

DATA SHEET

**BGY110D; BGY110E; BGY110F;
BGY110G**
UHF amplifier modules

Product specification
Supersedes data of May 1992
File under Discrete Semiconductors, SC09

1996 May 06

UHF amplifier modules

**BGY110D; BGY110E;
BGY110F; BGY110G**

FEATURES

- 7.2 V nominal supply voltage
- 1.7 W output power
- Easy control of output power by DC voltage.

APPLICATIONS

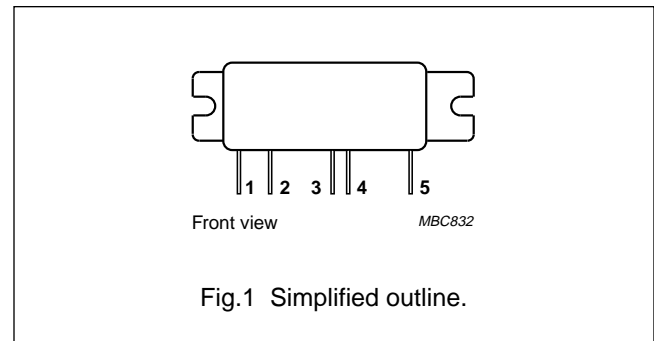
- Hand-held transmitting equipment operating in the 824 to 849 MHz, 872 to 905 MHz, 890 to 915 MHz and 902 to 928 MHz frequency ranges.

DESCRIPTION

The BGY110D, 110E, 110F and 110G are four-stage UHF amplifier modules in a SOT246 package. Each module consists of four NPN silicon planar transistor chips, mounted together with matching and bias circuit components on a metallized ceramic substrate.

PINNING - SOT246

PIN	DESCRIPTION
1	RF input/ V_C
2	V_{S1}
3	V_{S2}
4	V_{S3}
5	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)	V_C (V)	P_L (W)	G_P (dB)	η (%)	$Z_S; Z_L$ (Ω)
BGY110D	CW	824 to 849	7.2	4.5	1.7	≥ 32.3	≥ 39	50
BGY110E	CW	872 to 905	7.2	4.5	1.7	≥ 32.3	≥ 39	50
BGY110F	CW	890 to 915	7.2	4.5	1.7	≥ 32.3	≥ 39	50
BGY110G	CW	902 to 928	7.2	4.5	1.7	≥ 32.3	≥ 39	50

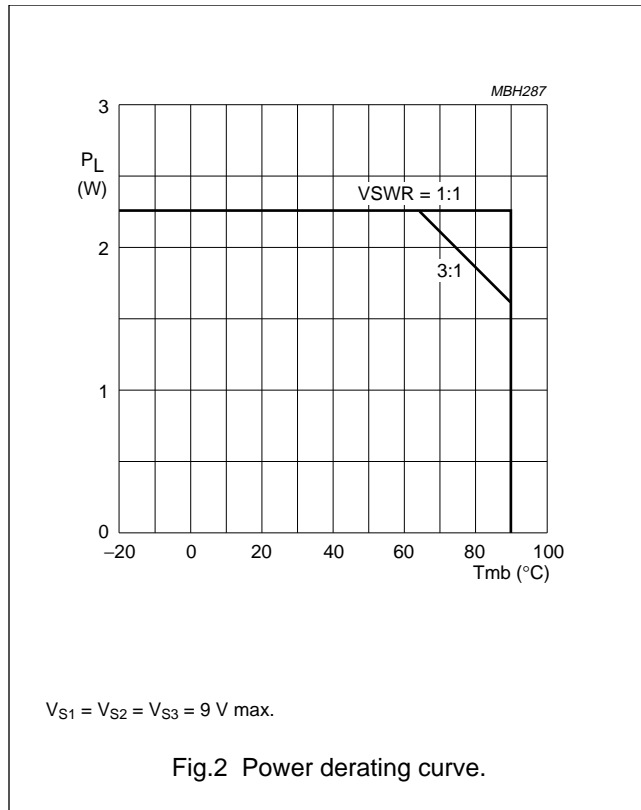
UHF amplifier modules

BGY110D; BGY110E;
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LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V _{S1}	DC supply voltage	–	10	V
V _{S2}	DC supply voltage	–	10	V
V _{S3}	DC supply voltage	–	10	V
V _C	DC control voltage	–	4.5	V
+V _o	RF output terminal voltage	–	25	V
P _D	input drive power	–	3	mW
P _L	load power	–	2.25	W
T _{stg}	storage temperature	–40	+100	°C
T _{mb}	mounting base temperature	–	90	°C



UHF amplifier modules

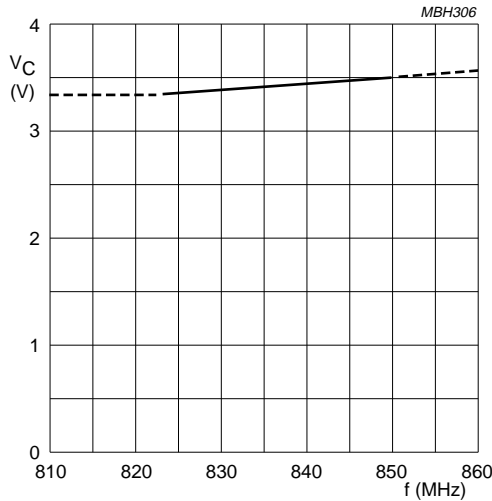
BGY110D; BGY110E;
BGY110F; BGY110G**CHARACTERISTICS**

$Z_S = Z_L = 50 \Omega$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $V_C = 4.5 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$; unless otherwise specified.4

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency BGY110D BGY110E BGY110F BGY110G		824 872 890 902	– – – –	849 905 915 928	MHz MHz MHz MHz
I_{C2}	leakage current	$V_{S1} = V_C = 0$	–	–	100	μA
I_{C3}	leakage current	$V_{S1} = V_C = 0$	–	–	100	μA
P_L	load power	$P_D = 1 \text{ mW}$	1.7	–	–	W
η	efficiency	$P_L = 1.7 \text{ W}$	39	–	–	%
H_2	second harmonic	$P_L = 1.7 \text{ W}$	–	–	–40	dB
H_3	third harmonic	$P_L = 1.7 \text{ W}$	–	–	–45	dB
$V_{SWR_{in}}$	input VSWR	$P_L = 1.7 \text{ W}$	–	–	2:1	
ΔG_p	gain control	$V_C = 0 \text{ to } 4.5 \text{ V}$; $P_D = 1 \text{ mW}$	30	–	–	dB
P_L	output switching power	$V_{S1} = V_C = 0$; $P_D = 1 \text{ mW}$	–	–	–20	dBm
	stability	$P_D = 0.5 \text{ to } 2 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 6 \text{ to } 9 \text{ V}$; $V_C = 0 \text{ to } 4.5 \text{ V}$; $P_L \leq 2 \text{ W}$; $V_{SWR} \leq 6 : 1$	–	–	–60	dBc
P_n	noise power	30 kHz bandwidth; $P_L = 1.7 \text{ W}$; 45 MHz above f_0	–	–84	–80	dBm
	ruggedness	$P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 9 \text{ V}$; $P_L \leq 1.8 \text{ W}$; $V_{SWR} = 10 : 1$ through all phases;	no degradation			

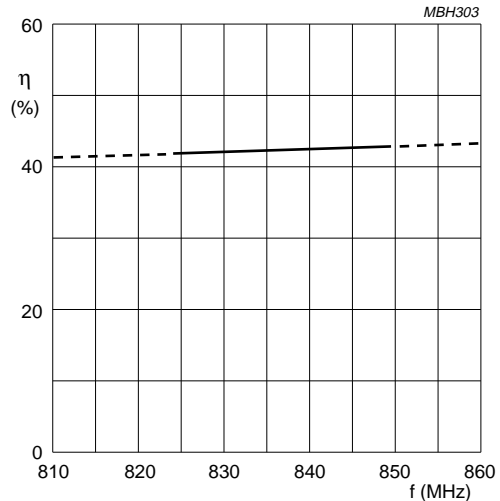
UHF amplifier modules

BGY110D; BGY110E;
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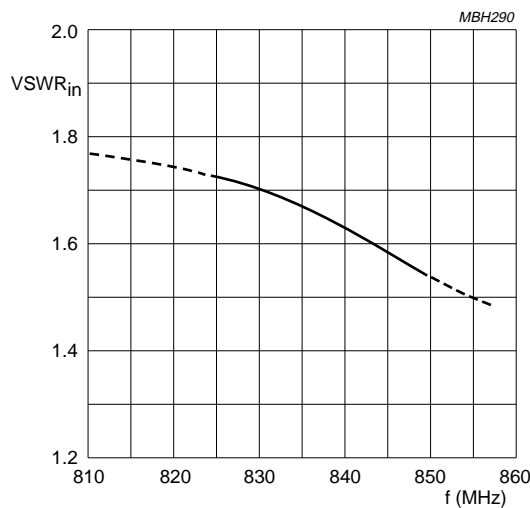
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.3 Control voltage as a function of frequency;
BGY110D; typical values.



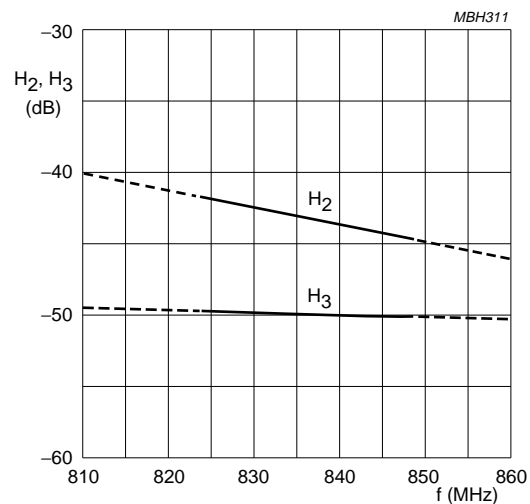
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.4 Efficiency as a function of frequency;
BGY110D; typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.5 Input VSWR as a function of frequency;
BGY110D; typical values.

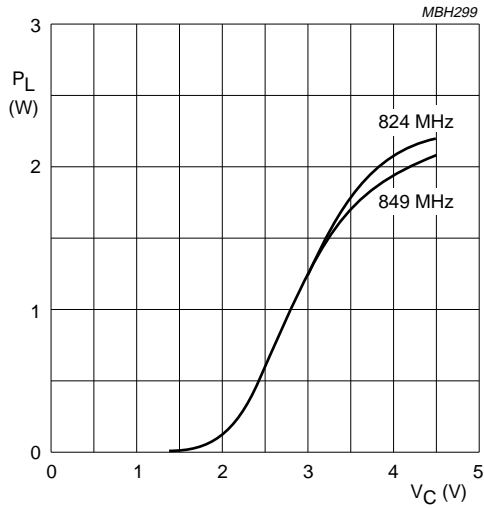


$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.6 Harmonics as a function of frequency;
BGY110D; typical values.

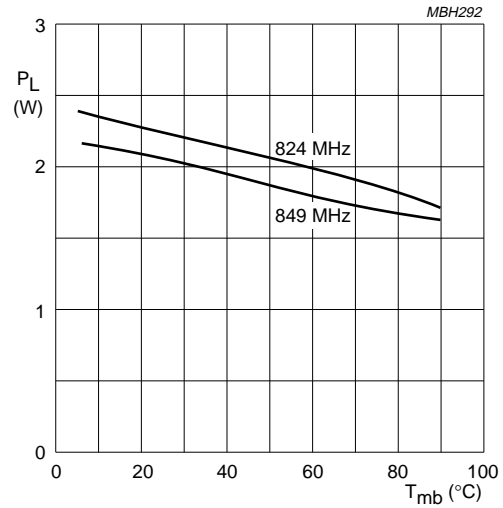
UHF amplifier modules

BGY110D; BGY110E;
BGY110F; BGY110G



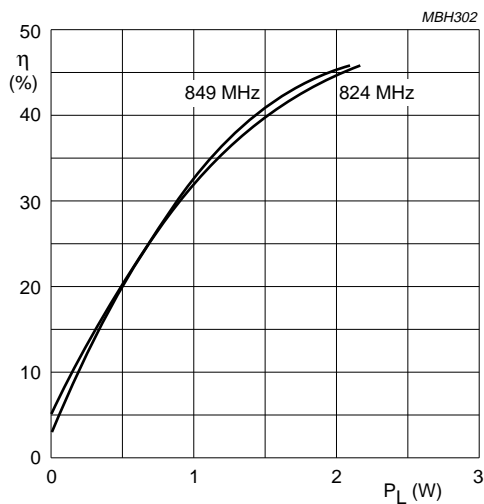
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.7 Load power as a function of control voltage; BGY110D; typical values.



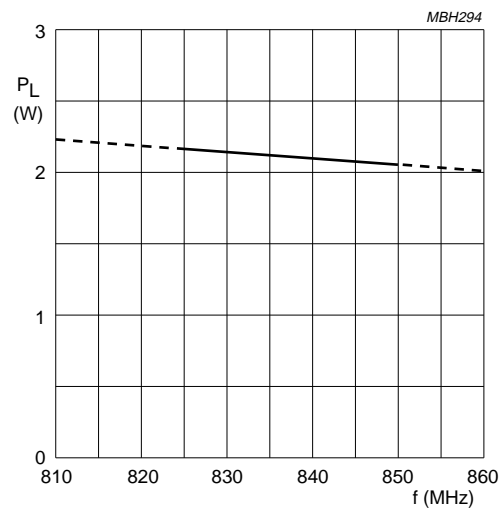
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $V_C = 4.5 \text{ V}$.

Fig.8 Load power as a function of mounting base temperature; BGY110D; typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.9 Efficiency as a function of load power; BGY110D; typical values.

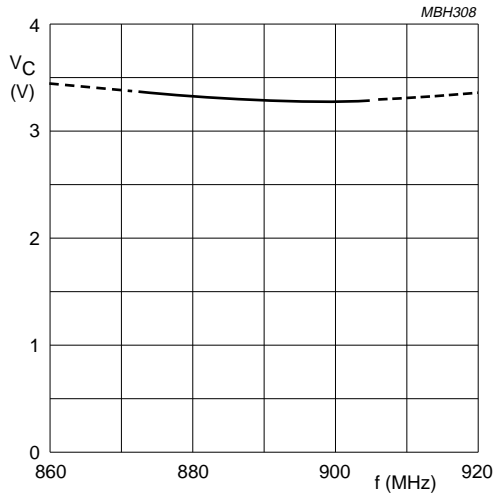


$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $V_C = 4.5 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.10 Load power as a function of frequency; BGY110D; typical values.

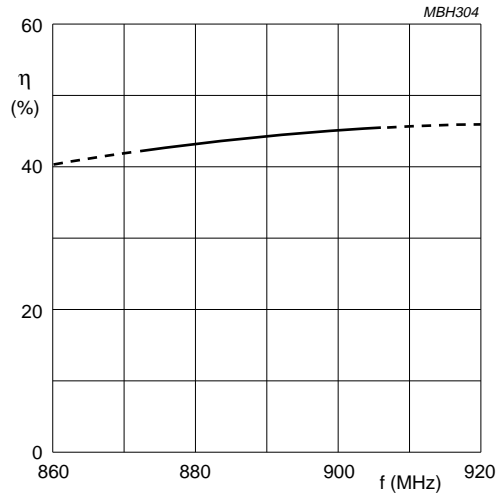
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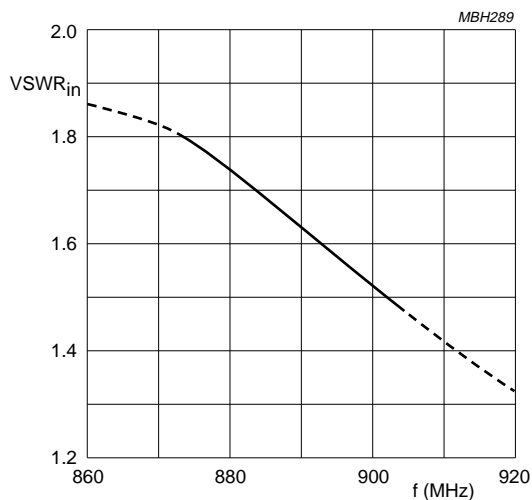
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.11 Control voltage as a function of frequency;
BGY110E; typical values.



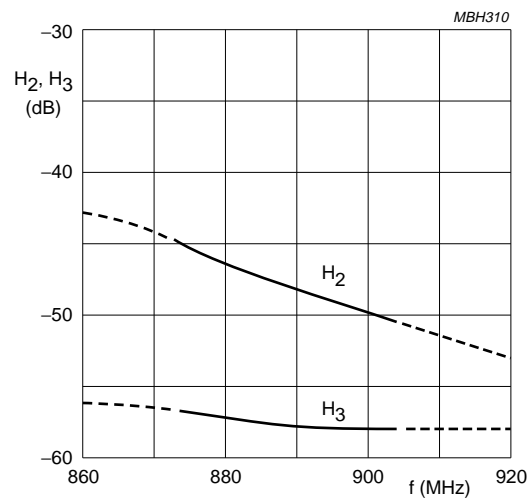
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.12 Efficiency as a function of frequency;
BGY110E; typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.13 Input VSWR as a function of frequency;
BGY110E; typical values.

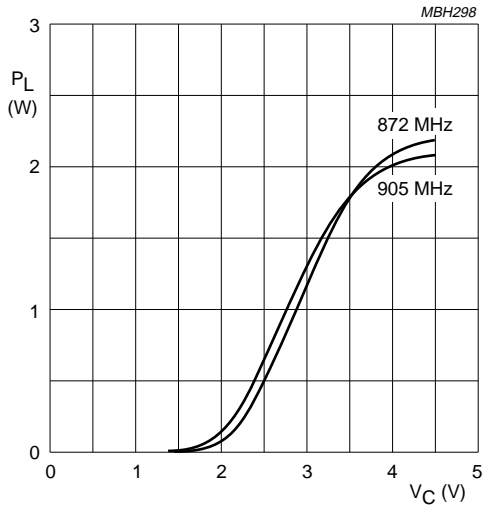


$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.14 Harmonics as a function of frequency;
BGY110E; typical values.

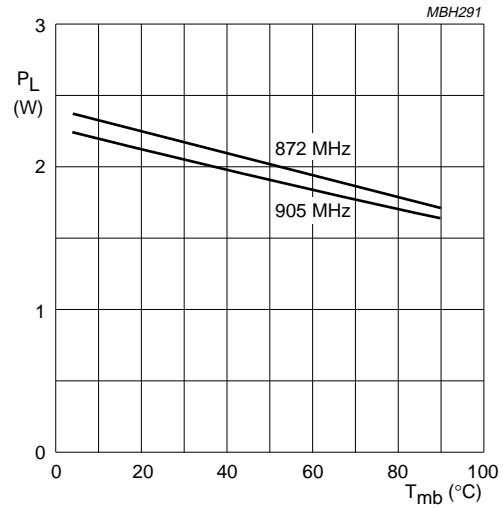
UHF amplifier modules

BGY110D; BGY110E;
BGY110F; BGY110G



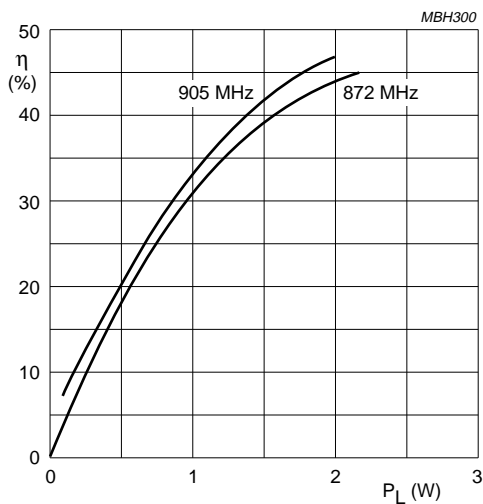
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.15 Load power as a function of control voltage; BGY110E; typical values.



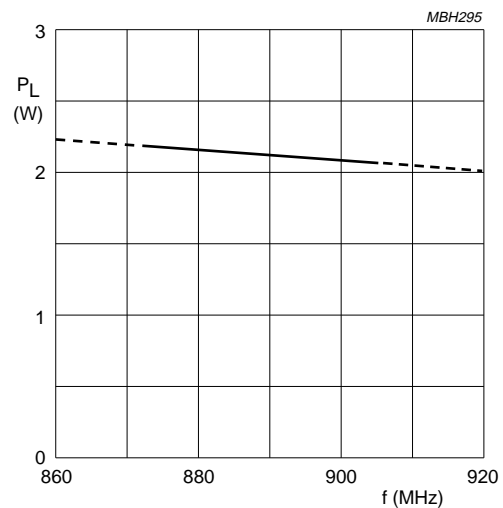
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $V_C = 4.5 \text{ V}$.

Fig.16 Load power as a function of mounting base temperature; BGY110E; typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.17 Efficiency as a function of load power; BGY110E; typical values.

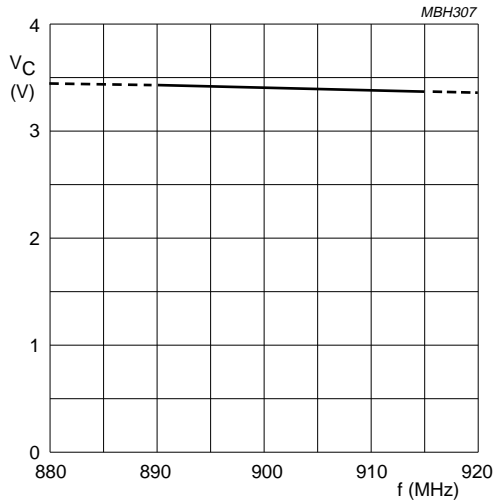


$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $V_C = 4.5 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.18 Load power as a function of frequency; BGY110E; typical values.

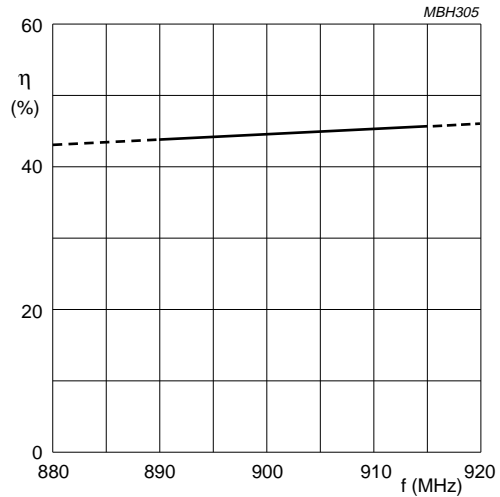
UHF amplifier modules

BGY110D; BGY110E;
BGY110F; BGY110G



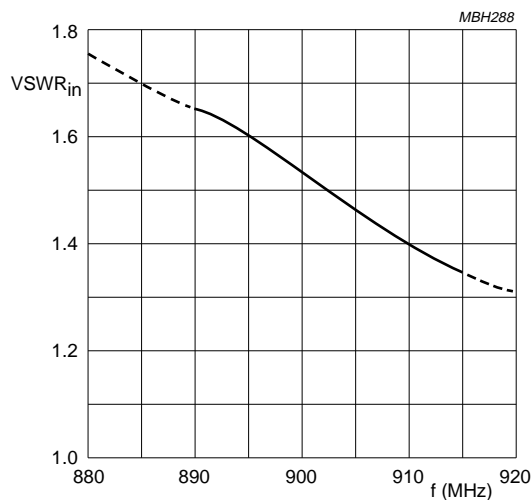
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.19 Control voltage as a function of frequency;
BGY110F; typical values.



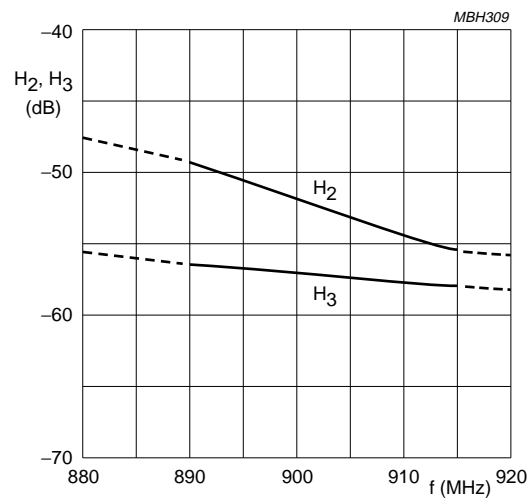
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.20 Efficiency as a function of frequency;
BGY110F; typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.21 Input VSWR as a function of frequency;
BGY110F; typical values.

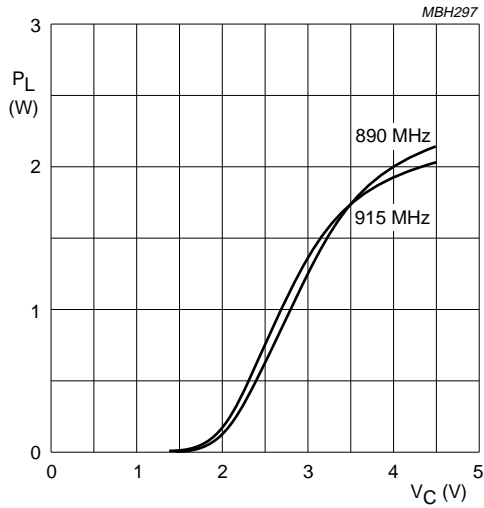


$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.22 Harmonics as a function of frequency;
BGY110F; typical values.

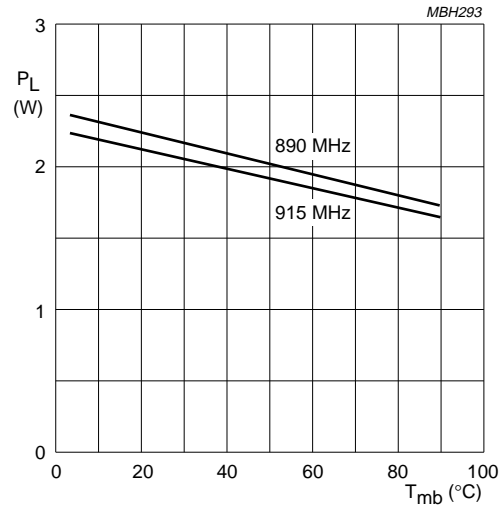
UHF amplifier modules

BGY110D; BGY110E;
BGY110F; BGY110G



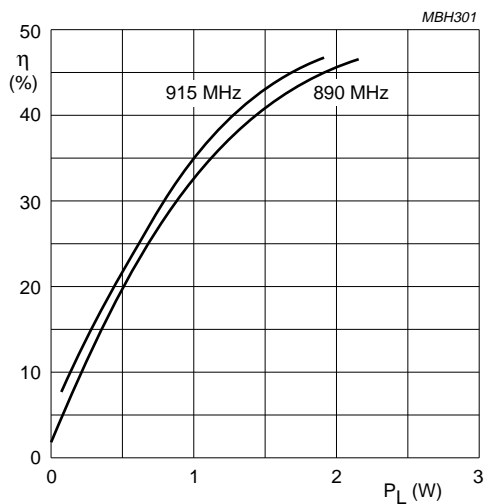
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.23 Load power as a function of control voltage; BGY110F; typical values.



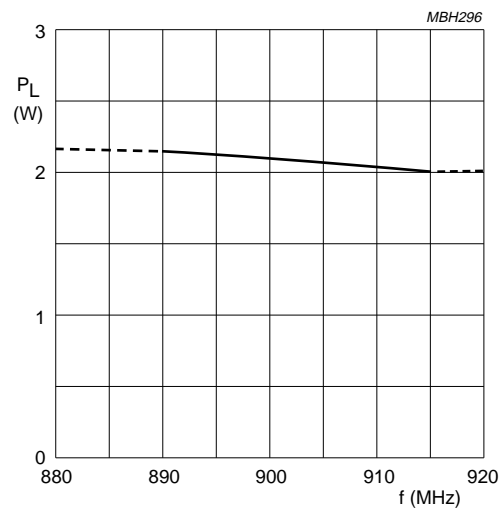
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $V_C = 4.5 \text{ V}$.

Fig.24 Load power as a function of mounting base temperature; BGY110F; typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.25 Efficiency as a function of load power; BGY110F; typical values.

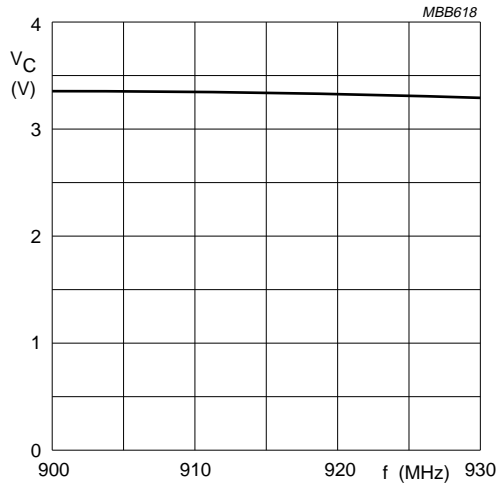


$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $V_C = 4.5 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.26 Load power as a function of frequency; BGY110F; typical values.

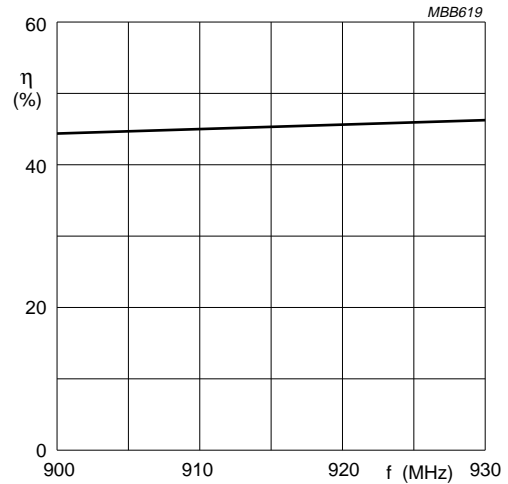
UHF amplifier modules

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BGY110F; BGY110G



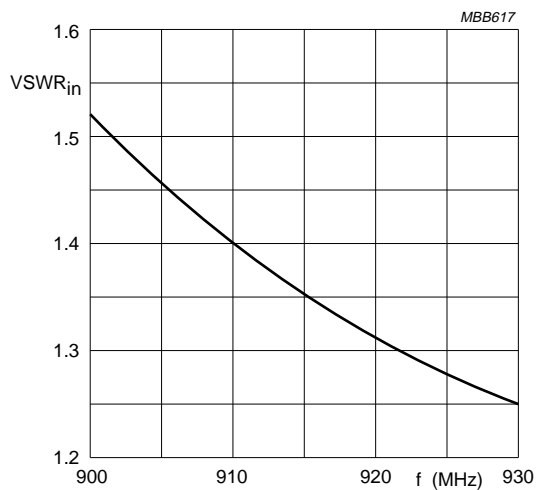
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.27 Control voltage as a function of frequency;
BGY110G; typical values.



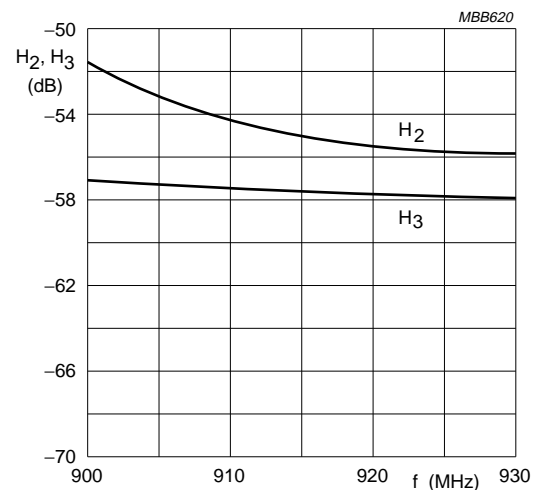
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.28 Efficiency as a function of frequency;
BGY110G; typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.29 Input VSWR as a function of frequency;
BGY110G; typical values.

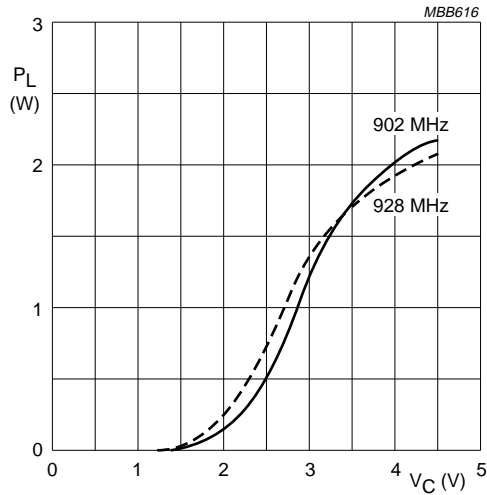


$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $P_L = 1.7 \text{ W}$;
 $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.30 Harmonics as a function of frequency;
BGY110G; typical values.

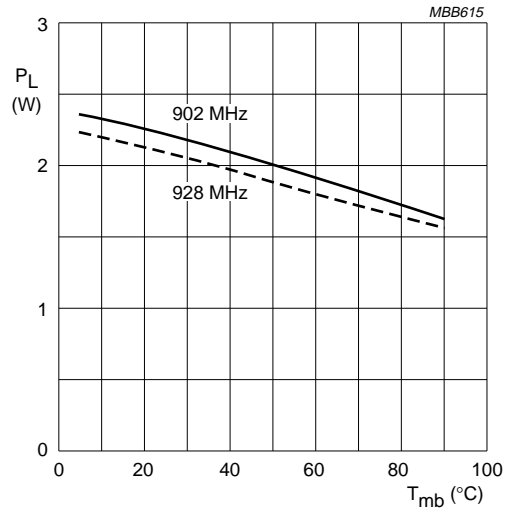
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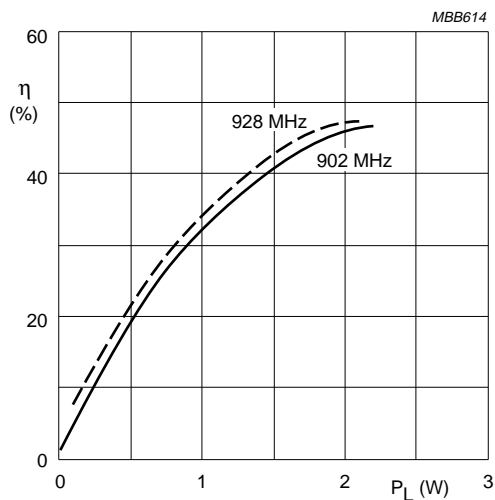
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.31 Load power as a function of control voltage; BGY110G; typical values.



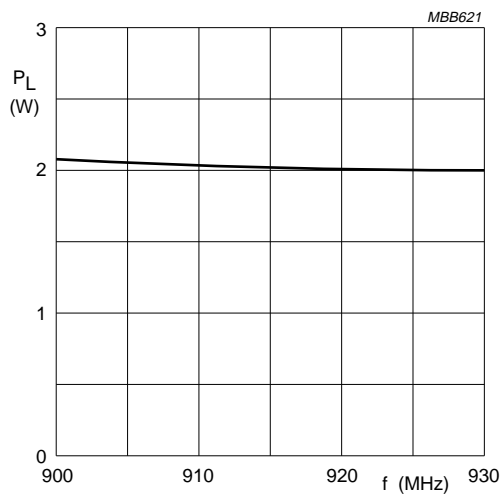
$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $V_C = 4.5 \text{ V}$.

Fig.32 Load power as a function of mounting base temperature; BGY110G; typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.33 Efficiency as a function of load power; BGY110G; typical values.



$Z_S = Z_L = 50 \Omega$; $P_D = 1 \text{ mW}$; $V_{S1} = V_{S2} = V_{S3} = 7.2 \text{ V}$; $V_C = 4.5 \text{ V}$; $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.34 Load power as a function of frequency; BGY110G; typical values.

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BGY110F; BGY110G

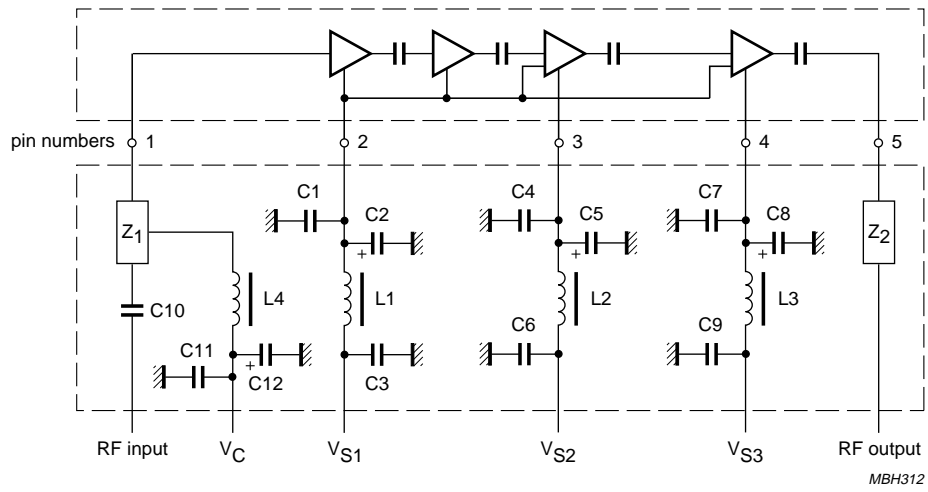


Fig.35 Test circuit.

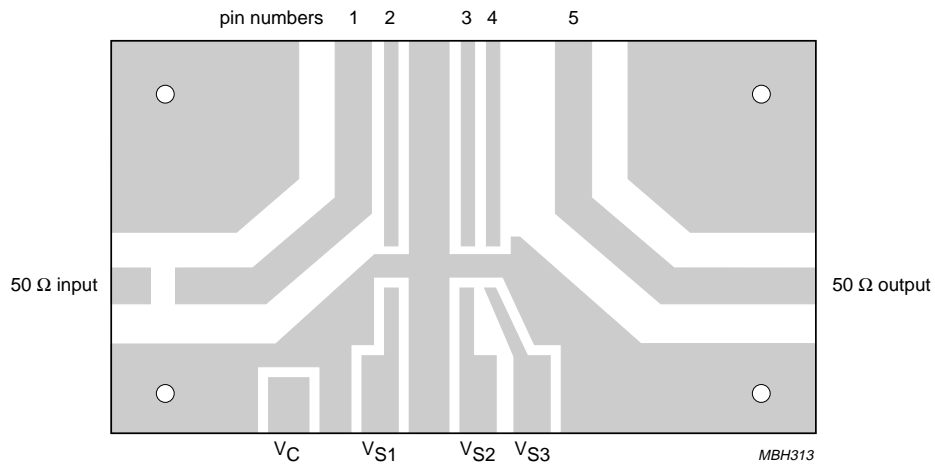


Fig.36 Printed circuit board test-fixture.

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BGY110F; BGY110G

List of components (see Fig.35)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C4, C7	multilayer chip capacitor	100 nF		
C2, C5, C8	tantalum capacitor	2.2 μ F		
C3, C6, C9	multilayer chip capacitor	33 pF		
C10, C11	multilayer chip capacitor	1 nF		
C12	tantalum capacitor	1 μ F		
L1, L2, L3	RF choke, 1 turn copper wire on grade 3B core	22 μ H	0.4 mm	4330 030 32221
L4	Ferroxcube coil	5 μ H		3122 108 20153
Z ₁ , Z ₂	stripline; note 1	50 Ω		

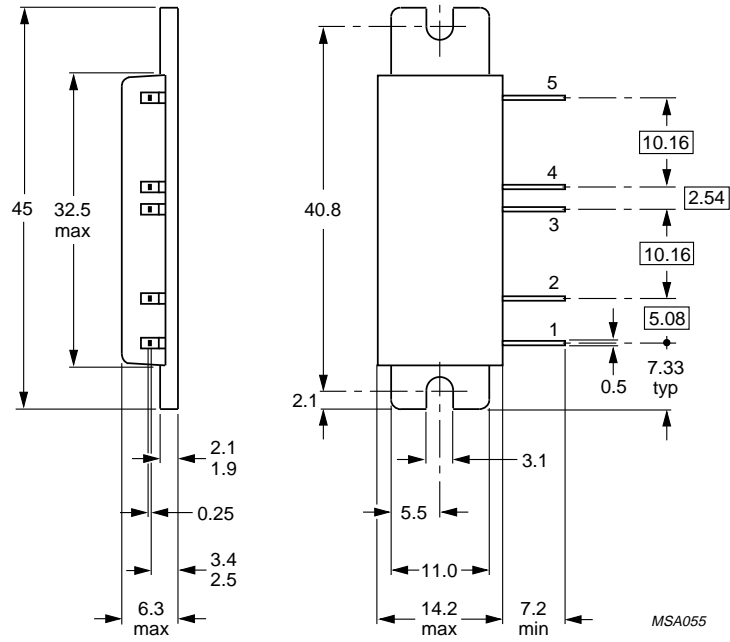
Note

1. The striplines are on double copper-clad printed circuit board with PTFE dielectric ($\epsilon_r = 2.2$), thickness $\frac{1}{16}$ inch.

UHF amplifier modules

BGY110D; BGY110E;
BGY110F; BGY110G

PACKAGE OUTLINE



Dimensions in mm.

Fig.37 SOT246.

UHF amplifier modules

BGY110D; BGY110E;
BGY110F; BGY110G

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.
Short-form specification	The data in this specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.
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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