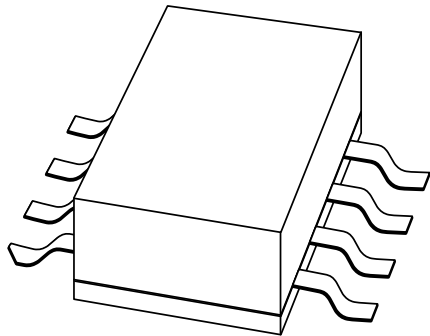


# DATA SHEET



## **BLT94** UHF power transistor

Product specification  
Supersedes data of 1997 Nov 04

1998 Jan 28

# UHF power transistor

# BLT94

## FEATURES

- Emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

## APPLICATIONS

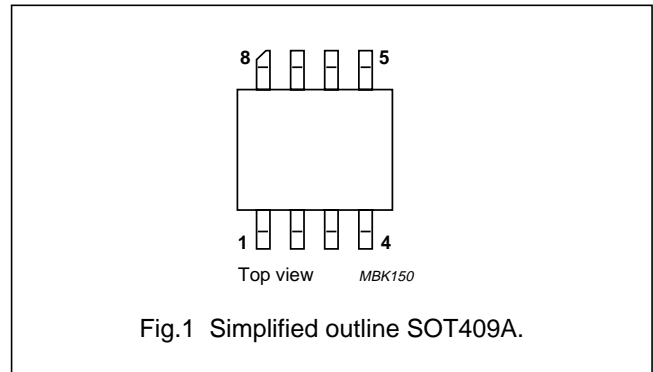
- Common emitter class-AB and B operation in portable radio transmitters in the 900 MHz communication band.

## DESCRIPTION

NPN silicon planar epitaxial power transistor encapsulated in a ceramic SOT409A package.

## PINNING

PIN	DESCRIPTION
1, 4, 5, 8	emitter
2, 3	base
6, 7	collector



## QUICK REFERENCE DATA

RF performance at  $T_{mb} \leq 60\text{ }^\circ\text{C}$  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	900	7.5	6	≥8 typ. 10	≥50 typ. 60

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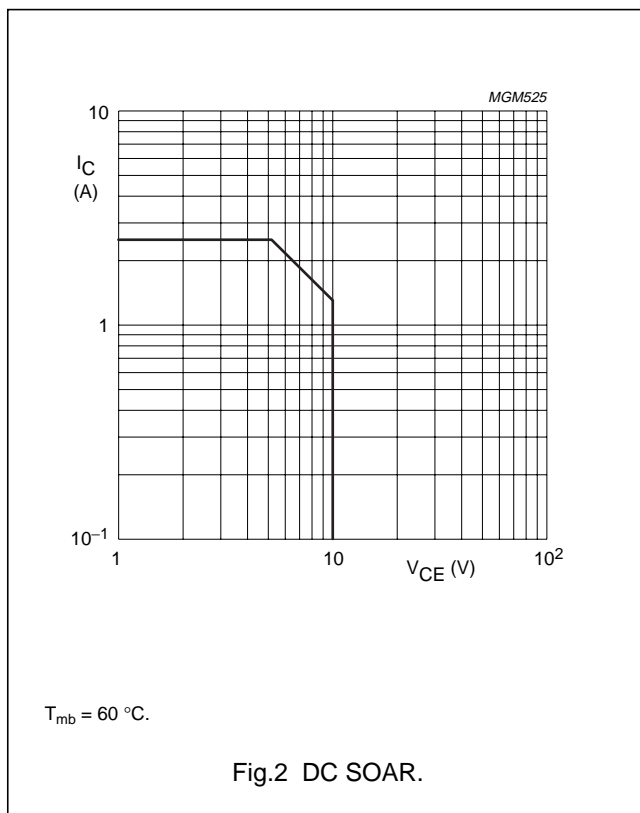
**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter	–	20	V
V <sub>CEO</sub>	collector-emitter voltage	open base	–	10	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	3	V
I <sub>C</sub>	collector current (DC)		–	2.5	A
P <sub>tot</sub>	total power dissipation	T <sub>mb</sub> ≤ 60 °C	–	13	W
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	operating junction temperature		–	200	°C

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th j-mb</sub>	thermal resistance from junction to mounting base	T <sub>mb</sub> ≤ 60 °C; P <sub>tot</sub> = 13 W	8	K/W



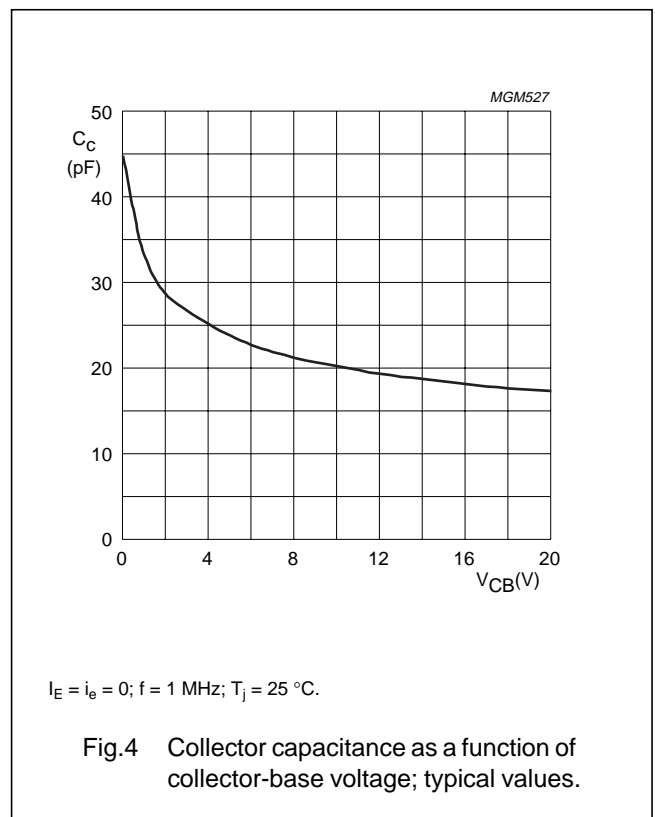
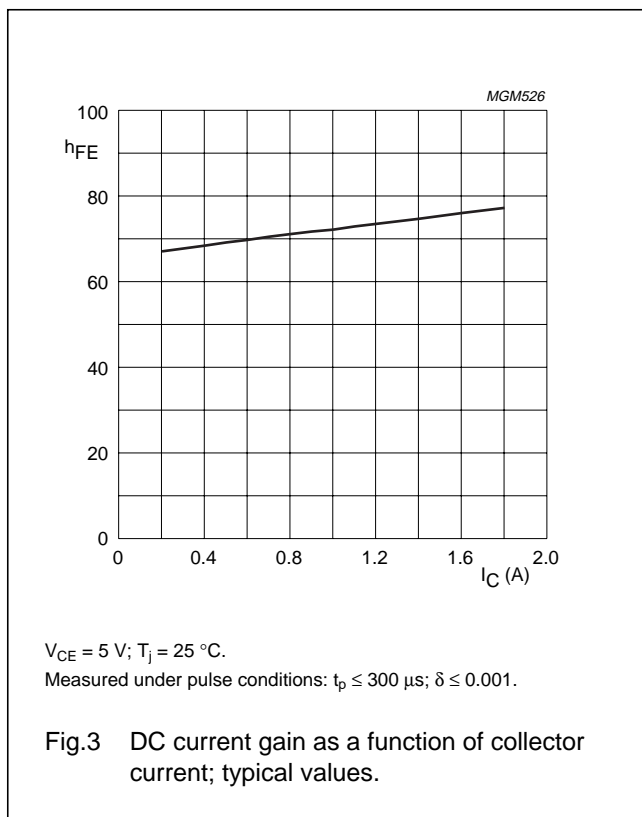
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**CHARACTERISTICS**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; $I_C = 20\text{ mA}$	20	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; $I_C = 40\text{ mA}$	10	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; $I_E = 4\text{ mA}$	3	–	–	V
$I_{CES}$	collector leakage current	$V_{BE} = 0; V_{CE} = 7.5\text{ V}$	–	–	1	mA
$h_{FE}$	DC current gain	$I_C = 1.2\text{ A}; V_{CE} = 5\text{ V}$	25	–	–	
$C_c$	collector capacitance	$I_E = i_e = 0; V_{CB} = 7.5\text{ V}; f = 1\text{ MHz}$	–	24	–	pF
$C_{re}$	feedback capacitance	$I_C = 0; V_{CE} = 7.5\text{ V}; f = 1\text{ MHz}$	–	17	–	pF



# UHF power transistor

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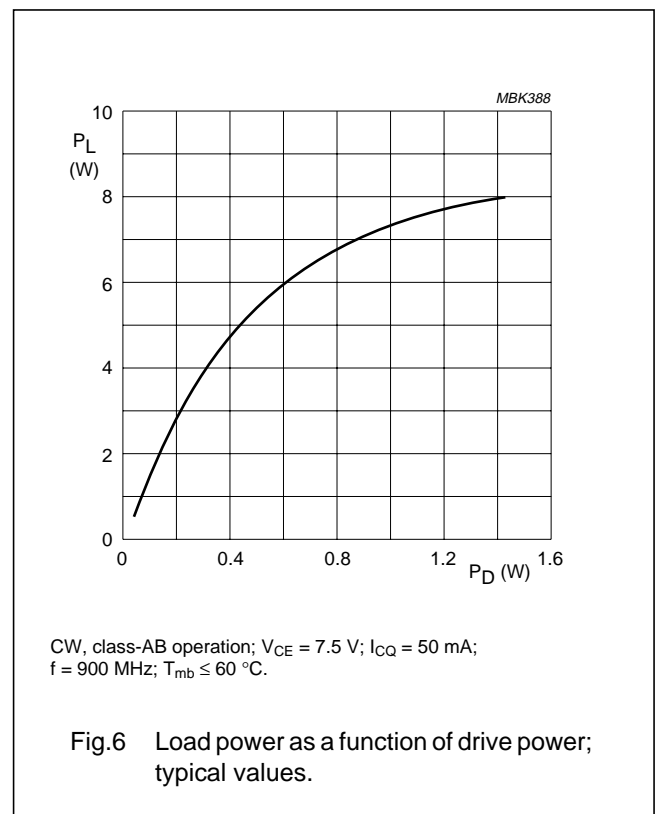
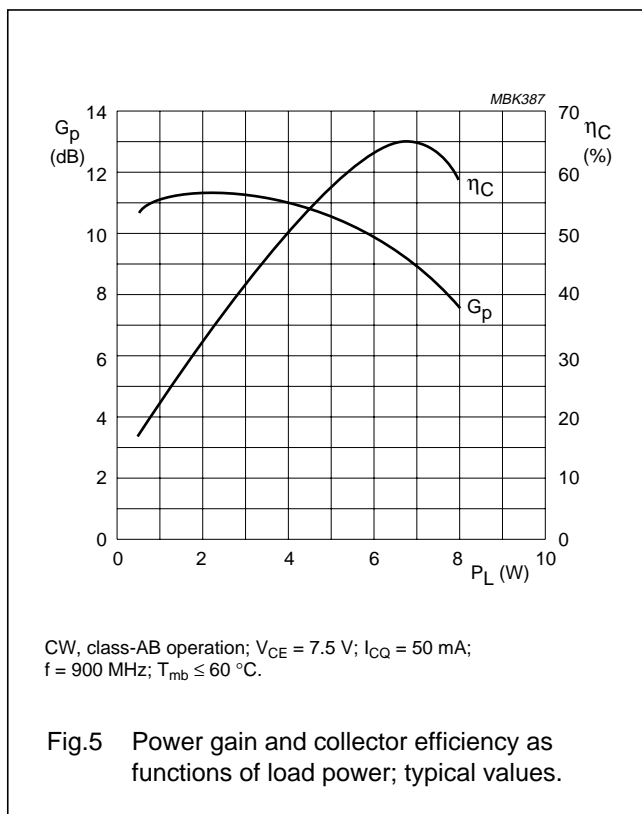
## APPLICATION INFORMATION

RF performance at  $T_{mb} \leq 60\text{ }^\circ\text{C}$  in a common emitter test circuit (see Fig.7).

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)	$\eta_c$ (%)
CW, class-AB	900	7.5	50	6	$\geq 8$ typ. 10	$\geq 50$ typ. 55

### Ruggedness in class-AB operation

The BLT94 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: CW, class-AB operation; V<sub>CE</sub> = 9 V; P<sub>L</sub> = 6 W and f = 900 MHz; T<sub>mb</sub> ≤ 60 °C.



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Test circuit information

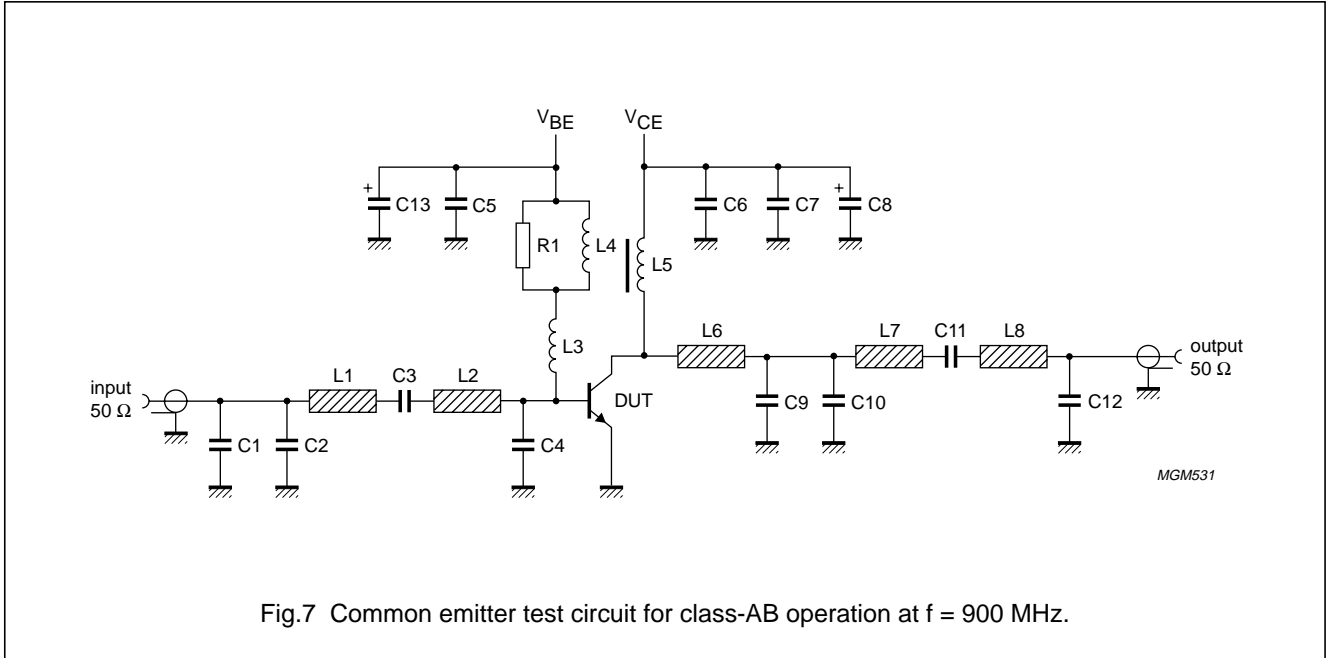


Fig.7 Common emitter test circuit for class-AB operation at  $f = 900$  MHz.

## UHF power transistor

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List of components used in test circuit (see Figs 7 and 8).

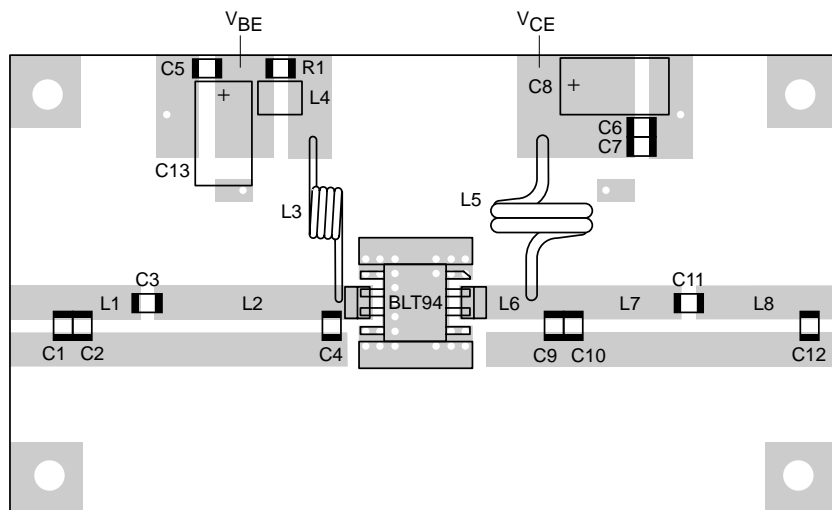
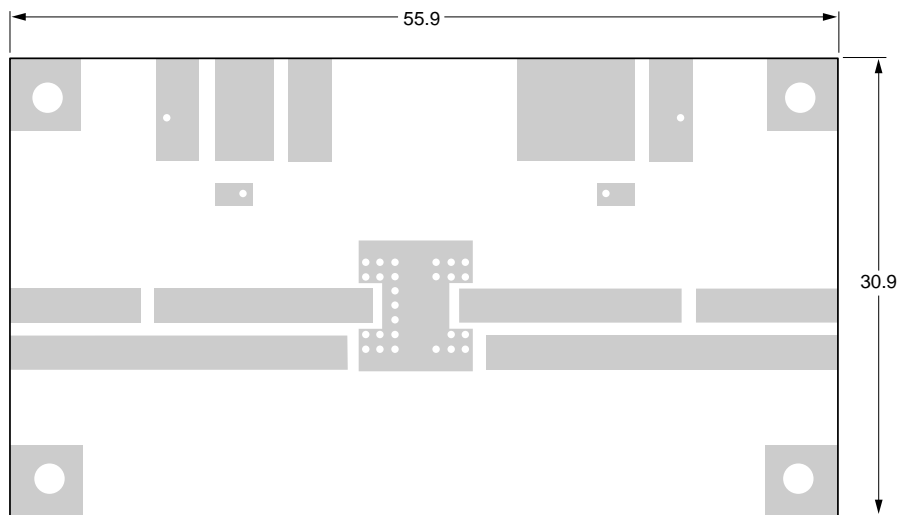
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C2	multilayer ceramic chip capacitor; note 1	2.7 pF		
C3	multilayer ceramic chip capacitor; note 1	82 pF		
C4	multilayer ceramic chip capacitor; note 1	15 pF		
C5	multilayer ceramic chip capacitor	1 nF		
C6	multilayer ceramic chip capacitor; note 1	100 pF		
C7	multilayer ceramic chip capacitor	39 nF		
C8	electrolytic capacitor	4.7 $\mu$ F, 10 V		
C9, C10	multilayer ceramic chip capacitor; note 1	6.8 pF		
C11	multilayer ceramic chip capacitor; note 1	4.3 pF		
C12	multilayer ceramic chip capacitor; note 1	0.7 pF		
C13	electrolytic capacitor	10 $\mu$ F, 10 V		
L1	stripline; note 2	50 $\Omega$	3.17 x 2.28 mm	
L2	stripline; note 2	50 $\Omega$	11 x 2.28 mm	
L3	5 turns 0.5 mm enamelled copper wire		int. dia. = 3 mm leads = 2 x 7.5 mm	
L4	chipbead	1 $\mu$ H		
L5	2 turns 1 mm enamelled copper wire		int. dia. = 6 mm; leads = 2 x 7.5 mm	
L6	stripline; note 2	50 $\Omega$	3.82 x 2.28 mm	
L7	stripline; note 2	50 $\Omega$	6.18 x 2.28 mm	
L8	stripline; note 2	50 $\Omega$	5.62 x 2.28 mm	
R1	SMD resistor	27 $\Omega$		

**Notes**

1. American Technical Ceramics type 100A or capacitor of same quality.
2. The striplines are on a double copper-clad printed circuit board, with DUROID dielectric ( $\epsilon_r = 2.2$ ); thickness 0.79 mm, thickness of the copper sheet 2 x 35  $\mu$ m.

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MGM532

Dimensions in mm.

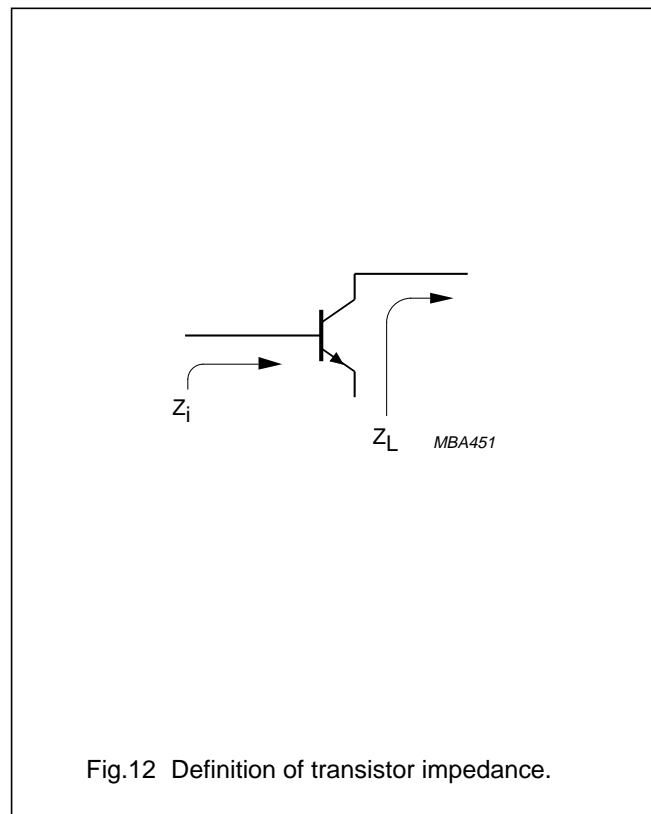
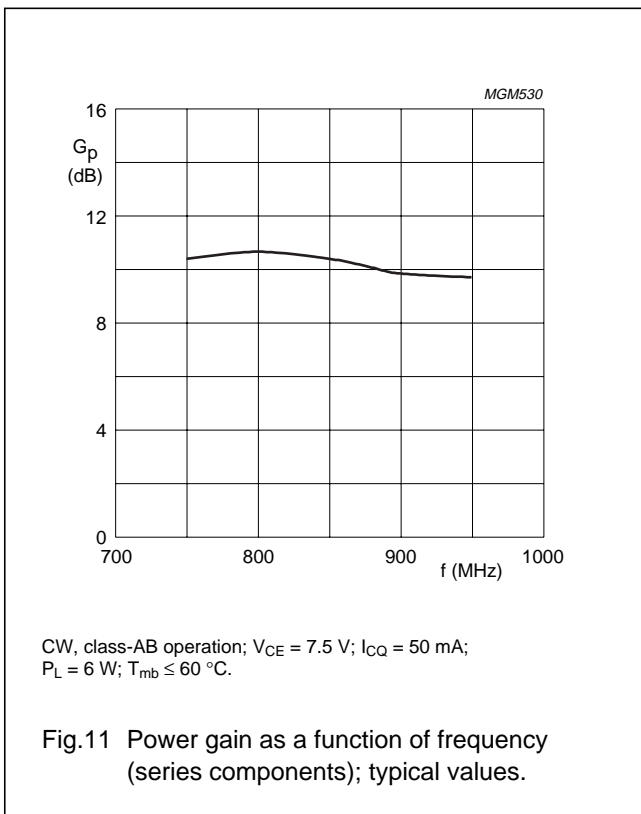
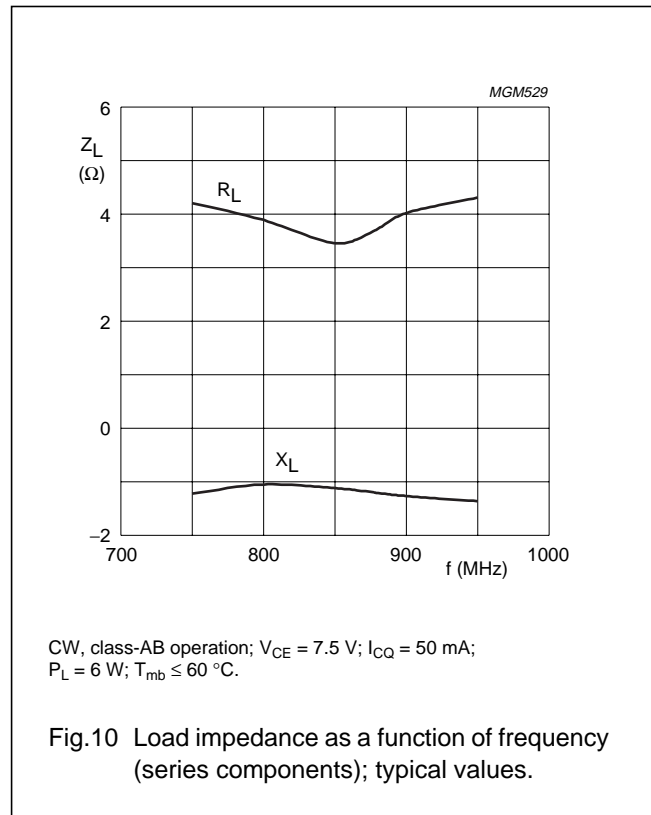
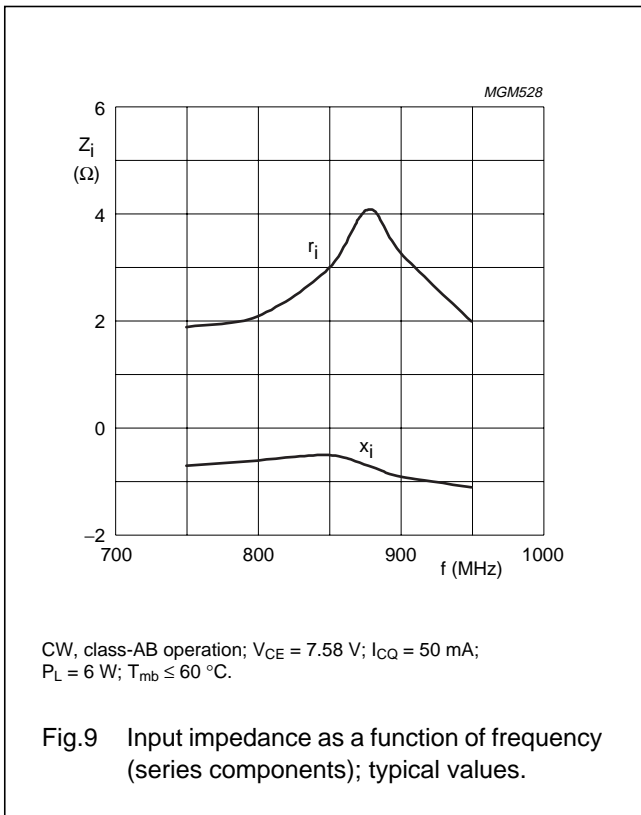
The components are situated on one side of the copper-clad printed-circuit board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.8 Printed-circuit board and component layout for 900 MHz class-AB test circuit in Fig.7.



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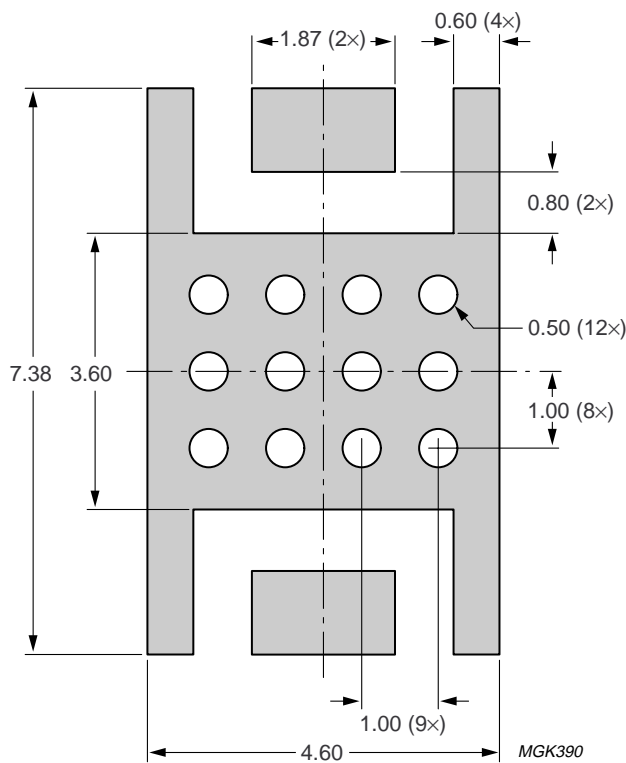
UHF power transistor

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**MOUNTING RECOMMENDATIONS**

Both the metallized groundplate and leads contribute to the heatflow. It is recommended that the transistor is mounted on a grounded metallized area of a maximum thickness of 0.8 mm on the printed-circuit board, equipped with at least 12 (0.5 mm diameter) through metallized holes filled with solder.

A thermal resistance  $R_{th(mb-h)}$  of 5 K/W can be achieved if heatsink compound is applied when the transistor is mounted on the printed-circuit board.



Dimensions in mm.

Fig.13 Reflow soldering footprint for SOT409A.

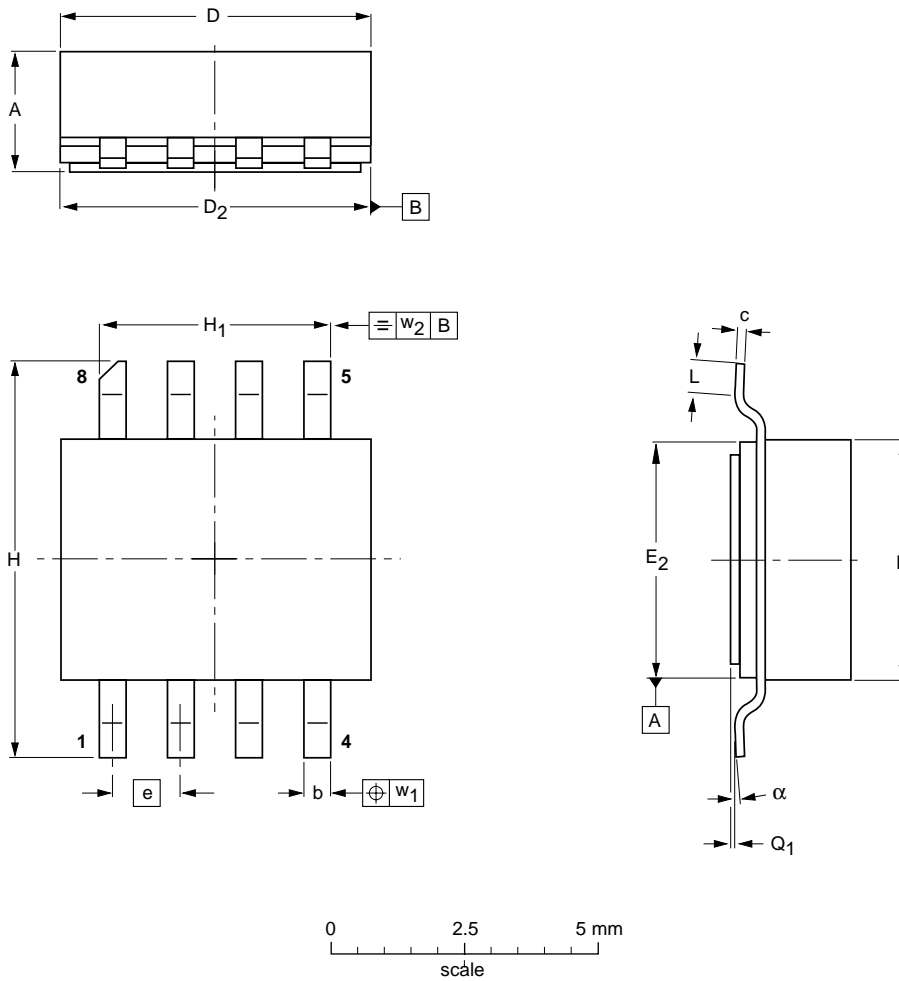
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PACKAGE OUTLINE

Ceramic surface mounted package; 8 leads

SOT409A



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

UNIT	A	b	c	D	D <sub>2</sub>	E	E <sub>2</sub>	e	H	H <sub>1</sub>	L	Q <sub>1</sub>	w <sub>1</sub>	w <sub>2</sub>	$\alpha$
mm	2.36 2.06	0.58 0.43	0.23 0.18	5.94 5.03	5.16 5.00	4.93 4.01	4.14 3.99	1.27	7.47 7.26	4.39 4.24	1.02 0.51	0.10 0.00	0.25	0.25	7° 0°
inches	0.093 0.081	0.023 0.017	0.009 0.007	0.234 0.198	0.203 0.197	0.194 0.158	0.163 0.157	0.050	0.294 0.286	0.173 0.167	0.040 0.020	0.004 0.000	0.010	0.010	7° 0°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT409A						98-01-27

## UHF power transistor

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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.	
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Where application information is given, it is advisory and does not form part of the specification.	

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**NOTES**

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**NOTES**

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