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DATA SHEET

LZ1418E100R

NPN microwave power transistor

Product specification
Supersedes data of June 1992

1997 Feb 18

NPN microwave power transistor

LZ1418E100R

FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistor provides 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 allows an easier design of wideband circuits.

APPLICATIONS

- Common emitter class A amplifiers in CW conditions for military and professional applications between 1.4 to 1.8 GHz.

DESCRIPTION

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

PINNING - SOT443A

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

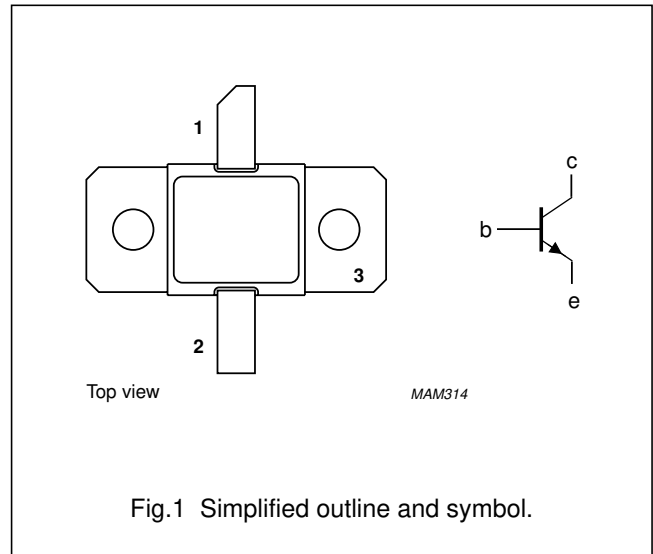


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

Microwave performance up to $T_{mb} = 25\text{ °C}$ in a common emitter class A wideband amplifier.

| MODE OF OPERATION | f (GHz) | V_{CE} (V) | I_C (A) | P_{L1} (W) | G_{po} (dB) | $Z_i; Z_L$ (Ω) |
|-------------------|------------|--------------|-----------|--------------|---------------|-------------------------|
| Class-A (CW) | 1.4 to 1.8 | 16 | 2 | ≥ 9 | ≥ 10 | see Fig 7 |

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.

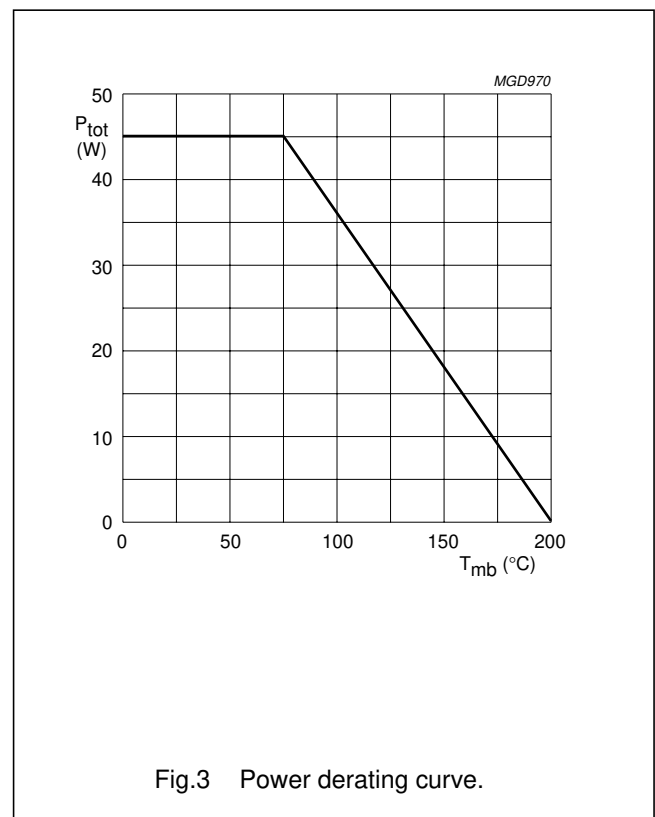
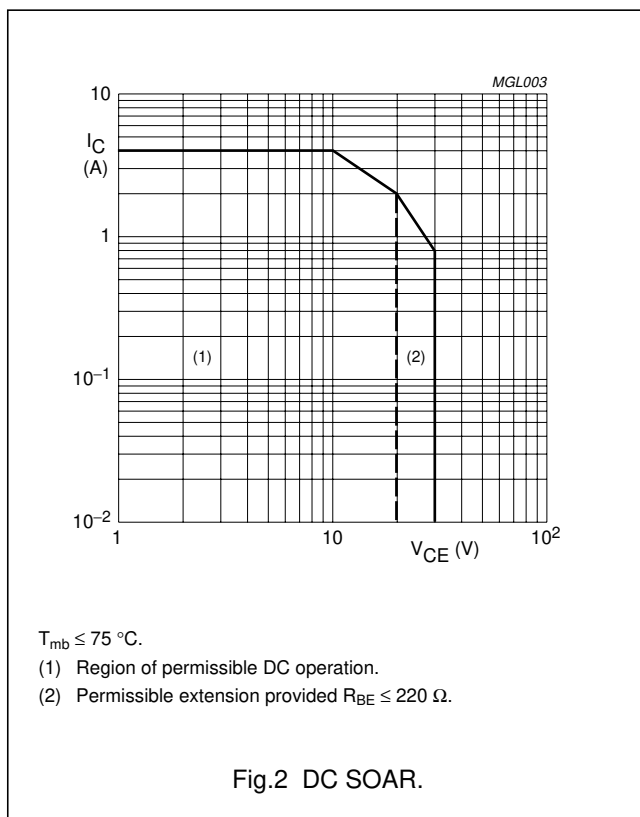
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LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|-----------|--------------------------------|---|------|------|------------------|
| V_{CBO} | collector-base voltage | open emitter | – | 45 | V |
| V_{CER} | collector-emitter voltage | $R_{BE} = 220 \Omega$ | – | 30 | V |
| V_{CEO} | collector-emitter voltage | open base | – | 20 | V |
| V_{EBO} | emitter-base voltage | open collector | – | 3 | V |
| I_C | collector current (DC) | | – | 4 | A |
| P_{tot} | total power dissipation | $T_{mb} \geq 75 \text{ }^\circ\text{C}$ | – | 45 | W |
| T_{stg} | storage temperature | | –65 | +200 | $^\circ\text{C}$ |
| T_j | operating junction temperature | | – | 200 | $^\circ\text{C}$ |
| T_{sld} | soldering temperature | at 0.2 mm from flange; $t \leq 10 \text{ s}$ | – | 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 | $T_j = 75\text{ °C}$ | 2.2 | K/W |
| $R_{th\ mb-h}$ | thermal resistance from mounting-base to heatsink | $T_j = 75\text{ °C}$; 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 | MIN. | MAX. | UNIT |
|-----------|---------------------------|---|------|------|---------------|
| I_{CBO} | collector cut-off current | $V_{CB} = 20\text{ V}$; $I_E = 0$ | – | 2 | mA |
| | | $V_{CB} = 40\text{ V}$; $I_E = 0$ | – | 20 | mA |
| I_{CER} | collector cut-off current | $V_{CE} = 30\text{ V}$; $R_{BE} = 220\ \Omega$ | – | 20 | mA |
| I_{CEO} | collector cut-off current | $V_{CE} = 20\text{ V}$; $I_B = 0$ | – | 20 | mA |
| I_{EBO} | emitter cut-off current | $V_{EB} = 1.5\text{ V}$; $I_C = 0$ | – | 200 | μA |
| h_{FE} | DC current gain | $V_{CE} = 3\text{ V}$; $I_C = 2\text{ A}$ | 15 | – | 100 |

APPLICATION INFORMATION

Microwave performance up to $T_{mb} = 25\text{ °C}$ in a common emitter class-A wideband amplifier; note 1.

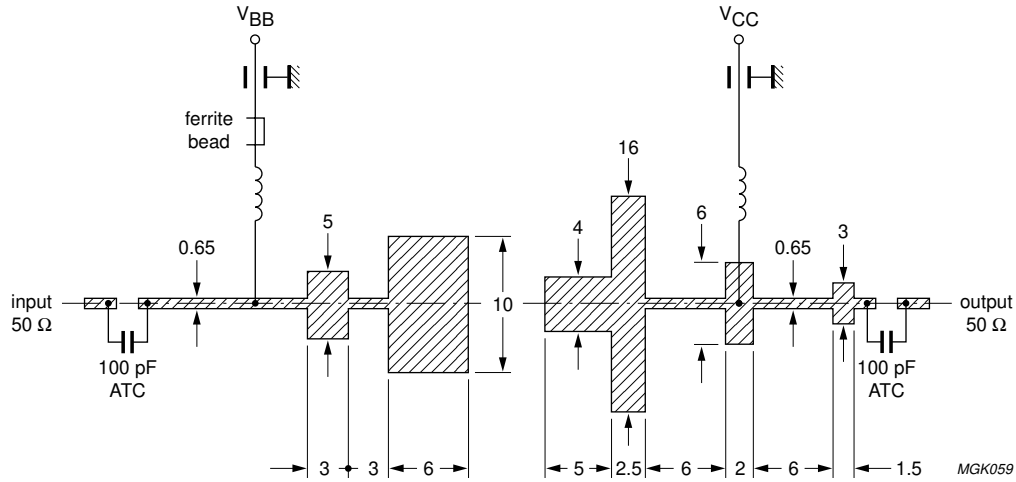
| MODE OF OPERATION | f (GHz) | V_{CE} (V) | I_C (A) | P_{L1} (W) | G_{po} (dB) | Z_i ; Z_L (Ω) |
|-------------------|------------|--------------|-----------|---------------------|----------------------|----------------------------|
| Class-A (CW) | 1.4 to 1.8 | 16 | 2 | ≥ 9 typ. 10 | ≥ 10 typ. 11 | see Fig 7 |

Note

- Amplifier consists of test circuit board without any additional tuning.

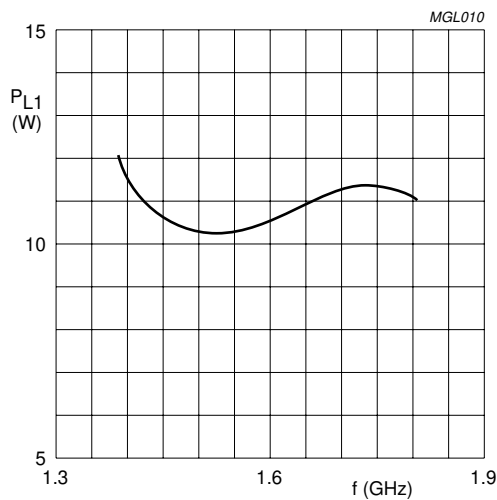
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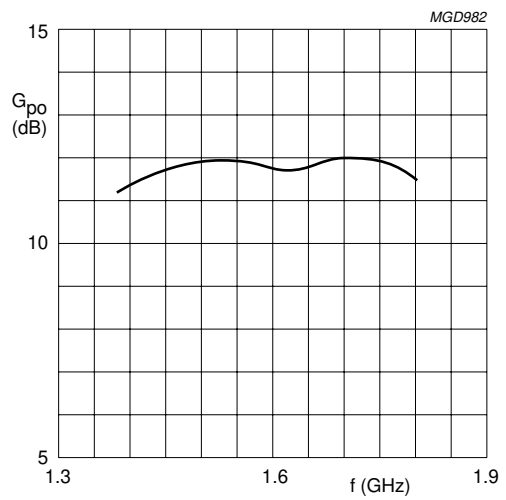
Dimensions in mm.
 Substrate: Epsilam printed-circuit board.
 Thickness: 0.635 mm.
 Permittivity: $\epsilon_r = 10$.

Fig.4 Wideband test circuit board for 1.4 to 1.8 GHz, CW class A application.



$V_{CE} = 16 \text{ V}$; $I_C = 2 \text{ A}$ (regulated); $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.5 Load power as a function of frequency; typical values.

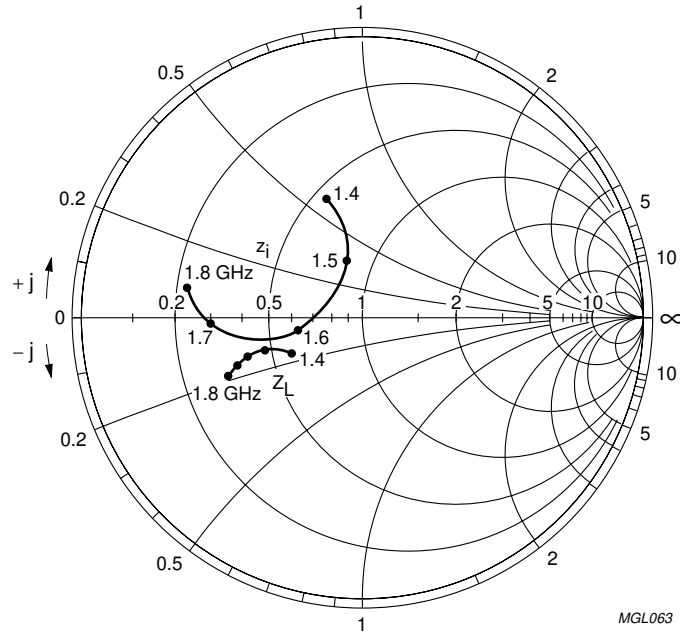


$V_{CE} = 16 \text{ V}$; $I_C = 2 \text{ A}$ (regulated); $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.6 Linear power gain as a function of frequency; typical values.

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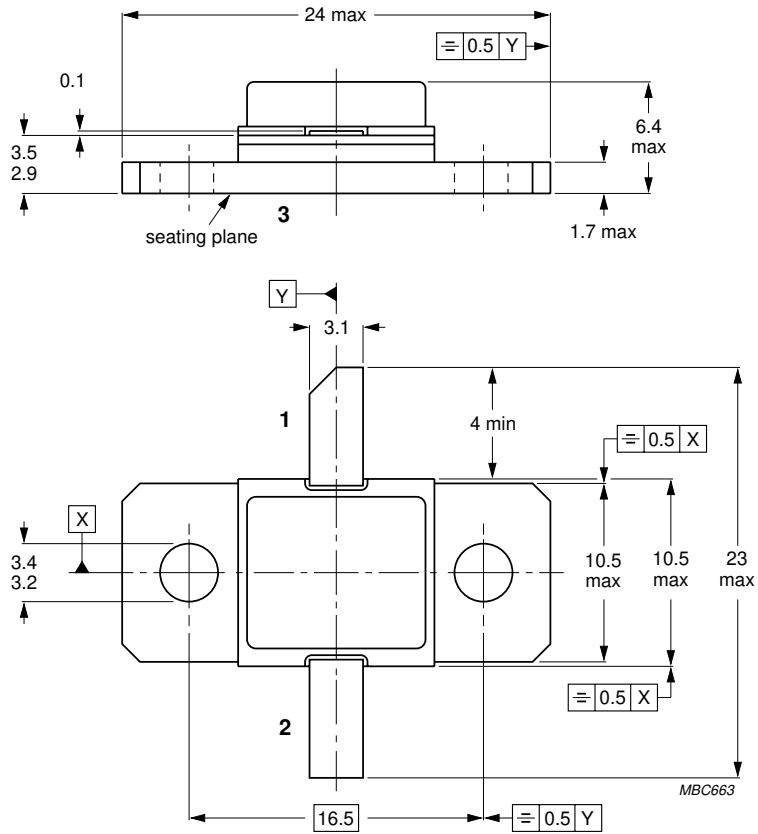
$Z_o = 10 \Omega$; $V_{CE} = 16 \text{ V}$; $I_C = 2 \text{ A}$ (regulated); $T_{mb} = 25 \text{ }^\circ\text{C}$.

Fig.7 Input and load impedances as functions of frequency; typical values.

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PACKAGE OUTLINE



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

Fig.8 SOT443A.

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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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NOTES

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NOTES

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