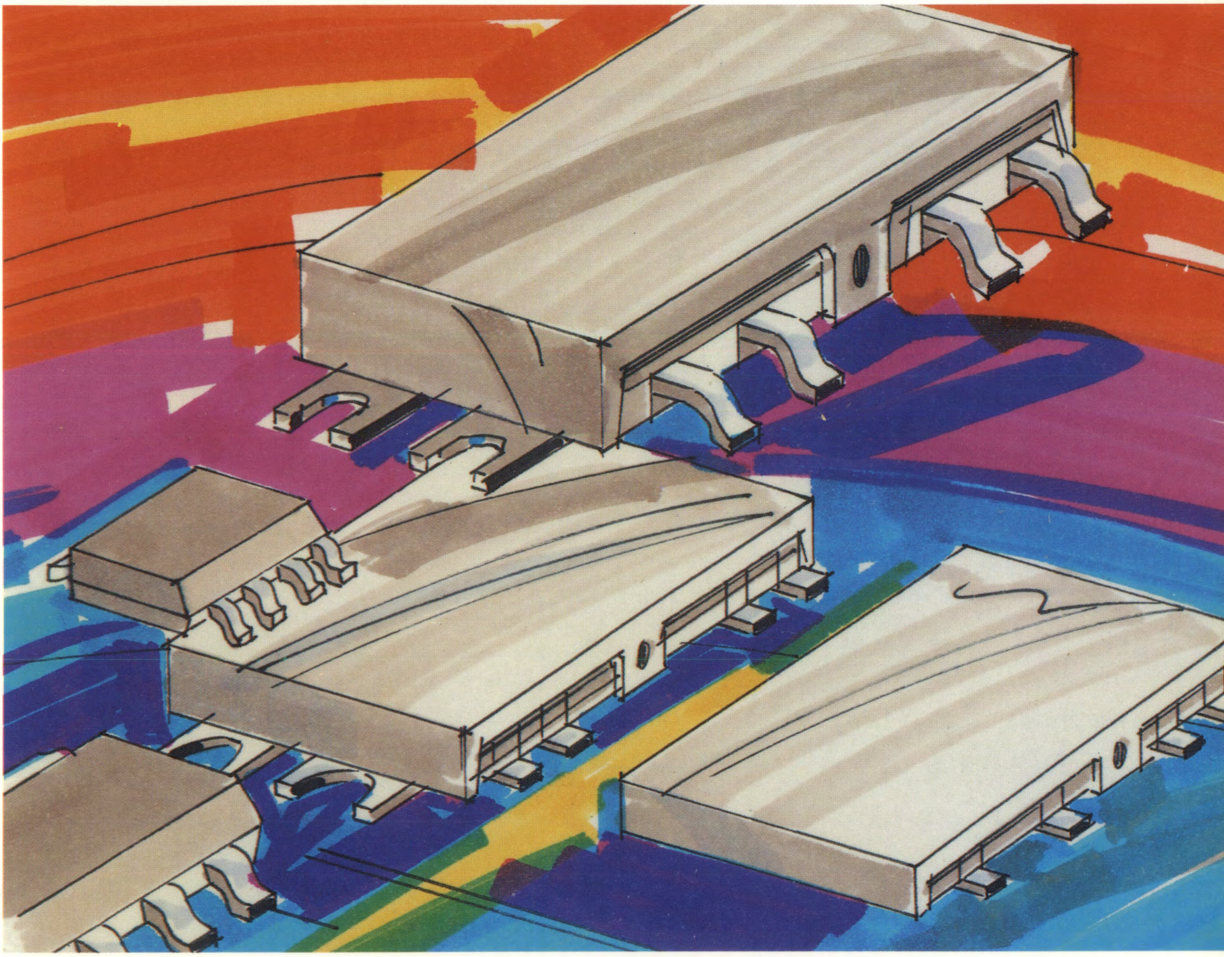
DISCRETE SEMICONDUCTORS

RF Power Modules and Transistors for Mobile Phones



1996

DATA HANDBOOK SC09

Philips Semiconductors

PHILIPS

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 Power Modules and Transistors for Mobile Phones

CONTENTS

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.

INDEX

ALPHANUMERIC INDEX

Types added to the range since the last issue of Handbook SC09 (1994 issue) are shown in bold print.

REPLACED/WITHDRAWN TYPES

The following type numbers were in the previous issue of this data handbook, but not in the current version.

TYPE NUMBER	REPLACED BY	REASON FOR DELETION
BGY46A	–	discontinued
BGY46B	–	discontinued
BGY47A	–	discontinued
BGY47B	–	discontinued
BGY115C	BGY115C/P	
BGY118C	–	discontinued
BGY200	–	discontinued

MAINTENANCE TYPES

The following type numbers are still included in the current issue of this data handbook, but they should no longer be used for new designs.

TYPE NUMBER	REPLACEMENT TYPE
BGY114D; BGY114E	–
BGY119C	–
BGY32; BGY33	BGY132; BGY133
BGY35; BGY36	BGY135; BGY136
BGY43	BGY143

SELECTION GUIDE

RF Power Modules and Transistors for Mobile Phones

Selection guide

VHF CAR MOBILE

V_S (V)	P_L (W)	f (MHz)	G_p (dB)	PACKAGE	TYPE NUMBER	PAGE
12.5	13	146 to 174	≥19.4	SOT132B	BGY143	194
	18	68 to 88	≥22.6	SOT132B	BGY132	180
	18	80 to 108	≥22.6	SOT132B	BGY133	180
	18	132 to 156	≥20.8	SOT132B	BGY135	187
	18	146 to174	≥20.8	SOT132B	BGY136	187

UHF PORTABLE

V_S (V)	P_L (W)	f (MHz)	G_p (dB)	PACKAGE	TYPE NUMBER	PAGE
6	≥3	400 to 440	≥24.8	SOT421A	BGY148A	200
	≥3	430 to 488	≥24.8	SOT421A	BGY148B	200
	3.5	400 to 440	≥35.5	SOT288D	BGY113E	107
	3.5	430 to 470	≥35.5	SOT288D	BGY113F	107
	3.5	470 to 520	≥35.5	SOT288D	BGY113G	107
7.2	7	400 to 470	≥38.5	SOT434A	BGY152A	205
	7	450 to 512	≥38.5	SOT434A	BGY152B	205
7.5	7	400 to 440	≥38.5	SOT288D	BGY113A	100
	7	430 to 470	≥38.5	SOT288D	BGY113B	100

SHF PORTABLE

V_S (V)	P_L (W)	f (MHz)	G_p (dB)	PACKAGE	TYPE NUMBER	PAGE
3.6	1.2	824 to 849	≥27.8	SOT388A	BGY120A	170
	1.2	872 to 905	≥27.8	SOT388A	BGY120B	170
	1.2	898 to 928	≥27.8	SOT388A	BGY120D	170
4.8	1.2	824 to 849	≥27.8	SOT321	BGY118A	152
	1.2	872 to 905	≥27.8	SOT321	BGY118B	152
	1.2	898 to 928	≥27.8	SOT321	BGY118D	152
	1.2	824 to 849	≥27.8	SOT359	BGY119A	162
	1.2	872 to 905	≥27.8	SOT359	BGY119B	162
	1.2	824 to 849	≥27.8	SOT388A	BGY122A	172
	1.2	872 to 905	≥27.8	SOT388A	BGY122B	172
6	1.2	824 to 849	≥27.8	SOT321	BGY115A	131
	1.2	872 to 905	≥27.8	SOT321	BGY115B	131
	1.2	902 to 928	≥27.8	SOT321	BGY115D	131
	1.4	890 to 915	≥28.5	SOT321	BGY115C/P	131
7.2	1.7	824 to 849	≥32.3	SOT246	BGY110D	87
	1.7	872 to 905	≥32.3	SOT246	BGY110E	87
	1.7	890 to 915	≥32.3	SOT246	BGY110F	87
	1.7	902 to 928	≥32.3	SOT246	BGY110G	87
	5	800 to 870	≥37	SOT434A	BGY172	207

SHF CAR MOBILE

V_S (V)	P_L (W)	f (MHz)	G_p (dB)	PACKAGE	TYPE NUMBER	PAGE
12.5	6	800 to 870	≥37.8	SOT278B	BGY116D	143
	6	824 to 849	≥37.8	SOT278A	BGY114A	116
	6	872 to 905	≥37.8	SOT278A	BGY114B	116
	6	890 to 950	≥37.8	SOT278B	BGY116E	143
	8	890 to 915	≥39.0	SOT278A	BGY114C	116

GSM

V_S (V)	P_L (W)	f (MHz)	G_p (dB)	PACKAGE	TYPE NUMBER	PAGE
4.8	2.8	880 to 915	≥21.8		BGY209	252
	3	880 to 915	≥27.8	SOT359A	BGY207	248
	3	880 to 915	≥30	SOT388A	BGY206	241
	3.5	880 to 915	≥32.5	SOT321B	BGY204	227
6	1.4	880 to 915	≥28.5	SOT321	BGY202	215
	2	1710 to 1785	≥27	SOT321B	BGY210	254
	3.2	880 to 915	≥35	SOT342	BGY203	221
	3.5	880 to 915	≥32.5	SOT321B	BGY205	234
6.8	3.5	880 to 915	≥30.7	SOT388A	BGY208	250
12.5	14	890 to 915	≥41.5	SOT278A	BGY201	209

TRANSISTORS FOR MOBILE PHONES

TYPE NUMBER	V_{CE} (V)	P_L (W)	G_P (dB)	PACKAGE	PAGE
Analog cellular					
BLT61[(1)]	3.6	1.2	>8	SO8, SOT96	272
BLT70	4.8	0.6	>6	SOT223	278
BLT71	4.8	1.2	>6	SOT223	286
BLT71/8	4.8	1.2	≥11	SO8, SOT96	295
BLT80	6	0.8	7	SOT223	302
	7.5	0.8	8	SOT223	302
BLT81	6	1.2	6.5	SOT223	309
	7.5	1.2	8	SOT223	309
Digital cellular					
BLT62[(1)]	3.6	3	≥8	SO8, SOT96	275
BLT14[(1)]	4.8	1.6	≥6	SO8, SOT96	269
BLT72[(1)]	4.8	3	>7	SO8, SOT96	299
BLT13[(1)]	6	2	>6	SO8, SOT96	266
BLT82	6	3.5	>8	SO8, SOT96	317

Note

1. Preliminary specification.

TRANSISTORS FOR MOBILE PHONES!

TYPE NUMBER	V_{CEO} (V)	I_C (mA)	P_{tot} (mW)	PACKAGE	PAGE
BFG10W/X	10	250	400	SOT343	43
BFG11W/X	8	500	760	SOT343	49
BFG520W	15(1)	70	500	SOT343	65
BFG520W/X	15(1)	70	500	SOT343	65
BFG520W/XR	15(1)	70	500	SOT343	65
BFG540W	15(1)	120	500	SOT343	76
BFG540W/X	15(1)	120	500	SOT343	76
BFG540W/XR	15(1)	120	500	SOT343	76

Note

1. V_{CES}.

HYBRID AMPLIFIERS

TYPE NUMBER	V_{S1} (V)	V_{S2} (V)	P_L (W)	G_P (dB)	PACKAGE	PAGE
BGY1816(1)	5	26	16	≥24	SOT365	263
BGY916(1)	26	26	16	≥28	SOT365	260

Note

1. Preliminary specification.

LINE-UPS

CELLULAR PHONES

Analog

V_S (V)	P_L (W)	1st STAGE	2nd STAGE	3rd STAGE
6	1.2	BFG540W/X	BLT80	BLT81
4.8	1.2	BFG540W/X	BLT70	BLT71
4.8	1.2	BFG10W/X	BLT71/8	
3.6	1.2	BFG520W/X	BFG10W/X	BLT61

GSM

V_S (V)	P_L (W)	1st STAGE	2nd STAGE	3rd STAGE
6	3.5	BFG540W/X	BFG10W/X	BLT82
4.8	3	BFG540W/X	BFG10W/X	BLT72
3.6	3	BFG540W/X	BFG10W/X	BLT62

PCN/DCS1800

V_S (V)	P_L (W)	1st STAGE	2nd STAGE	3rd STAGE
6	2	BFG540W/X	BFG10W/X	BLT13
4.8	1.6	BFG540W/X	BFG10W/X	BLT14

DECT

P_i (dBm)	P_L (dBm)	1st STAGE	2nd STAGE	3rd STAGE
3	26	BFG540/X	BFG10/X	BFG11/X
0	26	BFG540W/X	BFG10W/X	BFG11W/X

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 described in the following paragraphs.

QUALITY ASSURANCE

Based on ISO 9000 standards, customer standards such as Ford TQE 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 and 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.

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. Critical process steps are 100% 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.
- Periodic inspections to monitor and measure the conformance of products.

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 responses

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 discrete semiconductor devices (not integrated circuits), multiples of such devices, semiconductor chips and Darlington transistors.

FIRST LETTER

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

- A Germanium or other material with a band gap of 0.6 to 1 eV
- B Silicon or other material with a band gap of 1 to 1.3 eV
- C Gallium arsenide (GaAs) or other material with a band gap of 1.3 eV or more
- R Compound materials, e.g. cadmium sulphide.

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.

In the following list low power types are defined by $R_{th\ j\text{-}mb} > 15$ K/W and power types by $R_{th\ j\text{-}mb} \leq 15$ K/W.

- A Diode; signal, low power
- B Diode; variable capacitance
- C Transistor; low power, audio frequency
- D Transistor; power, audio frequency
- E Diode; tunnel
- F Transistor; low power, high frequency
- G Multiple of dissimilar devices/miscellaneous devices; e.g. oscillators. Also with special third letter; see under Section "Serial number"
- H Diode; magnetic sensitive
- L Transistor; power, high frequency
- N Photocoupler
- P Radiation detector; e.g. high sensitivity photo-transistor; with special third letter
- Q Radiation generator; e.g. LED, laser; with special third letter
- R Control or switching device; e.g. thyristor, low power; with special third letter
- S Transistor; low power, switching
- T Control or switching device; e.g. thyristor, low power; with special third letter
- U Transistor; power, switching
- W Surface acoustic wave device
- X Diode; multiplier, e.g. varactor, step recovery
- Y Diode; rectifying, booster
- Z Diode; voltage reference or regulator, transient suppressor diode; with special third letter.

SERIAL NUMBER

The number comprises three figures running from 100 to 999 for devices primarily intended for consumer equipment, or one letter (Z, Y, X, etc.) and two figures running from 10 to 99 for devices primarily intended for industrial or professional equipment.(1)

(1) When the supply of these serial numbers is exhausted, the serial number may be expanded to three figures for industrial types and four figures for consumer types.

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 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 detailed in this section are based on IEC publication number 148.

Basic letters

In the representation of currents, voltages and powers, lower-case letter symbols are used to indicate all instantaneous values that vary with time. All other values are represented by upper-case letters.

Electrical parameters[1] of external circuits and of circuits in which the device forms only a part are represented by upper-case letters. Lower-case letters are used for the representation of electrical parameters inherent in the device. Inductances and capacitances are always represented by upper-case letters.

The following is a list of basic letter symbols used with semiconductor devices:

B, b	Susceptance (imaginary part of an admittance)
C	Capacitance
G, g	Conductance (real part of an admittance)
H, h	Hybrid parameter
I, i	Current
L	Inductance
P, p	Power
R, r	Resistance (real part of an impedance)
V, v	Voltage
X, x	Reactance (imaginary part of an impedance)
Y, y	Admittance
Z, z	Impedance.

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

Subscripts

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. $I_{b(av)}$.

The following is a list of subscripts used with basic letter symbols for semiconductor devices:

A, a	anode
amb	ambient
(AV), (av)	average value
B, b	base
(BO)	breakover
(BR)	breakdown
case	case
C, c	collector
C	controllable
D, d	drain
E, e	emitter
F, f	fall, forward (or forward transfer)
G, g	gate
H	holding
h	heatsink
I, i	input
j-a	junction to ambient
j-mb	junction to mounting base
K, k	cathode
L	load
M, m	peak value
(min)	minimum
(max)	maximum
mb	mounting base
O, o	As first subscript: reverse (or reverse transfer), rise. As second subscript: repetitive, recovery. As third subscript: with a specified resistance between the terminal not mentioned and the reference terminal
(OV)	Overload
P, p	Pulse
Q, q	Turn-off
R, r	As first subscript: reverse (or reverse transfer), rise. As second subscript: repetitive, recovery. 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 subscript: series, source, storage, stray, switching. As second subscript: surge (non-repetitive). As third subscript: short circuit between the terminal not mentioned and the reference terminal
stg	Storage
th	Thermal
TO	Threshold
tot	Total
W	Working
X, x	Specified circuit
Z, z	Reference or regulator (zener)
1	Input (four-pole matrix)
2	Output (four-pole matrix).

Applications and examples

TRANSISTOR CURRENTS

The first subscript indicates the terminal carrying the current (conventional current flow from the external circuit into the terminal is positive).

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

TRANSISTOR VOLTAGES

A voltage is indicated by the first two subscripts: the first identifies the terminal at which the voltage is measured and the second the reference terminal or the circuit node. The second subscript may be omitted when there is no possibility of confusion.

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

SUPPLY VOLTAGES OR CURRENTS

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

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

A reference terminal is indicated by a third subscript.

Example: V_{CCE}.

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. Hyphens may be used to avoid confusion in multiple subscripts.

Examples:

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

MULTIPLE DEVICES

For multiple unit devices, the subscripts are modified by a number preceding the letter subscript. Hyphens may be used to avoid confusion in multiple subscripts.

Examples:

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

ELECTRICAL PARAMETERS

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 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
$Z_i = R_i + jX_i$	Small-signal value of the input impedance.

If more than one subscript is used, subscripts for which a choice of style is allowed, the subscripts chosen are all upper-case or all lower-case.

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

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 are 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 are not suitable, the notation shown in the following examples 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}.

TAPE AND REEL PACKING

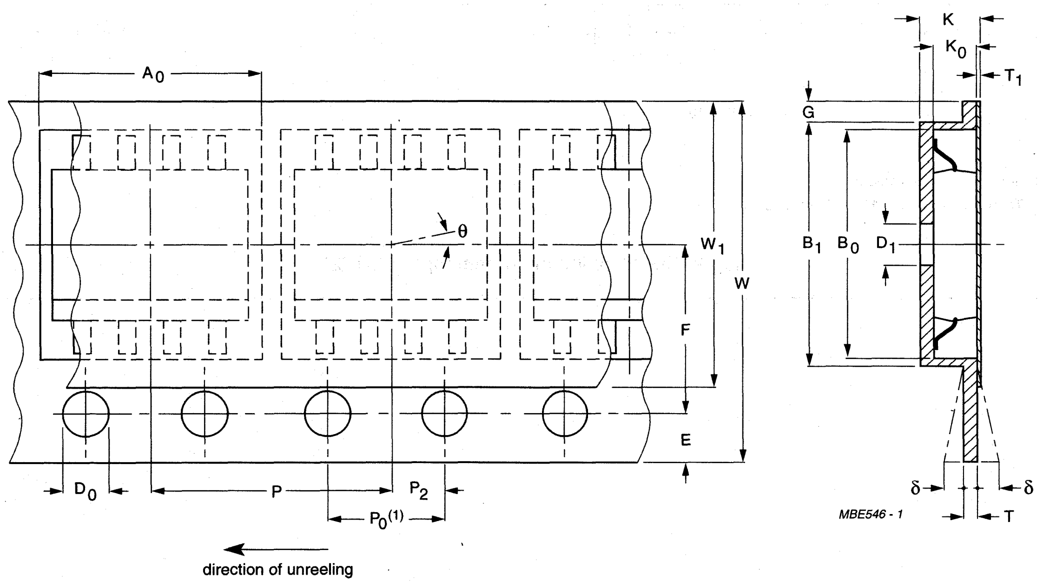
Packing types

Table 1 Packing quantities per reel

PACKAGE	TAPE WIDTH (mm)	REEL SIZE (mm)	QUANTITY PER REEL	12NC (note 1) ends with:
SOT96 (SO8)	12	330	2500	...118
SOT223	12	180	3000	...115
SOT321A	40	330	600	...135
SOT321B	40	330	600	...135

Note

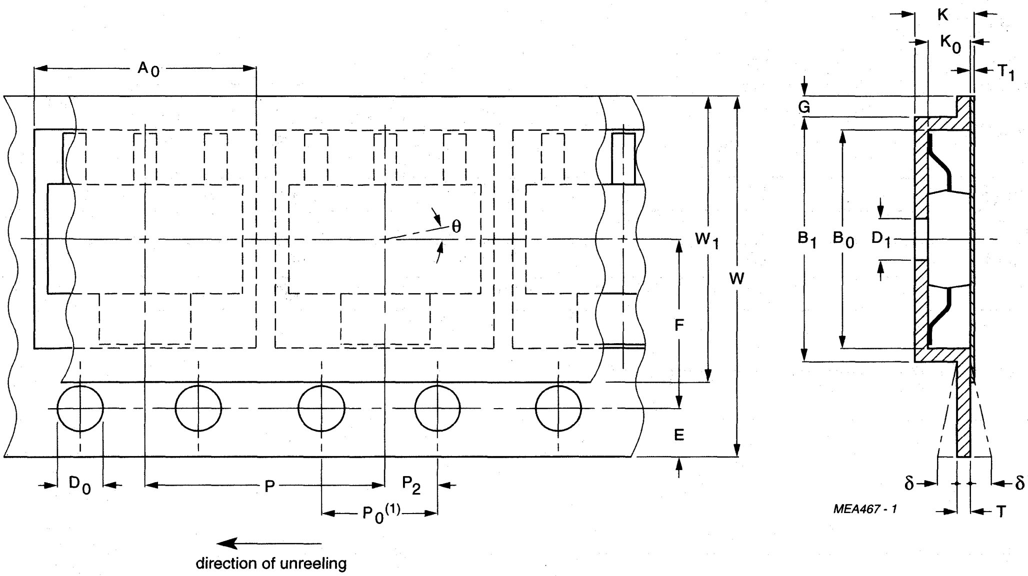
1. 12NC is the Philips twelve-digit ordering code.



For dimensions see Table 2.

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

Fig.1 Specification for 12 mm tape (SOT96).



For dimensions see Table 2.

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

Fig.2 Specification for 12 mm tape (SOT223).

Table 2 Tape dimensions (in mm)

DIMENSION (Figs 1 and 2)	**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.

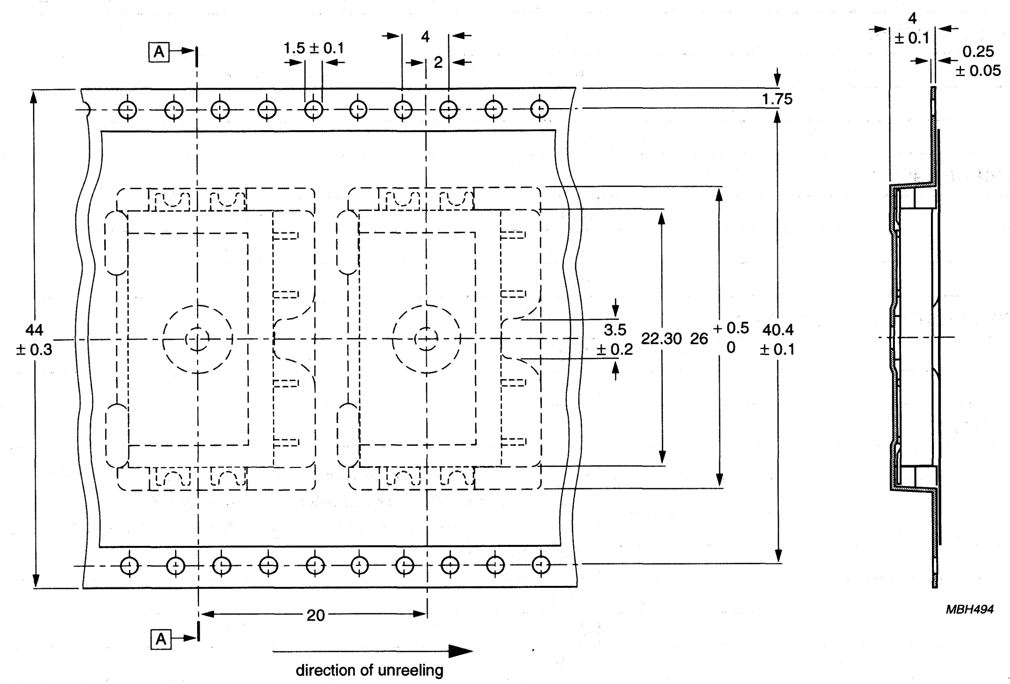


Fig.3 Specification for 40 mm tape (SOT321A).

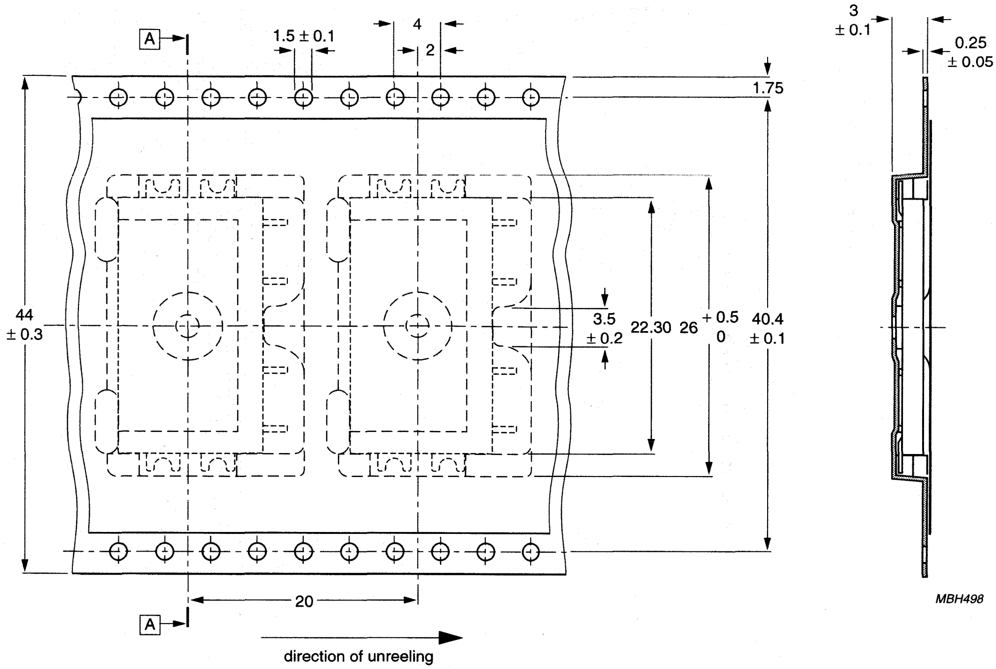
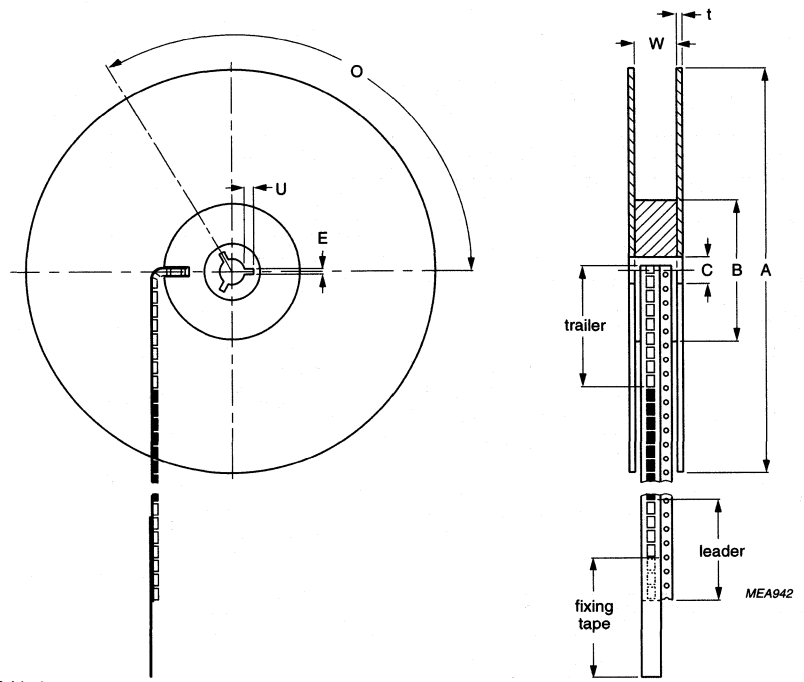


Fig.4 Specification for 40 mm tape (SOT321B).



For dimensions see Table 3.

Fig.5 Reel specification.

Table 3 Reel dimensions (in mm)

DIMENSION (SEE FIG.5)	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).

MOUNTING AND SOLDERING

Introduction

This chapter gives an overview of the mounting and soldering methods which can be applied to the SMD transistors, SMD modules, and the Flange mounted modules, all of which are present in this handbook.

Surface mounting techniques

For SMD transistors reflow soldering is recommended. For the SMD modules only reflow soldering is allowed. Surface mounting techniques are complex and this chapter provides only a simplified overview of the subject.

Reflow soldering

SOLDER PASTE

Most reflow soldering techniques utilize a paste that is a mixture of flux and solder. The solder paste is applied to the substrate before the components are placed. It is of sufficient viscosity to hold the components in place and, therefore, an application of adhesive is not required. Drying of the solder paste by preheating increases the viscosity and prevents any tendency for the components to become displaced during the soldering process. Preheating also minimizes thermal shock and drives off flux solvents.

Screen printing

This is the best high-volume production method of solder paste application. An emulsion-coated, fine mesh screen with apertures etched in the emulsion to coincide with the surfaces to be soldered is placed over the substrate.
A squeegee is passed across the screen to force solder paste through the apertures and on to the substrate. The layer thickness of screened solder paste is usually between 150 and 200 µm.

Stencilling

In this method a stencil with etched holes to pass the paste is used. The thickness of the stencil determines the amount of amount of solder paste that is deposited on the substrate. This method is also suited to high-volume work.

Dispensing

A computer-controlled pressure syringe dispenses small doses of paste to where it is required. This method is mainly suitable for small production runs and laboratory use.

Pin transfer

A pin picks up a droplet of solder paste from a reservoir and transfers it to the surface of the substrate or component. A multi-pin arrangement with pins positioned to match the substrate is possible and this speeds up the process time.

REFLOW TECHNIQUES

Thermal conduction

The prepared substrates are carried on a conveyor belt, first through a preheating stage and then through a soldering stage. Heat is transferred to the substrate by conduction through the belt. Figure 6 shows a theoretical time/temperature relationship for thermal conduction reflow soldering. This method is particularly suited to thick film substrates and is often combined with infrared heating.

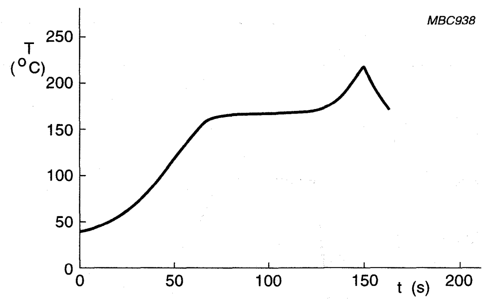


Fig.6 Theoretical time / temperature curve for a typical thermal conductive reflow cycle.

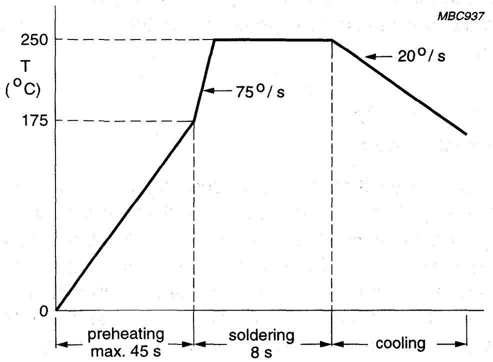


Fig.7 Typical temperature profile of an infrared oven operating at a belt speed of 0.41 mm / min.

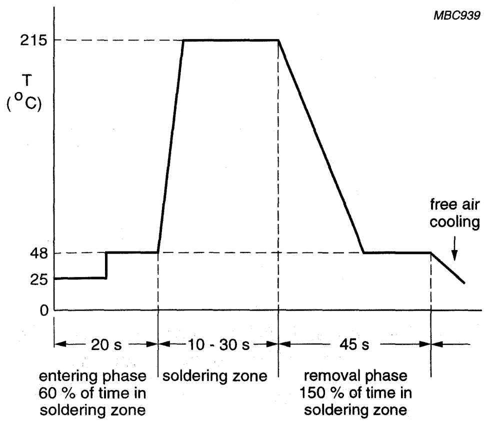


Fig.8 Theoretical time / temperature curve relationship for dual vapour reflow soldering.

Infrared

An infrared oven has several heating elements giving a broad spectrum of infrared radiation, normally above and below a closed loop belt system. There are separate zones for preheating, soldering and cooling. Dwell time in the soldering zone is kept as short as possible to prevent damage to components and substrate. A typical heating profile is shown in Fig.7. This reflow method is often applied in double-sided prints.

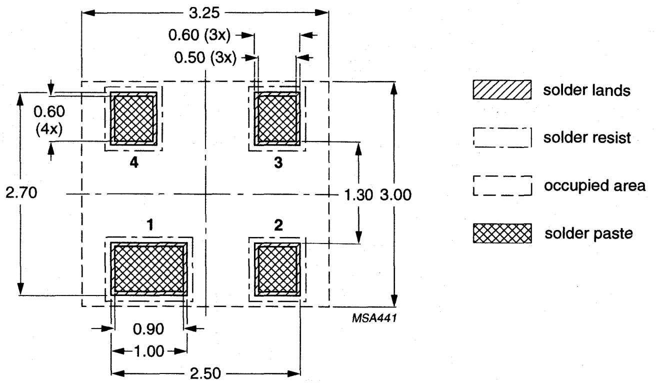
Vapour phase

A substrate is immersed in the vapours of a suitable boiling liquid. The vapours transfer latent heat of condensation to the substrate and solder reflow takes place. Temperature is controlled precisely by the boiling point of the liquid at a given pressure. Some systems employ two vapour zones, one above the other. An elevator tray, suspended from a hoist mechanism passes the substrate vertically through the first vapour zone into the secondary soldering zone and then hoists it out of the vapour to be cooled.
A theoretical time/temperature relationship for this method is shown in Fig.8.

SMD transistors

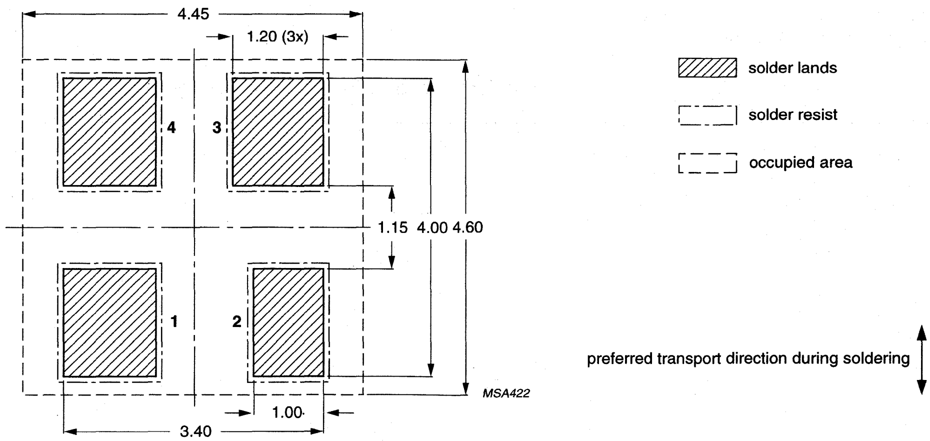
Soldering footprints for SMD transistors included in this handbook are as follows:

SOT143/SOT143R FOOTPRINTS



Dimensions in mm.
Placement accuracy: ±0.25 mm.

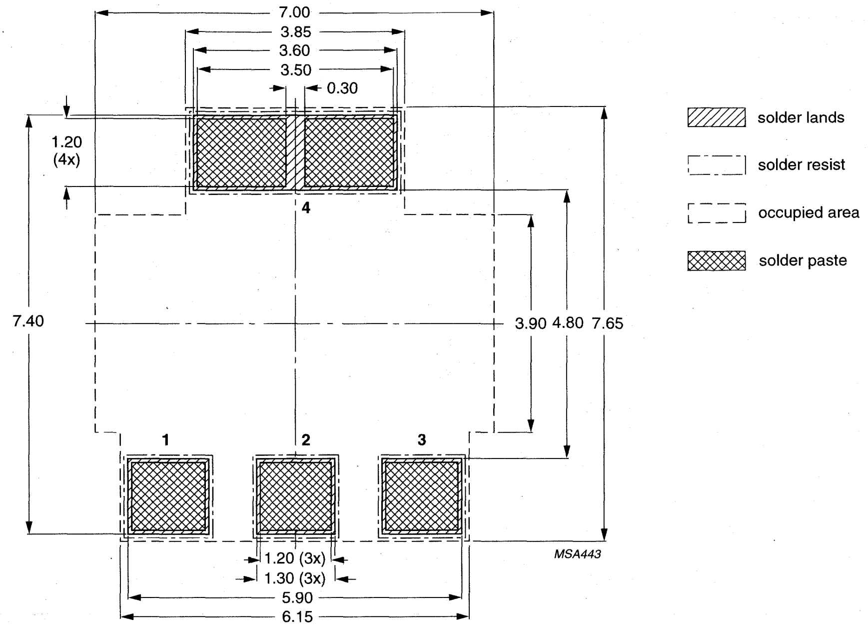
Fig.9 Reflow soldering footprint for SOT143; typical dimensions.



Dimensions in mm.
Placement accuracy: ±0.25 mm.

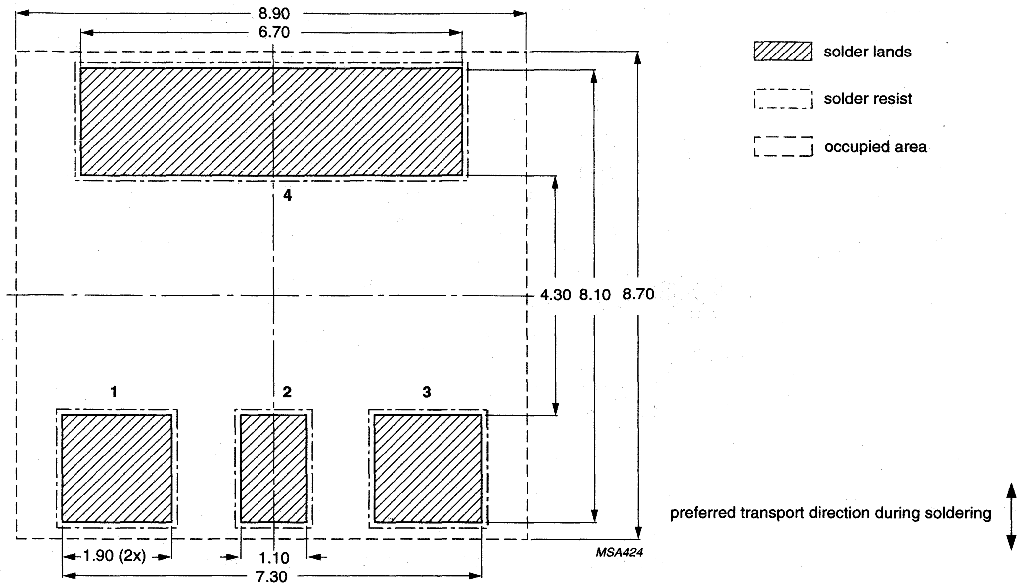
Fig.10 Wave soldering footprint for SOT143; typical dimensions.

SOT223 FOOTPRINTS



Dimensions in mm.
Placement accuracy: ±0.25 mm.

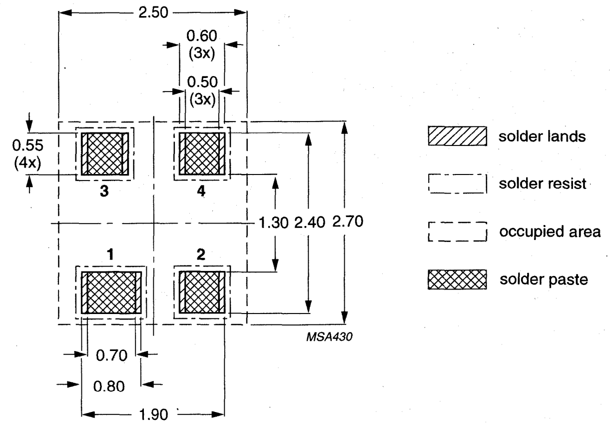
Fig.11 Reflow soldering footprint for SOT223; typical dimensions.



Dimensions in mm.
Placement accuracy: ±0.25 mm.

Fig.12 Wave soldering footprint for SOT223; typical dimensions.

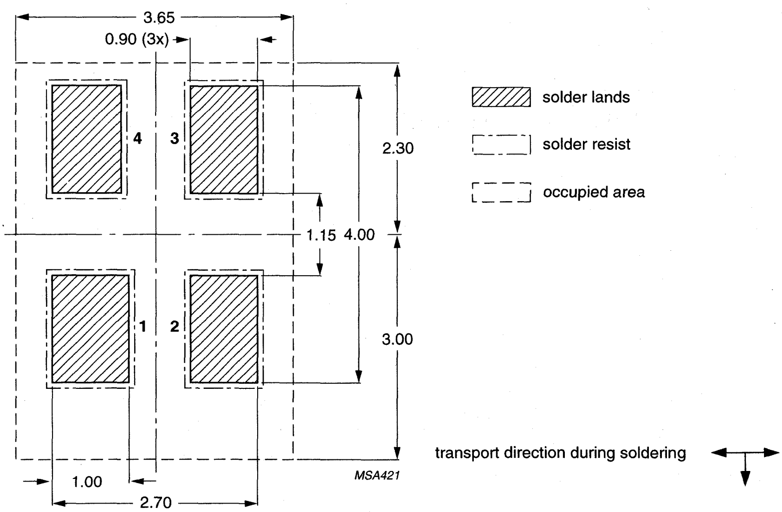
SOT343 FOOTPRINTS



Dimensions in mm.

Placement accuracy: ±0.25 mm.

Fig.13 Reflow soldering footprint for SOT343; typical dimensions.

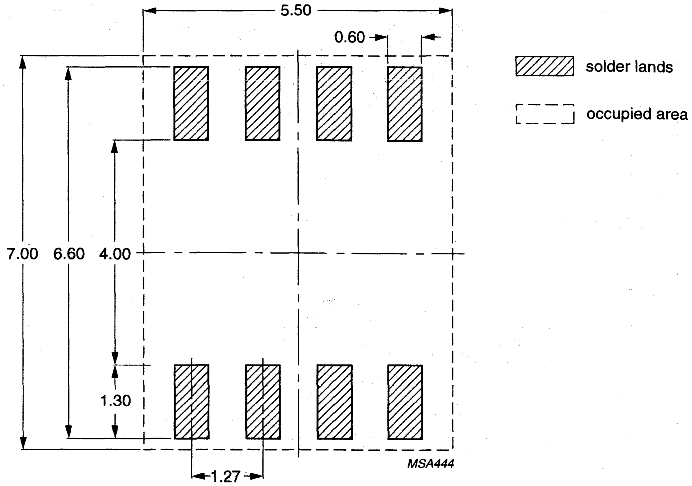


Dimensions in mm.

Placement accuracy: ±0.25 mm.

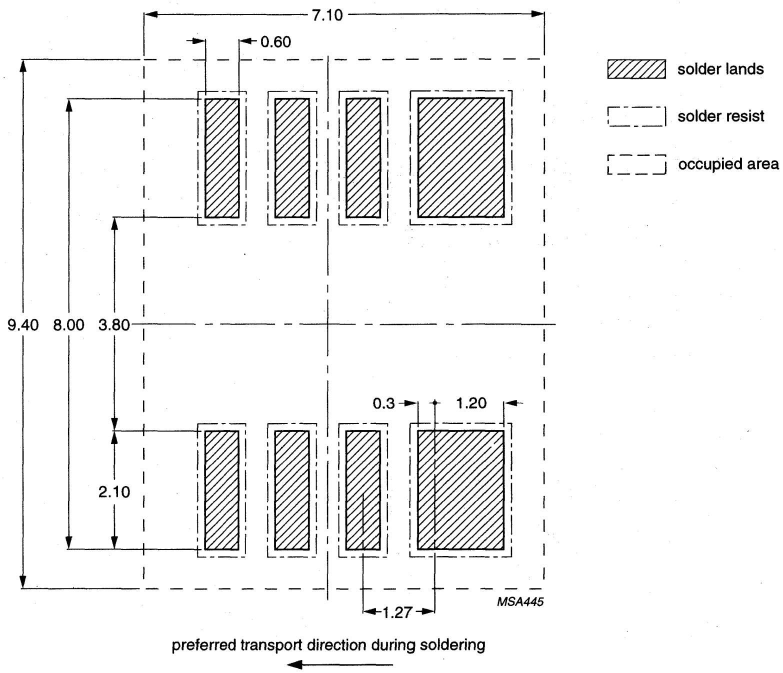
Fig.14 Wave soldering footprint for SOT343; typical dimensions.

SOT96 (SO8) FOOTPRINTS



Dimensions in mm.
Placement accuracy: ±0.25 mm.

Fig.15 Reflow soldering footprint for SOT96 (SO8); typical dimensions.



Dimensions in mm.

Placement accuracy: ±0.25 mm.

Fig.16 Wave soldering footprint for SOT96 (SO8); typical dimensions.

SOLDERING OF SMD MODULES

SMD modules can be soldered by using the reflow technique. Wave soldering is not allowed for SMD modules. Conditions for reflow soldering are as follows:

The indicated temperatures are those at the solder interfaces.

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

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

Footprints for soldering should cover the module contact area +0.1 mm on all sides.

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

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 soldering times at different temperatures are indicated as follows:

At 100 °C, t = 350 s

At 125 °C, t = 300 s

At 150 °C, t = 200 s

At 175 °C, t = 100 s

At 200 °C, t = 50 s

At 250 °C (maximum temperature), t = 5 s.

A soldering curve is shown in Fig.17:

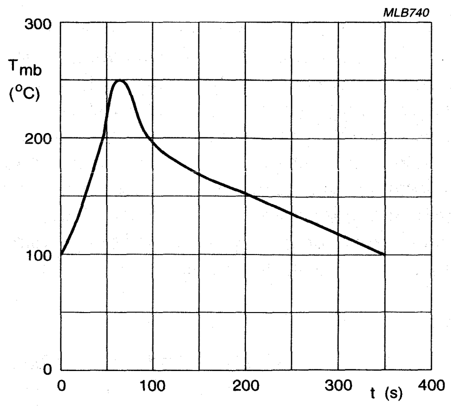


Fig.17 Maximum allowable temperature profile.

Cleaning

The following may be used for cleaning:

- Alcohol
- Bio-Act (Terpene Hydrocarbon)
- Triclean B/S
- Acetone.

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

MOUNTING OF FLANGE MOUNTED MODULES

General

The modules 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 module

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.

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 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.

CAUTION

Under no circumstances must the maximum specified operating or storage temperatures be exceeded, even for short periods.

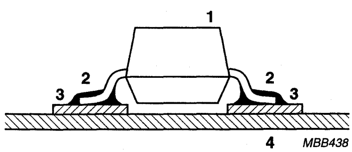
THERMAL CONSIDERATIONS

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.18 (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.



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

Fig.18 Heat losses.

The elements of thermal resistance shown in Fig.19 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
- $R_{th\ s\text{-}a}$ thermal resistance from soldering point to ambient
- $R_{th\ c\text{-}a}$ thermal resistance from case to ambient ($R_{th\ s\text{-}a}$ and $R_{th\ c\text{-}a}$ are the same for most packages)
- $R_{th\ j\text{-}a}$ thermal resistance from junction to ambient.

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.

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. 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 $T_j = T_{solder} + P_{tot} \times R_{th\ j\text{-}s}$.

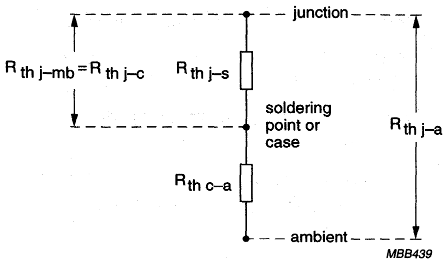


Fig.19 Representation of thermal resistance paths of a device mounted on a substrate or printed board.

DEVICE DATA

In alphanumeric sequence

UHF power transistor — BFG10W/X

FEATURES

- High efficiency
- Small size discrete power amplifier
- 900 MHz and 1.9 GHz operating areas
- Gold metallization ensures excellent reliability.

APPLICATIONS

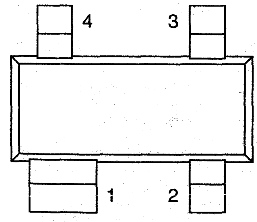
- Common emitter class-AB operation in hand-held radio equipment up to 1.9 GHz.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a plastic, 4-pin dual-emitter SOT343 package.

PINNING

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter



Marking code: T5.

Fig.1 SOT343.

QUICK REFERENCE DATA

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

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (mW)	G_p (dB)	η_c (%)
Pulsed, class-AB, duty cycle: < 1 : 2; t_p = 10 ms	1.9	3.6	200	≥5	≥50
Pulsed, class-AB, duty cycle: < 1 : 8; t_p = 4.6 ms	0.9	6	650	≥10	≥50
	0.9	6	360	≥12.5	≥50

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	–	2.5	V
I_C	collector current (DC)		–	250	mA
$I_{C(AV)}$	average collector current		–	250	mA
P_{tot}	total power dissipation	up to T_s = 102 °C; note 1	–	400	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	175	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	up to T_s = 102 °C; note 1; P_{tot} = 400 mW	180	K/W

Note to the Limiting values and Thermal characteristics

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 = 0.1 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 = 0.1 mA	2.5	–	V
I_{CES}	collector cut-off current	V_{CE} = 6 V; V_{BE} = 0	–	100	μA
h_{FE}	DC current gain	I_C = 50 mA; V_{CE} = 5 V	25	–	
C_c	collector capacitance	$I_E = i_e$ = 0; V_{CB} = 6 V; f = 1 MHz	–	3	pF
C_{re}	feedback capacitance	I_C = 0; V_{CE} = 6 V; f = 1 MHz	–	2	pF

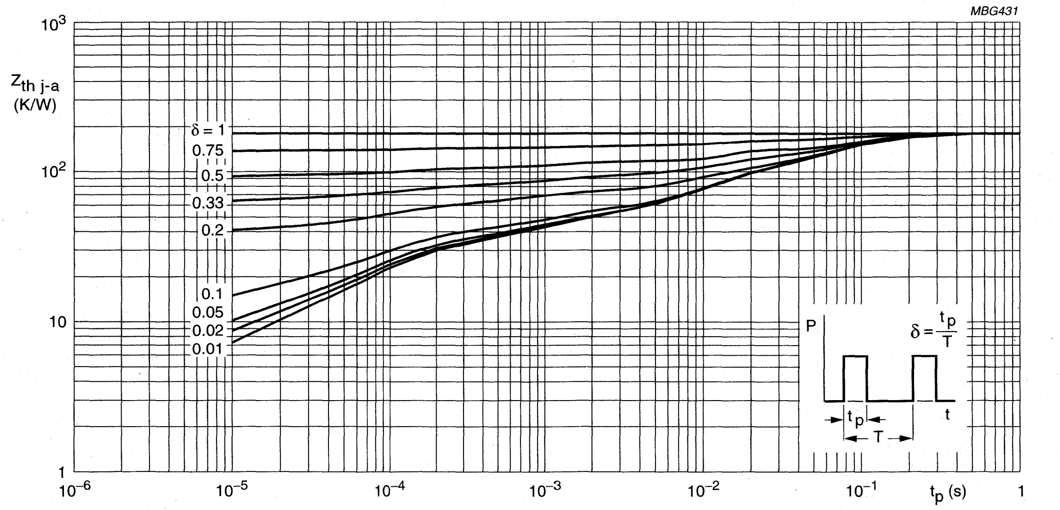


Fig.2 Transient thermal impedance from junction to soldering point as a function of pulse time; typical values.

UHF power transistor BFG10W/X

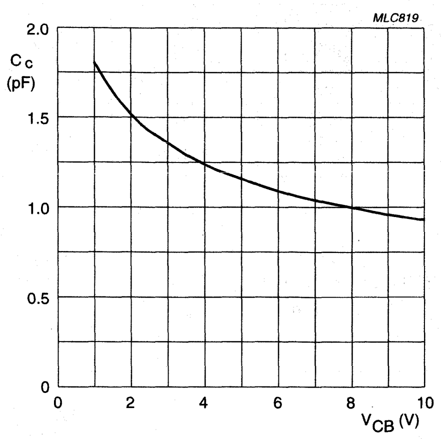


Fig.3 Collector capacitance as a function of collector-base voltage.

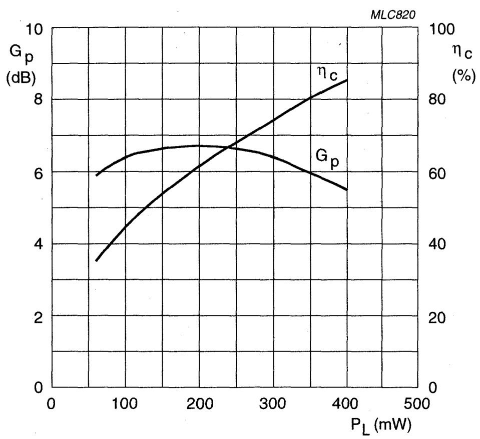
APPLICATION INFORMATION

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

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (mW)	G_p (dB)	η_c (%)
Pulsed, class-AB, duty cycle: < 1 : 2; t_p = 10 ms	1.9	3.6	200	≥5; typ. 7	≥50; typ. 60
Pulsed, class-AB, duty cycle: < 1 : 8; t_p = 5 ms	0.9	6	650	≥10	≥50
	0.9	6	360	≥12.5	≥50

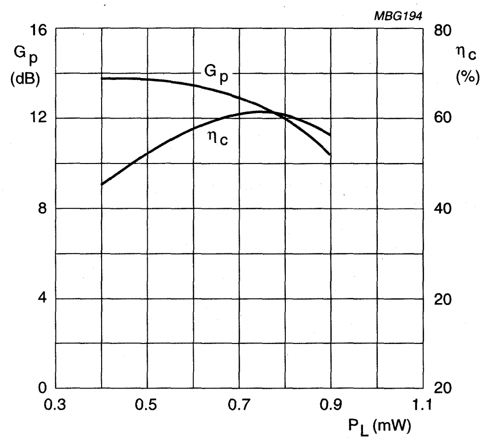
Ruggedness in class-AB operation

The BFG10W/X is capable of withstanding a load mismatch corresponding to VSWR = 6 : 1 through all phases under pulsed conditions up to a supply voltage of 8.6 V under the conditions: 900 MHz; 650 mW; t_p = 4.6 ms; duty cycle of 1 : 8 and up to a supply voltage of 5.5 V under the conditions: 1.9 GHz; 200 mW; t_p = 10 ms; duty cycle of 1 : 2.



Pulsed, class-AB operation.
V_{CE} = 3.6 V; f = 1.9 GHz; duty cycle < 1 : 2.
Circuit optimized for P_L = 200 mW.

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



Pulsed, class-AB operation.
V_{CE} = 6 V; f = 900 MHz; duty cycle < 1 : 8.
Circuit optimized for P_L = 600 mW.

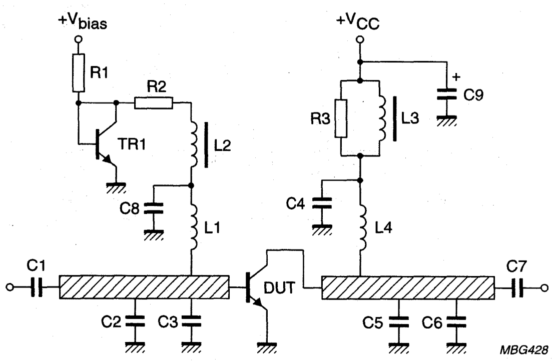
Fig.5 Power gain and efficiency as functions of load power; typical values.

List of components (see Fig.6)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
TR1	bias transistor, BC548 or equivalent	note 1		
C1, C4, C7	capacitor; notes 2 and 3	120 pF		
C2	capacitor; note 2	6.8 pF		
C3	capacitor; note 2	0.5 pF		
C5	capacitor; note 2	1.2 pF		
C6	capacitor; note 2	1.9 pF		
C8	Philips multilayer capacitor	1 nF, 10 V		
C9	Philips capacitor	1500 μF, 10 V		2222 032 14152
L1	6 turns enamelled 0.7 mm copper wire		length 3.5 mm	
L4	2 turns enamelled 0.7 mm copper wire		length 3 mm	
L2, L3	RF choke, Philips			4312 020 36690
R1	metal film resistor	275 Ω		
R2	metal film resistor	100 Ω		
R3	metal film resistor	10 Ω		

Notes

1. V_{BE} at 1 mA must be 0.65 V.
2. American Technical Ceramics type 100A or capacitor of same quality.
3. Resonant at 1900 MHz.



PCB RT5880, thickness 0.79 mm.

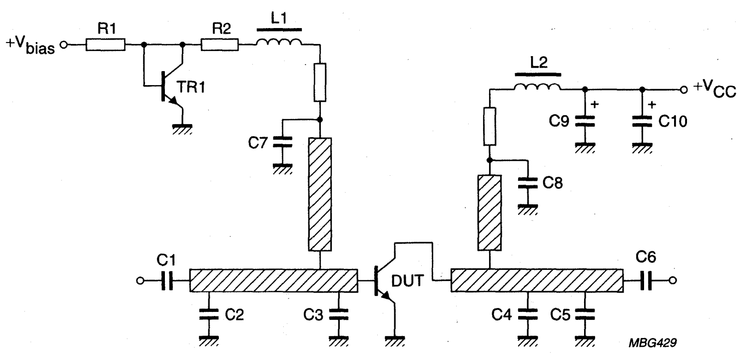
Fig.6 Class-AB test circuit at f = 900 MHz.

List of components (see Fig.6)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
TR1	bias transistor, BC548 or equivalent	note 1		
C1, C6, C7, C8	capacitor; notes 2 and 3	24 pF		
C2	capacitor; note 2	0.4 pF		
C3	capacitor; note 2	2.4 pF		
C4	capacitor; note 2	0.5 pF		
C5	capacitor; note 2	1.2 pF		
C9, C10	Philips capacitor	1500 μF, 10 V		2222 032 14152
L1, L2	RF choke, Philips			4330 030 36301
R1, R2	metal film resistor	75 Ω		
R3, R4	metal film resistor	10 Ω		

Notes

1. V_{BE} at 1 mA must be 0.65 V.
2. American Technical Ceramics type 100A or capacitor of same quality.
3. Resonant at 1900 MHz.



PCB RT5880, thickness 0.79 mm.

Fig.7 Class-AB test circuit at f = 1.9 GHz.

NPN 2 GHz power transistor BFG11W/X

FEATURES

- High power gain
- High efficiency
- Small size discrete power amplifier
- 1.9 GHz operating area
- Gold metallization ensures excellent reliability
- Linear and non-linear operation.

APPLICATIONS

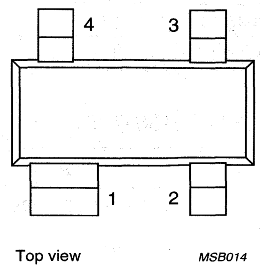
- Common emitter class-AB operation in handheld radio equipment at 1.9 GHz such as DECT, PHS.
- Driver for DCS 1800.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a plastic 4-pin dual-emitter SOT343 package.

PINNING - SOT343

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter



Marking code: S4

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 (GHz)	V_{CE} (V)	P_L (mW)	G_p (dB)	η_c (%)
Pulsed, class-AB, $\delta < 1:2$; $t_p = 5$ ms	1.9	3.6	400	≥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	–	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 = 60 °C; note 1	–	760	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	175	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	up to T_s = 60 °C; P_{tot} = 760 mW; note 1	150	K/W

Note to the Limiting values and Thermal characteristics

1. T_s is the temperature at the soldering point of the collector tab.

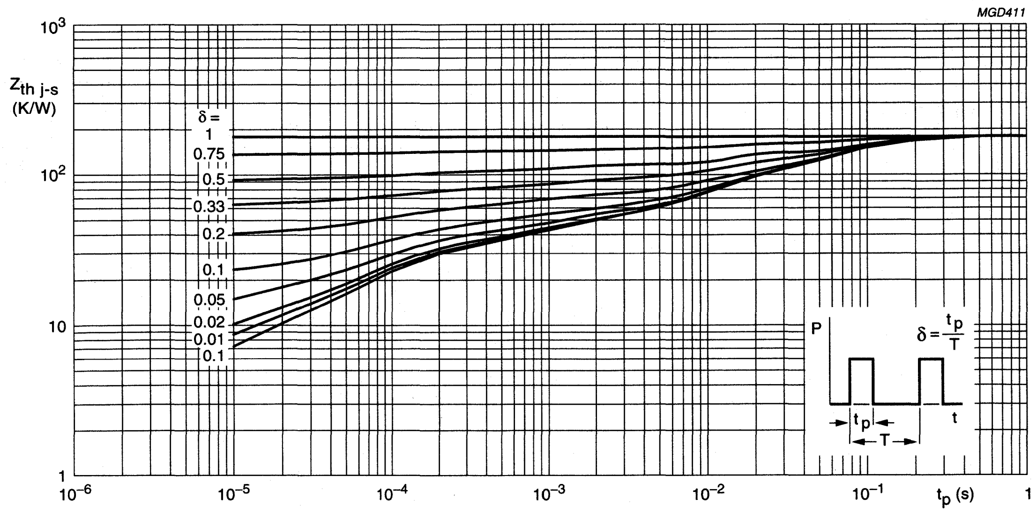


Fig.2 Transient thermal impedance from junction to soldering point as a function of pulse time; typical values.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 0.1 mA; open emitter	20	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 10 mA; open base	8	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 0.1 mA; open collector	2.5	–	V
I_{CES}	collector cut-off 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} = 3.6 V; $I_E = i_e$ = 0; f = 1 MHz	–	5	pF
C_{re}	feedback capacitance	V_{CE} = 3.6 V; I_C = 0; f = 1 MHz	–	4	pF

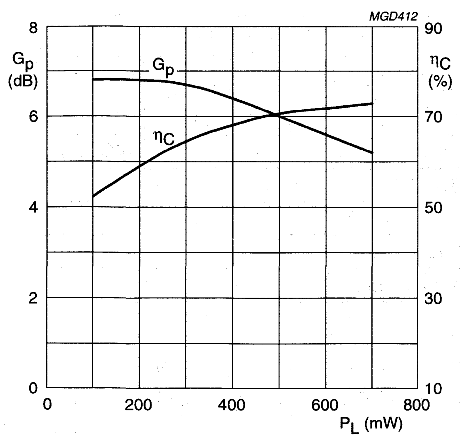
APPLICATION INFORMATION

RF performance at $T_s \leq 60$ °C in a common-emitter test circuit.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (mW)	G_p (dB)	η_c (%)
Pulsed, class-AB, $\delta < 1:2$; t_p = 5 ms	1.9	3.6	1	400	≥6	≥60

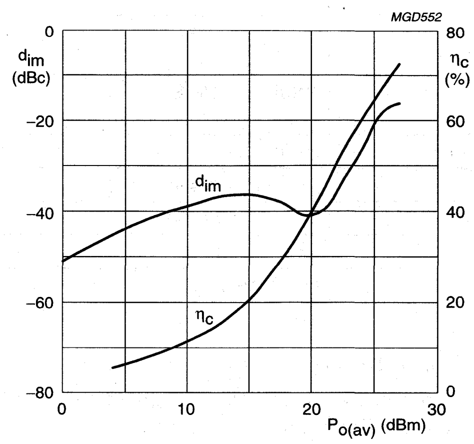
Ruggedness in class-AB operation

The transistors are capable of withstanding a load mismatch corresponding to VSWR = 8 : 1 through all phases, at rated output power under pulsed conditions at f = 1.9 GHz: t_p = 1.25 ms, δ = 1 : 8 at V_{CE} = 7 V and t_p = 5 ms, δ = 1 : 2 at V_{CE} = 4.5 V.



V_{CE} = 3.6 V; V_{BE} = 0.65 V; f = 1.9 GHz; $\delta < 1:8$; t_p = 1.25 ms.

Fig.3 Power gain and efficiency as functions of load power; typical values.



V_{CE} = 3.6 V; $I_{c\varphi}$ = 1 mA; f_1 = 1990.0 MHz; f_2 = 1990.1 MHz; δ = 1 : 8; t_p = 625 μs.

Fig.4 Two tone intermodulation distortion and efficiency as functions of average output power; typical values.

List of components used in test circuit (see Figs 5 and 6)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C8, C9, C10	multilayer ceramic chip capacitor; note 1	24 pF		
C2, C3	multilayer ceramic chip capacitor; note 1	2 pF		
C4	multilayer ceramic chip capacitor; note 1	1.2 pF		
C5	multilayer ceramic chip capacitor; note 1	0.2 pF		
C6, C7,	multilayer ceramic chip capacitor; note 1	1.3 pF		
C11, C12, C13	multilayer ceramic chip capacitor; note 1	10 nF		
C14, C15	electrolytic capacitor	470 μF; 10 V		2222 032 14152
L1	stripline; note 2		length 22.5 mm width 0.9 mm	
L2	stripline; note 2		length 6 mm width 0.9 mm	
L3	stripline; note 2		length 1 mm width 0.9 mm	
L4	stripline; note 2		length 2.5 mm width 0.9 mm	
L5	stripline; note 2		length 4.5 mm width 0.9 mm	
L6	stripline; note 2		length 24.5 mm width 0.9 mm	
L7	stripline; note 2		length 20 mm width 0.9 mm	
L8	stripline; note 2		length 10.5 mm width 0.9 mm	
L9	stripline; note 2		length 4.4 mm width 0.4 mm	
L10	stripline; note 2		length 19.7 mm width 0.4 mm	
L11, L12	RF choke	1 μH		4330 030 36301
R1	metal film resistor	78.7 Ω; 0.4 W		
R2	metal film resistor	38.3 Ω; 0.4 W		
R3	metal film resistor	10 Ω; 0.4 W		
T1	bias transistor	BC548; note 3		

Notes

1. American Technical Ceramics (ATC) capacitor, type 100A or other capacitor of the same quality.
2. The striplines are on a double copper-clad printed-circuit board with PTFE fibre-glass dielectric $\varepsilon_r = 6.15$; $\tan \delta = 0.0019$; thickness = 0.64 mm; copper cladding = 35 μm.
3. Or equivalent ($V_{BE} = 0.65$ V at $T_{amb} = 25$ °C).

NPN 2 GHz power transistor

BFG11W/X

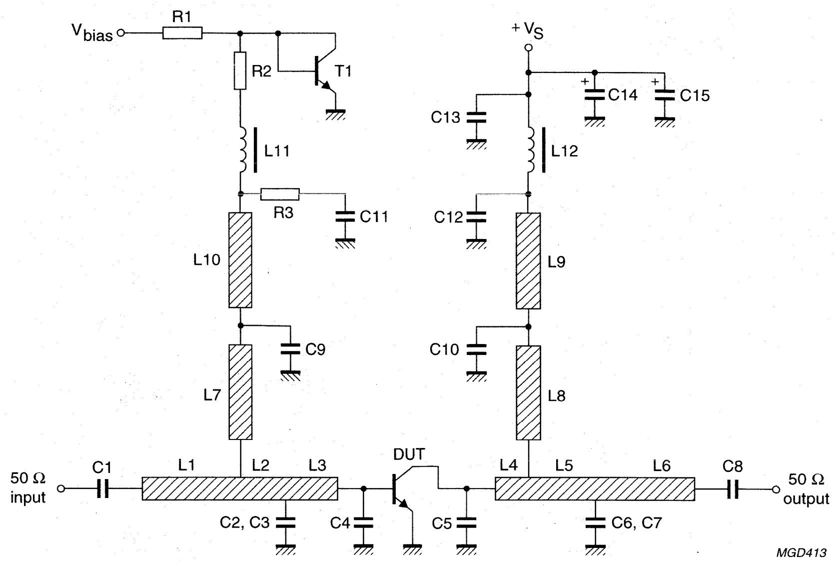
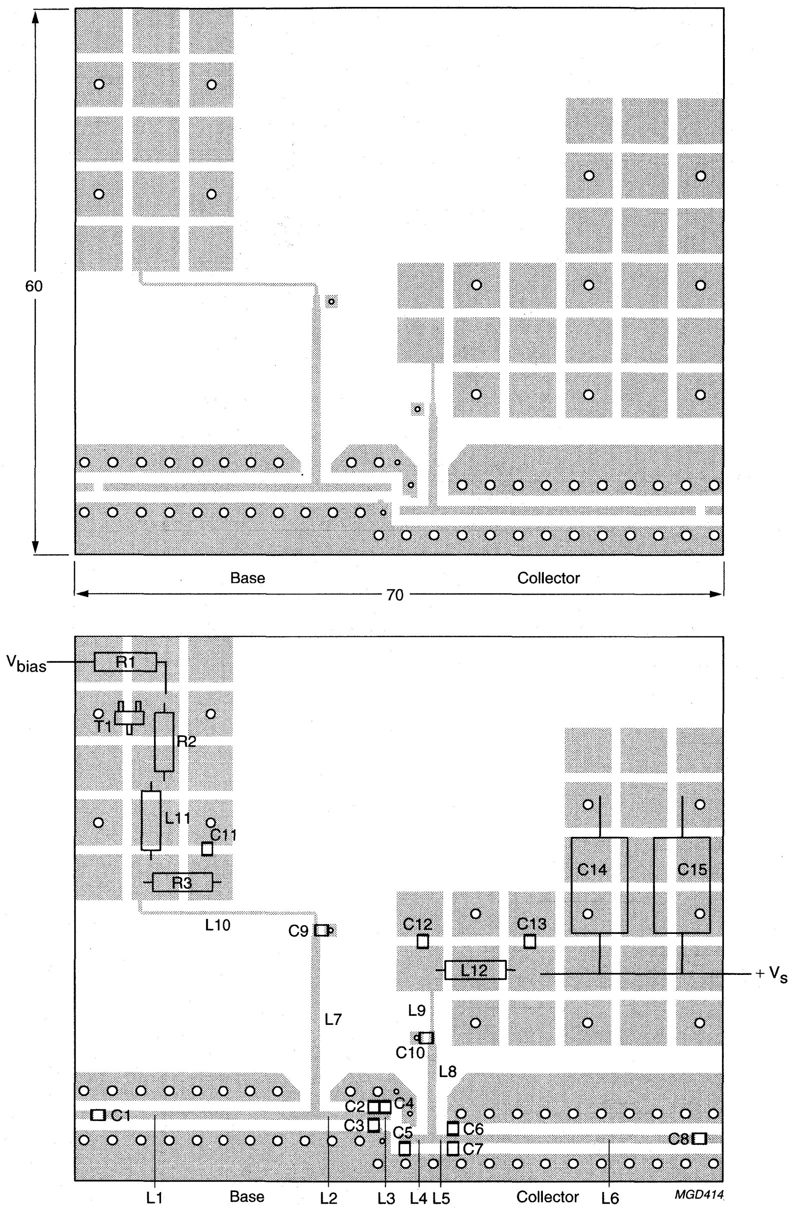
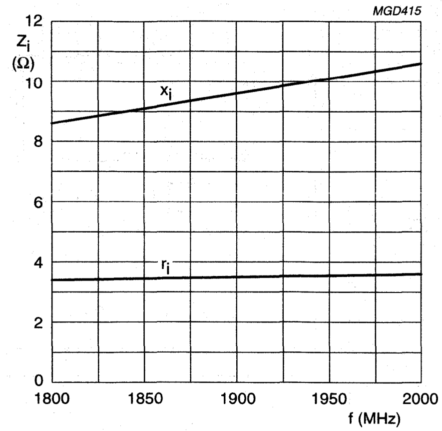


Fig.5 Common-emitter test circuit for class-AB operation at 1.9 GHz.



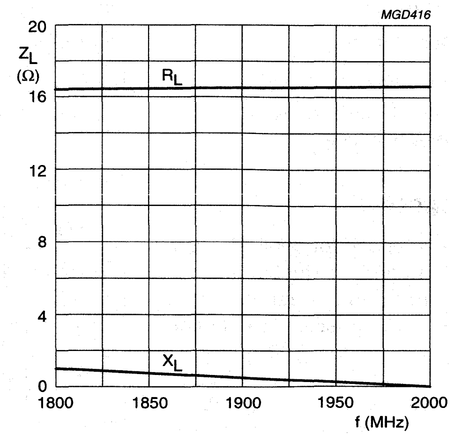
Dimensions in mm.

Fig.6 Component layout for common-emitter test circuit.



V_{CE} = 3.6 V; V_{BE} = 0.65 V; P_L = 400 mW.

Fig.7 Input impedance as a function of frequency (series components), typical values.



V_{CE} = 3.6 V; V_{BE} = 0.65 V; P_L = 400 mW.

Fig.8 Load impedance as a function of frequency (series components), typical values.

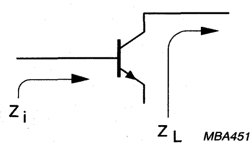


Fig.9 Definition of transistor impedance.

NPN 9 GHz wideband transistor

BFG520W; BFG520W/X; BFG520W/XR

FEATURES

- High power gain
- Low noise figure
- High transition frequency
- Gold metallization ensures excellent reliability.

APPLICATIONS

They are intended for applications in the RF front end, in wideband applications in the GHz range such as analog and digital cellular telephones, cordless telephones (CT2, CT3, PCN, DECT, etc.), radar detectors, pagers, satellite television tuners (SATV) and repeater amplifiers in fibre-optic systems.

DESCRIPTION

NPN silicon planar epitaxial transistors in plastic, 4-pin dual-emitter SOT343 and SOT343R packages.

MARKING

TYPE NUMBER	CODE
BFG520W	N3
BFG520W/X	N4
BFG520W/XR	N5

PINNING

PIN	DESCRIPTION
BFG520W (see Fig.1)	
1	collector
2	base
3	emitter
4	emitter
BFG520W/X (see Fig.1)	
1	collector
2	emitter
3	base
4	emitter
BFG520W/XR (see Fig.2)	
1	collector
2	emitter
3	base
4	emitter

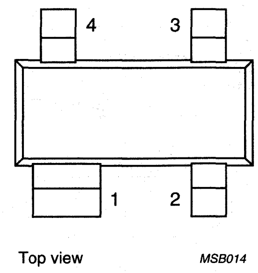


Fig.1 SOT343.

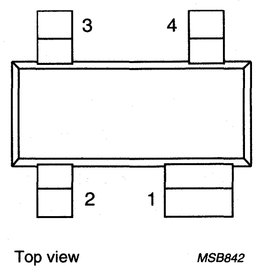


Fig.2 SOT343R.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–	20	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	–	15	V
I_C	collector current (DC)		–	–	70	mA
P_{tot}	total power dissipation	up to $T_s = 85$ °C	–	–	500	mW
h_{FE}	DC current gain	$I_C = 20$ mA; $V_{CE} = 6$ V	60	120	250	
C_{re}	feedback capacitance	$I_C = 0$; $V_{CB} = 6$ V; f = 1 MHz	–	0.35	–	pF
f_T	transition frequency	$I_C = 20$ mA; $V_{CE} = 6$ V; f = 1 GHz; $T_{amb} = 25$ °C	–	9	–	GHz
G_{UM}	maximum unilateral power gain	$I_C = 20$ mA; $V_{CE} = 6$ V; f = 900 MHz; $T_{amb} = 25$ °C	–	17	–	dB
$\lvert s_{21}\rvert^2$	insertion power gain	$I_C = 20$ mA; $V_{CE} = 6$ V; f = 900 MHz; $T_{amb} = 25$ °C	16	17	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}$; $I_C = 5$ mA; $V_{CE} = 6$ V; f = 900 MHz	–	1.1	1.6	dB

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_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	70	mA
P_{tot}	total power dissipation	up to T_s = 85 °C; see Fig.3; note 1	–	500	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	175	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	up to T_s = 85 °C; note 1	180	K/W

Note to the "Limiting values" and "Thermal characteristics"

1. T_s is the temperature at the soldering point of the collector pin.

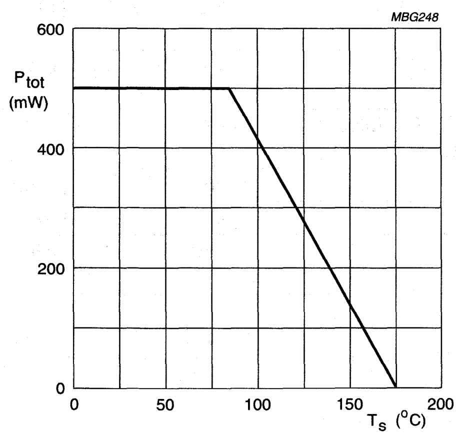


Fig.3 Power derating curve.

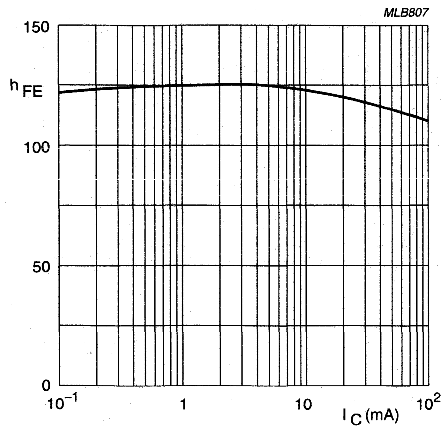
CHARACTERISTICS

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 =10 μA; I_E = 0	20	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	R_{BE} = 0; I_C = 10 μA	15	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 10 μA; I_C = 0	2.5	–	–	V
I_{CBO}	collector cut-off current	open emitter; V_{CB} = 6 V; I_E = 0	–	–	50	nA
h_{FE}	DC current gain	I_C = 20 mA; V_{CE} = 6 V	60	120	250	
C_{re}	feedback capacitance	I_C = 0; V_{CB} = 6 V; f = 1 MHz	–	0.35	–	pF
f_T	transition frequency	I_C = 20 mA; V_{CE} = 6 V; f = 1 GHz; T_{amb} = 25 °C	–	9	–	GHz
G_{UM}	maximum unilateral power gain; note 1	I_C = 20 mA; V_{CE} = 6 V; f = 900 MHz; T_{amb} = 25 °C	–	17	–	dB
		I_C = 20 mA; V_{CE} = 6 V; f = 2 GHz; T_{amb} = 25 °C	–	11	–	dB
$\|s_{21}\|^2$	insertion power gain	I_C = 20 mA; V_{CE} = 6 V; f = 900 MHz; T_{amb} = 25 °C	16	17	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}$; I_C = 5 mA; V_{CE} = 6 V; f = 900 MHz	–	1.1	1.6	dB
		$\Gamma_s = \Gamma_{opt}$; I_C = 20 mA; V_{CE} = 6 V; f = 900 MHz	–	1.6	2.1	dB
		$\Gamma_s = \Gamma_{opt}$; I_C = 5 mA; V_{CE} = 6 V; f = 2 GHz	–	1.85	–	dB
P_{L1}	output power at 1 dB gain compression	I_C = 20 mA; V_{CE} = 6 V; f = 900 MHz; R_L = 50 Ω; T_{amb} = 25 °C	–	17	–	dBm
ITO	third order intercept point	note 2	–	26	–	dBm
V_o	output voltage	note 3	–	275	–	mV
d_2	second order intermodulation distortion	note 4	–	–50	–	dB

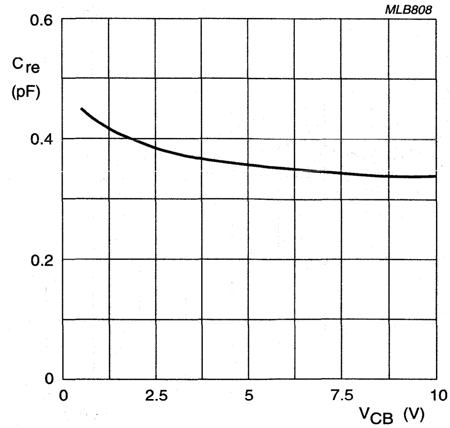
Notes

1. G_{UM} is the maximum unilateral power gain, assuming s_{12} is zero. $G_{UM} = 10\log\frac{|s_{21}|^2}{(1-|s_{11}|^2)(1-|s_{22}|^2)}$ dB.
2. I_C = 20 mA; V_{CE} = 6 V; R_L = 50 Ω; T_{amb} = 25 °C;
   f_p = 900 MHz; f_q = 902 MHz; measured at $f_{(2p-q)}$ = 898 MHz and $f_{(2q-p)}$ = 904 MHz.
3. d_{im} = –60 dB (DIN45004B); I_C = 20 mA; V_{CE} = 6 V; $V_p = V_o$; $V_q = V_o$ –6 dB; $V_r = V_o$ –6 dB; R_L = 75 Ω;
   f_p = 795.25 MHz; f_q = 803.25 MHz; f_r = 805.25 MHz; measured at $f_{(p+q-r)}$ = 793.25 MHz.
4. I_C = 20 mA; V_{CE} = 6 V; V_o = 75 mV; R_L = 75 Ω; T_{amb} = 25 °C;
   f_p = 250 MHz; f_q = 560 MHz; measured at $f_{(p+q)}$ = 810 MHz.



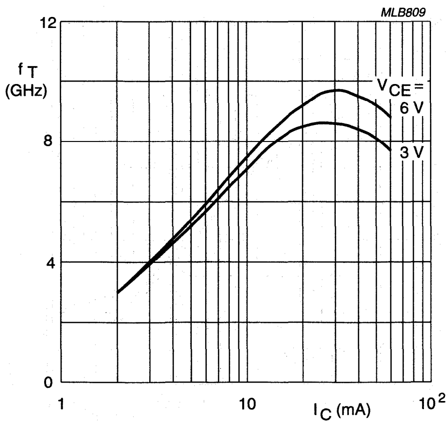
V_{CE} = 6 V.

Fig.4 DC current gain as a function of collector current; typical values.



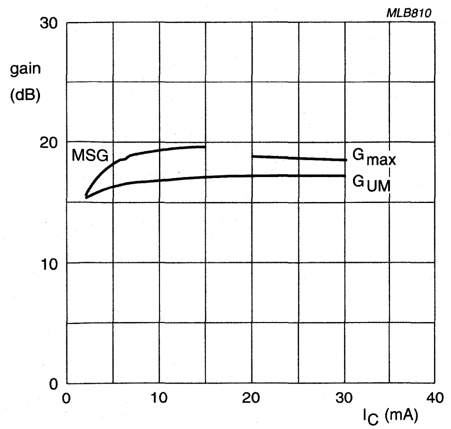
I_C = 0; f = 1 MHz.

Fig.5 Feedback capacitance as a function of collector-base voltage; typical values.



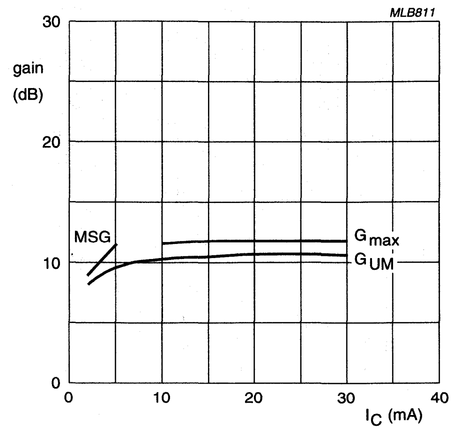
f = 1 GHz; T_{amb} = 25 °C.

Fig.6 Transition frequency as a function of collector current; typical values.



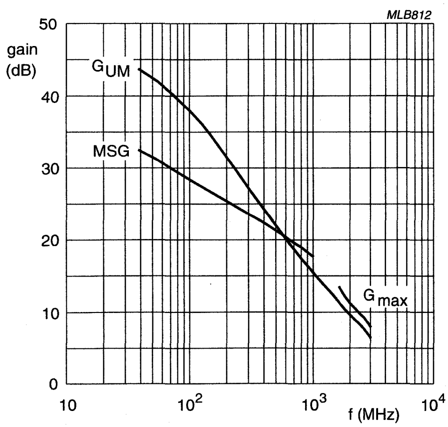
f = 900 MHz; V_{CE} = 6 V.

Fig.7 Gain as a function of collector current; typical values.



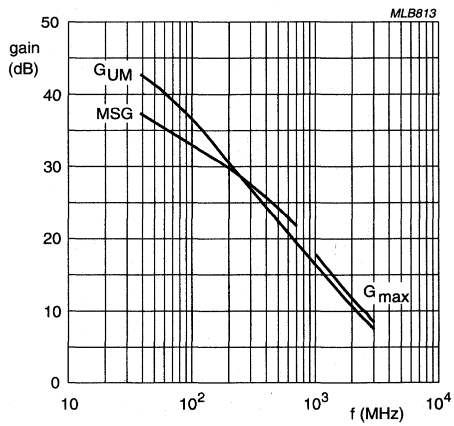
f = 2 GHz; V_{CE} = 6 V.

Fig.8 Gain as a function of collector current; typical values.



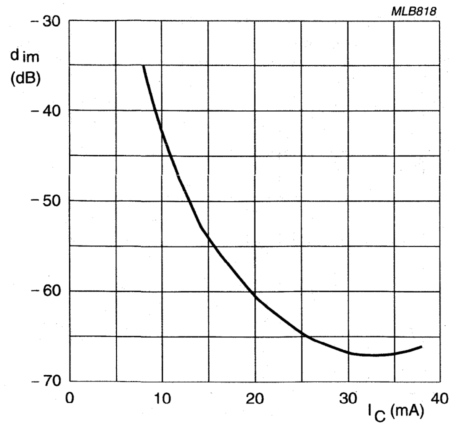
I_C = 5 mA; V_{CE} = 6 V.

Fig.9 Gain as a function of frequency; typical values.



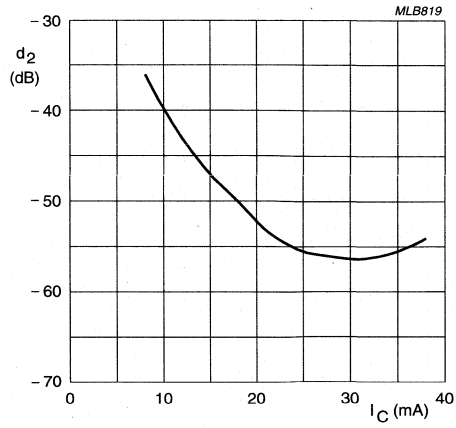
I_C = 20 mA; V_{CE} = 6 V.

Fig.10 Gain as a function of frequency; typical values.



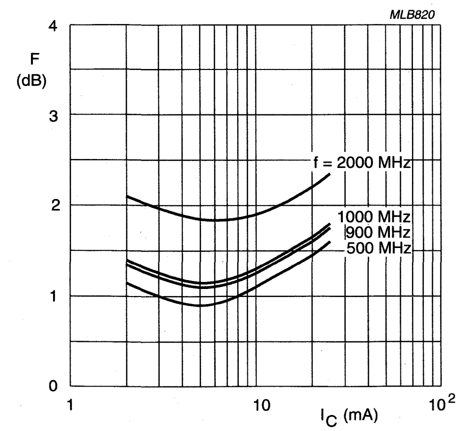
V_o = 275 mV; $f_{(p+q-r)}$ = 793.25 MHz; V_{CE} = 6 V; R_L = 75 Ω; T_{amb} = 25 °C.

Fig.11 Intermodulation distortion as a function of collector current; typical values.



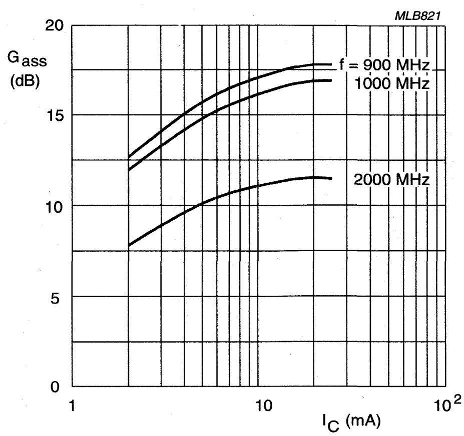
V_o = 75 mV; $f_{(p+q)}$ = 810 MHz; V_{CE} = 6 V; R_L = 75 Ω; T_{amb} = 25 °C.

Fig.12 Second order intermodulation distortion as a function of collector current; typical values.



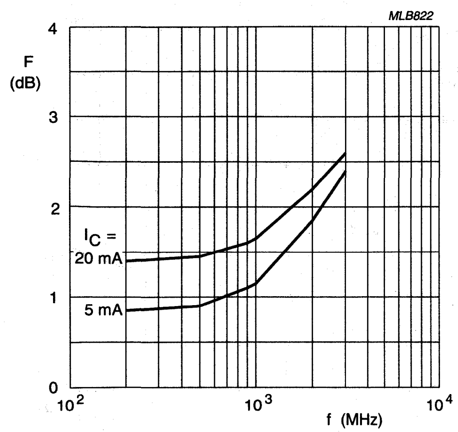
V_{CE} = 6 V.

Fig.13 Minimum noise figure as a function of collector current; typical values.



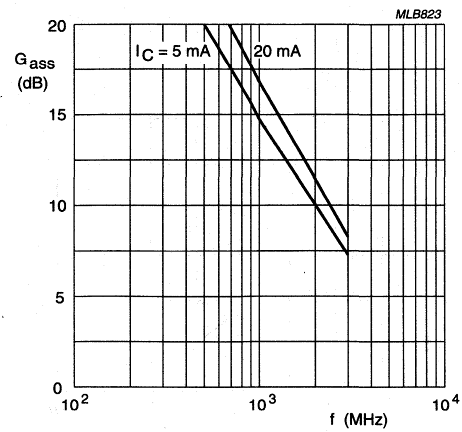
V_{CE} = 6 V.

Fig.14 Associated available gain as a function of collector current; typical values.



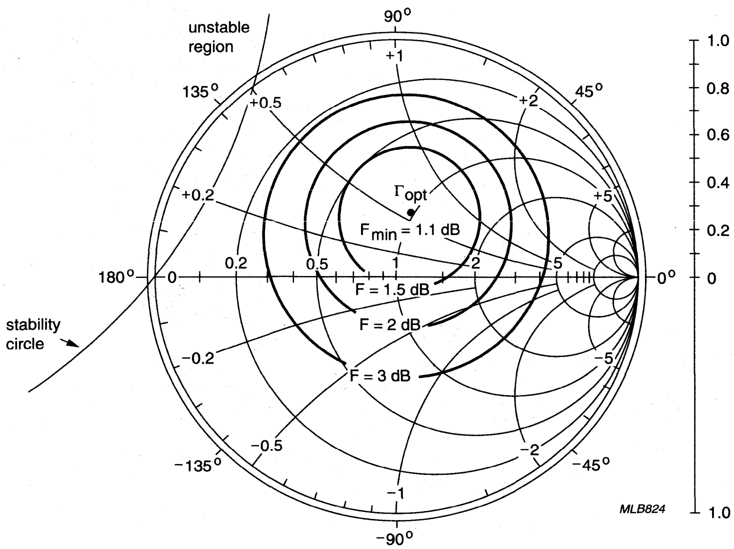
V_{CE} = 6 V.

Fig.15 Minimum noise figure as a function of frequency; typical values.



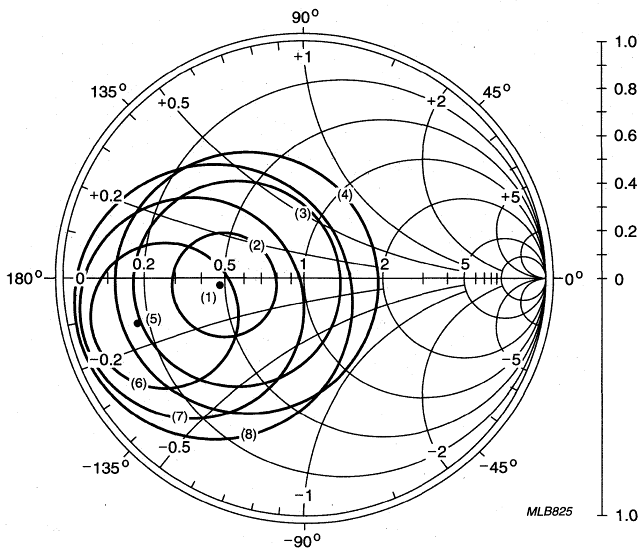
V_{CE} = 6 V.

Fig.16 Associated available gain as a function of frequency; typical values.



f = 900 MHz; V_{CE} = 6 V; I_C = 5 mA; Z_o = 50 Ω.

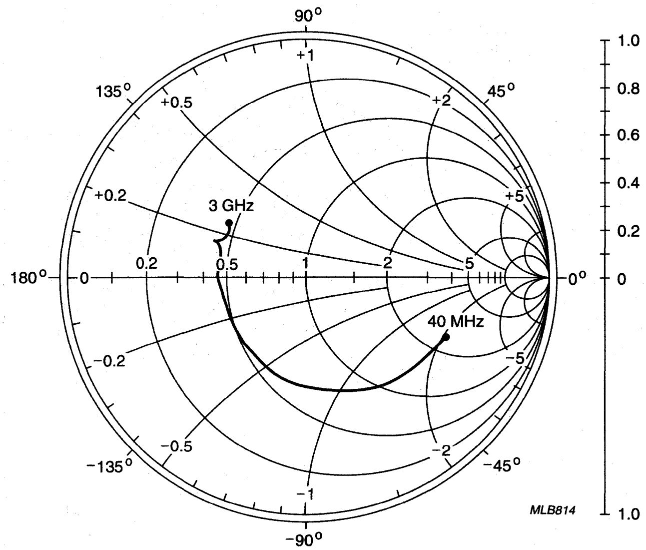
Fig.17 Common emitter noise figure circles; typical values.



(1) Γ_{opt}; F_{min} = 1.85 dB.
(2) F = 2 dB.
(3) F = 2.5 dB.
(4) F = 3 dB.
(5) Γ_{ms}; G_{max} = 11.8 dB.
(6) G = 11 dB.
(7) G = 10 dB.
(8) G = 9 dB.

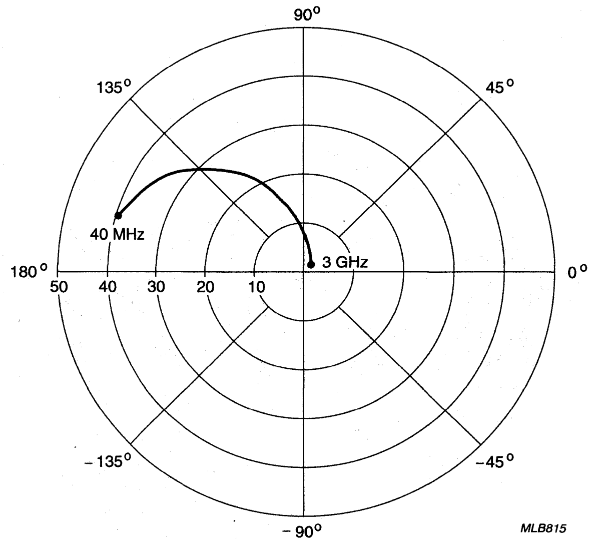
f = 2 GHz; V_{CE} = 6 V; I_C = 5 mA; Z_o = 50 Ω.

Fig.18 Common emitter noise figure circles; typical values.



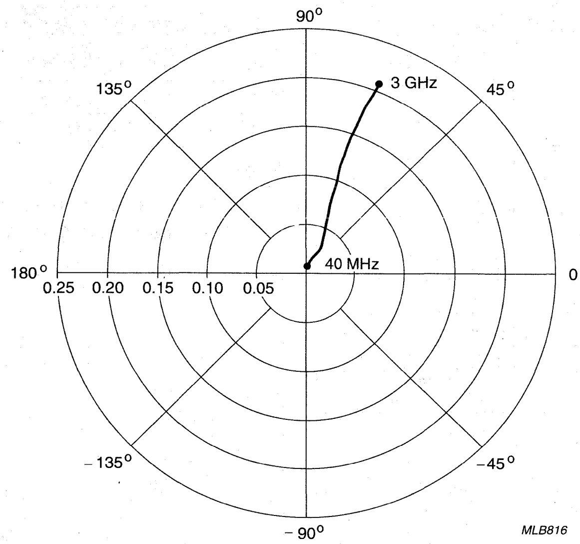
V_{CE} = 6 V; I_C = 20 mA; Z_o = 50 Ω.

Fig.19 Common emitter input reflection coefficient (s_{11}); typical values.



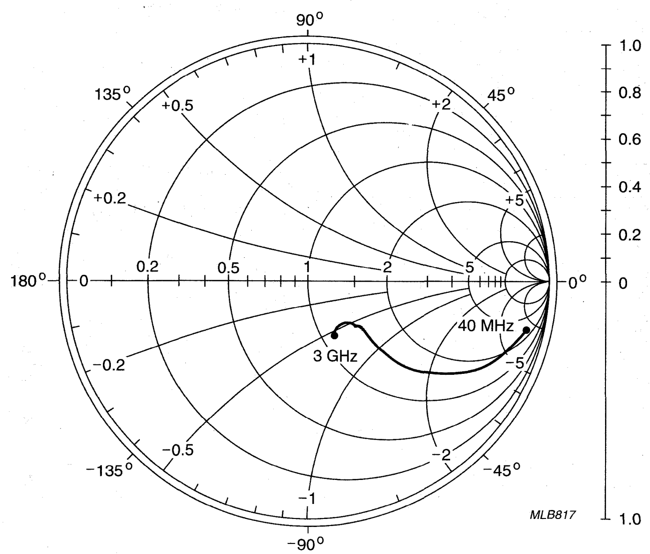
V_{CE} = 6 V; I_C = 20 mA.

Fig.20 Common emitter forward transmission coefficient (s_{21}); typical values.



V_{CE} = 6 V; I_C = 20 mA.

Fig.21 Common emitter reverse transmission coefficient (s_{12}); typical values.



V_{CE} = 6 V; I_C = 20 mA; Z_o = 50 Ω.

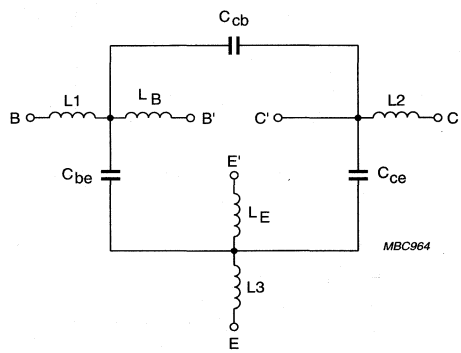
Fig.22 Common emitter output reflection coefficient (s_{22}); typical values.

SPICE parameters for the BFG520W crystal

SEQUENCE No.	PARAMETER	VALUE	UNIT
1	IS	1.016	fA
2	BF	220.1	–
3	NF	1.000	–
4	VAF	48.06	V
5	IKF	510	mA
6	ISE	283	fA
7	NE	2.035	–
8	BR	100.7	–
9	NR	0.988	–
10	VAR	1.692	V
11	IKR	2.352	mA
12	ISC	24.48	aA
13	NC	1.022	–
14	RB	10.00	Ω
15	IRB	1.000	μA
16	RBM	10.00	Ω
17	RE	775.3	mΩ
18	RC	2.210	Ω
19 (1)	XTB	0.000	–
20 (1)	EG	1.110	eV
21 (1)	XTI	3.000	–
22	CJE	1.245	pF
23	VJE	600.0	mV
24	MJE	0.258	–
25	TF	8.616	ps
26	XTF	6.788	–
27	VTF	1.414	V
28	ITF	110.3	mA
29	PTF	45.01	deg
30	CJC	447.6	fF
31	VJC	189.2	mV
32	MJC	0.070	–
33	XCJC	0.130	–
34	TR	543.7	ps
35 (1)	CJS	0.000	F
36 (1)	VJS	750.0	mV
37 (1)	MJS	0.000	–
38	FC	0.780	–

Note

1. These parameters have not been extracted, the default values are shown.



$QL_B = 50$; $QL_E = 50$; $QL_{B,E}(f) = QL_{B,E}\sqrt{(f/f_c)}$
f_c = scaling frequency = 1 GHz.

Fig.23 Package equivalent circuit SOT343; SOT343R.

List of components (see Fig.23)

DESIGNATION	VALUE	UNIT
C_{be}	70	fF
C_{cb}	50	fF
C_{ce}	115	fF
L1	0.34	nH
L2	0.10	nH
L3	0.25	nH
L_B	0.40	nH
L_E	0.40	nH

NPN 9 GHz wideband transistor

BFG540W; BFG540W/X; BFG540W/XR

FEATURES

- High power gain
- Low noise figure
- High transition frequency
- Gold metallization ensures excellent reliability.

APPLICATIONS

They are intended for applications in the RF front end, in wideband applications in the GHz range such as analog and digital cellular telephones, cordless telephones (CT2, CT3, PCN, DECT, etc.), radar detectors, pagers, satellite television tuners (SATV), MATV/CATV amplifiers and repeater amplifiers in fibre-optic systems.

DESCRIPTION

NPN silicon planar epitaxial transistors in plastic, 4-pin dual-emitter SOT343 and SOT343R packages.

MARKING

TYPE NUMBER	CODE
BFG540W	N9
BFG540W/X	N7
BFG540W/XR	N8

PINNING

PIN	DESCRIPTION
BFG540W (see Fig.1)	
1	collector
2	base
3	emitter
4	emitter
BFG540W/X (see Fig.1)	
1	collector
2	emitter
3	base
4	emitter
BFG540W/XR (see Fig.2)	
1	collector
2	emitter
3	base
4	emitter

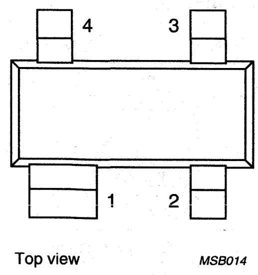


Fig.1 SOT343.

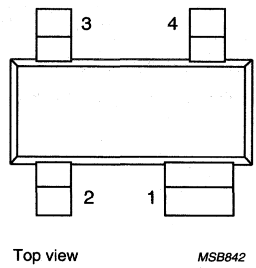


Fig.2 SOT343R.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–	20	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	–	15	V
I_C	collector current (DC)		–	–	120	mA
P_{tot}	total power dissipation	up to $T_s = 85$ °C	–	–	500	mW
h_{FE}	DC current gain	$I_C = 40$ mA; $V_{CE} = 8$ V	60	120	250	
C_{re}	feedback capacitance	$I_C = 0$; $V_{CB} = 8$ V; f = 1 MHz	–	0.5	–	pF
f_T	transition frequency	$I_C = 40$ mA; $V_{CE} = 8$ V; f = 1 GHz; $T_{amb} = 25$ °C	–	9	–	GHz
G_{UM}	maximum unilateral power gain	$I_C = 40$ mA; $V_{CE} = 8$ V; f = 900 MHz; $T_{amb} = 25$ °C	–	16	–	dB
		$I_C = 40$ mA; $V_{CE} = 8$ V; f = 2 GHz; $T_{amb} = 25$ °C		10	–	dB
$\|s_{21}\|^2$	insertion power gain	$I_C = 40$ mA; $V_{CE} = 8$ V; f = 900 MHz; $T_{amb} = 25$ °C	14	15	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}$; $I_C = 10$ mA; $V_{CE} = 8$ V; f = 2 GHz	–	2.1	–	dB

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_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	120	mA
P_{tot}	total power dissipation	up to T_s = 85 °C; see Fig.3; note 1	–	500	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	175	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	up to T_s = 85 °C; note 1	180	K/W

Note to the "Limiting values" and "Thermal characteristics"

1. T_s is the temperature at the soldering point of the collector pin.

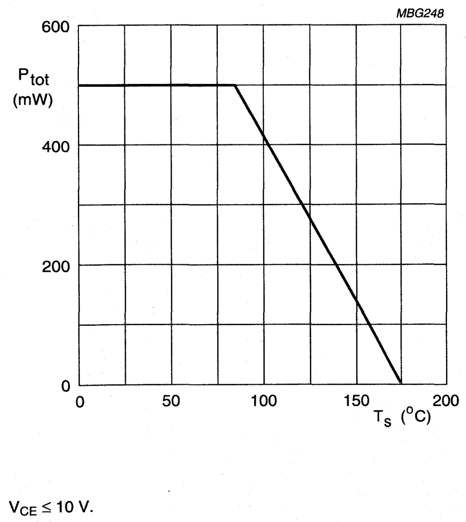


Fig.3 Power derating curve.

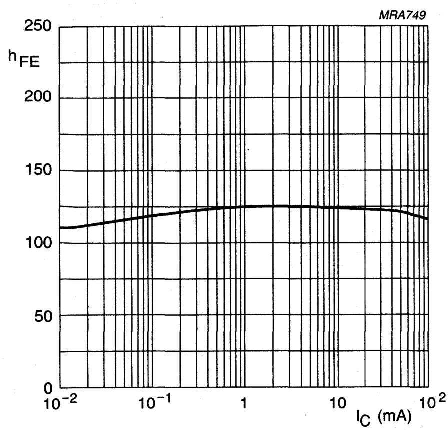
CHARACTERISTICS

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 = 10 μA ; I_E = 0	20	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	R_{BE} = 0; I_C = 40 μA	15	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 100 μA; I_C = 0	2.5	–	–	V
I_{CBO}	collector cut-off current	open emitter; V_{CB} = 8 V; I_E = 0	–	–	50	nA
h_{FE}	DC current gain	I_C = 40 mA; V_{CE} = 8 V	60	120	250	
f_T	transition frequency	I_C = 40 mA; V_{CE} = 8 V; f = 1 GHz; T_{amb} = 25 °C	–	9	–	GHz
C_c	collector capacitance	I_E = i_e = 0; V_{CB} = 8 V; f = 1 MHz	–	0.9	–	pF
C_e	emitter capacitance	I_C = i_c = 0; V_{EB} = 0.5 V; f = 1 MHz	–	2	–	pF
C_{re}	feedback capacitance	I_C = 0; V_{CB} = 8 V; f = 1 MHz	–	0.5	–	pF
G_{UM}	maximum unilateral power gain; note 1	I_C = 40 mA; V_{CE} = 8 V; f = 900 MHz; T_{amb} = 25 °C	–	16	–	dB
		I_C = 40 mA; V_{CE} = 8 V; f = 2 GHz; T_{amb} = 25 °C	–	10	–	dB
$\|s_{21}\|^2$	insertion power gain	I_C = 40 mA; V_{CE} = 8 V; f = 900 MHz; T_{amb} = 25 °C	14	15	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}$; I_C = 10 mA; V_{CE} = 8 V; f = 900 MHz	–	1.3	1.8	dB
		$\Gamma_s = \Gamma_{opt}$; I_C = 40 mA; V_{CE} = 8 V; f = 900 MHz	–	1.9	2.4	dB
		$\Gamma_s = \Gamma_{opt}$; I_C = 10 mA; V_{CE} = 8 V; f = 2 GHz	–	2.1	–	dB
P_{L1}	output power at 1 dB gain compression	I_C = 40 mA; V_{CE} = 8 V; f = 900 MHz; R_L = 50 Ω; T_{amb} = 25 °C	–	21	–	dBm
ITO	third order intercept point	note 2	–	34	–	dBm
V_o	output voltage	note 3	–	500	–	mV
d_2	second order intermodulation distortion	note 4	–	–50	–	dB

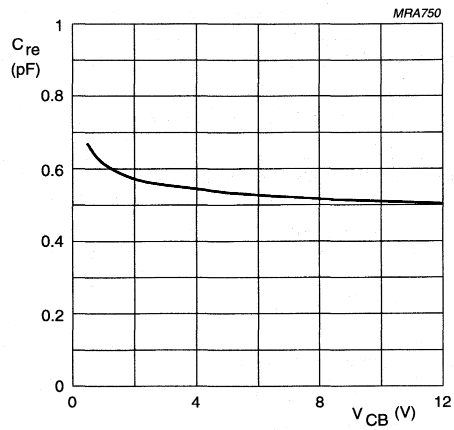
Notes

1. G_{UM} is the maximum unilateral power gain, assuming s_{12} is zero. $G_{UM} = 10 \log \frac{|s_{21}|^2}{(1-|s_{11}|^2)(1-|s_{22}|^2)}$ dB.
2. I_C = 40 mA; V_{CE} = 8 V; R_L = 50 Ω; T_{amb} = 25 °C;
   f_p = 900 MHz; f_q = 902 MHz; measured at $f_{(2p-q)}$ = 898 MHz and $f_{(2q-p)}$ = 904 MHz.
3. d_{im} = –60 dB (DIN45004B); $V_p = V_o$; $V_q = V_o$ –6 dB; $V_r = V_o$ –6 dB; R_L = 75 Ω; V_{CE} = 8 V; I_C = 40 mA;
   f_p = 795.25 MHz; f_q = 803.25 MHz; f_r = 805.25 MHz; measured at $f_{(p+q-r)}$ = 793.25 MHz.
4. I_C = 40 mA; V_{CE} = 8 V; V_o = 275 mV; R_L = 75 Ω; T_{amb} = 25 °C;
   f_p = 250 MHz; f_q = 560 MHz; measured at $f_{(p+q)}$ = 810 MHz.



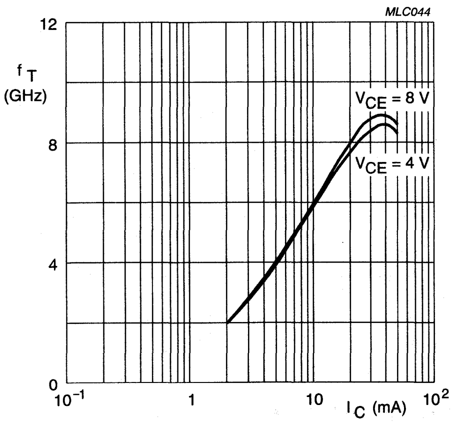
V_{CE} = 8 V.

Fig.4 DC current gain as a function of collector current; typical values.



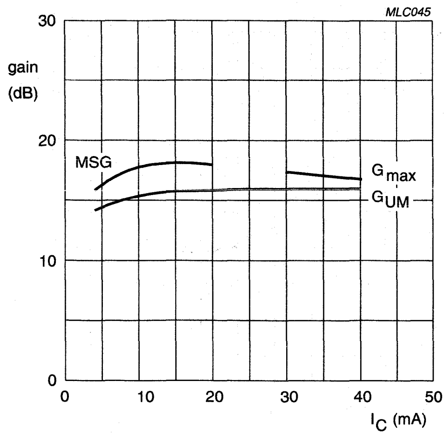
I_C = 0; f = 1 MHz.

Fig.5 Feedback capacitance as a function of collector-base voltage; typical values.



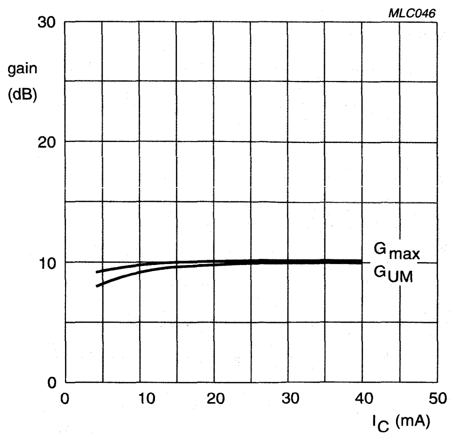
f = 1 GHz; T_{amb} = 25 °C.

Fig.6 Transition frequency as a function of collector current; typical values.



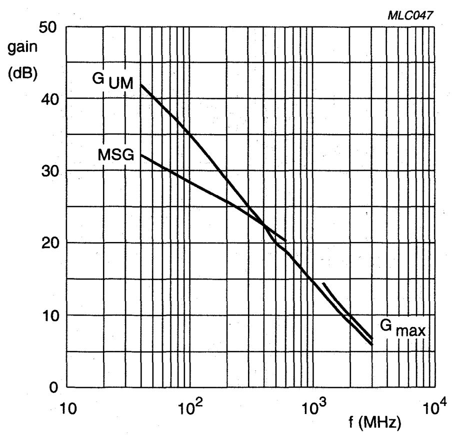
f = 900 MHz; V_{CE} = 8 V.

Fig.7 Gain as a function of collector current; typical values.



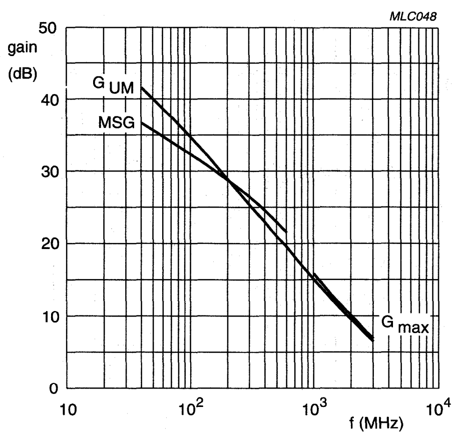
f = 2 GHz; V_{CE} = 8 V.

Fig.8 Gain as a function of collector current; typical values.



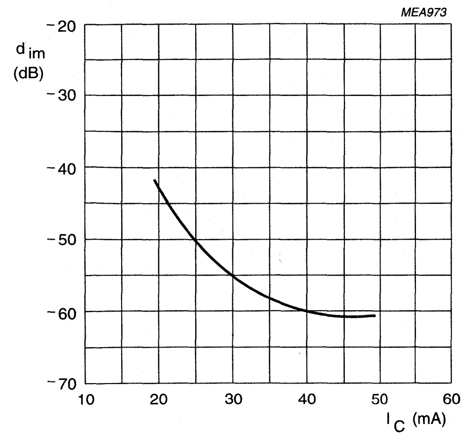
I_C = 10 mA; V_{CE} = 8 V.

Fig.9 Gain as a function of frequency; typical values.



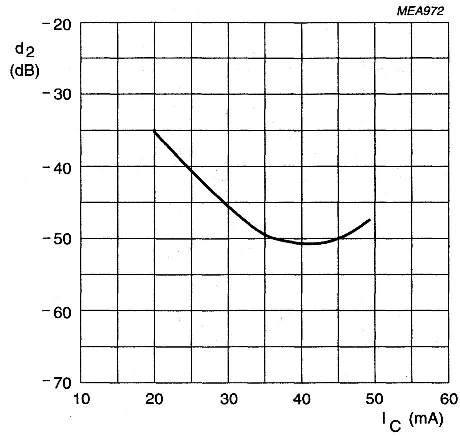
I_C = 40 mA; V_{CE} = 8 V.

Fig.10 Gain as a function of frequency; typical values.



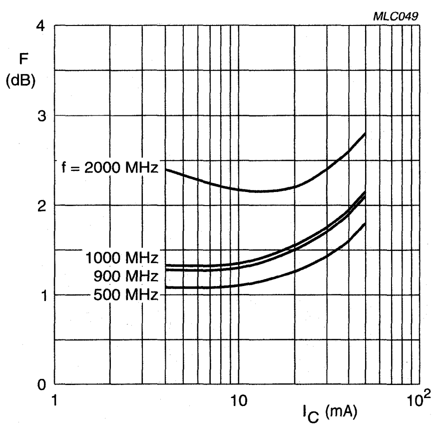
V_o = 500 mV; $f_{(p+q-r)}$ = 793.25 MHz; V_{CE} = 8 V; T_{amb} = 25 °C; R_L = 75 Ω.

Fig.11 Intermodulation distortion as a function of collector current; typical values.



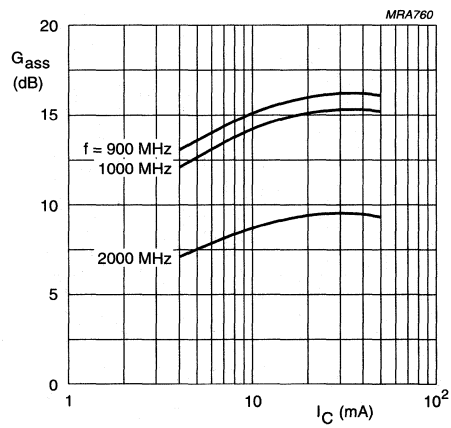
V_o = 275 mV; $f_{(p+q)}$ = 810 MHz; V_{CE} = 8 V; T_{amb} = 25 °C; R_L = 75 Ω.

Fig.12 Second order intermodulation distortion as a function of collector current; typical values.



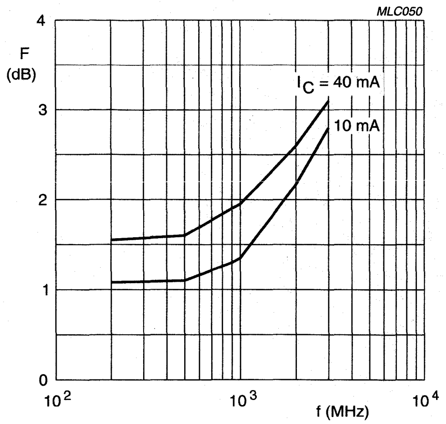
V_{CE} = 8 V.

Fig.13 Minimum noise figure as a function of collector current; typical values.



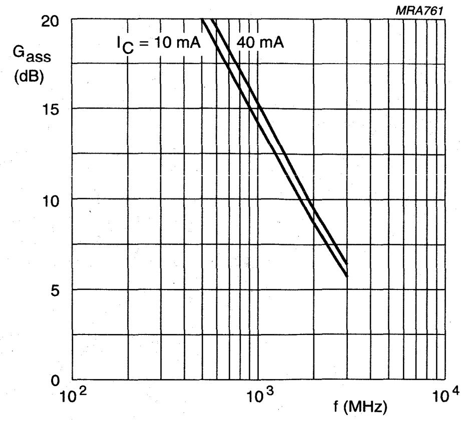
V_{CE} = 8 V.

Fig.14 Associated available gain as a function of collector current; typical values.



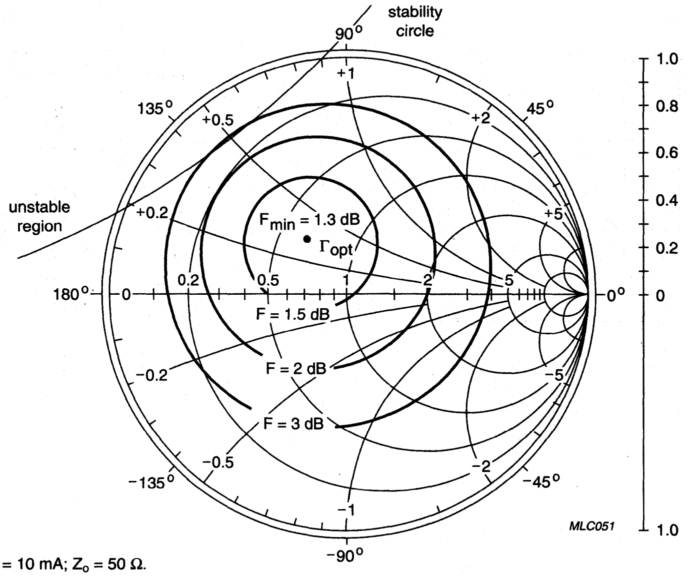
V_{CE} = 8 V.

Fig.15 Minimum noise figure as a function of frequency; typical values.



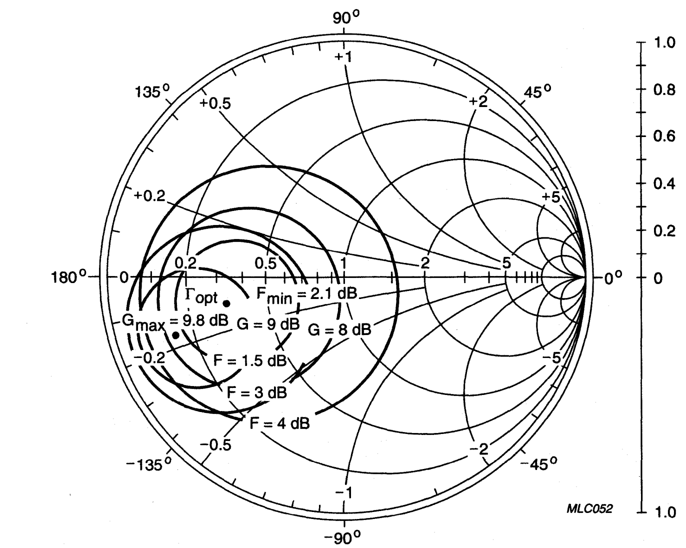
V_{CE} = 8 V.

Fig.16 Associated available gain as a function of frequency; typical values.



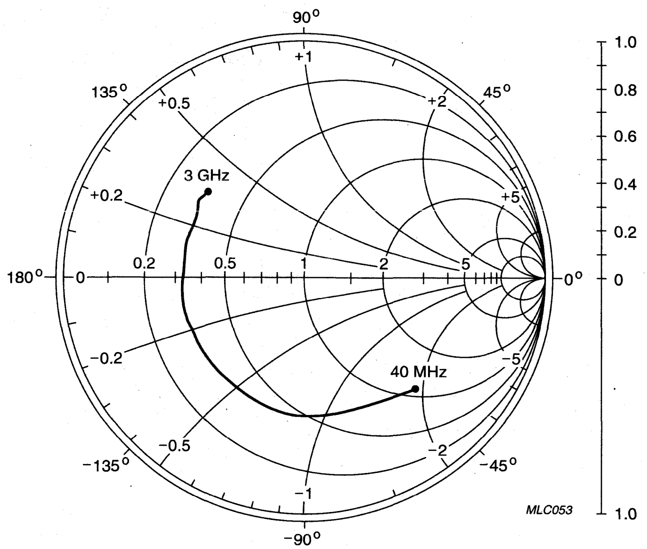
f = 900 MHz; V_{CE} = 8 V; I_C = 10 mA; Z_o = 50 Ω.

Fig.17 Common emitter noise figure circles; typical values.



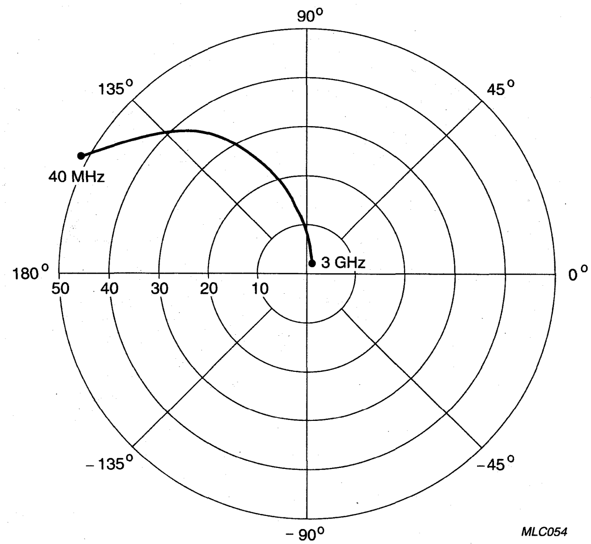
f = 2 GHz; V_{CE} = 8 V; I_C = 10 mA; Z_o = 50 Ω.

Fig.18 Common emitter noise figure circles; typical values.



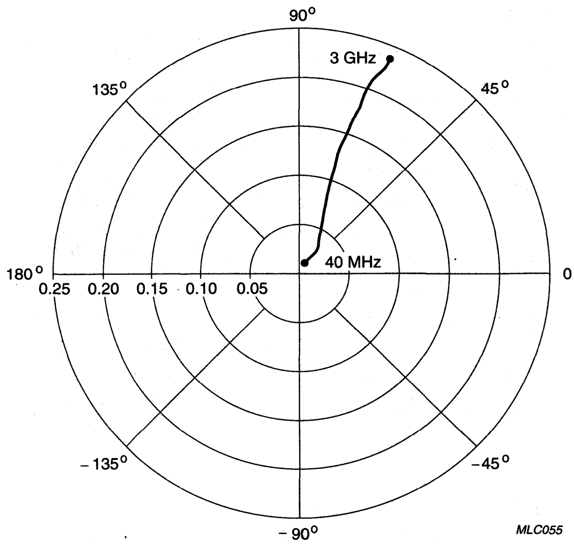
V_{CE} = 8 V; I_C = 40 mA; Z_o = 50 Ω.

Fig.19 Common emitter input reflection coefficient (s_{11}); typical values.



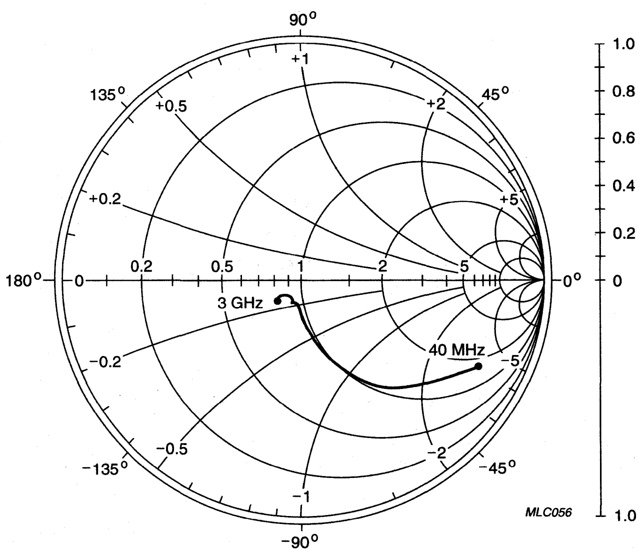
V_{CE} = 8 V; I_C = 40 mA.

Fig.20 Common emitter forward transmission coefficient (s_{21}); typical values.



V_{CE} = 8 V; I_C = 40 mA.

Fig.21 Common emitter reverse transmission coefficient (s_{12}); typical values.



V_{CE} = 8 V; I_C = 40 mA; Z_o = 50 Ω.

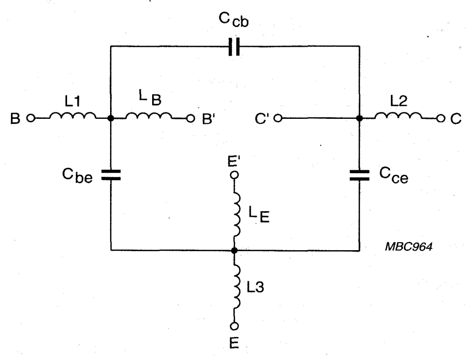
Fig.22 Common emitter output reflection coefficient (s_{22}); typical values.

SPICE parameters for the BFG540W crystal

SEQUENCE No.	PARAMETER	VALUE	UNIT
1	IS	1.045	fA
2	BF	184.3	–
3	NF	0.981	–
4	VAF	41.69	V
5	IKF	10.00	mA
6	ISE	232.4	fA
7	NE	2.028	–
8	BR	43.99	–
9	NR	0.992	–
10	VAR	2.097	V
11	IKR	166.2	mA
12	ISC	129.8	aA
13	NC	1.064	–
14	RB	5.000	Ω
15	IRB	1.000	μA
16	RBM	5.000	Ω
17	RE	353.5	mΩ
18	RC	1.340	Ω
19 (1)	XTB	0.000	–
20 (1)	EG	1.110	eV
21 (1)	XTI	3.000	–
22	CJE	1.978	pF
23	VJE	600.0	mV
24	MJE	0.332	–
25	TF	7.457	ps
26	XTF	11.40	–
27	VTF	3.158	V
28	ITF	156.9	mA
29	PTF	0.000	deg
30	CJC	793.7	fF
31	VJC	185.5	mV
32	MJC	0.084	–
33	XCJC	0.150	–
34	TR	1.598	ns
35 (1)	CJS	0.000	F
36 (1)	VJS	750.0	mV
37 (1)	MJS	0.000	–
38	FC	0.814	–

Note

1. These parameters have not been extracted, the default values are shown.



$QL_B = 50$; $QL_E = 50$; $QL_{B,E}(f) = QL_{B,E}\sqrt{(f/f_c)}$
f_c = scaling frequency = 1 GHz.

Fig.23 Package equivalent circuit SOT343; SOT343R.

List of components (see Fig.23).

DESIGNATION	VALUE	UNIT
C_{be}	70	fF
C_{cb}	50	fF
C_{ce}	115	fF
L1	0.34	nH
L2	0.10	nH
L3	0.25	nH
L_B	0.40	nH
L_E	0.40	nH

VHF power amplifier modules

BGY32; BGY33; BGY35; BGY36

FEATURESS

- Broadband VHF amplifiers
- 18 W output power
- Direct operation from 12 V vehicle electrical systems.

APPLICATIONS

- Mobile communication equipment.

DESCRIPTION

The BGY32, BGY33; BGY35 and BGY36 are two stage amplifier modules in a SOT132B package. Each module comprises two NPN silicon planar transistor dies together with lumped-element matching components.

PINNING - SOT132B

PIN	DESCRIPTION
1	RF input
2	ground
3	V_{S1}
4	ground
5	V_{S2}
6	ground
7	RF output
Flange	ground

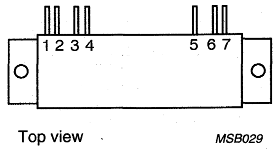


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C.

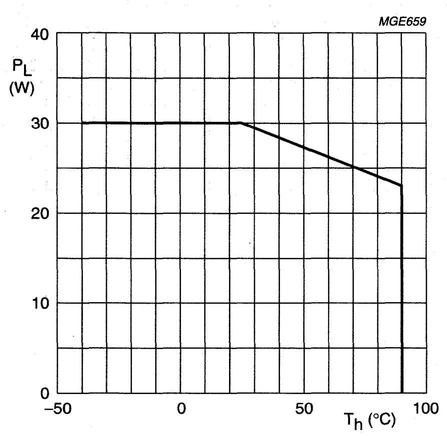
TYPE	MODE OF OPERATION	f (MHz)	V_{S1}; V_{S2} (V)	P_D (mW)	P_L (W)	Z_S, Z_L (Ω)
BGY32	CW	68 to 88	12.5	100	>18; typ. 23	50
BGY33	CW	80 to 108	12.5	100	>18; typ. 22	50
BGY35	CW	132 to 156	12.5	150	>18; typ. 22	50
BGY36	CW	148 to 174	12.5	150	>18; typ. 21	50

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	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	15	V
V_{S2}	DC supply voltage	–	15	V
V_i	RF input terminal voltage	–	±25	V
V_o	RF output terminal voltage	–	±25	V
P_D	input drive power			
	BGY32; BGY33	–	200	mW
	BGY35; BGY36	–	300	mW
P_L	load power	–	30	W
T_{stg}	storage temperature	–40	+100	°C
T_h	operating heatsink temperature	–	90	°C



VSWR = 1.

Fig.2 Power derating curve.

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $V_{S1} = V_{S2} = 12.5$ V; $T_h = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY32		68	–	88	MHz
	BGY33		80	–	108	MHz
	BGY35		132	–	156	MHz
	BGY36		148	–	174	MHz
I_{Q1}	leakage current	$P_D = 0$	–	6	–	mA
I_{Q2}	leakage current	$P_D = 0$	–	13	–	mA
P_L	load power					
	BGY32	$P_D = 100$ mW	18	23	–	W
	BGY33	$P_D = 100$ mW	18	22	–	W
	BGY35	$P_D = 150$ mW	18	22	–	W
	BGY36	$P_D = 150$ mW	18	21	–	W
η	efficiency		40	50	–	%
H_2	second harmonic		–	–	−25	dBc
H_3	third harmonic		–	–	−25	dBc
$VSWR_{in}$	input VSWR	with respect to 50 Ω	–	1.5	–	
	stability	$V_{S1} = 6$ to 15 V; $V_{S2} = 10$ to 15 V; $V_{S1} \leq V_{S2}$; $P_D = 50$ to 200 mW; VSWR ≤ 3 : 1 through all phases;	–	–	−60	dBc

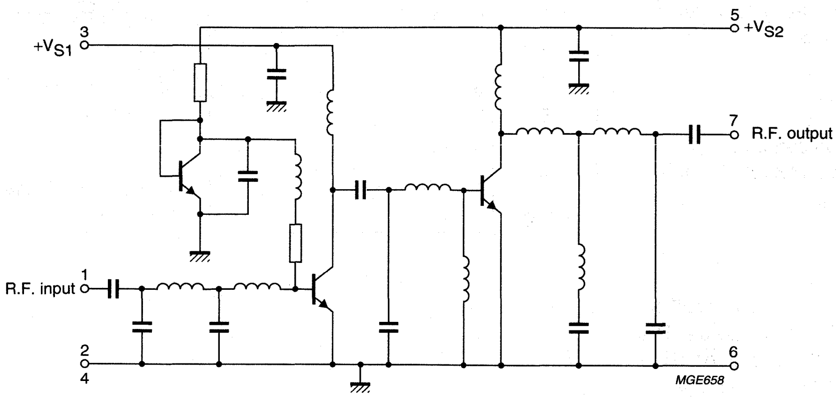


Fig.3 Circuit diagram.

Ruggedness

The module will withstand a load mismatch VSWR of 50:1 (all phases) for short period overload conditions, with P_D, V_{S1} and V_{S2} at maximum values providing the combination does not result in the matched RF output power rating being exceeded.

MOUNTING

To ensure good thermal transfer the module should be mounted on a heatsink with a flat surface with heat-conducting compound applied between module and heatsink. If an isolation washer is used, heatsink compound should be applied to both sides of the washer. Burrs and thickening of the holes in the heatsink should be removed and 3 mm bolts tightened to a maximum torque of 0.5 Nm. The leads of the devices may be soldered directly into a circuit using a soldering iron with a maximum temperature of 245 °C for not more than 10 seconds at a distance of at least 1 mm from the plastic.

APPLICATION INFORMATION

Supply

An electrolytic capacitor of 10 µF, 25 V, in parallel with a polyester capacitor of 100 nF to earth, is recommended as a decoupling arrangement for each power supply pin.

Power rating

In general it is recommended that the output power from the module under nominal conditions should not exceed 23 W in order to provide an adequate safety margin under fault conditions.

Output power control

The module is not designed to be operated over a large range of output power levels. The purpose of the output power control is to set the nominal output power level. The preferred method of output power control is by varying the drive power between 50 and 200 mW. The next option is by varying V_{S1} between 6 and 12.5 V.

VHF power amplifier module — BGY43

FEATURES

- Broadband VHF amplifier
- 13 W output power
- Direct operation from 12 V vehicle electrical systems

APPLICATIONS

- Mobile communication equipment operating in the 148 to 174 MHz frequency range.

DESCRIPTION

The BGY43 is a two-stage amplifier module in a SOT132B package. The module consists of a two stage RF amplifier using NPN silicon planar transistor dies with lumped-element matching components, in a plastic stripline encapsulation. The negative supply is internally connected to the flange.

PINNING - SOT132B

PIN	DESCRIPTION
1	RF input
2	ground
3	V_{S1}
4	ground
5	V_{S2}
6	ground
7	RF output
Flange	ground

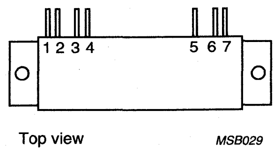


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C.

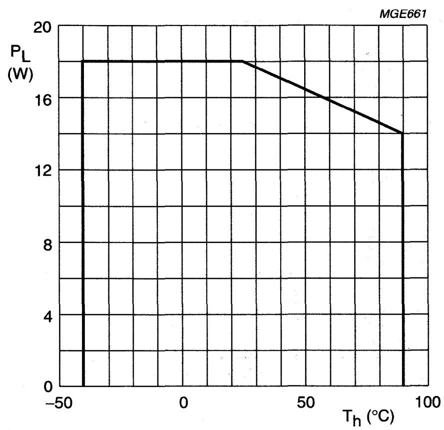
MODE OF OPERATION	f (MHz)	V_{S1}; V_{S2} (V)	P_D (mW)	P_L (W)	Z_S, Z_L (Ω)
CW	148 to 174	12.5	≤150; typ 80	>13	50

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	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	16.5	V
V_{S2}	DC supply voltage	–	16.5	V
V_i	RF input terminal voltage	–	±25	V
V_o	RF output terminal voltage	–	±25	V
P_D	input drive power	–	300	mW
P_L	load power	–	18	W
T_{stg}	storage temperature	–40	+100	°C
T_h	operating heatsink temperature	–	90	°C



VSWR = 1.

Fig.2 Power derating curve.

VHF power amplifier module BGY43

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $V_{S1} = V_{S2} = 12.5$ V; f = 148 to 174 MHz; $T_h = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{Q1}	leakage current	$P_D = 0$	–	5	–	mA
I_{Q2}	leakage current	$P_D = 0$	–	15	–	mA
P_D	input drive power	$P_L = 13$ W	–	80	150	mW
η	efficiency	$P_L = 13$ W	40	48	–	%
H_2	second harmonic		–25	–34	–	dBc
H_3	third harmonic		–25	–34	–	dBc
$VSWR_{in}$	input VSWR	with respect to 50 Ω	–	1 : 1.5	–	

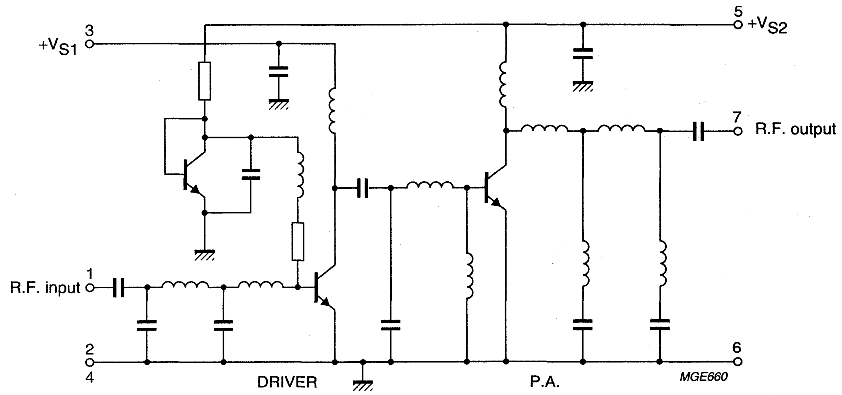


Fig.3 Circuit diagram.

Stability

The module is stable with a load VSWR up to 3:1 (all phases) when operated within the following conditions: $V_{S1} = V_{S2} = 10$ V to 16.5 V; $P_D = 30$ to 300 mW; f = 148 to 174 MHz; $P_L \leq 18$ W (matched).

Ruggedness

The module will withstand a load mismatch VSWR of 50:1 (all phases) for short period overload conditions, with drive power and DC supply voltages at maximum values, providing the combination does not result in the matched RF output power rating being exceeded.

MOUNTING

To ensure good thermal transfer the module should be mounted on a heatsink with a flat surface with heat-conducting compound applied between module and heatsink. If an isolation washer is used, heatsink compound should be applied to both sides of the washer. Burrs and thickening of the holes in the heatsink should be removed and 3 mm bolts tightened to a torque of 0.5 Nm. The leads of the devices may be soldered directly into a circuit using a soldering iron with a maximum temperature of 245 °C for not more than 10 seconds at a distance of at least 1 mm from the plastic.

APPLICATION INFORMATION

Power rating

In general, it is recommended that the output power from the module under nominal conditions should not exceed 16 W in order to provide an adequate safety margin under fault conditions.

Output power control

The module is not designed to be operated over a wide range of output power levels. The purpose of the output power control is to set the nominal output power level. The preferred method of output power control is by varying the drive power between 30 and 200 mW. The next option is by varying V_{S1} between 6 and 12.5 V.

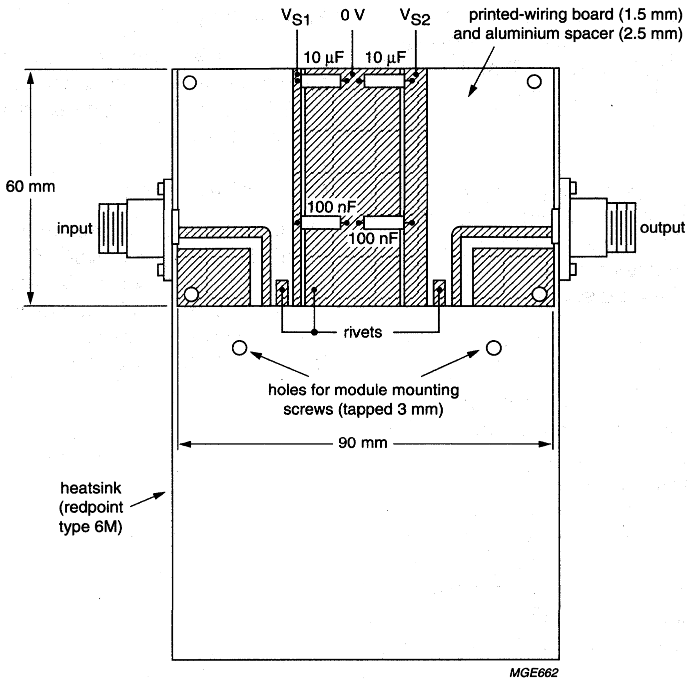


Fig.4 Test jig for VHF modules.

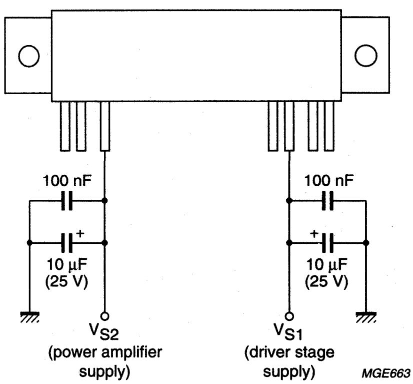


Fig.5 Recommended decoupling arrangement.

UHF amplifier modules
BGY110D; BGY110E; BGY110F; BGY110G

FEATURES

- 7.2 V nominal supply voltage
- 1.7 W output power
- Easy control of output power by DC voltage.

APPLICATIONS

- Hand-held transmitting equipment operating in the 824 to 849 MHz, 872 to 905 MHz, 890 to 915 MHz and 902 to 928 MHz frequency ranges respectively.

DESCRIPTION

The BGY110D, 110E, 110F and 110G are four-stage UHF amplifier modules in a SOT246 package. Each module consists of four NPN silicon planar transistor dies, mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT246

PIN	DESCRIPTION
1	RF input/V_C
2	V_{S1}
3	V_{S2}
4	V_{S3}
5	RF output
Flange	ground

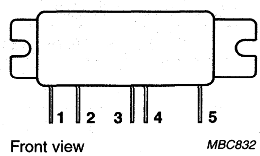


Fig.1 Simplified outline.

QUICK REFERENCE DATA

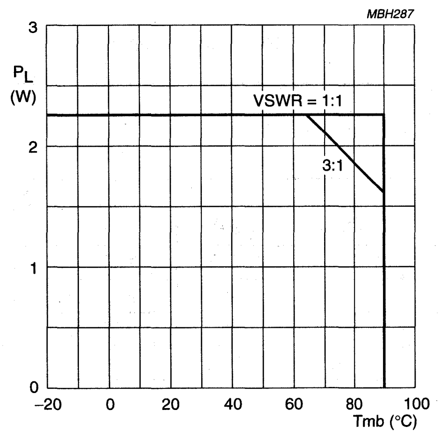
RF performance at T_{mb} = 25 °C.

TYPE NUMBER	MODE OF OPERATION	f (MHz)	V_S (V)	V_C (V)	P_L (W)	G_P (dB)	η (%)	Z_S; Z_L (Ω)
BGY110D	CW	824 to 849	7.2	4.5	1.7	≥32.3	≥39	50
BGY110E	CW	872 to 905	7.2	4.5	1.7	≥32.3	≥39	50
BGY110F	CW	890 to 915	7.2	4.5	1.7	≥32.3	≥39	50
BGY110G	CW	902 to 928	7.2	4.5	1.7	≥32.3	≥39	50

LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	10	V
V_{S2}	DC supply voltage	–	10	V
V_{S3}	DC supply voltage	–	10	V
V_C	DC control voltage	–	4.5	V
$+V_o$	RF output terminal voltage	–	25	V
P_D	input drive power	–	3	mW
P_L	load power	–	2.25	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	mounting base temperature	–	90	°C



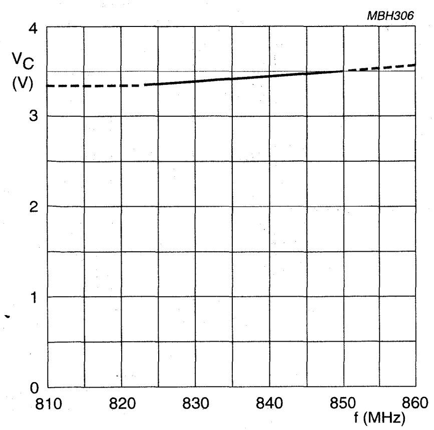
$V_{S1} = V_{S2} = V_{S3} = 9$ V max.

Fig.2 Power derating curve.

CHARACTERISTICS

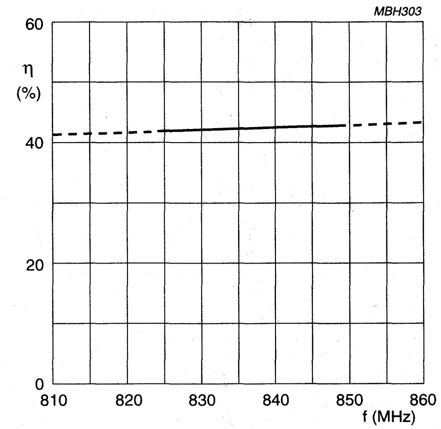
$Z_S = Z_L = 50\ \Omega$; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $V_C = 4.5$ V; $T_{mb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY110D		824	–	849	MHz
	BGY110E		872	–	905	MHz
	BGY110F		890	–	915	MHz
	BGY110G		902	–	928	MHz
I_{C2}	leakage current	$V_{S1} = V_C = 0$	–	–	100	μA
I_{C3}	leakage current	$V_{S1} = V_C = 0$	–	–	100	μA
P_L	load power	$P_D = 1$ mW	1.7	–	–	W
η	efficiency	$P_L = 1.7$ W	39	–	–	%
H_2	second harmonic	$P_L = 1.7$ W	–	–	−40	dB
H_3	third harmonic	$P_L = 1.7$ W	–	–	−45	dB
$VSWR_{in}$	input VSWR	$P_L = 1.7$ W	–	–	2:1	
ΔG_p	gain control	$V_C = 0$ to 4.5 V; $P_D = 1$ mW	30	–	–	dB
P_L	output switching power	$V_{S1} = V_C = 0$; $P_D = 1$ mW	–	–	−20	dBm
	stability	$P_D = 0.5$ to 2 mW; $V_{S1} = V_{S2} = V_{S3} = 6$ to 9 V; $V_C = 0$ to 4.5 V; $P_L \leq 2$ W; VSWR ≤ 6 : 1	–	–	−60	dBc
P_n	noise power	30 kHz bandwidth; $P_L = 1.7$ W; 45 MHz above f_o	–	−84	−80	dBm
	ruggedness	$P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 9$ V; $P_L \leq 1.8$ W; VSWR =10 : 1 through all phases;	no degradation			



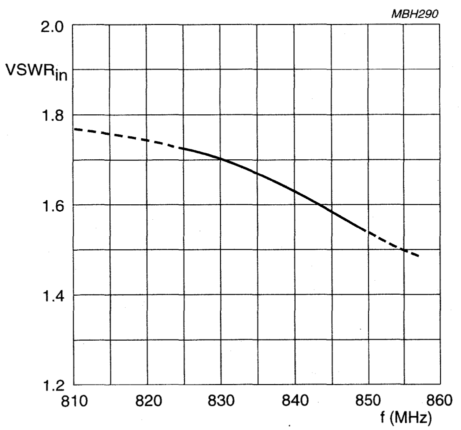
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.3 Control voltage as a function of frequency; BGY110D; typical values.



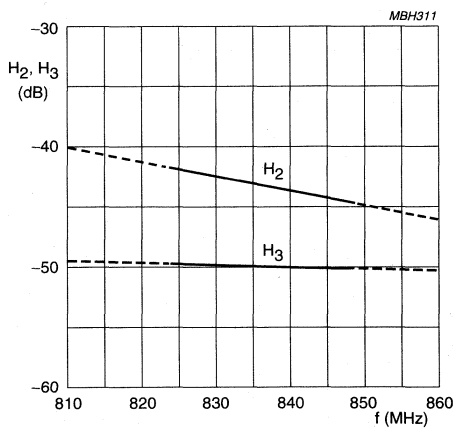
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.4 Efficiency as a function of frequency; BGY110D; typical values.



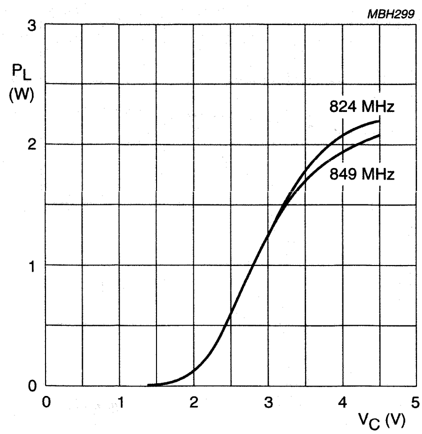
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.5 Input VSWR as a function of frequency; BGY110D; typical values.



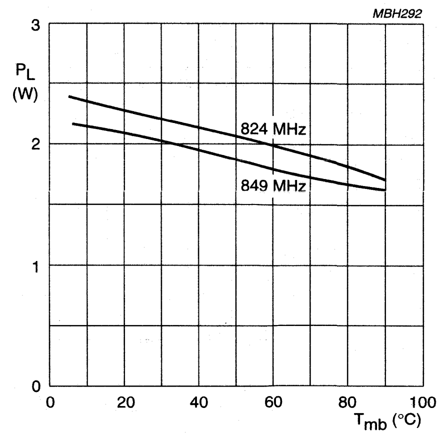
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.6 Harmonics as a function of frequency; BGY110D; typical values.



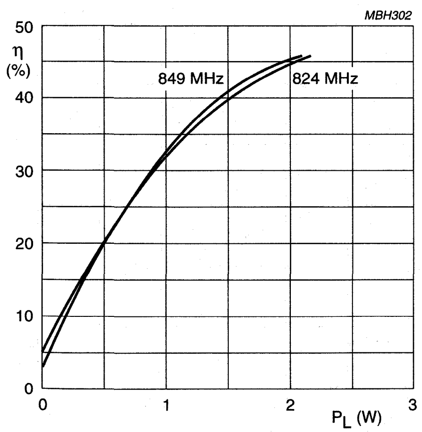
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $T_{mb} = 25$ °C.

Fig.7 Load power as a function of control voltage; BGY110D; typical values.



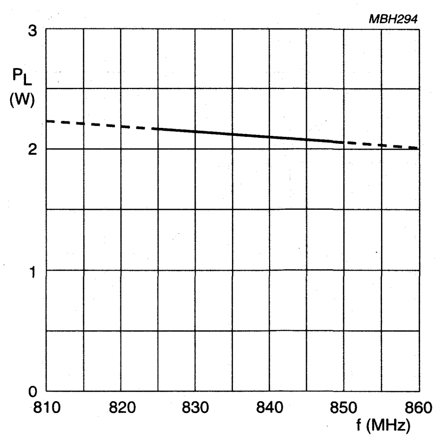
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $V_C = 4.5$ V.

Fig.8 Load power as a function of mounting base temperature; BGY110D; typical values.



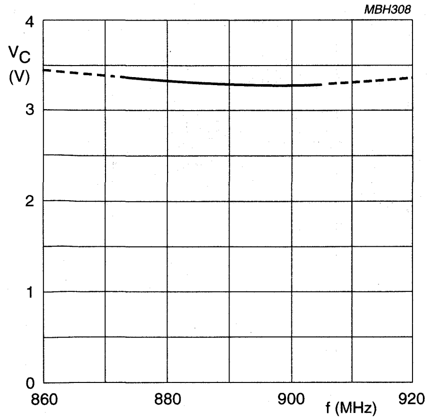
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $T_{mb} = 25$ °C.

Fig.9 Efficiency as a function of load power; BGY110D; typical values.



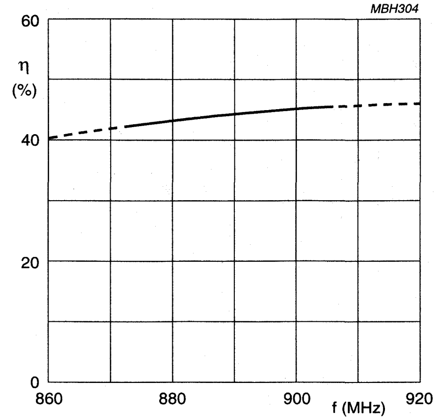
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $V_C = 4.5$ V; $T_{mb} = 25$ °C.

Fig.10 Load power as a function of frequency; BGY110D; typical values.



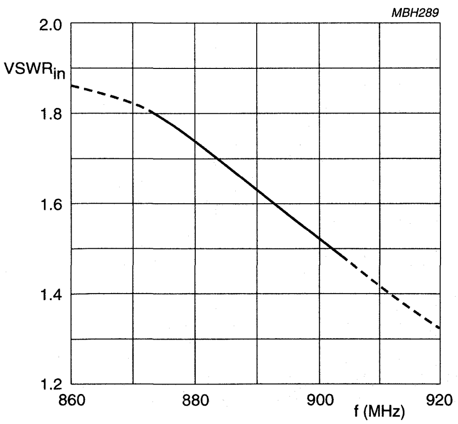
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.11 Control voltage as a function of frequency; BGY110E; typical values.



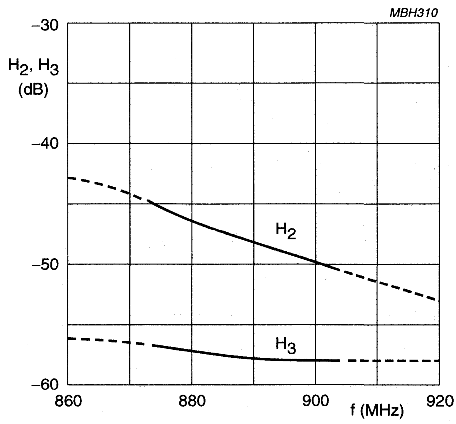
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.12 Efficiency as a function of frequency; BGY110E; typical values.



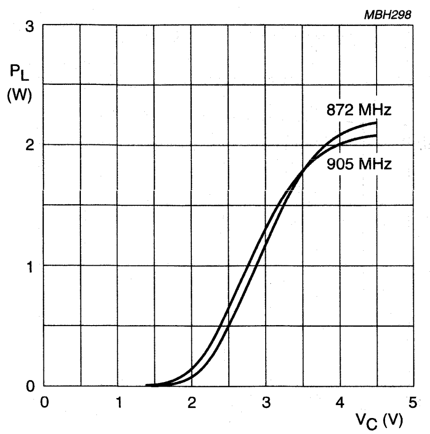
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.13 Input VSWR as a function of frequency; BGY110E; typical values.



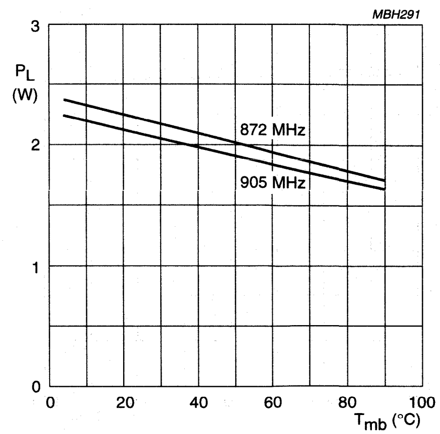
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.14 Harmonics as a function of frequency; BGY110E; typical values.



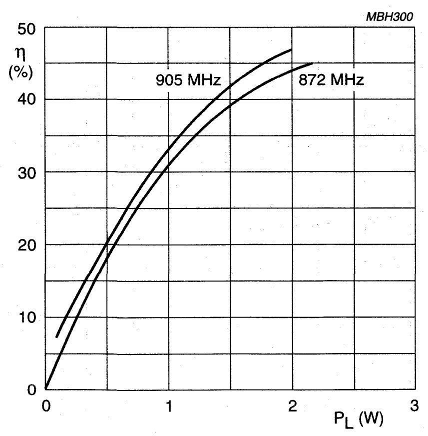
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $T_{mb} = 25$ °C.

Fig.15 Load power as a function of control voltage; BGY110E; typical values.



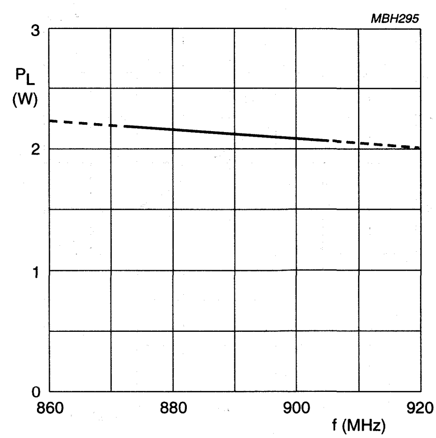
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $V_C = 4.5$ V.

Fig.16 Load power as a function of mounting base temperature; BGY110E; typical values.



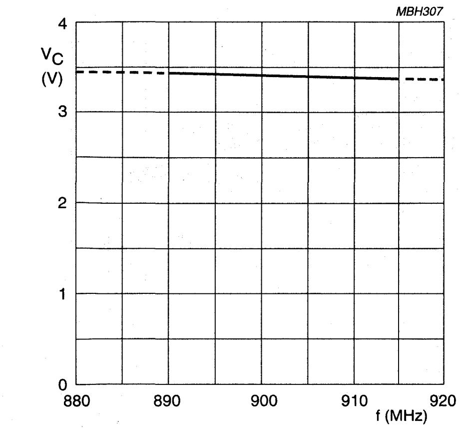
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $T_{mb} = 25$ °C.

Fig.17 Efficiency as a function of load power; BGY110E; typical values.



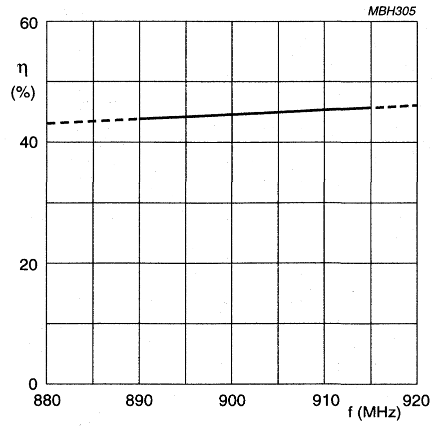
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $V_C = 4.5$ V; $T_{mb} = 25$ °C.

Fig.18 Load power as a function of frequency; BGY110E; typical values.



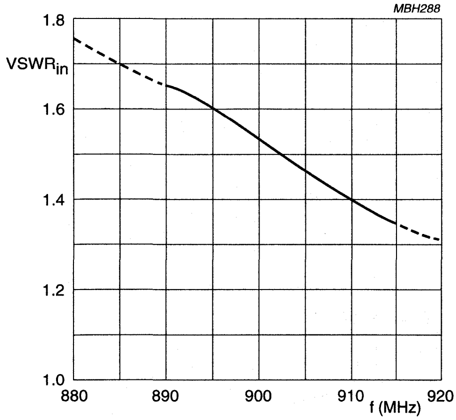
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.19 Control voltage as a function of frequency; BGY110F; typical values.



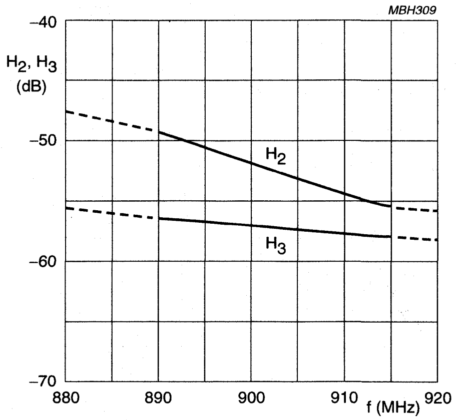
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.20 Efficiency as a function of frequency; BGY110F; typical values.



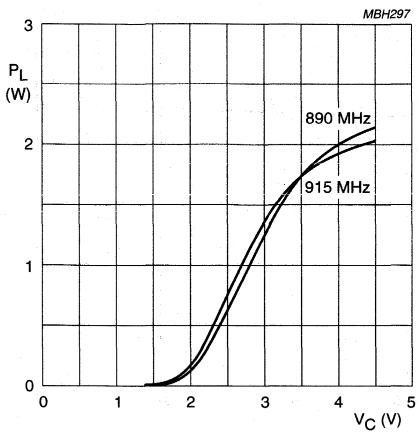
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.21 Input VSWR as a function of frequency; BGY110F; typical values.



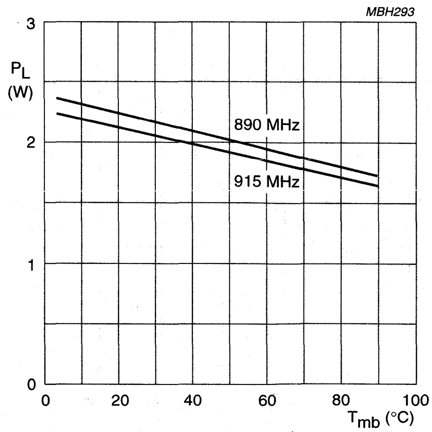
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.22 Harmonics as a function of frequency; BGY110F; typical values.



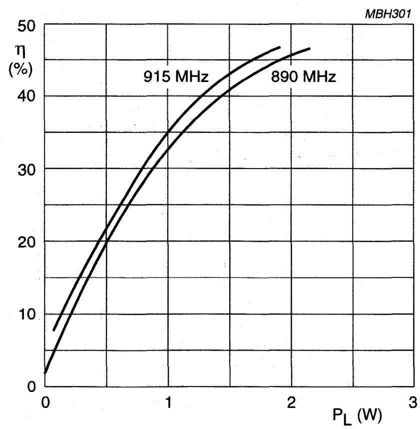
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $T_{mb} = 25$ °C.

Fig.23 Load power as a function of control voltage; BGY110F; typical values.



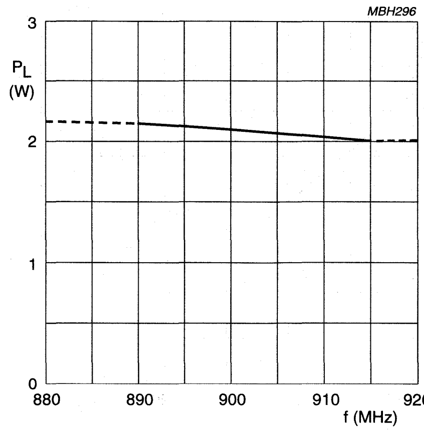
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $V_C = 4.5$ V.

Fig.24 Load power as a function of mounting base temperature; BGY110F; typical values.



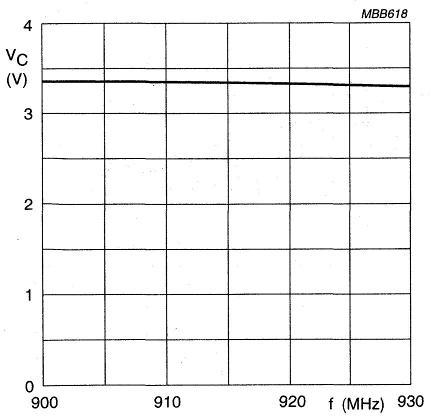
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $T_{mb} = 25$ °C.

Fig.25 Efficiency as a function of load power; BGY110F; typical values.



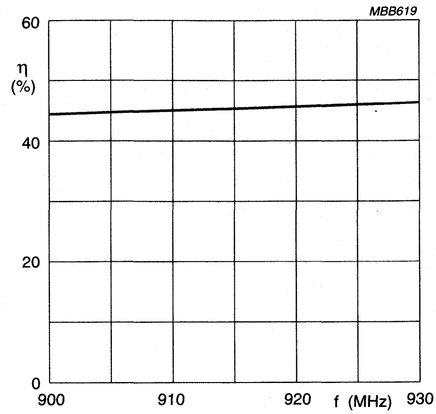
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $V_C = 4.5$ V; $T_{mb} = 25$ °C.

Fig.26 Load power as a function of frequency; BGY110F; typical values.



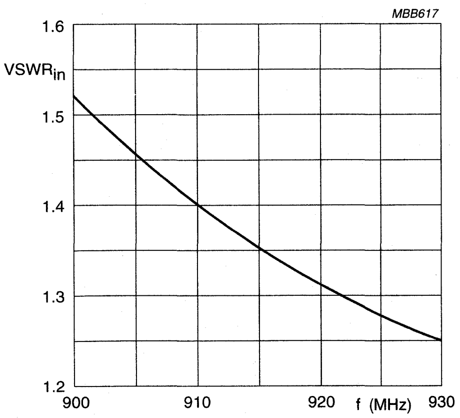
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.27 Control voltage as a function of frequency; BGY110G; typical values.



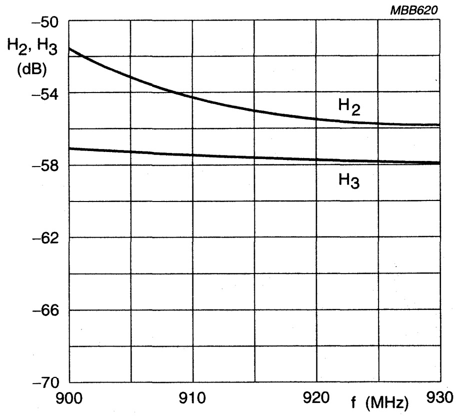
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.28 Efficiency as a function of frequency; BGY110G; typical values.



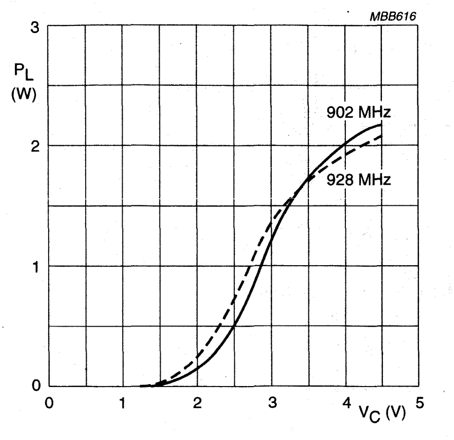
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.29 Input VSWR as a function of frequency; BGY110G; typical values.



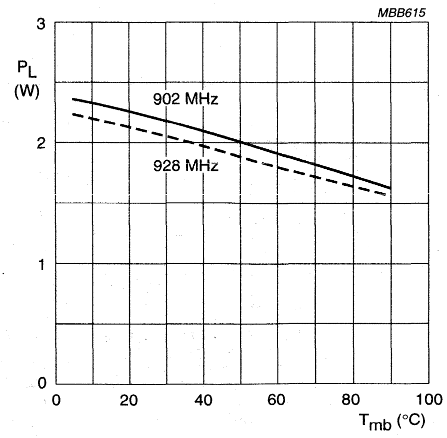
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $P_L = 1.7$ W; $T_{mb} = 25$ °C.

Fig.30 Harmonics as a function of frequency; BGY110G; typical values.



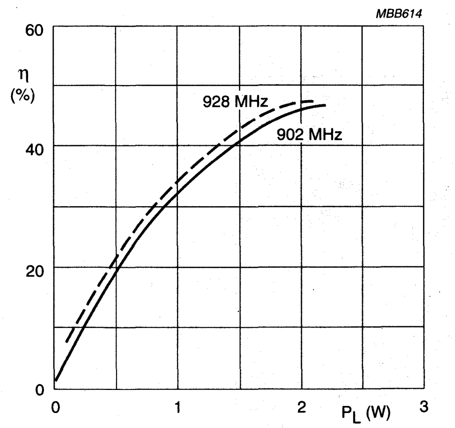
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $T_{mb} = 25$ °C.

Fig.31 Load power as a function of control voltage; BGY110G; typical values.



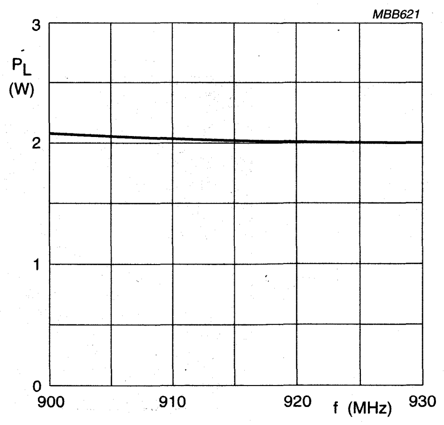
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $V_C = 4.5$ V.

Fig.32 Load power as a function of mounting base temperature; BGY110G; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $T_{mb} = 25$ °C.

Fig.33 Efficiency as a function of load power; BGY110G; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $V_C = 4.5$ V; $T_{mb} = 25$ °C.

Fig.34 Load power as a function of frequency; BGY110G; typical values.

UHF amplifier modules

BGY110D; BGY110E; BGY110F; BGY110G

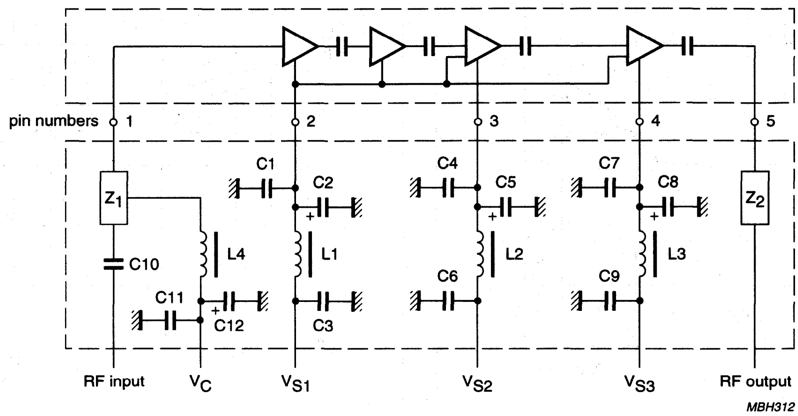


Fig.35 Test circuit.

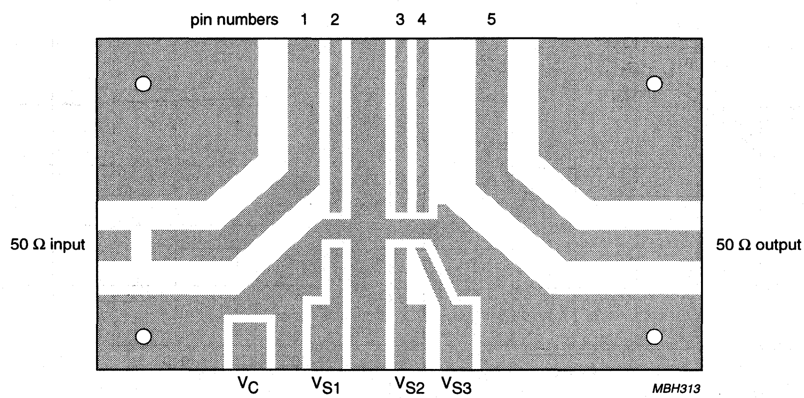


Fig.36 Printed circuit board test-fixture.

List of components (see Fig.35)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C4, C7	multilayer chip capacitor	100 nF		
C2, C5, C8	tantalum capacitor	2.2 μF		
C3, C6, C9	multilayer chip capacitor	33 pF		
C10, C11	multilayer chip capacitor	1 nF		
C12	tantalum capacitor	1 μF		
L1, L2, L3	RF choke, 1 turn copper wire on grade 3B core	22 μH	0.4 mm	4330 030 32221
L4	Ferroxcube coil	5 μH		3122 108 20153
Z_1, Z_2	stripline; note 1	50 Ω		

Note

1. The striplines are on double copper-clad printed circuit board with PTFE dielectric (ε_r = 2.2), thickness $^1/_{16}$ inch.

UHF amplifier modules BGY113A; BGY113B

FEATURES

- 7.5 V nominal supply voltage
- 7 W output power
- Easy control of output power by DC voltage.

APPLICATIONS

- Hand-held communication equipment operating in the frequency bands 400 to 440 MHz and 430 to 470 MHz respectively.

DESCRIPTION

The BGY113A and BGY113B are four-stage UHF amplifier modules in a 7-lead SOT288D package. The modules consist of four 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 7 W into a load of 50 Ω with an RF drive power of 1 mW.

PINNING - SOT288D

PIN	DESCRIPTION
1	RF input
2	V_{S1}
3	V_C
4	V_{S2}
5	V_{S3}
6	V_{S4}
7	RF output
Flange	ground

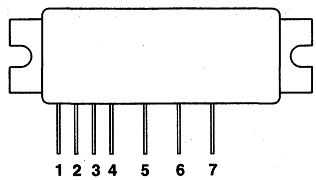


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

TYPE NUMBER	MODE OF OPERATION	f (MHz)	V_S (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
BGY113A	CW	400 to 440	7.5	≥7	≥38.5	≥40	50
BGY113B	CW	430 to 470	7.5	≥7	≥38.5	≥40	50

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

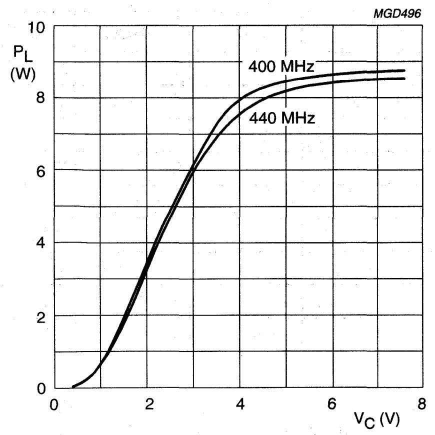
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	9	V
V_{S2}	DC supply voltage	–	9	V
V_{S3}	DC supply voltage	–	9	V
V_{S4}	DC supply voltage	–	9	V
V_C	DC control voltage	–	7.5	V
P_D	input drive power	–	5	mW
P_L	load power	–	9	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–30	+90	°C

CHARACTERISTICS

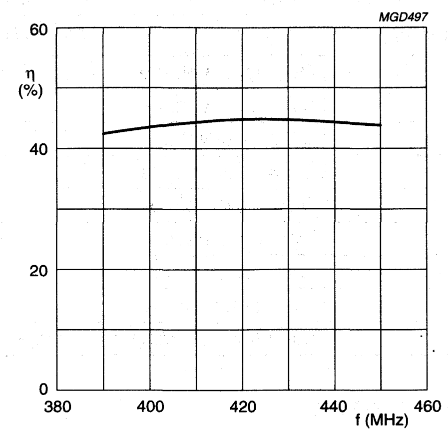
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = V_{S4} = 7.5$ V; $V_C \leq 7.5$ V; $T_{mb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY113A		400	–	440	MHz
	BGY113B		430	–	470	MHz
$I_{Q3} + I_{Q4}$	total leakage current	$V_{S1} = V_{S2} = V_C = 0$; $P_D = 0$	–	–	0.2	mA
P_L	load power	$V_C = 7.5$ V	7	–	–	W
G_p	power gain	adjust V_C for $P_L = 7$ W	38.5	–	–	dB
η	efficiency	adjust V_C for $P_L = 7$ W	40	45	–	%
H_2	second harmonic	adjust V_C for $P_L = 7$ W	–	–	–40	dBc
H_3	third harmonic	adjust V_C for $P_L = 7$ W	–	–	–40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 7$ W	–	–	2 : 1	
	control range	$V_C = 0$ to 7.5 V; $P_D = 1$ mW	10	–	–	dB
	stability	$P_D = 0.5$ to 2 mW; $V_{S1} = V_{S2} = V_{S3} = V_{S4} = 5$ to 9 V; adjust V_C for $P_L \leq 9$ W; VSWR $\leq$ 6 : 1 through all phases	–	–	–60	dBc
	ruggedness	$V_{S1} = V_{S2} = V_{S3} = V_{S4} = 9$ V; adjust V_C for $P_L = 9$ W; VSWR $\leq$ 10 : 1 through all phases	no degradation			



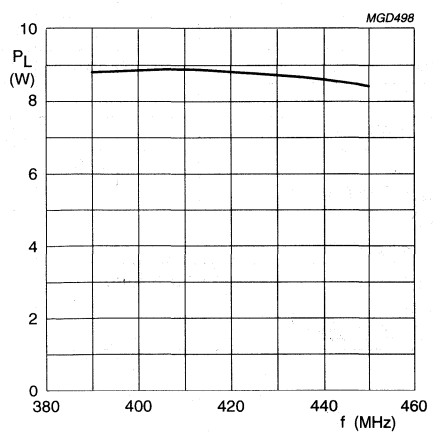
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 7.5$ V; $T_{mb} = 25$ °C.

Fig.2 Load power as a function of control voltage; BGY113A; typical values.



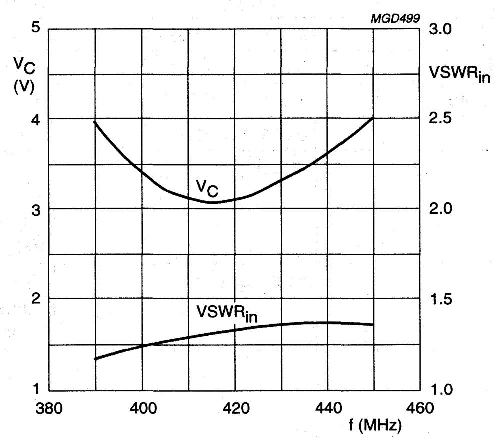
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 7.5$ V; $P_L = 7$ W; $T_{mb} = 25$ °C.

Fig.3 Efficiency as a function of frequency; BGY113A; typical values.



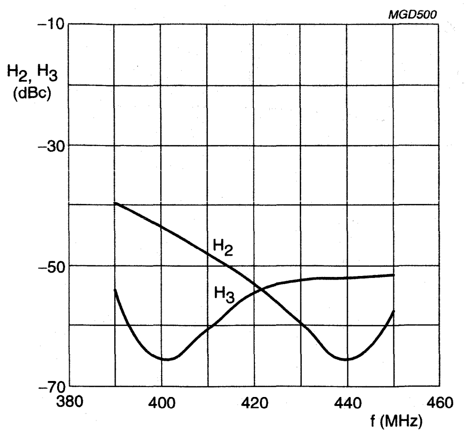
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 7.5$ V; $T_{mb} = 25$ °C.

Fig.4 Load power as a function of frequency; BGY113A; typical values.



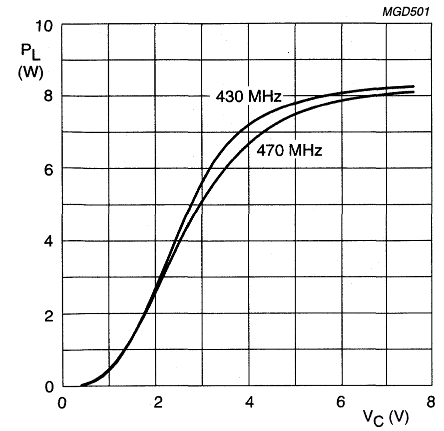
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 7.5$ V; $P_L = 7$ W; $T_{mb} = 25$ °C.

Fig.5 Control voltage and input VSWR as functions of frequency; BGY113A; typical values.



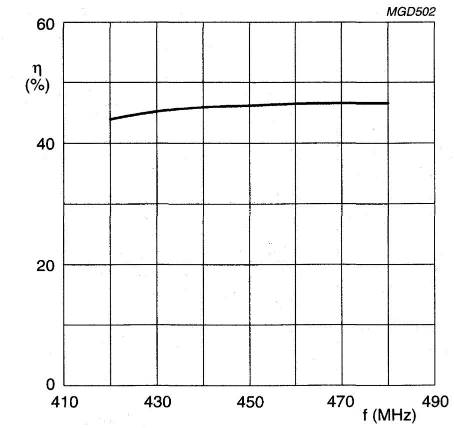
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 7.5$ V; $P_L = 7$ W; $T_{mb} = 25$ °C.

Fig.6 Harmonics as a function of frequency; BGY113A; typical values.



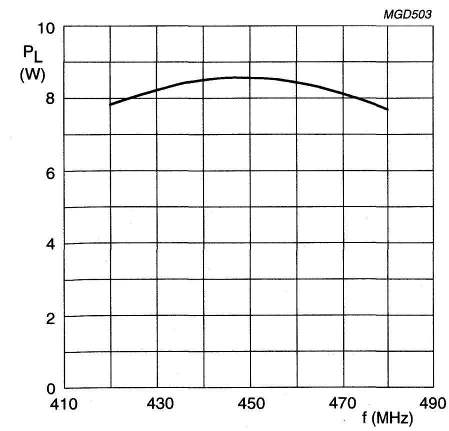
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 7.5$ V; $T_{mb} = 25$ °C.

Fig.7 Load power as a function of control voltage; BGY113B; typical values.



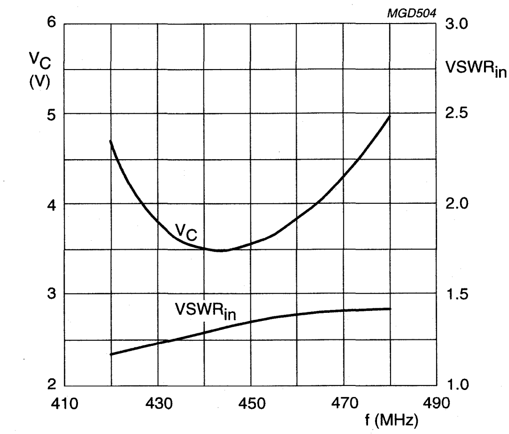
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 7.5$ V; $P_L = 7$ W; $T_{mb} = 25$ °C.

Fig.8 Efficiency as a function of frequency; BGY113B; typical values.



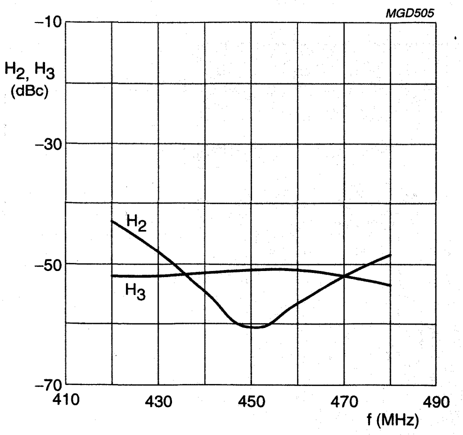
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 7.5$ V; $T_{mb} = 25$ °C.

Fig.9 Load power as a function of frequency; BGY113B; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 7.5$ V; $P_L = 7$ W; $T_{mb} = 25$ °C.

Fig.10 Control voltage and input VSWR as functions of frequency; BGY113B; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 7.5$ V; $P_L = 7$ W; $T_{mb} = 25$ °C.

Fig.11 Harmonics as a function of frequency; BGY113B; typical values.

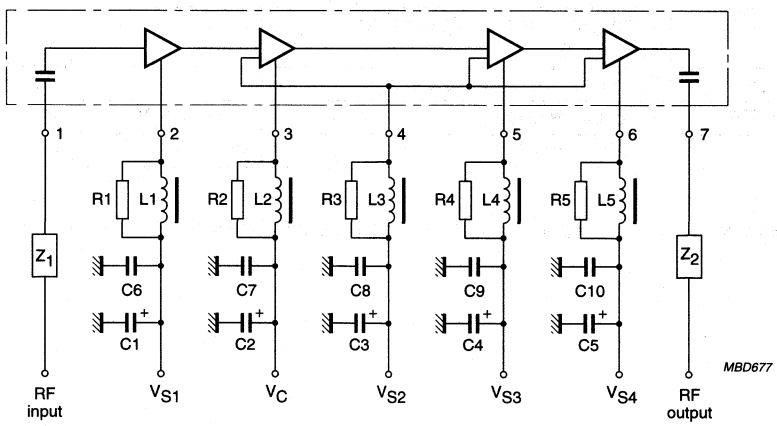
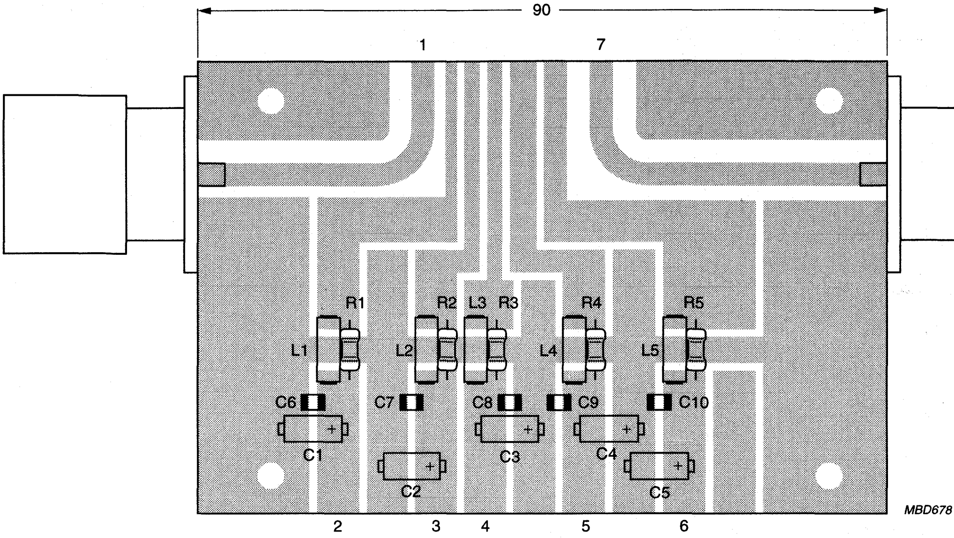


Fig.12 Test circuit.



Dimensions in mm.

Fig.13 Printed-circuit board component layout.

List of components (see Figs 12 and 13)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C2, C3, C4, C5	electrolytic capacitor	1 µF; 63 V	2222 085 68108
C6, C7, C8, C9, C10	multilayer ceramic chip capacitor; X7R, 0805	18 nF	2222 910 16739
L1, L2, L3, L4, L5	Grade 4S2 Ferroxcube bead		4330 030 36300
R1, R2, R3, R4, R5	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 = 4.7); thickness = $^1/_{16}$ inch.

UHF amplifier modules BGY113E; BGY113F; BGY113G

FEATURES

- 6 V nominal supply voltage
- 3.5 W output power
- Easy control of output power by DC voltage.

APPLICATIONS

- Hand-held communication equipment operating in the 400 to 440 MHz, 430 to 470 MHz and 470 to 520 MHz frequency ranges.

DESCRIPTION

The BGY113E, BGY113F and BGY113G are four-stage UHF amplifier modules in a 7-lead SOT288D package. The modules consist of four 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 3.5 W into a load of 50 Ω with an RF drive power of 1 mW.

PINNING - SOT288D

PIN	DESCRIPTION
1	RF input
2	V_{S1}
3	V_C
4	V_{S2}
5	V_{S3}
6	V_{S4}
7	RF output
Flange	ground

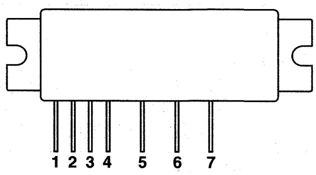


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

TYPE NUMBER	MODE OF OPERATION	f (MHz)	V_S (V)	P_L (W)	G_P (dB)	η (%)	Z_S, Z_L (Ω)
BGY113E	CW	400 to 440	6	3.5	≥35.5	≥40	50
BGY113F	CW	430 to 470	6	3.5	≥35.5	≥40	50
BGY113G	CW	470 to 520	6	3.5	≥35.5	≥38	50

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

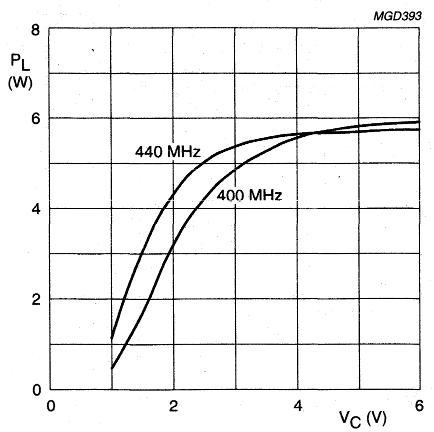
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	9	V
V_{S2}	DC supply voltage	–	9	V
V_{S3}	DC supply voltage	–	9	V
V_{S4}	DC supply voltage	–	9	V
V_C	DC control voltage	–	7.5	V
P_D	input drive power	–	5	mW
P_L	load power	–	4	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–30	+90	°C

CHARACTERISTICS

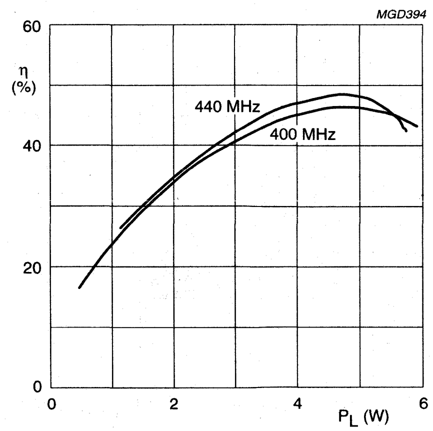
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = V_{S4} = 6$ V; $V_C \leq 6$ V; $T_{mb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY113E		400	–	440	MHz
	BGY113F		430	–	470	MHz
	BGY113G		470	–	520	MHz
$I_{Q3} + I_{Q4}$	total leakage current	$V_{S1} = V_{S2} = V_C = 0$; $P_D = 0$	–	–	0.2	mA
P_L	load power	$V_C = 6$ V	3.5	–	–	W
G_P	power gain	adjust V_C for $P_L = 3.5$ W	35.5	–	–	dB
η	efficiency	adjust V_C for $P_L = 3.5$ W				
	BGY113E		40	45	–	%
	BGY113F		40	45	–	%
	BGY113G		38	43	–	%
H_2	second harmonic	adjust V_C for $P_L = 3.5$ W	–	–	–40	dBc
H_3	third harmonic	adjust V_C for $P_L = 3.5$ W	–	–	–40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 3.5$ W	–	–	2 : 1	
	control range	$V_C = 0$ to 6 V; $P_D = 1$ mW	10	–	–	dB
	stability	$P_D = 0.5$ to 2 mW; $V_{S1} = V_{S2} = V_{S3} = V_{S4} = 5$ to 9 V; $V_C = 0$ to 6 V; adjust V_C for $P_L \leq 4$ W; VSWR ≤ 6 : 1 through all phases	–	–	–60	dBc
	ruggedness	$V_{S1} = V_{S2} = V_{S3} = V_{S4} = 9$ V; adjust V_C for $P_L = 4$ W; VSWR ≤ 10 : 1 through all phases	no degradation			



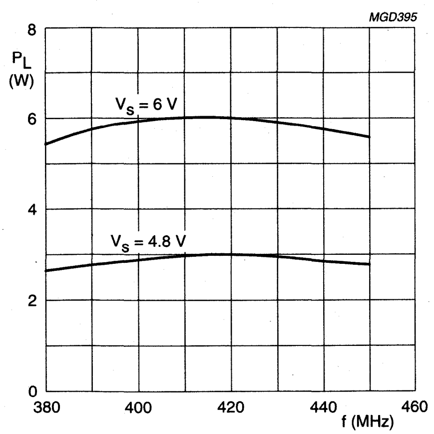
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.2 Load power as a function of control voltage; BGY113E; typical values.



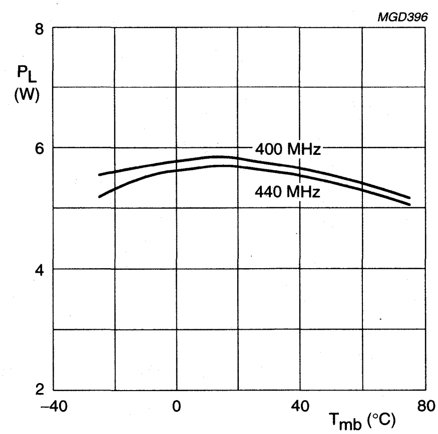
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.3 Efficiency as a function of load power; BGY113E; typical values.



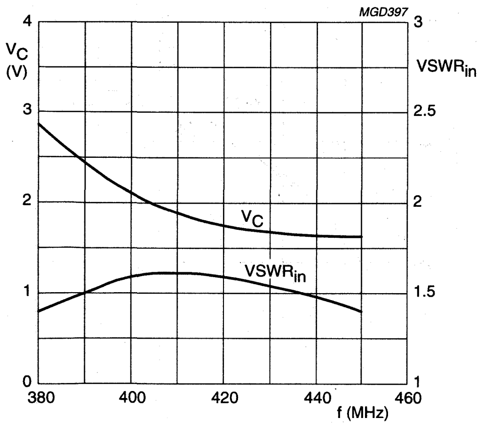
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 6$ V; $T_{mb} = 25$ °C.

Fig.4 Load power as a function of frequency; BGY113E; typical values.



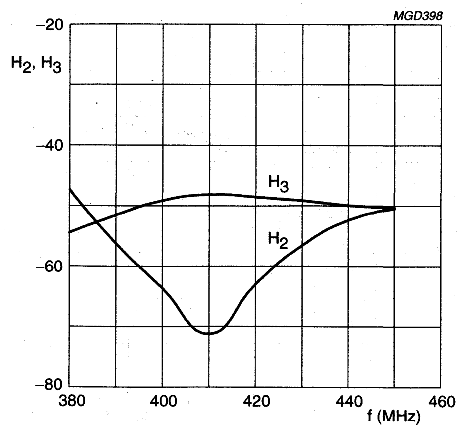
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $V_C = 6$ V.

Fig.5 Load power as a function of mounting base temperature; BGY113E; typical values.



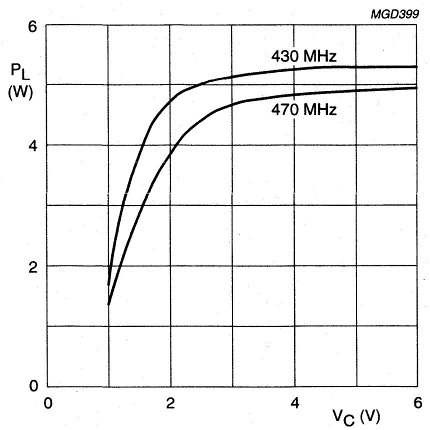
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $P_L = 3.5$ W; $T_{mb} = 25$ °C.

Fig.6 Control voltage and input VSWR as functions of frequency; BGY113E; typical values.



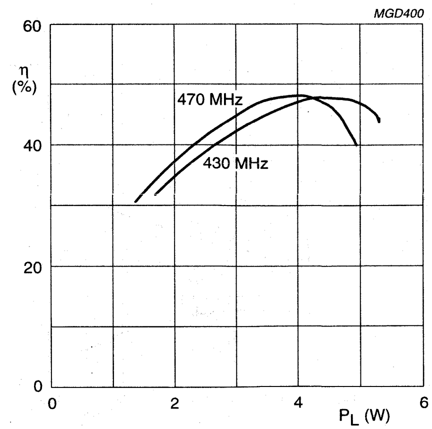
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $P_L = 3.5$ W; $T_{mb} = 25$ °C.

Fig.7 Harmonics as a function of frequency; BGY113E; typical values.



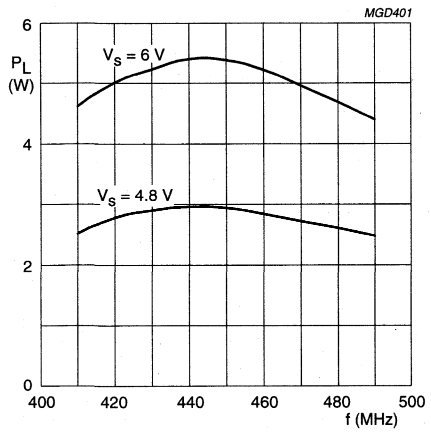
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.8 Load power as a function of control voltage; BGY113F; typical values.



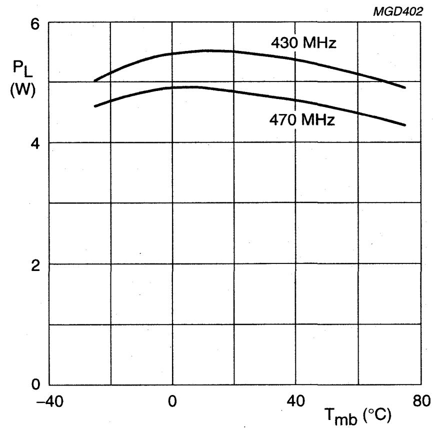
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.9 Efficiency as a function of load power; BGY113F; typical values.



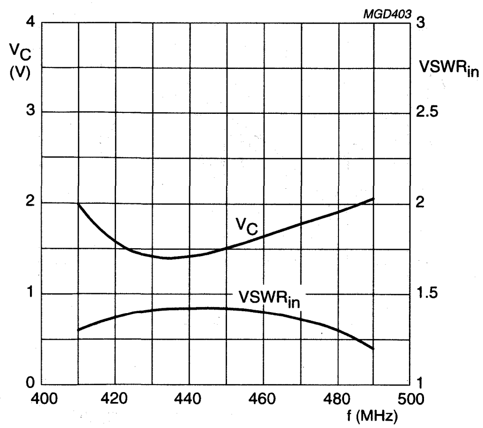
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 6$ V; $T_{mb} = 25$ °C.

Fig.10 Load power as a function of frequency; BGY113F; typical values.



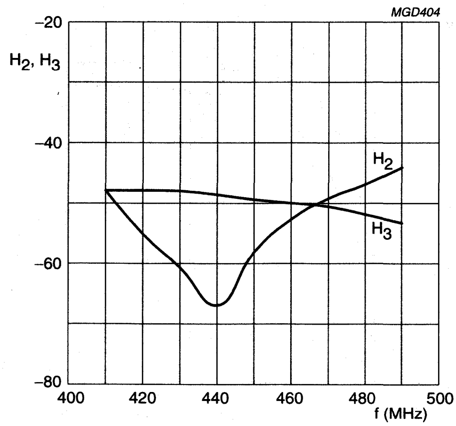
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $V_C = 6$ V.

Fig.11 Load power as a function of mounting base temperature; BGY113F; typical values.



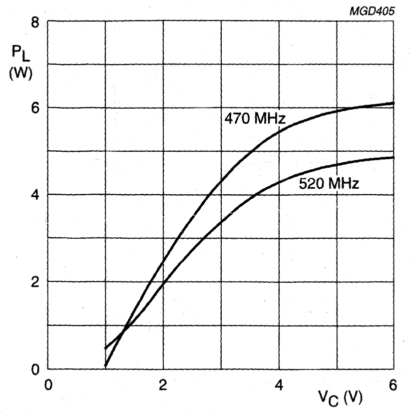
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $P_L = 3.5$ W; $T_{mb} = 25$ °C.

Fig.12 Control voltage and input VSWR as functions of frequency; BGY113F; typical values.



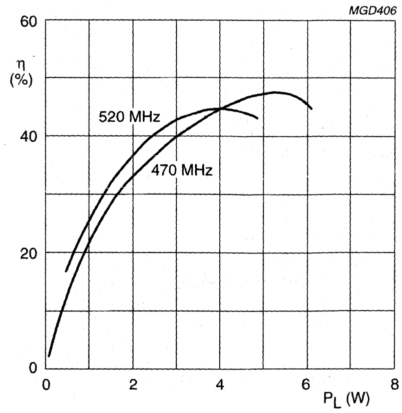
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $P_L = 3.5$ W; $T_{mb} = 25$ °C.

Fig.13 Harmonics as a function of frequency; BGY113F; typical values.



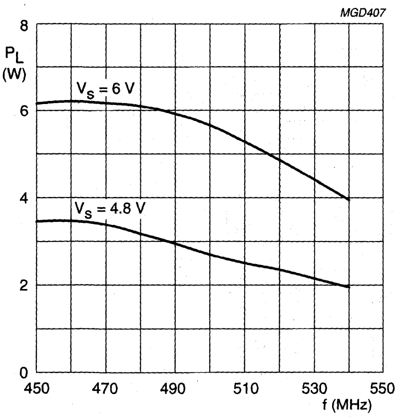
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.14 Load power as a function of control voltage; BGY113G; typical values.



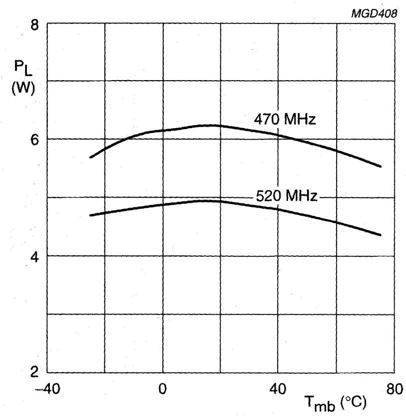
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.15 Efficiency as a function of load power; BGY113G; typical values.



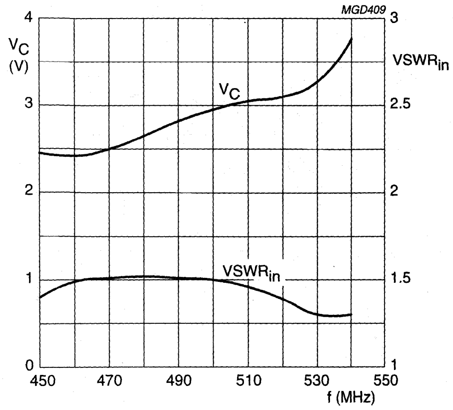
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 6$ V; $T_{mb} = 25$ °C.

Fig.16 Load power as a function of frequency; BGY113G; typical values.



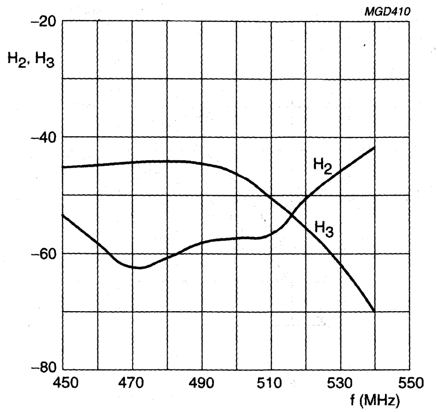
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $V_C = 6$ V.

Fig.17 Load power as a function of mounting base temperature; BGY113G; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $P_L = 3.5$ W; $T_{mb} = 25$ °C.

Fig.18 Control voltage and input VSWR as functions of frequency; BGY113G; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 6$ V; $P_L = 3.5$ W; $T_{mb} = 25$ °C.

Fig.19 Harmonics as a function of frequency; BGY113G; typical values.

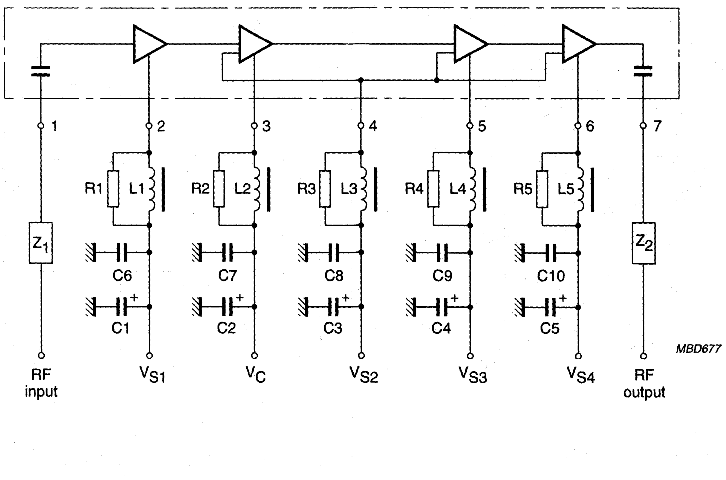
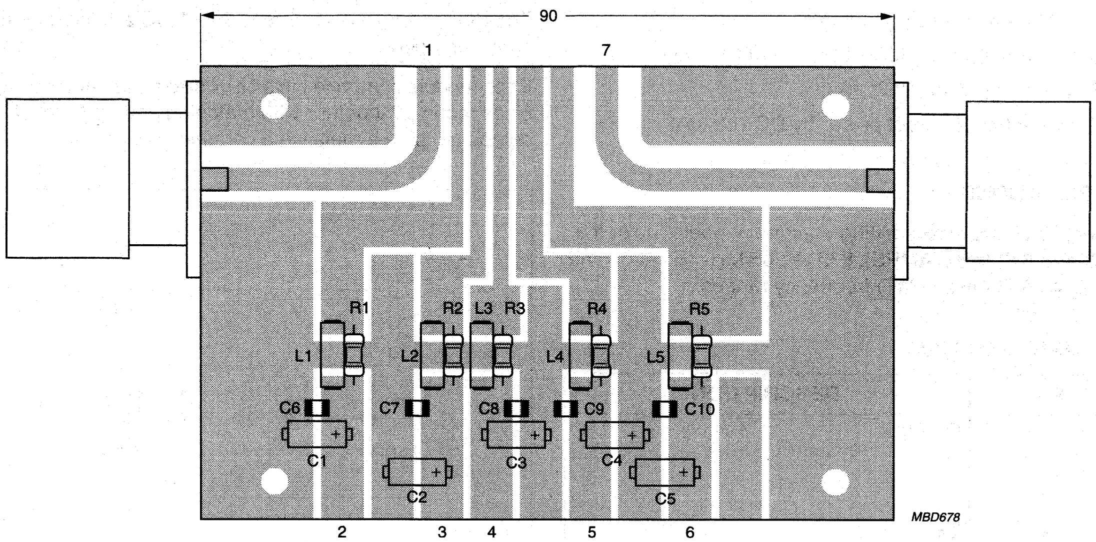


Fig.20 Test circuit.



Dimensions in mm.

Fig.21 Printed circuit-board layout.

List of components (see Figs 20 and 21)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C2, C3, C4, C5	electrolytic capacitor	1 µF; 63 V	2222 085 68108
C6, C7, C8, C9, C10	multilayer ceramic chip capacitor; X7R, 0805	18 nF	2222 910 16739
L1, L2, L3, L4, L5	Grade 4S2 Ferroxcube bead		4330 030 36300
R1, R2, R3, R4, R5	metal film resistor	0.4 W; 10 Ω	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 = 4.7); thickness = $^1/_{16}$ inch.

UHF amplifier modules — BGY114A; BGY114B; BGY114C

FEATURES

- 12.5 V nominal supply voltage
- 6 W output power (BGY114A and BGY114B)
- 8 W output power (BGY114C)
- Easy control of output power by DC voltage.

APPLICATIONS

- Mobile cellular transmitting equipment operating in the 824 to 849 MHz (AMPS), 872 to 905 MHz (ETACS) and 890 to 915 MHz (NMT) frequency ranges.

PINNING - SOT278A

PIN	DESCRIPTION
1	RF input
2	V_{S1}
3	V_C
4	V_{S2}
5	RF output
flange	ground

DESCRIPTION

The BGY114A, BGY114B and BGY114C are five-stage amplifier modules.

Each module comprises five NPN silicon planar transistor chips mounted together with matching and bias circuit components on a metallized ceramic substrate.

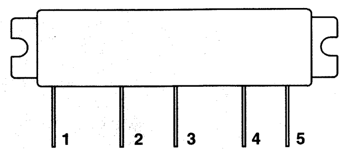


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

TYPE NUMBER	MODE OF OPERATION	f (MHz)	V_{S1} (V)	V_{S2} (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
BGY114A	CW	824 to 849	8	12.5	6	≥37.8	typ. 40	50
BGY114B	CW	872 to 905	8	12.5	6	≥37.8	typ. 40	50
BGY114C	CW	890 to 915	8	12.5	8	≥39	typ. 40	50

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	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	9	V
V_{S2}	DC supply voltage	–	16	V
V_C	DC control voltage	–	9	V
P_D	input drive power	–	3	mW
P_L	load power	–	10	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–30	+100	°C

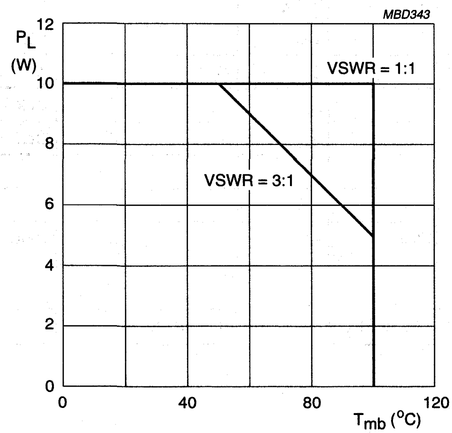


Fig.2 Power derating curve.

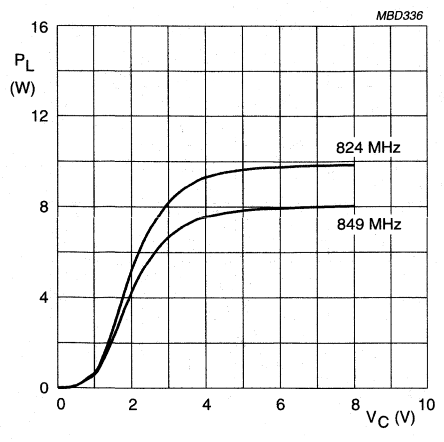
CHARACTERISTICS

T_{mb} = 25 °C; Z_S = Z_L = 50 Ω; P_D = 1 mW; V_{S1} = 8 V; V_{S2} = 12.5 V; V_C ≤ 8 V; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY114A		824	–	849	MHz
	BGY114B		872	–	905	MHz
	BGY114C		890	–	915	MHz
I_{Q5}	final stage leakage current	V_{S1} = V_C = 0; P_D = 0	–	–	1	mA
P_L	load power					
	BGY114A		6	–	–	W
	BGY114B		6	–	–	W
	BGY114C		8	–	–	W
G_p	power gain	note 1				
	BGY114A		37.8	–	–	dB
	BGY114B		37.8	–	–	dB
	BGY114C		39	–	–	dB
η	efficiency	note 1	35	40	–	%
H_2	second harmonic	note 1	–	–	−35	dBc
H_3	third harmonic	note 1	–	–	−35	dBc
$VSWR_{in}$	input VSWR	note 1	–	–	2 : 1	
ΔG	gain control	V_C = 0 to 8 V	30	–		dB
	stability	V_C = 0 to 8 V; VSWR ≤ 3 : 1; V_{S2} = 10 to 16 V; note 2; P_D = −3 to +3 dBm	–	–	−60	dBc
	ruggedness	V_{S2} = 16 V; VSWR ≤ 20 : 1; note 2	no degradation			

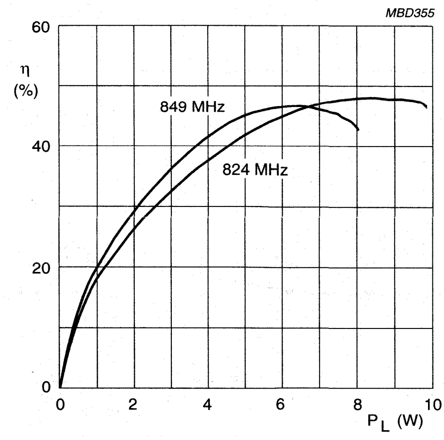
Notes

1. Adjust V_C for P_L = 6 W (BGY114A, BGY114B); P_L = 8 W (BGY114C).
2. Adjust V_C for P_L ≤ 7 W (BGY114A, BGY114B); P_L ≤ 9 W (BGY114C).



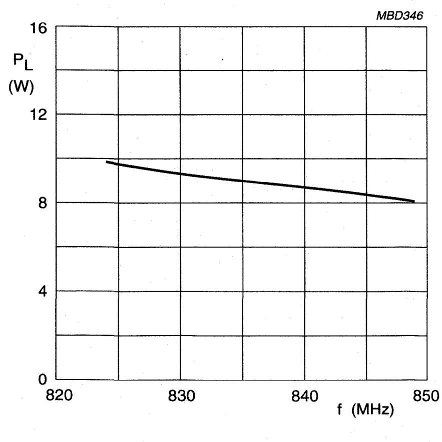
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25\ ^{\circ}C$.

Fig.3 Load power as a function of control voltage; BGY114A; typical values.



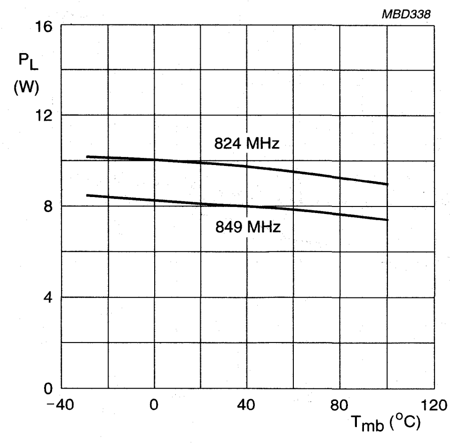
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C \leq 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25\ ^{\circ}C$.

Fig.4 Efficiency as a function of load power; BGY114A; typical values.



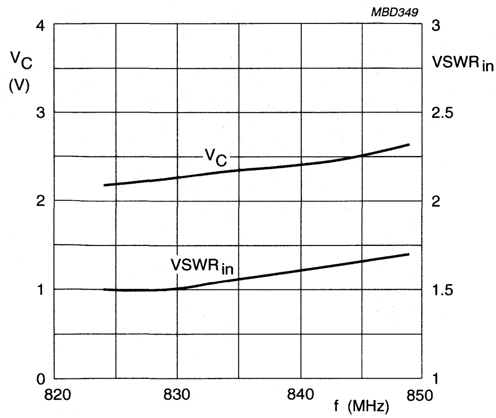
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25\ ^{\circ}C$.

Fig.5 Load power as a function of frequency; BGY114A; typical values.



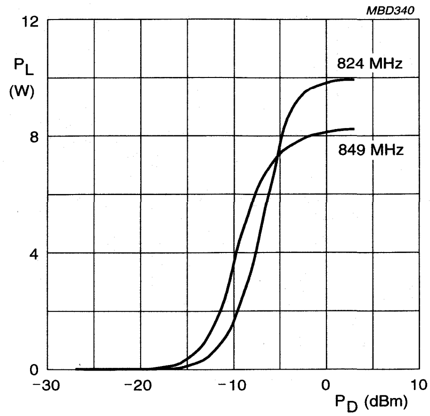
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V.

Fig.6 Load power as a function of mounting base temperature; BGY114A; typical values.



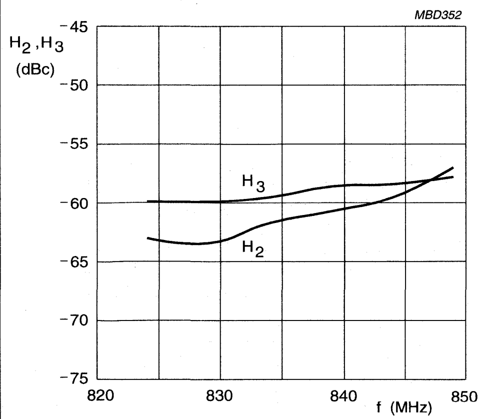
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $P_L = 6$ W; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.7 Control voltage and VSWR input as functions of frequency; BGY114A; typical values.



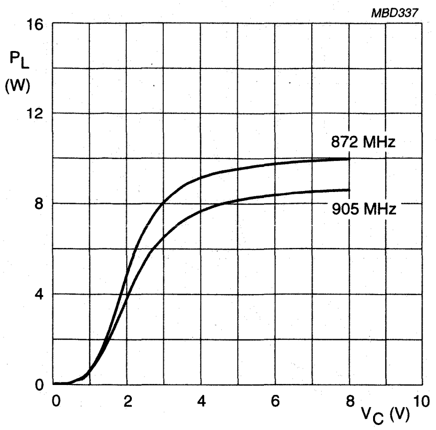
$Z_S = Z_L = 50\ \Omega$; $V_C = 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.8 Load power as a function of drive power; BGY114A; typical values.



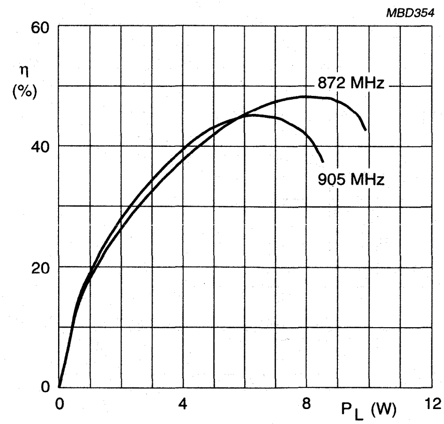
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $P_L = 6$ W; $V_C \leq 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.9 Harmonics as functions of frequency; BGY114A; typical values.



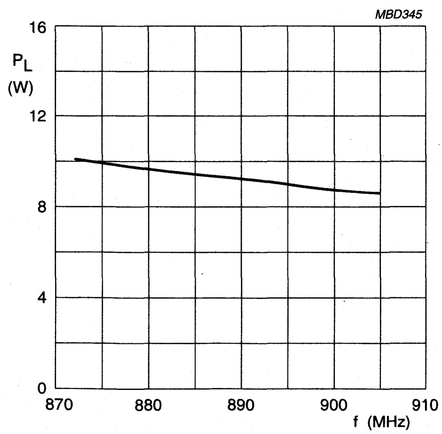
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C \leq 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.10 Load power as a function of control voltage; BGY114B; typical values.



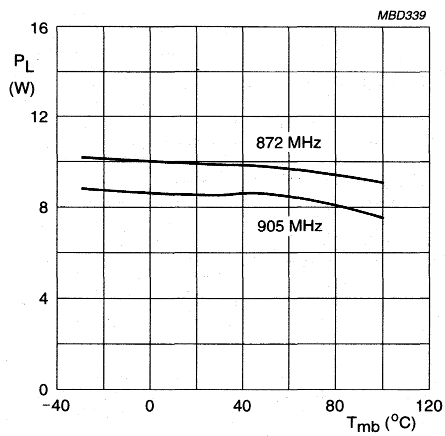
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C \leq 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.11 Efficiency as a function of load power; BGY114B; typical values.



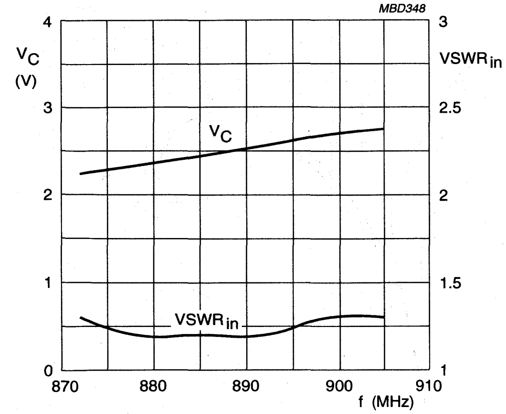
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.12 Load power as a function of frequency; BGY114B; typical values.



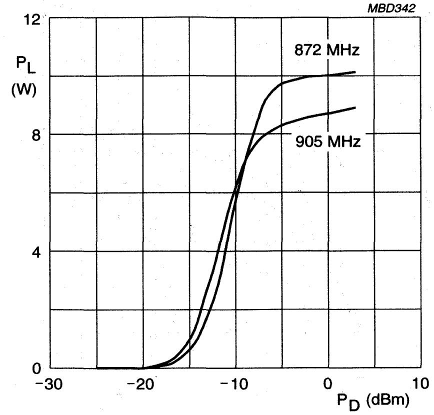
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V.

Fig.13 Load power as a function of mounting base temperature; BGY114B; typical values.



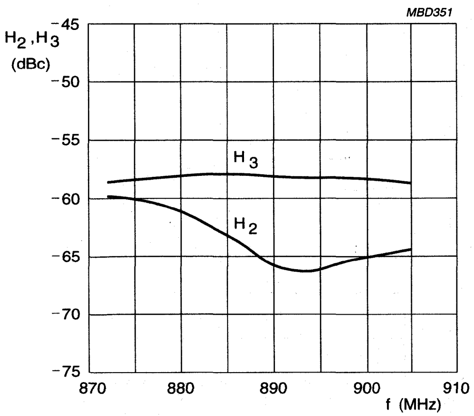
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $P_L = 6$ W; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.14 Control voltage and VSWR input as functions of frequency; BGY114B; typical values.



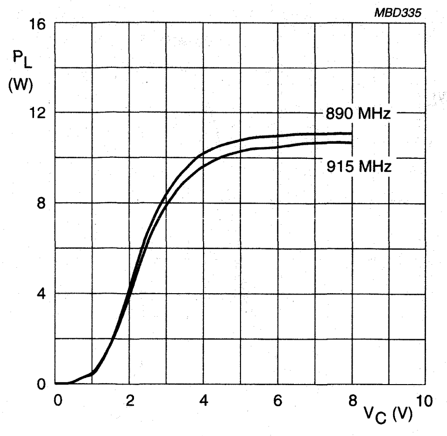
$Z_S = Z_L = 50\ \Omega$; $V_C = 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.15 Load power as a function of drive power; BGY114B; typical values.



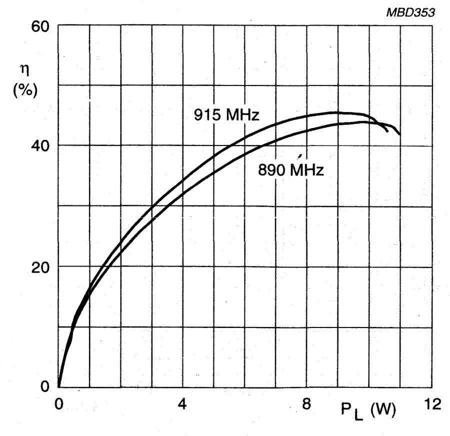
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $P_L = 6$ W; $V_C \leq 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.16 Harmonics as functions of frequency; BGY114B; typical values.



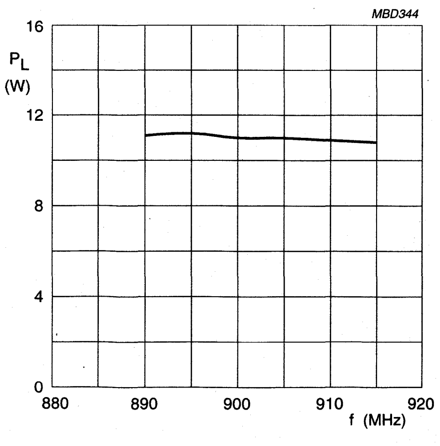
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.17 Load power as a function of control voltage; BGY114C; typical values.



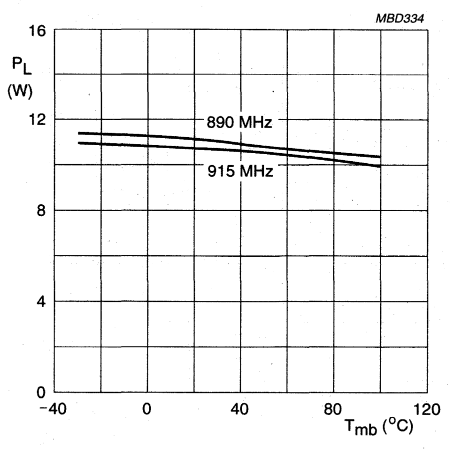
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C \leq 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.18 Efficiency as a function of load power; BGY114C; typical values.



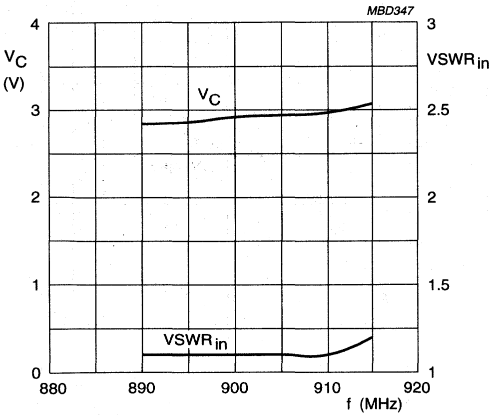
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.19 Load power as a function of frequency; BGY114C; typical values.



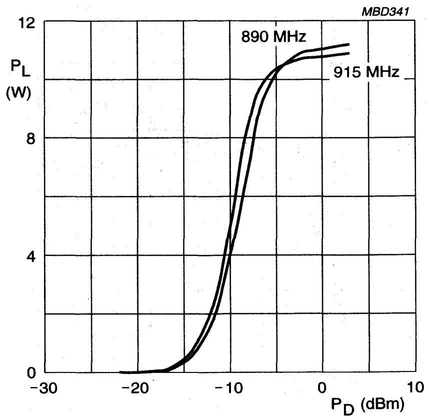
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V.

Fig.20 Load power as a function of mounting base temperature; BGY114C; typical values.



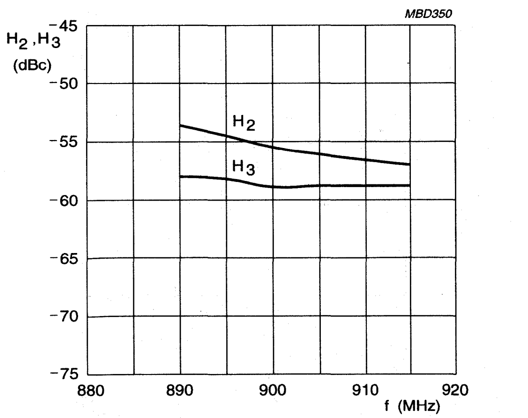
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $P_L = 6$ W; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.21 Control voltage and VSWR input as functions of frequency; BGY114C, typical values.



$Z_S = Z_L = 50\ \Omega$; $V_C = 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.22 Load power as a function of drive power; BGY114C, typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $P_L = 6$ W; $V_C \leq 8$ V; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $T_{mb} = 25$ °C.

Fig.23 Harmonics as functions of frequency; BGY114C, typical values.

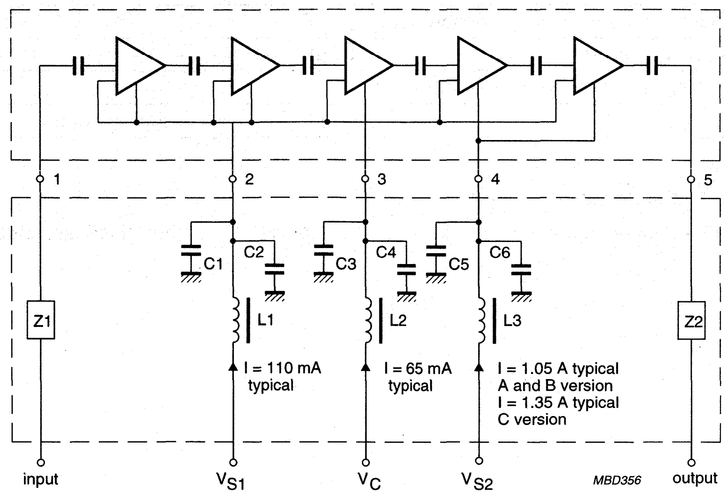
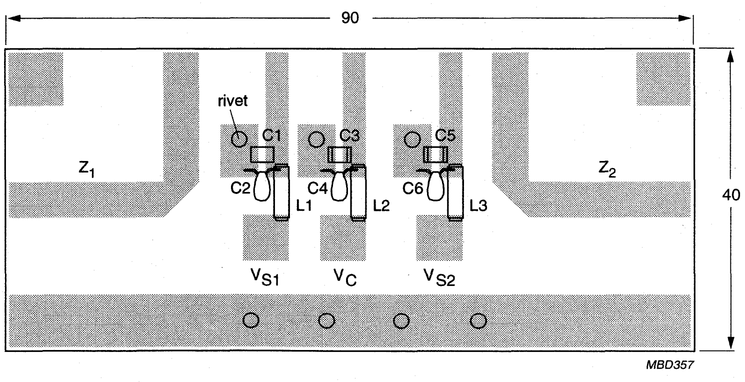


Fig.24 Test circuit.



Dimensions in mm.

Fig.25 Printed-circuit board layout.

List of components (Figs 24 and 25)

COMPONENT	DESCRIPTION	VALUE	DIMENSION	CATALOGUE NO.
C1, C3, C5	multilayer ceramic chip capacitor; note 1	1 nF	–	–
C2, C4, C6	tantalum capacitor	1 μF; 35 V	–	–
L1, L2, L3	Ferroxcube chip bead; grade 4S2	–	–	4330 030 36300
Z1, Z2	stripline; note 2	50 Ω	width 4.7 mm	–

Notes

1. ATC capacitor type 100B or capacitor of same quality.
2. The striplines are on a double copper-clad printed-circuit board with PTFE fibre-glass dielectric ($\varepsilon_r = 2.2$); thickness $1/16$ inch.

UHF amplifier modules

BGY114D; BGY114E

FEATURES

- 12.5 V nominal supply voltage
- 6 W output power
- Easy control of output power by DC voltage.

APPLICATIONS

- Personal Mobile Radio (PMR) equipment operating in the 800 to 870 MHz and 890 to 950 MHz frequency ranges.

DESCRIPTION

The BGY114D and BGY114E are five-stage UHF amplifier modules in a SOT278A package. Each module consists of 5 NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT278A

PIN	DESCRIPTION
1	RF input
2	V_{S1}
3	V_C
4	V_{S2}
5	RF output
Flange	ground

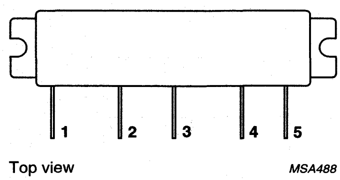


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

TYPE NUMBER	MODE OF OPERATION	f (MHz)	V_{S1} (V)	V_{S2} (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
BGY114D	CW	800 to 870	8	12.5	6	≥37.8	typ. 40	50
BGY114E	CW	890 to 950	8	12.5	6	≥37.8	typ. 40	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	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	9	V
V_{S2}	DC supply voltage	–	16	V
V_C	DC control voltage	–	9	V
P_D	input drive power	–	3	mW
P_L	load power	–	10	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–30	+100	°C

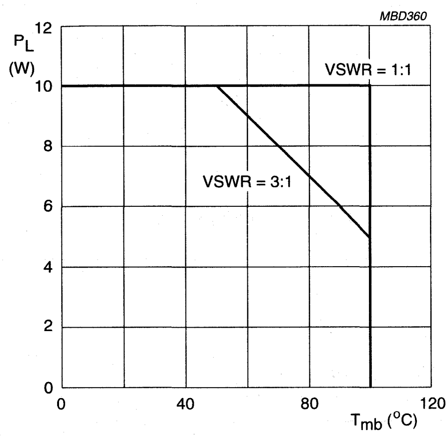


Fig.2 Power derating curve.

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = 8$ V; $V_{S2} = 12.5$ V; $V_C \leq 8$ V; $T_{mb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY114D		800	–	870	MHz
	BGY114E		890	–	950	MHz
I_{Q3}	leakage current	$V_{S1} = V_C = 0$; $P_D = 0$	–	–	1	mA
P_L	load power		6	–	–	W
G_p	power gain	adjust V_C for $P_L = 6$ W	37.8	–	–	dB
η	efficiency	adjust V_C for $P_L = 6$ W	30	40	–	%
H_2	second harmonic	adjust V_C for $P_L = 6$ W	–	–	–35	dBc
H_3	third harmonic	adjust V_C for $P_L = 6$ W	–	–	–35	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 6$ W	–	–	3 : 1	
ΔG	gain control	$V_C = 0$ to 8 V	30	–	–	dB
	stability	$P_D = -3$ to +3 dBm; $V_{S2} = 10$ to 16 V; $V_C = 0$ to 8 V; $P_L \leq 7$ W; VSWR ≤ 3 : 1	–	–	–60	dBc
	ruggedness	$V_{S2} = 16$ V; $P_L \leq 7$ W, duration 1 minute; VSWR ≤ 20 : 1	no degradation			

List of components (see Fig.3)

COMPONENT	DESCRIPTION	VALUE	DIMENSION	CATALOGUE NO.
C1, C3, C5	multilayer ceramic chip capacitor; note 1	1 nF	–	–
C2, C4, C6	tantalum capacitor	1 µF; 35 V	–	–
L1, L2, L3	Ferroxcube chip bead; grade 4S2	–	–	4330 030 36300
Z_1, Z_2	stripline; note 2	50 Ω	width 4.7 mm	–

Notes

1. ATC capacitor type 100B or capacitor of same quality.
2. The striplines are on a double copper-clad printed-circuit board with PTFE fibre-glass dielectric ($\varepsilon_r = 2.2$); thickness $\frac{1}{16}$ inch.

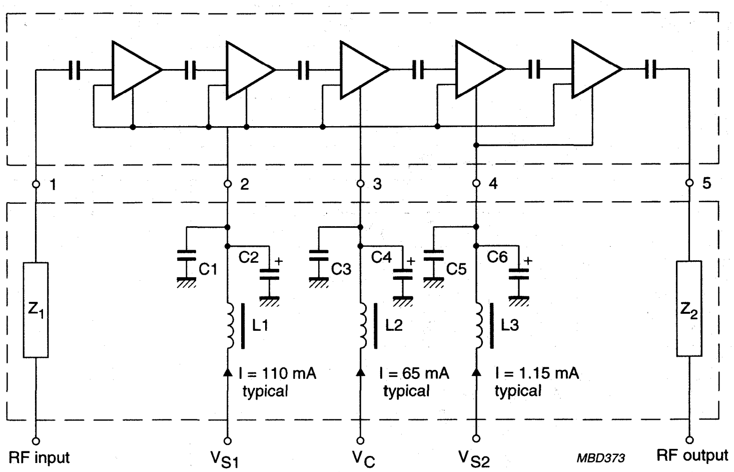
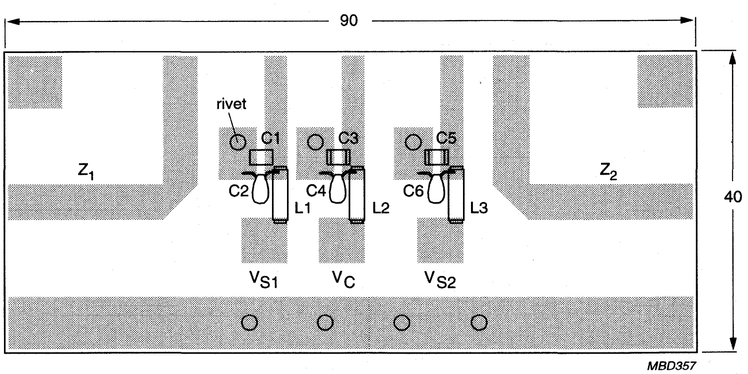


Fig.3 Test circuit.



Dimensions in mm.

Fig.4 Printed-circuit board component layout.

UHF amplifier modules

BGY115A; BGY115B; BGY115C/P; BGY115D

FEATURES

- 6 V nominal supply voltage
- 1.2 W output power (BGY115A, BGY115B and BGY115D)
- 1.4 W output power (BGY115C/P)
- Easy control of output power by DC voltage
- SMD outline.

APPLICATIONS

- Hand-held transmitting equipment operating in the 824 to 849 MHz, 872 to 905 MHz, 890 to 915 MHz and 902 to 928 MHz frequency ranges respectively.

DESCRIPTION

The BGY115A, BGY115B, BGY115C/P and BGY115D are three-stage UHF amplifier modules. Each module consists of three NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT321A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

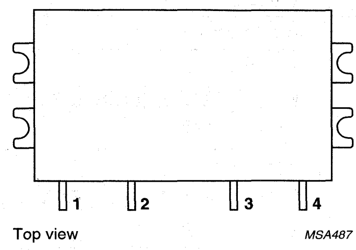


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

TYPE NUMBER	MODE OF OPERATION	f (MHz)	V_S (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
BGY115A	CW	824 to 849	6	1.2	≥27.8	typ. 50	50
BGY115B	CW	872 to 905	6	1.2	≥27.8	typ. 50	50
BGY115C/P	CW	890 to 915	6	1.4	≥28.5	typ. 50	50
BGY115D	CW	902 to 928	6	1.2	≥27.8	typ. 50	50

LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage			
	BGY115A, BGY115B, BGY115D	–	8.5	V
	BGY115C/P	–	9	V
V_C	DC control voltage	–	4	V
P_D	input drive power	–	5	mW
P_L	load power			
	BGY115A, BGY115B, BGY115D	–	1.6	W
	BGY115C/P	–	1.8	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–30	+100	°C

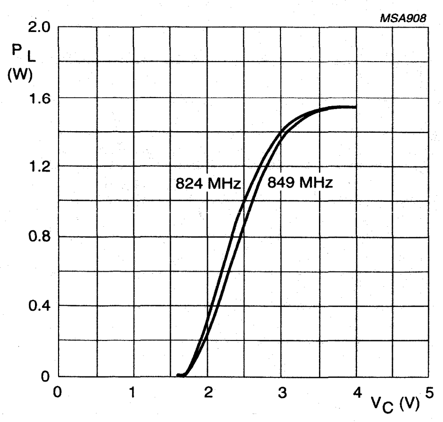
CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ 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					
	BGY115A		824	–	849	MHz
	BGY115B		872	–	905	MHz
	BGY115C/P		890	–	915	MHz
	BGY115D		902	–	928	MHz
I_Q	leakage current	$V_C = 0$; $P_D < -60$ dBm	–	–	100	μA
I_C	control current	note 1	–	–	500	μA
P_L	load power					
	BGY115A, BGY115B, BGY115D		1.2	–	–	W
	BGY115C/P		1.4	–	–	W
G_p	power gain	note 1				
	BGY115A, BGY115B, BGY115D		27.8	–	–	dB
	BGY115C/P		28.5	–	–	dB
η	efficiency	note 1	45	50	–	%
H_2	second harmonic	note 1	–	–	−40	dBc
H_3	third harmonic	note 1	–	–	−40	dBc
$VSWR_{in}$	input VSWR	note 1	–	–	3 : 1	
	stability	$P_D = 0$ to 6 dBm; $V_S = 4.8$ to 8.5 V; $V_C = 0$ to 3.5 V; VSWR ≤ 6 : 1 through all phases; note 2	–	–	−60	dBc
	isolation	$V_C = 0$	–	–	−40	dBm
P_n	noise power	bandwidth = 30 kHz; 45 MHz above f_0; note 1	–	–	−90	dBm
	ruggedness	note 3	no degradation			

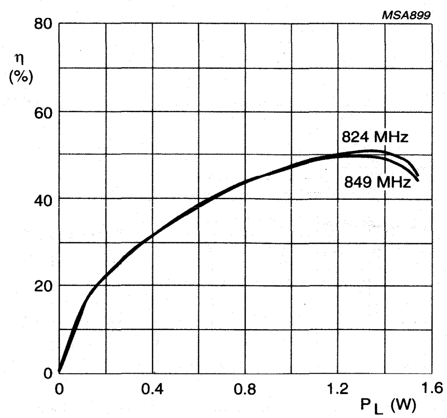
Notes

1. Adjust V_C for $P_L = 1.2$ W (BGY115A, BGY115B and BGY115D); $P_L = 1.4$ W (BGY115C/P).
2. Adjust V_C for $P_L \leq 1.2$ W (BGY115A, BGY115B and BGY115D); $P_L \leq 1.4$ W, $V_S = 4.8$ to 8 V (BGY115C/P).
3. Adjust V_C for $P_L = 1.6$ W; $V_S = 8.5$ V; VSWR ≤ 10 : 1; (BGY115A, BGY115B and BGY115D). Adjust V_C for $P_L = 1.6$ W; $V_S = 9$ V, VSWR ≤ 6 : 1 (BGY115C/P).



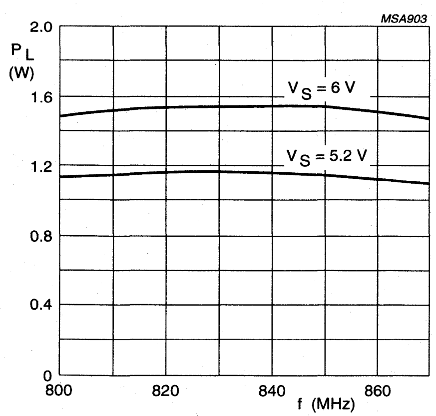
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.2 Load power as a function of control voltage; BGY115A; typical values.



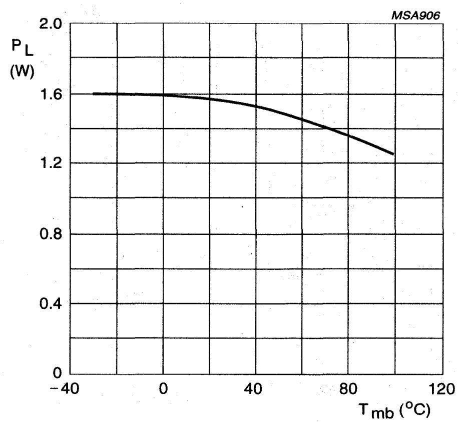
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.3 Efficiency as a function of load power; BGY115A; typical values.



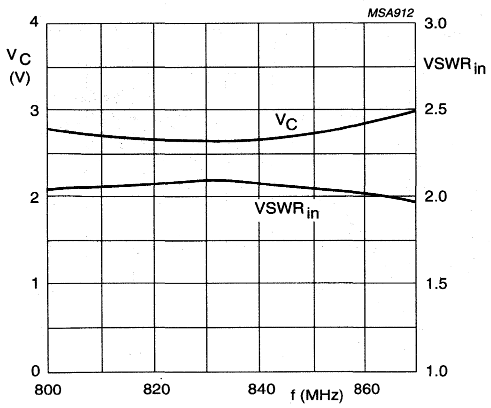
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3.5$ V; $T_{mb} = 25$ °C.

Fig.4 Load power as a function of frequency; BGY115A; typical values.



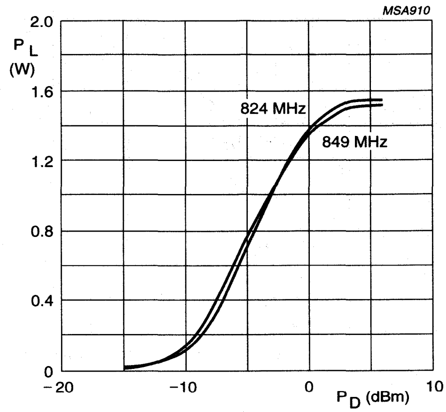
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $V_C = 3.5$ V; $T_{mb} = 25$ °C.

Fig.5 Load power as a function of mounting base temperature; BGY115A; typical values.



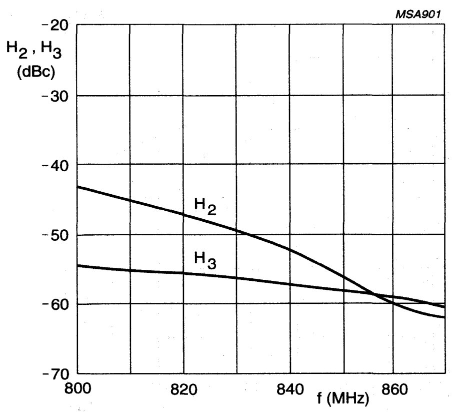
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.6 Control voltage and input VSWR as functions of frequency; BGY115A; typical values.



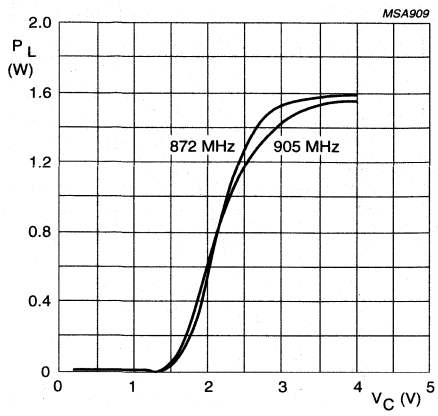
$Z_S = Z_L = 50\ \Omega$; $V_S = 6$ V; $V_C = 3.5$ V; $T_{mb} = 25$ °C.

Fig.7 Load power as a function of drive power; BGY115A; typical values.



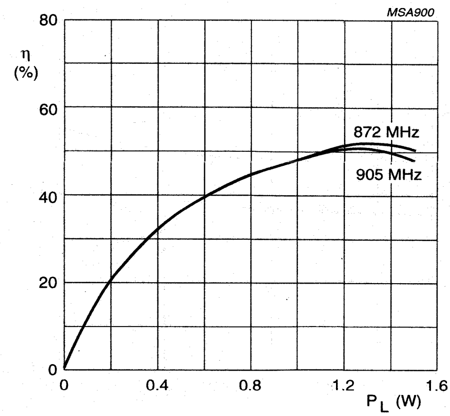
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.8 Harmonics as a function of frequency; BGY115A; typical values.



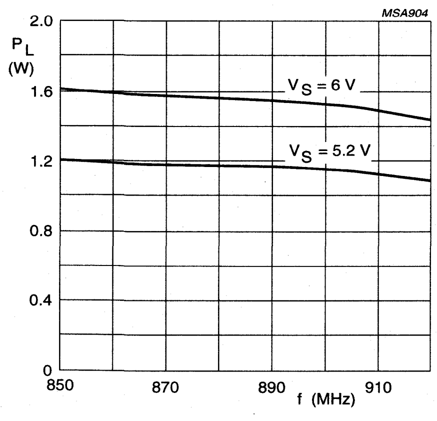
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.9 Load power as a function of control voltage; BGY115B; typical values.



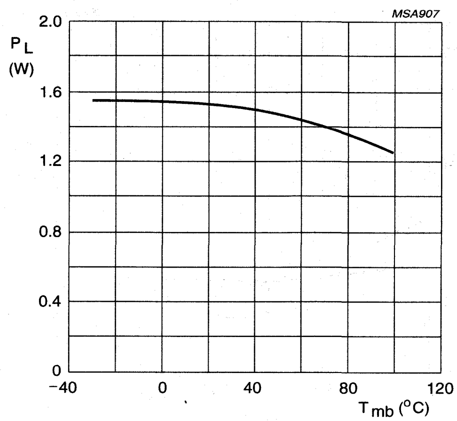
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.10 Efficiency as a function of load power; BGY115B; typical values.



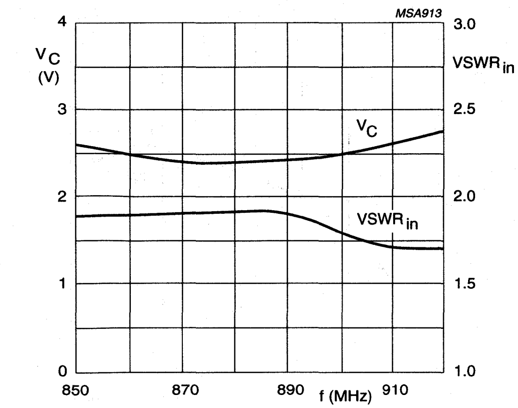
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3.5$ V; $T_{mb} = 25$ °C.

Fig.11 Load power as a function of frequency; BGY115B; typical values.



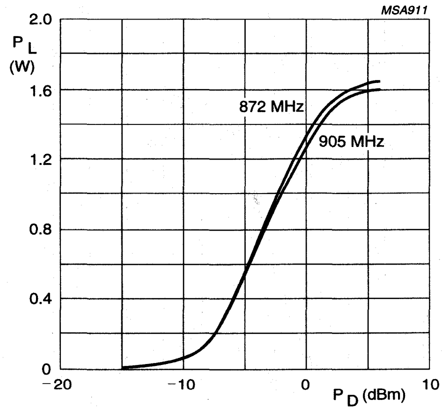
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $V_C = 3.5$ V; f = 890 MHz.

Fig.12 Load power as a function of mounting base temperature; BGY115B; typical values.



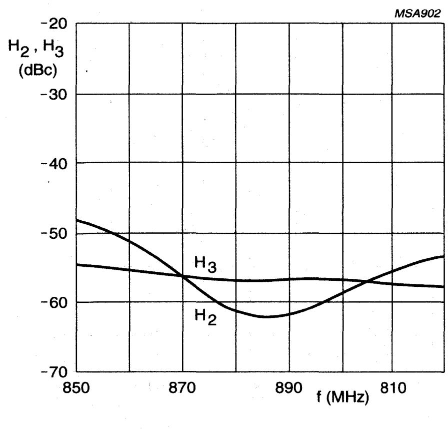
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.13 Control voltage and input VSWR as functions of frequency; BGY115B; typical values.



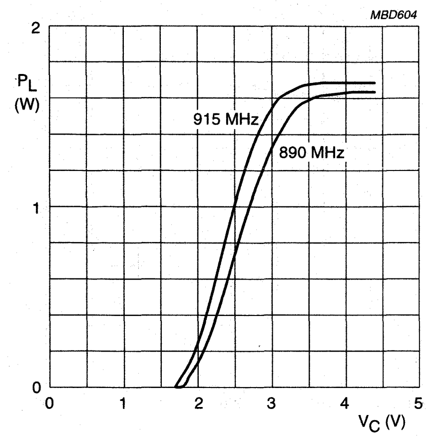
$Z_S = Z_L = 50\ \Omega$; $V_S = 6$ V; $V_C = 3.5$ V; $T_{mb} = 25$ °C.

Fig.14 Load power as a function of drive power; BGY115B; typical values.



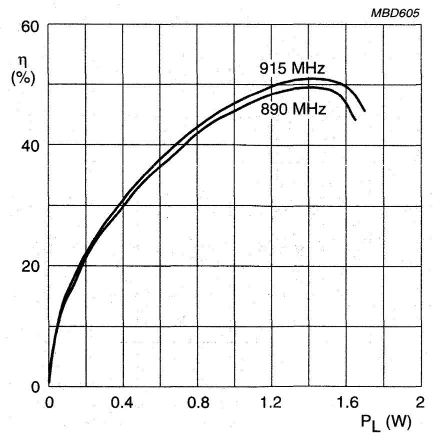
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.15 Harmonics as a function of frequency; BGY115B, typical values.



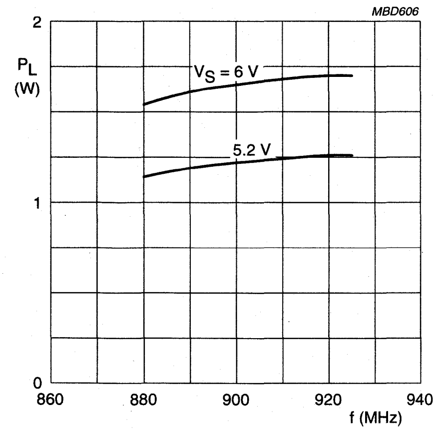
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.16 Load power as a function of control voltage; BGY115C/P; typical values.



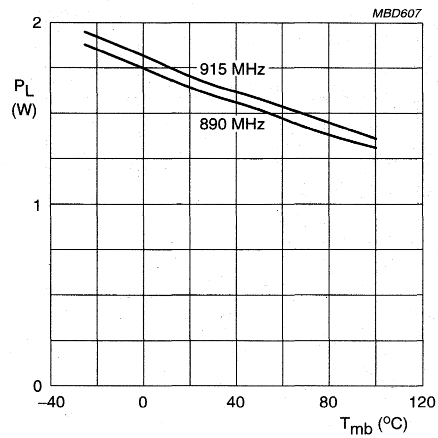
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.17 Efficiency as a function of load power; BGY115C/P; typical values.



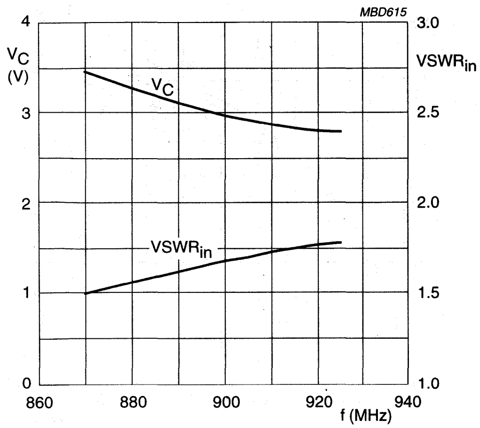
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3.5$ V; $T_{mb} = 25$ °C.

Fig.18 Load power as a function of frequency; BGY115C/P; typical values.



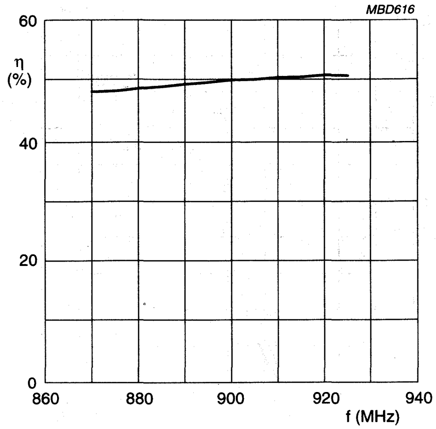
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $V_C = 3.5$ V.

Fig.19 Load power as a function of mounting base temperature; BGY115C/P; typical values.



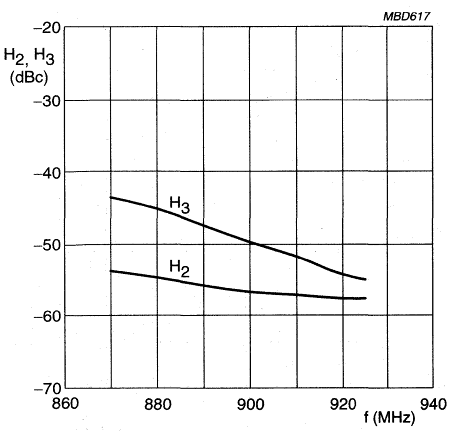
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $P_L = 1.4$ W; $T_{mb} = 25$ °C.

Fig.20 Control voltage and input VSWR as functions of frequency; BGY115C/P; typical values.



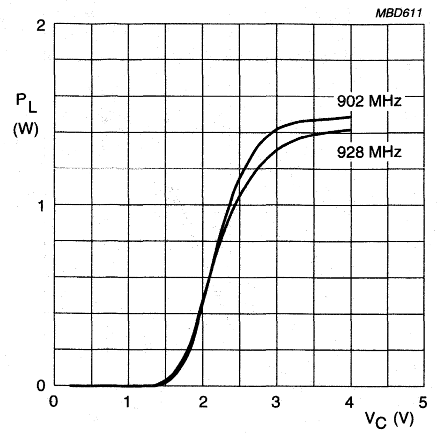
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $P_L = 1.4$ W; $T_{mb} = 25$ °C.

Fig.21 Efficiency as a function of frequency; BGY115C/P; typical values.



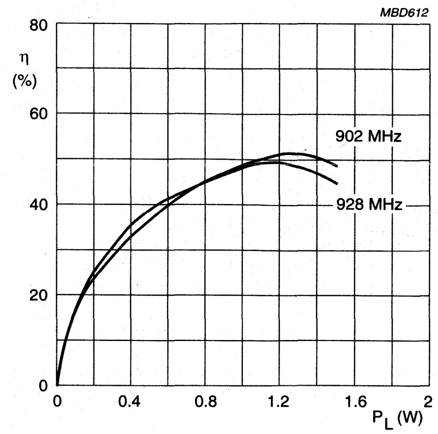
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $P_L = 1.4$ W; $T_{mb} = 25$ °C.

Fig.22 Harmonics as a function of frequency; BGY115C/P; typical values.



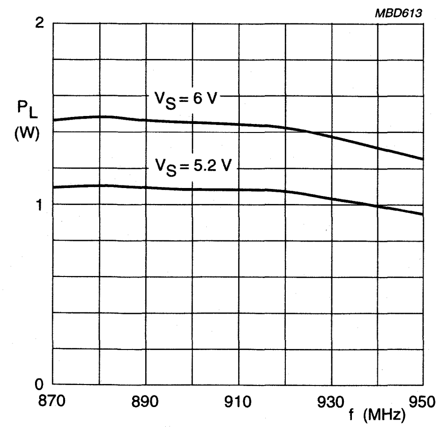
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.23 Load power as a function of control voltage; BGY115D; typical values.



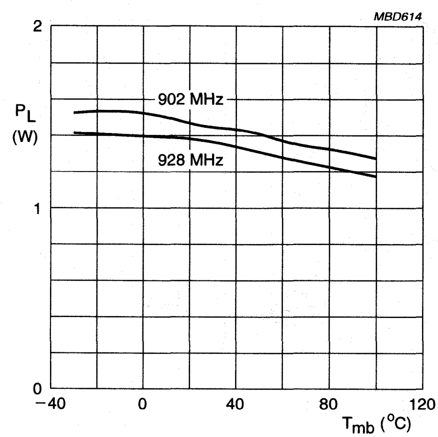
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.24 Efficiency as a function of load power; BGY115D; typical values.



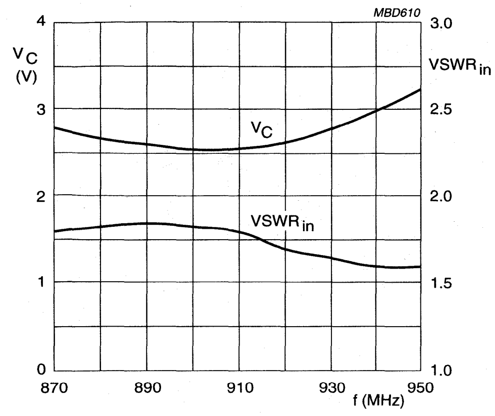
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3.5$ V; $T_{mb} = 25$ °C.

Fig.25 Load power as a function of frequency; BGY115D; typical values.



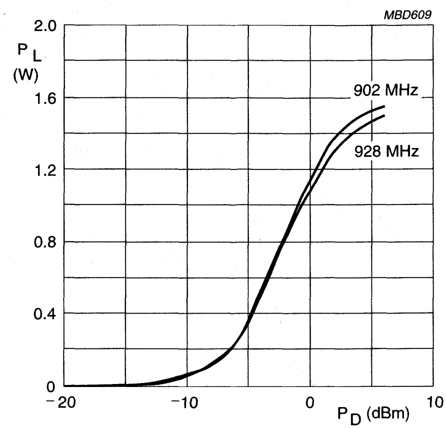
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $V_C = 3.5$ V.

Fig.26 Load power as a function of mounting base temperature; BGY115D; typical values.



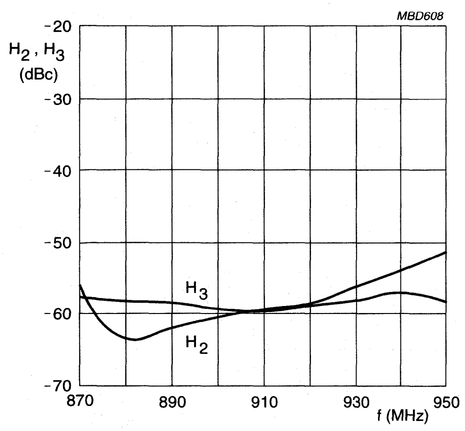
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.27 Control voltage and input VSWR as functions of frequency; BGY115D; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 6$ V; $V_C = 3.5$ V; $T_{mb} = 25$ °C.

Fig.28 Load power as a function of drive power; BGY115D; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 6$ V; $P_L = 1.2$ W: $T_{mb} = 25$ °C.

Fig.29 Harmonics as a function of frequency; BGY115D; typical values.

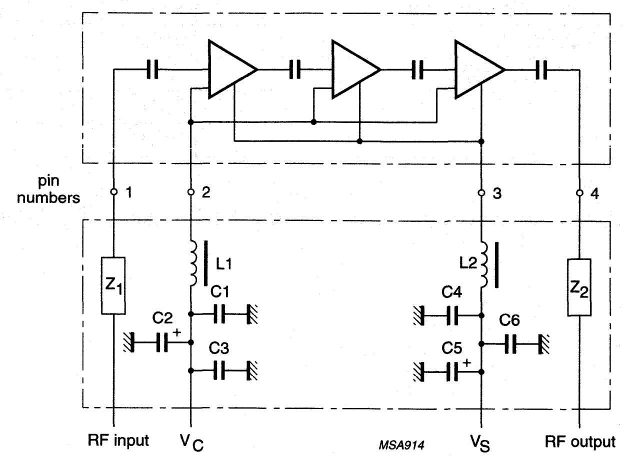
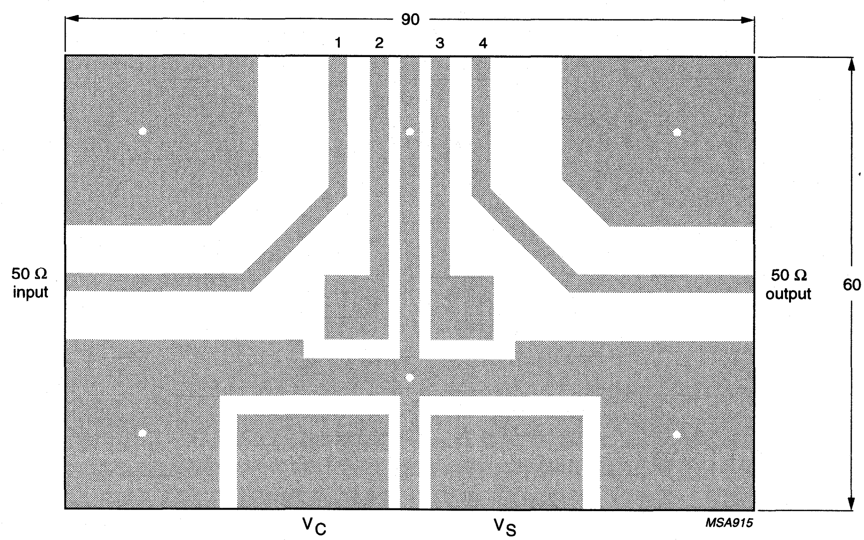


Fig.30 Test circuit.



Dimensions in mm.

Fig.31 Printed-circuit board layout.

List of components (see Fig.30)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C4	multilayer ceramic chip capacitor	100 nF	2222 852 47104
C2, C5	35 V tantalum capacitor	2.2 μF	–
C3, C6	multilayer ceramic chip capacitor	33 pF	2222 851 13339
L1, L2	Ferroxcube coil	5 μH	3122 108 20153
Z_1, Z_2	stripline; note 1	50 Ω	–

Note

1. The striplines are on a double copper-clad printed-circuit board with PTFE fibre-glass dielectric ($\varepsilon_r = 2.2$); thickness $1/32$ inch.

FEATURES

- 12.5 V nominal supply voltage
- 6 W output power
- Easy control of output power by DC voltage.

APPLICATIONS

- Mobile Radio equipment operating in the 800 to 870 and 890 to 950 MHz frequency ranges.

DESCRIPTION

The BGY116D and BGY116E are five-stage UHF amplifier modules in a SOT278B package. Each module consists of 5 NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT278B

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

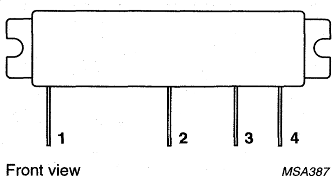


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

TYPE NUMBER	MODE OF OPERATION	f (MHz)	V_S (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
BGY116D	CW	800 to 870	12.5	6	≥37.8	typ. 40	50
BGY116E	CW	890 to 950	12.5	6	≥37.8	typ. 40	50

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	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	16	V
V_C	DC control voltage	–	8	V
P_D	input drive power	–	10	mW
P_L	load power	–	10	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–30	+100	°C

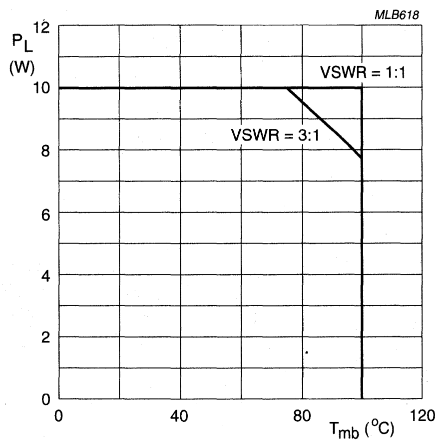
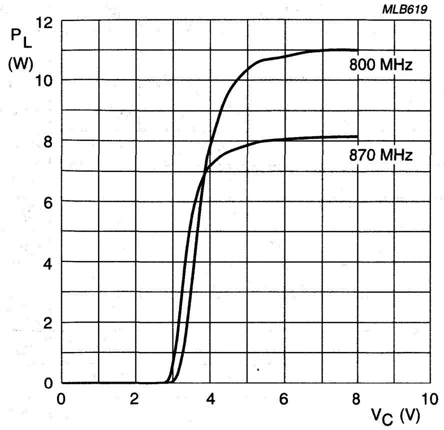


Fig.2 Power derating curve.

CHARACTERISTICS

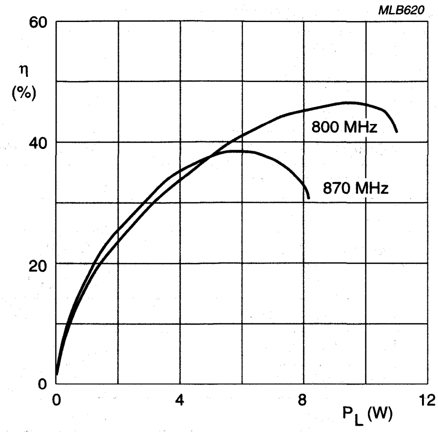
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 12.5$ V; $V_C \leq 6$ V; $T_{mb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY116D		800	–	870	MHz
	BGY116E		890	–	950	MHz
I_Q	quiescent current	$V_C = 0$; $P_D = 0$	–	–	1	mA
I_C	control current		–	–	0.5	mA
P_L	load power		6	–	–	W
G_p	power gain	adjust V_C for $P_L = 6$ W	37.8	–	–	dB
η	efficiency	adjust V_C for $P_L = 6$ W	33	40	–	%
H_2	second harmonic	adjust V_C for $P_L = 6$ W	–	–	–35	dBc
H_3	third harmonic	adjust V_C for $P_L = 6$ W	–	–	–35	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 6$ W	–	–	3 : 1	
	isolation	$V_C = 0$	–	–50	–40	dBm
	stability	$P_D = -3$ to $+3$ dBm; $V_S = 10$ to 16 V; $V_C = 0$ to 6 V; adjust V_C for $P_L \leq 7$ W; VSWR $\leq 6 : 1$	–	–	–60	dBc
	ruggedness	$V_S = 16$ V; adjust V_C for $P_L = 7$ W; VSWR $\leq 20 : 1$	no degradation			



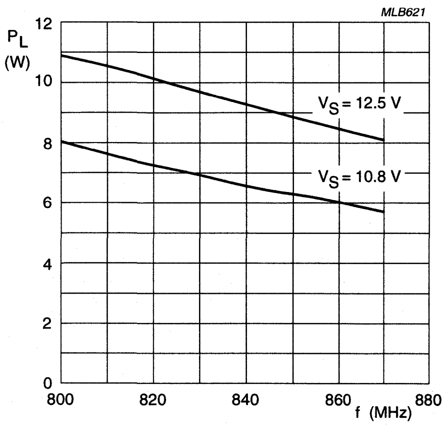
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 12.5$ V; $T_{mb} = 25\ ^{\circ}C$.

Fig.3 Load power as a function of control voltage; BGY116D; typical values.



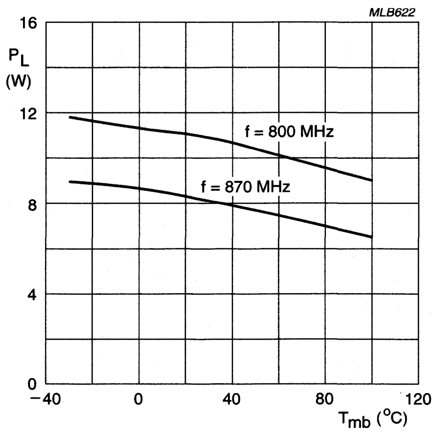
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 12.5$ V; $T_{mb} = 25\ ^{\circ}C$.

Fig.4 Efficiency as a function of load power; BGY116D; typical values.



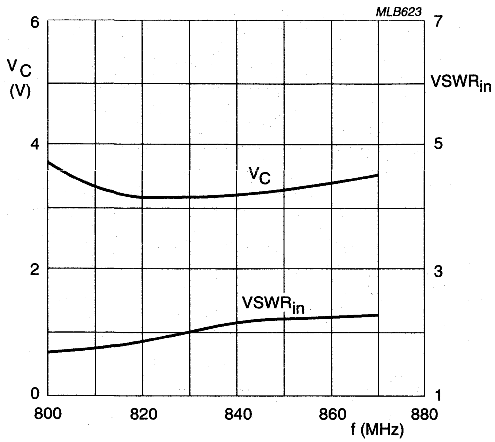
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_C = 6$ V; $T_{mb} = 25\ ^{\circ}C$.

Fig.5 Load power as a function of frequency; BGY116D; typical values.



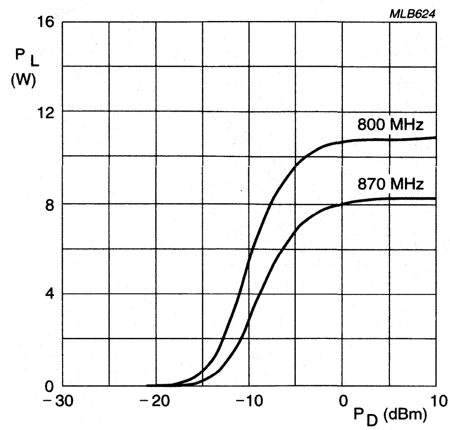
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 12.5$ V; $V_C = 6$ V.

Fig.6 Load power as a function of mounting base temperature; BGY116D; typical values.



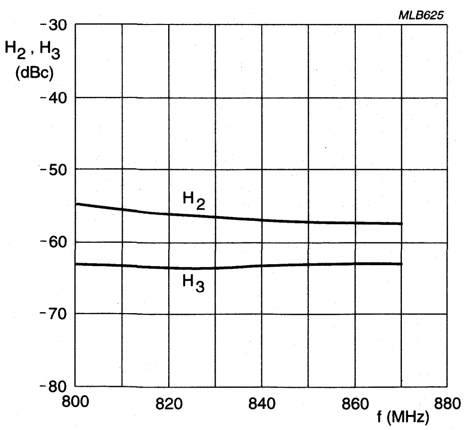
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 12.5$ V; $P_L = 6$ W; $T_{mb} = 25\ ^\circ C$.

Fig.7 Control voltage and input VSWR as functions of frequency; BGY116D; typical values.



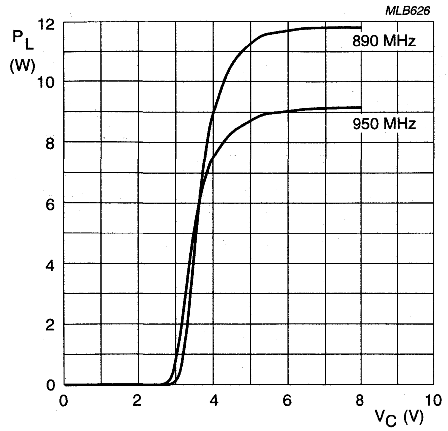
$Z_S = Z_L = 50\ \Omega$; $V_S = 12.5$ V; $V_C = 6$ V; $T_{mb} = 25\ ^\circ C$.

Fig.8 Load power as a function of drive power; BGY116D; typical values.



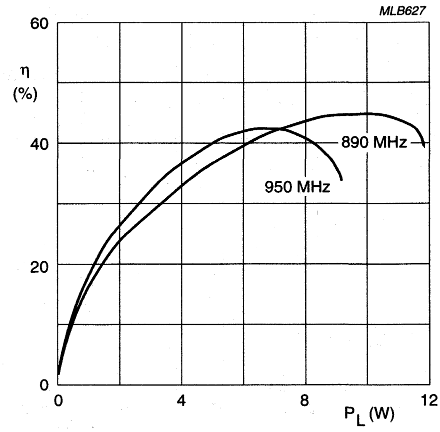
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 12.5$ V; $P_L = 6$ W; $T_{mb} = 25\ ^\circ C$.

Fig.9 Harmonics as function of frequency; BGY116D; typical values.



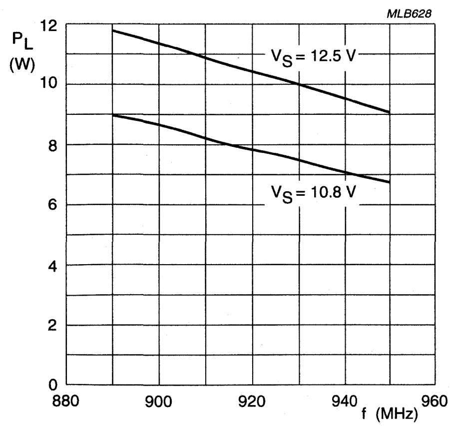
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 12.5$ V; $T_{mb} = 25\ ^{\circ}C$.

Fig.10 Load power as a function of control voltage; BGY116E; typical values.



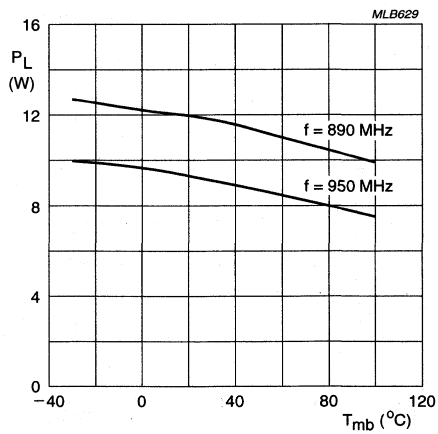
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 12.5$ V; $T_{mb} = 25\ ^{\circ}C$.

Fig.11 Efficiency as a function of load power; BGY116E; typical values.



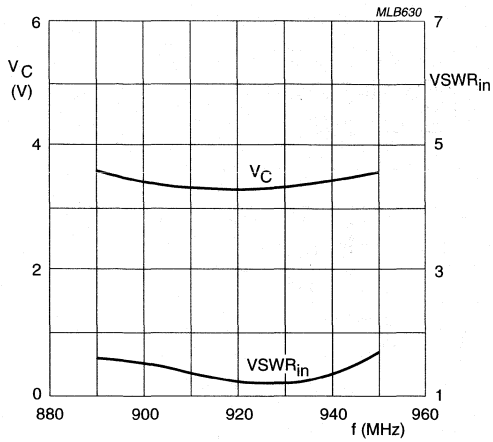
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_C = 6$ V; $T_{mb} = 25\ ^{\circ}C$.

Fig.12 Load power as a function of frequency; BGY116E; typical values.



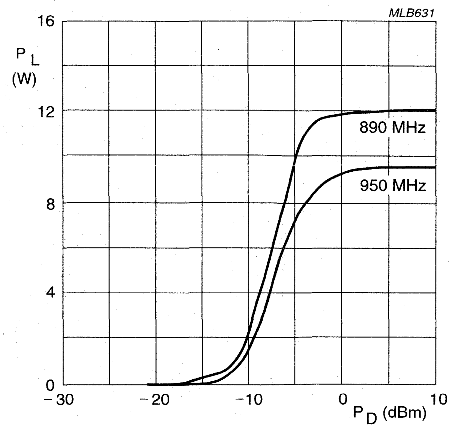
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 12.5$ V; $V_C = 6$ V.

Fig.13 Load power as a function of mounting base temperature; BGY116E; typical values.



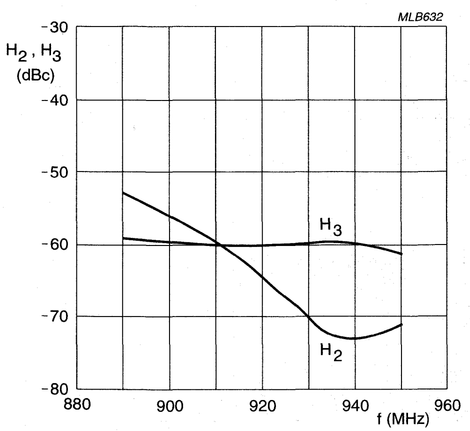
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 12.5$ V; $P_L = 6$ W; $T_{mb} = 25\ ^\circ C$.

Fig.14 Control voltage and input VSWR as functions of frequency; BGY116E; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 12.5$ V; $V_C = 6$ V; $T_{mb} = 25\ ^\circ C$.

Fig.15 Load power as a function of drive power; BGY116E; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 12.5$ V; $P_L = 6$ W; $T_{mb} = 25\ ^\circ C$.

Fig.16 Harmonics as function of frequency; BGY116E; typical values.

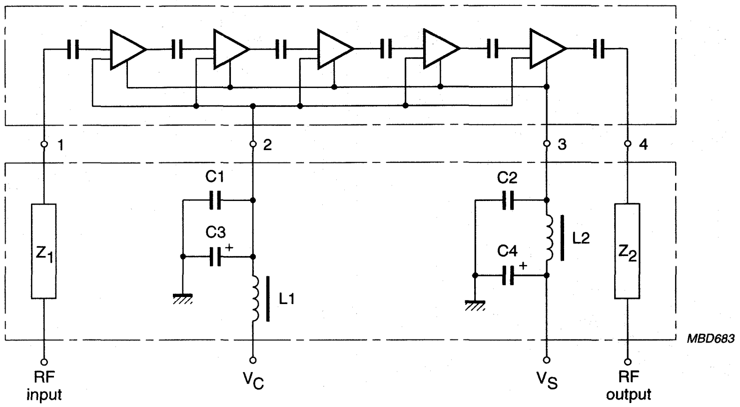
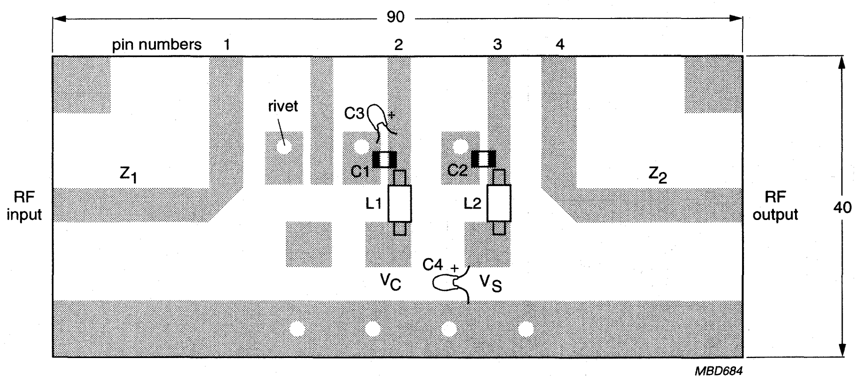


Fig.17 Test circuit.



Dimensions in mm.

Fig.18 Printed-circuit board component layout.

List of components (see Fig.17)

COMPONENT	DESCRIPTION	VALUE	DIMENSION	CATALOGUE NO.
C1, C2	multilayer ceramic chip capacitor	1 nF	–	–
C3, C4	tantalum capacitor	35 V; 4.7 μF	–	–
L1, L2	micro choke	1 μH	–	3122 108 20153
Z_1, Z_2	stripline; note 1	50 Ω	width 4.7 mm	–

Note

1. The striplines are on a double copper-clad printed-circuit board with PTFE fibre-glass dielectric (ε_r = 2.2); thickness $^1\!/_{16}$ inch.

UHF amplifier modules | BGY118A; BGY118B; BGY118D

FEATURES

- Single 4.8 V nominal supply voltage
- 1.2 W output power
- Easy output power control 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, 872 to 905 MHz and 898 to 928 MHz frequency ranges respectively.

DESCRIPTION

The BGY118A, BGY118B and BGY118D are three-stage UHF amplifier modules in a SOT321A package. Each module consists of three NPN silicon planar transistor chips mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING SOT321A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

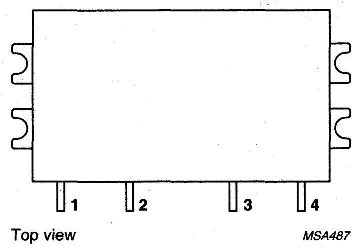


Fig.1 Simplified outline.

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)
BGY118A	CW	824 to 849	4.8	1.2	≥27.8	typ. 55	50
BGY118B	CW	872 to 905	4.8	1.2	≥27.8	typ. 55	50
BGY118D	CW	898 to 928	4.8	1.2	≥27.8	typ. 55	50

LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	7	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

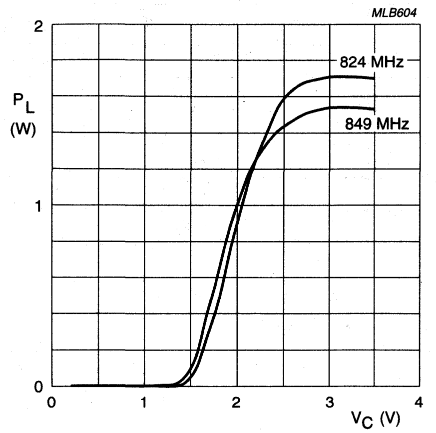
CHARACTERISTICS

$Z_S = Z_L = 50$ W; $P_D = 2$ 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					
	BGY118A		824	–	849	MHz
	BGY118B		872	–	905	MHz
	BGY118D		898	–	928	MHz
I_Q	total leakage 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		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 = 1.2 W	–	–	–40	dBc
H_3	third harmonic	adjust V_C for $P_L = 1.2$ W	–	–	–40	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; note 1	–	–	–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			

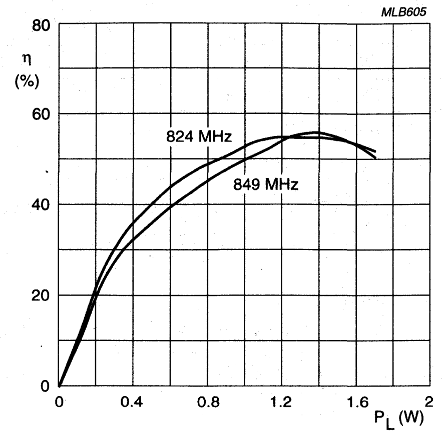
Note

1. BGY118A, BGY118B: $f_n = f_o + 45$ MHz.
   BGY118D: $f_n = f_o - 55$ MHz.



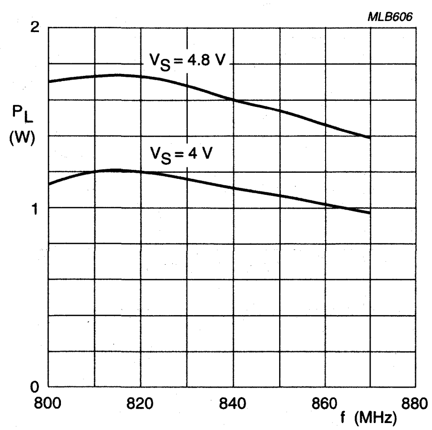
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.2 Load power as a function of control voltage; BGY118A; typical values.



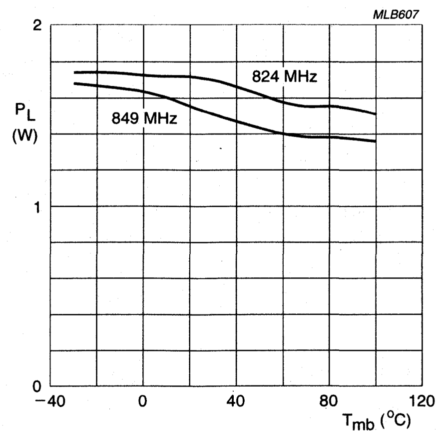
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.3 Efficiency as a function of load power; BGY118A; typical values.



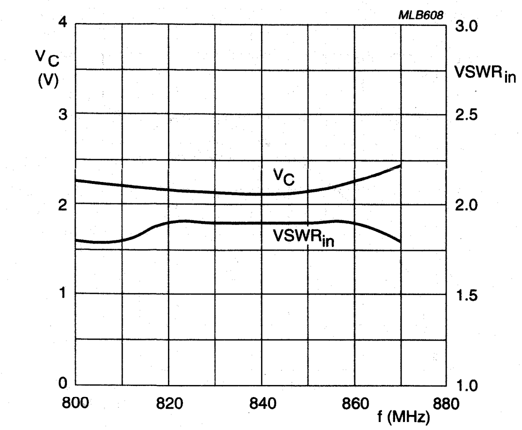
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.4 Load power as a function of frequency; BGY118A; typical values.



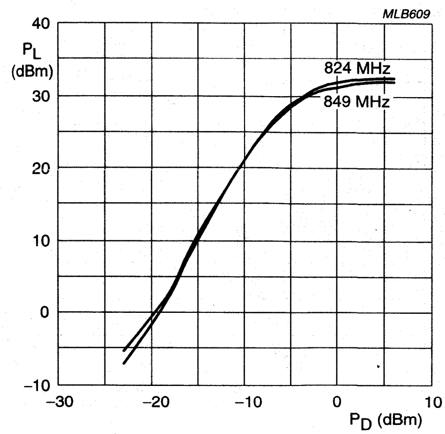
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.5 Load power as a function of mounting-base temperature; BGY118A; typical values.



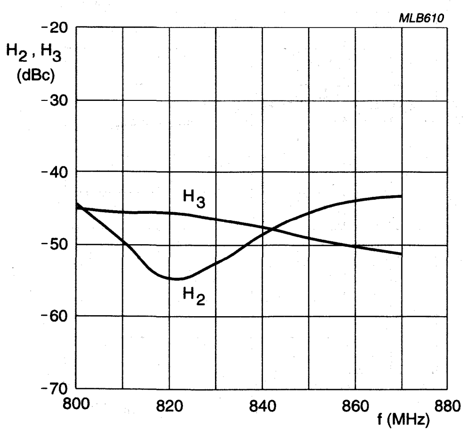
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.6 Control voltage and VSWR input as function of frequency; BGY118A; typical values.



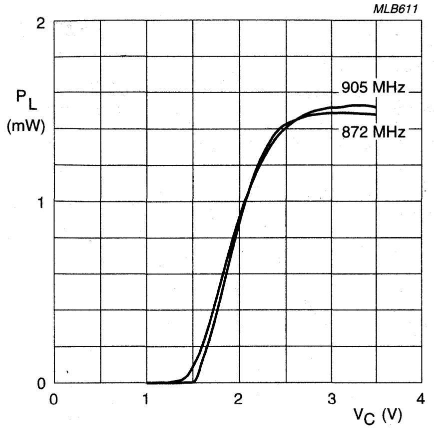
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.7 Load power as a function of drive power; BGY118A; typical values.



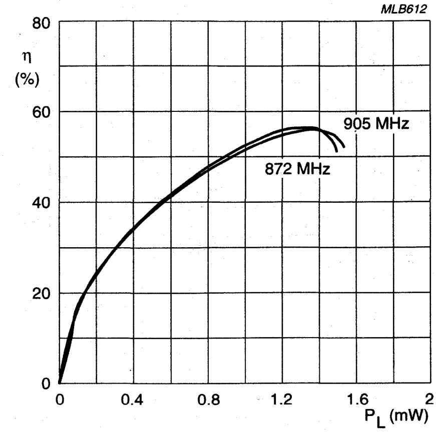
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.8 Harmonics as a function of frequency; BGY118A; typical values.



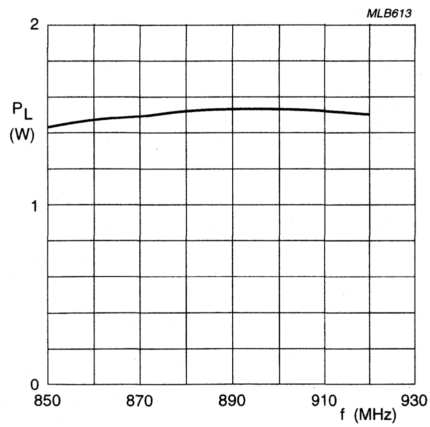
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.9 Load power as a function of control voltage; BGY118B; typical values.



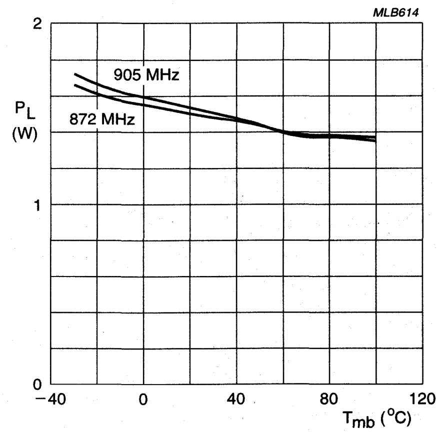
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.10 Efficiency as a function of load power; BGY118B; typical values.



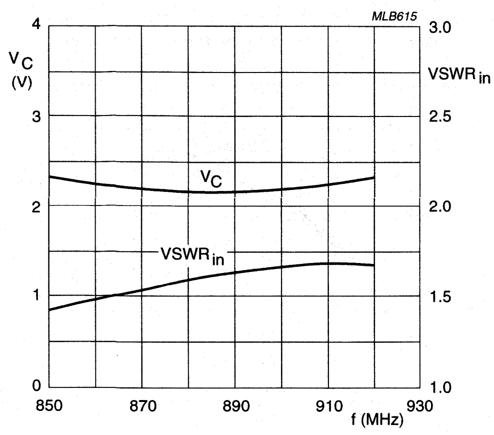
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.11 Load power as a function of frequency; BGY118B; typical values.



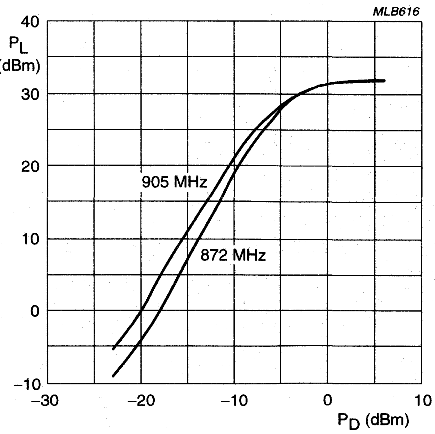
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.12 Load power as a function of mounting-base temperature; BGY118B; typical values.



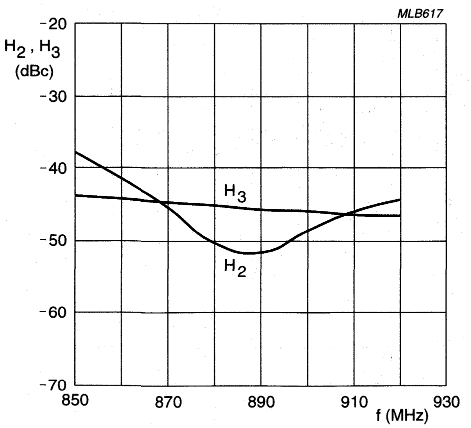
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.13 Control voltage and VSWR input as function of frequency; BGY118B; typical values.



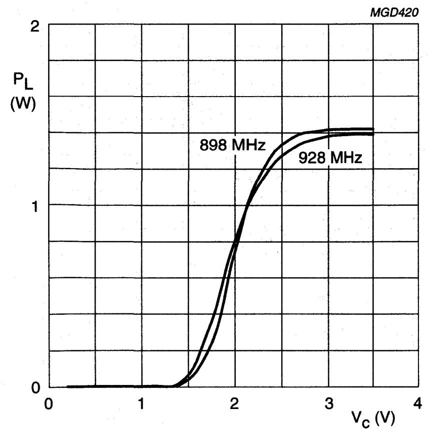
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.14 Load power as a function of drive power; BGY118B; typical values.



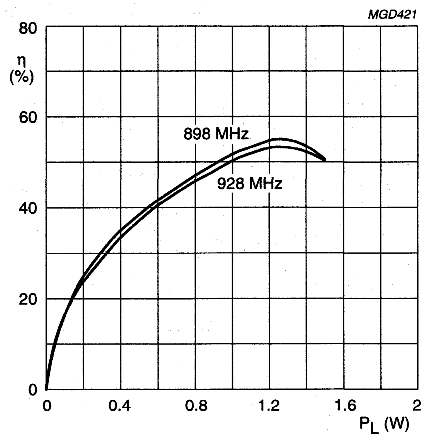
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.15 Harmonics as a function of frequency; BGY118; typical values.



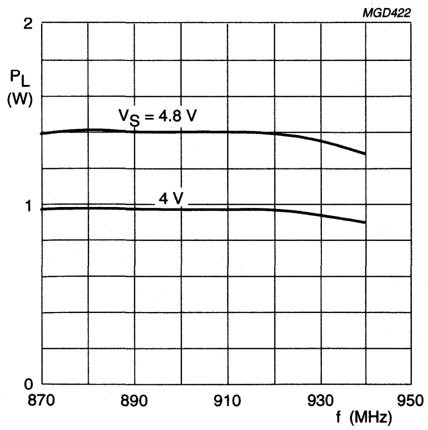
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; V_S 4.8 V; $T_{mb} = 25$ °C.

Fig.16 Load power as a function of control voltage; BGY118D; typical values.



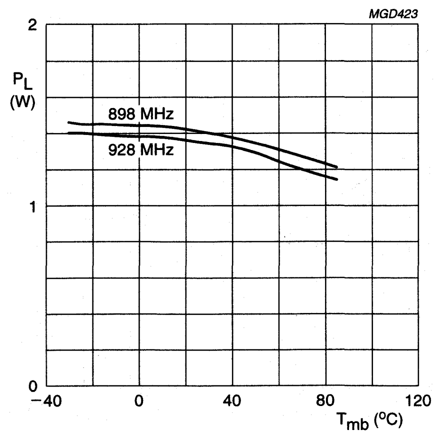
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.17 Efficiency as a function of load power; BGY118D; typical values.



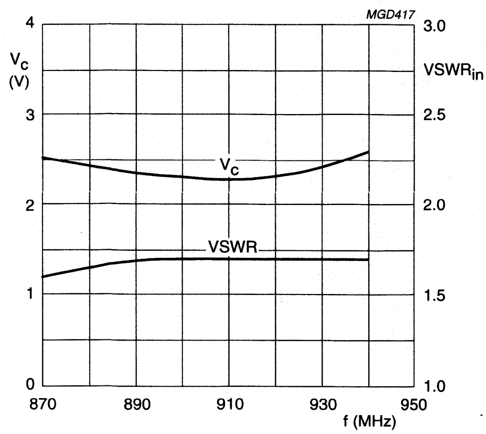
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.18 Load power as a function of frequency; BGY118D; typical values.



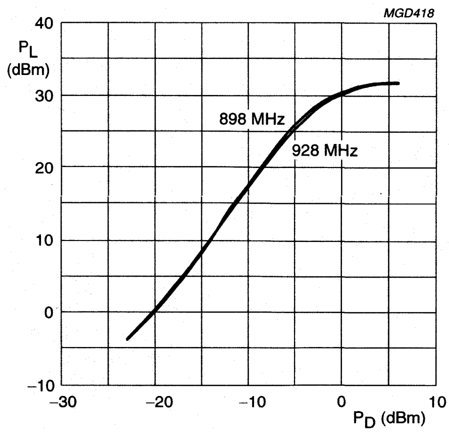
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.19 Load power as a function of mounting-base temperature; BGY118D; typical values.



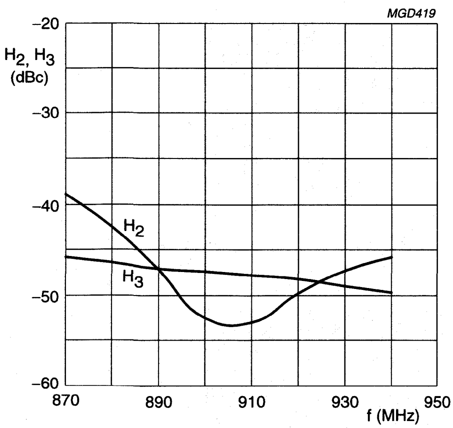
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.20 Control voltage and VSWR input as function of frequency; BGY118D; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.21 Load power as a function of drive power; BGY118D; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.22 Harmonics as a function of frequency; BGY118D; typical values.

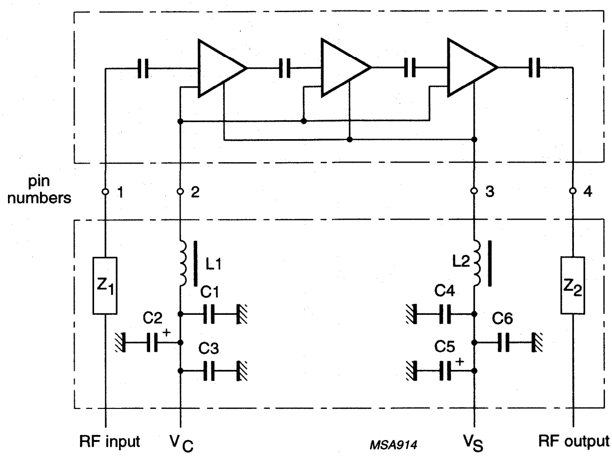
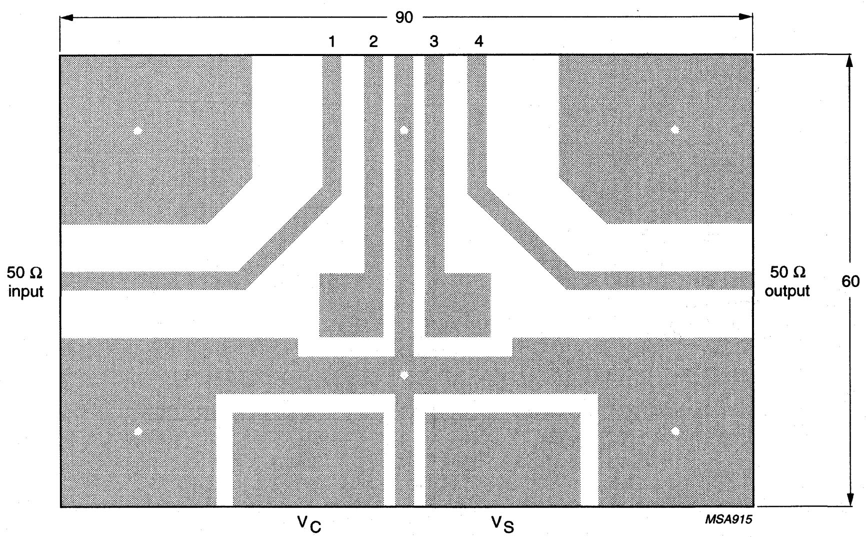


Fig.23 Test circuit.



Dimensions in mm.

Fig.24 Printed-circuit board layout.

List of components (See Fig.23)

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	Ferroxcube coil	5 μH	3122 108 20153
Z_1, Z_2	stripline; note 1	50 Ω	

Note

1. The striplines are on a double copper-clad PCB with PTFE fibre-glass dielectric (e_r = 2.2); thickness 1/32 inch.

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 BGY119A and BGY119B are three-stage UHF amplifier modules in a SOT359A 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 - SOT359A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

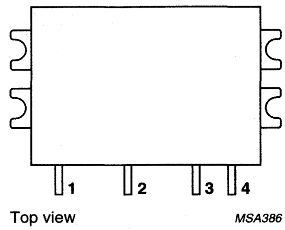


Fig.1 Simplified outline.

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)
BGY119A	CW	824 to 849	4.8	1.2	≥27.8	typ. 55	50
BGY119B	CW	872 to 905	4.8	1.2	≥27.8	typ. 55	50

LIMITING VALUES

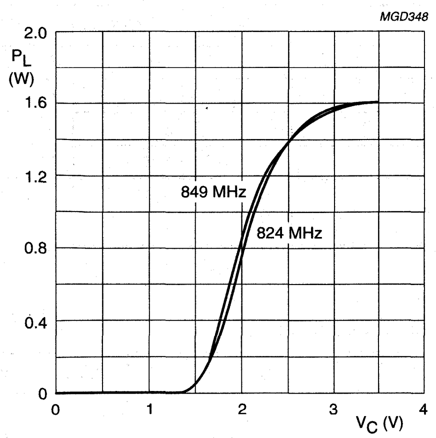
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	7	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

CHARACTERISTICS

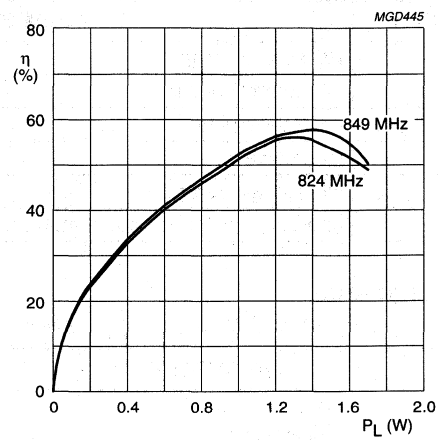
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C \leq 3$ V; $T_{mb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY119A		824	–	849	MHz
	BGY119B		872	–	905	MHz
I_Q	total leakage 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		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			



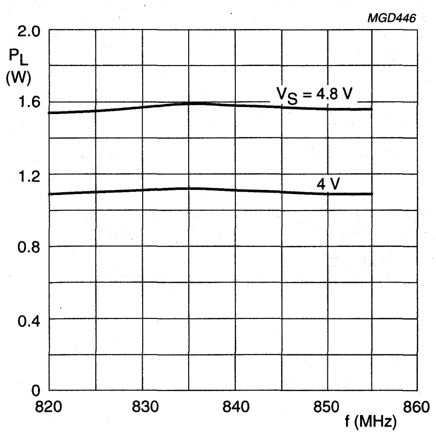
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.2 Load power as a function of control voltage; BGY119A; typical values.



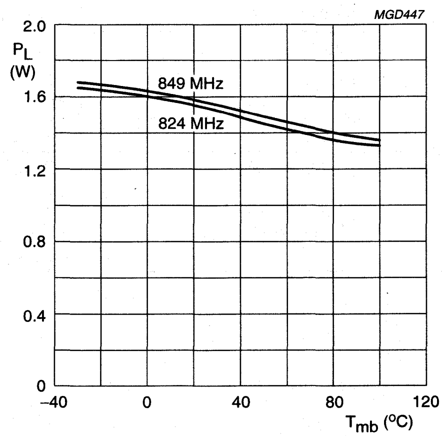
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.3 Efficiency as a function of load power; BGY119A; typical values.



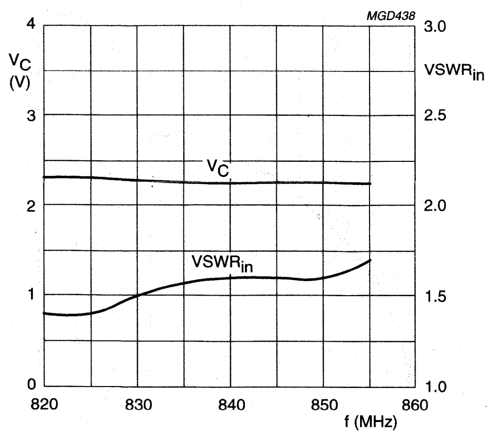
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.4 Load power as a function of frequency; BGY119A; typical values.



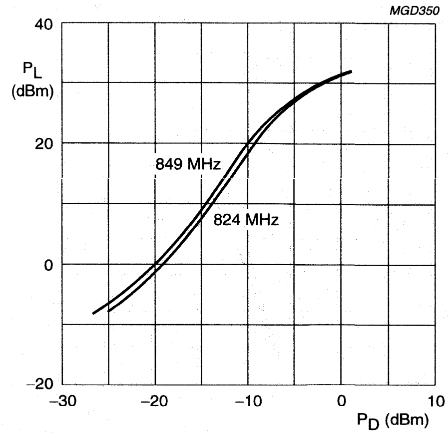
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C = 3$ V.

Fig.5 Load power as a function of mounting base temperature; BGY119A; typical values.



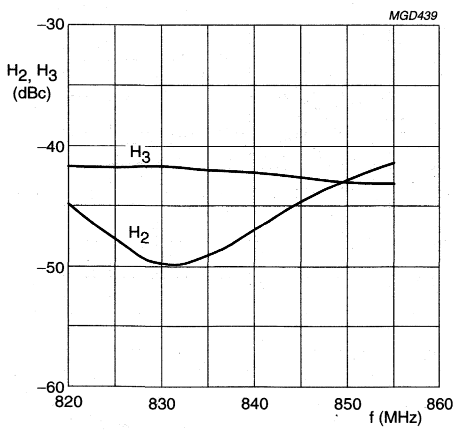
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.6 Control voltage and input VSWR as functions of frequency; BGY119A; typical values.



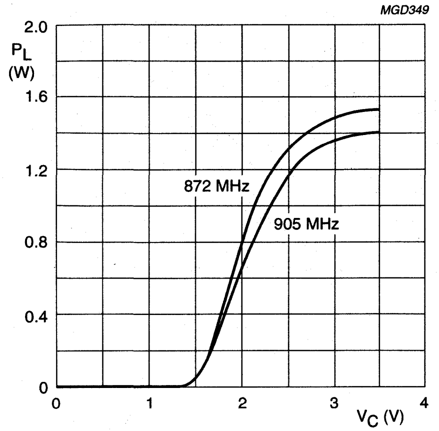
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.7 Load power as a function of drive power; BGY119A; typical values.



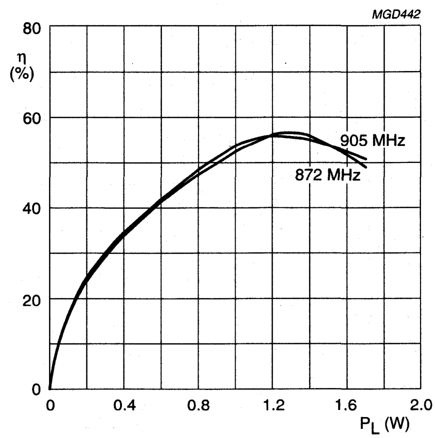
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.8 Harmonics as a function of frequency; BGY119A; typical values.



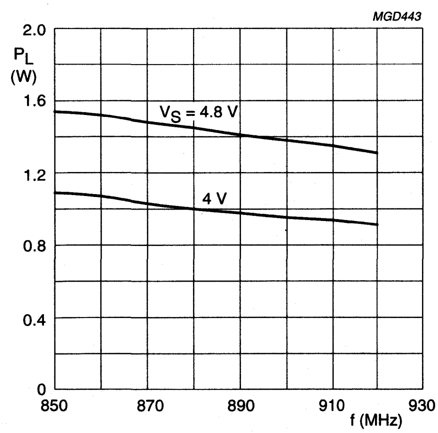
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.9 Load power as a function of control voltage; BGY119B; typical values.



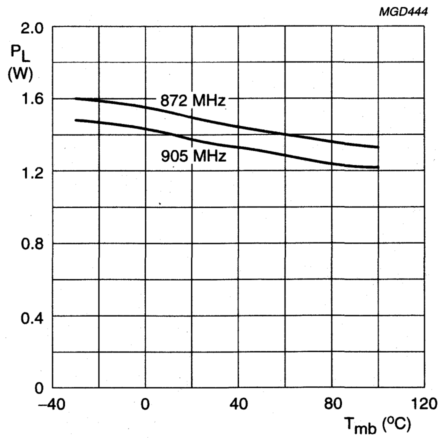
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.10 Efficiency as a function of load power; BGY119B; typical values.



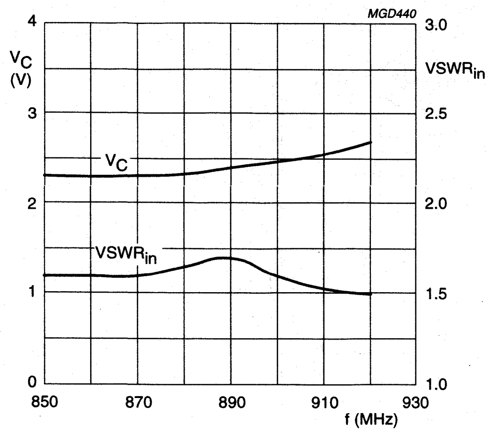
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.11 Load power as a function of frequency; BGY119B; typical values.



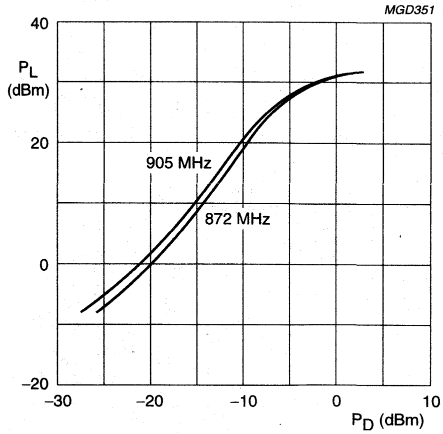
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C = 3$ V.

Fig.12 Load power as a function of mounting base temperature; BGY119B; typical values.



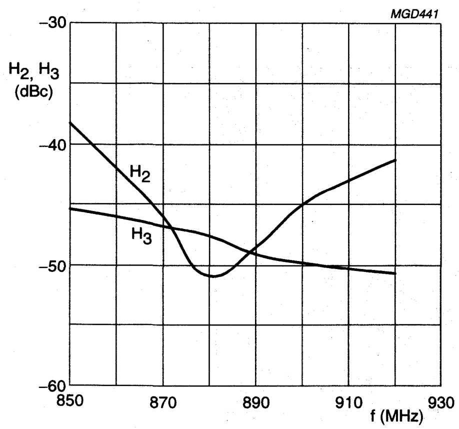
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.13 Control voltage and input VSWR as functions of frequency; BGY119B; 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; BGY119B; 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 Harmonics as a function of frequency; BGY119B; typical values.

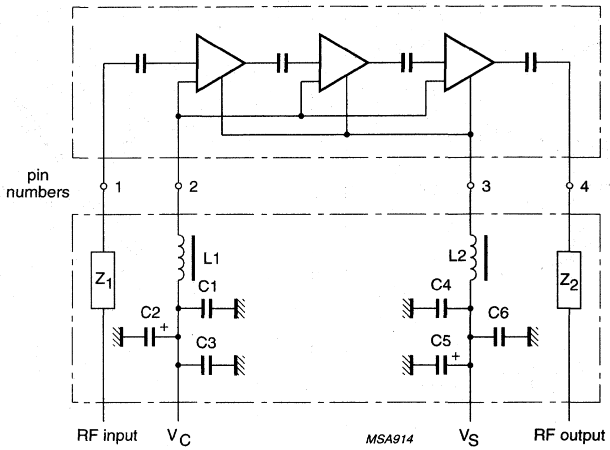
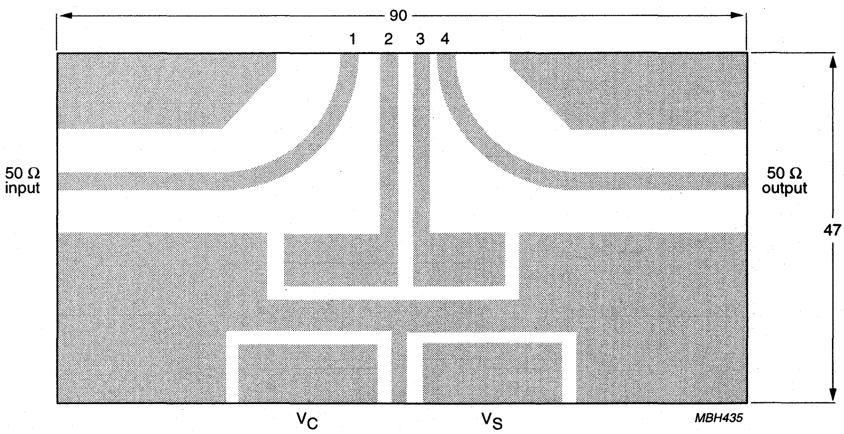


Fig.16 Test circuit.



Dimensions in mm.

Fig.17 Printed-circuit board layout.

List of components (See Figs 16 and 17)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C4	multilayer ceramic chip capacitor	100 nF	2222 852 47104
C2, C5	tantalum capacitor	35 V; 2.2 μF	–
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 PCB with PTFE fibreglass dielectric ($\varepsilon_r = 2.2$); thickness $1/_{32}$ inch.

UHF amplifier modules

BGY120A; BGY120B; BGY120D

FEATURES

- Single 3.6 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, 872 to 905 MHz and 898 to 928 MHz frequency ranges.

DESCRIPTION

The BGY120A, BGY120B, and BGY120D are three-stage UHF amplifier modules in a SOT388A package.
Each module consists of three NPN silicon planar transistor dies, mounted together with matching and bias 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 - SOT388A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

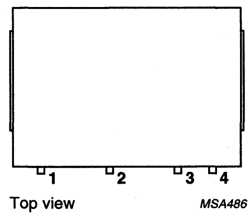


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

TYPE NUMBER	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	3.6	1.2	≥ 27.8	typ. 55	50
BGY120B	CW	872 to 905	3.6	1.2	≥ 27.8	typ. 55	50
BGY120D	CW	898 to 928	3.6	1.2	≥ 27.8	typ. 55	50

LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	5.5	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

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 3.6$ V; $V_C \leq 3$ V; $T_{mb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY120A		824	–	849	MHz
	BGY120B		872	–	905	MHz
	BGY120D		898	–	928	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		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	–	–	−40	dBc
H_3	third harmonic	adjust V_C for $P_L = 1.2$ W	–	–	−40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 1.2$ W	–	–	3 : 1	
	stability	$P_D = 0$ to +6 dBm; $V_S = 3$ to 4.8 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	$V_S = 4.8$ V; adjust V_C for $P_L = 1.4$ W; VSWR ≤ 10 : 1 through all phases	no degradation			

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 SOT388A package. Each module consists of three NPN silicon planar transistor chips 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 - SOT388A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

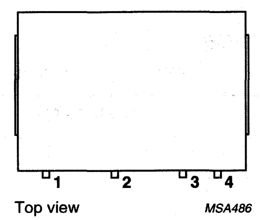


Fig.1 Simplified outline.

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

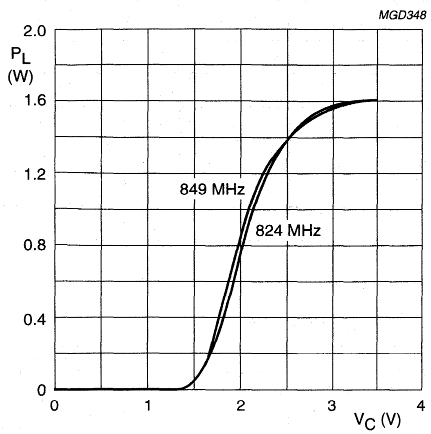
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	7	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 range	–40	+100	°C
T_{mb}	operating mounting base temperature	–30	+100	°C

CHARACTERISTICS

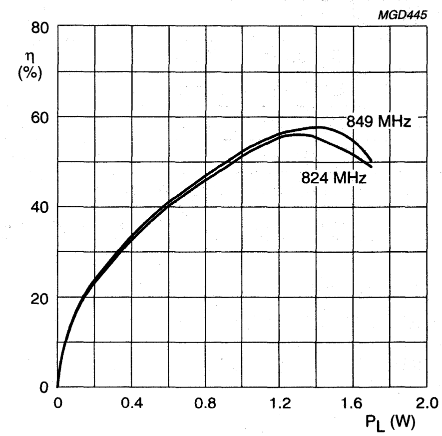
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C \leq 3$ V; $T_{mb} = 25$ °C; unless otherwise specified.

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 $\leq$ 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 $\leq$ 10 : 1 through all phases	no degradation			



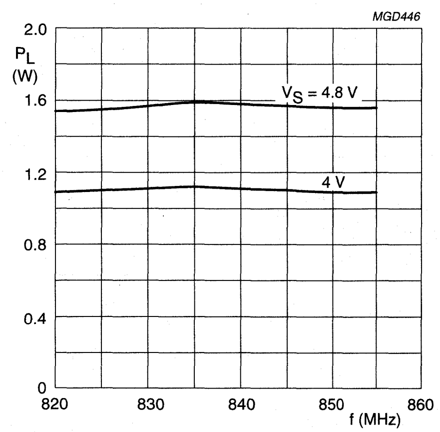
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.2 Load power as a function of control voltage; BGY122A; typical values.



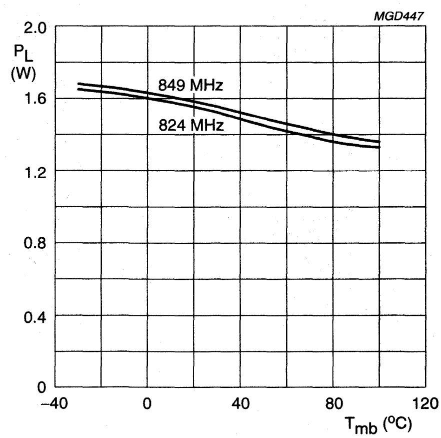
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.3 Efficiency as a function of load power; BGY122A; typical values.



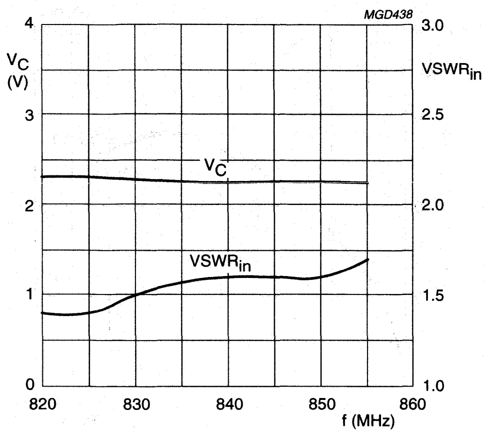
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.4 Load power as a function of frequency; BGY122A; typical values.



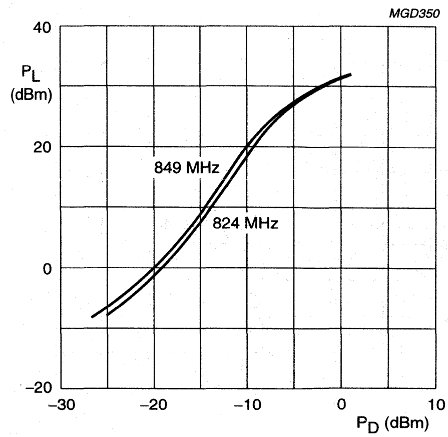
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C = 3$ V.

Fig.5 Load power as a function of mounting base temperature; BGY122A; typical values.



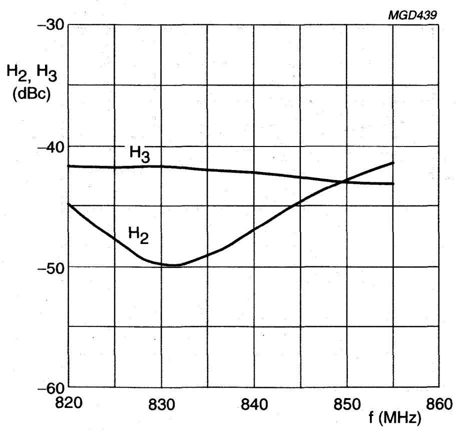
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.6 Control voltage and input VSWR as functions of frequency; BGY122A; typical values.



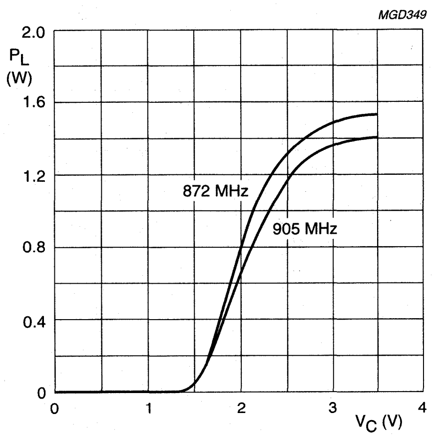
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.7 Load power as a function of drive power; BGY122A; typical values.



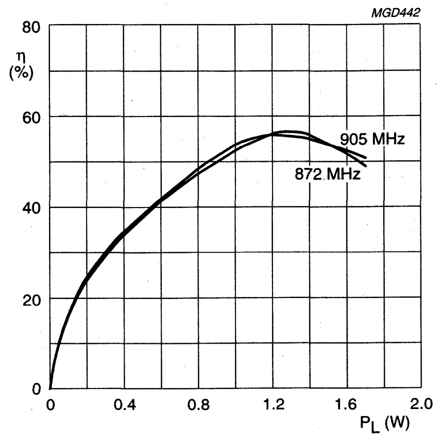
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.8 Harmonics as a function of frequency; BGY122A; typical values.



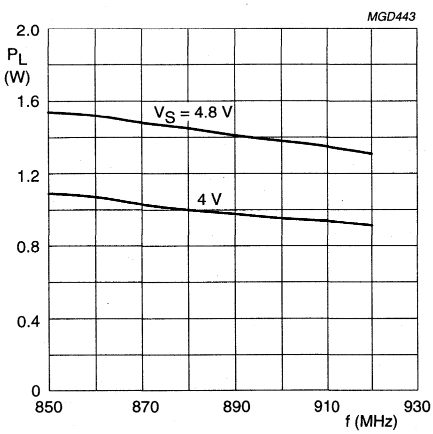
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.9 Load power as a function of control voltage; BGY122B; typical values.



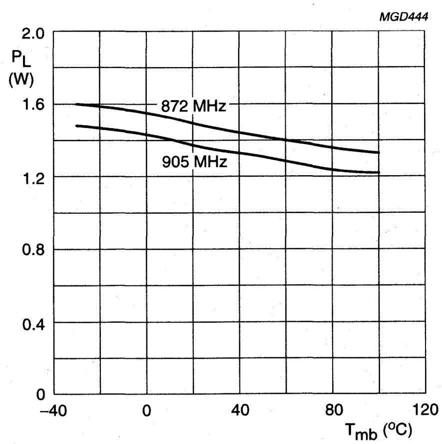
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.10 Efficiency as a function of load power; BGY122B; typical values.



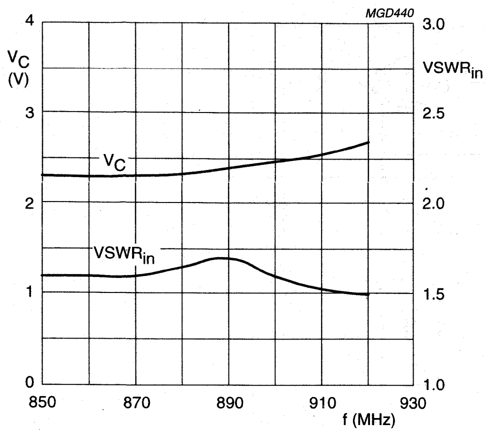
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.11 Load power as a function of frequency; BGY122B; typical values.



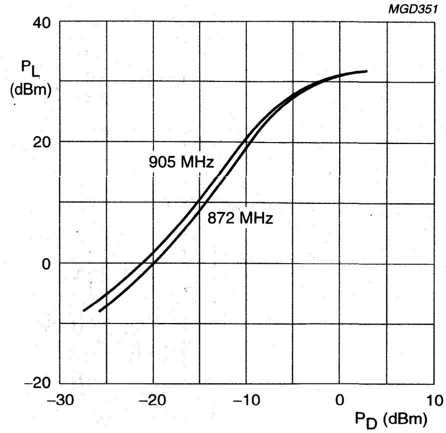
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C = 3$ V.

Fig.12 Load power as a function of mounting base temperature; BGY122B; typical values.



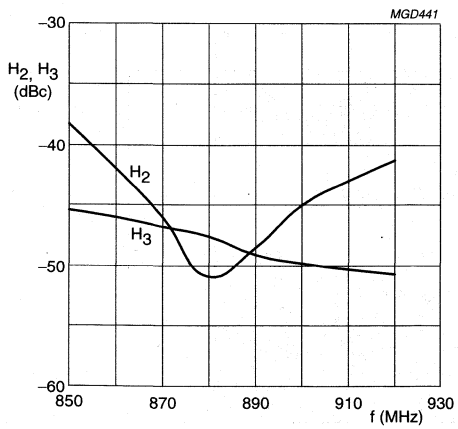
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.13 Control voltage and input VSWR as functions of frequency; 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 Harmonics as a function of frequency; BGY122B; typical values.

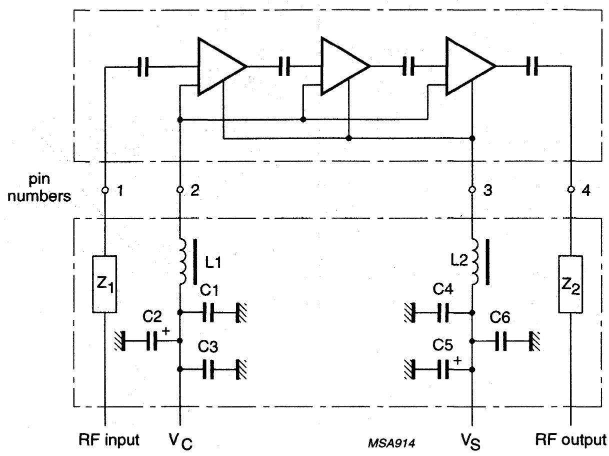
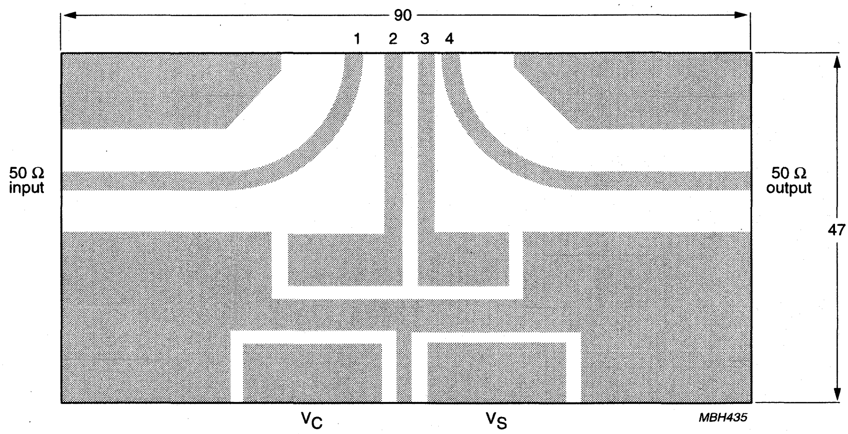


Fig.16 Test circuit.



Dimensions in mm.

Fig.17 Printed-circuit board test-fixture.

List of components (See Figs 16 and 17)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C4	multilayer ceramic chip capacitor	100 nF	2222 852 47104
C2, C5	tantalum capacitor	35 V; 2.2 μF	–
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 PCB with PTFE fibreglass dielectric (ε_r = 2.2); thickness $\frac{1}{32}$ inch.

VHF amplifier modules BGY132; BGY133

FEATURES

- Broadband VHF amplifiers
- 18 W output power
- Operate directly from 12 V vehicle electrical systems
- Output power control over a 10 dB range by drive power.

DESCRIPTION

The BGY132 and BGY133 are two stage amplifier modules. Each module comprises two NPN silicon planar transistor chips together with lumped-element matching components.

APPLICATIONS

- Mobile communication equipment.

PINNING - SOT132B

PIN	DESCRIPTION
1	RF input
2	ground
3	V_{S1}
4	ground
5	V_{S2}
6	ground
7	RF output
flange	ground

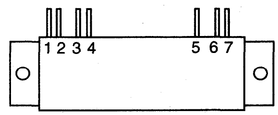


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

TYPE NUMBER	MODE OF OPERATION	f (MHz)	V_{S1}; V_{S2} (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
BGY132	CW	68 to 88	12.5	≥18	≥22.6	typ. 45	50
BGY133	CW	80 to 108	12.5	≥18	≥22.6	typ. 45	50

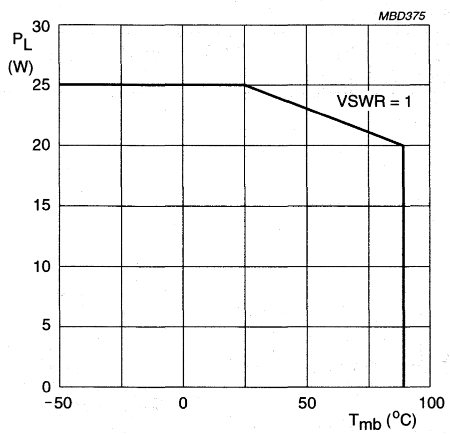
WARNING

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	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	15.6	V
V_{S2}	DC supply voltage	–	15.6	V
V_i	RF input terminal voltage	–	25	V
V_o	RF output terminal voltage	–	25	V
P_D	input drive power	–	200	mW
P_L	load power	–	25	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–20	+90	°C



$V_{S1} = V_{S2} = 12.5$ V.

Fig.2 Power derating curve.

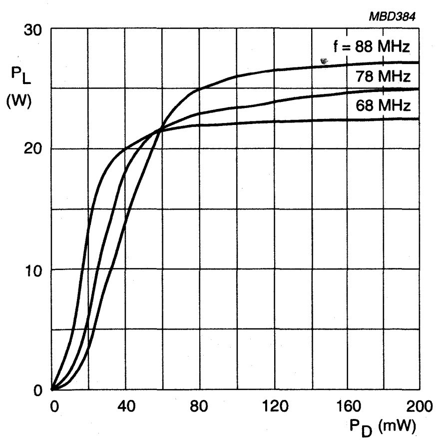
CHARACTERISTICS

T_{mb} = 25 °C; $Z_S = Z_L$ = 50 Ω; P_D = 100 mW; $V_{S1} = V_{S2}$ = 12.5 V; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY132		68	–	88	MHz
	BGY133		80	–	108	MHz
I_{Q2}	leakage current	V_{S1} = 0; P_D = 0	–	–	10	mA
P_L	load power		18	–	–	W
G_p	power gain	P_L = 18 W; note 1	22.6	–	–	dB
η	efficiency	P_L = 18 W; note 1	38	45	–	%
H_2	second harmonic	P_L = 18 W; note 1	–	–	–25	dBc
H_3	third harmonic	P_L = 18 W; note 1	–	–	–25	dBc
$VSWR_{in}$	input VSWR	P_L = 18 W; note 1	–	1.5 : 1	3 : 1	
	stability	VSWR ≤ 3 : 1; P_L = 2 to 20 W; $V_{S1} = V_{S2}$ = 10.8 to 15.6 V; note 1	–	–	–60	dBc
	ruggedness	VSWR = 50 : 1; $V_{S1} = V_{S2}$ = 15.6 V; P_L < 25 W during 1 minute; note 1	no degradation			

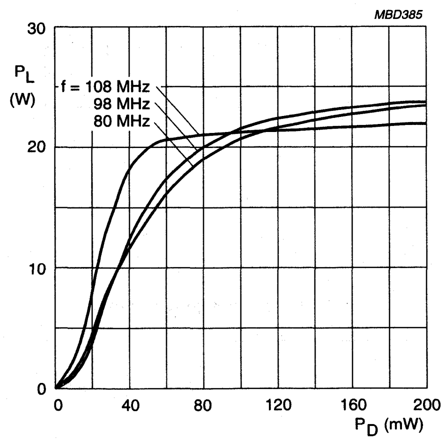
Note

1. Adjust P_D for specified P_L.



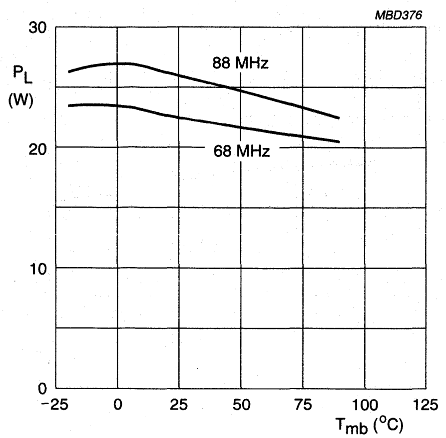
$Z_S = Z_L$ = 50 Ω.
$V_{S1} = V_{S2}$ = 12.5 V.
T_{mb} = 25 °C.

Fig.3 Load power as a function of drive power; BGY132; typical values.



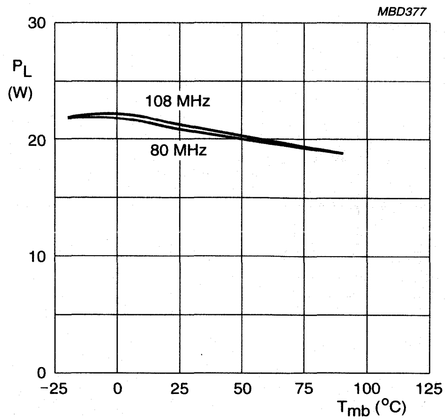
$Z_S = Z_L$ = 50 Ω.
$V_{S1} = V_{S2}$ = 12.5 V.
T_{mb} = 25 °C.

Fig.4 Load power as a function of drive power; BGY133; typical values.



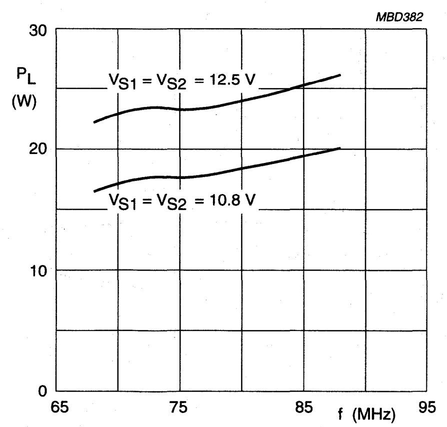
$Z_S = Z_L = 50\ \Omega$.
$P_D = 100$ mW.
$V_{S1} = V_{S2} = 12.5$ V.

Fig.5 Load power as a function of mounting base temperature; BGY132; typical values.



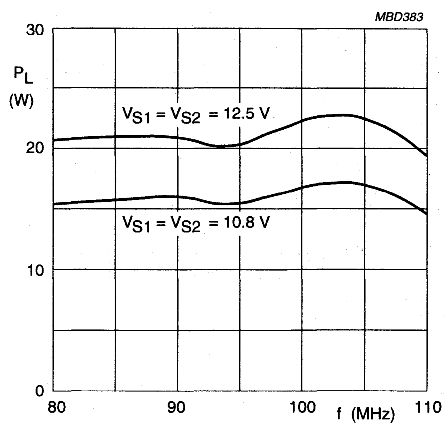
$Z_S = Z_L = 50\ \Omega$.
$P_D = 100$ mW.
$V_{S1} = V_{S2} = 12.5$ V.

Fig.6 Load power as a function of mounting base temperature; BGY133; typical values.



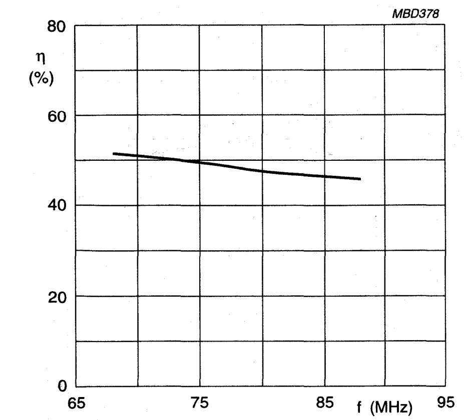
$Z_S = Z_L = 50\ \Omega$.
$P_D = 100$ mW.
$T_{mb} = 25$ °C.

Fig.7 Load power as a function of frequency; BGY132; typical values.



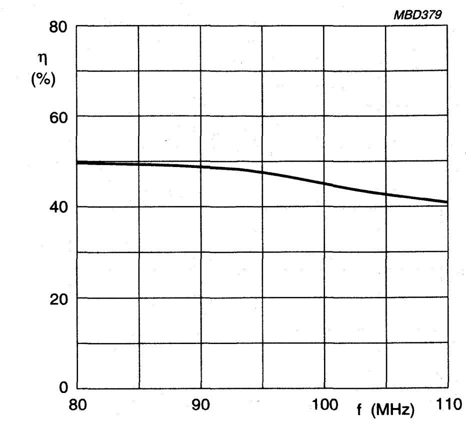
$Z_S = Z_L = 50\ \Omega$.
$P_D = 100$ mW.
$T_{mb} = 25$ °C.

Fig.8 Load power as a function of frequency; BGY133; typical values.



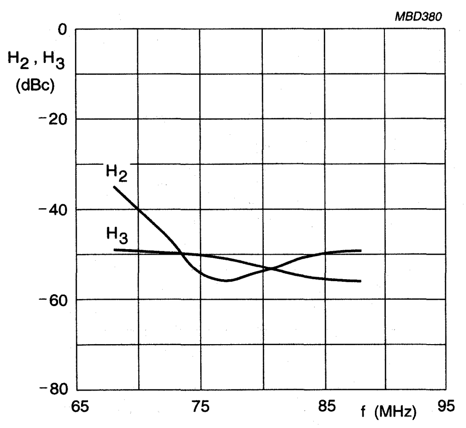
$Z_S = Z_L = 50\ \Omega$.
$P_D = 100$ mW.
$V_{S1} = V_{S2} = 12.5$ V.
$T_{mb} = 25$ °C.
$P_L = 18$ W.

Fig.9 Efficiency as a function of frequency; BGY132; typical values.



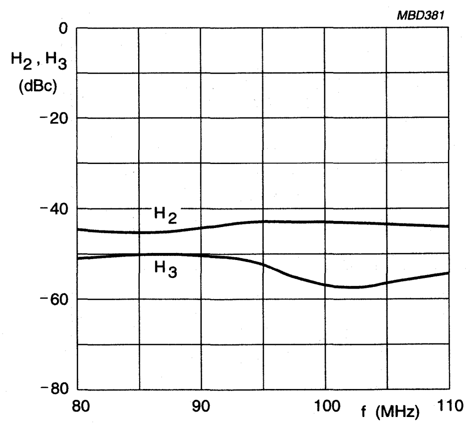
$Z_S = Z_L = 50\ \Omega$.
$P_D = 100$ mW.
$V_{S1} = V_{S2} = 12.5$ V.
$T_{mb} = 25$ °C.
$P_L = 18$ W.

Fig.10 Efficiency as a function of frequency; BGY133; typical values.



$Z_S = Z_L = 50\ \Omega$.
$P_D = 100$ mW.
$V_{S1} = V_{S2} = 12.5$ V.
$T_{mb} = 25$ °C.
$P_L = 18$ W.

Fig.11 Harmonics as functions of frequency; BGY132; typical values.



$Z_S = Z_L = 50\ \Omega$.
$P_D = 100$ mW.
$V_{S1} = V_{S2} = 12.5$ V.
$T_{mb} = 25$ °C.
$P_L = 18$ W.

Fig.12 Harmonics as functions of frequency; BGY133; typical values.

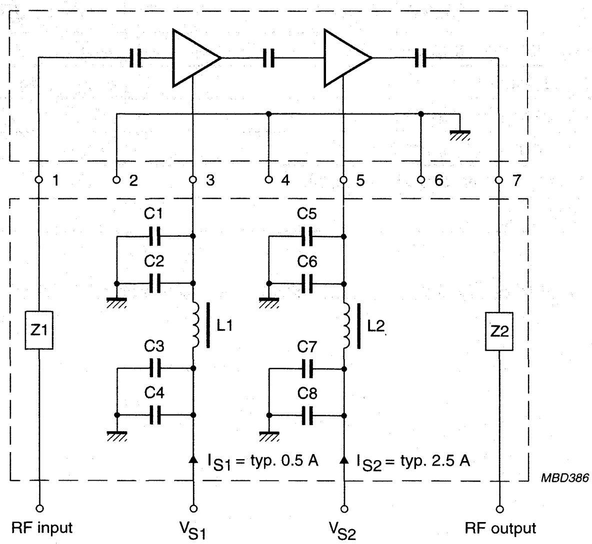


Fig.13 Test circuit.

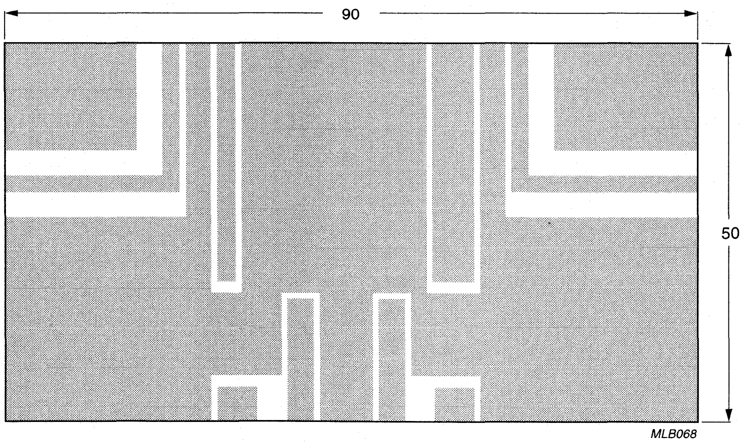


Fig.14 Printed-circuit board layout.

List of components (see Fig.13)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C5	multilayer ceramic chip capacitor	1 nF	4822 590 06614
C2, C6	tantalum capacitor	6.8 µF; 35 V	2022 001 00067
C3, C7	multilayer ceramic chip capacitor	10 nF	2222 852 47103
C4, C8	multilayer ceramic chip capacitor	100 nF	2222 852 47104
L1, L2	1 turn 0.5 mm Cu wire on ferrite coil	1 µH	3122 108 20153
Z1, Z2	stripline; note 1	50 Ω	

Note

1. The striplines are on a double copper-clad printed-circuit board with epoxy dielectric ($\varepsilon_r = 4.7$); thickness $^1/_{16}$ inch.

VHF power amplifier modules BGY135; BGY136

FEATURES

- 12.5 V nominal supply voltage
- 18 W output power.

APPLICATIONS

- Mobile communication equipment operating directly from 12 V vehicle electrical systems.

DESCRIPTION

The BGY135 and BGY136 are two-stage broadband RF amplifier modules in a SOT132B package. Each module consists of two NPN transistor dies together with lumped-element matching components.

PINNING - SOT132B

PIN	DESCRIPTION
1	RF input
2	ground
3	V_{S1}
4	ground
5	V_{S2}
6	ground
7	RF output
Flange	ground

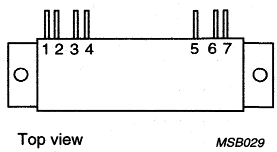


Fig.1 Simplified outline.

QUICK REFERENCE DATA

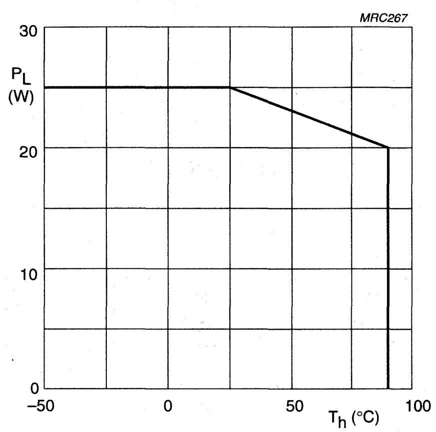
TYPE NUMBER	MODE OF OPERATION	f (MHz)	V_{S1}; V_{S2} (V)	P_D (mW)	P_L (W)	Z_S; Z_L (Ω)
BGY135	CW	132 to 156	12.5	150	≥18	50
BGY136	CW	146 to 174				

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO inserts 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	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	15.6	V
V_{S2}	DC supply voltage	–	15.6	V
V_i	RF input voltage	–	25	V
V_o	RF output voltage	–	25	V
P_D	input drive power	–	300	mW
P_L	load power	–	25	W
T_{stg}	storage temperature	–40	+100	°C
T_h	heatsink operating temperature	–20	+90	°C



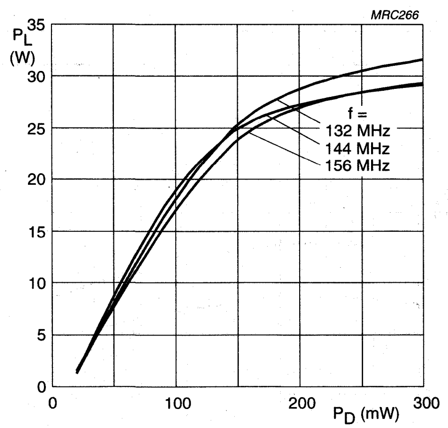
$V_{S1} = V_{S2} \leq 12.5$ V; VSWR = 1 : 1.

Fig.2 Power derating curve.

CHARACTERISTICS

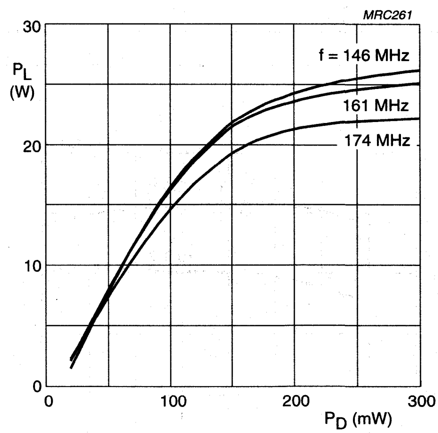
$Z_S = Z_L = 50\ \Omega$; $P_D = 150$ mW; $V_{S1} = V_{S2} = 12.5$ V; $T_h = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY135		132	–	156	MHz
	BGY136		146	–	174	MHz
I_{Q2}	leakage current	$V_{S1} = 0$; $P_D = 0$	–	–	1	mA
P_L	load power		18	–	–	W
η	efficiency	adjust P_D for $P_L = 18$ W	38	45	–	%
H_2	second harmonic	adjust P_D for $P_L = 18$ W	–	–	–25	dBc
H_3	third harmonic	adjust P_D for $P_L = 18$ W	–	–	–25	dBc
$VSWR_{in}$	input VSWR	adjust P_D for $P_L = 18$ W	–	1.5	3	
	stability	$V_{S1} = V_{S2} = 10.8$ to 15.6 V; $P_L = 2$ to 20 W; VSWR = 3 : 1	–	–	–60	dBc
	ruggedness	$P_D \leq 300$ mW; $V_{S1} = V_{S2} = 15.6$ V duration 5 s; $P_L < 25$ W; VSWR = 50 : 1		no degradation		



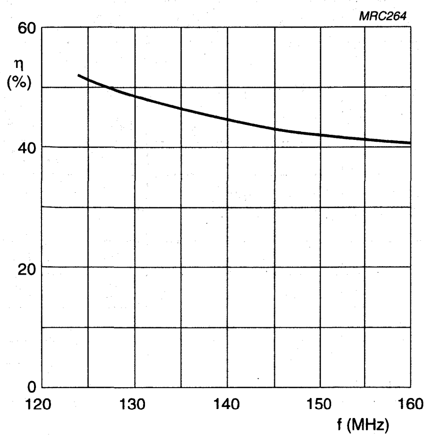
$V_{S1} = V_{S2} = 12.5$ V.

Fig.3 Load power as a function of drive power; BGY135; typical values.



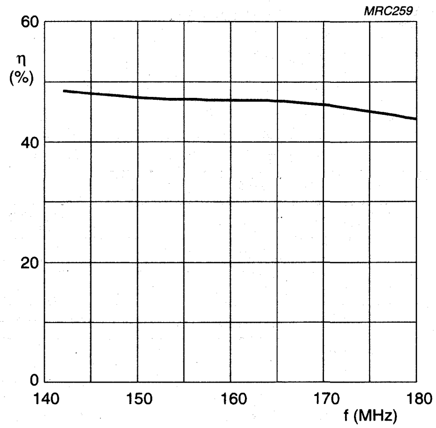
$V_{S1} = V_{S2} = 12.5$ V.

Fig.4 Load power as a function of drive power; BGY136; typical values.



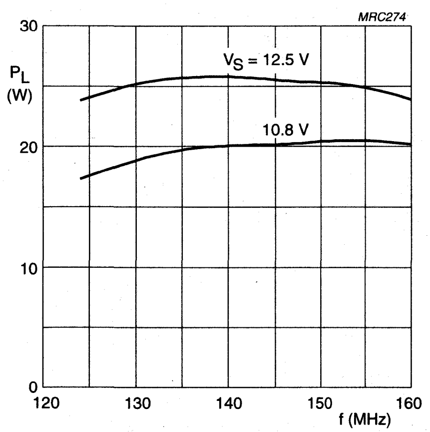
$V_{S1} = V_{S2} = 12.5$ V; $P_L = 18$ W.

Fig.5 Efficiency as a function of frequency; BGY135; typical values.



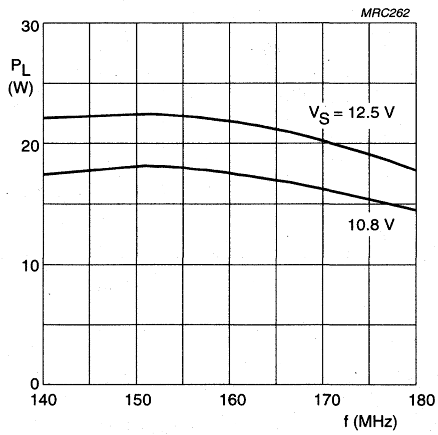
$V_{S1} = V_{S2} = 12.5$ V; $P_L = 18$ W.

Fig.6 Efficiency as a function of frequency; BGY136; typical values.



$P_D = 150$ mW.

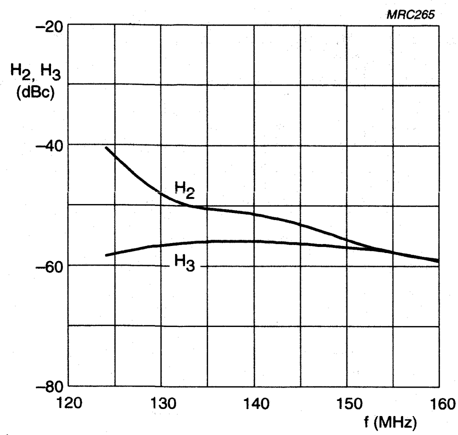
Fig.7 Load power as a function of frequency; BGY135; typical values.



$P_D = 150$ mW.

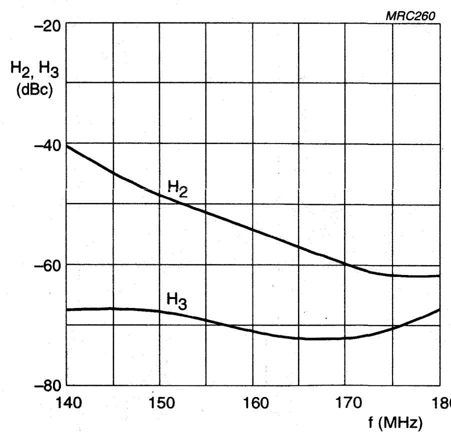
Fig.8 Load power as a function of frequency; BGY136; typical values.

VHF power amplifier modules BGY135; BGY136



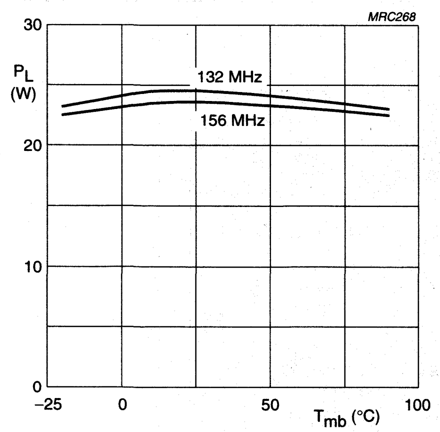
$V_{S1} = V_{S2} = 12.5$ V; $P_L = 18$ W.

Fig.9 Harmonics as a function of frequency; BGY135; typical values.



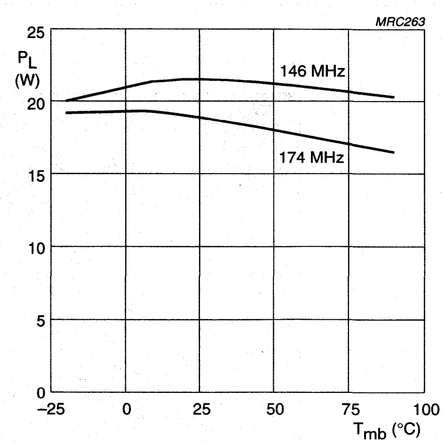
$V_{S1} = V_{S2} = 12.5$ V; $P_L = 18$ W.

Fig.10 Harmonics as a function of frequency; BGY136; typical values.



$P_D = 150$ mW; $V_{S1} = V_{S2} = 12.5$ V.

Fig.11 Load power as a function of mounting base temperature; BGY135; typical values.



$P_D = 150$ mW; $V_{S1} = V_{S2} = 12.5$ V.

Fig.12 Load power as a function of mounting base temperature; BGY136; typical values.

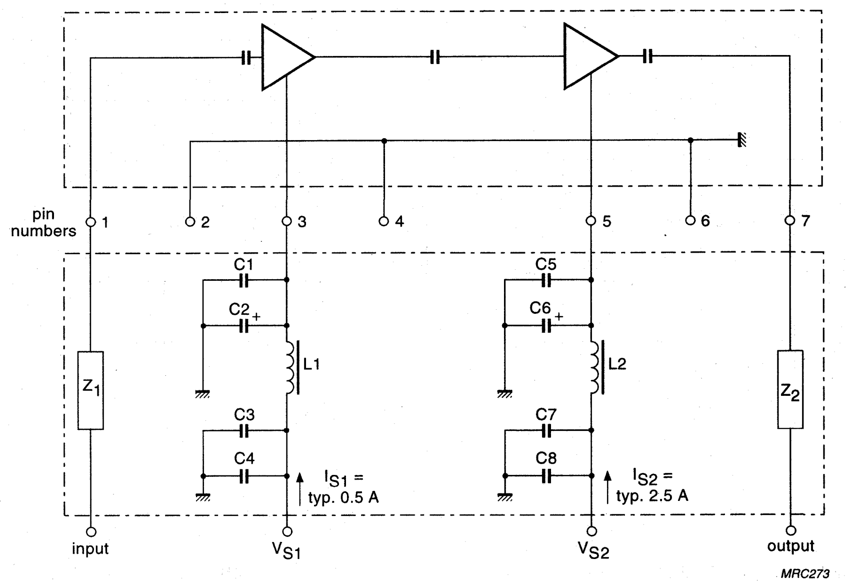
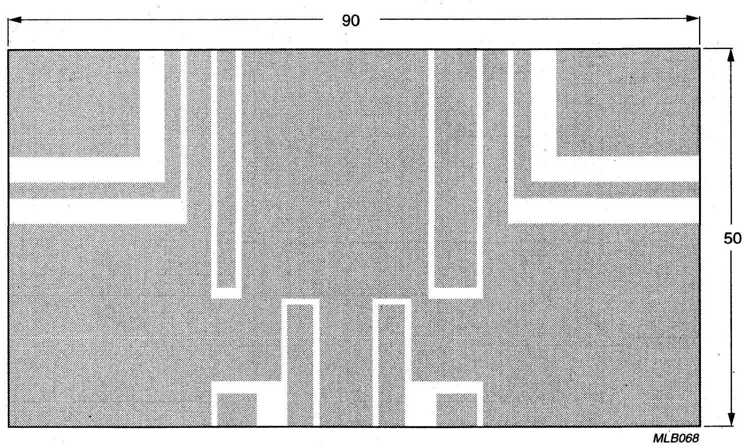


Fig.13 Test circuit.



Dimensions in mm.

Fig.14 Printed-circuit board layout.

List of components (see Fig.13)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO
C1, C5	multilayer chip capacitor	1 nF	4822 590 06614
C2, C6	tantalum capacitor	6.8 μF, 35 V	2022 001 00067
C3, C7	multilayer chip capacitor	10 nF	2222 852 47103
C4, C8	multilayer chip capacitor	100 nF	2222 852 47104
L1, L2	1 turn 0.5 mm copper wire on ferrite coil	1 μH	3122 108 20153
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 = 4.7), thickness $^1/_{16}$ inch.

VHF power amplifier module | BGY143

FEATURES

- 12.5 V nominal supply voltage
- 13 W output power.

APPLICATIONS

- Mobile communication equipment operating directly from 12 V vehicle electrical systems.

DESCRIPTION

The BGY143 is a two-stage broadband RF amplifier module in a SOT132B package. The module consists of two NPN transistor dies together with lumped-element matching components.

PINNING - SOT132B

PIN	DESCRIPTION
1	RF input
2	ground
3	V_{S1}
4	ground
5	V_{S2}
6	ground
7	RF output
Flange	ground

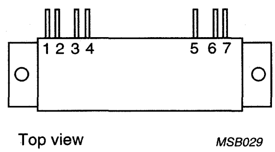


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C.

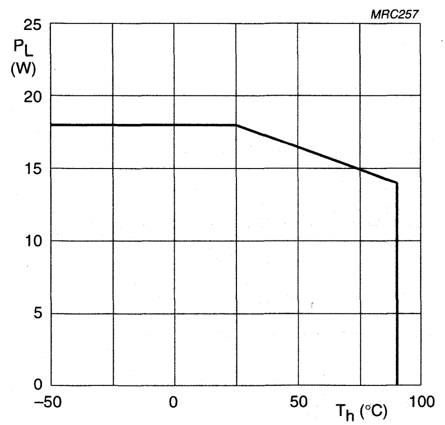
MODE OF OPERATION	f (MHz)	V_{S1}; V_{S2} (V)	P_D (mW)	P_L (W)	η (%)	Z_S; Z_L (Ω)
CW	146 to 174	12.5	150	≥13	typ. 48	50

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO inserts 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	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	15.6	V
V_{S2}	DC supply voltage	–	15.6	V
V_i	RF input voltage	–	25	V
V_o	RF output voltage	–	25	V
P_D	input drive power	–	300	mW
P_L	load power	–	18	W
T_{stg}	storage temperature	–40	+100	°C
T_h	heatsink operating temperature	–20	+90	°C



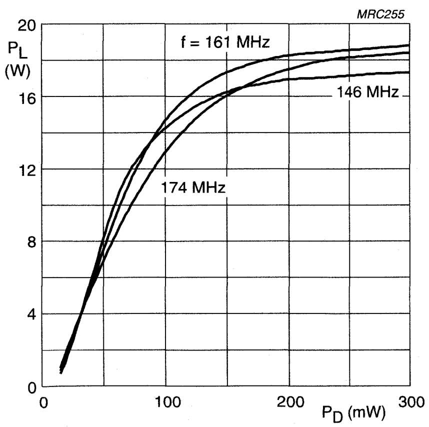
$V_{S1} = V_{S2} \leq 12.5$ V; VSWR = 1.

Fig.2 Load power derating curve.

CHARACTERISTICS

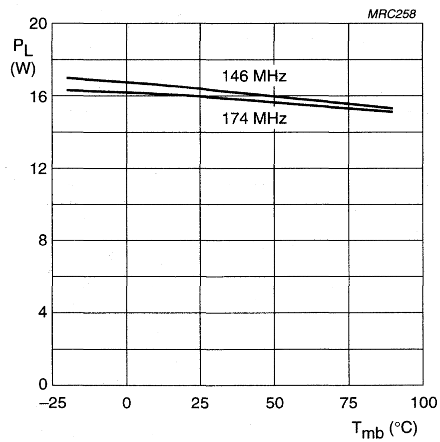
$Z_S = Z_L = 50\ \Omega$; $P_D = 150$ mW; $V_{S1} = V_{S2} = 12.5$ V; $T_h = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency		146	–	174	MHz
I_{Q2}	leakage current	$V_{S1} = 0$; $P_D = 0$	–	–	10	mA
P_L	load power		13	–	–	W
η	efficiency	adjust P_D for $P_L = 13$ W	40	48	–	%
H_2	second harmonic	adjust P_D for $P_L = 13$ W	–	–34	–25	dBc
H_3	third harmonic	adjust P_D for $P_L = 13$ W	–	–34	–25	dBc
$VSWR_{in}$	input VSWR	adjust P_D for $P_L = 13$ W	–	1.5	3	
	stability	$V_{S1} = V_{S2} = 10.8$ to 15.6 V; $P_L = 1$ to 15 W; VSWR = 3 : 1	–	–	–60	dBc
	ruggedness	$P_D \leq 300$ mW; $V_{S1} = V_{S2} = 15.6$ V duration 5 s; $P_L < 18$ W; VSWR = 50 : 1	no degradation			



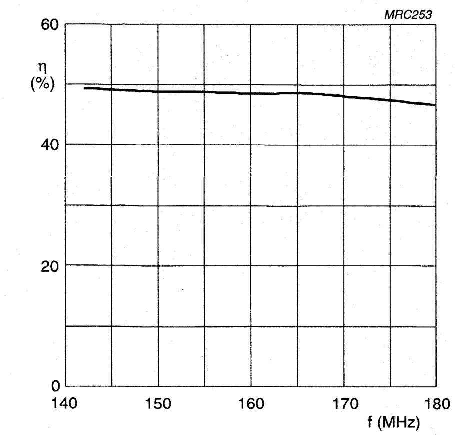
$V_{S1} = V_{S2} = 12.5$ V.

Fig.3 Load power as a function of drive power; typical values.



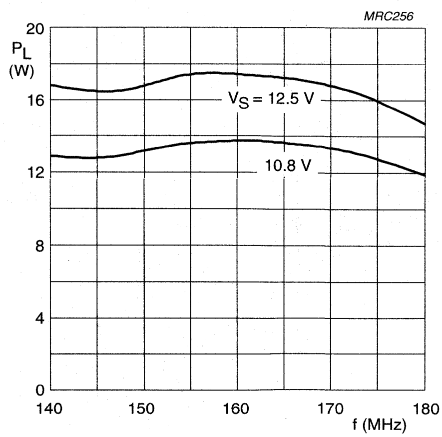
$P_D = 150$ mW; $V_{S1} = V_{S2} = 12.5$ V.

Fig.4 Load power as a function of mounting base temperature; typical values.



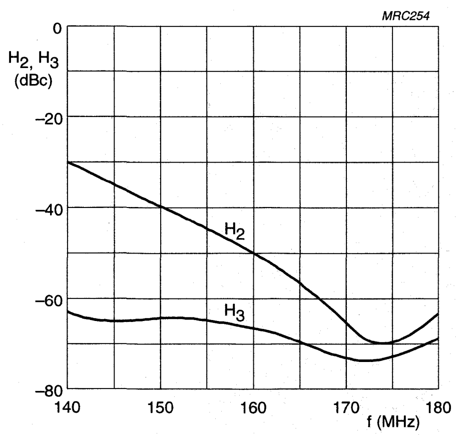
$V_{S1} = V_{S2} = 12.5$ V; $P_L = 13$ W.

Fig.5 Efficiency as a function of frequency; typical values.



$P_D = 150$ mW.

Fig.6 Load power as a function of frequency; typical values.



$V_{S1} = V_{S2} = 12.5$ V; $P_L = 13$ W.

Fig.7 Harmonics as functions of frequency; typical values.

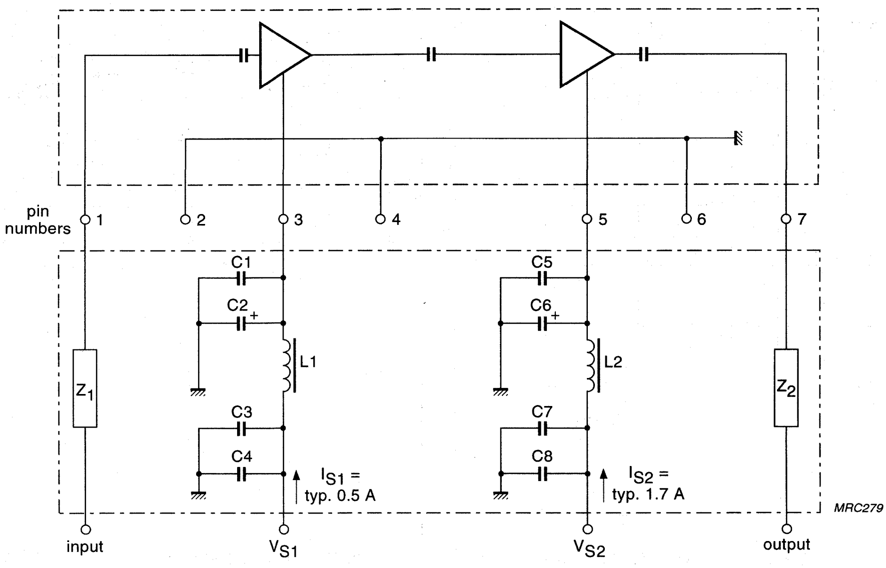
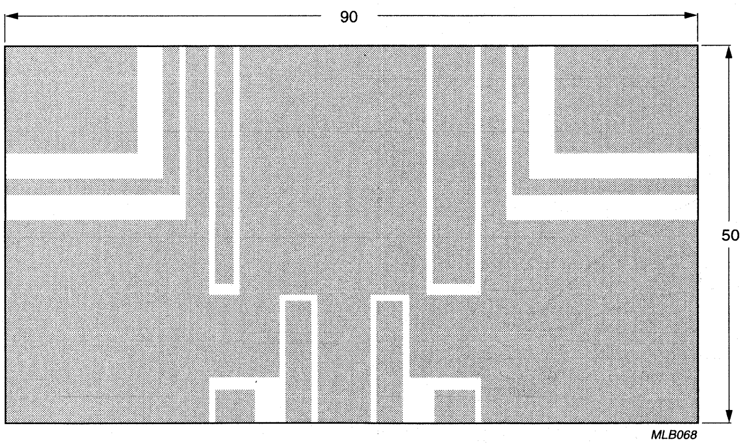


Fig.8 Test circuit.



Dimensions in mm.

Fig.9 Printed-circuit board layout.

List of components used in test circuit (see Fig.8)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO
C1, C5	multilayer chip capacitor	1 nF	4822 590 06614
C2, C6	tantalum capacitor	6.8 μF, 35 V	2022 001 00067
C3, C7	multilayer chip capacitor	10 nF	2222 852 47103
C4, C8	multilayer chip capacitor	100 nF	2222 852 47104
L1, L2	1 turn 0.5 mm copper wire on ferrite coil	1 μH	3122 108 20153
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 = 4.7), thickness $^1/_{16}$ inch.

UHF 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 power of 10 mW.

PINNING - SOT421A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

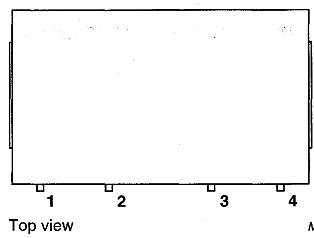


Fig.1 Simplified outline.

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

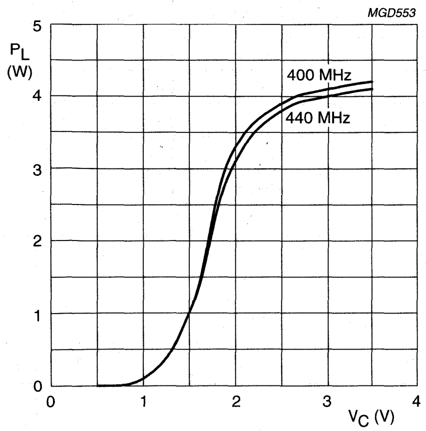
In accordance with the Absolute Maximum Rating System (IEC 134).

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	–30	+100	°C

CHARACTERISTICS

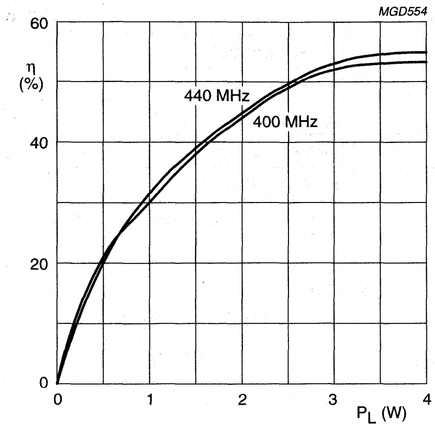
$Z_S = Z_L = 50\ \Omega$; $P_D = 10$ mW; $V_S = 6$ V; $V_C \leq 3.5$ V; $T_{mb} = 25$ °C; unless otherwise specified.

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			



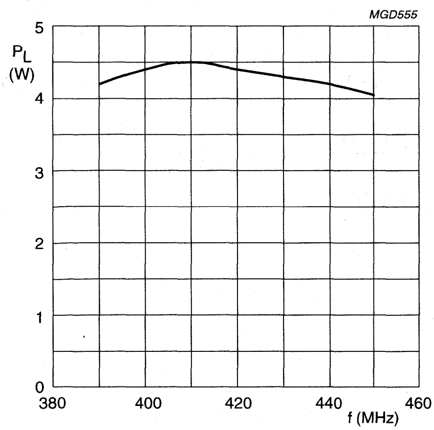
$Z_S = Z_L = 50\ \Omega$; $P_D = 10$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.2 Load power as a function of control voltage; BGY148A; typical values.



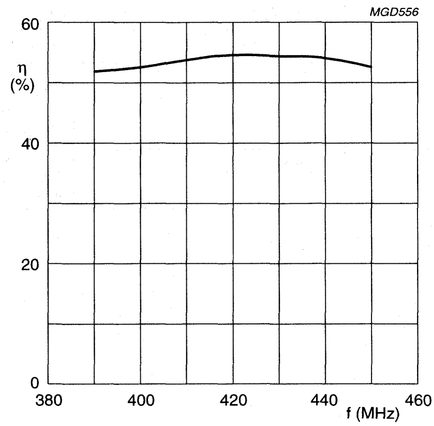
$Z_S = Z_L = 50\ \Omega$; $P_D = 10$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.3 Efficiency as a function of load power; BGY148A; typical values.



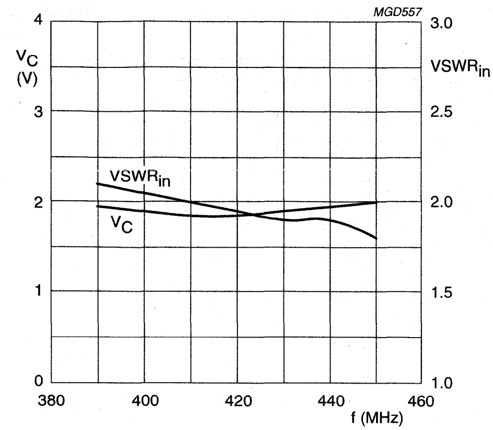
$Z_S = Z_L = 50\ \Omega$; $P_D = 10$ mW; $V_S = 6$ V; $V_C = 3.5$ V; $T_{mb} = 25$ °C.

Fig.4 Load power as a function of frequency; BGY148A; typical values.



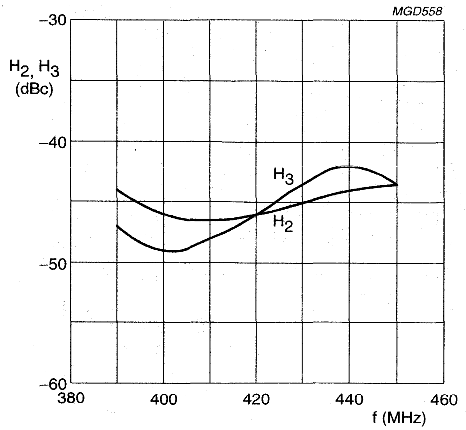
$Z_S = Z_L = 50\ \Omega$; $P_D = 10$ mW; $V_S = 6$ V; $P_L = 3$ W; $T_{mb} = 25$ °C.

Fig.5 Efficiency as a function of frequency; BGY148A; typical values.



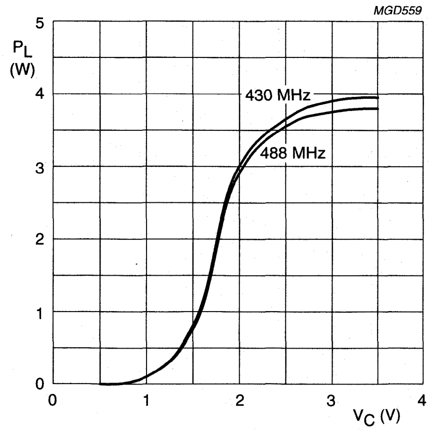
$Z_S = Z_L = 50\ \Omega$; $P_D = 10$ mW; $V_S = 6$ V; $P_L = 3$ W; $T_{mb} = 25$ °C.

Fig.6 Control voltage and input VSWR as functions of frequency; BGY148A; typical values.



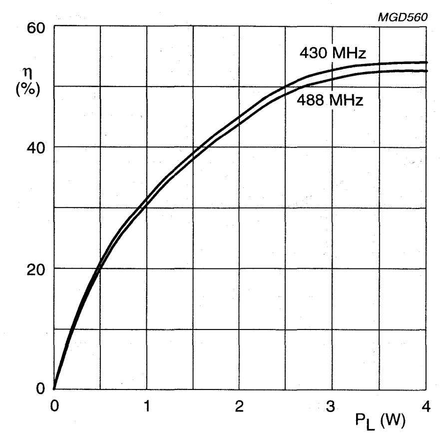
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $P_L = 3$ W; $T_{mb} = 25$ °C.

Fig.7 Harmonics as a function of frequency; BGY148A; typical values.



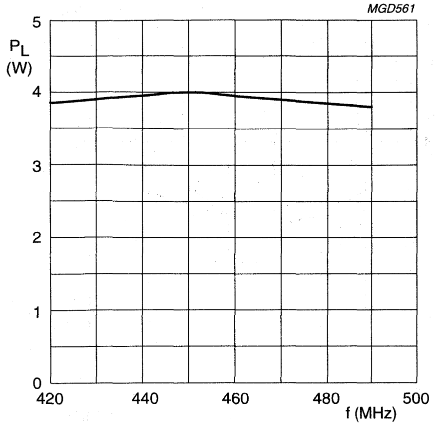
$Z_S = Z_L = 50\ \Omega$; $P_D = 10$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.8 Load power as a function of control voltage; BGY148B; typical values.



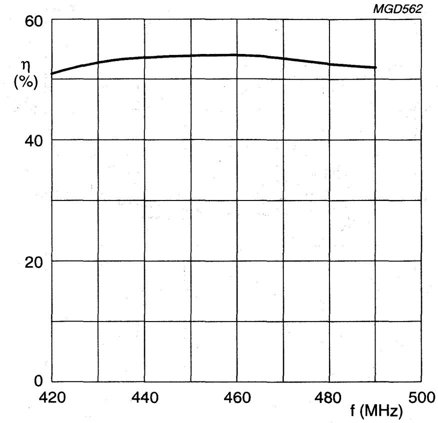
$Z_S = Z_L = 50\ \Omega$; $P_D = 10$ mW; $V_S = 6$ V; $T_{mb} = 25$ °C.

Fig.9 Efficiency as a function of load power; BGY148B; typical values.



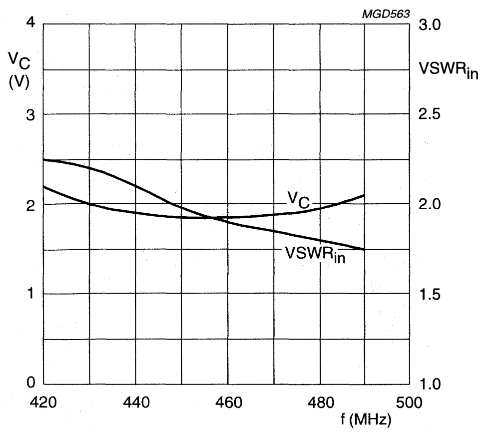
$Z_S = Z_L = 50\ \Omega$; $P_D = 10$ mW; $V_S = 6$ V; $V_C = 3.5$ V; $T_{mb} = 25$ °C.

Fig.10 Load power as a function of frequency; BGY148B; typical values.



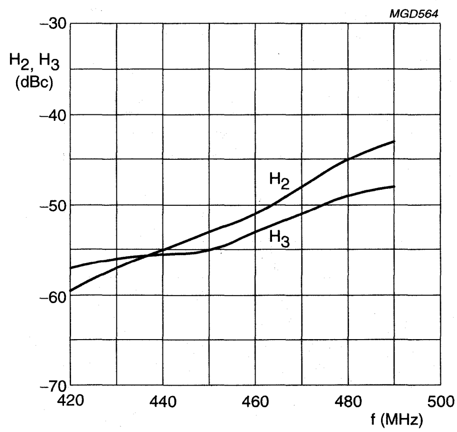
$Z_S = Z_L = 50\ \Omega$; $P_D = 10$ mW; $V_S = 6$ V; $P_L = 3$ W; $T_{mb} = 25$ °C.

Fig.11 Efficiency as a function of frequency; BGY148B; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 10$ mW; $V_S = 6$ V; $P_L = 3$ W; $T_{mb} = 25$ °C.

Fig.12 Control voltage and input VSWR as functions of frequency; BGY148B; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $P_L = 3$ W; $T_{mb} = 25$ °C.

Fig.13 Harmonics as a function of frequency; BGY148B; typical values.

FEATURES

- 7.2 V nominal supply voltage
- 7 W output power
- Easy output power control by DC voltage.

APPLICATIONS

- Portable communication equipment operating in the 400 to 470 MHz and 450 to 512 MHz frequency ranges respectively.

DESCRIPTION

The BGY152A and BGY152B are four-stage power amplifier modules in a SOT434A package. Each module consists of three MOSFET's and one bipolar transistor chip mounted together with matching and bias circuit components on a metallized ceramic substrate.
These modules produce an output power of 7 W into a load of 50 Ω at a supply voltage of 7.2 V with an RF drive power of 1 mW.

PINNING - SOT434A

PIN	DESCRIPTION
1	RF input + V_C
2	V_{S1}
3	V_{S2}
4	V_{S3}
5	RF output
Flange	ground

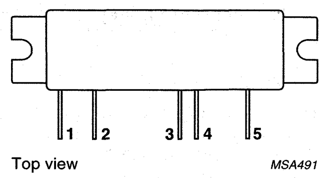


Fig.1 Simplified outline.

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)
BGY152A	CW	400 to 470	7.2	7	≥38.5	≥40	50
BGY152B	CW	450 to 512	7.2	7	≥38.5	≥40	50

LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	9	V
V_{S2}	DC supply voltage	–	9	V
V_{S3}	DC supply voltage	–	9	V
V_C	DC control voltage	–	7.5	V
P_D	input drive power	–	5	mW
P_L	load power	–	9	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–30	+100	°C

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = V_{S3} = 7.2$ V; $V_C \leq 7.2$ V; $T_{mb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY152A		400	–	470	MHz
	BGY152B		450	–	512	MHz
$I_{Q1}+I_{Q2}+I_{Q3}$	total leakage current	$V_C = 0$; $P_D = 0$	–	–	200	μA
P_L	load power		7	–	–	W
G_p	power gain	adjust V_C for $P_L = 7$ W	38.5	–	–	dB
η	efficiency	adjust V_C for $P_L = 7$ W	40	43	–	%
H_2	second harmonic	adjust V_C for $P_L = 7$ W	–	–	–35	dBc
H_3	third harmonic	adjust V_C for $P_L = 7$ W	–	–	–40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 7$ W	–	–	2 : 1	
	control range	$V_C = 0$ to 7.2 V; $P_D = 1$ mW	70	–	–	dB
	stability	$P_D = 0.5$ to 2 mW; $V_S = 6$ to 9 V; adjust V_C for $P_L \leq 9$ W; VSWR ≤ 8 : 1 through all phases	–	–	–60	dBc
	ruggedness	$V_S = 9$ V; adjust V_C for $P_L \leq 9$ W VSWR ≤ 20 : 1 through all phases	no degradation			

FEATURES

- 7.2 V nominal supply voltage
- 5 W output power
- Easy output power control by DC voltage.

APPLICATIONS

- Portable communication equipment operating in the 800 to 870 MHz frequency range.

DESCRIPTION

The BGY172 is a four-stage UHF amplifier module in a SOT434A package. The module consists of four NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT434A

PIN	DESCRIPTION
1	RF input + V_C
2	V_{S1}
3	V_{S2}
4	V_{S3}
5	RF output
Flange	ground

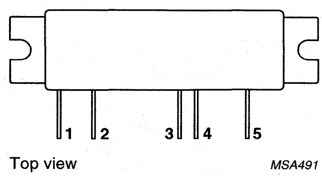


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_{S1-2} (V)	V_C (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
CW	800 to 870	7.2	3.75	5	≥37	≥35	50

LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	10	V
V_{S2}	DC supply voltage	–	10	V
V_C	DC control voltage	–	4	V
P_D	input drive power	–	2	mW
P_L	load power	–	6	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–30	+100	°C

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 7.2$ V; $V_C \leq 3.75$ V; f = 800 to 870 MHz; $T_{mb} = 25$ °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{Q2}	quiescent current	$V_C < 0.5$ V	–	200	µA
I_C	control current	adjust V_C for $P_L = 5$ W	–	500	µA
P_L	load power	$V_C = 3.75$ V	5	–	W
G_p	power gain	adjust V_C for $P_L = 5$ W	37	–	dB
η	efficiency	adjust V_C for $P_L = 5$ W	35	–	%
H_2	second harmonic	adjust V_C for $P_L = 5$ W	–	–35	dBc
H_3	third harmonic	adjust V_C for $P_L = 5$ W	–	–35	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 5$ W	–	2 : 1	
	stability	$P_D = 0.5$ to 2 mW; $V_{S1-2} = 6$ to 9 V; $V_C = 0.5$ to 3.75 V; $P_L \leq 5$ W; VSWR ≤ 6 : 1 through all phases	–	–60	dBc
	isolation	$V_C < 0.5$ V	–	–36	dBm
	ruggedness	$V_{S1-2} = 9$ V; adjust V_C for $P_L = 6$ W VSWR ≤ 20 : 1 through all phases	no degradation		

UHF amplifier module — BGY201

FEATURES

- 12.5 V nominal supply voltage
- 14 W output power
- Easy control of output power by pulsed 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 BGY201 is a five-stage UHF amplifier module in a SOT278A package. It consists of five NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT278A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_{S1}
4	V_{S2}
5	RF output
Flange	ground

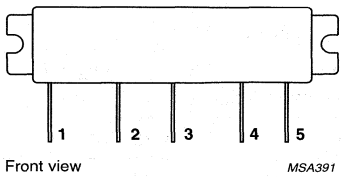


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_{S1}; V_{S2} (V)	V_C (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
Pulsed; δ = 1 : 8	890 to 915	12.5	≤4	14	≥41.5	typ. 38	50

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

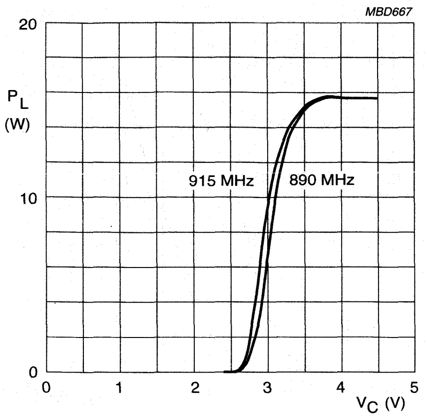
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	$V_C = 4$ V	–	15.6	V
V_{S2}	DC supply voltage	$V_C = 4$ V	–	15.6	V
V_C	DC control voltage		–	5	V
P_D	input drive power		–	2	mW
P_L	load power		–	16	W
T_{stg}	storage temperature range		–40	+100	°C
T_{mb}	operating mounting base temperature		–30	+90	°C

CHARACTERISTICS

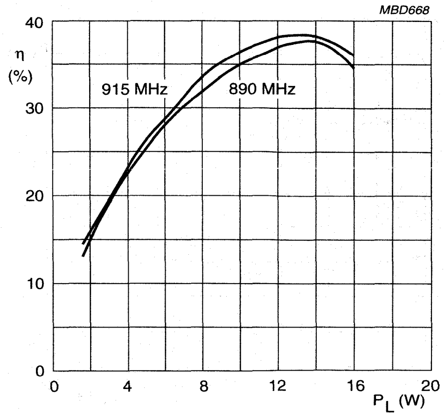
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 12.5$ V; $V_C \leq 4$ V; f = 890 to 915 MHz; $T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{Q2}	leakage current	$V_{S1} = V_C = 0$	–	–	1	mA
I_C	control current	adjust V_C for $P_L = 14$ W	–	–	1	mA
P_L	load power		14	–	–	W
G_p	power gain	adjust V_C for $P_L = 14$ W	41.5	–	–	dB
η	efficiency	adjust V_C for $P_L = 14$ W	33	38	–	%
H_2	second harmonic	adjust V_C for $P_L = 14$ W	–	–	–40	dBc
H_3	third harmonic	adjust V_C for $P_L = 14$ W	–	–	–40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 14$ W	–	–	2 : 1	
	stability	$P_D = -3$ to $+3$ dBm; $V_{S1} = V_{S2} = 10$ to 15.6 V; $V_C = 0$ to 4 V; $P_L \leq 14$ W; VSWR ≤ 6 : 1 through all phases	–	–	–55	dBc
	isolation	$V_C < 0.5$ V	–	–	–36	dBm
	control bandwidth	$P_L \leq 14$ W	1	–	–	MHz
	AM-AM conversion	P_D with 1% AM; $P_L \leq 14$ W	–	–	3	
t_r	rise time		–	–	1	µs
	ruggedness	$V_{S1} = V_{S2} = 15.6$ V; adjust V_C for $P_L = 16$ W VSWR ≤ 10 : 1 through all phases	no degradation			



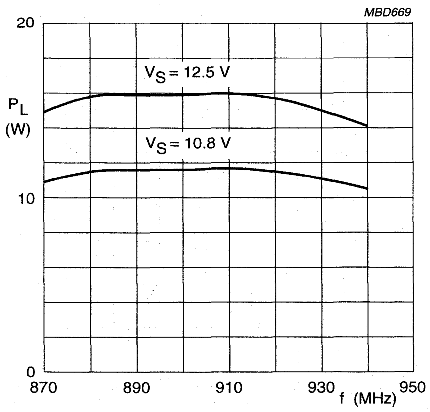
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 12.5$ V; $T_{mb} = 25\ ^{\circ}C$;
$\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.2 Load power as a function of control voltage; typical values.



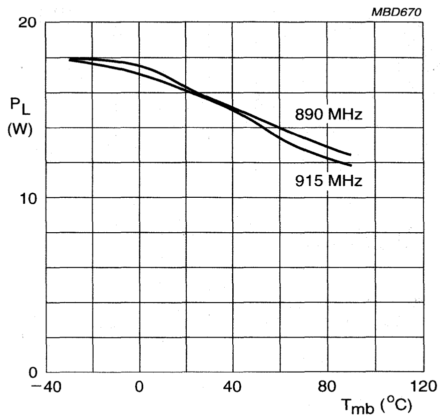
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 12.5$ V; $T_{mb} = 25\ ^{\circ}C$;
$\delta = 1:8$; $t_p = 575\ \mu s$.

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



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 4$ V; $T_{mb} = 25\ ^{\circ}C$;
$\delta = 1:8$; $t_p = 575\ \mu s$.

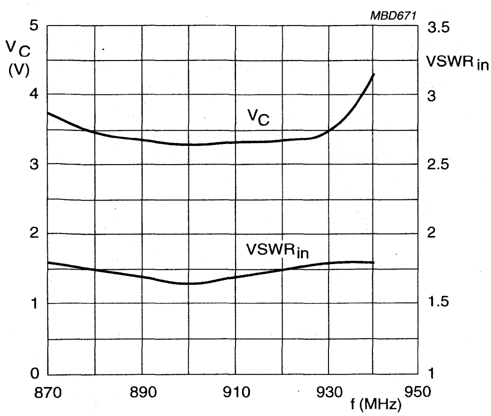
Fig.4 Load power as a function of frequency; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 12.5$ V; $V_C = 4$ V;
$\delta = 1:8$; $t_p = 575\ \mu s$.

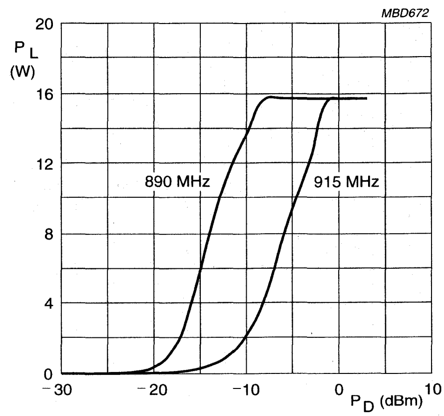
Fig.5 Load power as a function of mounting base temperature; typical values.

UHF amplifier module BGY201



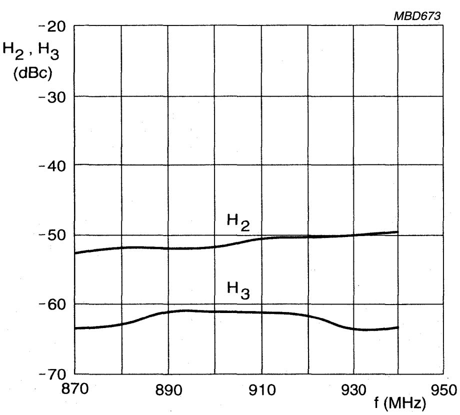
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 12.5$ V; $P_L = 14$ W; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.6 Control voltage and input VSWR as functions of frequency; typical values.



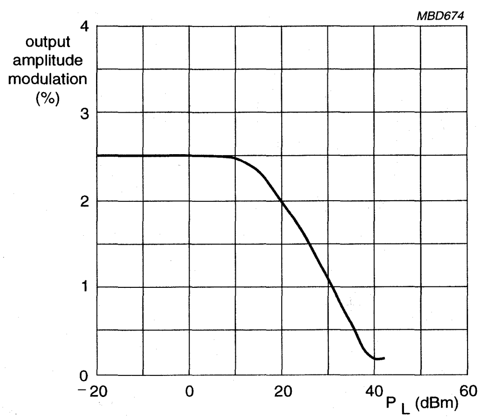
$Z_S = Z_L = 50\ \Omega$; $V_{S1} = V_{S2} = 12.5$ V; $V_C = 4$ V; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.7 Load power as a function of drive power; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 12.5$ V; $P_L = 14$ W; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.8 Harmonics as functions of frequency; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_{S1} = V_{S2} = 12.5$ V; $T_{mb} = 25$ °C; f = 900 MHz; input amplitude modulation = 1%; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.9 Output amplitude modulation as a function of load power; typical values.

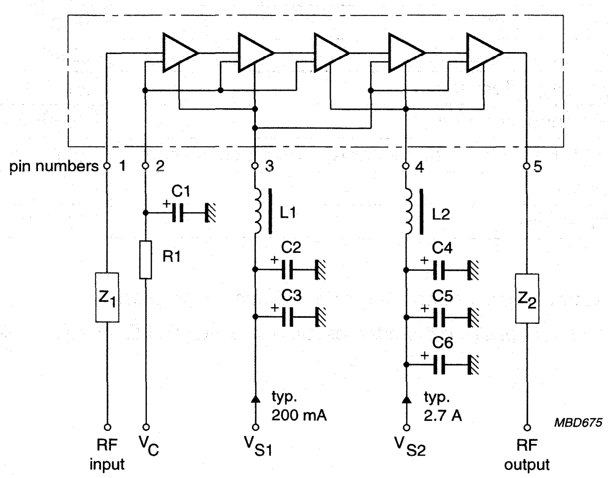


Fig.10 Test circuit.

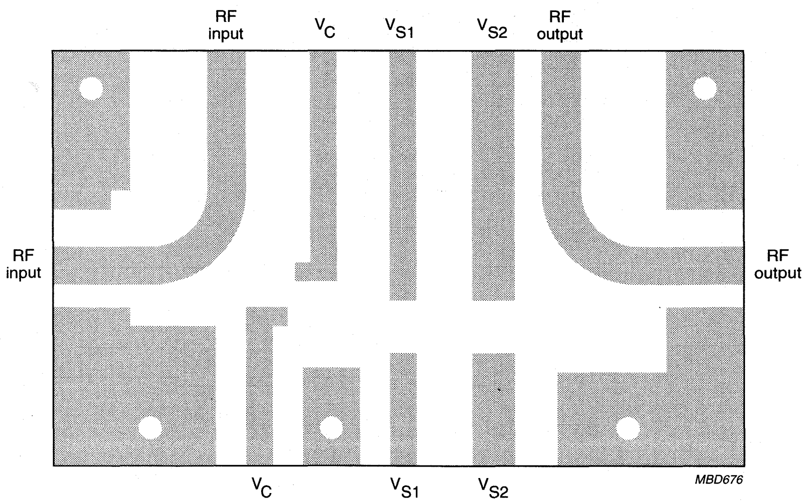


Fig.11 Printed-circuit board layout.

List of components (see Fig.10)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1	tantalum capacitor; note 1	560 pF	–
C2, C4	tantalum capacitor; note 1	2.2 μF	–
C3, C5	electrolytic capacitor; note 1	22 μF	–
C6	electrolytic capacitor; note 1	220 μF	–
L1, L2	RF choke, 0.5 turn 0.8 mm copper wire on grade 3B core	1 μH	4330 030 32221
Z_1, Z_2	stripline; note 2	–	–
R1	metal film resistor	100 Ω; 0.4 W	–

Notes

1. The capacitors are for external supply decoupling and optimum pulse shape.
2. The striplines are on a double copper-clad printed-circuit board with PTFE fibreglass dielectric (ε = 2.2); thickness $\frac{1}{16}$ inch.

UHF amplifier module BGY202

FEATURES

- Single 6 V nominal supply voltage
- 1.4 W output power
- Easy control of output power by DC voltage
- High efficiency (typically 50 %).

APPLICATIONS

- Digital cellular radio systems (GSM systems) in the 890 to 915 MHz frequency range.

PINNING - SOT321

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
flange	ground

DESCRIPTION

The BGY202 is a three-stage UHF amplifier module. It consists of three NPN silicon planar transistor chips mounted together with matching and bias circuit components on a metallized ceramic substrate.

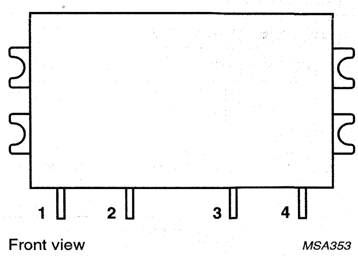


Fig.1 Simplified outline.

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	6	3.5	≥1.4	≥28.5	typ. 50	50

LIMITING VALUES

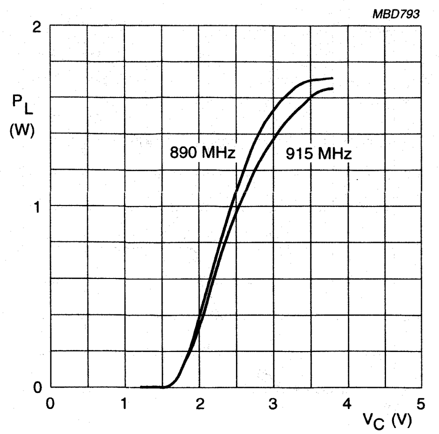
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_S	DC supply voltage		–	8.5	V
V_C	DC control voltage		–	4	V
P_D	input drive power		–	5	mW
P_L	load power	$\delta = 1 : 8$; $t_p = 575\ \mu s$	–	1.8	W
T_{stg}	storage temperature		–40	+100	°C
T_{mb}	operating mounting base temperature		–30	+100	°C

CHARACTERISTICS

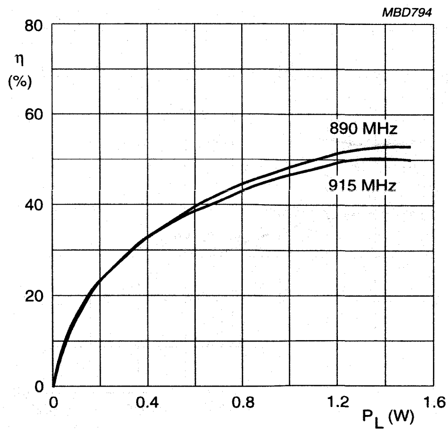
$T_{mb} = 25\ °C$; $Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C \leq 3.5$ V; $V_S = 6$ V; f = 890 to 915 MHz; $\delta = 1 : 8$; $t_p = 575\ \mu s$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
P_L	load power	$V_C = 3.5$ V	1.4	–	–	W
G_p	power gain	$P_L = 1.4$ W	28.5	–	–	dB
η	efficiency	$P_L = 1.4$ W	45	50	–	%
H_2	second harmonic	$P_L = 1.4$ W	–	–	–40	dBc
H_3	third harmonic	$P_L = 1.4$ W	–	–	–40	dBc
$VSWR_{in}$	input VSWR	$P_L = 1.4$ W	–	–	3 : 1	
I_C	control current		–	–	0.5	mA
I_Q	leakage current	$V_C = 0$; $P_D \leq -60$ dBm	–	–	0.1	mA
	isolation	$V_C = 0$	–	–	–36	dBm
	stability	VSWR ≤ 6 : 1 through all phases; $V_S = 4.8$ to 8.5 V; $V_C = 0$ to 3.5 V; $P_L \leq 1.4$ W; $P_D = 0$ to 6 dBm	–	–	–60	dBc
	control bandwidth		1	–	–	MHz
P_n	noise power	$P_L = 1.4$ W; bandwidth = 30 kHz; 20 MHz above f_o	–	–	–85	dBm
	AM-AM conversion	P_D with 1% AM; $P_L \leq 1.4$ W	–	5	–	%
	ruggedness	VSWR ≤ 10 : 1 through all phases; $V_S = 8.5$ V; $P_L = 1.6$ W	no degradation			



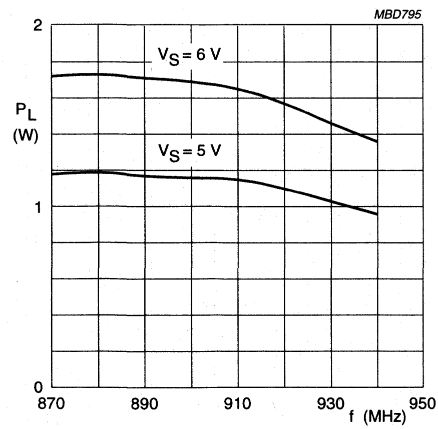
$Z_S = Z_L = 50\ \Omega$; $T_{mb} = 25$ C; $P_D = 2$ mW; $V_S = 6$ V;
$\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.2 Load power as a function of control voltage; typical values.



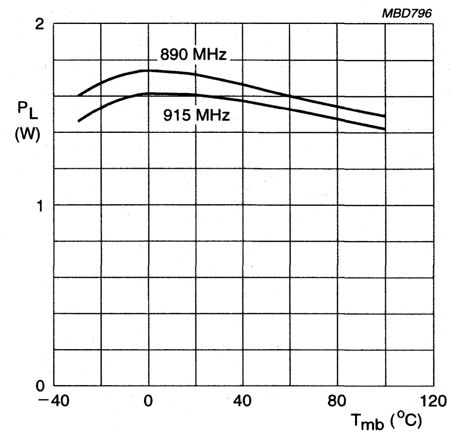
$Z_S = Z_L = 50\ \Omega$; $T_{mb} = 25$ C; $P_D = 2$ mW; $V_S = 6$ V;
$\delta = 1:8$; $t_p = 575\ \mu s$.

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



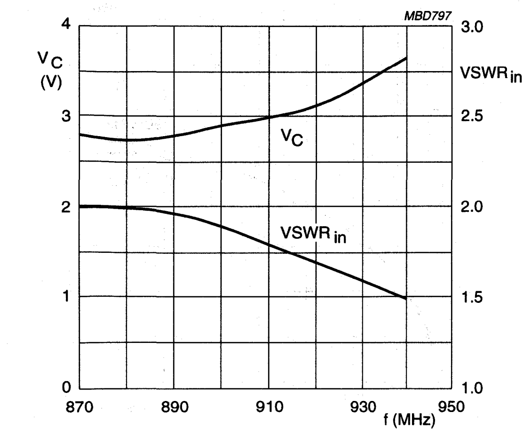
$Z_S = Z_L = 50\ \Omega$; $V_C = 3.5$ V; $T_{mb} = 25$ °C; $P_D = 2$ mW;
$\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.4 Load power as a function of frequency; typical values.



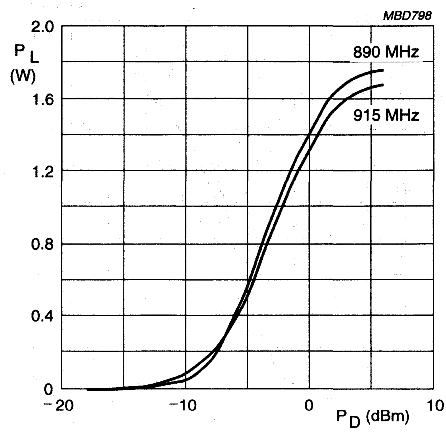
$Z_S = Z_L = 50\ \Omega$; $V_C = 3.5$ V; $V_S = 6$ V; $P_D = 2$ mW;
$\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.5 Load power as a function of mounting base temperature; typical values.



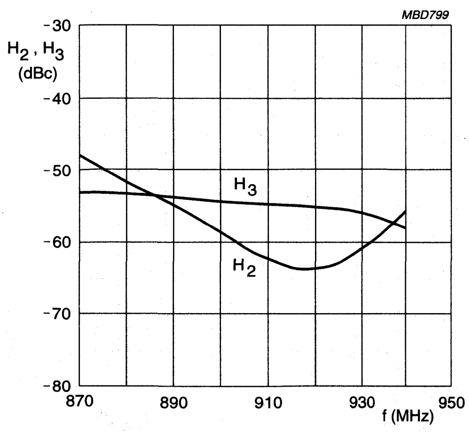
$Z_S = Z_L = 50\ \Omega$; $V_S = 6$ V; $T_{mb} = 25$ °C; $P_L = 1.4$ W; $P_D = 2$ mW; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.6 Control voltage and VSWR input as functions of frequency; typical values.



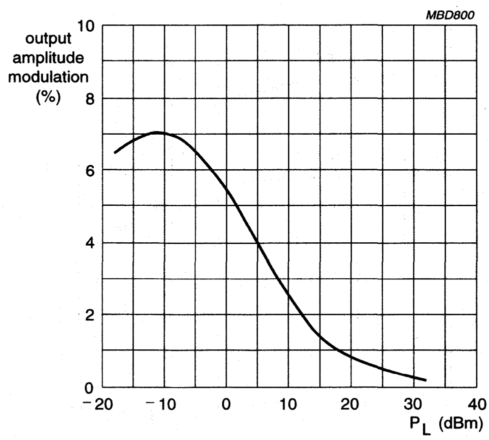
$Z_S = Z_L = 50\ \Omega$; $V_C = 3.5$ V; $V_S = 6$ V; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.7 Load power as a function of drive power; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 6$ V; $T_{mb} = 25$ °C; $P_L = 1.4$ W; $P_D = 2$ mW; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.8 Harmonics as functions of frequency; typical values.



$Z_S = Z_L = 50\ \Omega$; $T_{mb} = 25$ C; $V_S = 6$ V; input amplitude modulation = 1%; f = 900 MHz; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.9 Output amplitude modulation as a function of load power; typical values.

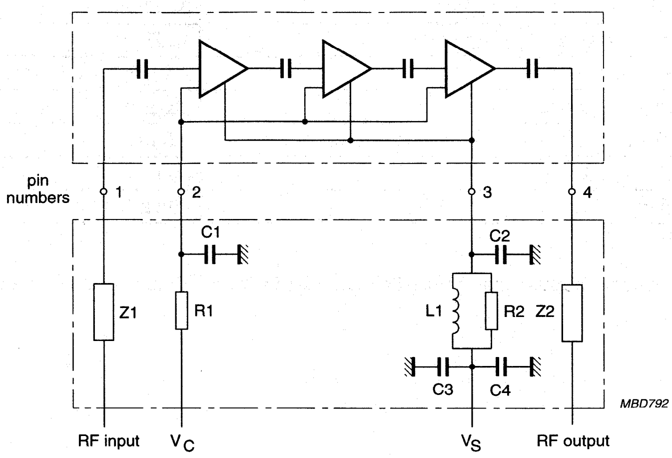


Fig.10 Test circuit.

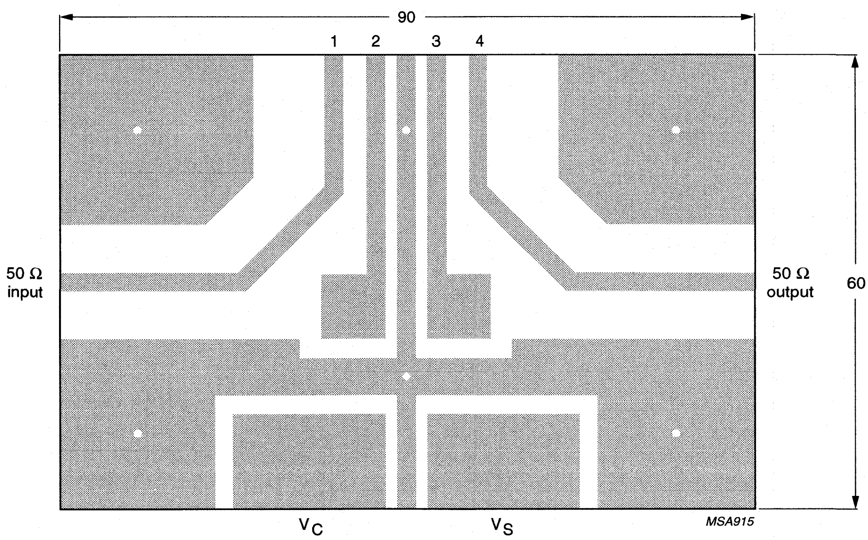


Fig.11 Printed-circuit board layout.

List of components (see Fig.10)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1	multilayer ceramic chip capacitor	33 pF	–
C2	multilayer ceramic chip capacitor	1 nF	–
C3	tantalum capacitor	2.2 µF; 35 V	–
C4	electrolytic capacitor	68 µF	–
L1	1 turn 0.4 mm copper wire on grade 3B core	0.9 µH	4330 030 32221
Z1, Z2	stripline; note 1	50 Ω	–
R1, R2	metal film resistor	10 Ω; 0.4 W	–

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 | BGY203

FEATURES

- 6 V nominal supply voltage
- 3.2 W output power
- Easy control of output power by pulsed 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 BGY203 is a four-stage UHF amplifier module in a SOT342A package. The module consists of four NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT342A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_{S1}
4	V_{S2}
5	RF output
Flange	ground

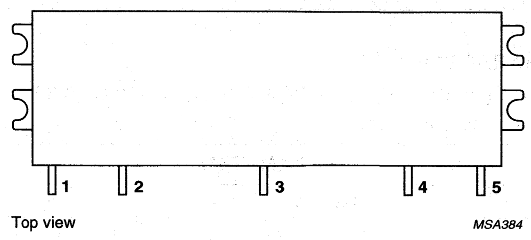


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_{S1}; V_{S2} (V)	V_C (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
Pulsed; δ = 1 : 8	880 to 915	6	≤3.5	3.2	≥35	≥35	50

LIMITING VALUES

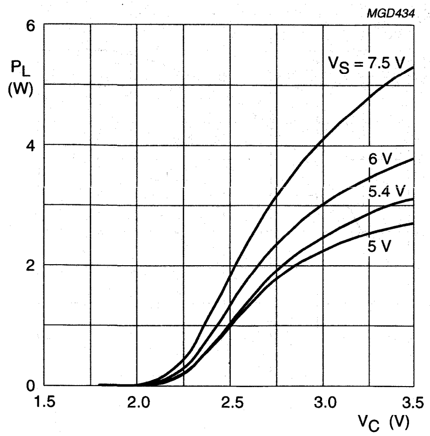
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS.	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	$V_C = 3.5$ V	–	8.5	V
V_{S2}	DC supply voltage	$V_C = 3.5$ V	–	8.5	V
V_C	DC control voltage		–	4	V
P_D	input drive power		–	2	mW
P_L	load power		–	4	W
T_{stg}	storage temperature		–40	+100	°C
T_{mb}	operating mounting base temperature		–30	+100	°C

CHARACTERISTICS

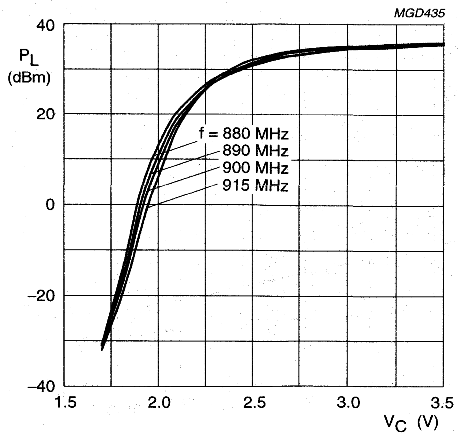
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V; $V_C \leq 3.5$ V; f = 880 to 915 MHz; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$I_{Q1} + I_{Q2}$	total leakage current	$V_C \leq 0.5$ V	–	0.2	mA
I_C	control current	adjust V_C for $P_L = 3.2$ W	–	0.5	mA
P_L	load power		3.2	–	W
G_p	power gain	adjust V_C for $P_L = 3.2$ W	35	–	dB
η	efficiency	adjust V_C for $P_L = 3.2$ W	35	–	%
H_2	second harmonic	adjust V_C for $P_L = 3.2$ W	–	–40	dBc
H_3	third harmonic	adjust V_C for $P_L = 3.2$ W	–	–40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 3.2$ W	–	2 : 1	
	stability	$P_D = 0.5$ to 2 mW; $V_{S1} = V_{S2} = 5$ to 8.5 V; $V_C = 0$ to 3.5 V; $P_L \leq 3.5$ W; VSWR $\leq 6:1$ through all phases	–	–60	dBc
	isolation	$V_C \leq 0.5$ V	–	–36	dBm
	control bandwidth		1	–	MHz
P_n	noise power	$P_L = 3.2$ W; bandwidth = 30 kHz; 20 MHz above transmitter band	–	–85	dBm
	ruggedness	$V_{S1} = V_{S2} = 8.5$ V; adjust V_C for $P_L = 3.5$ W; VSWR $\leq 10:1$ through all phases	no degradation		



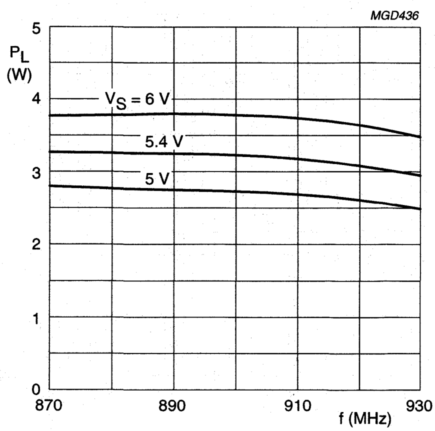
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; f = 902 MHz;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575\ \mu s$.

Fig.2 Load power as a function of control voltage; typical values.



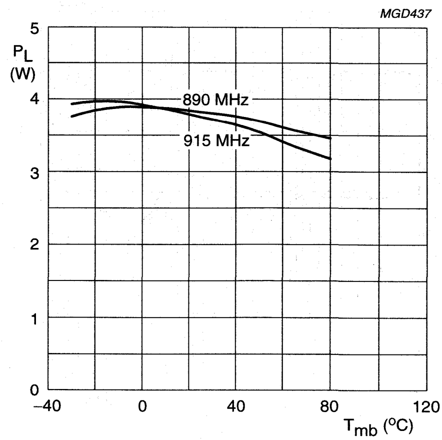
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575\ \mu s$.

Fig.3 Load power as a function of control voltage; typical values.



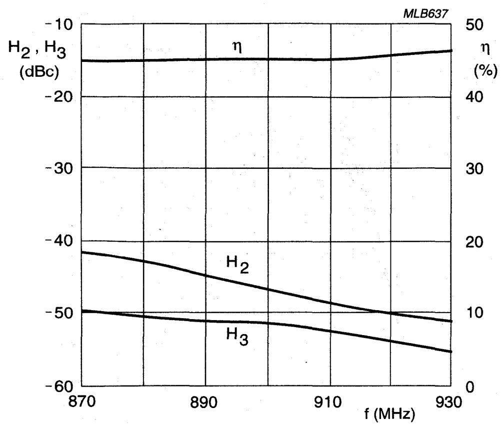
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_C = 3.5$ V;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575\ \mu s$.

Fig.4 Load power as a function of frequency; typical values.



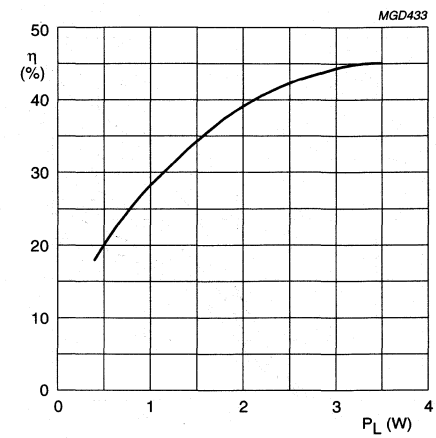
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V;
$V_C = 3.5$ V; $\delta = 1 : 8$; $t_p = 575\ \mu s$.

Fig.5 Load power as a function of mounting base temperature; typical values.



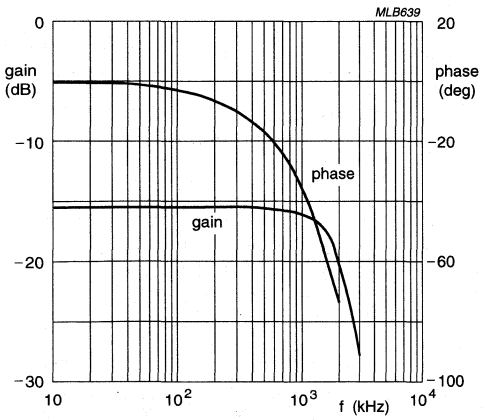
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V;
$P_L = 3.2$ W; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.6 Harmonics and efficiency as functions of frequency; typical values.



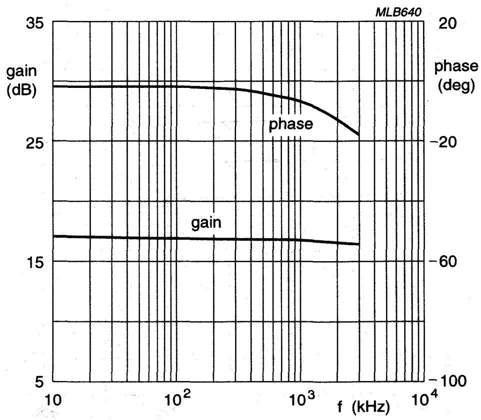
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V;
f = 902 MHz; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.7 Efficiency as a function of load power; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V;
$P_L = 35$ dBm; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.8 Control bandwidth in terms of gain and phase shift as functions of frequency; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_{S1} = V_{S2} = 6$ V;
$P_L = 15$ dBm; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.9 Control bandwidth in terms of gain and phase shift as functions of frequency; typical values.

UHF amplifier module BGY203

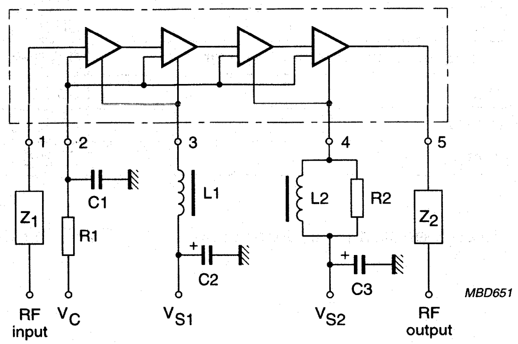
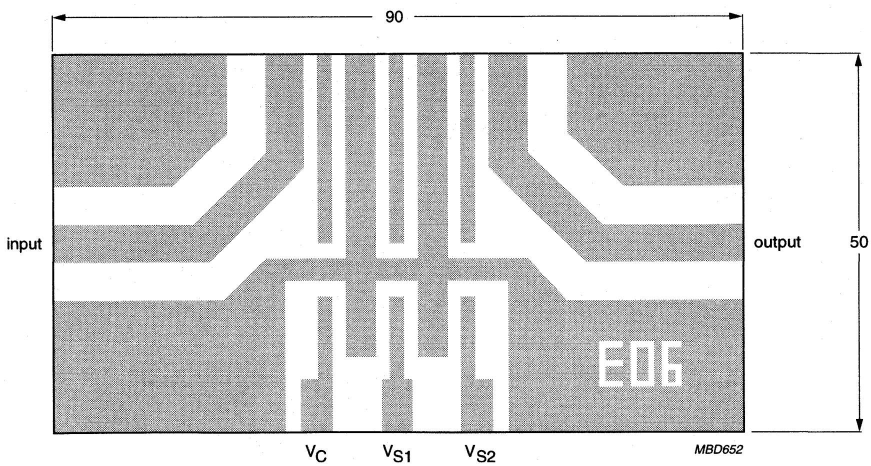


Fig.10 Test circuit.



Dimensions in mm.

Fig.11 Printed-circuit board layout.

List of components (see Fig.10)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1	multilayer ceramic chip capacitor	470 pF	–
C2	tantalum capacitor	2.2 μF	–
C3	electrolytic capacitor	68 μF	–
L1, L2	1 turn 0.4 mm copper wire on grade 3B core	0.9 μH	4330 030 32221
Z_1, Z_2	stripline; note 1	50 Ω	–
R1	metal film resistor	80 Ω; 0.4 W	–
R2	metal film resistor	5 Ω; 0.4 W	–

Note

1. The striplines are on a double copper-clad printed-circuit board with PTFE fibreglass dielectric (ε_r = 2.2); thickness $^1/_{16}$ inch.

UHF amplifier module — BGY204

FEATURES

- 4.8 V nominal supply voltage
- 3.2 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 BGY204 is a four-stage UHF amplifier module in a SOT321B package. The module consists of four NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT321B

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

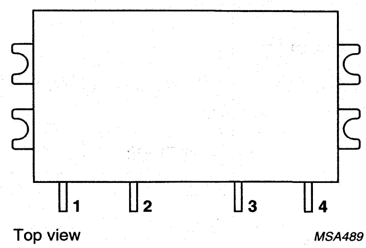


Fig.1 Simplified outline.

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	3.2	≥35	typ. 45	50

LIMITING VALUES

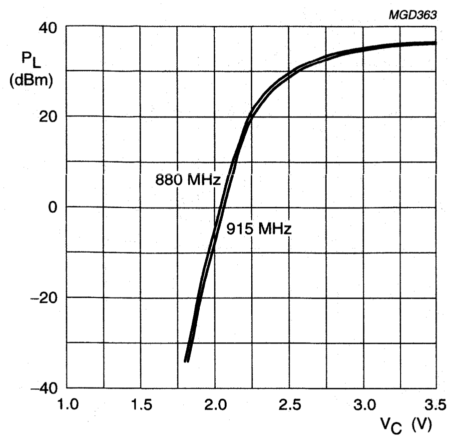
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_S	DC supply voltage	$P_L = 0$	–	8	V
V_C	DC control voltage		–	4.5	V
P_D	input drive power		–	2	mW
P_L	load power	$V_S \leq 6.5$ V; $Z_L = 50\ \Omega$	–	4	W
T_{stg}	storage temperature		–40	+100	°C
T_{mb}	operating mounting base temperature		–30	+100	°C

CHARACTERISTICS

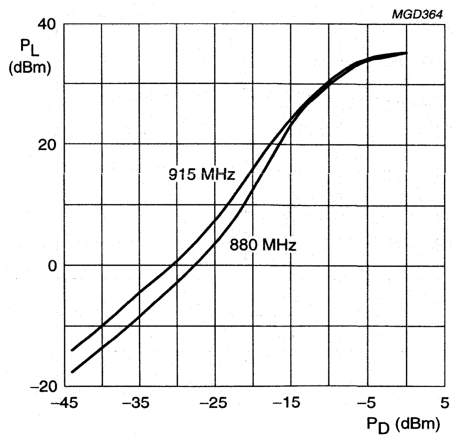
$Z_S = Z_L = 50\ \Omega$; $P_D = 1$ mW; $V_S = 4.8$ V; $V_C \leq 3.5$ V; f = 880 to 915 MHz; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_Q	leakage current	$V_C = 0.5$ V	–	–	0.2	mA
I_C	control current	adjust V_C for $P_L = 3.2$ W	–	–	0.5	mA
P_L	load power		3.2	–	–	W
G_p	power gain	adjust V_C for $P_L = 3.2$ W	35	–	–	dB
η	efficiency	adjust V_C for $P_L = 3.2$ W	40	45	–	%
H_2	second harmonic	adjust V_C for $P_L = 3.2$ W	–	–	–40	dBc
H_3	third harmonic	adjust V_C for $P_L = 3.2$ W	–	–	–40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 3.2$ W	–	–	2.5 : 1	
	stability	$P_D = 0.5$ to 2 mW; $V_S = 4$ to 6.5 V; $V_C = 0$ to 3.5 V; $P_L \leq 3.2$ 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	$P_L = 3.2$ W; bandwidth = 30 kHz; 20 MHz above transmitter band	–	–	–85	dBm
	ruggedness	$V_S = 6.5$ V; adjust V_C for $P_L = 3.2$ W; VSWR $\leq 10:1$ through all phases	no degradation			



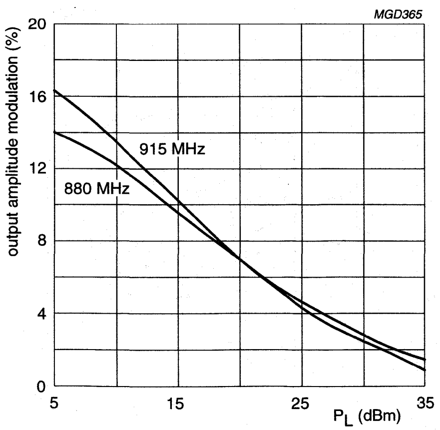
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.2 Load power as a function of control voltage; typical values.



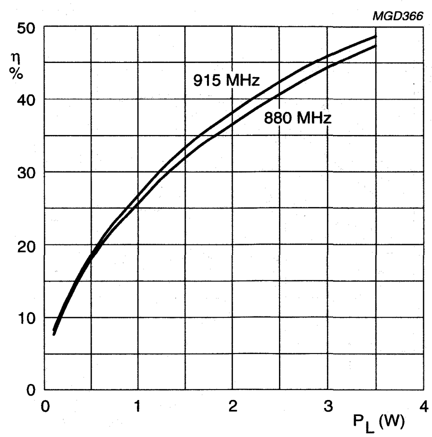
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; adjust V_C for $P_L = 3.2$ W; $T_{mb} = 25$ °C.

Fig.3 Load power as a function of drive power; typical values.



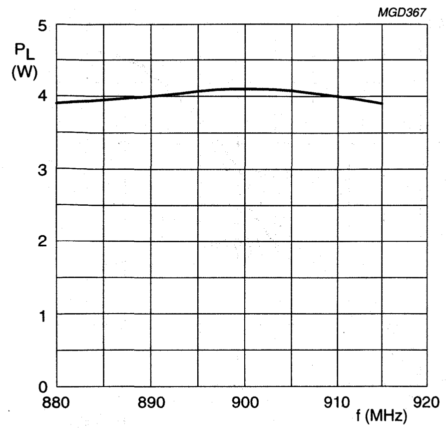
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $T_{mb} = 25$ °C;
input amplitude modulation = 3%.

Fig.4 Output amplitude modulation as a function of load power; typical values.



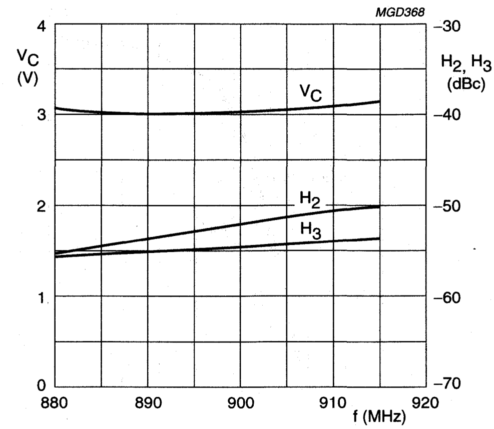
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.5 Efficiency as a function of load power; typical values.



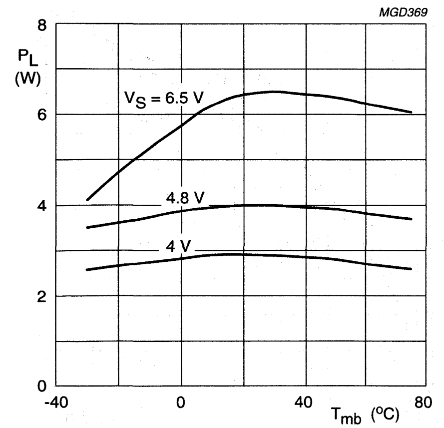
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 4.8$ V; $V_C = 3.5$ V; $T_{mb} = 25$ °C.

Fig.6 Load power as a function of frequency; typical values.



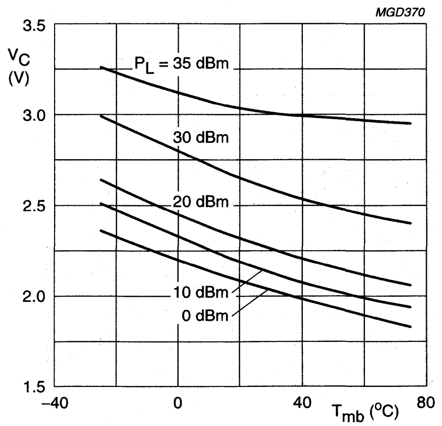
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 4.8$ V; $P_L = 3.2$ W; $T_{mb} = 25$ °C.

Fig.7 Control voltage and harmonics as functions of frequency; typical values.



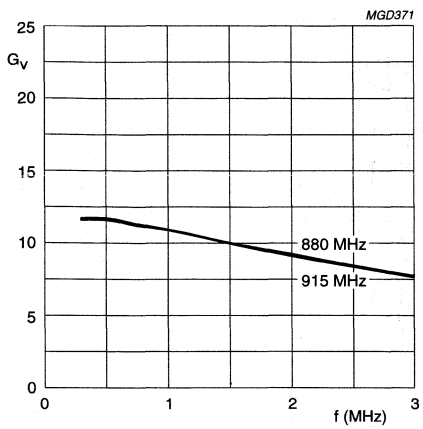
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_C = 3.5$ V; f = 900 MHz.

Fig.8 Load power as a function of the mounting base temperature; typical values.



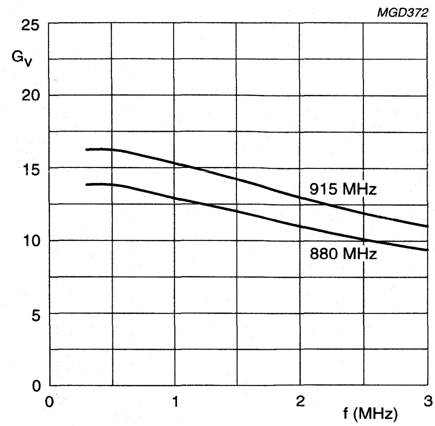
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 4.8$ V; f = 900 MHz.

Fig.9 Control voltage as a function of mounting base temperature; typical values.



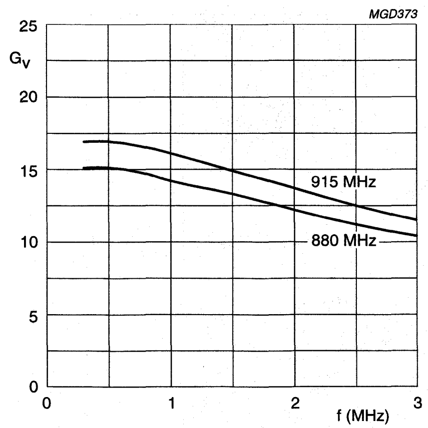
P_L = 30 dBm.
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.10 Control loop voltage gain as a function of the frequency on the control pin; typical values.



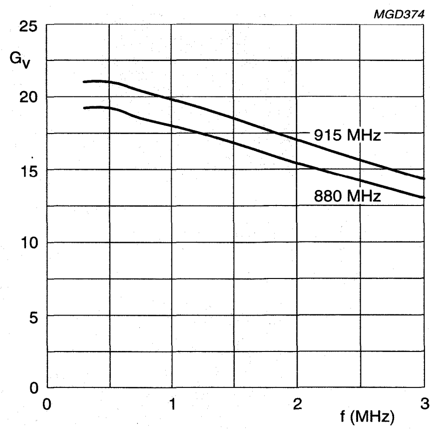
P_L = 25 dBm.
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.11 Control loop voltage gain as a function of the frequency on the control pin; typical values.



P_L = 20 dBm.
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.12 Control loop voltage gain as a function of frequency on the control pin; typical values.



P_L = 15 dBm.
$Z_S = Z_L = 50\ \Omega$; $P_D = 0$ dBm; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.13 Control loop voltage gain as a function of frequency on the control pin; typical values.

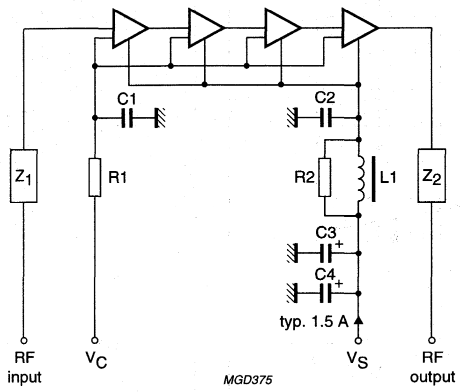
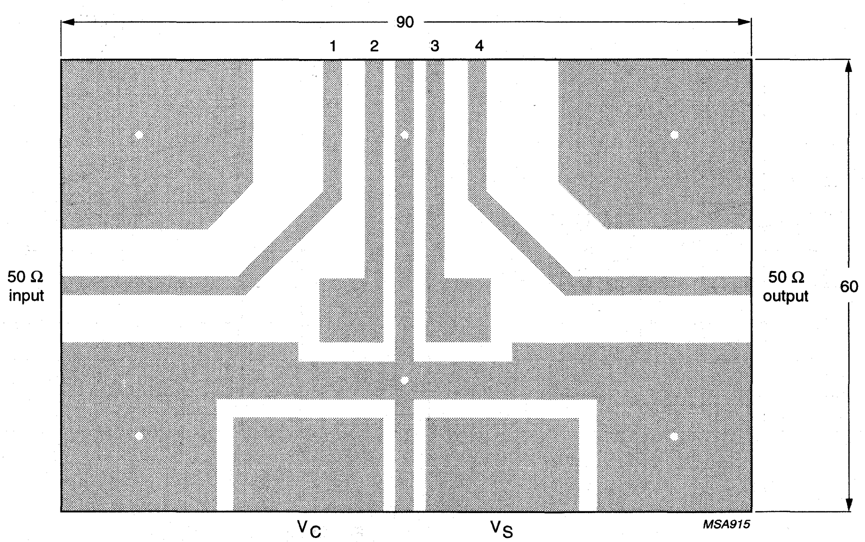


Fig.14 Test circuit.



Dimensions in mm.

Fig.15 Printed-circuit board layout.

List of components (See Fig.14)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C2	multilayer ceramic chip capacitor	680 pF	–
C3	tantalum capacitor	2.2 μF; 35 V	–
C4	electrolytic capacitor	47 μF; 40 V	–
L1	Grade 3B Ferroxcube bead		4330 030 36300
Z_1, Z_2	stripline; note 1	50 Ω	–
R1	metal film resistor	100 Ω; 0.4 W	–
R2	metal film resistor	5 Ω; 0.4 W	–

Note

1. The striplines are on a double copper-clad printed-circuit board with PTFE fibreglass dielectric (ε_r = 2.2); thickness $^1\!/_{16}$ inch.

FEATURES

- 6 V nominal supply voltage
- 3.5 W pulsed 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 BGY205 is a four-stage UHF amplifier module in a SOT321B package. The module consists of four NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT321B

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

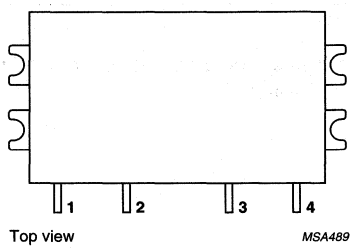


Fig.1 Simplified outline.

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	6	≤4	3.5	≥32.5	≥40	50

LIMITING VALUES

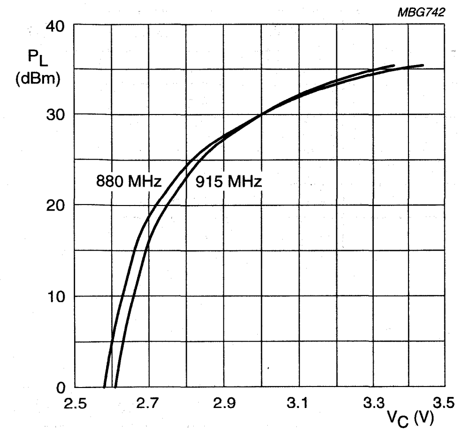
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	8.5	V
V_C	DC control voltage	–	4.5	V
P_D	input drive power	–	7	mW
P_L	load power	–	4	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–30	+100	°C

CHARACTERISTICS

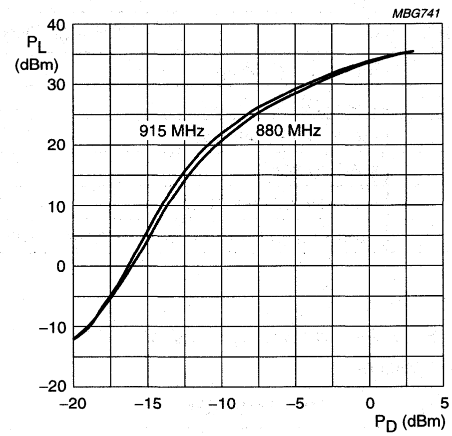
$Z_S = Z_L = 50\ \Omega$; $P_D = 3$ dBm; $V_S = 6$ V; $V_C \leq 4$ V; f = 880 to 915 MHz; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$; unless otherwise specified.

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 $P_L = 3.5$ W	–	–	500	μA
P_L	load power	$V_C = 4$ V	3.5	–	–	W
G_p	power gain	adjust V_C for $P_L = 3.5$ W	32.5	–	–	dB
η	efficiency	adjust V_C for $P_L = 3.5$ W	40	45	–	%
H_2	second harmonic	adjust V_C for $P_L = 3.5$ W	–	–	–40	dBc
H_3	third harmonic	adjust V_C for $P_L = 3.5$ W	–	–	–40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 3.5$ W	–	–	2 : 1	
	stability	$P_D = 0$ to 6 dBm; $V_S = 5$ to 8.5 V; $V_C = 0$ to 4 V; $P_L \leq 3.5$ W; VSWR $\leq$ 6 : 1 through all phases	–	–	–60	dBc
	isolation	$V_C = 0.5$ V	–	–	–36	dBm
	control bandwidth	R1 = 0; C1 = 0; see Fig.16	1	–	–	MHz
	AM-AM conversion	P_D with 3% AM; f = 100 kHz; $P_L = 3.5$ mW to 3.5 W	–	–	12	%
P_n	noise power	$P_L = 3.5$ W; bandwidth = 30 kHz; 20 MHz above transmitter band	–	–	–85	dBm
	ruggedness	$V_S = 8.5$ V; adjust V_C for $P_L = 3.5$ W; VSWR $\leq$ 10 : 1 through all phases	no degradation			



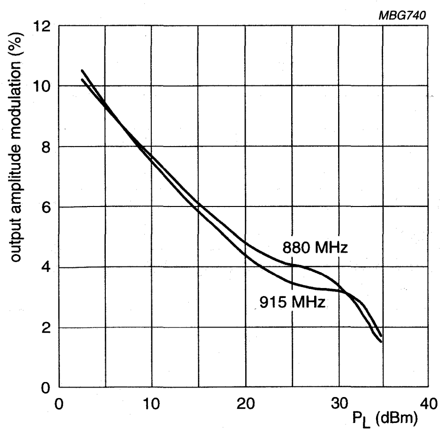
$Z_S = Z_L = 50\ \Omega$; $P_D = 3$ dBm; $V_S = 6$ V;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs.

Fig.2 Load power as a function of control voltage; typical values.



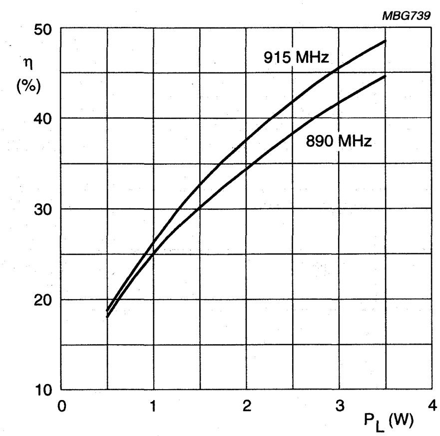
$Z_S = Z_L = 50\ \Omega$; $V_S = 6$ V; $P_L = 3.5$ mW;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs.

Fig.3 Load power as a function of drive power; typical values.



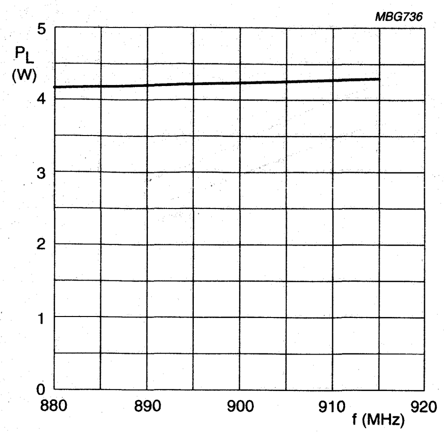
$Z_S = Z_L = 50\ \Omega$; $P_D = 3$ dBm; $V_S = 6$ V; $T_{mb} = 25$ °C;
$\delta = 1:8$; $t_p = 575$ µs; input amplitude modulation = 3%.

Fig.4 Output amplitude modulation as a function of load power; typical values.



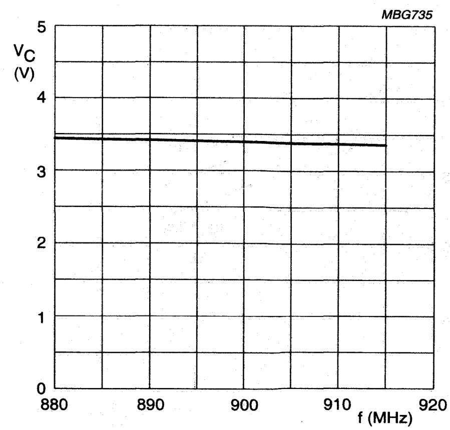
$Z_S = Z_L = 50\ \Omega$; $P_D = 3$ dBm; $V_S = 6$ V;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs.

Fig.5 Efficiency as a function of load power; typical values.



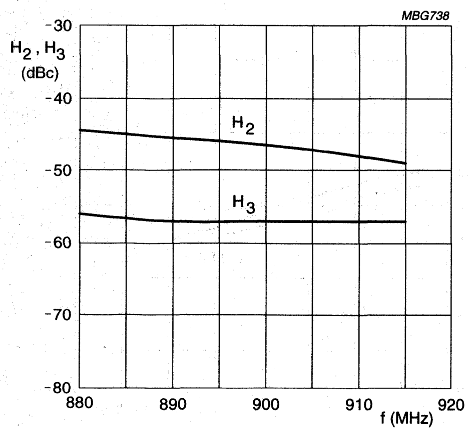
$Z_S = Z_L = 50\ \Omega$; $P_D = 3$ dBm; $V_S = 6$ V; $V_C = 4$ V; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.6 Load power as a function of frequency; typical values.



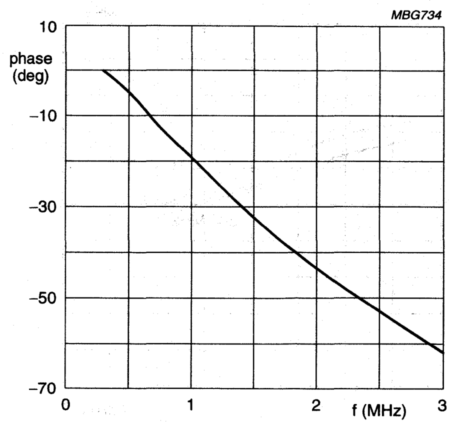
$Z_S = Z_L = 50\ \Omega$; $P_D = 3$ dBm; $V_S = 6$ V; $P_L = 3.5$ W; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.7 Control voltage as a function of frequency; typical values.



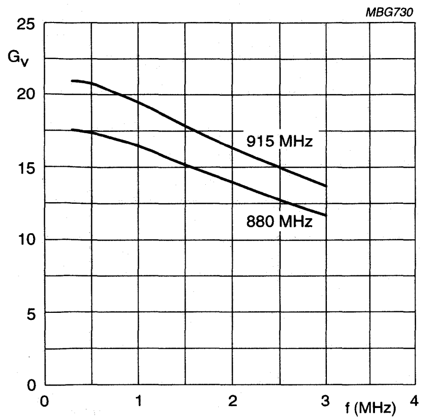
$Z_S = Z_L = 50\ \Omega$; $P_D = 3$ dBm; $V_S = 6$ V; $P_L = 3.5$ W; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.8 Harmonics as a function of frequency; typical values.



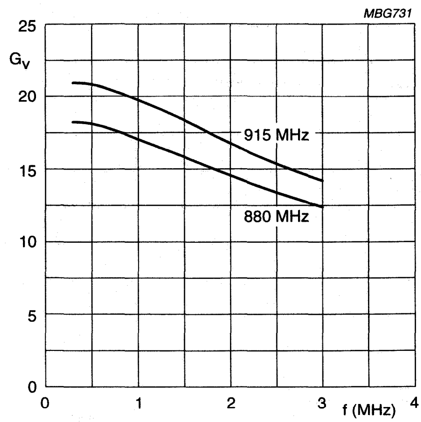
$Z_S = Z_L = 50\ \Omega$; $P_D = 3$ dBm; $V_S = 6$ V; $P_L = 15$ to 35.4 dBm; f = 880 to 915 MHz; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$; R1 = 0; C1 = 0.

Fig.9 Control loop phase as a function of frequency on the control pin; typical values.



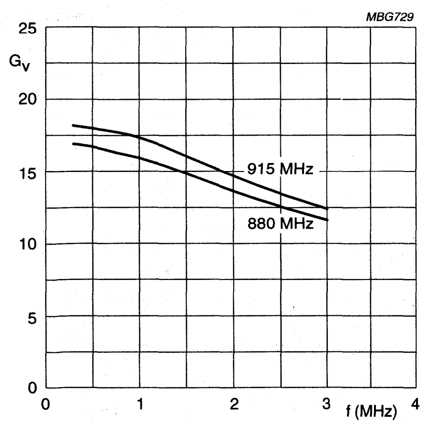
P_L = 30 dBm.
$Z_S = Z_L = 50\ \Omega$; P_D = 3 dBm; V_S = 6 V;
T_{mb} = 25 °C; δ = 1 : 8; t_p = 575 μs; R1 = 0; C1 = 0.

Fig.10 Control loop voltage gain as a function of frequency on the control pin; typical values.



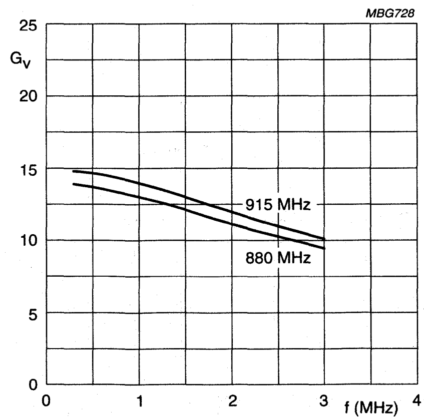
P_L = 25 dBm.
$Z_S = Z_L = 50\ \Omega$; P_D = 3 dBm; V_S = 6 V;
T_{mb} = 25 °C; δ = 1 : 8; t_p = 575 μs; R1 = 0; C1 = 0.

Fig.11 Control loop voltage gain as a function of frequency on the control pin; typical values.



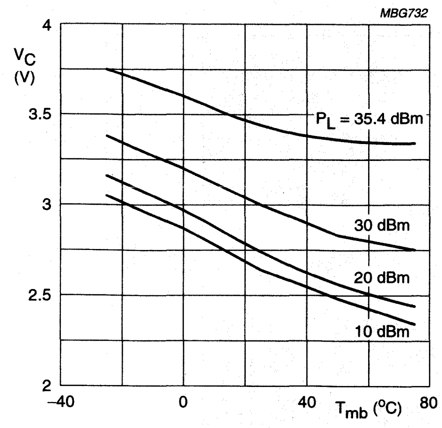
P_L = 20 dBm.
$Z_S = Z_L = 50\ \Omega$; P_D = 3 dBm; V_S = 6 V;
T_{mb} = 25 °C; δ = 1 : 8; t_p = 575 μs; R1 = 0; C1 = 0.

Fig.12 Control loop voltage gain as a function of frequency on the control pin; typical values.



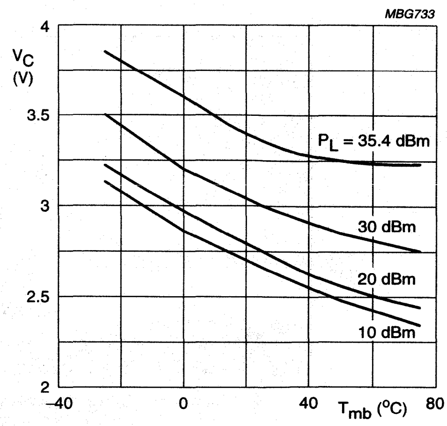
P_L = 15 dBm.
$Z_S = Z_L = 50\ \Omega$; P_D = 3 dBm; V_S = 6 V;
T_{mb} = 25 °C; δ = 1 : 8; t_p = 575 μs; R1 = 0; C1 = 0.

Fig.13 Control loop voltage gain as a function of frequency on the control pin; typical values.



f = 880 MHz.
$Z_S = Z_L = 50\ \Omega$; P_D = 3 dBm; V_S = 6 V; $\delta = 1:8$; t_p = 575 µs.

Fig.14 Control voltage as a function of mounting base temperature; typical values.



f = 915 MHz.
$Z_S = Z_L = 50\ \Omega$; P_D = 3 dBm; V_S = 6 V; $\delta = 1:8$; t_p = 575 µs.

Fig.15 Control voltage as a function of mounting base temperature; typical values.

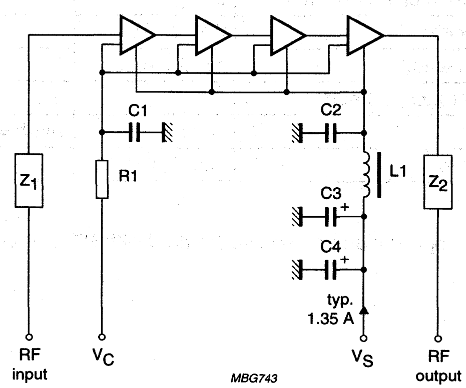
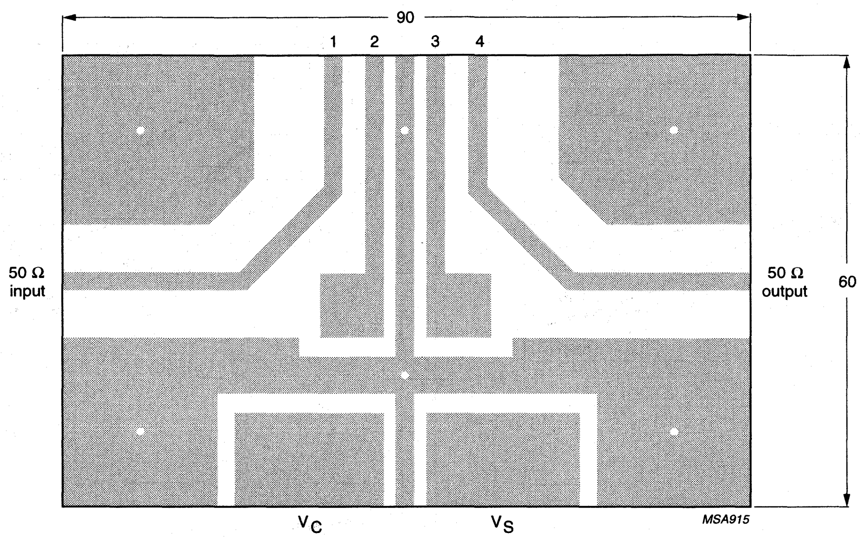


Fig.16 Test circuit.



Dimensions in mm.

Fig.17 Printed-circuit board layout.

List of components (see Fig.16)

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 — BGY206

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 SOT388A 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 - SOT388A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

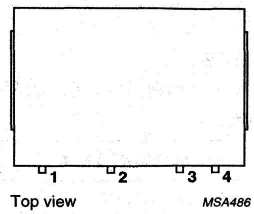


Fig.1 Simplified outline.

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; $\delta = 1:8$	880 to 915	4.8	≤3.5	3	≥30	typ. 45	50

LIMITING VALUES

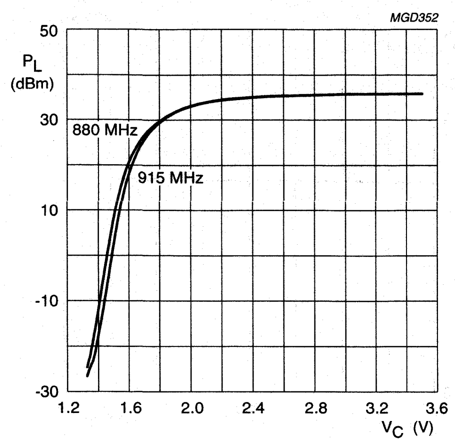
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	7	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

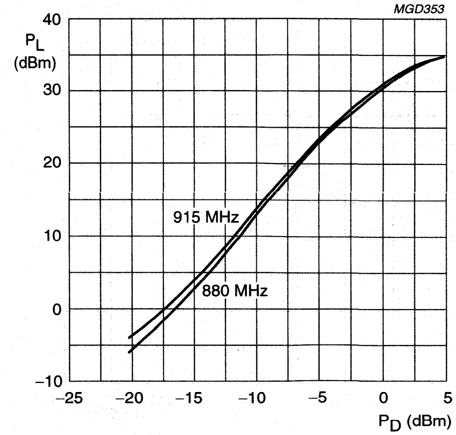
$Z_S = Z_L = 50\ \Omega$; $P_D = 3$ mW; $V_S = 4.8$ V; $V_C \leq 3.5$ V; f = 880 to 915 MHz; $T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs; unless otherwise specified.

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
G_p	power gain	adjust V_C for $P_L = 3$ W	30	–	–	dB
η	efficiency	adjust V_C for $P_L = 3$ W	–	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			



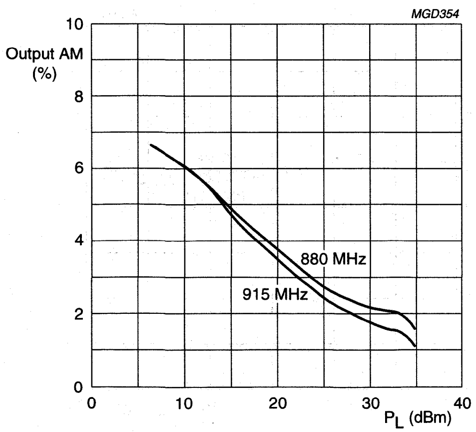
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ μs.

Fig.2 Load power as a function of control voltage; typical values.



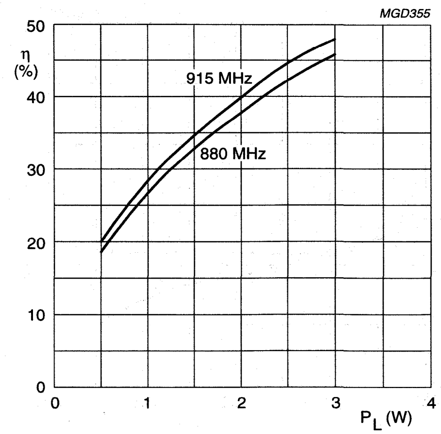
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; adjust V_C for $P_L = 3$ W;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ μs.

Fig.3 Load power as a function of drive power; typical values.



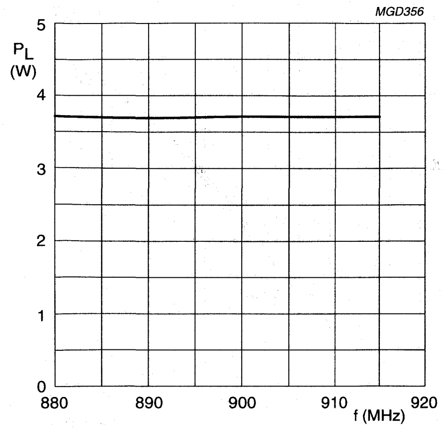
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW; $T_{mb} = 25$ °C;
input amplitude modulation = 3%; $\delta = 1 : 8$; $t_p = 575$ μs.

Fig.4 Output amplitude modulation as a function of load power; typical values.



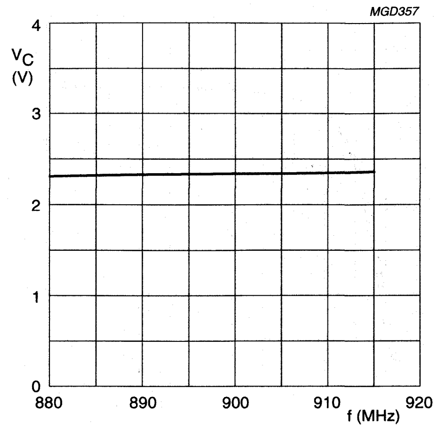
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ μs

Fig.5 Efficiency as a function of load power; typical values.



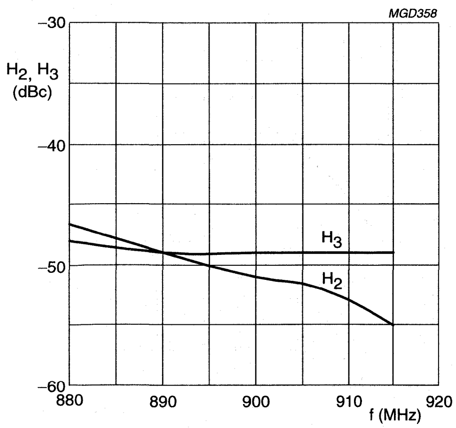
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW; $V_C = 3.5$ V; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.6 Load power as a function of frequency; typical values.



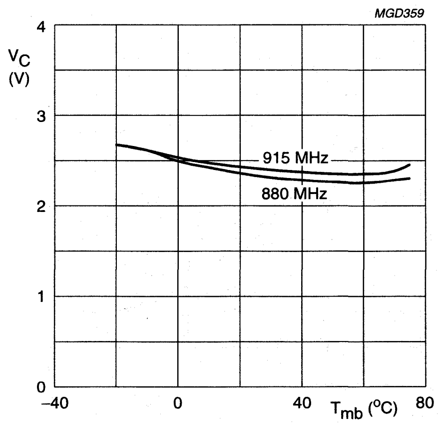
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW; $P_L = 3$ W; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.7 Control voltage as a function of frequency; typical values.



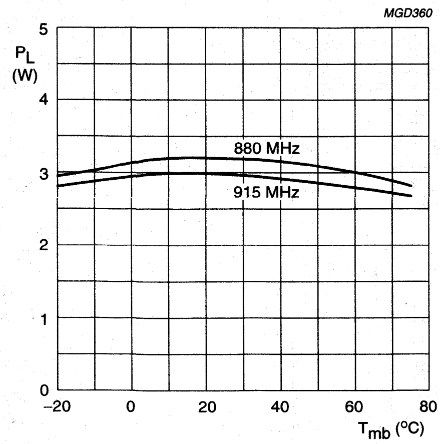
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW; $P_L = 3$ W; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.8 Harmonics as a function of frequency; typical values.



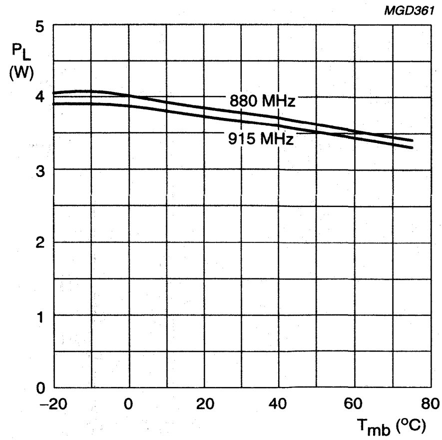
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.8$ V; $P_D = 3$ mW; $P_L = 3$ W; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.9 Control voltage as a function of mounting base temperature; typical values.



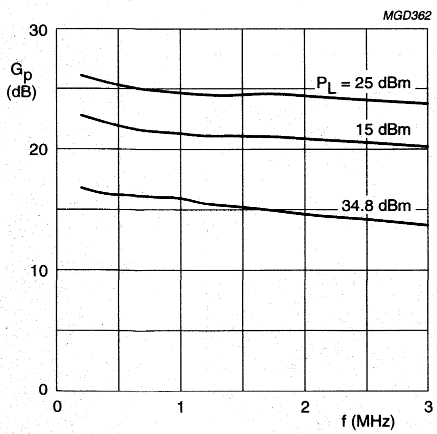
$Z_S = Z_L = 50\ \Omega$; $V_S = 4.3$ V; $P_D = 3$ mW; $V_C = 3.5$ V;
$\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.10 Load power as a function of mounting base temperature; 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.

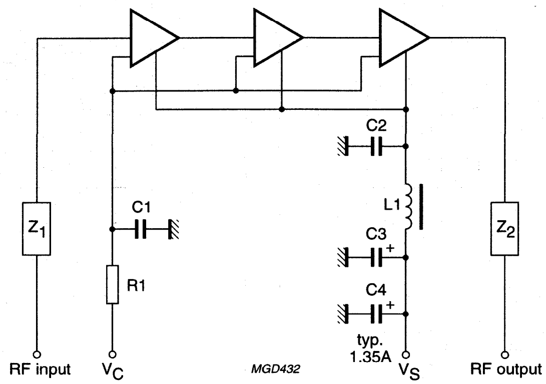
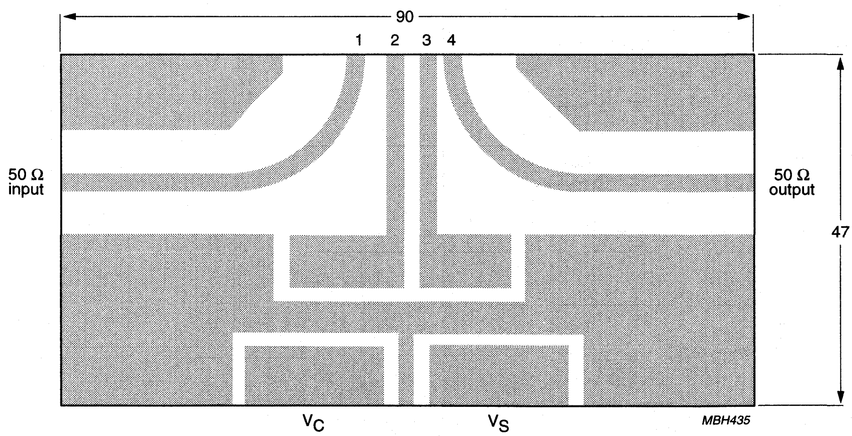


Fig.13 Test circuit.



Dimensions in mm.

Fig.14 Printed-circuit board layout.

List of components (See Fig 13)

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 — BGY207

FEATURES

- 4.8 V nominal supply voltage
- 1.2 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 880 to 915 MHz frequency range.

DESCRIPTION

The BGY207 is a three-stage UHF amplifier module in a SOT359A 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 - SOT359A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

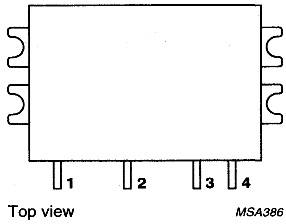


Fig.1 Simplified outline.

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	1.2	≥27.8	typ. 55	50

LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	7	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

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C \leq 3$ 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	$V_C = 0$; $P_D < -60$ dBm	–	–	100	μA
I_C	control current	adjust V_C for $P_L = 1.2$ W	–	–	500	μA
P_L	load power		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	–	–	–40	dBc
H_3	third harmonic	adjust V_C for $P_L = 1.2$ W	–	–	–40	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
	control bandwidth		1	–	–	MHz
P_n	noise power	$P_L = 1.2$ 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			

UHF amplifier module — BGY208

FEATURES

- 6.8 V nominal supply voltage
- 3.5 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 880 to 915 MHz frequency range.

DESCRIPTION

The BGY208 is a three-stage UHF amplifier module in a SOT388A 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 - SOT388A

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

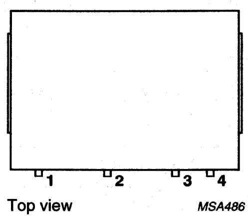


Fig.1 Simplified outline.

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	6.8	≤3.5	3.5	≥30.7	typ. 45	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	–	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

$Z_S = Z_L = 50\ \Omega$; $P_D = 3$ mW; $V_S = 6.8$ 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	quiescent current	$V_C = 0.5$ V	–	–	100	μA
I_C	control current	adjust V_C for $P_L = 3.5$ W	–	–	500	μA
P_L	load power	$V_C = 3.5$ V	3.5	–	–	W
G_p	power gain	adjust V_C for $P_L = 3.5$ W	30.7	–	–	dB
η	efficiency	adjust V_C for $P_L = 3.5$ W	–	45	–	%
H_2	second harmonic	adjust V_C for $P_L = 3.5$ W	–	–	–40	dBc
H_3	third harmonic	adjust V_C for $P_L = 3.5$ W	–	–	–40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 3.5$ W	–	–	3 : 1	
	stability	$P_D = 1.5$ to 6 mW; $V_S = 5$ to 8.5 V; $V_C = 0$ to 3.5 V; $P_L \leq 3.5$ W; VSWR ≤ 6 : 1 through all phases	–	–	–60	dBc
	isolation	$V_C = 0.5$ V	–	–	–36	dBm
	control bandwidth		1	–	–	MHz
P_n	noise power	$P_L = 3.5$ W; bandwidth = 30 kHz; 20 MHz above transmitter band	–	–	–85	dBm
	ruggedness	$V_S = 8.5$ V; adjust V_C for $P_L = 3.5$ W VSWR ≤ 10 : 1 through all phases	no degradation			

FEATURES

- 4.8 V nominal supply voltage
- 2.8 W output power
- Easy output power control by DC voltage.

APPLICATIONS

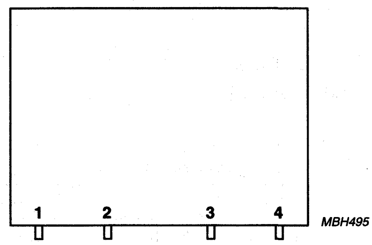
- Digital cellular radio systems with Time Division Multiple Access (TDMA) operation (GSM systems) in the 880 to 915 MHz frequency range.

DESCRIPTION

The BGY209 is a two-stage UHF amplifier module. The module consists of two NPN silicon planar transistor dies mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground



Dimensions: 14 mm × 10 mm × 1.8 mm.

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	2.8	≥21.8	typ. 45	50

LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	7	V
V_C	DC control voltage	–	4	V
P_D	input drive power	–	40	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

$Z_S = Z_L = 50\ \Omega$; $P_D = 20$ 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 $P_L = 2.8$ W	–	–	500	μA
P_L	load power	$V_C = 3.5$ V	2.8	–	–	W
G_p	power gain	adjust V_C for $P_L = 2.8$ W	21.8	–	–	dB
η	efficiency	adjust V_C for $P_L = 2.8$ W	–	45	–	%
H_2	second harmonic	adjust V_C for $P_L = 2.8$ W	–	–	–40	dBc
H_3	third harmonic	adjust V_C for $P_L = 2.8$ W	–	–	–40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 2.8$ W	–	–	3 : 1	
	stability	$P_D = 10$ to 40 mW; $V_S = 4$ to 6.5 V; $V_C = 0$ to 3.5 V; $P_L \leq 2.8$ W; VSWR ≤ 6 : 1 through all phases	–	–	–60	dBc
	isolation	$V_C = 0.5$ V	–	–	–32	dBm
	control bandwidth		1	–	–	MHz
P_n	noise power	$P_L = 2.8$ W; bandwidth = 30 kHz; 20 MHz above transmission band	–	–	–85	dBm
	ruggedness	$V_S = 6.5$ V; adjust V_C for $P_L = 2.8$ W; VSWR ≤ 10 : 1 through all phases	no degradation			

FEATURES

- 6 V nominal supply voltage
- 2 W pulsed output power
- Easy control of output power by DC voltage.

APPLICATIONS

- Digital cellular radio systems with Time Division Multiple Access (TDMA) operation (DCS1800 systems) in the 1710 to 1785 MHz frequency range.

DESCRIPTION

The BGY210 is a three-stage UHF amplifier module in a SOT321B package. The module consists of three NPN silicon planar transistor chips mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT321B

PIN	DESCRIPTION
1	RF input
2	V_C
3	V_S
4	RF output
Flange	ground

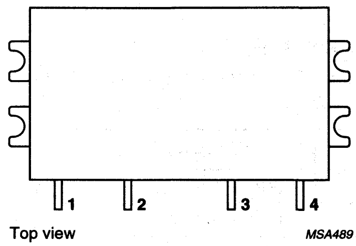


Fig.1 Simplified outline.

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	1710 to 1785	6	≤4	2	≥27	≥35	50

LIMITING VALUES

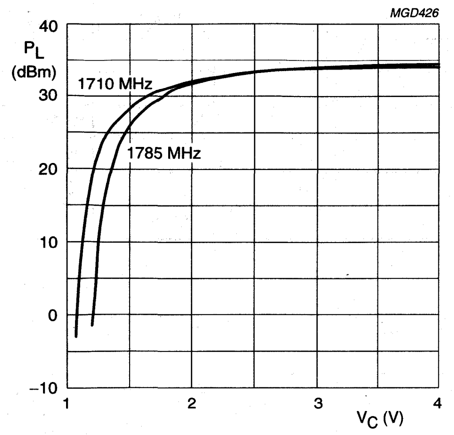
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	8.5	V
V_C	DC control voltage	–	4.5	V
P_D	input drive power	–	8	mW
P_L	load power	–	2.2	W
T_{stg}	storage temperature	–40	+100	°C
T_{mb}	operating mounting base temperature	–30	+100	°C

CHARACTERISTICS

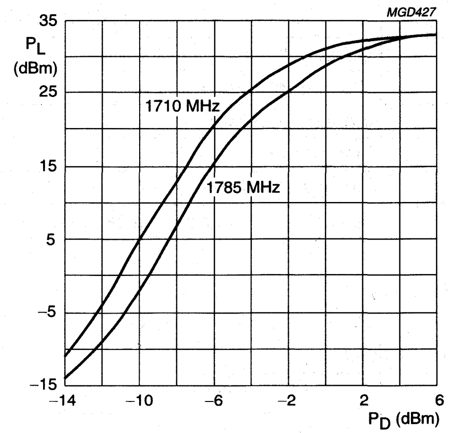
$Z_S = Z_L = 50\ \Omega$; $P_D = 6$ dBm; $V_S = 6$ V; $V_C \leq 4$ V; f = 1710 to 1785 MHz; $T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575$ µs; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_Q	leakage current	$V_C = 0.4$ V	–	–	100	µA
I_C	control current	adjust V_C for $P_L = 2$ W	–	–	500	µA
P_L	load power	$V_C = 4$ V	2	–	–	W
G_p	power gain	adjust V_C for $P_L = 2$ W	27	–	–	dB
η	efficiency	adjust V_C for $P_L = 2$ W	35	43	–	%
H_2	second harmonic	adjust V_C for $P_L = 2$ W	–	–	–30	dBc
H_3	third harmonic	adjust V_C for $P_L = 2$ W	–	–	–30	dBc
$VSWR_{in}$	input VSWR	adjust V_C for $P_L = 2$ W	–	–	3 : 1	
	stability	$P_D = 3$ to 9 dBm; $V_S = 5$ to 8.5 V; $V_C = 0$ to 4 V; $P_L \leq 2$ W; VSWR $\leq$ 6 : 1 through all phases	–	–	–60	dBc
	isolation	$V_C = 0.5$ V	–	–40	–25	dBm
	control bandwidth	R1 = 0; C1 = 0	1	–	–	MHz
	AM-AM conversion	P_D with 3% AM; f = 100 kHz; $P_L = 2$ mW to 2 W	–	t.b.f.	–	%
P_n	noise power	$P_L = 2$ W; bandwidth = 30 kHz; measured at 1805 to 1880 MHz	–	–90	–85	dBm
	ruggedness	$V_S = 8.5$ V; adjust V_C for $P_L = 2$ W; VSWR $\leq$ 6 : 1 through all phases	no degradation			



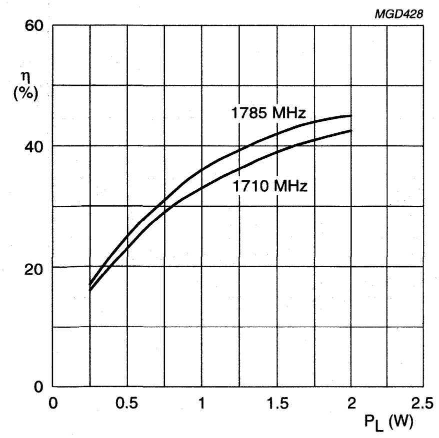
$Z_S = Z_L = 50\ \Omega$; $V_S = 6$ V; $P_D = 6$ dBm;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs.

Fig.2 Load power as a function of control voltage; typical values.



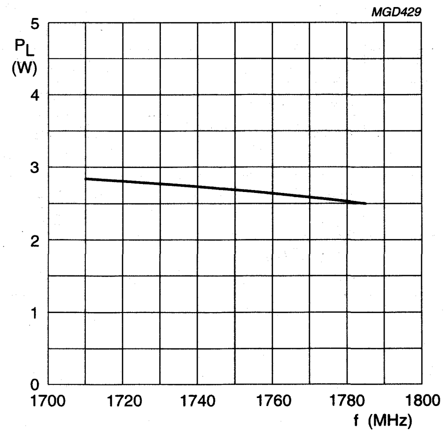
$Z_S = Z_L = 50\ \Omega$; $V_S = 6$ V; $V_C = 2.5$ V;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs.

Fig.3 Load power as a function of drive power; typical values.



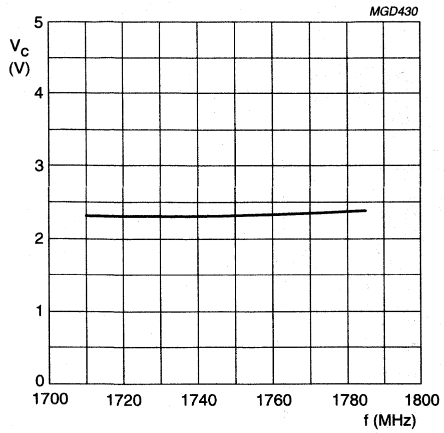
$Z_S = Z_L = 50\ \Omega$; $V_S = 6$ V; $P_D = 6$ dBm;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs.

Fig.4 Efficiency as a function of load power; typical values.



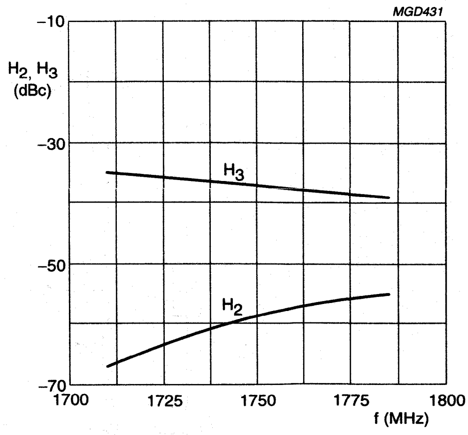
$Z_S = Z_L = 50\ \Omega$; $V_S = 6$ V; $P_D = 6$ dBm; $V_C = 4$ V;
$T_{mb} = 25$ °C; $\delta = 1 : 8$; $t_p = 575$ µs.

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



$Z_S = Z_L = 50\ \Omega$; $V_S = 6$ V; $P_D = 6$ dBm; $P_L = 2$ W;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.6 Control voltage as a function of frequency; typical values.



$Z_S = Z_L = 50\ \Omega$; $V_S = 6$ V; $P_D = 6$ dBm; $P_L = 2$ W;
$T_{mb} = 25$ °C; $\delta = 1:8$; $t_p = 575\ \mu s$.

Fig.7 Harmonics as a function of frequency; typical values.

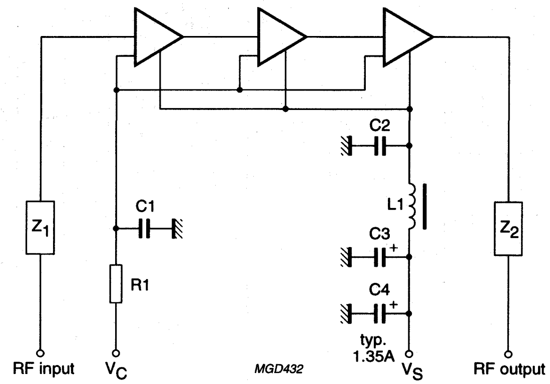


Fig.8 Test circuit.

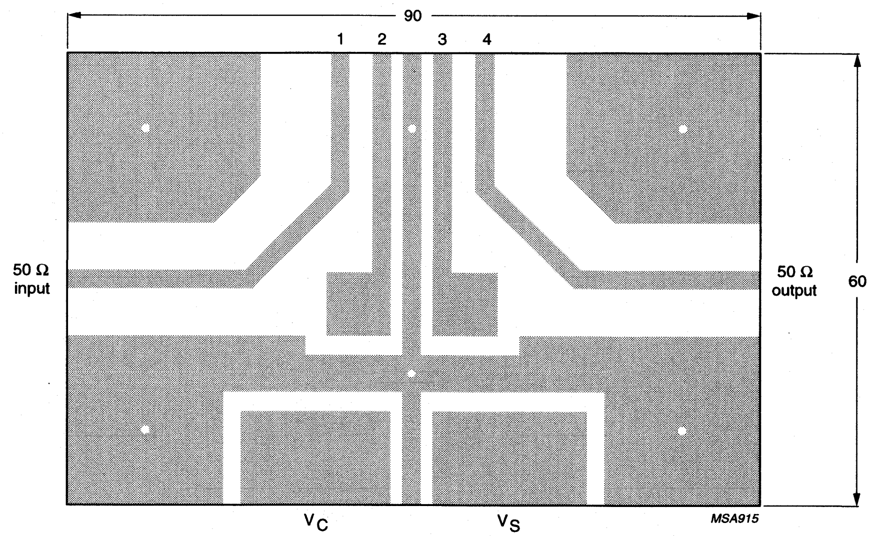


Fig.9 Printed-circuit board layout.

List of components (See Fig 8)

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.

FEATURES

- 26 V nominal supply voltage
- 16 W output power into a load of 50 Ω with an RF drive power of 25 mW

APPLICATION

- 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 chip and two silicon MOS-FET chips 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

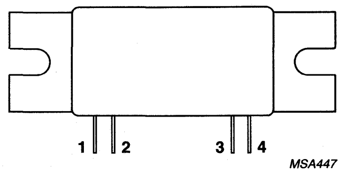


Fig.1 Simplified outline.

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

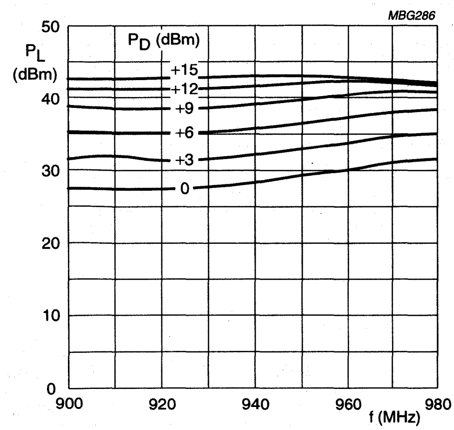
In accordance with the Absolute Maximum Rating System (IEC 134).

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

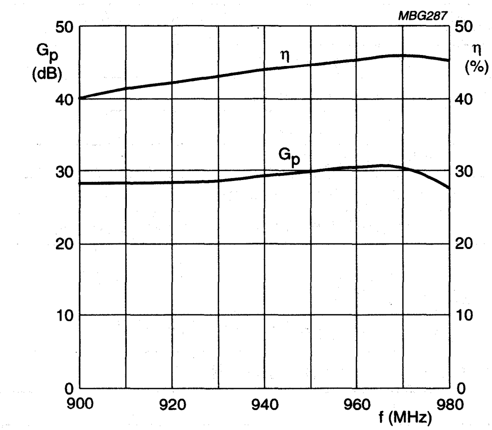
T_{mb} = 25 °C; V_{S1} = V_{S2} = 26 V; P_L = 16 W; Z_S = Z_L = 50 Ω unless otherwise specified.

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			



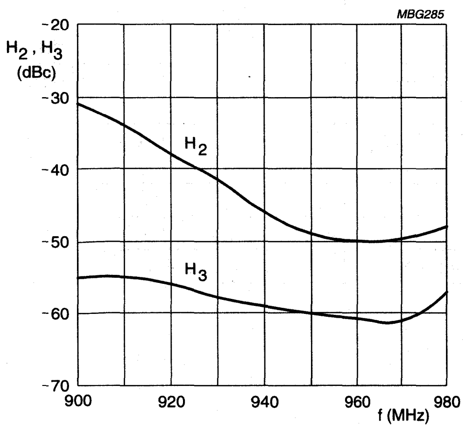
$V_{S1} = V_{S2} = 26$ V; $Z_S = Z_L = 50$ W; $T_{mb} = 25$ °C.

Fig.2 Load power as a function of frequency; typical values.



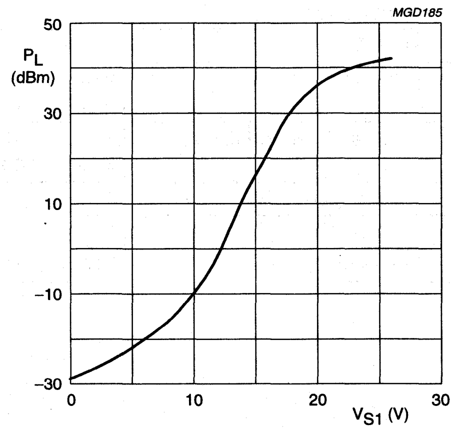
$V_{S1} = V_{S2} = 26$ V; $P_L = 16$ W; $Z_S = Z_L = 50$ W; $T_{mb} = 25$ °C.

Fig.3 Power gain and efficiency as functions of frequency; typical values.



$V_{S1} = V_{S2} = 26$ V; $P_L = 16$ W; $Z_S = Z_L = 50$ W; $T_{mb} = 25$ °C.

Fig.4 Harmonics as a function of frequency; typical values.



f = 940 MHz; $V_{S2} = 26$ V; $Z_S = Z_L = 50$ W; $T_{mb} = 25$ °C.

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

UHF amplifier module BGY1816

FEATURES

- 26 V nominal supply voltage
- 16 W output power into a load of 50 Ω with an RF drive power of 18 dBm.

APPLICATION

- Base station transmitting equipment operating in the 1805 to 1880 MHz frequency band.

PINNING-SOT365

PIN	DESCRIPTION
1	RF input
2	V_{S1}
3	V_{S2}
4	RF output
flange	ground

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 transistors mounted on a metallized ceramic AlN substrate, together with matching and bias circuitry.

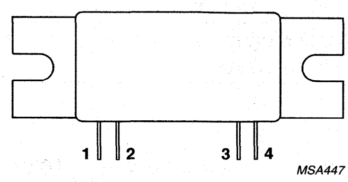


Fig.1 Simplified outline.

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	≥33	50

LIMITING VALUES

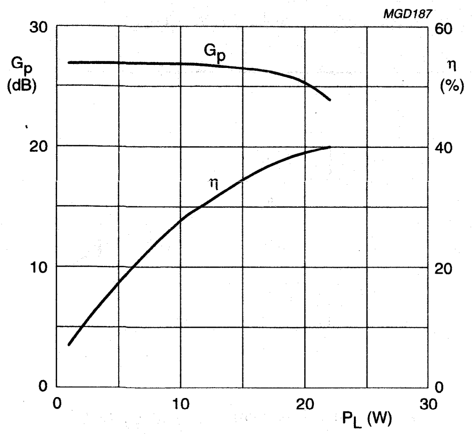
In accordance with the Absolute Maximum Rating System (IEC 134).

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

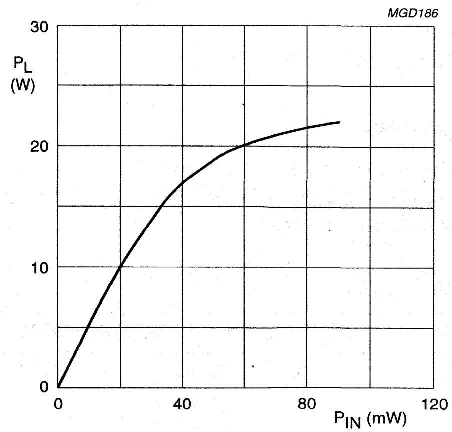
T_{mb} = 25 °C; V_{S1} = 5 V; V_{S2} = 26 V; P_L = 16 W; $Z_S = Z_L$ = 50 Ω unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency		1805	–	1880	MHz
I_{S1}	supply current		–	–	50	mA
I_{S2}	supply current	P_D < –60 dBm	–	310	–	mA
P_L	load power		16	–	–	W
G_P	power gain		24	–	28	dB
ΔG_P	gain ripple	peak to peak	–	–	1	dB
η	efficiency		33	–	–	%
H_2	second harmonic		–	–	–35	dBc
H_3	third harmonic		–	–	–45	dBc
$VSWR_{in}$	input VSWR		–	–	1.6 : 1	
	isolation	V_{S1} = 0	–	–	–40	dBm
	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
F	noise figure	20 MHz offset from carrier	–	–	–97	dBm/Hz
	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 W; 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 W; T_{mb} = 25 °C.

Fig.3 Load power as a function of input power; typical values.

UHF power transistor

BLT13

FEATURES

- High efficiency
- High gain
- Internal pre-matched input.

APPLICATIONS

- Hand-held radio equipment in common emitter class-AB operation for 1.8 GHz Time Division Multiple Access (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.

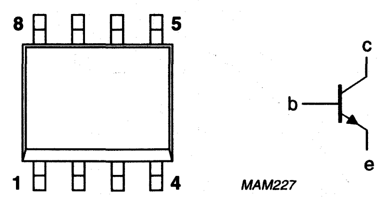


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
Pulsed, class-AB	1800	6	2	≥6	≥50

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	–	2.5	V
I_C	collector current (DC)		–	1	A
P_{tot}	total power dissipation	T_s = 130 °C; note 1	–	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} = 1 W; T_s = 130 °C; note 1	45	K/W

Note to the "Limiting values" and "Thermal characteristics"

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 = 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	2.5	–	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	–	8	pF
C_{re}	feedback capacitance	V_{CE} = 6 V; I_C = 0; f = 1 MHz	–	6	pF

APPLICATION INFORMATION

RF performance at $T_s \leq 60$ °C in a common emitter test circuit (note 1).

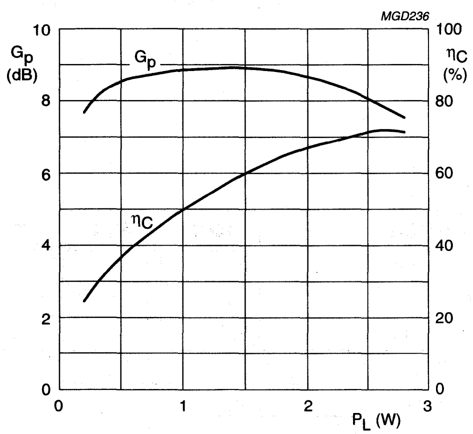
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
Pulsed, class-AB; $\delta = 1:8$; $t_p \leq 5$ ms	1800	6	2	2	≥6 typ. 8.5	≥50 typ. 65

Note

1. T_s is the temperature at the soldering point of the collector pin.

Ruggedness in class-AB operation

The BLT13 is capable of withstanding a load mismatch corresponding to VSWR = 6 : 1 through all phases under the following conditions: $\delta = 1:8$; $t_p \leq 5$ ms; f = 1800 MHz; $V_{CE} = 8.5$ V; $P_L = 2$ W; $T_s \leq 60$ °C.



Pulsed, class-AB; $\delta = 1:8$; $t_p \leq 5$ ms; f = 1800 MHz; $V_{CE} = 6$ V; $I_{CQ} = 2$ mA; tuned at $P_L = 2$ W; $T_s \leq 60$ °C.

Fig.2 Power gain and collector efficiency as functions of load power; typical values.

UHF power transistor BLT14

FEATURES

- High efficiency
- High gain
- Internal pre-matched input.

APPLICATIONS

- Hand-held radio equipment in common emitter class-AB operation for 1.8 GHz Time Division Multiple Access (TDMA) communications 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.

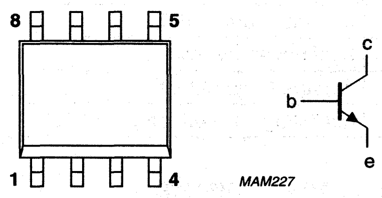


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
Pulsed, class-AB	1800	4.8	1.6	≥6	≥50

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)		–	1	A
P_{tot}	total power dissipation	T_s = 130 °C; note 1	–	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} = 1 W; T_s = 130 °C; note 1	45	K/W

Note to the "Limiting values" and "Thermal characteristics"

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 = 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 = 1 mA	2.5	–	V
I_{CES}	collector leakage current	V_{CE} = 4.8 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} = 4.8 V; $I_E = i_e$ = 0; f = 1 MHz	–	8	pF
C_{re}	feedback capacitance	V_{CE} = 4.8 V; I_C = 0; f = 1 MHz	–	6	pF

APPLICATION INFORMATION

RF performance at $T_s \leq 60$ °C in a common emitter test circuit (note 1).

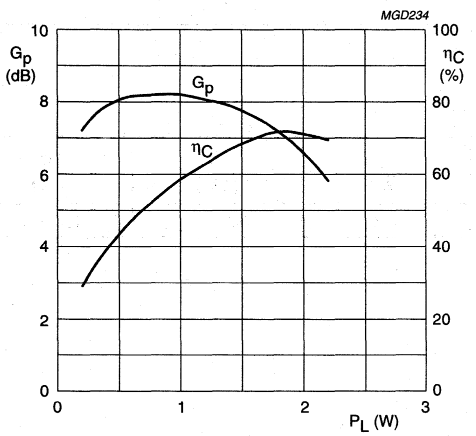
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
Pulsed, class-AB; $\delta = 1:8$; $t_p \leq 5$ ms	1800	4.8	2	1.6	≥6 typ. 7.5	≥50 typ. 65

Note

1. T_s is the temperature at the soldering point of the collector pin.

Ruggedness in class-AB operation

The BLT14 is capable of withstanding a load mismatch corresponding to VSWR = 6 : 1 through all phases under the following conditions: $\delta = 1:8$; $t_p \leq 5$ ms; f = 1800 MHz; $V_{CE} = 6.5$ V; $P_L = 1.6$ W; $T_s \leq 60$ °C.



Pulsed, class-AB; $\delta = 1:8$; $t_p \leq 5$ ms; f = 1800 MHz; $V_{CE} = 4.8$ V; $I_{CQ} = 1.6$ mA; tuned at $P_L = 1.6$ W; $T_s \leq 60$ °C.

Fig.2 Power gain and collector efficiency as functions of load power; typical values.

UHF power transistor BLT61

FEATURES

- High efficiency
- High gain
- Internal pre-matched input
- Low supply voltage.

APPLICATIONS

- Hand-held radio equipment in common emitter class-AB operation for 900 MHz 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.

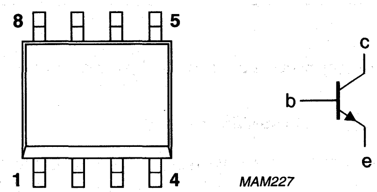


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	900	3.6	1.2	typ. 13	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	–	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)		–	650	mA
P_{tot}	total power dissipation	T_s = 115 °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 = 115 °C; note 1	35	K/W

Note to the "Limiting values" and "Thermal characteristics"

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 = 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} = 3.6 V; V_{BE} = 0	–	0.1	mA
h_{FE}	DC current gain	V_{CE} = 3.6 V; I_C = 100 mA	30	150	
C_c	collector capacitance	V_{CB} = 3.6 V; I_E = i_e = 0; f = 1 MHz	–	tbf	pF
C_{re}	feedback capacitance	V_{CE} = 3.6 V; I_C = 0; f = 1 MHz	–	tbf	pF

APPLICATION INFORMATION

RF performance at $T_s \leq 60$ °C in a common emitter test circuit (note 1).

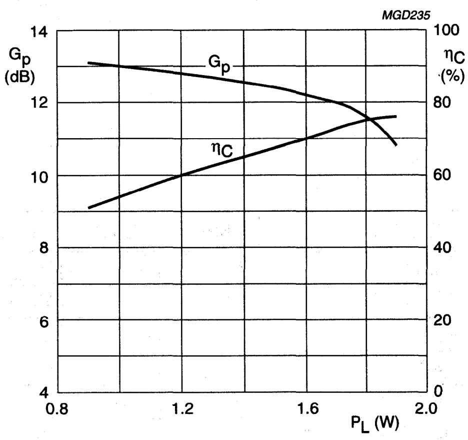
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	900	3.6	2	1.2	≥ 10 typ. 13	≥ 50 typ. 63

Note

1. T_s is the temperature at the soldering point of the collector pin.

Ruggedness in class-AB operation

The BLT61 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: f = 900 MHz; V_{CE} = 5 V; I_{CQ} = 2 mA; P_L = 1.45 W; $T_s \leq 60$ °C.



f = 900 MHz; V_{CE} = 3.6 V; I_{CQ} = 2 mA; tuned at P_L = 1.2 W.

Fig.2 Power gain and collector efficiency as functions of load power; typical values.

UHF power transistor — BLT62

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.

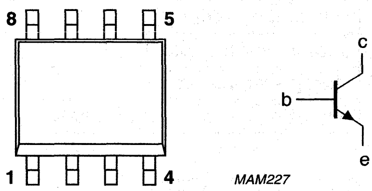


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
Pulsed, class-AB	900	3.6	3	typ. 9.5	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	–	15	V
V_{CEO}	collector-emitter voltage	open base	–	8	V
V_{EBO}	emitter-base voltage	open collector	–	3.5	V
I_C	collector current (DC)		–	650	mA
P_{tot}	total power dissipation	T_s = 115 °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 = 115 °C; note 1	30	K/W

Note to the "Limiting values" and "Thermal characteristics"

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 = 5 mA	15	–	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 = 1 mA	3.5	–	V
I_{CES}	collector leakage current	V_{CE} = 3.6 V; V_{BE} = 0	–	0.1	mA
h_{FE}	DC current gain	V_{CE} = 3.6 V; I_C = 100 mA	30	150	
C_c	collector capacitance	V_{CB} = 3.6 V; $I_E = i_e$ = 0; f = 1 MHz	–	tbf	pF
C_{re}	feedback capacitance	V_{CE} = 3.6 V; I_C = 0; f = 1 MHz	–	tbf	pF

APPLICATION INFORMATION

RF performance at $T_s \leq 60$ °C in a common emitter test circuit (note 1).

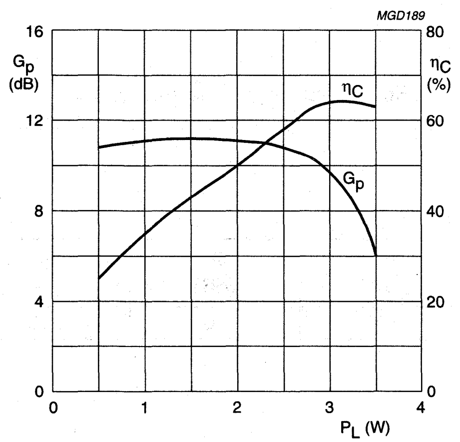
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
Pulsed, class-AB; $\delta = 1:8$; $t_p \leq 5$ ms	900	3.6	2	3	≥8 typ. 9.5	≥50 typ. 63

Note

1. T_s is the temperature at the soldering point of the collector pin.

Ruggedness in class-AB operation

The BLT62 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $\delta = 1:8$; $t_p \leq 5$ ms; f = 900 MHz; $V_{CE} = 5$ V; $I_{CQ} = 2$ mA; $P_L = 3.5$ W; $T_s \leq 60$ °C.



Pulsed, class AB; f = 900 MHz; $V_{CE} = 3.6$ V; $I_{CQ} = 2$ mA; $P_L = 3.5$ W; Ts ≤ 60 °.

Fig.2 Power gain and collector efficiency as functions of load power; typical values.

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

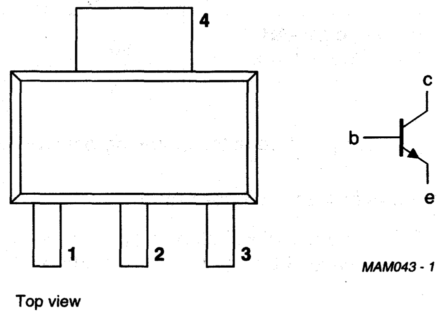


Fig.1 Simplified outline and symbol.

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.

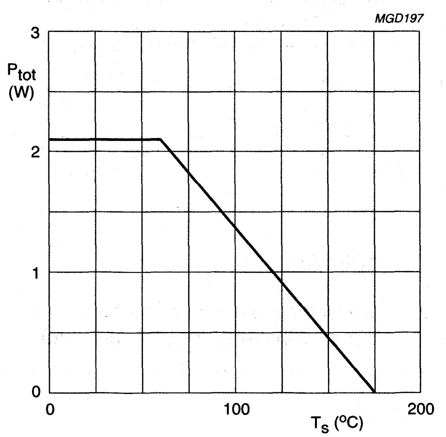
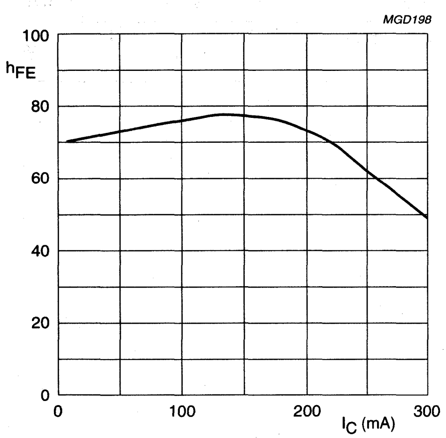


Fig.2 DC SOAR.

CHARACTERISTICS

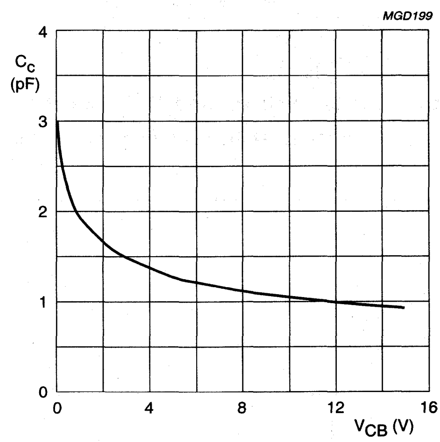
T_j = 25 °C unless otherwise specified.

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



V_{CE} = 4.8 V; T_j = 25 °C.

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 $T_s \leq 60$ °C in a common emitter test circuit (see note 1 and Fig.7).

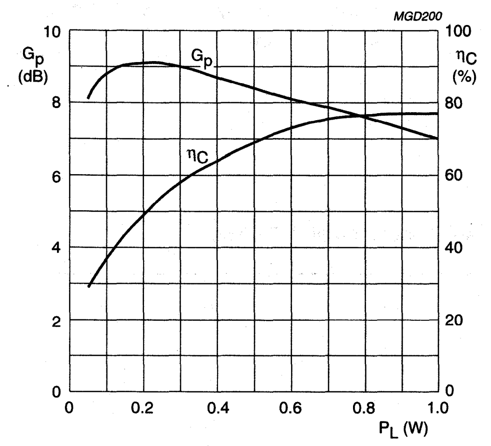
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	900	4.8	0.01	0.6	≥6 typ. 8.1	≥60 typ. 73

Note

1. T_s is the temperature at the soldering point of the collector pin.

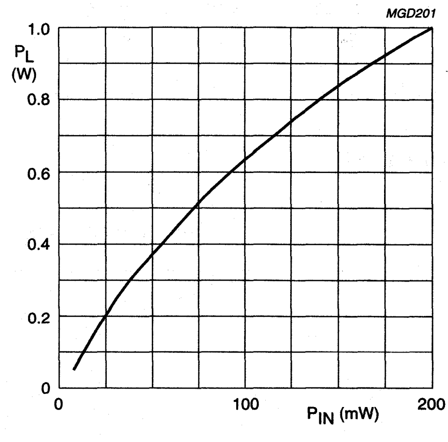
Ruggedness in class-AB operation

The BLT70 is capable of withstanding a load mismatch corresponding to VSWR = 6 : 1 through all phases under the following conditions: f = 900 MHz; V_{CE} = 6.5 V; P_L = 0.5 W; $T_s \leq 60$ °C.



f = 900 MHz; V_{CE} = 4.8 V; I_{CQ} = 0.01 mA; $T_s \leq 60$ °C.

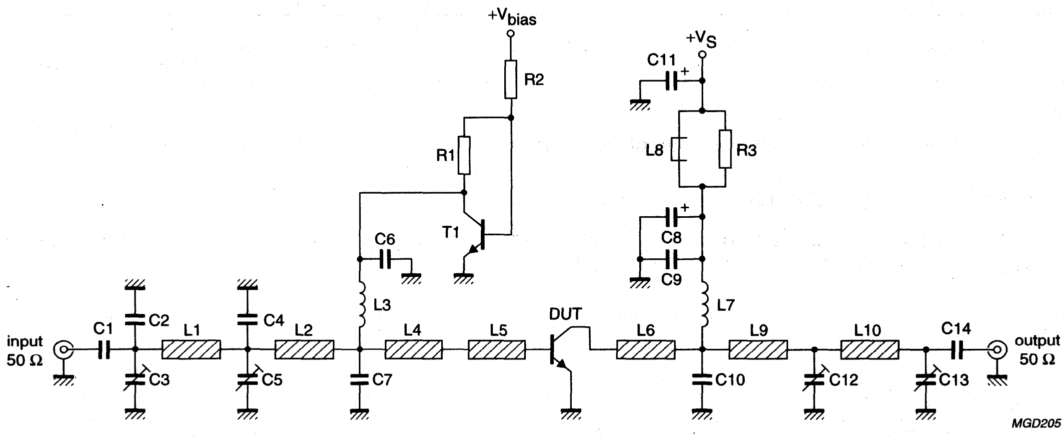
Fig.5 Power gain and collector efficiency as functions of load power; typical values.



f = 900 MHz; V_{CE} = 4.8 V; I_{CQ} = 0.01 mA; $T_s \leq 60$ °C.

Fig.6 Load power as a function of input power; typical values.

Test circuit information



$V_S = V_{bias}$ = typ. 4.8 V.

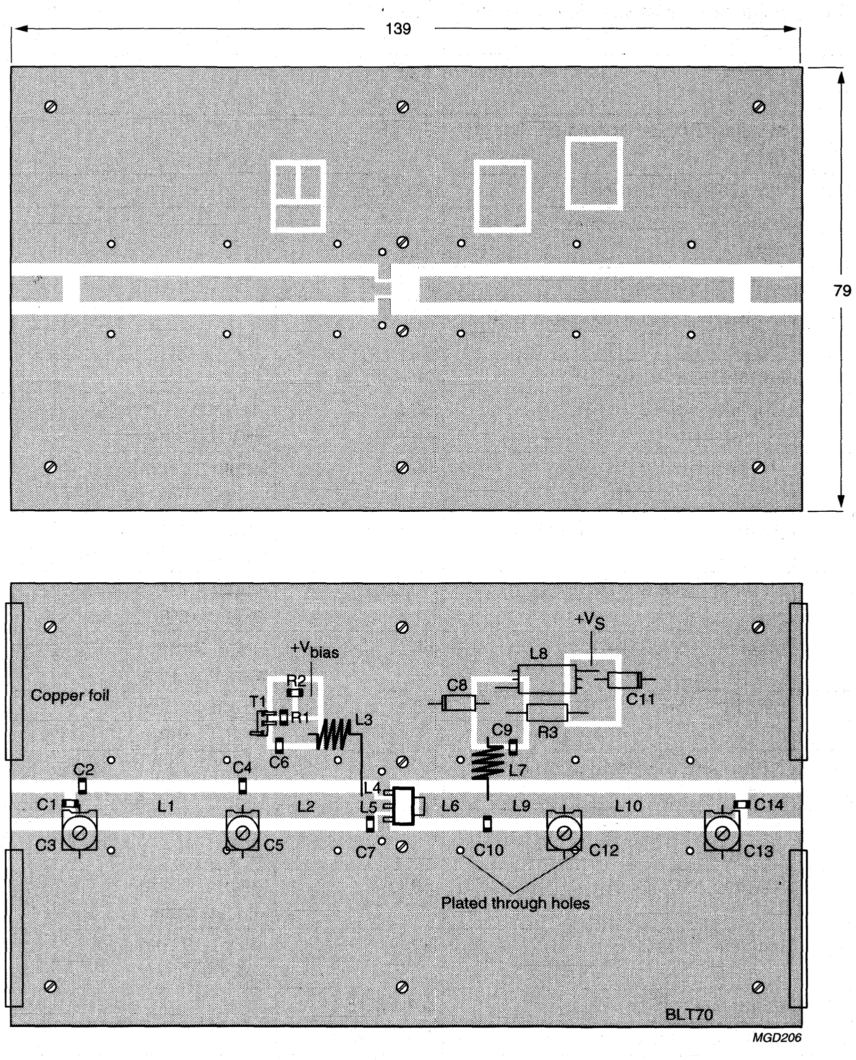
Fig.7 Common emitter test circuit for class-AB operation at 900 MHz.

List of components used in test circuit (see Figs 7 and 8)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C6, C9, C14	multilayer ceramic chip capacitor; note 1	100 pF		
C2	multilayer ceramic chip capacitor; note 1	1 pF		
C4	multilayer ceramic chip capacitor; note 1	2.4 pF		
C3, C5, C12, C13	film dielectric trimmer	1.4 to 5.5 pF		2222 809 09004
C7	multilayer ceramic chip capacitor; note 1	5.1 pF		
C8	tantalum capacitor	1 μF, 35 V		
C10	multilayer ceramic chip capacitor; note 1	2.7 pF		
C11	tantalum capacitor	100 μF, 20 V		
L1	stripline; note 2	50 Ω	length 29.1 mm width 5 mm	
L2	stripline; note 2	50 Ω	length 21 mm width 5 mm	
L3	8 turns enamelled 0.8 mm copper wire	216 nH	length 7 mm internal dia. 4.5 mm	
L4	stripline; note 2	50 Ω	length 1 mm width 5 mm	
L5	stripline; note 2	50 Ω	length 3 mm width 2.5 mm	
L6	stripline; note 2	50 Ω	length 12 mm width 5 mm	
L7	8 turns enamelled 0.8 mm copper wire	105 nH	length 7 mm internal dia. 3.4 mm	
L8	grade 3B Ferroxcube wideband HF choke			4132 020 36640
L9	stripline; note 2	50 Ω	length 12 mm width 5 mm	
L10	stripline; note 2	50 Ω	length 28 mm width 5 mm	
R1	metal film resistor	0.1 W, 15 Ω		
R2	metal film resistor	0.1 W, 390 Ω		
R3	metal film resistor	0.6 W, 10 Ω		
T1	NPN transistor	BD139		

Notes

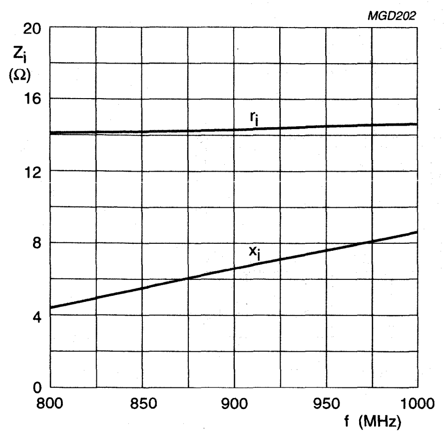
1. American Technical Ceramics type 100A or capacitor of same quality.
2. The striplines are on a double copper-clad printed-circuit board, with DUROID dielectric ($\varepsilon_r = 2.2$); thickness $1/16$"; thickness of the copper sheet 2×35 μm.



Dimensions in mm.

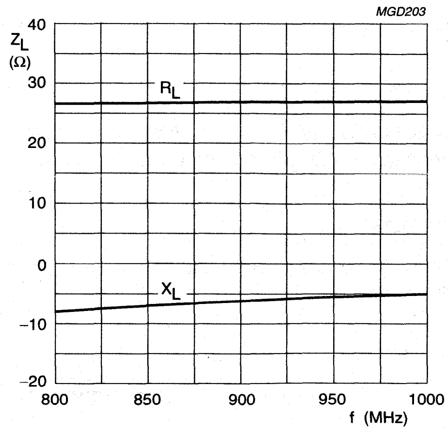
The components are situated on one side of the copper-clad PCB, the other side is unetched and serves as a ground plane.
Earth connections from the component side to the ground plane are made by through metallization.

Fig.8 Printed-circuit board and component lay-out for 900 MHz class-AB test circuit in Fig.7.



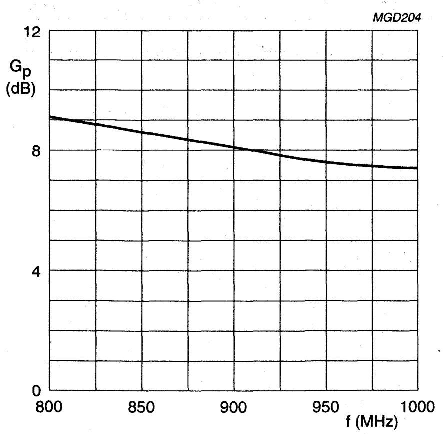
V_{CE} = 4.8 V; I_{CQ} = 0.01 mA; P_L = 0.6 W; $T_s \leq 60$ °C.

Fig.9 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 4.8 V; I_{CQ} = 0.01 mA; P_L = 0.6 W; $T_s \leq 60$ °C.

Fig.10 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 4.8 V; I_{CQ} = 0.01 mA; P_L = 0.6 W; $T_s \leq 60$ °C.

Fig.11 Power gain as a function of frequency; typical values.

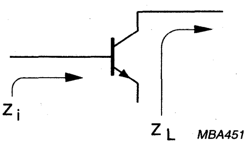


Fig.12 Definition of transistor impedance.

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

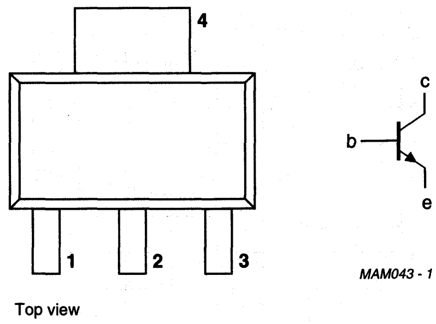


Fig.1 Simplified outline and symbol.

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

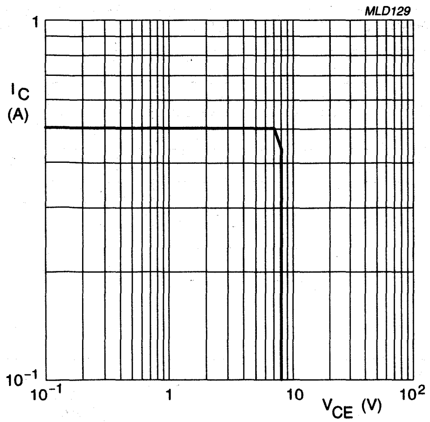
Note

1. T_s is the temperature at the soldering point of the collector lead.

CHARACTERISTICS

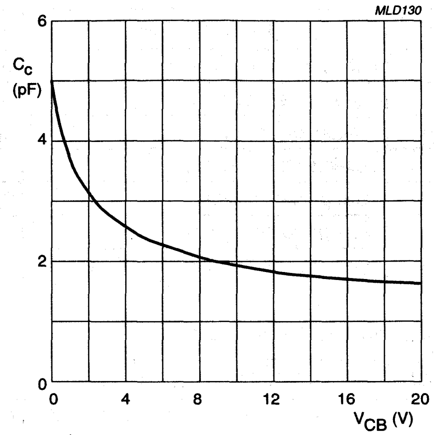
T_j = 25 °C unless otherwise specified.

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



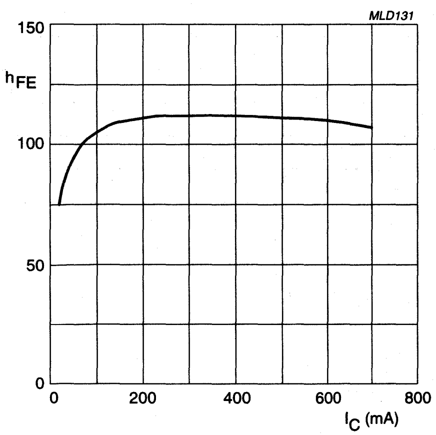
T_s = 90 °C.

Fig.2 DC SOAR.



$I_E = i_e = 0$; f = 1 MHz.

Fig.3 Collector capacitance as a function of collector-base voltage; typical values.



Measured under pulsed conditions: $t_p \leq 300$ µs; $\delta \leq 0.01$.
V_{CE} = 4.8 V.

Fig.4 DC current gain as a function of collector current; typical values.

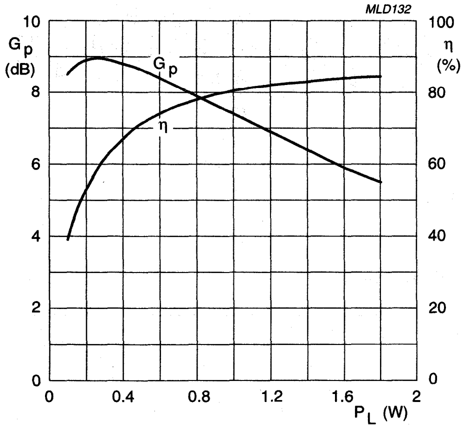
APPLICATION INFORMATION

RF performance at $T_s \leq 60$ °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 (%)
CW, class-AB	900	4.8	1	1.2	≥6	≥60

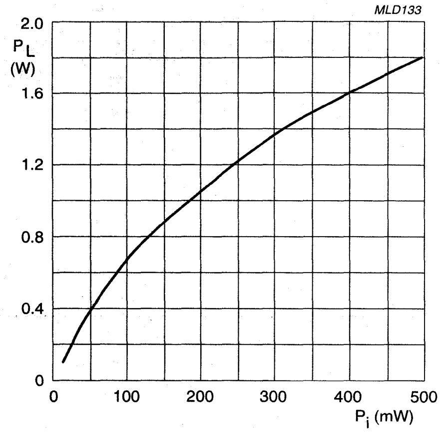
Ruggedness in class-AB operation

The BLT71 is capable of withstanding a load mismatch corresponding to VSWR = 6 : 1 through all phases under the following conditions: P_L = 1.2 W; V_{CE} = 6.5 V; f = 900 MHz.



V_{CE} = 4.8 V.
I_{CQ} = 1 mA.
f = 900 MHz.

Fig.5 Power gain and efficiency as functions of load power; typical values.



V_{CE} = 4.8 V.
I_{CQ} = 1 mA.
f = 900 MHz.

Fig.6 Load power as a function of input power; typical values.

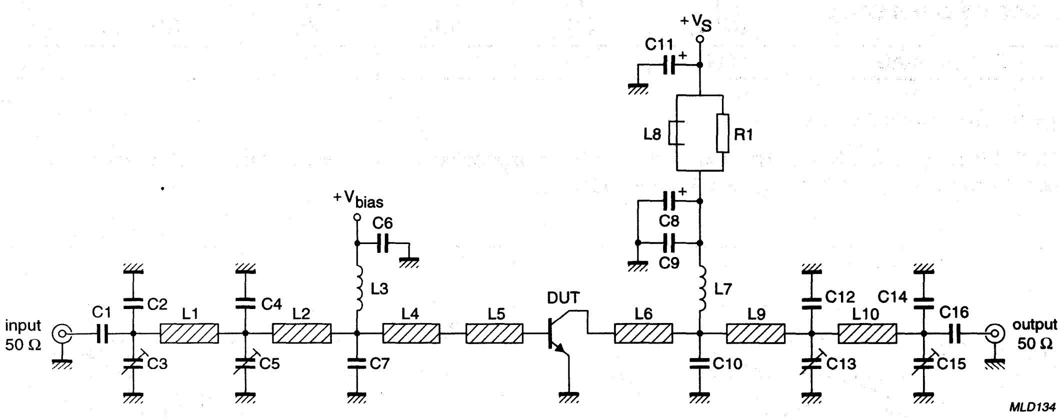


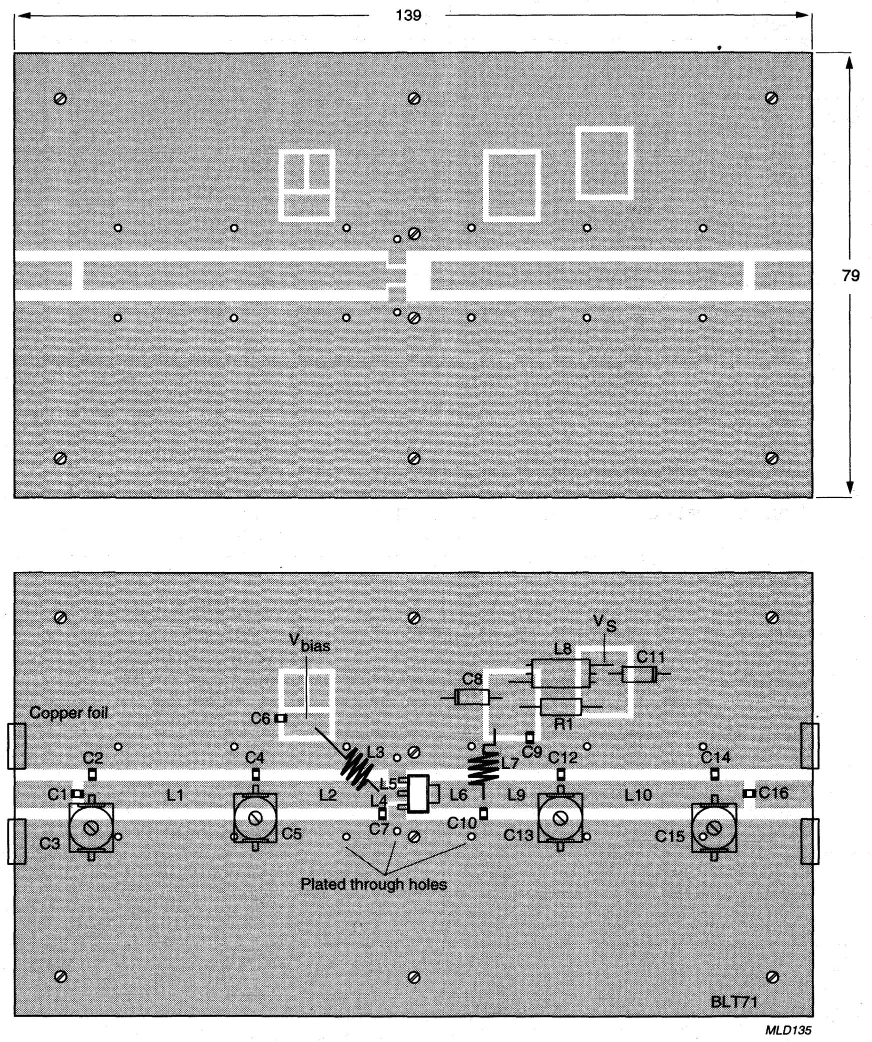
Fig.7 Class-AB test circuit at 900 MHz.

List of components (see Figs 7 and 8)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C6, C9, C16	multilayer ceramic chip capacitor; note 1	100 pF		
C2, C4, C12, C14	multilayer ceramic chip capacitor; note 1	1 pF		
C3, C5, C13, C15	film dielectric trimmer	1.4 to 5.5 pF		2222 809 09004
C7	multilayer ceramic chip capacitor; note 1	6.8 pF		
C8	tantalum capacitor	1 µF, 35 V		
C10	multilayer ceramic chip capacitor; note 1	5.1 pF		
C11	tantalum capacitor	100 µF, 20 V		
L1	stripline; note 2	50 Ω	length 28.5 mm width 5 mm	
L2	stripline; note 2	50 Ω	length 23 mm width 5 mm	
L3	11 turns enamelled 0.6 mm copper wire	100 nH	length 7.5 mm internal dia. 3.3 mm	
L4	stripline; note 2	50 Ω	length 1 mm width 5 mm	
L5	stripline; note 2	50 Ω	length 3 mm width 2.5 mm	
L6	stripline; note 2	50 Ω	length 9 mm width 5 mm	
L7	7 turns enamelled 0.6 mm copper wire	37 nH	length 7.3 mm internal dia. 3.3 mm	
L8	grade 3B Ferroxcube wideband HF choke			4132 020 36640
L9	stripline; note 2	50 Ω	length 13.5 mm width 5 mm	
L10	stripline; note 2	50 Ω	length 26.5 mm width 5 mm	
R1	metal film resistor	0.1 W, 10 Ω		

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 $^1\!/_{16}$"; thickness of the copper sheet 2 × 35 µm.



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.

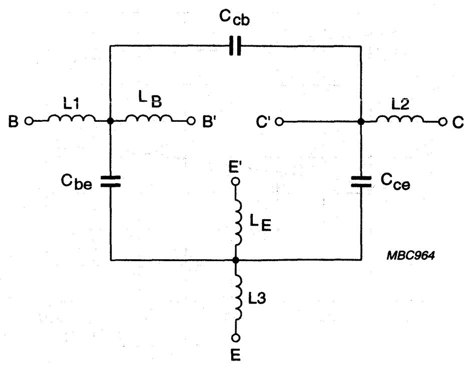
Fig.8 Component lay-out and printed-circuit board for 900 MHz class-AB test circuit.

SPICE parameters for the BLT71 crystal

SEQUENCE No.	PARAMETER	VALUE	UNIT
1	IS	3.503	fA
2	BF	190.5	–
3	NF	0.981	–
4	VAF	35.45	V
5	IKF	24.52	A
6	ISE	184.9	fA
7	NE	1.475	–
8	BR	12.61	–
9	NR	1.042	–
10	VAR	1.476	V
11	IKR	2.206	A
12	ISC	866.5	aA
13	NC	1.025	–
14	RB	2.000	Ω
15	IRB	1.000	μA
16	RBM	2.000	Ω
17	RE	373.8	mΩ
18	RC	330.6	mΩ
19(1)	XTB	0.000	–
20(1)	EG	1.110	eV
21(1)	XTI	3.000	–
22	CJE	9.746	pF
23	VJE	0.600	V
24	MJE	0.288	–
25	TF	11.99	ps
26	XTF	0.979	–
27	VTF	19.52	mV
28	ITF	0.137	A
29	PTF	0.000	deg
30	CJC	5.028	pF
31	VJC	0.609	V
32	MJC	0.368	–
33	XCJC	0.150	–
34	TR	3.841	ns
35(1)	CJS	0.000	F
36(1)	VJS	750.0	mV
37(1)	MJS	0.000	–
38	FC	0.813	–

Note

1. These parameters have not been extracted, the default values are shown.

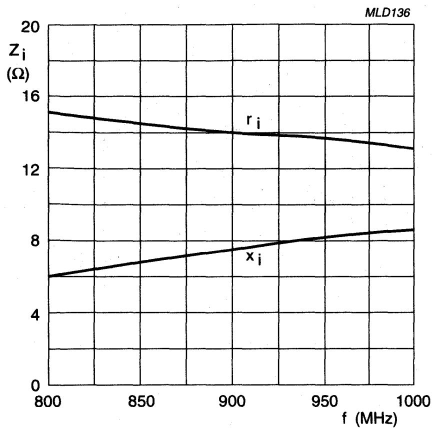


$QL_B = 50$; $QL_E = 50$; $QL_{B,E}(f) = QL_{B,E}\sqrt{(f/Fc)}$;
Fc = scaling frequency = 1 GHz.

Fig.9 Package equivalent circuit SOT223H.

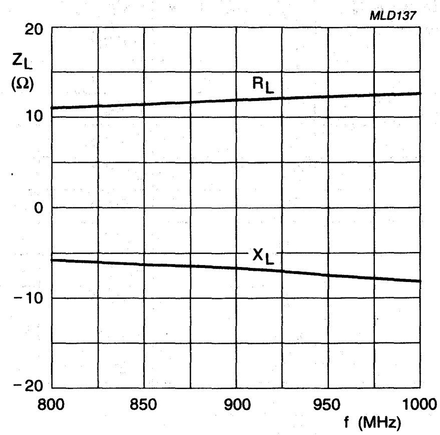
List of components (see Fig.9)

DESIGNATION	VALUE	UNIT
C_{be}	182	fF
C_{cb}	16	fF
C_{ce}	249	fF
L1	0.025	nH
L2	1.19	nH
L3	0.6	nH
L_B	1.85	nH
L_E	1.22	nH



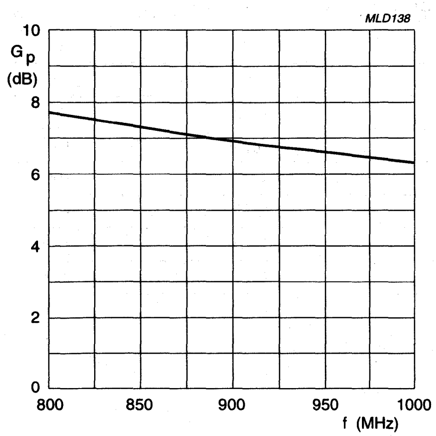
V_{CE} = 4.8 V; I_{CQ} = 1 mA.
P_L = 1.2 W; T_{amb} = 25 °C.

Fig.10 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 4.8 V; I_{CQ} = 1 mA.
P_L = 1.2 W; T_{amb} = 25 °C.

Fig.11 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 4.8 V; I_{CQ} = 1 mA.
P_L = 1.2 W; T_{amb} = 25 °C.

Fig.12 Gain as a function of frequency; typical values.

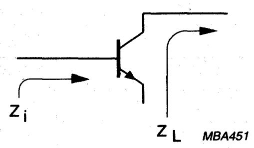


Fig.13 Definition of transistor impedance.

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 900 MHz communication band.

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.

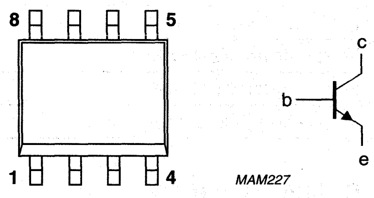


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter test circuit.

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; note 1	–	2.9	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} = 2.9 W; T_s = 60 °C; note 1	40	K/W

Note to the "Limiting values" and "Thermal characteristics"

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

APPLICATION INFORMATION

RF performance at $T_s \leq 60$ °C in a common emitter test circuit (note 1).

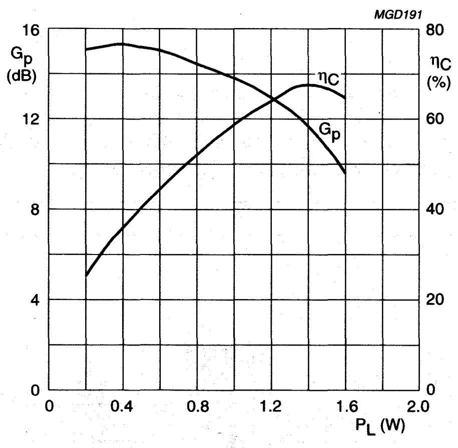
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	900	4.8	3	1.2	≥11 typ. 13	≥55 typ. 63

Note

1. T_s is the temperature at the soldering point of the collector pin.

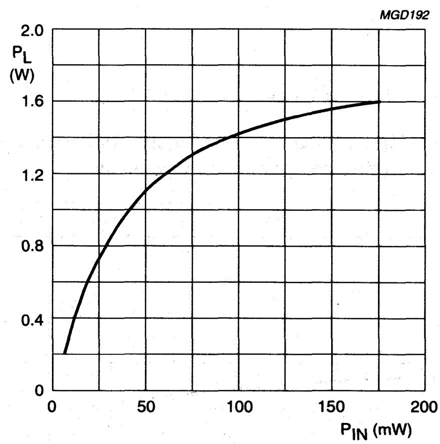
Ruggedness in class-AB operation

The BLT71/8 is capable of withstanding a load mismatch corresponding to VSWR = 6 : 1 through all phases under the following conditions: f = 900 MHz; V_{CE} = 6.5 V; I_{CQ} = 3 mA; P_L = 1.2 W; $T_s \leq 60$ °C.



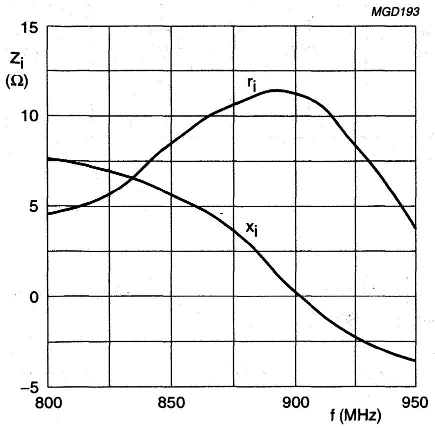
f = 900 MHz; V_{CE} = 4.8 V; I_{CQ} = 3 mA; $T_s \leq 60$ °C.

Fig.2 Power gain and collector efficiency as functions of load power; typical values.



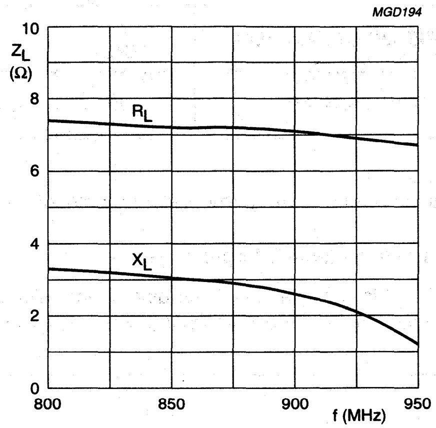
f = 900 MHz; V_{CE} = 4.8 V; I_{CQ} = 3 mA; $T_s \leq 60$ °C.

Fig.3 Load power as a function of input power; typical values.



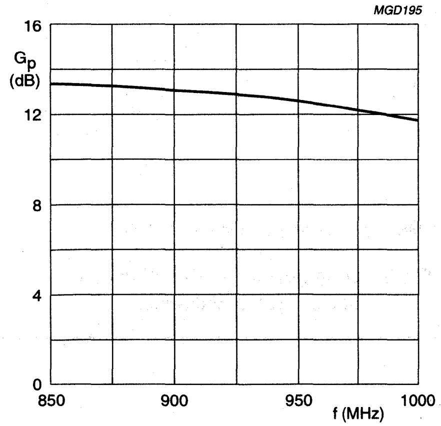
V_{CE} = 4.8 V; I_{CQ} = 3 mA; P_L = 1.2 W; T_{amb} = 25 °C.

Fig.4 Input impedance as a function of frequency (series components); typical values.



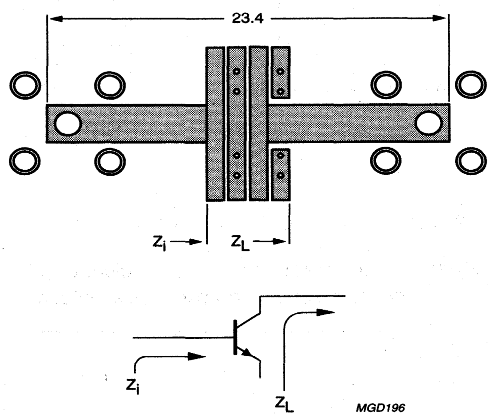
V_{CE} = 4.8 V; I_{CQ} = 3 mA; P_L = 1.2 W; T_{amb} = 25 °C.

Fig.5 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 4.8 V; I_{CQ} = 3 mA; P_L = 1.2 W; T_{amb} = 25 °C.

Fig.6 Power gain as a function of frequency (series components); typical values.



Dimensions in mm.

Fig.7 RF test print and definition of transistor impedance.

UHF power transistor | BLT72

FEATURES

- High efficiency
- High gain
- Internal pre-matched input
- Low supply voltage.

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.

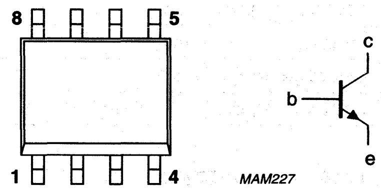


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at $T_s \leq 60$ °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
Pulsed, class-AB	900	4.8	3	typ. 11.5	typ. 70

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)		–	650	mA
P_{tot}	total power dissipation	T_s = 115 °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 = 115 °C; note 1	30	K/W

Note to the "Limiting values" and "Thermal characteristics"

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 = 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} = 4.8 V; V_{BE} = 0	–	0.1	mA
h_{FE}	DC current gain	V_{CE} = 4.8 V; I_C = 100 mA	30	150	
C_c	collector capacitance	V_{CB} = 4.8 V; I_E = i_e = 0; f = 1 MHz	–	tbf	pF
C_{re}	feedback capacitance	V_{CE} = 4.8 V; I_C = 0; f = 1 MHz	–	tbf	pF

APPLICATION INFORMATION

RF performance at $T_s \leq 60$ °C in a common emitter test circuit (note 1).

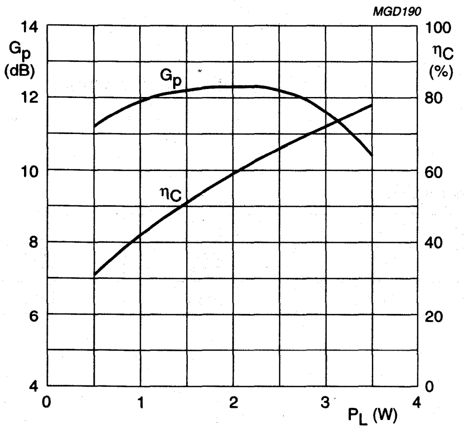
MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
Pulsed, class-AB; $\delta = 1 : 8$; $t_p \leq 5$ ms	900	4.8	2	3	≥ 9 typ. 11.5	≥ 55 typ. 70

Note

1. T_s is the temperature at the soldering point of the collector pin.

Ruggedness in class-AB operation

The BLT72 is capable of with standing a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $\delta = 1 : 8$; $t_p \leq 5$ ms; f = 900 MHz; $V_{CE} = 6.5$ V; $I_{CQ} = 3$ mA; $P_L = 3.5$ W; $T_s \leq 60$ °C.



Pulsed, class-AB; f = 900 MHz; $V_{CE} = 4.8$ V; $I_{CQ} = 2$ mA; tuned at $P_L = 3.2$ W.

Fig.2 Power gain and collector efficiency as functions of load power; typical values.

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

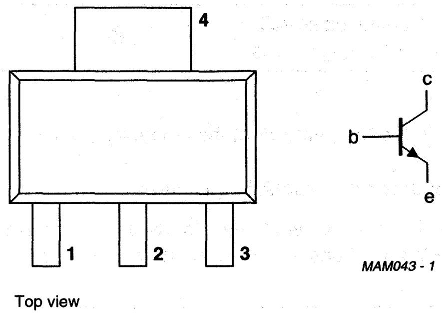


Fig.1 Simplified outline and symbol.

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).

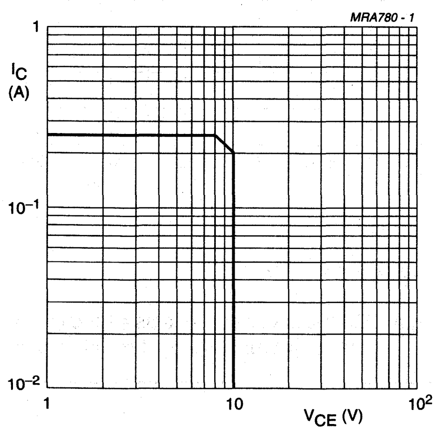
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	10	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	250	mA
$I_{C(AV)}$	average collector current		–	250	mA
I_{CM}	peak collector 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.

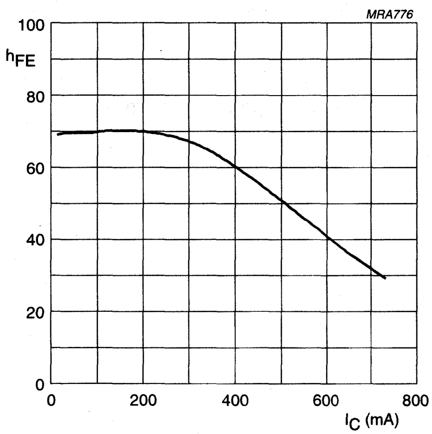
CHARACTERISTICS

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

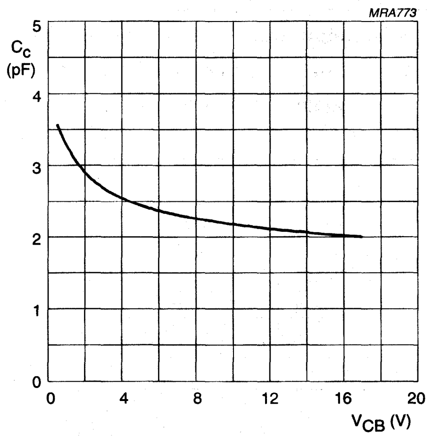
Note

1. Measured under pulsed conditions: $t_p \leq 200$ µs; $\delta \leq 0.02$.



V_{CE} = 7.5 V; $t_p \leq 200$ µs; $\delta \leq 0.02$; T_j = 25 °C.

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 $T_s \le 60$ °C in a common emitter test circuit (see note 1 and Fig.7).

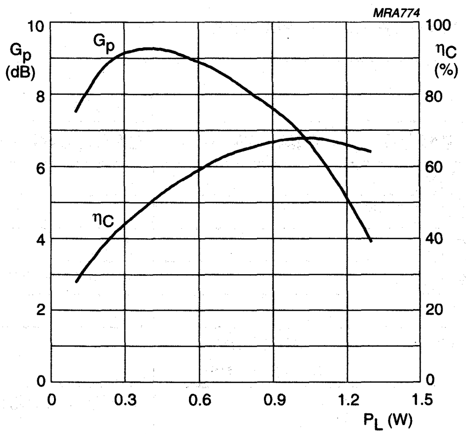
MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-B narrow band	900	7.5	0.8	≥6 typ. 8	≥60 typ. 67

Note

1. T_s is the temperature at the soldering point of the collector pin.

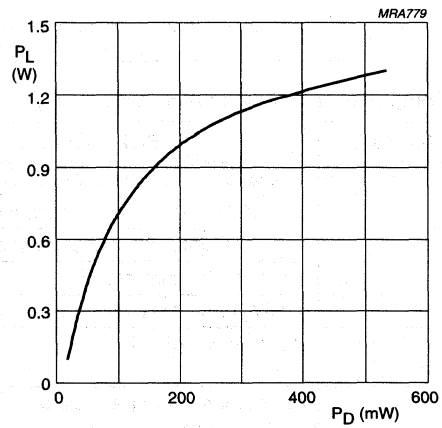
Ruggedness in class-AB operation

The BLT80 is capable of withstanding a load mismatch corresponding to VSWR = 50 : 1 through all phases under the following conditions: f = 900 MHz; V_{CE} = 9 V; P_L = 0.8 W; $T_s \le 60$ °C.



Class-B; f = 900 MHz; V_{CE} = 7.5 V; $T_s \le 60$ °C.

Fig.5 Power gain and collector efficiency as functions of load power; typical values.



Class-B; f = 900 MHz; V_{CE} = 7.5 V; $T_s \le 60$ °C.

Fig.6 Load power as a function of drive power; typical values.

Test circuit information

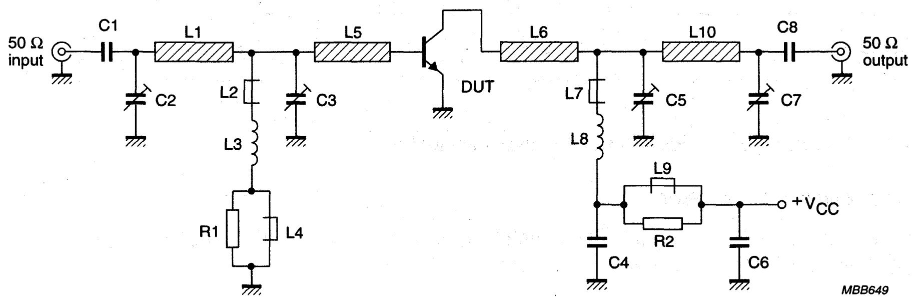


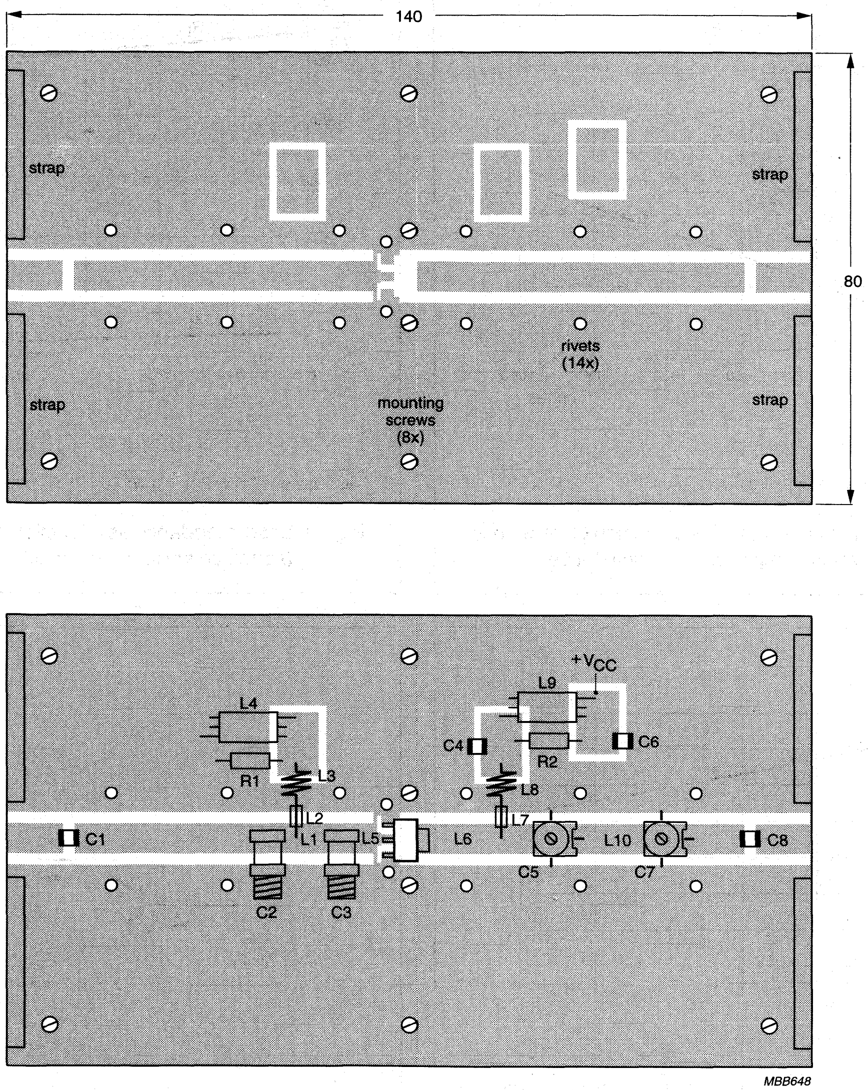
Fig.7 Common emitter test circuit for class-B operation at 900 MHz.

List of components used in test circuit (see Figs 7 and 8)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C8	multilayer ceramic chip capacitor; note 1	100 pF		
C2, C3	type 9105 Voltronix KM10 trimmer	0.6 to 10 pF		
C4	multilayer ceramic chip capacitor; note 1	220 pF		
C5, C7	film dielectric trimmer	1.4 to 5.5 pF		2222 809 09001
C6	multilayer ceramic chip capacitor; note 1	1 nF		
L1	stripline; note 2	50 Ω	length 13 mm width 4.85 mm	
L2, L7	1 turn 0.4 mm copper wire on grade 3B core			4330 030 32221
L3, L8	6 turns enamelled 0.8 mm copper wire		internal dia. 3 mm	
L4, L9	grade 3B Ferroxcube wideband HF choke			4312 020 36640
L5	stripline; note 2	50 Ω	length 8.4 mm width 4.85 mm	
L6	stripline; note 2	50 Ω	length 20 mm width 4.85 mm	
L10	stripline; note 2	50 Ω	length 21 mm width 4.85 mm	
R1, R2	metal film resistor	10 Ω, 0.25 W		

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 PTFE fibre-glass dielectric (ε_r = 2.2); thickness $^1/_{16}$"; thickness of the copper sheet 35 μm.

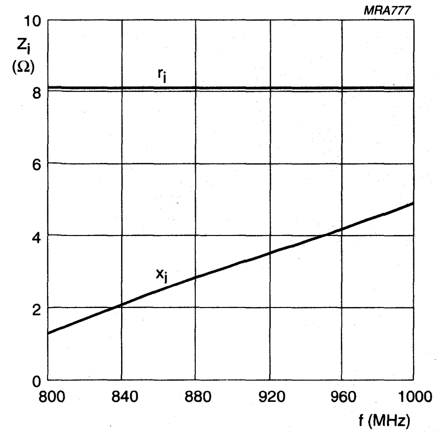


Dimensions in mm.

The components are situated on one side of the copper-clad PTFE 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 means of fixing screws and copper foil straps under the emitter leads.

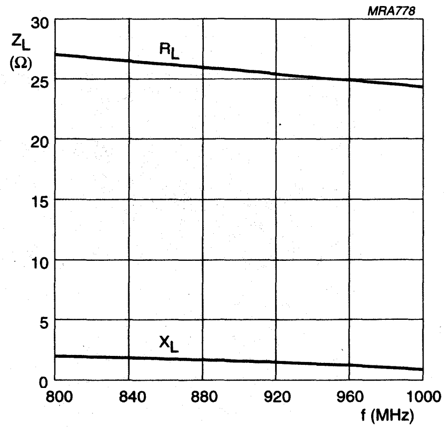
Fig.8 Printed-circuit board and component lay-out for 900 MHz class-B test circuit in Fig.7.

UHF power transistor BLT80



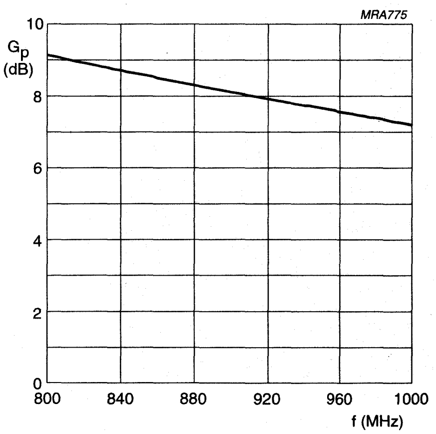
Class-B; V_{CE} = 7.5 V; P_L = 0.8 W; $T_s \leq 60$ °C.

Fig.9 Input impedance as a function of frequency (series components); typical values.



Class-B; V_{CE} = 7.5 V; P_L = 0.8 W; $T_s \leq 60$ °C.

Fig.10 Load impedance as a function of frequency (series components); typical values.



Class-B; V_{CE} = 7.5 V; P_L = 0.8 W; $T_s \leq 60$ °C.

Fig.11 Power gain as a function of frequency; typical values.

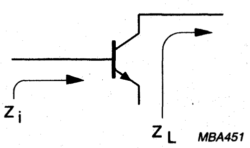


Fig.12 Definition of transistor impedance.

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

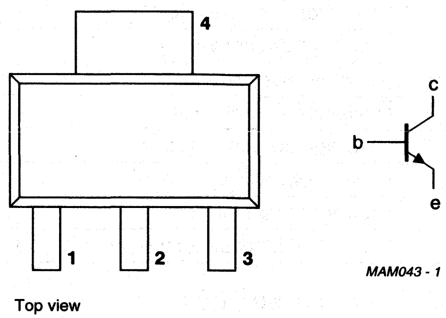


Fig.1 Simplified outline and symbol.

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).

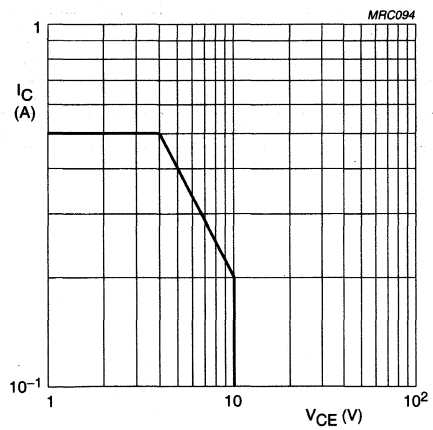
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	9.5	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	500	mA
$I_{C(AV)}$	average collector current		–	500	mA
P_{tot}	total power 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.

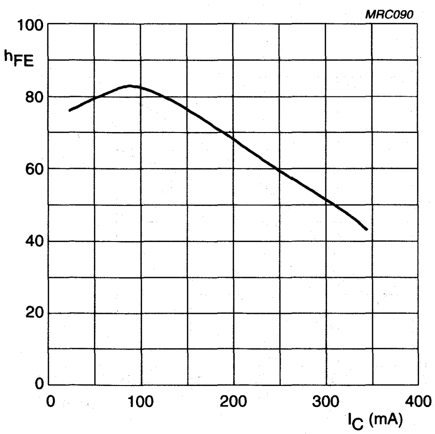
CHARACTERISTICS

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

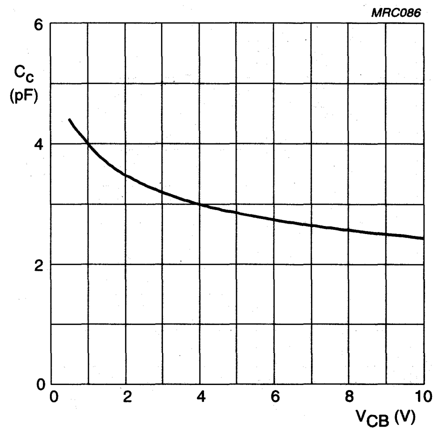
Note

1. Measured under pulsed conditions: $t_p \leq 200$ µs; $\delta \leq 0.02$.



V_{CE} = 7.5 V; $t_p \leq 200$ µs; $\delta \leq 0.02$; T_j = 25 °C.

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 $T_s \leq 60$ °C in a common emitter test circuit (see note 1 and Fig.7).

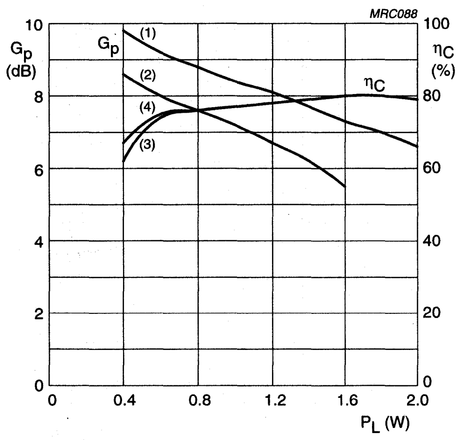
MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-B narrow band	900	7.5	1.2	≥6 typ. 8	≥60 typ. 77
		6	1.2	typ. 6.5	typ. 77

Note

1. T_s is the temperature at the soldering point of the collector pin.

Ruggedness in class-AB operation

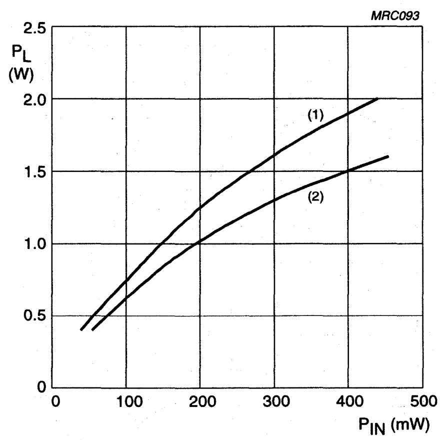
The BLT81 is capable of withstanding a load mismatch corresponding to VSWR = 50 : 1 through all phases under the following conditions: f = 900 MHz; V_{CE} = 9 V; P_L = 1.2 W; $T_s \leq 60$ °C.



Class-B; f = 900 MHz; $T_s \leq 60$ °C.

(1) V_{CE} = 7.5 V. (3) V_{CE} = 7.5 V.
(2) V_{CE} = 6 V. (4) V_{CE} = 6 V.

Fig.5 Power gain and collector efficiency as functions of load power; typical values.



Class-B; f = 900 MHz; $T_s \leq 60$ °C.

(1) V_{CE} = 7.5 V. (2) V_{CE} = 6 V.

Fig.6 Load power as a function of input power; typical values.

Test circuit information

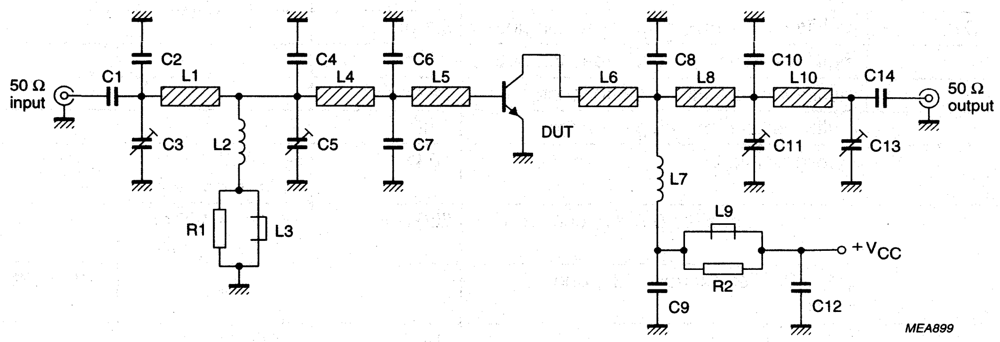


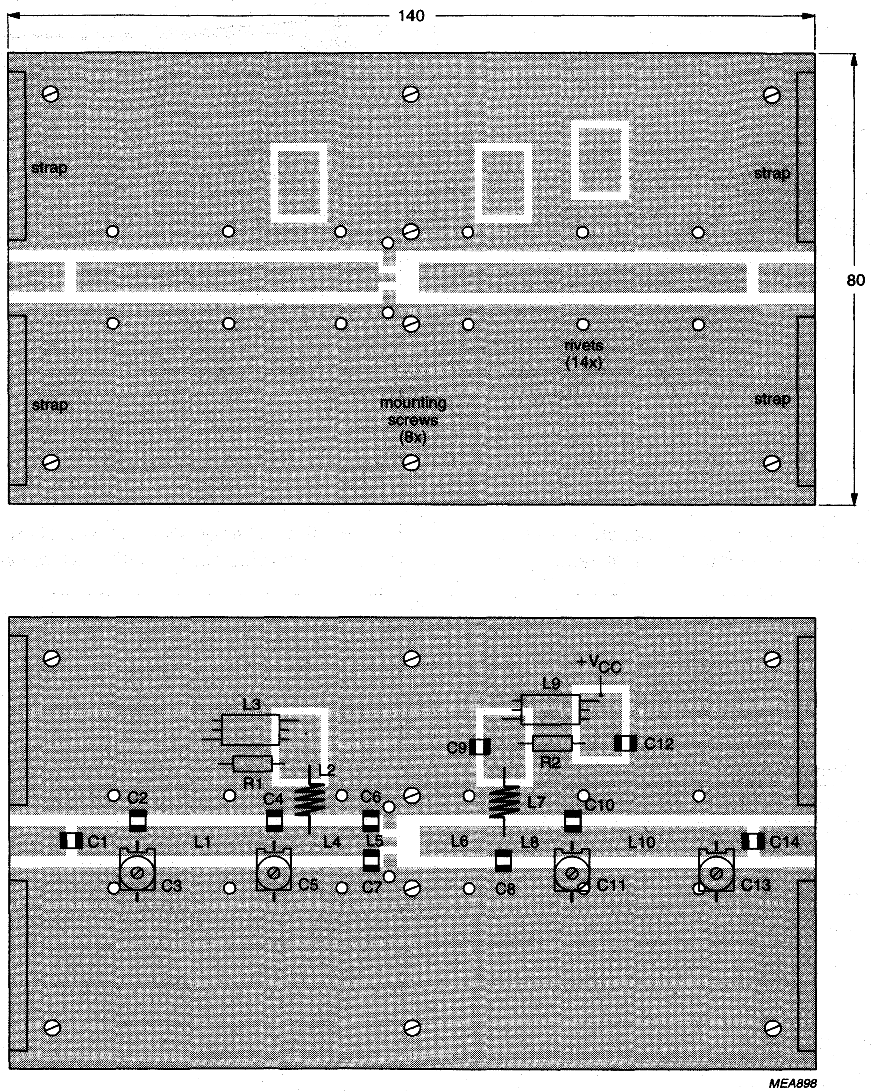
Fig.7 Common emitter test circuit for class-B operation at 900 MHz.

List of components used in test circuit (see Figs 7 and 8)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C14	multilayer ceramic chip capacitor; note 1	100 pF		
C2	multilayer ceramic chip capacitor; note 1	3 pF		
C3, C5, C11, C13	film dielectric trimmer	1.4 to 5.5 pF		2222 809 09004
C4	multilayer ceramic chip capacitor; note 1	5.6 pF		
C6, C7, C10	multilayer ceramic chip capacitor; note 1	5.1 pF		
C8	multilayer ceramic chip capacitor; note 1	3.6 pF		
C9	multilayer ceramic chip capacitor; note 1	220 pF		
C12	multilayer ceramic chip capacitor;	1 nF		
L1	stripline; note 2	50 Ω	length 26.6 mm width 4.85 mm	
L2	10 turns enamelled 0.6 mm copper wire	250 nH	int. dia. 4.5 mm leads 2 × 5 mm	
L3, L9	grade 3B Ferroxcube wideband HF choke			4312 020 36640
L4	stripline; note 2	50 Ω	length 18 mm width 4.85 mm	
L5	stripline; note 2	75 Ω	length 3.5 mm width 2.5 mm	
L6	stripline; note 2	50 Ω	length 10 mm width 4.85 mm	
L7	4 turns enamelled 0.6 mm copper wire	65 nH	int. dia. 4.5 mm leads 2 × 5 mm	
L8	stripline; note 2	50 Ω	length 15 mm width 4.85 mm	
L10	stripline; note 2	50 Ω	length 24.6 mm width 4.85 mm	
R1, R2	metal film resistor	10 Ω, 0.25 W		

Notes

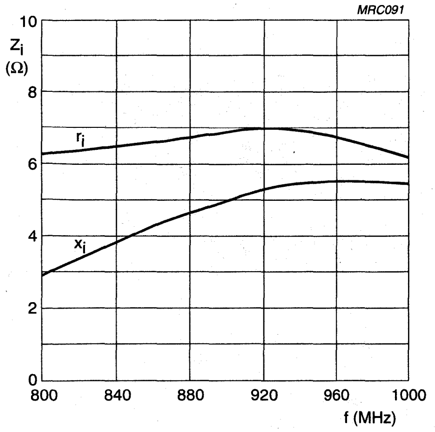
1. American Technical Ceramics type 100B or capacitor of same quality.
2. The striplines are on a double copper-clad printed-circuit board, with PTFE fibre-glass dielectric ($\varepsilon_r = 2.2$); thickness $^1/_{16}$"; thickness of the copper sheet 35 μm.



Dimensions in mm.

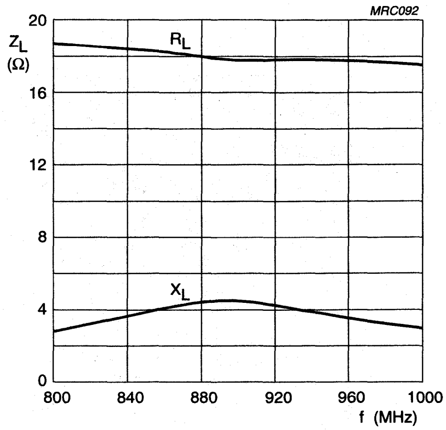
The components are situated on one side of the copper-clad PTFE fibre-glass board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by means of fixing screws and copper foil straps under the emitter leads.

Fig.8 Printed-circuit board and component lay-out for 900 MHz class-B test circuit in Fig.7.



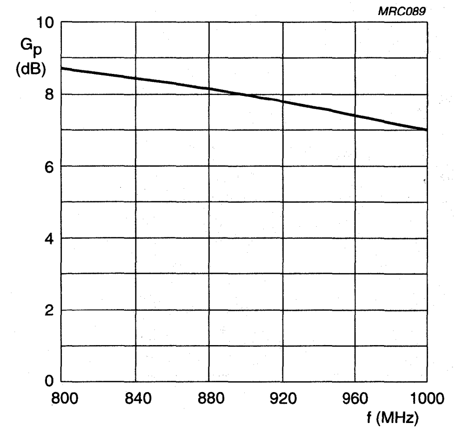
Class-B; V_{CE} = 7.5 V; P_L = 1.2 W; $T_s \leq$ 60 °C.

Fig.9 Input impedance as a function of frequency (series components); typical values.



Class-B; V_{CE} = 7.5 V; P_L = 1.2 W; $T_s \leq$ 60 °C.

Fig.10 Load impedance as a function of frequency (series components); typical values.



Class-B; V_{CE} = 7.5 V; P_L = 1.2 W; $T_s \leq$ 60 °C.

Fig.11 Power gain as a function of frequency; typical values.

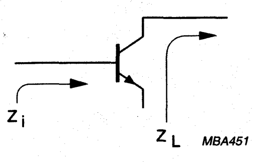


Fig.12 Definition of transistor impedance.

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.

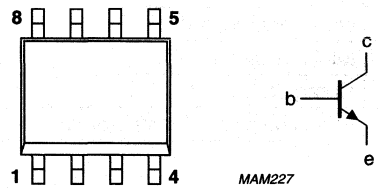


Fig.1 Simplified outline and symbol.

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

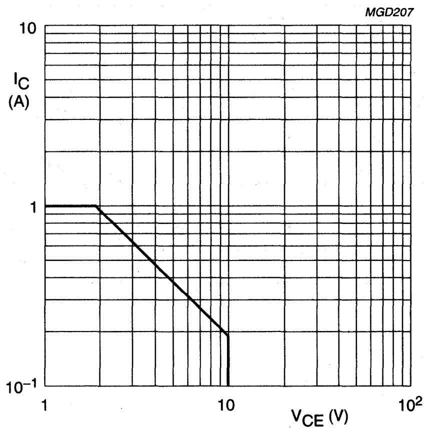
LIMITING VALUES

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.

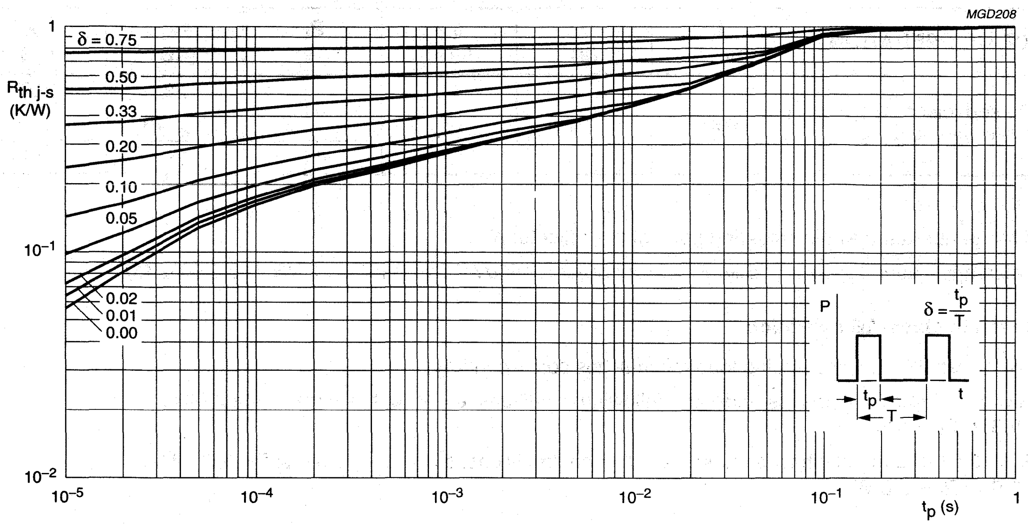


Fig.3 Normalized thermal resistance as a function of pulse time.

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

APPLICATION INFORMATION

RF performance at $T_s \leq 60$ °C in a common emitter test circuit (see notes 1, 2 and Fig.5).

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)
Pulsed, class-AB; $\delta = 1:8$; $t_p \leq 5$ ms	900	6	2	3.5	≥8 typ. 10	≥50 typ. 65
				2.8	≥9	≥57

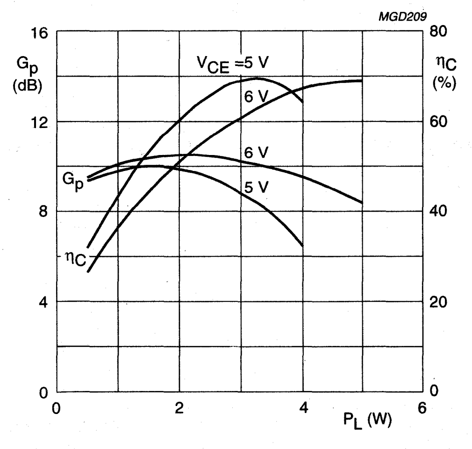
Notes

1. T_s is the temperature at the soldering point of the collector pin.
2. See also application report:. *"G.S.M. Power Amplifier for 900 MHz at 6 V (no.: RNR-T45-95-T-246)"*

Ruggedness in class-AB operation

The BLT82 is capable of withstanding load mismatches corresponding to:

- VSWR = 6 : 1 through all phases under the following conditions: $\delta = 1:8$; $t_p \leq 5$ ms; f = 900 MHz; $V_{CE} = 8.3$ V; $P_L = 4$ W.
- VSWR = 10 : 1 through all phases under the following conditions: $\delta = 1:8$; $t_p \leq 5$ ms; f = 900 MHz; $V_{CE} = 8.6$ V; $P_L = 2.8$ W.



Pulsed, class-AB; f = 900 MHz; $I_{CQ} = 2$ mA; tuned at $P_L = 3.5$ W; $T_s \leq 60$ °C.

Fig.4 Power gain and collector efficiency as functions of load power; typical values.

Test circuit information

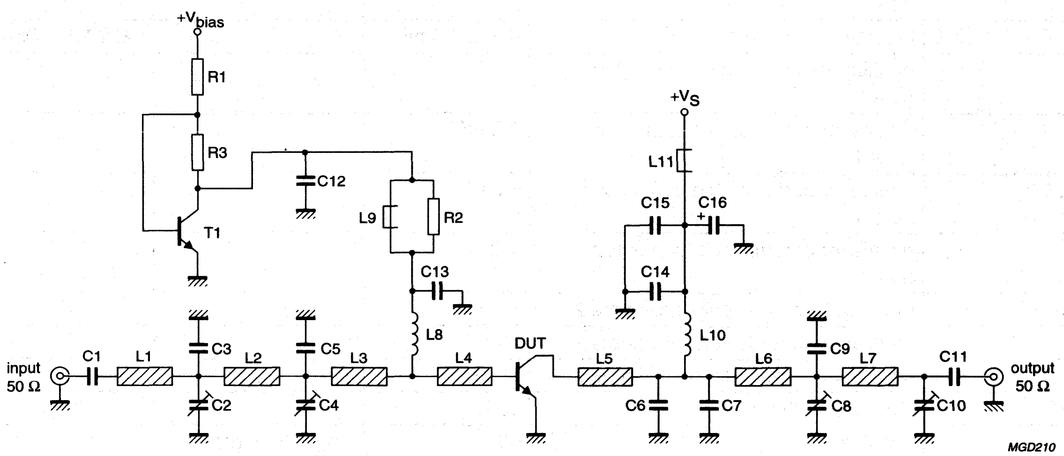


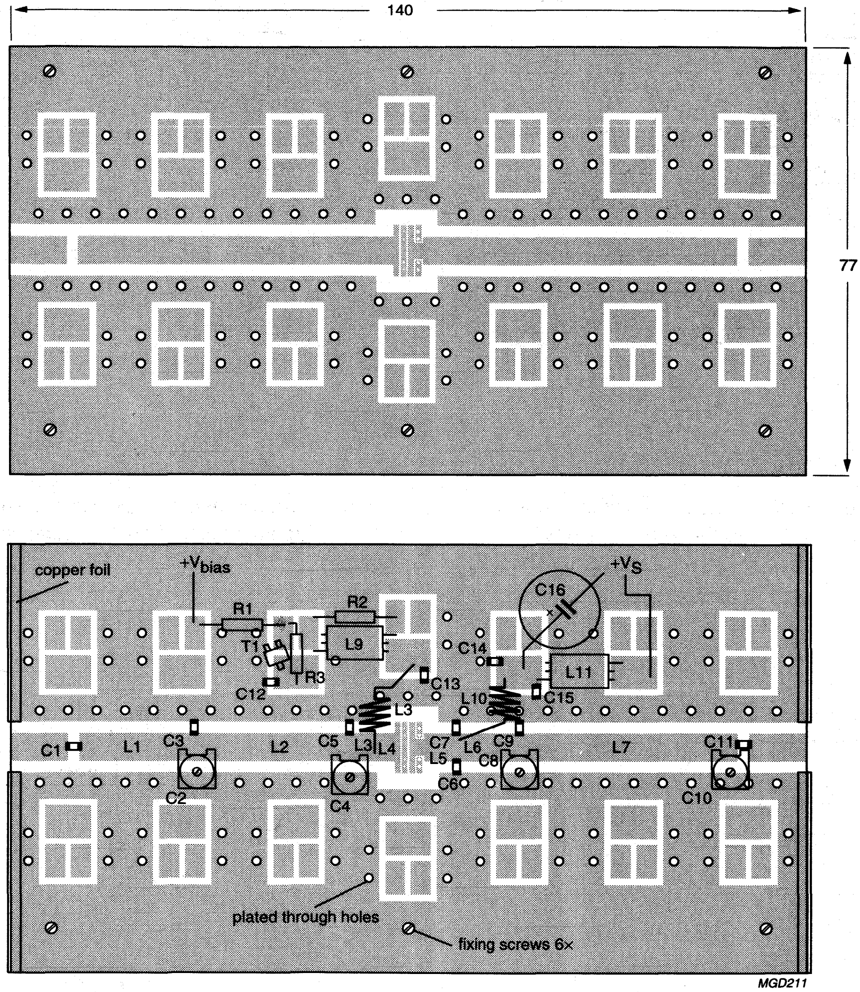
Fig.5 Common emitter test circuit for class-AB operation at 900 MHz.

List of components used in test circuit (see Figs 5 and 6)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C11	multilayer ceramic chip capacitor; note 1	62 pF		
C2, C4, C8, C10	film dielectric trimmer	0.8 to 3.5 pF		2222 809 05001
C3	multilayer ceramic chip capacitor; note 1	1 pF		
C5	multilayer ceramic chip capacitor; note 1	8.2 pF		
C6, C7	multilayer ceramic chip capacitor; note 1	6.2 pF		
C9	multilayer ceramic chip capacitor; note 1	1.2 pF		
C12	multilayer ceramic chip cap.; note 2	10 nF		
C13, C14	multilayer ceramic chip cap.; note 1	18 pF		
C15	multilayer ceramic chip cap.; note 2	39 nF		
C16	electrolytic capacitor	2200 μF		
L1	stripline; note 3	50 Ω	length 20.6 mm width 5 mm	
L2	stripline; note 3	50 Ω	length 27.4 mm width 5 mm	
L3, L4	stripline; note 3	50 Ω	length 4 mm width 5 mm	
L5	stripline; note 3	50 Ω	length 5.8 mm width 5 mm	
L6	stripline; note 3	50 Ω	length 12.4 mm width 5 mm	
L7	stripline; note 3	50 Ω	length 36 mm width 5 mm	
L8	8 turns enamelled 1 mm copper wire	80 nH	internal dia. 3 mm leads 2 × 5 mm	
L9, L11	grade 3B Ferroxcube wideband HF choke			4132 020 36640
L10	4 turns enamelled 1 mm copper wire	35 nH	internal dia. 3 mm leads 2 × 5 mm	
R1	metal film resistor	0.6 W, 38.3 Ω		2322 156 13839
R2	metal film resistor	0.6 W, 10 Ω		2322 156 11009
R3	metal film resistor	0.6 W, 1 Ω		2322 156 11008
T1	NPN transistor	BC817		

Notes

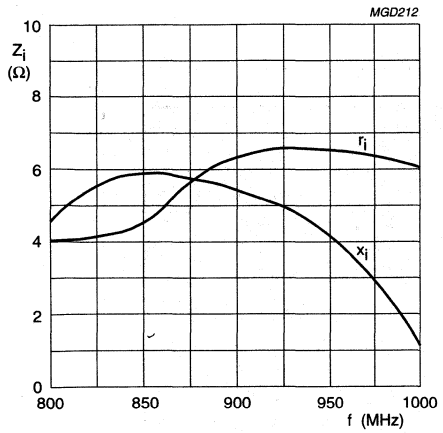
1. American Technical Ceramics type 100B or capacitor of same quality.
2. American Technical Ceramics type 200B or capacitor of same quality.
3. The striplines are on a double copper-clad printed-circuit board, with DUROID dielectric ($\varepsilon_r = 2.2$); thickness $\frac{1}{32}$"; thickness of the copper sheet 2 × 35 μm.



Dimensions in mm.

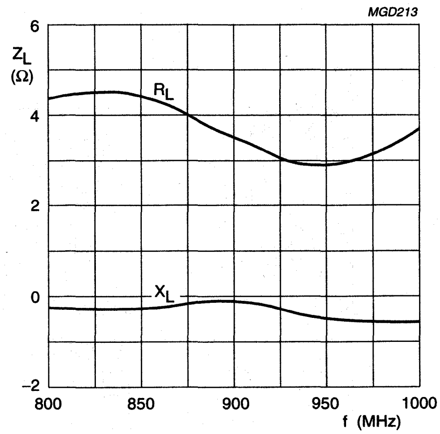
The components are situated on one side of the copper-clad PCB, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by fixing screws, through metallization and copper straps around the board.

Fig.6 Printed-circuit board and component lay-out for 900 MHz class-AB test circuit in Fig.5.



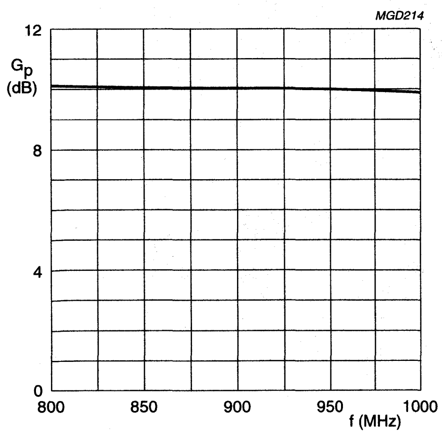
V_{CE} = 6 V; I_{CQ} = 2 mA; P_L = 3.5 W; T_{amb} = 25 °C.

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



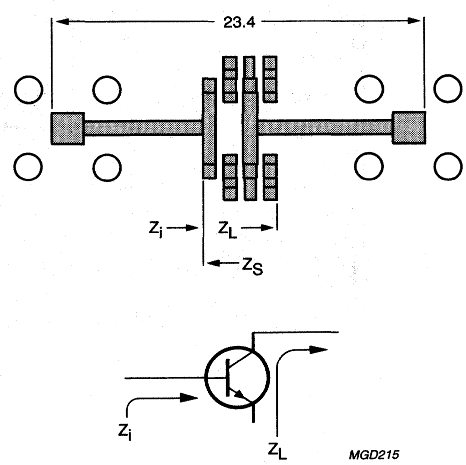
V_{CE} = 6 V; I_{CQ} = 2 mA; P_L = 3.5 W; T_{amb} = 25 °C.

Fig.8 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 6 V; I_{CQ} = 2 mA; P_L = 3.5 W; T_{amb} = 25 °C.

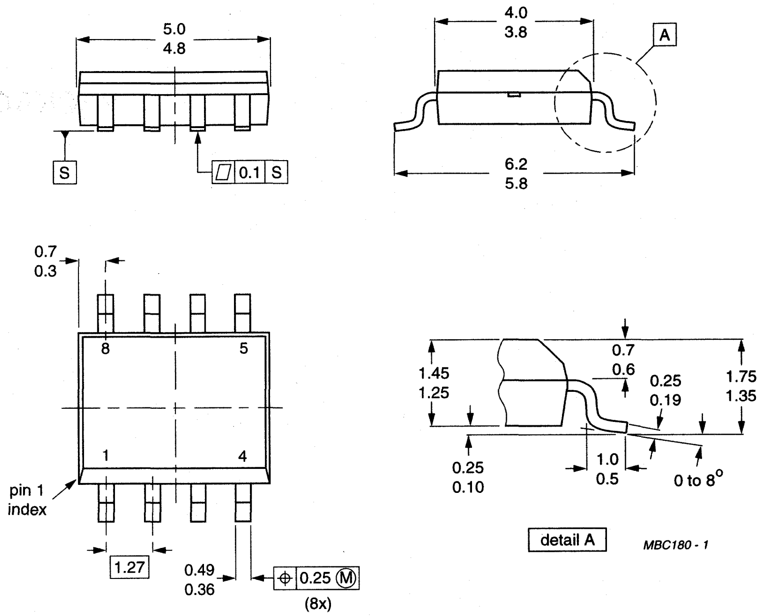
Fig.9 Power gain as a function of frequency; typical values.



Dimensions in mm.

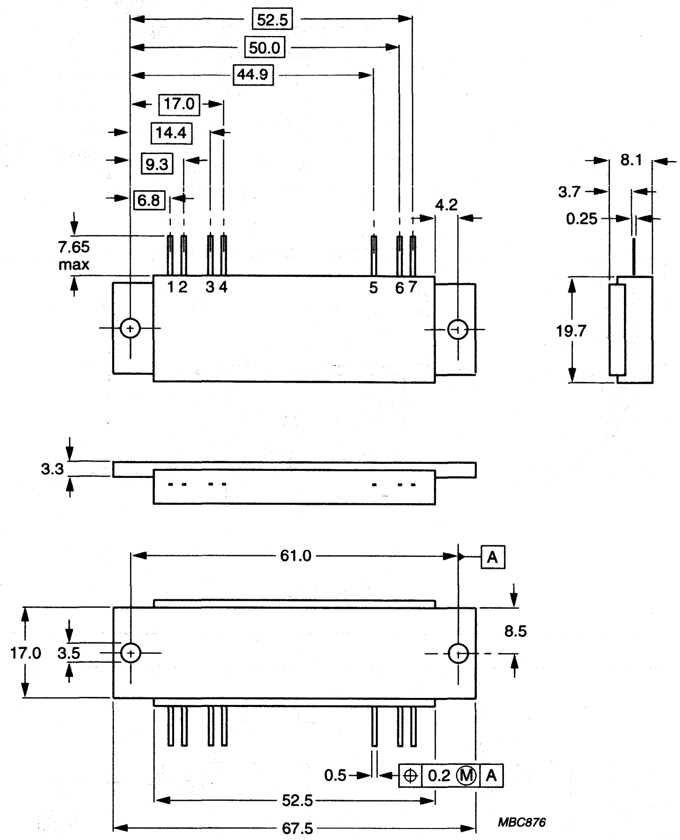
Fig.10 SO8, RF test print and definition of transistor impedance.

PACKAGE OUTLINES



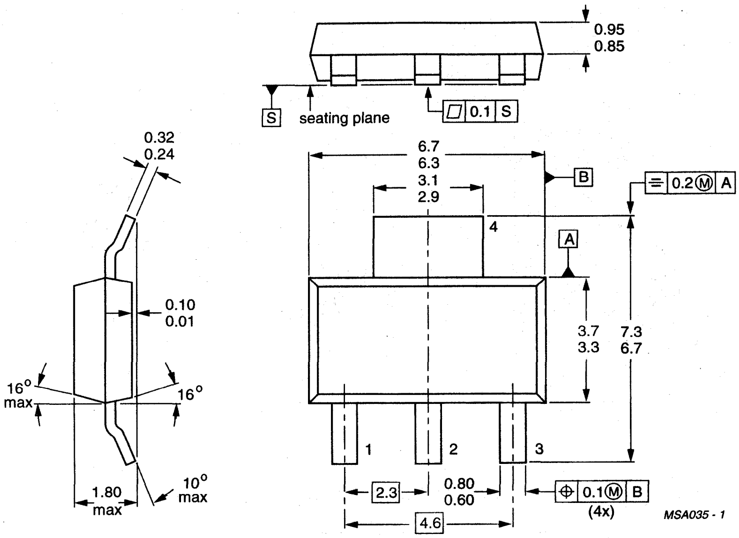
Dimensions in mm.

Fig.1 SOT96-1.



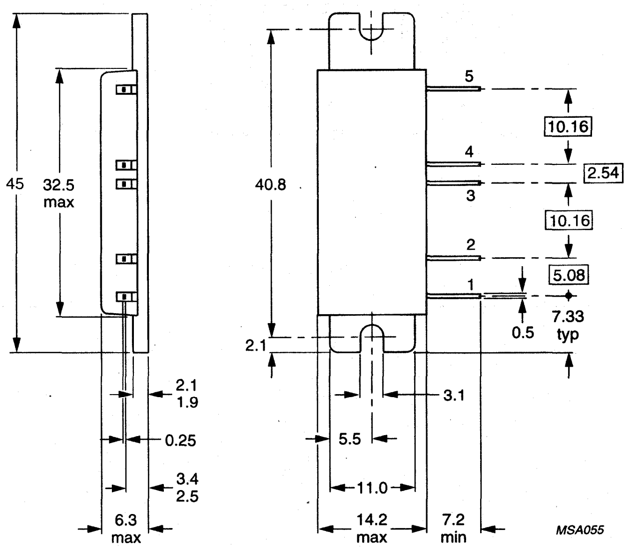
Dimensions in mm.

Fig.2 SOT132B.



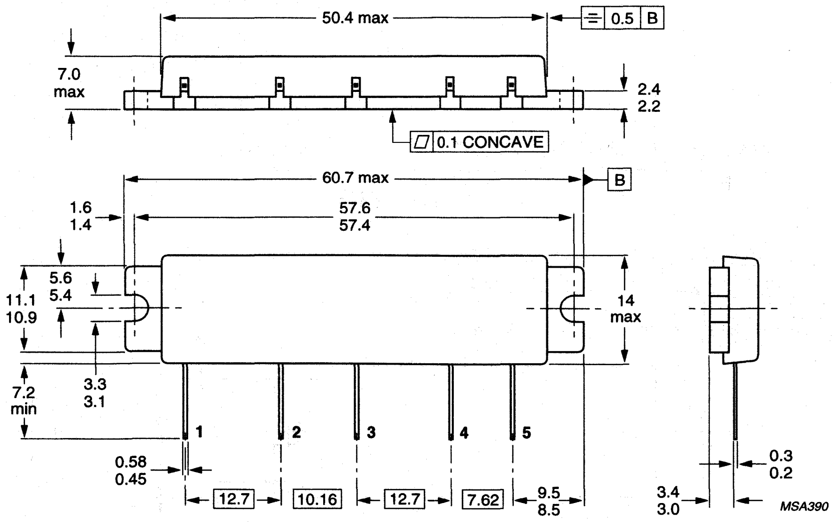
Dimensions in mm.

Fig.3 SOT223.



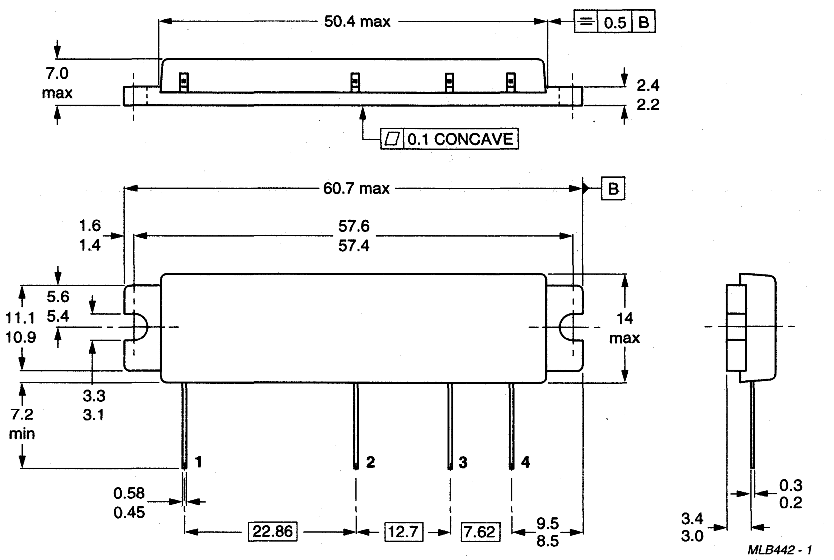
Dimensions in mm.

Fig.4 SOT246.



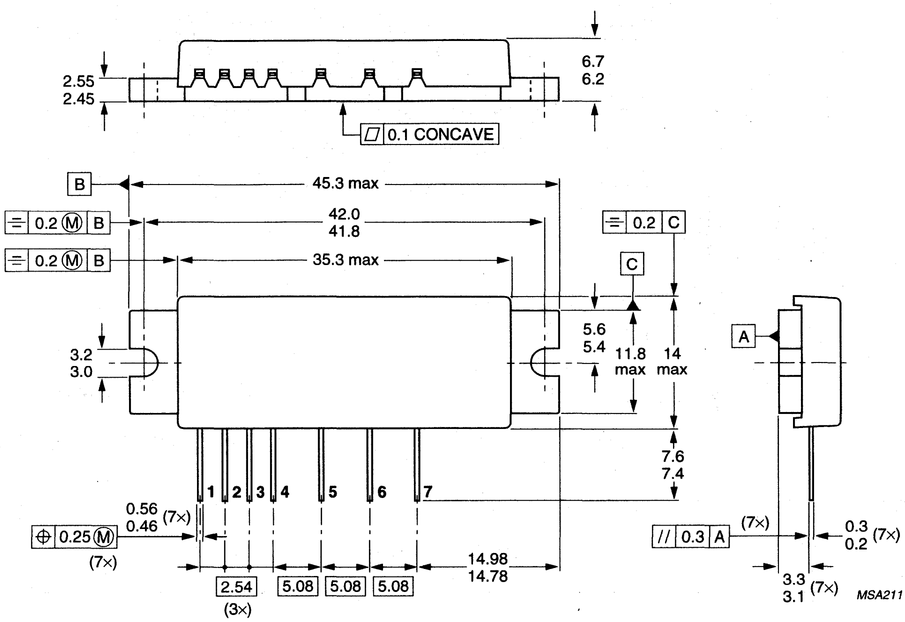
Dimensions in mm.

Fig.5 SOT278A.



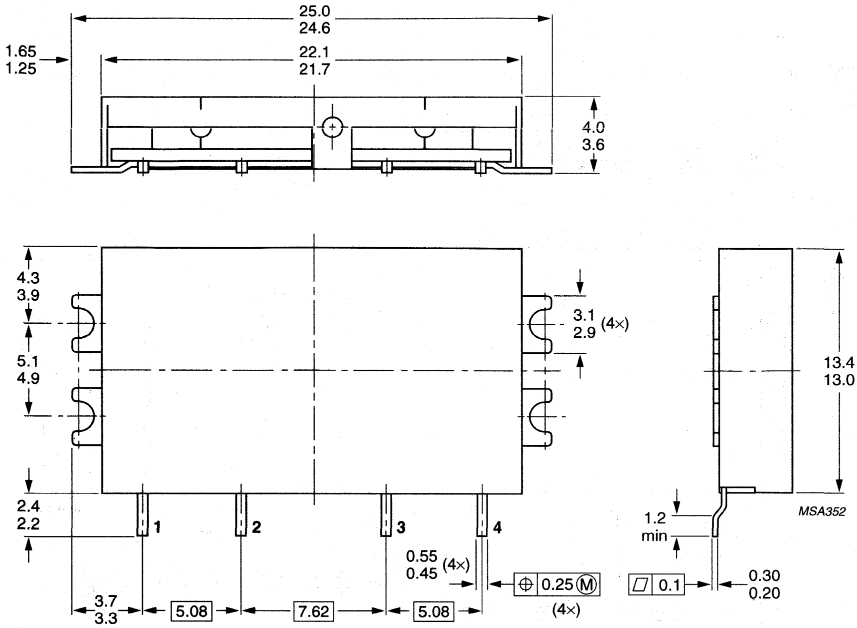
Dimensions in mm.

Fig.6 SOT278B.



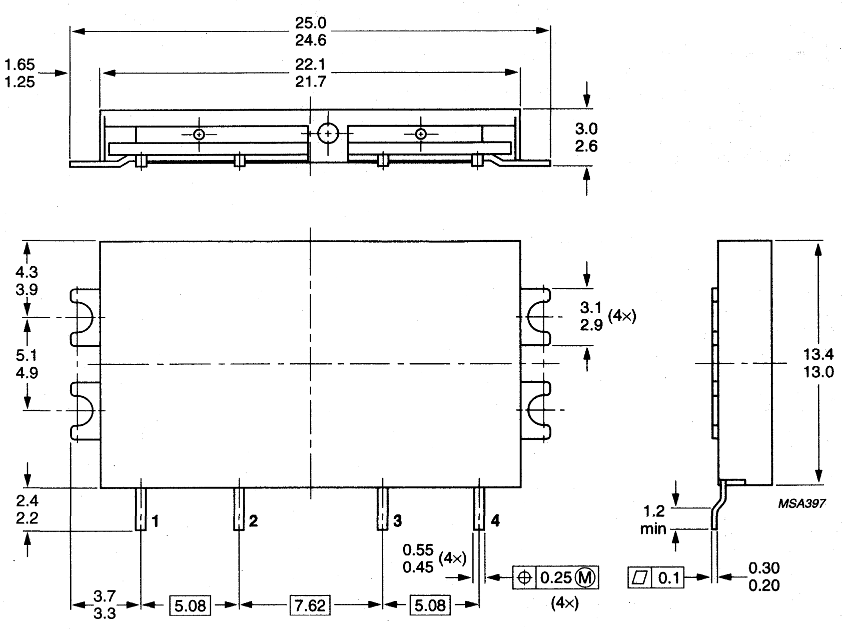
Dimensions in mm.

Fig.7 SOT288D.



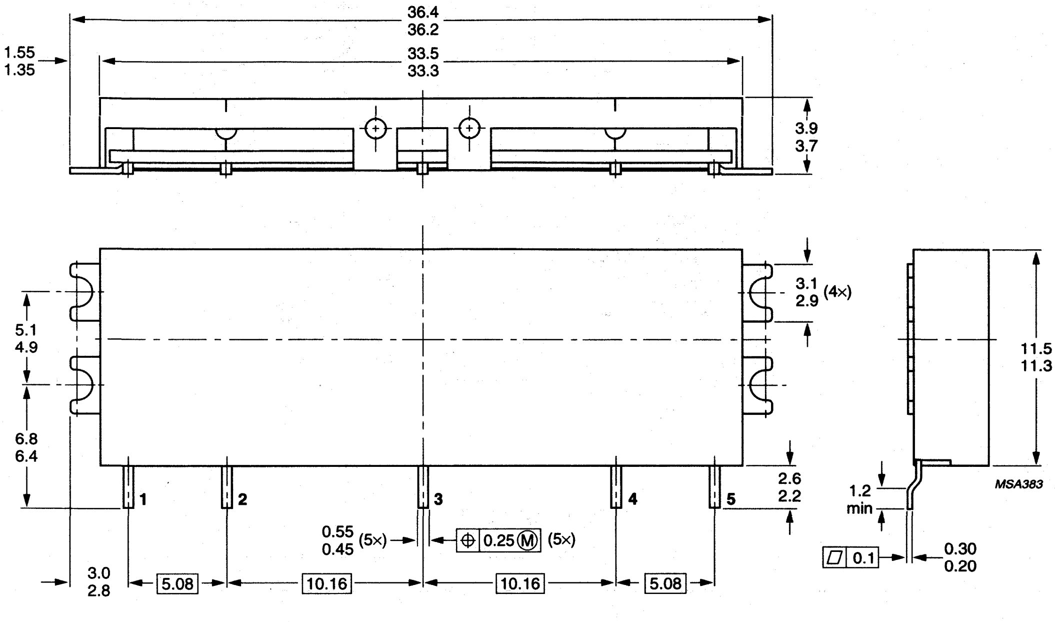
Dimensions in mm.

Fig.8 SOT321A.



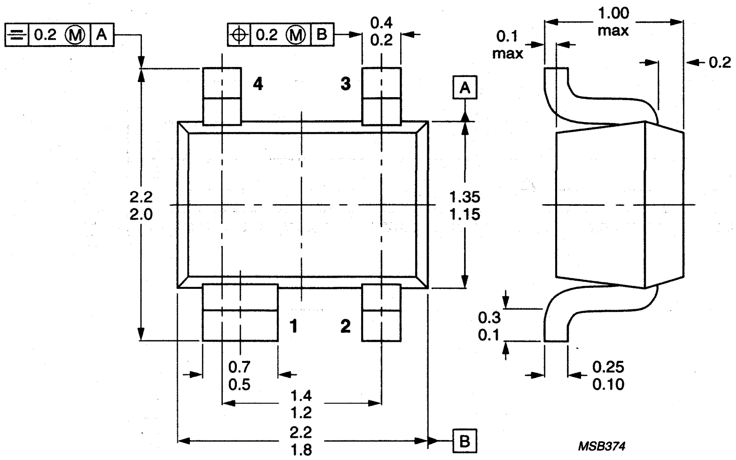
Dimensions in mm.

Fig.9 SOT321B.



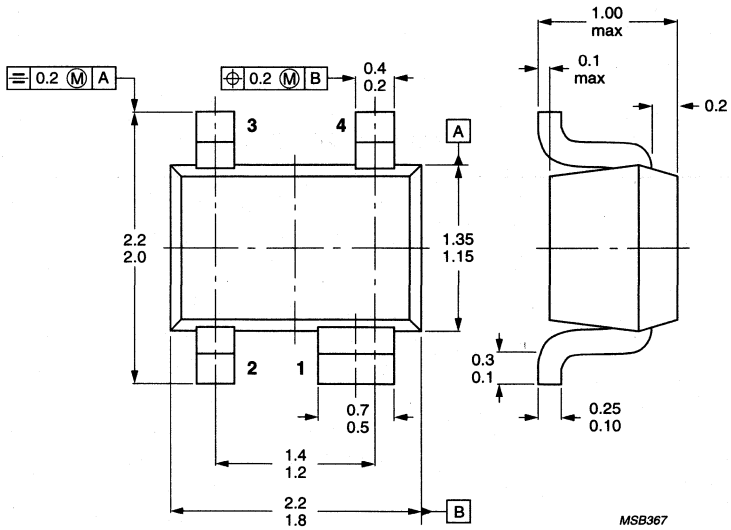
Dimensions in mm.

Fig.10 SOT342A.



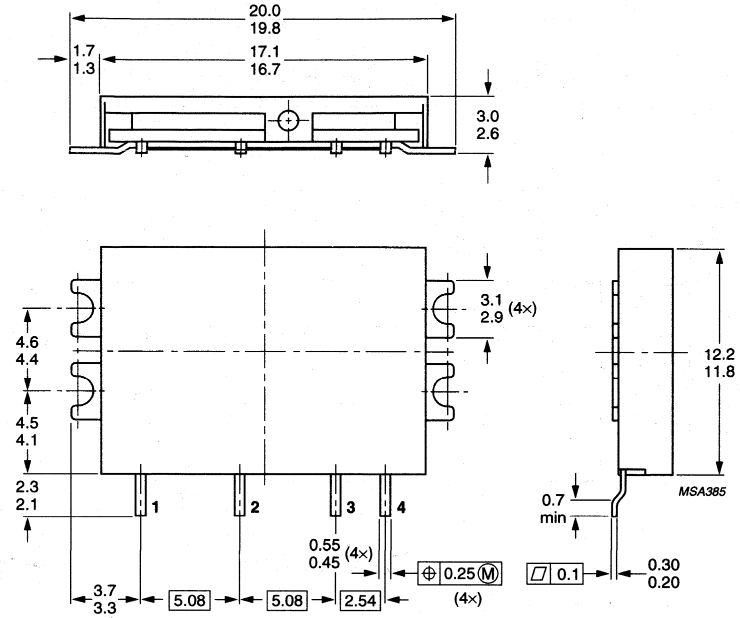
Dimensions in mm.

Fig.11 SOT343.



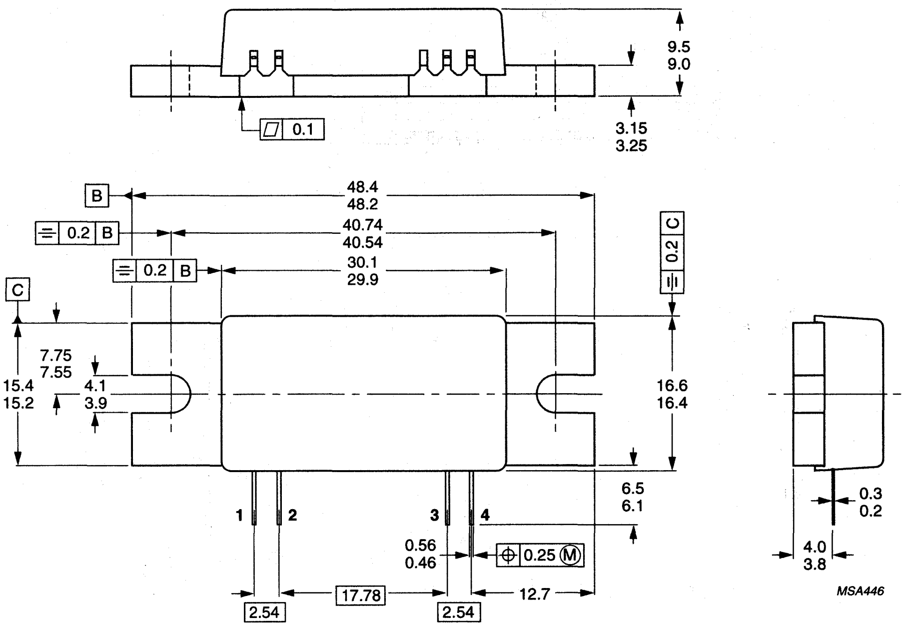
Dimensions in mm.

Fig.12 SOT343R.



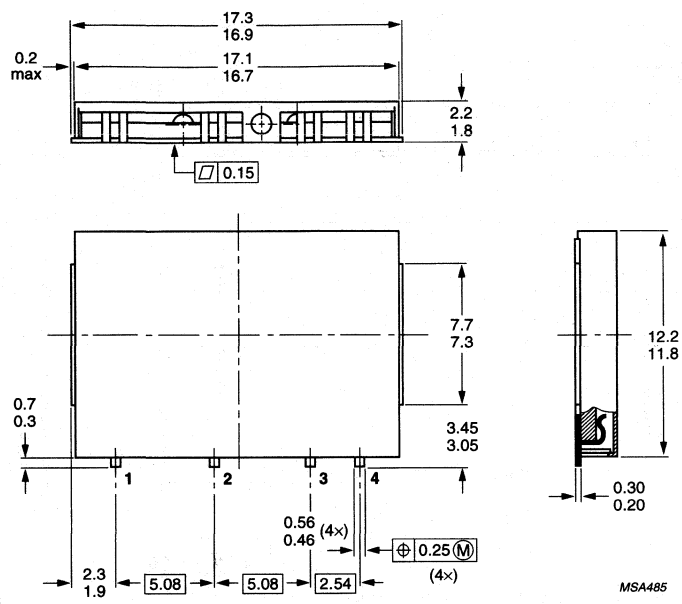
Dimensions in mm.

Fig.13 SOT359A.



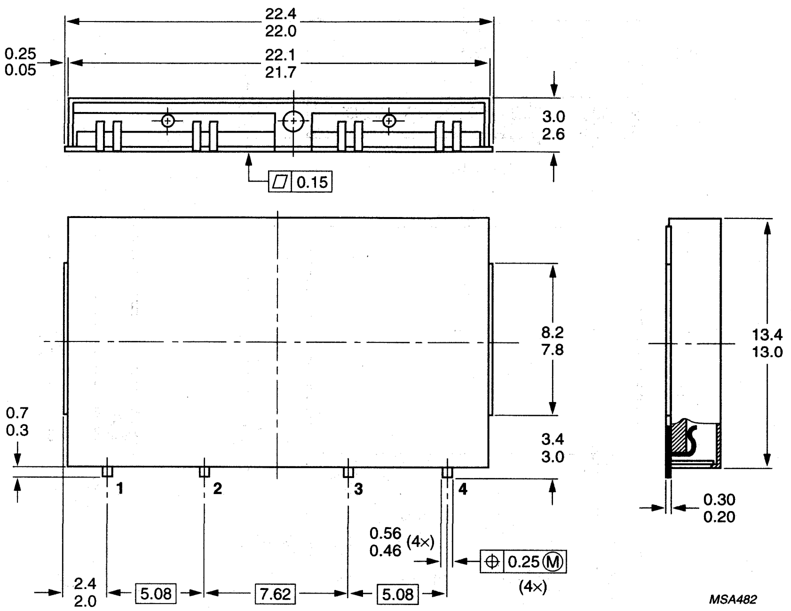
Dimensions in mm.

Fig.14 SOT365.



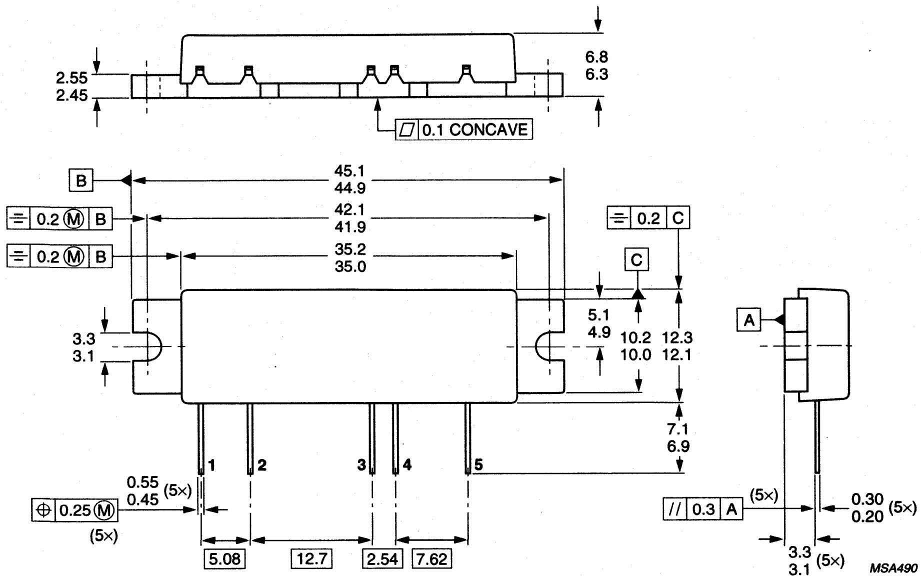
Dimensions in mm.

Fig.15 SOT388A.



Dimensions in mm.

Fig.16 SOT421A.



Dimensions in mm.

Fig.17 SOT434A.

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Data handbook system

DATA HANDBOOK SYSTEM

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SC08b	RF Power Transistors for UHF
SC09	RF Power Modules and Transistors for Mobile Phones
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DC03	Television Tuners, Coaxial Aerial Input Assemblies
DC04	Colour Monitor Tubes
DC05	Flyback Transformers, Mains Transformers and General-purpose FXC Assemblies

Magnetic products

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MA03	Piezoelectric Ceramics Specialty Ferrites
MA04	Dry-reed Switches

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