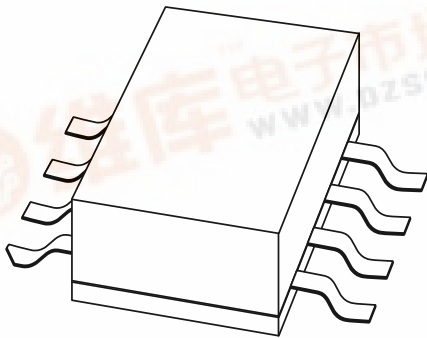


**DISCRETE SEMICONDUCTORS**

# DATA SHEET



## **BLV2042** UHF power transistor

Product specification  
Supersedes data of 1997 July 11

2000 May 08

# UHF power transistor

# BLV2042

### FEATURES

- Emitter ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability
- Internal input matching to achieve high power gain and easy design of wideband circuits.

### APPLICATIONS

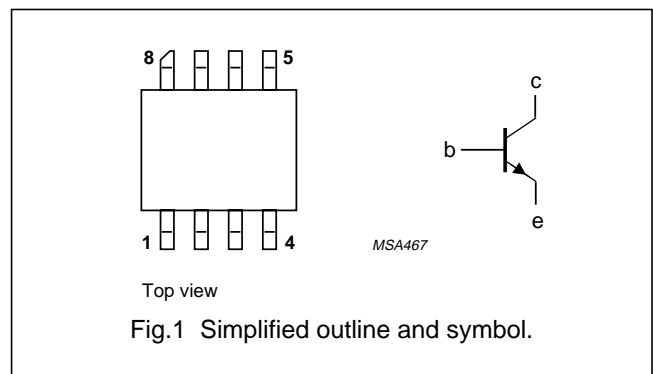
- Common emitter class-AB operation in base stations in the 1800 to 1990 MHz frequency range.

### DESCRIPTION

NPN silicon planar epitaxial power transistor in an 8-lead SOT409A SMD package with ceramic cap. All leads are isolated from the mounting base.

### PINNING - SOT409A

PIN	DESCRIPTION
1, 4, 5 and 8	emitter
2 and 3	base
6 and 7	collector



### QUICK REFERENCE DATA

RF performance at  $T_{mb} = 25\text{ °C}$  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	1950	26	4	$\geq 11$	$\geq 40$	–
CW, class-AB	1990	26	4	$\geq 11$	$\geq 40$	–
2-tone, class-AB	$f_1 = 1950; f_2 = 1950.1$	26	4 (PEP)	typ. 14	typ. 35	typ. –30

UHF power transistor

BLV2042

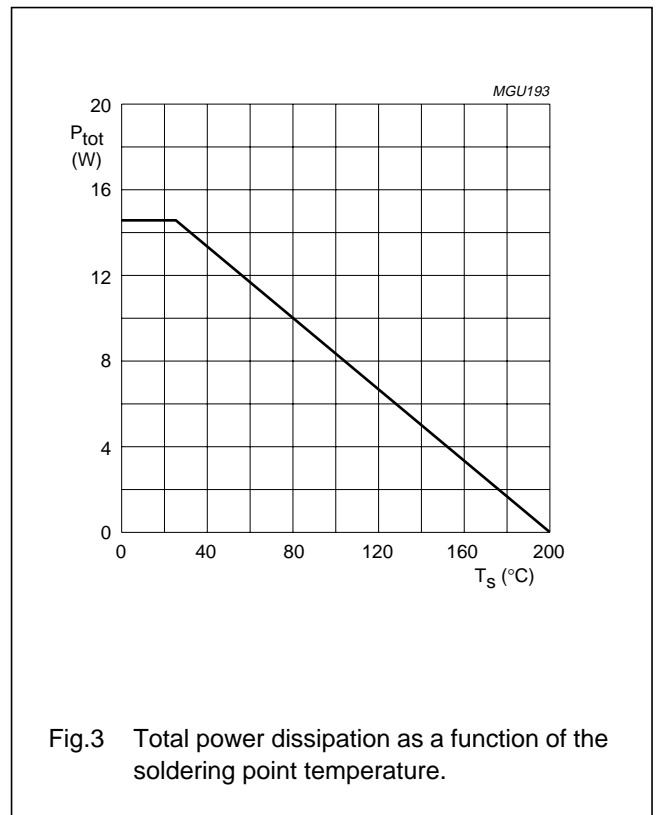
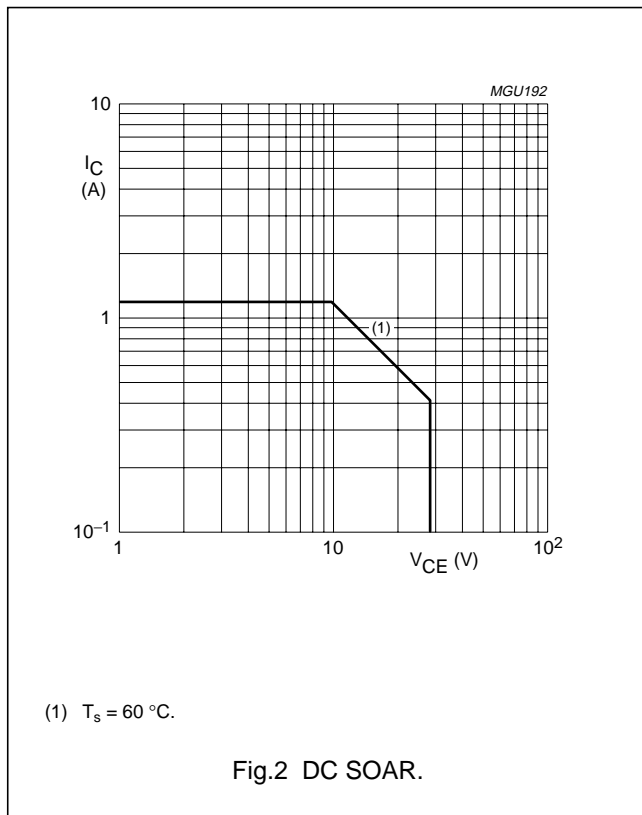
**LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	60	V
$V_{CEO}$	collector-emitter voltage	open base	–	28	V
$V_{EBO}$	emitter-base voltage	open collector	–	4	V
$I_C$	collector current (DC)		–	1.2	A
$I_{C(AV)}$	collector current (average)		–	1.2	A
$P_{tot}$	total power dissipation	$T_{mb} = 25\text{ °C}$ ; note 1	–	14.6	W
$T_{stg}$	storage temperature		–65	+150	°C
$T_j$	operating junction temperature		–	200	°C

**Note**

1. Transistor with metallized ground plane mounted on a printed-circuit board, see “Mounting and soldering recommendations in the General part of the associated handbook”.



UHF power transistor

BLV2042

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-mb}$	thermal resistance from junction to mounting base	$P_{tot} = 14.6\ W$ ; $T_{mb} = 25\ ^\circ C$ ; note 1	12	K/W

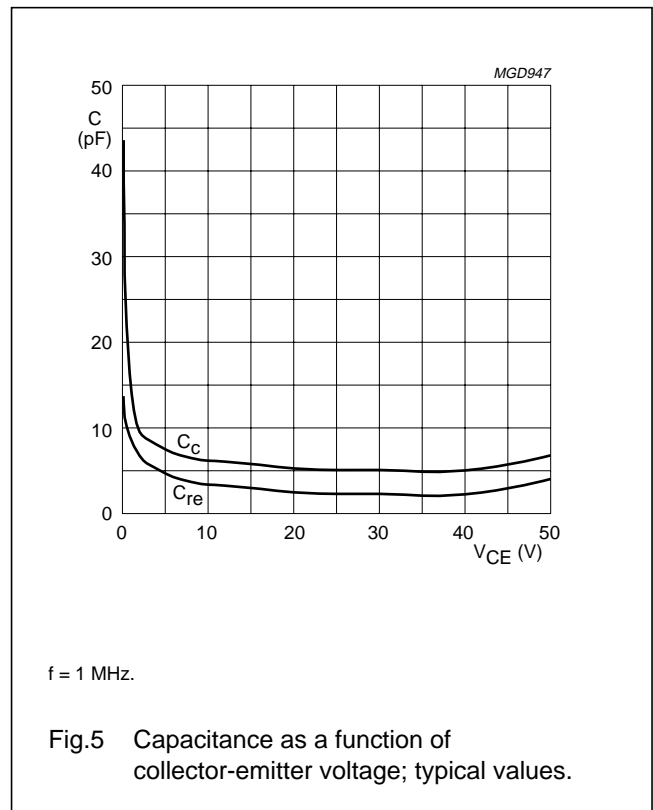
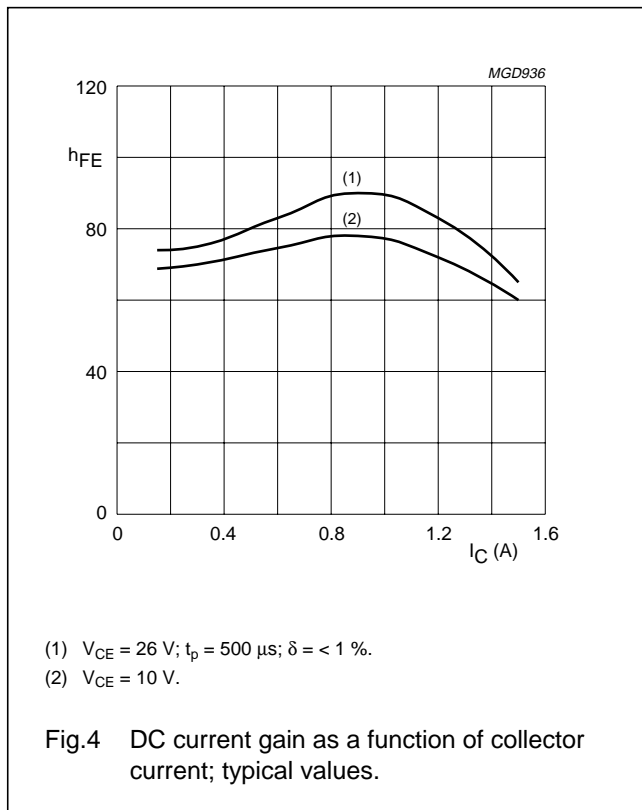
Note

1. Transistor with metallized ground plane mounted on a printed-circuit board, see "Mounting and soldering recommendations in the General part of the associated handbook".

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; $I_C = 5\ mA$	60	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; $I_C = 10\ mA$	28	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; $I_E = 0.5\ mA$	4	–	–	V
$I_{CES}$	collector leakage current	$V_{CE} = 26\ V$ ; $V_{BE} = 0$	–	–	1.3	mA
$h_{FE}$	DC current gain	$V_{CE} = 26\ V$ ; $I_C = 600\ mA$	30	–	120	
$C_c$	collector capacitance	$V_{CB} = 26\ V$ ; $I_E = i_e = 0$ ; $f = 1\ MHz$	–	6	–	pF
$C_{re}$	feedback capacitance	$V_{CE} = 26\ V$ ; $I_C = 0$ ; $f = 1\ MHz$	–	2.5	–	pF



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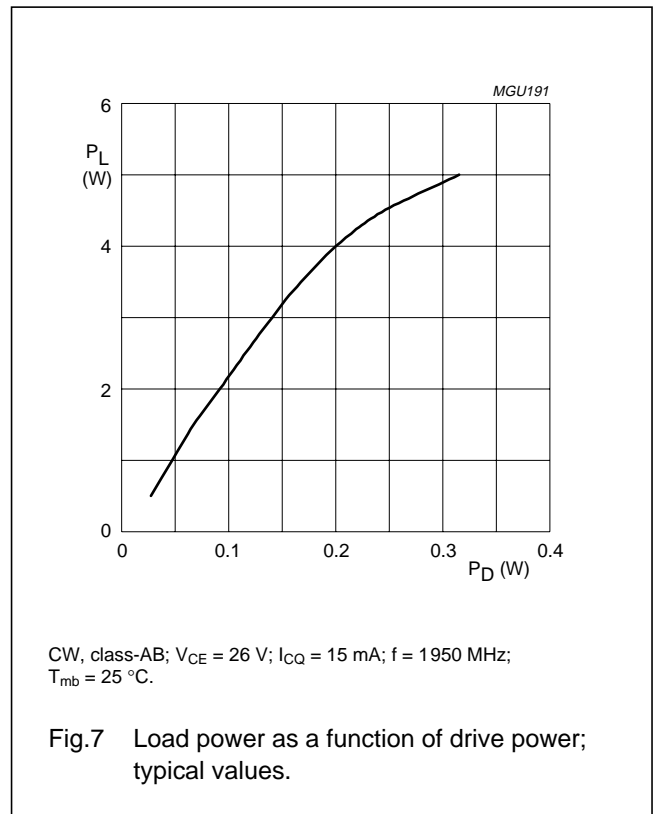
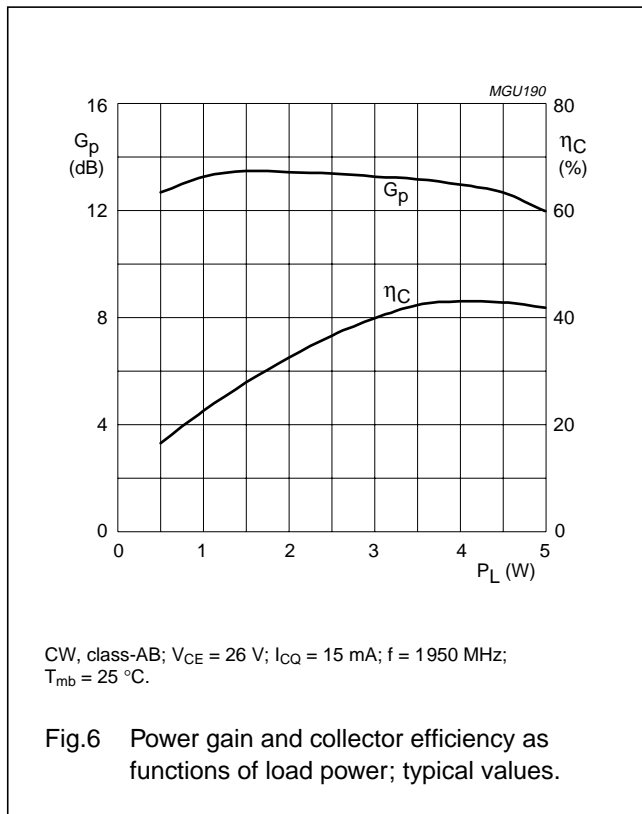
APPLICATION INFORMATION

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

MODE OF OPERATION	f (MHz)	V <sub>CE</sub> (V)	I <sub>CQ</sub> (mA)	P <sub>L</sub> (W)	G <sub>p</sub> (dB)	$\eta_c$ (%)	d <sub>im</sub> (dBc)
CW, class-AB	1950	26	15	4	$\geq 11$ typ. 13	$\geq 40$ typ. 43	–
CW, class-AB	1990	26	15	4	$\geq 11$	$\geq 40$	–
2-tone, class-AB	f <sub>1</sub> = 1950; f <sub>2</sub> = 1950.1	26	15	4 (PEP)	typ. 14	typ. 35	typ. –30

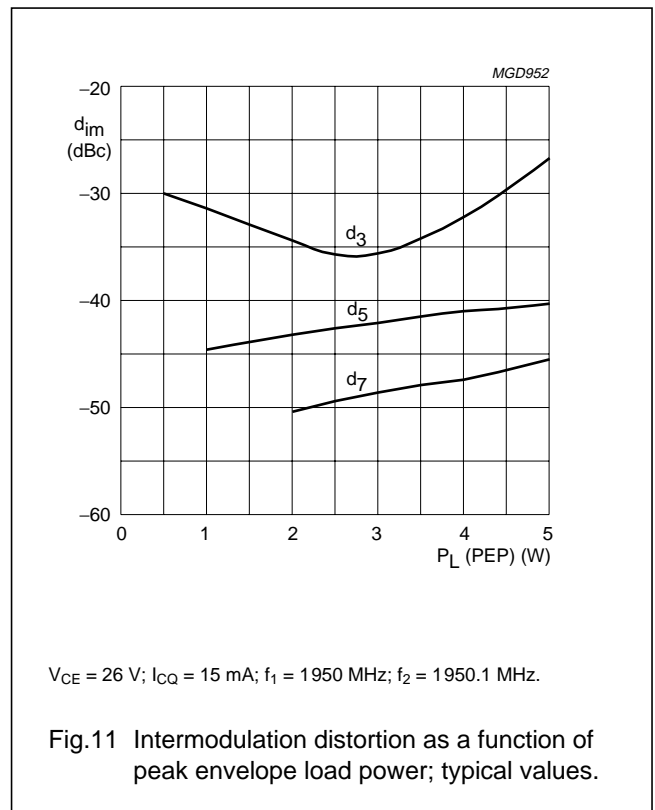
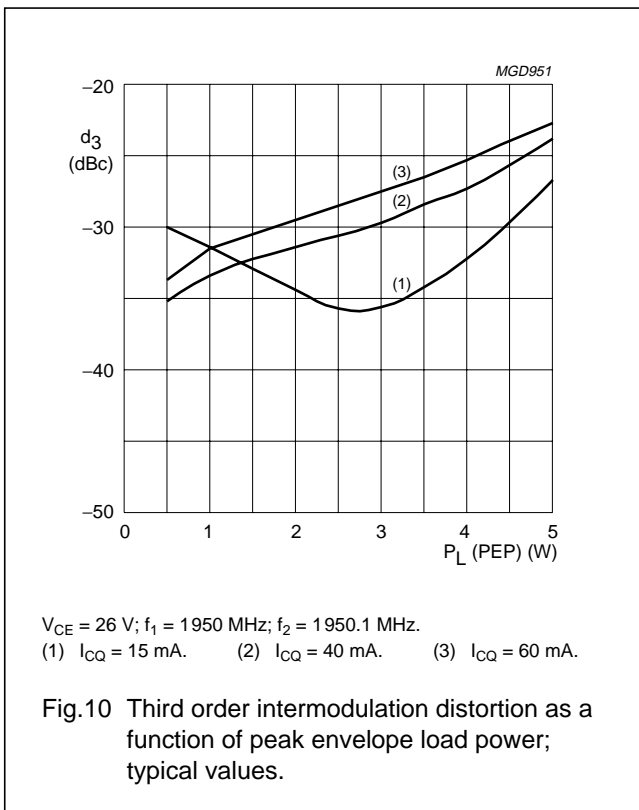
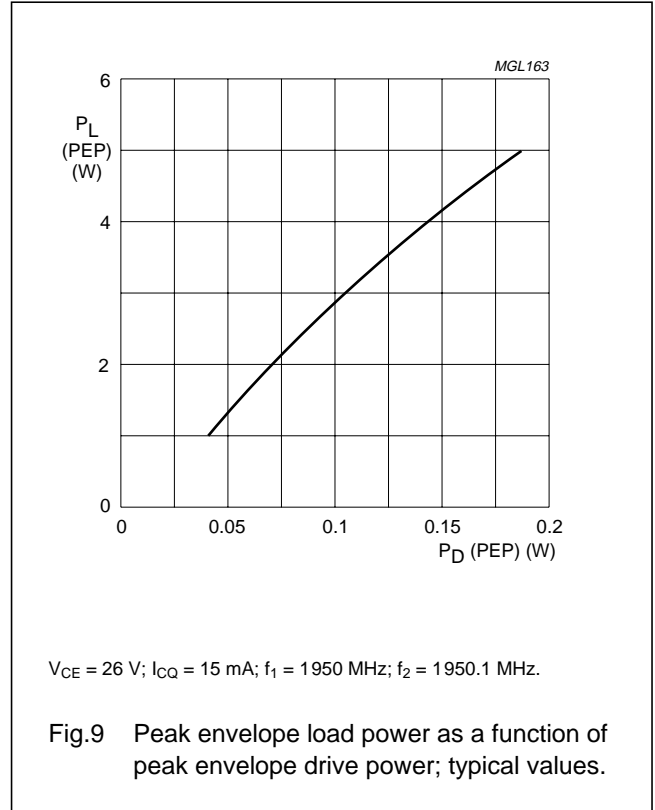
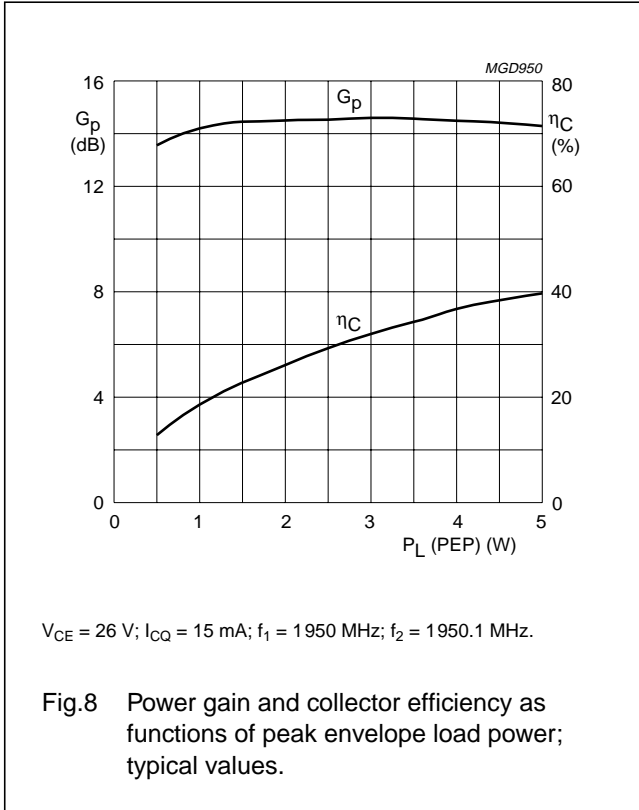
Ruggedness in class-AB operation

The BLV2042 is capable of withstanding a load mismatch corresponding to VSWR = 20 : 1 through all phases under the following conditions: f = 1950 MHz; V<sub>CE</sub> = 26 V; I<sub>CQ</sub> = 15 mA; P<sub>L</sub> = 4 W; T<sub>mb</sub> = 25 °C.



UHF power transistor

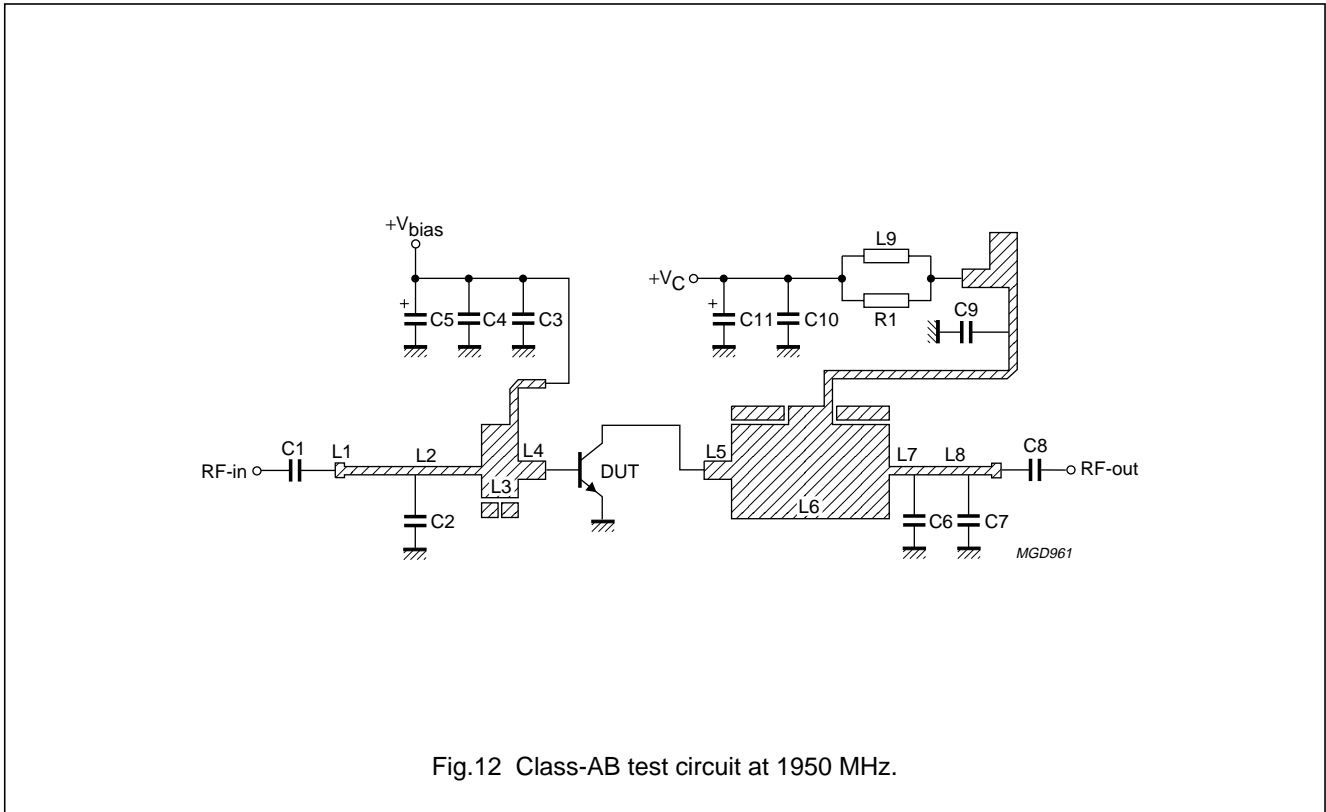
BLV2042



UHF power transistor

BLV2042

Test circuit information



## UHF power transistor

BLV2042

## List of components (see Figs 12 and 13)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C9	multilayer ceramic chip capacitor; note 1	100 pF		
C2, C6	multilayer ceramic chip capacitor; note 2	3 pF		
C3, C8	multilayer ceramic chip capacitor; note 2	27 pF		
C4, C10	multilayer ceramic chip capacitor	100 nF		2222 581 16641
C5, C11	tantalum SMD capacitor	47 $\mu$ F; 35 V		
C7	multilayer ceramic chip capacitor; note 2	1.2 pF		
L1	stripline; note 3	50 $\Omega$	length 9.9 mm width 0.91 mm	
L2	stripline; note 3	50 $\Omega$	length 6.66 mm width 0.91 mm	
L3	stripline; note 3	10 $\Omega$	length 4 mm width 8 mm	
L4	stripline; note 3	31 $\Omega$	length 3 mm width 2 mm	
L5	stripline; note 3	31 $\Omega$	length 3 mm width 2 mm	
L6	stripline; note 3	8.3 $\Omega$	length 17.25 mm width 10.3 mm	
L7	stripline; note 3	50 $\Omega$	length 2.42 mm width 0.91 mm	
L8	stripline; note 3	50 $\Omega$	length 6.14 mm width 0.91 mm	
L9	grade 4S2 ferroxcube chip-bead			4330 030 36301
R1	metal film resistor	100 $\Omega$ ; 0.4 W		

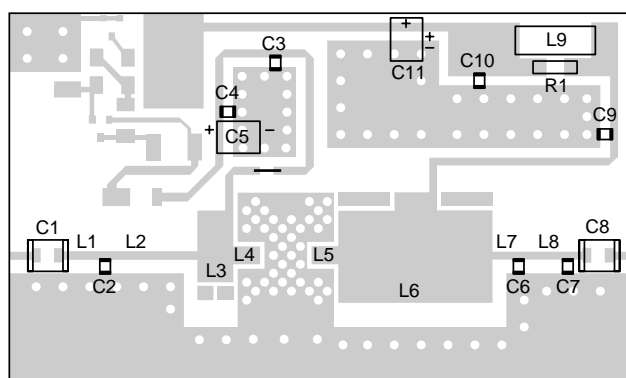
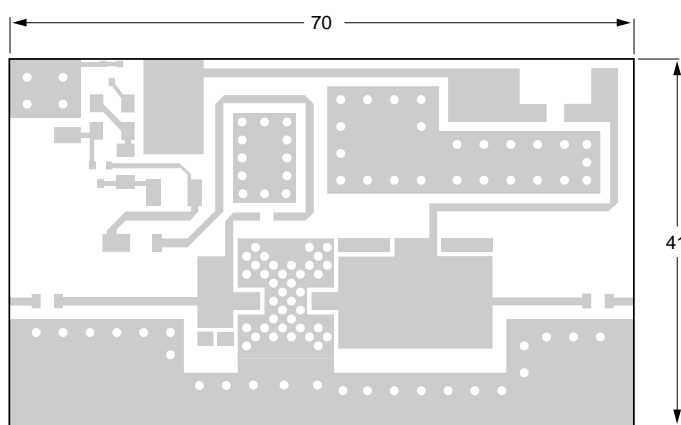
## Notes

1. American Technical Ceramics type 100B or capacitor of the same quality.
2. American Technical Ceramics type 100A or capacitor of the same quality.
3. The striplines are on a double copper-clad printed-circuit board with epoxy fibreglass dielectric ( $\epsilon_r = 6.15$ ); thickness 0.64 mm.



UHF power transistor

BLV2042



MGD965

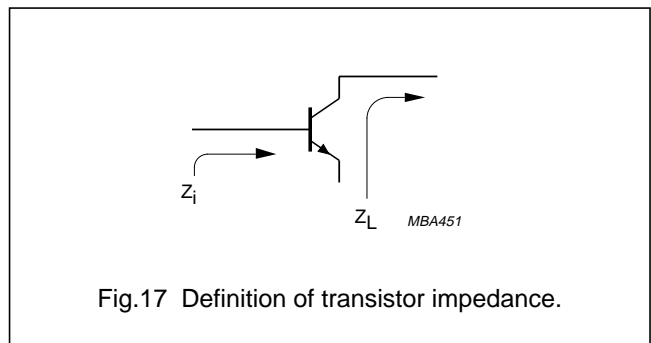
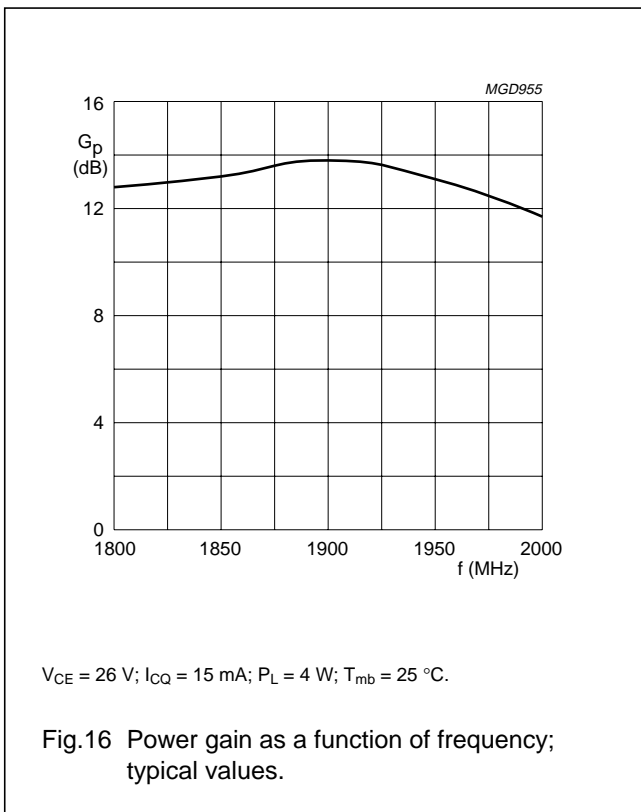
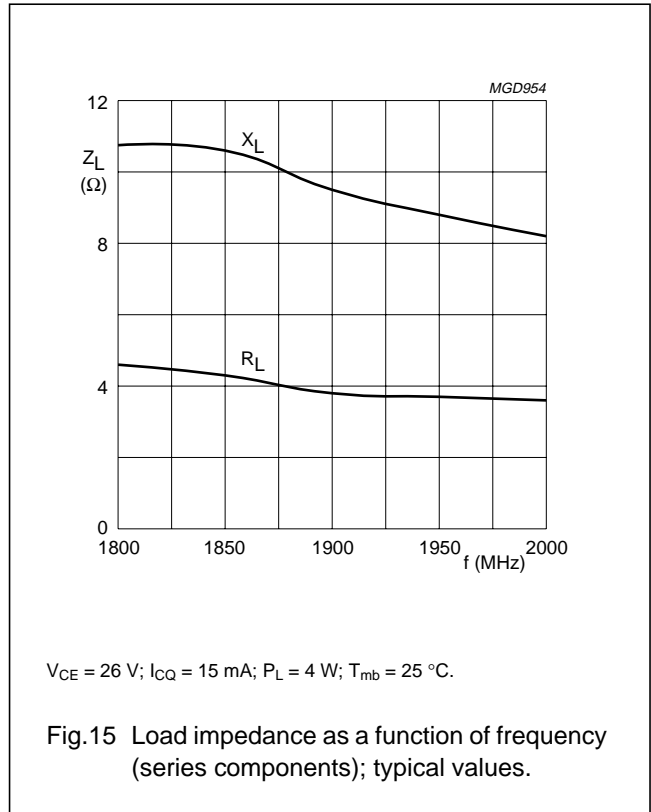
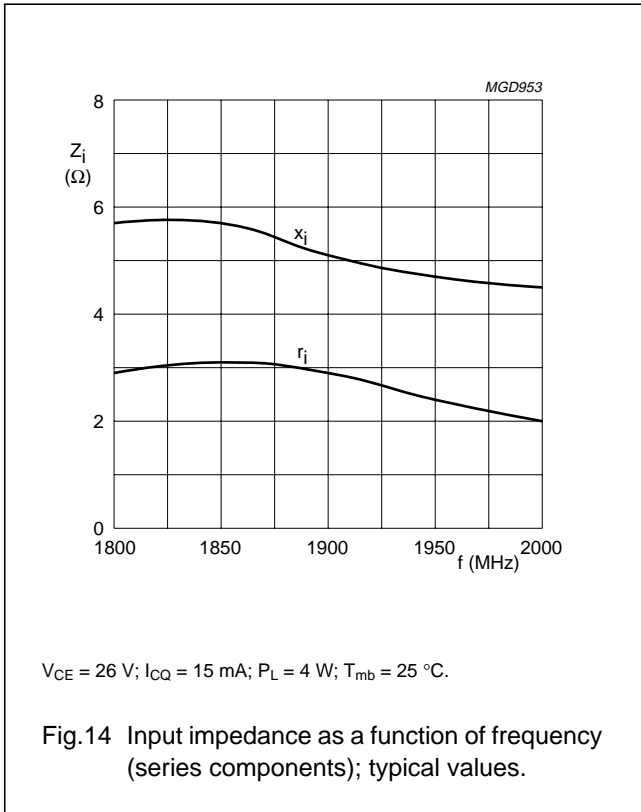
Dimensions in mm.

The components are situated on one side of the copper-clad epoxy fibreglass board, the other side is not etched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.13 Component layout for 1950 MHz class-AB test circuit.

UHF power transistor

BLV2042



**MOUNTING RECOMMENDATIONS**

Heat from the device is transferred via the leads and the metallized underside. For optimum heat transfer it is recommended that the transistor be mounted on a grounded metallized area on the component side of the printed-circuit board. This metallized area should contain a large number of metallized, solder-filled through-holes. The non-component side of the printed-circuit board forms a ground plane. When the printed-circuit board is mounted on the heatsink using heatsink compound, a thermal resistance from mounting base to heatsink of 0.9 K/W can be attained.

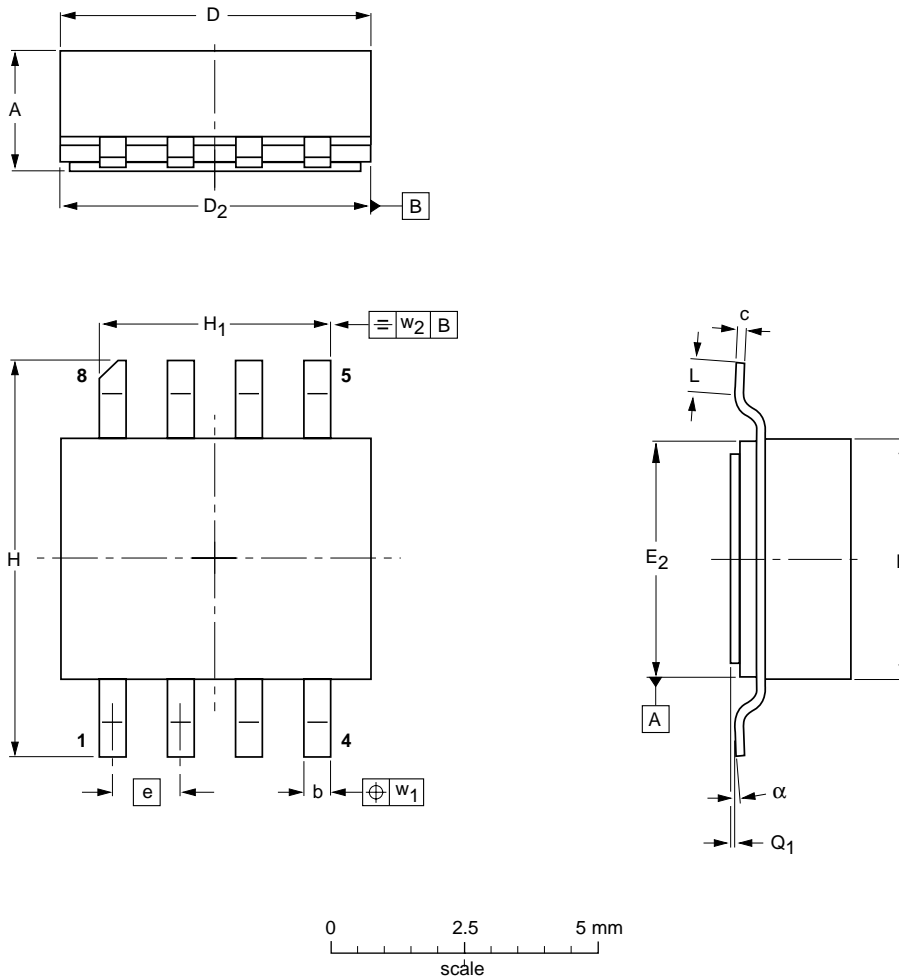
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BLV2042

PACKAGE OUTLINE

Ceramic surface mounted package; 8 leads

SOT409A



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

UNIT	A	b	c	D	D <sub>2</sub>	E	E <sub>2</sub>	e	H	H <sub>1</sub>	L	Q <sub>1</sub>	w <sub>1</sub>	w <sub>2</sub>	$\alpha$
mm	2.36 2.06	0.58 0.43	0.23 0.18	5.94 5.03	5.16 5.00	4.93 4.01	4.14 3.99	1.27	7.47 7.26	4.39 4.24	1.02 0.51	0.10 0.00	0.25	0.25	7° 0°
inches	0.093 0.081	0.023 0.017	0.009 0.007	0.234 0.198	0.203 0.197	0.194 0.158	0.163 0.157	0.050	0.294 0.286	0.173 0.167	0.040 0.020	0.004 0.000	0.010	0.010	7° 0°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT409A						98-01-27

## UHF power transistor

BLV2042

## DATA SHEET STATUS

DATA SHEET STATUS	PRODUCT STATUS	DEFINITIONS <sup>(1)</sup>
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
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**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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.

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**NOTES**

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Printed in The Netherlands

613524/03/pp16

Date of release: 2000 May 08

Document order number: 9397 750 07006

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