

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

Mode of operation	f (MHz)	V <sub>DS</sub> (V)	P <sub>L(AV)</sub> (W)	P <sub>L(M)</sub> (W)	G <sub>p</sub> (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<sub>DQ</sub> 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

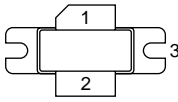
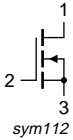
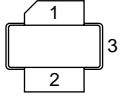
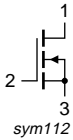
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

## 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		
<b>BLF6G27LS-75 (SOT502B)</b>			
1	drain		
2	gate		
3	source		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
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	$T_{case} = 80\text{ °C};$ $P_L = 60\text{ W (CW)}$	BLF6G27-75	0.85	K/W
			BLF6G27LS-75	0.75	K/W

## 6. Characteristics

**Table 6. Characteristics**

$T_j = 25\text{ °C}$  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  $V_{DS} = 28\text{ V}; I_{DQ} = 600\text{ mA}; T_{case} = 25\text{ °C};$  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

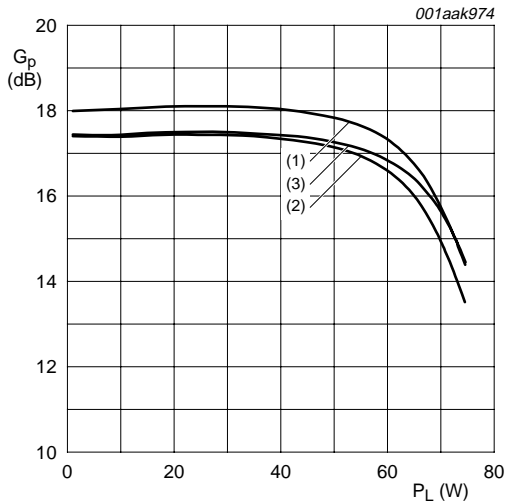
[1] Measured within 30 kHz bandwidth.

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

**7.1 Ruggedness in class-AB operation**

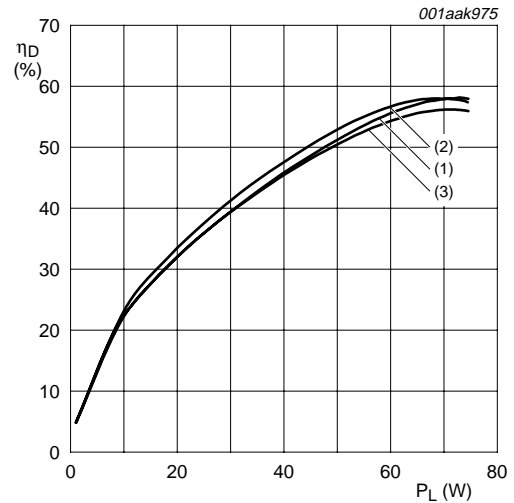
The BLF6G27-75 and BLF6G27LS-75 are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 600\text{ mA}$ ;  $P_L = 65\text{ W (CW)}$ ;  $f = 2500\text{ MHz}$ .

**7.2 One-tone CW**



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

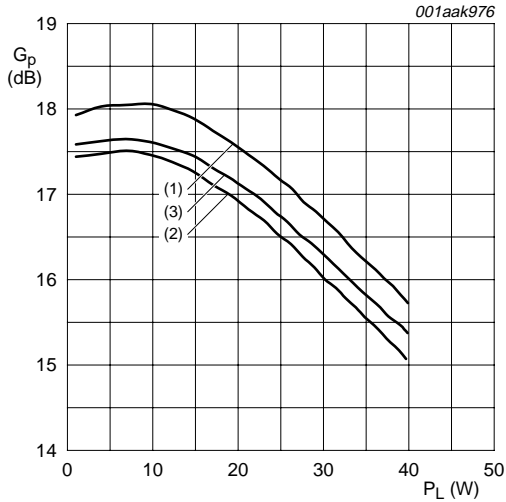
**Fig 1. Power gain as a function of load power; typical values**



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

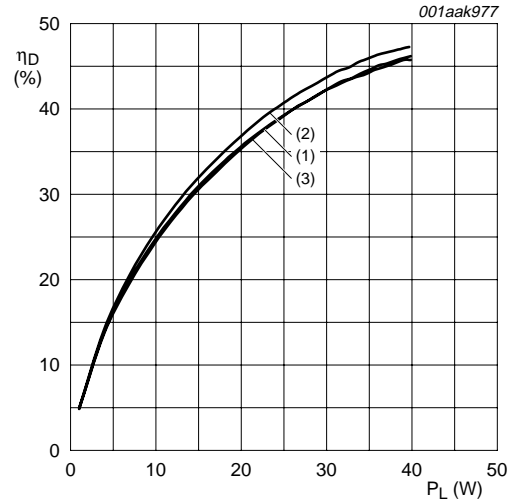
**Fig 2. Drain efficiency as a function of load power; typical values**

7.3 Single carrier IS-95



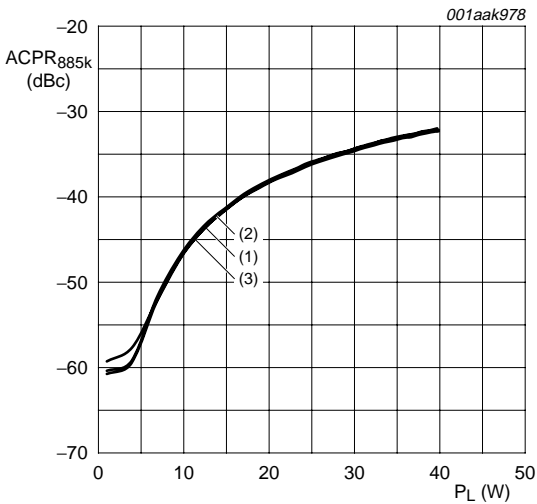
$V_{DS} = 28\text{ V}; I_{Dq} = 600\text{ mA.}$   
 (1)  $f = 2500\text{ MHz}$   
 (2)  $f = 2600\text{ MHz}$   
 (3)  $f = 2700\text{ MHz}$

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



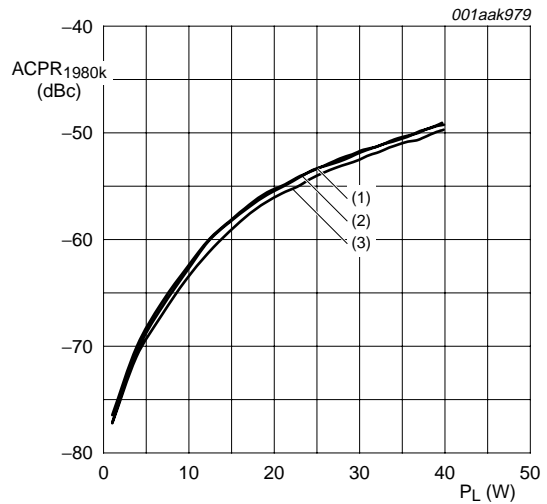
$V_{DS} = 28\text{ V}; I_{Dq} = 600\text{ mA.}$   
 (1)  $f = 2500\text{ MHz}$   
 (2)  $f = 2600\text{ MHz}$   
 (3)  $f = 2700\text{ MHz}$

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



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

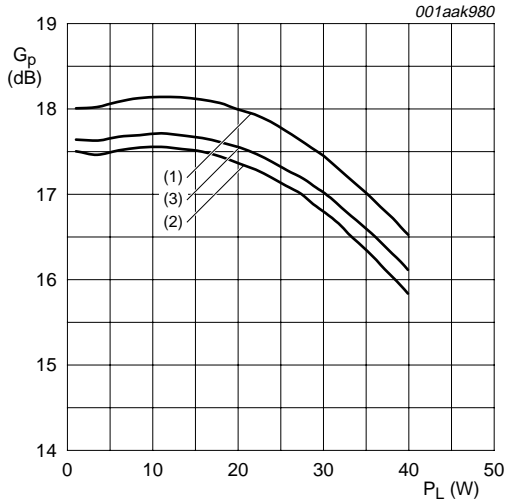
**Fig 5. Adjacent channel power ratio (885 kHz) as a function of load power; typical values**



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

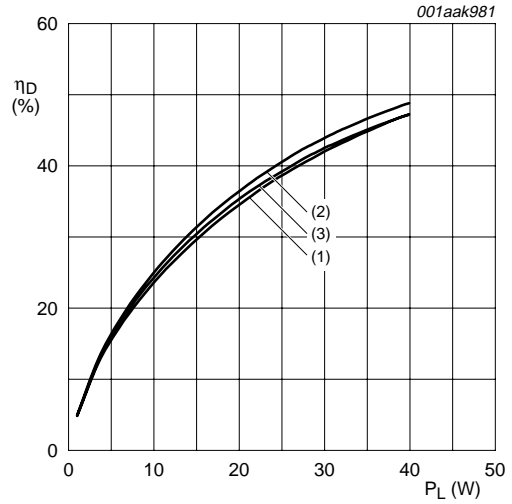
**Fig 6. Adjacent channel power ratio (1980 kHz) as a function of load power; typical values**

7.4 Single carrier W-CDMA



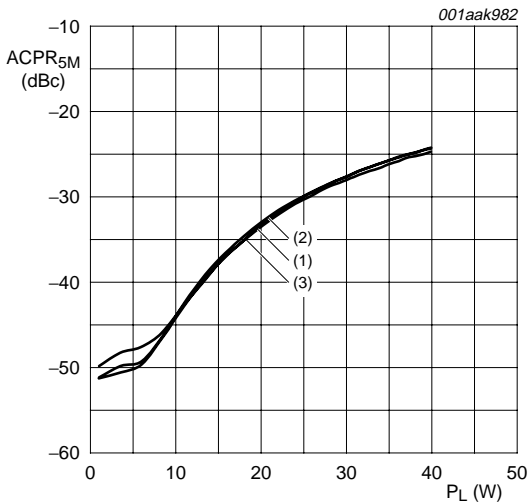
$V_{DS} = 28\text{ V}; I_{Dq} = 600\text{ mA}.$   
 (1)  $f = 2500\text{ MHz}$   
 (2)  $f = 2600\text{ MHz}$   
 (3)  $f = 2700\text{ MHz}$

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



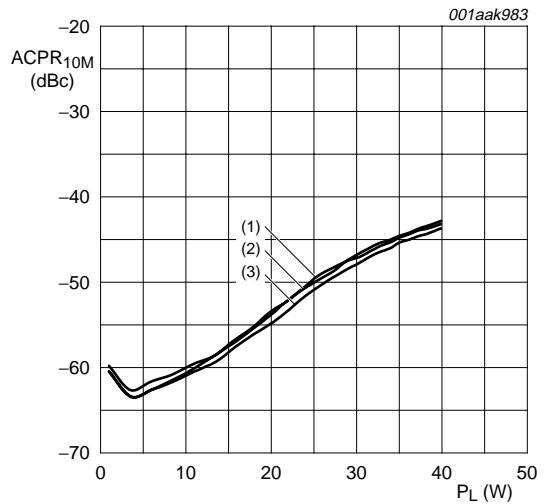
$V_{DS} = 28\text{ V}; I_{Dq} = 600\text{ mA}.$   
 (1)  $f = 2500\text{ MHz}$   
 (2)  $f = 2600\text{ MHz}$   
 (3)  $f = 2700\text{ MHz}$

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



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

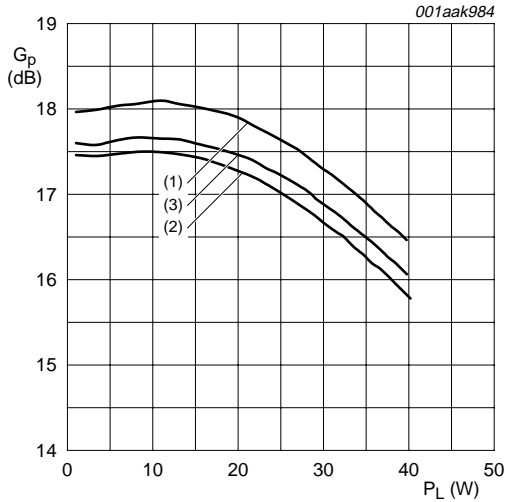
**Fig 9. Adjacent channel power ratio (5 MHz) as a function of load power; typical values**



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

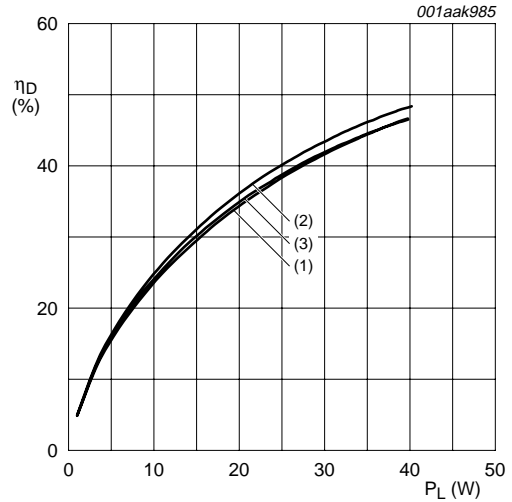
**Fig 10. Adjacent channel power ratio (10 MHz) as a function of load power; typical values**

7.5 2-carrier W-CDMA



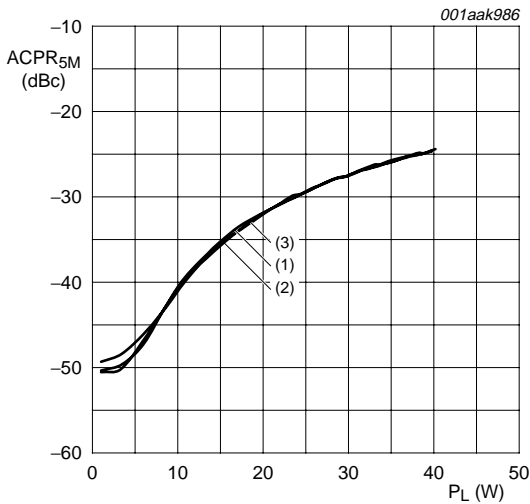
$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 600\text{ mA}$ ; carrier spacing = 10 MHz.  
 (1)  $f = 2500\text{ MHz}$   
 (2)  $f = 2600\text{ MHz}$   
 (3)  $f = 2700\text{ MHz}$

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



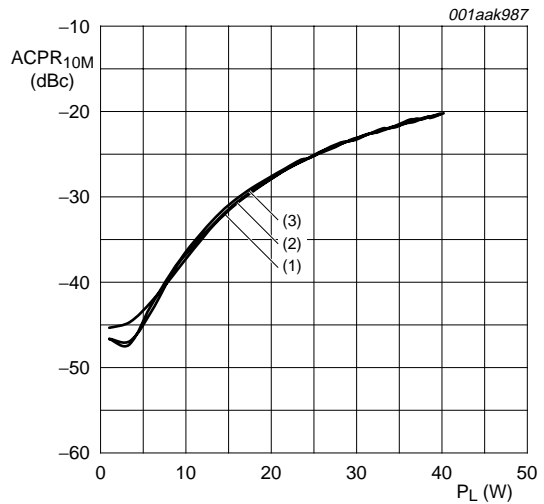
$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 600\text{ mA}$ ; carrier spacing = 10 MHz.  
 (1)  $f = 2500\text{ MHz}$   
 (2)  $f = 2600\text{ MHz}$   
 (3)  $f = 2700\text{ MHz}$

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



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

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



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

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

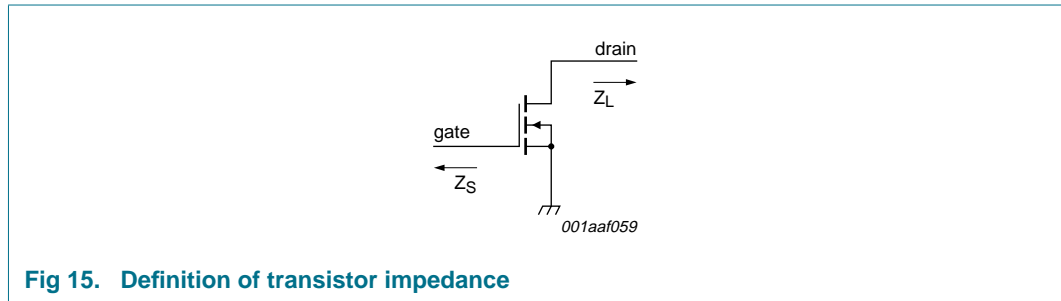
## 8. Test information

### 8.1 Impedance information

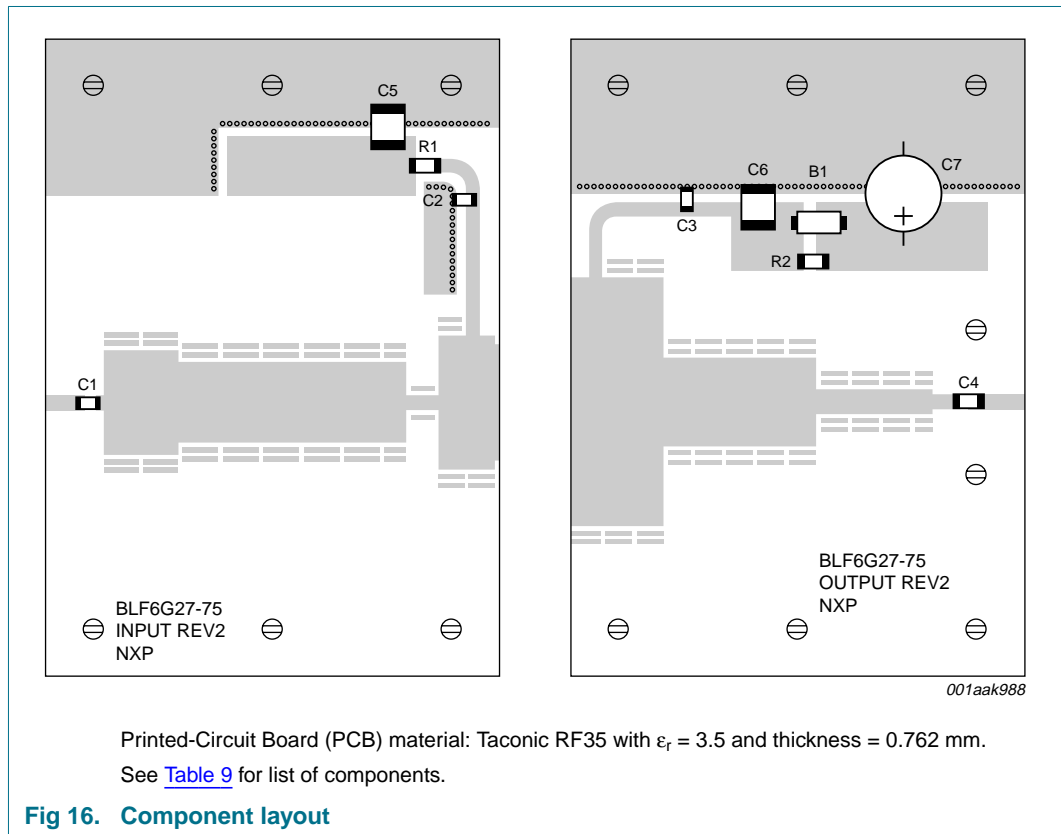
**Table 8. Typical impedance**

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



### 8.2 Test circuit



**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	<a href="#">[1]</a>
C4	multilayer ceramic chip capacitor	10 pF	<a href="#">[2]</a>
C5, C6	multilayer ceramic chip capacitor	4.7 $\mu$ F	TDK
C7	electrolytic capacitor	220 $\mu$ F; 63 V	
R1, R2	SMD resistor	10 $\Omega$	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

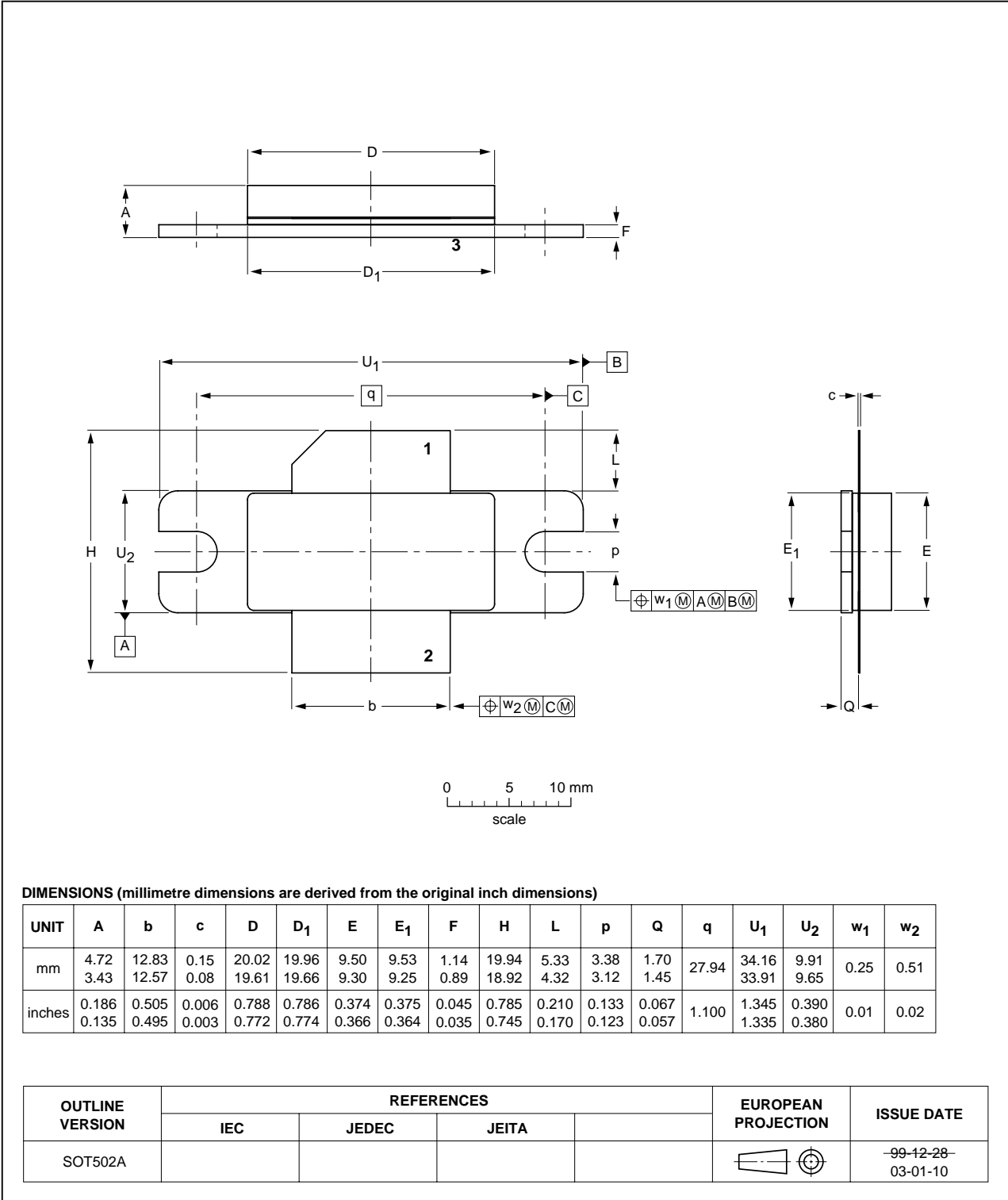


Fig 17. Package outline SOT502A

Earless flanged LDMOST ceramic package; 2 leads

SOT502B

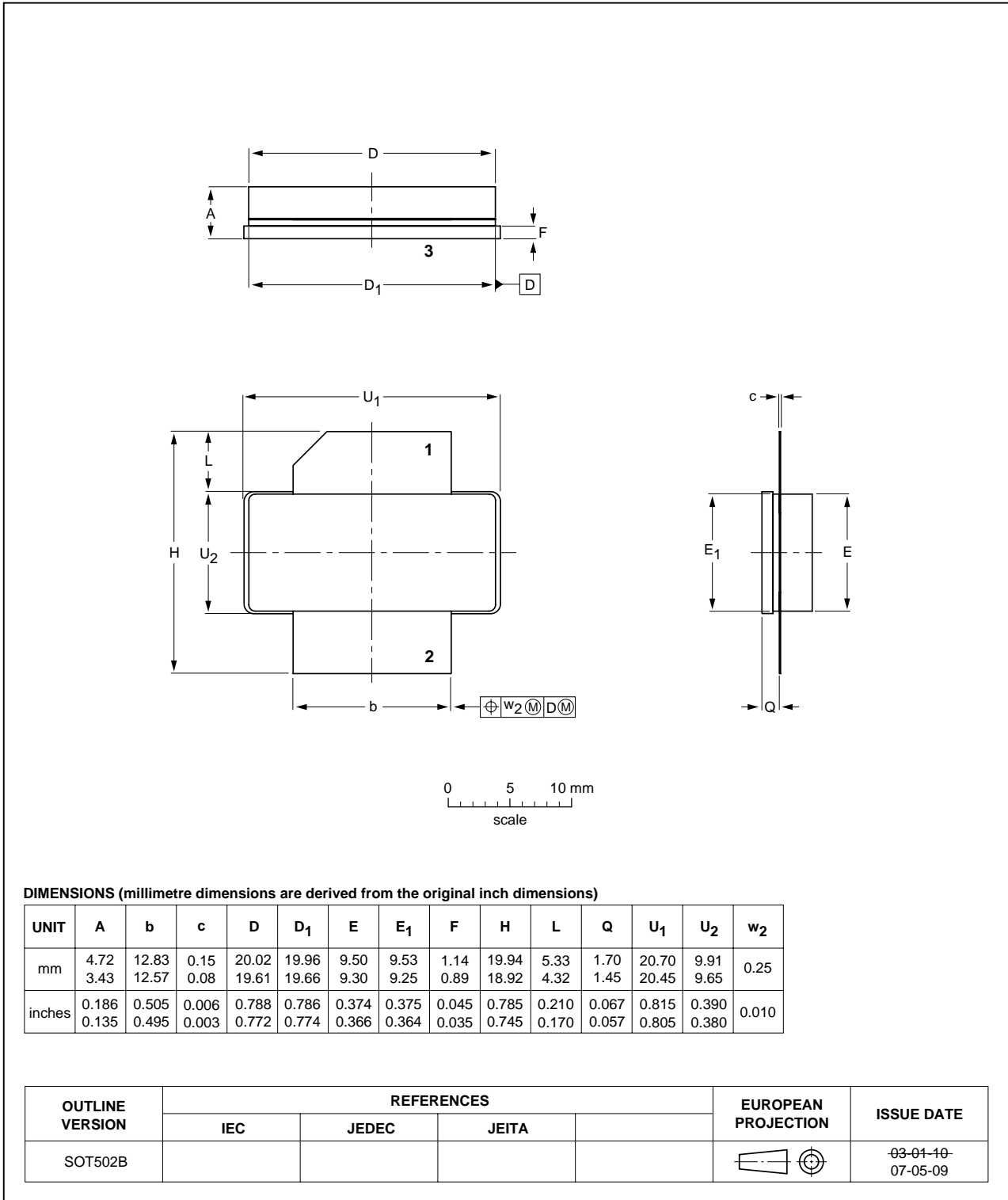


Fig 18. Package outline SOT502B

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

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