DISCRETE SEMICONDUCTORS

RF Power Modules

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Philips Components

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RF POWER MODULES

page

SELECTION GUIDE

VHF modules for portable transmitters

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5	9.6	68–88	21.5	SOT182	BGY94A	165
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VHF modules for mobile transmitters

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18	12.5	68–88	22.6	SOT132B	BGY32	45
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18	12.5	148–174	20.8	SOT132B	BGY36	45
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UHF modules for portable transmitters

1.4	9.6	400–440	15.0	SOT181	BGY46A	89
1.4	9.6	430–470	15.0	SOT181	BGY46B	95
3.2	9.6	400–440	18.0	SOT181	BGY47A	101
3.2	9.6	460–512	18.0	SOT181	BGY47F	109
5.0	9.6	400–440	21.5	SOT182	BGY48A	111
5.0	9.6	430–470	21.5	SOT182	BGY48B	115
5.0	9.6	460–512	21.5	SOT182	BGY48C	121

UHF modules for mobile transmitters

2.5	13.5	380–512	17.0	SOT75A	BGY22	29
7.0	13.5	380–480	4.5	SOT75A	BGY23	37
7.5	12.5	400–440	18.8	SOT132C	BGY40A	55
7.5	12.5	400–470	18.8	SOT132C	BGY40B	55
13	12.5	400–440	19.4	SOT132C	BGY41A	55
13	12.5	440–470	19.4	SOT132C	BGY41B	55
20	12.5	400–440	21.2	SOT132D	BGY49A	127
20	12.5	440–470	21.2	SOT132D	BGY49B	131

SHF modules for portable transmitters

2.2	7.5	825–845	21.0	SOT200	BGY95A	183
2.2	7.5	890–915	21.0	SOT200	BGY95B	183
2.5	9.6	825–845	21.0	SOT200	BGY96A	185
2.5	9.6	890–915	21.0	SOT200	BGY96B	187
1.2	6.0	824–849	30.8	SOT246	BGY110A	195
1.2	6.0	872–905	30.8	SOT246	BGY110B	197

SHF modules for mobile transmitters

P_L W	V_S V	f MHz	G_P dB	envelope	type number	page
6.0	12.5	806–890	14.8	SOT197	BGY90A	135
6.0	12.5	870–950	14.8	SOT197	BGY90B	137
6.0	12.5	809–890	14.8	SOT233	BGY91A	139
6.0	12.5	870–950	14.8	SOT233	BGY91B	143

TYPE NUMBER SURVEY

type (modules)	envelope	V_S	frequency MHz	output power W	power gain dB	page
BGY22	SOT75A	13.5	380–512	> 2.5	17	29
BGY23	SOT75A	13.5	380–480	> 7.0	4.5	37
BGY32	SOT132	12.5	68–88	> 18	22.6	45
BGY33	SOT132	12.5	80–108	> 18	22.6	45
BGY35	SOT132	12.5	132–156	> 18	20.6	45
BGY36	SOT132	12.5	148–174	> 18	20.8	45
BGY40A	SOT132	12.5	400–440	> 11.5	18.8	55
BGY40B	SOT132	12.5	440–470	> 10	18.8	55
BGY41A	SOT132	12.5	400–440	> 15.6	19.4	55
BGY41B	SOT132	12.5	440–470	> 15	19.4	55
BGY43	SOT132	12.5	148–174	> 13	19.4	63
BGY45A	SOT183	12.5	68–88	> 29	22.9	71
BGY45B	SOT183	12.5	148–174	> 28	19.2	77
BGY45C	SOT183	12.5	170–210	> 18	20.8	83
BGY46A	SOT181	9.6	400–440	> 1.4	15.0	89
BGY46B	SOT181	9.6	430–470	> 1.4	15.0	95
BGY47A	SOT181	9.6	400–470	> 3.2	18.0	101
BGY47F	SOT181	9.6	460–512	> 3.2	18.0	109
BGY48A	SOT182	9.6	400–440	> 5.0	21.5	111
BGY48B	SOT182	9.6	430–470	> 5.0	21.5	115
BGY48C	SOT182	9.6	460–512	> 5.0	21.5	121
BGY49A	SOT132	12.5	400–440	> 20.0	21.2	127
BGY49B	SOT132	12.5	440–470	> 20.0	21.2	131
BGY90A	SOT197	12.5	806–890	> 6.0	14.8	135
BGY90B	SOT197	12.5	870–950	> 6.0	14.8	137
BGY91A	SOT233	12.5	809–890	> 6.0	23.0	139
BGY91B	SOT233	12.5	870–950	> 6.0	23.0	143
BGY93A	SOT182	9.6	68–88	> 2.0	17.5	147
BGY93B	SOT182	9.6	136–156	> 2.0	17.5	153
BGY93C	SOT182	9.6	148–174	> 2.0	17.5	159
BGY94A	SOT182	9.6	68–88	> 5.0	21.5	165
BGY94B	SOT182	9.6	132–156	> 5.0	21.5	171
BGY94C	SOT182	9.6	148–174	> 5.0	21.5	177
BGY95A	SOT200	7.5	825–845	> 2.2	20.4	183
BGY95B	SOT200	7.5	890–915	> 2.2	20.4	183
BGY96A	SOT200	9.6	825–845	> 2.5	21.0	185
BGY96B	SOT200	9.6	890–915	> 2.5	21.0	187
BGY110A	SOT246	6.0	824–849	> 1.2	30.8	195
BGY110B	SOT246	6.0	872–905	> 1.2	30.8	197

GENERAL

Type designation
Rating systems
Letter symbols
s-parameters
Mounting recommendations

PRO ELECTRON TYPE DESIGNATION CODE FOR SEMICONDUCTOR DEVICES

This type designation code applies to discrete semiconductor devices — as opposed to integrated circuits —, multiples of such devices and semiconductor chips.

"Although not all type numbers accord with the Pro Electron system, the following explanation is given for the ones that do."

A basic type number consists of:

TWO LETTERS FOLLOWED BY A SERIAL NUMBER

FIRST LETTER

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

A. GERMANIUM or other material with band gap of 0,6 to 1,0 eV.
B. SILICON or other material with band gap of 1,0 to 1,3 eV.
C. GALLIUM-ARSENIDE or other material with 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.

A. DIODE; signal, low power
B. DIODE; variable capacitance
C. TRANSISTOR; low power, audio frequency ($R_{th\ j\text{-}mb} > 15$ K/W)
D. TRANSISTOR; power, audio frequency ($R_{th\ j\text{-}mb} \leqslant 15$ K/W)
E. DIODE; tunnel
F. TRANSISTOR; low power, high frequency ($R_{th\ j\text{-}mb} > 15$ K/W)
G. MULTIPLE OF DISSIMILAR DEVICES – MISCELLANEOUS; e.g. oscillator
H. DIODE; magnetic sensitive
L. TRANSISTOR; power, high frequency ($R_{th\ j\text{-}mb} \leqslant 15$ K/W)
N. PHOTO-COUPLER
P. RADIATION DETECTOR; e.g. high sensitivity phototransistor
Q. RADIATION GENERATOR; e.g. light-emitting diode (LED)
R. CONTROL AND SWITCHING DEVICE; e.g. thyristor, low power ($R_{th\ j\text{-}mb} > 15$ K/W)
S. TRANSISTOR; low power, switching ($R_{th\ j\text{-}mb} > 15$ K/W)
T. CONTROL AND SWITCHING DEVICE; e.g. thyristor, power ($R_{th\ j\text{-}mb} \leqslant 15$ K/W)
U. TRANSISTOR; power, switching ($R_{th\ j\text{-}mb} \leqslant 15$ K/W)
X. DIODE: multiplier, e.g. varactor, step recovery
Y. DIODE; rectifying, booster
Z. DIODE; voltage reference or regulator (transient suppressor diode, with third letter **W**)

SERIAL NUMBER

Three figures, running from 100 to 999, for devices primarily intended for consumer equipment.*
One letter (Z, Y, X, etc.) and two figures, running from 10 to 99, for devices primarily intended for industrial/professional equipment.*
This letter has no fixed meaning except W, which is used for transient suppressor diodes.

VERSION LETTER

It indicates a minor variant of the basic type either electrically or mechanically. The letter never has a fixed meaning, except letter R, indicating reverse voltage, e.g. collector to case or anode to stud.

SUFFIX

Sub-classification can be used for devices supplied in a wide range of variants called associated types. Following sub-coding suffixes are in use:

1. VOLTAGE REFERENCE and VOLTAGE REGULATOR DIODES: *ONE LETTER and ONE NUMBER*
   The LETTER indicates the nominal tolerance of the Zener (regulation, working or reference) voltage
   A. 1% (according to IEC 63: series E96)
   B. 2% (according to IEC 63: series E48)
   C. 5% (according to IEC 63: series E24)
   D. 10% (according to IEC 63: series E12)
   E. 20% (according to IEC 63: series E6)
   The number denotes the typical operating (Zener) voltage related to the nominal current rating for the whole range.
   The letter 'V' is used instead of the decimal point.

2. TRANSIENT SUPPRESSOR DIODES: *ONE NUMBER*
   The NUMBER indicates the maximum recommended continuous reversed (stand-off) voltage V_R. The letter 'V' is used as above.

3. CONVENTIONAL and CONTROLLED AVALANCHE RECTIFIER DIODES and THYRISTORS: *ONE NUMBER*
   The NUMBER indicates the rated maximum repetitive peak reverse voltage (V_{RRM}) or the rated repetitive peak off-state voltage (V_{DRM}), whichever is the lower. Reversed polarity is indicated by letter R, immediately after the number.

4. RADIATION DETECTORS: *ONE NUMBER,* preceded by a hyphen (–)
   The NUMBER indicates the depletion layer in μm. The resolution is indicated by a version LETTER.

5. ARRAY OF RADIATION DETECTORS and GENERATORS: *ONE NUMBER,* preceded by a stroke (/).
   The NUMBER indicates how many basic devices are assembled into the array.

* When these serial numbers are exhausted the serial number for consumer types may be extended to four figures, and that for industrial types to three figures.

RATING SYSTEMS

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

DEFINITIONS OF TERMS USED

Electronic device. An electronic tube or valve, transistor or other semiconductor device.

Note
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 which are directly related to the application.

Rating. A value which 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.

Note
Limiting conditions may be either maxima or minima.

Rating system. The set of principles upon which ratings are established and which determine their interpretation.

Note
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 life, 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 life, no design maximum value for the intended service is exceeded with a bogey 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 FOR TRANSISTORS AND SIGNAL DIODES

based on IEC Publication 148

LETTER SYMBOLS FOR CURRENTS, VOLTAGES AND POWERS

Basic letters

The basic letters to be used are:

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

Lower-case basic letters shall be used for the representation of instantaneous values which vary with time.
In all other instances upper-case basic letters shall be used.

Subscripts

A, a	Anode terminal
(AV), (av)	Average value
B, b	Base terminal, for MOS devices: Substrate
(BR)	Breakdown
C, c	Collector terminal
D, d	Drain terminal
E, e	Emitter terminal
F, f	Forward
G, g	Gate terminal
K, k	Cathode terminal
M, m	Peak value
O, o	As third subscript: The terminal not mentioned is open circuited
R, r	As first subscript: Reverse. As second subscript: Repetitive. As third subscript: With a specified resistance between the terminal not mentioned and the reference terminal.
(RMS), (rms)	Root-mean-square value
S, s	As first or second subscript: Source terminal (for FETS only) As second subscript: Non-repetitive (not for FETS) As third subscript: Short circuit between the terminal not mentioned and the reference terminal
X, x	Specified circuit
Z, z	Replaces R to indicate the actual working voltage, current or power of voltage reference and voltage regulator diodes.

Note: No additional subscript is used for DC values.

Upper-case subscripts shall be used for the indication of:

a) continuous (DC) values (without signal)

Example I_B

b) instantaneous total values

Example i_B

c) average total values

Example $I_{B(AV)}$

d) peak total values

Example I_{BM}

e) root-mean-square total values

Example $I_{B(RMS)}$

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

a) instantaneous values

Example i_b

b) root-mean-square values

Example $I_{b(rms)}$

c) peak values

Example I_{bm}

d) average values

Example $I_{b(av)}$

Note: If more than one subscript is used, subscript for which both styles exist shall either be all upper-case or all lower-case.

Additional rules for subscripts

Subscripts for currents

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

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

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

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

Subscripts for voltages

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

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

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

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

Subscripts for supply voltages or supply currents

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

Examples: V_{CC}, I_{EE}

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

Example : V_{CCE}

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

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

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

Subscripts for multiple devices

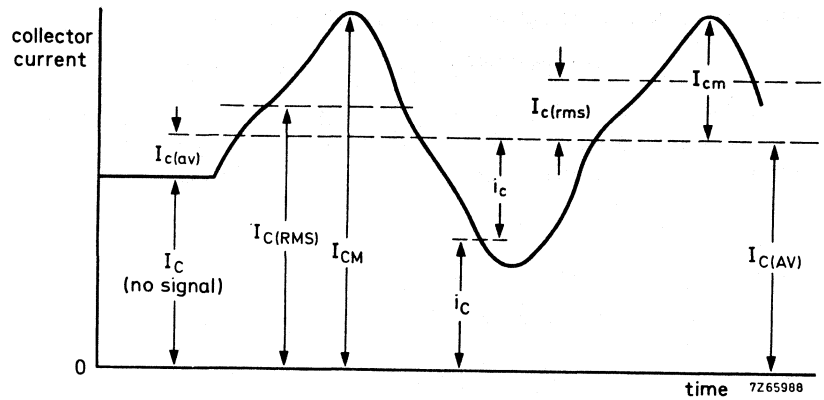
For multiple unit devices, the subscripts are modified by a number preceding the letter subscript; in the case of multiple subscripts, hyphens may be necessary to avoid misunderstanding.

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 the second unit.

Application of the rules

The figure below represents a transistor collector current as a function of time. It consists of a continuous (DC) current and a varying component.



LETTER SYMBOLS FOR ELECTRICAL PARAMETERS

Defenition

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

Basic letters

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

B, b = susceptance; imaginary part of an admittance

C = capacitance

G, g = conductance; real part of an admittance

H, h = hybrid parameter

L = inductance

R, r = resistance; real part of an impedance

X, x = reactance; imaginary part of an impedance

Y, y = admittance;

Z, z = impedance;

Upper-case letters shall be used for the representation of:

a) electrical parameters of external circuits and of circuits in which the device forms only a part;

b) all inductances and capacitances.

Lower-case letters shall be used for the representation of electrical parameters inherent in the device (with the exception of inductances and capacitances).

Subscripts

General subscripts

The following is a list of the most important general subscripts used for electrical parameters of semiconductor devices:

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

Examples: Z_S, h_f, h_F

The upper-case variant of a subscript shall be used for the designation of static (d.c.) values.

Examples : h_{FE} = static value of forward current transfer ratio in common-emitter configuration **(DC current gain)**

R_E = **DC value of the external emitter resistance**

Note: 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 shall be used for the designation of small-signal values.

Examples: h_{fe} = small-signal value of the short-circuit forward current transfer ratio in common-emitter configuration

$Z_e = R_e + jX_e$ = small-signal value of the external impedance

Note: If more than one subscript is used, subscripts for which both styles exist shall either be all upper-case or all lower-case

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

Subscripts for four-pole matrix parameters

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

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

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

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

Distinction between real and imaginary parts

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

Examples: $Z_i = R_i + jX_i$

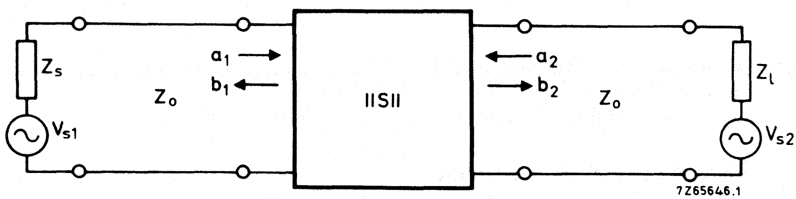
$y_{fe} = g_{fe} + jb_{fe}$

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

Examples: Re (h_{ib}) etc. for the real part of h_{ib}
Im (h_{ib}) etc. for the imaginary part of h_{ib}

SCATTERING PARAMETERS

In distinction to the conventional h, y and z-parameters, s-parameters relate to travelling wave conditions. The figure below shows a two-port network with the incident and reflected waves a_1, b_1, a_2 and b_2.



$$a_1 = \frac{V_{i1}}{\sqrt{Z_o}} \qquad a_2 = \frac{V_{i2}}{\sqrt{Z_o}} \qquad ^{1)}$$

$$b_1 = \frac{V_{r1}}{\sqrt{Z_o}} \qquad b_2 = \frac{V_{r2}}{\sqrt{Z_o}}$$

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

V_i = incident voltage

V_r = reflected (generated) voltage

The four-pole equations for s-parameters are:

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

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

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

$$s_i = s_{11} = \left.\frac{b_1}{a_1}\right|_{a_2 = 0}$$

$$s_r = s_{12} = \left.\frac{b_1}{a_2}\right|_{a_1 = 0}$$

$$s_f = s_{21} = \left.\frac{b_2}{a_1}\right|_{a_2 = 0}$$

$$s_o = s_{22} = \left.\frac{b_2}{a_2}\right|_{a_1 = 0}$$

1) The squares of these quantities have the dimension of power.

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

$s_i = s_{11}$ = Input reflection coefficient.
The complex ratio of the reflected wave and the incident wave at the input, under the conditions $Z_l = Z_o = 50\ \Omega$ and $V_{s2} = 0$.

$s_r = s_{12}$ = Reverse transmission coefficient.
The complex ratio of the generated wave at the input and the incident wave at the output, under the conditions $Z_s = Z_o = 50\ \Omega$ and $V_{s1} = 0$.

$s_f = s_{21}$ = Forward transmission coefficient.
The complex ratio of the generated wave at the output and the incident wave at the input, under the conditions $Z_l = Z_o = 50\ \Omega$ and $V_{s2} = 0$.

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

RECOMMENDATIONS FOR MOUNTING FLANGE R.F. POWER TRANSISTORS

Flange r.f. transistors are easy to mount but for optimum performance we offer the following recommendations:

- Holes or tapped holes in the heatsink should be free from burrs and spaced at 18,42 mm (+ 0,05; –0,05) between centres. They must have a depth of at least 6 mm.
  Recommended screw: for SOT-119, SOT-121 and SOT-161 cheese-head 4-40 UNC/2A, for SOT-123 and SOT-160 also M3. A washer to spread the joint pressure is also recommended.
- For transistors dissipating up to 80 W the heatsink thickness should be at least 3 mm copper ($>$ 99,9%, ETP-Cu) or 5 mm aluminium ($>$ 99,0% Al). For transistors dissipating more power, the thickness should be increased proportionally.
- The flatness of the heatsink mounting surface must be $>$ 0,02 mm with a surface roughness $R_a < 0{,}5\ \mu m$ (preferably by grinding or lapping).
- The sparing use of evenly distributed heatsink compound on the transistor flange is recommended. Suitable heatsink compound brands are: Dow Corning 340, Eccotherm TC-5 (E&C), Wakefield 120.
- The screws through the flange holes should first both be tightened to 0,05 Nm (finger tight), and then tightened to 0,6 to 0,75 Nm, to achieve the published thermal resistance between the mounting base and heatsink.
- When a transistor is removed from the heatsink, the flange will almost certainly have been distorted by the joint pressure. Grinding or lapping of the flange according to the information above is necessary if the transistor is remounted.

RECOMMENDATIONS FOR MOUNTING ¼", ⅜" AND ½" CAPSTAN HEADERS AS USED FOR R.F. POWER TRANSISTORS

A nickel plated brass nut is supplied with each transistor for securing it to a heatsink.

Screw threads, diameter and nuts:

mounting base diameter	thread	maximum diameter of threaded stud	nut thickness
¼"	8-32UNC-2A(B)	4,14 mm	3,5 and 5 mm
⅜"	10-32UNF-2A(B)	4,80 mm	5 mm
½"	¼" x 28UNF-2A(B)	6,33 mm	5,5 mm

To ensure optimum heat transfer and to avoid damage to the threaded stud of the transistor the following recommendations should be observed.

– Diameter of the mounting hole in the heatsink:
  - ¼" stud diameter 4,15 +0,05; –0 mm
  - ⅜" stud diameter 4,85 +0,05; –0 mm
  - ½" stud diameter 6,35 +0,05; –0 mm

  Heatsink surfaces at the mounting hole to be flat, parallel, and free of burrs or oxidation.

– Mounting nut torque:
  - ¼" nut minimum 0,75 Nm (7,5 kg cm) maximum 0,85 Nm (8,5 kg cm)
  - ⅜" nut minimum 1,5 Nm (15 kg cm) maximum 1,7 Nm (17 kg cm)
  - ½" nut minimum 2,3 Nm (23 kg cm) maximum 2,7 Nm (27 kg cm)

– Recommended distance from the surface of the heatsink to the top surface of the printed-circuit board:
  - ¼" capstan header 2,9 + 0; –0,2 mm
  - ⅜" capstan header 3,8 + 0; –0,2 mm
  - ½" capstan header 4,8 + 0; –0,2 mm

  It is important that the above maximum printed-circuit board mounting heights are not exceeded in order to prevent stress being applied to the encapsulation. Upward lead bending, in particular, can damage the encapsulation and impair the sealing of the header.

– Experience indicates that flux or flux solutions can penetrate even hermetically sealed ceramic-capped transistors. To prevent this, tin and wash the printed-circuit boards before mounting the power transistors, then solder the transistors in place without using flux.

– The leads may be tinned by dipping them, full length, into a solder bath at about 230 °C. Note, no flux should be used during tinning.

– The full mounting-nut torque (specified above) should be applied only once during the life of the transistor. For pre-assembly testing, apply no more than two thirds of the specified torque.

– Since locking washers are much harder than most heatsink materials, their locking action might deteriorate during the life of the transistor. The use of locking washers is therefore not recommended. Instead, tighten the nuts to their specified torque, allow about 30 minutes for them to bed down, then re-tighten. After this, apply locking paint.

MODULE DATA

U.H.F. POWER AMPLIFIER MODULES

Broadband amplifier modules primarily designed for mobile applications operating directly from 12 V vehicle electrical systems. The module will produce 2,5 W output into a 50 Ω load over the bands 380 to 512 MHz for the BGY22, and 420 to 480 MHz for the BGY22A.

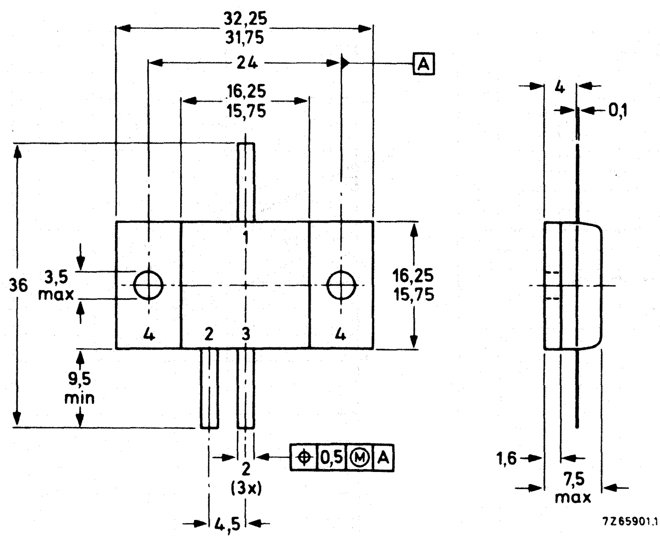
QUICK REFERENCE DATA

type number	mode of operation	freq. range MHz	V_B V	P_D mW	P_L W	η %	$Z_S = Z_L$ Ω
BGY22	c.w.	380 to 512	13,5	50	> 2,5 typ. 2,9	> 40 typ. 50	50
BGY22A	c.w.	420 to 480	12,5	50	> 2,5	> 40	50

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-75A.



Lead reference

1 = Input
2 = $+V_B$
3 = Output
4 = Earth

To ensure good thermal contact between mounting base and heatsink, burrs or thickening at the edges of the heatsink holes should be removed and the package bolted down onto a flat surface.

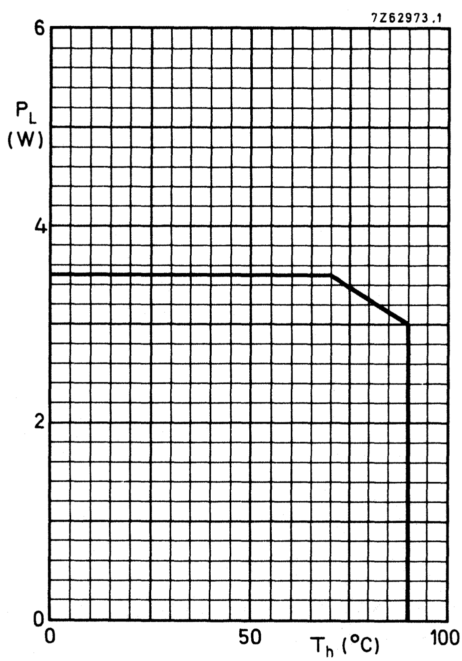
Devices may be soldered directly into a circuit with a soldering iron at a maximum iron temperature of 245 °C for 10 seconds at least 1 mm from the plastic.

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

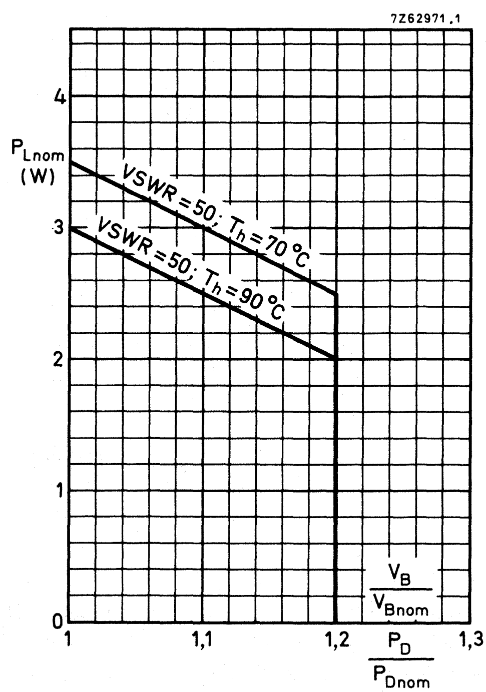
RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)

D.C. voltages (with respect to flange)				
Supply terminal	V_B	max.	18	V
Input terminal	$\pm V_I$	max.	25	V
Output terminal	$\pm V_O$	max.	25	V
Current				
Supply current (d.c.)	I_{tot}	max.	800	mA
Drive power				
$V_B = 13,5$ V; $Z_L = 50\ \Omega$	P_D	max.	150	mW
Temperatures				
Storage temperature	T_{stg}	−40 to +100		°C
Operating heatsink temperature	T_h	max.	90	°C

P_L for normal operation



P_L for fault condition



Where $P_{Lnom} = P_L$ at $V_B = 13,5$ V; $Z_L = 50\ \Omega$ (BGY22)
and $P_{Lnom} = P_L$ at $V_B = 12,5$ V; $Z_L = 50\ \Omega$ (BGY22A)

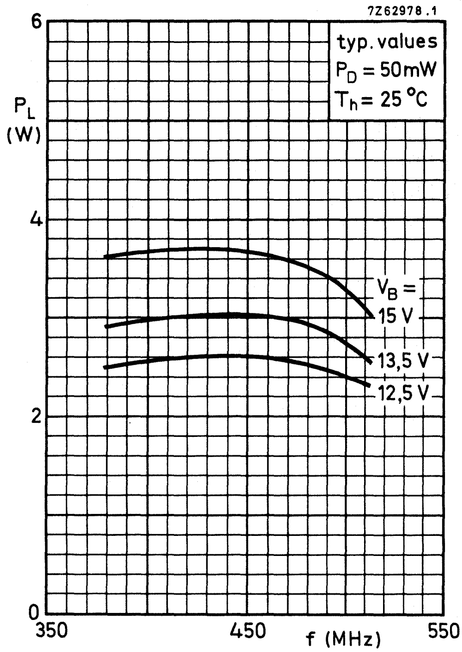
CHARACTERISTICS

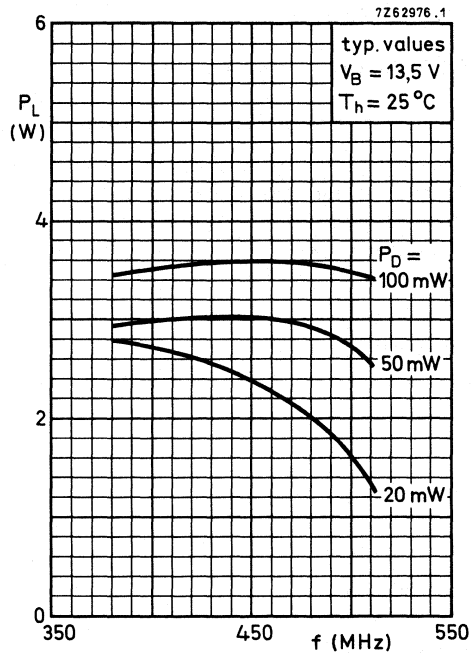
T_h = 25 °C unless otherwise specified

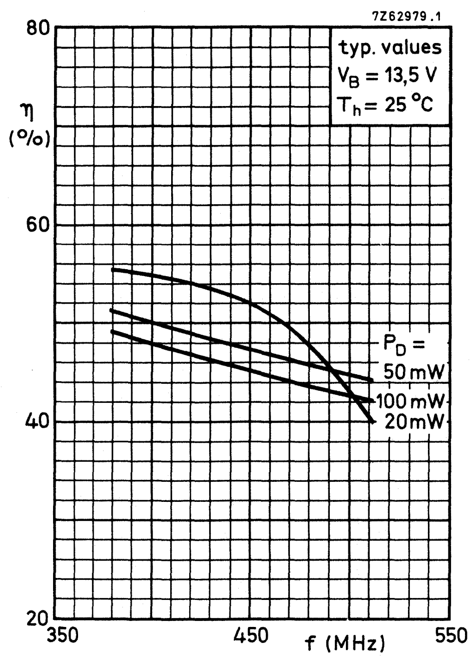
Reference planes at r.f. input and output terminals are 1 mm from the plastic encapsulation.

Frequency range 380-512 MHz; V_B = 13,5 V (BGY22)
Frequency range 420-480 MHz; V_B = 12,5 V (BGY22A)

Quiescent current			
P_D = 0	I_{BQ}	4,0 to 12,0	mA
Load power			
P_D = 50 mW	P_L	2,5 to 3,5	W
Efficiency			
P_D = 50 mW	η	> 40	%
Supply current			
P_D = 50 mW	I_{tot}	typ. 475	mA
Harmonic content			
P_D = 50 mW	Any harmonic is at least 20 dB down relative to carrier		
Input VSWR with respect to 50 Ω			
P_D = 50 mW	VSWR	< 2	
Temperature coefficient of P_L			
P_D = 50 mW; T_h = 25 to 70 °C		typ. −10	mW/°C
Stability			
V_B = 10,5 to 15 V; P_D = 10 mW to 100 mW T_h = −40 to +90 °C			
Output load VSWR ≤ 3, all phases		No instabilities	
Output load VSWR ≤ 10, all phases		No appreciable instabilities	


7Z62978.1
typ. values
P_D = 50 mW
T_h = 25 °C
P_L (W)
V_B =
15 V
13,5 V
12,5 V
f (MHz)
0
2
4
6
350
450
550


7Z62976.1
typ. values
V_B = 13,5 V
T_h = 25 °C
P_L (W)
P_D =
100 mW
50 mW
20 mW
f (MHz)
0
2
4
6
350
450
550


7Z62979.1
typ. values
V_B = 13,5 V
T_h = 25 °C
η (%)
P_D =
50 mW
100 mW
20 mW
f (MHz)
20
40
60
80
350
450
550

APPLICATION INFORMATION

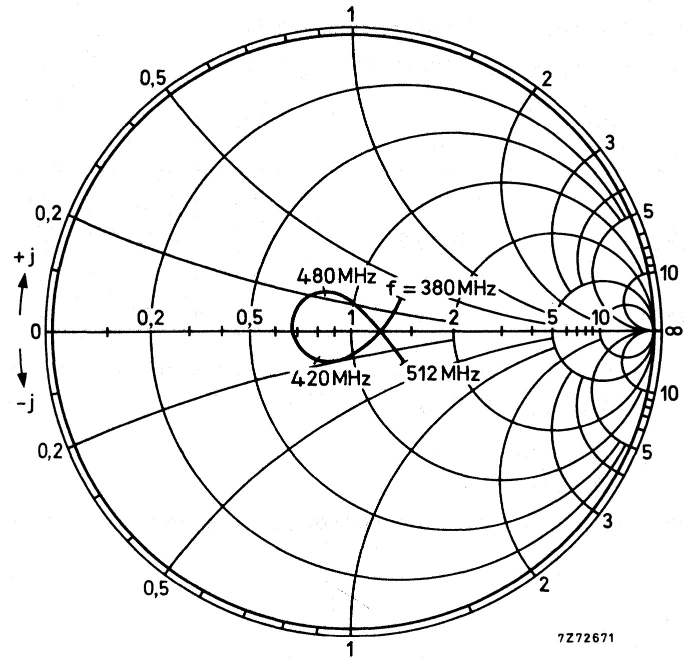
R.F. performance in c.w. operation; T_h = 25 °C
Drive source and load impedance $Z_S = Z_L$ = 50 Ω

type number	f MHz	V_B V	P_D mW	P_L W	η %
BGY22	380 to 512	15,0	50	typ. 3,5	typ. 47
		13,5		> 2,5	> 40
		13,5		typ. 2,9	typ. 47
		12,5		typ. 2,5	typ. 47
BGY22A	420 to 480	12,5	50	> 2,5	> 40

The modules are designed to withstand full load mismatch under the following conditions:

$P_D = P_{Dnom}$ + 20%; T_h = 70 °C
V_B = 16,5 V **(BGY22)**
V_B = 15,0 V **(BGY22A)**
VSWR = 50 at any phase

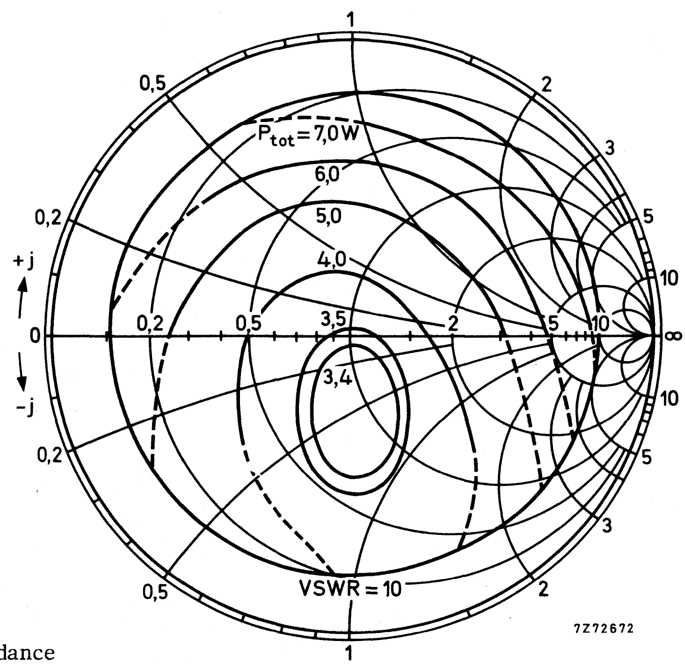
where $P_{Dnom} = P_D$ for 2,5 W module output under nominal conditions.



Typical variation of input impedance with frequency

V_B = 13,5 V

f = 470 MHz

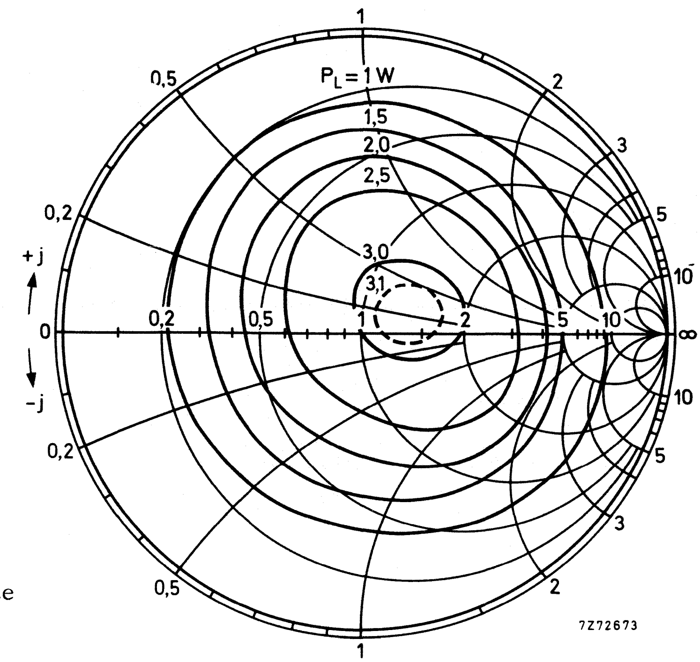


Typical variation of power dissipation with load impedance

V_B = 13,5 V

P_D = 50 mW

f = 470 MHz

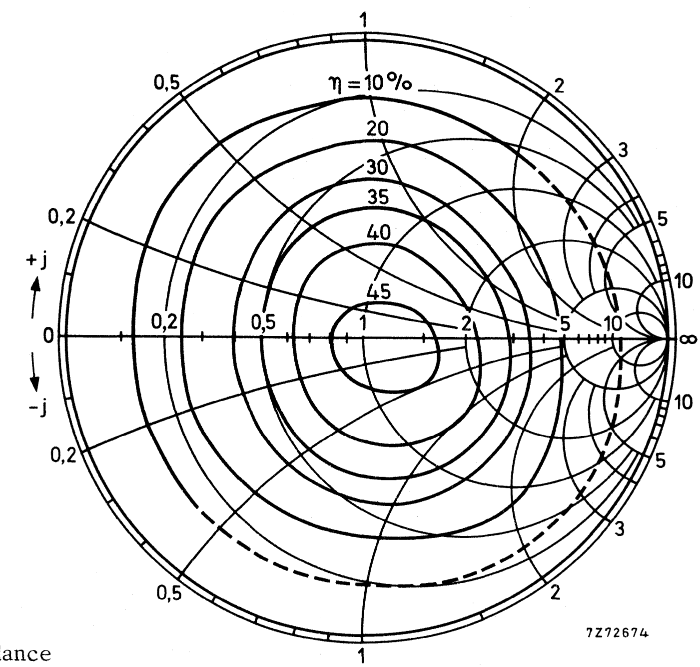


Typical variation of load power with load impedance

V_B = 13,5 V

P_D = 50 mW

f = 470 MHz



Typical variation of efficiency with load impedance

U.H.F. POWER AMPLIFIER MODULES

Broadband amplifier modules primarily designed for mobile applications operating directly from 12 V vehicle electrical systems. The modules are suitable for driving directly from the BGY22 and BGY22A respectively, and when so driven will produce 7 W output into a 50 Ω load over the band 380 to 480 MHz for the BGY23, and 7 W over the band 420 to 480 MHz for the BGY23A.

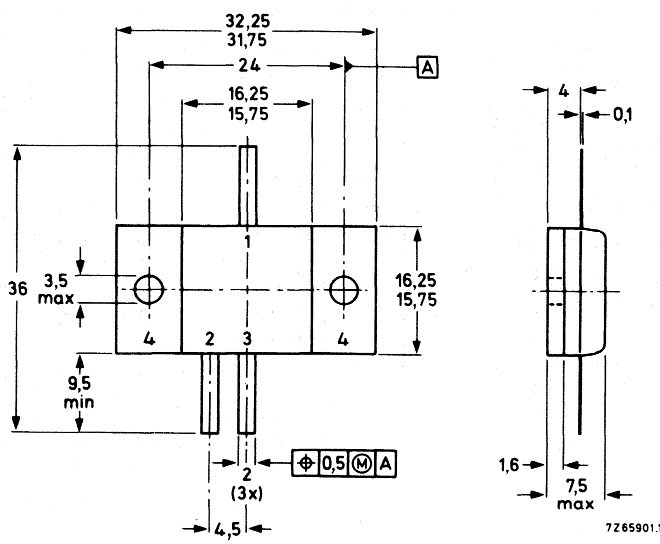
QUICK REFERENCE DATA

type number	mode of operation	freq. range MHz	V_B V	P_D W	P_L W	η %	$Z_S = Z_L$ Ω
BGY23	c.w.	380 to 480 380 to 480 480 to 512	13,5	2,5	> 7,0 typ. 8,3 typ. 7,5	> 60 typ. 71 typ. 69	50
BGY23A	c.w.	420 to 480	12,5	2,5	> 7,0	> 60	50

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-75A.



Lead reference

1 = Input
2 = $+V_B$
3 = Output
4 = Earth

To ensure good thermal contact between mounting base and heatsink, burrs or thickening at the edges of the heatsink holes should be removed and the package bolted down onto a flat surface.

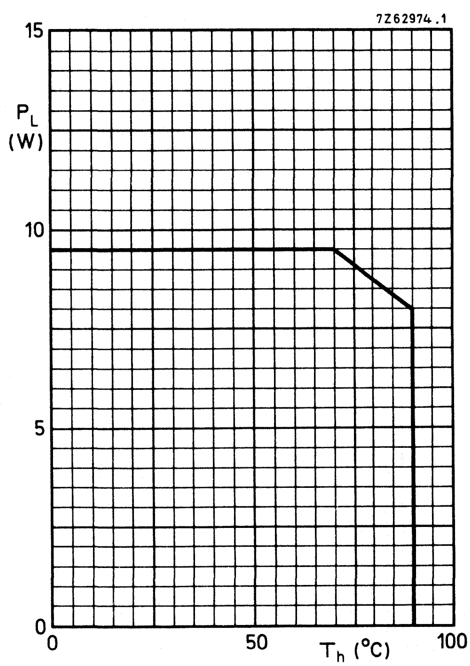
Devices may be soldered directly into a circuit with a soldering iron at a maximum iron temperature of 245 °C for 10 seconds at least 1 mm from the plastic.

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

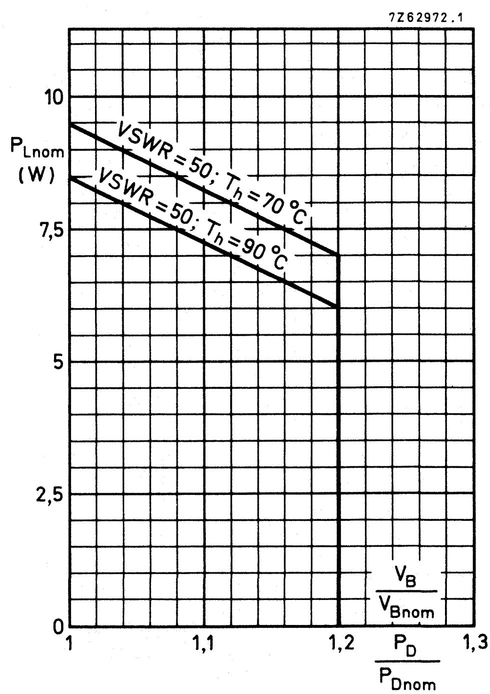
RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)
(with respect to flange)

Supply terminal	V_B	max.	18	V
Input terminal (no external d.c. connection)	$\pm V_I$	max.	0,5	V
Output terminal	$\pm V_O$	max.	25	V
Supply current (d.c.)	I_{tot}	max.	1,7	A
V_B = 13,5 V; Z_L = 50 Ω	P_D	max.	3,5	W
Storage temperature	T_{stg}	−40 to +100		°C
Operating heatsink temperature	T_h	max.	90	°C

P_L for normal operation



P_L for fault condition



Where P_{Lnom} = P_L at V_B = 13,5 V; Z_L = 50 Ω (BGY23)
and P_{Lnom} = P_L at V_B = 12,5 V; Z_L = 50 Ω (BGY23A)

CHARACTERISTICS

T_h = 25 °C unless otherwise specified.

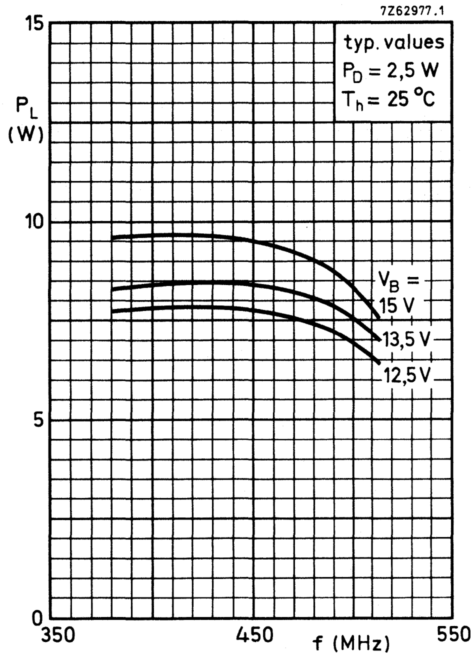
Reference planes at r.f. input and output terminals are 1 mm from the plastic encapsulation.

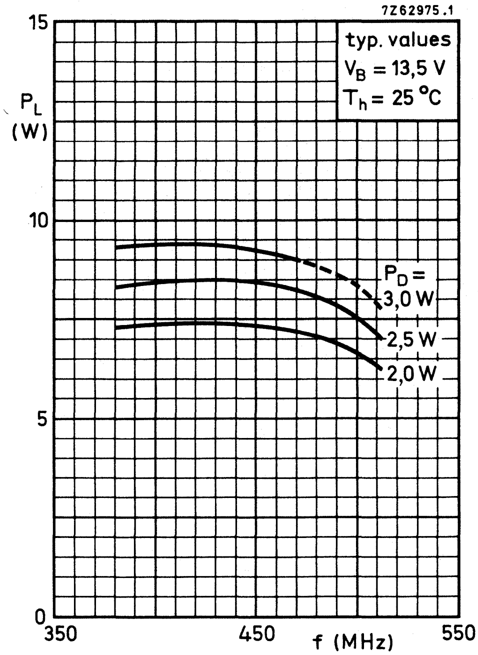
Frequency range 380-512 MHz; V_B = 13,5 V (BGY23)
Frequency range 420-480 MHz; V_B = 12,5 V (BGY23A)

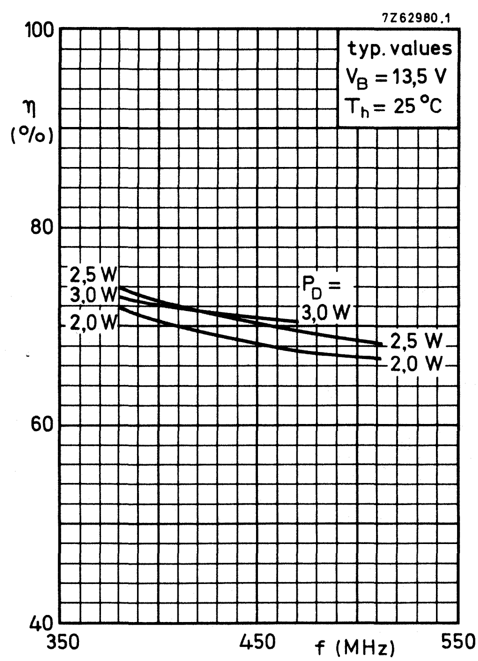
Quiescent current					
P_D = 0		I_{BQ}	<	5,0	mA
Load power					
P_D = 2,5 W; f = 380-480 MHz	BGY23	P_L		7,0 to 9,5	W
P_D = 2,5 W; f = 480-512 MHz	BGY23	P_L	typ.	7,5	W
P_D = 2,5 W; f = 420-480 MHz	BGY23A	P_L		7,0 to 9,5	W
Efficiency					
P_D = 2,5 W		η	>	60	%
Supply current					
P_D = 2,5 W		I_{tot}	typ.	900	mA
Harmonic content					
P_D = 2,5 W		Any harmonic is at least 20 dB down relative to carrier			
Input VSWR with respect to 50 Ω					
P_D = 2,5 W		VSWR	<	2	
Temperature coefficient of P_L					
P_D = 2,5 W; T_h = 25 to 70 °C			typ.	−20	mW/°C

Stability

V_B = 10,5 V to 15 V; P_D = 1 W to 3,5 W
T_h = −40 °C to +90 °C
Output load VSWR ≤ 3, all phases — No instabilities
Output load VSWR ≤ 10, all phases — No appreciable instabilities


7Z62977.1
typ. values
P_D = 2,5 W
T_h = 25 °C
P_L
(W)
15
10
5
0
V_B =
15 V
13,5 V
12,5 V
350
450
f (MHz)
550


7Z62975.1
typ. values
V_B = 13,5 V
T_h = 25 °C
P_L
(W)
15
10
5
0
P_D =
3,0 W
2,5 W
2,0 W
350
450
f (MHz)
550


7Z62980.1
typ. values
V_B = 13,5 V
T_h = 25 °C
η
(%)
100
80
60
40
2,5 W
3,0 W
2,0 W
P_D =
3,0 W
2,5 W
2,0 W
350
450
f (MHz)
550

APPLICATION INFORMATION

R.F. performance in c.w. operation; T_h = 25 °C

Drive source and load impedance $Z_S = Z_L$ = 50 Ω

Type number	f (MHz)	V_B (V)	P_D (W)	P_L (W)	η (%)
BGY23	380 to 512	15, 0	2, 5	typ. 9, 0	typ. 65
BGY23	380 to 480	13, 5	2, 5	> 7, 0	> 60
BGY23	380 to 480	13, 5	2, 5	typ. 8, 3	typ. 71
BGY23	480 to 512	13, 5	2, 5	typ. 7, 5	typ. 69
BGY23	380 to 512	12, 5	2, 5	typ. 7, 4	typ. 70
BGY23A	420 to 480	12, 5	2, 5	> 7, 0	> 60

Connection of the BGY22/BGY22A to the BGY23/BGY23A respectively can be either by 50 Ω transmission line or directly with a total lead length not greater than 2 mm.

The modules are designed to withstand full load mismatch under the following conditions:

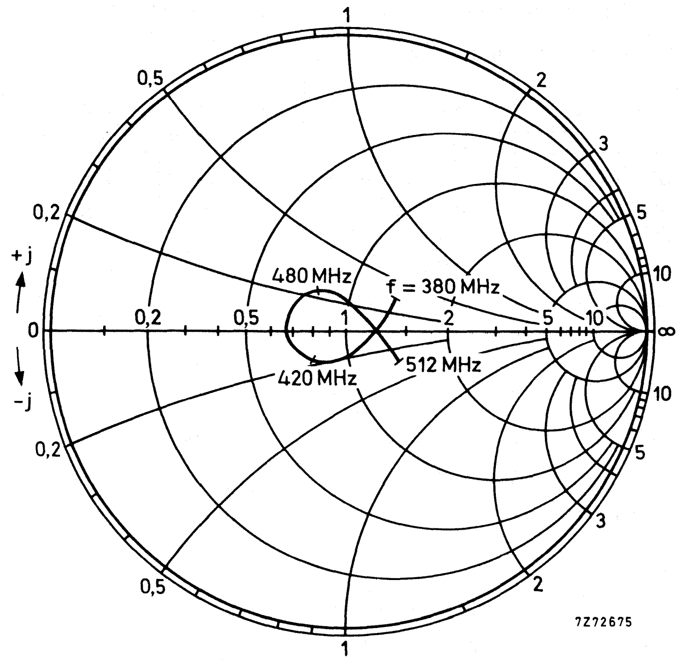
$P_D = P_{Dnom}$ + 20%; T_h = 70 °C

V_B = 16, 5 V (BGY23)

V_B = 15, 0 V (BGY23A)

VSWR = 50 at any phase

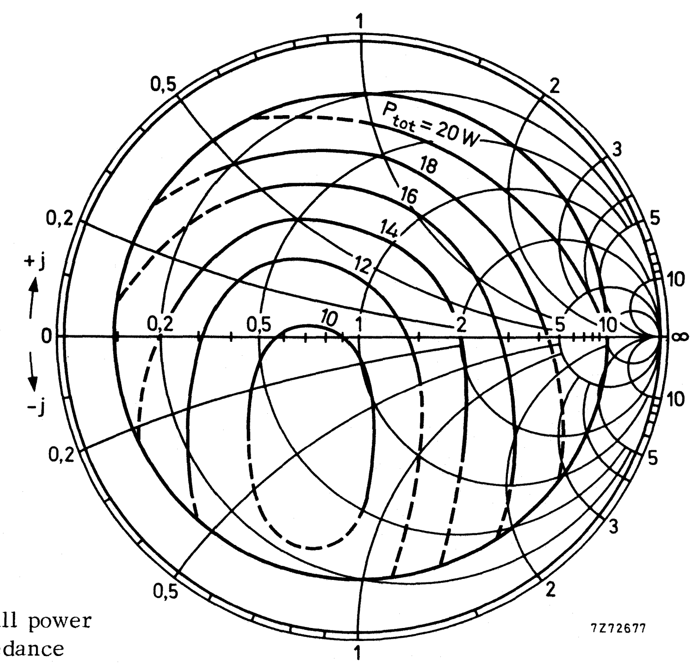
where $P_{Dnom} = P_D$ for 7, 0 W module output under nominal conditions.



Typical variation of input impedance with frequency

V_B = 13, 5 V
f = 470 MHz

BGY22/23 or BGY22A/23A cascaded amplifier

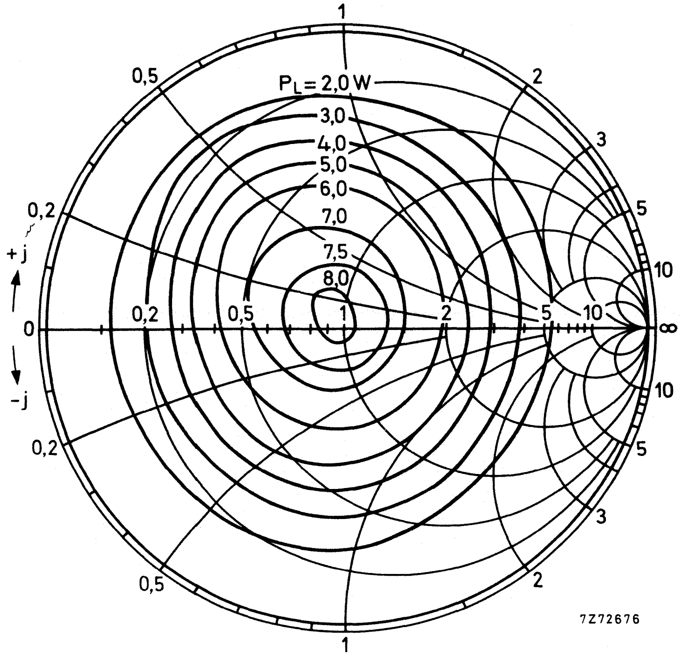


Typical variation of overall power dissipation with load impedance

V_B = 13, 5 V

f = 470 MHz

BGY22/23 or
BGY22A/23A
cascaded amplifier

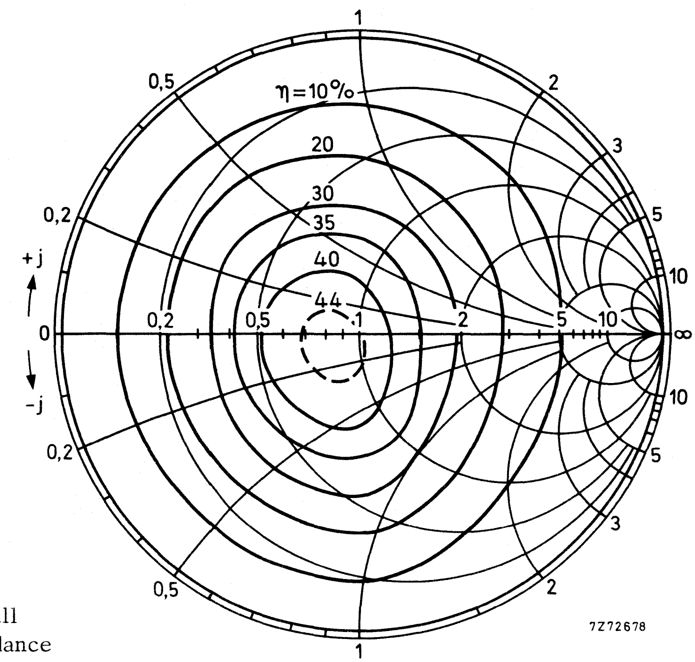


Typical variation of load
power with load impedance

V_B = 13, 5 V

f = 470 MHz

BGY22/23 or
BGY22A/23A
cascaded amplifier



Typical variation of overall
efficiency with load impedance

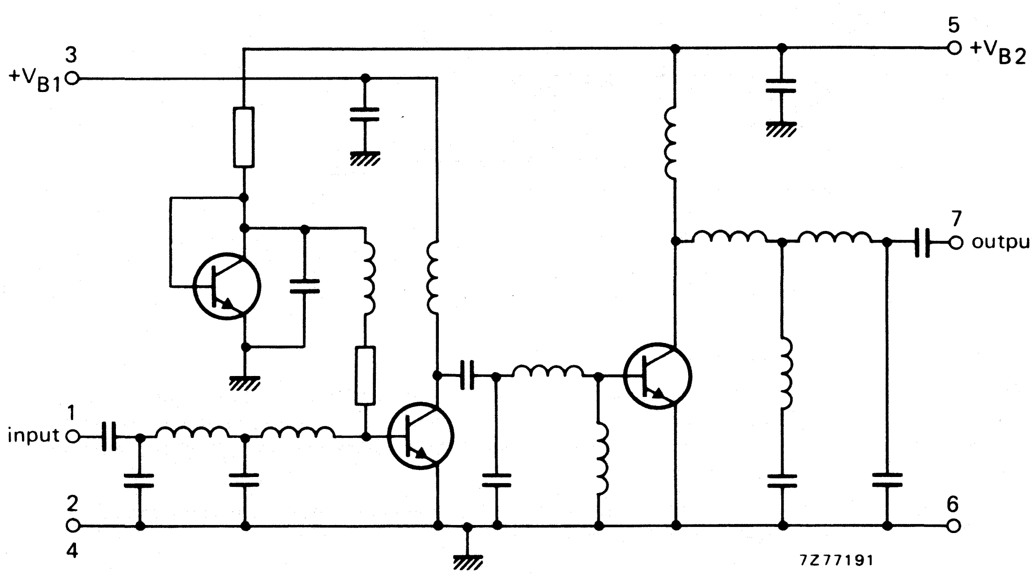
VHF POWER AMPLIFIER MODULES

A range of broadband amplifier modules designed for mobile communications equipments, operating directly from 12 V vehicle electrical systems. The devices will produce 18 W output into a 50 Ω load. The modules consist of a two stage RF amplifier using npn transistor chips, together with lumped-element matching components.

QUICK REFERENCE DATA

type number	mode of operation	frequency range f (MHz)	nominal supply voltages $V_{B1} = V_{B2}$ (V)	drive power P_D (mW)	load power P_L (W)	nominal input impedance z_i (Ω)	nominal load impedance Z_L (Ω)
BGY32	cw	68 to 88	12.5	100	> 18 typ 23	50	50
BGY33	cw	80 to 108	12.5	100	> 18 typ 22	50	50
BGY35	cw	132 to 156	12.5	150	> 18 typ 22	50	50
BGY36	cw	148 to 174	12.5	150	> 18 typ 21	50	50

CIRCUIT DIAGRAM

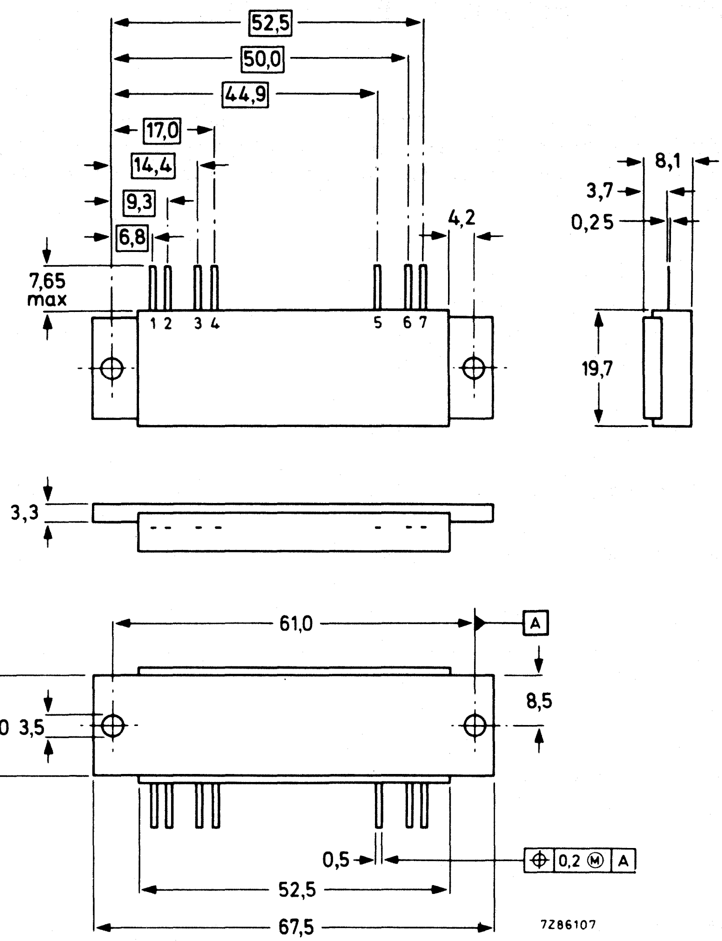


PRODUCT SAFETY This device incorporates beryllium oxide, the dust of wich is toxic. The device is entirely safe provided that the BeO disc is not damaged.

MECHANICAL DATA

Fig. 1 SOT132B.

Dimensions in mm



Lead reference

1 = Input
2 = Earth
3 = Supply $+V_{B1}$
4 = Earth
5 = Supply $+V_{B2}$
6 = Earth
7 = Output

Mounting and soldering recommendations

To ensure good thermal transfer the module should be mounted using heatsink compound onto a heatsink with a flat surface; if an isolation washer is used heatsink compound should be used on both sides of the insulator. Burrs and thickening of the holes in the heatsink should be removed and 3 mm bolts tightened to torques of 0,5 Nm minimum.

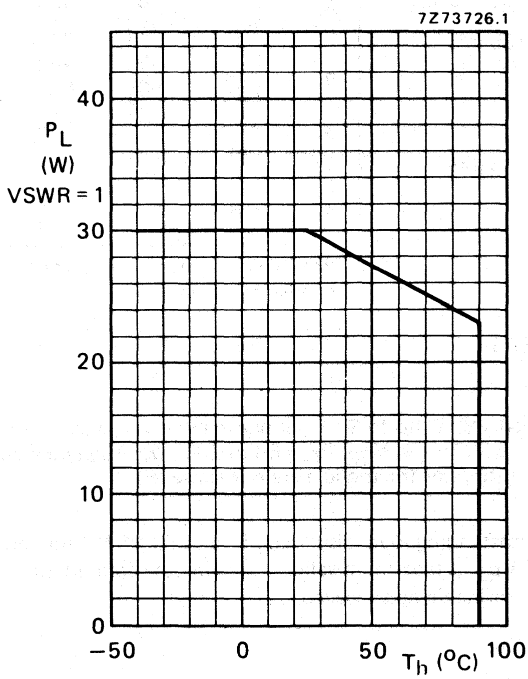
Devices may be soldered directly into a circuit with a soldering iron at maximum iron temperature of 245 ^{o}C for 10 seconds at least 1 mm from the plastic.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC voltages (with respect to flange)

DC supply terminals	V_{B1} and V_{B2}	max	15	V
RF input terminal	$\pm V_I$	max	25	V
RF output terminal	$\pm V_O$	max	25	V
Input drive power BGY32 and BGY33	P_D	max	200	mW
Input drive power BGY35 and BGY36	P_D	max	300	mW
Load power	P_L	max	30	W



Storage temperature range	T_{stg}	−40 to 100	°C
Operating heatsink temperature	T_h	max 90	°C

CHARACTERISTICS

T_h = 25 °C

			BGY32	BGY33	BGY35	BGY36	
Quiescent current $V_{B1} = V_{B2}$ = 12,5 V; P_D = 0; $R_S = R_L$ = 50 Ω	I_{BQ1}	typ	6	6	6	6	mA
	I_{BQ2}	typ	13	13	13	13	mA
Frequency range	f	>	68	80	132	148	MHz
		<	88	108	156	174	MHz
Load power $V_{B1} = V_{B2}$ = 12.5 V; $R_S = R_L$ = 50 Ω; **BGY32** and **BGY33**; P_D = 100 mW	P_L	>	18	18	–	–	W
		typ	23	22			W
	η	>	40	40	–	–	%
		typ	50	50			%
BGY35 and **BGY36**; P_D = 150 mW	P_L	>	–	–	18	18	W
		typ			22	21	W
	η	>	–	–	40	40	%
		typ			50	50	%

Harmonic output — Any single harmonic will be at least 25 dB down relative to carrier

Input VSWR with respect to 50 Ω — typ 1,5

Stability

The module is stable with a load VSWR up to 3 : 1 (all phases) when operated within the following conditions: V_{S1} = 6 to 15 V; V_{S2} = 10 to 15 V; $V_{S1} \leqslant V_{S2}$; P_D = 50 to 200 mW; frequency within operating frequency range, provided the maximum ratings of the module are not exceeded.

Ruggedness

The modules are capable of withstanding load mismatch of up to 50 VSWR for short period overload conditions, with P_D, V_{B1} and V_{B2} at maximum values providing the combination does not result in the matched RF output power rating being exceeded.

APPLICATION INFORMATION

Supply

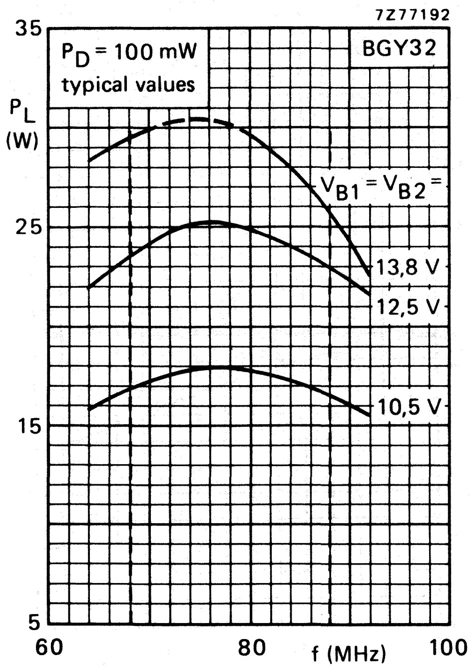
An electrolytic capacitor of 10 µF (25 V), in parallel with a polyester capacitor of 100 nF to earth, is recommended as decoupling arrangement for each power supply pin.

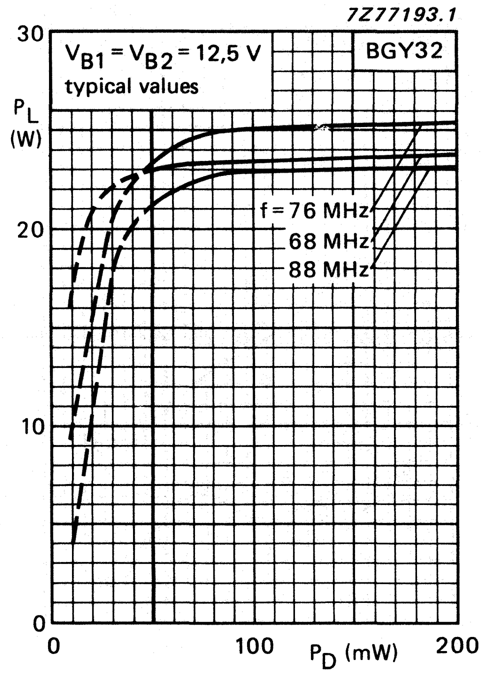
Power rating

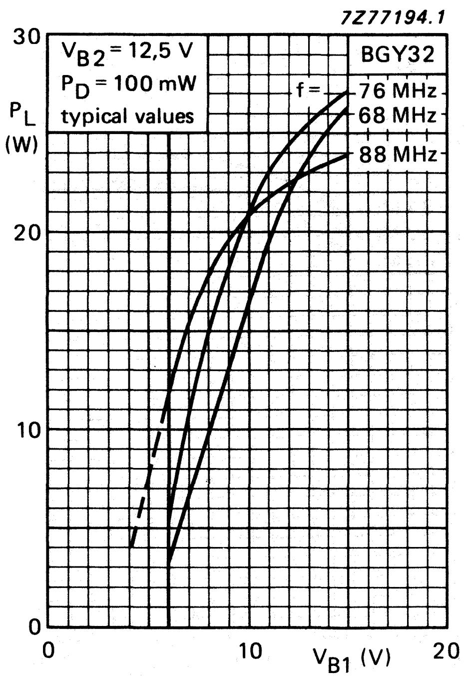
In general it is recommended that the output power from the module under nominal design conditions should not exceed 23 W in order to provide adequate safety margin under fault conditions.

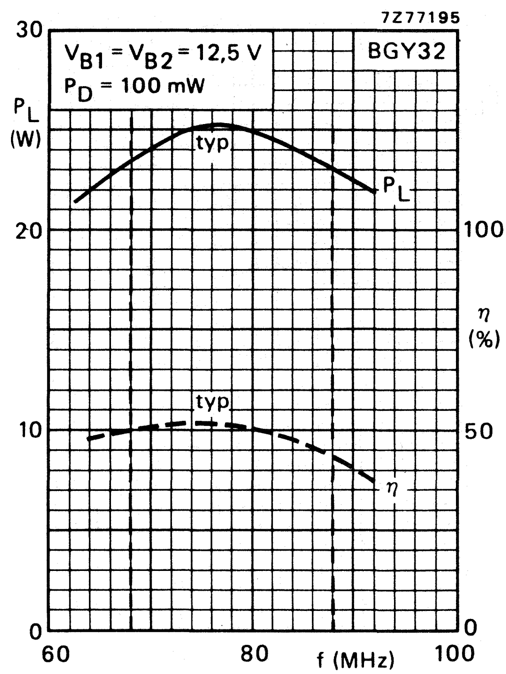
Output power control

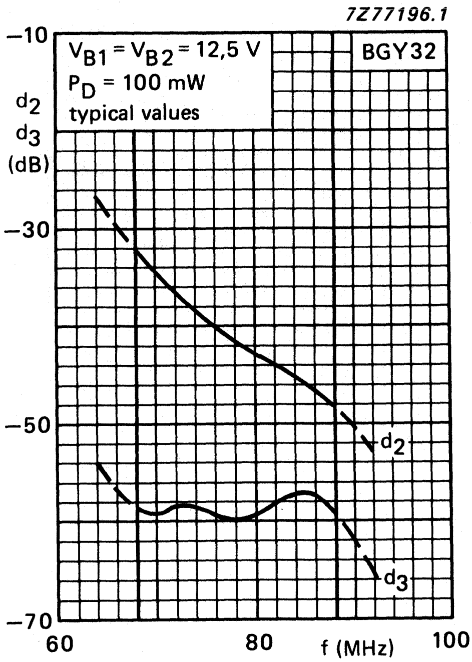
The module is not designed to be operated over a large range of output power levels. The purpose of the output power control is to set the nominal output power level. The preferred method of output power control is by varying the drive power between 50 and 200 mW. The next option is by varying V_{S1}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

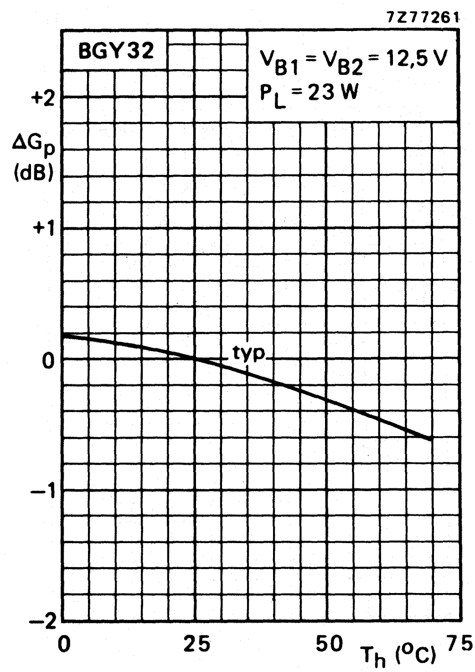

7Z77192
P_D = 100 mW
typical values
BGY32
P_L
(W)
$V_{B1} = V_{B2}$ =
13,8 V
12,5 V
10,5 V
35
25
15
5
60
80
f (MHz)
100

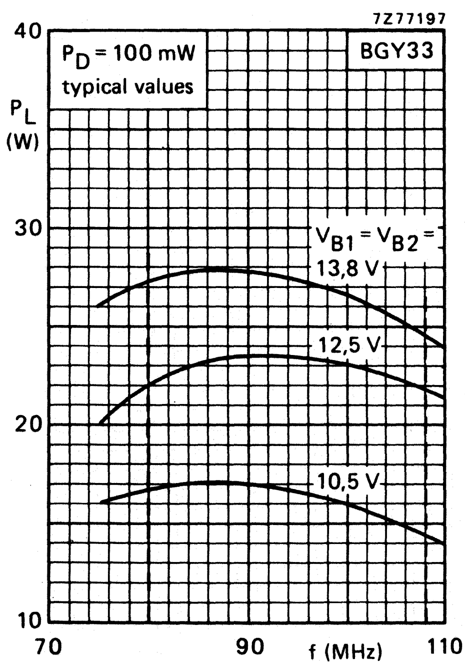

7Z77193.1
$V_{B1} = V_{B2}$ = 12,5 V
typical values
BGY32
P_L
(W)
f = 76 MHz
68 MHz
88 MHz
30
20
10
0
0
100
P_D (mW)
200

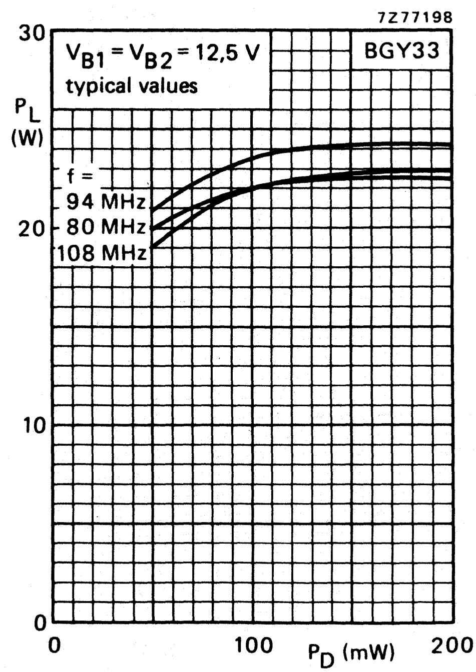

7Z77194.1
V_{B2} = 12,5 V
P_D = 100 mW
typical values
BGY32
P_L
(W)
f = 76 MHz
68 MHz
88 MHz
30
20
10
0
0
10
V_{B1} (V)
20

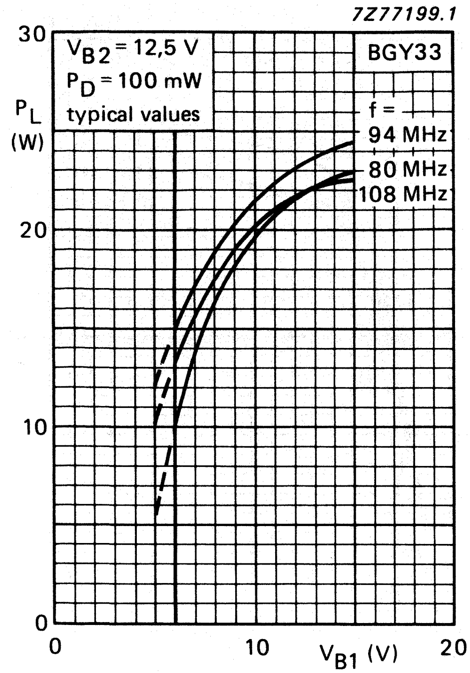

7Z77195
$V_{B1} = V_{B2}$ = 12,5 V
P_D = 100 mW
BGY32
P_L
(W)
typ
P_L
typ
η
η
(%)
30
20
10
0
100
50
0
60
80
f (MHz)
100

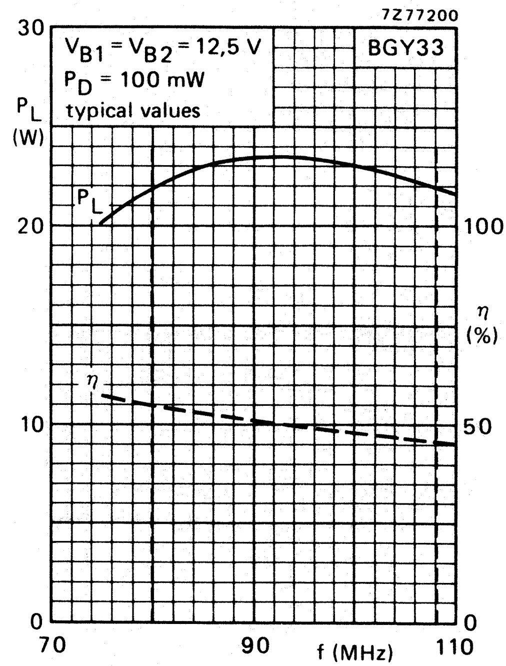

7Z77196.1
VB1 = VB2 = 12,5 V
PD = 100 mW
typical values
BGY32
d2
d3
(dB)
−10
−30
−50
−70
d2
d3
60
80
f (MHz)
100

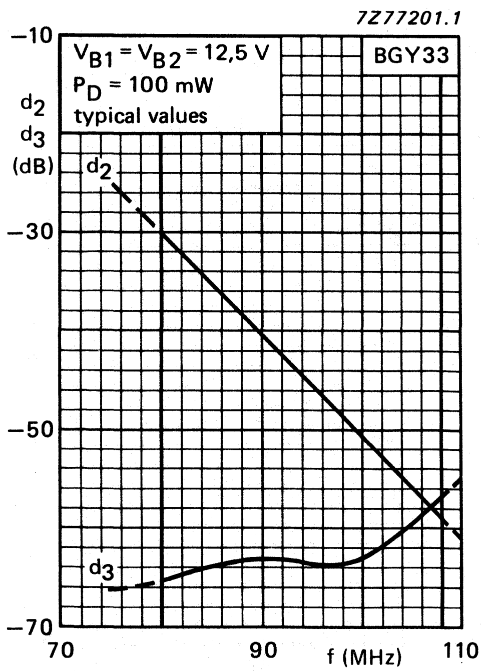

7Z77261
BGY32
VB1 = VB2 = 12,5 V
PL = 23 W
ΔGp
(dB)
+2
+1
0
−1
−2
typ
0
25
50
Th (°C)
75

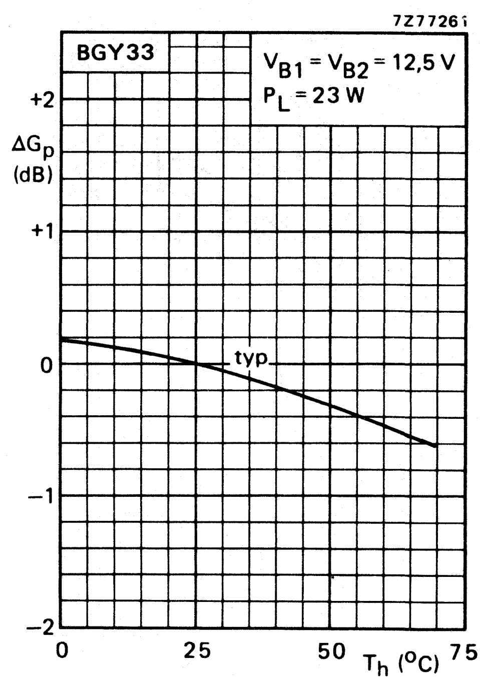

7Z77197
PD = 100 mW
typical values
BGY33
PL
(W)
40
30
20
10
VB1 = VB2 =
13,8 V
12,5 V
10,5 V
70
90
f (MHz)
110

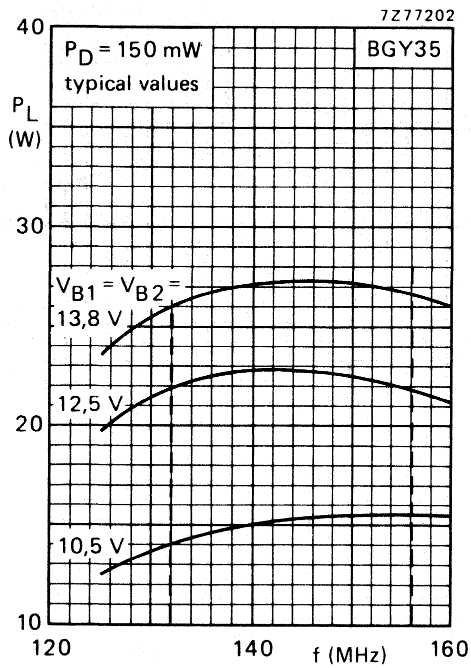

7Z77198
VB1 = VB2 = 12,5 V
typical values
BGY33
PL
(W)
30
20
10
0
f =
94 MHz
80 MHz
108 MHz
0
100
PD (mW)
200

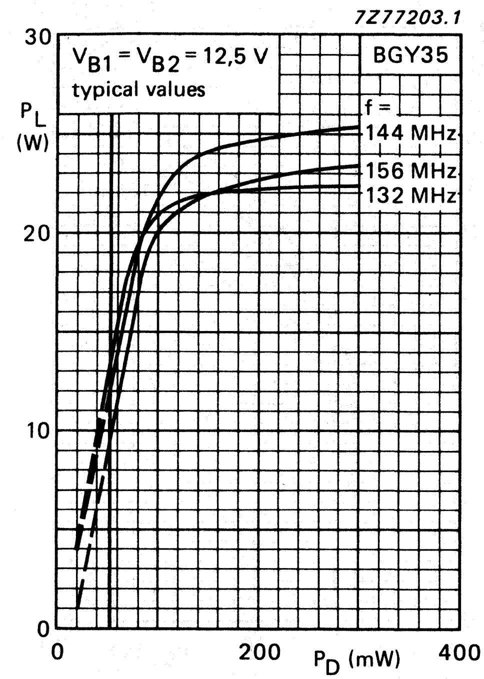

7Z77199.1
V_{B2} = 12,5 V
P_D = 100 mW
typical values
BGY33
f =
94 MHz
80 MHz
108 MHz
P_L (W)
V_{B1} (V)
30
20
10
0
0
10
20

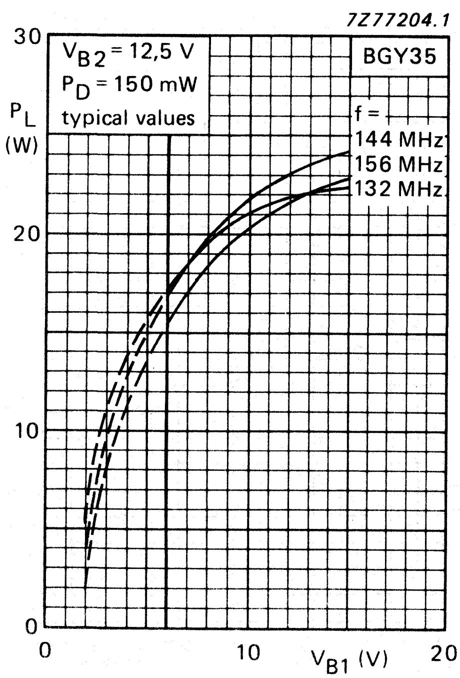

7Z77200
$V_{B1} = V_{B2}$ = 12,5 V
P_D = 100 mW
typical values
BGY33
P_L (W)
P_L
η
η (%)
f (MHz)
30
20
10
0
100
50
0
70
90
110

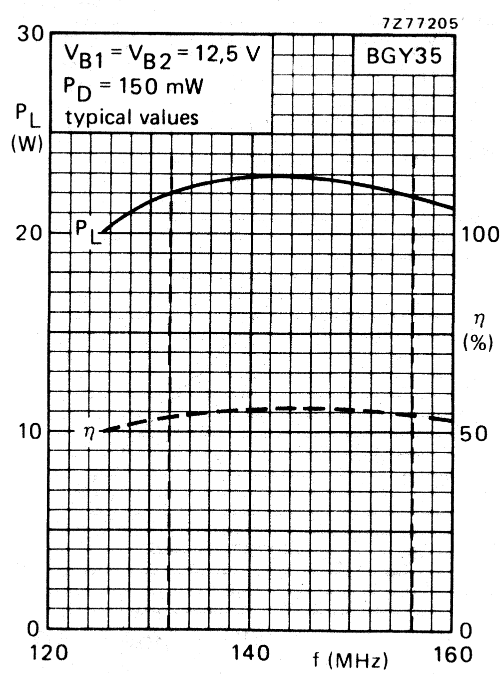

7Z77201.1
$V_{B1} = V_{B2}$ = 12,5 V
P_D = 100 mW
typical values
BGY33
d_2
d_3
(dB)
d_2
d_3
f (MHz)
−10
−30
−50
−70
70
90
110

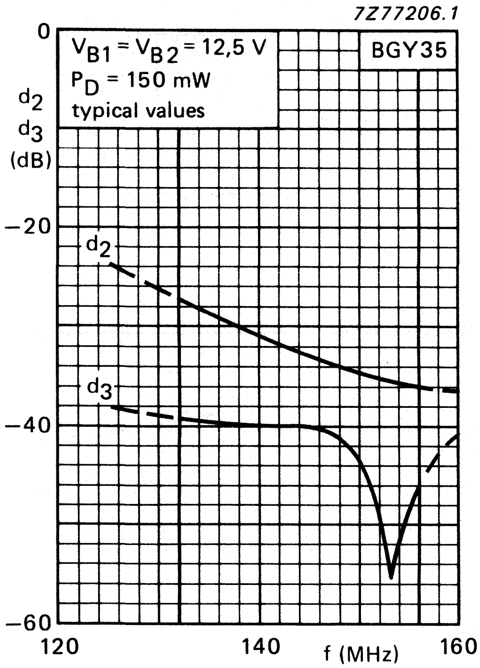

7Z77261
BGY33
$V_{B1} = V_{B2}$ = 12,5 V
P_L = 23 W
ΔG_p (dB)
typ
T_h (°C)
+2
+1
0
−1
−2
0
25
50
75

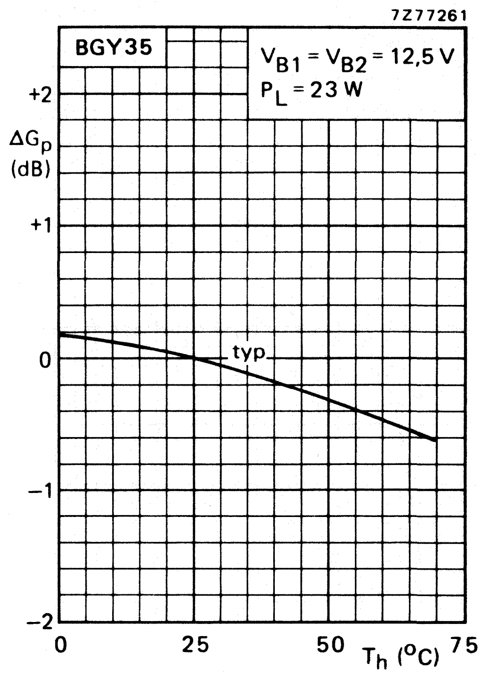

7Z77202
PD = 150 mW
typical values
BGY35
PL
(W)
VB1 = VB2 =
13,8 V
12,5 V
10,5 V
f (MHz)

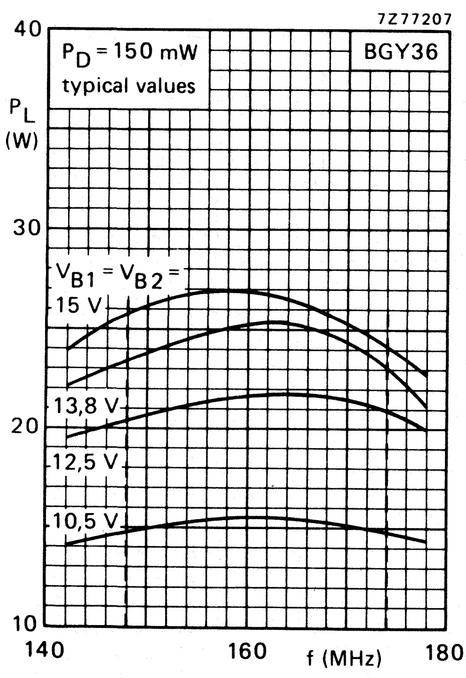

7Z77203.1
VB1 = VB2 = 12,5 V
typical values
BGY35
PL
(W)
f =
144 MHz
156 MHz
132 MHz
PD (mW)

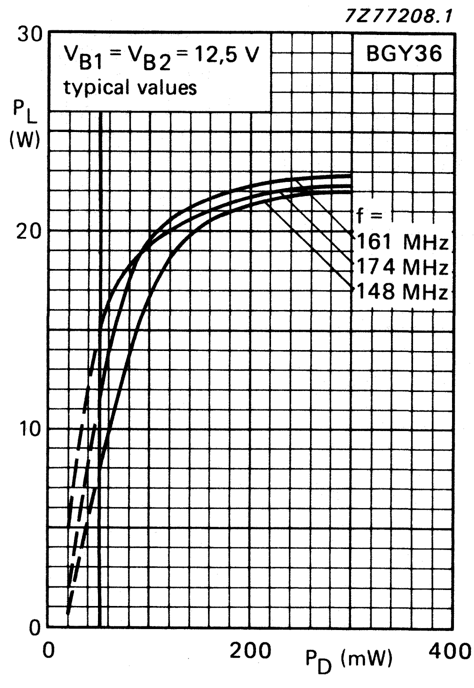

7Z77204.1
VB2 = 12,5 V
PD = 150 mW
typical values
BGY35
PL
(W)
f =
144 MHz
156 MHz
132 MHz
VB1 (V)

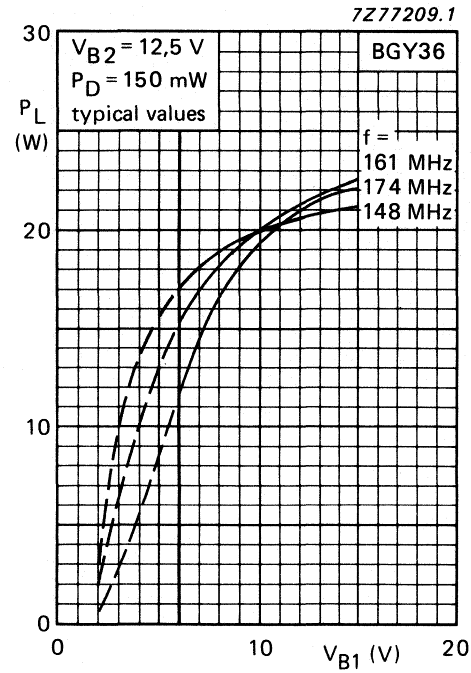

7Z77205
VB1 = VB2 = 12,5 V
PD = 150 mW
typical values
BGY35
PL
(W)
η
(%)
f (MHz)

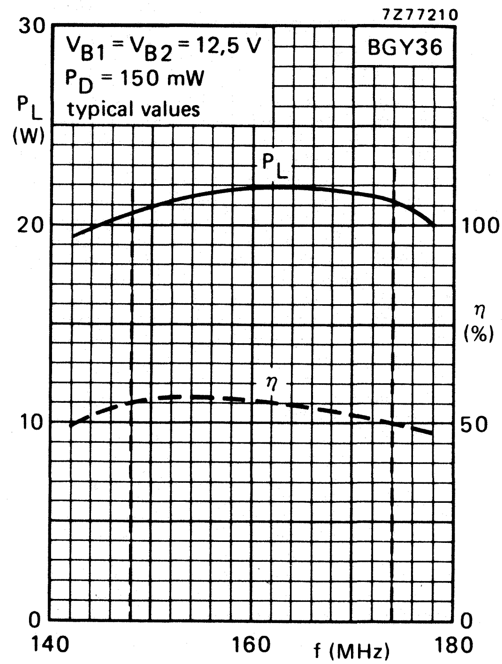

7Z77206.1
$V_{B1} = V_{B2} = 12,5$ V
$P_D = 150$ mW
typical values
BGY35
d_2
d_3
(dB)
0
−20
−40
−60
120
140
160
f (MHz)
d_2
d_3

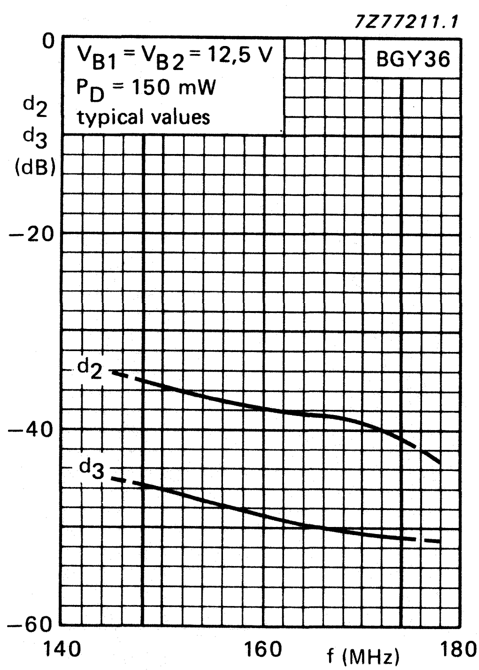

7Z77261
BGY35
$V_{B1} = V_{B2} = 12,5$ V
$P_L = 23$ W
ΔG_p
(dB)
+2
+1
0
−1
−2
typ
0
25
50
75
T_h (°C)

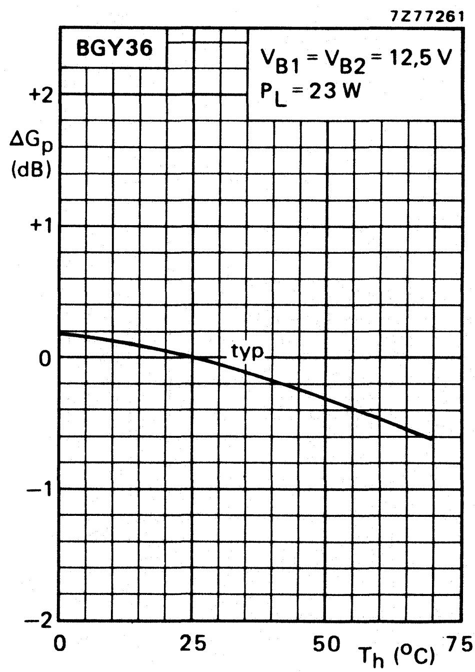

7Z77207
$P_D = 150$ mW
typical values
BGY36
P_L
(W)
40
30
20
10
$V_{B1} = V_{B2} =$
15 V
13,8 V
12,5 V
10,5 V
140
160
180
f (MHz)


7Z77208.1
$V_{B1} = V_{B2} = 12,5$ V
typical values
BGY36
P_L
(W)
30
20
10
0
f =
161 MHz
174 MHz
148 MHz
0
200
400
P_D (mW)


7Z77209.1
V_{B2} = 12,5 V
P_D = 150 mW
typical values
BGY36
P_L
(W)
f =
161 MHz
174 MHz
148 MHz
30
20
10
0
0
10
V_{B1} (V)
20


7Z77210
V_{B1} = V_{B2} = 12,5 V
P_D = 150 mW
typical values
BGY36
P_L
(W)
P_L
η
η
(%)
30
20
10
0
100
50
0
140
160
f (MHz)
180


7Z77211.1
V_{B1} = V_{B2} = 12,5 V
P_D = 150 mW
typical values
BGY36
d_2
d_3
(dB)
d_2
d_3
0
−20
−40
−60
140
160
f (MHz)
180


7Z77261
BGY36
V_{B1} = V_{B2} = 12,5 V
P_L = 23 W
ΔG_p
(dB)
typ
+2
+1
0
−1
−2
0
25
50
T_h (°C)
75

UHF POWER AMPLIFIER MODULES

A range of broadband UHF modules, primarily designed for mobile communication equipment, operating directly from 12 V electrical systems.
The BGY40,41 series produce minimum output powers of 7.5 W and 13 W respectively in the UHF communications bands, the 'A' types covering 400 to 440 MHz and the 'B' types covering 440 to 470 MHz.
The modules consist of a three-stage RF amplifier using n-p-n transistor chips with lumped element matching components in a plastic stripline encapsulation.
The negative supply is internally connected to the flange.

QUICK REFERENCE DATA

Mode of operation			cw	
Supply voltages	V_{S1}, V_{S2}	nom.	12.5	V
Input impedance	Z_i	nom.	50	Ω
Output load impedance	Z_L	nom.	50	Ω

RF performance

		BGY40A	BGY41A	BGY40B	BGY41B	
Frequency of operation	f	400 to 440		440 to 470		MHz
Typical drive power	P_D	75	150	100	150	mW
Typical load power	P_L	11.5	15.6	10	15	W
Typical efficiency	η	40	40	40	40	%

MECHANICAL DATA (see Fig. 15)

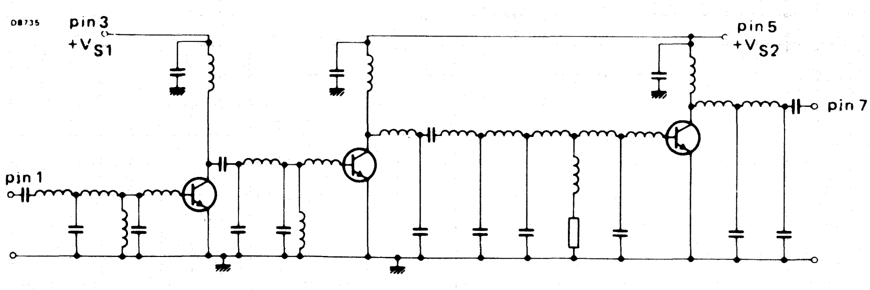


Fig. 1 Circuit of the UHF modules.

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC134)

Voltages (with respect to flange)

DC supply terminals		V_{S1} and V_{S2}	max.	16.5	V
RF input terminal		$\pm V_{in}$	max.	25	V
RF output terminal		$\pm V_{out}$	max.	25	V
Load power (see Fig.2)	BGY40A, 40B	P_L	max.	12	W
	BGY41A, 41B	P_L	max.	16.5	W
Input drive power	BGY40A, 40B	P_D	max.	150	mW
	BGY41A, 41B	P_D	max.	200	mW
Storage temperature range		T_{stg}		−40 to +100	°C
Operating heatsink temperature		T_h	max.	90	°C

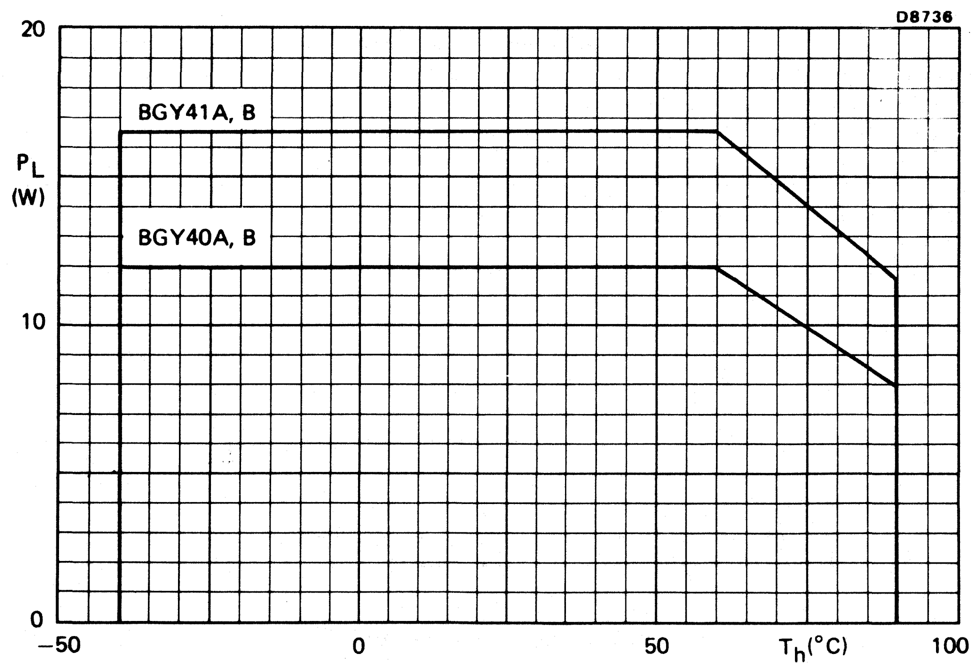


Fig.2 Load power derating; VSWR = 1

CHARACTERISTICS

T_h = 25 °C unless otherwise specified;
$V_{S1} = V_{S2}$ = 12.5 V; R_S = 50 Ω; R_L = 50 Ω

		BGY40A	BGY41A	BGY40B	BGY41B	
Frequency of operation	f	400 to 440		440 to 470		MHz
Minimum load power	P_L	7.5	13	7.5	13	W
Nominal drive power	P_D	100	150	100	150	mW
Minimum efficiency	η	35	35	35	35	%
Typical load power	P_L	11.5	15.6	10	15	W
Typical drive power	P_D	75	150	100	150	mW
Typical efficiency	η	40	40	40	40	%

Harmonic output Any single harmonic will be at least 40 dB down from the carrier.

Input VSWR (with respect to 50 Ω) typ. 1.5

Stability

The modules are stable with load VSWR up to 3 (all phases) when operated within the following limits:

BGY40A, BGY40B	BGY41A, BGY41B
P_D = 30 to 150 mW	P_D = 30 to 200 mW
$V_{S1} = V_{S2}$ = 8 to 16.5 V	$V_{S1} = V_{S2}$ = 8 to 16.5 V
P_L = 5 to 12 W	P_L = 5 to 16.5 W

Ruggedness

The modules will withstand load VSWR of 50 (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 onto a heatsink with a flat surface, with heat conducting compound 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.
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.

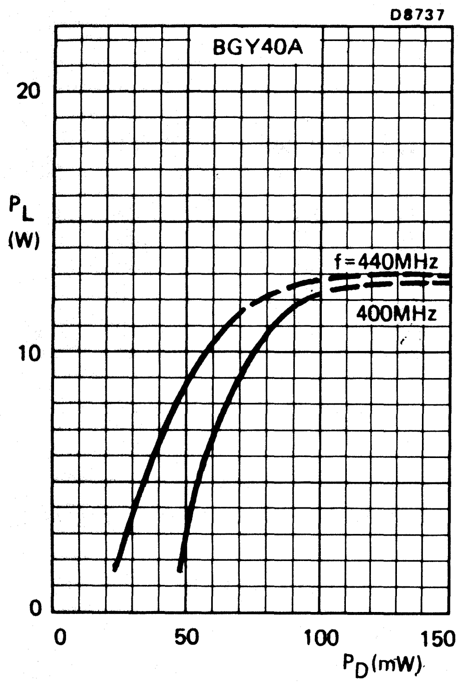


Fig.3 Typical values; $V_{S1} = V_{S2} = 12.5$ V

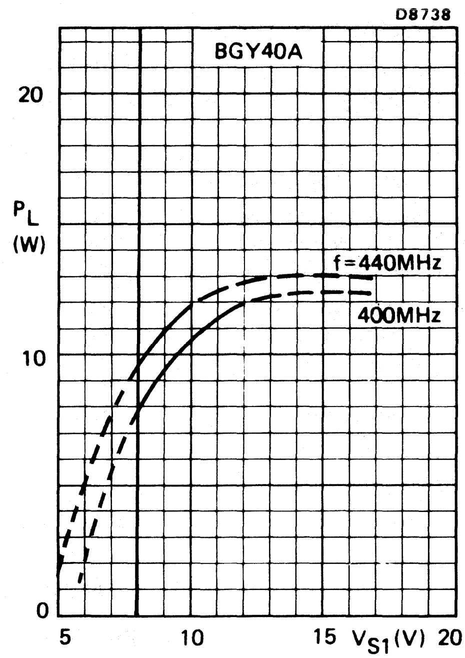


Fig.4 Typical values; $V_{S2} = 12.5$ V; $P_D = 100$ mW

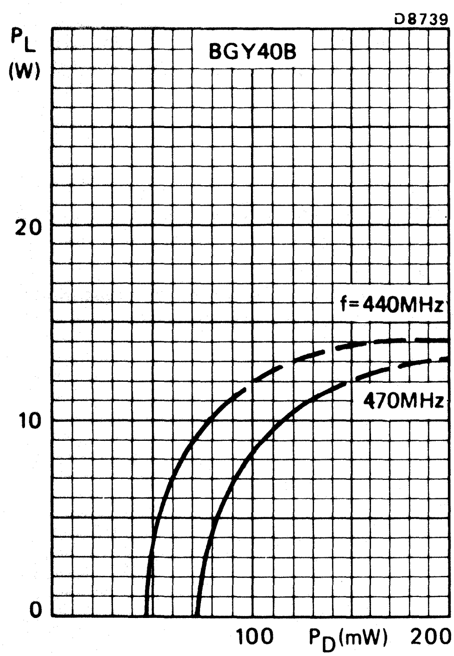


Fig.5 Typical values; $V_{S1} = V_{S2} = 12.5$ V

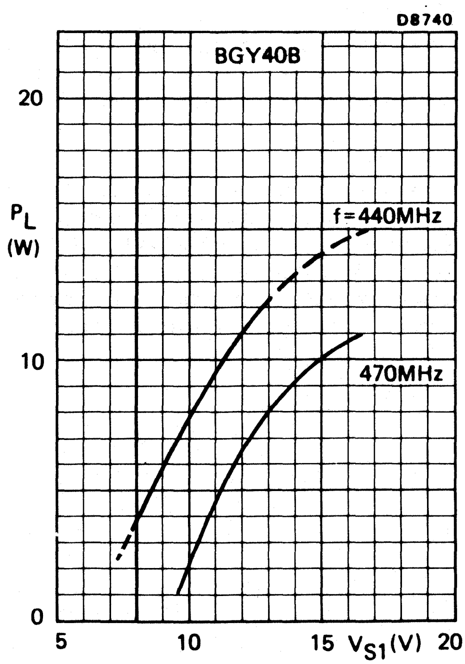


Fig.6 Typical values; $V_{S2} = 12.5$ V; $P_D = 100$ mW

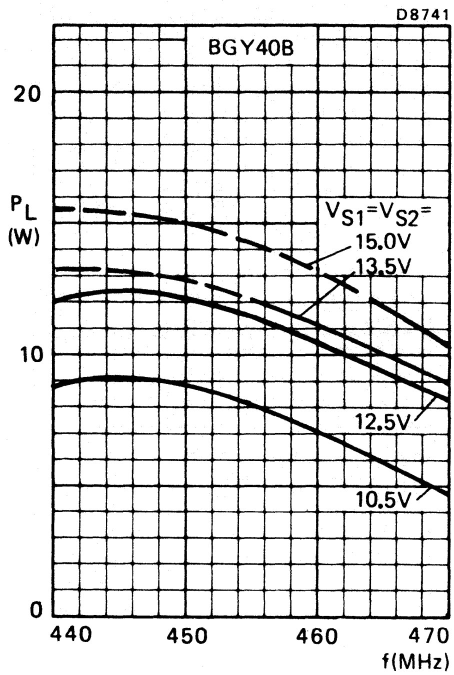


Fig.7 Typical values; P_D = 100 mW

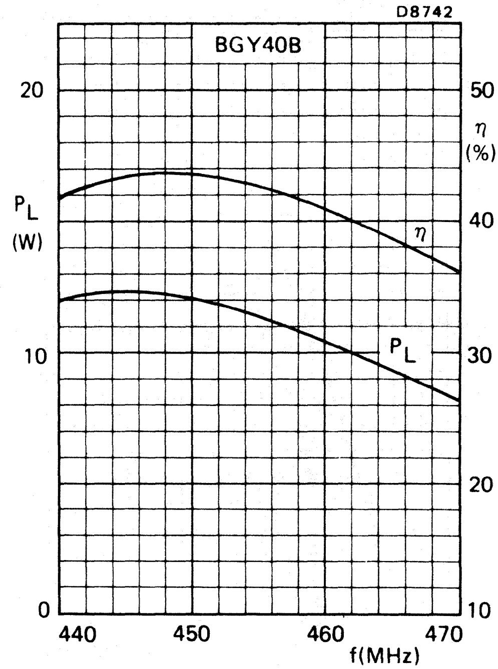


Fig.8 Typical values; V_{S1} = V_{S2} = 12.5 V; P_D = 100 mW

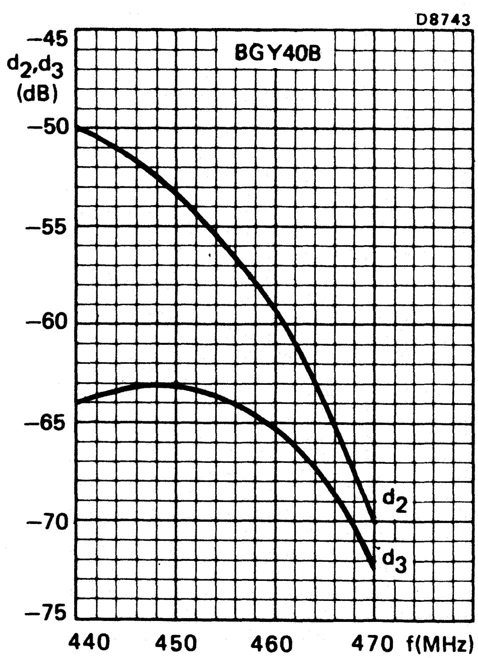


Fig.9 Typical values; V_{S1} = V_{S2} = 12.5 V; P_D = 100 mW

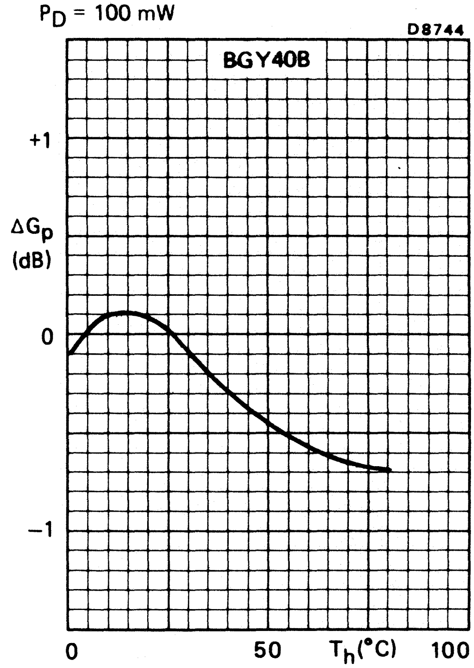


Fig.10 Typical values; V_{S1} = V_{S2} = 12.5 V; P_D = 100 mW

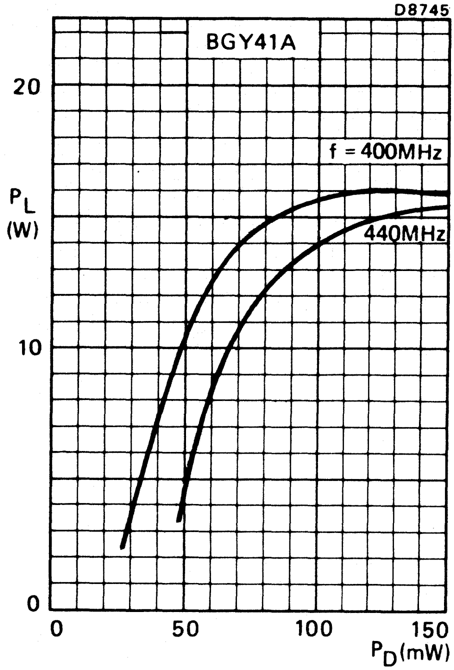


Fig. 11 Typical values; $V_{S1} = V_{S2} = 12.5$ V

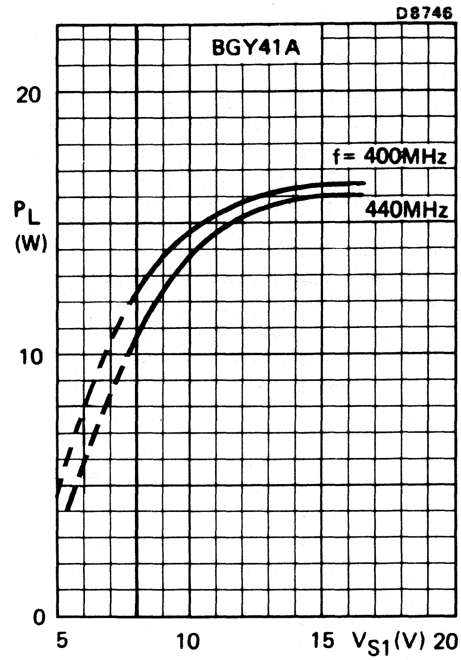


Fig. 12 Typical values; $V_{S2} = 12.5$ V; $P_D = 150$ mW

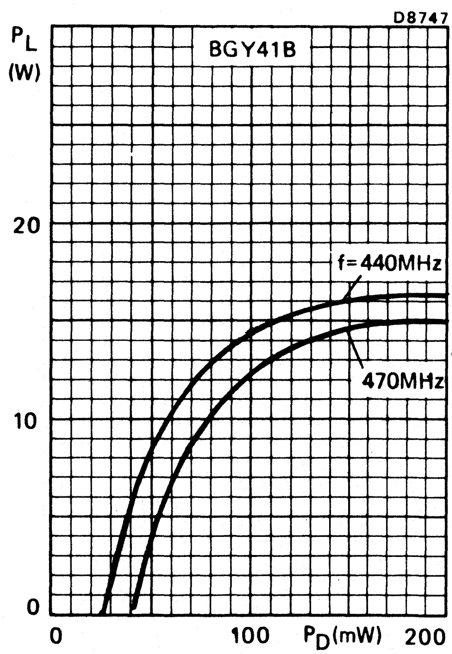


Fig. 13 Typical values; $V_{S1} = V_{S2} = 12.5$ V

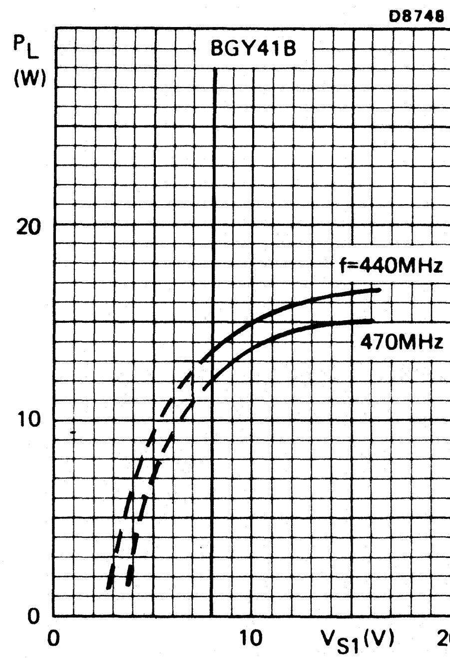
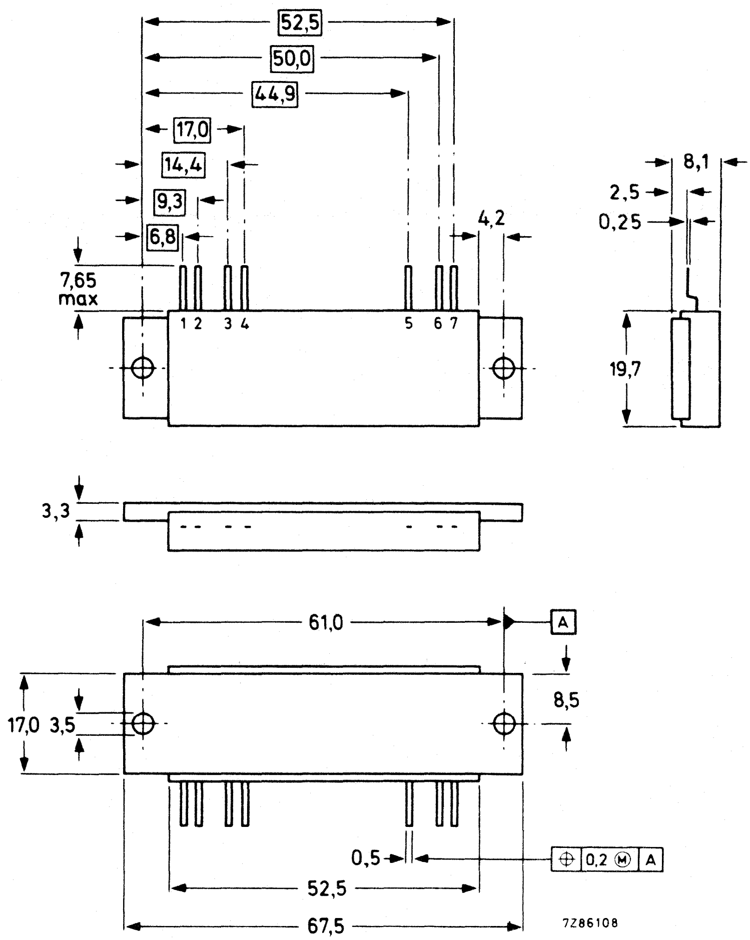


Fig. 14 Typical values; $V_{S2} = 12.5$ V; $P_D = 150$ mW

MECHANICAL DATA

Dimensions in mm

Fig. 15 SOT-132C.



Lead reference

1 = Input
2 = Earth
3 = V_{S1}
4 = Earth
5 = V_{S2}
6 = Earth
7 = Output

VHF POWER AMPLIFIER MODULE

A broadband VHF amplifier module primarily designed for mobile communications equipment, operating directly from 12 V electrical systems. The module will produce a minimum output of 13 W into a 50 Ω load over the frequency range 148 to 174 MHz.
The module consists of a two stage RF amplifier using npn transistor chips with lumped-element matching components in a plastic stripline encapsulation. The negative supply is internally connected to the flange.

QUICK REFERENCE DATA

Mode of operation			c.w.	
Frequency range	f		148 to 174	MHz
Drive power	P_D	max.	150	mW
	P_D	typ.	80	mW
Load power	P_L	>	13	W
Supply voltages	V_{S1} and V_{S2}	nom.	12.5	V
Input impedance	z_i	nom.	50	Ω
Output load impedance	Z_L	nom.	50	Ω

MECHANICAL DATA (see Fig. 10)

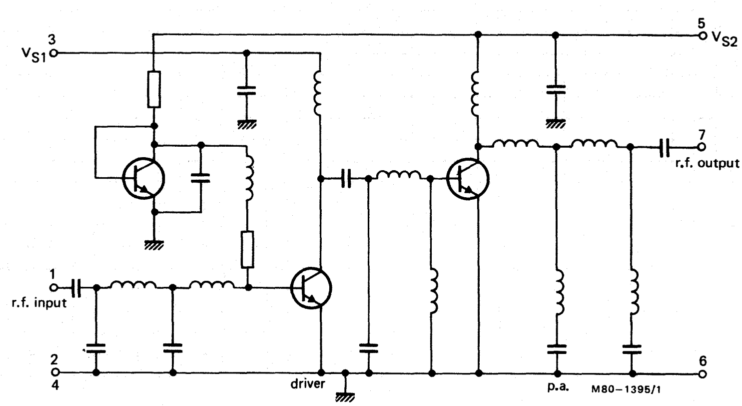


Fig. 1 Circuit of the VHF module.

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC134)

Voltages (with respect to flange)

DC supply terminals	V_{S1} and V_{S2}	max.	16.5	V
RF input terminal	$\pm V_i$	max.	25	V
RF output terminal	$\pm V_o$	max.	25	V
Load power (see below)	P_L	max.	18	W
Input drive power	P_D	max.	300	mW
Storage temperature range	T_{stg}		−40 to +100	°C
Operating heatsink temperature	T_h	max.	90	°C

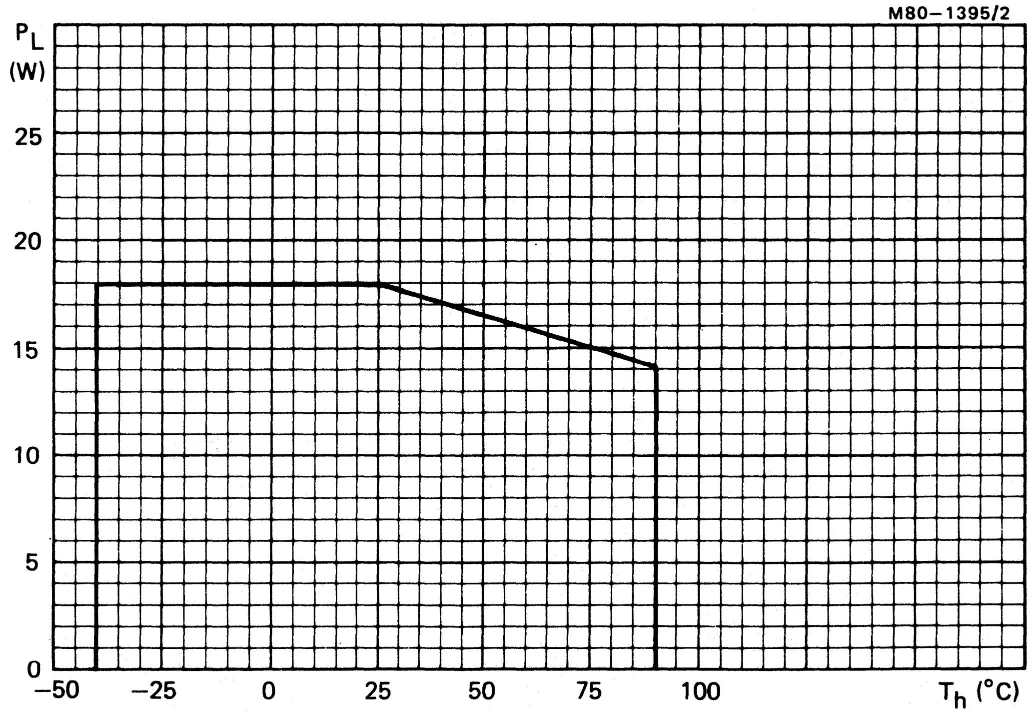


Fig.2 Load power derating; VSWR = 1

CHARACTERISTICS

T_h = 25 °C unless otherwise specified

$V_{S1} = V_{S2}$ = 12.5 V; R_S = 50 Ω; frequency range 148 to 174 MHz; R_L = 50 Ω

Quiescent currents				
$P_D = 0$	I_{Q1}	typ.	5	mA
	I_{Q2}	typ.	15	mA
RF drive power				
P_L = 13 W	P_D	<	150	mW
	P_D	typ.	80	mW
Efficiency				
P_L = 13 W	η	>	40	%
	η	typ.	48	%
Harmonic output	Any single harmonic will be at least 25 dB down from the carrier, with typical rejection of 34 dB.			
Input VSWR (with respect to 50 Ω)		typ.	1.5	

Stability

The module is stable with load VSWR up to 3 (all phases) when operated with:

$V_{S1} = V_{S2}$ = 10 to 16.5 V; f = 148 to 174 MHz; P_D = 30 to 300 mW; $P_L \leqslant$ 18 W (matched)

Ruggedness

The modules will withstand load VSWR of 50 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 onto a heatsink with a flat surface, with heat conducting compound 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.
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

A technical publication (M80—0056) entitled 'Transmitter design using VHF broadband amplifier modules' is available on request.

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 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 prefeered 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.

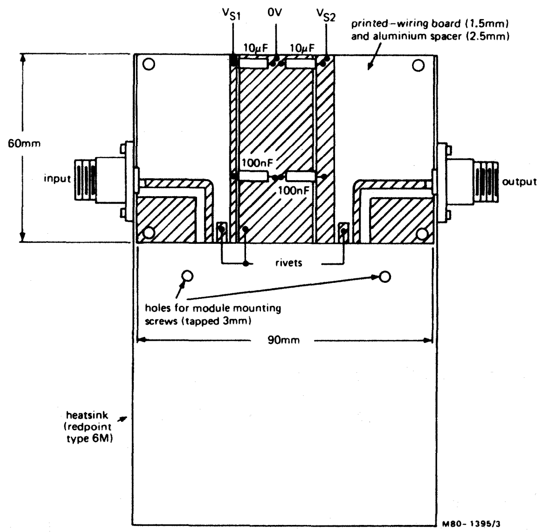


Fig.3 Test jig for VHF modules

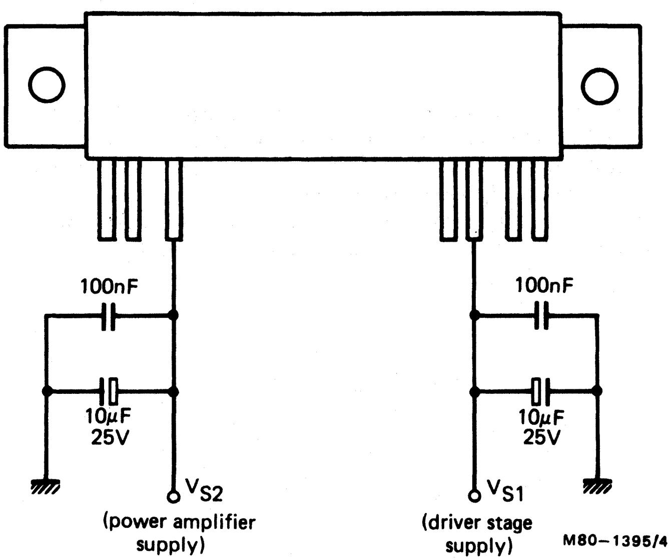


Fig.4 Recommended decoupling arrangement

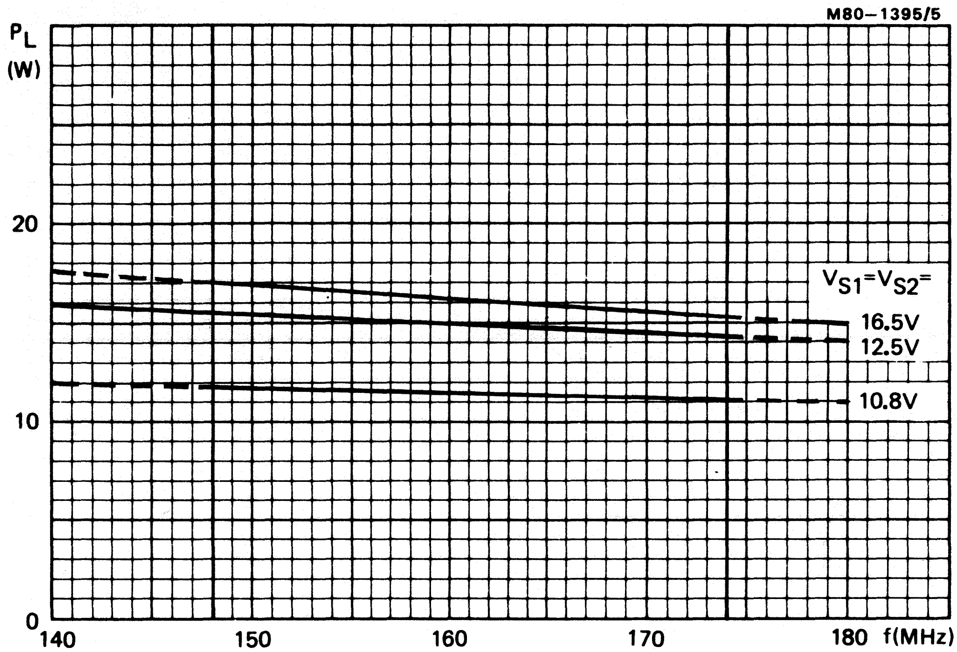


Fig.5 Typical values; P_D = 150 mW

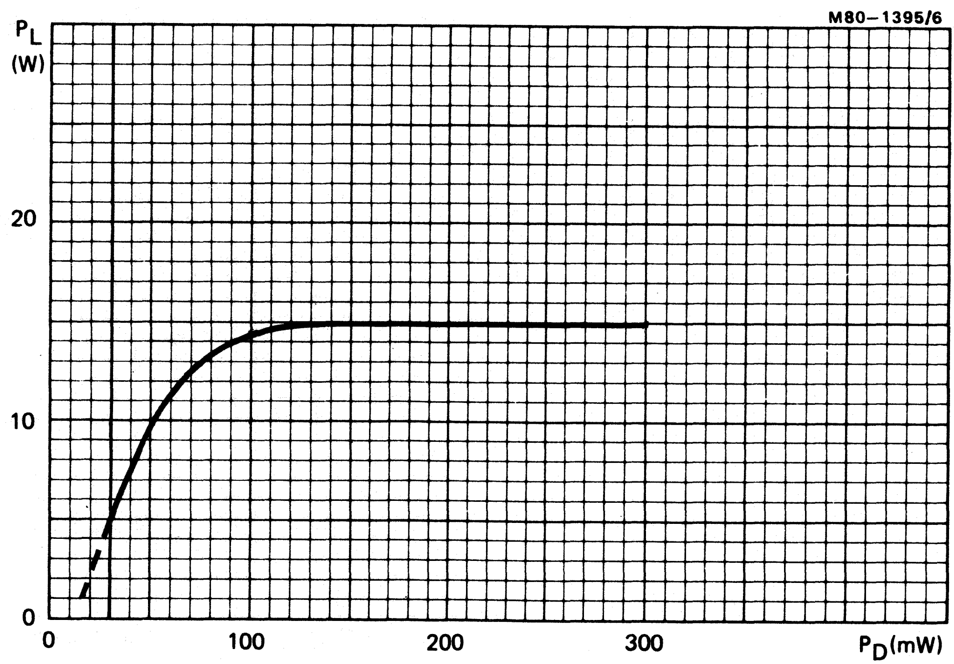


Fig.6 Typical values; V_{S1} = V_{S2} = 12.5 V; f = 160 MHz

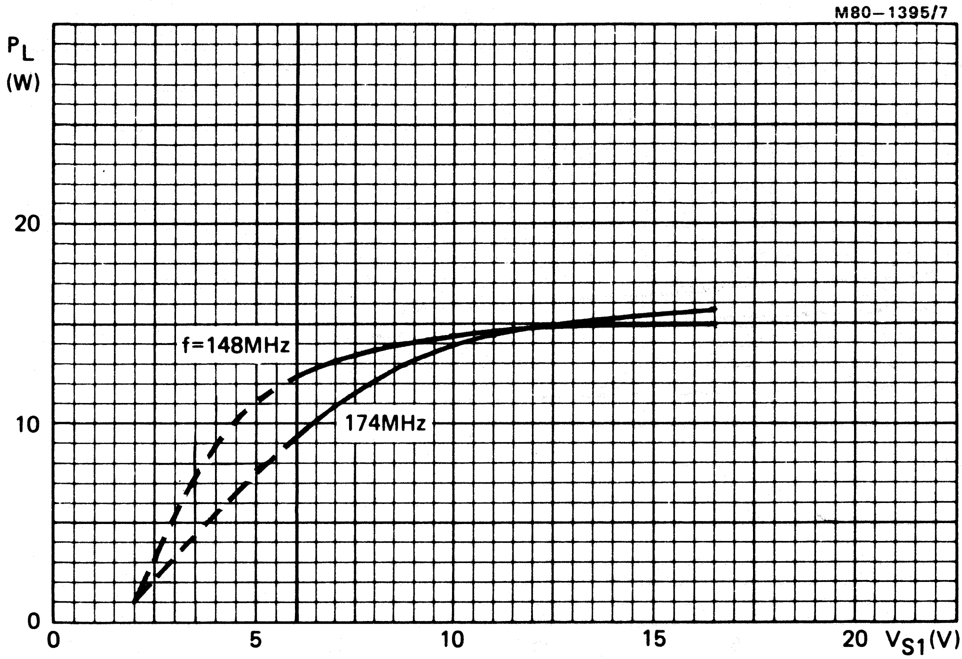


Fig.7 Typical values; V_{S2} = 12.5 V; P_D = 150 mW

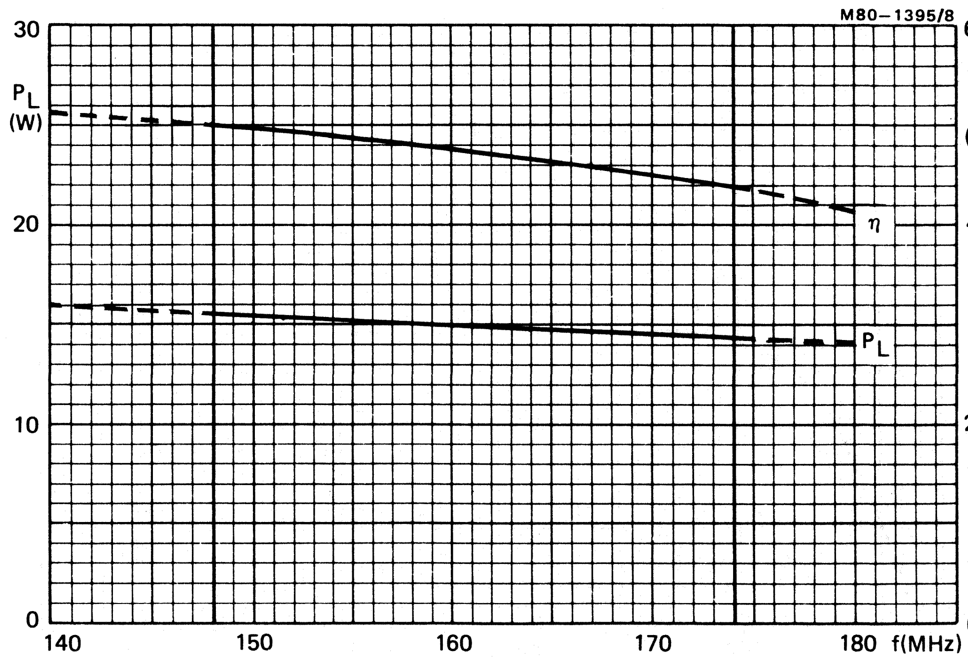


Fig.8 Typical values; V_{S1} = V_{S2} = 12.5 V; P_D = 150 mW

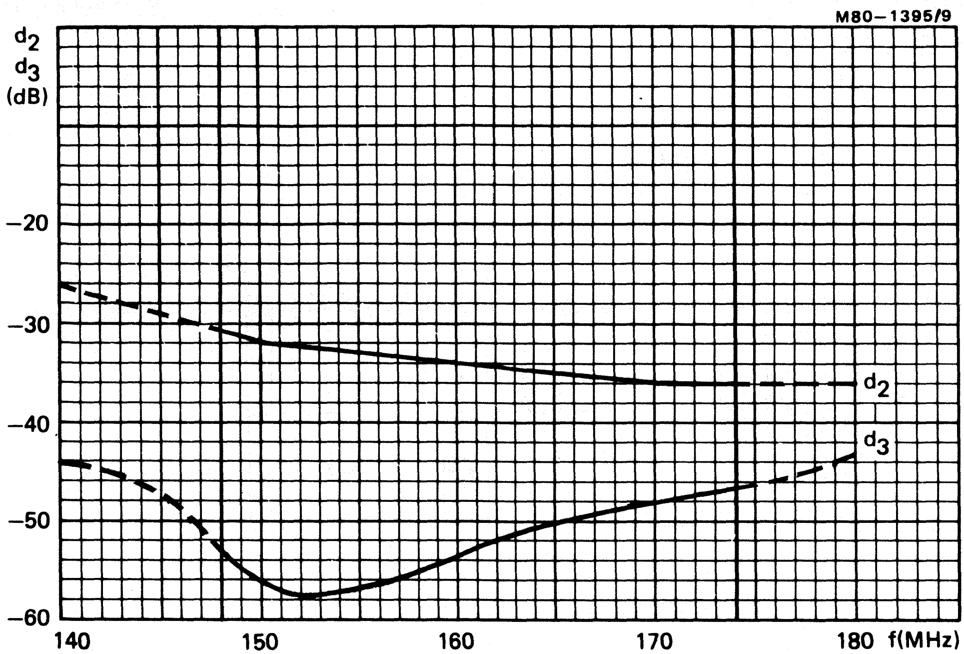
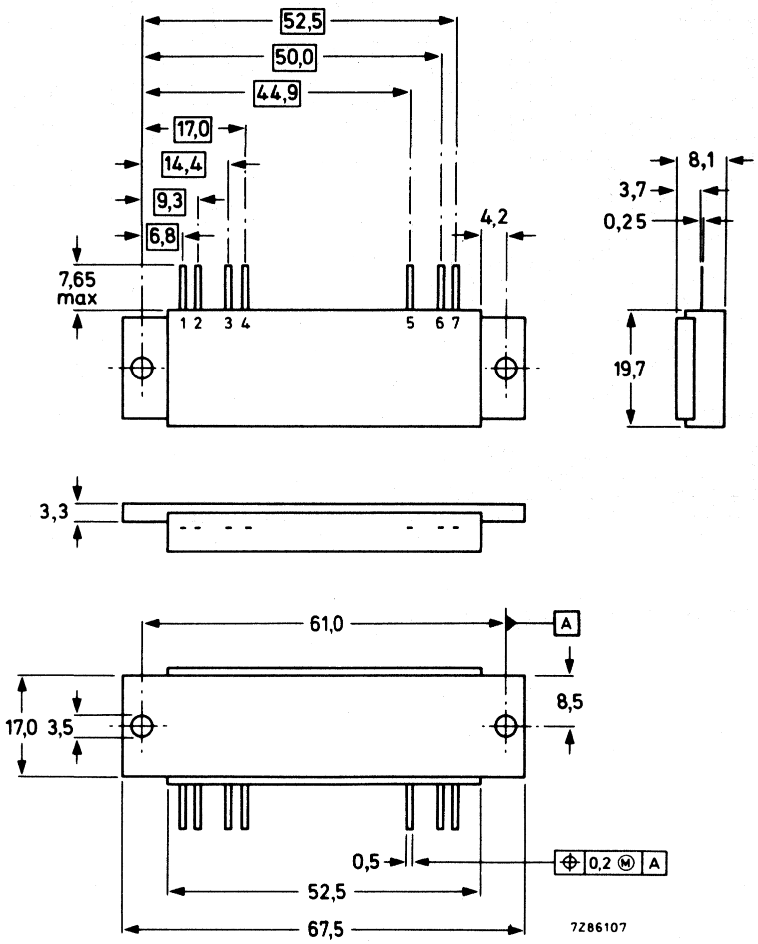


Fig.9 Typical values; $V_{S1} = V_{S2} = 12.5$ V; $P_D = 150$ mW

MECHANICAL DATA

Dimensions in mm

Fig. 10 SOT-132B.



Lead reference

1 = Input
2 = Earth
3 = V_{S1}
4 = Earth
5 = V_{S2}
6 = Earth
7 = Output

VHF BROADBAND POWER MODULE

VHF broadband power amplifier module primarily designed for mobile communications equipment, operating directly from 12.5 V systems. The module will produce a minimum output of 29 W into a 50 Ω load over the frequency range of 68 to 88 MHz.

The module consists of a two-stage amplifier using npn transistor chips with lumped-element matching components in a plastic stripline encapsulation. The negative supply is internally connected to the flange.

QUICK REFERENCE DATA

Mode of operation		CW		
Frequency range			68 to 88	MHz
DC supply voltage (terminal 1)	V_{S1}		12.5	V
DC supply voltage (terminal 2)	V_{S2}		12.5	V
Drive power	P_D	typ.	50	mW
		max.	150	mW
Load power	P_L		29	W
Efficiency	η	typ.	40	%
Operating heatsink temperature	T_h	max.	90	°C

MECHANICAL DATA

Dimensions in mm

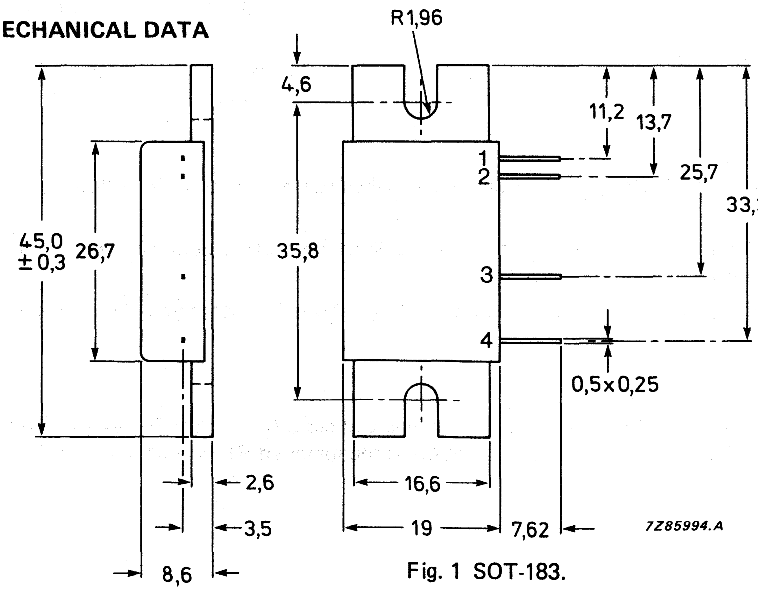


Fig. 1 SOT-183.

Lead reference

1 = input
2 = V_{S1}
3 = V_{S2}
4 = output
Flange is ground

PRODUCT SAFETY This device incorporates beryllium oxide (BeO), the dust of which is toxic. The device is entirely safe provided that the internal BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply voltages*	V_{S1}, V_{S2}	max.	15	V*
Input terminal voltage*	$\pm V_i$	max.	25	V*
Output terminal voltage*	$\pm V_o$	max.	25	V*
Load power	P_L	max.	40	W**
Drive power	P_D	max.	300	mW
Storage temperature range	T_{stg}		−40 to + 100	°C
Operating temperature	T_h	max.	90	°C

CHARACTERISTICS

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

Quiescent currents $P_{DR} = 0$	I_{Q1}	typ.	10	mA
	I_{Q2}	typ.	25	mA
		max.	35	mA
Frequency range	f		68 to 88	MHz
Efficiency $P_L = 29$ W	η	min.	37	%
		typ.	40	%
RF drive power $P_L = 29$ W	P_D	typ.	50	mW
		max.	150	mW
Second harmonic rejection $P_L = 29$ W		typ.	45	dB
		min.	30	dB
Input VSWR with respect to 50 Ω		typ.	1.5 : 1	
		max.	2.0 : 1	

Stability

The module is stable with load VSWR up to 3 : 1 (all phases) when operated within the following conditions:

$V_{S1} = 6$ to 15 V; $V_{S2} = 10$ to 15 V; $V_{S1} \leqslant V_{S2}$; f = 68 to 88 MHz; $P_D = 30$ to 300 mW provided the maximum ratings of the module are not exceeded.

The module should also be stable under no-drive conditions ($P_D = 0.0$ mW) with nominal source and load impedance.

Ruggedness

The module will withstand load VSWR of 20 : 1 for short overload conditions, with P_D, V_{S1} and V_{S2} at maximum values, providing the combination does not cause the matched RF output power rating to be exceeded.

* With respect to the flange.
** See Fig. 2.

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface with heat-conducting compound sparingly applied between module and heatsink. Any burrs on the heatsink should be removed. The connectors may be soldered directly onto a circuit using a soldering iron with a maximum temperature of 245 ^{o}C for not more than 10 seconds at a distance of at least 1 mm from the plastic.

Power rating

In general, it is recommended that the output power from the module under nominal conditions should not exceed 35 W in order to provide adequate safety margins under fault conditions.

Output power control

The module is not designed to be operated over a large range of output power level. The aim 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 6.0 and 12.5 V.

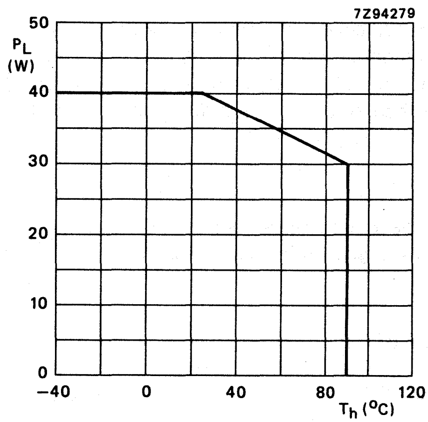


Fig. 2 Load power derating; VSWR = 1 : 1.

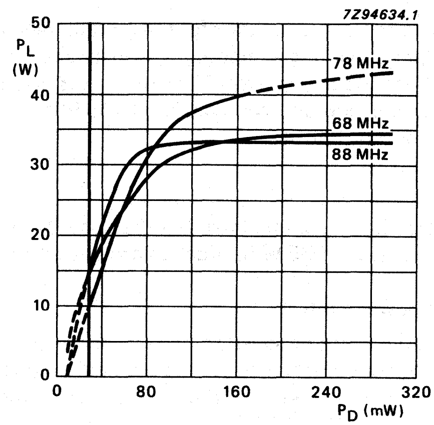


Fig. 3 Load power as a function of drive power; $V_{S1} = V_{S2} = 12.5$ V; $T_h = 25$ °C; typical values.

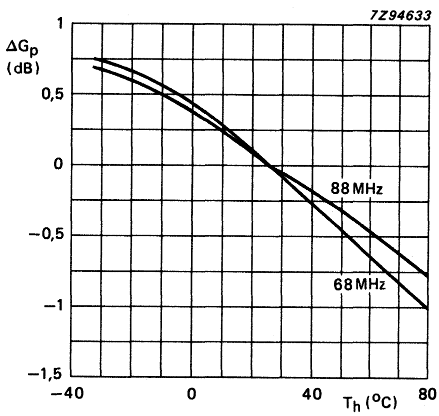


Fig. 4 Power gain as a function of temperature; $P_D = 150$ mW; $V_{S1} = V_{S2} = 12.5$ V; typical values.

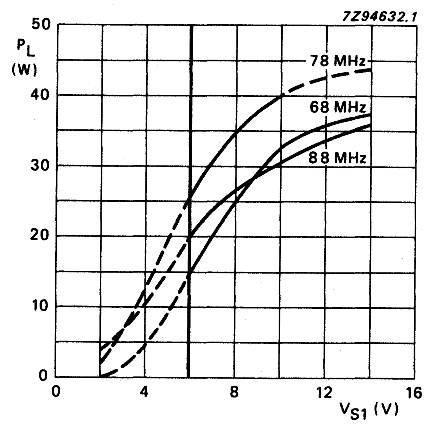


Fig. 5 Load power as a function of supply voltage V_{S1}; $P_D = 150$ mW; $V_{S2} = 12.5$ V; typical values.

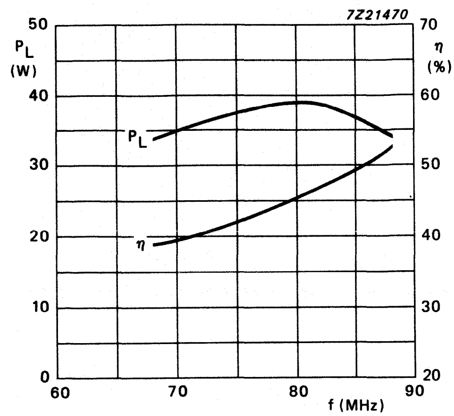


Fig. 6 Load power as a function of frequency; $V_{S1} = V_{S2} = 12.5$ V; $P_D = 150$ mW; typical values.

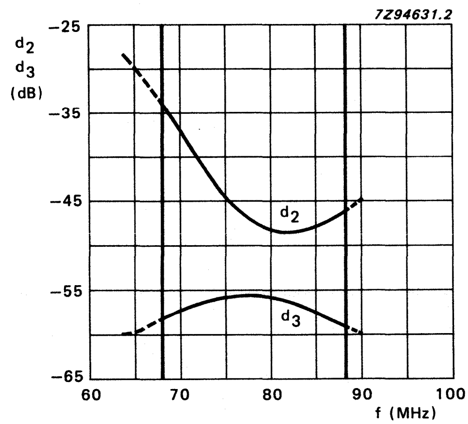


Fig. 7 Second and third harmonic distortions as a function of frequency; $V_{S1} = V_{S2} = 12.5$ V; $P_D = 150$ mW; typical values.

VHF BROADBAND POWER MODULE

VHF broadband power amplifier module primarily designed for mobile communications equipment, operating directly from 12.5 V systems. The module will produce a minimum output of 28 W into a 50 Ω load over the frequency range of 148 to 174 MHz.

The module consists of a two stage amplifier using npn transistor chips with lumped-element matching components in a plastic stripline encapsulation. The negative supply is internally connected to the flange.

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range			148 to 174	MHz
DC supply voltage (terminal 1)	V_{S1}		12.5	V
DC supply voltage (terminal 2)	V_{S2}		12.5	V
Drive power	P_D	typ. max.	150 300	mW mW
Load power	P_L		28	W
Efficiency	η	typ.	45	%
Operating heatsink temperature	T_h	max.	90	°C

MECHANICAL DATA

Dimensions in mm

Lead reference

1 = Input
2 = V_{S1}
3 = V_{S2}
4 = Output

Flange is ground

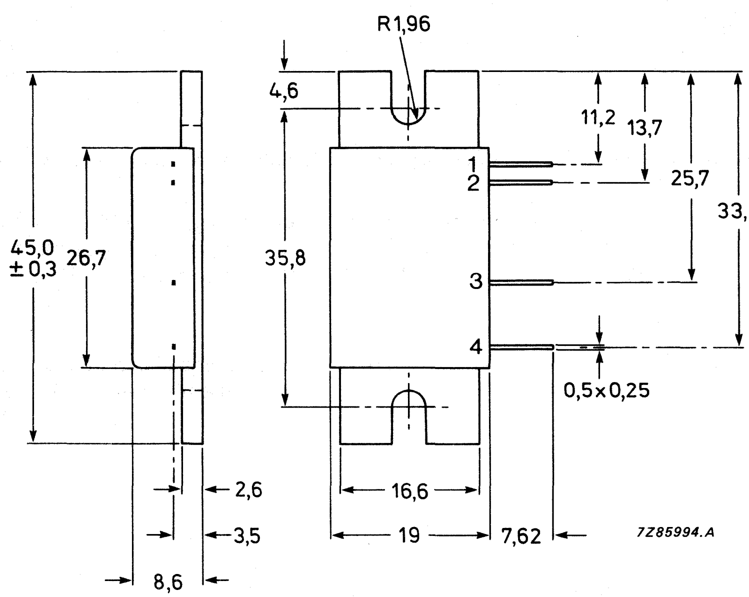


Fig. 1 SOT-183.

PRODUCT SAFETY This device incorporates beryllium oxide (BeO), the dust of which is toxic. The device is entirely safe provided that the internal BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages *	V_{S1}, V_{S2}	max.	15.5	V*
RF input voltage *	$\pm V_i$	max.	25	V*
RF output voltage*	$\pm V_o$	max.	25	V*
Load power	P_L	max.	40	W**
Drive power	P_D	max.	400	mW
Storage temperature range	T_{stg}		−40 to + 100	°C
Operating temperature	T_h	max.	90	°C

CHARACTERISTICS

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

Quiescent currents $P_D = 0$	I_{Q1}	typ.	10	mA
	I_{Q2}	typ.	25	mA
		max.	35	mA
Frequency range	f		148 – 174	MHz
Efficiency $P_L = 28$ W	η	min.	40	%
		typ.	45	%
RF drive power $P_L = 28$ W	P_D	max.	300	mW
		typ.	150	mW
Second harmonic rejection $P_L = 28$ W		typ.	35	dB
		min.	30	dB
Input VSWR with respect to 50 Ω	VSWR	typ.	1.5 : 1	
		max.	2.0 : 1	

Stability

The module is stable with load VSWR up to 3 : 1 (all phases) when operated within the following conditions:

$V_{S1} = 6$ to 15.5 V; $V_{S2} = 10$ to 15.5 V; V_{S1} not to exceed V_{S2}; f = 148 – 174 MHz;
$P_D = 50$ to 400 mW provided the maximum ratings of the module are not exceeded. The module should be stable also under no-drive conditions ($P_D = 0.0$ mW) with nominal source and load impedance.

Ruggedness

The module will withstand load VSWR of 20 : 1 for short overload conditions, with P_D, V_{S1} and V_{S2} at maximum values, providing the combination does not cause the matched RF output power rating to be exceeded.

* With respect to the flange.

** See Fig. 2.

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface with heat-conducting compound sparingly applied between module and heatsink. Any burrs on the heatsink should be removed. The connectors may be soldered directly onto 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.

Power rating

In general, it is recommended that the output power from the module under nominal conditions should not exceed 35 W in order to provide adequate safety margins under fault conditions.

Output power control

The module is not designed to be operated over a large range of output power levels. The aim 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 300 mW. The next option is by varying V_{S1} between 6.0 and 12.5 V.

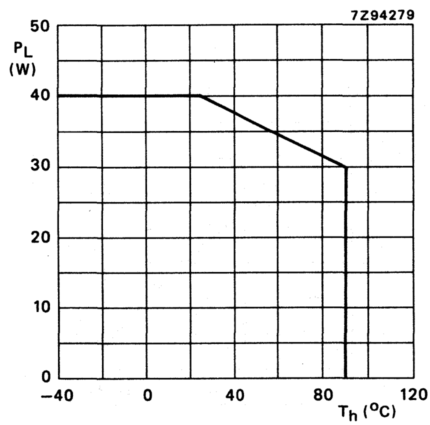


Fig. 2 Load power derating; VSWR = 1 : 1.

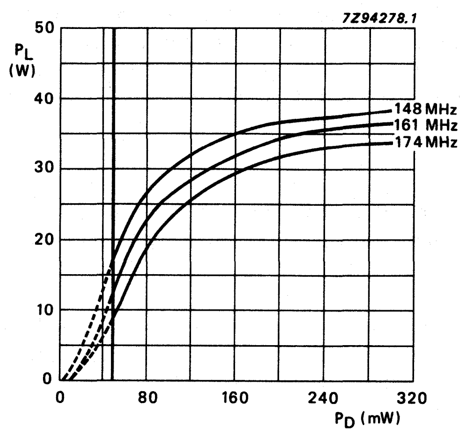


Fig. 3 Load power as a function of drive power; $V_{S1} = V_{S2} = 12.5$ V; $T_h = 25$ °C; typical values.

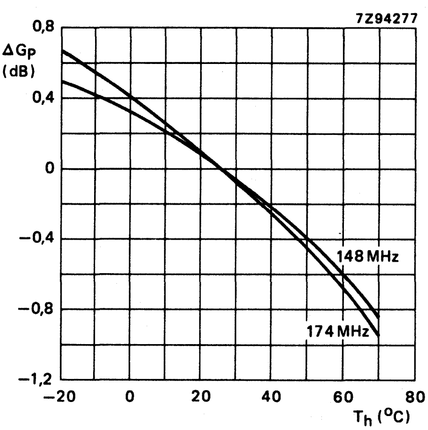


Fig. 4 Power gain as a function of heatsink temperature; $P_D = 300$ mW; $V_{S1} = V_{S2} = 12.5$ V; typical values.

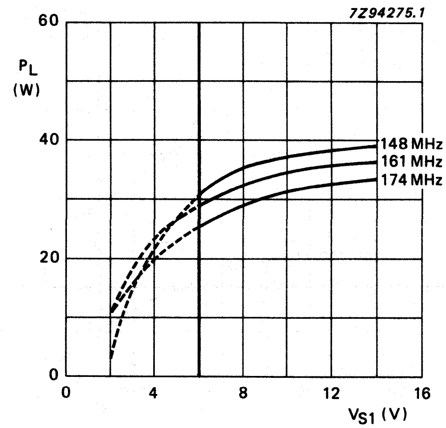


Fig. 5 Load power as a function of supply voltage V_{S1}; P_D = 300 mW; V_{S2} = 12.5 V; typical values.

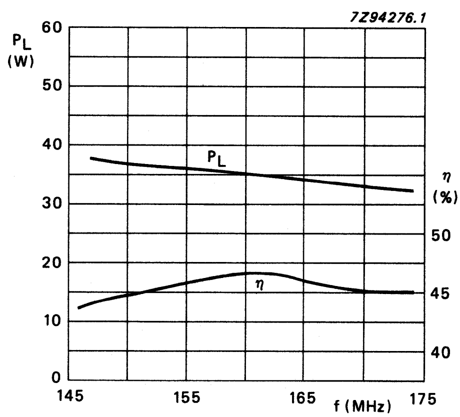


Fig. 6 Load power and efficiency as functions of frequency; V_{S1} = V_{S2} = 12.5 V; P_D = 300 mW; typical values.

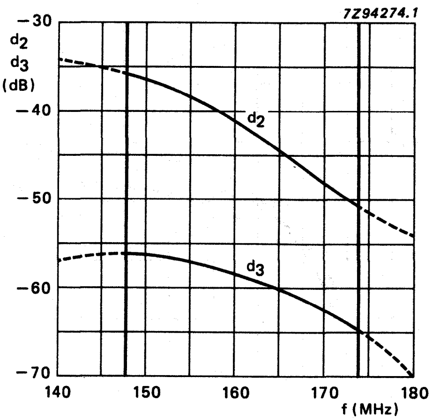


Fig. 7 Second and third harmonic distortions as a function of frequency; $V_{S1} = V_{S2} = 12.5$ V; $P_D = 300$ mW; typical values.

VHF BROADBAND POWER MODULE

VHF broadband power amplifier module primarily designed for mobile communications equipment, operating directly from 12.5 V systems. The module will produce a minimum output of 18 W into a 50 Ω load over the frequency range 170 to 210 MHz.

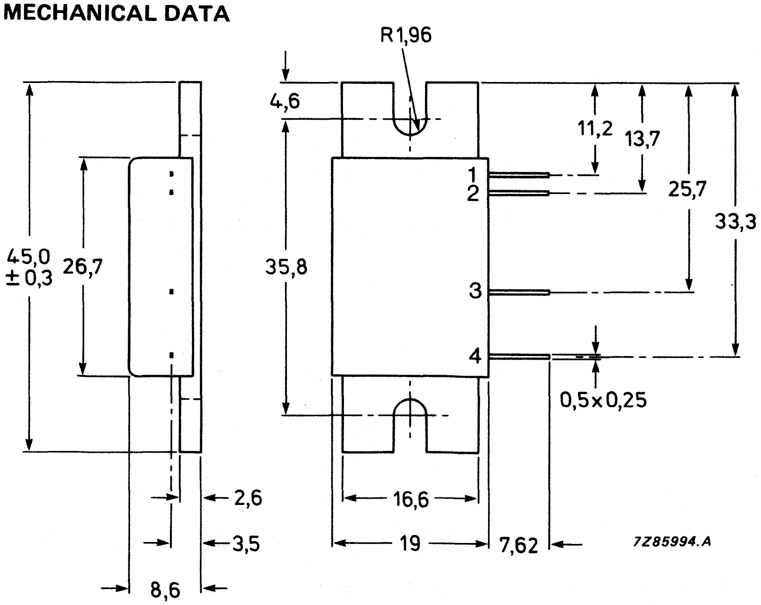
The module consists of a two-stage amplifier using npn transistor chips with lumped-element matching components in a plastic stripline encapsulation. The negative supply is internally connected to the flange.

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range			170 to 210	MHz
DC supply voltage (terminal 2)	V_{S1}		12.5	V
DC supply voltage (terminal 3)	V_{S2}		12.5	V
Drive power	P_D	typ. max.	80 150	mW mW
Load power	P_L	min.	18	W
Efficiency	η	min.	40	%
Operating heatsink temperature	T_h	max.	90	°C

MECHANICAL DATA

Dimensions in mm



Lead reference:
1 = input
2 = V_{S1}
3 = V_{S2}
4 = output
Flange is ground

Fig. 1 SOT-183.

PRODUCT SAFETY **This device incorporates beryllium oxide (BeO), the dust of which is toxic. The device is entirely safe provided that the internal BeO disc is not damaged.**

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages	V_{S1}, V_{S2}	max.	16.5	V
input terminal voltage*	$\pm V_i$	max.	25	V
output terminal voltage*	$\pm V_o$	max.	25	V
Load power (See Fig. 2)	P_L	max.	35	W
Drive power	P_D	max.	300	mW
Storage temperature	T_{stg}		−40 to 100	°C
Operating temperature	T_h	max.	90	°C

CHARACTERISTICS

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

Quiescent currents	I_{Q1}	typ.	10	mA
$P_D = 0$	I_{Q2}	typ.	25	mA
		max.	35	mA
Frequency range	f		170 to 210	MHz
Efficiency				
$P_L = 18$ W	η	min.	40	%
		typ.	45	%
RF drive power				
$P_L = 18$ W	P_D	typ.	80	W
		max.	150	W
Second harmonic rejection				
$P_L = 18$ W		min.	30	dB
Input VSWR		typ.	1.5:1	
		max.	2.0:1	

Stability

The module is stable with load VSWR up to 3:1 (all phases) when operated within the following conditions:
$V_{S1} = 6$ to 16.5 V; $V_{S2} = 10$ to 16.5 V; f = 170 to 210 MHz; $P_D = 30$ to 300 mW provided the maximum ratings of the module are not exceeded.

Note: V_{S1} not to exceed V_{S2}

Ruggedness

The modules will withstand load VSWR of 20:1 (all phases) when operated within the following conditions:
$V_{S1} \leqslant V_{S2} \leqslant 16{,}5$ V; f = 170 to 210 MHz; $P_D \leqslant 300$ mW; $T_h \leqslant 90$ °C, provided the maximum ratings are not exceeded.

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface and heat-conducting compound sparingly applied between module and heatsink. Any burrs on the heatsink should be removed. The connectors may be soldered directly onto 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.

* With respect to the flange.

Power rating

In general, it is recommended that the output power from the module under normal conditions should not exceed 25 W in order to provide adequate safety margins under fault conditions.

Output power control

The module is not designed to be operated over a large range of output power levels. The aim 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 150 mW. The next option is by varying V_{S1} between 6 and 12.5 V.

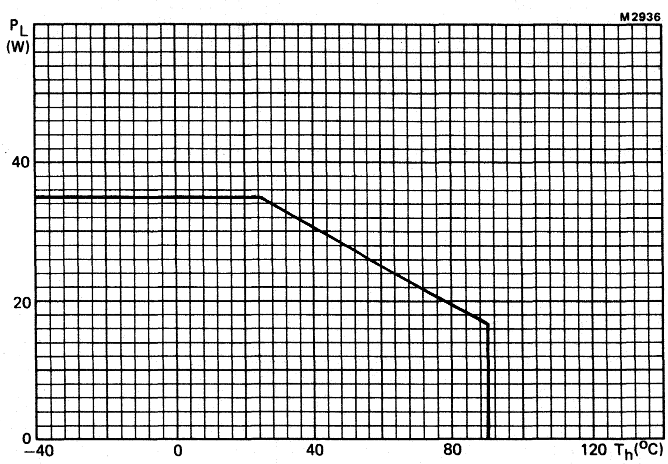


Fig. 2 Load power derating; VSWR = 1:1.

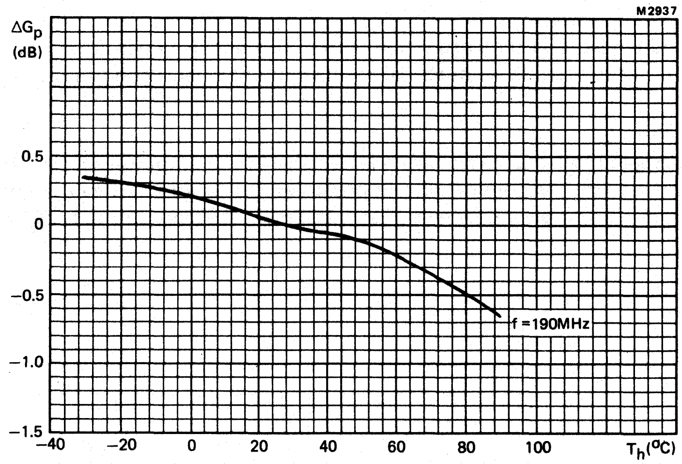


Fig. 3 Power gain as a function of temperature; P_D = 150 mW; $V_{S1} = V_{S2}$ = 12.5 V; typical values.

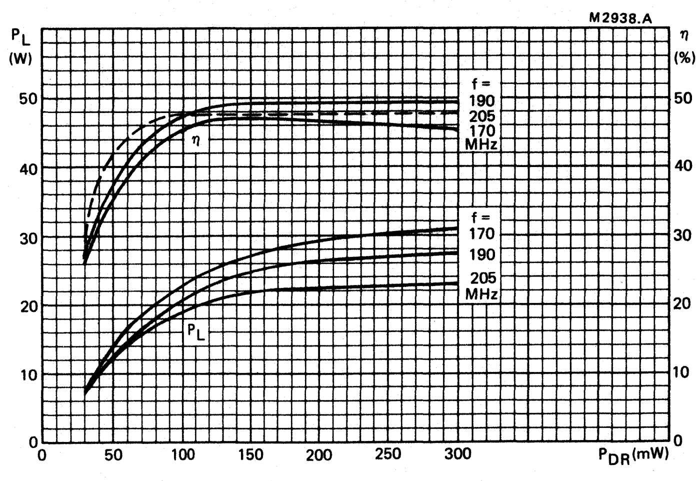


Fig. 4 Load power as a function of drive power; $V_{S1} = V_{S2}$ = 12.5 V; typical values.

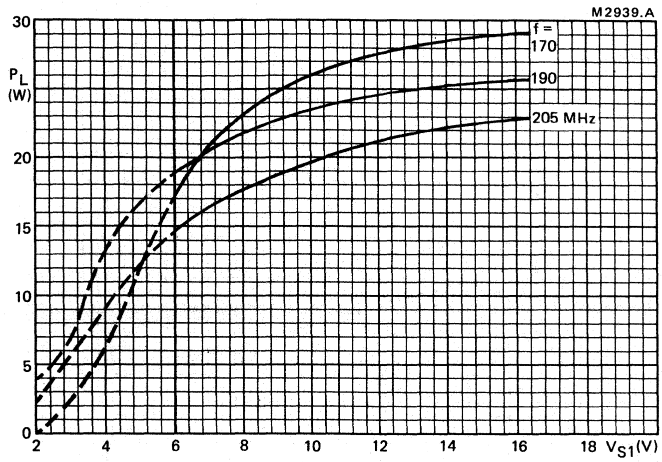


Fig. 5 Load power as a function of supply voltage V_{S1}; P_D = 150 mW; V_{S2} = 12.5 V; typical values.

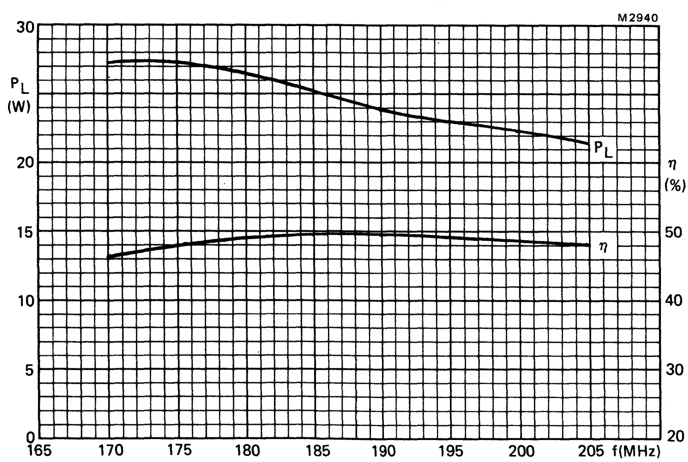


Fig. 6 Load power as a function of frequency; V_{S1} = V_{S2} = 12.5 V; P_D = 150 mW; typical values.

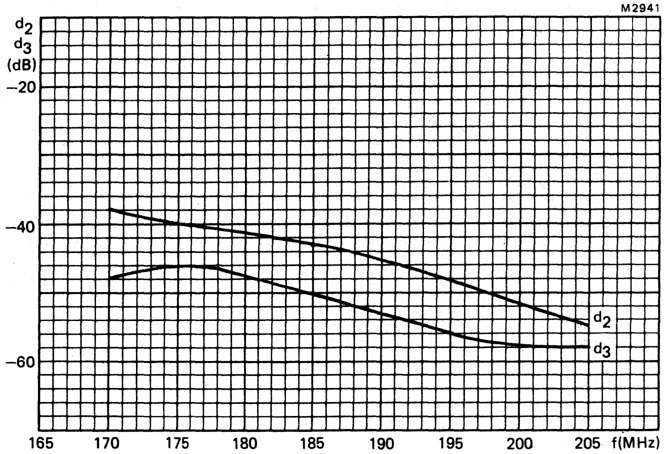


Fig. 7 Second and third harmonic distortions as a function of frequency; $V_{S1} = V_{S2} = 12.5$ V; $P_D = 150$ mW; typical values.

UHF POWER AMPLIFIER MODULE

UHF broadband amplifier module designed for use in mobile communication equipment operating directly from a 9.6 V electrical supply. The module will produce a minimum of 1.4 W into a 50 Ω load over the frequency range 400 to 440 MHz.

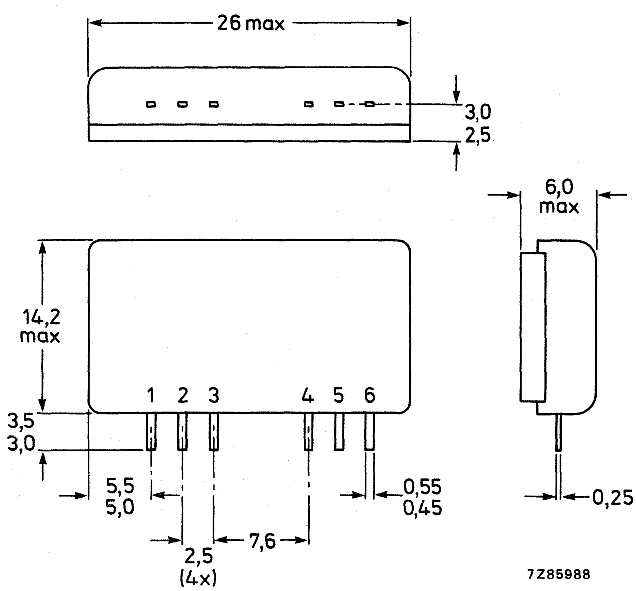
The module consists of a two-stage RF amplifier using npn transistor chips with lumped element matching components in a SOT-181 plastic encapsulation. The negative supply is internally connected to the flange.

QUICK REFERENCE DATA

Mode of operation			continuous wave	
Frequency range			400 to 440	MHz
DC supply voltage (terminal 3)	V_{S1}	nom.	7.5	V
DC supply voltage (terminal 4)	V_{S2}	nom.	9.6	V
RF drive power	P_D	$<$	45	mW
RF load power	P_L	min.	1.4	W
Efficiency	η	typ.	42	%

MECHANICAL DATA

Dimensions in mm



Lead reference

1. RF input
2. Earth
3. V_{S1}
4. V_{S2}
5. Earth
6. RF output

Flange connected to earth.

Fig. 1 SOT-181.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}, V_{S2}	max.	12	V*
RF input terminal voltage*	$\pm V_i$	max.	25	V*
RF output terminal voltage*	$\pm V_o$	max.	25	V*
Load power (see Fig. 2)	P_L	max.	2.5	W
Drive power	P_D	max.	90	mW
Storage temperature range	T_{stg}		−40 to 100	°C
Operating heatsink temperature range	T_h		−30 to 90	°C

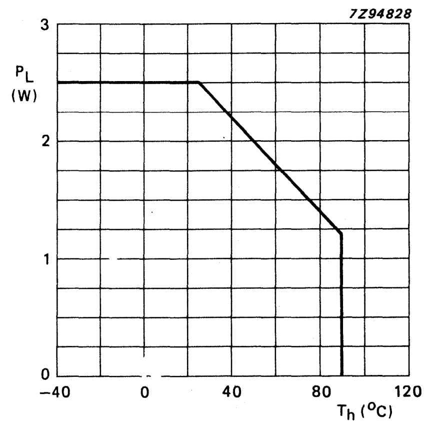


Fig. 2 Load power derating.

CHARACTERISTICS

V_{S1} = 7.5 V; V_{S2} = 9.6 V; R_S = R_L = 50 Ω; f = 400 to 440 MHz; T_h = 25 °C

Quiescent currents $P_D = 0$	I_{Q1}	<	7.0	mA
	I_{Q2}	<	0.1	mA
RF drive power P_L = 1.4 W	P_D	<	45	mW
Efficiency P_L = 1.4 W	η	>	40	%
		typ.	42	%
Harmonic output	any harmonic	min.	30	dB
		typ.	40	dB
Input VSWR with respect to 50 Ω		<	2 : 1	

* With respect to earth pins.

Stability

The module is stable with a load VSWR up to 5 : 1 (all phases) when operated within the following conditions:

$V_{S1} = V_{S2} = 5.0$ V to 11.2 V; $P_D = 17$ to 90 mW; f = 400 to 440 MHz; $P_L < 2.5$ W (matched).

Ruggedness

The module will withstand a load mismatch VSWR of 50 : 1 (all phases) for short period overload conditions, with $P_D \leqslant 90$ mW, $V_{S1} \leqslant V_{S2} \leqslant 12$ V, $P_L < 2.5$ W (matched), $T_h \leqslant 90$ °C.

APPLICATION INFORMATION

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface with heat-conducting compound applied between module and heatsink. The module is designed to be pressed against the heatsink by a sheet spring applying up to 50 N to the top surface of the module encapsulation. 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.

Power rating

In general, it is recommended that the output power from the module under nominal conditions should not exceed 1.5 W in order to provide an adequate safety margin under fault conditions.

Output power control

The module is designed to be operated at a constant output power of 1.4 W. The module is adjusted to produce nominal output by reducing the first stage supply voltage V_{S1}. If the module is to be used over a range of output power levels below 1.4 W, the first stage supply voltage should not be reduced below 5 V. If further reductions in power are needed, this may be achieved by varying the drive power P_D. For stable operation however, care must be taken to avoid operating the module outside the published stability conditions.

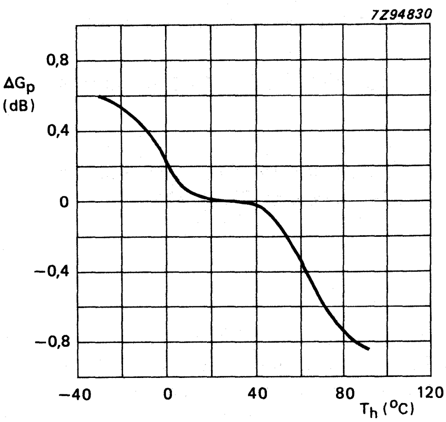


Fig. 3 Power gain as a function of temperature; V_{S1} = 7.5 V; V_{S2} = 9.6 V; P_D = 45 mW; typical values.

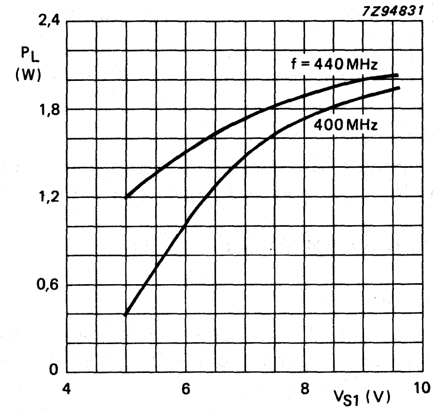


Fig. 4 Load power as a function of supply voltage V_{S1}; V_{S2} = 9.6 V; P_D = 45 mW; typical values.

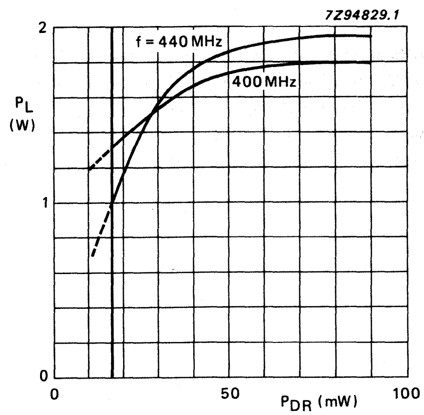


Fig. 5 Load power as a function of drive power; V_{S1} = 7.5 V; V_{S2} = 9.6 V; typical values.

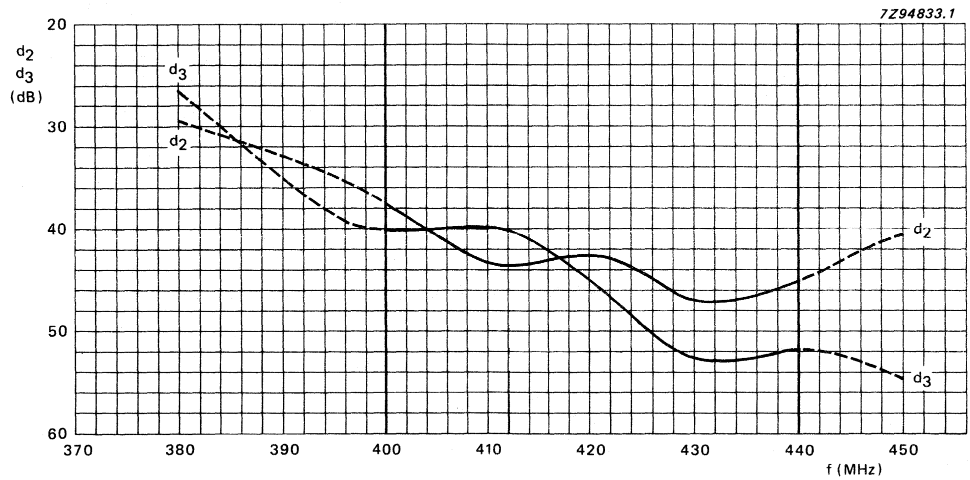


Fig. 6 Second and third harmonic distortions as a function of frequency; V_{S1} = 7.5 V; V_{S2} = 9.6 V; P_D = 45 mW; typical values.

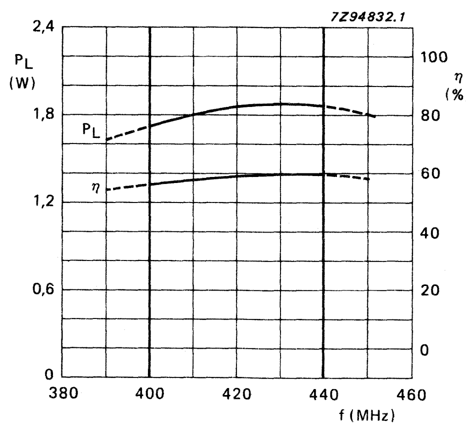


Fig. 7 Load power and efficiency as functions of frequency; V_{S1} = 7.5 V; V_{S2} = 9.6 V; P_D = 45 mW; typical values.

UHF POWER AMPLIFIER MODULE

UHF broadband amplifier module designed for use in mobile communication equipment operating directly from a 9.6 V electrical supply. The module will produce a minimum of 1.4 W into a 50 Ω load over the frequency range of 430 to 470 MHz.

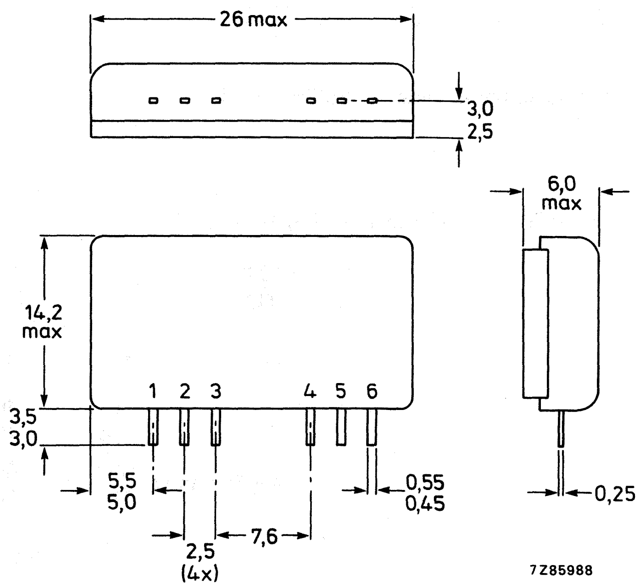
The module consists of a two-stage RF amplifier using npn transistor chips with lumped element matching components in a SOT-181 plastic encapsulation. The negative supply is internally connected to the flange.

QUICK REFERENCE DATA

Mode of operation		continuous wave		
Frequency range			430 to 470	MHz
DC supply voltage (terminal 3)	V_{S1}	nom.	7.5	V
DC supply voltage (terminal 4)	V_{S2}	nom.	9.6	V
RF drive power	P_D	<	45	mW
RF load power	P_L	min.	1.4	W
Efficiency	η	typ.	45	%

MECHANICAL DATA

Dimensions in mm



Lead reference

1. RF input
2. Earth
3. V_{S1}
4. V_{S2}
5. Earth
6. RF output

Flange connected to earth.

Fig. 1 SOT-181.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}, V_{S2}	max.	12	V*
RF input terminal voltage*	$\pm V_i$	max.	25	V*
RF output terminal voltage*	$\pm V_o$	max.	25	V*
Load power (see Fig. 2)	P_L	max.	2.5	W
Drive power	P_D	max.	90	mW
Storage temperature range	T_{stg}	−40 to + 100		°C
Operating heatsink temperature	T_h	max.	90	°C

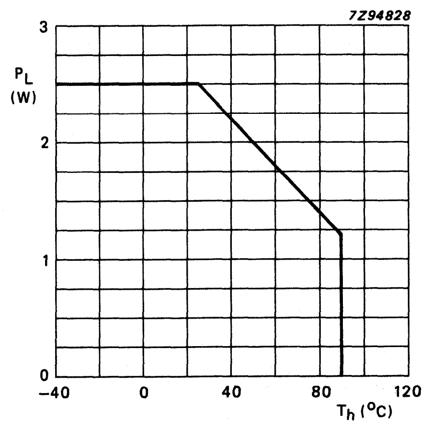


Fig. 2 Load power derating; VSWR = 1 : 1.

CHARACTERISTICS

V_{S1} = 7.5 V; V_{S2} = 9.6 V; R_S = R_L = 50 Ω; f = 430 to 470 MHz; T_h = 25 °C

Quiescent currents $P_D = 0$	I_{Q1} I_{Q2}	< <	7.0 0.1	mA mA
RF drive power $P_L = 1.4$ W	P_D	<	45	mW
Efficiency $P_L = 1.4$ W	η	> typ.	40 45	% %
Harmonic output	any harmonic	min. typ.	30 40	dB dB
Input VSWR with respect to 50 Ω		<	2 : 1	

* With respect to the earth pins.

Stability

The module is stable with a load VSWR up to 5 : 1 (all phases) when operated within the following conditions:

$V_{S1} \leqslant V_{S2}$ = 5.0 V to 11.2 V; P_D = 17 to 90 mW; f = 430 to 470 MHz; $P_L < 2.5$ W (matched).

Ruggedness

The module will withstand a load mismatch VSWR of 50 : 1 (all phases) for short period overload conditions, with $P_D \leqslant 90$ mW, $V_{S1} \leqslant V_{S2} \leqslant 12$ V, $P_L < 2.5$ V (matched), $T_h < 90$ °C.

APPLICATION INFORMATION

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface with heat-conducting compound applied between module and heatsink. The module is designed to be pressed against the heatsink by a sheet spring applying up to 50 N to the top surface of the module encapsulation. 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.

Power rating

In general, it is recommended that the output power from the module under nominal conditions should not exceed 1.5 W in order to provide an adequate safety margin under fault conditions.

Output power control

The module is designed to be operated at a constant output power of 1.4 W. The module is adjusted to produce nominal output by reducing the first stage supply voltage V_{S1}. If the module is to be used over a range of output power levels below 1.4 W, the first stage supply voltage should not be reduced below 5 V. If further reductions in power are needed, this may be achieved by varying the drive power P_D. For stable operation however, care must be taken to avoid operating the module outside the published stability conditions.

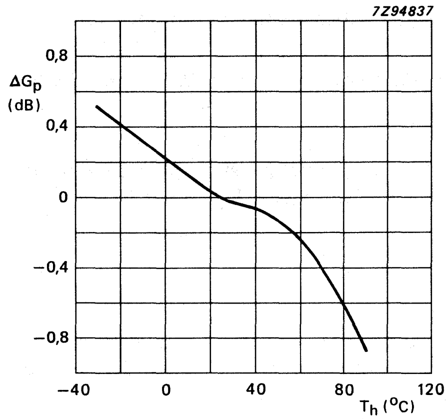


Fig. 3 Power gain as a function of temperature; V_{S1} = 7.5 V; V_{S2} = 9.6 V; P_D = 45 mW; typical values.

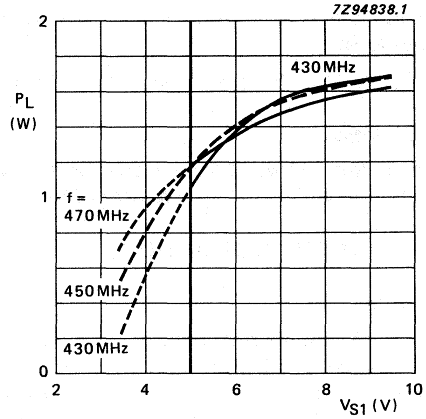


Fig. 4 Load power as a function of supply voltage V_{S1}; V_{S2} = 9.6 V; P_D = 45 mW; typical values.

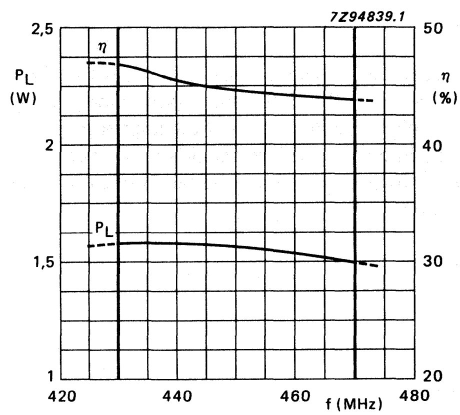


Fig. 5 Load power and efficiency as functions of frequency; V_{S1} = 7.5 V; V_{S2} = 9.6 V; P_D = 45 mW; typical values.

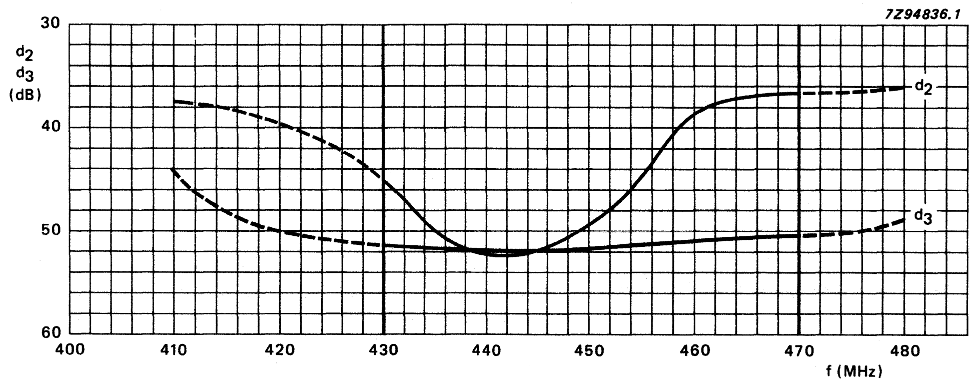


Fig. 6 Second and third harmonic distortions as a function of frequency; V_{S1} = 7.5 V; V_{S2} = 9.6 V; P_D = 45 mW; typical values.

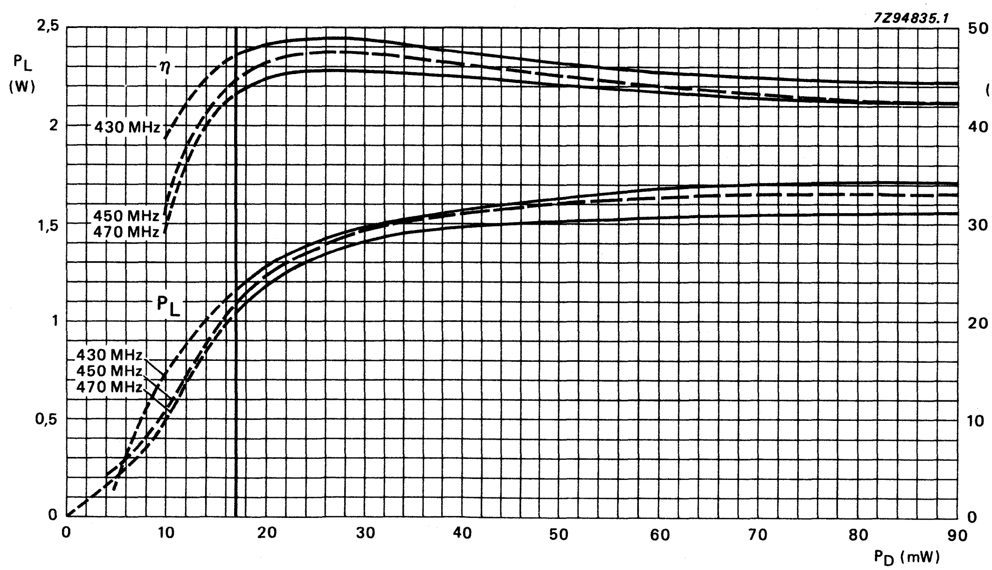


Fig. 7 Load power and efficiency as functions of drive power; V_{S1} = 7.5 V; V_{S2} = 9.6 V; typical values.

UHF POWER AMPLIFIER MODULE

A broadband UHF amplifier module primarily designed for mobile communications equipment, operating directly from 7.5 V or 9.6 V electrical systems. The module will produce a minimum output of 2.0 W or 3.2 W into a 50 Ω load over the frequency range 400 to 470 MHz.

The module consists of a two-stage RF amplifier, using npn transistor chips with lumped-element matching components in a plastic stripline encapsulation (SOT181). The negative supply is internally connected to the flange.

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range			400 to 470	MHz
DC supply voltage (terminal 3)	V_{S1}		7.5 or 9.6	V
DC supply voltage (terminal 4)	V_{S2}		7.5 or 9.6	V
RF drive power	P_D	max.	50	mW
RF load power	P_L	min.	2.0 or 3.2	W
Efficiency	η	typ.	44	%

MECHANICAL DATA

Dimensions in mm

Lead reference

1 = RF input
2 = Earth
3 = V_{S1}
4 = V_{S2}
5 = Earth
6 = RF output
Flange = earth

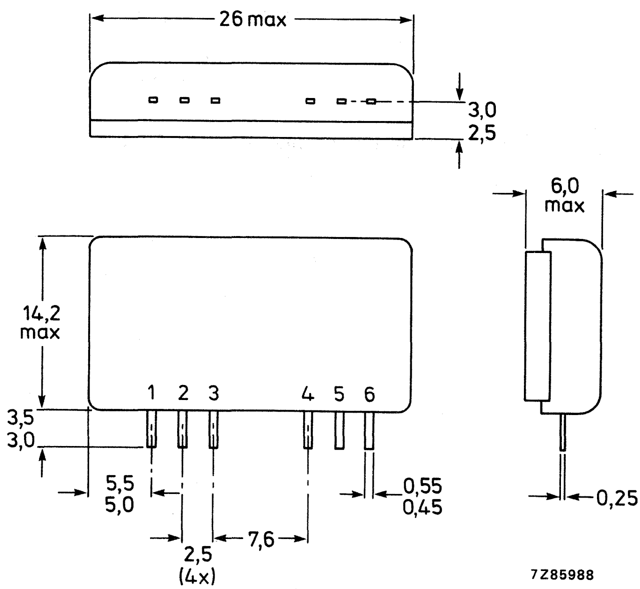


Fig.1 SOT181.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}, V_{S2}	max.	12	V
RF input terminal voltage*	$\pm V_i$	max.	25	V
RF output terminal voltage*	$\pm V_o$	max.	25	V
Load power	P_L	max.	5.0	W
Drive power	P_D	max.	90	mW
Storage temperature range	T_{stg}		−40 to 100	°C
Operating heatsink temperature	T_h	max.	90	°C

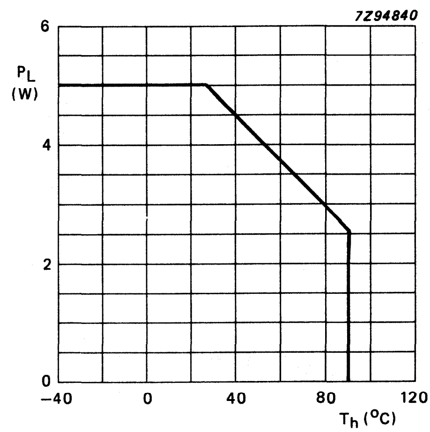


Fig.2 Load power derating; VSWR = 1 : 1.

* With respect to the earth pins.

CHARACTERISTICS

$Z_S = Z_L = 50\ \Omega$; frequency range = 400 to 470 MHz; $T_h = 25\ ^oC$ unless otherwise specified.

Quiescent currents			
$V_{S1} = V_{S2} = 7.5$ V or 9.6 V;	I_{Q1}	max.	7.0 mA
$P_D = 0$	I_{Q2}	max.	0.1 mA
Efficiency			
$P_L = 2.0$ W or $P_L = 3.2$ W	η	min.	40 %
	η	typ.	44 %
RF drive power			
$P_L = 2.0$ W; $V_{S1} = V_{S2} = 7.5$ V	P_D	max.	50 mW
$P_L = 3.2$ W; $V_{S1} = V_{S2} = 9.6$ V	P_D	max.	50 mW
Harmonic output	any harmonic	min.	−30 dB
		typ.	−40 dB
Input VSWR			
with respect to 50 Ω	VSWR	max.	2:1

Stability

The module is stable with a load VSWR up to 5:1 (all phases) when operated within the following conditions:

$V_{S1} \leqslant V_{S2} = 5.0$ V to 11.2 V; $P_D = 25$ to 90 mW; f = 400 to 470 MHz; $P_L < 5.0$ W (matched)

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 cause the matched RF output power rating to be exceeded.

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface with heat-conducting compound applied between module and heatsink. 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 a least 1 mm from the plastic.

Power rating

In general it is recommended that the output power from the module under nominal conditions should not exceed 4 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 aim 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 25 and 50 mW. The next option is by varying V_{S1} between 5.0 and 9.6 V.

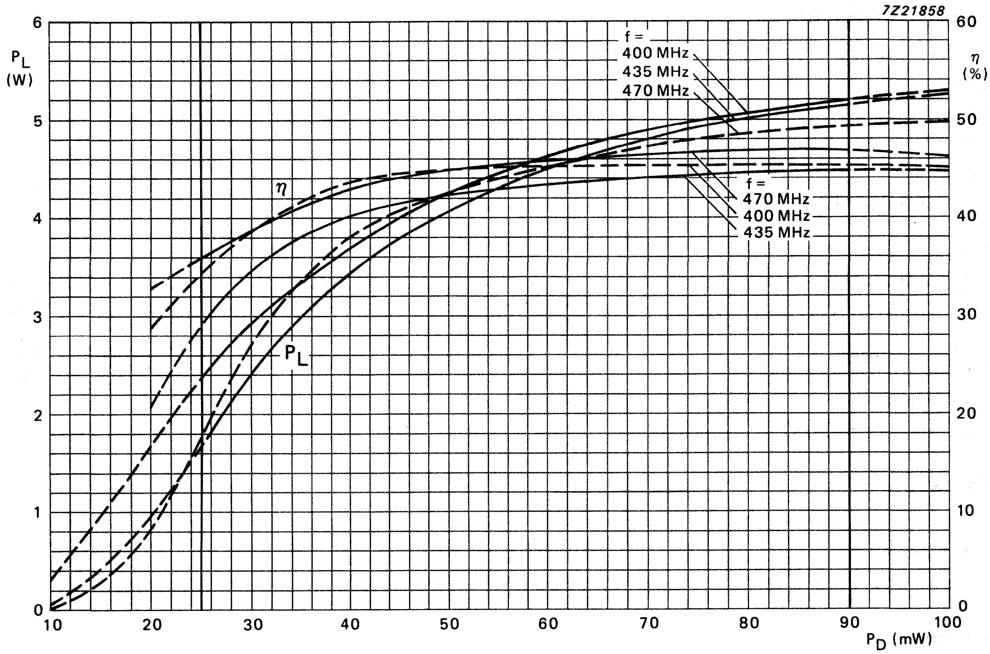


Fig.3 Load power and efficiency as functions of drive power; $V_{S1} = V_{S2} = 9.6$ V; typical values.

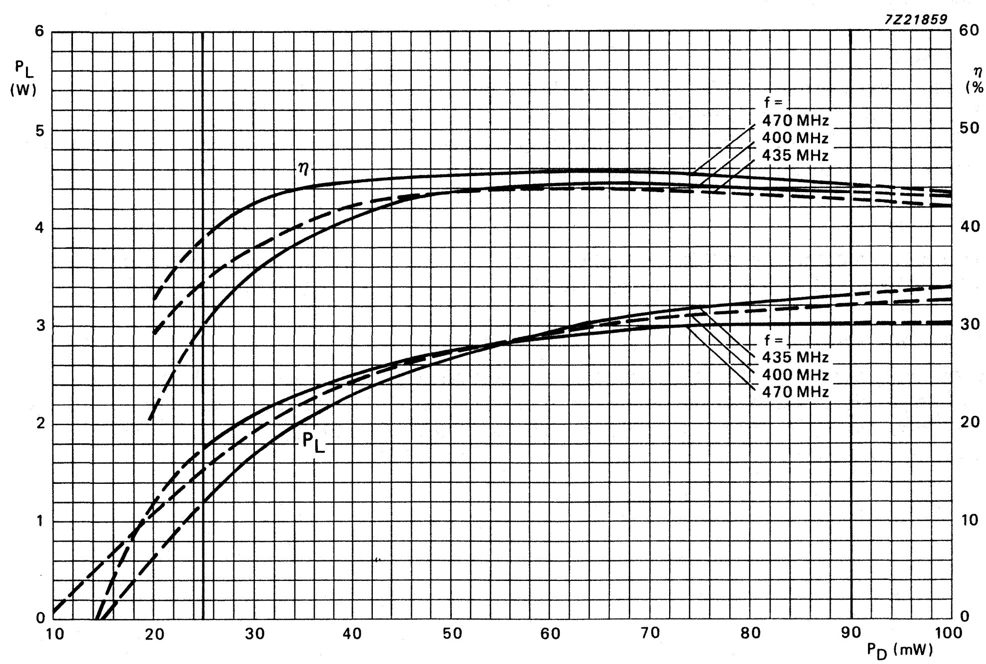


Fig.4 Load power and efficiency as functions of drive power; $V_{S1} = V_{S2} = 7.5$ V; typical values.

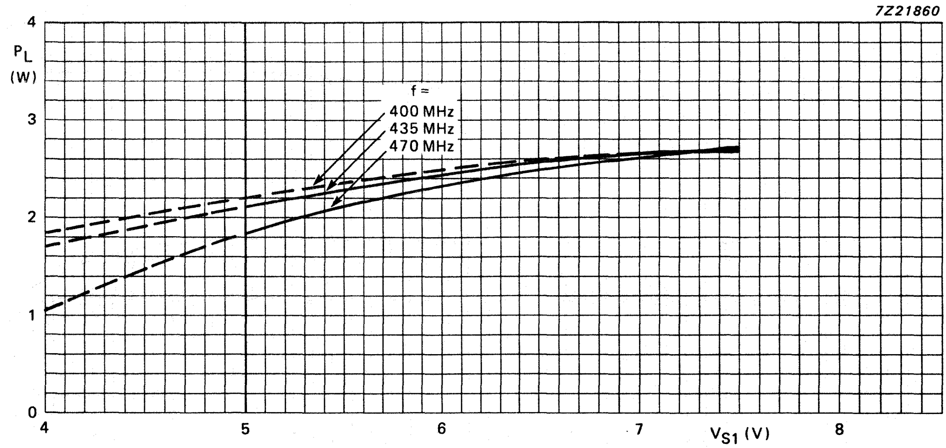


Fig.5 Load power as a function of V_{S1}; V_{S2} = 7.5 V; P_D = 50 mW; typical values.

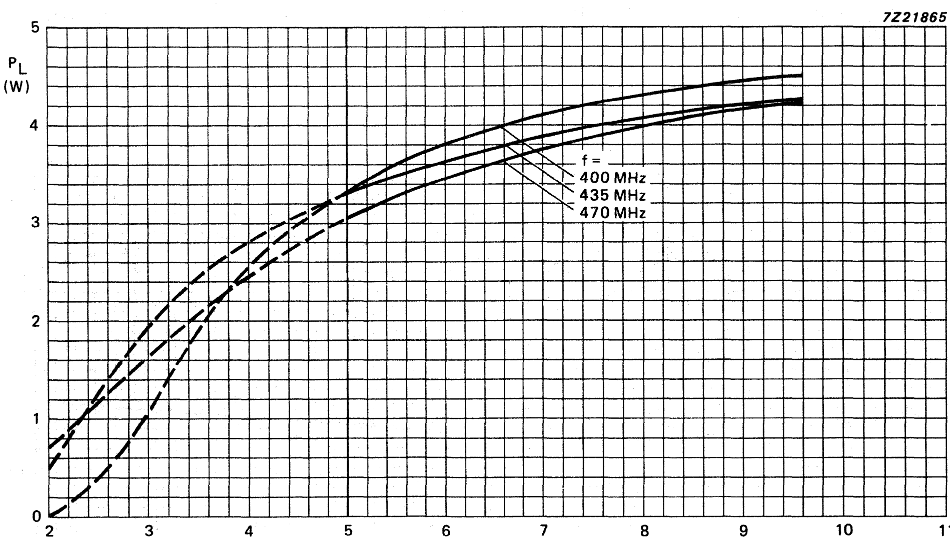


Fig.6 Load power as a function of V_{S1}; V_{S2} = 9.6 V; P_D = 50 mW; typical values.

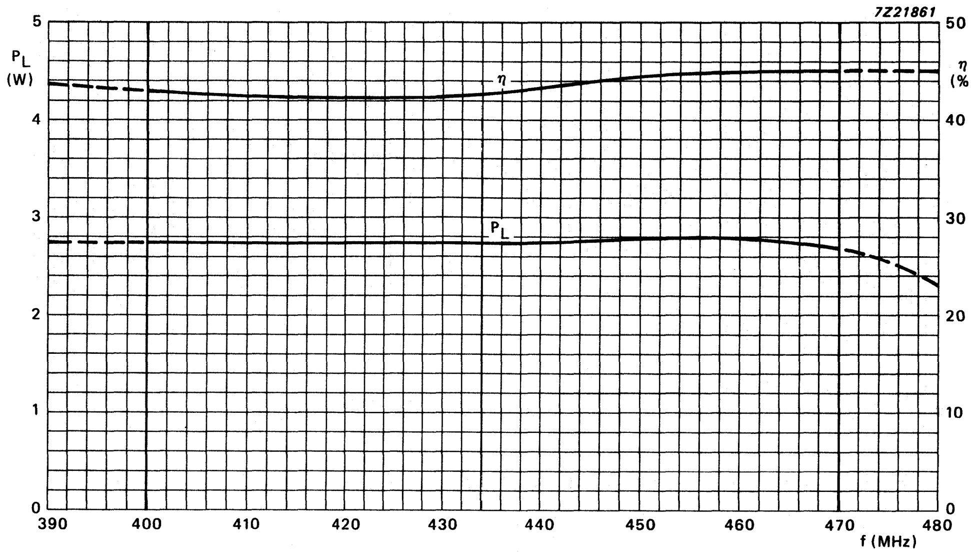


Fig.7 Load power and efficiency as functions of frequency; $V_{S1} = V_{S2} = 7.5$ V; $P_D = 50$ mW; typical values.

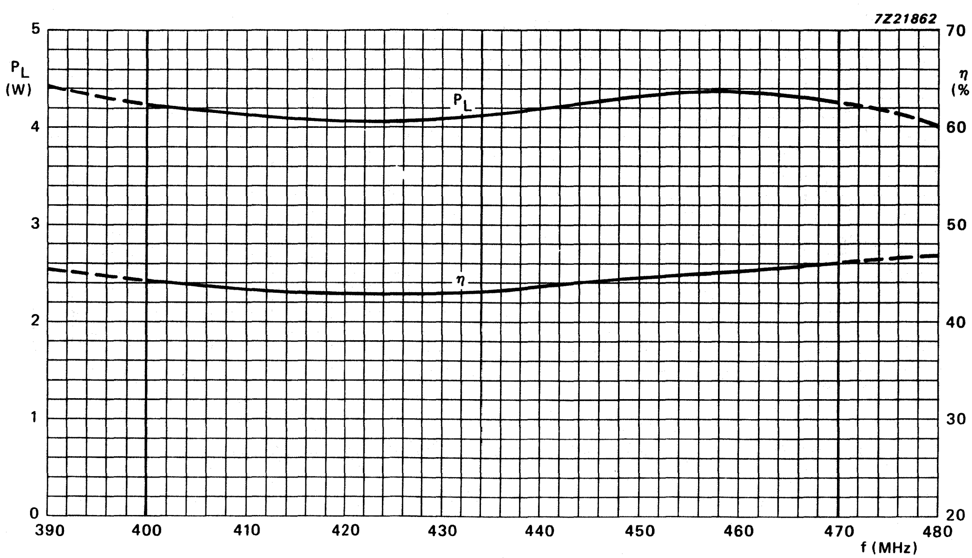


Fig.8 Load power and efficiency as functions of frequency; $V_{S1} = V_{S2} = 9.6$ V; $P_D = 50$ mW; typical values.

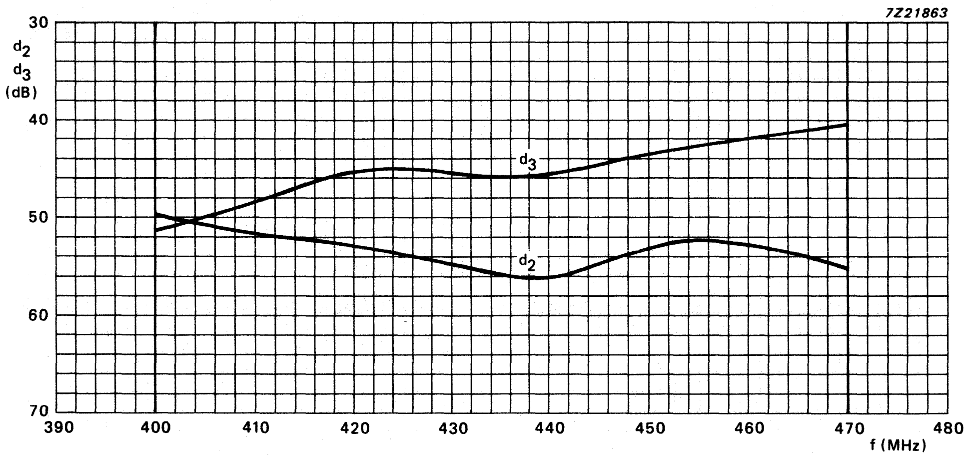


Fig.9 Second and third harmonic distortions as functions of frequency; $V_{S1} = V_{S2} = 7.5$ V; $P_D = 50$ mW; typical values.

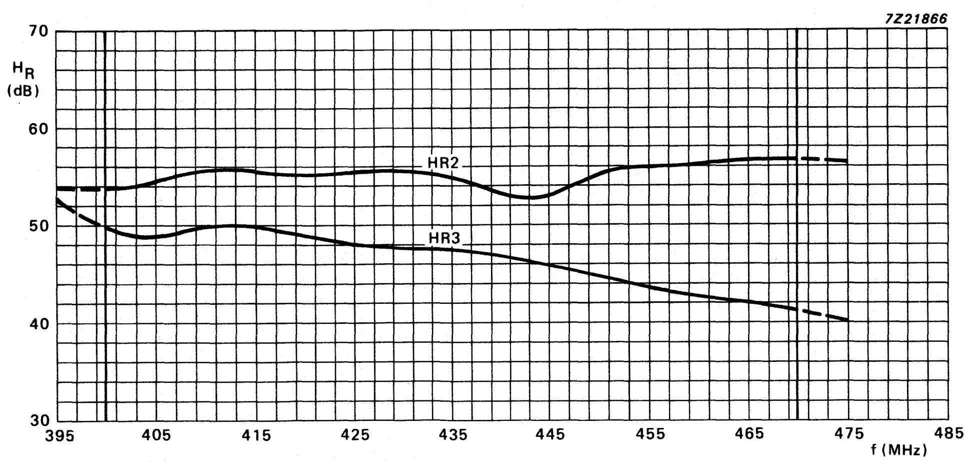


Fig.10 Second and third harmonic distortions as functions of frequency; $V_{S1} = V_{S2} = 9.6$ V; $P_D = 50$ mW; typical values.

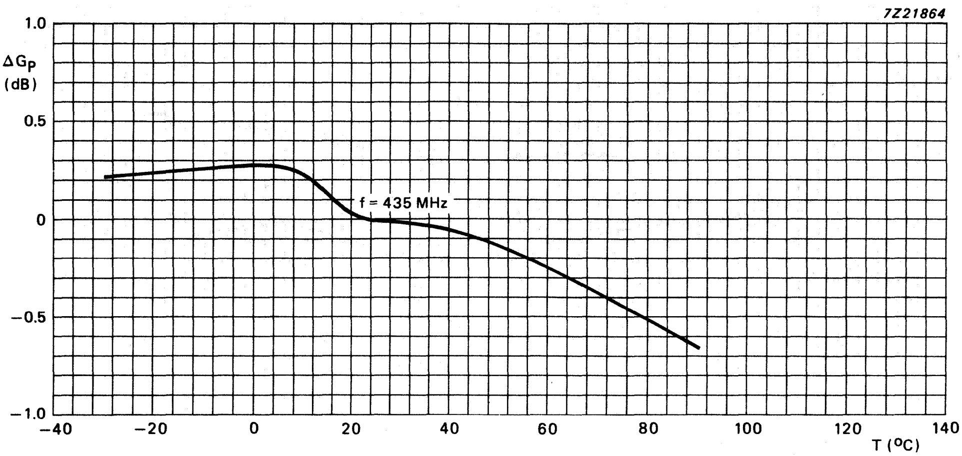


Fig.11 Power gain as a function of temperature; P_D = 50 mW; V_{S1} = V_{S2} = 7.5 V; typical values.

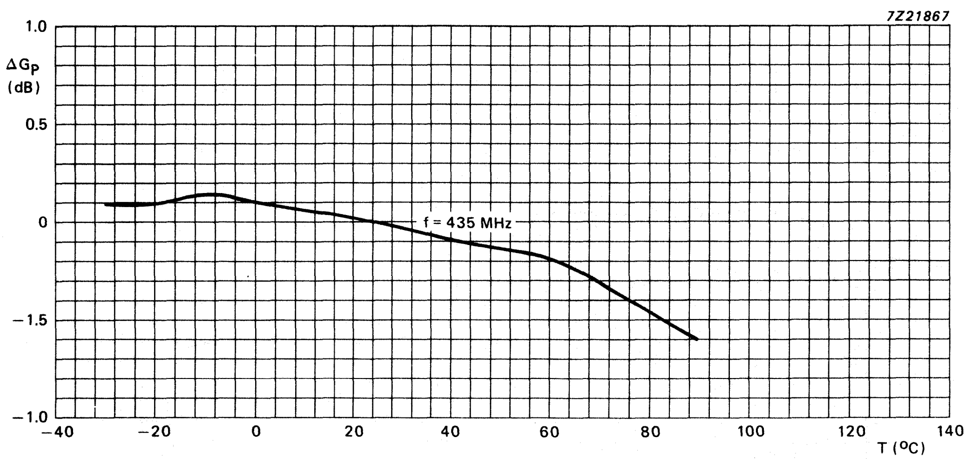


Fig.12 Power gain as a function of temperature; P_D = 50 mW; V_{S1} = V_{S2} = 9.6 V; typical values.

UHF AMPLIFIER MODULE

A UHF amplifier module designed for use in portable transmitters operating from a 9.6 V supply. The module is a two-stage amplifier using npn transistors mounted on a thin-film metallized alumina substrate with a stripline matching circuit.

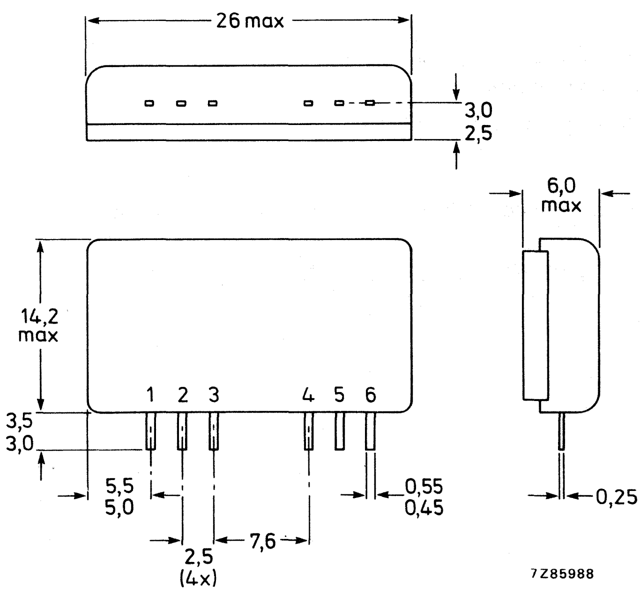
QUICK REFERENCE DATA

Mode of operation: frequency modulation

RF performance	f MHz	V_{S1} V	V_{S2} V	P_D mW	P_L W
	460 to 512	7.5	9.6	< 50	> 3.2

MECHANICAL DATA

Dimensions in mm



Lead reference
1. RF input
2. Earth
3. V_{S1}
4. V_{S2}
5. Earth
6. RF output

Flange = earth

Fig. 1 SOT181.

RATINGS

Limiting values in accordance with the Absolute Maximum Ssyetm (IEC 134)

DC supply terminal voltages*	V_{S1}/V_{S2}	max.	12	V*
RF input voltage*	$\pm V_i$	max.	25	V*
RF output voltage*	$\pm V_o$	max.	25	V*
Load power	P_L	max.	5	W
Drive power	P_D	max.	90	mW
Storage temperature range	T_{stg}		−40 to 100	°C
Operating heatsink temperature	T_h	max.	90	°C

CHARACTERISTICS

Quiescent currents				
$V_{S1} = 7.5$ V; $V_{S2} = 9.6$ V; $P_D = 0$; $T_h = 25$ °C	I_{Q1}	<	7	mA
	I_{Q2}	<	0.1	mA
Efficiency				
when operated under nominal conditions	η	>	36	%
Harmonic output				
$V_{S1} = 7.5$ V; $V_{S2} = 9.6$ V; $P_D = 50$ mW	any harmonic	<	−30	dB

Stability

The module will produce no spurious signals with a load mismatch of up to 5 VSWR (all phases) when operated within the following conditions:

$V_{S1} = 6$ to 12 V; $V_{S2} = 8$ to 12 V; $P_D = 25$ to 90 mW.

Ruggedness

The module will withstand a load mismatch VSWR of 50 (all phases) when operated within the following conditions:

$V_{S1} < 12$ V; $V_{S2} < 12$ V; $P_D < 90$ mW; $P_L < 5$ W; $T_h < 90$ °C

* With respect to flange.

UHF AMPLIFIER MODULE

UHF amplifier module designed for use in portable transmitters operating from a 9.6 V electrical supply. The module is a three-stage amplifier consisting of bipolar silicon npn transistors and lumped element matching circuits.

The BGY48A will produce a minimum of 5 W into a 50 Ω load over the 400 to 440 MHz frequency range.

QUICK REFERENCE DATA

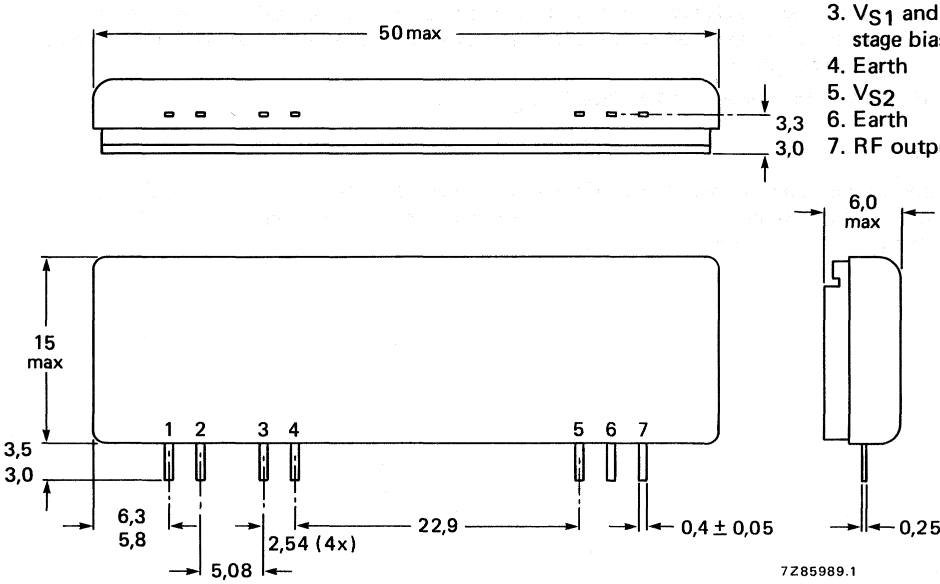
Mode of operation	continuous wave		
Frequency range		400 to 440	MHz
RF load power $V_{S1} = V_{S2} = 9.6$ V; $P_D = 50$ mW	>	5.0	W
RF drive power $V_{S1} = V_{S2} = 9.6$ V; $P_L = 5.0$ W	<	35	mW
Input and output impedances	nom.	50	Ω

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT182.

Lead reference
1. RF input
2. Earth
3. V_{S1} and second stage bias
4. Earth
5. V_{S2}
6. Earth
7. RF output



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}/V_{S2}	max.	13.5	V*
RF input voltage*	$\pm V_i$	max.	25	V*
RF output voltage*	$\pm V_o$	max.	25	V*
Load power	P_L	max.	9	W
Drive power	P_D	max.	70	mW
Storage temperature range	T_{stg}		−40 to 100	°C
Operating heatsink temperature	T_h	max.	90	°C

CHARACTERISTICS

Quiescent currents				
second stage current with first stage open circuit V_{S2} = 9.6 V; P_D = 0; R_S = R_L = 50 Ω; I_{S1} = 0	I_{Q2} I_{Q2}	< typ.	0.5 0.1	mA mA
first stage current V_{S1} = 7.1 V; V_{S2} = 9.6 V; P_D = 0; R_S = R_L = 50 Ω	I_{Q1}	typ.	2	mA
Efficiency V_{S1} = V_{S2} = 9.6 V; P_L = 5,0 W; R_S = R_L = 50 Ω	η	> typ.	40 42	% %
Harmonic output V_{S1} = V_{S2} = 9.6 V; P_D = 35 mW; R_S = R_L = 50 Ω	any harmonic (relative to carrier)	< typ.	−40 −50	dB dB
Input VSWR V_{S1} = V_{S2} = 9.6 V; P_D = 35 mW; R_S = R_L = 50 Ω	VSWR	max.	2	

Stability

The module will produce no signals at frequencies other than that of the carrier and harmonics of the carrier frequency when operated with a load mismatch of 5 VSWR (all phases) and when operated within the following conditions:

$V_{S1} \leqslant V_{S2}$ = 4 to 11.2 V; P_D = 17 to 70 mW; $P_L < 9.0$ W.

Ruggedness

The module will withstand a load VSWR of 50 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 derating curve being exceeded. T_h = 90 °C.

* With respect to earth pins.

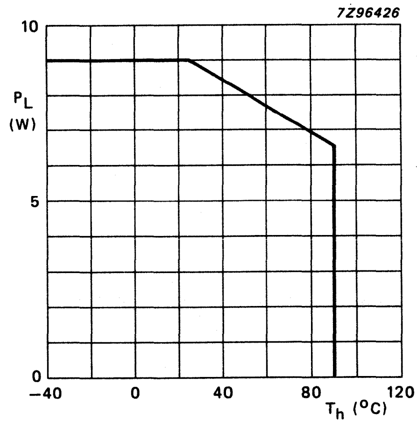


Fig. 2 Load power derating; VSWR = 1 : 1.

UHF POWER AMPLIFIER MODULE

UHF broadband amplifier module designed for use in mobile communication equipment operating directly from a 9.6 V electrical supply. The module will produce a minimum of 5 W into a 50 Ω load over the frequency range 430 to 470 MHz.

The module consists of a two-stage RF amplifier using npn transistor chips with lumped element matching components in a SOT182 plastic encapsulation.

QUICK REFERENCE DATA

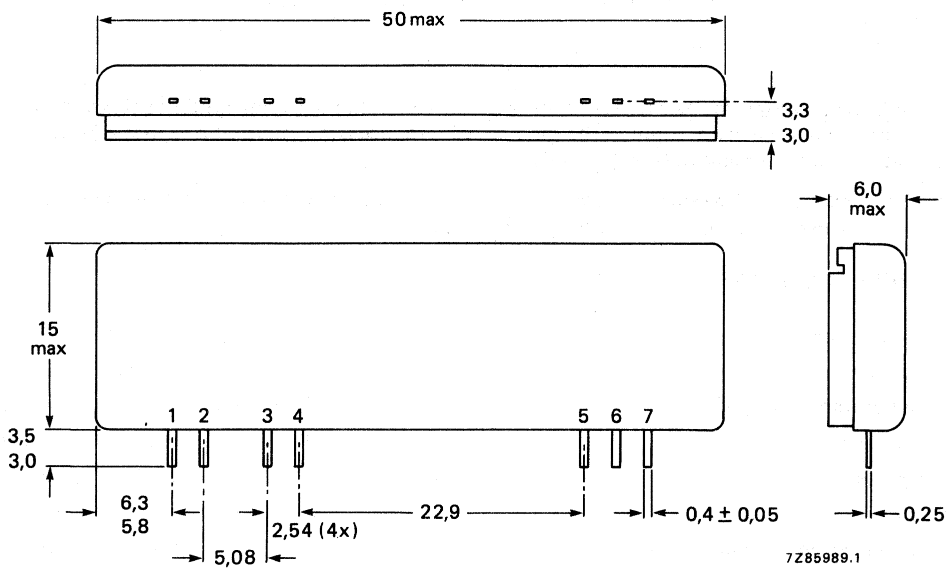
Mode of operation			continuous wave	
Frequency range			430 to 470	MHz
DC supply terminal voltages	V_{S1}; V_{S2}	nom.	9.6	V
RF drive power	P_D	max.	35	mW
RF load power	P_L	min.	5.0	W
Efficiency	n	min.	40	%
Input and output impedance	z_i; Z_l	nom.	50	Ω

MECHANICAL DATA

See Fig.1 next page.

MECHANICAL DATA

Dimensions in mm



Lead reference

1 = RF input
2 = Earth
3 = V_{S1} and second stage bias
4 = Earth
5 = V_{S2}
6 = Earth
7 = RF output

Flange connected to earth

Fig.1 SOT182.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}; V_{S2}	max.	13.5	V
RF input terminal voltage*	$\pm V_i$	max.	25	V
RF output terminal voltage*	$\pm V_o$	max.	25	V
Load power	P_L	max.	9.0	W
Drive power	P_D	max.	70	mW
Storage temperature range	T_{stg}		–40 to 100	°C
Operating heatsink temperature	T_h	max.	90	°C

* With respect to the earth pins.

CHARACTERISTICS

T_h = 25 °C unless otherwise stated

Conditions: $V_{S1} = V_{S2}$ = 9.6 V; $R_S = R_L$ = 50 Ω; f = 430 to 470 MHz

Quiescent currents			
first stage current P_D = 0	I_{Q1}	typ.	10 mA
second stage current with first stage open circuit	I_{Q2}	<	0.5 mA
RF drive power P_L = 5.0 W	P_D	<	35 mW
Efficiency P_L = 5.0 W	η	min. typ.	40 % 44 %
Harmonic output $R_S = R_L$ = 50 Ω	any harmonic	min. typ.	−40 dB −50 dB
Input VSWR with respect to 50 Ω	VSWR	<	2.0 : 1

Stability

The module is stable with a load VSWR up to 5 (all phases) when operated within the following conditions:

$V_{S1} = V_{S2}$ = 4.0 V to 11.2 V; P_D = 17 to 70 mW; f = 430 to 470 MHz; P_L = < 9.0 W (matched)

Ruggedness

The module will withstand a load mismatch VSWR of 50 (all phases) for short period overload conditions, with P_D, V_{S1} and V_{S2} at maximum values, providing the combination does not cause the matched RF output power rating to be exceeded (T_h < 90 °C).

Output power control

The module is designed to be operated at a constant output power of 5.0 W. The module is adjusted to produce nominal output power by reducing the first stage supply voltage V_{S1}. If the module is to be used over a range of output power levels below 5.0 W, the first stage supply voltage should not be reduced below 4.0 V. If further reductions in power are needed this may be achieved by varying the drive power P_D. For stable operation however, care must be taken to avoid operating the module outside the published stability conditions.

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface with heat-conducting compound applied between module and heatsink. The module is designed to be pressed against the heatsink by a sheet spring applying up to 50 N to the top surface of the module encapsulation. 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 s at a distance of at least 1 mm from the plastic.

Power rating

In general, it is recommended that the output power from the module under nominal conditions should not exceed 7 W in order to provide an adequate safety margin under fault conditions.

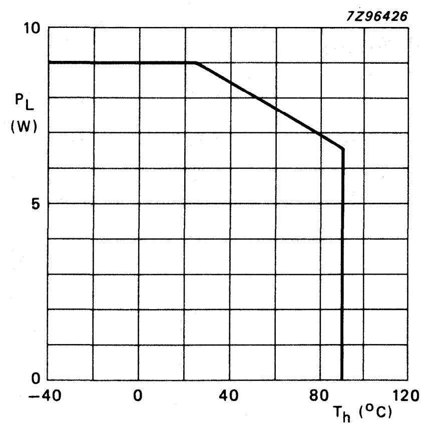


Fig.2 Load power derating; VSWR = 1 : 1.

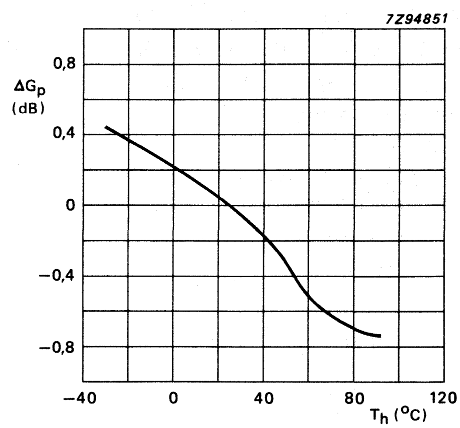


Fig.3 Change in power gain as a function of heatsink temperature; $V_{S1} = V_{S2} = 9.6$ V; typical values.

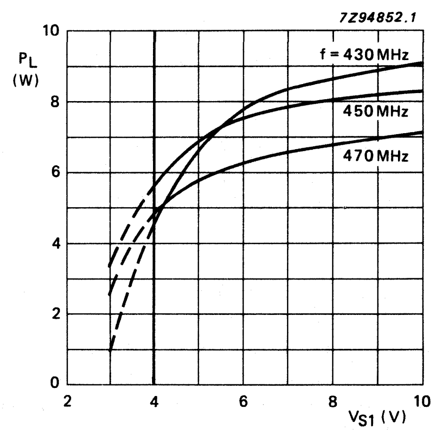


Fig.4 Load power as a function of V_{S1}; $V_{S2} = 9.6$ V; $P_D = 35$ mW; typical values.

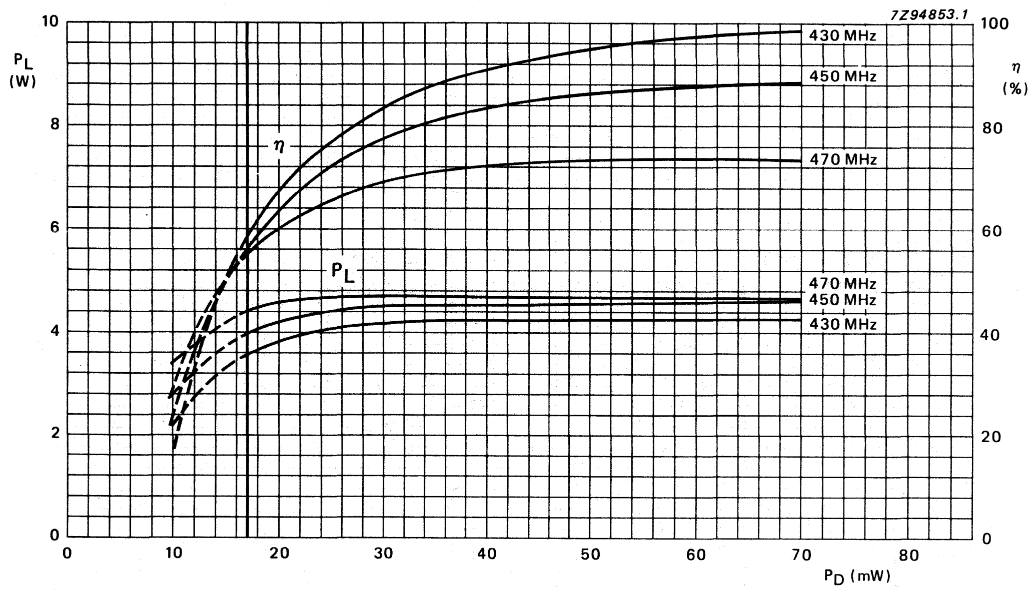


Fig.5 Load power and efficiency as functions of drive power; $V_{S1} = V_{S2} = 9.6$ V; typical values.

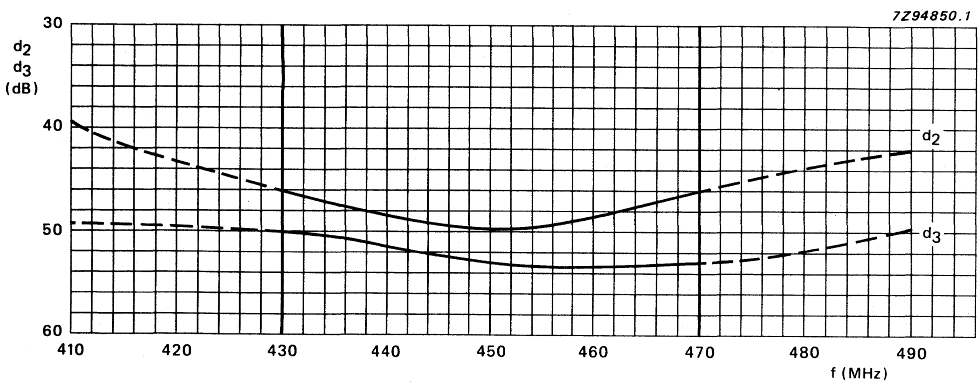


Fig.6 Second and third harmonic distortions as functions of frequency; $V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; typical values.

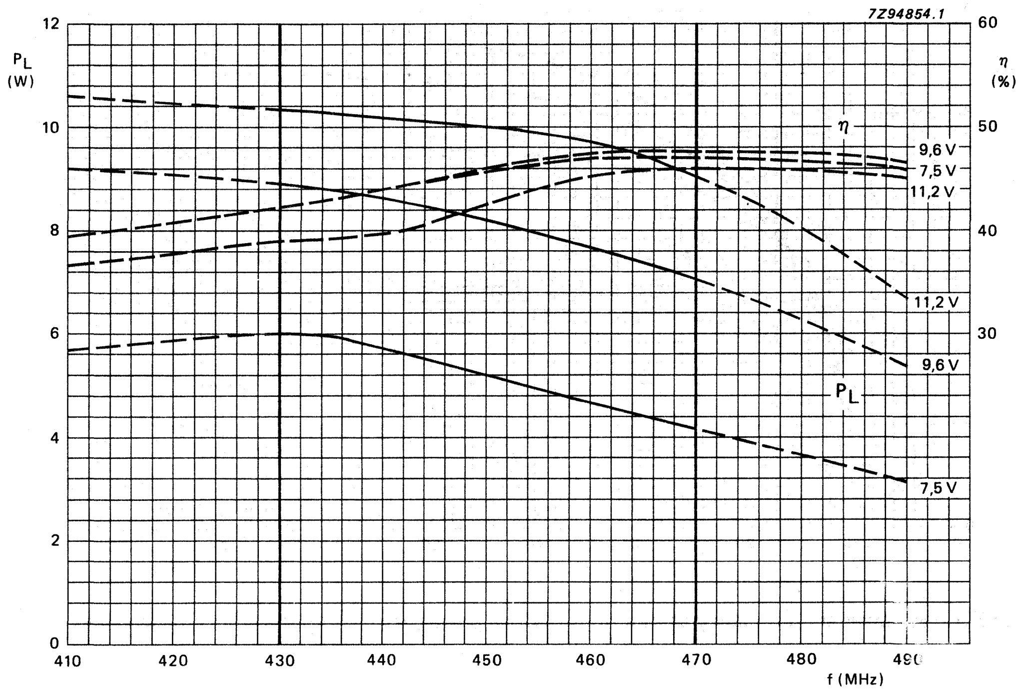


Fig.7 Load power and efficiency as functions of frequency; $V_{S1} = V_{S2}$; P_D = 35 mW; typical values.

U H F POWER AMPLIFIER MODULE

UHF broadband amplifier module designed for use in mobile communication equipment operating directly from a 9.6 V electrical supply. The module will produce a minimum of 5 W into a 50 Ω load over the frequency range 460 to 512 MHz.

The module consists of a two-stage RF amplifier using npn transistor chips with lumped element matching components in a SOT182 plastic encapsulation.

QUICK REFERENCE DATA

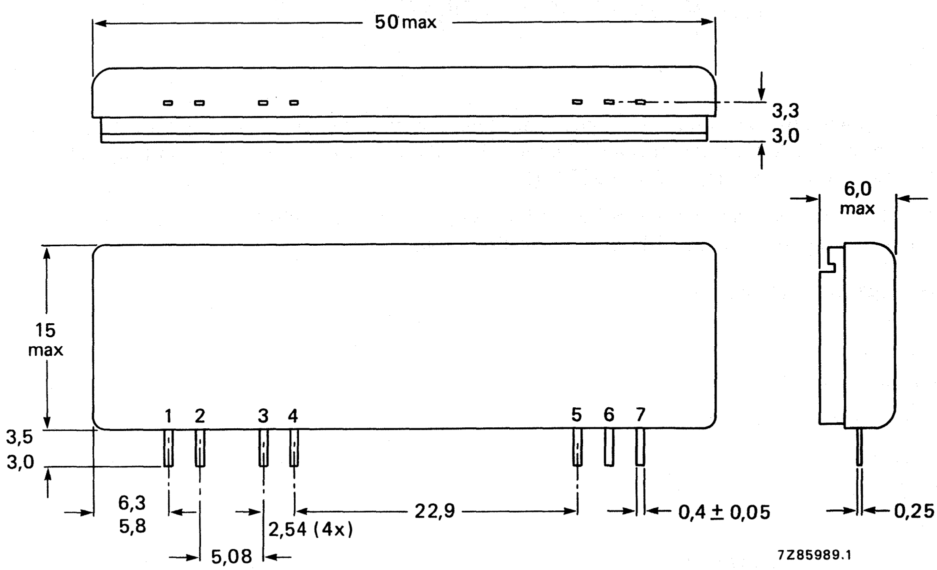
Mode of operation			continuous wave	
Frequency range			460 to 512	MHz
DC supply terminal voltages	V_{S1}; V_{S2}	nom.	9.6	V
RF drive power	P_D	max.	35	mW
RF load power	P_L	min.	5.0	W
Efficiency	n	min.	40	%
Input and output impedances	z_i; Z_l	nom.	50	Ω

MECHANICAL DATA

See Fig.1 next page.

MECHANICAL DATA

Dimensions in mm



Lead reference

1 = RF input
2 = Earth
3 = V_{S1} and second stage bias
4 = Earth
5 = V_{S2}
6 = Earth
7 = RF output

Flange connected to earth

Fig.1 SOT182.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}; V_{S2}	max.	13.5	V
RF input terminal voltage*	$\pm V_i$	max.	25	V
RF output terminal voltage*	$\pm V_o$	max.	25	V
Load power	P_L	max.	9.0	W
Drive power	P_D	max.	70	mW
Storage temperature range	T_{stg}		−40 to 100	°C
Operating heatsink temperature range	T_h		−30 to 90	°C

* With respect to the earth pins.

CHARACTERISTICS

T_h = 25 °C unless otherwise stated

Conditions: $V_{S1} = V_{S2}$ = 9.6 V; $R_S = R_L$ = 50 Ω; f = 460 to 512 MHz

Quiescent currents			
first stage current $P_D = 0$	I_{Q1}	typ.	10 mA
second stage current with first stage open circuit	I_{Q2}	<	0.5 mA
RF drive power P_L = 5.0 W	P_D	<	35 mW
Efficiency P_L = 5.0 W	η	min. typ.	40 % 42 %
Harmonic output $R_S = R_L$ = 50 Ω	any harmonic	min. typ.	−40 dB −50 dB
Input VSWR with respect to 50 Ω	VSWR	<	2.0 : 1

Stability

The module is stable with a load VSWR up to 5 (all phases) when operated within the following conditions:

$V_{S1} = V_{S2}$ = 4.0 V to 11.2 V; P_D = 17 to 70 mW; f = 460 to 512 MHz; P_L = < 9.0 W (matched)

Ruggedness

The module will withstand a load mismatch VSWR of 50 (all phases) for short period overload conditions, with P_D, V_{S1} and V_{S2} at maximum values, providing the combination does not cause the matched RF output power rating to be exceeded (T_h < 90 °C).

Output power control

The module is designed to be operated at a constant output power of 5.0 W. The module is adjusted to produce nominal output power by reducing the first stage supply voltage V_{S1}. If the module is to be used over a range of output power levels below 5.0 W, the first stage supply voltage should not be reduced below 4.0 V. If further reductions in power are needed this may be achieved by varying the drive power P_D. For stable operation however, care must be taken to avoid operating the module outside the published stability conditions.

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface with heat-conducting compound applied between module and heatsink. The module is designed to be pressed against the heatsink by a sheet spring applying up to 50 N to the top surface of the module encapsulation. 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 s at a distance of at least 1 mm from the plastic.

Power rating

In general, it is recommended that the output power from the module under nominal conditions should not exceed 7 W in order to provide an adequate safety margin under fault conditions.

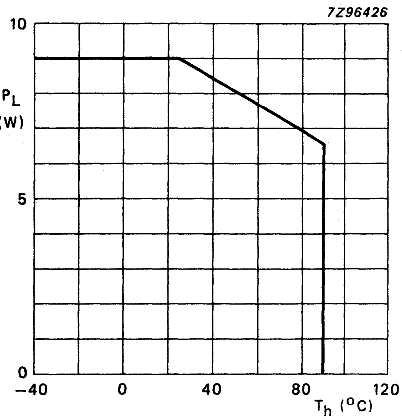


Fig.2 Load power derating; VSWR = 1 : 1.

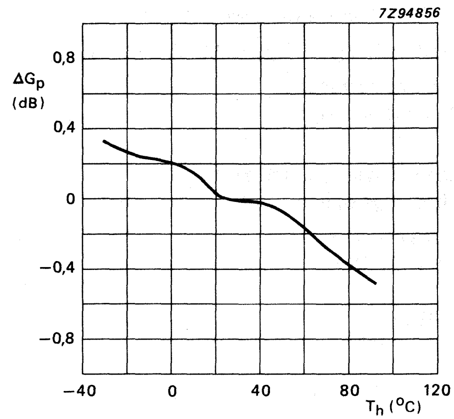


Fig.3 Change in power gain as a function of heatsink temperature; $V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; typical values.

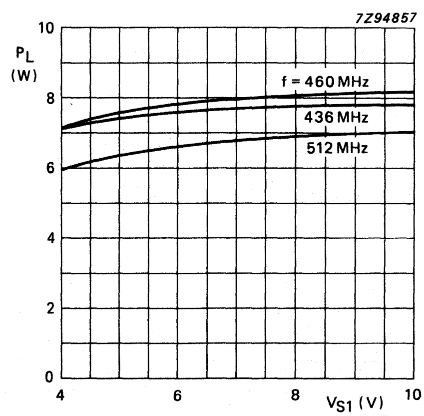


Fig.4 Load power as a function of V_{S1}; $V_{S2} = 9.6$ V; $P_D = 35$ mW; typical values.

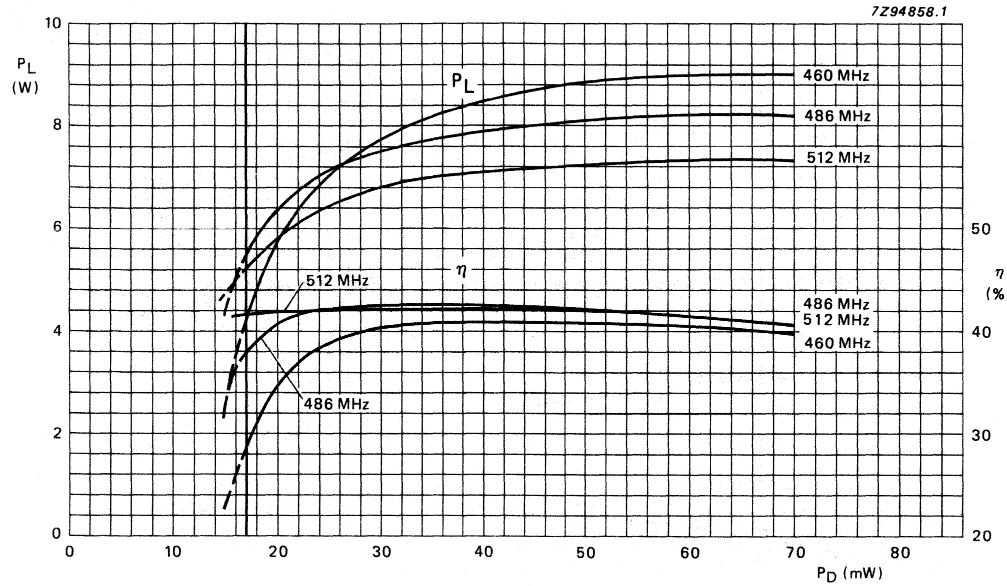


Fig.5 Load power and efficiency as functions of drive power; $V_{S1} = V_{S2} = 9.6$ V; typical values.

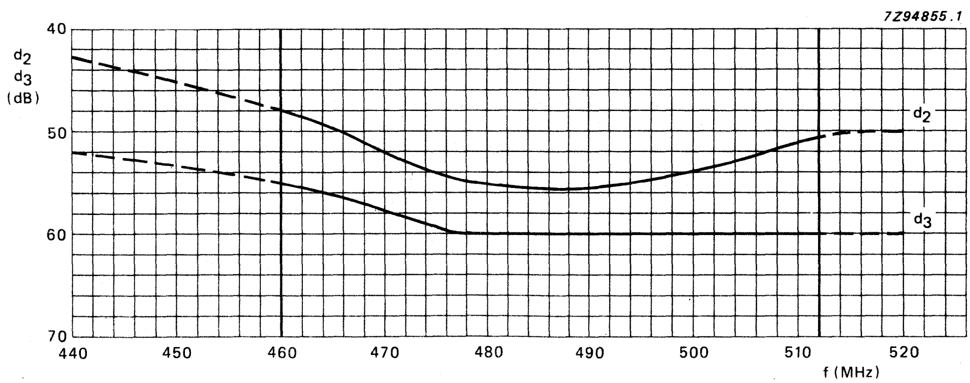


Fig.6 Second and third harmonic distortions as functions of frequency; $V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; typical values.

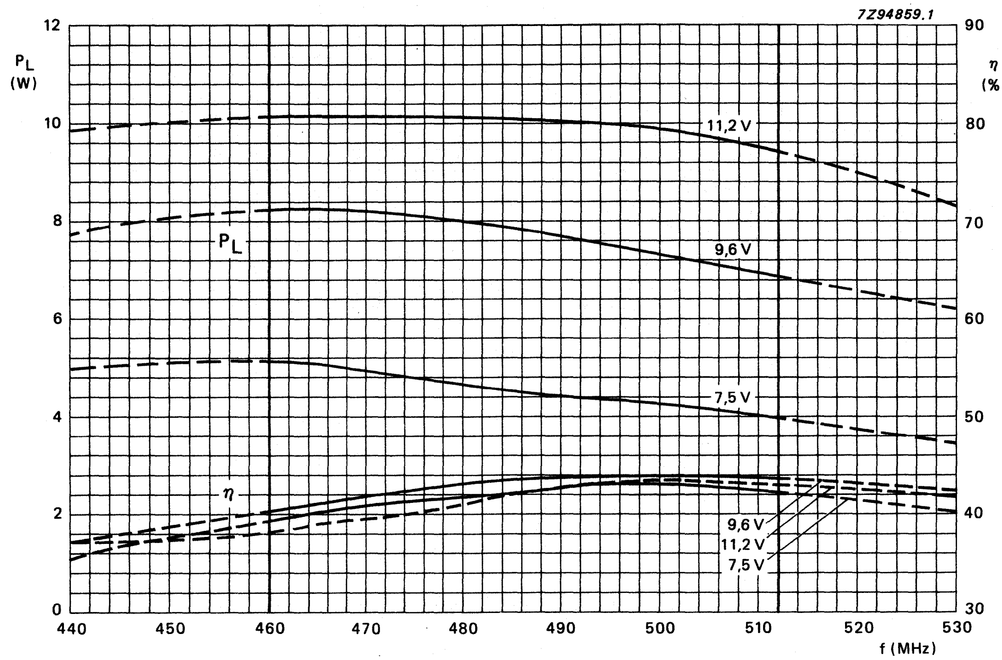


Fig.7 Load power and efficiency as functions of frequency; $V_{S1} = V_{S2}$; P_D = 35 mW; typical values.

UHF POWER AMPLIFIER MODULE

A UHF amplifier module primarily designed for mobile communications equipment, operating directly from 12.5 V electrical systems. The module will produce a minimum output of 20 W into a 50 Ω load over the frequency range of 400 to 440 MHz.

The module consists of a three-stage RF amplifier using npn transistor chips with stripline and surface mount matching elements. The negative supply is internally connected to the flange in a plastic strip-line encapsulation.

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range			400 to 440	MHz
Drive power				
P_L = 20 W	P_D	max.	150	mW
Load power	P_L	>	20	W
Supply voltages	V_{S1}, V_{S2}	nom.	12.5	V
Input impedance	z_i	nom.	50	Ω
Output load impedance	Z_L	nom.	50	Ω

MECHANICAL DATA

See Fig. 1 next page

MECHANICAL DATA

Dimensions in mm

Lead reference

1 = Input
2 = Earth
3 = V_{S1}
4 = V_{S2}
5 = Earth
6 = Output

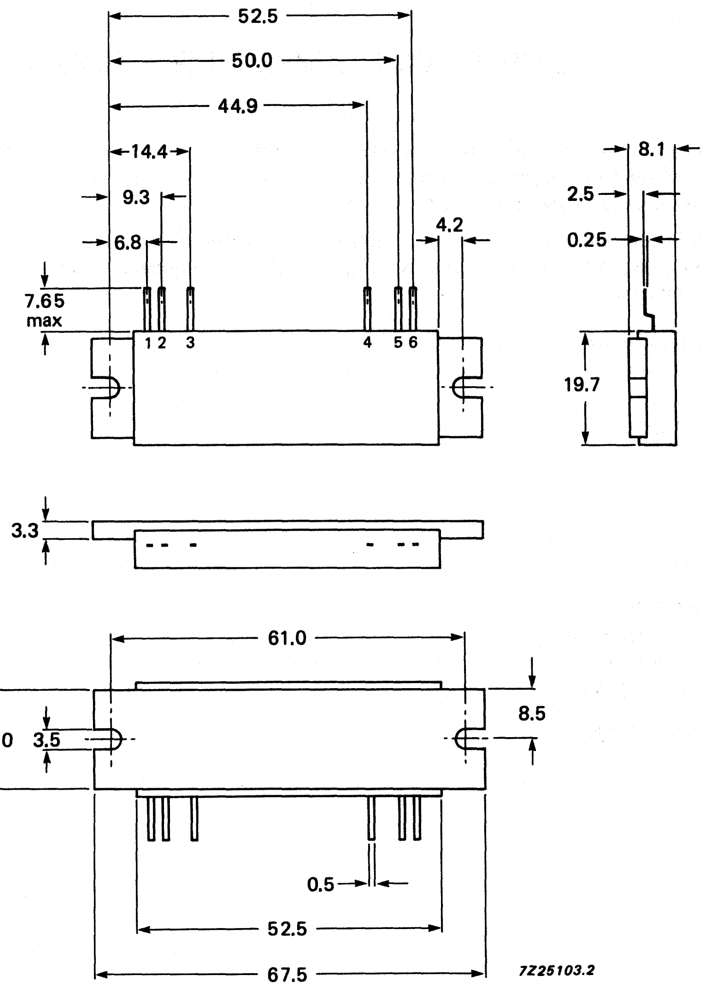


Fig. 1 SOT-132D.

PRODUCT SAFETY. This device incorporates beryllium oxide (BeO), the dust of which is toxic. The device is entirely safe provided that the internal BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}, V_{S2}	max.	15.5	V
RF input terminal voltage*	$\pm V_i$	max.	25	V
RF output terminal voltage*	$\pm V_o$	max.	25	V
Load power	P_L	max.	30	W
Drive power	P_D	max.	300	mW
Storage temperature range	T_{stg}		−30 to + 100	°C
Operating heatsink temperature range	T_h		−30 to + 90	°C

CHARACTERISTICS

T_h = 25 °C; V_{S1} = V_{S2} = 12.5 V; R_S = R_L = 50 Ω; f = 400 to 440 MHz, unless otherwise stated

Quiescent currents $P_D = 0$	I_{Q1}	max.	200	mA
RF load power P_D = 150 mW	P_L	min.	20	W
Efficiency P_L = 20 W	η	>	35	%
Harmonic output P_L = 20 W (any harmonic		<	35	dB
relative to carrier)		typ.	−40	dB
Input VSWR with respect to 50 Ω	VSWR	max.	2:1	

Stability

The module will produce no spurious signals when operated with a load mismatch < 4:1 VSWR, and P_D = 0 to 300 mW, V_{S1} = 6 to 15.5 V, V_{S2} = 10 to 15.5 V, and $V_{S2} \geqslant V_{S1}$ at all times.

Ruggedness

The module will withstand a load VSWR of 50:1 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 derating curve being exceeded (T_h < 90 °C).

DEVELOPMENT DATA

* with respect to the earth pins

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface and heat-conducting compound applied between module and heatsink. Burrs and tickening of 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 ^{o}C for not more than 10 seconds at a distance of at least 1 mm from the plastic.

Power rating

In general it is recommended that the output power from the module under nominal conditions should not exceed 25 W in order to provide an adequate safety margin under fault conditions.

Output power control

The module is designed to be operated over a wide range of output power levels. The preferred method of output power control is to fix V_{S1} and V_{S2} at 12.5 V and vary the drive power. Another method of output power control is to fix V_{S2} at 12.5 V, the drive power at 150 mW and vary V_{S1}, provided V_{S1} is not outside the stability criteria.

UHF POWER AMPLIFIER MODULE

A UHF amplifier module primarily designed for mobile communications equipment, operating directly from 12.5 V electrical systems. The module will produce a minimum output of 20 W into a 50 Ω load over the frequency range of 440 to 470 MHz.

The module consists of a three-stage RF amplifier using npn transistor chips with stripline and surface mounted matching elements. The negative supply is internally connected to the flange in a plastic stripline encapsulation.

QUICK REFERENCE DATA

Mode of operation			CW
Frequency range			440 to 470 MHz
Drive power P_L = 20 W	P_D	max.	150 mW
Load power	P_L	>	20 W
Supply voltages	V_{S1}, V_{S2}	nom.	12.5 V
Input impedance	z_i	nom.	50 Ω
Output load impedance	Z_L	nom.	50 Ω

MECHANICAL DATA

See Fig. 1 next page

MECHANICAL DATA

Dimensions in mm

Lead reference

1 = Input
2 = Earth
3 = V_{S1}
4 = V_{S2}
5 = Earth
6 = Output

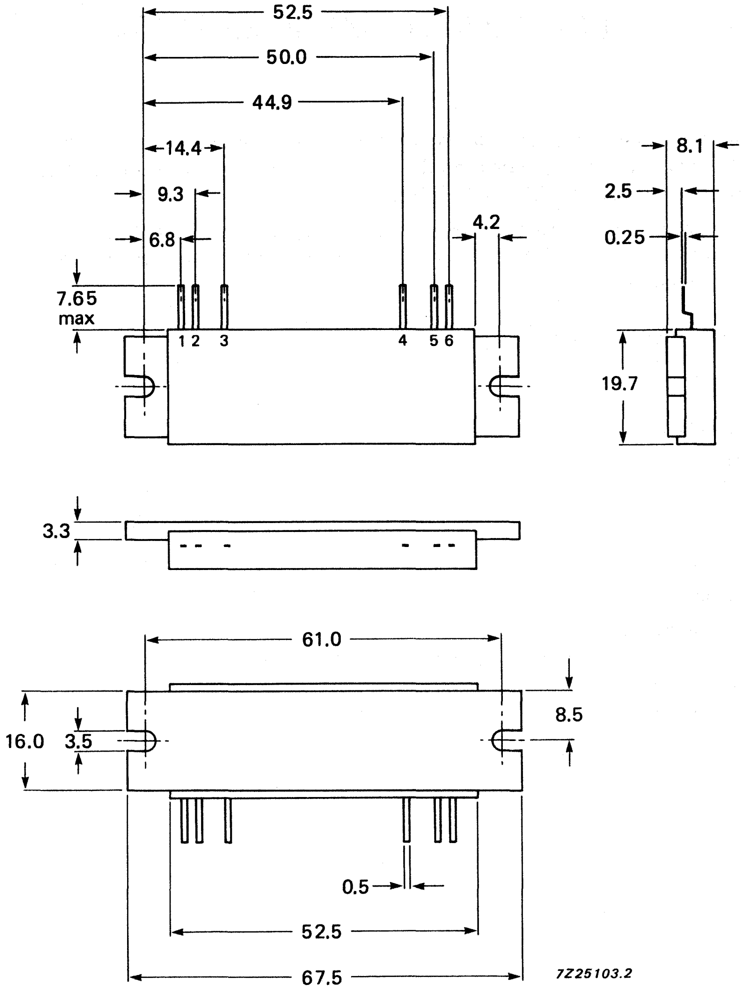


Fig.1 SOT-132D.

PRODUCT SAFETY. This device incorporates beryllium oxide (BeO), the dust of which is toxic. The device is entirely safe provided that the internal BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}, V_{S2}	max.	15.5	V
RF input terminal voltage*	$\pm V_i$	max.	25	V
RF output terminal voltage*	$\pm V_o$	max.	25	V
Load power	P_L	max.	30	W
Drive power	P_D	max.	300	mW
Storage temperature range	T_{stg}		−30 to + 100	°C
Operating heatsink temperature range	T_h		−30 to + 90	°C

CHARACTERISTICS

T_h = 25 °C; V_{S1} = V_{S2} = 12.5 V; R_S = R_L = 50 Ω; f = 400 to 440 MHz, unless otherwise stated

Quiescent currents P_D = 0	I_{Q1}	max.	200	mA
RF load power P_D = 150 mW	P_L	min.	20	W
Efficiency P_L = 20 W	η	>	35	%
Harmonic output P_L = 20 W (any harmonic relative to carrier)		< typ.	35 −40	dB dB
Input VSWR with respect to 50 Ω	VSWR	max.	2:1	

Stability

The module will produce no spurious signals when operated with a load mismatch < 4:1 VSWR, and P_D = 0 to 300 mW, V_{S1} = 6 to 15.5 V, V_{S2} = 10 to 15.5 V, and $V_{S2} \geqslant V_{S1}$ at all times.

Ruggedness

The module will withstand a load VSWR of 50:1 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 derating curve being exceeded (T_h < 90 °C).

DEVELOPMENT DATA

* with respect to the earth pins

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface and heat-conducting compound applied between module and heatsink. Burrs and tickening of 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 ^{o}C for not more than 10 seconds at a distance of at least 1 mm from the plastic.

Power rating

In general it is recommended that the output power from the module under nominal conditions should not exceed 25 W in order to provide an adequate safety margin under fault conditions.

Output power control

The module is designed to be operated over a wide range of output power levels. The preferred method of output power control is to fix V_{S1} and V_{S2} at 12.5 V and vary the drive power. Another method of output power control is to fix V_{S2} at 12.5 V, the drive power at 150 mW and vary V_{S1}, provided V_{S1} is not outside the stability criteria.

UHF POWER MODULE

The BGY90A is a two stage UHF power module designed for use in mobile transmitting equipment operating from a 12 V power supply.

The module consists of two npn silicon planar transistors mounted on a metallized ceramic substrate together with matching and bias circuitry. The module produces an output of 6.0 W into a 50 Ω load over the frequency range of 806 to 890 MHz when operated under nominal conditions.

QUICK REFERENCE DATA

DC supply terminal voltages	V_{S1}; V_{S2}	nom.	12.5	V
Frequency	f		806 to 890	MHz
RF load power at P_D = 200 mW	P_L	>	6.0	W
RF input drive power at P_L = 6.0 W	P_D	<	200	mW
Input and output impedance	Z_S; Z_L	nom.	50	Ω

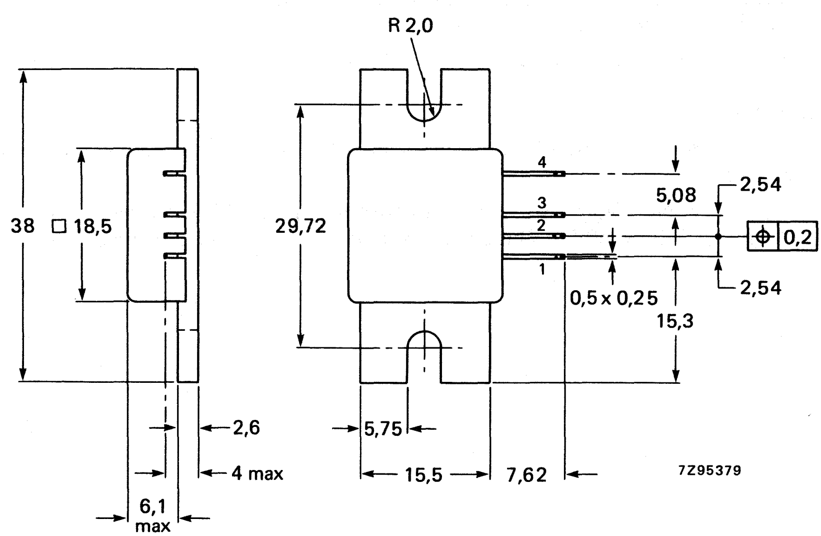
MECHANICAL DATA

Dimensions in mm

Fig.1 SOT197.

Lead reference:

1 = RF input
2 = V_{S1}
3 = V_{S2}
4 = RF output



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC terminal supply voltages	V_{S1}; V_{S2}	max.	16.5	V
DC voltage on RF input	$\pm V_i$	max.	25	V
DC voltage on RF output	$\pm V_o$	max.	25	V
Load power (RF)	P_L	max.	8	W
Drive power (RF)	P_D	max.	400	mW
Storage temperature range	T_{stg}		−40 to +100	°C
Operating heatsink temperature	T_h	max.	90	°C

CHARACTERISTICS

$V_{S1} = V_{S2} = 12{,}5$ V; f = 806 - 890 MHz; $Z_S = Z_L = 50\ \Omega$ unless otherwise specified

Quiescent currents $P_D = 0$	I_{Q1}	typ.	40	mA
	I_{Q2}	typ.	25	mA
RF input drive power at $P_L = 6.0$ W	P_D	<	200	mW
RF output power at $P_D = 200$ mW	P_L	>	6.0	W
Efficiency at $P_L = 6.0$ W	η	>	35	%
Harmonic rejection at $P_L = 6.0$ W		>	35	dB

Stability

The module will produce no spurious signals with a load mismatch of up to 3 VSWR when operated within the following conditions:

$V_{S1} = 0$ to 15 V; $V_{S2} = 6$ to 15 V; $P_D = 0$ to 400 mW; $T_h < 90$ °C; P_L (into 50 Ω) $\leqslant 9$ W.

Ruggedness

The module will withstand a load mismatch VSWR of 50 when operated within the following conditions:

$V_{S1} = 15$ V max.; $V_{S2} = 15$ V; $P_D = 400$ mW max.; $T_h < 90$ °C; providing the module is adjusted for $P_L < 8$ W (into 50 Ω). This adjustment may be performed by control of either P_D or V_{S1}.

UHF POWER MODULE

The BGY90B is a two stage UHF power module designed for use in mobile transmitting equipment operating from a 12 V power supply.

The module consists of two npn silicon planar transistors mounted on a metallized ceramic substrate together with matching and bias circuitry. The module produces an output power of 6.0 W into a 50 Ω load over the frequency range of 870 to 950 MHz when operated under nominal conditions.

QUICK REFERENCE DATA

DC supply terminal voltages	V_{S1}; V_{S2}	nom.	12.5	V
Frequency	f		870 to 950	MHz
RF load power at P_D = 200 mW	P_L	>	6.0	W
RF input drive power at P_L = 6.0 W	P_D	<	200	mW
Input and output impedances	Z_S; Z_L	nom.	50	Ω

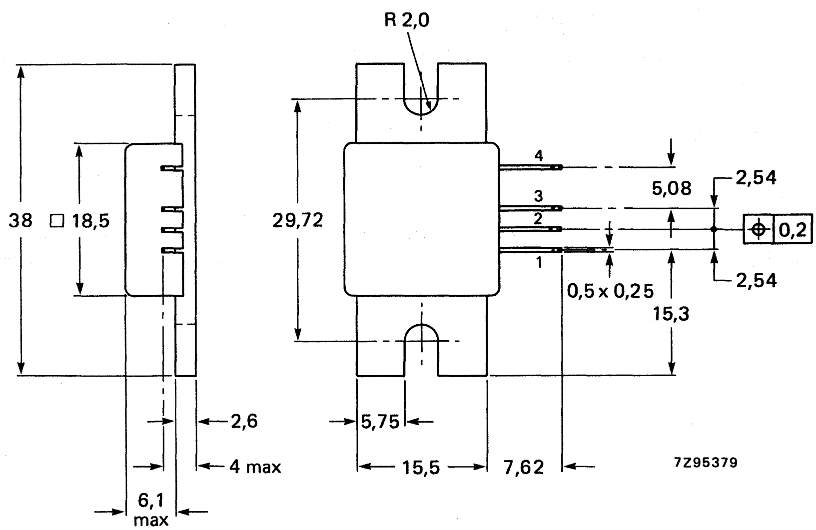
MECHANICAL DATA

Dimensions in mm

Fig.1 SOT197.

Lead reference:

1 = RF input
2 = V_{S1}
3 = V_{S2}
4 = RF output



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC terminal supply voltages	$V_{S1};V_{S2}$	max.	16,5	V
DC voltage on RF input	$\pm V_i$	max.	25	V
DC voltage on RF output	$\pm V_o$	max.	25	V
Load power (RF)	P_L	max.	8	W
Drive power (RF)	P_D	max.	400	mW
Storage temperature range	T_{stg}		−40 to +100	°C
Operating heatsink temperature	T_h	max.	90	°C

CHARACTERISTICS

$V_{S1} = V_{S2} = 12,5$ V; f = 870 - 950 MHz; $Z_S = Z_L = 50\ \Omega$ unless otherwise specified

Quiescent currents $P_D = 0$	I_{Q1}	typ.	15	mA
	I_{Q2}	typ.	25	mA
RF input drive power at $P_L = 6.0$ W	P_D	<	200	mW
RF output power at $P_D = 200$ mW	P_L	>	6.0	W
Efficiency at $P_L = 6.0$ W	η	>	35	%
Harmonic rejection at $P_L = 6.0$ W		>	35	dB

Stability

The module will produce no spurious signals with a load mismatch of up to 3 VSWR when operated within the following conditions:

$V_{S1} < V_{S2} = 0$ to 15 V; $P_D = 0$ to 400 mW; $T_h < 90$ °C; providing maximum ratings are not exceeded.

Ruggedness

The module will withstand a load mismatch VSWR of 50 when operated within the following conditions:

$V_{S1} = 15$ V max.; $V_{S2} = 15$ V; $P_D = 400$ mW max.; $T_h < 90$ °C; providing the module is adjusted for $P_L < 8$ W (into 50 Ω). This adjustment may be performed by control of either P_D or V_{S1}.

UHF POWER AMPLIFIER MODULE

A UHF amplifier module primarily designed for mobile communications equipment, operating directly from 12.5 V electrical systems. The module will produce a minimum output of 6 W into a 50 Ω load over the frequency range of 806 to 890 MHz.

The module consists of a three-stage RF amplifier using npn transistor chips with lumped-element matching components in a plastic stripline encapsulation. The negative supply is internally connected to the flange.

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range			806 to 890	MHz
DC supply voltage	V_{S1}, V_{S2}, V_{S3}	nom.	12.5	V
Drive power	P_D	max.	30	mW
Load power	P_L	>	6.0	W
Input, output impedance	z_i, Z_L	nom.	50	Ω

MECHANICAL DATA

Dimensions in mm

Pinning:

1 = RF input
2 = V_{S1}
3 = V_{S2}
4 = V_{S3}
5 = RF output

Flange connected to earth.

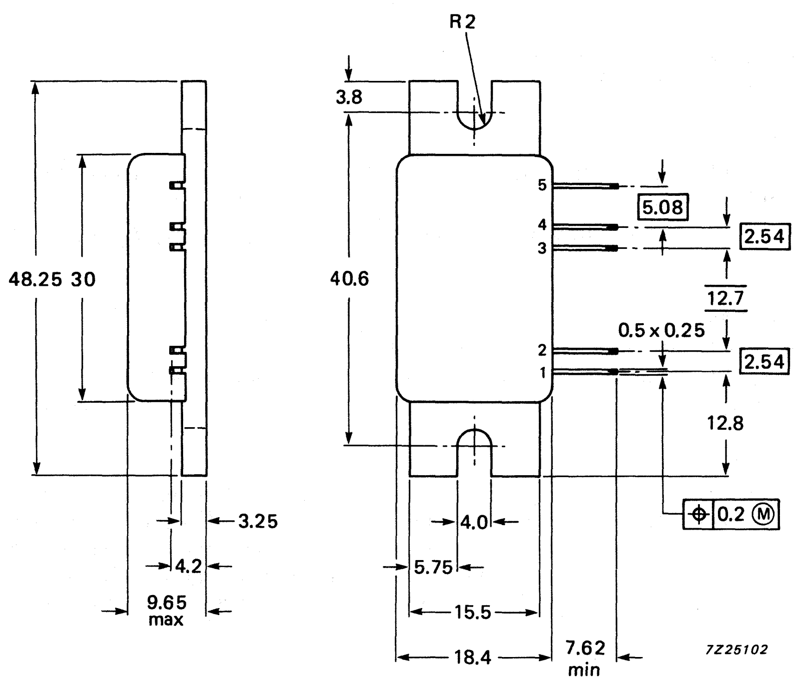


Fig. 1 SOT-233.

PRODUCT SAFETY This device incorporates beryllium oxide (BeO), the dust of which is toxic. The device is entirely safe provided that the internal BeO disc is not damaged.

RATINGS

Limiting values in according with the Absolute Maximum System (IEC 134)

DC supply terminal voltages *	V_{S1}, V_{S2}, V_{S3}	max.	16 V
RF input terminal voltage *	$\pm V_i$	max.	25 V
RF output terminal voltage *	$\pm V_o$	max.	25 V
Load power	P_L	max.	8.0 W
Drive power	P_D	max.	80 mW
Storage temperature range	T_{stg}		−40 to + 100 °C
Operating heatsink temperature range	T_h		−30 to + 90 °C

CHARACTERISTICS

T_h = 25 °C; $V_{S1} = V_{S2} = V_{S3}$ = 12.5 V; $R_S = R_L$ = 50 Ω; f = 806 to 890 MHz uhless otherwise stated.

Quiescent currents $P_D = 0$	I_{Q1}	typ.	10 mA
	I_{Q2}	typ.	80 mA
RF drive power P_L = 6 W	P_D	<	30 mW
		typ.	20 mW
Efficiency P_L = 6 W	η	>	30 %
		typ.	35 %
Harmonic output any harmonic (relative to carrier); P_L = 6 W		<	−35 dB
		typ.	−40 dB
Input VSWR with respect to 50 Ω	VSWR	max.	2.0 : 1

Stability

The module is stable with load VSWR up to 4 (all phases) when operated within the following conditions:

$V_{S2} = V_{S3}$ = 10 to 16 V; f = 806 to 890 MHz; P_D = 0 to 40 mW; V_{S1} = 0 to 12.5 V; $P_L < 8$ W (matched).

Ruggedness

The module will withstand a load VSWR of 50 : 1 for short period overload conditions, with P_D, V_{S1}, V_{S2} and V_{S3} at maximum values, providing the combination does not result in the matched RF output power derating curve being exceeded ($T_h < 90$ °C).

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface and heat-conducting compound applied between module and heatsink. Burrs and thickening of 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.

* With respect to flange.

Power rating

In general it is recommended that the output power from the module under nominal conditions should not exceed 7 W in order to provide an adequate safety margin under fault conditions.

Gain control

Power output can be controlled by variation of the driver stage supply voltage V_{S1} from 0.5 V to 12.5 V.

UHF POWER AMPLIFIER MODULE

A UHF amplifier module primarily designed for mobile communications equipment, operating directly from 12.5 V electrical systems. The module will produce a minimum output of 6 W into a 50 Ω load over the frequency range of 870 to 950 MHz.

The module consists of a three-stage RF amplifier using npn transistor chips with lumped-element matching components in a plastic stripline encapsulation. The negative supply is internally connected to the flange.

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range			870 to 950	MHz
DC supply voltage	V_{S1}, V_{S2}, V_{S3}	nom.	12.5	V
Drive power	P_D	max.	30	mW
Load power	P_L	>	6.0	W
Input, output impedance	Z_i, Z_L	nom.	50	Ω

MECHANICAL DATA

Dimensions in mm

Pinning:

1 = RF input
2 = V_{S1}
3 = V_{S2}
4 = V_{S3}
5 = RF output

Flange connected to earth.

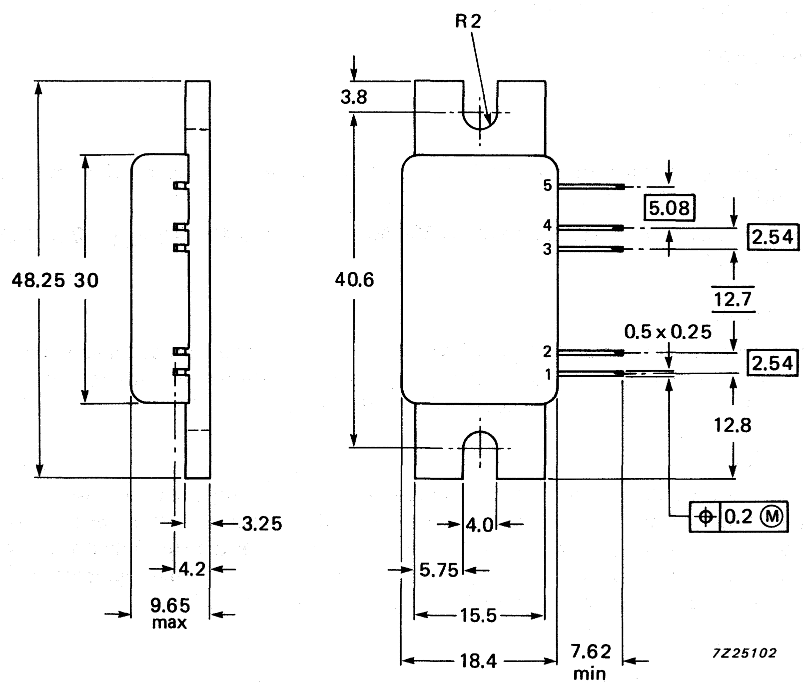


Fig. 1 SOT-233.

PRODUCT SAFETY This device incorporates beryllium oxide (BeO), the dust of which is toxic. The device is entirely safe provided that the internal BeO disc is not damaged.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages *	V_{S1}, V_{S2}, V_{S3}	max.	16	V
RF input terminal voltage *	$\pm V_i$	max.	25	V
RF output terminal voltage *	$\pm V_o$	max.	25	V
Load power	P_L	max.	8.0	W
Drive power	P_D	max.	80	mW
Storage temperature range	T_{stg}		−40 to + 100	°C
Operating heatsink temperature	T_h		−30 to + 90	°C

CHARACTERISTICS

T_h = 25 °C; $V_{S1} = V_{S2} = V_{S3}$ = 12.5 V; $R_S = R_L$ = 50 Ω; f = 870 to 950 MHz unless otherwise stated.

Quiescent currents $P_D = 0$	I_{Q1}	typ.	10	mA
	I_{Q2}	typ.	80	mA
RF drive power P_L = 6 W	P_D	<	30	mW
		typ.	20	mW
Efficiency P_L = 6 W	η	>	30	%
		typ.	35	%
Harmonic output any harmonic (relative to carrier); P_L = 6 W		<	−35	dB
		typ.	−40	dB
Input VSWR with respect to 50 Ω	VSWR	max.	2.0 : 1	

Stability

The module is stable with load VSWR up to 4 (all phases) when operated within the following conditions:

$V_{S2} = V_{S3}$ = 10 to 16 V; f = 806 to 890 MHz; P_D = 0 to 40 mW; V_{S1} = 0 to 12.5 V; P_L < 8 W (matched).

Ruggedness

The module will withstand a load VSWR of 50 : 1 for short period overload conditions, with P_D, V_{S1}, V_{S2} and V_{S3} at maximum values, providing the combination does not result in the matched RF output power derating curve being exceeded (T_h < 90 °C).

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface and heat-conducting compound applied between module and heatsink. Burrs and thickening of 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.

* With respect to flange.

Power rating

In general it is recommended that the output power from the module under nominal conditions should not exceed 7 W in order to provide an adequate safety margin under fault conditions.

Gain control

Power output can be controlled by variation of the driver stage supply voltage V_{S1} from 0.5 V to 12.5 V.

DEVELOPMENT DATA

VHF POWER AMPLIFIER MODULE

VHF broadband amplifier module designed for use in mobile communication equipment operating directly from a 9.6 V electrical supply. The module will produce a minimum of 2 W into a 50 Ω load over the frequency range 68 to 88 MHz.

The module consists of a two-stage RF amplifier using n-channel FETs with lumped element matching. components in a SOT-182 plastic encapsulation.

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range			68 to 88	MHz
DC supply voltage (terminal 3)	V_{S1}	nom.	9.6	V
DC supply voltage (terminal 5)	V_{S2}	nom.	9.6	V
Drive power	P_D	max.	35	mW
Load power	P_L	>	2.0	W
Input impedance	z_i	nom.	50	Ω
Output load impedance	Z_L	nom.	50	Ω

MECHANICAL DATA

Dimensions in mm

Lead reference

1 = RF input
2 = Earth
3 = V_{S1} and second stage bias
4 = Earth
5 = V_{S2}
6 = Earth
7 = RF output

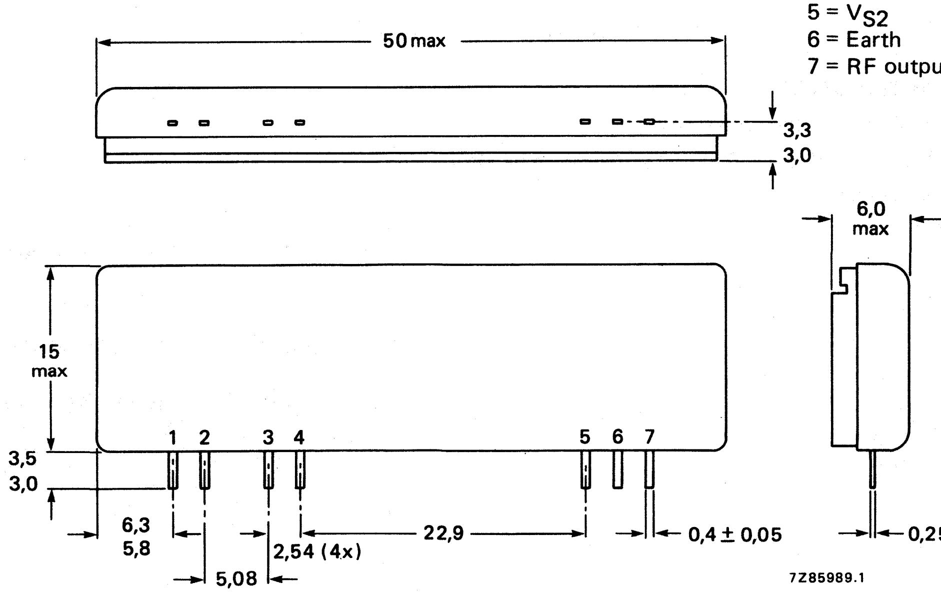


Fig. 1 SOT-182.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}/V_{S2}	max.	13.5	V
RF input terminal voltage*	$\pm V_i$	max.	25	V
RF output terminal voltage*	$\pm V_o$	max.	25	V
Load power (see Fig. 2)	P_L	max.	4.0	W
Drive power	P_D	max.	70	mW
Storage temperature range	T_{stg}	−40 to 100		°C
Operating heatsink temperature	T_h	max.	90	°C

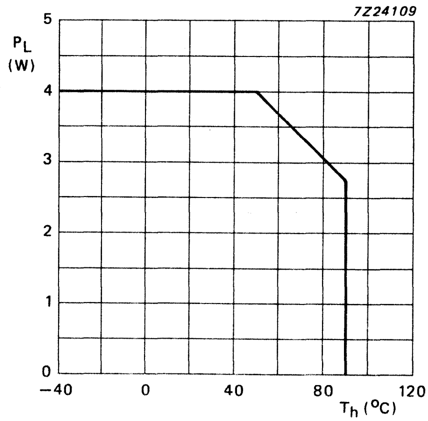


Fig. 2 Load power derating; VSWR = 1:1.

CHARACTERISTICS

T_h = 25 °C unless otherwise stated

$V_{S1} = V_{S2} = 9.6$ V; $R_S = R_L = 50\ \Omega$; f = 68 to 88 MHz.

Quiescent currents				
frist stage current $P_D = 0$	I_{Q1}	typ.	70	mA
second stage current with first stage open circuit $P_D = 0$; $I_{S1} = 0$	I_{Q2}	<	0.5	mA
second stage current with first stage supply connected	I_{Q2}	typ.	250	mA
RF drive power				
$P_L = 2.0$ W	P_D	<	35	mW

* With respect to flange.

CHARACTERISTICS (continued)

Efficiency				
$P_L = 2.0$ W	η	>	40	%
		typ.	55	%
Harmonic output	d_2, d_3	max.	−35	dB
Input VSWR				
with respect to 50 Ω	VSWR	<	2.0:1	

Stability

The module is stable with a load VSWR up to 8 (all phases) when operated within the following conditions:

$V_{S1} \leqslant V_{S2}$ = 4.0 V to 11.2 V; P_D = 17 to 70 mW; f = 68 to 88 MHz; P_L = < 4 W (matched).

Ruggedness

The module will withstand a load mismatch VSWR of 50 (all phases) for short period overload conditions, with P_D, V_{S1} and V_{S2} at maximum values, providing the combination does not cause the matched RF output power rating to be exceeded ($T_h < 90$ °C).

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface and heat-conducting compound applied between module and heatsink. The module is designed to be pressed against the heatsink by a sheet spring applying up to 50 N to the top surface of the module encapsulation. The leads of the devices may be soldered directly into a circuit using a soldering iron with a maximim temperature of 245 °C for not more than 10 s at a distance of at least 1 mm from the plastic.

Power rating

In general, it is recommended that the output power from the module under nominal conditions should not exceed 3 W in order to provide an adequate safety margin under fault conditions.

Gain control

Power output can be controlled by variation of the driver stage supply voltage V_{S1}. The supply required is a voltage regulator with a current rating of 0.15 A and an output voltage range of 4 V to 9.6 V. V_{S1} must not exceed V_{S2}.

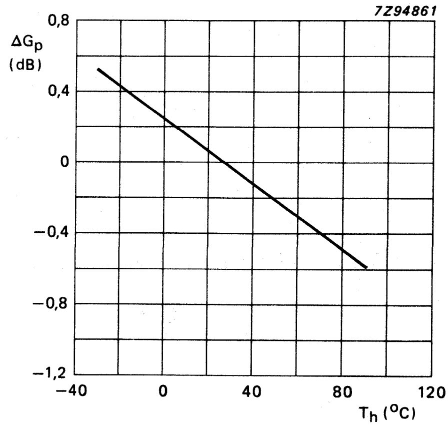


Fig. 3 Power gain as a function of temperature; P_D = 35 mW; V_{S1} = V_{S2} = 9.6 V; f = 78 MHz; typical values.

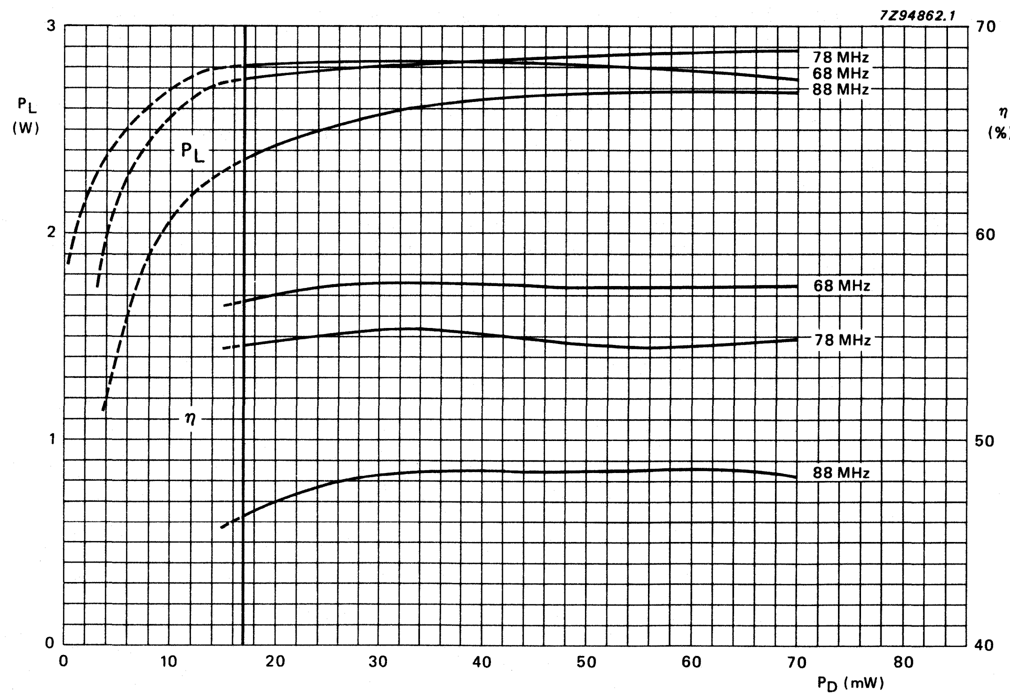


Fig. 4 Load power as a function of drive power; V_{S1} = V_{S2} = 9.6 V; typical values.

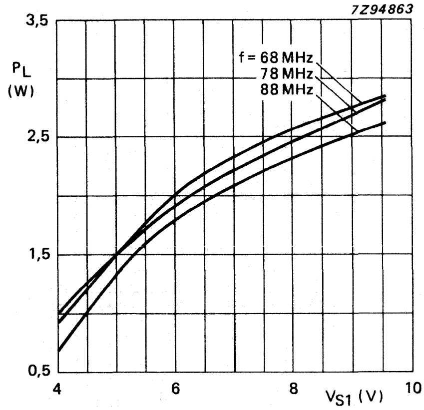


Fig. 5 Load power as a function of supply voltage V_{S1}; P_D = 35 mW; V_{S2} = 9.6 V; typical values.

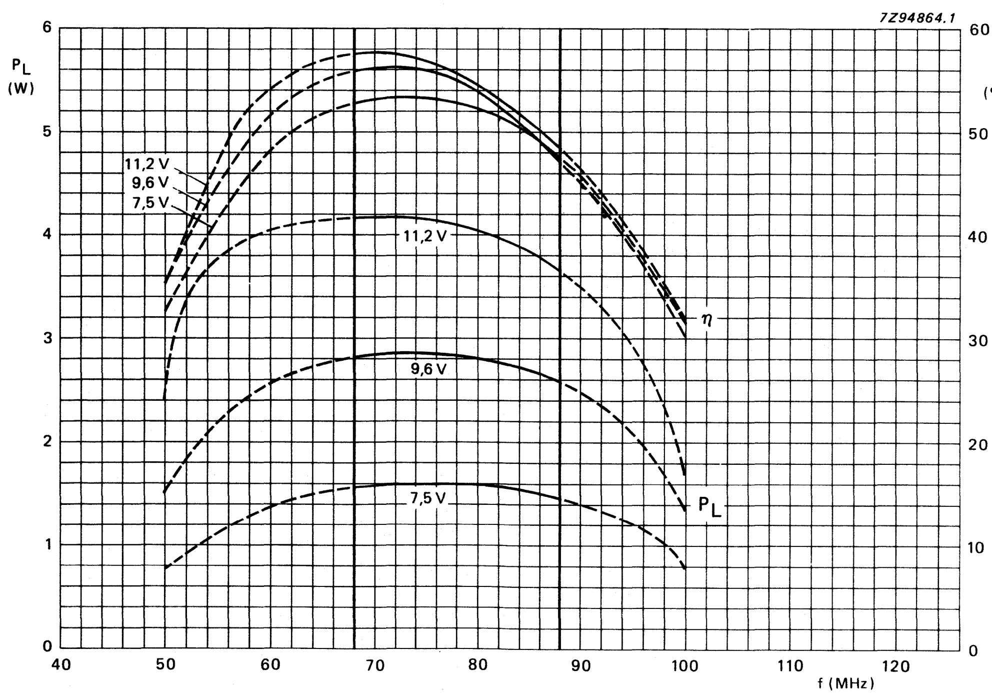


Fig. 6 Load power as a function of frequency; P_D = 35 mW; typical values.

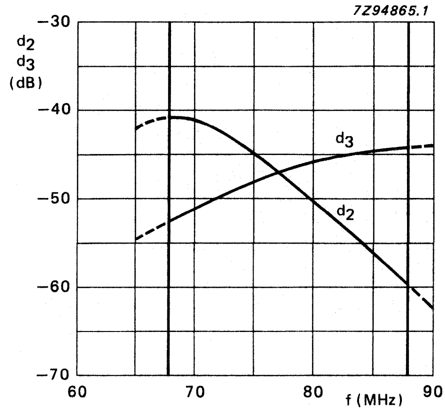


Fig. 7 Second and third harmonic distortions as a function of frequency; $V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; $P_L = 2.0$ W; typical values.

VHF POWER AMPLIFIER MODULE

VHF broadband amplifier module designed for use in mobile communication equipment operating directly from a 9.6 V electrical supply. The module will produce a minimum of 2 W into a 50 Ω load over the frequency range 132 to 156 MHz.

The module consists of a two-stage RF amplifier using n-channel FETs with lumped element matching components in a SOT-182 plastic encapsulation.

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range			132 to 156	MHz
DC supply voltage (terminal 3)	V_{S1}	nom.	9.6	V
DC supply voltage (terminal 5)	V_{S2}	nom.	9.6	V
Drive power	P_D	max.	35	mW
Load power	P_L	>	2.0	W
Input impedance	z_i	nom.	50	Ω
Output load impedance	Z_L	nom.	50	Ω

MECHANICAL DATA

Dimensions in mm

Lead reference

1 = RF input
2 = Earth
3 = V_{S1} and second stage bias
4 = Earth
5 = V_{S2}
6 = Earth
7 = RF output

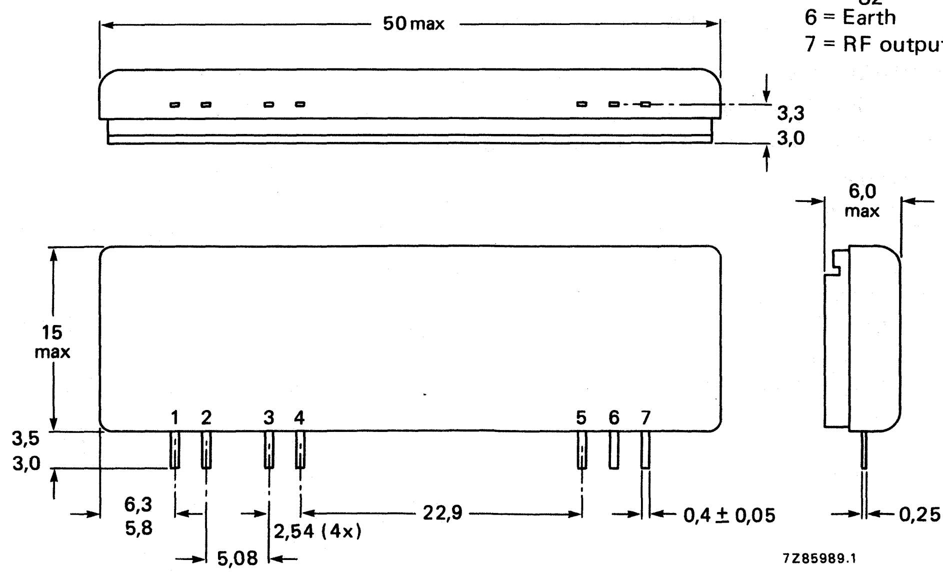


Fig. 1 SOT-182.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}, V_{S2}	max.	13.5	V
RF input terminal voltage*	$\pm V_i$	max.	25	V
RF output terminal voltage*	$\pm V_o$	max.	25	V
Load power (see Fig. 2)	P_L	max.	4.0	W
Drive power	P_D	max.	70	mW
Storage temperature range	T_{stg}		−40 to 100	°C
Operating heatsink temperature	T_h	max.	90	°C

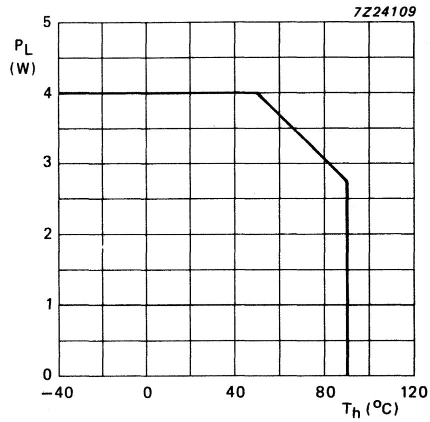


Fig. 2 Load power derating; VSWR = 1:1.

CHARACTERISTICS

T_h = 25 °C unless otherwise stated

$V_{S1} = V_{S2}$ = 9.6 V; $R_S = R_L$ = 50 Ω; f = 132 to 156 MHz.

Quiescent currents				
first stage current $P_D = 0$	I_{Q1}	typ.	70	mA
second stage current with first stage open circuit $P_D = 0$; $V_{S1} = 0$	I_{Q2}	<	0.5	mA
second stage current with first stage supply connected	I_{Q2}	typ.	250	mA
RF drive power P_L = 2.0 W	P_D	<	35	mW

* With respect to flange.

CHARACTERISTICS (continued)

Efficiency				
$P_L = 2.0$ W	η	>	40	%
		typ.	42	%
Harmonic output	d_2, d_3	max.	−35	dB
Input VSWR				
with respect to 50 Ω	VSWR	<	2.0:1	

Stability

The module is stable with a load VSWR up to 8 (all phases) when operated within the following conditions:

$V_{S1} \leqslant V_{S2}$ = 4.0 V to 11.2 V; P_D = 17 to 70 mW; f = 132 to 156 MHz; P_L = < 4 W (matched).

Ruggedness

The module will withstand a load mismatch VSWR of 50 (all phases) for short period overload conditions, with P_D, V_{S1} and V_{S2} at maximum values, providing the combination does not cause the matched RF output power rating to be exceeded (T_h < 90 °C).

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface and heat-conducting compound applied between module and heatsink. The module is designed to be pressed against the heatsink by a sheet spring applying up to 50 N to the top surface of the module encapsulation. 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 s at a distance of at least 1 mm from the plastic.

Power rating

In general, it is recommended that the output power from the module under nominal conditions should not exceed 3 W in order to provide an adequate safety margin under fault conditions.

Gain control

Power output can be controlled by variation of the driver stage supply voltage V_{S1}. The supply required is a voltage regulator with a current rating of 0.15 A and an output voltage range of 4 V to 9.6 V. V_{S1} must not exceed V_{S2}.

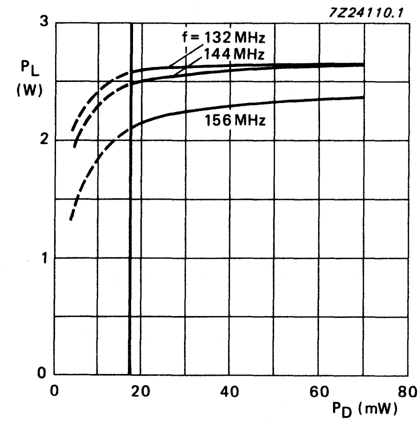


Fig. 3 Load power as a function of drive power; $V_{S1} = V_{S2} = 9.6$ V; typical values.

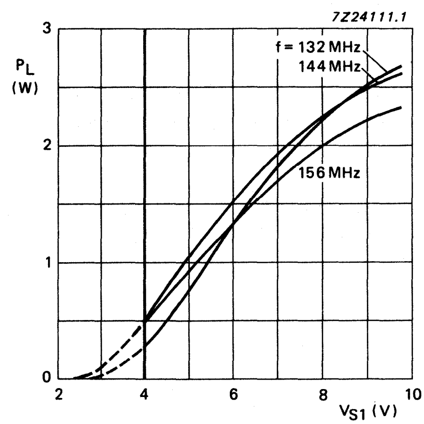


Fig. 4 Load power as a function of supply voltage V_{S1}; $P_D = 35$ mW; $V_{S2} = 9.6$ V; typical values.

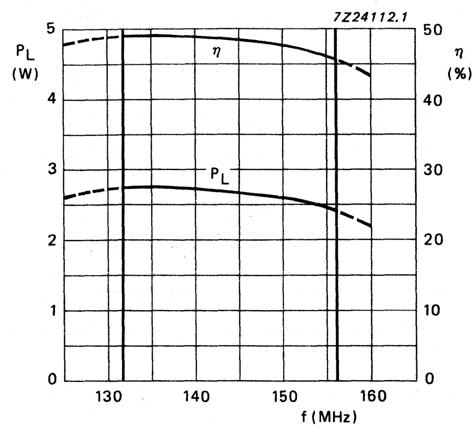


Fig. 5 Load power and efficiency as functions of frequency;
$V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; typical values.

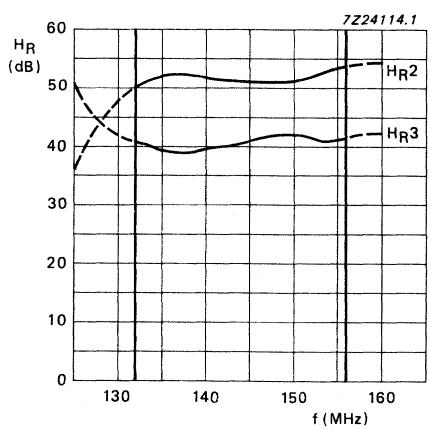


Fig. 6 Second and third harmonic rejection as a function of frequency;
$V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; $P_L = 2.0$ W; typical values.

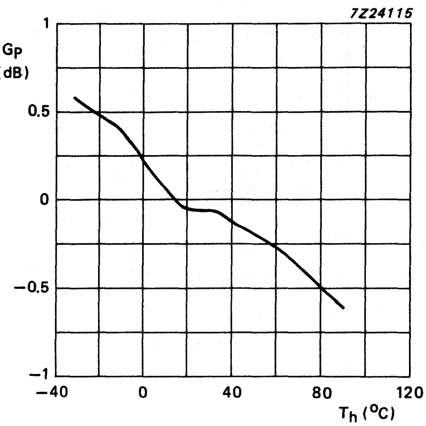


Fig. 7 Power gain as a function of temperature;
$V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; f = 144 MHz.

V H F POWER AMPLIFIER MODULE

A broadband VHF amplifier module primarily designed for use in portable transmitters operating from 9.6 V electrical battery supply.
The module is a two-stage RF amplifier consisting of n-channel FETs, with lumped-element matching and bias circuits.

The module will produce a minimum output of 2 W into a 50 Ω load over the frequency range of 148 to 174 MHz.

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range	f		148 to 174	MHz
Drive power	P_D	max.	35	mW
Load power	P_L	min.	2.0	W
Supply voltages	V_{S1}, V_{S2}	nom.	9.6	V
Input and output impedances	Z_S, Z_L	nom.	50	Ω

MECHANICAL DATA

Dimensions in mm

Lead reference

1 = RF input
2 = Earth
3 = V_{S1} and second stage bias
4 = Earth
5 = V_{S2}
6 = Earth
7 = RF output

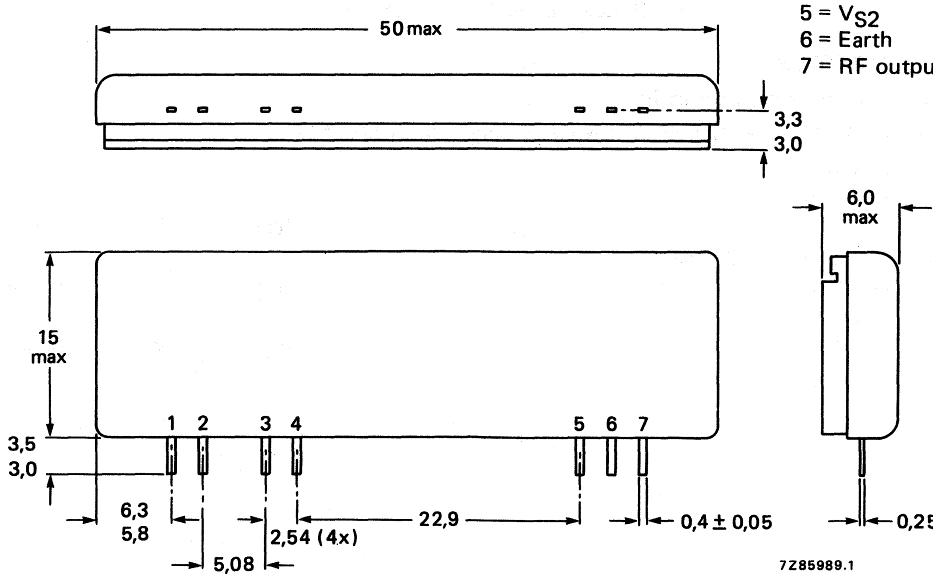


Fig. 1 SOT-182.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}, V_{S2}	max.	13.5	V*
RF input voltage*	$\pm V_i$	max.	25	V*
RF output voltage*	$\pm V_o$	max.	25	V*
Load power (see Fig. 2)	P_L	max.	4.0	W
Drive power	P_D	max.	70	mW
Storage temperature range	T_{stg}	−40 to 100		°C
Operating heatsink temperature	T_h	max.	90	°C

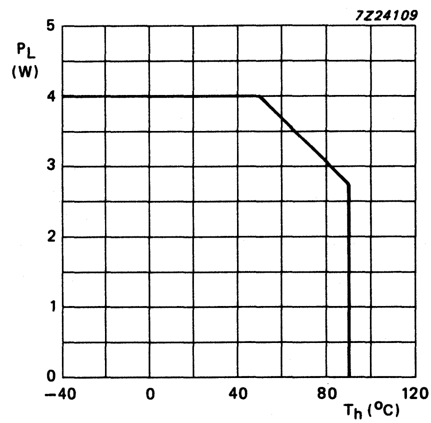


Fig. 2 Load power derating; VSWR = 1:1.

CHARACTERISTICS

T_h = 25 °C unless otherwise specified

$V_{S1} = V_{S2}$ = 9.6 V; $R_S = R_L$ = 50 Ω; frequency range 148 to 174 MHz.

Quiescent currents				
first stage current P_D = 0	I_{Q1}	typ.	70	mA
second stage current with first stage open circuit; P_D = 0; I_{S1} = 0	I_{Q2}	<	0.5	mA
RF drive power P_L = 2 W	P_D	<	35	mW

* With respect to flange.

CHARACTERISTICS (continued)

Efficiency			
$P_L = 2$ W	η	>	40 %
		typ.	43 %
Harmonic output	any harmonic	<	−35 dB
Input VSWR			
with respect to 50 Ω	VSWR	max.	2:1

Stability

The module is stable with load VSWR up to 8 (all phases) when operated with:

$V_{S1} \leqslant V_{S2} = 4$ to 11.2 V; f = 148 to 174 MHz; $P_D = 17$ to 70 mW; $P_L < 4.0$ W (matched).

Ruggedness

The modules will withstand a load mismatch VSWR of 50 for short 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 ($T_h < 90$ °C).

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface, with heat-conducting compound between module and heatsink. The module is designed to be pressed against the heatsink by a sheet spring applying up to 50 N to the top surface of the module encapsulation.

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.

Power rating

In general it is recommended that the output power from the module under nominal conditions should not exceed 3 W in order to provide an adequate safety margin under fault conditions.

Gain control

Power output can be controlled by variation of the driver stage supply voltage V_{S1}. The supply required is a voltage regulator with a current rating of 0.15 A, and an output voltage range of 4 V to 9.6 V. V_{S1} mut not exceed V_{S2}.

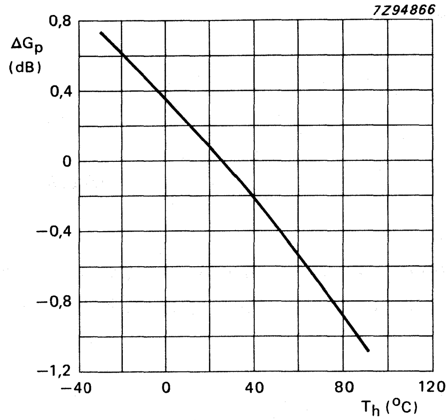


Fig. 3 Power gain as a function of temperature; P_D = 35 mW; $V_{S1} = V_{S2}$ = 9.6 V; f = 161 MHz; typical values.

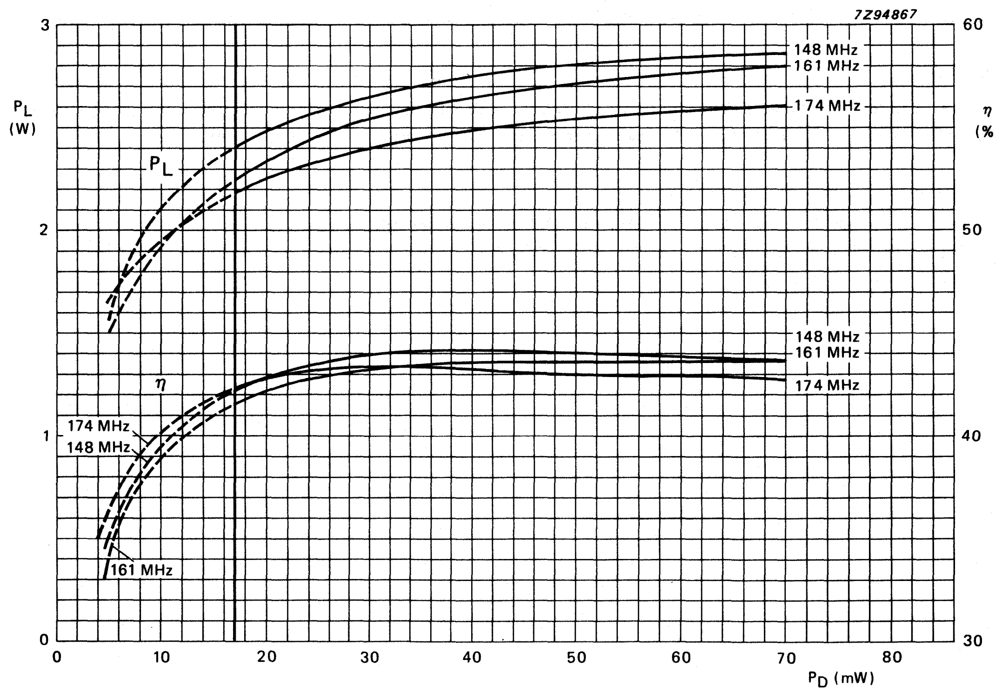


Fig. 4 Load power as a function of drive power; $V_{S1} = V_{S2}$ = 9.6 V; typical values.

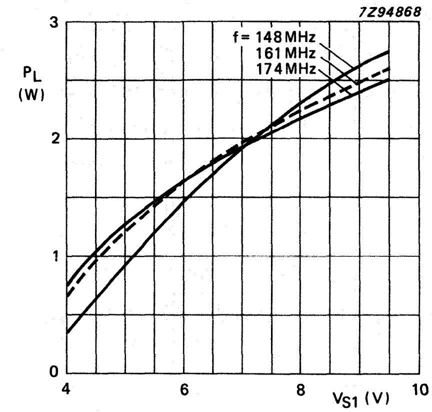


Fig. 5 Load power as a function of supply voltage V_{S1}; V_{S2} = 9.6 V; P_D = 35 mW; typical values.

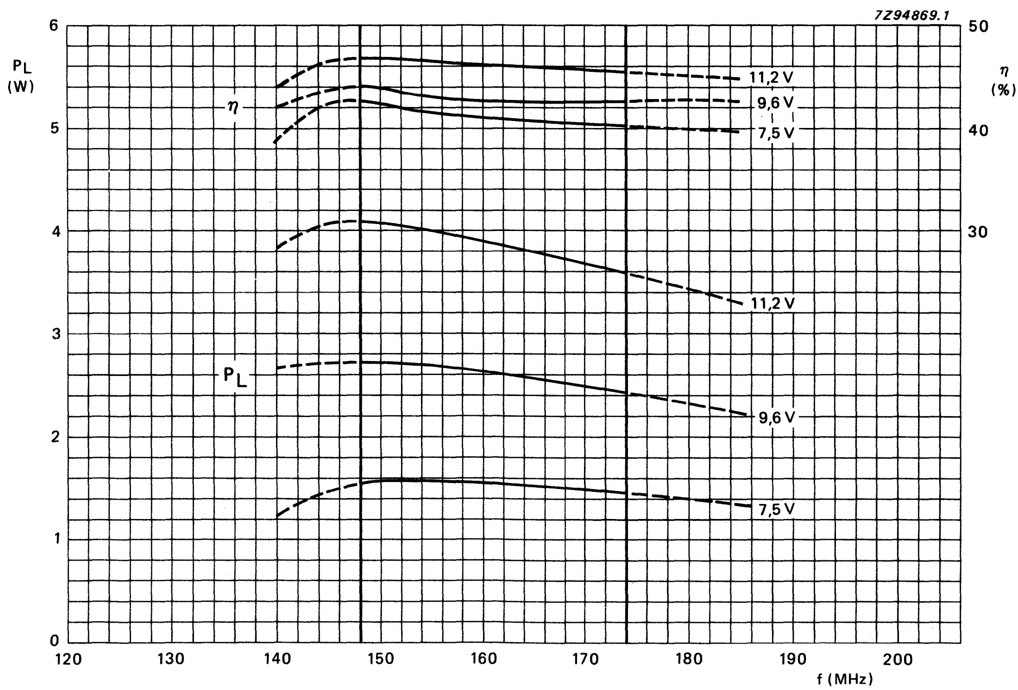


Fig. 6 Load power as a function of frequency; P_D = 35 mW; typical values.

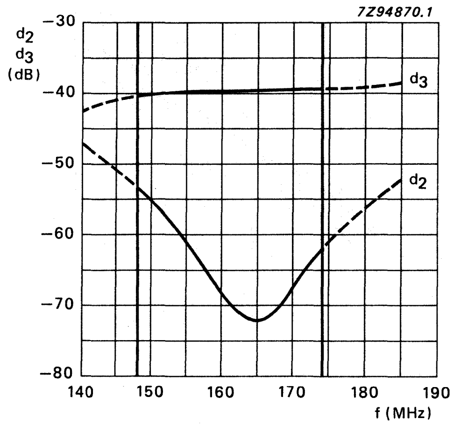


Fig. 7 Second and third harmonic distortion as a function of frequency; $V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; typical values.

VHF AMPLIFIER MODULE

VHF amplifier module designed for use in portable transmitters operating from a 9.6 V supply.
The module is a two-stage amplifier consisting of n-channel FET crystals and lumped-element matching circuits.

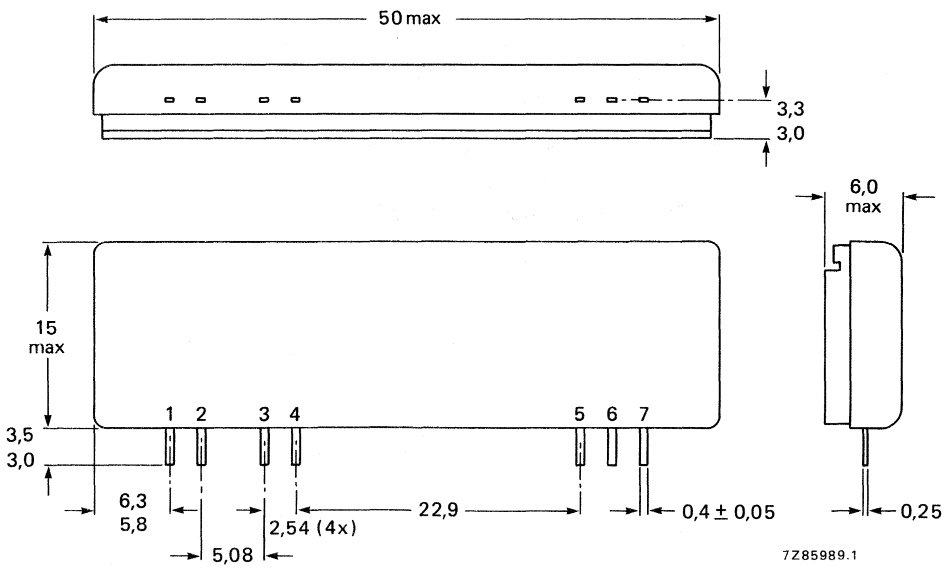
The BGY94A will produce a minimum of 5 W into a 50 Ω load over the 68 to 88 MHz frequency range.

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range			68 to 88	MHz
DC supply voltages	V_{S1}, V_{S2}	nom.	9.6	V
Drive power	P_D	max.	35	mW
Load power	P_L	>	5.0	W
Input, output impedance	z_i, z_L	nom.	50	Ω

MECHANICAL DATA

Dimensions in mm



Lead reference
1 = RF input
2 = Earth
3 = V_{S1} and second stage bias
4 = Earth
5 = V_{S2}
6 = Earth
7 = RF output
flange = earth

Fig. 1 SOT-182.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}, V_{S2}	max.	13.5 V
RF input terminal voltage*	$\pm V_i$	max.	25 V
RF output terminal voltage*	$\pm V_o$	max.	25 V
Load power (see Fig. 2)	P_L	max.	9.0 W
Drive power	P_D	max.	70 mW
Storage temperature range	T_{stg}		−40 to + 100 °C
Operating heatsink temperature	T_h	max.	90 °C

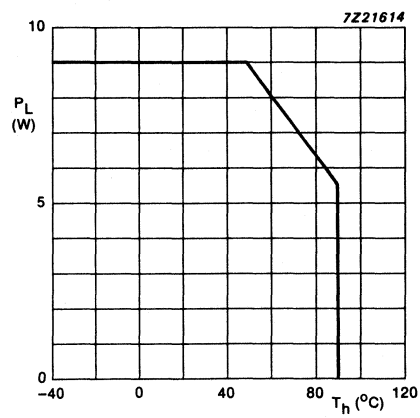


Fig. 2 Load power derating; VSWR = 1 : 1.

* With respect to earth.

CHARACTERISTICS

T_h = 25 °C unless otherwise stated
$V_{S1} = V_{S2}$ = 9.6 V; $R_S = R_L$ = 50 Ω; f = 68 to 88 MHz.

Quiescent currents			
first stage current			
$P_D = 0$	I_{Q1}	typ.	125 mA
second stage current with first stage open circuit			
$P_D = 0$; $I_{S1} = 0$	I_{Q2}	<	0.5 mA
RF drive power			
P_L = 5.0 W	P_D	<	35 mW
		typ.	10 mW
Efficiency			
P_L = 5.0 W	η	>	40 %
		typ.	48 %
Harmonic output	any harmonic (relative to carrier)	<	−35 dB
Input VSWR			
with respect to 50 Ω	VSWR	max.	2 : 1

Stability

The module is stable with load VSWR up to 8 (all phases) when operated within the following conditions:

$V_{S1} \leq V_{S2}$ = 4 to 11.2 V; f = 68 to 88 MHz; P_D = 17 to 70 mW; P_L < 9 W (matched).

Ruggedness

The module will withstand a load VSWR of 50 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 derating curve being exceeded (T_h < 90 °C).

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface and heat-conducting compound applied between module and heatsink. The module is designed to be pressed against the heatsink by a sheet spring applying up to 50 N to the top surface of the module encapsulation. 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 s at a distance of at least 1 mm from the plastic.

Power rating

In general it is recommended that the output power from the module under nominal conditions should not exceed 7 W in order to provide an adequate safety margin under fault conditions.

Gain control

The module is designed to be operated at a constant output power of 5 W. The module is adjusted to produce nominal output power by reducing the first stage supply voltage (V_{S1}). If the module is to be used over a range of output power levels below 5 W the first stage supply voltage should not be reduced below 4 V. If further reductions in power are needed this may be achieved by varying the drive power (P_D), however for stable operation care must be taken to avoid operating the module outside the published stability conditions.

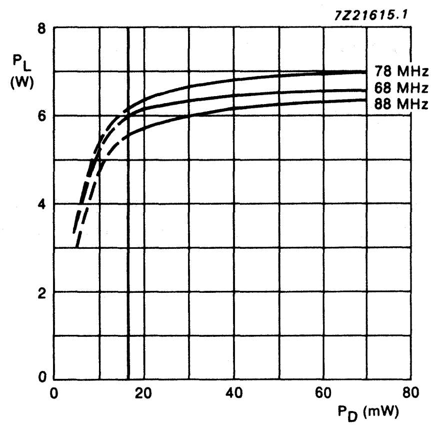


Fig. 3 Load power as a function of drive power; $V_{S1} = V_{S2} = 9.6$ V.

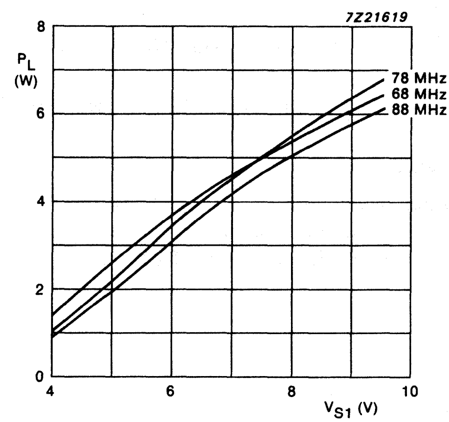


Fig. 4 Load power as a function of supply voltage V_{S1}; $P_D = 35$ mW; $V_{S2} = 9.6$ V.

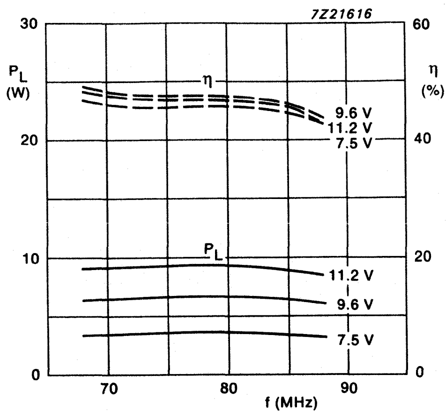


Fig. 5 Load power and efficiency as functions of frequency; P_D = 35 mW.

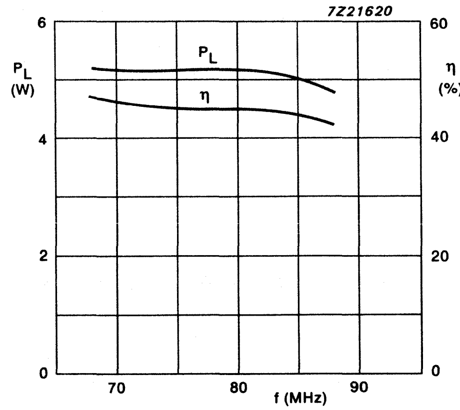


Fig. 6 Load power and efficiency as functions of frequency; P_D = 35 mW; V_{S1} = 7.5 V; V_{S2} = 9.6 V.

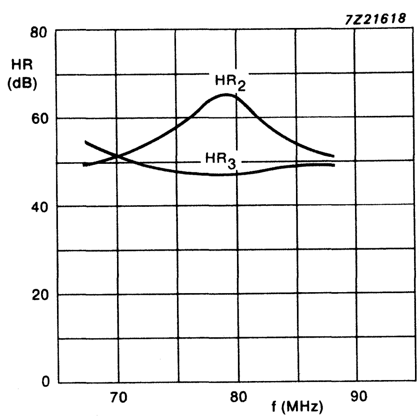


Fig. 7 Second and third harmonic rejection as a function of frequency; P_D = 35 mW; V_{S1} = V_{S2} = 9.6 V.

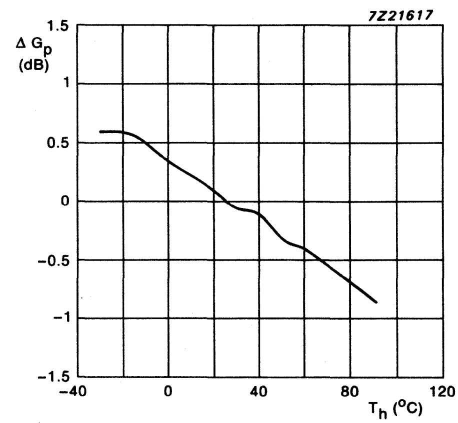


Fig. 8 Change in power gain as a function of heatsink temperature; f = 78 MHz; P_D = 35 mW; V_{S1} = V_{S2} = 9.6 V.

VHF POWER AMPLIFIER MODULE

A broadband VHF amplifier module primarily designed for use in portable transmitters operating from 9.6 V electrical battery supply.

The module is a two-stage RF amplifier consisting of n-channel FETs, with lumped-element matching and bias circuits.

The module will produce a minimum of 5 W into a 50 Ω load over the frequency range of 132 to 156 MHz.

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range			132 to 156	MHz
DC supply voltages	V_{S1}, V_{S2}	nom.	9.6	V
Drive power	P_D	max.	35	mW
Load power	P_L	>	5.0	W
Input, output impedance	Z_i, Z_L	nom.	50	Ω

MECHANICAL DATA

Dimensions in mm

Lead reference

1 = RF input
2 = Earth
3 = V_{S1} and second stage bias
4 = Earth
5 = V_{S2}
6 = Earth
7 = RF output
Flange = earth

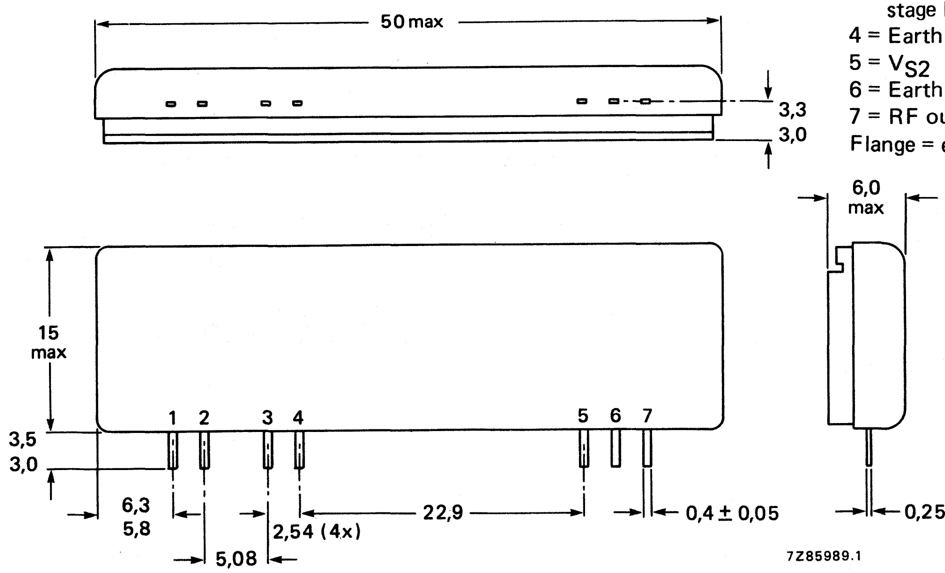


Fig. 1 SOT-182.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}, V_{S2}	max.	13.5	V
RF input terminal voltage*	$\pm V_i$	max.	25	V
RF output terminal voltage*	$\pm V_o$	max.	25	V
Load power	P_L	max.	9.0	W
Drive power	P_D	max.	70	mW
Storage temperature range	T_{stg}	−40 to + 100		°C
Operating heatsink temperature	T_h	max.	90	°C

CHARACTERISTICS

T_h = 25 °C unless otherwise stated

$V_{S1} = V_{S2} = 9.6$ V; $R_S = R_L = 50\ \Omega$; f = 132 to 156 MHz

Quiescent currents first stage current $P_D = 0$	I_{Q1}	typ.	125	mA
second stage current with first stage open circuit $P_D = 0$; $I_{S1} = 0$	I_{Q2}	<	0.5	mA
RF drive power P_L = 5.0 W	P_D	<	35	mW
Efficiency P_L = 5.0 W	η	> typ.	40 42	% %
Harmonic output	any harmonic (relative to carrier)	<	−35	dB
Input VSWR with respect to 50 Ω	VSWR	max.	2:1	

Stability

The module is stable with load VSWR up to 8 (all phases) when operated within the following conditions:

$V_{S1} \leqslant V_{S2}$ = 4 to 11.2 V; f = 132 to 156 MHz; P_D = 17 to 70 mW; $P_L < 9$ W (matched).

Ruggedness

The module will withstand a load VSWR of 50 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 derating curve being exceeded ($T_h < 90$ °C).

* With respect to flange.

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface and heat-conducting compound applied between module and heatsink. The module is designed to be pressed against the heatsink by a sheet spring applying up to 50 N to the top surface of the module encapsulation. 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 s at a distance of at least 1 mm from the plastic.

Power rating

In general it is recommended that the output power from the module under nominal conditions should not exceed 7 W in order to provide an adequate safety margin under fault conditions.

Gain control

The module is designed to be operated at a constant output power of 5 W. The module is adjusted to produce nominal output power by reducing the first stage supply voltage (V_{S1}). If the module is to be used over a range of output power levels below 5 W the first stage supply voltage should not be reduced below 4 V. If further reductions in power are needed this may be achieved by varying the drive power (P_D), however for stable operation care must be taken to avoid operating the module outside the published stability conditions.

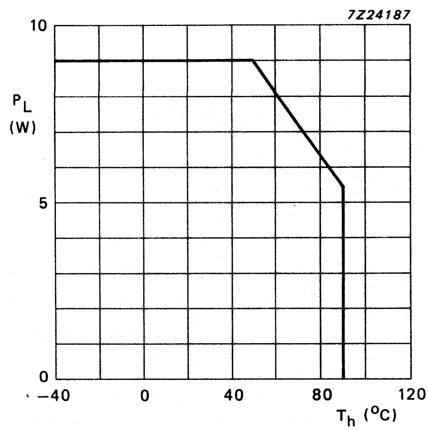


Fig. 2 Load power derating; VSWR = 1:1.

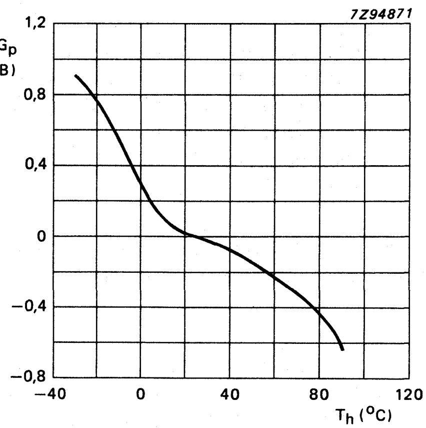


Fig. 3 Power gain as a function of temperature;
$V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; f = 144 MHz.

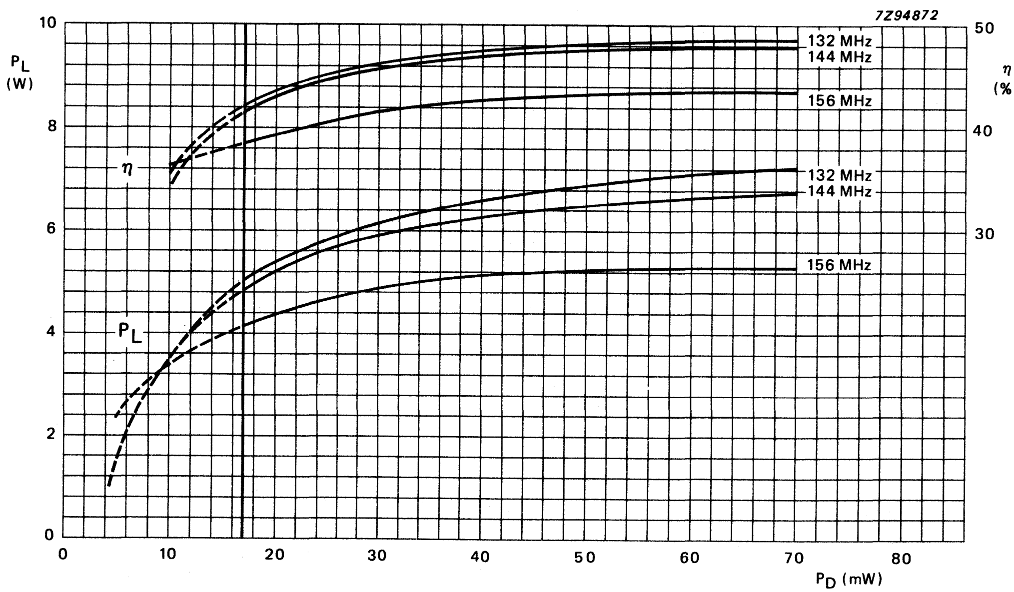


Fig. 4 Load power and efficiency as functions of drive power;
$V_{S1} = V_{S2} = 9.6$ V; typical values.

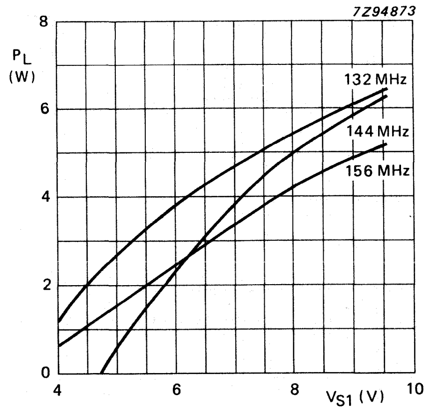


Fig. 5 Load power as a function of supply voltage V_{S1}; P_D = 35 mW; V_{S2} = 9.6 V; typical values.

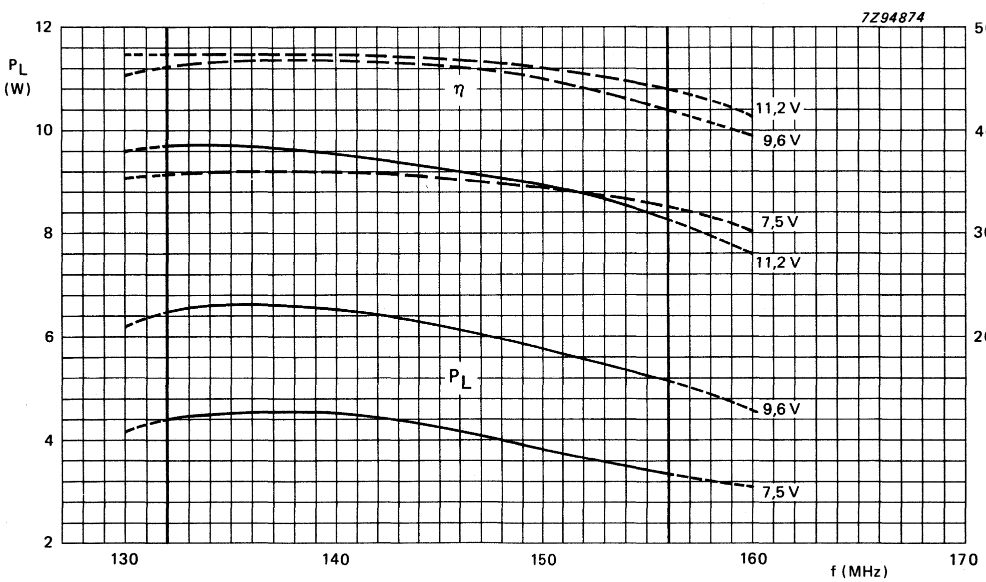


Fig. 6 Load power and efficiency as functions of frequency; $V_{S1} = V_{S2}$; P_D = 35 mW; typical values.

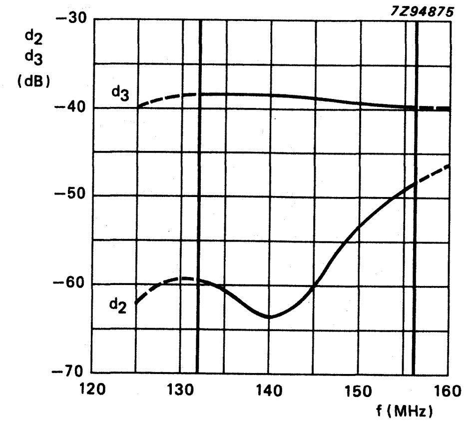


Fig. 7 Second and third harmonic distortion as a function of frequency; $V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; typical values.

VHF AMPLIFIER MODULE

A broadband VHF amplifier module primarily designed for use in portable transmitters operating from 9.6 V electrical battery supply.

The module is a two-stage RF amplifier consisting of n-channel FETs, with lumped-element matching and bias circuits.

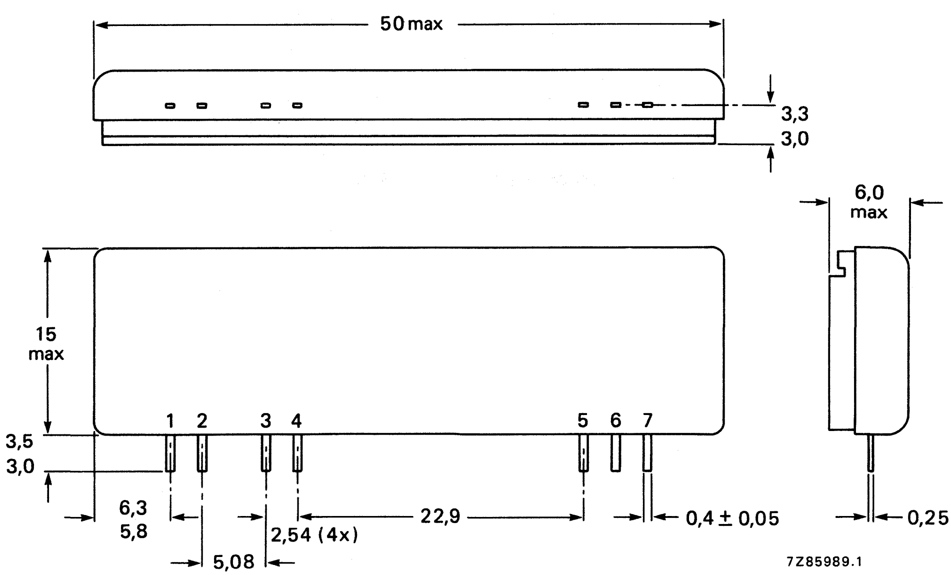
The module will produce a minimum of 5 W into a 50 Ω load over the frequency range of 148 to 174 MHz.

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range			148 to 174	MHz
DC supply voltages	V_{S1}, V_{S2}	nom.	9.6	V
Drive power	P_D	max.	35	mW
Load power	P_L	>	5.0	W
Input, output impedance	z_i, z_L	nom.	50	Ω

MECHANICAL DATA

Dimensions in mm



Lead reference

1 = RF input
2 = Earth
3 = V_{S1} and second stage bias
4 = Earth
5 = V_{S2}
6 = Earth
7 = RF output
Flange = Earth

Fig. 1 SOT-182.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}, V_{S2}	max.	13.5 V
RF input terminal voltage*	$\pm V_i$	max.	25 V
RF output terminal voltage*	$\pm V_o$	max.	25 V
Load power (see Fig. 2)	P_L	max.	9.0 W
Drive power	P_D	max.	70 mW
Storage temperature range	T_{stg}		−40 to + 100 °C
Operating heatsink temperature	T_h	max.	90 °C

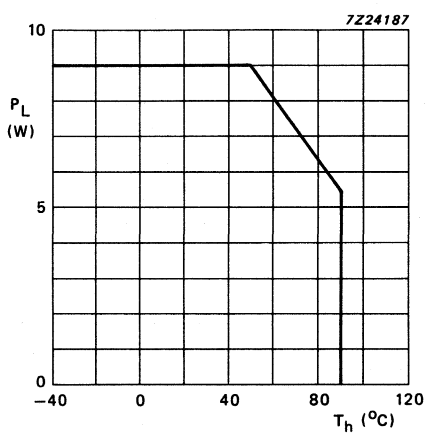


Fig. 2 Load power derating; VSWR = 1 : 1.

* With respect to earth.

CHARACTERISTICS

T_h = 25 °C unless otherwise stated
$V_{S1} = V_{S2}$ = 9.6 V; $R_S = R_L$ = 50 Ω; f = 148 to 174 MHz.

Quiescent currents			
first stage current			
$P_D = 0$	I_{Q1}	typ.	125 mA
second stage current with first stage open circuit			
$P_D = 0$; $I_{S1} = 0$	I_{Q2}	<	0.5 mA
RF drive power			
P_L = 5.0 W	P_D	<	35 mW
Efficiency			
P_L = 5.0 W	η	>	40 %
		typ.	46 %
Harmonic output	any harmonic (relative to carrier)	<	–35 dB
Input VSWR			
with respect to 50 Ω	VSWR	max.	2 : 1

Stability

The module is stable with load VSWR up to 8 (all phases) when operated within the following conditions:

$V_{S1} \leq V_{S2}$ = 4 to 11.2 V; f = 148 to 174 MHz; P_D = 17 to 70 mW; P_L < 9 W (matched).

Ruggedness

The module will withstand a load VSWR of 50 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 derating curve being exceeded (T_h < 90 °C).

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface and heat-conducting compound applied between module and heatsink. The module is designed to be pressed against the heatsink by a sheet spring applying up to 50 N to the top surface of the module encapsulation. 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 s at a distance of at least 1 mm from the plastic.

Power rating

In general it is recommended that the output power from the module under nominal conditions should not exceed 7 W in order to provide an adequate safety margin under fault conditions.

Gain control

The module is designed to be operated at a constant output power of 5 W. The module is adjusted to produce nominal output power by reducing the first stage supply voltage (V_{S1}). If the module is to be used over a range of output power levels below 5 W the first stage supply voltage should not be reduced below 4 V. If further reductions in power are needed this may be achieved by varying the drive power (P_D), however for stable operation care must be taken to avoid operating the module outside the published stability conditions.

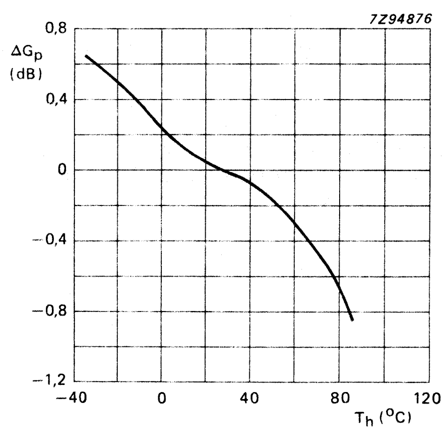


Fig. 3 Power gain as a function of temperature; $V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; f = 161 MHz.

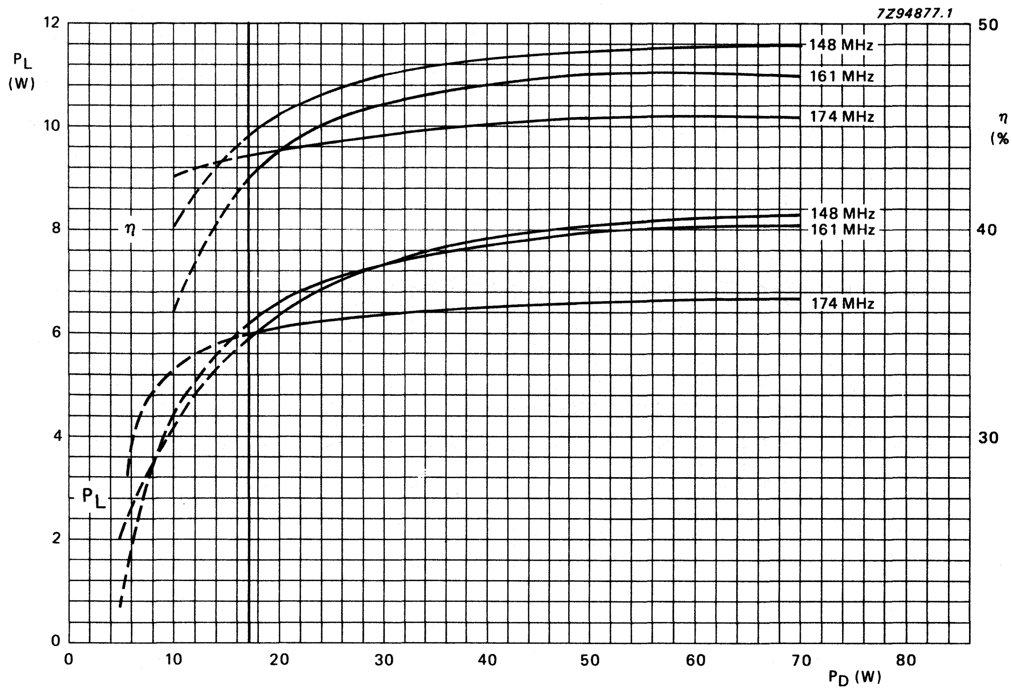


Fig. 4 Load power and efficiency as functions of drive power; $V_{S1} = V_{S2} = 9.6$ V; typical values.

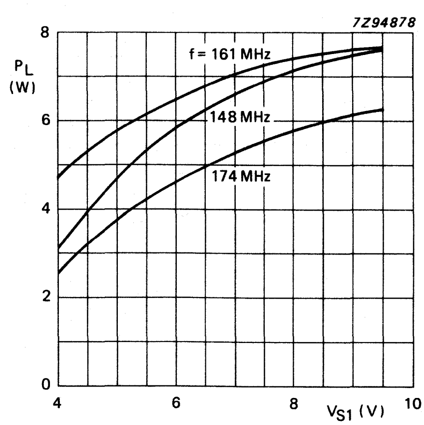


Fig. 5 Load power as a function of supply voltage V_{S1}; P_D = 35 mW; V_{S2} = 9.6 V; typical values.

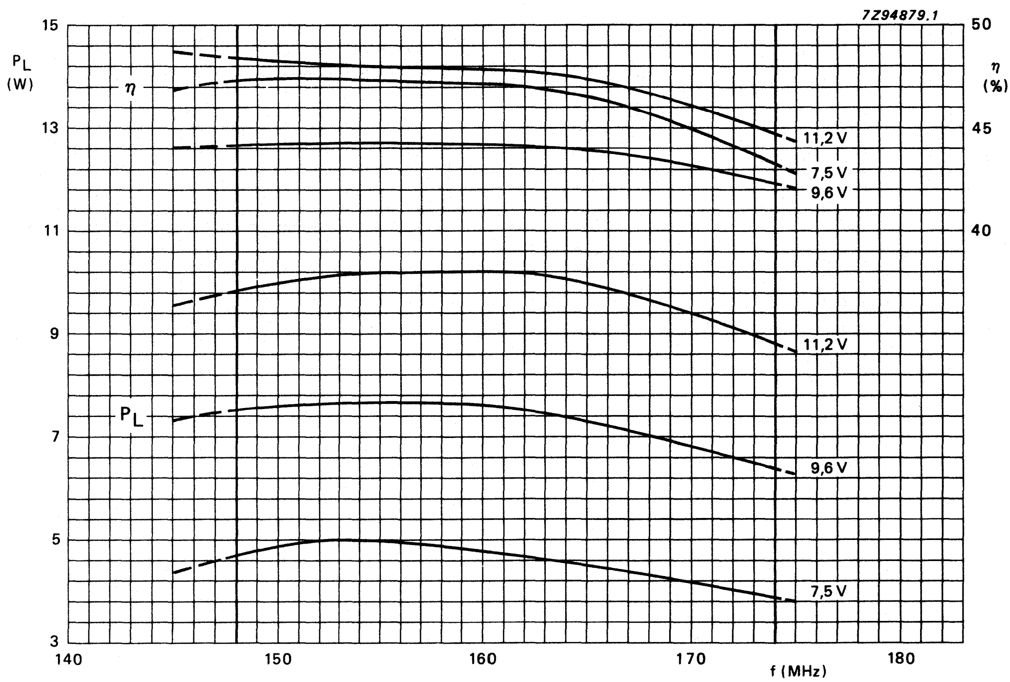


Fig. 6 Load power and efficiency as functions of frequency; $V_{S1} = V_{S2}$; P_D = 35 mW; typical values.

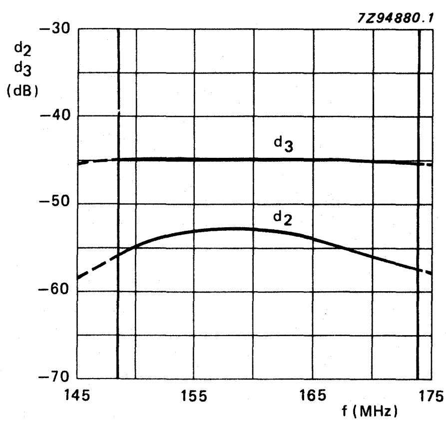


Fig. 7 Second and third harmonic distortion as a function of frequency; $V_{S1} = V_{S2}$ = 9.6 V; P_D = 35 mW; typical values.

UHF AMPLIFIER MODULE

The BGY95 is a three-stage UHF amplifier module designed primarily for mobile transmitting equipment operating from a nominal 7.5 V power supply.

The module consists of three npn silicon planar transistors mounted on a metallized ceramic substrate, together with matching and bias circuitry. The BGY95A and BGY95B produce an output power of 2.2 W into a 50 Ω load over the frequency band 824-849 MHz and 890-915 MHz respectively. The output power can be controlled by means of a DC voltage (V_{S1}).

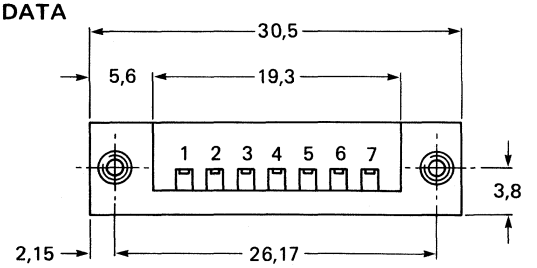
QUICK REFERENCE DATA

Mode of operation				CW
Frequency range	BGY95A	f		824-849 MHz
	BGY95B	f		890-915 MHz
RF power output $V_{S1} = V_{S2} = V_{S3} = 7.5$ V; $P_D = 20$ mW		P_L	min.	2.2 W
RF input drive power $V_{S1} = V_{S2} = V_{S3} = 7.5$ V; $P_L = 2.2$ W		P_D	⩽	20 mW
Output load impedance		Z_L	nom.	50 Ω

MECHANICAL DATA

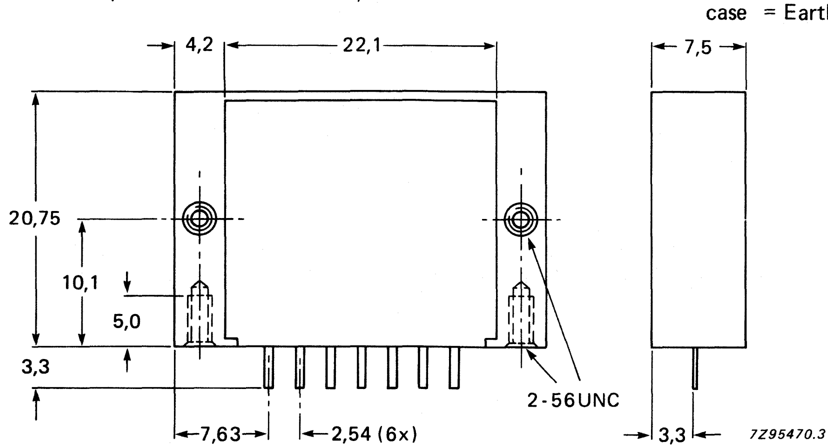
Dimensions in mm

Fig.1 SOT200.



Lead reference

Pin 1 = RF input
2 = V_{S1}
3 = not connected
4 = V_{S2}
5 = V_{S3}
6 = not connected
7 = RF output
case = Earth



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Voltages with respect to case			
RF input pin	V_{in}	max.	± 25 V
RF output pin	V_{out}	max.	± 25 V
Supply pins	V_{S1}	max.	8 V
	V_{S2}	max.	9 V
	V_{S3}	max.	9 V
RF output power	P_L	max.	3.5 W
RF input drive power	P_D	max.	40 mW
Storage temperature range	T_{stg}		−40 to + 100 °C
Operating heatsink temperature	T_h	max.	90 °C

CHARACTERISTICS

Performance

BGY95A: f = 824-849 MHz; $R_S = R_L = 50\ \Omega$; $V_{S1} = V_{S2} = V_{S3} = 7.5$ V
BGY95B: f = 890-915 MHz; $R_S = R_L = 50\ \Omega$; $V_{S1} = V_{S2} = V_{S3} = 7.5$ V

RF output power			
$P_D = 20$ mW	P_L	min.	2.2 W
RF input drive power			
$P_L = 2.2$ W	P_D	≤	20 mW
Efficiency			
$P_L = 2.2$ W	η	min.	35 %
Harmonic rejection			
$P_L = 2.2$ W		min.	30 dB
Input VSWR with respect to 50 Ω;			
$P_D = 20$ mW	VSWR	typ.	1.5
		max.	2.0
Gain control: $P_D = 20$ mW;			
at $V_{S1} = 0.5$ V	P_L	max.	6 mW
at $V_{S1} = 6.0$ V	P_L	min.	2.2 W

Stability

The module will produce no spurious signals with a load mismatch VSWR < 3 : 1 when operated with $V_{S1} = 0.5$ to 7.5 V, $V_{S2} = V_{S3} = 6$ to 9 V, $P_D = 10$ to 40 mW and $T_h \leq 90$ °C, provided maximum ratings are not exceeded.

Ruggedness

The module will withstand a load mismatch of 50 : 1 when operated with $V_{S1} = 0$ to 8 V, $V_{S2} = V_{S3} = 0$ to 9 V, $P_D = 0$ to 40 mW and $T_h = 90$ °C, provided maximum ratings are not exceeded.

UHF AMPLIFIER MODULE

The BGY96A is a three-stage UHF amplifier module designed primarily for mobile transmitting equipment operating from a nominal 9.6 V power supply.

The module consists of three npn silicon planar transistors mounted on a metallized ceramic substrate, together with matching and bias circuitry. The BGY96A produces an output power of 2.5 W into a 50 Ω load over the frequency band 824-849 MHz.
The output power can be controlled by means of a DC voltage (V_{S1}).

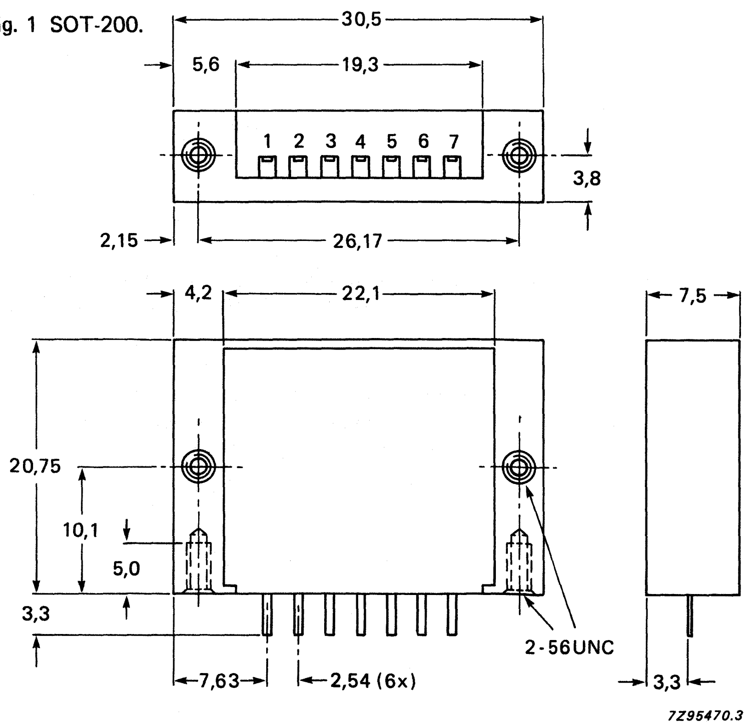
QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range	f		824-849	MHz
RF power output V_{S1} = 6 V; V_{S2} = V_{S3} = 9.6 V; P_D = 20 mW	P_L	min.	2.5	W
RF input drive power V_{S1} = 6 V; V_{S2} = V_{S3} = 9.6 V; P_L = 2.5 W	P_D	⩽	20	mW
Output load impedance	Z_L	nom.	50	Ω

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-200.



Lead reference

Pin 1 = RF input
2 = V_{S1}
3 = not connected
4 = V_{S2}
5 = V_{S3}
6 = not connected
7 = RF output
case = Earth

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Voltages with respect to case				
RF input pin	V_{in}	max.	± 25	V
RF output pin	V_{out}	max.	± 25	V
Supply pins	V_{S1}	max.	8	V
	V_{S2}	max.	13	V
	V_{S3}	max.	13	V
RF output power	P_L	max.	3.55	W
RF input drive power	P_D	max.	50	mW
Storage temperature range	T_{stg}	−40 to	+ 100	°C
Operating heatsink temperature	T_h	max.	90	°C

CHARACTERISTICS

Performance:
f = 824-849 MHz; $R_S = R_L = 50\ \Omega$; $V_{S1} = 6$ V; $V_{S2} = V_{S3} = 9.6$ V

RF output power, $P_D = 20$ mW	P_L	min.	2.5	W
RF input drive power, $P_L = 2.5$ W	P_D	$\leqslant$	20	mW
Efficiency, $P_L = 2.5$ W	η	min.	35	%
Harmonic rejection, $P_L = 2.5$ W		min.	30	dB
Input VSWR with respect to 50 Ω; $P_D = 20$ mW	VSWR	typ.	1.5	
		max.	2.0	
Gain control: $P_D = 20$ mW; at $V_{S1} = 0.5$ V	P_L	max.	6	mW
at $V_{S1} = 6.0$ V	P_L	min.	2.5	W

Stability:
The module will produce no spurious signals with a load mismatch VSWR < 3 : 1 when operated with $V_{S1} = 0.5$ to 6 V, $V_{S2} = V_{S3} = 7.9$ to 12 V, $P_D = 10$ to 40 mW and $T_h \leqslant 90$ °C, provided maximum ratings are not exceeded.

Ruggedness:
The module will withstand a load mismatch of 50 : 1 when operated with $V_{S1} = 0$ to 8 V, $V_{S2} = V_{S3} = 0$ to 13 V, $P_D = 0$ to 50 mW and $T_h = 90$ °C, provided maximum ratings are not exceeded.

UHF AMPLIFIER MODULE

The BGY96B is a three-stage UHF amplifier module designed primarily for mobile transmitting equipment operating from a nominal 9.6 V power supply.

The module consists of three npn silicon planar transistors mounted on a metallized ceramic substrate, together with matching and bias circuitry. The BGY96B produces an output power of 2.5 W into a 50 Ω load over the frequency band of 890 – 915 MHz. The output power can be controlled by means of a DC voltage (V_{S1}).

QUICK REFERENCE DATA

Mode of operation			CW
Frequency range	f		890 to 915 MHz
RF power output V_{S1} = 6 V; V_{S2} = V_{S3} = 9.6 V; P_D = 20 mW	P_L	min.	2.5 W
RF input drive power P_L = 2.5 W	P_D	≤	20 mW
Output load impedance	Z_L	nom.	50 Ω

MECHANICAL DATA

Dimensions in mm

Lead reference

1 = RF input
2 = V_{S1}
3 = not connected
4 = V_{S2}
5 = V_{S3}
6 = not connected
7 = RF output
case = earth

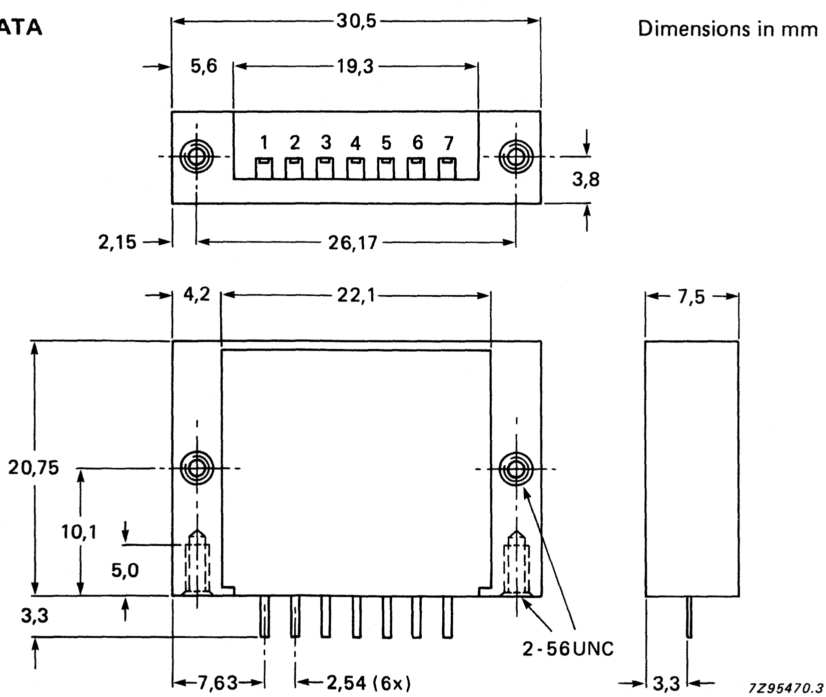


Fig. 1 SOT-200.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}	max.	8.0 V
	V_{S2}, V_{S3}	max.	13 V
RF input terminal voltage*	V_{in}	max.	± 25 V
RF output terminal voltage*	V_{out}	max.	± 25 V
RF load power (see Fig. 2)	P_L	max.	3.5 W
RF drive power	P_D	max.	50 mW
Storage temperature range	T_{stg}		−40 to + 100 °C
Operating heatsink temperature range	T_h	max.	−30 to + 90 °C

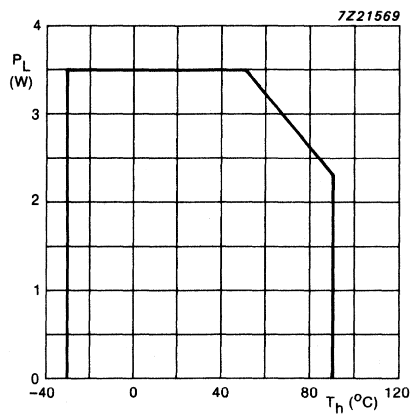


Fig. 2 Load power derating; VSWR = 1 : 1.

* With respect to case.

CHARACTERISTICS

V_{S1} = 6 V; V_{S2} = V_{S3} = 9.6 V; T_h = 25 °C; f = 890 – 915 MHz; R_S = R_L = 50 Ω
unless otherwise specified.

RF output power P_D = 20 mW	P_L	min.	2.5 W
RF input drive power P_L = 2.5 W	P_D	≤	20 mW
Efficiency P_L = 2.5 W	η	min.	35 %
Harmonic rejection P_L = 2.5 W	d2	min.	30 dB
	d3	min.	40 dB
Input VSWR with respect to 50 Ω P_D = 20 mW	VSWR	max.	2 : 1
Gain control: P_D = 20 mW at V_{S1} = 0.5 V to 6.0 V	ΔG_p		6 mW to 2.5 W
Noise power 25 kHz. bandwidth 45 MHz above f_o; P_{out} = 2.5 W by adjustment of $V_{control}$; Pi = 20 mW	Noise power max.		−85 dBm

Stability

The module will produce no spurious signals > −70 dB below the carrier signal when operated with a load mismatch VSWR < 3 : 1 (all phases) and V_{S1} = 0.5 to 6.0 V, V_{S2} = V_{S3} = 7.9 to 12 V. P_D = 10 to 40 mW and T_h ≤ 90 °C, provided maximum ratings are not exceeded. $V_{S1} \leq V_{S2}$ and V_{S3}.

Ruggedness

The module will withstand a load mismatch of 50 : 1 (all phases) for short periods when operated with V_{S1} = < 8 V, V_{S2} = V_{S3} = ≤ 13 V, P_D = ≤ 50 mW and T_h ≤ 90 °C, provided maximum ratings are not exceeded.

Mounting

To ensure good thermal transfer the module should be mounted onto a heatsink with a flat surface with heat-conducting compound applied between module and the heatsink. The leads 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.

Power rating

In general, it is recommended that the output power from the module under nominal conditions should not exceed 3.0 W in order to provide an adequate safety margin under fault conditions.

Gain control

The module is designed to be operated at a nominal output power of 2.5 W. The module is adjusted to produce nominal output power by reducing the first stage supply voltage V_{S1}. The output power may be varied from 6 mW to 2.5 W by varying V_{S1} from 0.5 V to 6 V.

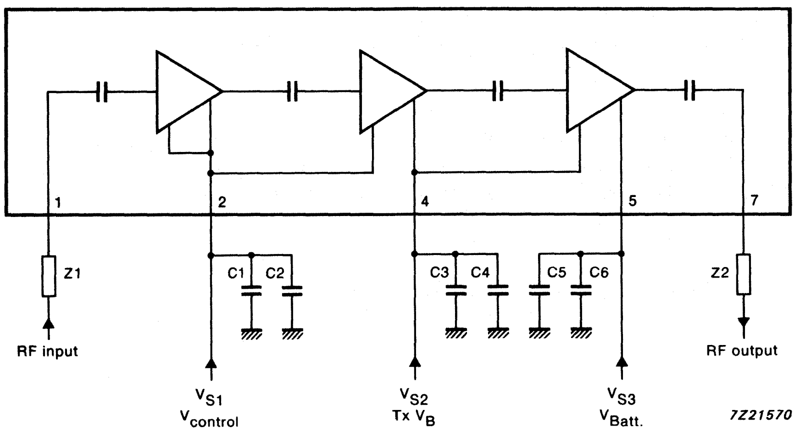
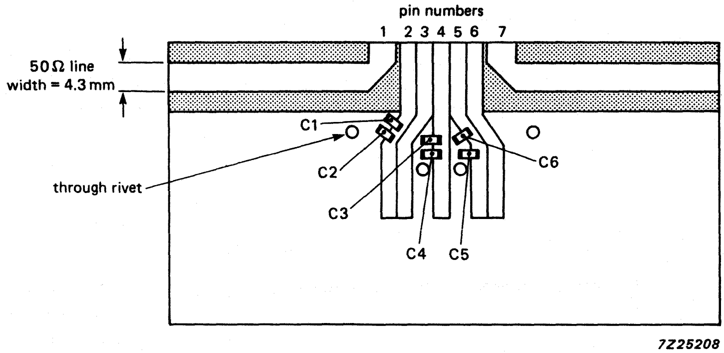


Fig. 3 Internal diagram.

Z1 = Z2 = 50 Ω stripline
C1 = C3 = C6 = 0.01 μF ceramic chip capacitor
C2 = C4 = C5 = 1.0 μF tantalum capacitor



Teflon glass board 1/16″; $\epsilon_r = 2.55$.

Fig. 4 Printed circuit board layout.

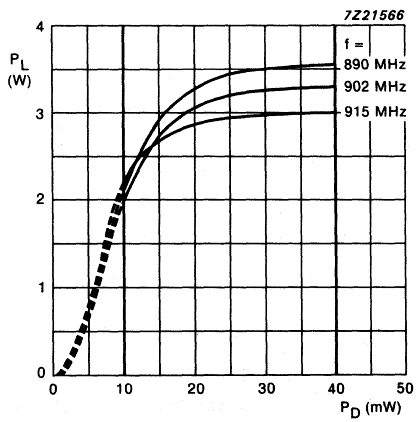


Fig. 5 Load power as a function of drive power; V_{S1} = 6 V; $V_{S2} = V_{S3}$ = 9.6 V.

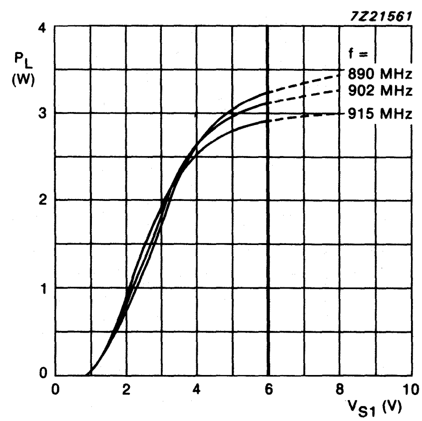


Fig. 6 Load power as a function of supply voltage V_{S1}; P_D = 20 mW; $V_{S2} = V_{S3}$ = 9.6 V.

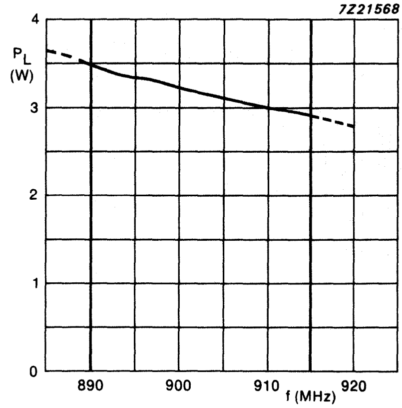


Fig. 7 Load power as a function of frequency; P_D = 20 mW; V_{S1} = 6 V; V_{S2} = V_{S3} = 9.6 V.

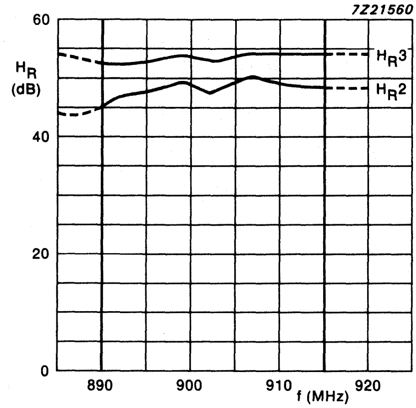


Fig. 8 Second and third harmonic rejections as functions of frequency; P_D = 20 mW; V_{S1} = 6 V; V_{S2} = V_{S3} = 9.6 V.

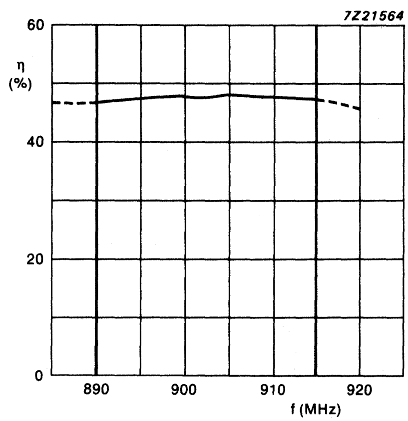


Fig. 9 Efficiency as a function of frequency; P_L = 2.5 W; P_D = 20 mW; V_{S2} = V_{S3} = 9.6 V.

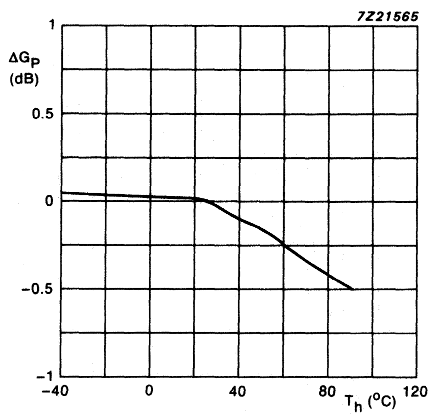


Fig. 10 Change in power gain as a function of heatsink temperature; P_D = 20 mW; V_{S1} = 6 V; V_{S2} = V_{S3} = 9.6 V; f = 915 MHz.

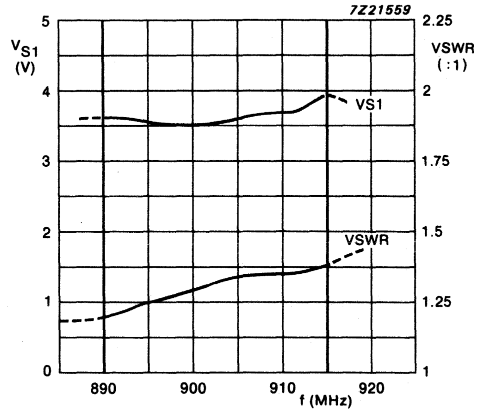


Fig. 11 Supply voltage V_{S1} and VSWR as functions of frequency; P_D = 20 mW; P_L = 2.5 W; V_{S2} = V_{S3} = 9.6 V.

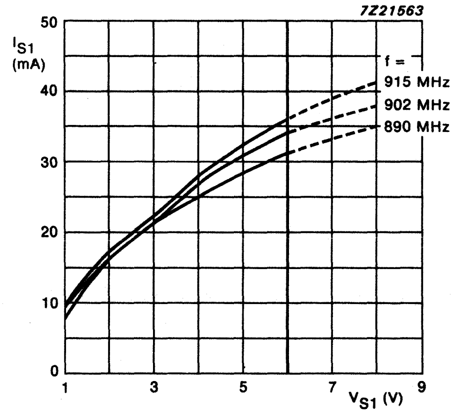


Fig. 12 Supply current I_{S1} as a function of supply voltage V_{S1}; P_D = 20 mW; V_{S2} = V_{S3} = 9.6 V.

UHF AMPLIFIER MODULE

The BGY110A is a four-stage UHF amplifier module designed primarily for hand-held transmitting equipment, operating from a nominal 6 V power supply.

The module consists of four npn silicon planar transistor chips mounted on a metallized ceramic substrate, together with matching and bias circuitry. The module produces an output power of 1.2 W into a 50 Ω load over the frequency band of 824 - 849 MHz. The output power can be controlled by means of a DC voltage (V_{S2}).

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range	f		824 to 849	MHz
Supply voltage	V_S		6.0	V
Load power	P_L	min.	1.2	W
Gain	G	min.	30.8	dB
Load impedance	Z_L	nom.	50	Ω

MECHANICAL DATA

Dimensions in mm

Lead reference

1 = RF input
2 = V_{S1}
3 = V_{S2}
4 = V_{S3}
5 = RF output
Flange = earth

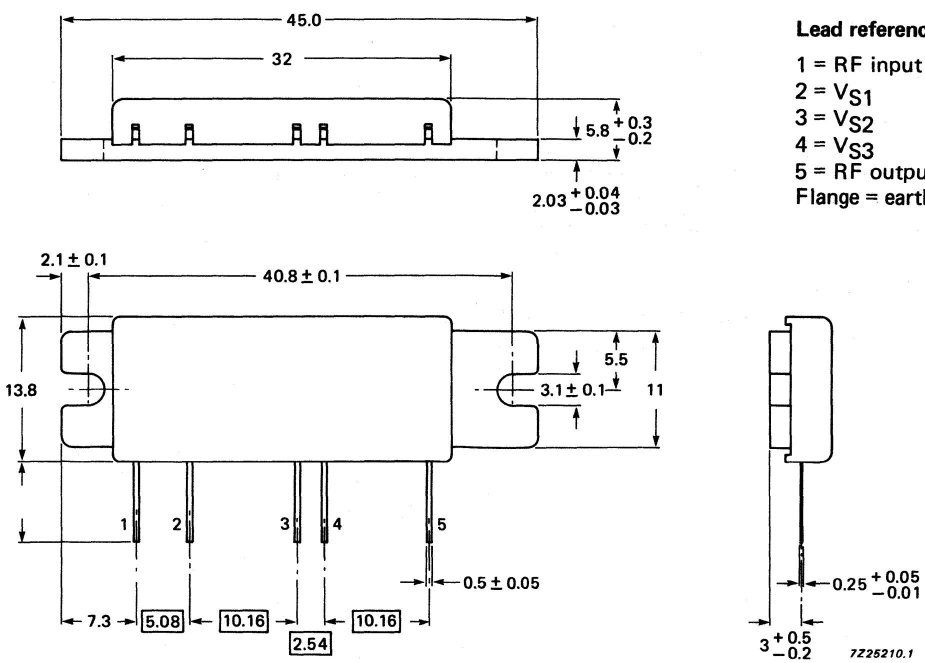


Fig. 1 SOT-246.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}, V_{S2}, V_{S3}	max.	8.0 V
RF input terminal voltage*	$+V_{in}$	max.	25 V
RF output terminal voltage*	$+V_{out}$	max.	25 V
RF load power	P_L	max.	1.6 W
RF drive power	P_D	max.	2.0 mW
Storage temperature range	T_{stg}		−40 to + 100 °C
Operating heatsink temperature	T_h	max.	90 °C

CHARACTERISTICS

$V_{S1} = V_{S2} = V_{S3} = 6$ V; $T_h = 25$ °C; f = 824 - 849 MHz; $R_S = R_L = 50\ \Omega$ unless otherwise specified

Load power			
$P_D = 1$ mW	P_L	min.	1.2 W
Efficiency			
$P_L = 1.2$ W	η	min.	40 %
Harmonic rejection			
$P_L = 1.2$ W	d2	min.	40 dB
	d3	min.	45 dB
Input VSWR			
$P_L = 1.2$ W	VSWR	max.	2 : 1
Gain control			
$P_D = 1$ mW	ΔG_p	min.	30 dB
Power switching			
$V_{S1} = 0$ V; $P_D = 1$ mW	P_L	max.	−20 dBm

Stability

All spurious signals will be at least 60 dB below the desired output signal level with a load mismatch VSWR < 3 : 1 when operated with V_{S1}, $V_{S3} = 4$ to 8 V and $V_{S2} = 0$ to 8 V; $P_D = 0.5$ to 2 mW, providing maximum ratings are not exceeded.

Ruggedness

The module will withstand a load mismatch of 50 : 1 under the following conditions: $P_D = 1$ mW; V_{S1}, $V_{S3} = 8$ V; $P_L = 1.6$ W (matched).

UHF AMPLIFIER MODULE

The BGY110B is a four-stage UHF amplifier module designed primarily for hand-held transmitting equipment, operating from a nominal 6 V power supply.

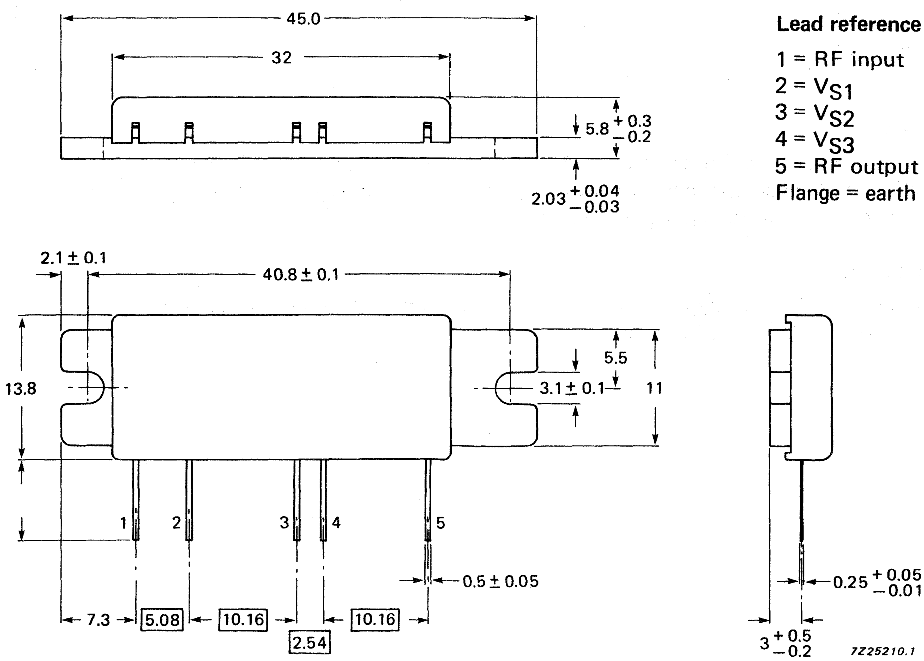
The module consists of four npn silicon planar transistor chips mounted on a metallized ceramic substrate, together with matching and bias circuitry. The module produces an output power of 1.2 W into a 50 Ω load over the frequency band of 872 - 905 MHz. The output power can be controlled by means of a DC voltage (V_{S2}).

QUICK REFERENCE DATA

Mode of operation			CW	
Frequency range	f		872 to 905	MHz
Supply voltage	V_S		6.0	V
Load power	P_L	min.	1.2	W
Gain	G	min.	30.8	dB
Load impedance	Z_L	nom.	50	Ω

MECHANICAL DATA

Dimensions in mm



Lead reference

1 = RF input
2 = V_{S1}
3 = V_{S2}
4 = V_{S3}
5 = RF output
Flange = earth

Fig. 1 SOT-246.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC supply terminal voltages*	V_{S1}, V_{S2}, V_{S3}	max.	8.0 V
RF input terminal voltage*	$+V_{in}$	max.	25 V
RF output terminal voltage*	$+V_{out}$	max.	25 V
RF load power	P_L	max.	1.6 W
RF drive power	P_D	max.	2.0 mW
Storage temperature range	T_{stg}	−40 to + 100 °C	
Operating heatsink temperature	T_h	max.	90 °C

CHARACTERISTICS

$V_{S1} = V_{S2} = V_{S3} = 6$ V; $T_h = 25$ °C; f = 872 - 905 MHz; $R_S = R_L = 50\ \Omega$ unless otherwise specified

Load power $P_D = 1$ mW	P_L	min.	1.2 W
Efficiency $P_L = 1.2$ W	η	min.	40 %
Harmonic rejection $P_L = 1.2$ W	d2 d3	min. min.	40 dB 45 dB
Input VSWR $P_L = 1.2$ W	VSWR	max.	2 : 1
Gain control $P_D = 1$ mW	ΔG_P	min.	30 dB
Power switching $V_{S1} = 0$ V; $P_D = 1$ mW	P_L	max.	−20 dBm

Stability

All spurious signals will be at least 60 dB below the desired output signal level with a load mismatch VSWR < 3 : 1 when operated with V_{S1}, $V_{S3} = 4$ to 8 V and $V_{S2} = 0$ to 8 V; $P_D = 0.5$ to 2 mW, providing maximum ratings are not exceeded.

Ruggedness

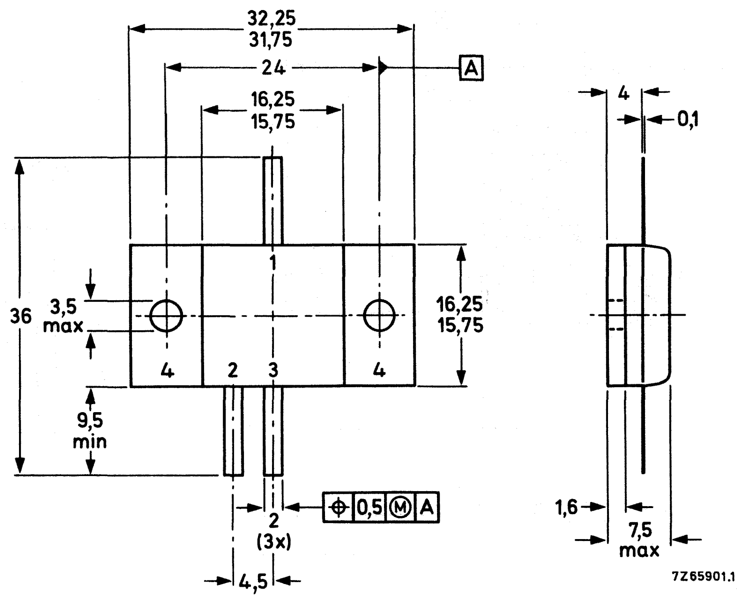
The module will withstand a load mismatch of 50 : 1 under the following conditions: $P_D = 1$ mW; V_{S1}, $V_{S3} = 8$ V; $P_L = 1.6$ W (matched).

ENVELOPE SPECIFICATIONS

SOT75A

MECHANICAL DATA

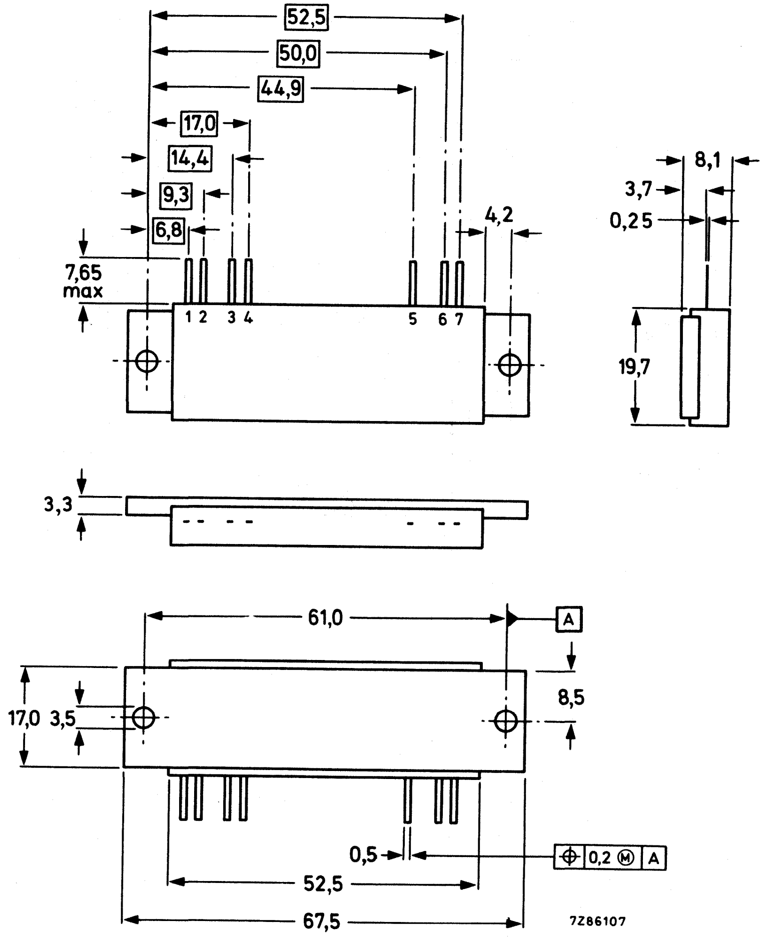
Dimensions in mm



SOT132B

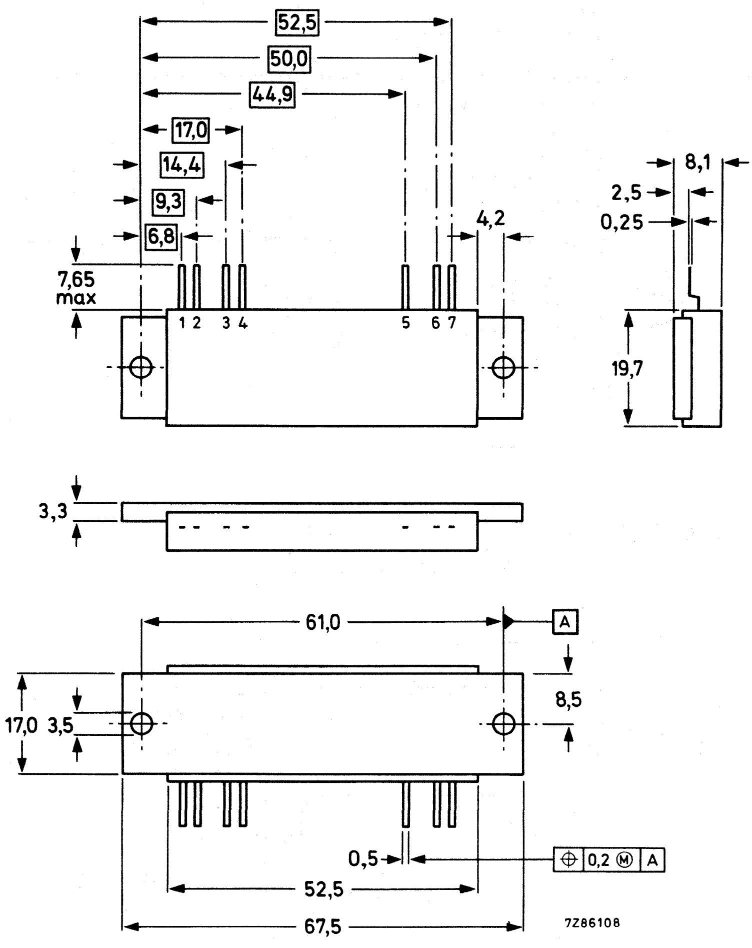
MECHANICAL DATA

Dimensions in mm



SOT132C

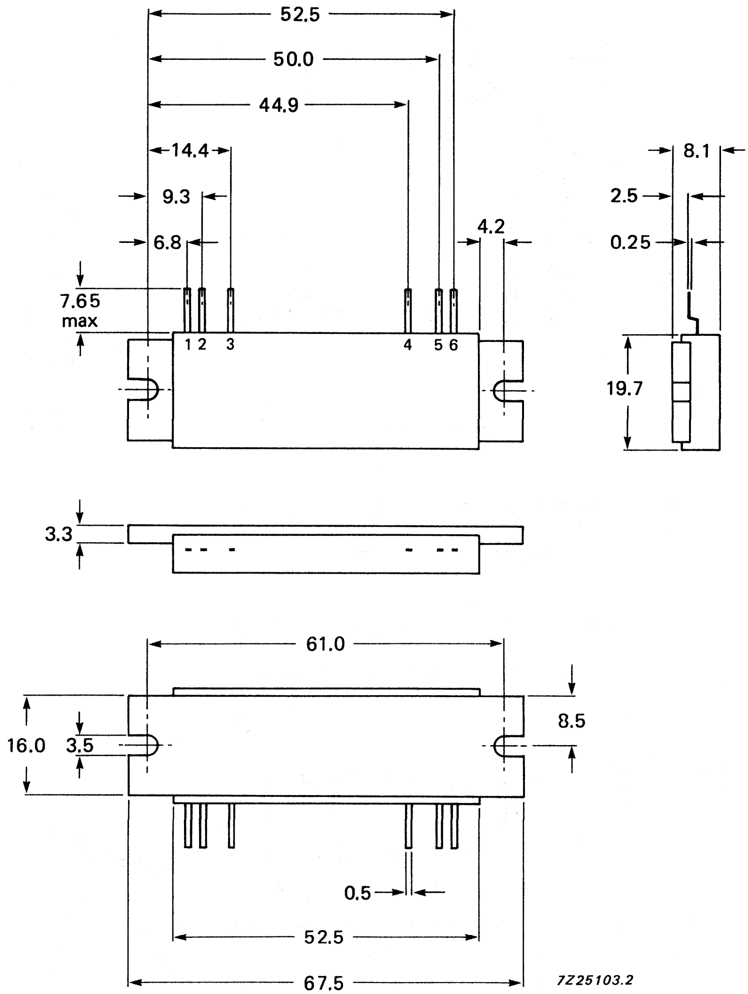
MECHANICAL DATA Dimensions in mm



SOT132D

MECHANICAL DATA

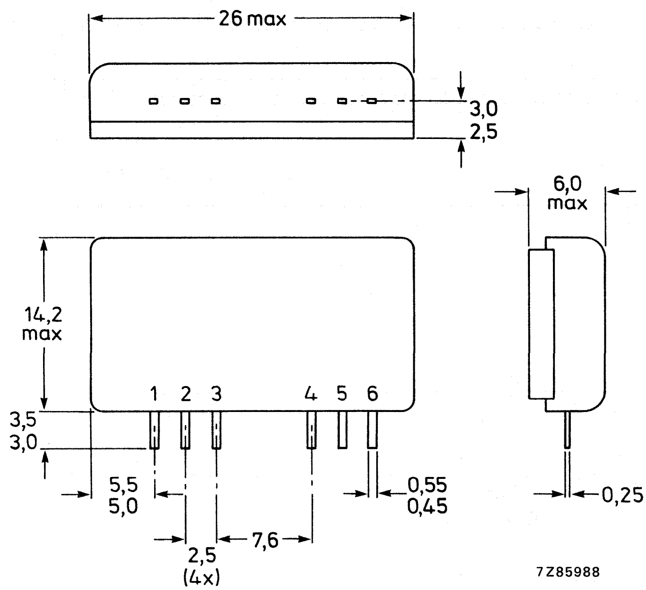
Dimensions in mm



SOT181

MECHANICAL DATA

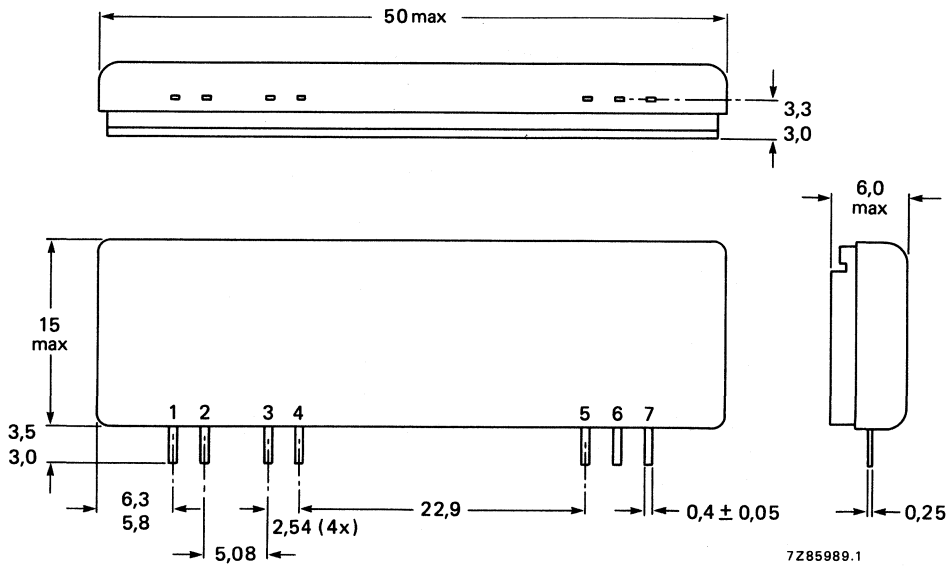
Dimensions in mm



SOT182

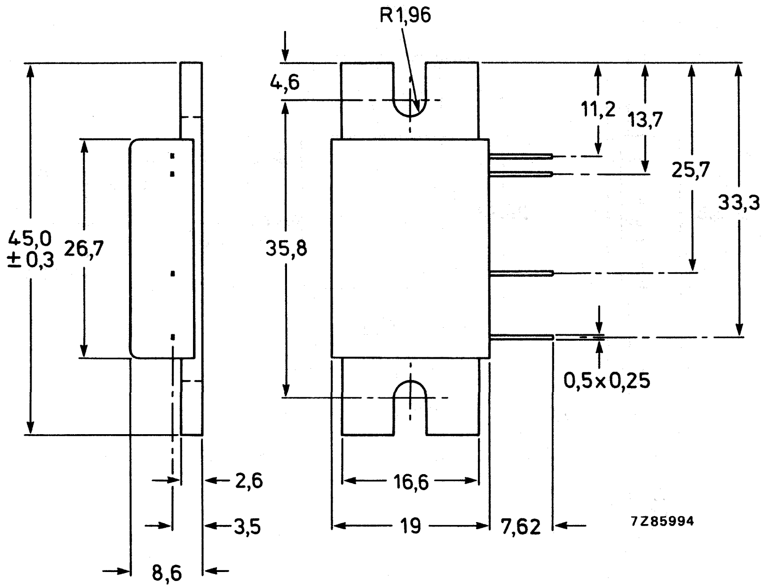
MECHANICAL DATA

Dimensions in mm



SOT183

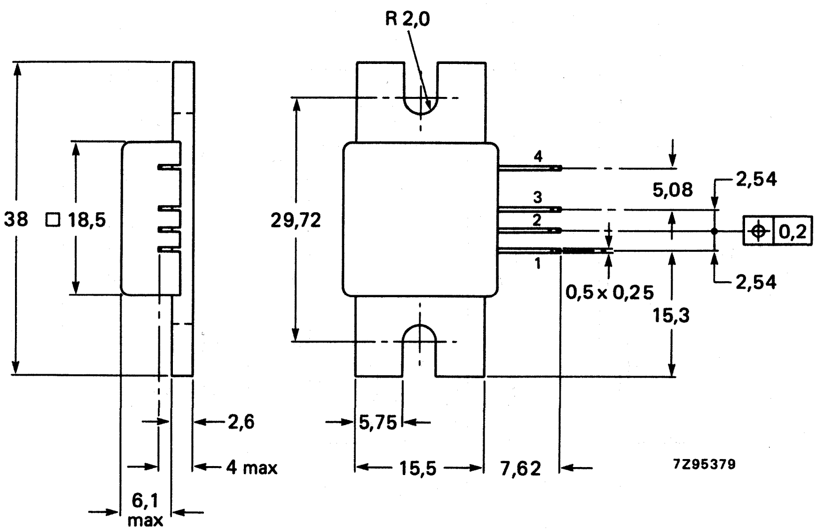
MECHANICAL DATA Dimensions in mm



SOT197

MECHANICAL DATA

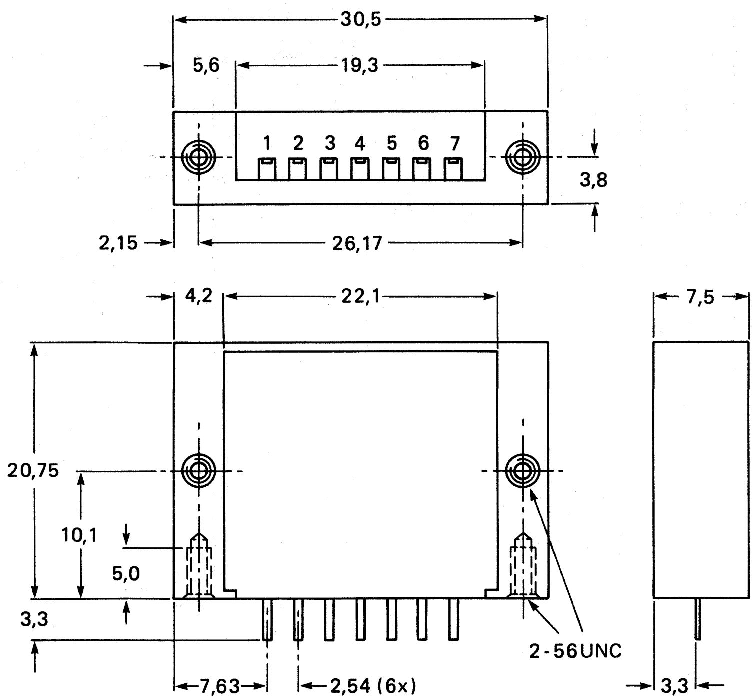
Dimensions in mm



SOT200

MECHANICAL DATA

Dimensions in mm

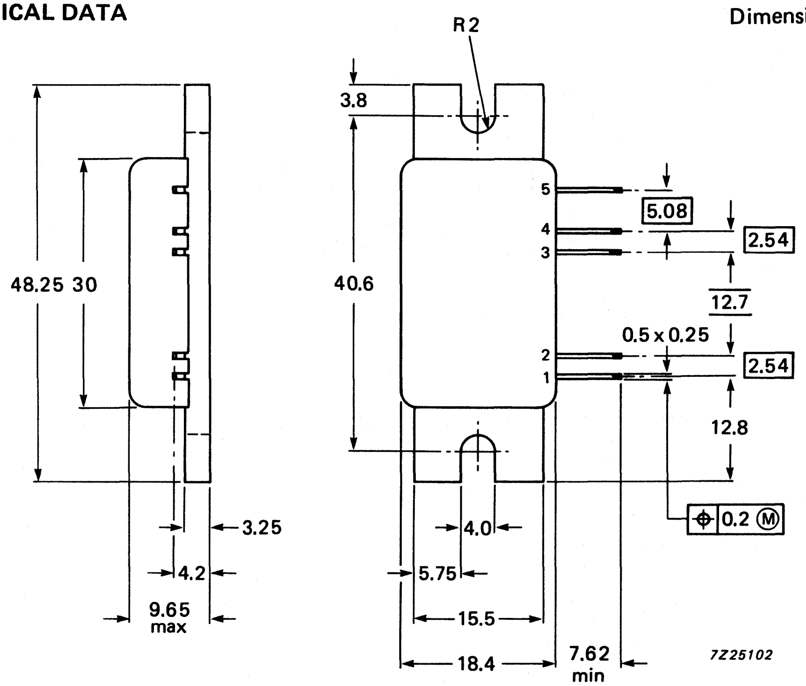


7Z95470.3

SOT233

MECHANICAL DATA

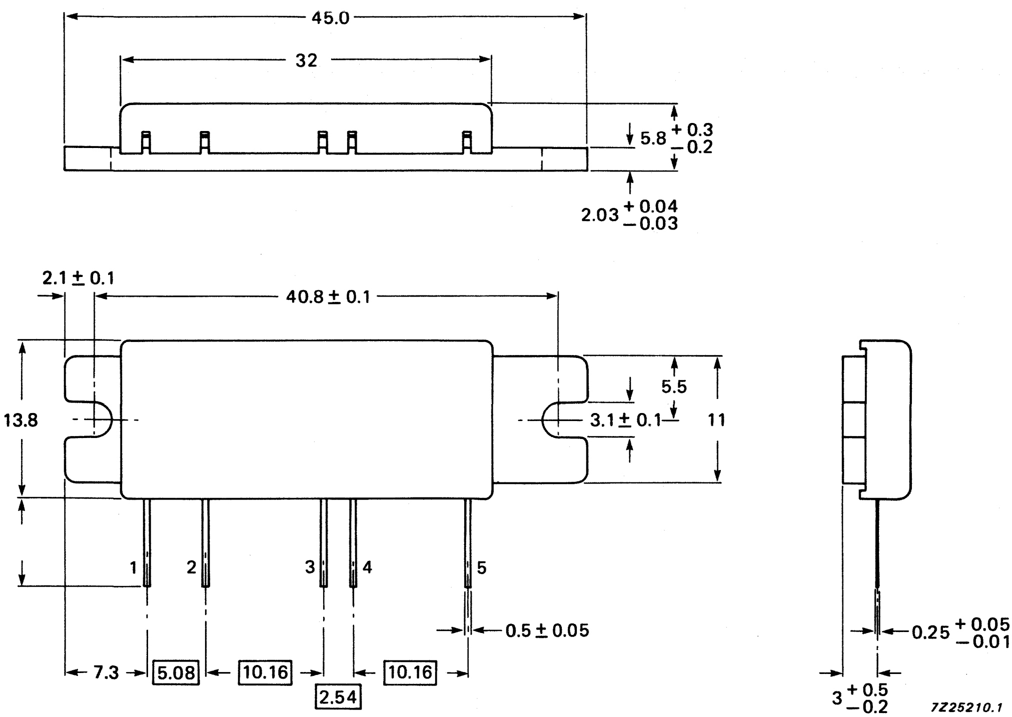
Dimensions in mm



SOT246

MECHANICAL DATA

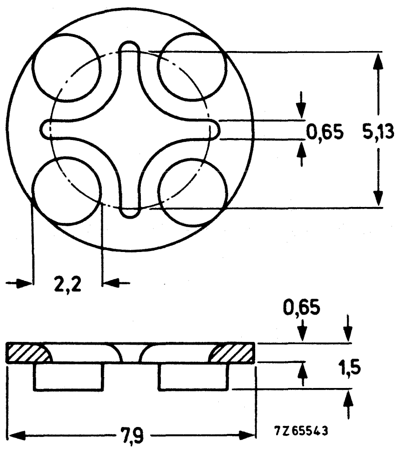
Dimensions in mm



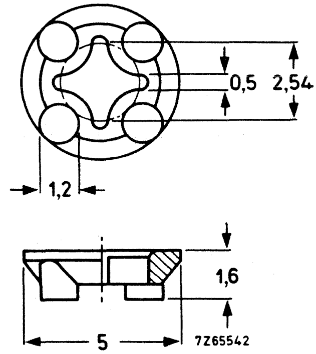
ACCESSORIES

MECHANICAL DATA

Dimensions in mm



Distance disc 56245 for TO-5 or TO-39; insulating material.

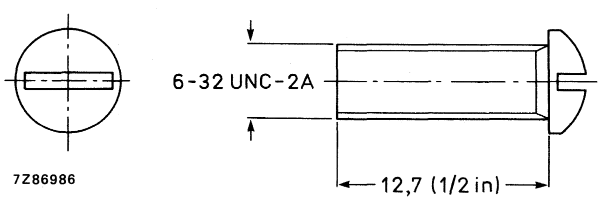


Distance disc 56246 for TO-18 or TO-72; insulating material.

Maximum permissible temperature: 100 °C.

ROUND HEAD SCREW 6-32 UNC-2A

Available, upon request, under type number 56396 or 12 NC code number 9390 298 10xx0.



INDEX OF TYPE NUMBERS

The inclusion of a type number in this publication does not necessarily imply its availability.

type no.	book	section	type no.	book	section	type no.	book	section
BA220	SC01	SD	BAS28	SC01/10	SD/Mm	BAV45	SC01	Sp
BA221	SC01	SD	BAS29	SC01/10	SD/Mm	BAV70	SC01/10	SD/Mm
BA223	SC01	T	BAS31	SC01/10	SD/Mm	BAV74	SC01	SD
BA281	SC01	SD	BAS32	SC01/10	SD/Mm	BAV99	SC01/10	SD/Mm
BA314	SC01	Vrg	BAS32L	SC01/10	SD/Mm	BAV100	SC01/10	SD/Mm
BA315	SC01	Vrg	BAS35	SC01/10	SD/Mm	BAV101	SC01/10	SD/Mm
BA316	SC01	SD	BAS45	SC01	SD	BAV102	SC01/10	SD/Mm
BA317	SC01	SD	BAS45L	SC01/10	SD/Mm	BAV103	SC01/10	SD/Mm
BA318	SC01	SD	BAS56	SC01/10	SD/Mm	BAV105	SC01/10	SD/Mm
BA423	SC01	T	BAS85	SC01	SD	BAW56	SC01/10	SD/Mm
BA423L	SC01	T	BAT17	SC01/10	T/Mm	BAW62	SC01	SD
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BA481	SC01	T	BAT54	SC01/10	SD/Mm	BAX14	SC01	SD
BA482	SC01	T	BAT74	SC01/10	SD/Mm	BAX18	SC01	SD
BA483	SC01	T	BAT81	SC01	T	BAY80	SC01	SD
BA484	SC01	T	BAT82	SC01	T	BB112	SC01	T
BA682	SC01/10	T/Mm	BAT83	SC01	T	BB119	SC01	T
BA683	SC01/10	T/Mm	BAT85	SC01	T	BB130	SC01	T
BAS11	SC01	SD	BAT86	SC01	T	BB204B	SC01	T
BAS15	SC01	SD	BAV10	SC01	SD	BB204G	SC01	T
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BAS19	SC01/10	SD/Mm	BAV20	SC01	SD	BB219	SC01/10	SD/Mm
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BAS21	SC01/10	SD/Mm	BAV23	SC01/10	SD/Mm	BB241	SC01/10	T/Mm

Key to handbook sections

A = Accessories
FET = Field-effect transistors
I = Infrared devices
LED = Light-emitting diodes
LCD = Liquid crystal displays
Mm = Surface-mounted devices
M = Microwave transistors
P = Low-frequency power transistors and modules
PDT = Photodiodes or transistors
Ph = Photoconductive devices
PhC = Photocouplers
PM = PowerMOS transistors
R = Rectifier diodes
RFP = RF power transistors and modules
RT = Triplers
SEN = Semiconductor sensors
SD = Small-signal diodes
Sm = Small-signal transistors
Sp = Special diodes
SP = Low-frequency switching power diodes
St = Rectifier stacks
T = Tuner diodes
Th = Thyristors
Tri = Triacs
TS = Transient suppressor diodes
Vrf = Voltage reference diodes
Vrg = Voltage regulator diodes
WBT = Wideband hybrid IC transistors
WBM = Wideband hybrid IC modules

* series.

DATA HANDBOOK SYSTEM

DATA HANDBOOK SYSTEM

Our Data Handbook System comprises more than 60 books with specifications on electronic components, subassemblies and materials. It is made up of six series of handbooks:

INTEGRATED CIRCUITS

DISCRETE SEMICONDUCTORS

DISPLAY COMPONENTS

PASSIVE COMPONENTS*

PROFESSIONAL COMPONENTS**

MATERIALS*

The contents of each series are listed on pages iii to viii.

The data handbooks contain all pertinent data available at the time of publication, and each is revised and reissued periodically.

When ratings or specifications differ from those published in the preceding edition they are indicated with arrows in the page margin. Where application is given it is advisory and does not form part of the product specification.

Condensed data on the preferred products of Philips Components is given in our Preferred Type Range catalogue (issued annually).

Information on current Data Handbooks and how to obtain a subscription for future issues is available from any of the Organizations listed on the back cover.
Product specialists are at your service and enquiries will be answered promptly.

* Will replace the Components and materials (green) series of handbooks.
** Will replace the Electron tubes (blue) series of handbooks.

INTEGRATED CIRCUITS

This series of handbooks comprises:

code	handbook title
IC01	**Radio, audio and associated systems** Bipolar, MOS
IC02a/b	**Video and associated systems** Bipolar, MOS
IC03	**ICs for Telecom** Bipolar, MOS Subscriber sets, Cordless Telephones
IC04	**HE4000B logic family** CMOS
IC05	**not yet issued**
IC06	**High-speed CMOS; PC74HC/HCT/HCU** Logic family
IC07	**Advanced CMOS logic (ACL)**
IC08	**ECL 10K and 100K logic families**
IC09N	**TTL logic series**
IC10	**Memories** MOS, TTL, ECL
IC11	**Linear Products**
Supplement to IC11	**Linear Products**
IC12	**I^2C-bus compatible ICs**
IC13	**Semi-custom** Programmable Logic Devices (PLD)
IC14	**Microcontrollers** NMOS, CMOS
IC15	**FAST TTL logic series**
IC16	**CMOS integrated circuits for clocks and watches**
IC17	**ICs for Telecom** Bipolar, MOS Radio pagers Mobile telephones ISDN
IC18	**Microprocessors and peripherals**
IC19	**Data communication products**

DISCRETE SEMICONDUCTORS

This series of data handbooks comprises:

current code	new code	handbook title
S1	**SC01**	**Diodes** High-voltage tripler units
S2a	**SC02***	**Power diodes**
S2b	**SC03***	**Thyristors and triacs**
S3	**SC04***	**Small-signal transistors**
S4a	**SC05***	**Low-frequency power transistors and hybrid IC power modules**
S4b	**SC06**	**High-voltage and switching power transistors**
S5	**SC07***	**Small-signal field-effect transistors**
S6	**SC08***	**RF power transistors**
	SC09	**RF power modules**
S7	**SC10***	**Surface mounted semiconductors**
S8a	**SC11***	**Light emitting diodes**
S8b	**SC12***	**Optocouplers**
S9	**SC13***	**PowerMOS transistors**
S10	**SC14***	**Wideband transistors and wideband hybrid IC modules**
S11	**SC15**	**Microwave transistors**
S15**	**SC16**	**Laser diodes**
S13	**SC17**	**Semiconductor sensors**
S14	**SC18***	**Liquid crystal displays and driver ICs for LCDs**

* Not yet issued with the new code in this series of handbooks.
** New handbook in this series; will be issued shortly.

DISPLAY COMPONENTS

This series of data handbooks comprises:

current code	new code	handbook title
T8	**DC01**	**Colour display systems**
T16	**DC02***	**Monochrome tubes and deflection units**
C2	**DC03***	**Television tuners, coaxial aerial input assemblies**
C3	**DC04***	**Loudspeakers**
C20	**DC05***	**Wire-wound components for TVs and monitors**

* These handbooks are currently issued in another series; they are not yet issued in the Display Components series of handbooks.

PASSIVE COMPONENTS

This series of data handbooks comprises:

current code	new code	handbook title
C14	**PA01**	**Electrolytic capacitors; solid and non-solid**
C11	**PA02***	**Varistors, thermistors and sensors**
C12	**PA03***	**Potentiometers, encoders and switches**
C7	**PA04***	**Variable capacitors**
C22	**PA05***	**Film capacitors**
C15	**PA06***	**Ceramic capacitors**
C9	**PA07***	**Piezoelectric quartz devices**
C13	**PA08***	**Fixed resistors**

* Not yet issued with the new code in this series of handbooks.

PROFESSIONAL COMPONENTS

This series of data handbooks comprises:

current code	new code	handbook title
T1	*	**Power tubes for RF heating and communications**
T2a	*	**Transmitting tubes for communications, glass types**
T2b	*	**Transmitting tubes for communications, ceramic types**
T3	**PC01****	**High-power klystrons**
T4	*	**Magnetrons for microwave heating**
T5	**PC02****	**Cathode-ray tubes**
T6	**PC03****	**Geiger-Müller tubes**
T9	**PC04****	**Photo and electron multipliers**
T10	**PC05****	**Plumbicon camera tubes and accessories**
T11	**PC06****	**Microwave diodes and sub-assemblies**
T12	**PC07**	**Vidicon and Newvicon camera tubes and deflection units**
T13	**PC08**	**Image intensifiers**
T15	**PC09****	**Dry reed switches**
C8	**PC10**	**Variable mains transformers; annular fixed transformers**
	PC11	**Solid state image sensors and peripheral integrated circuits**

* These handbooks will not be reissued.

** Not yet issued with the new code in this series of handbooks.

MATERIALS

This series of data handbooks comprises:

current code	new code	handbook title
C4 C5	**MA01***	**Soft Ferrites**
C16	**MA02****	**Permanent magnet materials**
C19	**MA03****	**Piezoelectric ceramics**

* Handbooks C4 and C5 will be reissued as one handbook having the new code MA01.

** Not yet issued with the new code in this series of handbooks.

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