

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

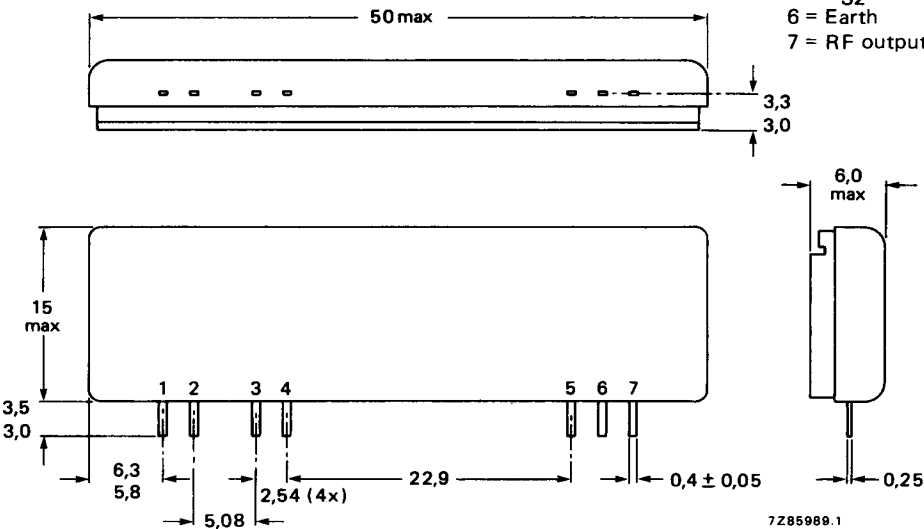


Fig. 1 SOT-182.

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

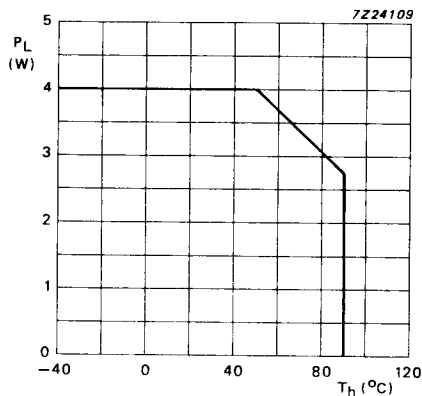


Fig. 2 Load power derating; VSWR = 1:1.

CHARACTERISTICS

$T_h = 25$ °C unless otherwise stated

$V_{S1} = V_{S2} = 9.6$ V; $R_S = R_L = 50$ Ω ; $f = 68$ to 88 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

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			
$P_L = 2.0\text{ W}$	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:

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

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 ($T_h < 90\text{ }^\circ\text{C}$).

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 $^\circ\text{C}$ 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} .

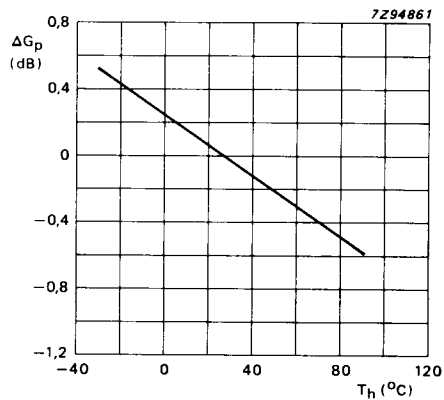


Fig. 3 Power gain as a function of temperature; $P_D = 35$ mW;
 $V_{S1} = V_{S2} = 9.6$ V; $f = 78$ MHz; typical values.

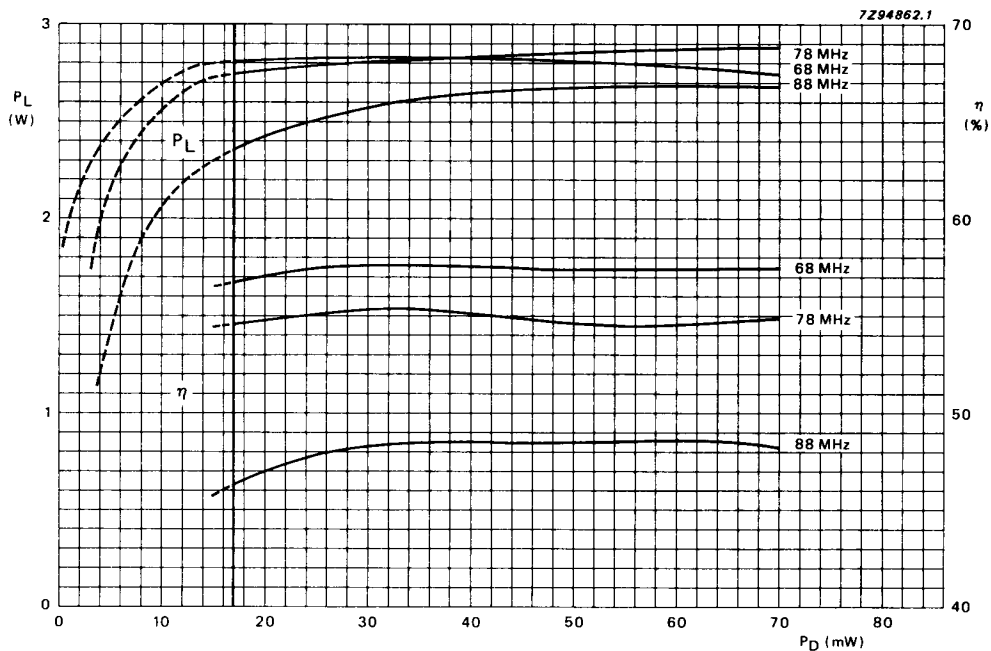


Fig. 4 Load power as a function of drive power;
 $V_{S1} = V_{S2} = 9.6$ V; typical values.

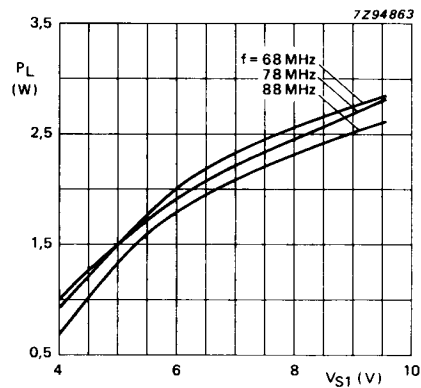


Fig. 5 Load power as a function of supply voltage V_{S1} ;
 $P_D = 35$ mW; $V_{S2} = 9.6$ V; typical values.

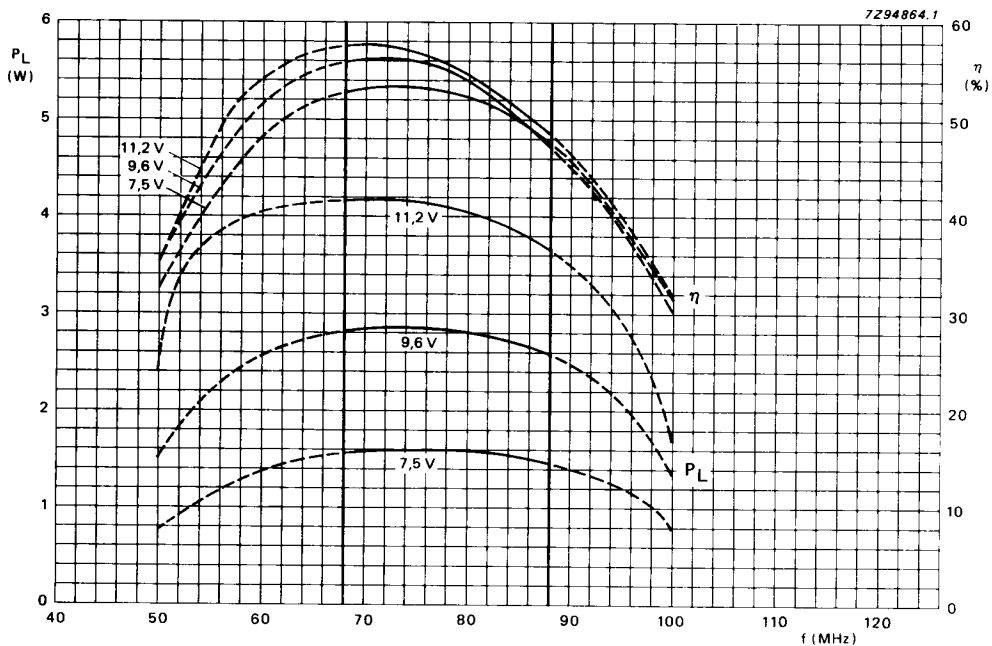


Fig. 6 Load power as a function of frequency;
 $P_D = 35$ mW; typical values.

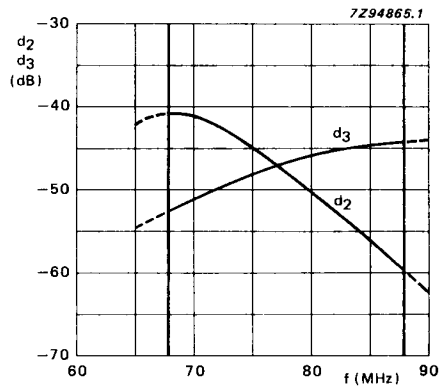


Fig. 7 Second and third harmonic distortions as a function of frequency;
 $V_{S1} = V_{S2} = 9.6 \text{ V}$; $P_D = 35 \text{ mW}$; $P_L = 2.0 \text{ W}$; typical values.