

# DATA SHEET

## **BLV934** UHF power transistor

Product specification

1995 Apr 11

**Philips Semiconductors**



**PHILIPS**

# UHF power transistor

# BLV934

### FEATURES

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

### APPLICATIONS

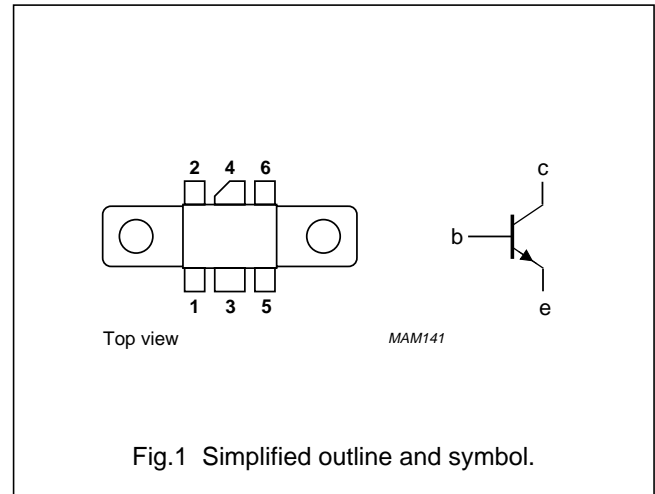
- Base station transmitters in the 820 to 960 MHz range.

### PINNING - SOT171

PIN	SYMBOL	DESCRIPTION
1	e	emitter
2	e	emitter
3	b	base
4	c	collector
5	e	emitter
6	e	emitter

### DESCRIPTION

NPN silicon planar epitaxial transistor intended for common emitter class-AB operation. The transistor has internal input matching by means of MOS capacitors and is encapsulated in a 6-lead SOT171 flange envelope with a ceramic cap. All leads are isolated from the flange.



### QUICK REFERENCE DATA

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

MODE OF OPERATION	f (MHz)	V <sub>CE</sub> (V)	P <sub>L</sub> (W)	G <sub>p</sub> (dB)	η <sub>c</sub> (%)
CW, class-AB	960	26	30	≥ 9	≥ 55

### 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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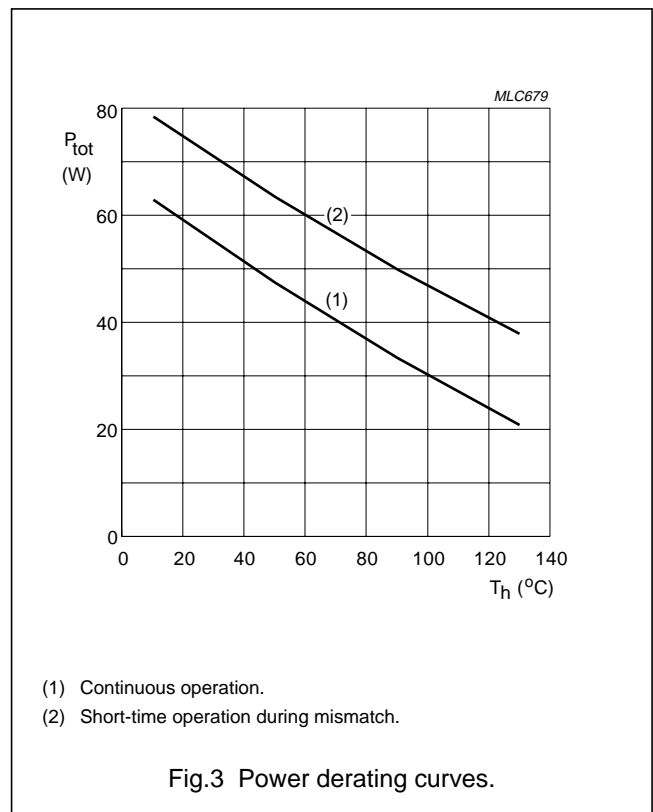
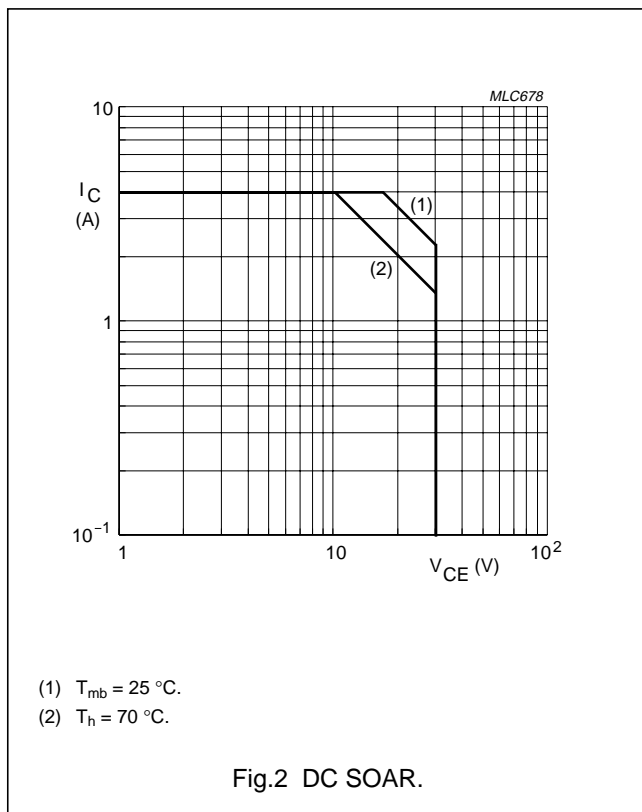
## LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	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)		–	4	A
$I_{C(AV)}$	average collector current		–	4	A
$P_{tot}$	total power dissipation	up to $T_{mb} = 25\text{ °C}$	–	68	W
$T_{stg}$	storage temperature		–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	$P_{tot} = 68\text{ W}; T_{mb} = 25\text{ °C}$	2.57	K/W
$R_{th\ mb-h}$	thermal resistance from mounting base to heatsink		0.4	K/W



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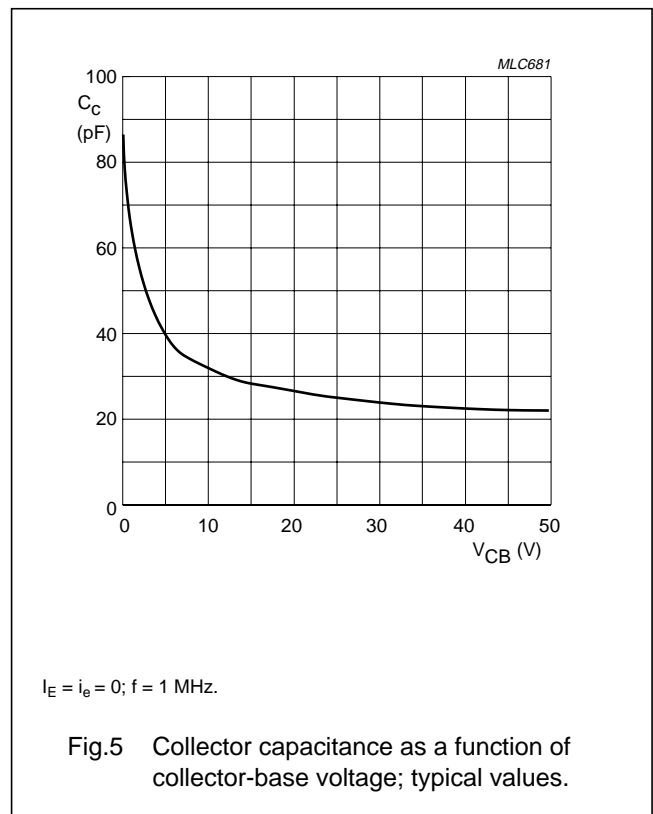
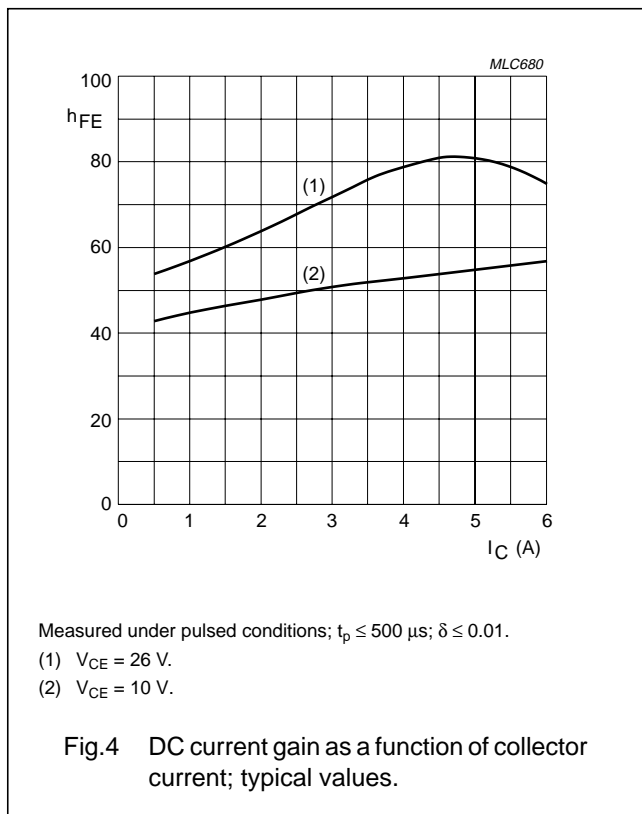
**CHARACTERISTICS**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; $I_C = 20\text{ mA}$	70	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; $I_C = 50\text{ mA}$	30	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; $I_E = 1\text{ mA}$	3	–	–	V
$I_{CES}$	collector leakage current	$V_{BE} = 0; V_{CE} = 28\text{ V}$	–	–	2	mA
$h_{FE}$	DC current gain	$V_{CE} = 10\text{ V}; I_C = 1.5\text{ A}; \text{note 1}$	30	–	120	
$C_c$	collector capacitance	$V_{CB} = 26\text{ V}; I_E = i_e = 0; f = 1\text{ MHz}$	–	25	–	pF
$C_{re}$	feedback capacitance	$V_{CE} = 26\text{ V}; I_C = 0; f = 1\text{ MHz}$	–	17	–	pF

**Note**

1. Measured under pulsed conditions:  $t_p \leq 500\text{ }\mu\text{s}; \delta \leq 0.01$ .



# UHF power transistor

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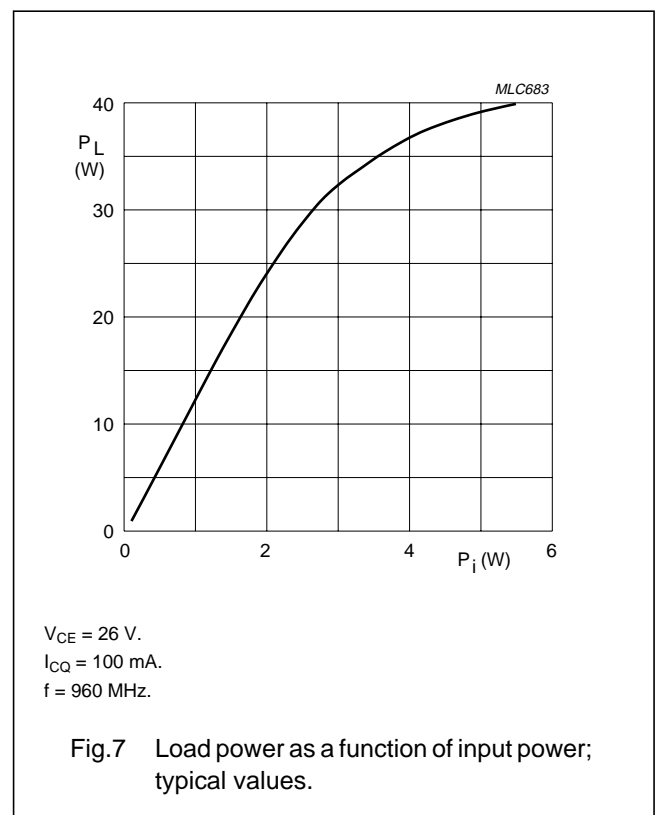
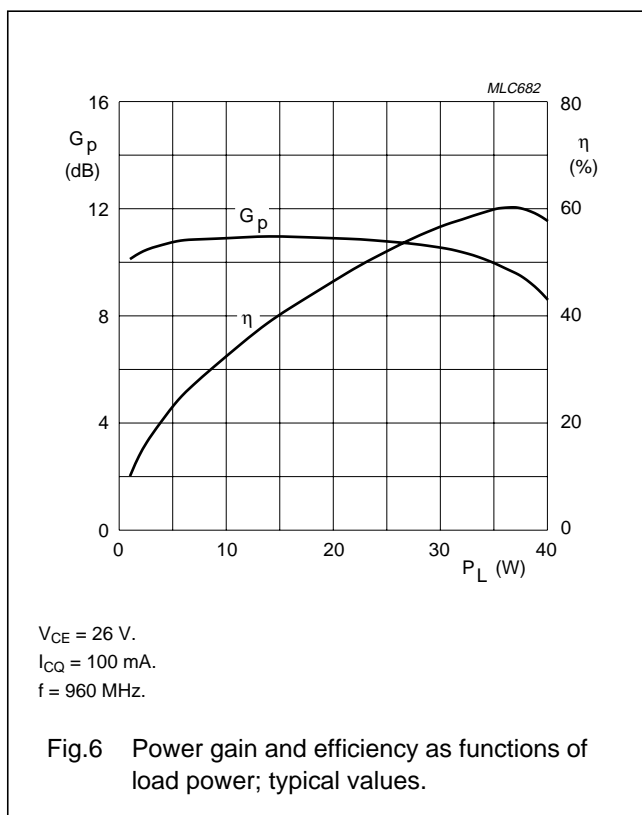
### APPLICATION INFORMATION

RF performance at  $T_h = 25\text{ }^\circ\text{C}$  in a common emitter, class-AB test circuit;  $R_{th\ mb-h} = 0.4\text{ K/W}$ .

MODE OF OPERATION	f (MHz)	$V_{CE}$ (V)	$I_{CQ}$ (mA)	$P_L$ (W)	$G_p$ (dB)	$\eta_c$ (%)
CW, class-AB	960	26	100	30	$\geq 9$	$\geq 55$

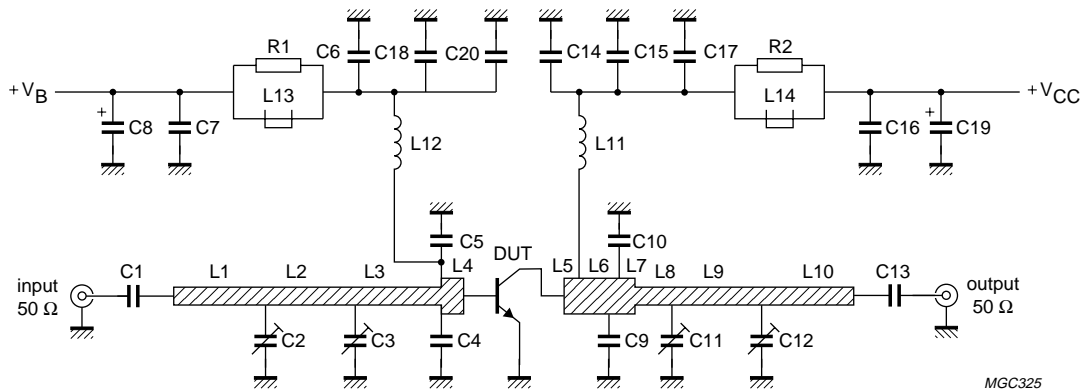
### Ruggedness in class-AB operation

The BLV934 is capable of withstanding a load mismatch corresponding to  $V_{SWR} = 20 : 1$  through all phases at rated output power, under the following conditions:  $V_{CE} = 26\text{ V}$ ;  $f = 960\text{ MHz}$ ;  $I_{CQ} = 100\text{ mA}$ ;  $T_h = 25\text{ }^\circ\text{C}$ ;  $R_{th\ mb-h} = 0.4\text{ K/W}$ .



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Fig.8 Class-AB test circuit at  $f = 960$  MHz.

## List of components (see Figs 8 and 9)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C13	multilayer ceramic chip capacitor; note 1	43 pF		
C2, C3, C11, C12	film dielectric trimmer	1.4 pF to 5.5 pF		2222 809 09001
C4, C5	multilayer ceramic chip capacitor; note 2	10 pF		
C6, C17	multilayer ceramic chip capacitor; note 1	150 pF		
C7, C16	ceramic capacitor	22 nF		2222 640 08223
C8, C19	solid aluminium capacitor	10 $\mu$ F, 63 V		2222 030 38109
C14	multilayer ceramic chip capacitor; note 1	20 pF		
C9, C10	multilayer ceramic chip capacitor; note 2	11 pF		
C20	multilayer ceramic chip capacitor; note 1	1 nF		
C15, C18	multilayer ceramic chip capacitor; note 1	62 pF		
L1	stripline; note 3	50 $\Omega$	length 16.8 mm width 2.4 mm	
L2	stripline; note 3	50 $\Omega$	length 14.8 mm width 2.4 mm	
L3	stripline; note 3	50 $\Omega$	length 13.7 mm width 2.4 mm	

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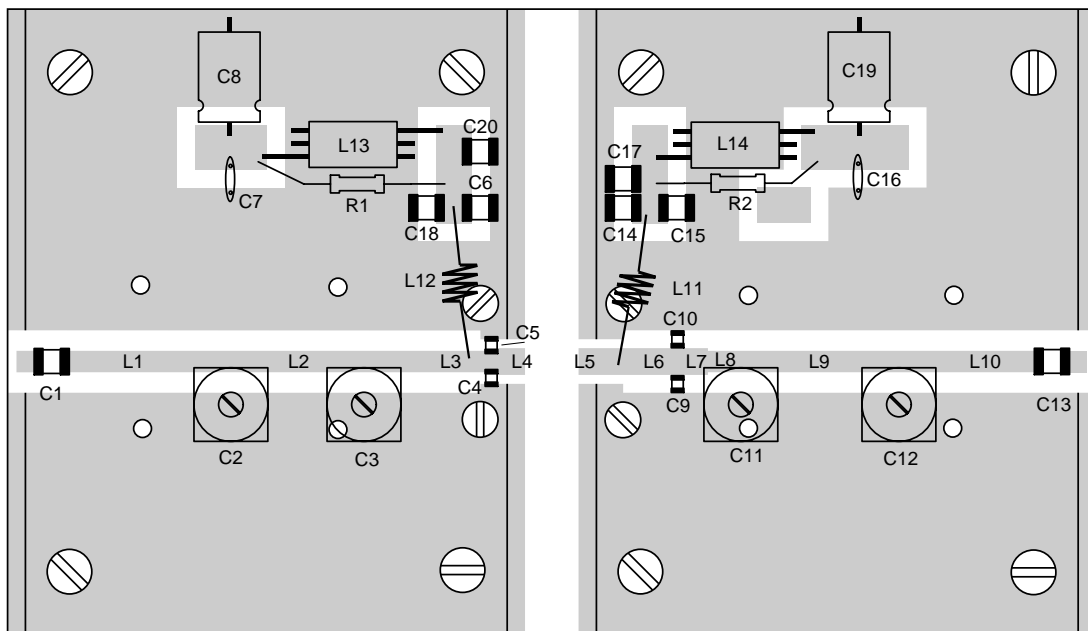
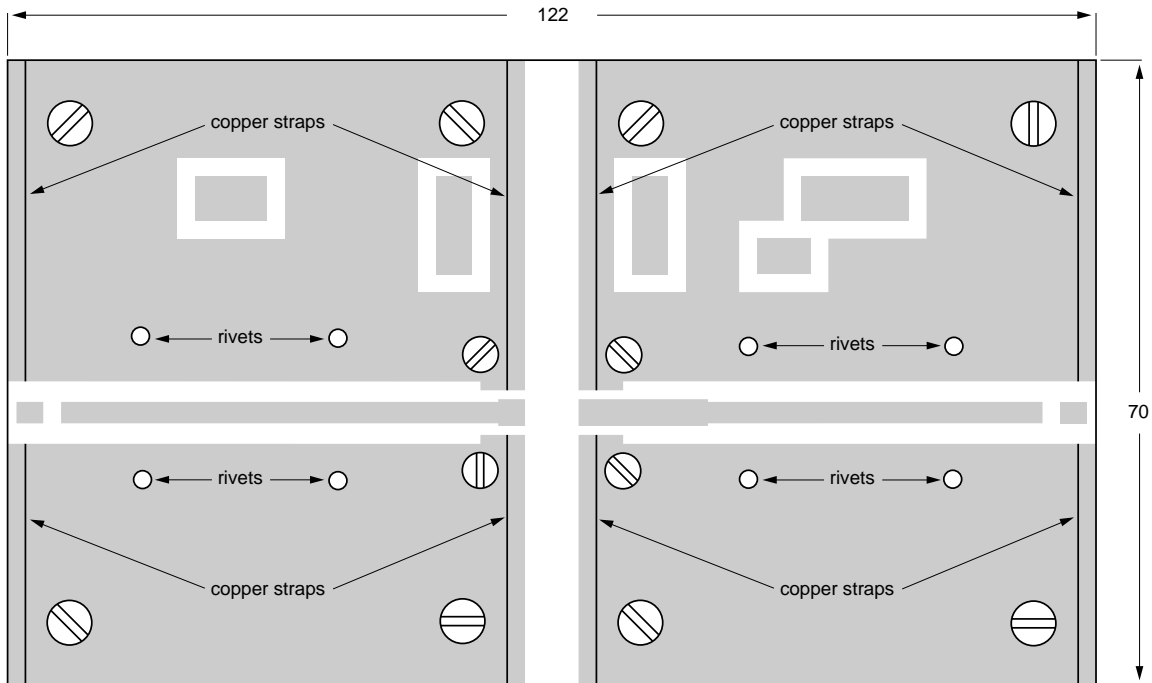
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
L4	stripline; note 3	43 $\Omega$	length 3.5 mm width 3 mm	
L5	stripline; note 3	43 $\Omega$	length 6.4 mm width 3 mm	
L6	stripline; note 3	43 $\Omega$	length 5.8 mm width 3 mm	
L7	stripline; note 3	43 $\Omega$	length 2.4 mm width 3 mm	
L9	stripline; note 3	50 $\Omega$	length 15.5 mm width 2.4 mm	
L10	stripline; note 3	50 $\Omega$	length 20 mm width 2.4 mm	
L11	4 turns enamelled 0.8 mm copper wire	45 nH	int. diameter 4mm length 5 mm leads 2 $\times$ 5 mm	
L12	3 turns enamelled 0.8 mm copper wire	30 nH	int. diameter 3mm length 5 mm leads 2 $\times$ 5 mm	
L13, L14	grade 3B Ferroxcube wideband RF choke			4312 020 36642
R1, R2	metal film resistor	10 $\Omega$ ; 0.4 W		2322 151 71009

**Notes**

1. American Technical Ceramics type 100B or capacitor of same quality.
2. American Technical Ceramics type 100A or capacitor of same quality.
3. The striplines are on double-clad PCB with PTFE fibre-glass dielectric ( $\epsilon_r = 2.2$ ); thickness  $\frac{1}{32}$ ".

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MGC326

Dimensions in mm.

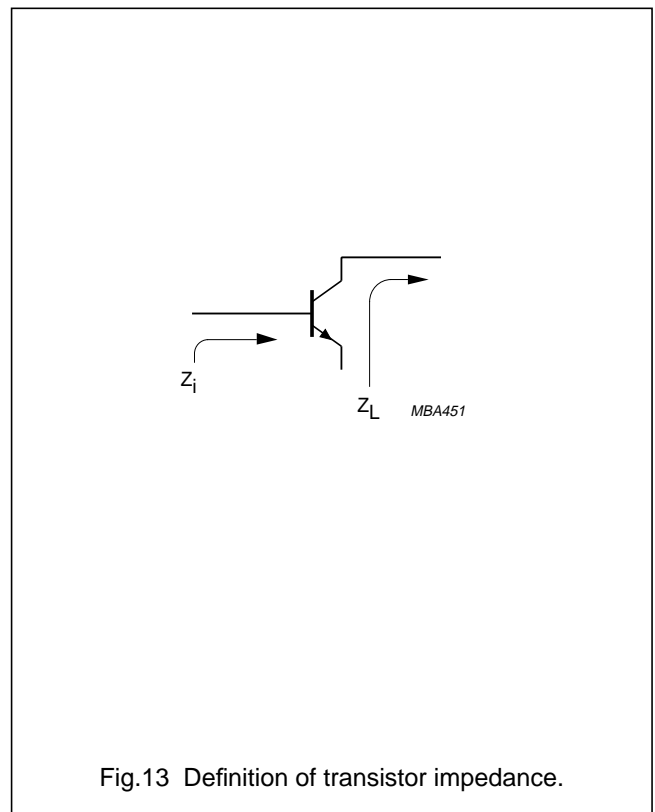
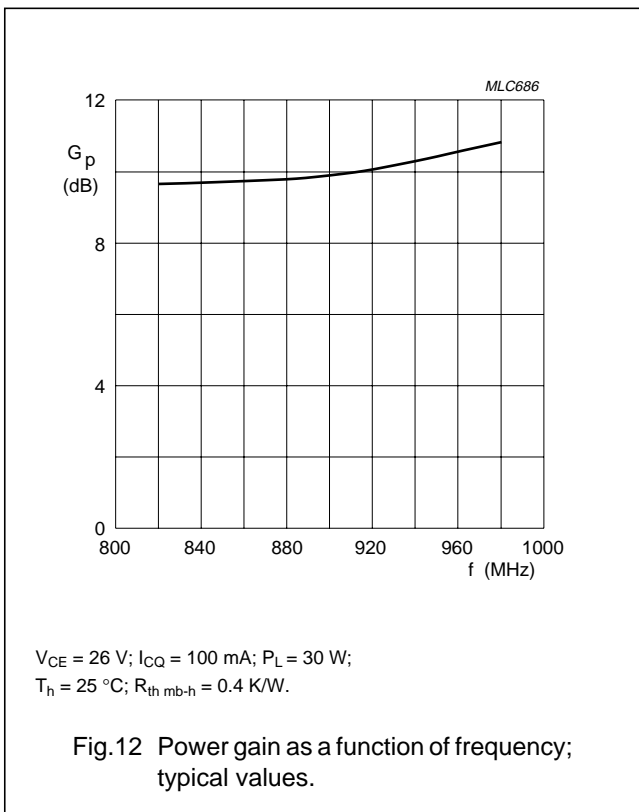
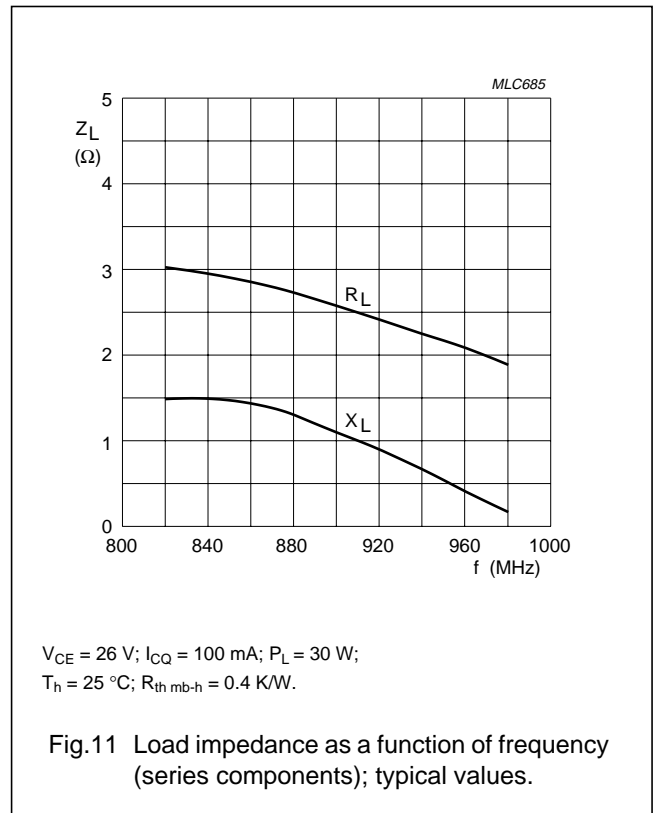
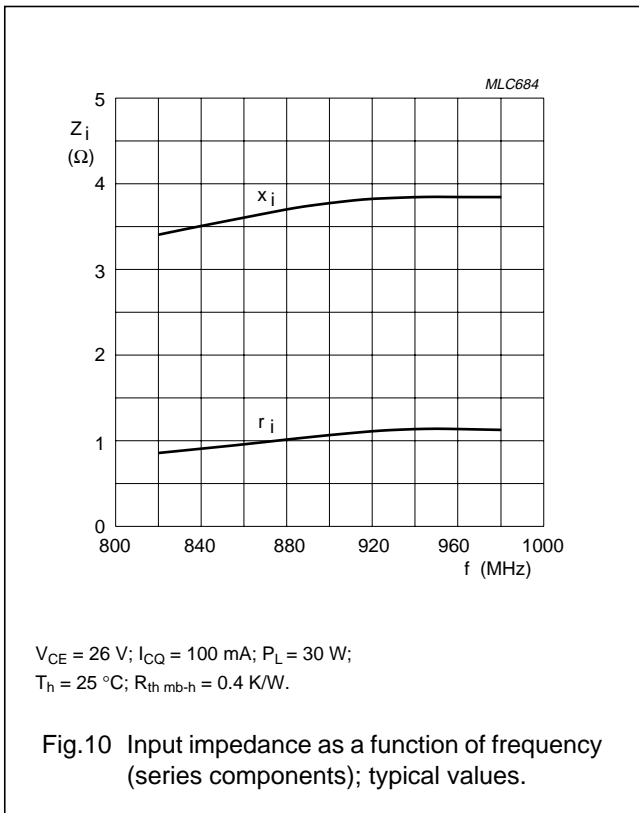
The components are located on one side of the PTFE fibre-glass board, the other side being fully metallized to serve as an earth. Earth connections are made by fixing screws, hollow rivets and copper straps around the board and under the emitters to provide a direct contact between the component side and the ground plane.

Fig.9 Component layout for 960 MHz class-AB test circuit.



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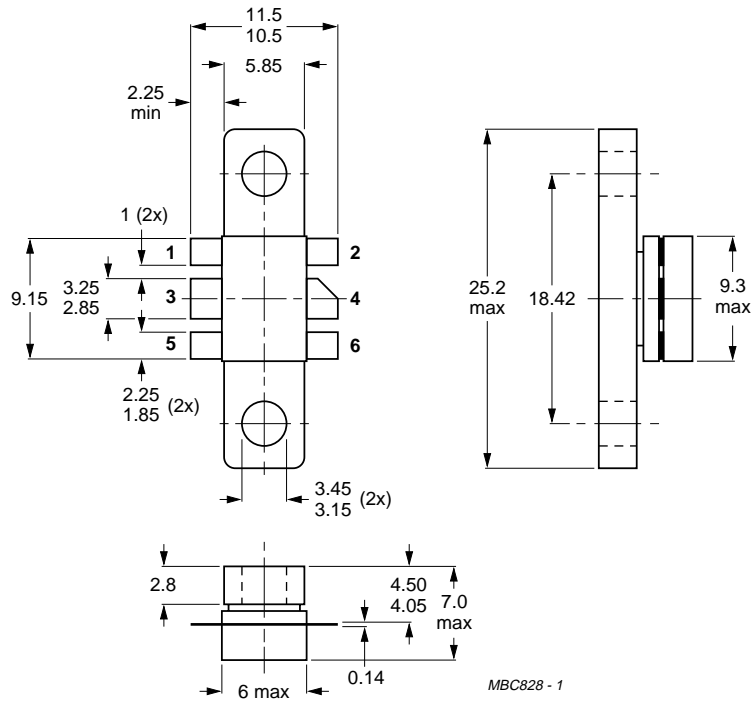
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UHF power transistor

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PACKAGE OUTLINE



Dimensions in mm.

Torque on screw: min. 0.6 Nm; max. 0.75 Nm.

Recommended screw: cheese-head 4-40 UNC/2A.

Heatsink compound must be applied sparingly and evenly distributed.

Fig.14 SOT171.

## 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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