

# BLF6G27-75; BLF6G27LS-75

WiMAX power LDMOS transistor

Rev. 01 — 22 October 2009

Product data sheet

## 1. Product profile

### 1.1 General description

75 W LDMOS power transistor for base station applications at frequencies from 2500 MHz to 2700 MHz.

**Table 1. Typical performance**

RF performance at  $T_{case} = 25^\circ\text{C}$  in a class-AB production test circuit.

Mode of operation	f (MHz)	$V_{DS}$ (V)	$P_{L(AV)}$ (W)	$P_{L(M)}$ (W)	$G_p$ (dB)	$\eta_D$ (%)	ACPR <sub>885k</sub> (dBc)	ACPR <sub>1980k</sub> (dBc)
1-carrier N-CDMA <sup>[1]</sup>	2500 to 2700	28	9	75	17	23	-50 <sup>[2]</sup>	-60 <sup>[2]</sup>

[1] Single carrier IS-95 with pilot, paging, sync and 6 traffic channels (Walsh codes 8 - 13). PAR = 9.7 dB at 0.01 % probability on the CCDF. Channel bandwidth is 1.2288 MHz.

[2] Measured within 30 kHz bandwidth.

#### CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

### 1.2 Features

- Typical 1-carrier N-CDMA performance (Single carrier IS-95 with pilot, paging, sync and 6 traffic channels [Walsh codes 8 - 13]. PAR = 9.7 dB at 0.01 % probability on the CCDF. Channel bandwidth is 1.2288 MHz) at a frequency of 2500 MHz and 2700 MHz, a supply voltage of 28 V and an  $I_{Dq}$  of 600 mA:
  - ◆ Average output power = 9 W
  - ◆ Power gain = 17 dB
  - ◆ Drain efficiency = 23 %
  - ◆ ACPR<sub>885</sub> = -50.0 dBc in 30 kHz bandwidth
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (2500 MHz to 2700 MHz)
- Internally matched for ease of use

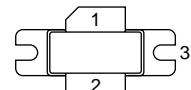
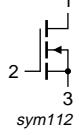
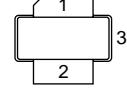
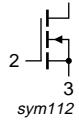
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

### 1.3 Applications

- RF power amplifiers for base stations and multicarrier applications in the 2500 MHz to 2700 MHz frequency range

## 2. Pinning information

**Table 2. Pinning**

Pin	Description	Simplified outline	Graphic symbol
<b>BLF6G27-75 (SOT502A)</b>			
1	drain		
2	gate		
3	source	[1]	 
<b>BLF6G27LS-75 (SOT502B)</b>			
1	drain		
2	gate		
3	source	[1]	 

[1] Connected to flange.

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package			Version
	Name	Description		
BLF6G27-75	-	flanged LDMOST ceramic package; 2 mounting holes; 2 leads		SOT502A
BLF6G27LS-75	-	earless flanged LDMOST ceramic package; 2 leads		SOT502B

## 4. Limiting values

**Table 4. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	drain-source voltage		-	65	V
$V_{GS}$	gate-source voltage		-0.5	+13	V
$I_D$	drain current		-	18	A
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	200	°C

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Type	Typ	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80^\circ\text{C}$ ; $P_L = 60 \text{ W (CW)}$	BLF6G27-75	0.85	K/W
			BLF6G27LS-75	0.75	K/W

## 6. Characteristics

**Table 6. Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0 \text{ V}; I_D = 0.5 \text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10 \text{ V}; I_D = 100 \text{ mA}$	1.4	2	2.4	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0 \text{ V}; V_{DS} = 28 \text{ V}$	-	-	3	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75 \text{ V}; V_{DS} = 10 \text{ V}$	14.9	18	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = +11 \text{ V}; V_{DS} = 0 \text{ V}$	-	-	300	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10 \text{ V}; I_D = 5 \text{ A}$	-	7	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75 \text{ V}; I_D = 3.5 \text{ A}$	-	0.14	0.25	$\Omega$
$C_{rs}$	feedback capacitance	$V_{GS} = 0 \text{ V}; V_{DS} = 28 \text{ V}; f = 1 \text{ MHz}$	-	1.6	-	pF

## 7. Application information

**Table 7. Application information**

Mode of operation: 1-carrier N-CDMA, single carrier IS-95 with pilot, paging, sync and 6 traffic channels (Walsh codes 8 - 13). PAR = 9.7 dB at 0.01 % probability on the CCDF, channel bandwidth is 1.2288 MHz;  $f_1 = 2500 \text{ MHz}$ ;  $f_2 = 2600 \text{ MHz}$ ;  $f_3 = 2700 \text{ MHz}$ ; RF performance at  $V_{DS} = 28 \text{ V}$ ;  $I_{Dq} = 600 \text{ mA}$ ;  $T_{case} = 25^\circ\text{C}$ ; unless otherwise specified, in a class-AB production circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$G_p$	power gain	$P_{L(AV)} = 9 \text{ W}$	15	17	-	dB	
$RL_{in}$	input return loss	$P_{L(AV)} = 9 \text{ W}$	-	-10	-	dB	
$\eta_D$	drain efficiency	$P_{L(AV)} = 9 \text{ W}$	19.0	23	-	%	
$ACPR_{885k}$	adjacent channel power ratio (885 kHz)	$P_{L(AV)} = 9 \text{ W}$	[1]	-	-50	-45	dBc
$ACPR_{1980k}$	adjacent channel power ratio (1980 kHz)	$P_{L(AV)} = 9 \text{ W}$	[1]	-	-60	-55	dBc
$P_{L(M)}$	peak output power		[2]	70	75	-	W

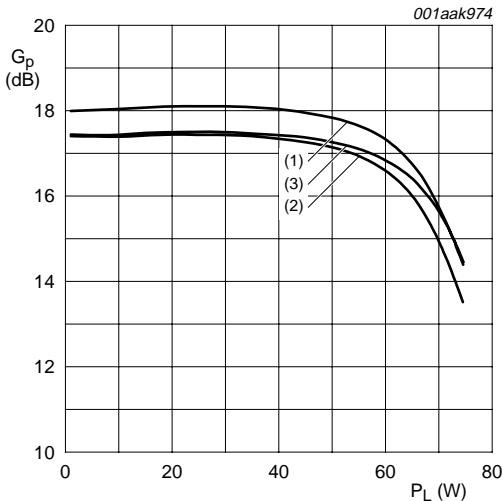
[1] Measured within 30 kHz bandwidth.

[2] Measured at 2.7 GHz and 3 dB compression of the CCDF at 0.01 % probability.

## 7.1 Ruggedness in class-AB operation

The BLF6G27-75 and BLF6G27LS-75 are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28$  V;  $I_{Dq} = 600$  mA;  $P_L = 65$  W (CW);  $f = 2500$  MHz.

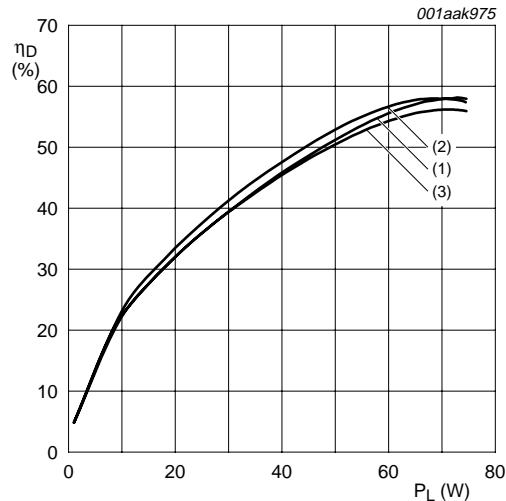
## 7.2 One-tone CW



$V_{DS} = 28$  V;  $I_{Dq} = 600$  mA.

- (1)  $f = 2500$  MHz
- (2)  $f = 2600$  MHz
- (3)  $f = 2700$  MHz

**Fig 1.** Power gain as a function of load power;  
typical values

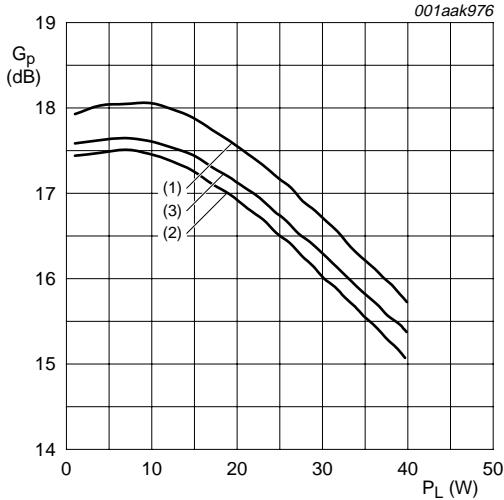


$V_{DS} = 28$  V;  $I_{Dq} = 600$  mA.

- (1)  $f = 2500$  MHz
- (2)  $f = 2600$  MHz
- (3)  $f = 2700$  MHz

**Fig 2.** Drain efficiency as a function of load power;  
typical values

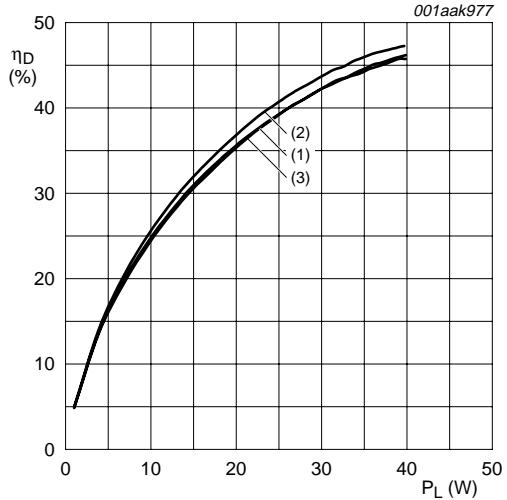
### 7.3 Single carrier IS-95



$V_{DS} = 28$  V;  $I_{Dq} = 600$  mA.

- (1)  $f = 2500$  MHz
- (2)  $f = 2600$  MHz
- (3)  $f = 2700$  MHz

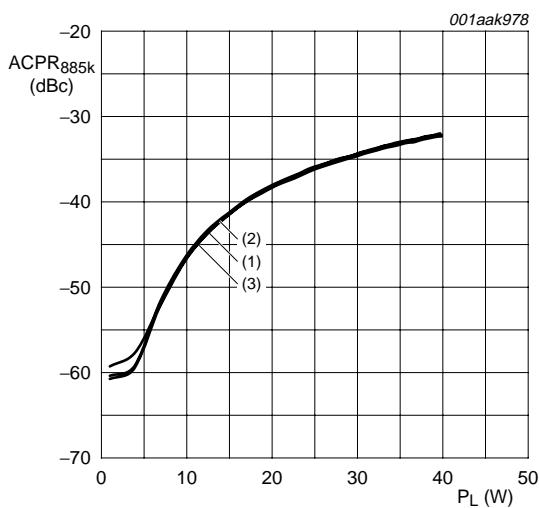
**Fig 3. Power gain as a function of load power; typical values**



$V_{DS} = 28$  V;  $I_{Dq} = 600$  mA.

- (1)  $f = 2500$  MHz
- (2)  $f = 2600$  MHz
- (3)  $f = 2700$  MHz

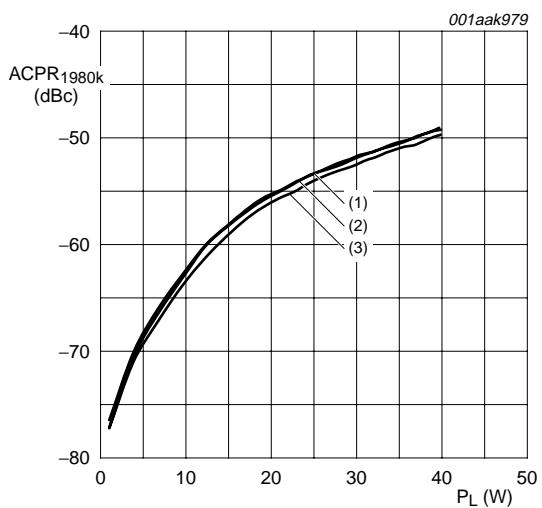
**Fig 4. Drain efficiency as a function of load power; typical values**



$V_{DS} = 28$  V;  $I_{Dq} = 600$  mA.

- (1)  $f = 2500$  MHz
- (2)  $f = 2600$  MHz
- (3)  $f = 2700$  MHz

**Fig 5. Adjacent channel power ratio (885 kHz) as a function of load power; typical values**

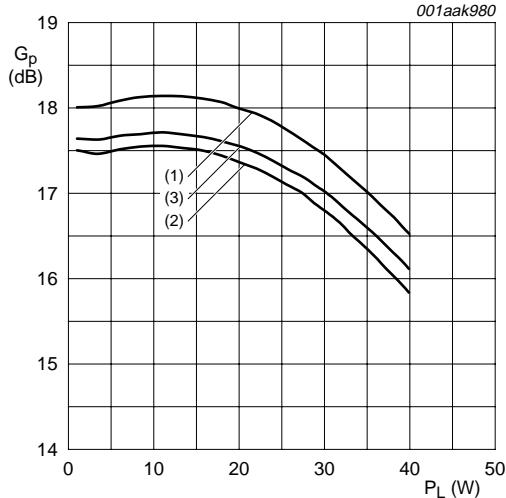


$V_{DS} = 28$  V;  $I_{Dq} = 600$  mA.

- (1)  $f = 2500$  MHz
- (2)  $f = 2600$  MHz
- (3)  $f = 2700$  MHz

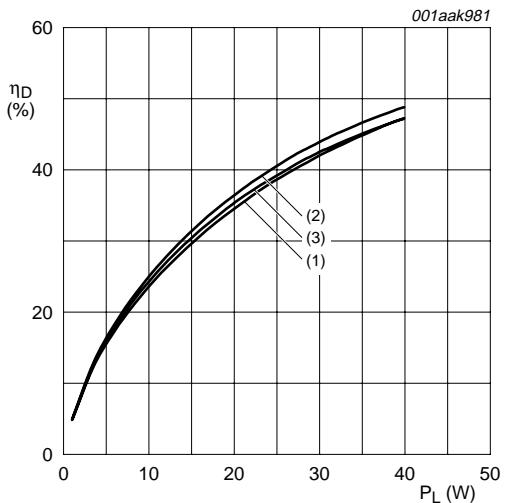
**Fig 6. Adjacent channel power ratio (1980 kHz) as a function of load power; typical values**

## 7.4 Single carrier W-CDMA



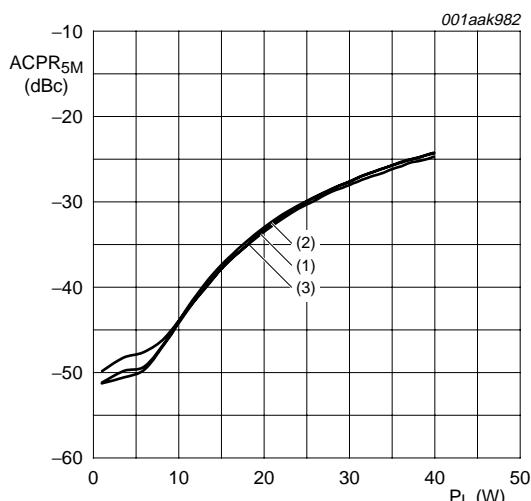
V<sub>DS</sub> = 28 V; I<sub>Dq</sub> = 600 mA.  
(1)  $f = 2500$  MHz  
(2)  $f = 2600$  MHz  
(3)  $f = 2700$  MHz

**Fig 7. Power gain as a function of load power; typical values**



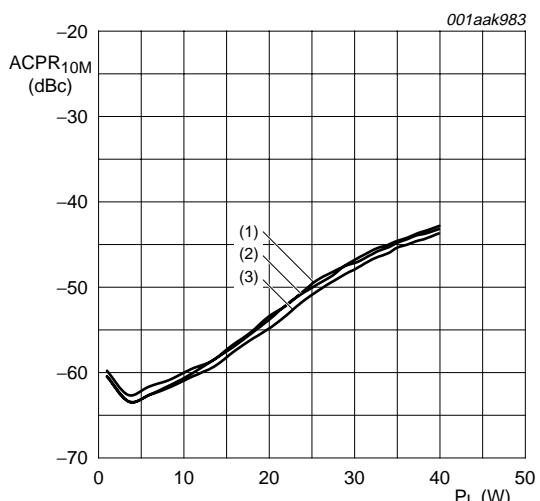
V<sub>DS</sub> = 28 V; I<sub>Dq</sub> = 600 mA.  
(1)  $f = 2500$  MHz  
(2)  $f = 2600$  MHz  
(3)  $f = 2700$  MHz

**Fig 8. Drain efficiency as a function of load power; typical values**



V<sub>DS</sub> = 28 V; I<sub>Dq</sub> = 600 mA.  
(1)  $f = 2500$  MHz  
(2)  $f = 2600$  MHz  
(3)  $f = 2700$  MHz

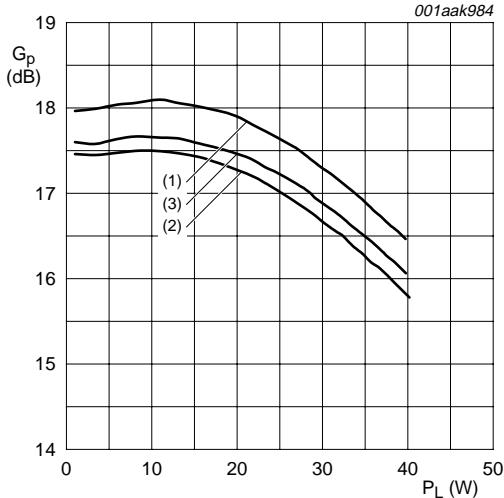
**Fig 9. Adjacent channel power ratio (5 MHz) as a function of load power; typical values**



V<sub>DS</sub> = 28 V; I<sub>Dq</sub> = 600 mA.  
(1)  $f = 2500$  MHz  
(2)  $f = 2600$  MHz  
(3)  $f = 2700$  MHz

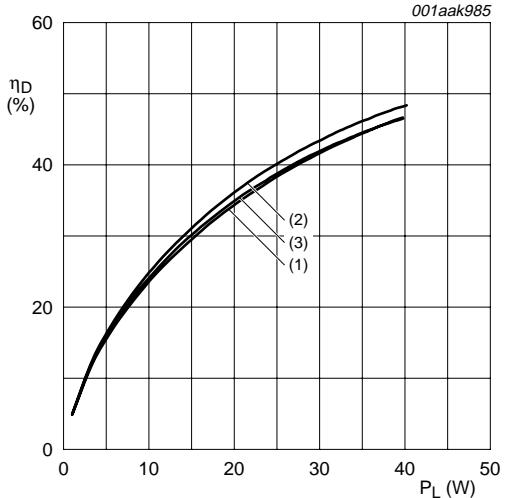
**Fig 10. Adjacent channel power ratio (10 MHz) as a function of load power; typical values**

## 7.5 2-carrier W-CDMA



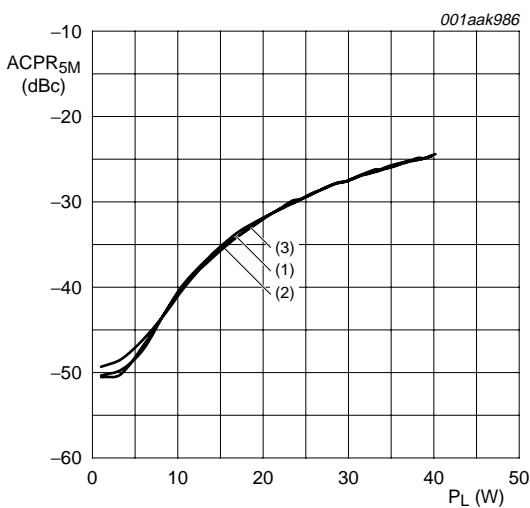
$V_{DS} = 28$  V;  $I_{Dq} = 600$  mA; carrier spacing = 10 MHz.  
(1)  $f = 2500$  MHz  
(2)  $f = 2600$  MHz  
(3)  $f = 2700$  MHz

**Fig 11. Power gain as a function of load power; typical values**



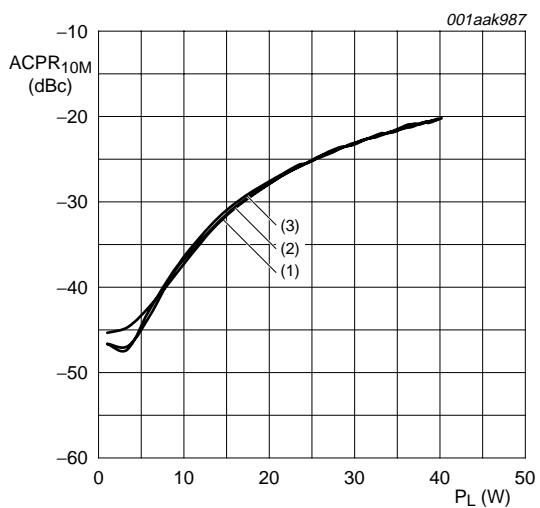
$V_{DS} = 28$  V;  $I_{Dq} = 600$  mA; carrier spacing = 10 MHz.  
(1)  $f = 2500$  MHz  
(2)  $f = 2600$  MHz  
(3)  $f = 2700$  MHz

**Fig 12. Drain efficiency as a function of load power; typical values**



$V_{DS} = 28$  V;  $I_{Dq} = 600$  mA; carrier spacing = 10 MHz.  
(1)  $f = 2500$  MHz  
(2)  $f = 2600$  MHz  
(3)  $f = 2700$  MHz

**Fig 13. Adjacent channel power ratio (5 MHz) as a function of load power; typical values**



$V_{DS} = 28$  V;  $I_{Dq} = 600$  mA; carrier spacing = 10 MHz.  
(1)  $f = 2500$  MHz  
(2)  $f = 2600$  MHz  
(3)  $f = 2700$  MHz

**Fig 14. Adjacent channel power ratio (10 MHz) as a function of load power; typical values**

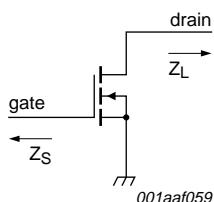
## 8. Test information

### 8.1 Impedance information

**Table 8. Typical impedance**

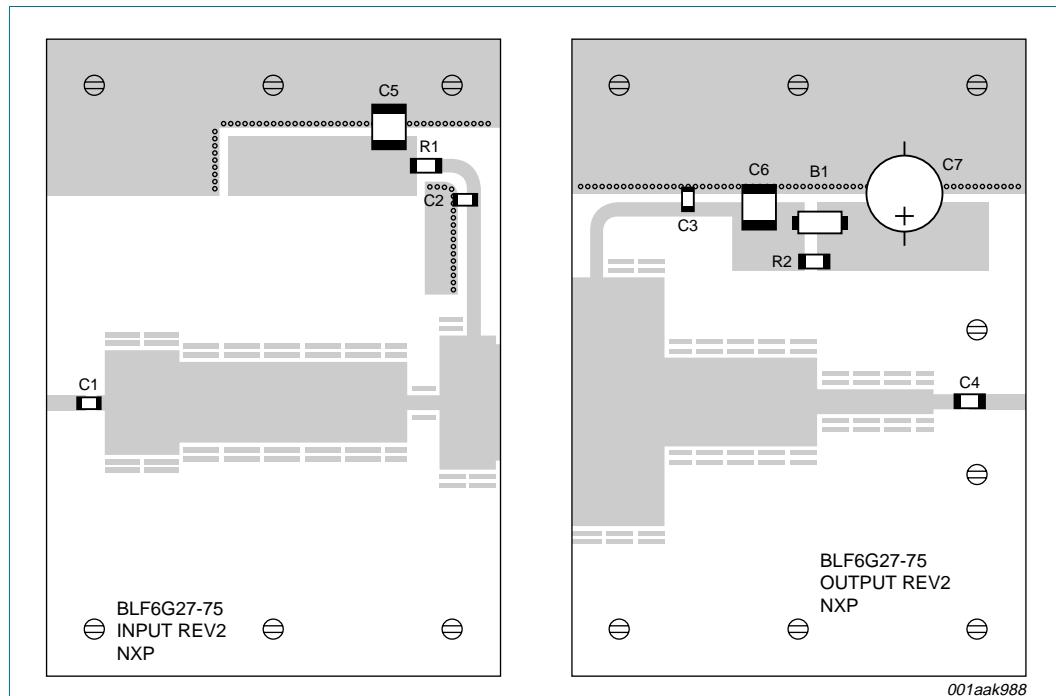
*Typical values per section unless otherwise specified.*

f GHz	Z <sub>S</sub> Ω	Z <sub>L</sub> Ω
2.5	5.3 - j7.7	6.0 - j3.3
2.6	8.7 - j8.7	4.7 - j2.6
2.7	12.2 + j0.4	3.9 - j2.4



**Fig 15. Definition of transistor impedance**

### 8.2 Test circuit



Printed-Circuit Board (PCB) material: Taconic RF35 with  $\epsilon_r = 3.5$  and thickness = 0.762 mm.

See [Table 9](#) for list of components.

**Fig 16. Component layout**

**Table 9. List of components**See [Figure 16](#) for component layout.

Component	Description	Value	Remarks
B1	ferrite bead	-	
C1, C2, C3	multilayer ceramic chip capacitor	13 pF	[1]
C4	multilayer ceramic chip capacitor	10 pF	[2]
C5, C6	multilayer ceramic chip capacitor	4.7 µF	TDK
C7	electrolytic capacitor	220 µF; 63 V	
R1, R2	SMD resistor	10 Ω	SMD 1206

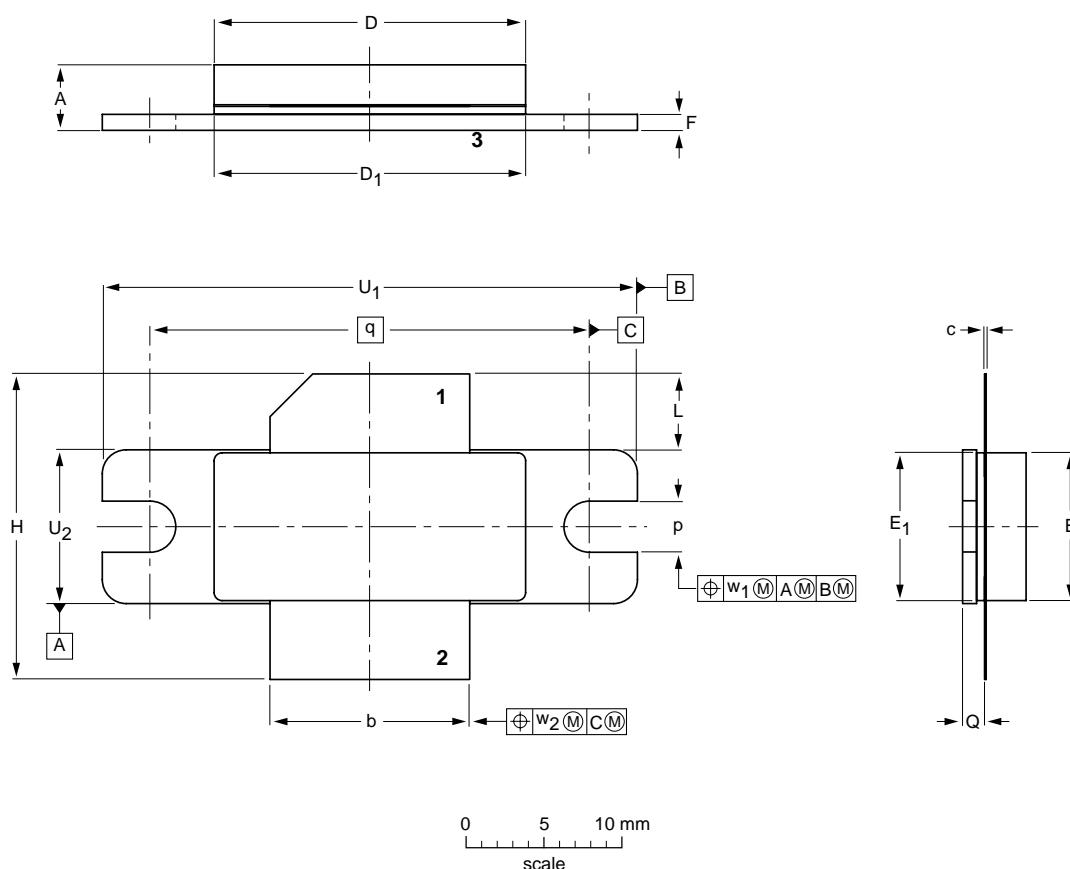
[1] American Technical Ceramics type 100A or capacitor of same quality.

[2] American Technical Ceramics type 100B or capacitor of same quality.

## 9. 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 3.43	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 31.12	34.16 33.91	9.91 9.65	0.25	0.51
inches	0.186 0.135	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 1.057	1.345 1.335	0.390 0.380	0.01	0.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT502A						-99-12-28 03-01-10

Fig 17. Package outline SOT502A

## Earless flanged LDMOST ceramic package; 2 leads

SOT502B

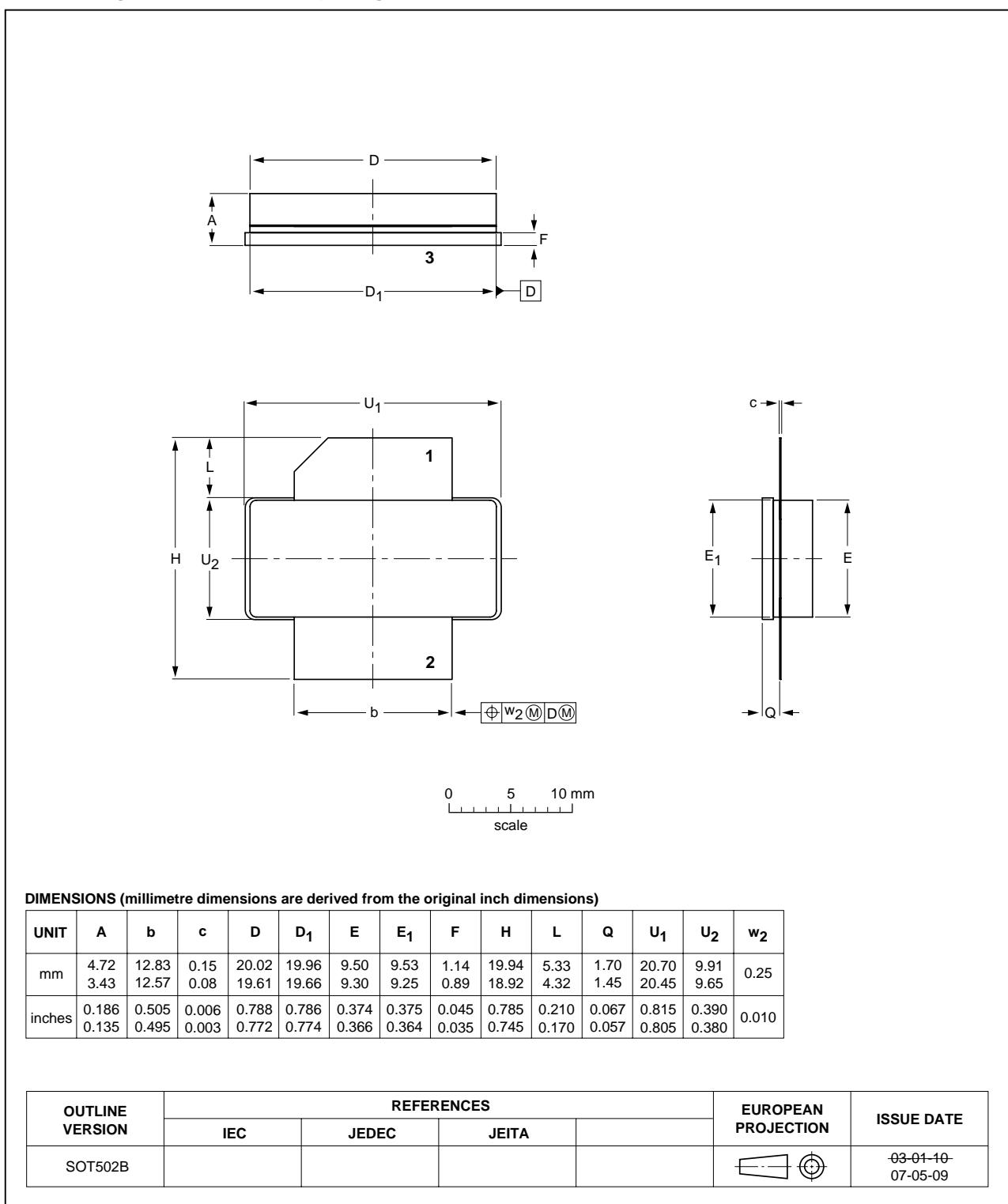


Fig 18. Package outline SOT502B

## 10. Abbreviations

**Table 10. Abbreviations**

Acronym	Description
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
IS-95	Interim Standard 95
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
LDMOST	Laterally Diffused Metal-Oxide Semiconductor Transistor
N-CDMA	Narrowband Code Division Multiple Access
PAR	Peak-to-Average power Ratio
RF	Radio Frequency
SMD	Surface Mounted Device
VSWR	Voltage Standing-Wave Ratio
W-CDMA	Wideband Code Division Multiple Access
WiMAX	Worldwide Interoperability for Microwave Access

## 11. Revision history

**Table 11. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G27-75_6G27LS-75_1	20091022	Product data sheet	-	-

## 12. Legal information

### 12.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

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