

# DATA SHEET

**PXB16050U**

**NPN microwave power transistor**

Product specification  
Supersedes data of June 1992

1997 Feb 19

# NPN microwave power transistor

# PXB16050U

### FEATURES

- Input and output matching cells allow 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 frequencies between 1.5 and 1.8 GHz.

### DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT439A metal ceramic flange package with base connected to the flange.

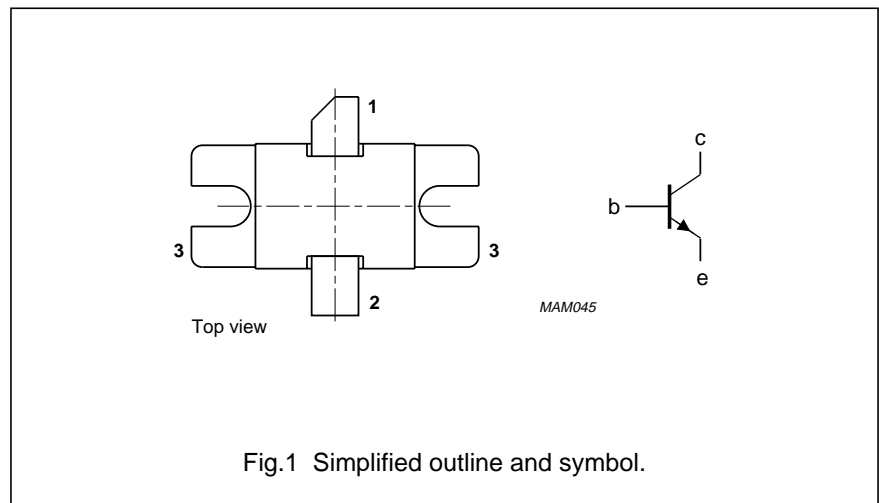
### QUICK REFERENCE DATA

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>po</sub> (dB)	η <sub>C</sub> (%)	Z <sub>i</sub> /Z <sub>L</sub> (Ω)
Class C (CW)	1.65	28	>45	>8.5	>45	see Figs 6 and 7

### PINNING - SOT439A

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.

NPN microwave power transistor

PXB16050U

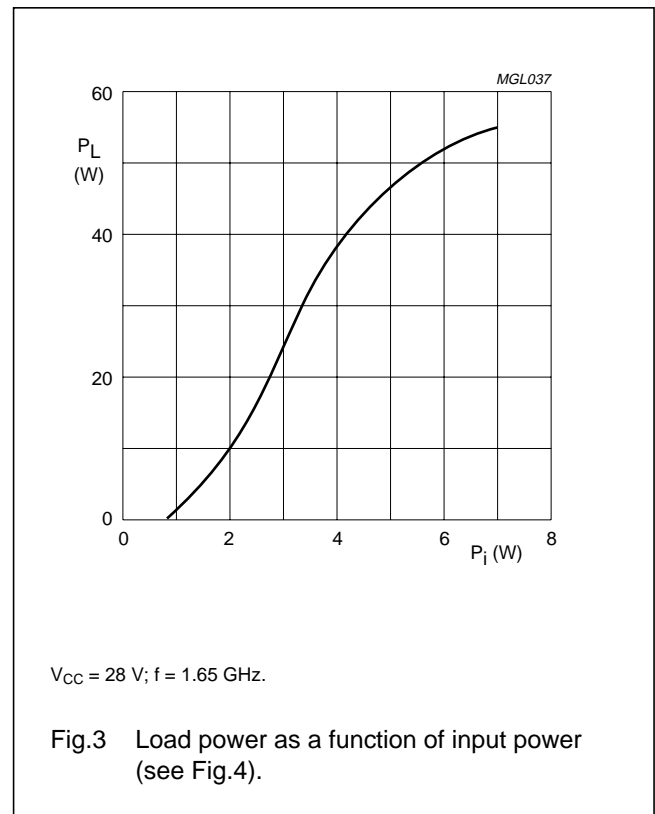
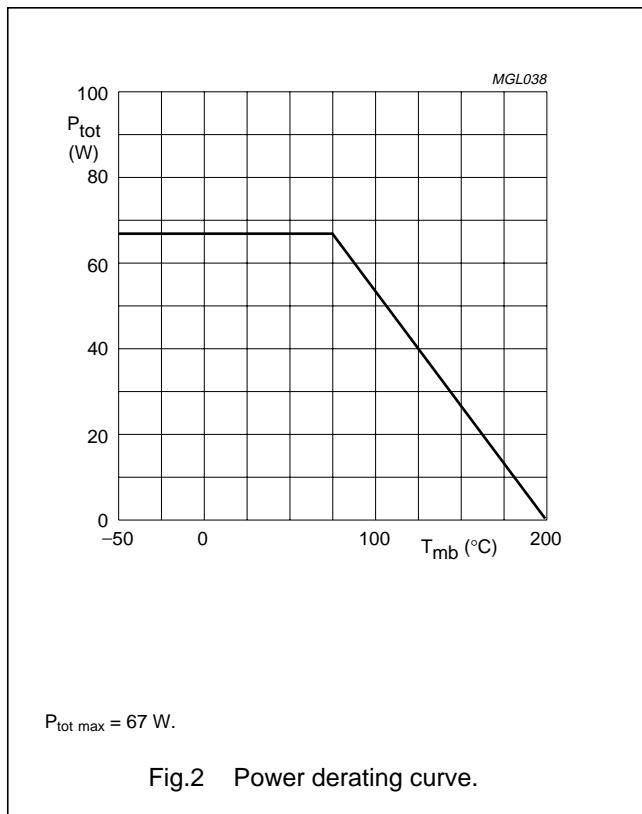
**LIMITING VALUES**

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	–	45	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	3	V
I <sub>C</sub>	collector current (DC )		–	6	A
P <sub>tot</sub>	total power dissipation	T <sub>mb</sub> = 75 °C	–	67	W
T <sub>stg</sub>	storage temperature		–65	+200	°C
T <sub>j</sub>	junction temperature		–	200	°C
T <sub>slid</sub>	soldering temperature	t ≤ 10 s; note 1	–	235	°C

**Note**

- Up to 0.2 mm from ceramic.



## NPN microwave power transistor

PXB16050U

## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j-mb}$	thermal resistance from junction to mounting base	$T_j = 100\text{ °C}$	1.5	K/W
$R_{th\ mb-h}$	thermal resistance from mounting base to heatsink	note 1	0.2	K/W

## Note

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

## CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$I_{cBO}$	collector cut-off current	$V_{CB} = 40\text{ V}; I_E = 0$	3	mA
		$V_{CB} = 45\text{ V}; I_E = 0$	15	mA
$I_{CES}$	collector cut-off current	$V_{CE} = 30\text{ V}; R_{BE} = 0$	3	mA
$I_{EBO}$	emitter cut-off current	$V_{EB} = 1.5\text{ V}; I_C = 0$	300	$\mu\text{A}$

## APPLICATION INFORMATION

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

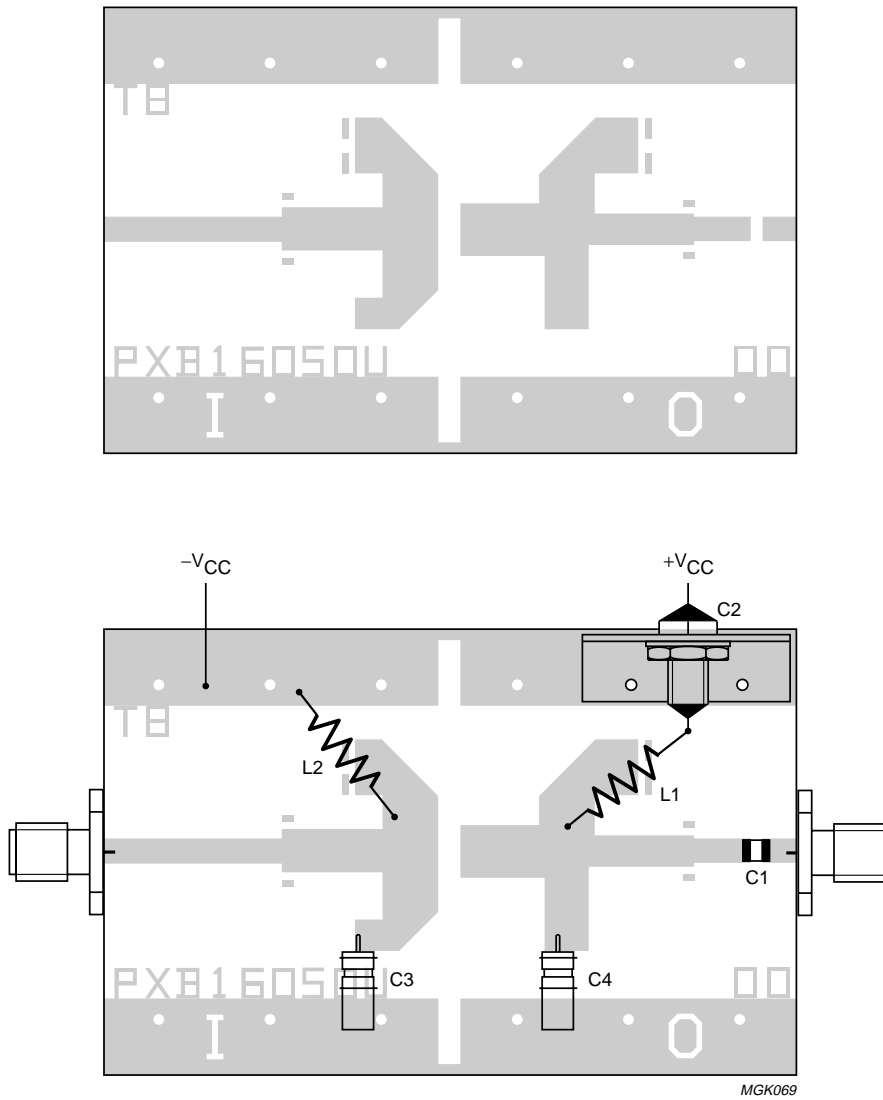
MODE OF OPERATION	f (GHz)	$V_{CC}$ (V)	$P_L$ (W)	$G_{po}$ (dB)	$\eta_c$ (%)	$Z_i/Z_L$ ( $\Omega$ )
Class C (CW); see note 1	1.65	28	$\geq 45$ ; typ. 50	$\geq 8.5$ ; typ. 9.5	$\geq 45$ ; typ. 52	see Figs 6 and 7

## Note

- Type PXB16050U may be used for narrowband or broadband amplifiers within the frequency range 1.5 to 1.8 GHz. Operation below 1.5 GHz may damage the transistor due to resonance of the internal output prematching circuit.

NPN microwave power transistor

PXB16050U



Substrate: Teflon fibreglass.

Permittivity:  $\epsilon_r = 2.55$ .

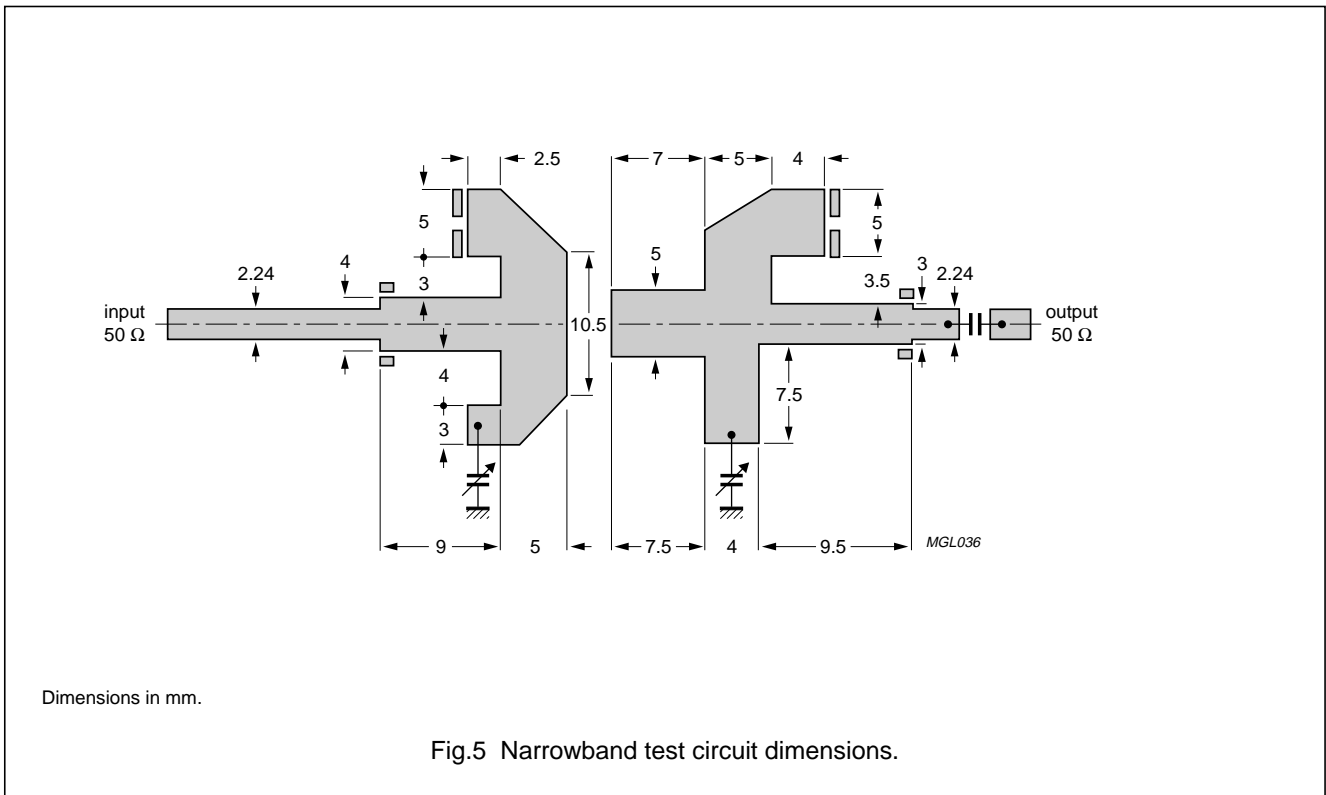
Thickness: 0.8 mm.

The narrowband test circuit is split into two totally independent halves each being 30 × 40 mm in size.

Fig.4 Narrowband test circuit.

NPN microwave power transistor

PXB16050U

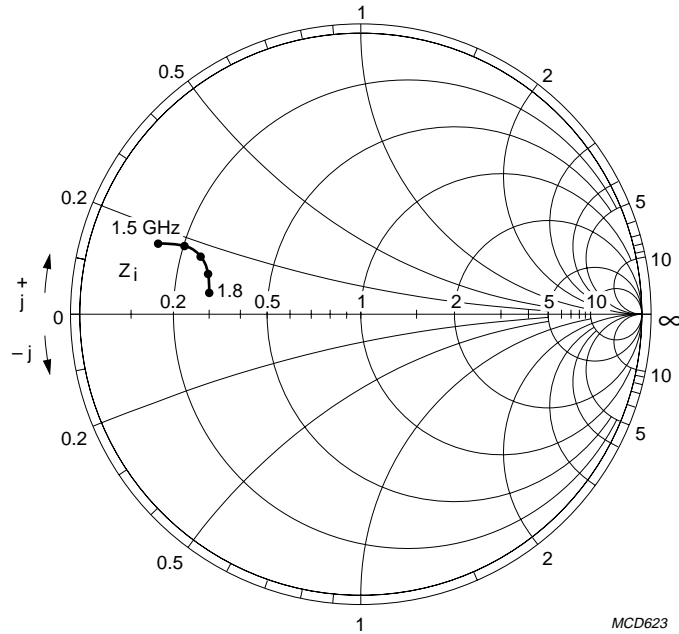


List of components (see Fig.4)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
L1	4 turns 0.5 mm diameter copper wire internal diameter = 2 mm	–	–
L2	5 turns 0.5 mm diameter copper wire internal diameter = 2 mm	–	–
C1	DC blocking capacitor	100 pF	ATC
C2	feedthrough bypass capacitor	–	Erie 1250-003
C3, C4	trimmer	0.6 to 4.5 pF	Tekelec AT-3-7271SL

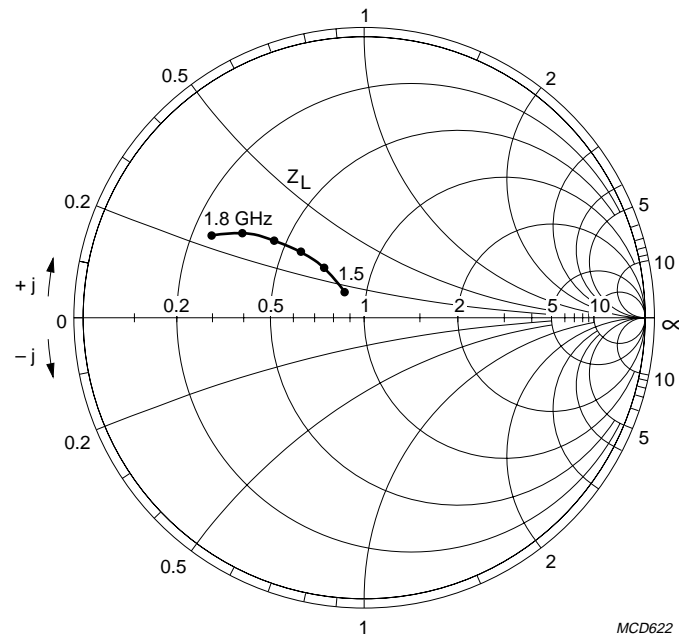
NPN microwave power transistor

PXB16050U



$V_{CC} = 28 \text{ V}; Z_0 = 10 \Omega.$

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



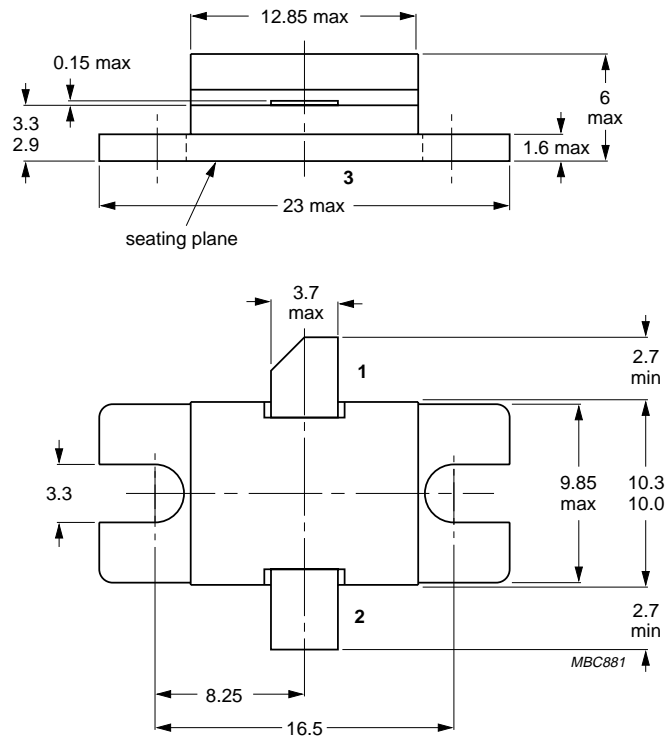
$V_{CC} = 28 \text{ V}; Z_0 = 10 \Omega.$

Fig.7 Optimum load impedance as a function of frequency; typical values.

NPN microwave power transistor

PXB16050U

PACKAGE OUTLINE



Dimensions in mm.  
 Torque on screws: max. 0.4 Nm.  
 Recommended screw: M3.  
 Recommended pitch for mounting screws: 19 mm.

Fig.8 SOT439A.



## NPN microwave power transistor

PXB16050U

**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 this 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.

NPN microwave power transistor

PXB16050U

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**NOTES**

NPN microwave power transistor

PXB16050U

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**NOTES**

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