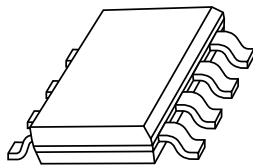


# DATA SHEET



## **BLT71/8** UHF power transistor

Product specification  
Supersedes data of 1996 Feb 06  
File under Discrete Semiconductors, SC08b

1997 Oct 14

## UHF power transistor

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## FEATURES

- High efficiency
- Very high gain
- Internal pre-matched input
- Low supply voltage.

## APPLICATIONS

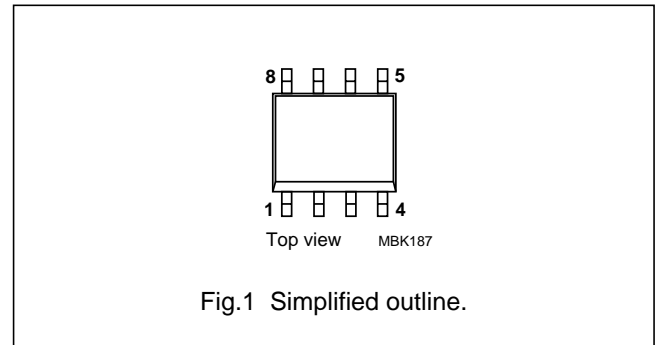
- Hand-held radio equipment in common emitter class-AB operation for the 900 MHz communication band.

## DESCRIPTION

NPN silicon planar epitaxial power transistor encapsulated in a SOT96-1 (SO8) plastic SMD package.

## PINNING - SOT96-1

PIN	SYMBOL	DESCRIPTION
1, 8	b	base
2, 4, 5, 7	e	emitter
3, 6	c	collector



## QUICK REFERENCE DATA

RF performance at  $T_s \leq 60^\circ\text{C}$  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	900	4.8	1.2	$\geq 11$ typ. 13	$\geq 55$ typ. 63

## 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	–	16	V
$V_{CEO}$	collector-emitter voltage	open base	–	8	V
$V_{EBO}$	emitter-base voltage	open collector	–	2.5	V
$I_C$	collector current (DC)		–	500	mA
$P_{tot}$	total power dissipation	$T_s = 60^\circ\text{C}$ ; $V_{CE} \leq 6.5\text{ V}$ ; note 1	–	2.9	W
$T_{stg}$	storage temperature		–65	+150	$^\circ\text{C}$
$T_j$	operating junction temperature		–	175	$^\circ\text{C}$

## Note

1.  $T_s$  is the temperature at the soldering point of the collector pin.

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**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	$P_{dis} = 2.9\text{ W}; T_s = 60\text{ }^\circ\text{C}; \text{note 1}$	40	K/W

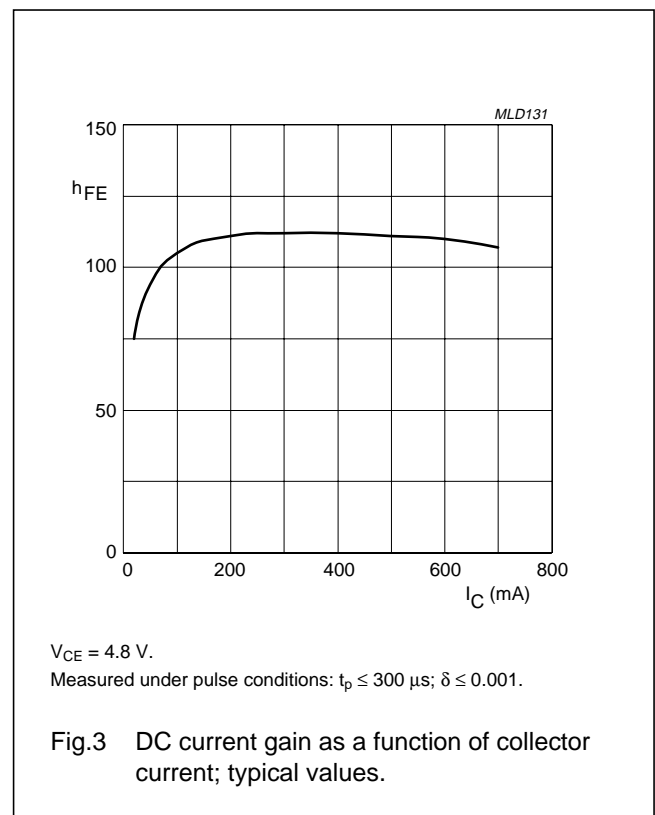
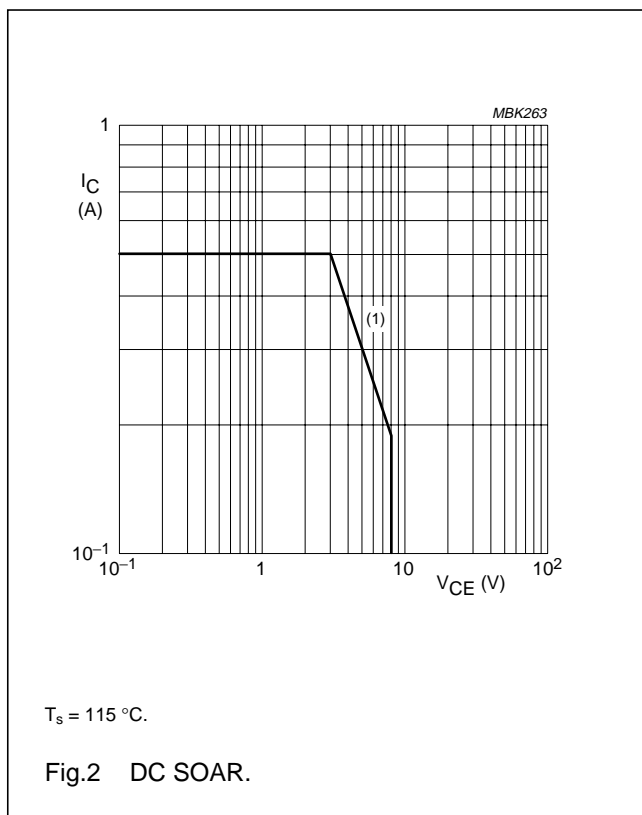
**Note**

1.  $T_s$  is the temperature at the soldering point of the collector pin.

**CHARACTERISTICS**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; $I_C = 0.5\text{ mA}$	16	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; $I_C = 10\text{ mA}$	8	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; $I_E = 0.1\text{ mA}$	2.5	–	V
$I_{CES}$	collector leakage current	$V_{CE} = 8\text{ V}; V_{BE} = 0$	–	0.1	mA
$h_{FE}$	DC current gain	$V_{CE} = 5\text{ V}; I_C = 100\text{ mA}$	25	–	
$C_c$	collector capacitance	$V_{CB} = 4.8\text{ V}; I_E = i_e = 0; f = 1\text{ MHz}$	–	7	pF
$C_{re}$	feedback capacitance	$V_{CE} = 4.8\text{ V}; I_C = 0; f = 1\text{ MHz}$	–	5	pF



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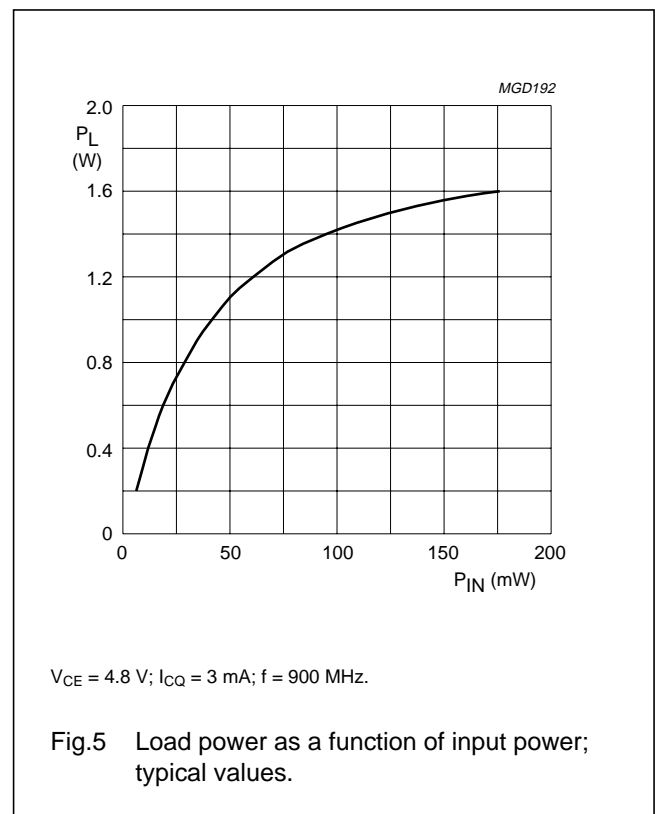
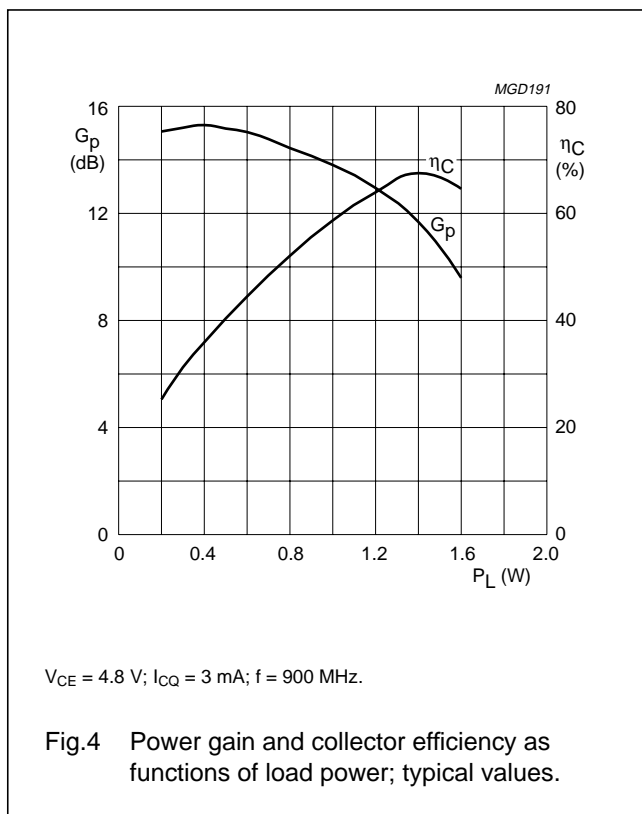
## APPLICATION INFORMATION

RF performance at  $T_s \leq 60\text{ }^\circ\text{C}$  in a common emitter test circuit.

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	4.8	3	1.2	$\geq 11$ typ. 13	$\geq 55$ typ. 63

### Ruggedness in class-AB operation

The BLT71/8 is capable of withstanding a load mismatch corresponding to VSWR = 6 : 1 through all phases under the following conditions: f = 900 MHz; V<sub>CE</sub> = 6.5 V; I<sub>CQ</sub> = 3 mA; P<sub>L</sub> = 1.2 W; T<sub>s</sub> = 60 °C.



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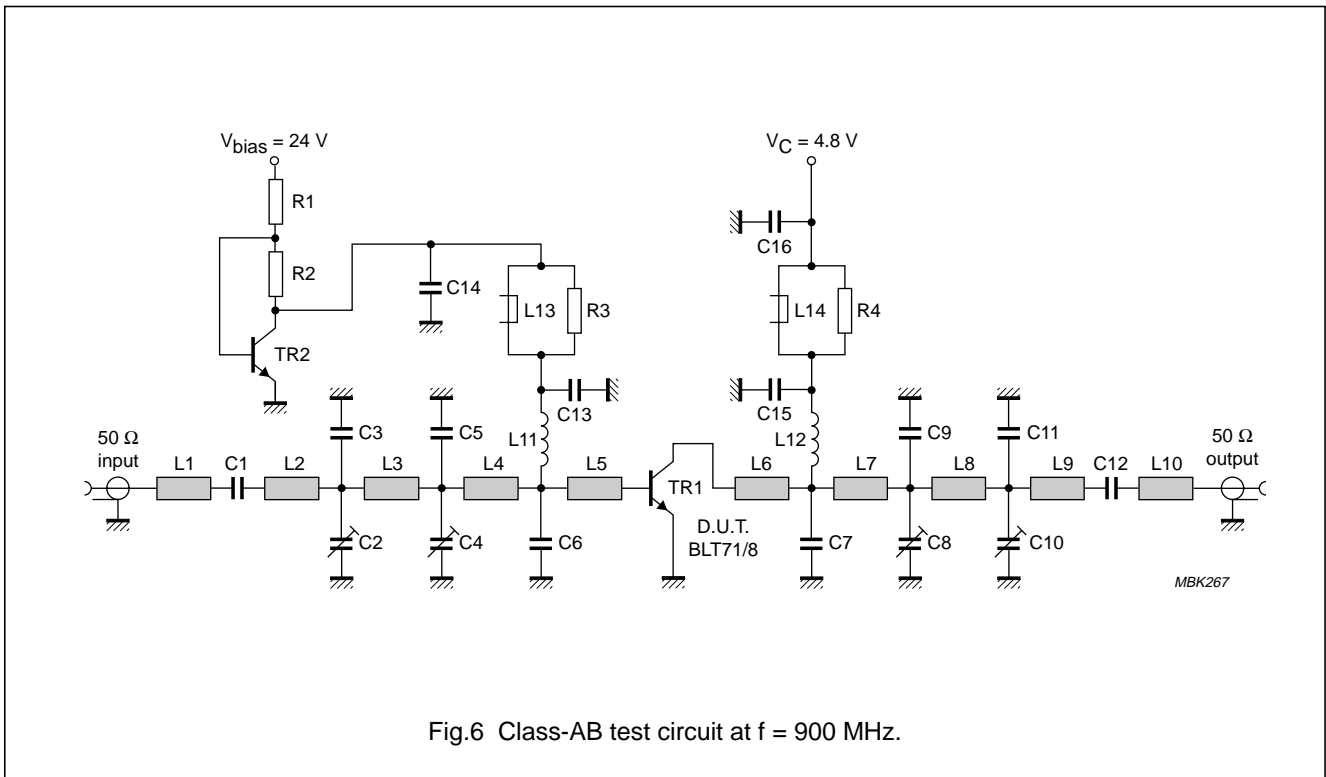
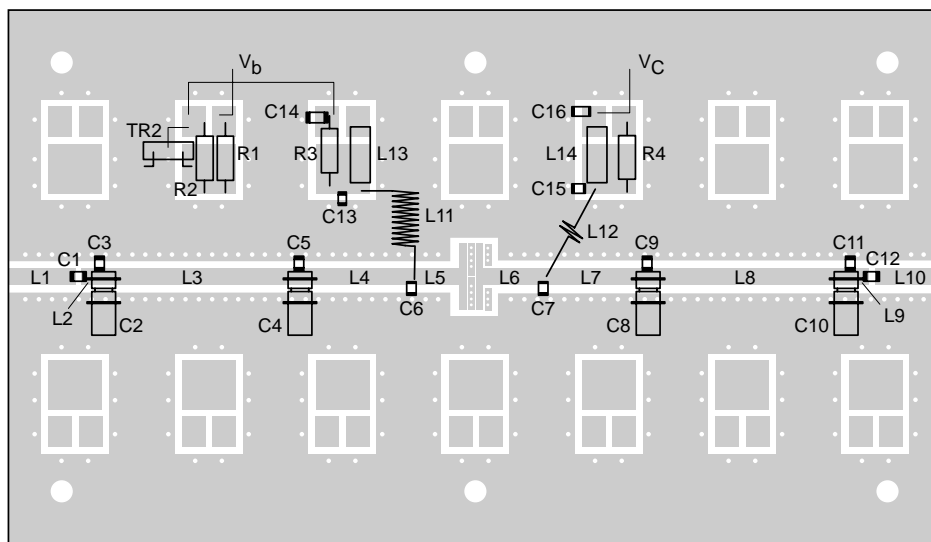
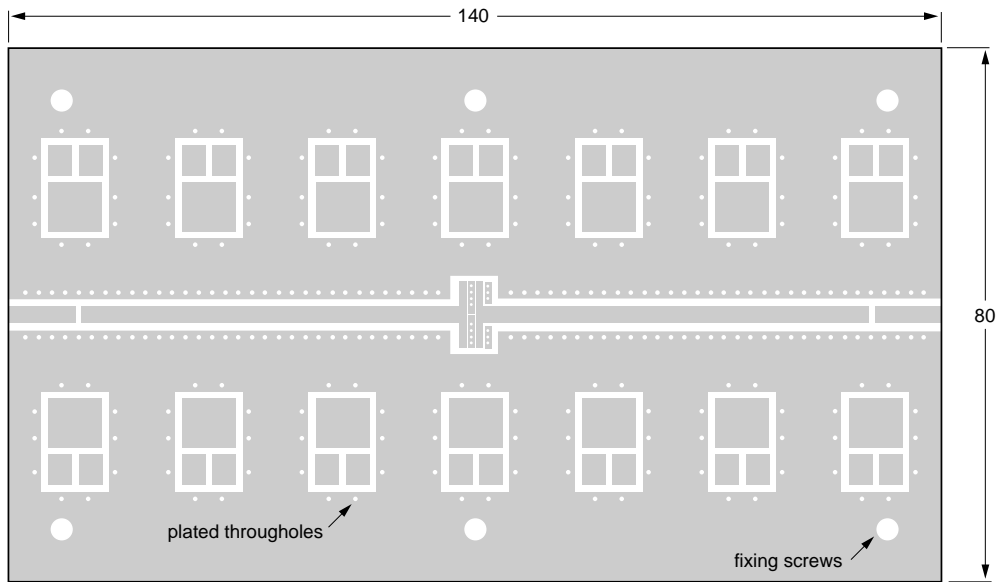


Fig.6 Class-AB test circuit at  $f = 900$  MHz.

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MBK266

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.7 Printed-circuit board and component lay-out for the 900 MHz class-AB test circuit.

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## List of components (see Figs 6 and 7).

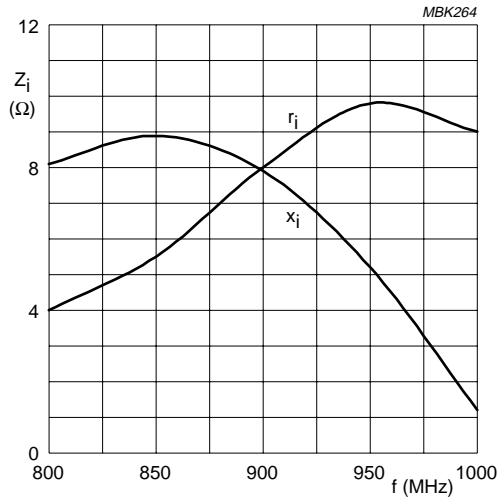
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C12, C13, C15	multilayer ceramic chip capacitor; note 1	120 pF		
C2, C4, C8, C10	Giga-Trim capacitor; note 2	0.6 to 4.5 pF		
C3	multilayer ceramic chip capacitor; note 1	4.7 pF		
C5	multilayer ceramic chip capacitor; note 1	5.6 pF		
C6	multilayer ceramic chip capacitor; note 1	3.9 pF		
C7	multilayer ceramic chip capacitor; note 1	6.8 pF		
C9	multilayer ceramic chip capacitor; note 1	7.5 pF		
C11	multilayer ceramic chip capacitor; note 1	5.1 pF		
C14, C16	multilayer ceramic chip capacitor; note 1	10 nF		
L1, L10	stripline; note 3	50 $\Omega$	10 x 2.4 mm	
L2	stripline; note 3	50 $\Omega$	2 x 2.4 mm	
L3	stripline; note 3	50 $\Omega$	30.4 x 2.4 mm	
L4	stripline; note 3	50 $\Omega$	17.4 x 2.4 mm	
L5	stripline; note 3	50 $\Omega$	6.8 x 2.4 mm	
L6	stripline; note 3	50 $\Omega$	8 x 2.4 mm	
L7	stripline; note 3	50 $\Omega$	19 x 2.4 mm	
L8	stripline; note 3	50 $\Omega$	28 x 2.4 mm	
L9	stripline; note 3	50 $\Omega$	1.6 x 2.4 mm	
L11	10 turns 1 mm enamelled copper wire	140 nH	int. dia. = 4 mm; lead 1 = 2.5 mm; lead 2 = 11 mm	
L12	2 turns 1 mm enamelled copper wire	60 nH	int. dia. = 2 mm; leads = 2 x 7.5 mm	
L13, L14	4S2 wideband RF choke			4330 030 36301
R1	metal film resistor	1.4 k $\Omega$ ; 0.6 W		2322 156 11402
R2, R3, R4	metal film resistor	10 $\Omega$ ; 0.6 W		2322 156 11009
TR1	device under test	BLT71/8		
TR2	NPN transistor	BD139		9330 912 20112

## Notes

- American Technical Ceramics type 100A or capacitor of same quality.
- Tekelec Giga-trim, type 37271.
- 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  $\mu\text{m}$ .

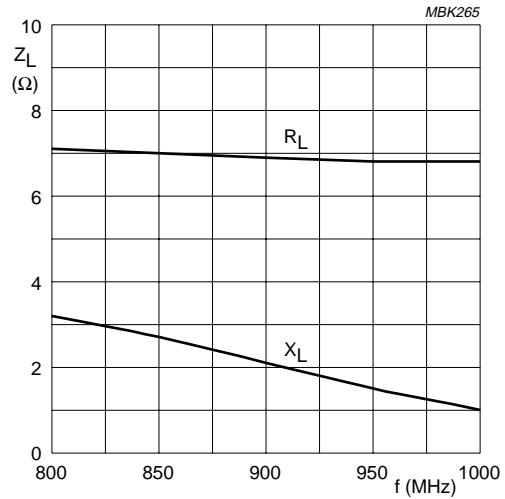
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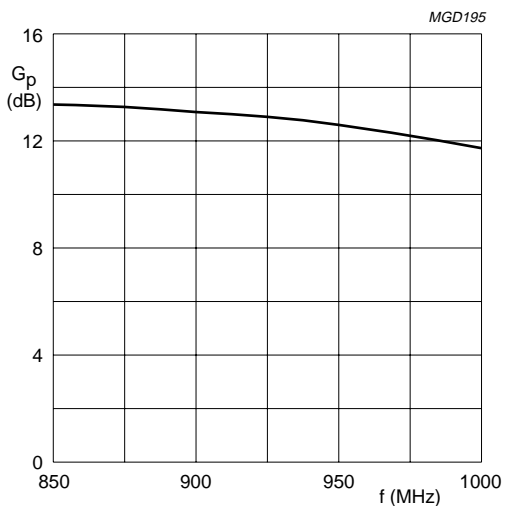
$V_{CE} = 4.8 \text{ V}$ ;  $I_{CQ} = 3 \text{ mA}$ ;  $P_L = 1.2 \text{ W}$ ;  $T_{amb} = 25 \text{ }^\circ\text{C}$ .

Fig.8 Input impedance as a function of frequency (series components); typical values.



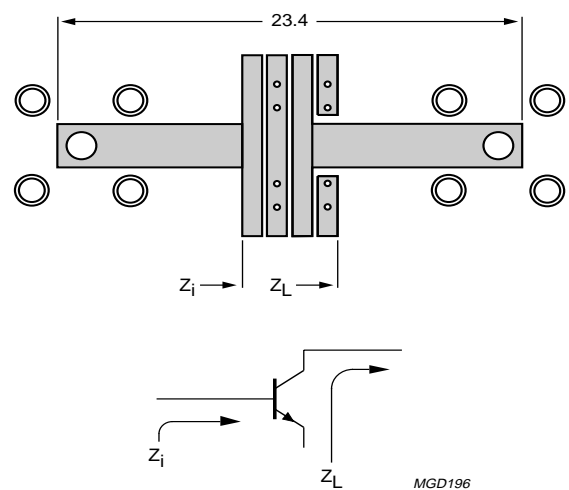
$V_{CE} = 4.8 \text{ V}$ ;  $I_{CQ} = 3 \text{ mA}$ ;  $P_L = 1.2 \text{ W}$ ;  $T_{amb} = 25 \text{ }^\circ\text{C}$ .

Fig.9 Load impedance as a function of frequency (series components); typical values.



$V_{CE} = 4.8 \text{ V}$ ;  $I_{CQ} = 3 \text{ mA}$ ;  $P_L = 1.2 \text{ W}$ ;  $T_{amb} = 25 \text{ }^\circ\text{C}$ .

Fig.10 Power gain as a function of frequency (series components); typical values.



Dimensions in mm.

Fig.11 RF test print and definition of transistor impedance.



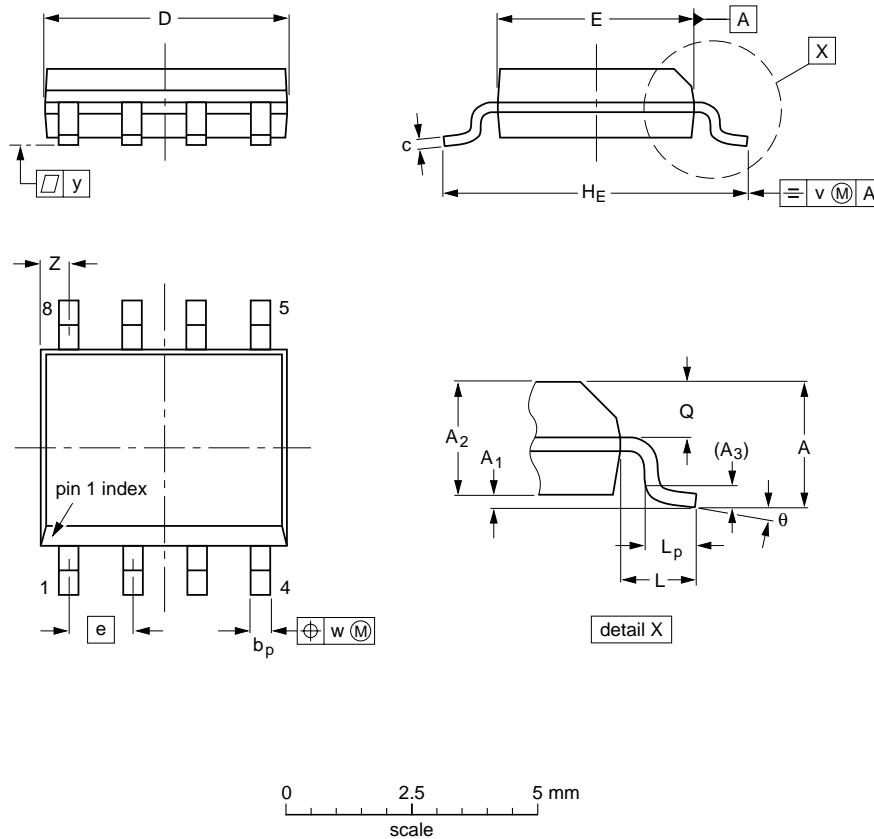
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PACKAGE OUTLINE

SO8: plastic small outline package; 8 leads; body width 3.9 mm

SOT96-1



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

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(2)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	z <sup>(1)</sup>	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	5.0 4.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.20 0.19	0.16 0.15	0.050	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT96-1	076E03S	MS-012AA				95-02-04 97-05-22

## 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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**Argentina:** see South America

**Australia:** 34 Waterloo Road, NORTH RYDE, NSW 2113,  
Tel. +61 2 9805 4455, Fax. +61 2 9805 4466

**Austria:** Computerstr. 6, A-1101 WIEN, P.O. Box 213, Tel. +43 160 1010,  
Fax. +43 160 101 1210

**Belarus:** Hotel Minsk Business Center, Bld. 3, r. 1211, Volodarski Str. 6,  
220050 MINSK, Tel. +375 172 200 733, Fax. +375 172 200 773

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**Denmark:** Prags Boulevard 80, PB 1919, DK-2300 COPENHAGEN S,  
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**Finland:** Sinikalliontie 3, FIN-02630 ESPOO,  
Tel. +358 9 615800, Fax. +358 9 61580920

**France:** 4 Rue du Port-aux-Vins, BP317, 92156 SURESNES Cedex,  
Tel. +33 1 40 99 6161, Fax. +33 1 40 99 6427

**Germany:** Hammerbrookstraße 69, D-20097 HAMBURG,  
Tel. +49 40 23 53 60, Fax. +49 40 23 536 300

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**Indonesia:** see Singapore

**Ireland:** Newstead, Clonskeagh, DUBLIN 14,  
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**Israel:** RAPAC Electronics, 7 Kehilat Saloniki St, PO Box 18053,  
TEL AVIV 61180, Tel. +972 3 645 0444, Fax. +972 3 649 1007

**Italy:** PHILIPS SEMICONDUCTORS, Piazza IV Novembre 3,  
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**Malaysia:** No. 76 Jalan Universiti, 46200 PETALING JAYA, SELANGOR,  
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**Mexico:** 5900 Gateway East, Suite 200, EL PASO, TEXAS 79905,  
Tel. +9-5 800 234 7381

**Middle East:** see Italy

**Netherlands:** Postbus 90050, 5600 PB EINDHOVEN, Bldg. VB,  
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**New Zealand:** 2 Wagener Place, C.P.O. Box 1041, AUCKLAND,  
Tel. +64 9 849 4160, Fax. +64 9 849 7811

**Norway:** Box 1, Manglerud 0612, OSLO,  
Tel. +47 22 74 8000, Fax. +47 22 74 8341

**Philippines:** Philips Semiconductors Philippines Inc.,  
106 Valero St. Salcedo Village, P.O. Box 2108 MCC, MAKATI,  
Metro MANILA, Tel. +63 2 816 6380, Fax. +63 2 817 3474

**Poland:** Ul. Lukiska 10, PL 04-123 WARSZAWA,  
Tel. +48 22 612 2831, Fax. +48 22 612 2327

**Portugal:** see Spain

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**South America:** Rua do Rocio 220, 5th floor, Suite 51,  
04552-903 São Paulo, SÃO PAULO - SP, Brazil,  
Tel. +55 11 821 2333, Fax. +55 11 829 1849

**Spain:** Balmes 22, 08007 BARCELONA,  
Tel. +34 3 301 6312, Fax. +34 3 301 4107

**Sweden:** Kottbygatan 7, Akalla, S-16485 STOCKHOLM,  
Tel. +46 8 632 2000, Fax. +46 8 632 2745

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**Taiwan:** Philips Semiconductors, 6F, No. 96, Chien Kuo N. Rd., Sec. 1,  
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Tel. +90 212 279 2770, Fax. +90 212 282 6707

**Ukraine:** PHILIPS UKRAINE, 4 Patrice Lumumba str., Building B, Floor 7,  
252042 KIEV, Tel. +380 44 264 2776, Fax. +380 44 268 0461

**United Kingdom:** Philips Semiconductors Ltd., 276 Bath Road, Hayes,  
MIDDLESEX UB3 5BX, Tel. +44 181 730 5000, Fax. +44 181 754 8421

**United States:** 811 East Arques Avenue, SUNNYVALE, CA 94088-3409,  
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