DATA SHEET

BGY118A; BGY118B; BGY118D
UHF amplifier modules

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

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Philips
Semiconductors

PHILIPS

UHF amplifier modules — BGY118A; BGY118B; BGY118D

FEATURES

- Single 4.8 V nominal supply voltage
- 1.2 W output power
- Easy output power control by DC voltage
- Very high efficiency (typ. 55 %)
- Silicon bipolar technology
- Standby current less than 100 μA.

APPLICATIONS

- Hand-held transmitting equipment operating in the 824 to 849 MHz, 872 to 905 MHz and 898 to 928 MHz frequency ranges respectively.

DESCRIPTION

The BGY118A, BGY118B and BGY118D are three-stage UHF amplifier modules in a SOT321A package. 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

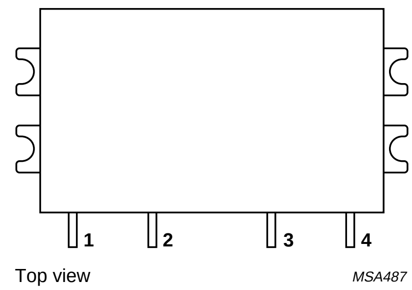


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

TYPE	MODE OF OPERATION	f (MHz)	V_S (V)	P_L (W)	G_P (dB)	η (%)	Z_S, Z_L (Ω)
BGY118A	CW	824 to 849	4.8	1.2	≥27.8	typ. 55	50
BGY118B	CW	872 to 905	4.8	1.2	≥27.8	typ. 55	50
BGY118D	CW	898 to 928	4.8	1.2	≥27.8	typ. 55	50

LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_S	DC supply voltage	–	7	V
V_C	DC control voltage	–	3.5	V
P_D	input drive power	–	5	mW
P_L	load power	–	1.6	W
T_{stg}	storage temperature	–40	+100	∞C
T_{mb}	operating mounting base temperature	–30	+100	∞C

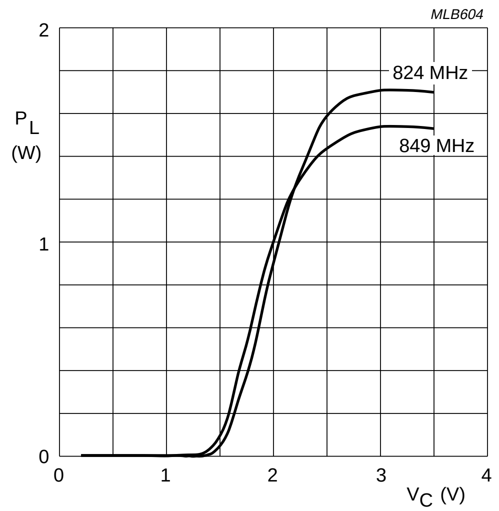
CHARACTERISTICS

$Z_S = Z_L$ = 50 W; P_D = 2 mW; V_S = 4.8 V; $V_C \leq 3$ V; T_{mb} = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency					
	BGY118A		824	–	849	MHz
	BGY118B		872	–	905	MHz
	BGY118D		898	–	928	MHz
I_Q	total leakage current	V_C = 0; P_D < –60 dBm	–	–	100	µA
I_C	control current	adjust V_C for P_L = 1.2 W	–	–	500	µA
P_L	load power		1.2	–	–	W
G_P	power gain	adjust V_C for P_L = 1.2 W	27.8	-	–	dB
η	efficiency	adjust V_C for P_L = 1.2 W	50	55	–	%
H_2	second harmonic	adjust V_C for P = 1.2 W	–	–	–40	dBc
H_3	third harmonic	adjust V_C for P_L = 1.2 W	–	–	–40	dBc
$VSWR_{in}$	input VSWR	adjust V_C for P_L = 1.2 W	–	–	3:1	
	stability	P_D = 0 to 6 dBm; V_S = 4 to 6.5 V; V_C = 0 to 3 V; $P_L \leq 1.2$ W; VSWR ≤ 6 : 1 through all phases	–	–	–60	dBc
	isolation	V_C = 0	–	–	–40	dBm
P_n	noise power	adjust V_C for P_L = 1.2 W; bandwidth = 30 kHz; note 1	–	–	–90	dBm
	ruggedness	V_S = 6.5 V; adjust V_C for P_L = 1.4 W; VSWR ≤ 10 : 1 through all phases	no degradation			

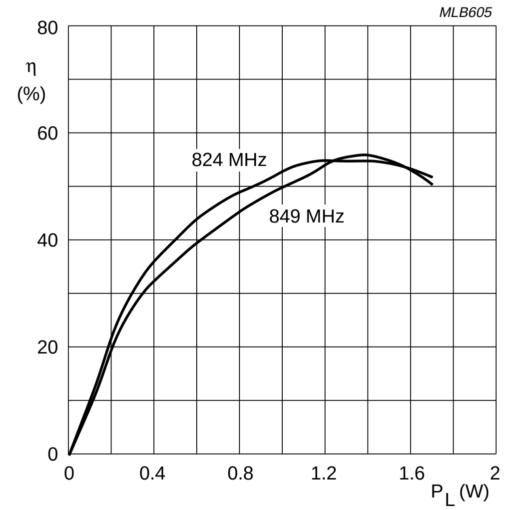
Note

1. BGY118A, BGY118B: $f_n = f_o$ + 45 MHz.
   BGY118D: $f_n = f_o$ – 55 MHz.



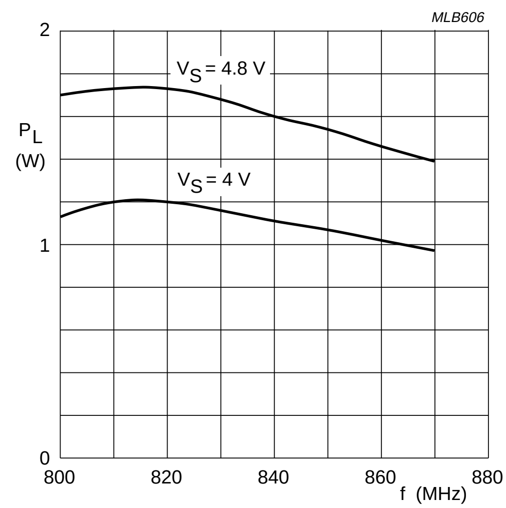
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.2 Load power as a function of control voltage; BGY118A; typical values.



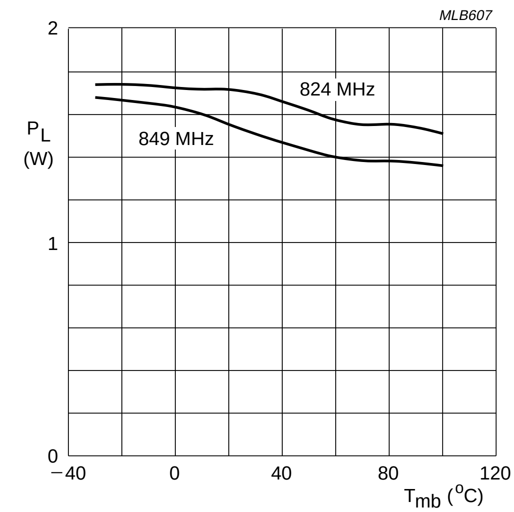
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.3 Efficiency as a function of load power; BGY118A; typical values.



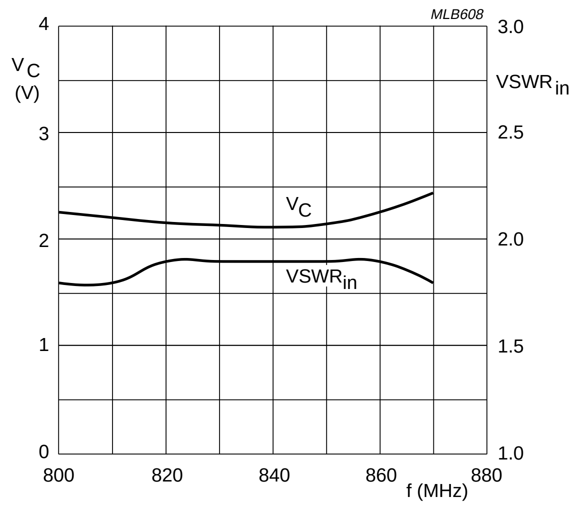
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.4 Load power as a function of frequency; BGY118A; typical values.



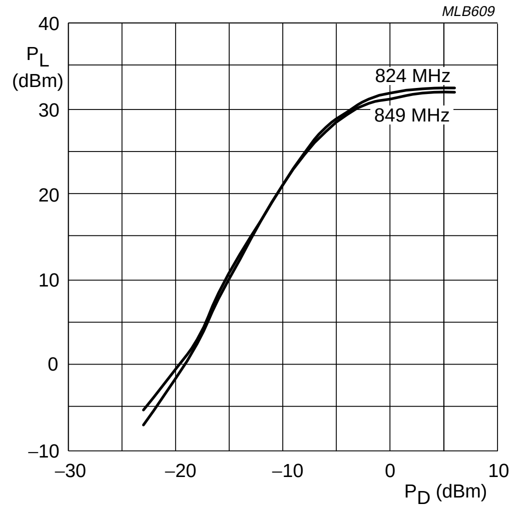
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.5 Load power as a function of mounting-base temperature; BGY118A; typical values.



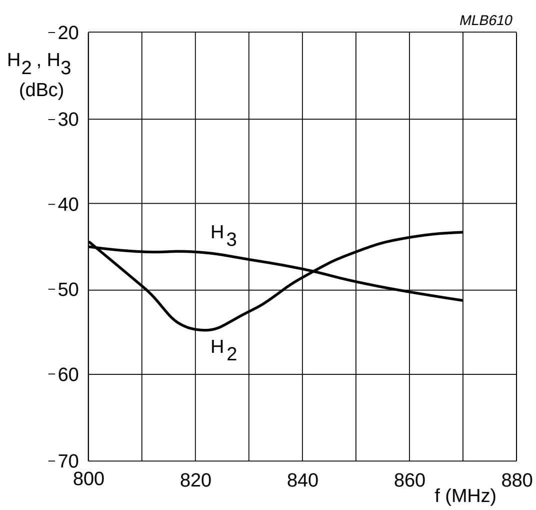
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.6 Control voltage and VSWR input as function of frequency; BGY118A; typical values.



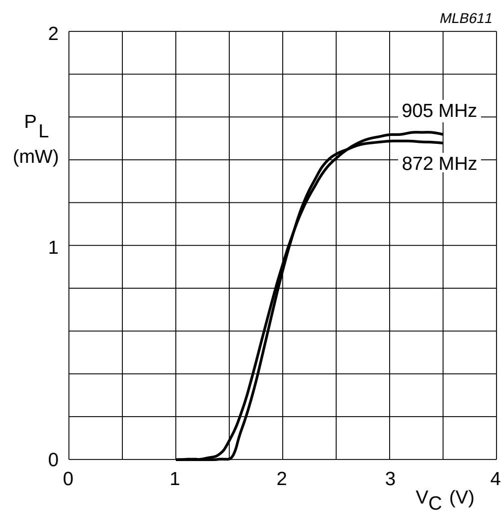
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.7 Load power as a function of drive power; BGY118A; typical values.



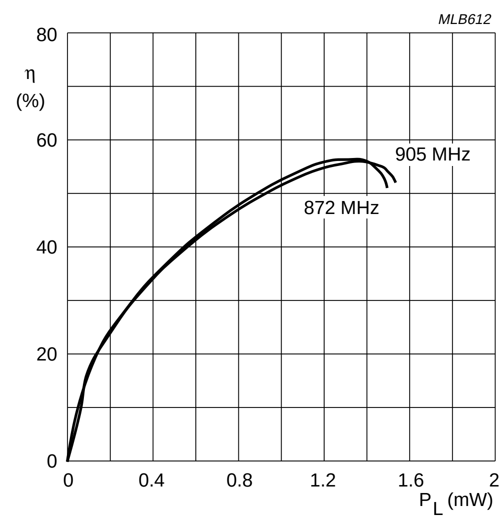
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.8 Harmonics as a function of frequency; BGY118A; typical values.



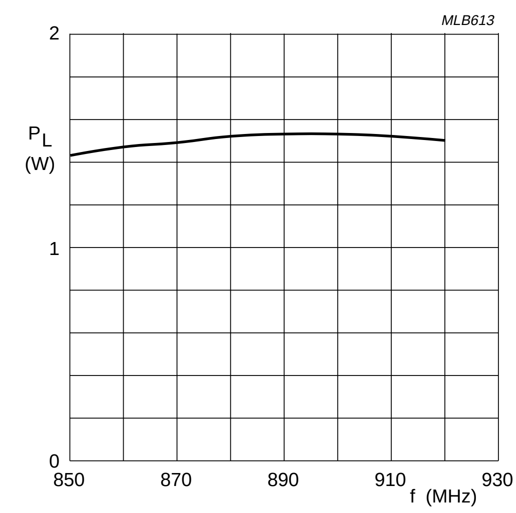
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.9 Load power as a function of control voltage; BGY118B; typical values.



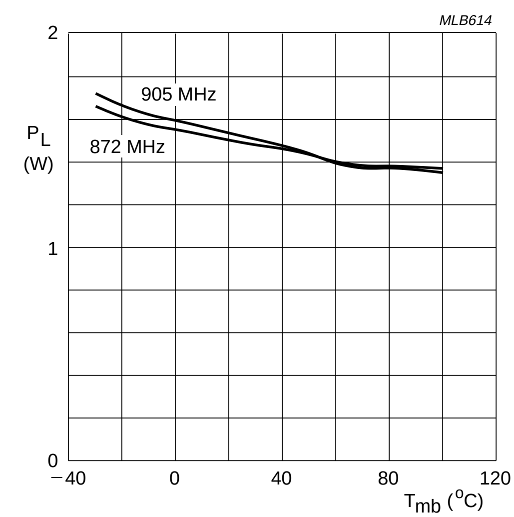
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.10 Efficiency as a function of load power; BGY118B; typical values.



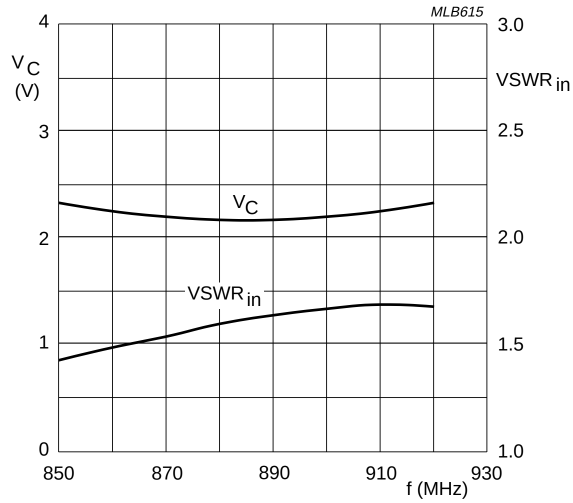
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.11 Load power as a function of frequency; BGY118B; typical values.



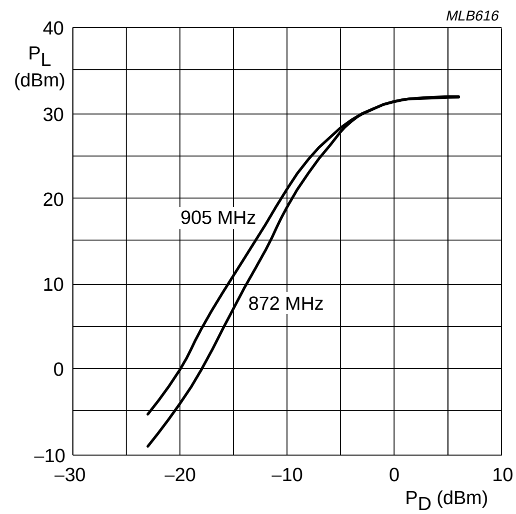
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.12 Load power as a function of mounting-base temperature; BGY118B; typical values.



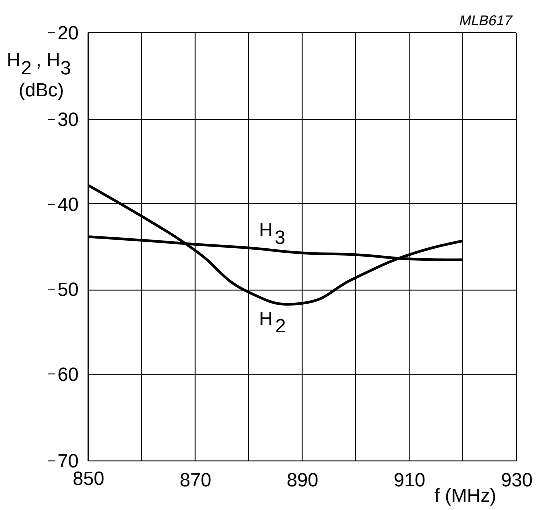
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.13 Control voltage and VSWR input as function of frequency; BGY118B; typical values.



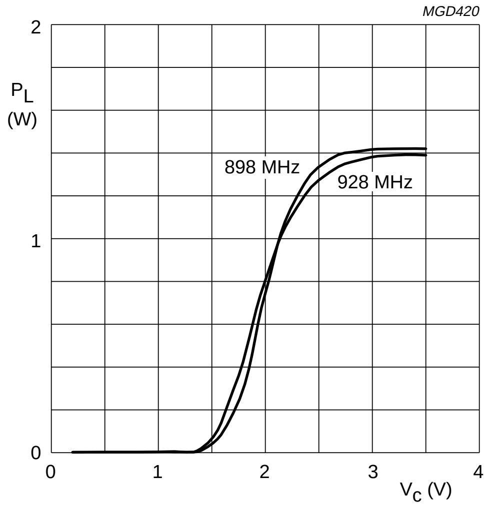
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.14 Load power as a function of drive power; BGY118B; typical values.



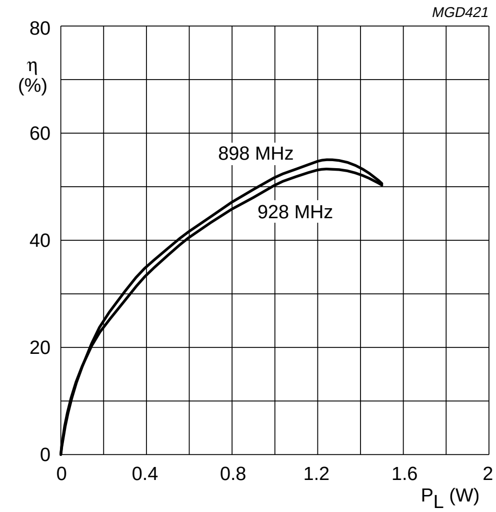
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.15 Harmonics as a function of frequency; BGY118; typical values.



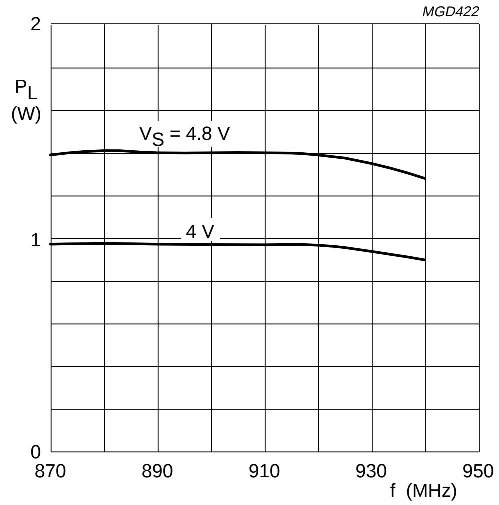
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; V_S 4.8 V; $T_{mb} = 25$ °C.

Fig.16 Load power as a function of control voltage; BGY118D; typical values.



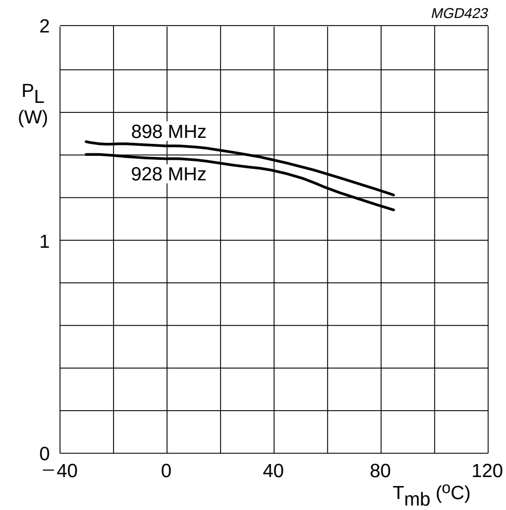
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $T_{mb} = 25$ °C.

Fig.17 Efficiency as a function of load power; BGY118D; typical values.



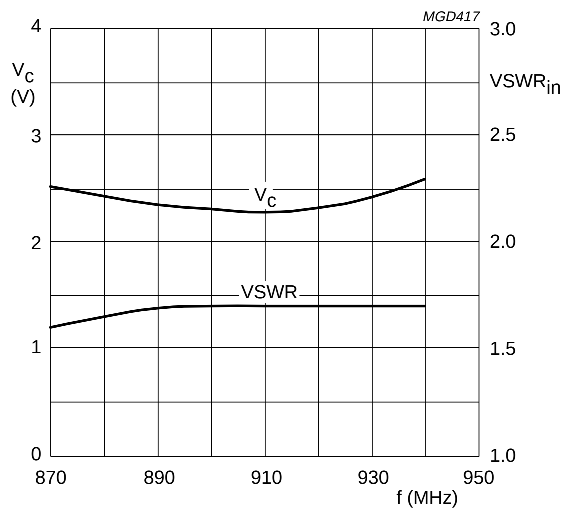
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_S = 4.8$ V; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.18 Load power as a function of frequency; BGY118D; typical values.



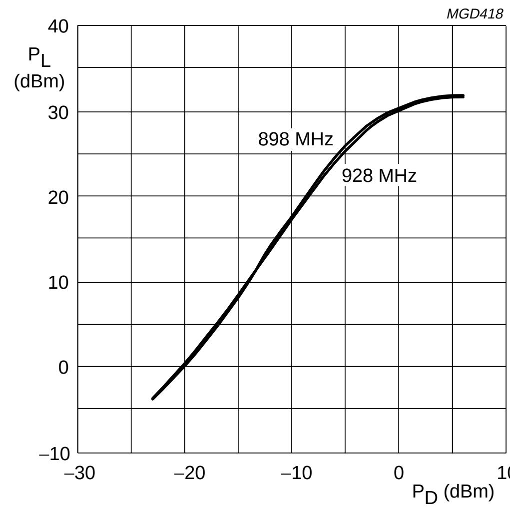
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.19 Load power as a function of mounting-base temperature; BGY118D; typical values.



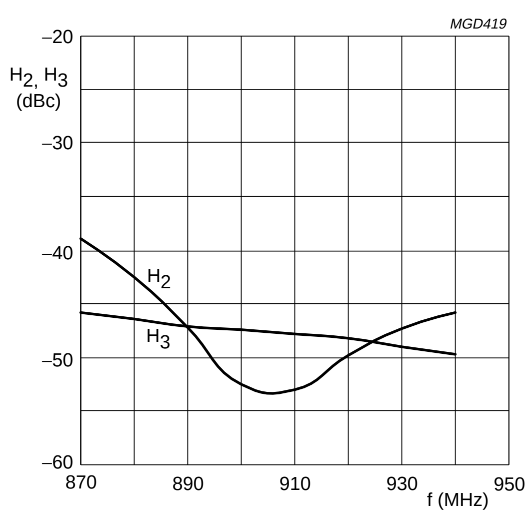
$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.20 Control voltage and VSWR input as function of frequency; BGY118D; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $V_C = 3$ V; $T_{mb} = 25$ °C.

Fig.21 Load power as a function of drive power; BGY118D; typical values.



$Z_S = Z_L = 50\ \Omega$; $P_D = 2$ mW; $P_L = 1.2$ W; $T_{mb} = 25$ °C.

Fig.22 Harmonics as a function of frequency; BGY118D; typical values.

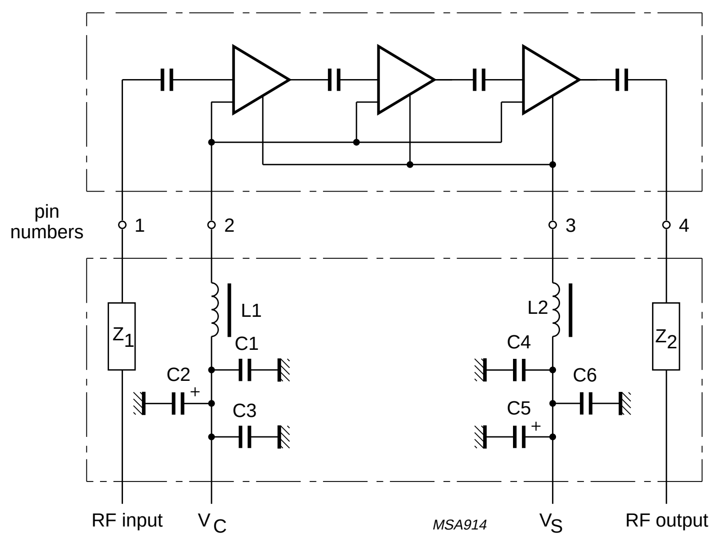
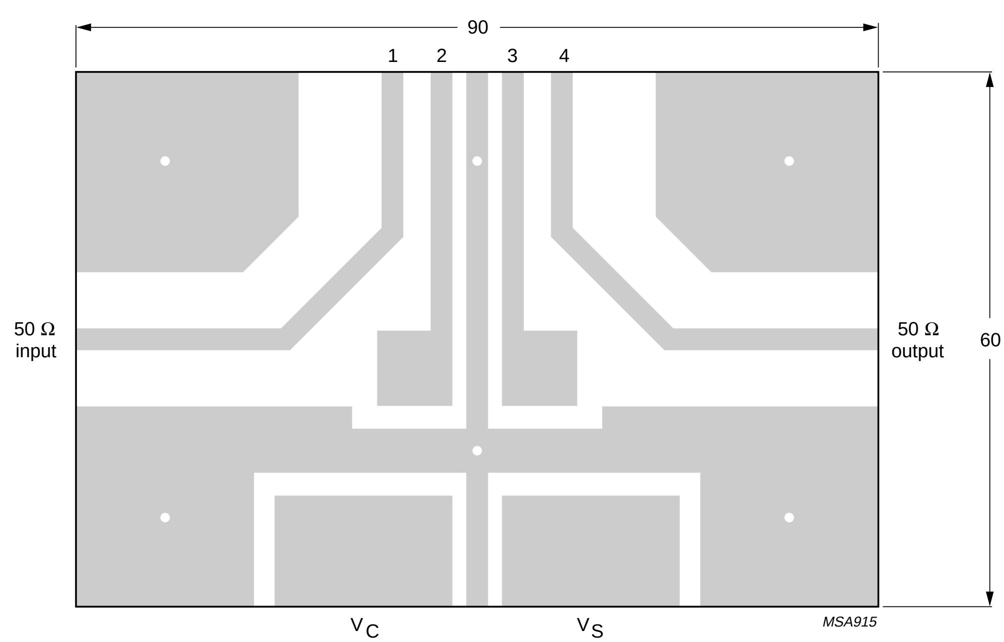


Fig.23 Test circuit.



Dimensions in mm.

Fig.24 Printed-circuit board layout.

List of components (See Fig.23)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C4	multilayer ceramic chip capacitor	100 nF	2222 852 47104
C2, C5	tantalum capacitor	2.2 μF; 35 V	
C3, C6	multilayer ceramic chip capacitor	33 pF	2222 851 13339
L1, L2	Ferroxcube coil	5 μH	3122 108 20153
Z_1, Z_2	stripline; note 1	50 Ω	

Note

1. The striplines are on a double copper-clad PCB with PTFE fibre-glass dielectric (e_r = 2.2); thickness 1/32 inch.

SOLDERING

The indicated temperatures are those at the solder interfaces.

Advised solder types are types with a liquidus less than or equal to 210 °C.

Solder dots or solder prints must be large enough to wet the contact areas.

Footprints for soldering should cover the module contact area +0.1 mm on all sides.

Soldering can be carried out using a conveyor oven, a hot air oven, an infrared oven or a combination of these ovens.

Hand soldering must be avoided because the soldering iron tip can exceed the maximum permitted temperature of 250 °C and damage the module.

The maximum temperature profile and soldering time is indicated as follows (see Fig.25):

t = 350 s at 100 °C

t = 300 s at 125 °C

t = 200 s at 150 °C

t = 100 s at 175 °C

t = 50 s at 200 °C

t = 5 s at 250 °C (maximum temperature).

Cleaning

The following fluids may be used for cleaning:

- Alcohol
- Bio-Act (Terpene Hydrocarbon)
- Triclean B/S
- Acetone.

Ultrasonic cleaning should not be used since this can cause serious damage to the product.

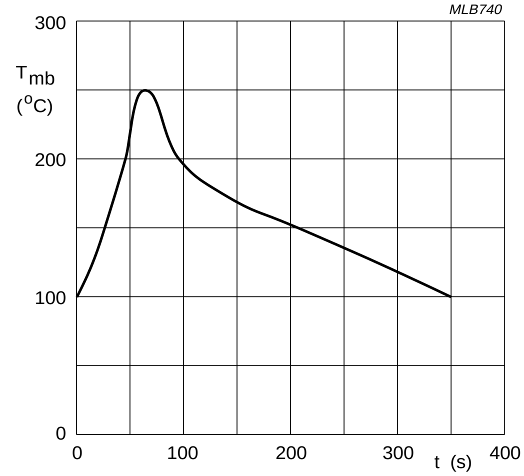
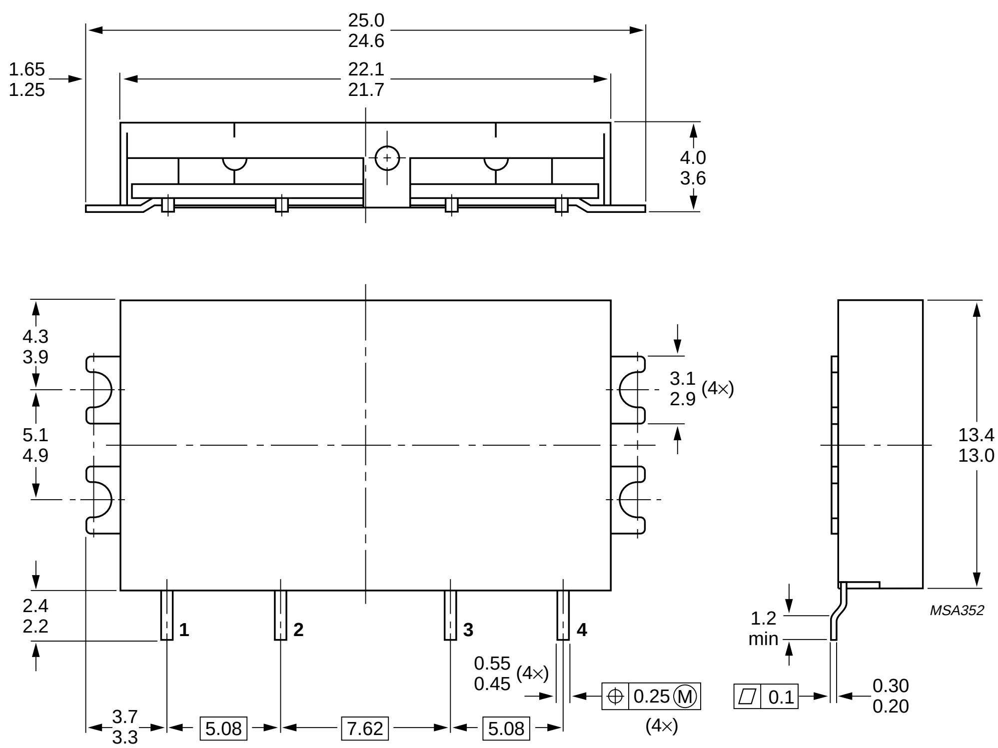


Fig.25 Maximum allowable temperature profile.

PACKAGE OUTLINE



Dimensions in mm.

Fig.26 SOT321A.

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

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.