

# BLF6G27-10; BLF6G27-10G

WiMAX power LDMOS transistor

Rev. 3 — 28 February 2011

Product data sheet

## 1. Product profile

### 1.1 General description

10 W LDMOS power transistor for base station applications at frequencies from 2300 MHz to 2400 MHz and 2500 MHz to 2700 MHz.

**Table 1. Typical performance**

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

Mode of operation	f (MHz)	V <sub>DS</sub> (V)	P <sub>L(AV)</sub> (W)	G <sub>p</sub> (dB)	η <sub>D</sub> (%)	ACPR <sub>885k</sub> (dBc)	ACPR <sub>1980k</sub> (dBc)
1-carrier N-CDMA <sup>[1]</sup>	2500 to 2700	28	2	19	20	-49 <sup>[2]</sup>	-64 <sup>[2]</sup>
IS-95	2300 to 2400	28	2	22.5	24.8	-47 <sup>[2]</sup>	-64 <sup>[2]</sup>

[1] Single carrier N-CDMA with pilot, paging sync and 6 traffic channels (Walsh codes 8 - 13). PAR = 9.7 dB at 0.01 % probability on CCDF. Channel bandwidth is 1.23 MHz.

[2] Measured within 30 kHz bandwidth.

### 1.2 Features and benefits

- Typical 1-carrier N-CDMA performance (Single carrier N-CDMA with pilot, paging, sync and 6 traffic channels [Walsh codes 8 - 13]. PAR = 9.7 dB at 0.01 % probability on CCDF. Channel bandwidth is 1.23 MHz), a supply voltage of 28 V and an I<sub>DQ</sub> of 130 mA:
- Qualified up to a maximum V<sub>DS</sub> operation of 32 V
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation
- Internally matched for ease of use
- Low gold plating thickness on leads
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

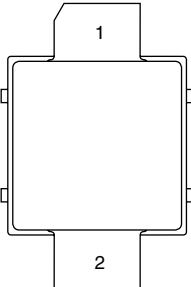
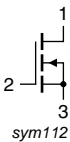
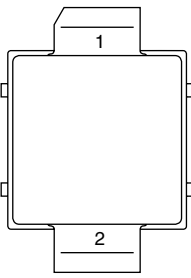
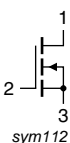
### 1.3 Applications

- RF power amplifiers for base stations and multi carrier applications in the 2300 MHz to 2400 MHz and 2500 MHz to 2700 MHz frequency range.



## 2. Pinning information

**Table 2. Pinning**

Pin	Description	Simplified outline	Graphic symbol
<b>BLF6G27-10 (SOT975B)</b>			
1	drain		
2	gate		
3	source		
<b>BLF6G27-10G (SOT975C)</b>			
1	drain		
2	gate		
3	source		

[1] Connected to flange.

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		Version
	Name	Description	
BLF6G27-10	-	earless flanged ceramic package; 2 leads	SOT975B
BLF6G27-10G	-	earless flanged ceramic package; 2 leads	SOT975C

## 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		-	3.5	A
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	225	°C

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Type	Typ	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C};$ $P_L = 10\text{ W (CW)}$	BLF6G27-10	4.0	K/W
			BLF6G27-10G	4.0	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	$V_{GS} = 0\text{ V}; I_D = 0.18\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 18\text{ mA}$	1.4	1.9	2.4	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	1.4	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $V_{DS} = 10\text{ V}$	2.7	-	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	140	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 0.9\text{ A}$	0.8	-	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $I_D = 0.6\text{ A}$	328	-	1256	$\text{m}\Omega$
$C_{rs}$	feedback capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V};$ $f = 1\text{ MHz}$	-	3.6	-	pF

## 7. Application information

**Table 7. Application information**

Mode of operation: Single carrier N-CDMA with pilot, paging, sync and 6 traffic channels (Walsh codes 8 - 13). PAR 9.7 dB at 0.01 % probability on CCDF; Channel Bandwidth is 1.23 MHz;  $f_1 = 2500\text{ MHz}; f_2 = 2600\text{ MHz}; f_3 = 2700\text{ MHz};$  RF performance at  $V_{DS} = 28\text{ V}; I_{Dq} = 130\text{ mA};$   $T_{case} = 25\text{ °C};$  unless otherwise specified; in a class-AB production circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$P_{L(AV)}$	average output power		-	2	-	W	
$G_p$	power gain	$P_{L(AV)} = 2\text{ W}$	17.5	19	-	dB	
$RL_{in}$	input return loss	$P_{L(AV)} = 2\text{ W}$	-	-10	-	dB	
$\eta_D$	drain efficiency	$P_{L(AV)} = 2\text{ W}$	18	20	-	%	
$ACPR_{885k}$	adjacent channel power ratio (885 kHz)	$P_{L(AV)} = 2\text{ W}$	[1]	-	-49	-46	dBc
$ACPR_{1980k}$	adjacent channel power ratio (1980 kHz)	$P_{L(AV)} = 2\text{ W}$	[1]	-	-64	-61	dBc

[1] Measured within 30 kHz bandwidth.

### 7.1 Ruggedness in class-AB operation

The BLF6G27-10 and BLF6G27-10G are capable of withstanding a load mismatch corresponding to  $VSWR = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 28\text{ V}; I_{Dq} = 130\text{ mA}; P_L = P_{L(1dB)}; f = 2700\text{ MHz}.$

7.2 NXP WiMAX signal

7.2.1 WiMAX signal description

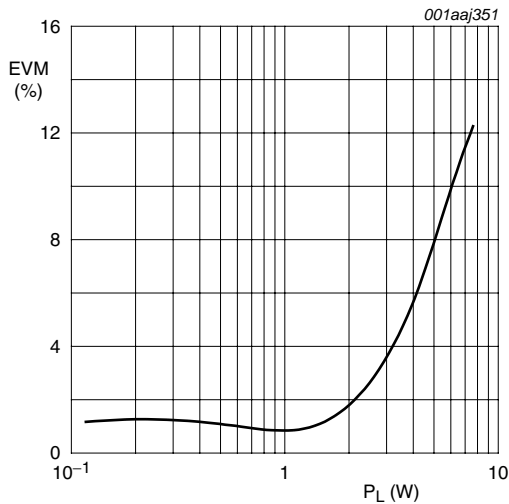
frame duration = 5 ms; bandwidth = 10 MHz; sequency = 1 frame;  
 frequency band = WCS; sampling rate = 11.2 MHz;  $n = 8 / 7$ ;  $G = T_g / T_b = 1 / 8$ ;  
 FFT = 1024; zone type = PUSC;  $\delta = 97.7 \%$ ; number of symbols = 46;  
 number of subchannels = 30; PAR = 9.5 dB.

Preamble: 1 symbol  $\times$  30 subchannels;  $P_L = P_{L(nom)} + 3.86 \text{ dB}$ .

Table 8. Frame structure

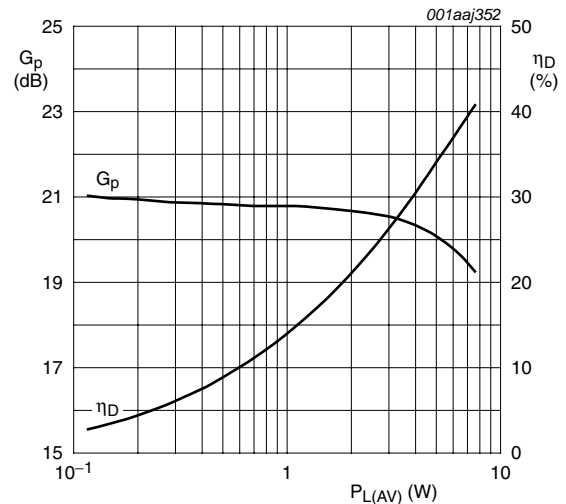
Frame contents	Modulation technique	Data length
Zone 0 FCH 2 symbols $\times$ 4 subchannels	QPSK1/2	3 bit
Zone 0 data 2 symbols $\times$ 26 subchannels	64QAM3/4	692 bit
Zone 0 data 44 symbols $\times$ 30 subchannels	64QAM3/4	10000 bit

7.2.2 Graphs



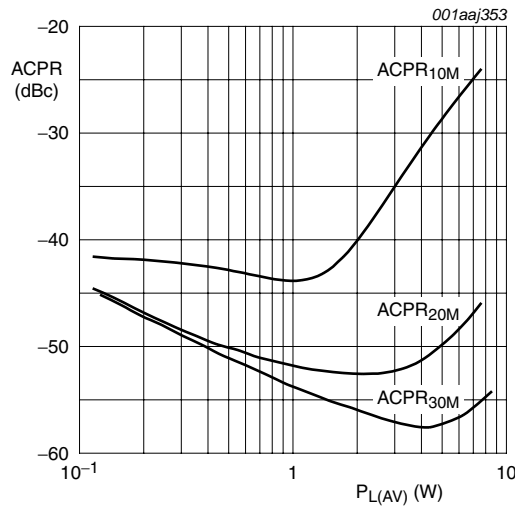
$V_{DS} = 28 \text{ V}$ ;  $I_{Dq} = 130 \text{ mA}$ ;  $f = 2600 \text{ MHz}$ .

Fig 1. EVM as a function of load power; typical values



$V_{DS} = 28 \text{ V}$ ;  $I_{Dq} = 130 \text{ mA}$ ;  $f = 2600 \text{ MHz}$ .

Fig 2. Power gain and drain efficiency as function of average load power; typical values

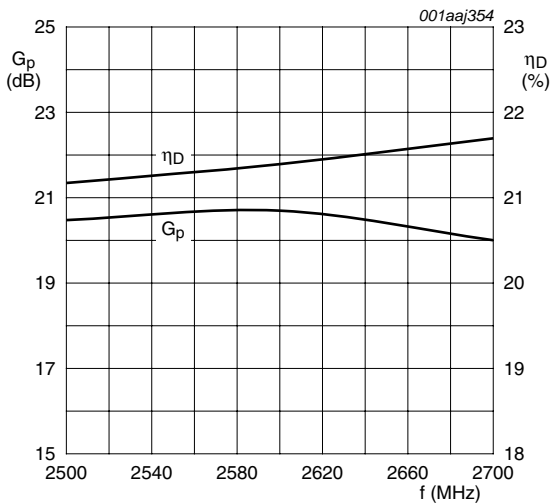


$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 130\text{ mA}$ ;  $f = 2600\text{ MHz}$ .

Fig 3. Adjacent channel power ratio as a function of average load power; typical values

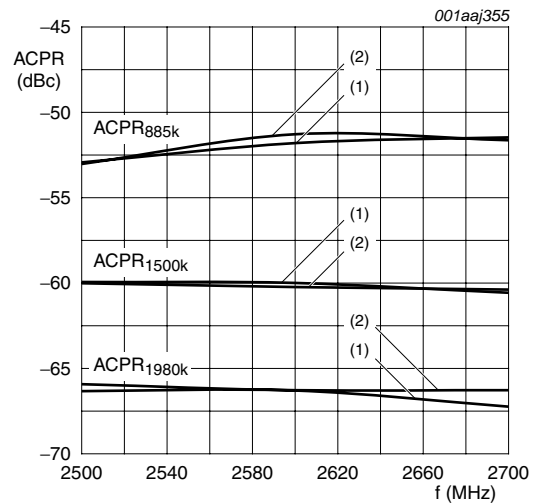
### 7.3 Single carrier NA IS-95 broadband performance at 2 W average

#### 7.3.1 Graphs



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 130\text{ mA}$ ; Single Carrier IS-95;  
PAR = 9.7 dB at 0.01 % probability.

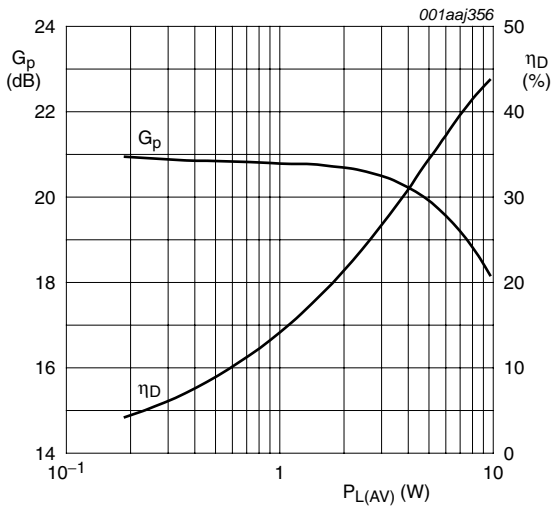
Fig 4. Power gain and drain efficiency as function of frequency; typical values



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 130\text{ mA}$ ; single carrier IS-95;  
PAR = 9.7 dB at .01 % probability.

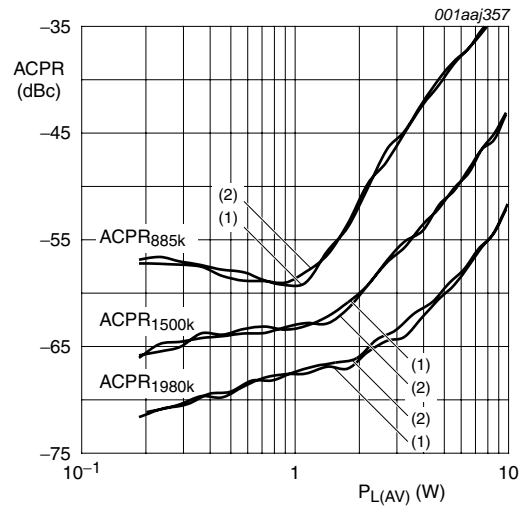
- (1) Low frequency component
- (2) High frequency component

Fig 5. Adjacent channel power ratio as a function of frequency; typical values



$V_{DS} = 28\text{ V}$ ;  $I_{DQ} = 130\text{ mA}$ ;  $f = 2600\text{ MHz}$ ;  
single carrier IS-95; PAR = 9.7 dB at 0.01 % probability;  
channel bandwidth = 1.23 MHz.

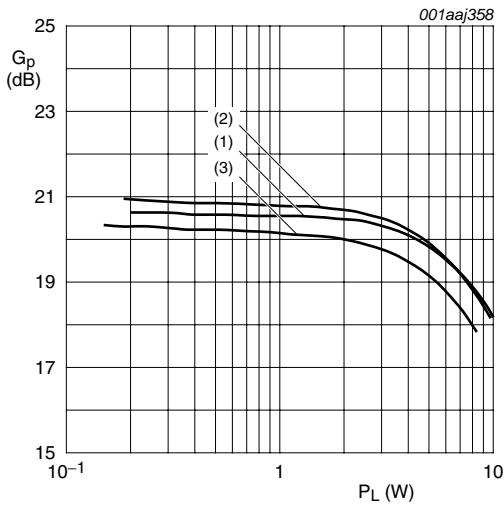
**Fig 6. Power gain and drain efficiency as function of load power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{DQ} = 130\text{ mA}$ ;  $f = 2600\text{ MHz}$ ;  
single carrier IS-95; PAR = 9.7 dB at 0.01 % probability;  
channel bandwidth = 1.23 MHz; IBW = 30 kHz.

- (1) Low frequency component
- (2) High frequency component

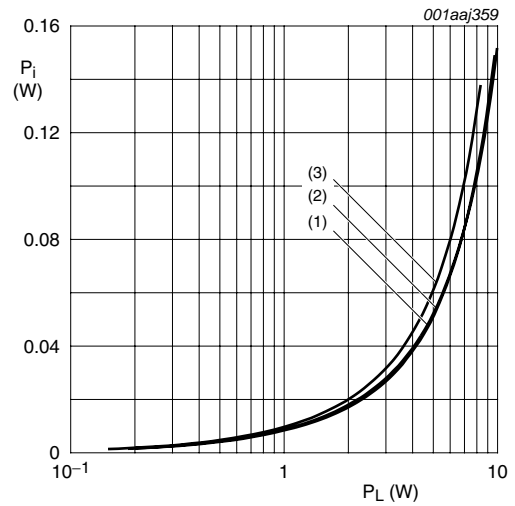
**Fig 7. Adjacent channel power ratio as a function of load power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{DQ} = 130\text{ mA}$ ; single carrier IS-95;  
PAR = 9.7 dB at 0.01 % probability;  
channel bandwidth = 1.23 MHz.

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

**Fig 8. Power gain as a function of load power; typical values**

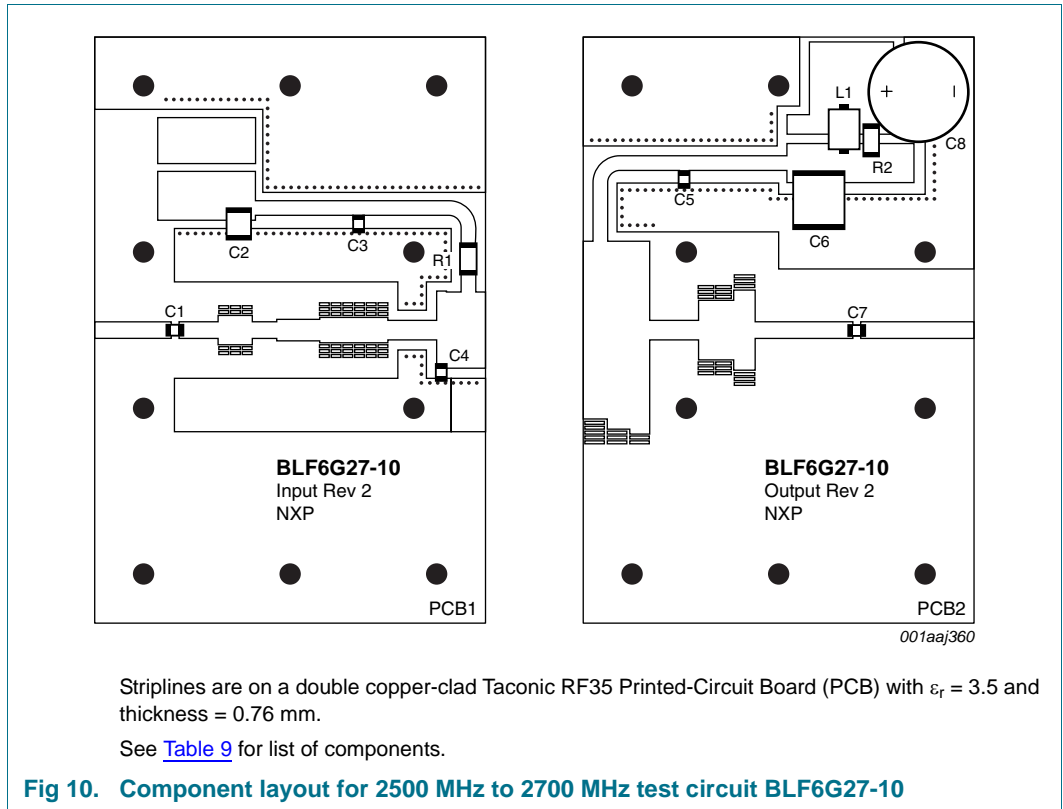


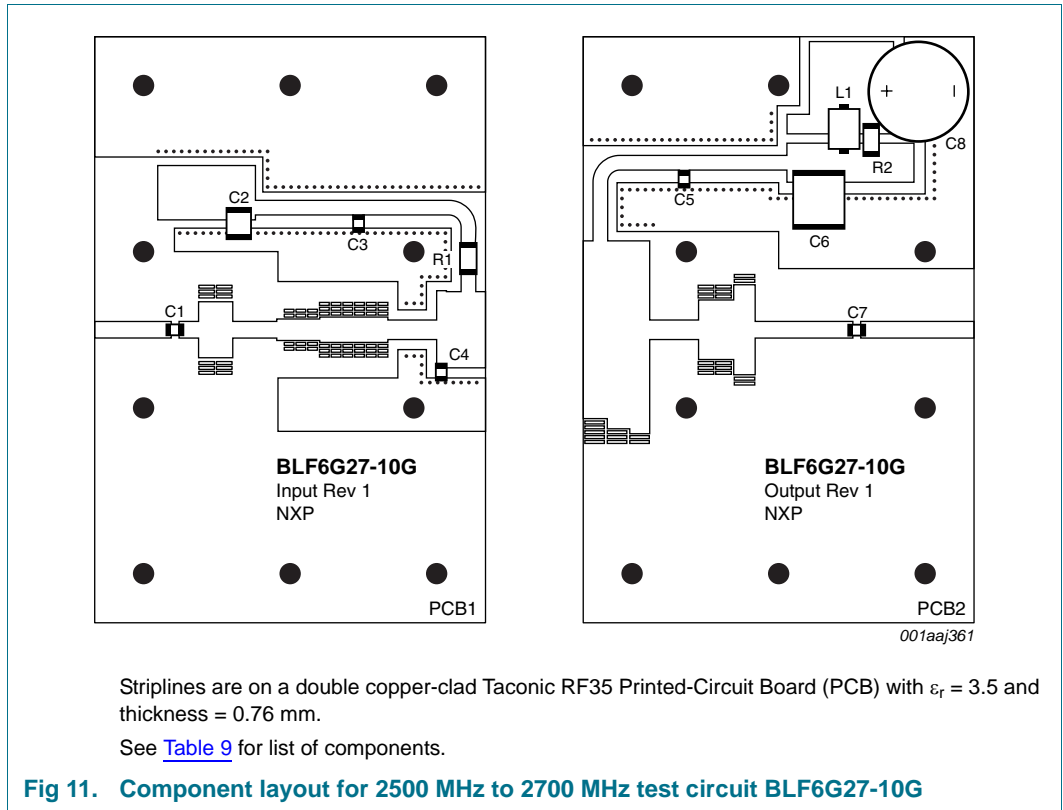
$V_{DS} = 28\text{ V}$ ;  $I_{DQ} = 130\text{ mA}$ ; single carrier IS-95;  
PAR = 9.7 dB at 0.01 % probability;  
channel bandwidth = 1.23 MHz.

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

**Fig 9. Input power as a function of load power; typical values**

**8. Test information**





**Table 9. List of components**

For test circuit, see [Figure 10](#) and [Figure 11](#).

Component	Description	Value	Remarks
C1, C3, C5, C7	multilayer ceramic chip capacitor	22 pF	ATC 100A
C2	multilayer ceramic chip capacitor	1.5 $\mu$ F	TDK
C4	multilayer ceramic chip capacitor	1.6 pF	ATC 100A
C6	multilayer ceramic chip capacitor	10 $\mu$ F; 50 V	TDK
C8	electrolytic capacitor	220 $\mu$ F; 63 V	Elco
L1	ferrite SMD bead	-	Ferroxcube bead
R1, R2	SMD resistor	8.2 $\Omega$	Thin film



Table 10. Measured test circuit impedances

f (GHz)	Z <sub>i</sub> (Ω)	Z <sub>o</sub> (Ω)
<b>BLF6G27-10</b>		
2.50	5.32 – j8.61	9.46 – j6.99
2.55	4.85 – j8.09	9.44 – j7.41
2.60	4.40 – j7.55	9.32 – j7.86
2.65	3.98 – j7.00	9.10 – j8.31
2.70	3.59 – j6.43	8.77 – j8.75
<b>BLF6G27-10G</b>		
2.50	5.67 – j13.62	10.70 – j7.38
2.55	5.06 – j12.79	10.61 – j8.00
2.60	4.55 – j11.98	10.38 – j8.63
2.65	4.10 – j11.19	10.00 – j9.24
2.70	3.71 – j10.43	9.49 – j9.79

9. Package outline

Earless flanged ceramic package; 2 leads

SOT975B

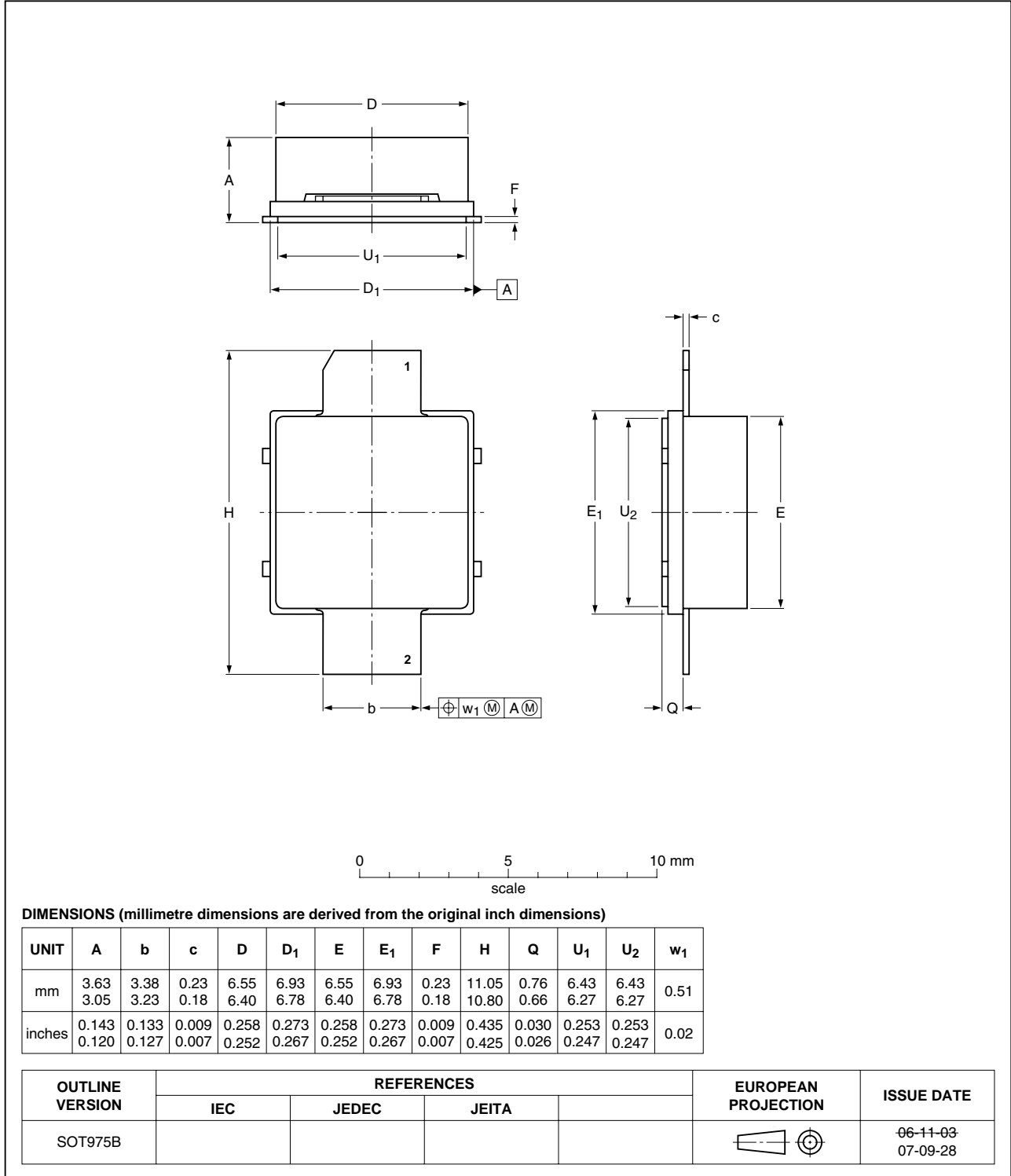


Fig 12. Package outline SOT975B

Earless flanged ceramic package; 2 leads

SOT975C

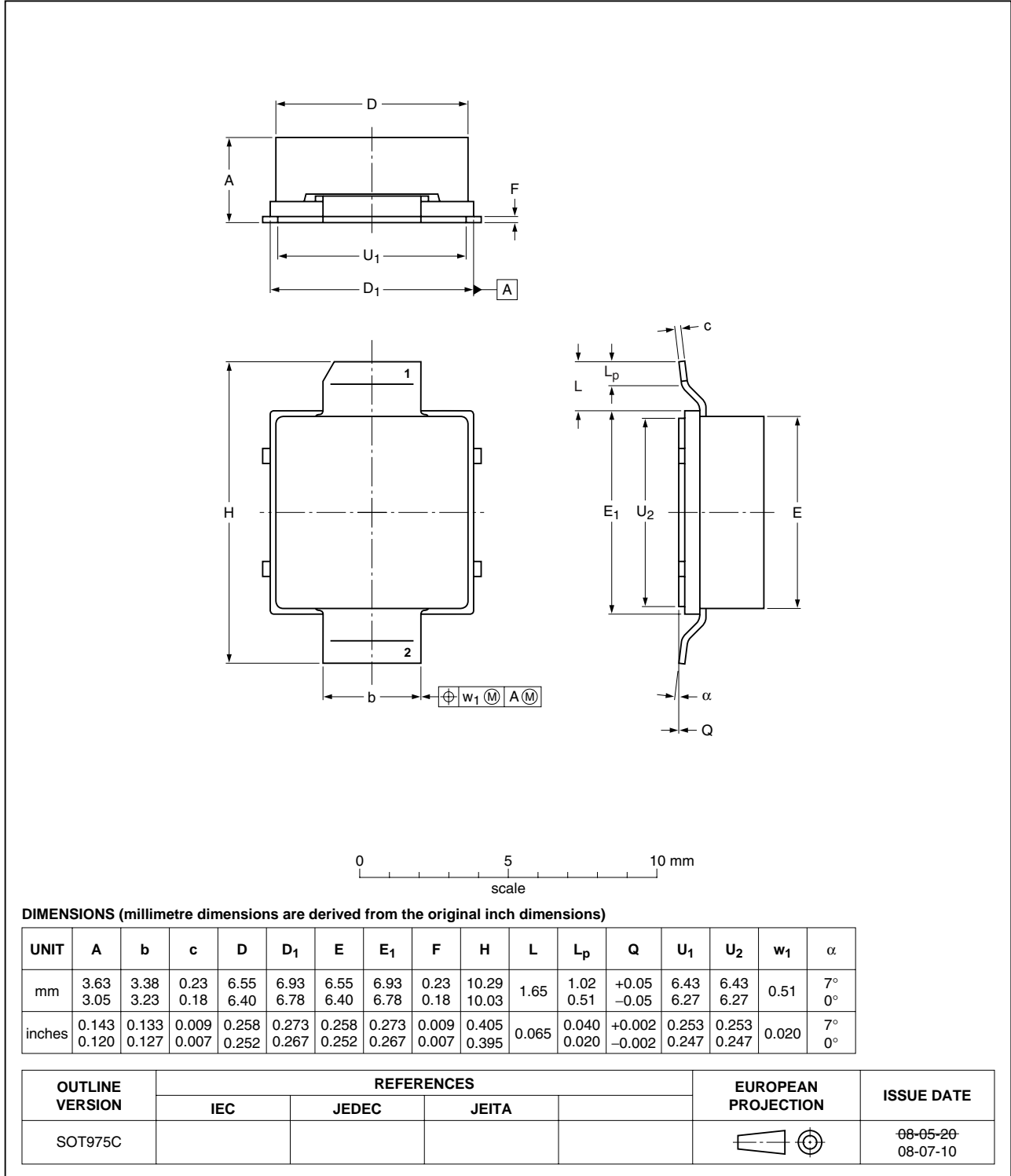


Fig 13. Package outline SOT975C

## 10. Abbreviations

Table 11. Abbreviations

Acronym	Description
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
EVM	Error Vector Magnitude
FCH	Frame Control Header
FFT	Fast Fourier Transform
IBW	Instantaneous BandWidth
IS-95	Interim Standard 95
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
NA	North American
N-CDMA	Narrowband Code Division Multiple Access
PAR	Peak-to-Average power Ratio
PUSC	Partial Usage of SubChannels
RF	Radio Frequency
SMD	Surface Mounted Device
VSWR	Voltage Standing-Wave Ratio
WCS	Wireless Communications Service
WiMAX	Worldwide Interoperability for Microwave Access

## 11. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G27-10_BLF6G27-10G v.3	20110228	Product data sheet	-	BLF6G27-10_BLF6G27-10G v.2
Modifications:				
				<ul style="list-style-type: none"> <li>• <a href="#">Section 1.1 on page 1</a>: added '2300 MHz to 2400 MHz'</li> <li>• <a href="#">Table 1 on page 1</a>: added 'IS-95' row to table</li> <li>• on page 1: removed caution remark ESD</li> <li>• <a href="#">Section 1.3 on page 1</a>: added '2300 MHz to 2400 MHz'</li> </ul>
BLF6G27-10_BLF6G27-10G v.2	20101202	Product data sheet	-	BLF6G27-10_BLF6G27-10G v.1
BLF6G27-10_BLF6G27-10G v.1	20090204	Product data sheet	-	-

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

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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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For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

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