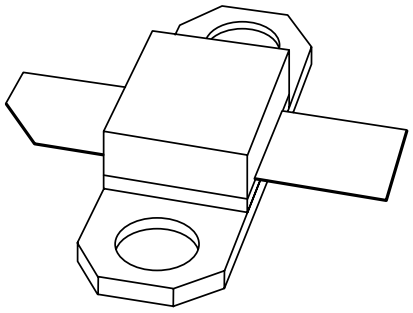
DATA SHEET



BLV2045N
UHF power transistor

Preliminary specification

1999 Apr 23

Philips
Semiconductors

PHILIPS

UHF power transistor BLV2045N

FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input and output matching for an easy design of wideband circuits.

APPLICATIONS

- Common emitter class-AB operation in PCN and PCS applications in the 1800 to 2000 MHz frequency range.

DESCRIPTION

NPN silicon planar UHF power transistor in a 2-lead SOT390A flange package with a ceramic cap. The emitter is connected to the flange.

PINNING - SOT390A

PIN	SYMBOL	DESCRIPTION
1	c	collector
2	b	base
3	e	emitter, connected to flange

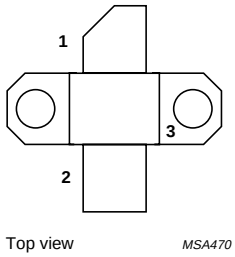


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	1990	26	35	typ. 9.5	typ. 43	–
2-tone, class-AB	f_1 = 1990.0; f_2 = 1990.1	26	35 (PEP)	≥9.5	≥33	≤–30

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	–	65	V
V_{CEO}	collector-emitter voltage	open base	–	27	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C	collector current (DC)		–	4	A
$I_{C(AV)}$	average collector current		–	4	A
P_{tot}	total power dissipation	T_{mb} = 25 °C	–	125	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	200	°C

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.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base	P_L = 35 W; η_C = 40 %; T_{mb} = 25 °C	1.4	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 = 20 mA	65	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = 60 mA	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = 40 mA	3	–	–	V
I_{CES}	collector leakage current	V_{CE} = 26 V; V_{BE} = 0	–	–	4	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 2 A	45	–	100	
C_c	collector capacitance	V_{CB} = 26 V; $I_E = i_e$ = 0; f = 1 MHz; note 1	–	t.b.f.	–	pF
C_{re}	feedback capacitance	V_{CE} = 26 V; I_C = 0; f = 1 MHz	–	t.b.f.	–	pF

Note

1. Capacitance of die only.

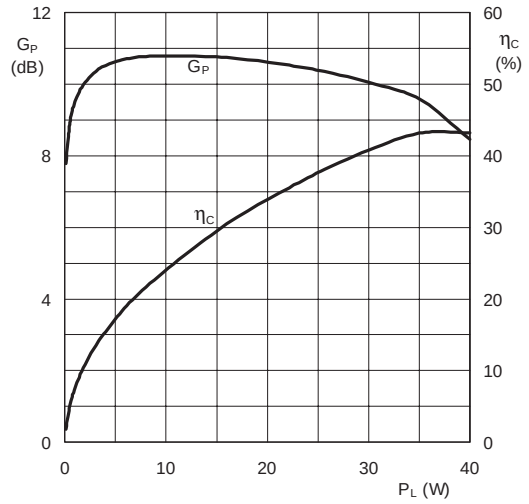
APPLICATION INFORMATION

RF performance at T_h = 25 °C in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	V_{CE} (V)	I_{CQ} (mA)	P_L (W)	G_p (dB)	η_C (%)	d_{im} (dBc)
CW, class-AB	1990	26	150	35	typ. 9.5	typ. 43	–
2-tone, class-AB	f_1 = 1990.0; f_2 = 1990.1	26	150	35 (PEP)	≥9.5 typ. 10.2	≥33 typ. 35	≤–30 typ. –32

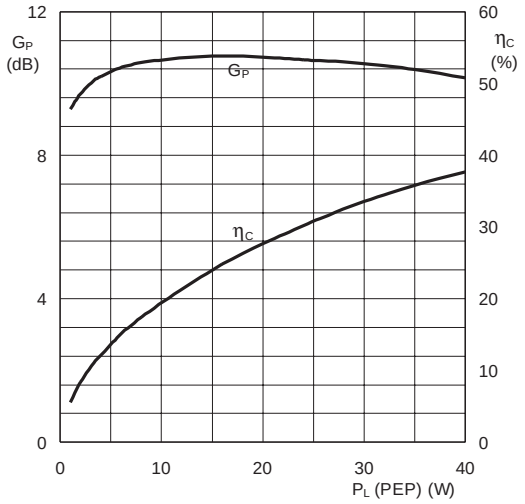
Ruggedness in class-AB operation

The BLV2045N is capable of withstanding a load mismatch corresponding to VSWR = 3 : 1 through all phases under the following conditions: f_1 = 1990.0 MHz; f_2 = 1990.1 MHz; V_{CE} = 26 V; I_{CQ} = 150 mA; P_L = 35 W (PEP); T_{mb} = 25 °C.



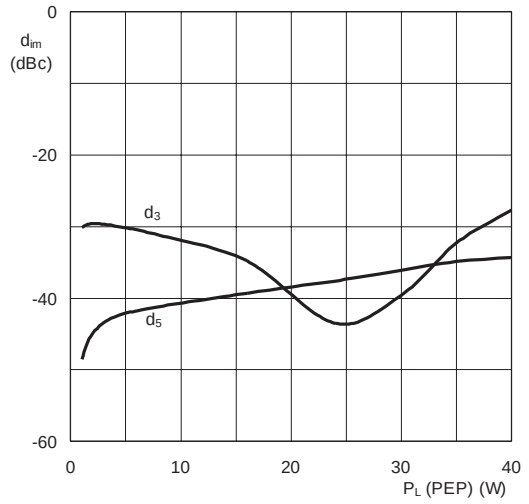
V_{CE} = 26 V; I_{CQ} = 150 mA; f = 1990 MHz.

Fig.2 Power gain and collector efficiency as functions of load power; typical values.



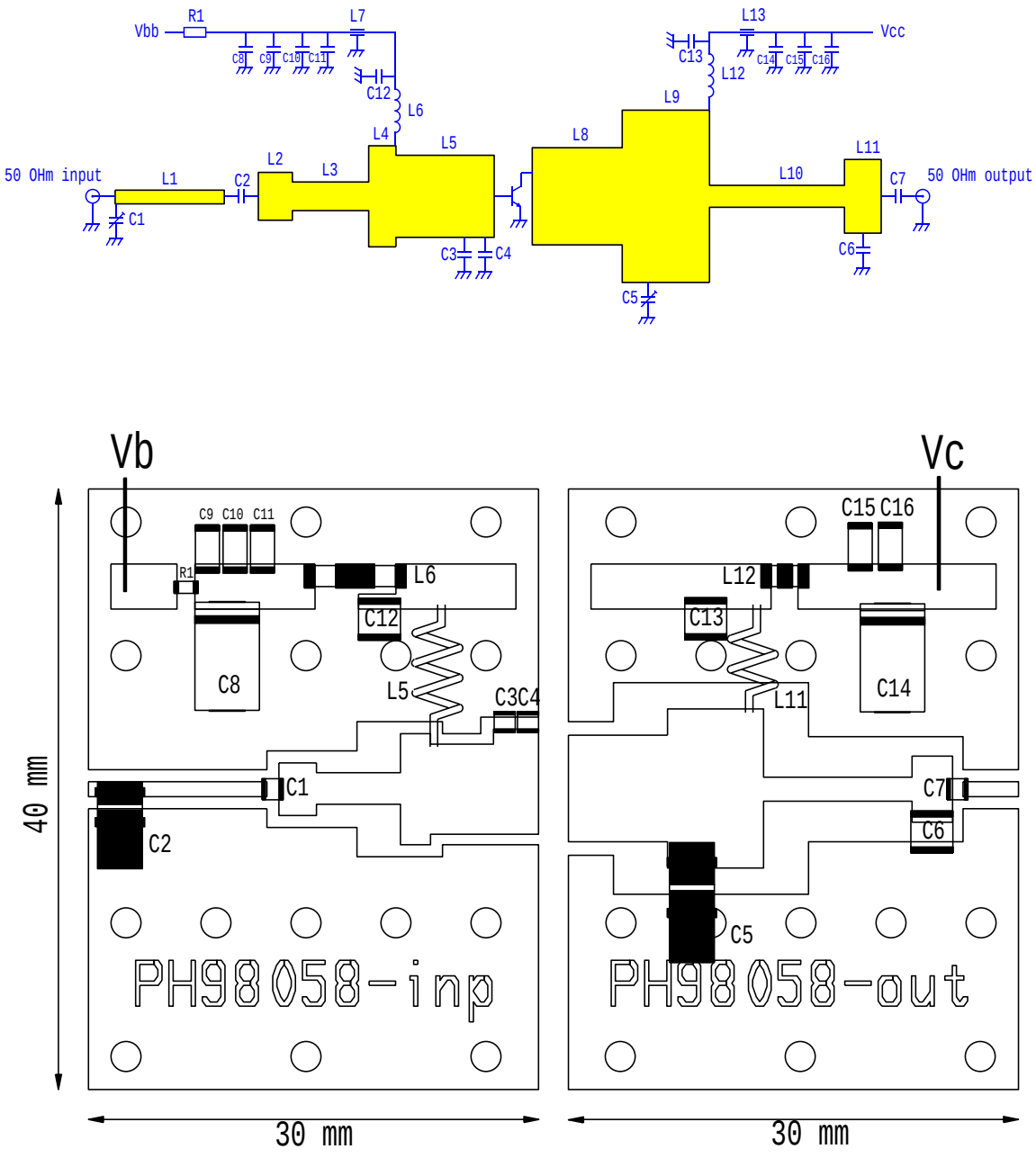
V_{CE} = 26 V; I_{CQ} = 150 mA; f_1 = 1990 MHz;f_2 = 1990.1 MHz

Fig.3 Power gain and collector efficiency as functions of peak envelope load power; typical values.



V_{CE} = 26 V; I_{CQ} = 150 mA; f_1 = 1990 MHz; f_2 = 1990.1 MHz.

Fig.4 Intermodulation distortion as a function of peak envelope load power; typical values.



Dimensions in mm

The components are situated on one side of the copper-clad board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

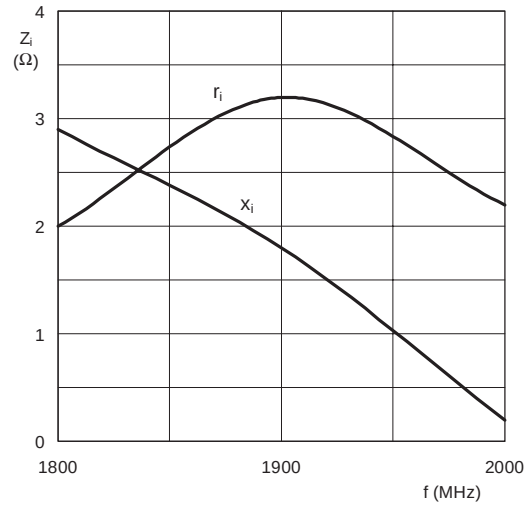
Fig.5 1990 MHz class-AB testcircuit and component layout

List of components

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1	Tekelec variable capacitor; type AT37281	0.4 to 2.5 pF		
C2, C7	multilayer ceramic chip capacitor; note 1	30 pF		
C3	multilayer ceramic chip capacitor; note 2	2.4 pF		
C4	multilayer ceramic chip capacitor; note 2	1.8 pF		
C5	Tekelec variable capacitor; type AT37271	0.6 to 4.5 pF		
C6	multilayer ceramic chip capacitor; note 2	1.3 pF		
C8, C14	tantal SMD capacitor	35 V; 10 μF		
C9, C10, C11, C15, C16	multilayer ceramic chip capacitor	100 nF		
C12, C13	multilayer ceramic chip capacitor; note 2	20 pF		
L1	stripline; note 3	50 Ω	8 x 1 mm	
L2	stripline; note 3	20.5 Ω	2.5 x 3.5 mm	
L3	stripline; note 3	29.8 Ω	5.6 x 2.1 mm	
L4	stripline; note 3	11 Ω	2.0 x 7.4 mm	
L5	stripline; note 3	13.2 Ω	7.2 x 6.0 mm	
L6	5 turns enamelled 1 mm copper wire		int. dia. = 3.3 mm; length = 6 mm	
L7	EMI filter; type NFM61RH20T332	3300 pF		
L8	stripline; note 3	11.5 Ω	6.6 x 7.1 mm	
L9	stripline; note 3	6.9 Ω	6.4 x 12.6 mm	
L10	stripline; note 3	35.8 Ω	9.9 x 1.6 mm	
L11	stripline; note 3	14.4 Ω	2.7 x 5.4 mm	
L12	2 turns enamelled 1 mm copper wire		int. dia. = 3.3 mm; length = 2.5 mm	
L13	EMI filter; type NFM60RH20T152	1500 pF		
R1	chip resistor	2.2 Ω		

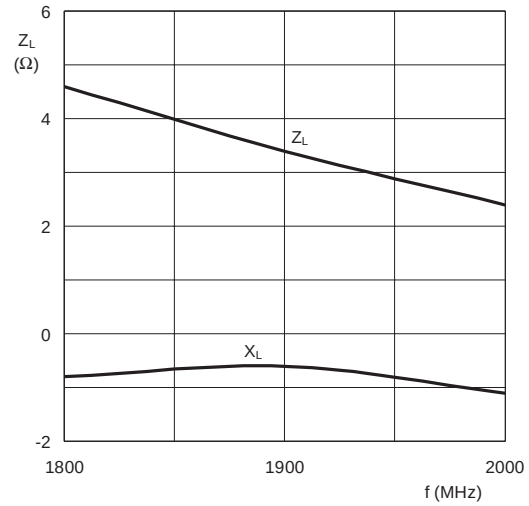
Notes

1. American Technical Ceramics type 100A or capacitor of same quality
2. American Technical Ceramics type 100B or capacitor of same quality
3. The striplines are on a double copper-clad PCB ε_r = 6.15; thickness 0.64mm.



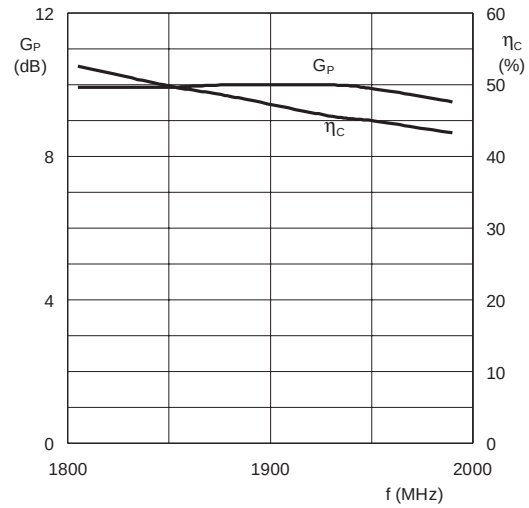
V_{CE} = 26 V; I_{CQ} = 150 mA; P_L = 35 W; T_{mb} = 25 °C.

Fig.6 Input impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 150 mA; P_L = 35 W; T_{mb} = 25 °C.

Fig.7 Load impedance as a function of frequency (series components); typical values.



V_{CE} = 26 V; I_{CQ} = 150 mA; P_L = 35 W; T_{mb} = 25 °C.

Fig.8 Power gain and collector efficiency as functions of frequency; typical values.

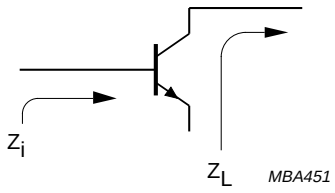
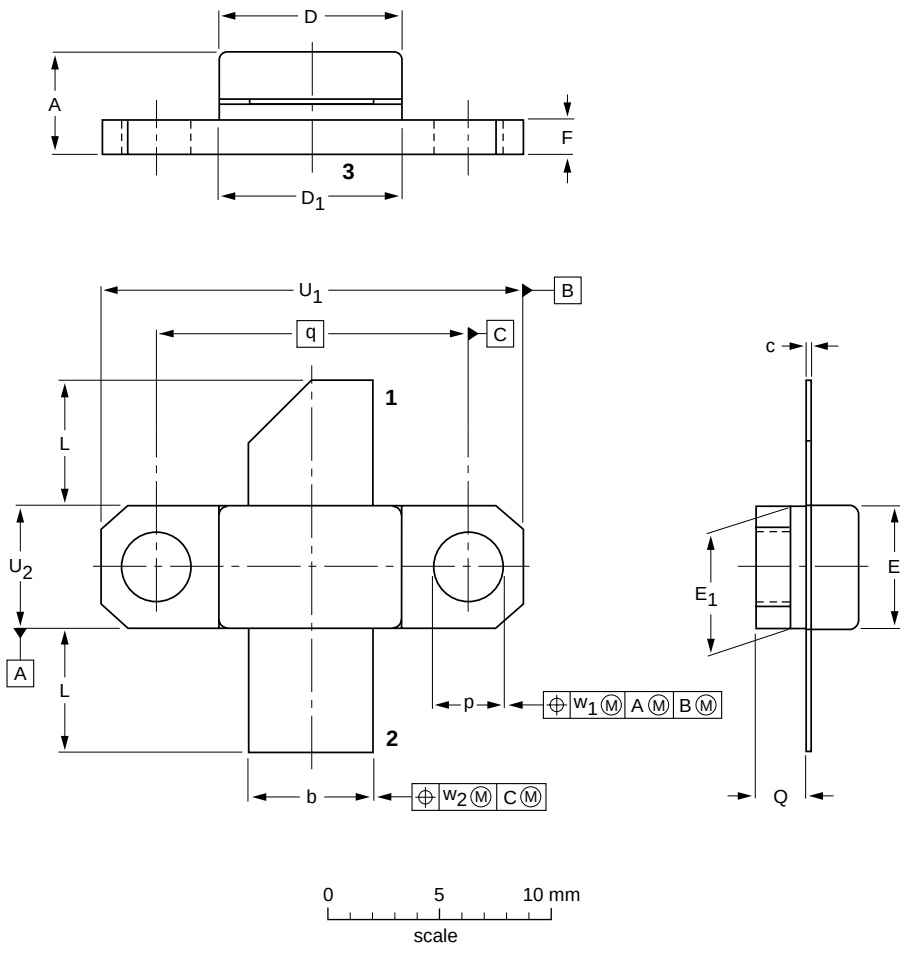


Fig.9 Definition of transistor impedance.

PACKAGE OUTLINE

Flanged ceramic package; 2 mounting holes; 2 leads **SOT390A**



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

UNIT	A	b	c	D	D_1	E	E_1	F	L	p	Q	q	U_1	U_2	w_1	w_2
mm	5.03 4.22	5.72 5.46	0.16 0.10	8.18 8.08	8.26 8.00	6.40 6.30	6.43 6.17	1.66 1.39	6.10 5.33	3.43 3.17	2.32 2.00	14.22	19.03 18.77	6.43 6.17	0.25	0.51
inches	0.198 0.166	0.225 0.215	0.006 0.004	0.322 0.318	0.325 0.315	0.252 0.248	0.253 0.243	0.065 0.055	0.24 0.21	0.135 0.125	0.091 0.079	0.560	0.749 0.739	0.253 0.243	0.010	0.020

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT390A						99-03-29

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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