

# DATA SHEET

**PLB16012U**

**NPN microwave power transistor**

Product specification  
Supersedes data of November 1994

1997 Feb 18

# NPN microwave power transistor

# PLB16012U

### FEATURES

- Input matching cell allows an easier design of circuits
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance.

### APPLICATIONS

Common base, class C, power amplifiers at 1.6 GHz. Also suitable for operation in the 1.4 to 1.8 GHz range.

### DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT437A glued cap metal ceramic flange package with base connected to flange.

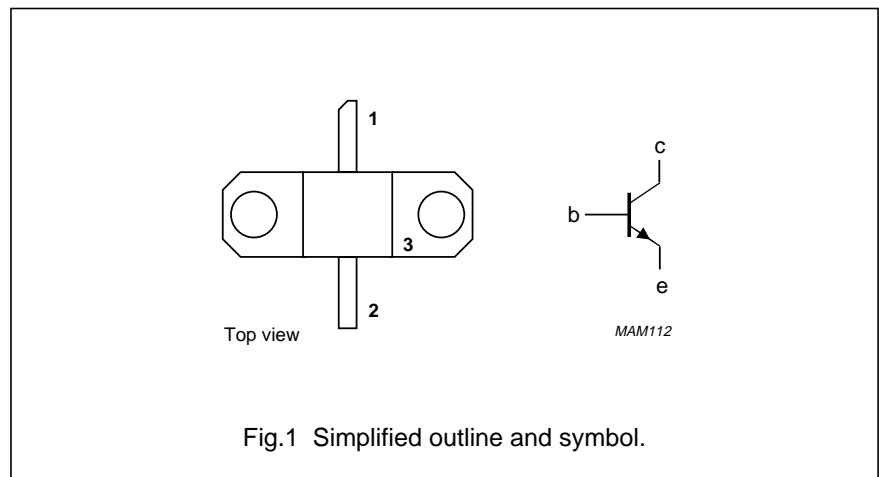
### QUICK REFERENCE DATA

Microwave performance up to  $T_{mb} = 25\text{ }^\circ\text{C}$  in a common base class C narrowband amplifier.

MODE OF OPERATION	f (GHz)	V <sub>CC</sub> (V)	P <sub>L</sub> (W)	G <sub>p</sub> (dB)	η <sub>c</sub> (%)	Z <sub>i</sub> ; Z <sub>L</sub> (Ω)
Class C (CW)	1.6	28	10	>8	>45	see Figs 5 and 6

### PINNING - SOT437A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange



### WARNING

#### Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

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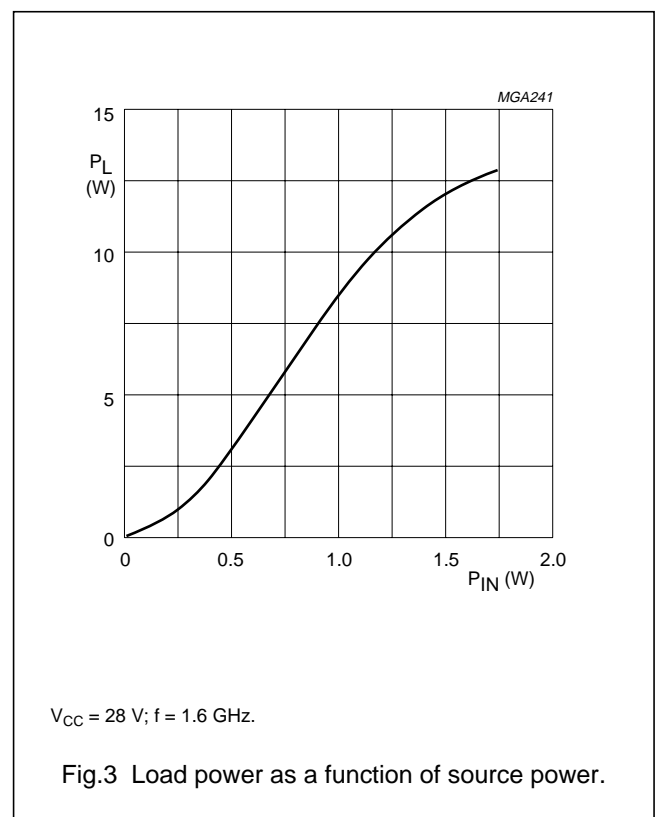
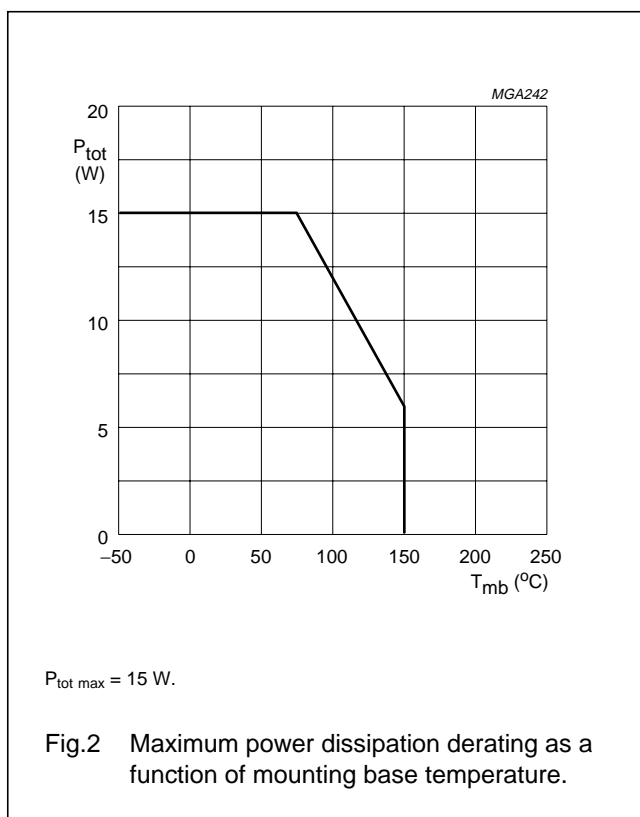
**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter	–	45	V
V <sub>CEO</sub>	collector-emitter voltage	open base	–	15	V
V <sub>CES</sub>	collector-emitter voltage	R <sub>BE</sub> = 0 Ω	–	40	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	3	V
I <sub>C</sub>	collector current (DC)		–	0.9	A
P <sub>tot</sub>	total power dissipation	T <sub>mb</sub> = 75 °C	–	15	W
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	operating junction temperature		–	200	°C
T <sub>slid</sub>	soldering temperature	t ≤ 10 s; note 1	–	235	°C

**Note**

- Up to 0.3 mm from ceramic.



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## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j-mb}$	thermal resistance from junction to mounting base	$T_j = 100\ ^\circ\text{C}$	6	K/W
$R_{th\ mb-h}$	thermal resistance from mounting base to heatsink	note 1	0.3	K/W

## Note

- See "Mounting recommendations in the General part of handbook SC19a".

## CHARACTERISTICS

$T_{mb} = 25\ ^\circ\text{C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$I_{CBO}$	collector cut-off current	$V_{CB} = 28\ \text{V}; I_E = 0$	0.3	mA
		$V_{CB} = 35\ \text{V}; I_E = 0$	0.6	mA
$I_{CES}$	collector cut-off current	$V_{CE} = 28\ \text{V}; R_{BE} = 0\ \Omega$	0.6	mA
$I_{EBO}$	emitter cut-off current	$V_{EB} = 1.5\ \text{V}; I_C = 0$	25	$\mu\text{A}$

## APPLICATION INFORMATION

Microwave performance up to  $T_{mb} = 25\ ^\circ\text{C}$  in a common base test circuit as shown in Fig.4 and working in CW class C mode.

MODE OF OPERATION	f (GHz)	$V_{CC}$ (V)	$P_L$ (W)	$G_p$ (dB)	$\eta_c$ (%)	$Z_i; Z_L$ ( $\Omega$ )
Class C (CW) note 1	1.6	28	10	$\geq 8$ typ. 9.4	$\geq 45$ typ. 60	see Figs 5 and 6
Class C - 100 ms 50%	1.6	28	typ. 15	typ. 9.4	typ. 60	

## Note

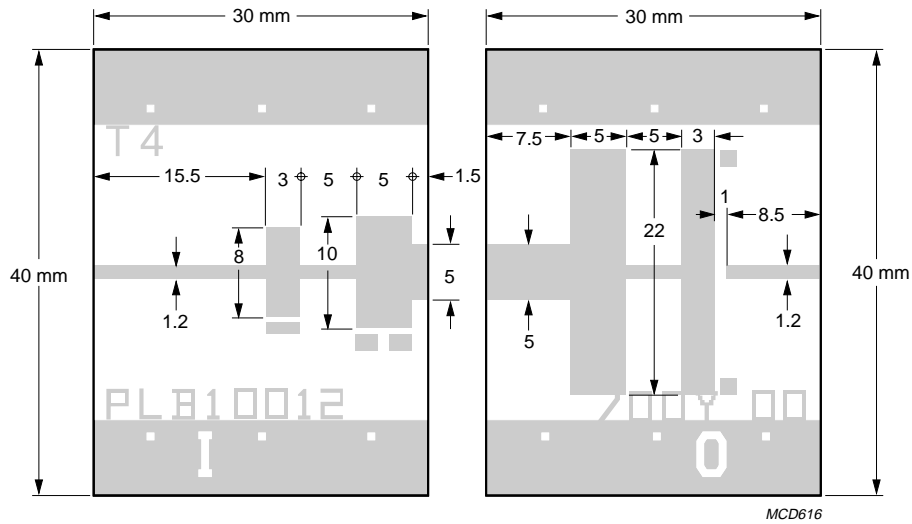
- May be used for narrowband or broadband amplifiers within the frequency range 1.4 to 1.8 GHz. Operation below 1.4 GHz may damage the transistor due to resonance of the internal output prematching circuit.

## List of components (see Fig.4)

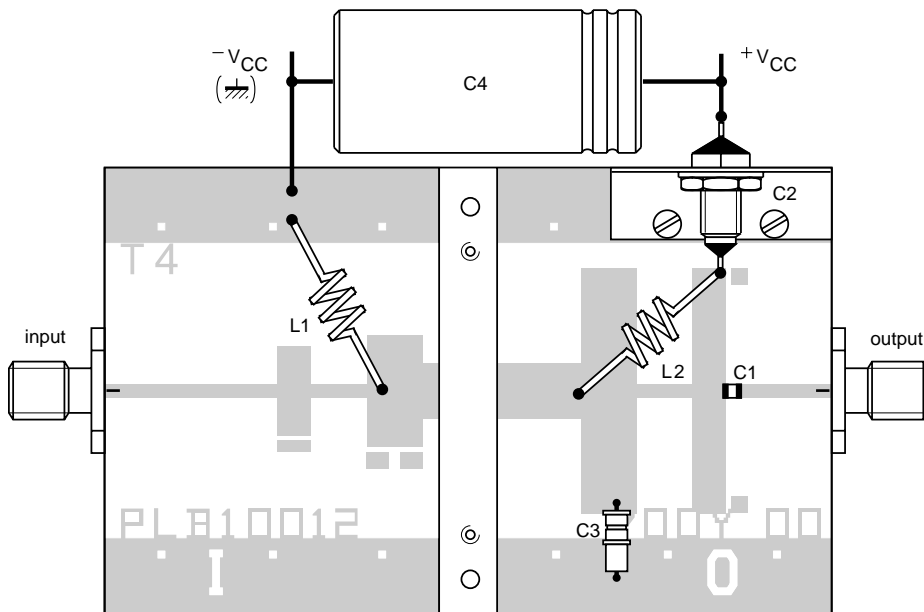
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
L1, L2	5 turns 0.2 mm diameter copper wire		int. dia. = 2 mm	
C1	DC blocking capacitor	100 pF		
C2	feedthrough bypass capacitor			Erie, ref.1250-003
C3	trimmer capacitor	0.6 - 4.5 pF		AT-3-7-271SL
C4	electrolytic capacitor	150 $\mu\text{F}$ , 45 V		

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MCD616



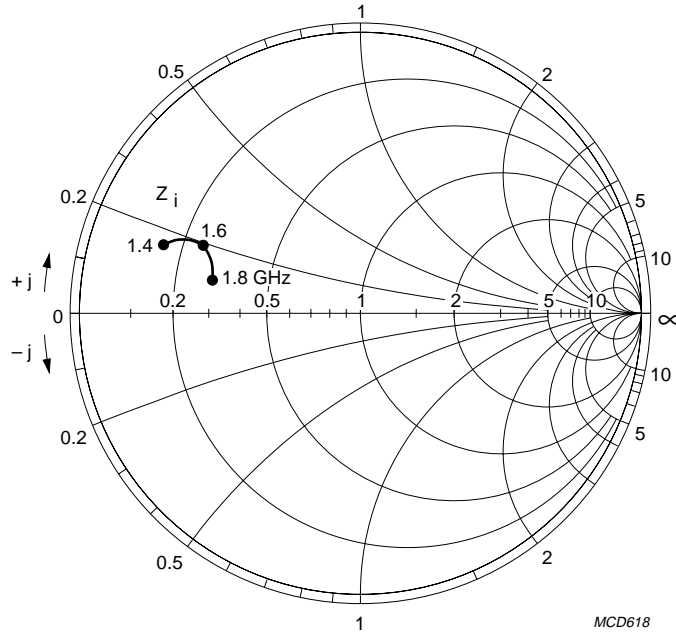
MCD617

Substrate: Teflon fibre glass.  
 Thickness: 0.4 mm.  
 Permittivity:  $\epsilon_r = 2.55$ .

Fig.4 Narrowband test circuit.

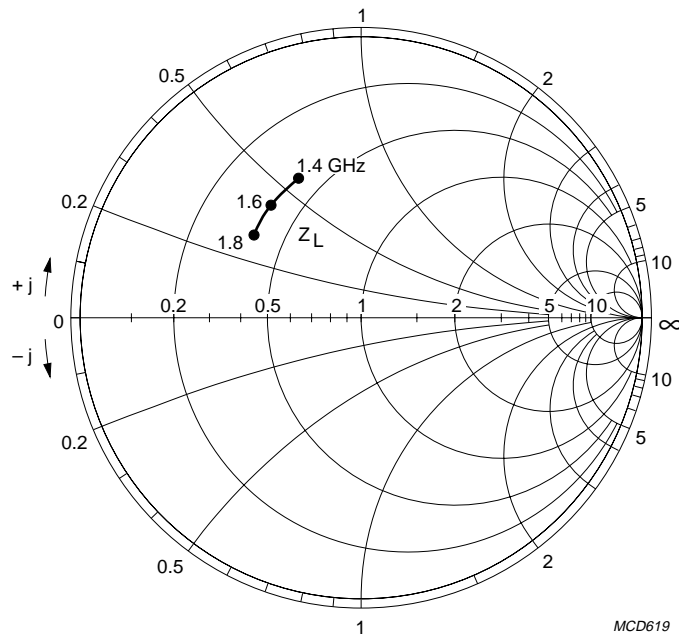
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$V_{CC} = 28\text{ V}; Z_o = 10\ \Omega.$

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



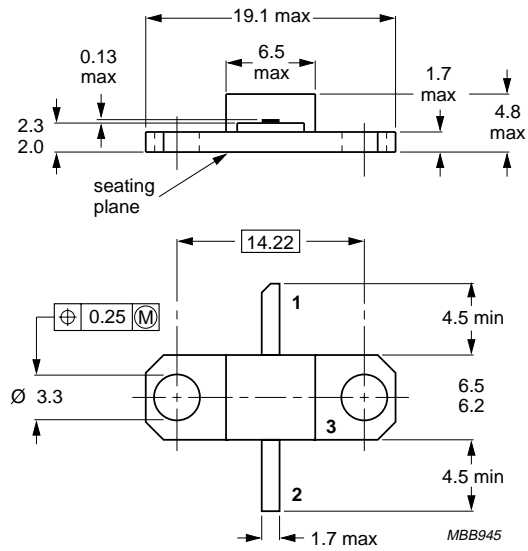
$V_{CC} = 28\text{ V}; Z_o = 10\ \Omega.$

Fig.6 Optimum load impedance as a function of frequency; typical values.

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PACKAGE OUTLINE



Dimensions in mm.  
 Torque on nut: max 0.5 Nm.  
 Recommended screw: M3.  
 Recommended pitch for mounting screw: 19 mm.

Fig.7 SOT437A.

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**DEFINITIONS**

<b>Data Sheet Status</b>	
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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
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.



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**NOTES**

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**NOTES**

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