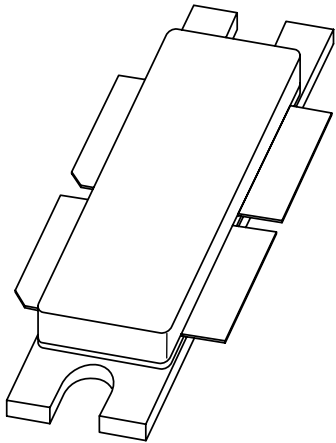


# DATA SHEET



## **BLF2048** UHF push-pull power LDMOS transistor

Preliminary specification  
Supersedes data of 1999 Dec 01

2000 Feb 17

# UHF push-pull power LDMOS transistor

# BLF2048

## FEATURES

- High power gain
- Easy power control
- Excellent ruggedness
- Source on underside eliminates DC isolators, reducing common mode inductance
- Designed for broadband operation (HF to 2.2 GHz).

## APPLICATIONS

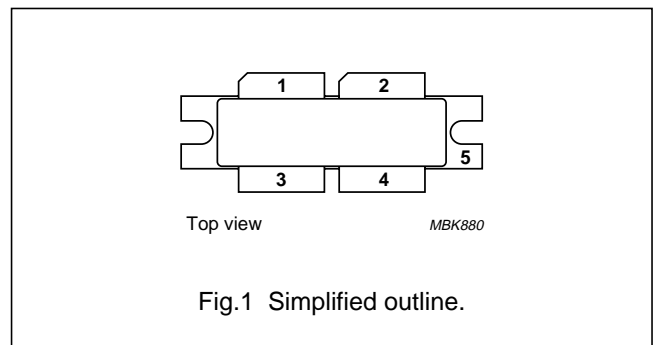
- Common source class-AB operation for PCN and PCS applications in the 1800 to 2200 MHz frequency range.

## DESCRIPTION

Push-pull silicon N-channel enhancement mode lateral D-MOS transistor encapsulated in a 4-lead flange package (SOT539A) with a ceramic cap. The common source is connected to the mounting flange.

## PINNING - SOT539A

PIN	DESCRIPTION
1	drain 1
2	drain 2
3	gate 1
4	gate 2
5	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)
2-tone, class-AB	$f_1 = 2200; f_2 = 2200.1$	26	120 (PEP)	>10	>30	$\leq -26$
		28	140 (PEP)	typ. 11.2	typ. 31	typ. -25

## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
$V_{DS}$	drain-source voltage	–	65	V
$V_{GS}$	gate-source voltage	–	$\pm 15$	V
$I_D$	drain current (DC)	–	18	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
$R_{th\ j-mb}$	thermal resistance from junction to mounting-base	$P_L = 120\text{ W}$ ; $T_{mb} = 50\text{ }^\circ\text{C}$ , note 1	0.35	K/W
$R_{th\ mb-h}$	thermal resistance from mounting-base to heatsink		0.15	K/W

## Note

1. Thermal resistance is determined under nominal 2-tone RF operating conditions.

## CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0$ ; $I_D = 1.4\text{ mA}$	65	–	–	V
$V_{GSth}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$ ; $I_D = 140\text{ mA}$	1.5	–	3.5	V
$I_{DSS}$	drain-source leakage current	$V_{GS} = 0$ ; $V_{DS} = 26\text{ V}$	–	–	10	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GSth} + 9\text{ V}$ ; $V_{DS} = 10\text{ V}$	18	–	–	A
$I_{GSS}$	gate leakage current	$V_{GS} = \pm 15\text{ V}$ ; $V_{DS} = 0$	–	–	250	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}$ ; $I_D = 5\text{ A}$	–	4	–	S
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = V_{GSth} + 9\text{ V}$ ; $I_D = 5\text{ A}$	–	0.17	–	$\Omega$
$C_{rs}$	feedback capacitance	$V_{GS} = 0$ ; $V_{DS} = 26\text{ V}$ ; $f = 1\text{ MHz}$ ; note 1	–	3.4	–	pF

## Note

1. Capacitance of die only.

## APPLICATION INFORMATION

RF performance in a common source class-AB circuit.  $T_h = 25\text{ }^\circ\text{C}$ ;  $R_{th\ j-h} = 0.5\text{ K/W}$ ; unless otherwise specified.

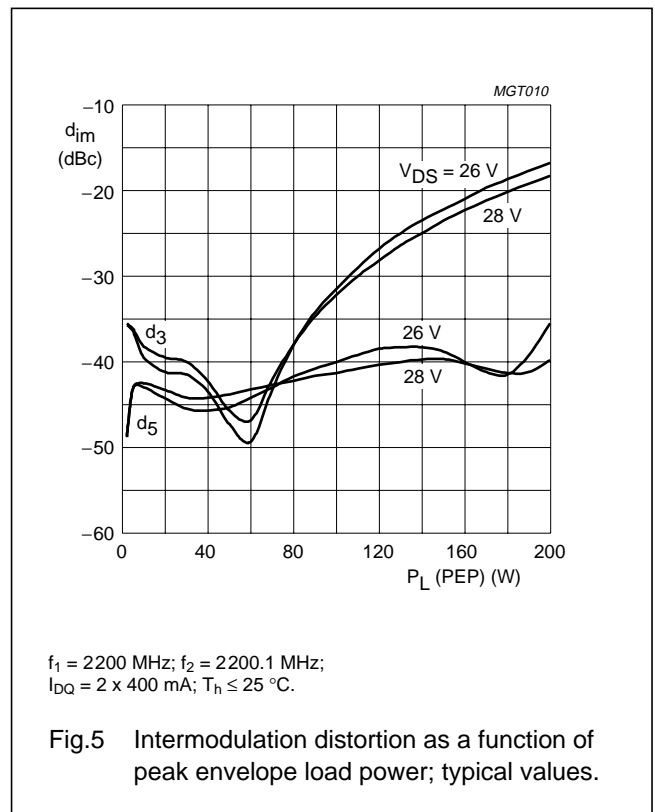
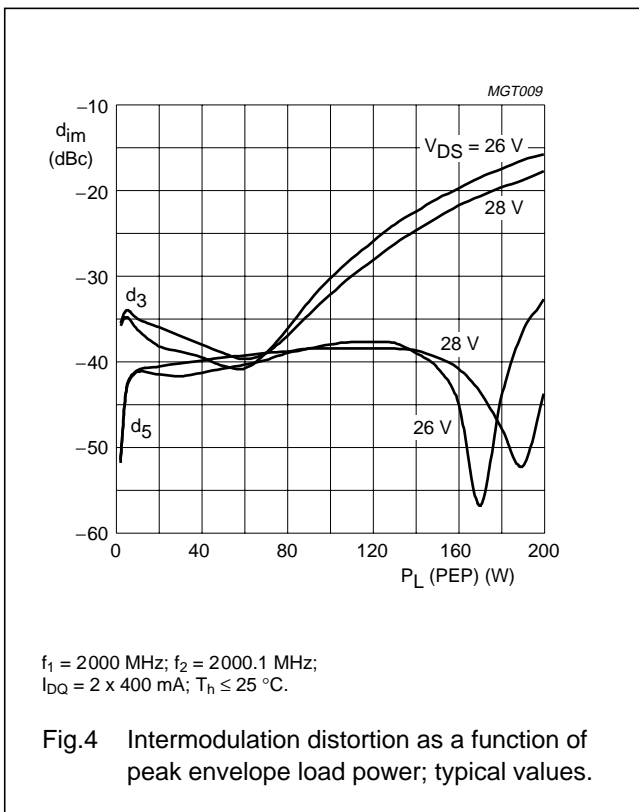
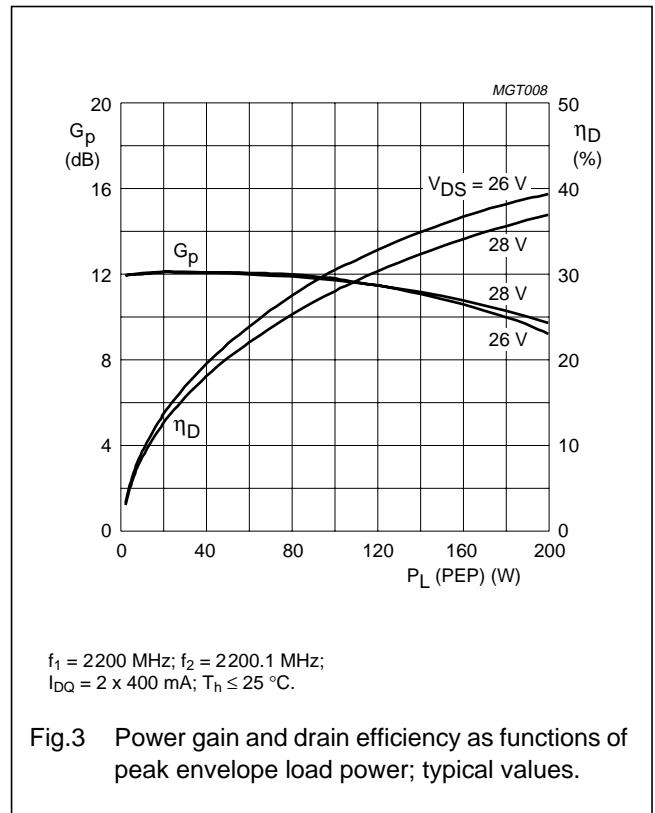
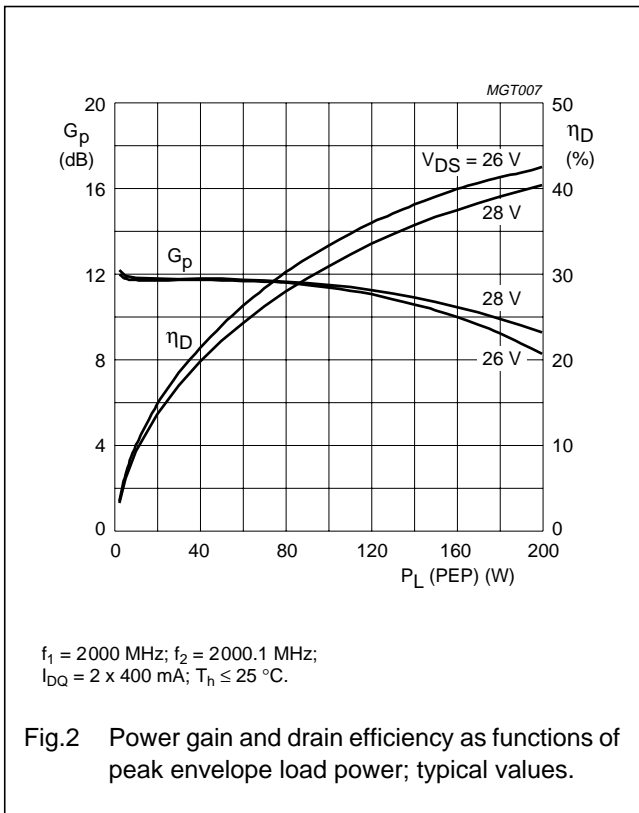
MODE OF OPERATION	f (MHz)	$V_{DS}$ (V)	$I_{DQ}$ (mA)	$P_L$ (W)	$G_p$ (dB)	$\eta_D$ (%)	$d_{im}$ (dBc)
2-tone, class-AB	$f_1 = 2200$ ; $f_2 = 2200.1$	26	2 x 400	120 (PEP)	>10	>30	$\leq -26$
		28	2 x 400	140 (PEP)	typ. 11.2	typ. 31	typ. -25

## Ruggedness in class-AB operation

The BLF2048 is capable of withstanding a load mismatch corresponding to  $VSWR = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 26\text{ V}$ ;  $f = 2200\text{ MHz}$ ,  $P_L = 120\text{ W}$  (CW).

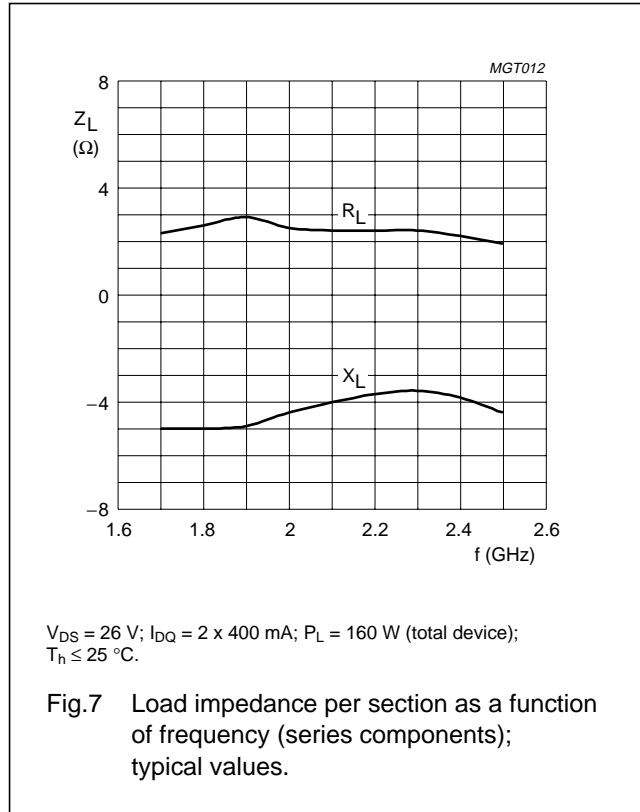
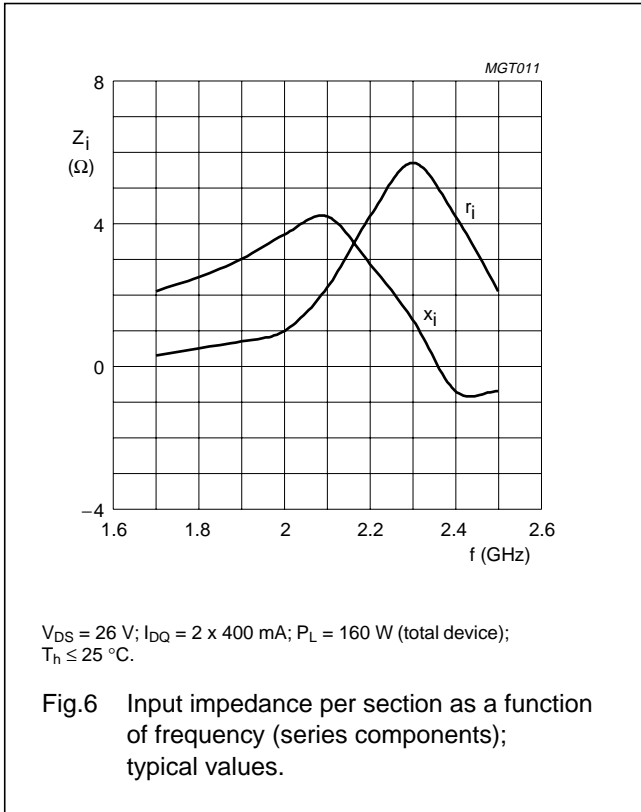
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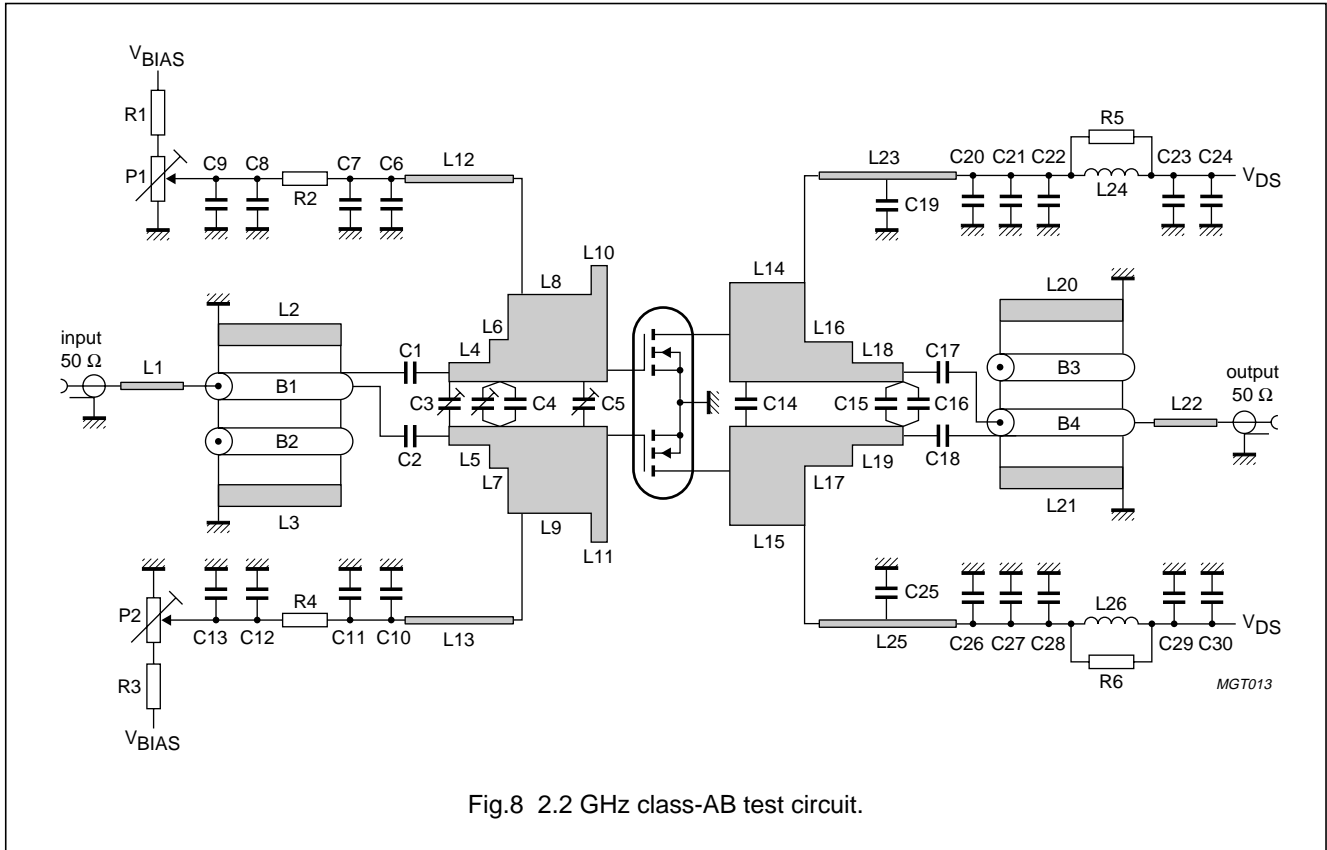


Fig.8 2.2 GHz class-AB test circuit.

List of components (see Figs 8 and 9)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C2	multilayer ceramic chip capacitor; note 1	5.1 pF		
C3, C5	Tekelec variable capacitor	0.6 to 4.5 pF		
C4	Tekelec variable capacitor + multilayer ceramic chip capacitor; note 1	0.6 to 4.5 pF + 2.4 pF		
C6, C10	multilayer ceramic chip capacitor; note 2	100 pF		
C7, C11	multilayer ceramic chip capacitor; note 2	18 pF		
C8, C12, C23, C29	tantalum SMD capacitor	4.7 μF; 35 V		
C9, C13, C24, C30	tantalum SMD capacitor	10 μF; 35 V		
C14	multilayer ceramic chip capacitor; note 3	0.5 pF		
C15	multilayer ceramic chip capacitor; note 3	1 pF		
C16	multilayer ceramic chip capacitor; note 1	1.5 pF		
C17, C18	multilayer ceramic chip capacitor; note 1	10 pF		
C19, C25	MKT ceramic chip capacitor	33 nF		2222 370 11333
C20, C26	multilayer ceramic chip capacitor; note 2	6.2 pF		
C21, C27	multilayer ceramic chip capacitor	100 nF		2222 581 16641

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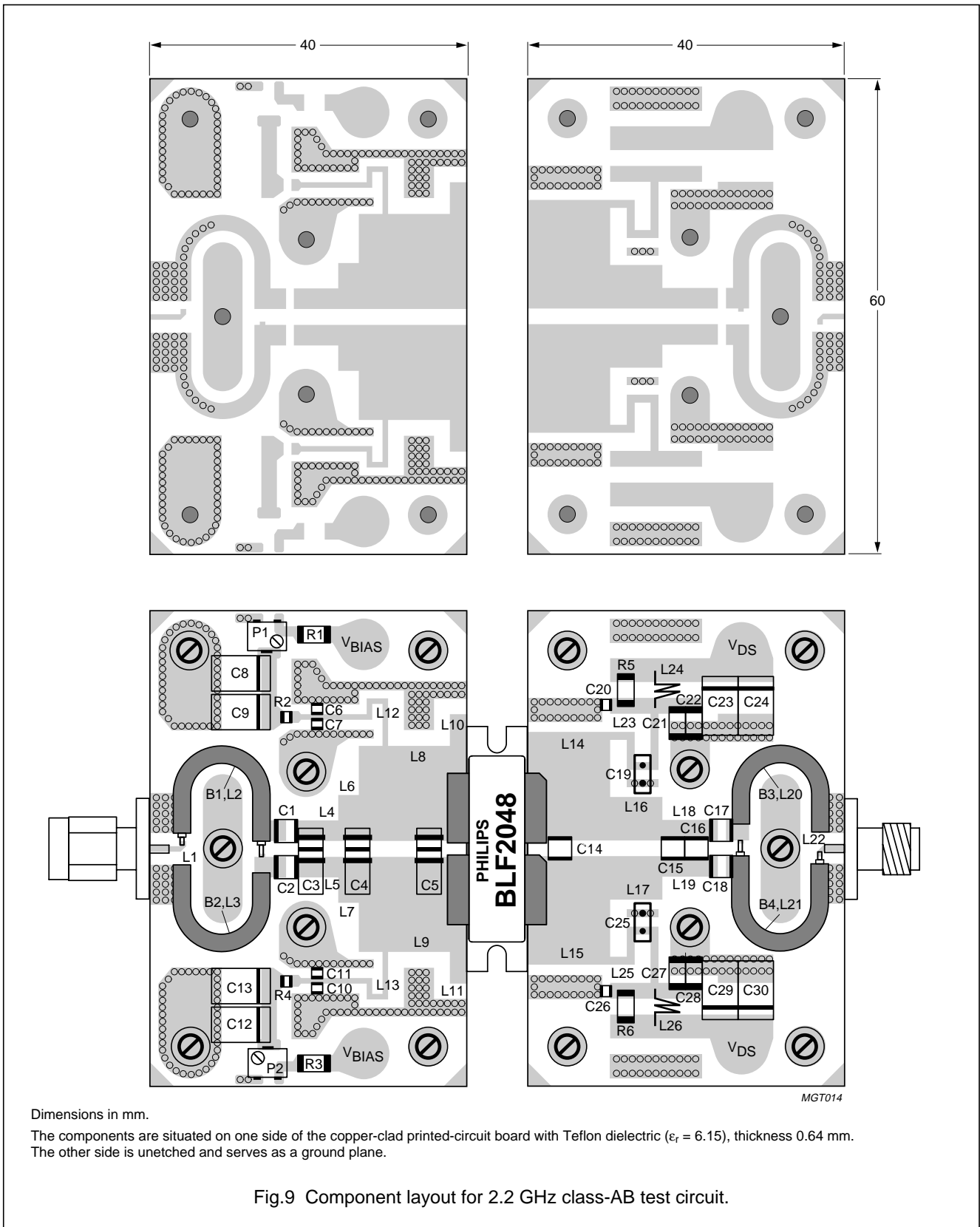
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C22, C28	multilayer ceramic chip capacitor; note 1	8.2 pF		
L1	stripline; note 4	47 $\Omega$	4.5 $\times$ 1 mm	
L2, L3, L20, L21	stripline; note 4		15 $\times$ 2 mm	
L4, L5	stripline; note 4		5.6 $\times$ 2.6 mm	
L6, L7	stripline; note 4		2.6 $\times$ 5.8 mm	
L8, L9	stripline; note 4		11.5 $\times$ 12 mm	
L10, L11	stripline; note 4		2.2 $\times$ 16 mm	
L12, L13	stripline; note 4	57 $\Omega$	1/4 $\lambda$ at 2.2 GHz	
L14, L15	stripline; note 4		10.4 $\times$ 13.7 mm	
L16, L17	stripline; note 4		6.6 $\times$ 5.5 mm	
L18, L19	stripline; note 4		7 $\times$ 2.6 mm	
L22	stripline; note 4	47 $\Omega$	4 $\times$ 1 mm	
L23, L25	stripline; note 4	47 $\Omega$	1/4 $\lambda$ at 2.2 GHz	
L24, L26	1 turn enamelled 0.7 mm copper wire		int.dia. 7 mm; length: tbf	
B1, B4	balun of semi-rigid cable	50 $\Omega$		
B2, B3	semi-rigid cable; note 5	50 $\Omega$		
R1, R3, R5, R6	metal film resistor	5.6 $\Omega$ , 0.6 W		
R2, R4	metal film resistor	10 $\Omega$ , 0.6 W		
P1, P2	variable resistor (multiturn)	5 k $\Omega$		

**Notes**

1. American Technical Ceramics type 100B or capacitor of same quality.
2. American Technical Ceramics type 100A or capacitor of same quality.
3. American Technical Ceramics type 180R or capacitor of same quality.
4. Semi-rigid cable soldered along the stub to establish balance.
5. The striplines are on a double copper-clad printed-circuit board with Teflon dielectric ( $\epsilon_r = 6.15$ ); thickness 0.64 mm.

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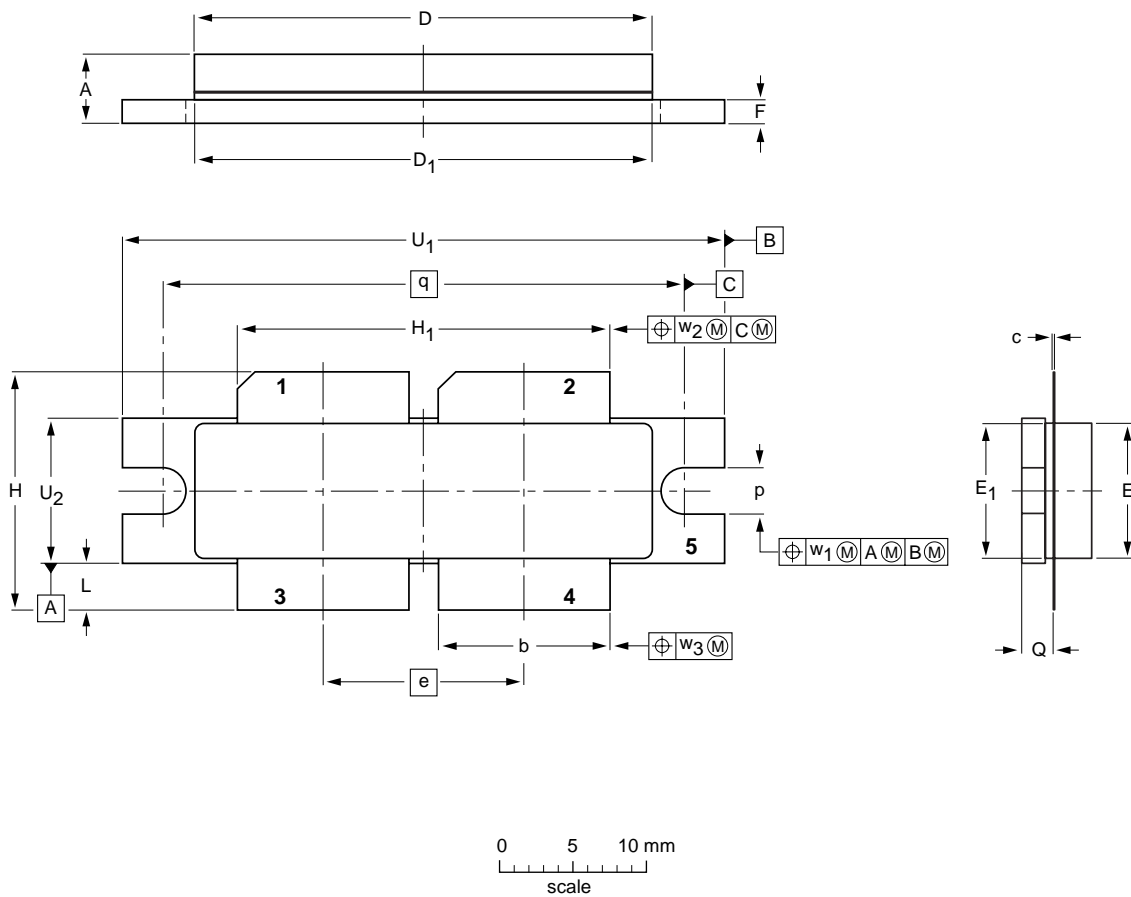
PACKAGE OUTLINE

Flanged balanced LDMOST ceramic package; 2 mounting holes; 4 leads

SOT539A

**Package under development**

Philips Semiconductors reserves the right to make changes without notice.



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

UNIT	A	b	c	D	D <sub>1</sub>	e	E	E <sub>1</sub>	F	H	H <sub>1</sub>	L	p	Q	q	U <sub>1</sub>	U <sub>2</sub>	w <sub>1</sub>	w <sub>2</sub>	w <sub>3</sub>
mm	5.33 3.96	11.81 11.56	0.15 0.08	31.55 30.94	31.52 30.96	13.72	9.50 9.30	9.53 9.27	1.75 1.50	17.12 16.10	25.53 25.27	3.73 2.72	3.30 3.05	2.31 2.01	35.56	41.28 41.02	10.29 10.03	0.25	0.51	0.25
inches	0.210 0.156	0.465 0.455	0.006 0.003	1.242 1.218	1.241 1.219	0.540	0.374 0.366	0.375 0.365	0.069 0.059	0.674 0.634	1.005 0.995	0.147 0.107	0.130 0.120	0.091 0.079	1.400	1.625 1.615	0.405 0.395	0.010	0.020	0.010

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT539A						99-12-08 99-12-28

## UHF push-pull power LDMOS transistor

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**DEFINITIONS**

<b>Data Sheet Status</b>	
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>	
Where application information is given, it is advisory and does not form part of the specification.	

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