

UHF power transistor

BLT81

FEATURES

- SMD encapsulation
- Gold metallization ensures excellent reliability.

APPLICATIONS

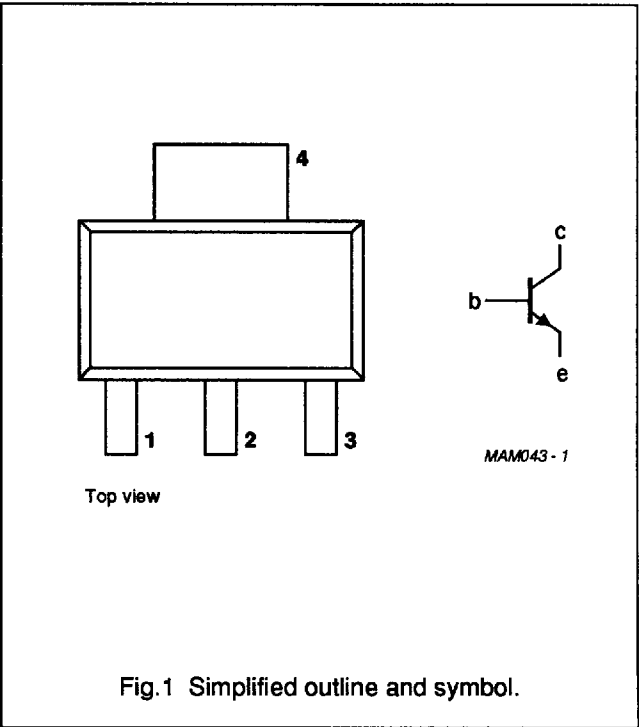
- Hand-held radio equipment in the 900 MHz communication band.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a plastic SOT223 SMD package.

PINNING - SOT223

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



QUICK REFERENCE DATA

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

MODE OF OPERATION	f (MHz)	V _{CE} (V)	P _L (W)	G _p (dB)	η_c (%)
CW, class-B narrow band	900	7.5	1.2	≥ 6	≥ 60
		6	1.2	typ. 6.5	typ. 77

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LIMITING VALUES

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

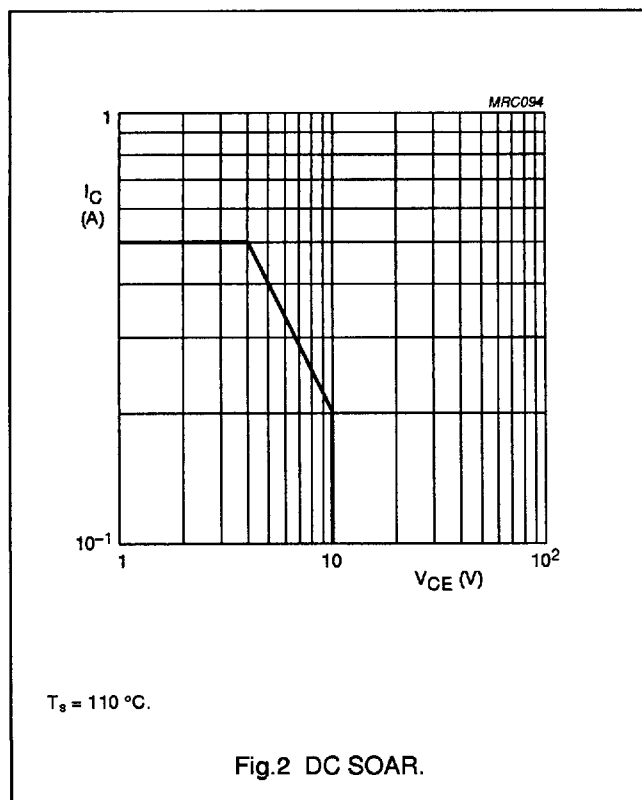
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	9.5	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	500	mA
$I_{C(AV)}$	average collector current		–	500	mA
P_{tot}	total power dissipation	$T_s = 110\text{ °C}$; note 1	–	2	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	175	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\,j-s}$	thermal resistance from junction to soldering point	$P_{tot} = 2\text{ W}$; $T_s = 110\text{ °C}$; note 1	32	K/W

Note to the “Limiting values” and “Thermal characteristics”

- T_s is the temperature at the soldering point of the collector pin.



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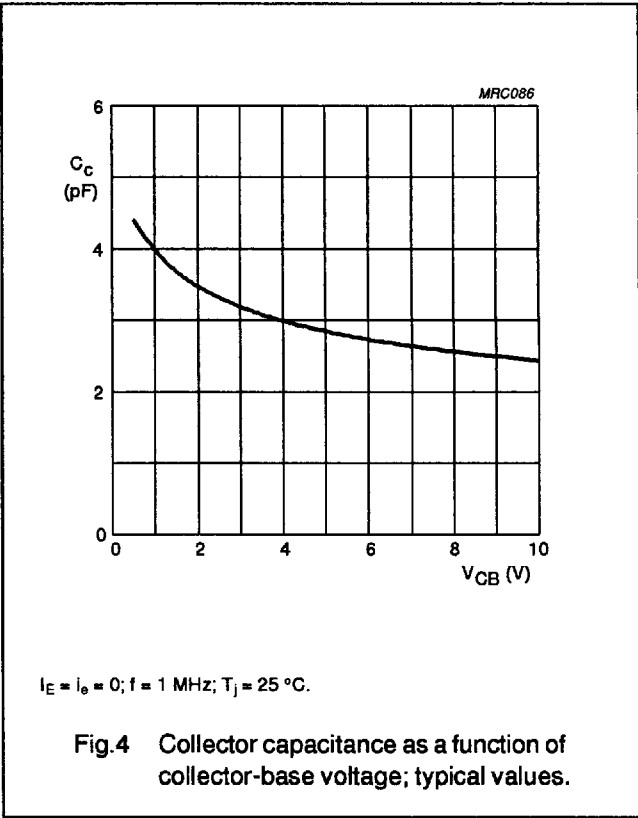
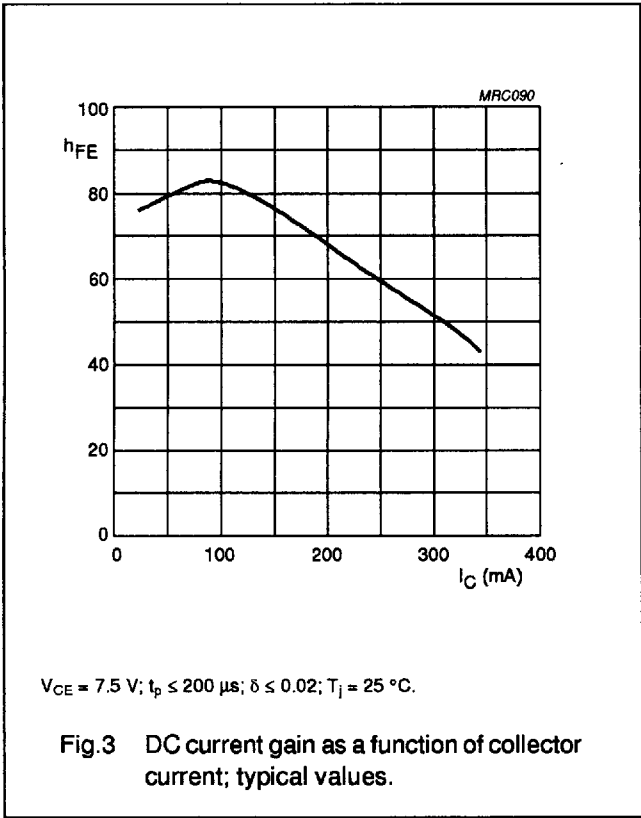
CHARACTERISTICS

T_J = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V _{(BR)CBO}	collector-base breakdown voltage	open emitter; I _C = 1 mA	20	–	–	V
V _{(BR)CEO}	collector-emitter breakdown voltage	open base; I _C = 10 mA	9.5	–	–	V
V _{(BR)EBO}	emitter-base breakdown voltage	open collector; I _E = 0.1 mA	2.5	–	–	V
I _{CES}	collector leakage current	V _{CE} = 10 V; V _{BE} = 0	–	–	0.1	mA
h _{FE}	DC current gain	V _{CE} = 5 V; I _C = 300 mA; note 1;	25	–	–	
C _c	collector capacitance	V _{CB} = 7.5 V; I _E = I _B = 0; f = 1 MHz;	–	2.7	4	pF
C _{re}	feedback capacitance	V _{CE} = 7.5 V; I _C = 0; f = 1 MHz	–	1.7	3	pF

Note

1. Measured under pulsed conditions: t_p ≤ 200 μs; δ ≤ 0.02.



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APPLICATION INFORMATION

RF performance at $T_s \leq 60\text{ }^\circ\text{C}$ in a common emitter test circuit (see note 1 and Fig.7).

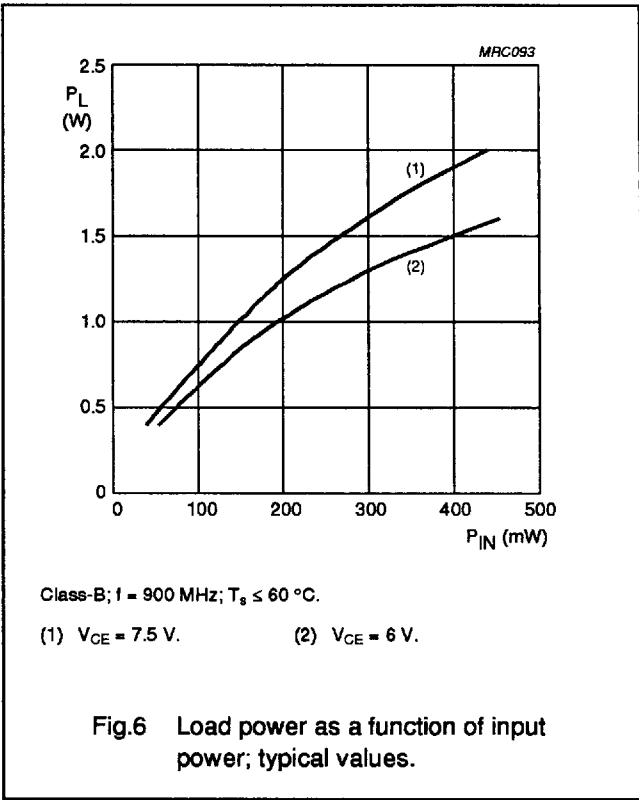
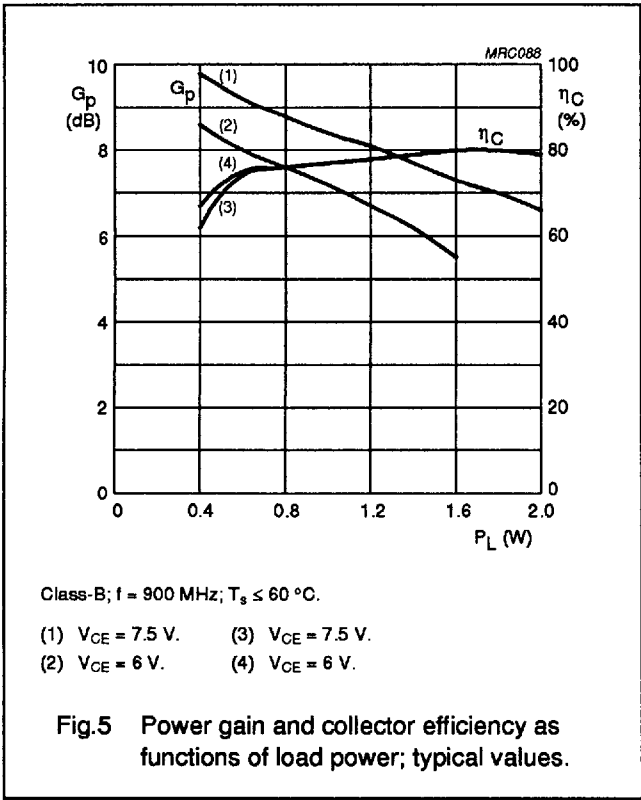
MODE OF OPERATION	f (MHz)	V _{CE} (V)	P _L (W)	G _p (dB)	η_c (%)
CW, class-B narrow band	900	7.5	1.2	≥ 6 typ. 8	≥ 60 typ. 77
		6	1.2	typ. 6.5	typ. 77

Note

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

Ruggedness In class-AB operation

The BLT81 is capable of withstanding a load mismatch corresponding to VSWR = 50 : 1 through all phases under the following conditions: $f = 900\text{ MHz}$; $V_{CE} = 9\text{ V}$; $P_L = 1.2\text{ W}$; $T_s \leq 60\text{ }^\circ\text{C}$.



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Test circuit information

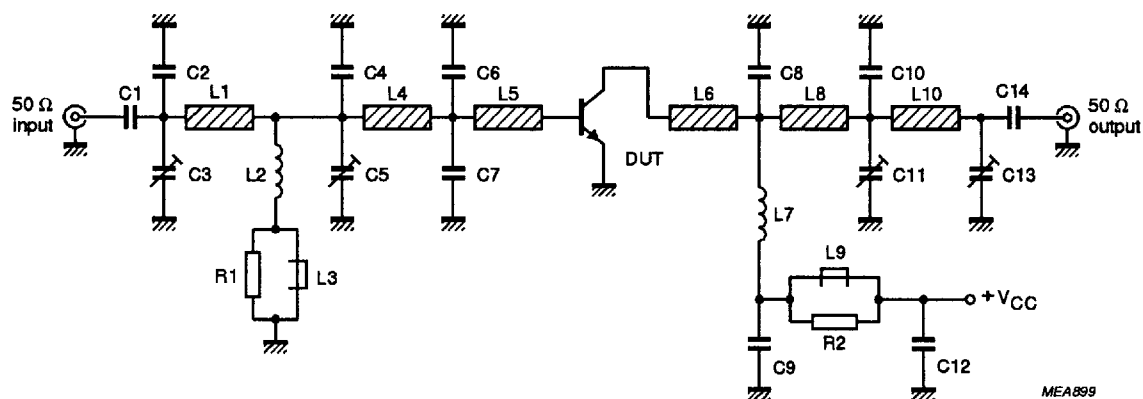


Fig.7 Common emitter test circuit for class-B operation at 900 MHz.

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

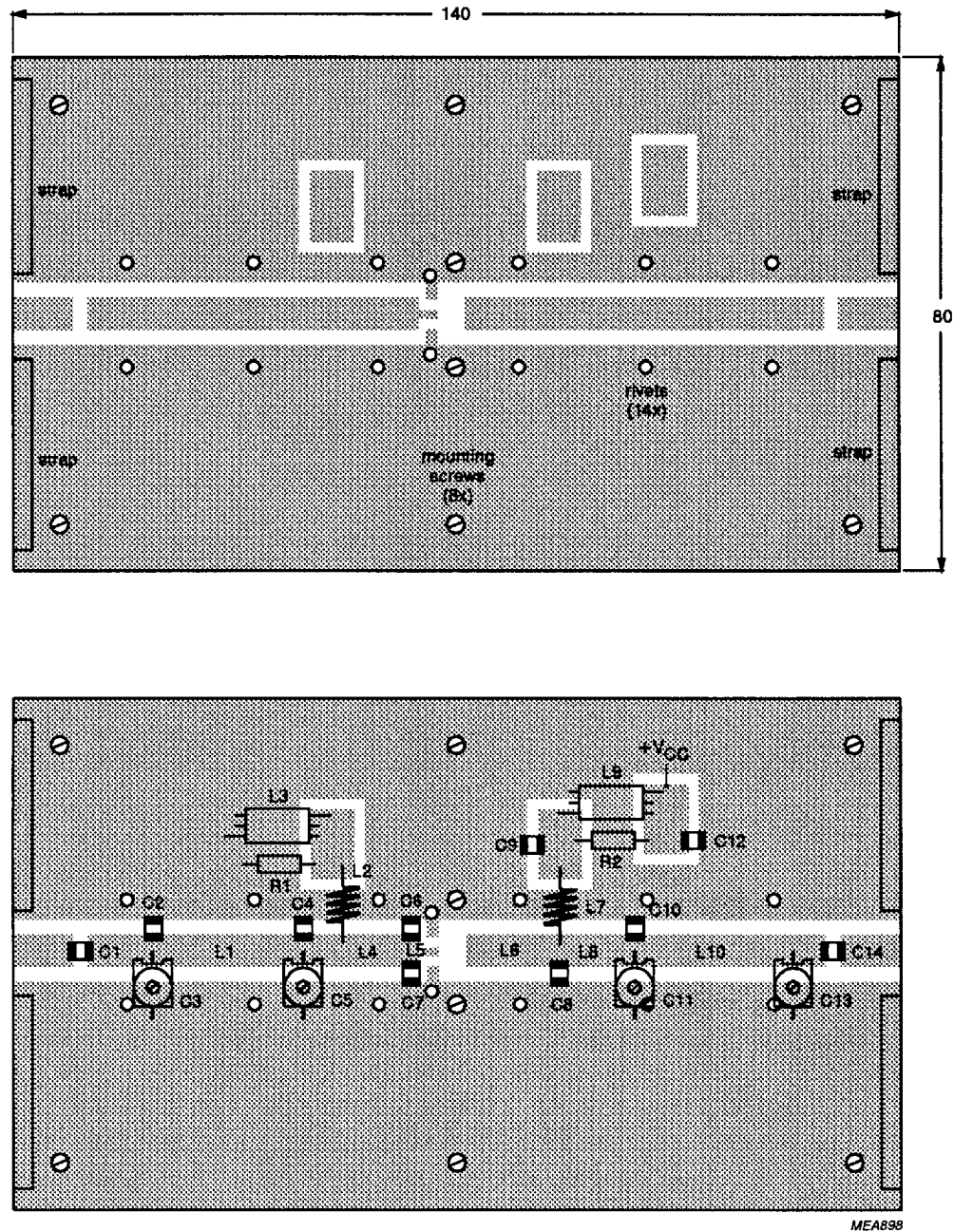
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C14	multilayer ceramic chip capacitor; note 1	100 pF		
C2	multilayer ceramic chip capacitor; note 1	3 pF		
C3, C5, C11, C13	film dielectric trimmer	1.4 to 5.5 pF		2222 809 09004
C4	multilayer ceramic chip capacitor; note 1	5.6 pF		
C6, C7, C10	multilayer ceramic chip capacitor; note 1	5.1 pF		
C8	multilayer ceramic chip capacitor; note 1	3.6 pF		
C9	multilayer ceramic chip capacitor; note 1	220 pF		
C12	multilayer ceramic chip capacitor;	1 nF		
L1	stripline; note 2	50 Ω	length 26.6 mm width 4.85 mm	
L2	10 turns enamelled 0.6 mm copper wire	250 nH	int. dia. 4.5 mm leads 2 $\times$ 5 mm	
L3, L9	grade 3B Ferroxcube wideband HF choke			4312 020 36640
L4	stripline; note 2	50 Ω	length 18 mm width 4.85 mm	
L5	stripline; note 2	75 Ω	length 3.5 mm width 2.5 mm	
L6	stripline; note 2	50 Ω	length 10 mm width 4.85 mm	
L7	4 turns enamelled 0.6 mm copper wire	65 nH	int. dia. 4.5 mm leads 2 $\times$ 5 mm	
L8	stripline; note 2	50 Ω	length 15 mm width 4.85 mm	
L10	stripline; note 2	50 Ω	length 24.6 mm width 4.85 mm	
R1, R2	metal film resistor	10 Ω , 0.25 W		

Notes

- American Technical Ceramics type 100B or capacitor of same quality.
- The striplines are on a double copper-clad printed-circuit board, with PTFE fibre-glass dielectric ($\epsilon_r = 2.2$); thickness $\frac{1}{16}$ "; thickness of the copper sheet 35 μm .

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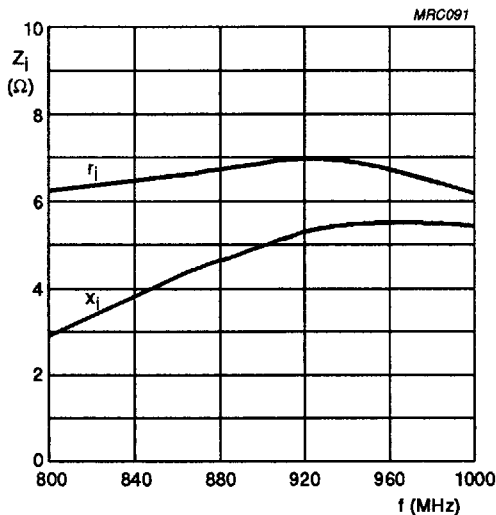
Dimensions in mm.

The components are situated on one side of the copper-clad PTFE fibre-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 means of fixing screws and copper foil straps under the emitter leads.

Fig.8 Printed-circuit board and component lay-out for 900 MHz class-B test circuit in Fig.7.

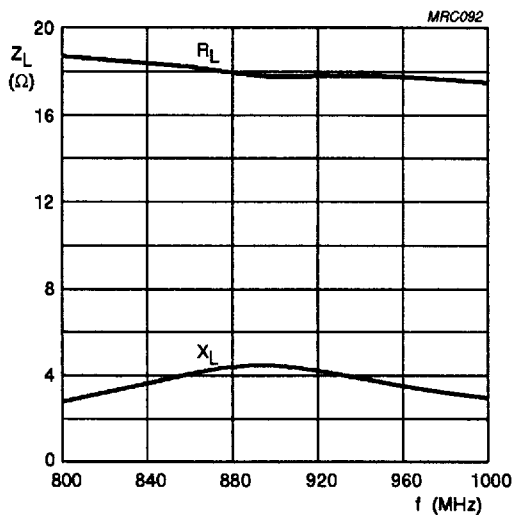
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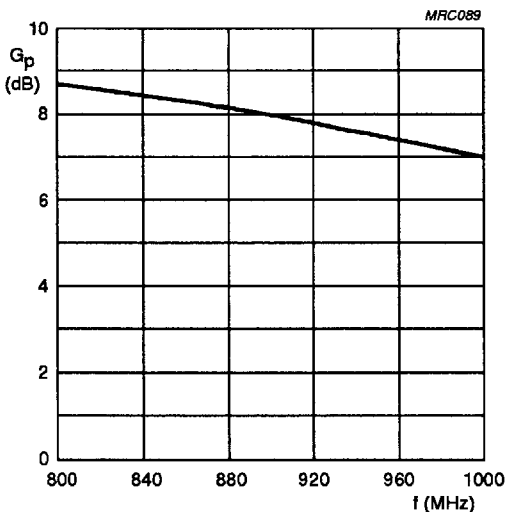
Class-B; $V_{CE} = 7.5\text{ V}$; $P_L = 1.2\text{ W}$; $T_s \leq 60\text{ }^\circ\text{C}$.

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



Class-B; $V_{CE} = 7.5\text{ V}$; $P_L = 1.2\text{ W}$; $T_s \leq 60\text{ }^\circ\text{C}$.

Fig.10 Load impedance as a function of frequency (series components); typical values.



Class-B; $V_{CE} = 7.5\text{ V}$; $P_L = 1.2\text{ W}$; $T_s \leq 60\text{ }^\circ\text{C}$.

Fig.11 Power gain as a function of frequency; typical values.

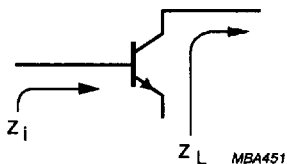
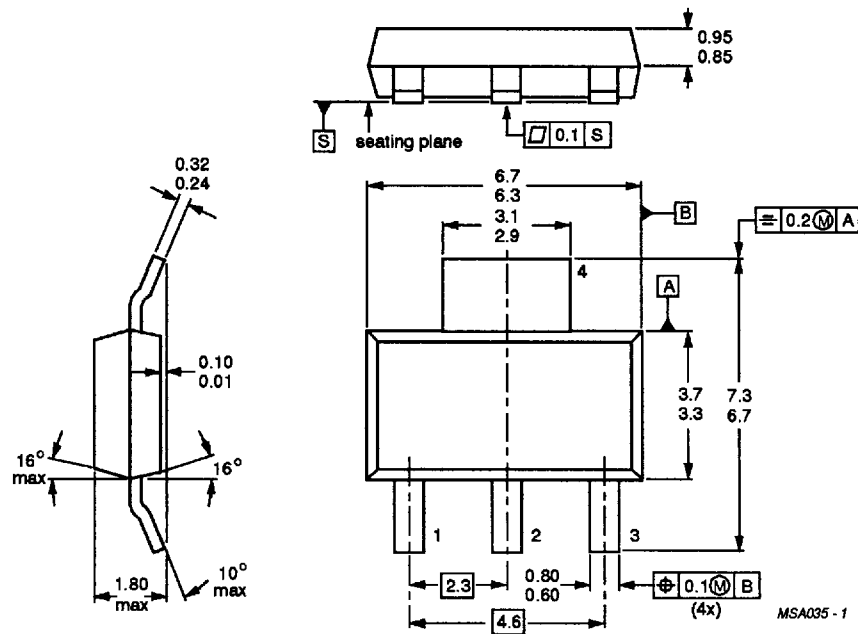


Fig.12 Definition of transistor impedance.

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PACKAGE OUTLINE



Dimensions in mm.

Fig.13 SOT223.