

DATA SHEET

BLV75/12 VHF power transistor

Product specification

August 1986

VHF power transistor

BLV75/12

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in mobile radio transmitters in the 175 MHz communications band.

FEATURES

- multi-base structure and emitter-ballasting resistors for an optimum temperature profile
- gold metallization ensures excellent reliability
- internal matching to achieve an optimum wideband capability and high power gain

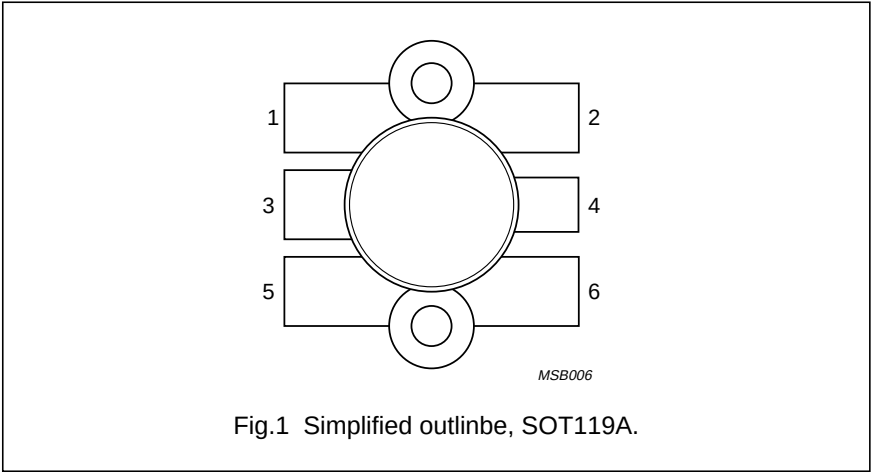
The transistor has a 6-lead flange envelope with a ceramic cap (SOT-119). All leads are isolated from the flange.

QUICK REFERENCE DATA

R.F. performance up to $T_h = 25\text{ }^{\circ}\text{C}$ in a common-emitter class-B circuit

MODE OF OPERATION	V_{CE} V	f MHz	P_L W	G_p dB	η_c %
narrow band; c.w.	12,5	175	75	> 6,5	> 55

PIN CONFIGURATION



PINNING

PIN	DESCRIPTION
1	emitter
2	emitter
3	base
4	collector
5	emitter
6	emitter

PRODUCT SAFETY This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

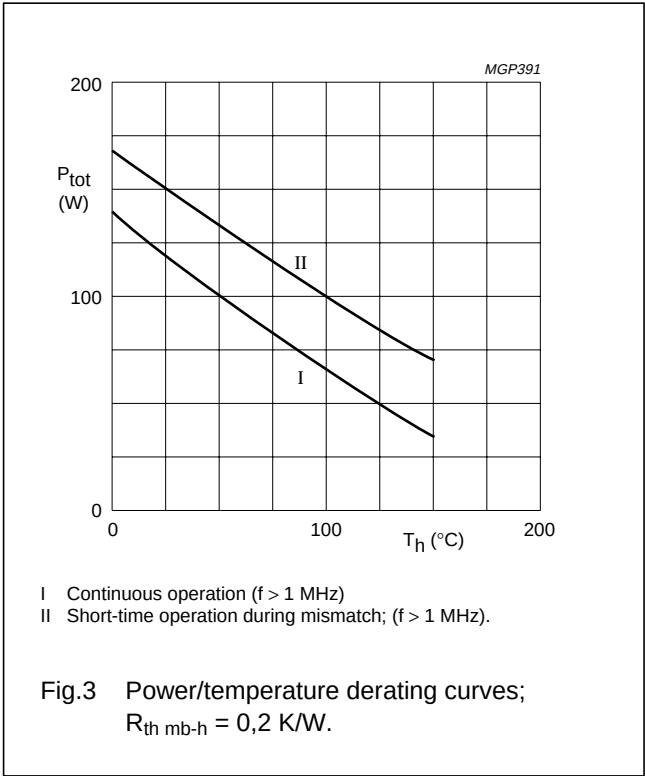
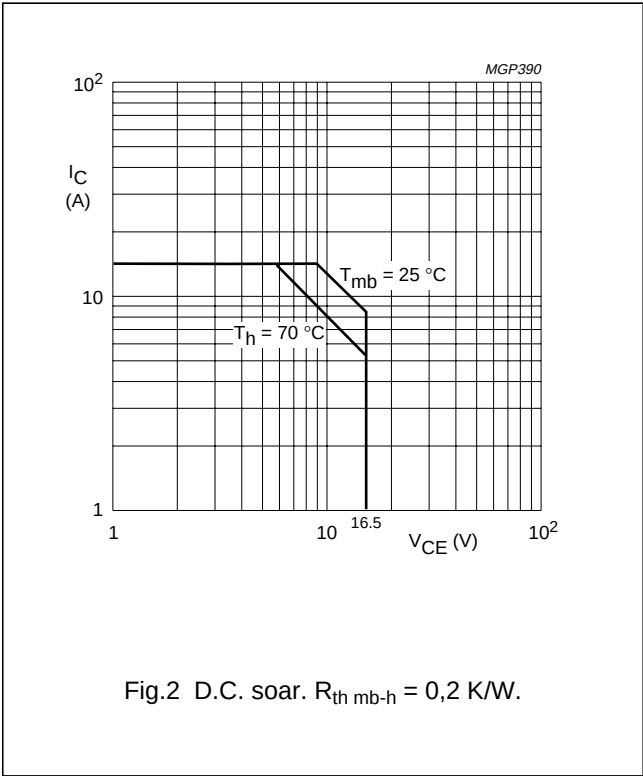
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RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)			
peak value	V_{CBOM}	max.	36 V
Collector-emitter voltage (open base)	V_{CEO}	max.	16,5 V
Emitter-base voltage (open collector)	V_{EBO}	max.	4 V
Collector current			
d.c. or average	I_C	max.	15 A
peak value; $f > 1$ MHz	I_{CM}	max.	45 A
Total power dissipation			
at $T_{mb} = 25\text{ }^{\circ}\text{C}$; $f > 1$ MHz	P_{tot}	max.	150 W
Storage temperature	T_{stg}		-65 to $+150\text{ }^{\circ}\text{C}$
Operating junction temperature	T_j	max.	$200\text{ }^{\circ}\text{C}$



THERMAL RESISTANCE

Dissipation = 96 W; $T_{mb} = 25\text{ }^{\circ}\text{C}$

From junction to mounting base			
(r.f. operation)	$R_{th\ j-mb}$	=	1,05 K/W
From mounting base to heatsink	$R_{th\ mb-h}$	=	0,2 K/W

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CHARACTERISTICS

T_j = 25°C unless otherwise specified

- Collector-base breakdown voltage
open emitter; I_C = 100 mA
- Collector-emitter breakdown voltage
open base; I_C = 200 mA
- Emitter-base breakdown voltage
open collector; I_E = 20 mA
- Collector cut-off current
V_{BE} = 0; V_{CE} = 16 V
- Second breakdown energy
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω
- D.C. current gain
V_{CE} = 10 V; I_C = 10 A

V _{(BR)CBO}	min.	36 V
V _{(BR)CEO}	min.	16,5 V
V _{(BR)EBO}	min.	4 V
I _{CES}	max.	44 mA
E _{SBR}	min.	20 mJ
h _{FE}	min. typ.	15 55

- Collector capacitance at f = 1 MHz
I_E = i_e = 0; V_{CB} = 12,5 V
- Feedback capacitance at f = 1 MHz
I_C = 0; V_{CE} = 12,5 V
- Collector-flange capacitance

C _c	typ.	240 pF
C _{re}	typ.	150 pF
C _{cf}	typ.	3 pF

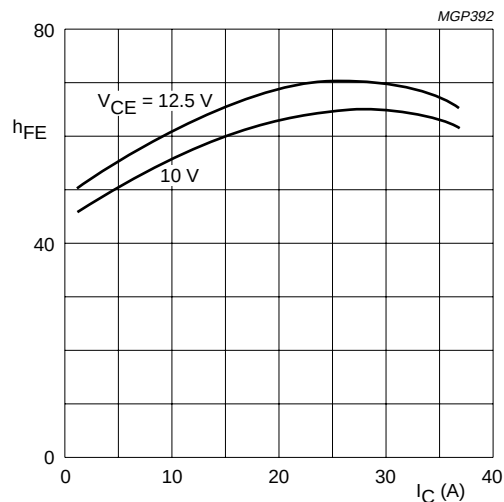


Fig.4 D.C. current gain versus collector current; T_j = 25 °C.

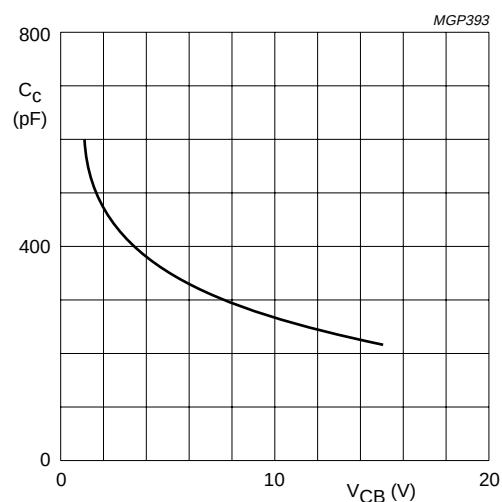


Fig.5 Output capacitance versus V_{CB}; I_E = i_e = 0; f = 1 MHz; T_j = 25 °C.

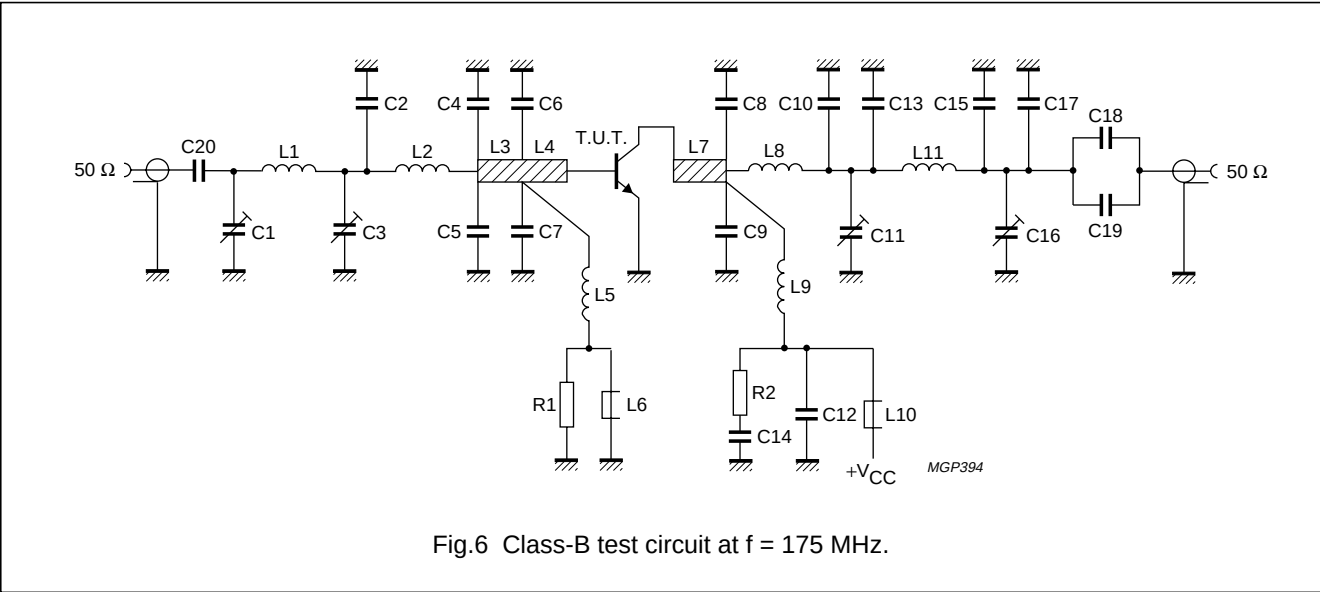
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APPLICATION

R. F. performance in c.w. operation (common-emitter circuit; class-B)
f = 175 MHz; T_h = 25 °C; R_{th mb-h} = 0,2 K/W

MODE OF OPERATION	V _{CE} V	P _L W	G _p dB	η _c %
narrow band; c.w.	12,5	75	> 6,5 typ. 7,5	> 55 typ. 63



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List of components:

- C1 = 5 to 60 pF film dielectric trimmer (cat. no. 2222 809 07011)
 - C2 = 10 pF multilayer ceramic chip capacitor⁽¹⁾
 - C3 = C16 = 4 to 40 pF film dielectric trimmer (cat. no. 2222 809 07008)
 - C4 = C5 = 75 pF multilayer ceramic chip capacitor
 - C6 = C7 = 100 pF multilayer ceramic chip capacitor⁽¹⁾
 - C8 = C9 = 2 × 75 pF multilayer ceramic chip capacitors⁽¹⁾ in parallel
 - C10 = C13 = 39 pF multilayer ceramic chip capacitor⁽¹⁾
 - C11 = 2,5 to 20 pF film dielectric trimmer (cat. no. 2222 809 07004)
 - C12 = 2 × 820 pF multilayer ceramic chip capacitors in parallel⁽¹⁾
 - C14 = 100 nF polyester capacitor
 - C15 = C17 = 12 pF multilayer ceramic chip capacitor⁽¹⁾
 - C18 = C19 = 470 pF multilayer ceramic chip capacitor⁽¹⁾
 - C20 = 820 pF multilayer ceramic chip capacitor⁽¹⁾
 - L1 = 1 turn silver-plated Cu-wire (2,0 mm); int. dia. 10 mm; leads 2 × 4 mm
 - L2 = 1 turn silver-plated Cu-wire (2,0 mm); int. dia. 1 mm; leads 2 × 6 mm
 - L3 = strip (14 mm × 6 mm)
 - L4 = strip (8 mm × 6 mm)
 - L5 = 100 nH, 7 turns closely wound enamelled Cu-wire (0,5 mm); int. dia. 3 mm; leads 2 × 7 mm
 - L6 = Ferroxcube wideband h.f. choke, grade 3B (cat. no. 4312 020 36640)
 - L7 = strip (12 mm × 6 mm)
 - L8 = silver-plated copper U-shaped inductance (7 + 15 + 7) mm × 4 mm × 0,5 mm
 - L9 = silver-plated copper U-shaped inductance (8 + 8,5 + 6) mm × 4 mm × 0,5 mm
 - L10 = modified Ferroxcube wideband h.f. choke, grade 3B (cat. no. 4312 020 36640) with 3 parallel connected Cu wires (0,8 mm)
 - L11 = 2 turns silver-plated Cu-wire (2,0 mm); int. dia. 9 mm; length 7,5 mm; leads 2 × 3,5 mm
- L3, L4 and L7 are strips on a double Cu-clad printed-circuit board with epoxy fibre-glass dielectric ($\epsilon_r = 4,5$), thickness 1/16 inch).
- R1 = 10 $\Omega \pm 10\%$, carbon resistor
 - R2 = 4,7 $\Omega \pm 10\%$, carbon resistor

Note

1. American Technical Ceramics capacitor type 100B or capacitor of the same quality.

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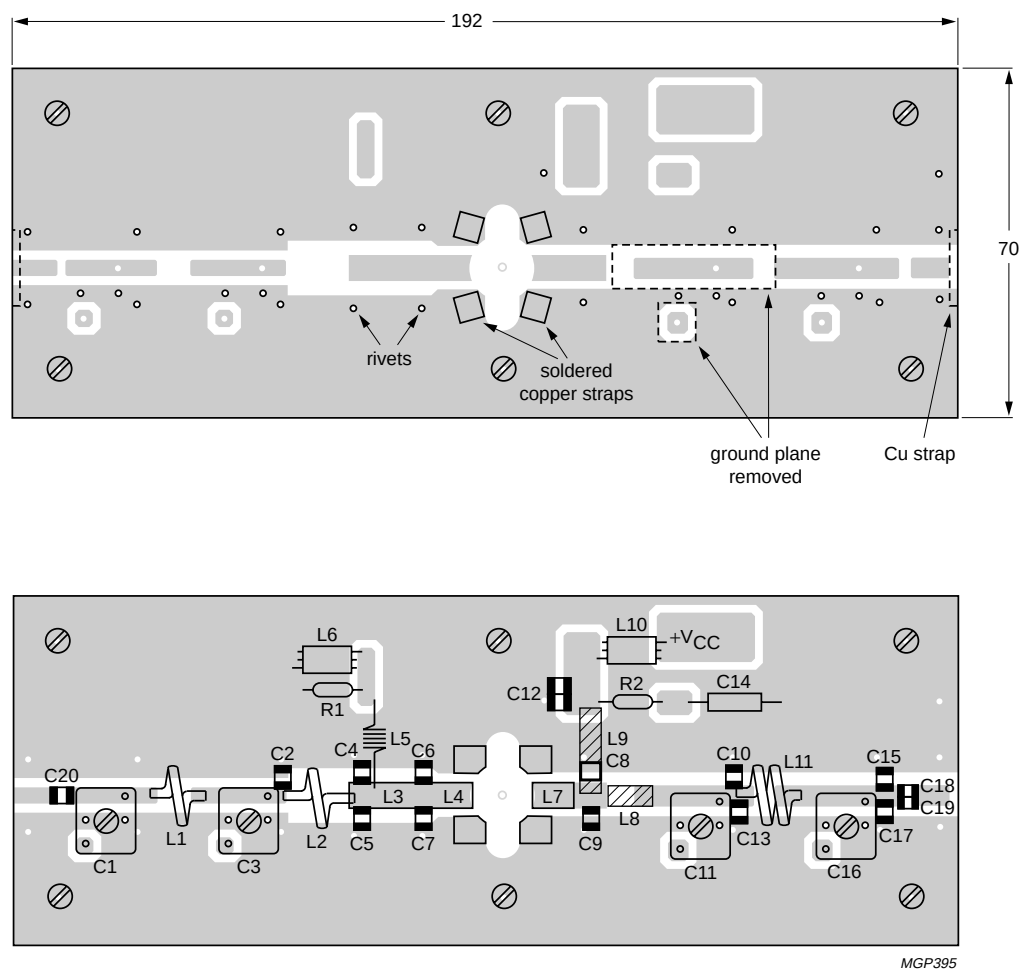


Fig.7 Printed circuit board and component lay-out for 175 MHz class-B test circuit.

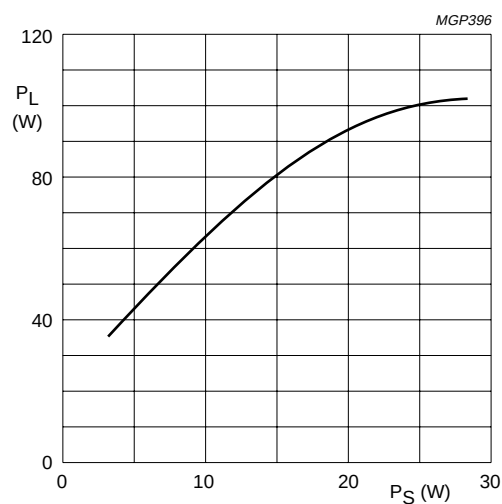
The circuit and components are on one side of the epoxy fibre-glass board. The other side, except for the area indicated by the dotted line, is unetched copper serving as a ground plane.

If the p.c.b. is in direct contact with the heatsink, the heatsink area within the dotted line has to be raised at least 0,5 mm to minimize the dielectric losses.

Earth connections are made by hollow rivets and additionally by fixing screws and copper straps under the emitters to provide a direct contact between the copper of the component side and the ground plane.

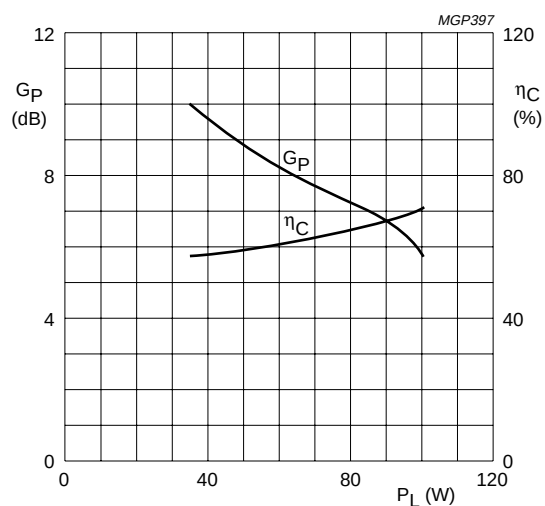
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Typical values; $V_{CE} = 12,5$ V; $f = 175$ MHz;
 $T_h = 25$ °C; $R_{th\ mb-h} = 0,2$ K/W

Fig.8 Load power versus source power.



Typical values; $V_{CE} = 12,5$ V; $f = 175$ MHz;
 $T_h = 25$ °C; $R_{th\ mb-h} = 0,2$ K/W

Fig.9 Power gain and efficiency versus load power.

Ruggedness in class-B operation

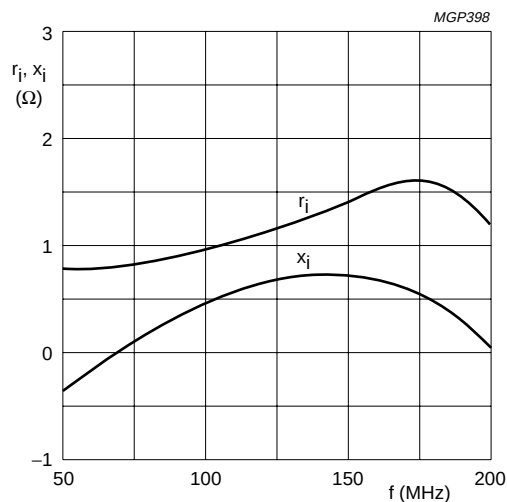
The BLV75/12 is capable of withstanding a load mismatch (VSWR = 20 through all phases) at rated load power up to a supply voltage of 12,5 V; $T_h = 25$ °C; $R_{th\ mb-h} = 0,2$ K/W.

Power slump

If T_h is increased from 25 °C to 70 °C the output power slump for constant P_S amounts to typ. 7% ($V_{CE} = 12,5$; $f = 175$ MHz; $R_{th\ mb-h} = 0,2$ K/W).

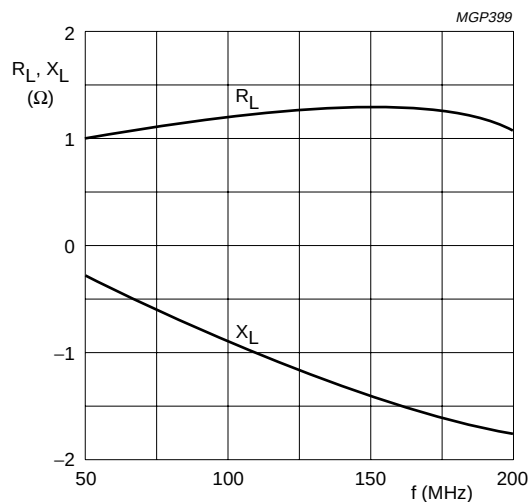
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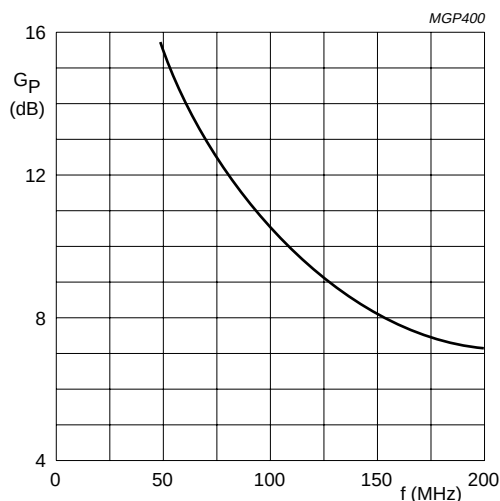
Typical values; $V_{CE} = 12,5\text{ V}$; $P_L = 75\text{ W}$; $f = 50\text{ to }200\text{ MHz}$; class-B operation; $R_{th\text{ mb-h}} = 0,2\text{ K/W}$

Fig.10 Input impedance (series components).



Typical values; $V_{CE} = 12,5\text{ V}$; $P_L = 75\text{ W}$; $f = 50\text{ to }200\text{ MHz}$; class-B operation; $R_{th\text{ mb-h}} = 0,2\text{ K/W}$

Fig.11 Load impedance (series components).



Typical values; $V_{CE} = 12,5\text{ V}$; $P_L = 75\text{ W}$; $f = 50\text{ to }200\text{ MHz}$; class-B operation; $R_{th\text{ mb-h}} = 0,2\text{ K/W}$

Fig.12 Power gain versus frequency.

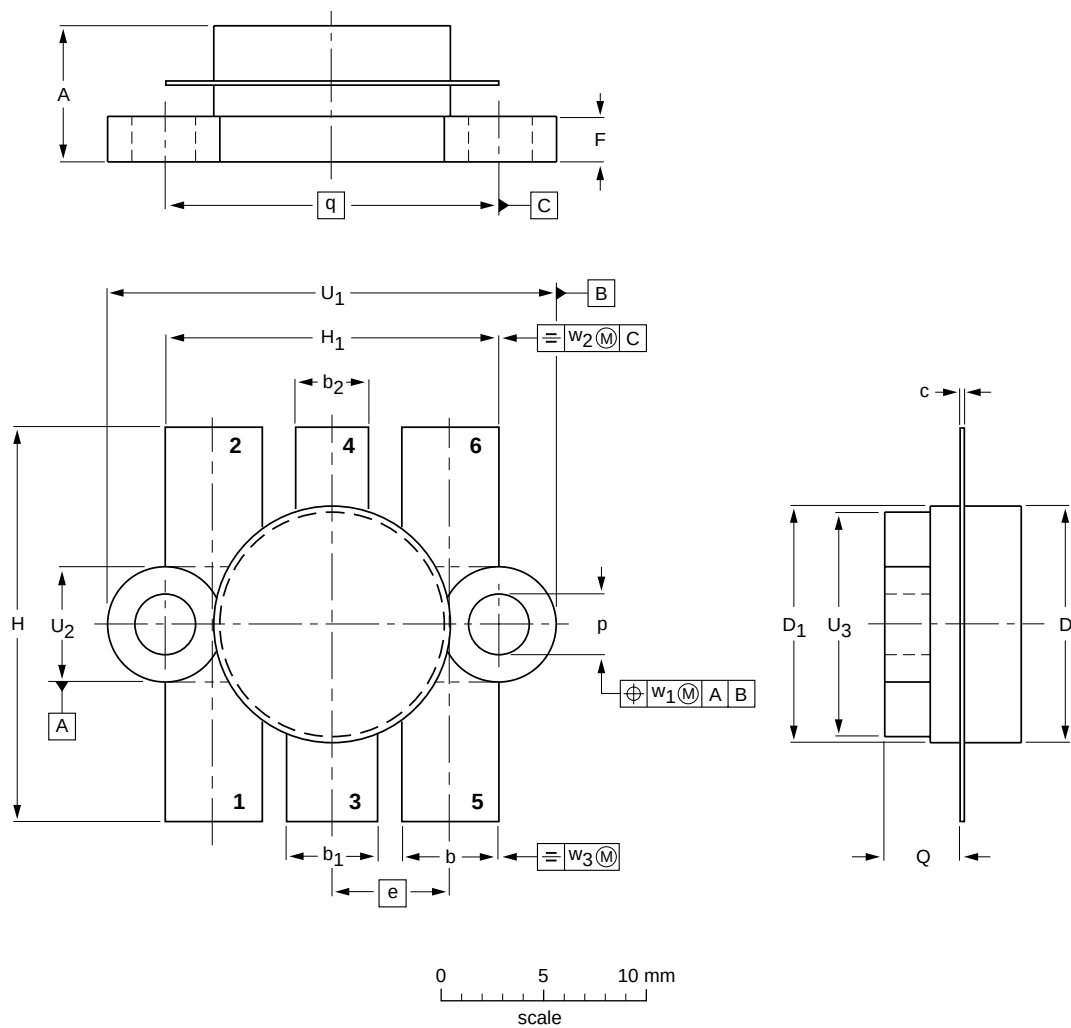
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PACKAGE OUTLINE

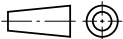
Flanged ceramic package; 2 mounting holes; 6 leads

SOT119A



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

UNIT	A	b	b ₁	b ₂	c	D	D ₁	e	F	H	H ₁	p	Q	q	U ₁	U ₂	U ₃	w ₁	w ₂	w ₃
mm	7.39 6.32	5.59 5.33	5.34 5.08	4.07 3.81	0.18 0.07	12.86 12.59	12.83 12.57	6.48	2.54 2.28	22.10 21.08	18.55 18.28	3.31 2.97	4.58 3.98	18.42	25.23 23.95	6.48 6.07	12.76 12.06	0.51	1.02	0.26
inches	0.291 0.249	0.220 0.210	0.210 0.200	0.160 0.150	0.007 0.003	0.505 0.496	0.505 0.495	0.255	0.100 0.090	0.870 0.830	0.730 0.720	0.130 0.117	0.180 0.157	0.725	0.993 0.943	0.255 0.239	0.502 0.475	0.02	0.04	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT119A						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.	

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