

DATA SHEET

RX1214B350Y

NPN microwave power transistor

Product specification
Superseded data of November 1994

1997 Feb 18

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FEATURES

- Suitable for short and medium pulse applications up to 1 ms/10%
- Internal input prematching networks allow an easier design of circuits
- Diffused emitter ballasting resistors improve ruggedness
- Interdigitated emitter-base structure provides high emitter efficiency
- Gold metallization with barrier realizes very stable characteristics and excellent lifetime
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

Common base, class C, broadband, pulsed power amplifiers for L-Band radar applications in the 1.2 to 1.4 GHz band. Also suitable for medium pulse, heavy duty operation within this band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a SOT439A metal ceramic flange package with base connected to flange.

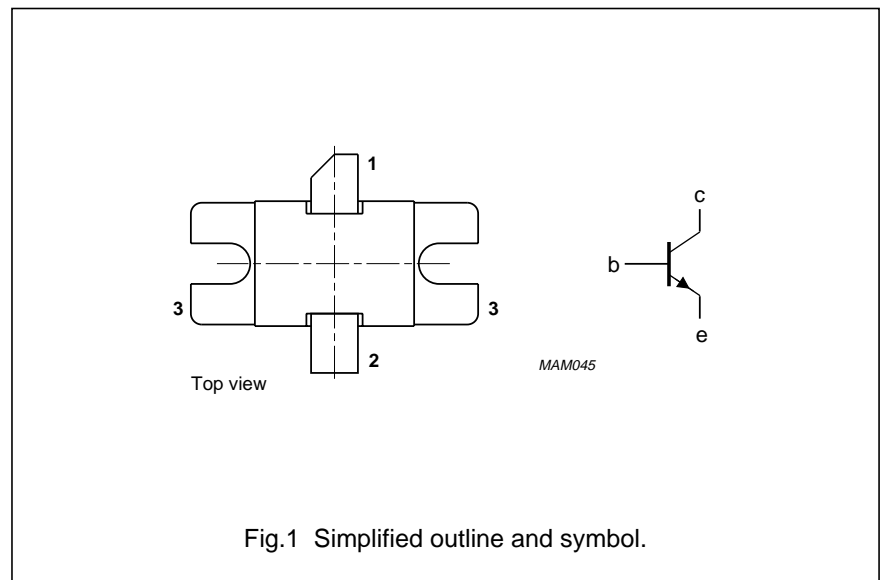
QUICK REFERENCE DATA

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

| MODE OF OPERATION | CONDITIONS | f (GHz) | V _{CC} (V) | P _L (W) | G _p (dB) | η _c (%) |
|-------------------|------------------------------------|------------|---------------------|--------------------|---------------------|--------------------|
| Class C | t _p = 130 μs; δ = 6% | 1.2 to 1.4 | 50 | 280 | ≥7 | ≥40 |

PINNING - SOT439A

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



WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc 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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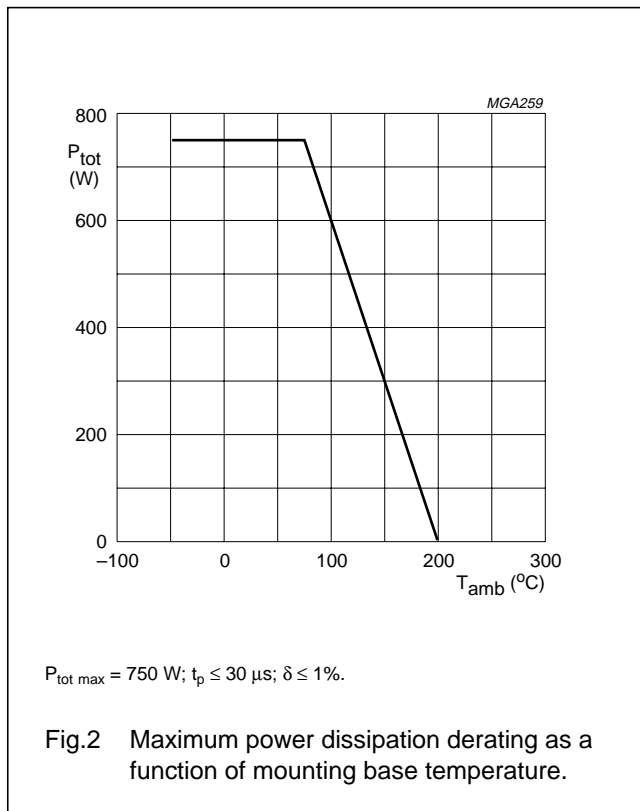
LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|-------------------|--------------------------------|--|------|------|------|
| V _{CBO} | collector-base voltage | open emitter | – | 65 | V |
| V _{CEO} | collector-emitter voltage | open base | – | 20 | V |
| V _{CES} | collector-emitter voltage | R _{BE} = 0 Ω | – | 65 | V |
| V _{EBO} | emitter-base voltage | open collector | – | 3 | V |
| I _C | collector current (DC) | t _p ≤ 130 μs; δ ≤ 6% | – | 25 | A |
| P _{tot} | total power dissipation | T _{mb} < 75 °C; t _p ≤ 30 μs; δ ≤ 1% | – | 750 | W |
| T _{stg} | storage temperature | | –65 | 200 | °C |
| T _j | operating junction temperature | | – | 200 | °C |
| T _{slid} | soldering temperature | t ≤ 10 s; note 1 | – | 235 | °C |

Note

- Up to 0.2 mm from ceramic.



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THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | MAX. | UNIT |
|----------------|---|---|------|------|
| $R_{th\ j-mb}$ | thermal resistance from junction to mounting base | $T_j = 120\ ^\circ\text{C}$ | 1.2 | K/W |
| $R_{th\ mb-h}$ | thermal resistance from mounting base to heatsink | note 1 | 0.2 | K/W |
| $Z_{th\ j-h}$ | thermal impedance from junction to heatsink | $t_p = 130\ \mu\text{s}; \delta = 6\%;$ $T_j = 110\ ^\circ\text{C};$ notes 1 and 2 | 0.17 | K/W |

Notes

1. See "Mounting recommendations in the General part of handbook SC19a".
2. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MAX. | UNIT |
|-----------|---------------------------|-----------------------------------|------|------|
| I_{CBO} | collector cut-off current | $V_{CB} = 50\ \text{V}; I_E = 0$ | 30 | mA |
| I_{EBO} | emitter cut-off current | $V_{EB} = 1.5\ \text{V}; I_C = 0$ | 3 | mA |

APPLICATION INFORMATION

Microwave performance up to $T_{mb} = 25\ ^\circ\text{C}$ in a common base test circuit as shown in Fig.3.

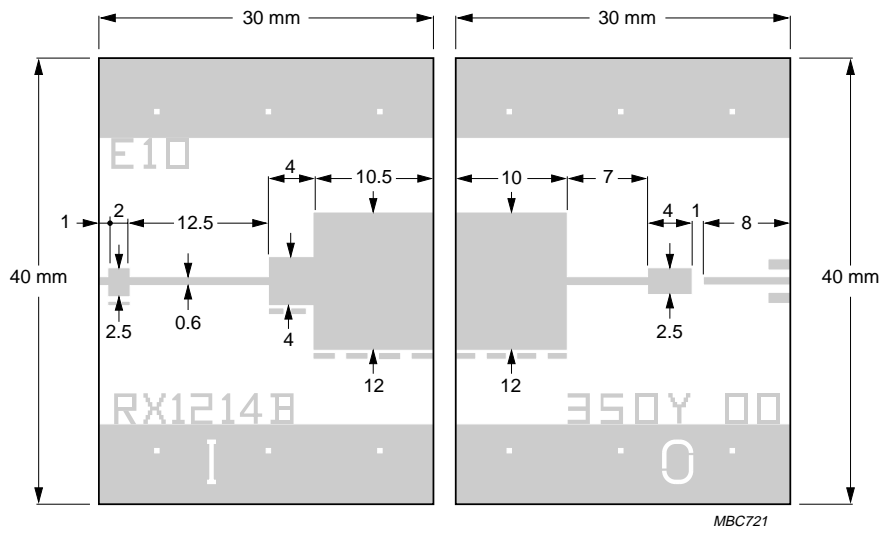
| MODE OF OPERATION | CONDITIONS | f (GHz) | V_{CC} (V) note 1 | P_L (W) | G_p (dB) | η_c (%) |
|-------------------|--|------------|------------------------|-----------|---------------------|-----------------------|
| Class C | $t_p = 130\ \mu\text{s}; \delta = 6\%;$ note 2 | 1.2 to 1.4 | 50 | 280 | $\geq 7;$ typ. 8 | $\geq 40;$ typ. 44 |

Notes

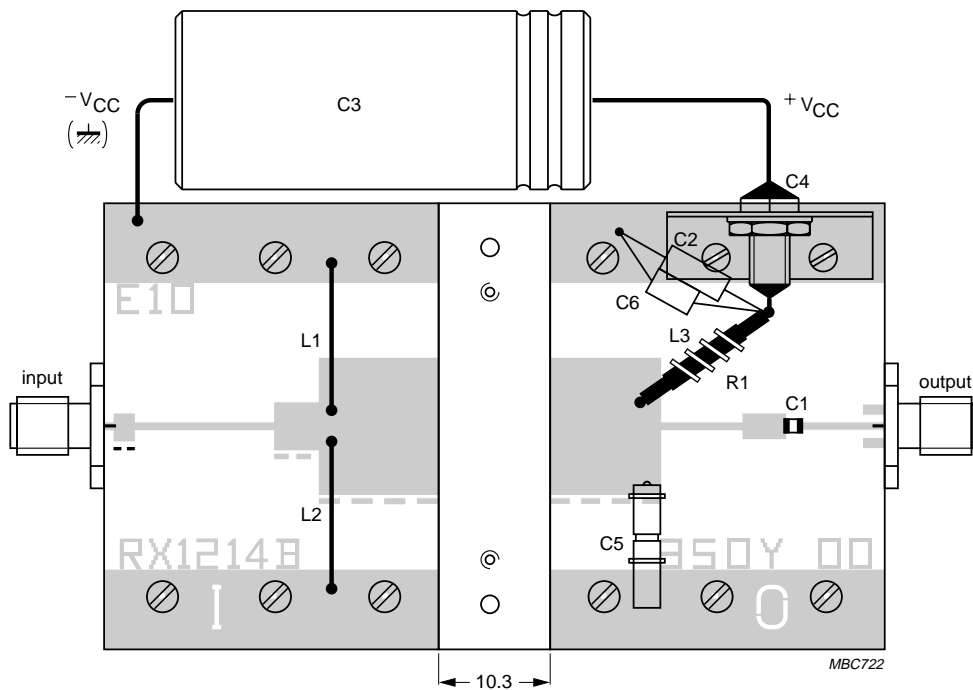
1. V_{CC} during pulse.
2. Operating conditions and performances for other pulse formats can be made available on request.

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MBC721



MBC722

Fig.3 Broadband test circuit.

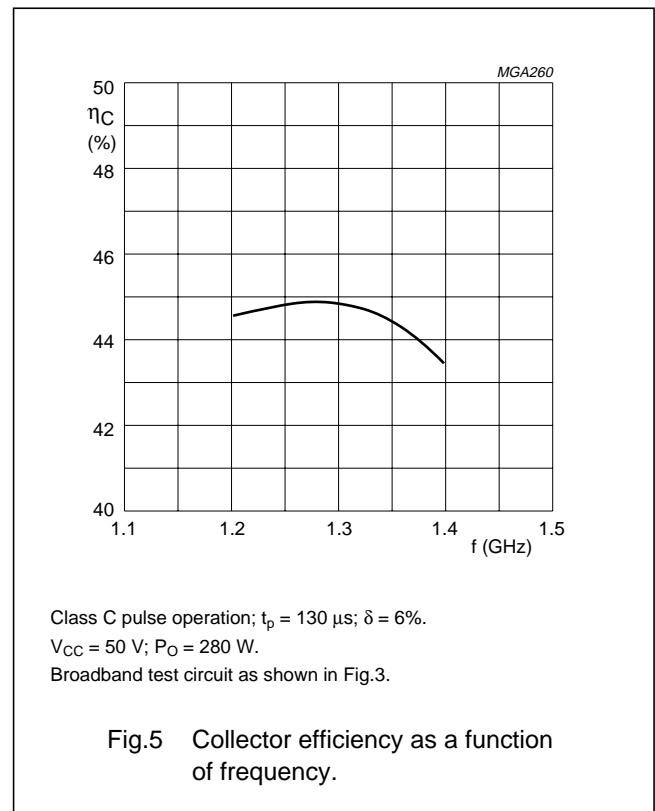
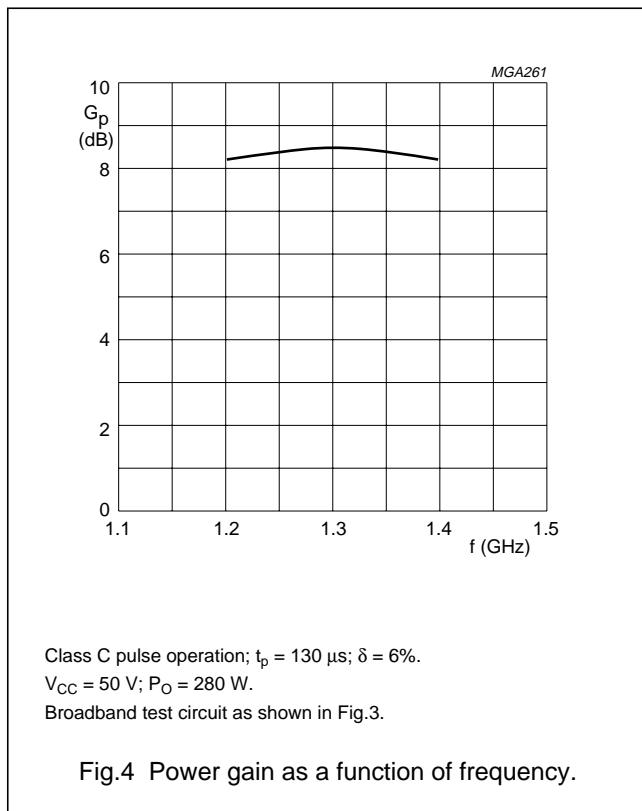
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List of components (see Fig.3)

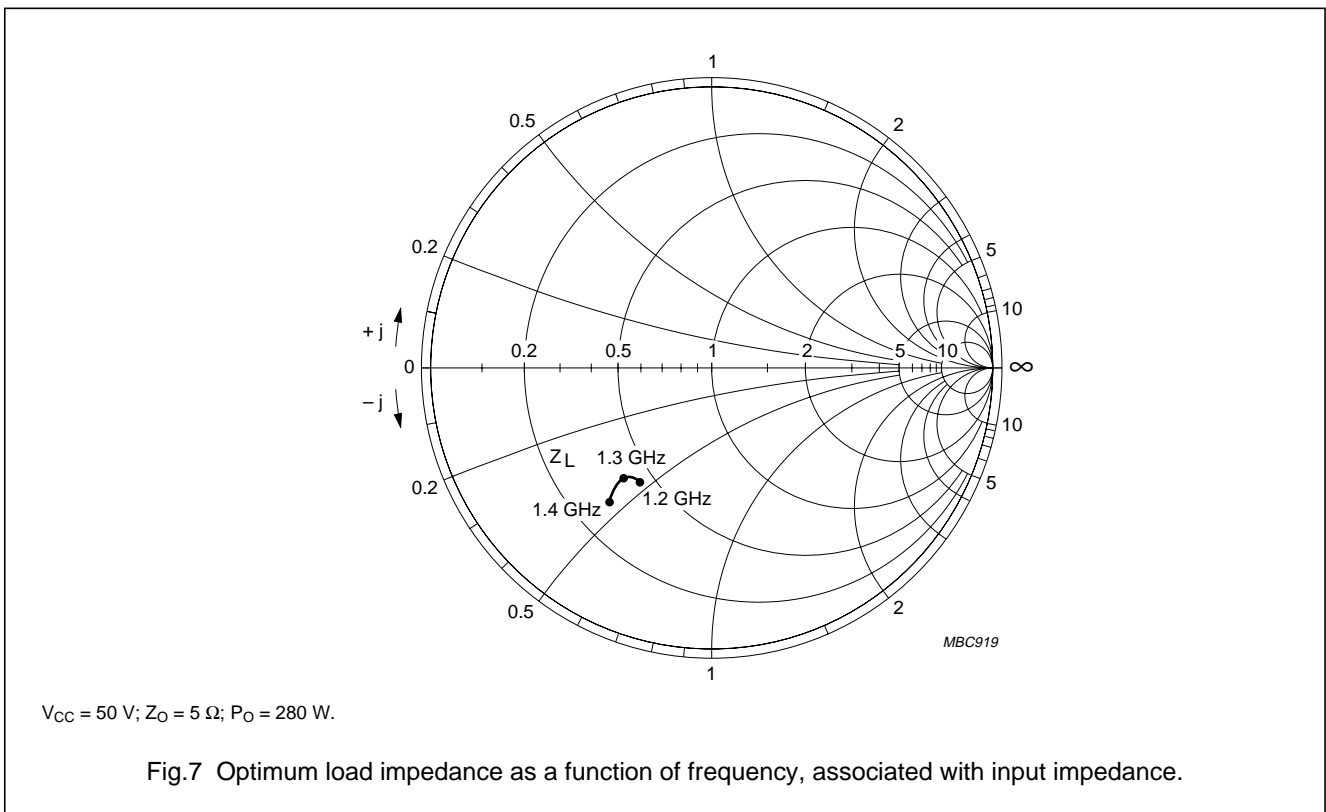
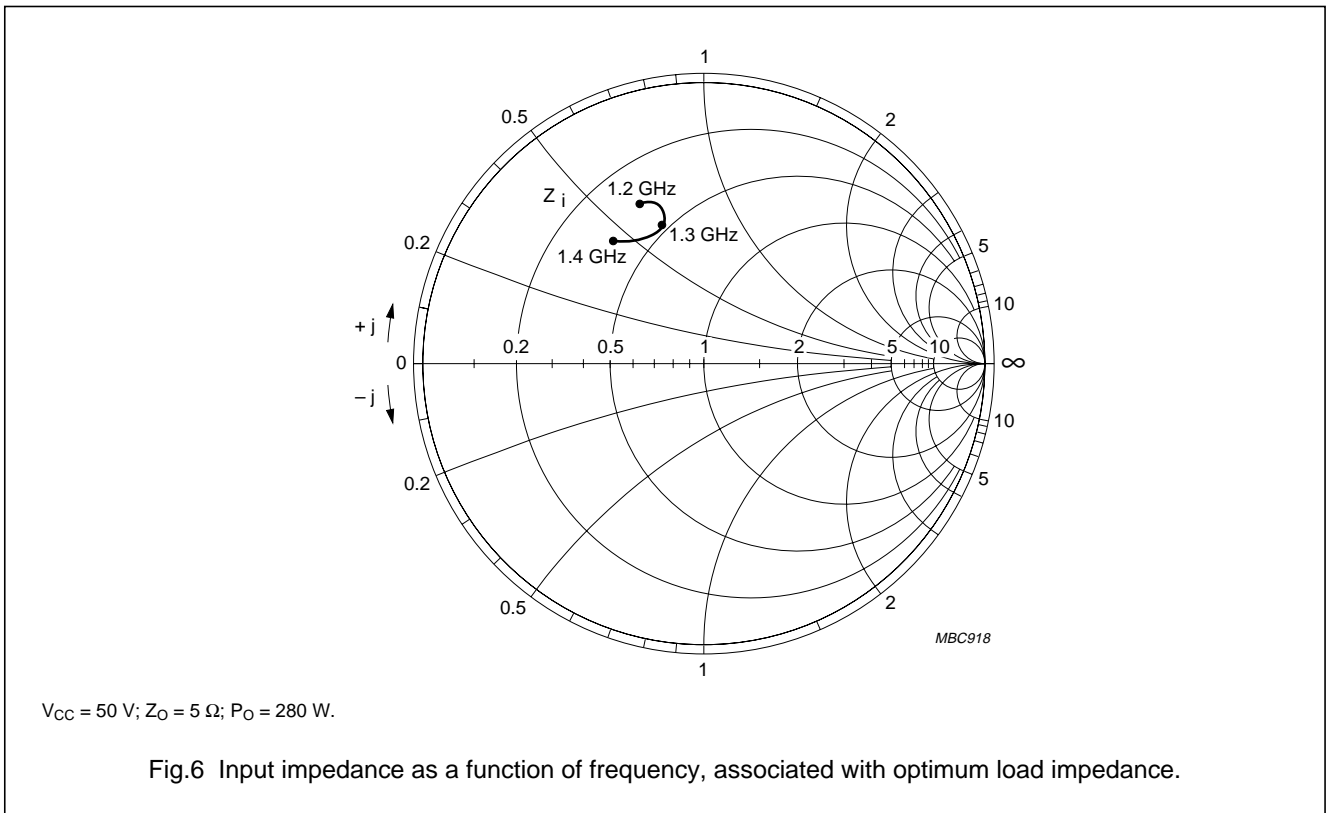
| COMPONENT | DESCRIPTION | VALUE | DIMENSIONS | CATALOGUE NO. |
|------------|--------------------------------------|-------------------|---|------------------------|
| L1, L2, L3 | 3 turns 0.65 mm diameter copper wire | | int dia. = 4 mm; length of turn = 3 mm | |
| C1 | capacitor | 100 pF | | ATC, ref. 100B101KP50X |
| C2 | tantalum capacitor | 10 μ F, 50 V | | |
| C3 | electrolytic capacitor | 470 μ F, 63 V | | |
| C4 | feedthrough bypass capacitor | | | Erie, ref.1250-003 |
| C5 | variable gigatrim capacitor | 0.8 - 8 pF | | Tekelec, ref.729.1 |
| C6 | capacitor | 4.7 nF | | |
| R1 | resistor | 4.7 Ω | | |

The test jig consists of two circuits (input and output), each being 30 mm x 40 mm in size. The two circuits are mounted on a 10 mm thick hard aluminium alloy block. A recess should be machined in the aluminium block in which the transistor can be mounted. The mounting surface must be lapped to a surface roughness of Ra <0.5 μ m and the sum of the depth of the recess and the thickness of the circuits should not exceed the specified minimum dimension between mounting face and the leads of the transistor. Tolerances on this dimension may be absorbed by placing a gold plated metal shim under the leads, close to the body of the transistor.



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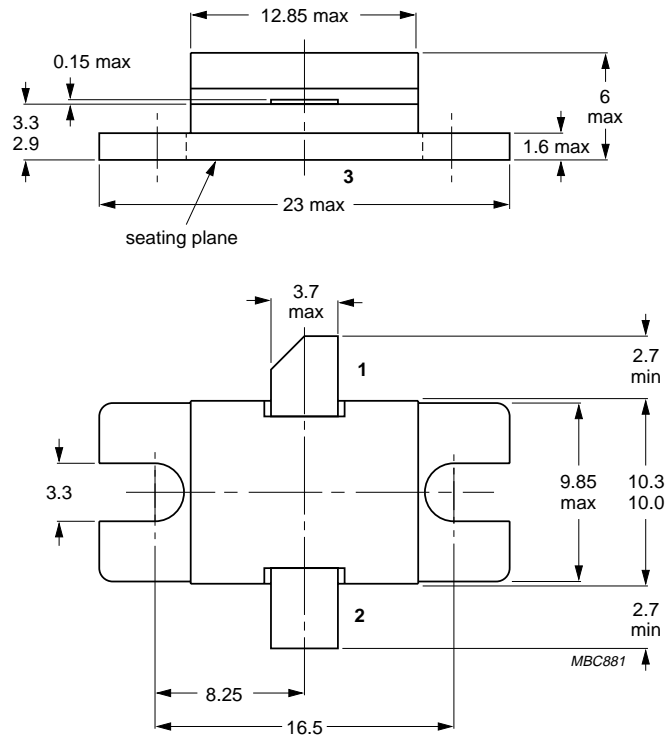
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PACKAGE OUTLINE



Dimensions in mm.
 Torque on nut: max 0.4 Nm.
 Recommended screw: M3.
 Recommended pitch for mounting screw: 19 mm.

Fig.8 SOT439A.

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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 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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NOTES

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