

DATA SHEET

LTE21015R

NPN microwave power transistor

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

1997 Feb 19

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FEATURES

- Interdigitated structure provides high emitter efficiency
- Diffused emitter ballasting resistors provide 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
- Input matching cell allows an easier design of circuits.

APPLICATIONS

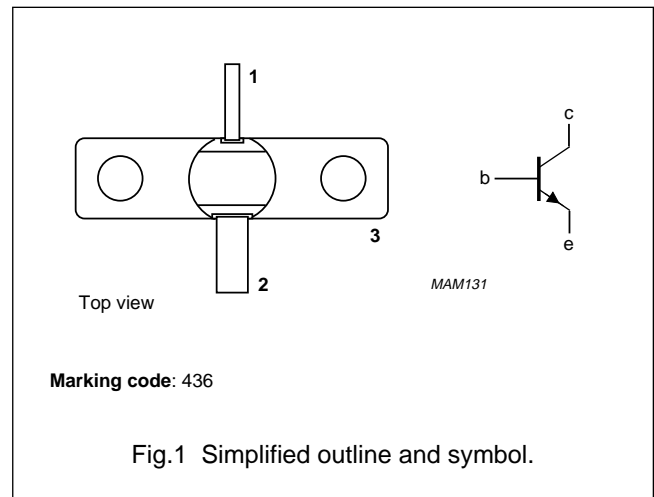
- Common emitter class-A linear power amplifiers up to 2 GHz.

DESCRIPTION

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

PINNING - SOT440A

PIN	DESCRIPTION
1	collector
2	base
3	emitter connected to flange



QUICK REFERENCE DATA

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

MODE OF OPERATION	f (GHz)	V_{CE} (V)	I_c (mA)	P_{L1} (W)	G_{po} (dB)	$Z_i; Z_L$ (Ω)
Class-A	2	16	250	≥ 1.5	≥ 8.5	see Figs 6 and 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.

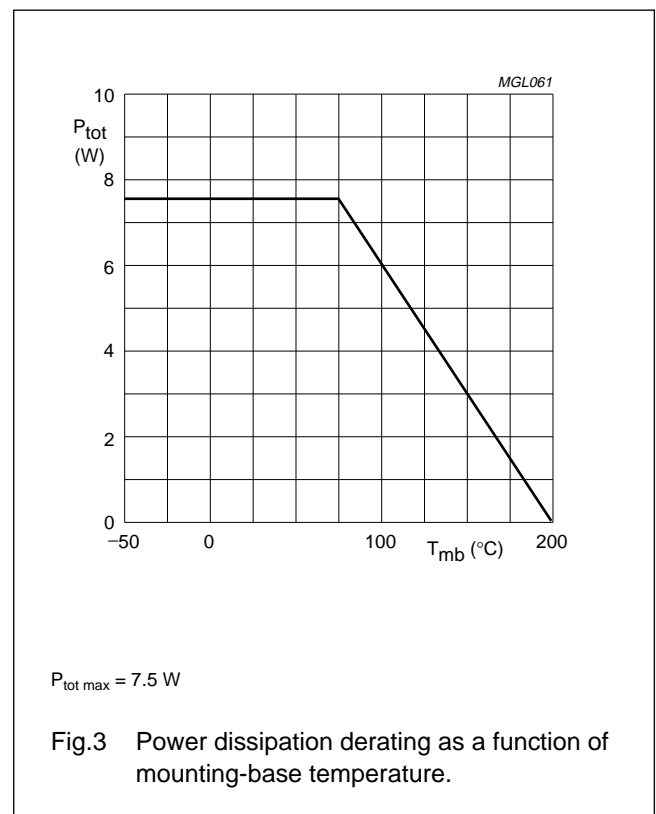
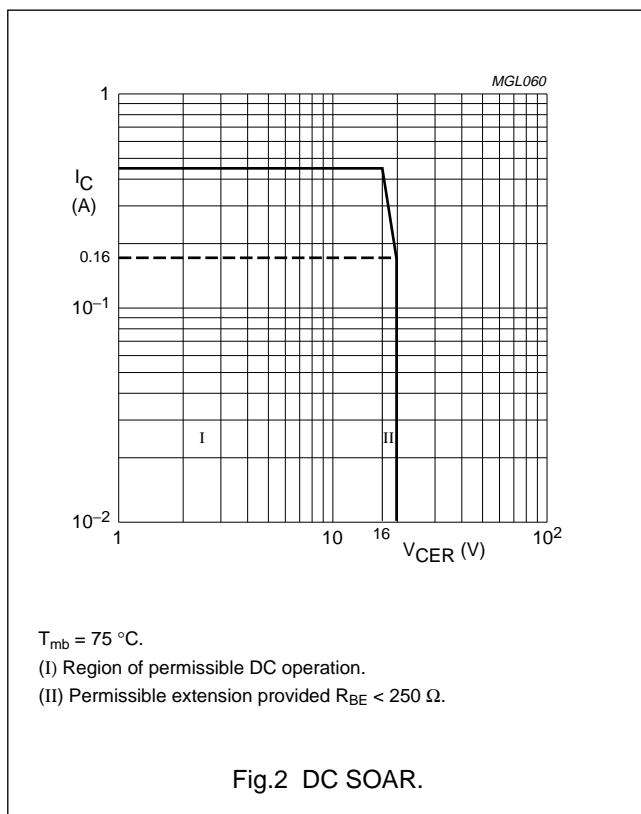
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LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CER}	collector-emitter voltage	$R_{BE} = 250 \Omega$	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	450	mA
P_{tot}	total power dissipation	$T_{mb} \leq 75 \text{ }^\circ\text{C}$	–	7.5	W
T_{stg}	storage temperature		–65	+200	$^\circ\text{C}$
T_j	operating junction temperature		–	200	$^\circ\text{C}$
T_{sld}	soldering temperature	up to 0.2 mm from ceramic; $t \leq 10 \text{ s}$	–	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	$T_j = 70\text{ °C}$	12	K/W
$R_{th\ mb-h}$	thermal resistance from mounting-base to heatsink	note1	0.7	K/W

Note

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

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	$V_{CB} = 20\text{ V}; I_E = 0$	–	150	μA
		$V_{CB} = 40\text{ V}; I_E = 0$	–	1	mA
I_{CER}	collector cut-off current	$V_{CE} = 20\text{ V}; R_{BE} = 270\ \Omega$	–	0.5	mA
I_{EBO}	emitter cut-off current	$V_{EB} = 1.5\text{ V}; I_C = 0$	–	1.5	μA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}; I_C = 250\text{ mA}$	15	150	

APPLICATION INFORMATION

Microwave performance up to $T_{mb} = 25\text{ °C}$ in a common emitter class-A test circuit.(see Fig.4)

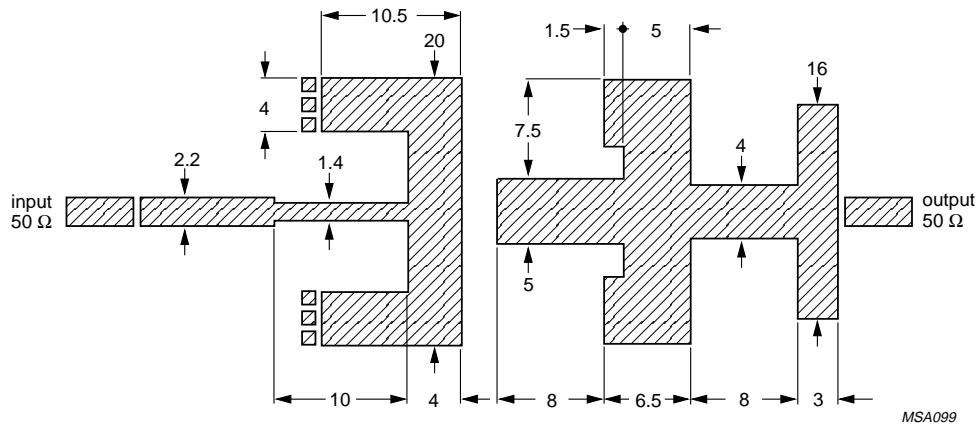
MODE OF OPERATION	f (GHz)	V_{CC} (V) ⁽¹⁾	I_C (mA) ⁽¹⁾	P_{L1} (W) ⁽²⁾	G_{po} (dB) ⁽³⁾	$Z_i; Z_L$ (Ω)
Class-A (CW)	2	16	250	≥ 1.5 typ. 1.8	≥ 8.5 typ. 9.5	see Figs 6 and 7

Notes

1. I_C and V_{CE} regulated.
2. Load power for 1 dB compression of gain.
3. Linear gain.

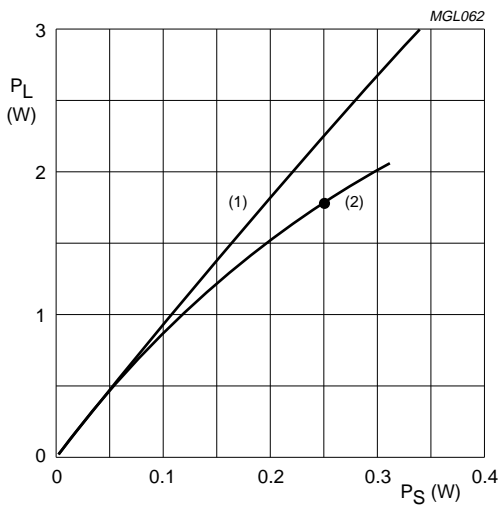
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Dimensions in mm.
 Substrate: Teflon fibreglass.
 Thickness: 0.8 mm.
 Permittivity: $\epsilon_r = 2.55$.

Fig.4 Narrowband test circuit.

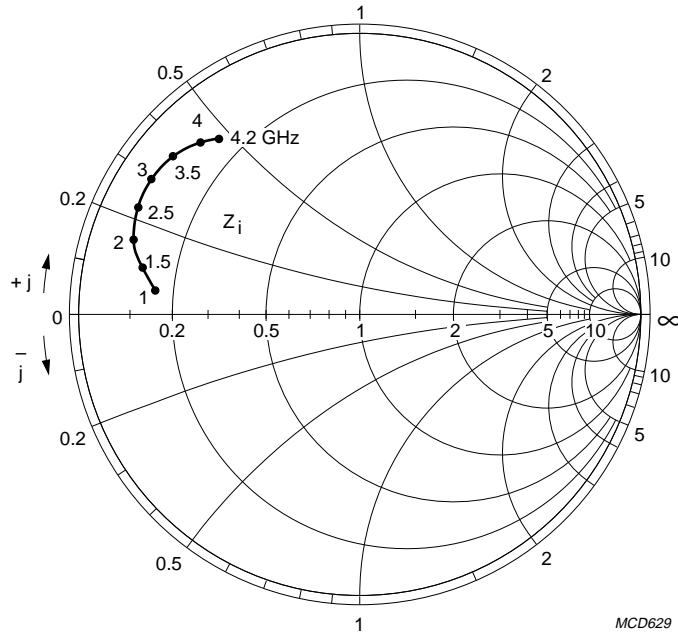


$V_{CE} = 16$ V; $I_C = 250$ mA (regulated).
 In narrowband test circuit as shown in Fig.4
 (1) $G_{po} = 9.5$ dB.
 (2) $P_{L1} = 1.8$ W.

Fig.5 Load power as a function of source power.

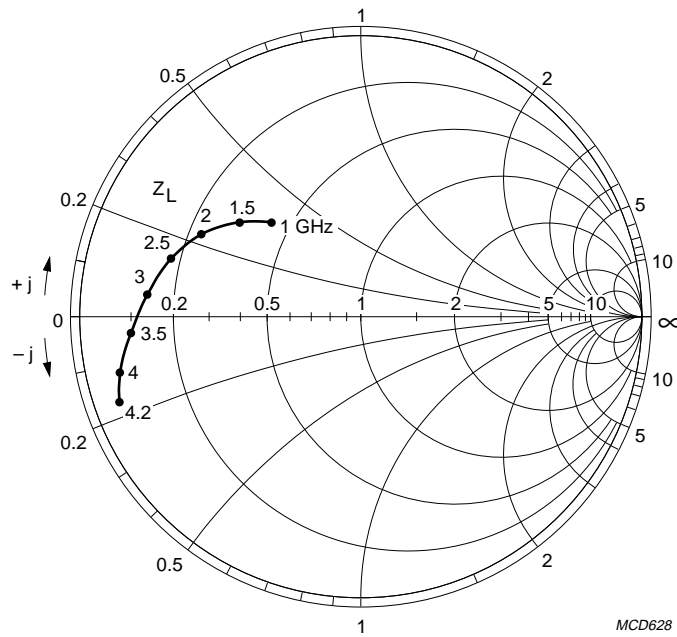
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$V_{CE} = 16\text{ V}$; $Z_0 = 50\ \Omega$; $I_C = 250\text{ mA}$.

Fig.6 Input impedance as a function of frequency for P_{L1} ; associated with optimum load impedance.



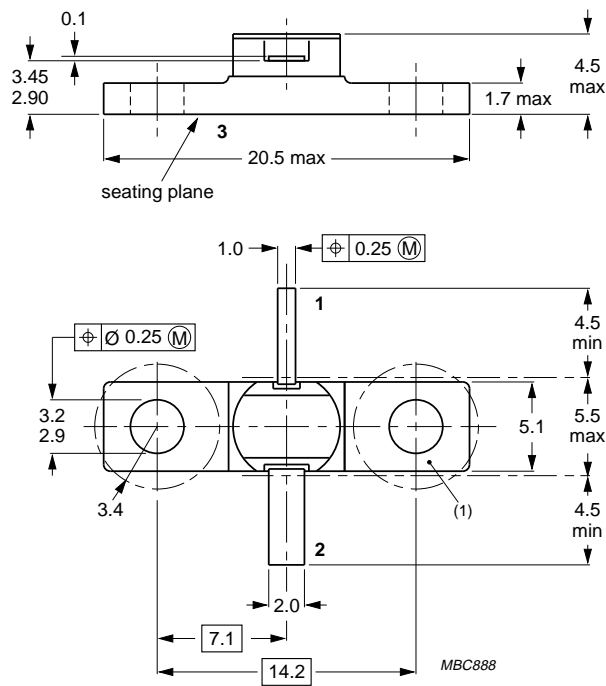
$V_{CE} = 16\text{ V}$; $Z_0 = 50\ \Omega$; $I_C = 250\text{ mA}$.

Fig.7 Optimum load impedance as a function of frequency for P_{L1} ; associated with input impedance.

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PACKAGE OUTLINE



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

Fig.8 SOT440A.

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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.	

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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NOTES

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