

DATA SHEET

BLF346 VHF power MOS transistor

Product specification
Supersedes data of September 1992

1996 Oct 02

VHF power MOS transistor

BLF346

FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability.

APPLICATIONS

- Linear amplifier applications in Television transmitters and transposers.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor encapsulated in a 6-lead, SOT119 flange package, with a ceramic cap. All leads are isolated from the flange. A marking code, showing gate-source voltage (V_{GS}) information is provided for matched pair applications. Refer to the General Section of Data Handbook SC19a for further information.

CAUTION

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

PINNING-SOT119

PIN	SYMBOL	DESCRIPTION
1	s	source
2	s	source
3	g	gate
4	d	drain
5	s	source
6	s	source

MAM268

Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance in a linear amplifier.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	I_D (A)	T_h (°C)	P_L (W)	G_p (dB)	d_{im} (dB) ⁽¹⁾
Class-A	224.25	28	3	70	>24	>14	-52
				25	typ. 30	typ. 16.5	-52

Note

1. Three-tone test method (vision carrier -8 dB, sound carrier -7 dB, sideband signal -16 dB), zero dB corresponds to peak synchronization level.

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.

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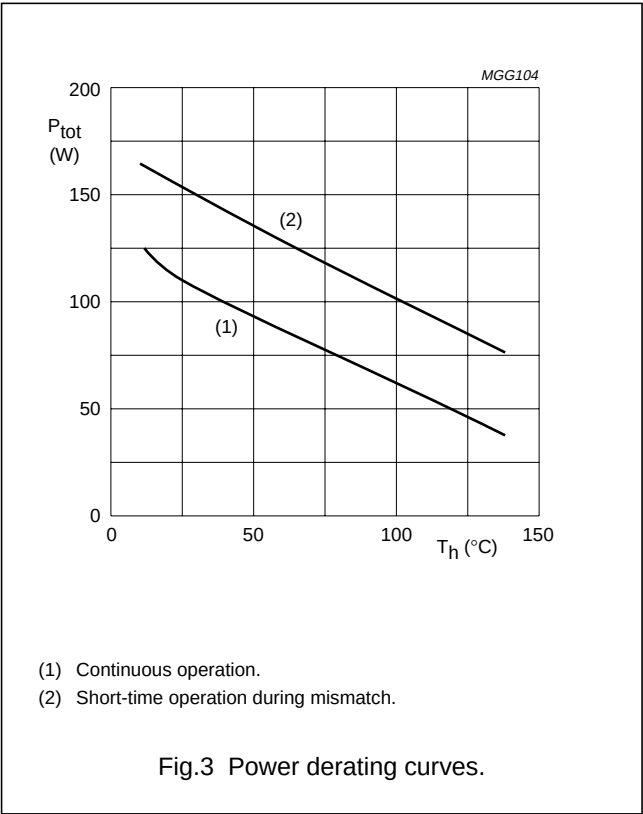
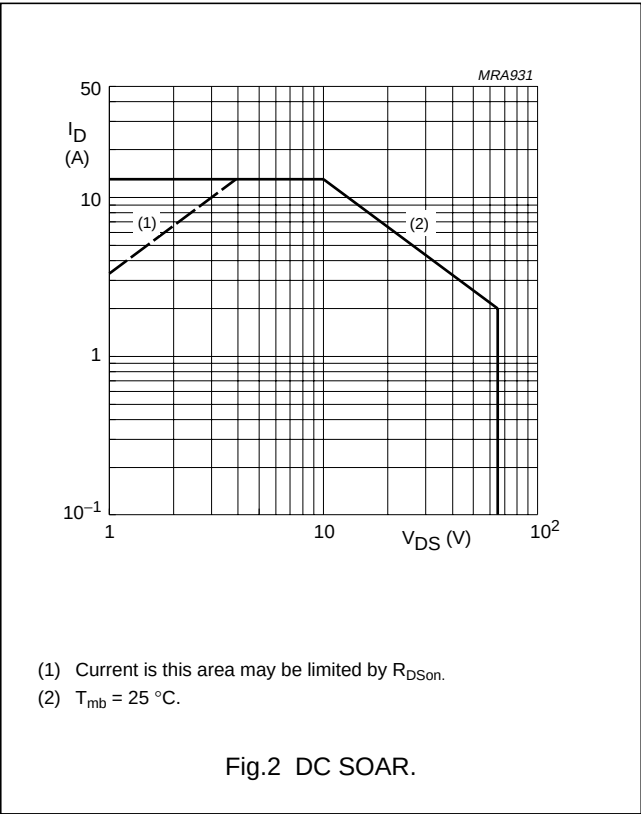
LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V _{DSS}	drain-source voltage		–	65	V
V _{GSS}	gate-source voltage		–	±20	V
I _D	DC drain current		–	13	A
P _{tot}	total power dissipation	up to T _{mb} = 25 °C	–	130	W
T _{stg}	storage temperature		–65	150	°C
T _j	junction temperature		–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R _{th j-mb}	thermal resistance from junction to mounting base	T _{mb} = 25 °C; P _{tot} = 130 W	1.35	K/W
R _{th mb-h}	thermal resistance from mounting base to heatsink	T _{mb} = 25 °C; P _{tot} = 130 W	0.2	K/W



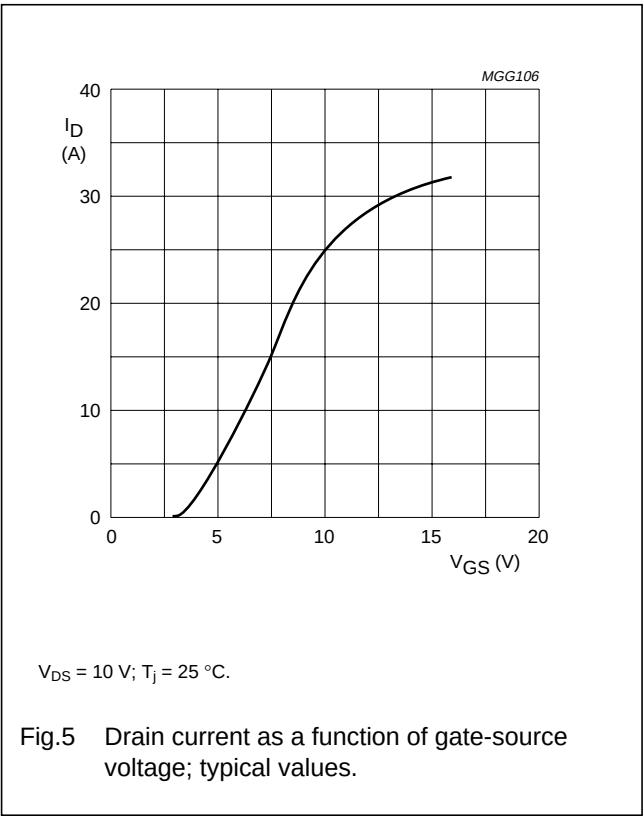
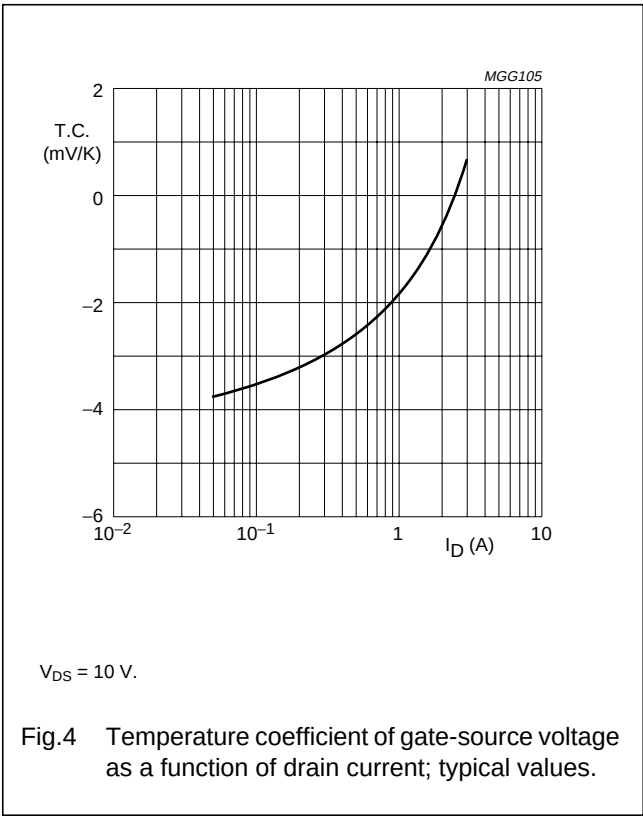
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CHARACTERISTICS

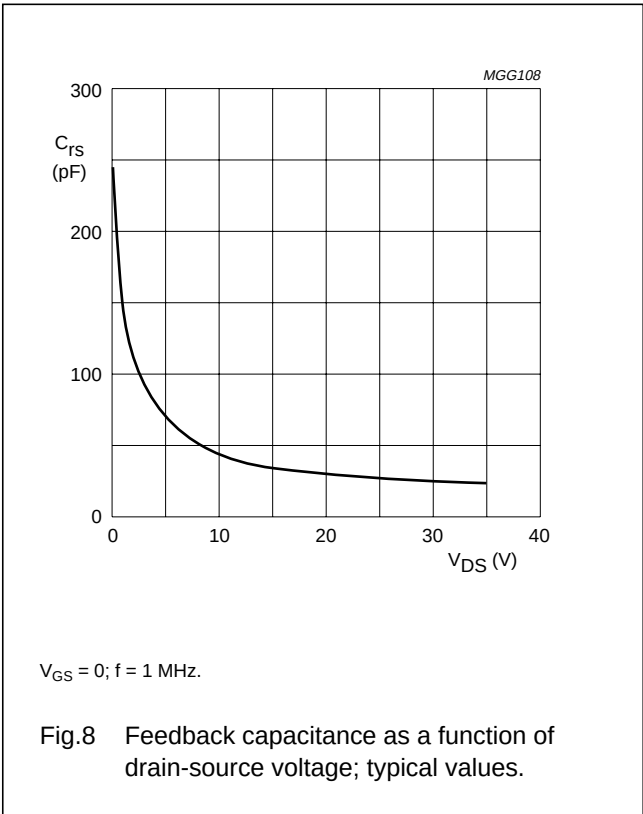
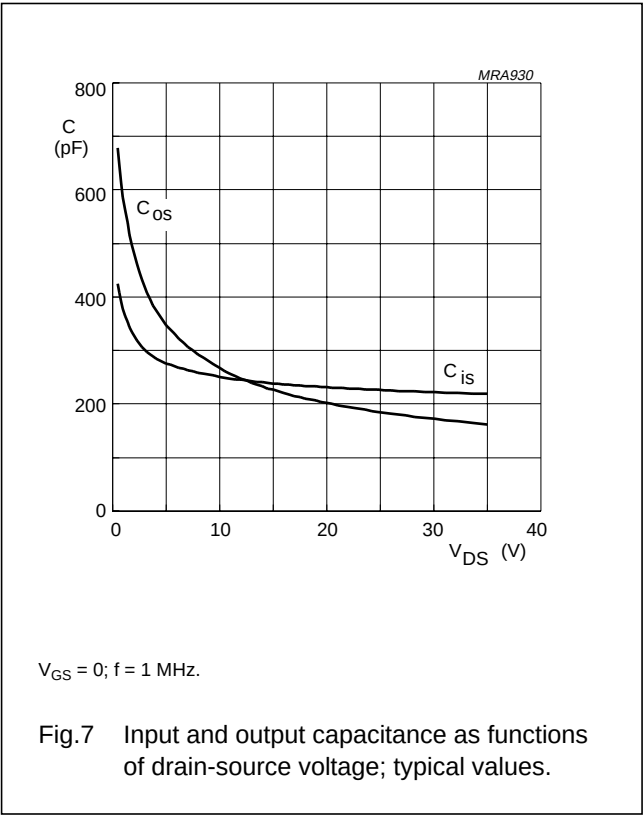
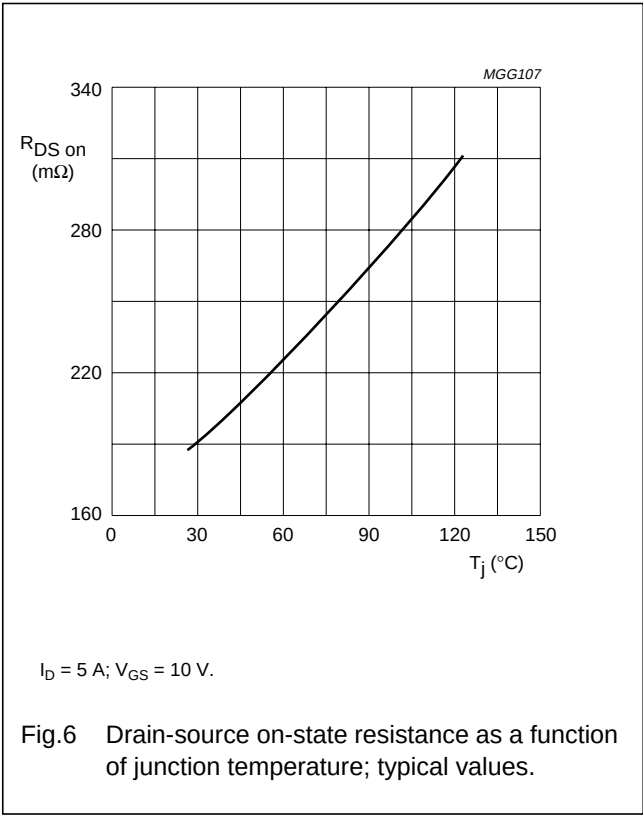
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V _{(BR)DSS}	drain-source breakdown voltage	V _{GS} = 0; I _D = 50 mA	65	–	–	V
I _{DSS}	drain-source leakage current	V _{GS} = 0; V _{DS} = 28 V	–	–	2.5	mA
I _{GSS}	gate-source leakage current	V _{GS} = ±20 V; V _{DS} = 0	–	–	1	µA
V _{GSth}	gate-source threshold voltage	V _{DS} = 10 V; I _D = 50 mA	2	–	4.5	V
ΔV _{GS}	gate-source voltage difference of matched pairs	V _{DS} = 10 V; I _D = 50 mA	–	–	100	mV
g _{fs}	forward transconductance	V _{DS} = 10 V; I _D = 5 A	3	4.2	–	S
R _{DSon}	drain-source on-state resistance	V _{GS} = 10 V; I _D = 5 A	–	0.2	0.3	Ω
I _{DSX}	on-state drain current	V _{GS} = 10 V; V _{DS} = 10 V	–	22	–	A
C _{is}	input capacitance	V _{GS} = 0; V _{DS} = 28 V; f = 1 MHz	–	225	–	pF
C _{os}	output capacitance	V _{GS} = 0; V _{DS} = 28 V; f = 1 MHz	–	180	–	pF
C _{rs}	feedback capacitance	V _{GS} = 0; V _{DS} = 28 V; f = 1 MHz	–	25	–	pF



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APPLICATION INFORMATION

RF performance in a linear amplifier (common source class-A circuit).
 $R_{th\,mb-h} = 0.2\text{ K/W}$; $Z_L = 1.1 + j0.2\ \Omega$ unless otherwise specified.

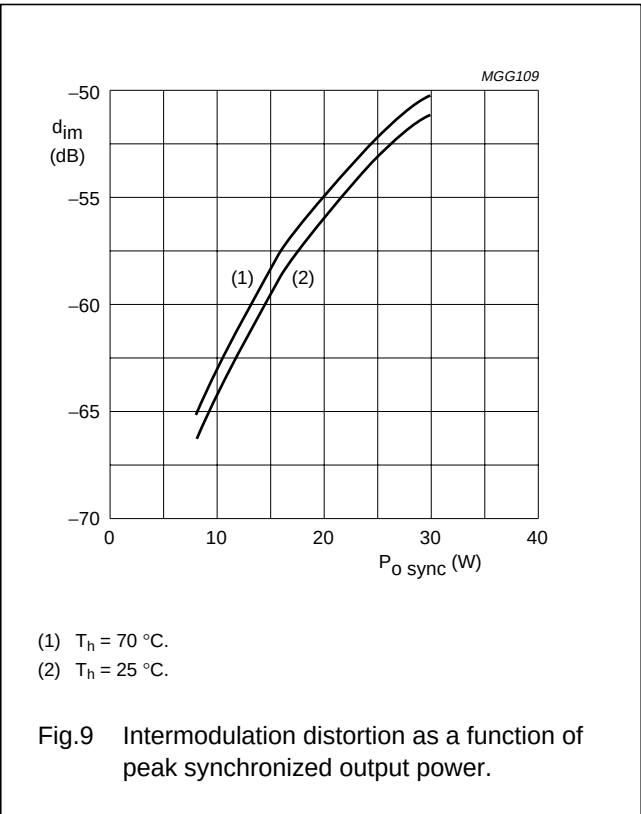
MODE OF OPERATION	f (MHz)	V _{DS} (V)	I _D (A)	T _h (°C)	P _{o sync} (W)	G _p (dB)	d _{im} (dB) ⁽¹⁾
Class-A	224.25	28	3	70	> 24	> 14	−52
				25	typ. 30	typ. 16.5	−52
				70	typ. 20	typ. 14.5	−55
				25	typ. 22	typ. 15	−55

Note

1. Three-tone test method (vision carrier −8 dB, sound carrier −7 dB, sideband signal −16 dB), zero dB corresponds to peak synchronization level.

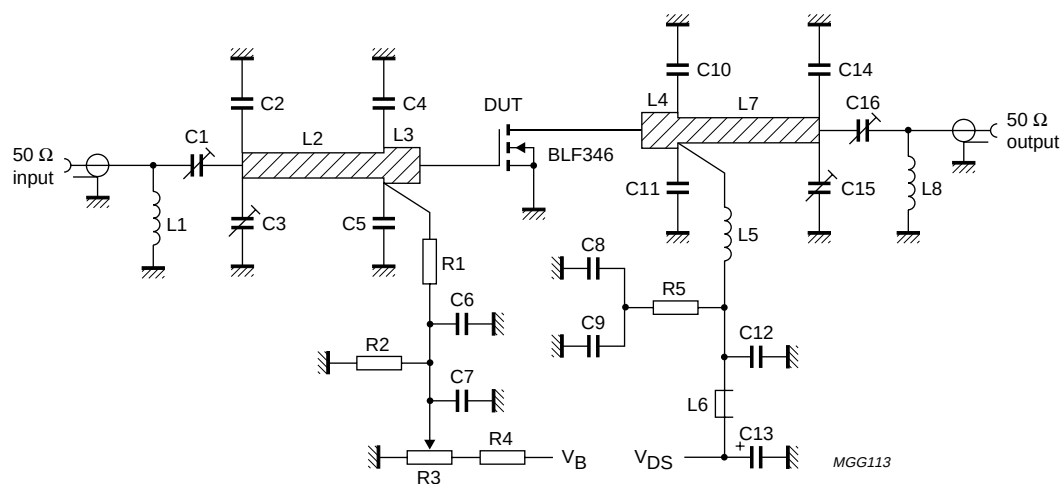
Ruggedness in class-A operation

The BLF346 is capable of withstanding a load mismatch corresponding to VSWR = 50 : 1 through all phases under the following conditions: V_{DS} = 28 V; f = 225 MHz at rated output power.



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Fig.10 Test circuit for class-A operation at $f = 225$ MHz.

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List of components (see Figs 10 and 11).

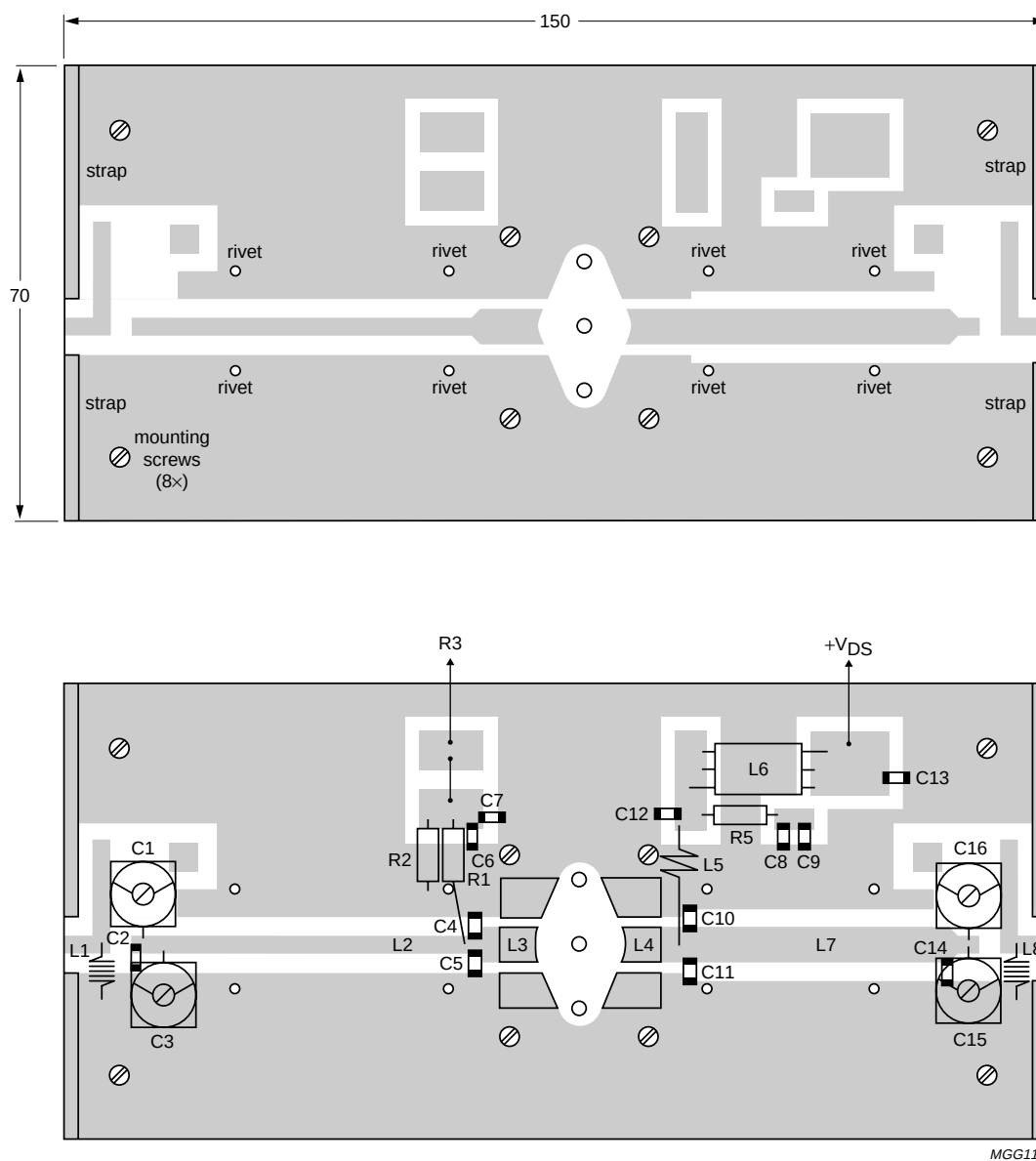
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1	film dielectric trimmer	2 to 18 pF		2222 809 09003
C2	multilayer ceramic chip capacitor (note 1)	10 pF, 500 V		
C3, C15, C16	film dielectric trimmer	4 to 40 pF		2222 809 08002
C4, C5	multilayer ceramic chip capacitor (note 1)	56 pF, 500 V		
C6, C12	multilayer ceramic chip capacitor (note 1)	680 pF, 500 V		
C7, C8, C9	multilayer ceramic chip capacitor	100 nF, 50 V		2222 852 47104
C10, C11	multilayer ceramic chip capacitor (note 1)	43 pF, 500 V		
C13	electrolytic capacitor	10 μ F, 63 V		2222 030 38109
C14	multilayer ceramic chip capacitor (note 1)	27 pF, 500 V		
L1	4 turns enamelled 0.7 mm copper wire	42.4 nH	length 4 mm; int. dia. 3 mm; leads 2 $\times$ 5 mm	
L2	stripline (note 2)	50 Ω	length 49 mm; width 2.8 mm	
L3, L4	stripline (note 2)	31 Ω	length 11.5 mm; width 6 mm	
L5	2 turns enamelled 1.5 mm copper wire	18.7 nH	length 8 mm; int. dia. 4 mm; leads 2 $\times$ 5 mm	
L6	grade 3B Ferroxcube RF choke			4312 020 36642
L7	stripline (note 2)	31 Ω	length 40 mm; width 6 mm	
L8	3 turns enamelled 1.5 mm copper wire	28.8 nH	length 8 mm; int. dia. 4 mm; leads 2 $\times$ 5 mm	
R1	metal film resistor	1 k Ω , 0.4 W		2322 151 71002
R2	metal film resistor	100 k Ω , 0.4 W		2322 151 71004
R3	10 turns cermet potentiometer	100 Ω		
R4	metal film resistor	316 k Ω , 0.4 W		2322 153 53161
R5	metal film resistor	10 Ω , 0.4 W		2322 153 51009

Notes

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

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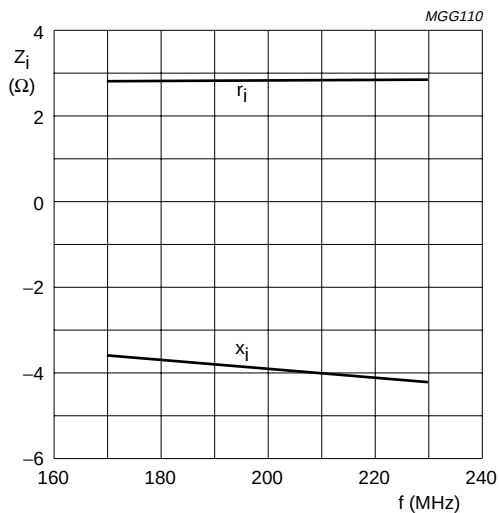
MGG114

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.

Fig.11 Component layout for 225 MHz class-A test circuit.

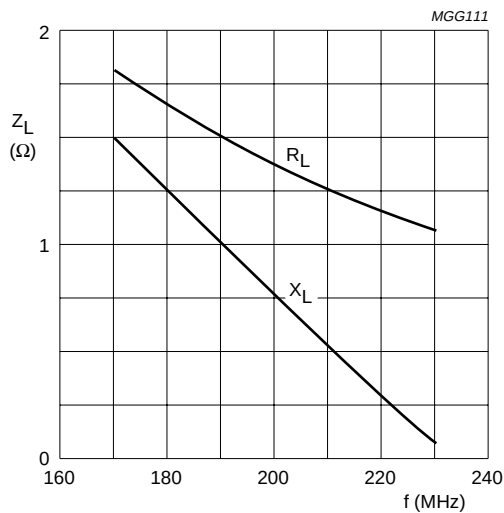
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Class-A operation; $V_{DS} = 28\text{ V}$; $I_D = 3\text{ A}$; $P_L = 30\text{ W}$; $T_h = 70\text{ }^\circ\text{C}$.

Fig.12 Input impedance as a function of frequency (series components); typical values.



Class-A operation; $V_{DS} = 28\text{ V}$; $I_D = 3\text{ A}$; $P_L = 30\text{ W}$; $T_h = 70\text{ }^\circ\text{C}$.

Fig.13 Load impedance as a function of frequency (series components); typical values.

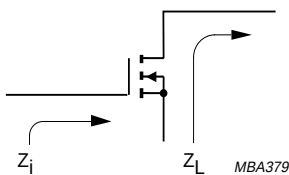
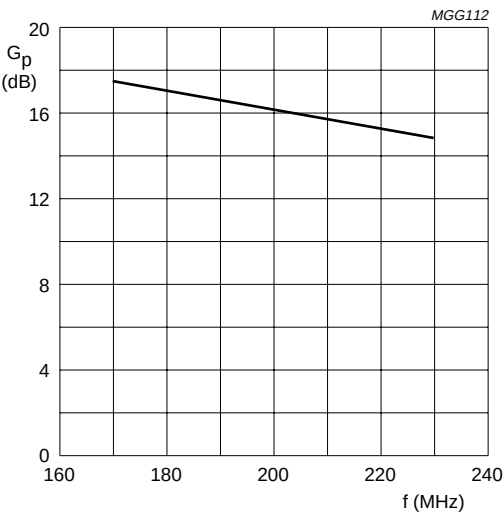


Fig.14 Definition of MOS impedance.



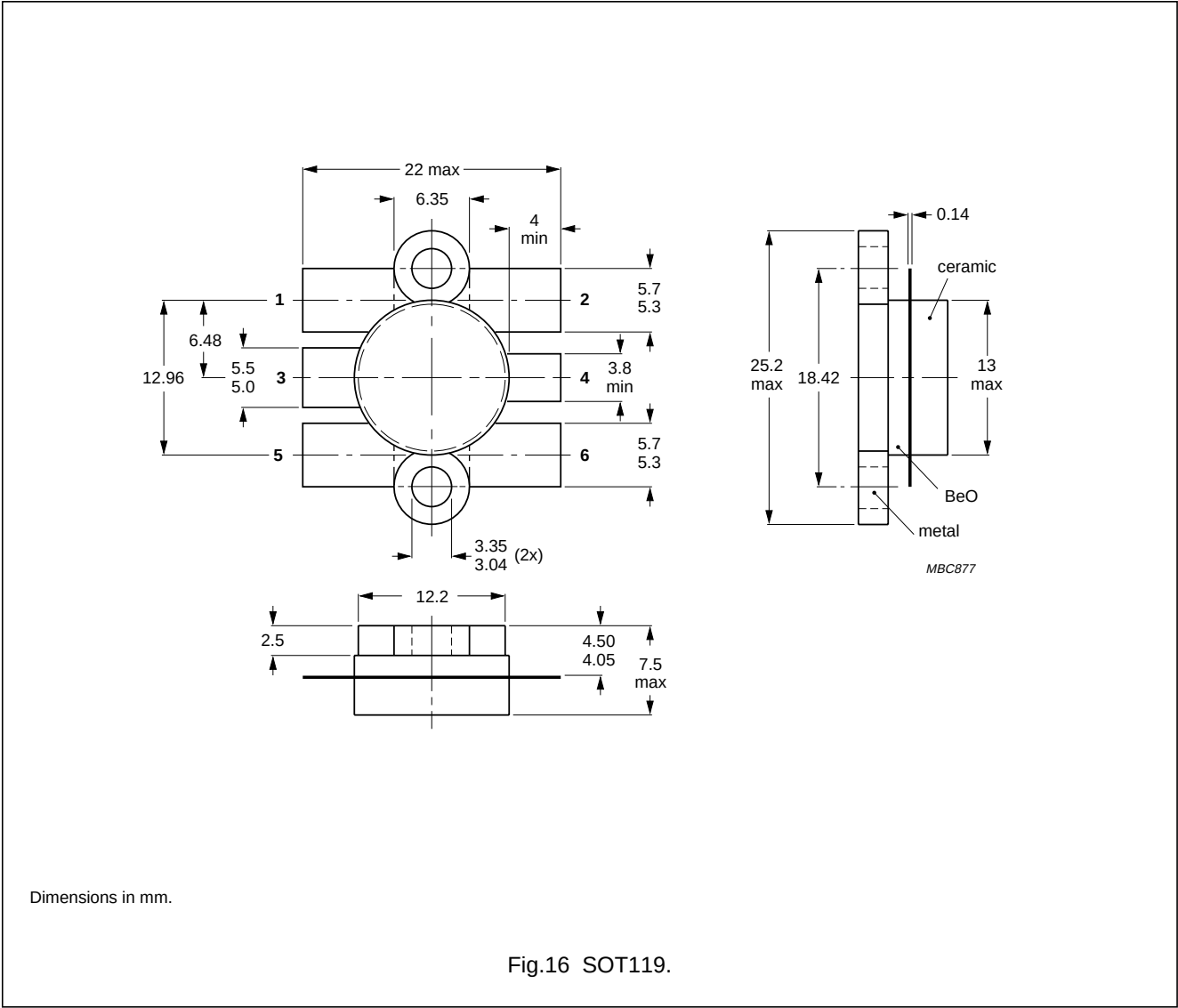
Class-A operation; $V_{DS} = 28\text{ V}$; $I_D = 3\text{ A}$; $P_L = 30\text{ W}$; $T_h = 70\text{ }^\circ\text{C}$.

Fig.15 Power gain as a function of frequency; typical values.

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PACKAGE OUTLINE



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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.	

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