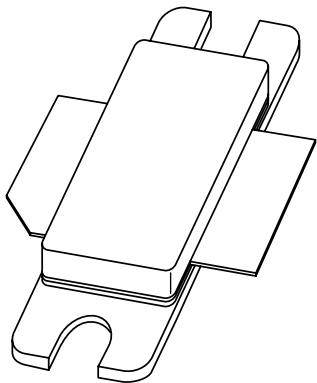


# DATA SHEET



## **BLF2047L/90** UHF power LDMOS transistor

Product specification  
Supersedes data of 2000 Feb 17

2000 Mar 06

# UHF power LDMOS transistor

# BLF2047L/90

## FEATURES

- High power gain
- Easy power control
- Excellent ruggedness
- Source on underside eliminates DC isolators, reducing common mode inductance
- Designed for broadband operation (1.8 to 2.0 GHz)
- Internal input and output matching for high gain and efficiency.

## APPLICATIONS

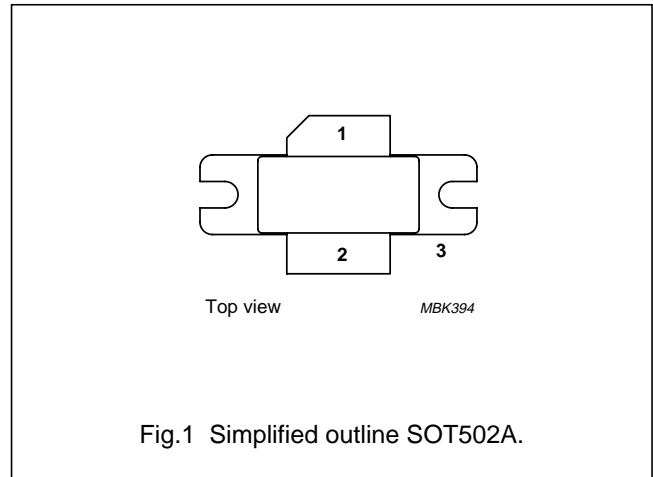
- Common source class-AB operation for PCN and PCS applications in the 1800 to 2000 MHz frequency range.

## DESCRIPTION

Silicon N-channel enhancement mode lateral D-MOS transistors encapsulated in a 2-lead SOT502A flange package with a ceramic cap. The common source is connected to the mounting flange.

## PINNING

PIN	DESCRIPTION
1	drain
2	gate
3	source, connected to flange



## QUICK REFERENCE DATA

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

MODE OF OPERATION	f (MHz)	$V_{DS}$ (V)	$P_L$ (W)	$G_p$ (dB)	$\eta_D$ (%)	$d_{im}$ (dBc)
Two-tone, class-AB	$f_1 = 2000; f_2 = 2000.1$	26	90 (PEP)	>10.5	>30	$\leq -25$

## LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
$V_{DS}$	drain-source voltage	–	65	V
$V_{GS}$	gate-source voltage	–	$\pm 15$	V
$I_D$	DC drain current	–	12	A
$T_{stg}$	storage temperature	–65	+150	°C
$T_j$	junction temperature	–	200	°C

## CAUTION

This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

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## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-h}$	thermal resistance from junction to heatsink	$T_h = 25\text{ °C}$ ; $P_{tot} = 92\text{ W}$ ; note 1	0.81	K/W

## Note

1. Determined under specified RF operating conditions, based on maximum junction temperature.

## CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0$ ; $I_D = 2.1\text{ mA}$	65	–	–	V
$V_{GSth}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$ ; $I_D = 210\text{ mA}$	1.5	–	3.5	V
$I_{DSS}$	drain-source leakage current	$V_{GS} = 0$ ; $V_{DS} = 26\text{ V}$	–	–	15	$\mu\text{A}$
$I_{DSX}$	on-state drain current	$V_{GS} = V_{GSth} + 9\text{ V}$ ; $V_{DS} = 10\text{ V}$	27	–	–	A
$I_{GSS}$	gate leakage current	$V_{GS} = \pm 15\text{ V}$ ; $V_{DS} = 0$	–	–	38	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}$ ; $I_D = 7.5\text{ A}$	–	6.0	–	S
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = V_{GSth} + 9\text{ V}$ ; $I_D = 7.5\text{ A}$	–	0.11	–	$\Omega$
$C_{rss}$	feedback capacitance	$V_{GS} = 0$ ; $V_{DS} = 26\text{ V}$ ; $f = 1\text{ MHz}$ ; note 1	–	5.1	–	pF

## Note

1. The value of capacitance is that of the die only.

# UHF power LDMOS transistor

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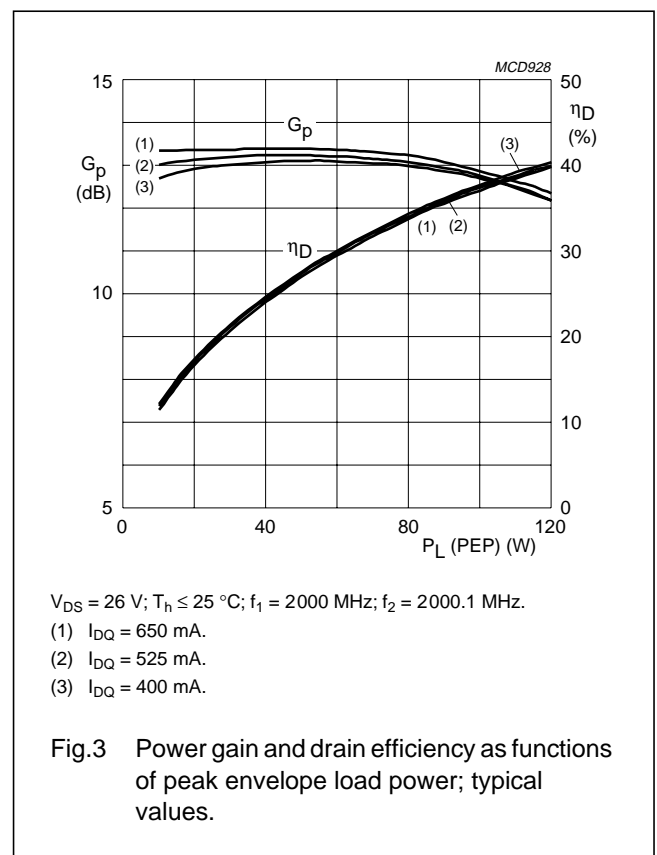
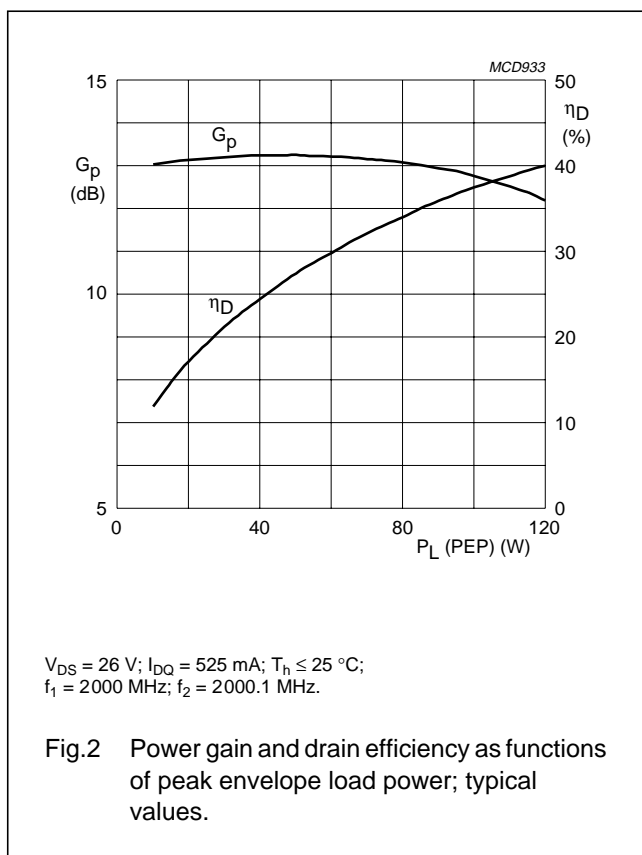
## APPLICATION INFORMATION

RF performance in a common source class-AB circuit.  $T_h = 25\text{ }^\circ\text{C}$ ;  $R_{th\ j-h} = 0.81\text{ K/W}$ ; unless otherwise specified.

MODE OF OPERATION	f (MHz)	V <sub>DS</sub> (V)	I <sub>DQ</sub> (mA)	P <sub>L</sub> (W)	G <sub>p</sub> (dB)	η <sub>D</sub> (%)	d <sub>im</sub> (dBc)
Two-tone, class-AB	f <sub>1</sub> = 2000; f <sub>2</sub> = 2000.1	26	525	90 (PEP)	>10.5	>30	≤-25

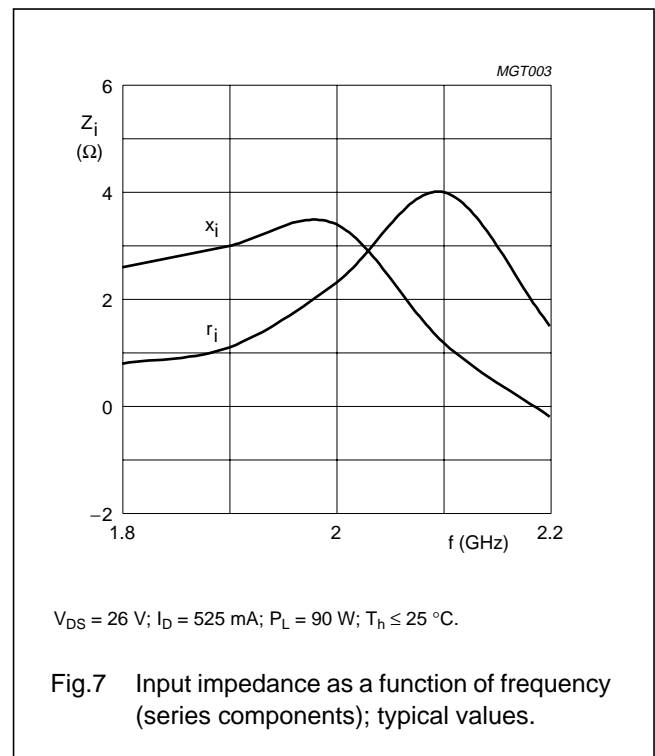
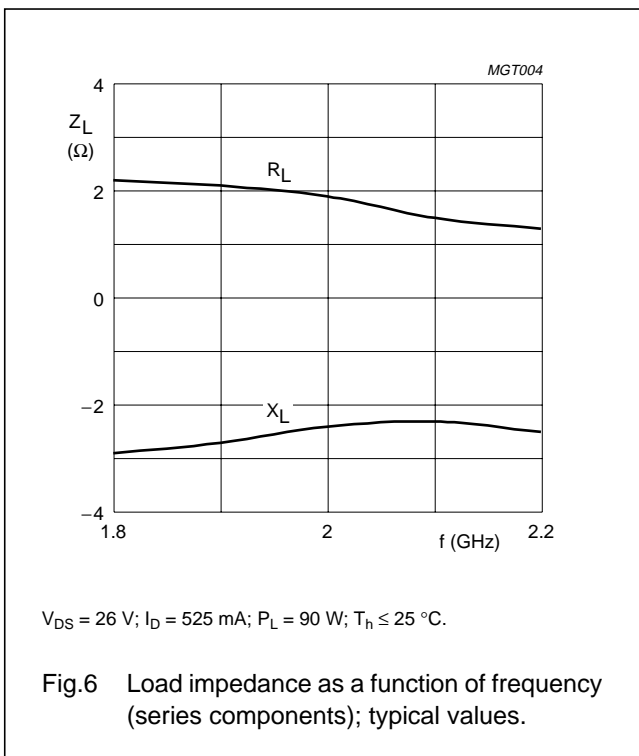
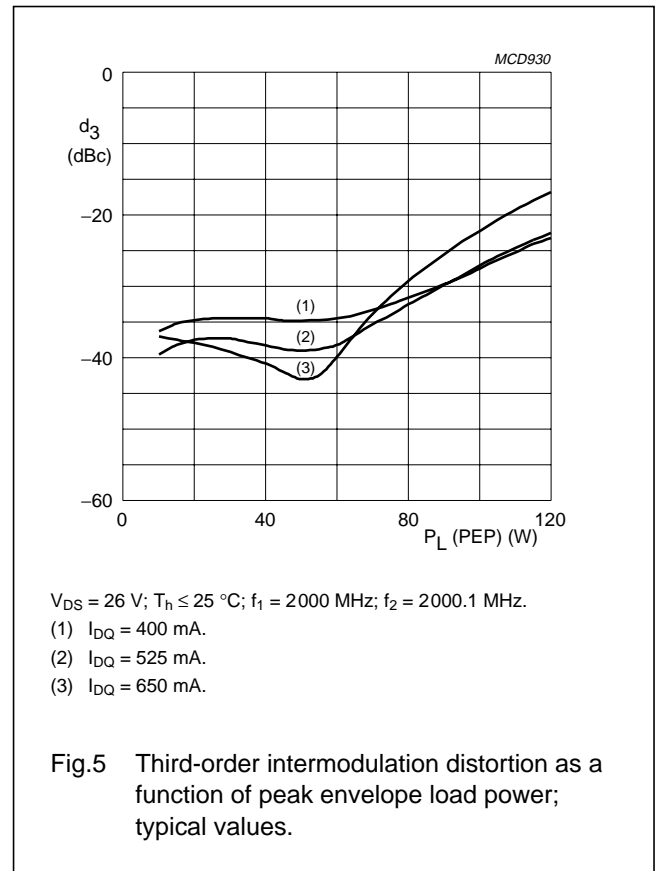
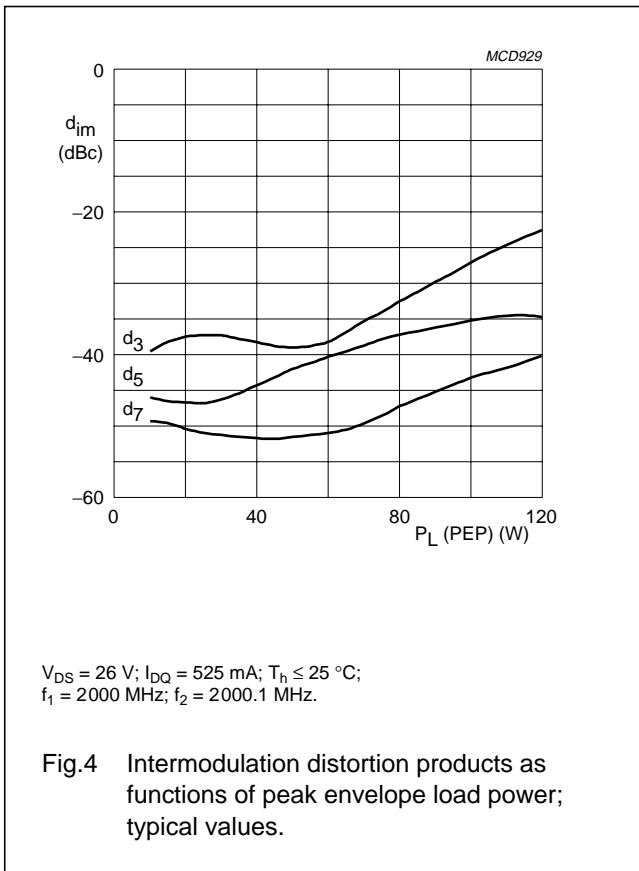
### Ruggedness in class-AB operation

The BLF2047L/90 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V<sub>DS</sub> = 26 V; I<sub>DQ</sub> = 525 mA; P<sub>L</sub> = 90 W; f = 2000 MHz (single tone).



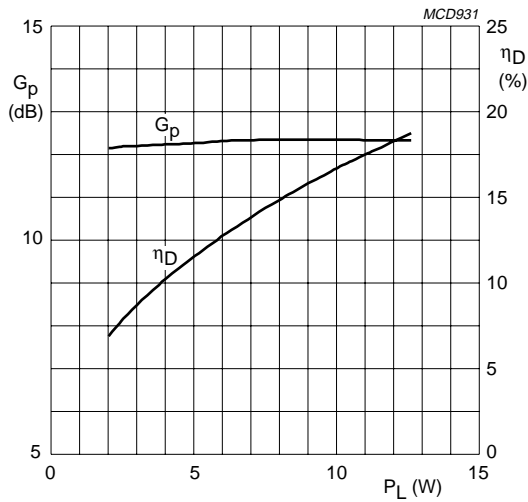
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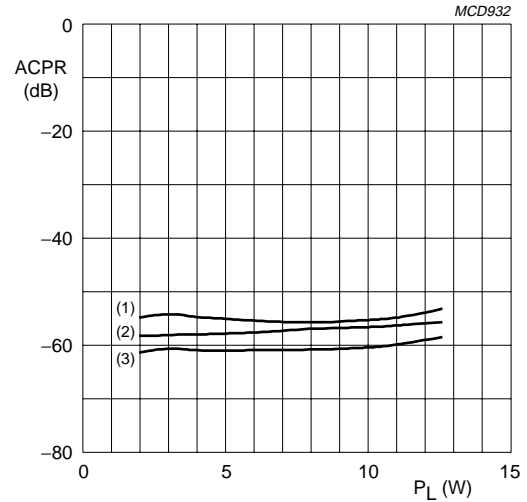


$V_{DS} = 26$  V;  $I_{DQ} = 465$  mA;  $T_h \leq 25$  °C;  $f = 1960$  MHz; CDMA mode.

CDMA conditions

CHANNEL	WALSH CODE
Pilot	0
Sync	32
Paging	1
Traffic	8 to 13

Fig.8 Power gain and drain efficiency as functions of average load power; typical values.



$V_{DS} = 26$  V;  $I_{DQ} = 465$  mA;  $T_h \leq 25$  °C;  $f = 1960$  MHz; CDMA mode.

- (1) Channel spacing/Bandwidth: 2.25 MHz/1 MHz.
- (2) Channel spacing/Bandwidth: 1.25 MHz/12.5 kHz.
- (3) Channel spacing/Bandwidth: 885 kHz/30 kHz.

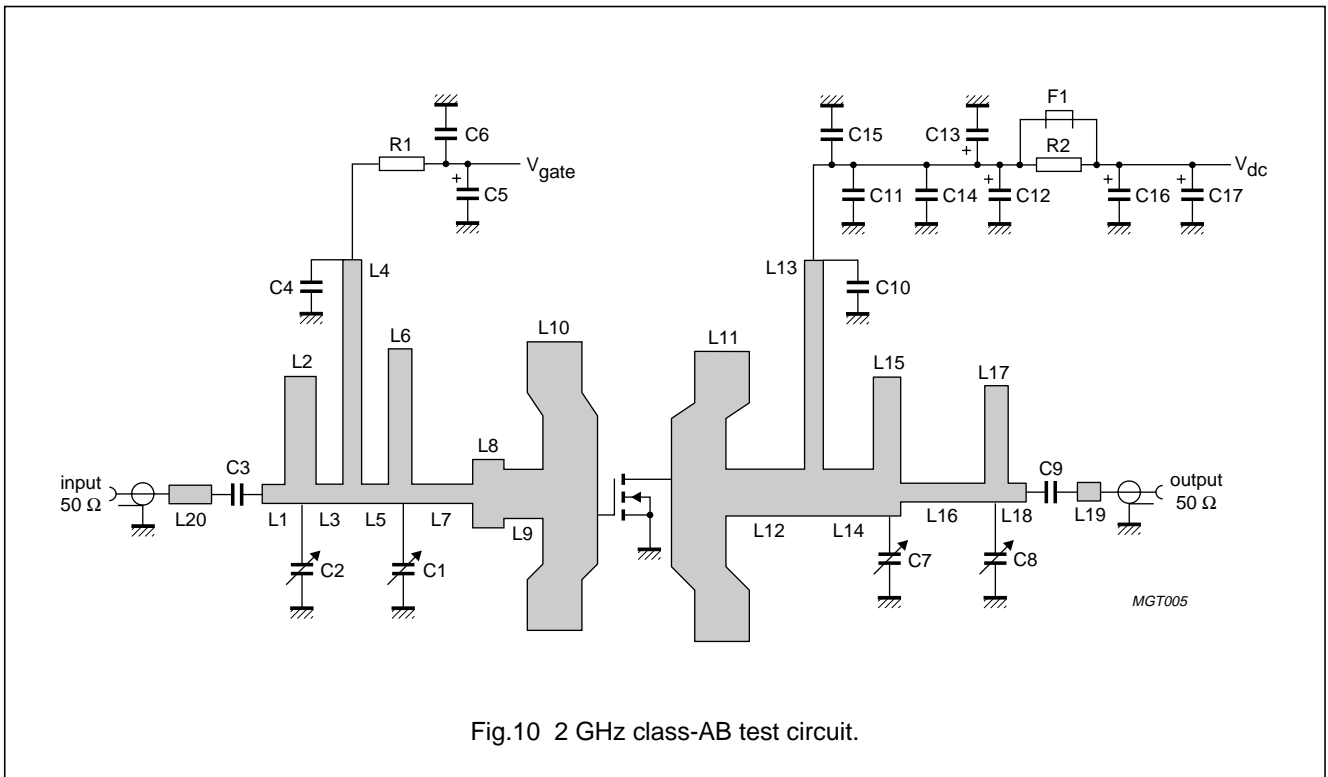
CDMA conditions

CHANNEL	WALSH CODE
Pilot	0
Sync	32
Paging	1
Traffic	8 to 13

Fig.9 Adjacent channel power reduction as a function of average load power; typical values.

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**List of components**

See Figs 10 and 11.

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C2, C7, C8	Tekelec variable capacitor; type 37271	0.6 to 4.5 pF		
C3, C9	multilayer ceramic chip capacitor; note 1	12 pF		
C4, C10	multilayer ceramic chip capacitor; note 2	12 pF		
C5, C12, C16	electrolytic capacitor	4.5 $\mu$ F; 50 V		
C6, C11, C15	multilayer ceramic chip capacitor; note 1	1 nF		
C13, C17	electrolytic capacitor	100 $\mu$ F; 63 V		2222 037 58101
C14	multilayer ceramic chip capacitor	100 nF		2222 581 16641
F1	Ferroxcube chip-bead 8DS3/3/8/9-4S2			4330 030 36301
L1	stripline; note 3	50 $\Omega$	2.9 $\times$ 2.4 mm	
L2		10.8 $\Omega$	4 $\times$ 16.3 mm	
L3		50 $\Omega$	3.7 $\times$ 2.4 mm	
L4		6 $\Omega$	2 $\times$ 30.8 mm	
L5		50 $\Omega$	3.6 $\times$ 2.4 mm	
L6		9 $\Omega$	3 $\times$ 19.9 mm	
L7		50 $\Omega$	7.8 $\times$ 2.4 mm	
L8		18.5 $\Omega$	4 $\times$ 8.8 mm	
L9		24.4 $\Omega$	5 $\times$ 6.3 mm	
L10		5.1 $\Omega$	7 $\times$ 37 mm	
L11		5.1 $\Omega$	7 $\times$ 40.9 mm	
L12		25.4 $\Omega$	10.1 $\times$ 6 mm	
L13		5.7 $\Omega$	2.4 $\times$ 32.8 mm	
L14		25.4 $\Omega$	6.4 $\times$ 6 mm	
L15		10 $\Omega$	3.5 $\times$ 20.7 mm	
L16		50 $\Omega$	10.8 $\times$ 2.4 mm	
L17		11.8 $\Omega$	3 $\times$ 7.9 mm	
L18		50 $\Omega$	2.3 $\times$ 2.4 mm	
L19		50 $\Omega$	3 $\times$ 2.4 mm	
L20		50 $\Omega$	5.5 $\times$ 2.4 mm	
R1, R2	metal film resistor	10 $\Omega$ , 0.6 W		2322 156 11009

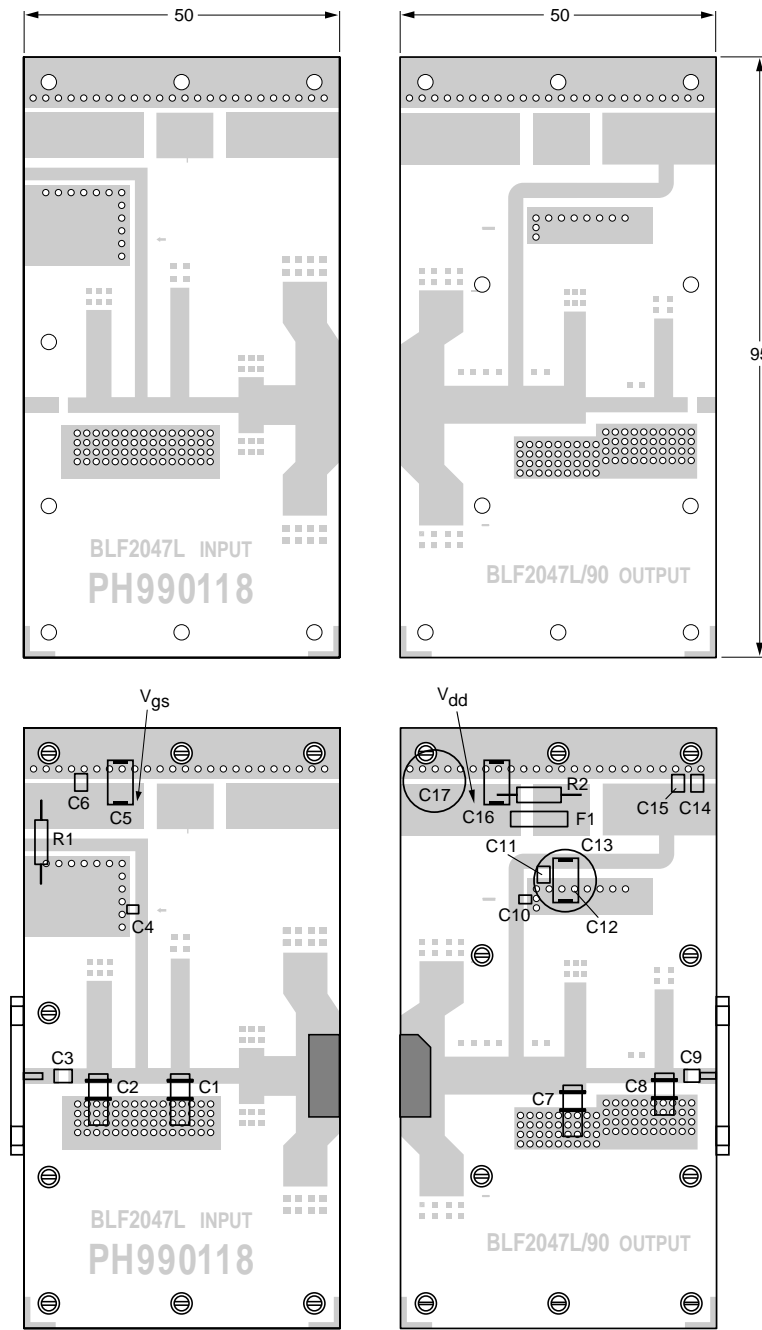
**Notes**

1. American Technical Ceramics type 100B or capacitor of same quality.
2. American Technical Ceramics type 100A or capacitor of same quality.
3. The striplines are on a double copper-clad printed-circuit board with Teflon dielectric ( $\epsilon_r = 2.2$ ); thickness 0.79 mm.



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MCD927

Dimensions in mm.

The components are situated on one side of the copper-clad printed-circuit board with Teflon dielectric ( $\epsilon_r = 2.2$ ), thickness 0.79 mm. The other side is unetched and serves as a ground plane.

Fig.11 Component layout for 2 GHz class-AB test circuit.

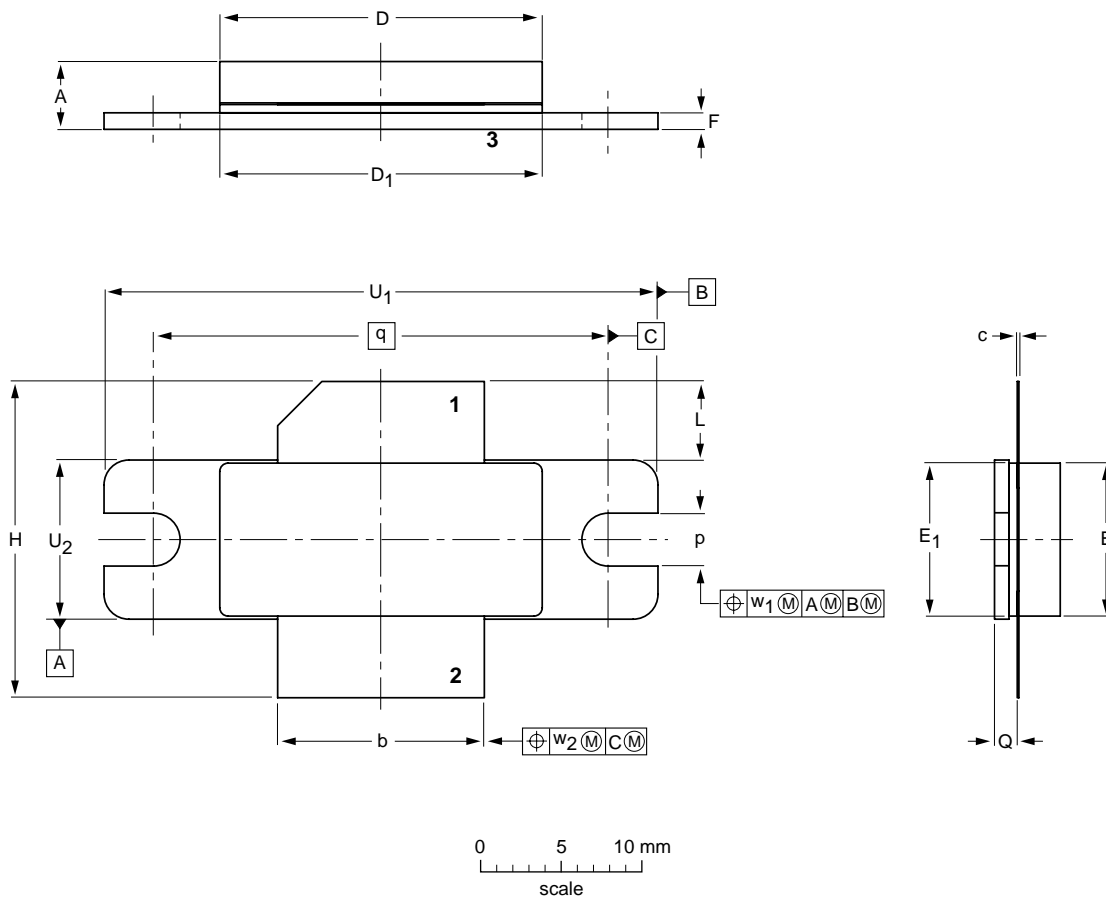
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PACKAGE OUTLINE

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads

SOT502A



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	H	L	p	Q	q	U <sub>1</sub>	U <sub>2</sub>	w <sub>1</sub>	w <sub>2</sub>
mm	4.72 3.99	12.83 12.57	0.15 0.08	20.02 19.61	19.96 19.66	9.50 9.30	9.53 9.25	1.14 0.89	19.94 18.92	5.33 4.32	3.38 3.12	1.70 1.45	27.94	34.16 33.91	9.91 9.65	0.25	0.51
inches	0.186 0.157	0.505 0.495	0.006 0.003	0.788 0.772	0.786 0.774	0.374 0.366	0.375 0.364	0.045 0.035	0.785 0.745	0.210 0.170	0.133 0.123	0.067 0.057	1.100	1.345 1.335	0.390 0.380	0.01	0.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT502A						99-10-13 99-12-28

## UHF power LDMOS transistor

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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 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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