

DATA SHEET

BLS2731-110

Microwave power transistor

Product specification
Supersedes data of 1997 Nov 05

1998 Jan 30

Microwave power transistor

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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

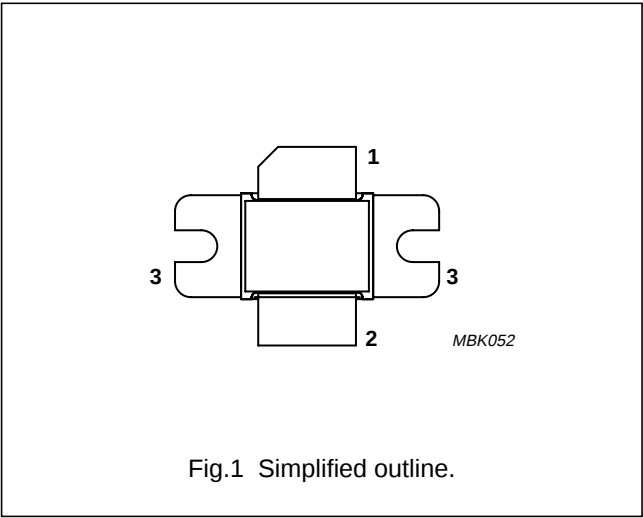
- Common base class-C pulsed power amplifiers for radar applications in the 2.7 to 3.1 GHz band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a 2-lead rectangular flange package with a ceramic cap (SOT423A) with the common base connected to the flange.

PINNING - SOT423A

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



QUICK REFERENCE DATA

RF performance at $T_h = 25\text{ }^{\circ}\text{C}$ 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	>110	>7	>35

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 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	$t_p \leq 100 \mu s$; $\delta \leq 10\%$	–	12	A
P_{tot}	total power dissipation	$t_p = 100 \mu s$; $\delta = 10\%$; $T_{mb} = 25^\circ C$	–	500	W
T_{stg}	storage temperature		–65	+200	$^\circ C$
T_j	operating junction temperature		–	200	$^\circ C$
T_{sld}	soldering temperature	up to 0.2 mm from ceramic cap; $t \leq 10 s$	–	235	$^\circ C$

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$Z_{th\ j-h}$	thermal impedance from junction to heatsink	$t_p = 100 \mu s$; $\delta = 10\%$; note 1	0.24	K/W

Note

1. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

 $T_j = 25^\circ C$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 30 mA$; open emitter	75	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 30 mA$; $V_{BE} = 0$	75	–	V
I_{CBO}	collector leakage current	$V_{CB} = 40 V$; $I_E = 0$	–	3	mA
I_{CES}	collector leakage current	$V_{CE} = 40 V$; $V_{BE} = 0$	–	6	mA
I_{EBO}	emitter leakage current	$V_{EB} = 1.5 V$; $I_C = 0$	–	0.6	mA
h_{FE}	DC current gain	$V_{CE} = 5 V$; $I_C = 3 A$	40	100	

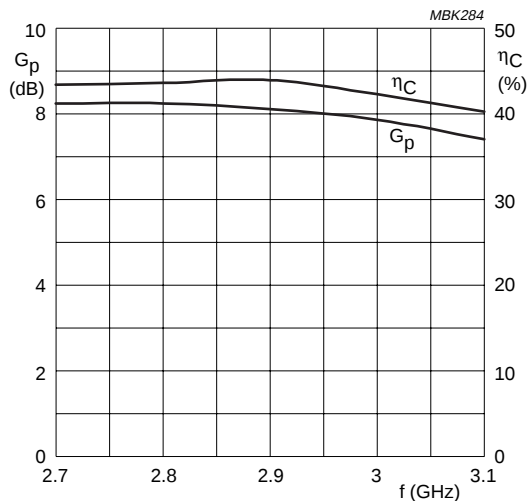
APPLICATION INFORMATION

RF performance at $T_h = 25^\circ C$ in a common base test circuit.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_c (%)
Class-C; $t_p = 100 \mu s$; $\delta = 10\%$	2.7 to 3.1	40	≥ 110	≥ 7	≥ 35
	2.7 to 2.9	40	typ. 130	typ. 8	typ. 42
	2.9 to 3.1	40	typ. 120	typ. 7.5	typ. 40

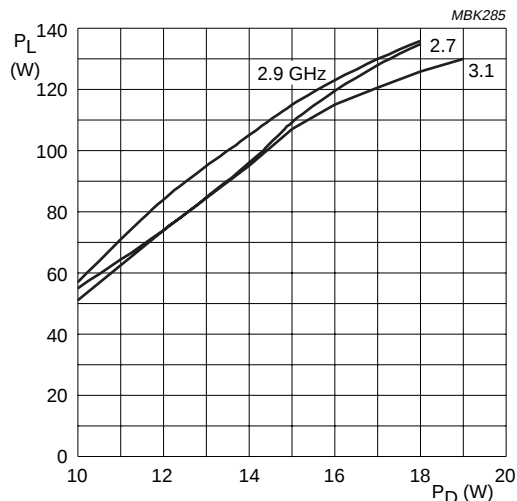
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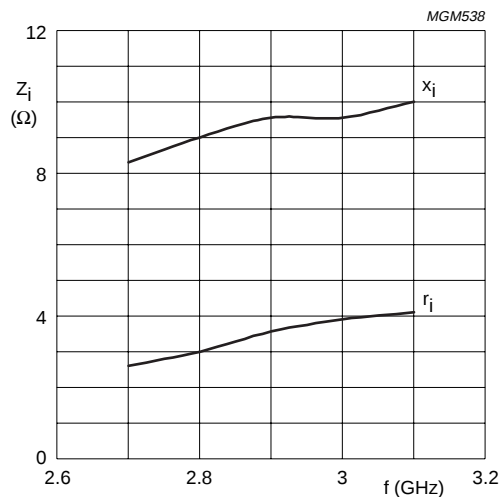
$V_{CE} = 40\text{ V}$; class-C; $t_p = 100\text{ }\mu\text{s}$; $\delta = 10\%$.

Fig.2 Power gain and efficiency as functions of frequency; typical values.



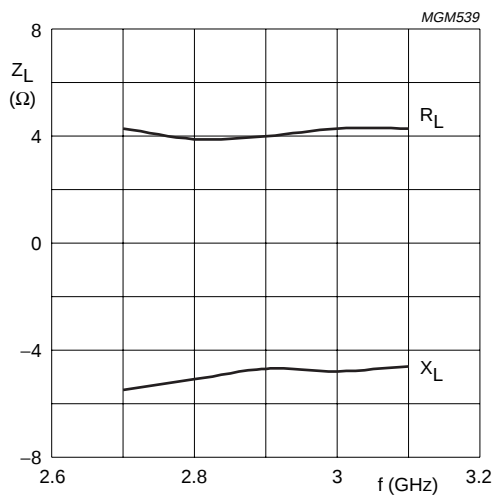
$V_{CE} = 40\text{ V}$; class-C; $t_p = 100\text{ }\mu\text{s}$; $\delta = 10\%$.

Fig.3 Load power as a function of drive power; typical values.



$V_{CB} = 40\text{ V}$; class-C; $P_L = 110\text{ W}$.

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

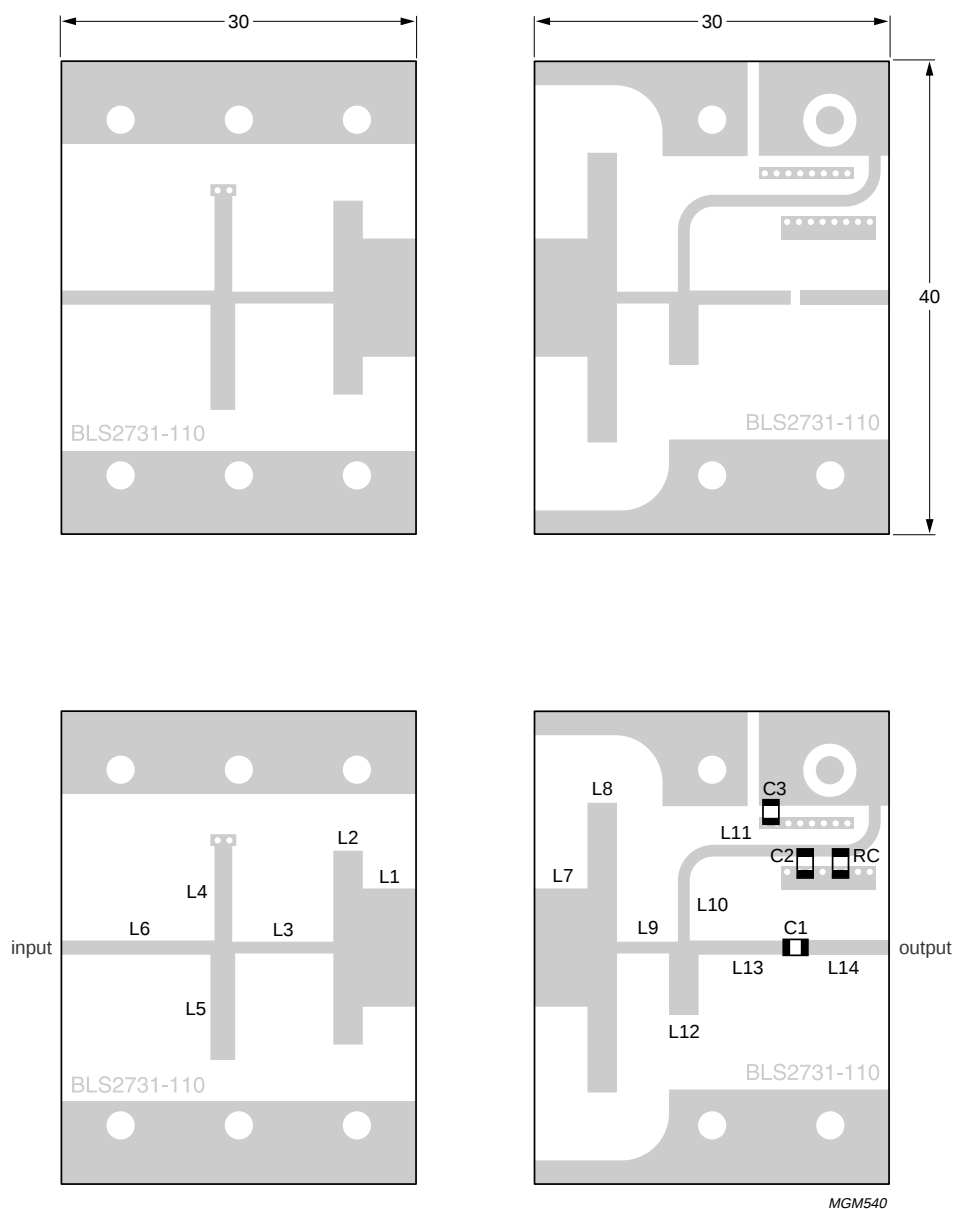


$V_{CB} = 40\text{ V}$; class-C; $P_L = 110\text{ W}$.

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

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Dimensions in mm.

The components are located on one side of the copper-clad printed-circuit board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

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

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List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C2	multilayer ceramic chip capacitor; note 1	100 pF		
C3	multilayer ceramic chip capacitor	100 nF		
RC	multilayer ceramic chip capacitor in series with SMD resistor	100 nF + 5 Ω		
L1	stripline; note 2		length 4.5 mm width 10 mm	
L2	stripline; note 2		length 2.5 mm width 16.4 mm	
L3	stripline; note 2		length 8.3 mm width 1 mm	
L4	stripline; note 2		length 8 mm width 1.5 mm	
L5	stripline; note 2		length 2 mm width 8.9 mm	
L6	stripline; note 2		length 12.7 mm width 1.2 mm	
L7	stripline; note 2		length 4.5 mm width 10 mm	
L8	stripline; note 2		length 2.5 mm width 24.4 mm	
L9	stripline; note 2		length 4.4 mm width 1 mm	
L10	stripline; note 2		length 5.2 mm width 1 mm	
L11	stripline; note 2		length 9.3 mm width 1 mm	
L12	stripline; note 2		length 2.5 mm width 6 mm	
L13	stripline; note 2		length 7.8 mm width 1.2 mm	
L14	stripline; note 2		length 7.5 mm width 1.2 mm	

Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. The striplines are on double-clad printed-circuit board with Duroid dielectric ($\epsilon_r = 2.2$); thickness = 0.38 mm.

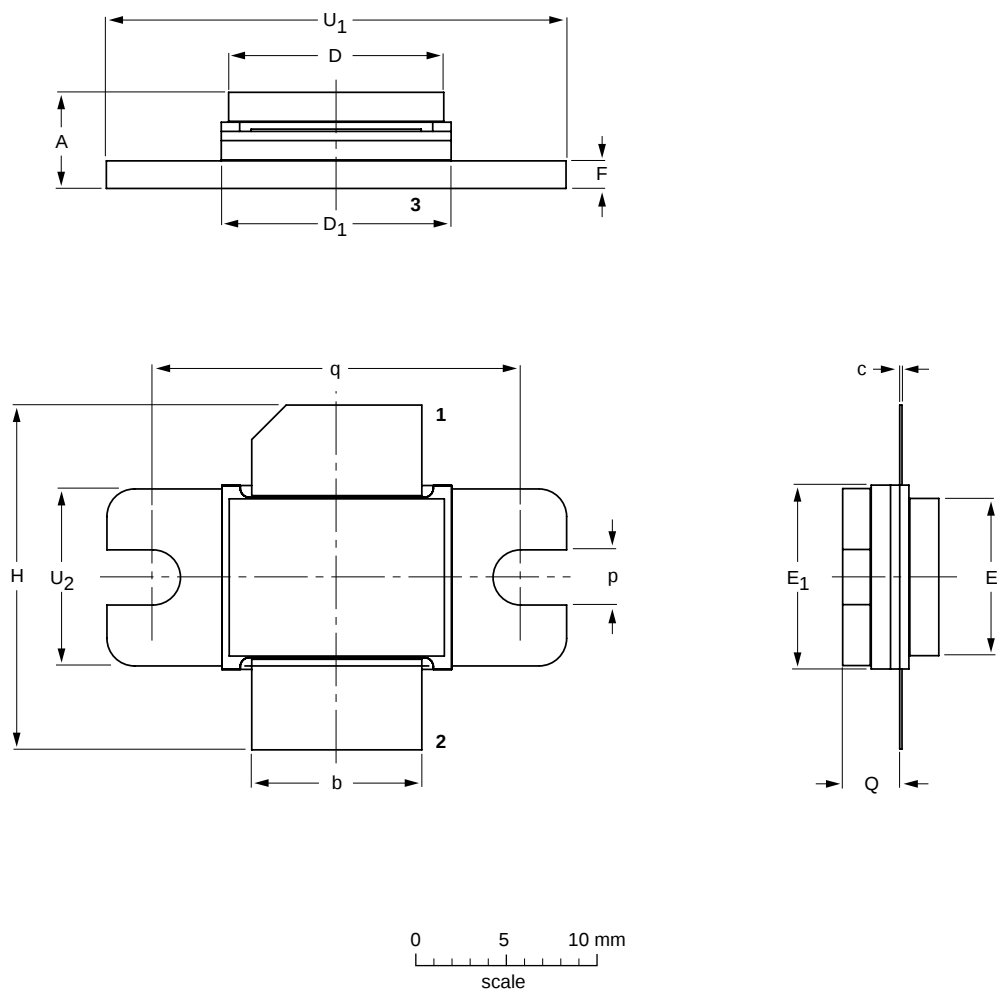
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PACKAGE OUTLINE

Flanged hermetic ceramic package; 2 mounting holes; 2 leads

SOT423A



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	c	D	D ₁	E	E ₁	F	H	p	Q	q	U ₁	U ₂
mm	5.58 5.04	9.53 9.27	0.16 0.10	12.02 11.76	12.83 12.57	8.82 8.56	10.29 10.03	1.58 1.46	19.18 18.92	3.43 3.17	3.42 2.88	16.64 16.38	22.99 22.73	9.91 9.65

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT423A						97-04-01

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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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