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.	150	mW
		max.	300	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

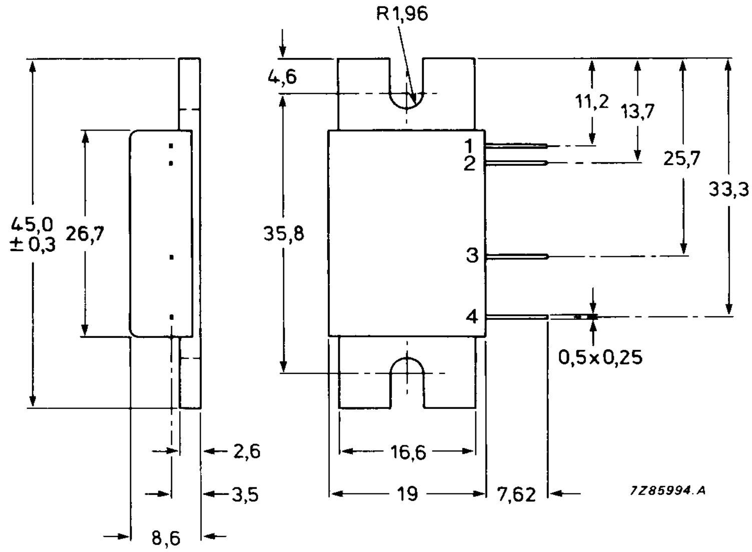

Fig. 1 SOT-183.

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.

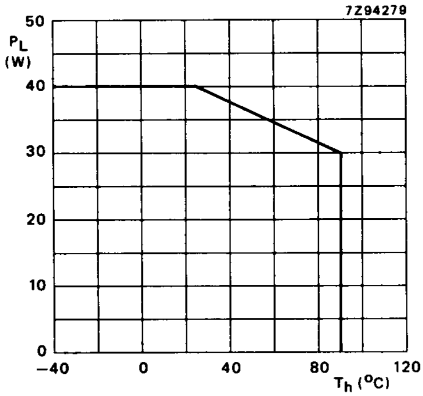

Fig. 2 Load power derating; VSWR = 1 : 1.

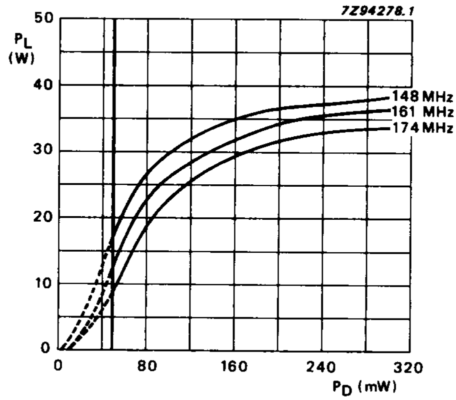

Fig. 3 Load power as a function of drive power; $V_{S1} = V_{S2} = 12.5$ V; $T_h = 25$ °C; typical values.

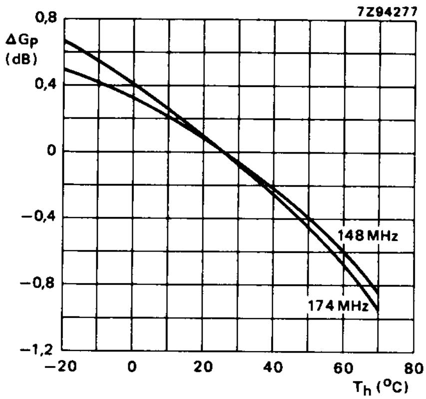

Fig. 4 Power gain as a function of heatsink temperature; $P_D = 300$ mW; $V_{S1} = V_{S2} = 12.5$ V; typical values.

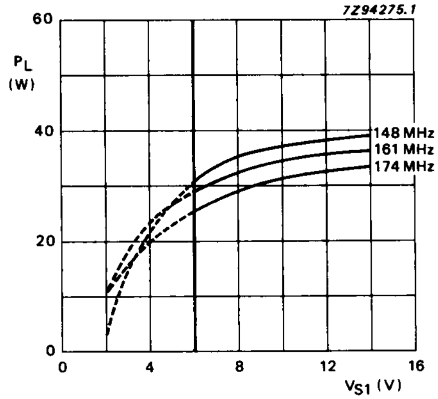

Fig. 5 Load power as a function of supply voltage V_{S1}; P_D = 300 mW; V_{S2} = 12.5 V; typical values.

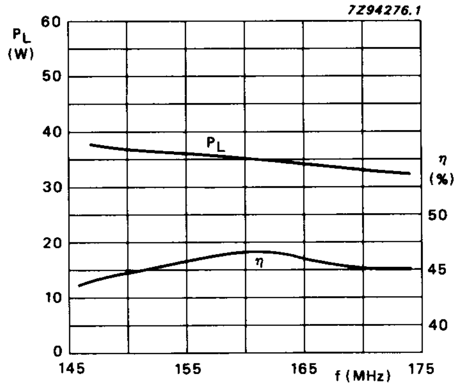

Fig. 6 Load power and efficiency as functions of frequency; V_{S1} = V_{S2} = 12.5 V; P_D = 300 mW; typical values.

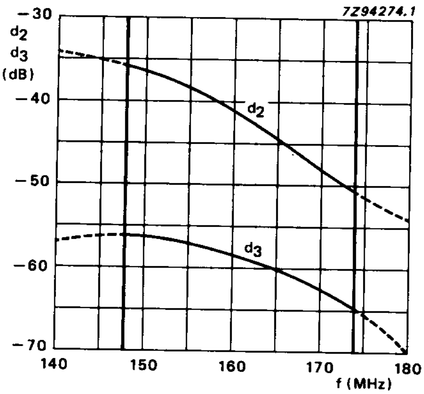

Fig. 7 Second and third harmonic distortions as a function of frequency; $V_{S1} = V_{S2} = 12.5$ V; $P_D = 300$ mW; typical values.