

DATA SHEET

BLF276 VHF power MOS transistor

Product specification

December 1997

VHF power MOS transistor

BLF276

FEATURES

- High power gain
- Easy power control
- Good thermal stability

DESCRIPTION

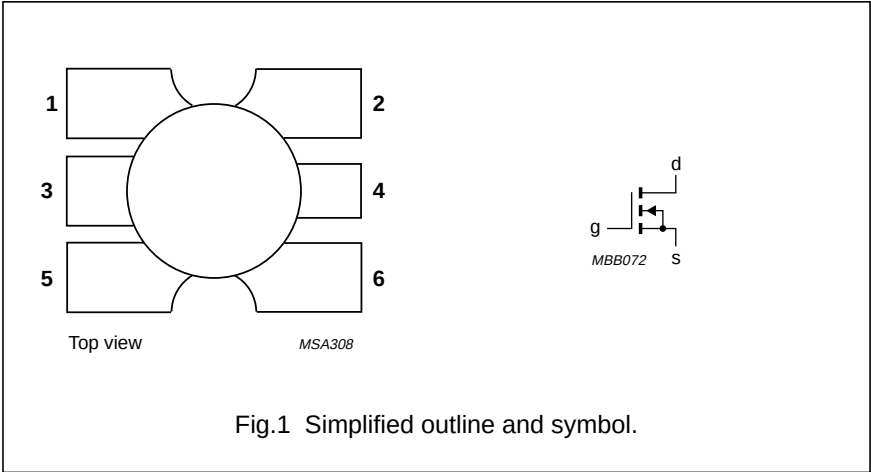
Silicon N-channel enhancement mode vertical D-MOS transistor designed for large signal amplifier applications in the VHF frequency range. The transistor delivers an output power of 100 W in class-B operation at a supply voltage of 50 V.

The transistor is encapsulated in a 6-lead, SOT119 pill-package envelope, with a ceramic cap.

PINNING - SOT119D3

PIN	DESCRIPTION
1	source
2	source
3	gate
4	drain
5	source
6	source

PIN CONFIGURATION



CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

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.

QUICK REFERENCE DATA

RF performance at $T_{mb} = 25\text{ }^{\circ}\text{C}$ in a common source test circuit.

MODE OF OPERATION	f (MHz)	V _{DS} (V)	P _L (W)	G _P (dB)	η _D (%)
CW, class-B	225	50	100	≥ 13	≥ 50
	108	50	100	≥ 18	≥ 60

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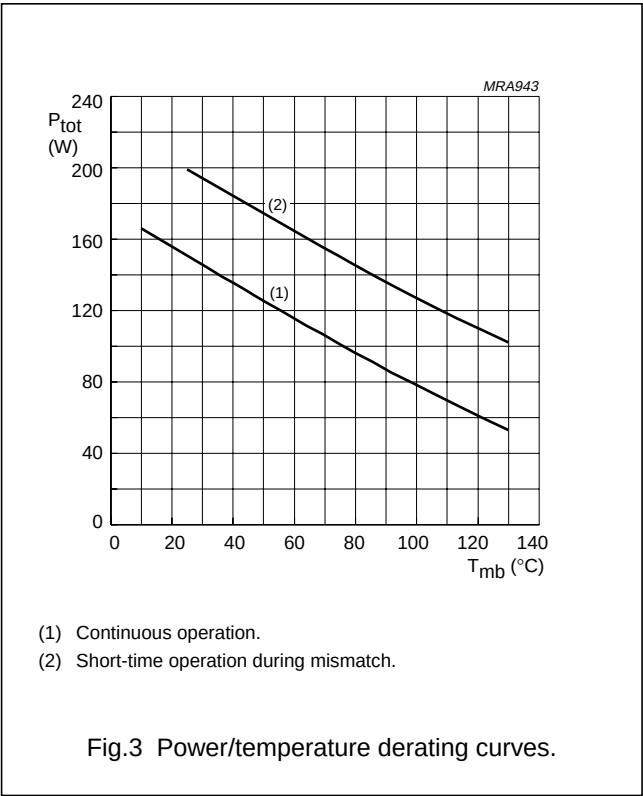
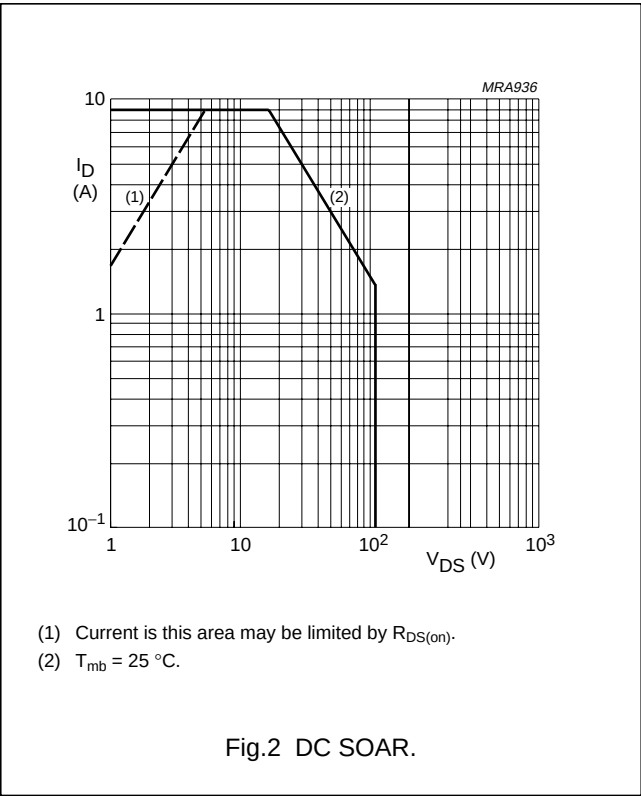
LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	110	V
$\pm V_{GS}$	gate-source voltage		–	20	V
I_D	DC drain current		–	9	A
P_{tot}	total power dissipation	up to $T_{mb} = 25\text{ }^{\circ}\text{C}$	–	150	W
T_{stg}	storage temperature		–65	150	$^{\circ}\text{C}$
T_j	junction temperature		–	200	$^{\circ}\text{C}$

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j-mb}$	thermal resistance from junction to mounting base	$P_{tot} = 150\text{ W}$; $T_{mb} = 25\text{ }^{\circ}\text{C}$	max. 1.17 K/W



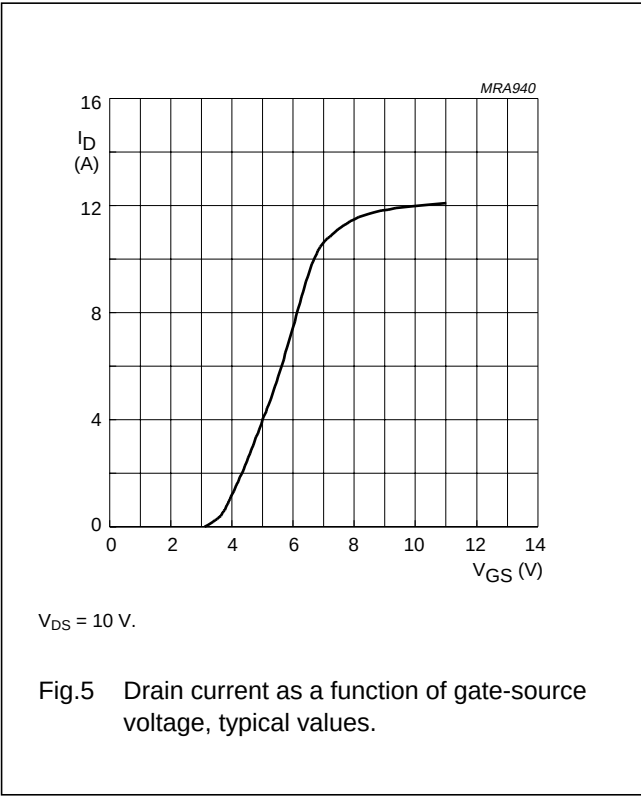
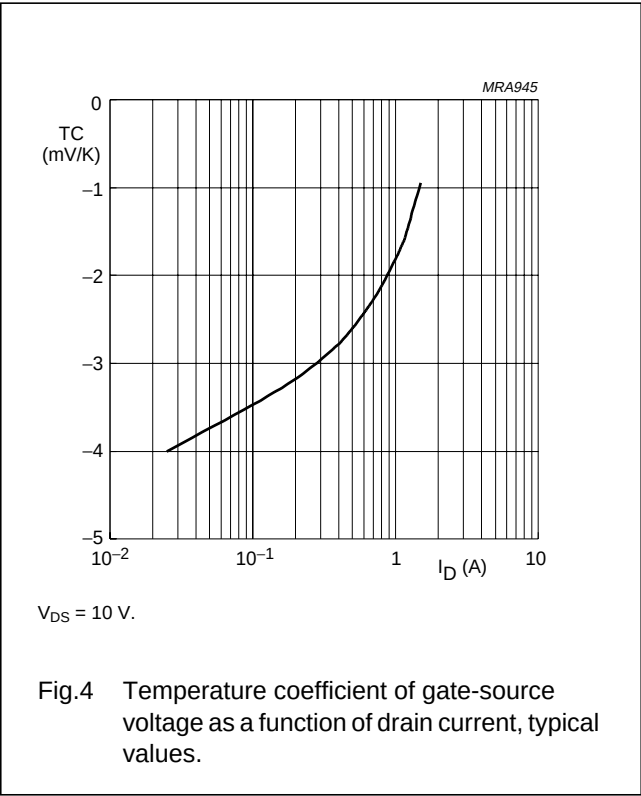
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CHARACTERISTICS

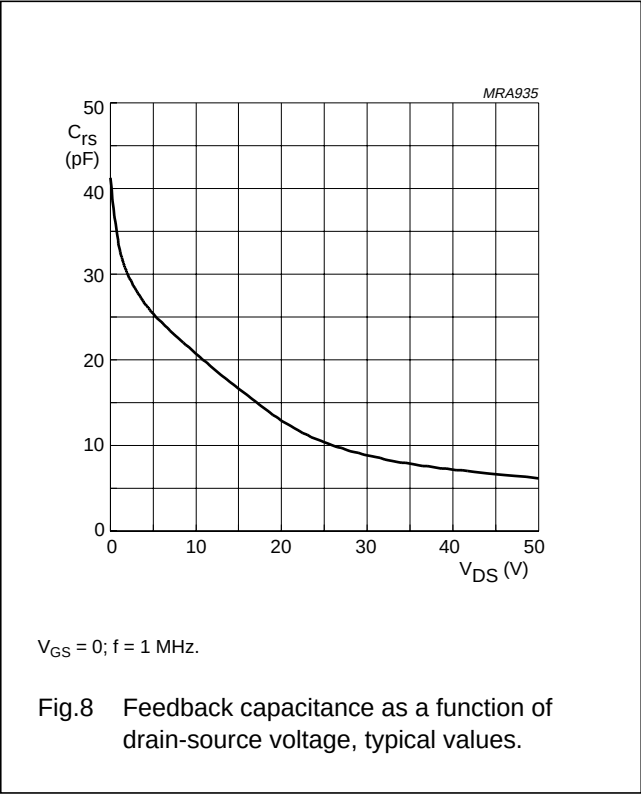
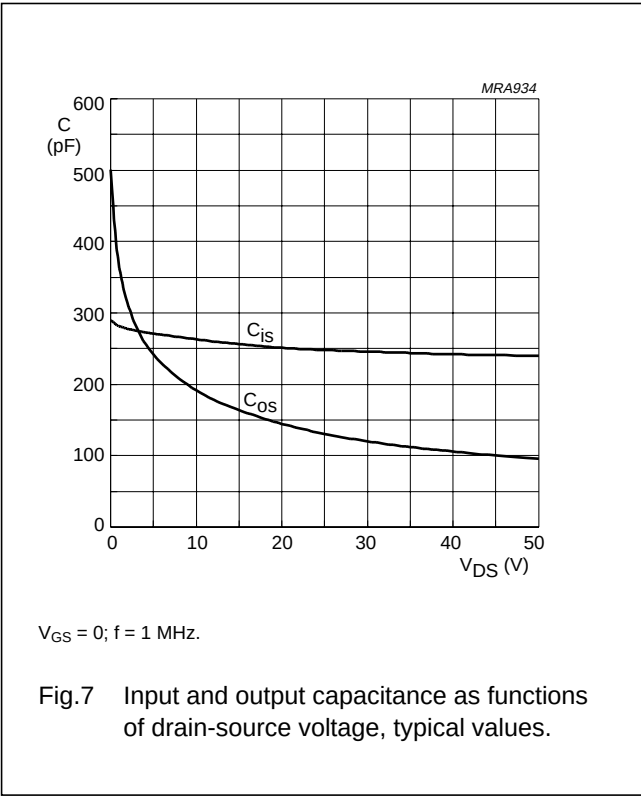
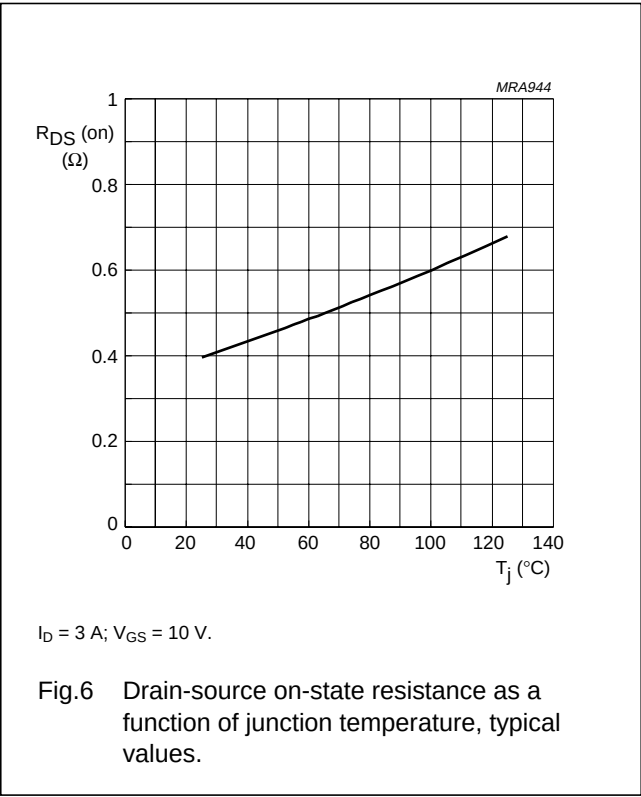
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V _{(BR)DSS}	drain-source breakdown voltage	V _{GS} = 0; I _D = 30 mA	110	–	–	V
I _{DSS}	drain-source leakage current	V _{GS} = 0; V _{DS} = 50 V	–	–	1	mA
I _{GSS}	gate-source leakage current	±V _{GS} = 20 V; V _{DS} = 0	–	–	1	μA
V _{GS(th)}	gate-source threshold voltage	I _D = 50 mA; V _{DS} = 10 V	2	–	4.5	V
g _{fs}	forward transconductance	I _D = 3 A; V _{DS} = 10 V	2.7	–	–	S
R _{DS(on)}	drain-source on-state resistance	I _D = 3 A; V _{GS} = 10 V	–	0.4	0.6	Ω
I _{DSX}	on-state drain current	V _{GS} = 10 V; V _{DS} = 10 V	8	12	–	A
C _{is}	input capacitance	V _{GS} = 0; V _{DS} = 50 V; f = 1 MHz	–	240	–	pF
C _{os}	output capacitance	V _{GS} = 0; V _{DS} = 50 V; f = 1 MHz	–	95	–	pF
C _{rs}	feedback capacitance	V _{GS} = 0; V _{DS} = 50 V; f = 1 MHz	–	7	–	pF



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APPLICATION INFORMATION FOR CLASS-B OPERATION

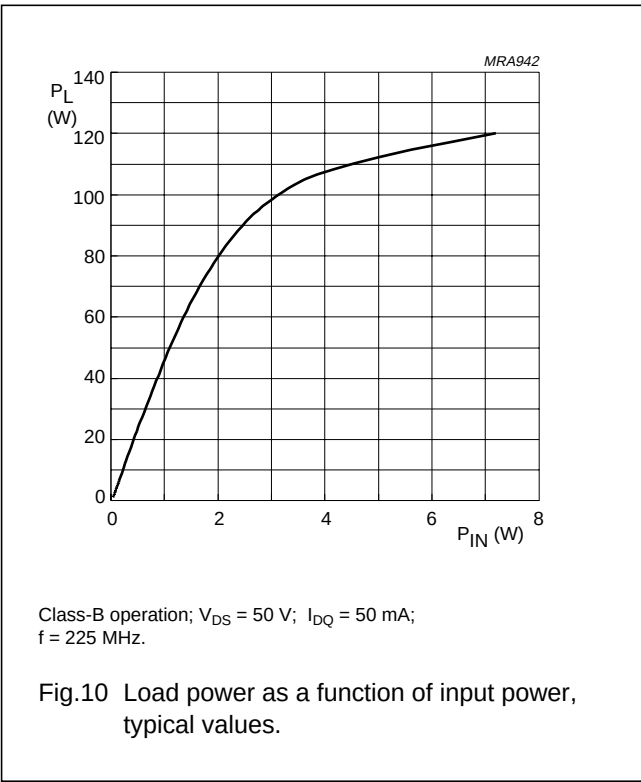
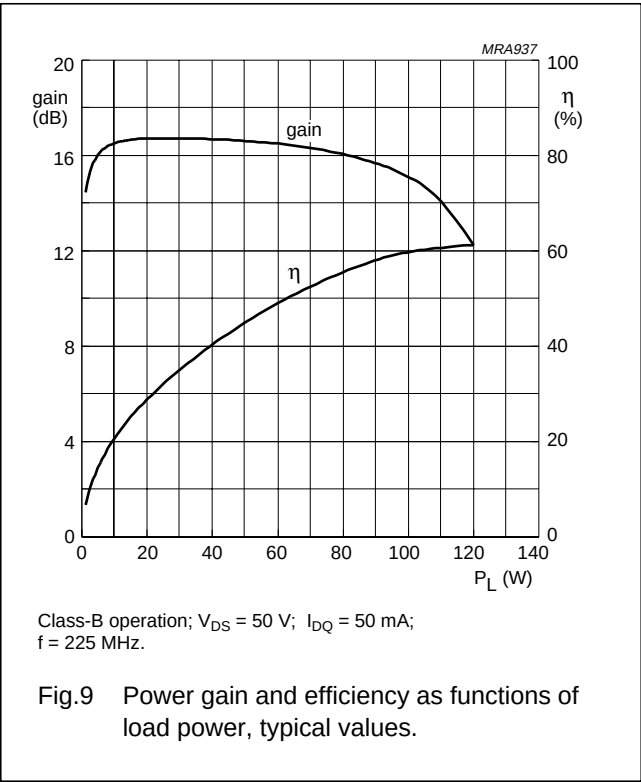
$T_{mb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.
RF performance in CW operation in a common source class-B circuit.

MODE OF OPERATION	f (MHz)	V _{DS} (V)	I _{DQ} (mA)	P _L (W)	G _p (dB)	η _D (%)
CW, class-B	225	50	50	100	≥ 13 typ. 15	≥ 50 typ. 57
	108	50	50	100	≥ 18 typ. 22	≥ 60 typ. 75

Ruggedness in class-B operation

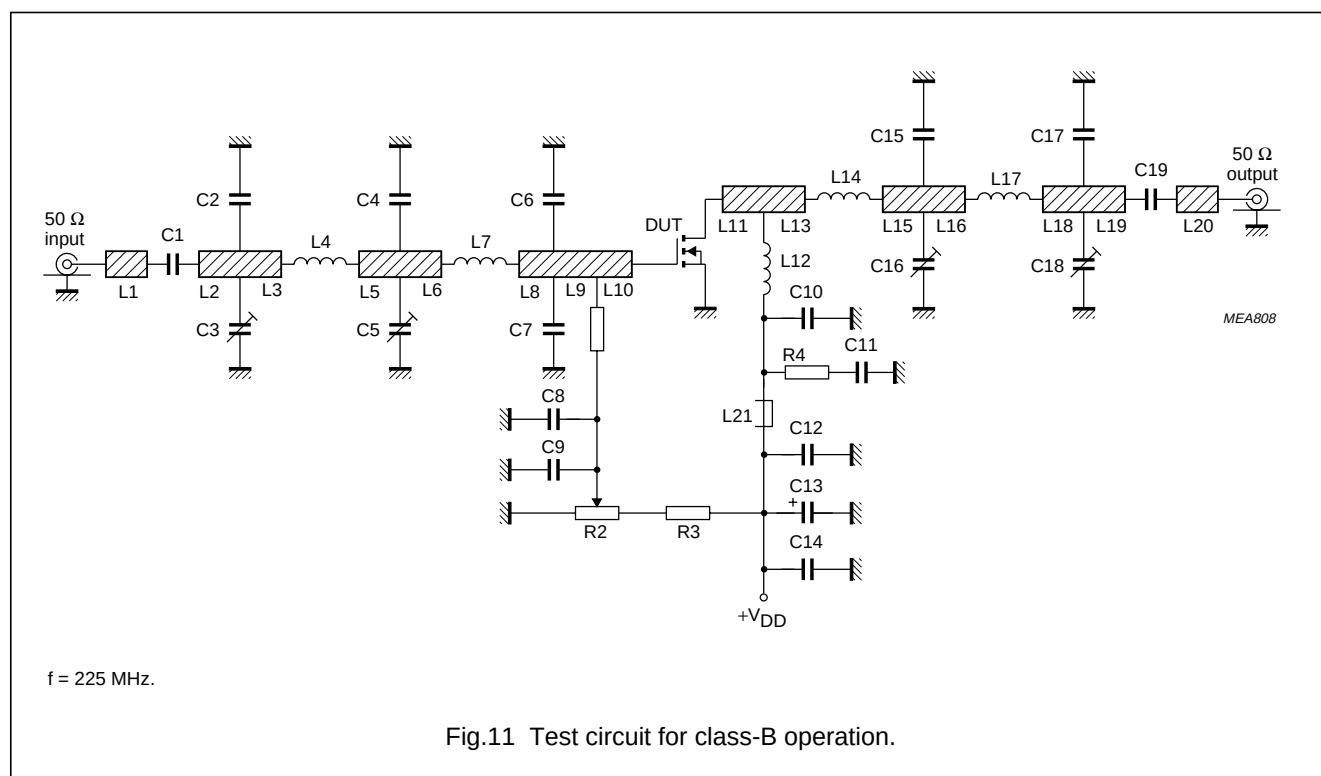
The BLF276 is capable of withstanding a load mismatch corresponding to VSWR = 8 through all phases under the following conditions:

$V_{DS} = 50\text{ V}$; $f = 225\text{ MHz}$;
 $T_{mb} = 25\text{ }^{\circ}\text{C}$ at rated load power.



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List of components (class-B test circuit)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C9, C19	multilayer ceramic chip capacitor (note 1)	680 pF, 500 V		
C2	multilayer ceramic chip capacitor (note 1)	15 pF, 500 V		
C3, C5, C16, C18	film dielectric trimmer	4 to 40 pF		2222 809 08002
C4	multilayer ceramic chip capacitor (note 1)	13 pF, 500 V		
C6, C7	multilayer ceramic chip capacitor (note 1)	62 pF, 500 V		
C8, C14	multilayer ceramic chip capacitor	100 nF		2222 852 47104
C10	multilayer ceramic chip capacitor (note 1)	100 pF, 500 V		
C11	foil capacitor	100 nF, 100 V		2222 368 21204
C12	multilayer ceramic chip capacitor	10 nF		2222 852 47103
C13	electrolytic capacitor	10 μ F, 63 V		2222 030 38109
C15	multilayer ceramic chip capacitor (note 2)	2 $\times$ 33 pF in parallel, 500 V		
C17	multilayer ceramic chip capacitor (note 1)	18 pF, 500 V		
L1	stripline (note 3)	49 Ω	length 8 mm width 4 mm	
L2	stripline (note 3)	49 Ω	length 12 mm width 4 mm	
L3	stripline (note 3)	49 Ω	length 7.5 mm width 4 mm	
L4	2 turns enamelled 1.5 mm copper wire	18 nH	length 4.2 mm int. dia. 4 mm leads 2 $\times$ 1 mm	
L5	stripline (note 3)	49 Ω	length 15.5 mm width 4 mm	
L6	stripline (note 3)	49 Ω	length 5 mm width 4 mm	
L7	2 turns enamelled 1.5 mm copper wire	16 nH	length 3.3 mm int. dia. 3 mm leads 2 $\times$ 4 mm	
L8	stripline (note 3)	31 Ω	length 6 mm width 6 mm	
L9	stripline (note 3)	31 Ω	length 9.5 mm width 6 mm	
L10, L11	stripline (note 3)	31 Ω	length 10 mm width 6 mm	

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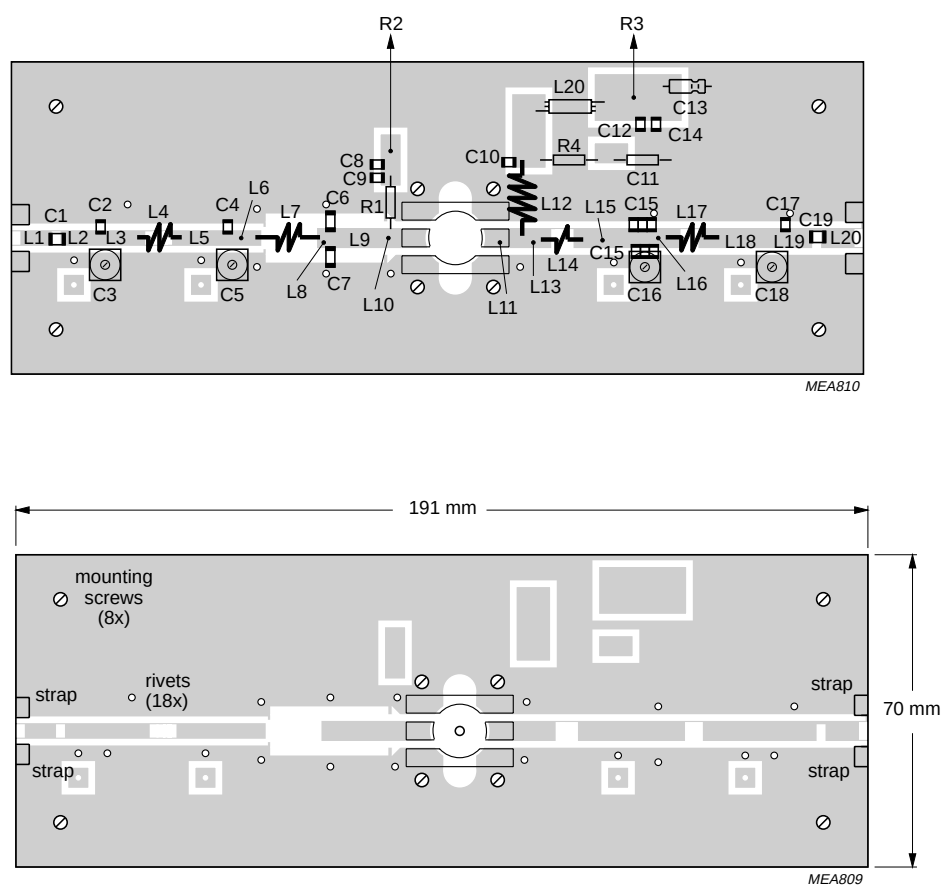
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
L12	3 turns enamelled 1.5 mm copper wire	50 nH	length 4.8 mm int. dia. 5 mm leads 2 × 4 mm	
L13	stripline (note 3)	31 Ω	length 5 mm width 6 mm	
L14	1 turn enamelled 1.5 mm copper wire		int. dia. 2.8 mm leads 2 × 1 mm	
L15	stripline (note 3)	36 Ω	length 16.5 mm width 5 mm	
L16	stripline (note 3)	36 Ω	length 8 mm width 5 mm	
L17	2 turns enamelled 1.5 mm copper wire	17 nH	length 4.7 mm int. dia. 4 mm leads 2 × 2 mm	
L18	stripline (note 3)	36 Ω	length 17.5 mm width 5 mm	
L19, L20	stripline (note 3)	36 Ω	length 8.5 mm width 5 mm	
L21	grade 3B Ferroxcube wide-band RF choke			4312 020 36642
R1	1 W metal film resistor	9.09 Ω		2222 153 59098
R2	10 turns potentiometer	50 k Ω		
R3	0.4 W metal film resistor	400 k Ω		2322 151 74024
R4	0.4 W metal film resistor	10 Ω		2322 151 11009

Notes

1. American Technical Ceramics (ATC) capacitor, type 100B or other capacitor of the same quality.
2. American Technical Ceramics (ATC) capacitor, type 175B or other capacitor of the same quality.
3. The striplines are on a double copper-clad printed circuit board, with epoxy fibre-glass PTFE dielectric ($\epsilon_r = 4.5$); thickness $\frac{1}{16}$ inch.

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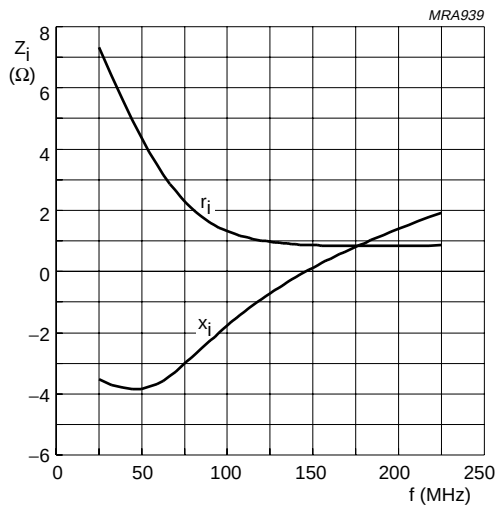


The circuit and components are situated on one side of the printed circuit board, the other side being fully metallized, to serve as a ground plane. Earth connections are made by means of copper straps and hollow rivets between the upper and lower sheets.

Fig.12 Component layout for 225 MHz class-B test circuit.

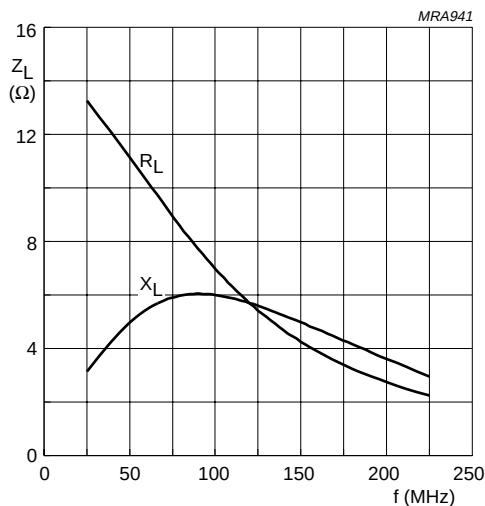
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Class-B operation; $V_{DS} = 50\text{ V}$; $I_{DQ} = 50\text{ mA}$;
 $R_{GS} = 9.1\text{ }\Omega$; $P_L = 100\text{ W}$.

Fig.13 Input impedance as a function of frequency (series components), typical values.



Class-B operation; $V_{DS} = 50\text{ V}$; $I_{DQ} = 50\text{ mA}$;
 $R_{GS} = 9.1\text{ }\Omega$; $P_L = 100\text{ W}$.

Fig.14 Load impedance as a function of frequency (series components), typical values.

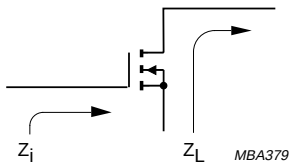
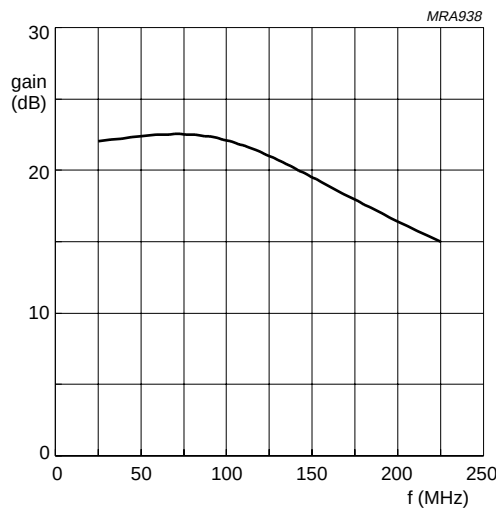


Fig.15 Definition of MOS impedance.



Class-B operation; $V_{DS} = 50\text{ V}$; $I_{DQ} = 50\text{ mA}$;
 $R_{GS} = 9.1\text{ }\Omega$; $P_L = 100\text{ W}$.

Fig.16 Power gain as a function of frequency, typical values.

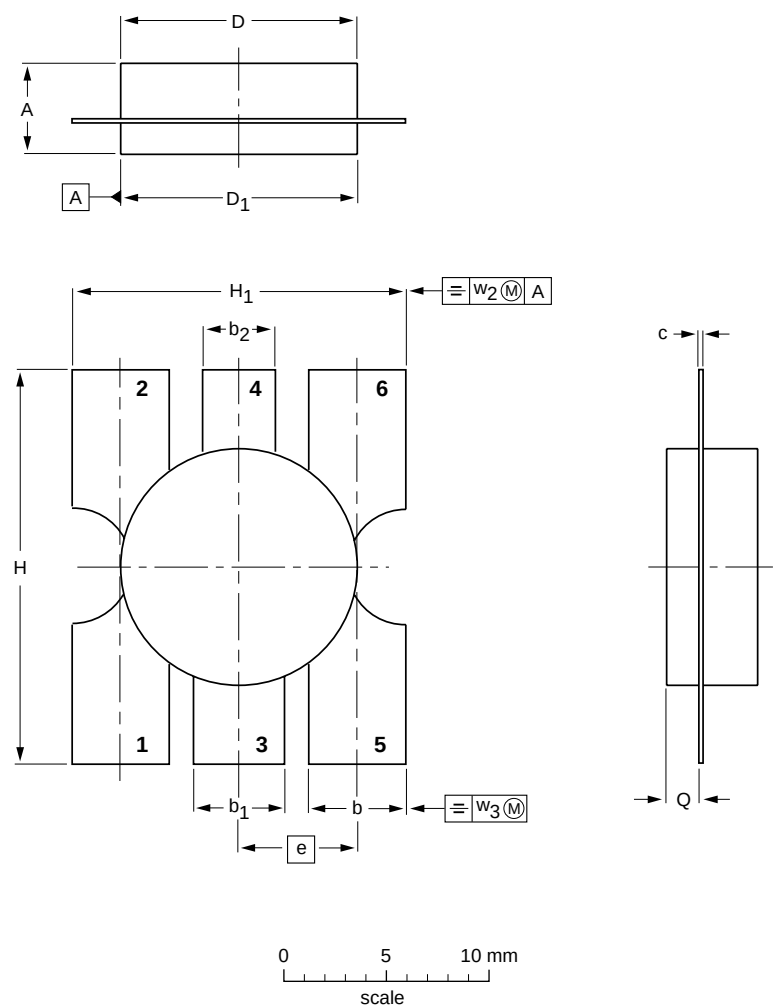
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PACKAGE OUTLINE

Flangeless ceramic package; 6 leads

SOT119D



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

UNIT	A	b	b ₁	b ₂	c	D	D ₁	e	H	H ₁	Q	w ₂	w ₃
mm	4.53 3.70	5.59 5.33	5.34 5.08	4.07 3.81	0.16 0.10	12.86 12.59	12.83 12.57	6.48	21.97 21.20	18.55 18.28	1.71 1.44	0.51	0.26
inches	0.178 0.146	0.220 0.210	0.210 0.200	0.160 0.150	0.006 0.004	0.506 0.496	0.505 0.495	0.255	0.865 0.835	0.730 0.720	0.067 0.057	0.02	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT119D						97-06-28

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DEFINITIONS

Data Sheet Status	
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.
Limiting values	
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.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

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