DATA SHEET

BLT92/SL
UHF power transistor

Product specification

May 1989

Philips
Semiconductors

PHILIPS

UHF power transistor BLT92/SL

DESCRIPTION

NPN silicon planar epitaxial transistor primarily intended for use in handheld radio stations in the 900 MHz communications band.

This device has been designed specifically for class-B operation.

FEATURES

- internal input matching capacitor for a high power gain
- gold metallization ensures excellent reliability

The transistor has a 4-lead studless envelope with a ceramic cap (SOT122D). All leads are isolated from the mounting base.

PINNING

1 = collector
2 = emitter
3 = base
4 = emitter

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C in a common-emitter class-B circuit

MODE OF OPERATION	V_{CE} (V)	f (MHz)	P_L (W)	G_p (dB)	η_C (%)
CW (class-B)	7.5	900	3.0	> 7.0	> 50

PIN CONFIGURATION

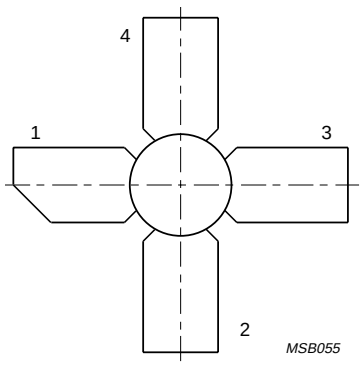


Fig.1 Simplified outline, SOT122D.

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

RATINGS

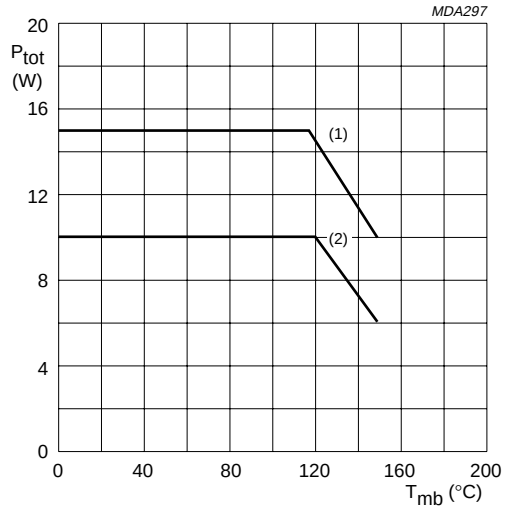
Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3.0	V
Collector current				
DC or average	I_C; $I_{C(AV)}$	max.	1.2	A
(peak value); f > 800 MHz	I_{CM}	max.	3.6	A
Total power dissipation				
at T_{amb} < 120 °C; f > 800 MHz	P_{tot}	max.	10	W
Storage temperature range	T_{stg}	−65 to +150		°C
Operating junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

Dissipation = 10 W; T_{mb} = 25 °C

From junction to mounting base (f > 800 MHz)	$R_{th\ j\text{-}mb(RF)}$	max.	6.0	K/W



(1) Short-time RF operation during mismatch (f > 800 MHz).
(2) Continuous RF operation (f > 800 MHz).

Fig.2 Total power dissipation as a function of temperature.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage				
open emitter; I_C = 10 mA	$V_{(BR)CBO}$	>	20	V
Collector-emitter breakdown voltage				
open base; I_C = 20 mA	$V_{(BR)CEO}$	>	10	V
Emitter-base breakdown voltage				
open collector; I_E = 2 mA	$V_{(BR)EBO}$	>	3.0	V
Collector cut-off current				
V_{BE} = 0; V_{CE} = 10 V	I_{CES}	<	5.0	mA
Second breakdown energy				
L = 25 mH; f = 50 Hz; R_{BE} = 10 Ω	E_{SBR}	>	1.0	mJ
DC current gain				
I_C = 600 mA; V_{CE} = 5 V	h_{FE}	>	25	
Collector capacitance at f = 1 MHz				
$I_E = i_e$ = 0; V_{CB} = 7.5 V	C_c	typ.	11	pF
Feedback capacitance at f = 1 MHz				
I_C = 0; V_{CE} = 7.5 V	C_{re}	typ.	6.0	pF
Collector-mounting base capacitance	$C_{c\text{-}mb}$	typ.	1.2	pF

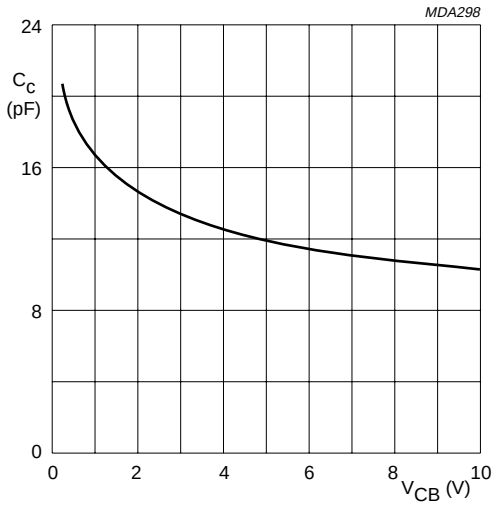


Fig.3 Collector capacitance as a function of collector-base voltage; f = 1 MHz; $I_E = i_e$ = 0; typical values.

APPLICATION INFORMATION

RF performance in CW operation (common-emitter circuit; class-B); f = 900 MHz; T_{mb} = 25 °C

MODE OF OPERATION	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)
Class-B; CW	7.5	3.0	> 7.0 typ. 8.5	> 50 typ. 57

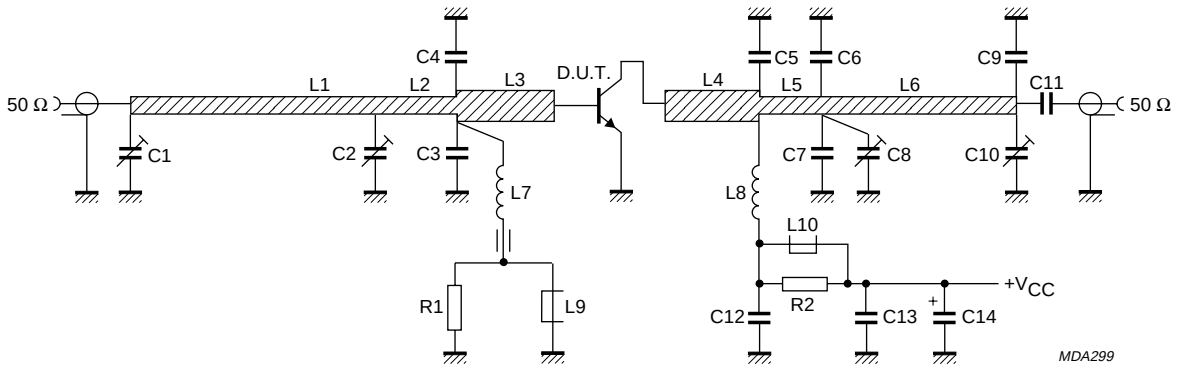


Fig.4 Class-B test circuit at f = 900 MHz.

List of components:

C1 = C2 = C8 = C10 = 1.4 to 5.5 pF film dielectric trimmer (cat. no. 2222 809 09001)
C3 = C6 = C7 = 3.3 pF multilayer ceramic chip capacitor(1)
C4 = C5 = C9 = 5.6 pF multilayer ceramic chip capacitor(1)
C11 = C12 = C13 = 180 pF multilayer ceramic chip capacitor
C14 = 1 μF (35 V) tantalum capacitor
L1 = 50 Ω stripline (25 mm × 2.4 mm)
L2 = 50 Ω stripline (11 mm × 2.4 mm)
L3 = L4 = 25 Ω stripline (11.5 mm × 6.0 mm)
L5 = 50 Ω stripline (7.0 mm × 2.4 mm)
L6 = 50 Ω stripline (27.0 mm × 2.4 mm)
L7 = 4 turns closely wound enamelled Cu wire (0.4 mm), int. dia;. 3 mm, with ferrite beat (cat. no. 4330 830 32221) over the coldside lead
L8 = 1 turn Cu wire (1.0 mm); int. dia. 5.5 mm; length 2 mm; leads 2 × 5 mm
L9 = L10 = Ferroxcube wideband HF choke, grade 3B (cat. no. 4312 020 36642)
R1 = R2 = 10 Ω ± 5%; 0.25 W metal film resistor

The striplines on a double Cu-clad printed circuit board with PTFE fibreglass dielectric (ε_r = 2.2); thickness 1/32 inch; thickness of copper-sheet 2 × 35 μm.

Note

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

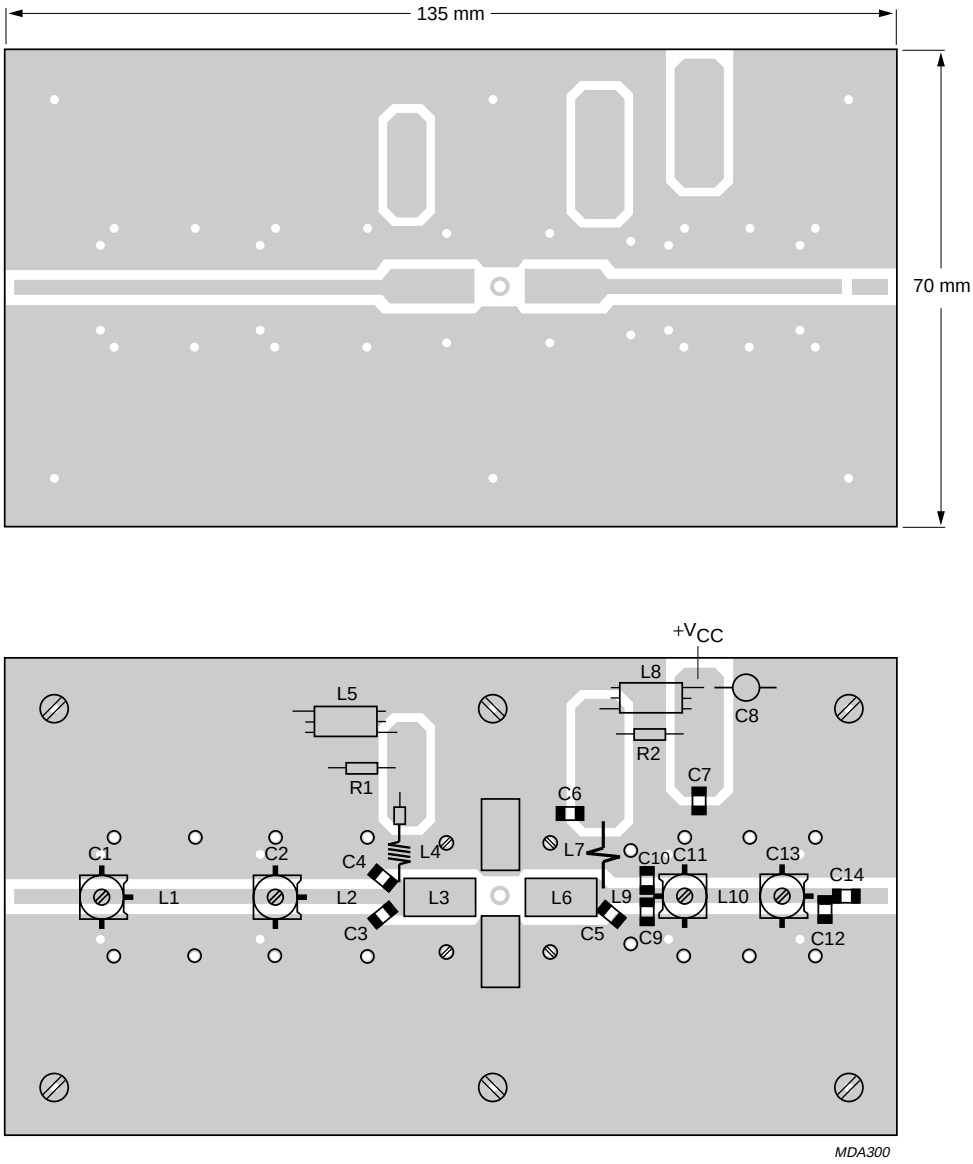
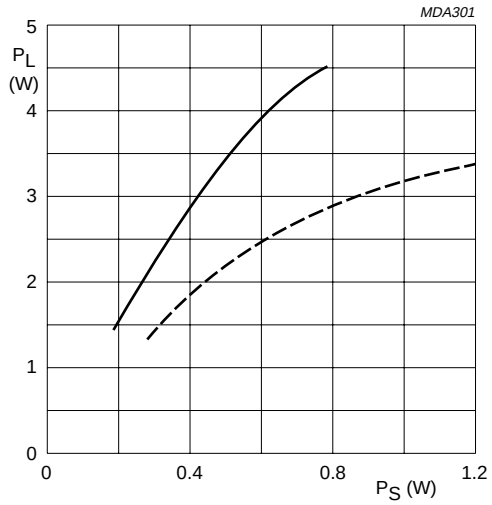


Fig.5 Printed circuit board and component layout for 900 MHz class-B test circuit.

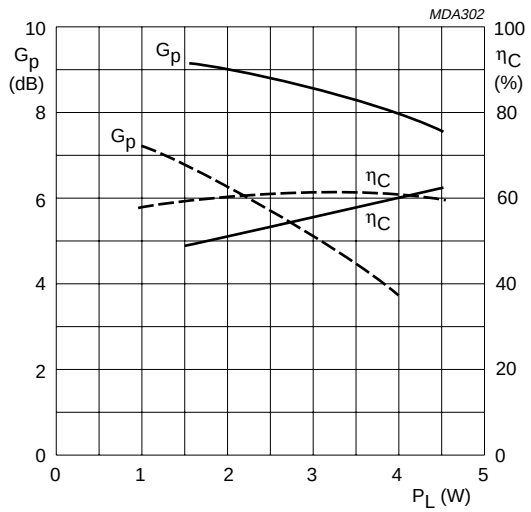
Note:

The circuit and the components are on one side of the PTFE fibreglass board; the other side is un-etched copper serving as groundplane. Earth connections are made by hollow rivets and also by fixing-screws and copper straps around the board and under the emitters to provide a direct contact between the copper on the component side and the groundplane.



f = 900 MHz; T_{mb} = 25 °C; class-B operation; typical values.
—— V_{CE} = 7.5 V
– – – V_{CE} = 5.0 V

Fig.6 Load power as a function of source power.

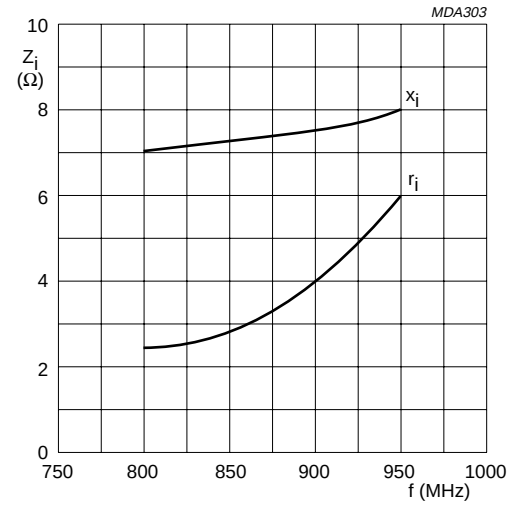


f = 900 MHz; T_{mb} = 25 °C; class-B operation; typical values.
—— V_{CE} = 7.5 V
– – – V_{CE} = 5.0 V

Fig.7 Power gain and efficiency as a function of load power.

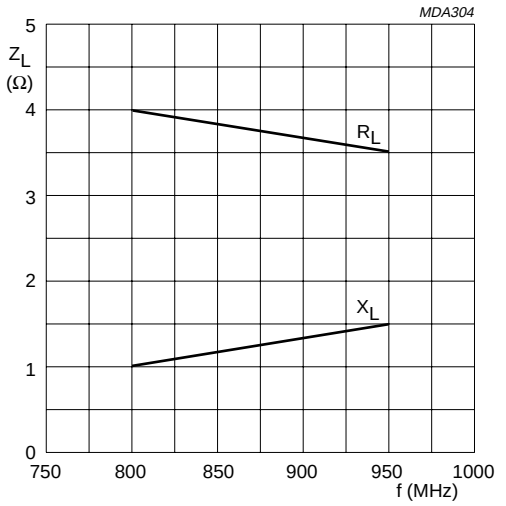
RUGGEDNESS

The device is capable of withstanding a full load mismatch (VSWR = 50; all phases) at rated load power up to a supply voltage of 9.0 V at T_{mb} = 25 °C.



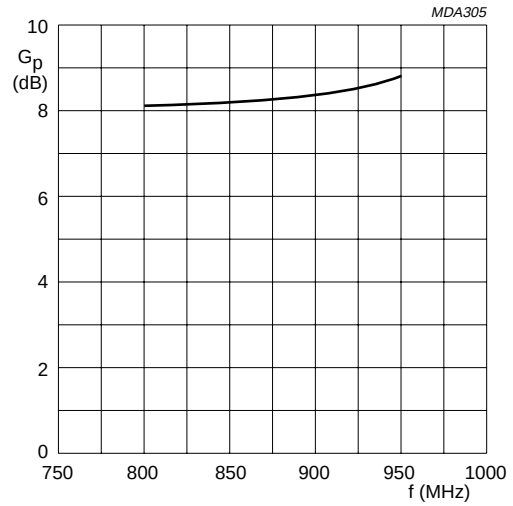
V_{CE} = 7,5 V; P_L = 3 W; f = 800 - 960 MHz; T_{mb} = 25 °C; class-B operation; typical values.

Fig.8 Input impedance as a function of frequency (series components).



V_{CE} = 7,5 V; P_L = 3 W; f = 800 - 960 MHz; T_{mb} = 25 °C; class-B operation; typical values.

Fig.9 Load impedance as a function of frequency (series components).

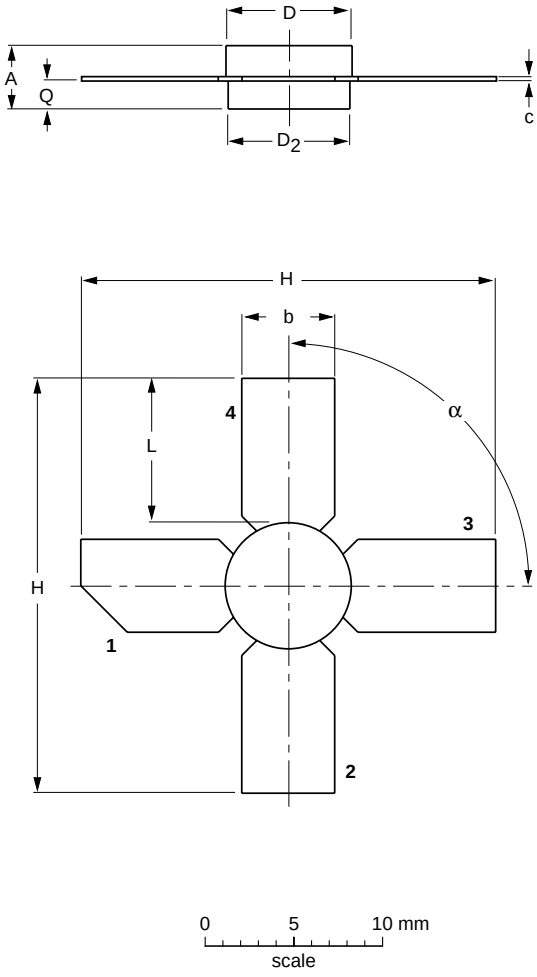


V_{CE} = 7,5 V; P_L = 3 W; f = 800 - 960 MHz; T_{mb} = 25 °C; class-B operation; typical values.

Fig.10 Power gain as a function of frequency.

PACKAGE OUTLINE

Studless ceramic package; 4 leads **SOT122D**



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

UNIT	A	b	c	D	D_2	H	L	Q	α
mm	4.17 3.27	5.85 5.58	0.18 0.14	7.50 7.23	7.24 6.98	27.56 25.78	9.91 9.14	1.58 1.27	90°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT122D						97-04-18

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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