VHF amplifier module

BGY145A

DESCRIPTION

The BGY145A is a RF amplifier module, designed for use in transmitters of mobile communications equipment powered by vehicles with 12.5 V battery supplies.

The module is a two-stage transistor amplifier and consists of two RF npn transistors mounted on a ceramic substrate, together with surface mounted components that make up the matching and bias circuits.

The module will provide 29 W RF power into a 50 Ω load, when operated at nominal conditions within the frequency range of 68 to 88 MHz.

PINNING - SOT183A

PIN	DESCRIPTION
1	output
2	V_{S2}
3	V_{S1}
4	input
flange	ground

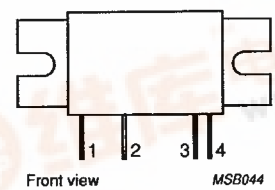


Fig.1 Simplified outline.

QUICK REFERENCE DATA

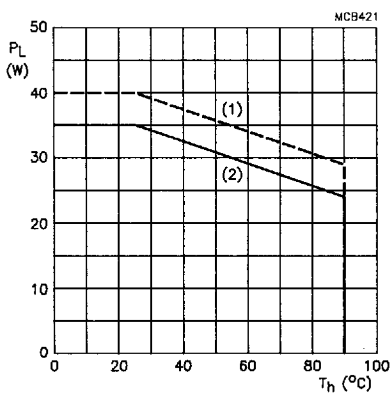
Mode of operation: continuous wave.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency range		68	–	88	MHz
P_D	RF output power	P_D = 150 mW	29	–	–	W
G_p	RF power gain	P_L = 29 W	22.9	–	–	dB
η	efficiency	P_L = 29 W	37	–	–	%
V_{S1}, V_{S2}	DC supply voltage		–	12.5	–	V
Z_i	input impedance		–	50	–	Ω
Z_L	output load impedance		–	50	–	Ω

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{S1}, V_{S2}	DC supply voltage	–	15	V
$\pm V_i$	RF input terminal voltage	–	25	V
$\pm V_o$	RF output terminal voltage	–	25	V
P_D	RF input power	–	300	mW
P_L	RF output power (see Fig.2)	–	40	W
T_{stg}	storage temperature range	–30	100	°C
T_h	heatsink operating temperature	–	90	°C



(1) Matched.

(2) 3:1 mismatch.

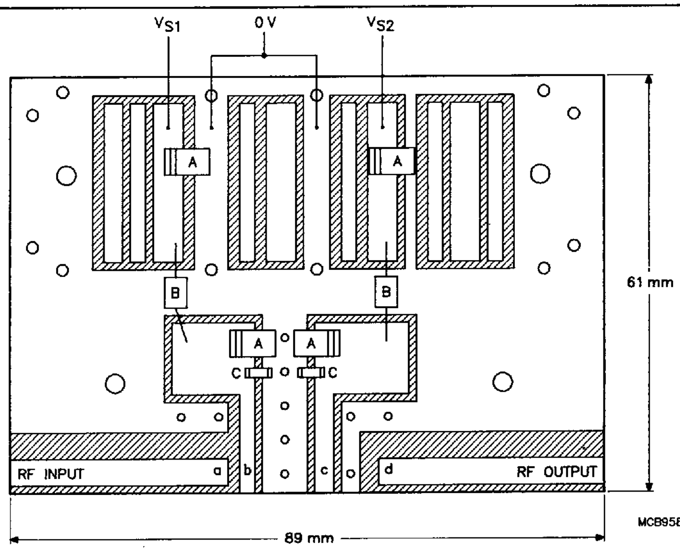
Fig.2 Load power derating.

CHARACTERISTICS

T_h = 25 °C; V_{S1} = V_{S2} = 12.5 V; R_S = R_L = 50 Ω; frequency range = 68 to 88 MHz.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{Q1}	quiescent current	P_D = 0	–	10	25	mA
I_{Q2}	quiescent current	P_D = 0	–	–	35	mA
P_L	RF output power	P_D = 150 mW	29	–	–	W
G_p	RF power gain	P_L = 29 W	22.9	–	–	dB
η	efficiency	P_L = 29 W	37	–	–	%
H_{R2}	2nd harmonic output	P_L = 29 W	–	–	–30	dBc
	input VSWR with respect to 50 Ω	P_L = 29 W	–	–	2:1	

APPLICATION INFORMATION



Epoxy fibre-glass board, 1/16 inch thick, $\varepsilon_r = 4.5$.

A: 10 µF, 16 V, tantalum chip capacitor.

B: 2 turns FX1115 Ferroxcube bead.

C: 0.1 µF, 60 V, ceramic multilayer chip capacitor.

Track widths 'a' and 'd' (50 Ω) = 4 mm.

Track width 'b' = 2.5 mm.

Track width 'c' = 3 mm.

Circles indicate the positions of through rivets.

Fig.3 Test jig.

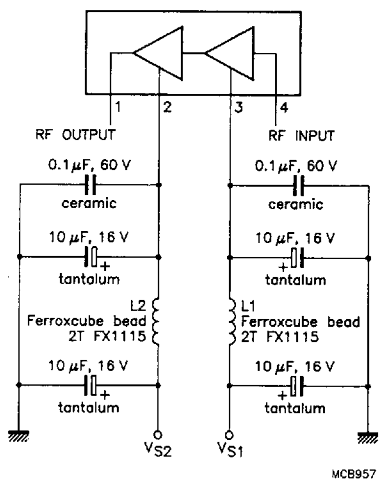


Fig.4 Decoupling arrangement.

STABILITY

The module is stable when operated into a load of 3:1 at all phases, under the following conditions, providing maximum ratings are not exceeded:

P_D 30 to 300 mW; $P_L \leq 40$ W; $V_{S1} = 6$ to 15 V; $V_{S2} = 10$ to 15 V and $V_{S1} < V_{S2}$.

RUGGEDNESS

The output power of the module into a 50 Ω load will be unchanged after one minute of operation into a load mismatch of 20:1 (any phase), providing maximum ratings are not exceeded.

V_{S1}, $V_{S2} \leq 15$ V; $T_h \leq 90$ °C; $P_L \leq 40$ W; $P_D < 300$ mW.

RF POWER CONTROL

The module is not designed to be operated over a wide range of output levels. The aim of the output power control is to set the nominal output level. The preferred method of output power control is by varying the drive power between 30 and 200 mW. Another option is to vary V_{S1} between 6 and 12.5 V.

CAUTIONS

The main earth return path for this module is via the flange. Therefore, it is important that the heatsink is well earthed and that the return paths are kept as short as possible. Failure to do this may result in loss of output power or oscillation, which will have a detrimental effect upon the life of the module.

The RF output connection should be made to correctly designed 50 Ω terminals. Failure to do so will result in a mismatch being presented to the module, with a resultant reduction in module life.

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.

Under no circumstances must the maximum specified operating or storage temperatures be exceeded, even for short periods.

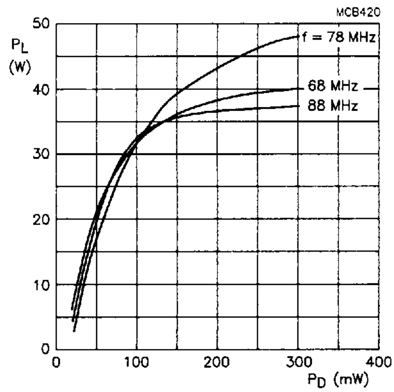


Fig.5 Load power as a function of drive power; $V_{S1} = V_{S2} = 12.5$ V; typical values.

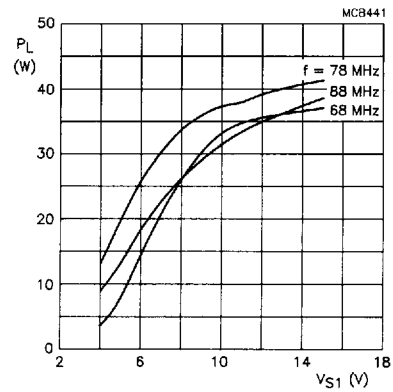


Fig.6 Load power as a function of supply voltage V_{S1}; $P_D = 150$ mW; typical values.

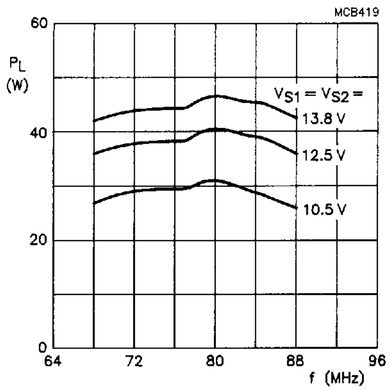


Fig.7 Load power as a function of frequency; $P_D = 150$ mW; typical values.

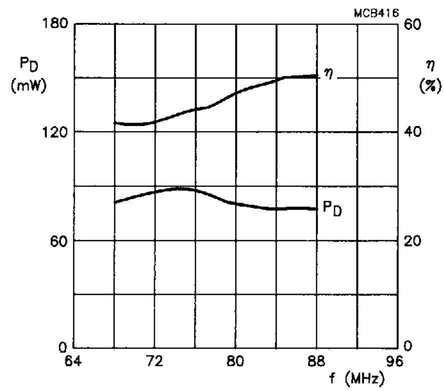


Fig.8 Efficiency and drive power as functions of frequency; $P_L = 29$ W; $V_{S1} = V_{S2} = 12.5$ V; typical values.

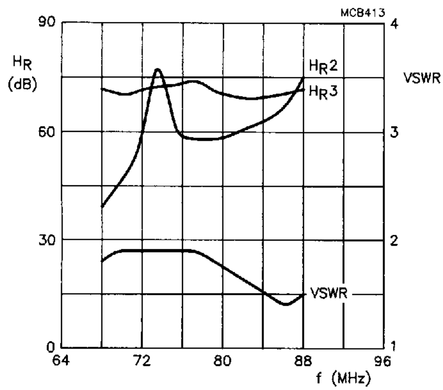
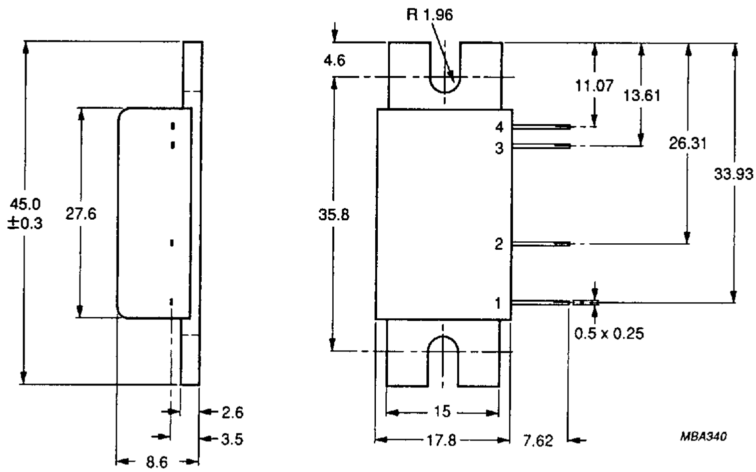


Fig.9 Second and third harmonic rejection as a function of frequency; P_L = 29 W; $V_{S1} = V_{S2}$ = 12.5 V; typical values.

PACKAGE OUTLINE



Dimensions in mm.

Fig.10 SOT183A.