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

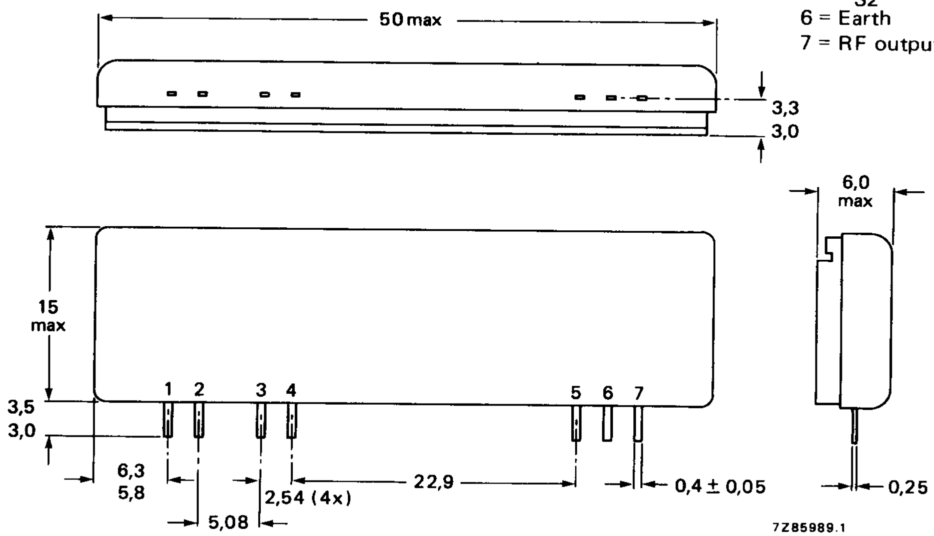

Fig. 1 SOT-182.

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

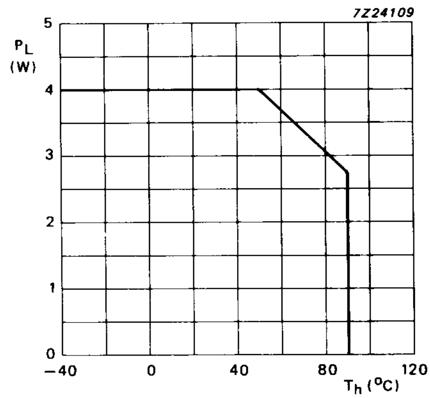

Fig. 2 Load power derating; VSWR = 1:1.

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}.

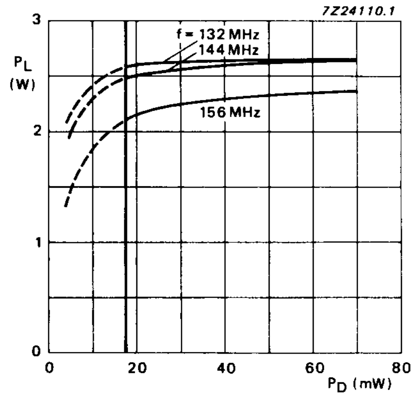

Fig. 3 Load power as a function of drive power; $V_{S1} = V_{S2} = 9.6$ V; typical values.

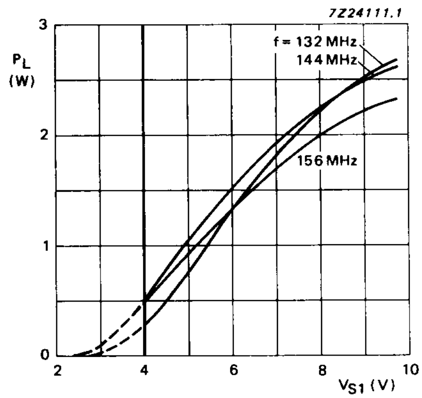

Fig. 4 Load power as a function of supply voltage V_{S1}; $P_D = 35$ mW; $V_{S2} = 9.6$ V; typical values.

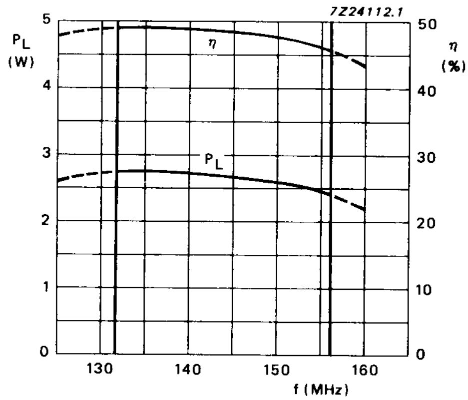

Fig. 5 Load power and efficiency as functions of frequency; $V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; typical values.

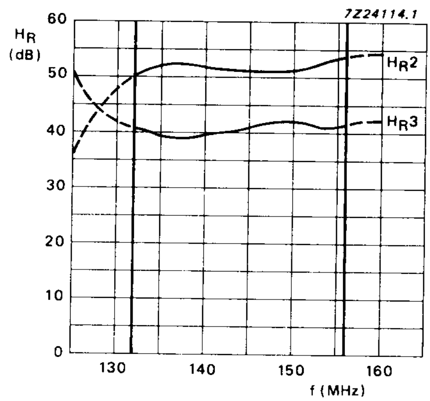

Fig. 6 Second and third harmonic rejection as a function of frequency; $V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; $P_L = 2.0$ W; typical values.

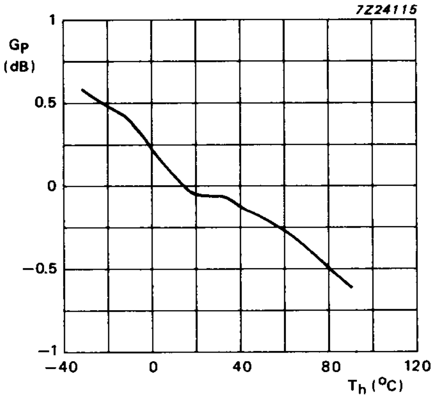

Fig. 7 Power gain as a function of temperature;
$V_{S1} = V_{S2} = 9.6$ V; $P_D = 35$ mW; f = 144 MHz.