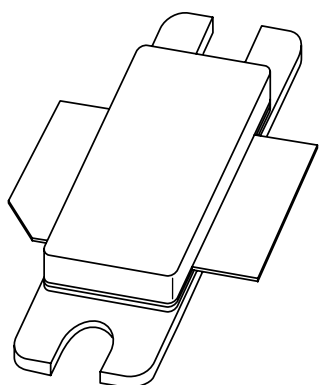


DATA SHEET



BLF2047

UHF power LDMOS transistor

Product specification
Supersedes data of 1999 Jul 01

1999 Dec 02

UHF power LDMOS transistor

BLF2047

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 2.2 GHz).
- Internal input and output matching for high gain and efficiency

APPLICATIONS

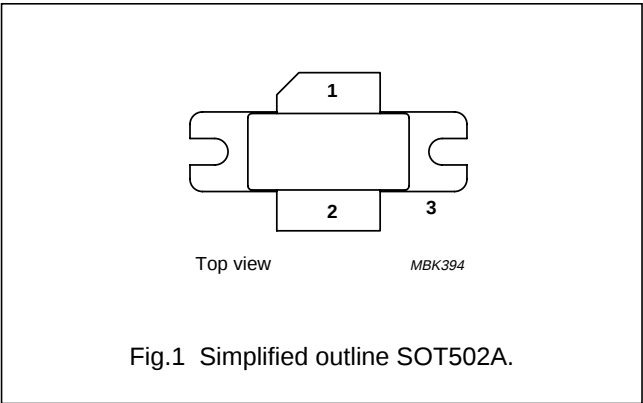
- Common source class-AB operation for PCN and PCS applications in the 1800 to 2200 MHz frequency range.

DESCRIPTION

Silicon N-channel enhancement mode lateral D-MOS transistor encapsulated in a 2-lead flange SOT502A 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 $T_h = 25\text{ }^{\circ}\text{C}$ in a common source test circuit.

MODE OF OPERATION	f (MHz)	V _{DS} (V)	P _L (W)	G _p (dB)	η_D (%)	d _{im} (dBc)
Two-tone, class-AB	f ₁ = 2200; f ₂ = 2200.1	26	65 (PEP)	>10	>30	≤−25
		28	65 (PEP)	typ. 12.6	typ. 31	typ. −29

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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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	–	± 15	V
I_D	DC drain current	–	9	A
T_{stg}	storage temperature	–65	+150	°C
T_j	junction temperature	–	200	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-h}$	thermal resistance from junction to heatsink	$T_h = 25\text{ °C}$, $P_{tot} = 152\text{ W}$, note 1	1.15	K/W

Note

1. Determined under specified RF operating conditions, based on maximum peak 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	$V_{GS} = 0$; $I_D = 1.4\text{ mA}$	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	μA
I_{DSX}	on-state drain 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	–	Ω
C_{rss}	feedback capacitance	$V_{GS} = 0$; $V_{DS} = 26\text{ V}$; $f = 1\text{ MHz}$	–	3.4	–	pF

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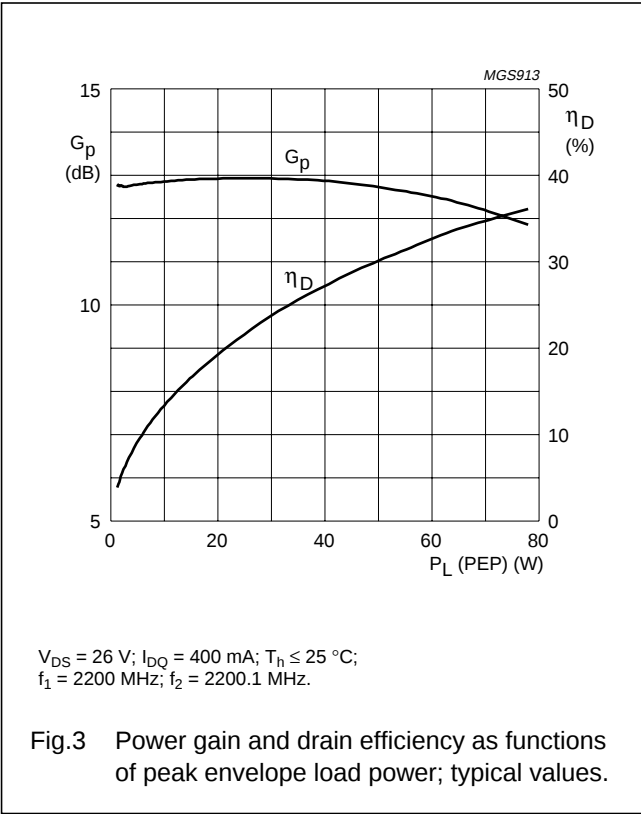
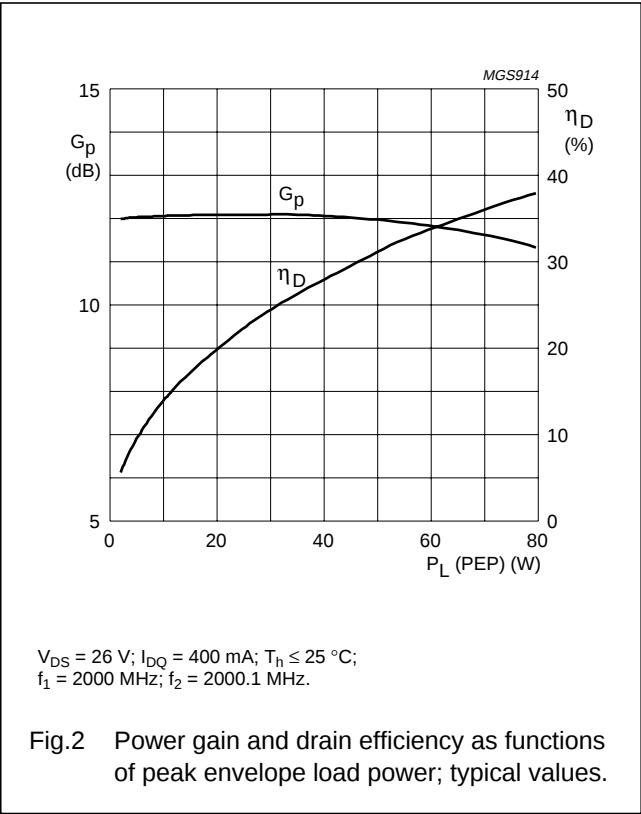
APPLICATION INFORMATION

RF performance in a common source class-AB circuit. $T_h = 25\text{ }^{\circ}\text{C}$; $R_{th\ j-h} = 1.15\text{ K/W}$; unless otherwise specified.

MODE OF OPERATION	f (MHz)	V _{DS} (V)	I _{DQ} (mA)	P _L (W)	G _p (dB)	η _D (%)	d _{im} (dBc)
Two-tone, class-AB	f ₁ = 2200; f ₂ = 2200.1	26	400	65 (PEP)	>10	>30	≤−25
		28	400	65 (PEP)	typ. 12.6	typ. 31	typ. −29

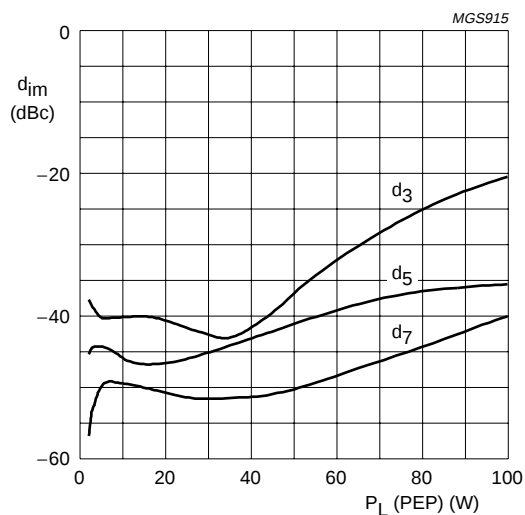
Ruggedness in class-AB operation

The BLF2047 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 26 V; I_{DQ} = 400 mA; P_L = 65 W (CW); f = 2200 MHz.



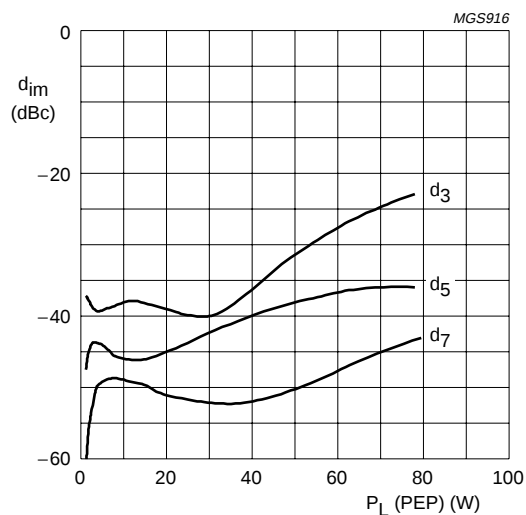
UHF power LDMOS transistor

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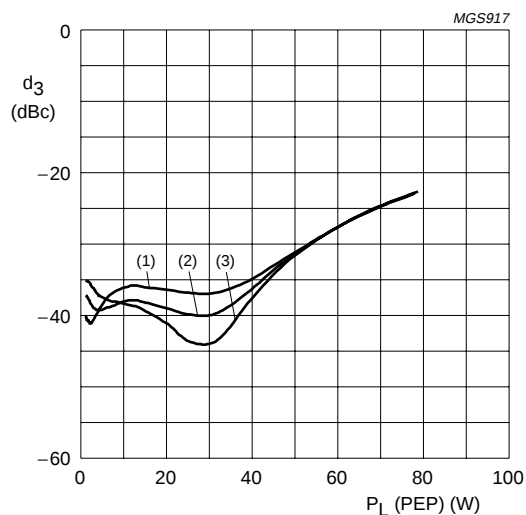
$V_{DS} = 26$ V; $I_{DQ} = 400$ mA; $T_h \leq 25$ °C;
 $f_1 = 2000$ MHz; $f_2 = 2000.1$ MHz.

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



$V_{DS} = 26$ V; $I_{DQ} = 400$ mA; $T_h \leq 25$ °C;
 $f_1 = 2200$ MHz; $f_2 = 2200.1$ MHz.

Fig.5 Intermodulation distortion as a function of peak envelope load power; typical values.

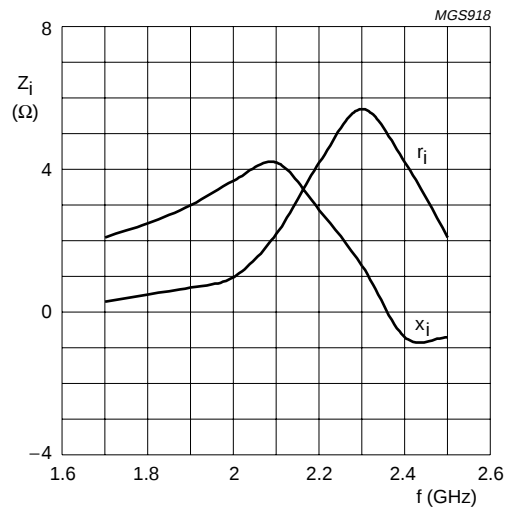


$V_{DS} = 26$ V; $T_h \leq 25$ °C; $f_1 = 2200$ MHz; $f_2 = 2200.1$ MHz.
 (1) $I_{DQ} = 350$ mA.
 (2) $I_{DQ} = 400$ mA.
 (3) $I_{DQ} = 450$ mA.

Fig.6 Intermodulation distortion as a function of peak envelope load power; typical values.

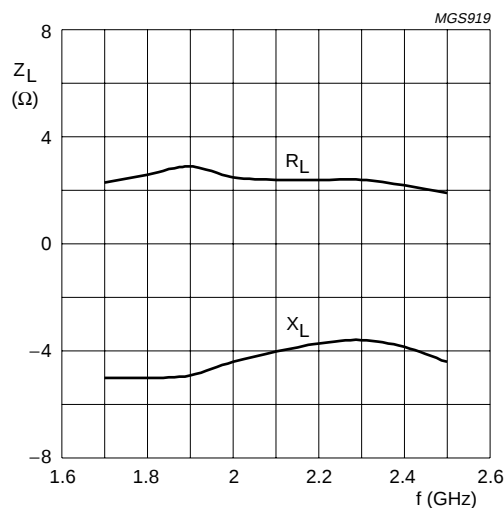
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$V_{DS} = 26\text{ V}$; $I_{DQ} = 400\text{ mA}$; $P_L = 80\text{ W}$; $T_h \leq 25\text{ }^\circ\text{C}$.

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



$V_{DS} = 26\text{ V}$; $I_{DQ} = 400\text{ mA}$; $P_L = 80\text{ W}$; $T_h \leq 25\text{ }^\circ\text{C}$.

Fig.8 Load impedance as a function of frequency (series components); typical values.

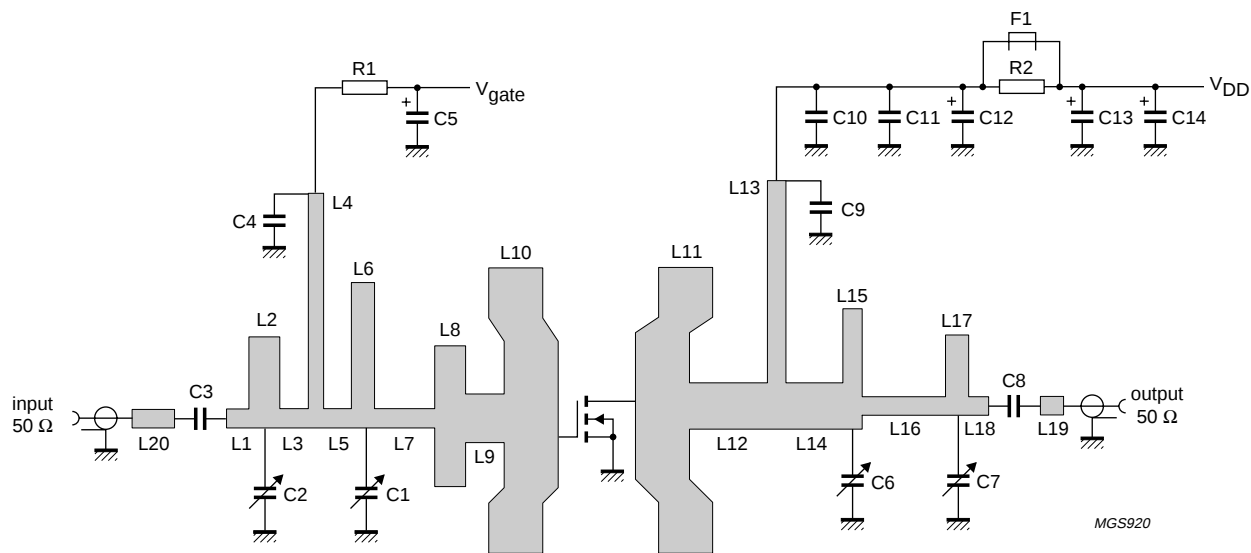


Fig.9 Class-AB test circuit at $f = 2.2\text{ GHz}$.

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List of components (See Figs 9 and 10)

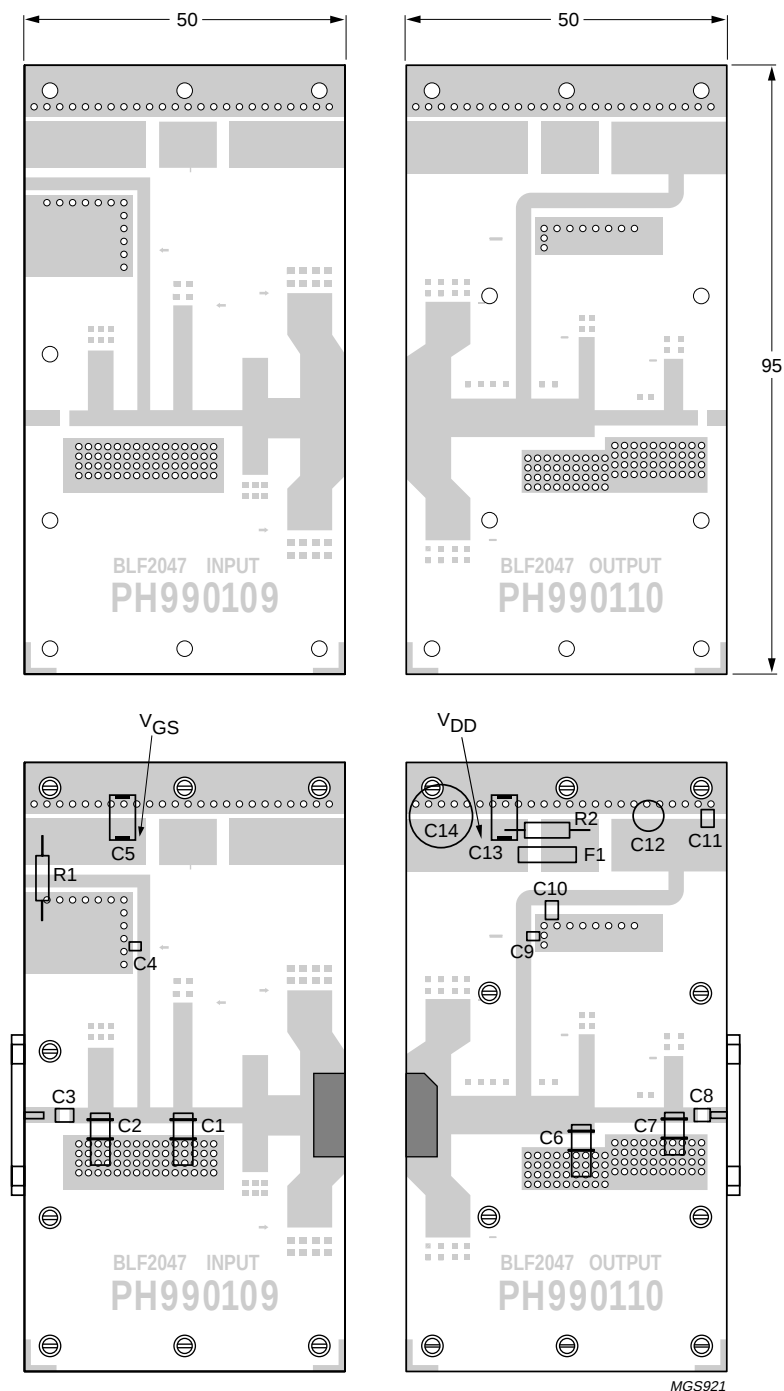
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C2, C6, C7	Tekelec variable capacitor; type 37281	0.4 to 2.5 pF		
C3, C8	multilayer ceramic chip capacitor; note 1	12 pF		
C4, C9	multilayer ceramic chip capacitor; note 2	12 pF		
C5, C12	electrolytic capacitor	10 μ F; 100 V		2222 037 59109
C10	multilayer ceramic chip capacitor; note 1	1 nF		
C11	multilayer ceramic chip capacitor	100 nF		2222 581 16641
C13	tantal SMD capacitor	4.5 μ F; 50 V		
C14	electrolytic capacitor	100 μ F; 63 V		2222 037 58101
F1	Ferroxcube chip-bead 8DS3/3/8/9-4S2			4330 030 36301
L1	stripline; note 3	50 Ω	2.9 $\times$ 2.4 mm	
L2	stripline; note 3	14.5 Ω	4 $\times$ 11.7 mm	
L3	stripline; note 3	50 Ω	3.7 $\times$ 2.4 mm	
L4	stripline; note 3	6 Ω	2 $\times$ 30.8 mm	
L5	stripline; note 3	50 Ω	3.6 $\times$ 2.4 mm	
L6	stripline; note 3	9.5 Ω	3 $\times$ 18.8 mm	
L7	stripline; note 3	50 Ω	7.8 $\times$ 2.4 mm	
L8	stripline; note 3	9.8 Ω	4 $\times$ 18.3 mm	
L9	stripline; note 3	24.4 Ω	5 $\times$ 6.3 mm	
L10, L11	stripline; note 3	5.1 Ω	7 $\times$ 37 mm	
L12	stripline; note 3	25.4 Ω	10.1 $\times$ 6 mm	
L13	stripline; note 3	5.7 Ω	2.4 $\times$ 32.8 mm	
L14	stripline; note 3	25.4 Ω	7.4 $\times$ 6 mm	
L15	stripline; note 3	11.3 Ω	2.5 $\times$ 15.6 mm	
L16	stripline; note 3	50 Ω	10.8 $\times$ 2.4 mm	
L17	stripline; note 3	16.1 Ω	3 $\times$ 10.4 mm	
L18	stripline; note 3	50 Ω	2.3 $\times$ 2.4 mm	
L19	stripline; note 3	50 Ω	3 $\times$ 2.4 mm	
L20	stripline; note 3	50 Ω	5.5 $\times$ 2.4 mm	
R1, R2	metal film resistor	10 Ω , 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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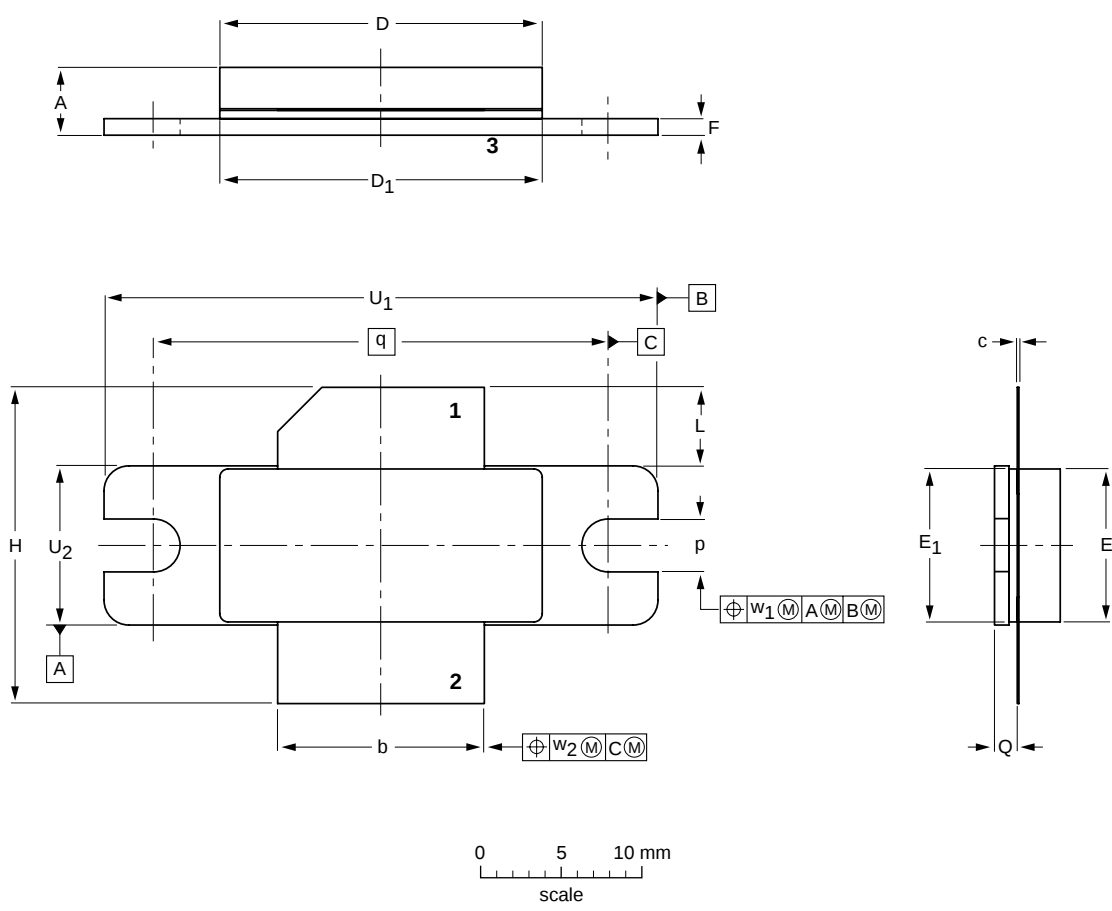
UHF power LDMOS transistor

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PACKAGE OUTLINE

Flanged LDMOST package; 2 mounting holes; 2 leads

SOT502A



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

UNIT	A	b	c	D	D ₁	E	E ₁	F	H	L	p	Q	q	U ₁	U ₂	w ₁	w ₂
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						99-06-07 99-10-13

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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.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

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Printed in The Netherlands

125002/04/pp12

Date of release: 1999 Dec 02

Document order number: 9397 750 06449

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