DATA SHEET

PZ1418B30U; PZ1721B25U; PZ2024B20U

NPN microwave power transistors

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

1997 Feb 19

Philips Semiconductors

PHILIPS

NPN microwave power transistors

PZ1418B30U; PZ1721B25U; 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

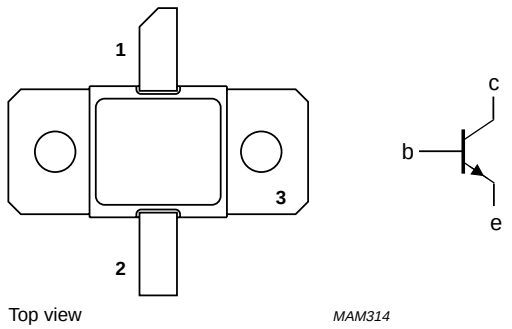


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance up to T_{mb} = 25 °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.

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 Ω	–	35	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	4	A
P_{tot}	total power dissipation	$T_{mb} \leq 75$ °C	–	45	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature		–	235	°C

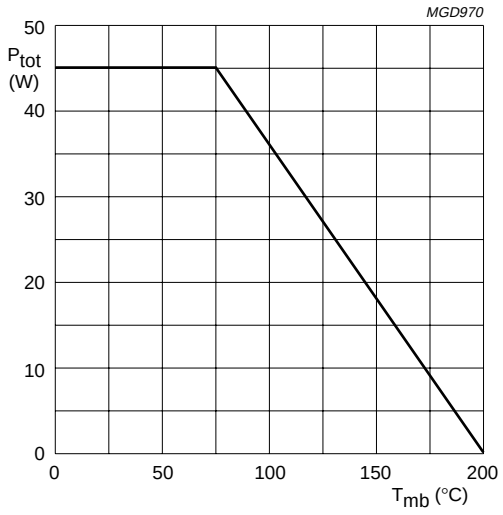


Fig.2 Power derating curve as a function of mounting base temperature.

THERMAL CHARACTERISTICS

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

Note

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

CHARACTERISTICS

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

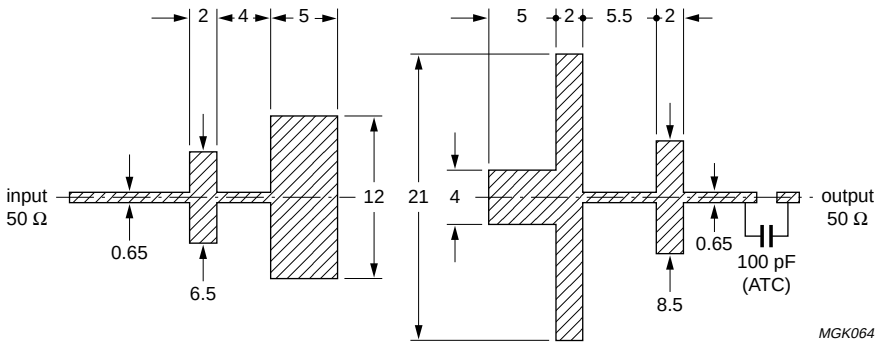
SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
I_{CBO}	collector cut-off current	V_{CB} = 40 V; I_E = 0	10	mA
		V_{CB} = 30 V; I_E = 0	5	mA
I_{CES}	collector cut-off current	V_{CE} = 35 V; R_{BE} = 0	50	mA
I_{EBO}	emitter cut-off current	V_{EB} = 1.5 V; I_C = 0	200	μA

APPLICATION INFORMATION

PZ1418B30U

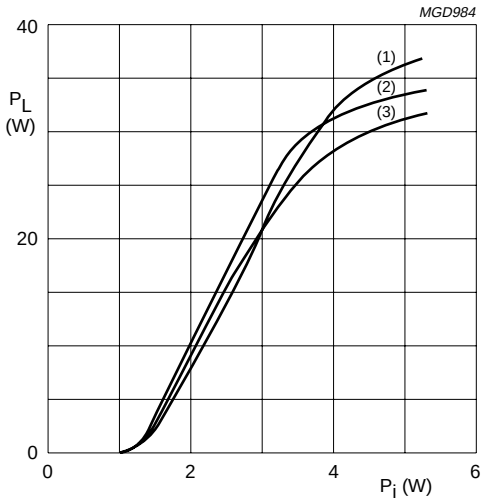
Microwave performance up to T_{mb} = 25 °C in a common base class B wideband amplifier.

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



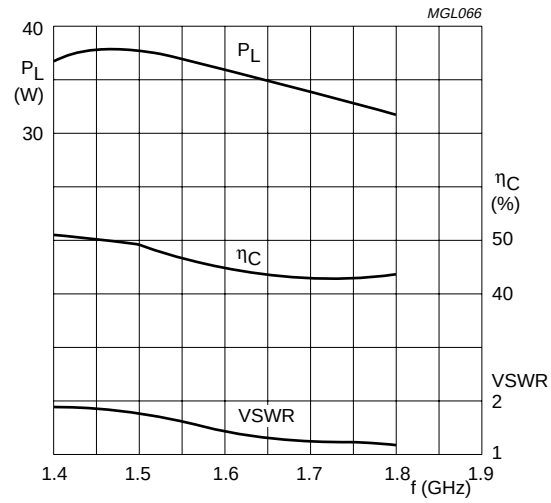
Dimensions in mm.
Substrate: Epsilam printed-circuit board.
Thickness: 0.635 mm.
Permittivity: ε_r = 10.

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



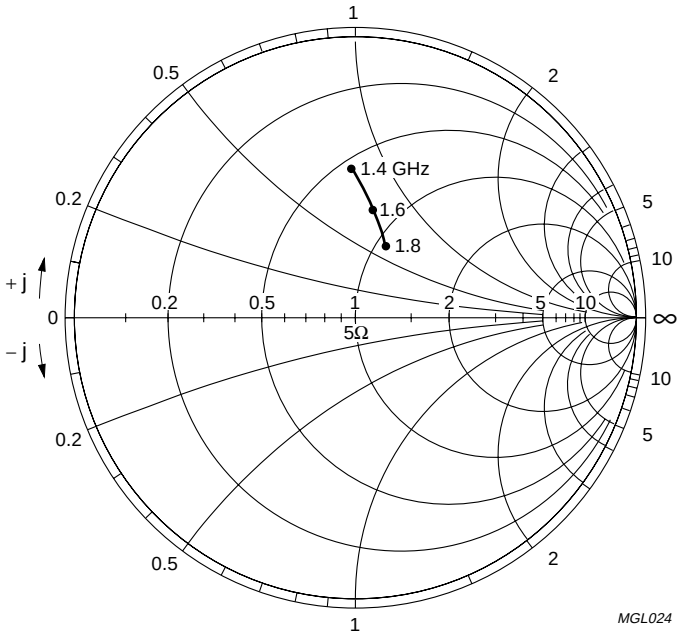
Class-B operation; V_{CC} = 28 V; T_{mb} = 25 °C.
(1) 1.4 GHz.
(2) 1.6 GHz.
(3) 1.8 GHz.

Fig.4 Load power as a function of input power; typical values for PZ1418B30U.



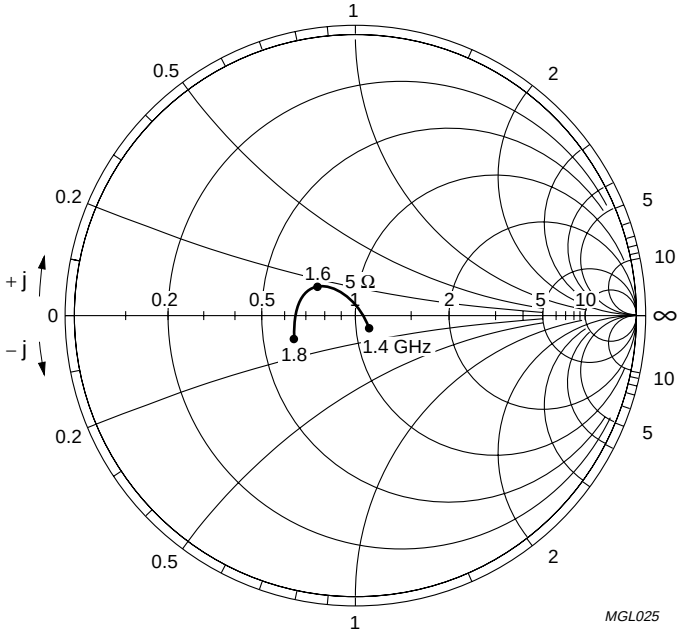
Class-B operation; V_{CC} = 28 V; T_{mb} = 25 °C; P_i = 5 W.

Fig.5 Load power, efficiency and VSWR as functions of frequency; typical value for PZ1418B30U.



Z_o = 5 Ω.

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



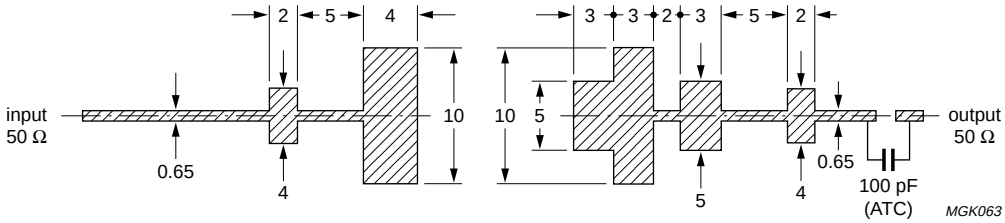
Z_o = 5 Ω.

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

PZ1721B25U

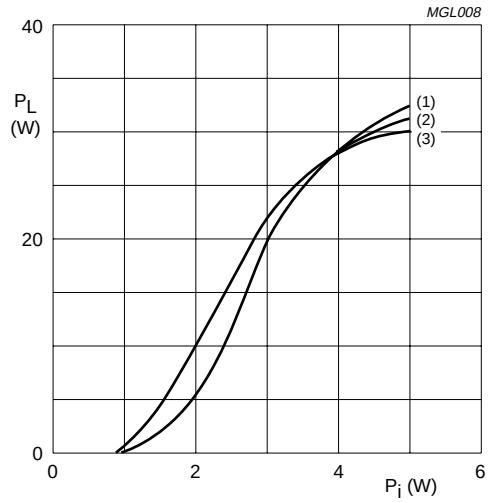
Microwave performance up to T_{mb} = 25 °C in a common base class B wideband amplifier.

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



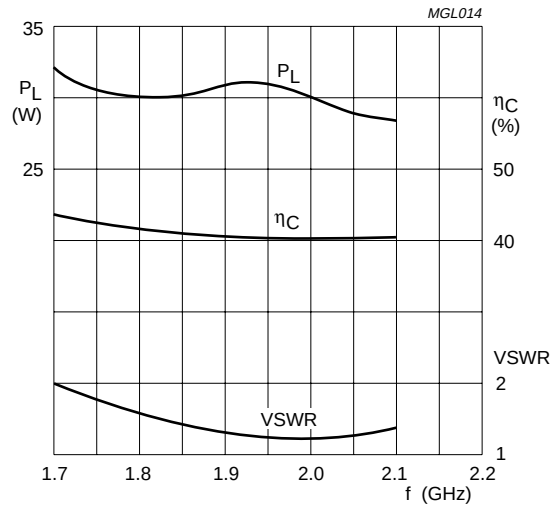
Dimensions in mm.
Substrate: Epsilam printed-circuit board.
Thickness: 0.635 mm.
Permittivity: ε_r = 10.

Fig.8 Wideband test circuit board for 1.7 to 2.1 GHz operation (PZ1721B25U).



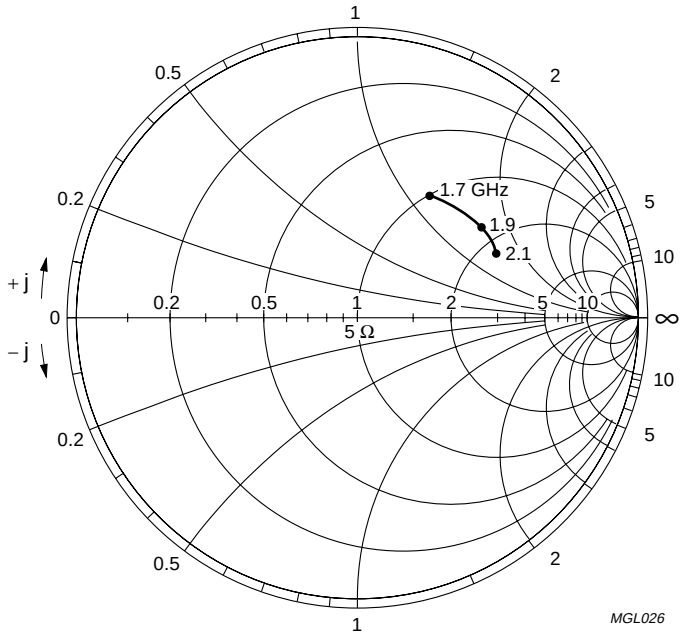
Class-B operation; V_{CC} = 28 V; T_{mb} = 25 °C.
(1) 1.7 GHz.
(2) 1.9 GHz.
(3) 2.1 GHz.

Fig.9 Load power as a function of input power; typical values for PZ1721B25U.



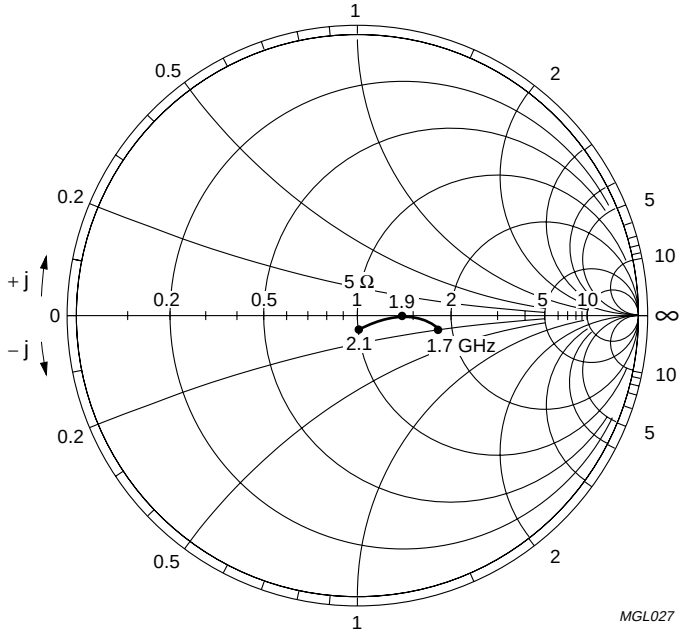
Class-B operation; V_{CC} = 28 V; T_{mb} = 25 °C; P_i = 5 W.

Fig.10 Load power, efficiency and VSWR as functions of frequency; typical values for PZ1721B25U.



Z_o = 5 Ω.

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



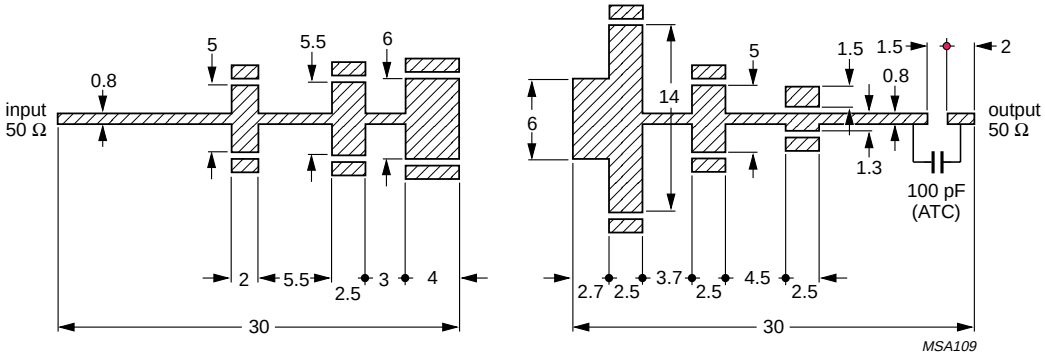
Z_o = 5 Ω.

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

PZ2024B20U

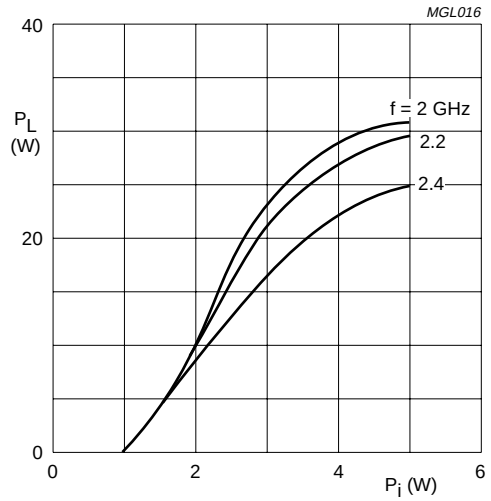
Microwave performance up to T_{mb} = 25 °C in a common base class B wideband amplifier.

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



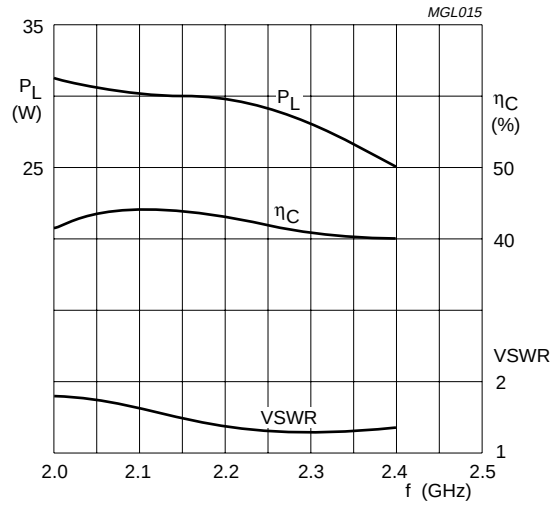
Dimensions in mm.
Substrate: Epsilam printed-circuit board.
Thickness: 0.635 mm.
Permittivity: ε_r = 10.

Fig.13 Wideband test circuit board for 2 to 2.4 GHz operation (PZ2024B20U).



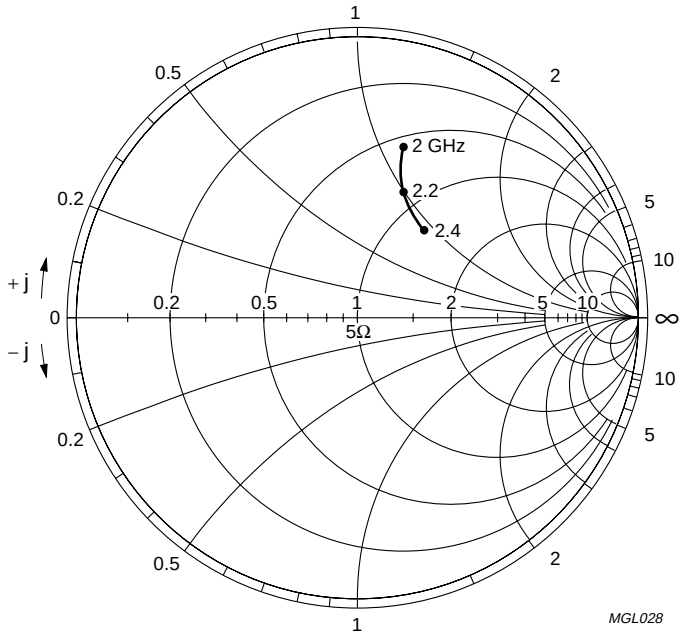
Class-B operation; V_{CC} = 28 V; T_{mb} = 25 °C.

Fig.14 Load power as a function of input power; typical values for PZ2024B20U.



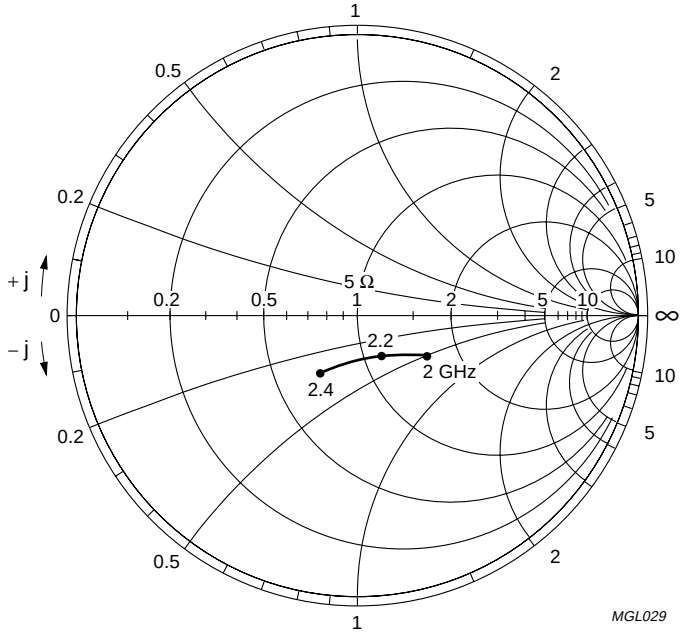
Class-B operation; V_{CC} = 28 V; T_{mb} = 25 °C; P_i = 5 W.

Fig.15 Load power, efficiency and VSWR as functions of frequency; typical values for PZ2024B20U.



Z_o = 5 Ω.

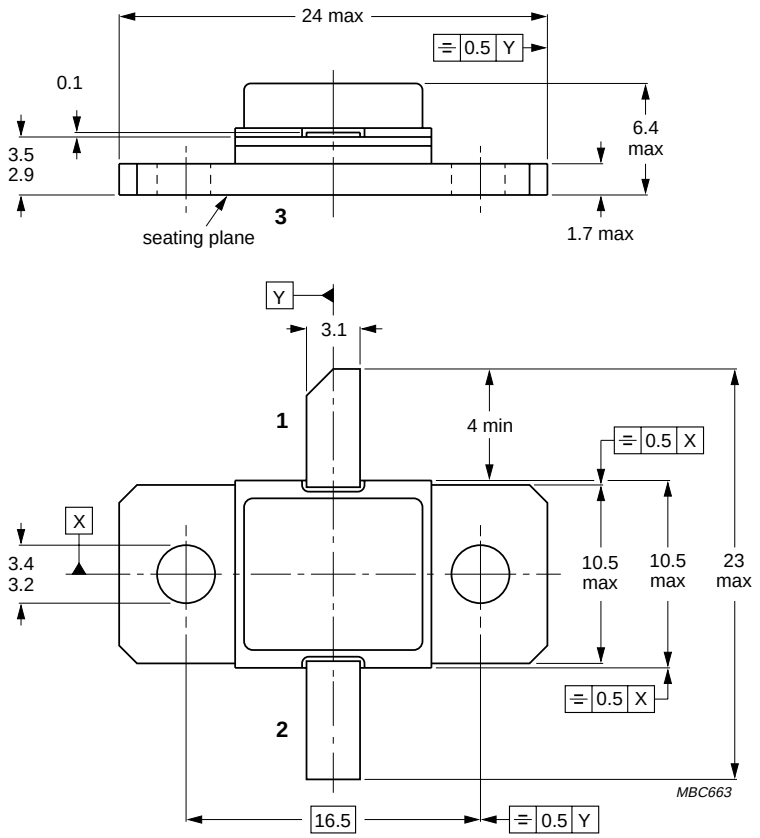
Fig.16 Input impedance as a function of frequency; typical values for PZ2024B20U.



Z_o = 5 Ω.

Fig.17 Optimum load impedance as a function of frequency; typical values for PZ2024B20U.

PACKAGE OUTLINE



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

Fig.18 SOT443A.

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.

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PHILIPS

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