

DATA SHEET

LTE42012R

NPN microwave power transistor

Product specification
Supersedes data of June 1992

1997 Feb 21

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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
- Input matching cell improves input impedance and allows an easier design of wideband circuits.

APPLICATIONS

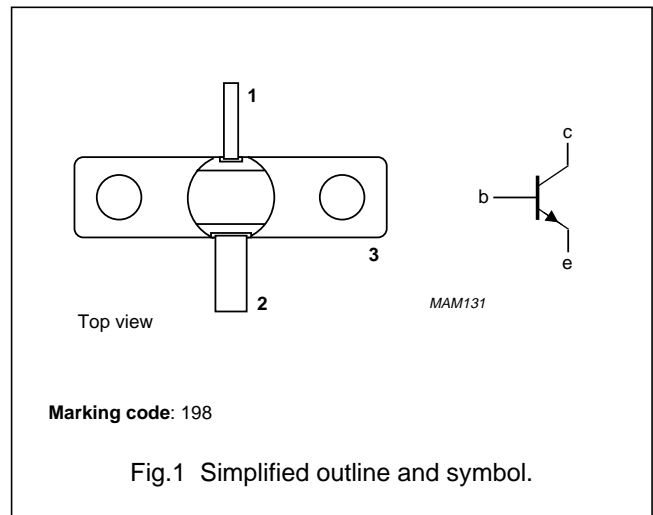
- Common emitter class-A power amplifiers up to 4.2 GHz in CW conditions for military and professional applications.

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 $T_{mb} = 25\text{ }^{\circ}\text{C}$ in a common emitter class-A selective amplifier.

MODE OF OPERATION	f (GHz)	V _{CE} (V)	I _C (mA)	P _{L1} (W)	G _{po} (dB)	Z _i (Ω)	Z _L (Ω)
Class-A (CW)	4.2	16	400	≥1	≥6	7.5 + j12	4 - j8

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.

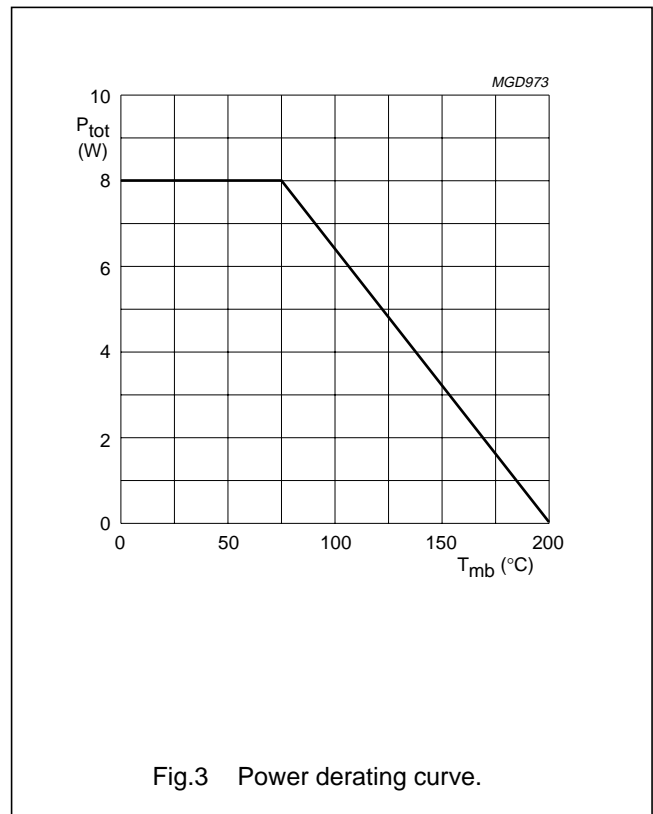
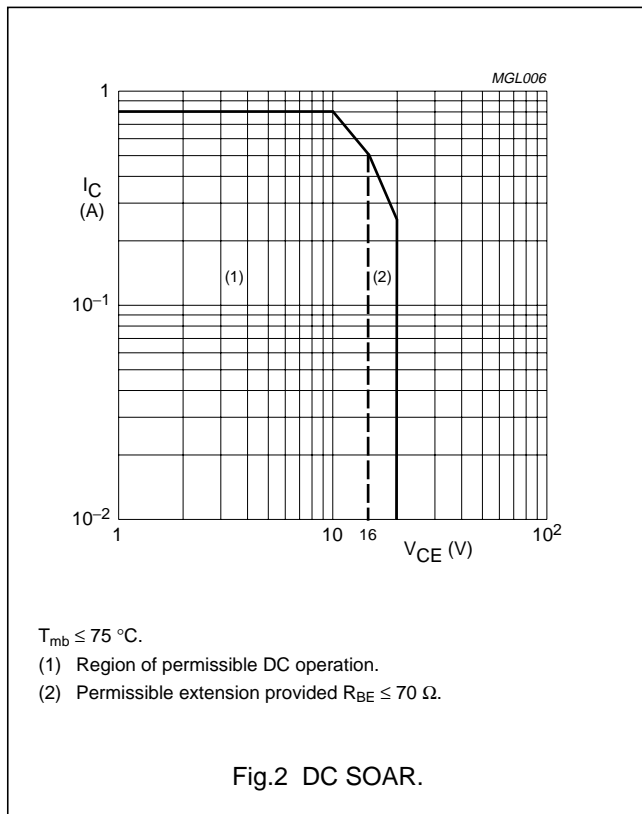
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LIMITING VALUES

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	$R_{BE} = 70 \Omega$	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
I_C	collector current (DC)		–	800	mA
P_{tot}	total power dissipation	$T_{mb} \leq 75 \text{ }^\circ\text{C}$	–	8	W
T_{stg}	storage temperature		–65	+200	$^\circ\text{C}$
T_j	operating junction temperature		–	200	$^\circ\text{C}$
T_{sld}	soldering temperature	at 0.1 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	$T_j = 75\text{ °C}$	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	$V_{CB} = 20\text{ V}$; $I_E = 0$	–	–	200	μA
I_{EBO}	emitter cut-off current	$V_{EB} = 1.5\text{ V}$; $I_C = 0$	–	–	600	nA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}$; $I_C = 400\text{ mA}$	15	–	100	
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 Common-emitter scattering parameters: $V_{CE} = 16\text{ V}$; $I_C = 400\text{ mA}$; $T_{mb} = 25\text{ °C}$; $Z_o = 50\ \Omega$; typical values.

f (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)
2000	0.84	163	0.049	64	0.96	47.2	0.60	179.3
2100	0.84	161	0.051	62.7	0.94	43.3	0.59	178.0
2200	0.84	159	0.054	60.4	0.93	39.8	0.59	175.6
2300	0.85	158	0.055	58.8	0.91	36.2	0.59	174.2
2400	0.85	156	0.057	57.5	0.91	32.2	0.60	172.6
2500	0.85	155	0.060	56.1	0.90	29.1	0.60	171.1
2600	0.85	154	0.064	54.9	0.89	24.6	0.60	169.8
2700	0.85	153	0.067	53.1	0.89	21.2	0.60	168.6
2800	0.85	152	0.071	51.3	0.89	17.2	0.61	167.1
2900	0.84	150	0.073	49.5	0.90	13.8	0.62	165.7
3000	0.83	149	0.076	48.0	0.90	9.3	0.62	164.7
3100	0.82	149	0.080	46.0	0.91	5.2	0.63	163.8
3200	0.80	147	0.084	44.1	0.92	0.6	0.64	163.0
3300	0.78	146	0.088	40.5	0.93	-4.3	0.65	161.5
3400	0.76	145	0.091	36.1	0.95	-9.7	0.67	160.9
3500	0.74	144	0.093	34.4	0.97	-16.1	0.69	159.6
3600	0.71	143	0.095	30.7	0.98	-23.2	0.70	158.3
3700	0.70	142	0.095	26.3	0.99	-30.6	0.73	156.2
3800	0.67	142	0.093	21.6	0.99	-37.9	0.76	153.6
3900	0.66	142	0.091	17.0	1.00	-46.6	0.79	150.7
4000	0.64	142	0.088	13.2	0.98	-55.8	0.82	147.0
4100	0.64	142	0.084	9.7	0.95	-64.9	0.85	143.1
4200	0.65	143	0.077	7.0	0.91	-73.8	0.88	138.4
4300	0.67	143	0.068	5.9	0.86	-82.6	0.90	133.6
4400	0.69	143	0.060	8.2	0.81	-92.3	0.93	129.3
4500	0.72	141	0.054	13.8	0.74	-101.7	0.94	124.9
4600	0.75	139	0.050	20.5	0.68	-110.6	0.95	120.1
4700	0.76	137	0.050	31.2	0.61	-119.7	0.96	116.5
4800	0.78	135	0.054	43.5	0.56	-129.1	0.97	113.5
4900	0.79	133	0.061	46.6	0.50	-139.5	0.97	110.1
5000	0.77	130	0.068	54.3	0.44	-148.6	0.97	106.7

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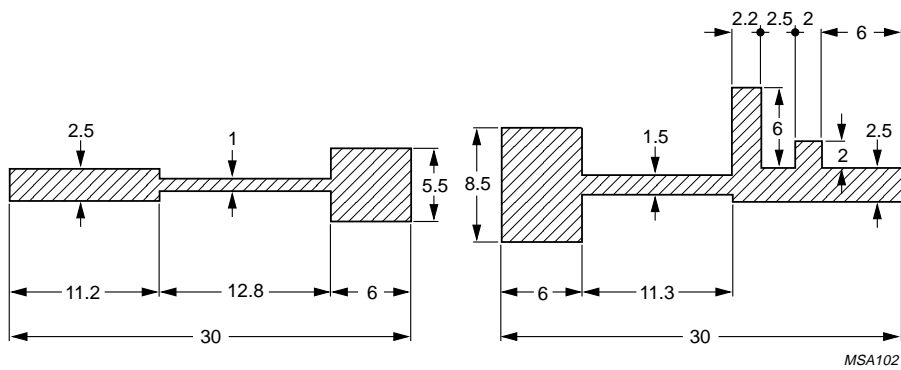
APPLICATION INFORMATION

Microwave performance up to $T_{mb} = 25\text{ }^{\circ}\text{C}$ in a common emitter class-A selective circuit; note 1.

MODE OF OPERATION	f (GHz)	V _{CE} (V)	I _c (mA)	P _{L1} (W)	G _{po} (dB)	Z _i (Ω)	Z _L (Ω)
Class-A	4.2	16	400	>1 typ. 1.25	>6 typ. 7	7.5 + j12	4 - j8

Note

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



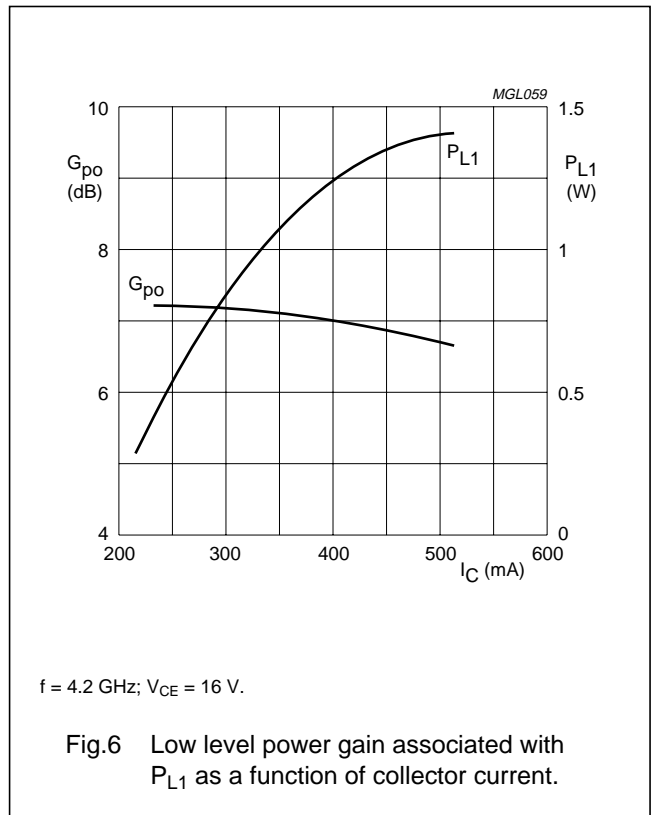
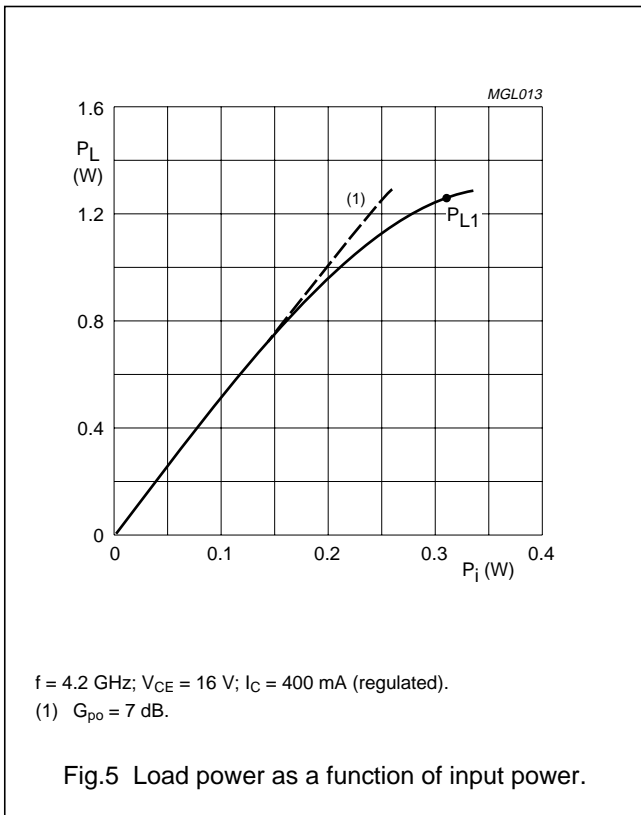
Dimensions in mm.

Input striplines on a double copper-clad printed-circuit board with PTFE fibreglass dielectric ($\epsilon_r = 2.54$); thickness: 0.8 mm.

Fig.4 Prematching test circuit board.

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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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