

DISCRETE SEMICONDUCTORS

DATA SHEET

PVB42004X

NPN microwave power transistor

Product specification

1997 Feb 19

Supersedes data of June 1992

File under Discrete Semiconductors, SC15

NPN microwave power transistor

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FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Local thick oxide and gold sandwich metallization realizes very stable characteristics and excellent lifetime
- Multicell geometry gives good balance of dissipated power and low thermal resistance.

APPLICATIONS

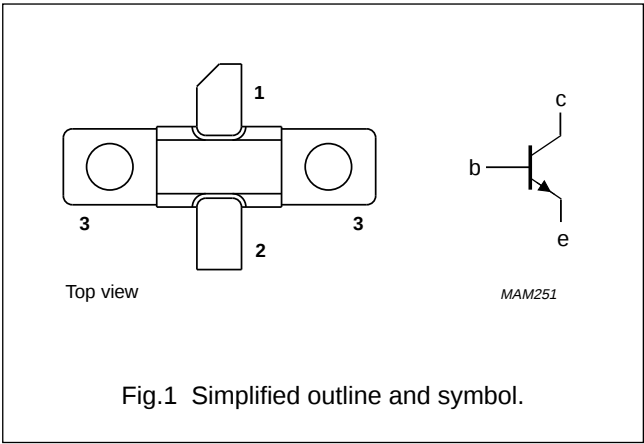
- Intended for use in common base class-B power amplifiers up to 4.2 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a 2-lead rectangular flange package with a ceramic cap (SOT445A) with the common base connected to the flange.

PINNING - SOT445A

PIN	DESCRIPTION
1	collector
2	emitter
3	base connected to flange



QUICK REFERENCE DATA

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

MODE OF OPERATION	f (GHz)	V _{CC} (V)	P _L (W)	G _p (dB)	η _c (%)	Z _i (Ω)	Z _L (Ω)
Class-B (CW)	1	24	typ. 13	typ. 11	typ. 60	2.3 + j2.8	7.8 + j11.6
	2	24	typ. 10	typ. 10	typ. 48	1.4 + j9.5	3.9 + j2.6
	3	24	typ. 7.5	typ. 8.8	typ. 30	4.2 + j21	2.3 – j2.5
	4	24	typ. 4	typ. 6	typ. 25	38 – j32	1.9 – j8.5

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.

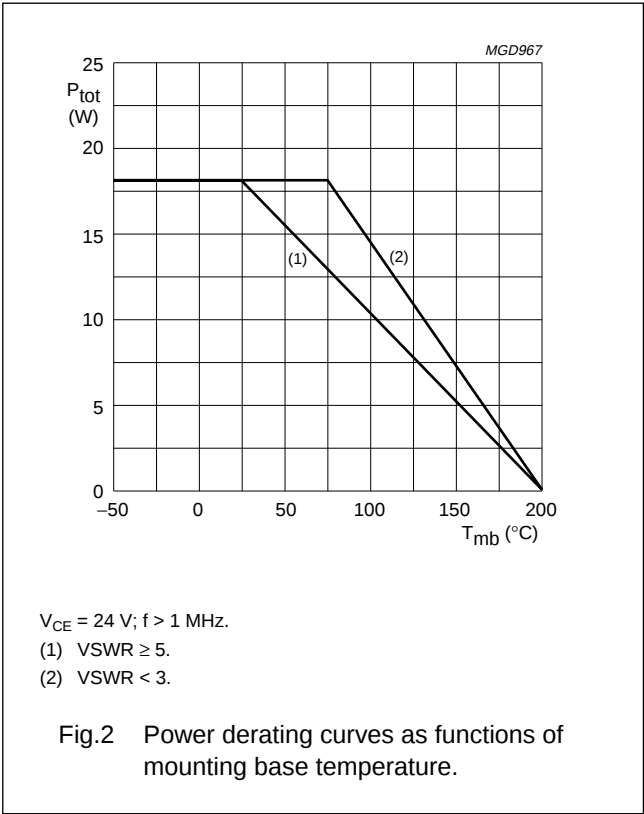
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LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V _{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	–	40	V
V _{EBO}	emitter-base voltage	open collector	–	3	V
I _C	collector current		–	1	A
P _{tot}	total power dissipation	T _{mb} = 75 °C	–	18	W
T _{stg}	storage temperature		–65	+200	°C
T _j	operating junction temperature		–	200	°C
T _{sld}	soldering temperature	at 0.1 mm from the case; t ≤ 10 s	–	235	°C



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THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j-mb}$	thermal resistance from junction to mounting base	$T_j = 75\ ^\circ\text{C}$	6.5	K/W
$R_{th\ mb-h}$	thermal resistance from mounting-base to heatsink	$T_j = 75\ ^\circ\text{C}$; note 1	0.7	K/W

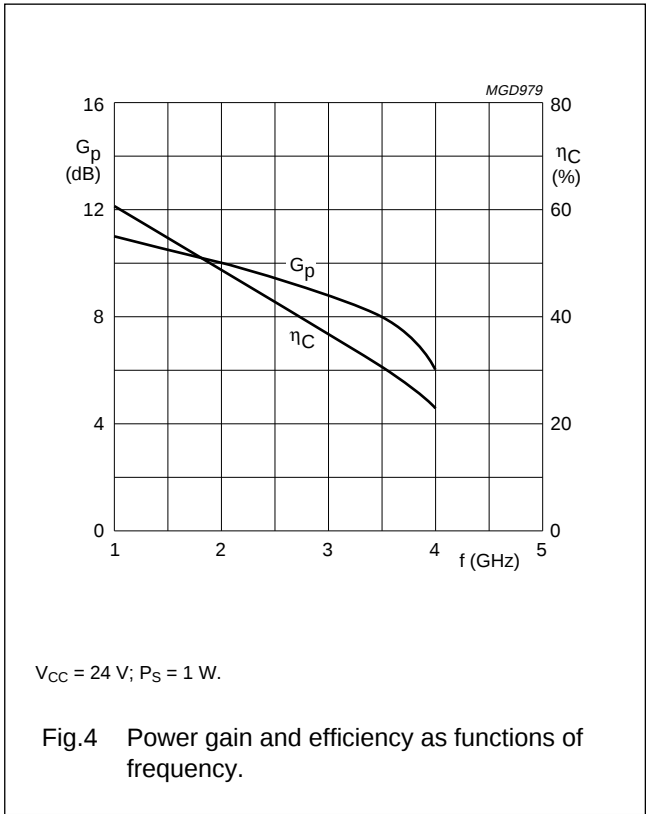
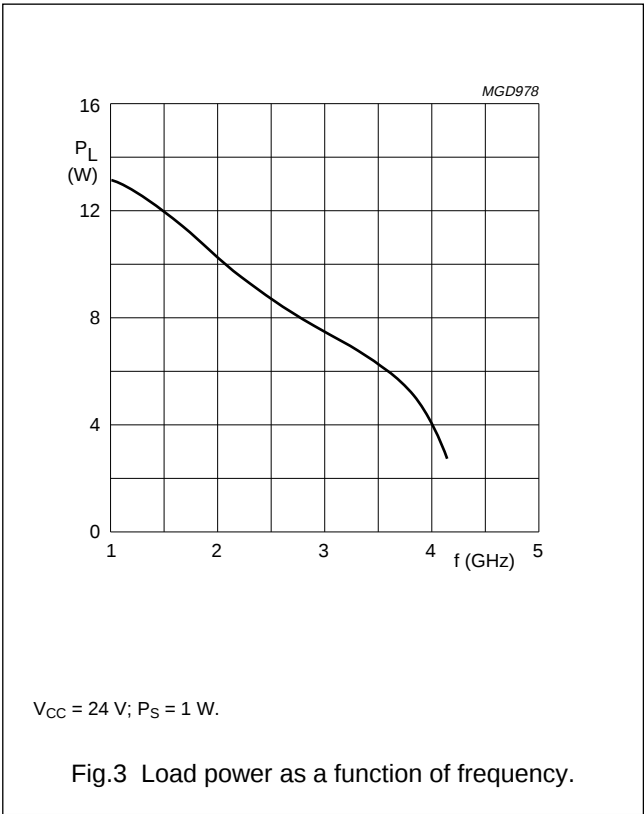
Note

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

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 30\ \text{mA}$; $R_{BE} = 0$	40	–	–	V
I_{CBO}	collector cut-off current	$V_{CB} = 24\ \text{V}$; $I_E = 0$	–	–	50	mA
I_{EBO}	emitter cut-off current	$V_{EB} = 1.5\ \text{V}$; $I_C = 0$	–	–	1.5	mA
C_{cb}	collector-base capacitance	$V_{CB} = 24\ \text{V}$; $V_{EB} = 1.5\ \text{V}$; $I_E = I_C = 0$; $f = 1\ \text{MHz}$	–	50	–	pF
C_{ce}	collector-emitter capacitance	$V_{CB} = 24\ \text{V}$; $V_{EB} = 1.5\ \text{V}$; $I_E = I_C = 0$; $f = 1\ \text{MHz}$	–	1.2	–	pF
C_{eb}	emitter-base capacitance	$V_{CB} = 24\ \text{V}$; $V_{EB} = 1\ \text{V}$; $I_E = I_C = 0$; $f = 1\ \text{MHz}$	–	30	–	pF



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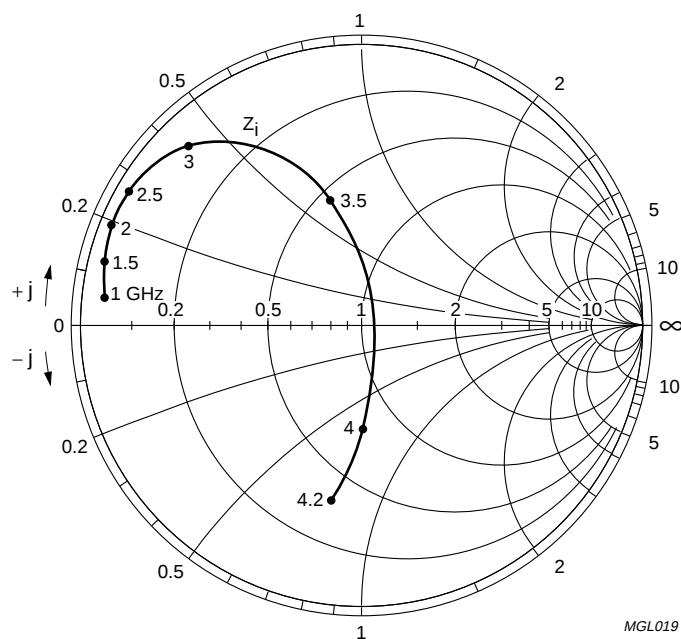

$$V_{CC} = 24 \text{ V}; P_S = 1 \text{ W}; Z_0 = 50 \text{ }\Omega.$$

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

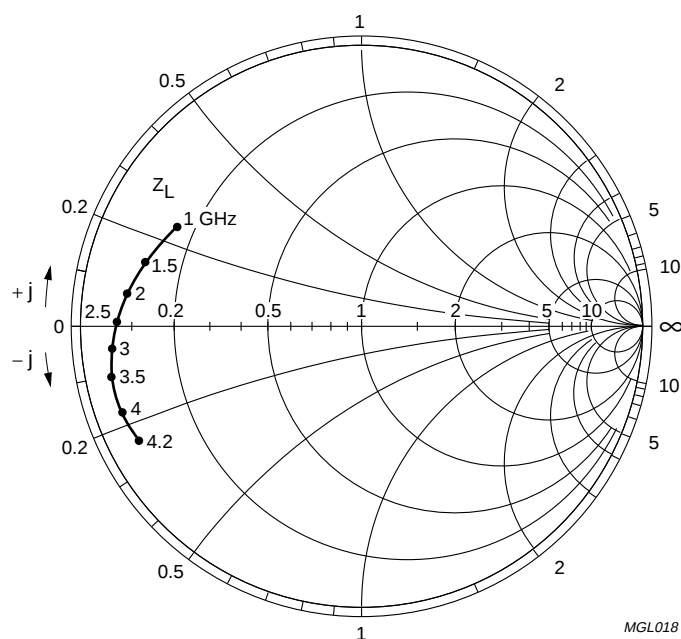
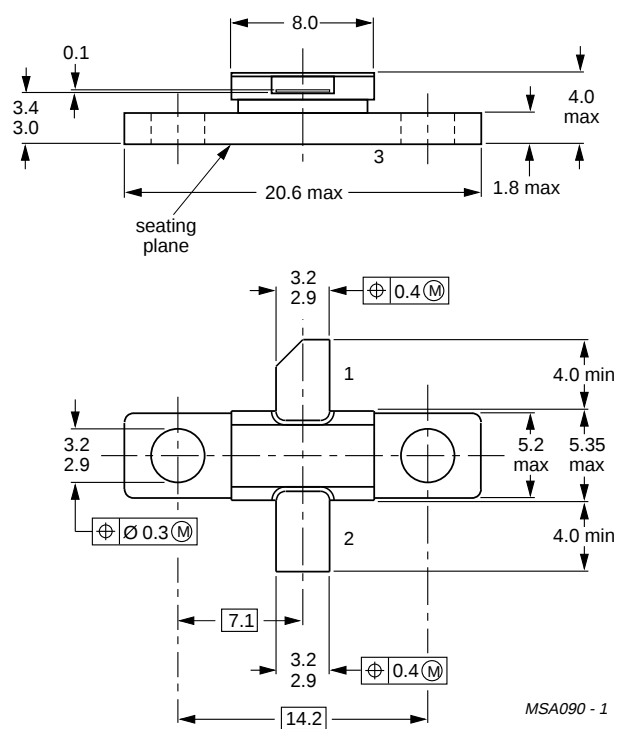
 $V_{CC} = 24 \text{ V}; P_S = 1 \text{ W}; Z_0 = 50 \Omega.$

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

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PACKAGE OUTLINE



Dimensions in mm.
 Torque on screw: Max. 0.4 Nm.
 Recommended screw: M2.5.

Fig.7 SOT445A.

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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.	

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