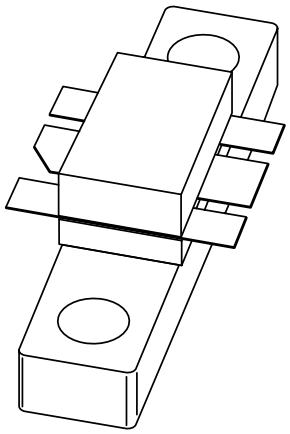
DATA SHEET



BLV59
UHF linear power transistor

Product specification
Supersedes data of March 1993

1998 Jan 09

Philips
Semiconductors

PHILIPS

UHF linear power transistor BLV59

FEATURES

- Internal input matching to achieve an optimum wideband capability and high power gain
- Emitter-ballasting resistors for lower junction temperatures
- Titanium-platinum-gold metallization ensures long life and excellent reliability.

APPLICATIONS

- UHF linear amplifiers in television transmitters.

DESCRIPTION

NPN silicon planar epitaxial power transistor encapsulated in a 6-lead SOT171A flange package with a ceramic cap. All leads are isolated from the flange.

PINNING - SOT171A

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

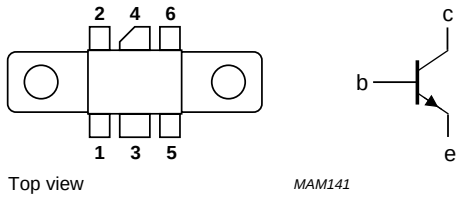


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter class-AB circuit.

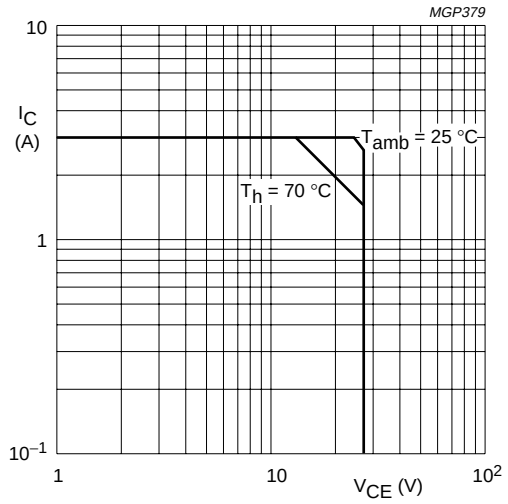
MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
CW, class-AB	860	25	30	>7	>50

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.

LIMITING VALUES

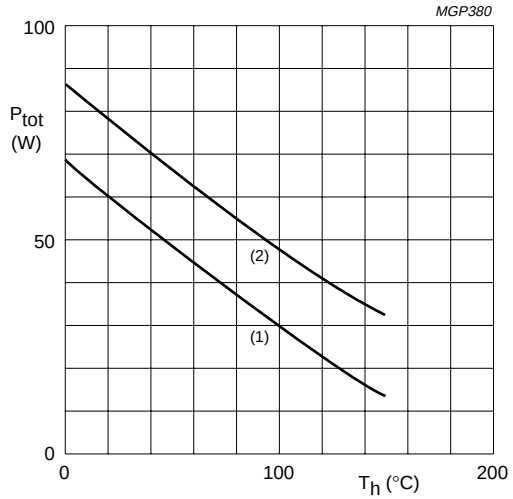
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	50	V
V_{CEO}	collector-emitter voltage	open base	–	27	V
V_{EBO}	emitter-base voltage	open collector	–	3.5	V
I_C	collector current (DC)		–	3	A
$I_{C(AV)}$	average collector current		–	3	A
I_{CM}	peak collector current	f > 1 MHz	–	9	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; f > 1 MHz	–	70	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C



$R_{th\ mb\text{-}h}$ = 0.4 K/W.

Fig.2 DC SOAR.



(1) Continuous operation (f > 1 MHz).

(2) Short-time operation during mismatch (f > 1 MHz).

Fig.3 Power/temperature derating curves.

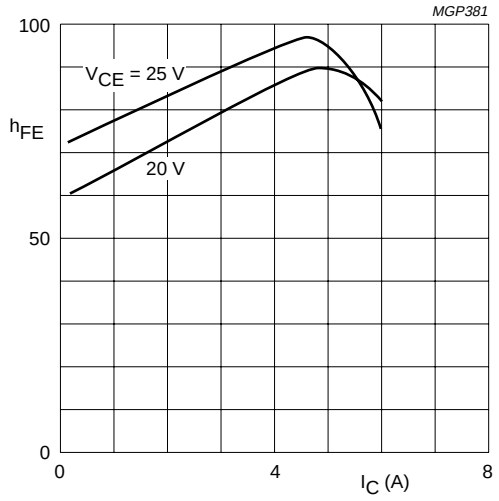
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	T_{mb} = 25 °C, P_{tot} = 50 W	2.3	K/W
$R_{th\ mb\text{-}h}$	thermal resistance from mounting base to heatsink		0.4	K/W

CHARACTERISTICS

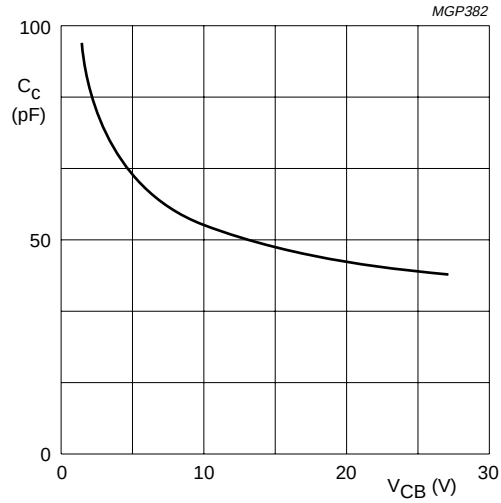
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 50 mA	50	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 100 mA	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 10 mA	3.5	–	–	V
I_{CES}	collector leakage current	V_{CE} = 27 V; V_{BE} = 0	–	–	10	mA
$E_{(SBR)}$	second breakdown energy	L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	4	–	–	mJ
h_{FE}	DC current gain	V_{CE} = 24 V; I_C = 2 A	15	–	–	
C_c	collector capacitance	V_{CB} = 25 V; I_E = i_e = 0; f = 1 MHz	–	44	–	pF
C_{re}	feedback capacitance	V_{CE} = 25 V; I_C = 0; f = 1 MHz	–	30	–	pF
C_{cf}	collector-flange capacitance		–	2	–	pF



T_j = 25 °C.

Fig.4 DC current gain as a function of collector current; typical values.



$I_E = i_e$ = 0; f = 1 MHz.

Fig.5 Collector capacitance as a function of collector-base voltage; typical values

APPLICATION INFORMATION

RF performance up to T_h = 25 °C in a common emitter class-AB circuit; $R_{th\ mb\text{-}h}$ = 0.4 K/W.

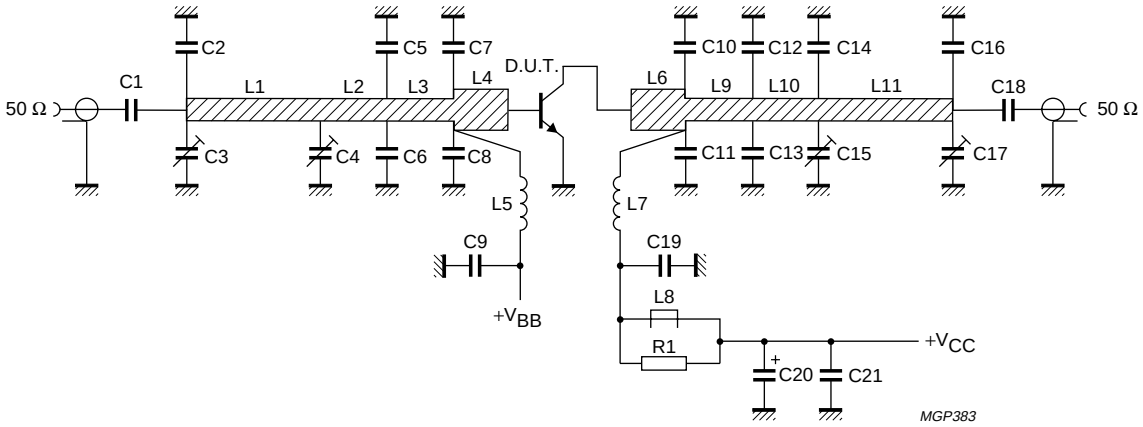
MODE OF OPERATION	f (MHz)	V_{CE} (V)	$I_{C(ZS)}$ (mA)	G_p (dB)	P_L (W)	η_C (%)	ΔG_p (dB)(1)
CW, class-AB	860	25	60	>7 typ. 8.5	30	>50 typ. 55	<1 typ. 0.2

Note

1. Assuming a 3rd order amplitude transfer characteristic, 1 dB gain compression corresponds with 30% sync input/25% sync output compression in television service (negative modulation, C.C.I.R. system).

Ruggedness in class-AB operation

The BLV59 is capable of withstanding a load mismatch corresponding to VSWR = 10 through all phases at rated load power under the following conditions: V_{CE} = 25 V; f = 860 MHz; T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.4 K/W; $I_{C(ZS)}$ = 60 mA.



Temperature compensated bias (R_i < 0.1 Ω).

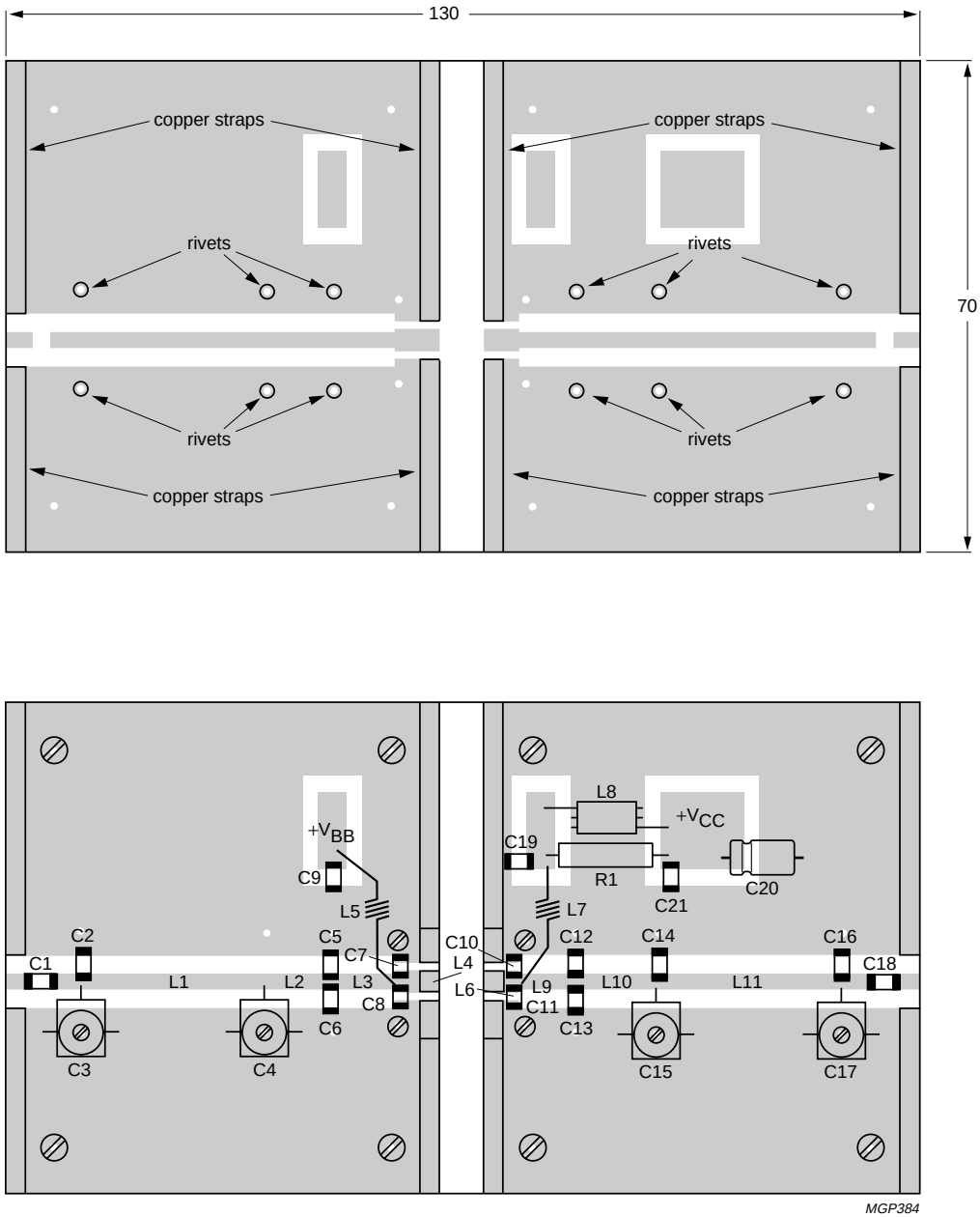
Fig.6 Class-AB test circuit at 860 MHz.

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

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C18	multilayer ceramic chip capacitor; note 1	33 pF		
C2, C14, C16	multilayer ceramic chip capacitor; note 1	3.6 pF		
C3, C4, C15, C17	film dielectric trimmer	1.4 to 5.5 pF		2222 809 09001
C5, C6	multilayer ceramic chip capacitor; note 1	1.8 pF		
C7, C8	multilayer ceramic chip capacitor	6.2 pF		
C9, C21	multilayer ceramic chip capacitor; note 1	330 pF		
C10, C11	multilayer ceramic chip capacitor; note 2	5.6 pF		
C12	multilayer ceramic chip capacitor; note 1	5.6 pF		
C13	multilayer ceramic chip capacitor; note 1	6.2 pF		
C19	multilayer ceramic chip capacitor; note 1	10 pF		
C20	electrolytic capacitor	6.8 μF; 63 V		
L1, L11	stripline; note 3	50 Ω	26 mm × 2.4 mm	
L2, L3	stripline; note 3	50 Ω	9.5 mm × 2.4 mm	
L4	stripline; note 3	42.6 Ω	6 mm × 3 mm	
L5	4 turns of closely wound 0.4 mm enamelled copper wire	60 nH	int. diameter 3 mm leads 2 × 5 mm	
L6	stripline; note 3	42.6 Ω	4 mm × 3 mm	
L7	4 turns of closely wound 1 mm enamelled Cu wire	45 nH	int. diameter 4 mm leads 2 × 5 mm	
L8	Ferroxcube HF choke	grade 3B		4312 020 36642
L9	stripline; note 3	50 Ω	9 mm × 2.4 mm	
L10	stripline; note 3	50 Ω	13.5 mm × 2.4 mm	
R1	metal film resistor	10 Ω ±5%; 1 W		

Notes

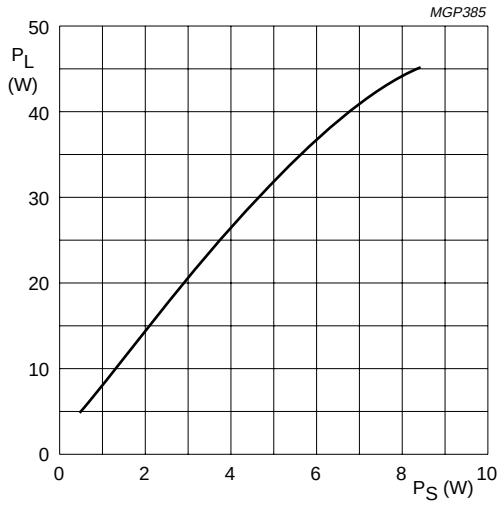
1. American Technical Ceramics (ATC) capacitor, type 100B or other capacitor of the same quality.
2. American Technical Ceramics (ATC) capacitor, type 100A or other capacitor of the same quality.
3. The striplines are on a double copper-clad printed-circuit board with PTFE fibre-glass dielectric (ε_r = 2.2); thickness $^1/_{32}$".



Dimensions in mm.

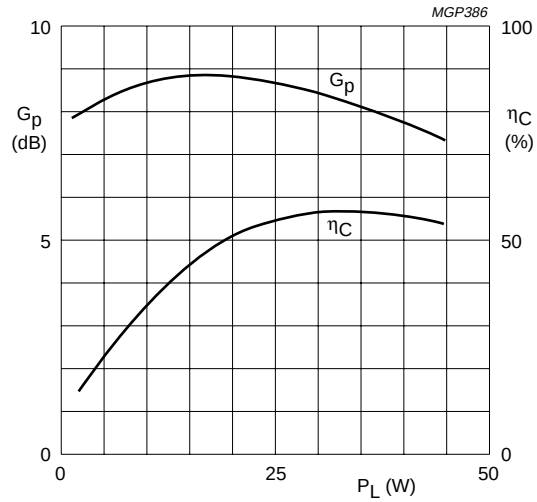
The components are situated on one side of the copper-clad PTFE-glass board, the other side is unetched and serves as a ground plane. Earth connections are made by fixing screws, hollow rivets and copper straps around the board and under the bases to provide a direct contact between the copper on the component side and the ground plane.

Fig.7 Printed-circuit board and component layout for 860 MHz class-AB test circuit.



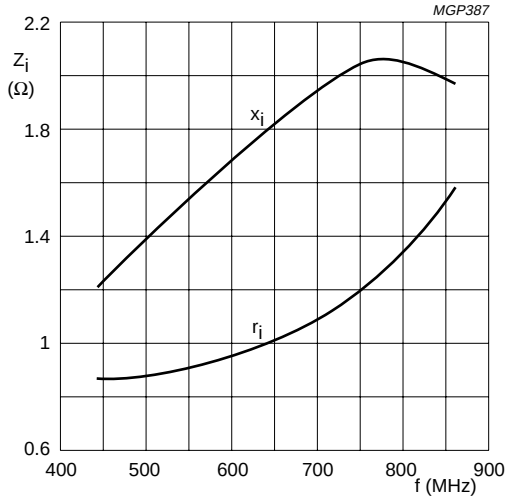
V_{CE} = 25 V; f = 860 MHz; $I_{C(ZS)}$ = 60 mA; T_h = 25 °C;
$R_{th\ mb\text{-}h}$ = 0.4 K/W; class-AB operation.

Fig.8 Load power as a function of source power; typical values.



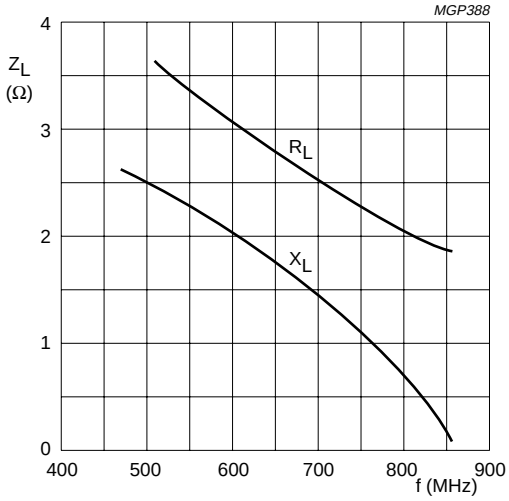
V_{CE} = 25 V; f = 860 MHz; $I_{C(ZS)}$ = 60 mA; T_h = 25 °C;
$R_{th\ mb\text{-}h}$ = 0.4 K/W; class-AB operation.

Fig.9 Power gain and efficiency as a function of load power; typical values.



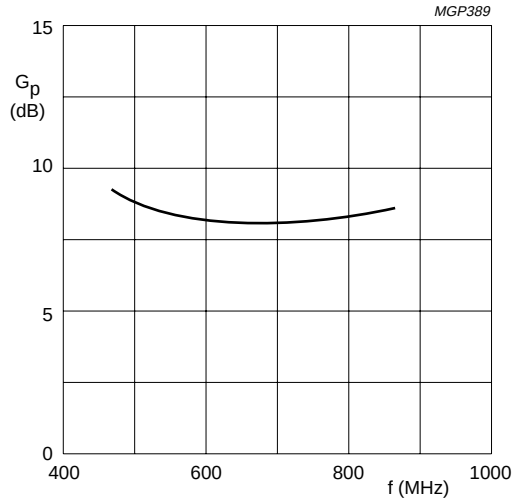
V_{CE} = 25 V; P_L = 30 W; T_h = 25 °C;
$R_{th\ mb\text{-}h}$ = 0.4 K/W; $I_{C(ZS)}$ = 60 mA; class-AB operation.

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



V_{CE} = 25 V; P_L = 30 W; T_h = 25 °C;
$R_{th\ mb\text{-}h}$ = 0.4 K/W; $I_{C(ZS)}$ = 60 mA; class-AB operation.

Fig.11 Load impedance as a function of frequency (series components); typical values.

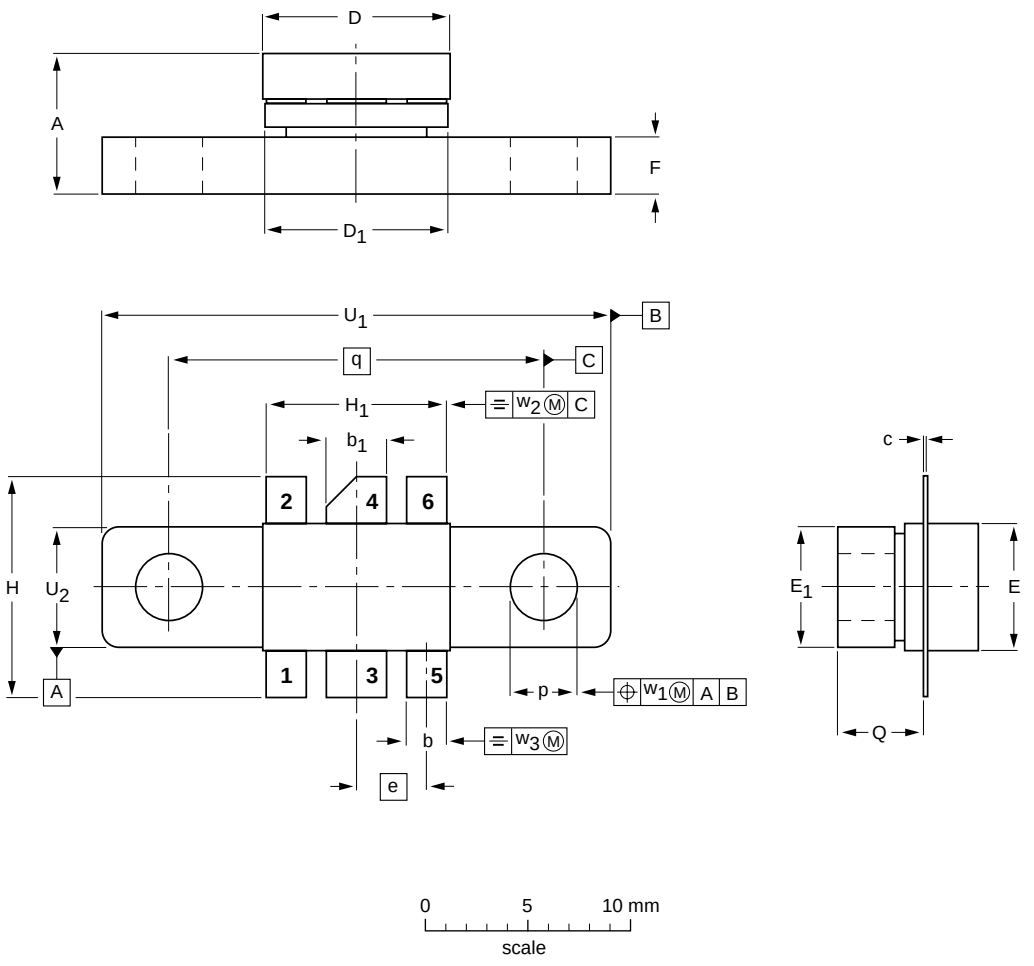


V_{CE} = 25 V; P_L = 30 W; T_h = 25 °C;
$R_{th\ mb\text{-}h}$ = 0.4 K/W; $I_{C(ZS)}$ = 60 mA; class-AB operation.

Fig.12 Power gain as a function of load power; typical values.

PACKAGE OUTLINE

Flanged ceramic package; 2 mounting holes; 6 leads **SOT171A**



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

UNIT	A	b	b_1	c	D	D_1	E	E_1	e	F	H	H_1	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	6.81 6.07	2.15 1.85	3.20 2.89	0.16 0.07	9.25 9.04	9.30 8.99	5.95 5.74	6.00 5.70	3.58	3.05 2.54	11.31 10.54	9.27 9.01	3.43 3.17	4.32 4.11	18.42	24.90 24.63	6.00 5.70	0.51	1.02	0.26
inches	0.268 0.239	0.085 0.073	0.126 0.114	0.006 0.003	0.364 0.356	0.366 0.354	0.234 0.226	0.236 0.224	0.140	0.120 0.100	0.445 0.415	0.365 0.355	0.135 0.125	0.170 0.162	0.725	0.980 0.970	0.236 0.224	0.02	0.04	0.01

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT171A						97-06-28

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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Printed in The Netherlands 127067/00/02/pp12 Date of release: 1998 Jan 09 Document order number: 9397 750 03119

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