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Ampleon

Microwave power transistor BLS2731-110

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

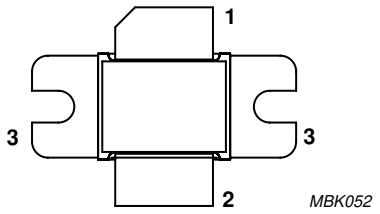


Fig.1 Simplified outline.

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	>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.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

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; $\delta \leq 10\%$	–	12	A
P_{tot}	total power dissipation	t_p = 100 μs; δ = 10%; T_{mb} = 25 °C	–	500	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	0.24	K/W

Note

1. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

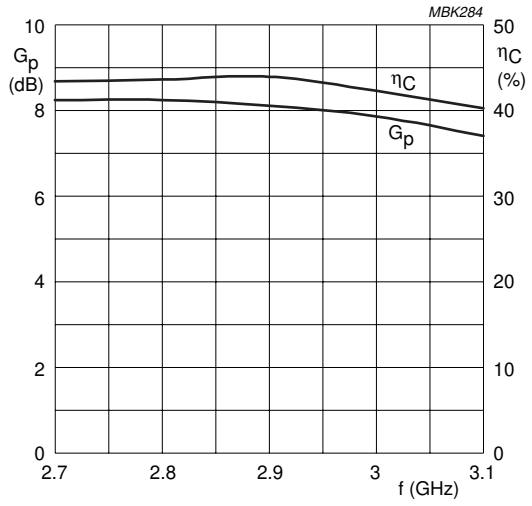
T_j = 25 °C unless otherwise specified.

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

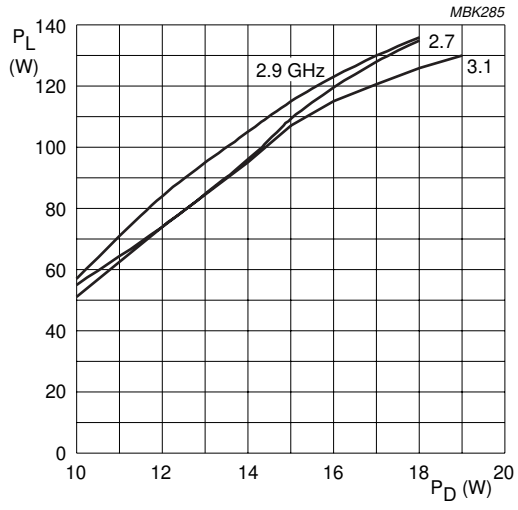
RF performance at T_h = 25 °C in a common base test circuit.

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	≥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



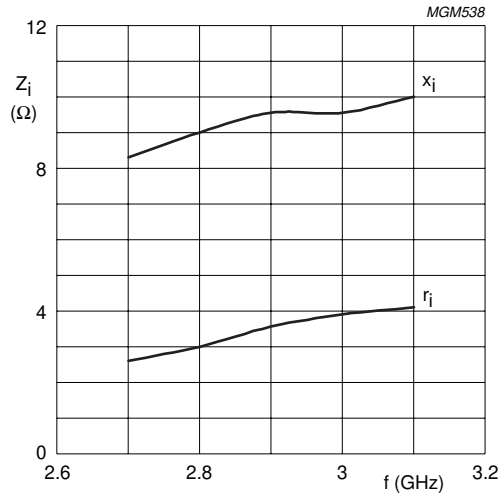
V_{CE} = 40 V; class-C; t_p = 100 μs; δ = 10%.

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



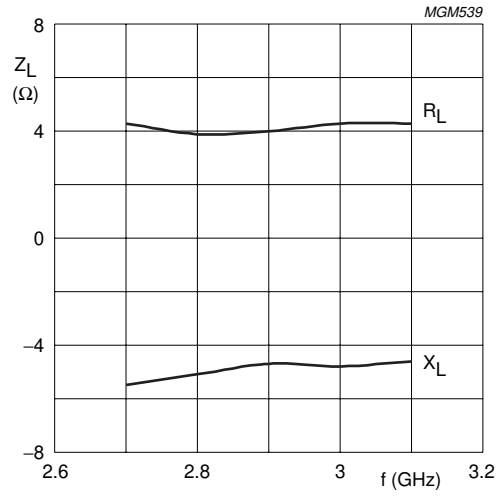
V_{CE} = 40 V; class-C; t_p = 100 μs; δ = 10%.

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



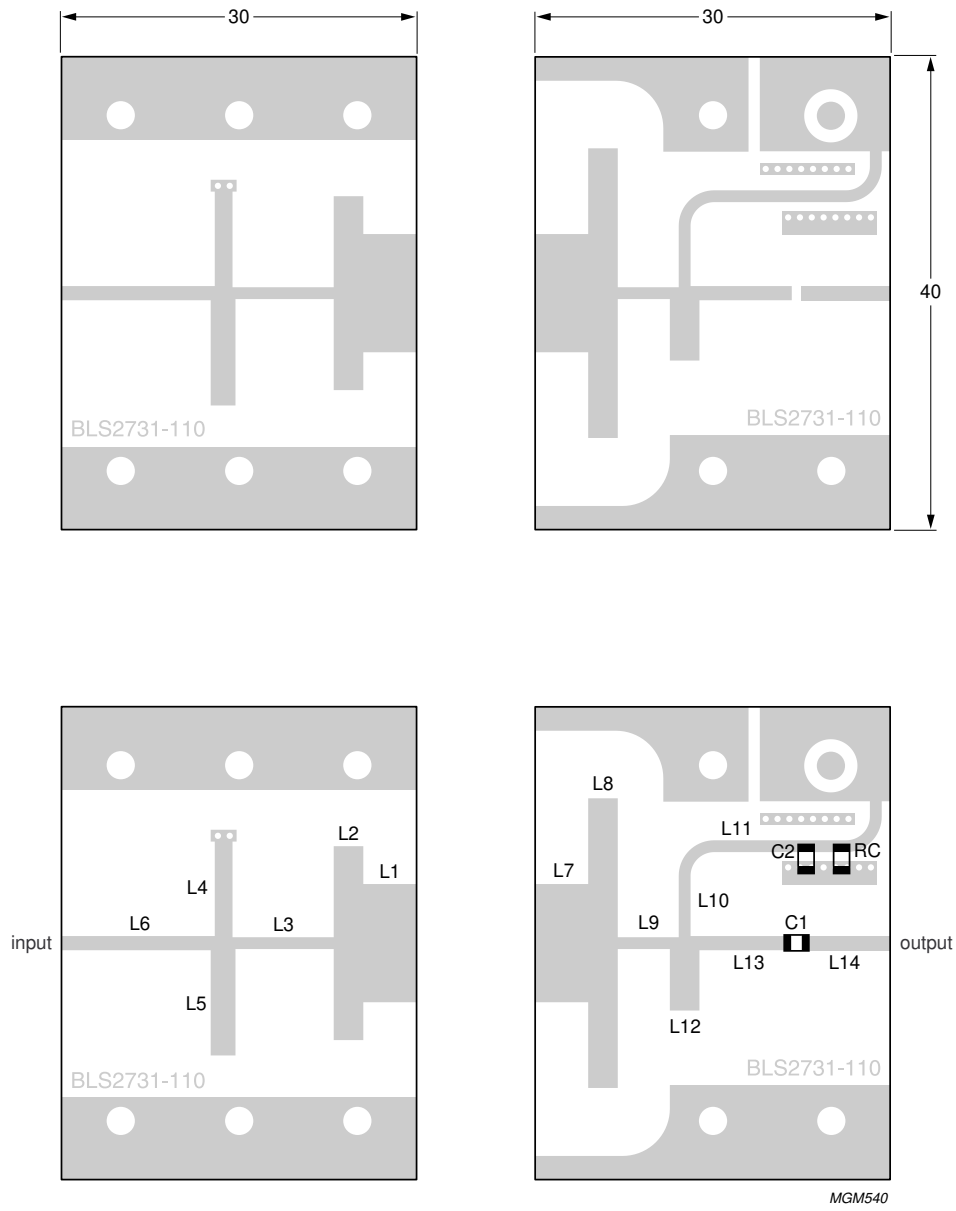
V_{CB} = 40 V; class-C; P_L = 110 W.

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



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

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



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.

List of components (see Fig.6)

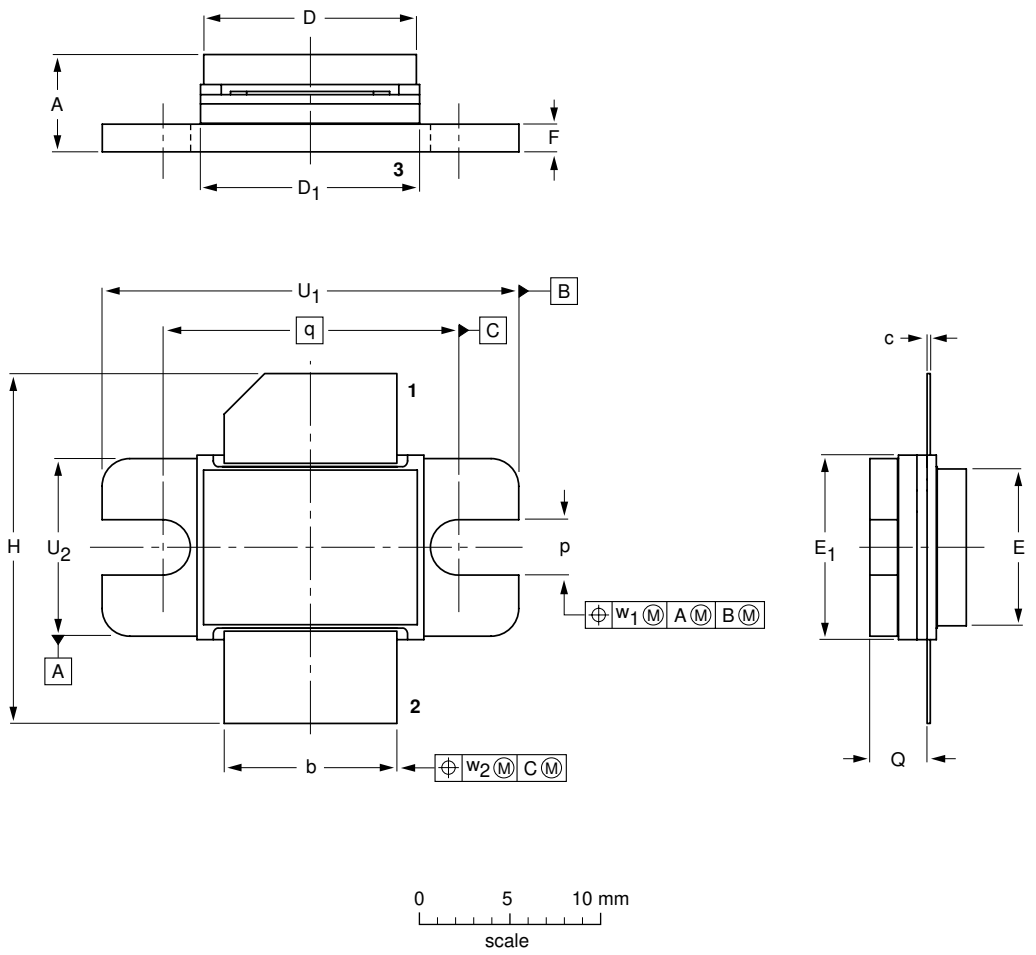
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS
C1	multilayer ceramic chip capacitor; note 1	12 pF	
C2	multilayer ceramic chip capacitor; note 1	18 pF	
RC	multilayer ceramic chip capacitor in series with SMD resistor	100 nF + 5 Ω	
L1	stripline; note 2		length 4.5 mm width 10 mm
L2	stripline; note 2		length 2.5 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 (ε_r = 2.2); thickness = 0.38 mm.

PACKAGE OUTLINE

Flanged hermetic ceramic package; 2 mounting holes; 2 leads **SOT423A**



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 4.90	9.53 9.27	0.10 0.05	12.09 11.71	12.83 12.57	8.84 8.56	10.29 10.03	1.58 1.47	19.81 18.29	3.43 3.18	3.35 2.95	16.51	22.99 22.73	9.91 9.65	0.25	0.76
inches	0.225 0.193	0.375 0.365	0.004 0.002	0.476 0.461	0.505 0.495	0.348 0.337	0.405 0.395	0.062 0.058	0.78 0.72	0.135 0.125	0.132 0.116	0.65	0.905 0.895	0.390 0.380	0.01	0.03

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT423A						99-03-29

DATA SHEET STATUS

DATA SHEET STATUS[1]	PRODUCT STATUS[2]	DEFINITIONS
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This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

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