

DATA SHEET

BGY115A; BGY115B; BGY115C/P; BGY115D UHF amplifier modules

Product specification
Supersedes data of May 1994
File under Discrete Semiconductors, SC09

1996 May 13

UHF amplifier modules

BGY115A; BGY115B; BGY115C/P; BGY115D

FEATURES

- 6 V nominal supply voltage
- 1.2 W output power (BGY115A, BGY115B and BGY115D)
- 1.4 W output power (BGY115C/P)
- Easy control of output power by DC voltage
- SMD outline.

APPLICATIONS

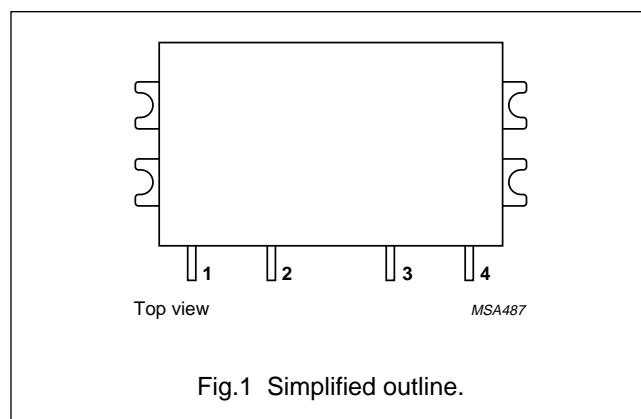
- Hand-held transmitting equipment operating in the 824 to 849 MHz, 872 to 905 MHz, 890 to 915 MHz and 902 to 928 MHz frequency ranges.

DESCRIPTION

The BGY115A, BGY115B, BGY115C/P and BGY115D are three-stage UHF amplifier modules. Each module consists of three NPN silicon planar transistor chips mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT321A

| PIN | DESCRIPTION |
|--------|-------------|
| 1 | RF input |
| 2 | V_C |
| 3 | V_S |
| 4 | RF output |
| Flange | ground |



QUICK REFERENCE DATA

RF performance at $T_{mb} = 25\text{ }^{\circ}\text{C}$.

| TYPE NUMBER | MODE OF OPERATION | f (MHz) | V_S (V) | P_L (W) | G_p (dB) | η (%) | $Z_S; Z_L$ (Ω) |
|-------------|-------------------|------------|-----------|-----------|-------------|------------|-------------------------|
| BGY115A | CW | 824 to 849 | 6 | 1.2 | ≥ 27.8 | typ. 50 | 50 |
| BGY115B | CW | 872 to 905 | 6 | 1.2 | ≥ 27.8 | typ. 50 | 50 |
| BGY115C/P | CW | 890 to 915 | 6 | 1.4 | ≥ 28.5 | typ. 50 | 50 |
| BGY115D | CW | 902 to 928 | 6 | 1.2 | ≥ 27.8 | typ. 50 | 50 |

LIMITING VALUES

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

| SYMBOL | PARAMETER | MIN. | MAX. | UNIT |
|-----------|---|--------|------------|--------------------|
| V_S | DC supply voltage BGY115A, BGY115B, BGY115D BGY115C/P | — — | 8.5 9 | V V |
| V_C | DC control voltage | — | 4 | V |
| P_D | input drive power | — | 5 | mW |
| P_L | load power BGY115A, BGY115B, BGY115D BGY115C/P | — — | 1.6 1.8 | W W |
| T_{stg} | storage temperature | −40 | +100 | $^{\circ}\text{C}$ |
| T_{mb} | operating mounting base temperature | −30 | +100 | $^{\circ}\text{C}$ |

UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D**CHARACTERISTICS**

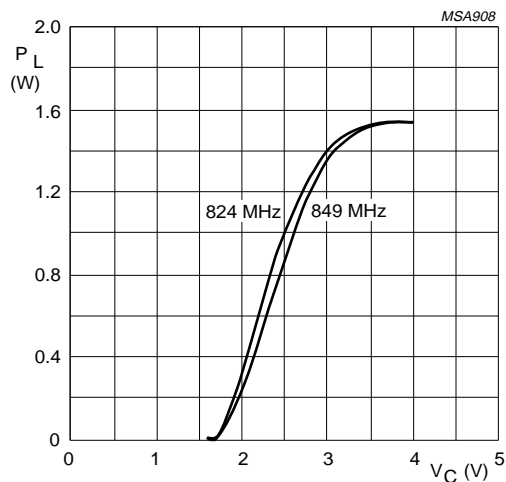
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $V_C \leq 3.5 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$; unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------|---------------------------|--|----------------|------|-------|---------------|
| f | frequency | | | | | |
| | BGY115A | | 824 | – | 849 | MHz |
| | BGY115B | | 872 | – | 905 | MHz |
| | BGY115C/P | | 890 | – | 915 | MHz |
| | BGY115D | | 902 | – | 928 | MHz |
| I_Q | leakage current | $V_C = 0$; $P_D < -60 \text{ dBm}$ | – | – | 100 | μA |
| I_C | control current | note 1 | – | – | 500 | μA |
| P_L | load power | | | | | |
| | BGY115A, BGY115B, BGY115D | | 1.2 | – | – | W |
| | BGY115C/P | | 1.4 | – | – | W |
| G_p | power gain | note 1 | | | | |
| | BGY115A, BGY115B, BGY115D | | 27.8 | – | – | dB |
| | BGY115C/P | | 28.5 | – | – | dB |
| η | efficiency | note 1 | 45 | 50 | – | % |
| H_2 | second harmonic | note 1 | – | – | –40 | dBc |
| H_3 | third harmonic | note 1 | – | – | –40 | dBc |
| $V_{SWR_{in}}$ | input VSWR | note 1 | – | – | 3 : 1 | |
| | stability | $P_D = 0 \text{ to } 6 \text{ dBm}$; $V_S = 4.8 \text{ to } 8.5 \text{ V}$; $V_C = 0 \text{ to } 3.5 \text{ V}$; $V_{SWR} \leq 6 : 1$ through all phases; note 2 | – | – | –60 | dBc |
| | isolation | $V_C = 0$ | – | – | –40 | dBm |
| P_n | noise power | bandwidth = 30 kHz; 45 MHz above f_0 ; note 1 | – | – | –90 | dBm |
| | ruggedness | note 3 | no degradation | | | |

Notes

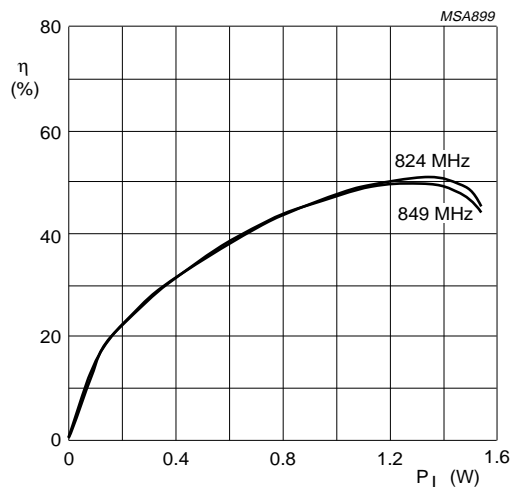
1. Adjust V_C for $P_L = 1.2 \text{ W}$ (BGY115A, BGY115B and BGY115D); $P_L = 1.4 \text{ W}$ (BGY115C/P).
2. Adjust V_C for $P_L \leq 1.2 \text{ W}$ (BGY115A, BGY115B and BGY115D); $P_L \leq 1.4 \text{ W}$, $V_S = 4.8 \text{ to } 8 \text{ V}$ (BGY115C/P).
3. Adjust V_C for $P_L = 1.6 \text{ W}$; $V_S = 8.5 \text{ V}$; $V_{SWR} \leq 10 : 1$; (BGY115A, BGY115B and BGY115D). Adjust V_C for $P_L = 1.6 \text{ W}$; $V_S = 9 \text{ V}$, $V_{SWR} \leq 6 : 1$ (BGY115C/P).

UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D

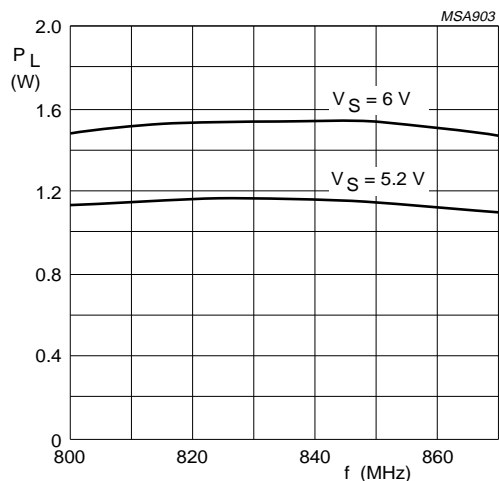
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

Fig.2 Load power as a function of control voltage;
BGY115A, typical values.



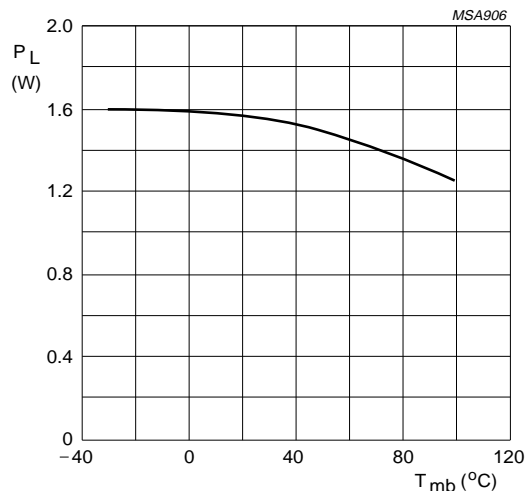
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

Fig.3 Efficiency as a function of load power;
BGY115A, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_C = 3.5 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

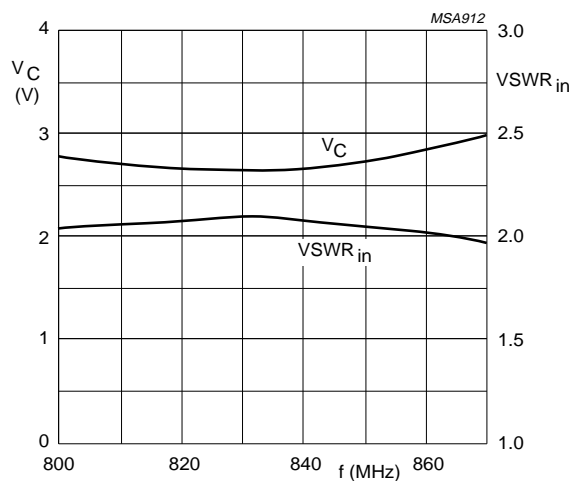
Fig.4 Load power as a function of frequency;
BGY115A, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $V_C = 3.5 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

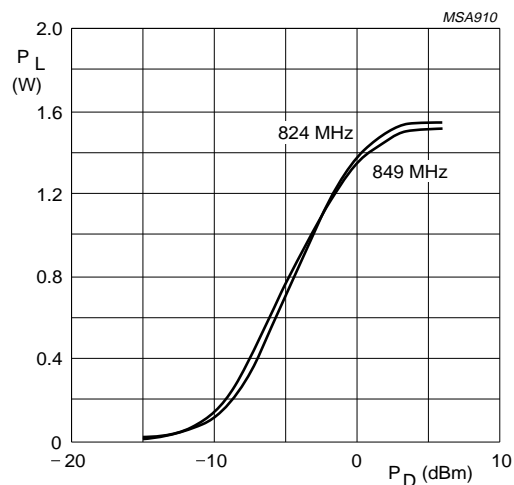
Fig.5 Load power as a function of mounting base
temperature; BGY115A, typical values.

UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D

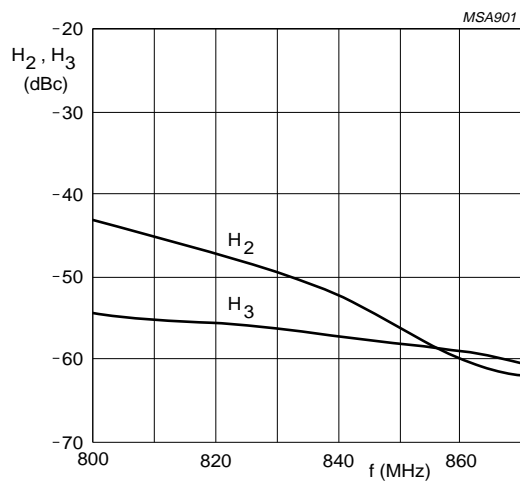
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $P_L = 1.2 \text{ W}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ \text{C}$.

Fig.6 Control voltage and VSWR input as functions of frequency; BGY115A, typical values.



$Z_S = Z_L = 50 \Omega$; $V_S = 6 \text{ V}$; $V_C = 3.5 \text{ V}$; $T_{mb} = 25^\circ \text{C}$.

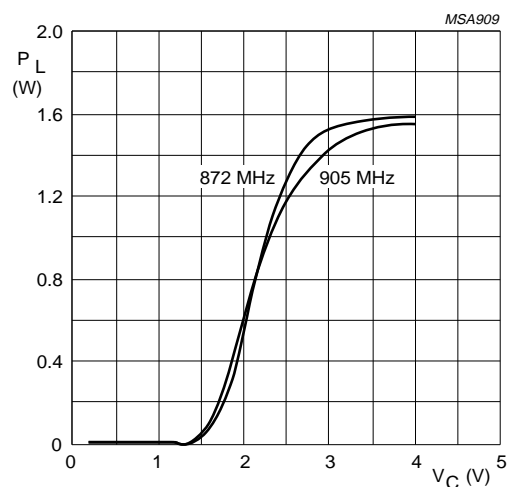
Fig.7 Load power as a function of drive power; BGY115A, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $P_L = 1.2 \text{ W}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ \text{C}$.

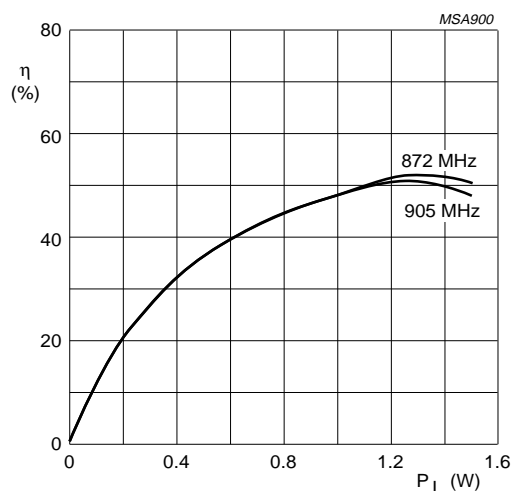
Fig.8 Harmonics as functions of frequency; BGY115A, typical values.

UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D

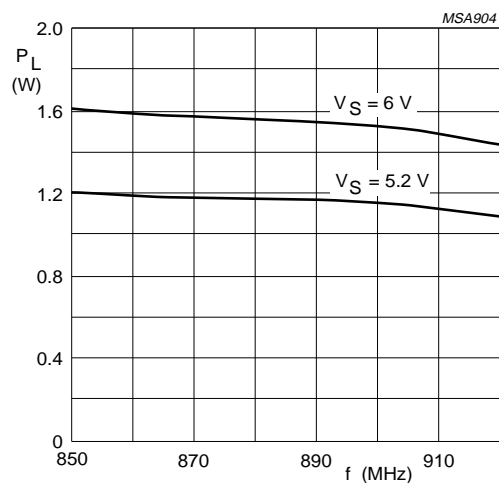
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

Fig.9 Load power as a function of control voltage;
BGY115B, typical values.



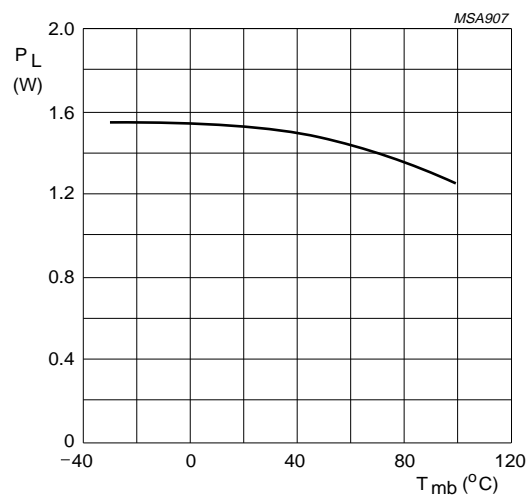
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

Fig.10 Efficiency as a function of load power;
BGY115B, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_C = 3.5 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

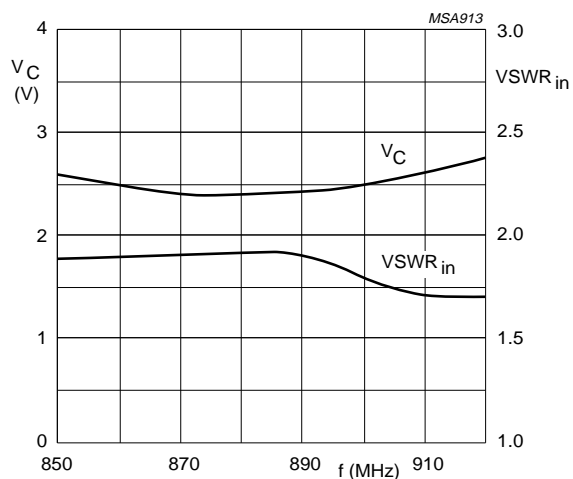
Fig.11 Load power as a function of frequency;
BGY115B, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $V_C = 3.5 \text{ V}$; $f = 890 \text{ MHz}$.

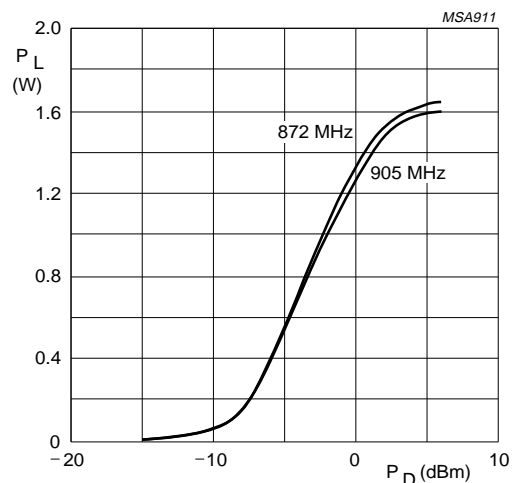
Fig.12 Load power as a function of mounting base
temperature; BGY115B, typical values.

UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D

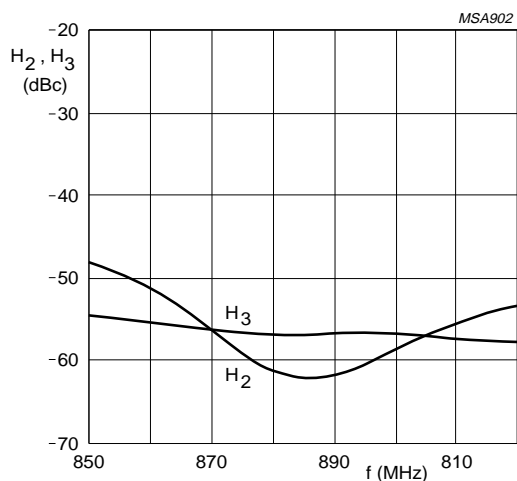
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $P_L = 1.2 \text{ W}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ \text{C}$.

Fig.13 Control voltage and VSWR input as functions of frequency; BGY115B, typical values.



$Z_S = Z_L = 50 \Omega$; $V_S = 6 \text{ V}$; $V_C = 3.5 \text{ V}$; $T_{mb} = 25^\circ \text{C}$.

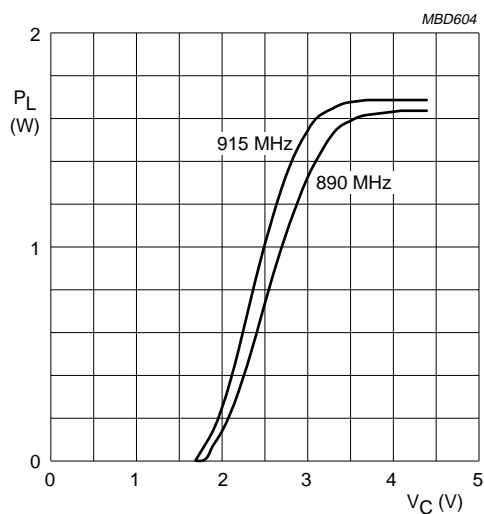
Fig.14 Load power as a function of drive power; BGY115B, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $P_L = 1.2 \text{ W}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ \text{C}$.

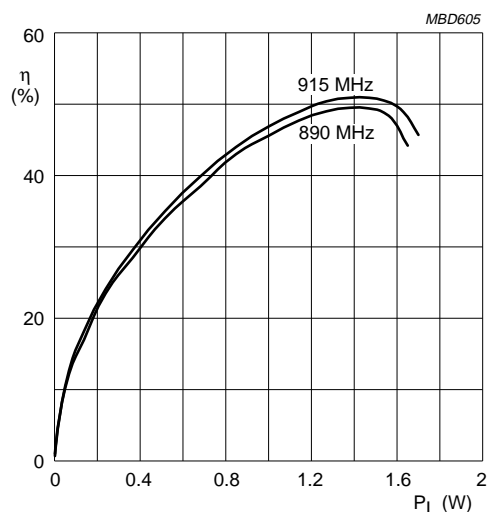
Fig.15 Harmonics as functions of frequency; BGY115B, typical values.

UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D

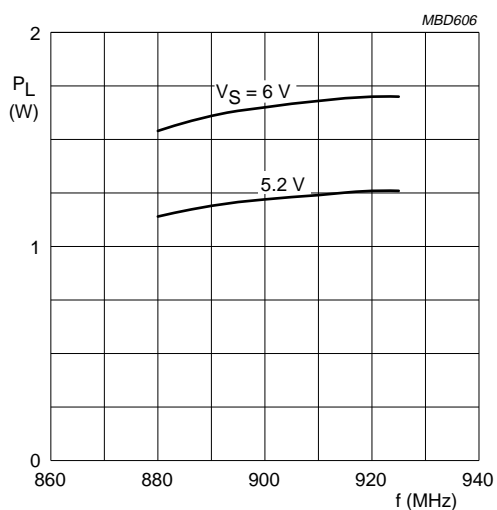
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

Fig. 16 Load power as a function of control voltage;
BGY115C/P, typical values.



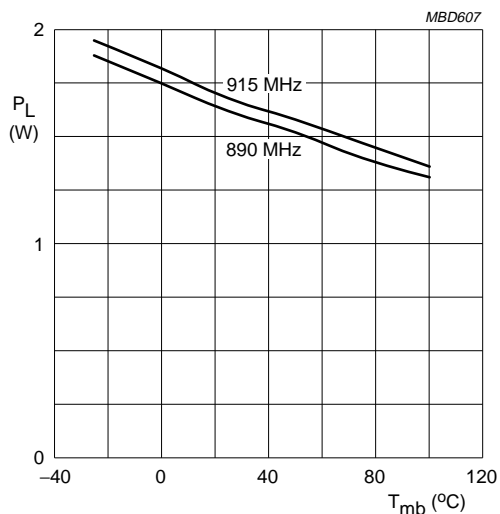
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

Fig. 17 Efficiency as a function of load power;
BGY115C/P, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_C = 3.5 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

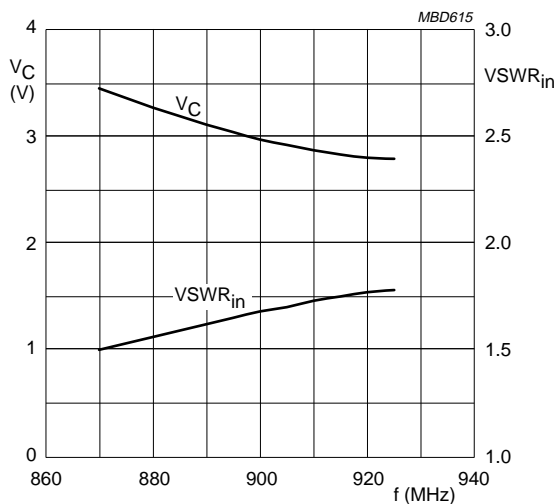
Fig. 18 Load power as a function of frequency;
BGY115C/P, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $V_C = 3.5 \text{ V}$.

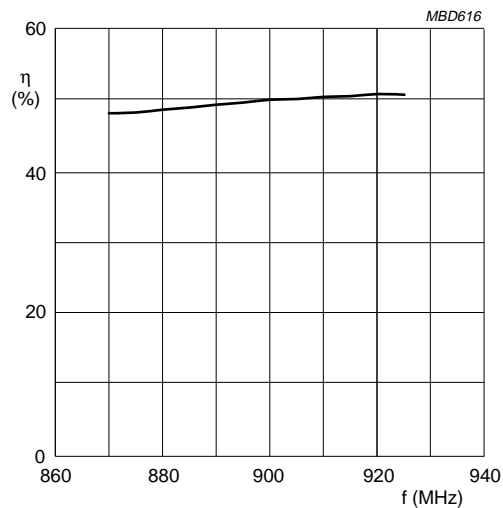
Fig. 19 Load power as a function of mounting base
temperature; BGY115C/P, typical values.

UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D

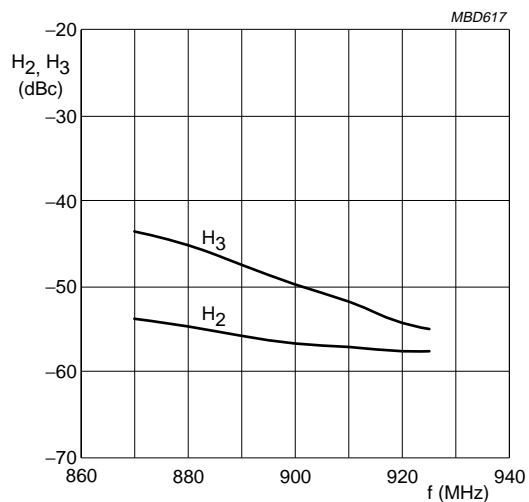
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $P_L = 1.4 \text{ W}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

Fig.20 Control voltage and VSWR input as functions of frequency; BGY115C/P, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $P_L = 1.4 \text{ W}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

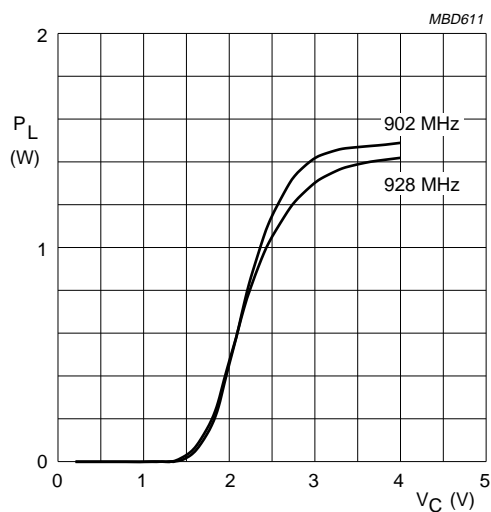
Fig.21 Efficiency as a function of frequency; BGY115C/P, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $P_L = 1.4 \text{ W}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

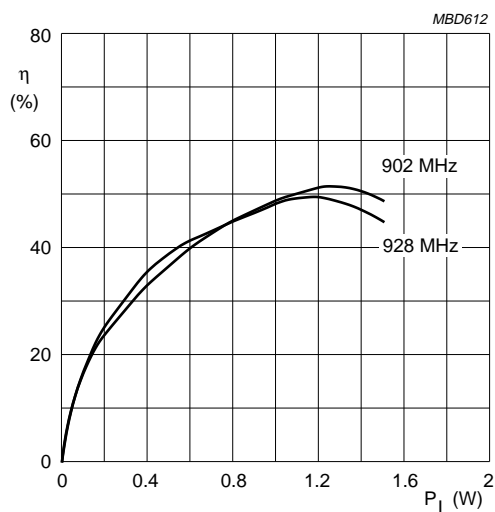
Fig.22 Harmonics as functions of frequency; BGY115C/P, typical values.

UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D

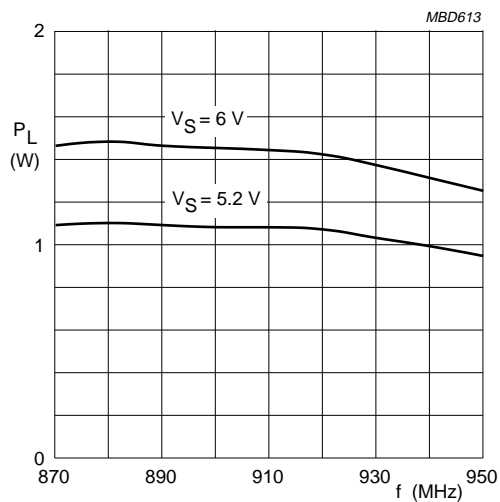
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

Fig.23 Load power as a function of control voltage;
BGY115D, typical values.



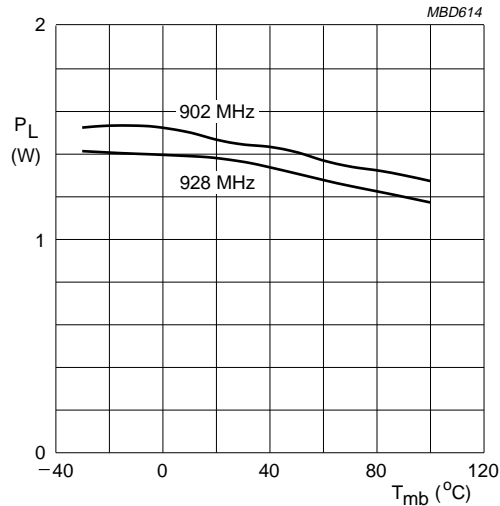
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

Fig.24 Efficiency as a function of load power;
BGY115D, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_C = 3.5 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

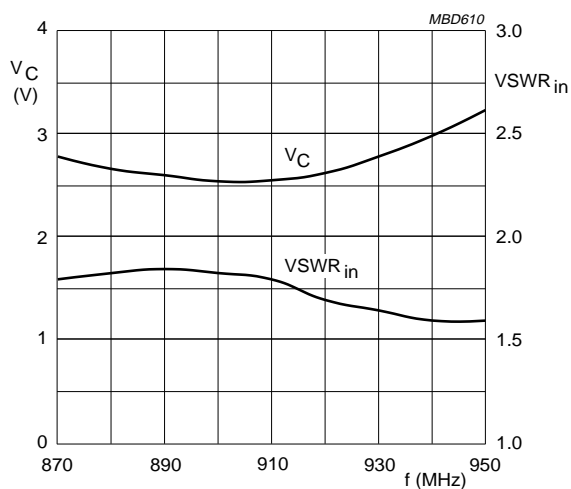
Fig.25 Load power as a function of frequency;
BGY115D, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $V_S = 6 \text{ V}$; $V_C = 3.5 \text{ V}$.

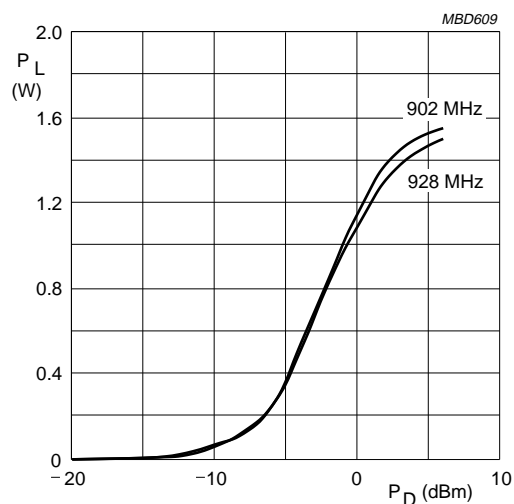
Fig.26 Load power as a function of mounting base
temperature; BGY115D, typical values.

UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D

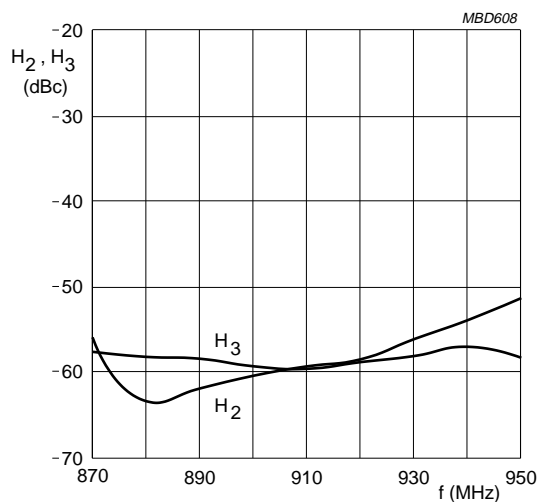
$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $P_L = 1.2 \text{ W}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

Fig.27 Control voltage and VSWR input as functions of frequency; BGY115D, typical values.



$Z_S = Z_L = 50 \Omega$; $V_S = 6 \text{ V}$; $V_C = 3.5 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

Fig.28 Load power as a function of drive power; BGY115D, typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 2 \text{ mW}$; $P_L = 1.2 \text{ W}$; $V_S = 6 \text{ V}$; $T_{mb} = 25^\circ\text{C}$.

Fig.29 Harmonics as functions of frequency; BGY115D, typical values.

UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D

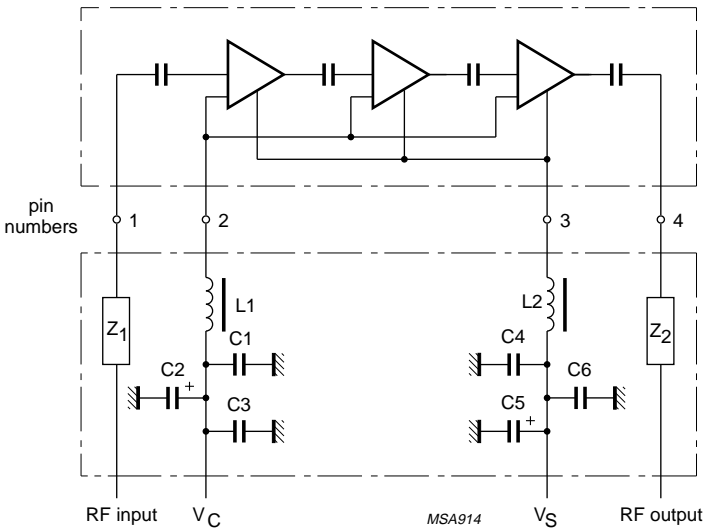
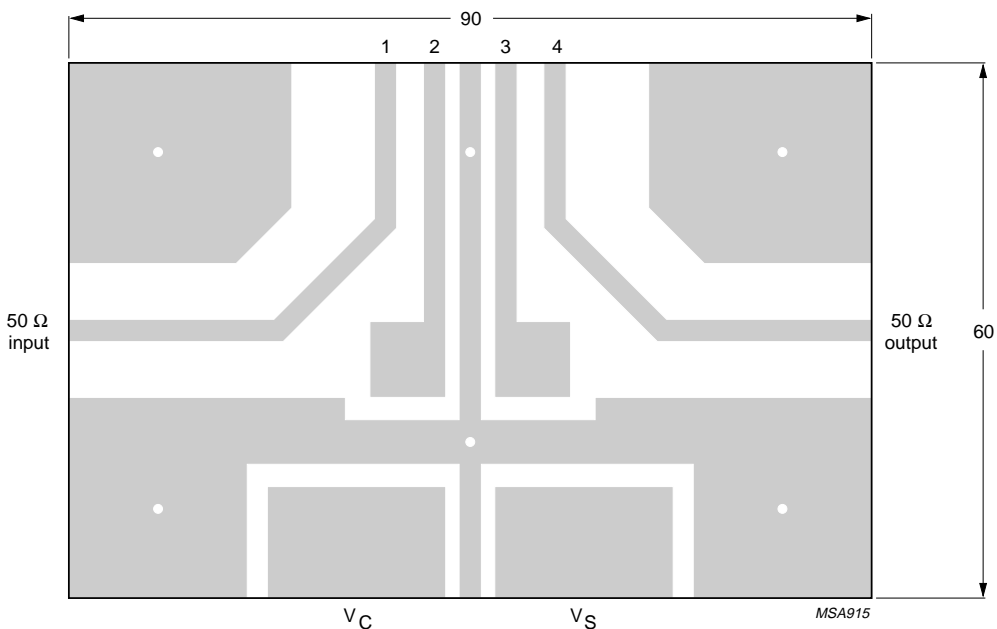


Fig.30 Test circuit.



Dimensions in mm.

Fig.31 Printed-circuit board layout.

UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D**List of components** (see Fig.30)

| COMPONENT | DESCRIPTION | VALUE | CATALOGUE NO. |
|---------------------------------|-----------------------------------|-------------|----------------|
| C1, C4 | multilayer ceramic chip capacitor | 100 nF | 2222 852 47104 |
| C2, C5 | 35 V tantalum capacitor | 2.2 μ F | — |
| C3, C6 | multilayer ceramic chip capacitor | 33 pF | 2222 851 13339 |
| L1, L2 | Ferroxcube coil | 5 μ H | 3122 108 20153 |
| Z ₁ , Z ₂ | stripline; note 1 | 50 Ω | — |

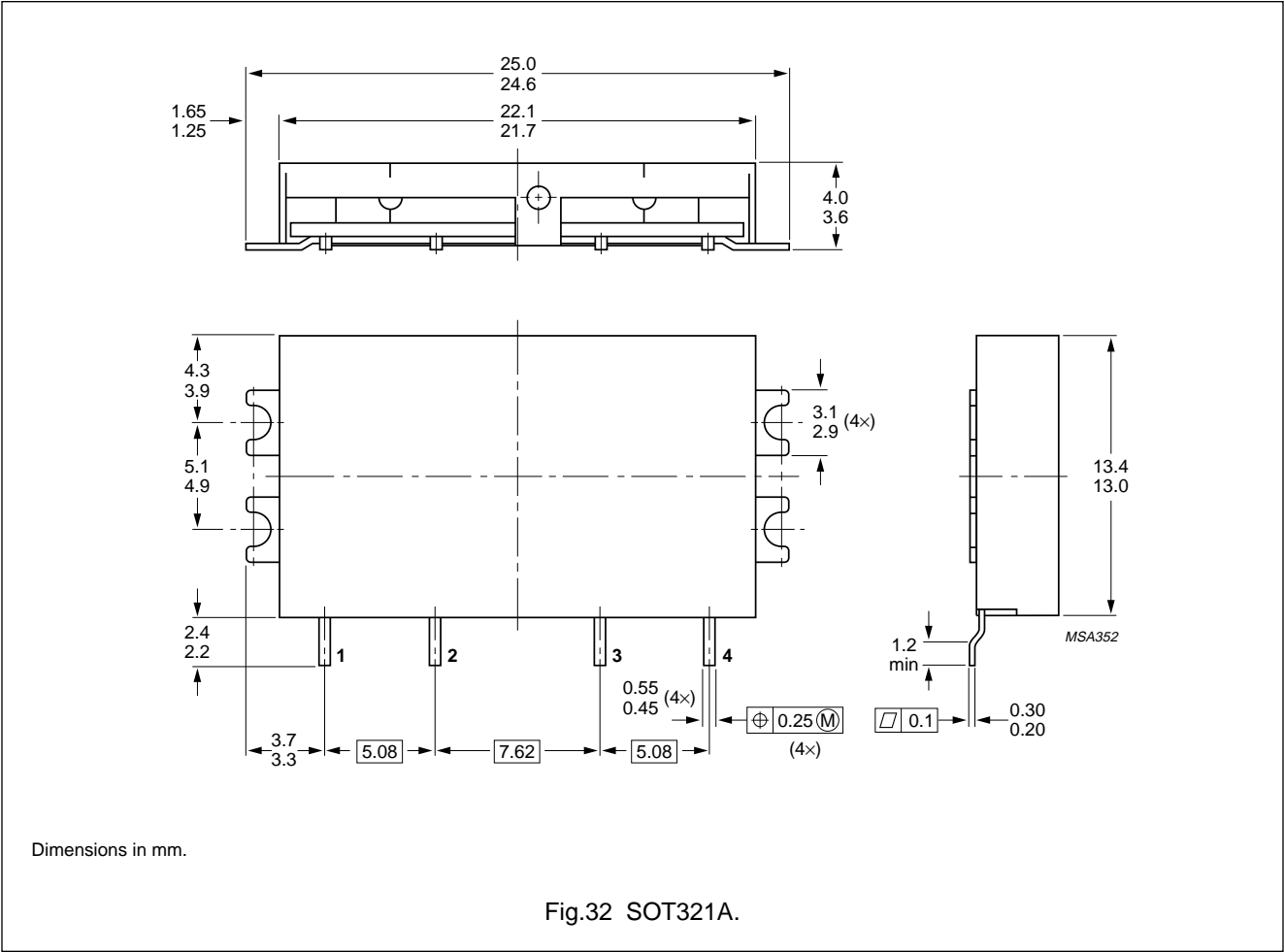
Note

1. The striplines are on a double copper-clad printed-circuit board with PTFE fibre-glass dielectric ($\epsilon_r = 2.2$); thickness $\frac{1}{32}$ inch.

UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D

PACKAGE OUTLINE



UHF amplifier modules

BGY115A; BGY115B;
BGY115C/P; BGY115D

DEFINITIONS

| Data Sheet Status | |
|---|---|
| Objective specification | This data sheet contains target or goal specifications for product development. |
| Preliminary specification | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification | This data sheet contains final product specifications. |
| Limiting values | |
| Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability. | |
| Application information | |
| Where application information is given, it is advisory and does not form part of the specification. | |

LIFE SUPPORT APPLICATIONS

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