DISCRETE SEMICONDUCTORS

DATA SHEET

BLU30/12 UHF power transistor

Product specification

January 1985





BLU30/12

DESCRIPTION

N-P-N silicon planar epitaxial transistor primarily intended for use in mobile radio transmitters in the 470 MHz communications band.

FEATURES:

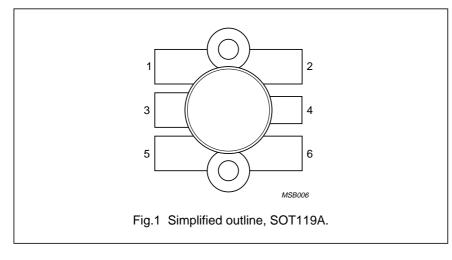
- multi-base structure and emitter-ballasting resistors for an optimum temperature profile
- gold metallization ensures excellent reliability
- internal matching to achieve an optimum wideband capability and high power gain

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

QUICK REFERENCE DATA

Envelope	SOT-119			
Mode of operation	class-B; c.w.			
Collector-emitter voltage (d.c.)	V_{CE}		12,5	V
Frequency	f		470	MHz
Load power	P_L		30	W
Power gain	G_P	>	6,0	dB
Collector efficiency	η_{C}	>	55	%
Heatsink temperature	T_h		25	°C

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.

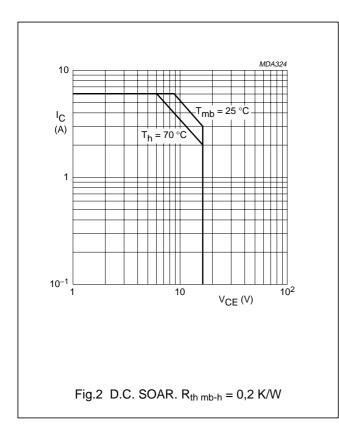
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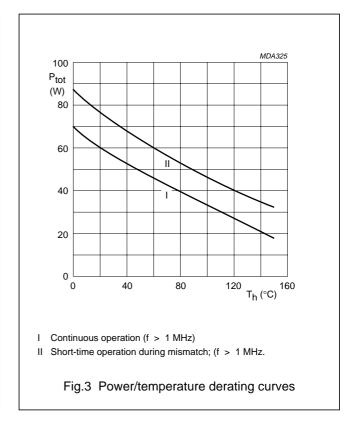
RATINGS

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

Collector-base voltage (open emitter)

peak value	V_{CBOM}	max.	36	٧
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	$I_{\mathbb{C}}$	max.	6	Α
(peak value); f > 1 MHz	I_{CM}	max.	18	Α
Total power dissipation				
$f > 1 \text{ MHz}; T_{mb} = 25 ^{\circ}\text{C}$	P _{tot} (r.f.)	max.	65	W
Storage temperature	T_{stg}	-65 to -	+ 150	°С
Operating junction temperature	T_j	max.	200	°С





THERMAL RESISTANCE

(dissipation = 45 W; T_{mb} = 25 °C)

From junction to mounting base

(r.f. dissipation)

From mounting base to heatsink

 $\begin{array}{lll} R_{th\; j\text{-mb}(r.f.)} & \text{max.} & 2,45 & \text{K/W} \\ R_{th\; mb\text{-}h} & \text{max.} & 0,2 & \text{K/W} \end{array}$

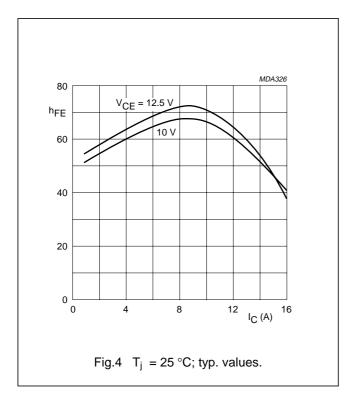
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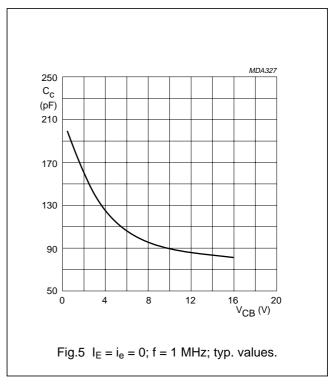
CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified				
Collector-base breakdown voltage				
I _C = 50 mA; open emitter	$V_{(BR)CBO}$	>	36	V
Collector-emitter breakdown voltage				
I _C = 100 mA; open base	$V_{(BR)CEO}$	>	16,5	V
Emitter-base breakdown voltage				
I _E = 10 mA; open collector	$V_{(BR)EBO}$	>	4	V
Collector cut-off current				
$V_{BE} = 0; V_{CE} = 16 \text{ V}$	I _{CES}	<	22	mΑ
Second breakdown energy				
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_SBR	>	8	mJ
D.C. current gain				
$I_C = 4 \text{ A}; V_{CF} = 10 \text{ V}$	h	>	15	
IC = 4 A, VCE = 10 V	h _{FE}	typ.	60	
Collector capacitance at f = 1 MHz ⁽¹⁾				
$I_E = i_e = 0$; $V_{CB} = 12,5 \text{ V}$	C_c	typ.	85	pF
Feed-back capacitance at f = 1 MHz ⁽¹⁾				
$I_C = 0; V_{CE} = 12,5 \text{ V}$	C_re	typ.	52	pF
Collector-flange capacitance	C_{cf}	typ.	3	pF

Note

1. Device mounted in SOT-119 envelope without input matching.



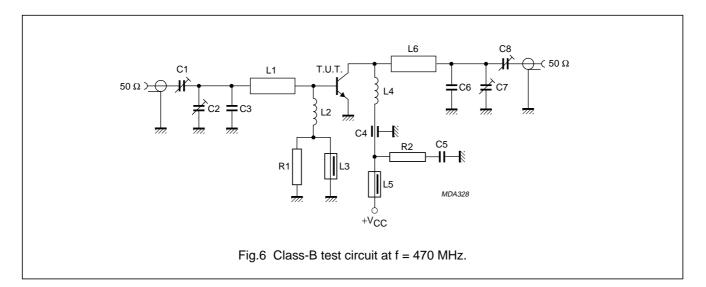


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APPLICATION INFORMATION

Mode of operation	In narrow	-band test o	circuit; clas	s-B; c.w.	
Collector-emitter voltage (d.c.)	$V_{\sf CE}$		12,5	V	
Frequency	f		470	MHz	
Load power	P_L		30	W	
Power gain	G	>	6,0	dB	
rowei gaiii	G_p	typ.	7,4	dB	
Collector efficiency	n a	>	55	%	
Collector efficiency	ης	typ.	66	%	
Heatsink temperature	Th		25	°C	



List of components:

C1 = C2 = C7 = C8 = 2 to 9 pF film dielectric trimmer (cat. no. 2222 809 09002)

C3 = C6 = 3.9 pF ceramic capacitor (500 V)

C4 = 100 pF feed-through capacitor

C5 = 100 nF polyester film capacitor

L1 = stripline (24,0 mm \times 6,7 mm)

L2 = 10 turns closely wound enamelled Cu-wire (0,4 mm); int. diam. 4 mm

L3 = 2 turns enamelled Cu-wire (0,6 mm); Ferroxcube tube core, grade 3B5 (cat. no. 4313 020 15170)

L4 = 12,6 nH; 2,5 turns enamelled Cu-wire (0,7 mm); int. diam. 4 mm; length 3 mm; leads 2 × 5 mm

L5 = Ferroxcube wideband h.f. choke, grade 3B (cat. no. 4312 020 36642)

L6 = stripline (28,4 mm \times 6,7 mm)

R1 = R2 = 10Ω carbon resistor

L1 and L6 are striplines on a double Cu-clad printed circuit board with P.T.F.E. fibre-glass dielectric (ϵ_r = 2,74); thickness $\frac{1}{16}$ inch.

Component lay-out and printed-circuit board for 470 MHz test circuit are shown in Figs 7 and 8.

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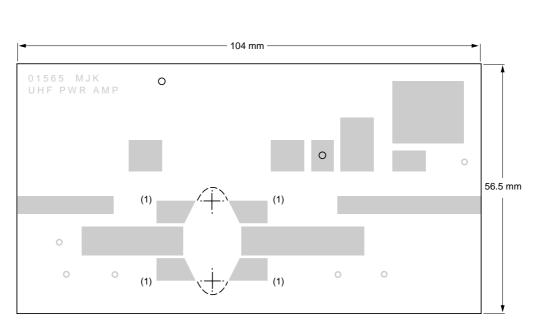
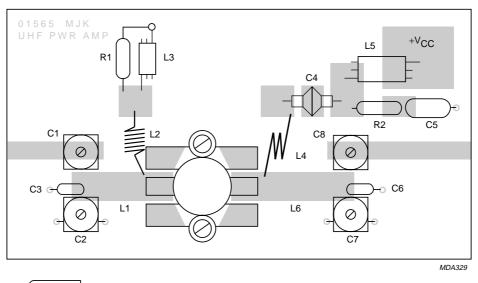


Fig.7 P.c. board for 470 MHz, class-B test circuit.



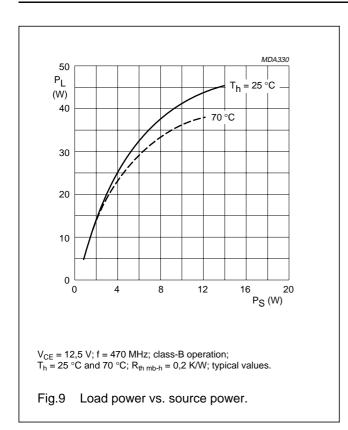
double Cu-clad printed-circuit board
Cu strap (thick 0.3 mm; wide 5.0 mm)

The circuit and the components are on one side of the P.T.F.E. fibre-glass board; the other side fully metallized serving as groundplane. Earth connections are made by hollow rivets and also by copper straps under the emitter to provide a direct contact between the copper on the component side and the ground plane.

Fig.8 Component lay-out of 470 MHz, class-B test circuit.

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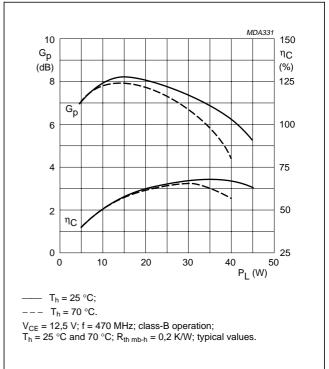


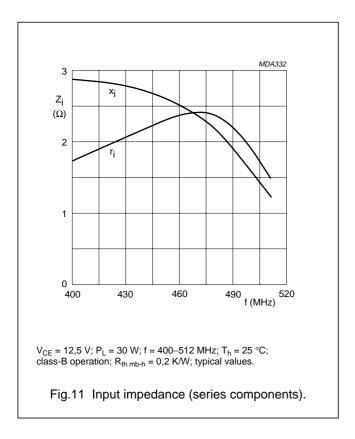
Fig.10 Power and gain and efficiency vs. load power.

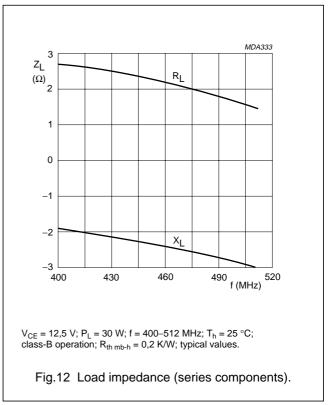
RUGGEDNESS

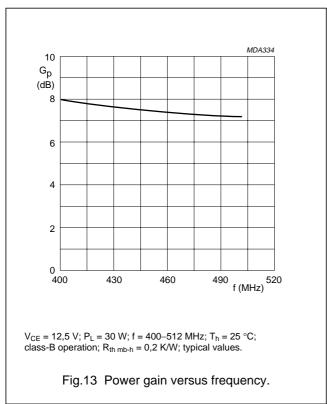
The device is capable of withstanding a full load mismatch (VSWR = 50; all phases) up to 38 W under the following conditions:

 V_{CE} = 15,5 V; f = 470 MHz; T_h = 25 °C; $R_{th \; mb\text{-}h}$ = 0,2 K/W.

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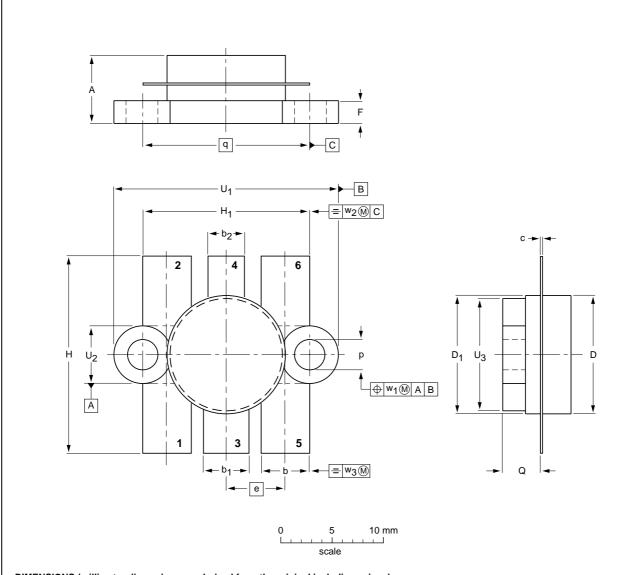


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PACKAGE OUTLINE

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	С	D	D ₁	е	F	Н	Н1	р	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		REFER	ENCES	EUROPEAN	ISSUE DATE
VERSION	IEC	JEDEC	EIAJ	PROJECTION	1330E DATE
SOT119A				$ \ \ \bigoplus \big($	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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