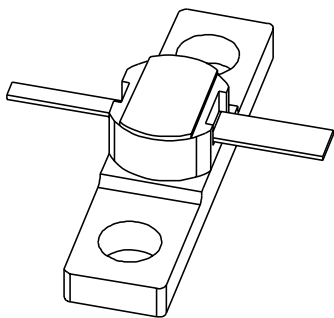


DATA SHEET



PTB23003X NPN microwave power transistor

Product specification
Supersedes data of 1997 Feb 19

1997 Nov 13

NPN microwave power transistor

PTB23003X

FEATURES

- Diffused emitter ballasting resistors providing excellent current sharing and withstanding a high VSWR
- Interdigitated structure provides high emitter efficiency
- Multicell geometry gives good balance of dissipated power and low thermal resistance
- Localized thick oxide auto-alignment process and gold sandwich metallization ensure an optimum temperature profile and excellent performance and reliability.

APPLICATIONS

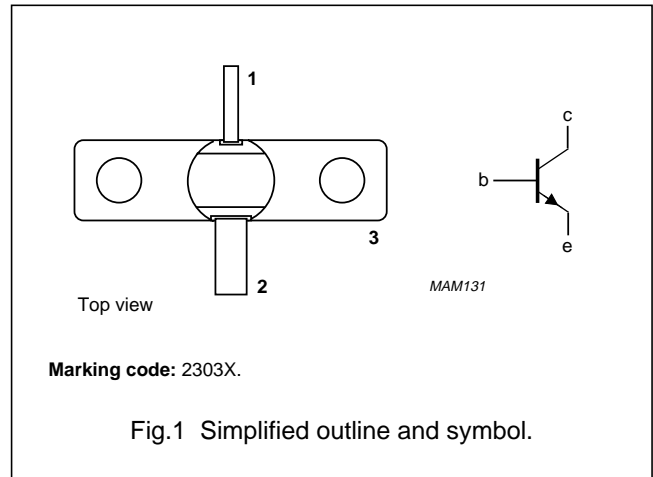
Common-base, class B power amplifiers up to 4.2 GHz.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a metal ceramic SOT440A flange package with base connected to the flange.

PINNING - SOT440A

| PIN | DESCRIPTION |
|-----|---------------------------|
| 1 | collector |
| 2 | emitter |
| 3 | base; connected to flange |



QUICK REFERENCE DATA

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

| MODE OF OPERATION | f (GHz) | V _{CC} (V) | P _L (W) | G _{po} (dB) | η _c (%) | Z _i (Ω) | Z _L (Ω) |
|-------------------|---------|---------------------|--------------------|----------------------|--------------------|--------------------|--------------------|
| CW | 2 | 24 | ≥3 | ≥8.75 | ≥45 | 2.5 + j14 | 8 + j6 |

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

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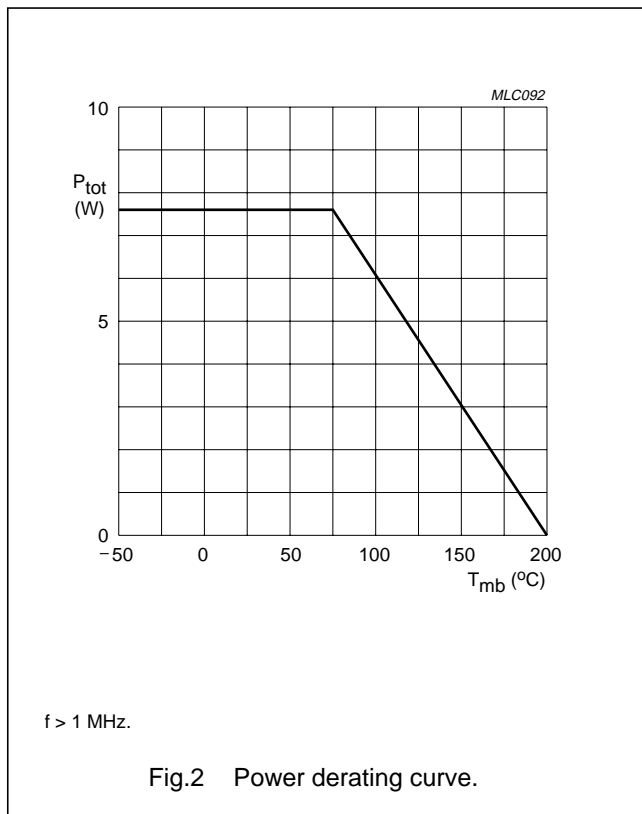
LIMITING VALUES

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 | $R_{BE} = 0$ | – | 40 | V |
| I_C | collector current (DC) | | – | 0.5 | A |
| P_{tot} | total power dissipation | $T_{mb} = 75\text{ °C}; f > 1\text{ MHz}$ | – | 7.6 | W |
| T_{stg} | storage temperature | | –65 | +200 | °C |
| T_j | operating junction temperature | | – | 200 | °C |
| T_{sld} | soldering temperature | $t \leq 10\text{ s}; \text{note 1}$ | – | 235 | °C |

Note

- Up to 0.3 mm from ceramic.



NPN microwave power transistor

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THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | MAX. | UNIT |
|----------------|---|-------------------------------|------|------|
| $R_{th\ j-mb}$ | thermal resistance from junction to mounting base | $T_j = 75\text{ °C}$ | 12 | K/W |
| $R_{th\ mb-h}$ | thermal resistance from mounting base to heatsink | $T_j = 75\text{ °C}$; note 1 | 0.7 | K/W |

Note

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

CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---------------|-------------------------------------|--|------|------|------|---------------|
| $V_{(BR)CBO}$ | collector-base breakdown voltage | $I_C = 2\text{ mA}$; $I_E = 0$ | 40 | – | – | V |
| $V_{(BR)CES}$ | collector-emitter breakdown voltage | $I_C = 10\text{ mA}$; $R_{BE} = 0$ | 40 | – | – | V |
| I_{CBO} | collector cut-off current | $V_{CE} = 24\text{ V}$; $I_E = 0$ | – | – | 20 | μA |
| I_{EBO} | emitter cut-off current | $V_{EB} = 1.5\text{ V}$; $I_C = 0$ | – | – | 0.4 | μA |
| C_{cb} | collector-base capacitance | $I_E = I_C = 0$; $V_{CB} = 24\text{ V}$; $V_{EB} = 1.5\text{ V}$; $f = 1\text{ MHz}$ | – | 3 | – | pF |
| C_{ce} | collector-emitter capacitance | $I_E = I_C = 0$; $V_{CB} = 24\text{ V}$; $V_{EB} = 1.5\text{ V}$; $f = 1\text{ MHz}$ | – | 0.6 | – | pF |

NPN microwave power transistor

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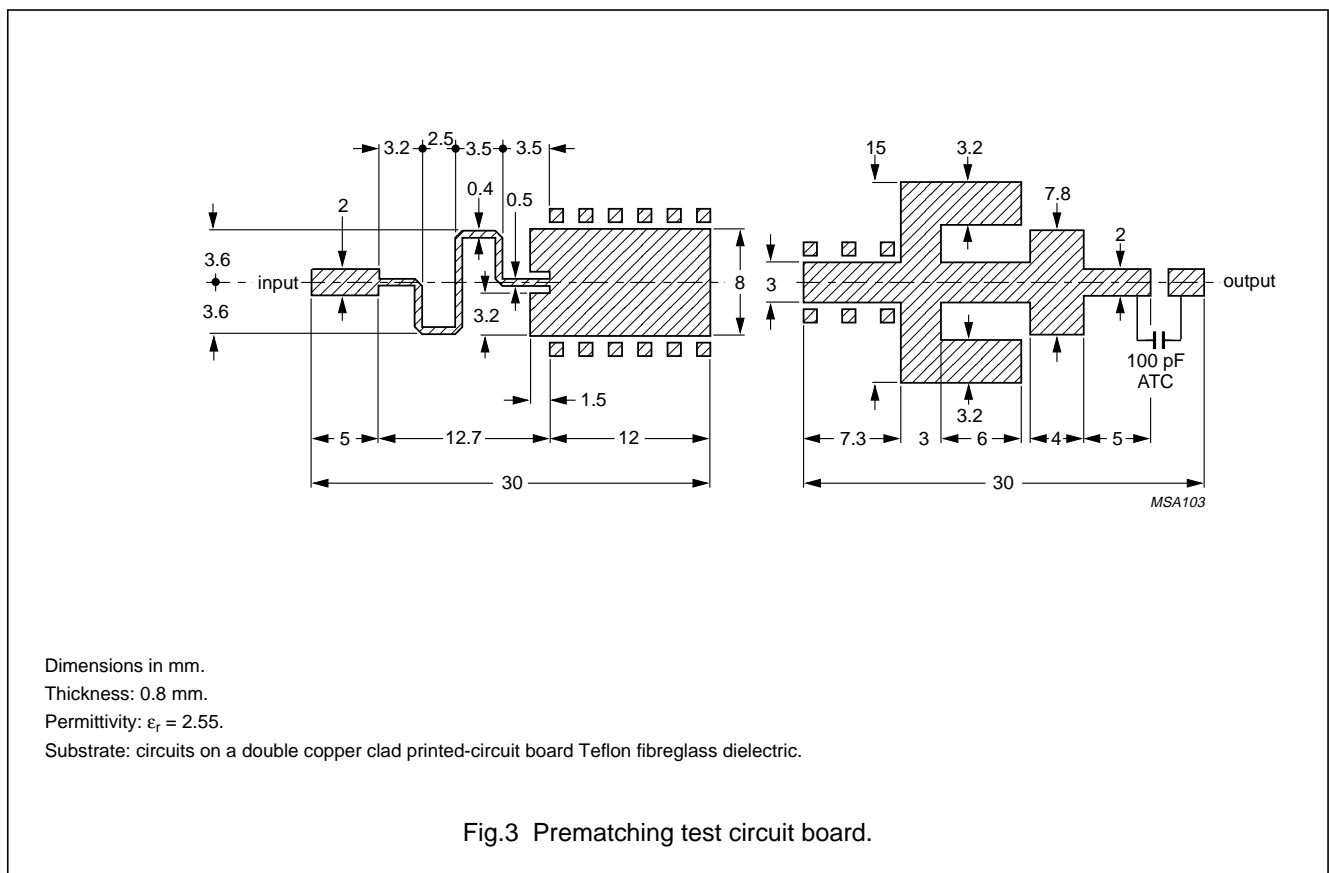
APPLICATION INFORMATION

Microwave performance in a common-base class B selective amplifier circuit; see note 1.

| MODE OF OPERATION | f (GHz) | V _{CC} (V) | P _L (W) | G _{po} (dB) | η _c (%) |
|-------------------|---------|---------------------|--------------------|----------------------|--------------------|
| Class B (CW) | 2 | 24 | >3; typ. 4 | >8.75; typ. 10 | >45; typ. 50 |

Note

1. Circuit consists of prematching circuit board in combination with complementary input and output slug tuners.



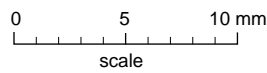
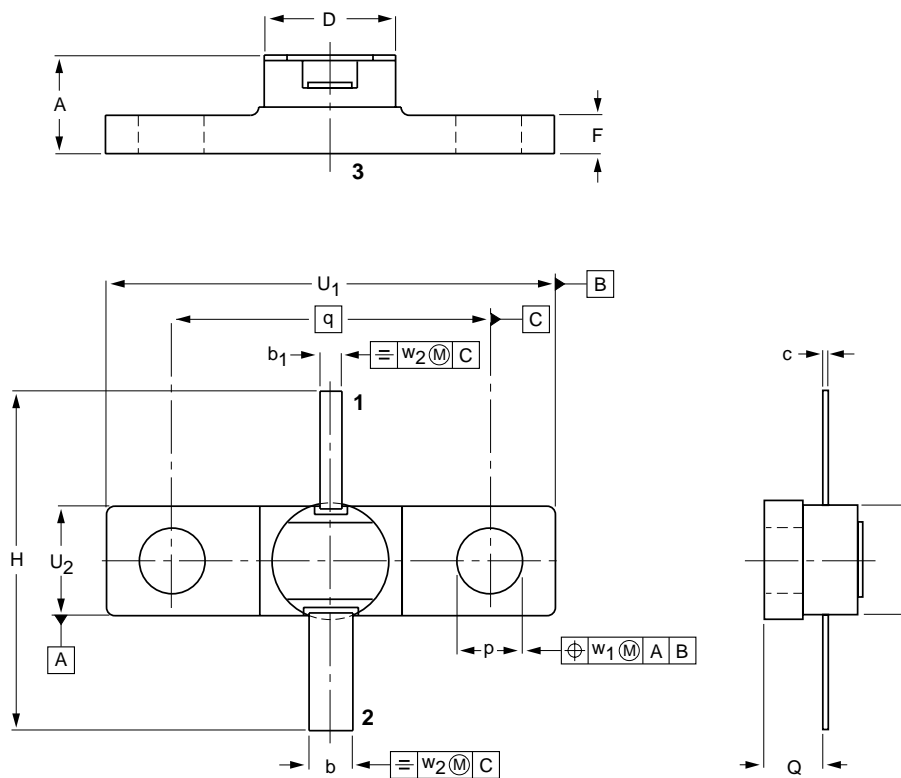
NPN microwave power transistor

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PACKAGE OUTLINE

Flanged hermetic ceramic package; 2 mounting holes; 2 leads

SOT440A



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

| UNIT | A | b | b ₁ | c | D | E | F | H | p | Q | q | U ₁ | U ₂ | w ₁ | w ₂ |
|------|--------------|--------------|----------------|--------------|--------------|--------------|--------------|----------------|--------------|--------------|-------|----------------|----------------|----------------|----------------|
| mm | 4.25 3.27 | 2.16 1.90 | 1.15 0.88 | 0.16 0.07 | 5.85 5.58 | 5.31 5.00 | 1.66 1.39 | 15.75 14.73 | 3.18 2.92 | 3.48 2.92 | 14.22 | 20.45 20.19 | 5.21 4.95 | 0.51 | 1.02 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|------|--|---------------------|------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT440A | | | | | | 97-05-23 |

NPN microwave power transistor**PTB23003X**

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 this 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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