

# DATA SHEET

## **BLV946** UHF power transistor

Product specification  
Supersedes data of 1995 Jun 29

1997 Oct 30

# UHF power transistor

# BLV946

### FEATURES

- Internal input and output matching for easy matching, high gain and efficiency
- Poly-silicon emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

### APPLICATIONS

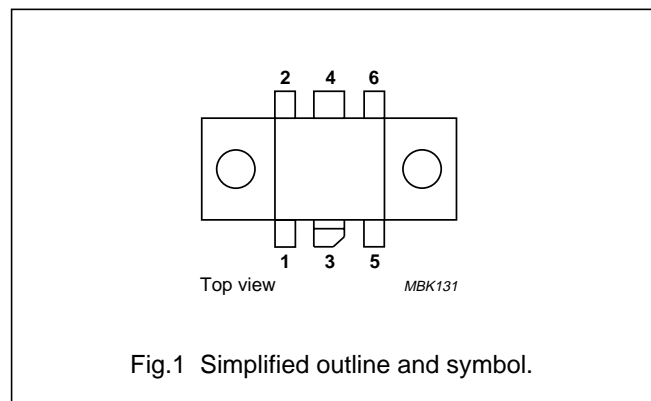
- Base stations in the 850 to 960 MHz frequency range.

### DESCRIPTION

NPN silicon planar transistor intended for common emitter class-AB operation. The transistor has internal input and output matching by means of MOS capacitors. The encapsulation is a SOT273A flange envelope with a ceramic cap. All leads are isolated from the flange.

### PINNING - SOT273A

PIN	DESCRIPTION
1	emitter
2	emitter
3	collector
4	base
5	emitter
6	emitter



### 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)	$\eta_c$ (%)
CW, class-AB	960	26	40	$\geq 9$	$\geq 55$

<b>WARNING</b>
<b>Product and environmental safety - toxic materials</b>
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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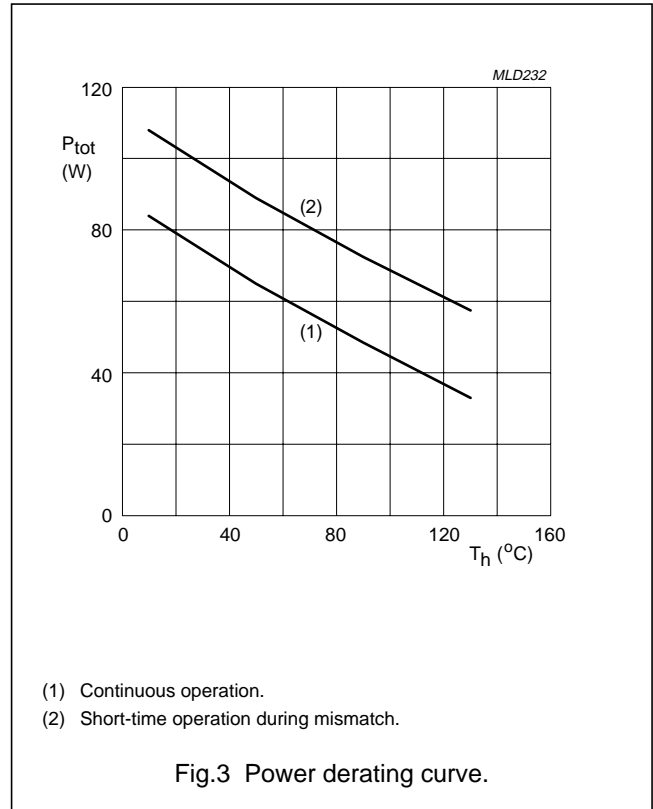
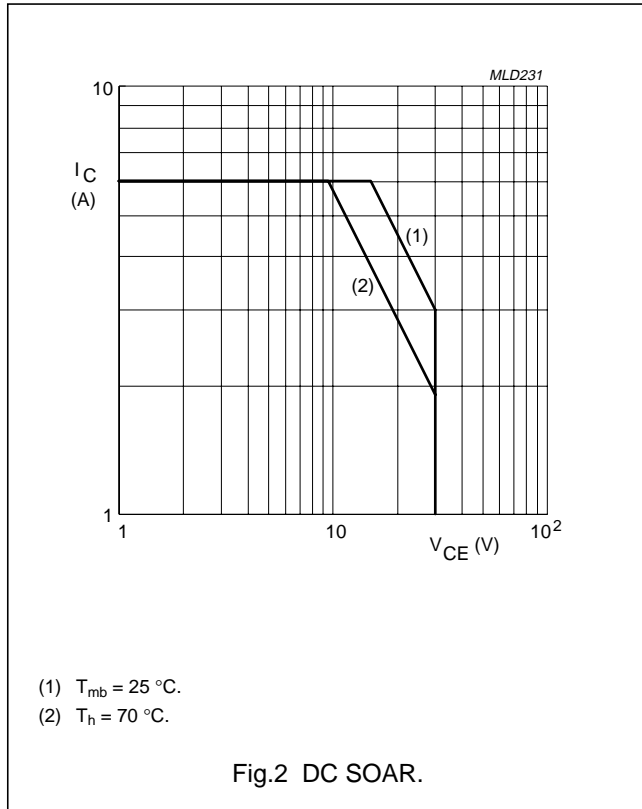
## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	70	V
$V_{CEO}$	collector-emitter voltage	open base	–	30	V
$V_{EBO}$	emitter-base voltage	open collector	–	3	V
$I_C$	collector current (DC)		–	6	A
$I_{C(AV)}$	average collector current		–	6	A
$P_{tot}$	total power dissipation	up to $T_{mb} = 25\text{ °C}$	–	90	W
$T_{stg}$	storage temperature range		–65	+150	°C
$T_j$	operating junction temperature		–	+200	°C

## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-mb}$	thermal resistance from junction to mounting base	$P_{tot} = 90\text{ W}; T_{mb} = 25\text{ °C}$	1.94	K/W
$R_{th\ mb-h}$	thermal resistance from mounting base to heatsink		0.3	K/W



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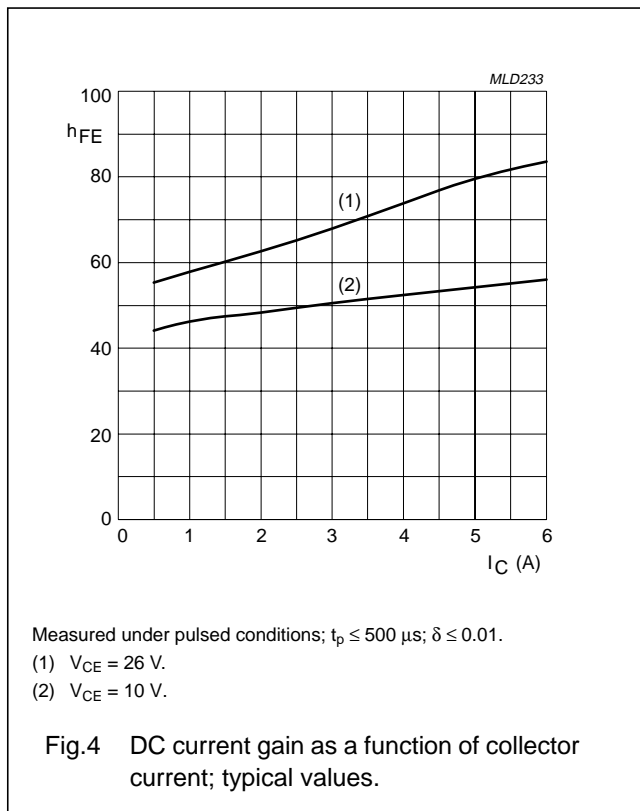
**CHARACTERISTICS**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; $I_C = 30\text{ mA}$	70	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; $I_C = 60\text{ mA}$	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; $I_E = 1.2\text{ mA}$	3	–	–	V
$I_{CES}$	collector leakage current	$V_{BE} = 0; V_{CE} = 28\text{ V}$	–	–	3	mA
$h_{FE}$	DC current gain	$V_{CE} = 10\text{ V}; I_C = 2\text{ A}; \text{note 1}$	30	–	120	
$C_c$	collector capacitance	$V_{CB} = 26\text{ V}; I_E = i_e = 0; f = 1\text{ MHz}; \text{note 2}$	–	33	–	pF

**Notes**

1. Measured under pulsed conditions:  $t_p \leq 500\text{ }\mu\text{s}; \delta \leq 0.01$ .
2.  $C_c$  value is that of the die only; it is not measurable because of internal matching network.



# UHF power transistor

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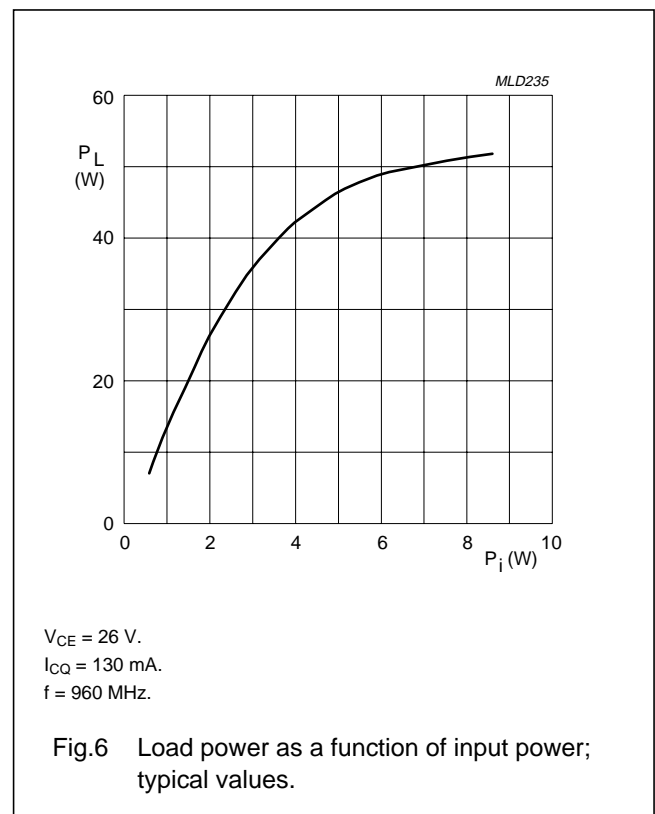
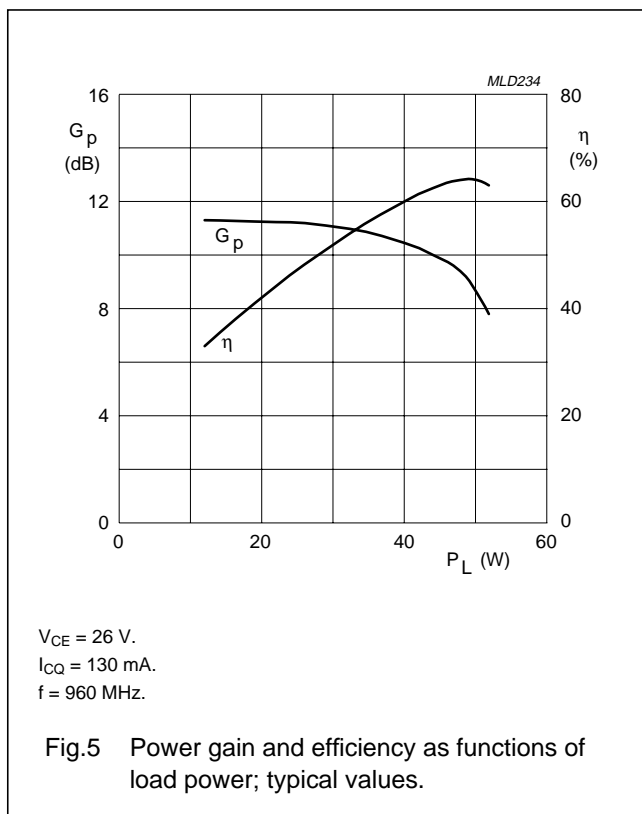
## APPLICATION INFORMATION

RF performance at  $T_h = 25\text{ }^\circ\text{C}$  in a common emitter, class-AB test circuit;  $R_{th\text{ mb-h}} = 0.3\text{ K/W}$ .

MODE OF OPERATION	f (MHz)	V <sub>CE</sub> (V)	I <sub>CQ</sub> (mA)	P <sub>L</sub> (W)	G <sub>p</sub> (dB)	η <sub>c</sub> (%)
CW, class-AB	960	26	130	40	≥9 typ. 11	≥55 typ. 60

### Ruggedness in class-AB operation

The BLV946 is capable of withstanding a load mismatch corresponding to VSWR = 5 : 1 through all phases at rated output power, under the following conditions: V<sub>CE</sub> = 26 V; f = 960 MHz; I<sub>CQ</sub> = 130 mA; T<sub>h</sub> = 25 °C; R<sub>th mb-h</sub> = 0.3 K/W.



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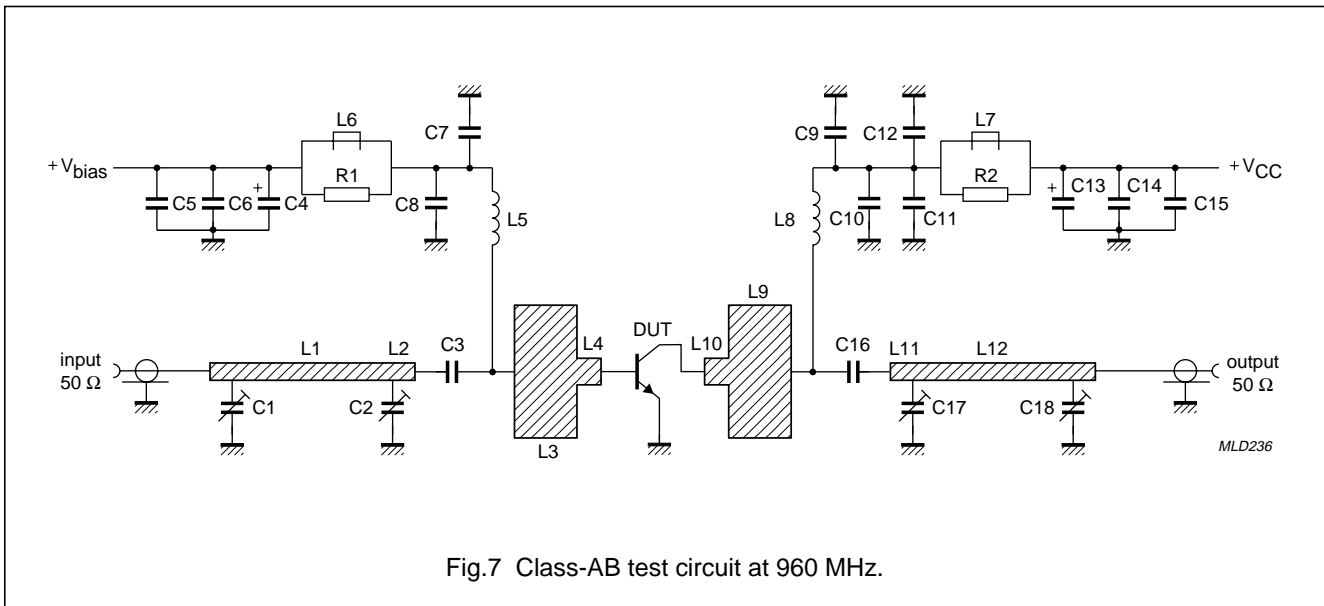


Fig.7 Class-AB test circuit at 960 MHz.

List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C2, C17, C18	TEKELEC variable capacitor type 6451	12 pF		
C3, C16	multilayer ceramic chip capacitor; note 1	68 pF, 500 V		
C4, C13	electrolytic capacitor	10 μF, 63 V		2222 030 28109
C5, C8, C10, C13, C15	multilayer ceramic chip capacitor; note 1	20 pF, 500 V		
C6	multilayer ceramic chip capacitor	100 nF, 50 V		2222 581 76641
C7, C11	multilayer ceramic chip capacitor; note 1	100 pF, 500 V		
C9	multilayer ceramic chip capacitor	470 pF, 50 V		2222 731 18471
C12	multilayer ceramic chip capacitor	10 nF, 50 V		2222 731 18103
C14	multilayer ceramic chip capacitor	22 nF, 50 V		2222 731 18223
L1	stripline; note 2	50 Ω	length 36 mm width 2.2 mm	
L2	stripline; note 2	50 Ω	length 8 mm width 2.2 mm	
L3, L9	stripline; note 2	8 Ω	length 10 mm width 20 mm	
L4, L10	stripline; note 2	37 Ω	length 4.5 mm width 3.5 mm	

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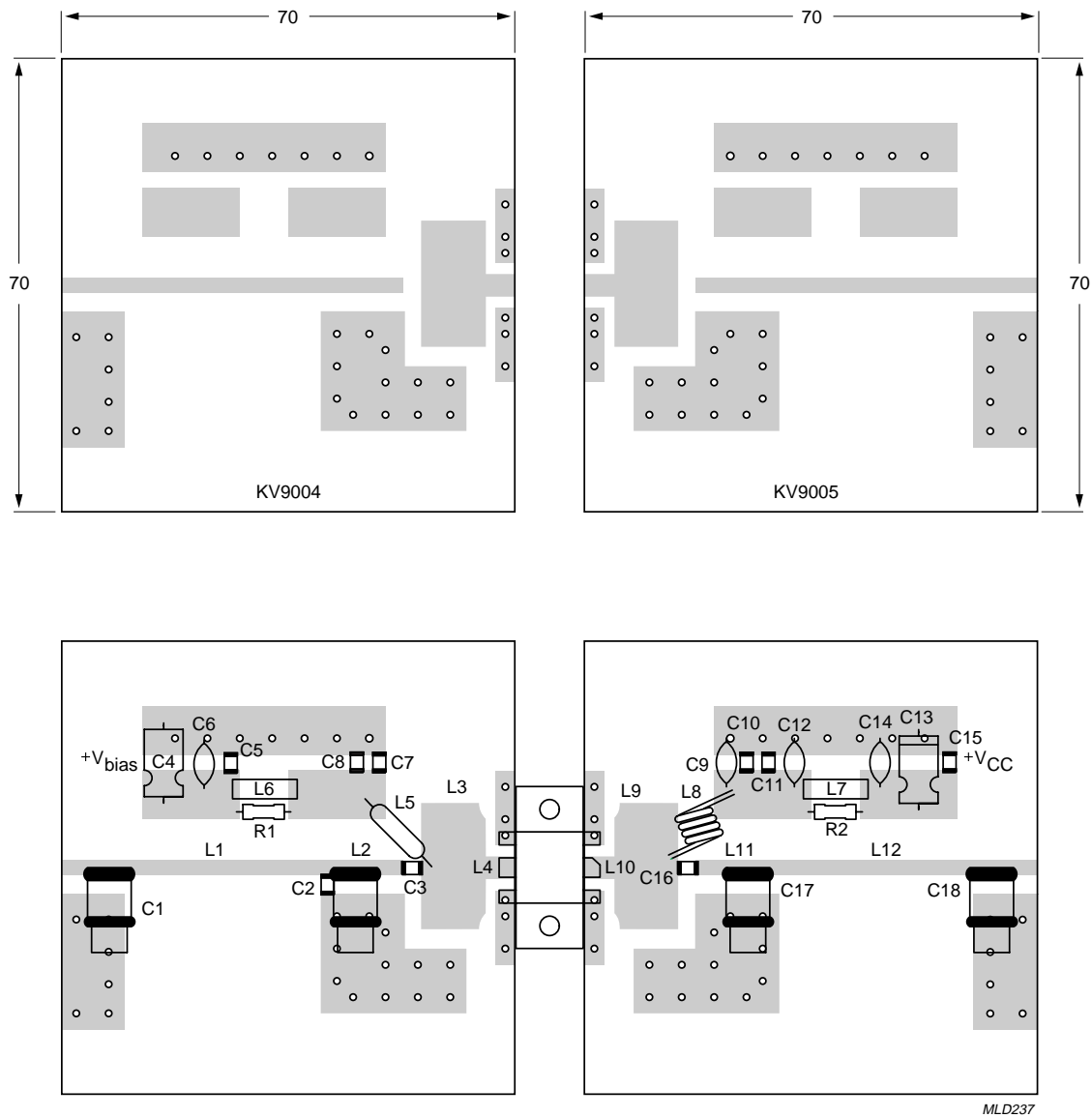
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
L5	microchoke	2.2 $\mu$ H		4322 057 02281
L6, L7	Ferroxcube wide band HF choke, grade 3B			4312 020 36642
L8	4.5 turns enamelled 1 mm copper wire	50 nH	internal dia. 4 mm close wound	
L11	stripline; note 2	50 $\Omega$	length 7 mm width 2.2 mm	
L12	stripline; note 2	50 $\Omega$	length 37 mm width 2.2 mm	
R1, R2	metal film resistor	100 $\Omega$ ; 0.4 W		2322 171 11001

**Notes**

1. American Technical Ceramics type 100B or capacitor of same quality.
2. The striplines are on a double copper-clad printed-circuit board, with PTFE microfibre-glass dielectric ( $\epsilon_r = 2.2$ ); thickness  $\frac{1}{32}$ " ; thickness of the copper sheet  $2 \times 35 \mu\text{m}$ .

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Dimensions in mm.

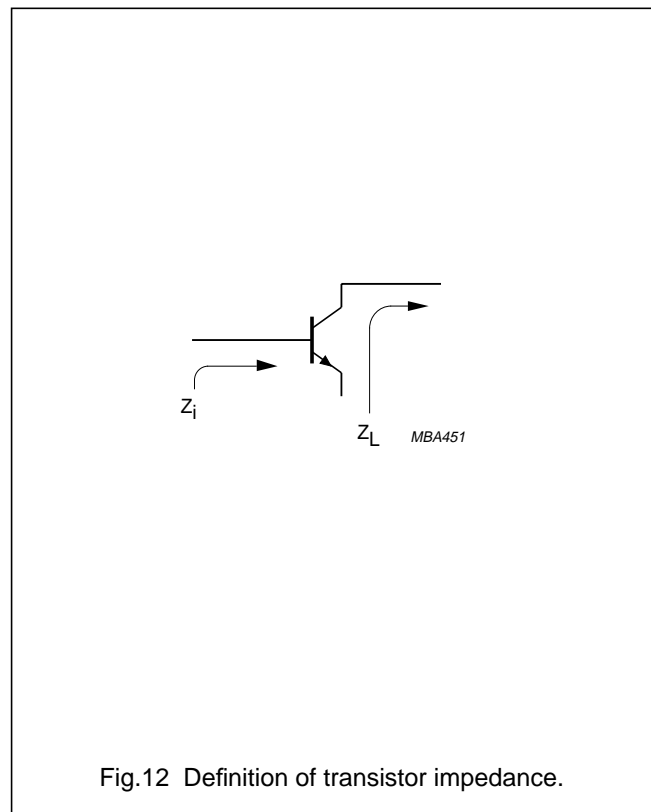
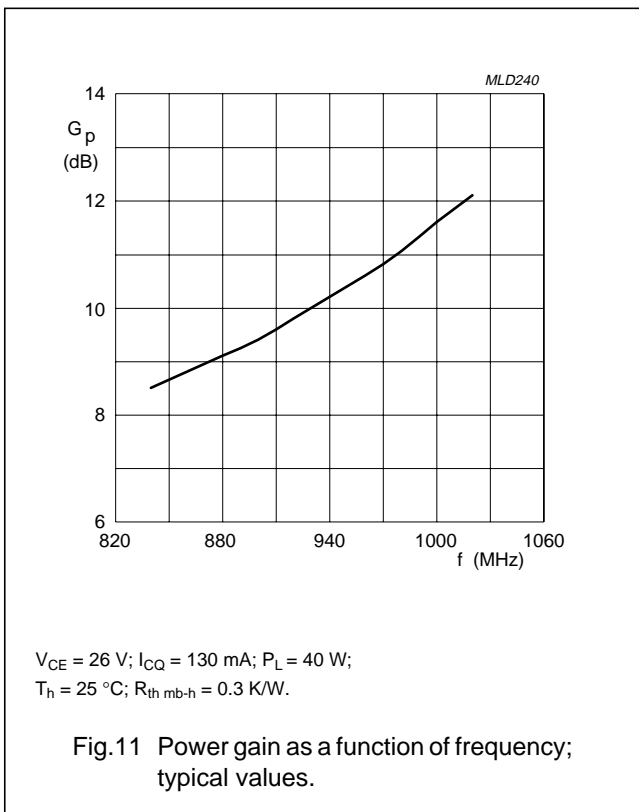
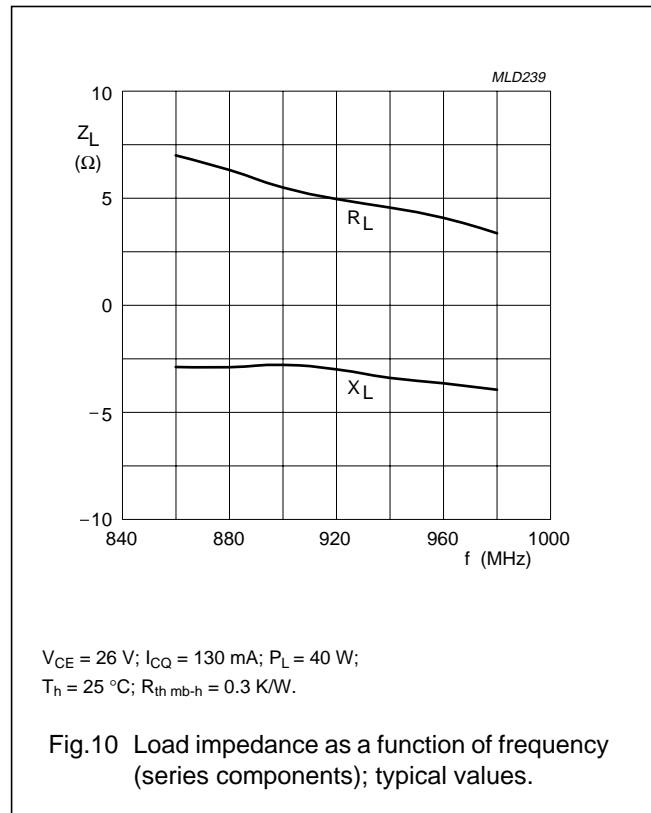
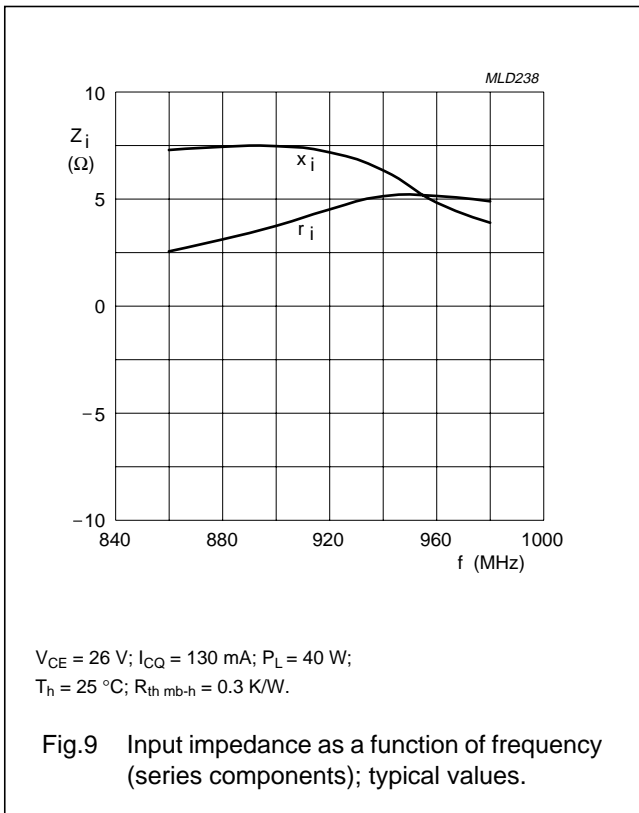
The components are located on one side of the copper-clad PTFE microfibre-glass board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.8 Component layout and printed circuit board for 960 MHz class-AB test circuit.



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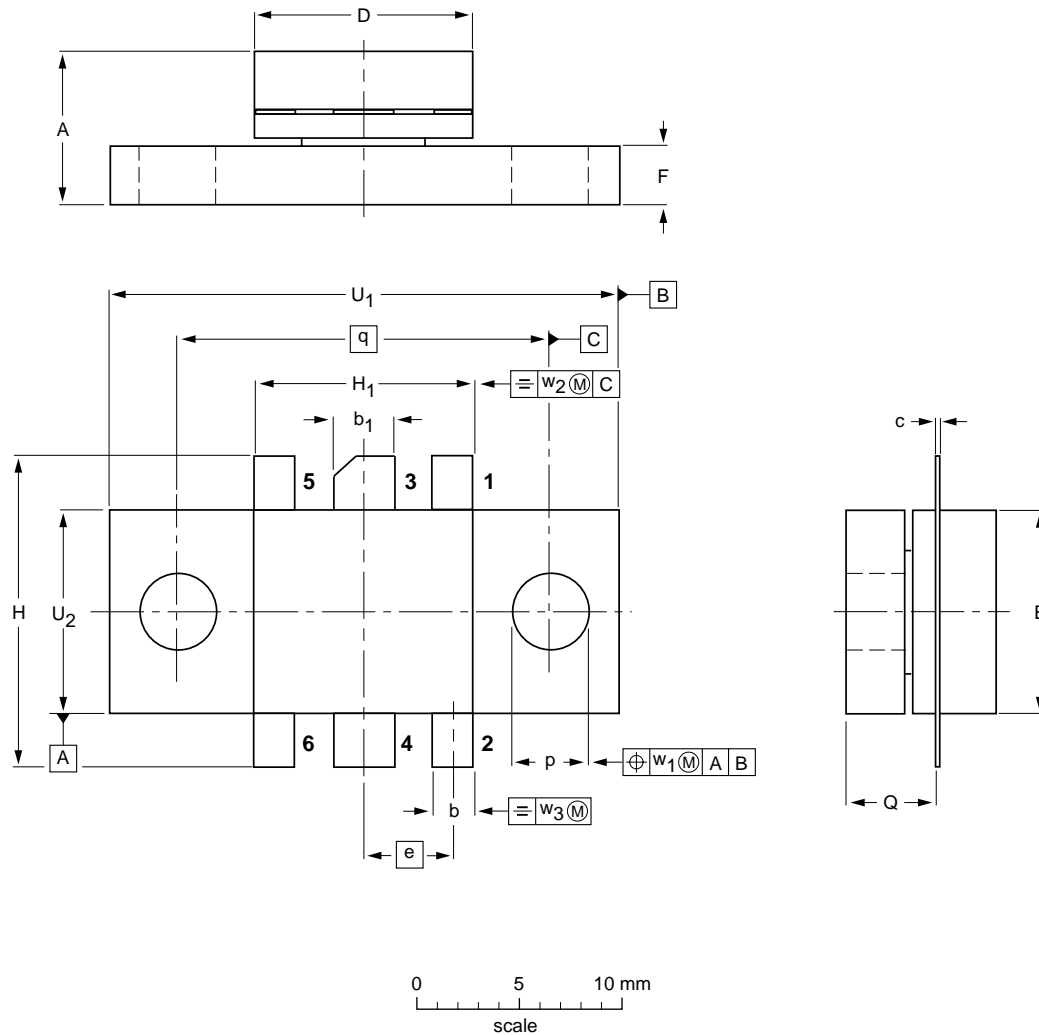
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PACKAGE OUTLINE

Flanged ceramic package; 2 mounting holes; 6 leads

SOT273A



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

UNIT	A	b	b <sub>1</sub>	c	D	E	e	F	H	H <sub>1</sub>	p	Q	q	U <sub>1</sub>	U <sub>2</sub>	w <sub>1</sub>	w <sub>2</sub>	w <sub>3</sub>
mm	7.45 7.27	2.42 1.80	3.18 2.92	0.16 0.10	10.93 10.66	10.29 10.03	4.35	3.05 2.54	15.75 14.73	10.93 10.66	3.31 3.04	4.35 4.03	18.42	24.90 24.63	10.29 10.03	0.51	1.02	0.25
inches	0.286 0.254	0.095 0.071	0.125 0.115	0.006 0.004	0.430 0.420	0.405 0.395	0.171	0.120 0.100	0.62 0.58	0.43 0.42	0.130 0.120	0.171 0.159	0.725	0.98 0.97	0.405 0.395	0.02	0.04	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT273A						97-06-28

## UHF power transistor

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**DEFINITIONS**

<b>Data Sheet Status</b>	
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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

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