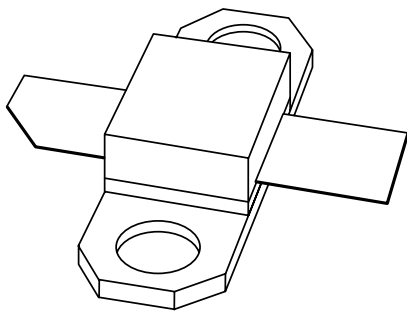


# DATA SHEET



## **BLV2045N** UHF power transistor

Preliminary specification

1999 Apr 23

# 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

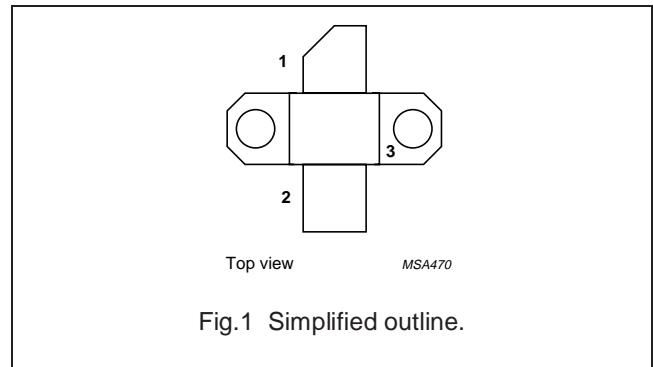
- Common emitter class-AB operation in PCN and PCS applications in the 1800 to 2000 MHz frequency range.

## 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



## QUICK REFERENCE DATA

RF performance at  $T_h = 25\text{ °C}$  in a common emitter test circuit.

MODE OF OPERATION	f (MHz)	$V_{CE}$ (V)	$P_L$ (W)	$G_p$ (dB)	$\eta_c$ (%)	$d_{im}$ (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)	$\geq 9.5$	$\geq 33$	$\leq -30$

## 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	$T_{mb} = 25\text{ °C}$	–	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.

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## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-mb}$	thermal resistance from junction to mounting base	$P_L = 35\text{ W}$ ; $\eta_C = 40\%$ ; $T_{mb} = 25\text{ }^\circ\text{C}$	1.4	K/W
$R_{th\ mb-h}$	thermal resistance from mounting base to heatsink		0.4	K/W

## CHARACTERISTICS

$T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; $I_C = 20\text{ mA}$	65	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; $I_C = 60\text{ mA}$	27	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; $I_E = 40\text{ mA}$	3	–	–	V
$I_{CES}$	collector leakage current	$V_{CE} = 26\text{ V}$ ; $V_{BE} = 0$	–	–	4	mA
$h_{FE}$	DC current gain	$V_{CE} = 10\text{ V}$ ; $I_C = 2\text{ A}$	45	–	100	
$C_c$	collector capacitance	$V_{CB} = 26\text{ V}$ ; $I_E = I_e = 0$ ; $f = 1\text{ MHz}$ ; note 1	–	t.b.f.	–	pF
$C_{re}$	feedback capacitance	$V_{CE} = 26\text{ V}$ ; $I_C = 0$ ; $f = 1\text{ MHz}$	–	t.b.f.	–	pF

## Note

- Capacitance of die only.

## APPLICATION INFORMATION

RF performance at  $T_h = 25\text{ }^\circ\text{C}$  in a common emitter test circuit.

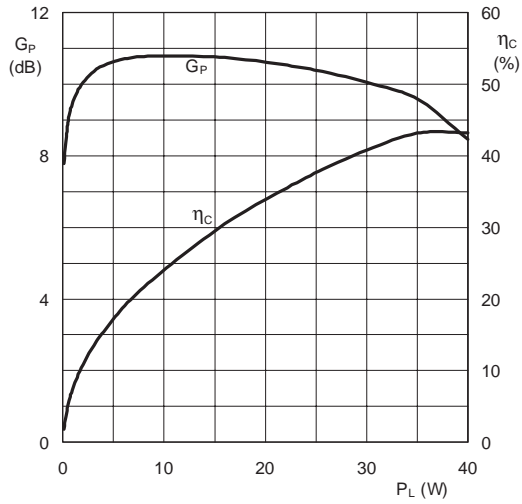
MODE OF OPERATION	f (MHz)	$V_{CE}$ (V)	$I_{CQ}$ (mA)	$P_L$ (W)	$G_p$ (dB)	$\eta_C$ (%)	$d_{im}$ (dBc)
CW, class-AB	1990	26	150	35	typ. 9.5	typ. 43	–
2-tone, class-AB	$f_1 = 1990.0$ ; $f_2 = 1990.1$	26	150	35 (PEP)	$\geq 9.5$ typ. 10.2	$\geq 33$ typ. 35	$\leq -30$ typ. -32

## 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:  $f_1 = 1990.0\text{ MHz}$ ;  $f_2 = 1990.1\text{ MHz}$ ;  $V_{CE} = 26\text{ V}$ ;  $I_{CQ} = 150\text{ mA}$ ;  $P_L = 35\text{ W}$  (PEP);  $T_{mb} = 25\text{ }^\circ\text{C}$ .

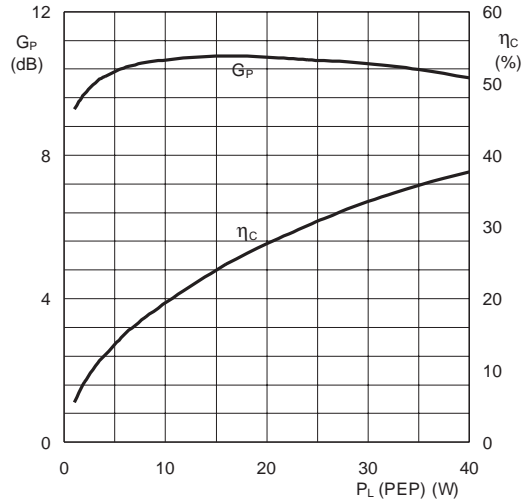
UHF power transistor

BLV2045N



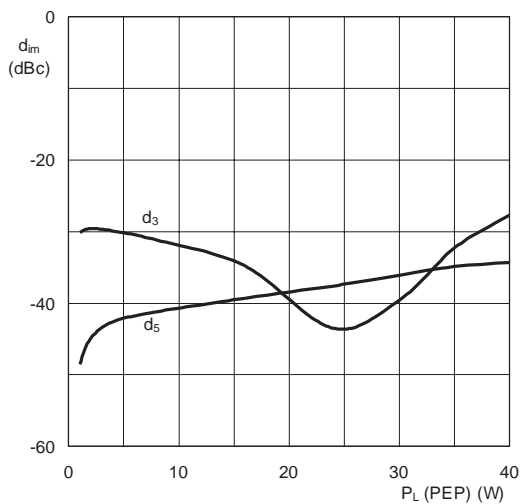
$V_{CE} = 26$  V;  $I_{CQ} = 150$  mA;  $f = 1990$  MHz.

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.

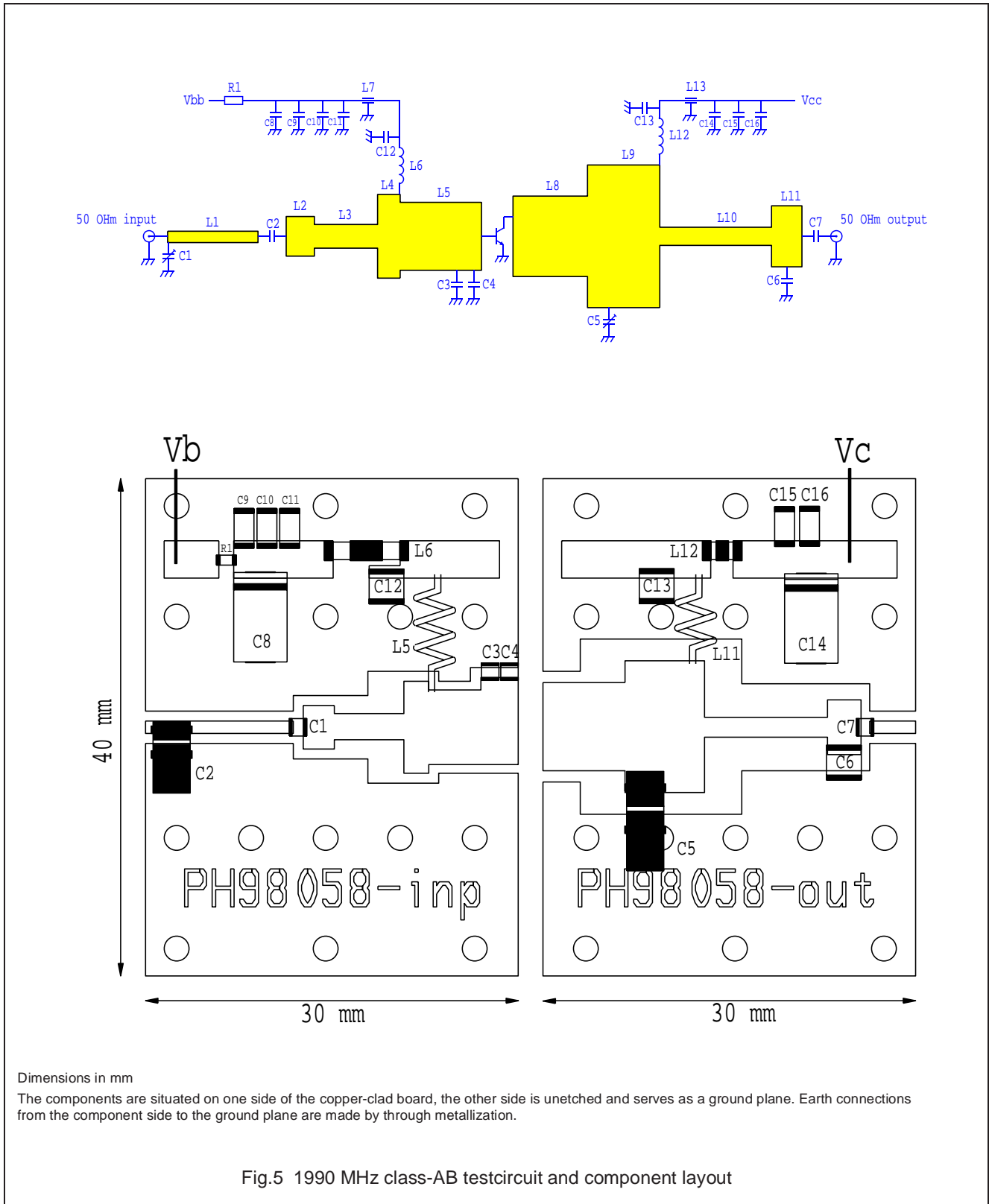


$V_{CE} = 26$  V;  $I_{CQ} = 150$  mA;  $f_1 = 1990$  MHz;  $f_2 = 1990.1$  MHz.

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

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## UHF power transistor

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## List of components

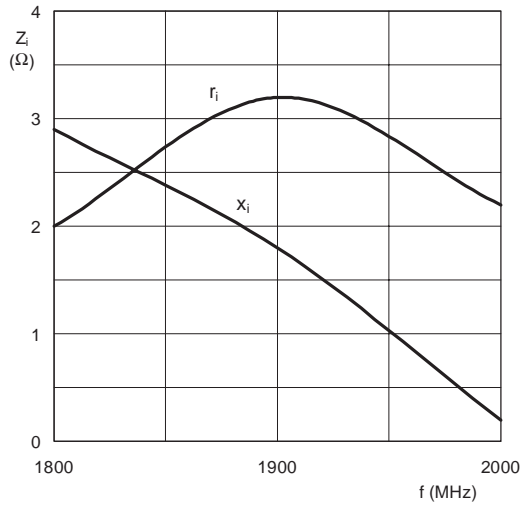
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1	Tekelec variable capacitor; type AT37281	0.4 to 2.5 pF		
C2, C7	multilayer ceramic chip capacitor; note 1	30 pF		
C3	multilayer ceramic chip capacitor; note 2	2.4 pF		
C4	multilayer ceramic chip capacitor; note 2	1.8 pF		
C5	Tekelec variable capacitor; 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 $\mu$ F		
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 $\Omega$	8 x 1 mm	
L2	stripline; note 3	20.5 $\Omega$	2.5 x 3.5 mm	
L3	stripline; note 3	29.8 $\Omega$	5.6 x 2.1 mm	
L4	stripline; note 3	11 $\Omega$	2.0 x 7.4 mm	
L5	stripline; note 3	13.2 $\Omega$	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 $\Omega$	6.6 x 7.1 mm	
L9	stripline; note 3	6.9 $\Omega$	6.4 x 12.6 mm	
L10	stripline; note 3	35.8 $\Omega$	9.9 x 1.6 mm	
L11	stripline; note 3	14.4 $\Omega$	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 $\Omega$		

## 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  $\epsilon_r = 6.15$ ; thickness 0.64mm.

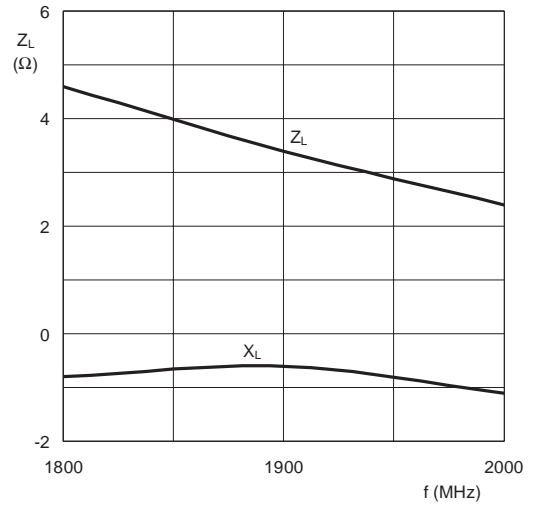
UHF power transistor

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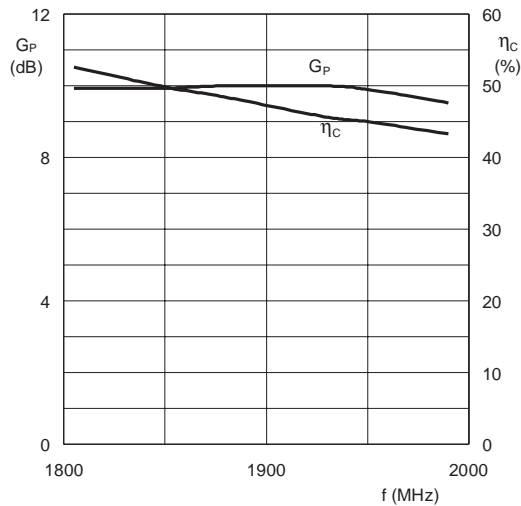
$V_{CE} = 26 \text{ V}$ ;  $I_{CQ} = 150 \text{ mA}$ ;  $P_L = 35 \text{ W}$ ;  $T_{mb} = 25 \text{ }^\circ\text{C}$ .

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



$V_{CE} = 26 \text{ V}$ ;  $I_{CQ} = 150 \text{ mA}$ ;  $P_L = 35 \text{ W}$ ;  $T_{mb} = 25 \text{ }^\circ\text{C}$ .

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



$V_{CE} = 26 \text{ V}$ ;  $I_{CQ} = 150 \text{ mA}$ ;  $P_L = 35 \text{ W}$ ;  $T_{mb} = 25 \text{ }^\circ\text{C}$ .

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

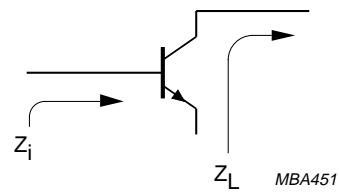


Fig.9 Definition of transistor impedance.

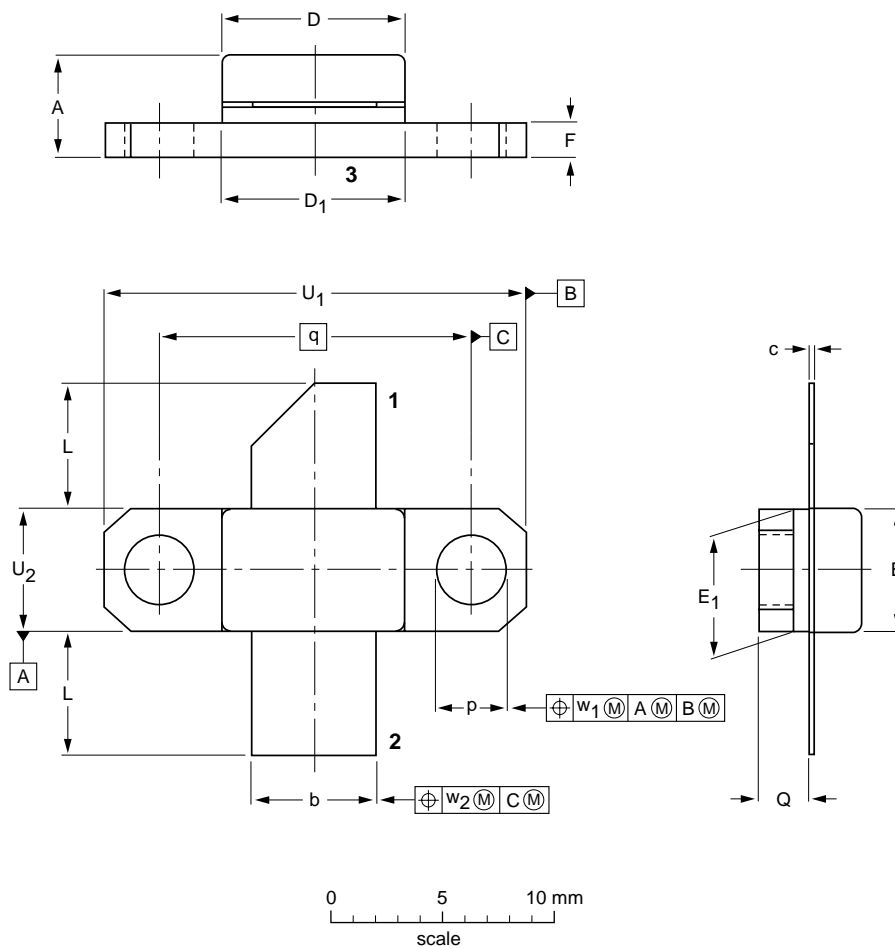
UHF power transistor

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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 <sub>1</sub>	E	E <sub>1</sub>	F	L	p	Q	q	U <sub>1</sub>	U <sub>2</sub>	w <sub>1</sub>	w <sub>2</sub>
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



## UHF power transistor

BLV2045N

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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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
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微波光电部专业代理经销高频、微波、光纤、光电元器件、组件、部件、模块、整机；电磁兼容元器件、材料、设备；微波 CAD、EDA 软件、开发测试仿真工具；微波、光纤仪器仪表。欢迎国外高科技微波、光纤厂商将优秀产品介绍到中国、共同开拓市场。长期大量现货专业批发高频、微波、卫星、光纤、电视、CATV 器件：晶振、VCO、连接器、PIN 开关、变容二极管、开关二极管、低噪晶体管、功率电阻及电容、放大器、功率管、MMIC、混频器、耦合器、功分器、振荡器、合成器、衰减器、滤波器、隔离器、环行器、移相器、调制解调器；光电子器件和组件：红外发射管、红外接收管、光电开关、光敏管、发光二极管和发光二极管组件、半导体激光二极管和激光器组件、光电探测器和光接收组件、光发射接收模块、光纤激光器和光放大器、光调制器、光开关、DWDM 用光发射和接收器件、用户接入系统光收发器件与模块、光纤连接器、光纤跳线/尾纤、光衰减器、光纤适配器、光隔离器、光耦合器、光环行器、光复用器/转换器；无线收发芯片和模组、蓝牙芯片和模组。

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