DATA SHEET

BLS2731-50
Microwave power transistor

Product specification
Supersedes data of 1997 Nov 05

1998 Jan 30

Philips
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Microwave power transistor BLS2731-50

FEATURES

- Suitable for short and medium pulse applications
- Internal input and output matching networks for an easy circuit design
- Emitter ballasting resistors improve ruggedness
- Gold metallization ensures excellent reliability
- Interdigitated emitter-base structure provides high emitter efficiency
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

- Common base class-C pulsed power amplifiers for radar applications in the 2.7 to 3.1 GHz band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a 2-lead rectangular flange package with a ceramic cap (SOT422A) with the common base connected to the flange.

PINNING - SOT422A

PIN	DESCRIPTION
1	collector
2	emitter
3	base; connected to flange

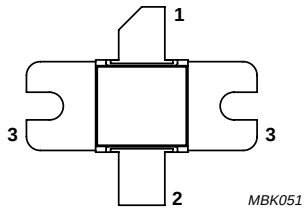


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common base class-C test circuit.

MODE OF OPERATION	f (GHz)	V_{CB} (V)	P_L (W)	G_p (dB)	η_C (%)
Pulsed, class-C	2.7 to 3.1	40	60	typ. 9	typ. 40

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.

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	–	75	V
V_{CES}	collector-emitter voltage	R_{BE} = 0	–	75	V
V_{EBO}	emitter-base voltage	open collector	–	2	V
I_{CM}	peak collector current	$t_p \leq 100$ μs; $\delta \leq 10\%$	–	6	A
P_{tot}	total power dissipation	t_p = 100 μs; δ = 10%; T_{mb} = 25 °C	–	80	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	up to 0.2 mm from ceramic cap; $t \leq 10$ s	–	235	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	t_p = 100 μs; δ = 10%; note 1	0.3	K/W

Note

1. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

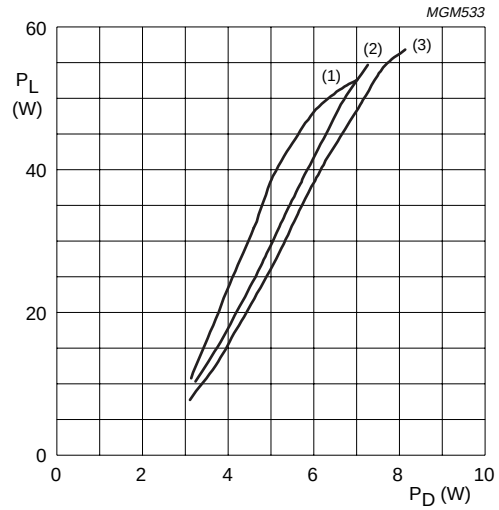
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 15 mA; open emitter	75	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 15 mA; V_{BE} = 0	75	–	–	V
I_{CBO}	collector leakage current	V_{CB} = 40 V; I_E = 0	–	–	1.5	mA
I_{CES}	collector leakage current	V_{CE} = 40 V; V_{BE} = 0	–	–	3	mA
I_{EBO}	emitter leakage current	V_{EB} = 1.5 V; I_C = 0	–	–	0.3	mA
h_{FE}	DC current gain	V_{CB} = 5 V; I_C = 1.5 A	40	–	–	
C_c	collector capacitance (die only)	V_{CE} = 1 V; $I_E = i_e$ = 0; f = 1 MHz	–	30	–	pF

APPLICATION INFORMATION

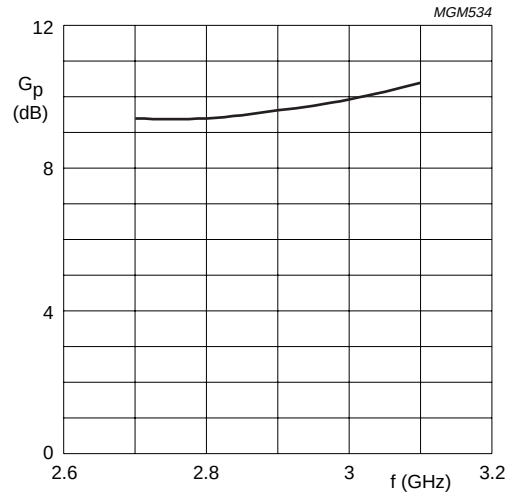
RF performance at T_h = 25 °C in a common-base test circuit.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
Class-C; t_p = 100 μs; δ = 10%	2.7 to 3.1	40	≥50 typ. 60	≥8 typ. 9	≥35 typ. 40



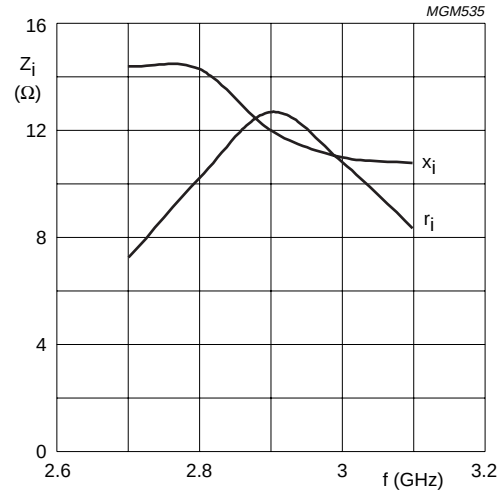
V_{CB} = 40 V; class-C; t_p = 100 µs; δ = 10%.
(1) f = 3.1 GHz.
(2) f = 2.7 GHz.
(3) f = 2.9 GHz.

Fig.2 Load power as a function of drive power; typical values.



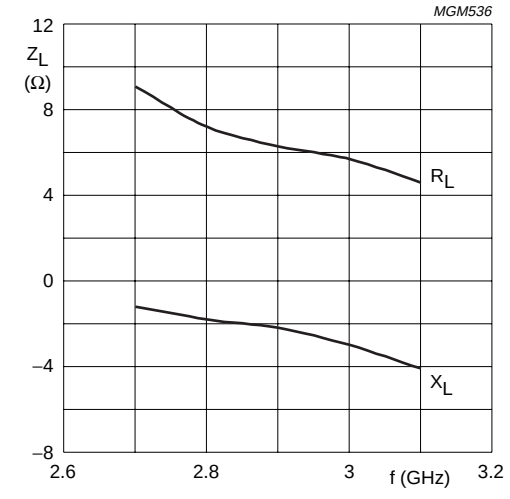
V_{CB} = 40 V; class-C; P_L = 50 W; t_p = 100 µs; δ = 10%.

Fig.3 Power gain as function of frequency; typical values.



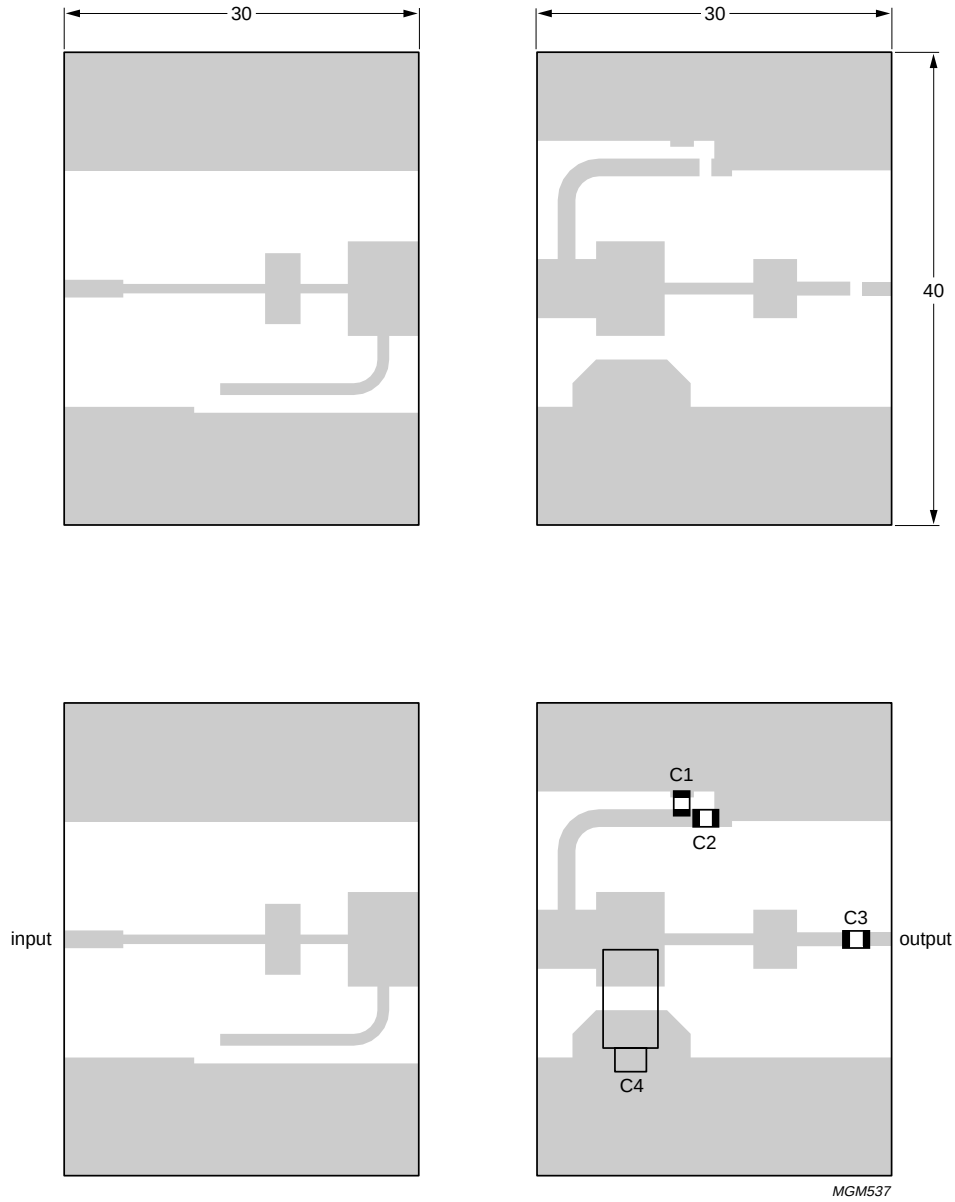
V_{CB} = 40 V; class-C; P_L = 50 W.

Fig.4 Input impedance as function of frequency (series components); typical values.



V_{CB} = 40 V; class-C; P_L = 50 W.

Fig.5 Load impedance as function of frequency (series components); typical values.



Dimensions in mm.

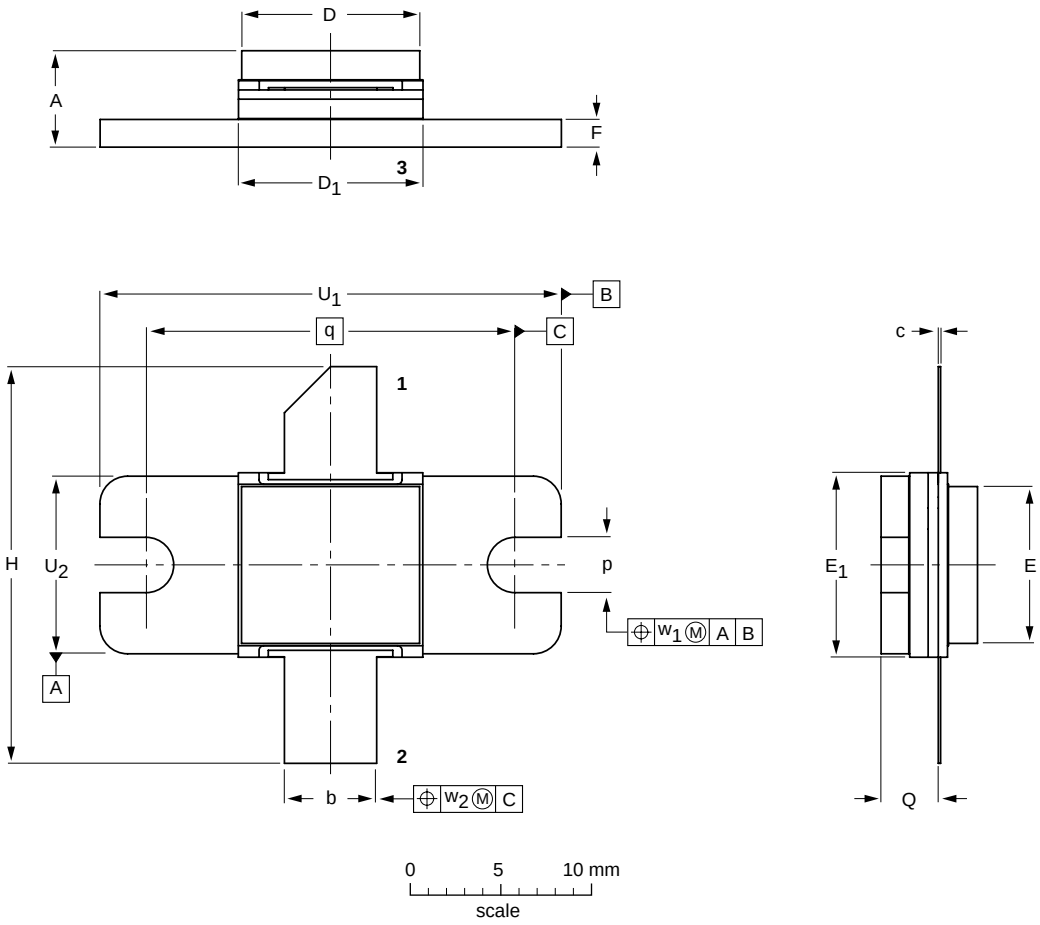
The components are situated on one side of the copper-clad printed-circuit board with Duroid dielectric (ε_r = 2.2), thickness 0.38 mm. The other side is unetched and serves as a ground plane.

C1 = ATC 200A 10 nF
C2 = ATC 100A 10 pF
C3 = ATC 700A 150 pF
C4 = Tekelec trimmer 37281SL 0.4 to 2.5 pF.

Fig.6 Component layout for 2.7 to 3.1 GHz class-C test circuit.

PACKAGE OUTLINE

Flanged hermetic ceramic package; 2 mounting holes; 2 leads **SOT422A**



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	p	Q	q	U_1	U_2	w_1	w_2
mm	5.72 4.83	5.21 4.95	0.13 0.08	9.93 9.68	10.29 10.03	8.76 8.51	10.29 10.03	1.58 1.47	21.61 21.08	3.43 3.18	3.35 2.92	16.51	22.99 22.73	9.91 9.65	0.25	0.76
inches	0.225 0.190	0.205 0.195	0.005 0.003	0.391 0.381	0.405 0.395	0.345 0.335	0.405 0.395	0.062 0.058	0.89 0.83	0.135 0.125	0.132 0.115	0.65	0.905 0.895	0.390 0.380	0.01	0.03

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT422A						97-12-24

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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