VHF POWER AMPLIFIER MODULES

A range of broadband amplifier modules designed for mobile communications equipments, operating directly from 12 V vehicle electrical systems. The devices will produce 18 W output into a 50 Ω load. The modules consist of two stage RF amplifier using npn transistor chips, together with lumped-element matching components.

QUICK REFERENCE DATA

<table>
<thead>
<tr>
<th>type number</th>
<th>mode of operation</th>
<th>frequency range f (MHz)</th>
<th>nominal supply voltages $V_{B_1} = V_{B_2}$ (V)</th>
<th>drive power $P_D$ (mW)</th>
<th>load power $P_L$ (W)</th>
<th>nominal input impedance $z_i$ (Ω)</th>
<th>nominal load impedance $Z_L$ (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGY32</td>
<td>cw</td>
<td>68 to 88</td>
<td>12.5</td>
<td>100</td>
<td>$&gt; 18$ typ 23</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>BGY33</td>
<td>cw</td>
<td>80 to 108</td>
<td>12.5</td>
<td>100</td>
<td>$&gt; 18$ typ 22</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>BGY35</td>
<td>cw</td>
<td>132 to 156</td>
<td>12.5</td>
<td>150</td>
<td>$&gt; 18$ typ 22</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>BGY36</td>
<td>cw</td>
<td>148 to 174</td>
<td>12.5</td>
<td>150</td>
<td>$&gt; 18$ typ 21</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

CIRCUIT DIAGRAM

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.
MECHANICAL DATA
Fig. 1 SOT132B.

Dimensions in mm

Load reference
1 = Input
2 = Earth
3 = Supply \( +V_B1 \)
4 = Earth
5 = Supply \( +V_B2 \)
6 = Earth
7 = Output

Mounting and soldering recommendations
To ensure good thermal transfer the module should be mounted using heatsink compound onto a heatsink with a flat surface; if an isolation washer is used heatsink compound should be used on both sides of the insulator. Burrs and thickening of the holes in the heatsink should be removed and 3 mm bolts tightened to torques of 0.5 Nm minimum.

Devices may be soldered directly into a circuit with a soldering iron at maximum iron temperature of 245 °C for 10 seconds at least 1 mm from the plastic.
RATINGS
Limiting values in accordance with the Absolute Maximum System (IEC 134)

DC voltages (with respect to flange)
- DC supply terminals
- RF input terminal
- RF output terminal

Input drive power BGY32 and BGY33
Input drive power BGY35 and BGY36
Load power

\[ V_{B1} \text{ and } V_{B2} \]  \quad \text{max} \quad 15 \text{ V}
\[ \pm V_I \]  \quad \text{max} \quad 25 \text{ V}
\[ \pm V_O \]  \quad \text{max} \quad 25 \text{ V}
\[ P_D \]  \quad \text{max} \quad 200 \text{ mW}
\[ P_D \]  \quad \text{max} \quad 300 \text{ mW}
\[ P_L \]  \quad \text{max} \quad 30 \text{ W}

Storage temperature range
Operating heatsink temperature

\[ T_{stg} \quad -40 \text{ to } 100 \text{ °C} \]
\[ T_h \quad \text{max} \quad 90 \text{ °C} \]
CHARACTERISTICS

\[ T_h = 25 \, ^\circ C \]

Quiescent current

\[ V_{B1} = V_{B2} = 12.5 \, V; P_D = 0; \]
\[ R_S = R_L = 50 \, \Omega \]

| IBQ1 | typ | 6 | 6 | 6 | 6 mA |
| IBQ2 | typ | 13 | 13 | 13 | 13 mA |

Frequency range

\[ f < 88 \quad f > 68 \]
\[ 108 \quad 132 \quad 148 \, MHz \]

Load power

\[ V_{B1} = V_{B2} = 12.5 \, V; R_S = R_L = 50 \, \Omega \]

BGY32 and BGY33; \( P_D = 100 \, mW \)

\[ P_L \]
\[ \eta \]
\[
\begin{array}{|c|c|c|c|c|}
\hline
& IBQ1 & IBQ2 & IBQ1 & IBQ2 \\
\hline
\text{typ} & 6 & 13 & 13 & 13 \\
\hline
\text{typ} & 6 & 13 & 13 & 13 \\
\hline
\text{typ} & 6 & 13 & 13 & 13 \\
\hline
\end{array}
\]

\[ P_L \]
\[ \eta \]
\[
\begin{array}{|c|c|c|c|}
\hline
& IBQ1 & IBQ2 & IBQ1 & IBQ2 \\
\hline
\text{typ} & 6 & 13 & 13 & 13 \\
\hline
\text{typ} & 6 & 13 & 13 & 13 \\
\hline
\text{typ} & 6 & 13 & 13 & 13 \\
\hline
\end{array}
\]

BGY35 and BGY36; \( P_D = 150 \, mW \)

Harmonic output

Any single harmonic will be at least 25 dB down relative to carrier

Input VSWR with respect to 50 \( \Omega \)

| typ | 1.5 |

Stability

The module is stable with a load VSWR up to 3 : 1 (all phases) when operated within the following conditions:

\[ V_{S1} = 6 \, \text{to} \, 15 \, V; V_{S2} = 10 \, \text{to} \, 15 \, V; V_{S1} < V_{S2}; P_D = 50 \, \text{to} \, 200 \, mW; \]

frequency within operating frequency range, provided the maximum ratings of the module are not exceeded.

Ruggedness

The modules are capable of withstanding load mismatch of up to 50 VSWR for short period overload conditions, with \( P_D, V_{B1} \) and \( V_{B2} \) at maximum values providing the combination does not result in the matched output power rating being exceeded.

APPLICATION INFORMATION

Supply

An electrolytic capacitor of 10 \( \mu F \) (25 V), in parallel with a polyester capacitor of 100 nF to earth, is recommended as decoupling arrangement for each power supply pin.

Power rating

In general it is recommended that the output power from the module under nominal design conditions should not exceed 23 W in order to provide adequate safety margin under fault conditions.

Output power control

The module is not designed to be operated over a large range of output power levels. The purpose of the output power control is to set the nominal output power level. The preferred method of output power control is by varying \( V_{S1} \) between 6 and 12.5 V.