

DATA SHEET

**PZ1418B30U; PZ1721B25U;
PZ2024B20U**
NPN microwave power transistors

Product specification
Supersedes data of June 1992
File under Discrete Semiconductors, SC15

1997 Feb 19

NPN microwave power transistors

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PZ2024B20U**

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Gold metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Internal input and output prematching ensures good stability and easy broadband use.

APPLICATIONS

- Common base class-B broadband amplifiers under CW conditions in military and professional applications.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT443A metal ceramic flange package with the base connected to the flange.

PINNING - SOT443A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange

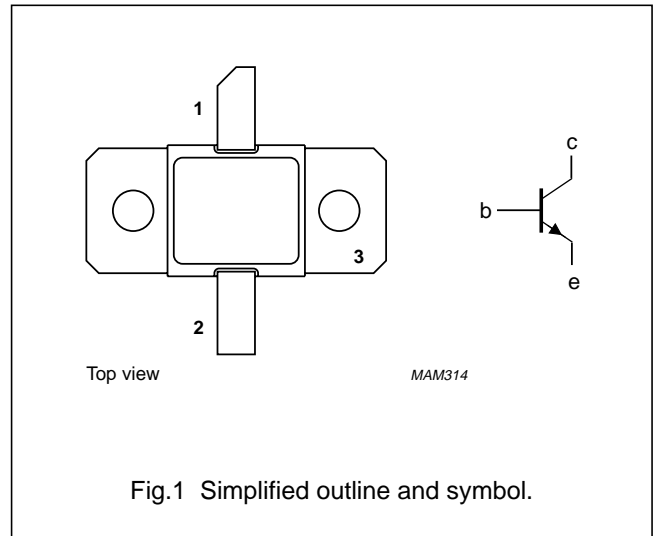


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance up to $T_{mb} = 25\text{ }^\circ\text{C}$ in a common base class-B wideband amplifier.

TYPE NUMBER	f (GHz)	V _{CC} (V)	P _L (W)	G _p (dB)	η _c (%)	Z _i ; Z _L (Ω)
PZ1418B30U	1.4 to 1.8	28	≥27	≥7.3	≥38	see Figs 6 and 7
PZ1721B25U	1.7 to 2.1	28	≥25	≥7	≥35	see Figs 11 and 12
PZ2024B20U	2 to 2.4	28	≥20	≥6	≥35	see Figs 16 and 17

WARNING

Product and environmental safety - toxic materials

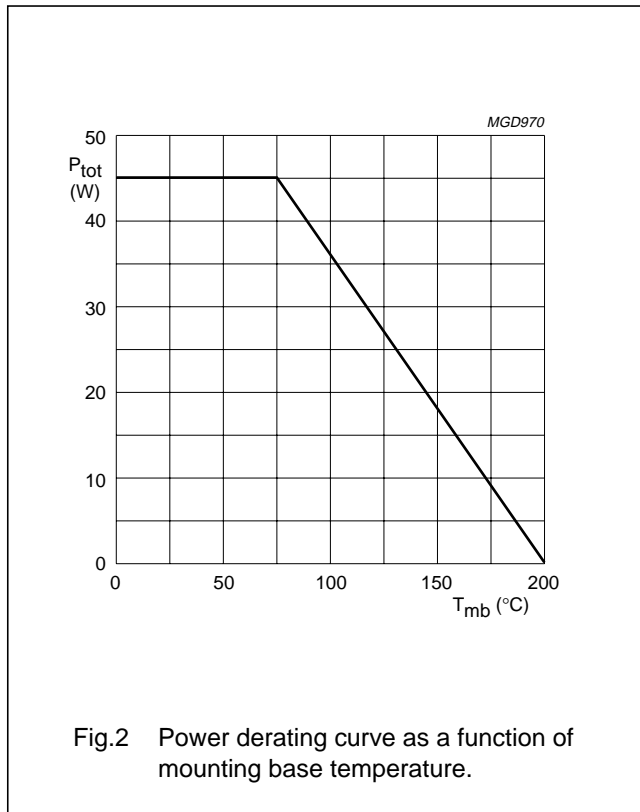
This product contains beryllium oxide. The product is entirely safe provided that the BeO slab is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to 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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PZ2024B20U**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0 \Omega$	–	35	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	4	A
P_{tot}	total power dissipation	$T_{mb} \leq 75 \text{ }^\circ\text{C}$	–	45	W
T_{stg}	storage temperature		–65	+200	$^\circ\text{C}$
T_j	operating junction temperature		–	200	$^\circ\text{C}$
T_{sld}	soldering temperature		–	235	$^\circ\text{C}$



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THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j-mb}$	thermal resistance from junction to mounting-base	$T_j = 75\text{ }^\circ\text{C}$	2.2	K/W
$R_{th\ mb-h}$	thermal resistance from mounting-base to heatsink	$T_j = 75\text{ }^\circ\text{C}$; note 1	0.2	K/W

Note

1. See "Mounting recommendations in the General part of handbook SC15".

CHARACTERISTICS

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

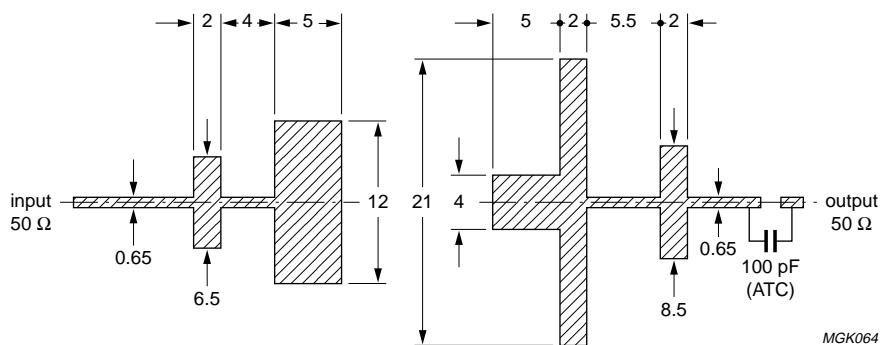
SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{cBO}	collector cut-off current	$V_{CB} = 40\text{ V}; I_E = 0$	10	mA
		$V_{CB} = 30\text{ V}; I_E = 0$	5	mA
I_{CES}	collector cut-off current	$V_{CE} = 35\text{ V}; R_{BE} = 0$	50	mA
I_{EBO}	emitter cut-off current	$V_{EB} = 1.5\text{ V}; I_C = 0$	200	μA

APPLICATION INFORMATION

PZ1418B30U

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

TYPE NUMBER	f (GHz)	V_{CC} (V)	P_L (W)	G_p (dB)	η_c (%)	$Z_i; Z_L$ (Ω)
PZ1418B30U	1.4 to 1.8	28	≥ 27 typ. 35	≥ 7.3 typ. 8.4	≥ 38 typ. 45	see Figs 6 and 7



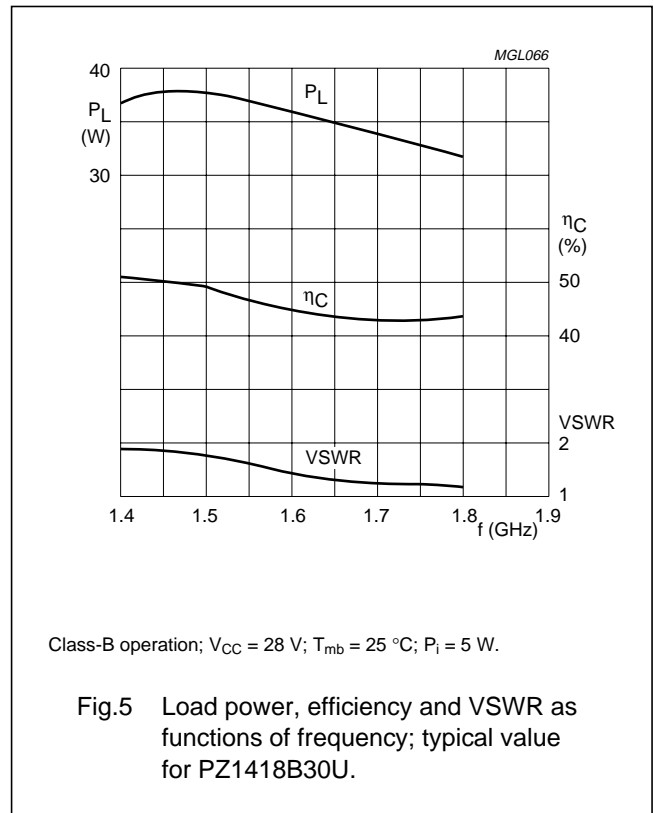
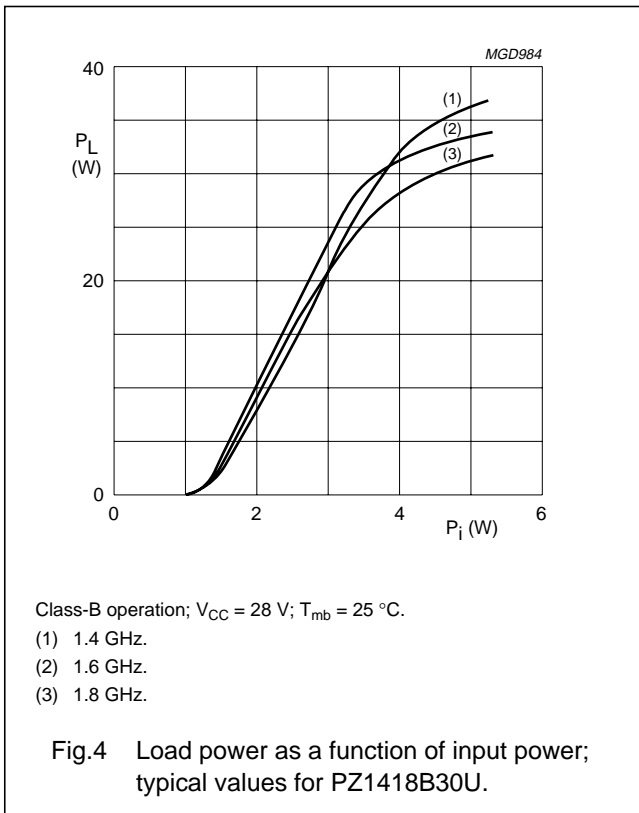
MGK064

Dimensions in mm.
Substrate: Epsilam printed-circuit board.
Thickness: 0.635 mm.
Permittivity: $\epsilon_r = 10$.

Fig.3 Wideband test circuit board for 1.4 to 1.8 GHz operation (PZ1418B30U).

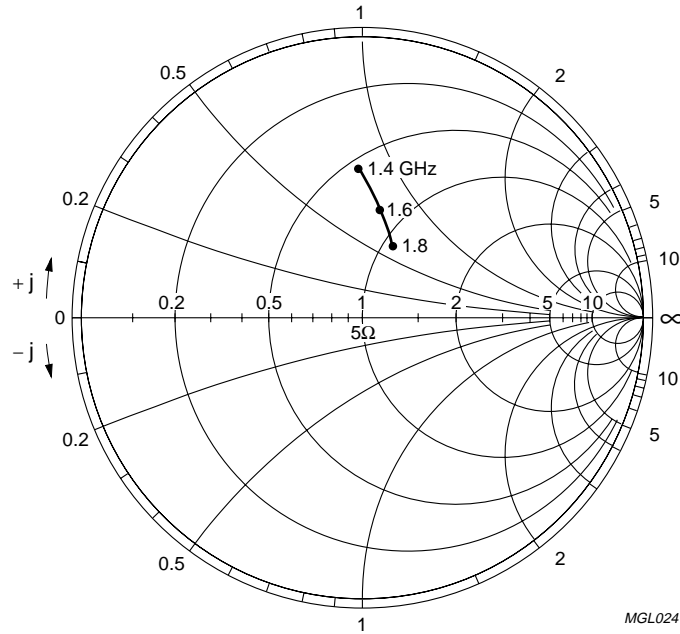
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PZ2024B20U



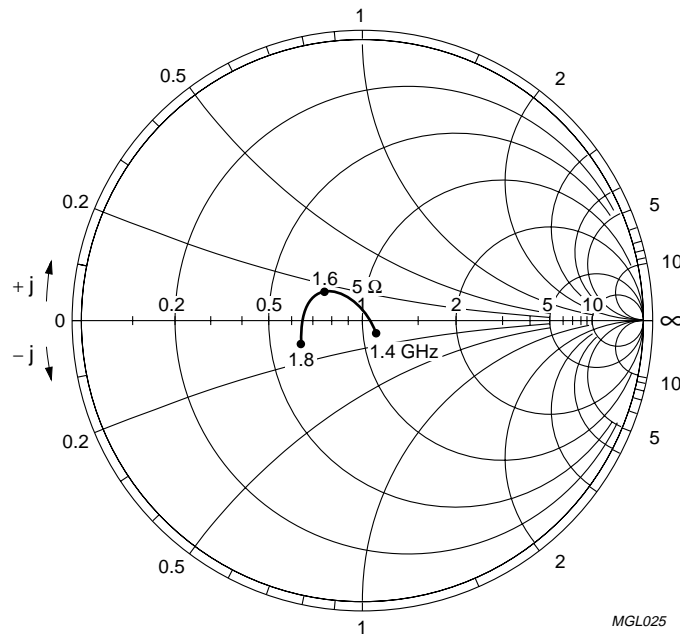
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PZ2024B20U



$Z_0 = 5 \Omega$.

Fig.6 Input impedance as a function of frequency; typical values for PZ1418B30U.



$Z_0 = 5 \Omega$.

Fig.7 Optimum load impedance as a function of frequency; typical values for PZ1418B30U.

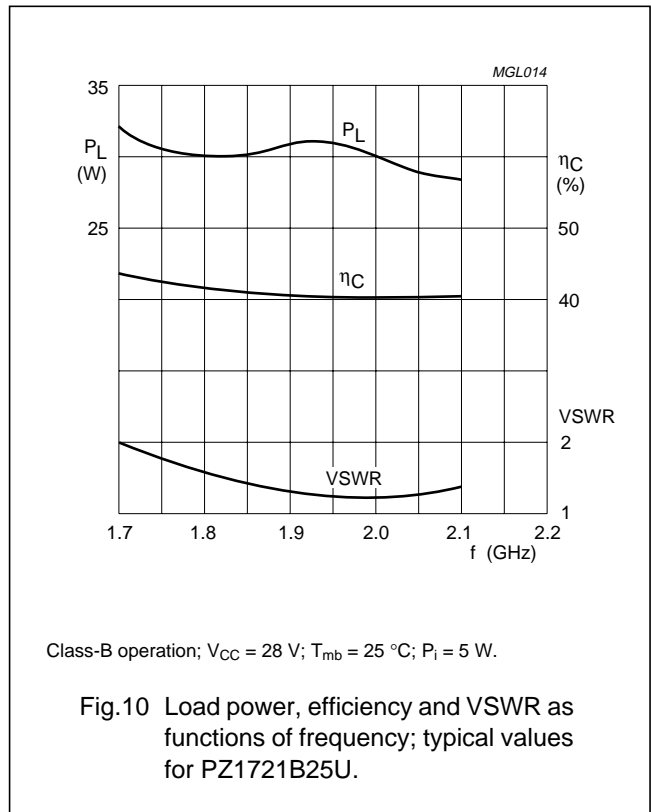
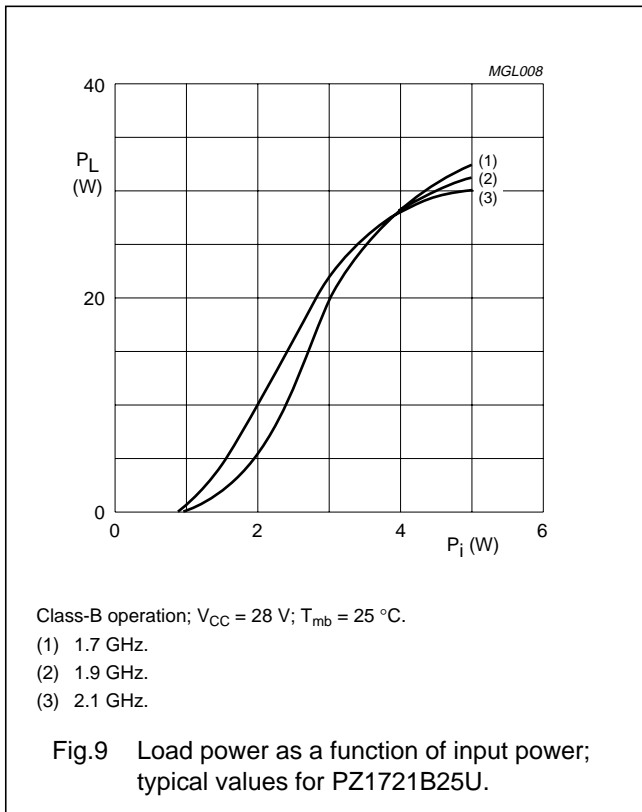
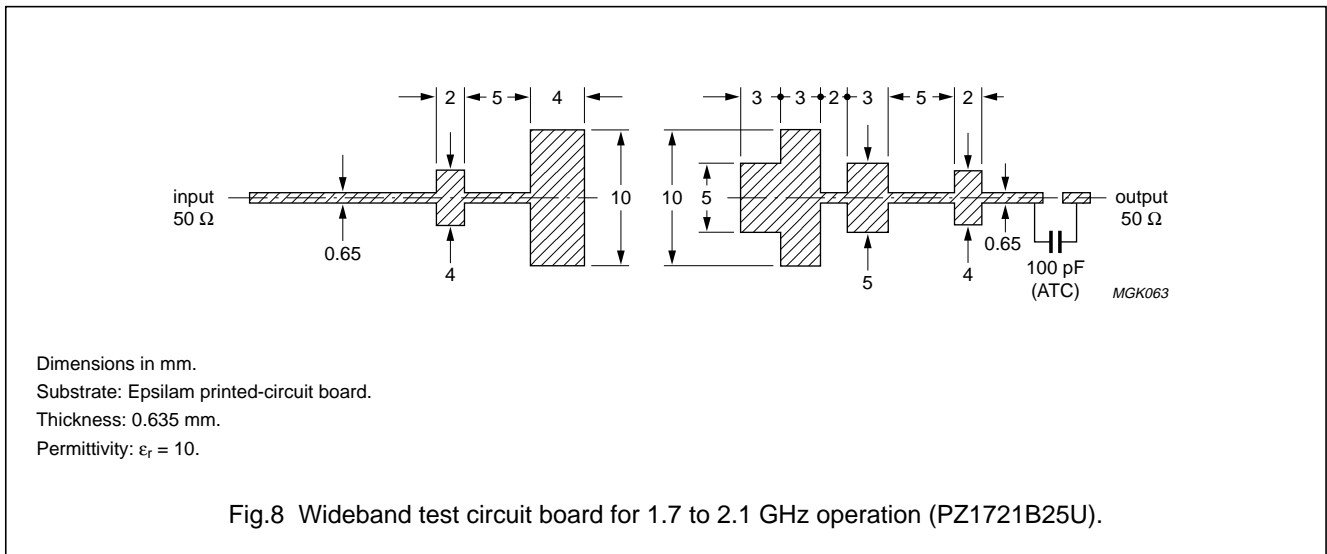
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PZ2024B20U

PZ1721B25U

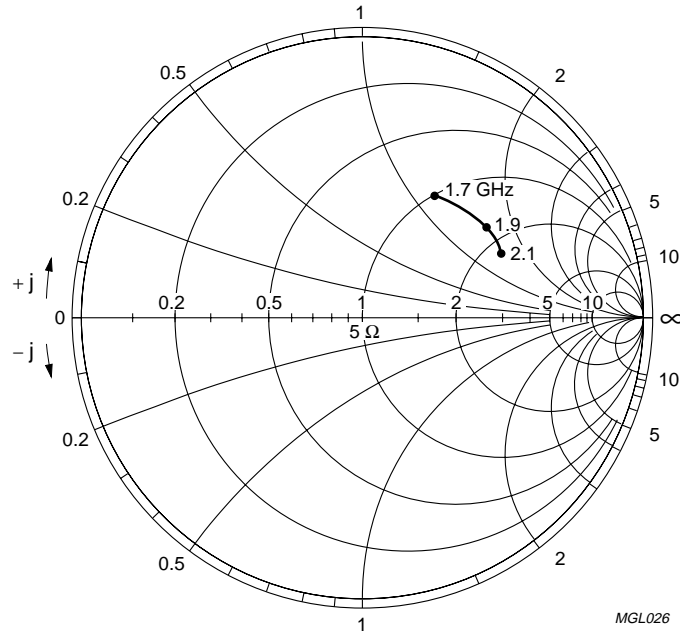
Microwave performance up to $T_{mb} = 25\text{ }^\circ\text{C}$ in a common base class B wideband amplifier.

TYPE NUMBER	f (GHz)	V _{CC} (V)	P _L (W)	G _p (dB)	η _c (%)	Z _i ; Z _L (Ω)
PZ1721B25U	1.7 to 2.1	28	≥25 typ. 30	≥7 typ. 7.8	≥35 typ. 44	see Figs 11 and 12



NPN microwave power transistors

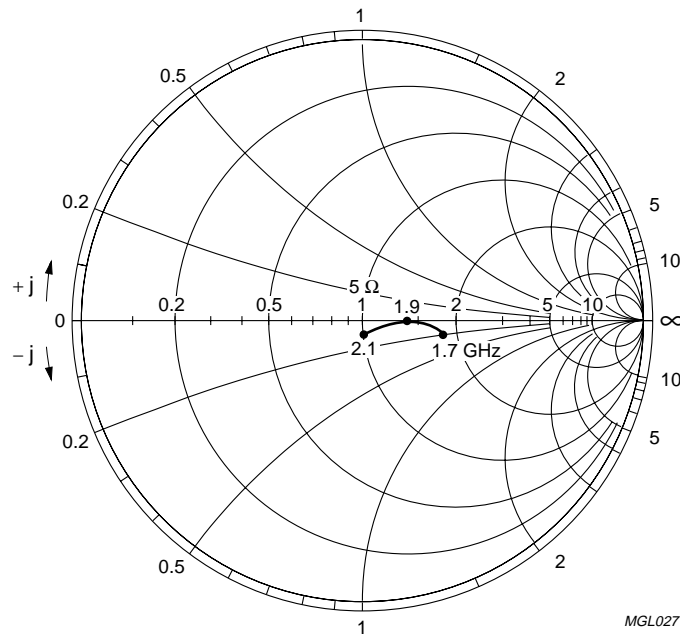
PZ1418B30U; PZ1721B25U;
PZ2024B20U



MGL026

$Z_0 = 5 \Omega$.

Fig.11 Input impedance as a function of frequency; typical values for PZ1721B25U.



MGL027

$Z_0 = 5 \Omega$.

Fig.12 Optimum load impedance as a function of frequency; typical values for PZ1721B25U.

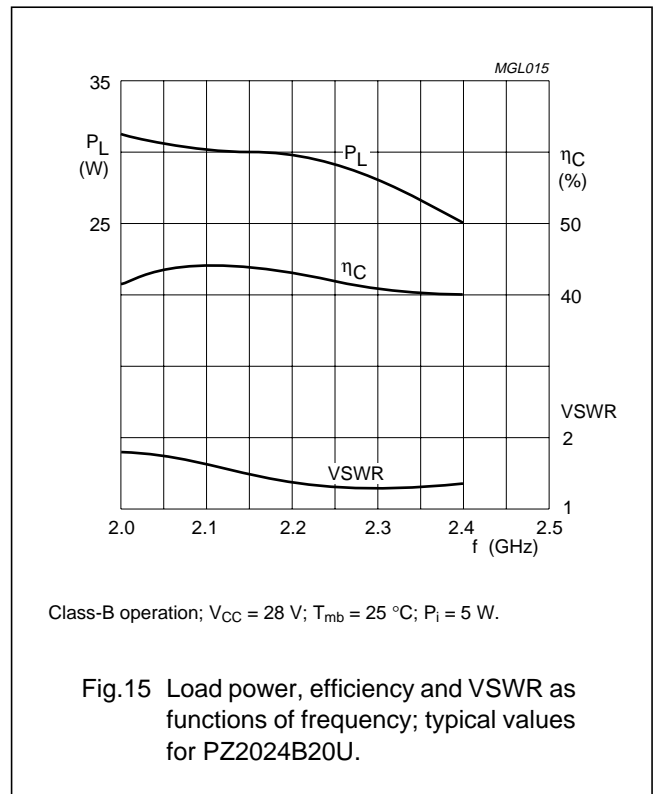
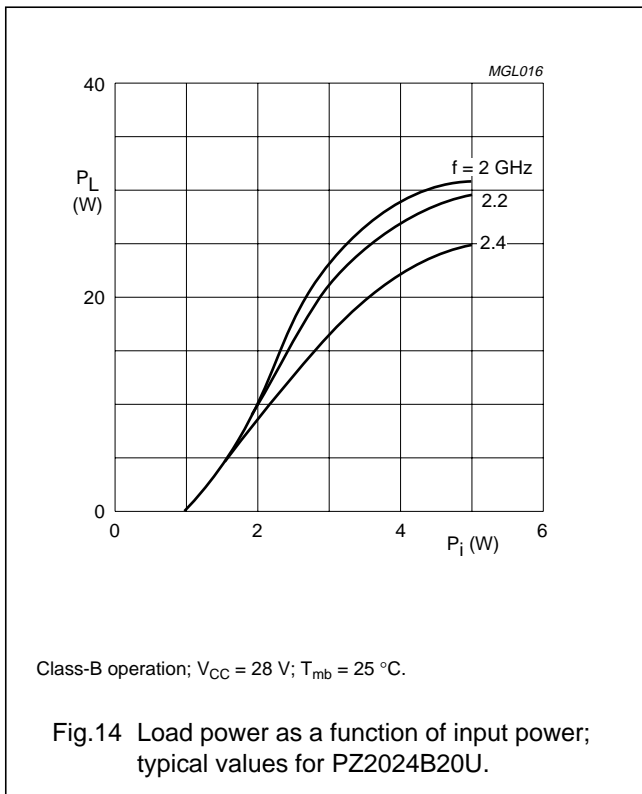
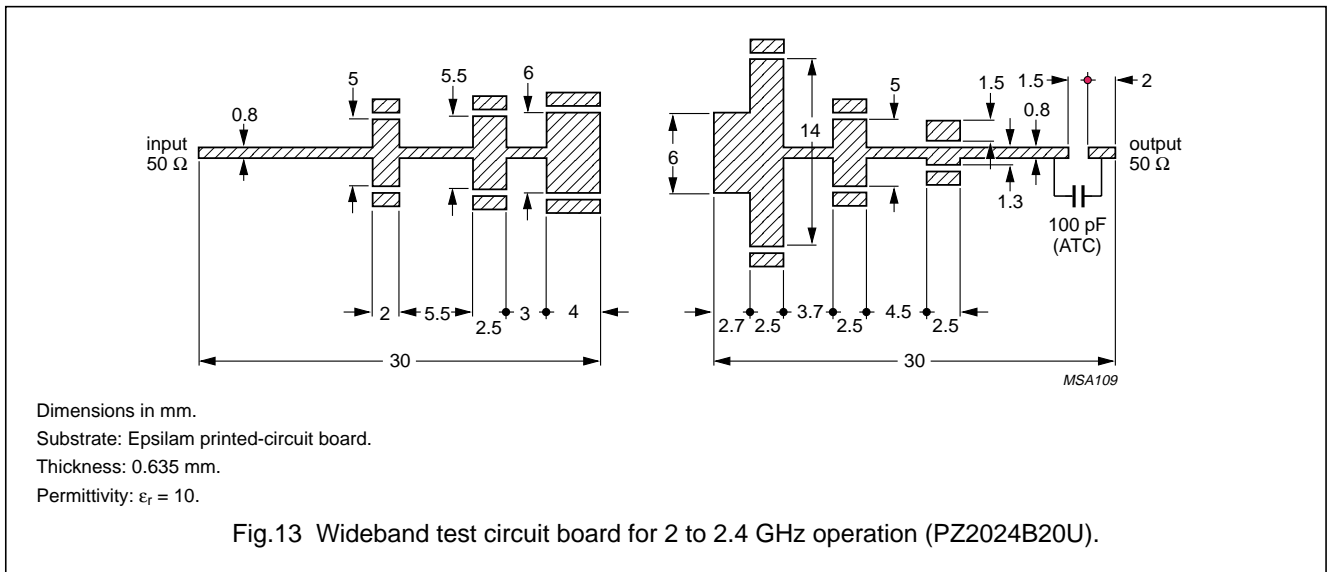
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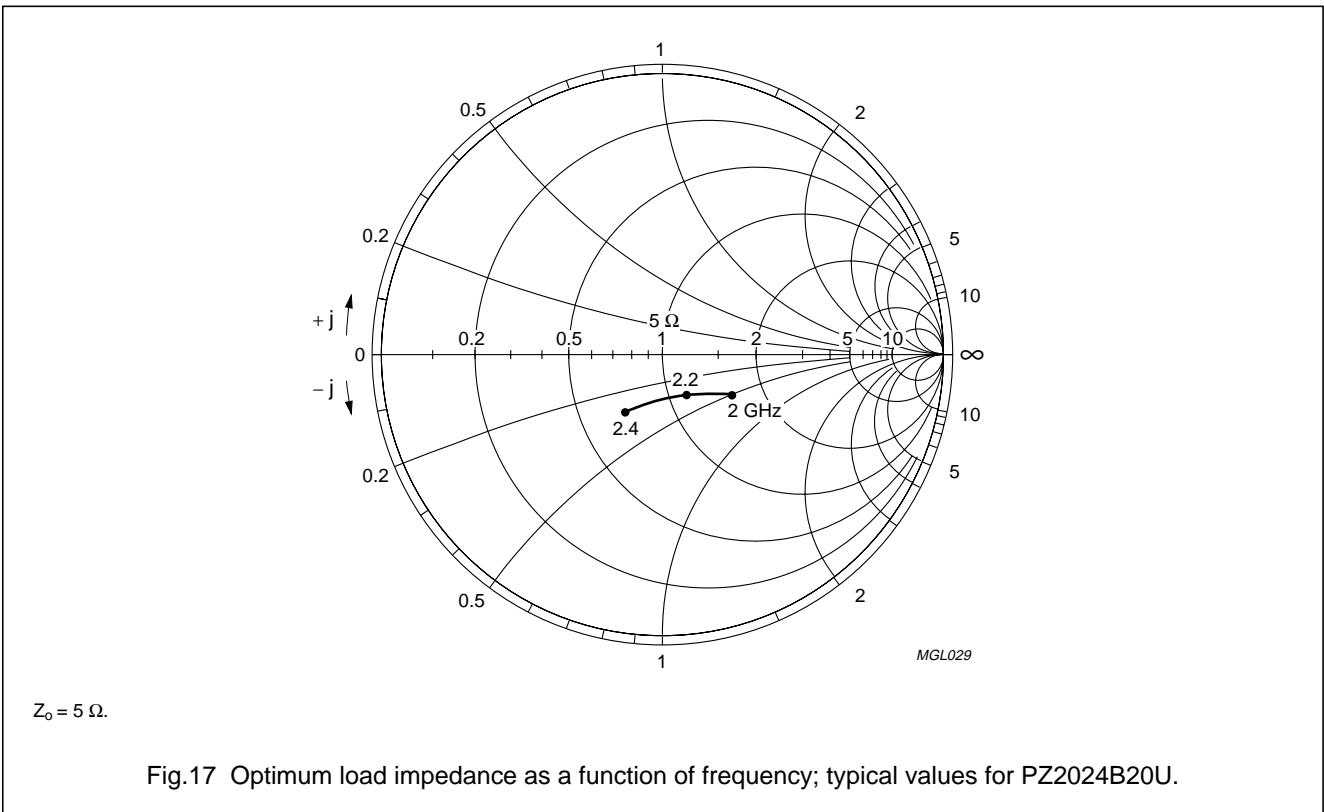
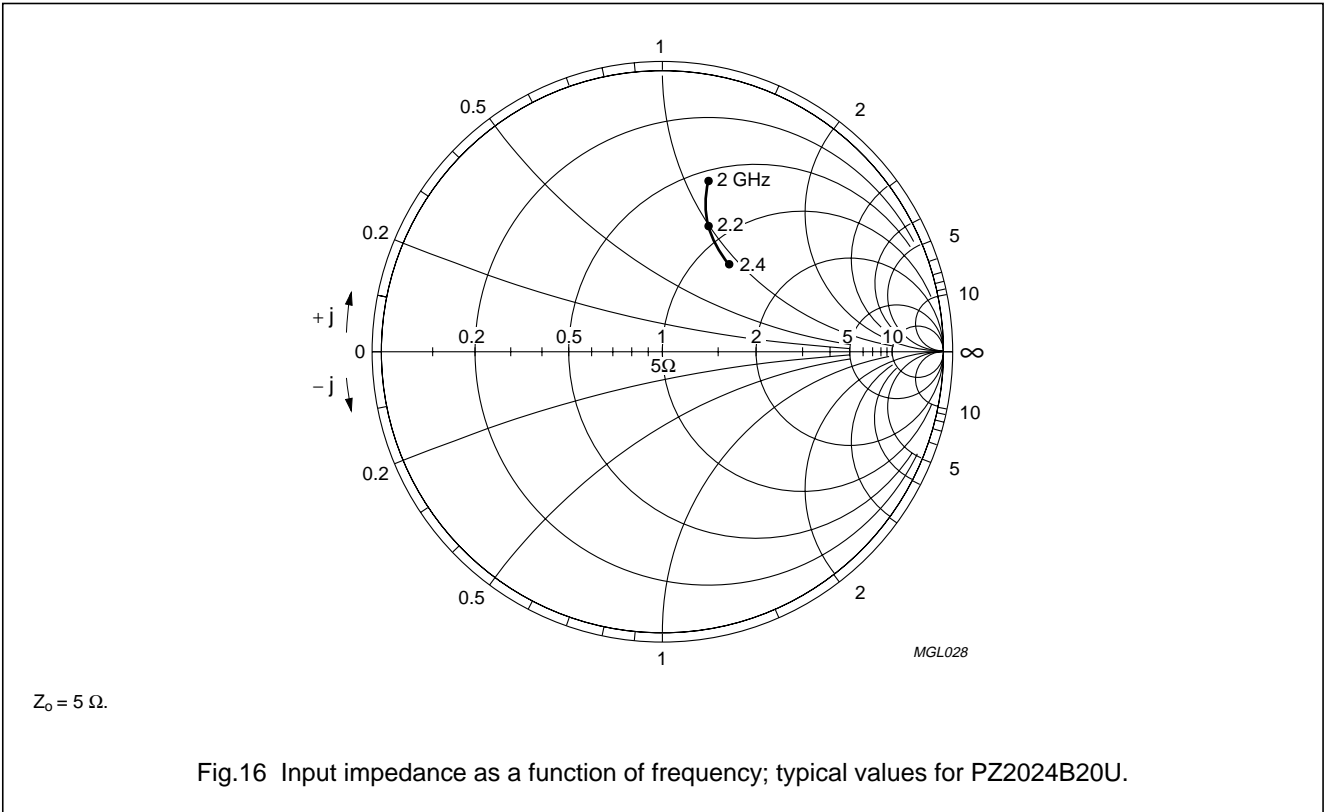
Microwave performance up to $T_{mb} = 25\text{ }^{\circ}\text{C}$ in a common base class B wideband amplifier.

TYPE NUMBER	f (GHz)	V _{CC} (V)	P _L (W)	G _p (dB)	η _c (%)	Z _i ; Z _L (Ω)
PZ2024B20U	2 to 2.4	28	≥20 typ. 26	≥6 typ. 7	≥35 typ. 42	see Figs 16 and 17



NPN microwave power transistors

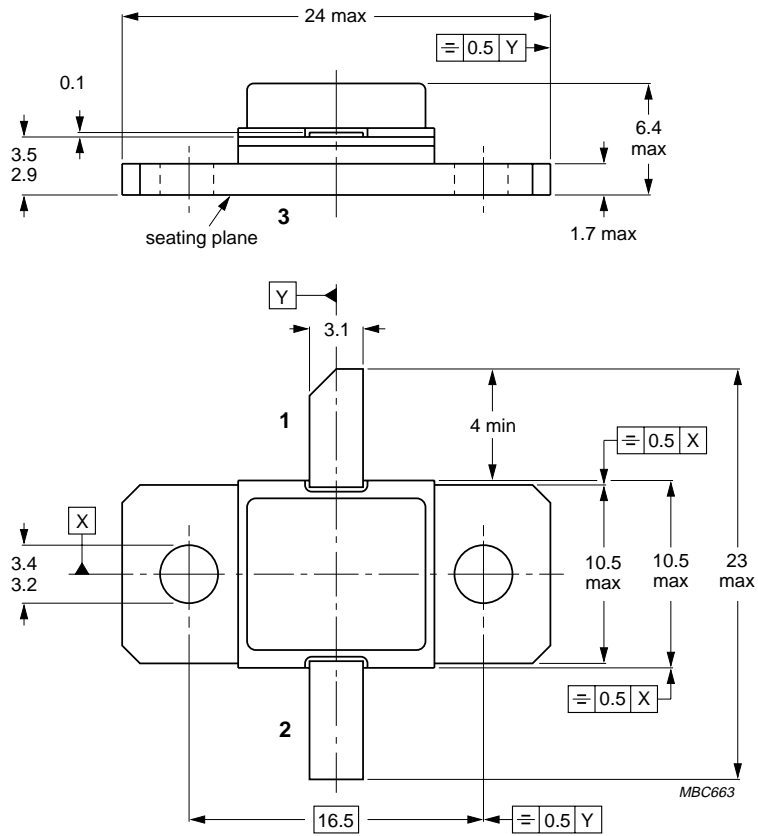
PZ1418B30U; PZ1721B25U;
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PACKAGE OUTLINE



Dimensions in mm.
Torque on nut: max 0.5 Nm.
Recommended screw: M3

Fig.18 SOT443A.

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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.

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NOTES

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