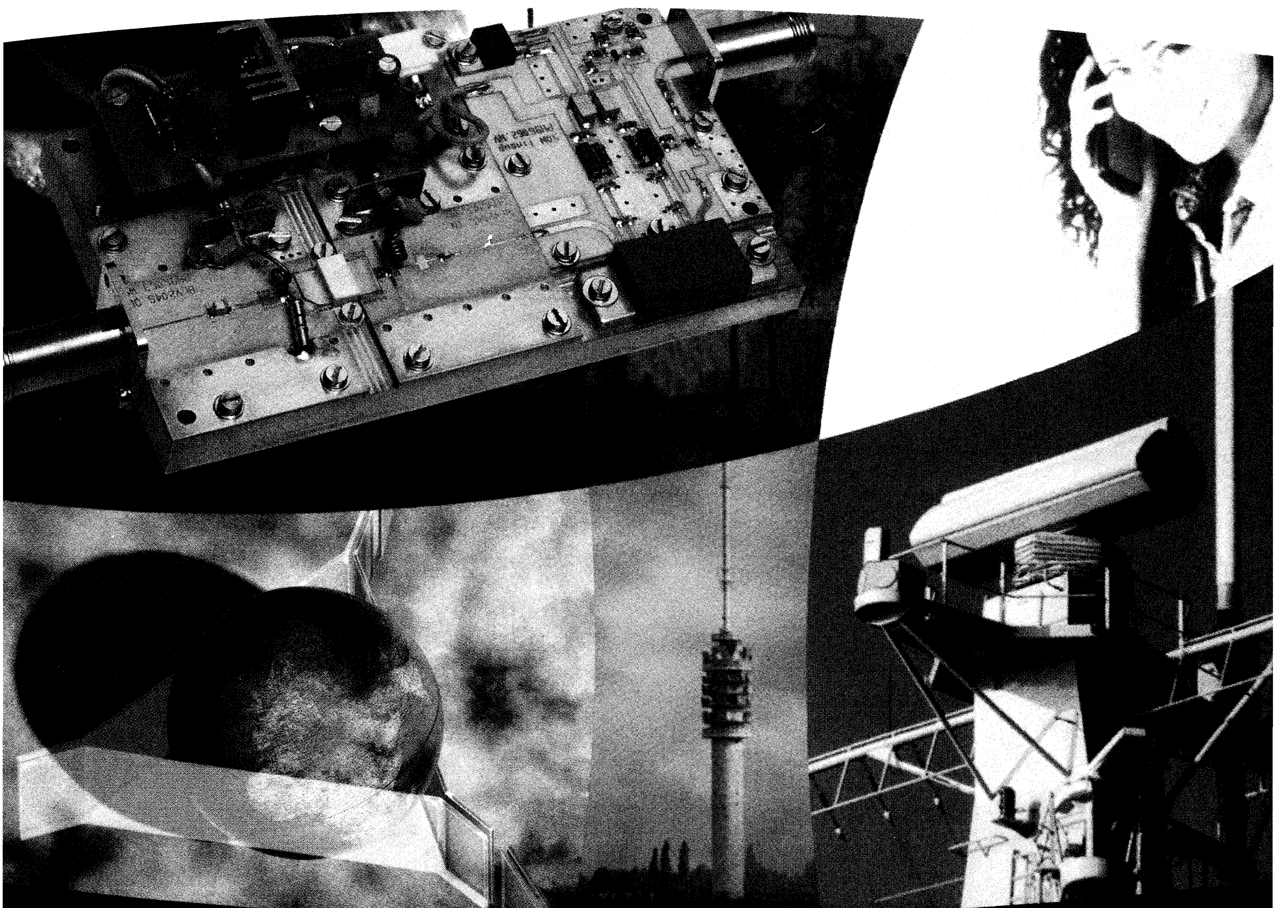
CRETE SEMICONDUCTORS

RF & Microwave Power Transistors, RF Power Modules and Circulators/Isolators

Data Handbook SC19a
CD-ROM included
1998



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QUALITY ASSURED

Our quality system focuses on the continuing high quality of our components and the best possible service for our customers. We have a three-sided quality strategy: we apply a system of total quality control and assurance; we operate customer-oriented dynamic improvement programmes; and we promote a partnering relationship with our customers and suppliers.

PRODUCT SAFETY

In striving for state-of-the-art perfection, we continuously improve components and processes with respect to environmental demands. Our components offer no hazard to the environment in normal use when operated or stored within the limits specified in the data sheet.

Some components unavoidably contain substances that, if exposed by accident or misuse, are potentially hazardous to health. Users of these components are informed of the danger by warning notices in the data sheets supporting the components. Where necessary the warning notices also indicate safety precautions to be taken and disposal instructions to be followed. Obviously users of these components, in general the set-making industry, assume responsibility towards the consumer with respect to safety matters and environmental demands.

All used or obsolete components should be disposed of according to the regulations applying at the disposal location. Depending on the location, electronic components are considered to be 'chemical', 'special' or sometimes 'industrial' waste. Disposal as domestic waste is usually not permitted.

RF & Microwave Power Transistors, RF Power Modules and Circulators/Isolators

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DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

RF & Microwave Power Transistors, RF Power Modules and Circulators/Isolators

PREFACE

Thank you for your interest in Philips Semiconductors RF and microwave products.

This databook lists many new and exciting products for all key segments of the RF market. For example, highly-advanced bipolar and MOS transistors for effective solutions in wireless communication up to 2 GHz, transmitting transistors for the more traditional radio and TV applications from HF to UHF, transistors for L- and S-band radars, and modules providing high-performance and low assembly costs. In short, the products that can assist your equipment marketing and help you meet sales targets.

All RF products in one book

This single volume (SC19a in Philips' data handbook system) replaces the following data handbooks:

- SC08a:RF Power Transistors for HF and VHF
- SC08b:RF Power Transistors for UHF
- SC09:RF Power Modules & Transistors for Mobile Phones
- SC15:Microwave transistors
- PC06:Circulators and Isolators.

We have been able to do this by publishing full data sheets for the newest products, but only short-form data for the others. Full data sheets of all types are however included on the CD-ROM supplied with this book (inside back cover). Subsequent revisions of the printed version will therefore constantly reflect state-of-the-art RF products.

Care has been taken in preparing both the CD-ROM and this book and in making them easy to use. Suggestions on how to make them even better are welcomed.

Stay up-to-date

Although the information in this data handbook is up-to-date at the time of going to press, for the latest information, contact your local Philips Semiconductors organization (see back cover), or visit our Internet site at:

http://www.semiconductors.philips.com

As well as being able to download data sheets via the Internet, you can get them from our fax -on-demand service, see page 44.

Application book - a practical support tool

A useful complement to this databook is the *"RF & Microwave Power Transistors and Isollators/Circulators application handbook"*. Part 1 describes the fundamentals of RF transmitting transistor and amplifier design and how to interpret published data sheets; Part 2 is a compilation of laboratory reports containing extensive information from Philips' System Laboratories to help you design-in Philips' RF and microwave transistors in a variety of applications.

Using the CD-ROM

The datasheet files on the CD-ROM are in Adobe's Portable Document Format (PDF) - a cross-platform file format that requires Acrobat Reader to view (also supplied on the CD-ROM). Acrobat Reader enables you to view and print pages, and perform basic searches. Please refer to the READ.ME file on the CD-ROM for information on the CD's contents and organization, as well as instructions how to install and use Acrobat Reader.

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GENERAL

QUALITY

Total Quality Management

Philips Semiconductors is a Quality Company, renowned for the high quality of our products and service. We keep alive this tradition by constantly aiming towards one ultimate standard, that of zero defects. This aim is guided by our Total Quality Management (TQM) system the basis of which is outlined the following paragraphs.

QUALITY ASSURANCE

Based on ISO 9000 standards, customer standards such as FDC, QS9000 and IBM MDQ. Our factories are certified to ISO 9000 by external inspectorates.

PARTNERSHIPS WITH CUSTOMERS

PPM co-operations, design-in agreements, ship-to-stock, just-in-time, self-qualification programmes and application support.

PARTNERSHIPS WITH SUPPLIERS

Ship-to-stock, statistical process control and ISO 9000 audits.

QUALITY IMPROVEMENT PROGRAMME

Continuous process and system improvement, design improvement, complete use of statistical process control, realization of our final objective of zero defects, and logistics improvement by ship-to-stock and just-in-time agreements.

Advanced quality planning

During the design and development of new products and processes, quality is built-in by advanced quality planning. Through failure-mode-and-effect analysis the critical parameters are detected and measures taken to ensure good performance on these parameters. The capability of process steps is also planned in this phase in preparation for production under statistical process control.

Product conformance

The assurance of product conformance is an integral part of our quality assurance (QA) practice. This is achieved by:

- Incoming material management through partnerships with suppliers.
- In-line quality assurance to monitor process reproducibility during manufacture and initiate any necessary corrective action. Process steps are under statistical process control.
- Acceptance tests on finished products to verify conformance with the device specification. The test results are used for quality feedback and corrective actions. The inspection and test requirements are detailed in the general quality specifications SNW-EQ-611.
- Periodic inspections to monitor and measure the conformance of products.
- Qualification tests (see SNW-EQ-611).

Product reliability

With the increasing complexity of Original Equipment Manufacturer (OEM) equipment, component reliability must be extremely high. Our research laboratories and development departments study the failure mechanisms of semiconductors. Their studies result in design rules and process optimization for the highest built-in product reliability. Highly accelerated tests are applied to the products reliability evaluation. Rejects from reliability tests and from customer complaints are submitted to failure analysis, to result in corrective action.

Customer response

Our quality improvement depends on joint action with our customer. We need our customer's inputs and we invite constructive comments on all aspects of our performance. Please contact our local sales representative.

Recognition

The high quality of our products and services is demonstrated by many Quality Awards granted by major customers and international organizations.

PRO ELECTRON TYPE NUMBERING SYSTEM

Basic type number

This type designation code applies to non-microwave discrete semiconductor devices (not integrated circuits), multiples of such devices, semiconductor chips and Darlington transistors. Only code letters relevant to the devices in this data handbook are given here.

FIRST LETTER

The first letter gives information about the material for the active part of the device.

B Silicon or other material with a band gap of 1 to 1.3 eV

SECOND LETTER

The second letter indicates the function for which the device is primarily designed. The same letter can be used for multi-chip devices with similar elements.

G Multiple of dissimilar devices/miscellaneous devices; e.g. oscillators. Also with special third letter; see under Section "Serial number"

L Transistor; power, high frequency

SERIAL NUMBER

For devices primarily intended for industrial or professional equipment, the serial number comprises one letter (Z, Y, X, etc.) and two to four figures running from 10 to 9999.

Version letter

A letter may be added to the basic type number to indicate minor electrical or mechanical variants of the basic type.

RATING SYSTEMS

The rating systems described are those recommended by the International Electrotechnical Commission (IEC) in its publication number 134.

Definitions of terms used

ELECTRONIC DEVICE

An electronic tube or valve, transistor or other semiconductor device. This definition excludes inductors, capacitors, resistors and similar components.

CHARACTERISTIC

A characteristic is an inherent and measurable property of a device. Such a property may be electrical, mechanical, thermal, hydraulic, electro-magnetic or nuclear, and can be expressed as a value for stated or recognized conditions. A characteristic may also be a set of related values, usually shown in graphical form.

BOGEY ELECTRONIC DEVICE

An electronic device whose characteristics have the published nominal values for the type. A bogey electronic device for any particular application can be obtained by considering only those characteristics that are directly related to the application.

RATING

A value that establishes either a limiting capability or a limiting condition for an electronic device. It is determined for specified values of environment and operation, and may be stated in any suitable terms. Limiting conditions may be either maxima or minima.

RATING SYSTEM

The set of principles upon which ratings are established and which determine their interpretation. The rating system indicates the division of responsibility between the device manufacturer and the circuit designer, with the object of ensuring that the working conditions do not exceed the ratings.

Absolute maximum rating system

Absolute maximum ratings are limiting values of operating and environmental conditions applicable to any electronic device of a specified type, as defined by its published data, which should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the device under consideration and of all other electronic devices in the equipment.

The equipment manufacturer should design so that, initially and throughout the life of the device, no absolute maximum value for the intended service is exceeded with any device, under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, equipment control adjustment, load variations, signal variation, environmental conditions, and variations in characteristics of the device under consideration and of all other electronic devices in the equipment.

Design maximum rating system

Design maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking responsibility for the effects of changes in operating conditions due to variations in the characteristics of the electronic device under consideration.

The equipment manufacturer should design so that, initially and throughout the life of the device, no design maximum value for the intended service is exceeded with a bogey electronic device, under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, variation in characteristics of all other devices in the equipment, equipment control adjustment, load variation, signal variation and environmental conditions.

Design centre rating system

Design centre ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device of a specified type as defined by its published data, and should not be exceeded under normal conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device in average applications, taking responsibility for normal changes in operating conditions due to rated supply voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of all electronic devices.

The equipment manufacturer should design so that, initially, no design centre value for the intended service is exceeded with a bogey electronic device in equipment operating at the stated normal supply voltage.

LETTER SYMBOLS

The letter symbols for transistors and signal diodes detailed in this section are based on IEC publication number 148.

Letter symbols for currents, voltages and powers

BASIC LETTERS

I, i	current
V, v	voltage
P, p	power.

Upper-case letter symbols are used to represent all values except instantaneous values that vary with time, these are represented by lower-case letters.

SUBSCRIPTS

A, a	anode terminal
(AV), (av)	average value
B, b	base terminal
C, c	collector terminal
D, d	drain terminal
E, e	emitter terminal
F, f	forward
G, g	gate terminal
K, k	cathode terminal
M, m	peak value
O, o	as third subscript: the terminal not mentioned is open-circuit
R, r	as first subscript: reverse. As second subscript: repetitive. As third subscript: with a specified resistance between the terminal not mentioned and the reference terminal
(RMS), (rms)	root-mean-square value
S, s	as first or second subscript: source terminal (FETs only). As second subscript: non-repetitive (not FETs). As third subscript: short circuit between the terminal not mentioned and the reference terminal
X, x	specified circuit
Z, z	replaces R to indicate the actual working voltage, current or power of voltage reference and voltage reference diodes.

No additional subscript is used for DC values.

Upper-case subscripts are used for the indication of:

- Continuous (DC) values (without signal), e.g. I_B
- Instantaneous total values, e.g. i_B
- Average total values, e.g. $I_{B(AV)}$
- Peak total values, e.g. I_{BM}
- Root-mean-square total values, e.g. $I_{B(RMS)}$.

Lower-case subscripts are used for the indication of values applying to the varying component alone:

- Instantaneous values, e.g. i_b
- Root-mean-square values, e.g. $I_{b(rms)}$
- Peak values, e.g. I_{bm}
- Average values, e.g. $I_{b(av)}$.

If more than one subscript is used, the subscript for which both styles exist are either all upper-case or all lower-case.

ADDITIONAL RULES FOR SUBSCRIPTS

Transistor currents

If it is necessary to indicate the terminal carrying the current, this should be done by the first subscript (conventional current flow from the external circuit into the terminal is positive).

Examples: I_B, i_B, i_b, I_{bm}.

Diode currents

To indicate a forward current (conventional current flow into the anode terminal), the subscript F or f should be used. For a reverse current (conventional current flow out of the anode terminal), the subscript R or r should be used.

Examples: I_F, I_R, i_F, $I_{f(rms)}$.

Transistor voltages

If it is necessary to indicate the points between which a voltage is measured, this should be done by the first two subscripts. The first subscript indicates the terminal at which the voltage is measured and the second the reference terminal or the circuit node. Where there is no possibility of confusion, the second subscript may be omitted.

Examples: V_{BE}, v_{BE}, v_{be}, V_{bem}.

Diode voltages

To indicate a forward voltage (anode positive with respect to cathode), the subscript F or f should be used. For a reverse voltage (anode negative with respect to cathode), the subscript R or r should be used.

Examples: V_F, V_R, v_F, V_{rm}.

Supply voltages or currents

Supply voltages or supply currents are indicated by repeating the appropriate terminal subscript.

Examples: V_{CC}, I_{EE}.

If it is necessary to indicate a reference terminal, this should be done by a third subscript.

Example: V_{CCE}.

Subscripts for devices with more than one terminal of the same kind

If a device has more than one terminal of the same kind, the subscript is formed by the appropriate letter for the terminal, followed by a number. In the case of multiple subscripts, hyphens may be necessary to avoid confusion.

Examples:

I_{B2}	continuous (DC) current flowing into the second base terminal
$V_{B2\text{-}E}$	continuous (DC) voltage between the terminals of second base and emitter terminals.

Subscripts for multiple devices

For multiple unit devices, the subscripts are modified by a number preceding the letter subscript. In the case of multiple subscripts, hyphens may be necessary to avoid confusion.

Examples:

I_{2C}	continuous (DC) current flowing into the collector terminal of the second unit
$V_{1C\text{-}2C}$	continuous (DC) voltage between the collector terminals of the first and second units.

Application of the rules

Figure 1 represents a transistor collector current as a function of time. It comprises a continuous (DC) current and a varying component.

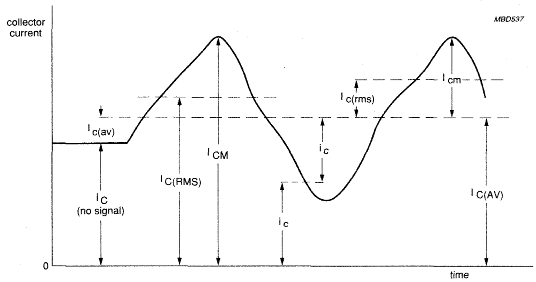


Fig.1 Collector current as a function of time.

Letter symbols for electrical parameters

DEFINITION

For the purpose of this publication, the term 'electrical parameter' applies to four-pole matrix parameters, elements of electrical equivalent circuits, electrical impedances and admittances, inductances and capacitances.

BASIC LETTERS

The following list comprises the most important basic letters used for electrical parameters of semiconductor devices.

B, b	susceptance (imaginary part of an admittance)
C	capacitance
G, g	conductance (real part of an admittance)
H, h	hybrid parameter
L	inductance
R, r	resistance (real part of an impedance)
X, x	reactance (imaginary part of an impedance)
Y, y	admittance
Z, z	impedance.

Upper-case letters are used for the representation of:

- Electrical parameters of external circuits and of circuits in which the device forms only a part.
- All inductances and capacitances.

Lower-case letters are used for the representation of electrical parameters inherent in the device, with the exception of inductances and capacitances.

SUBSCRIPTS

General subscripts

The following list comprises the most important general subscripts used for electrical parameters of semiconductor devices.

F, f	forward (forward transfer)
I, i (or 1)	input
L, l	load
O, o (or 2)	output
R, r	reverse (reverse transfer)
S, s	source.

Examples: Z_s, h_f, h_F.

The upper-case variant of a subscript is used for the designation of static (DC) values.

Examples:

h_{FE}	static value of forward current transfer ratio in common-emitter configuration (DC current gain)
R_E	DC value of the external emitter resistance.

The static value is the slope of the line from the origin to the operating point on the appropriate characteristic curve, i.e. the quotient of the appropriate electrical quantities at the operating point.

The lower-case variant of a subscript is used for the designation of small-signal values.

Examples:

h_{fe}	small-signal value of the short-circuit forward current transfer ratio in common-emitter configuration
$Z_e = R_e + jX_e$	small-signal value of the external impedance.

If more than one subscript is used, subscripts for which both styles exist are either all upper-case or all lower-case.

Examples: h_{FE}, y_{RE}, h_{fe}.

Subscripts for four-pole matrix parameters

The first letter subscript (or double numeric subscript) indicates input, output, forward transfer or reverse transfer.

Examples: h_i (or h_{11}), h_o (or h_{22}), h_f (or h_{21}), h_r (or h_{12}).

A further subscript is used for the identification of the circuit configuration. When no confusion is possible, this further subscript may be omitted.

Examples: h_{fe} (or h_{21e}), h_{FE} (or h_{21E}).

DISTINCTION BETWEEN REAL AND IMAGINARY PARTS

If it is necessary to distinguish between real and imaginary parts of electrical parameters, no additional subscripts should be used. If basic symbols for the real and imaginary parts exist, these may be used.

Examples: $Z_i = R_i + jX_i$, $y_{fe} = g_{fe} + jb_{fe}$.

If such symbols do not exist, or if they are not suitable, the following notation is used:

Examples:

Re (h_{ib}) etc. for the real part of h_{ib}

Im (h_{ib}) etc. for the imaginary part of h_{ib}.

Scattering parameters

In distinction to the conventional h-, y- and z-parameters, scattering parameters (s-parameters) relate to travelling wave conditions. Fig.2 shows a two-port network with the incident and reflected waves a_1, b_1, a_2 and b_2.

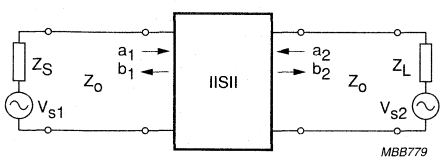


Fig.2 Two-port network.

From Fig.2: $a_1 = \frac{V_{i1}}{\sqrt{Z_0}}$; $a_2 = \frac{V_{i2}}{\sqrt{Z_0}}$; $b_1 = \frac{V_{r1}}{\sqrt{Z_0}}$; $b_2 = \frac{V_{r2}}{\sqrt{Z_0}}$

The squares of these quantities have the dimension of power.

Z_0 = characteristic impedance of the transmission line in which the two-port is connected

V_i = incident voltage

V_r = reflected (generated) voltage.

The four-pole equations for s-parameters are:

$b_1 = s_{11}a_1 + s_{12}a_2$

$b_2 = s_{21}a_1 + s_{22}a_2$.

Using the subscripts i for 11, r for 12, f for 21 and o for 22, it follows that:

$$s_i = s_{11} = \frac{b_1}{a_1} \mid a_2 = 0$$

$$s_r = s_{12} = \frac{b_1}{a_2} \mid a_1 = 0$$

$$s_f = s_{21} = \frac{b_2}{a_1} \mid a_2 = 0$$

$$s_o = s_{22} = \frac{b_2}{a_2} \mid a_1 = 0$$

The s-parameters can be named and expressed as follows:

$s_i = s_{11}$ input reflection coefficient: the complex ratio of the reflected wave and the incident wave at the input, under the conditions $Z_L = Z_0 = 50\ \Omega$ and $V_{s2} = 0$

$s_r = s_{12}$ reverse transmission coefficient: the complex ratio of the generated wave at the input and the incident wave at the output, under the conditions $Z_S = Z_0 = 50\ \Omega$ and $V_{s1} = 0$

$s_f = s_{21}$ forward transmission coefficient: the complex ratio of the generated wave at the output and the incident wave at the input, under the conditions $Z_L = Z_0 = 50\ \Omega$ and $V_{s2} = 0$

$s_o = s_{22}$ output reflection coefficient: the complex ratio of the reflected wave and the incident wave at the output, under the conditions $Z_S = Z_0 = 50\ \Omega$ and $V_{s1} = 0$.

SOLDERING SMD TRANSISTORS

Introduction

There are two basic forms of electronic component construction, those with leads for through-hole mounting and microminiature types for surface mounting (SMD). Through-hole mounting gives a very rugged construction and uses well established soldering methods. Surface mounting has the advantages of high packing density plus high-speed automated assembly. Surface mounting techniques are complex and this chapter gives only a simplified overview of the subject. For a more detailed description of soldering techniques, refer to Data Handbook SC18 "Discrete Semiconductor Packages", ordering number 9397 750 02418.

Although many electronic components are available as surface mounting types, some are not and this often leads to the use of through-hole as well as surface mounting components on one substrate (a mixed print). The mix of components affects the soldering methods that can be applied. A substrate having SMDs mounted on one or both sides but no through-hole components is likely to be suitable for reflow or wave soldering. A double sided mixed print that has through-hole components and some SMDs on one side and densely packed SMDs on the other normally undergoes a sequential combination of reflow and wave soldering. When the mixed print has only through-hole components on one side and all SMDs on the other, wave soldering is usually applied.

Reflow soldering process

There are three basic process steps for single-sided PCB reflow soldering, these are:

1. Applying solder paste to the PCB
2. Component placement
3. Reflow soldering.

APPLYING SOLDER PASTE TO THE PCB

Solder paste can be applied to the PCBs solder lands by one of either three methods: dispensing, screen or stencil printing.

Dispensing is flexible but is slow, and only suitable for pitches of 0.65 mm and above.

With screen printing, a fine-mesh screen is placed over the PCB and the solder paste is forced through the mesh onto the solder lands of the PCB. However, because of mesh aperture limitations (emulsion resolution), this method is only suitable for solder paste deposits of 300 μm and wider.

Stencil printing is similar to screen printing, except that a metal stencil is used instead of a fine-mesh screen. The stencil is usually made of stainless steel or bronze and should be 150 to 200 μm thick. A squeegee is passed across the stencil to force solder paste through the apertures in the stencil and onto the solder lands on the PCB. It does not suffer from the same limitations as the other two printing methods and so is the preferred method currently available.

COMPONENT PLACEMENT

The position of the component with respect to the solder lands is an important factor in the final result of the assembly process. A misaligned component can lead to unreliable joints, open circuits and/or bridges between leads.

The placement accuracy is defined as the maximum permissible deviation of the component outline or component leads, with respect to the actual position of the solder land pattern belonging to that component or component leads on the circuit board.

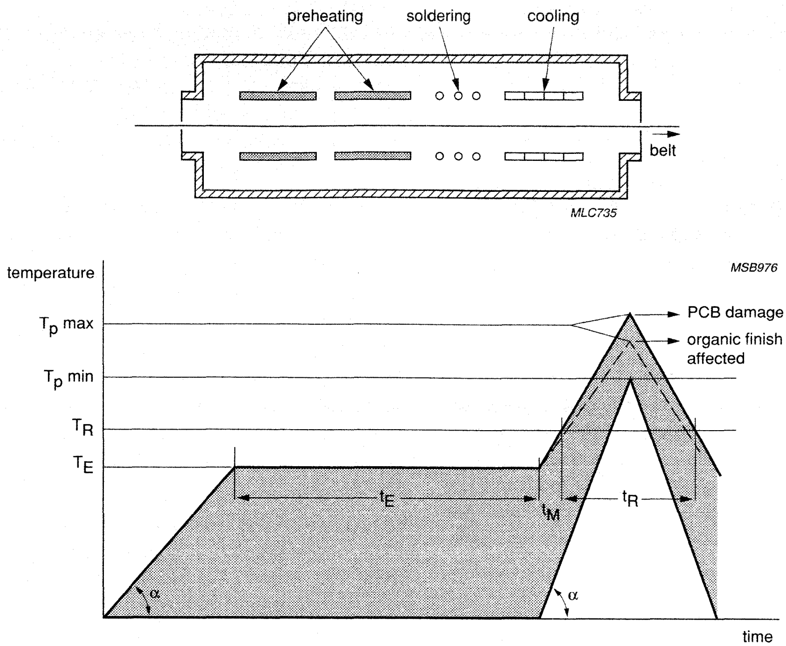
REFLOW SOLDERING

There are several methods available to provide the heat to reflow the solder paste, such as convection, hot belt, hot gas, vapour phase and resistance soldering. The preferred method is, however, convection reflow.

Convection reflow

With this method, the PCBs passes through an oven where it is preheated, reflow soldered and cooled (see Fig.3). If the heating rate of the board and components are similar, however, preheating is not necessary.

During the reflow soldering process, all parts of the board must be subjected to an accurate temperature/ time profile. Figure 3 shows a suitable profile framework for single-sided reflow soldering and the first side of double-sided print boards. It's important to note that this profile is for discrete semiconductor packages. The actual framework for the entire PCB could be smaller than the one shown, as other components on the board may have different process requirements.



α	$\leq$ 10 °C/s.	t_E $\leq$ 1 min, if possible (else $\leq$ 5 min).
T_E	$\leq$ 160 °C.	t_M = 2 to 30 s.
T_R	= 180 °C.	t_R $\leq$ 70 s.
$T_P$min	= 205 °C.	
$T_p$max	= 240 °C	for soldering the first side of a double-sided board with organic finish.
$T_P$max	= 280 °C	for all other cases.

Fig.3 Convection reflow soldering method (top), process requirements for reflow soldering (bottom).

Double-wave soldering process

There are four basic process steps for double-wave soldering, these are:

1. Applying adhesive
2. Component placement
3. Curing adhesive
4. Wave soldering process.

APPLYING ADHESIVE

To hold SMDs on the board during wave soldering, it is necessary to bond the component to the PCB with one or more adhesive dots. This is done either by dispensing, stencilling or pin transfer. Dispensing is currently the most popular technique. It is flexible and allows a controlled amount of adhesive to be applied at each position. Stencil printing and pin transfer are less flexible and are mainly used for mass production.

COMPONENT PLACEMENT

Positioning components on the PCB is similar in practice to that of reflow soldering.To prevent component shift and smearing of the adhesive, board support is important while placing components.

CURING THE ADHESIVE

To provide sufficient bonding strength between component and board, the adhesive must be properly cured. The adhesive can be cured either by infrared or hot-air convection.

WAVE SOLDERING PROCESS

After applying adhesive, placing the component on the PCB and curing, the PCB can be wave soldered. The wave soldering process is basically built up from three sub-processes. These are:

1. Fluxing
2. Preheating
3. (Double) wave soldering.

Although listed here as sub-process they are in practice combined in one machine. All are served by one transport mechanism, which guides the PCBs at an incline through the soldering machine. It's important to note that the PCB must be loaded into the machine so that the SMDs on the board come into direct contact with the solder wave (see Fig.4).

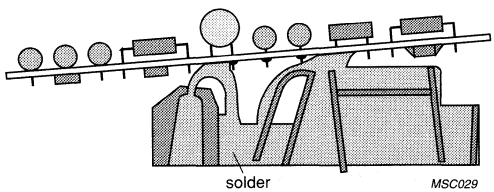


Fig.4 Double-wave soldering.

Fluxing

Fluxing is necessary to promote wetting both of the PCB and the mounted components. This ensures a good and even solder joint. During the fluxing process, the solder side of the PCB (including the components) are covered with a thin layer of solder flux, which can be applied to the PCB either by spraying or as a foam.

Preheating

After the flux is applied, the PCB needs to be preheated. This serves several purposes: it evaporates the flux solvents, it accelerates the activity of the flux and it heats the PCB and components to reduce thermal shock.

The required pre-heat temperature depends on the type of flux used. For example, the more common low-residue fluxes require a pre-heat temperature of 120 °C (measured on the wave solder side of the PCB).

(Double) wave soldering

The PCB first passes over a highly intensive (jet) solder wave with a carefully controlled constant height. This ensures good contact with the PCB, the edges of SMDs and the leads of components near to high non-wetted bodies. The greater the board's immersion depth into this first wave, the fewer joints will be missed.

The second, smoother laminar solder wave completes formation of the solder fillet, giving an optimal soldered connection between component and PCB. It also reduces the possibility of solder bridging by taking up excessive solder.

To reduce lead/tin oxides and possibly other solder imperfection forming during soldering, the complete wave configuration can be encapsulated by an inert atmosphere such as nitrogen.

Hand soldering microminiature components

It is possible to solder microminiature components with a light-weight hand-held soldering iron, but this method has obvious drawbacks and should be restricted to laboratory use and/or incidental repairs on production circuits:

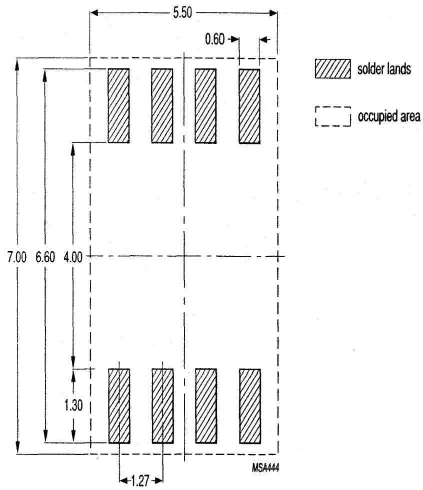
- Hand-soldering is time-consuming and therefore expensive
- The component cannot be positioned accurately and the connecting tags may come into contact with the substrate and damage it
- There is a risk of breaking the substrate and internal connections in the component could be damaged
- The component package could be damaged by the iron.

Specific recommendations for SOT409

Both the metallized ground plate and leads contribute to the heatflow. For the best results it is recommended to mount the transistor on a grounded metallized area on the printed-circuit board equipped with a large number of metallized through-holes filled with solder. A thermal resistance ($R_{th\ mb\text{-}h}$) of 0.9 K/W can be achieved if a heatsink compound is used when the printed-circuit board is mounted on the heatsink.

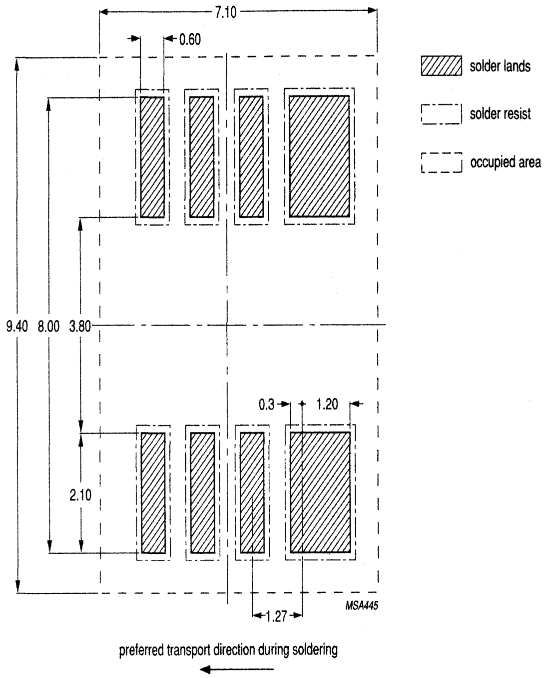
Recommended footprints

The recommended footprints for the discrete semiconductor packages contained in this book are given in Figs 5 to 9 and Fig.11.



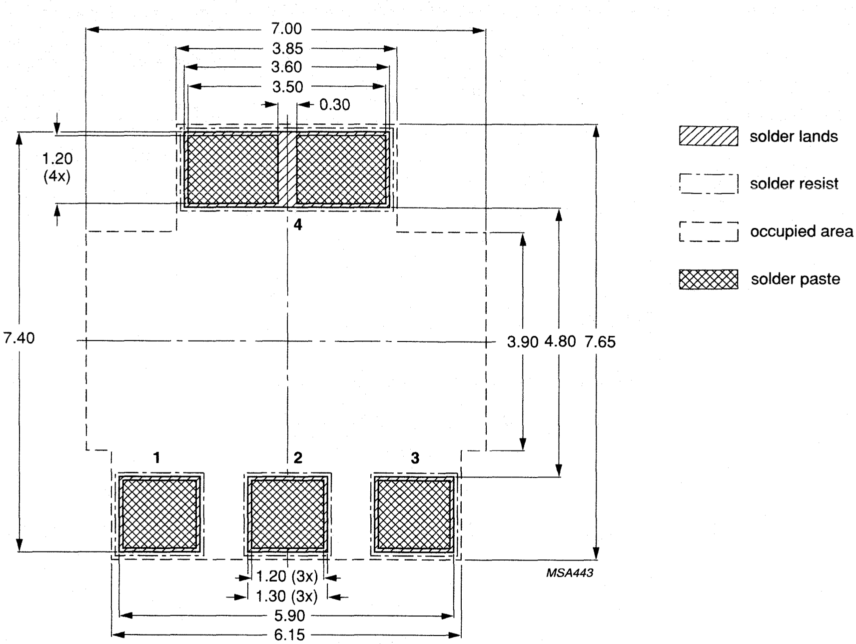
Dimensions in mm.
Placement accuracy: ±0.25 mm.

Fig.5 Reflow soldering footprint for SOT96 (SO8); typical dimensions.



Dimensions in mm.
Placement accuracy: ±0.25 mm.

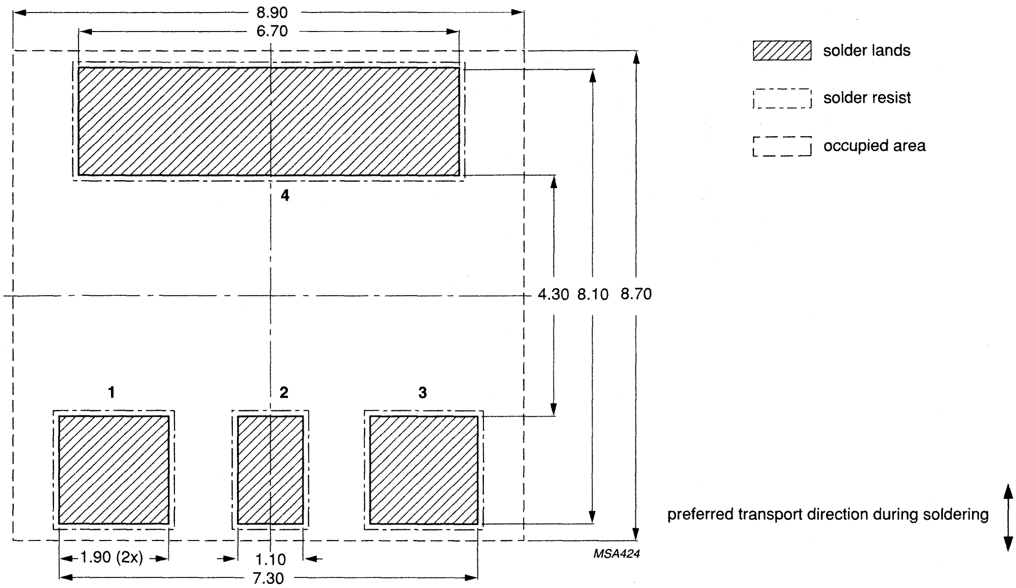
Fig.6 Wave soldering footprint for SOT96 (SO8); typical dimensions.



Dimensions in mm.

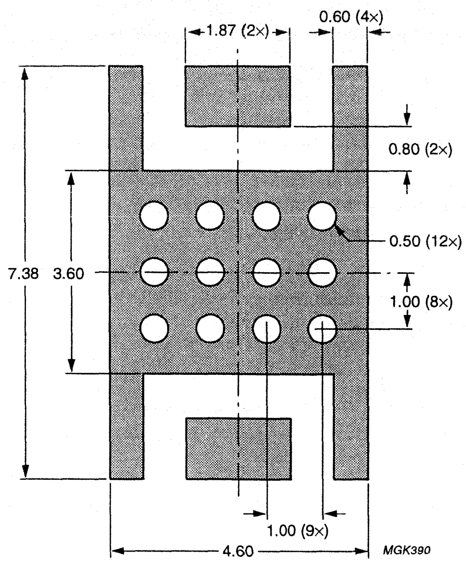
Placement accuracy: ±0.25 mm.

Fig.7 Reflow soldering footprint for SOT223; typical dimensions.



Dimensions in mm.
Placement accuracy: ±0.25 mm.

Fig.8 Wave soldering footprint for SOT223; typical dimensions.



Dimensions in mm.
Placement accuracy: ±0.25 mm.

Fig.9 Reflow soldering footprint for SOT409 (not suitable for wave soldering); typical dimensions.

SOLDERING SMD MODULES

The indicated temperatures are those at the solder interfaces.

Advised solder types are types with a liquidus less than or equal to 210 °C.

Solder dots or solder prints must be large enough to wet the contact areas.

Soldering can be carried out using a conveyor oven, a hot air oven, an infrared oven or a combination of these ovens. Two reflow steps are permitted.

Hand soldering must be avoided because the soldering iron tip can exceed the maximum permitted temperature of 250 °C and damage the module.

The maximum allowed temperature is (see Fig.10):

t = 5 s at 250 °C.

The maximum ramp-up is 10 °C per second.

The maximum cool-down is 5 °C per second.

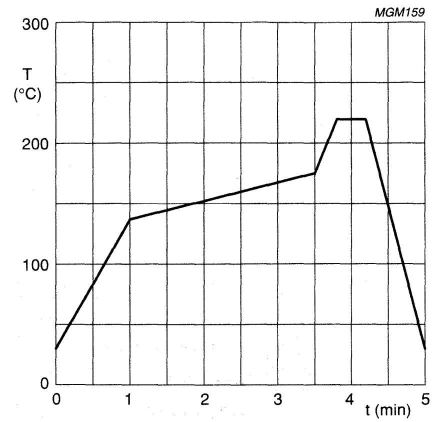


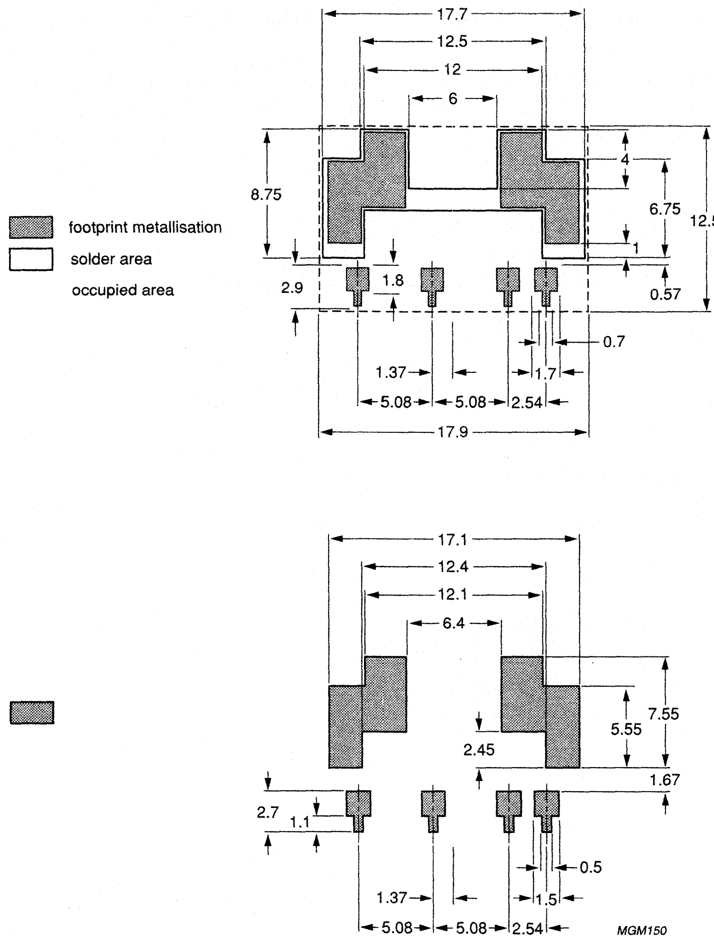
Fig.10 Recommended reflow temperature profile.

Cleaning

The following fluids may be used for cleaning:

- Alcohol
- Bio-Act (Terpene Hydrocarbon)
- Acetone.

Ultrasonic cleaning should not be used since this can cause serious damage to the product.



Dimensions in mm.

Fig.11 Footprint SOT388A/B/C.

MOUNTING FLANGED TRANSISTORS AND MODULES

Mounting recommendations for transistors

- Ensure holes in heatsinks are free from burrs.
- Minimum depth of tapped holes in heatsinks is 6 mm.
- Use 4-40 UNC-2A cheese-head screws with a flat washer to spread the joint pressure.
- For transistors dissipating up to 80 W, the heatsink thickness should be at least 3 mm copper (> 99.9% ETP-Cu) or 5 mm aluminium (99% Al). The thickness of the heatsink should be increased proportionally for transistors dissipating more power.
- The minimum flatness of the mounting area is 0.02 mm.
- Mounting area roughness should be less than 0.5 μm.
- Avoid, as much as possible, use of flux or flux solutions because flux can penetrate even hermetically sealed ceramic-capped transistors. Tin and wash the printed-circuit boards **before** mounting the transistors, then solder the transistors into place without using flux.
- Transistor leads may be tinned by dipping them full-length into a solder bath at a temperature of about 230 °C. No flux should be used during tinning.
- Recommended heatsink compounds: WPS II (silicone-free) from Austerlitz-Electronics; Comp. Trans. from KF; 340 from Dow Corning; Trans-Heat from E. Friis-Mikkelsen.
- When a transistor is removed from a heatsink, the flange, almost certainly, will have been distorted by the joint pressure. Grinding or lapping of the flange to the required flatness and smoothness is necessary before the transistor is remounted.

MOUNTING SEQUENCE

- Apply a thin layer of evenly-distributed heatsink compound to the flange.
- Position the device with flat washers in place.
- Tighten the screws until finger-tight (0.05 Nm).
- Further tighten the screws until the specified torque is reached (do not lubricate). Refer to Table 1 for torques.
- To lock mounting screws, allow about 30 minutes for them to bed-down after the specified torque has been applied, re-tighten to the specified torque and apply locking paint.

Table 1 Specified torque for flange mounted transistors

PACKAGE	TORQUE (Nm)	
	min	max
SOT119	0.6	0.75
SOT121	0.6	0.75
SOT123	0.6	0.75
SOT161	0.6	0.75
SOT171	0.6	0.75
SOT262	0.6	0.75
SOT268	0.6	0.75
SOT273	0.6	0.75
SOT279	0.6	0.75
SOT289	0.6	0.75
SOT324B	0.6	0.75
SOT390	–	0.5
SOT391	0.6	0.75
SOT391B	0.6	0.75
SOT422	–	0.5
SOT423	–	0.4
SOT437	–	0.5
SOT439	–	0.4
SOT440	–	0.4
SOT443	–	0.5
SOT445	–	0.4
SOT448	–	0.5
SOT460	–	0.5
SOT468	–	0.4
SOT469	–	0.4

Mounting recommendations for flanged modules

Modules (such as the SOT365) are manufactured using a ceramic substrate soldered to a copper or iron flange or mounting base; this causes a small thermal mismatch between these two components. A further thermal mismatch will exist between the mounting base and the heatsink to which it is mounted. Because of these mismatches, precautions must be taken to avoid unnecessary mechanical stresses being applied to the ceramic substrate and other components within the module resulting from variations in temperature during operating cycles.

Design of heatsink

To ensure that the maximum specified mounting base temperature will not be exceeded under maximum fault conditions, the module should always be mounted on a heatsink of suitable thermal resistance.

The mounting area of the heatsink should be flat and free from burrs and loose particles. Particular attention should be paid to the mounting hole areas. The maximum amount of bowing along the plane of the module should not exceed 0.1 mm. Where anodizing is used, the area under the module should be milled clean as the presence of anodizing under the module can result in high resistance earth paths, leading to oscillation and early failure, in addition to poor thermal contact.

The heatsink should be rigid and not prone to bowing under thermal cycling conditions. The thickness of a solid heatsink should not be less than 5 mm, to ensure a rigid assembly. On finned heatsinks, the module should be mounted along a plane parallel to the fins.

Mounting of modules

To ensure a good thermal contact and to prevent mechanical stresses when bolted down, the flatness of the mounting base is designed to be typically better than 100 μm.

The module should be mounted to the heatsink using 3 mm bolts with flat washers. The bolts should first be tightened to “finger tight” and then further tightened in alternating steps to a maximum torque of 0.4 to 0.6 Nm.

A thin, even layer of thermal compound should be used between the mounting base and the heatsink to achieve the best possible contact thermal resistance. Excessive use of thermal compound will result in an increase in thermal resistance and possible bowing of the mounting base; too little will also result in poor thermal resistance.

When mounted on the heatsink, the module leads can be soldered to the printed-circuit board. A soldering iron may be used up to a temperature of 250 °C for a maximum of 10 seconds at a distance of 2 mm from the plastic cap. ESD precautions must be taken to protect the device from electro-static damage.

Electrical connections

The main earth return path of all modules is via the mounting base; it is therefore important that the heatsink is well earthed and that return paths are kept as short as possible. Failure to ensure this may result in loss of output power or oscillation, which in turn will have a detrimental effect on the module life.

The RF output connection should be to correctly-designed 50 Ω terminations. Failure to do this will result in a mismatch being presented to the module, with a resulting reduction in module life.

THERMAL BEHAVIOUR OF TRANSISTORS

The thermal behaviour of packages is dependent on the materials used to construct the package. Table 2 gives an overview of the materials used in packages, while Table 3 shows the coefficients of linear thermal expansion for each material. The thermal expansion of the different parts can be calculated from this data.

Table 2 Overview of materials used in packages

PACKAGE	FLANGE			LEADFRAME				BACK-PAD	CERAMIC INSULATOR	
	Cu	W-Cu	Cu-Mo-Cu	ALLOY 42 (Fe58/Ni42)	Ni	KOVAR (Fe54/Ni29)	Cu	Cu	BeO	AIN
SOT119	√	–	–	√	–	–	–	–	√	–
SOT121	√	–	–	√	–	–	–	–	√	–
SOT123	√	–	–	√	–	–	–	–	√	–
SOT161	√	–	–	√	–	–	–	–	√	–
SOT171	√	–	–	√	–	–	–	–	√	–
SOT262	–	√	–	√	–	–	–	–	√	–
SOT268	–	√	–	√	–	–	–	–	√	–
SOT273	√	–	–	√	–	–	–	–	√	–
SOT279	√	–	–	√	–	–	–	–	√	–
SOT289	–	√	–	–	–	√	–	–	√	–
SOT324	–	√	–	√	–	–	–	–	√	–
SOT333	√	–	–	√	–	–	–	–	√	–
SOT390	–	√	–	√	–	–	–	–	√	–
SOT391	–	√	–	√	–	–	–	–	√	–
SOT391B	–	–	–	√	–	–	–	√	√	–
SOT409B	–	–	–	–	–	–	√	√	–	√
SOT422	√	–	–	–	√	–	–	–	√	–
SOT423	√	–	–	–	√	–	–	–	√	–
SOT437	–	√	–	√	–	–	–	–	√	–
SOT439	√	–	–	–	√	–	–	–	√	–
SOT440	√	–	–	–	–	√	–	–	√	–
SOT443	–	√	–	–	–	√	–	–	√	–
SOT445	√	–	–	–	–	√	–	–	√	–
SOT448	–	√	–	–	√	–	–	–	√	–
SOT460	–	√	–	√	–	–	–	–	√	–
SOT468	–	–	√	√	–	–	–	–	–	√
SOT511	–	–	–	–	–	–	–	–	–	√

Table 3 Coefficients of linear thermal expansion of package materials between 25 and 150 °C

SYMBOL	Cu	W-Cu	Cu-Mo-Cu	ALLOY 42 (Fe58/Ni42)	Ni	KOVAR (Fe54/Ni29)	BeO	AIN	UNIT
α	17.9	6.6	9.5 to 6.0	4.5	11.6	4.4	6.7	4.0	ppm/K

CAPSTAN HEADERS

Table 4 Mounting data for capstan headers

ITEM	MOUNTING STUD DIAMETER			TOLERANCE	UNIT
	$^1/_4$″	$^3/_8$″	$^1/_2$″		
Thread	8-32 UNC-2A(B)	10-32 UNF-2A(B)	$^1/_4$″ × 28 UNF-2A(B)	–	–
Maximum diameter of threaded stud	4.14	4.80	6.33	–	mm
Diameter of heatsink mounting hole	4.15	4.85	6.35	+0.05/–0	mm
Mounting nut thickness	3.5 and 5	5	5.5	–	mm
Mounting nut torque:					
minimum	0.75	1.5	2.3	–	Nm
maximum	0.85	1.7	2.7	–	Nm
Distance from heatsink to printed-circuit board	2.9	3.8	4.8	+0/–0.2	mm

Mounting recommendations

- Avoid, as much as possible, use of flux or flux solutions because flux can penetrate even hermetically sealed ceramic-capped transistors. Tin and wash the printed-circuit boards **before** mounting the power transistors, then solder the transistors into place without using flux.
- Transistor leads may be tinned by dipping them full-length into a solder bath at a temperature of about 230 °C. No flux should be used during tinning.
- Heatsink surfaces at the mounting hole are to be flat, parallel and free of burrs or oxidation.
- Do not use locking washers, their locking action can deteriorate in time due to the comparative softness of most heatsink materials. A flat washer can be used to spread the joint pressure.
- Ensure a positive clearance exists between leads and printed circuit board, this prevents upward lead-bending and consequent damage to the encapsulation
- Recommended heatsink compounds: WPS II (silicone-free) from Austerlitz-Electronics; Comp. Trans. from KF; 340 from Dow Corning; Trans-Heat from E. Friis-Mikkelsen.
- The full mounting nut torque should be applied only once in the life of a transistor. For pre-assembly testing, apply no more than two-thirds of the specified torque.

Mounting sequence

- Apply a thin layer of evenly-distributed heatsink compound to the heatsink.
- Position the device with a flat washer in place.
- Tighten the screws until finger-tight (0.05 Nm).
- Further tighten the screws until the specified torque is reached (do not lubricate); for torques, refer to the package outline section of this data handbook.
- To lock mounting screws, allow about 30 minutes for them to bed-down after the specified torque has been applied, re-tighten to the specified torque and apply locking paint.

HANDLING MOS DEVICES

Electrostatic charges

Electrostatic charges can exist in many things; for example, man-made-fibre clothing, moving machinery, objects with air blowing across them, plastic storage bins, sheets of paper stored in plastic envelopes, paper from electrostatic copying machines, and people. The charges are caused by friction between two surfaces, at least one of which is non-conductive. The magnitude and polarity of the charges depend on the different affinities for electrons of the two materials rubbing together, the friction force and the humidity of the surrounding air.

Electrostatic discharge is the transfer of an electrostatic charge between bodies at different potentials and occurs with direct contact or when induced by an electrostatic field. Our RF Power MOS transistors are sensitive to electrostatic discharge and, to avoid damage, the following precautions must be taken.

Work station

Figure 12 shows a working area suitable for safely handling electrostatic sensitive devices. It has a work bench, the surface of which is conductive or covered by an antistatic sheet. Typical resistivity for the bench surface is between 1 and 500 kΩ per cm^2. The floor should also be covered with antistatic material.

The following precautions should be observed:

- Persons at a work bench should be earthed via a wrist strap and a resistor.
- All mains-powered electrical equipment should be connected via an earth leakage switch.
- Equipment cases should be earthed.
- Relative humidity should be maintained between 50 and 65%.
- An ionizer should be used to neutralize objects with immobile static charges.

Receipt and storage

Our devices are packed for dispatch in antistatic conductive containers, usually boxes, tubes or blister tape. The fact that the contents are sensitive to electrostatic discharge is shown by warning labels on both primary and secondary packing.

The devices should be kept in their original packing whilst in storage. If a bulk container is partially unpacked, the unpacking should be performed at a protected work station. Any devices that are stored temporarily should be packed in conductive or antistatic packing or carriers.

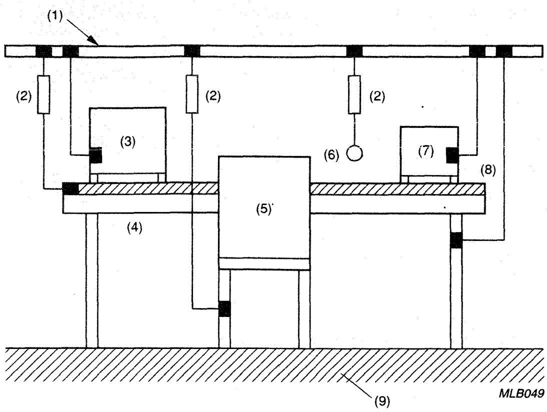
Assembly

The devices must be removed from their protective packing with earthed component pincers or short-circuit clips. Short-circuit clips must remain in place during mounting, soldering and cleansing/drying processes. Do not remove more devices from the storage packing than are needed at any one time. Production/assembly documents should state that the product contains electrostatic sensitive devices and that special precautions need to be taken.

All tools used during assembly, including soldering tools and solder baths, must be earthed. All hand tools should be of conductive or antistatic material and, where possible, should not be insulated.

Measuring and testing of completed circuit boards must be done at a protected work station. Place the soldered side of the circuit board on conductive or antistatic foam and remove the short-circuit clips. Remove the circuit board from the foam, holding the board only at the edges. Make sure the circuit board does not touch the conductive surface of the work bench. After testing, replace the circuit board on the conductive foam to await packing.

Assembled circuit boards should be handled in the same way as unmounted devices. They should also carry warning labels and be packed in conductive or antistatic packing.



(1) Earthing rail.
(2) Resistor (500 kΩ ±10%, 0.5 W).
(3) Ionizer.
(4) Work bench.
(5) Chair.
(6) Wrist strap.
(7) Electrical equipment.
(8) Conductive surface/antistatic sheet.
(9) Antistatic floor.

Fig.12 Protected work station.

TAPE AND REEL PACKING

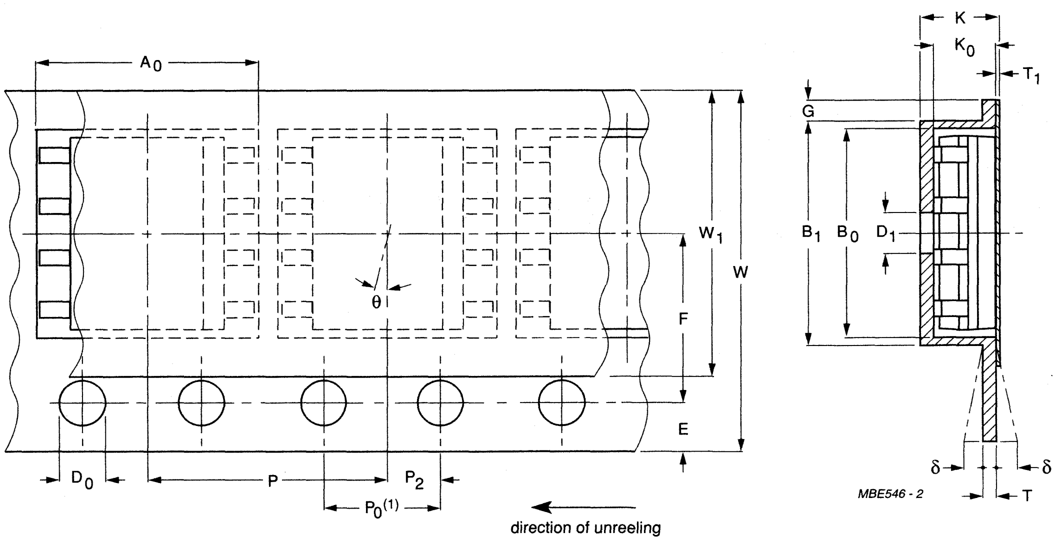
Packing types

Table 5 Packing quantities per reel

PACKAGE	TAPE WIDTH (mm)	REEL SIZE (mm)	QUANTITY PER REEL	12NC(1) ends with:
SOT96 (SO8)	12	330	2500	...118
SOT223	12	180	1000	...115
	12	330	4000	...135
SOT338A/B	32	330	750	...135
SOT338C	32	330	800	...135
SOT421A	44	330	600	...135

Note

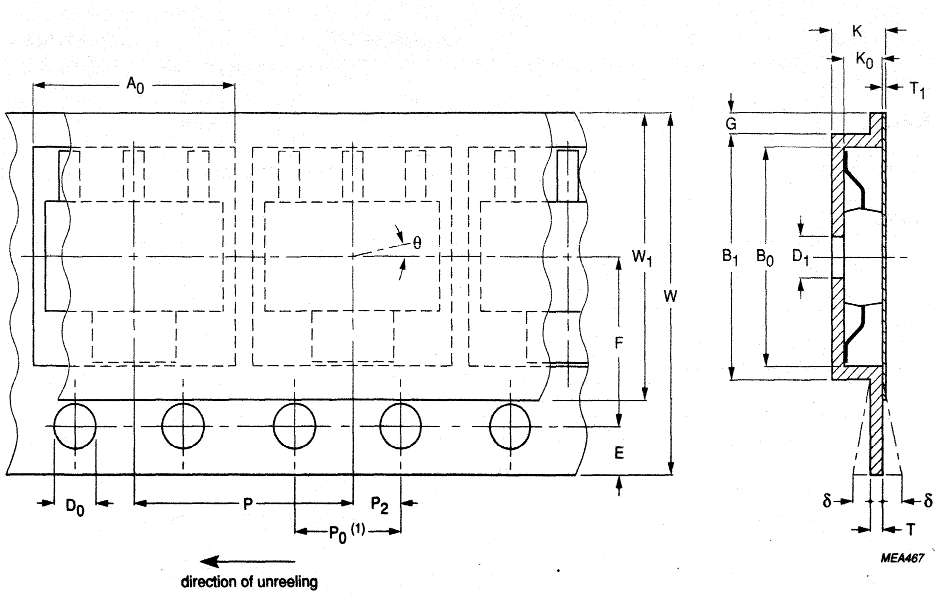
1. 12NC is the Philips twelve-digit ordering code.



For dimensions see Table 6.

(1) Tolerance over any 10 pitches: ±0.2 mm.

Fig.13 Specification for 12 mm tape (SOT96).



For dimensions see Table 6.

(1) Tolerance over any 10 pitches: ±0.2 mm.

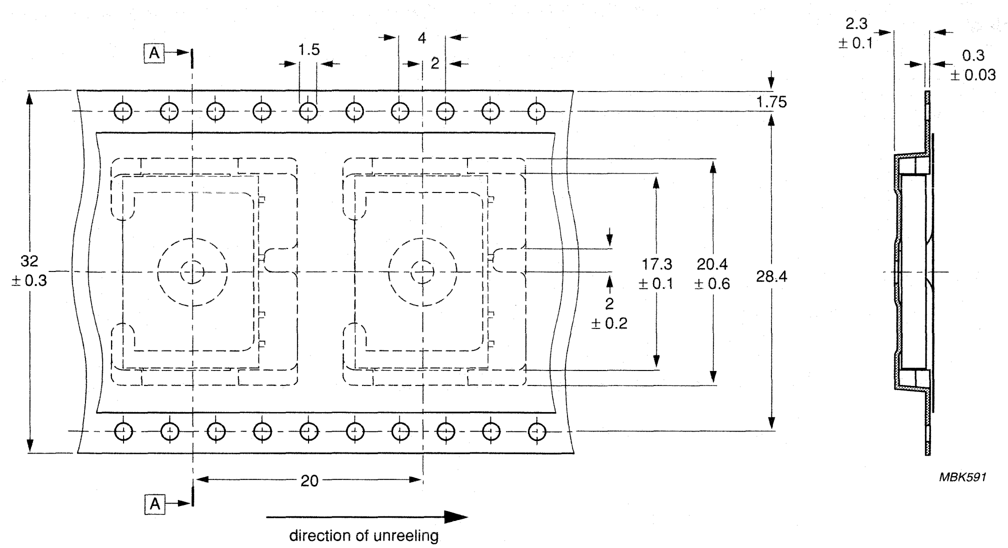
Fig.14 Specification for 12 mm tape (SOT223).

Table 6 Tape dimensions (in mm)

DIMENSION (Figs 13 and 15)	**12 mm CARRIER TAPE**	**TOLERANCE**
Overall dimensions		
W	12.0	±0.2
K	<2.4	–
G	>0.75	–
Sprocket holes; note 1		
D_0	1.5	+0.1/–0
E	1.75	±0.1
P_0	4.0	±0.1
Relative placement compartment		
P_2	2.0	±0.1
F	5.5	±0.05
Compartment		
A_0	Compartment dimensions depend on package size. Maximum clearance between device and compartment is 0.3 mm; the minimum clearance ensures that the device is not totally restrained within the compartment.	
B_0		
B_1		
K_0		
D_1	>1.5	–
P	8.0	±0.1
θ	<15°	–
Cover tape; note 2		
W_1	<9.5	–
T_1	<0.1	–
Carrier tape		
W	12.0	±0.2
T	<0.2	–
δ	<0.3	–

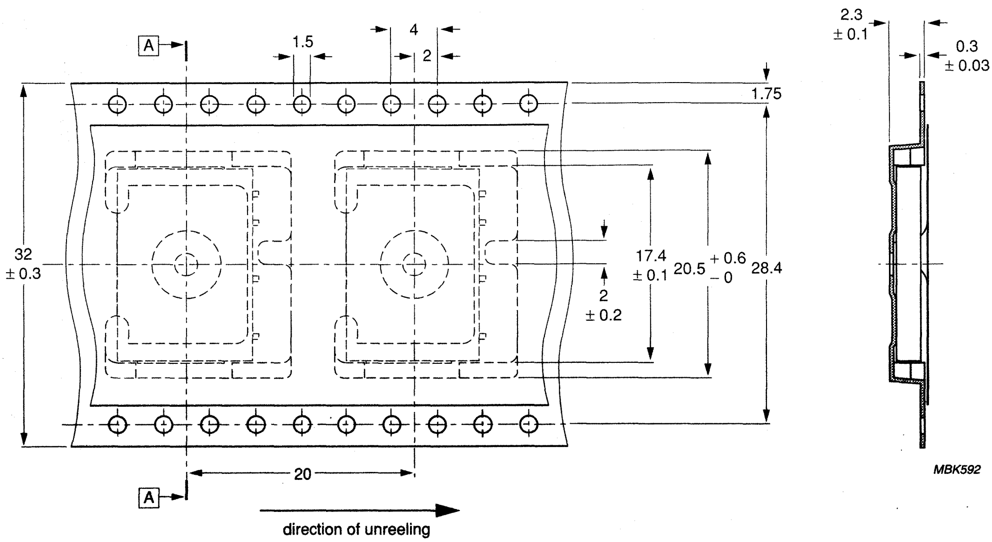
Notes

1. Tolerance over any 10 pitches ±0.2 mm.
2. The cover tape shall not overlap the tape or sprocket holes.



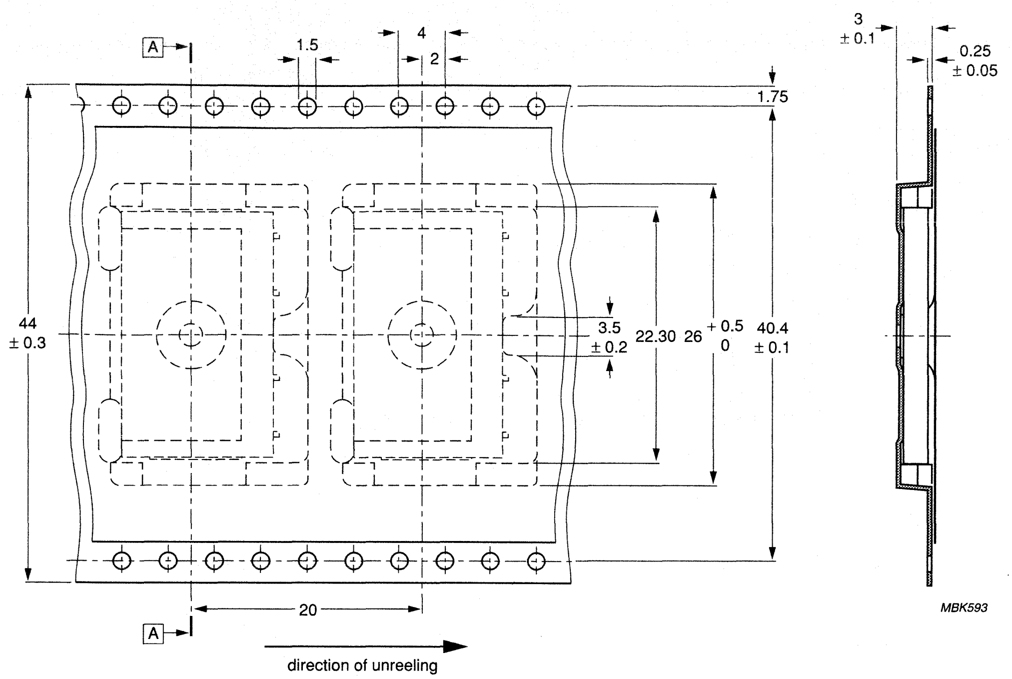
Dimensions in mm.

Fig.15 Specification of tape for SOT388A/B (32 mm tape).



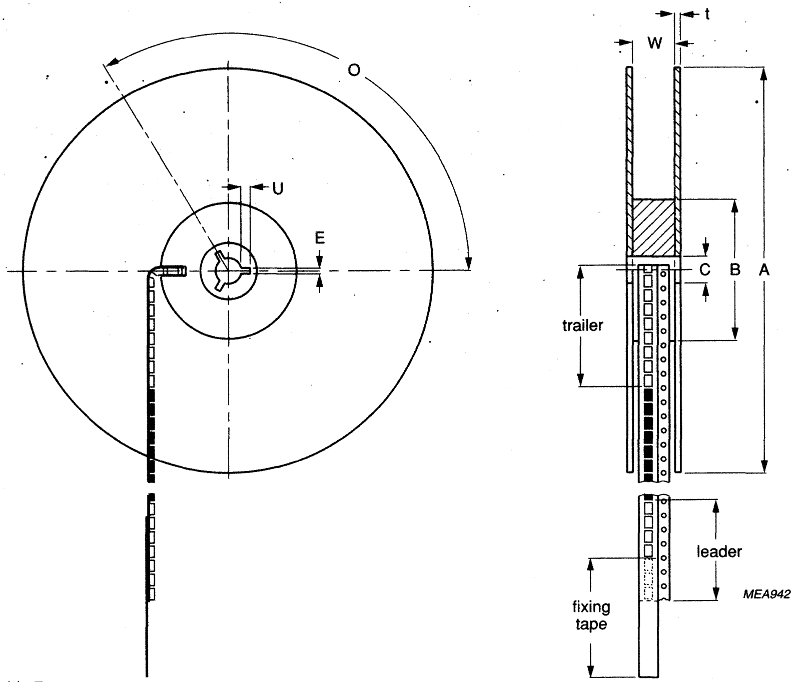
Dimensions in mm.

Fig.16 Specification of tape for SOT388C (32 mm tape).



Dimensions in mm.

Fig.17 Specification of tape for SOT421A (44 mm tape).



For dimensions see Table 7.

Fig.18 Reel specification.

Table 7 Reel dimensions (in mm)

DIMENSION (see Fig.18)	12 mm CARRIER TAPE	TOLERANCE	40 mm CARRIER TAPE	TOLERANCE
Flange				
A	180[1] or 330	±0.5	330	–
t	1.5	+0.5/–0.1	3	–
W	12.4	18.0+0.2	44.4	+2/–0
Hub				
B	62	±1.5	101	±1.5
C	12.75	+0.15/–0.2	13	±1.5
Key slot				
E	2	±0.2	1.5	–
U	4	±0.5	3.6	–
O	120°	–	120°	–

Note

1. Large reel diameter depends on individual package (286 or 350).

THERMAL CONSIDERATIONS

Introduction

This chapter only gives a brief overview of the thermal characteristics of discrete semiconductors. For a more in-depth explanation, refer to Data Handbook SC18 "Discrete Semiconductor Packages", ordering number 9397 750 02418.

Thermal resistance

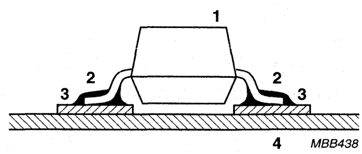
Circuit performance and long-term reliability are affected by the temperature of the transistor die. Normally, both are improved by keeping the die temperature (junction temperature) low.

Electrical power dissipated in any semiconductor device is a source of heat. This increases the temperature of the die about some reference point, normally an ambient temperature of 25 °C in still air. The size of the increase in temperature depends on the amount of power dissipated in the circuit and the net thermal resistance between the heat source and the reference point.

Devices lose most of their heat by conduction when mounted on a a printed board, a substrate or heatsink. Referring to Fig.19 (for surface mounted devices mounted on a substrate), heat conducts from its source (the junction) via the package leads and soldered connections to the substrate. Some heat radiates from the package into the surrounding air where it is dispersed by convection or by forced cooling air. Heat that radiates from the substrate is dispersed in the same way.

The elements of thermal resistance shown in Fig.20 are defined as follows:

- $R_{th\ j\text{-}mb}$ thermal resistance from junction to mounting base
- $R_{th\ j\text{-}c}$ thermal resistance from junction to case
- $R_{th\ j\text{-}s}$ thermal resistance from junction to soldering point
- $R_{th\ c\text{-}a}$ thermal resistance from case to ambient
- $R_{th\ j\text{-}a}$ thermal resistance from junction to ambient.



Heat radiates from the package '1' to ambient.
Heat conducts via leads '2', solder joints '3' to the substrate '4'.

Fig.19 Heat losses.

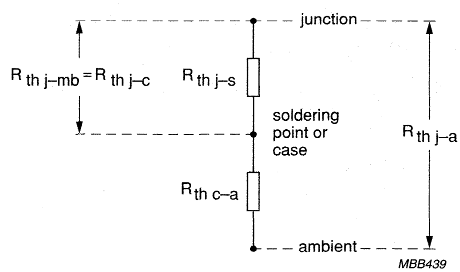


Fig.20 Representation of thermal resistance paths of a device mounted on a substrate or printed board.

The temperature at the junction depends on the ability of the package and its mounting to transfer heat from the junction region to the ambient environment. The basic relationship between junction temperature and power dissipation is:

$$T_{j\,max} = T_{amb} + P_{tot\,max}\,(R_{th\,j\text{-}s} + R_{th\,s\text{-}a})$$
$$= T_{amb} + P_{tot\,max}\,(R_{th\,j\text{-}a})$$

where:

$T_{j\,max}$ is the maximum junction temperature

T_{amb} is the ambient temperature

$P_{tot\,max}$ is the maximum power handling capability of the device, including the effects of external loads when applicable.

In the expression for $T_{j\,max}$, only T_{amb} and $R_{th\,s\text{-}a}$ can be varied by the user. The package mounting technique and the flow of cooling air are factors that affect $R_{th\,s\text{-}a}$. The device power dissipation can be controlled to a limited extent but under recommended usage, the supply voltage and circuit loading dictate a fixed power maximum. The $R_{th\,j\text{-}s}$ value is essentially independent of external mounting method and cooling air; but is sensitive to the materials used in the package construction, the die bonding method and the die area, all of which are fixed.

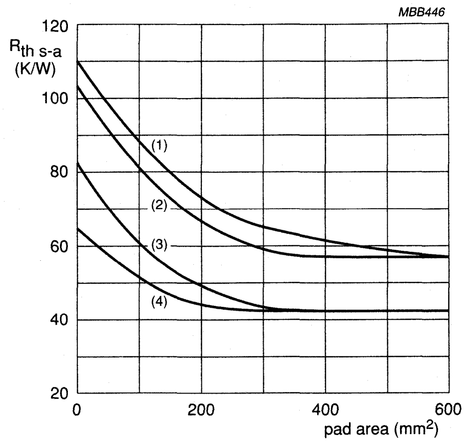
For applications where the temperature of the case is stabilized by a large or temperature-controlled heatsink, the junction temperature can be calculated from

$T_j = T_{case} + P_{tot} \times R_{th\,j\text{-}c}$ or, using the soldering point definition, from $T_j = T_{solder} + P_{tot} \times R_{th\,j\text{-}s}$.

Values of $T_{j\,max}$ and $R_{th\,j\text{-}s}$, or $R_{th\,j\text{-}c}$ or $R_{th\,j\text{-}a}$ are given in the device data sheets.

Thermal resistance ($R_{th\,s\text{-}a}$)

The thermal resistance from soldering point to ambient, and that from case to ambient depends on the shape and material of the tracks and substrate as illustrated in Figure 21.



(1) Single-sided, unplated.
(2) Single-sided, plated.
(3) Double-sided, unplated.
(4) Double-sided, plated.

Fig.21 Thermal resistance ($R_{th\,s\text{-}a}$) as a function of pad area on different configurations of FR4 epoxy fibre-glass circuit board.

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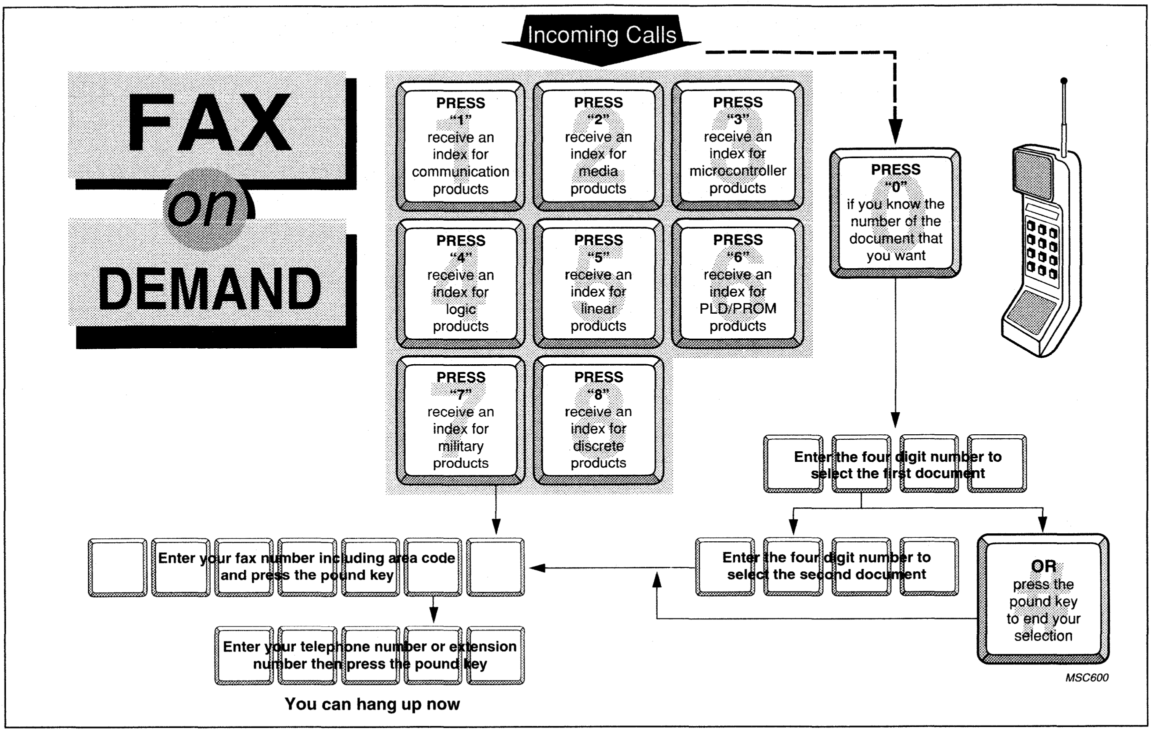

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RF & Microwave Power Transistors

CONTENTS

SELECTION GUIDE

RF & MICROWAVE POWER TRANSISTORS

RF POWER TRANSISTORS FOR HF AND VHF

1.6 to 30 MHz Bipolar RF power transistors

TYPE NUMBER	PACKAGE	LOAD POWER P_L (PEP) (W)	POWER GAIN G_p (dB)	SUPPLY VOLTAGE V_{CE} (V)	PAGE
Class-A intermodulation distortion: d_3, $d_5 < -40$ dB					
BLV10	SOT123A	1	18	12	257
BLY87C	SOT120A	1	18	12	564
BLV11	SOT123A	2	18	12	260
BLY88C	SOT120A	2	18	12	567
BLW87	SOT123A	6	18	12	540
BLY89C	SOT120A	6	18	12	570
BLV20	SOT123A	1.3	20	26	265
BLV21	SOT123A	2.5	20	26	268
BLW83	SOT123A	10	20	26	502
BLW86	SOT123A	17	22	26	537
BLW78	SOT123A	35	19.5	26	522
BLW96	SOT121B	50	19	40	546
BLW50F	SOT123A	16	19.5	45	510

1.6 to 30 MHz Bipolar RF power transistors

TYPE NUMBER	PACKAGE	LOAD POWER P_L (PEP) (W)	POWER GAIN G_p (dB)	EFFICIENCY (SSB) (%)	SUPPLY VOLTAGE V_{CE} (V)	PAGE
Class-AB intermodulation distortion d_3, $d_5 < -30$ dB						
BLW85	SOT123A	30	19.5	30	12.5	534
BLW60C	SOT120A	30	19.5	35	12.5	513
BLV11	SOT123A	10	18	–	13.5	260
BLY88C	SOT120A	10	18	–	13.5	567
BLW87	SOT123A	15	18	–	13.5	540
BLY89C	SOT120A	15	18	–	13.5	570
BLV21	SOT123A	10	20	–	28	268
BLW83	SOT123A	25	20	40	28	531
BLW86	SOT123A	42.5	19	45	28	537
BLW76	SOT121B	80	13	>35	28	516
BLW78	SOT121B	100	19	42	28	522
BLW77	SOT121B	130	12	>37.5	28	519
BLW97	SOT121B	175	11.5	>40	28	549
BLW50F	SOT123A	65	18	45	50	510
BLW96	SOT121B	200	13.5	>40	50	546

1.6 to 30 MHz MOS RF power transistors

TYPE NUMBER	PACKAGE	P_L (PEP) (W)	V_{DS} (V)	G_p (dB)	EFFICIENCY (SSB) (%)	PAGE
HF SSB class-AB (28 MHz, d3, d5 < −30 dB, 28 V & 50 V supply)						
BLF145	SOT123A	30	28	typ. 20	40	82
BLF246	SOT121B	80	28	typ. 20	–	109
BLF147	SOT121B	150	28	17	>35	85
BLF175	SOT123A	30	50	23	40	88
BLF177	SOT121B	150	50	20	>35	91
HF SSB class-A (1.6 to 30 MHz, d3, d5 < −40 dB, 28 V & 50 V supply)						
BLF242	SOT123A	2	28	typ. 23	–	97
BLF244	SOT123A	4	28	typ. 23	–	100
BLF145	SOT123A	8	28	24	–	82
BLF246	SOT121B	20	28	typ. 23	–	109
BLF175	SOT123A	8	50	>24	–	88

25 to 175 MHz bipolar RF power transistors

TYPE NUMBER	PACKAGE	LOAD POWER @ 175 MHZ (W)	POWER GAIN @ 175 MHZ (dB)	EFFICIENCY (CW) (%)	SUPPLY VOLTAGE V_{CE} (V)	PAGE
Class-B; 7.5 to 9.6 V supply voltage (portable)						
BLW29	SOT120A	9	7.4	>60	7.5	492
Class-B; 12 to 13.5 V supply voltage (car mobile)						
BLW80	SOT122A	4	8	60	12.5	525
BLW81	SOT122A	10	13.5	60	12.5	528
BLW30	SOT120A	30	10	60	12.5	495
BLV12	SOT123A	30	9	66	12.5	262
BLW60C	SOT120A	45	5	>75	12.5	513
BLW85	SOT123A	45	4.5	>75	12.5	534
BLV45/12	SOT119A	45	6.5	67	12.5	282
BLV75/12	SOT119A	75	6.5	63	12.5	296
BLV10	SOT123A	8	9	>70	13.5	257
BLY87C	SOT120A	8	12	>60	13.5	564
BLV11	SOT123A	15	8	>60	13.5	260
BLW29	SOT120A	15	10	>60	13.5	492
BLY88C	SOT120A	15	8	>60	13.5	567
BLW87	SOT123A	25	6	>70	13.5	540
BLY89C	SOT120A	25	6	>70	13.5	570
Class-B; 28 V base stations						
BLV20	SOT123A	8	12	>65	28	265
BLV21	SOT123A	15	10	>65	28	268
BLW86	SOT123A	45	7.5	>70	28	537
BLW78(1)	SOT121B	100	6	>70	28	522
BLW77(2)	SOT121B	130	7.5	75	28	519

Notes

1. Load power and power gain measured at 150 MHz.
2. Load power and power gain measured at 87.5 MHz.

25 to 175 MHz MOS RF transistors

TYPE NUMBER	PACKAGE	P_L (W)	V_{DS} (V)	f (MHz)	G_p (dB)	EFFICIENCY (CW) (%)	PAGE
VHF base stations (Class-B operation, 28 V & 50 V supply)							
BLF242	SOT123A	5	28	175	13	60	97
BLF244	SOT123A	15	28	175	13	65	100
BLF245	SOT123A	30	28	175	13	67	103
BLF245B	SOT279A	30	28	175	14	65	106
BLF246	SOT121B	80	28	108	16	55	109
BLF147	SOT121B	150	28	108	typ. 14	70	85
BLF248	SOT262A	300	28	175	typ. 13	67	112
BLF175	SOT123A	30	50	108	typ. 20	65	88
BLF276	SOT119D	100	50	108	18	60	115
BLF177	SOT121B	150	50	108	typ. 19	70	91
BLF277	SOT119A	150	50	175	14	58	118
BLF278	SOT262A	300	50	108	20	70	121
VHF mobile transmitters (Class-B operation, 12.5 V supply)							
BLF244	SOT123A	6	12.5	175	typ. 15	60	100
BLF245	SOT123A	12	12.5	175	typ. 12	66	103
BLF225	SOT123A	30	12.5	175	8. 5	70	94

87 to 108 MHz FM broadcast bipolar RF power transistors

TYPE NUMBER	PACKAGE	LOAD POWER @ 108 MHZ (W)	POWER GAIN @ 108 MHZ (dB)	EFFICIENCY (CW) (%)	SUPPLY VOLTAGE V_{CE} (V)	PAGE
Class-B						
BLW90	SOT122A	4	20	–	28	543
BLV21	SOT123A	15	10	>65	28	268
BLW86	SOT123A	45	7.5	>70	28	537
BLW76	SOT121B	80	8	70	28	516
BLW78	SOT121B	100	6	>70	28	522
BLV25	SOT119A	175	10	70	28	271

Bipolar RF power transistors for TV transposers and transmitters

TYPE NUMBER	PACKAGE	OUTPUT POWER $P_{o\ sync}$ (W)	d_{im} (dB)	LOAD POWER (W)	POWER GAIN @ 860 MHZ (dB)	EFFICIENCY (CW) (%)	SUPPLY VOLTAGE V_{CE} (V)	PAGE
Class-A bands I (41 to 68 MHz) & III (174 to 230 MHz)								
BLV33F	SOT119A	22	–55	–	14.8	–	25	278
BLV33	SOT147A	26	–55	–	9.7	–	25	274
Class-AB bands I (41 to 68 MHz) & III (174 to 230 MHz)								
BLV33F	SOT119A	–	–	85	10.5	71	28	278
BLV33	SOT147A	–	–	90	6.5	72	28	274
Class-A bands IV & V 470 to 860 MHz								
BLW32	SOT122A	0.63	–60	–	11	–	25	498
BLW33	SOT122A	1.15	–60	–	10	–	25	502
BLW34	SOT122A	2.15	–60	–	9	–	25	506
BLW898	SOT171A	3	–60	–	8.5	–	25	556
BLW98	SOT122A	4.4	–60	–	6.5	–	25	552
BLV857	SOT324B	10	–51	–	>10	–	25	332
BLV57	SOT161A	12	–60	–	9	–	25	285
BLV859	SOT262B	20	–51	–	10	–	25	341
BLV58	SOT289A	25	–45	–	10	–	25	290
Class-AB bands IV & V 470 to 860 MHz								
BLV59	SOT171A	–	–	30	7	55	25	293
BLV57	SOT161A	–	–	38	7	55	25	285
BLV861	SOT289A	–	–	100	8.5	55	28	350
BLV862	SOT262B	–	–	150	9	52	28	358

MOS RF power transistors for TV transposers and transmitters

TYPE NUMBER	PACKAGE	$P_{o\ sync}$ (W)	V_{DS} (V)	f (MHz)	G_p (dB)	d_{im} (dB)	I_D (mA)	EFFICIENCY (CW) (%)	PAGE
TV transposers Class-A band III (174 to 230 MHz)									
BLF346	SOT119A	25(1)	28	225	14	−52	3000	–	125
BLF348	SOT262A	67(1)	28	225	11	−52	2 × 4600	–	127
TV transmitters Class-AB band III (174 to 230 MHz)									
BLF248	SOT262A	300	28	225	10	–	2 × 250	65	112
BLF368	SOT262A	300(2)	32	225	12	–	2 × 250	62	130
BLF276	SOT119D	100	50	225	13	–	50	57	115
BLF378	SOT262A	250(2)	50	225	14	–	2 × 500	55	133
BLF278	SOT262A	250	50	225	14	–	2 × 500	55	121

Notes

1. Typical value at heatsink temperature of 70 °C.
2. At 1 dB power gain compression.

RF POWER TRANSISTORS AND BASE STATION HYBRID AMPLIFIERS FOR UHF

100 to 960 MHz MOS RF power transistors

TYPE NUMBER	PACKAGE	P_L (W)	V_{DS} (V)	f (MHz)	G_P (dB)	EFFICIENCY (CW) (%)	PAGE
UHF base stations, Class-B (225 to 400 MHz)							
BLF242	SOT123A	5	28	400	typ. 13	60	97
BLF244	SOT123A	15	28	400	typ. 11	65	100
BLF245	SOT123A	30	28	400	typ. 10	67	103
UHF base stations, Class-B (100 to 500 MHz)							
BLF521	SOT172D	2	12.5	500	10	60	146
BLF404	SOT409A	4	12.5	500	10	50	139
BLF522	SOT171A	5	12.5	500	10	55	149
BLF542	SOT171A	5	28	500	10	59	152
BLF543	SOT171A	10	28	500	12	60	155
BLF544	SOT171A	20	28	500	11	60	158
BLF544B	SOT268A	20	28	500	11	60	161
BLF545	SOT268A	40	28	500	11	60	164
BLF546	SOT268A	80	28	500	11	60	167
BLF547	SOT262A	100	28	500	10	55	170
BLF548	SOT262A	150	28	500	9	55	173

400 to 512 MHz bipolar RF power transistors

TYPE NUMBER	PACKAGE	LOAD POWER @ 470 MHz (W)	POWER GAIN @ 470 MHz (dB)	EFFICIENCY (CW) (%)	SUPPLY VOLTAGE V_{CE} (V)	PAGE
Class-B 7.5 V supply; portable mobile						
BLT50	SOT223	1.2	10	65	7.5	195
BLT52	SOT409A	7	9.5	65	7.5	198
BLT53	SOT122D	8	6	65	7.5	205
Class-B 12.5 V supply; car mobile						
BLU56	SOT223	1	12	58	12.5	242
BLU11/SL	SOT122D	2.5	10	60	12.5	230
BLW80	SOT122A	4	8	60	12.5	525
BLU99	SOT122A	5	10.5	66	12.5	254
BLU99/SL	SOT122D	5	10.5	66	12.5	254
BLU97	SOT122A	7	9	70	12.5	251
BLW81	SOT122A	10	6	>60	12.5	528
BLU20/12	SOT119A	20	6.5	64	12.5	233
BLU30/12	SOT119A	30	6	66	12.5	236
BLU45/12	SOT119A	45	4.8	61	12.5	239
BLU60/12	SOT119A	60	4.4	62	12.5	245
Class-B; 28 V; base stations						
BLW90	SOT122A	4	11	58	28	543

900 MHz bipolar RF power transistors

TYPE NUMBER	PACKAGE	LOAD POWER @ 900 MHz (W)	POWER GAIN @ 900 MHz (dB)	EFFICIENCY (CW) (%)	SUPPLY VOLTAGE V_{CE} (V)	PAGE
Class-AB 3.6 to 6 V portable analog cellular						
BLT70	SOT223	0.8	6	73	4.8	208
BLT71	SOT223	1.2	6.5	82	4.8	211
BLT71/8	SOT96	1.2	13	63	4.8	213
Class-A 3.6 to 6 V portable analog cellular						
BLT80	SOT223	0.8	6	–	6	215
BLT81	SOT223	1.2	6	–	6	218
Class-AB 4.8 to 6 V portable digital cellular						
BLT82	SOT96	3.5 pulsed	typ. 9	65	6	221
Class-B 7.5 to 9.6 V portable mobile						
BLT80	SOT223	0.8	6	67	7.5	215
BLT81	SOT223	1.2	6	70	7.5	218
BLT92/SL	SOT122D	3	7	57	7.5	224
BLT94	SOT409A	6	typ. 10	typ. 60	7.5	227
BLV90	SOT172A	0.75	7	60	9.6	299
BLV91/SL	SOT172D	1.5	6.6	60	9.6	302
BLV92	SOT171A	3	7.3	56	9.6	305
Class-B 12.5 V car mobile						
BLU86	SOT223	1	7	66	12.5	248
BLV90	SOT172A	1	7.5	60	12.5	299
BLV91/SL	SOT172D	2	6.5	60	12.5	302
BLU99	SOT122A	4	7	60	12.5	254
BLU99/SL	SOT122D	4	7	60	12.5	254
BLV92	SOT171A	4	7.5	56	12.5	305
BLV93	SOT171A	8	6.5	58	12.5	308
BLV193	SOT171A	12	6.5	60	12.5	326
BLV194	SOT171A	16	6	57	12.5	329

900 to 960 MHz bipolar RF power transistors

TYPE NUMBER	PACKAGE	LOAD POWER @ 900 MHz (W)	POWER GAIN @ 900 MHz (dB)	EFFICIENCY (CW) (%)	SUPPLY VOLTAGE V_{CE} (V)	PAGE
Class-AB and class-B 24 to 26 V base stations						
BLV99/SL	SOT172D	2	8	63 (class-B)	24	317
BLV103	SOT171A	4(1)	11.5	48	24	323
BLV100	SOT171A	8(1)	8	55	24	320
BLV98CE	SOT171A	15(1)	7.5	55	24	314
BLV897	SOT324B	30	≥10	≥45	24	366
BLV97CE	SOT171A	35(1)	7	55	24	311
BLV904	SOT409B	5(1)	11	>50	26	372
BLV909	SOT409B	9(1)	9	57	26	381
BLV910	SOT171A	10(1)	11	>55	26	390
BLV920	SOT171A	20(1)	10	>55	26	398
BLV934	SOT171A	30(1)	9	>55	26	406
BLV935	SOT273A	30(1)	9	>55	26	414
BLV946	SOT273A	40(1)	9	60	26	422
BLV958	SOT391A	75(1)	8.5	55	26	440
BLV958FL	SOT391B	75(1)	8.5	55	26	440
BLV950	SOT262A	150(1)	8	50	26	430
UHF base stations, Class-B (860 to 960 MHz)						
BLF543	SOT171A	10(1)	typ . 8	50	28	155
BLF544	SOT171A	20(1)	typ. 7	50	28	158

Note

1. Load power and power gain measured at 960 MHz.

1800 to 2000 MHz bipolar RF power transistors

TYPE NUMBER	PACKAGE	LOAD POWER @ 1950 MHz (W)	POWER GAIN @ 1950 MHz (dB)	EFFICIENCY (CW) (%)	SUPPLY VOLTAGE V_{CE} (V)	PAGE
Class-AB 26 V base stations						
LBE2009S	SOT441A	>0.7	8	–	26	573
BLV2042	SOT409B	4	8	45	26	448
LVE21050R	SOT445A	5.5	8	–	26	627
BLV2044	SOT437A	15	8	45	26	457
BLV2045	SOT390A	30	8.5	45	26	466
BLV2045N(1)	SOT390A	30	≥10	≥40	26	471
BLV2046	SOT460A	50	≥7.5	≥40	26	474
BLV2047	SOT468A	60	8.5	40	26	482
BLF2047 (1)	SOT502A	70(3)	>9	>40	26	482
BLV2048(1)	SOT494A	120(3)	≥8.5	≥40	26	490

Notes

1. In development.
2. Load power and power gain measured at 2400 MHz.
3. Load power and power gain measured at 2000 MHz.

1800 MHz bipolar RF power transistors

TYPE NUMBER	PACKAGE	CW LOAD POWER (W)	POWER GAIN (dB)	EFFICIENCY (%)	SUPPLY VOLTAGE V_{CE} (V)	PAGE
Class-AB 24 V base stations						
LLE18010X	SOT437A	>1	>8.5	–	24	597
LLE18040X	SOT437A	>4	>8.5	48	24	600
LLE18100X	SOT437A	>9	>8	–	24	603
LLE18300X	SOT437A	>27	>7.8	40	24	606
LXE18400X	SOT439A	>39	>7	42	24	630

MICROWAVE TRANSISTORS

Class-A Linear power transistors

TYPE NUMBER	PACKAGE	f (GHz)	V_{CE} (V)	I_C (mA)	P_{L1} (1) (W)	G_{po} (2) (dB)	PAGE
LZ1418E100R	SOT443A	1.4 to 1.8	16	2000	>9	>10	633
LBE2003S	SOT441A	2	18	30	>0.2	>10	573
LBE2009S	SOT441A	2	18	110	>0.7	>9	573
LTE21009R	SOT440A	2.1	16	150	>0.6	>10	609
LVE21050R	SOT445A	2.1	16	1100	5.5	8	627
LTE21025R	SOT440A	2.1	16	400	2.8	7.8	612
LV1721E50R	SOT445A	1.7 to 2.1	16	1100	≥5	≥7	624
LTE42005S	SOT440A	4.2	18	110	>0.45	>6.6	616
LTE42012R	SOT440A	4.2	16	400	>1	>6	620

Notes

1. Load power for 1 dB compressed power gain.
2. Low level power gain associated with P_{L1}.

Class-AB Linear power transistors

TYPE NUMBER	PACKAGE	f (GHz)	V_{CE} (V)	I_{CQ} (mA)	P_{L1} (1) (W)	G_{po} (2) (dB)	η_C (%)	PAGE
LLE15180X	SOT437A	1.5	24	50	>15	>7.8	50	582
LLE15370X	SOT437A	1.5	24	300	>33	>8	52	585
LFE15600X	SOT448A	1.5	24	200	>55	>8	50	579
LLE16045X	SOT437A	1.65	24	40	>4.5	>8.5	50	588
LLE16120X	SOT437A	1.65	24	100	>11	>8.7	45	591
LLE16350X	SOT437A	1.65	24	100	>29	>8	48	594
LLE18010X	SOT437A	1.85	24	10	>1	>8.5	–	597
LLE18040X	SOT437A	1.85	24	50	>4	>8.5	48	600
LLE18100X	SOT437A	1.85	24	100	>9	>8	–	603
LLE18300X	SOT437A	1.85	24	100	>27	>7.8	40	606
LXE18400X	SOT439A	1.85	24	150	>39	>7	42	630

Notes

1. Load power for 1 dB compressed power gain.
2. Low level power gain associated with P_{L1}.

CW power transistors

TYPE NUMBER	PACKAGE	CLASS	f (GHz)	V_{CC} (V)	P_L [1] (W)	G_p [2] (dB)	η_C (%)	PAGE
PLB16004U	SOT437A	C	1.6	28	4.5	>8.5	>40	660
PLB16012U	SOT437A	C	1.6	28	10	>8	45	663
PLB16030U	SOT437A	B	1.6	28	>30	>7	>45	666
PXB16050U	SOT439A	C	1.65	28	>45	>8.5	>45	682
PZ1418B15U	SOT443A	B	1.4 to 1.8	28	≥12.5	>7	>38	685
PZ1418B30U	SOT443A	B	1.4 to 1.8	28	≥27	>7.3	>38	688
PTB23006U	SOT440A	C	2	28	>5	>9	>40	675
PTB23003X	SOT440A	B	2	24	≥3	>8.75	>45	672
PTB23002U	SOT440A	B	2.3	28	>2	>9	>45	669
PTB32001X	SOT440A	B	3	24	≥1.3	>8	>35	678
PTB32003X	SOT440A	B	3	24	≥2.5	>8	>35	678
PTB32005X	SOT440A	B	3	24	≥4.5	>8	>35	678

Notes

1. Load power for 1 dB compressed power gain.
2. Low level power gain associated with P_{L1}.

Pulsed power transistors for avionics

TYPE NUMBER	PACKAGE	f (GHz)	V_{CC} (V)	t_p (µS)	at δ (%)	P_L (W)	G_p (dB)	η_C (%)	PAGE
MZ0912B50Y	SOT443A	0.96 to 1.215	50	10	10	>50	>7	>42	657
MX0912B100Y	SOT439A	0.96 to 1.215	50	10	10	>100	>7	>42	642
MX0912B251Y	SOT439A	0.96 to 1.215	50	10	10	>235	>7	>42	645
MX0912B351Y	SOT439A	0.96 to 1.215	50	10	10	>325	>7	>40	648
MTB10010U	SOT440A	1.03	24	1	1	>9.5	>9.5	>50	639
MX1011B200Y	SOT439A	1.09	50	10	1	200	≥7.5	>45	651
MX1011B700Y	SOT439A	1.09	50	10	1	650	≥6	>48	654
MF1011B900Y	SOT448A	1.09	50	10	1	800	≥6	>40	636

L and S-band pulsed power transistors for radar

TYPE NUMBER	PACKAGE	f (GHz)	V_{CC} (V)	t_p (μS)	at δ (%)	P_L (W)	G_p (dB)	η_C (%)	PAGE
L-band									
RZ1214B35Y	SOT443A	1.2 to 1.4	50	150	5	≥35	≥7	>30	703
RZ1214B65Y	SOT443A	1.2 to 1.4	50	150	5	≥70	≥7	>35	706
RX1214B80W	SOT439A	1.2 to 1.4	40	500	10	≥80	≥7	>35	700
RX1214B130Y	SOT439A	1.2 to 1.4	50	150	5	≥130	≥7	>35	700
RX1214B170W	SOT439A	1.2 to 1.4	42	500	10	≥170	≥6.7	>40	691
RX1214B300Y	SOT439A	1.2 to 1.4	50	150	5	≥250	≥7	>35	694
RX1214B350Y	SOT439A	1.2 to 1.4	50	130	6	280	≥7	>40	697
S-band									
BLS2731-10	SOT445C	2.7 to 3.1	40	100	10	≥10	typ. 9	typ. 45	178
BLS2731-20	SOT445C	2.7 to 3.1	40	100	10	≥20	typ. 8	typ. 40	182
BLS2731-50	SOT422A	2.7 to 3.1	40	100	10	>50	typ. 9	typ. 40	184
BLS2731-110	SOT423A	2.7 to 3.1	40	100	10	>110	typ. 7.5	typ. 40	188
S-band 50 Ω in/out matched transistor									
BLS2731-150 (1)	SOT469A	2.7 to 3.1	40	300	10	150	typ. 7	typ. 40	193

Note

1. In development

LINE-UPS

SSB TRANSMITTERS (1.5 to 30 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (PEP) (W)	SUPPLY VOLTAGE (V)	Stud S Flange F
Bipolar						
30	BLY87C(1)	2 × BLY89C	–	30	13	S
30	BLV10(1)	2 × BLW87	–	30	13	F
50	BLY88C	2 × BLW60C	–	50	13	S
50	BLV20(1)	2 × BLW83	–	50	28	F
50	BLV11(1)	2 × BLW85	–	50	13	F
100	BLY89C(1)	4 × BLW60C	–	100	13	S
100	BLW87(1)	4 × BLW85	–	100	13	F
140	2 × BLW87(1)	2 × BLW99	–	150	13	F
150	BLW83(1)	2 × BLW76	–	150	28	F
250	2 × BLW83(1)	2 × BLW77	–	250	28	F
220	2 × BLW86(1)	2 × BLW97	–	300	28	F
500	2 × BLW86	4 × BLW77	–	450	28	F
680	2 × BLW78(1)	4 × BLW97	–	600	28	F
300	2 × BLW83(2)	2 × BLW96	–	350	50	F
600	2 × BLW50F(1)	4 × BLW95	–	500	50	F
40	BLV20(2)	4 × BLW50F	8 × BLW96	1200	50	F
PowerMOS						
15	BLF244(1)	2 × BLF246	–	150	28	–
30	BLF145(1)	2 × BLF147	–	300	28	–
15	BLF244(2)	2 × BLF177	–	300	50	–
60	BLF246(1)	4 × BLF147	–	550	28	–
10	BLF175(1)	4 × BLF177	–	550	50	–
20	2 × BLF175(1)	8 × BLF177	–	1000	50	–

Notes

1. Class-A operation.
2. 28 V supply voltage in class-A operation.

MOBILE TRANSMITTERS (68 to 87.5 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	P_L (W)	SUPPLY VOLTAGE (V)
Bipolar/PowerMOS				
1	BFG35	BLV10	8	13
1	BFG35	BLW81	10	13
1	BFG35	BLF245(1)	12	12.5
1	BFG35	BLW29	15	13
1	BFG35	BLV11	15	13
40	BLW80	BLW87	25	13
25	BLW80	BLF225(1)	25	12.5
30	BLW80	BLV12	30	13
70	BLW80	BLV45/12	45	13
30	BLF244(1)	BLW85	45	13
90	BLF244(1)	BLV75/12	75	13
150	BLV10	BLV75/12	75	13

Note

1. PowerMOS transistor.

BASE STATIONS (68 to 87.5 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)	Stud S Flange F
PowerMOS						
80	BLF242	BLF246	–	80	28	–
150	BLF244	BLF147	–	150	28	–

FM BROADCAST TRANSMITTERS (87.5 to 108 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)	Stud S Flange F
Bipolar						
100	BLW90	BLW86	2 × BLV25	300	28	F
PowerMOS						
240	BLF244	BLF248	–	300	28	–
120	BLF244(1)	BLF278	–	300	50	–
240	BLF244(1)	2 × BLF278	–	550	50	–
320	BLF175	2 × BLF278	–	1000	50	–

Note

1. 28 V supply voltage in class-A operation.

MILITARY COMMUNICATION TRANSMITTERS (25 to 110 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)
PowerMOS					
150	BLF242(1)	2 × BLF244	–	12	12.5
150	BLF242(1)	BLF245B	–	12	12.5
500	BLF244(1)	2 × BLF245	–	60	28
100	BLF242(1)	BLF245(1)	2 × BLF246	150	28

Note

1. Class-A operation.

AM AIRCRAFT TRANSMITTERS (108 to 144 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	P_L (W)	SUPPLY VOLTAGE (V)
PowerMOS				
100	BLF242	BLF246	20	28
80	BLF244	BLF147	35	28
120	BLF242(1)	BLF278	75	50

Note

1. 28 V supply voltage in class-A operation.

AM AIRCRAFT TRANSMITTERS (118 to 136 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)	Stud S Flange F
Bipolar						
240	BLV20	BLW86	–	12	13 or 28	F

AM AIRCRAFT TRANSMITTERS (100 to 400 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)	Stud S Flange F
PowerMOS						
30	BLF521(1)	BLF522(1)	BLF545	40	28	–
25	BLF521(1)	BLF543	BLF546	80	28	–
30	BLF521(1)	BLF543	BLF547	100	28	–
100	BLF521(1)	BLF544	BLF548	150	28	–

Note

1. V_{DS} = 12.5 V.

PORTABLE and MOBILE TRANSMITTERS (132 to 174 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)	Stud S Flange F
Bipolar/PowerMOS						
35	BLW80	BLV10	–	8	13	S/F
1	BFG35	BLF245(1)	–	12	12.5	F
45	BLW80	BLW29	–	14	13	S
150	BLF522(1)	BLF225(1)	–	25	12.5	–
100	BLW80	BLV12	–	30	12.5	S/F
35	BLW80	BLV10	BLV45/12	45	13	S/F
40	BLW80	BLW29	BLV75/12	75	13	S/F

Note

1. PowerMOS transistor.

BASE STATIONS (132 to 174 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)	Stud S Flange F
Bipolar						
200	BLV20	BLW84	–	25	28	F
PowerMOS						
220	BLF242	BLF246	–	80	28	–
250	BLF244	BLF247B	–	150	28	–

TV TRANSPOSERS (BAND III: 174 to 230 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	$P_{o(sync)}$ (W)	$P_{o(sat)}$ (W)	SUPPLY VOLTAGE (V)
PowerMOS						
5	BLF242	2 × BLF244	BLF348	40	60	28
5	BLF242	BLF245B	BLF348	40	60	28
12	BLF244	2 × BLF245	2 × BLF348	75	115	28
20	BLF244	2 × BLF346	4 × BLF348	140	220	28

TV TRANSMITTERS (BAND III: 174 to 230 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	$P_{o(sync)}$ (W)	SUPPLY VOLTAGE (V)
PowerMOS					
25	BLF242	BLF175	2 × BLF276	150	50
50	BLF242	2 × BLF244	BLF368	300	32
50	BLF242	BLF245B	BLF368	300	32
100	BLF242	2 × BLF245	2 × BLF368	550	32
160	BLF242	2 × BLF346	4 × BLF368	1000	32
50	BLF242(1)	2 × BLF175	6 × BLF378	1250	50

Note

1. 28 V supply voltage in class-A operation.

PORTABLE and MOBILE TRANSMITTERS (400 to 512 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)	Stud S Flange F
Bipolar						
45	BLV90	BLU99	–	3	7.5	S
400	BLU99	BLU20/12	–	20	13	S/F
280	BLU99	BLU20/12	BLU45/12	45	13	S/F
400	BLU99	BLU20/12	BLU60/12	60	13	S/F
PowerMOS						
50	BLF521	BLF522	–	5	12.5	–

BASE STATIONS (400 to 470 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)
PowerMOS					
35	BLF521(1)	BLF522(1)	BLF545	40	28
40	BLF521(1)	BLF543	BLF546	80	28
45	BLF521(1)	BLF544	BLF547	100	28
150	BLF521(1)	BLF544	BLF548	150	28

Note

1. V_{DS} = 12.5 V.

TV TRANSPOSERS (BAND IV/V: 470 to 860 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	4th STAGE	$P_{o(sync)}$ (W)	$P_{o(sat)}$ (W)	SUPPLY VOLTAGE (V)
Bipolar							
5	BFQ34	BFQ68	2 × BFQ68	–	1.4	1.4	15
6	BLW32	BLW33	2 × BLW34	–	4.4	5.7	25
2	BLW32	BLW33	2 × BLW34	2 × BLW98	8	8	25
3	BLW32	BLW33	2 × BLW34	2 × BLV57	13	15	25
3	BFQ68	BLW34	BLW98	2 × BLV58	25(1)	30	25
500	2 × BLW898	2 × BLV859	–	–	40	–	25

Note

1. 25 W sync, –51 dB (–8, –16, or –7 dB).

TV TRANSMITTERS (BAND IV/V: 470 to 860 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	4th STAGE	$P_{o(sync)}$ (W)	SUPPLY VOLTAGE (V)
Bipolar						
12	BFG97	BFQ68	2 × BLW34	2 × BLV59	60	28
15	BFQ34	BLW34	BLV58	BLV862	150	28
30	BFQ34	2 × BLW33	2 × BLV58	4 × BLV862	500	28

ANALOG CELLULAR (AMPS, (E)TACS, NMT) 900 MHz

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)
Bipolar					
1	BFG540/X	BLT80	BLT81	1.2	6
1	BFG540/X	BLT70	BLT71	1.2	4.8

DIGITAL CELLULAR (GSM) 900 MHz

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)
Bipolar					
1	BFG540W/X	BFG10W/X	BLT82	3.5 pulsed	6

PORTABLE TRANSMITTERS (860 to 960 MHz))

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)
Bipolar					
1	BFG540	BLT80	BLT81	1.2	6
15	BFG91A	BLT80	BLT92/SL	3	7.5

MOBILE TRANSMITTERS (860 to 960 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)	Stud S Flange F
Bipolar						
110	BLU86	BLV91/SL	BLV93	8	13	S/F
100	BLV90	BLV92	BLV194	15	13	S/F

BASE STATIONS (860 to 960 MHz) CLASS-AB OPERATION

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	4th STAGE	P_L (W)	SUPPLY VOLTAGE (V)	FREQUENCY (MHz)
Bipolar							
270	BLV904	BLV934	–	–	30	26	960
220	BLV904	BLV935	–	–	30	26	960
65	BLV99/SL	BLV910	BLV946	–	40	26	960
25	BGY916	BLV958	–	–	75	26	960
75	BLV904	BLV920	BLV958	–	75	26	960
75	BLV904	BLV920	2 × BLV946	–	80	26	960
35	BLV99/SL	BLV103	BLV897	BLV950	120	25	900
20	BLV99/SL	BLV103	BLV897	BLV950	150 (PEP)	25	900[1]
250	BLV904	BLV934	BLV950	–	150	26	960

Note

1. d_{IM} = –30 dB.

BASE STATIONS (1800 to 2000 MHz) CLASS AB OPERATION

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)	FREQUENCY (MHz)
Bipolar						
60	BLV2042	BLV2042	BLV2044	15	26	2000
120	BLV2042	BLV2044	BLV2045	25	26	2000
35	BGY1816	BLV2046	–	50	26	1900
250	BLV2042	BLV2044	2 × BLV2045	50	26	2000
30	BGY1816	BLV2047	–	60	26	1900
30	BGY1916	BLV2047	–	60	26	2000
35	BGY1916	BLV2046	–	50	26	2000
120	BLV2042	BLV2044	BLV2047	60	25	2000
160	BLV2042	BLV2044	BLV2046	50	26	2000

NARROW BAND (1800 MHz)

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)
Bipolar					
50	LBE2009S	LLE18040X	LLE18300X	27	24
100	LBE2009S	LLE18100X	2 × LLE18300X	50	24

APPLICATION INFORMATION FOR MICROWAVE LINE-UPS

CW applications for avionics and SATCOM

INPUT POWER (mW)	1st STAGE	2nd STAGE	3rd STAGE	P_L (W)	SUPPLY VOLTAGE (V)
1.5 to 1.7 GHz - narrow band					
50	LBE2009S	LLE16045X	LLE16350X	32	24
100	BLV2042	LLE16120X	2 × LLE16350X	60	24
1.6 GHz - mobile VSAT					
50	BLV2042	PLB16004U	PLB16030U	30	28

GENERAL

RF & MICROWAVE POWER TRANSISTORS

MARKING CODES FOR RF POWER TRANSISTORS

For the purposes of matched pair applications, RF power MOS transistors are marked with a code that indicates their gate-source voltage range (see Table 8).

Table 8 Marking codes for RF power transistors

CODE	V_{GS}	CODE	V_{GS}
0	1.00 to 1.10	J	2.80 to 2.90
1	1.10 to 1.20	K	2.90 to 3.00
2	1.20 to 1.30	L	3.00 to 3.10
3	1.30 to 1.40	M	3.10 to 3.20
4	1.40 to 1.50	N	3.20 to 3.30
5	1.50 to 1.60	O	3.30 to 3.40
6	1.60 to 1.70	P	3.40 to 3.50
7	1.70 to 1.80	Q	3.50 to 3.60
8	1.80 to 1.90	R	3.60 to 3.70
9	1.90 to 2.00	S	3.70 to 3.80
A	2.00 to 2.10	T	3.80 to 3.90
B	2.10 to 2.20	U	3.90 to 4.00
C	2.20 to 2.30	V	4.00 to 4.10
D	2.30 to 2.40	W	4.10 to 4.20
E	2.40 to 2.50	X	4.20 to 4.30
F	2.50 to 2.60	Y	4.30 to 4.40
G	2.60 to 2.70	Z	4.40 to 4.50
H	2.70 to 2.80		

MARKING CODES FOR MICROWAVE TRANSISTORS

The microwave transistors in this book are normally marked with manufacturer's name or trademark, type designation and lot identification code. If space on the transistor package is insufficient for full type designation, the following marking codes may be used for identification (see Table 9).

Table 9 Marking codes for microwave transistors

TYPE NUMBER	MARKING CODE
LBE2003S	407
LBE2009S	409
LTE21009R	435
LTE21025R	439
LTE42005S	502
LTE42012R	198
LV1721E50R	1721E50R
LV2024E45R	2024E45R
LV2327E40R	2327E40R
MTB10010U	10010U
MX1011B430W	MX1011B430W
PTB23003X	2303X
PTB32001X	3201X
PTB32003X	3203X
PTB32005X	3205X

RELIABILITY GRADES

Microwave transistors are available from different quality levels which are listed as follows:

- **Standard grade**

  This applies to devices following the designation rules as listed in the chapters “Type Designation Code For Microwave Transistors”and “Pro Electron Type Numbering System”.

- **Grade “X” and “Y”**

  These grades correspond respectively to the equivalent MIL-STD 19500 grades JANTX and JANTXV.

  They have been subject to additional screening tests than those normally applied to the standard grade. The local sales organization can confirm whether they are available for the type you have selected.

  The majority of the devices included in this book may also be available in accordance with a space screening file similar to JANS or ESA/SCC5010.

Reliability grades (only for brazed cap devices and orders in excess of 50 parts)

OPERATION	MIL STD 750 METHOD	CONDITIONS	REQUIREMENTS (%)		
			STD GRADE	GRADE “X”(1)	GRADE “Y”(2)
Assembly			100	100	100
Internal visual inspection		note 3	100	100	100
Capping			100	100	100
Stabilization bake	1032	T = 200 °C; duration 48 hours	100	100	100
Temperature cycling	1051	condition C; 20 cycles; no dwell at 25 °C	–	100	100
Constant acceleration	2006	20000 g axis Y1; P_{tot} ≤5 W	–	–	100
		10000 g axis Y1; P_{tot} >5 W	–	–	100
Hermetic seal (brazed cap)	1071	condition H - FC43			
fine			100	100	100
gross			100	100	100
Serialisation			–	–	100
Initial electrical parameters		note 4	–	100 GO/NOGO	100 GO/NOGO

OPERATION	MIL STD 750 METHOD	CONDITIONS	REQUIREMENTS (%)		
			STD GRADE	GRADE "X"(1)	GRADE "Y"(2)
High temperature reverse bias (HTRB)	1039	T_{amb} = 150 °C; V_{CBmin} = 80% of published V_{CB}; duration 48 hours	–	100	100
Interim electrical parameters		note 5	–	–	100 read and record
Power burn-in	1039	T_{amb} = 125 °C; V_{CB} = 10 V; I_C reached when T_j average = 175 °C; duration 160 hours	–	–	100
Delta calculation		note 6	–	–	100
Other electrical parameters		note 4	100	100 GO/NOGO	read and record
Marking		as specified	100	100	100
External visual inspection	2071		100	100	100
Packing			100	100	100
Check for delivery		note 3			

Notes

1. Grade "X" is equivalent to JANTX.
2. Grade "Y" is equivalent to JANTXV.
3. As per Philips component specification.
4. Published DC, R_{th} and RF parameters.
5. Interim electrical parameters are published.
6. Published collector cut off current and forward current ratio. Delta limits are: Delta h_{FE} max = ±20% of initial value; Delta cut off current max = ±100% of initial value or ±10% of published parameter limit (whichever is greater).

BATCH RELEASE TESTS FOR GRADE "X" AND "Y" EQUIVALENTS

Group B; note 1.

INSPECTIONS	MIL STD 750 METHOD	CONDITIONS	SAMPLING PLAN LTPD(2)	SMALL LOT QUALITY CONFORMANCE INSPECTION	
				NO. OF DEVICES	NO. OF FAILURES
Subgroup 1					
Solderability	2026	the sampling plan applies to the number of leads inspected. A minimum of 3 devices shall be tested.	15	4	0
Resistance to solvents	1022				
Subgroup 2					
Temperature cycling (air to air)	1051	no dwell at 25 °C; test condition C, except step 3 at 175 °C; 45 cycles including screening	10	6	0
Thermal shock	1056	10 cycles; condition A			
Hermetic seal	1071				
fine leak		test condition H; max. leak rate = 5 x 10^{-7} atm cc/s			
gross leak		test condition C			
Electrical measurements		DC parameters of the relevant data sheet			
Subgroup 3					
Steady-state operation life	1027	as power burn-in except T_{mb} = 150 °C; duration 340 hours	10	12	0
Electrical measurements		DC parameters of the relevant data sheet			
Bond strength	2037	the sample shall include a minimum of 3 devices and shall include all wire sizes	20 (wires)	20 (wires)	0
Subgroup 4					
Decap internal visual (design criteria)	2075	visual criteria in accordance with qualified design		1	0
Subgroup 5 (not applicable)					
Subgroup 6					
High temperature life (non operating)	1032	340 hours at T_{amb} = 200 °C (brazed cap)	10	12	0
Electrical measurements		DC parameters of the relevant data sheet			

Notes

1. Optional for grades "X" and "Y" (minimum order quantity = 50 devices).
2. Sampling according to MIL-STD 19500. Small lot sampling applies for batches up to 500 devices.

TYPE DESIGNATION CODE FOR MICROWAVE TRANSISTORS

Code structure

The standard structures of type designation code for microwave transistors can be shown as follows, where X represents a letter and 0 represents a numeral:

XXX0000X	for transistors without matching cell
XXX00000X	for transistors with input matching cell and specified for narrowband applications
XXX0000X00X or XXX0000X000X	for transistors specified for wideband applications

Letters

FIRST LETTER

The first letter shows the mode of operation:

L linear
M short pulse
P CW class B
R long pulse.

SECOND LETTER

The second letter shows the encapsulation:

A SOT100
B SOT441A (FO-45)
C SOT442A (FO-46)
E SOT122A
F SOT448A (FO-231)
L SOT437A (FO-229)
P SOT447A (FO-102)
T SOT440A (FO-41B)
V SOT445A (FO-83A and FO-83B)
W SOT446A (FO-93)
X SOT439A (FO-91B)
Z SOT443A (FO-57C).

THIRD LETTER

The third letter indicates the common potential:

E common emitter
B common base
C common collector.

FOURTH LETTER (SUFFIX LETTER)

The fourth letter indicates the supply voltage:

Q 10 to 12 V
R 15 to 16 V
S 18 V
T 20 V or 18 to 21 V
U 28 to 30 V
W 40 to 45 V
X 24 V
Y 50 V
Z 48 V.

Numbers

TRANSISTORS WITHOUT MATCHING CELL (XXX0000X)

1st digit indicates frequency of measurement (GHz).

2nd, 3rd and 4th digits indicate power:

in watts for P, M and R modes of operation
in multiples of 100 mW for L mode of operation.

TRANSISTORS SPECIFIED FOR NARROWBAND APPLICATIONS (XXX00000X)

1st and 2nd digits indicate frequency of measurement (× 0.1 GHz).

3rd, 4th and 5th digits give the power:

in watts for P, M and R modes of operation
in multiples of 100 mW for L mode of operation.

TRANSISTORS SPECIFIED FOR WIDEBAND APPLICATIONS

1st and 2nd digits indicate the lower frequency of use (in 0.1 GHz).

3rd and 4th digits indicate the higher frequency of use (in 0.1 GHz).

Last digit indicates the power:

in watts for P, M and R modes of operation
in multiples of 100 mW for L mode of operation.

SUMMARY OF SYMBOLS FOR MICROWAVE TRANSISTORS

C_{cb}	collector-base capacitance
C_{ce}	collector-emitter capacitance
C_{eb}	emitter-base capacitance
d_{im}	intermodulation distortion
δ	duty factor
F_{min}	noise factor
f	signal frequency
G_a	associated gain (for a low-noise transistor)
G_{ma}	maximum available gain
G_{ms}	maximum stable gain
G_p	power gain under specified conditions
G_{po}	low level power gain associated with P_{L1}
h_{FE}	DC current gain
I_C	DC collector current
I_{CBO}	collector cut-off current, open emitter
I_{CER}	collector cut-off current, with specified R_{BE}
I_{CES}	collector cut-off current, base connected to emitter
I_{CQ}	quiescent current
I_{EBO}	emitter cut-off current, open collector
η_C	collector efficiency P_L / ($I_C \times V_{CC}$)
η_{add}	power added efficiency ($P_{out} - P_{in}$) / ($I_C \times V_{CC}$)
P_{in}	input power
P_L	load power under specified conditions
P_{L1}	load power for 1 dB compressed power gain
P_{out}	output power
P_{tot}	total power dissipation
$R_{th\ j\text{-}c}$	thermal resistance from junction to case
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base
$R_{th\ mb\text{-}j}$	thermal resistance from mounting base to heatsink
T_j	junction temperature
t_p	pulse width
T_{sld}	lead soldering temperature
T_{stg}	storage temperature
V_{CBO}	collector-base voltage, open emitter
V_{CC}	collector supply voltage
V_{CE}	collector-emitter voltage
V_{CEO}	collector-emitter voltage, open base
V_{CER}	collector-emitter voltage with specified R_{BE}
V_{CES}	collector-emitter voltage, base connected to emitter
V_{EBO}	emitter-base voltage, open collector
VSWR	voltage standing wave ratio
z_i	complex transistor impedance as seen by the generator
Z_L	complex transistor load impedance as seen by the transistor
Z_{th}	thermal impedance from junction to heatsink.

OPERATING RECOMMENDATIONS

These recommendations are included for the avoidance of damage or destruction of silicon bipolar transistors operating at high frequencies and high power during testing, setting-up procedures and final operation.

Polarization

A current-limiting power supply should be used when testing transistors in a new circuit.

Initial testing at reduced supply voltage is discouraged because the resulting change in output impedance could cause oscillation due to mismatch.

The RF blocking 1in the supply line, together with the DC blocking capacitor of the internal output prematching circuit of the transistor, could sometimes cause oscillations at very low frequencies. The oscillations can often be removed by bypassing the choke with a low value resistor.

Operation

INPUT POWER

When the circuit has not been optimized, the average power input should be kept a lower level than specified. Initial testing of CW amplifiers is best performed in pulsed operation at 50% duty factor. For pulsed amplifiers, the duty factor should be reduced.

OUTPUT WAVEFORM

The output waveform should be checked with a spectrum analyser or similar equipment to ensure that no parasitic effects causing unwanted modulation are present.

FREQUENCY

Microwave performance is published in the data sheet at a single frequency or for a range of frequencies. Devices whose data is published for narrow band application can normally be used at frequencies other than that specified. However, for high power types in particular, broadband operation may be difficult to obtain and the gain of transistors with an internal input prematching network may decrease sharply at higher frequencies.

Broadband transistors (generally those with type numbers starting with two letters followed by four digits) also have an output prematching network. This is essentially a high-pass filter with a resonance frequency below the lowest operating frequency. The transistor could be damaged if operated at this resonance frequency, therefore the manufacturer should be consulted if extended frequency operation is required.

Thermal considerations

The junction temperature is of paramount importance in the reliability of transistors and every effort should be made to keep this temperature as low as possible. This is affected by mechanical aspects of the fitting, therefore mounting recommendations given by the manufacturer should be followed.

Values of thermal resistance given in the data sheets are for a specific junction temperature. Note that thermal resistance from junction to mounting base increases with junction temperature at approximately 0.3%/K.

For transistors required for pulsed operation, an equivalent thermal impedance is given for a specified pulse format (pulse width and duty factor). This allows for calculation of peak junction temperature (at the end of a pulse). For widely differing pulse formats the manufacturer should be consulted.

The maximum power dissipation is defined as
$P_{tot} = V_{CE} \times I_C - P_o + P_i$ at $T_j = 200$ °C.

APPLICATION INFORMATION

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	TYPE NUMBER
A	amplifier			1/4 MC3403 or equivalent
D.U.T.	microwave transistor			
TR	transistor			2N2219 or equivalent
D	diode			1N4148 or equivalent
C1, C2	tantalum capacitor	22 μF, 50 V		
R1	resistor	2.2 kΩ ±5%		
R2, R3, R5, R6	resistor	10 kΩ ±5%		
R4	resistor	4.7 kΩ ±5%		
R_p	resistor	10 kΩ ±5%	10 turns	
R_b, R_c, R_e, R_x	resistor	note 1		

Note

1. Values to be adapted to I_c of the D.U.T.

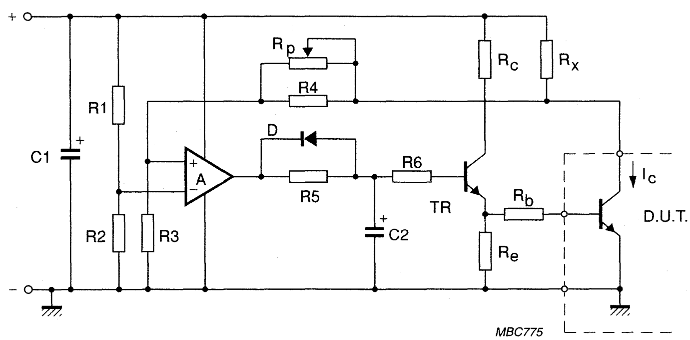


Fig.22 Bias circuit for a class-A linear microwave transistor.

RF & MICROWAVE POWER TRANSISTORS

DEVICE DATA

in alphanumeric sequence

FEATURES

- High power gain
- Low noise figure
- Good thermal stability
- Withstands full load mismatch.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for SSB transmitter applications in the HF frequency range. The transistor is encapsulated in a 4-lead, SOT123 flange envelope, with a ceramic cap. All leads are isolated from the flange. Matched gate-source voltage (V_{GS}) groups are available on request.

PINNING - SOT123

PIN	DESCRIPTION
1	drain
2	source
3	gate
4	source

PIN CONFIGURATION

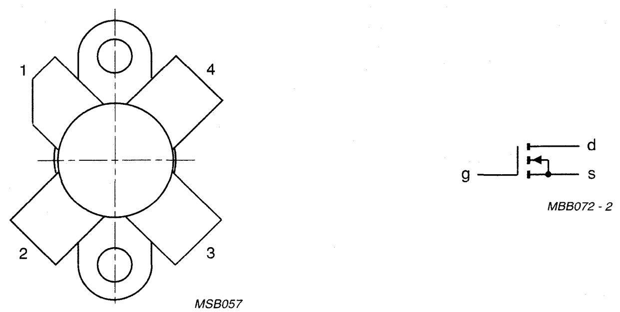


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	I_D (A)	P_L (W)	G_p (dB)	η_D (%) (note 1)	d_3 (dB)
SSB, class-A	28	28	1.3	8 (PEP)	> 24	–	< –40
SSB, class-AB	28	28	–	30 (PEP)	typ. 20	typ. 40	typ. –35

Note

1. 2-tone efficiency.

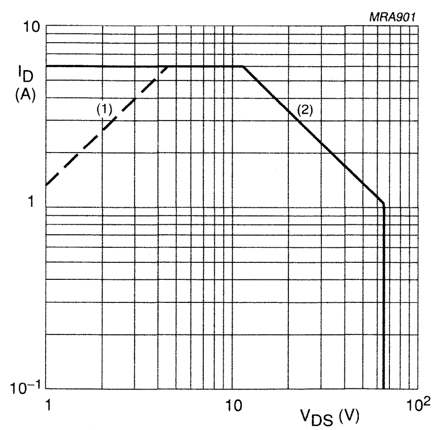
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DSS}	drain-source voltage		–	65	V
$\pm V_{GSS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	6	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	68	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

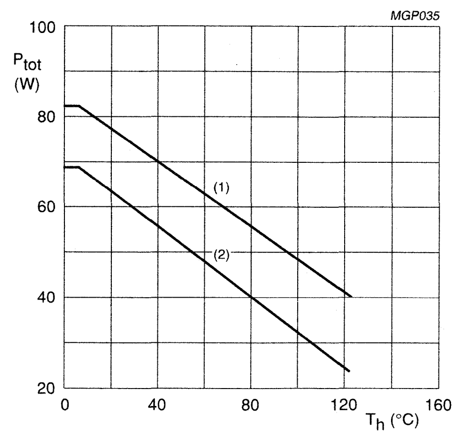
THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	2.6 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	0.3 K/W



(1) Current is this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Short-time operation during mismatch.
(2) Continuous operation.

Fig.3 Power/temperature derating curves.

HF power MOS transistor BLF145

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 10 mA; V_{GS} = 0	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	2	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 10 mA; V_{DS} = 10 V	2	–	4.5	V
ΔV_{GS}	gate-source voltage difference of matched devices	I_D = 10 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 1.5 A; V_{DS} = 10 V	1.2	–	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 1.5 A; V_{GS} = 10 V	–	0.4	0.75	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	10	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	125	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	75	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	7	–	pF

VHF power MOS transistor | BLF147

FEATURES

- High power gain
- Low intermodulation distortion
- Easy power control
- Good thermal stability
- Withstands full load mismatch.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for industrial and military applications in the HF/VHF frequency range.

The transistor is encapsulated in a 4-lead, SOT121 flange envelope, with a ceramic cap. All leads are isolated from the flange.

A marking code, showing gate-source voltage (V_{GS}) information is provided for matched pair applications. Refer to 'General' section for further information.

PINNING - SOT121

PIN	DESCRIPTION
1	drain
2	source
3	gate
4	source

PIN CONFIGURATION

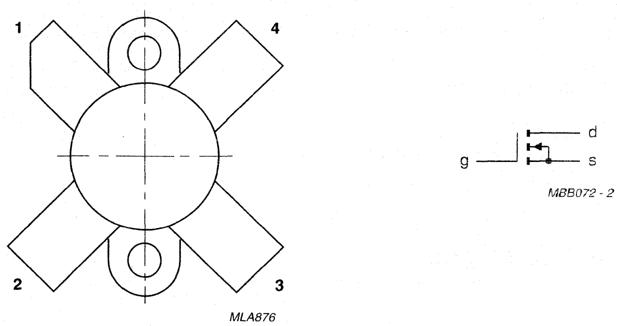


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)	d_3 (dB)	d_5 (dB)
SSB, class-AB	28	28	150 (PEP)	> 17	> 35	< −30	< −30
CW, class-B	108	28	150	typ. 70	typ. 70	–	–

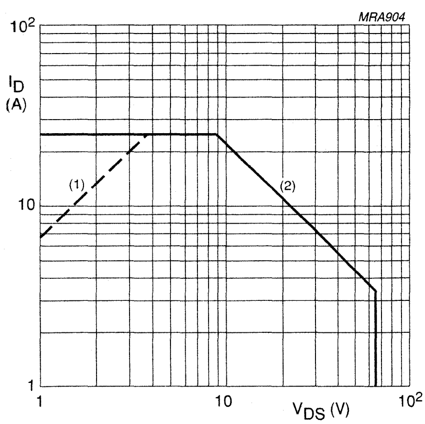
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	25	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	220	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

THERMAL RESISTANCE

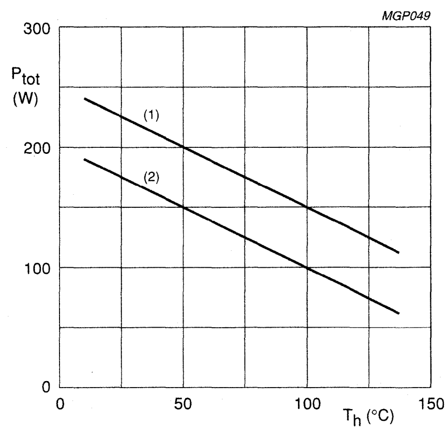
SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	0.8 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	0.2 K/W



(1) Current is this area may be limited by $R_{DS(on)}$.

(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Short-time operation during mismatch.

(2) Continuous operation.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 100 mA; V_{GS} = 0	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	5	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 200 mA; V_{DS} = 10 V	2	–	4.5	V
ΔV_{GS}	gate-source voltage difference of matched pairs	I_D = 100 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 8 A; V_{DS} = 10 V	5	7.5	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 8 A; V_{GS} = 10 V	–	0.1	0.15	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	37	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	450	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	360	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	55	–	pF

HF/VHF power MOS transistor BLF175

FEATURES

- High power gain
- Low intermodulation distortion
- Easy power control
- Good thermal stability
- Withstands full load mismatch
- Gold metallization ensures excellent reliability.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for large signal amplifier applications in the HF/VHF frequency range.

The transistor has a 4-lead, SOT123 flange envelope, with a ceramic cap. All leads are isolated from the flange.

A marking code, showing gate-source voltage (V_{GS}) information is provided for matched pair applications. Refer to the 'General' section for further information.

PINNING - SOT123

PIN	DESCRIPTION
1	drain
2	source
3	gate
4	source

PIN CONFIGURATION

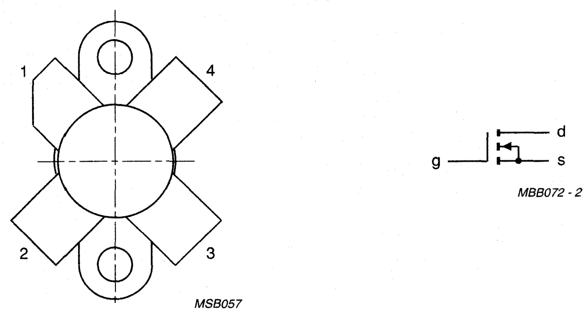


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	I_{DQ} (mA)	P_L (W)	G_P (dB)	η_D (%)	d_3 (dB)
class-A	28	50	800	8 (PEP)	> 24	–	< −40
class-AB	28	50	150	30 (PEP)	typ. 24	typ. 40 (note 1)	typ. −35
CW, class-B	108	50	30	30	typ. 20	typ. 65	–

Note

1. 2-tone efficiency.

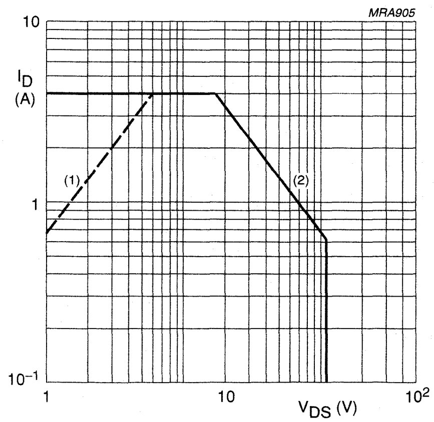
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	110	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	4	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	68	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

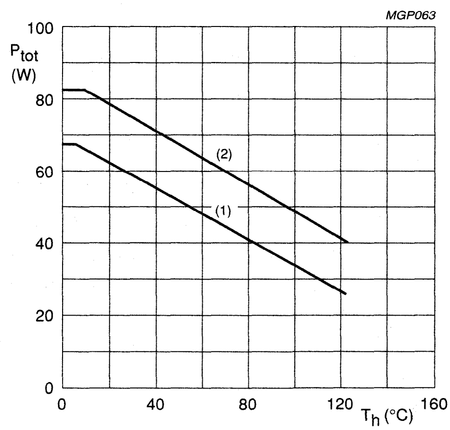
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_{mb} = 25 °C; P_{tot} = 68 W	2.6 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	T_{mb} = 25 °C; P_{tot} = 68 W	0.3 K/W



(1) Current is this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 10 mA; V_{GS} = 0	110	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 50 V	–	–	100	μA
I_{GSS}	gate-source leakage current	±V_{GS} = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 10 mA; V_{DS} = 10 V	2	–	4.5	V
ΔV_{GS}	gate-source voltage difference of matched pairs	I_D = 10 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 1 A; V_{DS} = 10 V	1.1	1.6	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 1 A; V_{GS} = 10 V	–	0.75	1.5	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	5.5	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	130	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	36	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	3.7	–	pF

HF/VHF power MOS transistor BLF177

FEATURES

- High power gain
- Low intermodulation distortion
- Easy power control
- Good thermal stability
- Withstands full load mismatch.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for industrial and military applications in the HF/VHF frequency range.

The transistor is encapsulated in a 4-lead, SOT121 flange envelope, with a ceramic cap. All leads are isolated from the flange.

A marking code, showing gate-source voltage (V_{GS}) information is provided for matched pair applications. Refer to the 'General' section for further information.

PINNING - SOT121

PIN	DESCRIPTION
1	drain
2	source
3	gate
4	source

PIN CONFIGURATION

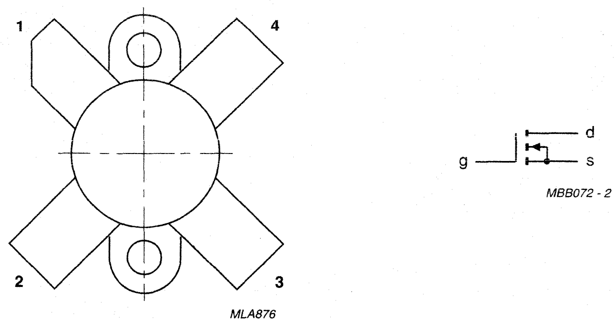


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_P (dB)	η_D (%)	d_3 (dB)	d_5 (dB)
SSB class-AB	28	50	150 (PEP)	> 20	> 35	< −30	< −30
CW class-B	108	50	150	typ. 19	typ. 70	−	−

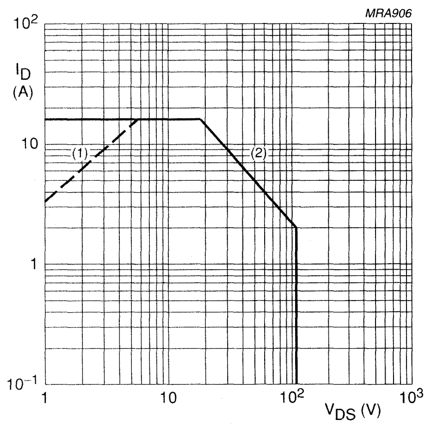
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	110	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	16	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	220	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

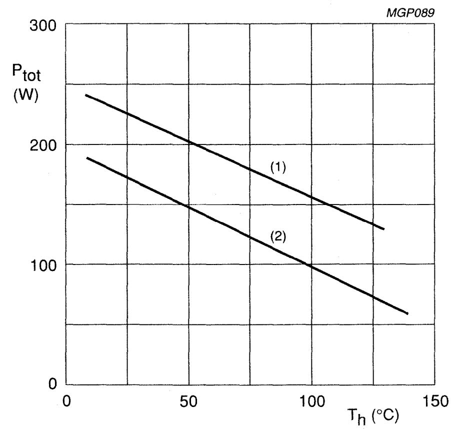
THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	max. 0.8 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	max. 0.2 K/W



(1) Current is this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Short-time operation during mismatch.
(2) Continuous operation.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 50 mA; V_{GS} = 0	110	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 50 V	–	–	2.5	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 50 mA; V_{DS} = 10 V	2	–	4.5	V
ΔV_{GS}	gate-source voltage difference of matched pairs	I_D = 50 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 5 A; V_{DS} = 10 V	4.5	6.2	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 5 A; V_{GS} = 10 V	–	0.2	0.3	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	25	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	480	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	190	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	14	–	pF

VHF power MOS transistor BLF225

FEATURES

- Easy power control
- Good thermal stability
- Withstands full load mismatch.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for communications transmitter applications in the VHF frequency range.

The transistor is encapsulated in a 4-lead, SOT123 flange envelope, with a ceramic cap. All leads are isolated from the flange.

PINNING - SOT123

PIN	DESCRIPTION
1	drain
2	source
3	gate
4	source

PIN CONFIGURATION

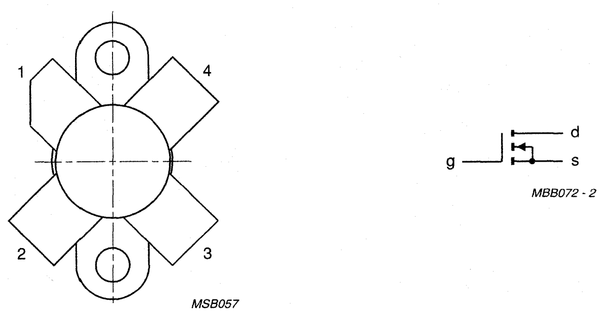


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	175	12.5	30	> 8.5	> 60

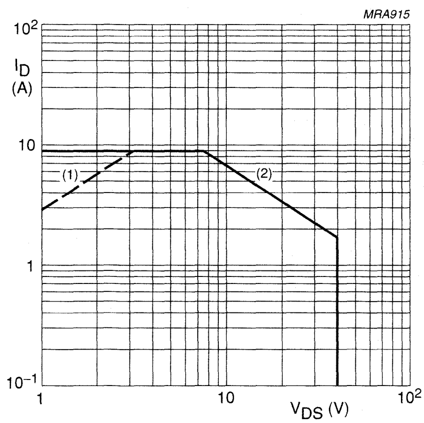
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	40	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	9	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	68	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

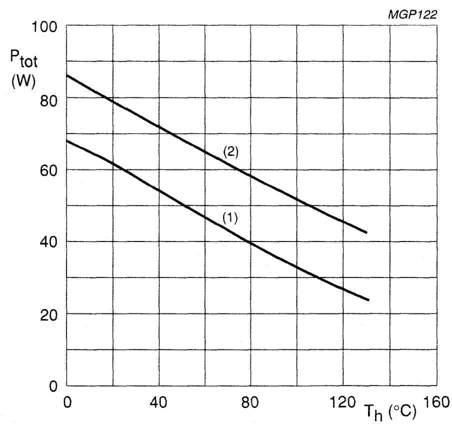
THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	2.6 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	0.3 K/W



(1) Current is this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 30 mA	40	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 12.5 V	–	–	1	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 30 mA; V_{DS} = 10 V	2	–	4.5	V
g_{fs}	forward transconductance	I_D = 3.5 A; V_{DS} = 10 V	1.5	2.2	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 3.5 A; V_{GS} = 15 V	–	0.25	0.35	Ω
I_{DSX}	on-state drain current	V_{GS} = 15 V; V_{DS} = 10 V	–	16	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz	–	120	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz	–	140	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz	–	20	–	pF

HF/VHF power MOS transistor | BLF242

FEATURES

- High power gain
- Low noise
- Easy power control
- Good thermal stability
- Withstands full load mismatch
- Gold metallization ensures excellent reliability.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for professional transmitter applications in the HF/VHF frequency range.

The transistor is encapsulated in a 4-lead, SOT123 flange envelope, with a ceramic cap. All leads are isolated from the flange.

PINNING - SOT123

PIN	DESCRIPTION
1	drain
2	source
3	gate
4	source

PIN CONFIGURATION

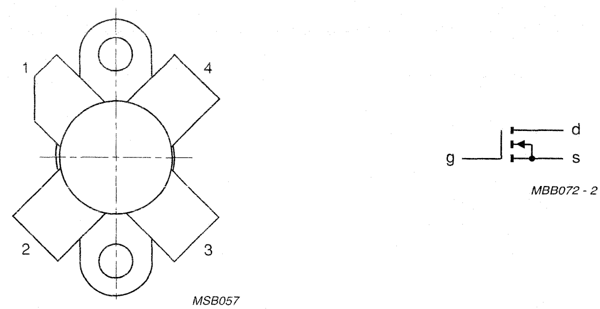


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	175	28	5	> 13 typ. 16	> 50 typ. 60

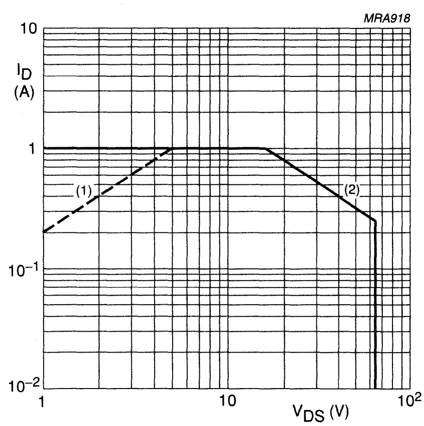
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	1	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	16	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

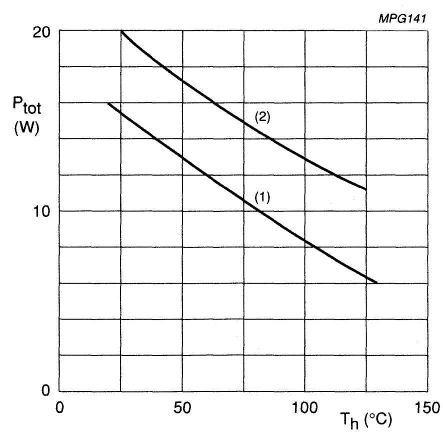
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_{mb} = 25 °C; P_{tot} = 16 W	11 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	T_{mb} = 25 °C; P_{tot} = 16 W	0.3 K/W



(1) Current is this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 0.1 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	10	μA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 3 mA; V_{DS} = 10 V	2	–	4.5	V
g_{fs}	forward transconductance	I_D = 0.3 A; V_{DS} = 10 V	0.16	0.24	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 0.3 A; V_{GS} = 1 V	–	3.3	5	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{GS} = 10 V	–	1.2	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	13	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	9.4	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	1.7	–	pF

VHF power MOS transistor | BLF244

FEATURES

- High power gain
- Low noise figure
- Easy power control
- Good thermal stability
- Withstands full load mismatch
- Gold metallization ensures excellent reliability.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for large signal amplifier applications in the VHF frequency range.

The transistor is encapsulated in a 4-lead SOT123 flange envelope, with a ceramic cap. All leads are isolated from the flange.

Matched gate-source voltage (V_{GS}) groups are available on request.

PINNING - SOT123

PIN	DESCRIPTION
1	drain
2	source
3	gate
4	source

PIN CONFIGURATION

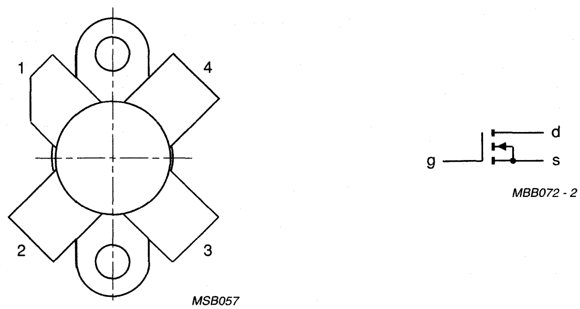


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	175	28	15	> 13	> 50

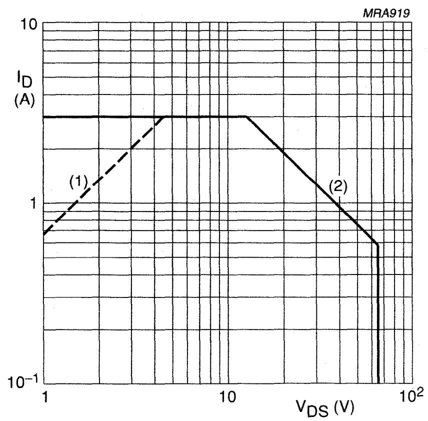
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	3	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	38	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

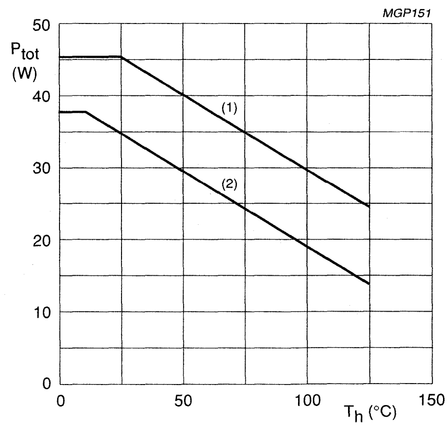
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_{mb} = 25 °C; P_{tot} = 38 W	4.6 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	T_{mb} = 25 °C; P_{tot} = 38 W	0.3 K/W



(1) Current is this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Short-time operation during mismatch.
(2) Continuous operation.

Fig.3 Power/temperature derating curves.

VHF power MOS transistor BLF244

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 5 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	1	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 5 mA; V_{DS} = 10 V	2	–	4.5	V
ΔV_{GS}	gate-source voltage difference of matched devices	I_D = 5 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 0.75 A; V_{DS} = 10 V	0.6	–	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 0.75 A; V_{GS} = 10 V	–	0.8	1.5	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	5	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	60	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	40	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	4.5	–	pF
F	noise figure (see Fig. 13)	I_D = 0.5 A; V_{DS} = 28 V; R1 = 23 Ω; T_h = 25 °C; f = 175 MHz; $R_{th\ mb-h}$ = 0.3 K/W	–	4.3	–	dB

VHF power MOS transistor — BLF245

FEATURES

- High power gain
- Low noise figure
- Easy power control
- Good thermal stability
- Withstands full load mismatch.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for large signal amplifier applications in the VHF frequency range.

The transistor is encapsulated in a 4-lead SOT123 flange envelope, with a ceramic cap. All leads are isolated from the flange.

Matched gate-source voltage (V_{GS}) groups are available on request.

PINNING - SOT123

PIN	DESCRIPTION
1	drain
2	source
3	gate
4	source

PIN CONFIGURATION

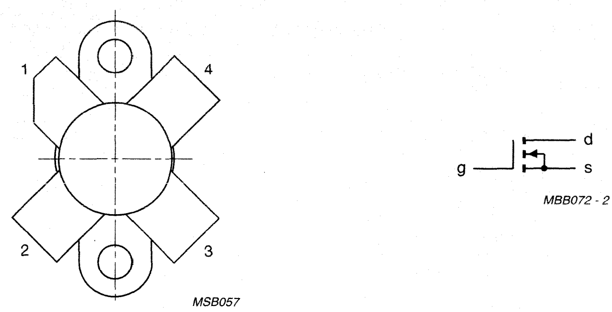


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a class-B test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	175	28	30	> 13	> 50

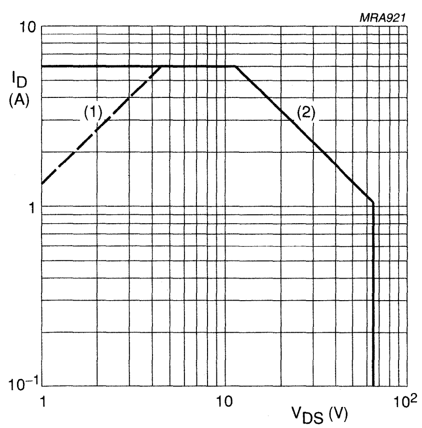
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage	$V_{GS} = 0$	–	65	V
$\pm V_{GS}$	gate-source voltage	$V_{DS} = 0$	–	20	V
I_D	DC drain current		–	6	A
P_{tot}	total power dissipation	up to $T_{mb} = 25$ °C	–	68	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

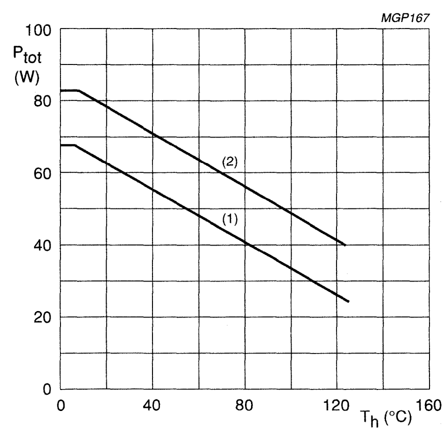
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	$T_{mb} = 25$ °C; $P_{tot} = 68$ W	2.6 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	$T_{mb} = 25$ °C; $P_{tot} = 68$ W	0.3 K/W



(1) Current is this area may be limited by $R_{DS(on)}$.
(2) $T_{mb} = 25$ °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 10 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	2	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 10 mA; V_{DS} = 10 V	2	–	4.5	V
ΔV_{GS}	gate-source voltage difference of matched devices	I_D = 10 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 1.5 A; V_{DS} = 10 V	1.2	1.9	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 1.5 A; V_{GS} = 10 V	–	0.4	0.75	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	10	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	125	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	75	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	7	–	pF
F	noise figure (see Fig.14)	input and output power matched for: I_D = 1 A; V_{DS} = 28 V; P_L = 30 W; R1 = 1 kΩ; T_h = 25 °C; f = 175 MHz	–	2	–	dB

VHF push-pull power MOS transistor | BLF245B

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability.

DESCRIPTION

Dual push-pull silicon N-channel enhancement mode vertical D-MOS transistor designed for large signal amplifier applications in the VHF frequency range.

The transistor is encapsulated in a 4-lead, SOT279 balanced flange envelope, with a ceramic cap. The mounting flange provides the common source connection for the transistors.

PINNING - SOT279

PIN	DESCRIPTION
1	gate 1
2	drain 1
3	gate 2
4	drain 2
5	source

PIN CONFIGURATION

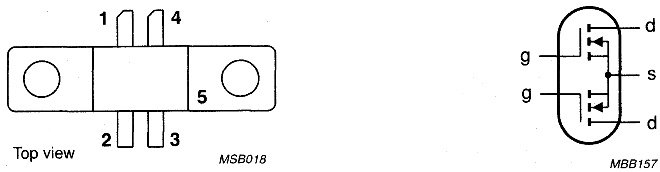


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a push-pull common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_P (dB)	η_D (%)
CW, class-B	175	28	30	> 14	> 55

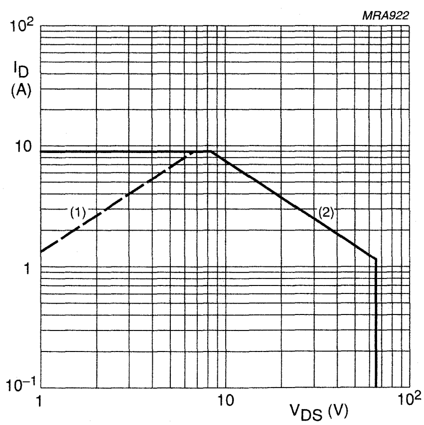
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).
Per transistor section unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	4.5	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C; total device; both sections equally loaded	–	75	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

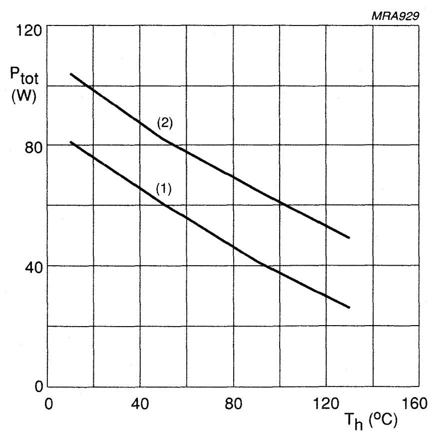
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	total device; both sections equally loaded	2.3 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	total device; both sections equally loaded	0.3 K/W



(1) Current in this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.
Total device; both sections equally loaded.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.
Total device; both sections equally loaded.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS (per section)

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 5 mA; V_{GS} = 0	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	1	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 5 mA; V_{DS} = 10 V	2	–	4.5	V
g_{fs}	forward transconductance	I_D = 0.75 A; V_{DS} = 10 V	600	850	–	mS
$R_{DS(on)}$	drain-source on-state resistance	I_D = 0.75 A; V_{GS} = 10 V	–	0.8	1.5	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	5	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	60	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	40	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	4.5	–	pF

VHF power MOS transistor | BLF246

FEATURES

- High power gain
- Low noise figure
- Easy power control
- Good thermal stability
- Withstands full load mismatch.

APPLICATIONS

- Large signal amplifier applications in the VHF frequency range.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor encapsulated in a 4-lead, SOT121 flange package, with a ceramic cap. All leads are isolated from the flange. A marking code, showing gate-source voltage (V_{GS}) information is provided for matched pair applications. Refer to the General section of Data Handbook SC08a for further information.

CAUTION
The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling.

PINNING - SOT121

PIN	SYMBOL	DESCRIPTION
1	d	drain
2	s	source
3	g	gate
4	s	source

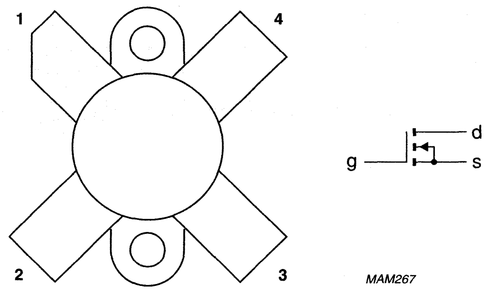


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	108	28	80	≥16	≥55

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

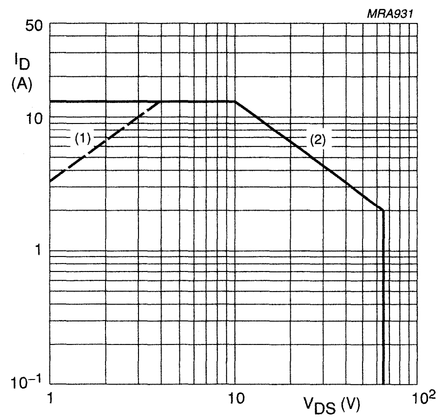
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
V_{GS}	gate-source voltage		–	±20	V
I_D	DC drain current		–	13	A
P_{tot}	total power dissipation	up to T_{amb} = 25 °C	–	130	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

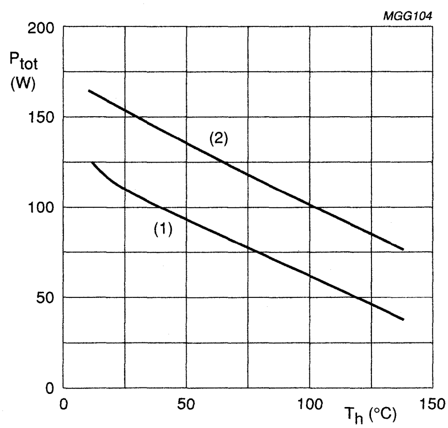
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	1.35	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	0.2	K/W



(1) Current is this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 50 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	2.5	mA
I_{GSS}	gate-source leakage current	V_{GS} = ±20 V; V_{DS} = 0	–	–	1	μA
V_{GSth}	gate-source threshold voltage	I_D = 50 mA; V_{DS} = 10 V	2	–	4.5	V
ΔV_{GS}	gate-source voltage difference of matched pairs	I_D = 50 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 2.5 A or 5 A; V_{DS} = 10 V	3	4.2	–	S
R_{DSon}	drain-source on-state resistance	I_D = 5 A; V_{GS} = 10 V	–	0.2	0.3	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	22	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	225	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	180	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	25	–	pF

VHF push-pull power MOS transistor | BLF248

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability.

DESCRIPTION

Dual push-pull silicon N-channel enhancement mode vertical D-MOS transistor, designed for large signal amplifier applications in the VHF frequency range.

The transistor is encapsulated in a 4-lead SOT262 A1 balanced flange envelope, with two ceramic caps. The mounting flange provides the common source connection for the transistors.

PINNING - SOT262 A1

PIN	DESCRIPTION
1	drain 1
2	drain 2
3	gate 1
4	gate 2
5	source

PIN CONFIGURATION

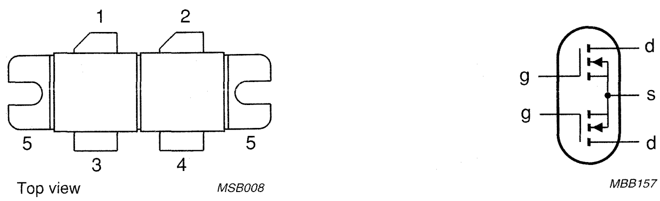


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a push-pull common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_P (dB)	η_D (%)
class-AB	225	28	300	> 10	> 55
	175	28	300	typ. 13	typ. 67

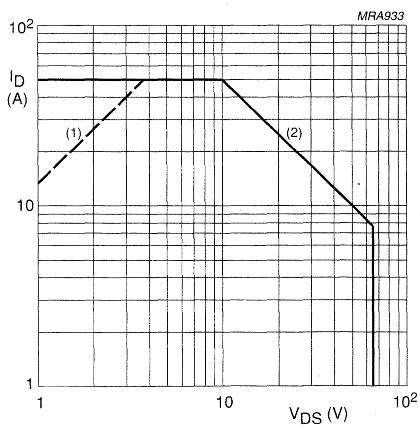
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).
Per transistor section unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	25	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C total device; both sections equally loaded	–	500	W
T_{stg}	storage temperature		–65	150	°C

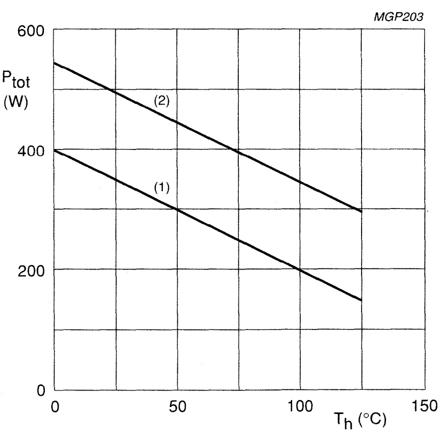
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	total device; both sections equally loaded.	0.35 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	total device; both sections equally loaded.	0.15 K/W



(1) Current is this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.
Total device; both sections equally loaded.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.
Total device; both sections equally loaded.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS (per section)

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 100 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	5	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 100 mA; V_{DS} = 10 V	2	–	4.5	V
ΔV_{GS}	gate-source voltage difference of both transistor sections	I_D = 100 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 8 A; V_{DS} = 10 V	5	7.5	–	S
g_{fs1}/g_{fs2}	forward transconductance ratio of both transistor sections	I_D = 8 A; V_{DS} = 10 V	0.9	–	1.1	
$R_{DS(on)}$	drain-source on-state resistance	I_D = 8 A; V_{GS} = 10 V	–	0.1	0.15	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	37	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	500	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	360	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	46	–	pF

VHF power MOS transistor BLF276

FEATURES

- High power gain
- Easy power control
- Good thermal stability

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for large signal amplifier applications in the VHF frequency range. The transistor delivers an output power of 100 W in class-B operation at a supply voltage of 50 V.

The transistor is encapsulated in a 6-lead, SOT119 pill-package envelope, with a ceramic cap.

PINNING - SOT119D3

PIN	DESCRIPTION
1	source
2	source
3	gate
4	drain
5	source
6	source

PIN CONFIGURATION

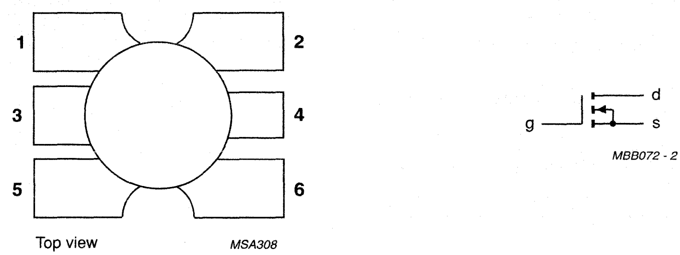


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_P (dB)	η_D (%)
CW, class-B	225	50	100	≥ 13	≥ 50
	108	50	100	≥ 18	≥ 60

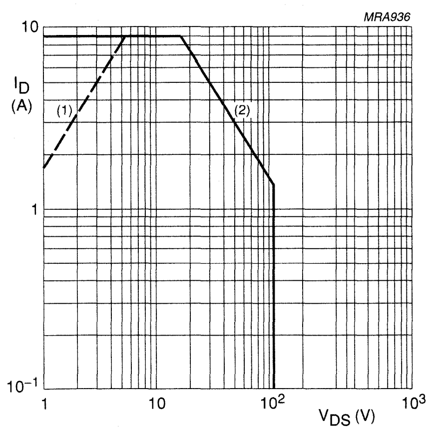
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	110	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	9	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	150	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

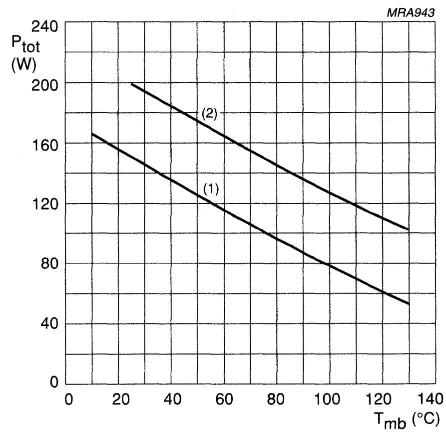
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 150 W; T_{mb} = 25 °C	max. 1.17 K/W



(1) Current is this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 30 mA	110	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 50 V	–	–	1	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 50 mA; V_{DS} = 10 V	2	–	4.5	V
g_{fs}	forward transconductance	I_D = 3 A; V_{DS} = 10 V	2.7	–	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 3 A; V_{GS} = 10 V	–	0.4	0.6	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	8	12	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	240	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	95	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	7	–	pF

VHF power MOS transistor BLF277

FEATURES

- High power gain
- Easy power control
- Gold metallization ensures excellent reliability
- Good thermal stability
- Withstands full load mismatch.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for large signal amplifier applications in the VHF frequency range.

The transistor is encapsulated in a 6-lead, SOT119 flange envelope, with a ceramic cap. All leads are isolated from the flange.

A marking code, showing gate-source voltage (V_{GS}) information is provided for matched pair applications. Refer to the 'General' section for further information.

PINNING - SOT119

PIN	DESCRIPTION
1	source
2	source
3	gate
4	drain
5	source
6	source

PIN CONFIGURATION

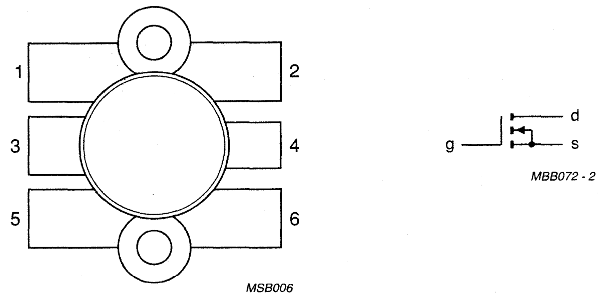


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	175	50	150	> 14	> 50

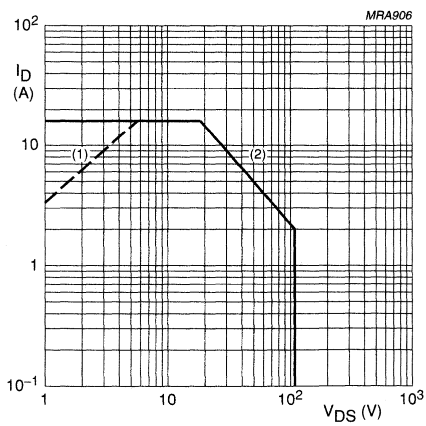
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	110	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	16	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	220	W
T_{stg}	storage temperature		−65	150	°C
T_j	junction temperature		–	200	°C

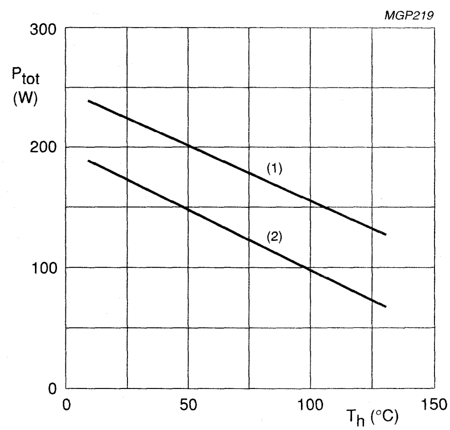
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_{mb} = 25 °C; P_{tot} = 220 W	0.8 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	T_{mb} = 25 °C; P_{tot} = 220 W	0.2 K/W



(1) Current in this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 50 mA	110	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 50 V	–	–	2.5	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 50 mA; V_{DS} = 10 V	2	–	4.5	V
ΔV_{GS}	gate-source voltage difference of matched pairs	I_D = 50 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 5 A; V_{DS} = 10 V	4.5	6.2	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 5 A; V_{GS} = 10 V	–	0.2	0.3	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	25	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	480	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	190	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	14	–	pF

VHF push-pull power MOS transistor BLF278

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Broadcast transmitters in the VHF frequency range.

DESCRIPTION

Dual push-pull silicon N-channel enhancement mode vertical D-MOS transistor encapsulated in a 4-lead, SOT262A1 balanced flange package with two ceramic caps. The mounting flange provides the common source connection for the transistors.

CAUTION
The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling.

PINNING - SOT262A1

PIN	SYMBOL	DESCRIPTION
1	d_1	drain 1
2	d_2	drain 2
3	g_1	gate 1
4	g_2	gate 2
5	s	source

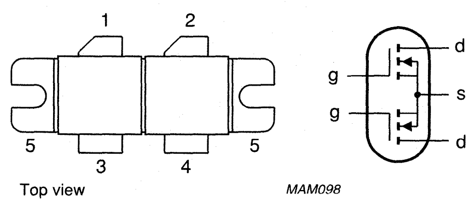


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a push-pull common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	108	50	300	>20	>60
CW, class-C	108	50	300	typ. 18	typ. 80
CW, class-AB	225	50	250	>14 typ. 16	>50 typ. 55

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

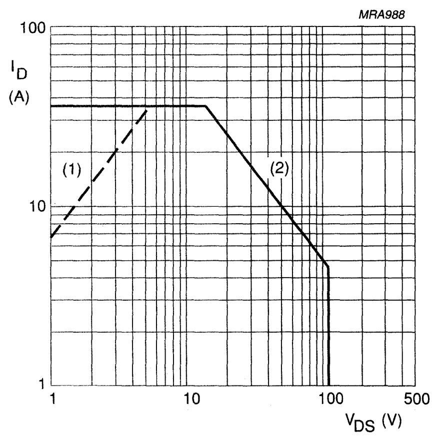
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
Per transistor section					
V_{DS}	drain-source voltage		–	110	V
V_{GS}	gate-source voltage		–	±20	V
I_D	drain current (DC)		–	18	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C total device; both sections equally loaded	–	500	W
T_{stg}	storage temperature		−65	150	°C
T_j	junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	total device; both sections equally loaded.	max. 0.35	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	total device; both sections equally loaded.	max. 0.15	K/W

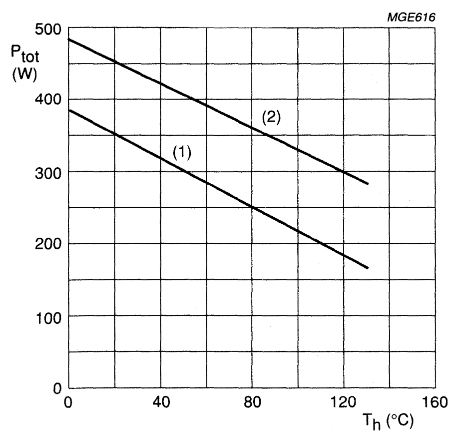


Total device; both sections equally loaded.

(1) Current is this area may be limited by R_{DSon}.

(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



Total device; both sections equally loaded.

(1) Continuous operation.

(2) Short-time operation during mismatch.

Fig.3 Power derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per transistor section						
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 50 mA	110	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 50 V	–	–	2.5	mA
I_{GSS}	gate-source leakage current	V_{GS} = ±20 V; V_{DS} = 0	–	–	1	μA
V_{GSth}	gate-source threshold voltage	V_{DS} = 10 V; I_D = 50 mA	2	–	4.5	V
ΔV_{GS}	gate-source voltage difference of both sections	V_{DS} = 10 V; I_D = 50 mA	–	–	100	mV
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 5 A	4.5	6.2	–	S
g_{fs1}/g_{fs2}	forward transconductance ratio of both sections	V_{DS} = 10 V; I_D = 5 A	0.9	–	1.1	
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 5 A	–	0.2	0.3	Ω
I_{DSX}	drain cut-off current	V_{GS} = 10 V; V_{DS} = 10 V	–	25	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	480	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	190	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	14	–	pF
C_{d-f}	drain-flange capacitance		–	5.4	–	pF

VHF power MOS transistor | BLF346

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Linear amplifier applications in Television transmitters and transposers.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor encapsulated in a 6-lead, SOT119 flange package, with a ceramic cap. All leads are isolated from the flange. A marking code, showing gate-source voltage (V_{GS}) information is provided for matched pair applications. Refer to the General Section of Data Handbook SC08a for further information.

CAUTION
The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling.

PINNING-SOT119

PIN	SYMBOL	DESCRIPTION
1	s	source
2	s	source
3	g	gate
4	d	drain
5	s	source
6	s	source

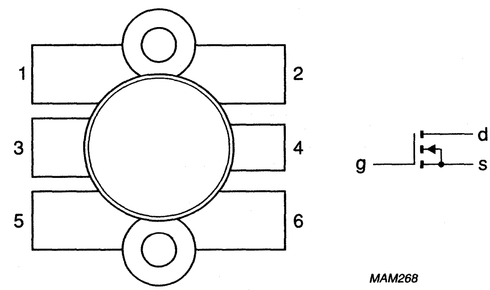


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance in a linear amplifier.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	I_D (A)	T_h (°C)	P_L (W)	G_P (dB)	d_{im} (dB) (1)
Class-A	224.25	28	3	70	>24	>14	−52
				25	typ. 30	typ. 16.5	−52

Note

1. Three-tone test method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB), zero dB corresponds to peak synchronization level.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

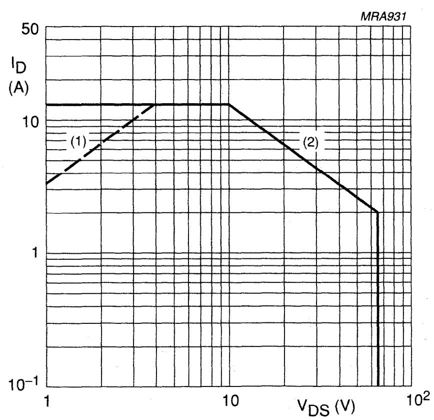
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DSS}	drain-source voltage		–	65	V
V_{GSS}	gate-source voltage		–	±20	V
I_D	DC drain current		–	13	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	130	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

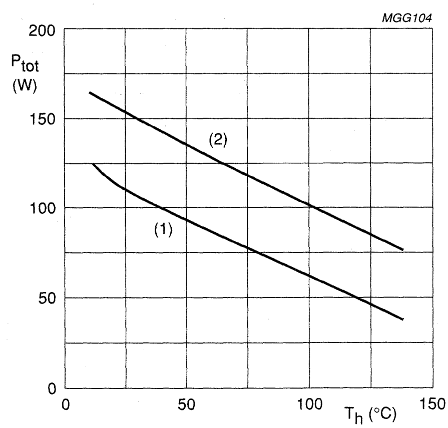
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_{mb} = 25 °C; P_{tot} = 130 W	1.35	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	T_{mb} = 25 °C; P_{tot} = 130 W	0.2	K/W



(1) Current is this area may be limited by R_{DSon}.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 50 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	2.5	mA
I_{GSS}	gate-source leakage current	V_{GS} = ±20 V; V_{DS} = 0	–	–	1	μA
V_{GSth}	gate-source threshold voltage	V_{DS} = 10 V; I_D = 50 mA	2	–	4.5	V
ΔV_{GS}	gate-source voltage difference of matched pairs	V_{DS} = 10 V; I_D = 50 mA	–	–	100	mV
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 5 A	3	4.2	–	S
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 5 A	–	0.2	0.3	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	22	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	225	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	180	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	25	–	pF

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability.

DESCRIPTION

Dual push-pull silicon N-channel enhancement mode vertical D-MOS transistor, designed for broadcast transmitter applications in the VHF frequency range.

The transistor is encapsulated in a 4-lead, SOT262 A1 balanced flange envelope, with two ceramic caps. The mounting flange provides the common source connection for the transistors.

PINNING – SOT262A1

PIN	DESCRIPTION
1	drain 1
2	drain 2
3	gate 1
4	gate 2
5	source

PIN CONFIGURATION

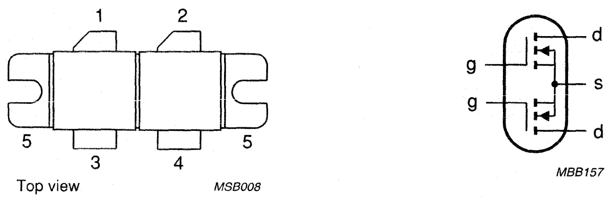


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environment safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance in a push-pull common source test circuit.

MODE OF OPERATION	f_{vision} (MHz)	V_{DS} (V)	I_D (A)	T_h (°C)	d_{im} (dB) (note 1)	$P_{o\ sync}$ (W)	G_p (dB)
class-A	224.25	28	2 × 4.6	70	−52	> 67	> 11
	224.25	28	2 × 4.6	25	−52	typ. 75	typ. 13

Note

1. Three-tone test method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB), zero dB corresponds to peak synchronization level.

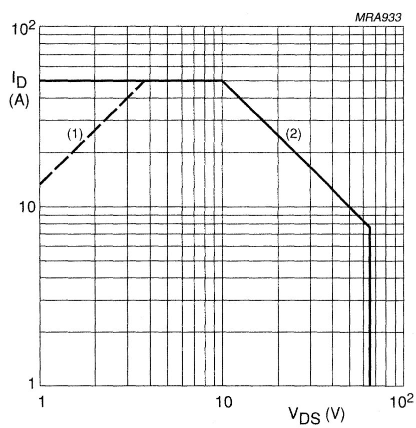
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).
Per transistor section unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DSS}	drain-source voltage		–	65	V
$\pm V_{GSS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	25	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C; total device; both sections equally loaded	–	500	W
T_{stg}	storage temperature		−65	150	°C
T_j	junction temperature		–	200	°C

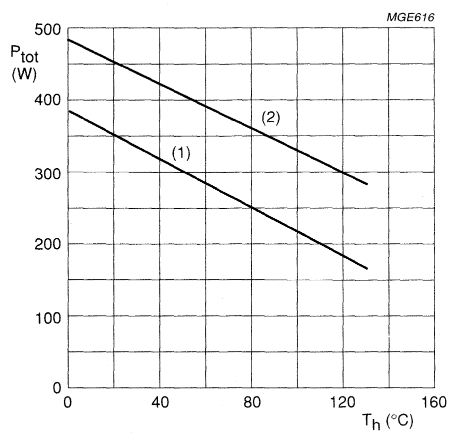
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	total device; both sections equally loaded	0.35 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	total device; both sections equally loaded	0.15 K/W



(1) Current is this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.
Total device; both sections equally loaded.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.
Total device; both sections equally loaded.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS (per section)

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 0.1 A	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	5	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 0.1 A; V_{DS} = 10 V	2	–	4.5	V
$\Delta V_{GS(th)}$	gate-source voltage difference of both transistor sections	I_D = 0.1 A; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 8 A; V_{DS} = 10 V	5	7.5	–	S
g_{fs1}/g_{fs2}	forward transconductance ratio of both transistor sections	I_D = 8 A; V_{DS} = 10 V	0.9	–	1.1	
$R_{DS(on)}$	drain-source on-state resistance	I_D = 8 A; V_{GS} = 10 V	–	0.1	0.15	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	37	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	495	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	340	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	40	–	pF

VHF push-pull power MOS transistor BLF368

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability.

DESCRIPTION

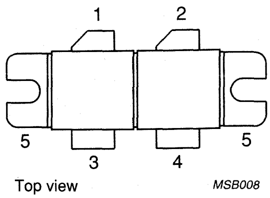
Dual push-pull silicon N-channel enhancement mode vertical D-MOS transistor, designed for broadcast transmitter applications in the VHF frequency range.

The transistor is encapsulated in a 4-lead SOT262 A1 balanced flange envelope, with two ceramic caps. The mounting flange provides the common source connection for the transistors.

PINNING - SOT262 A1

PIN	DESCRIPTION
1	drain 1
2	drain 2
3	gate 1
4	gate 2
5	source

PIN CONFIGURATION



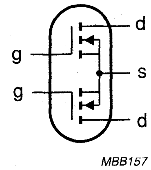


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a push-pull common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	ΔG_p (dB) (note 1)	η_D (%)
CW, class-AB	225	32	300	> 12 typ. 13.5	> 1 typ. 0.4	> 55 typ. 62

Note

1. Assuming a 3rd order amplitude transfer characteristic, 1 dB gain compression corresponds with 30% synchronized input/25% synchronized output compression in television service (negative modulation, CCIR system).

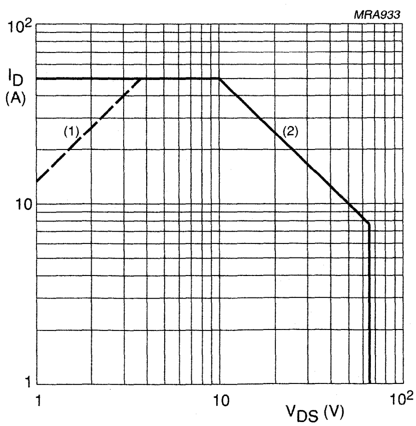
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).
Per transistor section unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DSS}	drain-source voltage		–	65	V
$\pm V_{GSS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	25	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C total device; both sections equally loaded	–	500	W
T_{stg}	storage temperature		−65	150	°C
T_j	junction temperature		–	200	°C

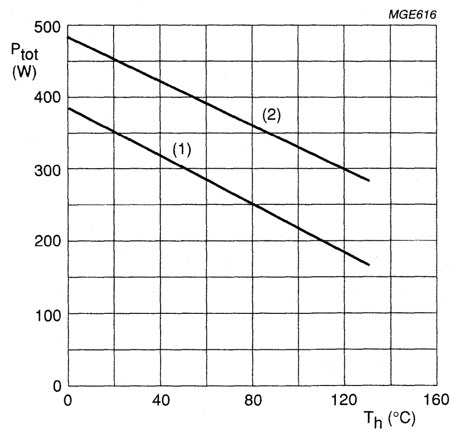
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	total device; both sections equally loaded	0.35 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	total device; both sections equally loaded	0.15 K/W



(1) Current in this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.
Total device; both sections equally loaded.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.
Total device; both sections equally loaded.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS (per section)

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 100 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 32 V	–	–	5	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 100 mA; V_{DS} = 10 V	2	–	4.5	V
ΔV_{GS}	gate-source voltage difference of both transistor sections	I_D = 100 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 8 A; V_{DS} = 10 V	5	7.5	–	S
g_{fs1}/g_{fs2}	forward transconductance ratio of both transistor sections	I_D = 8 A; V_{DS} = 10 V	0.9	–	1.1	
$R_{DS(on)}$	drain-source on-state resistance	I_D = 8 A; V_{GS} = 10 V	–	0.1	0.15	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	37	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 32 V; f = 1 MHz	–	495	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 32 V; f = 1 MHz	–	340	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 32 V; f = 1 MHz	–	40	–	pF
C_{d-f}	drain-flange capacitance		–	5.4	–	pF

VHF push-pull power MOS transistor — BLF378

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Broadcast transmitter applications in the VHF frequency range.

DESCRIPTION

Dual push-pull silicon N-channel enhancement mode vertical D-MOS transistor encapsulated in a 4-lead, SOT262A1 balanced flange package with two ceramic caps. The mounting flange provides the common source connection for the transistors.

CAUTION
The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling.

PINNING - SOT262A1

PIN	SYMBOL	DESCRIPTION
1	d_1	drain 1
2	d_2	drain 2
3	g_1	gate 1
4	g_2	gate 2
5	s	source

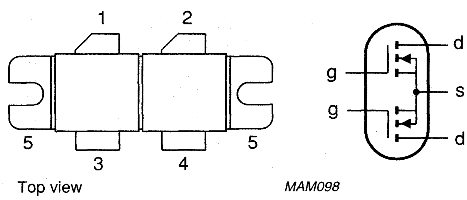


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a push-pull common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	ΔG_p (dB)(1)	η_D (%)
CW, class-AB	225	50	250	>14; typ. 16	<1; typ. 0.6	>50; typ. 55

Note

1. Assuming a 3rd order amplitude transfer characteristic, 1 dB gain compression corresponds with 30% synchronized input / 25% synchronized output compression in television service (negative modulation, CCIR system).

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

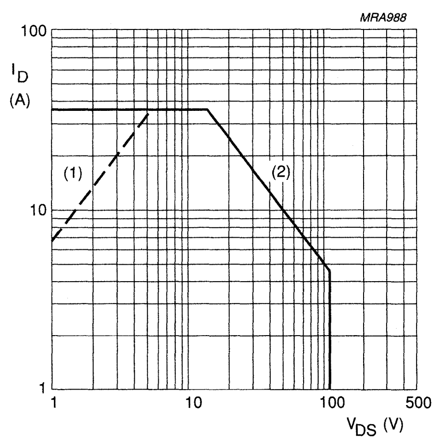
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
Per transistor section					
V_{DSS}	drain-source voltage		–	110	V
V_{GSS}	gate-source voltage		–	±20	V
I_D	DC drain current		–	18	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C total device; both sections equally loaded	–	500	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	total device; both sections equally loaded	0.35	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	total device; both sections equally loaded	0.15	K/W

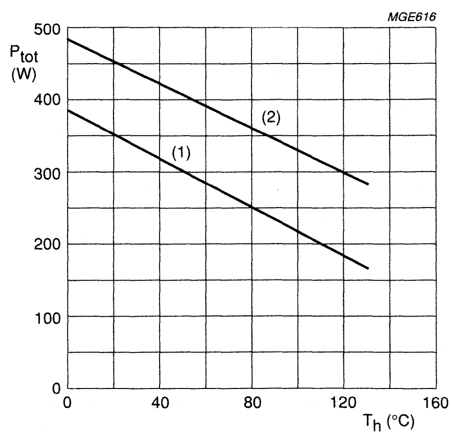


Total device; both sections equally loaded.

(1) Current is this area may be limited by R_{DSon}.

(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



Total device; both sections equally loaded.

(1) Continuous operation.

(2) Short-time operation during mismatch.

Fig.3 Power derating curves.

CHARACTERISTICS

T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per transistor section						
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 50 mA	110	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 50 V	–	–	2.5	mA
I_{GSS}	gate-source leakage current	V_{GS} = ±20 V; V_{DS} = 0	–	–	1	μA
V_{GSth}	gate-source threshold voltage	I_D = 50 mA; V_{DS} = 10 V	2.0	–	4.5	V
ΔV_{GS}	gate-source voltage difference of both transistor sections	I_D = 50 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 5 A; V_{DS} = 10 V	4.5	6.2	–	S
g_{fs1}/g_{fs2}	forward transconductance ratio of both transistor sections	I_D = 5 A; V_{DS} = 10 V	0.9	–	1.1	
R_{DSon}	drain-source on-state resistance	I_D = 5 A; V_{GS} = 10 V	–	0.2	0.3	Ω
I_{DSX}	on-state drain current	V_{GS} = 10 V; V_{DS} = 10 V	–	25	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	480	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	190	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 50 V; f = 1 MHz	–	14	–	pF
C_{d-f}	drain-flange capacitance		–	5.4	–	pF

UHF power MOS transistor BLF404

FEATURES

- High power gain
- Easy power control
- Gold metallization
- Good thermal stability
- Withstands full load mismatch
- Designed for broadband operation.

APPLICATIONS

- Communication transmitters in the VHF/UHF range with a nominal supply voltage of 12.5 V.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS power transistor in an 8-lead SOT409A SMD package with a ceramic cap.

PINNING

PIN	DESCRIPTION
1, 8	source
2, 3	gate
4, 5	source
6, 7	drain

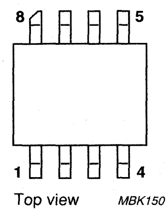


Fig.1 Simplified outline SOT409A.

QUICK REFERENCE DATA

RF performance at $T_{mb} \leq 60$ °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW class-AB	500	12.5	4	≥10	≥50

CAUTION
This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A, and SNW-FQ-302B.

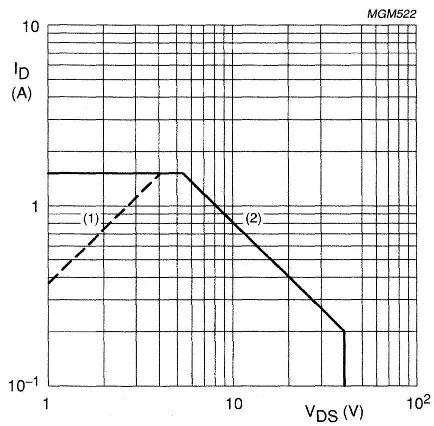
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	40	V
V_{GS}	gate-source voltage		–	±20	V
I_D	DC drain current		–	1.5	A
P_{tot}	total power dissipation	$T_{mb} \leq 85$ °C	–	8.3	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	$T_{mb} \leq 85$ °C, $P_{tot} = 8.3$ W	12.1	K/W



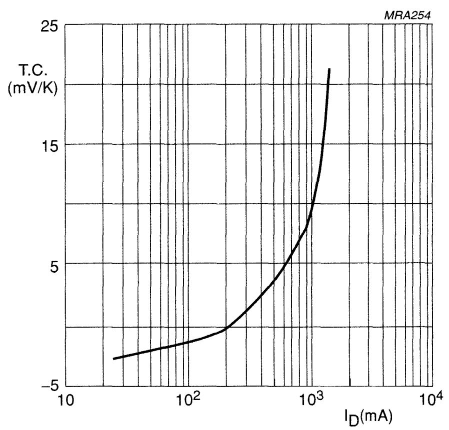
(1) Current in this area may be limited by R_{DSon}.
(2) $T_{mb} = 85$ °C.

Fig.2 DC SOAR.

CHARACTERISTICS

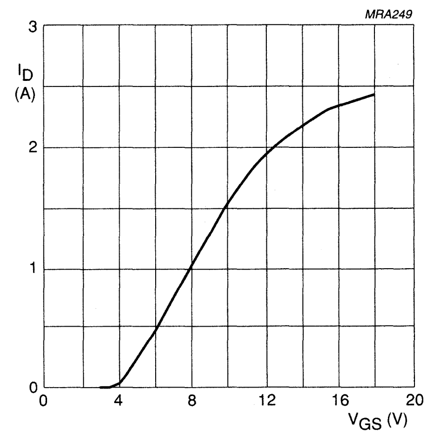
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 5 mA	40	–	–	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 50 mA; V_{DS} = 10 V	2	–	4.5	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 12.5 V	–	–	0.5	mA
I_{GSS}	gate-source leakage current	V_{DS} = 0; V_{GS} = ±20 V	–	–	1	μA
I_{DSX}	on-state drain current	V_{GS} = 15 V; V_{DS} = 10 V	–	2.3	–	A
R_{DSon}	drain-source on-state resistance	I_D = 0.7 A; V_{GS} = 15 V	–	1.8	2.7	Ω
g_{fs}	forward transconductance	I_D = 0.7 A; V_{DS} = 10 V	200	270	–	mS
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz	–	14	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz	–	17	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz	–	3	–	pF



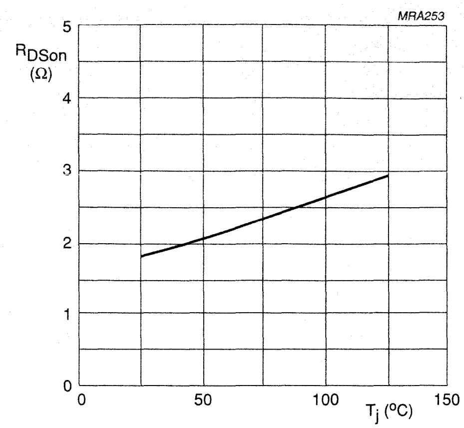
V_{DS} = 10 V.

Fig.3 Temperature coefficient of gate-source voltage as a function of drain current; typical values.



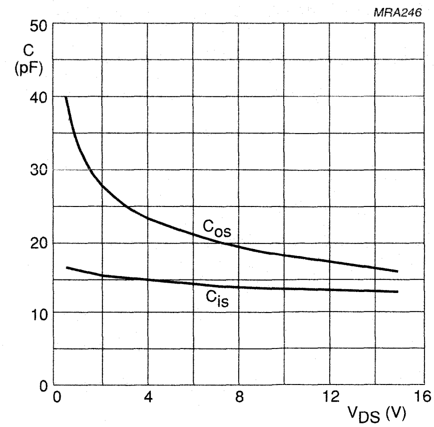
V_{DS} = 10 V; T_j = 25 °C.

Fig.4 Drain current as a function of gate-source voltage; typical values.



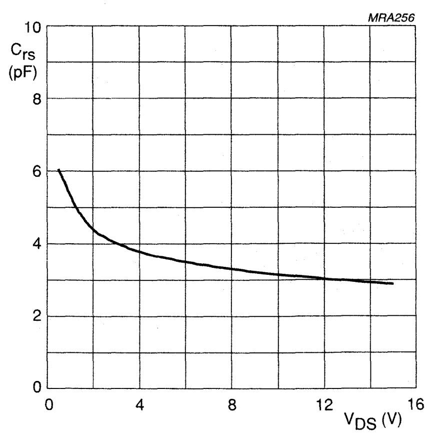
I_D = 0.7 A; V_{GS} = 15 V.

Fig.5 Drain-source on-state resistance as a function of junction temperature; typical values.



V_{GS} = 0; f = 1 MHz; T_j = 25 °C.

Fig.6 Input and output capacitance as functions of drain-source voltage; typical values.



V_{GS} = 0; f = 1 MHz; T_j = 25 °C.

Fig.7 Feedback capacitance as a function of drain-source voltage; typical values.

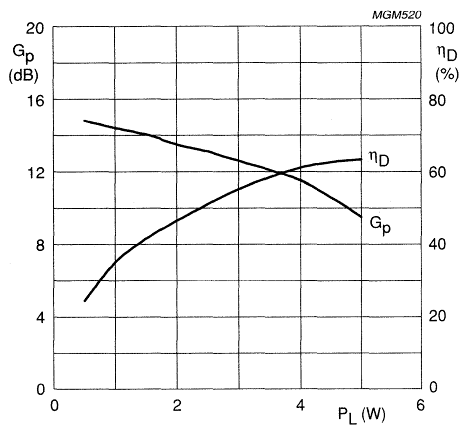
APPLICATION INFORMATION

RF performance at $T_{mb} \leq 60$ °C in a common source test circuit with the device soldered on a printed-circuit board with through metallized holes.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	I_{DQ} (A)	P_L (W)	G_p (dB)	η_D (%)
CW, class-AB	500	12.5	50	4	≥10 typ. 11.5	≥50 typ. 55

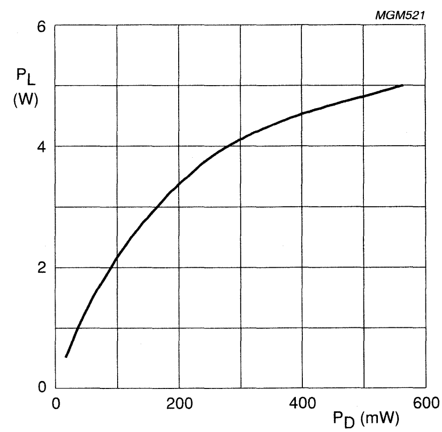
Ruggedness in class-AB operation

The BLF404 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: f = 500 MHz; V_{DS} = 12.5 V; P_L = 4 W; $T_{mb} \leq 60$ °C.



CW, class-AB operation; f = 500 MHz; V_{DS} = 12.5 V; I_{DQ} = 50 mA; $T_{mb} \leq 60$ °C.

Fig.8 Power gain and drain efficiency as functions of load power; typical values.



CW, class-AB operation; f = 500 MHz; V_{DS} = 12.5 V; I_{DQ} = 50 mA; $T_{mb} \leq 60$ °C.

Fig.9 Load power as a function of drive power; typical values.

Test circuit information

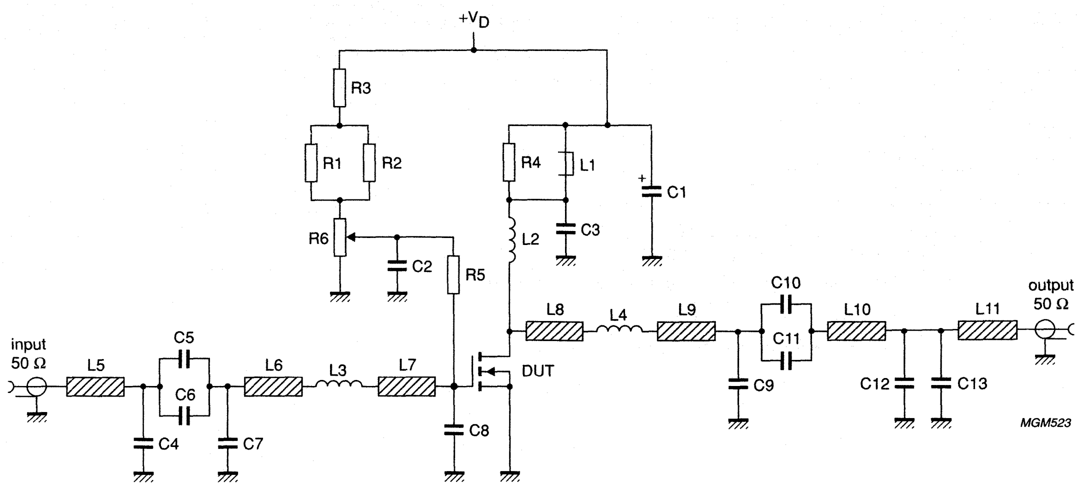


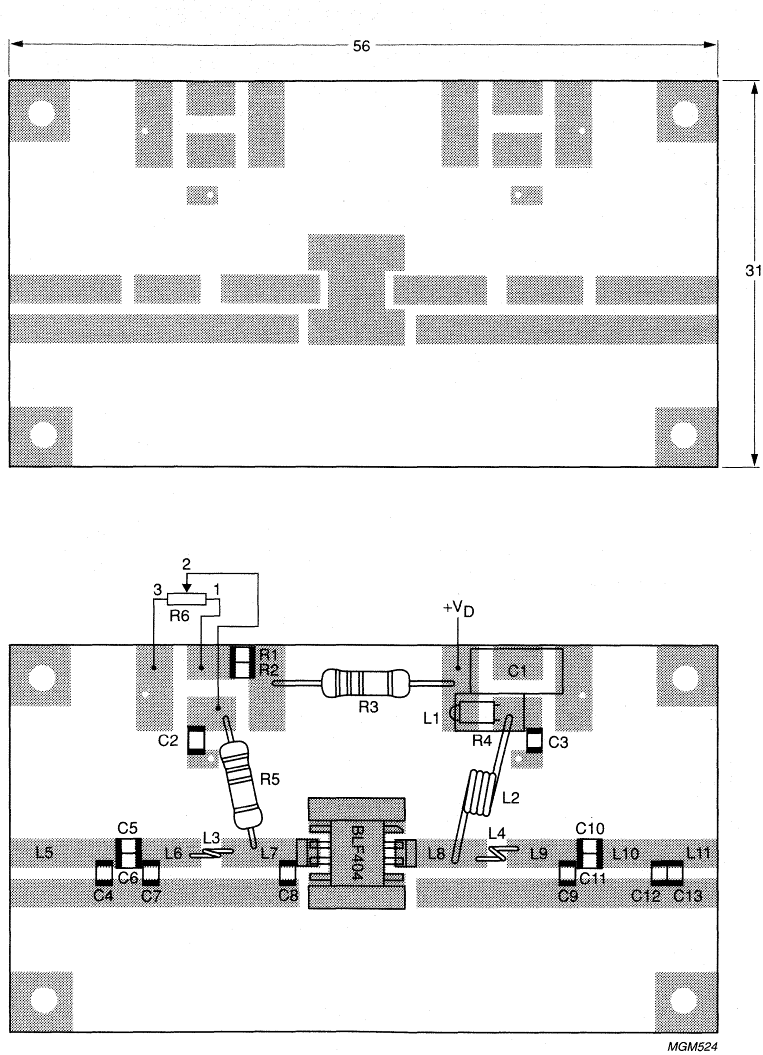
Fig.10 Class-AB common source test circuit at f = 500 MHz.

List of components used in test circuit (see Figs 10 and 11).

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1	electrolytic capacitor	4.7 μF, 10 V		
C2, C3	multilayer ceramic chip capacitor	47 nF		
C4	multilayer ceramic chip capacitor; note 1	18 pF		
C5, C10	multilayer ceramic chip capacitor; note 1	180 pF		
C6, C11	multilayer ceramic chip capacitor; note 1	270 pF		
C7	multilayer ceramic chip capacitor; note 1	22 pF		
C8	multilayer ceramic chip capacitor; note 1	8.2 pF		
C9	multilayer ceramic chip capacitor; note 1	2.7 pF		
C12	multilayer ceramic chip capacitor; note 1	1.2 pF		
C13	multilayer ceramic chip capacitor; note 1	12 pF		
L1	2 turns 1 mm enamelled copper wire on a grade 4B1 Ferroxcube core		ext. dia. = 4.2 mm int. dia. = 2 mm length = 6 mm	
L2	3 turns 1 mm enamelled copper wire		int. dia. = 4.6 mm leads = 2 x 5 mm	
L3	bifilar coil		lead dia. = 0.8 mm	
L4	bifilar coil		lead dia. = 1 mm	
L5	stripline; note 2	50 Ω	8.8 × 2.38 mm	
L6	stripline; note 2	50 Ω	5.8 × 2.38 mm	
L7	stripline; note 2	50 Ω	6.8 × 2.38 mm	
L8	stripline; note 2	50 Ω	3.76 × 2.38 mm	
L9	stripline; note 2	50 Ω	5.8 × 2.38 mm	
L10	stripline; note 2	50 Ω	4.48 × 2.38 mm	
L11	stripline; note 2	50 Ω	3.13 × 2.38 mm	
R1, R2	SMD resistor	3.9 kΩ		
R3	metal film resistor	1 kΩ, 0.25 W		
R4	metal film resistor	22 Ω, 0.25 W		
R5	metal film resistor	10 kΩ, 0.25 W		
R6	potentiometer	10 kΩ		

Notes

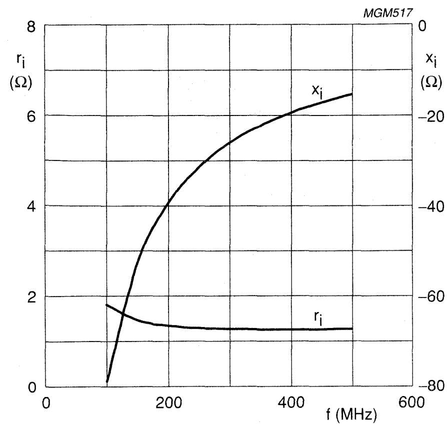
1. American Technical Ceramics type 100A or capacitor of same quality.
2. The striplines are on a double copper-clad printed circuit board, with DUROID dielectric ($\varepsilon_r = 2.2$); thickness 0.79 mm, thickness of the copper sheet 2 x 35 μm.



Dimensions in mm.

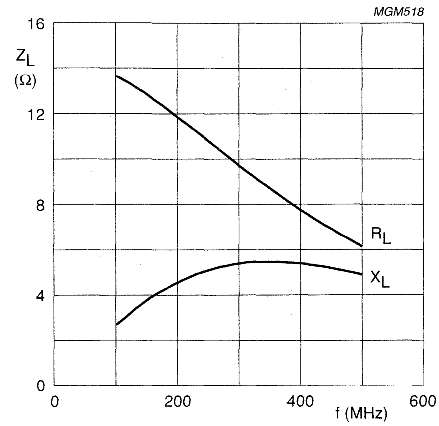
The components are situated on one side of the copper-clad printed-circuit board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.11 Printed-circuit board and component layout for 500 MHz class-AB test circuit in Fig.10.



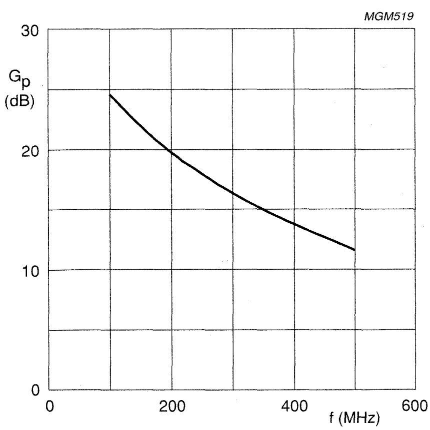
CW, class-AB operation; V_{DS} = 12.5 V; I_D = 50 mA;
P_L = 4 W; T_{mb} ≤ 60 °C.

Fig.12 Input impedance as a function of frequency (series components); typical values.



CW, class-AB operation; V_{DS} = 12.5 V; I_D = 50 mA;
P_L = 4 W; T_{mb} ≤ 60 °C.

Fig.13 Load impedance as a function of frequency (series components); typical values.

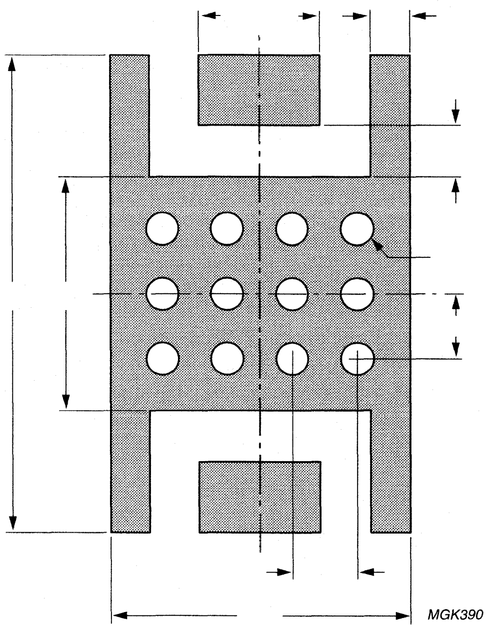


CW, class-AB operation; V_{DS} = 12.5 V; I_{DQ} = 50 mA;
P_L = 4 W; T_{mb} ≤ 60 °C.

Fig.14 Power gain as a function of frequency (series components); typical values.

MOUNTING RECOMMENDATIONS

Both the metallized groundplate and leads contribute to the heatflow. It is recommended that the transistor is mounted on a grounded metallized area of a maximum thickness of 0.8 mm on the printed-circuit board, equipped with at least 12 (0.5 mm diameter) through metallized holes filled with solder.
A thermal resistance $R_{th(mb-h)}$ of 5 K/W can be achieved if heatsink compound is applied when the transistor is mounted on the printed-circuit board.



Dimensions in mm.

Fig.15 Reflow soldering footprint for SOT409A.

UHF power MOS transistor BLF521

FEATURES

- High power gain
- Easy power control
- Gold metallization
- Good thermal stability
- Withstands full load mismatch
- Designed for broadband operation.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for communications transmitter applications in the UHF frequency range.

The transistor is encapsulated in a 4-lead, SOT172D studless envelope, with a ceramic cap. All leads are isolated from the mounting base.

PINNING - SOT172D

PIN	DESCRIPTION
1	source
2	gate
3	drain
4	source

PIN CONFIGURATION

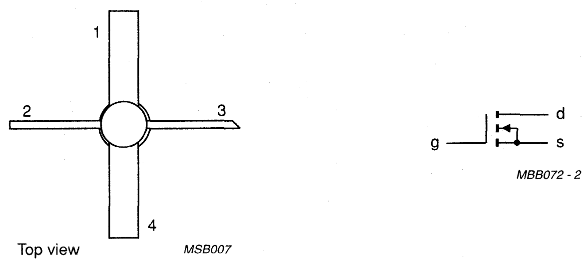


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_{amb} = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	500	12.5	2	> 10	> 50

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

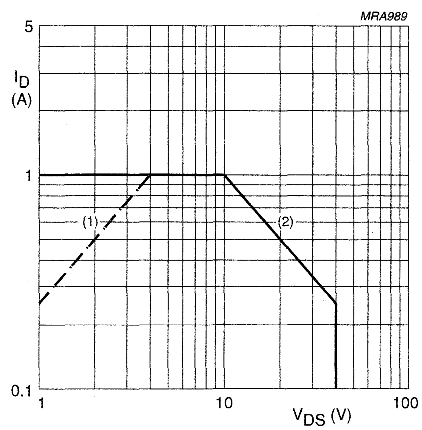
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	40	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	1	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	10	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	17.5 K/W
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient (note 1)	75 K/W

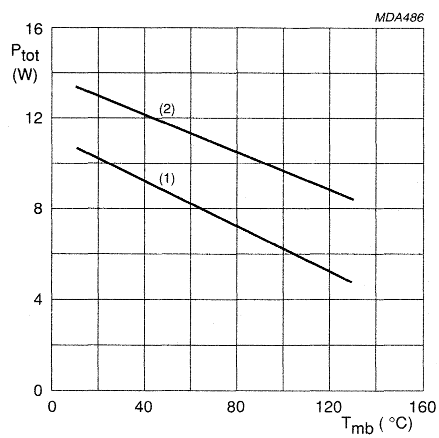
Note

1. Mounted on printed circuit board, see Fig.12.



(1) Current in this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 3 mA	40	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 12.5 V	–	–	10	μA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 3 mA; V_{DS} = 10 V	2	–	4.5	V
g_{fs}	forward transconductance	I_D = 0.3 A; V_{DS} = 10 V	80	135	–	mS
$R_{DS(on)}$	drain-source on-state resistance	I_D = 0.3 A; V_{GS} = 15 V	–	3.5	4	Ω
I_{DSX}	on-state drain current	V_{GS} = 15 V; V_{DS} = 10 V	–	1.3	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz	–	5.3	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz	–	7.8	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz	–	1.8	–	pF

UHF power MOS transistor | BLF522

FEATURES

- High power gain
- Easy power control
- Gold metallization
- Good thermal stability
- Withstands full load mismatch
- Designed for broadband operation.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for communications transmitter applications in the UHF frequency range.

The transistor is encapsulated in a 6-lead, SOT171 flange envelope, with a ceramic cap. All leads are isolated from the flange.

PINNING - SOT171

PIN	DESCRIPTION
1	source
2	source
3	gate
4	drain
5	source
6	source

PIN CONFIGURATION

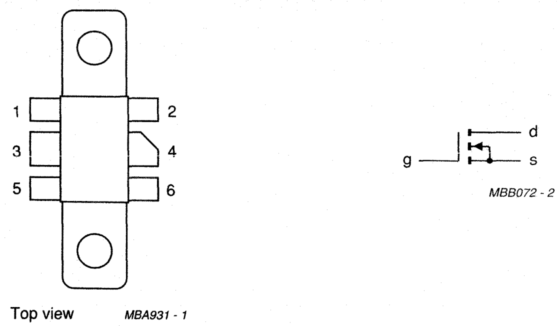


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source class-B circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	GP (dB)	η_D (%)
CW, class-B	500	12.5	5	> 10	> 50

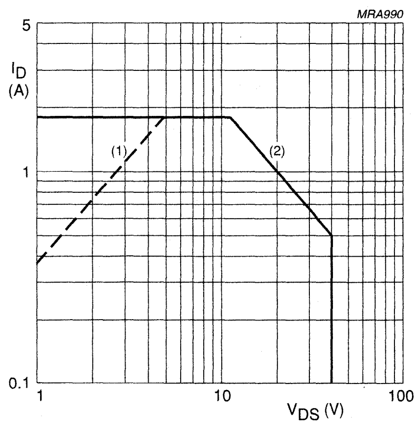
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	40	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	1.8	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	20	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

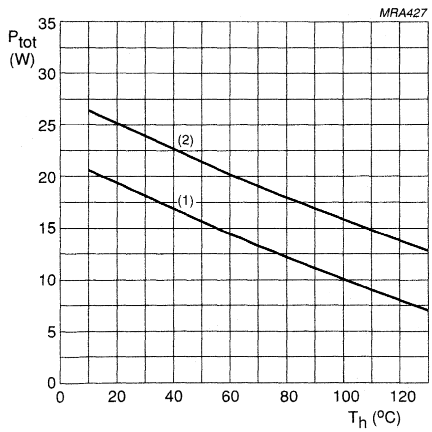
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_{mb} = 25 °C; P_{tot} = 20 W	8.8 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	T_{mb} = 25 °C; P_{tot} = 20 W	0.4 K/W



(1) Current in this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 5 mA	40	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 12.5 V	–	–	0.5	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 50 mA; V_{DS} = 10 V	2	–	4.5	V
g_{fs}	forward transconductance	I_D = 0.7 A; V_{DS} = 10 V	200	270	–	mS
$R_{DS(on)}$	drain-source on-state resistance	I_D = 0.7 A; V_{GS} = 15 V	–	1.8	2.7	Ω
I_{DSX}	on-state drain current	V_{GS} = 15 V; V_{DS} = 10 V	–	2.3	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz	–	14	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz	–	17	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz	–	3	–	pF

UHF power MOS transistor BLF542

FEATURES

- High power gain
- Easy power control
- Gold metallization
- Good thermal stability
- Withstands full load mismatch
- Designed for broadband operation.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for large signal amplifier applications in the UHF frequency range.

The transistor is encapsulated in a 6-lead, SOT171 flange envelope, with a ceramic cap. All leads are isolated from the flange.

PINNING - SOT171

PIN	DESCRIPTION
1	source
2	source
3	gate
4	drain
5	source
6	source

PIN CONFIGURATION

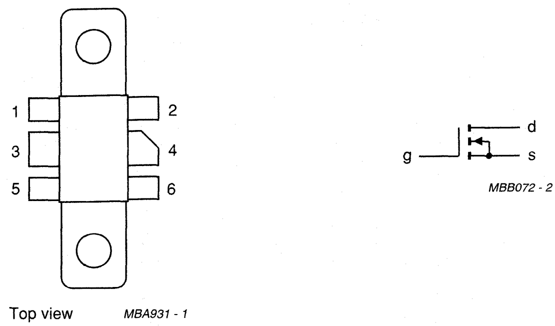


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_P (dB)	η_D (%)
CW, class-B	500	28	5	> 13	> 50

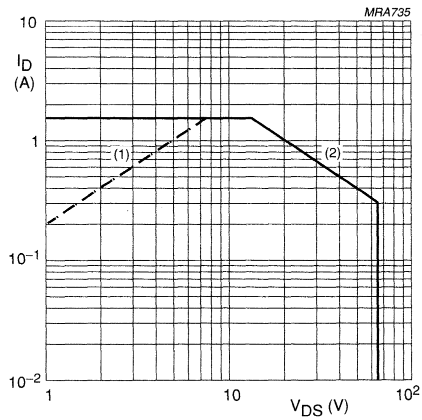
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	1.5	A
P_{tot}	total power dissipation	T_{mb} = 25 °C	–	20	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

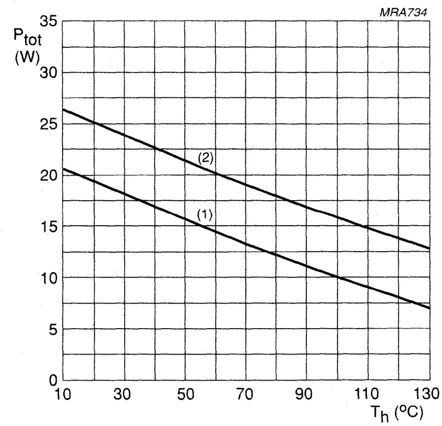
THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	8.8 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	0.4 K/W



(1) Current in this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short time operation during mismatch.

Fig.3 Power derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 0.1 mA; V_{GS} = 0	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	10	μA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 10 mA; V_{DS} = 10 V	2	–	4.5	V
g_{fs}	forward transconductance	I_D = 0.3 A; V_{DS} = 10 V	160	240	–	mS
$R_{DS(on)}$	drain-source on-resistance	I_D = 0.3 A; V_{GS} = 15 V	–	3.3	5	Ω
I_{DSX}	on-state drain current	V_{GS} = 15 V; V_{DS} = 10 V	–	1.4	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	14	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	9.4	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	1.7	–	pF

UHF power MOS transistor BLF543

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability
- Designed for broadband operation.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for communications transmitter applications in the UHF frequency range.

The transistor is encapsulated in a 6-lead, SOT171 flange envelope, with a ceramic cap. All leads are isolated from the flange.

The devices are marked with a V_{GS} indication intended for matched pair applications.

PINNING - SOT171

PIN	DESCRIPTION
1	source
2	source
3	gate
4	drain
5	source
6	source

PIN CONFIGURATION

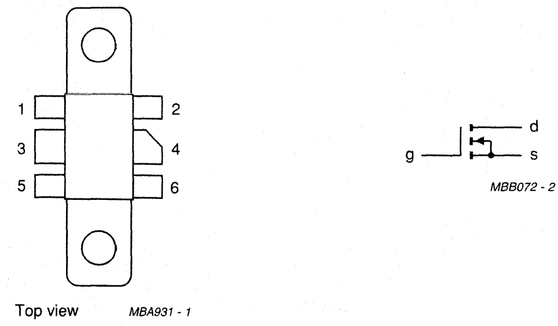


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source class-B circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	500	28	10	> 12	> 50
CW, class-B	960	28	10	typ. 8	typ. 50

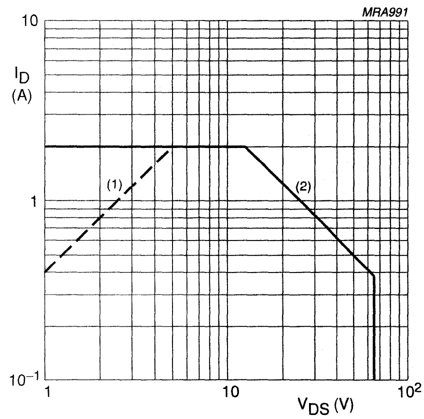
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	2	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	25	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

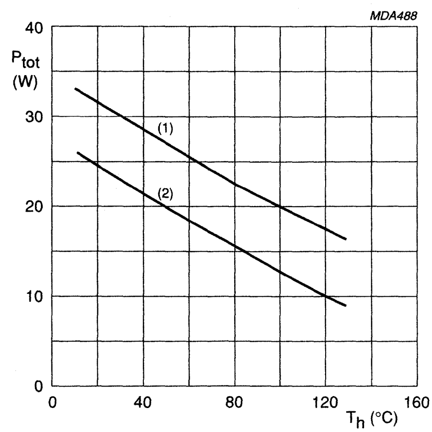
THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	7 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	0.4 K/W



(1) Current in this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 5 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	0.5	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	µA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 20 mA; V_{DS} = 10 V	1	–	4	V
$\Delta V_{GS(th)}$	gate-source voltage difference of matched pairs	I_D = 20 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 0.6 A; V_{DS} = 10 V	300	450	–	mS
$R_{DS(on)}$	drain-source on-state resistance	I_D = 0.6 A; V_{GS} = 10 V	–	1.7	2.5	Ω
I_{DSX}	on-state drain current	V_{GS} = 15 V; V_{DS} = 10 V	–	2.4	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	16	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	12	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	3.2	–	pF

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability
- Designed for broadband operation.

APPLICATIONS

- Communication transmitters in the UHF frequency range.

DESCRIPTION

N-channel enhancement mode vertical D-MOS power transistor encapsulated in a 6-lead, SOT171A flange package with a ceramic cap. All leads are isolated from the flange.
A marking code showing gate-source voltage (V_{GS}) information is provided for matched pair applications.

PINNING - SOT171A

PIN	SYMBOL	DESCRIPTION
1	s	source
2	s	source
3	g	gate
4	d	drain
5	s	source
6	s	source

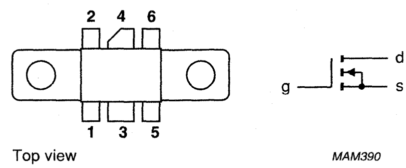


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source class-B circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	500	28	20	>11	>50
CW, class-B	960	28	20	typ. 7	typ. 50

CAUTION
This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

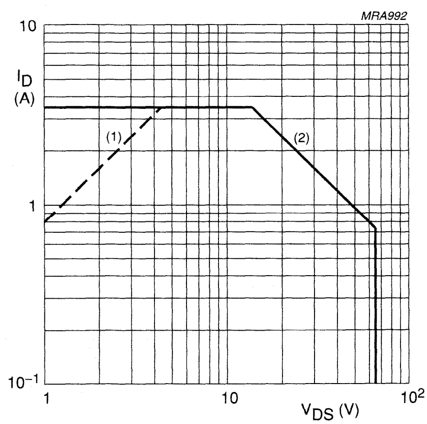
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
V_{GS}	gate-source voltage		–	±20	V
I_D	drain current (DC)		–	3.5	A
P_{tot}	total power dissipation	$T_{mb} \leq 25$ °C	–	48	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

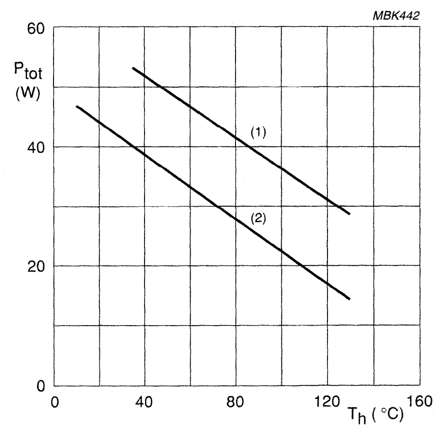
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	3.7	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	0.4	K/W



(1) Current is this area may be limited by R_{DSon}.
(2) T_{mb} = 25 °C.

Fig.2 DC SOAR.



(1) Short-time operation during mismatch.
(2) Continuous operation.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 10 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	1	mA
I_{GSS}	gate-source leakage current	V_{GS} = ±20 V; V_{DS} = 0	–	–	1	μA
V_{GSth}	gate-source threshold voltage	I_D = 40 mA; V_{DS} = 10 V	1	–	4	V
ΔV_{GSth}	gate-source voltage difference of matched pairs	I_D = 40 mA; V_{DS} = 10 V	–	–	100	mV
g_{fs}	forward transconductance	I_D = 1.2 A; V_{DS} = 10 V	600	900	–	mS
R_{DSon}	drain-source on-state resistance	I_D = 1.2 A; V_{GS} = 10 V	–	0.85	1.25	Ω
I_{DSX}	on-state drain current	V_{GS} = 15 V; V_{DS} = 10 V	–	4.8	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	32	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	24	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	6.4	–	pF

UHF push-pull power MOS transistor BLF544B

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability
- Designed for broadband operation.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS push-pull transistor designed for communications transmitter applications in the UHF frequency range.

The transistor is encapsulated in a 4-lead, SOT268 balanced flange envelope, with two ceramic caps. The mounting flange provides the common source connection for the transistors.

PINNING - SOT268

PIN	DESCRIPTION
1	gate 1
2	drain 1
3	gate 2
4	drain 2
5	source

PIN CONFIGURATION

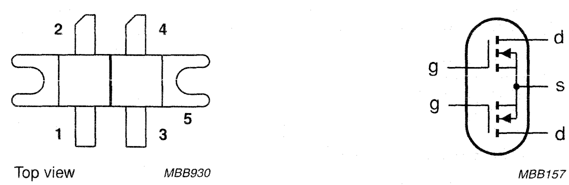


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a push-pull common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	500	28	20	> 12	> 50

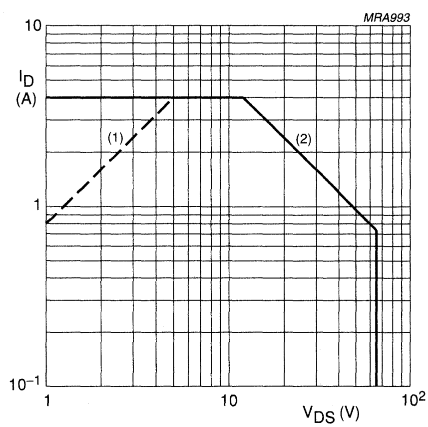
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).
Per transistor section unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	2	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C; total device; both sections equally loaded	–	48	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

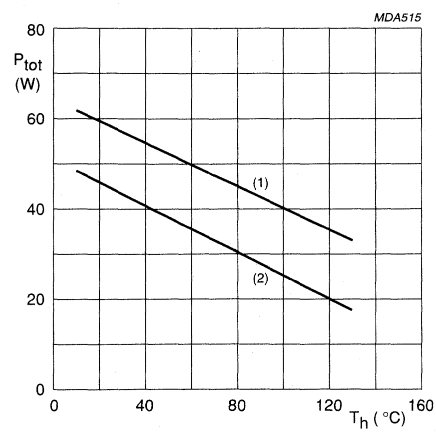
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	total device; both sections equally loaded	3.7 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	total device; both sections equally loaded	0.25 K/W



(1) Current in this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.
Total device; both sections equally loaded.

Fig.2 DC SOAR.



(1) Short-time operation during mismatch.
(2) Continuous operation.
Total device; both sections equally loaded.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS (per section)

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 5 mA; V_{GS} = 0	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	0.5	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 20 mA; V_{DS} = 10 V	1	–	4	V
g_{fs}	forward transconductance	I_D = 0.6 A; V_{DS} = 10 V	300	450	–	mS
$R_{DS(on)}$	drain-source on-state resistance	I_D = 0.6 A; V_{GS} = 10 V	–	0.7	2.5	Ω
I_{DSX}	on-state drain current	V_{GS} = 15 V; V_{DS} = 10 V	–	2.4	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	16	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	12	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	3.2	–	pF

UHF push-pull power MOS transistor — BLF545

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability
- Designed for broadband operation.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS push-pull transistor designed for communications transmitter applications in the UHF frequency range.

The transistor is encapsulated in a 4-lead, SOT268 balanced flange envelope, with two ceramic caps. The mounting flange provides the common source connection for the transistors.

PINNING - SOT268

PIN	DESCRIPTION
1	drain 1
2	gate 1
3	gate 2
4	drain 2
5	source

PIN CONFIGURATION

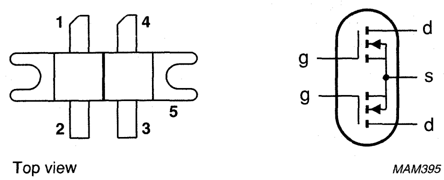


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a push-pull common source circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_P (dB)	η_D (%)
CW, class-B	500	28	40	> 11	> 50

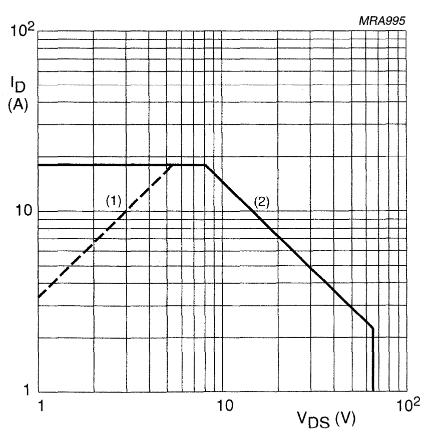
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).
Per transistor section unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	3.5	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C; total device; both sections equally loaded	–	92	W
T_{stg}	storage temperature		−65	150	°C
T_j	junction temperature		–	200	°C

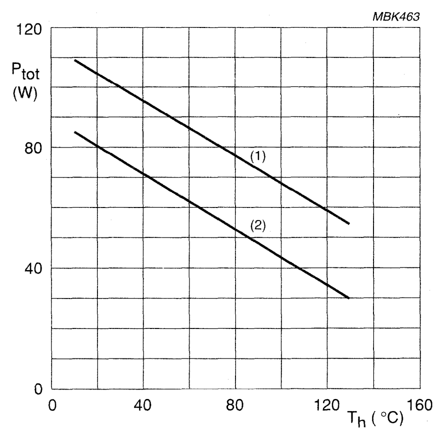
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	total device; both sections equally loaded	1.9 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	total device; both sections equally loaded	0.25 K/W



(1) Current in this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.
Total device; both sections equally loaded.

Fig.2 DC SOAR.



(1) Short-time operation during mismatch.
(2) Continuous operation.
Total device; both sections equally loaded.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS (per section)

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 10 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	1	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 40 mA; V_{DS} = 10 V	1	–	4	V
g_{fs}	forward transconductance	I_D = 1.2 A; V_{DS} = 10 V	600	900	–	mS
$R_{DS(on)}$	drain-source on-state resistance	I_D = 1.2 A; V_{GS} = 10 V	–	0.85	1.25	Ω
I_{DSX}	on-state drain current	V_{GS} = 15 V; V_{DS} = 10 V	–	4.8	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	32	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	24	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	6.4	–	pF

UHF push-pull power MOS transistor

BLF546

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability
- Designed for broadband operation.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS push-pull transistor designed for communications transmitter applications in the UHF frequency range.

The transistor is encapsulated in a 4-lead, SOT268 balanced flange envelope, with two ceramic caps. The mounting flange provides the common source connection for the transistors.

PINNING - SOT268

PIN	DESCRIPTION
1	drain 1
2	gate 1
3	gate 2
4	drain 2
5	source

PIN CONFIGURATION

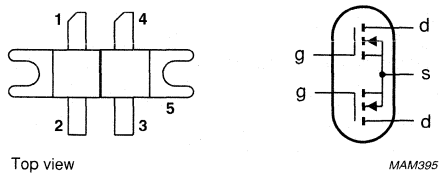


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a push-pull common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	500	28	80	> 11	> 50

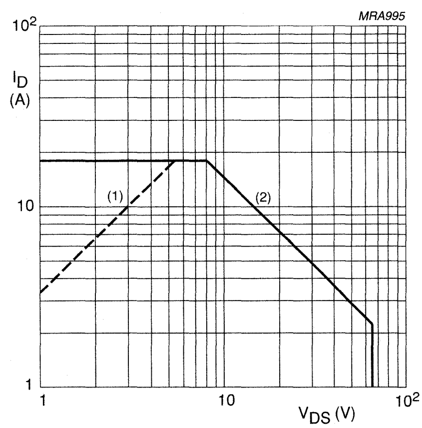
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).
Per transistor section unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	9	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C; total device; both sections equally loaded	–	145	W
T_{stg}	storage temperature		−65	150	°C
T_j	junction temperature		–	200	°C

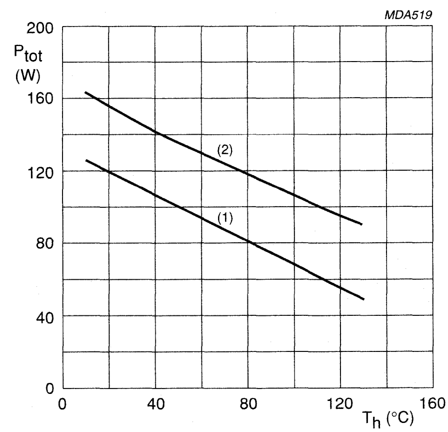
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j-mb}$	thermal resistance from junction to mounting base	total device; both sections equally loaded	1.2 K/W
$R_{th\ mb-h}$	thermal resistance from mounting base to heatsink	total device; both sections equally loaded	0.25 K/W



(1) Current in this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.
Total device; both sections equally loaded.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.
Total device; both sections equally loaded.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS (per section)

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 20 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	2	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 80 mA; V_{DS} = 10 V	1	–	4	V
g_{fs}	forward transconductance	I_D = 2.4 A; V_{DS} = 10 V	1.2	1.7	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 2.4 A; V_{GS} = 10 V	–	0.4	0.6	Ω
I_{DSX}	on-state drain current	V_{GS} = 15 V; V_{DS} = 10 V	–	10	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	60	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	46	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	15	–	pF

UHF push-pull power MOS transistor — BLF547

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability
- Designed for broadband operation.

DESCRIPTION

Dual push-pull silicon N-channel enhancement mode vertical D-MOS transistor designed for communications transmitter applications in the UHF frequency range.

The transistor is encapsulated in a 4-lead, SOT262A2 balanced flange envelope, with two ceramic caps. The mounting flange provides the common source connection for the transistors.

PINNING - SOT262A2

PIN	DESCRIPTION
1	drain 1
2	drain 2
3	gate 1
4	gate 2
5	source

PIN CONFIGURATION

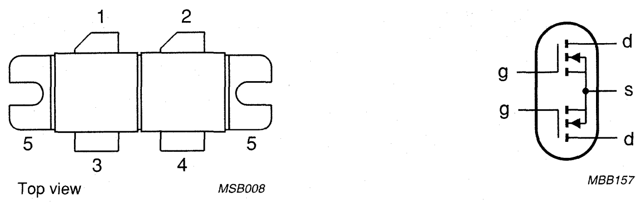


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a push-pull common-source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_P (dB)	η_D (%)
CW, class-B	500	28	100	> 10	> 50

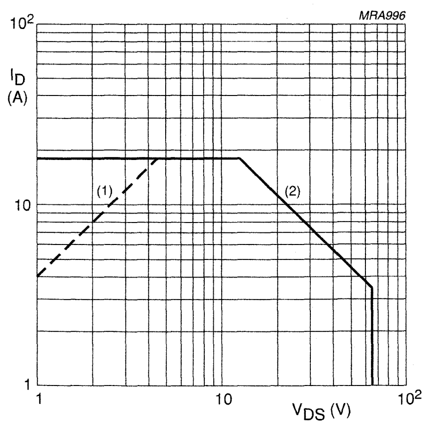
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).
Per transistor section unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	9	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C; total device; both sections equally loaded	–	225	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

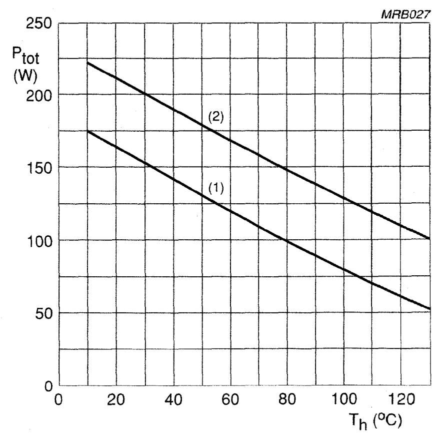
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_{mb} = 25 °C; P_{tot} = 225 W total device; both sections equally loaded	max. 0.78 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	total device; both sections equally loaded	max. 0.15 K/W



(1) Current in this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C;
Total device; both sections equally loaded.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.
Total device; both sections equally loaded.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS (per section)

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 25 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	2.5	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 100 mA; V_{DS} = 10 V	1	–	4	V
g_{fs}	forward transconductance	I_D = 3 A; V_{DS} = 10 V	1.5	2.1	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 3 A; V_{GS} = 10 V	–	0.4	0.5	Ω
I_{DSX}	on-state drain current	V_{GS} = 15 V; V_{DS} = 10 V	10	13	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	77	85	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	62	70	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	18	21	pF

UHF push-pull power MOS transistor

BLF548

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability
- Designed for broadband operation.

DESCRIPTION

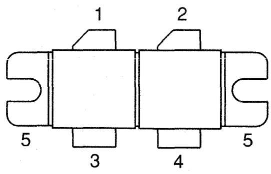
Dual push-pull silicon N-channel enhancement mode vertical D-MOS transistor designed for communications transmitter applications in the UHF frequency range.

The transistor is encapsulated in a 4-lead, SOT262A2 balanced flange envelope, with two ceramic caps. The mounting flange provides the common source connection for the transistors.

PINNING - SOT262A2

PIN	DESCRIPTION
1	drain 1
2	drain 2
3	gate 1
4	gate 2
5	source

PIN CONFIGURATION



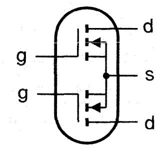


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a push-pull common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	500	28	150	> 10	> 50

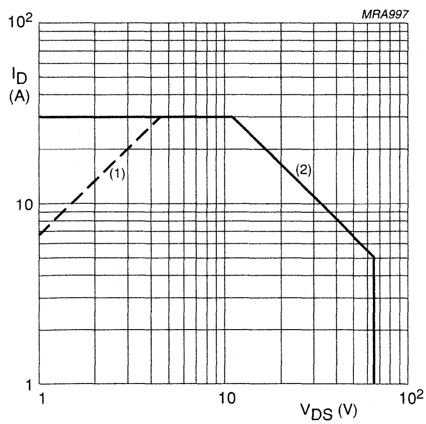
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).
Per transistor section unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	15	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C; total device; both sections equally loaded	–	330	W
T_{stg}	storage temperature		−65	150	°C
T_j	junction temperature		–	200	°C

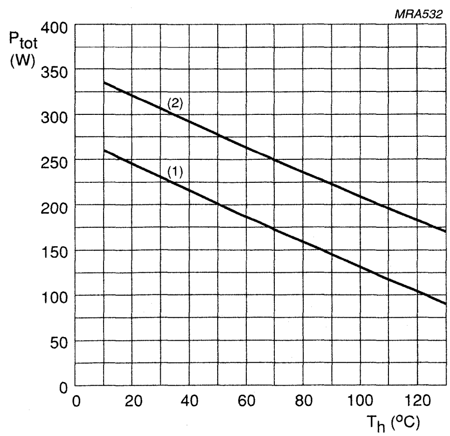
THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_{mb} = 25 °C; P_{tot} = 330 W; total device; both sections equally loaded	0.5 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	total device; both sections equally loaded	0.15 K/W



(1) Current in this area may be limited by $R_{DS(on)}$.
(2) T_{mb} = 25 °C.
Total device; both sections equally loaded.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.
Total device; both sections equally loaded.

Fig.3 Power/temperature derating curves.

CHARACTERISTICS (per section)

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 40 mA	65	–	–	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 28 V	–	–	0.5	mA
I_{GSS}	gate-source leakage current	$\pm V_{GS}$ = 20 V; V_{DS} = 0	–	–	1	μA
$V_{GS(th)}$	gate-source threshold voltage	I_D = 160 mA; V_{DS} = 10 V	2	–	4	V
g_{fs}	forward transconductance	I_D = 4.8 A; V_{DS} = 10 V	2.4	3.5	–	S
$R_{DS(on)}$	drain-source on-state resistance	I_D = 4.8 A; V_{GS} = 10 V	–	0.25	0.3	Ω
I_{DSX}	on-state drain current	V_{GS} = 15 V; V_{DS} = 10 V	16	20	–	A
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	105	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	90	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz	–	25	–	pF

UHF power transistor | BLF2047

FEATURES

- High power gain
- Easy power control
- Excellent ruggedness
- Source on underside eliminates DC isolators, reducing common mode inductance
- Designed for broadband operation.

APPLICATIONS

- Common emitter class-AB operation for PCN and PCS applications in the 1800 to 2000 MHz frequency range.

DESCRIPTION

Silicon N-channel enhancement mode lateral D-MOS transistor encapsulated in a 2-lead flange package (SOT502A) with a ceramic cap. The common source is connected to the mounting flange.

PINNING - SOT502A

PIN	DESCRIPTION
1	drain
2	gate
3	source, connected to flange

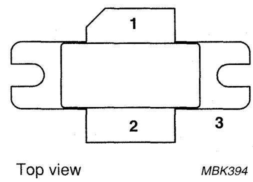


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)	d_{im} (dBc)
CW, class-AB (2-tone)	f_1 = 2000; f_2 = 2001	26	70 (PEP)	>10	>30	≤–30
CW, class-AB (1-tone)	2000	26	70	>9	>40	–

CAUTION
This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	65	V
V_{GS}	gate-source voltage		–	±20	V
I_D	DC drain current		–	9	A
P_{tot}	total power dissipation	$T_{mb} \leq 25$ °C	–	350	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	$T_{mb} = 25$ °C, $P_{tot} = 350$ W	0.5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.2	K/W

CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0$; $I_D = 2$ mA	65	–	–	V
V_{GSth}	gate-source threshold voltage	$V_{DS} = 10$ V; $I_D = 150$ mA	2	–	4.5	V
I_{DSS}	drain-source leakage current	$V_{GS} = 0$; $V_{DS} = 28$ V	–	–	1	mA
I_{DSX}	drain cut-off current	$V_{GS} = 10$ V; $V_{DS} = 10$ V	20	–	–	A
I_{GSS}	gate leakage current	$V_{GS} = \pm 20$ V; $V_{DS} = 0$	–	–	1	μA
g_{fs}	forward transconductance	$V_{DS} = 10$ V; $I_D = 9$ A	–	5	–	S
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10$ V; $I_D = 9$ A	–	0.15	–	Ω
C_{is}	input capacitance	$V_{GS} = 0$; $V_{DS} = 26$ V; f = 1 MHz	–	90	–	pF
C_{os}	output capacitance	$V_{GS} = 0$; $V_{DS} = 26$ V; f = 1 MHz	–	70	–	pF
C_{rs}	feedback capacitance	$V_{GS} = 0$; $V_{DS} = 26$ V; f = 1 MHz	–	3.4	–	pF

APPLICATION INFORMATION

RF performance in a common source class-AB circuit. $T_h = 25$ °C; $R_{th\ mb\text{-}h} = 0.2$ K/W, unless otherwise specified.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)	d_{im} (dBc)
CW, class-AB (2-tone)	$f_1 = 2000$; $f_2 = 2001$	26	70 (PEP)	>10	>30	≤–30
CW, class-AB (1-tone)	2000	26	70	>9	>40	–

Ruggedness in class-AB operation

The BLF2047 is capable of withstanding a load mismatch corresponding to VSWR = 5 : 1 through all phases under the following conditions: $V_{DS} = 28$ V; f = 2000 MHz at rated load power.

Microwave power transistor

BLS2731-10

FEATURES

- Suitable for short and medium pulse applications
- Internal input and output matching networks for an easy circuit design
- Emitter ballasting resistors improve ruggedness
- Gold metallization ensures excellent reliability
- Interdigitated emitter-base structure provides high emitter efficiency
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

- Common base class-C pulsed power amplifier for radar applications in the 2.7 to 3.1 GHz band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a 2-lead rectangular flange package with a ceramic cap (SOT445C) with the common base connected to the flange.

PINNING - SOT445C

PIN	DESCRIPTION
1	collector
2	emitter
3	base; connected to flange

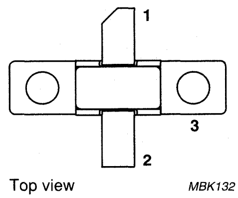


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common base class-C test circuit.

MODE OF OPERATION	f (GHz)	V_{CB} (V)	P_L (W)	G_p (dB)	η_C (%)
Pulsed class-C	2.7 to 3.1	40	12.5	typ. 9	typ. 45

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	75	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	75	V
V_{EBO}	emitter-base voltage	open collector	–	2	V
I_{CM}	peak collector current	$t_p \leq 100\ \mu s$; $\delta \leq 10\%$	–	1.5	A
P_{tot}	total power dissipation	$t_p = 100\ \mu s$; $\delta = 10\%$; $T_{mb} = 25\ °C$	–	t.b.f.	W
T_{stg}	storage temperature		−65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	up to 0.2 mm from ceramic cap; $t \leq 10$ s	–	235	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	$t_p = 100\ \mu s$; $\delta = 10\%$; note 1	t.b.f.	K/W

Note

1. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

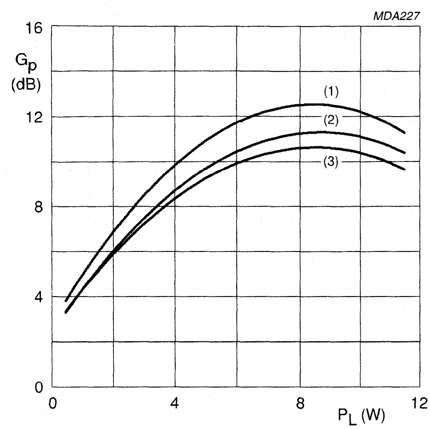
$T_j = 25\ °C$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 2.5$ mA; open emitter	75	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 2.5$ mA; $V_{BE} = 0$	75	–	–	V
I_{CBO}	collector leakage current	$V_{CB} = 40$ V; $I_E = 0$	–	–	0.3	mA
I_{CES}	collector leakage current	$V_{CE} = 40$ V; $V_{BE} = 0$	–	–	0.5	mA
I_{EBO}	emitter leakage current	$V_{EB} = 1.5$ V; $I_C = 0$	–	–	0.1	mA
h_{FE}	DC current gain	$V_{CE} = 5$ V; $I_C = 0.25$ A	40	–	–	
C_c	collector capacitance (die only)	$V_{CE} = 1$ V; $I_E = i_e = 0$; $f = 1$ MHz	–	10	–	pF

APPLICATION INFORMATION

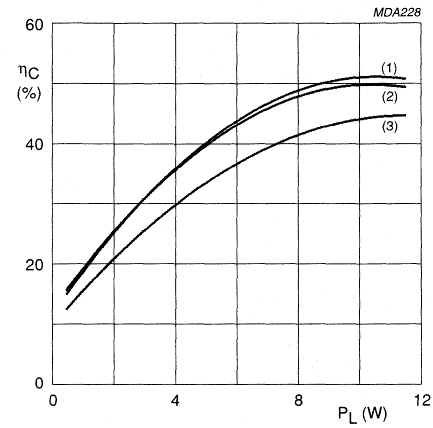
RF performance at T_h = 25 °C in a common-base test circuit.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
Class-C; t_p = 100 μs; δ = 10%	2.7 to 3.1	40	≥10 typ. 12.5	≥7 typ. 9	≥35 typ. 45



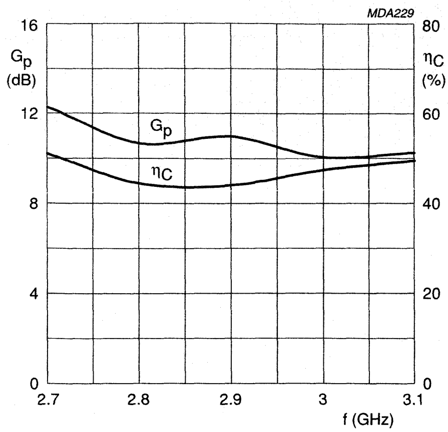
V_{CB} = 40 V; class-C; t_p = 100 μs; δ = 10%.
(1) f = 2.7 GHz.
(2) f = 2.9 GHz.
(3) f = 3.1 GHz.

Fig.2 Power gain as a function of load power; typical values.



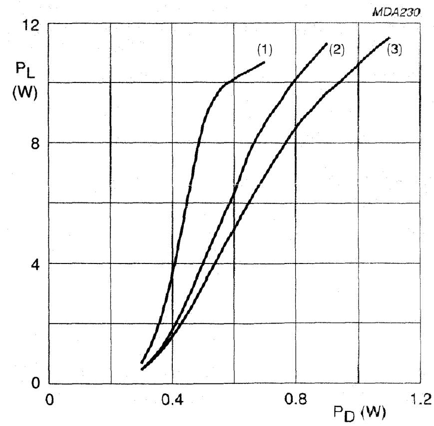
V_{CB} = 40 V; class-C; t_p = 100 μs; δ = 10%.
(1) f = 2.7 GHz.
(2) f = 3.1 GHz.
(3) f = 2.9 GHz.

Fig.3 Collector efficiency as a function of load power; typical values.



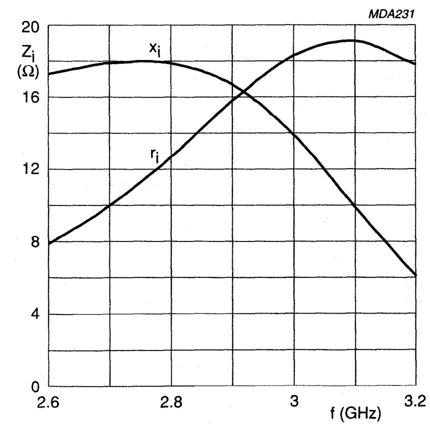
V_{CB} = 40 V; class-C; t_p = 100 μs; δ = 10%.

Fig.4 Power gain and efficiency as functions of frequency; typical values.



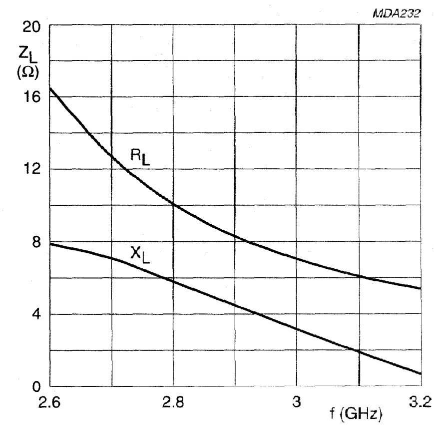
V_{CB} = 40 V; class-C; t_p = 100 μs; δ = 10%.
(1) f = 2.7 GHz.
(2) f = 2.9 GHz.
(3) f = 3.1 GHz.

Fig.5 Load power as a function of drive power; typical values.



V_{CB} = 40 V; class-C; P_L = 10 W.

Fig.6 Input impedance as function of frequency (series components); typical values.



V_{CB} = 40 V; class-C; P_L = 10 W.

Fig.7 Load impedance as function of frequency (series components); typical values.

Microwave power transistor BLS2731-20

FEATURES

- Suitable for short and medium pulse applications
- Internal input and output matching networks for an easy circuit design
- Emitter ballasting resistors improve ruggedness
- Gold metallization ensures excellent reliability
- Interdigitated emitter-base structure provides high emitter efficiency
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

- Common base class-C pulsed power amplifiers for radar applications in the 2.7 to 3.1 GHz band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a 2-lead rectangular flange package with a ceramic cap (SOT445C) with the common base connected to the flange.

PINNING - SOT445C

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

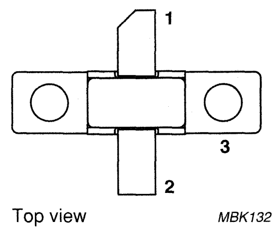


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common base class-C test circuit.

MODE OF OPERATION	f (GHz)	V_{CB} (V)	P_L (W)	G_p (dB)	η_C (%)
Pulsed class-C	2.7 to 3.1	40	25	typ. 8	typ. 40

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	75	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	75	V
V_{EBO}	emitter-base voltage	open collector	–	2	V
I_{CM}	peak collector current	$t_p \leq 100$ µs; $\delta \leq 10\%$	–	3	A
P_{tot}	total power dissipation	$t_p = 100$ µs; $\delta = 10\%$; $T_{mb} = 25$ °C	–	t.b.f.	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	up to 0.2 mm from ceramic cap; $t \leq 10$ s	–	235	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	$t_p = 100$ µs; $\delta = 10\%$; note 1	t.b.f.	K/W

Note

1. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 5$ mA; open emitter	75	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 5$ mA; $V_{BE} = 0$	75	–	–	V
I_{CBO}	collector leakage current	$V_{CB} = 40$ V; $I_E = 0$	–	–	0.5	mA
I_{CES}	collector leakage current	$V_{CE} = 40$ V; $V_{BE} = 0$	–	–	0.5	mA
I_{EBO}	emitter leakage current	$V_{EB} = 1.5$ V; $I_C = 0$	–	–	0.1	mA
h_{FE}	DC current gain	$V_{CB} = 5$ V; $I_C = 0.5$ A	40	–	–	
C_c	collector capacitance (die only)	$V_{CE} = 1$ V; $I_E = i_e = 0$; $f = 1$ MHz	–	10	–	pF

APPLICATION INFORMATION

RF performance at $T_h = 25$ °C in a common-base test circuit.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
Class-C; $t_p = 100$ µs; $\delta = 10\%$	2.7 to 3.1	40	≥20 typ. 25	≥7 typ. 8	≥35 typ. 40

Microwave power transistor | BLS2731-50

FEATURES

- Suitable for short and medium pulse applications
- Internal input and output matching networks for an easy circuit design
- Emitter ballasting resistors improve ruggedness
- Gold metallization ensures excellent reliability
- Interdigitated emitter-base structure provides high emitter efficiency
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

- Common base class-C pulsed power amplifiers for radar applications in the 2.7 to 3.1 GHz band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a 2-lead rectangular flange package with a ceramic cap (SOT422A) with the common base connected to the flange.

PINNING - SOT422A

PIN	DESCRIPTION
1	collector
2	emitter
3	base; connected to flange

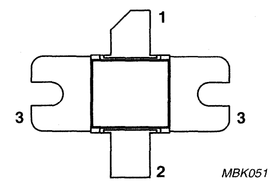


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common base class-C test circuit.

MODE OF OPERATION	f (GHz)	V_{CB} (V)	P_L (W)	G_p (dB)	η_C (%)
Pulsed, class-C	2.7 to 3.1	40	60	typ. 9	typ. 40

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	75	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	75	V
V_{EBO}	emitter-base voltage	open collector	–	2	V
I_{CM}	peak collector current	$t_p \leq 100$ μs; $\delta \leq 10\%$	–	6	A
P_{tot}	total power dissipation	$t_p = 100$ μs; $\delta = 10\%$; $T_{mb} = 25$ °C	–	80	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	up to 0.2 mm from ceramic cap; $t \leq 10$ s	–	235	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$Z_{th\ j-h}$	thermal impedance from junction to heatsink	$t_p = 100$ μs; $\delta = 10\%$; note 1	0.3	K/W

Note

1. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

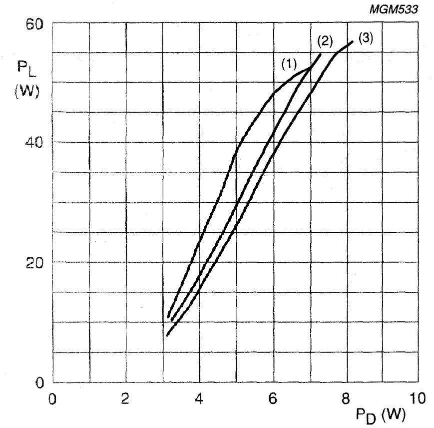
$T_j = 25$ °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 15$ mA; open emitter	75	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 15$ mA; $V_{BE} = 0$	75	–	–	V
I_{CBO}	collector leakage current	$V_{CB} = 40$ V; $I_E = 0$	–	–	1.5	mA
I_{CES}	collector leakage current	$V_{CE} = 40$ V; $V_{BE} = 0$	–	–	3	mA
I_{EBO}	emitter leakage current	$V_{EB} = 1.5$ V; $I_C = 0$	–	–	0.3	mA
h_{FE}	DC current gain	$V_{CB} = 5$ V; $I_C = 1.5$ A	40	–	–	
C_c	collector capacitance (die only)	$V_{CE} = 1$ V; $I_E = i_e = 0$; f = 1 MHz	–	30	–	pF

APPLICATION INFORMATION

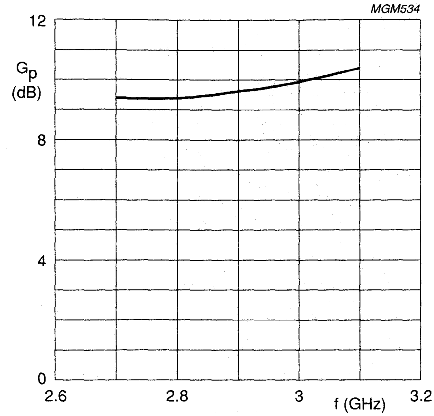
RF performance at $T_h = 25$ °C in a common-base test circuit.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
Class-C; $t_p = 100$ μs; $\delta = 10\%$	2.7 to 3.1	40	≥50 typ. 60	≥8 typ. 9	≥35 typ. 40



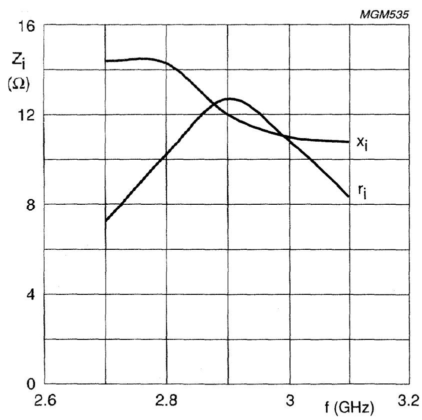
V_{CB} = 40 V; class-C; t_p = 100 μs; δ = 10%.
(1) f = 3.1 GHz.
(2) f = 2.7 GHz.
(3) f = 2.9 GHz.

Fig.2 Load power as a function of drive power; typical values.



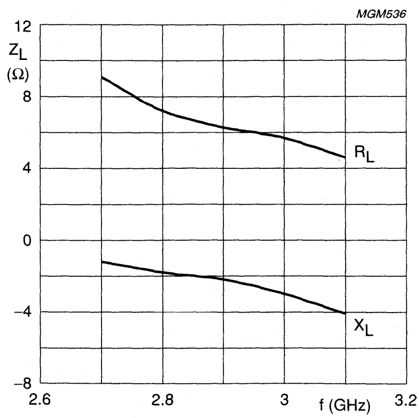
V_{CB} = 40 V; class-C; P_L = 50 W; t_p = 100 μs; δ = 10%.

Fig.3 Power gain as function of frequency; typical values.



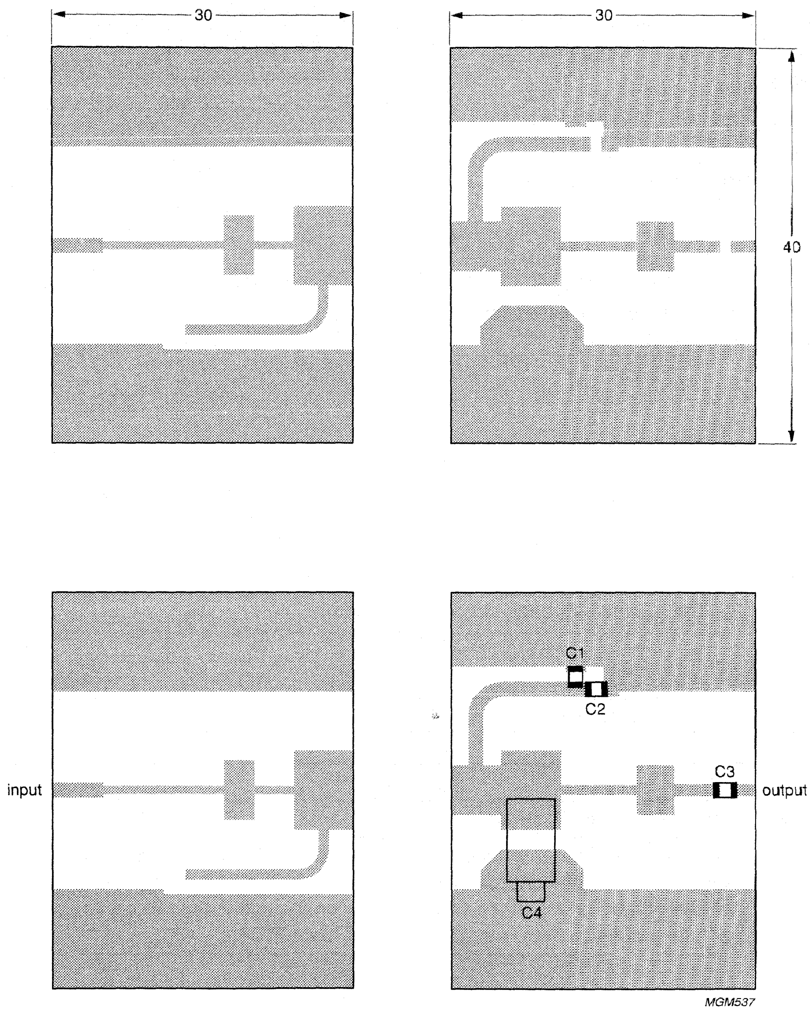
V_{CB} = 40 V; class-C; P_L = 50 W.

Fig.4 Input impedance as function of frequency (series components); typical values.



V_{CB} = 40 V; class-C; P_L = 50 W.

Fig.5 Load impedance as function of frequency (series components); typical values.



Dimensions in mm.

The components are situated on one side of the copper-clad printed-circuit board with Duroid dielectric (ε_r = 2.2), thickness 0.38 mm. The other side is unetched and serves as a ground plane.

C1 = ATC 200A 10 nF
C2 = ATC 100A 10 pF
C3 = ATC 700A 150 pF
C4 = Tekelec trimmer 37281SL 0.4 to 2.5 pF.

Fig.6 Component layout for 2.7 to 3.1 GHz class-C test circuit.

Microwave power transistor BLS2731-110

FEATURES

- Suitable for short and medium pulse applications
- Internal input and output matching networks for an easy circuit design
- Emitter ballasting resistors improve ruggedness
- Gold metallization ensures excellent reliability
- Interdigitated emitter-base structure provides high emitter efficiency
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

- Common base class-C pulsed power amplifiers for radar applications in the 2.7 to 3.1 GHz band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a 2-lead rectangular flange package with a ceramic cap (SOT423A) with the common base connected to the flange.

PINNING - SOT423A

PIN	DESCRIPTION
1	collector
2	emitter
3	base; connected to flange

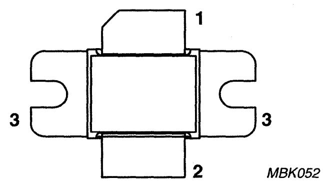


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at $T_h = 25$ °C in a common base class-C test circuit.

MODE OF OPERATION	f (GHz)	V_{CB} (V)	P_L (W)	G_p (dB)	η_C (%)
Pulsed class-C	2.7 to 3.1	40	>110	>7	>35

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	75	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	75	V
V_{EBO}	emitter-base voltage	open collector	–	2	V
I_{CM}	peak collector current	$t_p \leq 100$ µs; $\delta \leq 10\%$	–	12	A
P_{tot}	total power dissipation	$t_p = 100$ µs; $\delta = 10\%$; $T_{mb} = 25$ °C	–	500	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	up to 0.2 mm from ceramic cap; $t \leq 10$ s	–	235	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	$t_p = 100$ µs; $\delta = 10\%$; note 1	0.24	K/W

Note

1. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

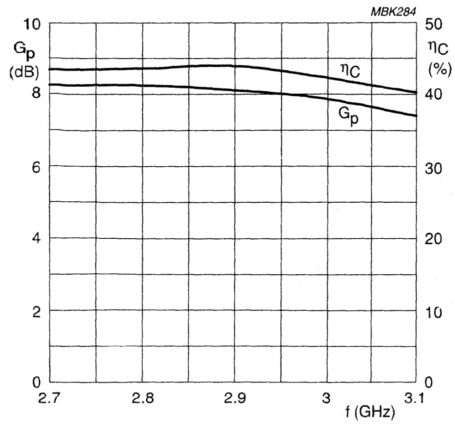
$T_j = 25$ °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 30$ mA; open emitter	75	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 30$ mA; $V_{BE} = 0$	75	–	V
I_{CBO}	collector leakage current	$V_{CB} = 40$ V; $I_E = 0$	–	3	mA
I_{CES}	collector leakage current	$V_{CE} = 40$ V; $V_{BE} = 0$	–	6	mA
I_{EBO}	emitter leakage current	$V_{EB} = 1.5$ V; $I_C = 0$	–	0.6	mA
h_{FE}	DC current gain	$V_{CE} = 5$ V; $I_C = 3$ A	40	100	

APPLICATION INFORMATION

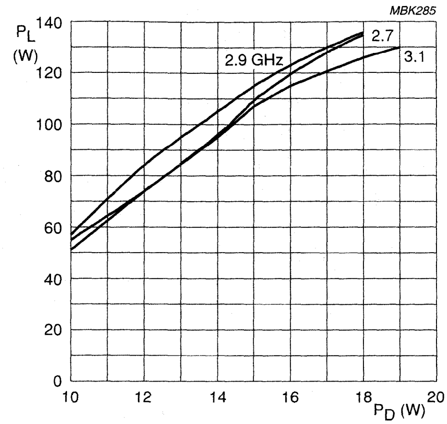
RF performance at $T_h = 25$ °C in a common base test circuit.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (W)	G_P (dB)	η_C (%)
Class-C; $t_p = 100$ µs; $\delta = 10\%$	2.7 to 3.1	40	≥110	≥7	≥35
	2.7 to 2.9	40	typ. 130	typ. 8	typ. 42
	2.9 to 3.1	40	typ. 120	typ. 7.5	typ. 40



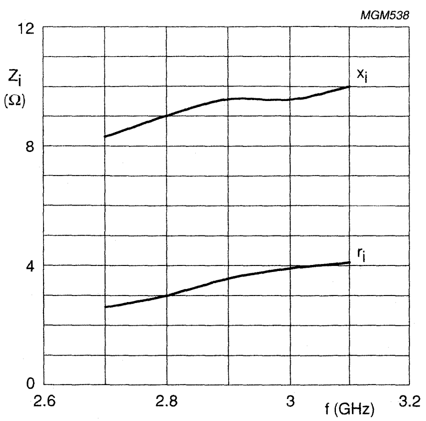
V_{CE} = 40 V; class-C; t_p = 100 μs; δ = 10%.

Fig.2 Power gain and efficiency as functions of frequency; typical values.



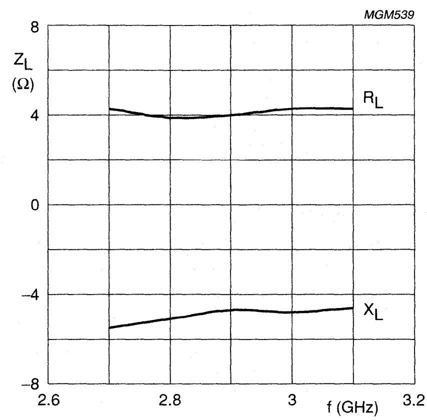
V_{CE} = 40 V; class-C; t_p = 100 μs; δ = 10%.

Fig.3 Load power as a function of drive power; typical values.



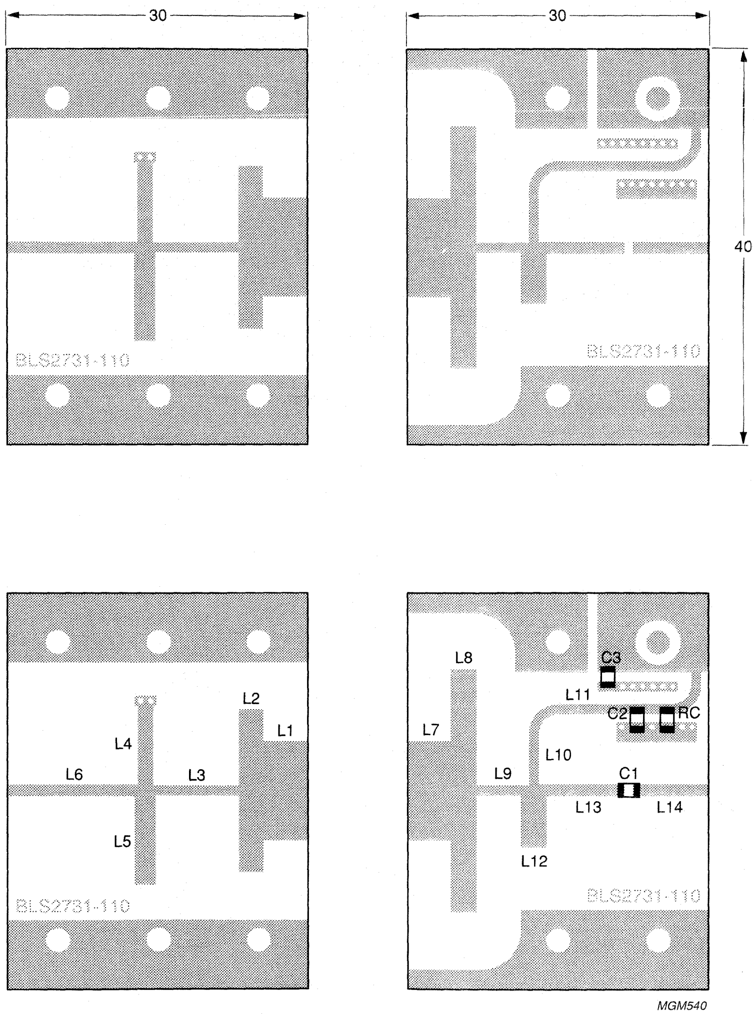
V_{CB} = 40 V; class-C; P_L = 110 W.

Fig.4 Input impedance as function of frequency (series components); typical values.



V_{CB} = 40 V; class-C; P_L = 110 W.

Fig.5 Load impedance as function of frequency (series components); typical values.



Dimensions in mm.

The components are located on one side of the copper-clad printed-circuit board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.6 Component layout for 2.7 to 3.1 GHz class-C test circuit.

List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C2	multilayer ceramic chip capacitor; note 1	100 pF		
C3	multilayer ceramic chip capacitor	100 nF		
RC	multilayer ceramic chip capacitor in series with SMD resistor	100 nF + 5 Ω		
L1	stripline; note 2		length 4.5 mm width 10 mm	
L2	stripline; note 2		length 2.5 mm width 16.4 mm	
L3	stripline; note 2		length 8.3 mm width 1 mm	
L4	stripline; note 2		length 8 mm width 1.5 mm	
L5	stripline; note 2		length 2 mm width 8.9 mm	
L6	stripline; note 2		length 12.7 mm width 1.2 mm	
L7	stripline; note 2		length 4.5 mm width 10 mm	
L8	stripline; note 2		length 2.5 mm width 24.4 mm	
L9	stripline; note 2		length 4.4 mm width 1 mm	
L10	stripline; note 2		length 5.2 mm width 1 mm	
L11	stripline; note 2		length 9.3 mm width 1 mm	
L12	stripline; note 2		length 2.5 mm width 6 mm	
L13	stripline; note 2		length 7.8 mm width 1.2 mm	
L14	stripline; note 2		length 7.5 mm width 1.2 mm	

Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. The striplines are on double-clad printed-circuit board with Duroid dielectric (ε_r = 2.2); thickness = 0.38 mm.

Microwave power transistor BLS2731-150

FEATURES

- Matched internally to 50 Ω
- Suitable for short, medium and long pulse applications
- Internal input and output matching networks for an easy circuit design
- Emitter ballasting resistors improve ruggedness
- Gold metallization ensures excellent reliability
- Interdigitated emitter-base structure provides high emitter efficiency
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

- Common base class-C pulsed power amplifiers for radar applications in the 2.7 to 3.1 GHz band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a 2-lead rectangular flange package with a ceramic cap (SOT469A) with the common base connected to the flange.

PINNING - SOT469A

PIN	DESCRIPTION
1	collector
2	emitter
3	base; connected to flange

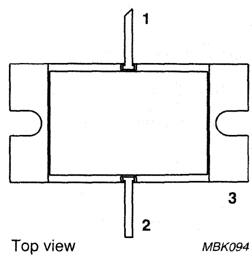


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at $T_h = 25$ °C in a common base class-C test circuit.

MODE OF OPERATION	f (GHz)	V_{CB} (V)	P_L (W)	G_p (dB)	η_C (%)
Pulsed class-C	2.7 to 3.1	40	typ.170	typ. 8	typ. 40

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	75	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	75	V
V_{EBO}	emitter-base voltage	open collector	–	2	V
I_{CM}	peak collector current	$t_p \leq 300$ µs; $\delta \leq 10\%$	–	12	A
P_{tot}	total power dissipation	$t_p = 300$ µs; $\delta = 10\%$; $T_{mb} = 25$ °C	–	500	W
T_{stg}	storage temperature		−65	+200	°C
T_j	operating junction temperature		–	+200	°C
T_{sld}	soldering temperature	up to 0.2 mm from ceramic cap; $t \leq 10$ s	–	+235	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE.	UNIT
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	$t_p = 300$ µs; $\delta = 10\%$; note 1	0.3	K/W

Note

1. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 45$ mA; open emitter	75	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 45$ mA; $V_{BE} = 0$	75	–	–	V
I_{CBO}	collector leakage current	$V_{CB} = 40$ V; $I_E = 0$	–	–	4	mA
I_{CES}	collector leakage current	$V_{CE} = 40$ V; $V_{BE} = 0$	–	–	8	mA
I_{EBO}	emitter leakage current	$V_{EB} = 1.5$ V; $I_C = 0$	–	–	0.8	mA
h_{FE}	DC current gain	$V_{CB} = 5$ V; $I_C = 3$ A	25	–	–	
C_c	collector capacitance (die only)	$V_{CE} = 1$ V; $I_E = i_e = 0$; f = 1 MHz	–	60	–	pF

APPLICATION INFORMATION

RF performance at $T_h = 25$ °C in a common-base test circuit.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
Class-C; $t_p = 300$ µs; $\delta = 10\%$	2.7 to 3.1	40	≥150 typ. 170	≥7 typ. 8	≥35 typ. 40

UHF power transistor | BLT50

FEATURES

- SMD encapsulation
- Gold metallization ensures excellent reliability.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a SOT223 surface mounted envelope and designed primarily for use in hand-held radio equipment in the 470 MHz communications band.

PINNING - SOT223

PIN	DESCRIPTION
1	emitter
2	base
3	emitter
4	collector

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter class-B test circuit (note 1).

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_c (%)
c.w. narrow band	470	7.5	1.2	> 10	> 55

Note

1. T_s = temperature at soldering point of collector tab.

PIN CONFIGURATION

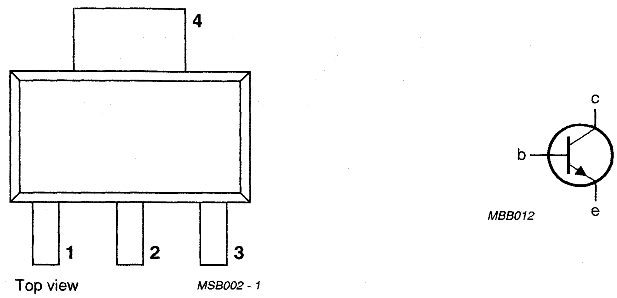


Fig.1 Simplified outline and symbol.

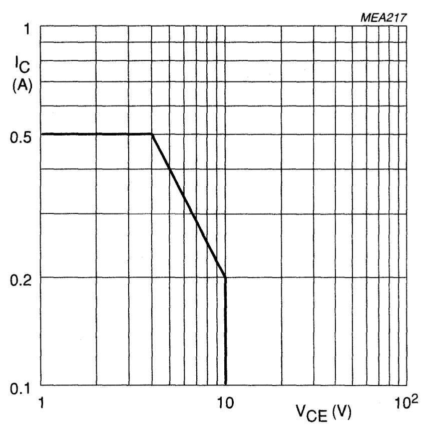
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	10	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C, $I_{C(AV)}$	collector current	DC or average value	–	500	mA
I_{CM}	collector current	peak value f > 1 MHz	–	1.5	A
P_{tot}	total power dissipation	f > 1 MHz; T_s = 103 °C (note 1)	–	2	W
T_{stg}	storage temperature range		–65	150	°C
T_j	operating junction temperature		–	175	°C

Note

1. T_s = temperature at soldering point of collector tab.



T_s = 103 °C.

Fig.2 DC SOAR.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}s(DC)}$	from junction to soldering point	P_{tot} = 2 W; T_s = 103 °C	36	K/W

CHARACTERISTICS

T_j = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 5 mA	20	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 10 mA	10	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 1 mA	3	–	–	V
I_{CES}	collector-emitter leakage current	V_{BE} = 0; V_{CE} = 10 V	–	–	250	μA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 300 mA	25	–	–	
E_{SBR}	second breakdown energy	L = 25 mH; R_{BE} = 10 Ω; f = 50 Hz	0.55	–	–	mJ
C_c	collector capacitance	V_{CB} = 7.5 V; $I_E = I_e$ = 0; f = 1 MHz	–	4.7	6	pF
C_{re}	feedback capacitance	V_{CE} = 7.5 V; I_C = 0; f = 1 MHz	–	2.9	4.5	pF

UHF power transistor BLT52

FEATURES

- Emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Common emitter class-B operation in portable radio transmitters in the 470 MHz communication band.

DESCRIPTION

NPN silicon planar epitaxial power transistor encapsulated in a ceramic SOT409A SMD package.

PINNING

PIN	DESCRIPTION
1, 4, 5, 8	emitter
2, 3	base
6, 7	collector

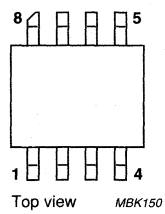


Fig.1 Simplified outline SOT409A.

QUICK REFERENCE DATA

RF performance at $T_{mb} \leq 60$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-B	470	7.5	7	≥8 typ. 9.5	≥50 typ. 65
		6	3	≥8 typ. 9.5	≥50 typ. 55

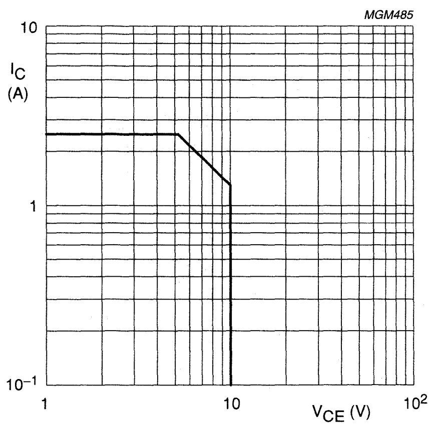
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	10	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	2.5	A
P_{tot}	total power dissipation	$T_{mb} \leq 60$ °C	–	13	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 13 W; $T_{mb} \leq 60$ °C	8	K/W



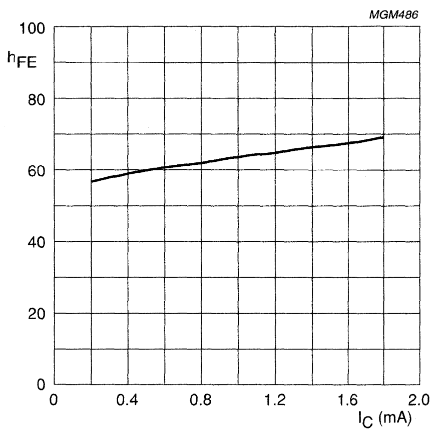
T_{mb} = 60 °C.

Fig.2 DC SOAR.

CHARACTERISTICS

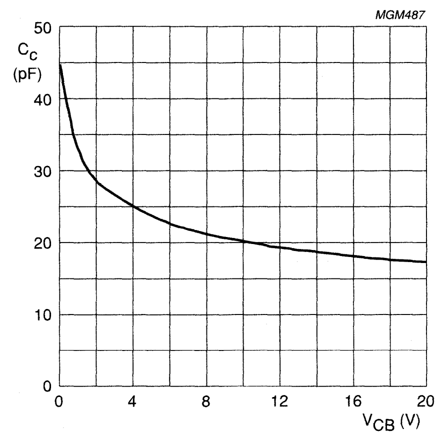
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 20 mA	20	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 40 mA	10	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 4 mA	3	–	–	V
I_{CES}	collector leakage current	V_{BE} = 0; V_{CE} = 7.5 V	–	–	1	mA
h_{FE}	DC current gain	I_C = 1.2 A; V_{CE} = 5 V	25	–	–	
C_c	collector capacitance	$I_E = i_e$ = 0; V_{CB} = 7.5 V; f = 1 MHz	–	24	–	pF
C_{re}	feedback capacitance	I_C = 0; V_{CE} = 7.5 V; f = 1 MHz	–	17	–	pF



V_{CE} = 5 V; T_j = 25 °C.
Measured under pulse conditions: $t_p \leq 300$ µs; $\delta \leq 0.001$.

Fig.3 DC current gain as a function of collector current; typical values.



$I_E = i_e$ = 0; f = 1 MHz; T_j = 25 °C.

Fig.4 Collector capacitance as a function of collector-base voltage; typical values.

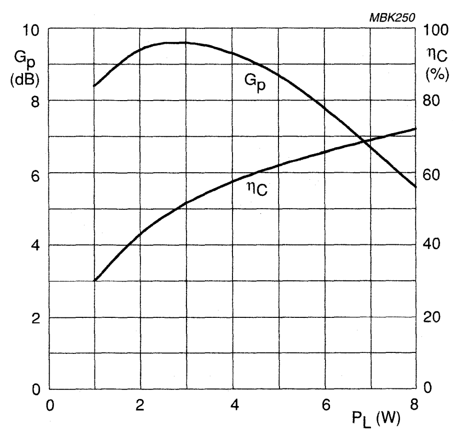
APPLICATION INFORMATION

RF performance at $T_{mb} \leq 60$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-B	470	7.5	7	≥8 typ. 9.5	≥50 typ. 65
		6	3	≥8 typ. 9.5	≥50 typ. 55

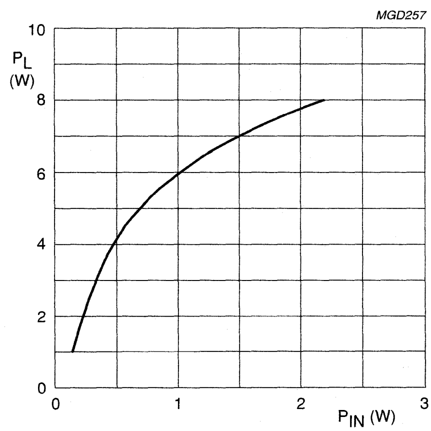
Ruggedness in class-B operation

The BLT52 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: CW, class-B operation; f = 470 MHz; V_{CE} = 9 V and P_L = 7 W; $T_{mb} \leq 60$ °C.



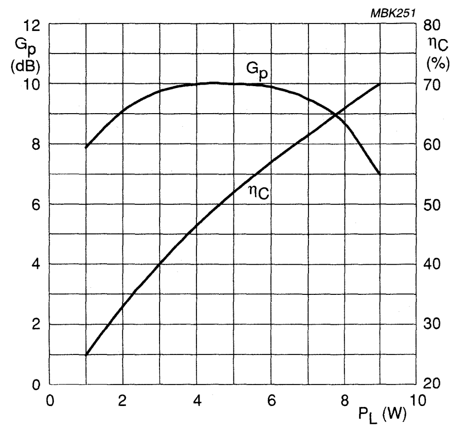
CW, class-B operation; f = 470 MHz; V_{CE} = 6 V;
tuned at P_L = 3 W; $T_{mb} \leq 60$ °C.

Fig.5 Power gain and collector efficiency as functions of load power; typical values.



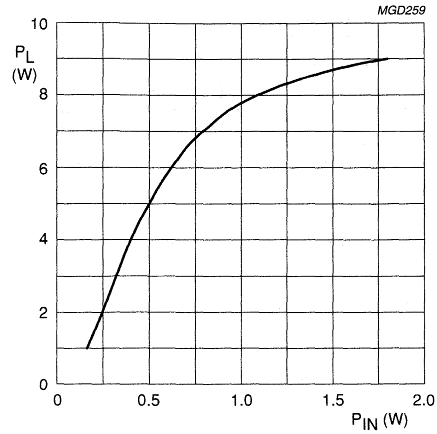
CW, class-B operation; f = 470 MHz; V_{CE} = 6 V;
tuned at P_L = 3 W; $T_{mb} \leq 60$ °C.

Fig.6 Load power as a function of input power; typical values.



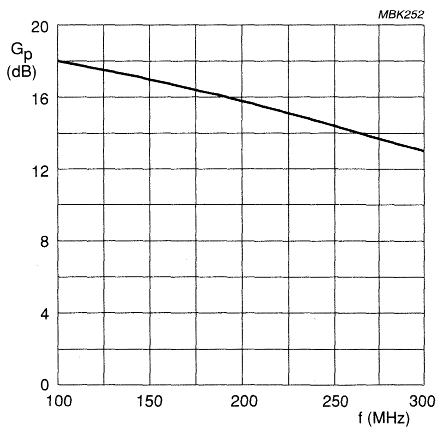
CW, class-B operation; f = 470 MHz; V_{CE} = 7.5 V;
tuned at P_L = 7 W; $T_{mb} \leq 60$ °C.

Fig.7 Power gain and collector efficiency as functions of load power; typical values.



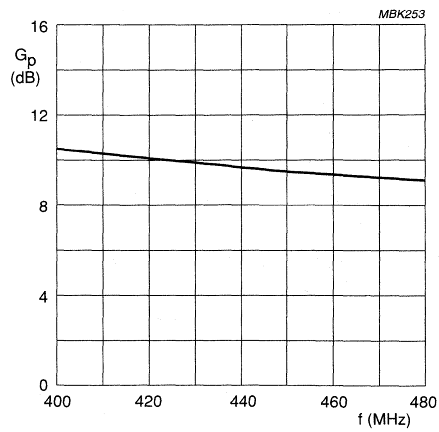
CW, class-B operation; f = 470 MHz; V_{CE} = 7.5 V;
tuned at P_L = 7 W; $T_{mb} \leq 60$ °C.

Fig.8 Load power as a function of input power; typical values.



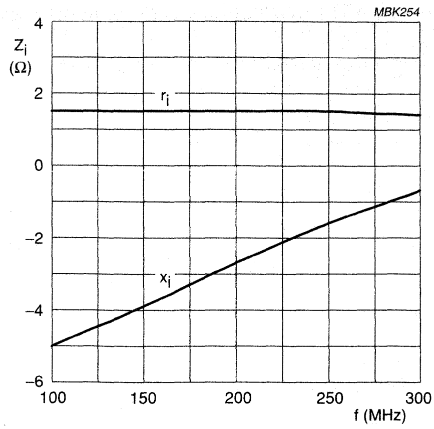
CW, class-B operation; V_{CE} = 7.5 V; P_L = 7 W; $T_{mb} \leq 60$ °C.

Fig.9 Power gain as a function of frequency; typical values.



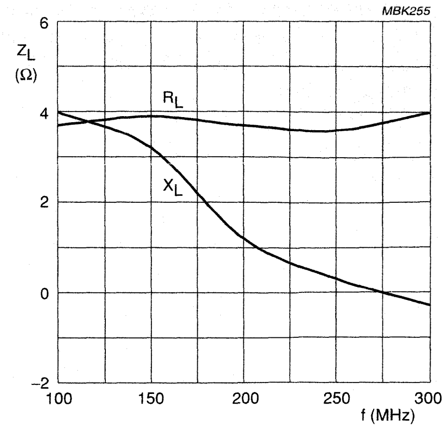
CW, class-B operation; V_{CE} = 7.5 V; P_L = 7 W; $T_{mb} \leq 60$ °C.

Fig.10 Power gain as a function of frequency; typical values.



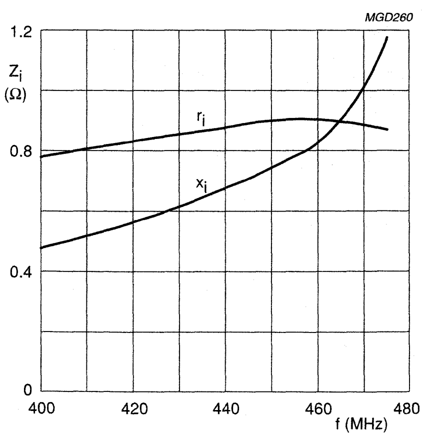
CW, class-B operation; V_{CE} = 7.5 V; P_L = 7 W; $T_{mb} \leq 60$ °C.

Fig.11 Input impedance as a function of frequency (series components); typical values.



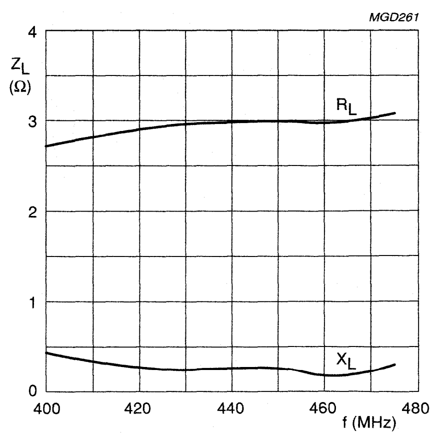
CW, class-B operation; V_{CE} = 7.5 V; P_L = 7 W; $T_{mb} \leq 60$ °C.

Fig.12 Load impedance as a function of frequency (series components); typical values.



CW, class-B operation; V_{CE} = 7.5 V; P_L = 7 W; $T_{mb} \leq 60$ °C.

Fig.13 Input impedance as a function of frequency (series components); typical values.

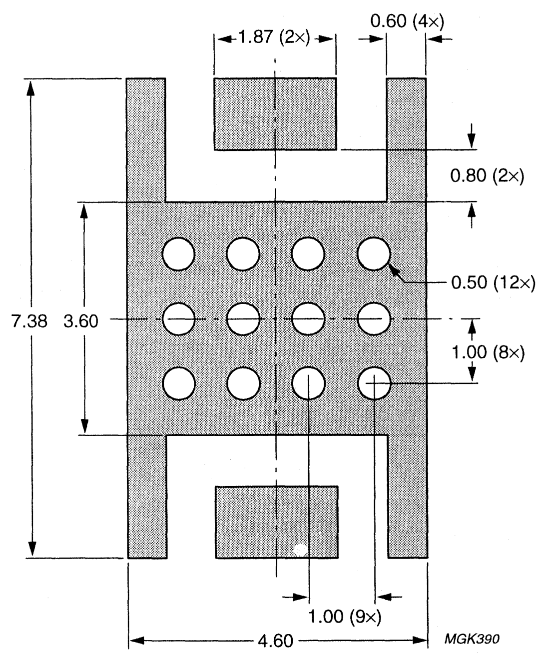


CW, class-B operation; V_{CE} = 7.5 V; P_L = 7 W; $T_{mb} \leq 60$ °C.

Fig.14 Load impedance as a function of frequency (series components); typical values.

MOUNTING RECOMMENDATIONS

Both the metallized groundplate and leads contribute to the heatflow. It is recommended that the transistor is mounted on a grounded metallized area of a maximum thickness of 0.8 mm on the printed-circuit board, equipped with at least 12 (0.5 mm diameter) through metallized holes filled with solder.
A thermal resistance $R_{th(mb-h)}$ of 5 K/W can be achieved if heatsink compound is applied when the transistor is mounted on the printed-circuit board.



Dimensions in mm.

Fig.15 Reflow soldering footprint for SOT409A.

UHF power transistor BLT53

FEATURES

- Emitter-ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability
- Withstands full load mismatch.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a 4-lead SOT122D studless envelope with a ceramic cap. It is designed for common emitter, class-B operation in portable radio transmitters in the 470 MHz communications band. All leads are isolated from the mounting flange.

PINNING - SOT122D

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_c (%)
c.w. class-B	470	7.5	8	> 6	> 60

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

PIN CONFIGURATION

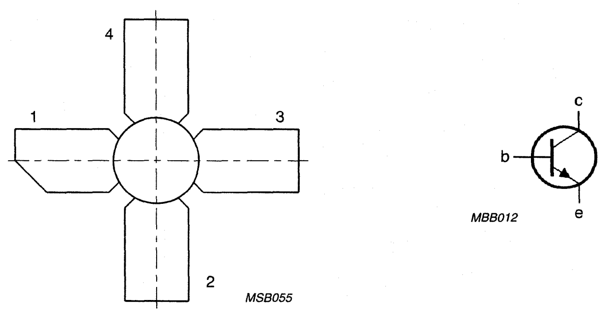


Fig.1 Simplified outline and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	10	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C, $I_{C(AV)}$	collector current	DC or average value	–	2.5	A
I_{CM}	collector current	peak value f > 1 MHz	–	7.5	A
P_{tot}	total power dissipation	RF operation; T_{mb} = 25 °C	–	35.5	W
T_{stg}	storage temperature range		–65	150	°C
T_j	junction operating temperature		–	200	°C

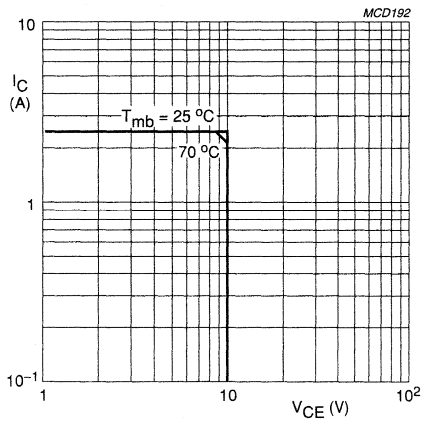
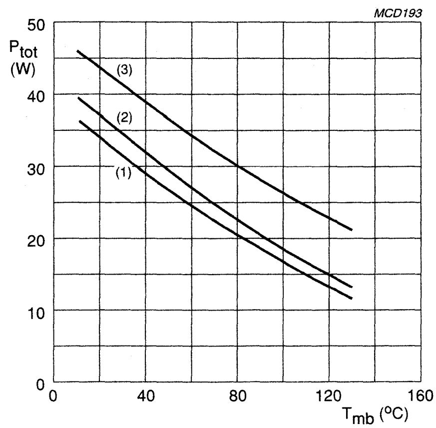


Fig.2 DC SOAR.



(1) Continuous DC operation.
(2) Continuous RF operation (f > 1 MHz).
(3) Short time operation during mismatch (f > 1 MHz).

Fig.3 Power derating curve.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb(RF)}$	from junction to mounting base	P_{tot} = 35.5 W; T_{mb} = 25 °C	4.9	K/W

CHARACTERISTICS

T_j = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 20 mA	20	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 40 mA	10	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 4 mA	3	–	–	V
I_{CES}	collector-emitter leakage current	V_{BE} = 0; V_{CE} = 10 V	–	–	1	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 1.2 A	25	–	–	
f_T	transition frequency	V_{CE} = 7.5 V; I_E = 1.6 A	–	3.9	–	GHz
C_c	collector capacitance	V_{CB} = 7.5 V; $I_E = I_e$ = 0; f = 1 MHz	–	24	–	pF
C_{re}	feedback capacitance	V_{CE} = 7.5 V; I_C = 0; f = 1 MHz	–	17	–	pF
$C_{c\text{-}mb}$	collector-mounting base capacitance	f = 1 MHz	–	1.2	–	pF

UHF power transistor — BLT70

FEATURES

- Very high efficiency
- Low supply voltage.

APPLICATIONS

- Hand-held radio equipment in common emitter class-AB operation in the 900 MHz communication band.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a plastic SOT223H SMD package.

PINNING - SOT223H

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	b	base
3	e	emitter
4	c	collector

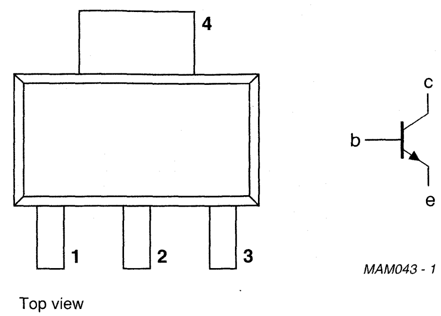


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter test circuit (see Fig.7).

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (mW)	G_p (dB)	η_C (%)
CW, class-AB	900	4.8	600	≥6	≥60

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	16	V
V_{CEO}	collector-emitter voltage	open base	–	8	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	250	mA
P_{tot}	total power dissipation	T_s = 60 °C; note 1	–	2.1	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	175	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	P_{tot} = 2.1 W; T_s = 60 °C; note 1	55	K/W

Note to the "Limiting values" and "Thermal characteristics"

1. T_s is the temperature at the soldering point of the collector pin.

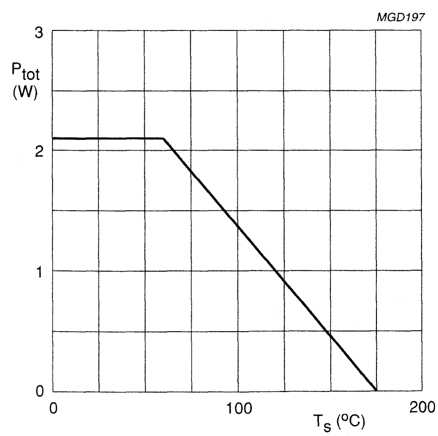


Fig.2 DC SOAR.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 0.5 mA	16	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 5 mA	8	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.2 mA	2.5	–	V
I_{CES}	collector leakage current	V_{CE} = 7 V; V_{BE} = 0	–	0.1	mA
h_{FE}	DC current gain	V_{CE} = 4.8 V; I_C = 100 mA	25	–	
C_c	collector capacitance	V_{CB} = 4.8 V; I_E = i_e = 0; f = 1 MHz	–	3.5	pF
C_{re}	feedback capacitance	V_{CE} = 4.8 V; I_C = 0; f = 1 MHz	–	2.5	pF

UHF power transistor — BLT71

FEATURES

- Very high efficiency
- Low supply voltage.

APPLICATIONS

- Hand-held radio equipment in common emitter class-AB operation in the 900 MHz communications band.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a SOT223 envelope.

PINNING - SOT223

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	b	base
3	e	emitter
4	c	collector

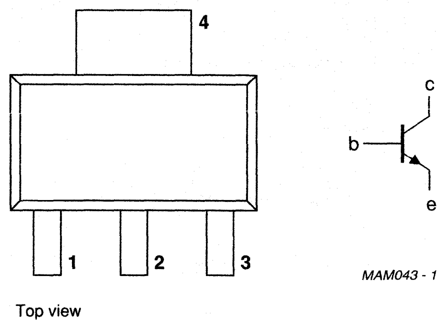


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	900	4.8	1.2	≥6	≥60

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	16	V
V_{CEO}	collector-emitter voltage	open base	–	8	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	500	mA
P_{tot}	total power dissipation	up to T_s = 90 °C	–	3.5	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	175	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	P_{tot} = 3.5 W; up to T_s = 90 °C; note 1	24	K/W

Note

1. T_s is the temperature at the soldering point of the collector lead.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 0.5 mA	16	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 10 mA	8	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.1 mA	2.5	–	–	V
I_{CES}	collector leakage current	V_{CE} = 8 V; V_{BE} = 0	–	–	100	μA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 100 mA	25	–	–	
C_c	collector capacitance	V_{CB} = 4.8 V; I_E = i_e = 0; f = 1 MHz	–	–	7	pF
C_{re}	feedback capacitance	V_{CE} = 4.8 V; I_C = 0; f = 1 MHz	–	–	5	pF

UHF power transistor BLT71/8

FEATURES

- High efficiency
- Very high gain
- Internal pre-matched input
- Low supply voltage.

APPLICATIONS

- Hand-held radio equipment in common emitter class-AB operation for the 900 MHz communication band.

DESCRIPTION

NPN silicon planar epitaxial power transistor encapsulated in a SOT96-1 (SO8) plastic SMD package.

PINNING - SOT96-1

PIN	SYMBOL	DESCRIPTION
1, 8	b	base
2, 4, 5, 7	e	emitter
3, 6	c	collector

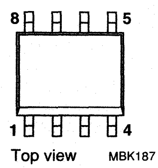


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	900	4.8	1.2	≥11 typ. 13	≥55 typ. 63

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	16	V
V_{CEO}	collector-emitter voltage	open base	–	8	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	500	mA
P_{tot}	total power dissipation	$T_s = 60$ °C; $V_{CE} \leq 6.5$ V; note 1	–	2.9	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	175	°C

Note

1. T_s is the temperature at the soldering point of the collector pin.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	P_{dis} = 2.9 W; T_s = 60 °C; note 1	40	K/W

Note

1. T_s is the temperature at the soldering point of the collector pin.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 0.5 mA	16	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 10 mA	8	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.1 mA	2.5	–	V
I_{CES}	collector leakage current	V_{CE} = 8 V; V_{BE} = 0	–	0.1	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 100 mA	25	–	
C_c	collector capacitance	V_{CB} = 4.8 V; I_E = i_e = 0; f = 1 MHz	–	7	pF
C_{re}	feedback capacitance	V_{CE} = 4.8 V; I_C = 0; f = 1 MHz	–	5	pF

UHF power transistor BLT80

FEATURES

- SMD encapsulation
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Hand-held radio equipment in the 900 MHz communication band.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a plastic SOT223 SMD package.

PINNING - SOT223

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	b	base
3	e	emitter
4	c	collector

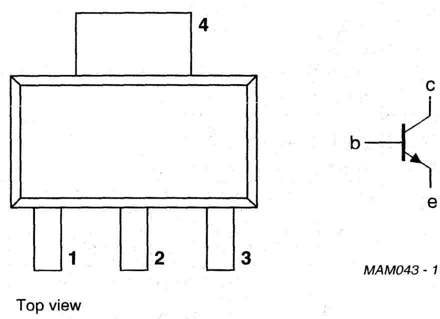


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter test circuit (see Fig.7).

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-B narrow band	900	7.5	0.8	≥6	≥60

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

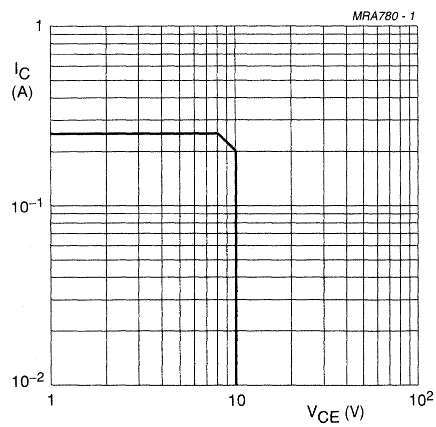
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	10	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	250	mA
$I_{C(AV)}$	average collector current		–	250	mA
I_{CM}	peak collector current	f > 1 MHz	–	750	mA
P_{tot}	total power dissipation	T_s = 131 °C; note 1	–	2	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	175	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	P_{tot} = 2 W; T_s = 131 °C; note 1	22	K/W
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	P_{tot} = 2 W; T_{amb} = 25 °C; note 2	85	K/W

Note to the "Limiting values" and "Thermal characteristics"

1. T_s is the temperature at the soldering point of the collector pin.
2. Transistor mounted on a printed-circuit board measuring 40 × 40 × 1 mm, collector pad 35 × 17 mm.



T_s = 131 °C.

Fig.2 DC SOAR.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 2.5 mA	20	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 5 mA	10	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.5 mA	3	–	V
I_{CES}	collector leakage current	V_{CE} = 10 V; V_{BE} = 0	–	0.1	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 150 mA; note 1; see Fig.3	25	–	
C_c	collector capacitance	V_{CB} = 7.5 V; I_E = i_e = 0; f = 1 MHz; see Fig.4	–	3.5	pF
C_{re}	feedback capacitance	V_{CE} = 7.5 V; I_C = 0; f = 1 MHz	–	2.5	pF

Note

1. Measured under pulsed conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0.02$.

UHF power transistor BLT81

FEATURES

- SMD encapsulation
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Hand-held radio equipment in the 900 MHz communication band.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a plastic SOT223 SMD package.

PINNING - SOT223

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	b	base
3	e	emitter
4	c	collector

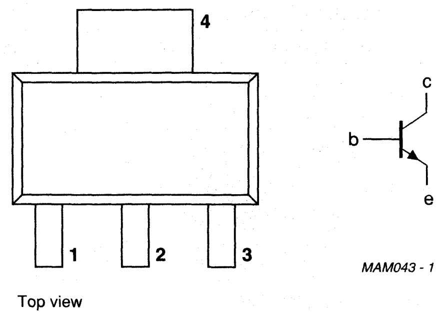


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter test circuit (see Fig.7).

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-B narrow band	900	7.5	1.2	≥6	≥60
		6	1.2	typ. 6.5	typ. 77

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

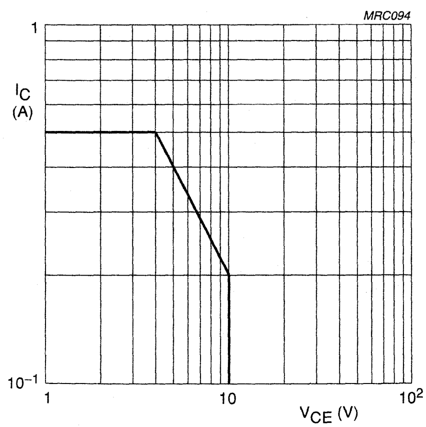
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	9.5	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	500	mA
$I_{C(AV)}$	average collector current		–	500	mA
P_{tot}	total power dissipation	T_s = 110 °C; note 1	–	2	W
T_{stg}	storage temperature		−65	+150	°C
T_j	operating junction temperature		–	175	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	P_{tot} = 2 W; T_s = 110 °C; note 1	32	K/W

Note to the "Limiting values" and "Thermal characteristics"

1. T_s is the temperature at the soldering point of the collector pin.



T_s = 110 °C.

Fig.2 DC SOAR.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 1 mA	20	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 10 mA	9.5	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.1 mA	2.5	–	–	V
I_{CES}	collector leakage current	V_{CE} = 10 V; V_{BE} = 0	–	–	0.1	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 300 mA; note 1;	25	–	–	
C_c	collector capacitance	V_{CB} = 7.5 V; $I_E = i_e$ = 0; f = 1 MHz;	–	2.7	4	pF
C_{re}	feedback capacitance	V_{CE} = 7.5 V; I_C = 0; f = 1 MHz	–	1.7	3	pF

Note

1. Measured under pulsed conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0.02$.

UHF power transistor — BLT82

FEATURES

- High efficiency
- High gain
- Internal pre-matched input.

APPLICATIONS

- Hand-held radio equipment in common emitter class-AB operation for 900 MHz Time Division Multiple Axis (TDMA) communication systems.

PINNING - SOT96-1

PIN	SYMBOL	DESCRIPTION
1, 8	b	base
2, 4, 5, 7	e	emitter
3, 6	c	collector

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a plastic SOT96-1 (SO8) SMD package.

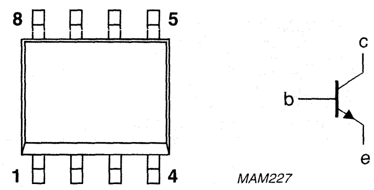


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter test circuit (see Fig.5).

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
Pulsed, class-AB	900	6	3.5	≥8 typ. 10	≥50 typ. 65
			2.8	≥9	≥57

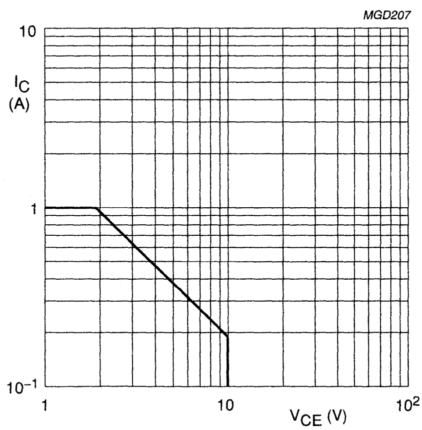
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	10	V
V_{EBO}	emitter-base voltage	open collector	–	3.5	V
I_C	collector current (DC)		–	1	A
P_{tot}	total power dissipation	T_s = 115 °C; note 1	–	1.9	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	175	°C

Note

1. T_s is the temperature at the soldering point of the collector pin.



T_s = 115 °C.

Fig.2 DC SOAR.

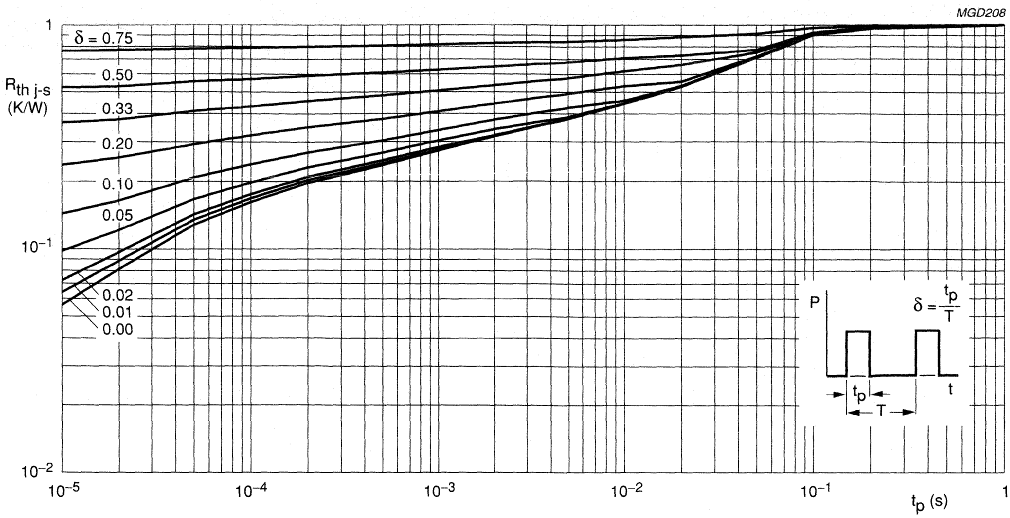


Fig.3 Normalized thermal resistance as a function of pulse time.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	P_{tot} = 1.9 W; T_s = 115 °C; note 1	32	K/W

Note

1. T_s is the temperature at the soldering point of the collector pin.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 5 mA	20	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 10 mA	10	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 1 mA	3.5	–	–	V
I_{CES}	collector leakage current	V_{CE} = 6 V; V_{BE} = 0	–	–	0.1	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 100 mA	30	–	150	
C_c	collector capacitance	V_{CB} = 6 V; I_E = i_e = 0; f = 1 MHz	–	17	–	pF
C_{re}	feedback capacitance	V_{CE} = 6 V; I_C = 0; f = 1 MHz	–	10	–	pF

UHF power transistor — BLT92/SL

DESCRIPTION

NPN silicon planar epitaxial transistor primarily intended for use in handheld radio stations in the 900 MHz communications band.

This device has been designed specifically for class-B operation.

FEATURES

- internal input matching capacitor for a high power gain
- gold metallization ensures excellent reliability

The transistor has a 4-lead studless envelope with a ceramic cap (SOT122D). All leads are isolated from the mounting base.

PINNING

1 = collector
2 = emitter
3 = base
4 = emitter

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C in a common-emitter class-B circuit

MODE OF OPERATION	V_{CE} (V)	f (MHz)	P_L (W)	G_p (dB)	η_C (%)
CW (class-B)	7.5	900	3.0	> 7.0	> 50

PIN CONFIGURATION

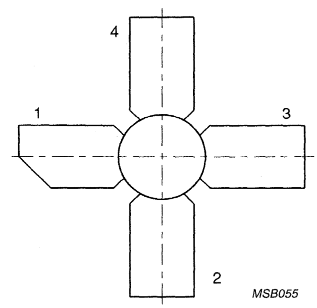


Fig.1 Simplified outline, SOT122D.

PRODUCT SAFETY This device incorporates beryllium oxide (BeO), the dust of which is toxic. The device is entirely safe provided that the internal BeO disc is not damaged.

RATINGS

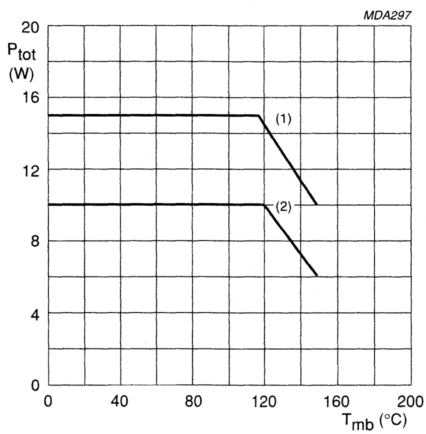
Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3.0	V
Collector current				
DC or average	I_C; $I_{C(AV)}$	max.	1.2	A
(peak value); f > 800 MHz	I_{CM}	max.	3.6	A
Total power dissipation				
at T_{amb} < 120 °C; f > 800 MHz	P_{tot}	max.	10	W
Storage temperature range	T_{stg}	−65 to +150		°C
Operating junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

Dissipation = 10 W; T_{mb} = 25 °C

From junction to mounting base (f > 800 MHz)	$R_{th\ j\text{-}mb(RF)}$	max.	6.0	K/W



(1) Short-time RF operation during mismatch (f > 800 MHz).
(2) Continuous RF operation (f > 800 MHz).

Fig.2 Total power dissipation as a function of temperature.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage				
open emitter; I_C = 10 mA	$V_{(BR)CBO}$	>	20	V
Collector-emitter breakdown voltage				
open base; I_C = 20 mA	$V_{(BR)CEO}$	>	10	V
Emitter-base breakdown voltage				
open collector; I_E = 2 mA	$V_{(BR)EBO}$	>	3.0	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 10 V	I_{CES}	<	5.0	mA
Second breakdown energy				
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	>	1.0	mJ
DC current gain				
I_C = 600 mA; V_{CE} = 5 V	h_{FE}	>	25	
Collector capacitance at f = 1 MHz				
$I_E = i_e$ = 0; V_{CB} = 7.5 V	C_c	typ.	11	pF
Feedback capacitance at f = 1 MHz				
I_C = 0; V_{CE} = 7.5 V	C_{re}	typ.	6.0	pF
Collector-mounting base capacitance	$C_{c\text{-}mb}$	typ.	1.2	pF

UHF power transistor BLT94

FEATURES

- Emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Common emitter class-AB and B operation in portable radio transmitters in the 900 MHz communication band.

DESCRIPTION

NPN silicon planar epitaxial power transistor encapsulated in a ceramic SOT409A package.

PINNING

PIN	DESCRIPTION
1, 4, 5, 8	emitter
2, 3	base
6, 7	collector

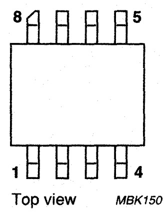


Fig.1 Simplified outline SOT409A.

QUICK REFERENCE DATA

RF performance at $T_{mb} \leq 60$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	900	7.5	6	≥8 typ. 10	≥50 typ. 60

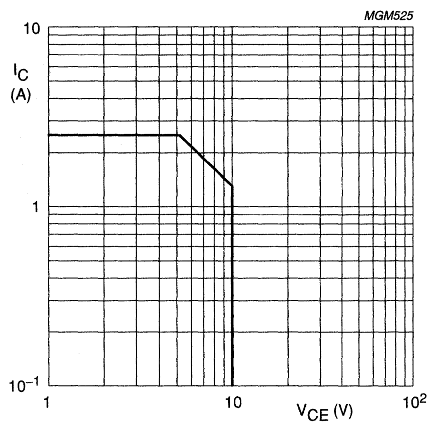
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	10	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	2.5	A
P_{tot}	total power dissipation	$T_{mb} \leq 60$ °C	–	13	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	$T_{mb} \leq 60$ °C; $P_{tot} = 13$ W	8	K/W



$T_{mb} = 60$ °C.

Fig.2 DC SOAR.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 20 mA	20	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 40 mA	10	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 4 mA	3	–	–	V
I_{CES}	collector leakage current	V_{BE} = 0; V_{CE} = 7.5 V	–	–	1	mA
h_{FE}	DC current gain	I_C = 1.2 A; V_{CE} = 5 V	25	–	–	
C_c	collector capacitance	I_E = i_e = 0; V_{CB} = 7.5 V; f = 1 MHz	–	24	–	pF
C_{re}	feedback capacitance	I_C = 0; V_{CE} = 7.5 V; f = 1 MHz	–	17	–	pF

UHF power transistor — BLU11/SL

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in mobile transmitters in the 470 MHz band.

FEATURES

- multi-base structure and emitter-ballasting resistors for an optimum temperature profile.
- gold metallization ensures excellent reliability.
- the device can be applied at a P_L of max. 1,5 W when it is mounted on a printed wiring board (see Fig.6) without an external heatsink.

The transistor has a 4-lead envelope with a ceramic cap (SOT-122D). All leads are isolated from the mounting base.

QUICK REFERENCE DATA

R.F. performance in a common-emitter class-B circuit.

MODE OF OPERATION	T °C	V_{CE} V	f MHz	P_L W	G_p dB	η_c %
narrow band; c.w.	T_{mb} = 25	12,5	470	2,5	> 10	> 55
	T_a = 25(1)	12,5	470	1,5	> 12	> 55

Note

1. Device mounted on a printed wiring board (see Fig.6).

PIN CONFIGURATION

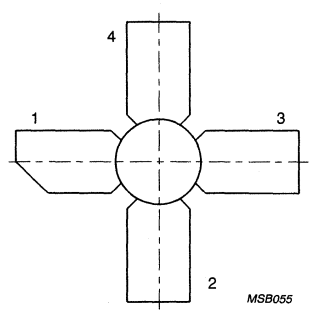


Fig.1 Simplified outline. SOT122D.

PINNING - SOT122D.

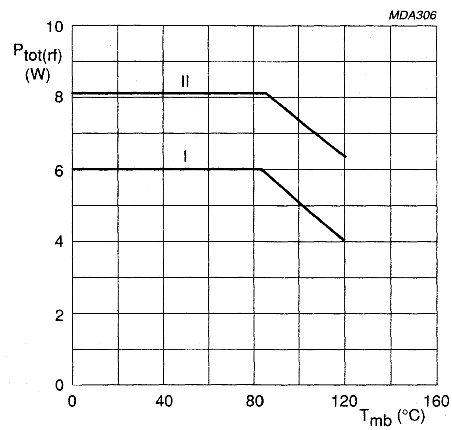
PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current				
d.c. or average	I_C; $I_{C(AV)}$	max.	0,4	A
(peak value), f > 1 MHz	I_{CM}	max.	1,2	A
Total power dissipation				
at T_{mb} ≤ 90 °C; f > 1 MHz	$P_{tot(rf)}$	max.	6	W
Storage temperature	T_{stg}		−65 to +150	°C
Operating junction temperature	T_j	max.	200	°C



I Continuous r.f. operation (f > 1 MHz)
II Short-time r.f. operation during mismatch (f > 1 MHz)

Fig.2 Power/temperature derating curves.

THERMAL RESISTANCE

Dissipation = 4,5 W

From junction to ambient(1)				
at T_a = 25 °C; f > 1 MHz (r.f. operation)	$R_{th\ j\text{-}a\ (rf)}$	max.	50	K/W
From junction to mounting base				
at T_{mb} = 25 °C; f > 1 MHz (r.f. operation)	$R_{th\ j\text{-}mb\ (rf)}$	max.	15	K/W

Note

1. Device mounted on a printed wiring board (see Fig.6).

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage				
open emitter; I_C = 5 mA	$V_{(BR)CBO}$	min.	36	V
Collector-emitter breakdown voltage				
open base; I_C = 10 mA	$V_{(BR)CEO}$	min.	16	V
Emitter-base breakdown voltage				
open collector; I_E = 0,5 mA	$V_{(BR)EBO}$	min.	3	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 16 V	I_{CES}	max.	2,5	mA
Second breakdown energy				
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	min.	0,55	mJ
D.C. current gain				
I_C = 0,3 A; V_{CE} = 10 V	h_{FE}	min.	25	
Collector capacitance at f = 1 MHz				
$I_E = i_e$ = 0; V_{CB} = 12,5 V	C_c	typ.	4	pF
Feedback capacitance at f = 1 MHz				
I_C = 0; V_{CE} = 12,5 V	C_{re}	typ.	2,5	pF
Collector-mounting base capacitance	$C_{c\text{-}mb}$	typ.	1,2	pF

UHF power transistor BLU20/12

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in mobile radio transmitters in the 470 MHz communications band.

FEATURES

- multi-base structure and emitter-ballasting resistors for an optimum temperature profile
- gold metallization ensures excellent reliability.
- internal matching to achieve an optimum wideband capability and high power gain.

The transistor has a 6-lead flange envelope with a ceramic cap (SOT-119). All leads are isolated from the flange.

QUICK REFERENCE DATA

Envelope	SOT-119			
Mode of operation	class-B; c.w.			
Collector-emitter voltage (d.c.)	V_{CE}		12,5	V
Frequency	f		470	MHz
Load power	P_L		20	W
Power gain	G_P	>	6,5	dB
Collector efficiency	η_c	>	55	%
Heatsink temperature	T_h		25	°C

PIN CONFIGURATION

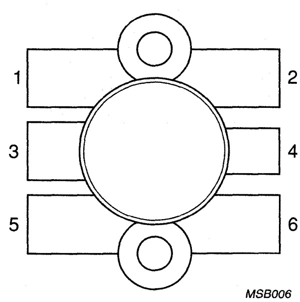


Fig.1 Simplified outline, SOT119A.

PINNING

PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)				
peak value	V_{CBOM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16,5	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current				
d.c. or average	I_C	max.	4	A
(peak value); f > 1 MHz	I_{CM}	max.	12	A
Total power dissipation				
at T_{mb} = 25 °C	P_{tot} (d.c.)	max.	38	W
f > 1 MHz; T_{mb} = 25 °C	P_{tot} (r.f.)	max.	44	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

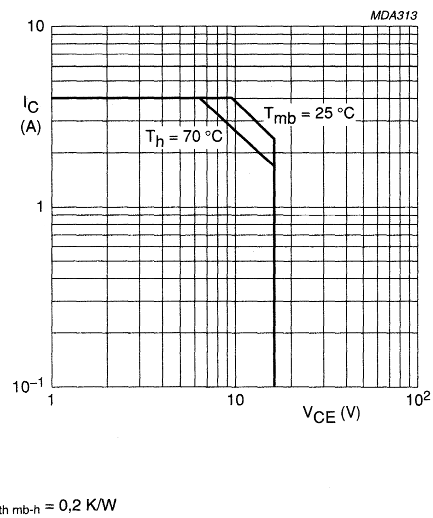


Fig.2 D.C. SOAR.

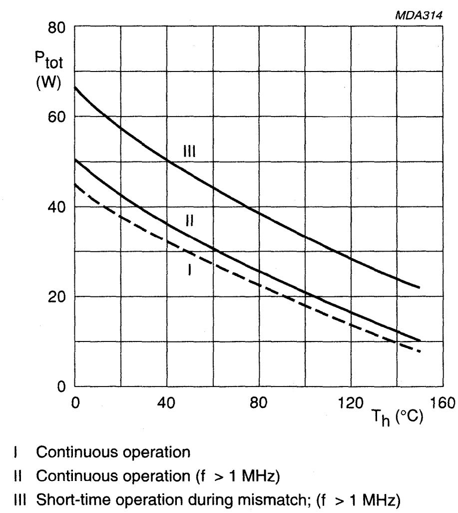


Fig.3 Power/temperature derating curves

THERMAL RESISTANCE

(dissipation = 37 W; T_{mb} = 25 °C, i.e. T_h = 18 °C)

From junction to mounting base				
(d.c. dissipation)	$R_{th\ j-mb(d.c.)}$	max	4,6	K/W
(r.f. dissipation)	$R_{th\ j-mb(r.f.)}$	max	4,1	K/W
From mounting base to heatsink	$R_{th\ mb-h}$	max	0,2	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage				
I_C = 25 mA; open emitter	$V_{(BR)CBO}$	>	36	V
Collector-emitter breakdown voltage				
I_C = 50 mA; open base	$V_{(BR)CEO}$	>	16,5	V
Emitter-base breakdown voltage				
I_E = 5 mA; open collector	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 20 V	I_{CES}	<	12,5	mA
Second breakdown energy				
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	>	5,3	mJ
D.C. current gain				
I_C = 2,7 A; V_{CE} = 10 V	h_{FE}	>	15	
		typ.	60	
Collector capacitance at f = 1 MHz				
$I_E = i_e$ = 0; V_{CB} = 12,5 V	C_C	typ.	53	pF
Feed-back capacitance at f = 1 MHz				
I_C = 0; V_{CE} = 12,5 V	C_{re}	typ.	33	pF
Collector-flange capacitance	C_{cf}	typ.	3	pF

UHF power transistor BLU30/12

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in mobile radio transmitters in the 470 MHz communications band.

FEATURES:

- multi-base structure and emitter-ballasting resistors for an optimum temperature profile
- gold metallization ensures excellent reliability
- internal matching to achieve an optimum wideband capability and high power gain

The transistor has a 6-lead flange envelope with a ceramic cap (SOT-119). All leads are isolated from the flange.

QUICK REFERENCE DATA

Envelope	SOT-119			
Mode of operation	class-B; c.w.			
Collector-emitter voltage (d.c.)	V_{CE}		12,5	V
Frequency	f		470	MHz
Load power	P_L		30	W
Power gain	G_P	>	6,0	dB
Collector efficiency	η_C	>	55	%
Heatsink temperature	T_h		25	°C

PIN CONFIGURATION

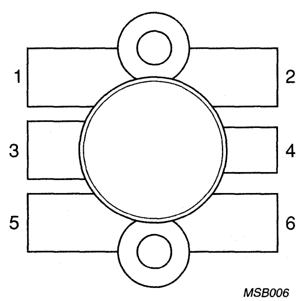


Fig.1 Simplified outline, SOT119A.

PINNING

PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

UHF power transistor BLU30/12

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)				
peak value	V_{CBOM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16,5	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current				
d.c. or average	I_C	max.	6	A
(peak value); f > 1 MHz	I_{CM}	max.	18	A
Total power dissipation				
f > 1 MHz; T_{mb} = 25 °C	P_{tot} (r.f.)	max.	65	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

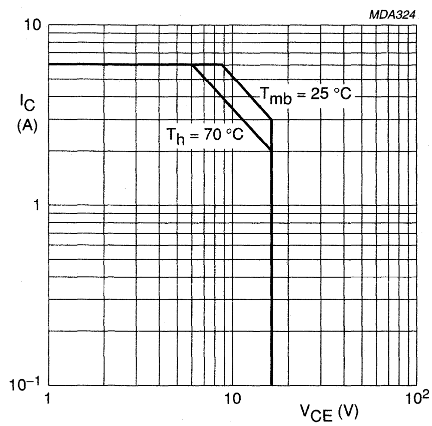
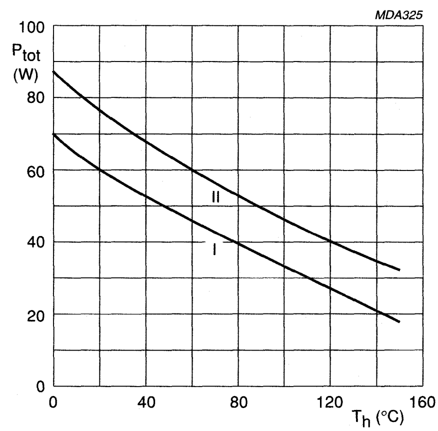


Fig.2 D.C. SOAR. $R_{th\ mb\text{-}h}$ = 0,2 K/W



I Continuous operation (f > 1 MHz)
II Short-time operation during mismatch; (f > 1 MHz.

Fig.3 Power/temperature derating curves

THERMAL RESISTANCE

(dissipation = 45 W; T_{mb} = 25 °C)

From junction to mounting base				
(r.f. dissipation)	$R_{th\ j\text{-}mb(r.f.)}$	max.	2,45	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	max.	0,2	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage				
I_C = 50 mA; open emitter	$V_{(BR)CBO}$	>	36	V
Collector-emitter breakdown voltage				
I_C = 100 mA; open base	$V_{(BR)CEO}$	>	16,5	V
Emitter-base breakdown voltage				
I_E = 10 mA; open collector	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 16 V	I_{CES}	<	22	mA
Second breakdown energy				
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	>	8	mJ
D.C. current gain				
I_C = 4 A; V_{CE} = 10 V	h_{FE}	> typ.	15 60	
Collector capacitance at f = 1 MHz(1)				
$I_E = i_e$ = 0; V_{CB} = 12,5 V	C_c	typ.	85	pF
Feed-back capacitance at f = 1 MHz(1)				
I_C = 0; V_{CE} = 12,5 V	C_{re}	typ.	52	pF
Collector-flange capacitance	C_{cf}	typ.	3	pF

Note

1. Device mounted in SOT-119 envelope without inputmatching.

UHF power transistor | BLU45/12

DESCRIPTION

N-P-N silicon planar epitaxial transistor in SOT-119 envelope primarily intended for use in mobile radio transmitters in the 470 MHz communications band.

FEATURES

- multi-base structure and emitter-ballasting resistors for an optimum temperature profile.
- internal matching to achieve an optimum wideband capability and high power gain.
- gold metallization ensures excellent reliability.

The transistor has a 6-lead flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in a common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_P dB	η_C %
narrow band; c.w.	12,5	470	45	> 4,8	> 55

PIN CONFIGURATION

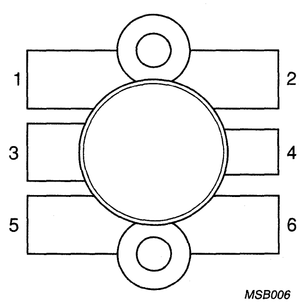


Fig.1 Simplified outline, SOT119A.

PINNING

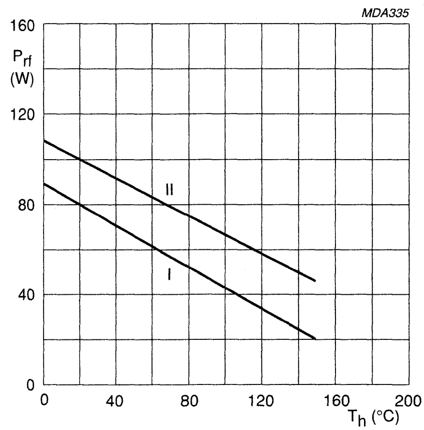
PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)				
peak value	V_{CBOM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16,5	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current				
d.c. or average	I_C	max.	9	A
(peak value); f > 1 MHz	I_{CM}	max.	27	A
Total power dissipation				
at T_{mb} = 25 °C; f > 1 MHz	P_{tot}	max.	87	W
Storage temperature	T_{stg}	−65 to + 150		°C
Operating junction temperature	T_j	max.	200	°C



I Continuous operation (f > 1 MHz).
II Short-time operation during mismatch (f > 1 MHz).

Fig.2 Power/temperature derating curves.

MAXIMUM THERMAL RESISTANCE

Dissipation = 54 W; T_{amb} = 25 °C

From junction to mounting base (r.f. operation)	$R_{th\ j\text{-}mb}$	max.	1,7	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	max.	0,2	K/W

UHF power transistor BLU45/12

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage				
open emitter; I_C = 100 mA	$V_{(BR)CBO}$	min.	36	V
Collector-emitter breakdown voltage				
open base; I_C = 200 mA	$V_{(BR)CEO}$	min.	16,5	V
Emitter-base breakdown voltage				
open collector; I_E = 20 mA	$V_{(BR)EBO}$	min.	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 16 V	I_{CES}	max.	44	mA
Second breakdown energy				
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	min.	15	mJ
D.C. current gain				
V_{CE} = 10 V; I_C = 8 A	h_{FE}	min.	15	
		typ.	60	
Collector capacitance at f = 1 MHz				
$I_E = i_e$ = 0; V_{CB} = 12,5 V	C_c	typ.	170	pF
Feedback capacitance at f = 1 MHz				
I_C = 0; V_{CE} = 12,5 V	C_{re}	typ.	100	pF
Collector-flange capacitance	C_{cf}	typ.	3	pF

UHF power transistor BLU56

FEATURES

- SMD encapsulation
- Emitter-ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a SOT223 surface mounted envelope and designed primarily for use in mobile radio equipment in the 470 MHz communications band.

PINNING - SOT223

PIN	DESCRIPTION
1	emitter
2	base
3	emitter
4	collector

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter class-B test circuit (see note 1).

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_c (%)
c.w. narrow band	470	12.5	1	> 12	> 50

Note

1. T_s = temperature at soldering point of collector tab.

PIN CONFIGURATION

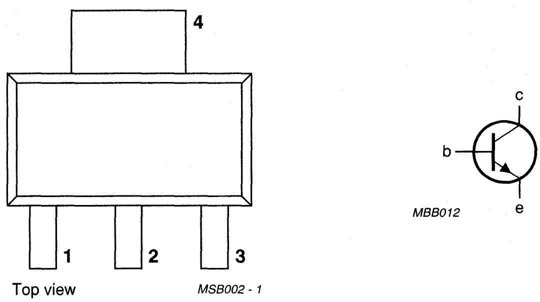


Fig.1 Simplified outline and symbol.

UHF power transistor BLU56

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	36	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C, $I_{C(AV)}$	collector current	DC or average value	–	200	mA
i_{CM}	collector current	peak value f > 1 MHz	–	600	mA
P_{tot}	total power dissipation	f > 1 MHz T_s = 105 °C (note 1)	–	2	W
T_{stg}	storage temperature range		–65	150	°C
T_j	operating junction temperature		–	175	°C

Note

1. T_s = temperature at soldering point of collector tab.

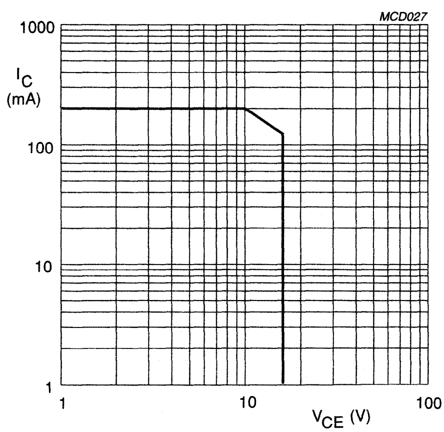


Fig.2 DC SOAR; T_s = 105 °C.

THERMAL RESISTANCE

SYMBOL	PARAMETER	MAX.	UNIT
$R_{th\ j\text{-}s(DC)}$	from junction to soldering point	35	K/W

CHARACTERISTICS

T_j = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter I_C = 2.5 mA	36	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base I_C = 10 mA	16	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector I_E = 0.5 mA	3	–	–	V
I_{CES}	collector-emitter leakage current	V_{BE} = 0 V_{CE} = 16 V	–	–	1	mA
h_{FE}	DC current gain	V_{CE} = 10 V I_C = 150 mA	25	–	–	
E_{SBR}	second breakdown energy	L = 25 mH R_{BE} = 10 Ω f = 50 Hz	0.3	–	–	mJ
C_c	collector capacitance	V_{CB} = 12.5 V $I_E = I_e = 0$ f = 1 MHz	–	2.2	3	pF
C_{re}	feedback capacitance	V_{CE} = 12.5 V I_C = 0 f = 1 MHz	–	1.2	2	pF

UHF power transistor — BLU60/12

DESCRIPTION

N-P-N silicon planar epitaxial transistor in SOT-119 envelope primarily intended for use in mobile radio transmitters in the 470 MHz communications band.

FEATURES

- multi-base structure and emitter-ballasting resistors for an optimum temperature profile.
- internal matching to achieve an optimum wideband capability and high power gain.
- gold metallization ensures excellent reliability.

The transistor has a 6-lead flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in a common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η_C %
narrow band; c.w.	12,5	470	60	> 4,4	> 55

PIN CONFIGURATION

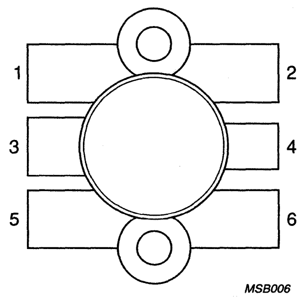


Fig.1 Simplified outline, SOT119A.

PINNING

PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

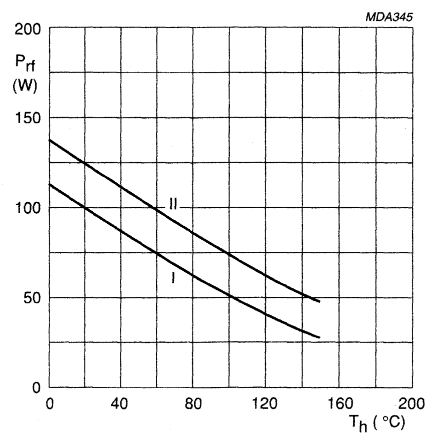
PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

UHF power transistor BLU60/12

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)				
peak value	V_{CBOM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16,5	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current				
d.c. or average	I_C	max.	12	A
(peak value); f > 1 MHz	I_{CM}	max.	36	A
Total power dissipation				
at T_{mb} = 25 °C; f > 1 MHz	P_{tot}	max.	110	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C



I Continuous operation (f > 1 MHz).
II Short-time operation during mismatch (f > 1 MHz).

Fig.2 Power/temperature derating curves.

MAXIMUM THERMAL RESISTANCE

Dissipation = 72 W; T_{amb} = 25 °C

From junction to mounting base (r.f. operation)	$R_{th\ j\text{-}mb}$	max.	1,4	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	max.	0,2	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage				
open emitter; I_C = 100 mA	$V_{(BR)CBO}$	min.	36	V
Collector-emitter breakdown voltage				
open base; I_C = 200 mA	$V_{(BR)CEO}$	min.	16,5	V
Emitter-base breakdown voltage				
open collector; I_E = 20 mA	$V_{(BR)EBO}$	min.	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 16 V	I_{CES}	max.	44	mA
Second breakdown energy				
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	min.	15	mJ
D.C. current gain				
V_{CE} = 10 V; I_C = 8 A	h_{FE}	min.	15	
		typ.	60	
Collector capacitance at f = 1 MHz				
$I_E = i_e$ = 0; V_{CB} = 12,5 V	C_c	typ.	170	pF
Feedback capacitance at f = 1 MHz				
I_C = 0; V_{CE} = 12,5	C_{re}	typ.	100	pF
Collector-flange capacitance	C_{cf}	typ.	3	pF

UHF power transistor BLU86

FEATURES

- SMD encapsulation
- Emitter-ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a SOT223 surface mounted envelope and designed primarily for use in mobile radio equipment in the 900 MHz communications band.

PINNING - SOT223

PIN	DESCRIPTION
1	emitter
2	base
3	emitter
4	collector

QUICK REFERENCE DATA

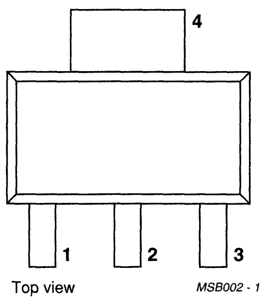
RF performance at $T_s \leq 60$ °C in a common emitter class-B test circuit (see note 1).

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_c (%)
c.w. narrow band	900	12.5	1	> 7	> 55

Note

1. T_s = temperature at soldering point of collector tab.

PIN CONFIGURATION



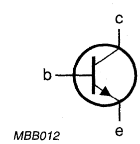


Fig.1 Simplified outline and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	32	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C, $I_{C(AV)}$	collector current	DC or average value	–	200	mA
I_{CM}	collector current	peak value; f > 1 MHz	–	600	mA
P_{tot}	total power dissipation	f > 1 MHz; T_s = 129 °C (note 1)	–	2	W
T_{stg}	storage temperature range		–65	150	°C
T_j	operating junction temperature		–	175	°C

Note

1. T_s = temperature at soldering point of collector tab.

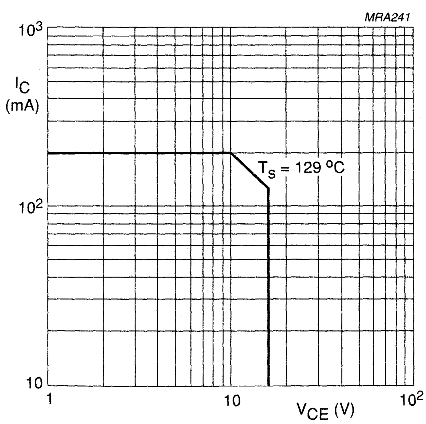


Fig.2 DC SOAR.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}s(DC)}$	from junction to soldering point	P_{tot} = 2 W; T_s = 129 °C	23	K/W

CHARACTERISTICS

T_j = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 2.5 mA	32	–	–	V
$V_{(BR)CEO}$	collector-emitter breadown voltage	open base; I_C = 10 mA	16	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.5 mA	3	–	–	V
I_{CES}	collector-emitter leakage current	V_{BE} = 0; V_{CE} = 16 V	–	–	1	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 150 mA	25	–	–	
E_{SBR}	second breakdown energy	L = 25 mH; R_{BE} = 10 Ω; f = 50 Hz	0.3	–	–	mJ
C_C	collector capacitance	V_{CB} = 12.5 V; $I_E = I_e$ = 0; f = 1 MHz	–	2.2	2.6	pF
C_{re}	feedback capacitance	V_{CE} = 12.5 V; I_C = 0; f = 1 MHz	–	1.2	1.8	pF

UHF power transistor | BLU97

DESCRIPTION

N-P-N silicon planar epitaxial transistor designed for use in mobile radio transmitters in the 470 MHz band.

FEATURES

- multi-base structure and emitter-ballasting resistors for an optimum temperature profile.
- gold metallization ensures excellent reliability.

The transistor has a 4-lead stud envelope with a ceramic cap (SOT122A). All leads are isolated from the stud.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in a common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η_C %
narrow band; c.w.	12,5	470	7	> 8,5	> 55

PIN CONFIGURATION

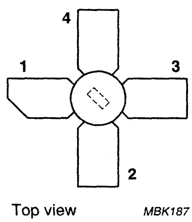


Fig.1 Simplified outline. SOT122A.

PINNING - SOT122A.

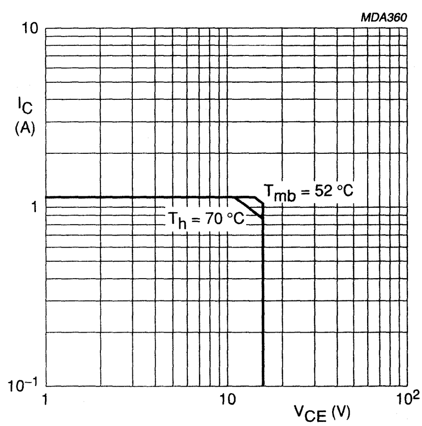
PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

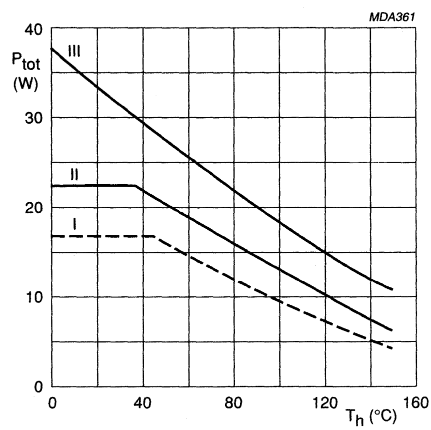
Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max. 36	V
Collector-emitter voltage (open base)	V_{CEO}	max. 16	V
Emitter-base voltage (open collector)	V_{EBO}	max. 3	V
Collector current			
d.c. or average	I_C	max. 1,2	A
(peak value); f > 1 MHz	I_{CM}	max. 3,6	A
Total power dissipation			
at T_{mb} = 52 °C	$P_{tot(d.c.)}$	max. 17	W
f > 1 MHz; T_{mb} = 52 °C	$P_{tot(r.f.)}$	max. 22,5	W
Storage temperature	T_{stg}	−65 to +150	°C
Operating junction temperature	T_j	max. 200	°C



$R_{th\ mb\text{-}h}$ = 0,6 K/W.

Fig.2 D.C. SOAR.



I Continuous operation
II Continuous operation (f > 1 MHz).
III Short-time operation during mismatch (f > 1 MHz).

Fig.3 Power/temperature derating curves.

THERMAL RESISTANCE

Dissipation = 15 W; T_{mb} = 25 °C

From junction to mounting base				
(d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	7,5	K/W
(r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	5,6	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0.6	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage, open emitter; I_C = 15 mA	$V_{(BR)CBO}$	>	36	V
Collector-emitter breakdown voltage, open base; I_C = 30 mA	$V_{(BR)CEO}$	>	16	V
Emitter-base breakdown voltage, open collector; I_E = 1,5 mA	$V_{(BR)EBO}$	>	3	V
Collector cut-off current, V_{BE} = 0; V_{CE} = 16 V	I_{CES}	<	7,5	mA
Second breakdown energy, L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	>	2,3	mJ
D.C. current gain, I_C = 0,9 A; V_{CE} = 10 V	h_{FE}	>	25	
		typ.	100	
Transition frequency at f = 500 MHz(1), $-I_E$ = 0,9 A; V_{CB} = 12,5 V	f_T	typ.	4,0	GHz
Collector capacitance at f = 1 MHz, $I_E = i_e$ = 0; V_{CB} = 12,5 V	C_c	typ.	10	pF
Feed-back capacitance at f = 1 MHz, I_C = 0; V_{CE} = 12,5 V	C_{re}	typ.	7	pF
Collector-stud capacitance	C_{cs}	typ.	1,2	pF

Note

1. Measured under pulse conditions: t_p = 50 µs; δ < 1%.

UHF power transistor

BLU99
BLU99/SL

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in mobile radio transmitters in the u.h.f. band. The transistor is also very suitable for application in the 900 MHz mobile radio band.

FEATURES

- multi-base structure and diffused emitter-ballasting resistors for an optimum temperature profile;
- gold metallization ensures excellent reliability.

The BLU99 has a 4-lead stud envelope with a ceramic cap (SOT122A). All leads are isolated from the stud. The BLU99/SL is a studless version (SOT122D).

QUICK REFERENCE DATA

R.F. performance at T_h = 25 °C in a common-emitter class-B circuit.

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η_C %
narrow band; c.w.	12,5	470	5	> 10,5	> 60
	12,5	900	4	typ. 7,0	typ. 60

PIN CONFIGURATION

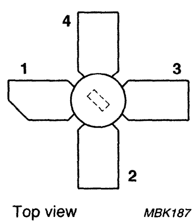


Fig.1 Simplified outline. SOT122A (BLU99).

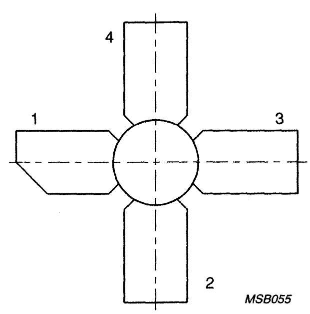


Fig.2 Simplified outline. SOT122D (BLU99/SL).

PINNING - SOT122A; SOT122D

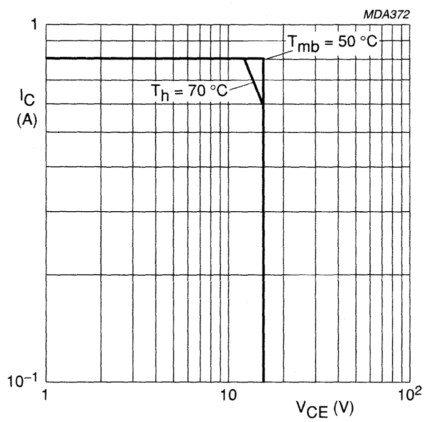
PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

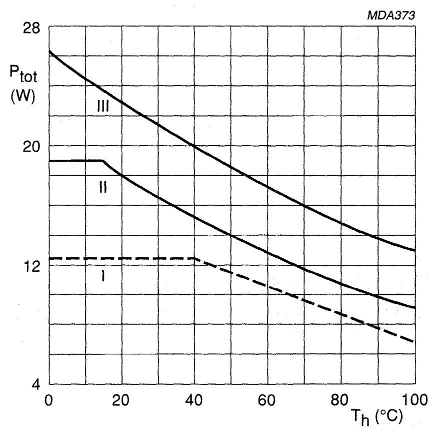
Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current				
d.c. or average	I_C;$I_{C(AV)}$	max.	0,8	A
peak value; f > 1 MHz	I_{CM}	max.	2,5	A
D.C. power dissipation up to T_{mb} = 50 °C	$P_{tot\ (d.c.)}$	max.	12,5	W
R.F. power dissipation				
f > 1 MHz; T_{mb} = 25 °C	$P_{tot\ (r.f.)}$	max.	19	W
Storage temperature	T_{stg}	−65 to + 150		°C
Operating junction temperature	T_j	max.	200	°C



$R_{th\ mb\text{-}h}$ = 0,6 K/W.

Fig.3 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation (f > 1 MHz).
III Short-time r.f. operation during mismatch (f > 1 MHz).

Fig.4 Power/temperature derating curves.

THERMAL RESISTANCE

(dissipation = 9 W; T_{mb} = 25 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	10	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	7,5	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,6	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage				
open emitter; I_C = 10 mA	$V_{(BR)CBO}$	>	36	V
Collector-emitter breakdown voltage				
open base; I_C = 20 mA	$V_{(BR)CEO}$	>	16	V
Emitter-base breakdown voltage				
open collector; I_E = 1 mA	$V_{(BR)EBO}$	>	3	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 16 V	I_{CES}	<	5	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
R_{BE} = 10 Ω	E_{SBR}	>	1	mJ
D.C. current gain(2)				
I_C = 0,6 A; V_{CE} = 10 V	h_{FE}	>	25	
		typ.	100	
Transition frequency at f = 500 MHz(1)				
I_C = 0,6 A; V_{CE} = 12,5 V	f_T	typ.	4,0	GHz
Collector capacitance at f = 1 MHz				
I_E = I_e = 0; V_{CB} = 12,5 V	C_c	typ.	7,5	pF
Feedback capacitance at f = 1 MHz				
I_C = 0; V_{CE} = 12,5 V	C_{re}	typ.	5	pF
Collector-stud capacitance	C_{cs}	typ.	1,2	pF

Notes

1. Measured under pulse conditions: t_p = 50 μs; δ < 0,01.
2. Measured under pulse conditions: t_p = 300 μs; δ < 0,01.

VHF power transistor BLV10

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, B and C operated mobile, h.f. and v.h.f. transmitters with a nominal supply voltage of 13,5 V. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions with a supply over-voltage to 16,5 V.

It has a 3/8" flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneautralized common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_P dB	η %	$\overline{z_i}$ Ω	$\overline{Y_L}$ mS
c.w.	**13,5**	**175**	**8**	**> 9,0**	**> 70**	**2,8 + j1,2**	**76 − j16**
c.w.	12,5	175	8	typ. 10,5	typ. 75	–	–

PIN CONFIGURATION

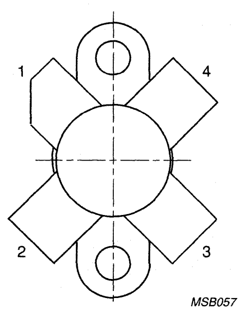


Fig.1 Simplified outline, SOT123.

PINNING

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage (V_{BE} = 0)				
peak value	V_{CESM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	1,5	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	4,0	A
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max.	20	W
Storage temperature	T_{stg}	−65 to + 150		°C
Operating junction temperature	T_j	max.	200	°C

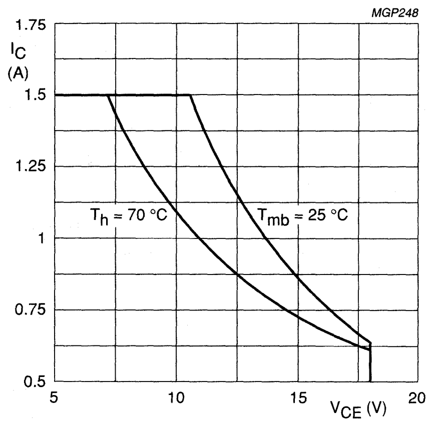
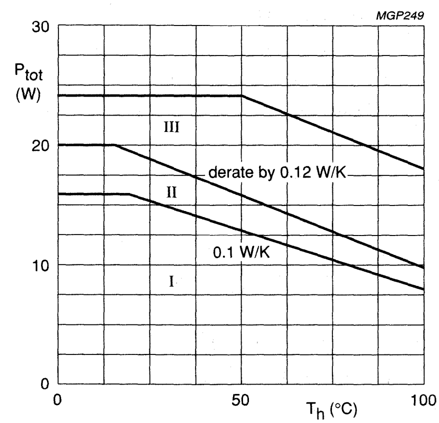


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation
III Short-time operation during mismatch

Fig.3 R.F. power dissipation; $V_{CE} \leq$ 16,5 V; f > 1 MHz.

THERMAL RESISTANCE

(dissipation = 8 W; T_{mb} = 72,4 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	10,7	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	8,6	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,3	K/W

CHARACTERISTICS

T_j = 25 °C

Collector-emitter breakdown voltage				
V_{BE} = 0; I_C = 5 mA	$V_{(BR)\ CES}$	>	36	V
Collector-emitter breakdown voltage				
open base; I_C = 25 mA	$V_{(BR)\ CEO}$	>	18	V
Emitter-base breakdown voltage				
open collector; I_E = 1 mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 18 V	I_{CES}	<	2	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	0,5	mJ
R_{BE} = 10 Ω	E_{SBR}	>	0,5	mJ
D.C. current gain(1)		typ.	40	
I_C = 0,75 A; V_{CE} = 5 V	h_{FE}		10 to 100	
Collector-emitter saturation voltage(1)				
I_C = 2 A; I_B = 0,4 A	V_{CEsat}	typ.	0,85	V
Transition frequency at f = 100 MHz(1)				
$-I_E$ = 0,75 A; V_{CB} = 13,5 V	f_T	typ.	950	MHz
$-I_E$ = 2 A; V_{CB} = 13,5 V	f_T	typ.	850	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e$ = 0; V_{CB} = 13,5 V	C_c	typ.	16,5	pF
Feedback capacitance at f = 1 MHz				
I_C = 100 mA; V_{CE} = 13,5 V	C_{re}	typ.	12	pF
Collector-flange capacitance	C_{cf}	typ.	2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0{,}02$.

VHF power transistor BLV11

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, B and C operated mobile, h.f. and v.h.f. transmitters with a nominal supply voltage of 13,5 V. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions with a supply over-voltage to 16,5 V.

It has a 3/8" flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneutralized common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %	$\overline{z_i}$ Ω	$\overline{Y_L}$ mS
c.w.	**13,5**	**175**	**15**	> **8,0**	> **60**	**2,3 + j2,2**	**130 − j4,4**
c.w.	12,5	175	15	typ. 7,5	typ. 67	−	−

PIN CONFIGURATION

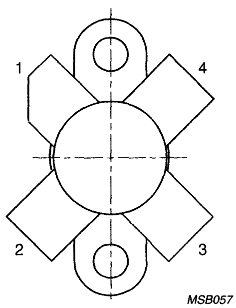


Fig.1 Simplified outline, SOT123.

PINNING

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage ($V_{BE} = 0$)				
peak value	V_{CESM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	3	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	8	A
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max.	36	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

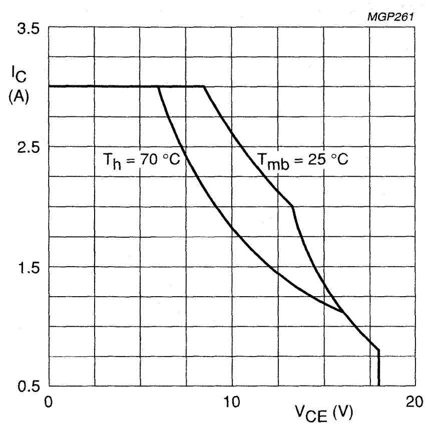
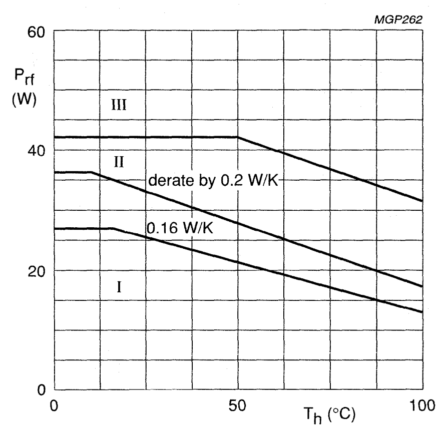


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation
III Short-time operation during mismatch

Fig.3 R.F. power dissipation; $V_{CE} \leq 16,5$ V; f > 1 MHz.

THERMAL RESISTANCE

(dissipation = 15 W; T_{mb} = 74,5 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j-mb(dc)}$	=	6,55	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j-mb(rf)}$	=	4,95	K/W
From mounting base to heatsink	$R_{th\ mb-h}$	=	0,3	K/W

VHF power transistor BLV12

FEATURES

- Emitter-ballasting resistors for an optimum temperature profile
- Excellent reliability
- Withstands full load mismatch.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a 4-lead SOT123 flange envelope with a ceramic cap. It is designed for common emitter, class-B operation in mobile VHF transmitters with a supply voltage of 12.5 V. All leads are isolated from the mounting flange.

PINNING - SOT123

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_P (dB)	η_C (%)
c.w. class-B	175	12.5	30	> 9	> 60

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

PIN CONFIGURATION

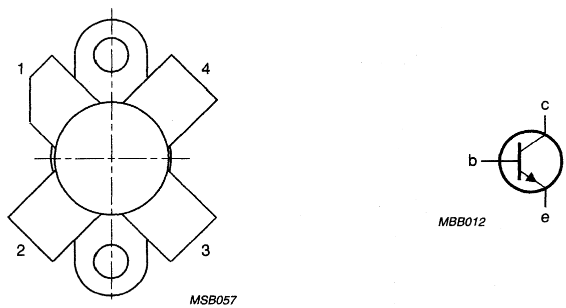
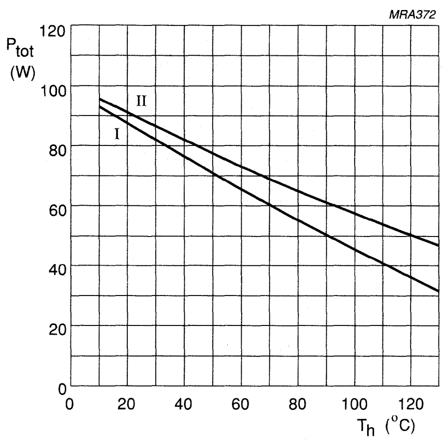


Fig.1 Simplified outline and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	36	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C, $I_{C(AV)}$	collector current	DC or average value	–	6	A
I_{CM}	collector current	peak value f > 1 MHz	–	18	A
P_{tot}	total power dissipation	RF operation; f > 1 MHz; T_{mb} = 25 °C	–	100	W
T_{stg}	storage temperature range		–65	150	°C
T_j	junction operating temperature		–	200	°C



(I) Continuous DC operation.

(II) Short time operation during mismatch (f > 1 MHz)

Fig.2 Power/temperature derating curve.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb(RF)}$	from junction to mounting base	P_{tot} = 100 W; T_{mb} = 25 °C	1.75	K/W
$R_{th\ mb\text{-}h}$	from mounting base to heatsink		0.3	K/W

CHARACTERISTICS

T_j = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_c = 10 mA	36	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_c = 25 mA	16	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 2 mA	3	–	–	V
I_{CES}	collector-emitter leakage current	V_{BE} = 0; V_{CE} = 16 V	–	–	10	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 4 A	25	35	–	
f_T	transition frequency	V_{CE} = 12.5 V; I_E = 4 A; f = 500 MHz	–	1.6	–	GHz
C_c	collector capacitance	V_{CB} = 12.5 V; $I_E = I_e$ = 0; f = 1 MHz	–	90	100	pF
C_{re}	feedback capacitance	V_{CE} = 12.5 V; I_C = 0; f = 1 MHz	–	60	70	pF
$C_{c\text{-}f}$	collector-flange capacitance	f = 1 MHz	–	2	–	pF

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, B and C operated h.f. and v.h.f. transmitters with a nominal supply voltage of 28 V. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions.

It has a 3/8" flange envelope with a ceramic cap. All leads are isolated from the flange.

PINNING - SOT123

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneutralized common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %	$\overline{z_i}$ Ω	$\overline{Y_L}$ mS
c.w.	28	175	8	> 12	> 65	1,8 + j0,7	18 – j20

PIN CONFIGURATION

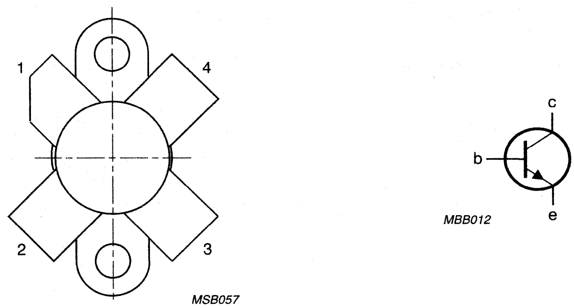


Fig.1 Simplified outline and symbol.

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage ($V_{BE} = 0$)			
peak value	V_{CESM}	max.	65 V
Collector-emitter voltage (open base)	V_{CEO}	max.	36 V
Emitter-base voltage (open collector)	V_{EBO}	max.	4 V
Collector current (average)	$I_{C(AV)}$	max.	0,9 A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	2,5 A
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max.	20 W
Storage temperature	T_{stg}		−65 to + 150 °C
Operating junction temperature	T_j	max.	200 °C

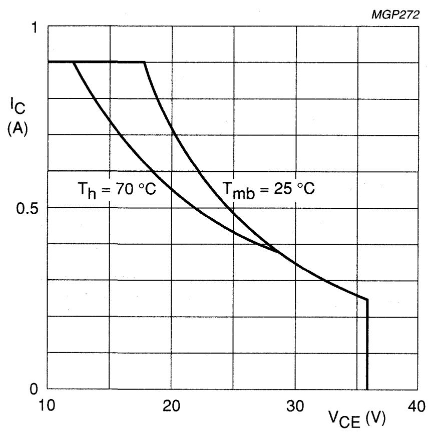
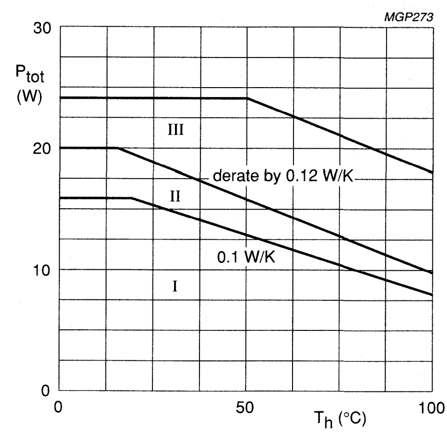


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation
III Short-time operation during mismatch

Fig.3 R.F. power dissipation; $V_{CE} \leq 28$ V; f > 1 MHz.

THERMAL RESISTANCE

(dissipation = 8 W; T_{mb} = 72,4 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j-mb(dc)}$	=	10,7 K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j-mb(rf)}$	=	8,6 K/W
From mounting base to heatsink	$R_{th\ mb-h}$	=	0,3 K/W

CHARACTERISTICS

$T_j = 25\ °C$

Collector-emitter breakdown voltage				
$V_{BE} = 0$; $I_C = 2$ mA	$V_{(BR)CES}$	>	65	V
Collector-emitter breakdown voltage				
open base; $I_C = 10$ mA	$V_{(BR)CEO}$	>	36	V
Emitter-base breakdown voltage				
open collector; $I_E = 1$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 36$ V	I_{CES}	<	1	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	0,5	mJ
$R_{BE} = 10\ \Omega$	E_{SBR}	>	0,5	mJ
D.C. current gain (1)		typ.	50	
$I_C = 0,4$ A; $V_{CE} = 5$ V	h_{FE}	10 to	100	
Collector-emitter saturation voltage (1)				
$I_C = 1,25$ A; $I_B = 0,25$ A	V_{CEsat}	typ.	0,8	V
Transition frequency at f = 100 MHz (1)				
$-I_E = 0,4$ A; $V_{CB} = 28$ V	f_T	typ.	600	MHz
$-I_E = 1,25$ A; $V_{CB} = 28$ V	f_T	typ.	520	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 28$ V	C_c	typ.	10	pF
Feedback capacitance at f = 1 MHz				
$I_C = 50$ mA; $V_{CE} = 28$ V	C_{re}	typ.	7,1	pF
Collector-flange capacitance	C_{cf}	typ.	2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0,02$.

VHF power transistor BLV21

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, B and C operated h.f. and v.h.f. transmitters with a nominal supply voltage of 28 V. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions.

It has a 3/8" flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneautralized common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %	$\bar{z}_i$ Ω	$\bar{Y}_L$ mS
c.w.	28	175	15	> 10	> 65	1,4 + j1,85	33 – j27,5

PIN CONFIGURATION

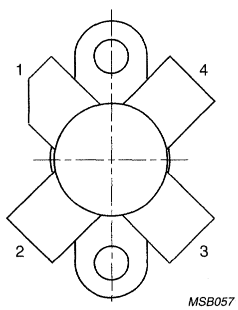


Fig.1 Simplified outline, SOT123.

PINNING

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage (V_{BE} = 0)				
peak value	V_{CESM}	max.	65	V
Collector-emitter voltage (open base)	V_{CEO}	max.	36	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	1,75	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	5,0	A
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max.	36	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

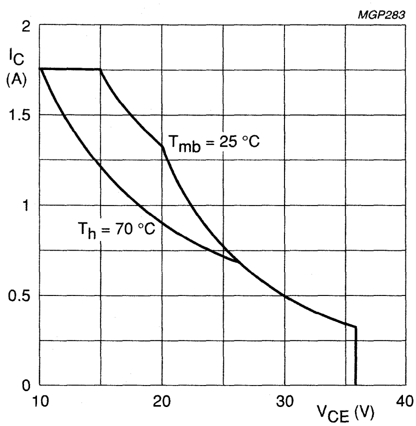
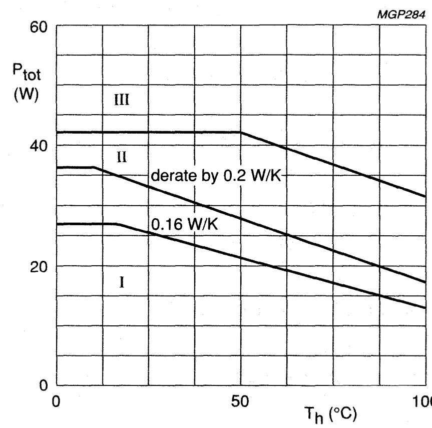


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation
III Short-time operation during mismatch

Fig.3 R.F. power dissipation; V_{CE} ≤ 28 V; f > 1 MHz.

THERMAL RESISTANCE

(dissipation = 15 W; T_{mb} = 74,5 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	6,55	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	4,95	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,3	K/W

CHARACTERISTICS

$T_j = 25\ °C$

Collector-emitter breakdown voltage				
$V_{BE} = 0$; $I_C = 5$ mA	$V_{(BR)\,CES}$	>	65	V
Collector-emitter breakdown voltage				
open base; $I_C = 25$ mA	$V_{(BR)\,CEO}$	>	36	V
Emitter-base breakdown voltage				
open collector; $I_E = 2$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 36$ V	I_{CES}	<	2	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	2,5	mJ
$R_{BE} = 10\ \Omega$	E_{SBR}	>	2,5	mJ
D.C. current gain(1)		typ.	50	
$I_C = 0{,}7$ A; $V_{CE} = 5$ V	h_{FE}	10 to 100		
Collector-emitter saturation voltage(1)				
$I_C = 2$ A; $I_B = 0{,}4$ A	V_{CEsat}	typ.	0,65	V
Transition frequency at f = 100 MHz(1)				
$-I_E = 0{,}7$ A; $V_{CB} = 28$ V	f_T	typ.	650	MHz
$-I_E = 2$ A; $V_{CB} = 28$ V	f_T	typ.	625	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 28$ V	C_c	typ.	18	pF
Feedback capacitance at f = 1 MHz				
$I_C = 100$ mA; $V_{CE} = 28$ V	C_{re}	typ.	12,8	pF
Collector-flange capacitance	C_{cf}	typ.	2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0{,}02$.

VHF power transistor BLV25

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily for use in v.h.f.-f.m. broadcast transmitters.

FEATURES

- internally matched input for wideband operation and high power gain;
- multi-base structure and diffused emitter ballasting resistors for an optimum temperature profile;
- gold-metallization ensures excellent reliability.

The transistor has a ½in 6-lead flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneutralized common-emitter class-B circuit.

MODE OPERATION	V_{CE} V	f MHz	P_L W	P_S W	G_p dB	η %
narrow band; c.w.	28	108	175	< 17,5	> 10,0	> 65

PIN CONFIGURATION

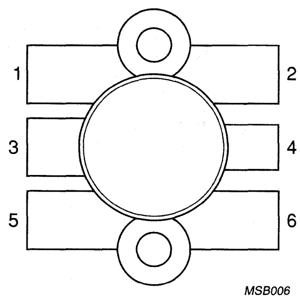


Fig.1 Simplified outline, SOT119A.

PINNING

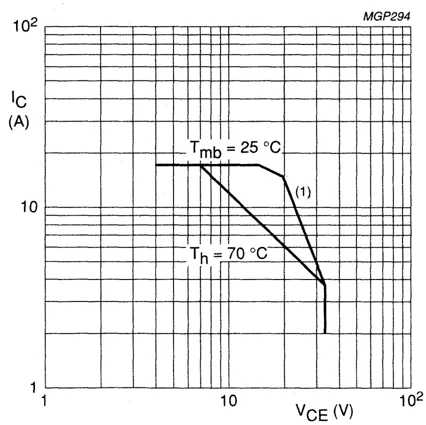
PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

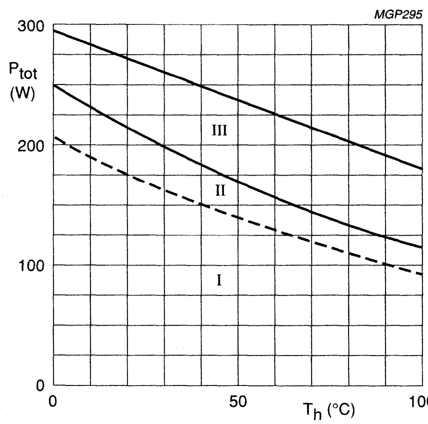
Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage					
(peak value); $V_{BE} = 0$	V_{CESM}	max.		65	V
open base	V_{CEO}	max.		33	V
Emitter-base voltage (open collector)	V_{EBO}	max.		4	V
Collector current					
d.c. or average	I_C; $I_{C(AV)}$	max.		17, 5	A
(peak value); f > 1 MHz	I_{CM}	max.		35	A
Total power dissipation at $T_{mb} = 25$ °C	$P_{tot\ (d.c.)}$	max.		220	W
R.F. power dissipation (f > 1 MHz); $T_{mb} = 25$ °C	$P_{tot\ (r.f.)}$	max.		270	W
R.F. power dissipation (f > 1 MHz); $T_h = 70$ °C	$P_{tot\ (r.f.)}$	max.		146	W
Storage temperature	T_{stg}	−65	to	+150	°C
Operating junction temperature	T_j	max.		200	°C



(1) Second breakdown limit.

Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation (f > 1 MHz)
III Short-time operation during mismatch; (f > 1 MHz).

Fig.3 Power derating curves vs. temperature.

THERMAL RESISTANCE

(dissipation = 150 W; $T_{mb} = 72$ °C, i.e. $T_h = 42$ °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	max	0,85	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	max	0,60	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	max	0,2	K/W

CHARACTERISTICS

T_j = 25 °C

Collector-emitter breakdown voltage				
V_{BE} = 0; I_C = 50 mA	$V_{(BR)CES}$	>	65	V
open base; I_C = 200 mA	$V_{(BR)CEO}$	>	33	V
Emitter-base breakdown voltage				
open collector; I_E = 20 mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 33 V	I_{CES}	<	25	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	20	mJ
R_{BE} = 10 Ω	E_{SBR}	>	20	mJ
D.C. current gain(1)				
I_C = 8,5 A; V_{CE} = 25 V	h_{FE}	typ.	50	
			15 to 100	
Collector-emitter saturation voltage(1)				
I_C = 20 A; I_B = 4,0 A	V_{CEsat}	typ.	1,6	V
Transition frequency at f = 100 MHz(2)				
$-I_E$ = 8,5 A; V_{CB} = 25 V	f_T	typ.	600	MHz
$-I_E$ = 20 A; V_{CB} = 25 V	f_T	typ.	600	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e$ = 0; V_{CB} = 25 V	C_c	typ.	275	pF
Feedback capacitance at f = 1 MHz				
I_C = 100 mA; V_{CE} = 25 V	C_{re}	typ.	155	pF
Collector-flange capacitance	C_{cf}	typ.	3	pF

Notes

1. Measured under pulse conditions: $t_p \leq 300$ µs; $\delta \leq 0{,}02$.
2. Measured under pulse conditions: $t_p \leq 50$ µs; $\delta \leq 0{,}01$.

VHF linear power transistor | BLV33

FEATURES

- Diffused emitter ballasting resistors for an optimum temperature profile
- Gold sandwich metallization ensures excellent reliability.

APPLICATIONS

- Primarily intended for use in linear VHF amplifiers for television transmitters and transposers.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a $\frac{1}{16}$" 4 fslead SOT147 capstan package with ceramic cap. All leads are isolated from the stud.

PINNING - SOT147

PIN	SYMBOL	DESCRIPTION
1	c	collector
2	e	emitter
3	b	base
4	e	emitter

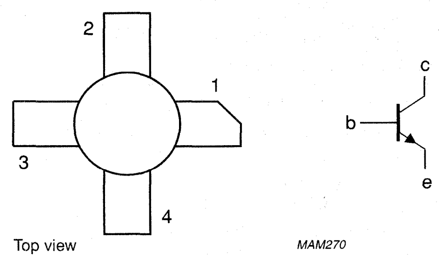


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance in a common emitter push-pull test circuit.

MODE OF OPERATION	f_{vision} (MHz)	V_{CE} (V)	I_C, $I_{C(ZS)}$ (A)	T_h (°C)	d_{im}(1) (dB)	$P_{o\ sync}$(1) (W)	G_P (dB)	sync compr.(2) sync in/sync out (%)
CW, class-A	224.25	25	3.2	70	−55	>16.5	>9	
				25	−55	typ. 26	typ. 9.7	
CW, class-AB	224.25	28	0.1	70		typ. 90	typ. 6.5	30/25

Notes

1. Three-tone test method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB), zero dB corresponds to peak sync level.
2. Television service (negative modulation, C.C.I.R. system).

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

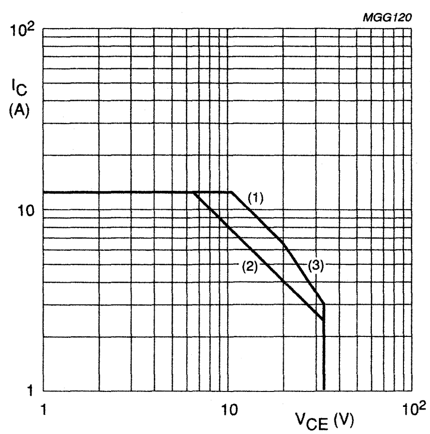
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CESM}	collector-emitter voltage	$V_{BE} = 0$	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	33	V
V_{EBO}	emitter-base voltage	open collector	–	4	V
I_C	collector current (DC)		–	12.5	A
$I_{C(AV)}$	average collector current		–	12.5	A
I_{CM}	peak collector current	f > 1 MHz	–	20	A
P_{tot}	total power dissipation (DC)	T_{mb} = 25 °C	–	132	W
P_{rf}	RF power dissipation	f > 1 MHz; T_{mb} = 25 °C	–	165	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

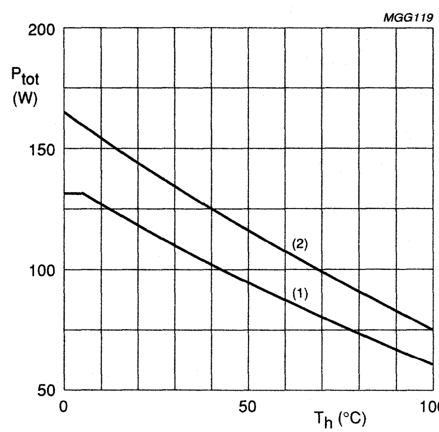
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb(dc)}$	thermal resistance from junction to mounting base (DC dissipation)	P_{diss} = 80 W; T_{mb} = 82 °C; T_h = 70 °C	1.46	K/W
$R_{th\ j\text{-}mb(rf)}$	thermal resistance from junction to mounting base (RF dissipation)	P_{diss} = 80 W; T_{mb} = 82 °C; T_h = 70 °C	1.17	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	P_{diss} = 80 W; T_{mb} = 82 °C; T_h = 70 °C	0.15	K/W



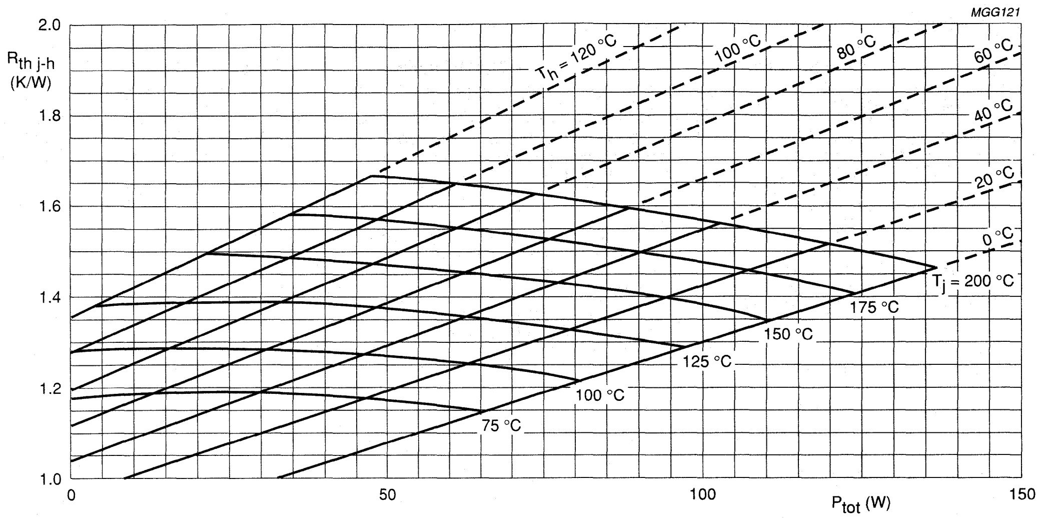
(1) T_{mb} = 25 °C.
(2) T_h = 70 °C.
(3) Second breakdown limit (independent of temperature).

Fig.2 DC SOAR.



(1) Continuous DC (including RF class-A) operation.
(2) Continuous RF operation.

Fig.3 Power derating curves.



$R_{th\ mb\text{-}h}$ = 0.15 K/W.

Fig.4 Maximum thermal resistance from junction to heatsink as a function of power dissipation, with heatsink and junction temperature as parameters.

Example

Nominal class-A operation: V_{CE} = 25 V; I_C = 3.2 A; T_h = 70 °C.

Figure 4 shows:

$R_{th\ j\text{-}h}$ = max. 1.60 K/W

T_j = max. 198 °C.

Typical device:

$R_{th\ j\text{-}h}$ = typ.1.50 K/W

T_j = typ. 190 °C.

CHARACTERISTICS

T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CES}$	collector-emitter breakdown voltage	V_{BE} = 0; I_C = 25 mA	65	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 100 mA	33	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 10 mA	4	–	–	V
I_{CES}	collector cut-off current	V_{BE} = 0; V_{CE} = 30 V	–	–	1	mA
h_{FE}	DC current gain	V_{CE} = 25 V; I_C = 3 A; note 1	15	50	100	
V_{CEsat}	collector-emitter saturation voltage	I_C = 6 A; I_B = 0.6 A; note 1	–	0.75	–	V
f_T	transition frequency	V_{CB} = 25 V; I_E = −3 A; f = 100 MHz; note 2	–	680	–	MHz
	transition frequency	V_{CB} = 25 V; I_E = −6 A; f = 100 MHz; note 2	–	750	–	MHz
C_c	collector capacitance	V_{CB} = 25 V; I_E = i_e = 0; f = 1 MHz	–	155	–	pF
C_{re}	feedback capacitance	I_C = 100 mA; V_{CE} = 25 V; f = 1 MHz	–	88	–	pF
C_{cs}	collector-stud capacitance		–	3	–	pF

Notes

1. Measured under pulse conditions: $t_p \leq 300\ \mu s$; $\delta \leq 0.02$.
2. Measured under pulse conditions: $t_p \leq 50\ \mu s$; $\delta \leq 0.01$.

VHF linear power transistor | BLV33F

FEATURES

- Internally matched input for wideband operation and high power gain
- Diffused emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Primarily intended for use in linear VHF amplifiers for television transmitters and transposers.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a ½" 6 lead SOT119A capstan package with ceramic cap. All leads are isolated from the flange.

PINNING - SOT119A

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	e	emitter
3	b	base
4	c	collector
5	e	emitter
6	e	emitter

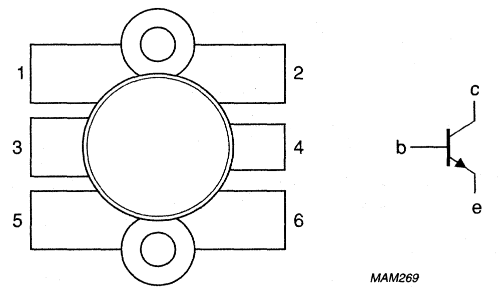


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance in a common emitter push-pull test circuit.

MODE OF OPERATION	f_{vision} (MHz)	V_{CE} (V)	I_C, $I_{C(ZS)}$ (A)	T_h (°C)	d_{im} (1) (dB)	$P_{o\ sync}$ (1) (W)	G_P (dB)	sync compr.(2) sync in/sync out (%)
CW, class-A	224.25	25	3.2	70	−55	>13	>13.5	
				25	−55	typ. 19	typ. 14.8	
CW, class-AB	224.25	28	0.2	70	−	typ. 85	typ. 10.5	30/25

Notes

1. Three-tone test method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB), zero dB corresponds to peak sync level.
2. Television service (negative modulation, C.C.I.R. system).

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

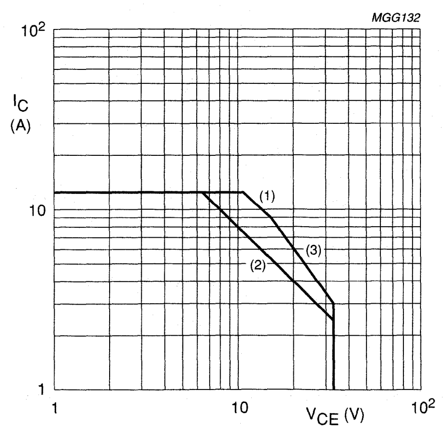
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CESM}	collector-emitter voltage	$V_{BE} = 0$	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	33	V
V_{EBO}	emitter-base voltage	open collector	–	4	V
I_C	collector current (DC)		–	12.5	A
$I_{C(AV)}$	average collector current		–	12.5	A
I_{CM}	peak collector current	f > 1 MHz	–	20	A
P_{tot}	total power dissipation (DC)	$T_{mb} = 25$ °C	–	133	W
P_{rf}	RF power dissipation	f > 1 MHz; $T_{mb} = 25$ °C	–	162	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

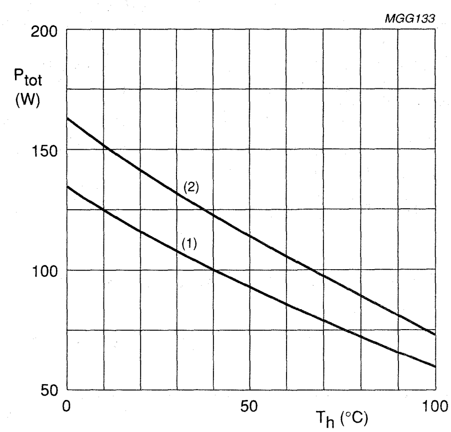
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb(dc)}$	thermal resistance from junction to mounting base (DC dissipation)	$P_{diss} = 80$ W; $T_{mb} = 82$ °C; $T_h = 70$ °C	1.43	K/W
$R_{th\ j\text{-}mb(rf)}$	thermal resistance from junction to mounting base (RF dissipation)	$P_{diss} = 80$ W; $T_{mb} = 82$ °C; $T_h = 70$ °C	1.17	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	$P_{diss} = 80$ W; $T_{mb} = 82$ °C; $T_h = 70$ °C	0.2	K/W



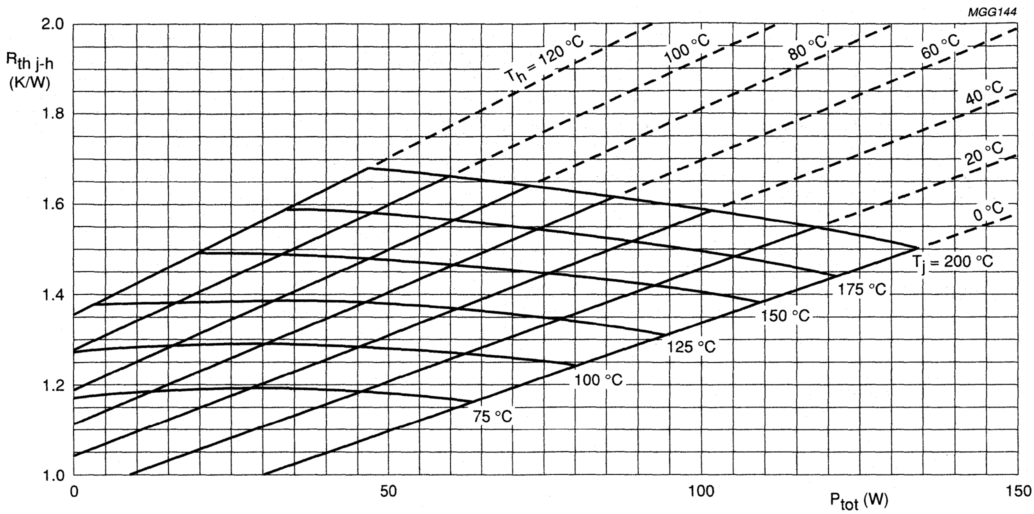
(1) $T_{mb} = 25$ °C.
(2) $T_h = 70$ °C.
(3) Second breakdown limit (independent of temperature).

Fig.2 DC SOAR.



(1) Continuous DC (including RF class-A) operation.
(2) Continuous RF operation.

Fig.3 Power derating curves.



$R_{th\ mb\text{-}h}$ = 0.2 K/W.

Fig.4 Maximum thermal resistance from junction to heatsink as a function of power dissipation, with heatsink and junction temperature as parameters.

Example

Nominal class-A operation (without RF signal): V_{CE} = 25 V; I_C = 3.2 A; T_h = 70 °C.

Figure 4 shows:

$R_{th\ j\text{-}h}$ = max. 1.63 K/W

T_j = max. 200 °C.

Typical device:

$R_{th\ j\text{-}h}$ = typ.1.53 K/W

T_j = typ. 192 °C.

CHARACTERISTICS

T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CES}$	collector-emitter breakdown voltage	V_{BE} = 0; I_C = 25 mA	65	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 100 mA	33	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 10 mA	4	–	–	V
I_{CES}	collector cut-off current	V_{BE} = 0; V_{CE} = 30 V	–	–	1	mA
h_{FE}	DC current gain	V_{CE} = 25 V; I_C = 3 A; note 1	15	50	100	
V_{CEsat}	collector-emitter saturation voltage	I_C = 6 A; I_B = 0.6 A; note 1	–	0.75	–	V
f_T	transition frequency	V_{CB} = 25 V; I_E = –3 A; f = 100 MHz; note 2	–	680	–	MHz
		V_{CB} = 25 V; I_E = –6 A; f = 100 MHz; note 2	–	750	–	MHz
C_c	collector capacitance	V_{CB} = 25 V; I_E = i_e = 0; f = 1 MHz	–	155	–	pF
C_{re}	feedback capacitance	I_C = 50 mA; V_{CE} = 25 V; f = 1 MHz	–	88	–	pF
C_{cf}	collector-flange capacitance		–	3	–	pF

Notes

1. Measured under pulse conditions: $t_p \leq 300\ \mu s$; $\delta \leq 0.02$.
2. Measured under pulse conditions: $t_p \leq 50\ \mu s$; $\delta \leq 0.01$.

VHF power transistor | BLV45/12

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in mobile radio transmitters in the 175 MHz commmunications band.

FEATURES

- multi-base structure and emitter-ballasting resistors for an optimum temperature profile
- gold metallization ensures excellent reliability
- internal matching to achieve an optimum wideband capability and high power gain

The transistor has a 6-lead flange envelope with a ceramic cap (SOT-119). All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in a common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η_C %
narrow band; c.w.	12,5	175	45	> 6,5	> 55

PIN CONFIGURATION

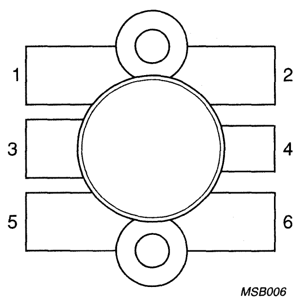


Fig.1 Simplified outlinbe, SOT119A.

PINNING

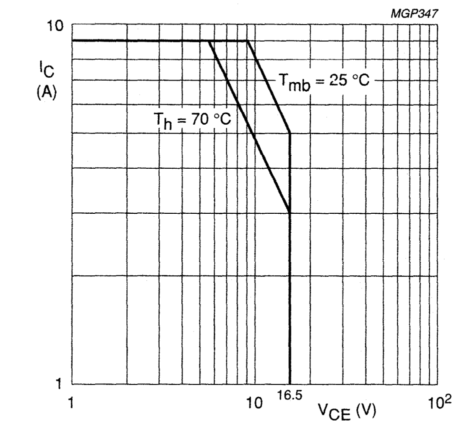
PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

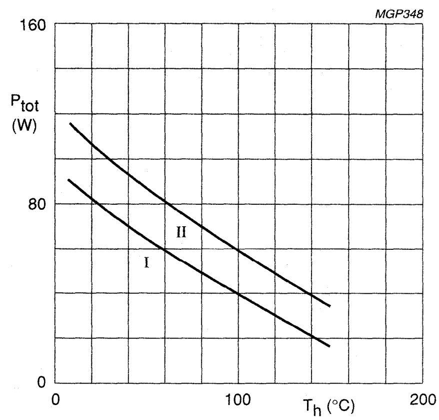
Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)				
peak value	V_{CBOM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16,5	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current				
d.c. or average	I_C	max.	9	A
peak value; f > 1 MHz	I_{CM}	max.	27	A
Total power dissipation				
at T_{mb} = 25 °C; f > 1 MHz	P_{tot}	max.	90	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C



$R_{th\ mb-h}$ = 0,2 K/W.

Fig.2 D.C. soar.



I Continuous operation (f > 1 MHz)
II Short-time operation during mismatch; (f > 1 MHz)

Fig.3 Power/temperature derating curves; $R_{th\ mb-h}$ = 0,2 K/W.

THERMAL RESISTANCE

Dissipation = 68 W; T_{mb} = 25 °C

From junction to mounting base (r.f. dissipation)	$R_{th\ j-mb}$	=	1,58	K/W
From mounting base to heatsink	$R_{th\ mb-h}$	=	0,2	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage open emitter; I_C = 50 mA	$V_{(BR)CBO}$	>	36	V
Collector-emitter breakdown voltage open base; I_C = 100 mA	$V_{(BR)CEO}$	>	16,5	V
Emitter-base breakdown voltage open collector; I_E = 10 mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current V_{BE} = 0; V_{CE} = 16 V	I_{CES}	<	22	mA
Second breakdown energy L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	>	12,5	mJ
D.C. current gain V_{CE} = 10 V; I_C = 6 A	h_{FE}	> typ.	15 55	
Collector capacitance at f = 1 MHz $I_E = i_e$ = 0; V_{CB} = 12,5 V	C_c	typ.	130	pF
Collector-flange capacitance	C_{cf}	typ.	3	pF
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 12,5 V	C_{re}	typ.	80	pF

UHF linear push-pull power transistor — BLV57

FEATURES

- internally matched input for wideband operation and high power gain
- internal midpoint (r.f. ground) reduces negative feedback and improves power gain
- increased input and output impedances (compared with single-ended transistors) simplify wideband matching
- length of the external emitter leads is not critical
- diffused emitter ballasting resistors for an optimum temperature profile
- gold metallization ensures excellent reliability.

DESCRIPTION

Two n-p-n silicon planar epitaxial transistor sections in one package to be used as push-pull amplifier, primarily intended for use in linear u.h.f. television transmitters and transposers.

The package is an 8-lead flange type with a ceramic cap. All leads are isolated from the flange.

PINNING - SOT161A

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	e	emitter
3	c2	collector 2
4	b2	base 2
5	c1	collector 1
6	b1	base 1
7	e	emitter
8	e	emitter

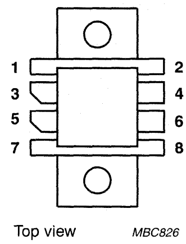


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

R.F. performance in linear amplifier

MODE OF OPERATION	f_{vision} MHz	V_{CE} V	$I_{C1} = I_{C2}$ A	$I_{C(ZS)}$ A	T_h °C	d_{im}(1) dB	$P_{o\ sync}$(1) W	P_L W	G_p dB
class-A	860	25	0,85	–	70	−60	> 6	–	> 8,0
					25	−55	typ. 12		typ. 9,0
class-AB	860	25	1,25	2 × 0,1	25	–	–	typ. 38(2)	typ. 6,5(2)

Notes

1. Three-tone test method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB), zero dB corresponds to peak sync level.
2. Power gain compression is 1 dB.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

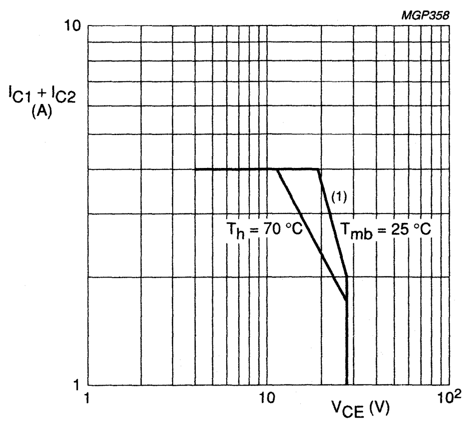
RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage				
(peak value); $V_{BE} = 0$	V_{CESM}	max.	50	V
open base	V_{CEO}	max.	27	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3,5	V
Collector current per transistor section				
d.c. or average	I_C; $I_{C(AV)}$	max.	2	A
(peak value); f 〉 1 MHz	I_{CM}	max.	4	A
Total power dissipation at T_{mb} = 25 °C(1)	P_{tot}	max.	77	W(1)
R.F. power dissipation (f 〉 1 MHz); T_{mb} = 25 °C(1)	P_{rf}	max.	93	W(1)
Storage temperature	T_{stg}	−65 to + 150		°C
Operating junction temperature	T_j	max.	200	°C

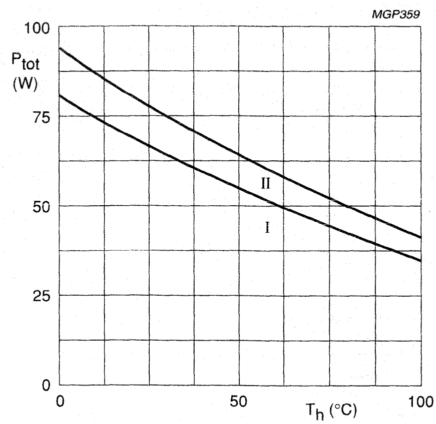
Note

1. Dissipation of either transistor section should not exceed half rated dissipation.



(1) Second breakdown limit (independent of temperature).

Fig.2 D.C. SOAR.(1)



I Continuous d.c. (including r.f. class-A) operation
II Continuous r.f. operation
Dissipation of either transistor section should not exceed half rated dissipation.

Fig.3 Power derating curves vs. temperature.(1)

THERMAL RESISTANCE

(dissipation = 42 W; T_{mb} = 80,5 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j-mb(dc)}$	=	2,43	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j-mb(rf)}$	=	1,91	K/W
From mounting base to heatsink	$R_{th\ mb-h}$	=	0,25	K/W

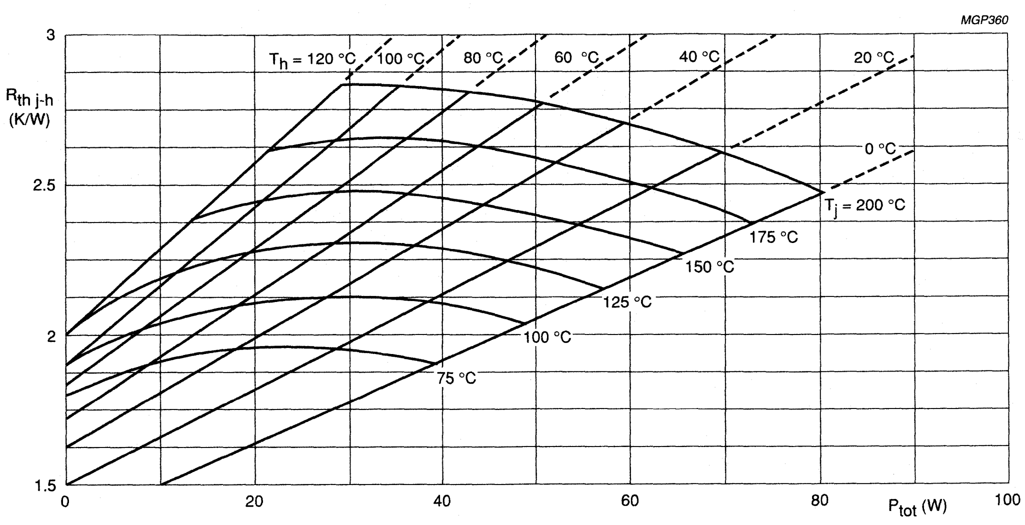


Fig.4 Maximum thermal resistance from junction to heatsink as a function of power dissipation, with heatsink and junction temperature as parameters. ($R_{th\ mb\text{-}h}$ = 0,25 K/W.)

Example

Nominal class-A push-pull operation (without r.f. signal): V_{CE} = 25 V; I_{C1} = I_{C2} = 0,85 A; T_h = 70 °C.

Fig.4 shows:	$R_{th\ j\text{-}h}$	max.	2,68	K/W
	T_j	max.	184	°C
Typical device:	$R_{th\ j\text{-}h}$	typ.	2,28	K/W
	T_j	typ.	167	°C

CHARACTERISTICS apply to either transistor section unless otherwise specified

$T_j = 25°C$

Collector-emitter breakdown voltage				
$V_{BE} = 0$; $I_C = 10$ mA	$V_{(BR)CES}$	$>$	50	V
open base; $I_C = 25$ mA	$V_{(BR)CEO}$	$>$	27	V
Emitter-base breakdown voltage				
open collector; $I_E = 5$ mA	$V_{(BR)EBO}$	$>$	3,5	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 27$ V	I_{CES}	$<$	10	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	$>$	2	mJ
$R_{BE} = 10\ \Omega$	E_{SBR}	$>$	2	mJ
D.C. current gain(1)				
$I_C = 0,85$ A; $V_{CE} = 25$ V	h_{FE}	$>$ typ.	15 40	
D.C. current gain ratio of transistor sections				
$I_C = 0,85$ A; $V_{CE} = 25$ V			0,67 to 1,5	
Collector-emitter saturation voltage(1)				
$I_C = 1,7$ A; $I_B = 0,17$ A	V_{CEsat}	typ.	0,75	V
Transition frequency at f = 100 MHz(2)				
$-I_E = 0,85$ A; $V_{CB} = 25$ V	f_T	typ.	2,5	GHz
$-I_E = 1,7$ A; $V_{CB} = 25$ V	f_T	typ.	2,5	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 25$ V	C_c	typ. $<$	24 30	pF pF
Feedback capacitance at f = 1 MHz				
$I_C = 50$ mA; $V_{CE} = 25$ V	C_{re}	typ.	15	pF
Collector-flange capacitance	C_{cf}	typ.	2	pF

Notes

1. Measured under pulse conditions: $t_p \leq 300\ \mu s$; $\delta \leq 0,02$.
2. Measured under pulse conditions: $t_p \leq 50\ \mu s$; $\delta \leq 0,01$.

The graphs apply to either transistor section.

UHF linear push-pull power transistor BLV58

FEATURES

- High power gain
- Double stage internal input matching for high input impedance
- Diffused emitter-ballasting resistors enhances ruggedness
- Gold metallization for high reliability.

DESCRIPTION

The BLV58 is a common emitter epitaxial npn silicon planar transistor designed for high linearity class-A operation in UHF (bands 4 and 5) TV transmitters and transposers.

The device is incorporated in a push-pull SOT289 flange envelope with a ceramic cap, which is utilized with the emitters connected to the flange.

PINNING - SOT289

PIN	DESCRIPTION
1	collector 1
2	collector 2
3	base 1
4	base 2
5	emitter

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f_{vision} (MHz)	V_{CE} (V)	I_{CQ} (A)	$P_{o\ sync}$ (W)	G_p (dB)	d_{im} (dB) (note 1)
c.w. class-A	860	25	2×1.6	25	>10	< −45

Note

1. Three-tone test method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB); zero dB corresponds to peak sync level.

PIN CONFIGURATION

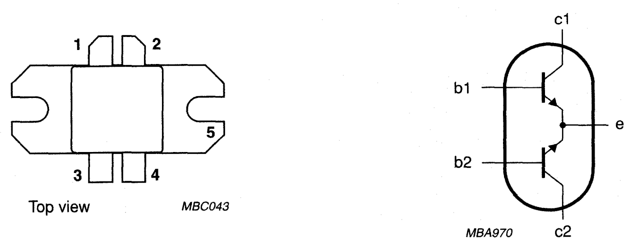


Fig.1 Simplified outline and symbol.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

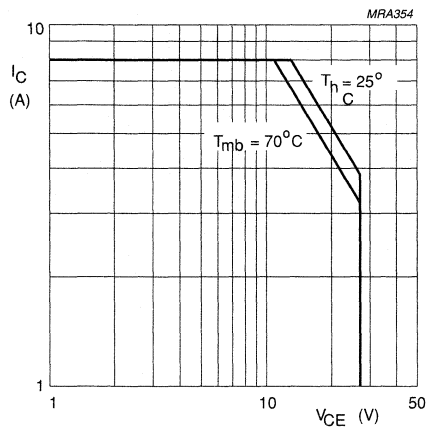
LIMITING VALUES (per transistor section unless otherwise specified)

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	50	V
V_{CEO}	collector-emitter voltage	open base	–	27	V
V_{EBO}	emitter-base voltage	open collector	–	3.5	V
I_C, $I_{C(AV)}$	collector current	DC or average value	–	4	A
I_{CM}	collector current	peak value; f > 1 MHz	–	8	A
P_{tot}	total power dissipation	DC operation; T_{mb} = 70 °C (note 1)	–	87	W
T_{stg}	storage temperature range		–65	150	°C
T_j	junction operating temperature		–	200	°C

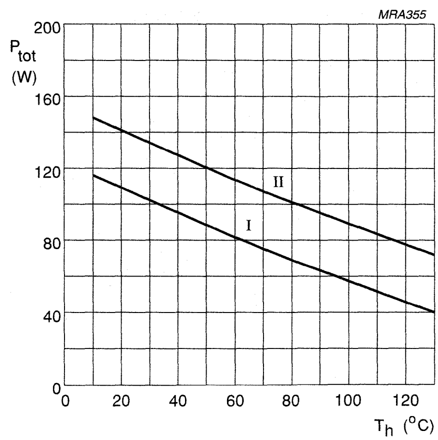
Note

1. Total device, both sections equally loaded.



Total device, both sections equally loaded.

Fig.2 DC SOAR.



(I) Continuous DC operation.
(II) Short time operation during mismatch.
Total device, both sections equally loaded.

Fig.3 Power derating curve.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb(DC)}$	from junction to mounting base	P_{dis} = 87 W; T_{mb} = 70 °C (note 1)	1.5	K/W
$R_{th\ mb\text{-}h}$	from mounting base to heatsink	note 1	0.2	K/W

Note

1. Total device, both sections equally loaded.

CHARACTERISTICS

Values apply to either transistor section; T_j = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 20 mA	50	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 50 mA	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 10 mA	3.5	–	–	V
I_{CES}	collector-emitter leakage current	V_{BE} = 0; V_{CE} = 27 V	–	–	10	mA
h_{FE}	DC current gain	V_{CE} = 25 V; I_C = 1.6 A	30	–	–	
C_c	collector capacitance	V_{CB} = 25 V; $I_E = I_e$ = 0; f = 1 MHz	–	36	45	pF

UHF linear power transistor BLV59

FEATURES

- Internal input matching to achieve an optimum wideband capability and high power gain
- Emitter-ballasting resistors for lower junction temperatures
- Titanium-platinum-gold metallization ensures long life and excellent reliability.

APPLICATIONS

- UHF linear amplifiers in television transmitters.

DESCRIPTION

NPN silicon planar epitaxial power transistor encapsulated in a 6-lead SOT171A flange package with a ceramic cap. All leads are isolated from the flange.

PINNING - SOT171A

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	e	emitter
3	b	base
4	c	collector
5	e	emitter
6	e	emitter

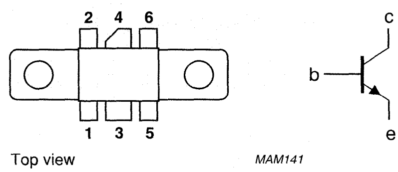


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter class-AB circuit.

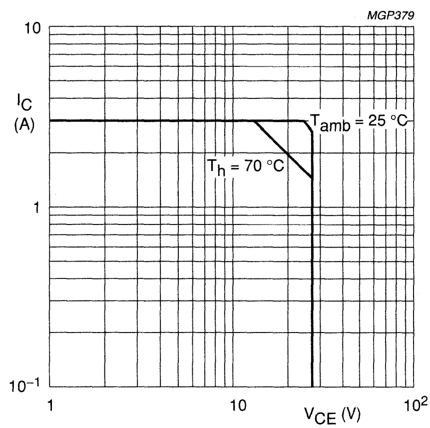
MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	860	25	30	>7	>50

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

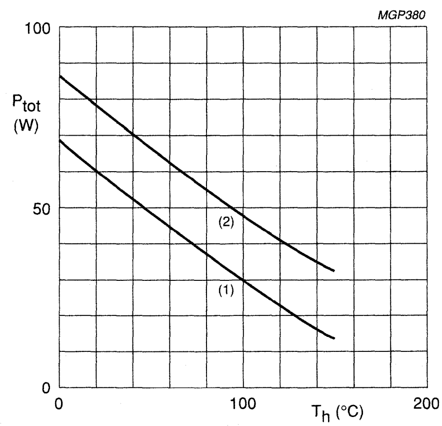
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	50	V
V_{CEO}	collector-emitter voltage	open base	–	27	V
V_{EBO}	emitter-base voltage	open collector	–	3.5	V
I_C	collector current (DC)		–	3	A
$I_{C(AV)}$	average collector current		–	3	A
I_{CM}	peak collector current	f > 1 MHz	–	9	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; f > 1 MHz	–	70	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C



$R_{th\ mb\text{-}h}$ = 0.4 K/W.

Fig.2 DC SOAR.



(1) Continuous operation (f > 1 MHz).
(2) Short-time operation during mismatch (f > 1 MHz).

Fig.3 Power/temperature derating curves.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_{mb} = 25 °C, P_{tot} = 50 W	2.3	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.4	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 50 mA	50	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 100 mA	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 10 mA	3.5	–	–	V
I_{CES}	collector leakage current	V_{CE} = 27 V; V_{BE} = 0	–	–	10	mA
$E_{(SBR)}$	second breakdown energy	L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	4	–	–	mJ
h_{FE}	DC current gain	V_{CE} = 24 V; I_C = 2 A	15	–	–	
C_c	collector capacitance	V_{CB} = 25 V; I_E = i_e = 0; f = 1 MHz	–	44	–	pF
C_{re}	feedback capacitance	V_{CE} = 25 V; I_C = 0; f = 1 MHz	–	30	–	pF
C_{cf}	collector-flange capacitance		–	2	–	pF

VHF power transistor BLV75/12

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in mobile radio transmitters in the 175 MHz commmunications band.

FEATURES

- multi-base structure and emitter-ballasting resistors for an optimum temperature profile
- gold metallization ensures excellent reliability
- internal matching to achieve an optimum wideband capability and high power gain

The transistor has a 6-lead flange envelope with a ceramic cap (SOT-119). All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in a common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η_C %
narrow band; c.w.	12,5	175	75	> 6,5	> 55

PIN CONFIGURATION

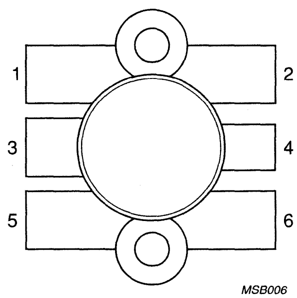


Fig.1 Simplified outlinbe, SOT119A.

PINNING

PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)				
peak value	V_{CBOM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16,5	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current				
d.c. or average	I_C	max.	15	A
peak value; f > 1 MHz	I_{CM}	max.	45	A
Total power dissipation				
at T_{mb} = 25 °C; f > 1 MHz	P_{tot}	max.	150	W
Storage temperature	T_{stg}	−65 to + 150		°C
Operating junction temperature	T_j	max.	200	°C

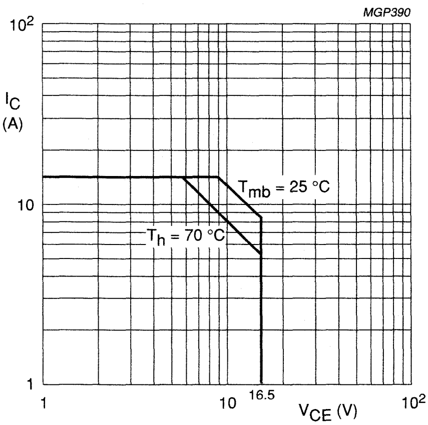
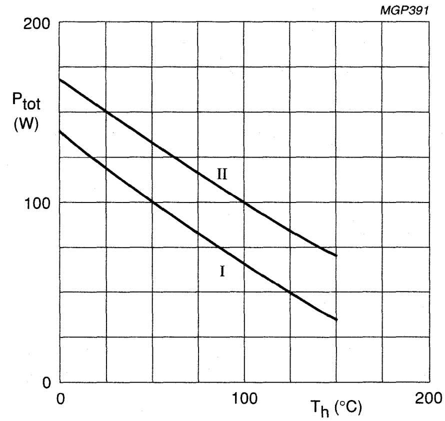


Fig.2 D.C. soar. $R_{th\ mb\text{-}h}$ = 0,2 K/W.



I Continuous operation (f > 1 MHz)
II Short-time operation during mismatch; (f > 1 MHz).

Fig.3 Power/temperature derating curves; $R_{th\ mb\text{-}h}$ = 0,2 K/W.

THERMAL RESISTANCE

Dissipation = 96 W; T_{mb} = 25 °C

From junction to mounting base (r.f. operation)	$R_{th\ j\text{-}mb}$	=	1,05	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,2	K/W

CHARACTERISTICS

T_j = 25°C unless otherwise specified

Collector-base breakdown voltage				
open emitter; I_C = 100 mA	$V_{(BR)CBO}$	min.	36	V
Collector-emitter breakdown voltage				
open base; I_C = 200 mA	$V_{(BR)CEO}$	min.	16,5	V
Emitter-base breakdown voltage				
open collector; I_E = 20 mA	$V_{(BR)EBO}$	min.	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 16 V	I_{CES}	max.	44	mA
Second breakdown energy				
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	min.	20	mJ
D.C. current gain				
V_{CE} = 10 V; I_C = 10 A	h_{FE}	min.	15	
		typ.	55	
Collector capacitance at f = 1 MHz				
$I_E = i_e$ = 0; V_{CB} = 12,5 V	C_c	typ.	240	pF
Feedback capacitance at f = 1 MHz				
I_C = 0; V_{CE} = 12,5 V	C_{re}	typ.	150	pF
Collector-flange capacitance	C_{cf}	typ.	3	pF

UHF power transistor BLV90

DESCRIPTION

NPN silicon planar epitaxial transistor designed for use in mobile radio transmitters in the 900 MHz band.

FEATURES

- diffused emitter-ballasting resistors for an optimum temperature profile.
- gold metallization ensures excellent reliability.
- the device can be applied at rated output power without an external heatsink when it is mounted on a printed-circuit board (see Fig.6).

The transistor has a 4-lead envelope with a ceramic cap (SOT-172D). All leads are isolated from the mounting base.

QUICK REFERENCE DATA

RF performance at T_a = 25 °C in a common-emitter class-B circuit.(1)

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η_C %
Narrow band; CW	12.5	900	1	> 7.5	> 50
	9.6	900	1	typ. 7.0	typ. 57

Note

1. Device mounted on a printed-circuit board (see Fig.6).

PIN CONFIGURATION

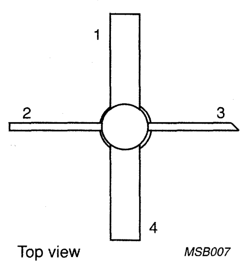


Fig.1 Simplified outline. SOT172D.

PINNING - SOT172D.

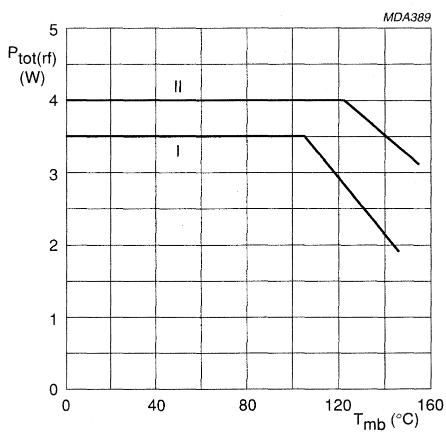
PIN	DESCRIPTION
1	emitter
2	base
3	collector
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current				
DC or average	I_C; $I_{C(AV)}$	max.	0.2	A
(peak value); f > 1 MHz	I_{CM}	max.	0.6	A
Total power dissipation				
f > 1 MHz; T_{mb} < 105 °C	$P_{tot(rf)}$	max.	3.5	W
Storage temperature	T_{stg}	−65 to + 150		°C
Operating junction temperature	T_j	max.	200	°C



I Continuous RF operation (f > 1 MHz)
II Short-time RF operation during mismatch (f > 1 MHz)

Fig.2 Power/temperature curve.

THERMAL RESISTANCE

Dissipation = 2.25 W

From junction to ambient(1) (f > 1 MHz)				
T_a = 25 °C	$R_{th\ j\text{-}a\ (RF)}$	max.	60	K/W
From junction to mounting base				
T_{mb} = 25 °C (f > 1 MHz)	$R_{th\ j\text{-}mb\ (RF)}$	max.	19	K/W

Note

1. Device mounted on a printed-circuit board (see Fig.6).

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage				
open emitter; I_C = 2.5 mA	$V_{(BR)CBO}$	>	36	V
Collector-emitter breakdown voltage				
open base; I_C = 10 mA	$V_{(BR)CEO}$	>	16	V
Emitter-base breakdown voltage				
open collector; I_E = 0.5 mA	$V_{(BR)EBO}$	>	3	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 16 V	I_{CES}	<	1	mA
Second breakdown energy				
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	>	0.3	mJ
D.C. current gain				
I_C = 0.15 A; V_{CE} = 10 V	h_{FE}	>	25	
Collector capacitance at f = 1 MHz				
$I_E = i_e$ = 0; V_{CB} = 12.5 V	C_c	typ.	1.8	pF
Feedback capacitance at f = 1 MHz				
I_C = 0; V_{CE} = 12.5 V	C_{re}	typ.	1.0	pF
Collector-mounting base capacitance	$C_{c\text{-}mb}$	typ.	0.5	pF

UHF power transistor BLV91/SL

DESCRIPTION

NPN silicon planar epitaxial transistor designed for use in mobile radio transmitters in the 900 MHz band.

FEATURES

- diffused emitter-ballasting resistors for an optimum temperature profile.
- gold metallization ensures excellent reliability.
- the device can be applied at rated load power, without an external heatsink, when it is mounted on a printed-circuit board (see Fig.6).

The transistor has a 4-lead envelope with a ceramic cap (SOT-172D). All leads are isolated from the mounting base.

QUICK REFERENCE DATA

RF performance in a common-emitter class-B circuit

MODE OF OPERATION	T °C	V_{CE} V	f MHz	P_L W	G_p dB	η_C %
narrow band; CW	T_{mb} = 25	12.5	900	2	> 6.5	> 50
	T_a = 25(1)	12.5	900	1.5	> 6.5	> 50
	T_a = 25(1)	9.6	900	1.5	typ. 6.6	typ. 60

Note

1. Device mounted on a printed-circuit board (see Fig.6).

PIN CONFIGURATION

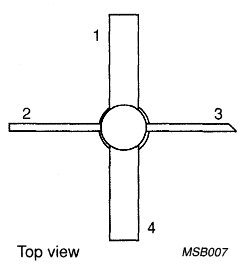


Fig.1 Simplified outline. SOT172D.

PINNING - SOT172D.

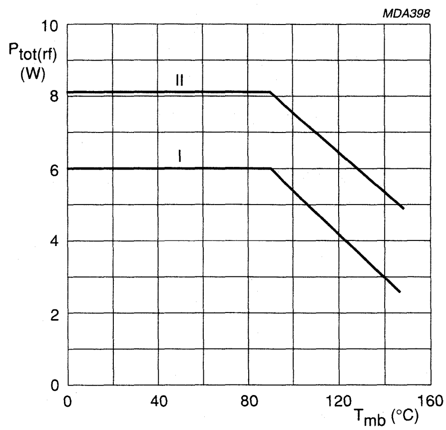
PIN	DESCRIPTION
1	emitter
2	base
3	collector
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current				
DC or average	I_C; $I_{C(AV)}$	max.	0.4	A
(peak value); f > 1 MHz	I_{CM}	max.	1.2	A
Total power dissipation				
f > 1 MHz; $T_{mb} \leq 90$ °C	$P_{tot(RF)}$	max.	6	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C



I Continuous RF operation (f > 1 MHz)
II Short-time RF operation during mismatch (f > 1 MHz)

Fig.2 Power/temperature curve.

THERMAL RESISTANCE

Dissipation = 4.5 W

From junction to ambient(1) (f > 1 MHz)				
T_a = 25 °C	$R_{th\ j\text{-}a\ (RF)}$	max.	55	K/W
From junction to mounting base				
T_{mb} = 25 °C (f > 1 MHz)	$R_{th\ j\text{-}mb\ (RF)}$	max.	15	K/W

Note

1. Device mounted on a printed-circuit board (see Fig.6).

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage				
open emitter; I_C = 5 mA	$V_{(BR)CBO}$	>	36	V
Collector-emitter breakdown voltage				
open base; I_C = 10 mA	$V_{(BR)CEO}$	>	16	V
Emitter-base breakdown voltage				
open collector; I_E = 0.5 mA	$V_{(BR)EBO}$	>	3	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 16 V	I_{CES}	<	2.5	mA
Second breakdown energy				
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	>	0.55	mJ
D.C. current gain				
I_C = 0.3 A; V_{CE} = 10 V	h_{FE}	>	25	
Collector capacitance at f = 1 MHz				
$I_E = i_e$ = 0; V_{CB} = 12.5 V	C_C	typ.	3.5	pF
Feedback capacitance at f = 1 MHz				
I_C = 0; V_{CE} = 12.5 V	C_{re}	typ.	2.0	pF
Collector-mounting base capacitance	$C_{c\text{-}mb}$	typ.	0.5	pF

UHF power transistor | BLV92

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in mobile radio transmitters in the 900 MHz communications band.

FEATURES

- multi-base structure and emitter-ballasting resistors for an optimum temperature profile
- internal input matching to achieve an optimum wideband capability and high power gain
- gold metallization ensures excellent reliability.

The transistor has a 6-lead flange envelope with a ceramic cap (SOT-171). All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance at T_h = 25 °C in a common-emitter class-B test circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_P dB	η_C %
narrow band; c.w.	12,5	900	4	> 7,5	> 50
	9,6	900	3	typ. 7,3	typ. 56

PINNING - SOT171A

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	e	emitter
3	b	base
4	c	collector
5	e	emitter
6	e	emitter

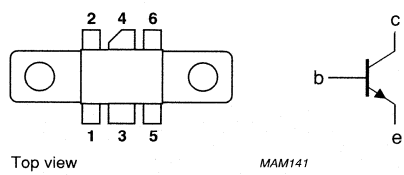


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
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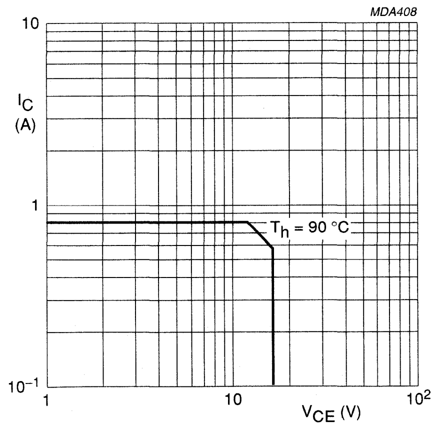
RATINGS

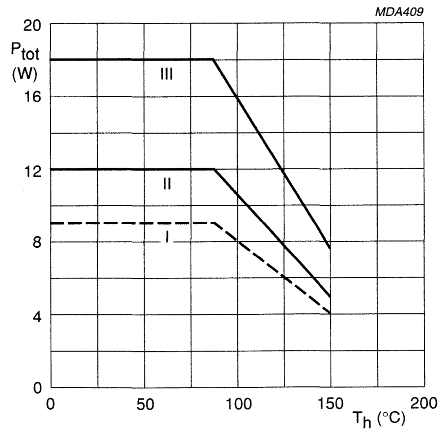
Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)				
peak value	V_{CBOM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current				
d.c. or average	I_C	max.	0,8	A
(peak value); f > 1 MHz	I_{CM}	max.	2,4	A
Total power dissipation				
at T_{mb} = 94 °C	$P_{tot(dc)}$	max.	9	W
at T_{mb} = 94 °C; f > 1 MHz	$P_{tot(rf)}$	max.	12	W
Storage temperature	T_{stg}	−65 to + 150		°C
Operating junction temperature	T_j	max.	200	°C



$R_{th\ mb\text{-}h}$ = 0,4 K/W.

Fig.2 D.C. SOAR.



I Continuous operation
II Continuous operation (f > 1 MHz)
III Short-time operation during mismatch; (f > 1 MHz)

Fig.3 Power/temperature derating curves.

THERMAL RESISTANCE

Dissipation = 6 W; T_{mb} = 128 °C

From junction to mounting base				
(d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	max.	12	K/W
(r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	max.	9	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	max.	0,4	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage, open emitter; I_C = 10 mA	$V_{(BR)CBO}$	>	36	V
Collector-emitter breakdown voltage, open base; I_C = 20 mA	$V_{(BR)CEO}$	>	16	V
Emitter-base breakdown voltage, open collector; I_E = 1 mA	$V_{(BR)EBO}$	>	3	V
Collector cut-off current, V_{BE} = 0; V_{CE} = 16 V	I_{CES}	<	5	mA
Second breakdown energy, L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	>	1	mJ
D.C. current gain, I_C = 0,6 A; V_{CE} = 10 V	h_{FE}	>	25	
Transition frequency at f = 500 MHz[(1)], $-I_E$ = 0,6 A; V_{CE} = 12,5 V	f_T	typ.	4	GHz
Collector capacitance at f = 1 MHz, $I_E = i_e$ = 0; V_{CB} = 12,5 V	C_c	typ.	8	pF
Feed-back capacitance at f = 1 MHz, I_C = 0; V_{CE} = 12,5 V	C_{re}	typ.	5	pF
Collector-flange capacitance	C_{cf}	typ.	2	pF

Note

1. Measured under pulse conditions: t_p = 50 μs; δ < 1%.

UHF power transistor BLV93

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in mobile radio transmitters in the 900 MHz communications band.

FEATURES

- multi-base structure and emitter-ballasting resistors for an optimum temperature profile
- internal input matching to achieve an optimum wideband capability and high power gain
- gold metallization ensures excellent reliability.

The transistor has a 6-lead flange envelope with a ceramic cap (SOT-171). All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance at T_h = 25 °C in a common-emitter class-B test circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB		η_C %	
narrow band; c.w.	12,5	900	8	>	6,5	>	50
	9,6	900	6	typ.	6,0	typ.	59

PINNING - SOT171A

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	e	emitter
3	b	base
4	c	collector
5	e	emitter
6	e	emitter

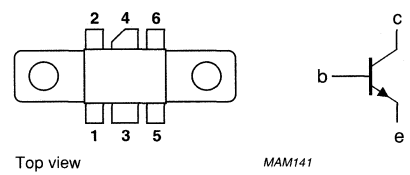


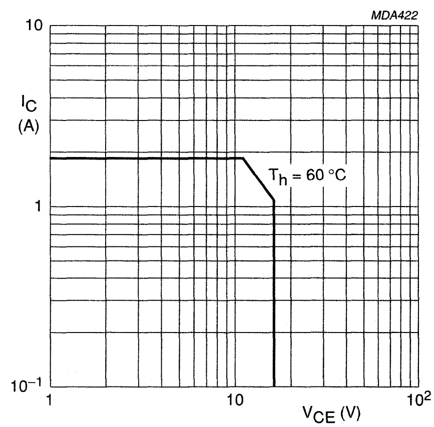
Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

RATINGS

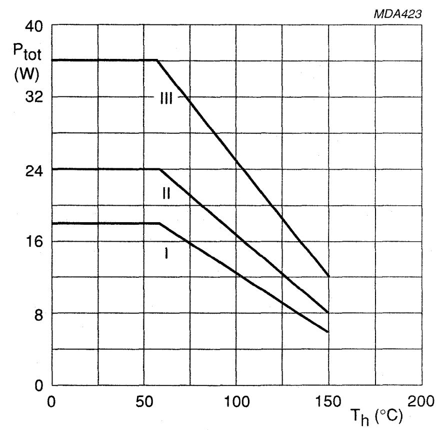
Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)				
peak value	V_{CBOM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current				
d.c. or average	I_C; $I_{C\,AV}$	max.	1,6	A
(peak value); f > 1 MHz	I_{CM}	max.	4,8	A
Total power dissipation				
at T_{mb} = 67 °C	$P_{tot(dc)}$	max.	18	W
at T_{mb} = 67 °C; f > 1 MHz	$P_{tot(rf)}$	max.	24	W
Storage temperature	T_{stg}		−65 to +150	°C
Operating junction temperature	T_j	max.	200	°C



$R_{th\,mb-h}$ = 0,4 K/W

Fig.2 D.C. SOAR.



I Continuous operation
II Continuous operation (f > 1 MHz)
III Short-time operation during mismatch; (f > 1 MHz)

Fig.3 Power/temperature derating curves.

THERMAL RESISTANCE

Dissipation = 12 W; T_{mb} = 112 °C

From junction to mounting base				
(d.c. dissipation)	$R_{th\,j-mb(dc)}$	max.	7,0	K/W
(r.f. dissipation)	$R_{th\,j-mb(rf)}$	max.	5,2	K/W
From mounting base to heatsink	$R_{th\,mb-h}$	max.	0,4	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage				
open emitter; I_C = 20 mA	$V_{(BR)CBO}$	>	36	V
Collector-emitter breakdown voltage				
open base; I_C = 40 mA	$V_{(BR)CEO}$	>	16	V
Emitter-base breakdown voltage				
open collector; I_E = 2 mA	$V_{(BR)EBO}$	>	3	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 16 V	I_{CES}	<	10	mA
Second breakdown energy				
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	>	2	mJ
D.C. current gain				
I_C = 1,2 A; V_{CE} = 10 V	h_{FE}	>	25	
Transition frequency at f = 500 MHz(1)				
$-I_E$ = 1,2 A; V_{CE} = 12,5 V	f_T	typ.	4	GHz
Collector capacitance at f = 1 MHz				
$I_E = i_e$ = 0; V_{CB} = 12,5 V	C_c	typ.	15	pF
Feed-back capacitance at f = 1 MHz				
I_C = 0; V_{CE} = 12,5 V	C_{re}	typ.	9	pF
Collector-flange capacitance	C_{cf}	typ.	2	pF

Note

1. Measured under pulse conditions: t_p = 50 µs; δ < 1%.

UHF power transistor BLV97CE

FEATURES

- Internal input matching to achieve high power gain
- Ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability

DESCRIPTION

NPN silicon planar epitaxial transistor in a SOT171 envelope, intended for common emitter, class-AB operation in radio transmitters for the 960 MHz communications band. The transistor has a 6-lead flange envelope, with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

RF performance up to T_h = 25 °C in a common emitter class-AB circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_P (dB)	η_C (%)
c.w. class-AB	960	24	35	> 7	> 50

PINNING - SOT171A

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	e	emitter
3	b	base
4	c	collector
5	e	emitter
6	e	emitter

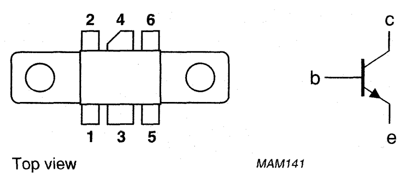


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector base voltage	open emitter	–	50	V
V_{CEO}	collector emitter voltage	open base	–	27	V
V_{EBO}	emitter base voltage	open collector	–	3.5	V
I_C	collector current	DC or average	–	3	A
I_{CM}	collector current	peak value f > 1 MHz	–	9	A
P_{tot}	total power dissipation	f > 1 MHz T_{mb} = 25 °C	–	70	W
T_{stg}	storage temperature		–65	150	°C
T_j	operating junction temperature		–	200	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th j-mb}$	from junction to mounting base (RF)		–	2.3	K/W
$R_{th mb-h}$	from mounting base to heatsink		–	0.4	K/W

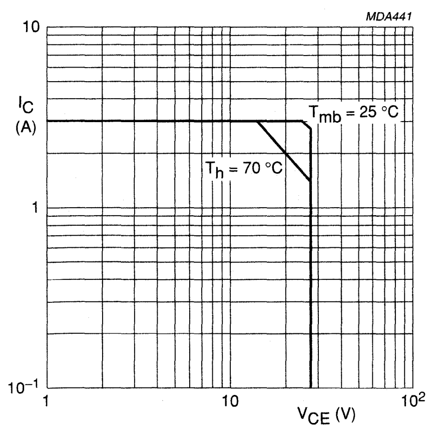


Fig.2 DC SOAR.

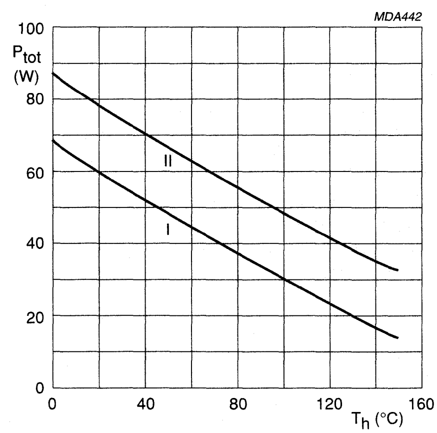


Fig.3 Power/temperature derating;
I: DC or RF operation;
II: short-term operation during mismatch.

CHARACTERISTICS

at T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter I_C = 50 mA	50	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base I_C = 100 mA	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector I_E = 10 mA	3.5	–	–	V
I_{CES}	collector leakage current	V_{BE} = 0 V_{CE} = 27 V	–	–	10	mA
h_{FE}	DC current gain	I_C = 2 A V_{CE} = 20 V	15	–	–	
C_c	collector capacitance at f = 1 MHz	$I_E = I_e$ = 0 V_{CB} = 25 V	–	44	–	pF
C_{re}	feedback capacitance at f = 1 MHz	I_C = 0 V_{CE} = 25 V	–	30	–	pF
C_{cf}	collector-flange capacitance		–	2	–	pF

UHF power transistor | BLV98CE

FEATURES

- Internal input matching to achieve high power gain
- Implanted ballasting resistors an for optimum temperature profile
- Gold metallization ensures excellent reliability

DESCRIPTION

NPN silicon planar epitaxial transistor in an SOT-171 envelope, intended for common emitter, class-AB operation in radio transmitters for the 960 MHz communications band. The transistor has a 6-lead flange envelope, with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

RF performance up to T_h = 25 °C in a common emitter class-AB circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_P (dB)	η_c (%)
c.w. class-AB	960	24	15	> 7.5	> 50

PINNING - SOT171A

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	e	emitter
3	b	base
4	c	collector
5	e	emitter
6	e	emitter

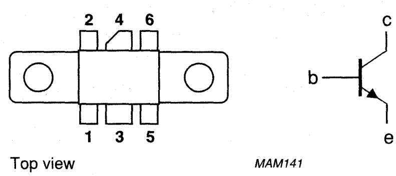


Fig.1 Simplified outline and symbol.

WARNING
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LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector base voltage	open emitter	–	50	V
V_{CEO}	collector emitter voltage	open base	–	27	V
V_{EBO}	emitter base voltage	open collector	–	3.5	V
I_C	collector current	DC or average	–	1.5	A
I_{CM}	collector current	peak value f > 1 MHz	–	4.5	A
P_{tot}	total power dissipation	f > 1 MHz T_{mb} = 25 °C	–	40	W
T_{stg}	storage temperature		–65	150	°C
T_j	operating junction temperature		–	200	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th j-mb}$	from junction to mounting base (RF)		–	4.4	K/W
$R_{th\ mb-h}$	from mounting base to heatsink		–	0.4	K/W

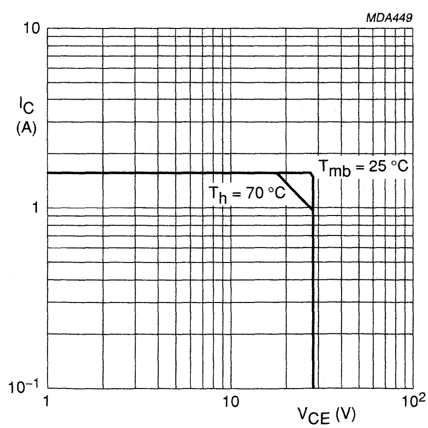
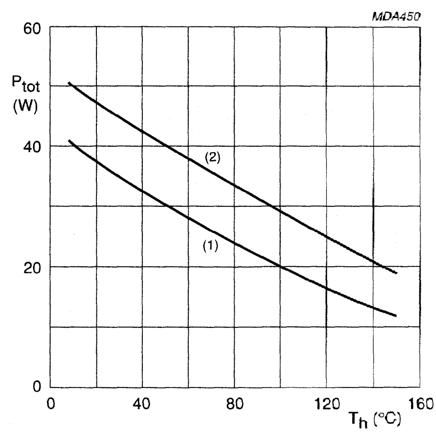


Fig.2 DC SOAR.



(1) DC or RF operation
(2) short-term operation during mismatch

Fig.3 Power/temperature derating.

CHARACTERISTICS

at T_j = 25 °C unless otherwise stated.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter I_C = 25 mA	50	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base I_C = 50 mA	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector I_E = 5 mA	3.5	–	–	V
I_{CES}	collector leakage current	V_{BE} = 0 V_{CE} = 27 V	–	–	5	mA
h_{FE}	DC current gain	I_C = 1 A V_{CE} = 20 V	15	–	–	
C_c	collector capacitance at f = 1 MHz	$I_E = I_e$ = 0 V_{CB} = 24 V	–	23	–	pF
C_{re}	feedback capacitance at f = 1 MHz	I_C = 0 V_{CE} = 24 V	–	14	–	pF
C_{cf}	collector-flange capacitance		–	2	–	pF

UHF power transistor | BLV99/SL

FEATURES

- Emitter-ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a 4-lead SOT172D envelope with a ceramic cap. It is designed primarily for use as a driver stage in base stations in the 900 MHz communications band. All leads are isolated from the mounting base.

PINNING - SOT172D

PIN	DESCRIPTION
1	emitter
2	base
3	collector
4	emitter

PIN CONFIGURATION

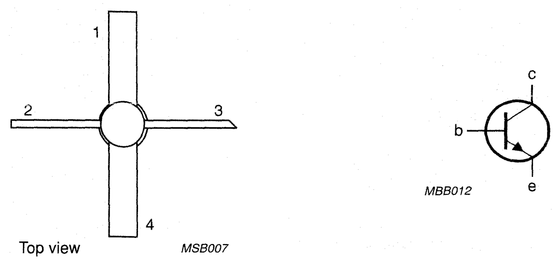


Fig.1 Simplified outline and symbol.

WARNING

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QUICK REFERENCE DATA

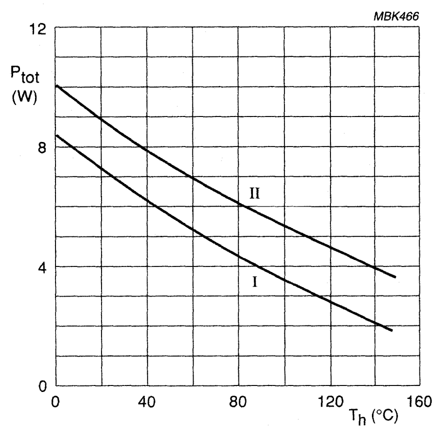
RF performance at T_{mb} = 25 °C in a common emitter class-B test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_c (%)
c.w. narrow band	900	24	2	> 8	> 55

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	50	V
V_{CEO}	collector-emitter voltage	open base	–	27	V
V_{EBO}	emitter-base voltage	open collector	–	3.5	V
I_C	collector current	DC value	–	200	mA
I_{CM}	collector current	peak value f > 1 MHz	–	600	mA
P_{tot}	total power dissipation	f > 1 MHz; T_{mb} = 50 °C	–	6	W
T_{stg}	storage temperature range		–65	150	°C
T_j	junction operating temperature		–	200	°C



(I) Continuous RF operation.
(II) Short time operation during mismatch.

Fig.2 Power/temperature derating curves.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb(RF)}$	from junction to mounting base	P_L = 4.5 W; T_{mb} = 25 °C	20	K/W

CHARACTERISTICS

T_j = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 5 mA	50	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	V_{BE} = 0; I_C = 10 mA	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.5 mA	3.5	–	–	V
I_{CES}	collector-emitter leakage current	V_{BE} = 0; V_{CE} = 27 V	–	–	2	mA
h_{FE}	DC current gain	V_{CE} = 20 V; I_C = 150 mA	25	–	–	
E_{SBR}	second breakdown energy	L = 25 mH; R_{BE} = 10 Ω; f = 50 Hz	0.5	–	–	mJ
C_c	collector capacitance	V_{CB} = 24 V; I_E = I_e = 0; f = 1 MHz	–	3	–	pF
C_{re}	feedback capacitance	V_{CE} = 24 V; I_C = 0; f = 1 MHz	–	1.3	–	pF

UHF power transistor — BLV100

FEATURES

- Internal input matching to achieve high power gain
- Ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

DESCRIPTION

NPN silicon planar epitaxial transistor in a SOT171 envelope, intended for common emitter, class-AB operation in radio transmitters for the 960 MHz communications band. The transistor has a 6-lead flange envelope with a ceramic cap. All leads are isolated from the flange.

PINNING - SOT171

PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

PIN CONFIGURATION

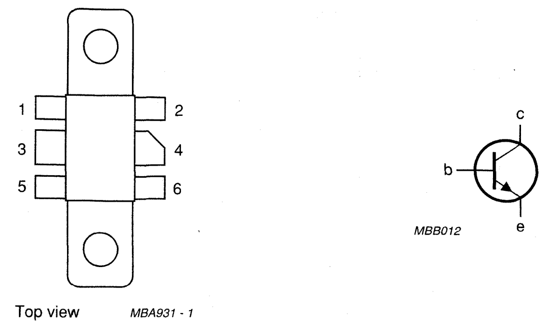


Fig.1 Simplified outline and symbol.

WARNING

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QUICK REFERENCE DATA

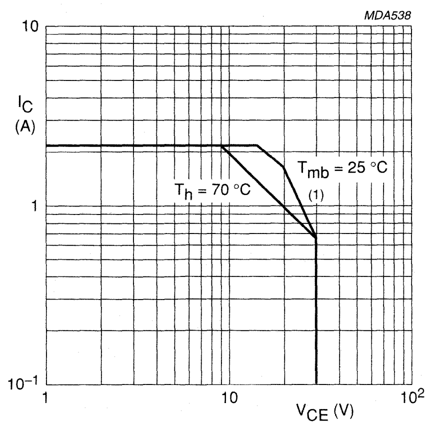
RF performance up to $T_h = 25$ °C in a common emitter class-AB test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_P (dB)	η_c (%)
c.w. class-AB	960	24	8	> 8	> 50

LIMITING VALUES

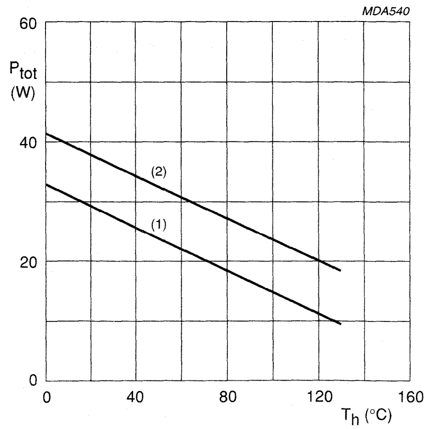
In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CESM}	collector-emitter voltage	peak value; $V_{BE} = 0$	–	50	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	4	V
I_C	collector current	DC or average value	–	2.25	A
I_{CM}	collector current	peak value f > 1 MHz	–	3.5	A
P_{tot}	total power dissipation	f > 1 MHz; $T_{mb} = 25$ °C	–	31	W
T_{stg}	storage temperature range		–65	150	°C
T_j	junction operating temperature		–	200	°C



(1) Second breakdown limit (temperature independent).

Fig.2 DC SOAR.



(1) RF operation.

(2) Short time operation during mismatch.

Fig.3 Power/temperature derating curve.

THERMAL RESISTANCE

Dissipation = 31 W; T_{mb} = 25 °C.

SYMBOL	PARAMETER	MAX.	UNIT
$R_{th\ j\text{-}mb(RF)}$	from junction to mounting base	5.6	K/W
$R_{th\ mb\text{-}h}$	from mounting base to heatsink	0.4	K/W

CHARACTERISTICS

$T_j = 25$ °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CES}$	collector-emitter breakdown voltage	$V_{BE} = 0$; $I_C = 8$ mA	50	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; $I_C = 60$ mA	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; $I_E = 4$ mA	4	–	–	V
I_{CES}	collector-emitter leakage current	$V_{BE} = 0$; $V_{CE} = 30$ V	–	–	2	mA
h_{FE}	DC current gain	$V_{CE} = 25$ V; $I_C = 0.6$ A	20	75	–	
C_c	collector capacitance	$V_{CB} = 25$ V; $I_E = I_e = 0$; f = 1 MHz	–	13.5	–	pF
C_{re}	feedback capacitance	$V_{CE} = 25$ V; $I_C = 40$ mA; f =1 MHz	–	8.4	–	pF
$C_{c\text{-}f}$	collector-flange capacitance		–	2	–	pF

FEATURES

- Internal matching for an optimum wideband capability and high gain
- Emitter-ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a 6-lead SOT171 flange envelope with a ceramic cap. It is intended for common emitter, class-AB operation in cellular radio base stations in the 960 MHz frequency band. All leads are isolated from the mounting base.

PINNING - SOT171

PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
c.w. class-AB	960	24	4	> 11.5	> 45

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

PIN CONFIGURATION

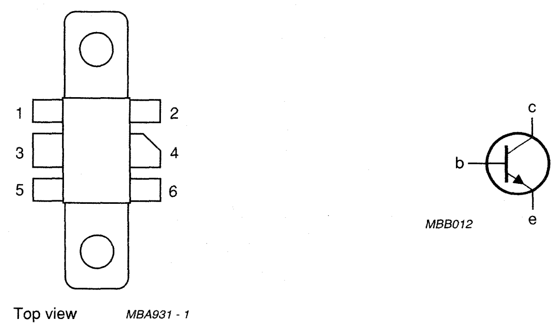
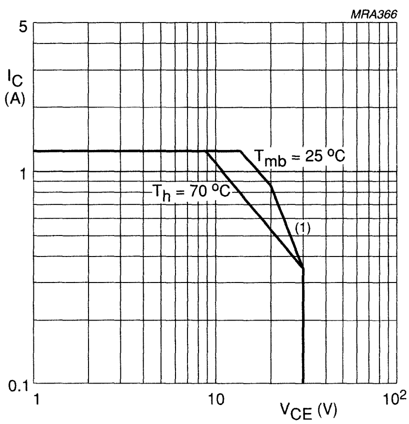


Fig.1 Simplified outline and symbol.

LIMITING VALUES

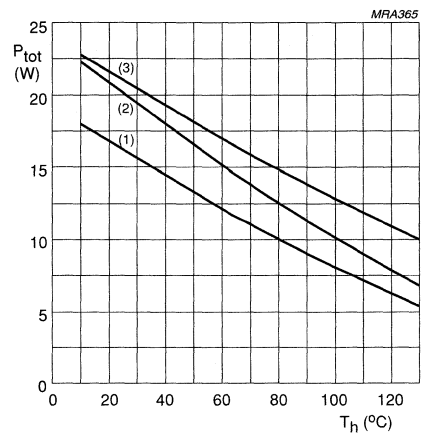
In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	50	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	4	V
I_C	collector current	DC or average value	–	1.25	A
P_{tot}	total power dissipation	T_{mb} = 25 °C	–	17	W
T_{stg}	storage temperature range		–65	150	°C
T_j	junction operating temperature		–	200	°C



(1) Second breakdown limit (independent of temperature).

Fig.2 DC SOAR.



(1) Continuous DC operation.
(2) Continuous RF operation.
(3) Short time operation during mismatch.

Fig.3 Power/temperature derating.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	from junction to mounting base	T_{mb} = 25 °C; P_{dis} = 17 W	10.3	K/W
$R_{th\ mb\text{-}h}$	from mounting base to heatsink		0.4	K/W

CHARACTERISTICS

T_j = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 4 mA	50	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 30 mA	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 2 mA	4	–	–	V
I_{CES}	collector-emitter leakage current	V_{BE} = 0; V_{CE} = 30 V	–	–	1	mA
h_{FE}	DC current gain	V_{CE} = 25 V; I_C = 300 mA	20	40	–	
C_c	collector capacitance	V_{CB} = 25 V; $I_E = I_e$ = 0; f = 1 MHz	–	6.6	8	pF
C_{re}	feedback capacitance	V_{CE} = 25 V; I_C = 20 mA; f = 1 MHz	–	3.5	4.5	pF

UHF power transistor BLV193

FEATURES

- Emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

DESCRIPTION

NPN silicon planar epitaxial transistor intended for common emitter class-A and class-AB operation in the 900 MHz communications band.

The transistor has a SOT171 flange envelope with a ceramic cap. All leads are isolated from the mounting base.

PINNING - SOT171

PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dB) (note 1)
c.w. class-AB	900	12.5	12	≥ 6.5	≥ 50	–
c.w. class-A	900	12	6 (PEP)	typ. 11	–	typ. –30

Note

1. 2-tone measurement, f_p = 900 MHz, f_q = 901 MHz.

PIN CONFIGURATION

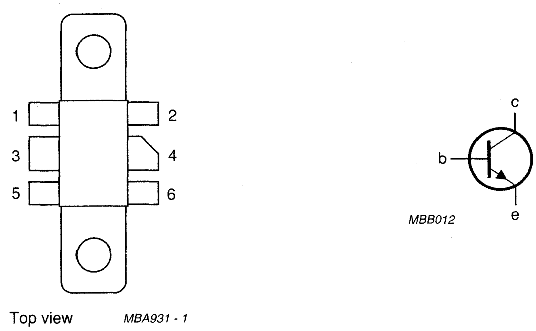


Fig.1 Simplified outline and symbol.

WARNING

Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	36	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current	DC or average value	–	3.5	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	44	W
T_{stg}	storage temperature range		–65	150	°C
T_j	junction temperature		–	200	°C

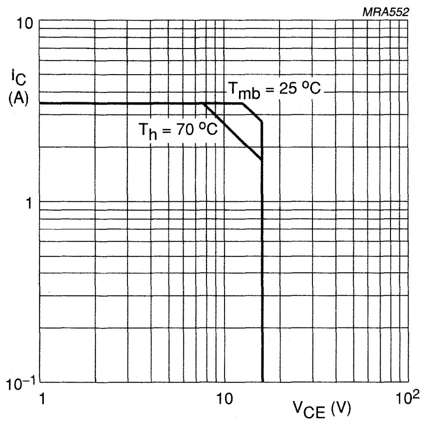
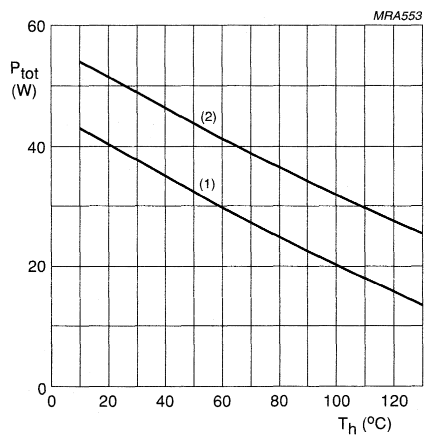


Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short time operation during mismatch.

Fig.3 Power derating curves.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	from junction to mounting base	P_{dis} = 44 W; T_{mb} = 25 °C	4.0 K/W
$R_{th\ mb\text{-}h}$	from mounting base to heatsink		0.4 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_c = 20 mA	36	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_c = 40 mA	16	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.5 mA	3	–	–	V
I_{CES}	collector-emitter leakage current	V_{CE} = 16 V; V_{BE} = 0	–	–	1	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_c = 1.2 A; note 1	25	60	–	
C_c	collector capacitance	V_{CB} = 12.5 V; $I_E = I_e$ = 0; f = 1 MHz	–	24.5	–	pF
C_{re}	feedback capacitance	V_{CE} = 12.5 V; I_c = 0; f = 1 MHz	–	13	–	pF
$C_{c\text{-}mb}$	collector-mounting base capacitance		–	2	–	pF

Note

1. Measured under pulse conditions: $t_p \leq 200$ μs; $\delta \leq 0.02$.

UHF power transistor BLV194

FEATURES

- Emitter-ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

DESCRIPTION

NPN silicon planar epitaxial transistor intended for common emitter class-AB operation in the 900 MHz communications band.

The transistor has a SOT171 flange envelope with a ceramic cap.

All leads are isolated from the mounting base.

PINNING - SOT171

PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	900	12.5	16	≥ 7	≥ 50

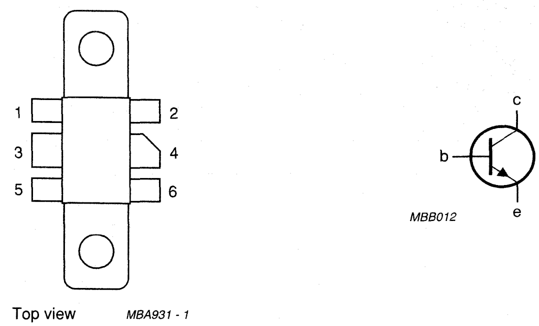


Fig.1 Simplified outline and symbol.

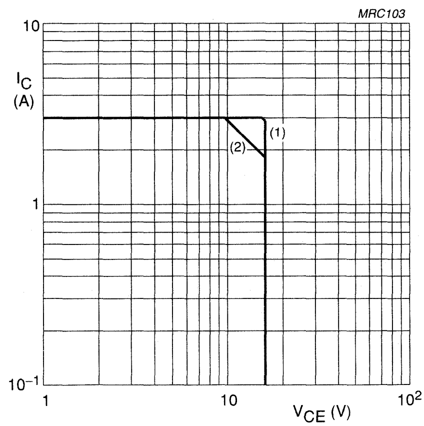
WARNING

Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

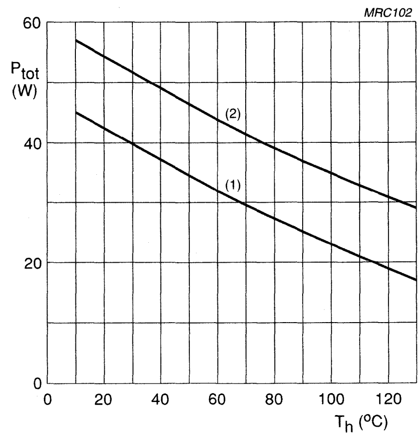
In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{CES}	collector-emitter voltage	base short-circuited	–	32	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	DC collector current		–	3	A
$I_{C(AV)}$	average collector current		–	3	A
P_{tot}	total power dissipation	T_{mb} = 25 °C	–	46	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C



(1) T_{mb} = 25 °C.
(2) T_h = 70 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power/temperature derating curve.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{dis} = 46 W; T_{mb} = 25 °C	3.8 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.4 K/W

CHARACTERISTICS

T_j = 25 °C, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_B = 0$; $I_C = 40$ mA	16	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 20$ mA; $V_{BE} = 0$	32	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_C = 0$; $I_E = 5$ mA	3	–	–	V
I_{CER}	collector leakage current	$R_{BE} = 700\ \Omega$; $V_{CE} = 16$ V	–	–	1	mA
h_{FE}	DC current gain	$I_C = 1.2$ A; $V_{CE} = 10$ V (note 1)	25	70	–	
C_c	collector capacitance	$I_E = i_e = 0$; $V_{CB} = 12.5$ V; f = 1 MHz	–	26	–	pF
C_{re}	feedback capacitance	$I_C = 0$; $V_{CB} = 12.5$ V; f = 1 MHz	–	19	–	pF
$C_{c\text{-}mb}$	collector-mounting base capacitance		–	2	–	pF

Note

1. Measured under pulse conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0.02$.

UHF linear push-pull power transistor BLV857

FEATURES

- Internal input matching for an optimum wideband capability and high gain
- Polysilicon emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATION

- Common emitter class-A operation in linear transposers/transmitters (television) in the 470 to 860 MHz frequency band.

DESCRIPTION

NPN silicon planar transistor with two sections in push-pull configuration. The device is encapsulated in a SOT324B 4-lead rectangular flange package with a ceramic cap. The common emitters are connected to the flange.

PINNING SOT324B

PIN	SYMBOL	DESCRIPTION
1	c1	collector 1
2	c2	collector 2
3	b1	base 1
4	b2	base 2
5	e	common emitters

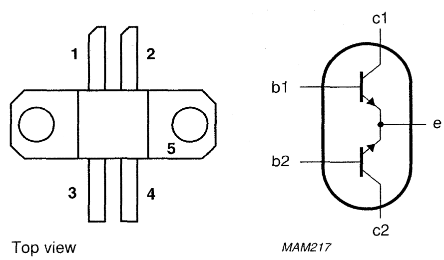


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter push-pull test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (A)	$P_{o\ sync}$ (W)	G_p (dB)
CW class-A	860	25	2 × 1.1	≥10(1)	≥10(1)

Note

1. Three-tone test signal (−8, −16 and −10 dB); d_{im} = −54 dB.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

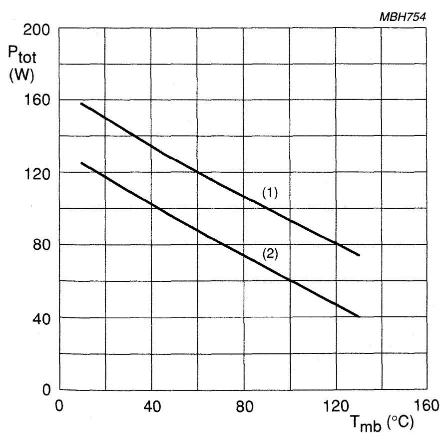
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	28	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	7.4	A
$I_{C(AV)}$	average collector current		–	7.4	A
P_{tot}	total power dissipation	T_{mb} = 70 °C; note 1; see Fig.2	–	80	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	P_{tot} = 80 W; T_{mb} = 70 °C note 1	1.6	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	note 1	0.4	K/W

Note to Limiting values and Thermal characteristics

1. Total device; both sections equally loaded.



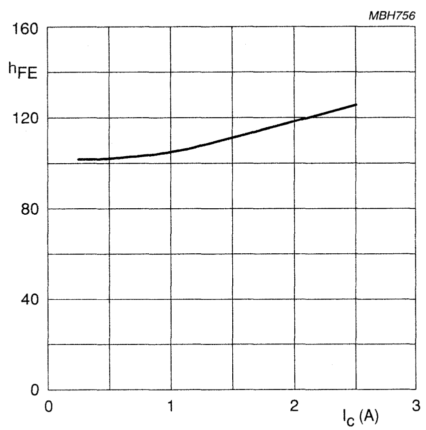
(1) Short-time operation during mismatch.
(2) Continuous operation.

Fig.2 Power derating curve.

CHARACTERISTICS

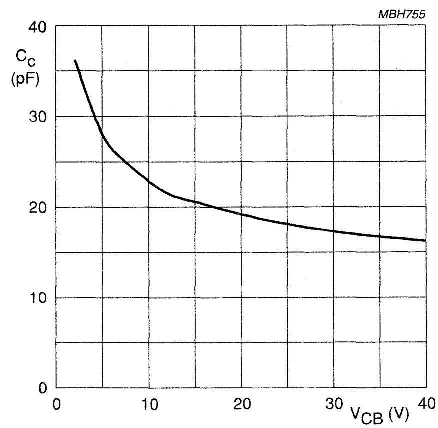
Values apply to either transistor section; T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 15 mA; I_E = 0	60	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 30 mA; I_B = 0	28	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 0.6 mA; I_C = 0	2.5	–	–	V
I_{CBO}	collector-base leakage current	V_{CB} = 27 V; V_{BE} = 0	–	–	1.5	mA
I_{CEO}	collector-emitter leakage current	V_{CE} = 20 V	–	–	3	mA
h_{FE}	DC current gain	V_{CE} = 25 V; I_C = 1.1 A; see Fig.3	30	–	140	
C_c	collector capacitance	V_{CB} = 25 V; I_E = i_e = 0; f = 1 MHz; see Fig.4	–	18	–	pF
C_{re}	feedback capacitance	V_{CE} = 25 V; I_C = 0; f = 1 MHz	–	11	–	pF



V_{CE} = 25 V; t_p = 500 µs; δ = <1 %.

Fig.3 DC current gain as a function of collector current; typical values.



I_E = i_e = 0; f = 1 MHz.

Fig.4 Collector capacitance as a function of collector-base voltage; typical values.

APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter push-pull class-A test circuit.

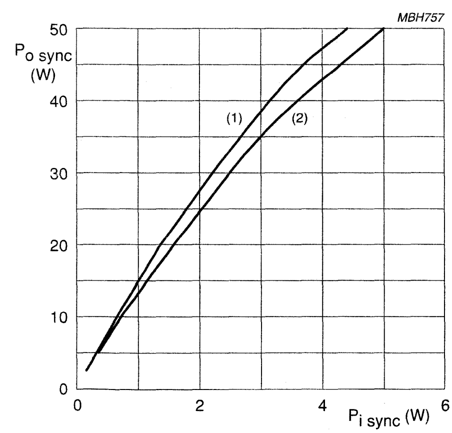
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (A)	$P_{o\,sync}$ (W)	G_p (dB)	d_{im} (dB)
CW class-A	860	25	2 × 1.1	≥10(1)	≥10(1)	≤−54(1)
CW class-A	860	25	2 × 1.1	≥10(2)	≥10(2)	≤−51(2)

Notes

1. Three-tone test method: f_{vision} = 855.25 MHz (vision carrier −8 dB); f_{sound} = 860.75 MHz (sound carrier −10 dB); $f_{sideband}$ = 859.68 MHz (sideband signal −16 dB); 0 dB corresponds to peak sync level.
2. Three-tone test method: f_{vision} = 855.25 MHz (vision carrier −8 dB); f_{sound} = 860.75 MHz (sound carrier −7 dB); $f_{sideband}$ = 859.68 MHz (sideband signal −16 dB); 0 dB corresponds to peak sync level.

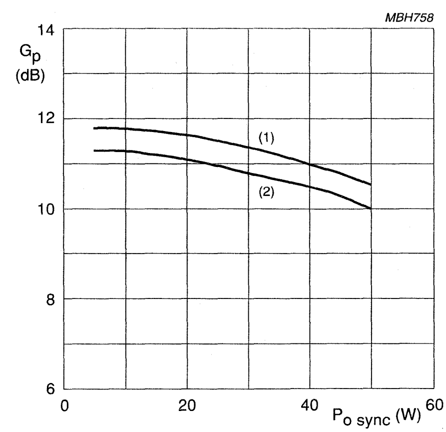
Ruggedness in class-A operation

The BLV857 is capable of withstanding a load mismatch corresponding to VSWR = 50 : 1 through all phases under the conditions: V_{CE} = 25 V; I_{CQ} = 2 × 1.1 A; f = 860 MHz; T_h = 25 °C; $P_{o\,sync}$ = 10 W.



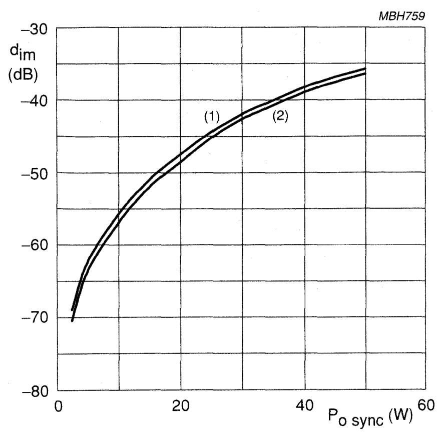
V_{CE} = 25 V; I_{CQ} = 2 × 1.1 A; f = 860 MHz; (3-tone; −8/−16/−10 dB).
(1) T_h = 25 °C.
(2) T_h = 70 °C.

Fig.5 Output power as a function of input power; typical values.



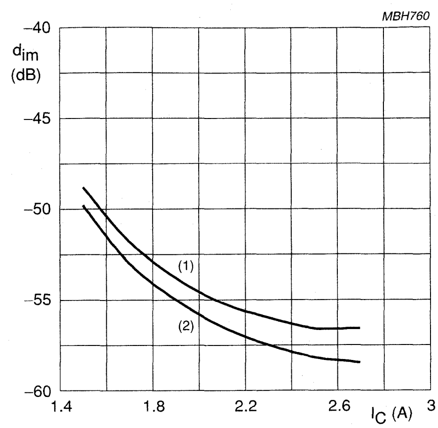
V_{CE} = 25 V; I_{CQ} = 2 × 1.1 A; f = 860 MHz; (3-tone; −8/−16/−10 dB).
(1) T_h = 25 °C.
(2) T_h = 70 °C.

Fig.6 Power gain as a function of output power; typical values.



V_{CE} = 25 V; I_{CQ} = 2 × 1.1 A; f = 860 MHz; (3-tone; −8/−16/−10 dB).
(1) T_h = 70 °C.
(2) T_h = 25 °C.

Fig.7 Intermodulation distortion as a function of output power; typical values.



V_{CE} = 25 V; f = 860 MHz; (3-tone; −8/−16/−10 dB).
(1) T_h = 70 °C.
(2) T_h = 25 °C.

Fig.8 Intermodulation distortion as a function of collector current; typical values.

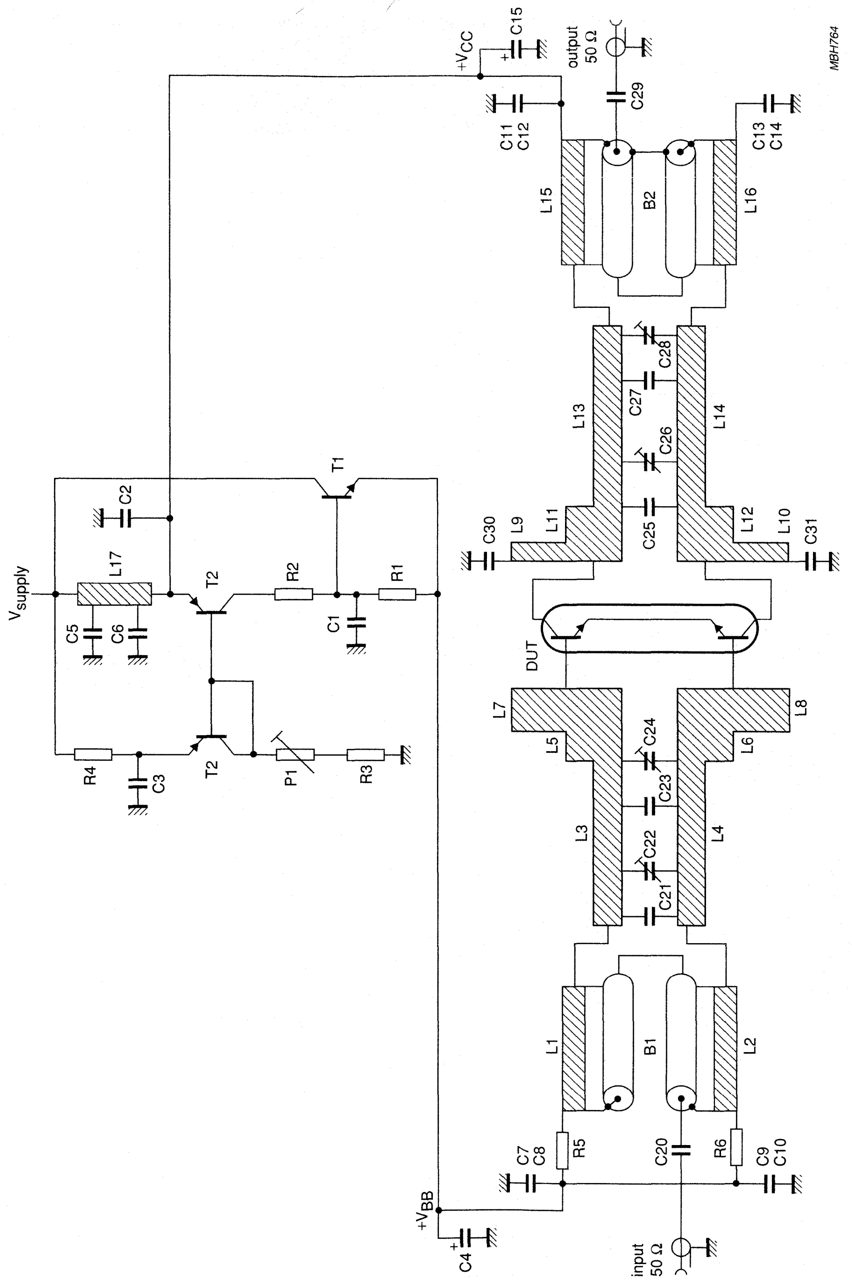
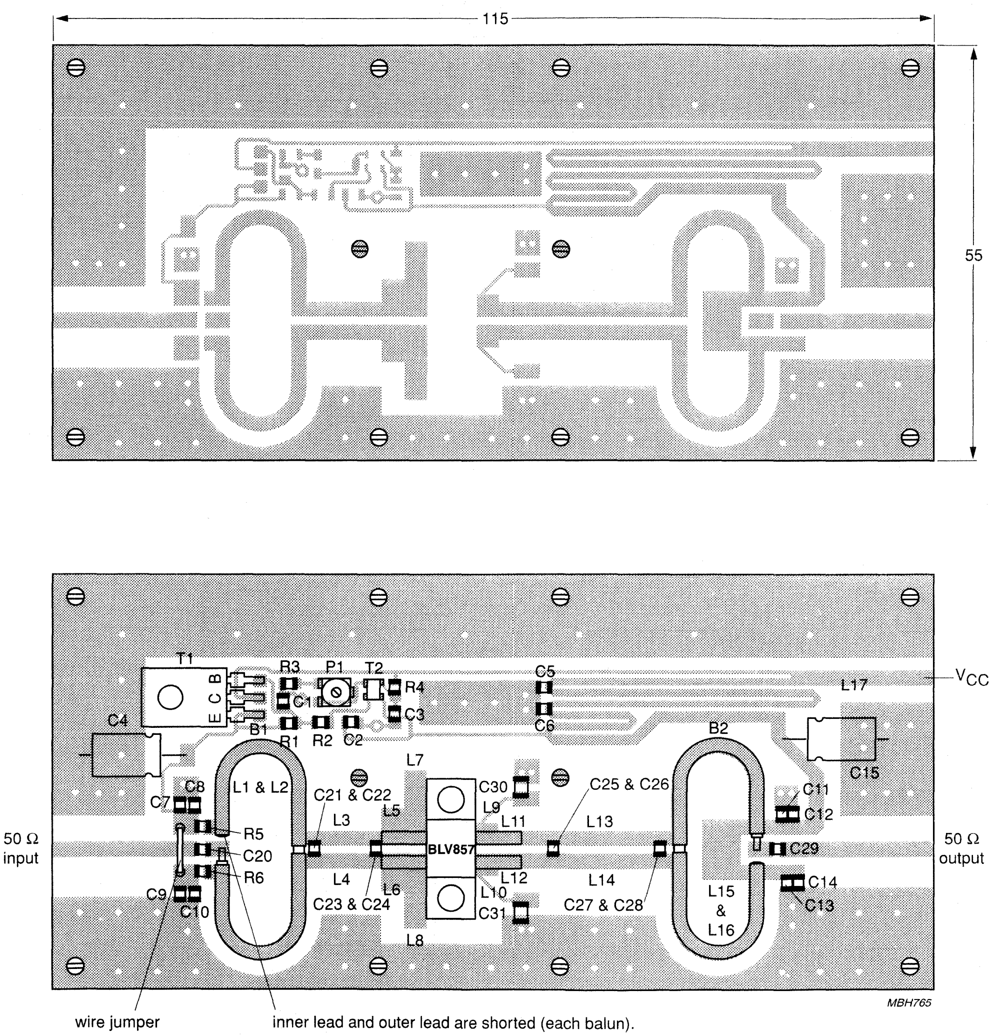


Fig.9 Class-A test circuit at f = 860 MHz.



Dimensions in mm.

The components are situated on one side of the copper-clad epoxy fibre-glass board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

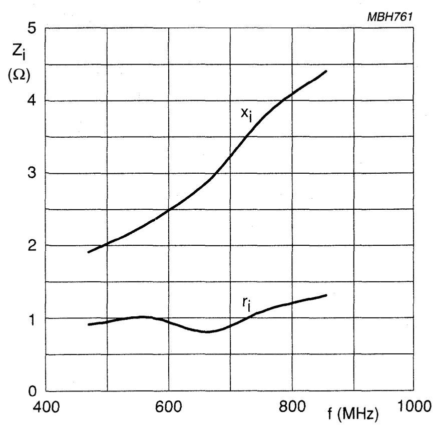
Fig.10 Printed-circuit board and component lay-out for 860 MHz class-A test circuit.

List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C2, C3, C5, C6, C7, C8, C9, C10	multilayer ceramic chip capacitor	10 nF	805	2222 590 16627
C4	solid aluminium capacitor	47 μF; 25 V		2222 030 36479
C11, C12, C13, C14, C30, C31	multilayer ceramic chip capacitor	100 nF	1206	2222 591 16641
C15	solid aluminium capacitor	10 μF; 63 V		2222 030 38109
C20	multilayer ceramic chip capacitor; note 1	18 pF		
C21	multilayer ceramic chip capacitor; note 1	3 pF		
C22, C24, C26, C28	Tekelec Giga trim 37271; note 3	0.6 to 4.5 pF		
C23	multilayer ceramic chip capacitor; note 1	7.5 pF		
C25	multilayer ceramic chip capacitor; notes 1 and 3	11 pF		
C27	multilayer ceramic chip capacitor; notes 1 and 3	9.1 pF		
C29	multilayer ceramic chip capacitor; note 1	100 pF		
L1, L2, L15, L16	stripline; note 2	50 Ω	30.6 × 2 mm	
L3, L4	stripline; note 2	50 Ω	10 × 2 mm	
L5, L6	stripline; note 2	26.5 Ω	3 × 5 mm	
L7, L8	stripline; note 2	15 Ω	3 × 10 mm	
L9, L10	stripline; note 2	104 Ω	6 × 0.5 mm	
L11, L12	stripline; note 2	38.8 Ω	3 × 3 mm	
L13, L14	stripline; note 2	50 Ω	22.5 × 2 mm	
L17	stripline; notes 2 and 4	76.2 Ω	120 × 1 mm	
B1, B2	Semi rigid coax balun UT70-25	Z = 25 Ω ±1.5 Ω	70 mm	
R1	SMD resistor	220 Ω	805	2322 734 22201
R2	SMD resistor	1.8 Ω	805	2322 734 21808
R3	SMD resistor	4.3 kΩ	805	2322 734 24302
R4	SMD resistor	33 Ω	805	2322 734 23309
R5, R6	SMD resistor	3.3 Ω	805	2322 734 23308
P1	potentiometer	2 kΩ		
T1	NPN transistor	BD139		9330 912 20112
T2	double PNP transistor	BCV62		5322 130 60505

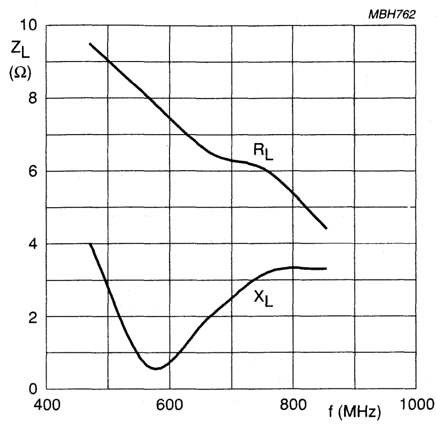
Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. The striplines are on a double copper-clad printed-circuit board: Rogers ULTRALAM 2000 (B0300M1046QB) (ε_r = 2.55); thickness 0.76 mm.
3. Position of C25 and C26: distance of centre capacitor to transistor BLV857 = 7.5 mm.
   Position of C27 and C28: distance of centre capacitor to balun B2 = 1.5 mm.
4. The sense resistor on the bias unit is implemented as a stripline L17, in this way we obtain a small sense resistor (approximately 80 mΩ) which can handle the dissipated power.



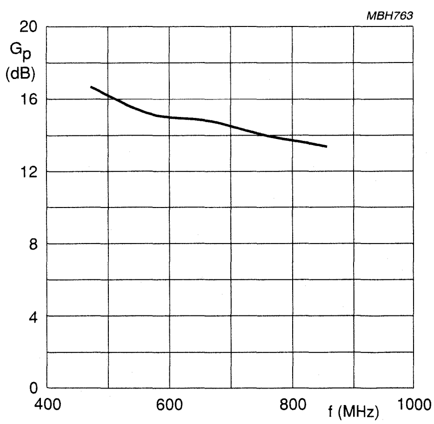
V_{CE} = 25 V; I_{CQ} = 2 × 1.1 A; $P_{o\ sync}$ = 10 W (total device); T_h = 25 °C.

Fig.11 Input impedance (per section) as a function of frequency (series components); typical values.



V_{CE} = 25 V; I_{CQ} = 2 × 1.1 A; $P_{o\ sync}$ = 10 W (total device); T_h = 25 °C.

Fig.12 Load impedance (per section) as a function of frequency (series components); typical values.



V_{CE} = 25 V; I_{CQ} = 2 × 1.1 A; $P_{o\ sync}$ = 10 W (total device); T_h = 25 °C.

Fig.13 Gain as a function of frequency; typical values.

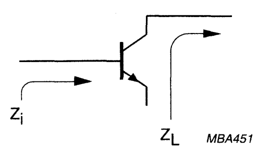


Fig.14 Definition of transistor impedance.

UHF linear push-pull power transistor BLV859

FEATURES

- Double internal input and output matching for an optimum wideband capability and high gain
- Polysilicon emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATION

- Common emitter class-A operation in linear transposers/transmitters (television) in the 470 to 860 MHz frequency band.

DESCRIPTION

NPN silicon planar transistor with two sections in push-pull configuration. The device is encapsulated in a SOT262B 4-lead rectangular flange package, with two ceramic caps. It delivers a $P_{o\ sync}$ = 20 W in class-A operation at 860 MHz and a supply voltage of 25 V.

PINNING SOT262B

PIN	SYMBOL	DESCRIPTION
1	c1	collector 1
2	c2	collector 2
3	b1	base 1
4	b2	base 2
5	e	emitter

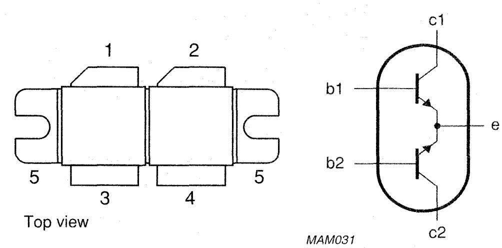


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter push-pull test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (A)	$P_{o\ sync}$ (W)	G_p (dB)
CW class-A	860	25	2 × 2.25	≥20(1)	≥10(1)

Note

1. Three-tone test signal (−8, −16 and −10 dB); d_{im} = −54 dB.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

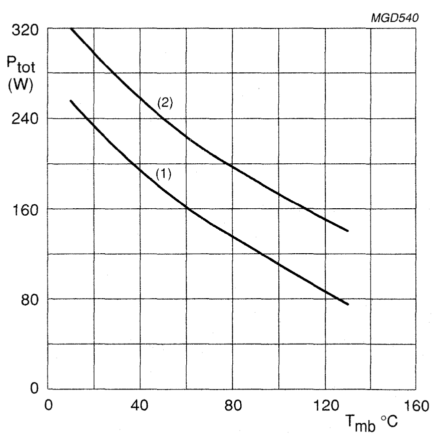
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	28	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	15	A
$I_{C(AV)}$	average collector current		–	15	A
P_{tot}	total power dissipation	T_{mb} = 70 °C; note 1	–	145	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	P_{tot} = 145 W; T_{mb} = 70 °C note 1	0.9	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	note 1	0.15	K/W

Note to Limiting values and Thermal characteristics

1. Total device; both sections equally loaded.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.2 Power derating curve.

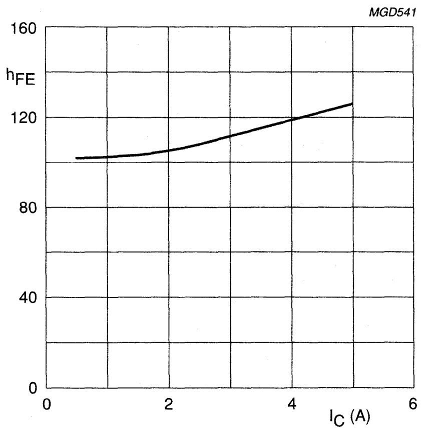
CHARACTERISTICS

Values apply to either transistor section; T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 30 mA; I_E = 0	60	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 60 mA; I_B = 0	28	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 1.2 mA; I_C = 0	2.5	–	–	V
I_{CBO}	collector-base leakage current	V_{CB} = 27 V; V_{BE} = 0	–	–	3	mA
I_{CEO}	collector-emitter leakage current	V_{CE} = 20 V	–	–	6	mA
h_{FE}	DC current gain	V_{CE} = 25 V; I_C = 2.25 A	30	–	140	
C_c	collector capacitance	V_{CB} = 25 V; I_E = i_e = 0; f = 1 MHz	–	36(1)	–	pF
C_{re}	feedback capacitance	V_{CE} = 25 V; I_B = 0; f = 1 MHz	–	22	–	pF

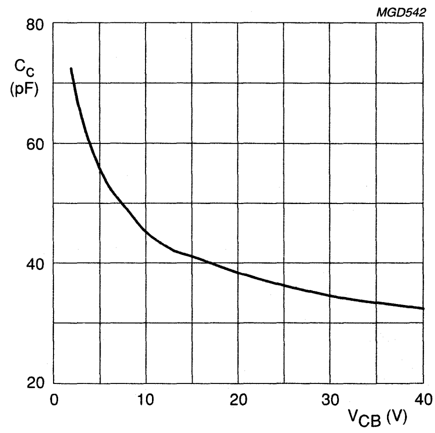
Note

1. The value of C_c is that of the die only; it is not measurable, because of the internal matching network.



V_{CE} = 25 V; t_p = 500 µs; δ = <1 %.

Fig.3 DC current gain as a function of collector current; typical values.



I_E = i_e = 0; f = 1 MHz.

Fig.4 Collector capacitance as a function of collector-base voltage; typical values.

APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter push-pull class-A test circuit.

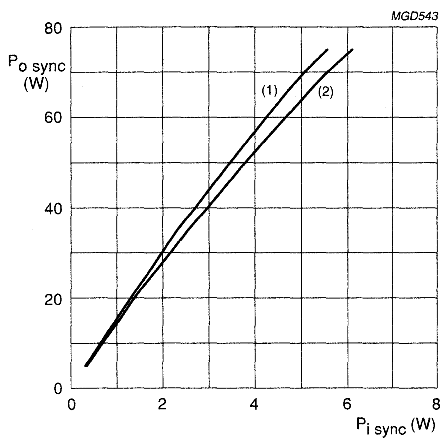
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (A)	$P_{o\ sync}$ (W)	G_p (dB)	d_{im} (dB)
CW class-A	860	25	2 × 2.25	≥20(1)	≥10(1)	≤–54(1)
CW class-A	860	25	2 × 2.25	≥20(2)	≥10(2)	≤–51(2)

Notes

1. Three-tone test method (vision carrier –8 dB, sound carrier –10 dB, sideband signal –16 dB), 0 dB corresponds to peak sync level.
2. Three-tone test method (vision carrier –8 dB, sound carrier –7 dB, sideband signal –16 dB), 0 dB corresponds to peak sync level.

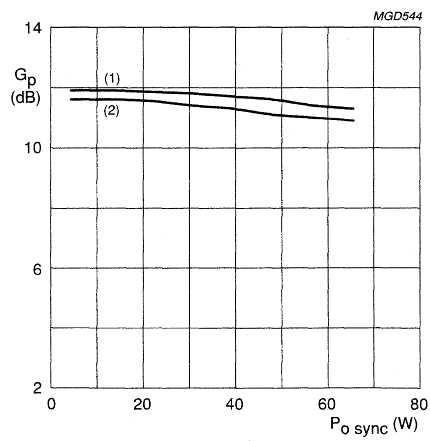
Ruggedness in class-A operation

The BLV859 is capable of withstanding a load mismatch corresponding to VSWR = 50 : 1 through all phases under the conditions: V_{CE} = 25 V; I_{CQ} = 2 × 2.25 A; f = 860 MHz; T_h = 25 °C; $P_{o\ sync}$ = 20 W.



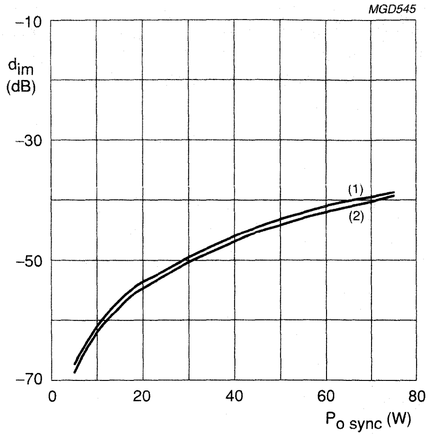
V_{CE} = 25 V; I_{CQ} = 2 × 2.25 A; f = 860 MHz; (3-tone; –8/–16/–10 dB).
(1) T_h = 25 °C.
(2) T_h = 70 °C.

Fig.5 Output power as a function of input power; typical values.



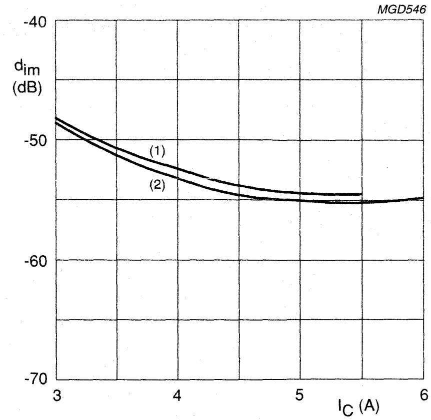
V_{CE} = 25 V; I_{CQ} = 2 × 2.25 A; f = 860 MHz; (3-tone; –8/–16/–10 dB).
(1) T_h = 25 °C.
(2) T_h = 70 °C.

Fig.6 Power gain as a function of output power; typical values.



V_{CE} = 25 V; I_{CQ} = 2 × 2.25 A; f = 860 MHz; (3-tone; −8/−16/−10 dB).
(1) T_h = 70 °C.
(2) T_h = 25 °C.

Fig.7 Intermodulation distortion as a function of output power; typical values.



V_{CE} = 25 V; f = 860 MHz; (3-tone; −8/−16/−10 dB).
(1) T_h = 70 °C.
(2) T_h = 25 °C.

Fig.8 Intermodulation distortion as a function of collector current; typical values.

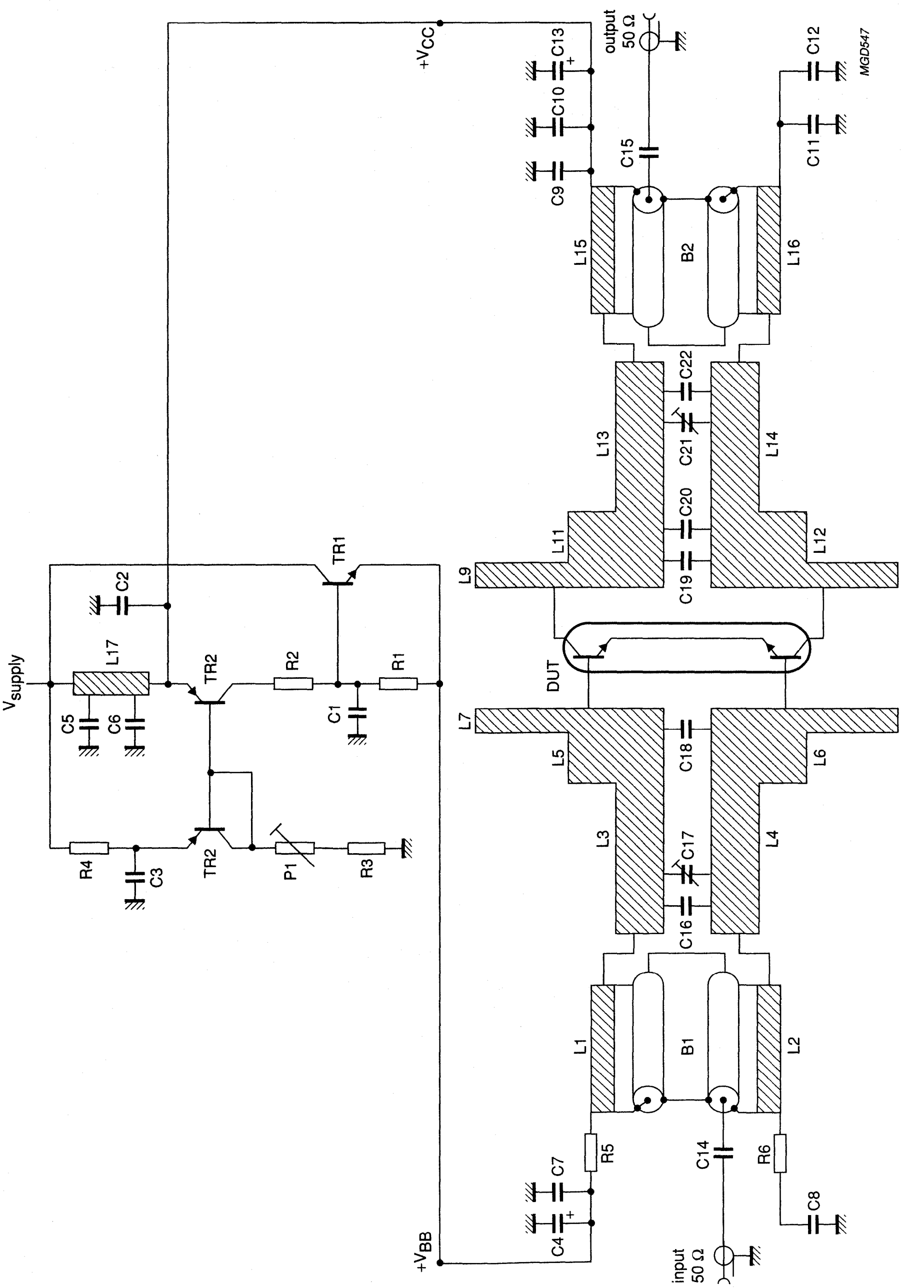
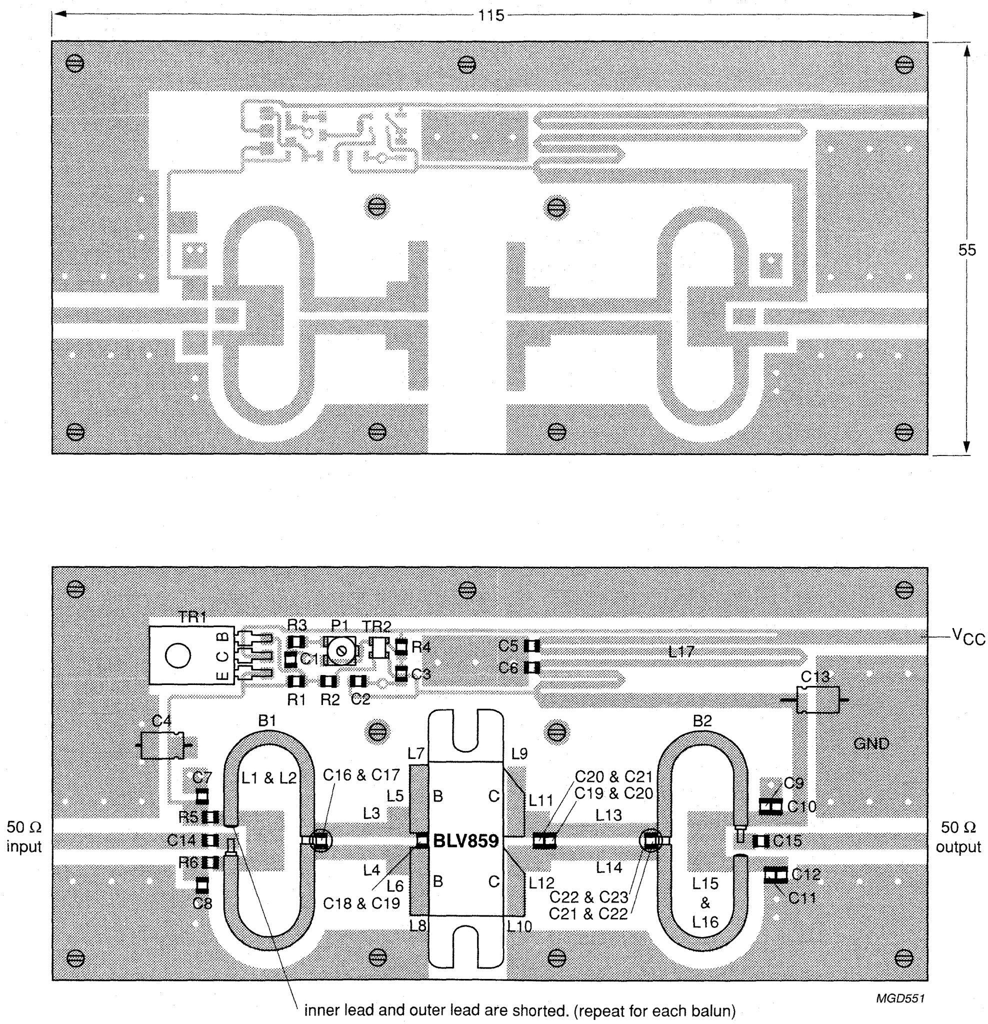


Fig.9 Class-A test circuit at f = 860 MHz.



Dimensions in mm.

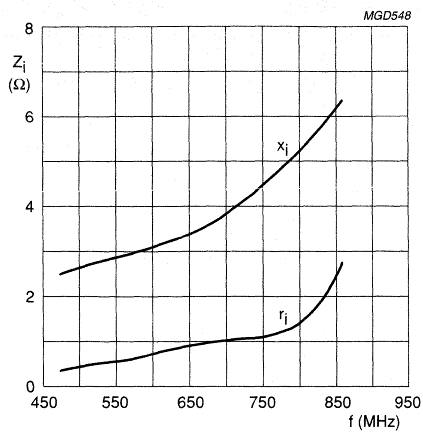
Fig.10 Printed-circuit board and component lay-out for 860 MHz class-A test circuit.

List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C2, C3, C5, C6	multilayer ceramic chip capacitor;	15 nF	805	2222 590 16629
C4	solid aluminium capacitor	47 μF; 25 V		2222 030 36479
C7, C8	multilayer ceramic chip capacitor	10 nF	805	2222 590 16627
C9, C10, C11, C12	multilayer ceramic chip capacitor	100 nF	1206	2222 591 16641
C13	solid aluminium capacitor	10 μF; 63 V		2222 030 381109
C14, C15	multilayer ceramic chip capacitor; note 1	47 pF		
C16	multilayer ceramic chip capacitor; note 1	8.2 pF		
C17, C21	Tekelec Giga trim 37271	0.6 to 4.5 pF		
C18	multilayer ceramic chip capacitor; note 1	13 pF		
C19	multilayer ceramic chip capacitor; note 1	3.9 pF		
C20	multilayer ceramic chip capacitor; note 1	12 pF		
C22	multilayer ceramic chip capacitor; note 1	9.1 pF		
L1, L2, L15, L16	stripline; note 2	50 Ω	2 × 30.6 mm	
L3, L4	stripline; note 2	50 Ω	2 × 9.5 mm	
L5, L6	stripline; note 2	32.4 Ω	4 × 3 mm	
L7, L8, L9, L10	stripline; note 2	16.2 Ω	9.5 × 2.6 mm	
L11, L12	stripline; note 2	37.5 Ω	3.5 × 3.4 mm	
L13, L14	stripline; note 2	50 Ω	2 × 13.9 mm	
L17	stripline; note 2	77.7 Ω	1 × 120 mm	
B1, B2	Semi rigid coax balun UT70-25	Z = 25 Ω, ±1.5 Ω	70 mm	
R1	SMD resistor	220 Ω	805	2322 734 22201
R2	SMD resistor	1.8 Ω	805	2322 734 21808
R3	SMD resistor	2.7 kΩ	805	2322 734 22702
R4	SMD resistor	33 Ω	805	2322 734 23309
R7, R8	SMD resistor	3.3 Ω	805	2322 734 23308
P1	Murata potentiometer RG4M08-102VM-TG	1 kΩ		
TR1	NPN transistor	BD139		9330 912 20112
TR2	double PNP transistor	BVC62		5332 130 60505

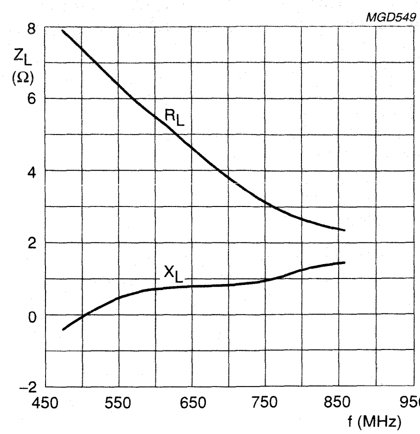
Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. The striplines are on a double copper-clad PCB: Rogers ULTRALAM 200 (B0300M1046QB) (ε_r = 2.55); thickness 0.76 mm.



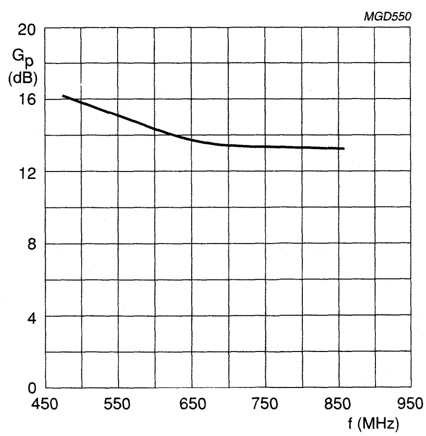
V_{CE} = 25 V; I_{CQ} = 2 × 2.25 A; $P_{o\ sync}$ = 20 W (total device); T_h = 25 °C.

Fig.11 Input impedance (per section) as a function of frequency (series components); typical values.



V_{CE} = 25 V; I_{CQ} = 2 × 2.25 A; $P_{o\ sync}$ = 20 W (total device); T_h = 25 °C.

Fig.12 Load impedance (per section) as a function of frequency (series components); typical values.



V_{CE} = 25 V; I_{CQ} = 2 × 2.25 A; $P_{o\ sync}$ = 20 W (total device); T_h = 25 °C.

Fig.13 Gain as a function of frequency; typical values.

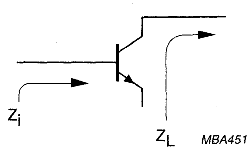


Fig.14 Definition of transistor impedance.

FEATURES

- Double stage internal input and output matching networks for an optimum wideband capability and high gain
- Polysilicon emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Common emitter class-AB output stages of television transmitter amplifiers (sound and vision) operating in bands 4 and 5 (470 to 860 MHz).

DESCRIPTION

NPN silicon planar epitaxial transistor with two sections in push-pull configuration. The device is encapsulated in a SOT289A 4-lead rectangular flange package, with a ceramic cap.

PINNING

PIN	SYMBOL	DESCRIPTION
1	c1	collector 1; note 1
2	c2	collector 2; note 1
3	b1	base 1
4	b2	base 2
5	e	common emitters; note 2

Notes

1. Collectors c1 and c2 are internally connected.
2. Common emitters are connected to the flange.

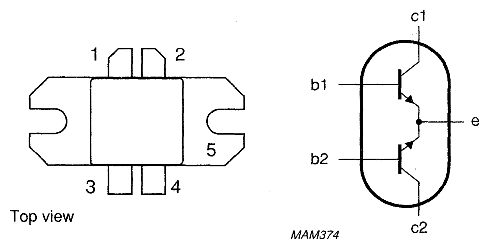


Fig.1 Simplified outline (SOT289A) and symbol.

QUICK REFERENCE DATA

RF performance at $T_h = 25$ °C in a common emitter push-pull test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	ΔG_p (dB)
CW class-AB	860	28	100	≥8.5	≥55	≤1

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

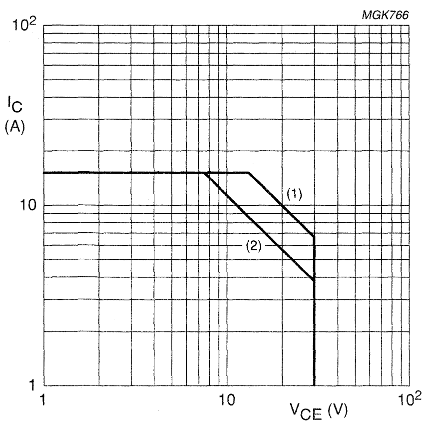
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	15	A
P_{tot}	total power dissipation	T_{mb} = 25 °C	–	220	W
T_{stg}	storage temperature		−65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 220 W; note 1	0.8	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.2	K/W

Note

1. Thermal resistance is determined under specified RF operating conditions.



Total device; both sections equally loaded.
(1) T_{mb} = 25 °C.
(2) T_h = 70 °C.

Fig.2 DC SOAR.

CHARACTERISTICS

Values apply to either transistor section; T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_E = 0; I_C = 35 mA	65	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_B = 0; I_C = 90 mA	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 2 mA; I_C = 0	3	–	–	V
I_{CBO}	collector-base leakage current	V_{CB} = 28 V	–	–	3	mA
h_{FE}	DC current gain	I_C = 2.8 A; V_{CE} = 10 V	30	–	120	–
Δh_{FE}	DC current gain ratio of both sections	I_C = 4.5 A; V_{CE} = 10 V	0.67	–	1.5	–
C_c	collector capacitance	$I_E = i_e$= 0; V_{CE} = 28 V; f = 1 MHz; note 1	–	47	–	pF

Note

1. The value of C_c is that of the die only; it is not measurable because of the internal matching network.

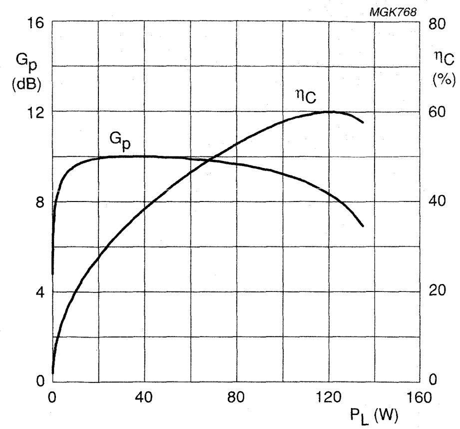
APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter push-pull class-AB test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (A)	P_L (W)	G_p (dB)	η_C (%)	ΔG_p (dB)
CW class-AB	860	28	0.1	100	≥8.5	≥55	≤1

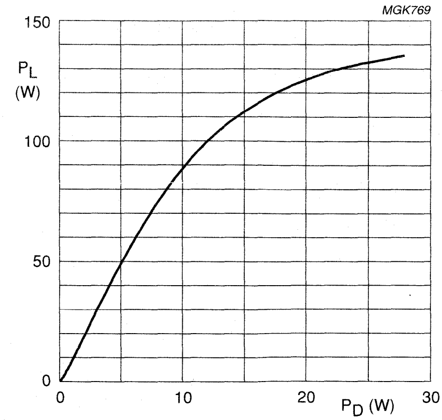
Ruggedness in class-AB operation

The BLV861 is capable of withstanding a load mismatch corresponding to VSWR = 3 : 1 through all phases under the conditions: T_h = 25 °C; f = 860 MHz; V_{CE} = 28 V; I_{CQ} = 0.1 A; P_L = 100 W; $R_{th\ mb\text{-}h}$ = 0.2 K/W.



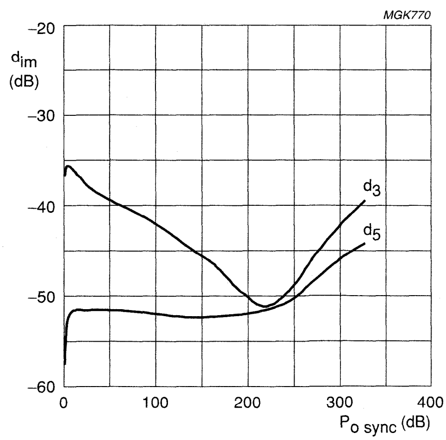
T_h = 25 °C; f = 860 MHz; V_{CE} = 28 V; I_{CQ} = 0.1 A.

Fig.3 Power gain and collector efficiency as functions of load power; typical values.



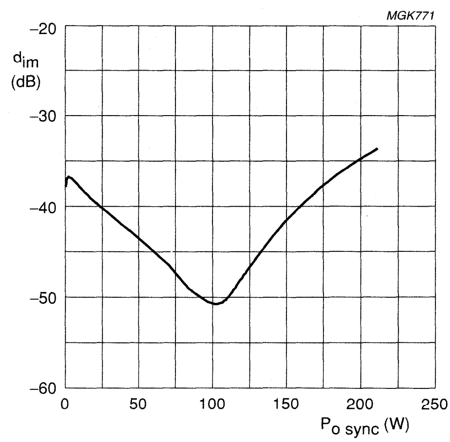
T_h = 25 °C; f = 860 MHz; V_{CE} = 28 V; I_{CQ} = 0.1 A.

Fig.4 Load power as a function of drive power; typical values.



T_h = 25 °C; V_{CE} = 28 V; I_{CQ} = 0.1 A;
2-tone:
f_{vision} = 855.25 MHz (−8 dB);
$f_{sideband}$ = 859.68 MHz (−16 dB).

Fig.5 Intermodulation distortion as a function of output power; typical values.



T_h = 25 °C; V_{CE} = 28 V; I_{CQ} = 0.1 A;
3-tone:
f_{vision} = 855.25 MHz (−8 dB);
$f_{sideband}$ = 859.68 MHz (−16 dB);
f_{sound} = 860.75 MHz (−10 dB).

Fig.6 Intermodulation distortion as a function of output power; typical values.

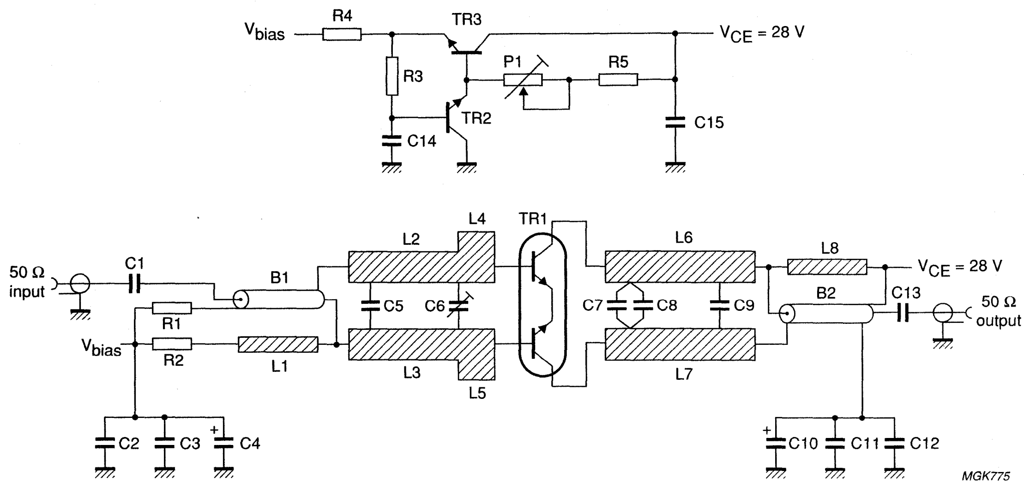
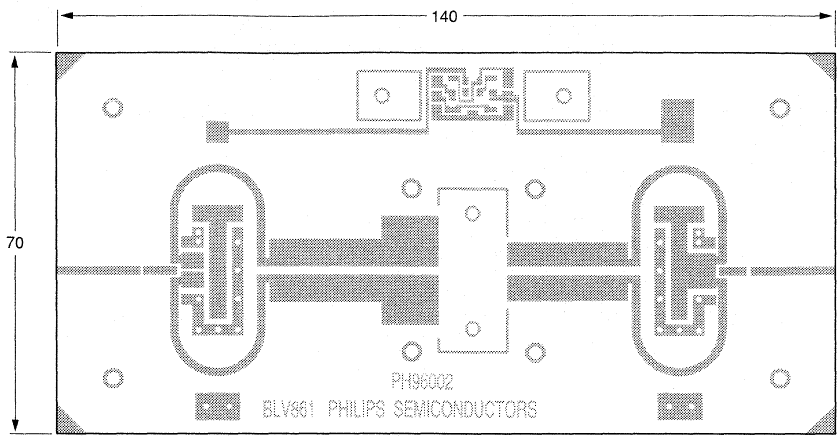
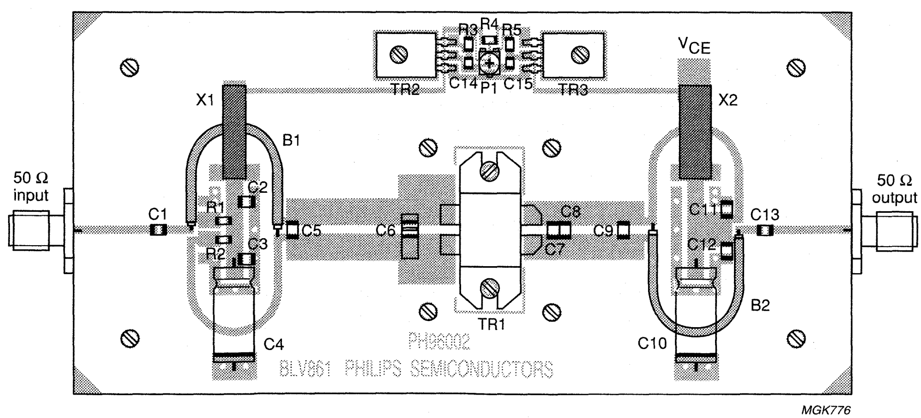


Fig.7 Class-AB test circuit at 860 MHz.





Dimensions in mm.

The components are situated on one side of the copper-clad PTFE-glass board (TLX8) from Taconic, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

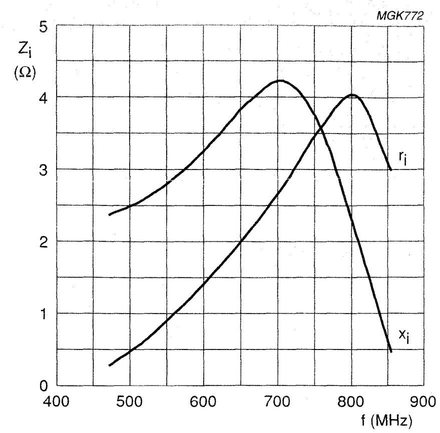
Fig.8 Printed-circuit board and component layout for the 860 MHz class-AB test circuit.

List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C13	multilayer ceramic chip capacitor; note 1	15 pF		
C2, C11, C15	multilayer ceramic chip capacitor	15 nF	0805	2222 590 16629
C3, C12	multilayer ceramic chip capacitor	100 nF	1206	2222 581 16641
C4, C10	solid aluminium capacitor	100 μF; 40 V		2222 031 37101
C5	multilayer ceramic chip capacitor; note 2	8.2 pF		
C6	multilayer ceramic chip capacitor + Tekelek trimmer; note 2	10 pF; 0.6 to 4.5 pF		
C7	multilayer ceramic chip capacitor; note 3	10 pF		
C8	multilayer ceramic chip capacitor; note 3	2.7 pF		
C9	multilayer ceramic chip capacitor; note 2	3 pF		
C14	multilayer ceramic chip capacitor; note 1	100 nF		
L1, L8	stripline; note 4		46 × 1.8 mm	
L2, L3	stripline; note 4		20 × 5 mm	
L4, L5	stripline; note 4		10 × 10 mm	
L6, L7	stripline; note 4		21 × 5 mm	
B1	semi rigid coax balun UT70-25	Z = 25 Ω ±1.5 Ω	46 mm	
B2	semi rigid coax balun UT70-25	Z = 25 Ω ±1.5 Ω	46 mm	
R1, R2, R4	SMD resistor	1 Ω	0805	2122 118 04562
R3	SMD resistor	47 Ω	0805	2122 118 04598
R5	SMD resistor	1.2 kΩ	0805	2122 118 04579
P1	potentiometer	4.7 kΩ		
X1, X2	copper ribbon hairpin			
TR1	NPN push-pull RF transistor BLV861			9340 542 40112
TR2, TR3	NPN transistor BD139			9330 912 20112

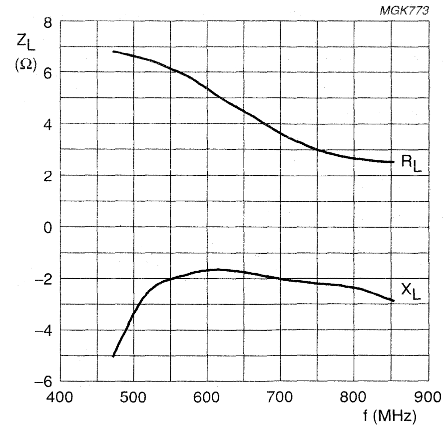
Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. American Technical Ceramics type 100B or capacitor of same quality.
3. American Technical Ceramics type 180R or capacitor of same quality.
4. The striplines are on a double copper-clad printed-circuit board: PTFE-glass material (TLX8) from Taconic (ε_r = 2.55); thickness 0.5 mm.



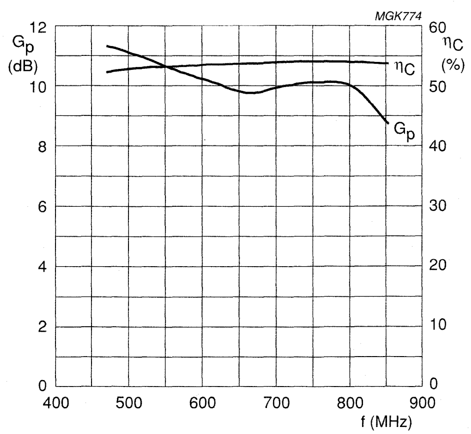
T_h = 25 °C; V_{CE} = 28 V; I_{CQ} = 0.1 A; P_L = 100 W (total device).

Fig.9 Input impedance (per section) as a function of frequency (series components); typical values.



T_h = 25 °C; V_{CE} = 28 V; I_{CQ} = 0.1 A; P_L = 100 W (total device).

Fig.10 Load impedance (per section) as a function of frequency (series components); typical values.



T_h = 25 °C; V_{CE} = 28 V; I_{CQ} = 0.1 A; P_L = 100 W (total device).

Fig.11 Power gain and collector efficiency as functions of frequency; typical values.

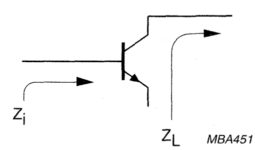


Fig.12 Definition of transistor impedance.

UHF linear push-pull power transistor | BLV862

FEATURES

- Double stage internal input and output matching networks for an optimum wideband capability and high gain
- Polysilicon emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Common emitter class-AB operation in output stages in bands 4 and 5 (470 to 860 MHz) television transmitter amplifiers (vision or sound).

DESCRIPTION

NPN silicon planar epitaxial transistor with two sections in push-pull configuration. The device is encapsulated in a SOT262B 4-lead rectangular flange package, with two ceramic caps.

PINNING

PIN	SYMBOL	DESCRIPTION
1	c1	collector 1; note 1
2	c2	collector 2; note 1
3	b1	base 1
4	b2	base 2
5	e	common emitter; note 2

Notes

1. Collectors 1 and 2 are connected together internally.
2. Common emitters are connected to the flange.

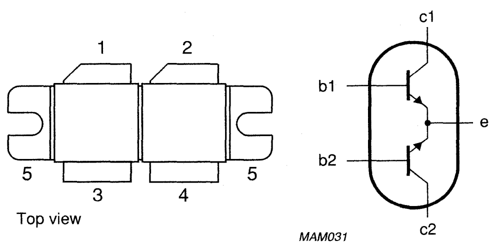


Fig.1 Simplified outline (SOT262B) and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter push-pull test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	ΔG_p (dB)
CW class-AB	860	28	150	≥8 typ. 9	≥45 typ. 52	≤1

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

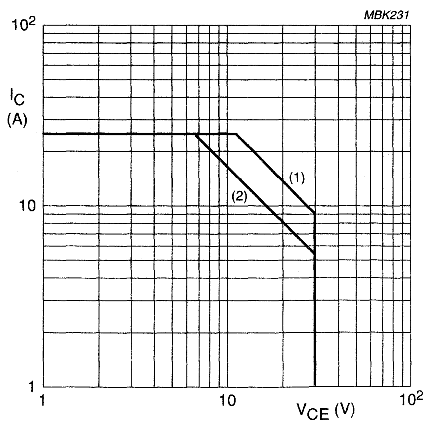
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	25	A
P_{tot}	total power dissipation	T_{mb} = 25 °C	–	350	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 350 W; note 1	0.5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.15	K/W

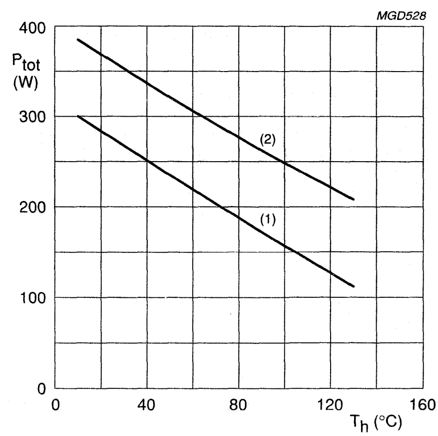
Note

1. Thermal resistance is determined under specified RF operating conditions.



Total device; both sections equally loaded.
(1) T_{mb} = 25 °C.
(2) T_h = 70 °C.

Fig.2 DC SOAR.



Total device; both sections equally loaded.
(1) Continuous operation.
(2) Short time operation during mismatch.

Fig.3 Power derating curves.

CHARACTERISTICS

Values apply to either transistor section; T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_E = 0; I_C = 60 mA	65	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_B = 0; I_C = 150 mA	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 3 mA; I_C = 0	3	–	–	V
I_{CBO}	collector-base leakage current	V_{CB} = 28 V	–	–	5	mA
h_{FE}	DC current gain	I_C = 4.5 A; V_{CE} = 10 V	30	–	140	–
Δh_{FE}	DC current gain ratio of both sections	I_C = 4.5 A; V_{CE} = 10 V	0.67	–	1.5	–
C_c	collector capacitance	I_E = i_e= 0; V_{CE} = 28 V; f = 1 MHz; note 1	–	75	–	pF

Note

1. The value of C_c is that of the die only, it is not measurable because of the internal matching network.

APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter push-pull class-AB test circuit; note 1.

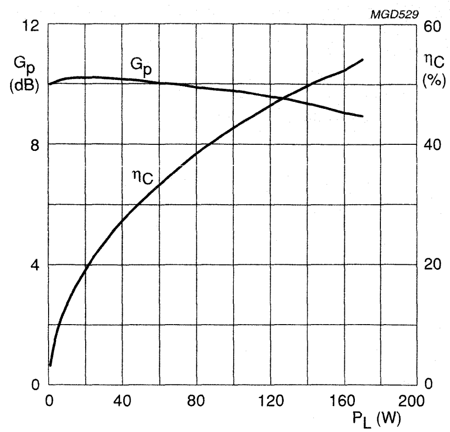
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (A)	P_L (W)	G_p (dB)	η_C (%)	ΔG_p (dB)
CW class-AB	860	28	0.8	150	≥8 typ. 9	≥45 typ. 52	≤1

Note

1. An application note containing broadband (470 to 860 MHz) information is available under no.: *"RNR-T45-96-T-557"*.

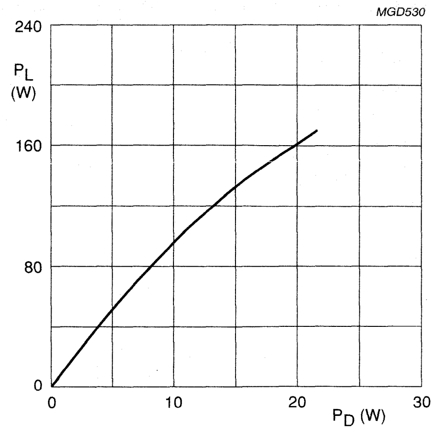
Ruggedness in class-AB operation

The BLV862 is capable of withstanding a load mismatch corresponding to VSWR = 2 : 1 through all phases under the conditions: T_h = 25 °C; f = 860 MHz; V_{CE} = 28 V; I_{CQ} = 0.8 A; P_L = 150 W; $R_{th\ mb\text{-}h}$ = 0.15 K/W.



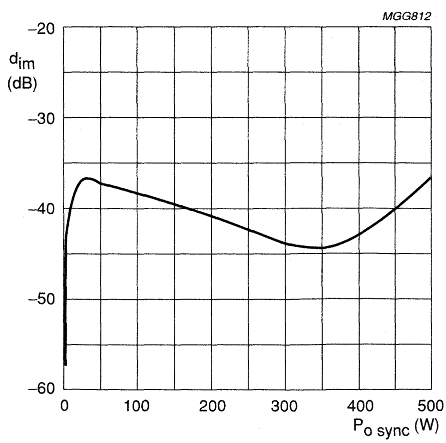
T_h = 25 °C; f = 860 MHz; V_{CE} = 28 V; I_{CQ} = 0.8 A.

Fig.4 Power gain and collector efficiency as functions of load power; typical values.



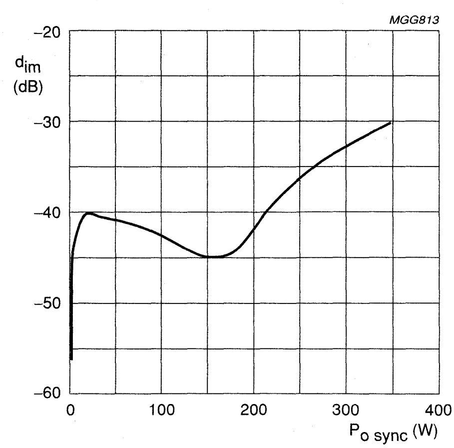
T_h = 25 °C; f = 860 MHz; V_{CE} = 28 V; I_{CQ} = 0.8 A.

Fig.5 Load power as a function of drive power; typical values.



T_h = 25 °C; V_{CE} = 28 V; I_{CQ} = 0.8 A;
2-tone: f_{vision} = 855.25 MHz (-8 dB); $f_{sideband}$ = 859.68 MHz (-16 dB).

Fig.6 Intermodulation distortion as a function of output power; typical values.



T_h = 25 °C; V_{CE} = 28 V; I_{CQ} = 0.8 A;
3-tone: f_{vision} = 855.25 MHz (-8 dB); $f_{sideband}$ = 859.68 MHz (-16 dB); f_{sound} = 860.75 MHz (-10 dB).

Fig.7 Intermodulation distortion as a function of output power; typical values.

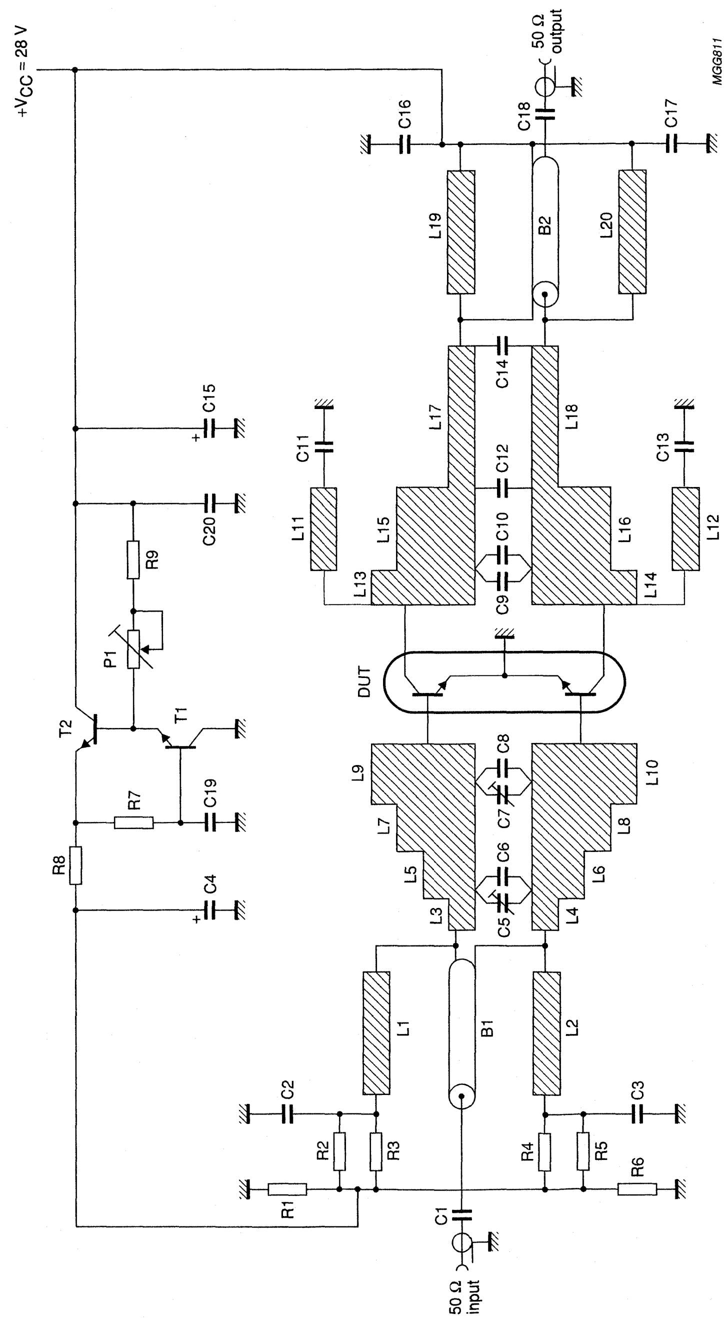
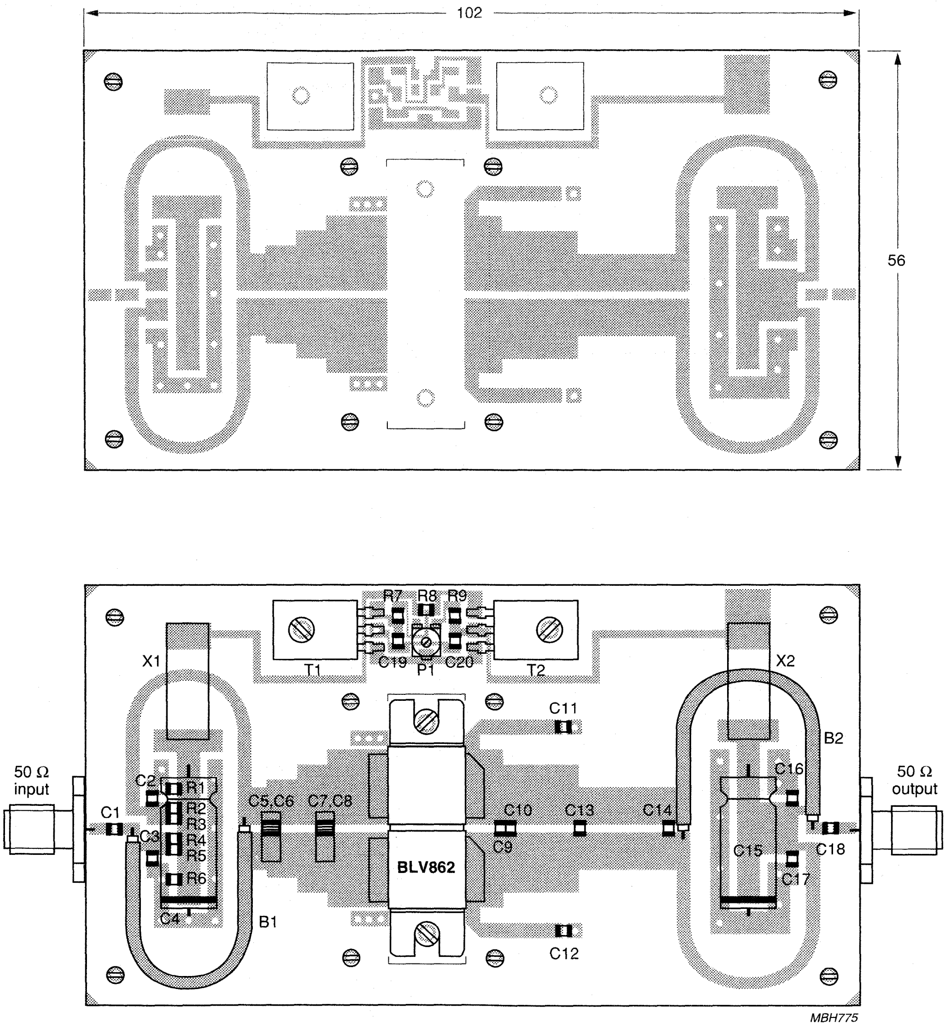


Fig.8 Class-AB test circuit at f = 860 MHz.



Dimensions in mm.

The components are situated on one side of the copper-clad PTFE-glass board (TLX8) from Taconic, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

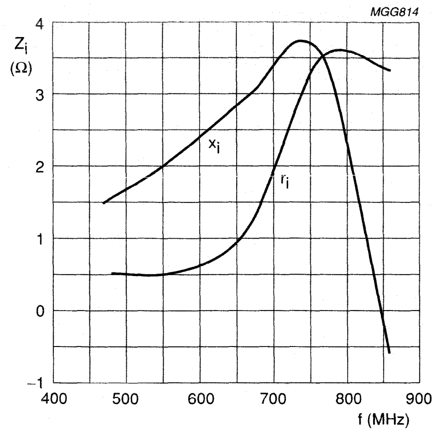
Fig.9 Printed-circuit board and component lay-out for the 860 MHz class-AB test circuit.

List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1	multilayer ceramic chip capacitor; note 1	10 pF		
C2. C3	multilayer ceramic chip capacitor	1 nF		2222 852 47102
C4	solid aluminium capacitor	220 μF; 16 V		2222 031 35221
C5, C7	Tekelec trimmer	1 to 5 pF		
C6, C8	multilayer ceramic chip capacitor; note 2	6.8 pF		
C9, C10	multilayer ceramic chip capacitor; note 3	10 pF		
C11, C13	multilayer ceramic chip capacitor; note 1	100 pF		
C12	multilayer ceramic chip capacitor; note 1	8.2 pF		
C14	multilayer ceramic chip capacitor; note 2	3.9 pF		
C15	solid aluminium capacitor	100 μF; 40 V		2222 031 37101
C16, C17	multilayer ceramic chip capacitor	100 nF		2222 852 47104
C18	multilayer ceramic chip capacitor; note 1	22 pF		
C19	multilayer ceramic chip capacitor; note 1	100 pF		
C20	multilayer ceramic chip capacitor	15 nF		2222 852 47153
L1, L2	stripline; note 4		47 × 1.8 mm	
L3, L4	stripline; note 4		2 × 5 mm	
L5, L6	stripline; note 4		4 × 6 mm	
L7, L8	stripline; note 4		4 × 8 mm	
L9, L10	stripline; note 4		8.1 × 10 mm	
L11, L12	stripline; note 4		15 × 2 mm	
L13, L14	stripline; note 4		5 × 10 mm	
L15, L16	stripline; note 4		10 × 8 mm	
L17, L18	stripline; note 4		12.9 × 5 mm	
L19, L20	stripline; note 4		48.7 × 1.8 mm	
B1	semi rigid coax balun UT70-25	Z = 25 Ω ±1.5 Ω	47 mm	
B2	semi rigid coax balun UT70-25	Z = 25 Ω ±1.5 Ω	48.7 mm	
R1, R6	SMD resistor	100 Ω	0805	2122 118 03881
R2, R3, R4, R5, R8	SMD resistor	1 Ω	0805	2122 118 04562
R7	SMD resistor	47 Ω	0805	2122 118 04598
R9	SMD resistor	1.2 kΩ	0805	2122 118 04579
P1	potentiometer	4.7 kΩ		
X1, X2	copper ribbon hairpin			
T1, T2	NPN transistor	BD139		9330 912 20112

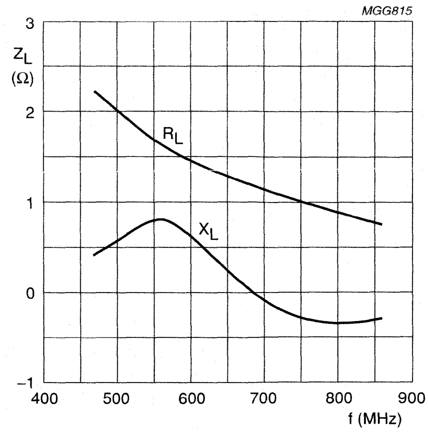
Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. American Technical Ceramics type 100B or capacitor of same quality.
3. American Technical Ceramics type 180R or capacitor of same quality.
4. The striplines are on a double copper-clad printed-circuit board: PTFE-glass material (TLX8) from Taconic (ε_r = 2.55); thickness 0.5 mm.



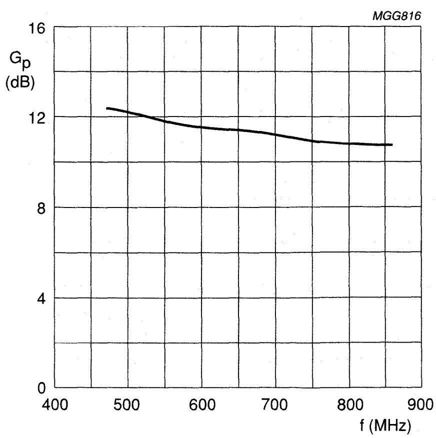
T_h = 25 °C; V_{CE} = 28 V; I_{CQ} = 0.8 A; P_L = 150 W (total device).

Fig.10 Input impedance (per section) as function of frequency (series components); typical values.



T_h = 25 °C; V_{CE} = 28 V; I_{CQ} = 0.8 A; P_L = 150 W (total device).

Fig.11 Load impedance (per section) as function of frequency (series components); typical values.



T_h = 25 °C; V_{CE} = 28 V; I_{CQ} = 0.8 A; P_L = 150 W (total device).

Fig.12 Power gain as a function of frequency; typical values.

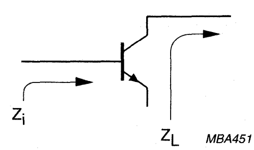


Fig.13 Definition of transistor impedance.

UHF push-pull power transistor BLV897

FEATURES

- Internal input matching for an optimum wideband capability and high gain
- Polysilicon emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Common emitter class-AB operation in base stations in the 800 to 960 MHz frequency band.

DESCRIPTION

NPN silicon planar transistor with two sections in push-pull configuration. The device is encapsulated in a SOT324B 4-lead rectangular flange package with a ceramic cap. The common emitters are connected to the flange.

PINNING - SOT324B

PIN	SYMBOL	DESCRIPTION
1	c1	collector 1
2	c2	collector 2
3	b1	base 1
4	b2	base 2
5	e	common emitters connected to flange

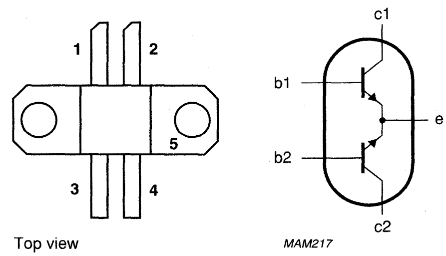


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter push-pull test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_3 (dBc)
CW, class-AB	900	24	2 × 80	30	≥10	≥45	–
2-tone, class-AB	900	24	2 × 80	30 (PEP)	≥11	≥35	<–32; typ. –37

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	70	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	5	A
$I_{C(AV)}$	average collector current		–	5	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; note 1	–	97	W
T_{stg}	storage temperature		−65	+150	°C
T_j	operating junction temperature		–	200	°C

Note

1. Total device; both sections equally loaded.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 97 W; note 1	1.79	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.4	K/W

Note

1. Total device; both sections equally loaded.

CHARACTERISTICS

Values apply to either transistor section; T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 15 mA; I_E = 0	70	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 30 mA; I_B = 0	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 0.6 mA; I_C = 0	3	–	–	V
I_{CBO}	collector-base leakage current	V_{CB} = 28 V; V_{BE} = 0	–	–	1.5	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 1 A	30	–	120	
C_c	collector capacitance	V_{CB} = 24 V; I_E = i_e = 0; f = 1 MHz	–	18	–	pF

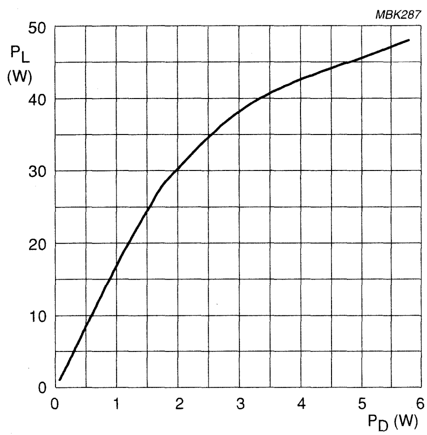
APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter push-pull class-AB test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_3 (dBc)
CW, class-AB	900	24	2 × 80	30	≥10	≥45	–
2-tone, class-AB	900	24	2 × 80	30 (PEP)	≥11	≥35	<–32; typ. –37

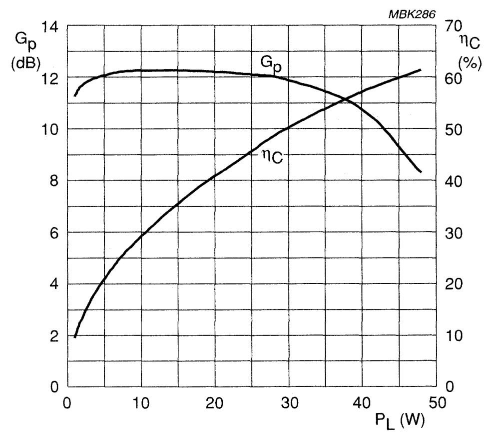
Ruggedness in class-AB operation

The BLV897 is capable of withstanding a load mismatch corresponding to VSWR = 5 : 1 through all phases under the conditions: V_{CE} = 24 V; I_{CQ} = 2 × 80 mA; f = 900 MHz; T_h = 25 °C; P_L = 30 W. The transistor is also capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases at P_L = 30 W (PEP).



V_{CE} = 24 V; I_{CQ} = 2 × 80 mA; f = 900 MHz.

Fig.2 Load power as a function of drive power; typical values.



V_{CE} = 24 V; I_{CQ} = 2 × 80 mA; f = 900 MHz.

Fig.3 Power gain and collector efficiency as functions of load power; typical values.

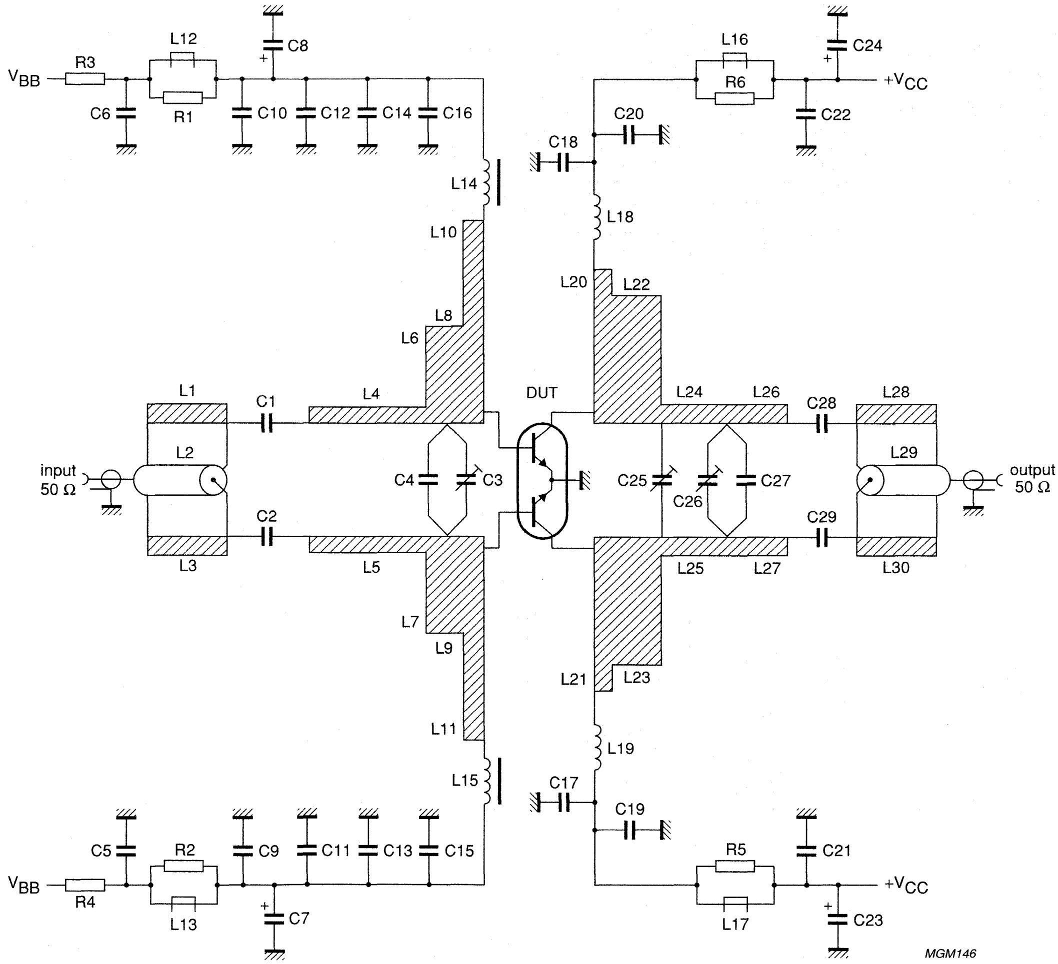


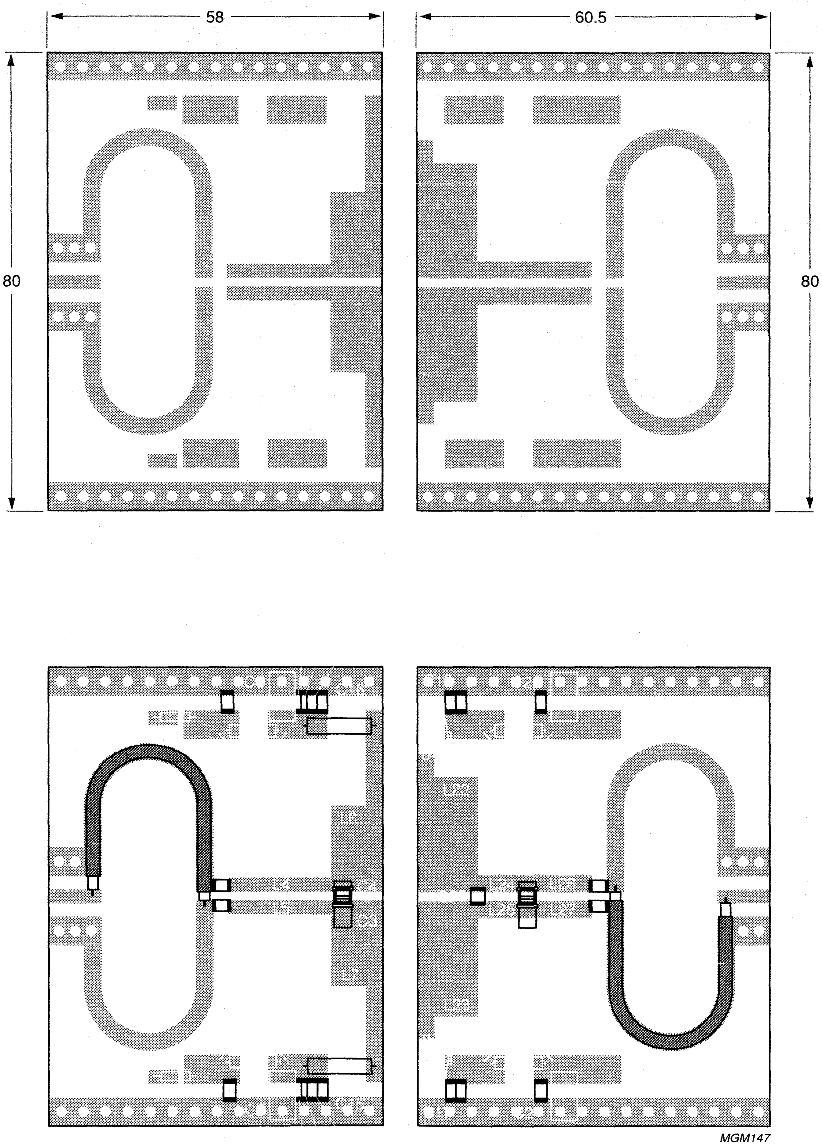
Fig.4 Class-AB test circuit at 900 MHz.

List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C2	multilayer ceramic chip capacitor; note 1	47 pF; 500 V		
C3, C27	Tekelec trimmer (type 37271)	0.6 to 4.5 pF		
C4, C25	multilayer ceramic chip capacitor; note 1	5.6 pF; 500 V		
C5, C6, C13, C14, C19, C20, C21, C22	multilayer ceramic chip capacitor; note 1	300 pF; 200 V		
C7, C8, C23, C24	tantalum SMD capacitor	10 μF; 35 V		
C9, C10	multilayer ceramic chip capacitor	100 nF; 50 V		2222 581 76641
C11, C12	multilayer ceramic chip capacitor	10 nF; 50 V		2222 581 76627
C15, C16, C17, C18	multilayer ceramic chip capacitor; note 1	39 pF; 500 V		
C26	multilayer ceramic chip capacitor; note 1	2.7 pF; 500 V		
C28, C29	multilayer ceramic chip capacitor; note 1	27 pF; 500 V		
L1, L3, L28, L30	stripline; note 2	50 Ω	57.1 × 3 mm	
L2, L29	semi-rigid cable; note 3	50 Ω	ext. conductor length 57.1 mm, ext. dia. 2.2 mm	
L4, L5	stripline; note 2		18 × 2.6 mm	
L6, L7	stripline; note 2		2 × 15 mm	
L8, L9	stripline; note 2		4.8 × 15 mm	
L10, L11	stripline; note 2		3 × 31.5 mm	
L12, L13, L16, L17	Ferroxcube chip-bead grade 4S2			4330 030 36300
L14, L15	microchoke	470 nH		4322 057 04771
L18, L19	4 turns enamelled 1 mm copper wire		int. dia. 6 mm, close wound	
L20, L21	stripline; note 2		3 × 24 mm	
L22, L23	stripline; note 2		7.5 × 20 mm	
L24, L25	stripline; note 2		8.5 × 3 mm	
L26, L27	stripline; note 2		11 × 3 mm	
R1, R2, R5, R6	metal film resistor	5.11 Ω; 0.4 W		2322 151 75118
R3, R4	metal film resistor	4.7 Ω; 0.4 W		2322 151 77508

Notes

1. American Technical Ceramics type 100B or capacitor of same quality.
2. The striplines are on a double copper-clad printed-circuit board: PTFE microfibre-glass dielectric ($\varepsilon_r = 2.2$); thickness 1/32 inch; thickness of the copper sheet 2 x 35 μm.
3. Semi-rigid cables L2 and L29 are soldered on the striplines L1 and L30.



Dimensions in mm.

The components are located on one side of the copper-clad PTFE microfibre-glass board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.5 Printed-circuit board for the 900 MHz class-AB test circuit.

UHF power transistor

BLV904

FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input matching to achieve high power gain and easy design of wideband circuits.

APPLICATIONS

- Common emitter class-AB operation in base stations in the 820 to 960 MHz frequency range.

DESCRIPTION

NPN silicon planar epitaxial power transistor in an 8-lead SOT409B SMD package with ceramic cap.
All leads are isolated from the mounting base.

PINNING - SOT409B

PIN	DESCRIPTION
1, 4, 5, 8	emitter
2, 3	base
6, 7	collector

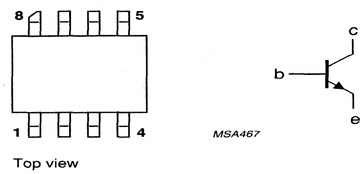


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	960	26	5	≥13	≥50	–
2-tone, class-AB	f_1 = 960; f_2 = 960.1	26	5 (PEP)	typ. 15.5	typ. 40	typ. –30

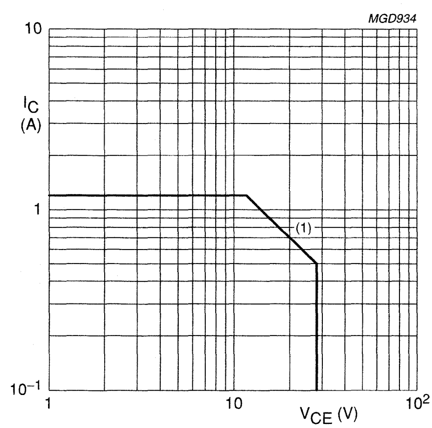
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	28	V
V_{EBO}	emitter-base voltage	open collector	–	4	V
I_C	collector current (DC)		–	1.2	A
$I_{C(AV)}$	collector current (average)		–	1.2	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; note 1	–	17	W
T_{stg}	storage temperature		−65	+150	°C
T_j	operating junction temperature		–	200	°C

Note

1. Transistor with metallized ground plane mounted on a printed-circuit board, see *"Mounting and soldering recommendations in the General part of handbook SC08b"*.



(1) T_s = 60 °C.

Fig.2 DC SOAR.

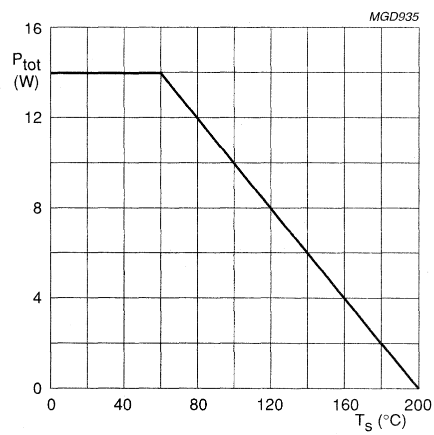


Fig.3 Total power dissipation as a function of the soldering point temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 17 W; T_{mb} = 25 °C; note 1	10	K/W

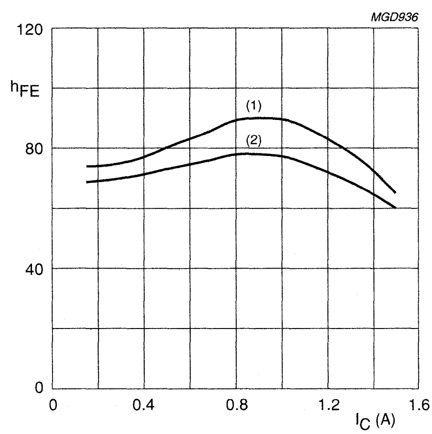
Note

1. Transistor with metallized ground plane mounted on a printed-circuit board, see *"Mounting and soldering recommendations in the General part of handbook SC08b"*.

CHARACTERISTICS

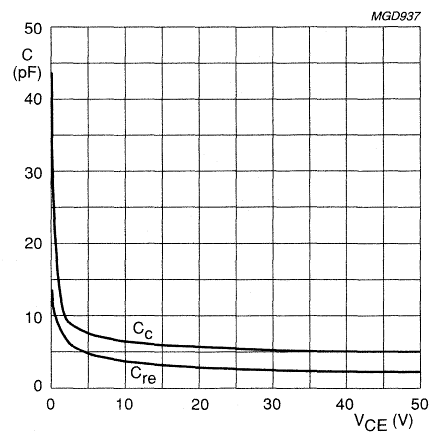
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 5 mA	60	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 10 mA	28	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.5 mA	4	–	–	V
I_{CES}	collector leakage current	V_{CE} = 26 V; V_{BE} = 0	–	–	1.3	mA
h_{FE}	DC current gain	V_{CE} = 26 V; I_C = 600 mA	30	–	120	
C_c	collector capacitance	V_{CB} = 26 V; I_E = i_e = 0; f = 1 MHz	–	6	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	2.5	–	pF



(1) V_{CE} = 26 V; t_p = 500 µs; δ = < 1 %.
(2) V_{CE} = 10 V.

Fig.4 DC current gain as a function of collector current; typical values.



f = 1 MHz.

Fig.5 Capacitance as a function of collector-emitter voltage; typical values.

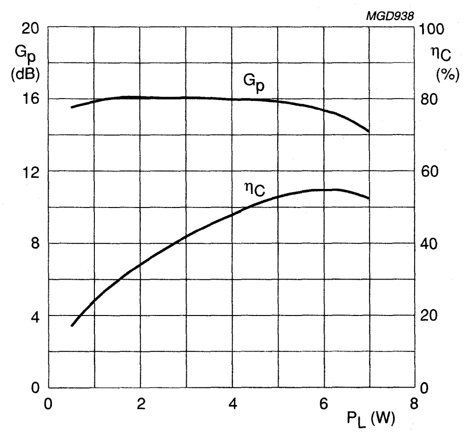
APPLICATION INFORMATION

RF performance at T_{mb} = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	960	26	15	5	≥13 typ. 15.5	≥50 typ. 55	–
2-tone, class-AB	f_1 = 960; f_2 = 960.1	26	15	5 (PEP)	typ. 15.5	typ. 40	typ. −30

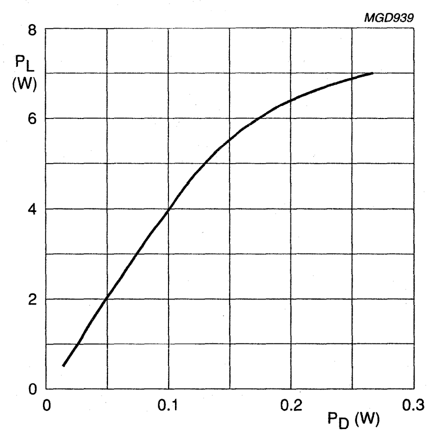
Ruggedness in class-AB operation

The BLV904 is capable of withstanding a load mismatch corresponding to VSWR = 20 : 1 through all phases under the following conditions: f = 960 MHz; V_{CE} = 26 V; I_{CQ} = 15 mA; P_L = 5 W; T_{mb} = 25 °C.



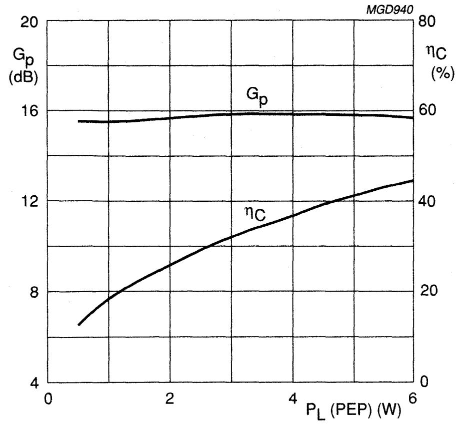
CW, class-AB; V_{CE} = 26 V; I_{CQ} = 15 mA; f = 960 MHz; T_{mb} = 25 °C.

Fig.6 Power gain and collector efficiency as functions of load power; typical values.



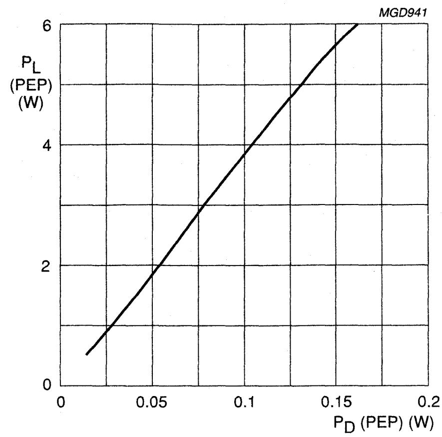
CW, class-AB; V_{CE} = 26 V; I_{CQ} = 15 mA; f = 960 MHz; T_{mb} = 25 °C.

Fig.7 Load power as a function of drive power; typical values.



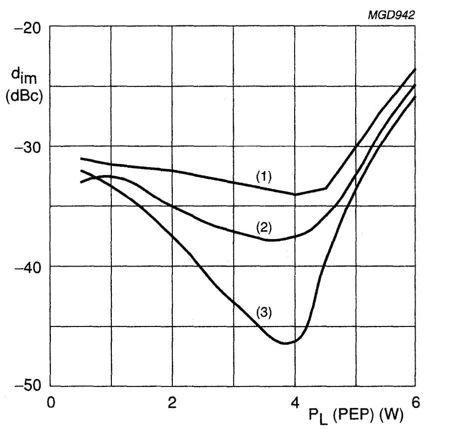
V_{CE} = 26 V; I_{CQ} = 15 mA; f_1 = 960 MHz; f_2 = 960.1 MHz.

Fig.8 Power gain and collector efficiency as functions of peak envelope load power; typical values.



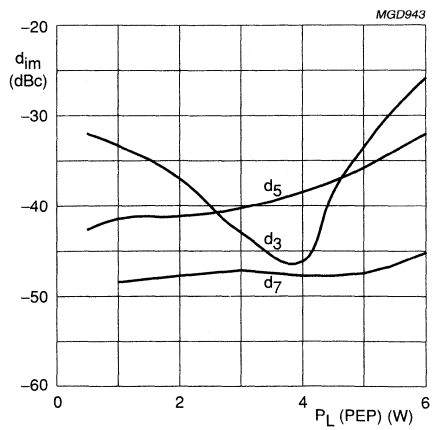
V_{CE} = 26 V; I_{CQ} = 15 mA; f_1 = 960 MHz; f_2 = 960.1 MHz.

Fig.9 Peak envelope load power as a function of peak envelope drive power; typical values.



V_{CE} = 26 V; f_1 = 960 MHz; f_2 = 960.1 MHz.
(1) I_{CQ} = 15 mA. (2) I_{CQ} = 40 mA. (3) I_{CQ} = 60 mA.

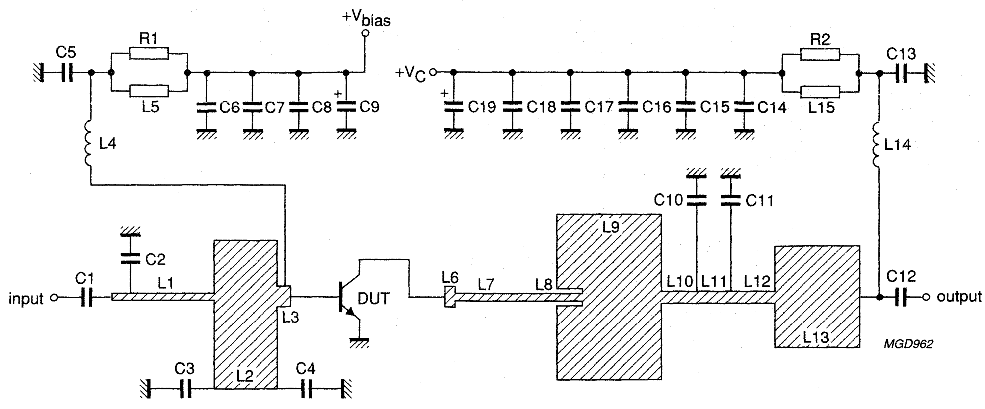
Fig.10 Third order intermodulation distortion as a function of peak envelope load power; typical values.



V_{CE} = 26 V; I_{CQ} = 15 mA; f_1 = 960 MHz; f_2 = 960.1 MHz.

Fig.11 Intermodulation distortion as a function of peak envelope load power; typical values.

Test circuit information



f = 960 MHz.

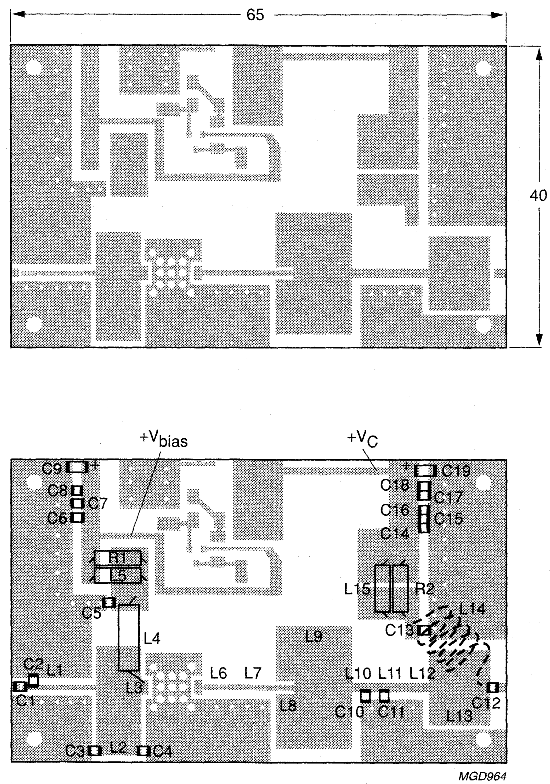
Fig.12 Class-AB test circuit.

List of components (see Figs 12 and 13)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C12	multilayer ceramic chip capacitor; note 1	24 pF		
C2	multilayer ceramic chip capacitor; note 1	3.3 pF		
C3	multilayer ceramic chip capacitor, note 1	2.2 pF		
C4	multilayer ceramic chip capacitor; note 1	1.6 pF		
C5, C6, C13, C18	multilayer ceramic chip capacitor; note 2	200 pF		
C7, C17	multilayer ceramic chip capacitor; note 2	110 pF		
C8, C14, C15, C16	multilayer ceramic chip capacitor	100 nF		2222 581 16641
C9, C19	tantalum SMD capacitor	10 μF; 35 V		
C10	multilayer ceramic chip capacitor; note 1	1.8 pF		
C11	multilayer ceramic chip capacitor; note 1	13 pF		
L1	stripline; note 3	50 Ω	8.2 × 0.65 mm	
L2	stripline; note 3	4.9 Ω	6 × 14 mm	
L3, L6	stripline; note 3	24.5 Ω	1.5 × 2 mm	
L4	RF-choke	0.22 μH		
L5, L15	grade 4S2 ferroxcube chip-bead			4330 030 36301
L7	stripline; note 3	46.3 Ω	12.22 × 0.7 mm	
L8	stripline; notes 3 and 4	4.3 Ω	7.58 × 16.1 mm	
L9	stripline; note 3	4.3 Ω	10 × 16.1 mm	
L10	stripline; note 3	34.3 Ω	1.9 × 1.2 mm	
L11	stripline; note 3	34.3 Ω	3.2 × 1.2 mm	
L12	stripline; note 3	34.3 Ω	4.8 × 1.2 mm	
L13	stripline; note 3	6.7 Ω	8 × 9.9 mm	
L14	5 turns enamelled 1 mm copper wire			
R1	metal film resistor	100 Ω; 0.4 W		
DUT	transistor	BLV904		

Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. American Technical Ceramics type 100B or capacitor of same quality.
3. The striplines are on a double copper-clad printed-circuit board with epoxy fibreglass dielectric (ε_r = 10.2); thickness 0.64 mm.
4. Not connected over total length; only 7.58 mm connected.

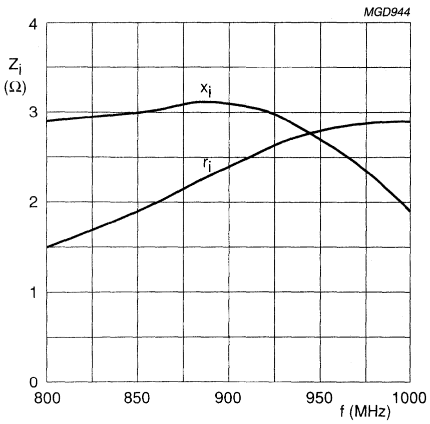


Dimensions in mm.

f = 960 MHz.

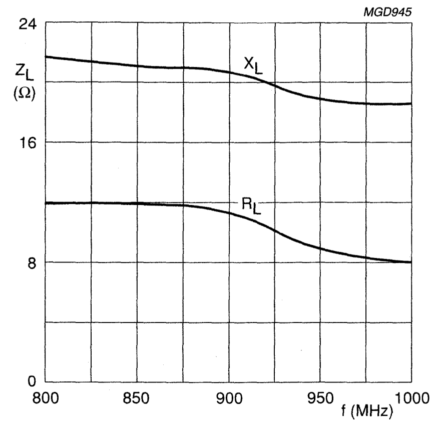
The components are situated on one side of the copper-clad epoxy fibreglass board, the other side is not etched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.13 Component layout for class-AB test circuit.



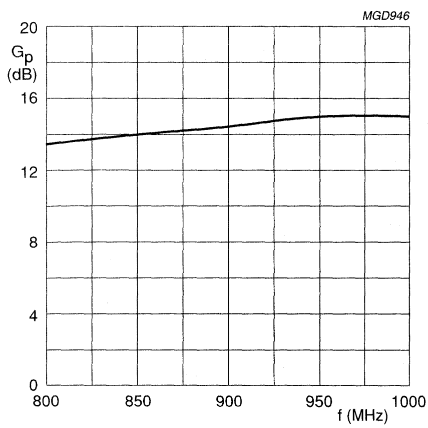
V_{CE} = 26 V; I_{CQ} = 15 mA; P_L = 5 W; T_{mb} = 25 °C.

Fig.14 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 15 mA; P_L = 5 W; T_{mb} = 25 °C.

Fig.15 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 15 mA; P_L = 5 W; T_{mb} = 25 °C.

Fig.16 Power gain as a function of frequency; typical values.

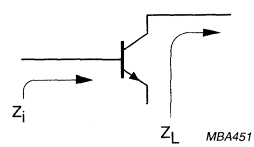


Fig.17 Definition of transistor impedance.

MOUNTING RECOMMENDATIONS

Heat from the device is transferred via the leads and the metallized underside. For optimum heat transfer it is recommended that the transistor be mounted on a grounded metallized area on the component side of the printed-circuit board. This metallized area should contain a large number of metallized, solder-filled through-holes. The non-component side of the printed-circuit board forms a ground plane. When the printed-circuit board is mounted on the heatsink using heatsink compound, a thermal resistance from mounting base to heatsink of 0.9 K/W can be attained.

UHF power transistor — BLV909

FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input matching to achieve high power gain and easy design of wideband circuits.

APPLICATIONS

- Common emitter class-AB operation in base stations in the 820 to 960 MHz frequency range.

DESCRIPTION

NPN silicon planar epitaxial transistor in an 8-lead SOT409B SMD package with a ceramic cap. All leads are isolated from the mounting base.

PINNING - SOT409B

PIN	SYMBOL	DESCRIPTION
1, 4, 5, 8	e	emitter
2, 3	b	base
6, 7	c	collector

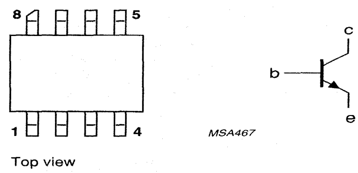


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	960	26	9	≥9.5	≥50	–
2-tone, class-AB	f_1 = 960; f_2 = 960.1	26	9 (PEP)	≥9.5	≥35	typ. −30

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

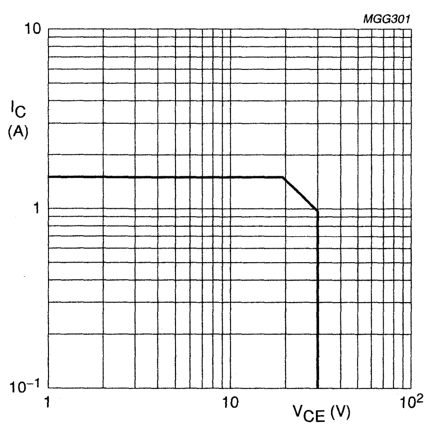
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	70	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	1.5	A
$I_{C(AV)}$	average collector current		–	1.5	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; note 1	–	29	W
T_{stg}	storage temperature		−65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 29 W; T_{mb} = 25 °C; note 1	6	K/W

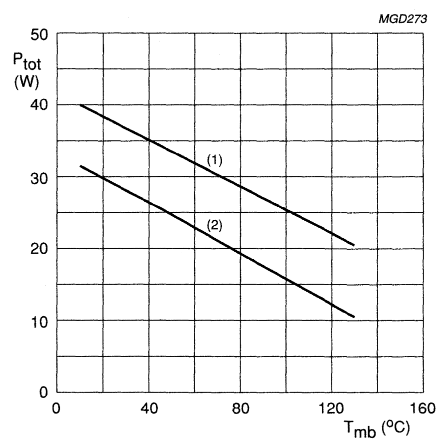
Note to the Limiting values and Thermal characteristics

1. Transistor with metallized ground plane mounted on a printed-circuit board, see *"Mounting and soldering section, Handbook SC08a."*



T_{mb} = 25 °C.

Fig.2 DC SOAR.



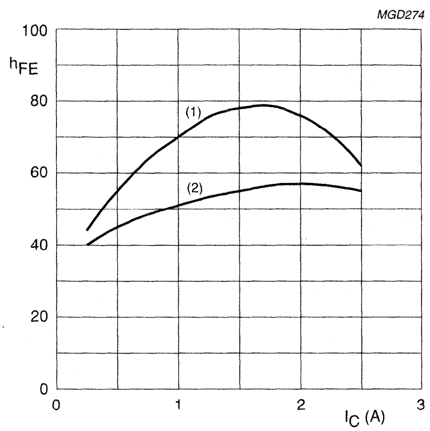
(1) Short-time operation during mismatch.
(2) Continuous operation.

Fig.3 Power derating curves.

CHARACTERISTICS

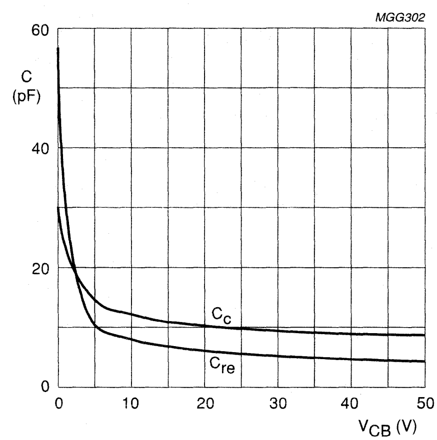
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 5 mA	70	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 15 mA	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.3 mA	3	–	–	V
I_{CES}	collector leakage current	V_{CE} = 28 V; V_{BE} = 0	–	–	0.75	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 500 mA	30	–	120	
C_c	collector capacitance	V_{CB} = 26 V; I_E = i_e = 0; f = 1 MHz	–	10	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	6	–	pF



(1) V_{CE} = 26 V; t_p = 500 µs; $\delta \leq 1$ %.
(2) V_{CE} = 10 V.

Fig.4 DC current gain as a function of collector current; typical values.



f = 1 MHz.

Fig.5 Collector and feedback capacitance as a function of collector-base voltage; typical values.

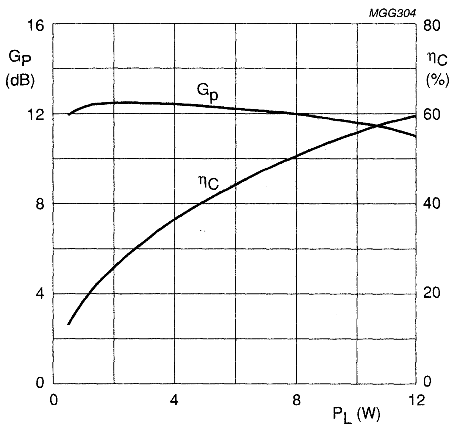
APPLICATION INFORMATION

RF performance at T_{mb} = 25 °C in a common emitter test circuit (see Figs 12 and 13).

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	960	26	25	9	≥9.5, typ. 11.5	≥50, typ. 55	–
2-tone, class-AB	f_1 = 960; f_2 = 960.1	26	25	9 (PEP)	≥9.5, typ. 11.5	≥35, typ. 40	typ. –30

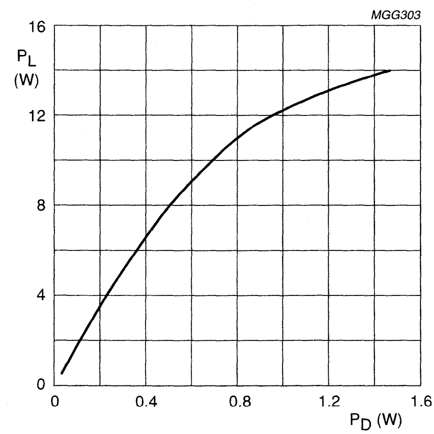
Ruggedness in class-AB operation

The BLV909 is capable of withstanding a load mismatch corresponding to VSWR = 20 : 1 through all phases under the following conditions: f = 960 MHz; V_{CE} = 26 V; I_{CQ} = 25 mA; T_{mb} = 25 °C.



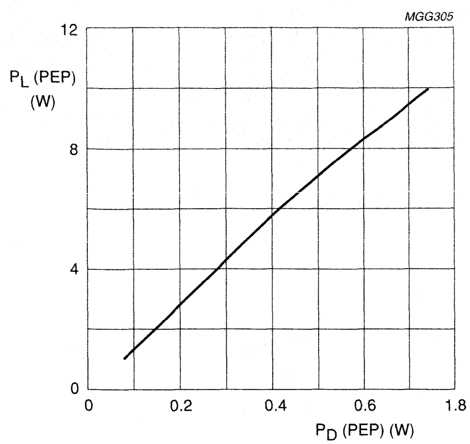
V_{CE} = 26 V; I_{CQ} = 25 mA; f = 960 MHz.

Fig.6 Power gain and collector efficiency as functions of load power; typical values.



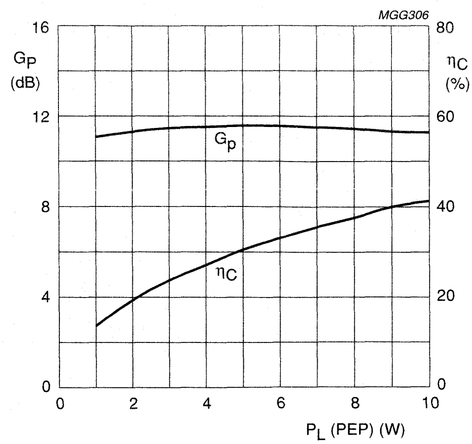
V_{CE} = 26 V; I_{CQ} = 25 mA; f = 960 MHz.

Fig.7 Load power as a function of drive power; typical values.



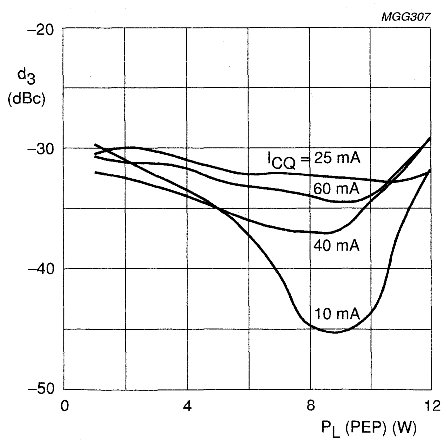
V_{CE} = 26 V; I_{CQ} = 25 mA; f_1 = 960 MHz; f_2 = 960.1 MHz.

Fig.8 Peak envelope load power as a function of drive power; typical values.



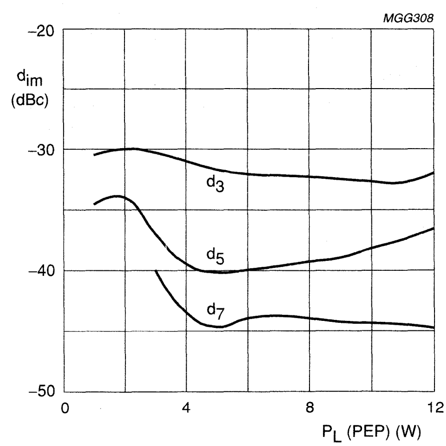
V_{CE} = 26 V; I_{CQ} = 25 mA; f_1 = 960 MHz; f_2 = 960.1 MHz.

Fig.9 Power gain and efficiency as functions of peak envelope load power; typical values.



V_{CE} = 26 V; f_1 = 960 MHz; f_2 = 960.1 MHz.

Fig.10 Third order intermodulation distortion as a function of peak envelope load power; typical values.



V_{CE} = 26 V; I_{CQ} = 25 mA; f_1 = 960 MHz; f_2 = 960.1 MHz.

Fig.11 Intermodulation distortion as a function of peak envelope load power; typical values.

Test circuit information

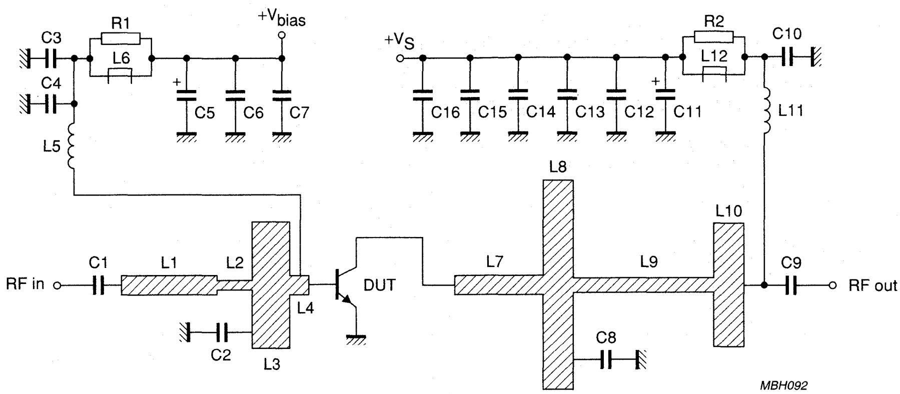


Fig.12 Common emitter test circuit for class-AB operation at 900-960 MHz.

Mounting recommendations

Both the metallized rear side and the leads of the device contribute to the heat flow. For the best results, it is recommended to mount the transistor on a grounded metallized area on the printed-circuit board, which is equipped with a large number of through metallized holes filled with solder.

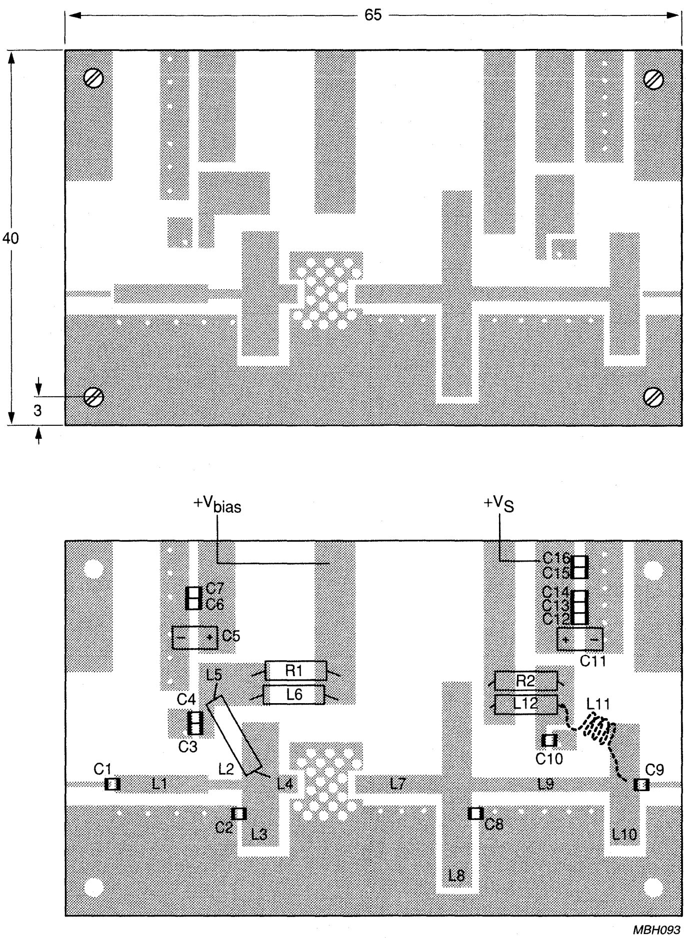
When the heatsink is mounted to the rear side of the printed-circuit board by means of heatsink compound, a thermal resistance between the mounting base and the heatsink of 0.9 K/W can be achieved.

List of components used in test circuit (see Figs 12 and 13)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C9	multilayer ceramic chip capacitor; note 1	24 pF		
C2	multilayer ceramic chip capacitor; notes 1 and 2	5.6 pF		
C3, C7, C10, C16	multilayer ceramic chip capacitor; note 3	110 pF		
C4, C15	multilayer ceramic chip capacitor; note 3	200 pF		
C5, C11	tantalum SMD capacitor	10 μF, 35 V		
C6, C12, C13, C14	ceramic chip capacitor	100 nF		2222 852 47104
C8	multilayer ceramic chip capacitor; note 1	8.2 pF		
L1	stripline; note 4	24.3 Ω	length 9.85 mm width 2 mm	
L2	stripline; note 4	37.5 Ω	length 3.63 mm width 1 mm	
L3	stripline; note 4	5.11 Ω	length 4.1 mm width 13.3 mm	
L4	stripline; note 4	24.3 Ω	length 2 mm width 2 mm	
L5	RF choke	0.22 μH		
L6, L12	grade 4S2 ferroxcube chip-bead			
L7	stripline; note 4	24.3 Ω	length 9.2 mm width 2 mm	
L8	stripline; note 4	3.2 Ω	length 3.1 mm width 22 mm	
L9	stripline; note 4	29.4 Ω	length 14.4 mm width 1.5 mm	
L10	stripline; note 4	5.22 Ω	length 3.2 mm width 13 mm	
L11	5 turns enamelled 1 mm copper wire	35 nH	pitch 1.23 mm int. dia. 3.2 mm	
R1, R2	metal film resistor	100 Ω, 0.4 W		

Notes

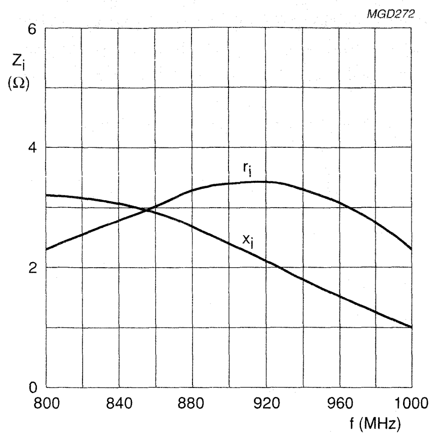
1. American Technical Ceramics type 100A or capacitor of same quality.
2. For operation at 820 to 900 MHz: C2 = 6.2 pF.
3. American Technical Ceramics type 100B or capacitor of same quality
4. The striplines are on a double copper-clad printed-circuit board, with PTFE fibre-glass dielectric (ε_r = 10.2); thickness 0.64 mm.



Dimensions in mm.

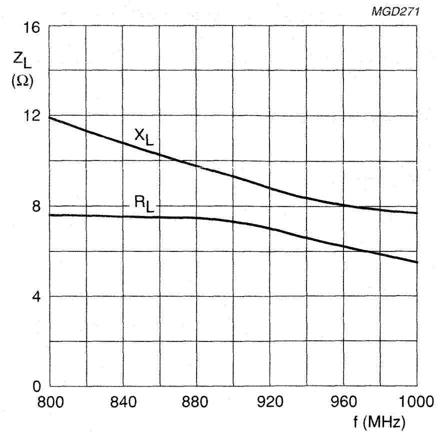
The components are situated on one side of the copper-clad PCB, the other side is unetched and serves as a ground plane.
Earth connections from the component side to the ground plane are made by through metallization.

Fig.13 Component layout and printed-circuit board and component lay-out for 900 to 960 MHz class-AB test circuit.



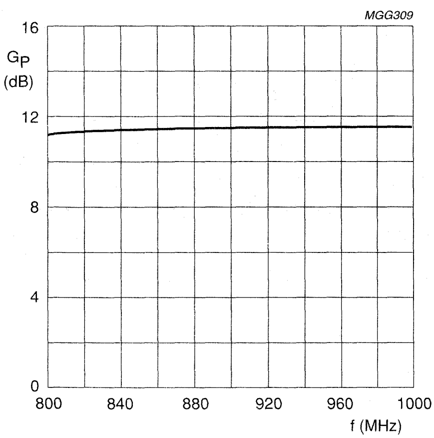
V_{CE} = 26 V; I_{CQ} = 25 mA; P_L = 9 W; T_{mb} = 25 °C.

Fig.14 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 25 mA; P_L = 9 W; T_{mb} = 25 °C.

Fig.15 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 25 mA; P_L = 9 W; T_{mb} = 25 °C.

Fig.16 Power gain as a function of frequency; typical values.

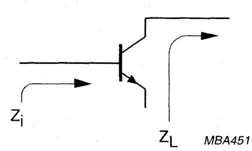


Fig.17 Definition of transistor impedance.

UHF power transistor | BLV910

FEATURES

- Internal input matching to achieve high power gain and easy design of wideband circuits
- Emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Base station transmitters in the 820 to 960 MHz range.

PINNING - SOT171

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	e	emitter
3	b	base
4	c	collector
5	e	emitter
6	e	emitter

DESCRIPTION

NPN silicon planar epitaxial transistor intended for common emitter class-AB operation. The transistor is encapsulated in a 6-lead SOT171 flange envelope with a ceramic cap. All leads are isolated from the flange.

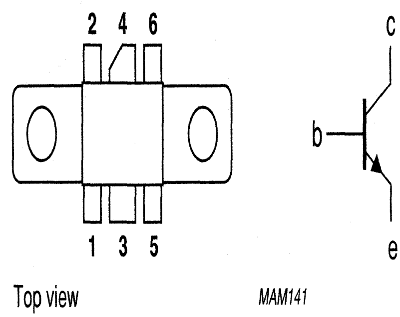


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	960	26	10	≥ 11	≥ 55

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

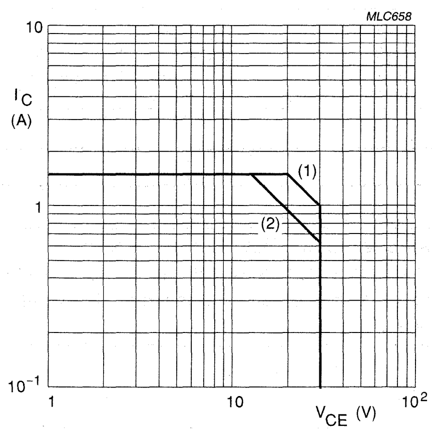
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	70	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	1.5	A
$I_{C(AV)}$	average collector current		–	1.5	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	30	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

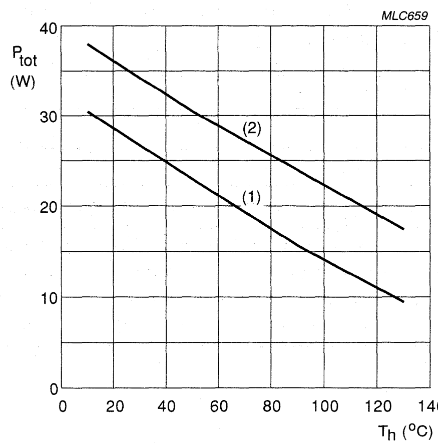
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 30 W; T_{mb} = 25 °C	5.85	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.4	K/W



(1) T_{mb} = 25 °C.
(2) T_h = 70 °C.

Fig.2 DC SOAR.



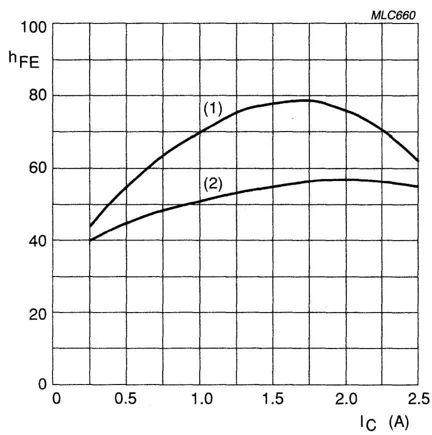
(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power derating curves.

CHARACTERISTICS

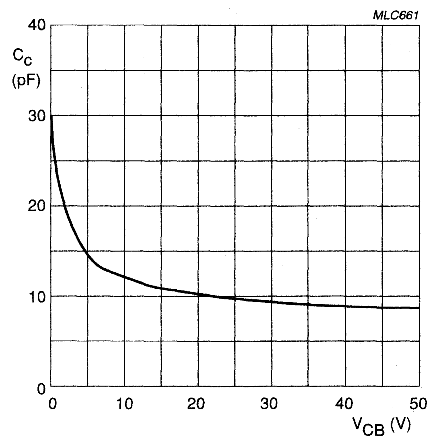
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 5 mA	70	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 15 mA	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.3 mA	3	–	–	V
I_{CES}	collector leakage current	V_{BE} = 0; V_{CE} = 28 V	–	–	0.75	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 0.5 A;	30	–	120	
C_c	collector capacitance	V_{CB} = 26 V; I_E = i_e = 0; f = 1 MHz	–	10	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	6	–	pF



(1) V_{CE} = 26 V: measured under pulsed conditions; $t_p \leq 500$ µs; $\delta < 0.01$.
(2) V_{CE} = 10 V.

Fig.4 DC current gain as a function of collector current; typical values.



$I_E = i_e = 0$; f = 1 MHz.

Fig.5 Collector capacitance as a function of collector-base voltage; typical values.

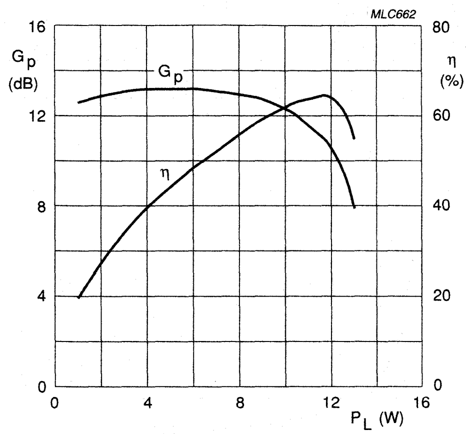
APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter, class-AB test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	960	26	25	10	≥11	≥55

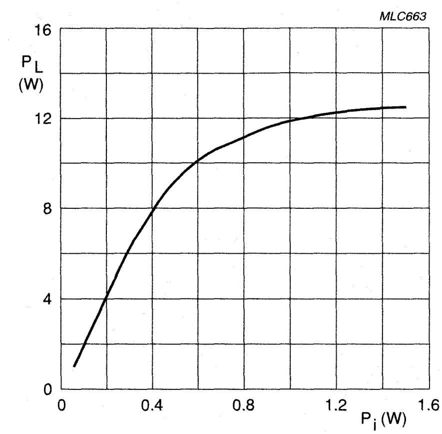
Ruggedness in class-AB operation

The BLV910 is capable of withstanding a load mismatch corresponding to VSWR = 20 : 1 through all phases at rated output power, under the following conditions: V_{CE} = 26 V; f = 960 MHz; I_{CQ} = 25 mA; T_{mb} = 25 °C.



V_{CE} = 26 V.
I_{CQ} = 25 mA.
f = 960 MHz.

Fig.6 Power gain and efficiency as functions of load power; typical values.



V_{CE} = 26 V.
I_{CQ} = 25 mA.
f = 960 MHz.

Fig.7 Load power as a function of input power; typical values.

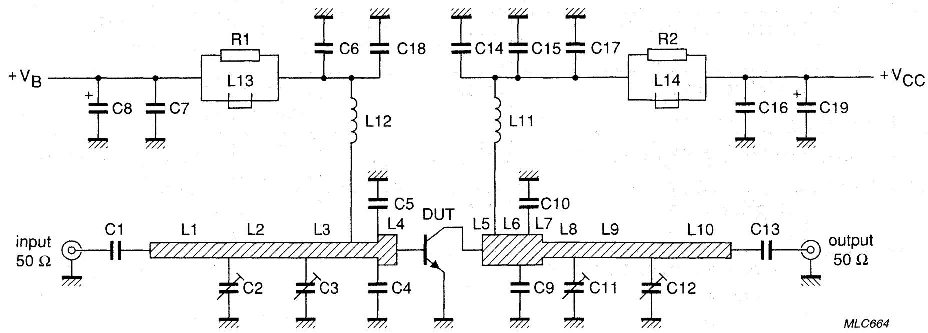


Fig.8 Class-AB test circuit at f = 960 MHz.

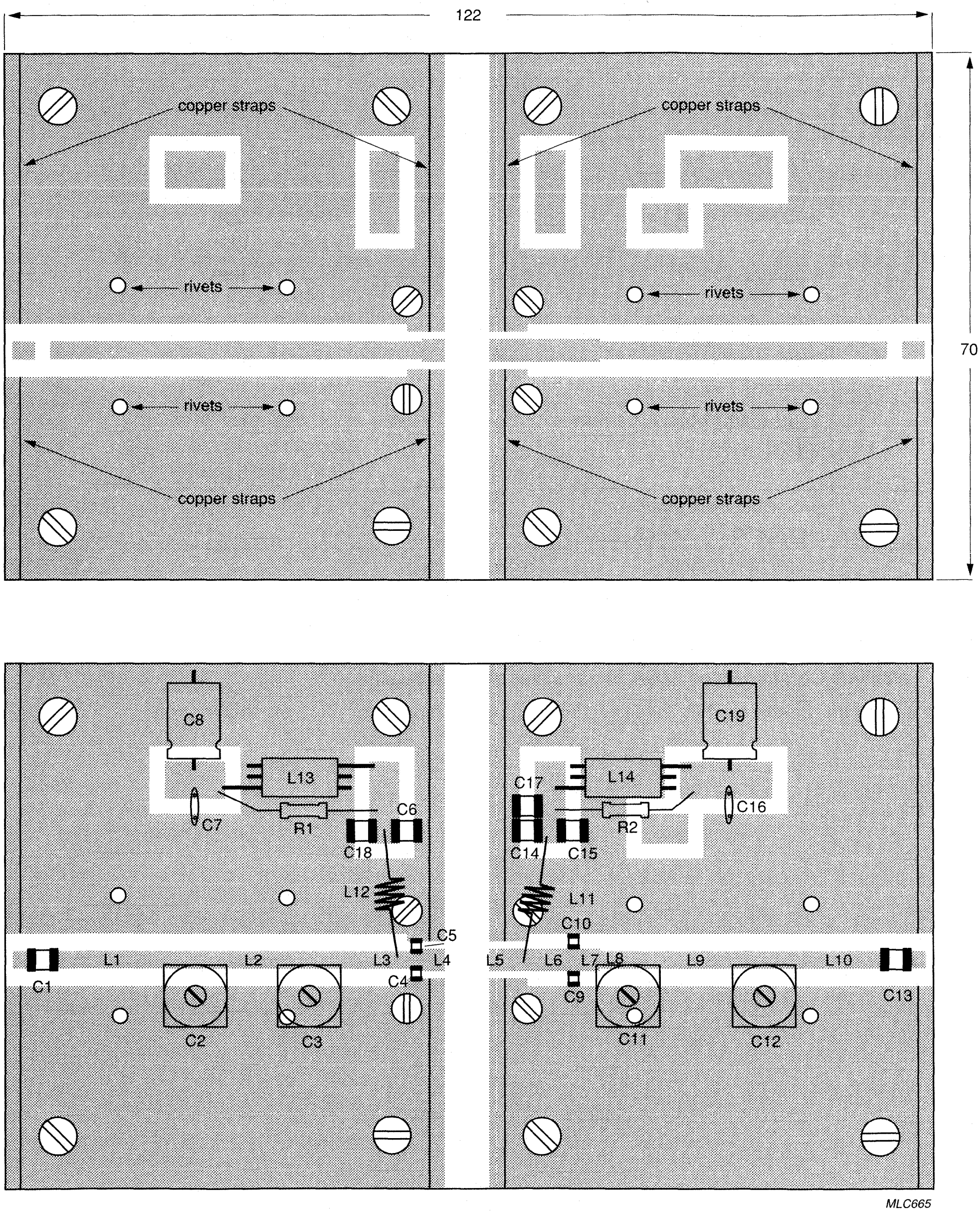
List of components (see Figs 8 and 9)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C13	multilayer ceramic chip capacitor; note 1	43 pF		
C2, C3, C11, C12	film dielectric trimmer	1.4 pF to 5.5 pF		2222 809 09001
C4, C5	multilayer ceramic chip capacitor; note 2	10 pF		
C6	multilayer ceramic chip capacitor; note 1	150 pF		
C7, C16	ceramic capacitor	22 nF		2222 640 08223
C8, C19	solid aluminium capacitor	10 μF, 63 V		2222 030 38109
C14	multilayer ceramic chip capacitor; note 1	20 pF		
C9, C10	multilayer ceramic chip capacitor; note 2	8.2 pF		
C17	multilayer ceramic chip capacitor; note 1	220 pF		
C15, C18	multilayer ceramic chip capacitor; note 1	62 pF		
L1	stripline; note 3	50 Ω	length 17 mm width 2.4 mm	
L2, L3	stripline; note 3	50 Ω	length 14 mm width 2.4 mm	
L4	stripline; note 3	43 Ω	length 4 mm width 3 mm	

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
L5, L6	stripline; note 3	43 Ω	length 3 mm width 3 mm	
L7	stripline; note 3	43 Ω	length 3.4 mm width 3 mm	
L8	stripline; note 3	50 Ω	length 6.3 mm width 2.4 mm	
L9	stripline; note 3	50 Ω	length 18 mm width 2.4 mm	
L10	stripline; note 3	50 Ω	length 15 mm width 2.4 mm	
L11	4 turns enamelled 0.8 mm copper wire		int. diameter 4mm length 5 mm leads 2 × 5 mm	
L12	3 turns enamelled 0.8 mm copper wire		int. diameter 3mm length 5 mm leads 2 × 5 mm	
L13, L14	grade 3B Ferroxcube wideband RF choke			4312 020 36642
R1, R2	metal film resistor	10 Ω, 0.4 W		2322 151 71009

Notes

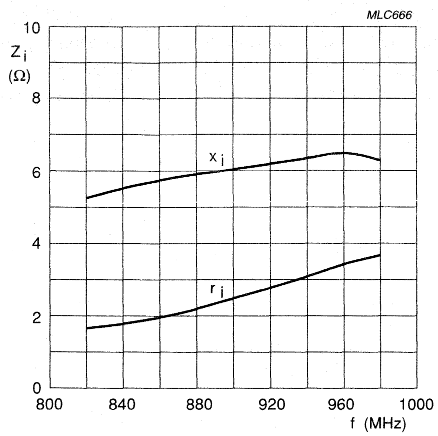
1. American Technical Ceramics type 100B or capacitor of same quality.
2. American Technical Ceramics type 100A or capacitor of same quality.
3. The striplines are on double-clad PCB with PTFE fibre-glass dielectric (ε_r = 2.2); thickness $^1/_{32}$".



Dimensions in mm.

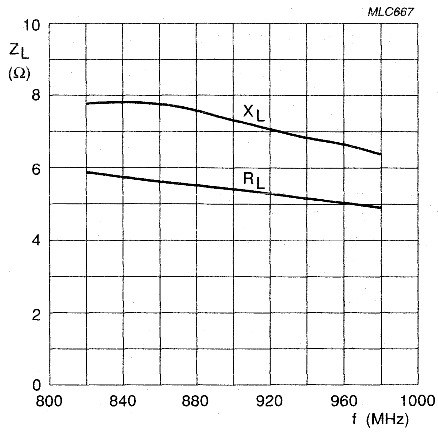
The components are located on one side of the PTFE fibre-glass board, the other side being fully metallized to serve as an earth. Earth connections are made by fixing screws, hollow rivets and copper straps around the board and under the emitters to provide a direct contact between the component side and the ground plane.

Fig.9 Component layout for 960 MHz class-AB test circuit.



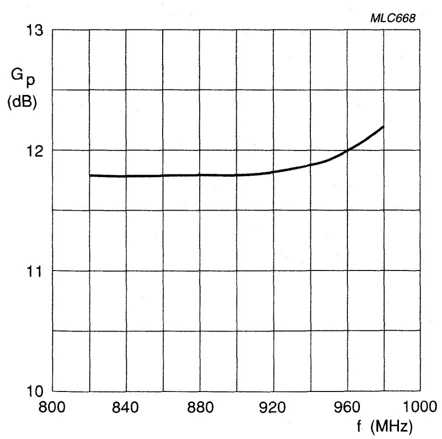
V_{CE} = 26 V.
I_{CQ} = 25 mA.
T_{mb} = 25 °C.
P_L = 10 W.

Fig.10 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V.
I_{CQ} = 25 mA.
T_{mb} = 25 °C.
P_L = 10 W.

Fig.11 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V.
I_{CQ} = 25 mA.
T_{mb} = 25 °C.
P_L = 10 W.

Fig.12 Power gain as a function of frequency; typical values.

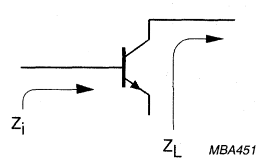


Fig.13 Definition of transistor impedance.

UHF power transistor BLV920

FEATURES

- Internal input matching to achieve high power gain and easy design of wideband circuits
- Emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Base station transmitters in the 820 to 960 MHz range.

PINNING - SOT171A

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	e	emitter
3	b	base
4	c	collector
5	e	emitter
6	e	emitter

DESCRIPTION

NPN silicon planar epitaxial transistor intended for common emitter class-AB operation. The transistor is encapsulated in a 6-lead SOT171A flange envelope with a ceramic cap. All leads are isolated from the flange.

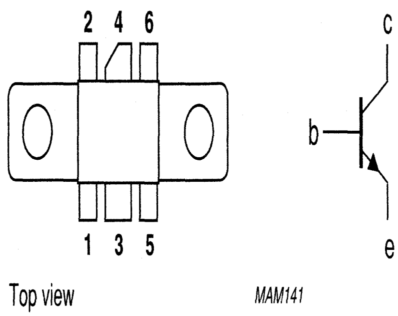


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	960	26	20	≥10	≥ 55

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

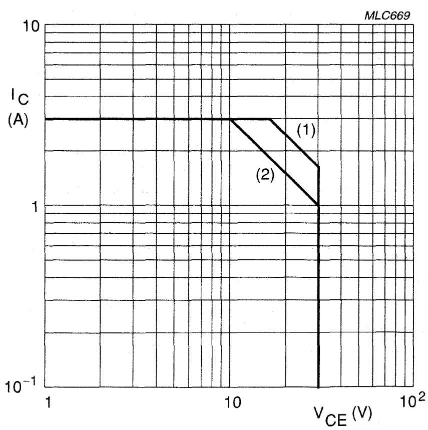
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	70	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	3	A
$I_{C(AV)}$	average collector current		–	3	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	50	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

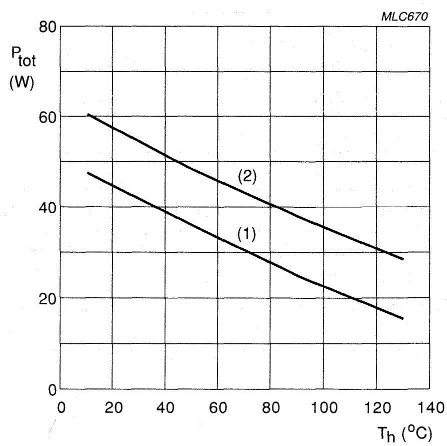
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 49 W; T_{mb} = 25 °C	3.5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.4	K/W



(1) T_{mb} = 25 °C.
(2) T_h = 70 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power derating curves.

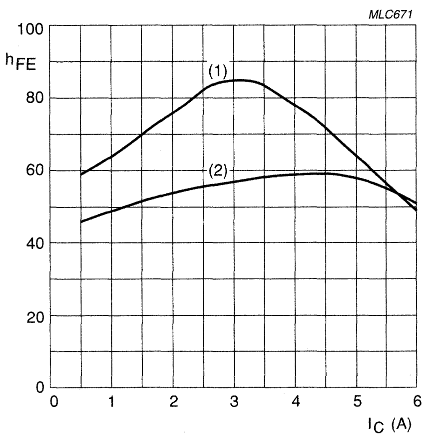
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 15 mA	70	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 30 mA	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.6 mA	3	–	–	V
I_{CES}	collector leakage current	V_{BE} = 0; V_{CE} = 28 V	–	–	1.5	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 1 A; note 1	30	–	120	
C_c	collector capacitance	V_{CB} = 26 V; $I_E = i_e$ = 0; f = 1 MHz	–	17	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	11	–	pF

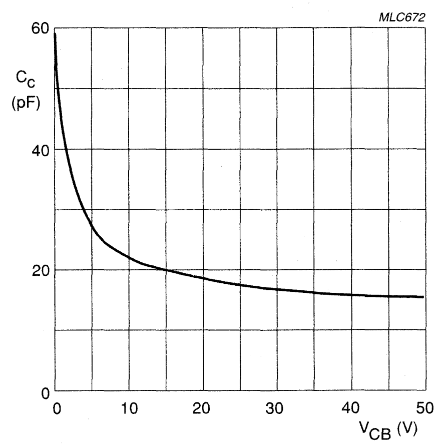
Note

1. Measured under pulsed conditions: $t_p \leq 500$ µs; $\delta \leq 0.01$.



Measured under pulsed conditions; $t_p \leq 500$ µs; $\delta \leq 0.01$.
(1) V_{CE} = 26 V.
(2) V_{CE} = 10 V.

Fig.4 DC current gain as a function of collector current; typical values.



$I_E = i_e$ = 0; f = 1 MHz.

Fig.5 Collector capacitance as a function of collector-base voltage; typical values.

UHF power transistor BLV920

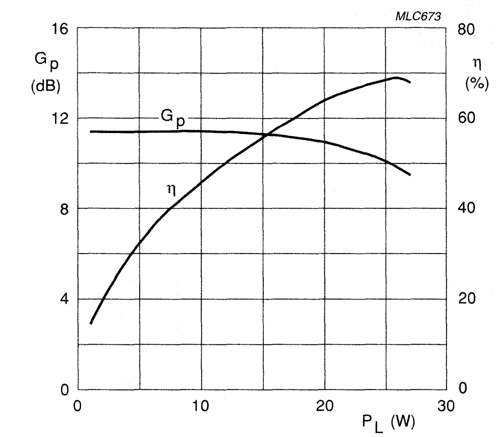
APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter, class-AB test circuit; $R_{th\ mb\text{-}h}$ = 0.4 K/W.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	960	26	50	20	≥10	≥55

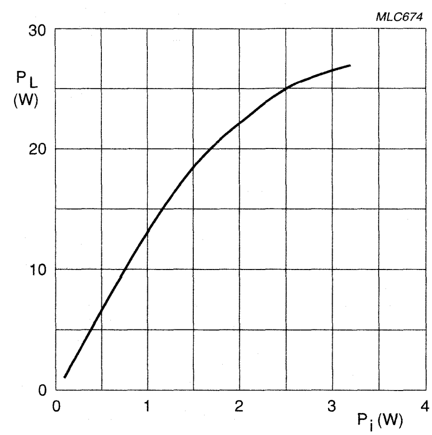
Ruggedness in class-AB operation

The BLV920 is capable of withstanding a load mismatch corresponding to VSWR = 20 : 1 through all phases at rated output power, under the following conditions: V_{CE} = 26 V; f = 960 MHz; I_{CQ} = 50 mA; T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.4 K/W.



V_{CE} = 26 V.
I_{CQ} = 50 mA.
f = 960 MHz.

Fig.6 Power gain and efficiency as functions of load power; typical values.



V_{CE} = 26 V.
I_{CQ} = 50 mA.
f = 960 MHz.

Fig.7 Load power as a function of input power; typical values.

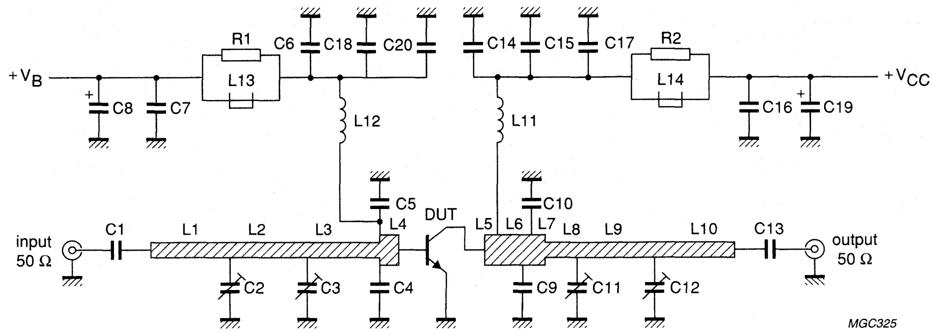


Fig.8 Class-AB test circuit at f = 960 MHz.

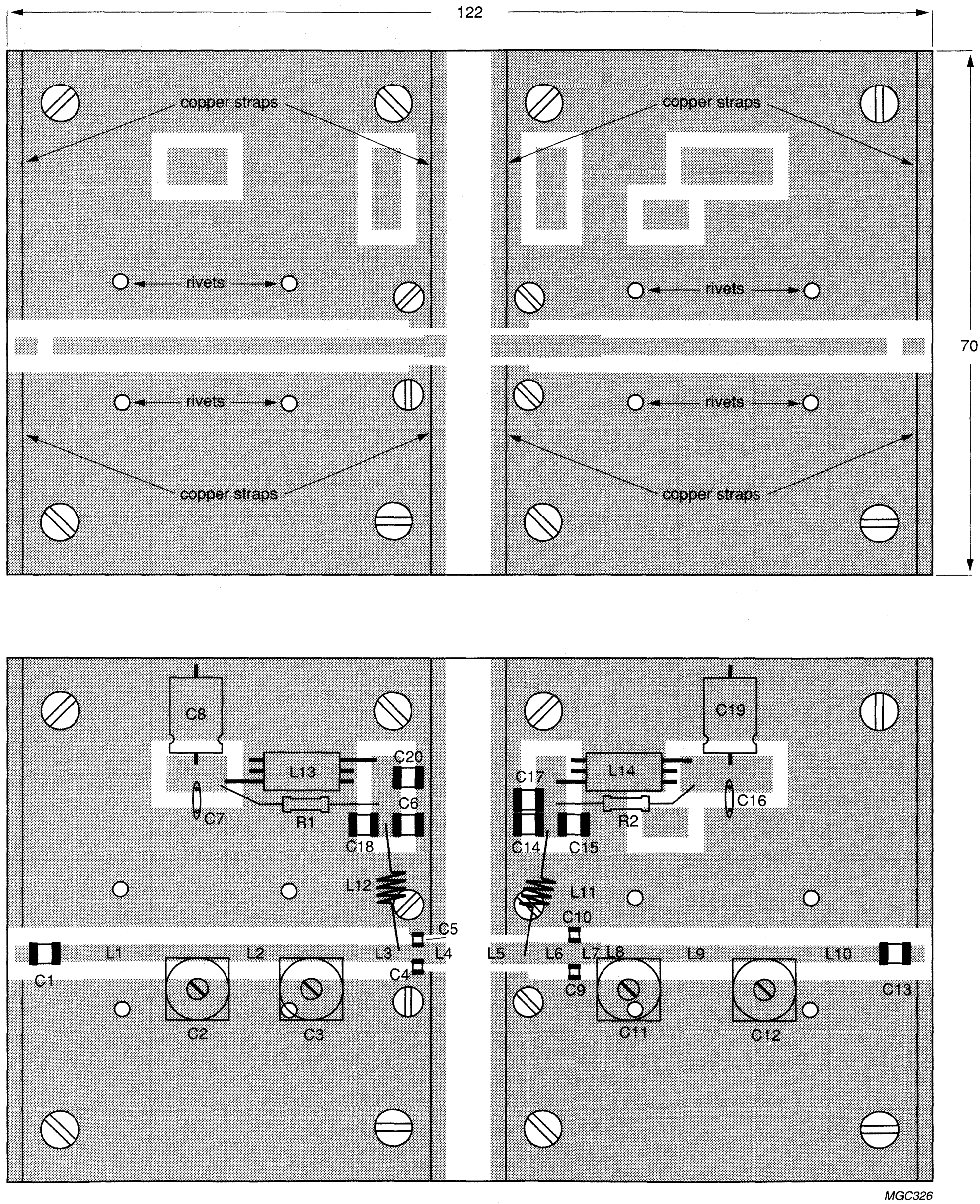
List of components (see Figs 8 and 9)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C13	multilayer ceramic chip capacitor; note 1	43 pF		
C2, C3, C11, C12	film dielectric trimmer	1.4 pF to 5.5 pF		2222 809 09001
C4, C5	multilayer ceramic chip capacitor; note 2	10 pF		
C6, C17	multilayer ceramic chip capacitor; note 1	150 pF		
C7, C16	ceramic capacitor	22 nF		2222 640 08223
C8, C19	solid aluminium capacitor	10 μF, 63 V		2222 030 38109
C14	multilayer ceramic chip capacitor; note 1	20 pF		
C9, C10	multilayer ceramic chip capacitor; note 2	11 pF		
C20	multilayer ceramic chip capacitor; note 1	1 nF		
C15, C18	multilayer ceramic chip capacitor; note 1	62 pF		
L1	stripline; note 3	50 Ω	length 16.8 mm width 2.4 mm	
L2	stripline; note 3	50 Ω	length 14.8 mm width 2.4 mm	
L3	stripline; note 3	50 Ω	length 13.7 mm width 2.4 mm	

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
L4	stripline; note 3	43 Ω	length 3.5 mm width 3 mm	
L5	stripline; note 3	43 Ω	length 6.4 mm width 3 mm	
L6	stripline; note 3	43 Ω	length 5.8 mm width 3 mm	
L7	stripline; note 3	43 Ω	length 2.4 mm width 3 mm	
L8	stripline; note 3	50 Ω	length 3 mm width 2.4 mm	
L9	stripline; note 3	50 Ω	length 15.5 mm width 2.4 mm	
L10	stripline; note 3	50 Ω	length 20 mm width 2.4 mm	
L11	4 turns enamelled 0.8 mm copper wire	45 nH	int. diameter 4mm length 5 mm leads 2 × 5 mm	
L12	3 turns enamelled 0.8 mm copper wire	30 nH	int. diameter 3mm length 5 mm leads 2 × 5 mm	
L13, L14	grade 3B Ferroxcube wideband RF choke			4312 020 36642
R1, R2	metal film resistor	10 Ω, 0.4 W		2322 151 71009

Notes

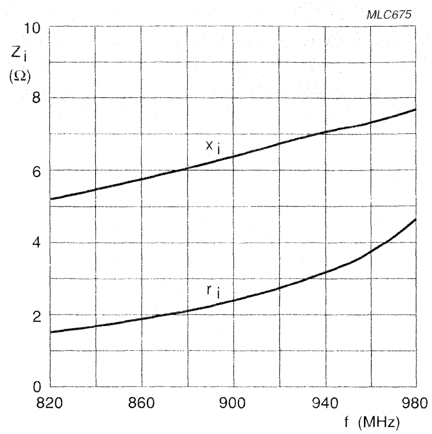
1. American Technical Ceramics type 100B or capacitor of same quality.
2. American Technical Ceramics type 100A or capacitor of same quality.
3. The striplines are on double-clad PCB with PTFE fibre-glass dielectric (ε_r = 2.2); thickness $\frac{1}{32}$".



Dimensions in mm.

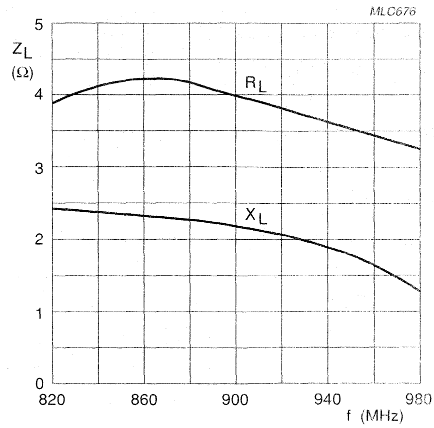
The components are located on one side of the PTFE fibre-glass board, the other side being fully metallized to serve as an earth. Earth connections are made by fixing screws, hollow rivets and copper straps around the board and under the emitters to provide a direct contact between the component side and the ground plane.

Fig.9 Component layout for 960 MHz class-AB test circuit.



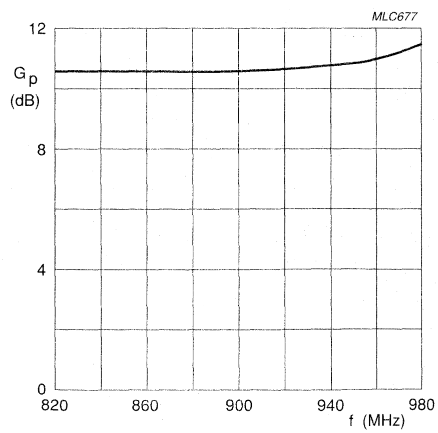
V_{CE} = 26 V; I_{CQ} = 50 mA; P_L = 20 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.4 K/W.

Fig.10 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 50 mA; P_L = 20 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.4 K/W.

Fig.11 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 50 mA; P_L = 20 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.4 K/W.

Fig.12 Power gain as a function of frequency; typical values.

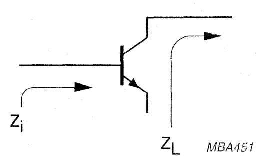


Fig.13 Definition of transistor impedance.

UHF power transistor BLV934

FEATURES

- Internal input matching to achieve high power gain and easy design of wideband circuits
- Emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Base station transmitters in the 820 to 960 MHz range.

PINNING - SOT171

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	e	emitter
3	b	base
4	c	collector
5	e	emitter
6	e	emitter

DESCRIPTION

NPN silicon planar epitaxial transistor intended for common emitter class-AB operation. The transistor has internal input matching by means of MOS capacitors and is encapsulated in a 6-lead SOT171 flange envelope with a ceramic cap. All leads are isolated from the flange.

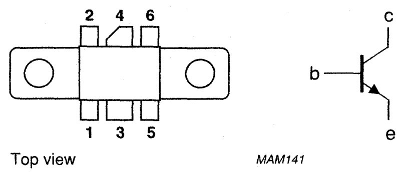


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	960	26	30	≥ 9	≥ 55

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

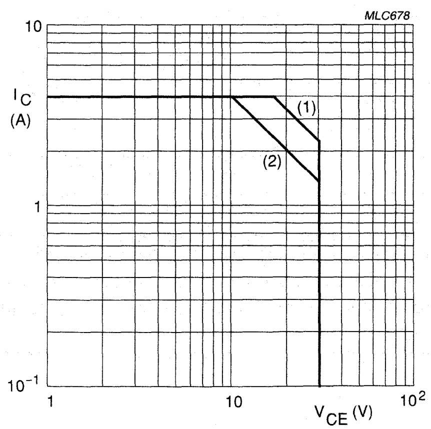
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	70	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	4	A
$I_{C(AV)}$	average collector current		–	4	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	68	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

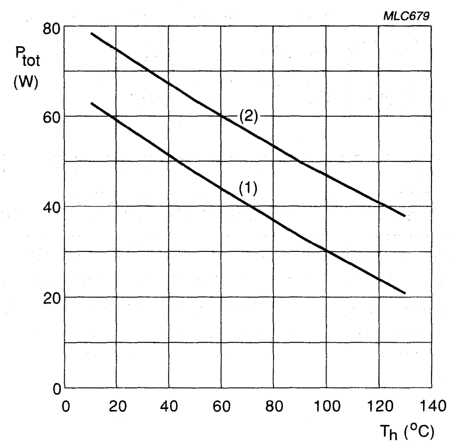
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 68 W; T_{mb} = 25 °C	2.57	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.4	K/W



(1) T_{mb} = 25 °C.
(2) T_h = 70 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power derating curves.

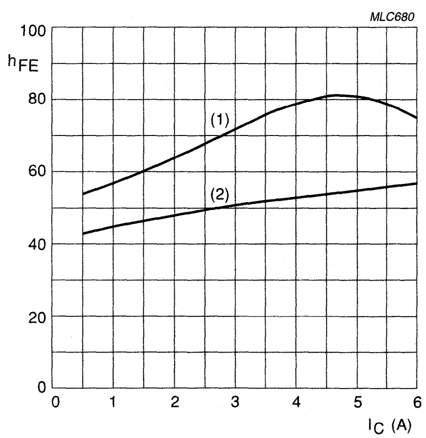
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 20 mA	70	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 50 mA	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 1 mA	3	–	–	V
I_{CES}	collector leakage current	V_{BE} = 0; V_{CE} = 28 V	–	–	2	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 1.5 A; note 1	30	–	120	
C_c	collector capacitance	V_{CB} = 26 V; $I_E = i_e$ = 0; f = 1 MHz	–	25	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	17	–	pF

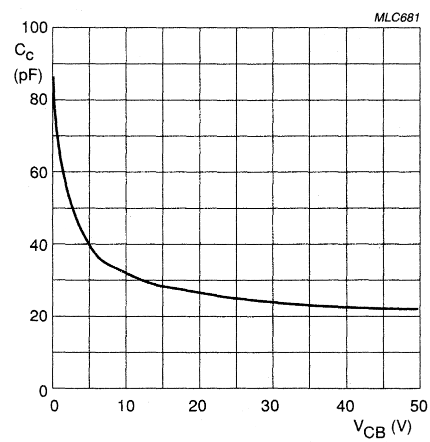
Note

1. Measured under pulsed conditions: $t_p \leq 500$ µs; $\delta \leq 0.01$.



Measured under pulsed conditions; $t_p \leq 500$ µs; $\delta \leq 0.01$.
(1) V_{CE} = 26 V.
(2) V_{CE} = 10 V.

Fig.4 DC current gain as a function of collector current; typical values.



$I_E = i_e$ = 0; f = 1 MHz.

Fig.5 Collector capacitance as a function of collector-base voltage; typical values.

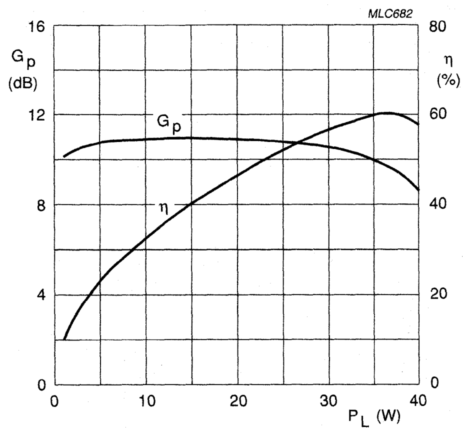
APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter, class-AB test circuit; $R_{th\ mb-h}$ = 0.4 K/W.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	960	26	100	30	≥9	≥55

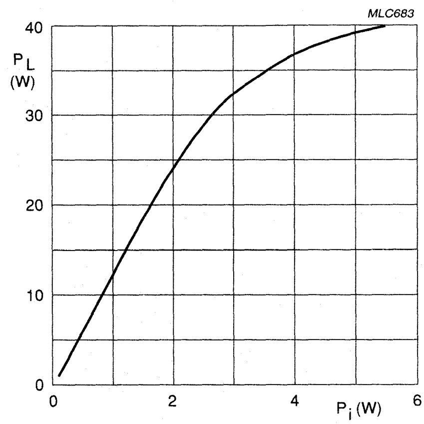
Ruggedness in class-AB operation

The BLV934 is capable of withstanding a load mismatch corresponding to VSWR = 20 : 1 through all phases at rated output power, under the following conditions: V_{CE} = 26 V; f = 960 MHz; I_{CQ} = 100 mA; T_h = 25 °C; $R_{th\ mb-h}$ = 0.4 K/W.



V_{CE} = 26 V.
I_{CQ} = 100 mA.
f = 960 MHz.

Fig.6 Power gain and efficiency as functions of load power; typical values.



V_{CE} = 26 V.
I_{CQ} = 100 mA.
f = 960 MHz.

Fig.7 Load power as a function of input power; typical values.

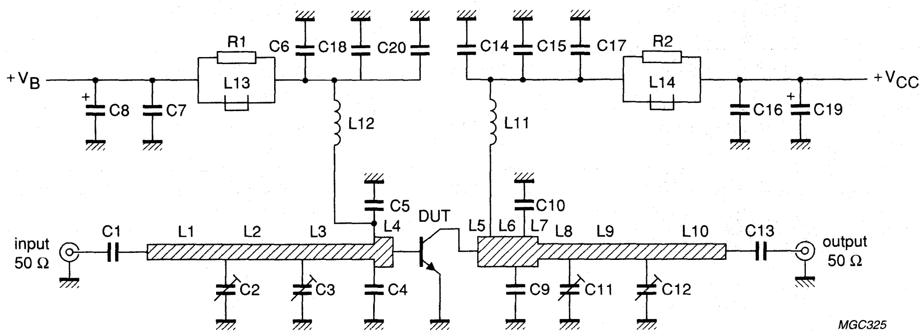


Fig.8 Class-AB test circuit at f = 960 MHz.

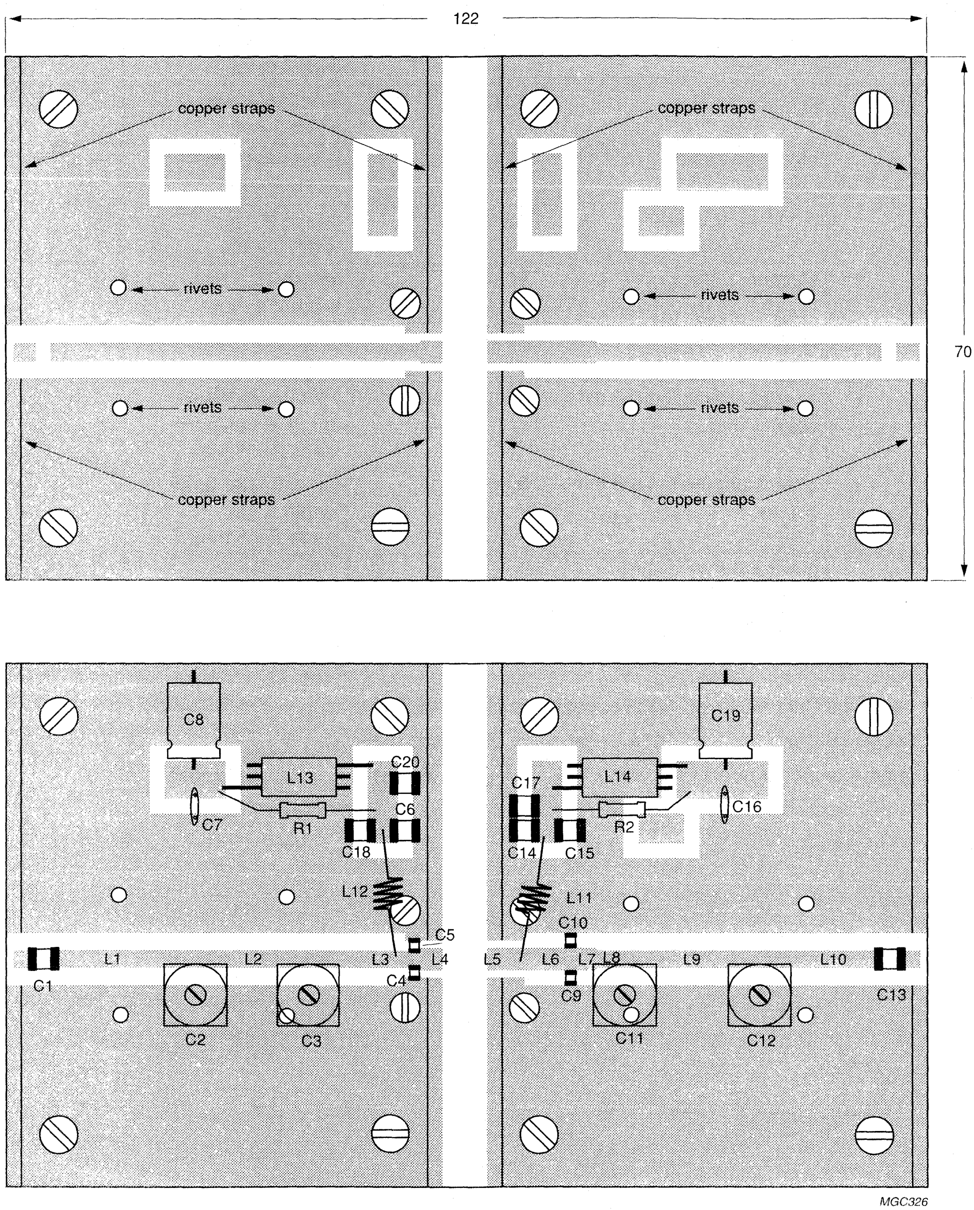
List of components (see Figs 8 and 9)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C13	multilayer ceramic chip capacitor; note 1	43 pF		
C2, C3, C11, C12	film dielectric trimmer	1.4 pF to 5.5 pF		2222 809 09001
C4, C5	multilayer ceramic chip capacitor; note 2	10 pF		
C6, C17	multilayer ceramic chip capacitor; note 1	150 pF		
C7, C16	ceramic capacitor	22 nF		2222 640 08223
C8, C19	solid aluminium capacitor	10 μF, 63 V		2222 030 38109
C14	multilayer ceramic chip capacitor; note 1	20 pF		
C9, C10	multilayer ceramic chip capacitor; note 2	11 pF		
C20	multilayer ceramic chip capacitor; note 1	1 nF		
C15, C18	multilayer ceramic chip capacitor; note 1	62 pF		
L1	stripline; note 3	50 Ω	length 16.8 mm width 2.4 mm	
L2	stripline; note 3	50 Ω	length 14.8 mm width 2.4 mm	
L3	stripline; note 3	50 Ω	length 13.7 mm width 2.4 mm	

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
L4	stripline; note 3	43 Ω	length 3.5 mm width 3 mm	
L5	stripline; note 3	43 Ω	length 6.4 mm width 3 mm	
L6	stripline; note 3	43 Ω	length 5.8 mm width 3 mm	
L7	stripline; note 3	43 Ω	length 2.4 mm width 3 mm	
L9	stripline; note 3	50 Ω	length 15.5 mm width 2.4 mm	
L10	stripline; note 3	50 Ω	length 20 mm width 2.4 mm	
L11	4 turns enamelled 0.8 mm copper wire	45 nH	int. diameter 4mm length 5 mm leads 2 × 5 mm	
L12	3 turns enamelled 0.8 mm copper wire	30 nH	int. diameter 3mm length 5 mm leads 2 × 5 mm	
L13, L14	grade 3B Ferroxcube wideband RF choke			4312 020 36642
R1, R2	metal film resistor	10 Ω; 0.4 W		2322 151 71009

Notes

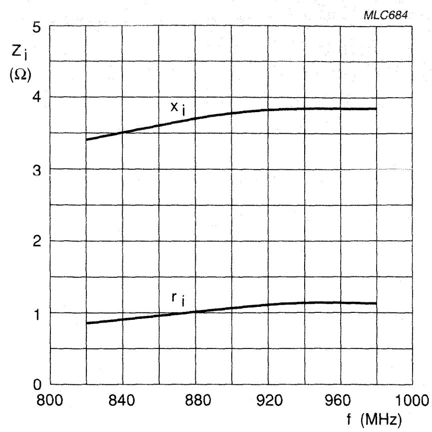
1. American Technical Ceramics type 100B or capacitor of same quality.
2. American Technical Ceramics type 100A or capacitor of same quality.
3. The striplines are on double-clad PCB with PTFE fibre-glass dielectric ($\varepsilon_r = 2.2$); thickness $\frac{1}{32}$".



Dimensions in mm.

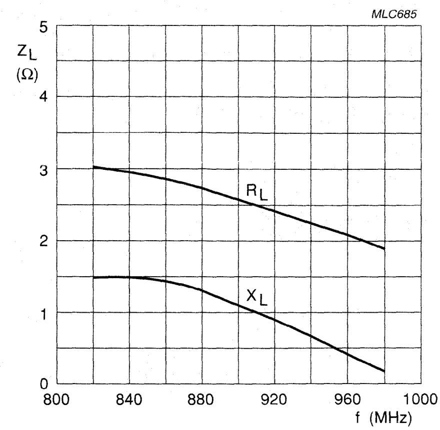
The components are located on one side of the PTFE fibre-glass board, the other side being fully metallized to serve as an earth. Earth connections are made by fixing screws, hollow rivets and copper straps around the board and under the emitters to provide a direct contact between the component side and the ground plane.

Fig.9 Component layout for 960 MHz class-AB test circuit.



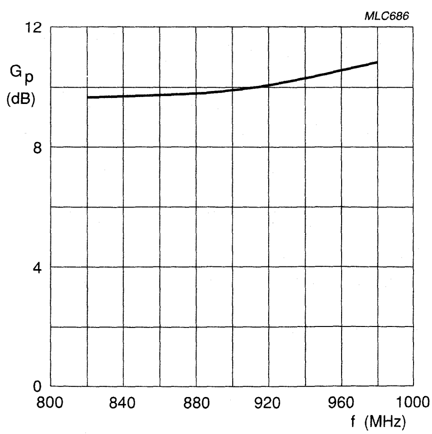
V_{CE} = 26 V; I_{CQ} = 100 mA; P_L = 30 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.4 K/W.

Fig.10 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 100 mA; P_L = 30 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.4 K/W.

Fig.11 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 100 mA; P_L = 30 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.4 K/W.

Fig.12 Power gain as a function of frequency; typical values.

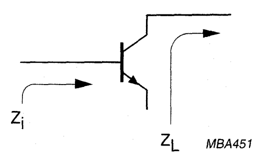


Fig.13 Definition of transistor impedance.

UHF power transistor BLV935

FEATURES

- Emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input matching to achieve high power gain and easy design of wideband circuits.

APPLICATIONS

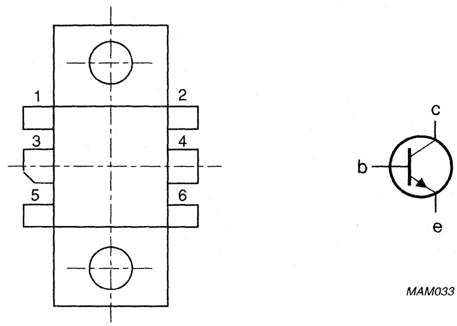
- Base stations in the 820 to 980 MHz range.

PINNING - SOT273

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	e	emitter
3	c	collector
4	b	base
5	e	emitter
6	e	emitter

DESCRIPTION

NPN silicon planar epitaxial transistor intended for common emitter class-AB operation. The transistor has internal input matching by means of MOS capacitors and is encapsulated in a 6-lead SOT273 flange envelope with a ceramic cap. All leads are isolated from the flange.



Top view

Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at $T_h = 25$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	960	26	30	≥ 9	≥ 55

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

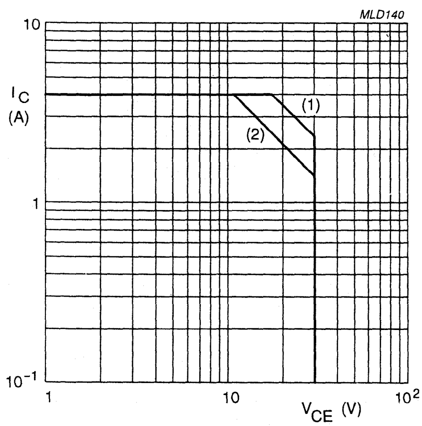
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	70	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	4	A
$I_{C(AV)}$	average collector current		–	4	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	70	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	+200	°C

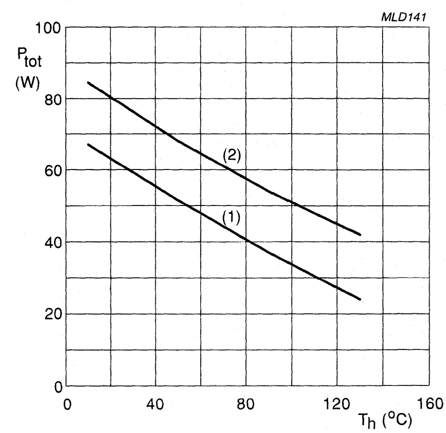
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 70 W; T_{mb} = 25 °C	2.5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.3	K/W



(1) T_{mb} = 25 °C.
(2) T_h = 70 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power derating curves.

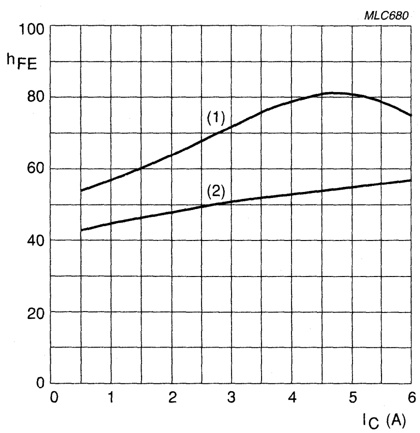
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 20 mA	70	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 50 mA	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 1 mA	3	–	–	V
I_{CES}	collector leakage current	V_{BE} = 0; V_{CE} = 28 V	–	–	2	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 1.5 A; note 1	30	–	120	
C_c	collector capacitance	V_{CB} = 26 V; $I_E = i_e$ = 0; f = 1 MHz; note 2	–	25	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	17	–	pF

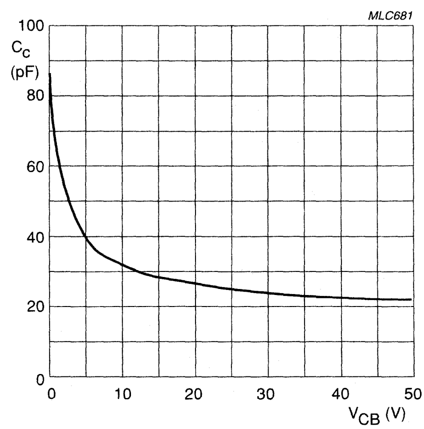
Notes

1. Measured under pulsed conditions: $t_p \leq 500$ µs; $\delta \leq 0.01$.
2. C_C value is that of the die only; it is not measurable because of internal matching network.



Measured under pulsed conditions; $t_p \leq 500$ µs; $\delta \leq 0.01$.
(1) V_{CE} = 26 V.
(2) V_{CE} = 10 V.

Fig.4 DC current gain as a function of collector current; typical values.



C_c value is that of the die only; it is not measurable because of internal matching network.
f = 1 MHz.

Fig.5 Collector capacitance as a function of collector-base voltage; typical values.

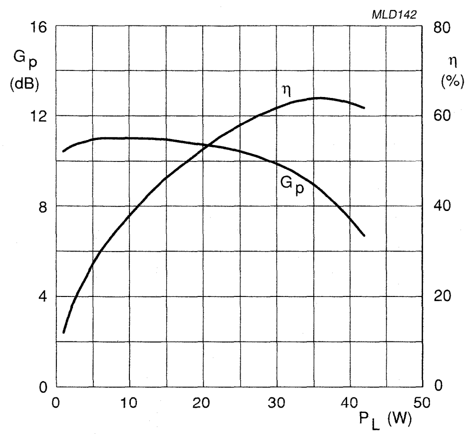
APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter, class-AB test circuit; $R_{th\ mb-h}$ = 0.3 K/W.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	960	26	100	30	≥9 typ. 10	≥55 typ. 60

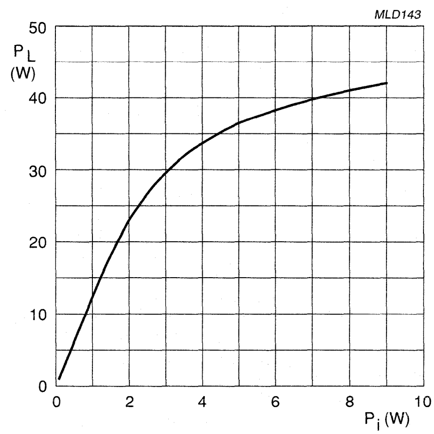
Ruggedness in class-AB operation

The BLV935 is capable of withstanding a load mismatch corresponding to VSWR = 5 : 1 through all phases at rated output power, under the following conditions: V_{CE} = 26 V; f = 960 MHz; I_{CQ} = 100 mA; T_h = 25 °C; $R_{th\ mb-h}$ = 0.3 K/W.



V_{CE} = 26 V.
I_{CQ} = 100 mA.
f = 960 MHz.

Fig.6 Power gain and efficiency as functions of load power; typical values.



V_{CE} = 26 V.
I_{CQ} = 100 mA.
f = 960 MHz.

Fig.7 Load power as a function of input power; typical values.

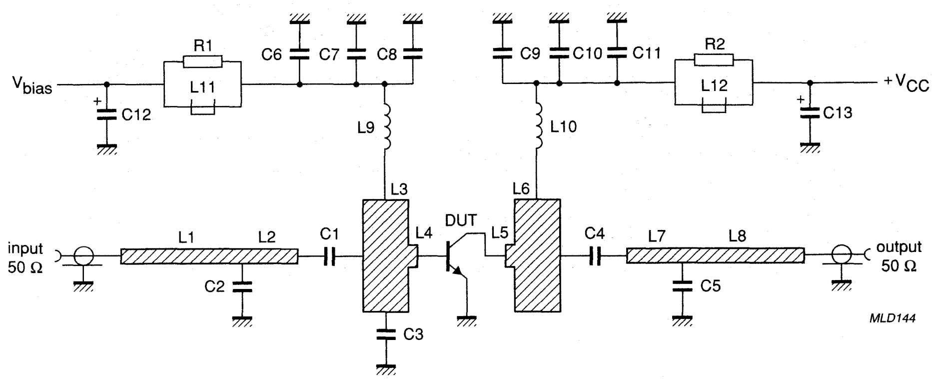


Fig.8 Class-AB broadband test circuit at 850 to 980 MHz.

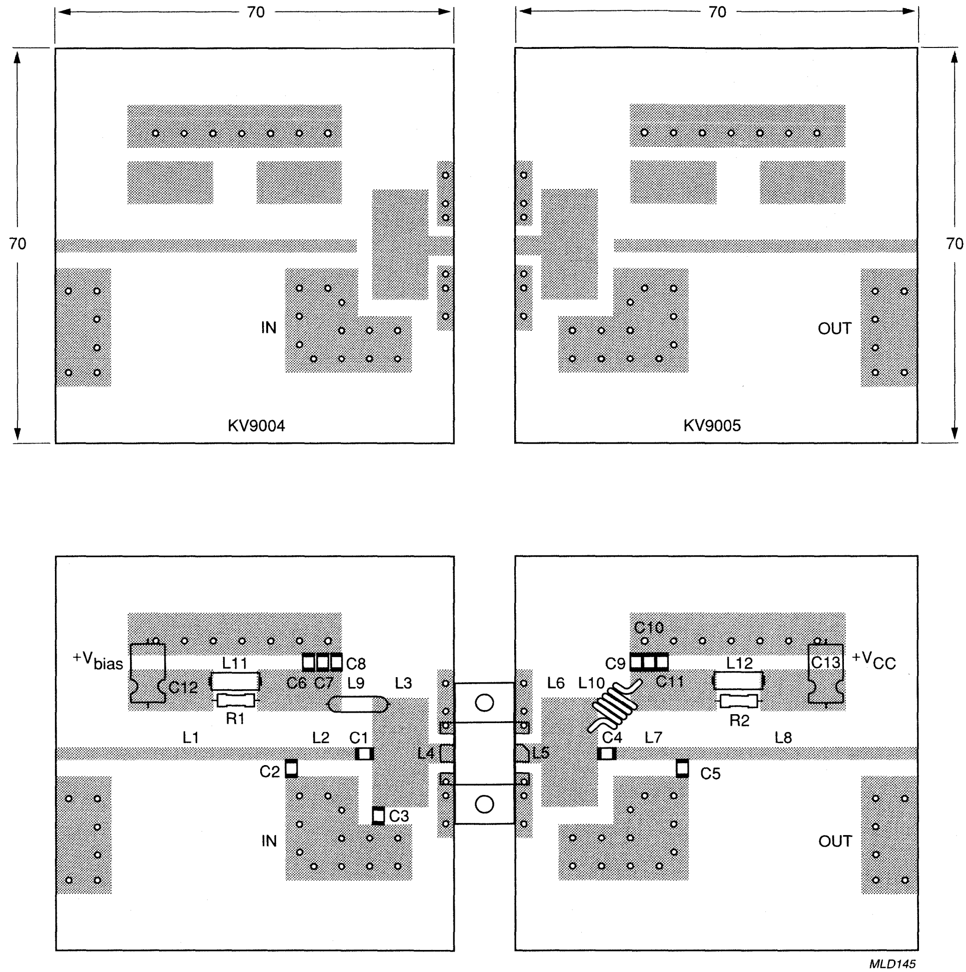
List of components (see Figs 8 and 9)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C4	multilayer ceramic chip capacitor; note 1	68 pF		
C2	multilayer ceramic chip capacitor; note 1	0.7 pF		
C3	multilayer ceramic chip capacitor; note 1	3.9 pF		
C5	multilayer ceramic chip capacitor; note 1	2 pF		
C6, C11	multilayer ceramic chip capacitor; note 1	1 nF		
C7, C8, C9, C10	multilayer ceramic chip capacitor; note 1	20 pF		
C12, C13	63 V solid aluminium capacitor	10 μF		2222 030 38109
L1, L8	stripline; note 2	50 Ω	41 × 2.4 mm	
L2, L7	stripline; note 2	50 Ω	12 × 2.4 mm	
L3, L6	stripline; note 2	9 Ω	10 × 20 mm	
L4, L5	stripline; note 2	38 Ω	4.5 × 3.5 mm	
L9	microchoke	100 nH		4322 057 01071

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
L10	4 turns 1 mm enamelled copper wire (close wound)	65 nH	internal diameter: 4 mm length: 4 mm leads: 2 × 5 mm	
L11, L12	grade 3B Ferroxcube wideband RF choke			4312 020 36642
R1, R2	metal film resistor	10 Ω; 0.4 W		2322 151 71009

Notes

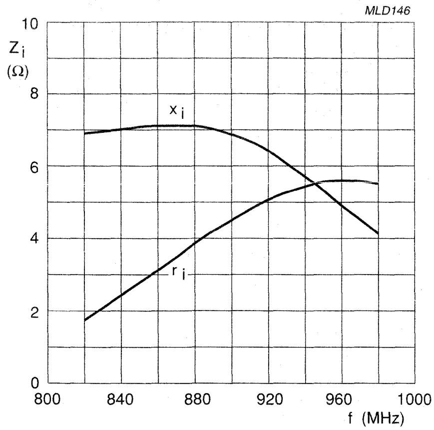
1. American Technical Ceramics type 100B or capacitor of same quality.
2. The striplines are on double-clad PCB with PTFE fibre-glass dielectric (ε_r = 2.2); thickness $^1\!/_{32}$".



Dimensions in mm.

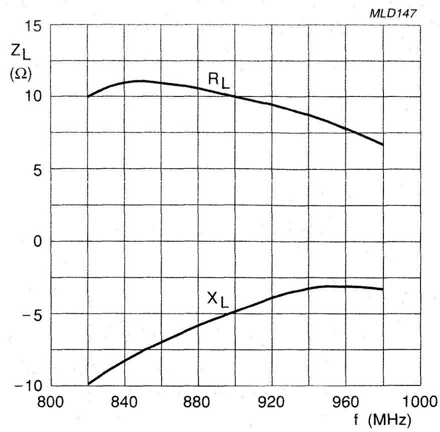
The components are located on one side of the PTFE fibre-glass board, the other side being fully metallized to serve as an earth. Earth connections are made by fixing screws, hollow rivets and copper straps around the board and under the emitters to provide a direct contact between the component side and the ground plane.

Fig.9 Printed circuit board and component layout for class-AB test circuit (850-980 MHz).



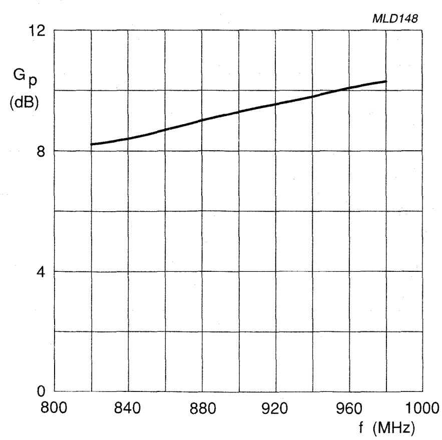
V_{CE} = 26 V; I_{CQ} = 100 mA; P_L = 30 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.3 K/W.

Fig.10 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 100 mA; P_L = 30 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.3 K/W.

Fig.11 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 100 mA; P_L = 30 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.3 K/W.

Fig.12 Power gain as a function of frequency; typical values.

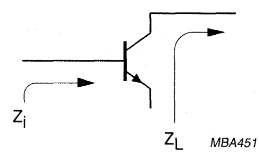


Fig.13 Definition of transistor impedance.

UHF power transistor BLV946

FEATURES

- Internal input and output matching for easy matching, high gain and efficiency
- Poly-silicon emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Base stations in the 850 to 960 MHz frequency range.

DESCRIPTION

NPN silicon planar transistor intended for common emitter class-AB operation. The transistor has internal input and output matching by means of MOS capacitors.
The encapsulation is a SOT273A flange envelope with a ceramic cap. All leads are isolated from the flange.

PINNING - SOT273A

PIN	DESCRIPTION
1	emitter
2	emitter
3	collector
4	base
5	emitter
6	emitter

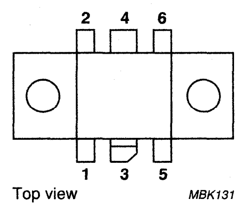


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	960	26	40	≥9	≥55

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

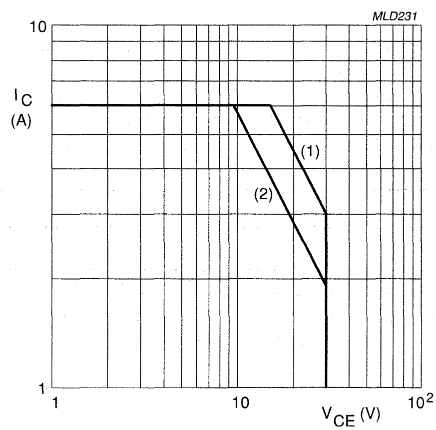
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	70	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	6	A
$I_{C(AV)}$	average collector current		–	6	A
P_{tot}	total power dissipation	up to T_{mb} = 25 °C	–	90	W
T_{stg}	storage temperature range		–65	+150	°C
T_j	operating junction temperature		–	+200	°C

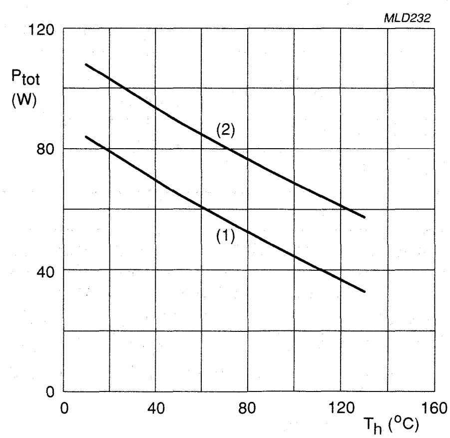
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 90 W; T_{mb} = 25 °C	1.94	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.3	K/W



(1) T_{mb} = 25 °C.
(2) T_h = 70 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power derating curve.

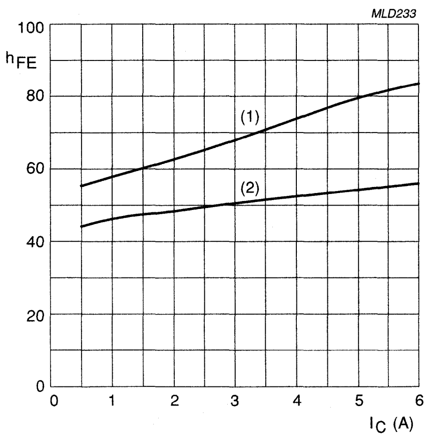
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 30 mA	70	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 60 mA	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 1.2 mA	3	–	–	V
I_{CES}	collector leakage current	V_{BE} = 0; V_{CE} = 28 V	–	–	3	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 2 A; note 1	30	–	120	
C_c	collector capacitance	V_{CB} = 26 V; $I_E = i_e$ = 0; f = 1 MHz; note 2	–	33	–	pF

Notes

1. Measured under pulsed conditions: $t_p \leq 500\ \mu s$; $\delta \leq 0.01$.
2. C_C value is that of the die only; it is not measurable because of internal matching network.



Measured under pulsed conditions; $t_p \leq 500\ \mu s$; $\delta \leq 0.01$.

(1) V_{CE} = 26 V.

(2) V_{CE} = 10 V.

Fig.4 DC current gain as a function of collector current; typical values.

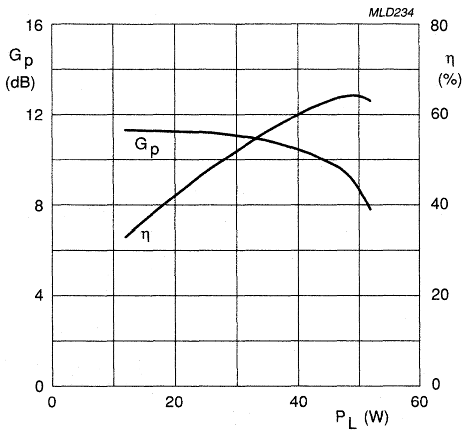
APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter, class-AB test circuit; $R_{th\ mb-h}$ = 0.3 K/W.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	960	26	130	40	≥9 typ. 11	≥55 typ. 60

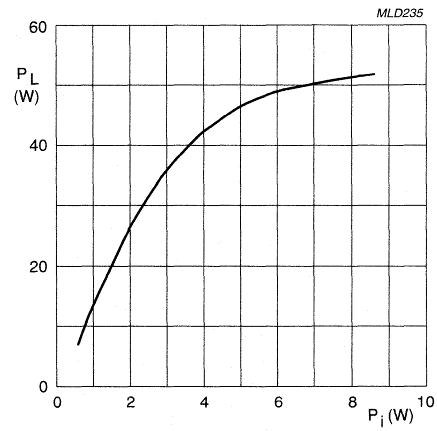
Ruggedness in class-AB operation

The BLV946 is capable of withstanding a load mismatch corresponding to VSWR = 5 : 1 through all phases at rated output power, under the following conditions: V_{CE} = 26 V; f = 960 MHz; I_{CQ} = 130 mA; T_h = 25 °C; $R_{th\ mb-h}$ = 0.3 K/W.



V_{CE} = 26 V.
I_{CQ} = 130 mA.
f = 960 MHz.

Fig.5 Power gain and efficiency as functions of load power; typical values.



V_{CE} = 26 V.
I_{CQ} = 130 mA.
f = 960 MHz.

Fig.6 Load power as a function of input power; typical values.

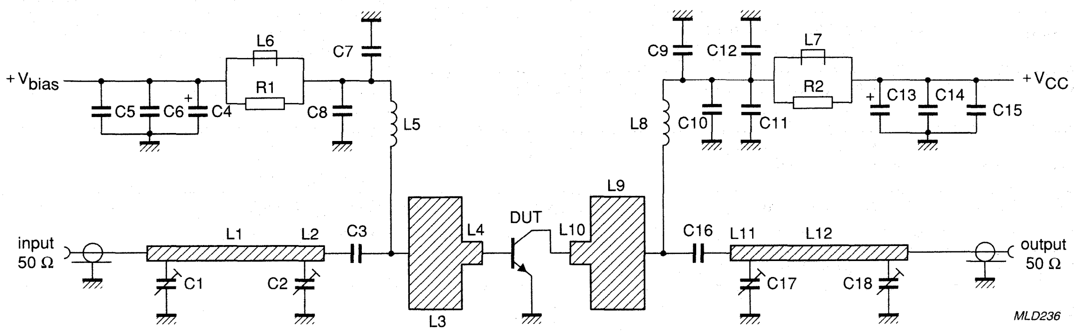


Fig.7 Class-AB test circuit at 960 MHz.

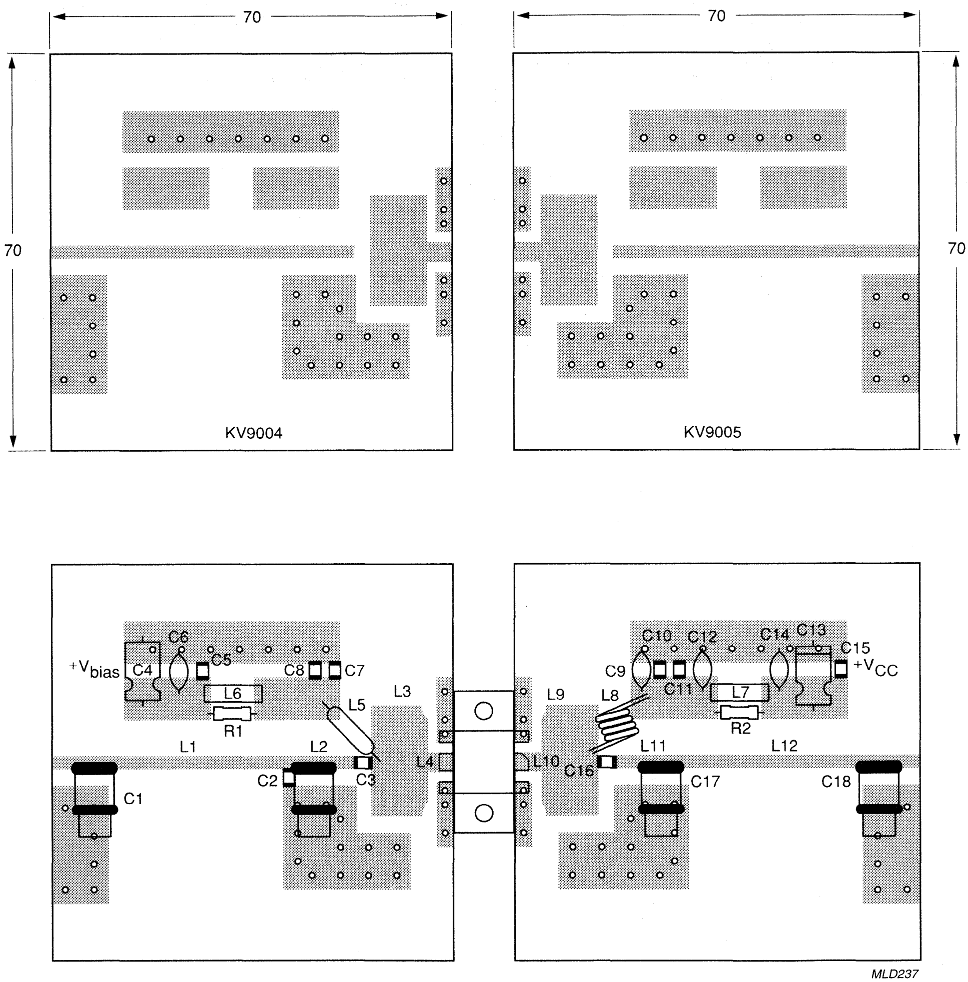
List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C2, C17, C18	TEKELEC variable capacitor type 6451	12 pF		
C3, C16	multilayer ceramic chip capacitor; note 1	68 pF, 500 V		
C4, C13	electrolytic capacitor	10 µF, 63 V		2222 030 28109
C5, C8, C10, C13, C15	multilayer ceramic chip capacitor; note 1	20 pF, 500 V		
C6	multilayer ceramic chip capacitor	100 nF, 50 V		2222 581 76641
C7, C11	multilayer ceramic chip capacitor; note 1	100 pF, 500 V		
C9	multilayer ceramic chip capacitor	470 pF, 50 V		2222 731 18471
C12	multilayer ceramic chip capacitor	10 nF, 50 V		2222 731 18103
C14	multilayer ceramic chip capacitor	22 nF, 50 V		2222 731 18223
L1	stripline; note 2	50 Ω	length 36 mm width 2.2 mm	
L2	stripline; note 2	50 Ω	length 8 mm width 2.2 mm	
L3, L9	stripline; note 2	8 Ω	length 10 mm width 20 mm	
L4, L10	stripline; note 2	37 Ω	length 4.5 mm width 3.5 mm	

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
L5	microchoke	2.2 μH		4322 057 02281
L6, L7	Ferroxcube wide band HF choke, grade 3B			4312 020 36642
L8	4.5 turns enamelled 1 mm copper wire	50 nH	internal dia. 4 mm close wound	
L11	stripline; note 2	50 Ω	length 7 mm width 2.2 mm	
L12	stripline; note 2	50 Ω	length 37 mm width 2.2 mm	
R1, R2	metal film resistor	100 Ω; 0.4 W		2322 171 11001

Notes

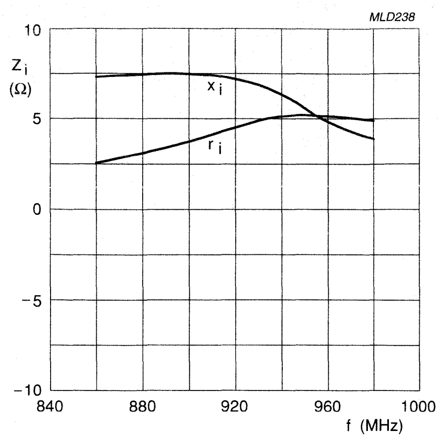
1. American Technical Ceramics type 100B or capacitor of same quality.
2. The striplines are on a double copper-clad printed-circuit board, with PTFE microfibre-glass dielectric ($\varepsilon_r = 2.2$); thickness $^1/_{32}$"; thickness of the copper sheet 2×35 μm.



Dimensions in mm.

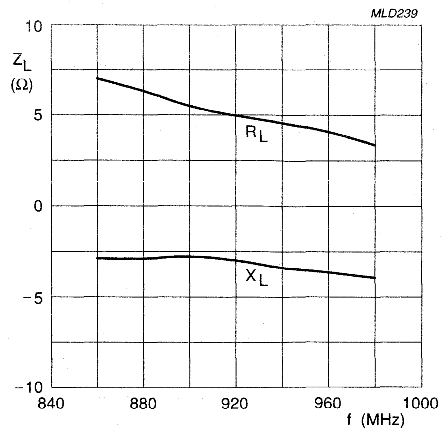
The components are located on one side of the copper-clad PTFE microfibre-glass board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.8 Component layout and printed circuit board for 960 MHz class-AB test circuit.



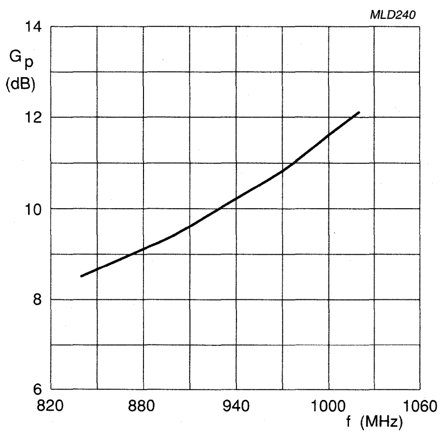
V_{CE} = 26 V; I_{CQ} = 130 mA; P_L = 40 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.3 K/W.

Fig.9 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 130 mA; P_L = 40 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.3 K/W.

Fig.10 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 130 mA; P_L = 40 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.3 K/W.

Fig.11 Power gain as a function of frequency; typical values.

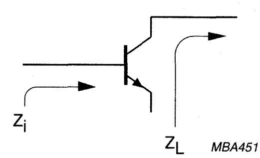


Fig.12 Definition of transistor impedance.

UHF push-pull power transistor

BLV950

FEATURES

- Internal input and output matching for easy matching, high gain and efficiency
- Poly-silicon emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Base station transmitters in the 800 to 960 MHz range.

DESCRIPTION

Two NPN silicon planar epitaxial transistors in push-pull configuration, intended for linear common emitter class-AB operation. The transistors are encapsulated in a 4-lead SOT262A2 flange package with 2 ceramic caps. The flange provides the common emitter connection for both transistors.

PINNING - SOT262A2

PIN	SYMBOL	DESCRIPTION
1	c1	collector 1
2	c2	collector 2
3	b1	base 1
4	b2	base 2
5	e	common emitter; connected to flange

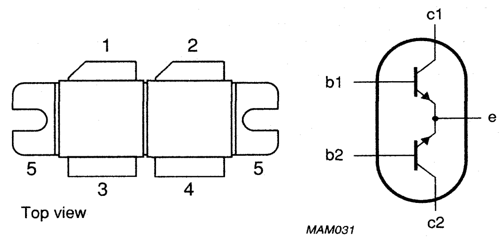


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter push-pull test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_3 (dBc)
CW, class-AB	900	26	150	≥8	≥45	–
	960	26	150	≥7.5	≥45	–
2-tone, class-AB	900	26	150 (PEP)	≥8.5	≥35	≤–30
	960	26	150 (PEP)	≥8	≥35	≤–30

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
Per transistor section					
V_{CBO}	collector-base voltage	open emitter	–	70	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	12	A
$I_{C(AV)}$	average collector current		–	12	A
P_{tot}	total power dissipation (DC)	T_{mb} = 25 °C	–	340	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 340 W; T_{mb} = 25 °C; note 1	0.52	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.15	K/W

Note

1. Total device; both sections equally loaded; thermal resistance is determined under specified RF operating conditions.

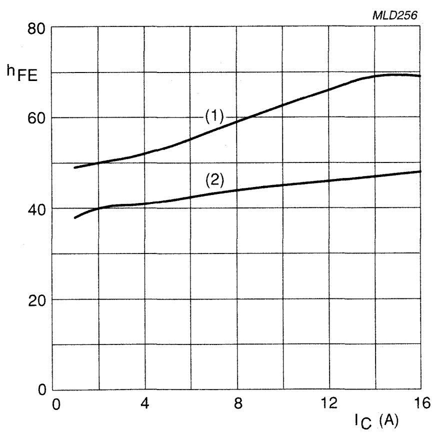
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per transistor section						
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 60 mA	70	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 150 mA	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 3 mA	3	–	–	V
I_{CES}	collector leakage current	V_{BE} = 0; V_{CE} = 28 V	–	–	5	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 4.5 A; note 1	30	–	120	
C_c	collector capacitance	V_{CB} = 26 V; $I_E = i_e$ = 0; f = 1 MHz; note 2	–	75	–	pF

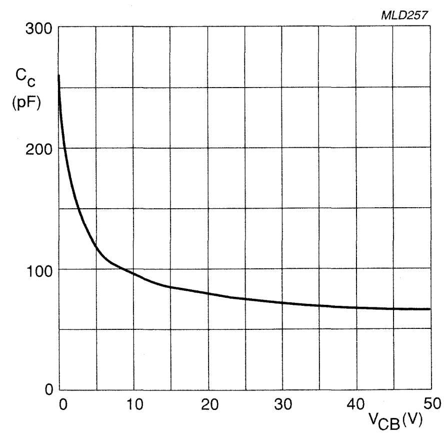
Notes

1. Measured under pulse conditions: $t_p \leq 300\ \mu s$; $\delta \leq 0.01$.
2. Value C_c is that of the die only, it is not measurable because of internal matching network.



Measured under pulsed conditions; $t_p \leq 300\ \mu s$; $\delta \leq 0.01$.
(1) V_{CE} = 26 V.
(2) V_{CE} = 10 V.

Fig.2 DC current gain as a function of collector current; typical values.



Value C_c is that of the die only, it is not measurable because of internal matching network.
$I_E = i_e$ = 0; f = 1 MHz.

Fig.3 Collector capacitance as a function of collector-base voltage; typical values.

APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter push-pull test circuit; $R_{th\ mb\text{-}h}$ = 0.15 K/W.

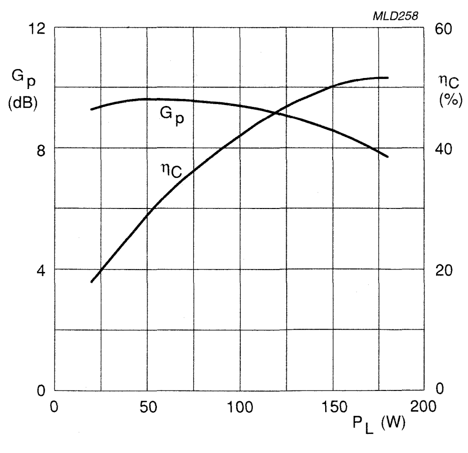
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_3 (dBc)
CW, class-AB	900	26	2 × 100	150	≥8 typ. 9	≥45 typ. 50	–
	960	26	2 × 100	150	≥7.5 typ. 8.5	≥45 typ. 50	–
2-tone, class-AB	note 1	26	2 × 100	150 (PEP)	≥8.5 typ. 9.5	≥35 typ. 40	≤–28 typ. –31
	note 2	26	2 × 100	150 (PEP)	≥8 typ. 9	≥35 typ. 40	≤–30 typ. –33

Notes

1. f_1 = 900.0 MHz; f_2 = 900.1 MHz.
2. f_1 = 960.0 MHz; f_2 = 960.1 MHz.

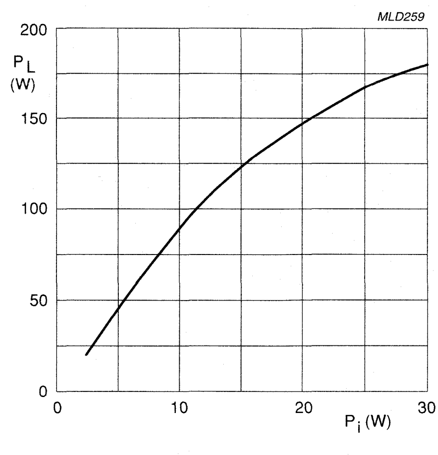
Ruggedness in class-AB operation

The BLV950 is capable of withstanding a load mismatch corresponding to VSWR = 2 : 1 through all phases under the conditions: P_L = 150 W; f = 960 MHz; V_{CE} = 26 V; I_{CQ} = 2 × 100 mA; T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.15 K/W and also a load mismatch of VSWR = 5 : 1 through all phases at P_L = 150 W (PEP) and f_1 = 960.0 MHz and f_2 = 960.1 MHz.



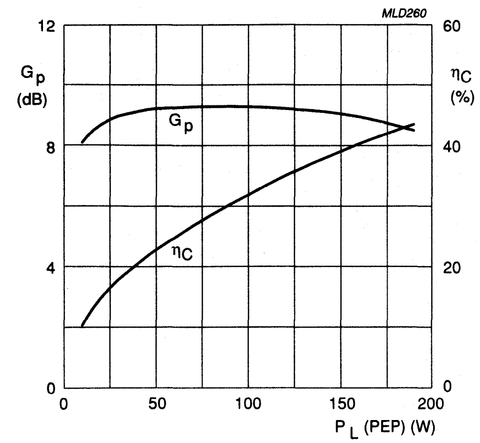
V_{CE} = 26 V; I_{CQ} = 2 × 100 mA; f = 960 MHz.

Fig.4 Power gain and efficiency as functions of load power; typical values.



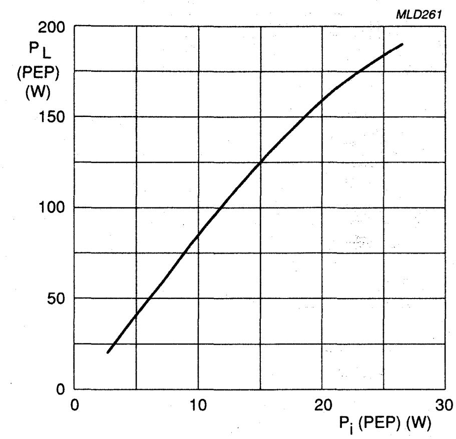
V_{CE} = 26 V; I_{CQ} = 2 × 100 mA; f = 960 MHz.

Fig.5 Load power as a function of input power; typical values.



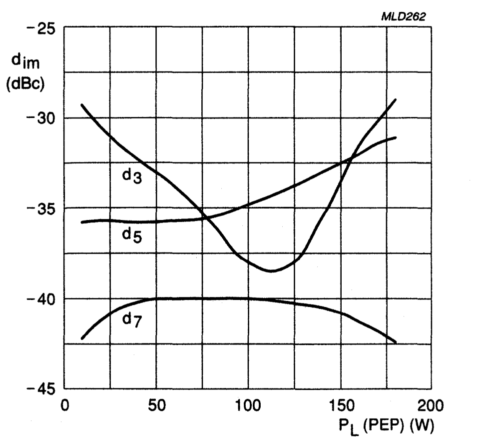
V_{CE} = 26 V; I_{CQ} = 2 × 100 mA; f_1 = 960.0 MHz; f_2 = 960.1 MHz.

Fig.6 Power gain and efficiency as functions of load power; typical values.



V_{CE} = 26 V; I_{CQ} = 2 × 100 mA; f_1 = 960.0 MHz; f_2 = 960.1 MHz.

Fig.7 Load power as a function of input power; typical values.



V_{CE} = 26 V; I_{CQ} = 2 × 100 mA; f_1 = 960.0 MHz; f_2 = 960.1 MHz.

Fig.8 Intermodulation distortion as a function of load power; typical values.

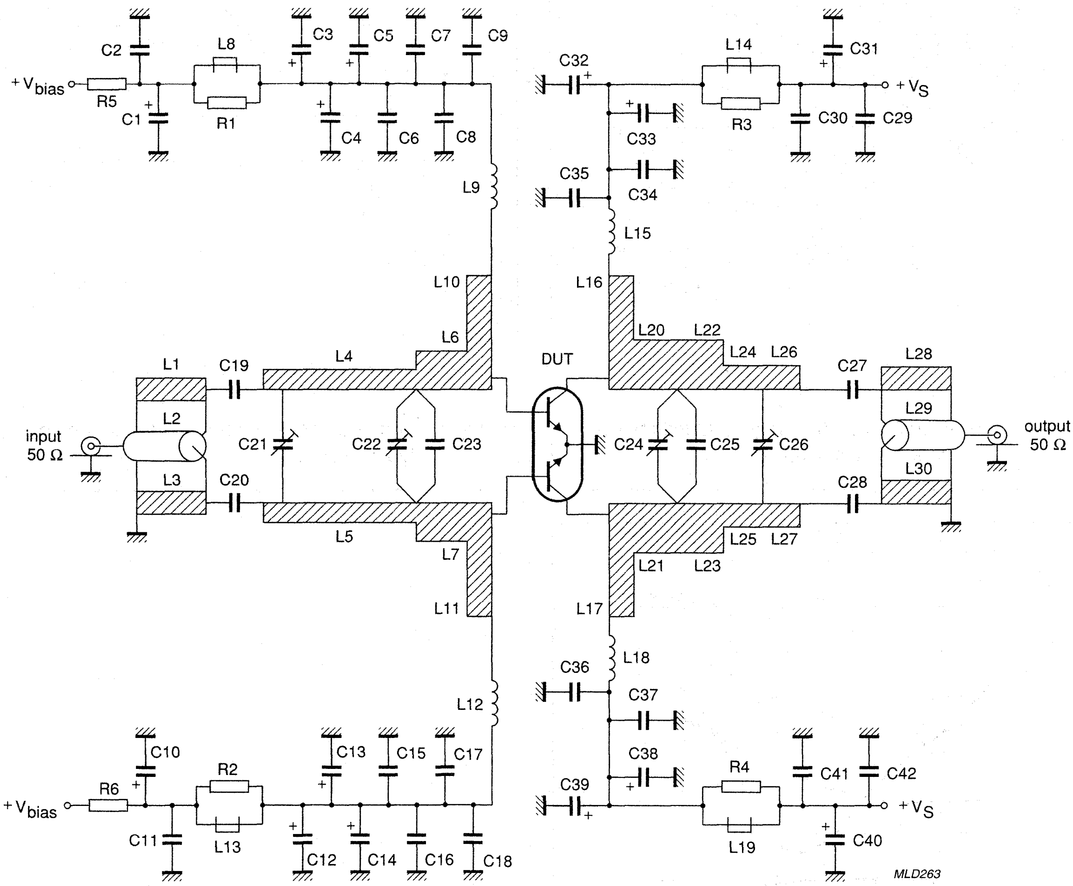


Fig.9 Class-AB test circuit at 900 to 960 MHz.

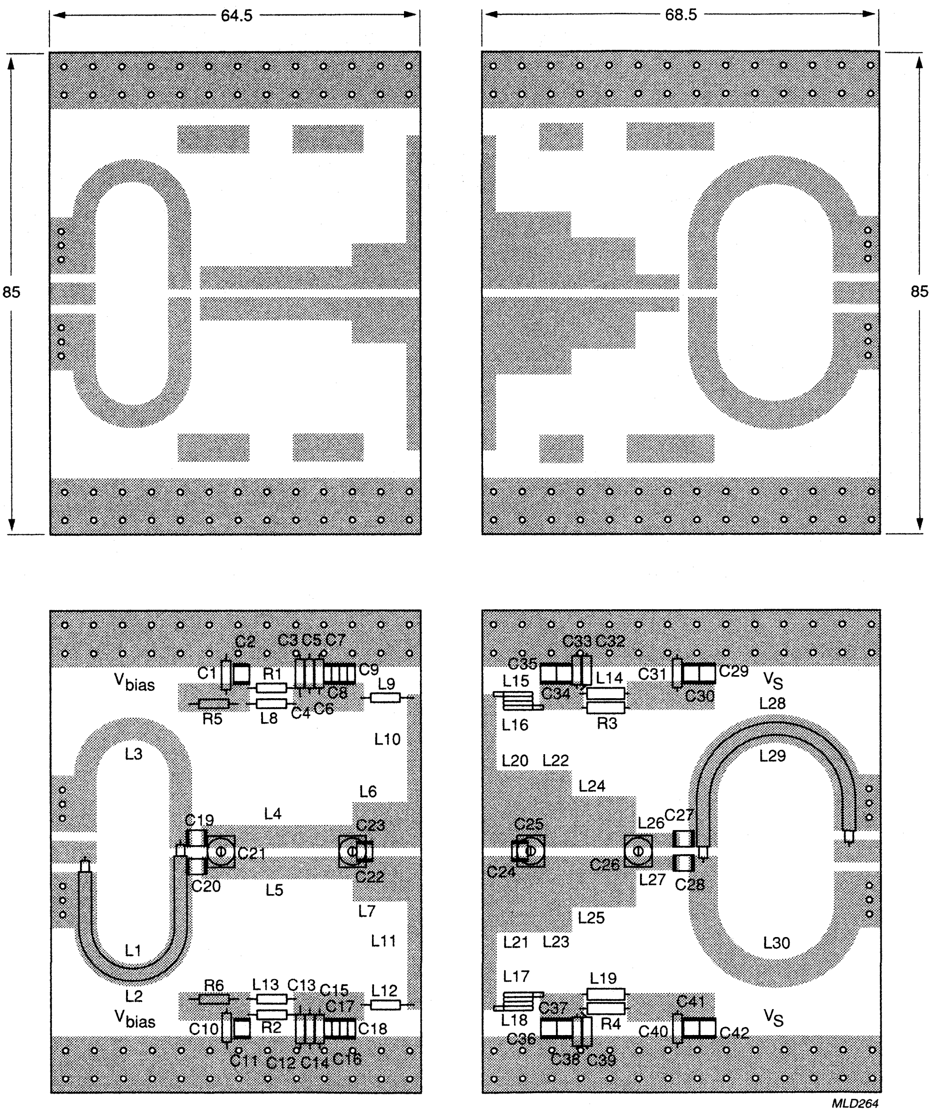
List of components (see Figs 9 and 10)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C10	tantalum capacitor	2.2 μF, 35 V		2022 019 00058
C2, C11, C30, C34, C37, C41	multilayer ceramic chip capacitor; note 1	300 pF, 200 V		
C3, C12	electrolytic capacitor	1 μF, 63 V		2222 085 78108
C4, C13	electrolytic capacitor	10 μF, 16 V		2222 085 75109
C5, C14, C31, C40	tantalum capacitor	1 μF, 35 V		2022 019 00056
C6, C15, C29, C42	multilayer ceramic chip capacitor	100 nF, 50 V		2222 581 76641
C7, C16	multilayer ceramic chip capacitor	10 nF, 50 V		2222 581 76627
C8, C17	multilayer ceramic chip capacitor; note 1	330 pF, 200 V		
C9, C18, C19, C20, C35, C36	multilayer ceramic chip capacitor; note 1	39 pF, 500 V		
C23	multilayer ceramic chip capacitor; note 1	2 pF, 500 V		
C25	multilayer ceramic chip capacitor; note 1	3.9 pF, 500 V		
C21, C22	film dielectric trimmer	9 pF		2222 809 09005
C24, C26	film dielectric trimmer	3.5 pF		2222 809 05215
C27, C28	multilayer ceramic chip capacitor; note 1	68 pF, 500 V		
C32, C39	electrolytic capacitor	10 μF, 63 V		2222 030 28109
C33, C38	electrolytic capacitor	1 μF, 63 V		2222 030 38108
L1, L3	stripline; note 2	35 Ω	length 50.7 mm width 4 mm	
L2	semi-rigid cable; note 3	50 Ω	ext. conductor length 50.7 mm ext. diameter 2.2 mm	
L4, L5	stripline; note 2	35 Ω	length 26.5 mm width 4 mm	
L6, L7	stripline; note 2	20 Ω	length 9.2 mm width 8 mm	
L10, L11, L16, L17	stripline; note 2	7 Ω	length 2.5 mm width 27 mm	
L8, L13, L14, L19	grade 4S2 Ferroxcube chip-bead			4330 030 36300
L9, L12	microchoke	4.7 μH		4322 057 04781
L15, L18	4 turns enamelled 1 mm copper wire	100 nH	int. diameter 6 mm close wound	
L20, L21	stripline; note 2	14 Ω	length 6 mm width 12.5 mm	

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
L22, L23	stripline; note 2	14 Ω	length 7 mm width 12.5 mm	
L24, L25	stripline; note 2	18 Ω	length 11 mm width 9 mm	
L26, L27	stripline; note 2	50 Ω	length 6.5 mm width 2.5 mm	
L28, L30	stripline; note 2	30 Ω	length 49.3 mm width 5 mm	
L29	semi-rigid cable; note 3	50 Ω	ext. conductor length 49.3 mm ext. diameter 3.6 mm	
R5, R6	metal film resistor	0.4 W, 1 Ω		2322 151 71008
R1, R2	metal film resistor	0.4 W, 5.11 Ω		2322 151 75118
R3, R4	metal resistor	1 W, 5.11 Ω		2322 153 75118

Notes

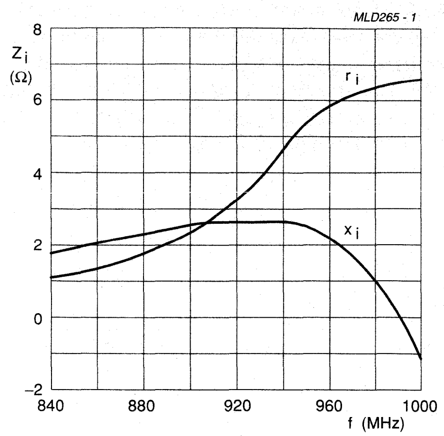
1. American Technical Ceramics type 100B or capacitor of same quality.
2. The striplines are on a double copper-clad printed-circuit board, with PTFE microfibre-glass dielectric ($\varepsilon_r = 2.2$); thickness $^1/_{32}$"; thickness of the copper sheet 2×35 μm.
3. Semi-rigid cables soldered respectively on striplines L1 and L28.



Dimensions in mm.

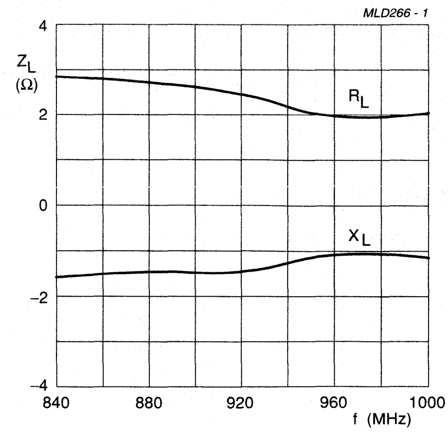
The components are situated on one side of the copper-clad PTFE microfibre-glass board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.10 Component layout and printed-circuit board for 900 to 960 MHz class-AB test circuit.



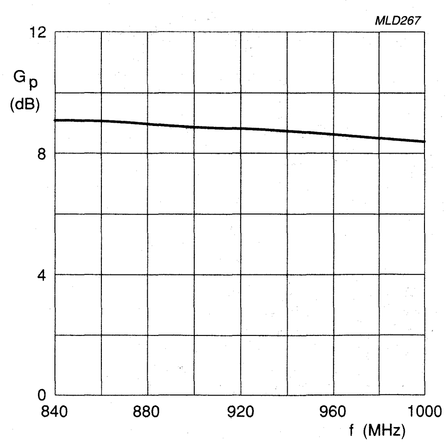
V_{CE} = 26 V; I_{CQ} = 2 × 100 mA; P_L = 150 W (total device);
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.15 K/W.

Fig.11 Input impedance as a function of frequency (series components); typical values per section.



V_{CE} = 26 V; I_{CQ} = 2 × 100 mA; P_L = 150 W (total device);
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.15 K/W.

Fig.12 Load impedance as a function of frequency (series components); typical values per section.



V_{CE} = 26 V; I_{CQ} = 2 × 100 mA; P_L = 150 W (total device);
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.15 K/W.

Fig.13 Power gain as a function of frequency; typical values.

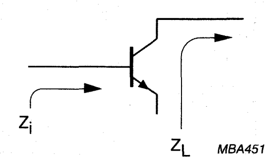


Fig.14 Definition of transistor impedance.

FEATURES

- Internal input and output matching for easy matching, high gain and efficiency
- Poly-silicon emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Base stations in the 800 to 960 MHz frequency range.

DESCRIPTION

NPN silicon planar epitaxial transistors primarily intended for common emitter class-AB operation. The transistors have internal input and output matching by means of MOS capacitors. The encapsulations are a 2-lead rectangular SOT391A flange package and a SOT391B flangeless package, both with a ceramic cap.

PINNING - SOT391A

PIN	SYMBOL	DESCRIPTION
1	c	collector
2	b	base
3	e	emitter; connected to flange

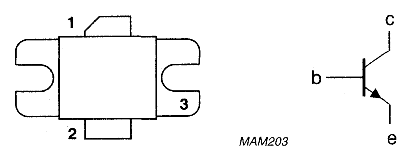


Fig.1 Simplified outline (SOT391A) and symbol.

PINNING - SOT391B

PIN	SYMBOL	DESCRIPTION
1	c	collector
2	b	base
Ground plane	e	emitter

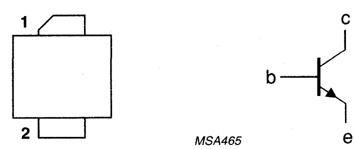


Fig.2 Simplified outline (SOT391B) and symbol.

QUICK REFERENCE DATA

RF performance at $T_h = 25$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	900	26	75	≥8	≥50
	960	26	75	≥8.5	≥50

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	70	V
V_{CEO}	collector-emitter voltage	open base	–	30	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	15	A
$I_{C(AV)}$	average collector current		–	15	A
P_{tot}	total power dissipation	$T_{mb} \leq 25$ °C	–	250	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	$P_{tot} = 250$ W; $T_{mb} = 25$ °C; note 1	0.7	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.2	K/W

Note

1. Thermal resistance is determined under specified RF operating conditions.

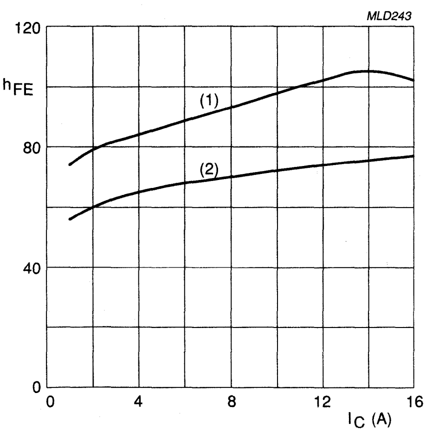
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 60 mA	70	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 150 mA	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 3 mA	3	–	–	V
I_{CES}	collector leakage current	V_{BE} = 0; V_{CE} = 28 V	–	–	5	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 4.5 A; note 1; see Fig 3	30	–	120	
C_c	collector capacitance	V_{CB} = 26 V; I_E = i_e = 0; f = 1 MHz; note 2; see Fig 4	–	75	–	pF

Notes

1. Measured under pulsed conditions: $t_p \le 500$ µs; $\delta \le 0.01$.
2. Value of C_c is that of the die only, it is not measurable because of internal matching network.

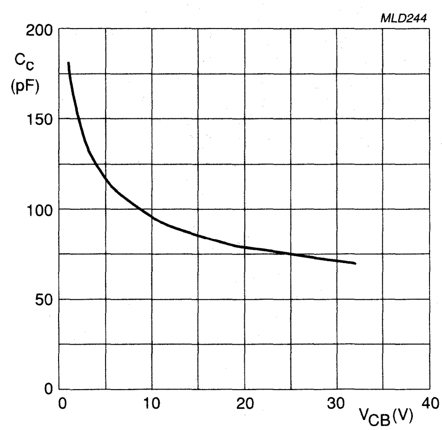


Measured under pulsed conditions; $t_p \le 500$ µs; $\delta \le 0.01$.

(1) V_{CE} = 26 V.

(2) V_{CE} = 10 V.

Fig.3 DC current gain as a function of collector current; typical values.



Value C_c is that of the die only, it is not measurable because of internal matching network.

I_E = i_e = 0; f = 1 MHz.

Fig.4 Collector capacitance as a function of collector-base voltage; typical values.

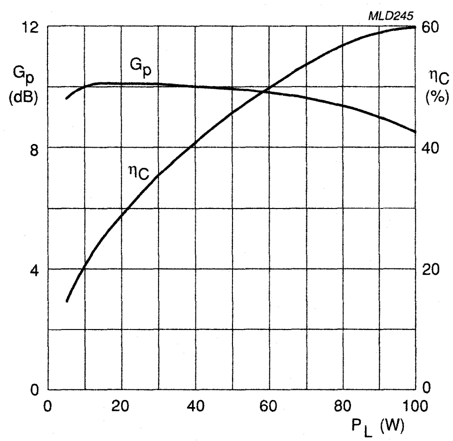
APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter, class-AB test circuit; $R_{th\ mb\text{-}h}$ = 0.2 K/W.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	900	26	200	75	≥8 typ. 9.5	≥50 typ. 55
	960	26	200	75	≥8.5 typ. 9.5	≥50 typ. 55

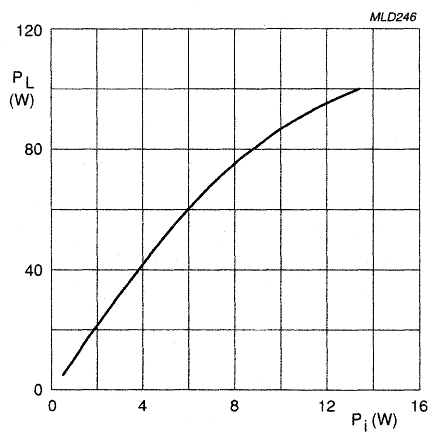
Ruggedness in class-AB operation

The transistors are capable of withstanding a load mismatch corresponding to VSWR = 4 : 1 through all phases at rated output power, under the following conditions: V_{CE} = 26 V; f = 960 MHz; I_{CQ} = 200 mA; T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.2 K/W.



V_{CE} = 26 V; I_{CQ} = 200 mA; f = 960 MHz.

Fig.5 Power gain and collector efficiency as functions of load power; typical values.



V_{CE} = 26 V; I_{CQ} = 200 mA; f = 960 MHz.

Fig.6 Load power as a function of input power; typical values.

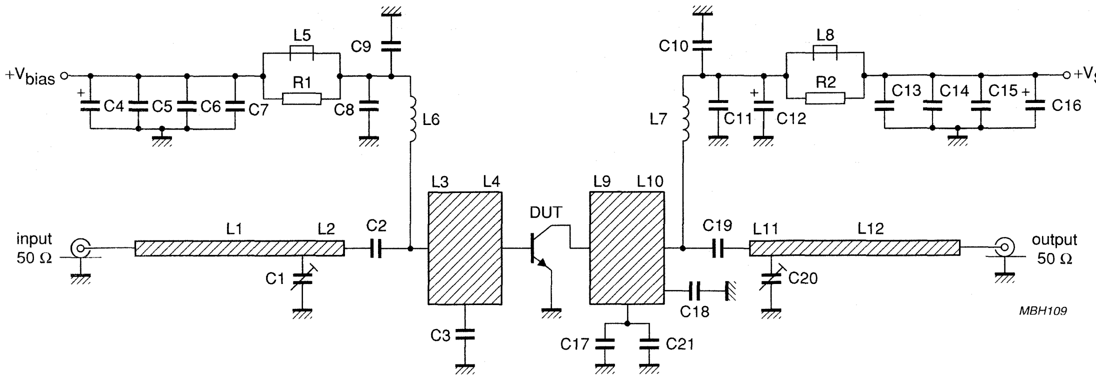


Fig.7 Class-AB test circuit at f = 960 MHz.

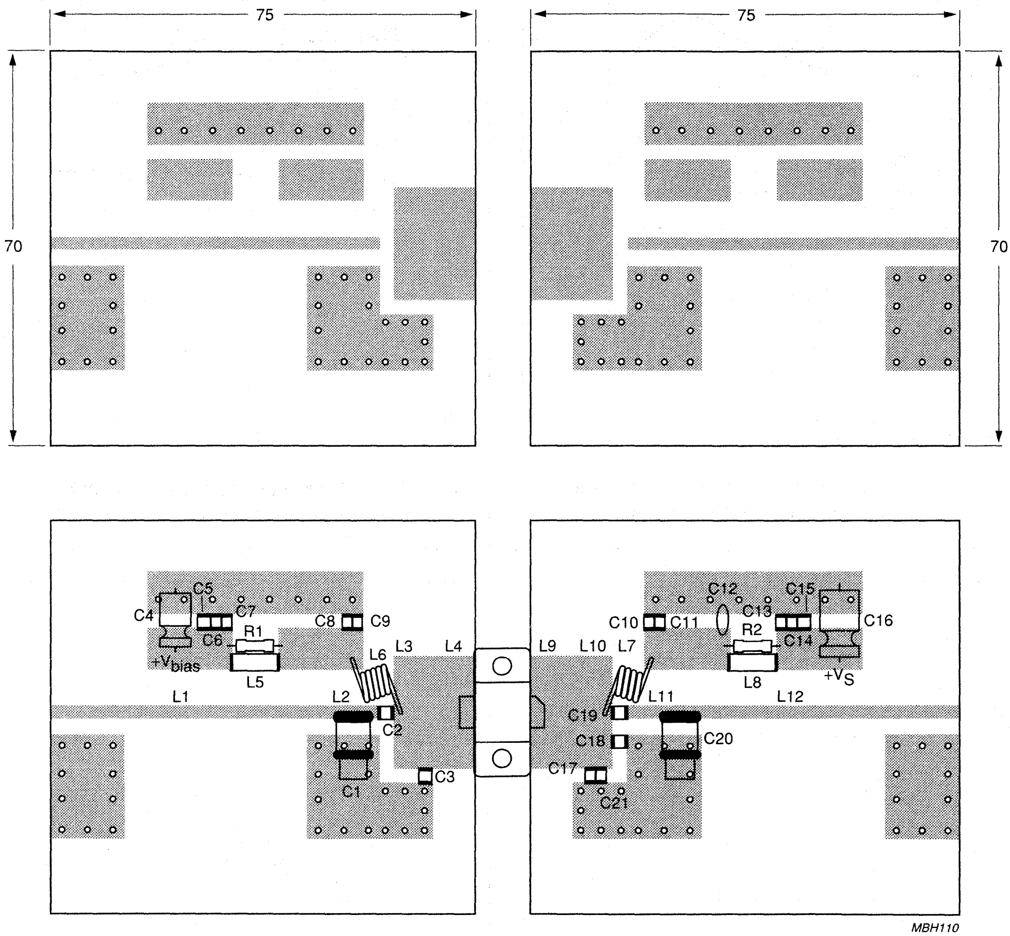
List of components (see Figs 7 and 8)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C20	Tekelec, type 5201	0.8 to 10 pF		
C2, C19	multilayer ceramic chip capacitor; note 1	15 pF; 500 V		
C3	multilayer ceramic chip capacitor; note 1	6.2 pF; 500 V		
C4	electrolytic capacitor	10 μF; 63 V		
C5	multilayer ceramic chip capacitor	22 nF; 50 V		
C6	multilayer ceramic chip capacitor; note 1	1 nF; 500 V		
C7	multilayer ceramic chip capacitor; note 1	33 pF; 500 V		2222 030 28109
C8, C11, C14	multilayer ceramic chip capacitor; note 1	100 pF; 500 V		
C9, C10, C13	multilayer ceramic chip capacitor; note 1	20 pF; 500 V		
C12	solid tantalum capacitor	1 μF; 35 V		
C15	multilayer ceramic chip capacitor	100 nF; 50 V		
C16	electrolytic capacitor	47 μF; 40 V		2222 036 68479

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C17	multilayer ceramic chip capacitor; note 1	4.7 pF; 500 V		
C18	multilayer ceramic chip capacitor; note 1	3.3 pF; 500 V		
C21	multilayer ceramic chip capacitor; note 1	2.7 pF; 500 V		
L1	stripline; note 2		length 51 mm width 2.2 mm	
L2	stripline; note 2		length 7 mm width 2.2 mm	
L3	stripline; note 2		length 5.5 mm width 20 mm	
L4	stripline; note 2		length 9 mm width 20 mm	
L5, L8	Ferroxcube chip-bead grade 4S2			4330 030 36300
L6	5 turns enamelled 1 mm copper wire		int. diameter 4 mm close wound	
L7	4 turns enamelled 1 mm copper wire		int. diameter 4 mm close wound	
L9	stripline; note 2		length 12.5 mm width 20 mm	
L10	stripline; note 2		length 2 mm width 20 mm	
L11	stripline; note 2		length 17 mm width 2.2 mm	
L12	stripline; note 2		length 41 mm width 2.2 mm	
R1, R2	metal film resistor	100 Ω; 0.4 W		

Notes

1. American Technical Ceramics type 100B or capacitor of same quality.
2. The striplines are on double-clad printed-circuit board with PTFE fibre-glass dielectric ($\varepsilon_r = 2.25$); thickness $\frac{1}{32}$".

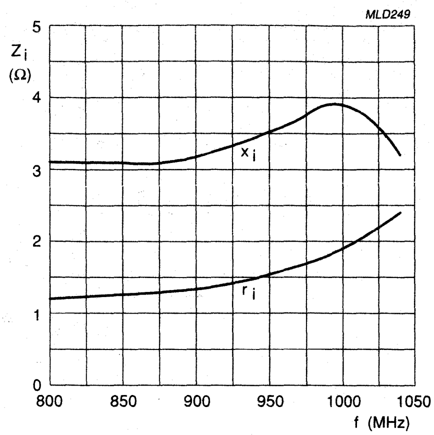


The same printed-circuit board can also be used for the flangeless version FL.

Dimensions in mm.

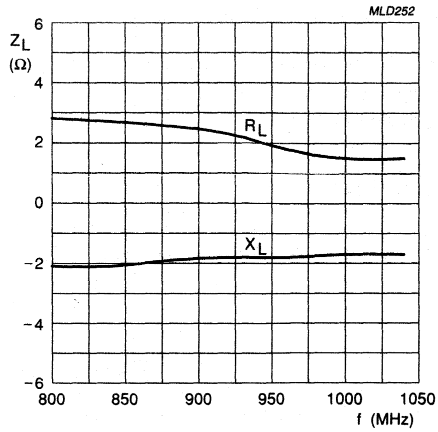
The components are located on one side of the copper-clad PTFE microfibre-glass board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.8 Component layout and printed-circuit board for 960 MHz class-AB test circuit.



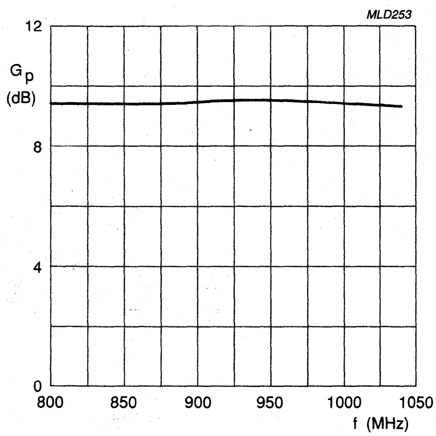
V_{CE} = 26 V; I_{CQ} = 200 mA; P_L = 75 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.2 K/W.

Fig.9 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 200 mA; P_L = 75 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.2 K/W.

Fig.10 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 200 mA; P_L = 75 W;
T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.2 K/W.

Fig.11 Power gain as a function of frequency; typical values.

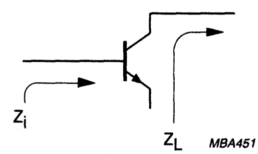


Fig.12 Definition of transistor impedance.

UHF power transistor | BLV2042

FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input matching to achieve high power gain and easy design of wideband circuits.

APPLICATIONS

- Common emitter class-AB operation in base stations in the 1 800 to 1 990 MHz frequency range.

DESCRIPTION

NPN silicon planar epitaxial power transistor in an 8-lead SOT409B SMD package with ceramic cap.
All leads are isolated from the mounting base.

PINNING - SOT409B

PIN	DESCRIPTION
1, 4, 5, 8	emitter
2, 3	base
6, 7	collector

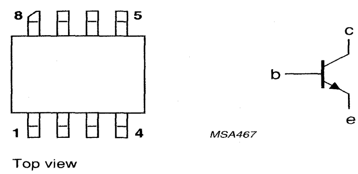


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	1 950	26	4	≥11	≥40	–
CW, class-AB	1 990	26	4	≥11	≥40	–
2-tone, class-AB	f_1 = 1 950; f_2 = 1 950.1	26	4 (PEP)	typ. 14	typ. 35	typ. –30

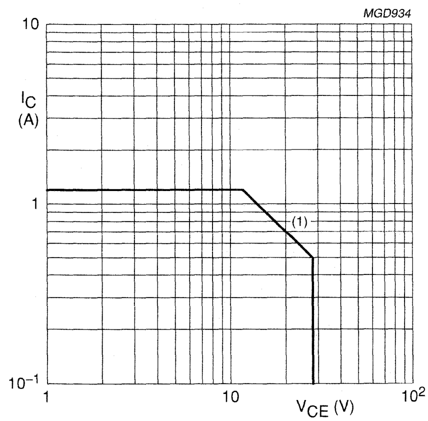
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	28	V
V_{EBO}	emitter-base voltage	open collector	–	4	V
I_C	collector current (DC)		–	1.2	A
$I_{C(AV)}$	collector current (average)		–	1.2	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; note 1	–	17	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

Note

1. Transistor with metallized ground plane mounted on a printed-circuit board, see *"Mounting and soldering recommendations in the General part of handbook SC08b"*.



(1) T_s = 60 °C.

Fig.2 DC SOAR.

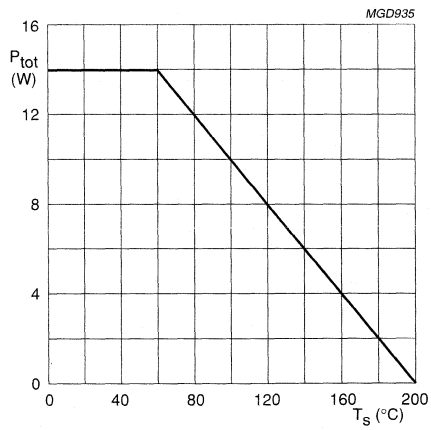


Fig.3 Total power dissipation as a function of the soldering point temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 17 W; T_{mb} = 25 °C; note 1	10	K/W

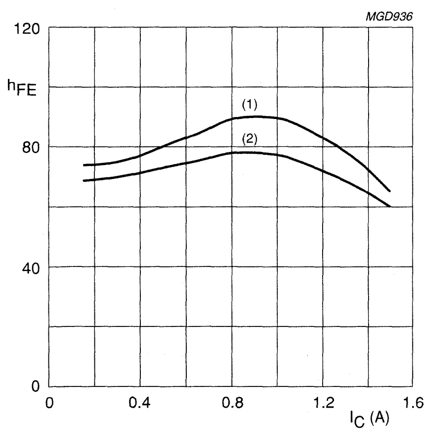
Note

1. Transistor with metallized ground plane mounted on a printed-circuit board, see *"Mounting and soldering recommendations in the General part of handbook SC08b"*.

CHARACTERISTICS

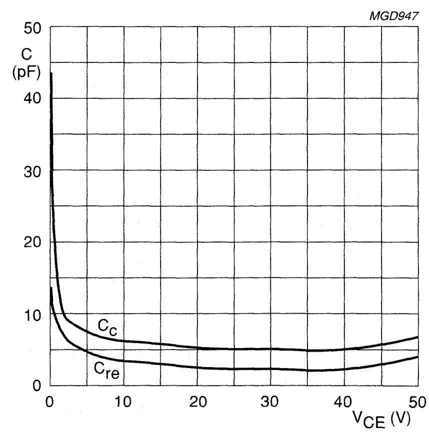
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 5 mA	60	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 10 mA	28	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.5 mA	4	–	–	V
I_{CES}	collector leakage current	V_{CE} = 26 V; V_{BE} = 0	–	–	1.3	mA
h_{FE}	DC current gain	V_{CE} = 26 V; I_C = 600 mA	30	–	120	
C_c	collector capacitance	V_{CB} = 26 V; $I_E = i_e$ = 0; f = 1 MHz	–	6	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	2.5	–	pF



(1) V_{CE} = 26 V; t_p = 500 μs; δ = < 1 %.
(2) V_{CE} = 10 V.

Fig.4 DC current gain as a function of collector current; typical values.



f = 1 MHz.

Fig.5 Capacitance as a function of collector-emitter voltage; typical values.

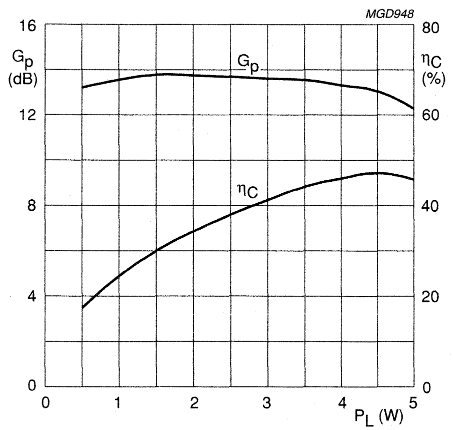
APPLICATION INFORMATION

RF performance at T_{mb} = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	1950	26	15	4	≥11 typ. 13	≥40 typ. 45	–
CW, class-AB	1990	26	15	4	≥11	≥40	–
2-tone, class-AB	f_1 = 1950; f_2 = 1950.1	26	15	4 (PEP)	typ. 14	typ. 35	typ. −30

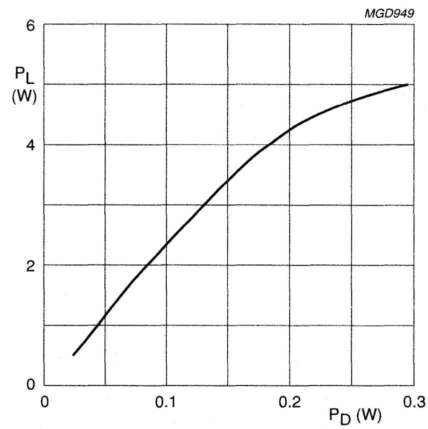
Ruggedness in class-AB operation

The BLV2042 is capable of withstanding a load mismatch corresponding to VSWR = 20 : 1 through all phases under the following conditions: f = 1950 MHz; V_{CE} = 26 V; I_{CQ} = 15 mA; P_L = 4 W; T_{mb} = 25 °C.



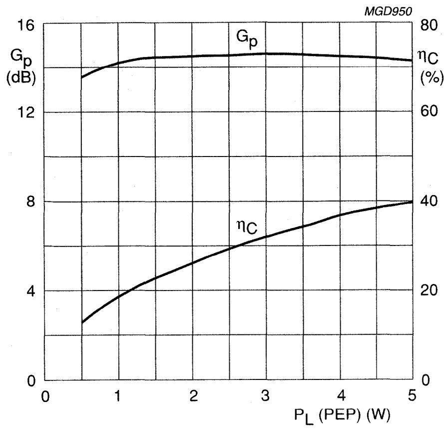
CW, class-AB; V_{CE} = 26 V; I_{CQ} = 15 mA; f = 1950 MHz; T_{mb} = 25 °C.

Fig.6 Power gain and collector efficiency as functions of load power; typical values.



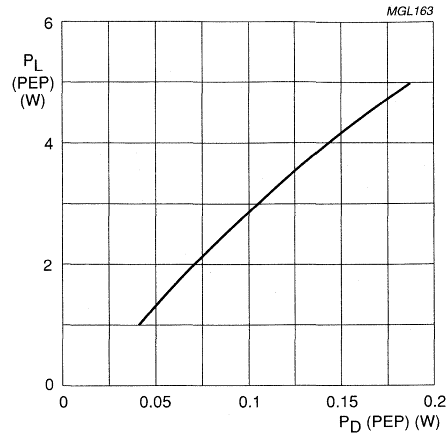
CW, class-AB; V_{CE} = 26 V; I_{CQ} = 15 mA; f = 1950 MHz; T_{mb} = 25 °C.

Fig.7 Load power as a function of drive power; typical values.



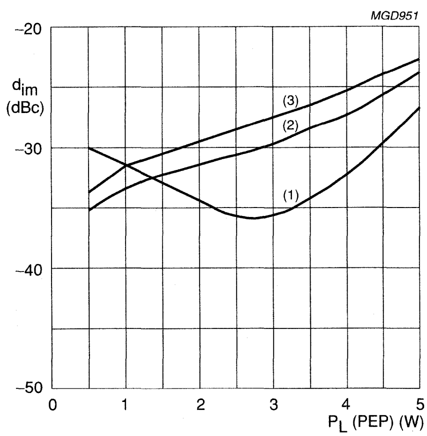
V_{CE} = 26 V; I_{CQ} = 15 mA; f_1 = 1950 MHz; f_2 = 1950.1 MHz.

Fig.8 Power gain and collector efficiency as functions of peak envelope load power; typical values.



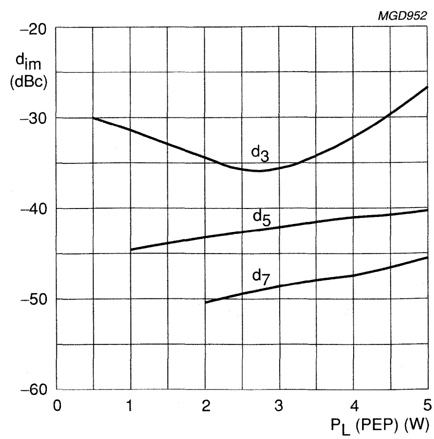
V_{CE} = 26 V; I_{CQ} = 15 mA; f_1 = 1950 MHz; f_2 = 1950.1 MHz.

Fig.9 Peak envelope load power as a function of peak envelope drive power; typical values.



V_{CE} = 26 V; f_1 = 1950 MHz; f_2 = 1950.1 MHz.
(1) I_{CQ} = 15 mA. (2) I_{CQ} = 40 mA. (3) I_{CQ} = 60 mA.

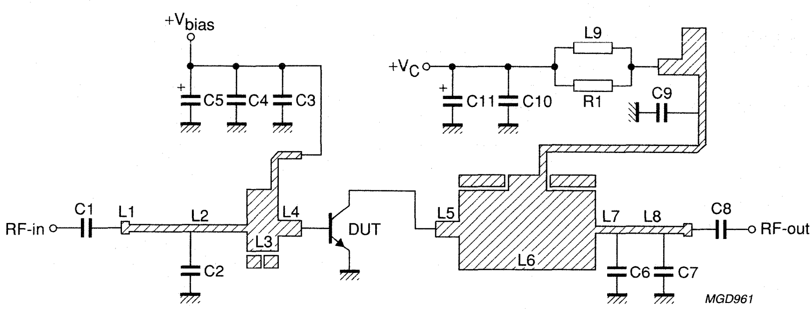
Fig.10 Third order intermodulation distortion as a function of peak envelope load power; typical values.



V_{CE} = 26 V; I_{CQ} = 15 mA; f_1 = 1950 MHz; f_2 = 1950.1 MHz.

Fig.11 Intermodulation distortion as a function of peak envelope load power; typical values.

Test circuit information



f = 1950 MHz.

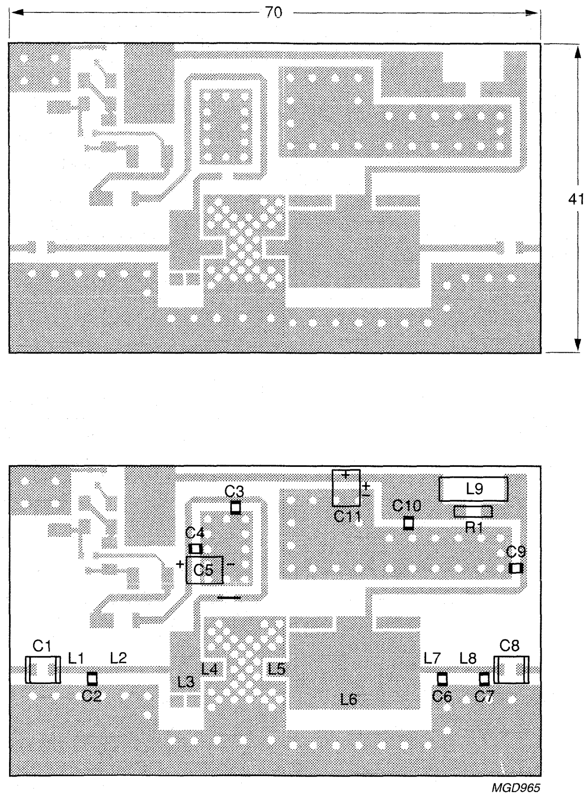
Fig.12 Class-AB test circuit.

List of components (see Figs 12 and 13)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C9	multilayer ceramic chip capacitor; note 1	100 pF		
C2, C6	multilayer ceramic chip capacitor; note 2	3 pF		
C3, C8	multilayer ceramic chip capacitor; note 2	27 pF		
C4, C10	multilayer ceramic chip capacitor	100 nF		2222 581 16641
C5, C11	tantalum SMD capacitor	47 μF; 35 V		
C7	multilayer ceramic chip capacitor; note 2	1.2 pF		
L1	stripline; note 3	50 Ω	length 9.9 mm width 0.91 mm	
L2	stripline; note 3	50 Ω	length 6.66 mm width 0.91 mm	
L3	stripline; note 3	10 Ω	length 4 mm width 8 mm	
L4	stripline; note 3	31 Ω	length 3 mm width 2 mm	
L5	stripline; note 3	31 Ω	length 3 mm width 2 mm	
L6	stripline; note 3	8.3 Ω	length 17.25 mm width 10.3 mm	
L7	stripline; note 3	50 Ω	length 2.42 mm width 0.91 mm	
L8	stripline; note 3	50 Ω	length 6.14 mm width 0.91 mm	
L9	grade 4S2 ferroxcube chip-bead			4330 030 36301
R1	metal film resistor	100 Ω; 0.4 W		
DUT	transistor	BLV2042		

Notes

1. American Technical Ceramics type 100B or capacitor of the same quality.
2. American Technical Ceramics type 100A or capacitor of the same quality.
3. The striplines are on a double copper-clad printed-circuit board with epoxy fibreglass dielectric ($\varepsilon_r = 6.15$); thickness 0.64 mm.

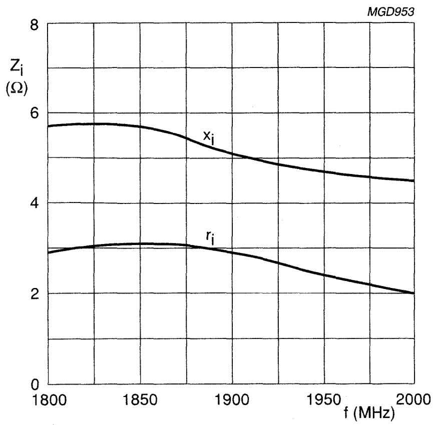


Dimensions in mm.

f = 1 950 MHz.

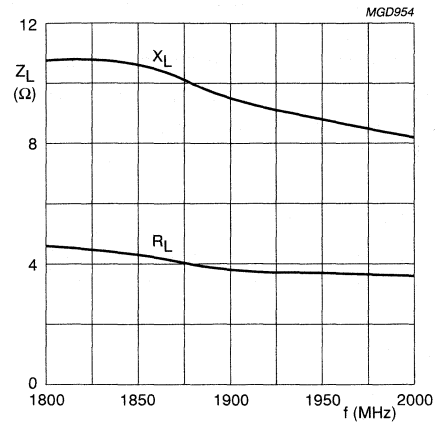
The components are situated on one side of the copper-clad epoxy fibreglass board, the other side is not etched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.13 Component layout for class-AB test circuit.



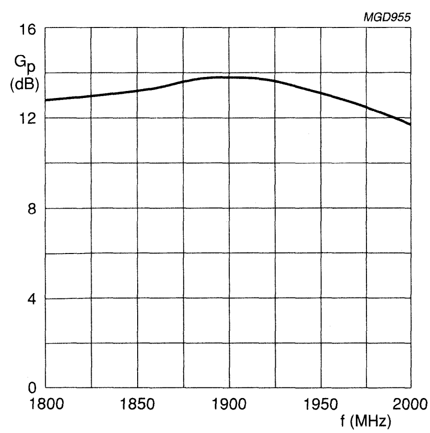
V_{CE} = 26 V; I_{CQ} = 15 mA; P_L = 4 W; T_{mb} = 25 °C.

Fig.14 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 15 mA; P_L = 4 W; T_{mb} = 25 °C.

Fig.15 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 15 mA; P_L = 4 W; T_{mb} = 25 °C.

Fig.16 Power gain as a function of frequency; typical values.

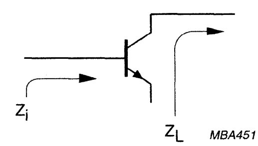


Fig.17 Definition of transistor impedance.

MOUNTING RECOMMENDATIONS

Heat from the device is transferred via the leads and the metallized underside. For optimum heat transfer it is recommended that the transistor be mounted on a grounded metallized area on the component side of the printed-circuit board. This metallized area should contain a large number of metallized, solder-filled through-holes. The non-component side of the printed-circuit board forms a ground plane. When the printed-circuit board is mounted on the heatsink using heatsink compound, a thermal resistance from mounting base to heatsink of 0.9 K/W can be attained.

UHF power transistor BLV2044

FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input and output matching to achieve high power gain and collector efficiency for an easy design of wideband circuits.

APPLICATIONS

- Common emitter class-AB operation in base station transmitters in the 1800 to 2000 MHz frequency range.

DESCRIPTION

NPN silicon planar transistor in a 2-lead SOT437A flange package with a ceramic cap. The emitter is connected to the flange.

PINNING - SOT437A

PIN	SYMBOL	DESCRIPTION
1	c	collector
2	b	base
3	e	emitter, connected to flange

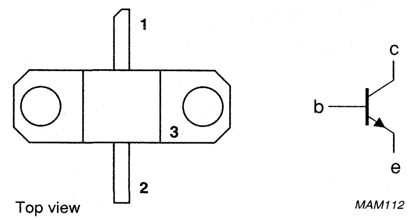


Fig.1 SOT437A.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	1950	26	15	≥8	≥40	–
CW, class-AB	1990	26	15	≥8	≥40	–
2-tone, class-AB	f_1 = 1950; f_2 = 1950.1	26	15 (PEP)	typ. 8.5	typ. 35	typ. –30

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

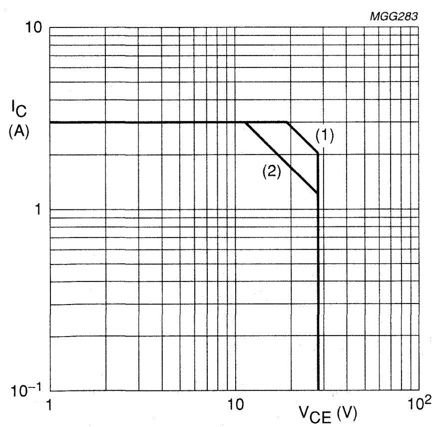
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	28	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	3	A
$I_{C(AV)}$	average collector current		–	3	A
P_{tot}	total power dissipation	T_{mb} = 25 °C	–	57	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

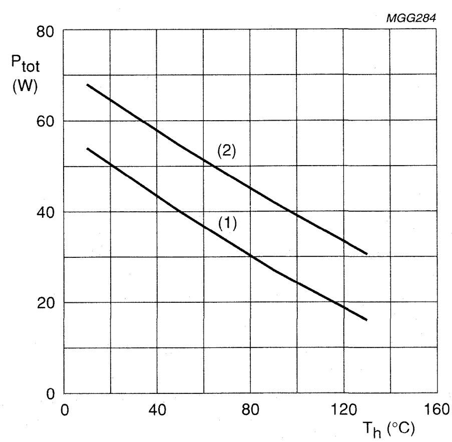
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 57 W; T_{mb} = 25 °C	3.07	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.4	K/W



(1) T_{mb} =25 °C.
(2) T_h = 70 °C.

Fig.2 DC SOAR.



(1) Continuous operation.
(2) Short-time operation during mismatch.

Fig.3 Power derating curves.

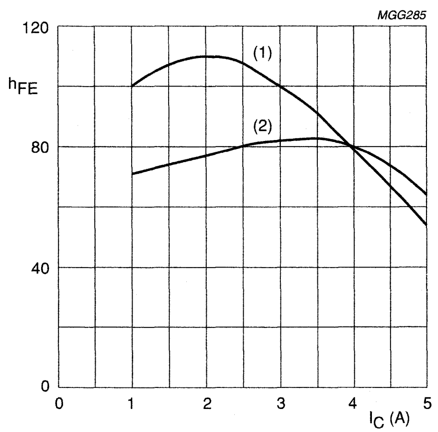
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 20 mA	60	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 10 mA	28	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 0.5 mA	2.5	–	–	V
I_{CES}	collector leakage current	V_{CE} = 12.5 V; V_{BE} = 0	–	–	4	mA
h_{FE}	DC current gain	V_{CE} = 26 V; I_C = 1 A	45	100	120	
C_c	collector capacitance	V_{CB} = 26 V; I_E = i_e = 0; f = 1 MHz; note 1	–	16	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	8	–	pF

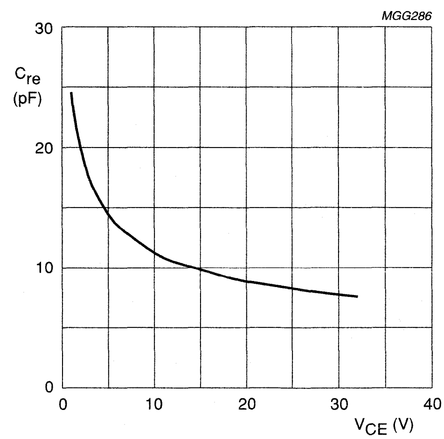
Note

1. Capacitance of die only.



(1) V_{CE} = 26 V; t_p = 500 μs; δ = < 1 %.
(2) V_{CE} = 10 V.

Fig.4 DC current gain as a function of collector current; typical values.



f = 1 MHz.

Fig.5 Feedback capacitance as a function of collector-emitter voltage; typical values.

APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter test circuit.

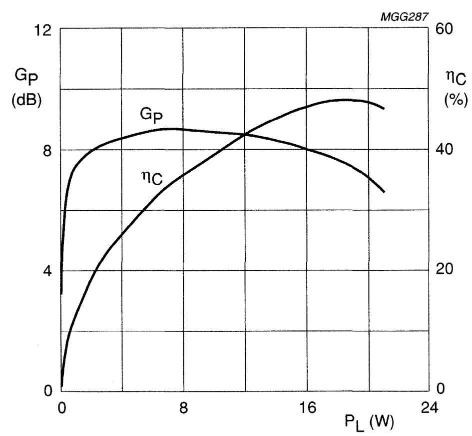
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	1950	26	40	15	≥8 typ. 8.5	≥40 typ. 45	–
CW, class-AB (note 1)	1990	26	40	15	≥8	≥40	–
2-tone, class-AB	f_1 = 1950, f_2 = 1950.1	26	40	15 (PEP)	typ. 8.5	typ. 35	typ. −30

Note

1. See application note BLV2044.

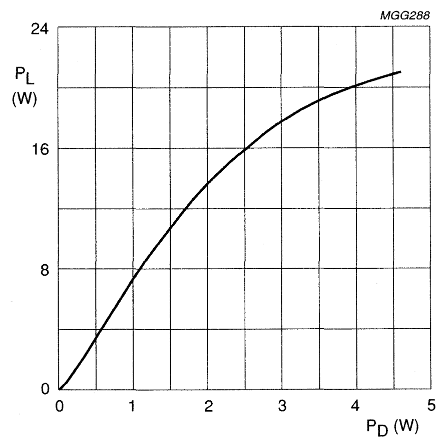
Ruggedness in class-AB operation

The BLV2044 is capable of withstanding a load mismatch corresponding to VSWR = 5 : 1 through all phases under the following conditions: f = 1950 MHz; V_{CE} = 26 V; I_{CQ} = 40 mA; P_L = 15 W; T_{mb} = 25 °C.



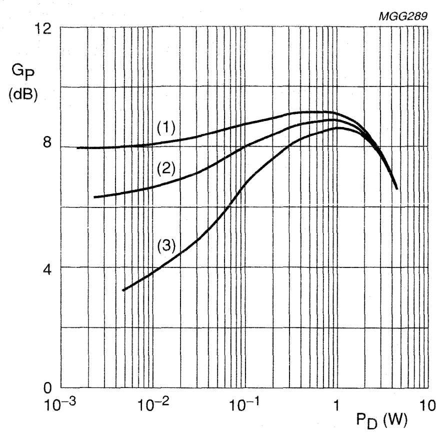
V_{CE} = 26 V; I_{CQ} = 40 mA; f = 1950 MHz.

Fig.6 Power gain and collector efficiency as functions of load power; typical values.



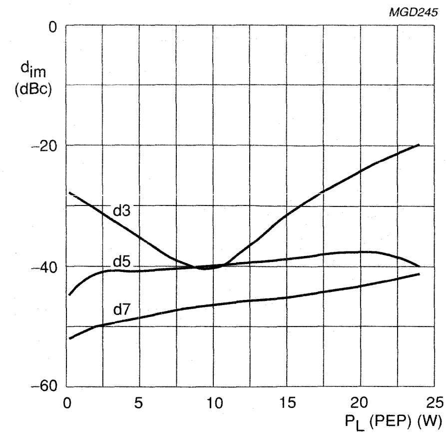
V_{CE} = 26 V; I_{CQ} = 40 mA; f = 1950 MHz.

Fig.7 Load power as a function of drive power; typical values.



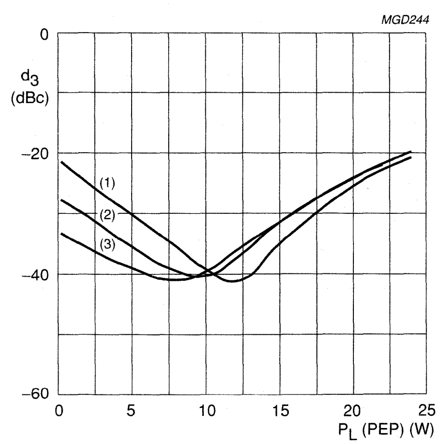
V_{CE} = 26 V; f = 1950 MHz.
(1) I_{CQ} = 120 mA. (2) I_{CQ} = 80 mA. (3) I_{CQ} = 40 mA.

Fig.8 Power gain as a function of drive power; typical values.



V_{CE} = 26 V; I_{CQ} = 40 mA; f_1 = 1950 MHz; f_2 = 1950.1 MHz.

Fig.9 Intermodulation distortion as a function of peak envelope load power; typical values.



V_{CE} = 26 V; f_1 = 1950 MHz; f_2 = 1950.1 MHz.
(1) I_{CQ} = 20 mA. (2) I_{CQ} = 40 mA. (3) I_{CQ} = 60 mA.

Fig.10 Third order intermodulation distortion as a function of peak envelope load power; typical values.

Test circuit information

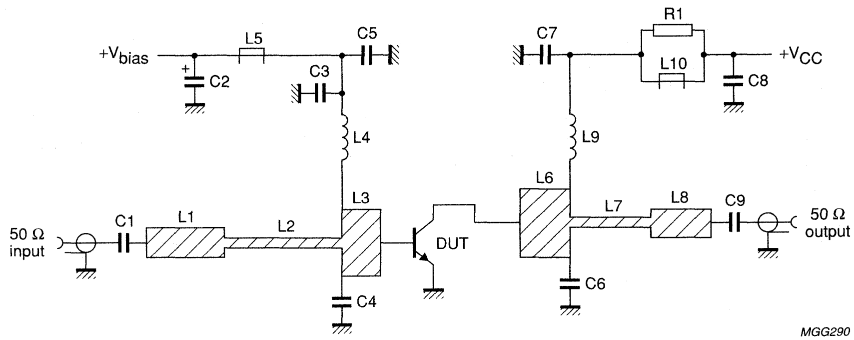


Fig.11 Class-AB test circuit for 1.8 to 2 GHz.

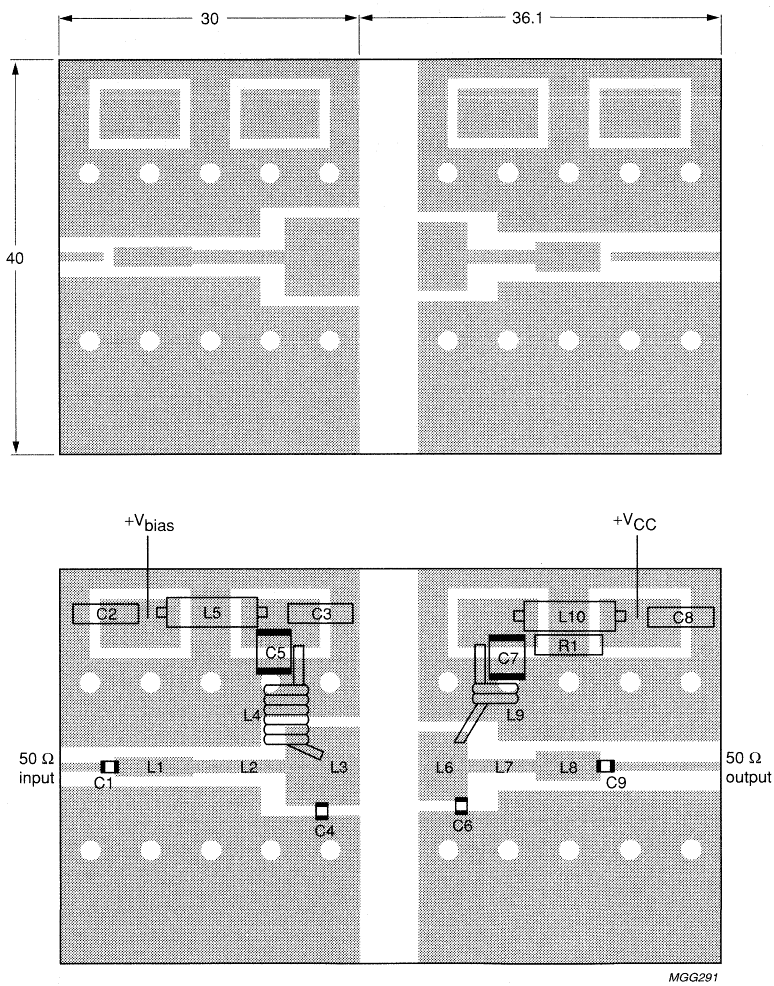
List of components (see Figs 11 and 12)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C9	multilayer ceramic chip capacitor; note 1	30 pF		
C2	tantalum SMD capacitor	10 μF; 35 V		
C3	multilayer ceramic chip capacitor	22 nF		2222 629 08223
C4	multilayer ceramic chip capacitor; note 1	1.1 pF		
C5, C7	multilayer ceramic chip capacitor; note 2	20 pF		
C6	multilayer ceramic chip capacitor; note 1	1.2 pF		
C8	multilayer ceramic chip capacitor	100 nF		2222 852 47104
L1	stripline; note 3	31 Ω	length 7.8 mm width 2 mm	
L2	stripline; note 3	40 Ω	length 8.8 mm width 1.4 mm	
L3	stripline; note 3	10 Ω	length 8 mm width 8 mm	
L4	5 turns enamelled 1 mm copper wire	38 nH	length 8 mm int. dia. 3 mm	
L5, L10	grade 4S2 ferroxcube chip-bead			4330 030 36301
L6	stripline; note 3	12 Ω	length 5 mm width 7 mm	
L7	stripline; note 3	40 Ω	length 6.7 mm width 1.4 mm	

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
L8	stripline; note 3	23 Ω	length 6.4 mm width 3 mm	
L9	2 turns enamelled 1 mm copper wire	9 nH	length 4 mm int. dia. 3 mm	
R1	metal film resistor	10 Ω; 0.4 W		2311 153 51009

Notes

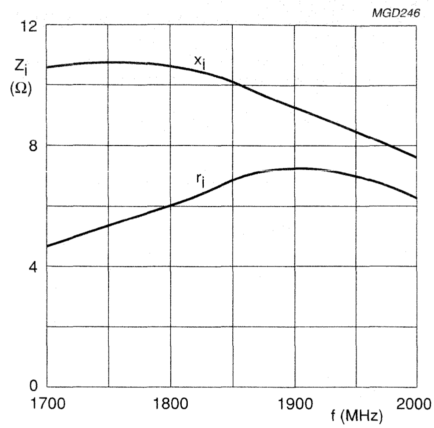
1. American Technical Ceramics type 100A or capacitor of the same quality.
2. American Technical Ceramics type 100B or capacitor of the same quality.
3. The striplines are on a double copper-clad printed-circuit board with epoxy fibre-glass dielectric (ε_r = 6.15); thickness 0.64 mm.



Dimensions in mm.

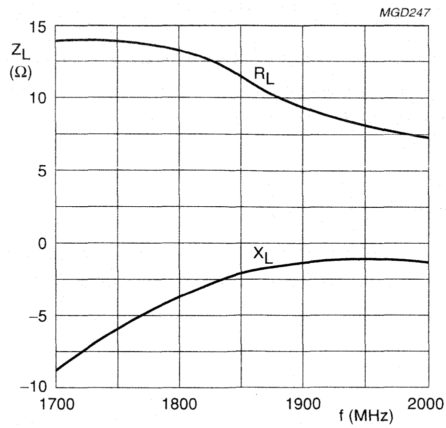
The components are situated on one side of the copper-clad epoxy fibre-glass board, the other side is not etched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.12 Component layout and printed-circuit board for 1.8 to 2 GHz class-AB test circuit.



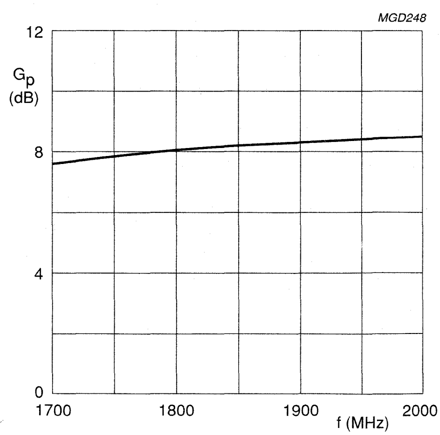
V_{CE} = 26 V; I_{CQ} = 40 mA; P_L = 15 W; T_{mb} = 25 °C.

Fig.13 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 40 mA; P_L = 15 W; T_{mb} = 25 °C.

Fig.14 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 40 mA; P_L = 15 W; T_{mb} = 25 °C.

Fig.15 Power gain as a function of frequency; typical values.

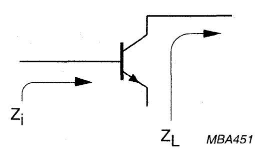


Fig.16 Definition of transistor impedance.

UHF power transistor | BLV2045

FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input and output matching to achieve high power gain and collector efficiency for an easy design of wideband circuits.

APPLICATIONS

- Common emitter class-AB operation in base station transmitters in the 1800 to 1970 MHz frequency range.

DESCRIPTION

NPN silicon planar transistor encapsulated in a 2-lead SOT390A flange package with a ceramic cap. The emitter is connected to the flange.

PINNING - SOT390A

PIN	SYMBOL	DESCRIPTION
1	c	collector
2	b	base
3 (flange)	e	emitter

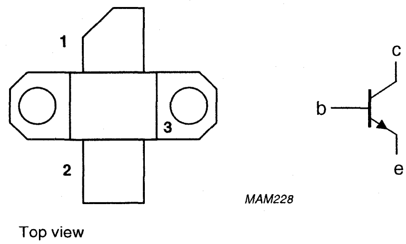


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	1950	26	30	≥8	≥40	–
2-tone, class-AB	1950	26	30 (PEP)	typ. 9	typ. 35	typ. –30

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	28	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	7	A
$I_{C(AV)}$	collector current (average)		–	7	A
P_{tot}	total power dissipation	T_{mb} = 25 °C	–	100	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 100 W; T_{mb} = 25 °C	1.75	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.4	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 40 mA	60	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 20 mA	28	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 1 mA	2.5	–	–	V
I_{CES}	collector leakage current	V_{CE} = 12.5 V; V_{BE} = 0	–	–	8	mA
h_{FE}	DC current gain	V_{CE} = 24 V; I_C = 2 A	45	60	–	
C_c	collector capacitance	V_{CB} = 26 V; I_E = i_e = 0; f = 1 MHz; note 1	–	32	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	20	–	pF

Note

1. Capacitance of die only.

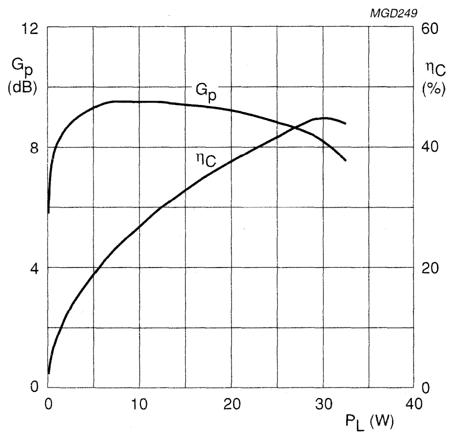
APPLICATION INFORMATION

RF performance at $T_h = 25$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	1950	26	80	30	≥8 typ. 8.5	≥40 typ. 45	–
2-tone, class-AB	1950	26	80	30 (PEP)	typ. 9	typ. 35	typ. −30

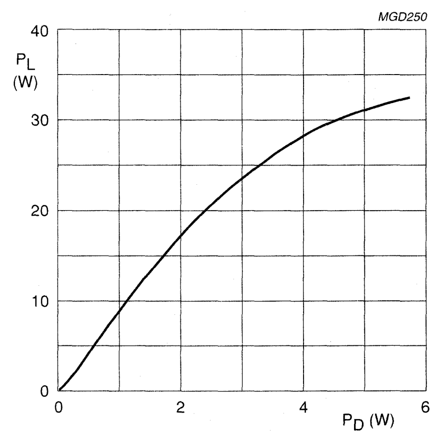
Ruggedness in class-AB operation

The BLV2045 is capable of withstanding a load mismatch corresponding to VSWR = 5 : 1 through all phases under the following conditions: f = 1950 MHz; $V_{CE} = 26$ V; $I_{CQ} = 80$ mA; $P_L = 30$ W; $T_{mb} = 25$ °C.



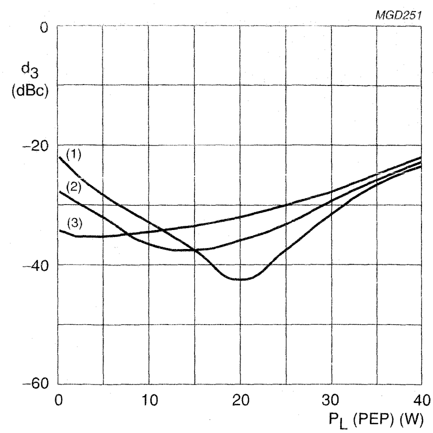
CW class-AB; f = 1950 MHz; $V_{CE} = 26$ V; $I_{CQ} = 80$ mA; $T_h = 25$ °C.

Fig.2 Power gain and collector efficiency as functions of load power; typical values.



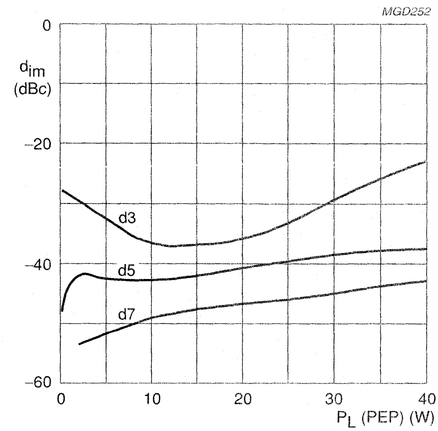
CW class-AB; f = 1950 MHz; $V_{CE} = 26$ V; $I_{CQ} = 80$ mA; $T_h = 25$ °C.

Fig.3 Load power as a function of input power; typical values.



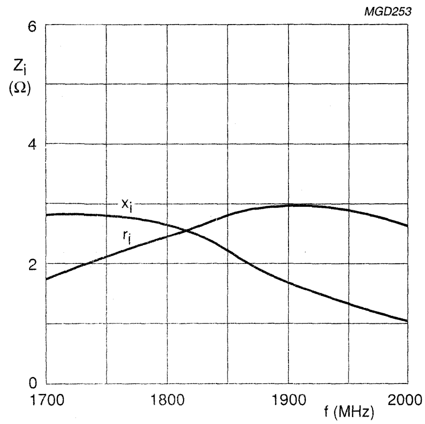
2-tone, class-AB; f = 1950 MHz; V_{CE} = 26 V.
(1) I_{CQ} = 40 mA. (2) I_{CQ} = 80 mA. (3) I_{CQ} = 120 mA.

Fig.4 Third order Intermodulation distortion as a function of peak envelope load power; typical values.



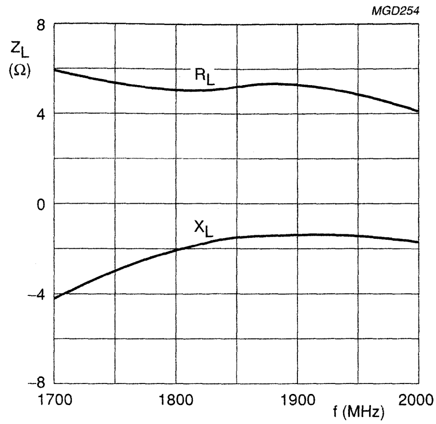
2-tone, class-AB; f = 1950 MHz; V_{CE} = 26 V; I_{CQ} = 80 mA.

Fig.5 Intermodulation distortion as a function of peak envelope load power; typical values.



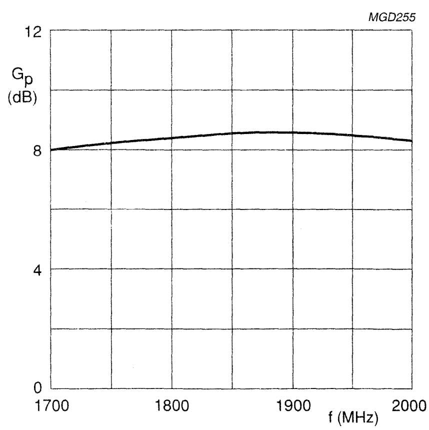
V_{CE} = 26 V; I_{CQ} = 80 mA; P_L = 30 W; T_{mb} = 25 °C.

Fig.6 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 80 mA; P_L = 30 W; T_{mb} = 25 °C.

Fig.7 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 80 mA; P_L = 30 W; T_{mb} = 25 °C.

Fig.8 Power gain as a function of frequency; typical values.

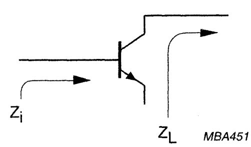


Fig.9 Definition of transistor impedance.

UHF power transistor BLV2045N

FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input and output matching for an easy design of wideband circuits.

APPLICATIONS

- Common emitter class-AB operation in PCN and PCS applications in the 1800 to 2000 MHz frequency range.

DESCRIPTION

NPN silicon planar UHF power transistor in a 2-lead SOT390A flange package with a ceramic cap. The emitter is connected to the flange.

PINNING - SOT390A

PIN	DESCRIPTION
1	collector
2	base
3	emitter, connected to flange

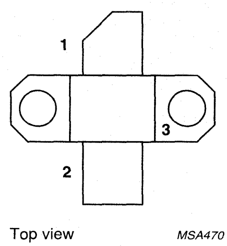


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	2000	26	30	≥10	≥40	–
2-tone, class-AB	f_1 = 2000.0; f_2 = 2000.1	26	30 (PEP)	≥10	≥35	≤–30

WARNING
Product and environmental safety - toxic materials.
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	27	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	4	A
$I_{C(AV)}$	average collector current		–	4	A
P_{tot}	total power dissipation	T_{mb} = 25 °C	–	t.b.f.	W
T_{stg}	storage temperature		−65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = t.b.f. W; T_{mb} = 25 °C	t.b.f.	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.15	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 15 mA	60	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 45 mA	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 15 mA	2.5	–	–	V
I_{CES}	collector leakage current	V_{CE} = 40 V; V_{BE} = 0	–	–	3	mA
h_{FE}	DC current gain	V_{CE} = 26 V; I_C = 1.5 A	45	–	–	
C_c	collector capacitance	V_{CB} = 26 V; $I_E = i_e$ = 0; f = 1 MHz; note 1	–	t.b.f.	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	t.b.f.	–	pF

Note

1. Capacitance of die only.

APPLICATION INFORMATION

RF performance at $T_h = 25$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	2000	26	60	30	≥10	≥40	–
2-tone, class-AB	$f_1 = 2000.0$; $f_2 = 2000.1$	26	60	30 (PEP)	≥10	≥30	≤–30

Ruggedness in class-AB operation

The BLV2045N is capable of withstanding a load mismatch corresponding to VSWR = 3 : 1 through all phases under the following conditions: $f_1 = 2000.0$ MHz; $f_2 = 2000.1$ MHz; $V_{CE} = 26$ V; $I_{CQ} = 60$ mA; $P_L = 30$ W (PEP); $T_{mb} = 25$ °C.

UHF power transistor BLV2046

FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input and output matching to achieve high power gain and collector efficiency for an easy design of wideband circuits.

APPLICATIONS

- Common emitter class-AB operation in PCN and PCS applications in the 1800 to 1990 MHz frequency range.

DESCRIPTION

NPN silicon planar transistor in a 2-lead SOT460A flange package with a ceramic cap. The emitter is connected to the flange.

PINNING - SOT460A

PIN	SYMBOL	DESCRIPTION
1	c	collector
2	b	base
3	e	emitter, connected to flange

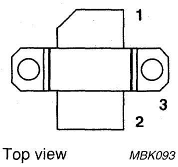


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	1990	26	50	≥7.5	≥40	–
2-tone, class-AB	f_1 = 1990.0; f_2 = 1990.1	26	50 (PEP)	typ. 8	typ. 33	typ. –30

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	27	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	12	A
$I_{C(AV)}$	average collector current		–	12	A
P_{tot}	total power dissipation	T_{mb} = 25 °C	–	195	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	P_{dis} = 195 W; T_{mb} = 25 °C	0.9	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink		0.2	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 20 mA; open emitter	65	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 60 mA; open base	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 20 mA; I_B = 30 mA; open collector	3.2	–	–	V
I_{CBO}	collector-base leakage current	V_{CB} = 40 V; I_E = 0	–	–	4	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 1 A	20	–	100	
C_c	collector capacitance	V_{CB} = 26 V; I_E = i_e = 0; f = 1 MHz; note 1	–	60	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	40	–	pF

Note

1. Die only.

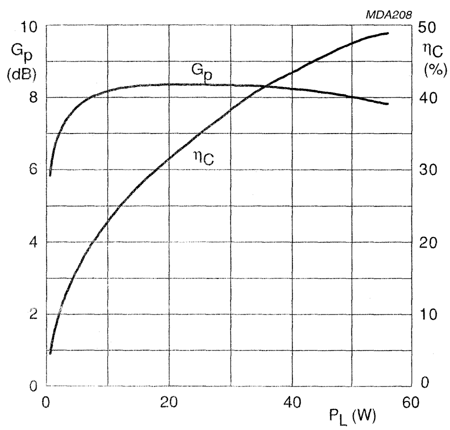
APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common-emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW class-AB	1990	26	200	50	≥7.5	≥40	–
2-tone class-AB	f_1 = 1990.0; f_2 = 1990.1	26	200	50 (PEP)	typ. 8	typ. 33	typ. −30

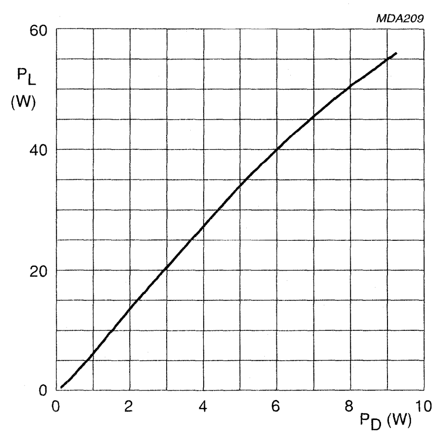
Ruggedness in class-AB operation

The BLV2046 is capable of withstanding a load mismatch corresponding to VSWR = 2:1 through all phases under the following conditions: f_1 = 1990.0 MHz; f_2 = 1990.1 MHz; V_{CE} = 26 V; I_{CQ} = 200 mA; P_L = 50 W (PEP) and T_h = 25 °C.



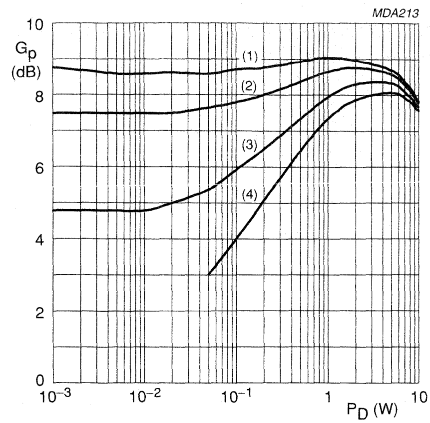
V_{CE} = 26 V; I_{CQ} = 200 mA; f = 1990 MHz.

Fig.2 Power gain and efficiency as a function of load power; typical values.



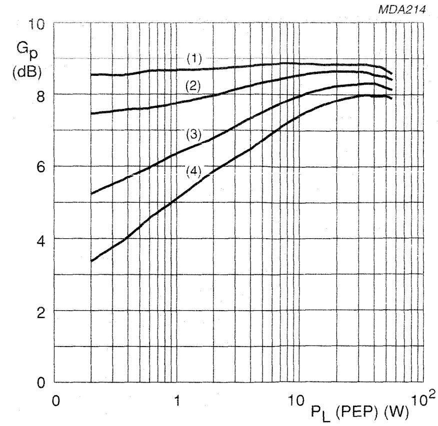
V_{CE} = 26 V; I_{CQ} = 200 mA; f = 1990 MHz.

Fig.3 Load power as a function of drive power; typical values.



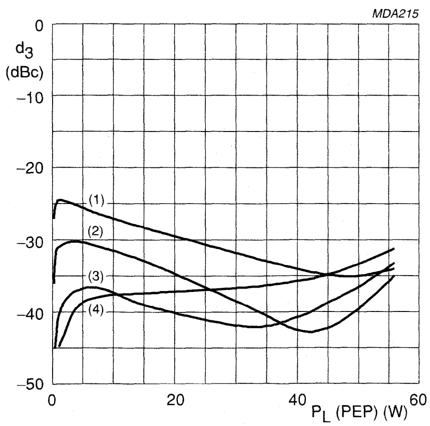
V_{CE} = 26 V; f = 1990 MHz.
(1) I_{CQ} = 600 mA.
(2) I_{CQ} = 400 mA.
(3) I_{CQ} = 200 mA.
(4) I_{CQ} = 100 mA.

Fig.4 Power gain expansion as a function of drive power; typical values.



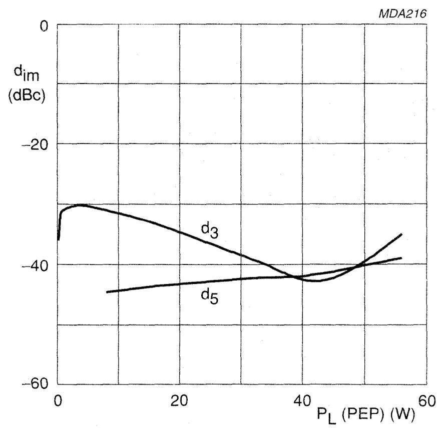
V_{CE} = 26 V; f_1 = 1990 MHz; f_2 = 1990.1 MHz.
(1) I_{CQ} = 600 mA.
(2) I_{CQ} = 400 mA.
(3) I_{CQ} = 200 mA.
(4) I_{CQ} = 100 mA.

Fig.5 Power gain expansion as a function of load power; typical values.



V_{CE} = 26 V; f_1 = 1990 MHz; f_2 = 1990.1 MHz.
(1) I_{CQ} = 100 mA.
(2) I_{CQ} = 200 mA.
(3) I_{CQ} = 400 mA.
(4) I_{CQ} = 600 mA.

Fig.6 Intermodulation distortion as a function of load power; typical values.



V_{CE} = 26 V; I_{CQ} = 200 mA; f_1 = 1990 MHz; f_2 = 1990.1 MHz.

Fig.7 Intermodulation distortion as a function of load power; typical values.

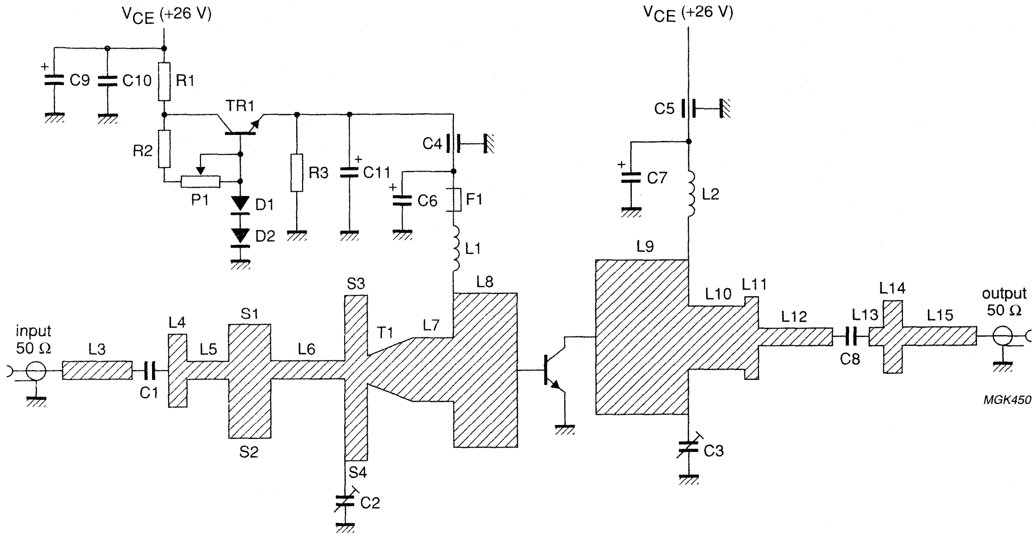


Fig.8 Class-AB test circuit for 1990 MHz.

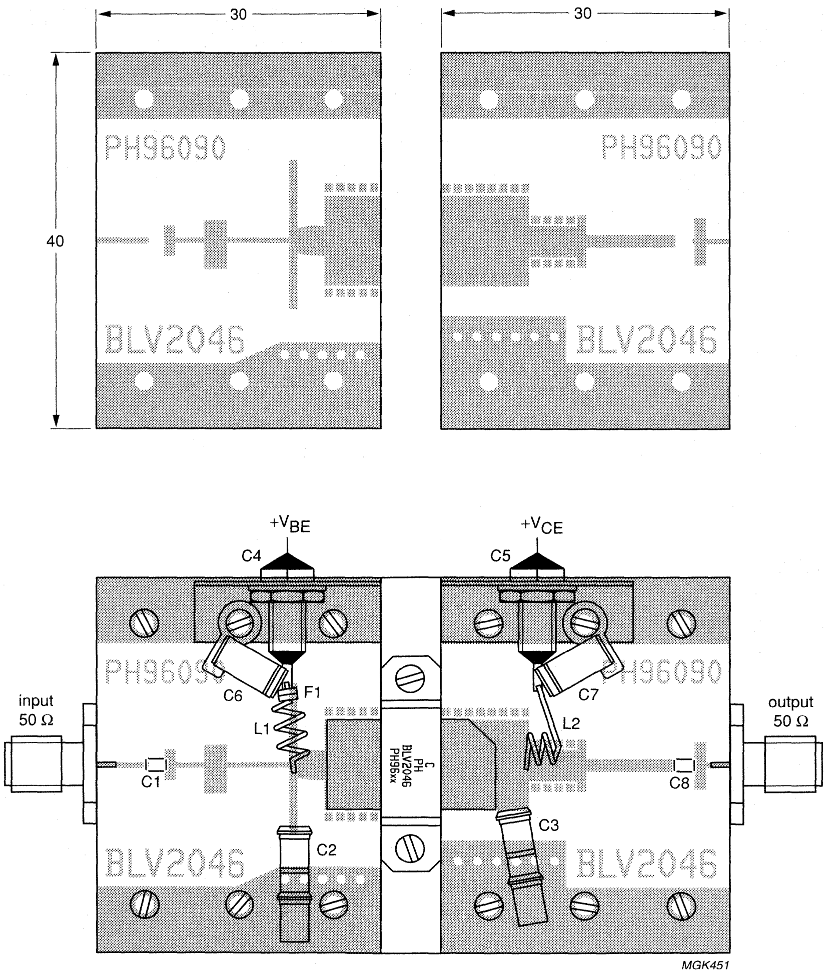
List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C8	multilayer ceramic chip capacitor; note 1	30 pF		
C2, C3	trimmer capacitor	0.4 to 2.5 pF		
C4, C5	feedthrough bypass capacitor	1500 pF		
C6, C7	tantal SMD capacitor	10 μF; 35 V		
C9	electrolytic capacitor	10 μF; 100 V		
C10	multilayer ceramic chip capacitor	22 nF		2222 629 08223
C11	electrolytic capacitor	10 μF; 63 V		
L1	5 turns enamelled 0.5 mm copper wire		int. dia. = 4 mm; length = 6.7 mm	
L2	2 turns enamelled 0.5 mm copper wire		int. dia. = 4 mm; length = 2.7 mm	
L3	stripline; note 2	48.8 Ω	5.34 × 0.59 mm	
L4	stripline; note 2	17 Ω	1.2 × 3.23 mm	
L5	stripline; note 2	48.8 Ω	2.93 × 0.59 mm	

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
L6	stripline; note 2	48.8 Ω	6.63 × 0.59 mm	
L7	stripline; note 2	17.1 Ω	1.6 × 3.2 mm	
L8	stripline; note 2	6.8 Ω	6 × 9.6 mm	
L9	stripline; note 2	6.8 Ω	9.11 × 9.6 mm	
L10	stripline; note 2	16.6 Ω	5.09 × 3.32 mm	
L11	stripline; note 2	10.9 Ω	0.85 × 5.59 mm	
L12	stripline; note 2	31.9 Ω	9.26 × 1.3 mm	
L13	stripline; note 2	48.8 Ω	0.24 × 0.59 mm	
L14	stripline; note 2	11.9 Ω	1.15 × 5.04 mm	
L15	stripline; note 2	48.8 Ω	2.5 × 0.59 mm	
S1	stub; note 2		2.4 × 2.17 mm	
S2	stub; note 2		2.4 × 3.04 mm	
S3	stub; note 2		0.9 × 8.63 mm	
S4	stub; note 2		0.9 × 7.29 mm	
T1	taper; note 2		1.3 × 2.7 / 3.2 mm	
F1	grade 4B1 ferrite bead			4330 030 43081
P1	linear potentiometer	5 kΩ		
R1	resistor	100 Ω, 3 W		
R2	resistor	1 kΩ, 0.25 W		
R3	resistor	56 Ω, 3 W		
TR1	transistor	BD241C		
D1	diode, note 3	BY239		
D2	diode, note 4	BY239		

Notes

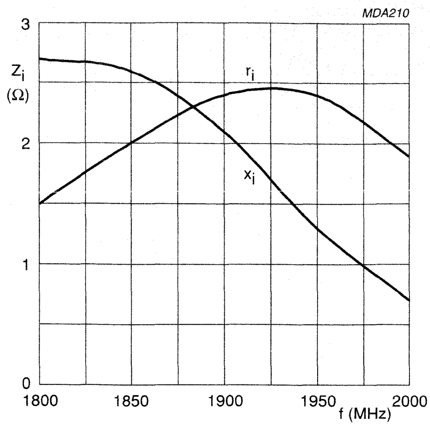
1. American Technical Ceramics type 100A (C1), type 100B (C8) or capacitor of same quality.
2. The striplines are on a double copper-clad PCB with duroid 6010 dielectric (ε_r = 10.2); thickness 0.635 mm.
3. In thermal contact with TR1.
4. In thermal contact with DUT.



Dimensions in mm.

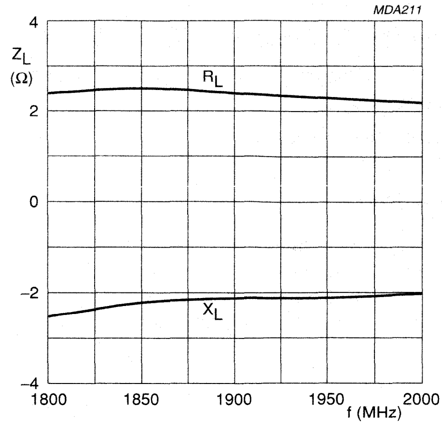
The components are situated on one side of the copper-clad board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.9 Component layout and printed-circuit board for 1 990 MHz class-AB test circuit.



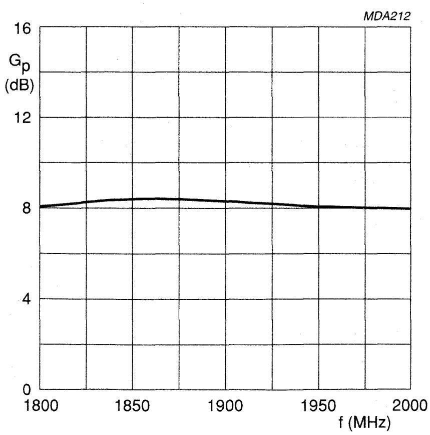
V_{CE} = 26 V; I_{CQ} = 400 mA; P_L = 50 W; T_{mb} = 25 °C.

Fig.10 Input impedance as function of the frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 400 mA; P_L = 50 W; T_{mb} = 25 °C.

Fig.11 Load impedance as a function of the frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 200 mA; P_L = 50 W; T_{mb} = 25 °C.

Fig.12 Gain as a function of the frequency; typical values.

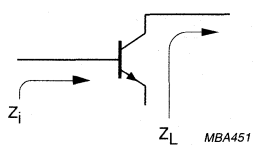


Fig.13 Definition of transistor impedance.

UHF power transistor BLV2047

FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input and output matching for easy design of wideband circuits
- AIN substrate package for environmental safety.

APPLICATIONS

- Common emitter class-AB operation for PCN (Personal Communication Networks) and PCS (Personal Communication Services) base station applications in the 1800 to 2000 MHz frequency range.

DESCRIPTION

NPN silicon planar power transistor in a 2-lead SOT468A flange package with ceramic cap. The emitter is connected to the flange.

PINNING - SOT468A

PIN	DESCRIPTION
1	collector
2	base
3	emitter; connected to flange

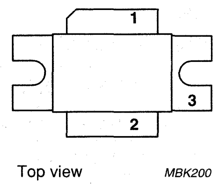


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	2000	26	60	≥8.5	≥40	–
2-tone, class-AB	f_1 = 2000.0; f_2 = 2000.1	26	60 (PEP)	≥9	≥33	≤–30

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	27	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	10	A
P_{tot}	total power dissipation	T_{mb} = 25 °C	–	270	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-mb}$	thermal resistance from junction to mounting base	P_{tot} = 270 W; T_{mb} = 25 °C; note 1	0.65	K/W
$R_{th\ mb-h}$	thermal resistance from mounting base to heatsink		0.25	K/W

Note

1. Thermal resistance is determined under specified RF operating conditions.

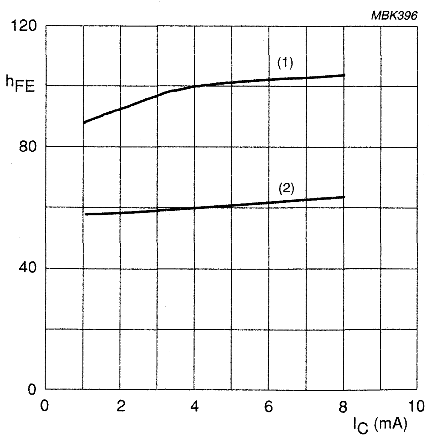
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 120 mA	60	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 40 mA	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 40 mA	3.2	–	–	V
I_{CES}	collector leakage current	V_{CE} = 26 V; V_{BE} = 0	–	–	8	mA
h_{FE}	DC current gain	V_{CE} = 24 V; I_C = 4 A	45	–	120	
C_c	collector capacitance	V_{CB} = 26 V; $I_E = i_e$ = 0; f = 1 MHz; note 1	–	72	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	41	–	pF

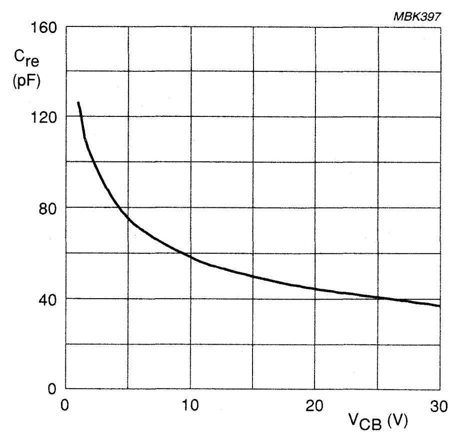
Note

1. Capacitance of die only.



(1) V_{CE} = 26 V.
(2) V_{CE} = 10 V.

Fig.2 DC current gain as a function of collector current; typical values.



f = 1 MHz.

Fig.3 Feedback capacitance as a function of collector-base voltage; typical values.

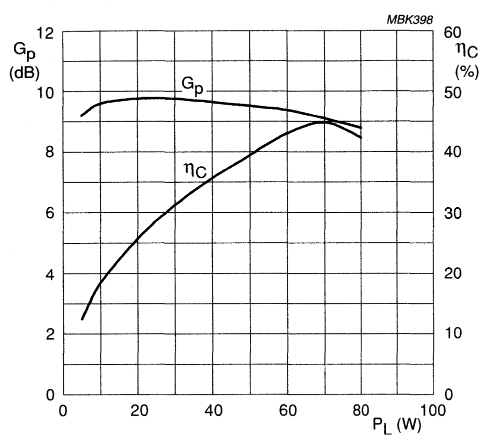
APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	2000	26	300	60	≥8.5	≥40	–
2-tone, class-AB	f_1 = 2000.0 f_2 = 2000.1	26	300	60 (PEP)	≥9	≥33	≤–30

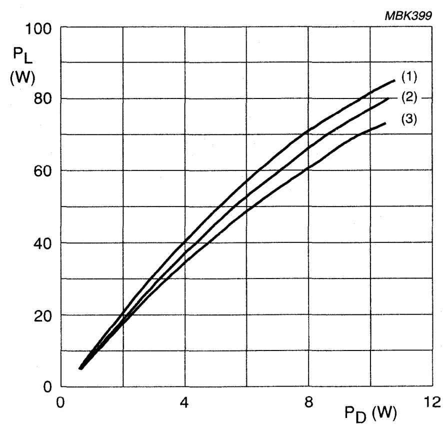
Ruggedness in class-AB operation

The BLV2047 is capable of withstanding a load mismatch corresponding to VSWR = 3 : 1 through all phases under the following conditions: f_1 = 2000.0 MHz; f_2 = 2000.1 MHz; V_{CE} = 26 V; I_{CQ} = 300 mA; P_L = 60 W (PEP); T_{mb} = 25 °C.



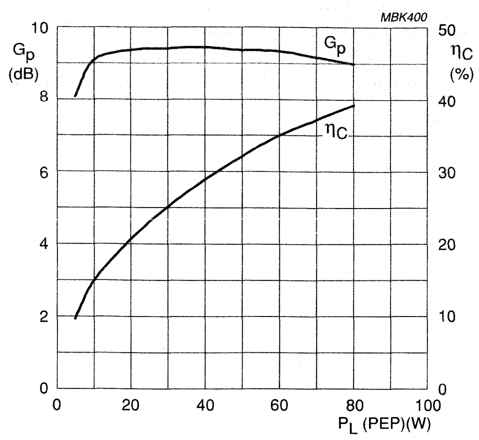
V_{CE} = 26 V; I_{CQ} = 300 mA; f = 2000 MHz.

Fig.4 Power gain and collector efficiency as a function of load power; typical values.



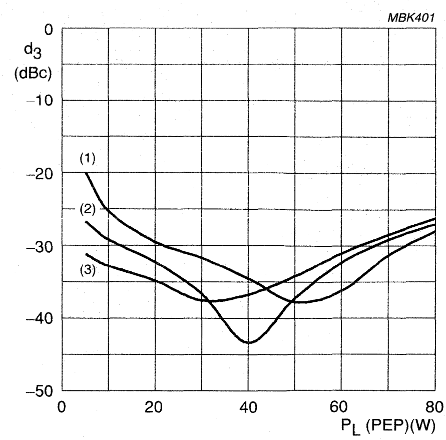
I_{CQ} = 300 mA; f = 2000 MHz.
(1) V_{CE} = 28 V.
(2) V_{CE} = 26 V.
(3) V_{CE} = 24 V.

Fig.5 Load power as a function of drive power; typical values.



V_{CE} = 26 V; I_{CQ} = 300 mA; f_1 = 2000 MHz; f_2 = 2000.1 MHz.

Fig.6 Power gain and collector efficiency as functions of peak envelope load power; typical values.



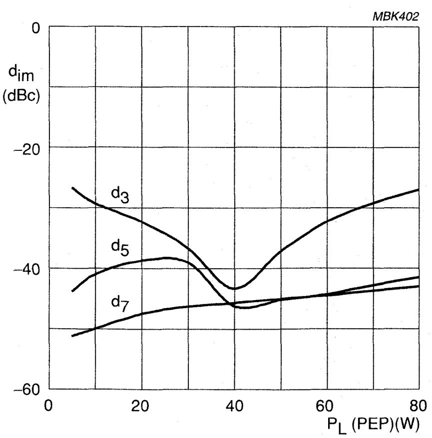
V_{CE} = 26 V; f_1 = 2000 MHz; f_2 = 2000.1 MHz.

(1) I_{CQ} = 100 mA.

(2) I_{CQ} = 300 mA.

(3) I_{CQ} = 500 mA.

Fig.7 Intermodulation products as a function of peak envelope load power; typical values.



V_{CE} = 26 V; I_{CQ} = 300 mA; f_1 = 2000 MHz; f_2 = 2000.1 MHz.

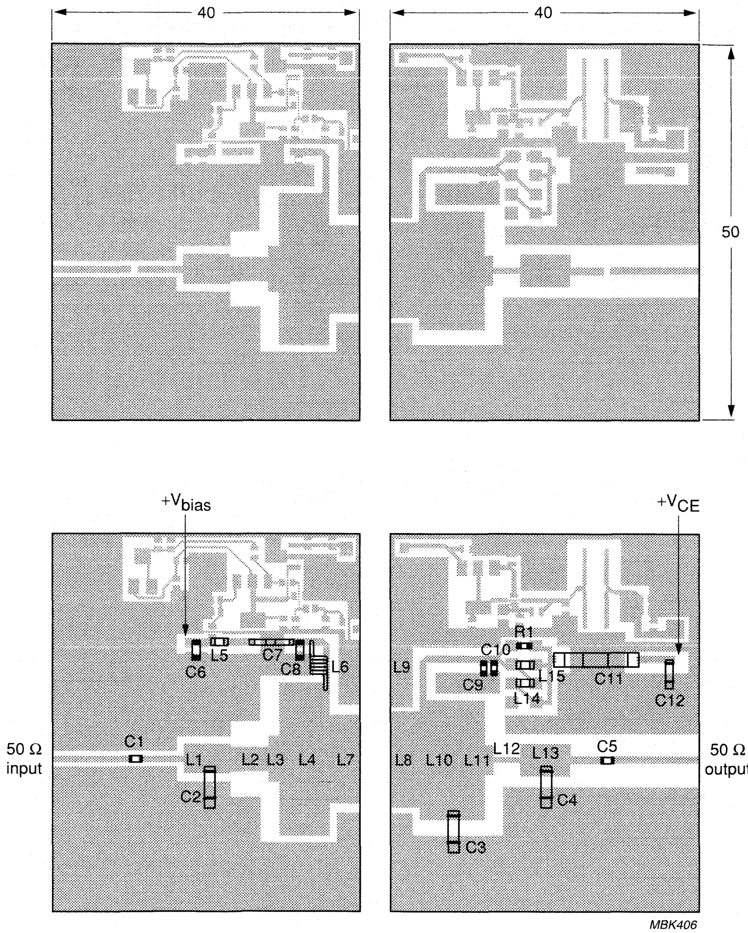
Fig.8 Intermodulation products as a function of peak envelope load power; typical values.

List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C8	multilayer ceramic chip capacitor; note 1	22 pF		
C2	Tekelec variable capacitor; type 37291	0.8 to 8 pF		
C3, C4	Tekelec variable capacitor; type 37271	0.6 to 4.5 pF		
C5	multilayer ceramic chip capacitor, note 2	22 pF		
C6, C12	tantalum SMD capacitor	10 μF, 35 V		
C7	feedthrough capacitor	1.5 nF		
C9	multilayer ceramic chip capacitor, note 3	13 pF		
C10	multilayer ceramic chip capacitor, note 3	10 nF		
C11	feedthrough capacitor	3.3 nF		
L1	stripline; note 4	18.8 Ω	length 6.1 mm; width 3.9 mm	
L2	stripline; note 4	21.9 Ω	length 5 mm; width 3.2 mm	
L3	stripline; note 4	13 Ω	length 1.4 mm; width 6.1 mm	
L4	stripline; note 4	4.5 Ω	length 6.6 mm; width 20.2 mm	
L5, L14, L15	grade 4B1 ferroxcube chip-bead			4322 020 34420
L6	4 turns enamelled 1 mm copper wire	30 nH	int.dia. 3 mm; length 7 mm	
L7	stripline; note 4	7.3 Ω	length 4 mm; width 11.8 mm	
L8	stripline; note 4	6.8 Ω	length 4 mm; width 12.8 mm	
L9	stripline; note 4	43.7 Ω	length 12.5 mm; width 1 mm	
L10	stripline; note 4	5.6 Ω	length 8.5 mm; width 15.9 mm	
L11	stripline; note 4	18.8 Ω	length 1 mm; width 3.9 mm	
L12	stripline; note 4	53.3 Ω	length 3.4 mm; width 0.8 mm	
L13	stripline; note 4	17.4 Ω	length 6.5 mm; width 4.3 mm	
R1	standard chip resistor	10 Ω	type 0603	

Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. American Technical Ceramics type 175B or capacitor of same quality.
3. American Technical Ceramics type 100B or capacitor of same quality.
4. The striplines are on a double copper-clad printed-circuit board with Teflon dielectric ($\varepsilon_r = 6.15$); thickness 0.64 mm.



Dimensions in mm.

The components are situated on one side of the copper-clad Teflon board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.9 Component layout for 2000 MHz class-AB test circuit.

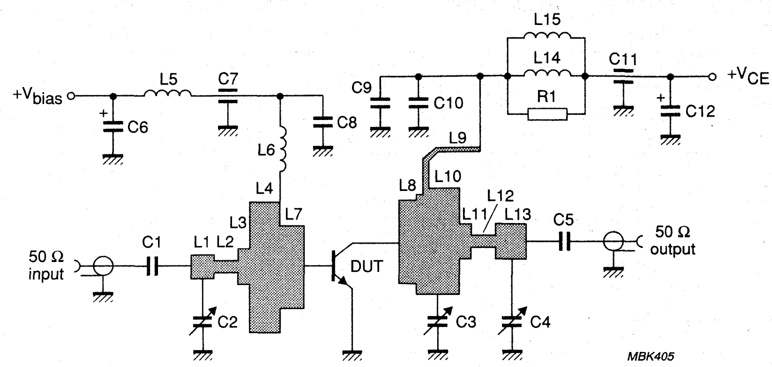
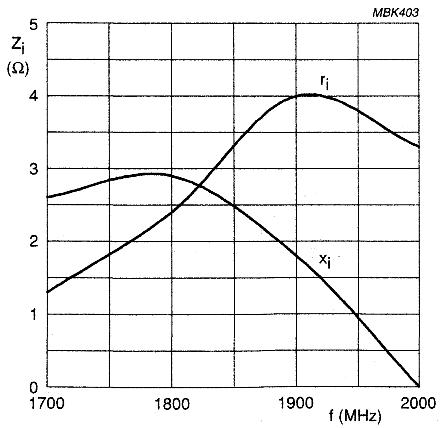


Fig.10 Class-AB test circuit for 2000 MHz.

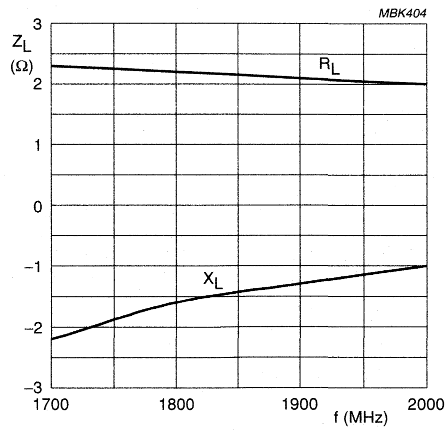
Scattering parameters: V_{CE} = 26 V; I_C = 1 A

f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)
1500	0.982	173.3	0.169	131.8	0.031	106.4	0.967	174.6
1600	0.970	172.0	0.227	126.1	0.035	96.0	0.953	174.0
1700	0.947	170.4	0.349	114.3	0.037	93.3	0.929	173.8
1800	0.870	167.5	0.633	85.8	0.036	74.7	0.879	174.2
1850	0.779	169.9	0.838	59.5	0.034	60.4	0.845	178.0
1900	0.775	179.3	0.833	22.7	0.018	47.4	0.902	−177.4
1950	0.863	−178.0	0.644	−6.9	0.011	103.7	0.967	−178.7
2000	0.913	−179.4	0.456	−24.5	0.018	121.2	0.990	179.3
2100	0.950	178.0	0.285	−40.8	0.028	114.7	0.995	176.9
2200	0.955	176.4	0.190	−54.0	0.031	115.2	0.987	175.5
2300	0.955	175.0	0.145	−53.6	0.034	114.7	0.983	175.0
2400	0.948	173.7	0.162	−60.4	0.036	116.7	0.975	174.4
2500	0.937	172.4	0.143	−84.2	0.038	116.8	0.973	173.9



V_{CE} = 26 V; I_{CQ} = 300 mA; P_L = 60 W; T_{mb} = 25 °C.

Fig.11 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 300 mA; P_L = 60 W; T_{mb} = 25 °C.

Fig.12 Load impedance as a function of frequency (series components); typical values.

UHF push-pull power transistor BLV2048

FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input and output matching for an easy design of wideband circuits.

APPLICATIONS

- Common emitter class-AB operation for PCN (Personal Communication Network) and PCS (Personal Communication System) applications in the 1800 to 2000 MHz frequency range.

DESCRIPTION

NPN silicon planar push-pull power transistor in a 4-lead AlN SOT494A flange package with two ceramic caps. The emitters are connected to the flange.

PINNING - SOT494A

PIN	SYMBOL	DESCRIPTION
1	c	collector 1
2	c	collector 2
3	b	base 1
4	b	base 2
5	e	emitter, connected to flange

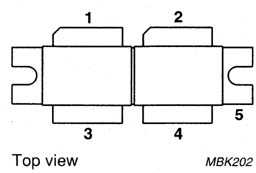


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	2000	26	120	≥8	≥40	–
2-tone, class-AB	f_1 = 2000.0; f_2 = 2000.1	26	120 (PEP)	≥8.5	≥33	≤–30

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	27	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	20	A
$I_{C(AV)}$	average collector current		–	10	A
P_{tot}	total power dissipation	T_{mb} = 25 °C	–	500	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_{tot} = 500 W; T_{mb} = 25 °C	0.35	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.1	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per transistor section						
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 60 mA	60	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 60 mA	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 4 mA	2.5	–	–	V
I_{CES}	collector leakage current	V_{CE} = 26 V; V_{BE} = 0	–	–	8	mA
h_{FE}	DC current gain	V_{CE} = 24 V; I_C = 4 A	45	–	110	
C_c	collector capacitance	V_{CB} = 26 V; $I_E = i_e$ = 0; f = 1 MHz; note 1	–	t.b.f.	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	t.b.f.	–	pF

Note

1. Capacitance of die only.

APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	2000	26	160	120	≥8	≥40	–
2-tone, class-AB	f_1 = 2000.0; f_2 = 2000.1	26	400	120 (PEP)	≥8.5	≥33	≤–30

Ruggedness in class-AB operation

The BLV2048 is capable of withstanding a load mismatch corresponding to VSWR = 3 : 1 through all phases under the following conditions: f_1 = 2000.0 MHz; f_2 = 2000.1 MHz; V_{CE} = 26 V; I_{CQ} = 400 mA; P_L = 120 W (PEP); T_h = 25 °C.

VHF power transistor BLW29

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, B or C operated mobile transmitters with a nominal supply voltage of 13,5 V. Because of the high gain and excellent power handling capability, the transistor is especially suited for design of wide-band and semi-wide-band v.h.f. amplifiers. Together with a BFQ42 driver stage, the chain can deliver 15 W with a maximum drive power of 120 mW at 175 MHz. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions with a supply over-voltage to 16,5 V.

It has a 3/8" capstan envelope with a ceramic cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %	$\bar{z}_i$ Ω	$\bar{Y}_L$ mS
c.w. class-B	**13,5**	**175**	**15**	**> 10**	**> 60**	**1,3 + j0,68**	**180 − j54**
c.w. class-B	12,5	175	15	typ. 10, 5	typ. 67	−	−

PIN CONFIGURATION

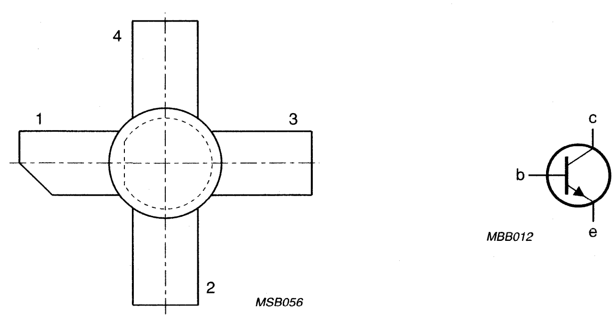


Fig.1 Simplified outline and symbol.

PINNING - SOT120

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage ($V_{BE} = 0$)				
peak value	V_{CESM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	2,75	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	8	A
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max.	53	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

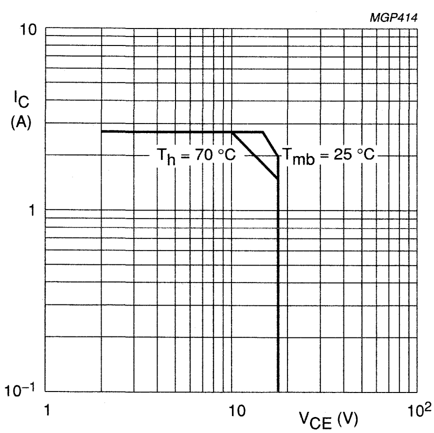


Fig.2 D.C. SOAR.

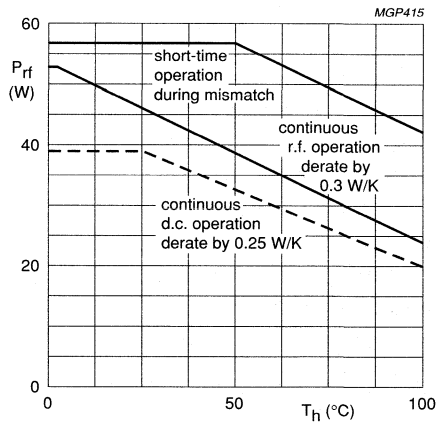


Fig.3 R.F. power dissipation; $V_{CE} \leq 16{,}5$ V; f ≥ 1 MHz.

THERMAL RESISTANCE

(dissipation = 15 W; T_{mb} = 77 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	3,7	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	3,05	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,45	K/W

CHARACTERISTICS

$T_j = 25\ °C$

Collector-emitter breakdown voltage				
$V_{BE} = 0$; $I_C = 15$ mA	$V_{(BR)\ CES}$	>	36	V
Collector-emitter breakdown voltage				
open base; $I_C = 100$ mA	$V_{(BR)CEO}$	>	18	V
Emitter-base breakdown voltage				
open collector; $I_E = 5$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 18$ V	I_{CES}	<	5	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	4	mJ
$R_{BE} = 10\ \Omega$	E_{SBR}	>	4	mJ
D.C. current gain(1)				
$I_C = 1{,}75$ A; $V_{CE} = 5$ V	h_{FE}	typ.	40	
			10 to 80	
Collector-emitter saturation voltage(1)				
$I_C = 5$ A; $I_B = 1$ A	V_{CEsat}	typ.	1,5	V
Transition frequency at f = 100 MHz(1)				
$-I_E = 1{,}75$ A; $V_{CB} = 13{,}5$ V	f_T	typ.	900	MHz
$-I_E = 5$ A; $V_{CB} = 13{,}5$ V	f_T	typ.	825	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 13{,}5$ V	C_c	typ.	43	pF
Feedback capacitance at f = 1 MHz				
$I_C = 100$ mA; $V_{CE} = 13{,}5$ V	C_{re}	typ.	27	pF
Collector-stud capacitance	C_{cs}	typ.	2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0{,}02$.

VHF power transistor BLW30

FEATURES

- Emitter-ballasting resistors for an optimum temperature profile
- Excellent reliability
- Withstands full load mismatch.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a 4-lead 3/8 inch SOT120 capstan envelope with a ceramic cap. It is designed for common emitter, class-B operation mobile VHF transmitters with a supply voltage of 12.5 V. All leads are isolated from the stud.

PINNING - SOT120

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_P (dB)	η_C (%)
c.w. class-B	175	12.5	30	> 10	> 55

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

PIN CONFIGURATION

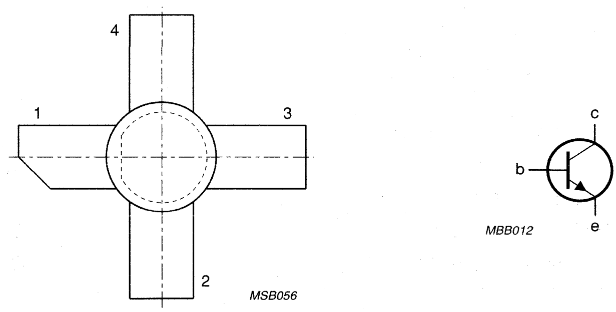
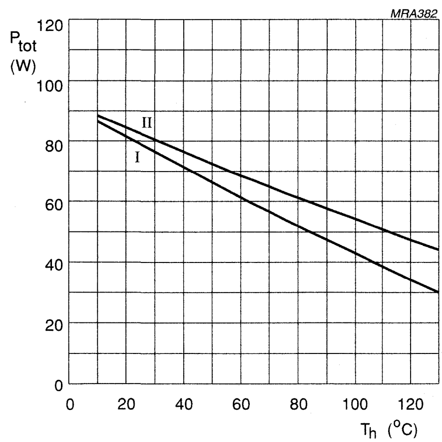


Fig.1 Simplified outline and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	36	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C, $I_{C(AV)}$	collector current	DC or average value	–	6	A
I_{CM}	collector current	peak value f > 1 MHz	–	18	A
P_{tot}	total power dissipation	RF operation; f > 1 MHz; T_{mb} = 25 °C	–	100	W
T_{stg}	storage temperature range		–65	150	°C
T_j	junction operating temperature		–	200	°C



(I) Continuous RF operation (f > 1 MHz).
(II) Short time operation during mismatch (f > 1 MHz).

Fig.2 Power/temperature derating curve.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb(RF)}$	from junction to mounting base	P_{tot} = 100 W; T_{mb} = 25 °C	1.75	K/W
$R_{th\ mb\text{-}h}$	from mounting base to heatsink		0.45	K/W

CHARACTERISTICS

T_j = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_c = 10 mA	36	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_c = 25 mA	16	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 2 mA	3	–	–	V
I_{CES}	collector-emitter leakage current	V_{BE} = 0; V_{CE} = 16 V	–	–	10	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 4 A	25	35	–	
f_T	transition frequency	V_{CE} = 12.5 V; I_E = 4 A; f = 500 MHz	–	1.6	–	GHz
C_c	collector capacitance	V_{CB} = 12.5 V; $I_E = I_e$ = 0; f = 1 MHz	–	90	100	pF
C_{re}	feedback capacitance	V_{CE} = 12.5 V; I_C = 0; f = 1 MHz	–	60	70	pF
$C_{c\text{-}s}$	collector-stud capacitance	f = 1 MHz	–	2	–	pF

UHF linear power transistor BLW32

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in linear **u.h.f. amplifiers** for television transmitters and transposers. The **excellent d.c. dissipation properties** for class-A operation are obtained by means of diffused emitter ballasting resistors and a multi-base structure, providing an optimum temperature profile on the crystal area. The combination of optimum thermal design and the application of **gold sandwich metallization** realizes excellent reliability properties.

The transistor has a ¼" capstan envelope with ceramic cap.

QUICK REFERENCE DATA

R.F. performance

MODE OF OPERATION	f_{vision} MHz	V_{CE} V	I_C mA	T_h °C	d_{im} (1) dB	$P_{o\ sync}$ (1) W	G_p dB
class-A; linear amplifier	860	25	150	70	−60	> 0,5	> 11
	860	25	150	25	−60	typ. 0,63	typ. 12,2

Note

1. Three-tone test method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB), zero dB corresponds to peak sync level.

PIN CONFIGURATION

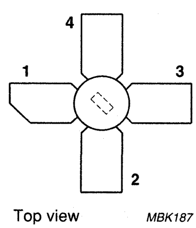


Fig.1 Simplified outline. SOT122A.

PINNING - SOT122A.

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

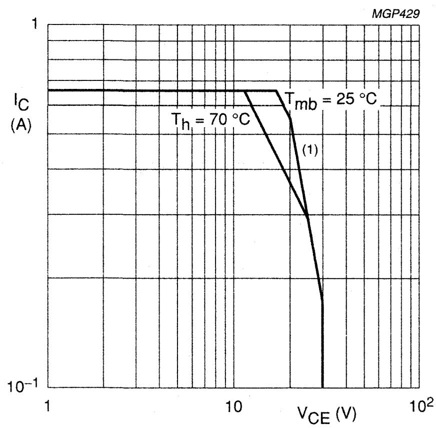
PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

UHF linear power transistor BLW32

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage				
(peak value); $V_{BE} = 0$	V_{CESM}	max.	50	V
open base	V_{CEO}	max.	30	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current				
d.c. or average	I_C	max.	650	mA
(peak value); f > 1 MHz	I_{CM}	max.	1000	mA
Total power dissipation up to $T_{mb} = 25$ °C	P_{tot}	max.	10,8	W
Storage temperature	T_{stg}		−65 to +150	°C
Operating junction temperature	T_j	max.	200	°C



(1) Second breakdown limit (independent of temperature).

Fig.2 D.C. SOAR.

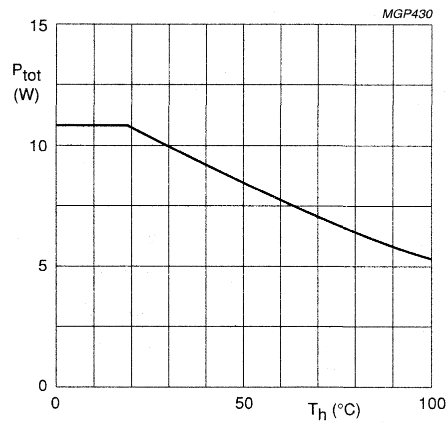


Fig.3 Power derating curve vs. temperature.

THERMAL RESISTANCE (see Fig.4)

From junction to mounting base (dissipation = 3,75 W; T_{mb} = 72,3 °C; i.e. T_h = 70 °C)	$R_{th\ j\text{-}mb}$	=	15,0	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,6	K/W

UHF linear power transistor BLW32

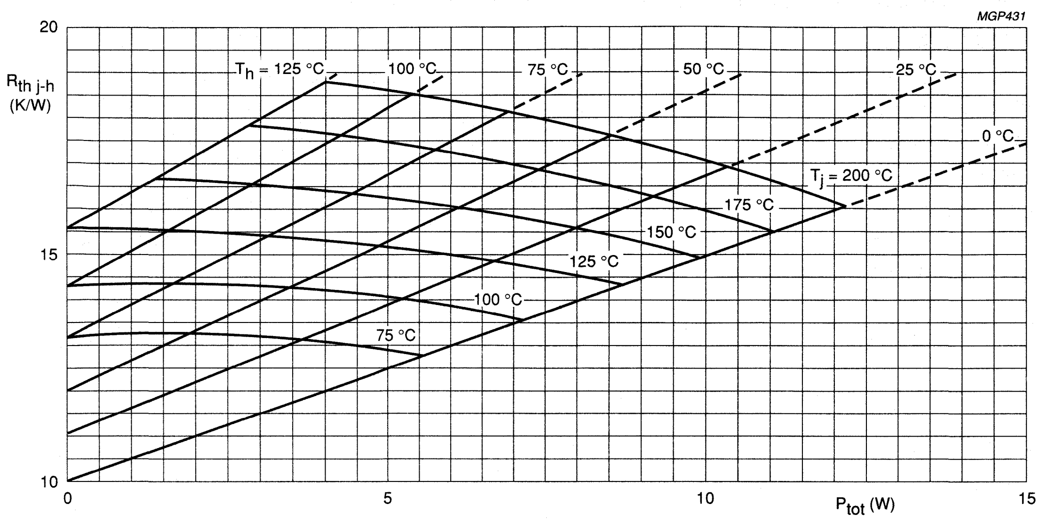


Fig.4 Maximum thermal resistance from junction to heatsink as a function of power dissipation, with heatsink and junction temperature as parameters. ($R_{th\ mb\text{-}h}$ = 0,6 K/W.)

Example

Nominal class-A operation: V_{CE} = 25 V; I_C = 150 mA; T_h = 70 °C.

Fig.4 shows:	$R_{th\ j\text{-}h}$	max.	15,6	K/W
	T_j	max.	130	°C
Typical device:	$R_{th\ j\text{-}h}$	typ.	13,5	K/W
	T_j	typ.	120	°C

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-emitter breakdown voltage				
V_{BE} = 0; I_C = 2 mA	$V_{(BR)CES}$	>	50	V
open base; I_C = 15 mA	$V_{(BR)CEO}$	>	30	V
Emitter-base breakdown voltage				
open collector; I_E = 1 mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 30 V	I_{CES}	<	0,5	mA
V_{BE} = 0; V_{CE} = 30 V; T_j = 175 °C	I_{CES}	<	1,2	mA
D.C. current gain (1)				
I_C = 150 mA; V_{CE} = 25 V	h_{FE}	>	20	
		typ.	40	
I_C = 150 mA; V_{CE} = 25 V; T_j = 175 °C	h_{FE}	<	120	
Collector-emitter saturation voltage (1)				
I_C = 300 mA; I_B = 30 mA	V_{CEsat}	typ.	500	mV
Transition frequency at f = 500 MHz (2)				
$-I_E$ = 150 mA; V_{CB} = 25 V	f_T	typ.	3,5	GHz
$-I_E$ = 300 mA; V_{CB} = 25 V	f_T	typ.	3,4	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e$ = 0; V_{CB} = 25 V	C_c	typ.	3,7	pF
Feedback capacitance at f = 1 MHz				
I_C = 10 mA; V_{CE} = 25 V	C_{re}	typ.	1,9	pF
Collector-stud capacitance	C_{cs}	typ.	1,2	pF

Notes

1. Measured under pulse conditions: $t_p \leq 300\ \mu s$; $\delta \leq 0{,}02$.
2. Measured under pulse conditions: $t_p \leq 50\ \mu s$; $\delta \leq 0{,}01$.

UHF linear power transistor — BLW33

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in **linear u.h.f. amplifiers** for television transmitters and transposers. The **excellent d.c. dissipation properties** for class-A operation are obtained by means of diffused emitter ballasting resistors and a multi-base structure, providing an optimum temperature profile on the crystal area. The combination of optimum thermal design and the application of **gold sandwich metallization** realizes excellent reliability properties.

The transistor has a ¼" capstan envelope with ceramic cap.

QUICK REFERENCE DATA

R.F. performance

MODE OF OPERATION	f_{vision} MHz	V_{CE} V	I_C mA	T_h °C	d_{im} (1) dB	$P_{o\ sync}$ (1) W	G_p dB
class-A; linear amplifier	860	25	300	70	−60	> 1,0	> 10,0
	860	25	300	25	−60	typ. 1,15	typ. 10,5

Note

1. Three-tone test method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB), zero dB corresponds to peak sync level.

PIN CONFIGURATION

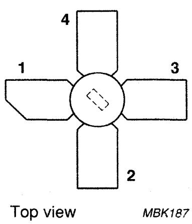


Fig.1 Simplified outline. SOT122A.

PINNING - SOT122A.

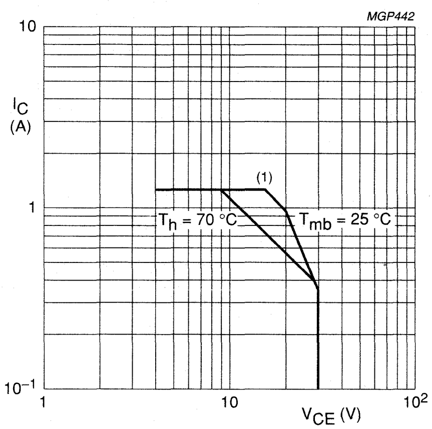
PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage				
(peak value); $V_{BE} = 0$	V_{CESM}	max.	50	V
open base	V_{CEO}	max.	30	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current				
d.c. or average	I_C	max.	1,25	A
(peak value); f > 1 MHz	I_{CM}	max.	1,9	A
Total power dissipation up to $T_{mb} = 25$ °C	P_{tot}	max.	19,3	W
Storage temperature	T_{stg}		−65 to +150	°C
Operating junction temperature	T_j	max.	200	°C



(1) Second breakdown limit (independent of temperature).

Fig.2 D.C. SOAR.

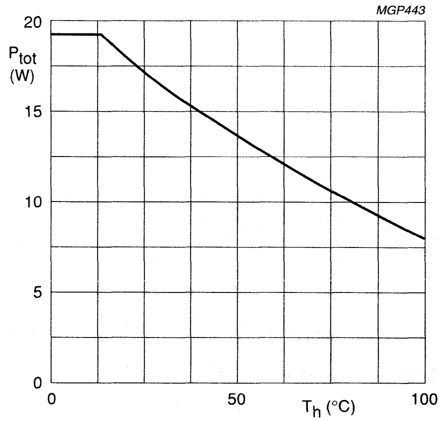


Fig.3 Power derating curve vs. temperature.

THERMAL RESISTANCE (see Fig.4)

From junction to mounting base				
(dissipation = 7,5 W; $T_{mb} = 74,5$ °C; i.e. $T_h = 70$ °C)	$R_{th\ j\text{-}mb}$	=	10,1	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,6	K/W

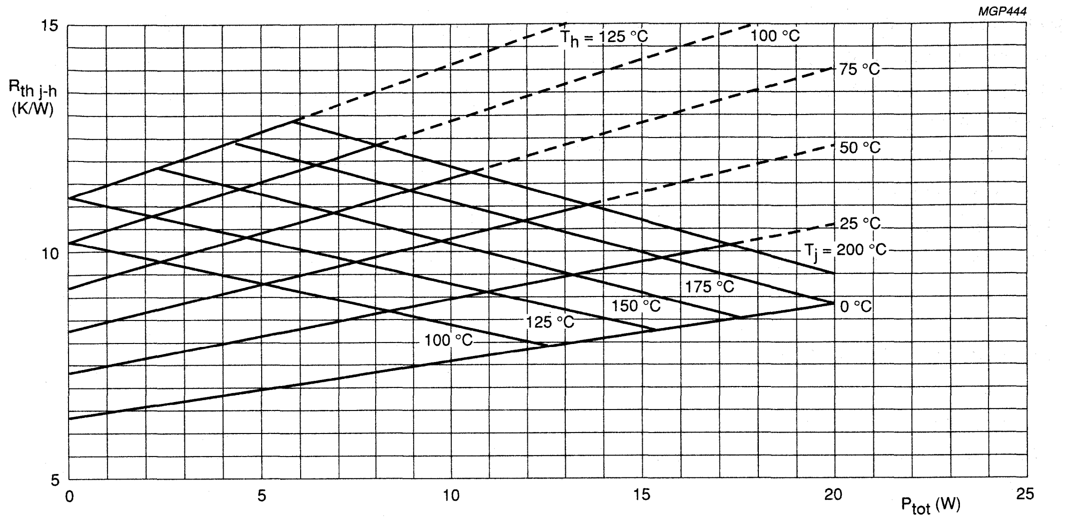


Fig.4 Maximum thermal resistance from junction to heatsink as a function of power dissipation, with heatsink and junction temperature as parameters. ($R_{th\ mb\text{-}h}$ = 0,6 K/W.)

Example

Nominal class-A operation: V_{CE} = 25 V; I_C = 300 mA; T_h = 70 °C.

Fig.4 shows:	$R_{th\ j\text{-}h}$	max.	10,7	K/W
	T_j	max.	150	°C
Typical device:	$R_{th\ j\text{-}h}$	typ.	8,25	K/W
	T_j	typ.	132	°C

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-emitter breakdown voltage				
V_{BE} = 0; I_C = 4 mA	$V_{(BR)CES}$	>	50	V
open base; I_C = 30 mA	$V_{(BR)CEO}$	>	30	V
Emitter-base breakdown voltage				
open collector; I_E = 2 mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 30 V	I_{CES}	<	1,0	mA
V_{BE} = 0; V_{CE} = 30 V; T_j = 175 °C	I_{CES}	<	2,5	mA
D.C. current gain				
I_C = 300 mA; V_{CE} = 25 V	h_{FE}	>	20	
		typ.	40	
I_C = 300 mA; V_{CE} = 25 V; T_j = 175 °C	h_{FE}	<	120	
Collector-emitter saturation voltage (1)				
I_C = 600 mA; I_B = 60 mA	V_{CEsat}	typ.	450	mV
Transition frequency at f = 500 MHz (2)				
$-I_E$ = 300 mA; V_{CB} = 25 V	f_T	typ.	3,4	GHz
$-I_E$ = 600 mA; V_{CB} = 25 V	f_T	typ.	3,1	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; V_{CB} = 25 V	C_c	typ.	6,6	pF
Feedback capacitance at f = 1 MHz				
I_C = 20 mA; V_{CE} = 25 V	C_{re}	typ.	3,5	pF
Collector-stud capacitance	C_{cs}	typ.	1,2	pF

Notes

1. Measured under pulse conditions: $t_p \leq 300$ µs; $\delta \leq 0{,}02$.
2. Measured under pulse conditions: $t_p \leq 50$ µs; $\delta \leq 0{,}01$.

UHF linear power transistor | BLW34

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in **linear u.h.f. amplifiers** for television transmitters and transposers. The **excellent d.c. dissipation properties** for class-A operation are obtained by means of diffused emitter ballasting resistors and a multi-base structure, providing an optimum temperature profile on the crystal area. The combination of optimum thermal design and the application of **gold sandwich metallization** realizes excellent reliability properties.

The transistor has a ¼" capstan envelope with ceramic cap.

QUICK REFERENCE DATA

R.F. performance

MODE OF OPERATION	f_{vision} MHz	V_{CE} V	I_C mA	T_h °C	d_{im} (1) dB	$P_{o\ sync}$ (1) W	G_p dB
class-A; linear amplifier	860	25	600	70	−60	> 1,8	> 9
	860	25	600	25	−60	typ. 2,15	typ. 10,2

Note

1. Three-tone test method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB), zero dB corresponds to peak sync level.

PIN CONFIGURATION

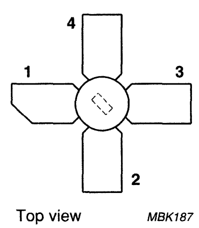


Fig.1 Simplified outline. SOT122A.

PINNING - SOT122A.

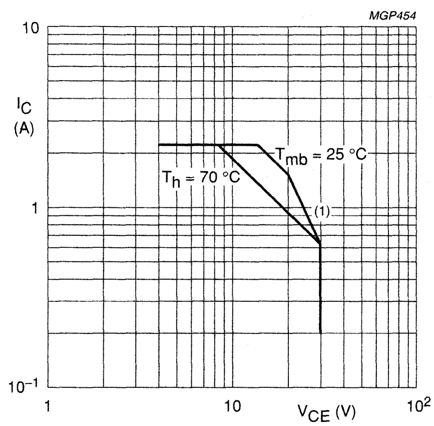
PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage				
(peak value); $V_{BE} = 0$	V_{CESM}	max.	50	V
open base	V_{CEO}	max.	30	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current				
d.c. or average	I_C	max.	2,25	A
(peak value); f > 1 MHz	I_{CM}	max.	3,5	A
Total power dissipation at T_{mb} = 25 °C	P_{tot}	max.	31	W
Storage temperature	T_{stg}		−65 to +150	°C
Operating junction temperature	T_j	max.	200	°C



(1) Second breakdown limit (independent of temperature).

Fig.2 D.C. SOAR.

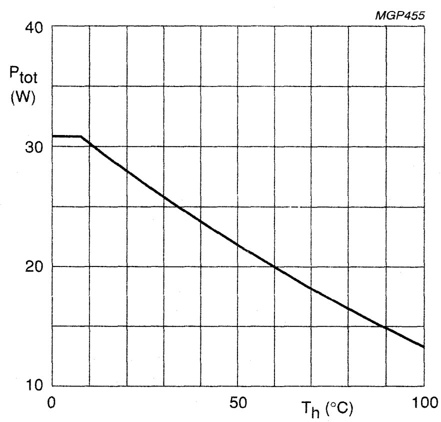


Fig.3 Power derating curve vs. temperature.

THERMAL RESISTANCE (see Fig.4)

From junction to mounting base				
(dissipation = 15 W; T_{mb} = 79 °C; i.e. T_h = 70 °C)	$R_{th\ j\text{-}mb}$	=	6,2	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,6	K/W

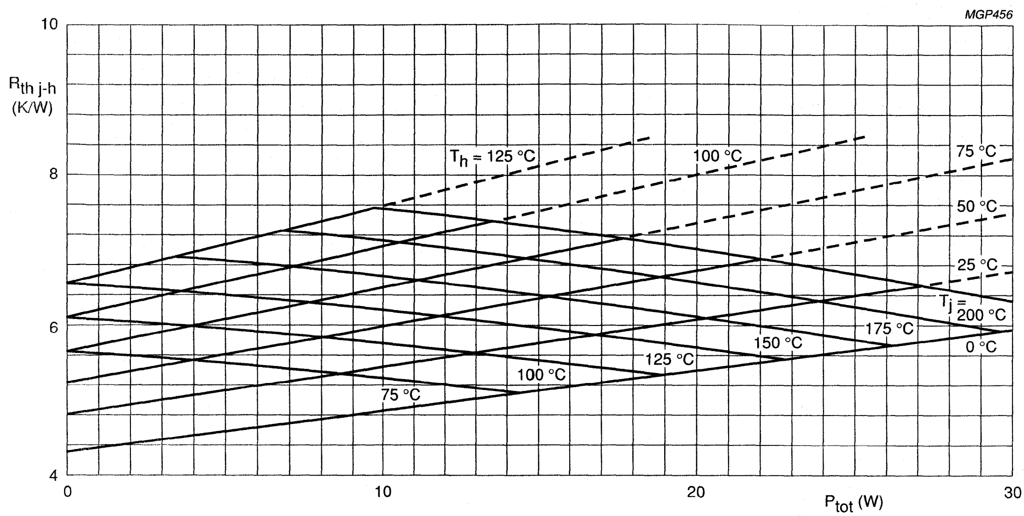


Fig.4 Maximum thermal resistance from junction to heatsink as a function of power dissipation, with heatsink and junction temperature as parameters. ($R_{th\ mb\text{-}h}$ = 0,6 K/W.)

Example

Nominal class-A operation: V_{CE} = 25 V; I_C = 600 mA; T_h = 70 °C.

Fig.4 shows:	$R_{th\ j\text{-}h}$	max.	6,75	K/W
	T_j	max.	170	°C
Typical device:	$R_{th\ j\text{-}h}$	typ.	5,45	K/W
	T_j	typ.	152	°C

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-emitter breakdown voltage				
V_{BE} = 0; I_C = 8 mA	$V_{(BR)CES}$	>	50	V
open base; I_C = 60 mA	$V_{(BR)CEO}$	>	30	V
Emitter-base breakdown voltage				
open collector; I_E = 4 mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 30 V	I_{CES}	<	2,0	mA
V_{BE} = 0; V_{CE} = 30 V; T_j = 175 °C	I_{CES}	<	5,0	mA
D.C. current gain				
I_C = 600 mA; V_{CE} = 25 V	h_{FE}	>	20	
		typ.	40	
I_C = 600 mA; V_{CE} = 25 V; T_j = 175 °C	h_{FE}	<	120	
Collector-emitter saturation voltage (1)				
I_C = 1,2 A; I_B = 0,12 A	V_{CEsat}	typ.	450	mV
Transition frequency at f = 500 MHz (2)				
$-I_E$ = 0,6 A; V_{CB} = 25 V	f_T	typ.	3,3	GHz
$-I_E$ = 1,2 A; V_{CB} = 25 V	f_T	typ.	3,0	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e$ = 0; V_{CB} = 25 V	C_c	typ.	13,5	pF
Feedback capacitance at f = 1 MHz				
I_C = 40 mA; V_{CE} = 25 V	C_{re}	typ.	8,4	pF
Collector-stud capacitance	C_{cs}	typ.	1,2	pF

Notes

1. Measured under pulse conditions: $t_p \leq 300\ \mu s$; $\delta \leq 0,02$.
2. Measured under pulse conditions: $t_p \leq 50\ \mu s$; $\delta \leq 0,01$.

HF/VHF power transistor — BLW50F

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in class-A, AB and B operated, industrial and military transmitters in the h.f. and v.h.f. band. Resistance stabilization provides protection against device damage at severe load mismatch conditions. Matched h_{FE} groups are available on request.

It has a 3/8" flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η_{dt} %	I_C A	$I_{C(ZS)}$ mA	d_3 dB	T_h °C
s.s.b. (class-A)	45	1,6 - 28	0 - 16 (P.E.P.)	> 19,5	–	1,2	–	< −40	70
s.s.b. (class-AB)	50	1,6 - 28	10 - 65 (P.E.P.)	typ. 18	typ. 45[(1)]	1,45	50	typ. −30	25

Note

1. At 65W P.E.P.

PIN CONFIGURATION

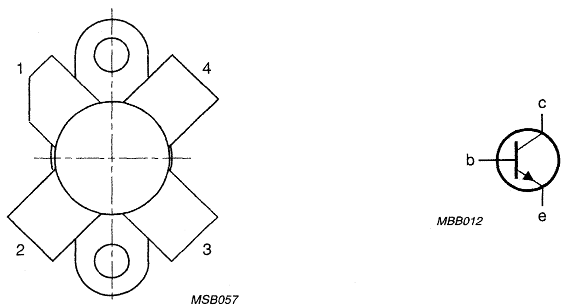


Fig.1 Simplified outline and symbol.

PINNING - SOT123

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage ($V_{BE} = 0$)				
peak value	V_{CESM}	max.	110	V
Collector-emitter voltage (open base)	V_{CEO}	max.	55	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	2,5	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	7,5	A
D.C. and r.f. (f > 1 MHz) power dissipation; T_{mb} = 25 °C	P_{tot}; P_{rf}	max.	94	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

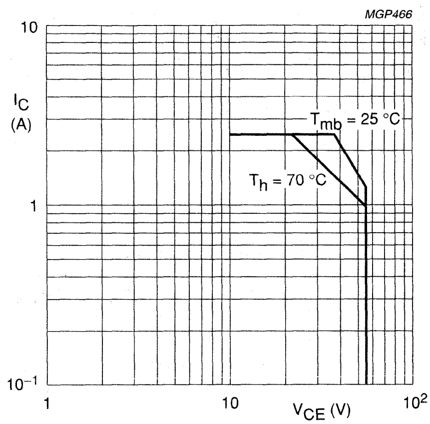
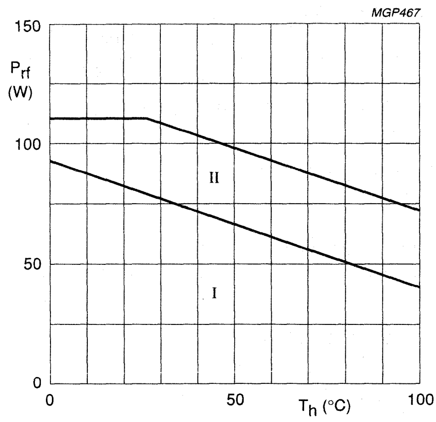


Fig.2 D.C. SOAR.



I Continuous d.c. and r.f. operation
II Short-time operation during mismatch

Fig.3 Power derating curves vs. temperature.

THERMAL RESISTANCE

(dissipation = 54 W; T_{mb} = 86 °C, i.e. T_h = 70 °C)

From junction to mounting base			
(d.c. and r.f. dissipation)	$R_{th\ j\text{-}mb}$	=	2,1 K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,3 K/W

CHARACTERISTICS

$T_j = 25$ °C

Collector-emitter breakdown voltage				
$V_{BE} = 0$; $I_C = 25$ mA	$V_{(BR)CES}$	>	110	V
Collector-emitter breakdown voltage				
open base; $I_C = 100$ mA	$V_{(BR)CEO}$	>	55	V
Emitter-base breakdown voltage				
open collector; $I_E = 10$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 55$ V	I_{CES}	<	10	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	8	mJ
$R_{BE} = 10\ \Omega$	E_{SBR}	>	8	mJ
D.C. current gain(1)				
$I_C = 1,2$ A; $V_{CE} = 5$ V	h_{FE}	typ.	25	
			15 to 100	
D.C. current gain ratio of matched devices(1)				
$I_C = 1,2$ A; $V_{CE} = 5$ V	h_{FE1}/h_{FE2}	<	1,2	
Collector-emitter saturation voltage(1)				
$I_C = 3,0$ A; $I_B = 0,6$ A	V_{CEsat}	typ.	1,2	V
Transition frequency at f = 100 MHz(1)				
$-I_E = 1,2$ A; $V_{CB} = 45$ V	f_T	typ.	490	MHz
$-I_E = 4,0$ A; $V_{CB} = 45$ V	f_T	typ.	540	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 45$ V	C_c	typ.	53	pF
Feedback capacitance at f = 1 MHz				
$I_C = 50$ mA; $V_{CE} = 45$ V	C_{re}	typ.	35	pF
Collector-flange capacitance	C_{cf}	typ.	2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0,02$.

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, B and C operated mobile, industrial and military transmitters with a nominal supply voltage of 12,5 V. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions with a supply over-voltage to 16,5 V.

Matched h_{FE} groups are available on request.

It has a 3/8" capstan envelope with a ceramic cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C

MODE OF OPERATION	V_{CC} V	f MHz	P_L W	G_L dB	η %	$\overline{z}_i$ Ω	$\overline{Z}_L$ Ω	d_3 dB
c.w. (class-B)	**12,5**	**175**	**45**	**> 5,0**	**> 75**	**1,2 + j1,4**	**2,6 − j1,2**	–
s.s.b. (class-AB)	12,5	1,6-28	3-30 (P.E.P.)	typ. 19,5	typ. 35	–	–	typ. −33

PIN CONFIGURATION

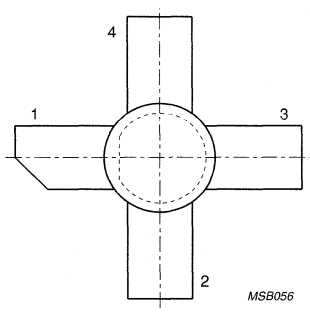


Fig.1 Simplified outline. SOT120A.

PINNING - SOT120A.

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage (V_{BE} = 0)				
peak value	V_{CESM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	9	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	22	A
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max.	100	W
Storage temperature	T_{stg}	−65 to +	150	°C
Operating junction temperature	T_j	max.	200	°C

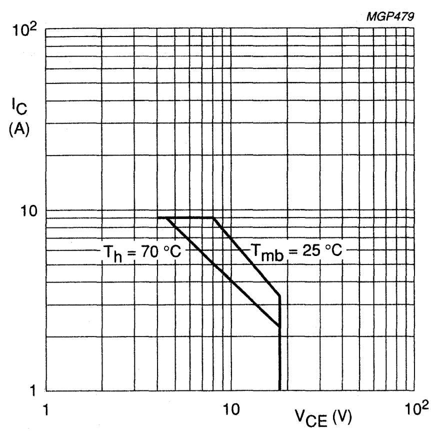
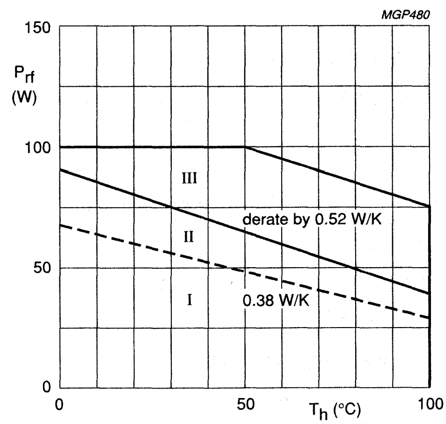


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II *Continuous* r.f. operation
III Short-time operation during mismatch

Fig.3 R.F. power dissipation; $V_{CE} \leq$ 16,5 V; f > MHz.

THERMAL RESISTANCE

(dissipation = 40 W; T_{mb} = 88 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	2,8	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	2,05	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,45	K/W

CHARACTERISTICS

T_j = 25 °C

Breakdown voltage					
Collector-emitter voltage					
V_{BE} = 0; I_C = 50 mA	$V_{(BR)CES}$	>		36	V
Collector-emitter voltage					
open base; I_C = 100 mA	$V_{(BR)CEO}$	>		16	V
Emitter-base voltage					
open collector; I_E = 25 mA	$V_{(BR)EBO}$	>		4	V
Collector cut-off current					
V_{BE} = 0; V_{CE} = 15 V	I_{CES}	<		25	mA
Transient energy					
L = 25 mH; f = 50 Hz					
open base	E	>		8	ms
$-V_{BE}$ = 1,5 V; R_{BE} = 33 Ω	E	>		8	ms
D.C. current gain (1)					
I_C = 4 A; V_{CE} = 5 V	h_{FE}	typ		50	
		10	to	80	
D.C. current gain ratio of matched devices (1)					
I_C = 4 A; V_{CE} = 5 V	h_{FE1}/h_{FE2}	<		1,2	
Collector-emitter saturation voltage (1)					
I_C = 12,5 A; I_B = 2,5 A	V_{CEsat}	typ		1,5	V
Transition frequency at f = 100 MHz (1)					
I_C = 4 A; V_{CE} = 12,5 V	f_T	typ		650	MHz
I_C = 12,5 A; V_{CE} = 12,5 V	f_T	typ		600	MHz
Collector capacitance at f = 1 MHz					
$I_E = I_e$ = 0; V_{CB} = 15 V	C_c	typ		120	pF
		<		160	pF
Feedback capacitance at f = 1 MHz					
I_C = 200 mA; V_{CE} = 15 V	C_{re}	typ		80	pF
Collector-stud capacitance	C_{cs}	typ		2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200$ µs; $\delta \leq 0{,}02$.

HF/VHF power transistor — BLW76

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-AB or class-B operated high power transmitters in the h.f. and v.h.f. bands. The transistor presents excellent performance as a linear amplifier in the h.f. band. It is resistance stabilized and is guaranteed to withstand severe load mismatch conditions. Transistors are delivered in matched h_{FE} groups.

The transistor has a ½" flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C

MODE OF OPERATION	V_{CE} V	$I_{C(ZS)}$ A	f MHz	P_L W	G_p dB	η %	d_3 dB
s.s.b. (class-AB)	**28**	**0,05**	**1,6 – 28**	**8 – 80 (P.E.P.)**	**> 13**	**> 35**(1)	**< –30**
c.w. (class-B)	28	–	108	80	typ. 7,9	typ. 70	–

Note

1. At 80 W P.E.P.

PIN CONFIGURATION

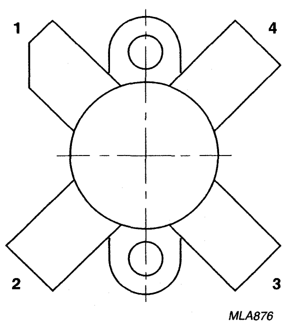


Fig.1 Simplified outline. SOT121B.

PINNING - SOT121B.

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage ($V_{BE} = 0$)				
peak value	V_{CESM}	max.	70	V
Collector-emitter voltage (open base)	V_{CEO}	max.	35	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	8	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	20	A
R.F. power dissipation (f > 1 MHz); $T_{mb} = 25$ °C	P_{rf}	max.	140	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

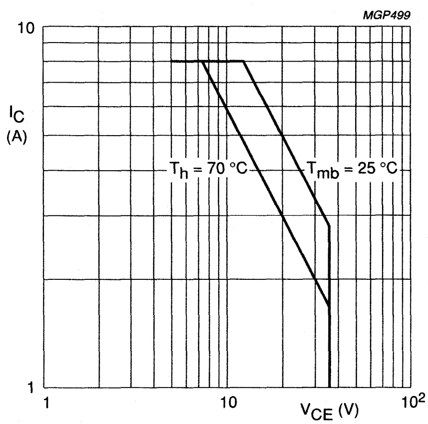
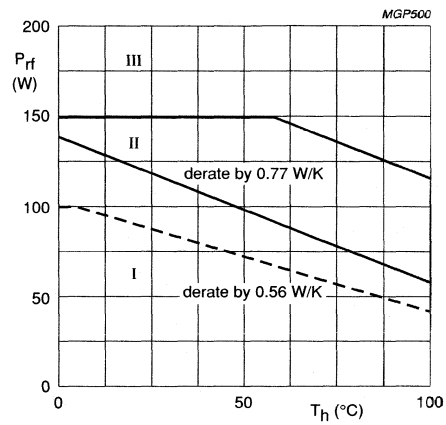


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation
III Short-time operation during mismatch

Fig.3 R.F. power dissipation; $V_{CE} \leq 28$ V; f > 1 MHz.

THERMAL RESISTANCE

(dissipation = 60 W; $T_{mb} = 82$ °C, i.e. $T_h = 70$ °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	1,92	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	1,33	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,2	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-emitter breakdown voltage			
$V_{BE} = 0$; $I_C = 50$ mA	$V_{(BR)\,CES}$	>	70 V
Collector-emitter breakdown voltage			
open base; $I_C = 50$ mA	$V_{(BR)\,CEO}$	>	35 V
Emitter-base breakdown voltage			
open collector; $I_E = 10$ mA	$V_{(BR)EBO}$	>	4 V
Collector cut-off current			
$V_{BE} = 0$; $V_{CE} = 35$ V	I_{CES}	<	10 mA
D.C. current gain(1)			
$I_C = 4$ A; $V_{CE} = 5$ V	h_{FE}		15 to 80
D.C. current grain ratio of matched devices(1)			
$I_C = 4$ A; $V_{CE} = 5$ V	h_{FE1}/h_{FE2}	<	1,2
Collector-emitter saturation voltage(1)			
$I_C = 12,5$ A; $I_B = 2,5$ A	V_{CEsat}	typ.	2,5 V
Transition frequency at f = 100 MHz(2)			
$-I_E = 4$ A; $V_{CB} = 28$ V	f_T	typ.	315 MHz
$-I_E = 12,5$ A; $V_{CB} = 28$ V	f_T	typ.	305 MHz
Collector capacitance at f = 1 MHz			
$I_E = I_e = 0$; $V_{CB} = 28$ V	C_c	typ.	125 pF
Feedback capacitance at f = 1 MHz			
$I_C = 50$ mA; $V_{CE} = 28$ V	C_{re}	typ.	85 pF
Collector-flange capacitance	C_{cf}	typ.	3 pF

Notes

1. Measured under pulse conditions: $t_p \leq 300$ µs; $\delta \leq 0,02$.
2. Measured under pulse conditions: $t_p \leq 50$ µs; $\delta \leq 0,01$.

HF/VHF power transistor BLW77

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-AB or class-B operated high power transmitters in the h.f. and v.h.f. bands. The transistor presents excellent performance as a linear amplifier in the h.f. band. It is resistance stabilized and is guaranteed to withstand severe load mismatch conditions. Transistors are delivered in matched h_{FE} groups.

The transistor has a ½" flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C

MODE OF OPERATION	V_{CE} V	$I_{C(ZS)}$ A	f MHz	P_L W	G_p dB	η %	d_3 dB
s.s.b. (class-AB)	**28**	**0,1**	**1,6 – 28**	**15 – 130** (P.E.P.)	**> 12**	**> 37,5**(1)	**< –30**
c.w. (class-B)	28	–	87,5	130	typ. 7,5	typ. 75	–

Note

1. At 130 W P.E.P.

PIN CONFIGURATION

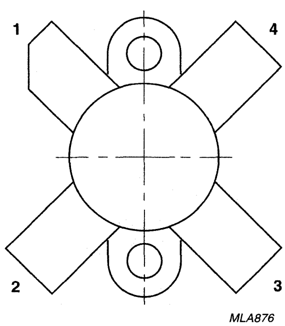


Fig.1 Simplified outline. SOT121B.

PINNING - SOT121B.

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage (V_{BE} = 0)				
peak value	V_{CESM}	max.	70	V
Collector-emitter voltage (open base)	V_{CEO}	max.	35	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	12	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	30	A
R.F. power dissipation (f > 1 MHz;); T_{mb} = 25 °C	P_{rf}	max.	245	W
Storage temperature	T_{stg}	−65 to + 150		°C
Operating junction temperature	T_j	max.	200	°C

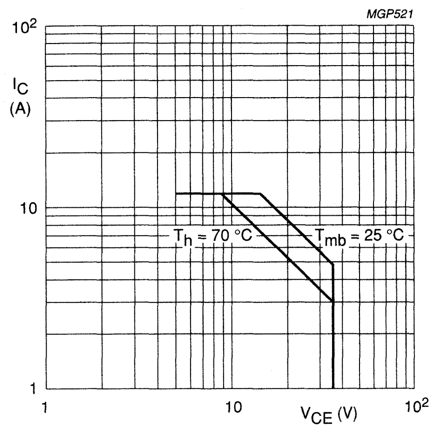
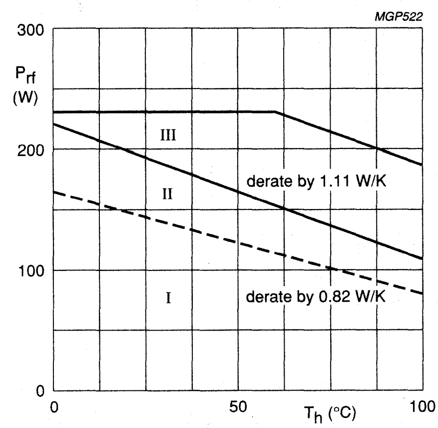


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation
III Short-time operation during mismatch

Fig.3 R.F. power dissipation; $V_{CE} \leq 28$ V; f ≥ 1 MHz.

THERMAL RESISTANCE

(dissipation = 100 W; T_{mb} = 90 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	1,03	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	0,71	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,2	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-emitter breakdown voltage				
V_{BE} = 0; I_C = 50 mA	$V_{(BR)\,CES}$	>	70	V
Collector-emitter breakdown voltage				
open base; I_C = 100 mA	$V_{(BR)\,CEO}$	>	35	V
Emitter-base breakdown voltage				
open collector; I_E = 20 mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 35 V	I_{CES}	<	20	mA
D.C. current gain[(1)]				
I_C = 7 A; V_{CE} = 5 V	h_{FE}		15 to 80	
D.C. current gain ratio of matched devices[(1)]				
I_C = 7 A; V_{CE} = 5 V	h_{FE1}/h_{FE2}	<	1,2	
Collector-emitter saturation voltage[(1)]				
I_C = 20 A; I_B = 4 A	V_{CEsat}	typ.	2	V
Transition frequency at f = 100 MHz[(2)]				
$-I_E$ = 7 A; V_{CB} = 28 V	f_T	typ.	320	MHz
$-I_E$ = 20 A; V_{CB} = 28 V	f_T	typ.	300	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e$ = 0; V_{CB} = 28 V	C_c	typ.	255	pF
Feedback capacitance at f = 1 MHz				
I_C = 100 mA; V_{CE} = 28 V	C_{re}	typ.	175	pF
Collector-flange capacitance	C_{cf}	typ.	3	pF

Notes

1. Measured under pulse conditions: $t_p \leq 300$ μs; $\delta \leq 0{,}02$.
2. Measured under pulse conditions: $t_p \leq 50$ μs; $\delta \leq 0{,}01$.

HF/VHF power transistor BLW78

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, AB or B operated mobile, industrial and military transmitters in the h.f. and v.h.f. bands. It is resistance stabilized and is guaranteed to withstand severe load mismatch conditions.

It has a ½" flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C

MODE OF OPERATION	V_{CE} V	I_C $I_{C(ZS)}$ A	f MHz	P_L W	G_p dB	η %	d_3[(1)] dB
c.w. (class-B)	**28**	–	**150**	**100**	> **6**	> **70**	–
s.s.b. (class-A)	26	3	28	35 (P.E.P.)	typ. 19,5	–	typ. –40
s.s.b. (class-AB)	28	0,05	28	100 (P.E.P.)	typ. 19,0	typ. 42	typ. –30

Note

1. Stated intermodulation distortion figures are referred to the according level of either of the equal amplified tones. Relative to the according peak envelope powers these figures should be increased by 6 dB.

PIN CONFIGURATION

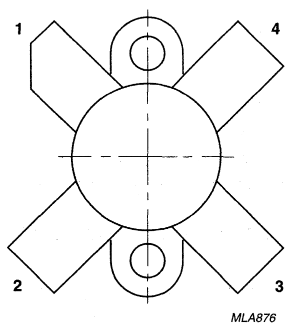


Fig.1 Simplified outline. SOT121B.

PINNING - SOT121B.

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

HF/VHF power transistor | BLW78

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage ($V_{BE} = 0$)				
peak value	V_{CESM}	max.	70	V
Collector-emitter voltage (open base)	V_{CEO}	max.	35	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	10	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	25	A
R.F. power dissipation (f > 1 MHz); $T_{mb} = 25$ °C	P_{rf}	max.	160	W
Storage temperature	T_{stg}		−65 to +150	°C
Operating junction temperature	T_j	max.	200	°C

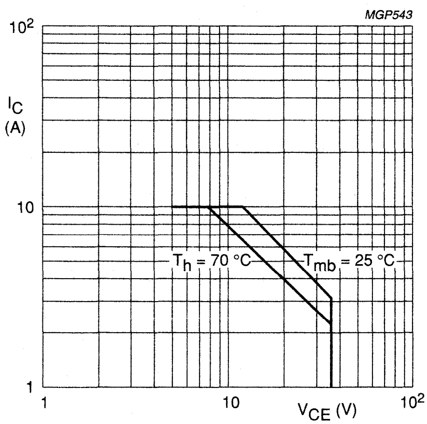
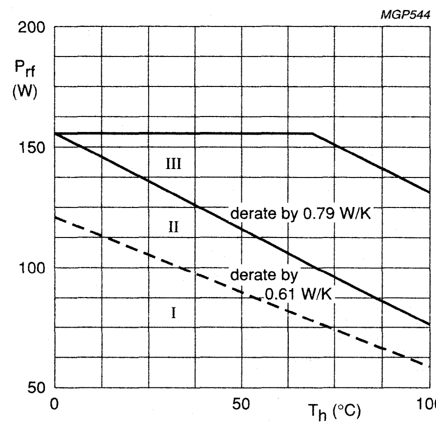


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation
III Short-time operation during mismatch

Fig.3 R.F. power dissipation; $V_{CE} \leq 28$ V; f > 1 MHz.

THERMAL RESISTANCE

(dissipation = 80 W; $T_{mb} = 86$ °C; i.e. $T_h = 70$ °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	1,45	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	1,06	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,2	K/W

CHARACTERISTICS

$T_j = 25$ °C

Collector-emitter breakdown voltage				
$V_{BE} = 0$; $I_C = 50$ mA	$V_{(BR)CES}$	>	70	V
Collector-emitter breakdown voltage				
open base; $I_C = 100$ mA	$V_{(BR)CEO}$	>	35	V
Emitter-base breakdown voltage				
open collector; $I_E = 5$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 35$ V	I_{CES}	<	5	mA
D.C. current gain(1)				
$I_C = 5$ A; $V_{CE} = 5$ V	h_{FE}	20 to 85		
Collector-emitter saturation voltage				
$I_C = 15$ A; $I_B = 3$ A	V_{CEsat}	typ.	2	V
Transition frequency at f = 100 MHz(2)				
$-I_E = 5$ A; $V_{CB} = 28$ V	f_T	typ.	370	MHz
$-I_E = 15$ A; $V_{CB} = 28$ V	f_T	typ.	350	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 28$ V	C_c	typ.	155	pF
Feedback capacitance at f = 1 MHz				
$I_C = 100$ mA; $V_{CE} = 28$ V	C_{re}	typ.	102	pF
Collector-flange capacitance	C_{cf}	typ.	3	pF

Notes

1. Measured under pulse conditions: $t_p \leq 300$ µs; $\delta \leq 0{,}02$.
2. Measured under pulse conditions: $t_p \leq 50$ µs; $\delta \leq 0{,}01$.

UHF power transistor BLW80

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for transmitting applications in class-A, B or C in the u.h.f. and v.h.f. range for nominal supply voltages up to 13,5 V.

The resistance stabilization of the transistor provides protection against device damage at severe load mismatch conditions.

The transistor is housed in a ¼" capstan envelope with a ceramic cap.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneutralized common-emitter class-circuit.

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %	$\bar{z}_i$ Ω	$\bar{Y}_L$ mS
c.w.	**12,5**	**470**	**4**	> **8,0**	> **60**	**2,1 + j2,3**	**57 − j56**
c.w.	12,5	175	4	typ. 15,0	typ. 60	2,0 − j2,2	51 −j48

PIN CONFIGURATION

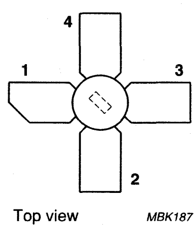


Fig.1 Simplified outline. SOT122A.

PINNING - SOT122A.

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

UHF power transistor BLW80

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage (V_{BE} = 0)				
peak value	V_{CESM}	max	36	V
Collector-emitter voltage (open base)	V_{CEO}	max	17	V
Emitter-base voltage (open collector)	V_{EBO}	max	4	V
Collector current (d.c.)	I_C	max	1	A
Collector current (peak value); f > 1 MHz	I_{CM}	max	3	A
Total power dissipation (d.c. and r.f.) up to T_{mb} = 25 °C	P_{tot}	max	17	W
Storage temperature	T_{stg}	–65 to +150		°C
Operating junction temperature	T_j	max	200	°C

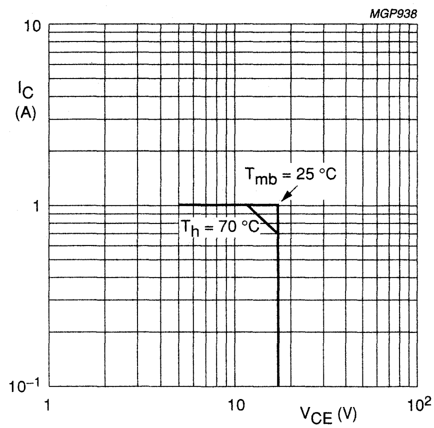


Fig.2 D.C. soar.

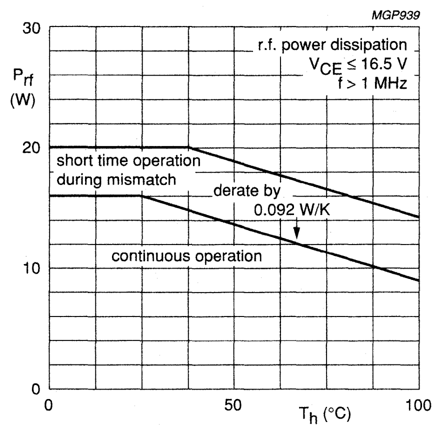


Fig.3 R.F. power dissipation.

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	10,3	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,6	K/W

CHARACTERISTICS

$T_j = 25\ °C$

Breakdown voltages				
Collector-emitter voltage				
$V_{BE} = 0$; $I_C = 10$ mA	$V_{(BR)CES}$	>	36	V
Collector-emitter voltage				
open base; $I_C = 50$ mA	$V_{(BR)CEO}$	>	17	V
Emitter-base voltage				
open collector; $I_E = 4$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 17$ V	I_{CES}	<	4	mA
D.C. current gain (1)				
$I_C = 0,5$ A; $V_{CE} = 5$ V	h_{FE}	>	10	
		typ	35	
Collector-emitter saturation voltage (1)				
$I_C = 1,5$ A; $I_B = 0,3$ A	V_{CEsat}	typ	0,75	V
Transition frequency at f = 500 MHz (1)				
$I_C = 0,5$ A; $V_{CE} = 12,5$ V	f_T	typ	1,75	GHz
$I_C = 1,5$ A; $V_{CE} = 12,5$ V	f_T	typ	1,25	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 12,5$ V	C_c	typ	14	pF
Feedback capacitance at f = 1 MHz				
$I_C = 40$ mA; $V_{CE} = 12,5$ V	C_{re}	typ	7,1	pF
Collector-stud capacitance	C_{cs}	typ	1,2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0,02$.

UHF power transistor | BLW81

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for transmitting applications in class-A, B or C in the u.h.f. and v.h.f. range for a nominal supply voltages up to 13,5 V.
The resistance stabilization of the transistor provides protection against device damage at severe load mismatch conditions.

The transistor is housed in a ¼" capstan envelope with a ceramic cap.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneutralized common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %	$\bar{z}_i$ Ω	$\bar{Y}_L$ mS
c.w.	**12,5**	**470**	**10**	> **6,0**	> **60**	**1,3 + j2,5**	**150 − j66**
c.w.	12,5	175	10	typ. 13,5	typ. 60	1,2 − j0,6	140 − j80

PIN CONFIGURATION

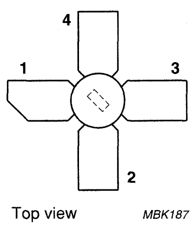


Fig.1 Simplified outline. SOT122A.

PINNING - SOT122A.

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage (V_{BE} = 0)				
peak value	V_{CESM}	max	36	V
Collector-emitter voltage (open base)	V_{CEO}	max	17	V
Emitter-base voltage (open collector)	V_{EBO}	max	4	V
Collector current (d.c. or average)	I_C	max	2,5	A
Collector current (peak value); f > 1 MHz	I_{CM}	max	7,5	A
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{tot}	max	40	W
Storage temperature	T_{stg}		−65 to +150	°C
Operating junction temperature	T_j	max	200	°C

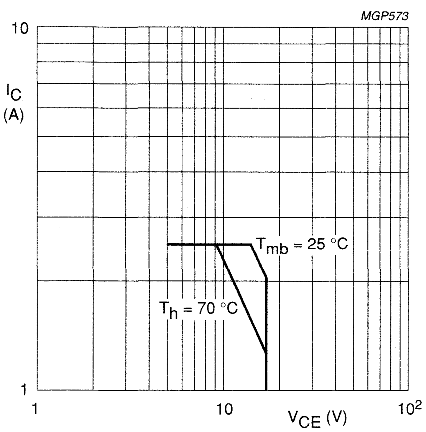


Fig.2

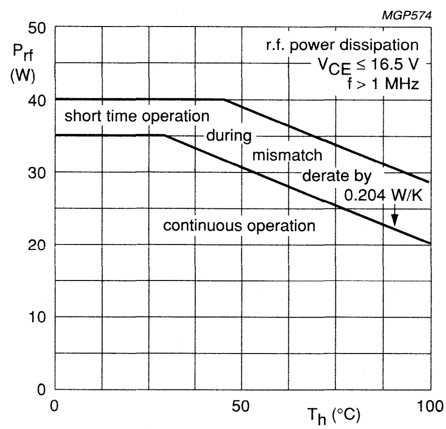


Fig.3

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	4,3 K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,6 K/W

CHARACTERISTICS

$T_j = 25\ °C$

Breakdown voltages				
Collector-emitter voltage				
$V_{BE} = 0$; $I_C = 25$ mA	$V_{(BR)CES}$	>	36	V
Collector-emitter voltage				
open base; $I_C = 100$ mA	$V_{(BR)CEO}$	>	17	V
Emitter-base voltage				
open collector; $I_E = 10$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 17$ V	I_{CES}	<	10	mA
D.C. current gain (1)				
$I_C = 1{,}25$ A; $V_{CE} = 5$ V	h_{FE}	>	10	
		typ	35	
Collector-emitter saturation voltage (1)				
$I_C = 3{,}75$ A; $I_B = 0{,}75$ A	V_{CEsat}	typ	0,75	V
Transition frequency at f = 500 MHz (1)				
$I_C = 1{,}25$ A; $V_{CE} = 12{,}5$ V	f_T	typ	1,3	GHz
$I_C = 3{,}75$ A; $V_{CE} = 12{,}5$ V	f_T	typ	0,9	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 12{,}5$ V	C_c	typ	34	pF
Feedback capacitance at f = 1 MHz				
$I_C = 100$ mA; $V_{CE} = 12{,}5$ V	C_{re}	typ	18	pF
Collector-stud capacitance	C_{cs}	typ	1,2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0{,}02$.

HF/VHF power transistor BLW83

DESCRIPTION

N-P-N silicon planar epitaxial transistor for use in transmitting amplifiers operating in the h.f. and v.h.f. bands, with a nominal supply voltage of 28 V. The transistor is specified for s.s.b. applications as linear amplifier in class-A and AB. The device is resistance stabilized and is guaranteed to withstand severe load mismatch conditions.

Matched h_{FE} groups are available on request.

It has a 3/8" flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η_{dt} %	I_C A	d_3 dB	T_h °C
s.s.b. (class-A)	**26**	**1,6 – 28**	**0 – 10 (P.E.P.)**	**> 20**	–	**1,35**	**< –40**	**70**
s.s.b. (class-AB)	28	1,6 – 28	3 – 30 (P.E.P.)	typ. 21	typ. 40	typ. 1,34	typ. –30	25

PIN CONFIGURATION

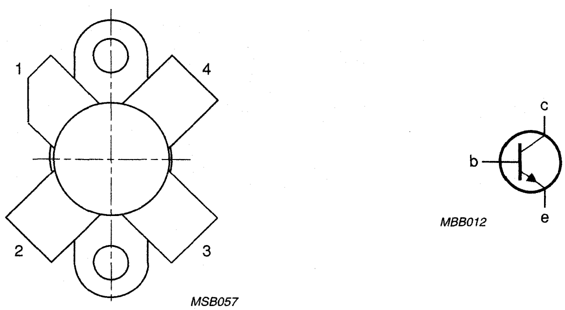


Fig.1 Simplified outline and symbol.

PINNING - SOT123

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage ($V_{BE} = 0$)				
peak value	V_{CESM}	max.	65	V
Collector-emitter voltage (open base)	V_{CEO}	max.	36	V
Emitter-base voltage (open-collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	3	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	9	A
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max.	76	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

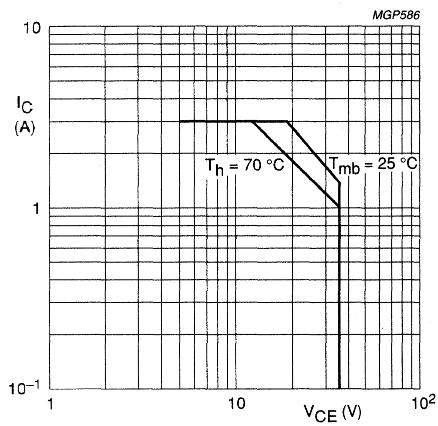


Fig.2 D.C. SOAR.

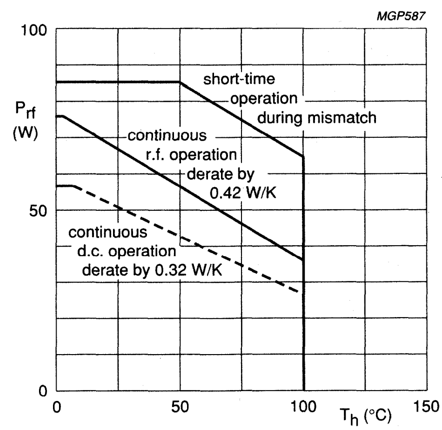


Fig.3 R.F. power dissipation; $V_{CE} \leq 28$ V; f ≥ 1 MHz.

THERMAL RESISTANCE

(dissipation = 35 W; T_{mb} = 80 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	3,15	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	2,35	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,3	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-emitter breakdown voltage				
$V_{BE} = 0$; $I_C = 10$ mA	$V_{(BR)CES}$	>	65	V
Collector-emitter breakdown voltage				
open base; $I_C = 50$ mA	$V_{(BR)CEO}$	>	36	V
Emitter-base breakdown voltage				
open collector; $I_E = 10$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 36$ V	I_{CES}	<	4	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	8	mJ
$R_{BE} = 10\ \Omega$	E_{SBR}	>	8	mJ
D.C. current gain (1)		typ.	50	
$I_C = 1,25$ A; $V_{CE} = 5$ V	h_{FE}		10 to 100	
D.C. current gain ratio of matched devices(1)				
$I_C = 1,25$ A; $V_{CE} = 5$ V	h_{FE1}/h_{FE2}	<	1,2	
Collector-emitter saturation voltage(1)				
$I_C = 3,75$ A; $I_B = 0,75$ A	V_{CEsat}	typ.	1,5	V
Transition frequency at f = 100 MHz(1)				
$-I_E = 1,25$ A; $V_{CB} = 28$ V	f_T	typ.	530	MHz
$-I_E = 3,75$ A; $V_{CB} = 28$ V	f_T	typ.	530	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 28$ V	C_c	typ.	50	pF
Feedback capacitance at f = 1 MHz				
$I_C = 100$ mA; $V_{CE} = 28$ V	C_{re}	typ.	31	pF
Collector-flange capacitance	C_{cf}	typ.	2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0,02$.

HF/VHF power transistor — BLW85

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, B and C operated mobile h.f. and v.h.f. transmitters with a nominal supply voltage of 12,5 V. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions with a supply over-voltage to 16,5 V.

Matched h_{FE} groups are available on request.

It has a 3/8" flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %	$\bar{z}_i$ Ω	$\bar{Z}_L$ Ω	d_3 dB
c.w. (class-B)	**12,5**	**175**	**45**	**> 4,5**	**> 75**	**1,4 + j1,5**	**2,7–j1,3**	–
s.s.b. (class-AB)	12,5	1,6–28	3–30 (P.E.P.)	typ. 19,5	typ. 35	–	–	typ. –33

PIN CONFIGURATION

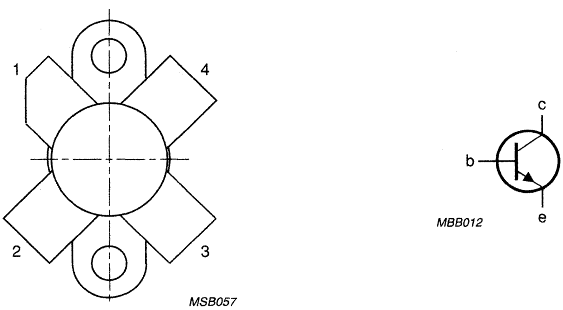


Fig.1 Simplified outline and symbol.

PINNING - SOT123

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage (V_{BE} = 0)				
peak value	V_{CESM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	16	V
Emitter-base voltage (open-collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	9	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	22	A
R.F. power dissipation up to (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max.	105	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

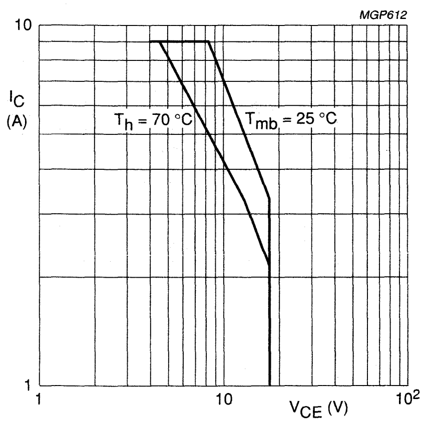


Fig.2 D.C. SOAR.

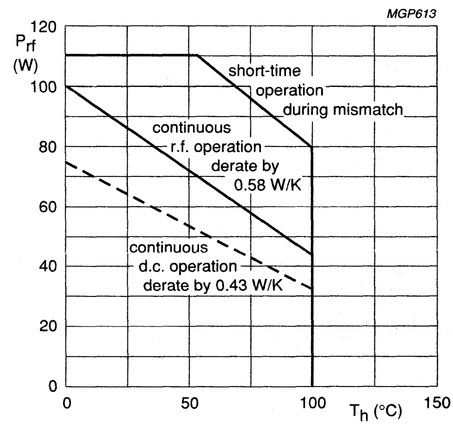


Fig.3 R.F. power dissipation; $V_{CE} \leq 16{,}5$ V; f ≥ 1 MHz.

THERMAL RESISTANCE

(dissipation = 30 W; T_{mb} = 79 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	2,5	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	1,8	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,3	K/W

CHARACTERISTICS

$T_j = 25$ °C

Collector-emitter breakdown voltage				
$V_{BE} = 0$; $I_C = 50$ mA	$V_{(BR)CES}$	>	36	V
Collector-emitter breakdown voltage				
open base; $I_C = 100$ mA	$V_{(BR)CEO}$	>	16	V
Emitter-base breakdown voltage				
open collector; $I_E = 25$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 18$ V	I_{CES}	<	25	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	8	mJ
$R_{BE} = 10\ \Omega$	E_{SBR}	>	8	mJ
D.C. current gain(1)		typ.	50	
$I_C = 4$ A; $V_{CE} = 5$ V	h_{FE}		10 to 80	
D.C. current gain ratio of matched devices(1)				
$I_C = 4$ A; $V_{CE} = 5$ V	h_{FE1}/h_{FE2}	<	1,2	
Collector-emitter saturation voltage(1)				
$I_C = 12,5$ A; $I_B = 2,5$ A	V_{CEsat}	typ.	1,5	V
Transition frequency at f = 100 MHz(1)				
$-I_E = 4$ A; $V_{CB} = 12,5$ V	f_T	typ.	650	MHz
$-I_E = 12,5$ A; $V_{CB} = 12,5$ V	f_T	typ.	600	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 15$ V	C_c	typ.	120	pF
Feedback capacitance at f = 1 MHz				
$I_C = 200$ mA; $V_{CE} = 15$ V	C_{re}	typ.	82	pF
Collector-flange capacitance	C_{cf}	typ.	2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200$ µs; $\delta \leq 0,02$.

HF/VHF power transistor | BLW86

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, AB and B operated h.f. and v.h.f. transmitters with a nominal supply voltage of 28 V. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions. Matched h_{FE} groups are available on request.

It has a 3/8" flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %	$\bar{z}_i$ Ω	$\bar{Y}_L$ mS	d_3 dB
c.w. (class-B)	**28**	**175**	**45**	> **7,5**	> **70**	**0,7 + j1,3**	**110 − j62**	−
s.s.b. (class-AB)	28	1,6 − 28	5–47,5 (P.E.P.)	typ. 19	typ. 45	−	−	typ. −30
s.s.b. (class-A)	26	1,6 − 28	17 (P.E.P.)	typ. 22	−	−	−	typ. −42

PIN CONFIGURATION

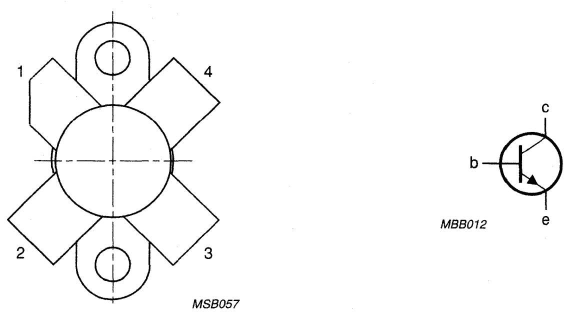


Fig.1 Simplified outline and symbol.

PINNING - SOT123

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage (V_{BE} = 0)				
peak value	V_{CESM}	max.	65	V
Collector-emitter voltage (open base)	V_{CEO}	max.	36	V
Emitter-base voltage (open-collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	4	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	12	A
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max.	105	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

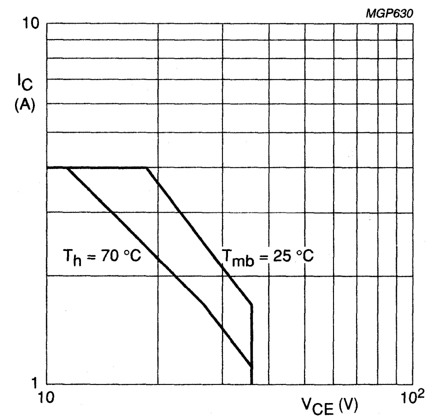
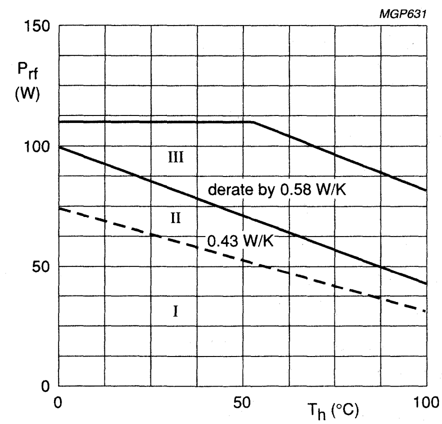


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation
III Short-time operation during mismatch

Fig.3 R.F. power dissipation; V_{CE} ≤ 28 V; f > 1 MHz.

THERMAL RESISTANCE

(dissipation = 45 W; T_{mb} = 83,5 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	2,65	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	1,95	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,3	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-emitter breakdown voltage				
V_{BE} = 0; I_C = 25 mA	$V_{(BR)CES}$	>	65	V
Collector-emitter breakdown voltage				
open base; I_C = 100 mA	$V_{(BR)CEO}$	>	36	V
Emitter-base breakdown voltage				
open collector; I_E = 10 mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 36 V	I_{CES}	<	10	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	8	mJ
R_{BE} = 10 Ω	E_{SBR}	>	8	mJ
D.C. current gain(1)				
I_C = 2,5 A; V_{CE} = 5 V	h_{FE}	typ.	45	
			10 to 80	
D.C. current gain ratio of matched devices(1)				
I_C = 2,5 A; V_{CE} = 5 V	h_{FE1}/h_{FE2}	<	1,2	
Collector-emitter saturation voltage(1)				
I_C = 7,5 A; I_B = 1,5 A	V_{CEsat}	typ.	1,5	V
Transition frequency at f = 100 MHz(1)				
$-I_E$ = 2,5 A; V_{CB} = 28 V	f_T	typ.	570	MHz
$-I_E$ = 7,5 A; V_{CB} = 28 V	f_T	typ.	570	MHz
Collector capacitance at f = 1 MHz				
I_E = I_e = 0; V_{CB} = 28 V	C_c	typ.	82	pF
Feedback capacitance at f = 1 MHz				
I_C = 100 mA; V_{CE} = 28 V	C_{re}	typ.	54	pF
Collector-flange capacitance	C_{cf}	typ.	2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200$ µs; $\delta \leq 0{,}02$.

VHF power transistor | BLW87

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, B and C operated mobile h.f. and v.h.f. transmitters with a nominal supply voltage of 13,5 V. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions with a supply over-voltage to 16,5 V.

It has a 3/8" flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneutralized common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %	$\bar{z}_i$ Ω	$\bar{Y}_L$ mS
c.w.	**13,5**	**175**	**25**	**> 6**	**> 70**	**1,6 + j1,4**	**210 + j5,5**

PIN CONFIGURATION

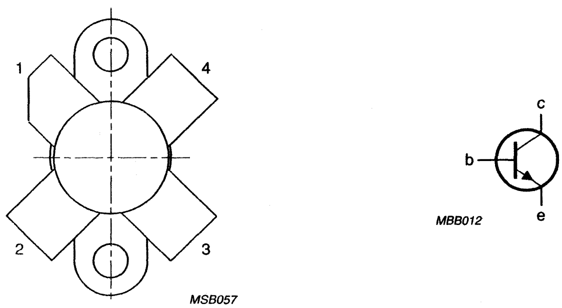


Fig.1 Simplified outline and symbol.

PINNING - SOT123

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage ($V_{BE} = 0$)				
peak value	V_{CESM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	6	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	12	A
R.F. power dissipation (f > 1 MHz); $T_{mb} = 25$ °C	P_{rf}	max.	76	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

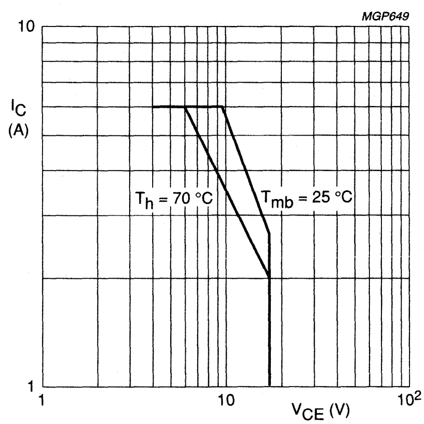


Fig.2 D.C. SOAR.

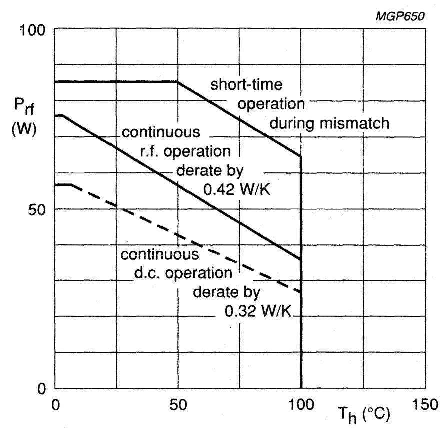


Fig.3 R.F. power dissipation; $V_{CE} \leq 16{,}5$ V; f ≥ 1 MHz.

THERMAL RESISTANCE

(dissipation = 20 W; $T_{mb} = 76$ °C; i.e. $T_h = 70$ °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	3,0	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	2,25	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,3	K/W

CHARACTERISTICS

$T_j = 25$ °C

Collector-emitter breakdown voltage				
$V_{BE} = 0$; $I_C = 25$ mA	$V_{(BR)\,CES}$	>	36	V
Collector-emitter breakdown voltage				
open base; $I_C = 50$ mA	$V_{(BR)\,CEO}$	>	18	V
Emitter-base breakdown voltage				
open collector; $I_E = 10$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 18$ V	I_{CES}	<	10	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	8	mJ
$R_{BE} = 10\ \Omega$	E_{SBR}	>	8	mJ
D.C. current gain[(1)]		typ.	50	
$I_C = 2,5$ A; $V_{CE} = 5$ V	h_{FE}		10 to 80	
Collector-emitter saturation voltage[(1)]				
$I_C = 7,5$ A; $I_B = 1,5$ A	V_{CEsat}	typ.	1,7	V
Transition frequency at f = 100 MHz[(1)]				
$-I_E = 2,5$ A; $V_{CB} = 13,5$ V	f_T	typ.	800	MHz
$-I_E = 7,5$ A; $V_{CB} = 13,5$ V	f_T	typ.	750	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 15$ V	C_c	typ.	65	pF
Feedback capacitance at f = 1 MHz				
$I_C = 100$ mA; $V_{CE} = 15$ V	C_{re}	typ.	41	pF
Collector-flange capacitance	C_{cf}	typ.	2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0,02$.

UHF power transistor BLW90

DESCRIPTION

N-P-N silicon planar epitaxial transistor suitable for transmitting applications in class-A, B or C in the u.h.f. and v.h.f. range for a nominal supply voltage of 28 V. The transistor is resistance stabilized and is guaranteed to withstand infinite VSWR at rated output power. High reliability is ensured by a **gold sandwich metallization.**

The transistor is housed in a $\frac{1}{4}$" capstan envelope with a ceramic cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneutralized common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %
c.w.	28	470	4	> 11	> 55

PIN CONFIGURATION

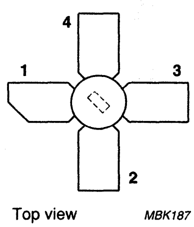


Fig.1 Simplified outline. SOT122A.

PINNING - SOT122A.

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

UHF power transistor BLW90

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage			
(peak value); $V_{BE} = 0$	V_{CESM}	max.	60 V
open base	V_{CEO}	max.	30 V
Emitter-base voltage (open collector)	V_{EBO}	max.	4 V
Collector current			
d.c. or average	I_C; $I_{C(AV)}$	max.	0,62 A
(peak value); f > 1 MHz	I_{CM}	max.	2,0 A
Total power dissipation (d.c. and r.f.) up to $T_{mb} = 25\ °C$	P_{tot}	max.	18,6 W
Storage temperature	T_{stg}		−65 to + 150 °C
Operating junction temperature	T_j	max.	200 °C

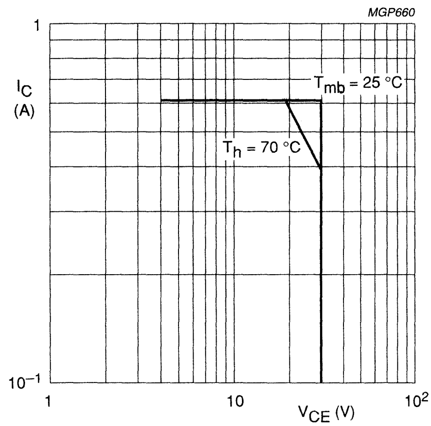
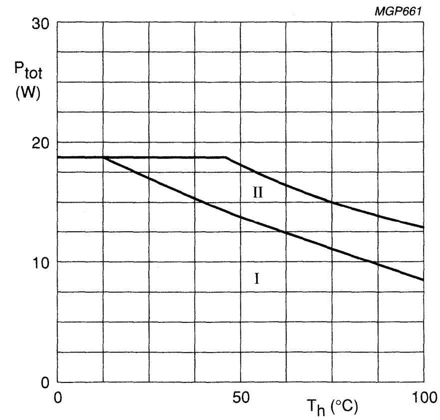


Fig.2 D.C. SOAR.



I Continuous d.c. and r.f. operation
II Short-time operation during mismatch

Fig.3 Power derating curves vs. temperature.

THERMAL RESISTANCE

(dissipation = 6 W; $T_{mb} = 73,6\ °C$, i.e. $T_h = 70\ °C$)

From junction to mounting base			
(d.c. and r.f. dissipation)	$R_{th\ j\text{-}mb}$	=	9,0 K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,6 K/W

CHARACTERISTICS

$T_j = 25\ °C$

Collector-emitter breakdown voltage				
$V_{BE} = 0$; $I_C = 4$ mA	$V_{(BR)CES}$	>	60	V
Collector-emitter breakdown voltage				
open base; $I_C = 20$ mA	$V_{(BR)CEO}$	>	30	V
Emitter-base breakdown voltage				
open collector; $I_E = 2$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 30$ V	I_{CES}	<	2	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	1	mJ
$R_{BE} = 10\ \Omega$	E_{SBR}	>	1	mJ
D.C. current gain (1)		typ.	40	
$I_C = 0{,}3$ A; $V_{CE} = 5$ V	h_{FE}		10 to 100	
Collector-emitter saturation voltage (1)				
$I_C = 1{,}0$ A; $I_B = 0{,}2$ A	V_{CEsat}	typ.	0,9	V
Transition frequency at f = 500 MHz (1)				
$-I_E = 0{,}3$ A; $V_{CB} = 28$ V	f_T	typ.	1,2	GHz
$-I_E = 1{,}0$ A; $V_{CB} = 28$ V	f_T	typ.	0,9	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 28$ V	C_c	typ.	8,4	pF
Feedback capacitance at f = 1 MHz				
$I_C = 20$ mA; $V_{CE} = 28$ V	C_{re}	typ.	3,6	pF
Collector-stud capacitance	C_{cs}	typ.	1,2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0{,}02$.

HF/VHF power transistor BLW96

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, AB and B operated high power industrial and military transmitting equipment in the h.f. and v.h.f. band. The transistor presents excellent performance as a linear amplifier in s.s.b. applications. It is resistance stabilized and is guaranteed to withstand severe load mismatch conditions. Transistors are supplied in matched h_{FE} groups.

The transistor has a ½" flange envelope with a ceramic cap. All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %	d_3 dB	d_5 dB	$I_{C(ZS)}$ (I_C) A
s.s.b. (class-AB)	**50**	**1,6 – 28**	**25 – 200 (P.E.P.)**	> **13,5**	> **40**(1)	< **−30**	< **−30**	**0,1**
c.w. (class-B)	50	108	200	typ. 6,5	typ. 67	–	–	(6)
s.s.b. (class-A)	40	28	50 (P.E.P.)	typ. 19	–	typ. −40	< −40	(4)

Note

1. η_{dt} at 200 W P.E.P.

PIN CONFIGURATION

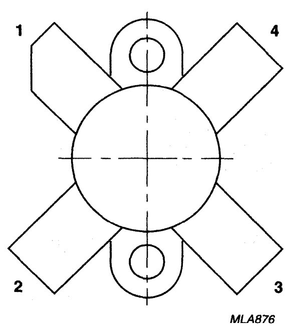


Fig.1 Simplified outline. SOT121B.

PINNING - SOT121B.

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage ($V_{BE} = 0$)				
peak value	V_{CESM}	max.	110	V
Collector-emitter voltage (open base)	V_{CEO}	max.	55	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	12	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	40	A
R.F. power dissipation (f > 1 MHz); T_{mb} = 45 °C	P_{rf}	max.	340	W
Storage temperature	T_{stg}	−65 to + 150		°C
Operating junction temperature	T_j	max.	200	°C

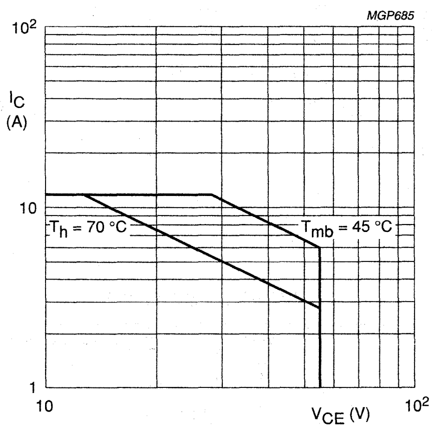
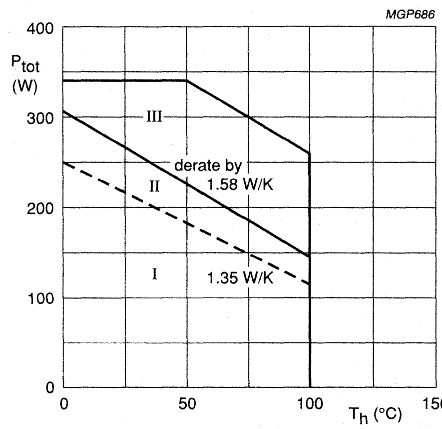


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation; f > 1 MHz
III Short-time operation during mismatch; f > 1 MHz

Fig.3 Power/temperature derating curves.

THERMAL RESISTANCE

(dissipation = 150 W; T_{mb} = 100 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	0,63	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	0,45	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,2	K/W

CHARACTERISTICS

$T_j = 25\ °C$

Collector-emitter breakdown voltage				
$V_{BE} = 0$; $I_C = 50$ mA	$V_{(BR)CES}$	>	110	V
Collector-emitter breakdown voltage				
open base; $I_C = 200$ mA	$V_{(BR)CEO}$	>	55	V
Emitter-base breakdown voltage				
open collector; $I_E = 20$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 55$ V	I_{CES}	<	10	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	20	mJ
$R_{BE} = 10\ \Omega$	E_{SBR}	>	20	mJ
D.C. current gain(1)				
$I_C = 7$ A; $V_{CE} = 5$ V	h_{FE}	typ. 15 to	30 50	
D.C. current gain ratio of matched devices(1)				
$I_C = 7$ A; $V_{CE} = 5$ V	h_{FE1}/h_{FE2}	≤	1,2	
Collector-emitter saturation voltage(1)				
$I_C = 20$ A; $I_B = 4$ A	V_{CEsat}	typ.	1,9	V
Transition frequency at f = 100 MHz(2)				
$-I_E = 7$ A; $V_{CB} = 45$ V	f_T	typ.	235	MHz
$-I_E = 20$ A; $V_{CB} = 45$ V	f_T	typ.	245	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 50$ V				
Feedback capacitance at f = 1 MHz	C_c	typ.	280	pF
$I_C = 150$ mA; $V_{CE} = 50$ V	C_{re}	typ.	170	pF
Collecting-flange capacitance	C_{cf}	typ.	4,4	pF

Notes

1. Measured under pulse conditions: $t_p \leq 300\ \mu s$; $\delta \leq 0{,}02$.
2. Measured under pulse conditions: $t_p \leq 50\ \mu s$; $\delta \leq 0{,}01$.

HF power transistor BLW97

DESCRIPTION

N-P-N silicon planar epitaxial transistor designed for use in class-A, AB and B operated high-power industrial and military transmitting equipment in the h.f. band.

The transistor offers excellent performance as a linear amplifier in s.s.b. applications. It is resistance stabilized and is made to withstand severe load-mismatch conditions. All leads are isolated from the flange.

The transistors are supplied in matched h_{FE} groups.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C

MODE OF OPERATION	V_{CE} V	$I_{C(ZS)}$ A	f MHz	P_L W	G_p dB	η_{dt} %	d_3 dB	d_5 dB
s.s.b. (class-AB)	28	0,1	1,6 – 28	175 (PEP)	> 11,5	> 40	< –30	< –30

PIN CONFIGURATION

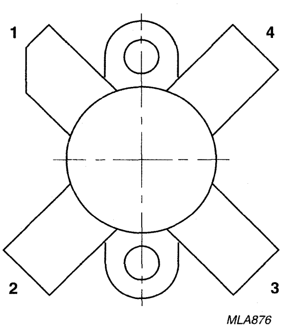


Fig.1 Simplified outline. SOT121B.

PINNING - SOT121B.

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage (peak value)				
$V_{BE} = 0$	V_{CESM}	max.	65	V
open base	V_{CEO}	max.	33	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current				
average	$I_{C(AV)}$	max.	15	A
peak value; f > 1 MHz	I_{CM}	max.	50	A
Total d.c. power dissipation at $T_h = 25°C$	$P_{tot(d.c.)}$	max.	190	W
R.F. power dissipation				
f > 1 MHz; $T_h = 25°C$	$P_{tot(rf)}$	max.	230	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

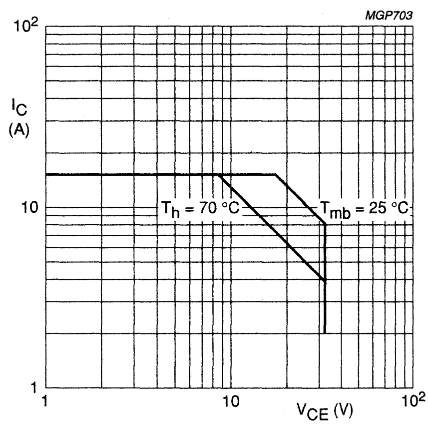
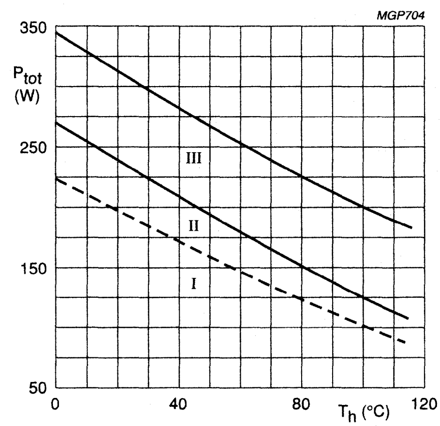


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation (f > 1 Mhz).
III Short-time operation during mismatch; (f > 1 MHz).

Fig.3 Power/temperature derating curves.

THERMAL RESISTANCE

(dissipation = 120 W; T_h = 25 °C i.e. T_{mb} = 49 °C)

From junction to mounting base				
(d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	0,63	K/W
From junction to mounting base				
(r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	0,48	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,20	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-emitter breakdown voltage				
V_{BE} = 0; I_C = 50 mA	$V_{(BR)CES}$	>	65	V
I_C = 100 mA; open base	$V_{(BR)CEO}$	>	33	V
Emitter-base breakdown voltage				
I_E = 20 mA; open collector	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
V_{CE} = 33 V; V_{BE} = 0	I_{CES}	<	20	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	20	mJ
R_{BE} = 10 Ω	E_{SBR}	>	20	mJ
D.C. current gain(1)		typ.	30	
I_C = 10 A; V_{CE} = 5 V	h_{FE}	15 to	50	
D.C. current gain ratio of matched devices(1)				
I_C = 10 A; V_{CE} = 5 V	h_{FE1}/h_{FE2}	<	1,2	
Collector-emitter saturation voltage(1)				
I_C = 25 A; I_B = 5 A	V_{CEsat}	typ.	2,4	V
Transition frequency at f = 100 MHz(2)				
$-I_E$ = 10 A; V_{CB} = 28 V	f_T	typ.	230	MHz
$-I_E$ = 20 A; V_{CB} = 28 V	f_T	typ.	235	MHz
Collector capacitance at f = 1 MHz				
$I_E = i_e$ = 0; V_{CB} = 28 V	C_c	typ.	380	pF
Feedback capacitance at f = 1 MHz				
I_C = 0; V_{CE} = 28 V	C_{re}	typ.	235	pF
Collector-flange capacitance	C_{cf}	typ.	4,5	pF

Notes

1. Measured under pulse conditions: t_p = 500 µs.
2. Measured under pulse conditions: t_p = 300 µs; δ = 0,02.

UHF linear power transistor BLW98

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in linear u.h.f. amplifiers of TV transposers and transmitters in band IV-V, as well as for driver stages in tube systems.

FEATURES:

- diffused emitter ballasting resistors for an optimum temperature profile;
- gold sandwich metallization ensures excellent reliability.

The transistor has a ¼" capstan envelope with ceramic cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

R.F. performance in linear amplifier

MODE OF OPERATION	f_{vision} MHz	V_{CE} V	I_C mA	T_h °C	d_{im}(1) dB	$P_{o\ sync}$(1) W	G_p dB
class-A	860	25	850	70	−60	> 3,5	> 6,5
class-A	860	25	850	25	−60	typ. 4,4	typ. 7,0

Note

1. Three-tone test method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB), zero dB corresponds to peak sync level.

PIN CONFIGURATION

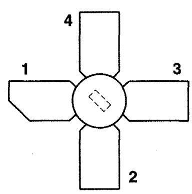


Fig.1 Simplified outline. SOT122A.

PINNING - SOT122A.

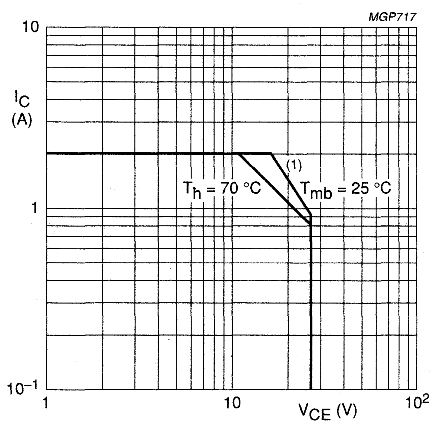
PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage				
(peak value); $V_{BE} = 0$	V_{CESM}	max.	50	V
open base	V_{CEO}	max.	27	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3,5	V
Collector current				
d.c.	I_C	max.	2	A
(peak value); f > 1 MHz	I_{CM}	max.	4	A
Total power dissipation at $T_h = 70$ °C	P_{tot}	max.	21,5	W
Storage temperature	T_{stg}		−65 to +150	°C
Operating junction temperature	T_j	max.	200	°C



(1) Second breakdown limit (independent of temperature).

Fig.2 D.C. SOAR.

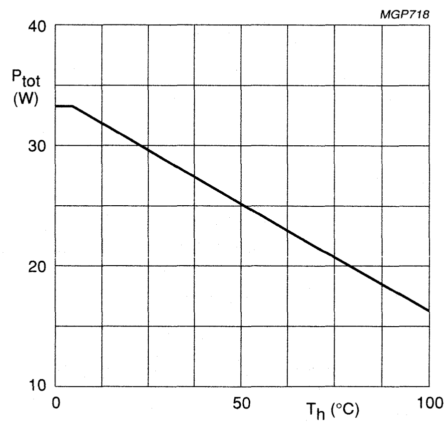


Fig.3 Power derating curve vs. temperature.

THERMAL RESISTANCE

(dissipation = 21,25 W; T_{mb} = 82,75 °C, T_h = 70 °C)

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	5,45	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,6	K/W

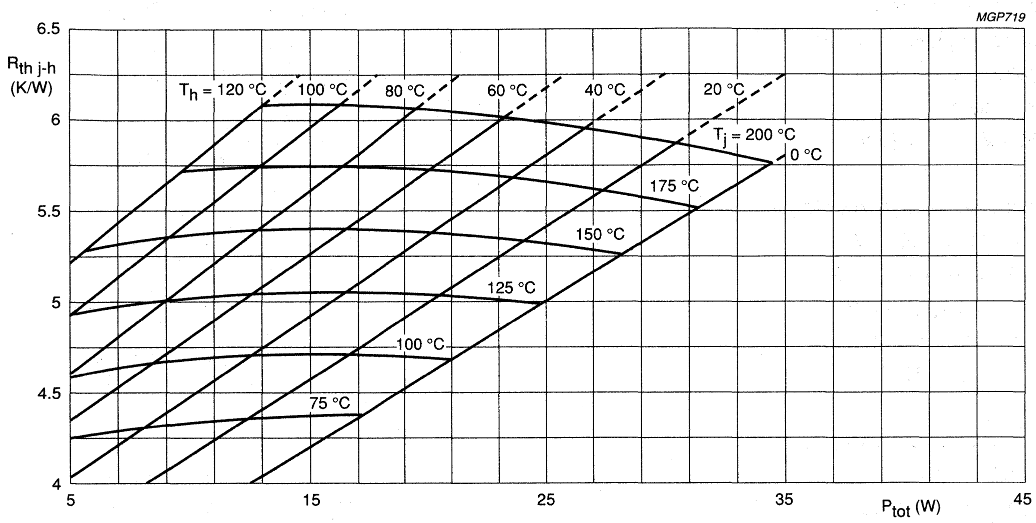


Fig.4 Maximum thermal resistance from junction to heatsink as a function of power dissipation, with heatsink and junction temperature as parameters. ($R_{th\ mb-h}$ = 0,6 K/W.)

Example

Nominal class-A operation (without r.f. signal): V_{CE} = 25 V; I_C = 850 mA; T_h = 70 °C.

Fig.4 shows:	$R_{th\ j-h}$	max.	6,05	K/W
	T_j	max.	200	°C
Typical device:	$R_{th\ j-h}$	typ.	5,35	K/W
	T_j	typ.	183	°C

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-emitter breakdown voltage				
V_{BE} = 0; I_C = 10 mA	$V_{(BR)CES}$	>	50	V
open base, I_C = 25 mA	$V_{(BR)CEO}$	>	27	V
Emitter-base breakdown voltage				
open collector, I_E = 5 mA	$V_{(BR)EBO}$	>	3,5	V
D.C. current gain(1)				
I_C = 850 mA; V_{CE} = 25 V	h_{FE}	>	15	
		typ.	40	
Collector-emitter saturation voltage(1)				
I_C = 500 mA; I_B = 100 mA	V_{CEsat}	typ.	0,25	V
Transition frequency at f = 500 MHz(2)				
$-I_E$ = 850 mA; V_{CB} = 25 V	f_T	typ.	2,5	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e$ = 0; V_{CB} = 25 V	C_c	typ.	24	pF
		<	30	pF
Feedback capacitance at f = 1 MHz				
I_C = 50 mA; V_{CE} = 25 V	C_{re}	typ.	15	pF
Collector-stud capacitance	C_{cs}	typ.	1,2	pF

Notes

1. Measured under pulse conditions: $t_p \leq 300\ \mu s$; $\delta \leq 0{,}02$.
2. Measured under pulse conditions: $t_p \leq 50\ \mu s$; $\delta \leq 0{,}01$.

UHF linear power transistor | BLW898

FEATURES

- Internal input matching for wideband operation and high power gain
- Polysilicon emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATION

- Common emitter class-A operation in linear transposers/transmitters (television) in the 470 to 860 MHz frequency band.

DESCRIPTION

NPN silicon planar transistor in a SOT171A 6-lead rectangular flange package, with a ceramic cap. The transistor delivers a $P_{o\ sync}$ = 3 W in class-A operation at 860 MHz and a supply voltage of 25 V.

PINNING SOT171A

PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

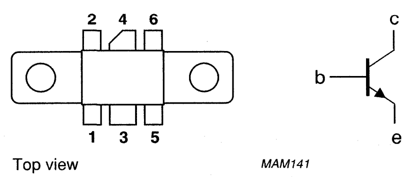


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (A)	$P_{o\ sync}$ (W)	G_p (dB)
CW class-A	860	25	1.1	≥3(1)	≥9(1)

Note

1. Three-tone test signal (−8, −16, and −10 dB); d_{im} = −63 dB.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

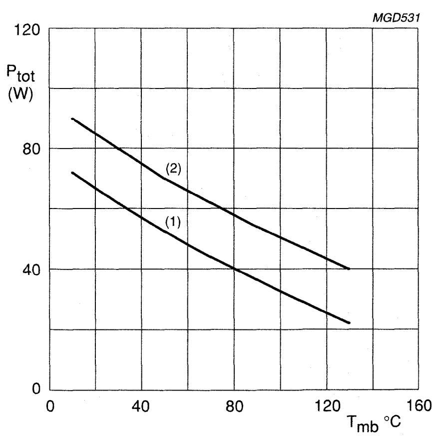
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	28	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	3.7	A
$I_{C(AV)}$	average collector current		–	3.7	A
P_{tot}	total power dissipation	up to T_{mb} = 70 °C	–	44	W
T_{stg}	storage temperature		−65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	P_{tot} = 44 W; T_{mb} = 70 °C	3	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink		0.3	K/W



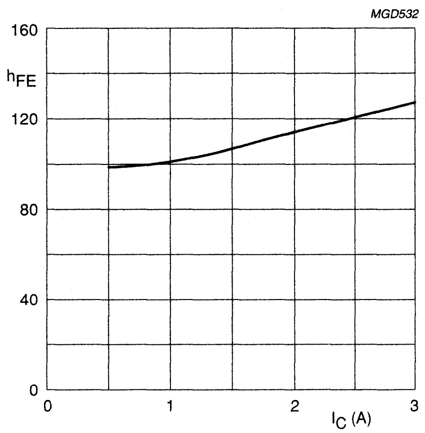
(1) Continuous operation
(2) Short-time operation during mismatch.

Fig.2 Power derating curve.

CHARACTERISTICS

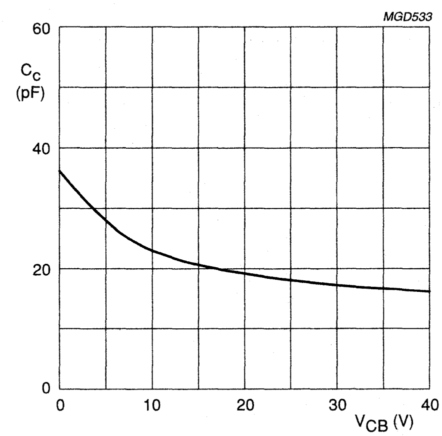
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 15 mA; I_E = 0	60	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 30 mA; I_B = 0	28	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 0.6 mA; I_C = 0	2.5	–	–	V
I_{CBO}	collector-base leakage current	V_{BE} = 0; V_{CB} = 28 V	–	–	1.5	mA
I_{CEO}	collector-emitter leakage current	V_{CE} = 20 V	–	–	3	mA
h_{FE}	DC current gain	V_{CE} = 25 V; I_C = 1.1 A	30	–	140	
C_c	collector capacitance	V_{CB} = 25 V; I_E = i_e = 0; f = 1 MHz	–	18	–	pF
C_{re}	feedback capacitance	V_{CB} = 25 V; I_C = 0; f = 1 MHz	–	11	–	pF



V_{CE} = 25 V; t_p = 500 μs; δ = <1 %.

Fig.3 DC current gain as a function of collector current; typical values.



I_E = i_e = 0; f = 1 MHz.

Fig.4 Collector capacitance as a function of collector-base voltage; typical values.

APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter class-A test circuit.

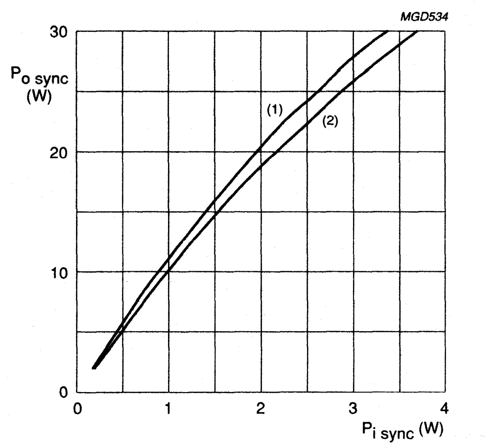
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (A)	$P_{o\ sync}$ (W)	G_p (dB)	d_{im} (dB)
CW class-A	860	25	1.1	≥3[1]	≥9[1]	<−63[1]
CW class-A	860	25	1.1	≥3[2]	≥9[2]	<−60[2]

Notes

1. Three-tone test method (vision carrier −8 dB, sound carrier −10 dB, sideband signal −16 dB), 0 dB corresponds to peak sync level.
2. Three-tone test method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB), 0 dB corresponds to peak sync level.

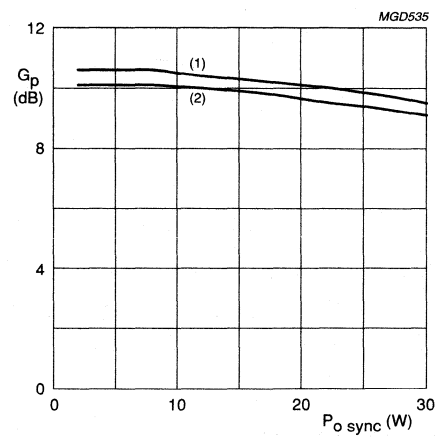
Ruggedness in class-A operation

The BLW898 is capable of withstanding a load mismatch corresponding to VSWR = 50 : 1 through all phases, under the conditions: V_{CE} = 25 V; I_{CQ} = 1.1 A; T_h = 25 °C; f = 860 MHz; $P_{o\ sync}$ = 3 W.



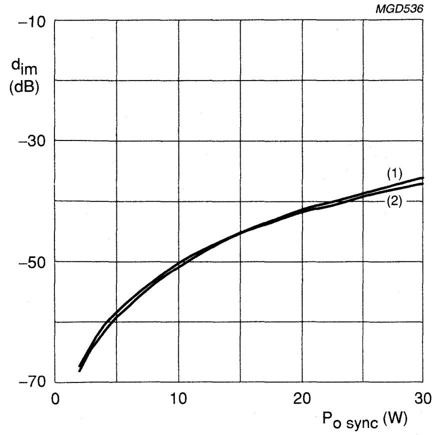
V_{CE} = 25 V; I_{CQ} = 1.1 A; f = 860 MHz; (3-tone; −8/−16/−10 dB).
(1) T_h = 25 °C.
(2) T_h = 70 °C.

Fig.5 Output power as a function of input power; typical values.



V_{CE} = 25 V; I_{CQ} = 1.1 A; f = 860 MHz; (3-tone; −8/−16/−10 dB).
(1) T_h = 25 °C.
(2) T_h = 70 °C.

Fig.6 Power gain as a function of output power; typical values.

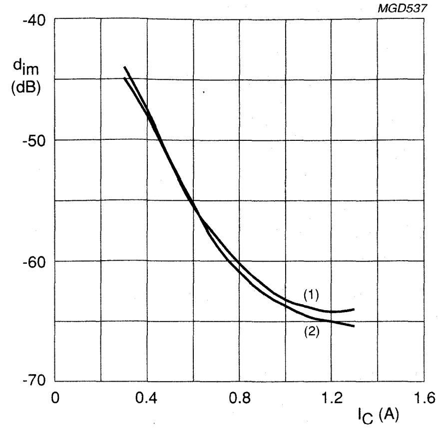


V_{CE} = 25 V; I_{CQ} = 1.1 A; f = 860 MHz; (3-tone; −8/−16/−10 dB).

(1) T_h = 25 °C.

(2) T_h = 70 °C.

Fig.7 Intermodulation distortion as a function of output power; typical values.



V_{CE} = 25 V; I_{CQ} = 1.1 A; f = 860 MHz; $P_{o\ sync}$ = 3 W; (3-tone; −8/−16/−10 dB).

(1) T_h = 70 °C.

(2) T_h = 25 °C.

Fig.8 Intermodulation distortion as a function of collector current; typical values.

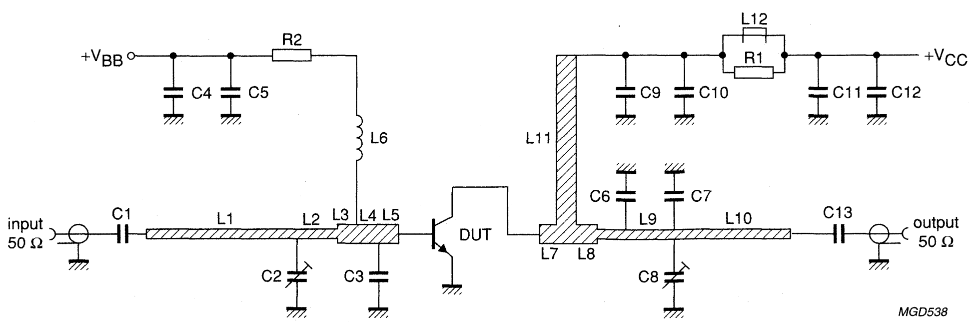
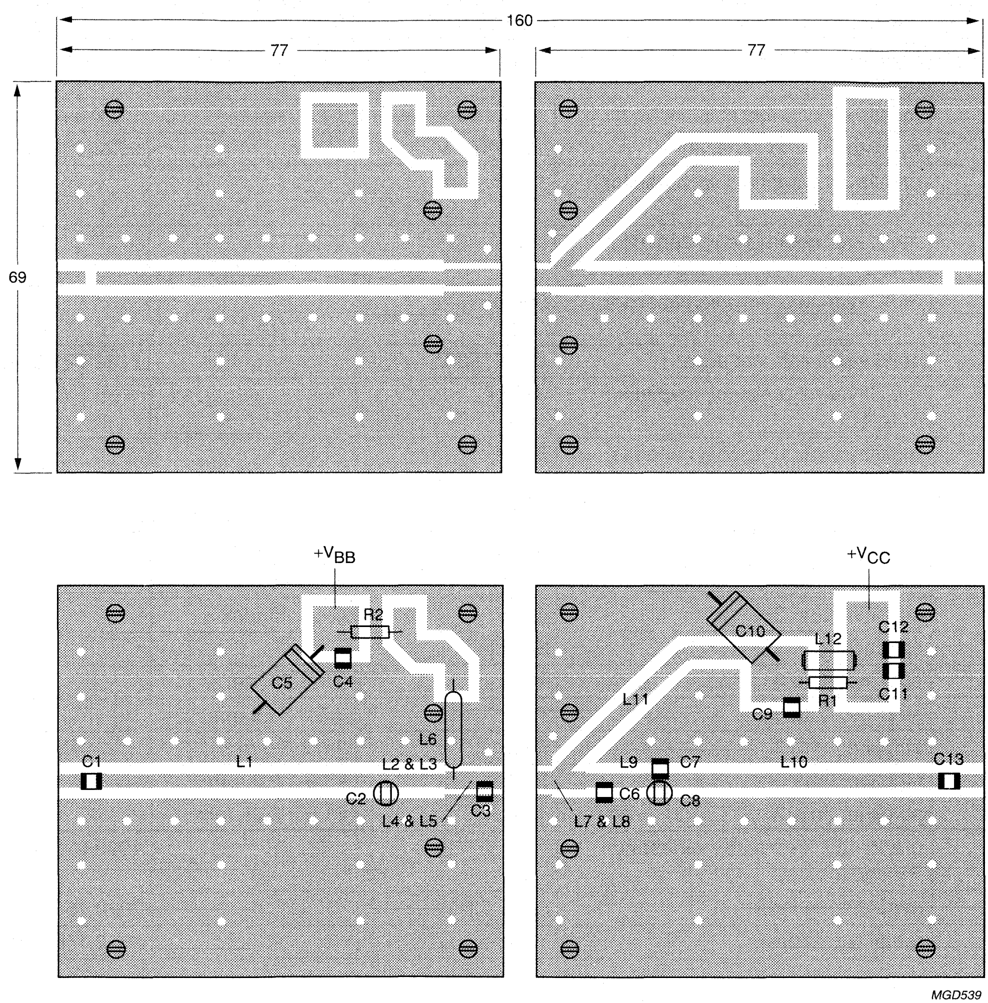


Fig.9 Class-A test circuit at 860 MHz.



Dimensions in mm.

Fig.10 Printed-circuit board and component lay-out for 860 MHz class-A test circuit.

List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1	multilayer ceramic chip capacitor; note 1	8.2 pF		
C2, C8	Tekelec Giga trim 37271	0.6 to 4.5 pF		
C3	multilayer ceramic chip capacitor; note 1	15 pF		
C4, C12	multilayer ceramic chip capacitor	10 nF; 63 V		2222 592 16627
C5	solid aluminium capacitor	10 μF; 63 V		2222 030 38109
C6	multilayer ceramic chip capacitor; note 2	10 pF		
C7	multilayer ceramic chip capacitor; note 2	2.4 pF		
C9	multilayer ceramic chip capacitor; note 2	500 pF		
C10	solid aluminium capacitor	47 μF; 63 V		2222 031 38479
C11	multilayer ceramic chip capacitor; note 2	330 pF		
C13	multilayer ceramic chip capacitor; note 1	5.1 pF		
L1	stripline; note 3	50 Ω	50 × 2.3 mm	
L2	stripline; note 3	50 Ω	10 × 2.3 mm	
L3	stripline; note 3	40 Ω	2 × 3.25 mm	
L4, L5	stripline; note 3	40 Ω	4 × 3.25 mm	
L6	RF choke	220 nH		
L7	stripline; note 3	40 Ω	9 × 3.25 mm	
L8	stripline; note 3	40 Ω	3.5 × 3.25 mm	
L9	stripline; note 3	50 Ω	9 × 2.3 mm	
L10	stripline; note 3	50 Ω	48.5 × 2.3 mm	
L11	stripline; note 3	40 Ω	41.5 × 3.25 mm	
L12	grade 4S2 ferroxcube wideband RF choke			4330 030 36301
R1	metal film resistor	50 Ω; 0.6 W		2322 156 14999
R2	metal film resistor	10 Ω; 0.6 W		2322 156 11009

Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. American Technical Ceramics type 100B or capacitor of same quality.
3. The striplines are on a double copper-clad PCB with PTFE fibre-glass dielectric ($\varepsilon_r = 2.2$); thickness 0.79 mm.

Table 1 Common emitter scattering parameter, I_{CQ} = 1.1 A; V_{CE} = 25 V.

f (MHZ)	S_{11}		S_{21}		S_{12}		S_{22}		G_{UM} (dB)
	MAG. (RAT)	ANG. (DEG)	MAG. (RAT)	ANG. (DEG)	MAG. (RAT)	ANG. (DEG)	MAG. (ANG)	ANG. (DEG)	
470	0.962	176.1	1.002	68.3	0.017	32.6	0.802	−178.2	15.7
495	0.961	175.9	0.961	66.9	0.017	32.8	0.803	−178.2	15.2
520	0.959	175.7	0.923	65.7	0.017	33.6	0.804	−178.2	14.7
545	0.958	175.5	0.891	64.4	0.018	34.9	0.803	−178.3	14.3
570	0.957	175.3	0.861	63.2	0.018	35.8	0.804	−178.2	14.0
595	0.955	175.0	0.835	62.0	0.018	36.1	0.805	−178.2	13.5
620	0.953	174.8	0.815	61.0	0.019	36.8	0.804	−178.2	13.0
645	0.951	174.5	0.795	59.7	0.019	37.3	0.805	−178.1	12.7
670	0.950	174.2	0.775	58.6	0.019	37.4	0.807	−178.0	12.5
695	0.947	173.9	0.757	57.7	0.020	37.8	0.806	−178.0	12.0
720	0.943	173.7	0.744	56.6	0.021	38.5	0.805	−178.1	11.5
745	0.942	173.4	0.732	55.4	0.021	38.6	0.807	−177.9	11.3
770	0.941	173.1	0.724	54.4	0.021	39.8	0.808	−177.8	11.1
795	0.938	172.8	0.716	53.3	0.021	40.1	0.807	−177.8	10.8
820	0.935	172.5	0.707	51.8	0.022	39.1	0.808	−177.8	10.6
845	0.933	172.1	0.701	50.9	0.021	39.3	0.810	−177.6	10.4
860	0.932	171.9	0.700	50.2	0.022	39.4	0.809	−177.5	10.3

VHF power transistor BLY87C

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, B and C operated mobile, h.f. and v.h.f. transmitters with a nominal supply voltage of 13,5 V. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions with a supply over-voltage 16,5 V.

It has a 3/8" capstan envelope with a ceramic cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneutralized common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %	$\bar{z}_i$ Ω	$\bar{Y}_L$ mS
c.w.	**13,5**	**175**	**8**	> **12,0**	> **60**	**2,2 + j0,4**	**96 − j28**
c.w.	12,5	175	8	typ. 11,5	typ. 65	–	–

PIN CONFIGURATION

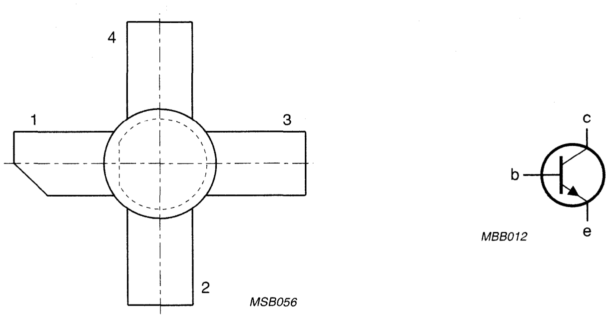


Fig.1 Simplified outline and symbol.

PINNING - SOT120

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage ($V_{BE} = 0$)				
peak value	V_{CESM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	1,5	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	4,0	A
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max.	20	W
Storage temperature	T_{stg}		−65 to + 150	°C
Operating junction temperature	T_j	max.	200	°C

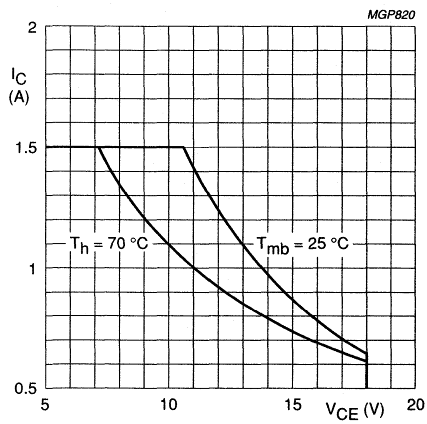
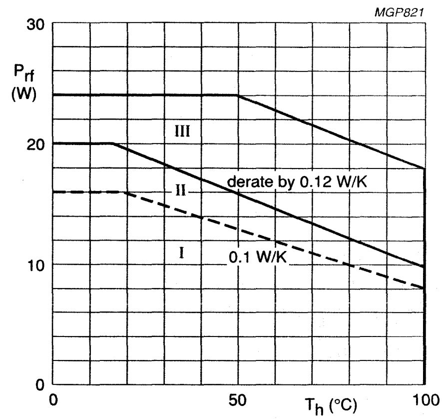


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation
III Short-time operation during mismatch

Fig.3 R.F. power dissipation; $V_{CE} \leq 16{,}5$ V; f > 1 MHz.

THERMAL RESISTANCE

(dissipation = 8 W; T_{mb} = 73,5 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	10,7	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	8,6	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,45	K/W

CHARACTERISTICS

T_j = 25 °C

Collector-emitter breakdown voltage				
V_{BE} = 0; I_C = 5 mA	$V_{(BR)CES}$	>	36	V
Collector-emitter breakdown voltage				
open base; I_C = 25 mA	$V_{(BR)CEO}$	>	18	V
Emitter-base breakdown voltage				
open collector; I_E = 1 mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 18 V	I_{CES}	<	2	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	0,5	mJ
R_{BE} = 10 Ω	E_{SBR}	>	0,5	mJ
D.C. current gain (1)				
I_C = 0,75 A; V_{CE} = 5 V	h_{FE}	typ.	40 10 to 100	
Collector-emitter saturation voltage (1)				
I_C = 2 A; I_B = 0,4 A	V_{CEsat}	typ.	0,85	V
Transition frequency at f = 100 MHz (1)				
$-I_E$ = 0,75 A; V_{CB} = 13,5 V	f_T	typ.	950	MHz
$-I_E$ = 2 A; V_{CB} = 13,5 V	f_T	typ.	850	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e$ = 0; V_{CB} = 13,5 V	C_c	typ.	16,5	pF
Feedback capacitance at f = 1 MHz				
I_C = 100 mA; V_{CE} = 13,5 V	C_{re}	typ.	12	pF
Collector-stud capacitance	C_{cs}	typ.	2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200$ µs; $\delta \leq 0,02$.

VHF power transistor BLY88C

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, B and C operated mobile, h.f. and v.h.f. transmitters with a nominal supply voltage of 13,5 V. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions with a supply over-voltage to 16,5 V.

It has a 3/8" capstan envelope with a ceramic cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneutralized common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η %	$\bar{z}_i$ Ω	$\bar{Y}_L$ mS
c.w.	13,5	175	15	> 8,0	> 60	2,3 + j2,2	130 − j4,4
c.w.	12,5	175	15	typ. 7,5	typ. 67	−	−

PIN CONFIGURATION

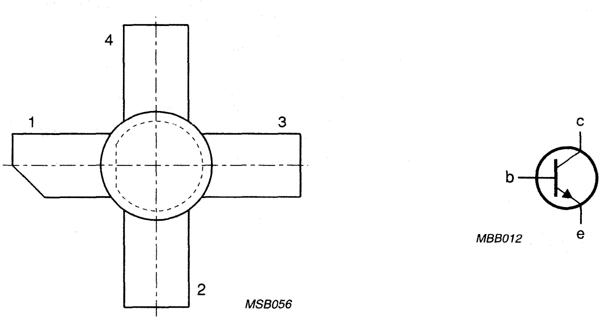


Fig.1 Simplified outline and symbol.

PINNING - SOT120

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage ($V_{BE} = 0$)				
peak value	V_{CESM}	max.	36	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Emitter-base voltage (open collector)	V_{EBO}	max.	4	V
Collector current (average)	$I_{C(AV)}$	max.	3	A
Collector current (peak value); f > 1 MHz	I_{CM}	max.	8	A
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max.	36	W
Storage temperature	T_{stg}	−65 to +150		°C
Operating junction temperature	T_j	max.	200	°C

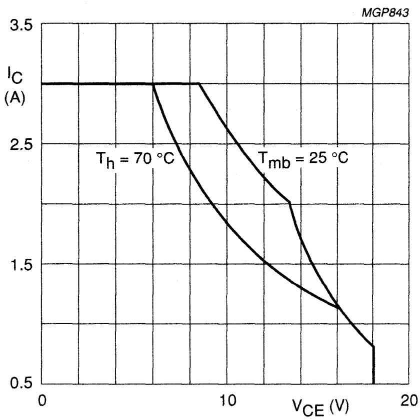
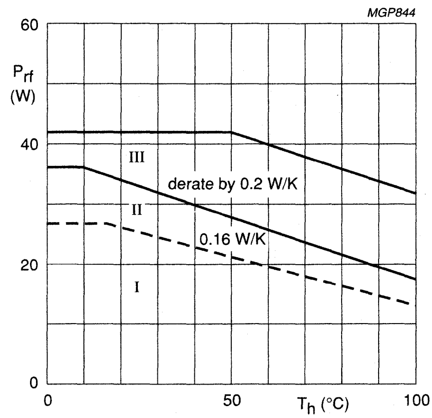


Fig.2 D.C. SOAR.



I Continuous d.c. operation
II Continuous r.f. operation
III Short-time operation during mismatch

Fig.3 R.F. power dissipation; $V_{CE} \leq 16,5$ V; f > 1 MHz.

THERMAL RESISTANCE

(dissipation = 15 W; T_{mb} = 77 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	= 6,55	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	= 4,95	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	= 0,45	K/W

CHARACTERISTICS

$T_j = 25\ °C$

Collector-emitter breakdown voltage				
$V_{BE} = 0$; $I_C = 10$ mA	$V_{(BR)CES}$	>	36	V
Collector-emitter breakdown voltage				
open base; $I_C = 50$ mA	$V_{(BR)CEO}$	>	18	V
Emitter-base breakdown voltage				
open collector; $I_E = 4$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 18$ V	I_{CES}	<	4	mA
Second breakdown energy; L = 25 mH; f = 50 Hz				
open base	E_{SBO}	>	2,5	mJ
$R_{BE} = 10\ \Omega$	E_{SBR}	>	2,5	mJ
D.C. current gain[1]				
$I_C = 1,5$ A; $V_{CE} = 5$ V	h_{FE}	typ.	40	
		10 to	100	
Collector-emitter saturation voltage[1]				
$I_C = 4,5$ A; $I_B = 0,9$ A	V_{CEsat}	typ.	1,0	V
Transition frequency at f = 100 MHz[1]				
$-I_E = 1,5$ A; $V_{CB} = 13,5$ V	f_T	typ.	850	MHz
$-I_E = 4,5$ A; $V_{CB} = 13,5$ V	f_T	typ.	800	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 13,5$ V	C_c	typ.	32	pF
Feedback capacitance at f = 1 MHz				
$I_C = 200$ mA; $V_{CE} = 13,5$ V	C_{re}	typ.	23	pF
Collector-stud capacitance	C_{cs}	typ.	2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200\ \mu s$; $\delta \leq 0,02$.

VHF power transistor BLY89C

DESCRIPTION

N-P-N silicon planar epitaxial transistor intended for use in class-A, B and C operated mobile, industrial and military transmitters with a nominal supply voltage of 13,5 V. The transistor is resistance stabilized and is guaranteed to withstand severe load mismatch conditions with a supply over-voltage to 16,5 V. It has a 3/8" capstan envelope with a ceramic cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

R.F. performance up to T_h = 25 °C in an unneutralized common-emitter class-B circuit

MODE OF OPERATION	V_{CC} V	f MHz	P_L W	G_p dB	η %	$\overline{z_i}$ Ω	$\overline{Y_L}$ mS
c.w.	13,5	175	25	>6	>70	1,6 + j1,4	210 + j5,5

PIN CONFIGURATION

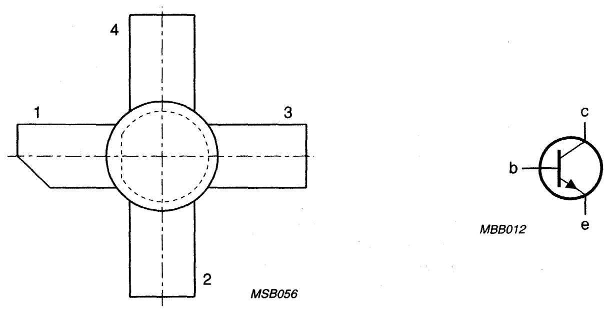


Fig.1 Simplified outline and symbol.

PINNING - SOT120

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage (V_{BE} = 0)				
peak value	V_{CESM}	max	36	V
Collector-emitter voltage (open base)	V_{CEO}	max	18	V
Emitter-base voltage (open collector)	V_{EBO}	max	4	V
Collector current (average)	$I_{C(AV)}$	max	6	A
Collector current (peak value); f > 1 MHz	I_{CM}	max	12	A
R.F. power dissipation (f > 1 MHz); T_{mb} = 25 °C	P_{rf}	max	73	W

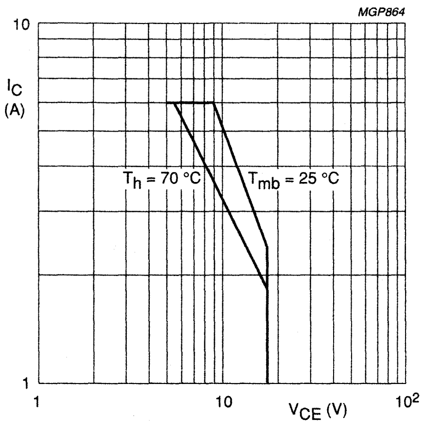
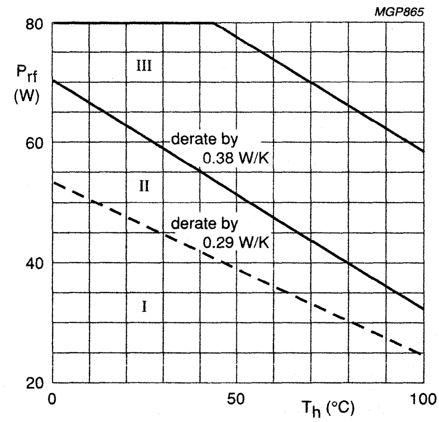


Fig.2 D.C. soar.



I Continuous d.c. operation
II Continuous r.f. operation
III Short-time operation during mismatch

Fig.3 R.F. power dissipation; V_{CE} ≤ 16,5 V; f > 1 MHz.

THERMAL RESISTANCE

(dissipation 20 W; T_{mb} = 79 °C, i.e. T_h = 70 °C)

From junction to mounting base (d.c. dissipation)	$R_{th\ j\text{-}mb(dc)}$	=	3,1	K/W
From junction to mounting base (r.f. dissipation)	$R_{th\ j\text{-}mb(rf)}$	=	2,3	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,45	K/W

CHARACTERISTICS

$T_j = 25$ °C

Breakdown voltage				
Collector-emitter voltage				
$V_{BE} = 0$; $I_C = 25$ mA	$V_{(BR)CES}$	>	36	V
Collector-emitter voltage				
open base; $I_C = 50$ mA	$V_{(BR)CEO}$	>	18	V
Emitter-base voltage				
open collector; $I_E = 10$ mA	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0$; $V_{CE} = 18$ V	I_{CES}	<	10	mA
Transient energy				
L = 25 mH; f = 50 Hz				
open base	E	>	8	ms
$-V_{BE} = 1,5$ V; $R_{BE} = 33$ Ω	E	>	8	ms
D.C. current gain(1)				
$I_C = 2,5$ A; $V_{CE} = 5$ V	h_{FE}	typ	50	
			10 to 80	
Collector-emitter saturation voltage(1)				
$I_C = 7,5$ A; $I_B = 1,5$ A	V_{CEsat}	typ	1,7	V
Transition frequency at f = 100 MHz(1)				
$I_C = 2,5$ A; $V_{CE} = 13,5$ V	f_T	typ	800	MHz
$I_C = 7,5$ A; $V_{CE} = 13,5$ V	f_T	typ	750	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 15$ V	C_c	typ	65	pF
		<	90	pF
Feedback capacitance at f = 1 MHz				
$I_C = 100$ mA; $V_{CE} = 15$ V	C_{re}	typ	41	pF
Collector-stud capacitance	C_{cs}	typ	2	pF

Note

1. Measured under pulse conditions: $t_p \leq 200$ µs; $\delta \leq 0,02$.

NPN microwave power transistors | LBE2003S; LBE2009S

FEATURES

- Diffused emitter ballasting resistors
- Self-aligned process entirely ion implanted and gold metallization
- Optimum temperature profile
- Excellent performance and reliability.

APPLICATIONS

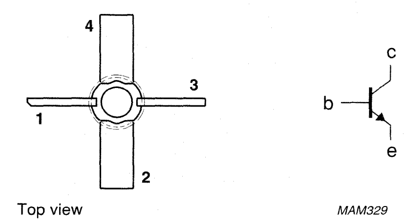
- Common emitter class-A linear power amplifiers up to 4 GHz.

DESCRIPTION

The LBE2003S and LBE2009S are NPN silicon planar epitaxial microwave power transistors in a SOT441A metal ceramic studless package.

PINNING

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter



Marking code: LBE2003S = 407; LBE2009S = 409.

Fig.1 Simplified outline and symbol (SOT441A).

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class-A amplifier.

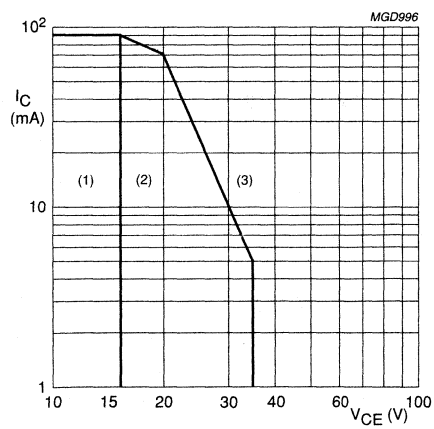
TYPE NUMBER	MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_C (mA)	P_{L1} (mW)	G_{po} (dB)	Z_i (Ω)	Z_L (Ω)
LBE2003S	Class-A (CW) linear	2	18	30	≥200	≥10	6.2 + j30	17.5 + j7
LBE2009S	Class-A (CW) linear	2	18	110	≥700	≥9	7.5 + j15	17.5 + j39

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter		40	V
V_{CER}	collector-emitter voltage				
	LBE2003S	R_{BE} = 220 Ω	–	35	V
	LBE2009S	R_{BE} = 100 Ω	–	35	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)				
	LBE2003S		–	90	mA
	LBE2009S		–	250	mA
P_{tot}	total power dissipation	T_{mb} ≤ 75 °C			
	LBE2003S		–	1.4	W
	LBE2009S		–	3.5	W
T_{stg}	storage temperature		−65	+150	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	at 0.3 mm from case; t = 10 s	–	235	°C



T_{mb} ≤ 75 °C.

(1) Region of permissible DC operation.

(2) Permissible extension provided R_{BE} ≤ 220 Ω.

(3) Second breakdown limit (independent of temperature).

Fig.2 DC SOAR; LBE2003S.

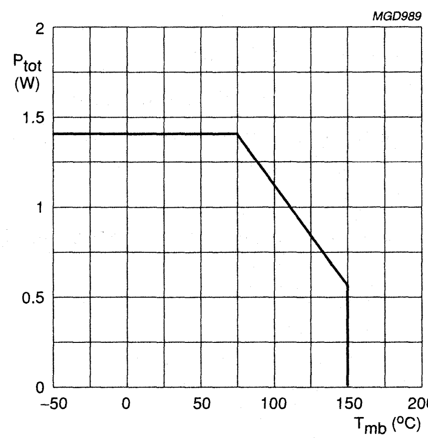
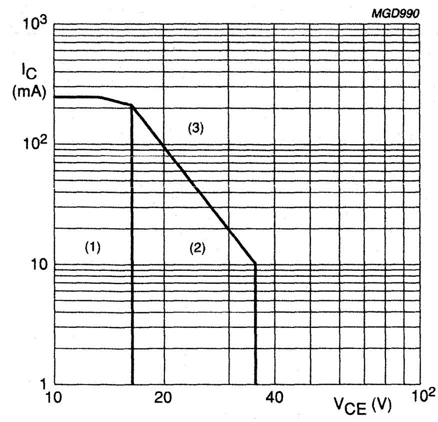


Fig.3 Power dissipation derating as a function of mounting-base temperature; LBE2003S.



$T_{mb} \le 75$ °C.
(1) Region of permissible DC operation.
(2) Permissible extension provided $R_{BE} \le 100\ \Omega$.
(3) Second breakdown limit (independant of temperature).

Fig.4 DC SOAR; LBE2009S.

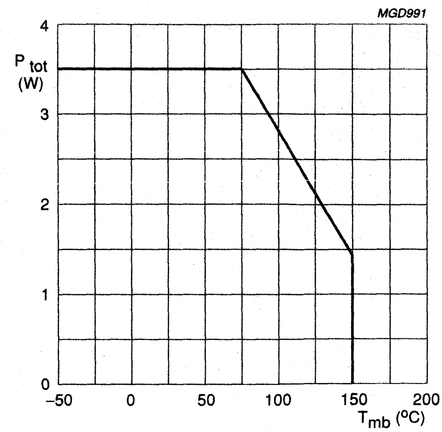


Fig.5 Power dissipation derating as a function of mounting-base temperature; LBE2009S.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	$T_j = 75$ °C		
	LBE2003S		65	K/W
	LBE2009S		36	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	$T_j = 75$ °C	1.5	K/W

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 20 V; I_E = 0	–	–	0.1	μA
I_{CBO}	collector cut-off current	V_{CB} = 40 V; I_E = 0				
	LBE2003S		–	–	150	μA
	LBE2009S		–	–	250	μA
I_{CER}	collector cut-off current					
	LBE2003S	V_{CB} = 35 V; R_{BE} = 220 Ω	–	–	500	μA
	LBE2009S	V_{CB} = 35 V; R_{BE} = 100 Ω	–	–	1000	μA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0				
	LBE2003S		–	–	0.05	μA
	LBE2009S		–	–	0.2	μA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 30 mA	15	–	150	
		V_{CE} = 5 V; I_C = 110 mA	15	–	150	
C_{cb}	collector-base capacitance	V_{CB} = 18 V; V_{EB} = 1.5 V; I_E = I_C = 0; f = 1 MHz				
	LBE2003S		–	0.3	–	pF
	LBE2009S		–	0.6	–	pF
C_{ce}	collector-emitter capacitance	V_{CE} = 18 V; V_{EB} = 1.5 V; I_E = I_C = 0; f = 1 MHz				
	LBE2003S		–	0.45	–	pF
	LBE2009S		–	0.6	–	pF
C_{eb}	emitter-base capacitance	V_{CB} = 10 V; V_{EB} = 1 V; I_E = I_C = 0; f = 1 MHz				
	LBE2003S		–	1.7	–	pF
	LBE2009S		–	3.3	–	pF

NPN microwave power transistors | LBE2003S; LBE2009S

Table 1 Scattering parameters LBE2003S: V_{CE} = 18 V; I_C = 30 mA (V_{CE} and I_C regulated); T_{mb} = 25 °C; Z_o = 50 Ω; typical values. (The figures given between brackets are values in dB).

f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
	MAGNITUDE (ratio)	**ANGLE (deg)**	**MAGNITUDE (ratio)**	**ANGLE (deg)**	**MAGNITUDE (ratio)**	**ANGLE (deg)**	**MAGNITUDE (ratio)**	**ANGLE (deg)**
500	0.56	−143	0.037 (−28.6)	41	9.50 (19.6)	101	0.56	−34
600	0.55	−154	0.040 (−28.0)	39	8.28 (18.4)	93	0.51	−35
700	0.55	−164	0.040 (−27.9)	40	7.13 (17.1)	88	0.50	−36
800	0.55	−171	0.041 (−27.7)	40	6.35 (16.1)	82	0.49	−37
900	0.55	−178	0.043 (−27.4)	41	5.69 (15.1	77	0.47	−38
1000	0.55	176	0.045 (−26.9)	40	5.14 (14.2	72	0.46	−39
1100	0.55	170	0.048 (−26.4)	40	4.72 (13.5	68	0.46	−39
1200	0.55	165	0.051 (−25.9)	41	4.37 (12.8	64	0.45	−41
1300	0.56	159	0.056 (−25.1)	41	4.05 (12.2	60	0.44	−44
1400	0.55	158	0.060 (−24.5)	41	3.76 (11.5	57	0.45	−46
1500	0.55	149	0.062 (−24.2)	40	3.52 (10.9	53	0.43	−48
1600	0.55	146	0.065 (−23.8)	42	3.33 (10.5	50	0.43	−50
1700	0.56	142	0.068 (−23.3)	42	3.15 (10.0	46	0.43	−53
1800	0.57	137	0.070 (−23.1)	41	2.96 (9.4)	42	0.43	−54
1900	0.57	132	0.072 (−22.9)	40	2.80 (8.9)	39	0.43	−56
2000	0.58	128	0.074 (−22.7)	40	2.66 (8.5)	36	0.42	−57
2200	0.60	121	0.081 (−21.8)	39	2.43 (7.7)	28	0.41	−61
2400	0.62	114	0.091 (−20.8)	37	2.24 (7.0)	23	0.40	−67
2600	0.64	108	0.099 (−20.1)	36	2.08 (6.4)	16	0.39	−75
2800	0.66	102	0.105 (−19.6)	33	1.90 (5.6)	10	0.38	−82
3000	0.68	96	0.108 (−19.4)	31	1.79 (5.1)	4	0.39	−87
3200	0.71	92	0.124 (−18.7)	29	1.63 (4.3)	−2	0.37	−94
3400	0.73	89	0.125 (−18.0)	27	1.58 (4.0)	−7	0.40	−101
3600	0.75	86	0.137 (−17.3)	25	1.46 (3.3)	−13	0.39	−112
3800	0.76	82	0.142 (−17.0)	23	1.40 (2.9)	−18	0.38	−120
4000	0.77	79	0.149 (−16.6)	20	1.31 (2.3)	−24	0.38	−128
4200	0.78	75	0.155 (−16.2)	17	1.25 (1.9)	−28	0.38	−133
4400	0.80	73	0.167 (−15.5)	15	1.20 (1.6)	−34	0.39	−142
4600	0.81	69	0.177 (−15.0)	12	1.14 (1.1)	−38	0.39	−151
4800	0.81	68	0.187 (−14.6)	10	1.10 (0.8)	−43	0.42	−159
5000	0.81	65	0.194 (−14.3)	6	1.04 (0.4)	−47	0.44	−165
5200	0.80	60	0.203 (−13.8)	4	1.03 (0.3)	−53	0.47	−169
5400	0.81	56	0.219 (−13.2)	−1	0.98 (−0.2)	−57	0.48	−175
5600	0.81	51	0.229 (−12.8)	−3	0.97 (−0.3)	−62	0.49	−178
5800	0.81	48	0.243 (−12.3)	−8	0.92 (−0.7)	−68	0.51	−171
6000	0.80	44	0.245 (−12.2)	−12	0.90 (−0.9)	−72	0.55	−165

Table 2 Scattering parameters LBE2009S: V_{CE} = 18 V; I_C = 110 mA (V_{CE} and I_C regulated); T_{mb} = 25 °C; Z_o = 50 Ω; typical values. (The figures given between brackets are values in dB).

f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)
500	0.70	177	0.029 (−30.7)	50	7.55 (17.6)	83	0.25	−48
600	0.70	171	0.033 (−29.6)	51	6.43 (16.2)	77	0.22	−50
700	0.70	168	0.036 (−29.0)	53	5.46 (14.6)	73	0.23	−52
800	0.70	163	0.039 (−28.4)	54	4.80 (13.6)	68	0.22	−54
900	0.71	159	0.041 (−27.8)	54	4.27 (12.6)	64	0.22	−56
1000	0.71	155	0.045 (−27.0)	55	3.84 (11.7)	60	0.21	−59
1100	0.71	151	0.049 (−26.2)	54	3.53 (11.0)	56	0.21	−62
1200	0.71	148	0.054 (−25.4)	54	3.27 (10.3)	52	0.21	−65
1300	0.71	144	0.060 (−24.5)	53	3.01 (9.6)	48	0.20	−74
1400	0.72	143	0.066 (−23.6)	54	2.80 (9.0)	45	0.20	−79
1500	0.72	136	0.070 (−23.1)	52	2.61 (8.3)	41	0.21	−80
1600	0.72	133	0.075 (−22.5)	53	2.47 (7.9)	38	0.21	−83
1700	0.72	130	0.080 (−21.9)	51	2.33 (7.3)	34	0.22	−87
1800	0.73	127	0.084 (−21.5)	49	2.18 (6.8)	30	0.22	−90
1900	0.73	123	0.087 (−21.2)	48	2.05 (6.3)	26	0.22	−94
2000	0.74	120	0.090 (−20.9)	46	1.97 (5.9)	23	0.22	−97
2200	0.75	114	0.100 (−20.0)	43	1.78 (5.0)	15	0.22	−109
2400	0.77	108	0.112 (−19.0)	40	1.63 (4.3)	10	0.21	−122
2600	0.79	103	0.123 (−18.2)	37	1.51 (3.6)	2	0.24	−133
2800	0.80	97	0.129 (−17.8)	33	1.36 (2.7)	−4	0.25	−143
3000	0.81	92	0.134 (−17.5)	30	1.28 (2.1)	−11	0.27	−151
3200	0.83	88	0.143 (−16.9)	26	1.15 (1.2)	−17	0.28	−163
3400	0.85	85	0.152 (−16.4)	24	1.10 (0.9)	−21	0.30	−173
3600	0.86	82	0.163 (−15.8)	20	1.00 (0)	−28	0.34	178
3800	0.87	79	0.168 (−15.5)	17	0.96 (−0.4)	−32	0.37	173
4000	0.88	75	0.175 (−15.2)	14	0.88 (−1.1)	−39	0.41	168
4200	0.88	71	0.180 (−14.9)	11	0.83 (−1.6)	−42	0.42	162
4400	0.89	69	0.193 (−14.3)	8	0.79 (−2.1)	−48	0.45	155
4600	0.90	66	0.200 (−14.0)	5	0.74 (−2.6)	−51	0.48	149
4800	0.90	64	0.211 (−13.5)	2	0.71 (−3.0)	−56	0.52	145
5000	0.90	61	0.214 (−13.4)	−2	0.66 (−3.6)	−59	0.55	144

NPN microwave power transistor | LFE15600X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very good stability of the characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output prematching ensures good stability and allows an easier design of wideband circuits.

APPLICATIONS

Common emitter, class AB amplifiers in CW conditions for professional applications between 1.5 GHz and 1.7 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT448A glued cap metal ceramic flange package, with emitter connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class AB amplifier.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (A)	P_{L1} (W)	G_{po} (dB)	η_C (%)	Z_i/Z_L (Ω)
Class AB (CW)	1.5	24	0.2	≥55	≥8	typ.50	see Figs 7 and 8

PINNING - SOT448A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange

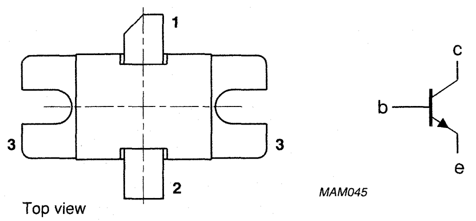


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CER}	collector-emitter voltage	R_{BE} = 56 Ω	–	30	V
V_{CEO}	collector-emitter voltage	open base	–	22	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	DC collector current		–	12	A
P_i	input power	f = 1.5 GHz; V_{CE} = 24 V; class AB	–	20	W
P_{tot}	total power dissipation	T_{mb} = 75 °C	–	80	W
T_{stg}	storage temperature		–65	+200	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.

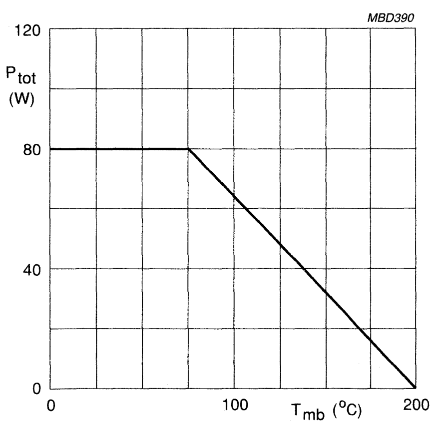


Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 100 °C	1.2	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC15"*.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 20 V	–	6	mA
$V_{(BR)CER}$	collector-emitter breakdown voltage	I_C = 30 mA; R_{BE} = 56 Ω	30	–	V
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 30 mA	45	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 30 mA	3	–	V
h_{FE}	DC current gain	I_C = 1 A; V_{CE} = 5 V	15	100	

NPN microwave power transistor LLE15180X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very good stability of the characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output prematching ensures good stability and allows an easier design of wideband circuits.

APPLICATIONS

Intended for use in common emitter, class AB amplifiers in CW conditions for professional applications between 1.4 GHz and 1.6 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT437A glued cap metal ceramic flange package, with emitter connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class AB amplifier.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (A)	P_{L1} (W)	G_{po} (dB)	η_C (%)	Z_i; Z_L (Ω)
Class AB (CW)	1.5	24	0.05	≥15	≥7.8	typ. 50	see Figs 6 and 7

PINNING - SOT437A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange

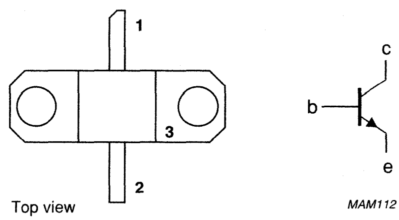


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CER}	collector-emitter voltage	$R_{BE} = 220\ \Omega$	–	30	V
V_{CEO}	collector-emitter voltage	open base	–	22	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	DC collector current		–	3	A
P_i	input power	f = 1.85 GHz; V_{CE} = 24 V; class AB	–	4	W
P_{tot}	total power dissipation	T_{mb} = 75 °C	–	25	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.

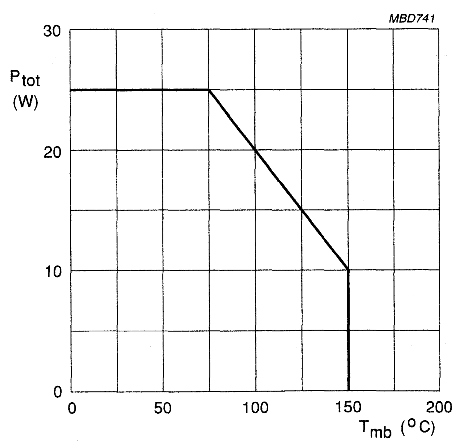


Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 100 °C	3.6	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC15"*.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 20 V	–	1.5	mA
$V_{(BR)CER}$	collector-emitter breakdown voltage	I_C = 10 mA; R_{BE} = 220 Ω	30	–	V
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 10 mA	45	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 10 mA	3	–	V
h_{FE}	DC current gain	I_C = 0.5 A; V_{CE} = 3 V	15	100	

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very good stability of the characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output prematching ensures good stability and allows an easier design of wideband circuits.

APPLICATION

Intended for use in common emitter, class AB amplifiers in CW conditions for professional applications between 1.4 GHz and 1.6 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT437A glued cap metal ceramic flange package, with emitter connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class AB amplifier.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (A)	P_{L1} (W)	G_{po} (dB)	η_C (%)	Z_i; Z_L (Ω)
Class AB (CW)	1.5	24	0.3	≥33	≥8	typ. 43	see Figs 8 and 9

PINNING - SOT437A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange

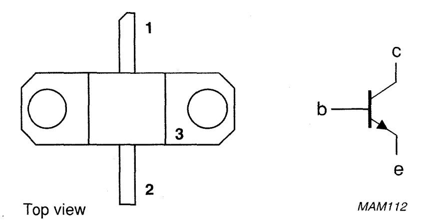


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

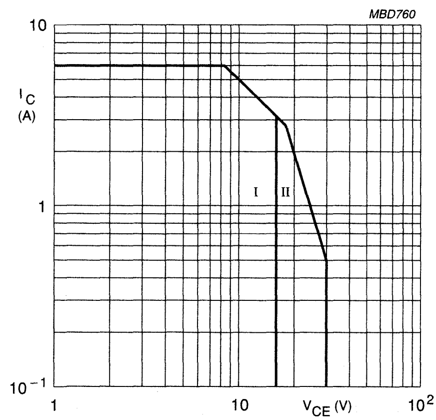
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CER}	collector-emitter voltage	R_{BE} = 220 Ω	–	30	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	DC collector current		–	6	A
P_i	input power	f = 1.5 GHz; V_{CE} = 24 V; class AB	–	8	W
P_{tot}	total power dissipation	T_{mb} = 75 °C	–	50	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



T_{mb} ≤ 75 °C.
(I) Region of permissible DC operation.
(II) Permissible extension provided R_{BE} ≤ 220 Ω.

Fig.2 DC SOAR.

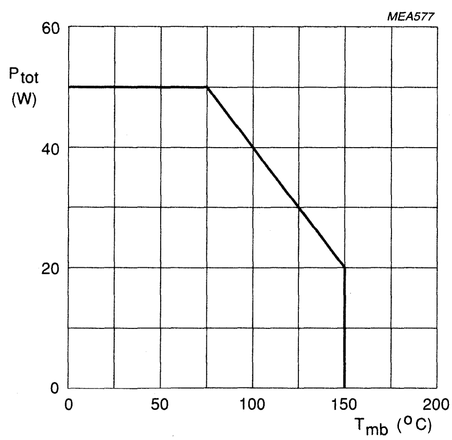


Fig.3 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 100 °C	2	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC15".*

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; V_{CB} = 20 V	–	3	mA
$V_{(BR)CER}$	collector-emitter breakdown voltage	I_C = 15 mA; R_{BE} = 220 Ω	30	–	V
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 15 mA	45	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 15 mA	3	–	V
h_{FE}	DC current gain	I_C = 1 A; V_{CE} = 3 V	15	100	

NPN microwave power transistor | LLE16045X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very good stability of the characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input prematching ensures good stability and allows an easier design of wideband circuits.

APPLICATIONS

Intended for use in common emitter, class AB amplifiers in CW conditions for professional applications between 1.5 GHz and 1.8 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT437A glued cap metal ceramic flange package, with emitter connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class AB amplifier.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (A)	P_{L1} (W)	G_{po} (dB)	η_C (%)	Z_i; Z_L (Ω)
Class AB (CW)	1.65	24	0.04	≥4.5	≥8.5	typ. 50	see Figs 8 and 9

PINNING - SOT437A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange

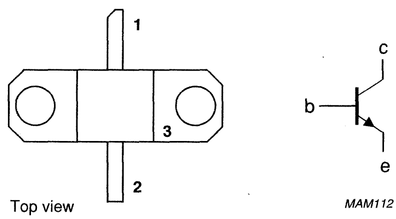


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

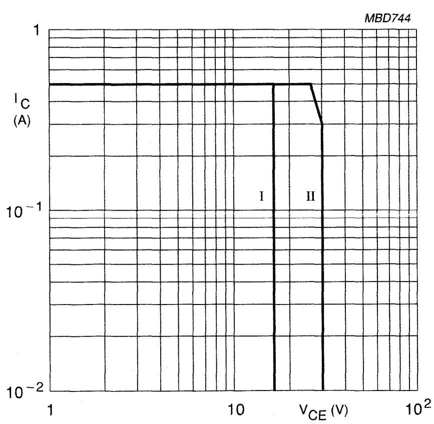
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CER}	collector-emitter voltage	R_{BE} = 220 Ω	–	30	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	DC collector current		–	0.5	A
P_i	input power	f = 1.65 GHz; V_{CE} = 24 V; class AB	–	1	W
P_{tot}	total power dissipation	T_{mb} = 75 °C	–	11	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



T_{mb} ≤ 75 °C.
(I) Region of permissible DC operation.
(II) Permissible extension provided R_{BE} ≤ 220 Ω.

Fig.2 DC SOAR.

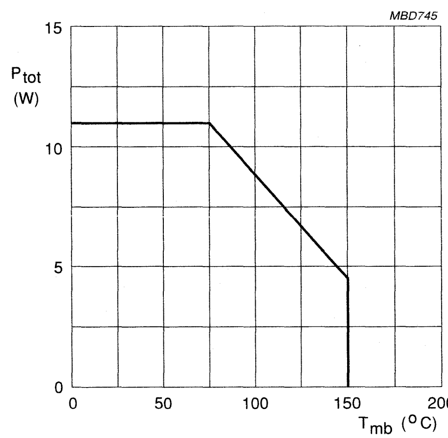


Fig.3 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 100 °C	8.5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC15".*

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 20 V	–	75	μA
$V_{(BR)CER}$	collector-emitter breakdown voltage	I_C = 1 mA; R_{BE} = 220 Ω	30	–	V
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 1 mA	45	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 1 mA	3	–	V
h_{FE}	DC current gain	I_C = 0.25 A; V_{CE} = 5 V	15	100	

NPN microwave power transistor | LLE16120X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very good stability of the characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input prematching ensures good stability and allows an easier design of wideband circuits.

APPLICATIONS

Intended for use in common emitter, class AB power amplifiers in CW conditions for professional applications at 1.65 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT437A glued cap metal ceramic flange package, with emitter connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class AB amplifier.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (A)	P_{L1} (W)	G_{po} (dB)	Z_i; Z_L (Ω)
Class AB (CW)	1.65	24	0.1	≥11	≥8.7	see Figs 8 and 9

PINNING - SOT437A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange

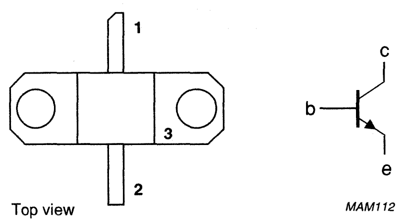


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

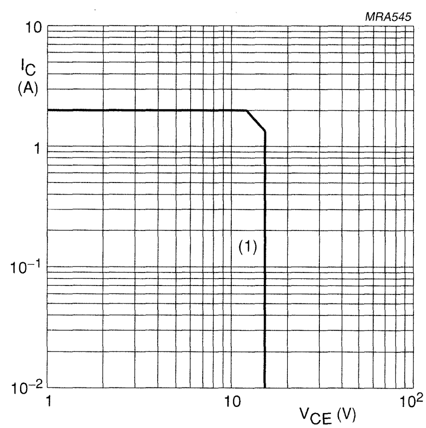
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CER}	collector-emitter voltage	R_{BE} = 220 Ω	–	30	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	2	A
P_{tot}	total power dissipation	T_{mb} = 75 °C	–	23	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note1	–	235	°C

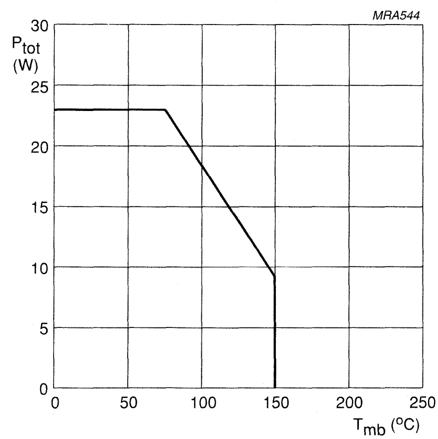
Note

1. Up to 0.2 mm from ceramic.



T_{mb} ≤ 75 °C.
(l) Region of permissible DC operation.

Fig.2 DC SOAR.



$P_{tot\ max}$ = 23 W.

Fig.3 Maximum power dissipation derating as a function of mounting base temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 100 °C	4.2	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note1	0.2	K/W

Note

1. See "*Mounting recommendations in the General part of handbook SC15*".

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 20 V; I_E = 0	–	1	mA
$V_{(BR)CER}$	collector-emitter breakdown voltage	I_C = 5 mA; R_{BE} = 220 Ω	30	–	V
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 5 mA; I_B = 0	45	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 5 mA; I_C = 0	3	–	V
h_{FE}	DC current gain	V_{CE} = 3 V; I_C = 1 A	15	100	

NPN microwave power transistor LLE16350X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very good stability of the characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output prematching ensures good stability and allows an easier design of wideband circuits.

APPLICATIONS

Intended for use in common emitter, class AB amplifiers in CW conditions for professional applications between 1.5 GHz and 1.8 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT437A glued cap metal ceramic flange package, with emitter connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class AB amplifier.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (A)	P_{L1} (W)	G_{po} (dB)	η_C (%)	Z_i; Z_L (Ω)
Class AB (CW)	1.65	24	0.1	≥29	≥8	typ. 48	see Figs 8 and 9

PINNING - SOT437A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange

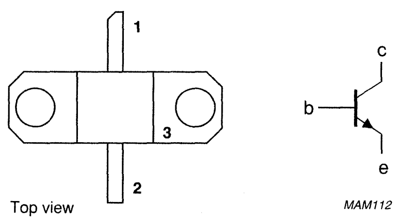


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

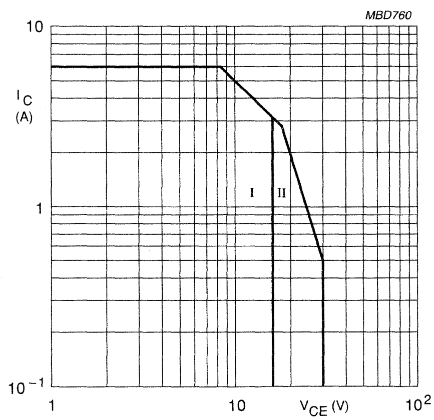
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CER}	collector-emitter voltage	R_{BE} = 220 Ω	–	30	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	DC collector current		–	6	A
P_i	input power	f = 1.65 GHz; V_{CE} = 24 V; class AB	–	8	W
P_{tot}	total power dissipation	T_{mb} = 75 °C	–	50	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



T_{mb} ≤ 75 °C.
(I) Region of permissible DC operation.
(II) Permissible extension provided R_{BE} ≤ 220 Ω.

Fig.2 DC SOAR.

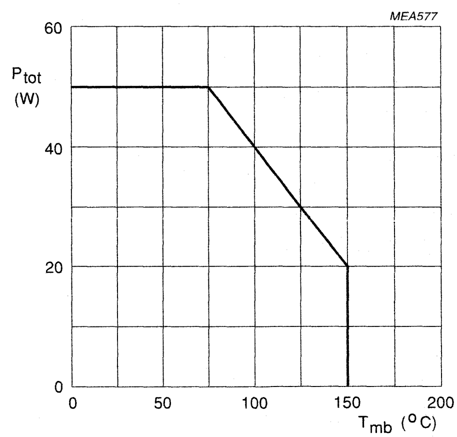


Fig.3 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 100 °C	max. 2	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		typ. 0.2	K/W

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 20 V	–	3	mA
$V_{(BR)CER}$	collector-emitter breakdown voltage	I_C = 15 mA; R_{BE} = 220 Ω	30	–	V
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 15 mA	45	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 15 mA	3	–	V
h_{FE}	DC current gain	I_C = 1 A; V_{CE} = 3 V	15	100	

NPN silicon planar epitaxial microwave power transistor

LLE18010X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very good stability of the characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input prematching ensures good stability and allows an easier design of wideband circuits.

APPLICATION

Intended for use in common emitter, class AB amplifiers in CW conditions for professional applications up to 2 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a FO-229 glued cap metal ceramic flange package, with emitter connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class AB amplifier.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (mA)	P_{L1} (W)	G_{po} (dB)	Z_i; Z_L (Ω)
Class AB (CW)	1.85	24	10	≥1	≥8.5	see Figs 6 and 7

PINNING - FO-229

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange

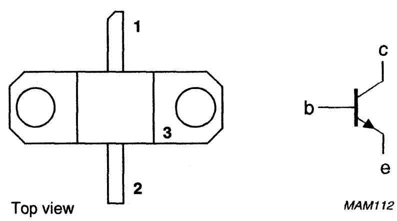


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

NPN silicon planar epitaxial microwave power transistor

LLE18010X

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CER}	collector-emitter voltage	R_{BE} = 220 Ω	–	30	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	DC collector current		–	250	mA
P_{tot}	total power dissipation	T_{mb} = 75 °C	–	4.5	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.

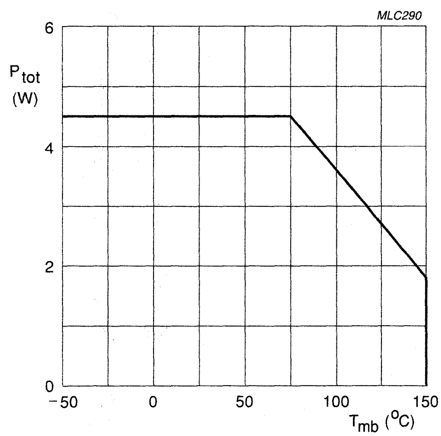


Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	$T_j = 100$ °C	22	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.2	K/W

CHARACTERISTICS

$T_{mb} = 25$ °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = 20$ V	–	11	μA
$V_{(BR)CER}$	collector-emitter breakdown voltage	$I_C = 1$ mA; $R_{BE} = 220\ \Omega$	30	–	V
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 1$ mA	40	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 0.5$ mA	3	–	V
h_{FE}	DC current gain	$I_C = 125$ mA; $V_{CE} = 5$ V	15	150	

NPN silicon planar epitaxial microwave power transistor

LLE18040X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very good stability of the characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input prematching ensures good stability and allows an easier design of wideband circuits.

APPLICATION

Intended for use in common emitter, class AB amplifiers in CW conditions for professional applications between 1.7 GHz and 2 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a FO-229 glued cap metal ceramic flange package, with emitter connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class AB amplifier.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (A)	P_{L1} (W)	G_{po} (dB)	η_C (%)	Z_i; Z_L (Ω)
Class AB (CW)	1.85	24	0.04	≥4	≥8.5	typ. 48	see Figs 8 and 9

PINNING - FO-229

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange

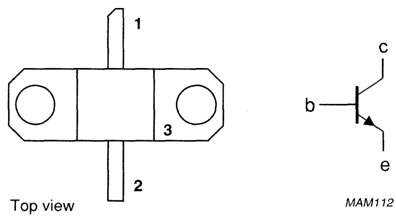


Fig.1 Simplified outline and symbol.

WARNING

Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

NPN silicon planar epitaxial microwave power transistor

LLE18040X

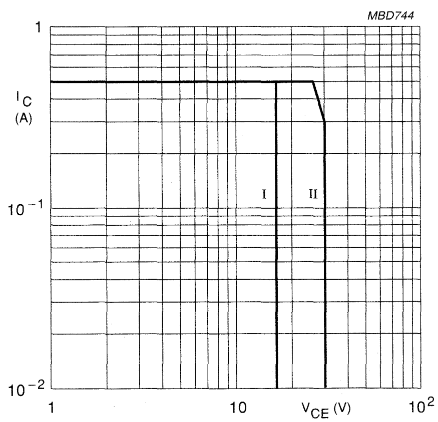
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CER}	collector-emitter voltage	R_{BE} = 220 Ω	–	30	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	DC collector current		–	0.5	A
P_i	input power	f = 1.85 GHz; V_{CE} = 24 V; class AB	–	1	W
P_{tot}	total power dissipation	T_{mb} = 75 °C	–	11	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



T_{mb} ≤ 75 °C.
(I) Region of permissible DC operation.
(II) Permissible extension provided R_{BE} ≤ 220 Ω.

Fig.2 DC SOAR.

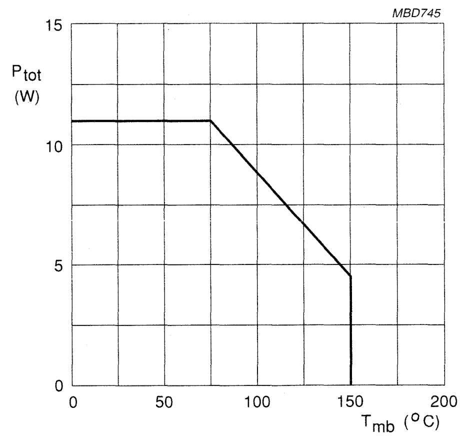


Fig.3 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 100 °C	8.5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.2	K/W

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 20 V	–	75	μA
$V_{(BR)CER}$	collector-emitter breakdown voltage	I_C = 1 mA; R_{BE} = 220 Ω	30	–	V
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 1 mA	45	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 1 mA	3	–	V
h_{FE}	DC current gain	I_C = 0.25 A; V_{CE} = 5 V	15	100	

NPN silicon planar epitaxial microwave power transistor

LLE18100X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very good stability of the characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input prematching ensures good stability and allows an easier design of wideband circuits.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT437A glued cap metal ceramic flange package, with emitter connected to flange.

APPLICATIONS

Intended for use in common emitter, class AB power amplifiers in CW conditions for professional applications at 1.85 GHz.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class AB amplifier.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (A)	P_{L1} (W)	G_{po} (dB)	Z_i/Z_L (Ω)
class AB (CW)	1.85	24	0.1	≥ 9	≥ 8	see Figs 8 and 9

PINNING - SOT437A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange

PIN CONFIGURATION

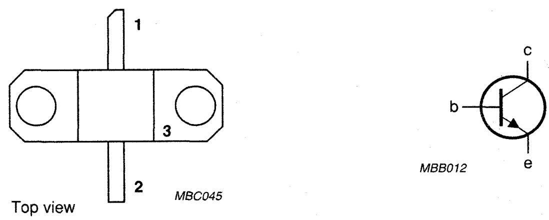


Fig.1 Simplified outline and symbol.

WARNING

Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

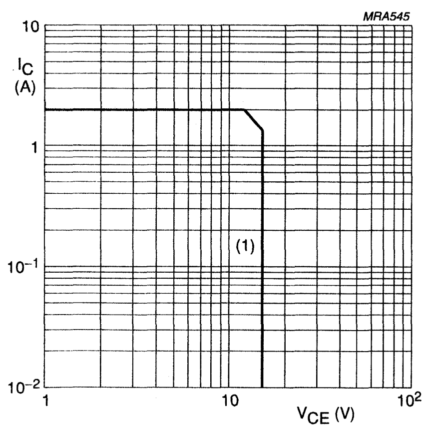
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CER}	collector-emitter voltage	R_{BE} = 220 Ω	–	30	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current		–	2	A
P_{tot}	total power dissipation	T_{mb} = 75 °C	–	23	W
T_{stg}	storage temperature range		–65	150	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s note 1	–	235	°C

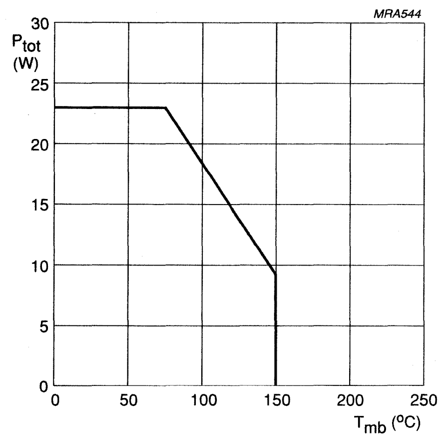
Note

1. Up to 0.2 mm from ceramic.



T_{mb} ≤ 75 °C
(1) Region of permissible DC operation

Fig.2 DC SOAR.



P_{tot} max = 23 W.

Fig.3 Maximum power dissipation derating as a function of mounting base temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 100 °C	4.2 K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.2 K/W

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 20 V; I_E = 0	–	1	mA
I_{CER}	collector cut-off current	V_{CE} = 30 V; R_{BE} = 220 Ω	–	10	mA
I_{CEO}	collector cut-off current	V_{CE} = 20 V; I_B = 0	–	10	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	–	100	μA
h_{FE}	DC current gain	V_{CE} = 3 V; I_C = 1 A	15	100	

NPN silicon planar epitaxial microwave power transistor

LLE18300X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very good stability of the characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output prematching ensures good stability and allows an easier design of wideband circuits.

APPLICATION

Intended for use in common emitter, class AB amplifiers in CW conditions for professional applications between 1.7 GHz and 2 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a FO-229 glued cap metal ceramic flange package, with emitter connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class AB amplifier.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (A)	P_{L1} (W)	G_{po} (dB)	η_C (%)	Z_i; Z_L (Ω)
Class AB (CW)	1.85	24	0.1	≥27	≥7.8	typ. 40	see Figs 8 and 9

PINNING - FO-229

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange

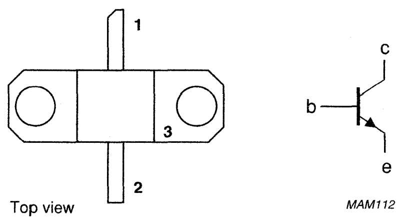


Fig.1 Simplified outline and symbol.

WARNING

Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

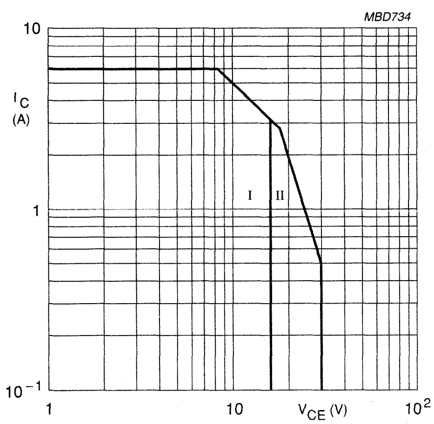
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CER}	collector-emitter voltage	R_{BE} = 220 Ω	–	30	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	DC collector current		–	6	A
P_i	input power	f = 1.85 GHz; V_{CE} = 24 V; class AB	–	8	W
P_{tot}	total power dissipation	T_{mb} = 75 °C	–	50	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



T_{mb} ≤ 75 °C.
(I) Region of permissible DC operation.
(II) Permissible extension provided R_{BE} ≤ 220 Ω.

Fig.2 DC SOAR.

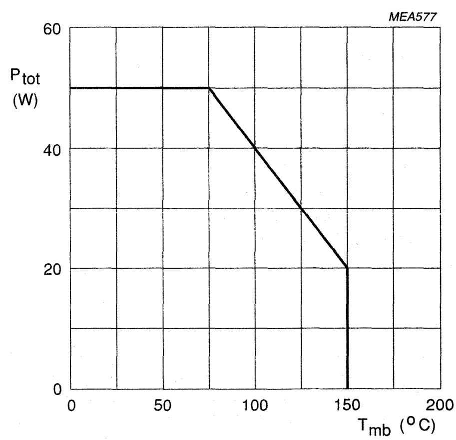


Fig.3 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	$T_j = 100\ °C$	2	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.2	K/W

CHARACTERISTICS

$T_{mb} = 25\ °C$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = 20$ V	–	3	mA
$V_{(BR)CER}$	collector-emitter breakdown voltage	$I_C = 15$ mA; $R_{BE} = 220\ \Omega$	30	–	V
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 15$ mA	45	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 15$ mA	3	–	V
h_{FE}	DC current gain	$I_C = 1$ A; $V_{CE} = 3$ V	15	100	

NPN microwave power transistor | LTE21009R

FEATURES

- Diffused emitter ballasting resistors
- Self-aligned process entirely ion implanted and gold sandwich metallization
- optimum temperature profile
- excellent performance and reliability
- Input matching cell improves input impedance and facilitates the design of wideband circuits.

APPLICATIONS

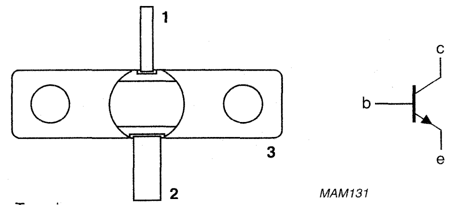
- Common emitter class-A linear power amplifiers up to 4.2 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT440A metal ceramic flange package with the emitter connected to the flange.

PINNING - SOT440A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange



Marking code: 435

Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class-A amplifier.

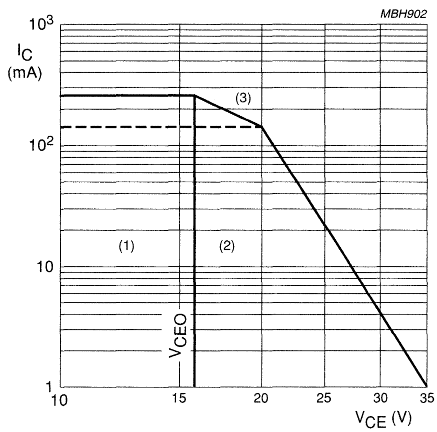
MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_C (mA)	P_{L1} (W)	G_{po} (dB)
Class-A	2.1	16	150	≥0.6	≥10

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CER}	collector-emitter voltage	R_{BE} = 100 Ω	–	35	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	DC collector current (DC)		–	250	mA
P_{tot}	total power dissipation	T_{mb} ≤ 75 °C	–	4	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	up to 0.3 mm from case; t ≤ 10 s	–	235	°C



T_{mb} = 75 °C.

(1) Region of permissible DC operation.

(2) Permissible extension provided R_{BE} < 100 Ω.

(3) Second breakdown limit (independent of temperature).

Fig.2 DC SOAR.

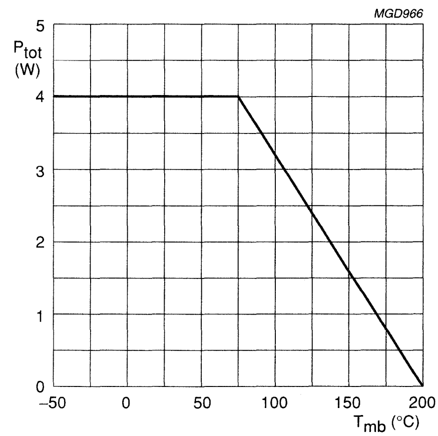


Fig.3 Power dissipation derating as a function of mounting-base temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_{mb} = 25 °C	36	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.7	K/W

Note

1. See "*Mounting recommendations in the General part of handbook SC15*".

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 20 V; I_E = 0	–	50	μA
		V_{CB} = 40 V; I_E = 0	–	0.4	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	–	200	nA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 150 mA	15	150	

NPN microwave power transistor — LTE21025R

FEATURES

- Diffused emitter ballasting resistors provide excellent current sharing and withstanding a high VSWR
- Self-aligned process entirely ion implanted
- Gold metallization realizes very stable characteristics and excellent lifetime
- Input matching cell improves input impedance and allows an easier design of wideband circuits.

APPLICATIONS

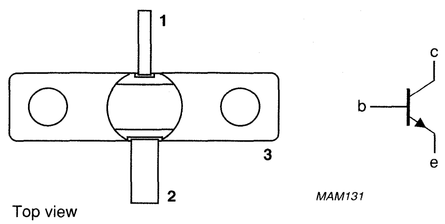
- Common emitter class-A linear power amplifiers up to 4.2 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT440A metal ceramic flange package with the emitter connected to the flange.

PINNING - SOT440A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange



Marking code: 439

Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance up to T_{mb} = 25 °C in a common emitter class-A test circuit.

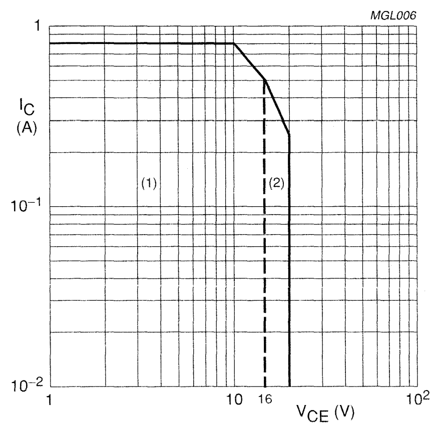
MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_C (mA)	P_{L1} (W)	G_{po} (dB)
Class-A (CW)	2.1	16	400	typ. 2.8	typ. 7.8

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CER}	collector-emitter voltage	$R_{BE} = 70\ \Omega$	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	800	mA
P_{tot}	total power dissipation	$T_{mb} \leq 75$ °C	–	8	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	at 0.3 mm from ceramic; $t \leq 10$ s	–	235	°C



$T_{mb} \leq 75$ °C.

(1) Region of permissible DC operation.

(2) Permissible extension provided $R_{BE} \leq 70\ \Omega$.

Fig.2 DC SOAR.

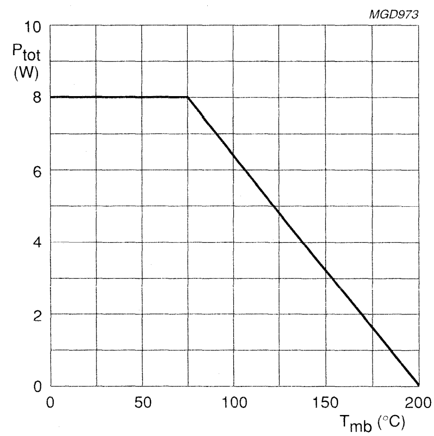


Fig.3 Power dissipation derating as a function of mounting-base temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	T_j = 75 °C	10	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	T_j = 75 °C; note 1	0.7	K/W

Note

1. See "*Mounting recommendations in the General part of handbook SC15*".

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 20 V; I_E = 0	–	–	225	μA
		V_{CB} = 40 V; I_E = 0	–	–	1.5	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	–	–	0.6	μA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 400 mA	15	–	150	
C_{cb}	collector-base capacitance	V_{CB} = 16 V; V_{EB} = 1.5 V; $I_E = I_C$ = 0; f = 1 MHz	–	3	–	pF
C_{ce}	collector-emitter capacitance	V_{CE} = 16 V; V_{EB} = 1.5 V; $I_E = I_C$ = 0; f = 1 MHz	–	1.5	–	pF
C_{eb}	emitter-base capacitance	V_{CB} = 10 V; V_{EB} = 1 V; $I_C = I_E$ = 0; f = 1 MHz	–	28	–	pF

Table 1 Scattering parameters: V_{CE} = 16 V; I_C = 400 mA (V_{CE} and I_C regulated); T_{mb} = 25 °C; Z_o = 50 Ω; typical values. (The figures given between brackets are values in dB).

f (MHz)	s_{11}		s_{21}		s_{12}		s_{22}	
	MAGNITUDE (ratio)	**ANGLE (deg)**	**MAGNITUDE (ratio)**	**ANGLE (deg)**	**MAGNITUDE (ratio)**	**ANGLE (deg)**	**MAGNITUDE (ratio)**	**ANGLE (deg)**
500	0.94	176	0.017 (–35.4)	43	2.79 (8.9)	81	0.49	–173
600	0.94	174	0.018 (–34.7)	46	2.39 (7.6)	77	0.54	–173
700	0.94	173	0.019 (–34.4)	47	2.07 (6.3)	72	0.52	–176
800	0.93	172	0.020 (–34.1)	49	1.85 (5.3)	68	0.52	–177
900	0.93	170	0.021 (–33.8)	49	1.66 (4.4)	64	0.53	–179
1000	0.93	168	0.022 (–33.3)	50	1.50 (3.5)	60	0.53	179
1100	0.92	167	0.023 (–32.6)	50	1.39 (2.9)	57	0.53	179
1200	0.93	166	0.026 (–31.6)	50	1.31 (2.4)	53	0.54	177
1300	0.93	164	0.029 (–30.6)	49	1.23 (1.8)	49	0.54	176
1400	0.93	167	0.032 (–29.9)	54	1.16 (1.3)	48	0.55	179
1500	0.93	163	0.037 (–28.7)	54	1.11 (0.9)	43	0.54	176
1600	0.93	162	0.040 (–27.9)	53	1.07 (0.6)	39	0.55	175
1700	0.93	161	0.042 (–27.5)	51	1.03 (0.3)	35	0.55	176
1800	0.92	159	0.043 (–27.3)	49	0.99 (–0.1)	30	0.56	174
2000	0.88	151	0.046 (–26.7)	46	0.99 (–0.1)	22	0.56	170
2200	0.89	148	0.052 (–25.7)	43	0.92 (–0.7)	14	0.57	168
2400	0.90	147	0.059 (–24.6)	41	0.88 (–1.1)	9	0.58	168
2600	0.90	147	0.069 (–23.2)	38	0.90 (–0.9	1	0.59	168
2800	0.87	142	0.073 (–22.8)	32	0.88 (–1.1)	–8	0.60	169
3000	0.83	134	0.075 (–22.5)	26	0.90 (–0.9)	–18	0.61	168
3200	0.82	129	0.077(–22.2)	21	0.87 (–1.2)	–27	0.63	166
3400	0.83	130	0.085 (–21.4)	18	0.90 (–1.0)	–37	0.65	165
3600	0.80	130	0.091 (–20.8)	11	0.91 (–0.8)	–50	0.69	165
3800	0.73	127	0.091 (–20.8)	3	0.94 (–0.5)	–64	0.74	164
4000	0.69	122	0.087 (–21.2)	–7	0.95 (–0.5)	–82	0.79	162
4200	0.67	122	0.078 (–22.2)	–15	0.89 (–1.0)	–100	0.84	157
4400	0.69	126	0.071 (–23.0)	–19	0.83 (–1.7)	–121	0.89	150
4600	0.72	130	0.059 (–24.6)	–18	0.70 (–3.1)	–141	0.92	143
4800	0.76	128	0.054 (–25.4)	–11	0.60 (–4.4)	–160	0.94	136

FEATURES

- Diffused emitter ballasting resistors provide excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Input matching cell improves input impedance and allows an easier design of circuits

APPLICATION

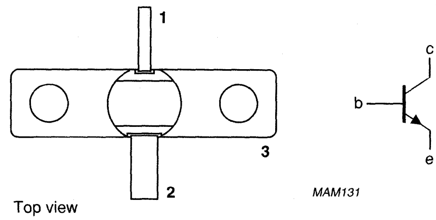
- Common emitter class-A linear power amplifiers up to 4.2 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT440A metal ceramic flange package with the emitter connected to the flange.

PINNING - SOT440A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange



Marking code: 502

Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class-A amplifier.

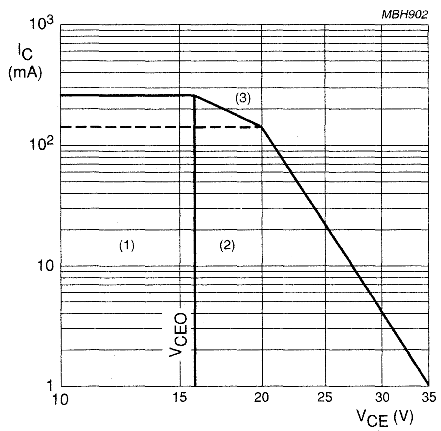
MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_C (mA)	P_{L1} (mW)	G_{po} (dB)	Z_i (Ω)	Z_L (Ω)
Class-A (CW) linear	4.2	18	110	≥450	≥6.6	100 + j40	4 + j4

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CER}	collector-emitter voltage	R_{BE} = 100 Ω	–	35	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	250	mA
P_{tot}	total power dissipation	T_{mb} ≤ 75 °C	–	4	W
T_{stg}	storage temperature		−65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	at 0.3 mm from case; t = 10 s	–	235	°C



T_{mb} ≤ 75 °C.

(1) Region of permissible DC operation.

(2) Permissible extension provided R_{BE} ≤ 100 Ω.

(3) Second breakdown limit (independent of temperature).

Fig.2 DC SOAR.

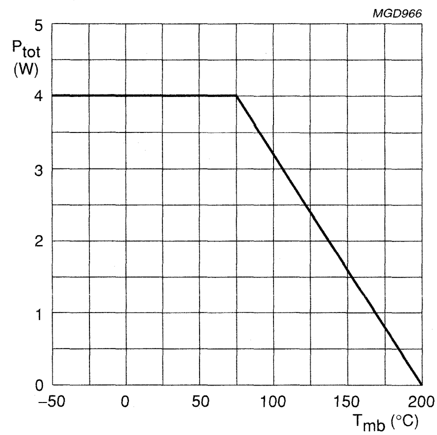


Fig.3 Power dissipation derating as a function of mounting-base temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	$T_j = 75$ °C	36	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	$T_j = 75$ °C; note 1	0.7	K/W

Note

1. See "*Mounting recommendations in the General part of handbook SC15*".

CHARACTERISTICS

$T_{mb} = 25$ °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	$V_{CB} = 20$ V; $I_E = 0$	–	–	0.1	μA
		$V_{CB} = 40$ V; $I_E = 0$	–	–	0.25	mA
I_{CER}	emitter cut-off current	$V_{CE} = 35$ V; $R_{BE} = 100\ \Omega$	–	–	1	mA
I_{EBO}	emitter cut-off current	$V_{EB} = 1.5$ V; $I_C = 0$	–	–	0.2	μA
h_{FE}	DC current gain	$V_{CE} = 5$ V; $I_C = 110$ mA	15	–	150	
C_{cb}	collector-base capacitance	$V_{CB} = 20$ V; $V_{EB} = 1.5$ V; $I_E = I_C = 0$; f = 1 MHz	–	0.5	–	pF
C_{ce}	collector-emitter capacitance	$V_{CE} = 20$ V; $V_{EB} = 1.5$ V; $I_E = I_C = 0$; f = 1 MHz	–	1.5	–	pF
C_{eb}	emitter-base capacitance	$V_{CB} = 10$ V; $V_{EB} = 1$ V; $I_C = I_E = 0$; f = 1 MHz	–	6.5	–	pF

Table 1 Scattering parameters: V_{CE} = 18 V; I_C = 110 mA (V_{CE} and I_C regulated); T_{mb} = 25 °C; Z_o = 50 Ω; typical values. (The figures given between brackets are values in dB).

f (MHz)	s_{11}		s_{21}		s_{12}		s_{22}	
	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)
500	0.76	−176	0.022 (−33.2)	37	8.13 (18.2)	85	0.35	−62
600	0.75	180	0.023 (−32.8)	37	6.95 (16.8)	78	0.34	−66
700	0.76	177	0.023 (−32.8)	40	5.95 (15.5)	73	0.34	−71
800	0.76	174	0.024 (−32.5)	41	5.25 (14.4)	67	0.35	−75
900	0.76	171	0.024 (−32.3)	42	4.69 (13.4)	62	0.35	−79
1000	0.75	168	0.026 (−31.8)	43	4.23 (12.5)	57	0.36	−83
1100	0.75	165	0.028 (−31.0)	43	3.88 (11.8)	53	0.37	−87
1200	0.74	163	0.031 (−30.1)	43	3.61 (11.2)	49	0.39	−90
1300	0.75	160	0.035 (−29.2)	43	3.36 (10.5)	44	0.40	−95
1400	0.74	162	0.037 (−28.5)	44	3.12 (9.9)	41	0.43	−98
1500	0.73	157	0.041 (−27.8)	46	2.95 (9.4)	37	0.43	−101
1600	0.73	155	0.045 (−27.0)	46	2.83 (9.0)	32	0.45	−104
1700	0.71	154	0.047 (−26.5)	44	2.70 (8.6)	28	0.47	−107
1800	0.70	151	0.049 (−26.1)	43	2.56 (8.2)	23	0.48	−110
1900	0.69	148	0.050 (−25.9)	42	2.44 (7.7)	19	0.50	−114
2000	0.68	143	0.051 (−25.9)	39	2.34 (7.4)	14	0.51	−116
2200	0.67	138	0.058 (−24.7)	36	2.16 (6.7)	4	0.55	−124
2400	0.65	134	0.067 (−23.5	34	2.02(6.1)	−2	0.59	−129
2600	0.62	129	0.077 (−22.3)	31	1.95 (5.8)	−12	0.64	−134
2800	0.57	122	0.082 (−21.7)	25	1.84 (5.3)	−21	0.68	−138
3000	0.52	113	0.086 (−21.3)	21	1.78 (5.0)	−32	0.72	−143
3200	0.49	104	0.093 (−20.6)	16	1.67 (4.5)	−42	0.74	−150
3400	0.45	99	0.102 (−19.8)	13	1.62 (4.2)	−52	0.80	−157
3600	0.38	92	0.113 (−18.9)	8	1.52 (3.6)	−64	0.80	−163
3800	0.29	83	0.119 (−18.5)	6	1.43 (3.1)	−76	0.82	−170
4000	0.24	69	0.137 (−17.3)	2	1.27 (2.1)	−88	0.80	−179
4200	0.20	54	0.165 (−15.7)	−5	1.08 (0.7)	−98	0.68	171
4400	0.15	28	0.202 (−13.9)	−20	0.92 (0.8	−100	0.51	172
4600	0.12	−36	0.206 (−13.7)	−38	0.93 (0.6)	−102	0.52	−174
4800	0.17	−86	0.195 (−14.2)	−52	0.97 (−0.3)	−110	0.63	−171
5000	0.24	−114	0.177 (−15.0)	−65	0.97 (−0.3)	−122	0.73	−174
5200	0.31	−137	0.164 (−15.7	−73	0.93 (−0.6)	−133	0.79	−180
5400	0.41	−152	0.154 (−16.2)	−83	0.88 (−1.1)	−145	0.83	174
5600	0.48	−161	0.134 (−17.4)	−90	0.81 (−1.8)	−156	0.85	166
5800	0.53	−168	0.122 (−18.2)	−97	0.77 (−2.3)	−167	0.87	160
6000	0.56	−179	0.105 (−19.6)	−104	0.70 (−3.1)	−178	0.89	154

NPN microwave power transistor LTE42012R

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistor provides excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Input matching cell improves input impedance and allows an easier design of wideband circuits.

APPLICATIONS

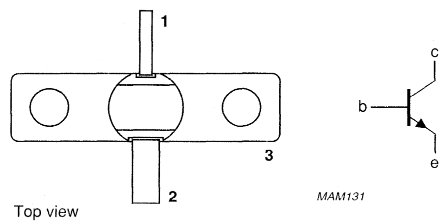
- Common emitter class-A power amplifiers up to 4.2 GHz in CW conditions for military and professional applications.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT440A metal ceramic flange package with the emitter connected to the flange.

PINNING - SOT440A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange



Marking code: 198

Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class-A selective amplifier.

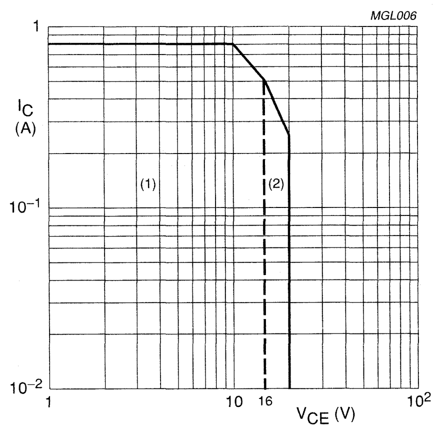
MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_C (mA)	P_{L1} (W)	G_{po} (dB)	Z_i (Ω)	Z_L (Ω)
Class-A (CW)	4.2	16	400	≥1	≥6	7.5 + j12	4 – j8

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CER}	collector-emitter voltage	R_{BE} = 70 Ω	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
I_C	collector current (DC)		–	800	mA
P_{tot}	total power dissipation	$T_{mb} \leq 75$ °C	–	8	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	at 0.1 mm from ceramic; $t \leq 10$ s	–	235	°C



$T_{mb} \leq 75$ °C.

(1) Region of permissible DC operation.

(2) Permissible extension provided $R_{BE} \leq 70$ Ω.

Fig.2 DC SOAR.

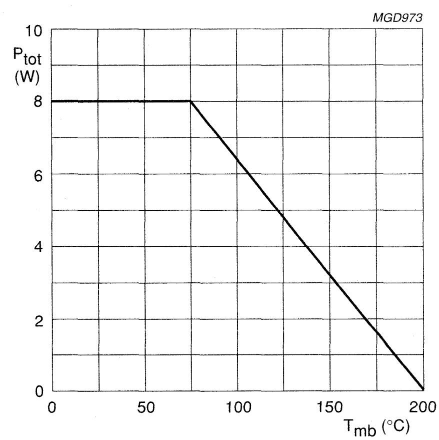


Fig.3 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	T_j = 75 °C	10	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	T_j = 75 °C; note 1	0.7	K/W

Note

1. See "*Mounting recommendations in the General part of handbook SC15*".

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 20 V; I_E = 0	–	–	200	μA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	–	–	600	nA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 400 mA	15	–	100	
C_{cb}	collector-base capacitance	V_{CB} = 16 V; V_{EB} = 1.5 V; I_E = I_C = 0; f = 1 MHz	–	3	–	pF
C_{ce}	collector-emitter capacitance	V_{CE} = 16 V; V_{EB} = 1.5 V; I_E = I_C = 0; f = 1 MHz	–	1.5	–	pF
C_{eb}	emitter-base capacitance	V_{CB} = 10 V; V_{EB} = 1 V; I_C = I_E = 0; f = 1 MHz	–	28	–	pF

Table 1 Common-emitter scattering parameters: V_{CE} = 16 V; I_C = 400 mA; T_{mb} = 25 °C; Z_o = 50 Ω; typical values.

f (MHz)	s_{11}		s_{21}		s_{12}		s_{22}	
	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)
2000	0.84	163	0.049	64	0.96	47.2	0.60	179.3
2100	0.84	161	0.051	62.7	0.94	43.3	0.59	178.0
2200	0.84	159	0.054	60.4	0.93	39.8	0.59	175.6
2300	0.85	158	0.055	58.8	0.91	36.2	0.59	174.2
2400	0.85	156	0.057	57.5	0.91	32.2	0.60	172.6
2500	0.85	155	0.060	56.1	0.90	29.1	0.60	171.1
2600	0.85	154	0.064	54.9	0.89	24.6	0.60	169.8
2700	0.85	153	0.067	53.1	0.89	21.2	0.60	168.6
2800	0.85	152	0.071	51.3	0.89	17.2	0.61	167.1
2900	0.84	150	0.073	49.5	0.90	13.8	0.62	165.7
3000	0.83	149	0.076	48.0	0.90	9.3	0.62	164.7
3100	0.82	149	0.080	46.0	0.91	5.2	0.63	163.8
3200	0.80	147	0.084	44.1	0.92	0.6	0.64	163.0
3300	0.78	146	0.088	40.5	0.93	−4.3	0.65	161.5
3400	0.76	145	0.091	36.1	0.95	−9.7	0.67	160.9
3500	0.74	144	0.093	34.4	0.97	−16.1	0.69	159.6
3600	0.71	143	0.095	30.7	0.98	−23.2	0.70	158.3
3700	0.70	142	0.095	26.3	0.99	−30.6	0.73	156.2
3800	0.67	142	0.093	21.6	0.99	−37.9	0.76	153.6
3900	0.66	142	0.091	17.0	1.00	−46.6	0.79	150.7
4000	0.64	142	0.088	13.2	0.98	−55.8	0.82	147.0
4100	0.64	142	0.084	9.7	0.95	−64.9	0.85	143.1
4200	0.65	143	0.077	7.0	0.91	−73.8	0.88	138.4
4300	0.67	143	0.068	5.9	0.86	−82.6	0.90	133.6
4400	0.69	143	0.060	8.2	0.81	−92.3	0.93	129.3
4500	0.72	141	0.054	13.8	0.74	−101.7	0.94	124.9
4600	0.75	139	0.050	20.5	0.68	−110.6	0.95	120.1
4700	0.76	137	0.050	31.2	0.61	−119.7	0.96	116.5
4800	0.78	135	0.054	43.5	0.56	−129.1	0.97	113.5
4900	0.79	133	0.061	46.6	0.50	−139.5	0.97	110.1
5000	0.77	130	0.068	54.3	0.44	−148.6	0.97	106.7

NPN microwave power transistor | LV1721E50R

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistor provides excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output prematching ensures good stability and allows an easier design of wideband circuits.

APPLICATIONS

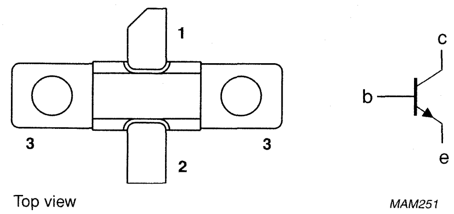
- Common emitter class-A amplifiers in CW conditions for military and professional applications in the 1.7 GHz to 2.1 GHz band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT445A metal ceramic flange package with the emitter connected to the flange.

PINNING - SOT445A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange



Marking code: 1721E50R

Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class-A wideband amplifier.

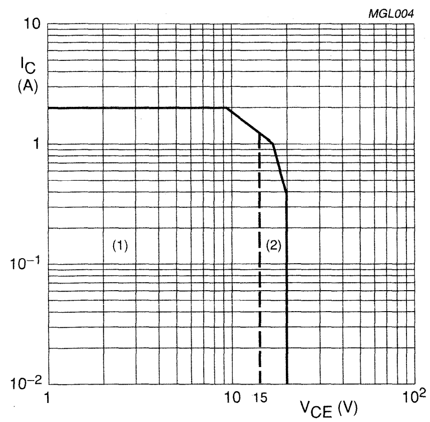
MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_C (A)	P_{L1} (W)	G_{po} (dB)	Z_i; Z_L (Ω)
Class-A (CW)	1.7 to 2.1	16	1.1	≥5	≥7	see Fig 6

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CER}	collector-emitter voltage	R_{BE} = 47 Ω	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	2	A
P_{tot}	total power dissipation	$T_{mb} \leq 75$ °C	–	18	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	at 0.1 mm from case; t ≤ 10 s	–	235	°C



$T_{mb} \leq 75$ °C.
(1) Region of permissible DC operation.
(2) Permissible extension provided $R_{BE} \leq 47$ Ω.

Fig.2 DC SOAR.

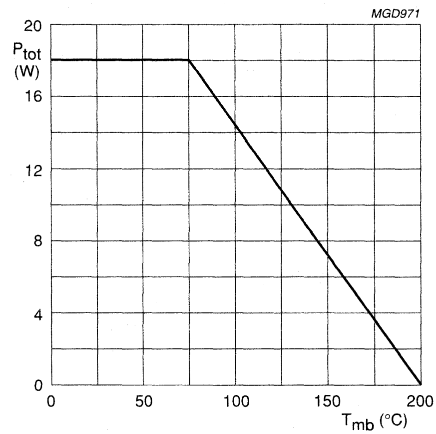


Fig.3 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	$T_j = 75\ °C$	4	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	$T_j = 75\ °C$; note 1	0.7	K/W

Note

1. See "*Mounting recommendations in the General part of handbook SC15*".

CHARACTERISTICS

$T_{mb} = 25\ °C$ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	$V_{CB} = 20\ V$; $I_E = 0$	–	–	0.5	mA
		$V_{CB} = 40\ V$; $I_E = 0$	–	–	2.5	mA
I_{CER}	collector cut-off current	$V_{CE} = 20\ V$; $R_{BE} = 47\ \Omega$	–	–	25	mA
I_{CEO}	collector cut-off current	$V_{CE} = 15\ V$; $I_B = 0$	–	–	2	mA
I_{EBO}	emitter cut-off current	$V_{EB} = 1.5\ V$; $I_C = 0$	–	–	100	μA
h_{FE}	DC current gain	$V_{CE} = 3\ V$; $I_C = 1\ A$	15	–	100	

NPN microwave power transistor LVE21050R

FEATURES

- Diffused emitter ballasting resistors provide excellent current sharing and withstanding a high VSWR
- Self-aligned process entirely ion implanted
- Gold metallization ensures an optimum temperature profile with excellent performance and reliability
- Input matching cell improves input impedance and allows an easier design of wideband circuits.

APPLICATIONS

- Common emitter class-A linear power amplifiers up to 4.2 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT445A metal ceramic flange package with the emitter connected to the flange.

PINNING - SOT445A

PIN	DESCRIPTiON
1	collector
2	base
3	emitter connected to flange

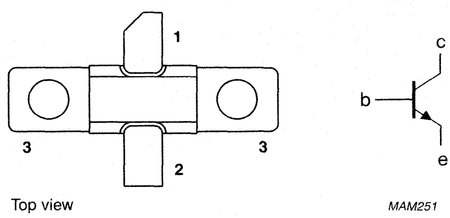


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class-A circuit.

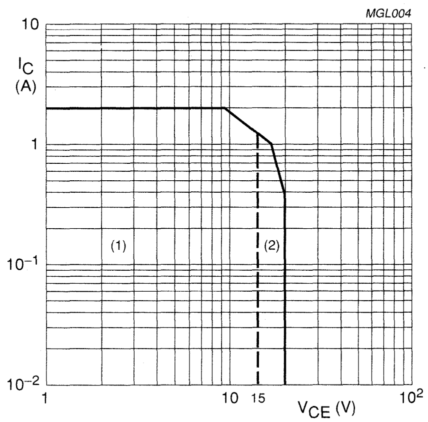
MODE OF OPERATION	f (GHz)	V_{CC} (V)	I_C (A)	P_{L1} (W)	G_{po} (dB)	Z_i; Z_L (Ω)
Class-A (CW)	2.1	16	1.1	typ. 5.5	typ. 8	see Fig 4

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CER}	collector-emitter voltage	R_{BE} = 47 Ω	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	2	A
P_{tot}	total power dissipation	$T_{mb} \leq 75$ °C	–	18	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	at 0.3 mm from case; $t \leq 10$ s	–	235	°C



$T_{mb} \leq 75$ °C.
(1) Region of permissible DC operation.
(2) Permissible extension provided $R_{BE} \leq 47$ Ω.

Fig.2 DC SOAR.

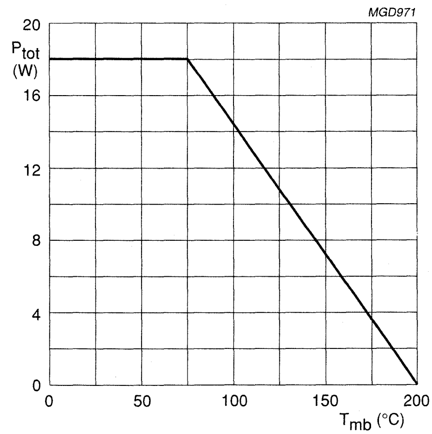


Fig.3 Power dissipation derating as a function of mounting base temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	$T_j = 75\ °C$	4	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	$T_j = 75\ °C$; note 1	0.7	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC15"*.

CHARACTERISTICS

$T_{mb} = 25\ °C$ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	$V_{CB} = 20$ V; $I_E = 0$	–	–	0.5	mA
		$V_{CB} = 40$ V; $I_E = 0$	–	–	2.5	mA
I_{CER}	collector cut-off current	$V_{CE} = 20$ V; $R_{BE} = 47\ \Omega$	–	–	25	mA
I_{CEO}	collector cut-off current	$V_{CE} = 15$ V; $I_B = 0$	–	–	2	mA
I_{EBO}	emitter cut-off current	$V_{EB} = 1.5$ V; $I_C = 0$	–	–	100	μA
h_{FE}	DC current gain	$V_{CE} = 3$ V; $I_C = 1$ A	15	–	100	

NPN silicon planar epitaxial microwave power transistor

LXE18400X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very good stability of the characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output prematching ensures good stability and allows an easier design of wideband circuits.

APPLICATION

Intended for use in common emitter, class AB amplifiers in CW conditions for military and professional applications between 1.7 and 2 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a FO-91B metal ceramic flange package, with emitter connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class AB amplifier.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (A)	P_{L1} (W)	G_{po} (dB)	η_C (%)	Z_i; Z_L (Ω)
Class AB (CW)	1.85	24	0.15	≥39	≥7	typ. 42	see Figs 8 and 9

PINNING - FO-91B

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange

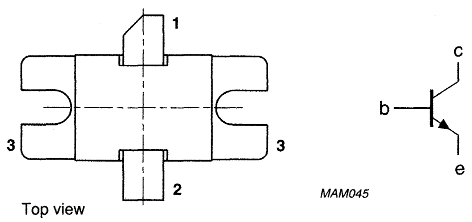


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

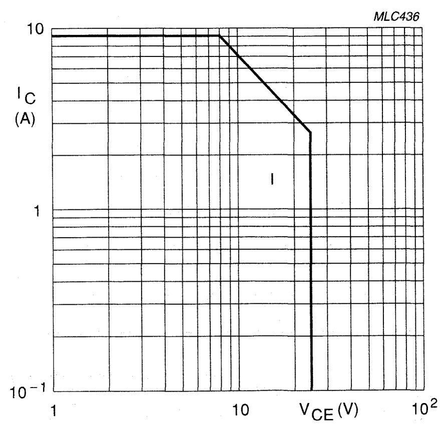
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CER}	collector-emitter voltage	R_{BE} = 220 Ω	–	30	V
V_{CEO}	collector-emitter voltage	open base	–	25	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	DC collector current		–	9	A
P_i	input power	f = 1.85 GHz; V_{CE} = 24 V; class AB	–	12	W
P_{tot}	total power dissipation	T_{mb} = 75 °C	–	70	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



T_{mb} ≤ 75 °C.
(I) Region of permissible DC operation.

Fig.2 DC SOAR.

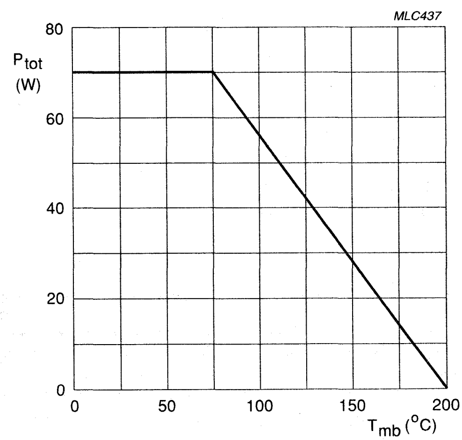


Fig.3 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	$T_j = 100$ °C	1.3	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.2	K/W

CHARACTERISTICS

$T_{mb} = 25$ °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = 20$ V	–	4.5	mA
$V_{(BR)CER}$	collector-emitter breakdown voltage	$I_C = 150$ mA; $R_{BE} = 220\ \Omega$	30	–	V
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 22$ mA	45	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 22$ mA	3	–	V
h_{FE}	DC current gain	$I_C = 4.5$ A; $V_{CE} = 3$ V	15	100	

NPN microwave power transistor LZ1418E100R

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistor provides excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output prematching ensures good stability and allows an easier design of wideband circuits.

APPLICATIONS

- Common emitter class A amplifiers in CW conditions for military and professional applications between 1.4 to 1.8 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT443A metal ceramic flange package with the emitter connected to the flange.

PINNING - SOT443A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange

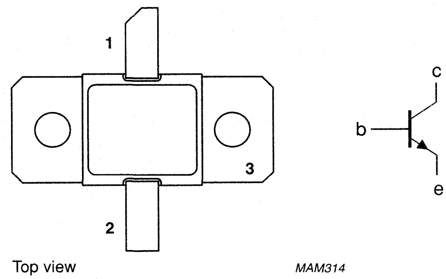


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common emitter class A wideband amplifier.

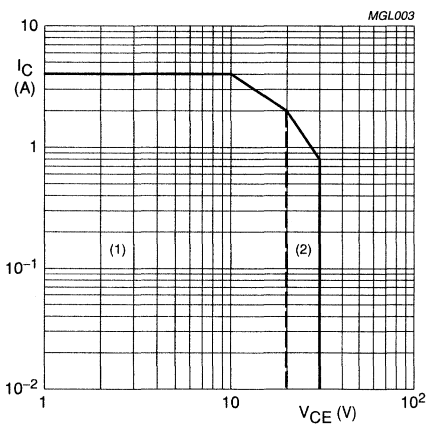
MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_C (A)	P_{L1} (W)	G_{po} (dB)	Z_i; Z_L (Ω)
Class-A (CW)	1.4 to 1.8	16	2	≥9	≥10	see Fig 7

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CER}	collector-emitter voltage	R_{BE} = 220 Ω	–	30	V
V_{CEO}	collector-emitter voltage	open base	–	20	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	4	A
P_{tot}	total power dissipation	$T_{mb} \geq 75$ °C	–	45	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	at 0.2 mm from flange; $t \leq 10$ s	–	235	°C



$T_{mb} \leq 75$ °C.
(1) Region of permissible DC operation.
(2) Permissible extension provided $R_{BE} \leq 220$ Ω.

Fig.2 DC SOAR.

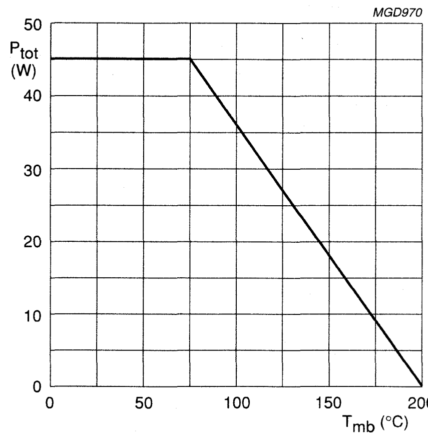


Fig.3 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	$T_j = 75\ °C$	2.2	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	$T_j = 75\ °C$; note 1	0.2	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC15".*

CHARACTERISTICS

$T_{mb} = 25\ °C$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	$V_{CB} = 20$ V; $I_E = 0$	–	2	mA
		$V_{CB} = 40$ V; $I_E = 0$	–	20	mA
I_{CER}	collector cut-off current	$V_{CE} = 30$ V; $R_{BE} = 220\ \Omega$	–	20	mA
I_{CEO}	collector cut-off current	$V_{CE} = 20$ V; $I_B = 0$	–	20	mA
I_{EBO}	emitter cut-off current	$V_{EB} = 1.5$ V; $I_C = 0$	–	200	μA
h_{FE}	DC current gain	$V_{CE} = 3$ V; $I_C = 2$ A	15	–	100

Microwave power transistor MF1011B900Y

FEATURES

- Suitable for short and medium pulse applications up to 100 μs pulse width, duty factor 10%
- Diffused emitter ballasting resistors improve ruggedness
- Interdigitated emitter-base structure provides high emitter efficiency
- Gold metallization with barrier realizes very stable characteristics and excellent lifetime
- Multicell geometry improves power sharing and reduces thermal resistance
- Internal input and output prematching networks allow an easier design of circuits.

APPLICATIONS

Intended for use in common base class C broadband pulsed power amplifiers for IFF, TCAS and Mode S applications in the 1 030 MHz to 1 090 MHz band. Also suitable for medium pulse, heavy duty operation within this band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT448A glued cap metal ceramic flange package, with base connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common-base class C narrowband amplifier.

MODE OF OPERATION	CONDITIONS	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)
Class C	t_p = 10 μs; δ = 1%	1.09	50	800	≥6	≥40

PINNING - SOT448A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

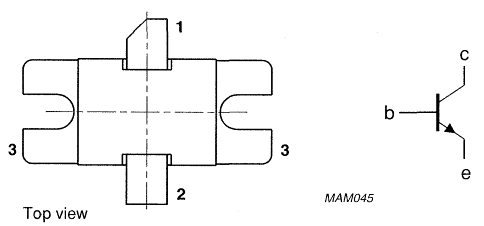


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

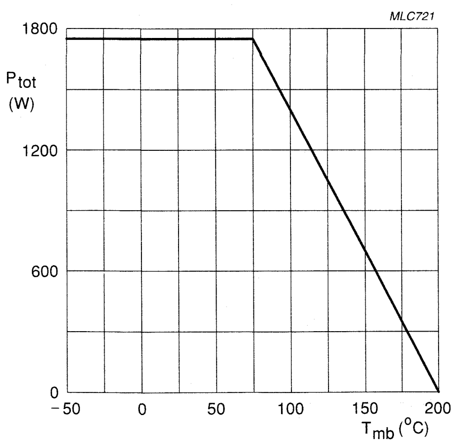
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_{CM}	peak collector current	$t_p = 10\ \mu s$; $\delta = 1\%$	–	50	A
P_{tot}	total power dissipation	$T_{mb} < 75\ °C$; $t_p \leq 10\ \mu s$; $\delta \leq 1\%$	–	1750	W
T_{stg}	storage temperature		−65	+200	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



$t_p = 10\ \mu s$; $\delta = 1\%$.

Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	$T_j = 120\ °C$	0.84	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W
Z_{th}	thermal impedance from junction to heatsink	$t_p = 10\ \mu s$; $\delta = 1\%$; notes 1and 2	0.01	K/W

Notes

1. See *"Mounting recommendations in the General part of handbook SC15"*.
2. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

$T_{mb} = 25\ °C$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = 50\ V$	27	mA
I_{CES}	collector cut-off current	$V_{BE} = 0$; $V_{CE} = 50\ V$	27	mA
I_{EBO}	emitter cut-off current	$I_C = 0$; $V_{EB} = 1.5\ V$	7	mA
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 180\ mA$	65	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 180\ mA$; $V_{BE} = 0$	65	V

NPN microwave power transistor | MTB10010U

FEATURES

- Input prematching cell allows an easier design of circuits
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very good characteristics stability and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance.

APPLICATIONS

Common base class C narrowband pulsed power amplifiers at 1 030 MHz for IFF applications.

DESCRIPTION

NPN silicon planar epitaxial microwave transistor with internal input prematching cell in a SOT440A metal ceramic package with base connected to flange.

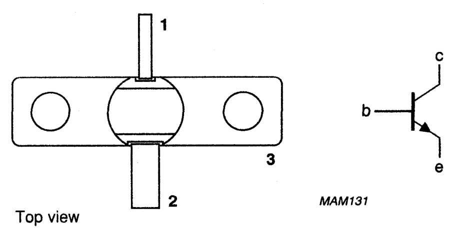
QUICK REFERENCE DATA

Microwave performance for T_{mb} = 25 °C in a common base class C narrowband amplifier.

MODE OF OPERATION	CONDITIONS	f (MHz)	V_{CC} (V)	P_L (W)	G_{PO} (dB)	η_C (%)	Z_i/Z_L (Ω)
Class C	t_p = 1 μs; δ = 1%	1 030	24	>9.5	>9.5	>50	see Figs 5 and 6

PINNING - SOT440A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange



Marking code: 10010U.

Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

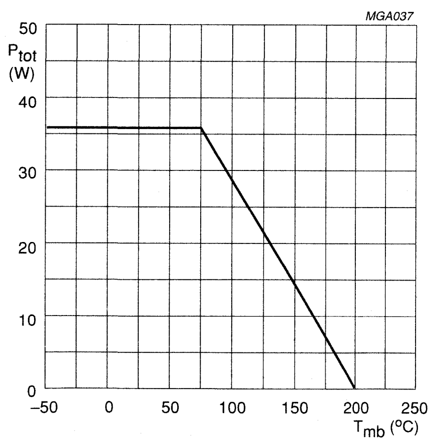
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	40	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (average)		–	0.75	A
P_{tot}	total power dissipation	$T_{mb} < 75$ °C; $t_p = 1\ \mu s$; $\delta = 1\%$	–	36	W
T_{stg}	storage temperature		−65	+200	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

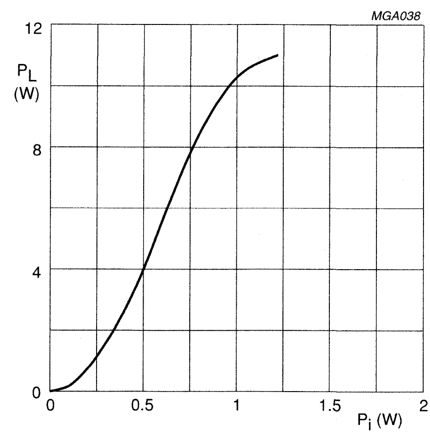
Note

1. Up to 0.3 mm from ceramic.



$P_{tot\ max}$ = 36 W under the nominal pulse conditions.

Fig.2 Power derating curve.



V_{CC} = 24 V; t_p = 1 μs; δ = 1%; f = 1030 MHz.

Fig.3 Load power as a function of input power.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	$T_j = 100\ °C$	10.5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.7	K/W
$Z_{th\ j\text{-}mb}$	thermal impedance from junction to mounting base	$t_p = 1\ \mu s$; $\delta = 1\%$; note 1	2.5	K/W

Note

1. See "*Mounting recommendations in the General part of handbook SC15*".

CHARACTERISTICS

$T_{mb} = 25\ °C$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	$V_{CB} = 30\ V$; $I_E = 0$	45	μA
I_{CES}	collector cut-off current	$V_{CE} = 30\ V$; $R_{BE} = 0$	300	μA
I_{EBO}	emitter cut-off current	$V_{EB} = 1.5\ V$; $I_C = 0$	4.5	μA

NPN microwave power transistors MX0912B100Y; MZ0912B100Y

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry improves power sharing and low thermal resistance
- Input and output matching cell allows an easier design of circuits.

APPLICATIONS

- Common base class-C broadband pulse power amplifiers operating at 960 to 1215 MHz for TACAN application.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistors.

The MX0912B100Y has a SOT439A metal ceramic flange package and improved output prematching cells. It is recommended for new designs.

The MZ0912B100Y has a SOT443A metal ceramic flange package with the base connected to the flange. It is mounted in common base configuration and specified in class C.

PINNING

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

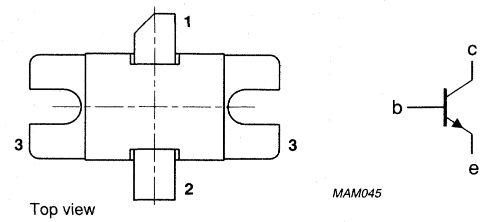


Fig.1 Simplified outline and symbol (SOT439A).

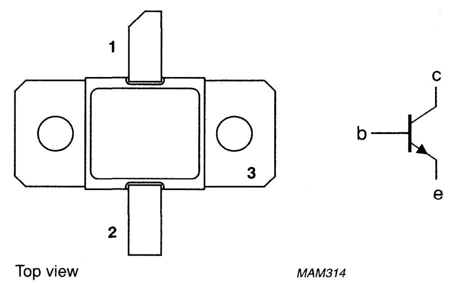


Fig.2 Simplified outline and symbol (SOT443A).

QUICK REFERENCE DATA

Microwave performance at $T_{mb} \leq 25$ °C in a common base class-C broadband amplifier.

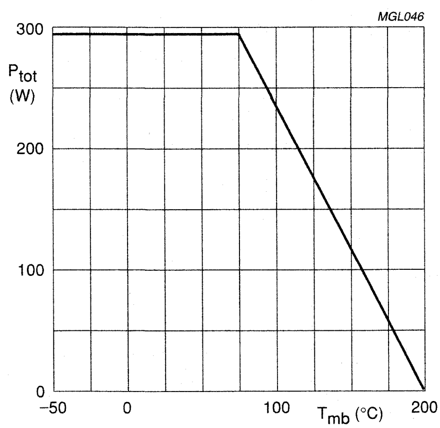
MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_P (dB)	η_C (%)	Z_i; Z_L (Ω)
Class-C; $t_p = 10$ μs; $\delta = 10$ %	0.960 to 1.215	50	>100	>7	>42	see Figs 8 and 9

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	20	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)	$t_p \leq 10\ \mu s$; $\delta \leq 10\ \%$	–	6	A
P_{tot}	total power dissipation (peak power)	$t_p \leq 10\ \mu s$; $\delta \leq 10\ \%$; $T_{mb} = 75\ °C$	–	290	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	up to 0.2 mm from ceramic; $t \leq 10$ s	–	235	°C



$t_p = 10\ \mu s$; $\delta = 10\ \%$; $P_{tot\ max} = 290$ W.

Fig.3 Maximum power dissipation derating as a function of mounting-base temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	T_j = 125 °C	3.2	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	T_j = 125 °C; note 1	0.2	K/W
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	t_p = 10 μs; δ = 10 %; T_j = 125 °C; notes 1 and 2	0.43	K/W

Notes

1. See "*Mounting recommendations in the General part of handbook SC15*".
2. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 65 V; I_E = 0	40	mA
		V_{CB} = 50 V; I_E = 0	4	mA
I_{CES}	collector cut-off current	V_{CB} = 60 V; R_{BE} = 0	40	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	400	μA

NPN microwave power transistor MX0912B251Y

FEATURES

- Interdigitated structure; high emitter efficiency
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Input and output matching cell allows an easier design of circuits.

APPLICATIONS

Intended for use in common base class C broadband pulse power amplifier from 960 to 1215 MHz for TACAN application.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT439A metal ceramic flange package, with base connected to flange. It is mounted in common base configuration, and specified in class C.

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

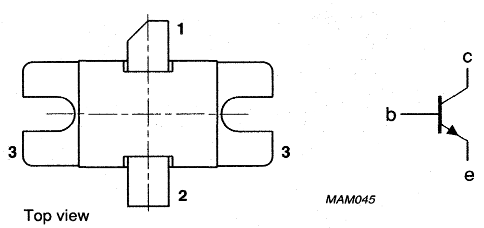


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class C broadband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_{po} (dB)	η_C (%)	Z_i/Z_L (Ω)
Class C t_p = 10 μs; δ = 10%	0.960 to 1.215	50	>235	>7	>42	see Figs 7 and 8

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

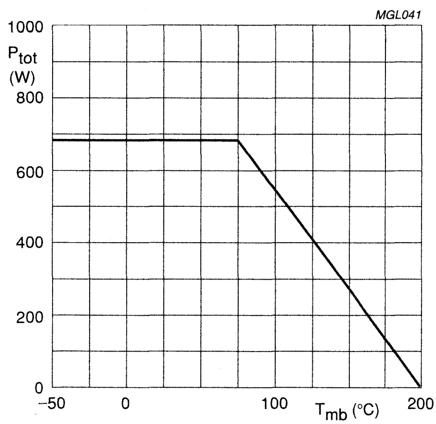
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	20	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current	$t_p \leq 10\ \mu s$; $\delta \leq 10\%$	–	15	A
P_{tot}	total power dissipation (peak power)	$T_{mb} = 75\ °C$; $t_p \leq 10\ \mu s$; $\delta \leq 10\%$	–	690	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



$t_p = 10\ \mu s$; $\delta = 10\%$; $P_{tot\,max} = 690$ W.

Fig.2 Maximum power dissipation derating as a function of mounting base temperature.

THERMAL CHARACTERISTICS

T_j = 125 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	CW	1.9	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	CW; note 1	0.2	K/W
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	t_p = 10 μs; δ = 10% notes 1 and 2	0.28	K/W

Notes

1. See "*Mounting recommendations in the General part of handbook SC15*".
2. Equivalent thermal impedance under nominal pulse microwave operating conditions.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 65 V; I_E = 0	100	mA
		V_{CB} = 50 V; I_E = 0	10	mA
I_{CES}	collector cut-off current	V_{CE} = 60 V; R_{BE} = 0	100	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	1	mA

NPN microwave power transistor | MX0912B351Y

FEATURES

- Interdigitated structure; high emitter efficiency
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Input and output matching cell allows an easier design of circuits.

APPLICATIONS

Intended for use in common base class C broadband pulse power amplifier from 960 to 1 215 MHz for TACAN application.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT439A metal ceramic flange package, with base connected to flange. It is mounted in common base configuration and specified in class C.

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

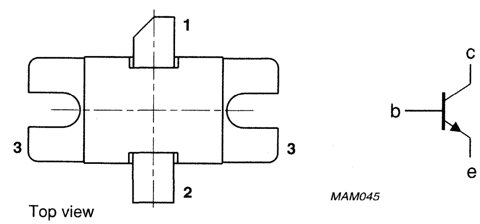


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class C broadband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_{po} (dB)	η_C (%)	Z_i/Z_L (Ω)
Class C t_p = 10 μs; δ = 10%	0.960 to 1.215	50	>325	>7	>40	see Figs 7 and 8

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

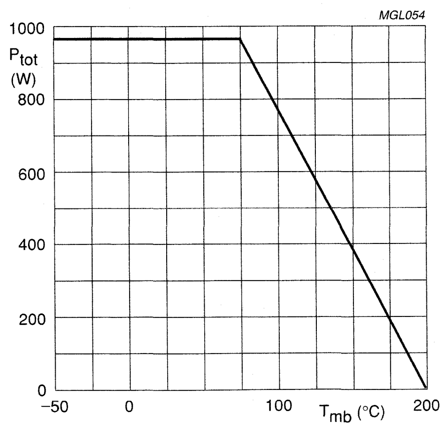
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	20	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current	$t_p \leq 10\ \mu s$; $\delta \leq 10\%$	–	21	A
P_{tot}	total power dissipation (peak power)	$T_{mb} = 75\ °C$; $t_p \leq 10\ \mu s$; $\delta \leq 10\%$	–	960	W
T_{stg}	storage temperature		−65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



$t_p = 10\ \mu s$; $\delta = 10\%$; $P_{tot\ max} = 960$ W.

Fig.2 Maximum power dissipation derating as a function of mounting base temperature.

THERMAL CHARACTERISTICS

T_j = 125 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	CW	1.7	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	CW; note 1	0.2	K/W
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	t_p = 10 µs; δ = 10% notes 1 and 2	0.13	K/W

Notes

1. See "*Mounting recommendations in the General part of handbook SC15*".
2. Equivalent thermal impedance under nominal pulse microwave operating conditions.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 65 V; I_E = 0	140	mA
		V_{CB} = 50 V; I_E = 0	14	mA
I_{CES}	collector cut-off current	V_{CE} = 60 V; R_{BE} = 0 Ω	140	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	1.4	mA

Microwave power transistor | MX1011B200Y

FEATURES

- Suitable for short and medium pulse applications up to 100 μs pulse width, 10% duty factor
- Diffused emitter ballasting resistors improve ruggedness
- Interdigitated emitter-base structure provides high emitter efficiency
- Gold metallization with barrier realizes very stable characteristics and excellent lifetime
- Multicell geometry improves power sharing reduces thermal resistance
- Internal input and output prematching networks allow an easier design of circuits.

APPLICATIONS

Intended for use in common base class C broadband pulsed power amplifiers for IFF, TCAS and Mode S applications in the 1030 MHz to 1090 MHz bandwidth. Also suitable for medium pulse, heavy duty operation within the 1030 MHz to 1150 MHz bandwidth.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT439A metal ceramic flange package, with base connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class C narrowband amplifier.

MODE OF OPERATION	CONDITIONS	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)
Class C	t_p = 10 μs; δ = 1%	1.09	50	200	≥7.5	≥45

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

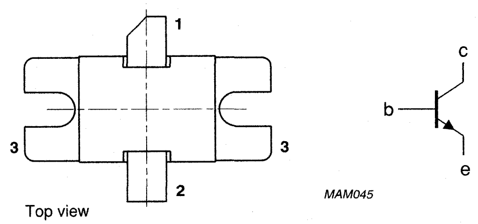


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

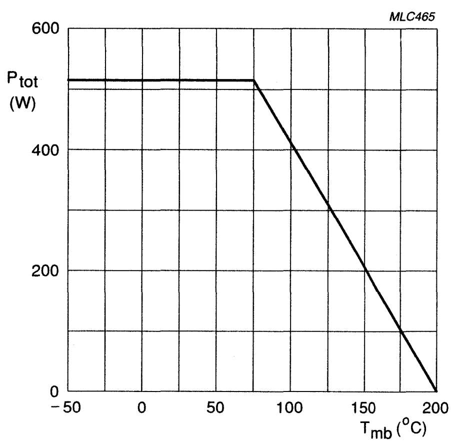
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_{CM}	peak collector current	$t_p = 10\ \mu s$; $\delta = 1\%$	–	11.5	A
P_{tot}	total power dissipation	$T_{mb} < 75\ °C$; $t_p \leq 10\ \mu s$; $\delta \leq 1\%$	–	515	W
T_{stg}	storage temperature		–65	+200	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



$t_p = 10\ \mu s$; $\delta = 1\%$.

Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 120 °C	2.5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W
Z_{th}	thermal impedance from junction to heatsink	t_p = 10 μs; δ = 1%; notes 1 and 2	0.16	K/W

Notes

1. See *"Mounting recommendations in the General part of handbook SC15".*
2. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 50 V	6	mA
I_{CES}	collector cut-off current	V_{BE} = 0; V_{CE} = 50 V	6	mA
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = 1.5 V	1.5	mA
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 40 mA	65	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 40 mA; V_{BE} = 0	65	V

NPN microwave power transistor MX1011B700Y

FEATURES

- Suitable for short and medium pulse applications up to 100 µs/10%
- Internal input and output prematching networks allow an easier design of circuits
- Diffused emitter ballasting resistors improve ruggedness
- Interdigitated emitter-base structure provides high emitter efficiency
- Gold metallization with barrier realizes very good stability of the characteristics and excellent lifetime
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

Intended for use in common base, class C, broadband, pulsed power amplifiers for IFF, TCAS and Mode S applications in the 1 030 to 1 090 MHz band. Also suitable for medium pulse, heavy duty operation within the 1 030 to 1 150 MHz band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT439A metal ceramic flange package with base connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class C broadband amplifier.

MODE OF OPERATION	CONDITIONS	f (GHz)	V_{CC} (V)	P_L (W)	G_P (dB)	η_C (%)
Class C	t_p = 10 µs; δ = 1%	1.09	50	650	≥6	≥48

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

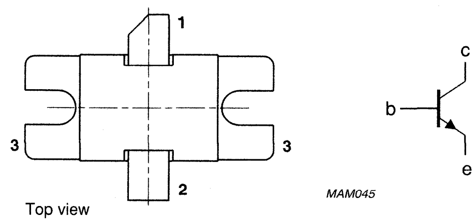


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

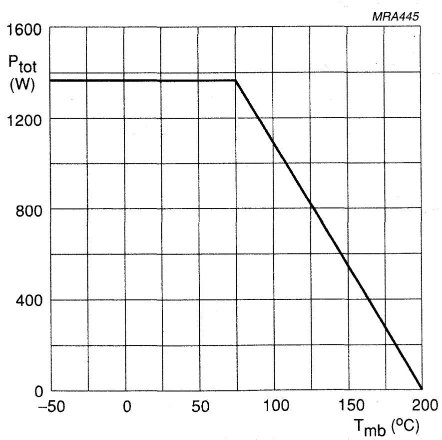
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	65	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_{CM}	peak collector current	$t_p \leq 10\ \mu s$; $\delta \leq 1\%$	–	40	A
P_{tot}	total power dissipation	$T_{mb} < 75$ °C; $t_p \leq 10\ \mu s$; $\delta \leq 1\%$	–	1365	W
T_{stg}	storage temperature		−65	+200	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



$t_p = 10\ \mu s$; $\delta = 1\%$; $P_{tot\ max} = 1365$ W.

Fig.2 Maximum power dissipation derating as a function of mounting base temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 120 °C	1.12	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	t_p = 10 μs; δ = 1%; notes 1 and 2	0.06	K/W

Notes

1. See "*Mounting recommendations in the General part of handbook SC15*".
2. Equivalent thermal impedance under nominal pulse microwave operating conditions.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 50 V; I_E = 0	20	mA
I_{CES}	collector cut-off current	V_{CE} = 50 V; V_{BE} = 0	20	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	5	mA
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 140 mA; V_{BE} = 0	65	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 140 mA; V_{BE} = 0	65	V

NPN microwave power transistor MZ0912B50Y

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Input and output matching cell allows an easier design of circuits.

APPLICATIONS

Common base, class C, broadband, pulse power amplifier from 960 to 1215 MHz for TACAN application.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT443A metal ceramic flange package with base connected to flange. It is mounted in common base configuration, and specified in class C.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class C broadband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)	Z_i/Z_L (Ω)
Class C; t_p = 10 µs; δ = 1%	0.960 to 1.215	50	>50	>7	>42	see Figs 6 and 7

PINNING - SOT443A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

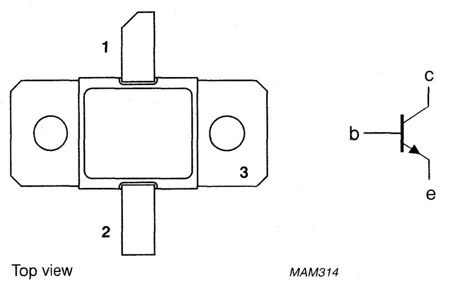


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

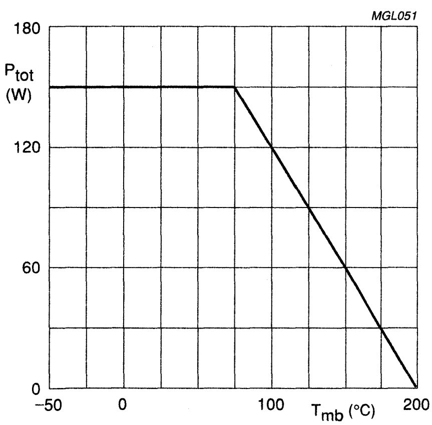
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	20	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	60	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)	$t_p \leq 10\ \mu s$; $\delta \leq 10\%$	–	3	A
P_{tot}	total power dissipation (peak power)	$T_{mb} = 75\ °C$; $t_p \leq 10\ \mu s$; $\delta \leq 10\%$	–	150	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



$t_p = 10\ \mu s$; $\delta = 10\%$; $P_{tot\ max} = 150$ W.

Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

T_j = 125 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	CW	4.9	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	CW; note 1	0.2	K/W
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	notes 1 and 2	0.85	K/W

Notes

1. See *"Mounting recommendations in the General part of handbook SC15"*.
2. Equivalent thermal impedance under nominal pulse microwave operating conditions; t_p = 10 μs; δ = 10%.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 65 V; I_E = 0	20	mA
		V_{CB} = 50 V; I_E = 0	2	mA
I_{CES}	collector cut-off current	V_{CE} = 60 V; R_{BE} = 0 Ω	20	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	200	μA

Microwave power transistor | PLB16004U

FEATURES

- Diffused emitter ballasting resistors improve excellent current sharing and withstanding a high VSWR
- Interdigitated common-base structure provides high emitter efficiency
- Gold metallization with barrier realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output prematching networks allow an easier design of circuits.

APPLICATIONS

Intended for use in common-base class C power amplifiers at 1.6 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT437A glued cap metal ceramic flange package, with base connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class C narrowband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)	Z_i; Z_L (Ω)
Class C (CW)	1.6	28	>4.5	>8.5	>40	see Figs 5 and 6

PINNING - SOT437A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

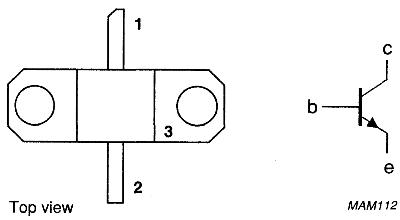


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
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LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	40	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	DC collector current		–	0.5	A
P_{tot}	total power dissipation	$T_{mb} = 75$ °C	–	9	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

Note

1. Up to 0.3 mm from ceramic.

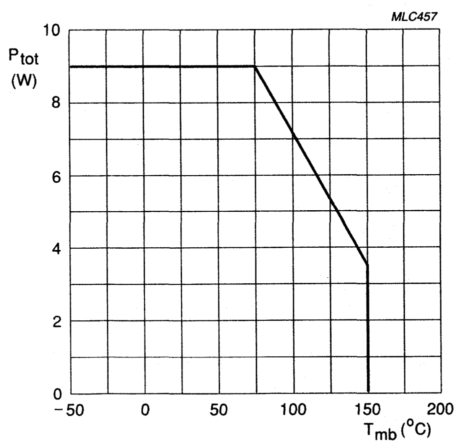

Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 100 °C	11	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.3	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC15".*

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CES}	collector cut-off current	R_{BE} = 0; V_{CE} = 30 V	–	200	μA
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 1 mA; I_E = 0	40	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 1 mA; I_E = 0	40	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_C = 1 mA; I_E = 0	3	–	V
h_{FE}	DC current gain	I_C = 300 mA; V_{CE} = 5 V	15	100	

NPN microwave power transistor PLB16012U

FEATURES

- Input matching cell allows an easier design of circuits
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance.

APPLICATIONS

Common base, class C, power amplifiers at 1.6 GHz. Also suitable for operation in the 1.4 to 1.8 GHz range.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT437A glued cap metal ceramic flange package with base connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class C narrowband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)	Z_i; Z_L (Ω)
Class C (CW)	1.6	28	10	>8	>45	see Figs 5 and 6

PINNING - SOT437A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

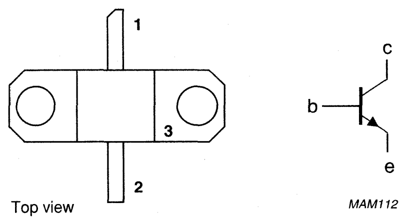

Fig.1 Simplified outline and symbol.

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Product and environmental safety - toxic materials
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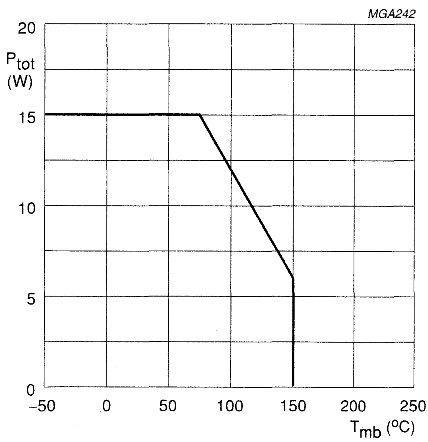
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	40	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	0.9	A
P_{tot}	total power dissipation	$T_{mb} = 75\ °C$	–	15	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

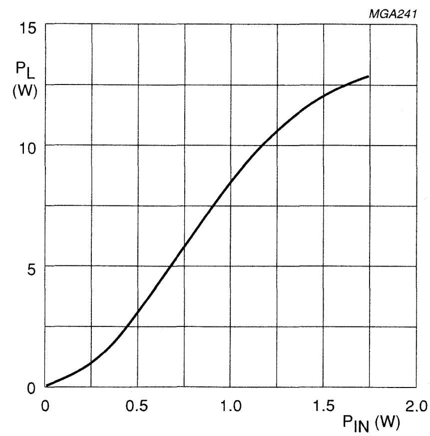
Note

1. Up to 0.3 mm from ceramic.



$P_{tot\ max} = 15$ W.

Fig.2 Maximum power dissipation derating as a function of mounting base temperature.



$V_{CC} = 28$ V; f = 1.6 GHz.

Fig.3 Load power as a function of source power.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 100 °C	6	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.3	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC15"*.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 28 V; I_E = 0	0.3	mA
		V_{CB} = 35 V; I_E = 0	0.6	mA
I_{CES}	collector cut-off current	V_{CE} = 28 V; R_{BE} = 0 Ω	0.6	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	25	μA

NPN microwave power transistor PLB16030U

FEATURES

- Input and output matching cell allows an easier design of circuits
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance.

APPLICATIONS

Common base class B power amplifiers at 1.6 GHz. Also suitable for operation in the frequency range 1.4 to 1.8 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT437A glued cap metal ceramic flange package with base connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class B narrowband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)	Z_i; Z_L (Ω)
Class B (CW)	1.6	28	>30	>7	>45	see Figs 5 and 6

PINNING - SOT437A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

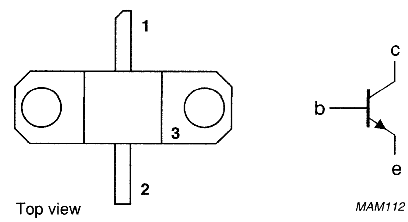


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

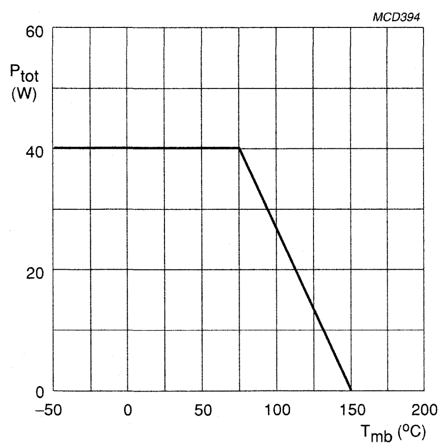
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	40	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	2.6	A
P_{tot}	total power dissipation	$T_{mb} = 75\ °C$	–	40	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

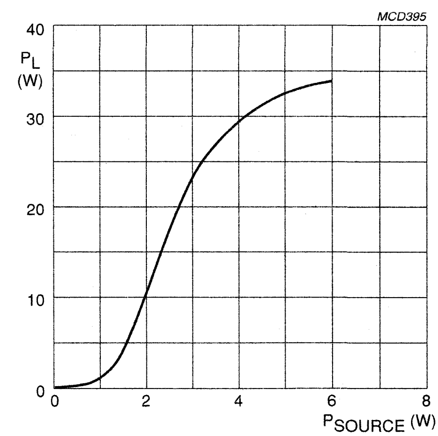
Note

1. Up to 0.3 mm from ceramic.



$P_{tot\ max} = 40$ W.

Fig.2 Maximum power dissipation derating as a function of mounting base temperature.



$V_{CC} = 28$ V; f = 1.6 GHz.

Fig.3 Load power as a function of source power.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 100 °C	2.4	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.3	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC15".*

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 28 V; I_E = 0	0.9	mA
		V_{CB} = 35 V; I_E = 0	1.8	mA
I_{CES}	collector cut-off current	V_{CE} = 28 V; R_{BE} = 0 Ω	1.8	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	90	μA

NPN microwave power transistor | PTB23002U

FEATURES

- Very high power gain
- Internal input prematching network
- Diffused emitter ballasting resistors improve ruggedness
- Interdigitated emitter-base structure
- Gold metallization with barrier layer to prevent electromigration and gold diffusion during life
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

Common-base, class C power amplifiers at frequencies up to 2.3 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT440A hermetically sealed metal ceramic flange package, with base connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common-base class C narrowband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)	Z_i; Z_L (Ω)
Class C (CW)	2.3	28	>2	>9	>45	see Figs 5 and 6

PINNING - SOT440A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

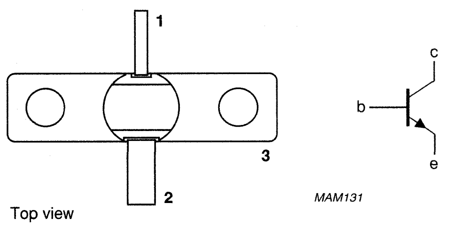


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

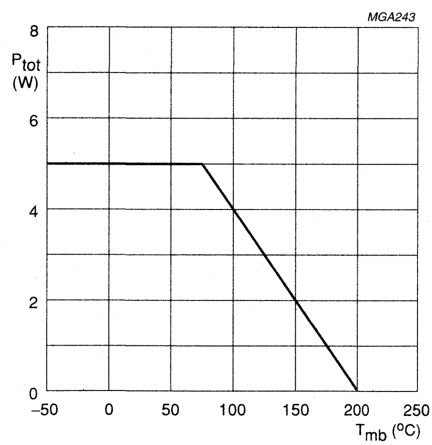
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	40	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	0.25	A
P_{tot}	total power dissipation	$T_{mb} = 75\ °C$	–	5	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



$P_{tot\ max} = 5$ W.

Fig.2 Maximum power dissipation derating as a function of mounting base temperature.

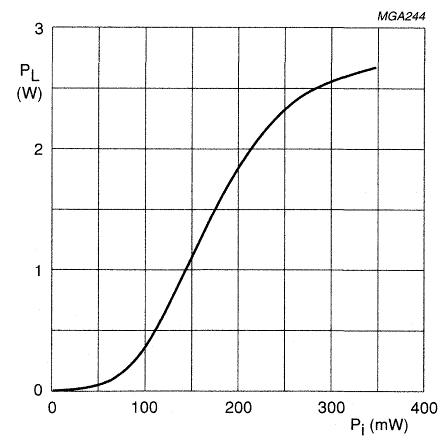


Fig.3 Output power as a function of input power.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 75 °C	22	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.7	K/W

Note

1. See "*Mounting recommendations in the General part of handbook SC15*".

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 1 mA; I_E = 0	40	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 1 mA; R_{BE} = 0 Ω	40	–	V
I_{CBO}	collector cut-off current	V_{CE} = 30 V; I_E = 0	–	15	μA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	–	1.5	μA

NPN microwave power transistor PTB23003X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Localized thick oxide auto-alignment process and gold sandwich metallization ensure an optimum temperature profile and excellent performance and reliability.

APPLICATIONS

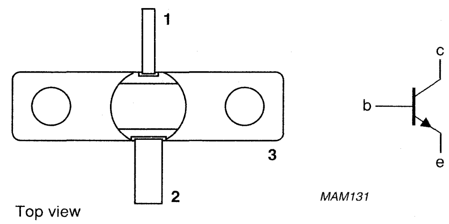
Common-base, class B power amplifiers up to 4.2 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a metal ceramic SOT440A flange package with base connected to the flange.

PINNING - SOT440A

PIN	DESCRIPTION
1	collector
2	emitter
3	base; connected to flange



Marking code: 2303X.

Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common-base class B circuit.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_{po} (dB)	η_C (%)	Z_i (Ω)	Z_L (Ω)
CW	2	24	≥3	≥8.75	≥45	2.5 + j14	8 + j6

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

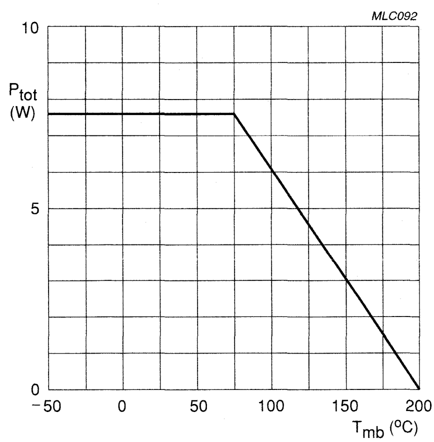
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	40	V
I_C	collector current (DC)		–	0.5	A
P_{tot}	total power dissipation	$T_{mb} = 75$ °C; f > 1 MHz	–	7.6	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.3 mm from ceramic.



f > 1 MHz.

Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 75 °C	12	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	T_j = 75 °C; note 1	0.7	K/W

Note

1. See "*Mounting recommendations in the General part of handbook SC19.*

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 2 mA; I_E = 0	40	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 10 mA; R_{BE} = 0	40	–	–	V
I_{CBO}	collector cut-off current	V_{CE} = 24 V; I_E = 0	–	–	20	μA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	–	–	0.4	μA
C_{cb}	collector-base capacitance	I_E = I_C = 0; V_{CB} = 24 V; V_{EB} = 1.5 V; f = 1 MHz	–	3	–	pF
C_{ce}	collector-emitter capacitance	I_E = I_C = 0; V_{CB} = 24 V; V_{EB} = 1.5 V; f = 1 MHz	–	0.6	–	pF

Microwave power transistor PTB23006U

FEATURES

- Very high power gain
- Diffused emitter ballasting resistors improve ruggedness
- Interdigitated emitter-base structure
- Gold metallization with barrier layer to prevent electromigration and gold diffusion during life
- Multicell geometry improves power sharing and reduces thermal resistance
- Internal input prematching network.

APPLICATIONS

Intended for use in common-base, class C power amplifiers at frequencies up to 2.3 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT440A hermetically sealed metal ceramic flange package, with base connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common-base class C narrowband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)	Z_i; Z_L (Ω)
Class C (CW)	2	28	>5	>9	>40	see Figs 5 and 6

PINNING - SOT440A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

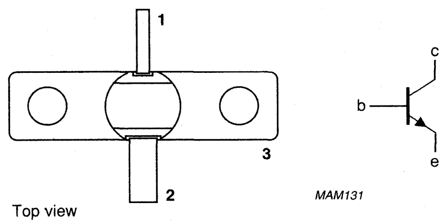


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	40	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current		–	0.75	A
P_{tot}	total power dissipation	$T_{mb} = 75\ °C$	–	11	W
T_{stg}	storage temperature		–65	+200	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.

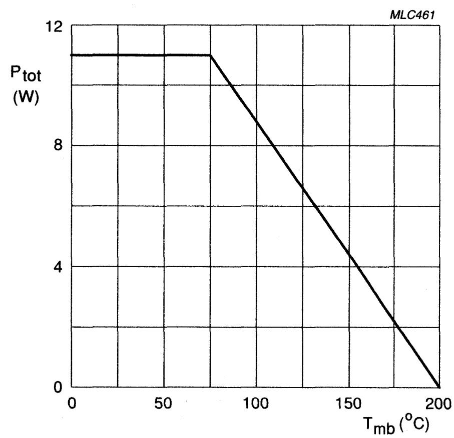


Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 75 °C	8.5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.7	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC15"*.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CES}	collector cut-off current	I_E = 0; V_{CE} = 30 V	–	300	μA
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 3 mA; I_E = 0	40	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 3 mA; R_{BE} = 0	40	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_C = 1.5 mA	3	–	V
h_{FE}	DC current gain	I_C = 450 mA; V_{CE} = 3 V	15	150	

NPN microwave power transistors

PTB32001X; PTB32003X; PTB32005X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Localized thick oxide auto-alignment process and gold sandwich metallization ensure an optimum temperature profile and excellent performance and reliability.

APPLICATIONS

Common-base, class B power amplifiers up to 4.2 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a metal ceramic SOT440A flange package with base connected to the flange.

MARKING

TYPE NUMBER	MARKING CODE
PTB32001X	3201X
PTB32003X	3203X
PTB32005X	3205X

PINNING - SOT440A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

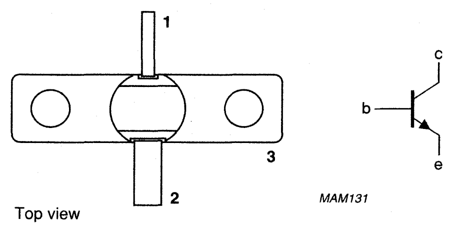


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common-base class B circuit.

TYPE NUMBER	MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_{po} (dB)	η_C (%)	Z_i (Ω)	Z_L (Ω)
PTB32001X	CW	3	24	≥1.3	≥8	≥35	15 + j31	5.5 + j10
PTB32003X	CW	3	24	≥2.5	≥8	≥35	5.5 + j29	5 – j2.2
PTB32005X	CW	3	24	≥4.5	≥8	≥35	2.8 + j20	4 – j7

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

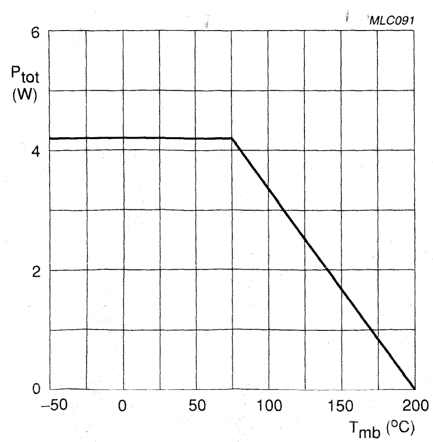
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	40	V
V_{EBO}	emitter-base voltage	open collector	–	3.0	V
I_C	collector current (DC)				
	PTB32001X		–	0.25	A
	PTB32003X		–	0.5	A
	PTB32005X		–	0.75	A
P_{tot}	total power dissipation	$T_{mb} \leq 75$ °C; f > 1 MHz			
	PTB32001X		–	4.2	W
	PTB32003X		–	7.6	W
	PTB32005X		–	8.7	W
T_{stg}	storage temperature range		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

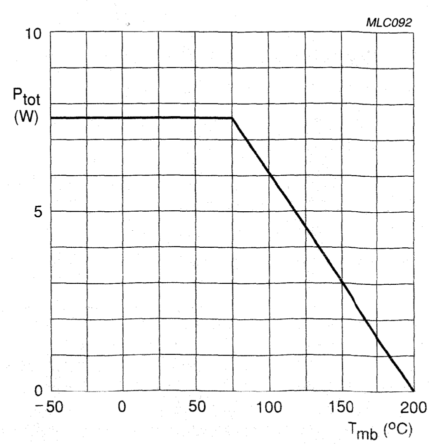
Note

1. Up to 0.3 mm from ceramic.



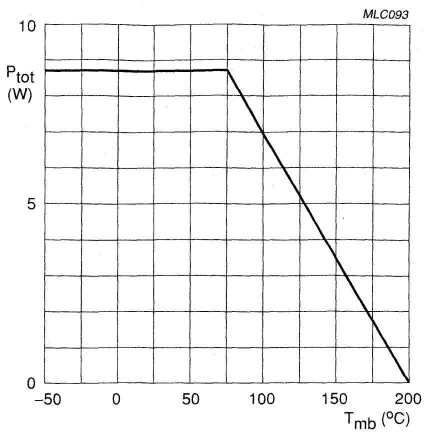
f > 1 MHz.

Fig.2 Power derating curve; PTB32001X.



f > 1 MHz.

Fig.3 Power derating curve; PTB32003X.



f > 1 MHz.

Fig.4 Power derating curve; PTB32005X.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 75 °C		
	PTB32001X		22	K/W
	PTB32003X		12	K/W
	PTB32005X		10.5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	T_j = 75 °C; note 1	0.7	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC15"*.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage					
	PTB32001X	I_C = 1 mA; I_E = 0	40	–	–	V
	PTB32003X	I_C = 2 mA; I_E = 0	40	–	–	V
	PTB32005X	I_C = 3 mA; I_E = 0	40	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 10 mA; R_{BE} = 0 Ω	40	–	–	V
I_{CBO}	collector cut-off current					
	PTB32001X	V_{CE} = 24 V; I_E = 0	–	–	10	μA
	PTB32003X	V_{CE} = 24 V; I_E = 0	–	–	20	μA
	PTB32005X	V_{CE} = 24 V; I_E = 0	–	–	30	μA
I_{EBO}	emitter cut-off current					
	PTB32001X	V_{EB} = 1.5 V; I_C = 0	–	–	0.2	μA
	PTB32003X	V_{EB} = 1.5 V; I_C = 0	–	–	0.4	μA
	PTB32005X	V_{EB} = 1.5 V; I_C = 0	–	–	0.6	μA
C_{cb}	collector-base capacitance					
	PTB32001X	I_E = I_C = 0; V_{CB} = 24 V; V_{EB} = 1.5 V; f = 1 MHz	–	2.2	–	pF
	PTB32003X	I_E = I_C = 0; V_{CB} = 24 V; V_{EB} = 1.5 V; f = 1 MHz	–	3	–	pF
	PTB32005X	I_E = I_C = 0; V_{CB} = 24 V; V_{EB} = 1.5 V; f = 1 MHz	–	3.8	–	pF
C_{ce}	collector-emitter capacitance					
	PTB32001X	I_E = I_C = 0; V_{CB} = 24 V; V_{EB} = 1.5 V; f = 1 MHz	–	0.3	–	pF
	PTB32003X	I_E = I_C = 0; V_{CB} = 24 V; V_{EB} = 1.5 V; f = 1 MHz	–	0.6	–	pF
	PTB32005X	I_E = I_C = 0; V_{CB} = 24 V; V_{EB} = 1.5 V; f = 1 MHz	–	0.9	–	pF

NPN microwave power transistor | PXB16050U

FEATURES

- Input and output matching cells allow an easier design of circuits
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance.

APPLICATIONS

Common-base class C power amplifiers at frequencies between 1.5 and 1.8 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT439A metal ceramic flange package with base connected to the flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class C narrowband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_{po} (dB)	η_C (%)	Z_i/Z_L (Ω)
Class C (CW)	1.65	28	>45	>8.5	>45	see Figs 6 and 7

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

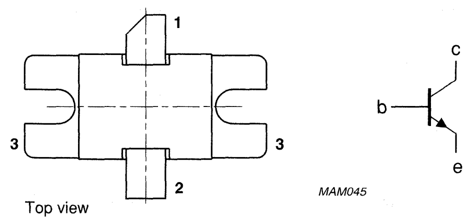


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

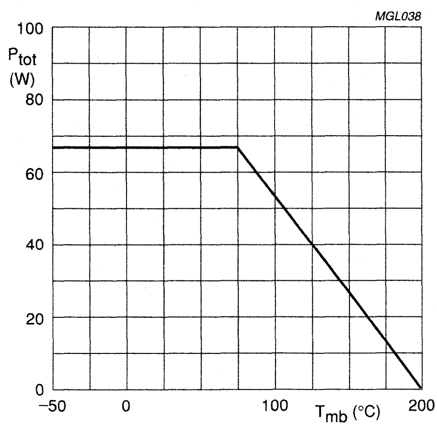
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	45	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	45	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	6	A
P_{tot}	total power dissipation	$T_{mb} = 75$ °C	–	67	W
T_{stg}	storage temperature		–65	+200	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

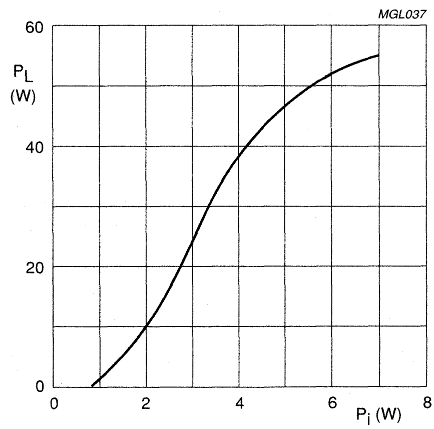
Note

1. Up to 0.2 mm from ceramic.



$P_{tot\ max}$ = 67 W.

Fig.2 Power derating curve.



V_{CC} = 28 V; f = 1.65 GHz.

Fig.3 Load power as a function of input power (see Fig.4).

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 100 °C	1.5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W

Note

1. See "*Mounting recommendations in the General part of handbook SC15*".

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 40 V; I_E = 0	3	mA
		V_{CB} = 45 V; I_E = 0	15	mA
I_{CES}	collector cut-off current	V_{CE} = 30 V; R_{BE} = 0	3	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	300	μA

NPN microwave power transistor PZ1418B15U

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output prematching ensures good stability and easy broadband use.

APPLICATIONS

- Common base class-B wideband amplifiers under CW conditions in military and professional applications, and to drive the type PZ1418B30U.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT443A metal ceramic flange package with the base connected to the flange.

PINNING - SOT443A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

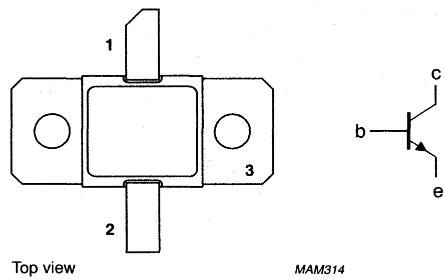


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance up to T_{mb} = 25 °C in a common base class-B wideband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)	Z_i; Z_L (Ω)
Class-B	1.4 to 1.8	28	≥12.5	≥7	≥38	see Figs 6 and 7

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	35	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	2	A
P_{tot}	total power dissipation	$T_{mb} \leq 75$ °C	–	27	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature		–	235	°C

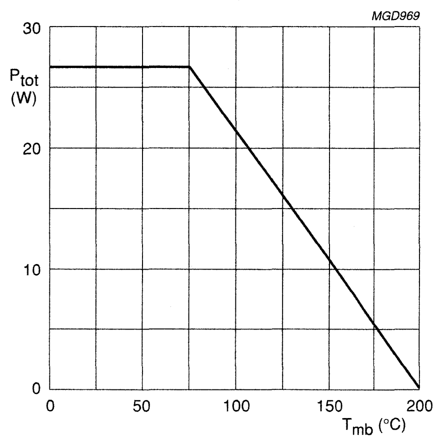


Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	$T_j = 75$ °C	4	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	$T_j = 75$ °C; note 1	0.2	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC15"*.

CHARACTERISTICS

$T_{mb} = 25$ °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	$V_{CB} = 40$ V; $I_E = 0$	5	mA
		$V_{CB} = 30$ V; $I_E = 0$	2.5	mA
I_{CES}	collector cut-off current	$V_{CE} = 35$ V; $R_{BE} = 0$	25	mA
I_{EBO}	emitter cut-off current	$V_{EB} = 1.5$ V; $I_C = 0$	100	μA

NPN microwave power transistor PZ1418B30U

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output prematching ensures good stability and easy broadband use.

APPLICATIONS

- Common base class-B broadband amplifiers under CW conditions in military and professional applications.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT443A metal ceramic flange package with the base connected to the flange.

PINNING - SOT443A

PIN	DESCRIPTION
1	collector
2	emitter
3	base; connected to flange

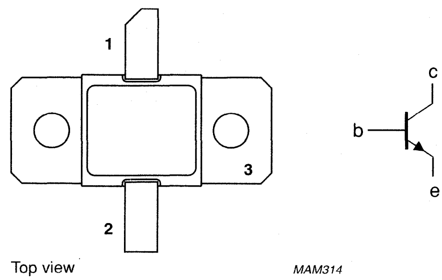


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance up to T_{mb} = 25 °C in a common base class-B wideband amplifier.

f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)	Z_i; Z_L (Ω)
1.4 to 1.8	28	≥27	≥7.3	≥38	see Figs 6 and 7

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	35	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	4	A
P_{tot}	total power dissipation	$T_{mb} \leq 75$ °C	–	45	W
T_{stg}	storage temperature		−65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature		–	235	°C

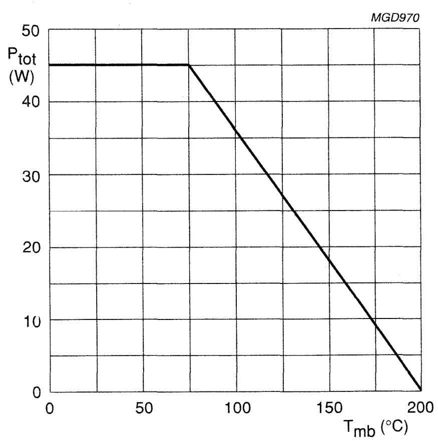


Fig.2 Power derating curve as a function of mounting base temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base	T_j = 75 °C	2.2	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	T_j = 75 °C; note 1	0.2	K/W

Note

1. See *"Mounting recommendations in the General part of handbook SC19"*.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 40 V; I_E = 0	10	mA
		V_{CB} = 30 V; I_E = 0	5	mA
I_{CES}	collector cut-off current	V_{CE} = 35 V; R_{BE} = 0	50	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	200	μA

Microwave power transistor RX1214B170W

FEATURES

- Suitable for short and medium pulse applications up to 1 ms pulse width, 10% duty factor
- Diffused emitter ballasting resistors improve ruggedness
- Interdigitated emitter-base structure provides high emitter efficiency
- Gold metallization with barrier realizes very stable characteristics and excellent lifetime
- Multicell geometry improves power sharing and reduces thermal resistance
- Internal input and output prematching networks allow an easier design of circuits.

APPLICATIONS

Intended for use in common-base class C broadband pulsed power amplifiers for radar applications in the 1.2 to 1.4 GHz band. Also suitable for long pulse, heavy duty operation within this band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT439A metal ceramic flange package, with base connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class C narrowband amplifier.

MODE OF OPERATION	CONDITIONS	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)
Class C	t_p = 500 μs; δ = 10%	1.2 to 1.4	42	≥170	≥6.7	≥40

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

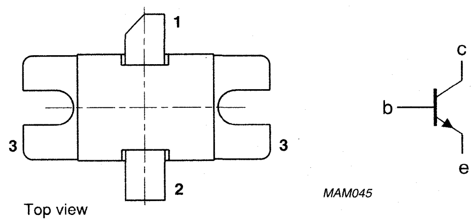


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

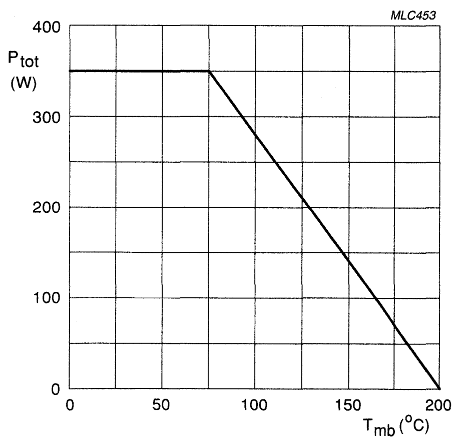
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current	$t_p \leq 150$ µs; $\delta \leq 5\%$	–	15	A
P_{tot}	total power dissipation	$T_{mb} \leq 75$ °C; $t_p \leq 150$ µs; $\delta \leq 5\%$	–	350	W
T_{stg}	storage temperature		–65	+200	°C
T_j	junction temperature		–	200	°C
T_{sld}	soldering temperature	t ≤ 10 s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



$t_p = 150$ µs; $\delta = 5\%$.

Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 120 °C	1.9	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W
Z_{th}	thermal impedance from junction to heatsink	t_p = 500 µs; δ = 10%; notes 1 and 2	0.28	K/W

Notes

1. See *"Mounting recommendations in the General part of handbook SC15".*
2. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; V_{CB} = 50 V	–	20	mA
I_{EBO}	emitter cut-off current	$I_C = 0$; V_{EB} = 1.5 V	–	2	mA
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 60 mA; $V_{BE} = 0$	65	–	V

NPN microwave power transistor

RX1214B300Y

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry improves power sharing and reduces thermal resistance
- Internal input and output matching networks for an easy circuit design.

APPLICATIONS

- Common base class-C wideband amplifiers operating under pulsed conditions, recommended for L-band radar applications.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT439A metal ceramic flange package with the base connected to the flange.

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

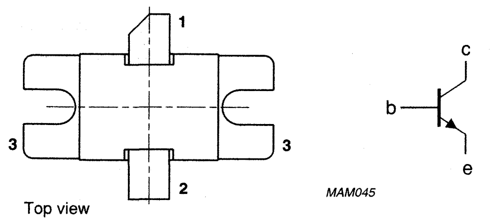


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance at $T_{mb} \leq 25$ °C in a common base class-C wideband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_P (dB)	η_C (%)	Z_i; Z_L (Ω)
Class-C $t_p = 150$ μs; $\delta = 5$ %	1.2 to 1.4	50	≥250	≥7	≥35	see Fig 6

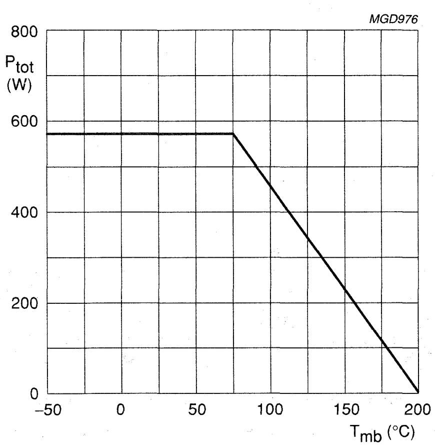
WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

NPN microwave power transistor RX1214B300Y

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	60	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)	$t_p \leq 150\ \mu s$; $\delta = 5\ \%$	–	21	A
P_{tot}	total power dissipation	$t_p \leq 150\ \mu s$; $\delta = 5\ \%$; $T_{mb} = 75\ °C$	–	570	W
T_{stg}	storage temperature		−65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	at 0.2 mm from case; $t \leq 10$ s	–	235	°C



$t_p = 150\ \mu s$; $\delta = 5\ \%$

Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

T_j = 100 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base		0.8	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	t_p = 150 μs; δ = 5 %; notes 1 and 2	0.22	K/W

Notes

1. See "*Mounting recommendations in the General part of handbook SC15*".
2. Equivalent thermal impedance under nominal pulse microwave operating conditions.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 140 mA; I_E = 0	65	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 140 mA; R_{BE} = 0 Ω	60	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_C = 0; I_E = 20 mA	3	–	V
I_{CBO}	collector cut-off current	V_{CB} = 50 V; I_E = 0	–	14	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	–	1.4	mA

FEATURES

- Suitable for short and medium pulse applications up to 1 ms/10%
- Internal input prematching networks allow an easier design of circuits
- Diffused emitter ballasting resistors improve ruggedness
- Interdigitated emitter-base structure provides high emitter efficiency
- Gold metallization with barrier realizes very stable characteristics and excellent lifetime
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

Common base, class C, broadband, pulsed power amplifiers for L-Band radar applications in the 1.2 to 1.4 GHz band. Also suitable for medium pulse, heavy duty operation within this band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT439A metal ceramic flange package with base connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class C broadband amplifier.

MODE OF OPERATION	CONDITIONS	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)
Class C	t_p = 130 μs; δ = 6%	1.2 to 1.4	50	280	≥7	≥40

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

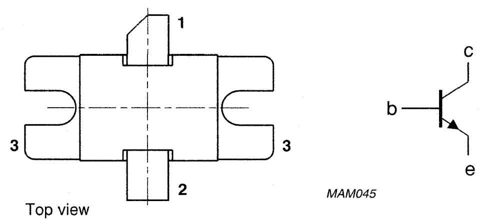


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

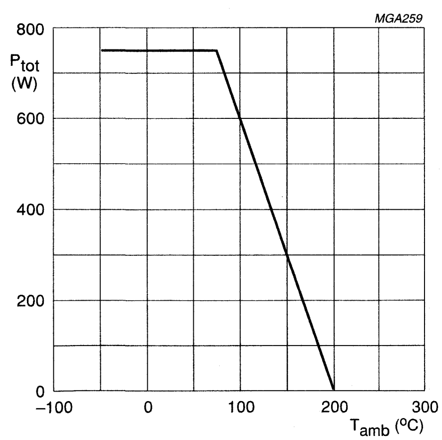
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	20	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	65	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)	$t_p \leq 130\ \mu s$; $\delta \leq 6\%$	–	25	A
P_{tot}	total power dissipation	$T_{mb} < 75\ °C$; $t_p \leq 30\ \mu s$; $\delta \leq 1\%$	–	750	W
T_{stg}	storage temperature		–65	200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



$P_{tot\ max} = 750$ W; $t_p \leq 30\ \mu s$; $\delta \leq 1\%$.

Fig.2 Maximum power dissipation derating as a function of mounting base temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_j = 120 °C	1.2	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	t_p = 130 µs; δ = 6%; T_j = 110 °C; notes 1 and 2	0.17	K/W

Notes

1. See *"Mounting recommendations in the General part of handbook SC15"*.
2. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 50 V; I_E = 0	30	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	3	mA

NPN microwave power transistors RX1214B80W; RX1214B130Y

FEATURES

- Suitable for short and medium pulse applications up to 1 ms pulse width, 10% duty factor
- Diffused emitter ballasting resistors improve ruggedness
- Interdigitated emitter-base structure provides high emitter efficiency
- Gold metallization with barrier realizes very stable characteristics and excellent lifetime
- Multicell geometry improves power sharing and reduces thermal resistance
- Internal input and output prematching networks allow an easier design of circuits.

APPLICATIONS

Common-base class C broadband pulsed power amplifiers for radar applications in the 1.2 to 1.4 GHz band. Also suitable for long pulse, heavy duty operation within this band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT439A metal ceramic flange package, with base connected to flange.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common-base class C narrowband amplifier.

MODE OF OPERATION	CONDITIONS	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)
Class C RX1214B80W	t_p = 500 μs; δ = 10%	1.2 to 1.4	40	≥80	≥7	≥35
Class C RX1214B130Y	t_p = 150 μs; δ = 5%	1.2 to 1.4	50	≥130	≥7	≥35

PINNING - SOT439A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

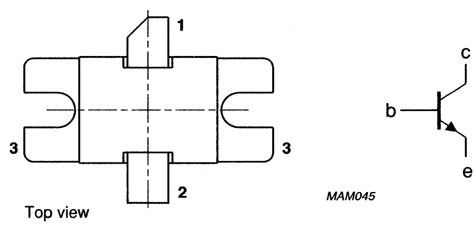


Fig.1 Simplified outline and symbol.

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

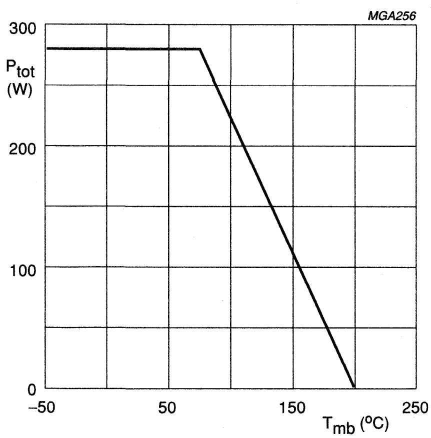
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	60	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)	$t_p \leq 150\ \mu s$; $\delta \leq 5\%$	–	9	A
P_{tot}	total power dissipation	$T_{mb} < 75\ °C$; $t_p \leq 150\ \mu s$; $\delta \leq 5\%$	–	280	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	$t \leq 10$ s; note 1	–	235	°C

Note

1. Up to 0.2 mm from ceramic.



$t_p = 150\ \mu s$; $\delta = 5\%$; $P_{tot\ max} = 280$ W.

Fig.2 Maximum power dissipation derating as a function of mounting base temperature.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	$T_j = 120\ °C$	1.75	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	$t_p = 150\ \mu s$; $\delta = 5\%$; notes 1 and 2	0.4	K/W

Notes

1. See *"Mounting recommendations in the General part of handbook SC15"*.
2. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

$T_{mb} = 25\ °C$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = 50\ V$	–	6	mA
I_{EBO}	emitter cut-off current	$I_C = 0$; $V_{EB} = 1.5\ V$	–	0.6	mA
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 60\ mA$; $V_{BE} = 0$	60	–	V

NPN microwave power transistor RZ1214B35Y

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistor providing excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input matching ensures good stability and allows an easier design of wideband circuits.

APPLICATIONS

- Common base class-C wideband pulsed power amplifiers for L-band radar applications in the 1.2 to 1.4 GHz band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT443A metal ceramic flange package with the base connected to the flange.

PINNING - SOT443A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

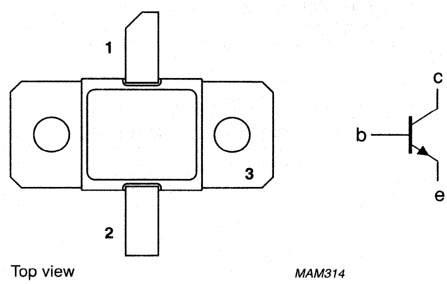


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class-C wideband amplifier.

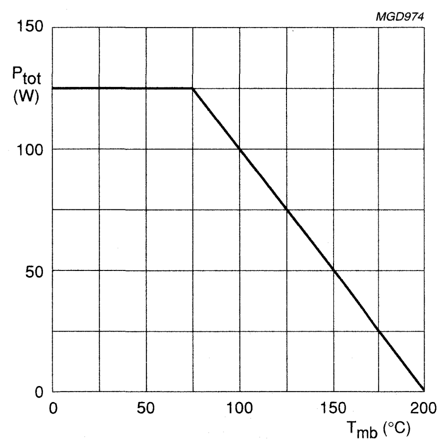
MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)	Z_i; Z_L (Ω)
Class-C; t_p = 150 μs; δ = 5%	1.2 to 1.4	50	≥35	≥7	≥30	see Fig 4

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	60	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)	$t_p \leq 150\ \mu s$; $\delta \leq 5\%\leq$	–	3	A
P_{tot}	total power dissipation	$T_{mb} \leq 75\ °C$; $t_p \leq 150\ \mu s$; $\delta \leq 5\%$	–	125	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	at 0.2 mm from the case; $t \leq 10$ s	–	235	°C



$t_p = 150\ \mu s$; $\delta = 5\%$.

Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

T_j = 75 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base		5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	note 1	0.2	K/W
$Z_{th\ j\text{-}h}$	thermal resistance from junction to heatsink	t_p = 100 μs; δ = 10 %; notes 1 and 2	1	K/W

Notes

1. See *"Mounting recommendations in the General part of handbook SC15"*.
2. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 20 mA; I_E = 0	65	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 20 mA; R_{BE} = 0	60	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_C = 0; I_E = 3 mA	3	–	V
I_{CBO}	collector cut-off current	V_{CB} = 50 V; I_E = 0	–	2	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	–	0.2	mA

NPN microwave power transistor | RZ1214B65Y

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistor providing excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output matching ensures good stability and allows an easier design of wideband circuits.

APPLICATIONS

- Intended for use in common base class B wideband pulsed power amplifiers for L-band radar applications in the 1.2 to 1.4 GHz band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT443A metal ceramic flange package with the base connected to the flange.

PINNING - SOT443A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

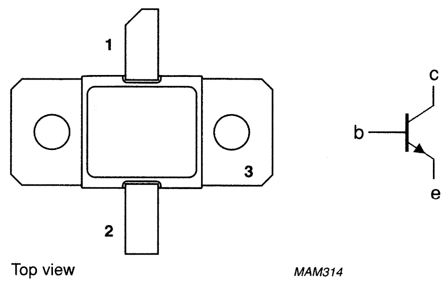


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to T_{mb} = 25 °C in a common base class B wideband amplifier.

MODE OF OPERATION	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_C (%)	Z_i; Z_L (Ω)
Class-B; t_p = 150 μs; δ = 5%	1.2 to 1.4	50	≥70	≥7	≥35	see Fig 4

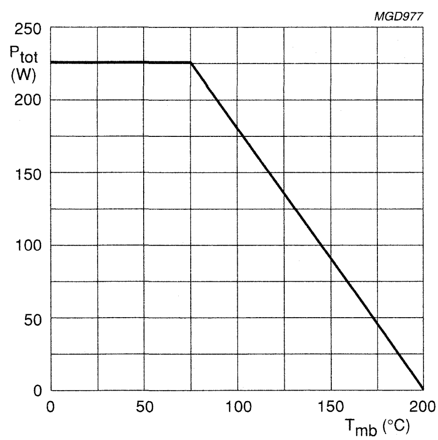
WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

NPN microwave power transistor RZ1214B65Y

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0\ \Omega$	–	60	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)	$t_p \leq 150\ \mu s$; $\delta \leq 5\%$	–	6	A
P_{tot}	total power dissipation	$T_{mb} \leq 75\ °C$; $t_p \leq 150\ \mu s$; $\delta \leq 5\%$	–	225	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	at 0.2 mm from the case; $t \leq 10$ s	–	235	°C



$t_p = 150\ \mu s$; $\delta = 5\%$.

Fig.2 Power derating curve.

THERMAL CHARACTERISTICS

T_j = 75 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting-base		2.5	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting-base to heatsink	note 1	0.2	K/W
$Z_{th\ j\text{-}h}$	thermal resistance from junction to heatsink	t_p = 100 μs; δ = 10 %; notes 1 and 2	0.55	K/W

Notes

1. See *"Mounting recommendations in the General part of handbook SC15".*
2. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 40 mA; I_E = 0	65	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 40 mA; R_{BE} = 0	60	–	V
I_{CBO}	collector cut-off current	V_{CB} = 50 V; I_E = 0	–	4	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	–	0.4	mA

RF Power Modules

CONTENTS

SELECTION GUIDE

RF POWER MODULES

RF POWER AMPLIFIERS

RF power amplifier modules

TYPE NUMBER	PACKAGE	FREQUENCY BAND (MHz)	OUTPUT POWER (W)	POWER GAIN (dB)	SUPPLY VOLTAGE (V)	EFFICIENCY min. (%)	PAGE
UHF portable							
BGY148A	SOT421A	400 to 440	3	24.8	6	50	726
BGY148B	SOT421A	430 to 488	3	24.8	6	50	726
SHF portable							
BGY120A	SOT482B	824 to 849	1.2	27.8	3.6	50	716
BGY120B	SOT482B	872 to 905	1.2	27.8	3.6	50	716
BGY122A	SOT388B	824 to 849	1.2	27.8	4.8	50	718
BGY122B	SOT388B	872 to 905	1.2	27.8	4.8	50	718
	SOT388B	905 to 928	1	27.8	4.8	50	718
GSM							
BGY206	SOT388A	880 to 915	3	30	4.8	typ. 45	728
BGY240S	SOT388C	880 to 915	3	35	3.5	typ. 47	735
BGY241	SOT482B	880 to 915	3	35	3.5	45	741

920 to 960 MHz RF amplifier modules

TYPE NUMBER	PACKAGE	LOAD POWER (W)	POWER GAIN (dB)	SUPPLY VOLTAGE V_{CE} (V)	EFFICIENCY (%)	PAGE
26 V base stations						
BGY916	SOT365A	16	≥28	26	≥35	744
BGY916/5	SOT365A	16	≥28	26	≥35	750
BGY925	SOT365A	23	>28	26	>30	756

1805 to 1880 MHz RF amplifier modules

TYPE NUMBER	PACKAGE	LOAD POWER (W)	POWER GAIN (dB)	SUPPLY VOLTAGE V_{CE} (V)	EFFICIENCY (%)	PAGE
26 V base stations						
BGY1816	SOT365A	16	>24	26	>30	761

1930 to 1990 MHz RF amplifier modules

TYPE NUMBER	PACKAGE	LOAD POWER (W)	POWER GAIN (dB)	SUPPLY VOLTAGE V_{CE} (V)	EFFICIENCY (%)	PAGE
26 V base stations						
BGY1916	SOT365	16	>24	26	>30	764

RF POWER MODULES

DEVICE DATA

in alphanumeric sequence

UHF amplifier modules | BGY120A; BGY120B

FEATURES

- Single 3.5 V nominal supply voltage
- 1 W output power
- Easy control of output power by DC voltage
- Very high efficiency (typ. 60%)
- Silicon bipolar technology
- Standby current less than 10 μA.

APPLICATIONS

- Hand-held transmitting equipment operating in the 824 to 849 MHz and 872 to 905 MHz frequency ranges.

DESCRIPTION

The BGY120A and BGY120B are two-stage UHF amplifier modules in a SOT482B package with plastic cover. Each module consists of two NPN silicon planar transistor dies mounted together with a matching and bias circuit components on a metallized ceramic substrate.
These modules produce an output power of 1 W into a load of 50 Ω with an RF drive power of 5 mW.

PINNING - SOT482B

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
5	flange connected to ground

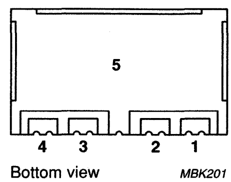


Fig.1 Simplified outline

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

TYPE	MODE OF OPERATION	f (MHz)	V_S (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
BGY120A	CW	824 to 849	3.5	1	≥23	typ. 60	50
BGY120B	CW	872 to 905	3.5	1	≥23	typ. 60	50

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	5	V
V_C	DC control voltage	–	2.9	V
P_D	input drive power	–	10	mW
P_L	load power	–	1.4	W
T_{stg}	storage temperature	−40	+100	°C
T_{mb}	operating mounting-base temperature	−30	+100	°C

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $P_D = 5$ mW; $V_S = 3.5$ V; $V_C \leq 2.5$ V; $T_{mb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency range					
	BGY120A		824	–	849	MHz
	BGY120B		872	–	905	MHz
I_Q	total leakage current	$V_C = 0.3$ V; $P_D < -60$ dBm	–	–	10	µA
I_C	control current		–	–	10	mA
P_L	load power	$V_C = 2.5$ V	1	–	–	W
		$V_S = 3.2$ V; $T_{mb} = 85$ °C	0.71	–	–	W
G_p	power gain	adjust V_C for $P_L = 1$ W	23	–	–	dB
η	efficiency	$V_S = 3.2$ V; adjust V_C for $P_L = 0.9$ W	55	60	–	%
H_2	second harmonic	adjust V_C for $P_L = 0.9$ W	–	–	−35	dBc
H_3	third harmonic	adjust V_C for $P_L = 0.9$ W	–	–	−40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 0.9$ W	–	–	2 : 1	
		$V_C \leq 0.5$ V	–	–	4 : 1	
	stability	$P_L \leq 1.4$ W; $V_C = 0$ to 2.9 V; $V_S = 2.8$ to 5 V; $P_D = 4$ to 10 dBm; VSWR ≤ 6 : 1 through all phases	–	–	−60	dBc
	isolation	$V_C \leq 0.5$ V	–	-40	–	dBm
P_n	noise power	adjust V_C for $P_L = 1$ W; bandwidth = 30 kHz; $f_n = f_o + 45$ MHz	–	–	−90	dBm
d_{im}	reverse intermodulation	$P_{Tx} = 0.9$ W; $f_{int} = f_{Tx} - 45$ MHz; $P_{int} = P_{Tx} - 30$ dB; note 1	–	–	−8	dB
	ruggedness	$V_S = 5$ V; adjust V_C for $P_L = 1.4$ W; VSWR ≤ 10 : 1 through all phases	no degradation			

Note

1. With respect to P_{int}.

UHF amplifier modules

BGY122A; BGY122B

FEATURES

- Single 4.8 V nominal supply voltage
- 1.2 W output power
- Easy control of output power by DC voltage
- Very high efficiency (typ. 55%)
- Silicon bipolar technology
- Standby current less than 100 μA.

APPLICATIONS

- Hand-held transmitting equipment operating in the 824 to 849 MHz and 872 to 905 MHz frequency ranges.

DESCRIPTION

The BGY122A and BGY122B are three-stage UHF amplifier modules in a SOT388B package. Each module consists of three NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.
The modules produce an output power of 1.2 W into a load of 50 Ω with an RF drive power of 2 mW.

PINNING - SOT388B

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

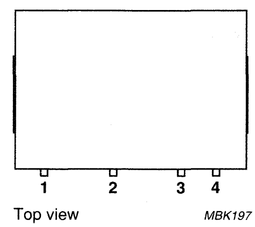


Fig.1 Simplified outline.

QUICK REFERENCE DATA

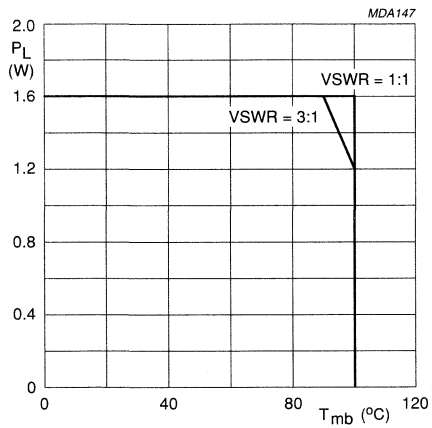
RF performance at T_{mb} = 25 °C.

TYPE	MODE OF OPERATION	f (MHz)	V_S (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
BGY122A	CW	824 to 849	4.8	1.2	≥27.8	typ. 55	50
BGY122B	CW	872 to 905	4.8	1.2	≥27.8	typ. 55	50

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_S	DC supply voltage	$V_C = 0$; $P_D = 0$	–	10	V
V_C	DC control voltage		–	3.5	V
P_D	input drive power		–	5	mW
P_L	load power		–	1.6	W
T_{stg}	storage temperature		–40	+100	°C
T_{mb}	operating mounting base temperature		–30	+100	°C



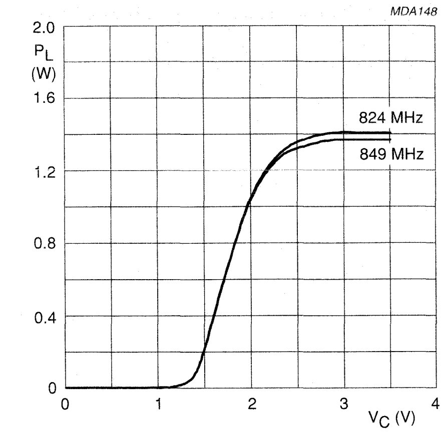
$V_S = 6.5$ V.

Fig.2 Load power derating curve.

CHARACTERISTICS

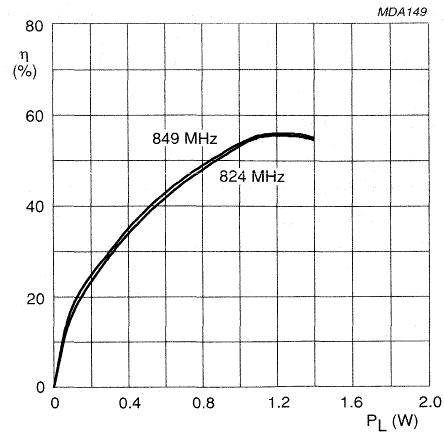
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C \leq 3$ V; $T_{mb} = 25$ °C; unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY122A		824	–	849	MHz
	BGY122B		872	–	905	MHz
I_Q	total quiescent current	$V_C = 0$; $P_D < -60$ dBm	–	–	100	μA
I_C	control current	adjust V_C for $P_L = 1.2$ W	–	–	500	μA
P_L	load power	$V_C = 3$ V	1.2	–	–	W
G_p	power gain	adjust V_C for $P_L = 1.2$ W	27.8	–	–	dB
η	efficiency	adjust V_C for $P_L = 1.2$ W	50	55	–	%
H_2	second harmonic	adjust V_C for $P_L = 1.2$ W	–	–	−36	dBc
H_3	third harmonic	adjust V_C for $P_L = 1.2$ W	–	–	−36	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 1.2$ W	–	–	3 : 1	
	stability	$P_D = 0$ to +6 dBm; $V_S = 4$ to 6.5 V; $V_C = 0$ to 3 V; $P_L \leq 1.2$ W; VSWR ≤ 6 : 1 through all phases	–	–	−60	dBc
	isolation	$V_C = 0$	–	−40	–	dBm
P_n	noise power	adjust V_C for $P_L = 1.2$ W; bandwidth = 30 kHz; $f_n = f_o + 45$ MHz	–	–	−90	dBm
	ruggedness	$V_S = 6.5$ V; adjust V_C for $P_L = 1.4$ W; VSWR ≤ 10 : 1 through all phases	no degradation			



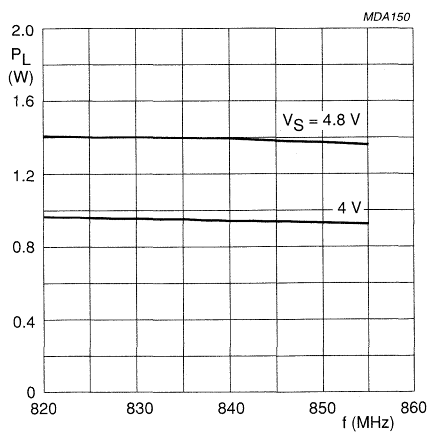
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.3 Load power as a function of control voltage; BGY122A; typical values.



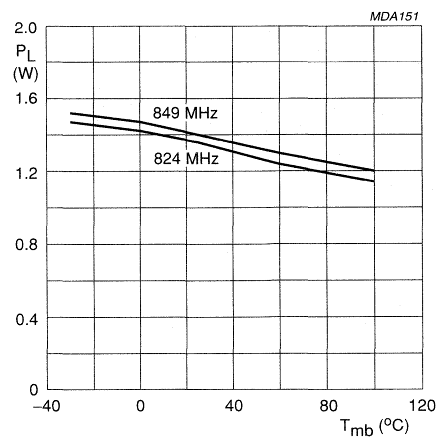
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.4 Efficiency as a function of load power; BGY122A; typical values.



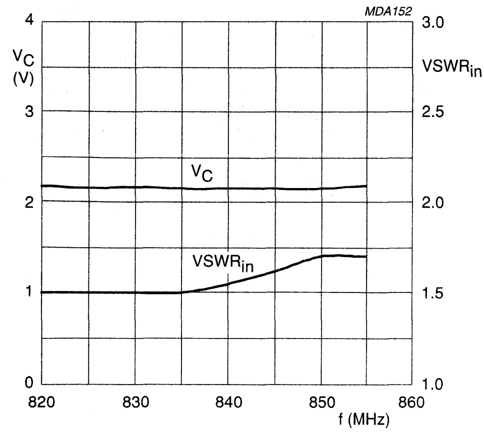
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.5 Load power as a function of frequency; BGY122A; typical values.



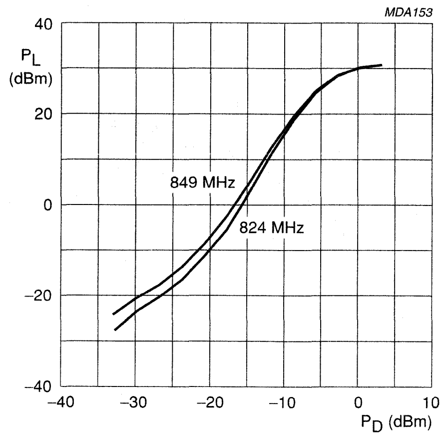
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C = 3$ V.

Fig.6 Load power as a function of mounting base temperature; BGY122A; typical values.



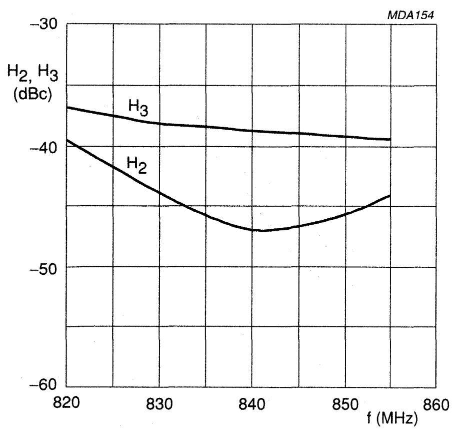
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.7 Control voltage and input VSWR as functions of frequency; BGY122A; typical values.



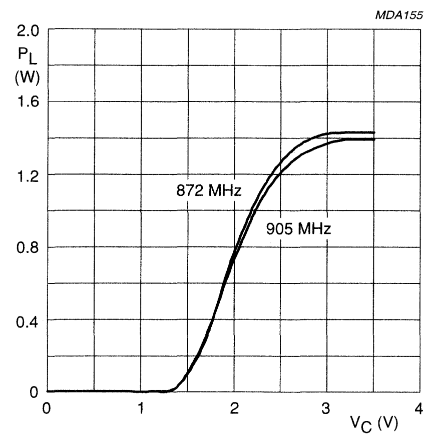
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.8 Load power as a function of drive power; BGY122A; typical values.



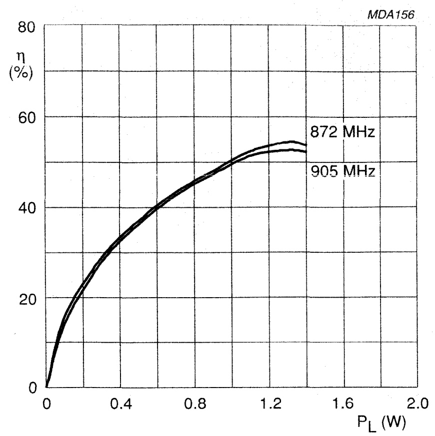
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.9 Harmonics as a function of frequency; BGY122A; typical values.



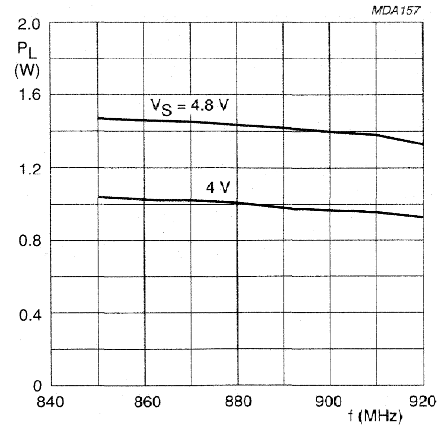
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.10 Load power as a function of control voltage; BGY122B; typical values.



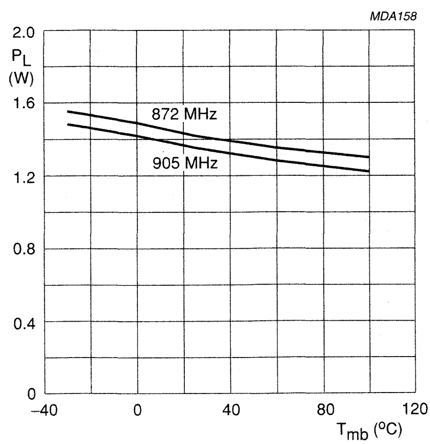
$Z_S = Z_L = 50\ \Omega$; P_D =2 mW; V_S = 4.8 V; T_{mb} = 25 °C.

Fig.11 Efficiency as a function of load power; BGY122B; typical values.



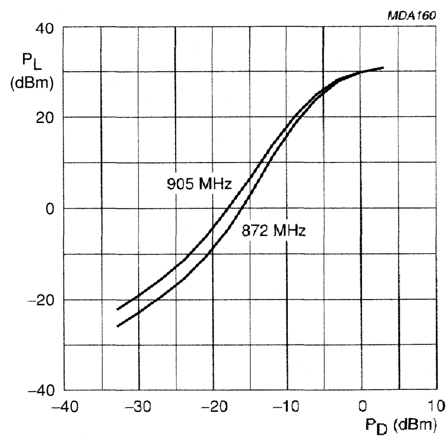
$Z_S = Z_L = 50\ \Omega$; P_D = 2 mW; V_C = 3 V; T_{mb} = 25 °C.

Fig.12 Load power as a function of frequency; BGY122B; typical values.



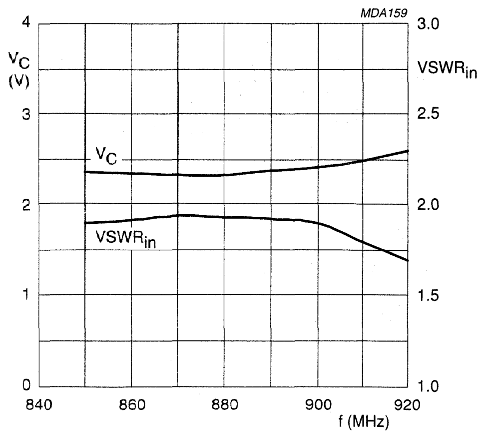
$Z_S = Z_L = 50\ \Omega$; P_D = 2 mW; V_S = 4.8 V; V_C = 3 V.

Fig.13 Load power as a function of mounting base temperature; BGY122B; typical values.



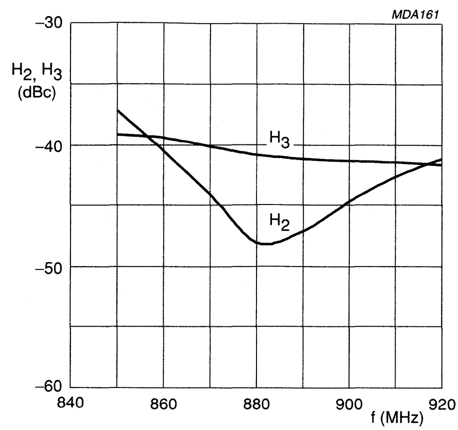
$Z_S = Z_L = 50\ \Omega$; V_S = 4.8 V; V_C = 3 V; T_{mb} = 25 °C.

Fig.14 Load power as a function of drive power; BGY122B; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.15 Control voltage and input VSWR as functions of frequency; BGY122B; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.16 Harmonics as a function of frequency; BGY122B; typical values.

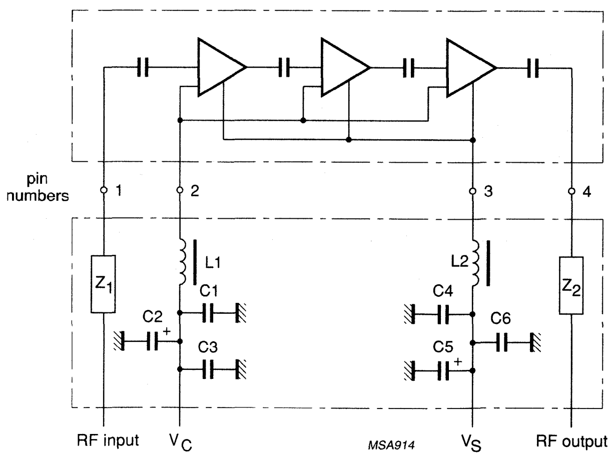
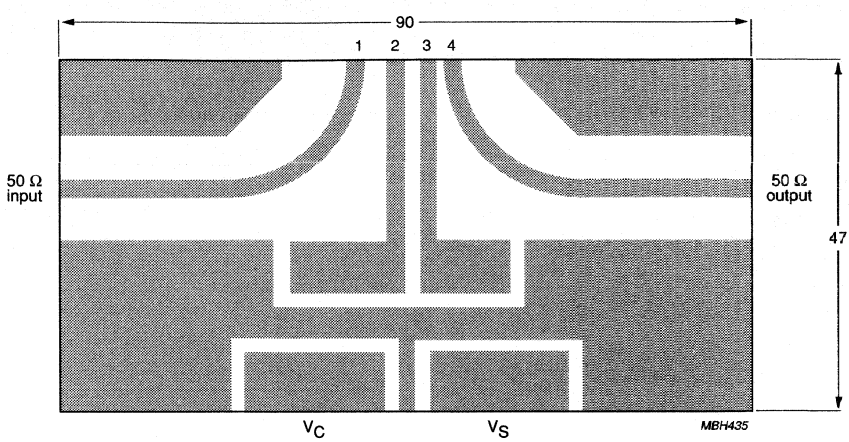


Fig.17 Test circuit.



Dimensions in mm.

Fig.18 Printed-circuit board test-fixture.

List of components (See Figs 17 and 18)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C4	multilayer ceramic chip capacitor	100 nF	2222 852 47104
C2, C5	tantalum capacitor	2.2 μF; 35 V	–
C3, C6	multilayer ceramic chip capacitor	33 pF	2222 851 13339
L1, L2	Grade 4S2 Ferroxcube chip bead	–	4330 030 36300
Z_1, Z_2	stripline; note 1	50 Ω	–

Note

1. The striplines are on a double copper-clad printed-circuit board with PTFE fibreglass dielectric (ε_r = 2.2); thickness $^1/_{32}$ inch.

HF amplifier modules | BGY148A; BGY148B

FEATURES

- Single 6 V nominal supply voltage
- 3 W output power
- Easy control of output power by DC voltage
- Silicon bipolar technology
- Standby current less than 100 μA.

APPLICATIONS

- Portable communication equipment operating in the 400 to 440 MHz and 430 to 488 MHz frequency ranges respectively.

DESCRIPTION

The BGY148A and BGY148B are three-stage UHF amplifier modules in a SOT421A package. Each module consists of three NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate. The modules produce an output power of 3 W into a load of 50 Ω with an RF drive power of 10 mW.

PINNING - SOT421A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

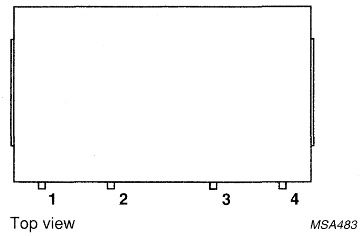


Fig.1 Simplified outline (SOT421A).

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

TYPE	MODE OF OPERATION	f (MHz)	V_S (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
BGY148A	CW	400 to 440	6	≥3	≥24.8	typ. 53	50
BGY148B	CW	430 to 488	6	≥3	≥24.8	typ. 53	50

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	8.5	V
V_C	DC control voltage	–	4	V
P_D	input drive power	–	20	mW
P_L	load power	–	3.5	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting-base temperature; note1	–30	+100	°C

Note

1. In order to control the mounting-base temperature, proper heatsinking of the underside of the device is required. It is therefore advisable that the device is mounted on a printed-circuit board with metallized through holes.

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $P_D = 10$ mW; $V_S = 6$ V; $V_C \leq 3.5$ V; $T_{mb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency range					
	BGY148A		400	–	440	MHz
	BGY148B		430	–	488	MHz
I_Q	total quiescent current	$V_C = 0$; $P_D = 0$	–	–	100	μA
I_C	control current	adjust V_C for $P_L = 3$ W	–	–	500	μA
P_L	load power		3	–	–	W
G_p	power gain	adjust V_C for $P_L = 3$ W	24.8	–	–	dB
η	efficiency	adjust V_C for $P_L = 3$ W	46	53	–	%
H_2	second harmonic	adjust V_C for $P_L = 3$ W	–	–	−38	dBc
H_3	third harmonic	adjust V_C for $P_L = 3$ W	–	–	−38	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 3$ W	–	–	3 : 1	
	control range	$V_C = 0$ to 3.5 V	10	–	–	dB
	stability	$P_D = 5$ to 20 mW; $V_S = 5$ to 8.5 V; $P_L \leq 3.5$ W; VSWR ≤ 4 : 1 through all phases	–	–	−60	dBc
	ruggedness	$V_S = 8.5$ V; adjust V_C for $P_L = 3.5$ W; VSWR ≤ 4 : 1 through all phases	no degradation			

FEATURES

- 4.8 V nominal supply voltage
- 3 W output power
- Easy control of output power by DC voltage.

APPLICATIONS

- Digital cellular radio systems with Time Division Multiple Access (TDMA) operation (GSM systems) in the 880 to 915 MHz frequency range.

DESCRIPTION

The BGY206 is a three-stage UHF amplifier module in a SOT388B package. The module consists of three NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT388B

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

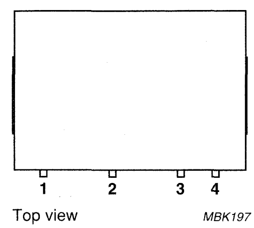


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_S (V)	V_C (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
Pulsed; δ = 1 : 8	880 to 915	4.8	≤3.5	3	≥30	typ. 45	50

LIMITING VALUES

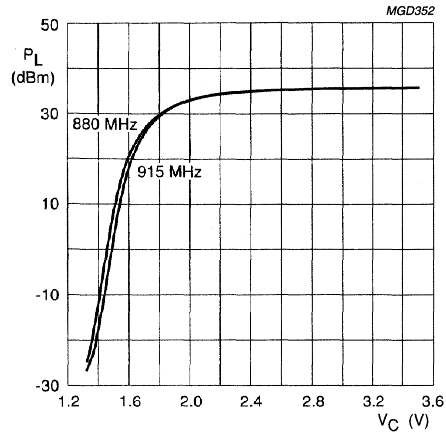
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_S	DC supply voltage	$V_C < 0.5$ V	–	10	V
V_C	DC control voltage		–	4	V
P_D	input drive power		–	10	mW
P_L	load power		–	3.5	W
T_{stg}	storage temperature		–40	+100	°C
T_{mb}	operating mounting base temperature		–30	+100	°C

CHARACTERISTICS

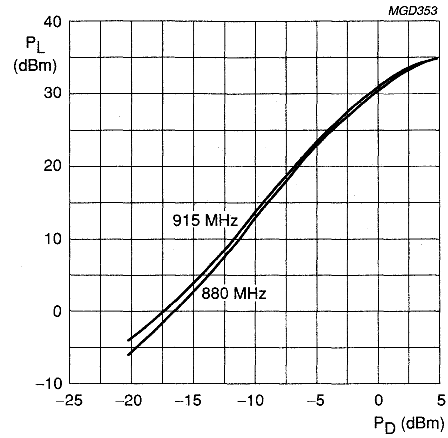
$Z_S = Z_L = 50\ \Omega$; $P_D = 3$ mW; $V_S = 4.8$ V; $V_C \leq 3.5$ V; f = 880 to 915 MHz; $T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575\ \mu s$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_Q	leakage current	$V_C = 0.5$ V	–	–	100	μA
I_C	control current	adjust V_C for $P_L = 3$ W	–	–	500	μA
P_L	load power	$V_C = 3.5$ V	3	–	–	W
		$V_C = 3.5$ V; $V_S = 4.3$ V; $T_{mb} = 85$ °C	2	–	–	W
G_p	power gain	adjust V_C for $P_L = 3$ W	30	–	–	dB
η	efficiency	adjust V_C for $P_L = 3$ W	40	45	–	%
H_2	second harmonic	adjust V_C for $P_L = 3$ W	–	–	–40	dBc
H_3	third harmonic	adjust V_C for $P_L = 3$ W	–	–	–40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 3$ W	–	–	3 : 1	
	stability	$P_D = 1.5$ to 6 mW; $V_S = 4$ to 6.5 V; $V_C = 0$ to 3.5 V; $P_L \leq 3$ W; VSWR $\leq$ 6 : 1 through all phases	–	–	–60	dBc
	isolation	$V_C = 0.5$ V	–	–	–36	dBm
	control bandwidth		1	–	–	MHz
P_n	noise power	$P_L = 3$ W; bandwidth = 30 kHz; 20 MHz above transmission band	–	–	–85	dBm
	ruggedness	$V_S = 6.5$ V; adjust V_C for $P_L = 3$ W; VSWR $\leq$ 10 : 1 through all phases	no degradation			



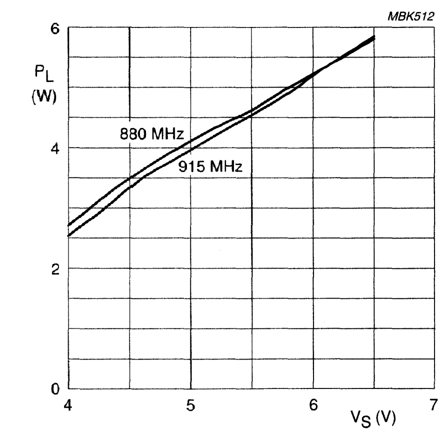
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs.

Fig.2 Load power as a function of control voltage; typical values.



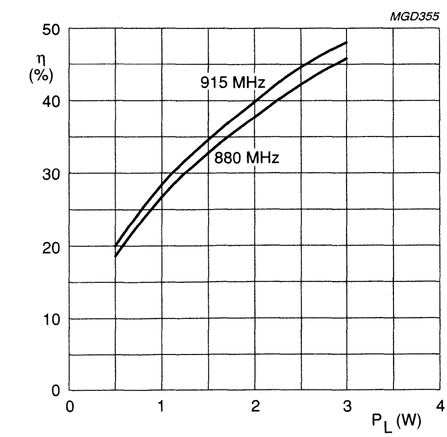
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; adjust V_C for $P_L = 3$ W;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs.

Fig.3 Load power as a function of drive power; typical values.



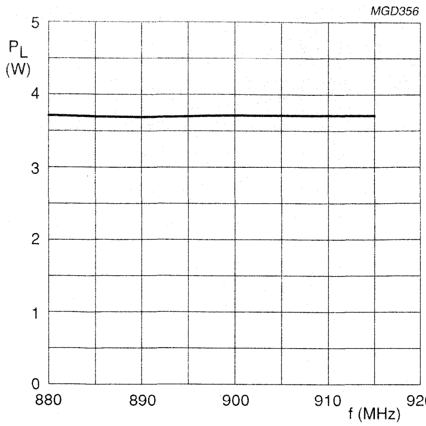
$Z_S = Z_L = 50\ \Omega$; $V_C = 3.5$ V; $P_D = 3$ mW;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs.

Fig.4 Load power as a function of supply voltage; typical values.



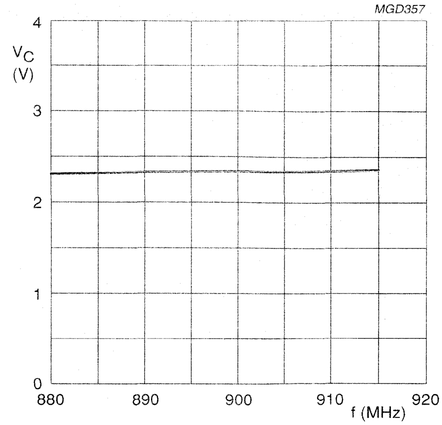
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs

Fig.5 Efficiency as a function of load power; typical values.



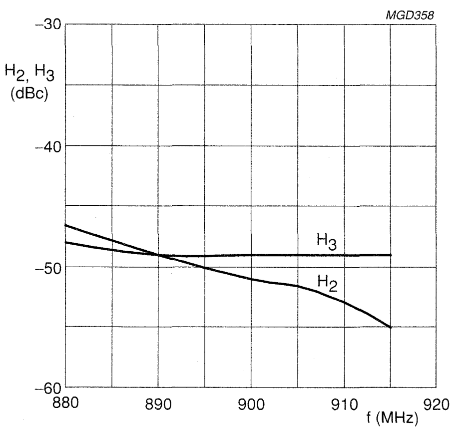
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW; $V_C = 3.5$ V;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ μs.

Fig.6 Load power as a function of frequency; typical values.



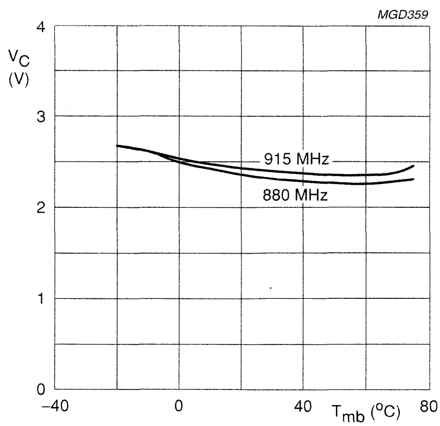
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW; $P_L = 3$ W;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ μs.

Fig.7 Control voltage as a function of frequency; typical values.



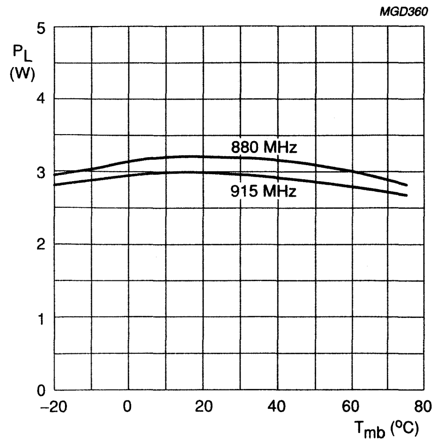
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW; $P_L = 3$ W;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ μs.

Fig.8 Harmonics as a function of frequency; typical values.



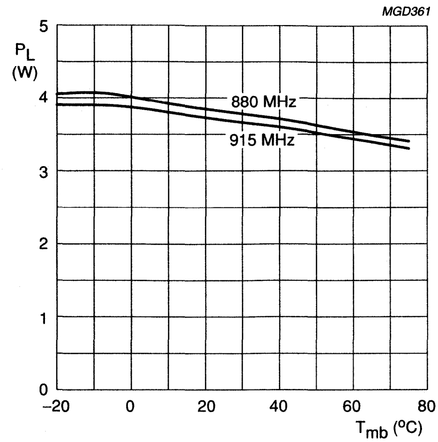
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW; $P_L = 3$ W;
$\delta = 1:8$; $t_p = 575$ μs.

Fig.9 Control voltage as a function of mounting base temperature; typical values.



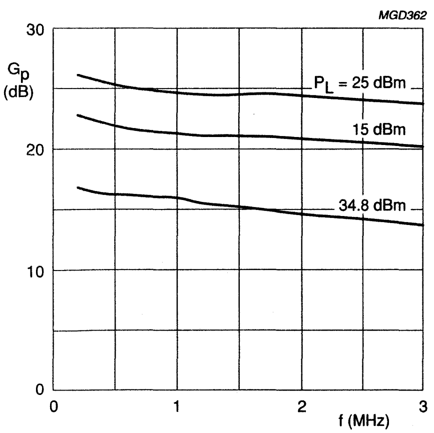
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.3$ V; $P_D = 3$ mW; $V_C = 3.5$ V;
$\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.10 Load power as a function of mounting base temperature (reduced supply voltage); typical values.



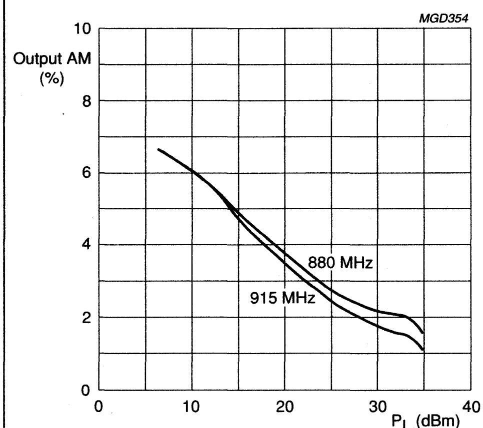
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW; $V_C = 3.5$ V;
$\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.11 Load power as a function of mounting base temperature; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW; f = 900 MHz; C1 = 0;
R1 = 100 Ω; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.12 Control loop power gain as a function of frequency on the control pin; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW; $T_{mb} = 25$ °C;
input amplitude modulation = 3%; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.13 Output amplitude modulation as a function of load power; typical values.

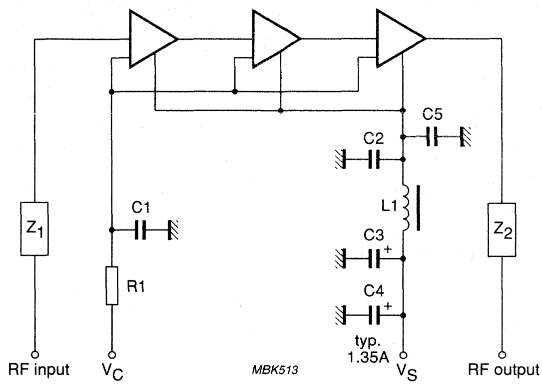
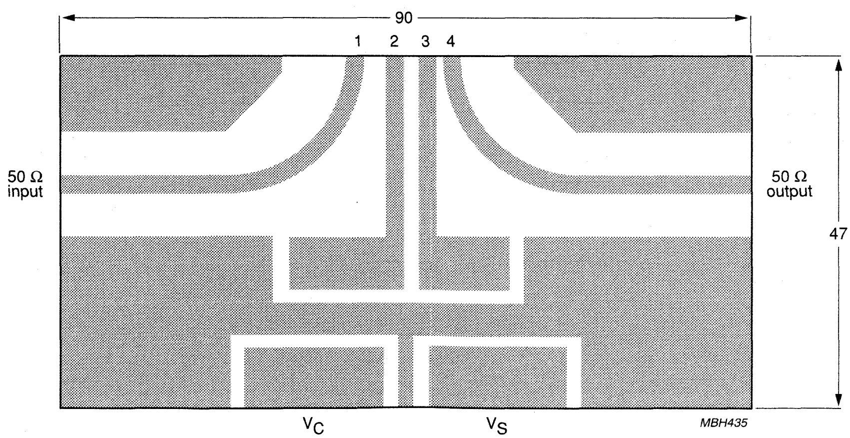


Fig.14 Test circuit.



Dimensions in mm.

Fig.15 Printed-circuit board layout.

List of components (See Fig 14)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C2	multilayer ceramic chip capacitor	680 pF		2222 851 11681
C3	tantalum capacitor	2.2 μF; 35 V		–
C4	electrolytic capacitor	47 μF; 40 V		2222 030 37479
C5	multilayer ceramic chip capacitor	100 nF		2222 852 47104
L1	Grade 4S2 Ferroxcube bead			4330 030 36300
Z_1, Z_2	stripline; note 1	50 Ω	width 2.33 mm	–
R1	metal film resistor	100 Ω; 0.6 W		2322 156 11001

Note

1. The striplines are on a double copper-clad printed-circuit board with PTFE fibreglass dielectric ($\varepsilon_r = 2.2$); thickness $^1/_{32}$ inch.

UHF amplifier module BGY240S

FEATURES

- 3.5 V nominal supply voltage
- 3 W output power
- Easy output power control by DC voltage.

APPLICATIONS

- Digital cellular radio systems with Time Division Multiple Access (TDMA) operation (GSM systems) in the 890 to 915 MHz frequency range.

DESCRIPTION

The BGY240S is a three-stage UHF amplifier module in a SOT388C package. The module consists of three NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT388C

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

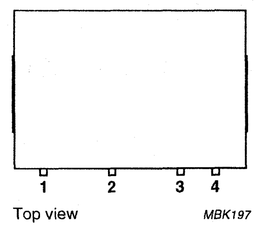


Fig.1 Simplified outline

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_S (V)	V_C (V)	P_L (W)	G_p (dB)	η (%)	Z_S, Z_L (Ω)
Pulsed; δ = 1 : 8	890 to 915	3.5	≤2.2	≥3 typ. 3.5	≥35	typ. 47	50

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

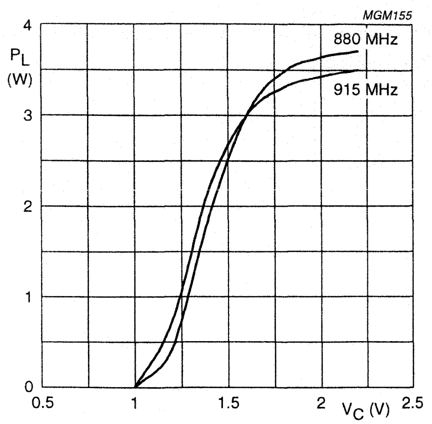
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_S	DC supply voltage	V_C < 0.2 V; no RF	–	6	V
		V_C ≥ 0.2 V	–	5	V
V_C	DC control voltage		–	3	V
P_D	input drive power		–	5	mW
P_L	load power		–	3.8	W
T_{stg}	storage temperature		–40	+100	°C
T_{mb}	operating mounting base temperature		–30	+100	°C

CAUTION
This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

CHARACTERISTICS

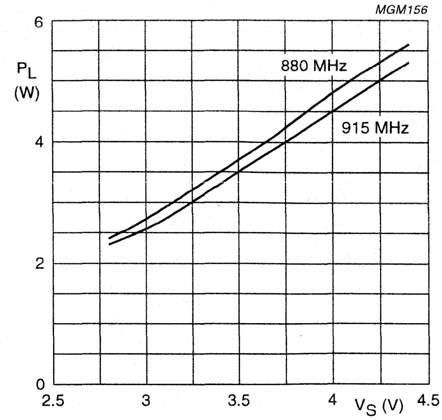
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 3.5$ V; $V_C \leq 2.2$ V; f = 890 to 915 MHz; $T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_Q	leakage current	$V_C = 0.2$ V	–	–	10	µA
I_{CM}	peak control current	adjust V_C for $P_L = 2.5$ W	–	–	3	mA
P_L	load power	$V_C = 2.2$ V	3	3.5	–	W
G_p	power gain	adjust V_C for $P_L = 2.5$ W	35	–	–	dB
η	efficiency	adjust V_C for $P_L = 2.5$ W	–	44	–	%
H_2	second harmonic	adjust V_C for $P_L = 2.5$ W	–	–	–35	dBc
H_3	third harmonic	adjust V_C for $P_L = 2.5$ W	–	–	–33	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 2.5$ W	–	1.8 : 1	3 : 1	
	stability	$V_S = 3$ to 5 V; $P_D = -2$ to 5 dBm; $V_C = 0$ to 2.2 V; $P_L \leq 3$ W; VSWR ≤ 12 : 1 through all phases	–	–	–60	dBc
	isolation	$V_C = 0.2$ V	–	–45	–36	dBm
P_n	noise power	$P_L = 2.5$ W; bandwidth = 30 kHz; 10 MHz above transmission band	–	–82	–80	dBm
	AM/PM conversion	$P_D = -2$ to 5 dBm; $P_L = 6$ to 34 dBm	–	–	3	deg/dB
	AM/AM conversion	P_D with 3% AM; f = 100 kHz; $P_L = 6$ to 34 dBm	–	–	12	%
t_r	carrier rise time	$P_L = 6$ to 34 dBm; time to settle within –0.5 dB of final P_L	–	1.5	2	µs
t_f	carrier fall time	$P_L = 6$ to 34 dBm; time to settle within –0.5 dB of final P_L	–	1.5	2	µs
	ruggedness	$V_S = 5$ V; adjust V_C for $P_L = 3$ W; VSWR ≤ 12 : 1 through all phases	no degradation			



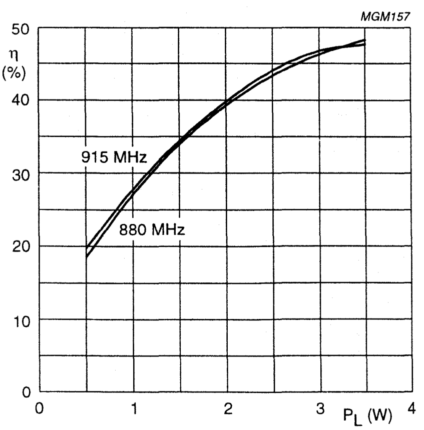
$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 1$ mW;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.2 Load power as a function of control voltage; typical values.



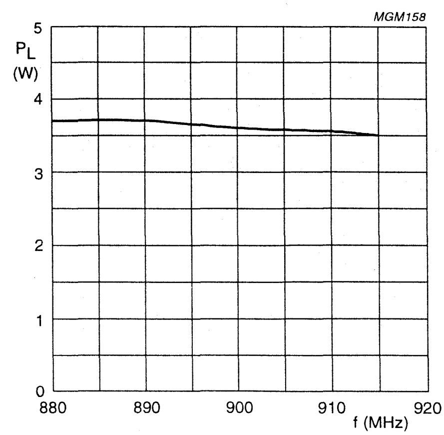
$Z_S = Z_L = 50\ \Omega$; $V_C = 2.2$ V; $P_D = 1$ mW;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.3 Load power as a function of supply voltage; typical values.



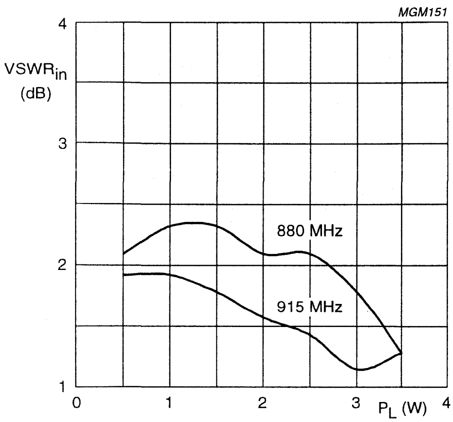
$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 1$ mW;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.4 Efficiency as a function of load power; typical values.



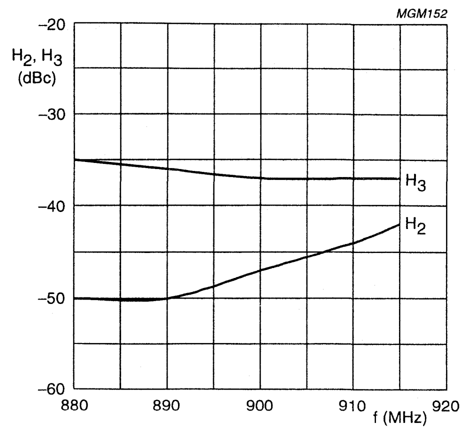
$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 1$ mW; $V_C = 2.2$ V;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.5 Load power as a function of frequency; typical values.



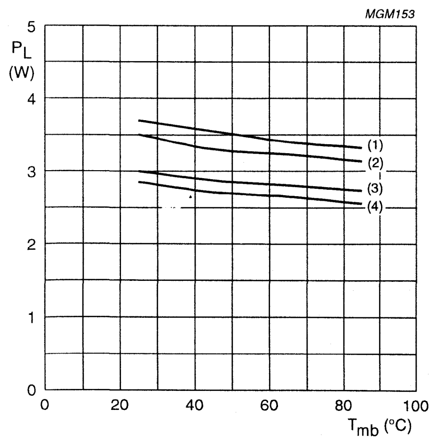
$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 1$ mW;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575\ \mu s$

Fig.6 Input VSWR as a function of load power; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 1$ mW; $P_L = 2.5$ W;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575\ \mu s$.

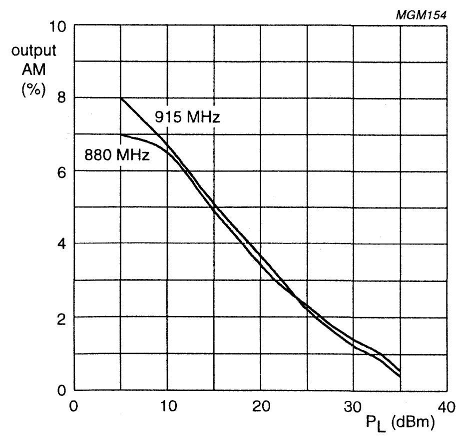
Fig.7 Harmonics as a function of frequency; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 2.2$ V; $\delta = 1 : 8$; $t_p = 575\ \mu s$.

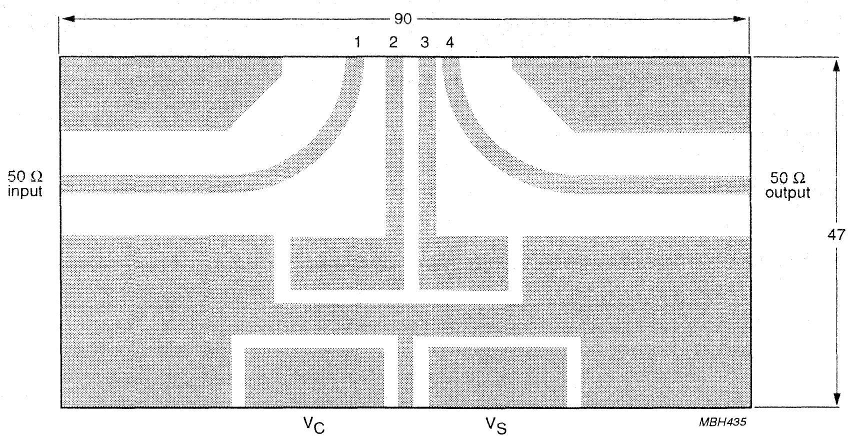
(1) $V_S = 3.5$ V; f = 880 MHz.
(2) $V_S = 3.5$ V; f = 915 MHz.
(3) $V_S = 3.1$ V; f = 880 MHz.
(4) $V_S = 3.1$ V; f = 915 MHz.

Fig.8 Load power as a function of mounting base temperature; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 3.5$ V; $P_D = 1$ mW; $T_{mb} = 25$ °C;
$\Delta f = 100$ kHz; input amplitude modulation = 3%; $\delta = 1 : 8$; $t_p = 575\ \mu s$.

Fig.9 Output amplitude modulation as a function of load power; typical values.



Dimensions in mm.

Fig.10 Printed-circuit board test-fixture.

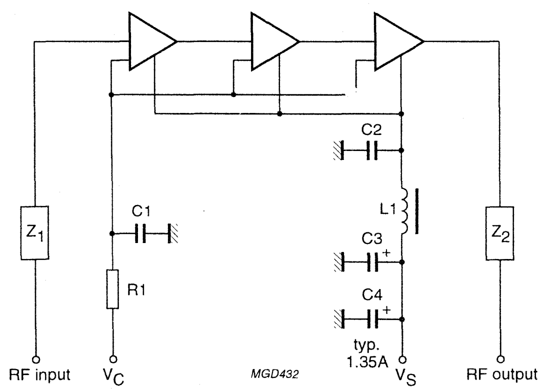


Fig.11 Test circuit.

List of components (see Fig.26)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C2	multilayer ceramic chip capacitor	680 pF		2222 851 11681
C3	tantalum capacitor	2.2 μF; 35 V		
C4	electrolytic capacitor	47 μF; 40 V		2222 030 37479
L1	Grade 4S2 Ferroxcube bead			4330 030 36300
Z_1, Z_2	stripline; note 1	50 Ω	width 2.33 mm	
R1	metal film resistor	100 Ω; 0.6 W		2322 156 11001

Note

1. The striplines are on a double copper-clad printed-circuit board with PTFE fibreglass dielectric (ε_r = 2.2); thickness $^1\!/_{32}$ inch.

UHF amplifier module BGY241

FEATURES

- 3.5 V nominal supply voltage
- 35 dBm output power
- Easy output power control by DC voltage.

APPLICATIONS

- Digital cellular radio systems with Time Division Multiple Access (TDMA) operation (GSM systems) in the 880 to 915 MHz frequency range.

DESCRIPTION

The BGY241 is a three-stage UHF amplifier module in a SOT482B leadless package with a plastic cover. The module consists of one NPN silicon planar transistor die and one bipolar monolithic integrated circuit mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT482B

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

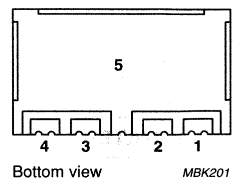


Fig.1 Simplified outline

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_S (V)	V_C (V)	P_L (dBm)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
Pulsed; δ = 1 : 8	880 to 915	3.5	$\leq$2.2	35	$\geq$35	$\geq$45	50

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_S	DC supply voltage	$V_C = 0$; $P_D = 0$ mW	–	8	V
V_C	DC control voltage		–	3	V
P_D	input drive power		–	10	mW
P_L	load power		–	4	W
T_{stg}	storage temperature		–40	+100	°C
T_{mb}	operating mounting base temperature		–30	+100	°C

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dB; $V_S = 3.5$ V; $V_C \leq 2.2$ V; f = 880 to 915 MHz; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_Q	leakage current	$V_C = 0.2$ V; $P_D = 0$ mW	–	–	10	μA
I_{CM}	peak control current	adjust V_C for $P_L = 35$ dBm	–	–	3	mA
P_L	load power	$V_C = 2.2$ V	35	35.5	–	dBm
G_p	power gain	adjust V_C for $P_L = 35$ dBm	35	–	–	dB
η	efficiency	adjust V_C for $P_L = 35$ dBm	45	–	–	%
H_2	second harmonic	adjust V_C for $P_L = 35$ dBm	–	–	–40	dBc
H_3 to H_6	third to sixth harmonics	adjust V_C for $P_L = 35$ dBm	–	–	–35	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 35$ dBm	–	–	2 : 1	
		adjust V_C for $P_L < 35$ dBm	–	–	3 : 1	
	stability	$V_S = 3$ to 5 V; $P_D = -3$ to +3 dBm; $V_C = 0$ to 2.2 V; $P_L \leq 35$ dBm; VSWR ≤ 12 : 1 through all phases	–	–	–60	dBc
	isolation	$V_C = 0.5$ V	–	–	–40	dBm
	control bandwidth		1	–	–	MHz
	control slope	$P_L = 3$ mW to 35 dBm	–	–	120	dB/V
P_n	noise power	$P_L = 5$ to 34.5 dBm; bandwidth = 30 kHz; 10 MHz above transmitter band	–	–	–85	dBm
	AM/AM conversion	$P_D = 4\%$ AM; f = 50 kHz; $P_L = 5$ to 35 dBm	–	–	10	%
	AM/PM conversion	$P_D = -3$ to +3 dBm; $P_L = 5$ to 35 dBm	–	–	5	deg
	conversion gain	measured at f = 925 MHz; $P_L = 34.5$ dBm; $P_D = -40$ dBm at 905 MHz; $P_D = 0$ dBm at 915 MHz	–	–	–8	dB
	ruggedness	$V_S = 5$ V; adjust V_C for $P_L = 35$ dBm; VSWR ≤ 12 : 1 through all phases	no degradation			

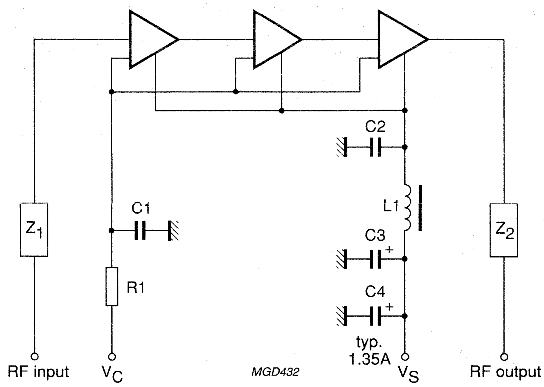


Fig.2 Test circuit

List of components (See Fig 2)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C2	multilayer ceramic chip capacitor	680 pF		2222 851 11681
C3	tantalum capacitor	2.2 µF; 35 V		–
C4	electrolytic capacitor	47 µF; 40 V		2222 030 37479
L1	Grade 4S2 Ferroxcube bead			4330 030 36300
Z_1, Z_2	stripline; note 1	50 Ω	width 2.33 mm	–
R1	metal film resistor	100 Ω; 0.6 W		2322 156 11001

Note

1. The striplines are on a double copper-clad printed-circuit board with PTFE fibreglass dielectric ($\varepsilon_r = 2.2$); thickness $\frac{1}{32}$ inch.

FEATURES

- 26 V nominal supply voltage
- 16 W output power into a load of 50 Ω with an RF drive power of 25 mW.

APPLICATIONS

- Base station transmitting equipment operating in the 920 to 960 MHz frequency range.

DESCRIPTION

The BGY916 is a three-stage UHF amplifier module in a SOT365 package. It consists of one NPN silicon planar transistor die and two silicon MOS-FET dies mounted on a metallized ceramic AlN substrate, together with matching and bias circuitry.

PINNING - SOT365

PIN	DESCRIPTION
1	RF input
2	V_{S1}
3	V_{S2}
4	RF output
flange	ground

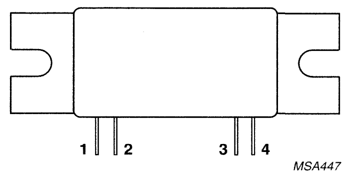


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_{S1}; V_{S2} (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
CW	920 to 960	26	16	≥28	≥35	50

LIMITING VALUES

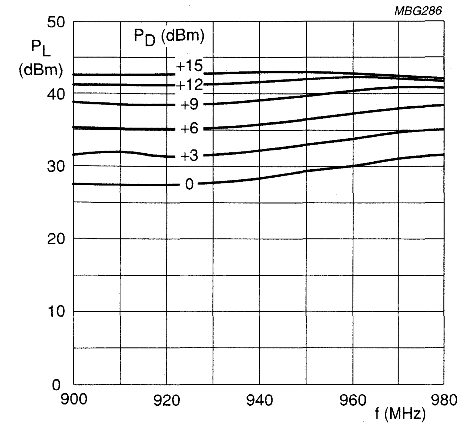
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	28	V
V_{S2}	DC supply voltage	–	28	V
P_D	input drive power	–	80	mW
P_L	load power	–	25	W
T_{stg}	storage temperature	–30	+100	°C
T_{mb}	operating mounting base temperature	–10	+90	°C

CHARACTERISTICS

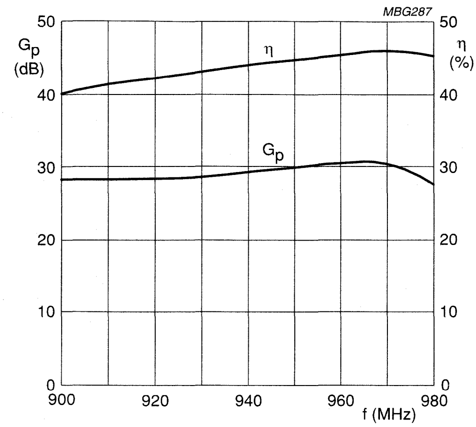
T_{mb} = 25 °C; V_{S1} = V_{S2} = 26 V; P_L = 16 W; Z_S = Z_L = 50 Ω unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency		920	–	960	MHz
I_{S1}	supply current		–	50	–	mA
I_{S2}	supply current	P_D < –60 dBm	–	150	–	mA
P_L	load power		16	19	–	W
G_p	power gain		28	30	32	dB
ΔG_p	gain ripple	40 dB dynamic range at f = 920 to 960 MHz	–	1	4	dB
η	efficiency		35	40	–	%
H_2	second harmonic		–	–47	–35	dBc
H_3	third harmonic		–	–55	–45	dBc
$VSWR_{in}$	input VSWR		–	1 : 1.5	2 : 1	
	isolation	V_{S1} = 0	–	–	–40	dBm
	stability	VSWR ≤ 3 : 1 through all phases; V_{S2} = 24 to 28 V	–	–	–60	dBc
	reverse intermodulation	$P_{carrier}$ = 16 W; $P_{interference}$ = 16 μW; $f_i = f_c$ ±600 kHz	–	–68	–65	dBc
F	noise figure		–	5	8	dBc
B	AM bandwidth		2	–	–	MHz
	ruggedness	VSWR ≤ 5 : 1 through all phases	no degradation			



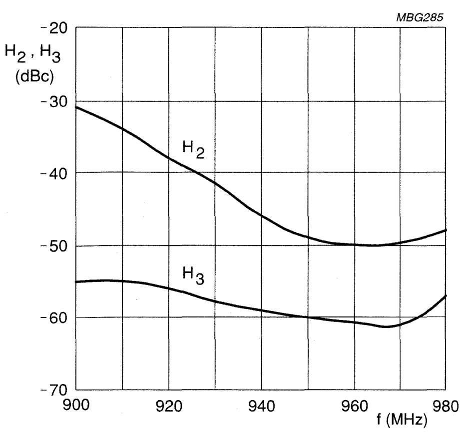
$V_{S1} = V_{S2} = 26$ V; $Z_S = Z_L = 50\ \Omega$; $T_{mb} = 25$ °C.

Fig.2 Load power as a function of frequency; typical values.



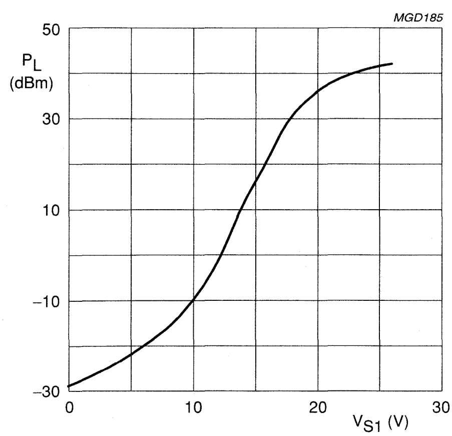
$V_{S1} = V_{S2} = 26$ V; $P_L = 16$ W; $Z_S = Z_L = 50\ \Omega$; $T_{mb} = 25$ °C.

Fig.3 Power gain and efficiency as functions of frequency; typical values.



$V_{S1} = V_{S2} = 26$ V; $P_L = 16$ W; $Z_S = Z_L = 50\ \Omega$; $T_{mb} = 25$ °C.

Fig.4 Harmonics as a function of frequency; typical values.



f = 940 MHz; $V_{S2} = 26$ V; $Z_S = Z_L = 50\ \Omega$; $T_{mb} = 25$ °C.

Fig.5 Load power as a function of supply voltage; typical values.

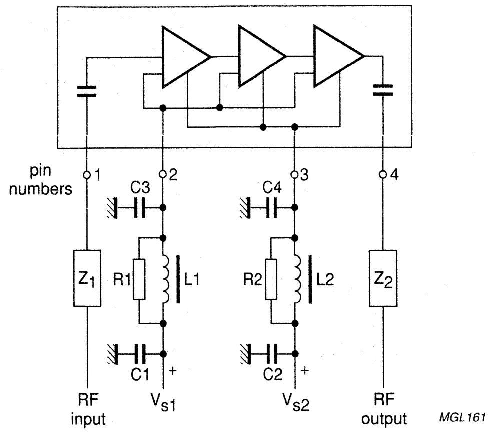


Fig.6 Test circuit.

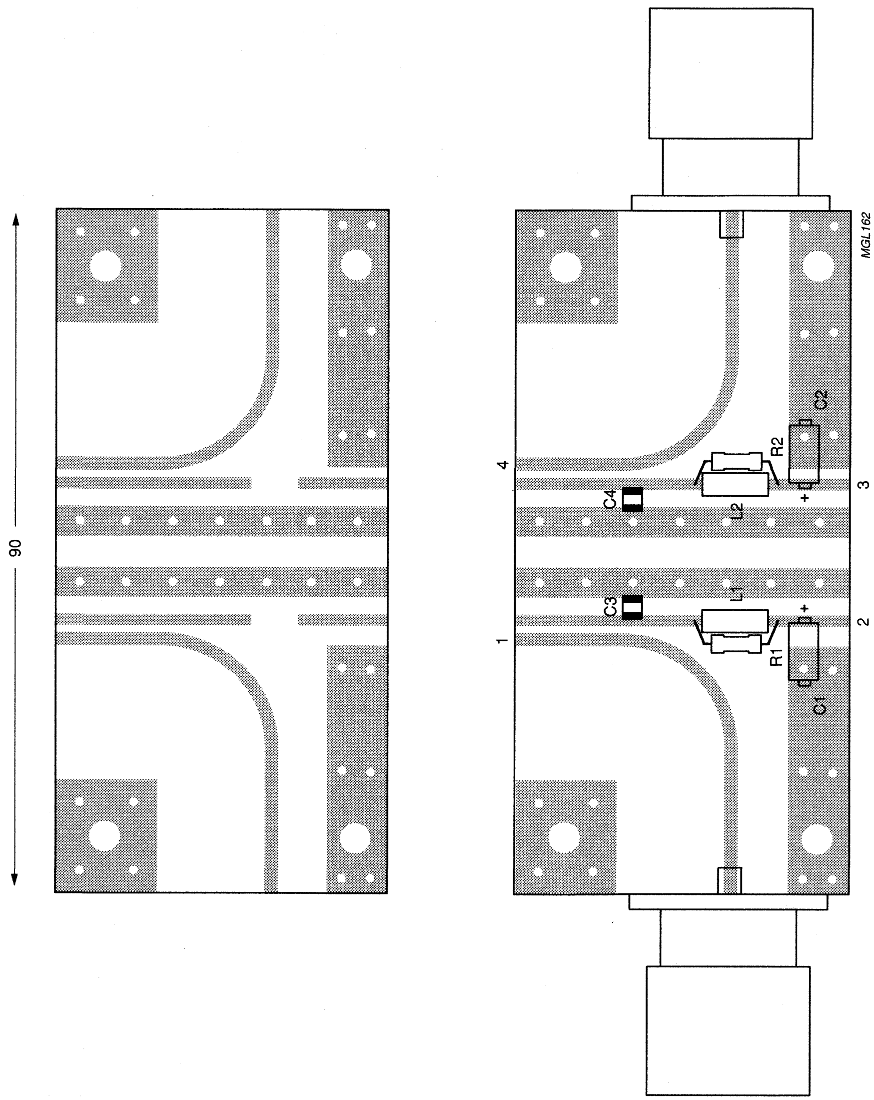


Fig.7 Printed-circuit board component layout.

Dimensions in mm.

List of components (see Figs 6 and 7)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C2	electrolytic capacitor	10 μF; 35 V	
C3, C4	multilayer ceramic chip capacitor	100 nF; 50 V	
L1, L2	Grade 4S2 Ferroxcube bead		4330 030 36300
R1, R2	metal film resistor	10 Ω; 0.4 W	2322 195 13109
Z_1, Z_2	stripline; note 1	50 Ω	–

Note

1. The striplines are on a double copper-clad printed-circuit board with epoxy dielectric (ε_r = 4.5); thickness = 1 mm.

MOUNTING RECOMMENDATIONS

To ensure a good thermal contact and to prevent mechanical stresses when bolted down, the flatness of the mounting base is designed to be typically better than 0.1 mm. The mounting area of the heatsink should be flat and free from burrs and loose particles. The heatsink should be rigid and not prone to bowing under thermal cycling conditions. The thickness of a solid heatsink should be not less than 5 mm to ensure a rigid assembly.

A thin, even layer of thermal compound should be used between the mounting base and the heatsink to achieve the best possible contact thermal resistance. Excessive use of thermal compound will result in an increase in thermal resistance and possible bowing of the mounting base; too little will also result in poor thermal conduction.

The module should be mounted to the heatsink using 3 mm bolts with flat washers. The bolts should first be tightened to “finger tight” and then further tightened in alternating steps to a maximum torque of 0.4 to 0.6 Nm.

Once mounted on the heatsink, the module leads can be soldered to the printed-circuit board. A soldering iron may be used up to a temperature of 250 °C for a maximum of 10 seconds at a distance of 2 mm from the plastic cap.

ESD precautions must be taken to protect the device from electrostatic damage.

UHF amplifier module BGY916/5

FEATURES

- 26 V nominal supply voltage
- 5 V nominal bias voltage
- 16 W output power into a load of 50 Ω with an RF drive power of 25 mW.

APPLICATIONS

- Base station transmitting equipment operating in the 920 to 960 MHz frequency range.

DESCRIPTION

The BGY916/5 is a three-stage UHF amplifier module in a SOT365 package. It consists of one NPN silicon planar transistor die and two silicon MOS-FET dies mounted on a metallized ceramic AlN substrate, together with matching and bias circuitry.

PINNING SOT365

PIN	DESCRIPTION
1	RF input
2	V_{S1} (bias)
3	V_{S2}
4	RF output
flange	ground

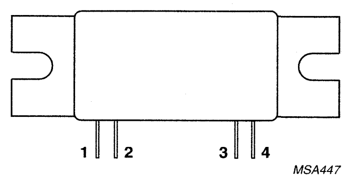


Fig.1 Simplified outline

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_{S1} (V)	V_{S2} (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
CW	920 to 960	5	26	16	≥28	≥35	50

LIMITING VALUES

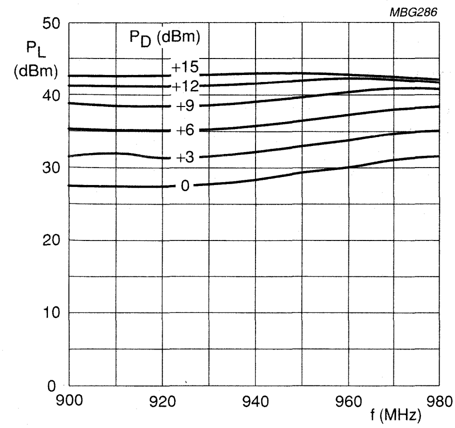
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	5.5	V
V_{S2}	DC supply voltage	–	28	V
P_D	input drive power	–	80	mW
P_L	load power	–	25	W
T_{stg}	storage temperature	–30	+100	°C
T_{mb}	operating mounting base temperature	–10	+90	°C

CHARACTERISTICS

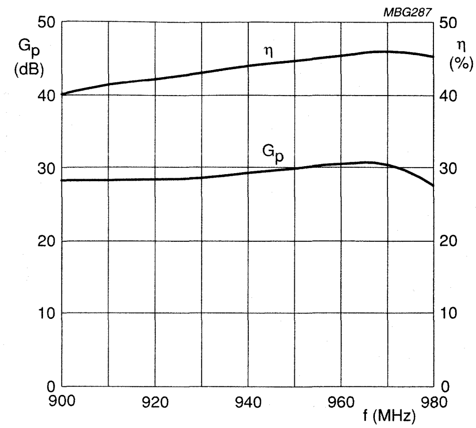
T_{mb} = 25 °C; V_{S1} = 5 V; V_{S2} = 26 V; P_L = 16 W; $Z_S = Z_L$ = 50 Ω unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency		920	–	960	MHz
I_{S1}	supply current		–	50	–	mA
I_{S2}	supply current	P_D < –60 dBm	–	150	–	mA
P_L	load power	P_D = 25 mW (14 dBm)	16	19	–	W
G_p	power gain		28	30	32	dB
ΔG_p	gain ripple	40 dB dynamic range at f = 920 to 960 MHz	–	1	4	dB
η	efficiency		35	40	–	%
H_2	second harmonic		–	–47	–35	dBc
H_3	third harmonic		–	–55	–45	dBc
$VSWR_{in}$	input VSWR		–	1.5 : 1	2 : 1	
	isolation	V_{S1} = 0	–	–	–40	dBm
	stability	VSWR ≤ 3 : 1 through all phases; V_{S2} = 24 to 26 V	–	–	–60	dBc
	reverse intermodulation	$P_{carrier}$ = 16 W; $P_{interference}$ = 16 μW; $f_i = f_c$ ±600 kHz	–	–68	–65	dBc
F	noise figure		–	5	8	dBc
B	AM bandwidth	At 3 dB corner frequency; $P_{carrier}$ = 16 W; modulation = 20 %	2	–	–	MHz
	ruggedness	VSWR ≤ 5 : 1 through all phases	no degradation			



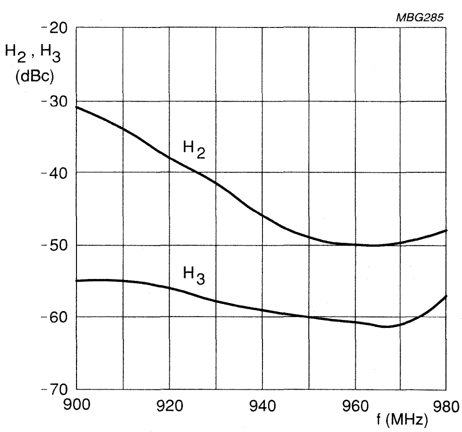
V_{S1} = 5 V; V_{S2} = 26 V; Z_S = Z_L = 50 Ω; T_{mb} = 25 °C.

Fig.2 Load power as a function of frequency; typical values.



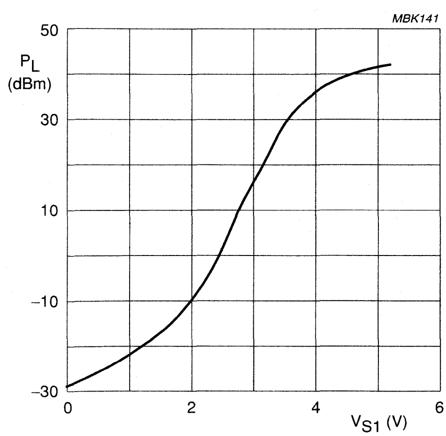
V_{S1} = 5 V; V_{S2} = 26 V; P_L = 16 W; Z_S = Z_L = 50 Ω; T_{mb} = 25 °C.

Fig.3 Power gain and efficiency as functions of frequency; typical values.



V_{S1} = 5 V; V_{S2} = 26 V; P_L = 16 W; Z_S = Z_L = 50 Ω; T_{mb} = 25 °C.

Fig.4 Harmonics as a function of frequency; typical values.



f = 940 MHz; V_{S2} = 26 V; Z_S = Z_L = 50 Ω; T_{mb} = 25 °C.

Fig.5 Load power as a function of supply voltage; typical values.

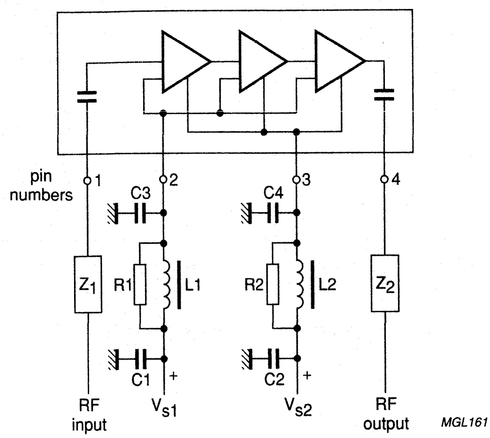


Fig.6 Test circuit.

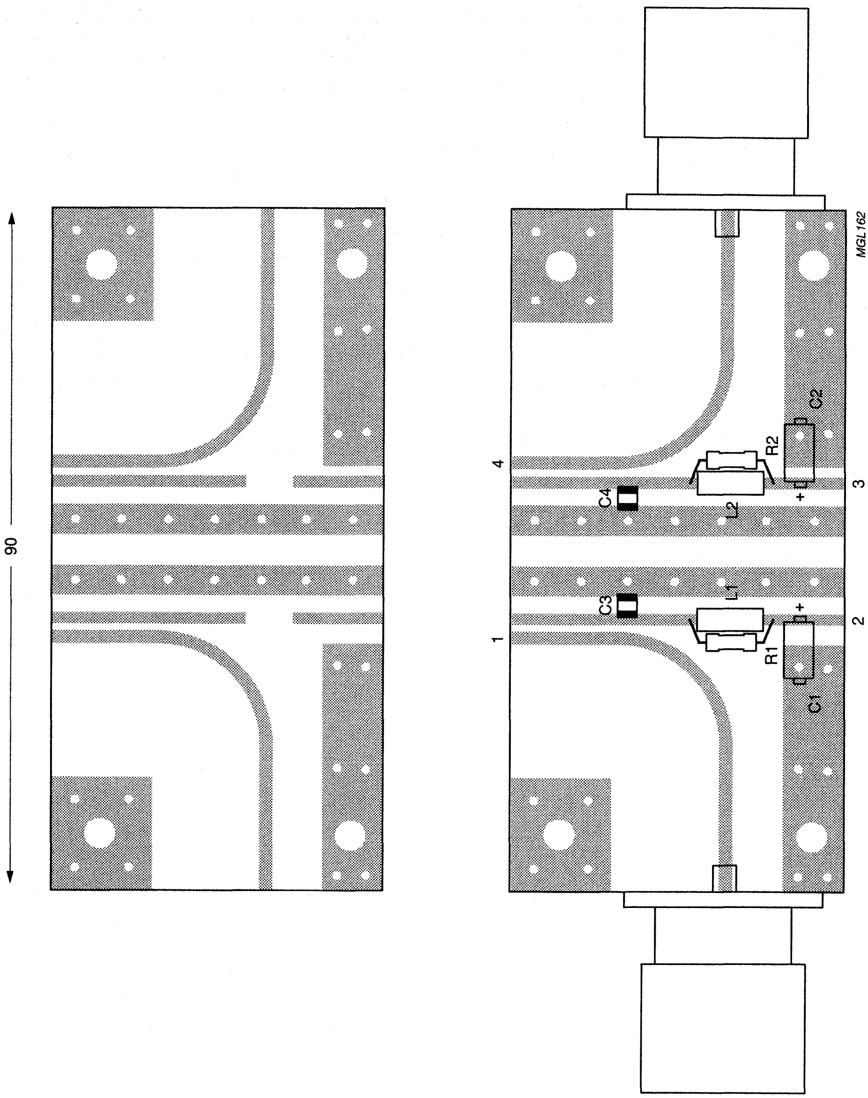


Fig.7 Printed-circuit board component layout.

Dimensions in mm.

List of components (see Figs 6 and 7)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C2	electrolytic capacitor	10 μF; 35 V	
C3, C4	multilayer ceramic chip capacitor	100 nF; 50 V	
L1, L2	Grade 4S2 Ferroxcube bead		4330 030 36300
R1, R2	metal film resistor	10 Ω; 0.4 W	2322 195 13109
Z_1, Z_2	stripline; note 1	50 Ω	–

Note

1. The striplines are on a double copper-clad printed-circuit board with epoxy dielectric (ε_r = 4.5); thickness = 1 mm.

MOUNTING RECOMMENDATIONS

To ensure a good thermal contact and to prevent mechanical stresses when bolted down, the flatness of the mounting base is designed to be typically better than 0.1 mm. The mounting area of the heatsink should be flat and free from burrs and loose particles. The heatsink should be rigid and not prone to bowing under thermal cycling conditions. The thickness of a solid heatsink should be not less than 5 mm to ensure a rigid assembly.

A thin, even layer of thermal compound should be used between the mounting base and the heatsink to achieve the best possible contact thermal resistance. Excessive use of thermal compound will result in an increase in thermal resistance and possible bowing of the mounting base; too little will also result in poor thermal conduction.

The module should be mounted to the heatsink using 3 mm bolts with flat washers. The bolts should first be tightened to “finger tight” and then further tightened in alternating steps to a maximum torque of 0.4 to 0.6 Nm.

Once mounted on the heatsink, the module leads can be soldered to the printed-circuit board. A soldering iron may be used up to a temperature of 250 °C for a maximum of 10 seconds at a distance of 2 mm from the plastic cap.

ESD precautions must be taken to protect the device from electrostatic damage.

FEATURES

- 26 V nominal supply voltage
- 23 W output power into a load of 50 Ω with an RF drive power of 36 mW.

APPLICATIONS

- Base station transmitting equipment operating in the 920 to 960 MHz frequency range.

DESCRIPTION

The BGY925 is a three-stage UHF amplifier module in a SOT365 package. It consists of one NPN silicon planar transistor die and two silicon MOSFET dies mounted on a metallized ceramic AlN substrate, together with matching and bias circuitry.

PINNING - SOT365

PIN	DESCRIPTION
1	RF input
2	V_{S1}
3	V_{S2}
4	RF output
Flange	ground

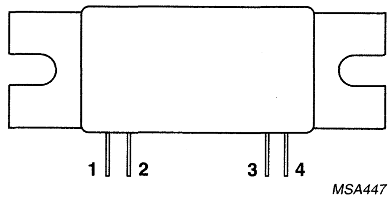


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_{S1}, V_{S2} (V)	P_L (W)	G_p (dB)	η (%) (note 1)	Z_S, Z_L (Ω)
CW	920 to 960	26	23	≥28	≥30	50

Note

1. At P_L = 16 W.

LIMITING VALUES

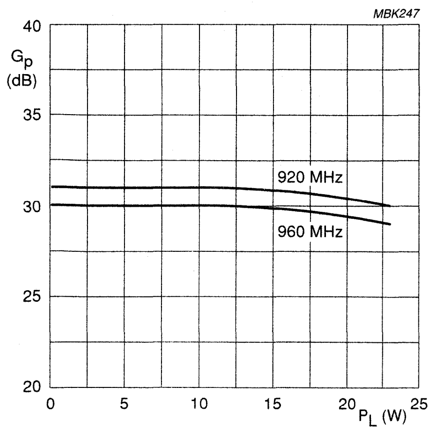
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	28	V
V_{S2}	DC supply voltage	–	28	V
P_D	input drive power	–	80	mW
P_L	load power	–	32	W
T_{stg}	storage temperature	–30	+100	°C
T_{mb}	operating mounting-base temperature	–10	+90	°C

CHARACTERISTICS

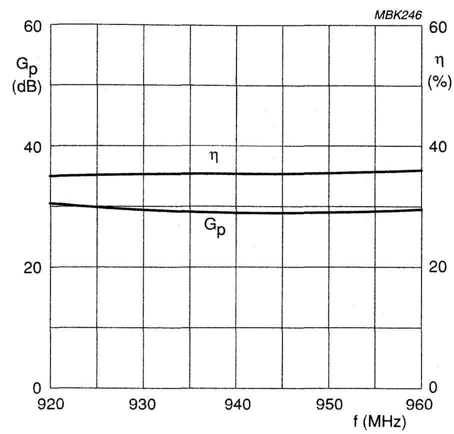
$Z_S = Z_L = 50\ \Omega$; $P_L = 23$ W; $V_{S1} = V_{S2} = 26$ V; $T_{mb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency range		920	–	960	MHz
I_{S1}	supply current		–	50	–	mA
I_{S2}	supply current	$P_D < -60$ dBm	–	500	–	mA
P_L	load power		23	–	–	W
G_p	power gain	160 mW $\leq P_L <$ 2 W	28	30	34	dB
		2 W $\leq P_L \leq$ 23 W	28	30	32	dB
η	efficiency	$P_L = 16$ W	30	–	–	%
H_2	second harmonic	$P_L = 16$ W	–	–	–35	dBc
H_3	third harmonic	$P_L = 16$ W	–	–	–40	dBc
$VSWR_{in}$	input VSWR		–	–	2:1	
	stability	VSWR $\leq$ 3 : 1 through all phases; V_{S2} = 26 to 27 V; $P_L = 23$ W	–	–	–60	dBc
	reverse intermodulation	$P_{carrier} = 16$ W; $P_{interference} = 1.6\ \mu$W; $f_i = f_c \pm 600$ kHz	–	–80	–	dBc
	direct intermodulation	$P_{carrier} = 16$ W; $P_{interference} = 1.6$ mW; $f_i = f_c + 270$ kHz	–	–55	–	dBc
NF	noise figure				8	dBc
B	AM bandwidth	corner frequency = 3 dB; $P_{carrier} = 16$ W; modulation = 20%	2	–	–	MHz
	ruggedness	VSWR $\leq$ 5 : 1 through all phases; $V_{S2} = 26$ V; $P_L = 23$ W	no degradation			



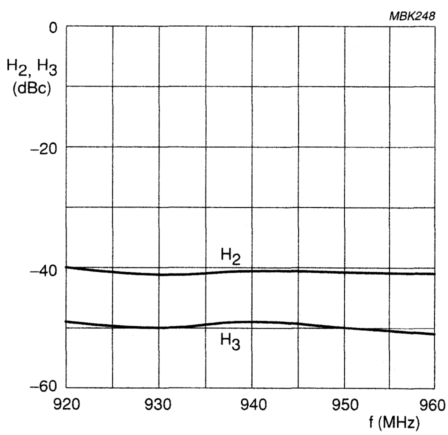
$Z_S = Z_L = 50\ \Omega$; $V_{S1} = V_{S2} = 26$ V; $T_{mb} = 25$ °C.

Fig.2 Power gain as a function of load power; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_L = 16$ W; $V_{S1} = V_{S2} = 26$ V; $T_{mb} = 25$ °C.

Fig.3 Power gain and efficiency as functions of frequency; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_L = 16$ W; $V_{S1} = V_{S2} = 26$ V; $T_{mb} = 25$ °C.

Fig.4 Harmonics as a function of frequency; typical values.

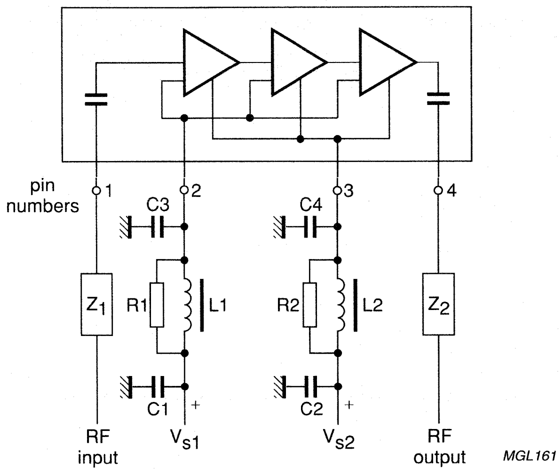
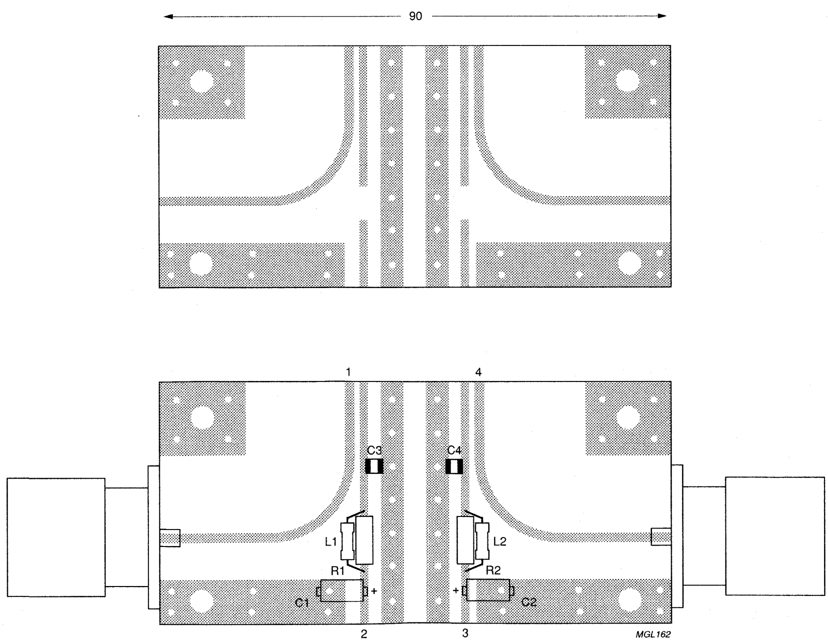


Fig.5 Test circuit.



Dimensions in mm.

Fig.6 Printed-circuit board component layout.

List of components (See Figs 5 and 6)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C2	electrolytic capacitor	10 μF; 35 V	
C3, C4	multilayer ceramic chip capacitor	100 nF; 50 V	
L1, L2	Grade 4S2 Ferroxcube bead		4330 030 36300
R1, R2	metal film resistor	10 Ω; 0.4 W	2322 195 13109
Z_1, Z_2	stripline; note 1	50 Ω	

Note

1. The striplines are on a double copper-clad printed-circuit board with epoxy dielectric (ε_r = 4.5); thickness = 1 mm.

MOUNTING RECOMMENDATIONS

To ensure a good thermal contact and to prevent mechanical stress when bolted down, the flatness of the mounting base is designed to be typically better than 0.1 mm. The mounting area of the heatsink should be flat and free from burrs and loose particles. The heatsink should be rigid and not prone to bowing under thermal cycling conditions. The thickness of a solid heatsink should be not less than 5 mm to ensure a rigid assembly.

A thin, even layer of thermal compound should be applied between the mounting base and the heatsink to achieve the best possible thermal contact resistance. Excessive use of thermal compound will result in an increase in thermal resistance and possible bowing of the mounting-base; too little will also result in poor thermal conduction.

The module should be mounted to the heatsink using 3 mm bolts with flat washers. The bolts should first be tightened to “finger tight” and then further tightened in alternating steps to a maximum torque of 0.4 to 0.6 Nm.

Once mounted on the heatsink, the module leads can be soldered to the printed-circuit board. A soldering iron may be used up to a temperature of 250 °C for a maximum of 10 seconds at a distance of 2 mm from the plastic cap.

ESD precautions must be taken to protect the device from electrostatic damage.

FEATURES

- 26 V nominal supply voltage
- 16 W output power into a load of 50 Ω with an RF drive power of ≤63 mW.

APPLICATIONS

- Base station transmitting equipment operating in the 1805 to 1880 MHz frequency band.

DESCRIPTION

The BGY1816 is a three-stage UHF amplifier module in a SOT365 package with a plastic cap. It consists of three NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic AlN substrate.

PINNING - SOT365

PIN	DESCRIPTION
1	RF input
2	V_{S1}
3	V_{S2}
4	RF output
Flange	ground

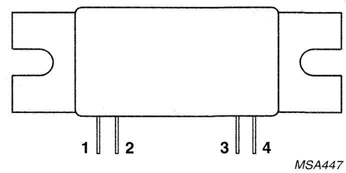


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_{S1} (V)	V_{S2} (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
CW	1805 to 1880	5	26	≥16	≥24	≥30	50

LIMITING VALUES

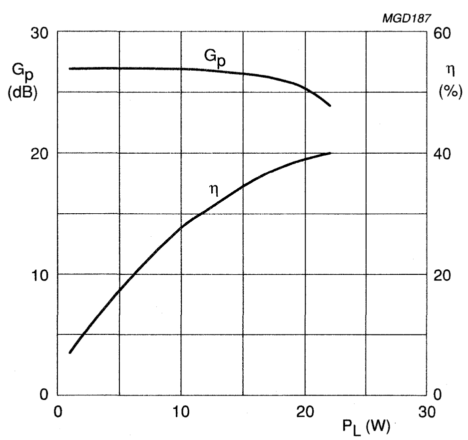
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage		4.5	5.5	V
V_{S2}	DC supply voltage		–	28	V
P_D	input drive power		–	120	mW
P_L	load power	T_{mb} = 25 °C	–	20	W
T_{stg}	storage temperature		–30	+100	°C
T_{mb}	operating mounting base temperature		–10	+90	°C

CHARACTERISTICS

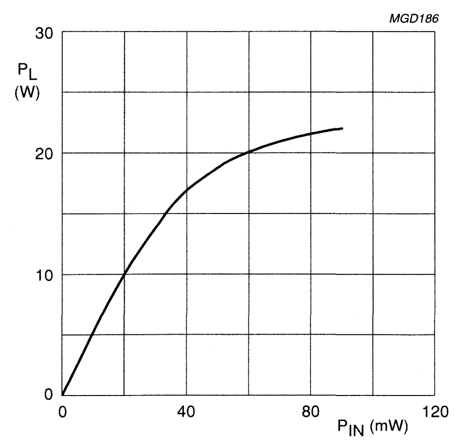
T_{mb} = 25 °C; V_{S1} = 5 V; V_{S2} = 26 V; P_L = 16 W; $Z_S = Z_L$ = 50 Ω unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency		1805	–	1880	MHz
I_{S1}	supply current		–	80	–	mA
I_{S2}	supply current	$P_D < -60$ dBm	–	430	–	mA
P_L	load power	$P_D < 63$ mW	16	–	–	W
G_p	power gain		24	–	28	dB
η	efficiency		30	–	–	%
H_2	second harmonic		–	–	–35	dBc
H_3	third harmonic		–	–	–40	dBc
$VSWR_{in}$	input VSWR		–	–	1.6 : 1	
	stability	VSWR ≤ 2 : 1 through all phases; $P_L \leq 16$ W; V_{S2} = 25 to 27 V	–	–	–60	dBc
	reverse intermodulation	$P_{carrier}$ = 16 W; $P_{reverse}$ = –40 dBc; $f_i = f_c$ ±200 kHz	–	–	–53	dBc
B	AM bandwidth	corner frequency = 3 dB; $P_{carrier}$ = 16 W; modulation = 20%	2	–	–	MHz
	ruggedness	VSWR ≤ 5 : 1 through all phases	no degradation			



f = 1850 MHz; V_{S1} = 5 V; V_{S2} = 26 V; $Z_S = Z_L$ = 50 Ω; T_{mb} = 25 °C.

Fig.2 Power gain and efficiency as functions of load power; typical values.



f = 1850 MHz; V_{S1} = 5 V; V_{S2} = 26 V; $Z_S = Z_L$ = 50 Ω; T_{mb} = 25 °C.

Fig.3 Load power as a function of input power; typical values.

MOUNTING RECOMMENDATIONS

To ensure a good thermal contact and to prevent mechanical stress when bolted down, the flatness of the mounting base is designed to be typically better than 0.1 mm. The mounting area of the heatsink should be flat and free from burrs and loose particles. The heatsink should be rigid and not prone to bowing under thermal cycling conditions. The thickness of a solid heatsink should be not less than 5 mm to ensure a rigid assembly.

A thin, even layer of thermal compound should be applied between the mounting base and the heatsink to achieve the best possible thermal contact resistance. Excessive use of thermal compound will result in an increase in thermal resistance and possible bowing of the mounting base; too little will also result in poor thermal conduction.

The module should be mounted to the heatsink using 3 mm bolts with flat washers. The bolts should first be tightened to "finger tight" and then further tightened in alternating steps to a maximum torque of 0.4 to 0.6 Nm.

Once mounted on the heatsink, the module leads can be soldered to the printed-circuit board. A soldering iron may be used up to a temperature of 250 °C for a maximum of 10 seconds at a distance of 2 mm from the plastic cap.

ESD precautions must be taken to protect the device from electrostatic damage.

UHF amplifier module BGY1916

FEATURES

- 26 V nominal supply voltage
- 16 W output power into a load of 50 Ω with an RF drive power of ≤63 mW.

APPLICATIONS

- Base station transmitting equipment operating in the 1930 to 1990 MHz frequency band.

DESCRIPTION

The BGY1916 is a three-stage UHF amplifier module in a SOT365 package with a plastic cap. It consists of three NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic AlN substrate.

PINNING - SOT365

PIN	DESCRIPTION
1	RF input
2	V_{S1}
3	V_{S2}
4	RF output
Flange	ground

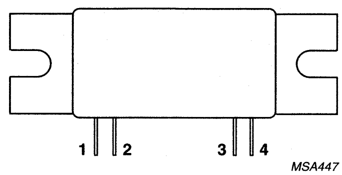


Fig.4 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_{S1} (V)	V_{S2} (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
CW	1930 to 1990	5	26	≥16	≥24	≥30	50

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage		4.5	5.5	V
V_{S2}	DC supply voltage		–	28	V
P_D	input drive power		–	120	mW
P_L	load power	T_{mb} = 25 °C	–	20	W
T_{stg}	storage temperature		−30	+100	°C
T_{mb}	operating mounting base temperature		−10	+90	°C

CHARACTERISTICS

T_{mb} = 25 °C; V_{S1} = 5 V; V_{S2} = 26 V; P_L = 16 W; Z_S = Z_L = 50 Ω unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency		1930	–	1990	MHz
I_{S1}	supply current		–	80	–	mA
I_{S2}	supply current	P_D < −60 dBm	–	430	–	mA
P_L	load power	P_D < 63 mW	16	–	–	W
G_p	power gain		24	–	28	dB
η	efficiency		30	–	–	%
H_2	second harmonic		–	–	−35	dBc
H_3	third harmonic		–	–	−45	dBc
$VSWR_{in}$	input VSWR		–	–	1.6 : 1	
	stability	VSWR ≤ 2 : 1 through all phases; P_L ≤ 16 W; V_{S2} = 25 to 27 V	–	–	−60	dBc
	reverse intermodulation	$P_{carrier}$ = 16 W; $P_{reverse}$ = −40 dBc; $f_i = f_c$ ±200 kHz	–	–	−53	dBc
B	AM bandwidth	corner frequency = 3 dB; $P_{carrier}$ = 16 W; modulation = 20%	2	–	–	MHz
	ruggedness	VSWR ≤ 5 : 1 through all phases	no degradation			

MOUNTING RECOMMENDATIONS

To ensure a good thermal contact and to prevent mechanical stress when bolted down, the flatness of the mounting base is designed to be typically better than 0.1 mm. The mounting area of the heatsink should be flat and free from burrs and loose particles. The heatsink should be rigid and not prone to bowing under thermal cycling conditions. The thickness of a solid heatsink should be not less than 5 mm to ensure a rigid assembly.

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Once the module is mounted on the heatsink, the leads can be soldered to the printed-circuit board. A soldering iron may be used up to a temperature of 250 °C for a maximum of 10 seconds at a distance of 2 mm from the plastic cap

Precautions must be taken to protect the device from electrostatic damage (ESD).

Circulators and Isolators

CONTENTS

SELECTION GUIDE

CIRCULATORS AND ISOLATORS

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54 to 60	130	2722 162 07271	802
66 to 72	130	2722 162 07281	802
68 to 150	40	2722 162 09002	786
72 to 73	20	2722 162 02913	790
74.5 to 75.5	25	2722 162 05151	790
83 to 84	20	2722 162 02723	790
88 to 108	50	2722 162 05991	790
88 to 108	300	2722 162 07021	802
96 to 146	50	2722 162 03332	802
96 to 146	50	2722 162 03342	802
100 to 101	20	2722 162 02943	790
100 to 163	75	2722 162 05881	802
100 to 163	300	2722 162 05891	802
118 to 144	100	VFB893	802
132 to 178	40	2722 162 07141	802
135 to 150	250	VAB1010	790
138 to 141	25	2722 162 02903	790
138 to 141	110	2722 162 05002	790
140 to 260	40	2722 162 09012	786
144.5 to 147.5	20	2722 162 02953	790
146 to 174	250	VBB1002	790
146 to 174	250	VKB1007	790
146 to 174	250	2722 162 04142	790
146 to 174	250	2722 162 04143	790
146 to 174	110	2722 162 05755	790
148 to 165	250	VAB1011	790
153.5 to 156.5	20	2722 162 02963	820
155 to 174	250	VKB1008	820
156 to 157	20	2722 162 06003	820
160 to 175	250	VAB1009	820
160 to 178	500	2722 162 01871	820
160 to 178	500	2722 162 03641	820
160 to 178	1000	2722 162 01901	820
160 to 178	1000	2722 162 03681	820
161 to 162	15	2722 162 02993	790
170 to 230	100	2722 162 07005	820
170 to 310	100	2722 162 07811	802
173 to 204	500	2722 162 01861	820
173 to 204	500	2722 162 03631	820

FREQUENCY RANGE (MHz)	MAXIMUM POWER (W)	TYPE	PAGE
173 to 204	1000	2722 162 03671	820
173 to 204	1000	2722 162 01891	820
173 to 204	1000	2722 162 05811	820
173 to 204	1500	2722 162 05971	820
176.5 to 183.5	20	2722 162 06893	790
195 to 205	1000	2722 162 05031	820
200 to 230	500	2722 162 01851	820
200 to 230	500	2722 162 03621	820
200 to 230	1000	2722 162 05821	820
200 to 230	1500	2722 162 05981	820
200 to 230	1000	2722 162 01881	820
200 to 230	1000	2722 162 03661	820
200.5 to 207.5	20	2722 162 06903	790
216 to 230	325	VBC1004	802
225 to 270	150	2722 162 01931	790
225 to 270	150	2722 162 01932	790
225 to 270	500	2722 162 03171	820
225 to 270	500	2722 162 03651	820
225 to 270	1000	2722 162 03691	820
225 to 270	1000	2722 162 03181	820
225 to 400	50	2722 162 03722	802
225 to 400	50	2722 162 03732	802
225 to 400	200	2722 162 05782	802
225 to 400	230	2722 162 08771	802
230 to 470	40	2722 162 09022	786
270 to 330	60	2722 162 03421	790
270 to 330	150	2722 162 01941	790
330 to 400	60	2722 162 05091	790
330 to 400	150	2722 162 01951	790
400 to 470	100	2722 162 03411	808
400 to 470	100	2722 162 05101	808
400 to 470	300	2722 162 01572	832
406 to 414	60	2722 162 02931	808
406 to 470	100	2722 162 06161	808
424 to 431	100	VNE887A	808
433 to 435	2000	2722 162 03991	836
440 to 470	200	VBE1026	808
450 to 458	60	2722 162 02981	808
455 to 459	100	2722 162 06931	808
455 to 475	250	VQE1005	808

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460	to	470	30	VGE1003A	808
460	to	470	100	VNE876A	808
462	to	468	100	2722 162 01555	808
470	to	600	10	2722 162 02691	826
470	to	600	10	2722 162 02671	826
470	to	600	50	2722 162 03871	826
470	to	600	100	2722 162 03961	826
470	to	600	100	2722 162 01551	826
470	to	600	300	2722 162 01582	832
470	to	600	300	2722 162 01632	832
470	to	600	500	2722 162 01121	834
470	to	600	500	2722 162 03221	834
470	to	600	500	2722 162 03141	834
470	to	600	700	2722 162 05371	834
470	to	600	2000	2722 162 01771	836
470	to	600	2000	2722 162 01261	836
470	to	600	2000	2722 162 03001	838
470	to	610	200	2722 162 07651	826
470	to	610	150	2722 162 07411	826
510	to	514	60	2722 162 02921	808
550	to	650	100	2722 162 01563	826
590	to	720	300	2722 162 01592	832
590	to	720	300	2722 162 01642	832
590	to	720	500	2722 162 03241	834
590	to	720	500	2722 162 03201	834
590	to	720	500	2722 162 01131	834
590	to	720	700	2722 162 05381	834
590	to	720	2000	2722 162 01781	836
590	to	720	2000	2722 162 01281	836
590	to	720	2000	2722 162 03011	838
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600	to	800	10	2722 162 02681	826
600	to	800	10	2722 162 02751	826
600	to	800	50	2722 162 03821	826
600	to	800	100	2722 162 01561	826
600	to	800	100	2722 162 03971	826
600	to	800	500	2722 162 03151	834
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600	to	800	500	2722 162 03191	834

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600 to 960	10	2722 162 05321	808
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610 to 810	150	2722 162 07421	826
610 to 860	200	2722 162 07661	826
710 to 860	300	2722 162 01612	832
710 to 860	300	2722 162 01662	832
710 to 860	500	2722 162 01141	834
710 to 860	500	2722 162 03211	834
710 to 860	500	2722 162 03251	834
710 to 860	700	2722 162 05391	834
710 to 860	2000	2722 162 01801	836
710 to 860	2000	2722 162 01271	836
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790 to 1000	10	2722 162 02401	826
790 to 1000	50	2722 162 03811	826
790 to 1000	100	2722 162 03261	826
790 to 1000	100	2722 162 03981	826
806 to 960	100	2722 162 06671	808
860 to 960	60	2722 162 08901	808
870 to 960	20	2722 162 08841	808
880 to 950	10	2722 162 07361	808
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935 to 960	70	VAJ759G	808
935 to 960	60	2722 162 08801	808
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1215 to 1400	250	2722 162 07511	840
1230 to 1365	60	2722 162 08641	840
1270 to 1400	120	VBN1012A	840
1350 to 1700	10	2722 162 05331	840
1350 to 2100	10	2722 162 06701	840
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1700	to	2100	15	2722 162 02571	848
1700	to	2100	15	2722 162 02581	848
1700	to	2100	30	2722 162 05241	848
1700	to	2100	30	2722 162 05231	848
1700	to	2100	30	2722 162 05251	848
1700	to	2100	30	2722 162 04051	854
1700	to	2100	30	2722 162 04091	854
1700	to	2300	20	2722 162 02191	850
1700	to	2300	20	2722 162 02511	850
1700	to	2300	20	2722 162 03951	850
1700	to	2300	50	2722 162 03941	850
1700	to	2700	25	2722 162 07601	848
1805	to	1880	40	VLS1027	840
1805	to	1880	50	VFS1021	840
1805	to	1880	50	VAS1024	840
1805	to	1880	50	VBS1028	840
1850	to	1910	1	VGS1029	840
1880	to	2120	20	2722 162 03891	848
1880	to	2120	50	2722 162 03921	848
1900	to	2300	10	2722 162 05341	848
1900	to	2300	15	2722 162 02591	848
1900	to	2300	15	2722 162 02601	848
1900	to	2300	15	2722 162 05471	848
1900	to	2300	30	2722 162 05261	848
1900	to	2300	30	2722 162 05271	848
1900	to	2300	30	2722 162 04101	854
1900	to	2300	30	2722 162 04061	854
1930	to	1990	50	2722 162 08921	840
1930	to	1990	50	VFT1015	840
2000	to	2700	10	2722 162 05411	848
2000	to	4000	50	2722 162 01501	860
2000	to	4000	50	2722 162 02091	860
2000	to	4000	50	2722 162 02101	860
2000	to	4000	50	2722 162 01491	860

FREQUENCY RANGE (MHz)			MAXIMUM POWER (W)	TYPE	PAGE
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2080	to	2320	50	2722 162 03931	850
2100	to	2500	10	2722 162 05351	850
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2425	to	2475	3000	2722 163 02071	868
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2425	to	2475	6500	2722 163 01021	872
2425	to	2475	2000	2722 163 02101	874
2450	to	2850	10	2722 162 05401	848
3000	to	6000	20	2722 162 02071	860
3000	to	6000	20	2722 162 01511	860
3800	to	4200	10	2722 162 04031	856
3800	to	4200	10	2722 162 03431	856
4000	to	8000	10	2722 162 01811	860
4000	to	8000	10	2722 162 02111	860
4200	to	4400	10	2722 162 02471	856
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4400	to	5000	10	2722 162 03441	856
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5925	to	6425	200	2722 161 02212	858
6400	to	7100	10	2722 162 08461	858
6425	to	7125	200	2722 161 02312	858
6425	to	7125	200	2722 161 04052	858
7000	to	12400	10	2722 162 02122	860
7000	to	12400	10	2722 162 01822	860
7125	to	7750	200	2722 161 04062	858
7125	to	7750	200	2722 161 02322	858
7900	to	10400	5	2722 162 02231	860
8200	to	11200	50	2722 161 02071	860
8500	to	9600	1	2722 161 01221	866
8500	to	9600	1	2722 161 01222	866
8500	to	9600	5	2722 161 01361	866
8500	to	9600	10	2722 161 01211	866
8500	to	9600	10	2722 161 01261	866
8900	to	9600	5	2722 162 02501	860
12000	to	18000	5	2722 162 02221	860
12000	to	18000	5	2722 162 03301	860

GENERAL

INTRODUCTION

This Data Handbook gives only a selection of circulators and isolators from our production line which, we think, are of common interest and which shows our capability. Should you require other executions, different connectors, different frequencies or any other data, please contact us.

Circulators and isolators are key elements in modern VHF, UHF, and microwave engineering. Their fundamental property of non-reciprocity is capable of simplifying the construction and improving the stability, efficiency and accuracy of radar, communication and testing systems, and industrial heating applications.

The devices contain a core of ferrite material biased by a static magnetic field. This field orients the electron spins within the ferrite to produce a gyromagnetic effect. The non-reciprocal behaviour occurs when a RF signal, applied perpendicular to the biasing field, interacts with the precessing electrons to set up a standing-wave pattern within the core.

CIRCULATORS

A circulator is a passive non-reciprocal device with three or more ports. Energy introduced into one port is transferred to an adjacent port, the other ports being isolated. Although circulators can be made with any number of ports, the most commonly used are 3-port and 4-port ones, the symbols for which are given in Figs 1 and 2.

Energy entering into port 1 emerges from port 2; energy entering into port 2 emerges from port 3, and so on in cyclic order.

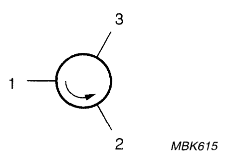


Fig.1 Symbol for 3-port circulator.

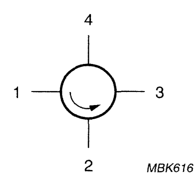


Fig.2 Symbol for 4-port circulator.

ISOLATORS

An isolator is a passive non-reciprocal 2-port device which permits RF energy to pass through it in one direction whilst absorbing energy in the reverse direction.

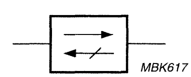


Fig.3 Symbol for an isolator.

TERMS AND DEFINITIONS

Frequency range

This is the range within which the circulator or isolator meets the guaranteed specification.

Isolation

In a circulator, isolation is the ratio, expressed in dB, of the power entering a port to the power scattered into the adjacent port on the side opposed to the normal circulation (matched source and the other ports correctly terminated).

In an isolator, isolation is the ratio, expressed in dB, of the input power to the output power for signal injection in the reverse direction (matched source and load).

Insertion loss

The attenuation that results from including the device in the transmission system. It is given as a power ratio, expressed in dB, which compares the situation before and after the insertion of a circulator/isolator (matched source and the other ports correctly terminated).

Maximum power

In a circulator, the maximum power is the largest power it can handle at sea level and at maximum ambient temperature when one port is terminated with a mismatch giving a VSWR of 2, whilst the next port is matched with a VSWR of 1.2 or less, unless otherwise stated. This power value must not be exceeded. If the mismatch of the load is expected to exceed a VSWR of 2, a circulator of higher power handling capacity should be used.

The maximum power is the maximum continuous-wave power unless a maximum peak power is separately stated. If this value is exceeded the circulator can be damaged by arcing in its internal transmission structure. Power values are valid for one signal passage only. If more than one signal passes through the circulator, the peak power of the combined signal should not exceed the indicated maximum peak power.

In an isolator, the maximum power is the largest power that may be passed through it in the forward direction into a load with a VSWR of 2, unless otherwise stated. This power value must not be exceeded.

Temperature range

The ambient temperature range within which circulators and isolators function to specification. (When necessary, special temperature compensation is built in for circulators.) Circulators still function outside the temperature range but their electrical behaviour may then be far outside the guaranteed specifications. However, no permanent damage can be expected unless a large temperature rise is caused by excessive power handling.

CAUTIONARY NOTES

Circulators and isolators have internal fields that are carefully adjusted for optimum operation; they should not, therefore, be subjected to strong external magnetic fields. During storage and transport a minimum distance of 10 mm to other circulators/isolators and ferromagnetic material is recommended. During operation this distance should be at least 20 mm.
Care must be taken that condensation of humidity, especially in water-cooled items, does not occur.

QUALITY GUARANTEE

Subject to the Conditions of Guarantee the Manufacturer guarantees that circulators and isolators supplied to the purchaser meet the specifications published in the Manufacturer's Data Handbook and are free from defects in material and workmanship.

STANDARD TEST SPECIFICATIONS

Initial measurements

These measurements have been carried out at room temperature and at the extreme temperatures, with a power level not exceeding 10 mW.

Tropical test

This test has been carried out completely in accordance with IEC 68 test D, accelerated damp heat. This test begins with the temperature at 55 ± 2 °C and R.H. at 95 to 100% for a period of 16 hours, followed by a period of 8 hours with the temperature at + 25 °C and R.H. 80 to 100% to complete the 24-hour cycle: the test consists of 6 uninterrupted cycles.

Vibration test

This test has been carried out completely in accordance with MIL-STD-202D, method 201A: frequency range 10 to 55 to 10 Hz for 2 hours in each of the X, Y and Z directions, with a total excursion of 1,5 mm.

Thermal shock test

This test has been carried out completely in accordance with MIL-STD-202D, method 107C under condition A: 5 cycles with extreme temperatures of −55 °C and + 85 °C; each cycle of 1 hour's duration.

Mechanical shock test

This test has been carried out in accordance with MIL-STD-202D, method 213A under condition G: peak value 100 g, duration 6 ms, and also with extreme peak values up to 800 g, duration approximately 1 ms for each device, referring to the results of the drop test.

Drop test

This test has been carried out in accordance with ISO 2248, part IV: packaging complete, filled transport packages, vertical impact.

RF power test

The devices have been tested in accordance with the definition of maximum power in the Data Handbook (VSWR = 2). The ambient temperature of 25 °C was increased to the maximum operating temperature and the duration of the test was 1 hour for each device.

Final measurements

On completion of the above tests final measurements were carried out at a temperature of + 25 °C and with a power level not exceeding 10 mW. The results of these tests should be within the guaranteed values.

Dimensions and visual appearance

These have been checked in accordance with the published data.

Note

On request, different tests and/or additional tests to those above can be carried out.

12-digit type number

Each device is uniquely identified by a 12-digit type number, the last three digits being specific device identifiers. The diagram below shows you how, from the first nine digits, to find the circulator, isolator or isoductor you need. Remember that devices with alternative connectors and operating at other frequencies may be available on request.

DIGITS 1 - 4	**DIGITS 5 - 7**	**DIGITS 8**	**AND 9**		
	161				
	(waveguide)	0	1	=	field displacement or slimline isolator
		0	2	=	circulator
		0	3	=	X-configuration, 4-port circulator
		0	4	=	isolator
2722	162				
	(coaxial)	0	1, 3, 5, 7	=	circulator
		0	2, 6, 8	=	isolator
		0	4	=	4-port circulator
		0	9	=	isoductor
	163				
	(industrial)	0	1	=	circulator
		0	2	=	isolator

APPLICATIONS

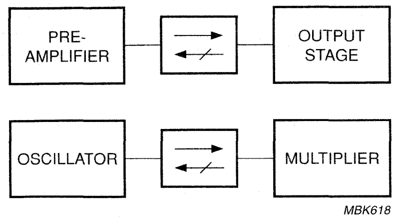


Fig.4 Decoupling of circuit stages.

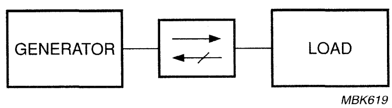


Fig.5 Reflection suppression.

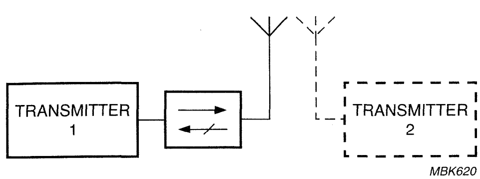


Fig.6 Suppression of reflections from
– long line to aerial
– mismatch by aerial damage
– feedback from nearby transmitter.

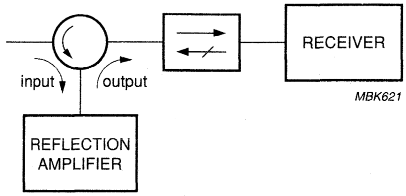


Fig.7 Separate input and output of a reflection amplifier, such as parametric amplifiers; tunnel, Gunn or Impatt diode amplifiers.

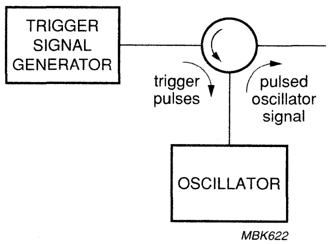


Fig.8 Feed trigger signals into an oscillator.

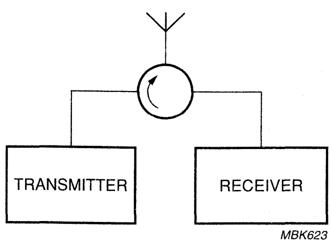


Fig.9 Avoid separate aerial for transmitter and receiver.

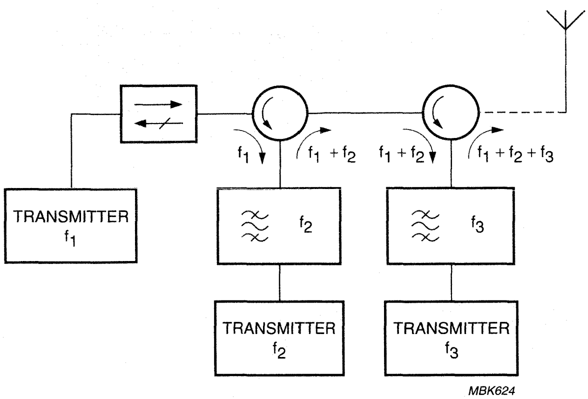


Fig.10 Connect different transmitters to a common aerial.

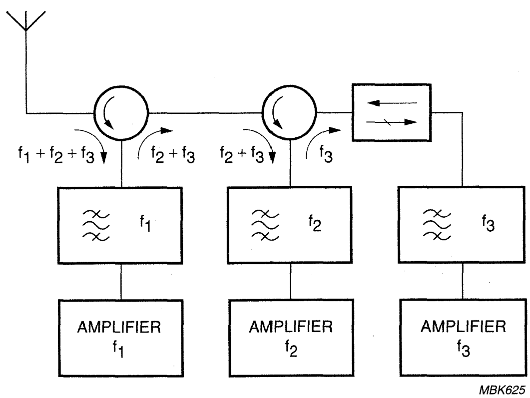


Fig.11 Separate a range of frequencies received by a common aerial.

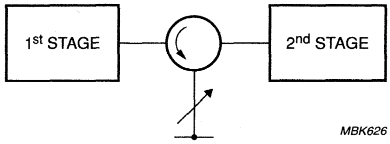


Fig.12 Variable phase shifters with a variable short-circuit.

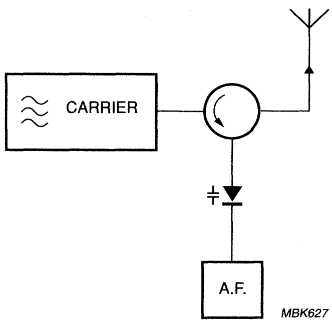


Fig.13 Phase modulation with a variable capacitance diode as a variable reactance.

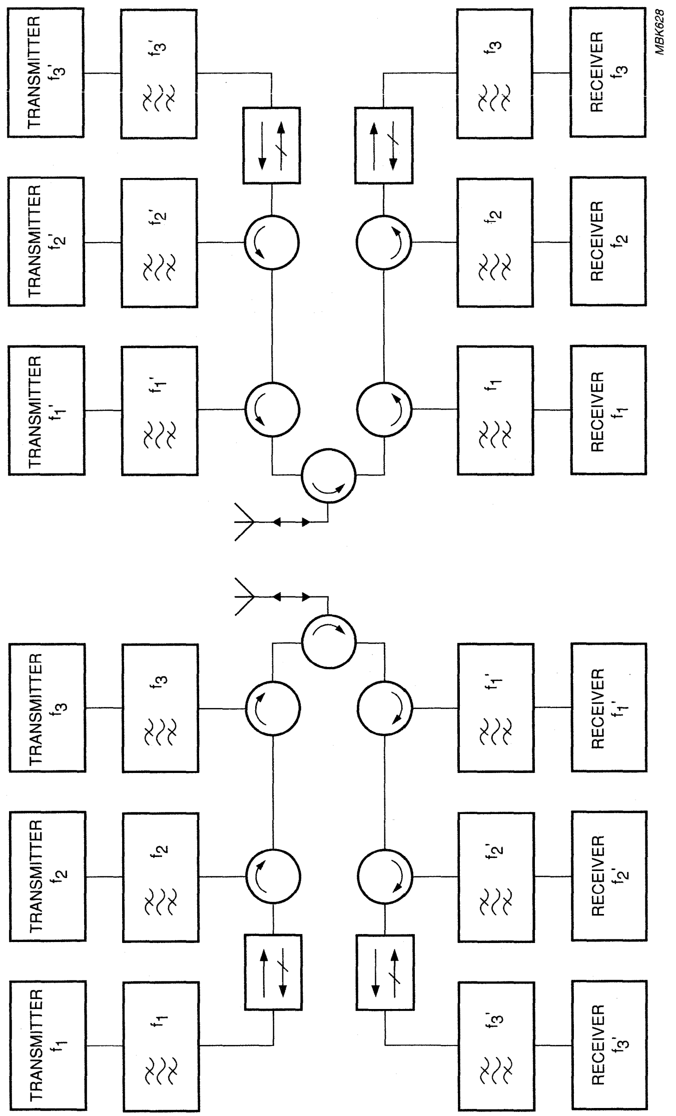


Fig.14 Signal combination and separation used together in a frequency-multiplexed, multi-channel transceiver system.

ISODUCTORS

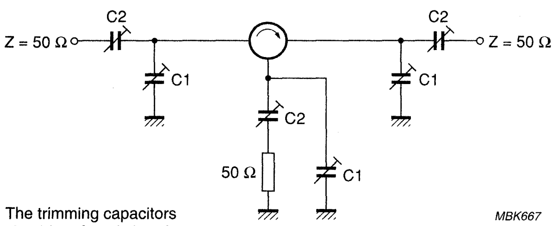
Preferred application: fixed and mobile communication.

TYPE	DIMENSIONS Fig.	FREQUENCY RANGE[(1)] MHz	MAXIMUM POWER FORWARD W	MAXIMUM POWER REFLECTED W
2722 162 09002	1	68 to 150	40	total reflection permitted
2722 162 09012	1	140 to 260	40	total reflection permitted
2722 162 09022	1	230 to 470	40	total reflection permitted

Note

1. For instantaneous bandwidth see diagram.

The technical characteristics have been measured in the following circuit:



The trimming capacitors should preferably be of a type with low temperature coefficient.

TYPE	C1 (pF)	C2 (pF)
2722 162 09002	25 to 200	20 to 150
2722 162 09012	5,5 to 65	5,5 to 65
2722 162 09022	2 to 16,5	2 to 16,5

Fig.1

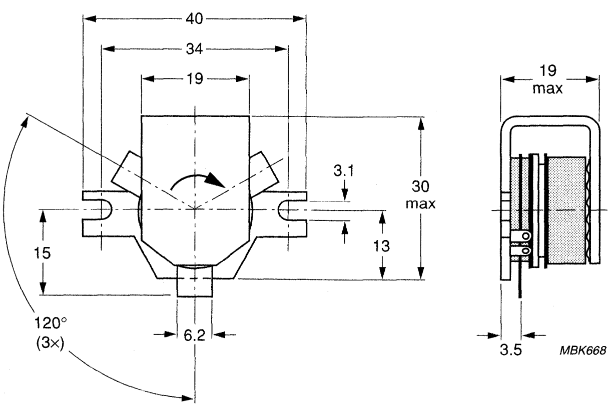


Fig.2

ISODUCTORS

TYPE	INSERTION LOSS dB	ISOLATION dB	VSWR	TEMP. RANGE °C	CONNECTOR	MASS g
2722 162 09002	≤ 0,9 (≤ 100 MHz) ≤ 0,7 (> 100 MHz)	≥ 20	≤ 1,22	0 to 60	solder pins	40
2722 162 09012	≤ 0,6	≥ 20	≤ 1,22	0 to 60	solder pins	40
2722 162 09022	≤ 0,5	≥ 20	≤ 1,22	0 to 60	solder pins	40

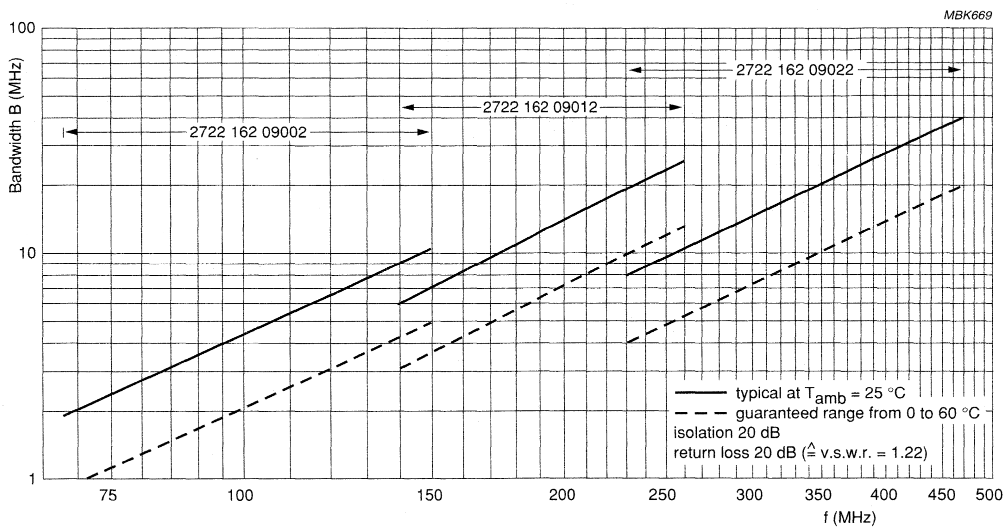


Fig.3

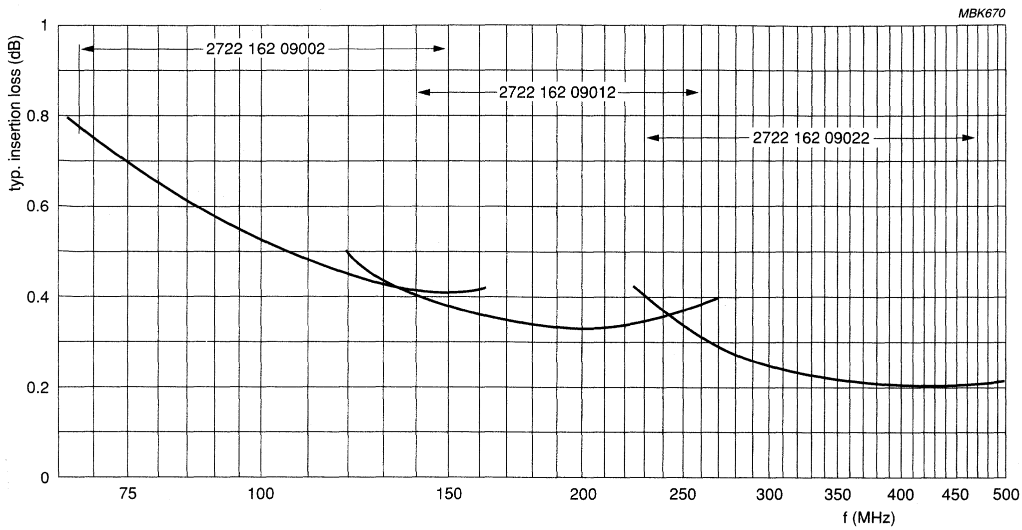

MBK670
typ. insertion loss (dB)
1
0.8
0.6
0.4
0.2
0
2722 162 09002
2722 162 09012
2722 162 09022
75
100
150
200
250
300
350
400
450
500
f (MHz)

Fig.4

VHF NARROW-BAND CIRCULATORS / ISOLATORS

Preferred application: fixed and mobile communication

TYPE		DIMENSIONS Fig.	FREQUENCY RANGE[(1)] MHz			MAXIMUM POWER	
						CW W	REFLECTED W
2722 162	02913	1	72	to	73	20	20
	02723		83	to	84	20	20
	02943		100	to	101	20	20
	02903		138	to	141	25	20
	02953		144,5	to	147,5	20	20
	02963		153,5	to	156,5	20	20
	06003		156	to	157	20	20
	02993		161	to	162	15	15
	06893		176,5	to	183,5	20	20
	06903		200,5	to	207,5	20	20
2722 162	05151	2	74,5	to	75,5	25	20
	05002	3	138	to	141	110	110
	05755	3	146	to	174[(2)]	110	110
2722 162	01931	4	225	to	270	150	
	01932		225	to	270		
	01941		270	to	330		
	01951		330	to	400		
2722 162	03421	5	270	to	330	60	
	05091		330	to	400		
2722 162	04142	6	146	to	174[(2)]	250	
2722 162	04143	7	146	to	174[(2)]	250	
VBB 1002		7	146	to	174	250	
VKB 1007		7	146	to	164	250	
VKB 1008		7	155	to	174	250	
VAB 1009		7	160	to	175	250	
VAB 1010		7	135	to	150	250	
VAB 1011		7	148	to	165	250	

Notes

1. Other frequencies on request
2. Tunable instantaneous bandwidth for isolation 20 dB min. 5 MHz.

VHF NARROW-BAND CIRCULATORS / ISOLATORS

TYPE	ISOLATION MIN. dB	ISOLATION TYP. dB	INSERTION LOSS MAX. dB	INSERTION LOSS TYP. dB	VSWR MAX.	VSWR TYP.	TEMP. RANGE °C	CONNECTOR	MASS g
2722 162 02913	20		0,7		1,25		0 to +50	N female	220
02723			0,7				0 to +55		
02943			0,7				0 to +50		
02903			0,4				0 to +55		
02953			0,6				0 to +50		
02963			0,6				0 to +50		
06003			0,6				0 to +50		
02993			0,6				0 to +50		
06893			0,6				0 to +55		
06903			0,6				0 to +55		
2722 162 05151			0,8				0 to +55	N female	400
05002			0,5				0 to +55		
05755			0,5				0 to +60		
2722 162 01931	18	21	0,35	0,2	1,35	1,25	0 to +70	N female	725
01932			0,5	0,35					
01941			0,35	0,2					
01951			0,35	0,3					
2722 162 03421 05091	18	21	0,35	0,2	1,35	1,25	0 to +70	SMA female	725
2722 162 04142	40		0,8		1,25		0 to +60	SMA	
2722 162 04143	40		0,8		1,25		0 to +60	SMA	
VBB 1002	20		0,40		1,25		30	solder tabs	
VKB 1007	40		0,80		1,25		30	N, SMA	
VKB 1008	40		0,80		1,25		30	N, SMA	
VAB 1009	25		0,40		1,25		30	N, SMA	
VAB 1010	25		0,40		1,25		30	N, SMA	
VAB 1011	25		0,40		1,25		30	N, SMA	

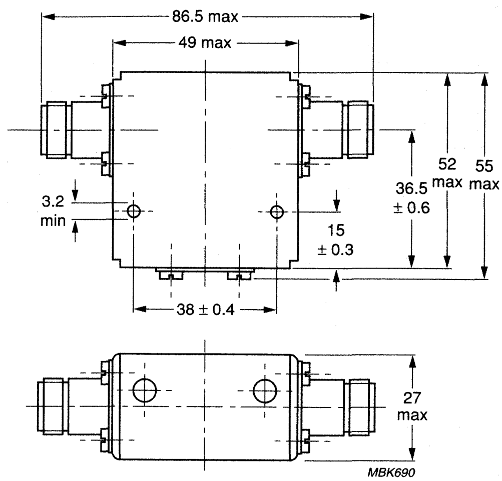
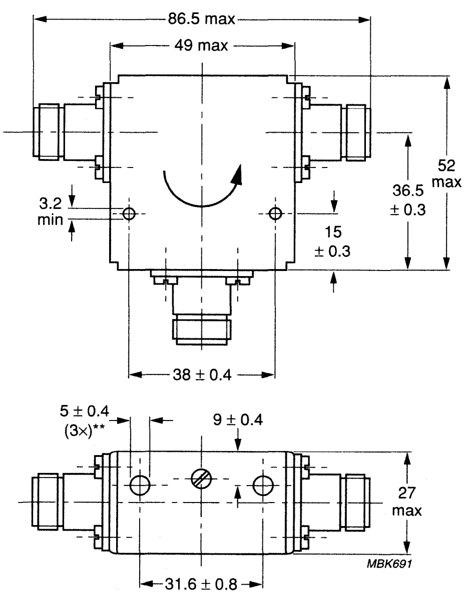
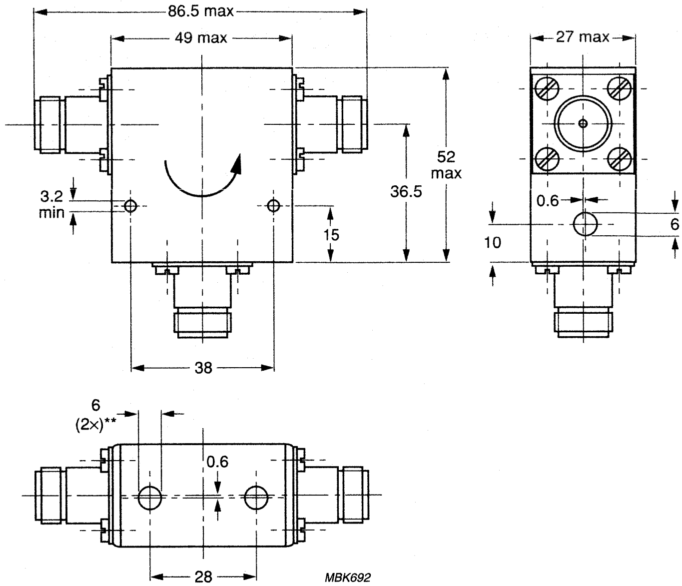


Fig.1



** note see page before

Fig.2



** note see page before

Fig.3

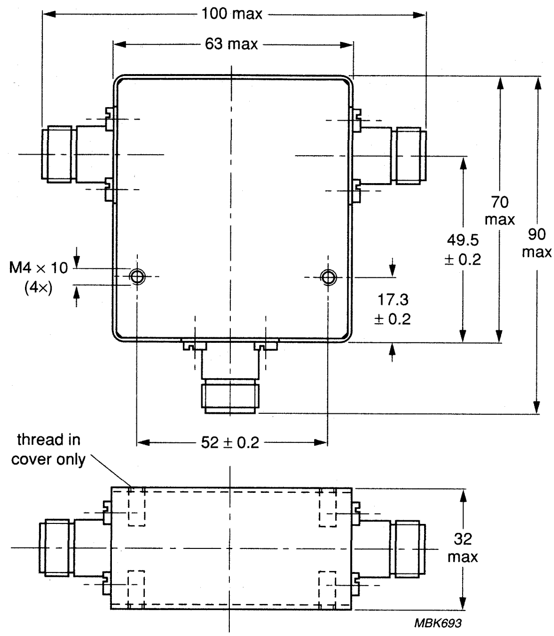

100 max
63 max
70
max
90
max
49.5
± 0.2
M4 × 10
(4×)
17.3
± 0.2
52 ± 0.2
thread in
cover only
32
max
MBK693

Fig.4

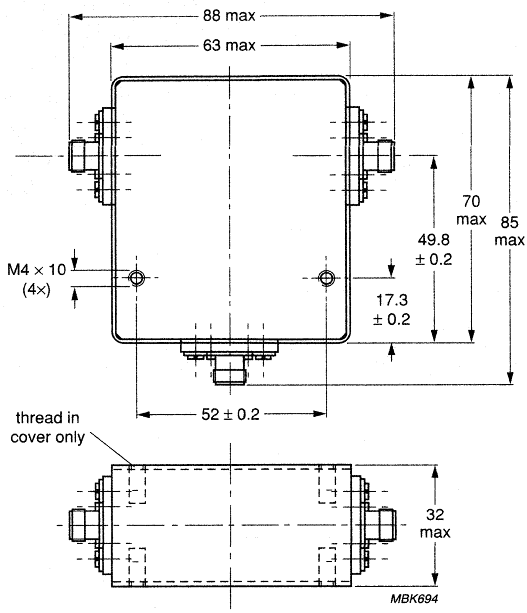

88 max
63 max
70
max
85
max
49.8
± 0.2
M4 × 10
(4×)
17.3
± 0.2
52 ± 0.2
thread in
cover only
32
max
MBK694

Fig.5

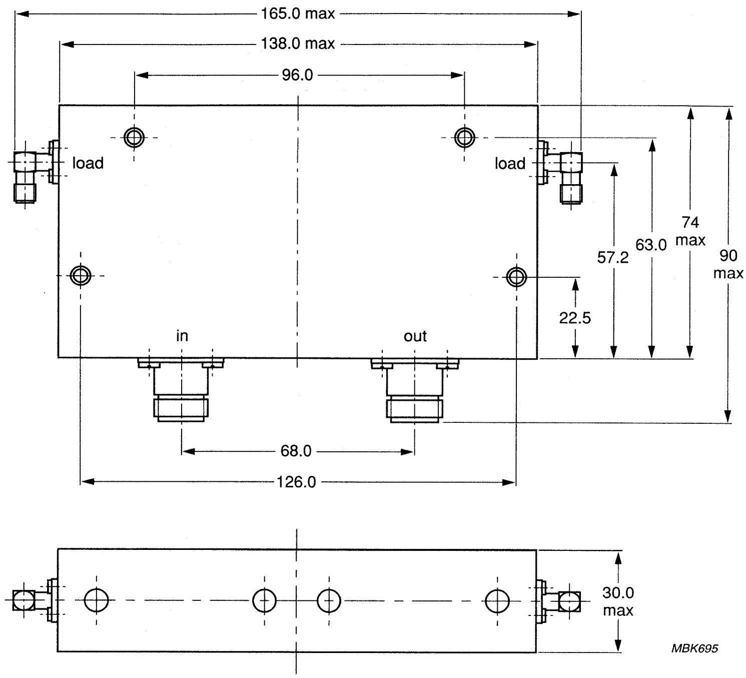

165.0 max
138.0 max
96.0
load
load
74
max
63.0
57.2
90
max
22.5
in
out
68.0
126.0
30.0
max
MBK695

Fig.6

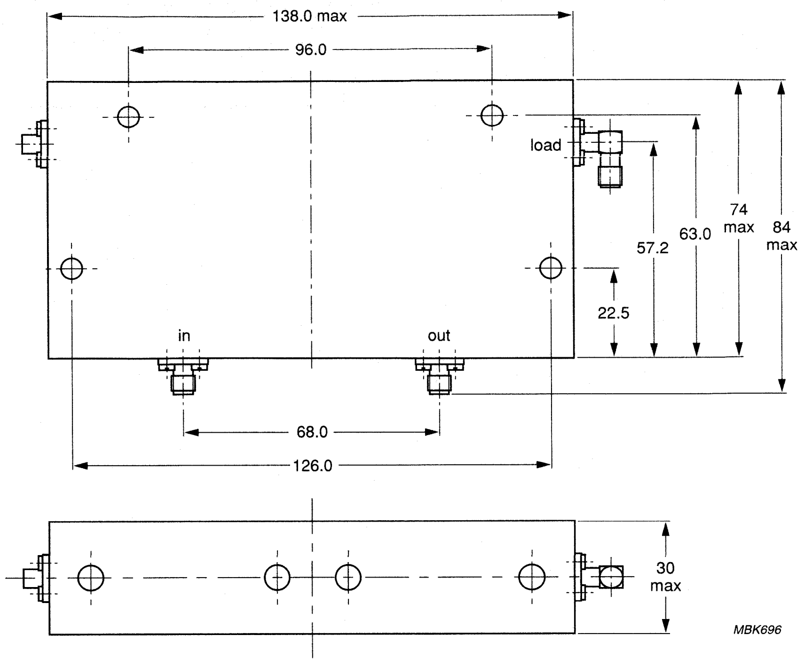

138.0 max
96.0
load
57.2
63.0
74
max
84
max
22.5
in
out
68.0
126.0
30
max
MBK696

Fig.7

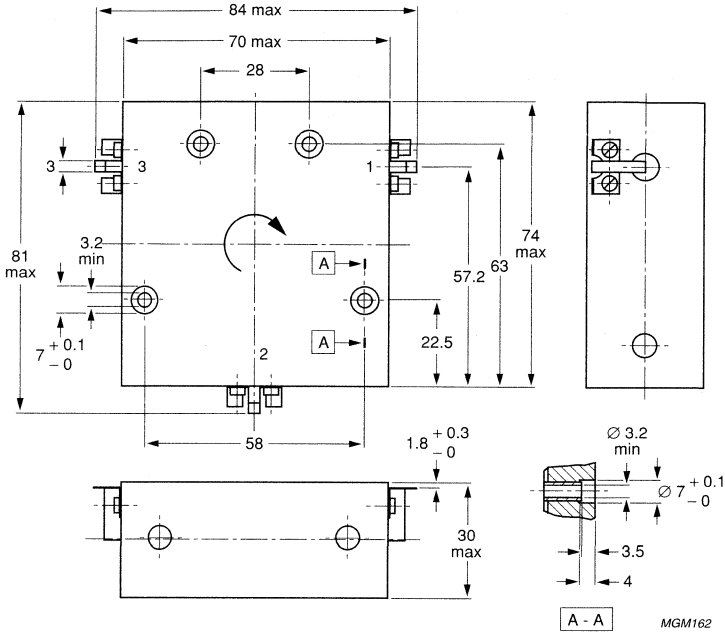

84 max
70 max
28
3
3
1
3.2
min
81
max
7 + 0.1
– 0
A
A
2
74
max
63
57.2
22.5
58
1.8 + 0.3
– 0
30
max
∅ 3.2
min
∅ 7 + 0.1
– 0
3.5
4
A - A
MGM162

Fig.8

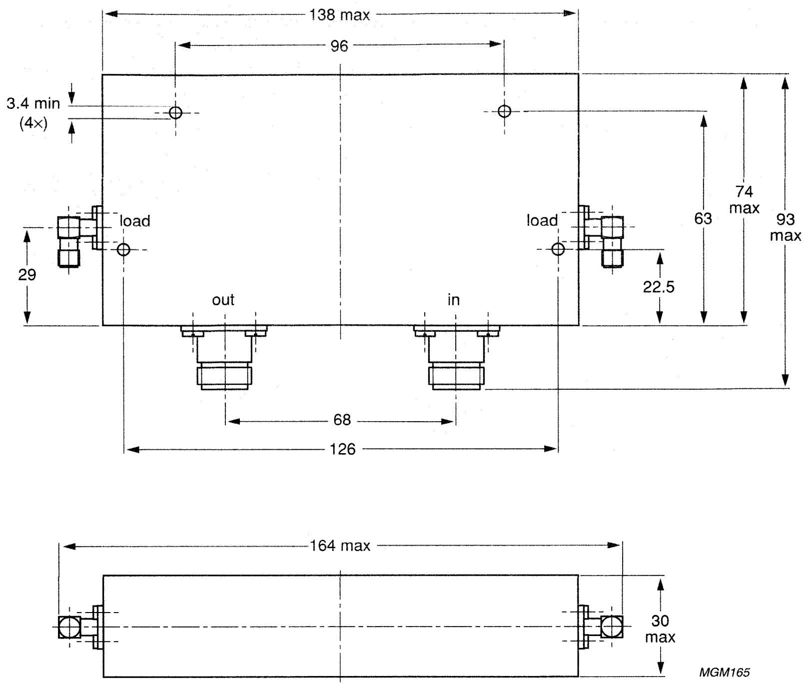

138 max
96
3.4 min
(4×)
load
load
63
74
max
93
max
29
22.5
out
in
68
126
164 max
30
max
MGM165

Fig.9

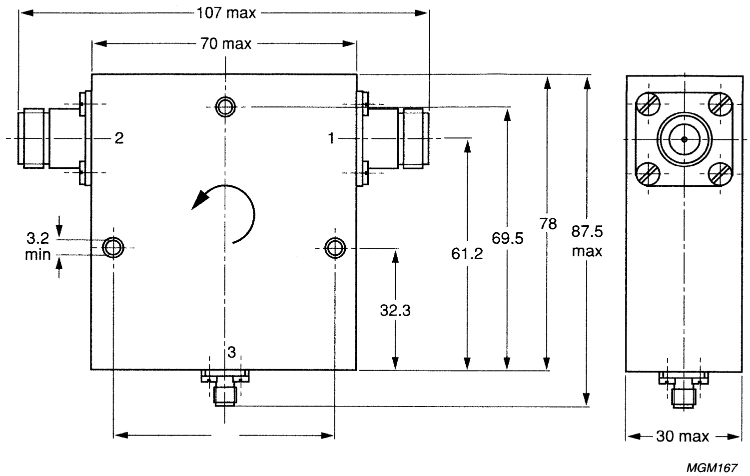


Fig.10

VHF BROADBAND CIRCULATORS / ISOLATORS

Preferred application: band I TV, fm radio, fixed and mobile communication

TYPE		DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER CW W	MAXIMUM POWER REFLECTED W
2722 162	07271	3	54 to 60	130	
	07281		66 to 72		
2722 162	05991	1	88 to 108	50	
	07021	3		300	
2722 162	03342	1	96 to 146	50	
	03332	2			
2722 162	05881	1	100 to 163	75	
	05891	3		300	
2722 162	07141	1	132 to 178	40	
2722 162	03732	1	225 to 400	60	
	03722	2		60	
	05782	1		200	
2722 162	07811	4	170 to 310	100	
2722 162	08771	6	225 to 400	230	
VBC 1004		6	216 to 230	325	
VFB 893		6	118 to 144	100	

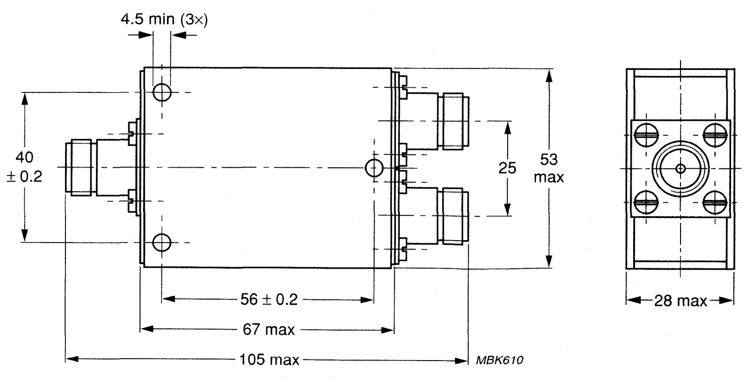


Fig.1

VHF BROADBAND CIRCULATORS / ISOLATORS

TYPE	ISOLATION MIN. dB	ISOLATION TYP. dB	INSERTION LOSS MAX. dB	INSERTION LOSS TYP. dB	VSWR MAX.	VSWR TYP.	TEMP. RANGE °C	CONNECTOR	MASS g
2722 162 07271 07281	17		0,7		1,4		0 to +60	N female	700
2722 162 05991	18		0,8		1,3		−10 to +50	N female	420
07021	16		0,8		1,4		0 to +60	N female	700
2722 162 03342	18		1,3		1,3		−10 to +60	N female	420
03332								SMA female	380
2722 162 05881	14		1,5		1,5		−20 to +55	N female	420
05891									700
2722 162 07141	17		0,5		1,35		−30 to +60	N female	420
2722 162 03732	15		1,4		1,6	1,4	− 40 to +80	N female	420
03722	15		1,4		1,6	1,4	− 40 to +80	SMA female	380
05782	17		0,7		1,4		0 to +60	N female	420
2722 162 07811	14		0,8		1,5		−30 to +85	stripline	
2722 162 08771	14		0,7		1,5		−40 to +60	SMA female	
VBC 1004	24		0,50		1,15		–	solder tabs	
VFB 893	18		0,60		1,30		0 to +60	SMA	

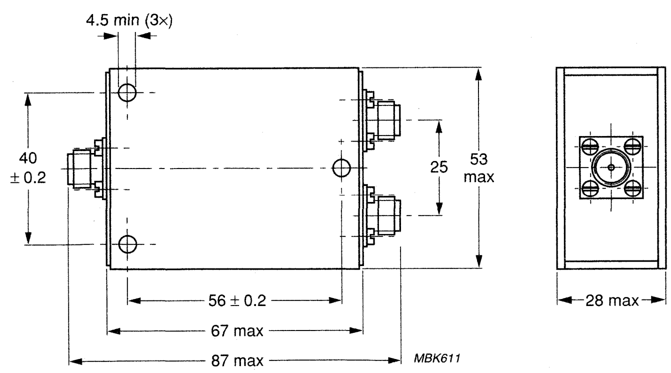


Fig.2

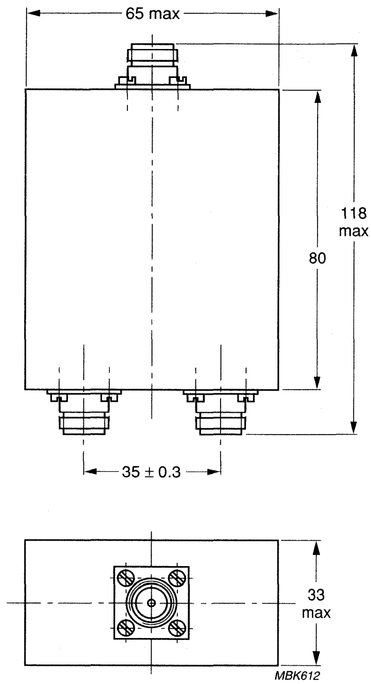

65 max
118
max
80
35 ± 0.3
33
max
MBK612

Fig.3

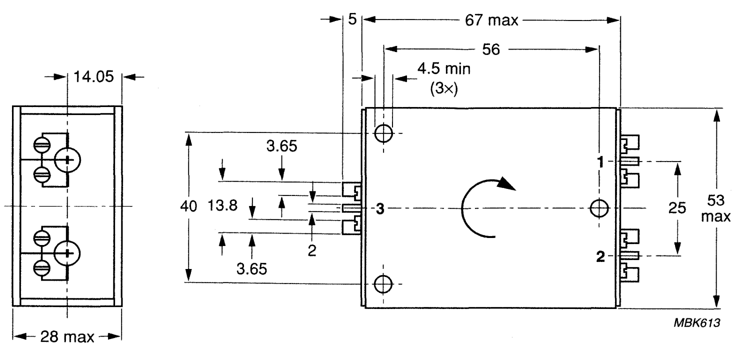

14.05
28 max
5
67 max
56
4.5 min
(3×)
3.65
40
13.8
2
3.65
1
3
2
25
53
max
MBK613

Fig.4

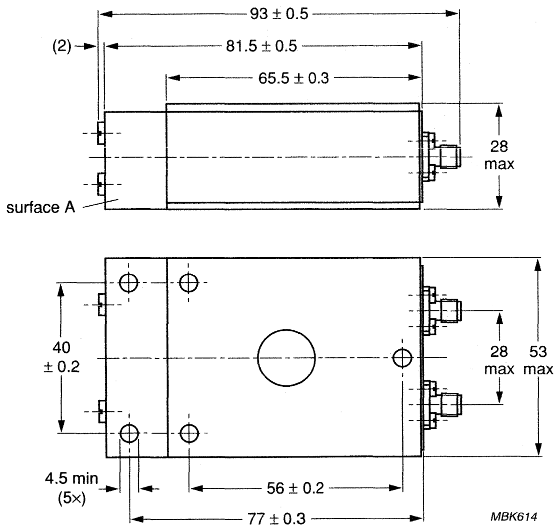

93 ± 0.5
(2)
81.5 ± 0.5
65.5 ± 0.3
28
max
surface A
40
± 0.2
28
max
53
max
4.5 min
(5×)
56 ± 0.2
77 ± 0.3
MBK614

Fig.5

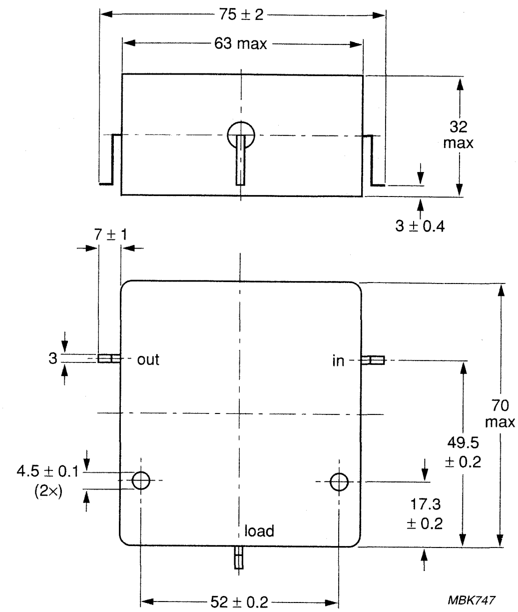

75 ± 2
63 max
32
max
3 ± 0.4
7 ± 1
3
out
in
70
max
49.5
± 0.2
4.5 ± 0.1
(2×)
17.3
± 0.2
load
52 ± 0.2
MBK747

Fig.6

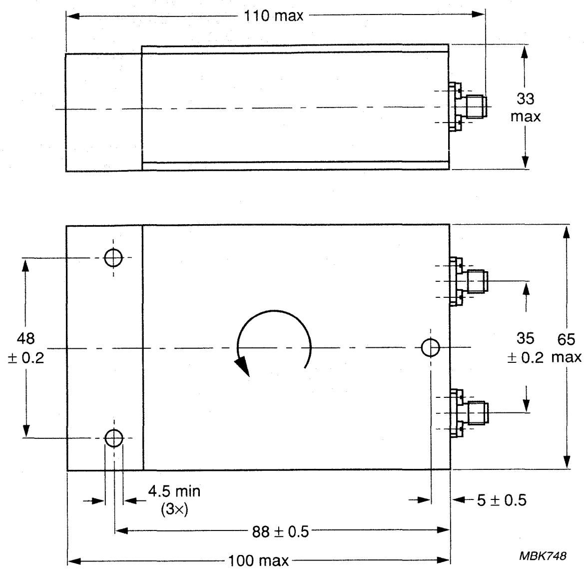


Fig.7

UHF CIRCULATORS / ISOLATORS

Preferred application: fixed and mobile communication, car telephone base stations

TYPE	DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER CW W	MAXIMUM POWER REFLECTED W
2722 162 03411	5	400 to 470	100	100
05101	6			
2722 162 02931		406 to 414		
02981	1	450 to 458	70	70
02921		510 to 514		
2722 162 06161		406 to 470		
06931	1	455 to 459	100	
02857		460 to 468		
2722 162 01555	5	462 to 468	100	
2722 162 06671	1	806 to 960	100	
2722 162 08801	4	935 to 960	60	
2722 162 07361	7	880 to 950	10	
VNJ868B	2	930 to 965	60	
2722 162 07781	3	925 to 960	50	
VNE887A	8	424 to 431	100	100
VNE876A	9	460 to 470	100	100
2722 162 08901	10	860 to 960	60	50
2722 162 08841	11	870 to 960	20	
VFJ878A	12	925 to 960	40	
VAJ759G	13	935 to 960	70	
2722 162 08721	14	935 to 960	40	
2722 162 06111	15	600 to 960	10	
05321	16			
VGE 1003A	17	460 to 470	30	
VQE 1005	18	455 to 475	250	
VBJ 1006	19	925 to 960	50	
VBE 1026	20	440 to 470	200	

UHF CIRCULATORS / ISOLATORS

TYPE		ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
		MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 162	03411 05101	20	25	0,5	0,35	1,25	1,15	−10 to +60	N female SMA female	400
2722 162	02931 02981 02921	45	55	1,0 0,8 0,8	0,7 0,6 0,6	1,25	1,15	−10 to +60	N female	700
2722 162	06161 06931 02857	50	55 – –	0,8 0,6 0,6	0,7 – 0,4	1,25	1,15 – –	−20 to +60 −10 to +60 −10 to +60	N female	700
2722 162	01555	25		0,5		1,20		−10 to +60	N female	400
2722 162	06671	45	55	0,8	0,5	1,25	115	−10 to +60	N female	700
2722 162	08801	50		0,6		1,25		−10 to +55	N	340
2722 162	07361	22		0,4		1,20		−10 to +50	SMA female	120
VNJ868B		45		0,7		1,20		−10 to +85	SMA female	400
2722 162	07781	20		0,5		1,25		−10 to +85	solder pins	40
2722 162	08871	45		0,7		1,25		−10 to +85	SMA female	
2722 162	08761	45		0,7		1,25		−10 to +85	SMA female	
2722 162	08901	≥ 45		≤ 0,5		≤ 1,25		−10 to +65	N female	
2722 162	08841	20		0,5		1,3		−10 to +85	SMA female	
VFJ878A		≥ 23		≤ 0,35		≤ 1,2		−10 to +85	SMA female	
VAJ759G		20		0,3		1,2		−10 to +85	N	
2722 162	08721	≥ 50		≤ 0,5		≤ 1,20		+10 to +35	N, MCX	
2722 162	06111 05321	13	15	0,9	0,6	1,65	1,4	−25 to +65	SMA female	400
VGE 1003A		23		0,35		1,20		−10 to +85	solder tabs	
VQE 1005		45		0,50		1,20		−10 to +85	N, SMA	
VBJ 1006		20		0,30		1,25		–	solder tabs	
VBE 1026		25		0,25		1,15		+5 to +40	solder tabs	

Note

1. 2x semi-rigid cable

UHF CIRCULATORS / ISOLATORS

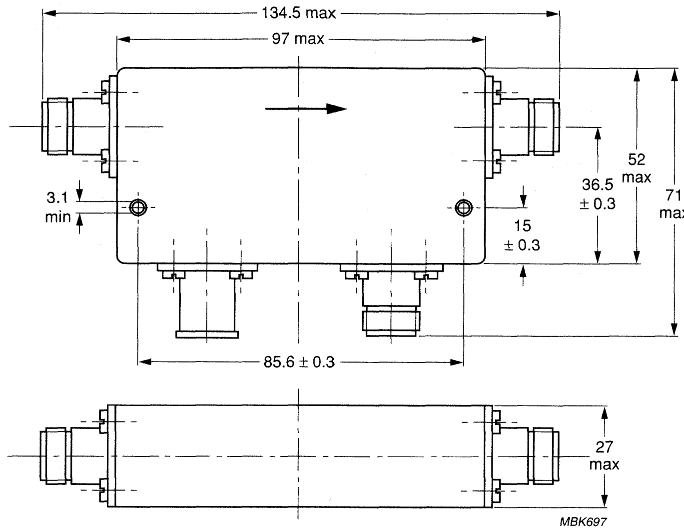


Fig.1

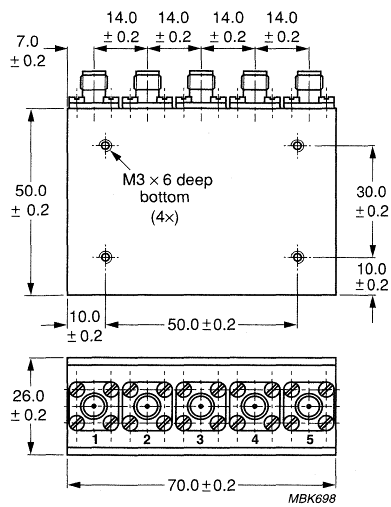


Fig.2

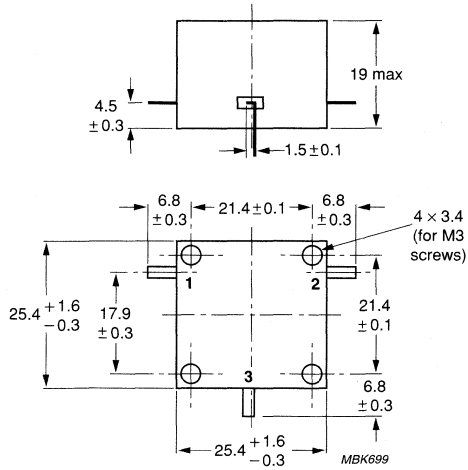


Fig.3

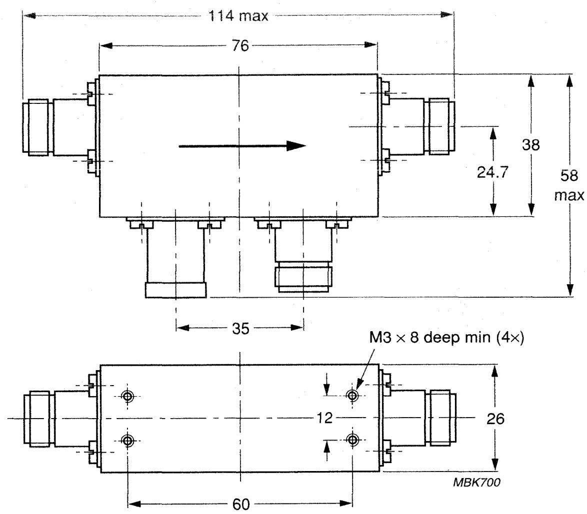


Fig.4

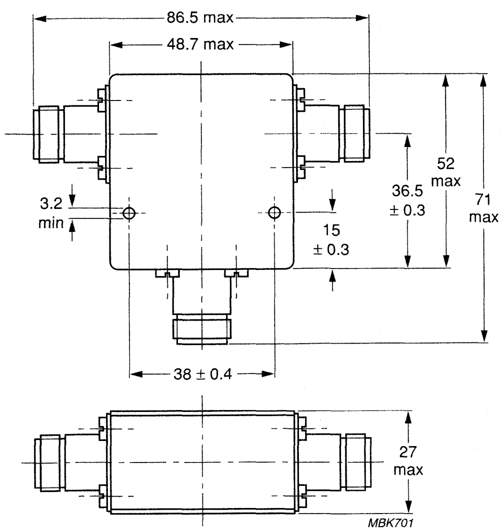


Fig.5

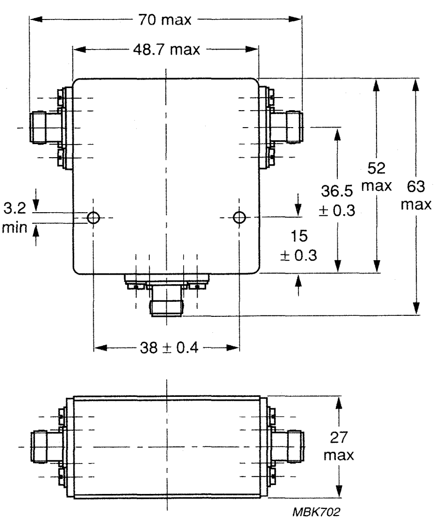


Fig.6

UHF CIRCULATORS / ISOLATORS

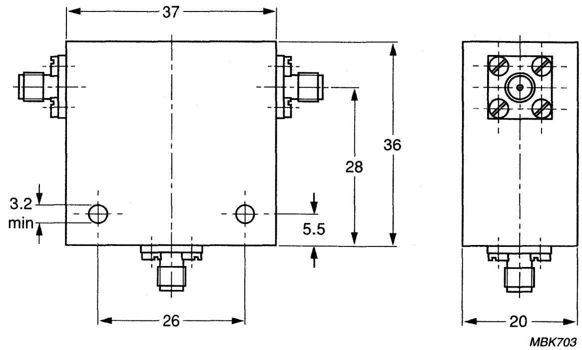


Fig.7

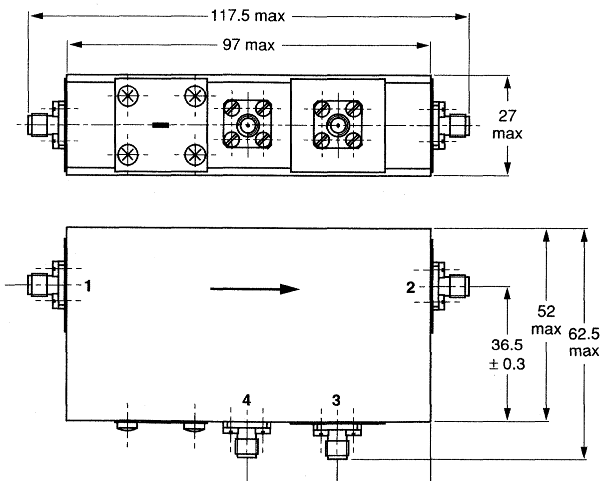


Fig.8

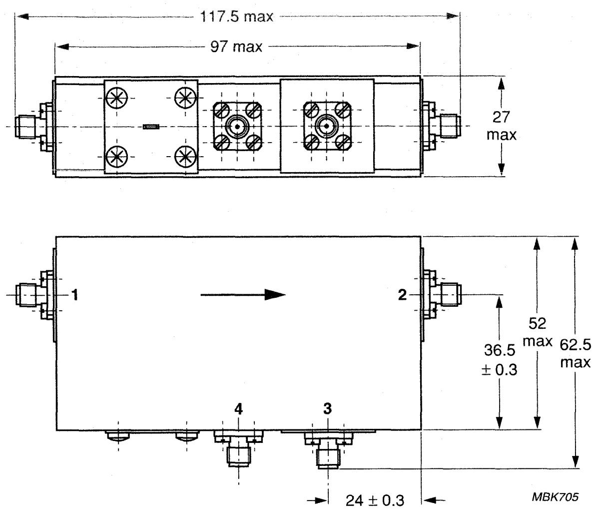


Fig.9

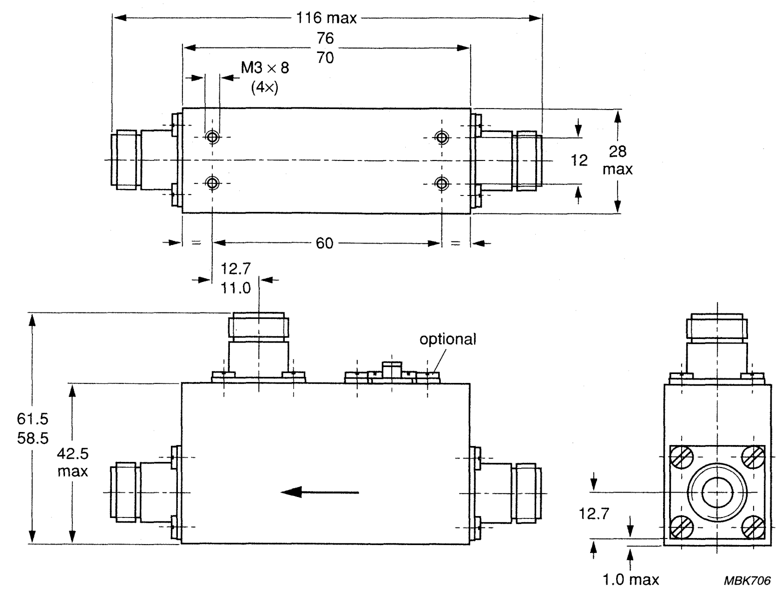

116 max
76
70
M3 × 8
(4×)
12
28
max
=
60
=
12.7
11.0
optional
61.5
58.5
42.5
max
12.7
1.0 max
MBK706

Fig.10

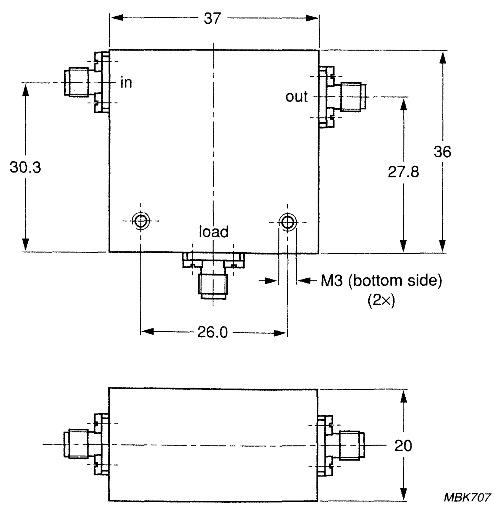

37
in
out
30.3
27.8
36
load
M3 (bottom side)
(2×)
26.0
20
MBK707

Fig.11

UHF CIRCULATORS / ISOLATORS

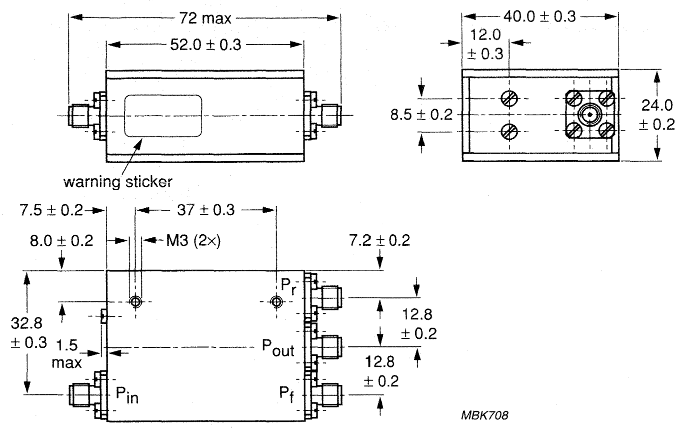


Fig.12

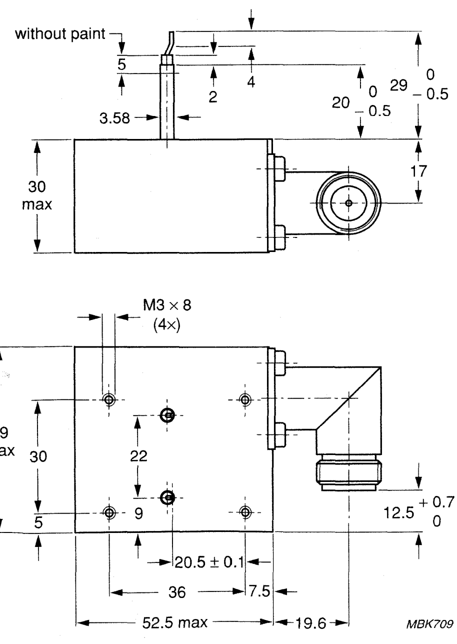


Fig.13

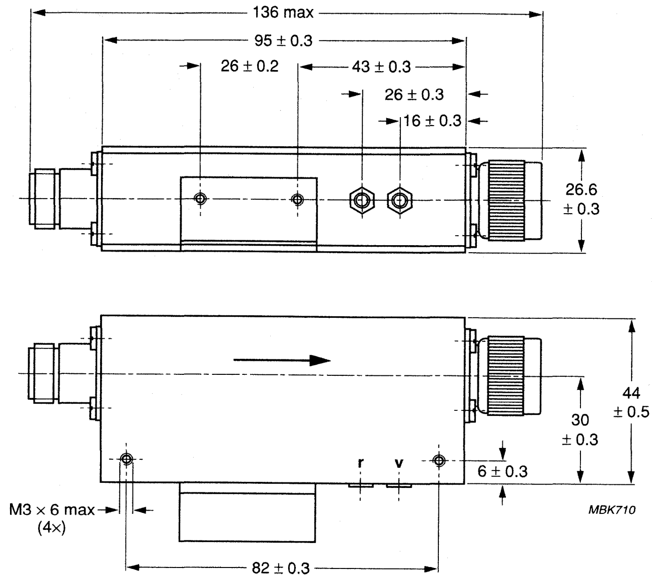

136 max
95 ± 0.3
26 ± 0.2
43 ± 0.3
26 ± 0.3
16 ± 0.3
26.6
± 0.3
44
± 0.5
30
± 0.3
6 ± 0.3
r
v
M3 × 6 max
(4×)
82 ± 0.3
MBK710

Fig.14

UHF CIRCULATORS / ISOLATORS

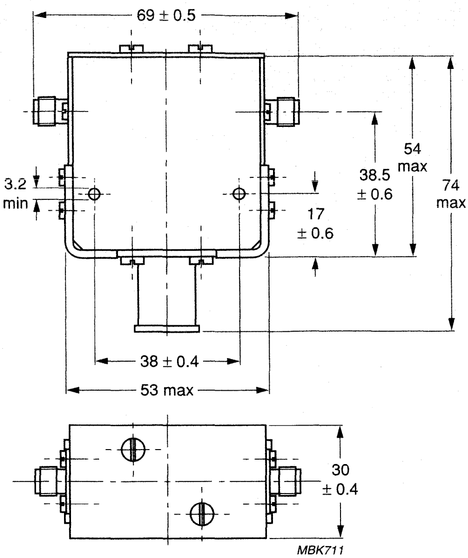


Fig.15

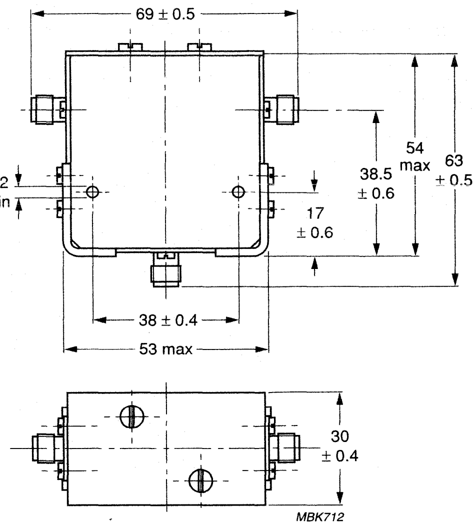


Fig.16

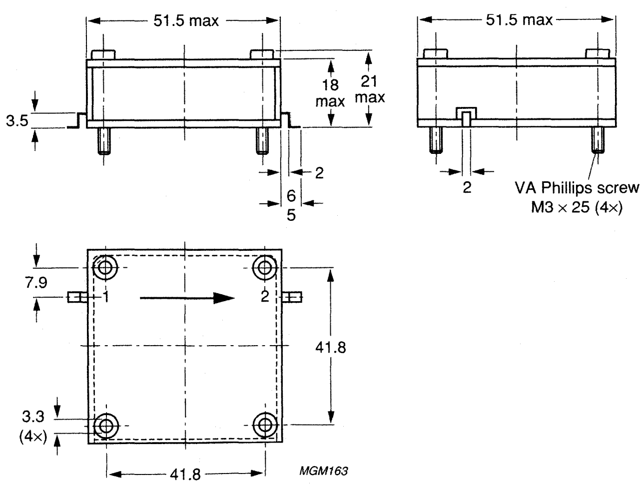


Fig.17

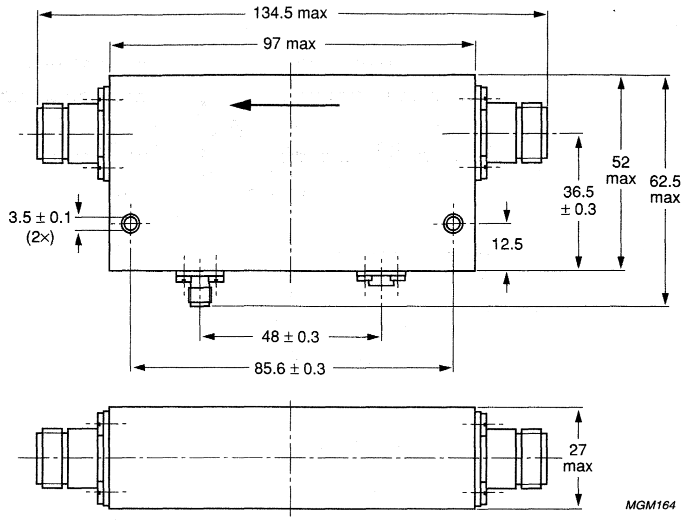

134.5 max
97 max
52
max
62.5
max
36.5
± 0.3
3.5 ± 0.1
(2×)
12.5
48 ± 0.3
85.6 ± 0.3
27
max
MGM164

Fig.18

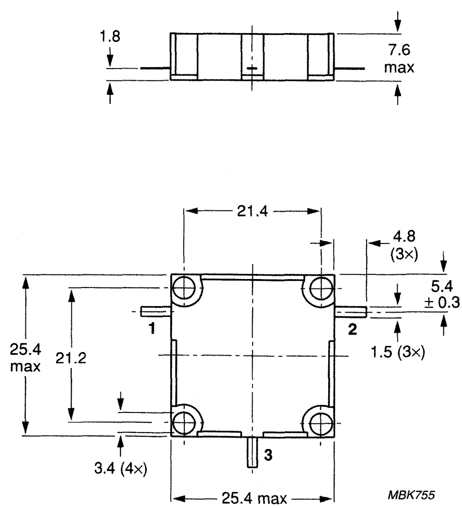

1.8
7.6
max
21.4
4.8
(3×)
5.4
± 0.3
1
2
1.5 (3×)
25.4
max
21.2
3.4 (4×)
3
25.4 max
MBK755

Fig.19

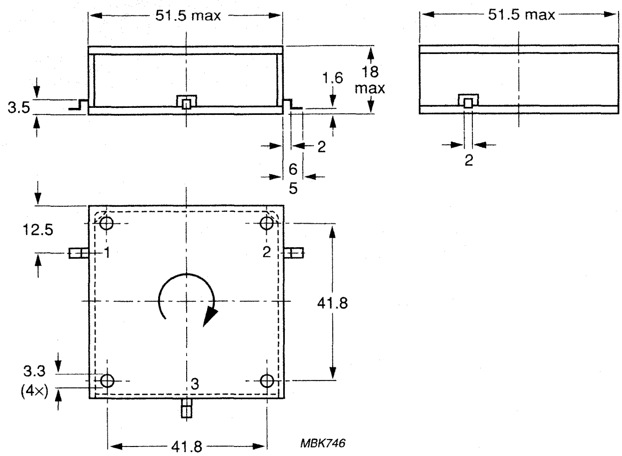


Fig.20

BAND III CIRCULATORS

Preferred application: VHF television

TYPE		DIMENSIONS Fig.	FREQUENCY RANGE MHz			MAXIMUM POWER	
						CW W	PEAK W
2722 162	07005	2	170	to	230(1)	100	
2722 162	01871	3	160	to	178	500	850
	01861		173	to	204		
	01851		200	to	230		
	03171		225	to	270		
2722 162	03641	4	160	to	178	500	850
	03631		173	to	204		
	03621		200	to	230		
	03651		225	to	270		
2722 162	05031	6	195	to	205	1000	1800
2722 162	03681	5	160	to	178	1000	1800
	03671		173	to	204		
	03661		200	to	230		
	03691		225	to	270		
2722 162	01901	6	160	to	178	1000	1800
	01891		173	to	204		
	01881		200	to	230		
	03181		225	to	270		
2722 162	05971	7	173	to	204	1500	1800
	05981		200	to	230		
2722 162	05811	1	173	to	204	1000	
	05821		200	to	230		

Notes

1. Tunable, instantaneous bandwidth for isolation 18 dB min. 7 MHz.
2. With (filtered) air cooling at 250 Pa pressure drop; max. inlet temperature 40°C; max. permissible temperature of the connectors +55°C.

BAND III CIRCULATORS

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 162 07005	18		0,5		1,3		0 to +50	N female	
2722 162 01871 01861 01851 03171	20	24	0,35	0,3	1,25	1,15	−10 to +60	N female	2100
2722 162 03641 03631 03621 03651	20	24	0,35	0,3	1,25	1,15	−10 to +60	EIA 7/8"	2700
2722 162 05031	20		0,4		1,25		−10 to +40(2)	N female	2100
2722 162 03681 03671 03661 03691	20	24	0,35	0,3	1,25	1,15	−10 to +40(2)	EIA 7/8"	2700
2722 162 01901 01891 01881 03181	20	24	0,35	0,3	1,25	1,15	−10 to +40(2)	HF 7/16 female	2150
2722 162 05971 05981	20		0,35		1,25		−10 to +40(2)	EIA 1 5/8"	
2722 162 05811 05821	20		0,35		1,25		−10 to +40(2)	N female	

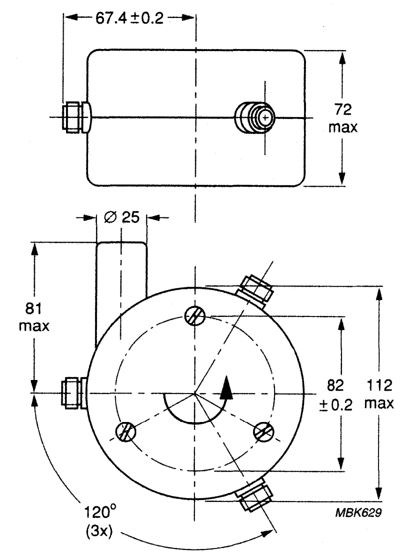

67.4 ±0.2
72
max
∅ 25
81
max
82
±0.2
112
max
120°
(3x)
MBK629

Fig.1

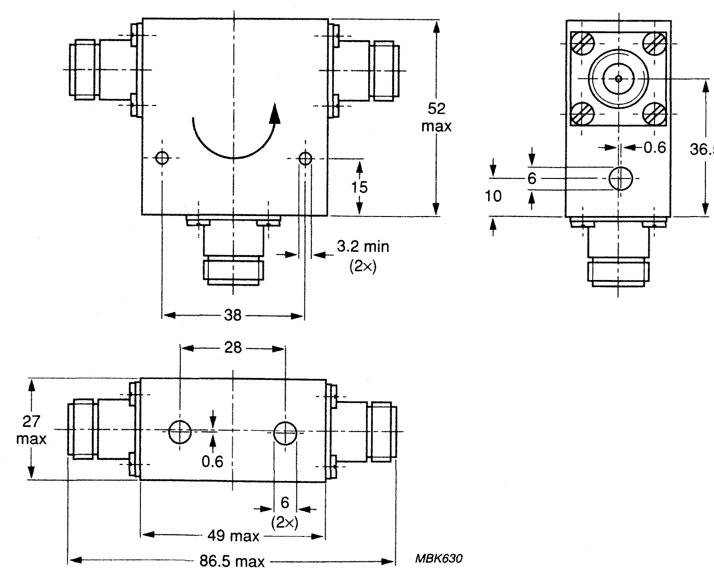

52
max
15
3.2 min
(2×)
38
0.6
6
10
36.5
28
27
max
0.6
6
(2×)
49 max
86.5 max
MBK630

Fig.2

BAND III CIRCULATORS

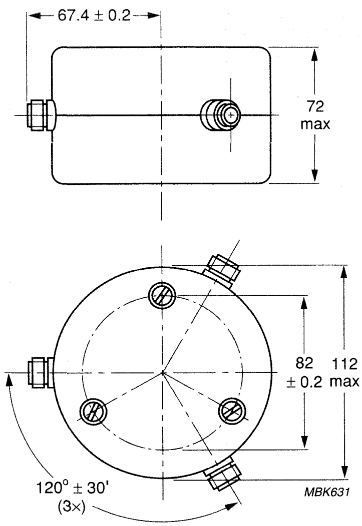


Fig.3

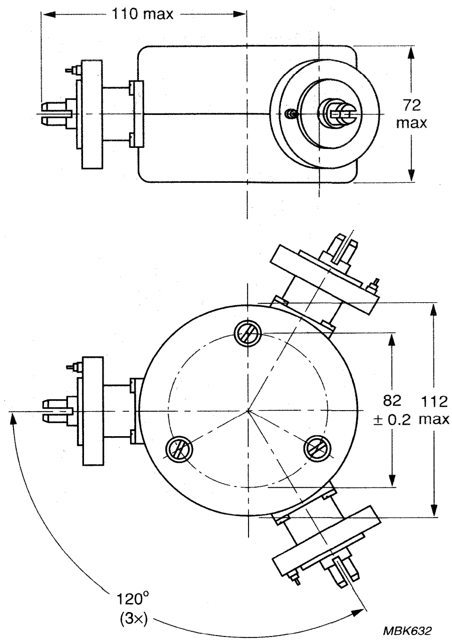


Fig.4

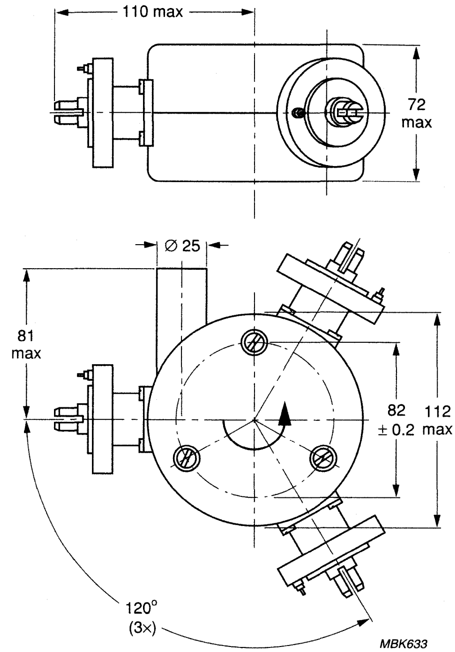

110 max
72
max
Ø 25
81
max
82
± 0.2
112
max
120°
(3×)
MBK633

Fig.5

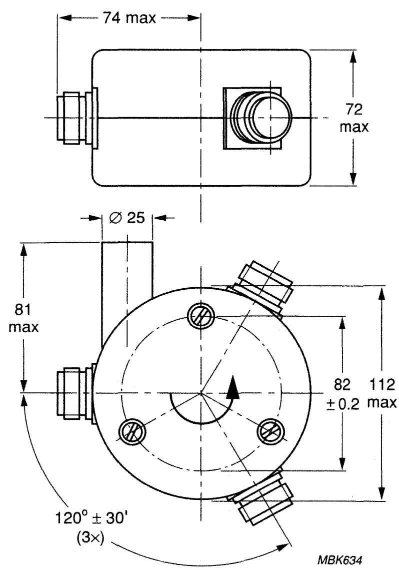

74 max
72
max
Ø 25
81
max
82
±0.2
112
max
120° ± 30'
(3×)
MBK634

Fig.6

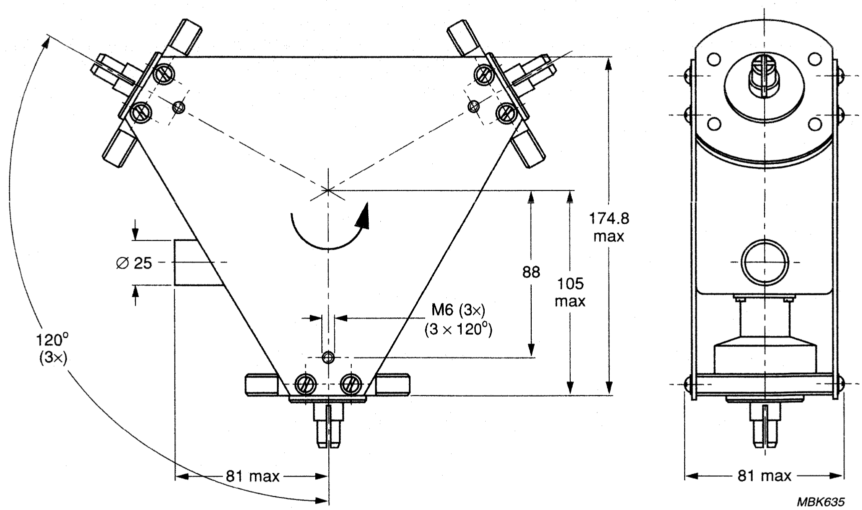


Fig.7

BAND IV/V CIRCULATORS / ISOLATORS UP TO 200 W

Preferred application: UHF television

TYPE		DIMENSIONS Fig.	FREQUENCY RANGE MHz			MAXIMUM POWER	
						CW W	PEAK W
2722 162	02691	1	470	to	600	10	100
	02701		600	to	800		
	02401		790	to	1000		
2722 162	02751	2	600	to	800	10	100
	02741		790	to	1000		
2722 162	02671	3	470	to	600	10	100
	02681		600	to	800		
2722 162	03871	4	470	to	600	50	200
	03821		600	to	800		
	03811		790	to	1000		
2722 162	01551	5	470	to	600	100	200
	01563		550	to	650		
	01561		600	to	800		
	03261		790	to	1000		
2722 162	03961	6	470	to	600	100	200
	03971		600	to	800		
	03981		790	to	1000		
2722 162	07411	7	470	to	610	150	350
	07421		610	to	860		
2722 162	07651	5	470	to	610	200	
	07661		610	to	860		

TYPE		ISOLATION MIN. dB	ISOLATION TYP. dB	INSERTION LOSS MAX. dB	INSERTION LOSS TYP. dB	VSWR MAX.	VSWR TYP.	TEMP. RANGE °C	CONNECTOR **	MASS g
2722 162	02691 02701 02401	20	25	0,5	0,35	1,25	1,15	−10 to +60	N female	400
2722 162	02751 02741	20	25	0,5	0,35	1,25	1,15	−10 to +60	SMA female	400
2722 162	02671 02681	20	25	0,5	0,35	1,25	1,15	−10 to +60	4, 1/9, 5 female	400
2722 162	03871 03821 03811	20	25	0,5	0,35 0,35 0,3	1,25	1,15 1,15 1,14	−10 to +60	SMA female	400
2722 162	01551 01563 01561 03261	20	25	0,5	0,35 0,35 0,35 0,3	1,25	1,15 1,15 1,15 1,14	−10 to +60	N female	400
2722 162	03961 03971 03981	20	25	0,5	0,35 0,35 0,3	1,25	1,15 1,15 1,14	−10 to +60	N male	400
2722 162	07411 07421	18		0,4		1,35		0 to +60	solder pins	240
2722 162	07651 07661	18		0,4		1,35		0 to +60	N female	400

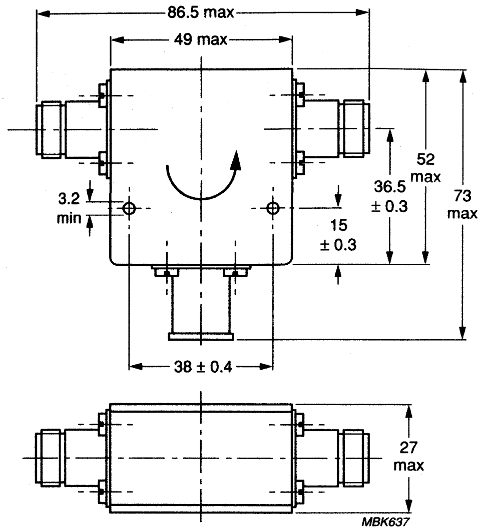

86.5 max
49 max
52
max
36.5
± 0.3
73
max
3.2
min
15
± 0.3
38 ± 0.4
27
max
MBK637

Fig.1

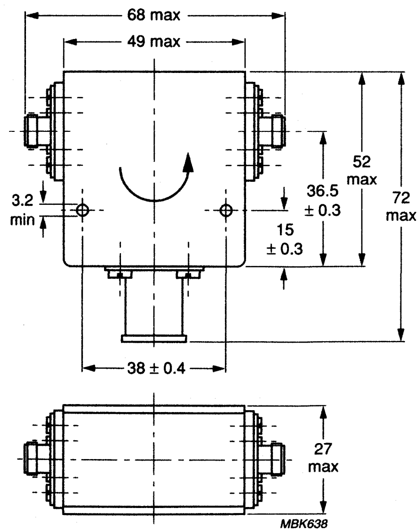

68 max
49 max
52
max
36.5
± 0.3
72
max
3.2
min
15
± 0.3
38 ± 0.4
27
max
MBK638

Fig.2

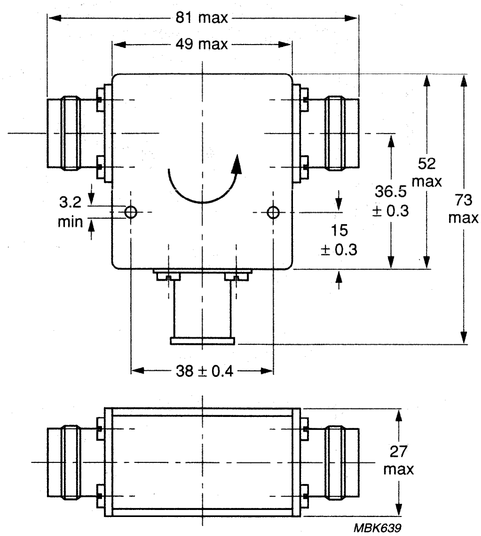

81 max
49 max
52
max
36.5
± 0.3
73
max
3.2
min
15
± 0.3
38 ± 0.4
27
max
MBK639

Fig.3

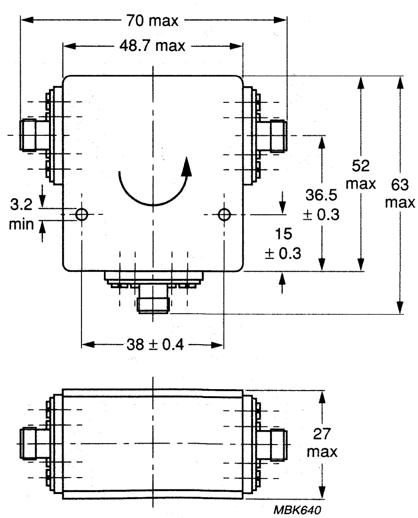

70 max
48.7 max
52
max
63
max
36.5
± 0.3
3.2
min
15
± 0.3
38 ± 0.4
27
max
MBK640

Fig.4

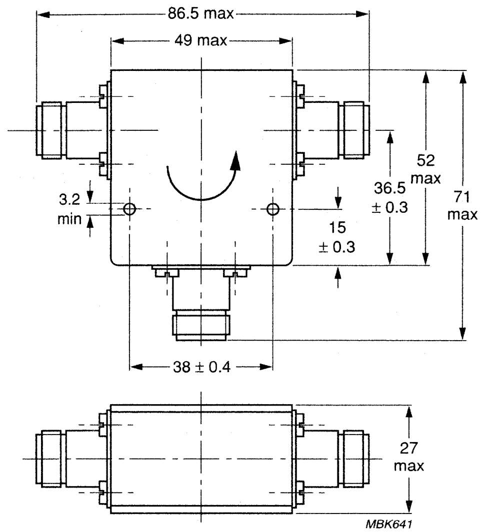

86.5 max
49 max
52
max
36.5
± 0.3
71
max
3.2
min
15
± 0.3
38 ± 0.4
27
max
MBK641

Fig.5

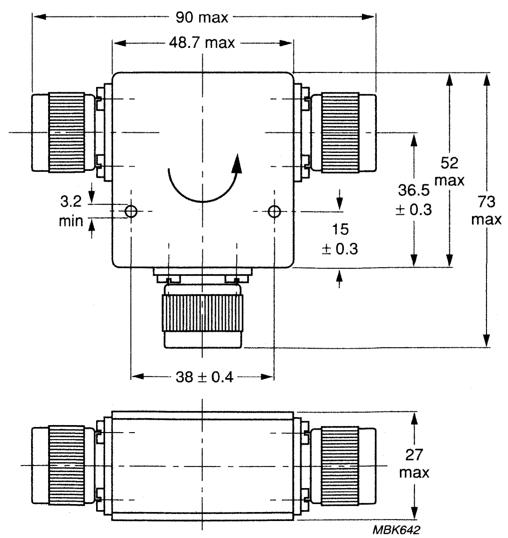

90 max
48.7 max
52
max
36.5
± 0.3
73
max
3.2
min
15
± 0.3
38 ± 0.4
27
max
MBK642

Fig.6

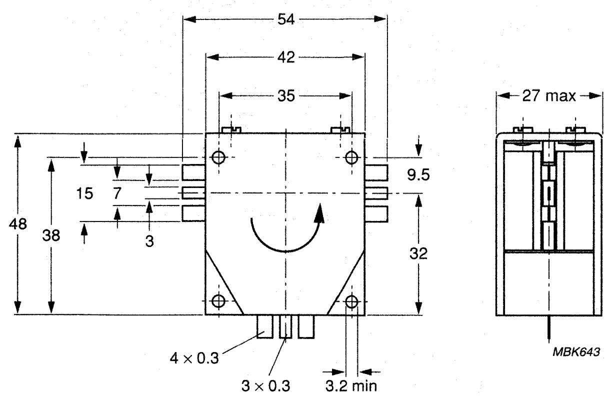


Fig.7

Preferred application: UHF television

TYPE		DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER	
				CW W	PEAK W
2722 162	01572	1	400 to 470	300	500
	01582		470 to 600		
	01592		590 to 720		
	01612		710 to 860		
2722 162	01632	2	470 to 600	300	500
	01642		590 to 720		
	01662		710 to 860		

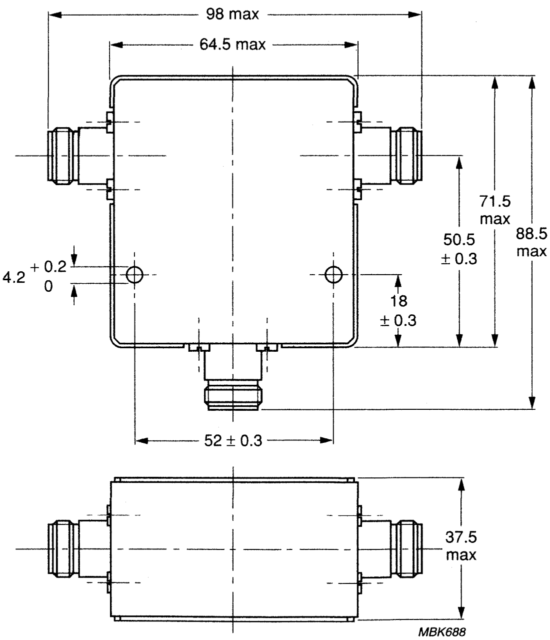


Fig.1

BAND IV/V CIRCULATORS 300 W

TYPE		ISOLATION MIN. dB	ISOLATION TYP. dB	INSERTION LOSS MAX. dB	INSERTION LOSS TYP. dB	VSWR MAX.	VSWR TYP.	TEMP. RANGE °C	CONNECTOR	MASS g
2722 162	01572									
	01582	20	25	0,35	0,20	1,25	1,15	−10 to +60	N female	900
	01592									
	01612									
2722 162	01632									
	01642	20	25	0,35	0,20	1,25	1,15	−10 to +60	HF 7/16 female	1200
	01662									

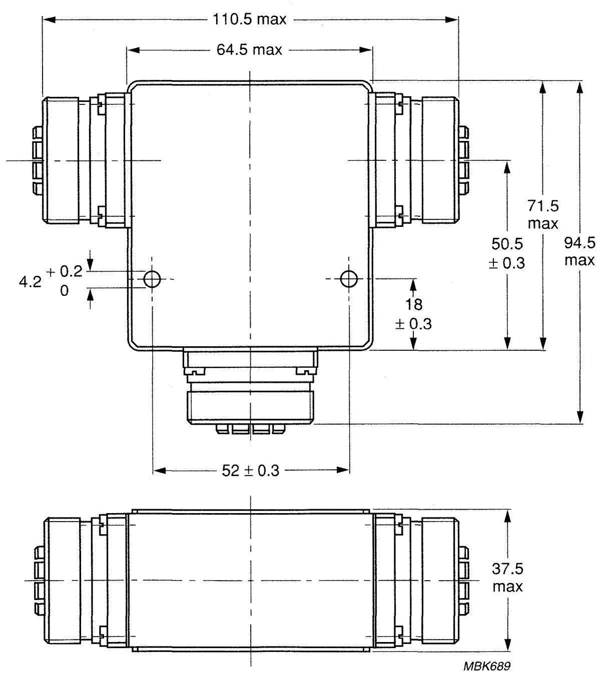


Fig.2

BAND IV/V CIRCULATORS 500 AND 700 W

Preferred application: UHF television

TYPE	DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER	
			CW W	PEAK W
2722 162 01121	1	470 to 600	500	900
03191		600 to 800		
01131		590 to 720		
01141		710 to 860		
2722 162 03221	2	470 to 600	500	900
03231		600 to 800		
03241		590 to 720		
03251		710 to 860		
2722 162 03141	3	470 to 600	500	900
03151		600 to 800		
03201		590 to 720		
03211		710 to 860		
2722 162 05371	3	470 to 600	700	8000
05381		590 to 720		
05391		710 to 860		

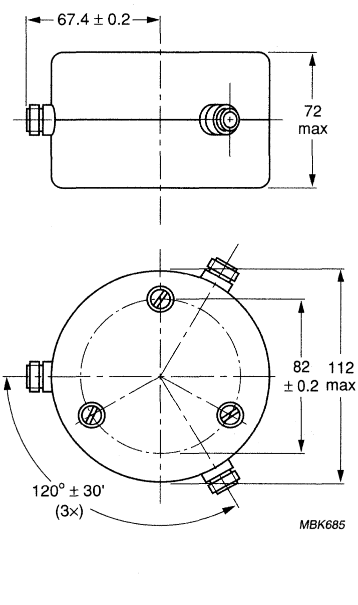


Fig.1

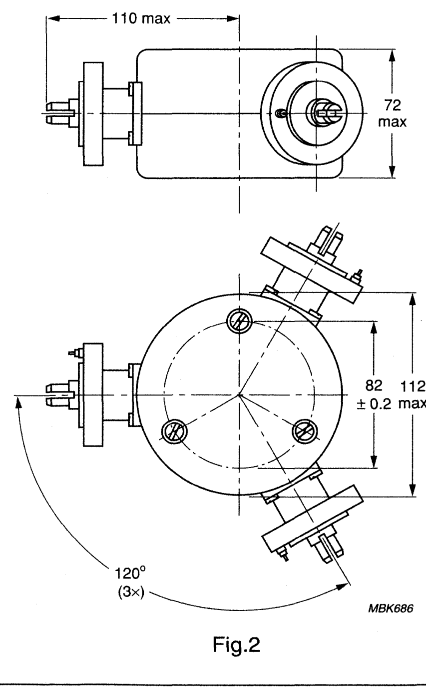


Fig.2

BAND IV/V CIRCULATORS 500 AND 700 W

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 162 01121 03191 01131 01141	20	24	0,35	0,25	1,2	1,15	−10 to +70	N female	2080
2722 162 03221 03231 03241 03251	20	24	0,35	0,25	1,25	1,15	−10 to +70	EIA 7/8"	2700
2722 162 03141 03151 03201 03211	20	24	0,35	0,25	1,25	1,15	−10 to +70	HF 7/16 female	2200
2722 162 05371 05381 05391	20		0,4		1,25		+5 to +65	HF 7/16 female	2200

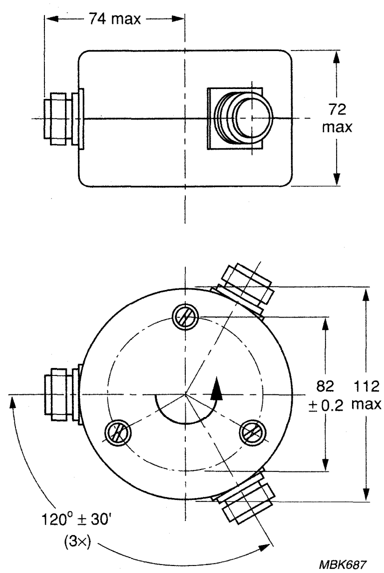


Fig.3

BAND IV/V CIRCULATORS 2 kW

Preferred application: UHF television

TYPE		DIMENSIONS Fig.	FREQUENCY RANGE MHz			MAXIMUM POWER	
						CW W	PEAK W
2722 162	03991	1	433	to	435	2000	2000
2722 162	01771	1	470	to	600	2000	2000
	01791		600	to	800		
	01781		590	to	720		
	01801		710	to	860		
2722 162	01261	2	470	to	600	2000	2000
	01331		600	to	800		
	01281		590	to	720		
	01271		710	to	860		

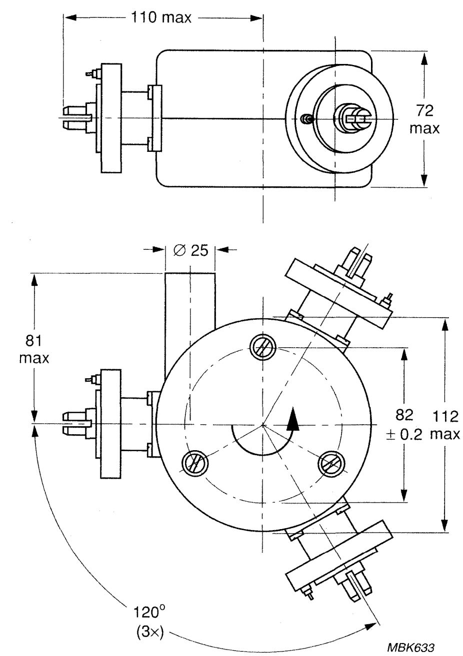


Fig.1

BAND IV/V CIRCULATORS 2 kW

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 162 03991	20	24	0,4	0,3	1,25	1,15	0 to 40 (1)	EIA 7/8"	2700
2722 162 01771 01791 01781 01801	20	24	0,35	0,25	1,25	1,15	−10 to +40 (1)	EIA 7/8"	2700
2722 162 01261	22	24	0,35	0,25	1,2	1,15	−10 to +40 (1)	HF 7/16 female	2200
01331	20	24			1,25				
01281	20	26			1,25				
01271	22	26			1,2				

Note

1. With (filtered) air cooling, at 250 Pa pressure drop; 40 °C inlet temperature, max. permissible temperature of the connectors +55 °C.

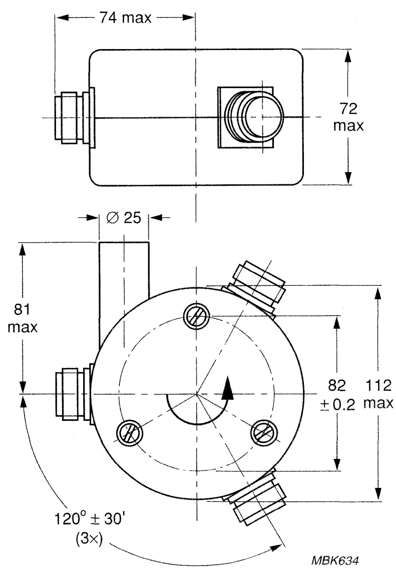


Fig.2

BAND IV/V CIRCULATORS 2/8 kW

Preferred application: UHF television

TYPE	DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER CW W	MAXIMUM POWER PEAK W
2722 162 03001	1	470 to 600	2000	8000
03011		590 to 720		
01981		710 to 860		

BAND IV/V CIRCULATORS 2/8 kW

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 162 03001 03011 01981	20		0,4		1,25		+5 to +40 (1)	EIA 1 5"/8	3900

Note

1. With (filtered) air cooling at 250 Pa pressure drop; 40 °C inlet temperature, max. permissible temperature of the connectors +55 °C.

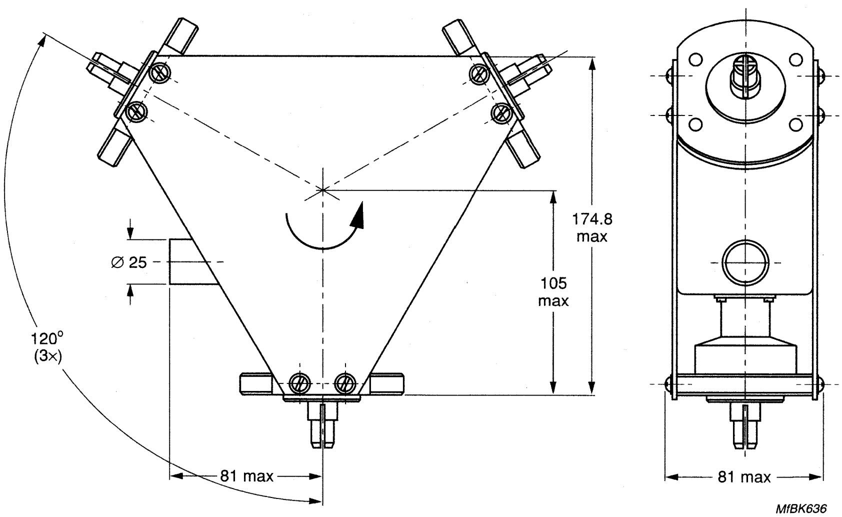


Fig.1

CIRCULATORS/ISOLATORS 1 TO 2 GHZ

Preferred application: radio links and navigation, pcn

TYPE	DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER CW W	MAXIMUM POWER REFLECTED W
2722 162 03591	1	960 to 1225	100	
2722 162 08341	2	1200 to 1415	20	
2722 162 07511	3	1215 to 1400	250	
2722 162 08641	4	1230 to 1365	60	
2722 162 05331	5	1350 to 1700	10	
2722 162 05571	5	1350 to 2100		
06701	6			
2722 162 02492	2	1427 to 1535	10	
03802	1			
2722 162 08921	8	1930 to 1990	60	
VAO 1001	1	1450 to 1500	130	
VBN 1012A	8	1270 to 1400	120	
VFT 1015	5	1930 to 1990	50	
VAT 1019	5	1930 to 1990	50	
VFS 1021	5	1805 to 1880	50	
VAS 1024	5	1805 to 1880	50	
VLS 1027	5	1805 to 1880	40	
VBS 1028	5	1805 to 1880	50	
VGS 1029	5	1850 to 1910	1	
VBO 1030A	8	1450 to 1500	60	

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 162 03591	20	22	0,5	0,35	1,25	1,20	−10 to +60	N female	460
2722 162 08341	20		0,4		1,25		0 to +70	N female	400
2722 162 07511	19		0,3		1,25		0 to +50	HF 7/16 female	1200
2722 162 08641	20		0,4		1,25		0 to +55	SMA female, N female	180
2722 162 05331	20	23	0,4	0,3	1,2	1,15	0 to +45	SMA female	120
2722 162 05571 06701	17		0,5		1,35		−15 to +65	SMA female	120
2722 162 02492 03802	20	24	0,4	0,3	1,15	1,12	0 to +55	N female	400
2722 162 08921	≥ 50		≤ 0,5		≤ 1,25		−10 to +65	SMB, TNC	
VAO 1001	23		0,25		1,15		0 to +50	N	
VBN 1012A	20		0,40		1,25		−30 to +95	solder tabs	
VFT 1015	23		0,25		1,15		−10 to +55	N, SMA	
VAT 1019	23		0,25		1,15		−10 to +55	N, SMA	
VFS 1021	23		0,25		1,15		−10 to +55	N, SMA	
VAS 1024	23		0,25		1,15		−10 to +55	N, SMA	
VLS 1027	45		0,50		1,20		–	solder tabs	
VBS 1028	20		0,30		1,25		–	solder tabs	
VGS 1029	23		0,35		1,20		–	solder tabs	
VBO 1030A	23		0,30		1,15		–	solder tabs	

Note

1. 2x semi-rigid cable

CIRCULATORS/ISOLATORS
1 TO 2 GHZ

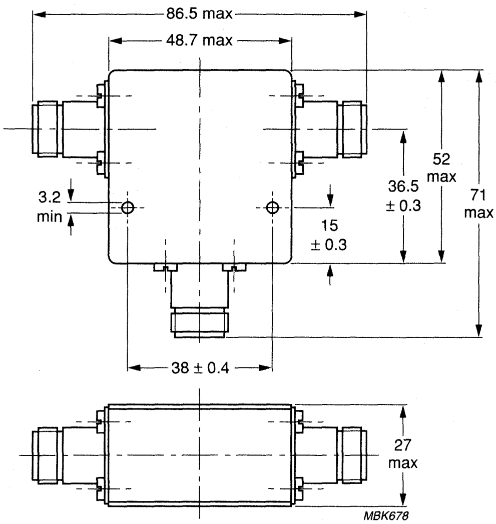


Fig.1

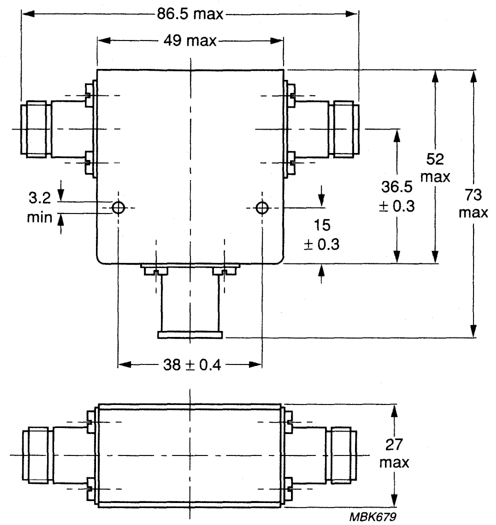


Fig.2

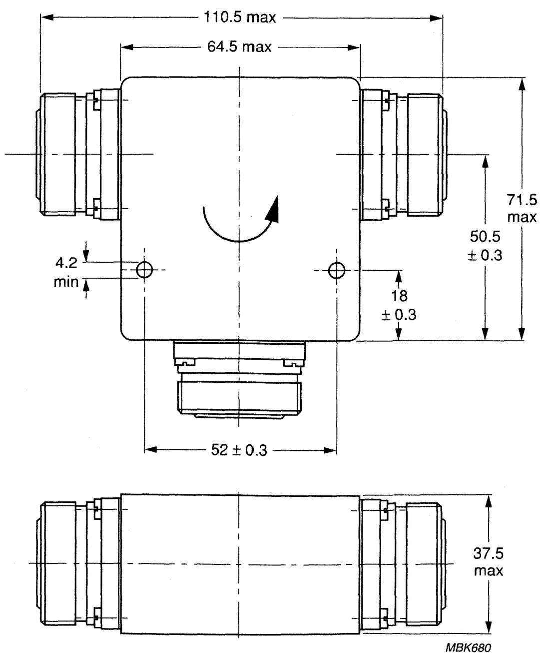


Fig.3

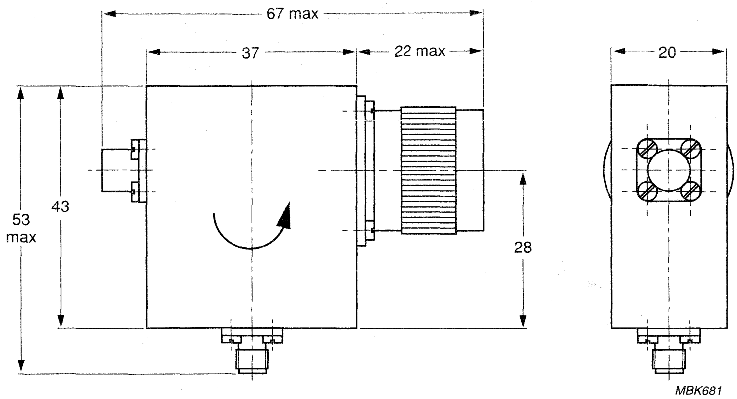


Fig.4

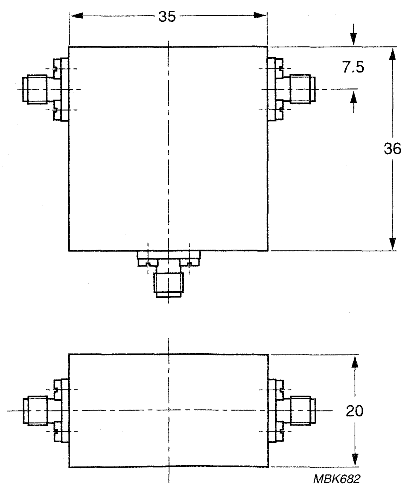


Fig.5

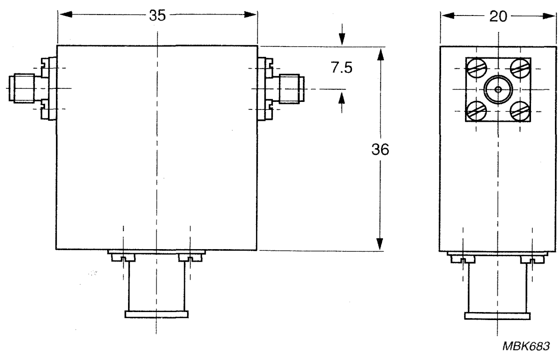

35
20
7.5
36
MBK683

Fig.6

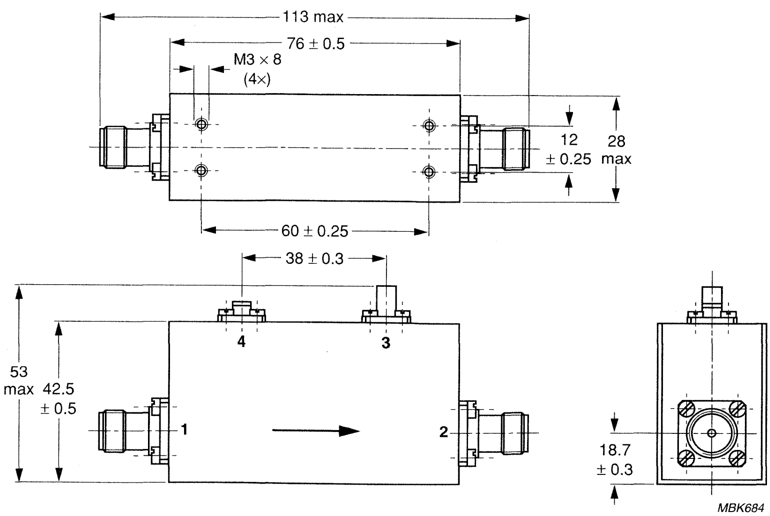

113 max
76 ± 0.5
M3 × 8
(4×)
12
± 0.25
28
max
60 ± 0.25
38 ± 0.3
4
3
53
max
42.5
± 0.5
1
2
18.7
± 0.3
MBK684

Fig.7

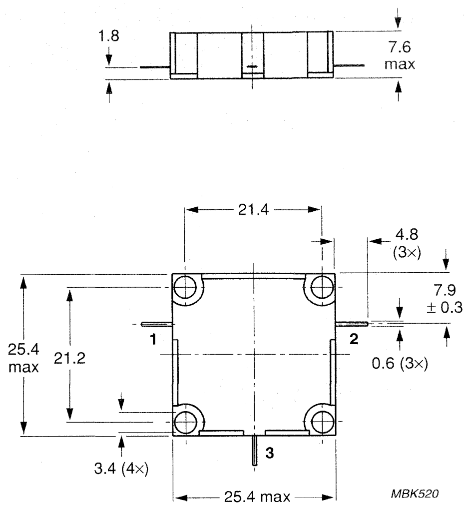

1.8
7.6
max
21.4
4.8
(3×)
7.9
± 0.3
1
2
0.6 (3×)
25.4
max
21.2
3
3.4 (4×)
25.4 max
MBK520

Fig.8

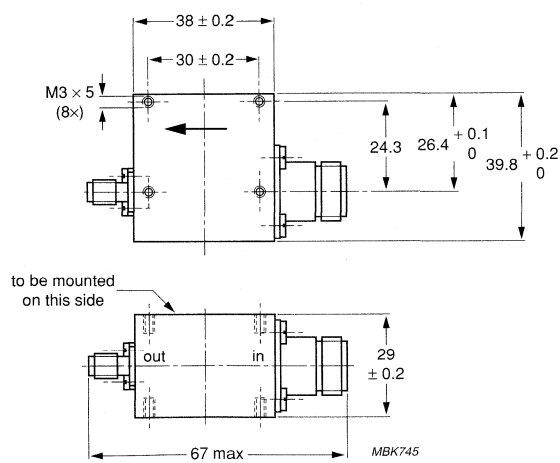

38 ± 0.2
30 ± 0.2
M3 × 5
(8×)
24.3
26.4 + 0.1 0
39.8 + 0.2 0
to be mounted
on this side
out
in
29
± 0.2
67 max
MBK745

Fig.9

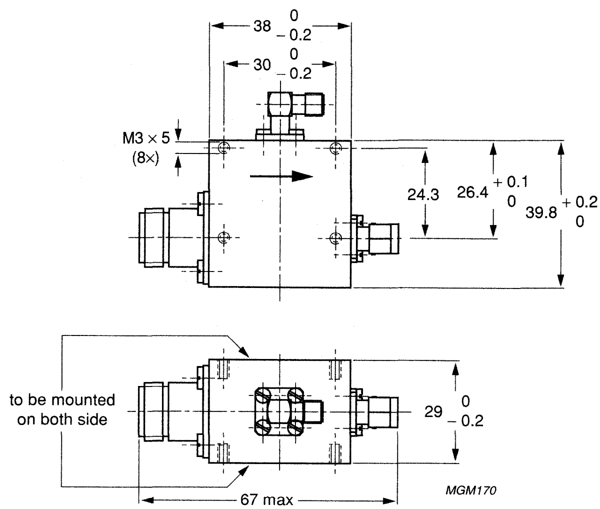

38 0 −0.2
30 0 −0.2
M3 × 5
(8×)
24.3
26.4 +0.1 0
39.8 +0.2 0
to be mounted
on both side
29 0 −0.2
67 max
MGM170

Fig.10

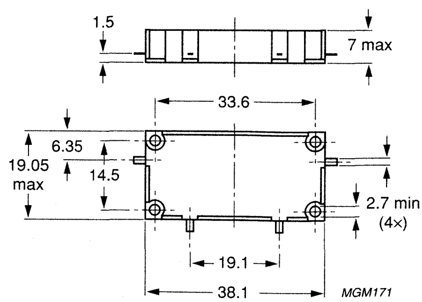

1.5
7 max
33.6
6.35
19.05
max
14.5
2.7 min
(4×)
19.1
38.1
MGM171

Fig.11

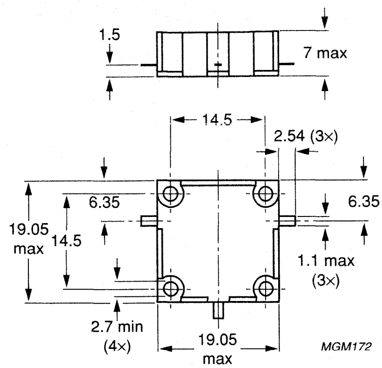

1.5
7 max
14.5
2.54 (3×)
6.35
6.35
19.05
max
14.5
1.1 max
(3×)
2.7 min
(4×)
19.05
max
MGM172

Fig.12

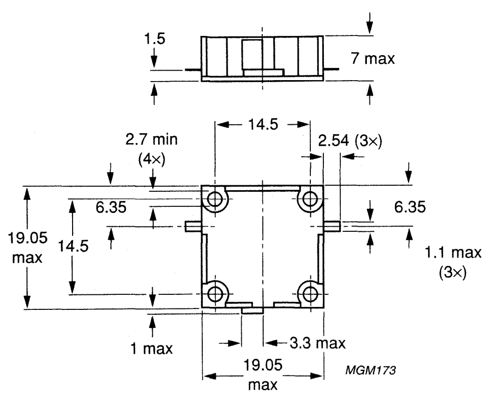

1.5
7 max
14.5
2.7 min
(4×)
2.54 (3×)
6.35
6.35
19.05
max
14.5
1.1 max
(3×)
1 max
3.3 max
19.05
max
MGM173

Fig.13

CIRCULATORS / ISOLATORS 2 GHZ

Preferred application: radio links

TYPE	DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER	
			CW W	REFLECTED W
2722 162 05241 05251 05231	1	1700 to 2100	30	
2722 162 05261 05271	1	1900 to 2300	30	
2722 162 02571 02581 02591 02601	2	1700 to 2100 1700 to 2100 1900 to 2300 1900 to 2300	15	15
2722 162 05311 05341 05351 05361 05401 05411	3	1700 to 2100 1900 to 2300 2100 to 2500 2300 to 2700 2450 to 2850 2000 to 2700	10	
2722 162 07601	3	1700 to 2700	25	
2722 162 05471	4	1900 to 2300	15	

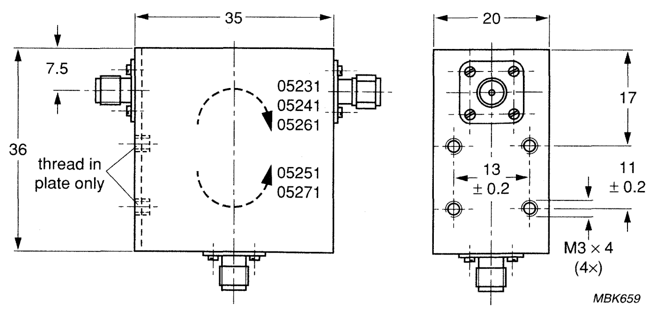


Fig.1

CIRCULATORS / ISOLATORS
2 GHZ

TYPE	ISOLATION MIN. dB	ISOLATION TYP. dB	INSERTION LOSS MAX. dB	INSERTION LOSS TYP. dB	VSWR MAX.	VSWR TYP	TEMP. RANGE °C	CONNECTOR	MASS g
2722 162 05241	26		0,3		1,11		0 to +55	SMA 2x female 1x male	120
05251	26				1,11				
05231	20				1,25				
2722 162 05261 05271	26		0,3		1,11		0 to +55	SMA 2 x female 1 x male	120
2722 162 02571 02581 02591 02601	26		0,25		1,11		0 to +55	SMA 1x female 1x male	140
2722 162 05311 05341 05351 05361 05401 05411	20		0,4		1,2		−20 to +50	SMA female	120
2722 162 07601	20		0,45		1,25		0 to +50	SMA female	120
2722 162 05471	23		0,3		1,1		0 to +45	1 x N female 2 x SMA female	150

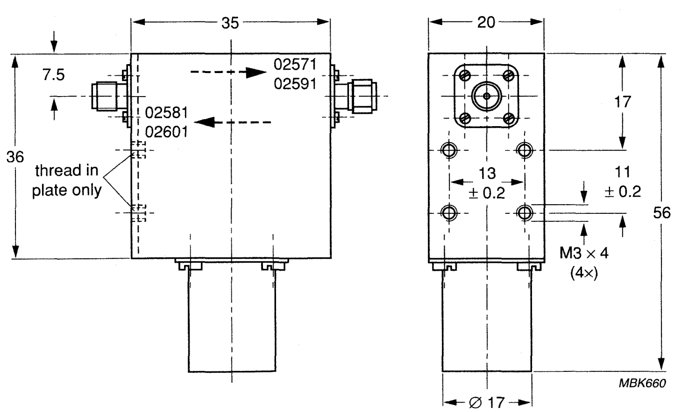


Fig.2

CIRCULATORS / ISOLATORS 2 GHZ

Preferred application: radio links

TYPE		DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER	
				CW W	REFLECTED W
2722 162	03881	5	1680 to 1920	20	
	03891		1880 to 2120		
	03901		2080 to 2320		
2722 162	03911	6	1680 to 1920	50	
	03921		1880 to 2120		
	03931		2080 to 2320		
2722 162	03951	5	1700 to 2300	20	
	03941	6		50	
2722 162	02191	7	1700 to 2300	20	5
	02511	8			

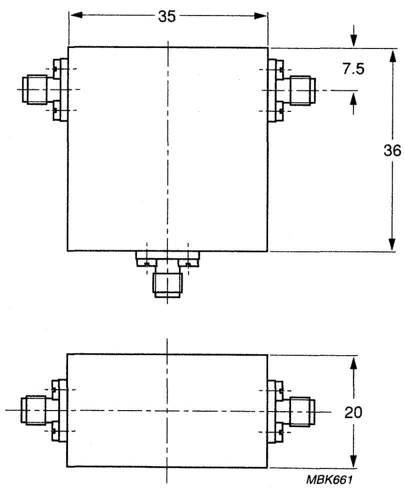


Fig.3

CIRCULATORS / ISOLATORS 2 GHZ

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP			
2722 162 03881 03891 03901	25		0,35		1,12		0 to +50	SMA female	400
2722 162 03911 03921 03931	23		0,40		1,15		−20 to +60	N female	400
2722 162 03951 03941	20		0,3		1,25		0 to +55	SMA female N female	400
2722 162 02191 02511	20		0,3		1,25		0 to +55	N m + f SMA m + f	400

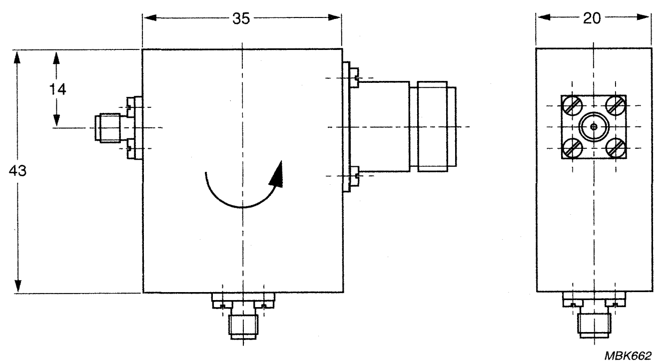


Fig.4

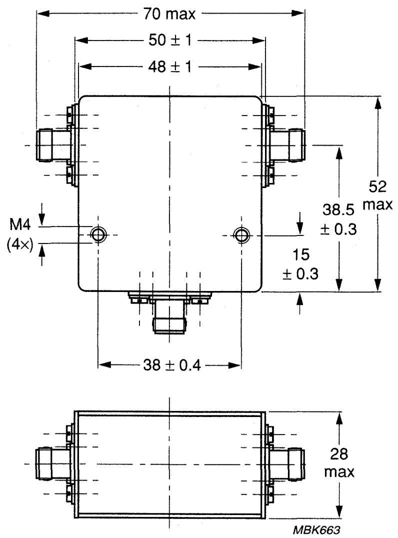

70 max
50 ± 1
48 ± 1
52 max
38.5 ± 0.3
M4 (4×)
15 ± 0.3
38 ± 0.4
28 max
MBK663

Fig.5

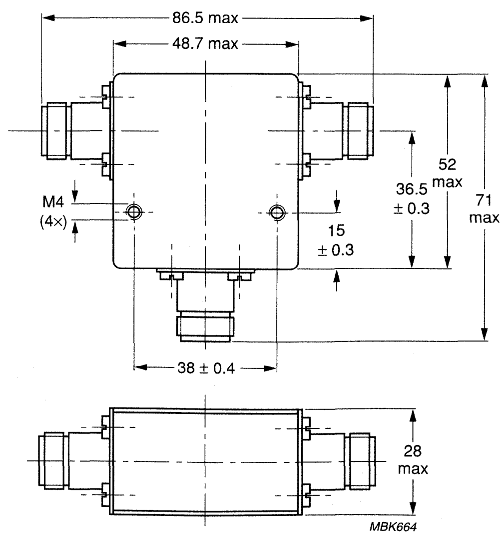

86.5 max
48.7 max
52 max
36.5 ± 0.3
71 max
M4 (4×)
15 ± 0.3
38 ± 0.4
28 max
MBK664

Fig.6

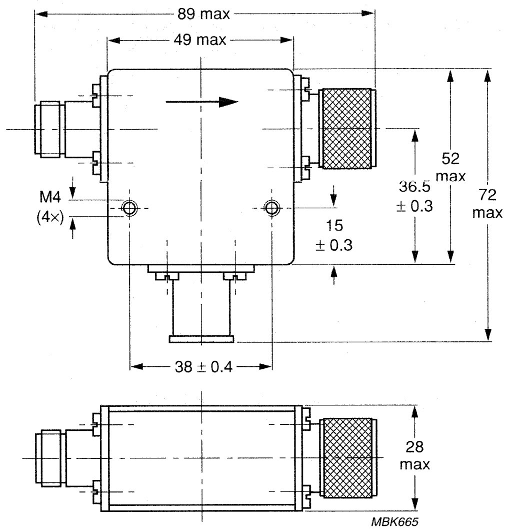

89 max
49 max
52
max
36.5
± 0.3
72
max
M4
(4×)
15
± 0.3
38 ± 0.4
28
max
MBK665

Fig.7

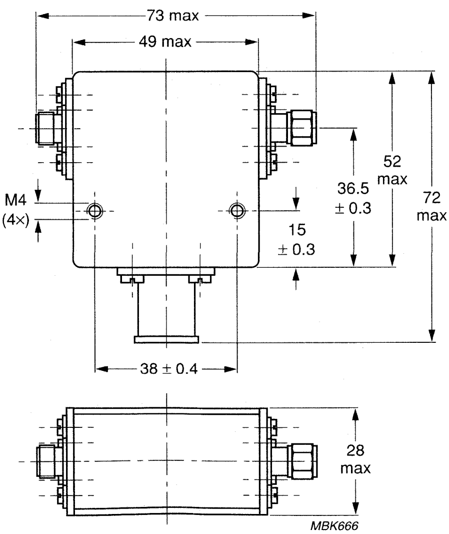

73 max
49 max
52
max
36.5
± 0.3
72
max
M4
(4×)
15
± 0.3
38 ± 0.4
28
max
MBK666

Fig.8

4-PORT CIRCULATORS/ 2 GHz

Preferred application: radio links

TYPE	DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER	
			CW W	REFLECTED W
2722 162 04051 04061	1	1700 to 2100 1900 to 2300	30	15
2722 162 04091 04101	1	1700 to 2100 1900 to 2300	30	

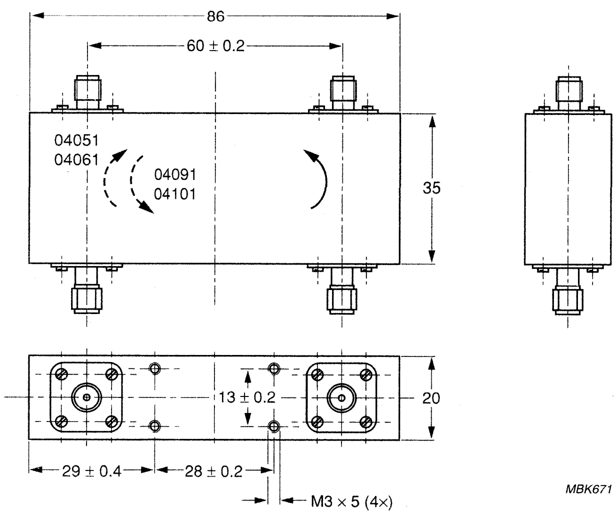


Fig.1

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP			
2722 162 04051 04061	26		0,25		1,11		0 to +55	SMA male 2 x female 2 x	220
2722 162 04091 04101	26		0,40		1,11		0 to +55	SMA male 2 x female 2 x	220

Preferred application: radio links

TYPE		DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER	
				CW W	REFLECTED W
2722 162	02471	1	4200 to 4400	10	1,5
2722 162	03431	2	3800 to 4200	10	
	03441		4400 to 5000		
2722 162	04031	3	3800 to 4200	10	
	04041		4400 to 5000		

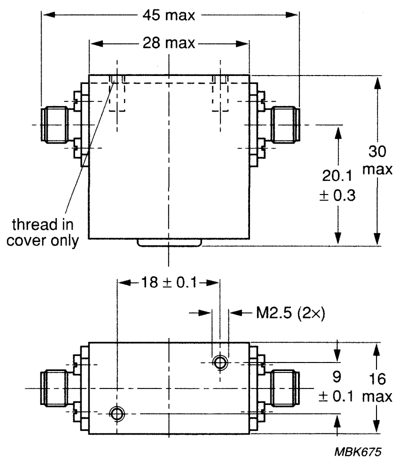


Fig.1

CIRCULATORS / ISOLATORS 4 GHz

TYPE		ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
		MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 162	02471	23	25	0,3	0,25	1,2	1,12	−55 to +90	SMA female	60
2722 162	03431 03441	25	27	0,25	0,2	1,12	1,10	−10 to +70	SMA female	110
2722 162	04031 04041	25	27	0,25	0,2	1,12	1,10	−10 to +70	SMA female	220

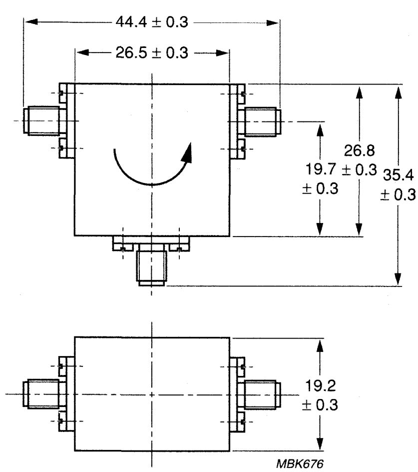


Fig.2

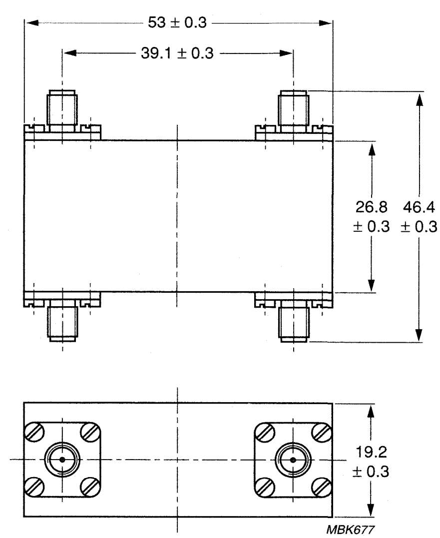


Fig.3

CIRCULATORS / ISOLATORS 6 TO 7 GHz

Preferred application: radio links

TYPE		DIMENSIONS Fig.	FREQUENCY RANGE MHz		MAXIMUM POWER	
					CW W	REFLECTED W
2722 161	04003		5925	to 6425		
	04052	1	6425	to 7125	200	3
	04062		7125	to 7750		
2722 161	02212		5925	to 6425		
	02312	2	6425	to 7125	200	
	02322		7125	to 7750		
2722 162	08461	3	6400	to 7100	1	

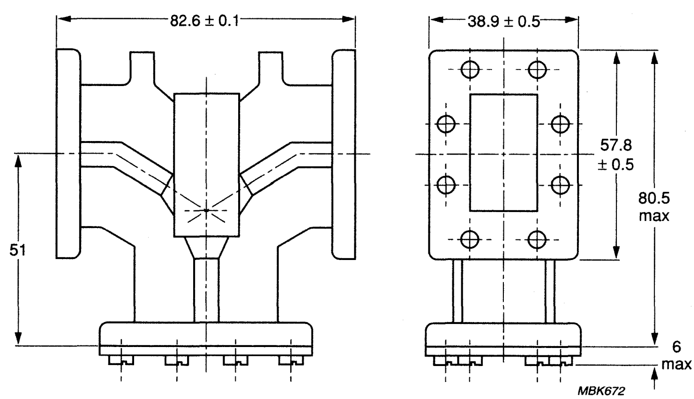


Fig.1

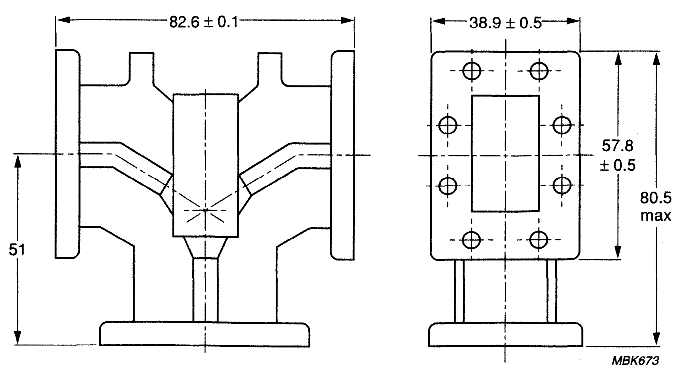


Fig.2

CIRCULATORS / ISOLATORS
6 TO 7 GHz

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 161 04003 04052 04062	28		0,2		1,08		0 to +50	IEC-UER 70	230
2722 161 02212 02312 02322	28		0,2		1,08		0 to +50	IEC-UER 70	230
2722 162 08461	23		0,4		1,15		0 to +50	SMA female	60

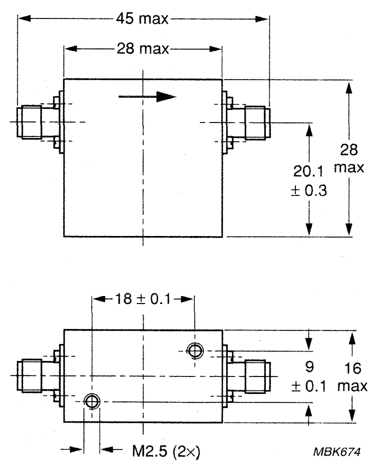


Fig.3

OCTAVE BANDWIDTH CIRCULATORS / ISOLATORS

Preferred application: microwave measurements

TYPE		DIMENSIONS Fig.	FREQUENCY RANGE MHz		MAXIMUM POWER	
					CW W	REFLECTED W
2722 162	02091	1	2000	to 4000	50	
	01491	2				
2722 162	02101	3	2000	to 4000	50	
	01501	4				
2722 162	02071	5	3000	to 6000	20	
	01511	6				
2722 162	02111	7	4000	to 8000	10	
	01811	8				
2722 162	02122	9	7000	to 12400	10	
	01822	10				
2722 162	02221	11	12000	to 18000	5	
	03301	12				
2722 162	02231	13	7900	to 10400	5	
	02501	14	8900	to 9600		
2722 161	02071	15	8200	to 11200	50	

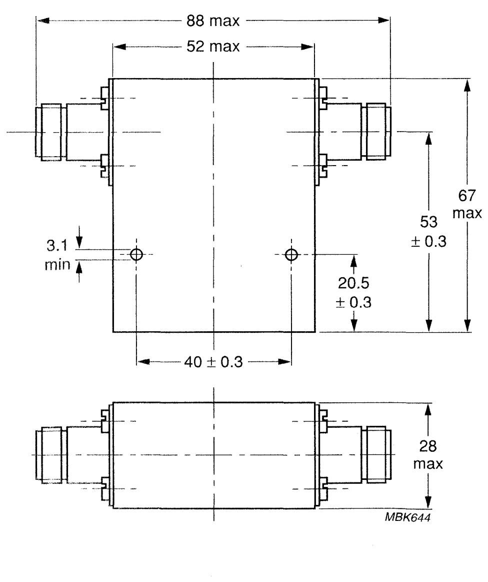


Fig.1

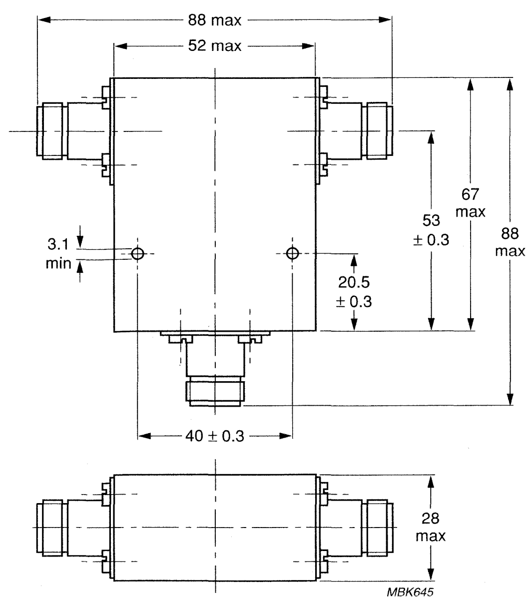


Fig.2

OCTAVE BANDWIDTH CIRCULATORS / ISOLATORS

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 162 02091 01491	20	24	0,5	0,35	1,25	1,15	−10 to +70	N female	300
2722 162 02101 01501	20	24	0,5	0,35	1,25	1,15	−10 to +70	SMA female	300
2722 162 02071 01511	20	24	0,5	0,3	1,25	1,15	−10 to +70	SMA female	120
2722 162 02111 01811	20	24	0,5	0,3	1,25	1,15	−10 to +70	SMA female	100
2722 162 02122 01822	20	24	0,6	0,35 0,4	1,25	1,15	−10 to +70	SMA female	60
2722 162 02221 03301	20 18	22	0,6	0,35	1,3	1,2	−10 to +70	SMA female	20
2722 162 02231 02501	20	22	0,4	0,35	1,25	1,23	−10 to +70	SMA female	30
2722 161 02071	22	30	0,5	0,3	1,18	1,15	+10 to +40	IEC-UBR 100	500

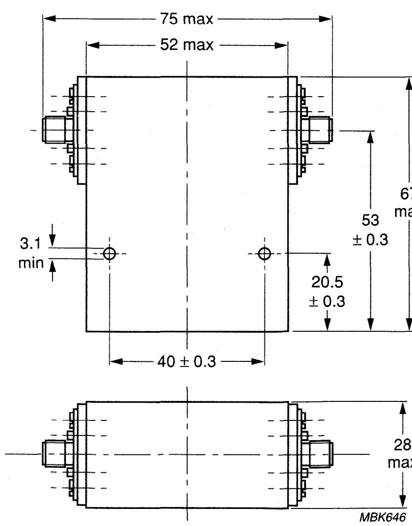


Fig.3

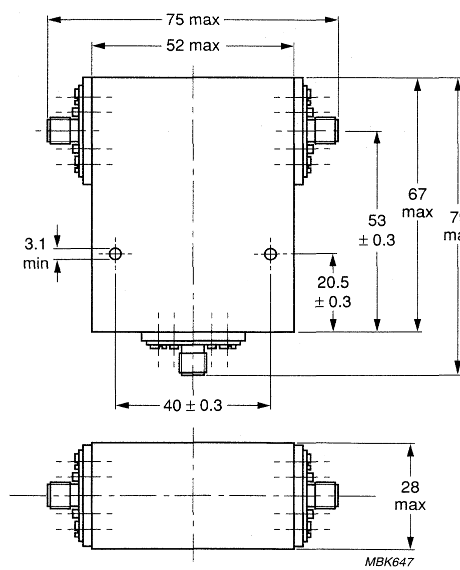


Fig.4

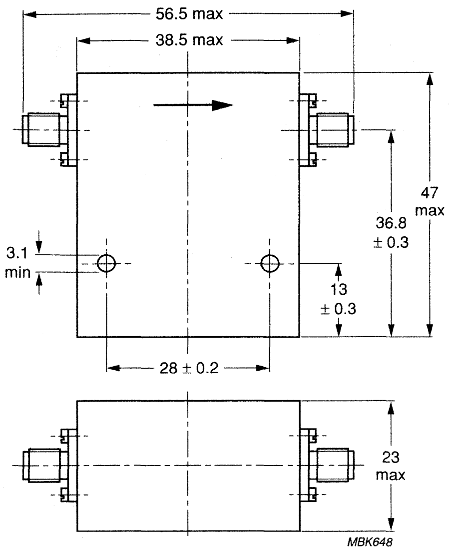


Fig.5

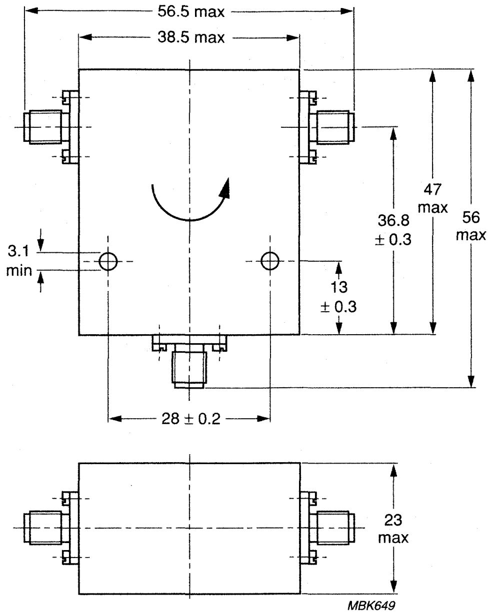


Fig.6

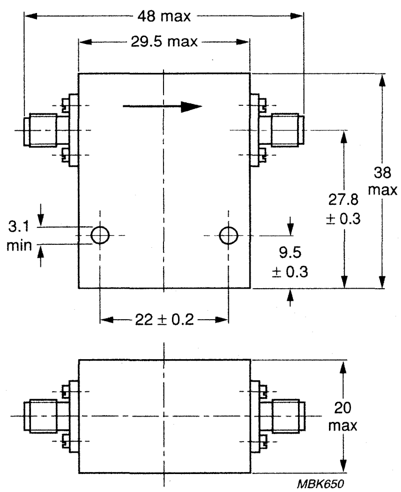


Fig.7

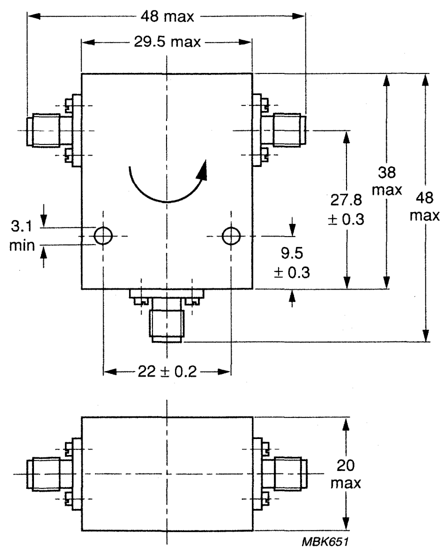


Fig.8

OCTAVE BANDWIDTH CIRCULATORS / ISOLATORS

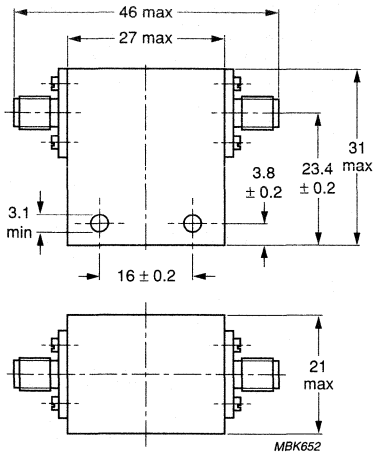


Fig.9

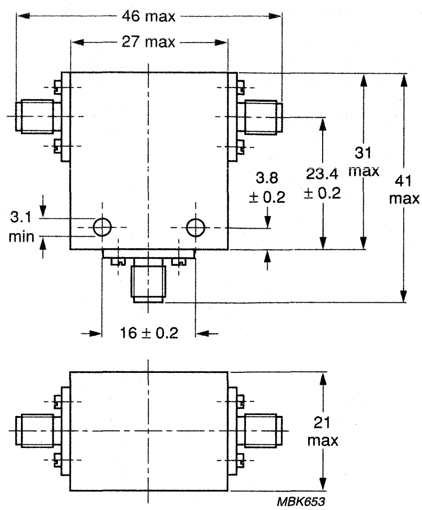


Fig.10

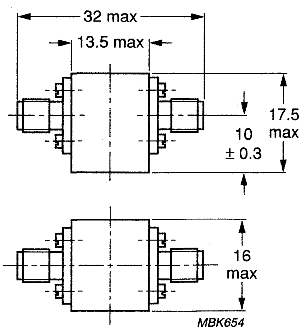


Fig.11

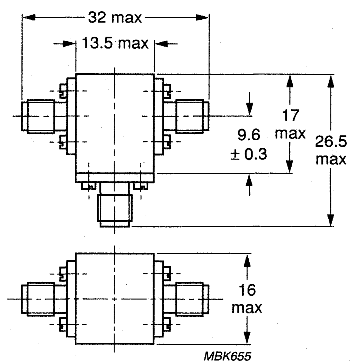


Fig.12

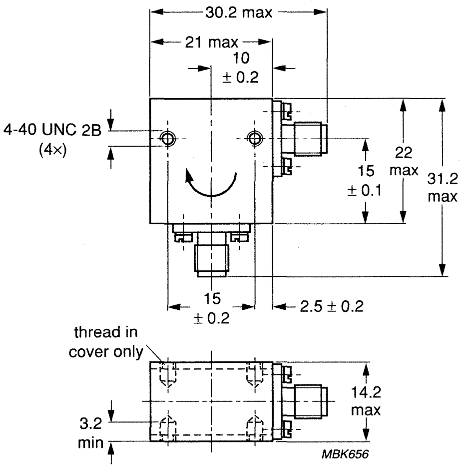


Fig.13

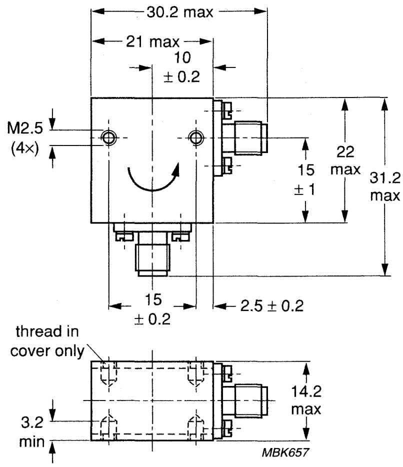


Fig.14

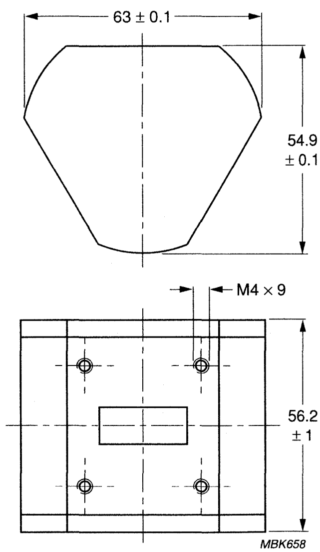


Fig.15

WAVEGUIDE ISOLATORS X-BAND

Preferred application: radar

TYPE		DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER	
				CW W	REFLECTED W
2722 161	01221 01222(1)	1	8500 to 9600	1	
2722 161	01361	2	8500 to 9600	5	
2722 161	01211 01261	3 4	8500 to 9600	10	

Note

1. With M4-Helicoil

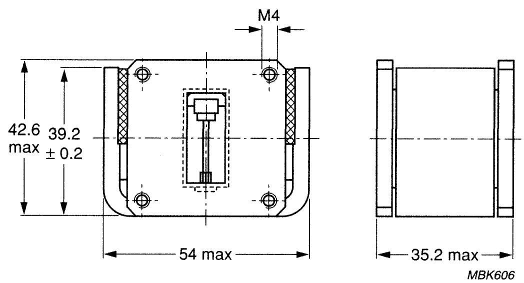


Fig.1

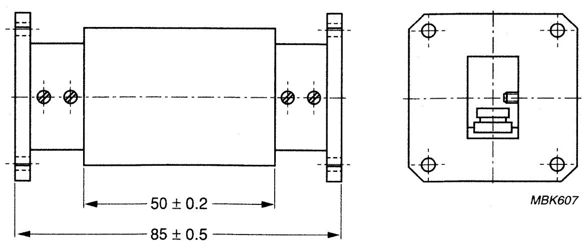


Fig.2

WAVEGUIDE ISOLATORS X-BAND

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 161 01221 01222(1)	15		0,6		1,15		+10 to +70	IEC-UBR 100	400
2722 161 01361	30		0,5		1,05		−10 to +70	IEC-UBR 100	600
2722 161 01211	30		0,5		1,05		−10 to +70	IEC-UBR 100	420
01261	55		1,2		1,20				600

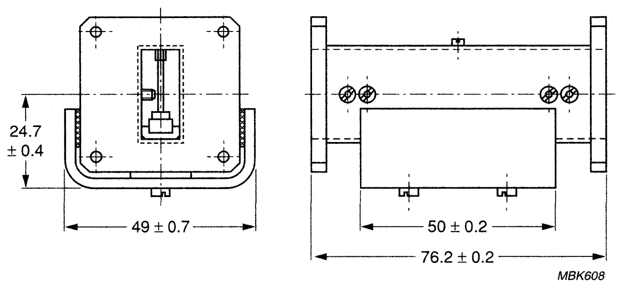


Fig.3

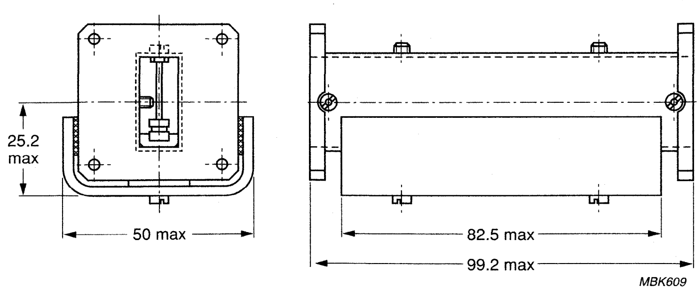


Fig.4

POWER ISOLATORS WITH WATER LOAD

Preferred application: microwave heating

TYPE	DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER	
			CW W	REFLECTED W
2722 163 02071	1	2425 to 2475	3000	3000
02061	2			

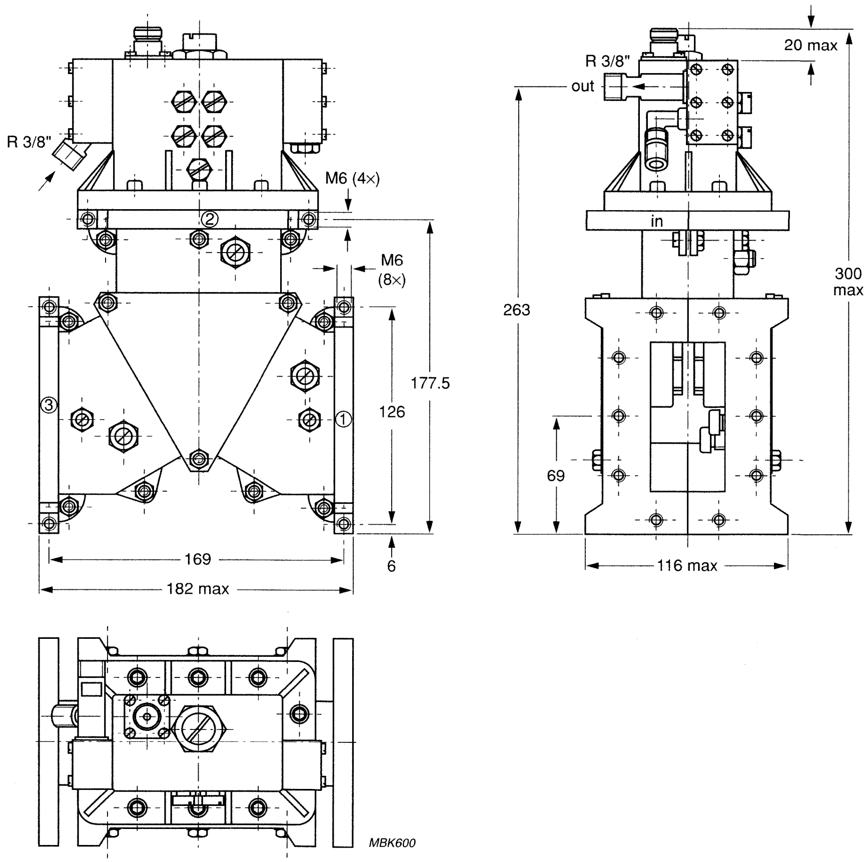


Fig.1

POWER ISOLATORS WITH WATER LOAD

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 163 02071 02061	20	26	0,3	0,2	1,25(1)		θ1: max. +40 θ2: max. +50	IEC-PDR 26, monitor output: N female	4500

Note

1. With output short-circuited: S ≤ 1,5.

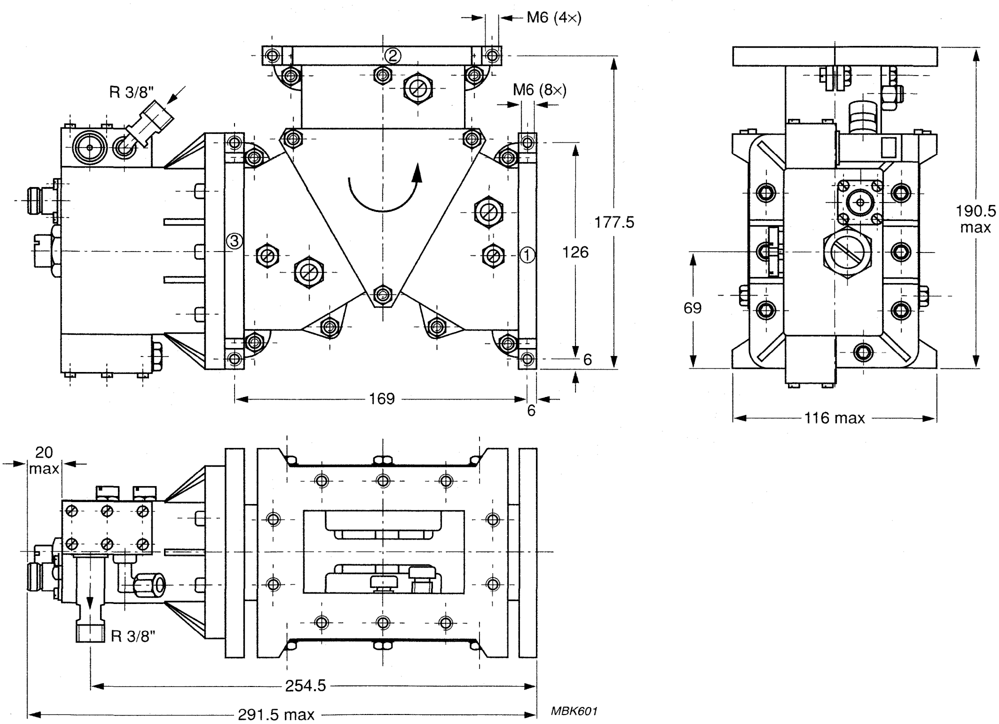


Fig.2

POWER ISOLATORS WITH WATER LOAD

Preferred application: microwave heating

TYPE	DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER CW W	MAXIMUM POWER REFLECTED W
2722 163 02004	3	2425 to 2475	6500	6500
02005	4			

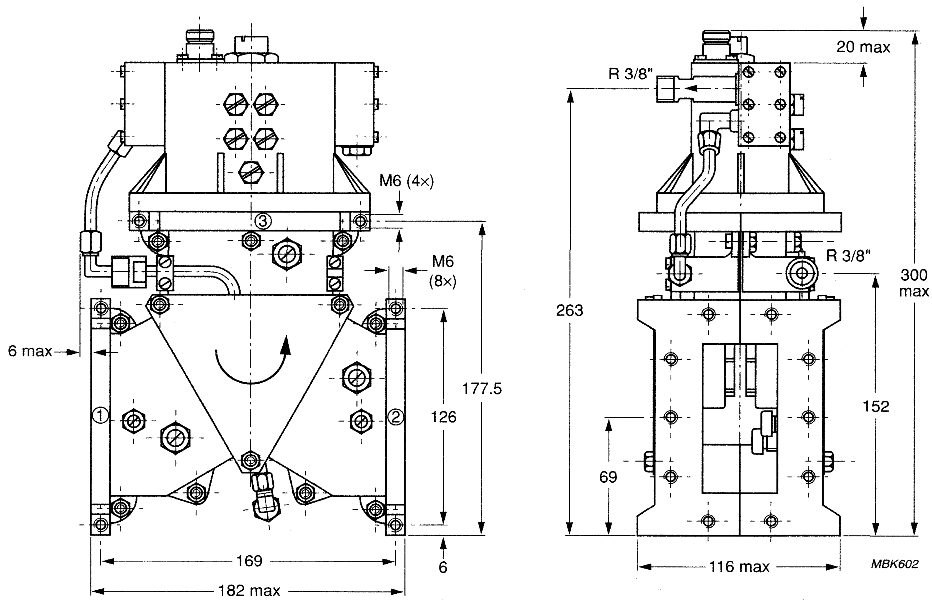


Fig.3

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 163 02004 02005	20	26	0,3	0,2	1,25(1)	1,1	θ1: max. +40 θ2: max. +50	IEC-PDR 26, monitor output: N female	4700

Note

1. With output short-circuited: S ≤ 1,5.

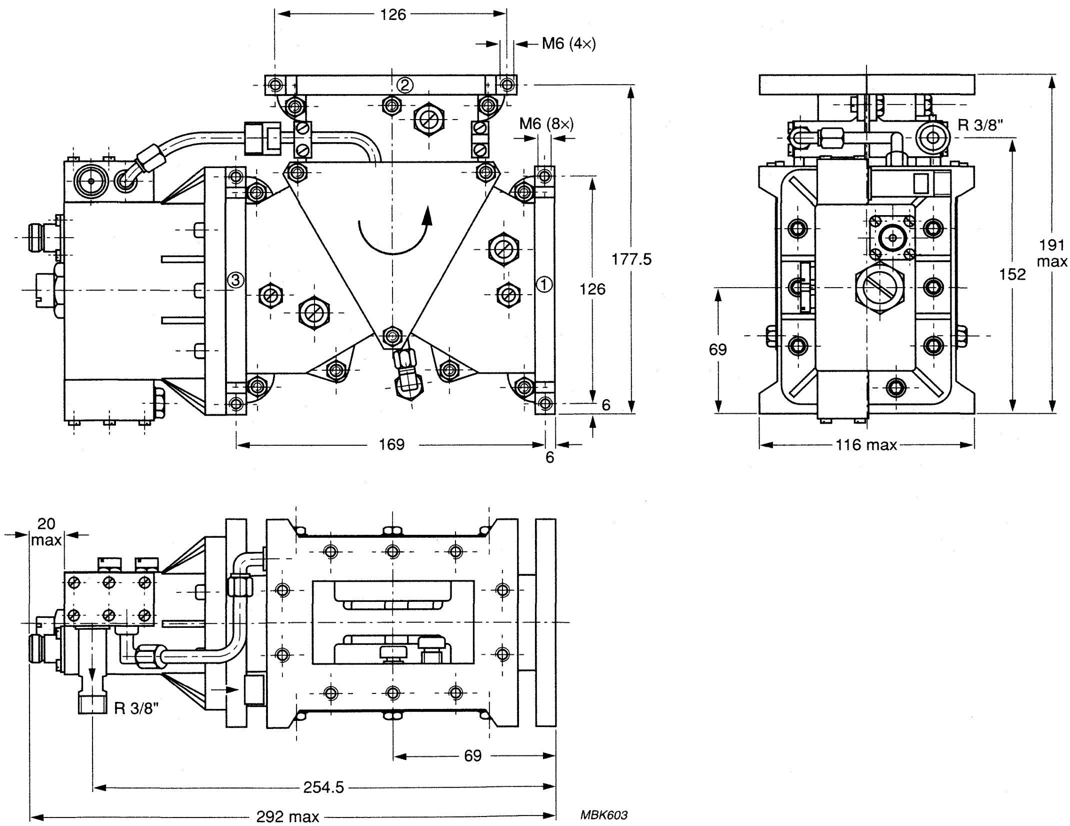


Fig.4

POWER ISOLATORS WITH WATER LOAD

Preferred application: microwave heating

TYPE	DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER	
			CW W	REFLECTED W
2722 163 01021	5	2425 to 2475	6500	

Water load; type 2722 163 02051; dimensions Fig.6; θ1: max. + 40 °C; θ2: max. 50 °C; connector: IEC-PDR 26, monitor output: N female.

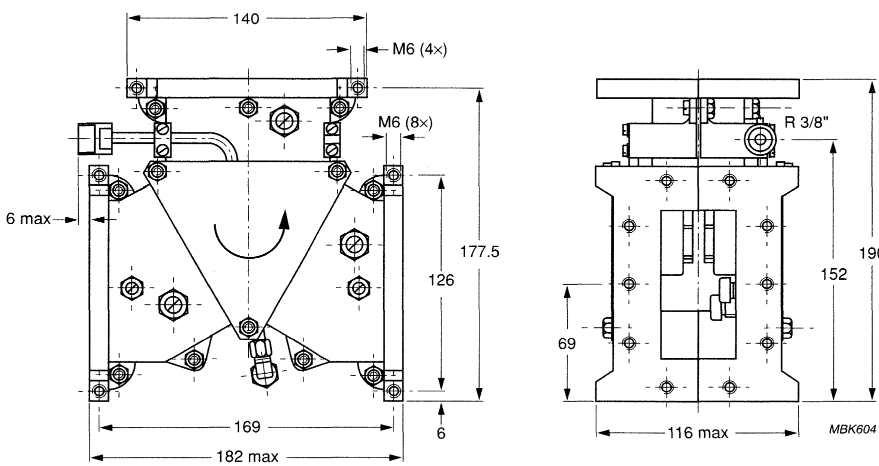


Fig.5

POWER ISOLATORS WITH WATER LOAD

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 163 01021	20		0,3		1,25(1)		θ1: max. + 40 θ2: max. + 50	IEC-PDR 26	

Note

1. With output short-circuited: S ≤ 1,5.

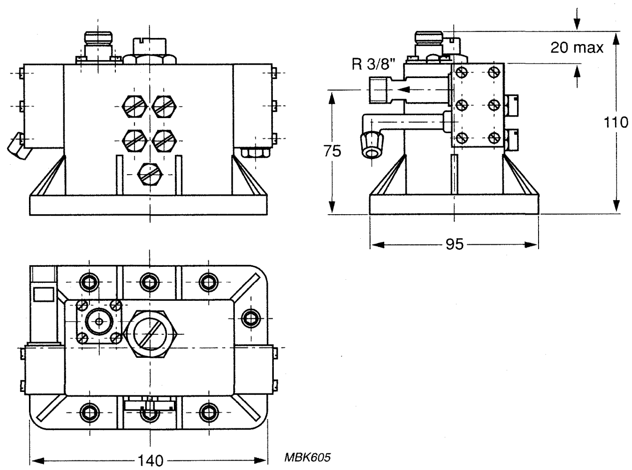


Fig.6

Preferred application: microwave heating

TYPE	DIMENSIONS Fig.	FREQUENCY RANGE MHz	MAXIMUM POWER	
			CW W	REFLECTED W
2722 163 02101	7	2425 to 2475	2000	2000

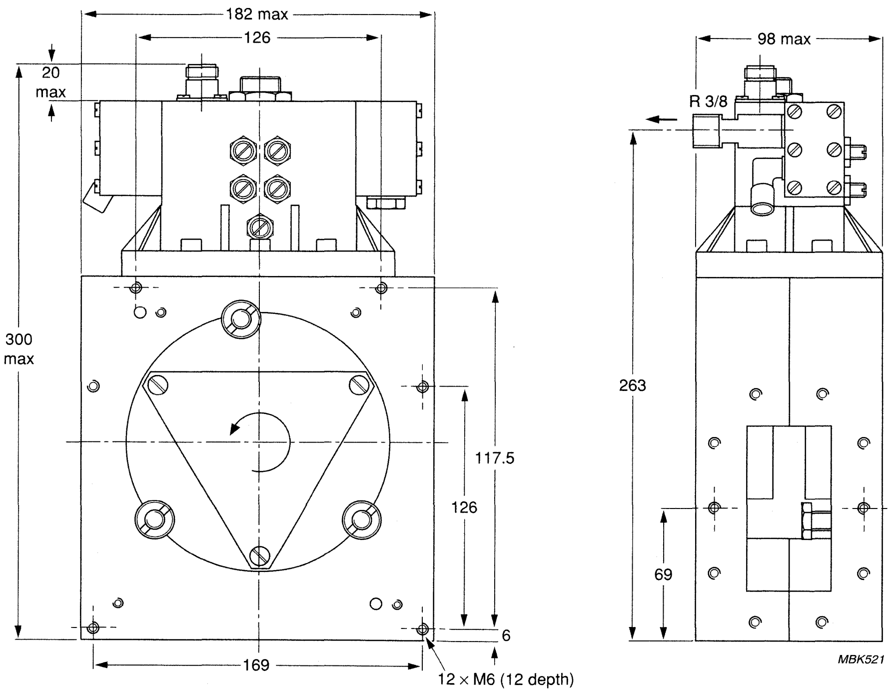


Fig.7

POWER ISOLATORS WITH WATER LOAD

TYPE	ISOLATION		INSERTION LOSS		VSWR		TEMP. RANGE °C	CONNECTOR	MASS g
	MIN. dB	TYP. dB	MAX. dB	TYP. dB	MAX.	TYP.			
2722 163 02101	20	26	0,3	0,2	1,25(1)		θ1: max. + 40 θ2: max. + 50	IEC-PDR 26, monitor output: N female	9000

Note

1. With output short-circuited: S ≤ 1,5.

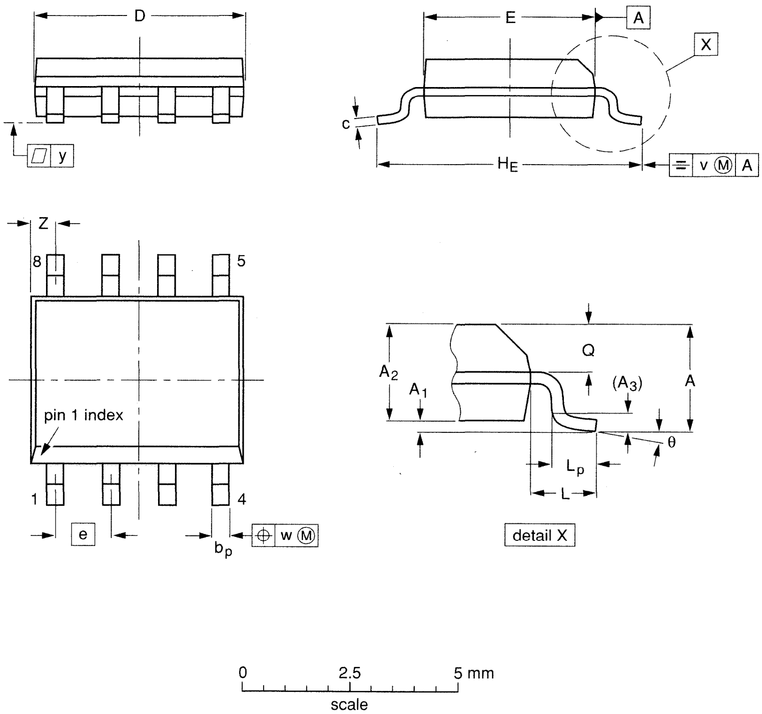
PACKAGE OUTLINES

PACKAGE OUTLINES CONTINUED

PACKAGE OUTLINES
CONTINUED

SO8: plastic small outline package; 8 leads; body width 3.9 mm

SOT96-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

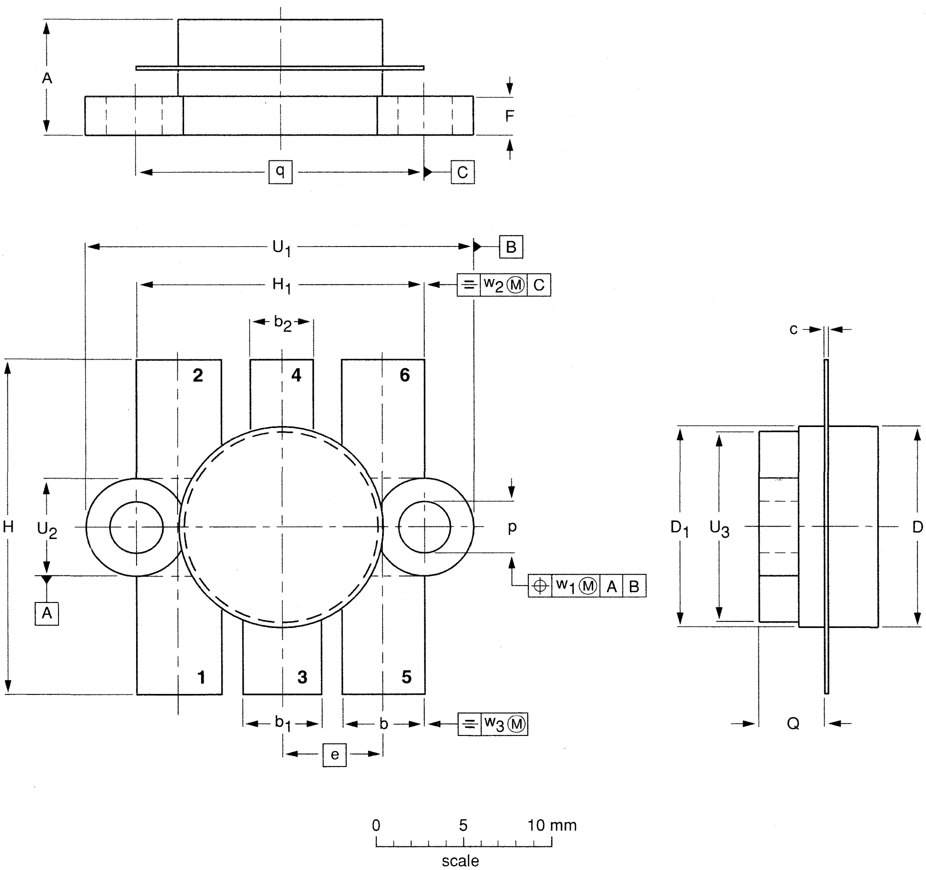
UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(2)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	5.0 4.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.20 0.19	0.16 0.15	0.050	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT96-1	076E03S	MS-012AA				~~95-02-04~~ 97-05-22

Flanged ceramic package; 2 mounting holes; 6 leads **SOT119A**

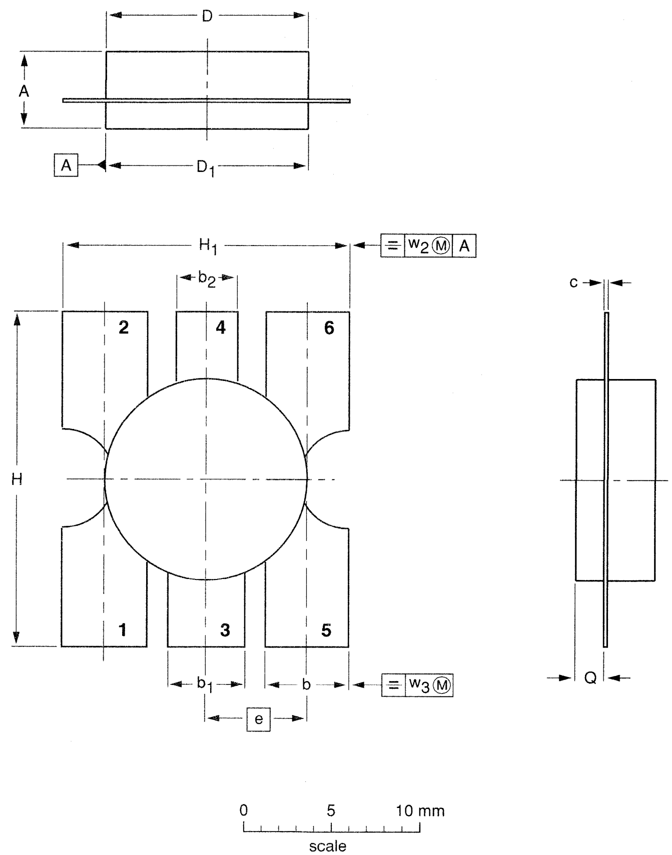


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	b_1	b_2	c	D	D_1	e	F	H	H_1	p	Q	q	U_1	U_2	U_3	w_1	w_2	w_3
mm	7.39 6.32	5.59 5.33	5.34 5.08	4.07 3.81	0.18 0.07	12.86 12.59	12.83 12.57	6.48	2.54 2.28	22.10 21.08	18.55 18.28	3.31 2.97	4.58 3.98	18.42	25.23 23.95	6.48 6.07	12.76 12.06	0.51	1.02	0.26
inches	0.291 0.249	0.220 0.210	0.210 0.200	0.160 0.150	0.007 0.003	0.505 0.496	0.505 0.495	0.255	0.100 0.090	0.870 0.830	0.730 0.720	0.130 0.117	0.180 0.157	0.725	0.993 0.943	0.255 0.239	0.502 0.475	0.02	0.04	0.01

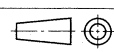
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT119A						97-06-28

Flangeless ceramic package; 6 leads **SOT119D**

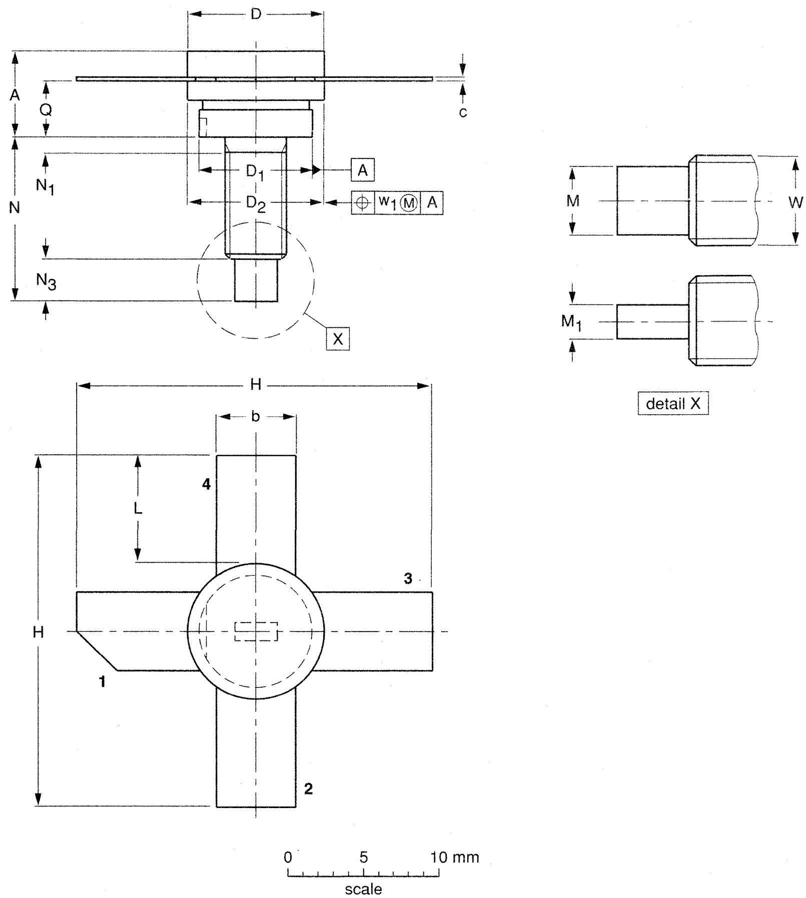


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	b_1	b_2	c	D	D_1	e	H	H_1	Q	w_2	w_3
mm	4.53 3.70	5.59 5.33	5.34 5.08	4.07 3.81	0.16 0.10	12.86 12.59	12.83 12.57	6.48	21.97 21.20	18.55 18.28	1.71 1.44	0.51	0.26
inches	0.178 0.146	0.220 0.210	0.210 0.200	0.160 0.150	0.006 0.004	0.506 0.496	0.505 0.495	0.255	0.865 0.835	0.730 0.720	0.067 0.057	0.02	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT119D						97-06-28

Studded ceramic package; 4 leads **SOT120A**

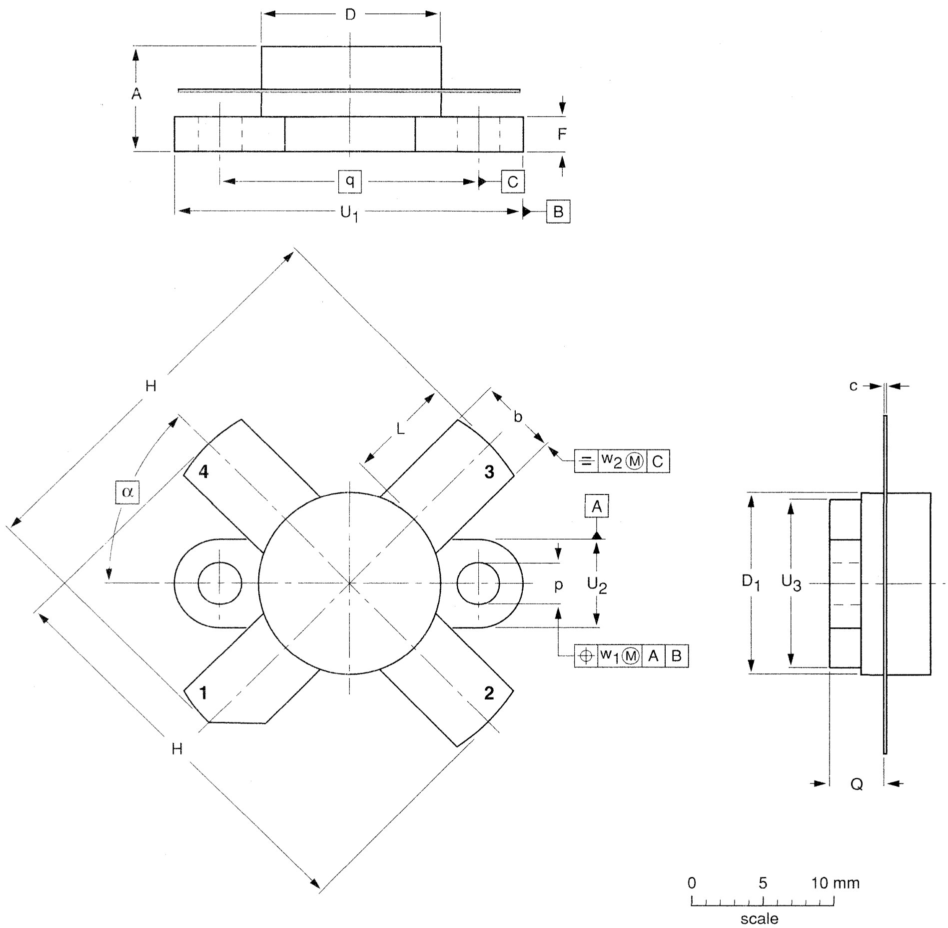


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	D_2	H	L	M	M_1	N	N_1	N_3	Q	W	w_1
mm	5.97 4.74	5.90 5.48	0.18 0.14	9.73 9.47	8.39 8.12	9.66 9.39	27.44 25.78	9.00 8.00	3.41 2.92	1.66 1.39	12.83 11.17	1.60 0.00	3.31 2.54	4.35 3.98	8-32 UNC	0.38
inches	0.283 0.248	0.232 0.216	0.007 0.004	0.383 0.373	0.330 0.320	0.380 0.370	1.080 1.015	0.354 0.315	0.134 0.115	0.065 0.055	0.505 0.440	0.063 0.000	0.130 0.100	0.171 0.157		0.015

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT120A						97-06-28

Flanged ceramic package; 2 mounting holes; 4 leads **SOT121B**

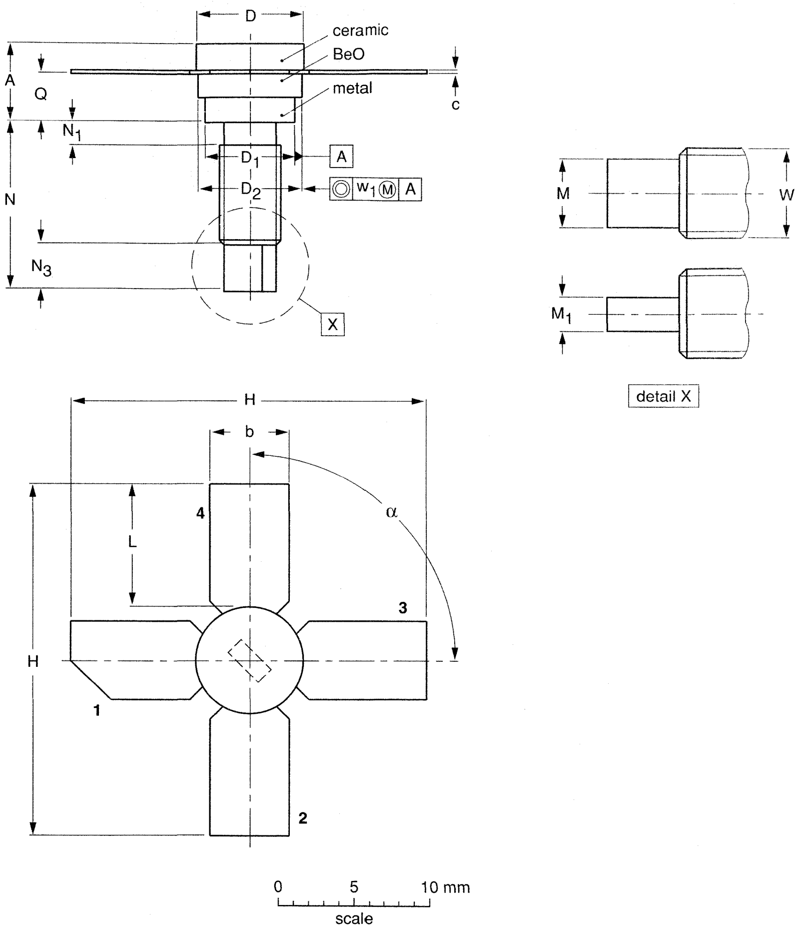


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	F	H	L	p	Q	q	U_1	U_2	U_3	w_1	w_2	α
mm	7.27 6.17	5.82 5.56	0.16 0.10	12.86 12.59	12.83 12.57	2.67 2.41	28.45 25.52	7.93 6.32	3.30 3.05	4.45 3.91	18.42	24.90 24.63	6.48 6.22	12.32 12.06	0.51	1.02	45°
inches	0.286 0.243	0.229 0.219	0.006 0.004	0.506 0.496	0.505 0.495	0.105 0.095	1.120 1.005	0.312 0.249	0.130 0.120	0.175 0.154	0.725	0.98 0.97	0.255 0.245	0.485 0.475	0.02	0.04	

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT121B						97-06-28

Studded ceramic package; 4 leads **SOT122A**

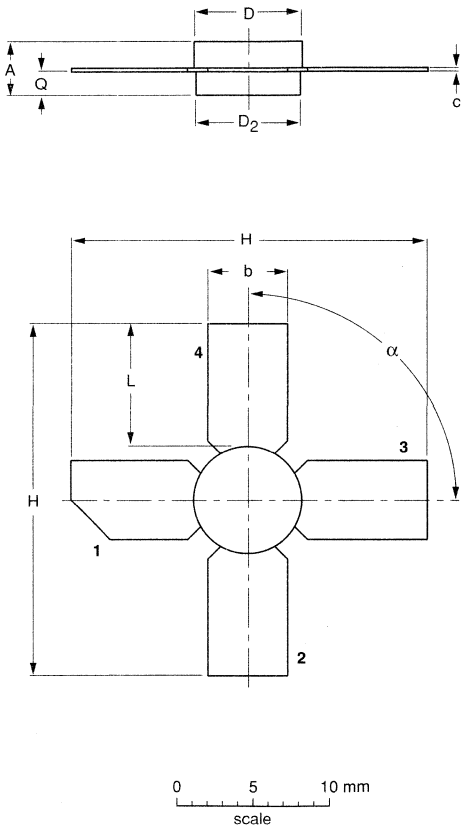


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	D_2	H	L	M_1	M	N	N_1 max.	N_3	Q	W	w_1	α
mm	5.97 4.74	5.85 5.58	0.18 0.14	7.50 7.23	6.48 6.22	7.24 6.93	27.56 25.78	9.91 9.14	3.18 2.66	1.66 1.39	11.82 11.04	1.02	3.86 2.92	3.38 2.74	8-32 UNC	0.381	90°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT122A						97-04-18

Studless ceramic package; 4 leads **SOT122D**

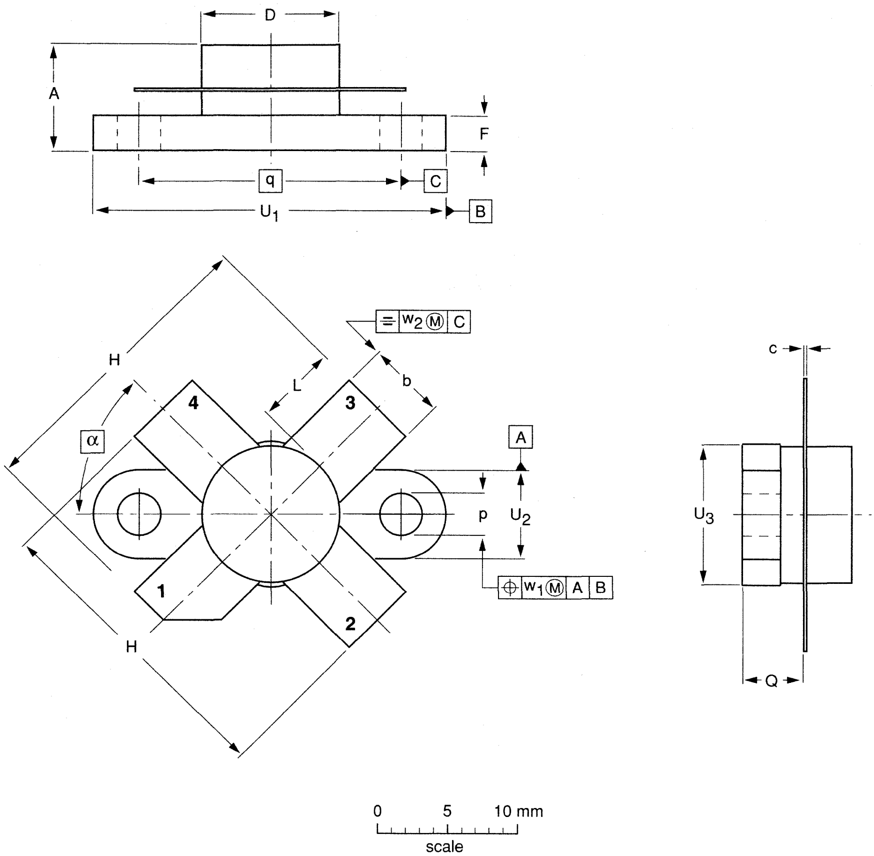


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_2	H	L	Q	α
mm	4.17 3.27	5.85 5.58	0.18 0.14	7.50 7.23	7.24 6.98	27.56 25.78	9.91 9.14	1.58 1.27	90°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT122D						97-04-18

Flanged ceramic package; 2 mounting holes; 4 leads **SOT123A**

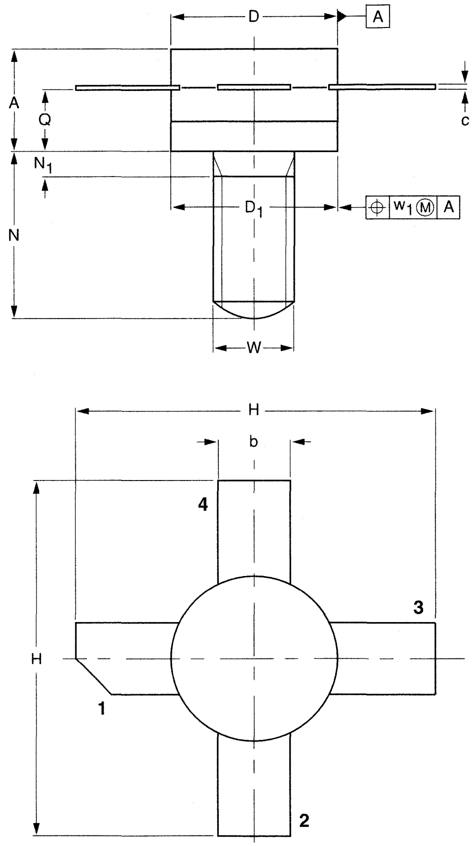


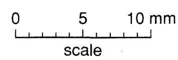
DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	F	H	L	p	Q	q	U_1	U_2	U_3	w_1	w_2	α
mm	7.47 6.37	5.82 5.56	0.18 0.10	9.73 9.47	9.63 9.42	2.72 2.31	20.71 19.93	5.61 5.16	3.33 3.04	4.63 4.11	18.42	25.15 24.38	6.61 6.09	9.78 9.39	0.51	1.02	45°
inches	0.294 0.251	0.229 0.219	0.007 0.004	0.383 0.373	0.397 0.371	0.107 0.091	0.815 0.785	0.221 0.203	0.131 0.120	0.182 0.162	0.725	0.99 0.96	0.26 0.24	0.385 0.370	0.02	0.04	

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT123A						97-06-28

Studded ceramic package; 4 leads **SOT147A**



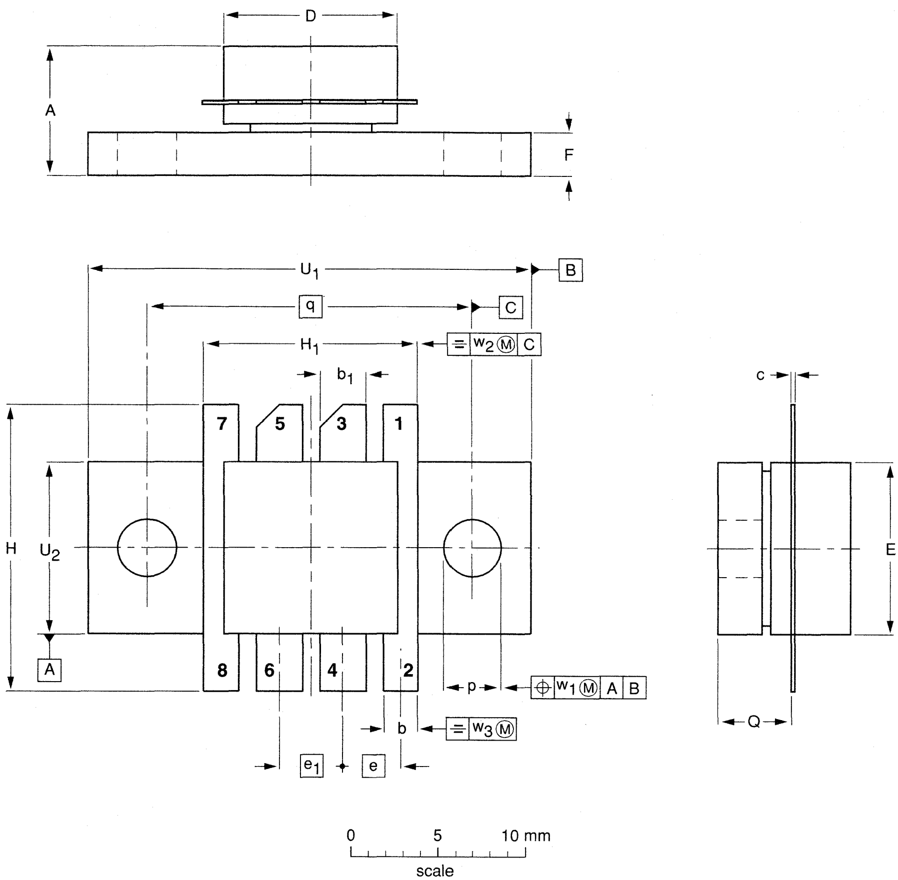


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	H	N	N_1 max.	Q	W	w_1
mm	8.06 7.18	5.82 5.56	0.16 0.10	12.86 12.59	13.34 12.57	28.45 27.43	13.39 12.62	1.40	5.24 4.92	1/4"× 28 UNF	0.51
inches	0.317 0.283	0.229 0.219	0.006 0.004	0.506 0.496	0.525 0.495	1.12 1.08	0.527 0.497	0.055	0.206 0.194		0.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT147A						97-06-28

Flanged ceramic package; 2 mounting holes; 8 leads **SOT161A**

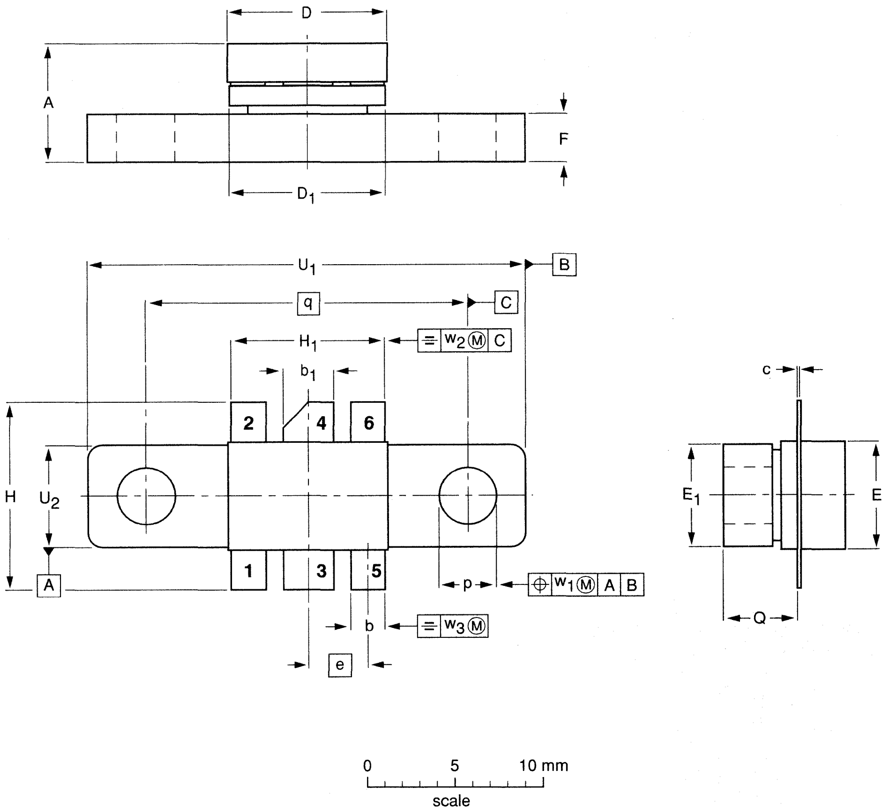


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	b_1	c	D	E	e	e_1	F	H	H_1	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	7.27 6.47	2.04 1.77	2.93 2.66	0.18 0.10	10.22 10.00	10.22 10.00	3.50	3.80	2.70 2.08	17.00 16.00	12.83 12.57	3.36 2.92	4.32 4.06	18.42	24.97 24.71	10.34 10.08	0.51	1.02	0.26
inches	0.286 0.255	0.080 0.070	0.115 0.105	0.007 0.004	0.402 0.394	0.402 0.394	0.138	0.150	0.106 0.082	0.669 0.630	0.505 0.495	0.132 0.120	0.170 0.160	0.725	0.983 0.973	0.407 0.397	0.02	0.04	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT161A						97-06-28

Flanged ceramic package; 2 mounting holes; 6 leads **SOT171A**

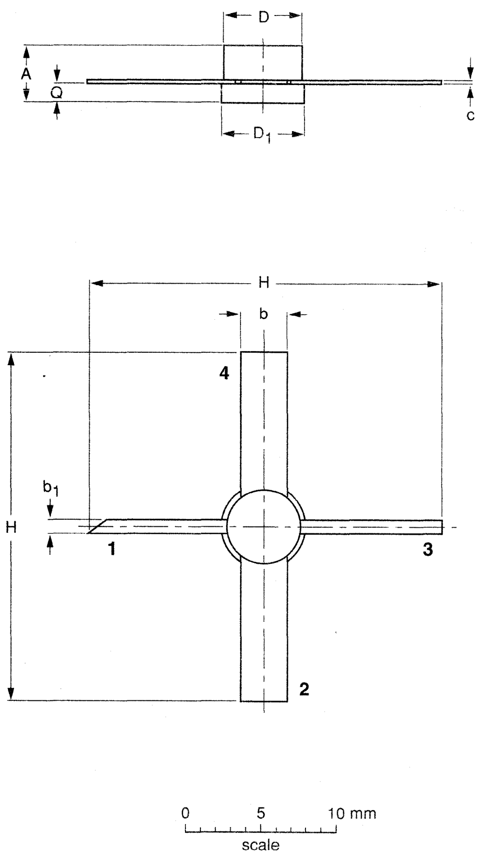


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	b_1	c	D	D_1	E	E_1	e	F	H	H_1	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	6.81 6.07	2.15 1.85	3.20 2.89	0.16 0.07	9.25 9.04	9.30 8.99	5.95 5.74	6.00 5.70	3.58	3.05 2.54	11.31 10.54	9.27 9.01	3.43 3.17	4.32 4.11	18.42	24.90 24.63	6.00 5.70	0.51	1.02	0.26
inches	0.268 0.239	0.085 0.073	0.126 0.114	0.006 0.003	0.364 0.356	0.366 0.354	0.234 0.226	0.236 0.224	0.140	0.120 0.100	0.445 0.415	0.365 0.355	0.135 0.125	0.170 0.162	0.725	0.980 0.970	0.236 0.224	0.02	0.04	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT171A						97-06-28

Studless ceramic package; 4 leads **SOT172D**

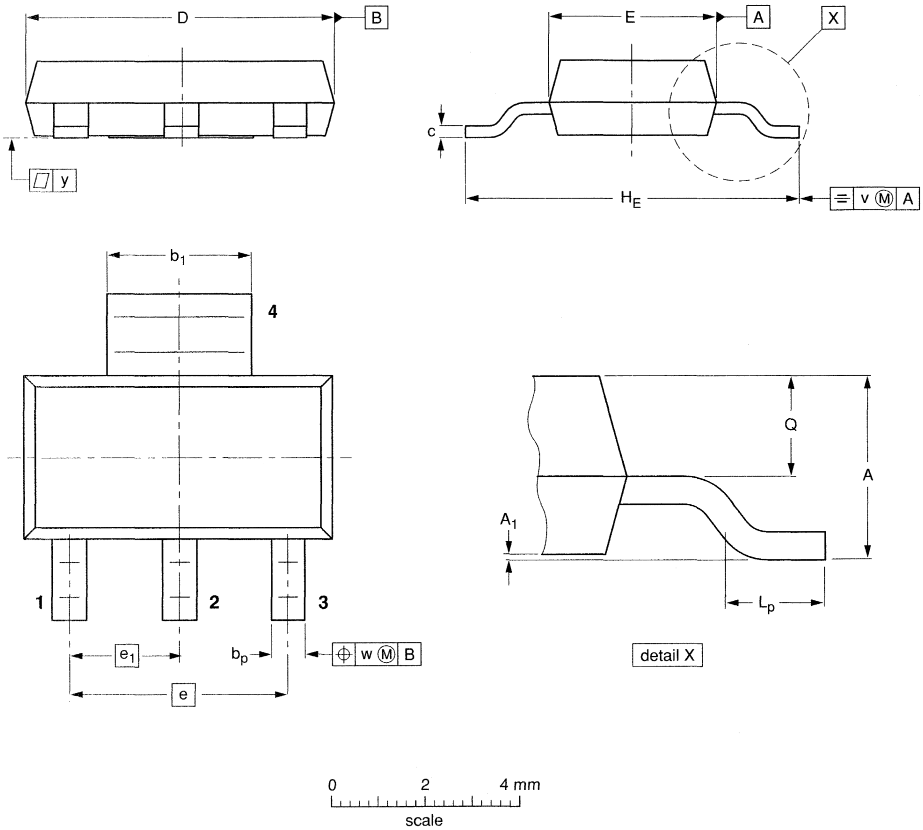


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	b_1	c	D	D_1	H	Q
mm	3.71 2.89	3.31 3.04	0.89 0.63	0.16 0.10	5.20 4.95	5.33 5.08	26.17 24.63	1.15 0.88
inches	0.146 0.114	0.13 0.12	0.035 0.025	0.006 0.004	0.205 0.195	0.210 0.200	1.03 0.97	0.045 0.035

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT172D						97-06-28

Plastic surface mounted package; collector pad for good heat transfer; 4 leads **SOT223**

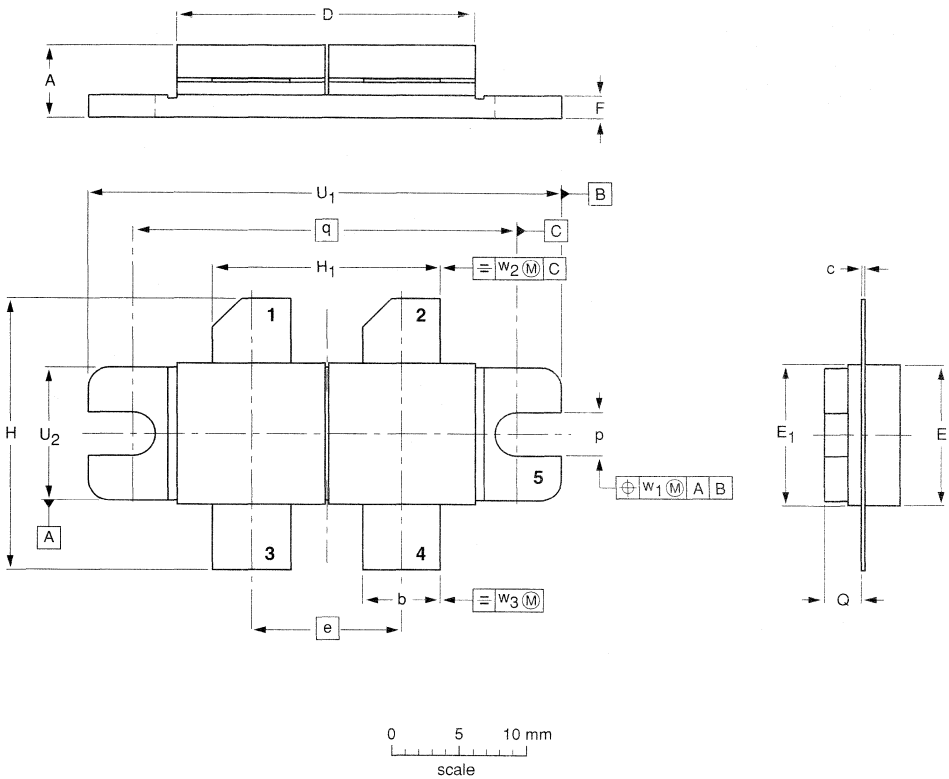


DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.8 1.5	0.10 0.01	0.80 0.60	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	4.6	2.3	7.3 6.7	1.1 0.7	0.95 0.85	0.2	0.1	0.1

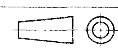
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT223						~~96-11-11~~ 97-02-28

Flanged double-ended ceramic package; 2 mounting holes; 4 leads **SOT262A1**

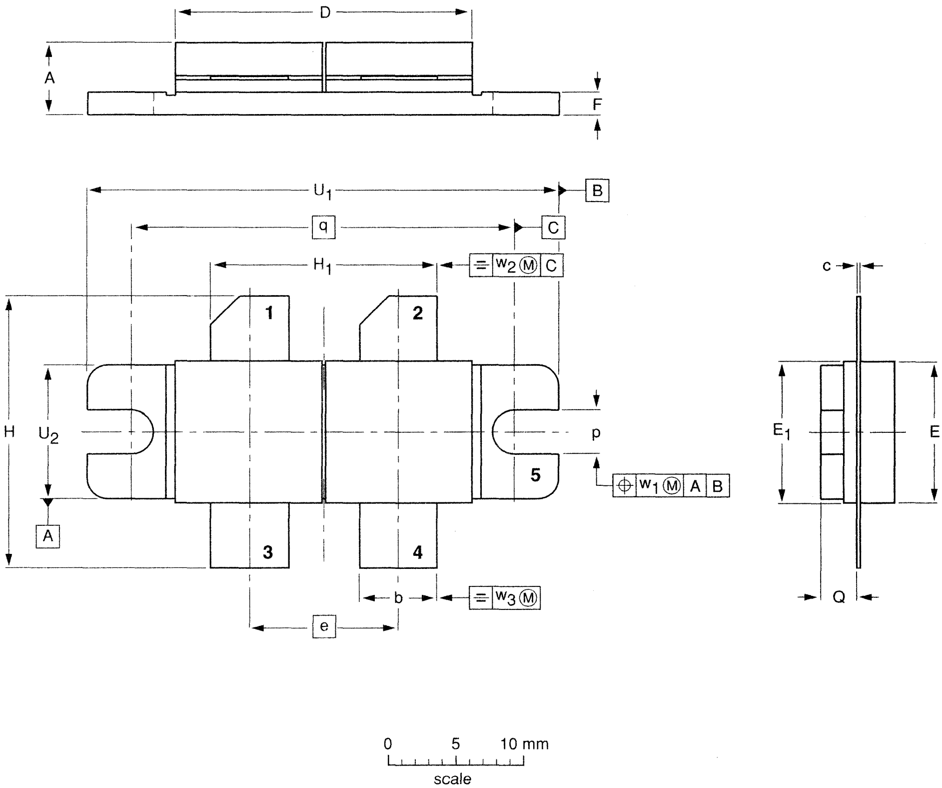


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	e	E	E_1	F	H	H_1	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	5.77 5.00	5.85 5.58	0.16 0.10	21.98 21.71	11.05	10.27 10.05	10.29 10.03	1.78 1.52	20.58 20.06	17.02 16.51	3.28 3.02	2.85 2.59	27.94	34.17 33.90	9.91 9.65	0.51	1.02	0.25
inches	0.227 0.197	0.230 0.220	0.006 0.004	0.865 0.855	0.435	0.404 0.396	0.405 0.395	0.070 0.060	0.81 0.79	0.67 0.65	0.129 0.119	0.112 0.102	1.100	1.345 1.335	0.390 0.380	0.02	0.04	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT262A1						97-06-28

Flanged double-ended ceramic package; 2 mounting holes; 4 leads **SOT262A2**

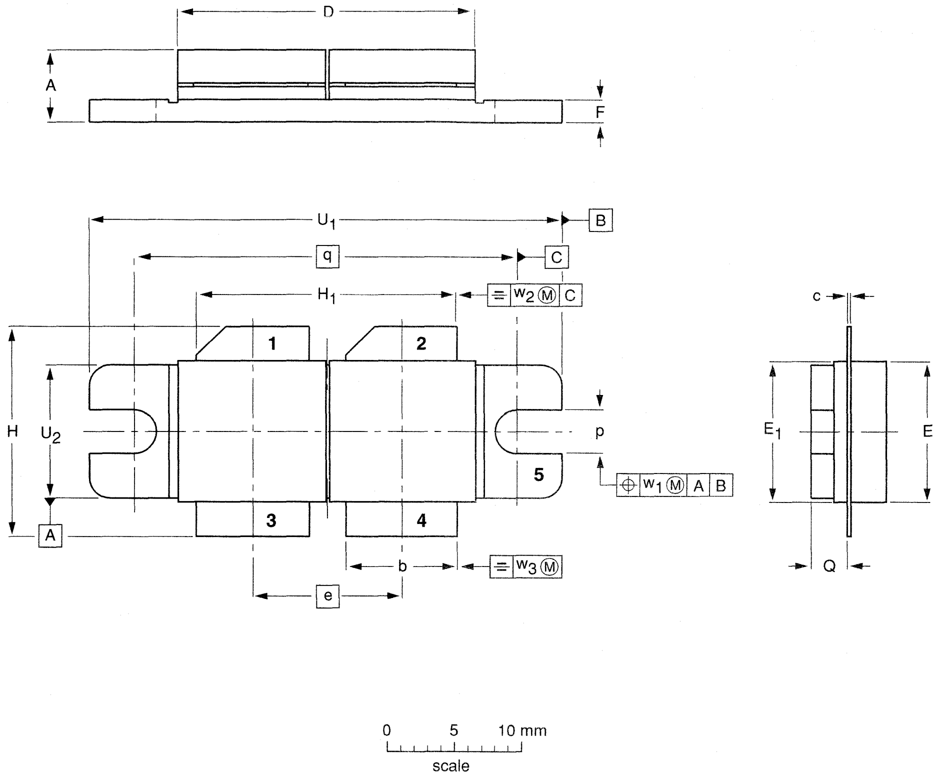


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	e	E	E_1	F	H	H_1	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	5.39 4.62	5.85 5.58	0.16 0.10	21.98 21.71	11.05	10.27 10.05	10.29 10.03	1.78 1.52	20.58 20.06	17.02 16.51	3.28 3.02	2,47 2.20	27.94	34.17 33.90	9.91 9.65	0.51	1.02	0.25
inches	0.212 0.182	0.230 0.220	0.006 0.004	0.865 0.855	0.435	0.404 0.395	0.405 0.396	0.070 0.060	0.81 0.79	0.67 0.65	0.129 0.119	0.097 0.087	1.100	1.345 1.335	0.390 0.380	0.02	0.04	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT262A2						97-06-28

Flanged double-ended ceramic package; 2 mounting holes; 4 leads **SOT262B**

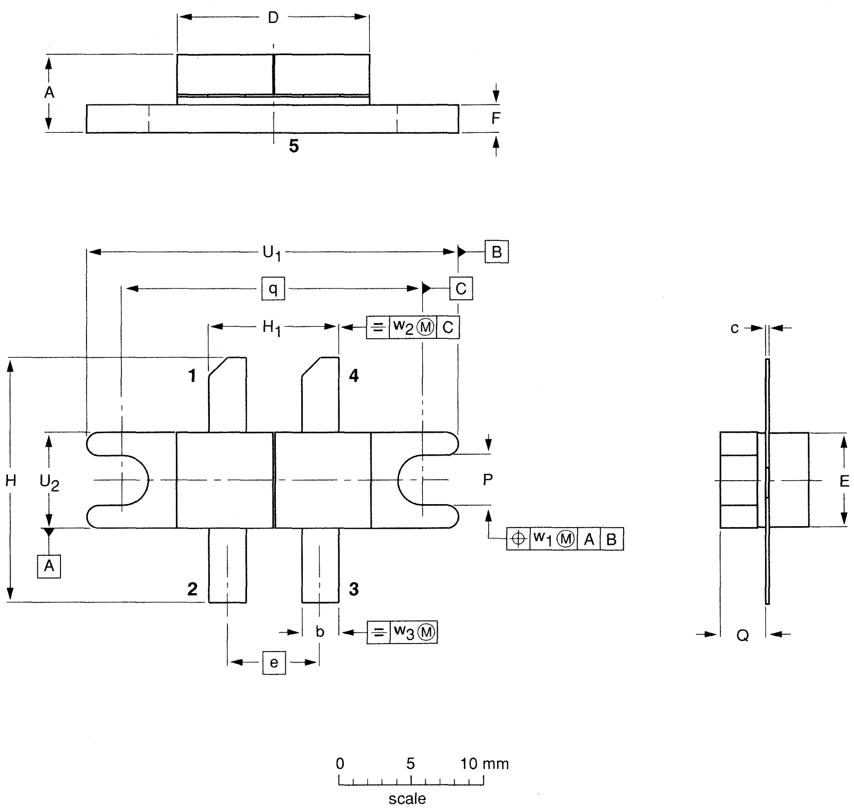


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	e	E	E_1	F	H	H_1	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	5.39 4.62	8.51 8.25	0.16 0.10	21.98 21.71	11.05	10.27 10.05	10.29 10.03	1.78 1.52	15.50 14.98	19.69 19.17	3.28 3.02	2,47 2.20	27.94	34.17 33.90	9.91 9.65	0.51	1.02	0.25
inches	0.212 0.182	0.335 0.325	0.006 0.004	0.865 0.855	0.435	0.404 0.396	0.405 0.395	0.070 0.060	0.61 0.59	0.775 0.755	0.129 0.119	0.097 0.087	1.100	1.345 1.335	0.390 0.380	0.02	0.04	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT262B						97-06-28

Flanged double-ended ceramic package; 2 mounting holes; 4 leads **SOT268A**

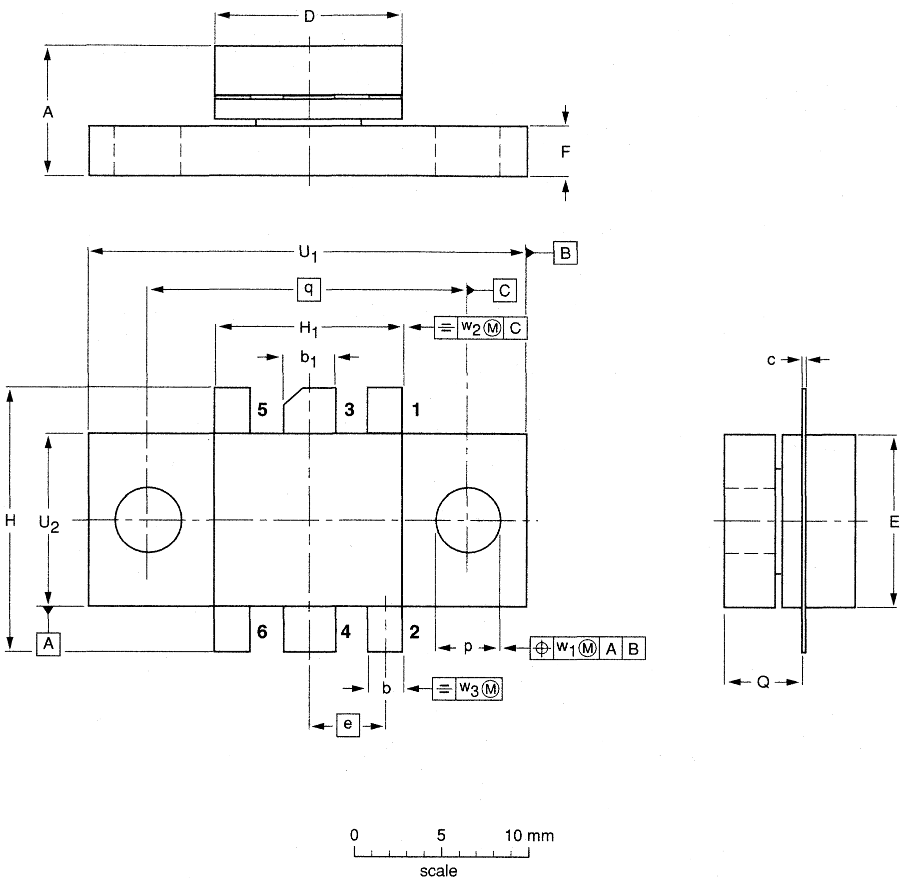


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	E	e	F	H	H_1	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	4.91 4.19	1.66 1.39	0.13 0.07	12.96 12.44	6.48 6.22	6.45	2.04 1.77	17.02 16.00	8.23 7.72	3.43 3.17	2.67 2.41	18.42	24.90 24.63	6.61 6.35	0.51	1.02	0.26
inches	0.193 0.165	0.065 0.055	0.005 0.003	0.510 0.490	0.255 0.245	0.254	0.080 0.070	0.670 0.630	0.324 0.304	0.135 0.125	0.105 0.095	0.725	0.980 0.970	0.260 0.250	0.02	0.04	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT268A						97-06-28

Flanged ceramic package; 2 mounting holes; 6 leads **SOT273A**

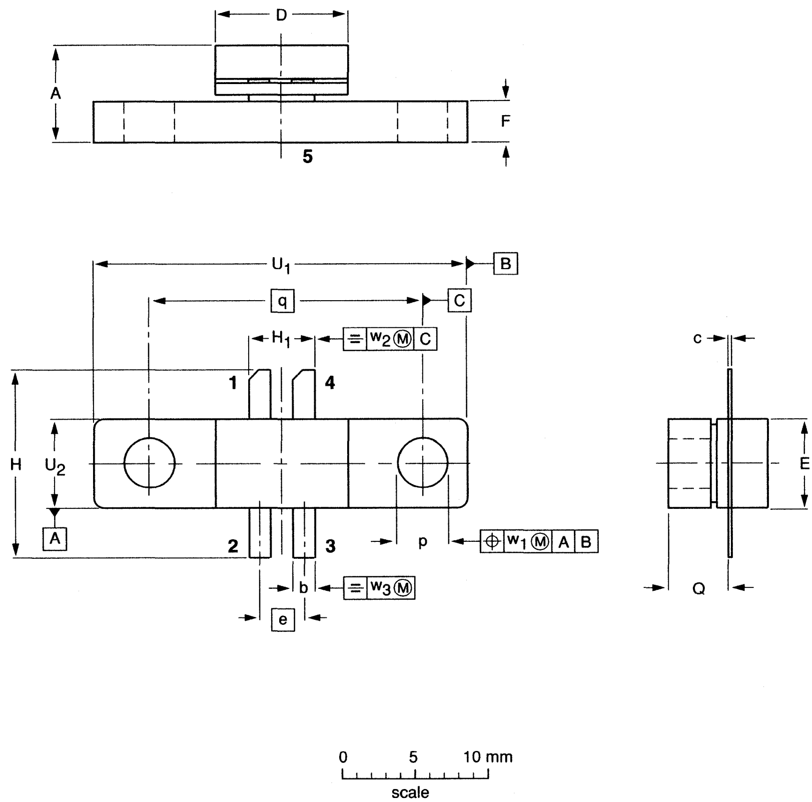


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	b_1	c	D	E	e	F	H	H_1	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	7.45 7.27	2.42 1.80	3.18 2.92	0.16 0.10	10.93 10.66	10.29 10.03	4.35	3.05 2.54	15.75 14.73	10.93 10.66	3.31 3.04	4.35 4.03	18.42	24.90 24.63	10.29 10.03	0.51	1.02	0.25
inches	0.286 0.254	0.095 0.071	0.125 0.115	0.006 0.004	0.430 0.420	0.405 0.395	0.171	0.120 0.100	0.62 0.58	0.43 0.42	0.130 0.120	0.171 0.159	0.725	0.98 0.97	0.405 0.395	0.02	0.04	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT273A						97-06-28

Flanged double-ended ceramic package; 2 mounting holes; 4 leads **SOT279A**

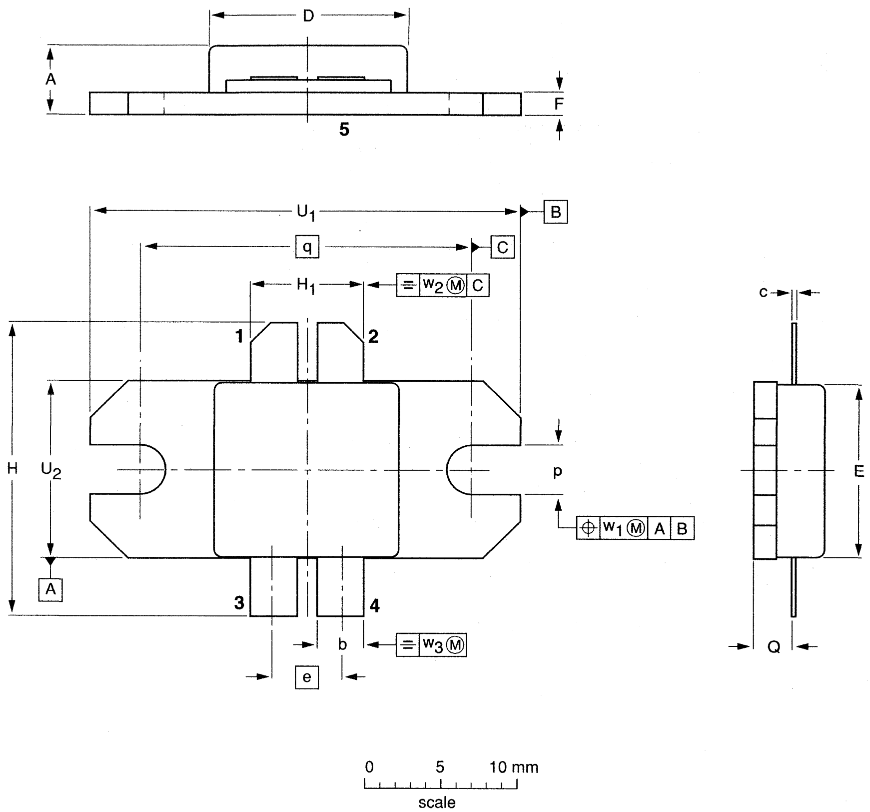


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	E	e	F	H	H_1	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	6.84 6.01	1.66 1.39	0.16 0.10	9.28 9.01	5.97 5.71	3.05	3.05 2.54	12.96 11.93	4.96 4.19	3.48 3.22	4.35 4.03	18.42	24.90 24.63	5.97 5.71	0.51	1.02	0.25
inches	0.269 0.237	0.065 0.055	0.006 0.004	0.365 0.355	0.235 0.225	0.12	0.120 0.100	0.51 0.47	0.195 0.165	0.137 0.127	0.171 0.159	0.725	0.98 0.97	0.235 0.225	0.02	0.04	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT279A						97-06-28

Flanged ceramic package; 2 mounting holes; 4 leads **SOT289A**

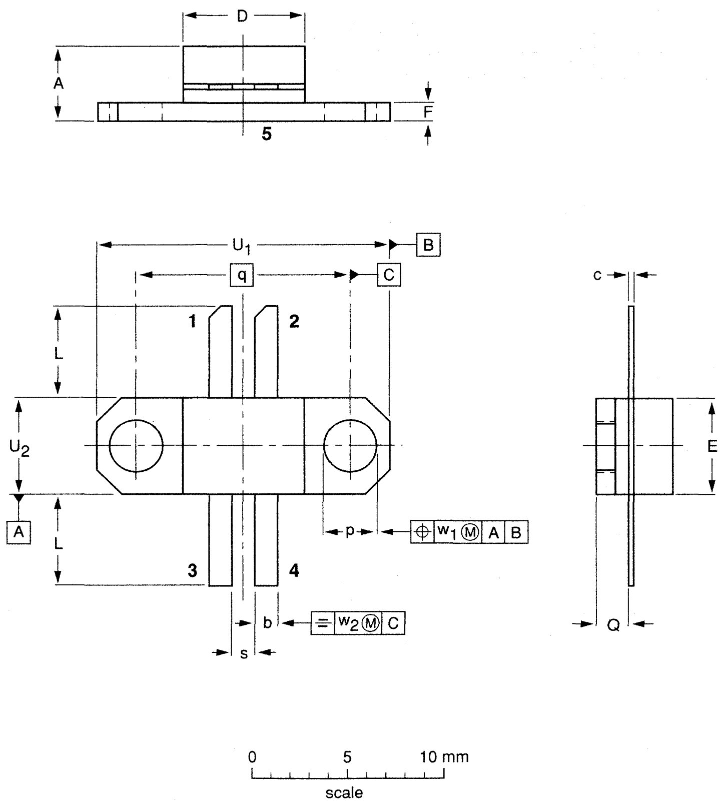


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	E	e	F	H	H_1	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	4.65 3.92	3.33 3.07	0.10 0.05	13.10 12.90	11.53 11.33	4.60	1.65 1.40	19.81 19.05	4.85 4.34	3.43 3.17	2.31 2.06	21.44	28.07 27.81	11.81 11.56	0.51	1.02	0.25
inches	0.183 0.154	0.131 0.121	0.004 0.002	0.516 0.508	0.454 0.446	0.181	0.065 0.055	0.780 0.750	0.191 0.171	0.135 0.125	0.091 0.081	0.844	1.105 1.095	0.465 0.455	0.02	0.04	0.01

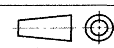
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT289A						97-06-28

Flanged ceramic package; 2 mounting holes; 4 leads **SOT324B**

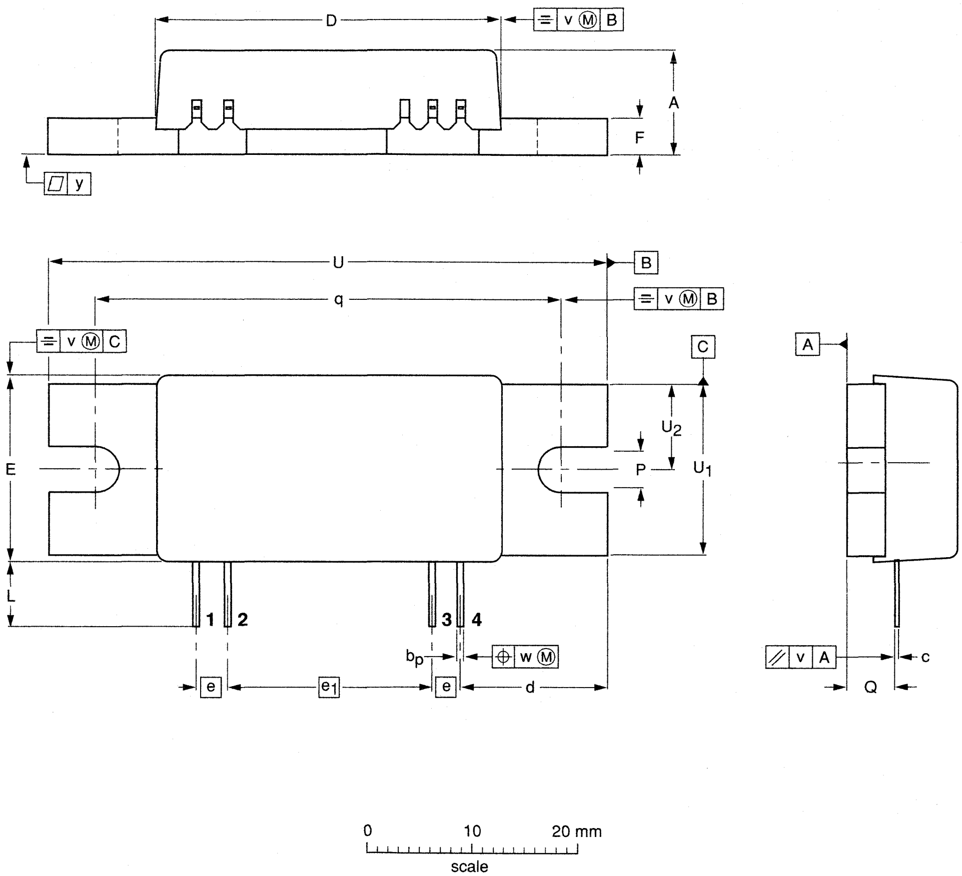


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	E	F	L	p	Q	q	s	U_1	U_2	w_1	w_2
mm	4.37 3.55	1.66 1.39	0.13 0.07	8.69 8.07	6.91 6.29	1.66 1.39	5.59 4.57	3.43 3.17	2.32 2.00	14.22	1.66 1.39	19.03 18.77	6.43 6.17	0.51	1.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT324B						97-06-05

Plastic rectangular single-ended flat package; flange mounted; 2 mounting holes; 4 in-line leads **SOT365**

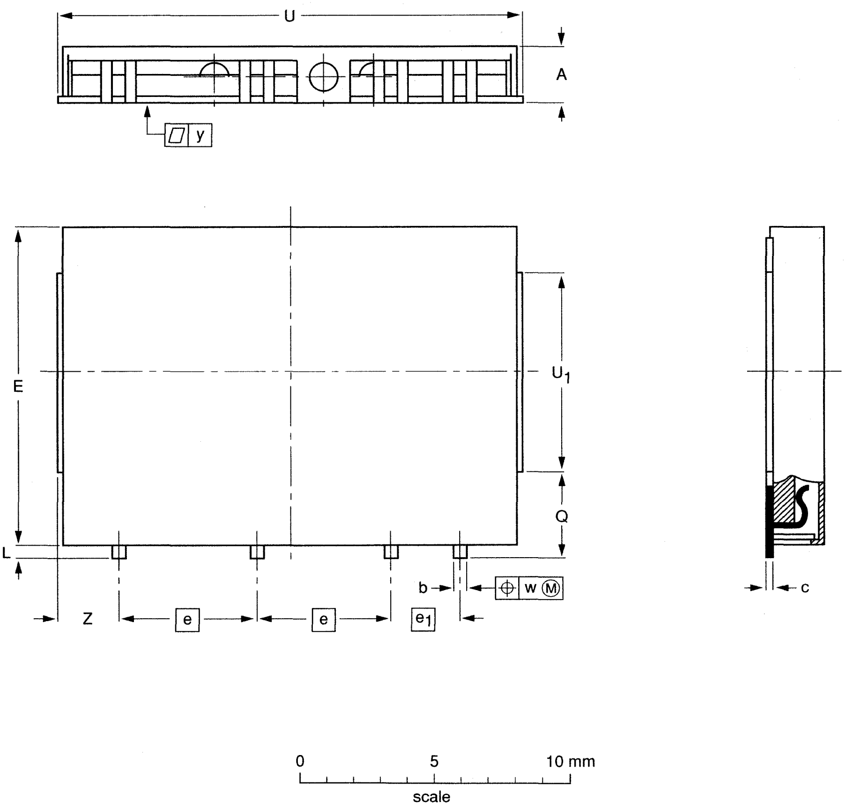


DIMENSIONS (mm are the original dimensions)

UNIT	A	b_p	c	D	d	E	e	e_1	F	L	P	Q	q	U	U_1	U_2	v	w	y
mm	9.5 9.0	0.56 0.46	0.3 0.2	30.1 29.9	12.8 12.6	18.6 18.4	2.54	17.78	3.25 3.15	6.5 6.1	4.1 3.9	4.0 3.8	40.74 40.54	48.4 48.2	15.4 15.2	7.75 7.55	0.2	0.25	0.1

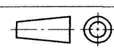
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT365						97-10-13

Rectangular single-ended surface-mount package; metal cap; 4 in-line leads **SOT388A**

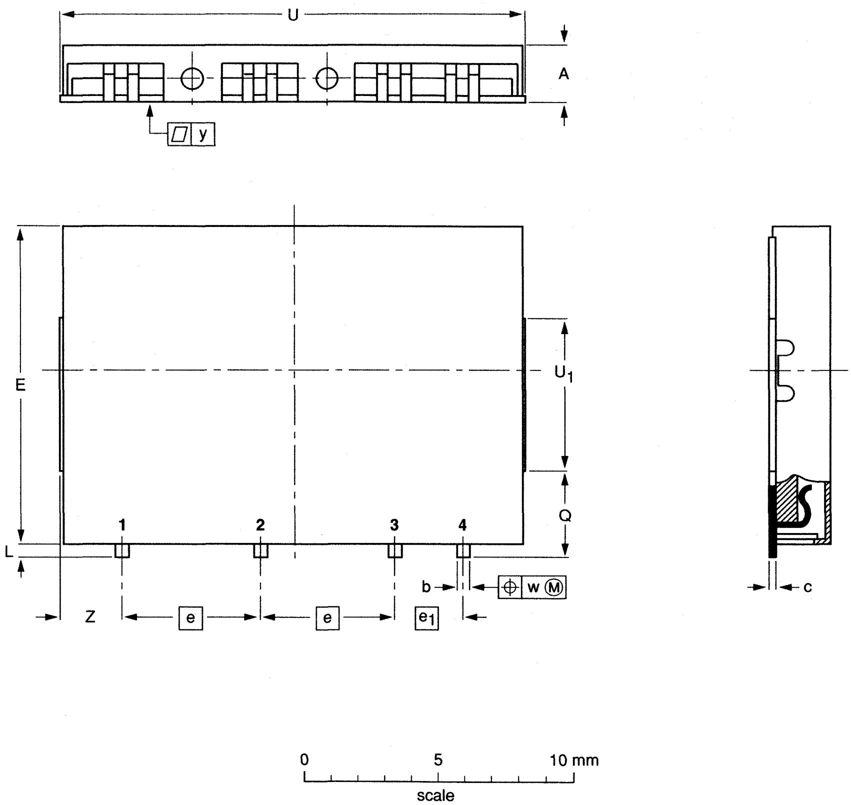


DIMENSIONS (mm are the original dimensions)

UNIT	A	b	c	e	e_1	E	L	Q	U	U_1	w	y	Z
mm	2.2 1.8	0.56 0.46	0.30 0.20	5.08	2.54	12.2 11.8	0.7 0.3	3.45 3.05	17.3 16.9	7.7 7.3	0.25	0.15	2.3 1.9

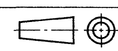
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT388A						97-04-18

Rectangular single-ended surface-mount package; metal cap; 4 in-line leads **SOT388B**

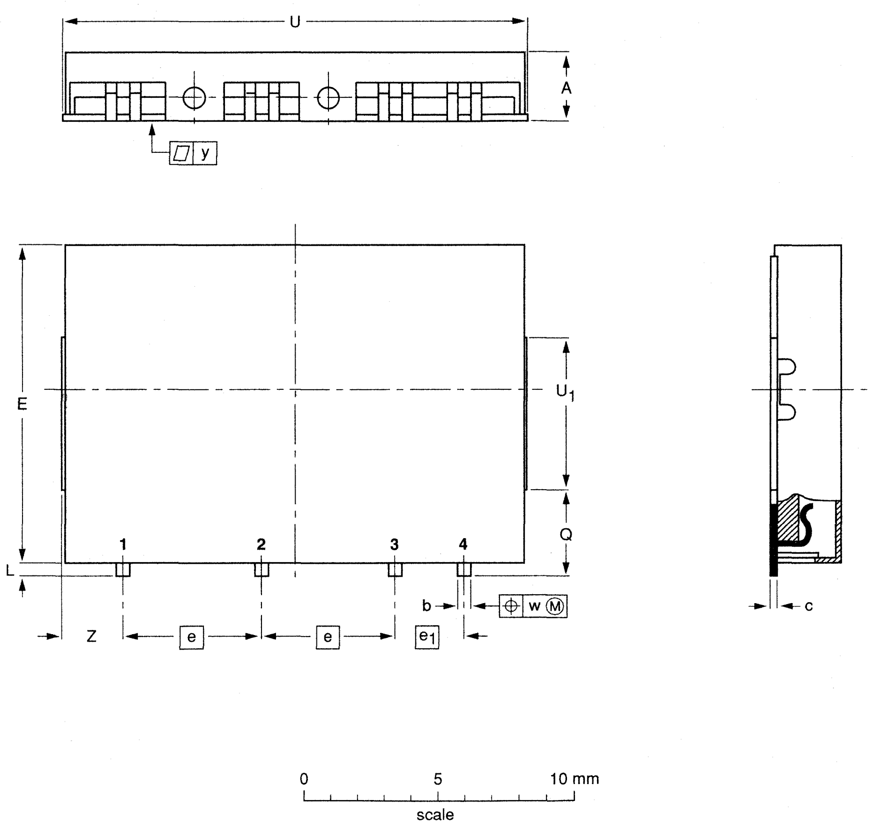


DIMENSIONS (mm are the original dimensions)

UNIT	A	b	c	e	e_1	E	L	Q	U	U_1	w	y	Z
mm	2.2 1.8	0.56 0.46	0.30 0.20	5.08	2.54	12.2 11.8	0.7 0.3	3.4 3.0	17.3 16.9	6.0 5.6	0.25	0.15	2.3 1.9

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT388B						97-11-19

Rectangular single-ended surface-mount package; metal cap; 4 in-line leads **SOT388C**

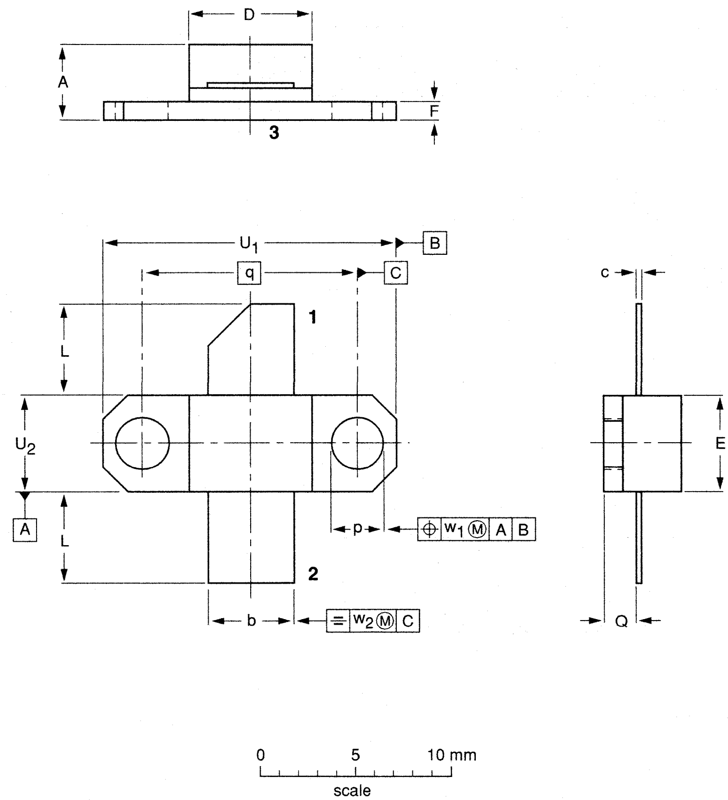


DIMENSIONS (mm are the original dimensions)

UNIT	A	b	c	e	e_1	E	L	Q	U	U_1	w	y	Z
mm	2.7 2.3	0.56 0.46	0.30 0.20	5.08	2.54	12.2 11.8	0.7 0.3	3.4 3.0	17.3 16.9	6.0 5.6	0.25	0.15	2.3 1.9

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT388C						97-10-02

Flanged ceramic package; 2 mounting holes; 2 leads **SOT390A**

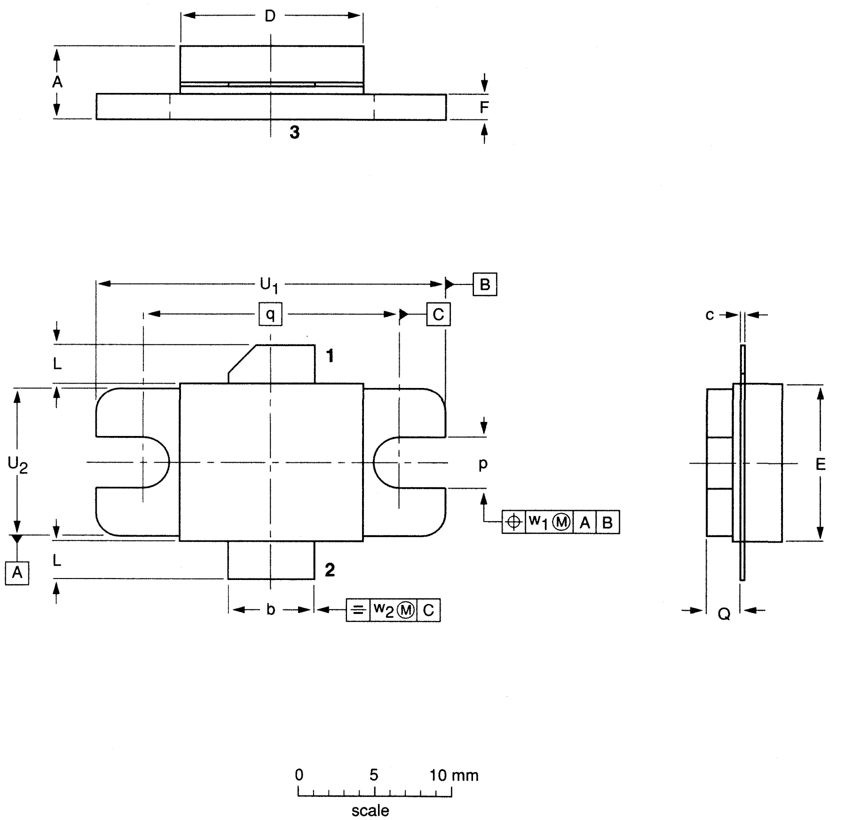


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	E	F	L	p	Q	q	U_1	U_2	w_1	w_2
mm	4.37 3.55	5.72 5.46	0.16 0.10	8.69 8.07	6.91 6.29	1.66 1.39	6.10 5.33	3.43 3.17	2.32 2.00	14.22	19.03 18.77	6.43 6.17	0.51	1.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT390A						97-05-29

Flanged ceramic package; 2 mounting holes; 2 leads **SOT391A**

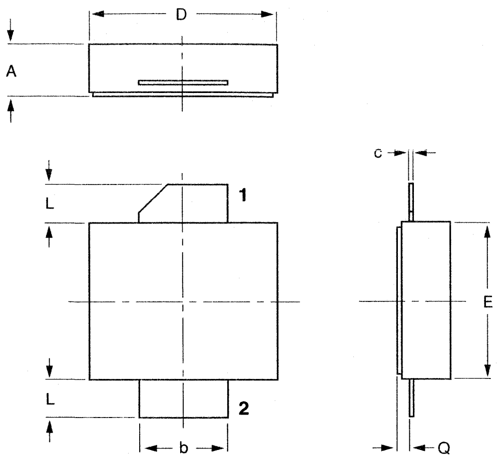


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	E	F	L	p	Q	q	U_1	U_2	w_1	w_2
mm	5.36 4.29	5.85 5.58	0.16 0.10	11.54 10.51	10.93 9.90	1.66 1.39	2.79 2.29	3.43 3.17	2.29 2.03	16.51	22.99 22.73	9.91 9.65	0.51	1.02

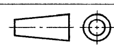
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT391A						97-05-29

Flangeless ceramic package; 2 leads **SOT391B**

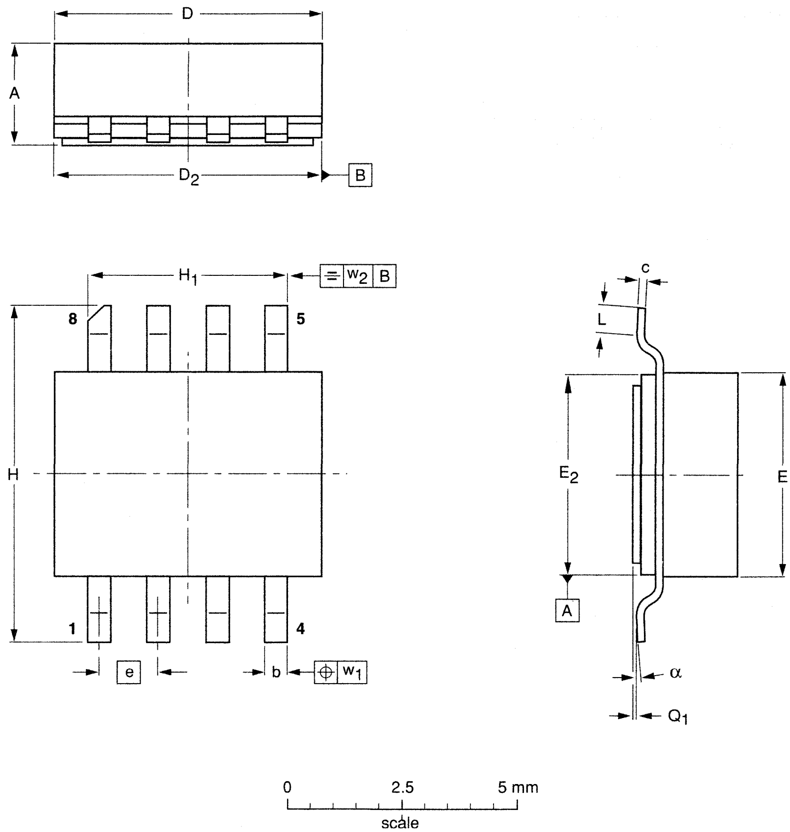


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	E	L	Q
mm	4.09 3.02	5.85 5.58	0.16 0.10	11.54 10.51	10.93 9.90	2.79 2.29	1.02 0.76

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT391B						97-05-29

Ceramic surface mounted package; 8 leads **SOT409A**



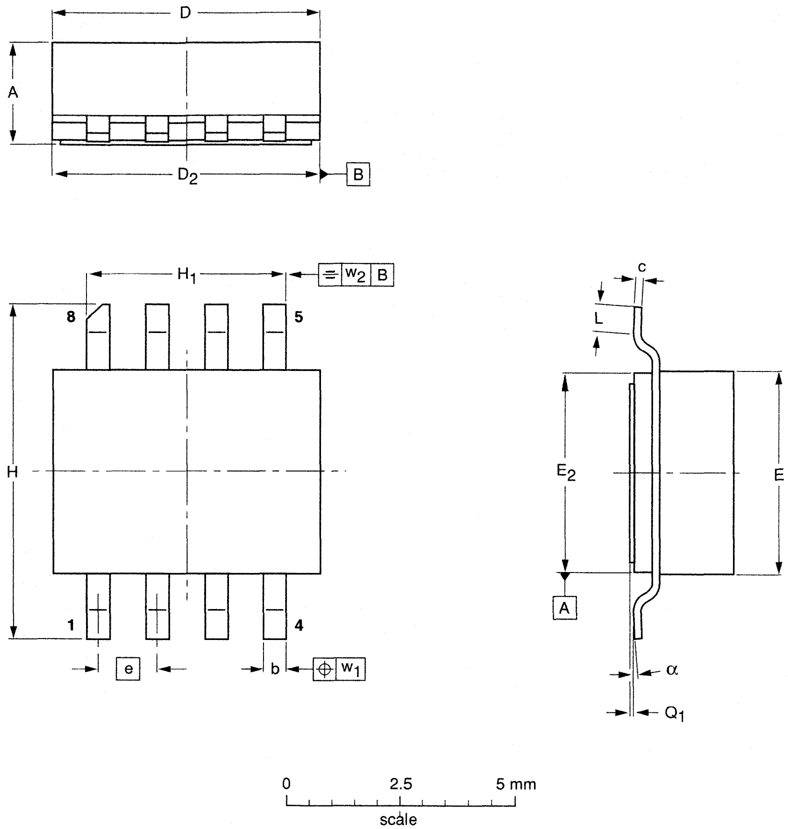
DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_2	E	E_2	e	H	H_1	L	Q_1	w_1	w_2	α
mm	2.36 2.06	0.58 0.43	0.23 0.18	5.94 5.03	5.16 5.00	4.93 4.01	4.14 3.99	1.27	7.47 7.26	4.39 4.24	1.02 0.51	0.10 0.00	0.25	0.25	7° 0°
inches	0.093 0.081	0.023 0.017	0.009 0.007	0.234 0.198	0.203 0.197	0.194 0.158	0.163 0.157	0.050	0.294 0.286	0.173 0.167	0.040 0.020	0.004 0.000	0.010	0.010	7° 0°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT409A						98-01-27

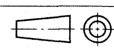
Ceramic surface mounted package; 8 leads

SOT409B

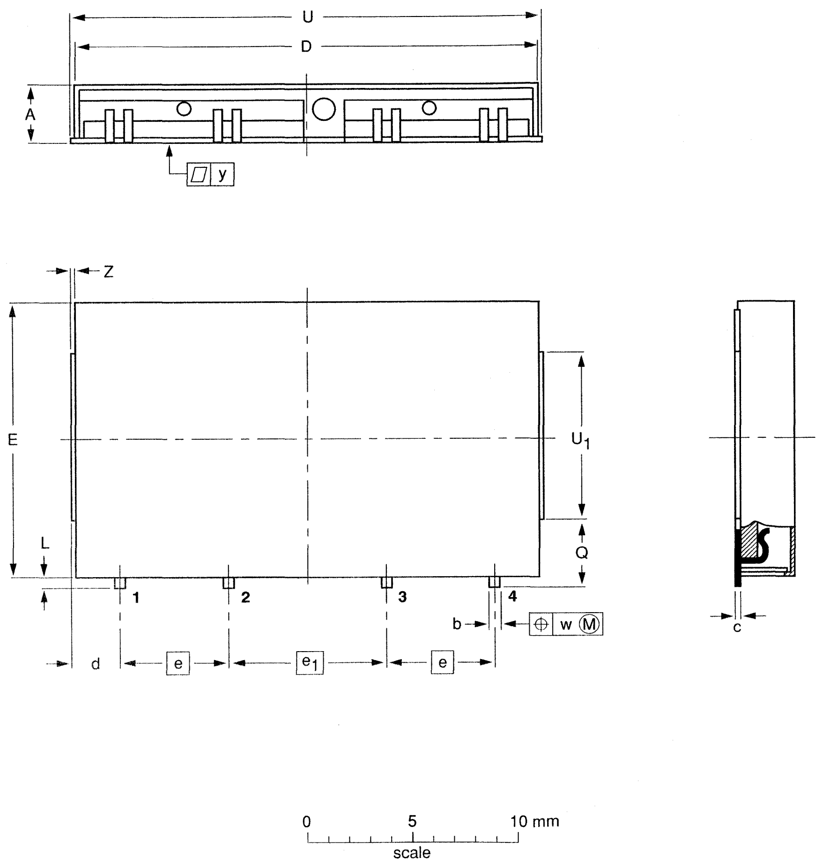


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_2	E	E_2	e	H	H_1	L	Q_1	w_1	w_2	α
mm	2.36 2.06	0.58 0.43	0.15 0.10	5.94 5.03	5.16 5.00	4.93 4.01	4.14 3.99	1.27	7.47 7.26	4.39 4.24	0.84 0.69	0.10 0.00	0.25	0.25	2° 0°
inches	0.093 0.081	0.023 0.017	0.006 0.004	0.234 0.198	0.203 0.197	0.194 0.158	0.163 0.157	0.050	0.294 0.286	0.173 0.167	0.033 0.027	0.004 0.000	0.010	0.010	2° 0°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT409B						98-01-27

Ceramic single-ended flat package; 4 in-line leads **SOT421A**

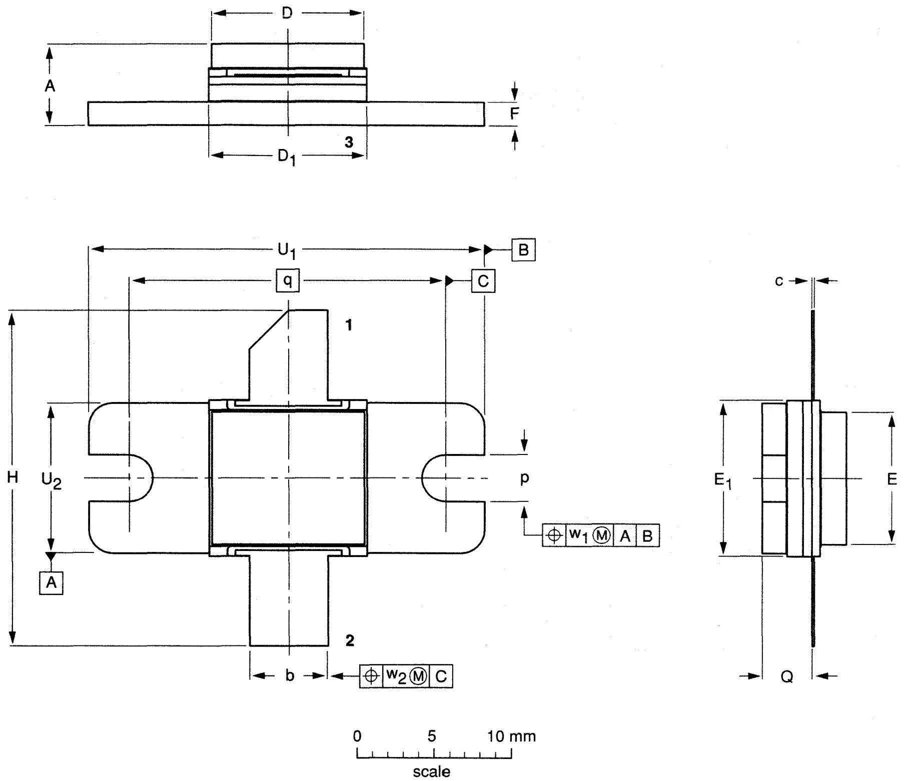


DIMENSIONS (mm are the original dimensions)

UNIT	A	b	c	D	d	E	e	e_1	L	Q	U	U_1	w	y	Z
mm	3.0 2.6	0.56 0.46	0.30 0.20	22.1 21.7	2.4 2.0	13.4 13.0	5.08	7.62	0.7 0.3	3.4 3.0	22.4 22.0	8.2 7.8	0.25	0.15	0.25 0.05

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT421A						97-06-20

Flanged hermetic ceramic package; 2 mounting holes; 2 leads **SOT422A**

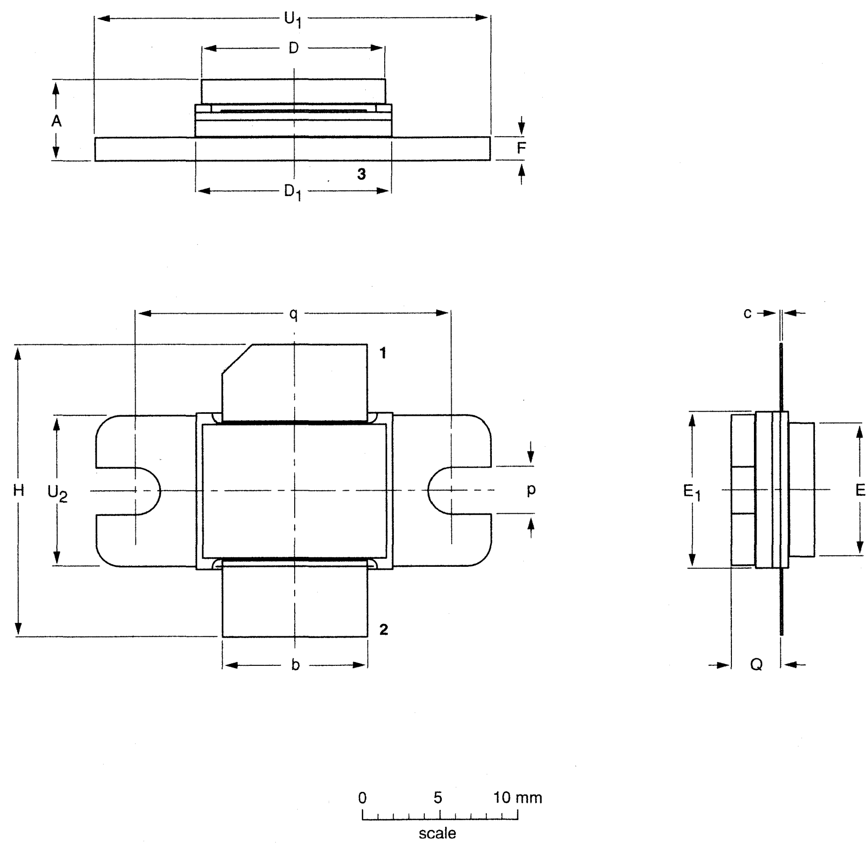


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	p	Q	q	U_1	U_2	w_1	w_2
mm	5.72 4.83	5.21 4.95	0.13 0.08	9.93 9.68	10.29 10.03	8.76 8.51	10.29 10.03	1.58 1.47	21.61 21.08	3.43 3.18	3.35 2.92	16.51	22.99 22.73	9.91 9.65	0.25	0.76
inches	0.225 0.190	0.205 0.195	0.005 0.003	0.391 0.381	0.405 0.395	0.345 0.335	0.405 0.395	0.062 0.058	0.89 0.83	0.135 0.125	0.132 0.115	0.65	0.905 0.895	0.390 0.380	0.01	0.03

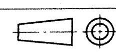
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT422A						97-12-24

Flanged hermetic ceramic package; 2 mounting holes; 2 leads **SOT423A**

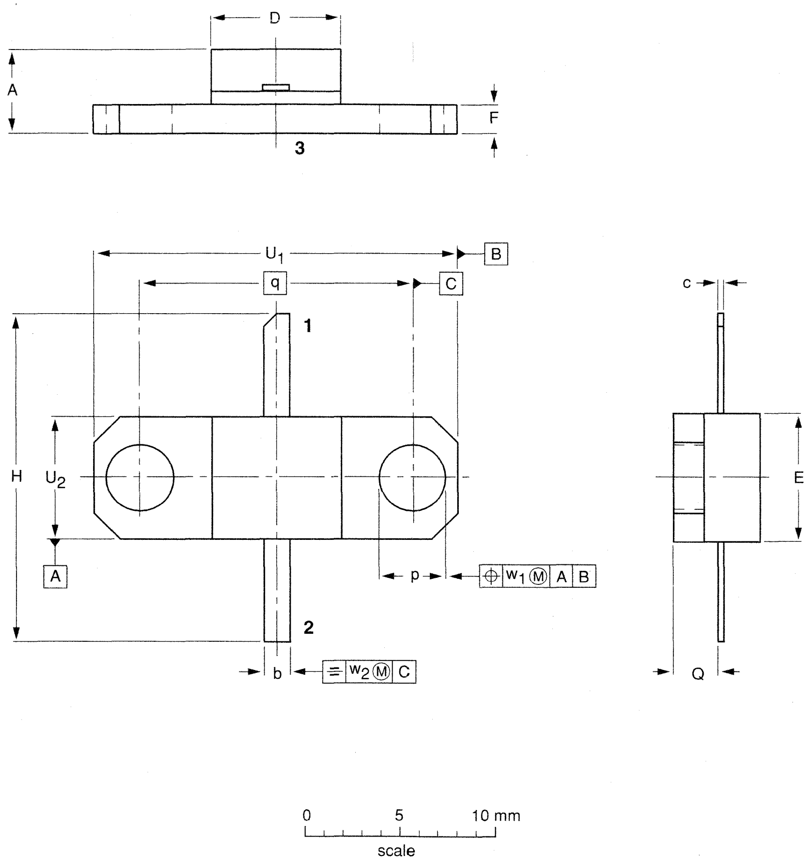


DIMENSIONS (mm are the original dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	p	Q	q	U_1	U_2
mm	5.58 5.04	9.53 9.27	0.16 0.10	12.02 11.76	12.83 12.57	8.82 8.56	10.29 10.03	1.58 1.46	19.18 18.92	3.43 3.17	3.42 2.88	16.64 16.38	22.99 22.73	9.91 9.65

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT423A						97-04-01

Flanged ceramic package; 2 mounting holes; 2 leads **SOT437A**

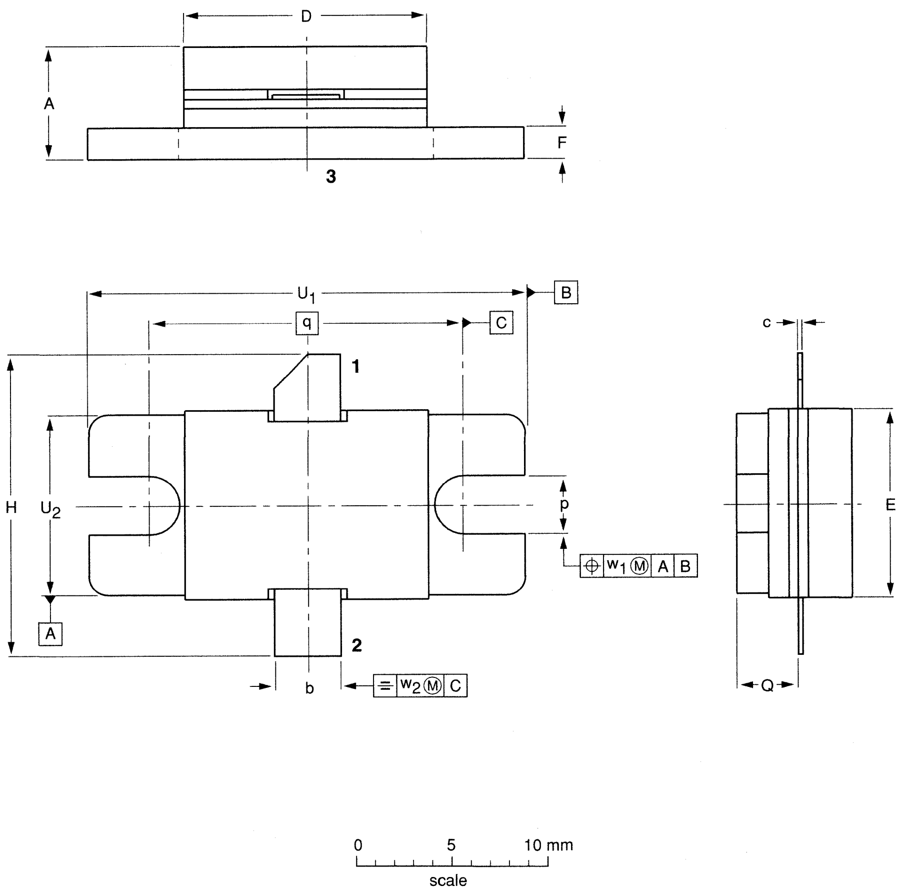


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	E	F	H	p	Q	q	U_1	U_2	w_1	w_2
mm	5.03 4.31	1.66 1.39	0.13 0.07	6.99 6.22	6.99 6.22	1.66 1.39	17.02 16.00	3.43 3.17	2.29 2.03	14.22	19.03 18.77	6.48 6.22	0.51	1.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT437A						97-05-23

Flanged hermetic ceramic package; 2 mounting holes; 2 leads **SOT439A**

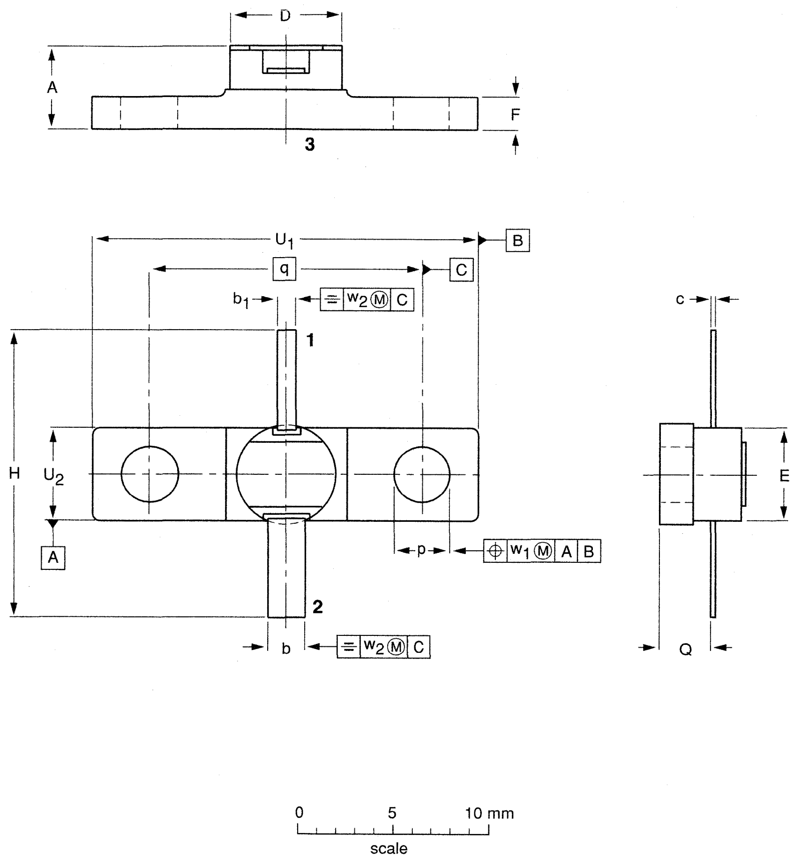


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	E	F	H	p	Q	q	U_1	U_2	w_1	w_2
mm	6.05 5.13	3.69 3.42	0.13 0.05	13.09 12.57	10.55 10.03	1.58 1.47	17.28 15.74	3.43 3.17	3.36 2.92	16.51	22.94 22.73	9.91 9.65	0.51	1.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT439A						97-05-23

Flanged hermetic ceramic package; 2 mounting holes; 2 leads **SOT440A**

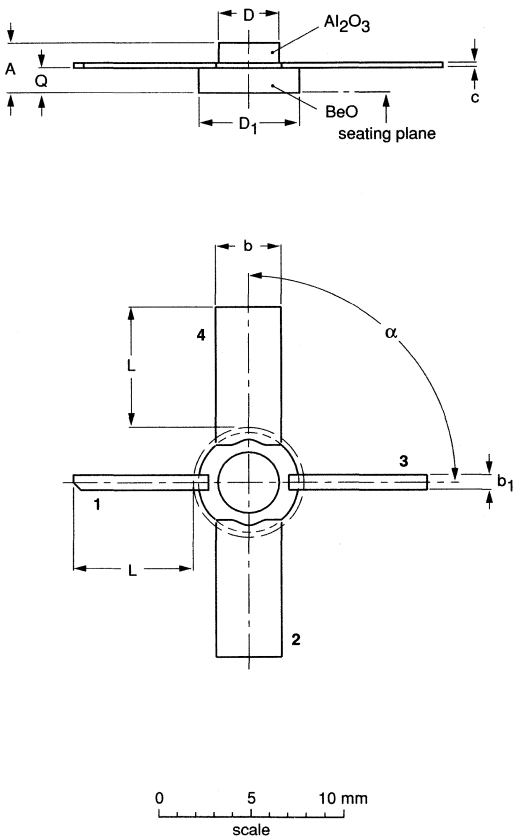


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	b_1	c	D	E	F	H	p	Q	q	U_1	U_2	w_1	w_2
mm	4.25 3.27	2.16 1.90	1.15 0.88	0.16 0.07	5.85 5.58	5.31 5.00	1.66 1.39	15.75 14.73	3.18 2.92	3.48 2.92	14.22	20.45 20.19	5.21 4.95	0.51	1.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT440A						97-05-23

Studless ceramic package; 4 leads **SOT441A**



DIMENSIONS (mm are the original dimensions)

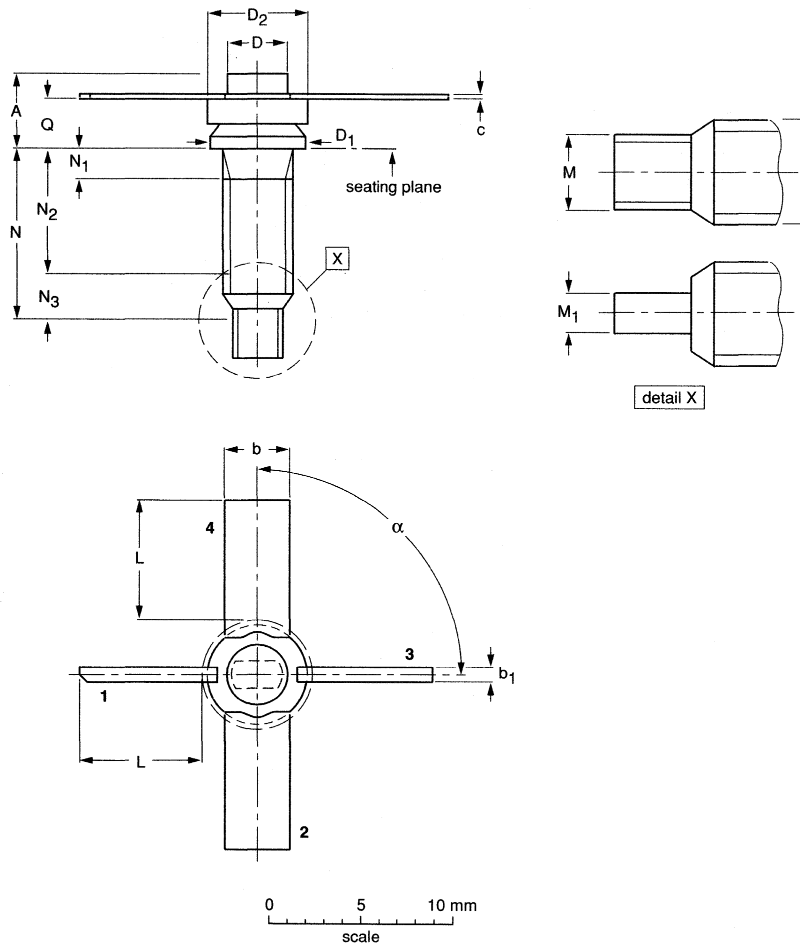
UNIT	A max.	b	b_1	c	D	D_1	L min.	Q	α
mm	2.4	3.2	0.75	0.125	3.38 3.08	5.28 5.12	6	1.3 1.0	90°

Note

1. This device corporates naked beryllium oxide, the dust of witch is toxic.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT441A						97-02-28

Studded ceramic package; 4 leads **SOT442A**

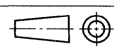


DIMENSIONS (mm are the original dimensions)

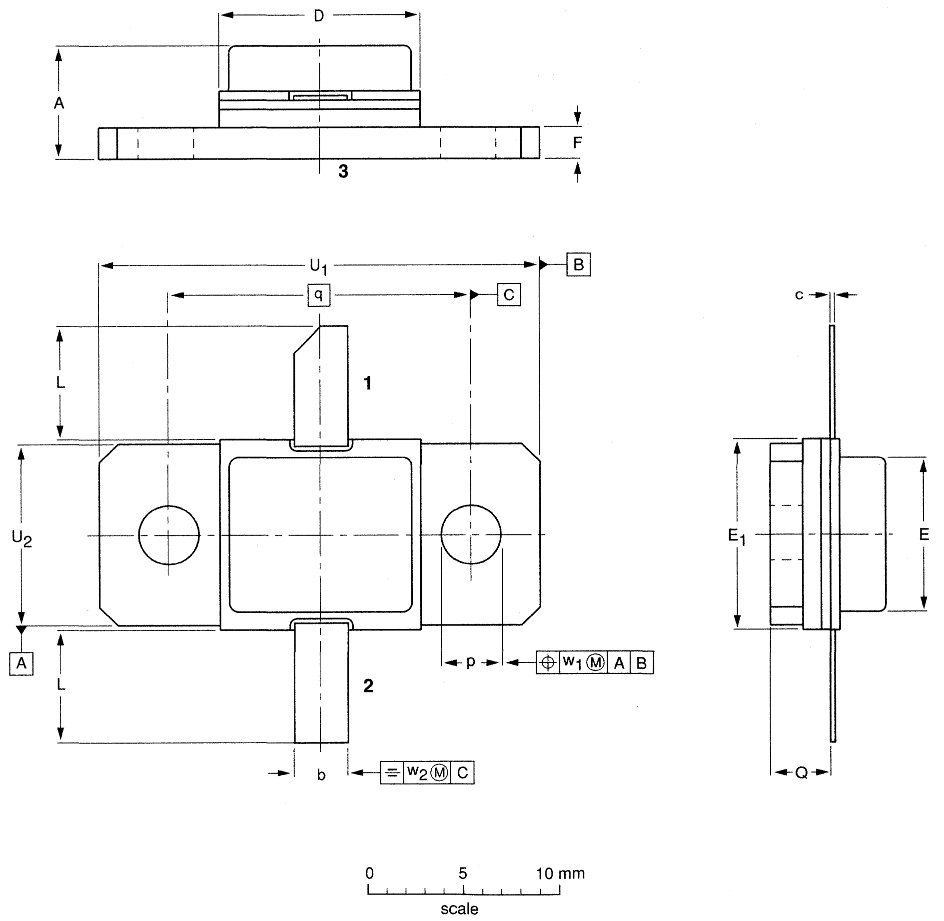
UNIT	A max.	b	b_1	c	D	D_1	D_2	L min.	M	M_1	N max.	N_1 max.	N_2	N_3 min	Q	W	α
mm	4.0	3.2	0.75	0.125	3.38 3.08	5.25 5.10	5.28 5.12	6	3.27 3.01	1.6 1.4	12.5	1.6	8.5 7.5	2.9	2.80 2.50	8-32 UNC	90°

Note

1. This device corporates naked beryllium oxide, the dust of witch is toxic.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT442A						97-02-28

Flanged hermetic ceramic package; 2 mounting holes; 2 leads **SOT443A**

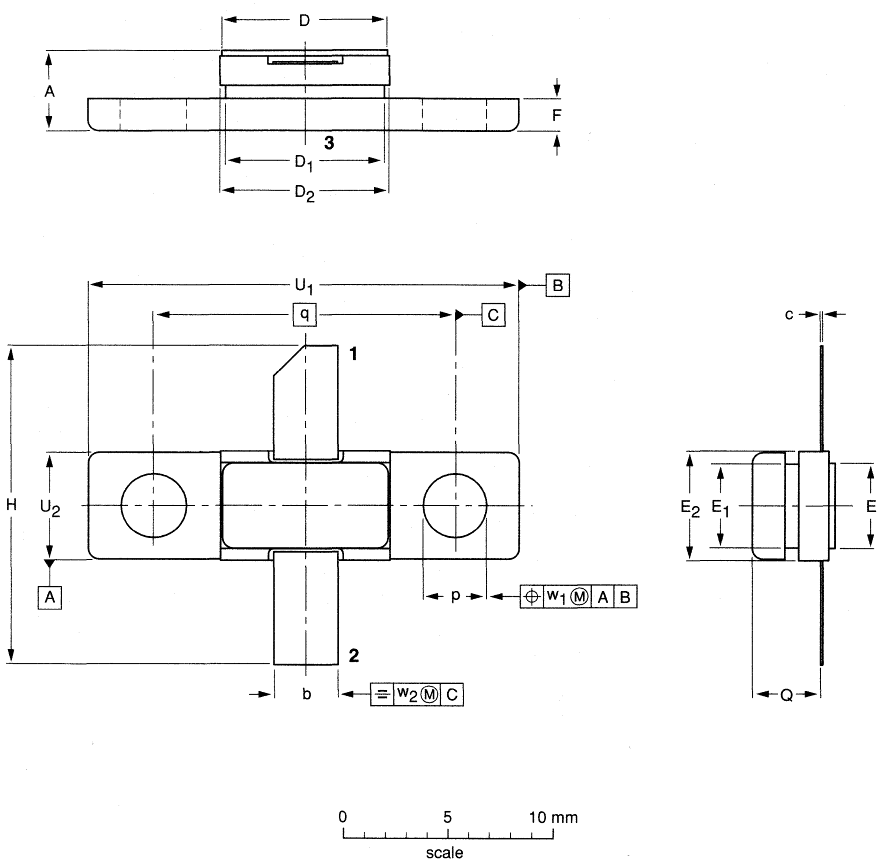


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	E	E_1	F	L	p	Q	q	U_1	U_2	w_1	w_2
mm	6.33 4.87	3.21 2.89	0.16 0.07	10.47 9.90	8.13 7.87	10.22 9.90	1.61 1.44	6.25 5.74	3.41 3.20	3.61 2.84	16.51	23.12 22.70	9.91 9.70	0.51	1.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT443A						97-05-23

Flanged hermetic ceramic package; 2 mounting holes; 2 leads **SOT445A**

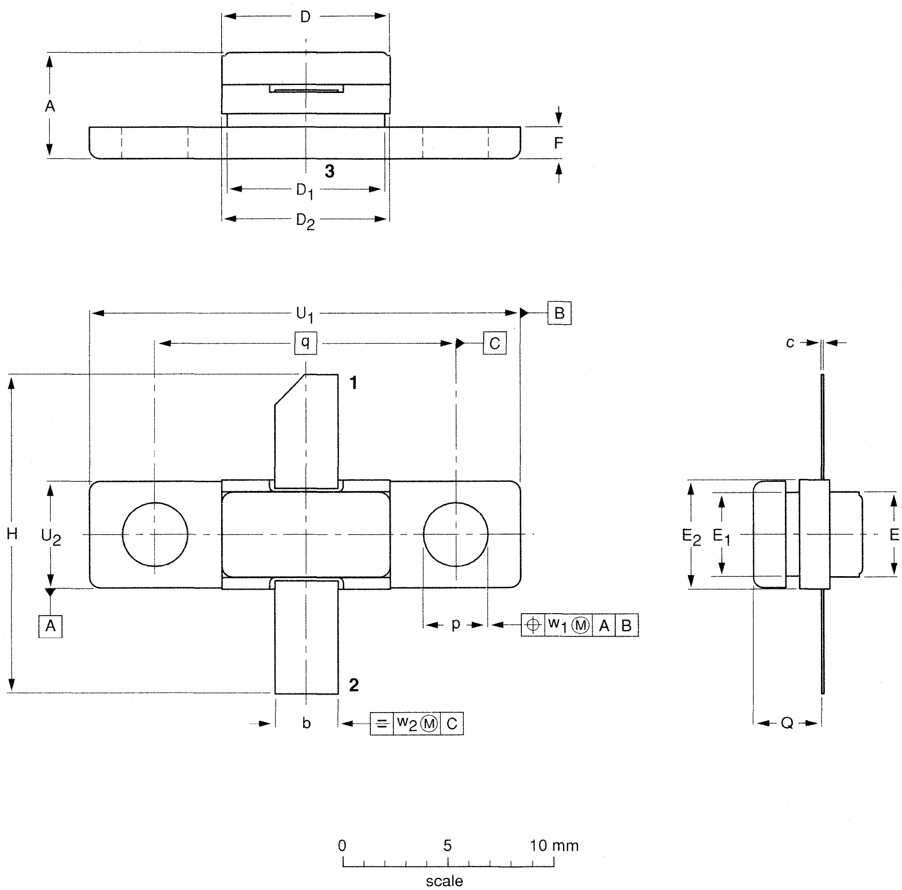


DIMENSIONS (mm are the original dimensions)

UNIT	A	b	c	D	D_1	D_2	E	E_1	E_2	F	H	p	Q	q	U_1	U_2	w_1	w_2
mm	4.01 3.36	3.15 2.95	0.15 0.09	7.9 7.7	7.65 7.35	8.15 7.85	4.1 3.9	4.25 3.95	5.31 5.01	1.82 1.22	15.84 14.64	3.35 3.05	3.33 3.03	14.22	20.47 20.17	5.18 4.98	0.51	1.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT445A						97-05-26

Flanged hermetic ceramic package; 2 mounting holes; 2 leads **SOT445C**

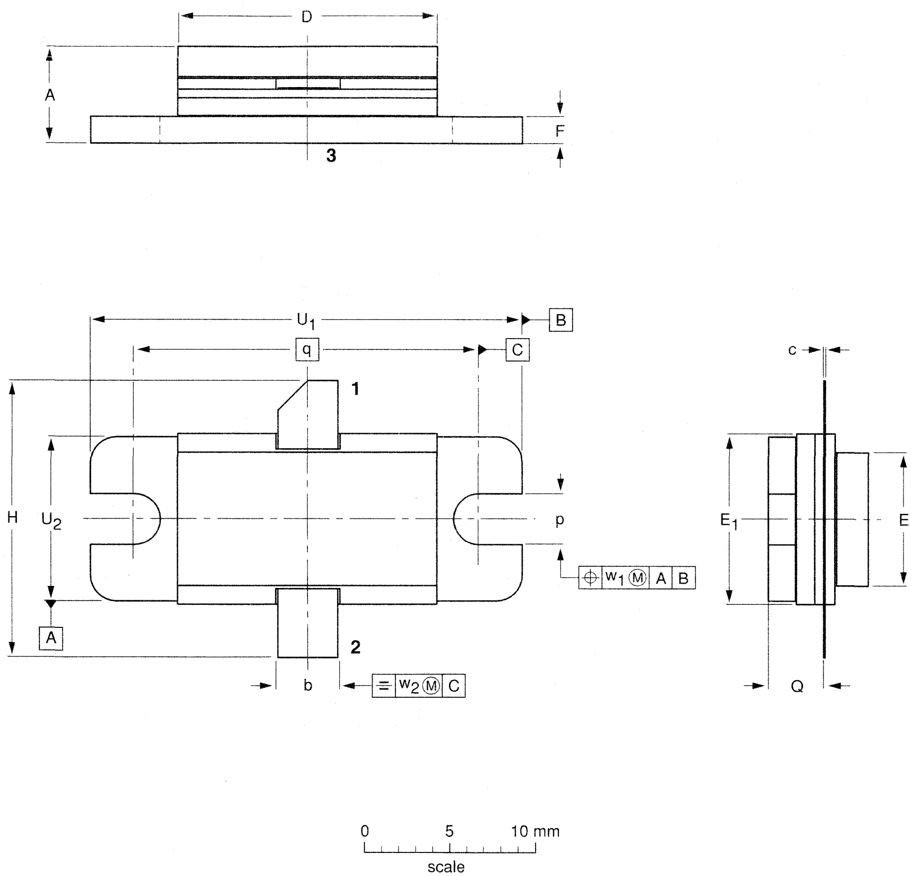


DIMENSIONS (mm are the original dimensions)

UNIT	A	b	c	D	D_1	D_2	E	E_1	E_2	F	H	p	Q	q	U_1	U_2	w_1	w_2
mm	5.57 4.70	3.15 2.95	0.15 0.09	8.13 7.87	7.65 7.35	8.15 7.85	4.20 3.93	4.25 3.95	5.31 5.01	1.82 1.22	15.84 14.64	3.35 3.05	3.33 3.03	14.22	20.47 20.17	5.18 4.98	0.51	1.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT445C						97-05-23

Flanged hermetic ceramic package; 2 mounting holes; 2 leads **SOT448A**

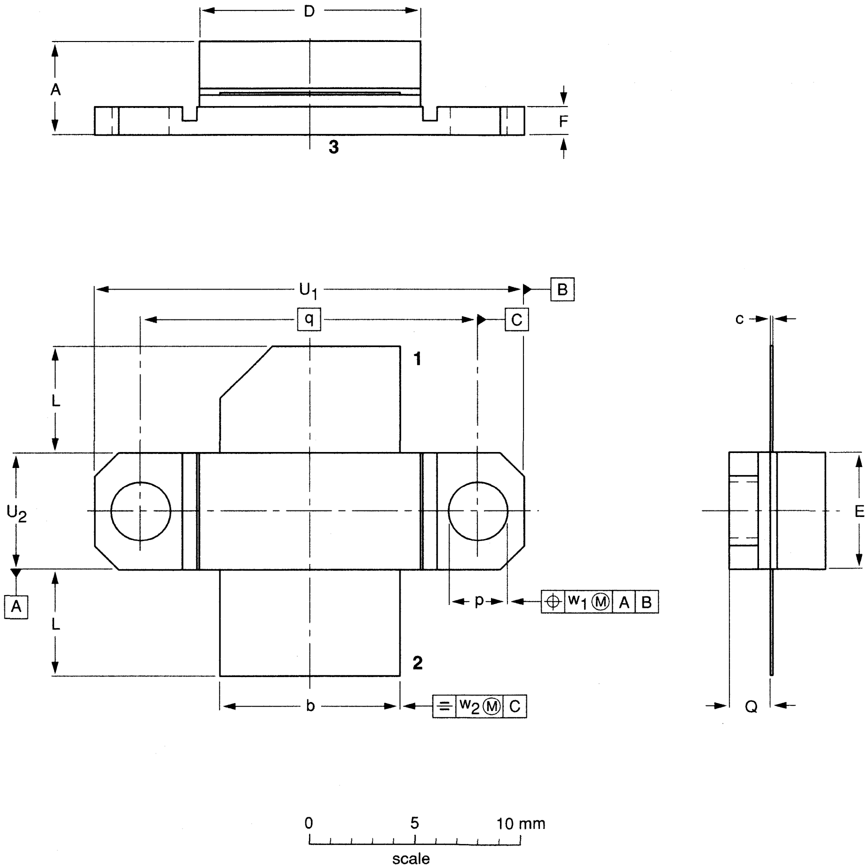


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	E	E_1	F	H	p	Q	q	U_1	U_2	w_1	w_2
mm	6.18 5.23	3.69 3.42	0.13 0.05	15.68 15.16	8.08 7.82	10.29 10.03	1.63 1.52	17.02 16.00	3.31 2.79	3.42 2.94	20.32	25.53 25.27	9.91 9.65	0.51	1.02

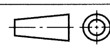
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT448A						97-05-29

Flanged hermetic ceramic package; 2 mounting holes; 2 leads **SOT460A**

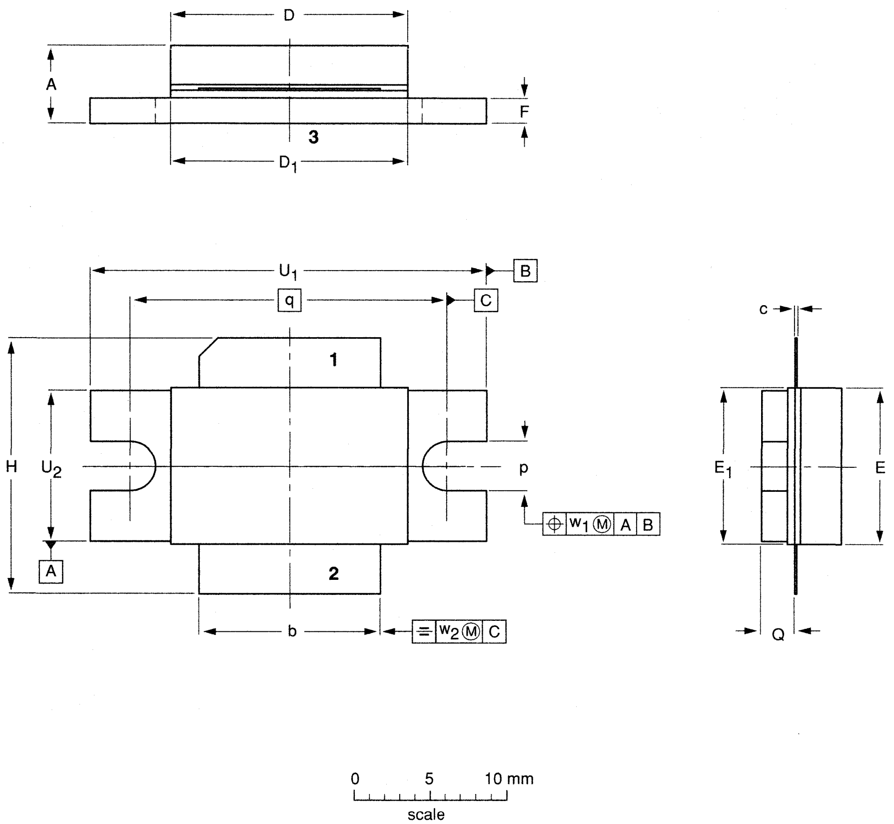


DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	E	F	L	p	Q	q	U_1	U_2	w_1	w_2
mm	5.39 4.49	9.78 9.52	0.16 0.07	12.45 11.68	6.94 6.22	1.66 1.39	6.10 5.33	3.28 3.02	2.37 1.95	17.98	22.99 22.73	6.43 6.17	0.51	1.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT460A						97-05-23

Flanged ceramic (AlN) package; 2 mounting holes; 2 leads **SOT468A**



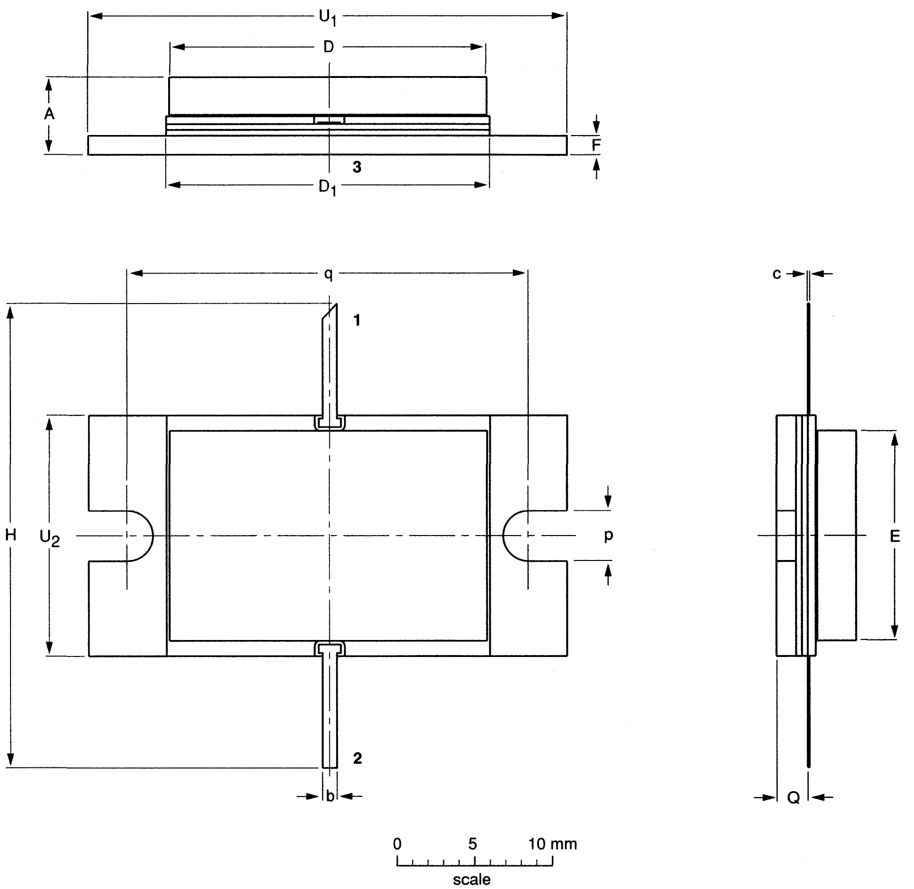
DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	p	Q	q	U_1	U_2	w_1	w_2
mm	5.23 4.62	11.81 11.58	0.15 0.10	15.39 15,09	15.37 15,11	10.26 10.06	10.29 10.03	1.65 1.60	16.74 16.48	3.30 3.05	2.21 2.06	20.32	25.53 25.27	9.91 9.65	0.254	0.508
inches	0.206 0.182	0.465 0.455	0.006 0.004	0.606 0.594	0.605 0.595	0.404 0.396	0.405 0.395	0.065 0.063	0.659 0.649	0.130 0.120	0.087 0.081	0.800	1.005 0.995	0.390 0.380	0.01	0.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT468A						97-12-24

Flanged hermetic ceramic package; 2 mounting holes; 2 leads

SOT469A

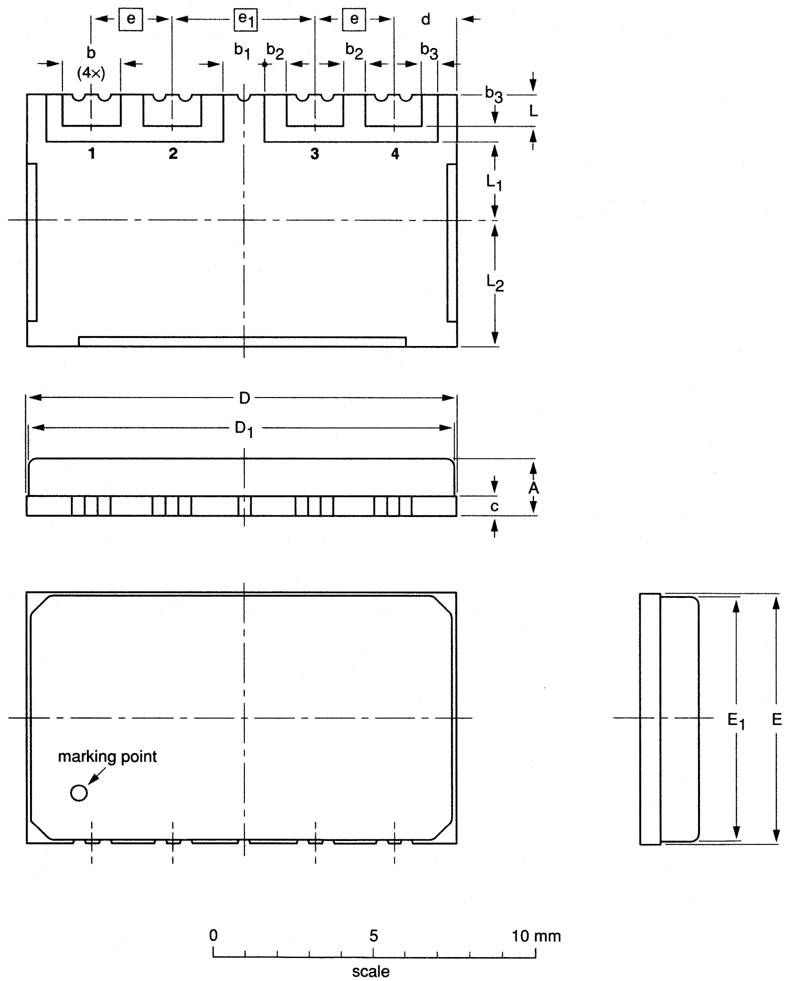


DIMENSIONS (mm are the original dimensions)

UNIT	A	b	c	D	D_1	E	F	H	p	Q	q	U_1	U_2
mm	5.73 4.53	1.12 0.86	0.13 0.07	20.76 20.44	21.11 20.85	13.95 13.63	1.40 1.14	30.61 30.35	3.43 3.17	2.16 1.90	26.14 25.88	31.12 30.86	15.93 15.67

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT469A						97-04-01

Leadless surface mounted package; plastic cap; 4 terminations **SOT482B**

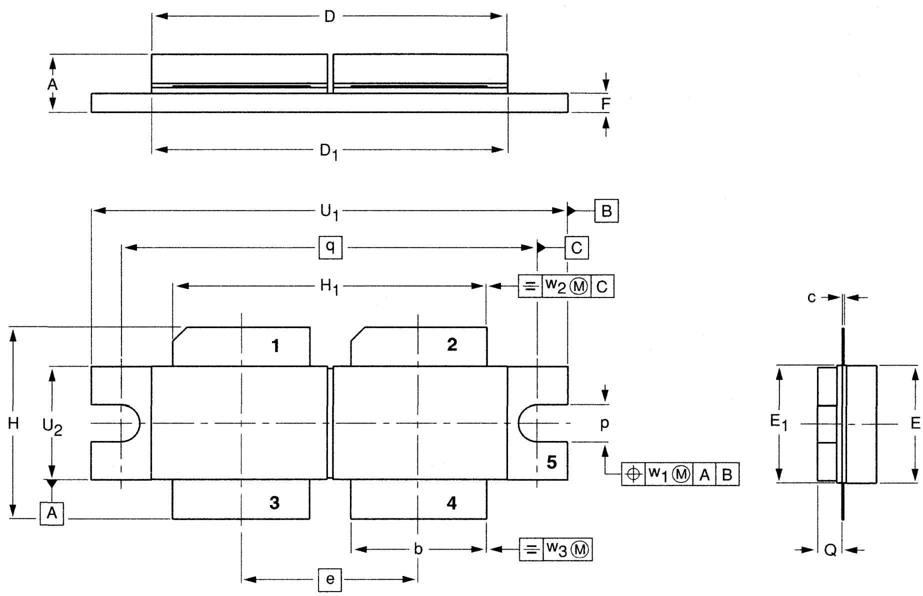


DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b_1	b_2	b_3	c	D	D_1	d	E	E_1	e	e_1	L	L_1	L_2
mm	2.09 1.59	1.9 1.7	1.4 1.2	0.8 0.6	0.6 0.4	0.70 0.57	13.7 13.3	13.35 13.05	2.0	8.2 7.8	7.85 7.55	2.6 2.4	4.6 4.4	1.15 0.85	2.65 2.35	3.85 3.55

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT482B						98-13-02

Flanged double-ended ceramic (AIN) package; 2 mounting holes; 4 leads **SOT494A**



PROPOSAL

0 5 10 mm
scale

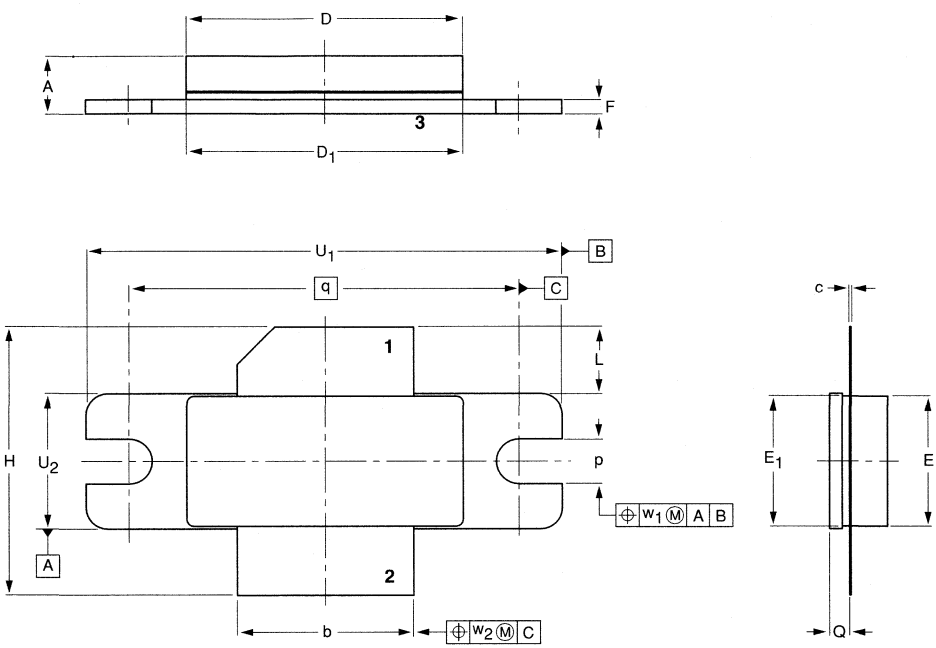
97-10-17

DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	E	E_1	e	F	H	H_1	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	5.26 4.60	11.81 11.56	0.15 0.10	33.96 28.02	31.37 30.61	10.26 10.06	10.29 10.03	15.75	1.66 1.60	16.74 16.48	27.81 27.05	3.30 3.05	2.21 2.06	36.07	41.28 41.02	10.29 10.03	0.25	0.51	0.25
inches	0.207 0.181	0.465 0.455	0.006 0.004	1.337 1.103	1.235 1.205	0.404 0.396	0.405 0.395	0.62	0.065 0.063	0.659 0.649	1.095 1.065	0.130 0.120	0.087 0.081	1.42	1.625 1.615	0.405 0.395	0.01	0.02	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT494A						

Flanged LDMOST package; 2 mounting holes; 2 leads — SOT502A



PROPOSAL

0 5 10 mm
scale

97-10-22

DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	L	p	Q	q	U_1	U_2	w_1	w_2
mm	4.80 3.81	12.83 12.57	0.15 0.08	20.02 19.61	19.96 19.66	9.50 9.30	9.50 9.25	1.14 0.89	19.94 18.92	5.33 4.32	3.38 3.12	1.78 1.27	27.94	34.16 33.91	9.91 9.65	0.25	0.51
inches	0.189 0.150	0.505 0.4.95	0.006 0.003	0.788 0.772	0.786 0.774	0.374 0.366	0.374 0.364	0.045 0.035	0.785 0.745	0.210 0.170	0.133 0.123	0.070 0.050	1.100	1.345 1.335	0.390 0.380	0.01	0.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT502A						97-10-22

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Data handbook system

DATA HANDBOOK SYSTEM

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SC07	Small-signal Field-effect Transistors
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DC03	Television Tuners, Coaxial Aerial Input Assemblies
DC04	Colour Monitor and Multimedia Tubes
DC05	Wire Wound Components

Magnetic products

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MA03	Piezoelectric Ceramics Specialty Ferrites
MA04	Dry-reed Switches

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PA03	Potentiometers
PA04	Variable Capacitors
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