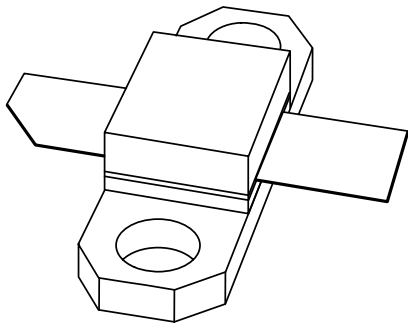


DATA SHEET



BLF2043F UHF power LDMOS transistor

Preliminary specification

2000 Oct 19

UHF power LDMOS transistor

BLF2043F

FEATURES

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

APPLICATIONS

- Communication transmitter applications in the UHF frequency range.

DESCRIPTION

Silicon N-channel enhancement mode lateral D-MOS transistor encapsulated in a 2-lead flange package (SOT467C) with a ceramic cap. The common source is connected to the mounting base.

PINNING - SOT467C

PIN	DESCRIPTION
1	drain
2	gate
3	source

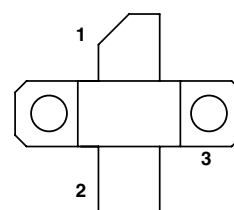


Fig.1 Simplified outline.

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)
CW, class-AB (2-tone)	f ₁ = 2200; f ₂ = 2200.1	26	10 (PEP)	>11	>30	≤-26

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V _{DS}	drain-source voltage		–	65	V
V _{GS}	gate-source voltage		–	±15	V
I _D	drain current (DC)		–	2.2	A
P _{tot}	total power dissipation	T _{mb} ≤ 25 °C	–	tbf	W
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	$T_{mb} = 25\text{ }^{\circ}\text{C}$; note 1	5	K/W
$R_{th\ mb-h}$	thermal resistance from mounting base to heatsink		0.5	K/W

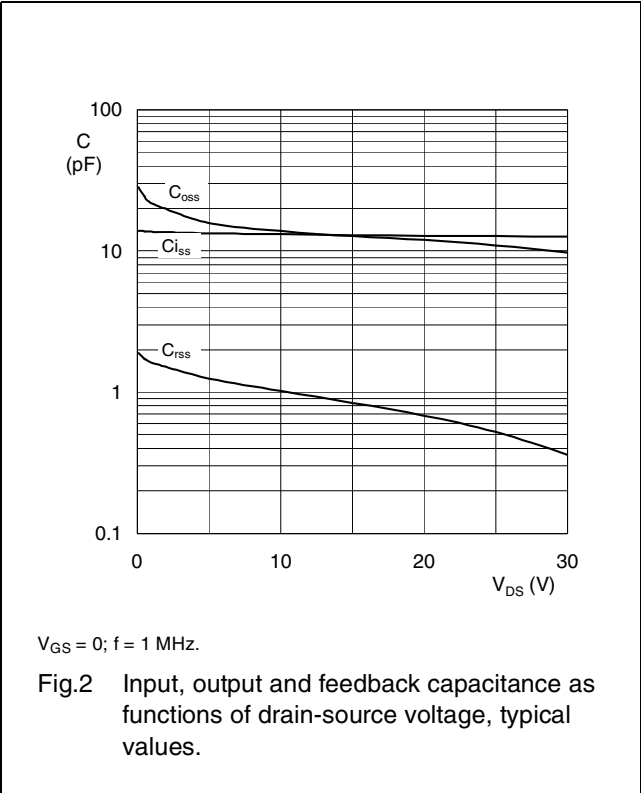
Note

1. Thermal resistance is determined under RF operating conditions.

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0$; $I_D = 0.2\text{ mA}$	75	–	–	V
V_{GSth}	gate-source threshold voltage	$V_{DS} = 10\text{ V}$; $I_D = 20\text{ mA}$	4	–	5	V
I_{DSS}	drain-source leakage current	$V_{GS} = 0$; $V_{DS} = 26\text{ V}$	–	–	1.5	μA
I_{DSX}	on-state drain current	$V_{GS} = V_{GSth} + 9\text{ V}$; $V_{DS} = 10\text{ V}$	2.8	–	–	A
I_{GSS}	gate leakage current	$V_{GS} = \pm 15\text{ V}$; $V_{DS} = 0$	–	–	40	nA
g_{fs}	forward transconductance	$V_{DS} = 10\text{ V}$; $I_D = 0.75\text{ A}$	–	0.5	–	S
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10\text{ V}$; $I_D = 0.75\text{ A}$	–	1.2	–	Ω
C_{is}	input capacitance	$V_{GS} = 0$; $V_{DS} = 26\text{ V}$; $f = 1\text{ MHz}$	–	13	–	pF
C_{os}	output capacitance	$V_{GS} = 0$; $V_{DS} = 26\text{ V}$; $f = 1\text{ MHz}$	–	11	–	pF
C_{rs}	feedback capacitance	$V_{GS} = 0$; $V_{DS} = 26\text{ V}$; $f = 1\text{ MHz}$	–	0.5	–	pF



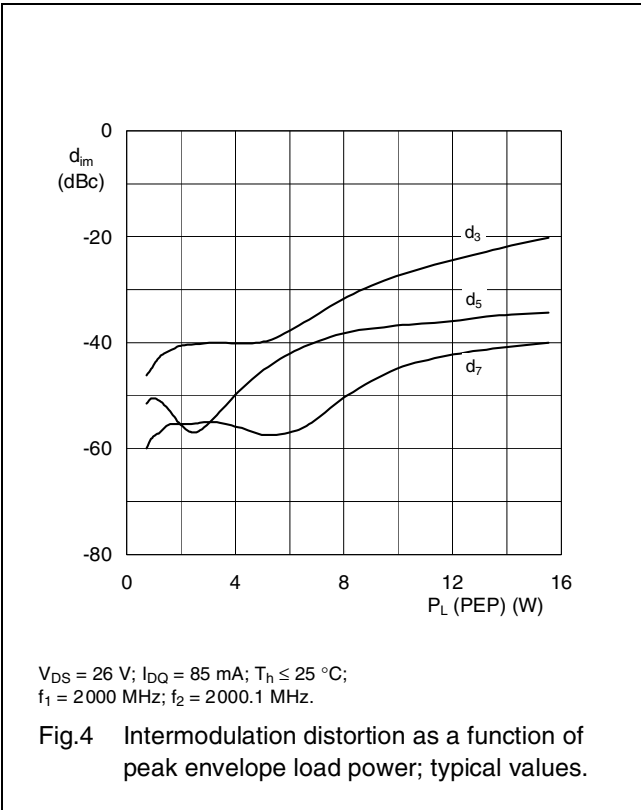
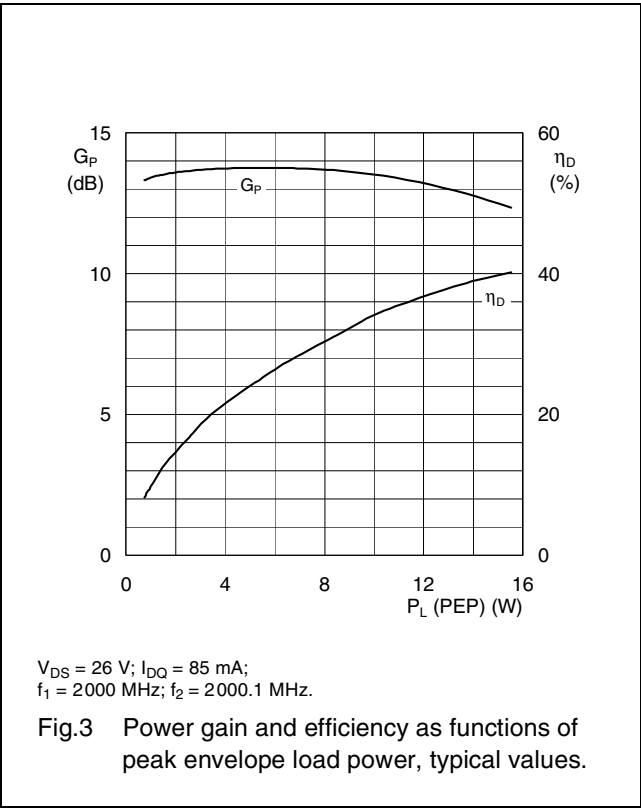
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APPLICATION INFORMATION
RF performance in a common source class-AB circuit. $T_h = 25\text{ }^{\circ}\text{C}$; $R_{th\text{ mb-h}} = 0.4\text{ K/W}$, unless otherwise specified.

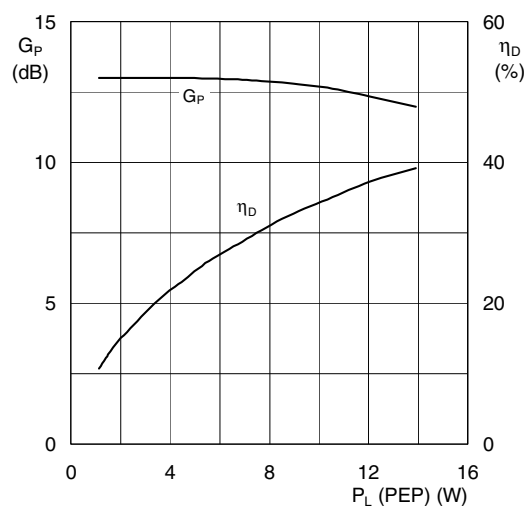
MODE OF OPERATION	f (MHz)	V _{DS} (V)	I _{DQ} (mA)	P _L (W)	G _p (dB)	η _D (%)	d _{im} (dBc)
CW, class-AB (2-tone)	f ₁ = 2200; f ₂ = 2200.1	26	85	10 (PEP)	>11	>30	≤-26

Ruggedness in class-AB operation
The BLF2043F is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 26 V; f = 2200 MHz at rated load power.



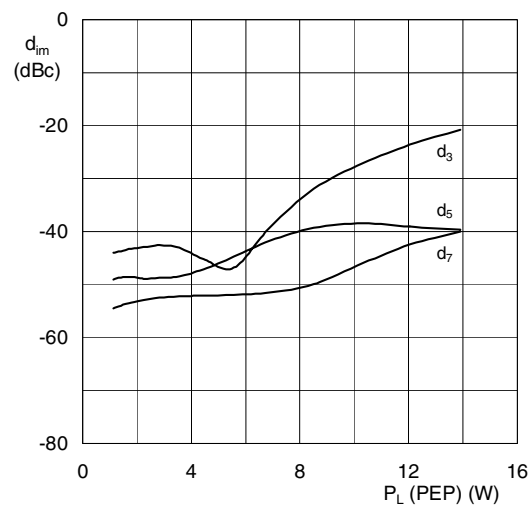
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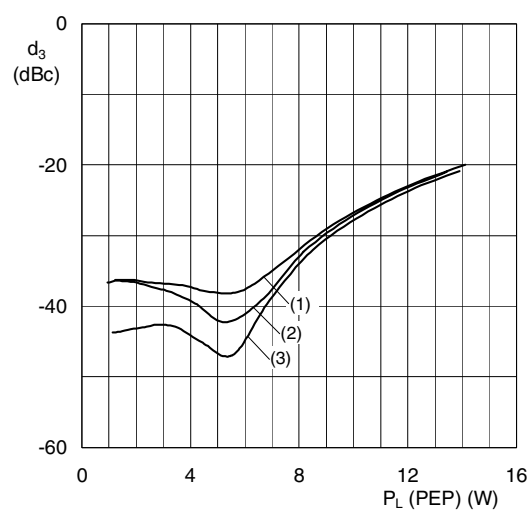
$V_{DS} = 26$ V; $I_{DQ} = 85$ mA;
 $f_1 = 2200$ MHz; $f_2 = 2200.1$ MHz.

Fig.5 Power gain and efficiency as functions of peak envelope load power, typical values.



$V_{DS} = 26$ V; $I_{DQ} = 85$ mA; $T_h \leq 25$ °C;
 $f_1 = 2200$ MHz; $f_2 = 2200.1$ MHz.

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



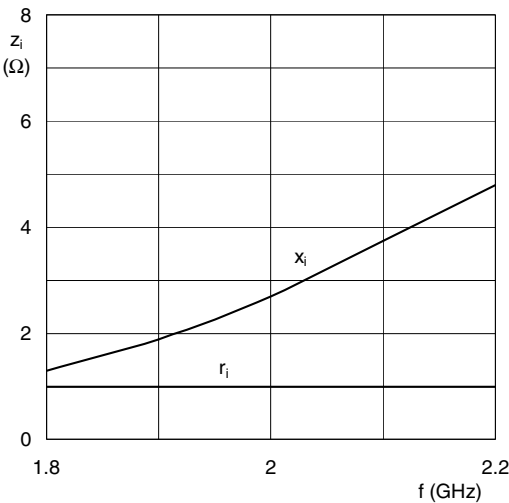
$V_{DS} = 26$ V; $T_h \leq 25$ °C;
 $f_1 = 2200$ MHz; $f_2 = 2200.1$ MHz.

- (1) $I_{DQ} = 115$ mA.
- (2) $I_{DQ} = 55$ mA.
- (3) $I_{DQ} = 85$ mA.

Fig.7 Intermodulation distortion as a function of peak envelope load power; typical values.

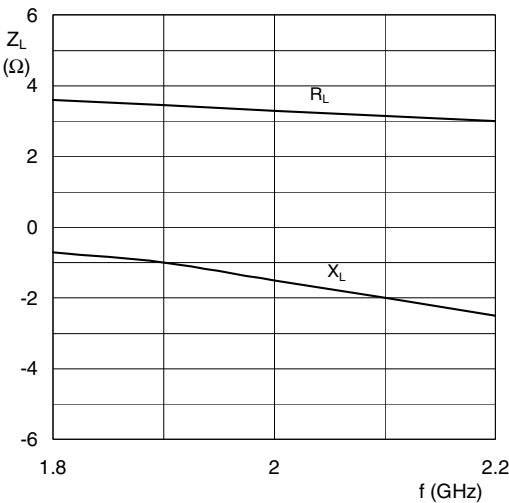
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$V_{DS} = 26\text{ V}$; $I_{DQ} = 85\text{ mA}$; $P_L = 10\text{ W}$; $T_h \leq 25\text{ }^\circ\text{C}$.
Impedance measured at reference planes.

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



$V_{DS} = 26\text{ V}$; $I_{DQ} = 85\text{ mA}$; $P_L = 10\text{ W}$; $T_h \leq 25\text{ }^\circ\text{C}$.
Impedance measured at reference planes.

Fig.9 Load impedance as a function of frequency (series components); typical values.

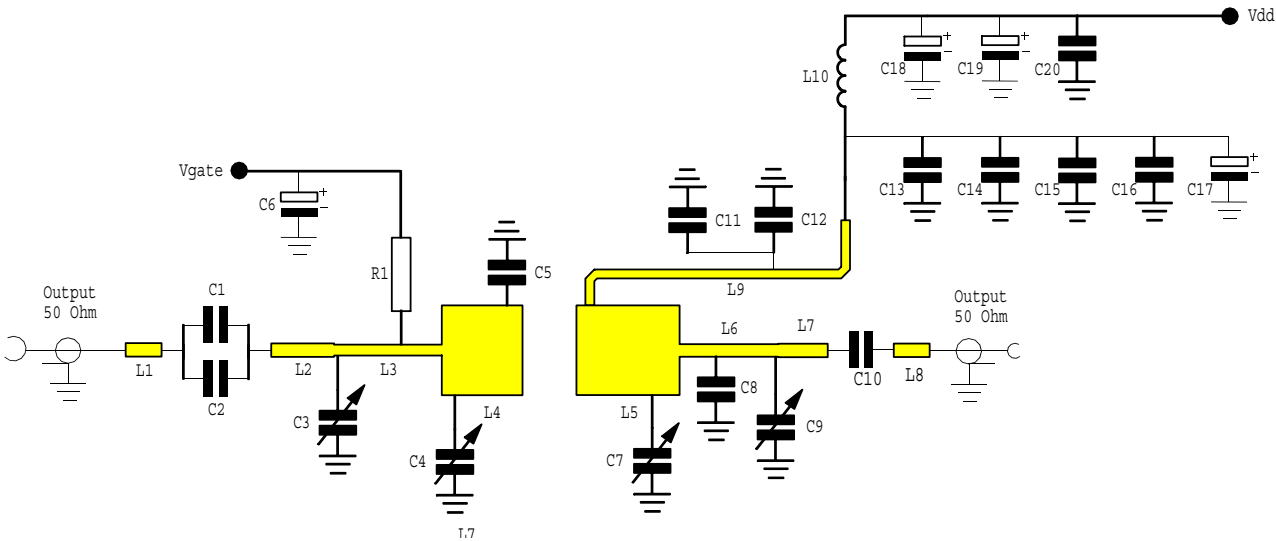


Fig.10 Class-AB test circuit for 2.2 GHz.

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List of components (see Figs 10 and 11)

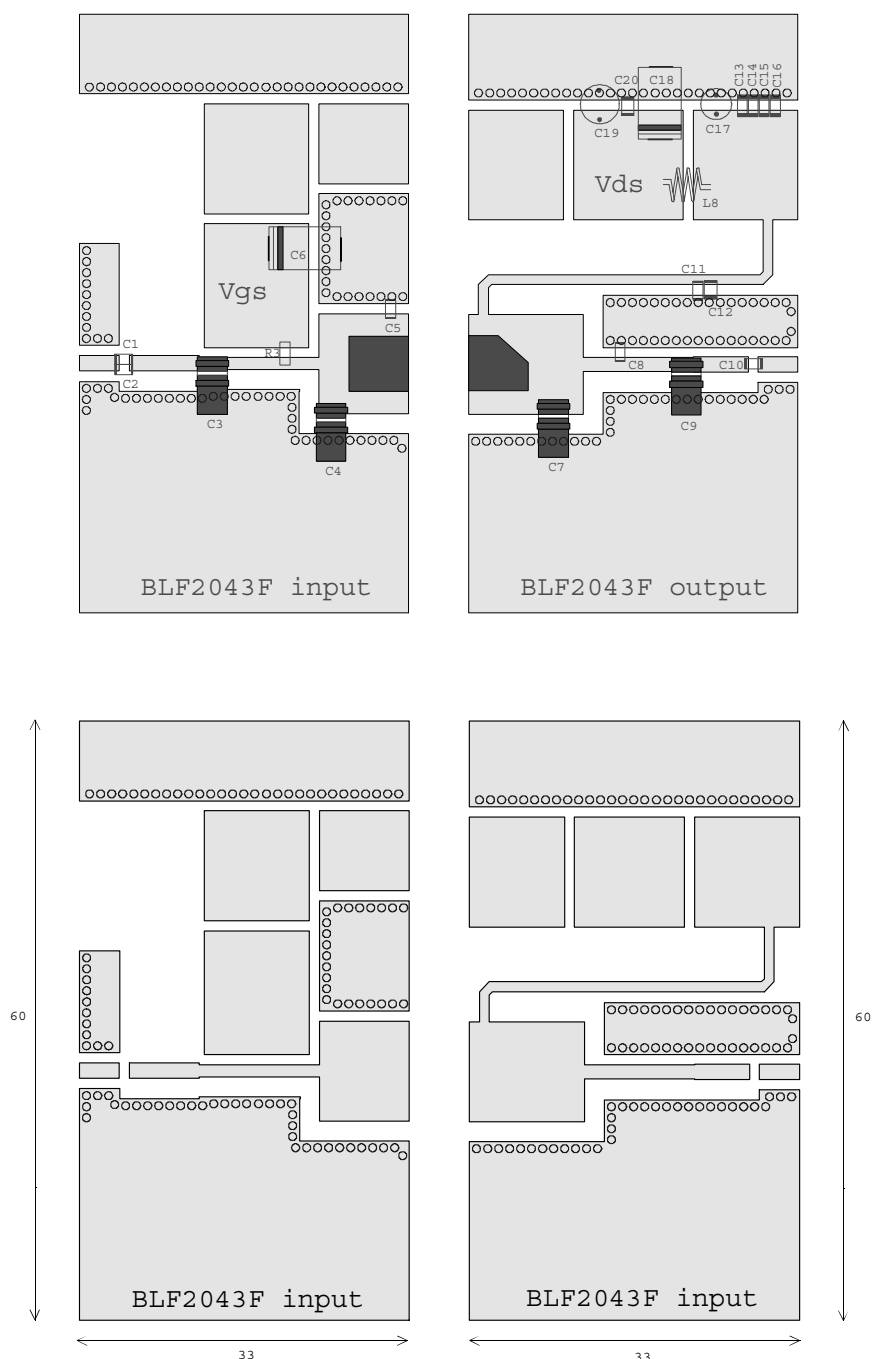
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C2, C10, C11	multilayer ceramic chip capacitor; note 1	6.8 pF		
C3, C4, C7 and C9	Tekelec variable capacitor; type 37271	0.6 to 4.5 pF		
C5	multilayer ceramic chip capacitor; note 1	2.4 pF		
C6, C18	tantalum SMD capacitor	10 μ F; 35 V		
C8	multilayer ceramic chip capacitor; note 1	1.5 pF		
C12, C20	multilayer ceramic chip capacitor; note 2	1 nF		
C13,	multilayer ceramic chip capacitor; note 1	10 pF		
C14,	multilayer ceramic chip capacitor; note 1	51 pF		
C15,	multilayer ceramic chip capacitor; note 1	120 pF		
C16	multilayer ceramic chip capacitor	100 nF		2222 581 16641
C17	electrolytic capacitor	47 μ F; 35 V		2222 036 90094
C19	electrolytic capacitor	100 μ F; 63 V		2222 037 58101
L1, L8	stripline; note 3	50 Ω	4 $\times$ 1.5 mm	
L2	stripline; note 3	50 Ω	7 $\times$ 1.5 mm	
L3	stripline; note 3	58.1 Ω	12 $\times$ 1.2 mm	
L4	stripline; note 3	11.3 Ω	9 $\times$ 10 mm	
L5	stripline; note 3	11.3 Ω	11.5 $\times$ 10 mm	
L6	stripline; note 3	52.8 Ω	11 $\times$ 1.4 mm	
L7	stripline; note 3	50 Ω	5.5 $\times$ 1.5 mm	
L8	2 turns enamelled 0.5 mm copper wire		int. dia. = 3 mm length = 3 mm	
R1	metal film resistor	390 Ω , 0.6 W		2322 156 11009

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 printed-circuit board with Teflon dielectric ($\epsilon_r = 2.2$); thickness 0.51 mm.

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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 0.51 mm.
The other side is unetched and serves as a ground plane.

Fig.11 Component layout for 2.2 GHz class-AB test circuit.

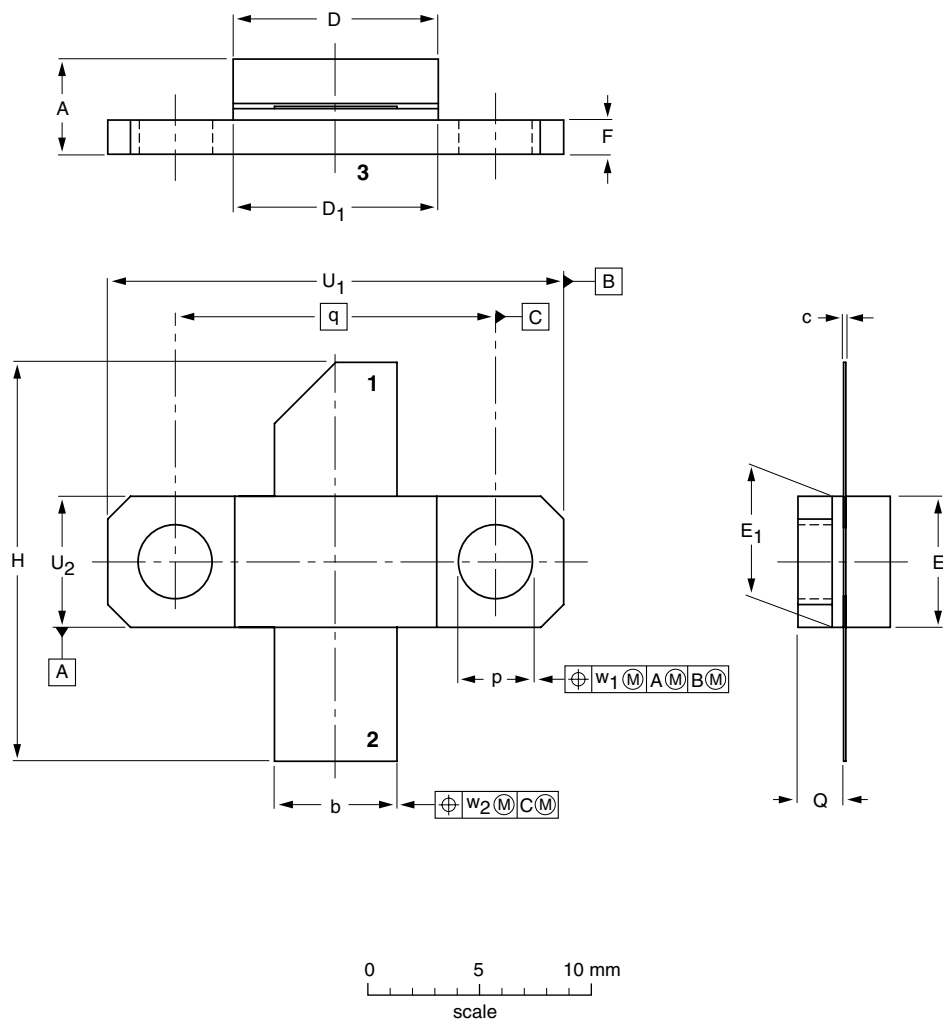
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PACKAGE OUTLINE

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads

SOT467C



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

UNIT	A	b	c	D	D ₁	E	E ₁	F	H	p	Q	q	U ₁	U ₂	w ₁	w ₂
mm	4.67 3.94	5.59 5.33	0.15 0.10	9.25 9.04	9.27 9.02	5.92 5.77	5.97 5.72	1.65 1.40	18.54 17.02	3.43 3.18	2.21 1.96	14.27	20.45 20.19	5.97 5.72	0.25	0.51
inch	0.184 0.155	0.220 0.210	0.006 0.004	0.364 0.356	0.365 0.355	0.233 0.227	0.235 0.225	0.065 0.055	0.73 0.67	0.135 0.125	0.087 0.077	0.562	0.805 0.795	0.235 0.225	0.010	0.020

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT467C						99-12-06 99-12-28

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DATA SHEET STATUS

DATA SHEET STATUS	PRODUCT STATUS	DEFINITIONS ⁽¹⁾
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.
Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

Note

1. Please consult the most recently issued data sheet before initiating or completing a design.

DEFINITIONS

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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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