

# DATA SHEET

## **BLX94C** UHF power transistor

Product specification

1996 Feb 06

# UHF power transistor

# BLX94C

### FEATURES

- Withstands full load mismatch
- Emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

### APPLICATIONS

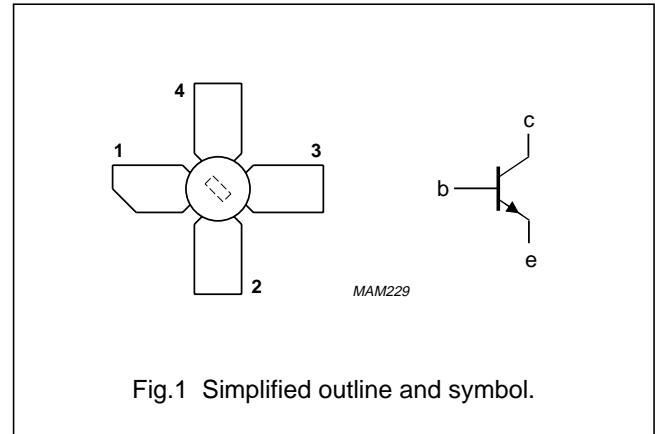
- Transmitting applications in the UHF range with a nominal supply voltage up to 28 V.

### PINNING - SOT122A

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

### DESCRIPTION

NPN silicon planar epitaxial transistor primarily intended for class-A, B or C operation. The transistor is encapsulated in a 4-lead SOT122A stud envelope with a ceramic cap.



### 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-B	470	28	25	>6.5	>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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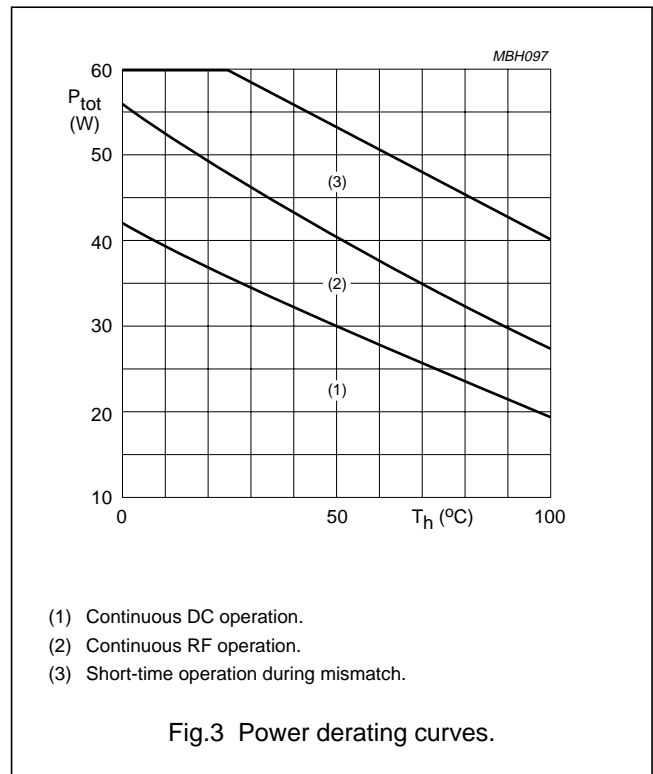
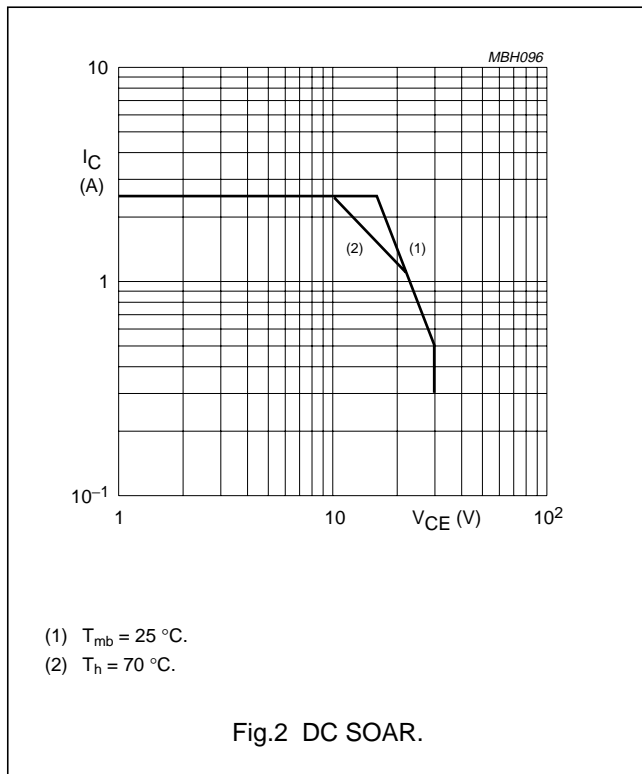
**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CESM}$	collector-emitter voltage (peak value)	$V_{BE} = 0$	–	65	V
$V_{CEO}$	collector-emitter voltage	open base	–	30	V
$V_{EBO}$	emitter-base voltage	open collector	–	4	V
$I_C$	collector current (DC)		–	2.5	A
$I_{C(AV)}$	average collector current		–	2.5	A
$I_{CM}$	peak collector current	$f > 1$ MHz	–	6	A
$P_{tot}$	total power dissipation	$\leq T_{mb} = 25$ °C	–	60	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 (DC dissipation)	$P_{tot} = 20$ W; $T_{mb} = 82$ °C; $T_h = 70$ °C	4	K/W
$R_{th\ j-mb}$	thermal resistance from junction to mounting base (RF dissipation)	$P_{tot} = 20$ W; $T_{mb} = 82$ °C; $T_h = 70$ °C	2.7	K/W
$R_{th\ mb-h}$	thermal resistance from mounting base to heatsink	$P_{tot} = 20$ W; $T_{mb} = 82$ °C; $T_h = 70$ °C	0.6	K/W



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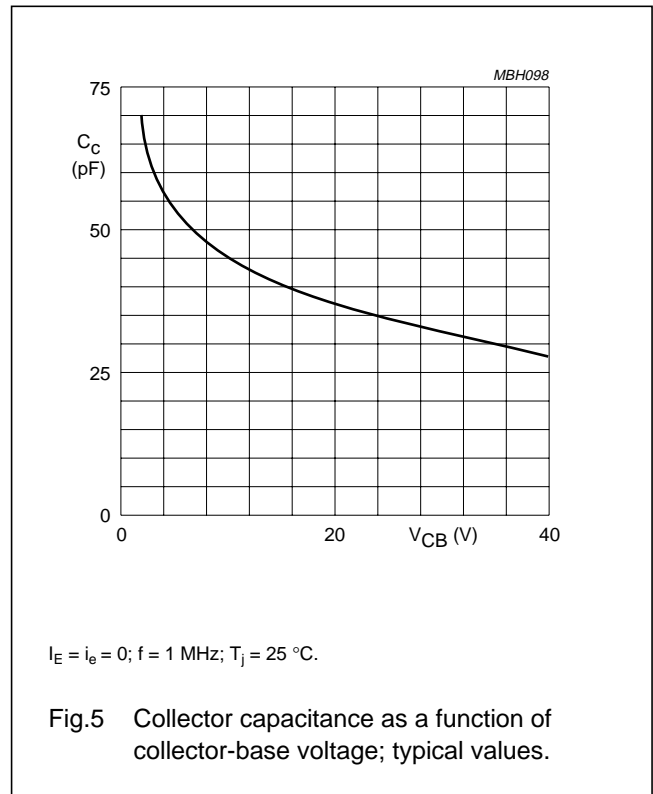
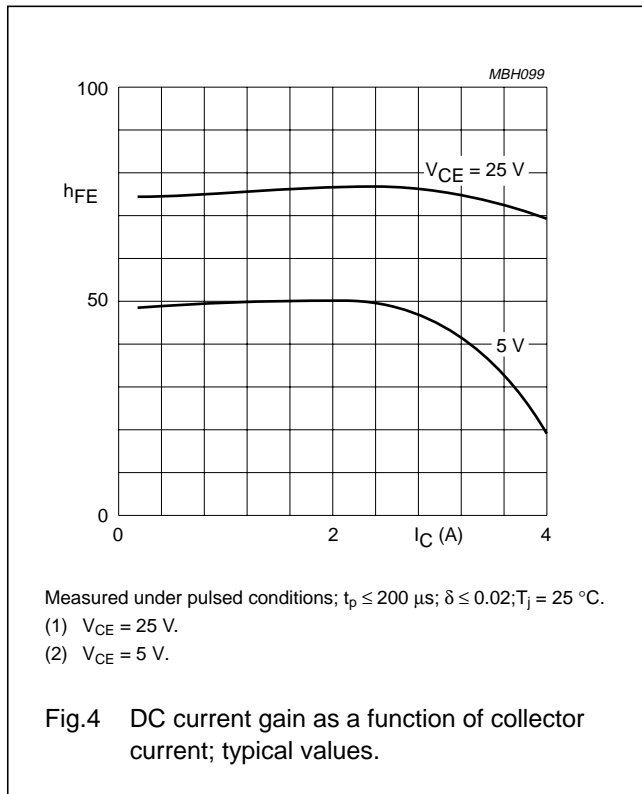
CHARACTERISTICS

T<sub>j</sub> = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V <sub>(BR)CES</sub>	collector-emitter breakdown voltage	V <sub>BE</sub> = 0; I <sub>C</sub> = 25 mA	65	–	–	V
V <sub>(BR)CEO</sub>	collector-emitter breakdown voltage	open base; I <sub>C</sub> = 100 mA	30	–	–	V
V <sub>(BR)EBO</sub>	emitter-base breakdown voltage	open collector; I <sub>E</sub> = 10 mA	4	–	–	V
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = 4 A; I <sub>B</sub> = 0.8 A; note 1	–	1.5	–	V
I <sub>CES</sub>	collector cut-off current	V <sub>BE</sub> = 0; V <sub>CE</sub> = 30 V	–	–	10	mA
E <sub>SBR</sub>	second breakdown energy	open base; L = 25 mH; f = 50 Hz	3	–	–	mJ
		R <sub>BE</sub> = 10 Ω; L = 25 mH; f = 50 Hz	3	–	–	mJ
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = 5 V; I <sub>C</sub> = 1.5 A; note 1	15	50	–	
f <sub>T</sub>	transition frequency	V <sub>CB</sub> = 28 V; I <sub>E</sub> = –1.5 A; f = 500 MHz; note 1	–	1.1	–	f <sub>T</sub>
		V <sub>CB</sub> = 28 V; I <sub>E</sub> = –4 A; f = 500 MHz; note 1	–	0.75	–	f <sub>T</sub>
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = 28 V; I <sub>E</sub> = i <sub>e</sub> = 0; f = 1 MHz	–	33	–	pF
C <sub>re</sub>	feedback capacitance	V <sub>CE</sub> = 28 V; I <sub>C</sub> = 20 mA; f = 1 MHz;	–	18	–	pF
C <sub>c-s</sub>	collector-stud capacitance		–	1.2	–	pF

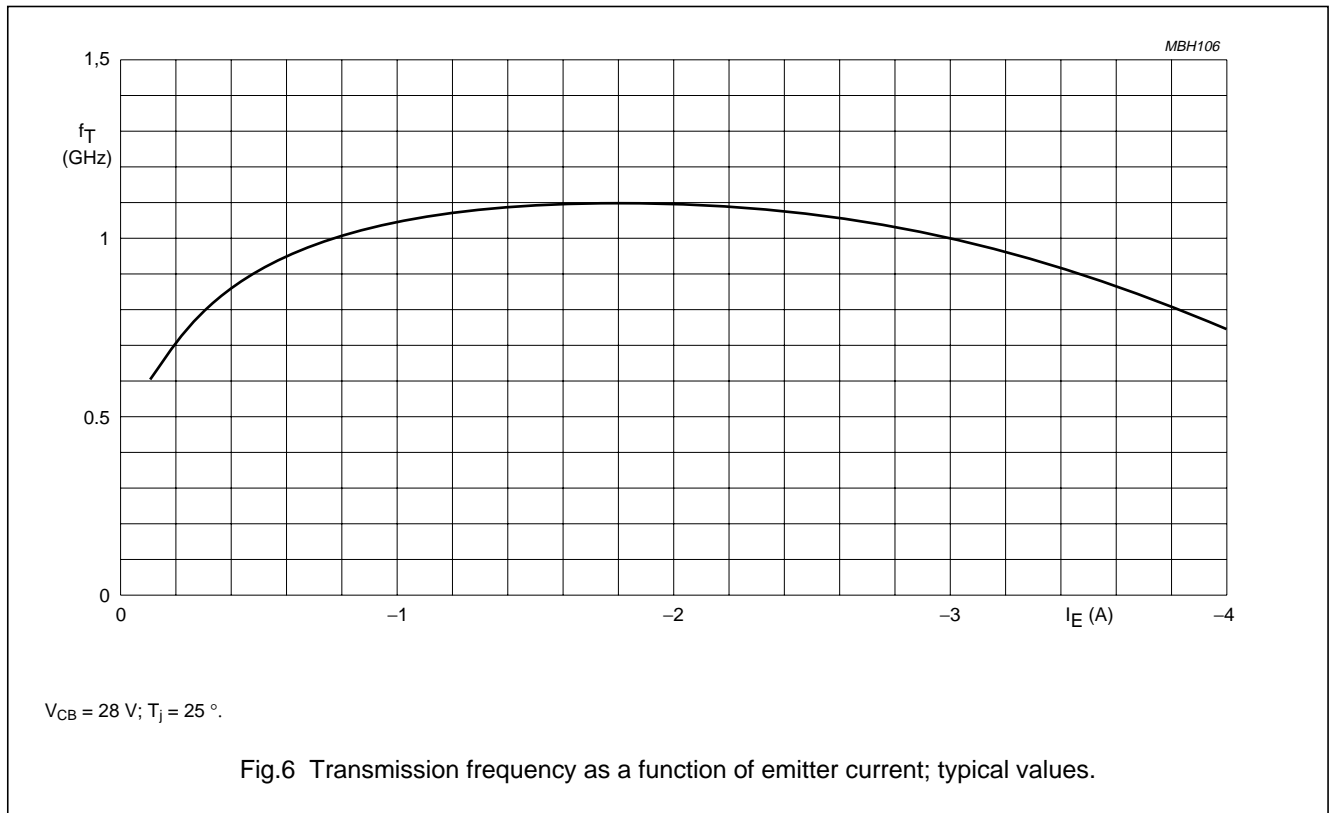
Note

1. Measured under pulsed conditions: t<sub>p</sub> ≤ 200 μs; δ ≤ 0.02.



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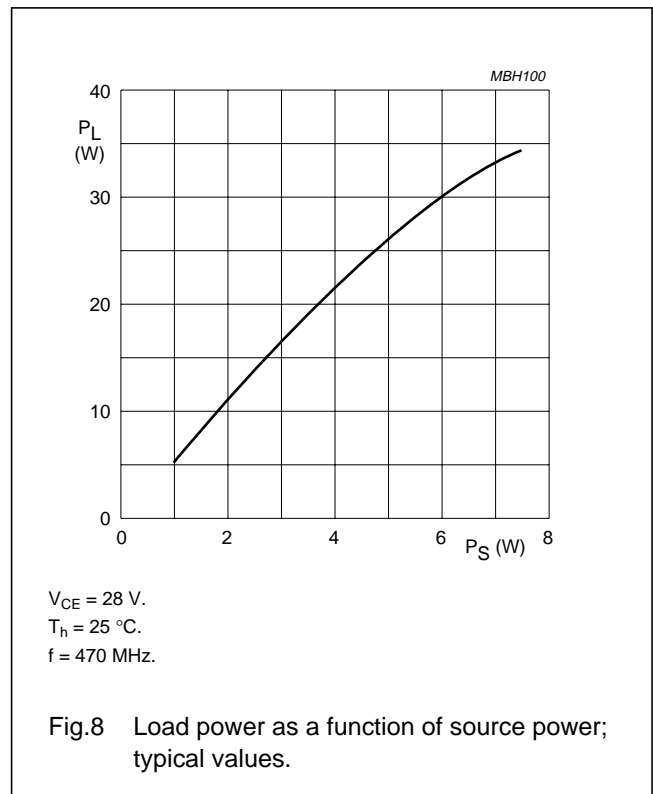
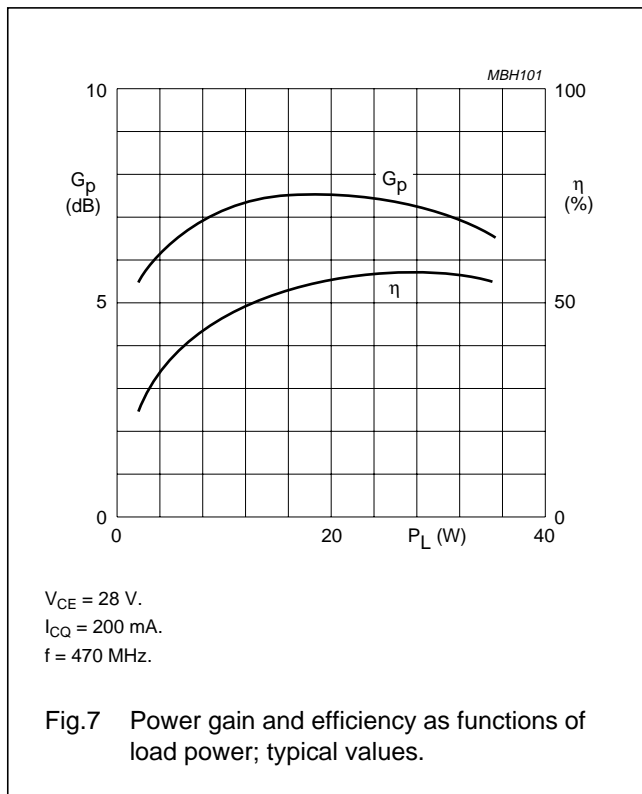
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APPLICATION INFORMATION

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

MODE OF OPERATION	f (MHz)	V <sub>CE</sub> (V)	P <sub>L</sub> (W)	P <sub>S</sub> (W)	G <sub>p</sub> (dB)	I <sub>c</sub> (A)	η <sub>c</sub> (%)
CW, class-B	470	28	25	<5.6 typ. 4.7	>6.5 typ. 7.25	<1.62 typ. 1.54	>55 typ. 58



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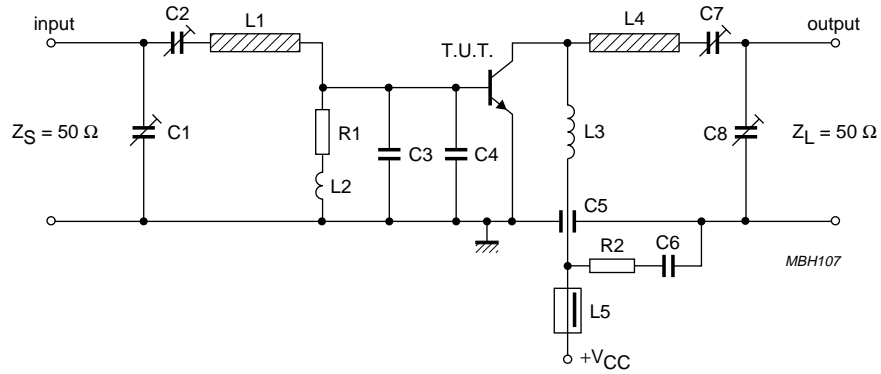


Fig.9 Class-B test circuit at f = 470 MHz.

List of components (see Figs 9 and 10)

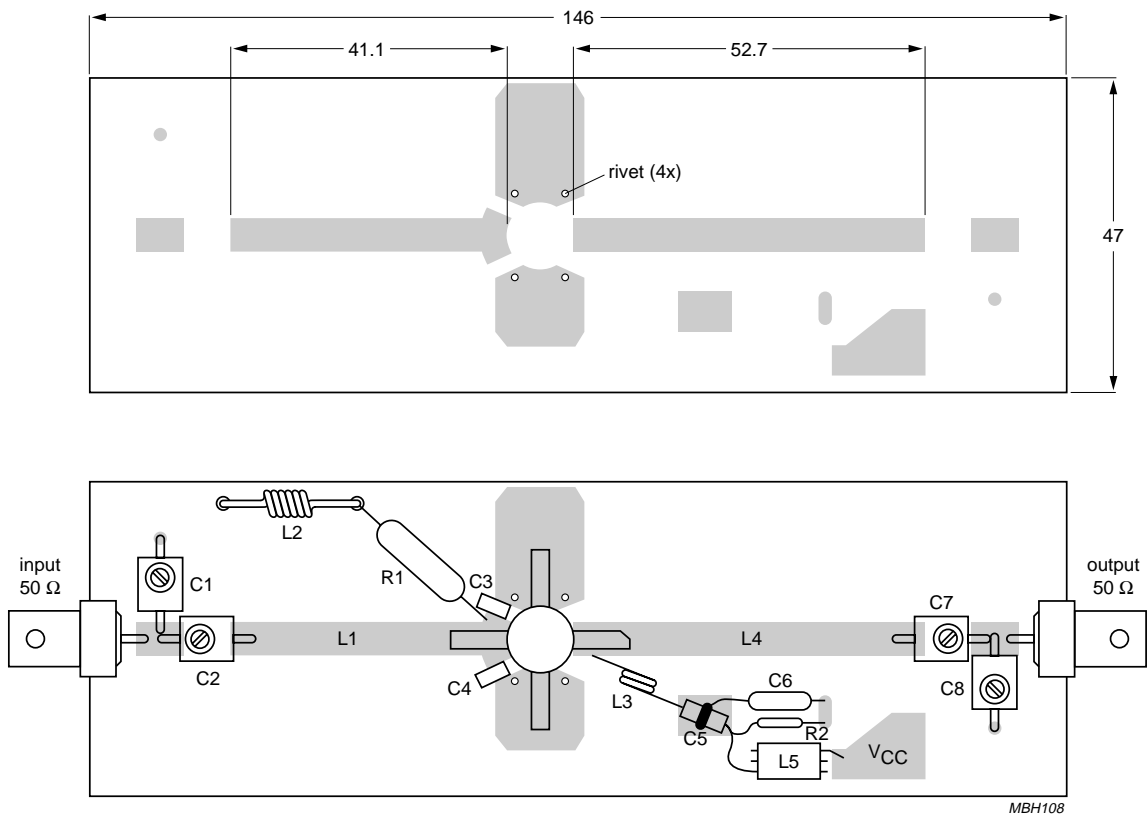
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C2, C8	film dielectric trimmer capacitor	2 to 9 pF		2222 809 09002
C3, C4	chip capacitor	15 pF		
C5	feed through capacitor	100 pF		
C6	polyester capacitor	33 nF		
C6	chip capacitor	22 nF, 63 V		
C7	film dielectric trimmer capacitor	2 to 18 pF		2222 809 09003
L1	stripline; note 1		length 41.1 mm width 5 mm	
L2	13 turns enamelled 0.5 mm copper wire		int. diameter 4 mm close wound	
L3	2 turns 1 mm copper wire		int. diameter 4 mm winding pitch 1.5 mm leads 2 x 5 mm	
L4	stripline; note 1		length 52.7 mm width 5 mm	
L5	Ferroxcube choke coil	750 Ω; ± 20%		4312 020 36640
R1	carbon resistor	1 Ω		
R2	carbon resistor	10 Ω		

Note

1. The striplines are on double-clad PCB with PTFE fibre-glass dielectric ( $\epsilon_r = 2.74$ ); thickness 1.45 mm.

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Dimensions in mm.

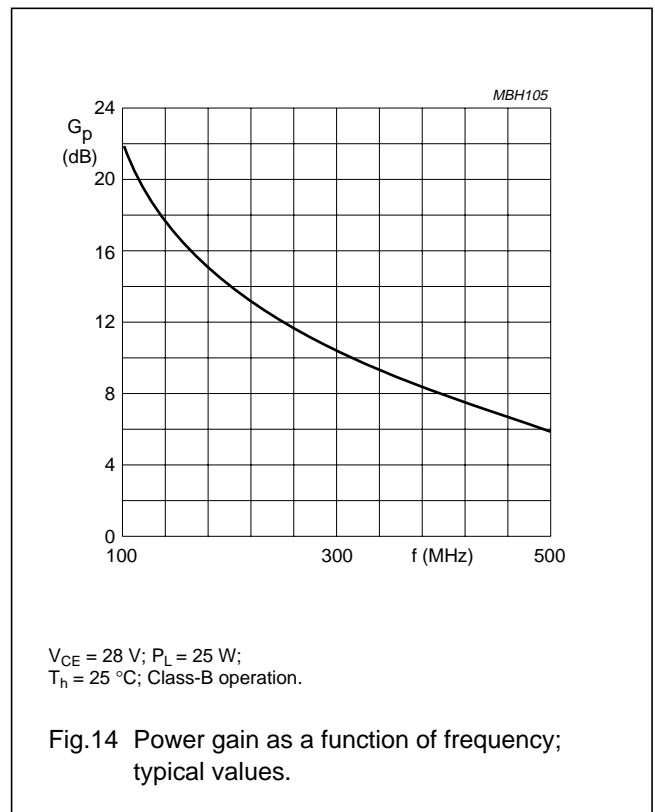
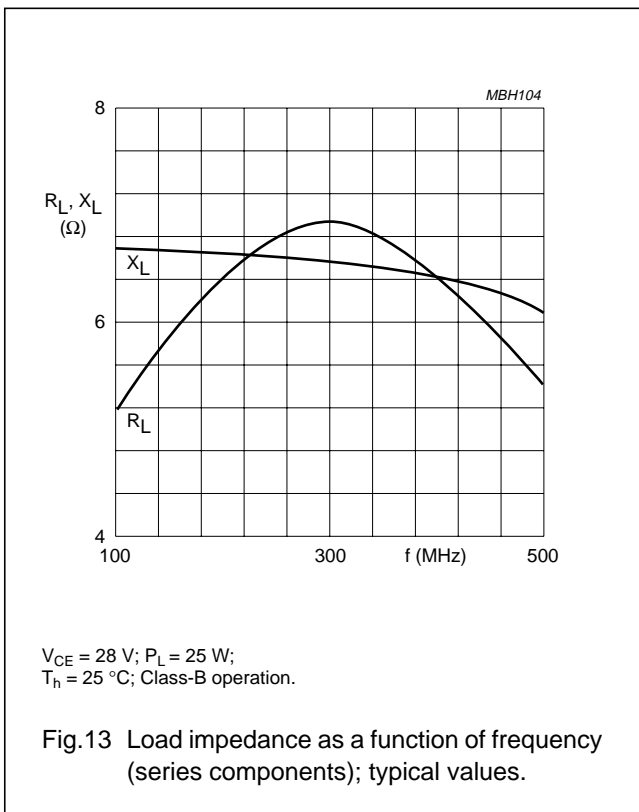
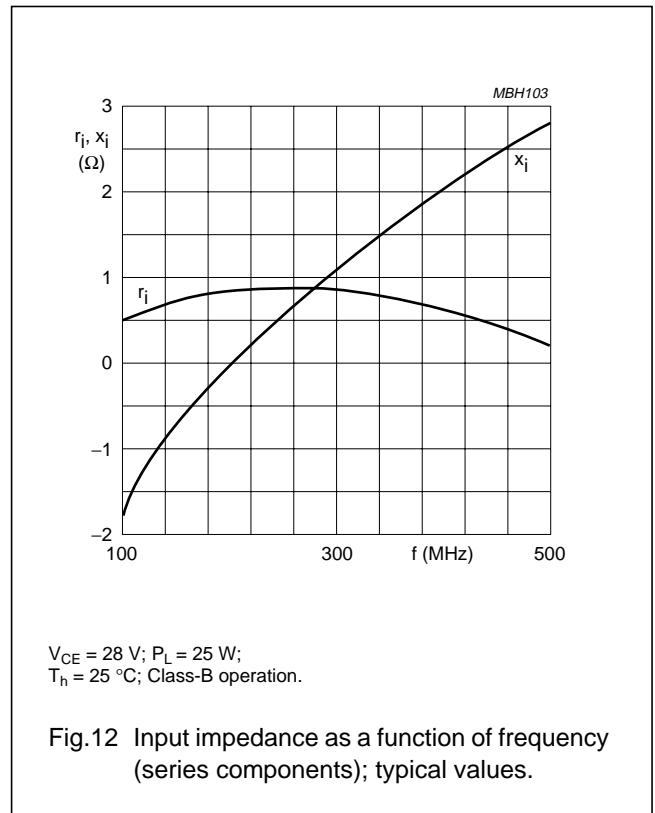
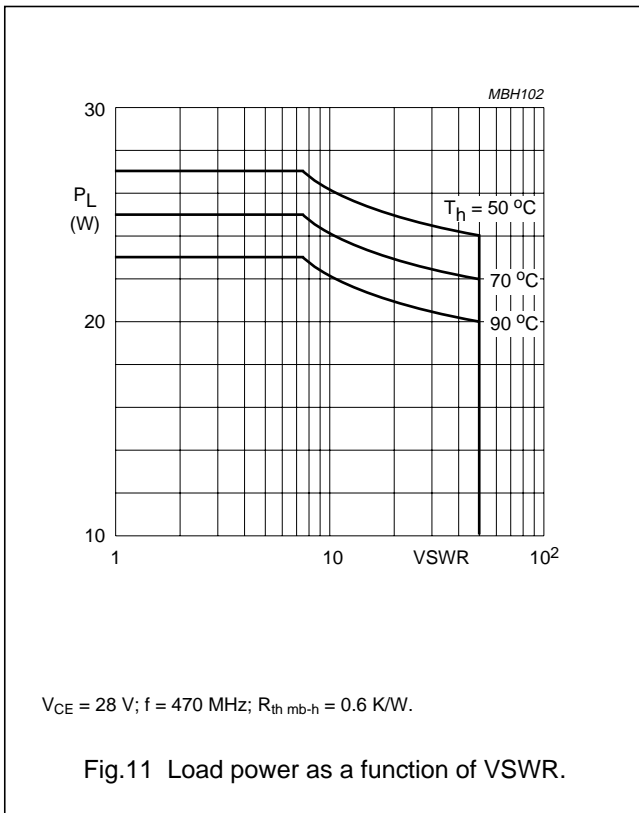
The components are located on one side of the copper-clad PTFE microfibre-glass board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.10 Component layout and printed-circuit board for 470 MHz class-B test circuit.



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PACKAGE OUTLINE

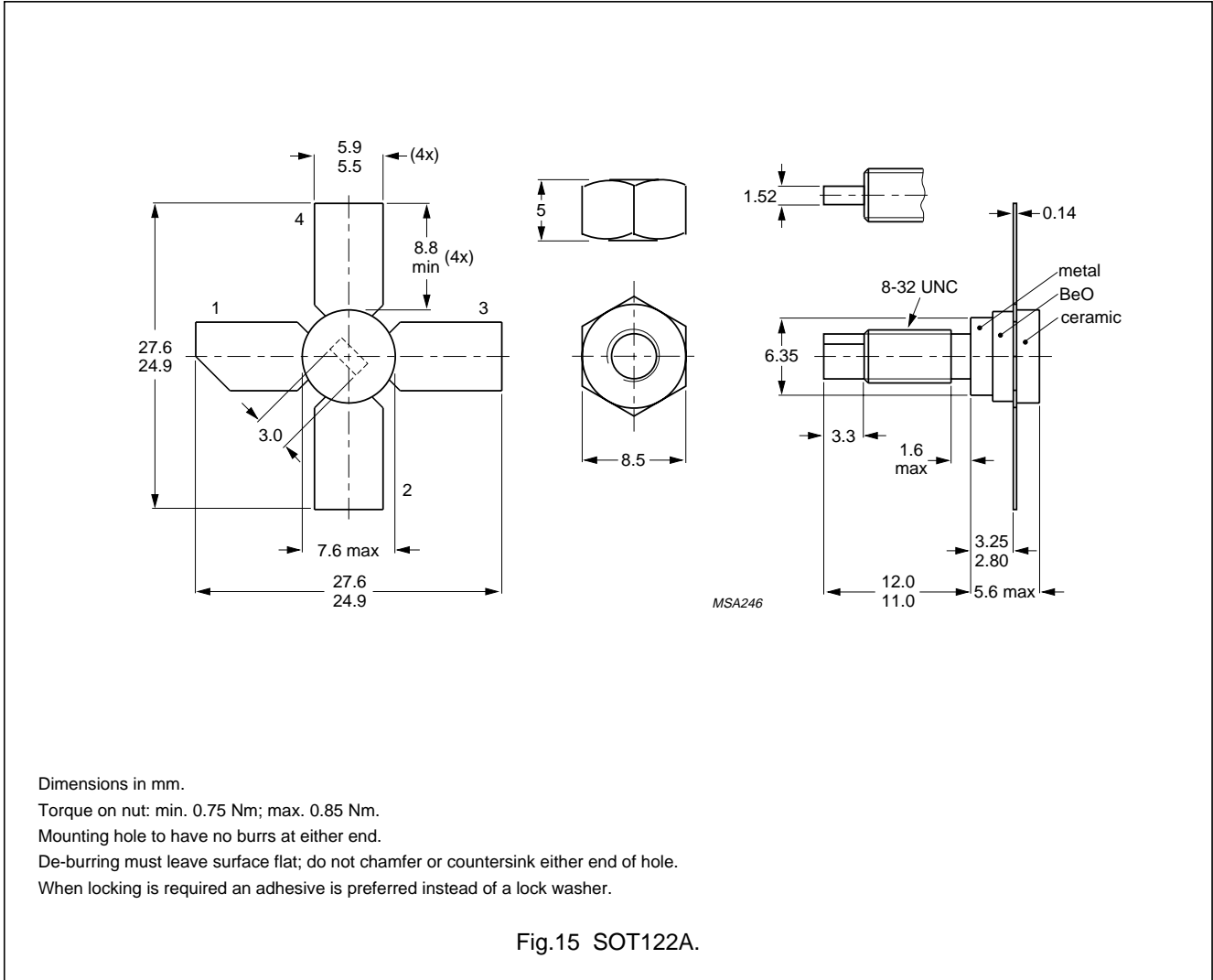


Fig.15 SOT122A.

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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.	

**LIFE SUPPORT APPLICATIONS**

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