



Island Labs

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.

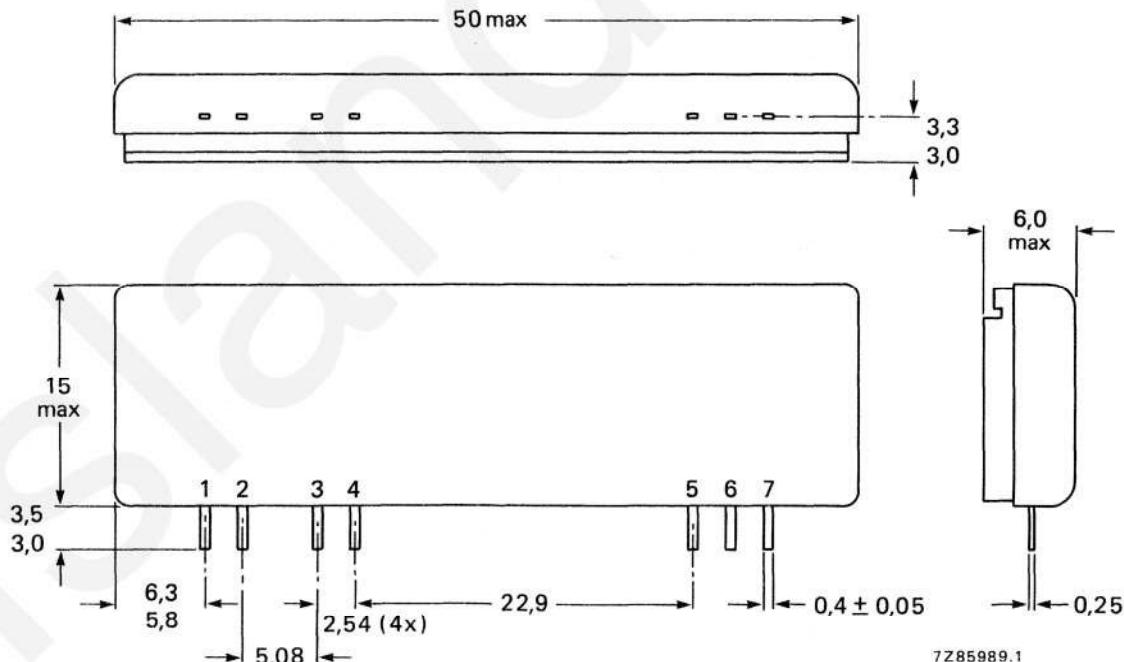
The BGY94A will produce a minimum of 5 W into a 50Ω load over the 68 to 88 MHz frequency range.

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.	50Ω

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

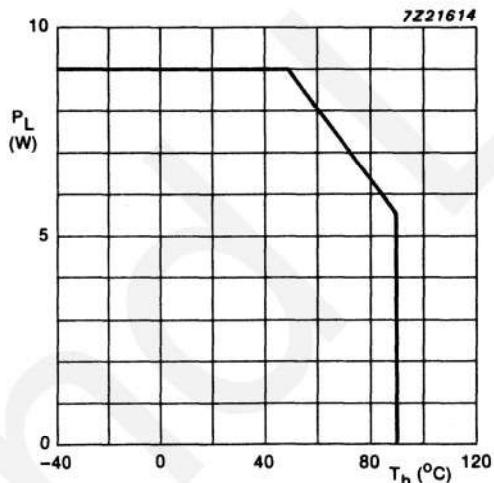


Fig. 2 Load power derating; VSWR = 1 : 1.

* With respect to earth.

CHARACTERISTICS $T_h = 25^\circ\text{C}$ unless otherwise stated $V_{S1} = V_{S2} = 9.6 \text{ V}; R_S = R_L = 50 \Omega; f = 68 \text{ to } 88 \text{ MHz.}$ **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** $P_L = 5.0 \text{ W}$ P_D < 35 mW

typ. 10 mW

Efficiency $P_L = 5.0 \text{ W}$ η > 40 %

typ. 48 %

Harmonic output

any harmonic

(relative to carrier) < -35 dB

Input VSWRwith respect to 50Ω

VSWR max. 2 : 1

Stability

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

 $V_{S1} \leq V_{S2} = 4 \text{ to } 11.2 \text{ V}; f = 68 \text{ to } 88 \text{ MHz}; P_D = 17 \text{ to } 70 \text{ mW}; P_L < 9 \text{ W}$ (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 ($T_h < 90^\circ\text{C}$).

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 °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.

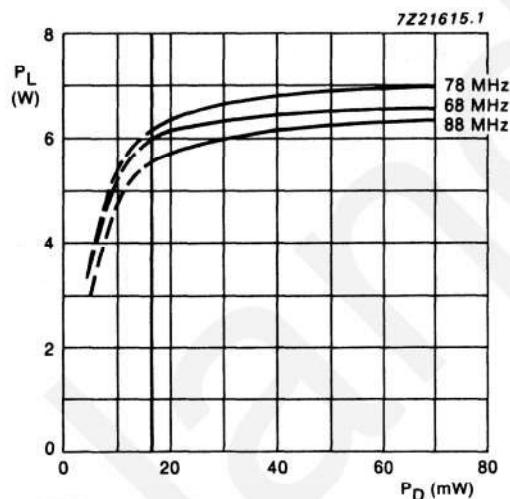


Fig. 3 Load power as a function of drive power; $V_{S1} = V_{S2} = 9.6$ V.

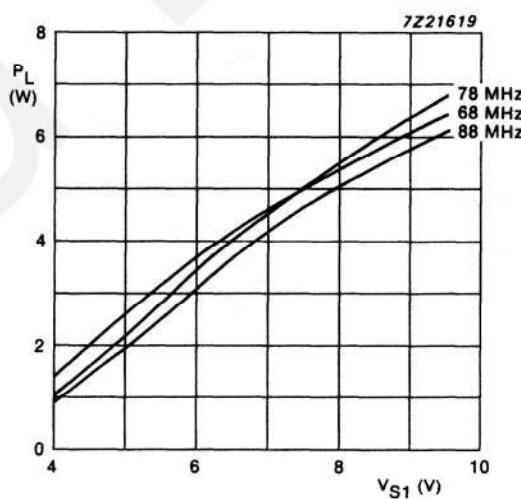


Fig. 4 Load power as a function of supply voltage V_{S1} ; $P_D = 35$ mW; $V_{S2} = 9.6$ V.

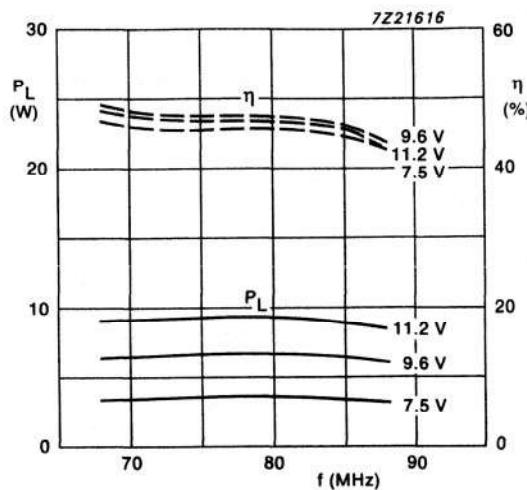


Fig. 5 Load power and efficiency as functions of frequency; $P_D = 35$ mW.

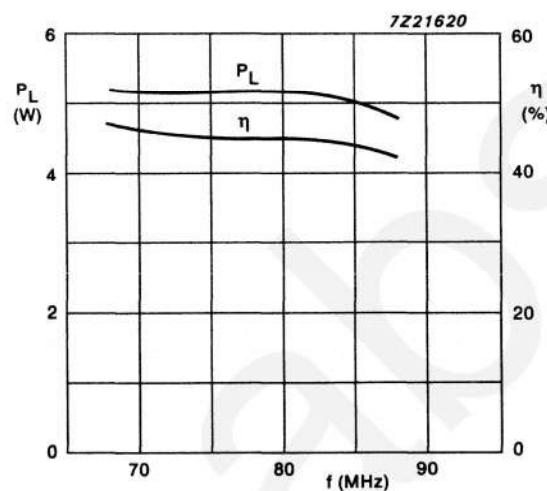


Fig. 6 Load power and efficiency as functions of frequency; $P_D = 35$ mW; $V_{S1} = 7.5$ V; $V_{S2} = 9.6$ V.

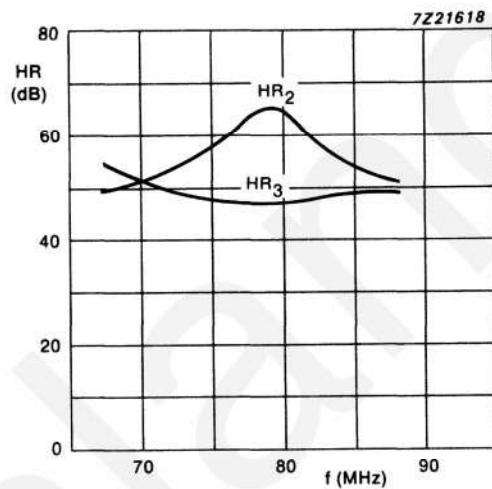


Fig. 7 Second and third harmonic rejection as a function of frequency; $P_D = 35$ mW; $V_{S1} = V_{S2} = 9.6$ V.

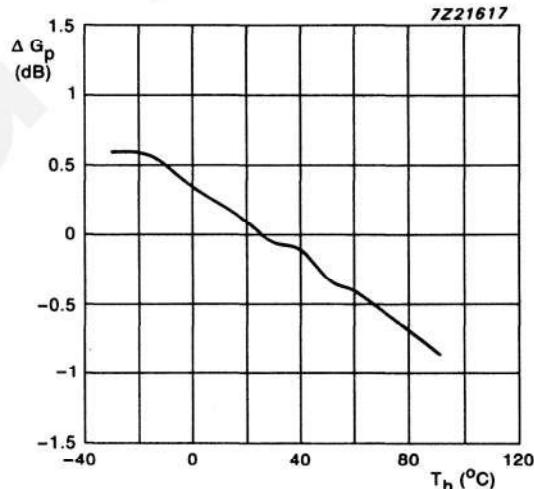


Fig. 8 Change in power gain as a function of heatsink temperature; $f = 78$ MHz; $P_D = 35$ mW; $V_{S1} = V_{S2} = 9.6$ V.