

DATA SHEET

BLV2046 UHF power transistor

Product specification

1997 Aug 22

UHF power transistor

BLV2046

FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input and output matching to achieve high power gain and collector efficiency for an easy design of wideband circuits.

APPLICATIONS

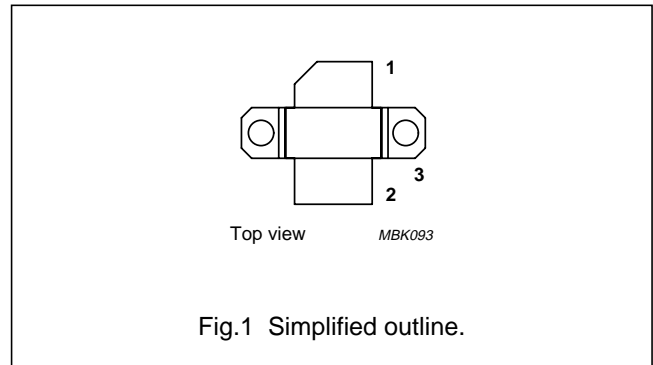
- Common emitter class-AB operation in PCN and PCS applications in the 1800 to 1990 MHz frequency range.

DESCRIPTION

NPN silicon planar transistor in a 2-lead SOT460A flange package with a ceramic cap. The emitter is connected to the flange.

PINNING - SOT460A

PIN	SYMBOL	DESCRIPTION
1	c	collector
2	b	base
3	e	emitter, connected to flange



QUICK REFERENCE DATA

RF performance at $T_h = 25\text{ }^\circ\text{C}$ in a common emitter test circuit

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_c (%)	d_{im} (dBc)
CW, class-AB	1 990	26	50	≥ 7.5	≥ 40	–
2-tone, class-AB	$f_1 = 1\,990.0$; $f_2 = 1\,990.1$	26	50 (PEP)	typ. 8	typ. 33	typ. –30

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	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	27	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	12	A
$I_{C(AV)}$	average collector current		–	12	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C}$	–	195	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j-mb}$	thermal resistance from junction to mounting-base	$P_{dis} = 195\text{ W}; T_{mb} = 25\text{ °C}$	0.9	K/W
$R_{th\ mb-h}$	thermal resistance from mounting-base to heatsink		0.2	K/W

CHARACTERISTICS $T_j = 25\text{ °C}$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 20\text{ mA}$; open emitter	65	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 60\text{ mA}$; open base	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 20\text{ mA}$; $I_B = 30\text{ mA}$; open collector	3.2	–	–	V
I_{CBO}	collector-base leakage current	$V_{CB} = 40\text{ V}$; $I_E = 0$	–	–	4	mA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}$; $I_C = 1\text{ A}$	20	–	100	
C_c	collector capacitance	$V_{CB} = 26\text{ V}$; $I_E = i_e = 0$; $f = 1\text{ MHz}$; note 1	–	60	–	pF
C_{re}	feedback capacitance	$V_{CE} = 26\text{ V}$; $I_C = 0$; $f = 1\text{ MHz}$	–	40	–	pF

Note

1. Die only.

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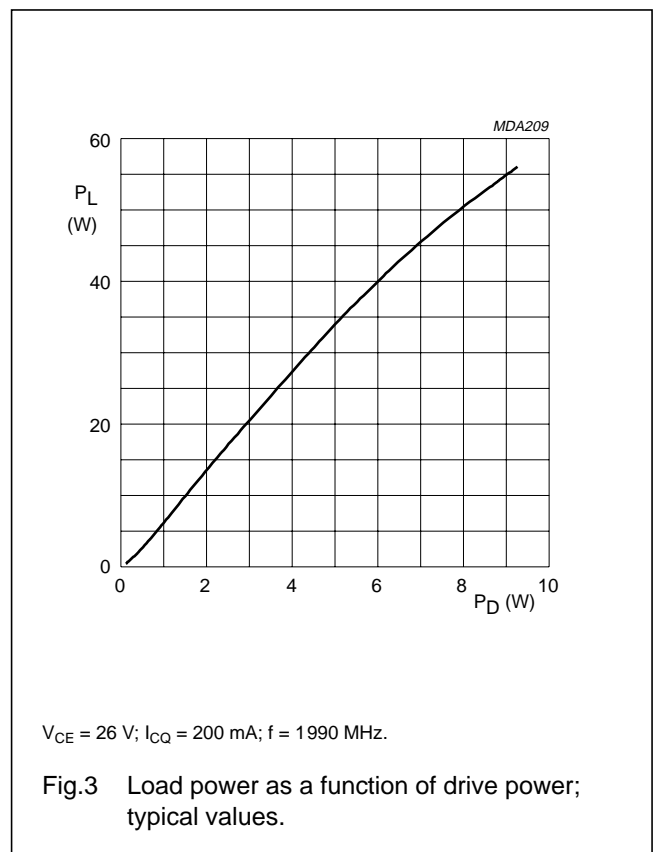
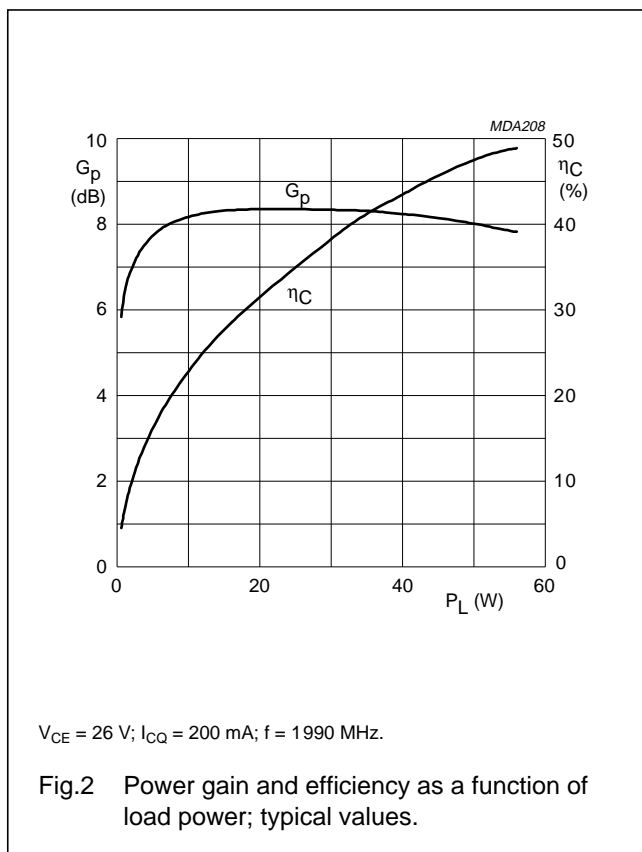
APPLICATION INFORMATION

RF performance at $T_h = 25\text{ }^\circ\text{C}$ in a common-emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_c (%)	d_{im} (dBc)
CW class-AB	1990	26	200	50	≥ 7.5	≥ 40	–
2-tone class-AB	$f_1 = 1990.0; f_2 = 1990.1$	26	200	50 (PEP)	typ. 8	typ. 33	typ. -30

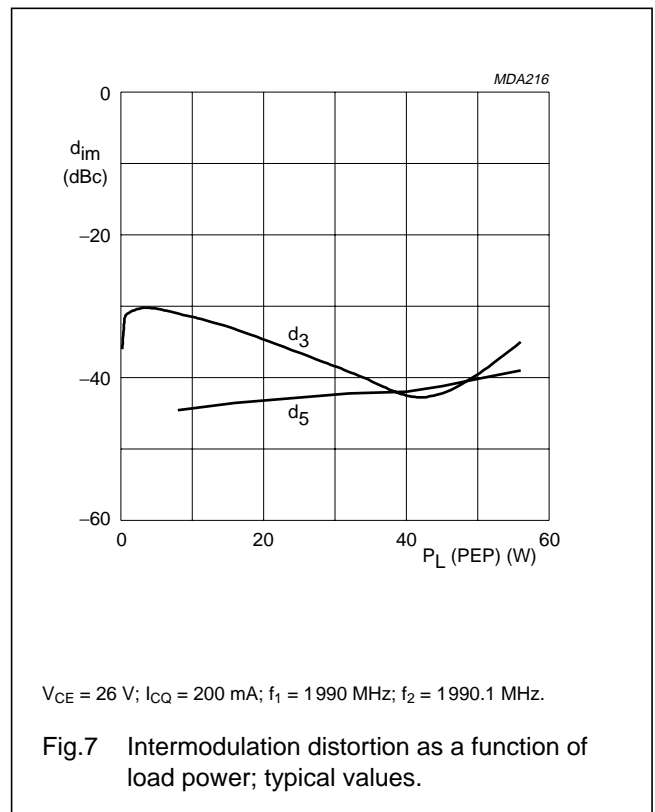
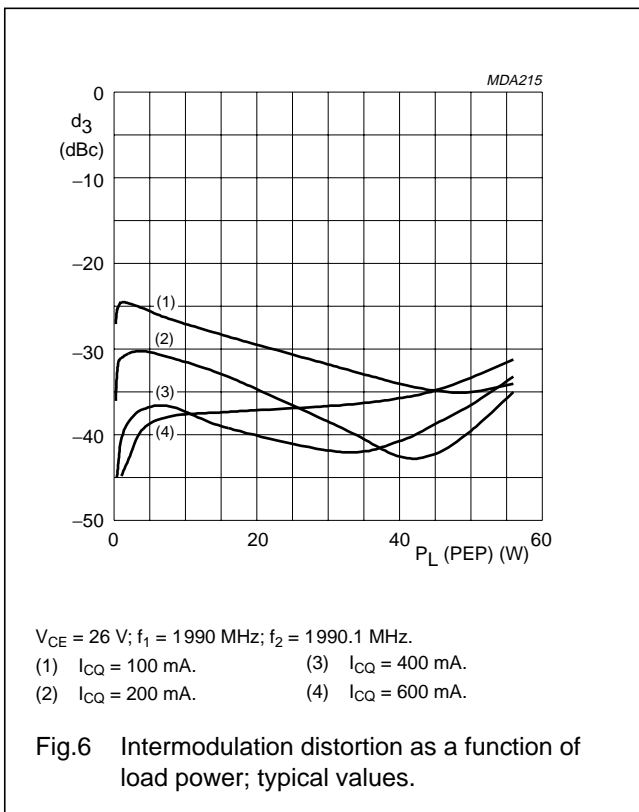
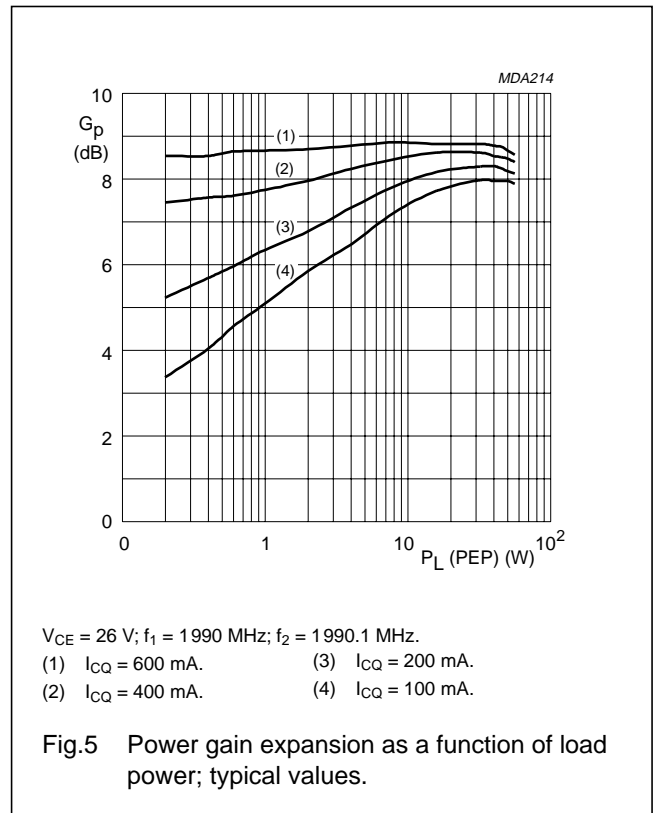
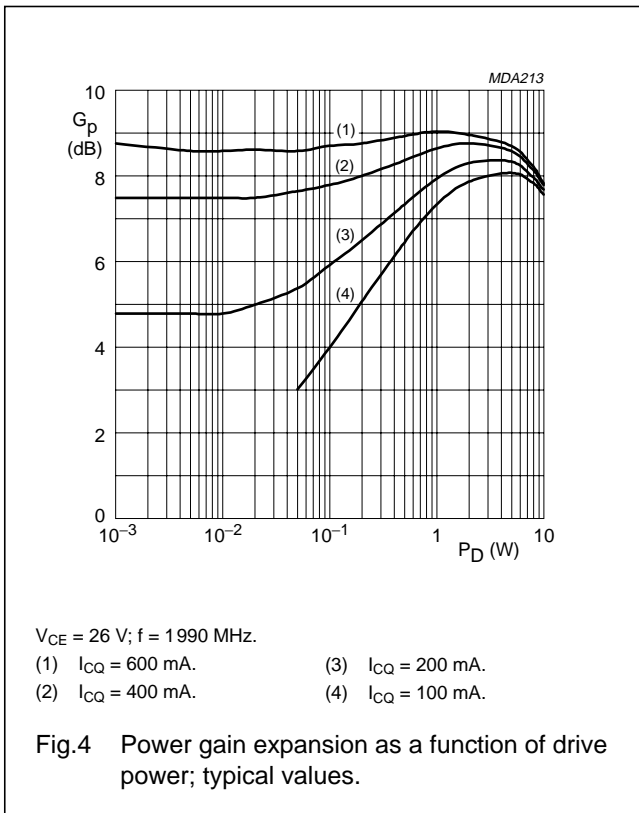
Ruggedness in class-AB operation

The BLV2046 is capable of withstanding a load mismatch corresponding to $VSWR = 2:1$ through all phases under the following conditions: $f_1 = 1990.0\text{ MHz}$; $f_2 = 1990.1\text{ MHz}$; $V_{CE} = 26\text{ V}$; $I_{CQ} = 200\text{ mA}$; $P_L = 50\text{ W (PEP)}$ and $T_h = 25\text{ }^\circ\text{C}$.



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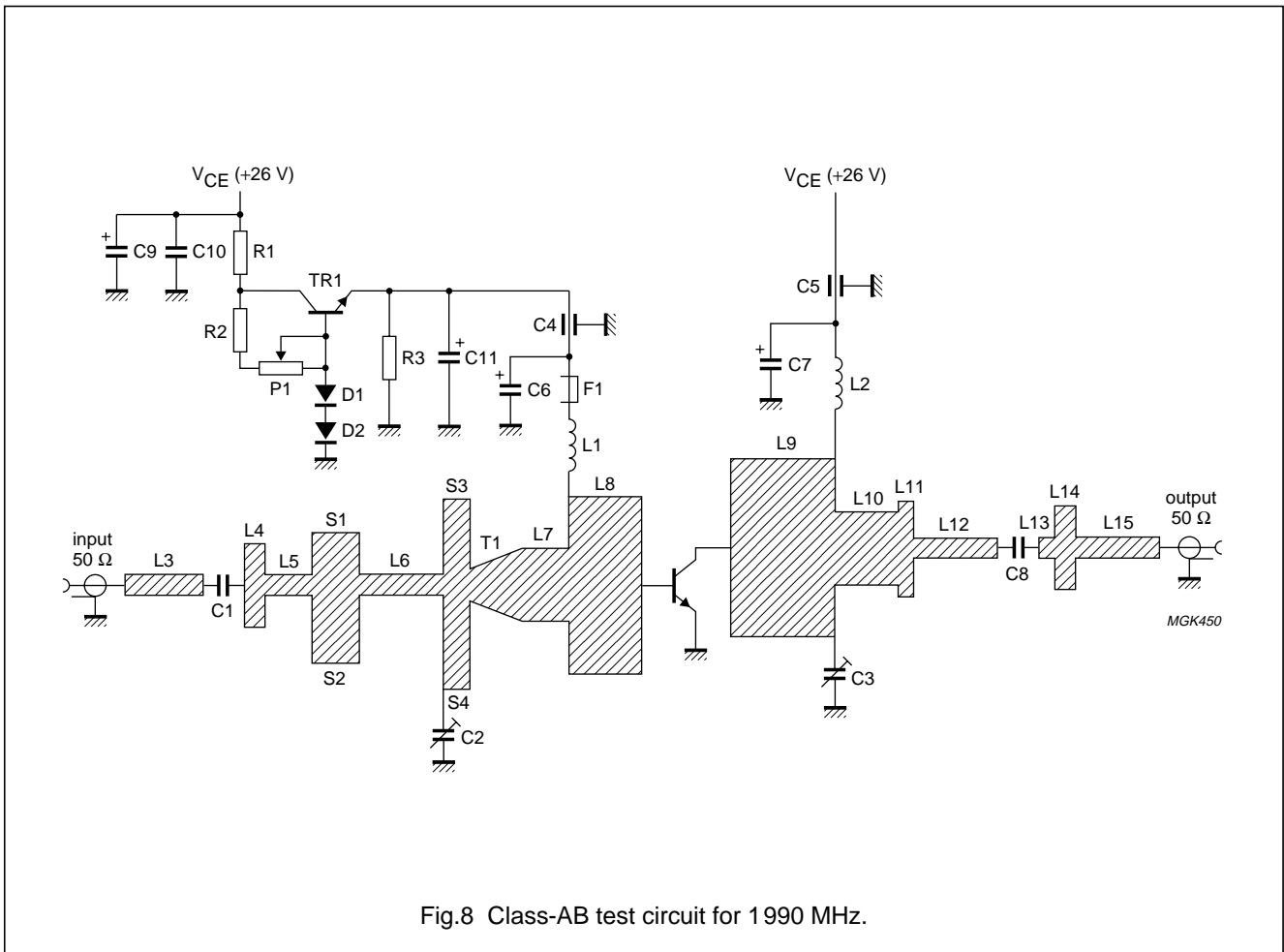


Fig.8 Class-AB test circuit for 1990 MHz.

List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C8	multilayer ceramic chip capacitor; note 1	30 pF		
C2, C3	trimmer capacitor	0.4 to 2.5 pF		
C4, C5	feedthrough bypass capacitor	1500 pF		
C6, C7	tantal SMD capacitor	10 μF; 35 V		
C9	electrolytic capacitor	10 μF; 100 V		
C10	multilayer ceramic chip capacitor	22 nF		2222 629 08223
C11	electrolytic capacitor	10 μF; 63 V		
L1	5 turns enamelled 0.5 mm copper wire		int. dia. = 4 mm; length = 6.7 mm	
L2	2 turns enamelled 0.5 mm copper wire		int. dia. = 4 mm; length = 2.7 mm	
L3	stripline; note 2	48.8 Ω	5.34 × 0.59 mm	
L4	stripline; note 2	17 Ω	1.2 × 3.23 mm	
L5	stripline; note 2	48.8 Ω	2.93 × 0.59 mm	

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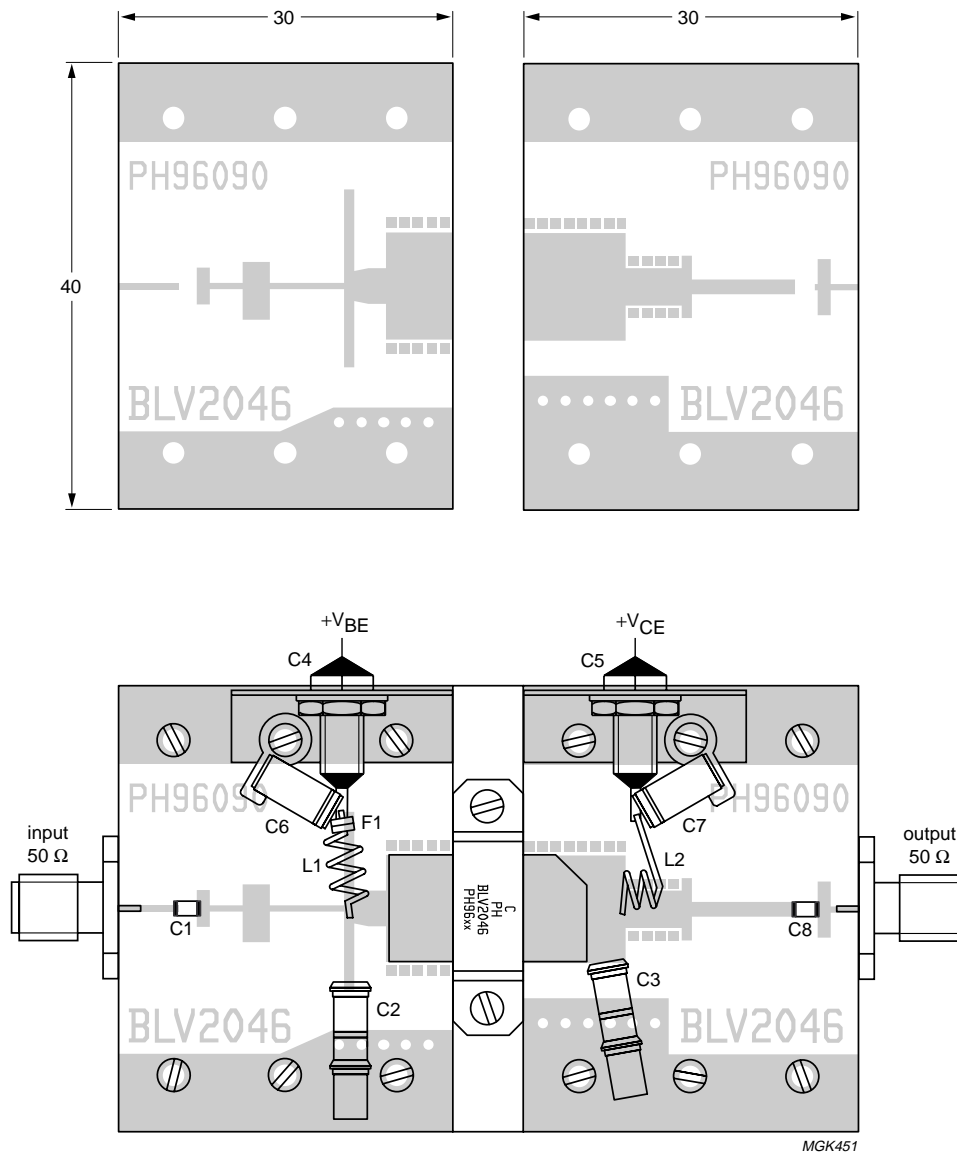
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
L6	stripline; note 2	48.8 Ω	6.63 \times 0.59 mm	
L7	stripline; note 2	17.1 Ω	1.6 \times 3.2 mm	
L8	stripline; note 2	6.8 Ω	6 \times 9.6 mm	
L9	stripline; note 2	6.8 Ω	9.11 \times 9.6 mm	
L10	stripline; note 2	16.6 Ω	5.09 \times 3.32 mm	
L11	stripline; note 2	10.9 Ω	0.85 \times 5.59 mm	
L12	stripline; note 2	31.9 Ω	9.26 \times 1.3 mm	
L13	stripline; note 2	48.8 Ω	0.24 \times 0.59 mm	
L14	stripline; note 2	11.9 Ω	1.15 \times 5.04 mm	
L15	stripline; note 2	48.8 Ω	2.5 \times 0.59 mm	
S1	stub; note 2		2.4 \times 2.17 mm	
S2	stub; note 2		2.4 \times 3.04 mm	
S3	stub; note 2		0.9 \times 8.63 mm	
S4	stub; note 2		0.9 \times 7.29 mm	
T1	taper; note 2		1.3 \times 2.7 / 3.2 mm	
F1	grade 4B1 ferrite bead			4330 030 43081
P1	linear potentiometer	5 k Ω		
R1	resistor	100 Ω , 3 W		
R2	resistor	1 k Ω , 0.25 W		
R3	resistor	56 Ω , 3 W		
TR1	transistor	BD241C		
D1	diode, note 3	BY239		
D2	diode, note 4	BY239		

Notes

1. American Technical Ceramics type 100A (C1), type 100B (C8) or capacitor of same quality.
2. The striplines are on a double copper-clad PCB with duroid 6 010 dielectric ($\epsilon_r = 10.2$); thickness 0.635 mm.
3. In thermal contact with TR1.
4. In thermal contact with DUT.

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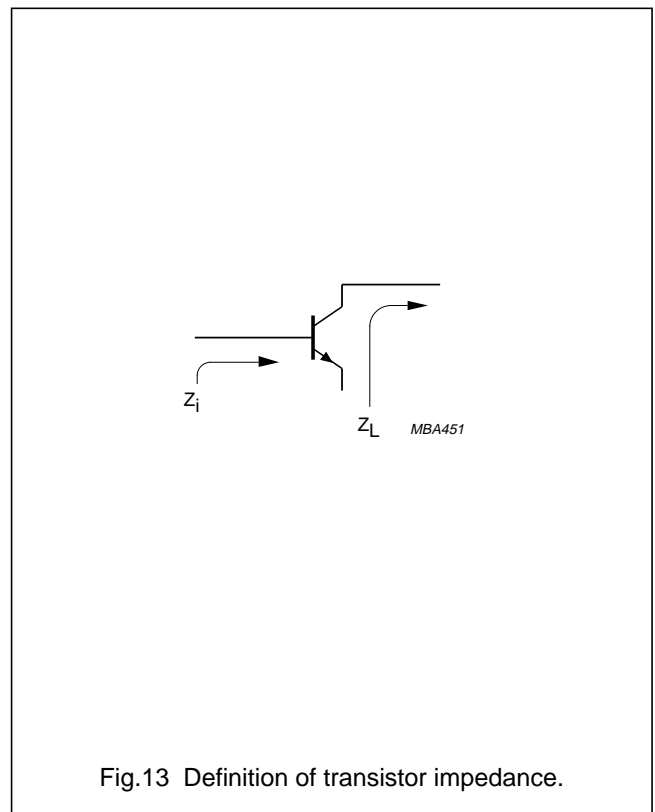
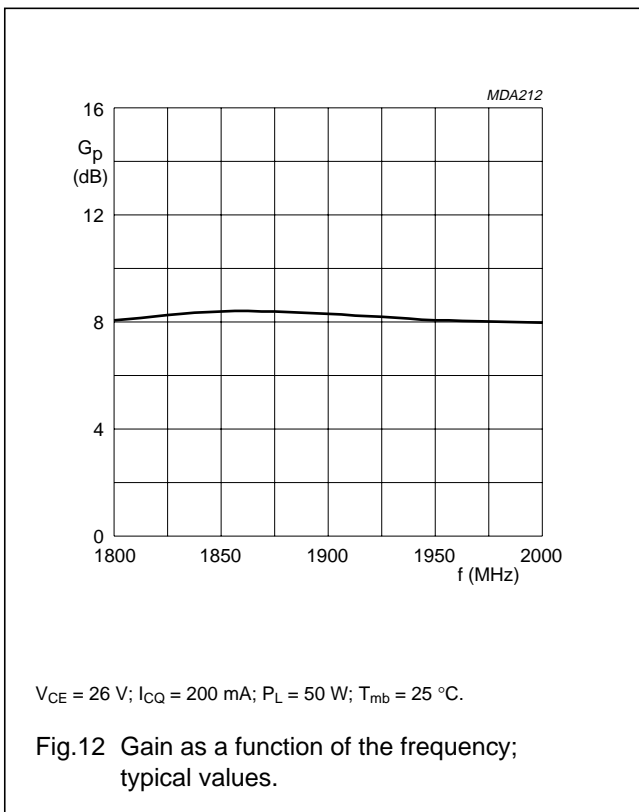
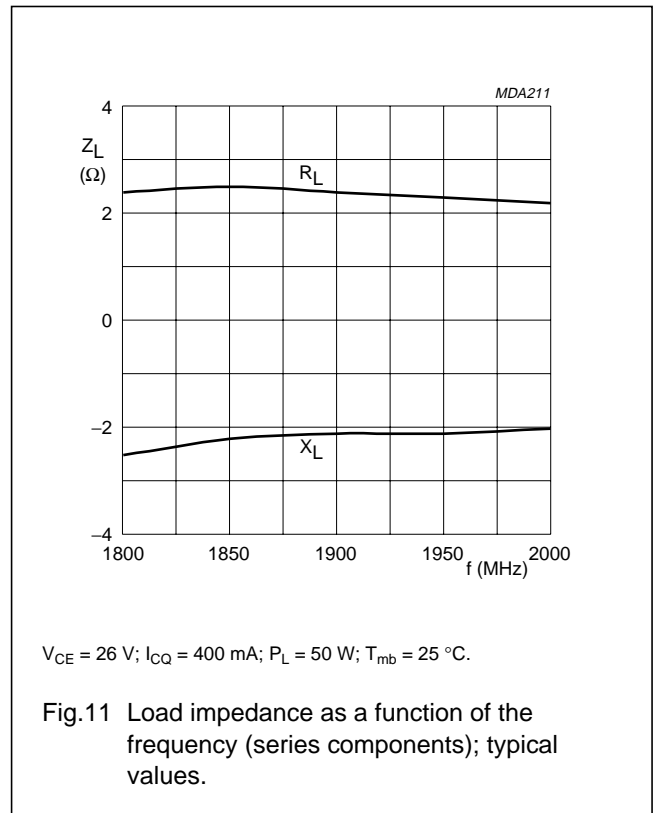
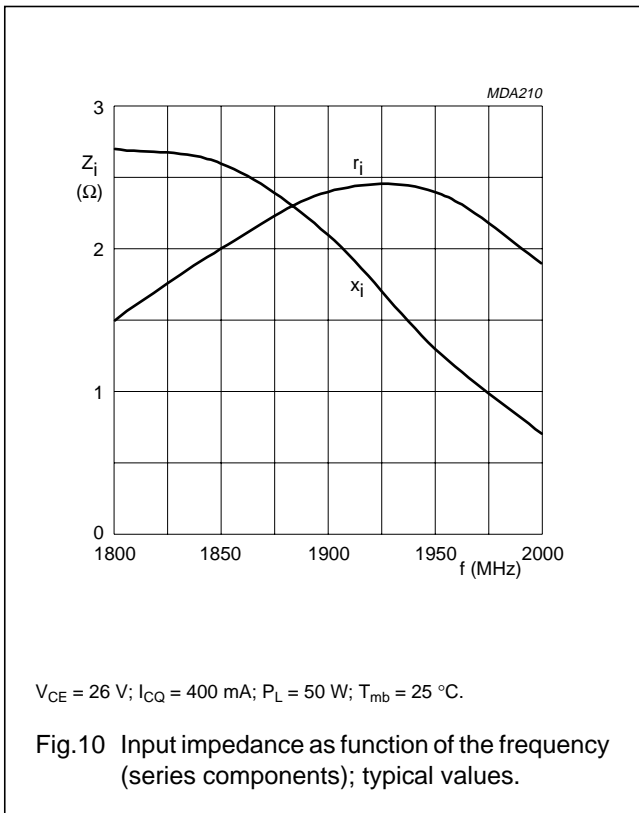
Dimensions in mm.

The components are situated on one side of the copper-clad 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.9 Component layout and printed-circuit board for 1990 MHz class-AB test circuit.

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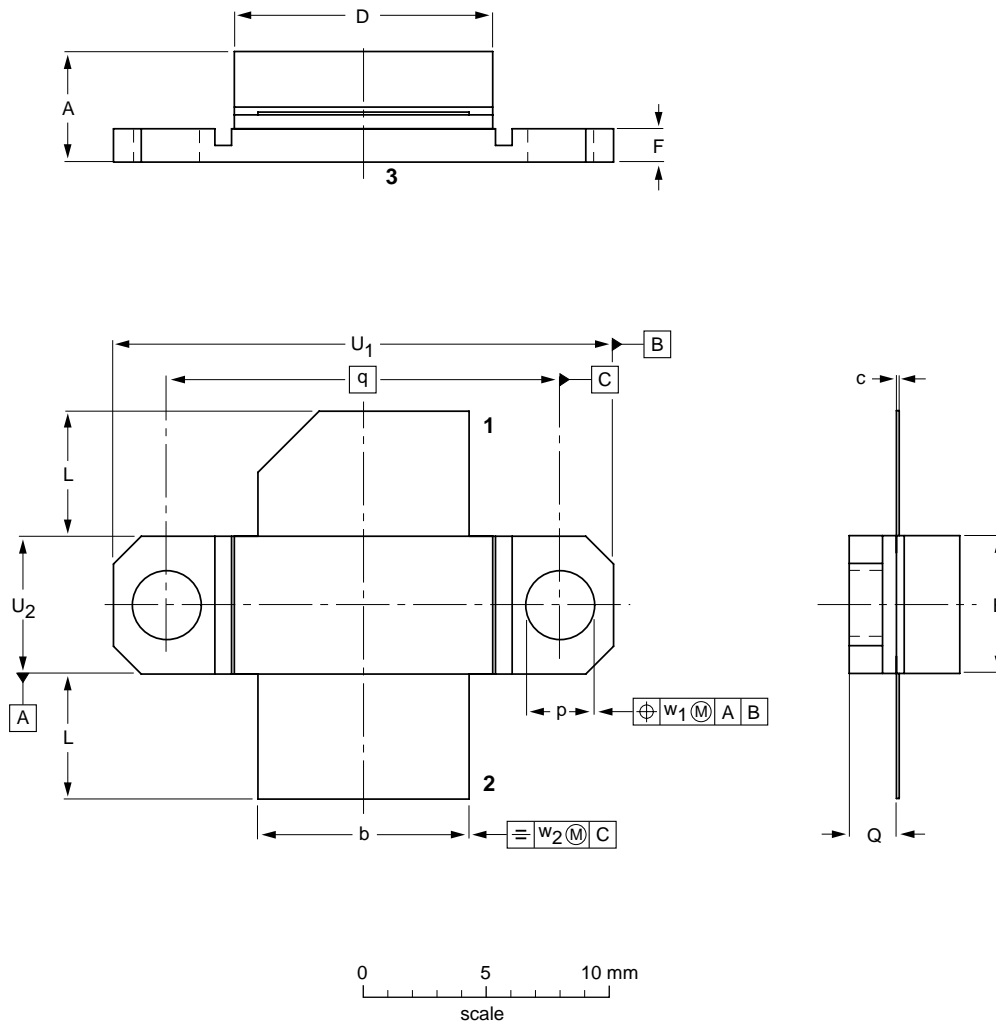
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PACKAGE OUTLINE

Flanged hermetic ceramic package; 2 mounting holes; 2 leads

SOT460A



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

UNIT	A	b	c	D	E	F	L	p	Q	q	U ₁	U ₂	w ₁	w ₂
mm	5.39 4.49	9.78 9.52	0.16 0.07	12.45 11.68	6.94 6.22	1.66 1.39	6.10 5.33	3.28 3.02	2.37 1.95	17.98	22.99 22.73	6.43 6.17	0.51	1.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT460A						97-05-23

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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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Printed in The Netherlands

127067/00/01/pp12

Date of release: 1997 Aug 22

Document order number: 9397 750 01823

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