

# DATA SHEET

**LTE21025R**

**NPN microwave power transistor**

Product specification  
Supersedes data of June 1992

1997 Feb 21

# NPN microwave power transistor

# LTE21025R

### FEATURES

- Diffused emitter ballasting resistors provide excellent current sharing and withstanding a high VSWR
- Self-aligned process entirely ion implanted
- Gold metallization realizes very stable characteristics and excellent lifetime
- Input matching cell improves input impedance and allows an easier design of wideband circuits.

### APPLICATIONS

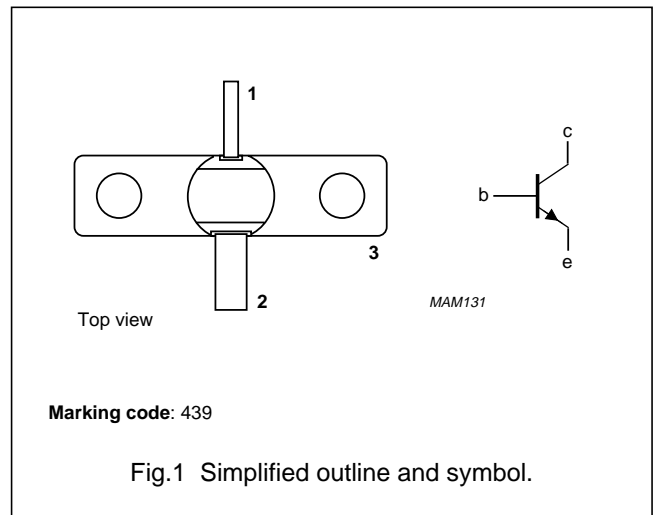
- Common emitter class-A linear power amplifiers up to 4.2 GHz.

### 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

RF performance up to  $T_{mb} = 25\text{ }^{\circ}\text{C}$  in a common emitter class-A test circuit.

MODE OF OPERATION	f (GHz)	V <sub>CE</sub> (V)	I <sub>C</sub> (mA)	P <sub>L1</sub> (W)	G <sub>po</sub> (dB)
Class-A (CW)	2.1	16	400	typ. 2.8	typ. 7.8

### 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.

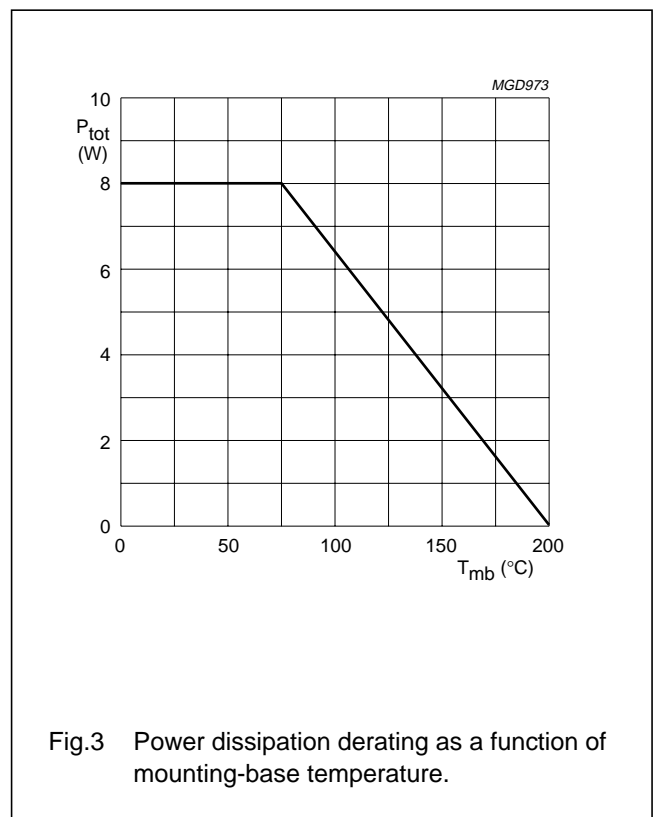
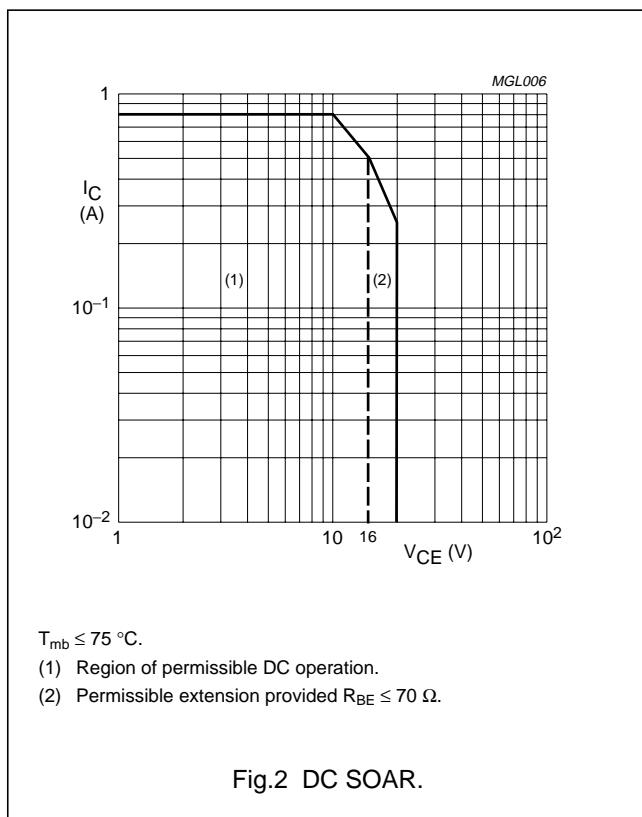
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**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter	–	40	V
V <sub>CER</sub>	collector-emitter voltage	R <sub>BE</sub> = 70 Ω	–	20	V
V <sub>CEO</sub>	collector-emitter voltage	open base	–	16	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	3	V
I <sub>C</sub>	collector current (DC)		–	800	mA
P <sub>tot</sub>	total power dissipation	T <sub>mb</sub> ≤ 75 °C	–	8	W
T <sub>stg</sub>	storage temperature		–65	+200	°C
T <sub>j</sub>	operating junction temperature		–	200	°C
T <sub>slid</sub>	soldering temperature	at 0.3 mm from ceramic; 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	$T_j = 75\text{ °C}$	10	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
$I_{CBO}$	collector cut-off current	$V_{CB} = 20\text{ V}; I_E = 0$	–	–	225	$\mu\text{A}$
		$V_{CB} = 40\text{ V}; I_E = 0$	–	–	1.5	mA
$I_{EBO}$	emitter cut-off current	$V_{EB} = 1.5\text{ V}; I_C = 0$	–	–	0.6	$\mu\text{A}$
$h_{FE}$	DC current gain	$V_{CE} = 5\text{ V}; I_C = 400\text{ mA}$	15	–	150	
$C_{cb}$	collector-base capacitance	$V_{CB} = 16\text{ V}; V_{EB} = 1.5\text{ V};$ $I_E = I_C = 0; f = 1\text{ MHz}$	–	3	–	pF
$C_{ce}$	collector-emitter capacitance	$V_{CE} = 16\text{ V}; V_{EB} = 1.5\text{ V};$ $I_E = I_C = 0; f = 1\text{ MHz}$	–	1.5	–	pF
$C_{eb}$	emitter-base capacitance	$V_{CB} = 10\text{ V}; V_{EB} = 1\text{ V};$ $I_C = I_E = 0; f = 1\text{ MHz}$	–	28	–	pF

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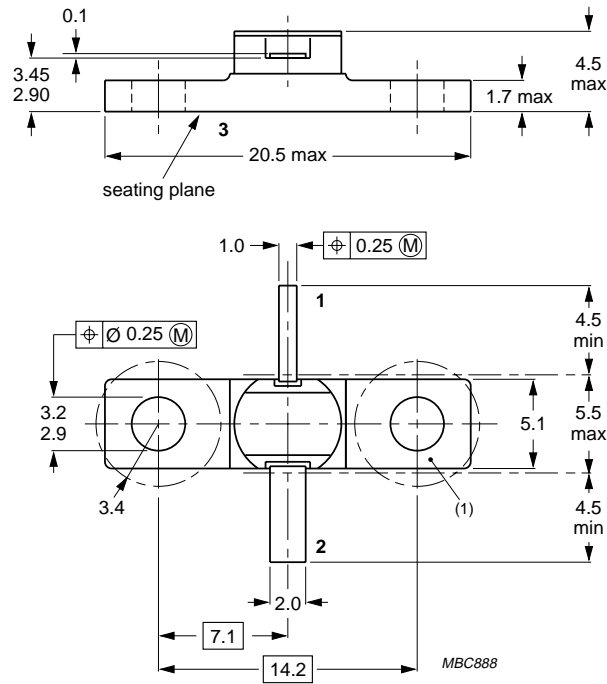
**Table 1** Scattering parameters:  $V_{CE} = 16\text{ V}$ ;  $I_C = 400\text{ mA}$  ( $V_{CE}$  and  $I_C$  regulated);  $T_{mb} = 25\text{ °C}$ ;  $Z_o = 50\ \Omega$ ; typical values. (The figures given between brackets are values in dB).

f (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)
500	0.94	176	0.017 (-35.4)	43	2.79 (8.9)	81	0.49	-173
600	0.94	174	0.018 (-34.7)	46	2.39 (7.6)	77	0.54	-173
700	0.94	173	0.019 (-34.4)	47	2.07 (6.3)	72	0.52	-176
800	0.93	172	0.020 (-34.1)	49	1.85 (5.3)	68	0.52	-177
900	0.93	170	0.021 (-33.8)	49	1.66 (4.4)	64	0.53	-179
1000	0.93	168	0.022 (-33.3)	50	1.50 (3.5)	60	0.53	179
1100	0.92	167	0.023 (-32.6)	50	1.39 (2.9)	57	0.53	179
1200	0.93	166	0.026 (-31.6)	50	1.31 (2.4)	53	0.54	177
1300	0.93	164	0.029 (-30.6)	49	1.23 (1.8)	49	0.54	176
1400	0.93	167	0.032 (-29.9)	54	1.16 (1.3)	48	0.55	179
1500	0.93	163	0.037 (-28.7)	54	1.11 (0.9)	43	0.54	176
1600	0.93	162	0.040 (-27.9)	53	1.07 (0.6)	39	0.55	175
1700	0.93	161	0.042 (-27.5)	51	1.03 (0.3)	35	0.55	176
1800	0.92	159	0.043 (-27.3)	49	0.99 (-0.1)	30	0.56	174
2000	0.88	151	0.046 (-26.7)	46	0.99 (-0.1)	22	0.56	170
2200	0.89	148	0.052 (-25.7)	43	0.92 (-0.7)	14	0.57	168
2400	0.90	147	0.059 (-24.6)	41	0.88 (-1.1)	9	0.58	168
2600	0.90	147	0.069 (-23.2)	38	0.90 (-0.9)	1	0.59	168
2800	0.87	142	0.073 (-22.8)	32	0.88 (-1.1)	-8	0.60	169
3000	0.83	134	0.075 (-22.5)	26	0.90 (-0.9)	-18	0.61	168
3200	0.82	129	0.077 (-22.2)	21	0.87 (-1.2)	-27	0.63	166
3400	0.83	130	0.085 (-21.4)	18	0.90 (-1.0)	-37	0.65	165
3600	0.80	130	0.091 (-20.8)	11	0.91 (-0.8)	-50	0.69	165
3800	0.73	127	0.091 (-20.8)	3	0.94 (-0.5)	-64	0.74	164
4000	0.69	122	0.087 (-21.2)	-7	0.95 (-0.5)	-82	0.79	162
4200	0.67	122	0.078 (-22.2)	-15	0.89 (-1.0)	-100	0.84	157
4400	0.69	126	0.071 (-23.0)	-19	0.83 (-1.7)	-121	0.89	150
4600	0.72	130	0.059 (-24.6)	-18	0.70 (-3.1)	-141	0.92	143
4800	0.76	128	0.054 (-25.4)	-11	0.60 (-4.4)	-160	0.94	136

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PACKAGE OUTLINE



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

(1) Flatness of this area ensures full thermal contact with bolt head.

Fig.4 SOT440A.

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**DEFINITIONS**

<b>Data Sheet Status</b>	
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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

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