

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 $T_{case} = 25^{\circ}C$ 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)	η_D (%)	ACPR _{885k} (dBc)	ACPR _{1980k} (dBc)
1-carrier N-CDMA ^[1]	2500 to 2700	28	9	75	17	23	-50 ^[2]	-60 ^[2]

[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 %
 - ◆ ACPR₈₈₅ = -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

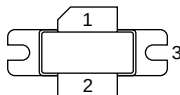
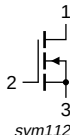
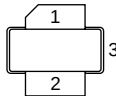
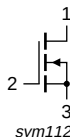
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

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
BLF6G27-75 (SOT502A)			
1	drain		
2	gate		
3	source		
BLF6G27LS-75 (SOT502B)			
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	$T_{case} = 80\text{ }^{\circ}\text{C}$; $P_L = 60\text{ W (CW)}$	BLF6G27-75	0.85	K/W
			BLF6G27LS-75	0.75	K/W

6. Characteristics

Table 6. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}$; $I_D = 0.5\text{ mA}$	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	μA
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	Ω
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 $V_{DS} = 28\text{ V}$; $I_{DQ} = 600\text{ mA}$; $T_{case} = 25\text{ }^{\circ}\text{C}$; 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
η_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

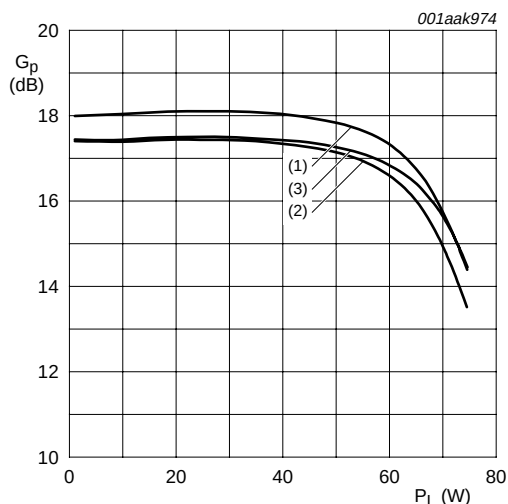
[1] Measured within 30 kHz bandwidth.

[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:
 $V_{DS} = 28\text{ V}$; $I_{DQ} = 600\text{ mA}$; $P_L = 65\text{ W (CW)}$; $f = 2500\text{ MHz}$.

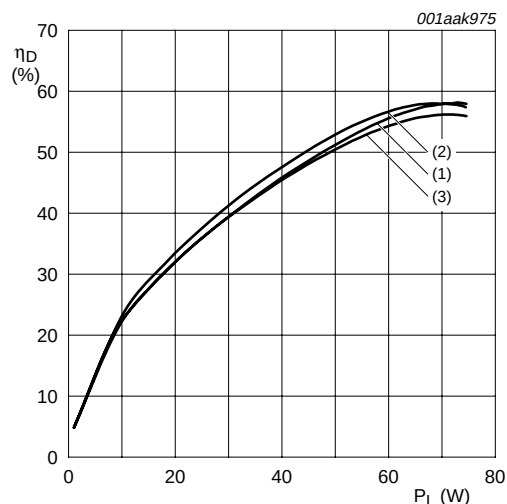
7.2 One-tone CW



$V_{DS} = 28\text{ V}$; $I_{DQ} = 600\text{ mA}$.

- (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

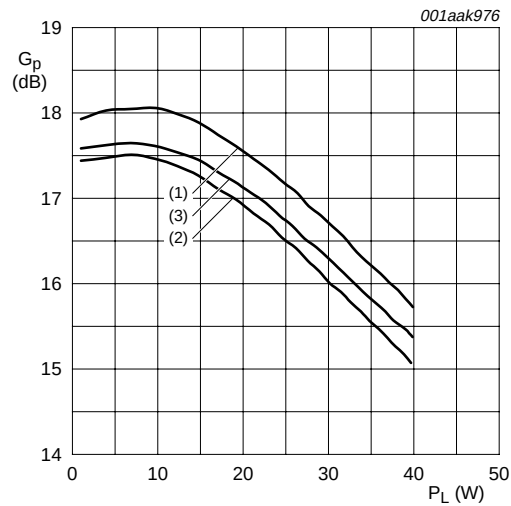


$V_{DS} = 28\text{ V}$; $I_{DQ} = 600\text{ mA}$.

- (1) $f = 2500\text{ MHz}$
- (2) $f = 2600\text{ MHz}$
- (3) $f = 2700\text{ MHz}$

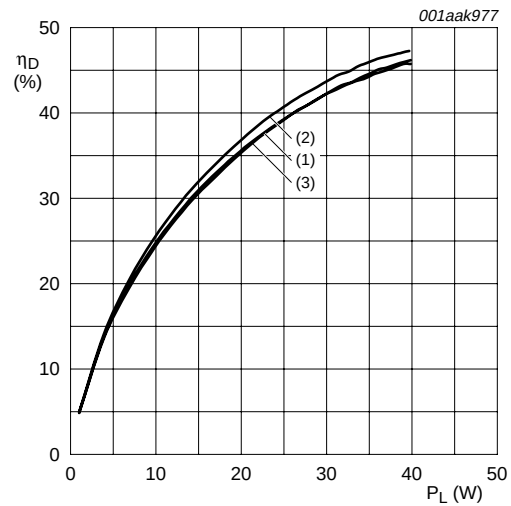
Fig 2. Drain efficiency as a function of load power; typical values

7.3 Single carrier IS-95



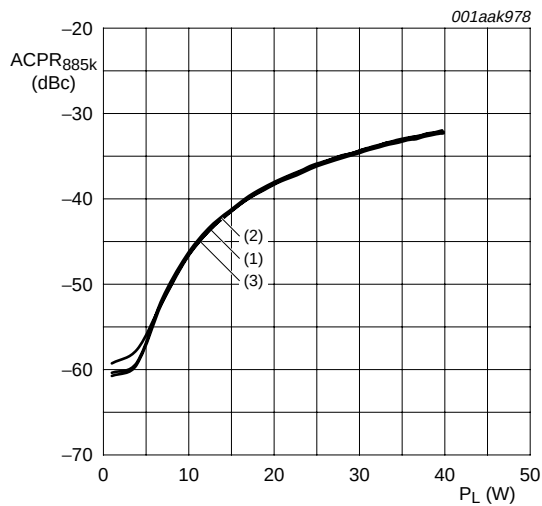
$V_{DS} = 28\text{ V}; I_{Dq} = 600\text{ mA}.$
(1) $f = 2500\text{ MHz}$
(2) $f = 2600\text{ MHz}$
(3) $f = 2700\text{ MHz}$

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



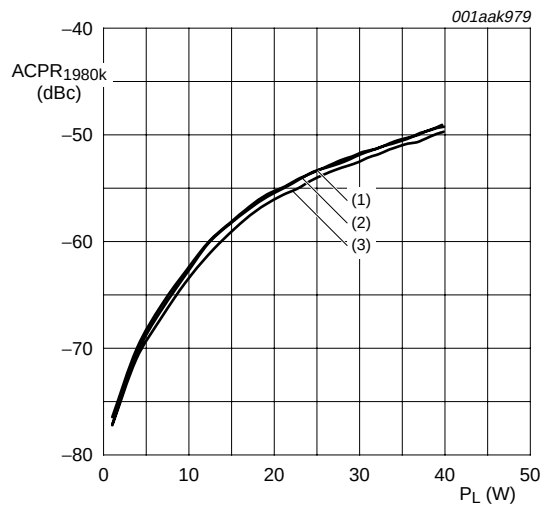
$V_{DS} = 28\text{ V}; I_{Dq} = 600\text{ mA}.$
(1) $f = 2500\text{ MHz}$
(2) $f = 2600\text{ MHz}$
(3) $f = 2700\text{ MHz}$

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

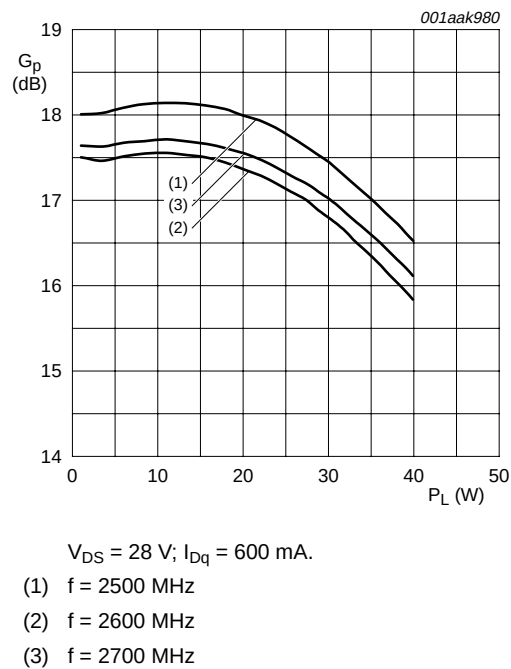


Fig 7. Power gain as a function of load power; typical values

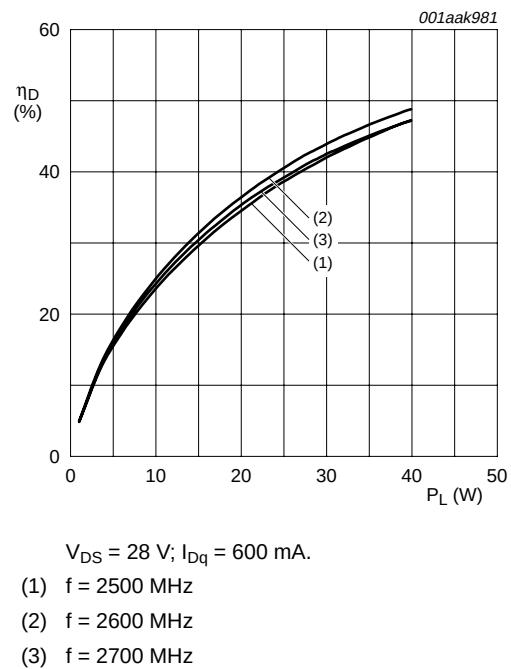


Fig 8. Drain efficiency as a function of load power; typical values

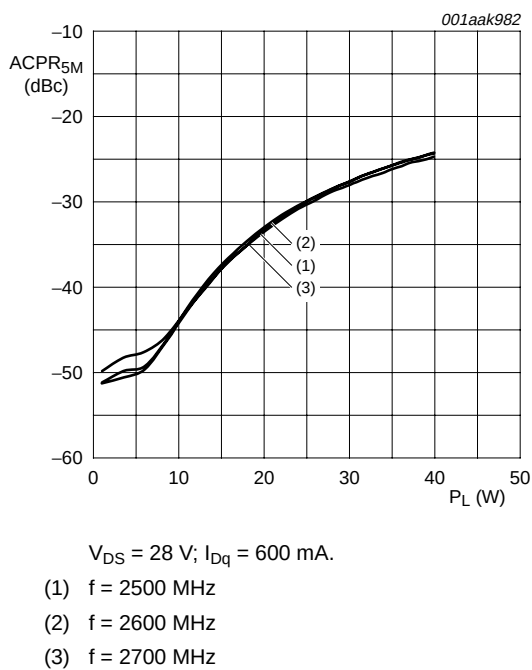


Fig 9. Adjacent channel power ratio (5 MHz) as a function of load power; typical values

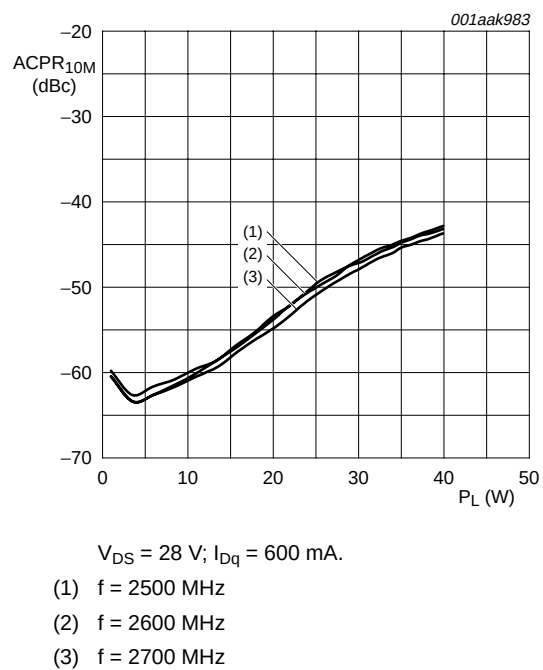
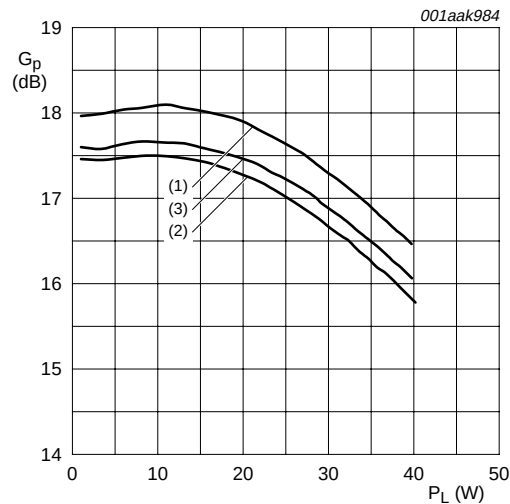


Fig 10. Adjacent channel power ratio (10 MHz) as a function of load power; typical values

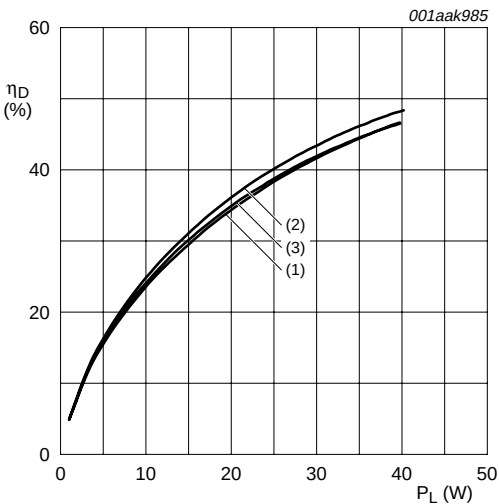
7.5 2-carrier W-CDMA



$V_{DS} = 28\text{ V}$; $I_{DQ} = 600\text{ mA}$; carrier spacing = 10 MHz.

- (1) $f = 2500\text{ MHz}$
- (2) $f = 2600\text{ MHz}$
- (3) $f = 2700\text{ MHz}$

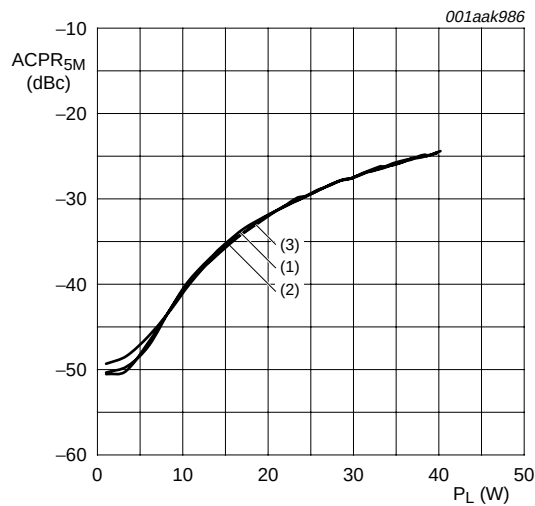
Fig 11. Power gain as a function of load power; typical values



$V_{DS} = 28\text{ V}$; $I_{DQ} = 600\text{ mA}$; carrier spacing = 10 MHz.

- (1) $f = 2500\text{ MHz}$
- (2) $f = 2600\text{ MHz}$
- (3) $f = 2700\text{ MHz}$

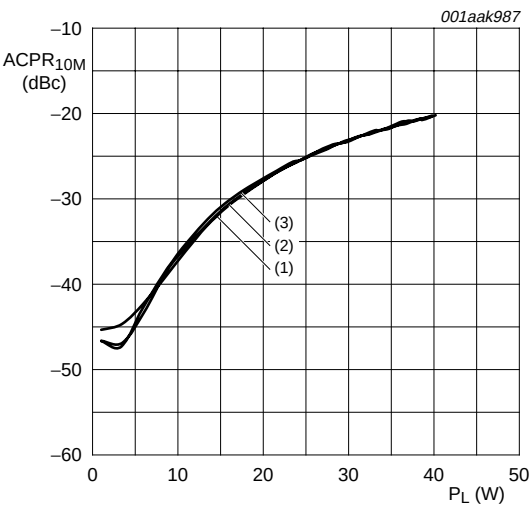
Fig 12. Drain efficiency as a function of load power; typical values



$V_{DS} = 28\text{ V}$; $I_{DQ} = 600\text{ mA}$; 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) $f = 2700\text{ MHz}$

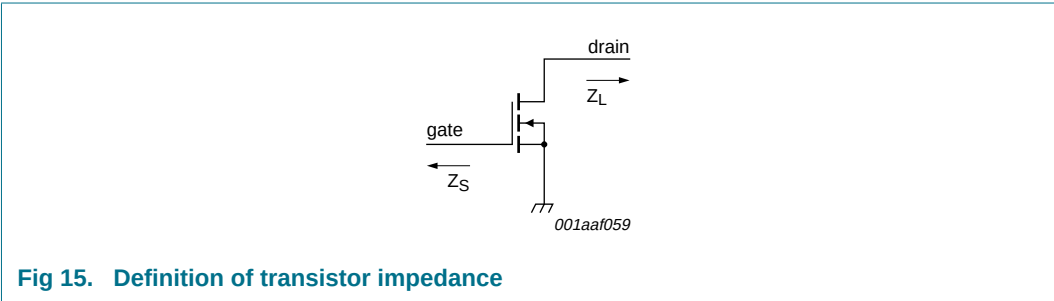
Fig 14. Adjacent channel power ratio (10 MHz) as a function of load power; typical values

8. Test information

8.1 Impedance information

Table 8. Typical impedance
Typical values per section unless otherwise specified.

f	Z _S	Z _L
GHz	Ω	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

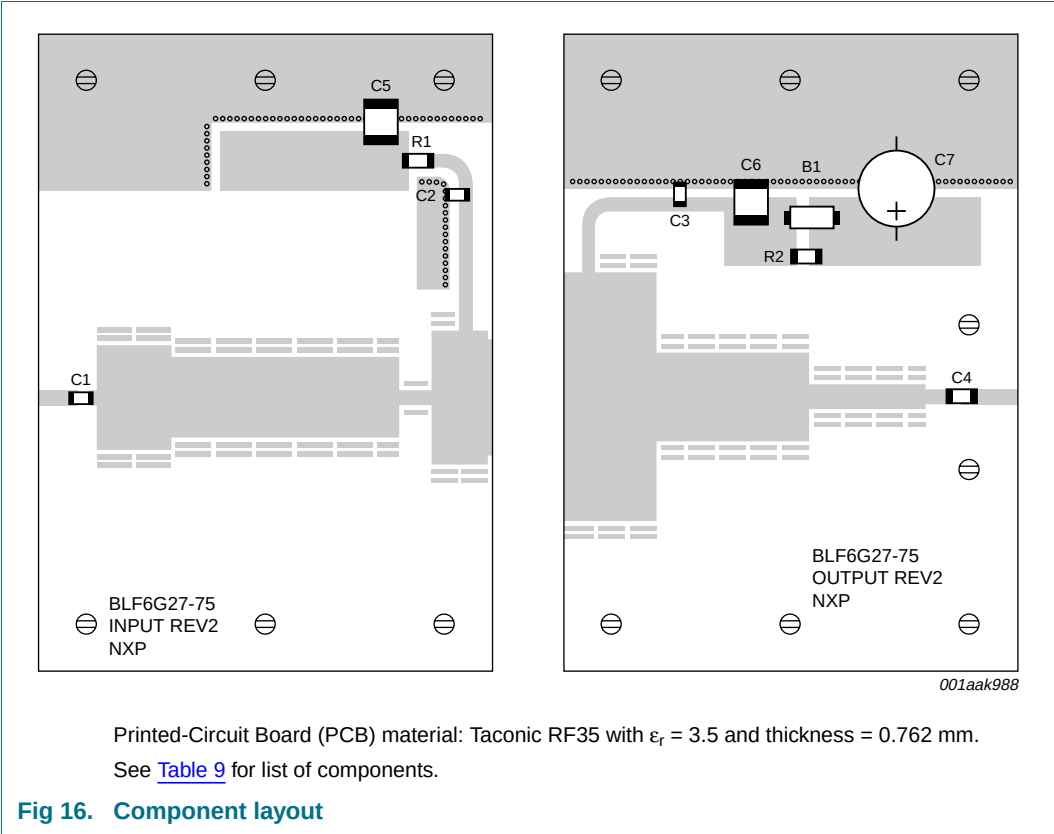


Table 9. List of components

See [Figure 16](#) for component layout.

Component	Description	Value	Remarks
B1	ferrite bead	-	
C1, C2, C3	multilayer ceramic chip capacitor	13 pF	[1]
C4	multilayer ceramic chip capacitor	10 pF	[2]
C5, C6	multilayer ceramic chip capacitor	4.7 μ F	TDK
C7	electrolytic capacitor	220 μ F; 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

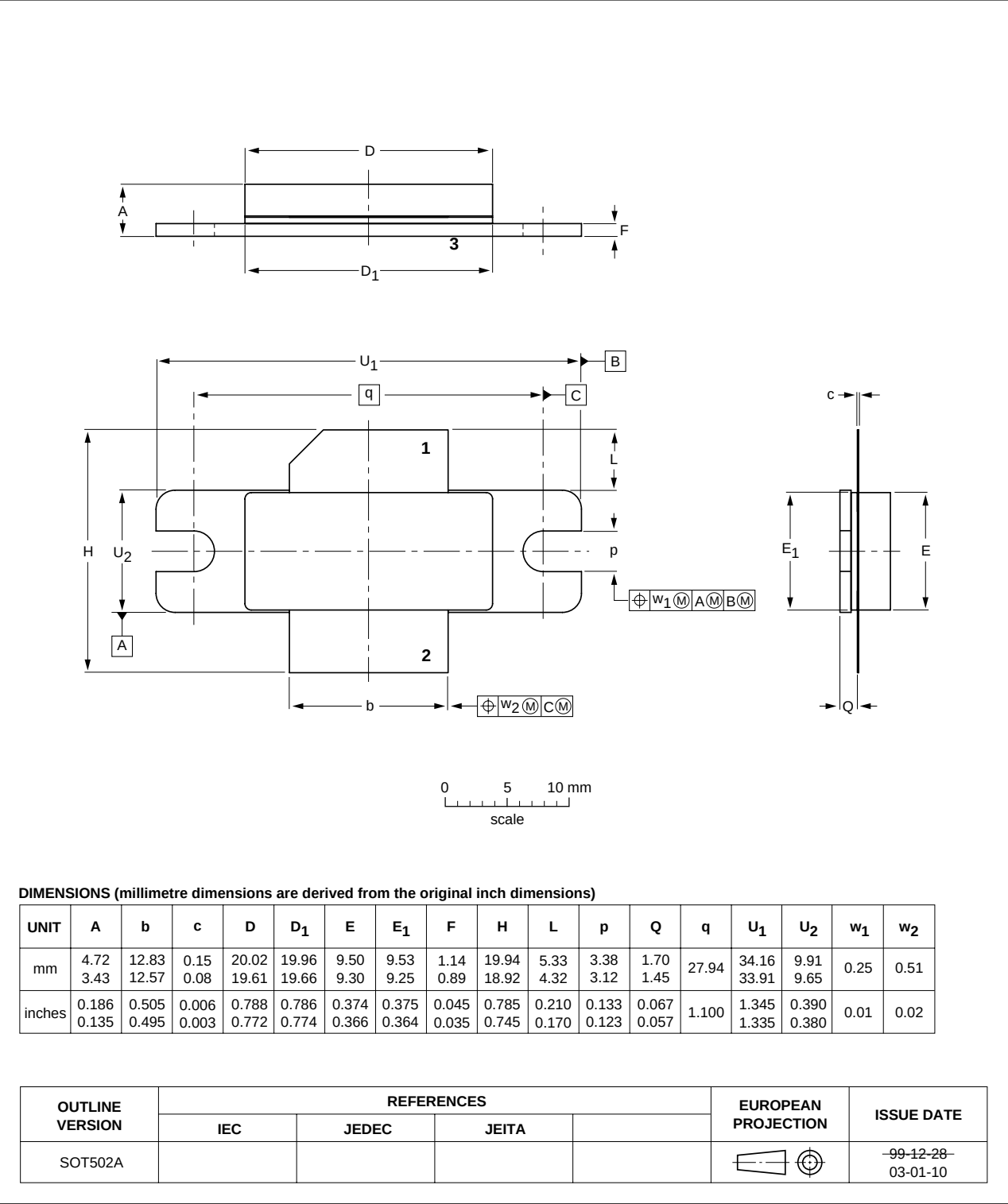


Fig 17. Package outline SOT502A

Earless flanged LDMOST ceramic package; 2 leads

SOT502B

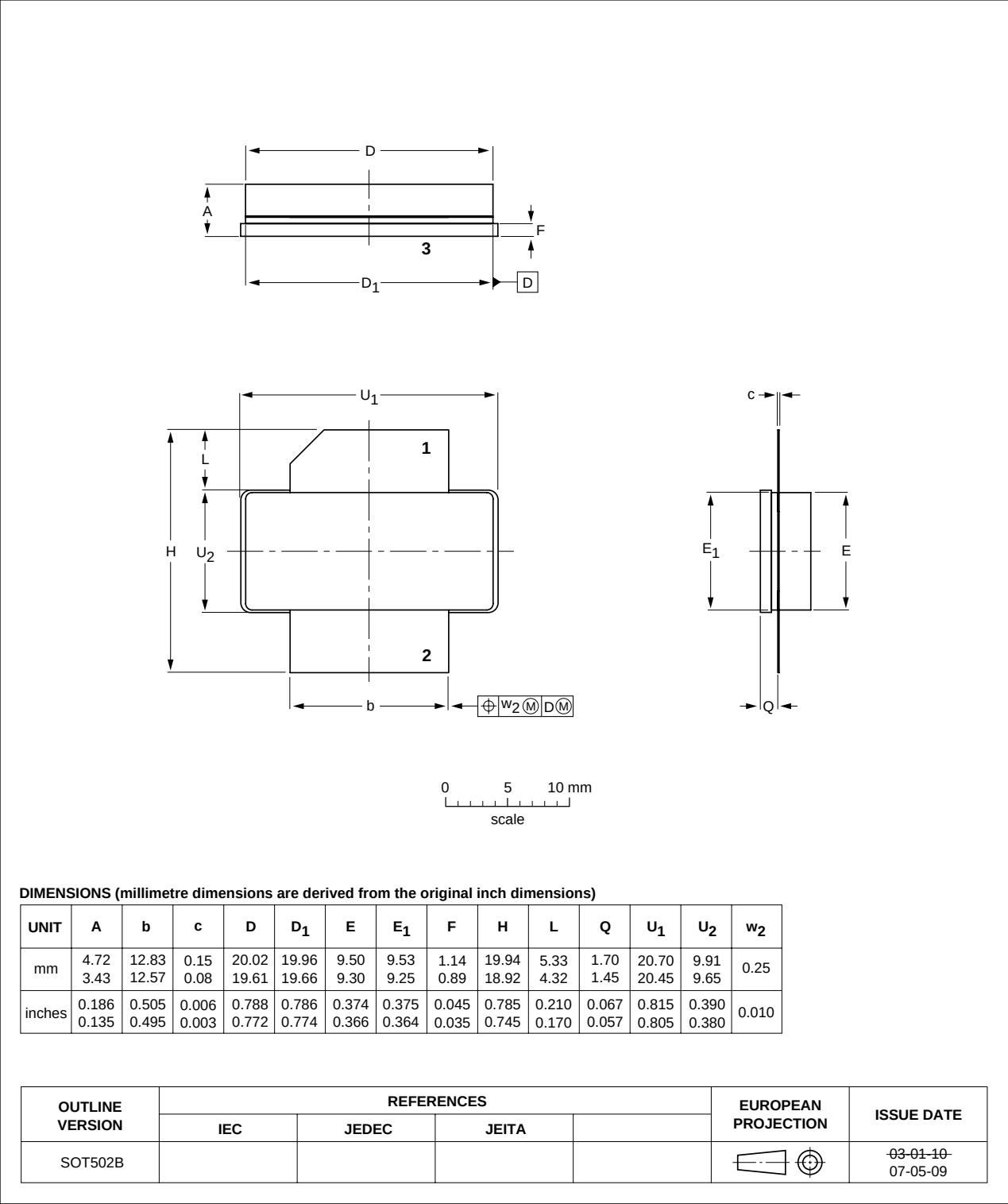


Fig 18. Package outline SOT502B

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 ^{[1][2]}	Product status ^[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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Product [short] data sheet	Production	This document contains the product specification.

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

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