

# BLF6G38-10; BLF6G38-10G www.DataSheet4U.com

WiMAX power LDMOS transistor

Rev. 01 — 3 February 2009

Product data sheet

## 1. Product profile

### 1.1 General description

10 W LDMOS power transistor for base station applications at frequencies from 3400 MHz to 3600 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)	G <sub>p</sub> (dB)	$\eta_D$ (%)	ACPR <sub>885k</sub> (dBc)	ACPR <sub>1980k</sub> (dBc)
1-carrier N-CDMA <sup>[1]</sup>	3400 to 3600	28	2	14	20	-49 <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.

#### 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 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 3400 MHz to 3600 MHz frequency range

## 2. Pinning information

**Table 2. Pinning**

Pin	Description	Simplified outline	Graphic symbol
<b>BLF6G38-10 (SOT975B)</b>			
1	drain		
2	gate		
3	source		
<b>BLF6G38-10G (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	
BLF6G38-10	-	earless flanged ceramic package; 2 leads	SOT975B
BLF6G38-10G	-	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		-	3.1	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	$T_{case} = 80\text{ °C}$ ; $P_L = 10\text{ W (CW)}$	BLF6G38-10	4.0	K/W
			BLF6G38-10G	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	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;  $f_1 = 3400$  MHz;  $f_2 = 3500$  MHz;  $f_3 = 3600$  MHz; RF performance at  $V_{DS} = 28$  V;  $I_{Dq} = 130$  mA;  $T_{case} = 25$  °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	$P_{L(AV)} = 2$ W	13	14	-	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 2$ W	-	-10	-	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 2$ W	18	20	-	%
$ACPR_{885k}$	adjacent channel power ratio (885 kHz)	$P_{L(AV)} = 2$ W [1]	-	-49	-46	dBc
$ACPR_{1980k}$	adjacent channel power ratio (1980 kHz)	$P_{L(AV)} = 2$ W [1]	-	-64	-61	dBc

[1] Measured within 30 kHz bandwidth.

### 7.1 Ruggedness in class-AB operation

The BLF6G38-10 and BLF6G38-10G are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28$  V;  $I_{Dq} = 130$  mA;  $P_L = P_{L(1dB)}$ ;  $f = 3600$  MHz.

### 7.2 NXP WiMAX signal

#### 7.2.1 WiMAX signal description

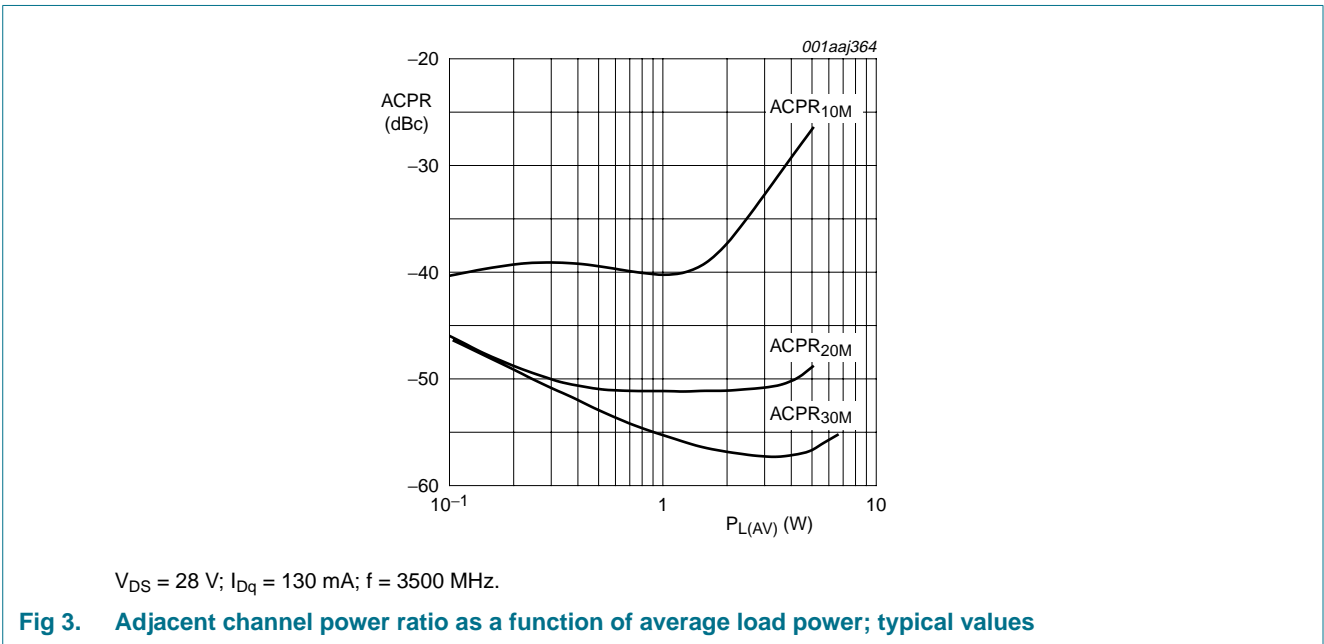
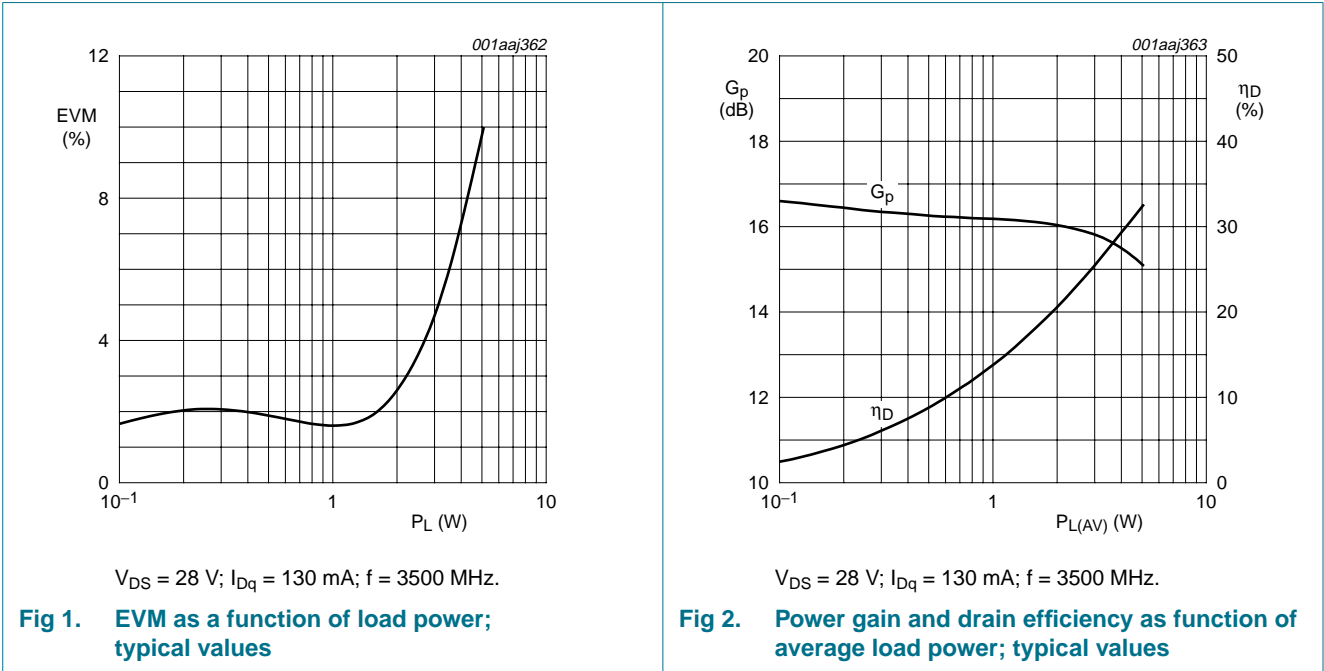
frame duration = 5 ms; bandwidth = 10 MHz; sequency = 1 frame;  
 frequency band = WCS; sampling rate = 11.2 MHz;  $n = 8 / 7$ ;  $G = T_g / T_b = 1 / 8$ ;  
 FFT = 1024; zone type = PUSC;  $\delta = 97.7$  %; number of symbols = 46;  
 number of subchannels = 30; PAR = 9.5 dB.

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

**Table 8. Frame structure**

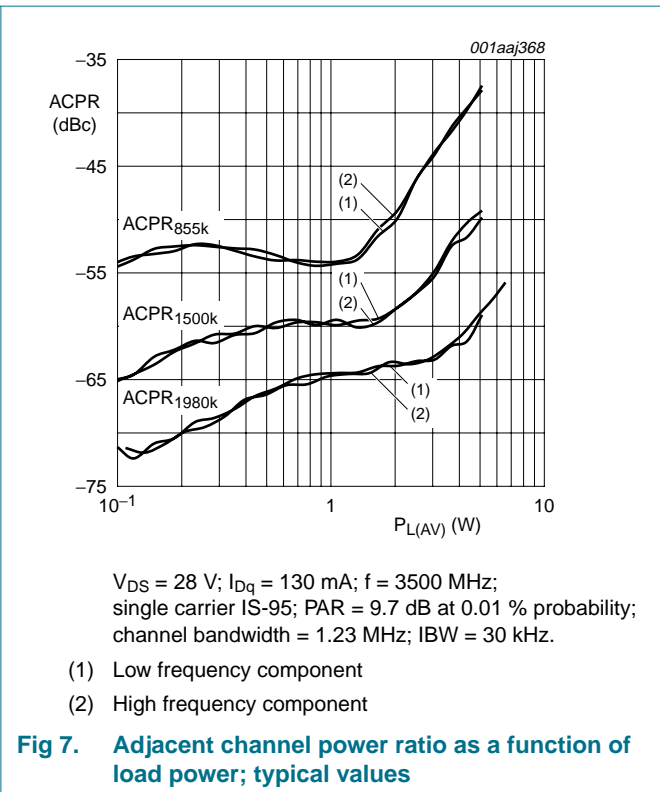
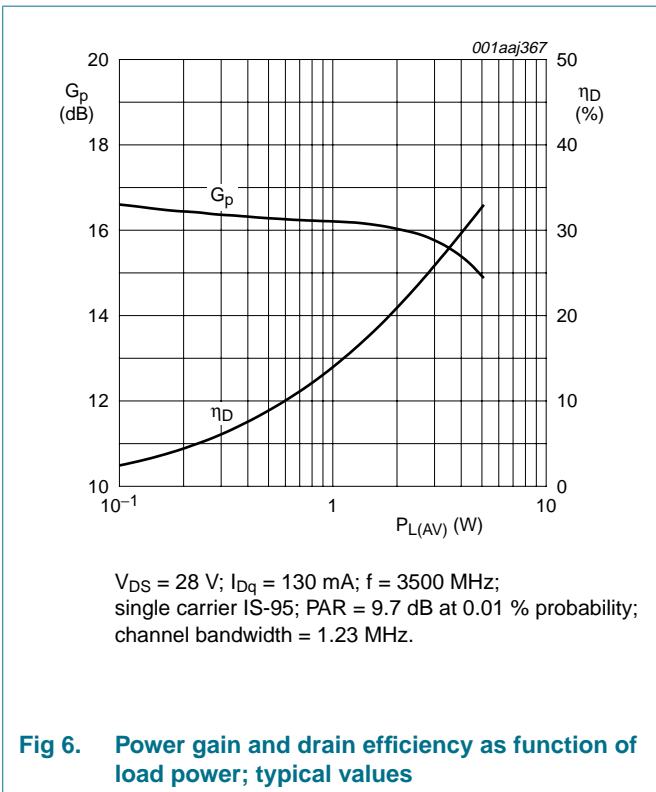
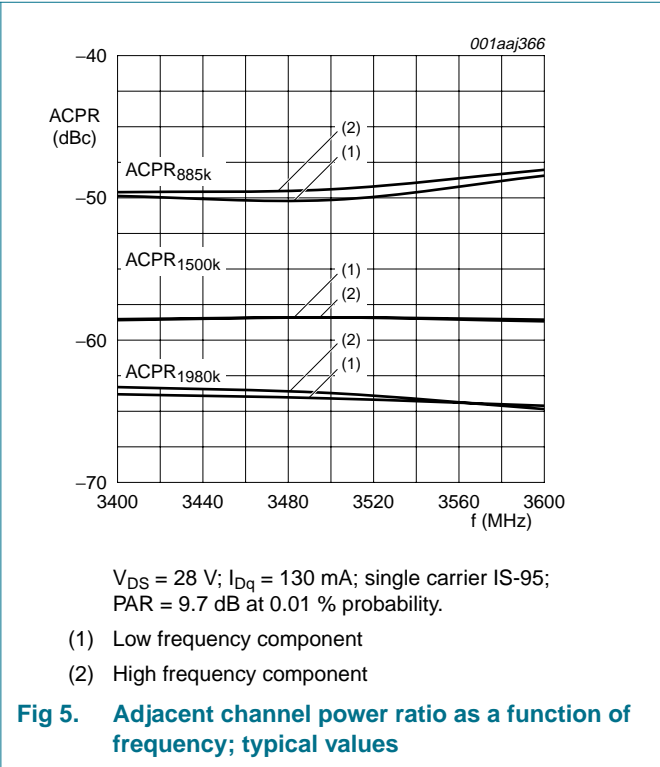
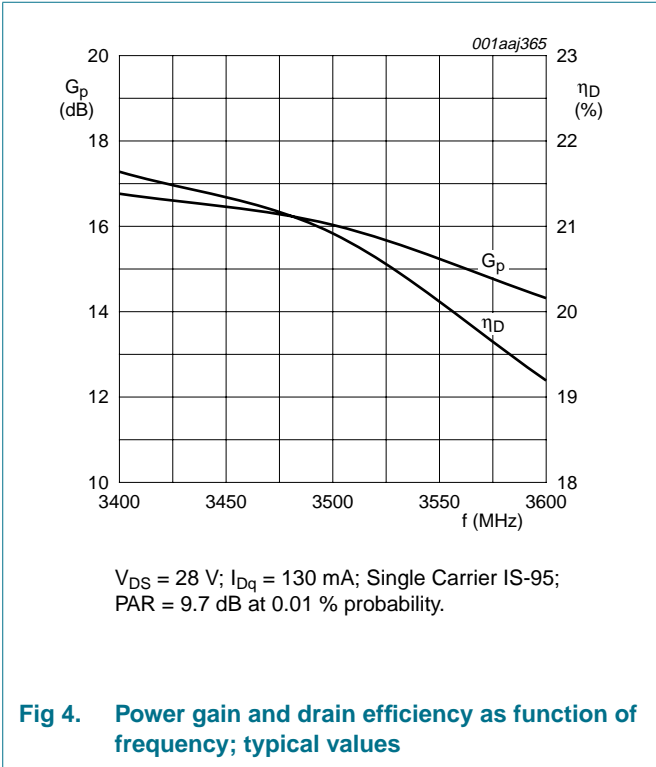
Frame contents	Modulation technique	Data length
Zone 0 FCH 2 symbols $\times$ 4 subchannels	QPSK1/2	3 bit
Zone 0 data 2 symbols $\times$ 26 subchannels	64QAM3/4	692 bit
Zone 0 data 44 symbols $\times$ 30 subchannels	64QAM3/4	10000 bit

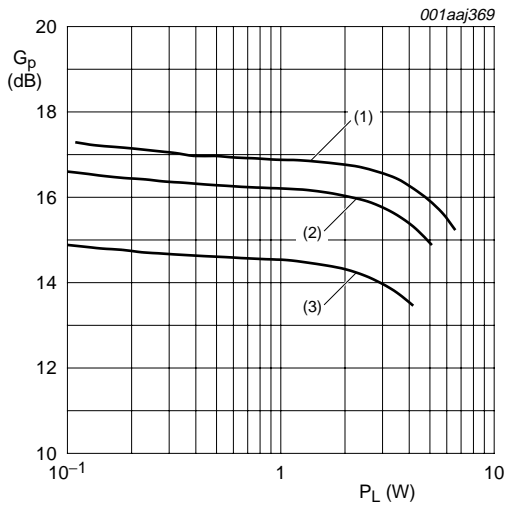
7.2.2 Graphs



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

7.3.1 Graphs

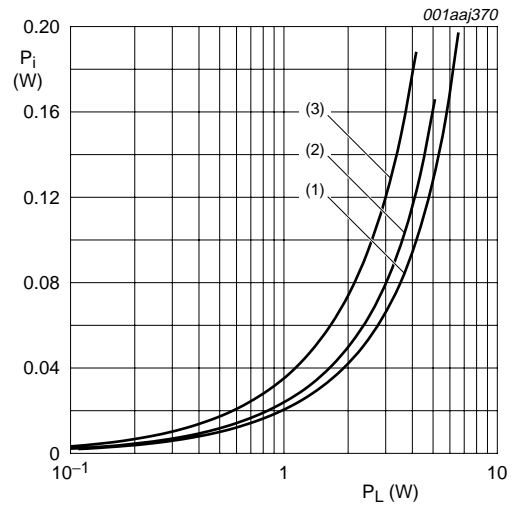




$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 130\text{ mA}$ ; single carrier IS-95;  
 PAR = 9.7 dB at 0.01 % probability;  
 channel bandwidth = 1.23 MHz.

- (1)  $f = 3400\text{ MHz}$
- (2)  $f = 3500\text{ MHz}$
- (3)  $f = 3600\text{ MHz}$

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

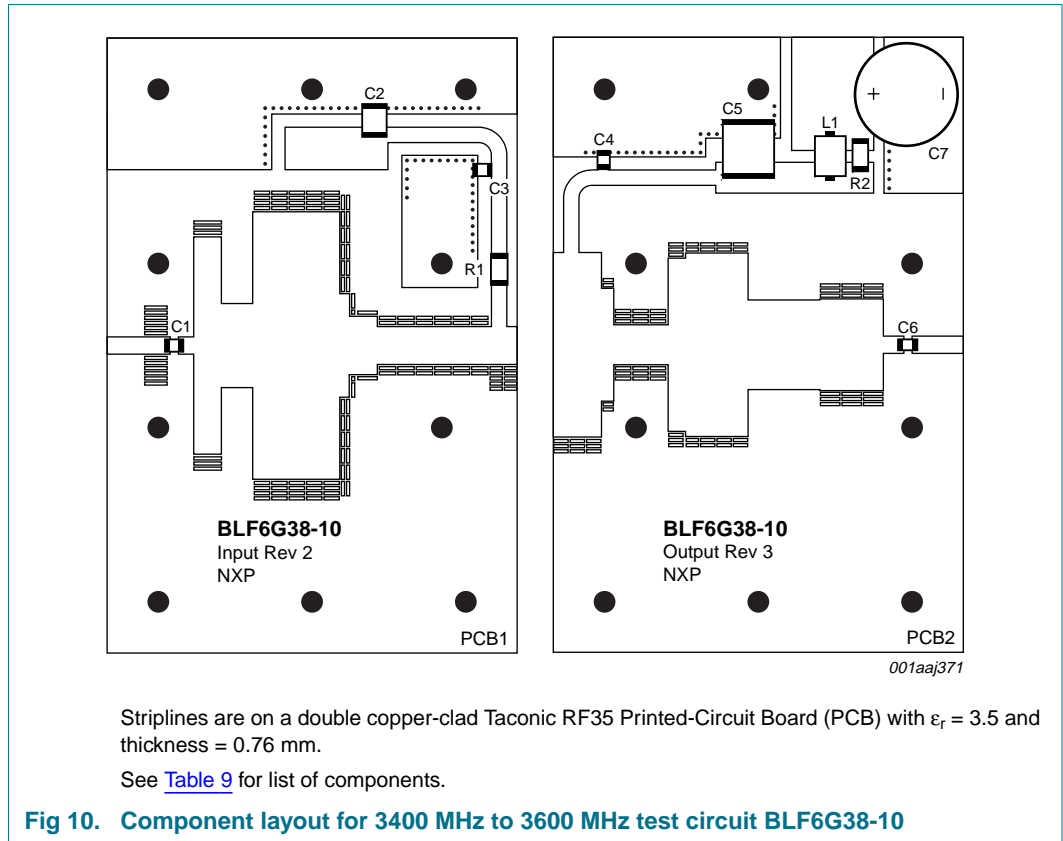


$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 130\text{ mA}$ ; single carrier IS-95;  
 PAR = 9.7 dB at 0.01 % probability;  
 channel bandwidth = 1.23 MHz.

- (1)  $f = 3400\text{ MHz}$
- (2)  $f = 3500\text{ MHz}$
- (3)  $f = 3600\text{ MHz}$

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

**8. Test information**





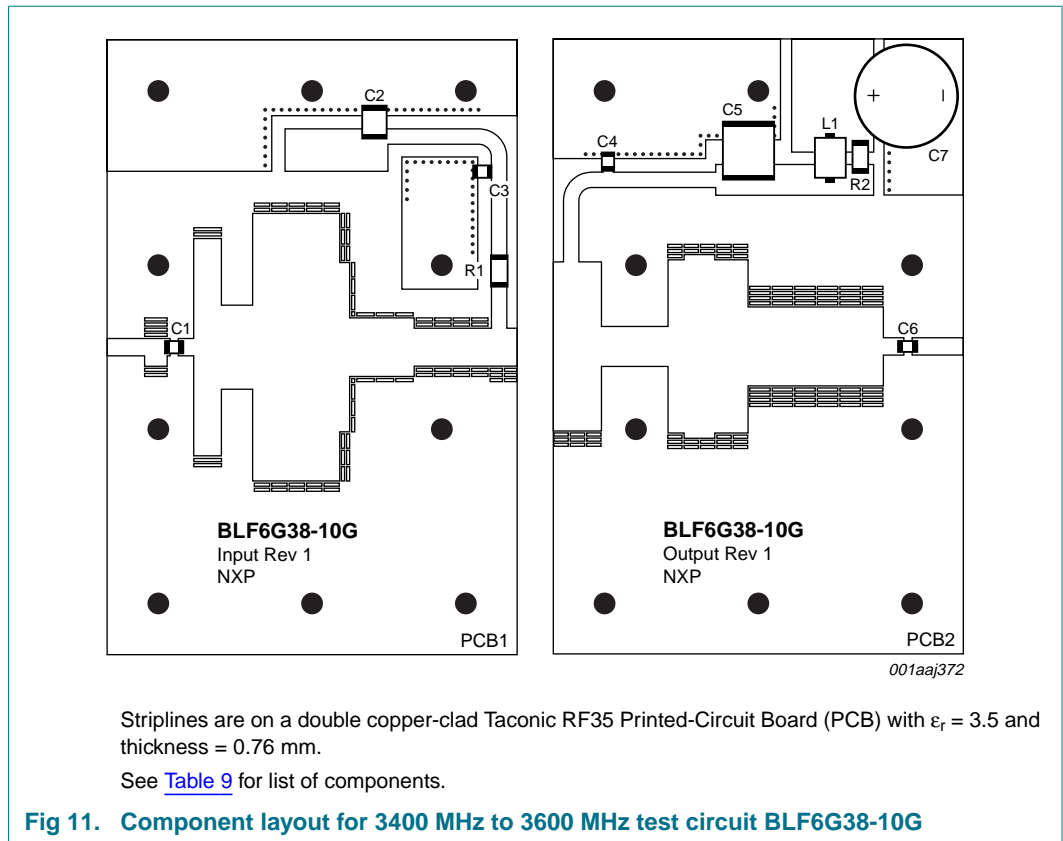


Fig 11. Component layout for 3400 MHz to 3600 MHz test circuit BLF6G38-10G

Table 9. List of components

For test circuit, see Figure 10 and Figure 11.

Component	Description	Value	Remarks
C1, C3, C6	multilayer ceramic chip capacitor	20 pF	ATC 100A
C2	multilayer ceramic chip capacitor	1.5 μF	TDK
C4	multilayer ceramic chip capacitor	6.8 μF	ATC 100A
C5	multilayer ceramic chip capacitor	10 μF; 50 V	TDK
C7	electrolytic capacitor	220 μF; 63 V	Elco
L1	ferrite SMD bead	-	Ferroxcube bead
R1, R2	SMD resistor	8.2 Ω	Thin film

Table 10. Measured test circuit impedances

f (GHz)	Z <sub>i</sub> (Ω)	Z <sub>o</sub> (Ω)
<b>BLF6G38-10</b>		
3.40	12.61 - j23.96	5.21 - j6.31
3.45	14.16 - j22.23	5.47 - j6.01
3.50	16.00 - j21.74	5.72 - j5.87
3.55	17.43 - j22.91	5.90 - j5.91
3.60	17.11 - j25.43	5.92 - j6.09
<b>BLF6G38-10G</b>		
3.40	19.33 - j22.54	4.71 - j7.09
3.45	21.20 - j21.65	4.75 - j6.82
3.50	23.02 - j22.41	4.72 - j6.65
3.55	23.70 - j24.95	4.60 - j6.55
3.60	21.98 - j28.26	4.36 - j6.47

9. Package outline

Earless flanged ceramic package; 2 leads

SOT975B

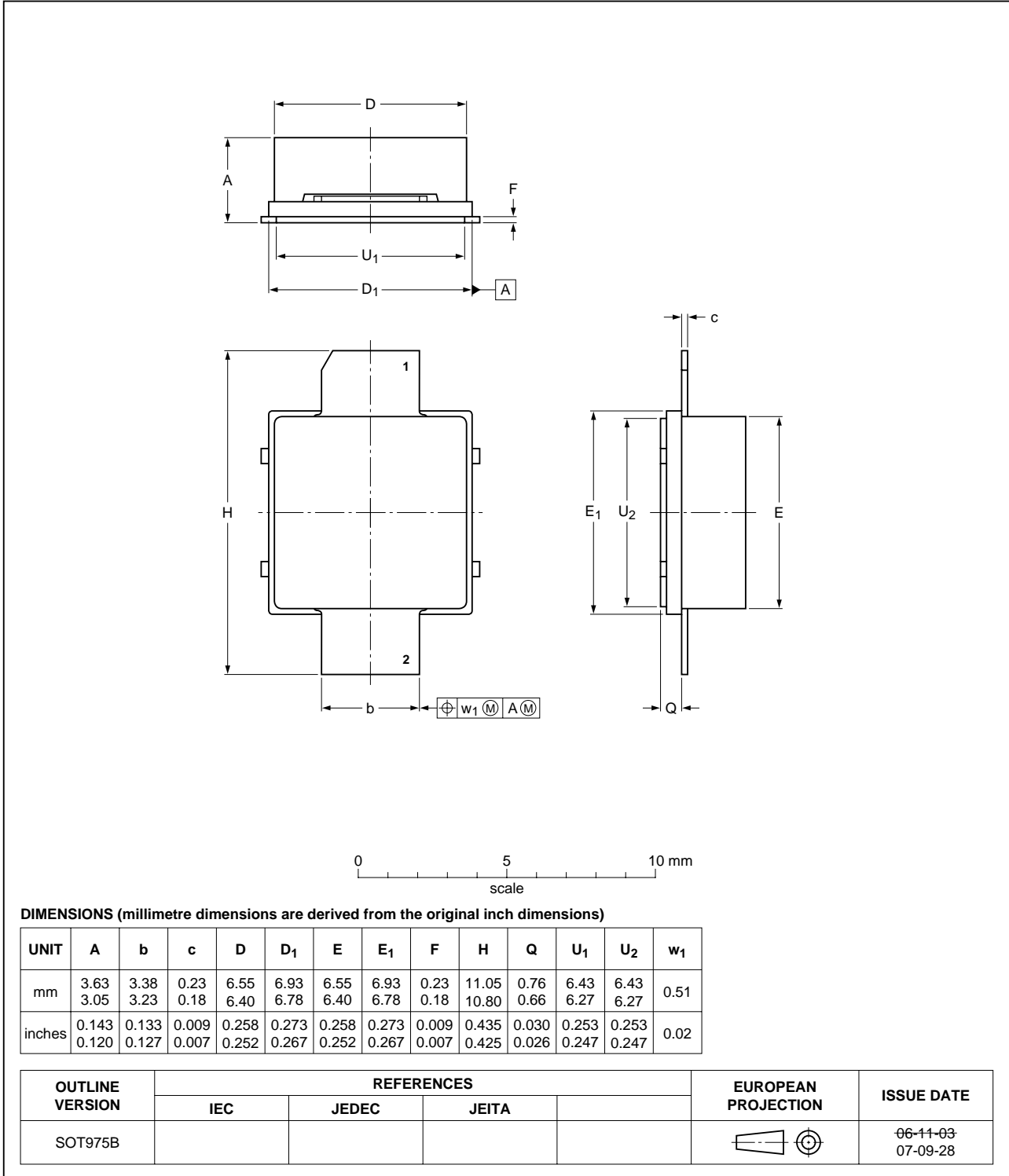


Fig 12. Package outline SOT975B

Earless flanged ceramic package; 2 leads

SOT975C

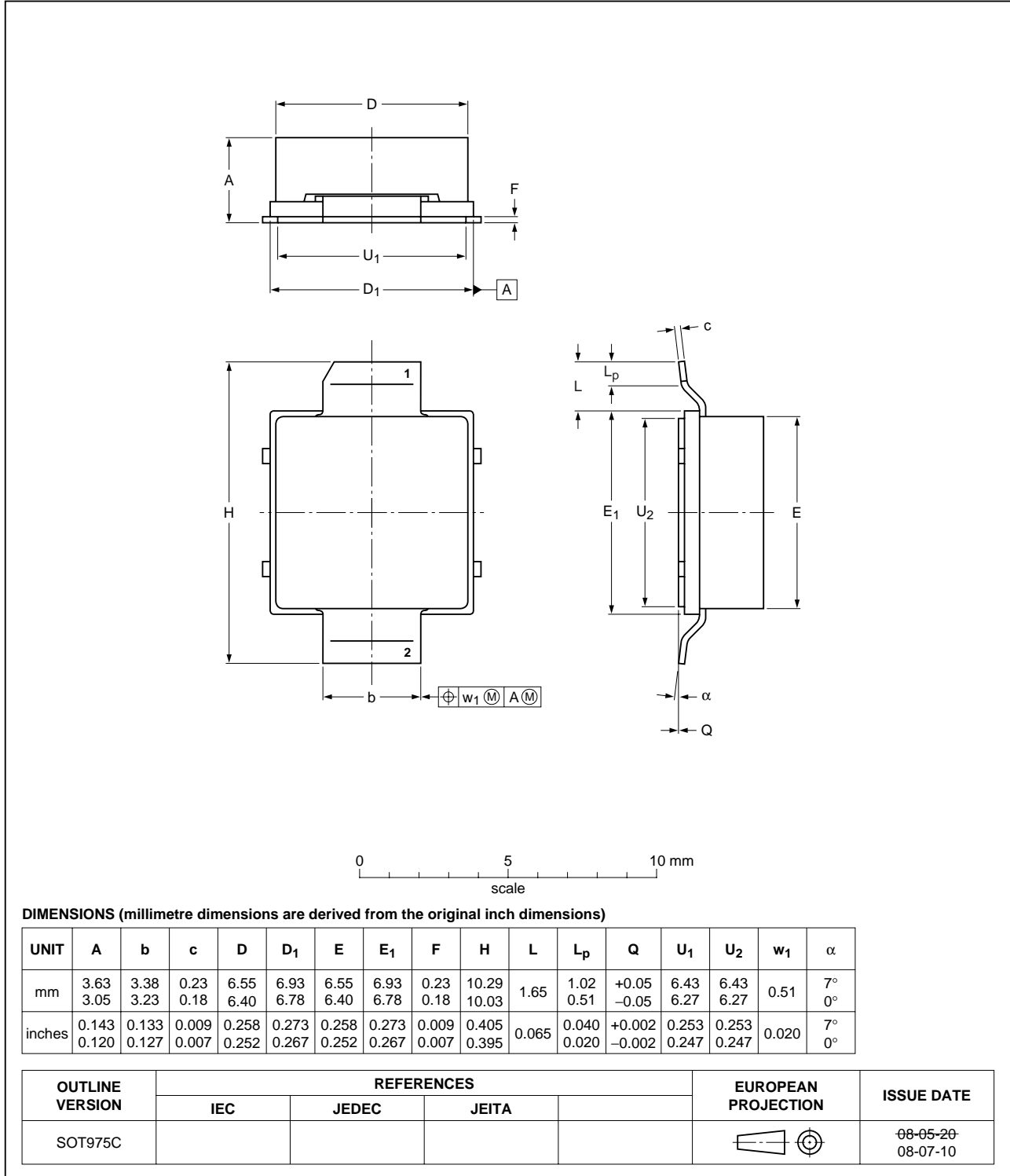


Fig 13. Package outline SOT975C

## 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
BLF6G38-10_BLF6G38-10G_1	20090203	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.
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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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