

# BLF6G27-10; BLF6G27-10G

WiMAX power LDMOS transistor

AMPLEON

Rev. 5 — 1 September 2015

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

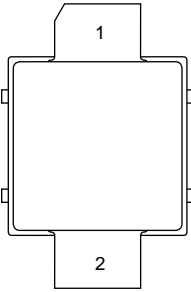
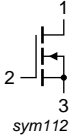
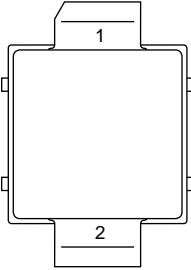
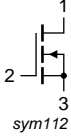
- Typical 1-carrier N-CDMA performance (Single carrier N-CDMA with pilot, paging, sync and 6 traffic channels [Walsh codes 8 - 13]. PAR = 9.7 dB at 0.01 % probability on CCDF. Channel bandwidth is 1.23 MHz), a supply voltage of 28 V and an I<sub>DQ</sub> of 130 mA:
- Qualified up to a maximum V<sub>DS</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 <sup>[1]</sup>		
<b>BLF6G27-10G (SOT975C)</b>			
1	drain		
2	gate		
3	source <sup>[1]</sup>		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
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 <sub>885k</sub>	adjacent channel power ratio (885 kHz)	$P_{L(AV)} = 2\text{ W}$ [1]	-	-49	-46	dBc
ACPR <sub>1980k</sub>	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 Ampleon WiMAX signal

7.2.1 WiMAX signal description

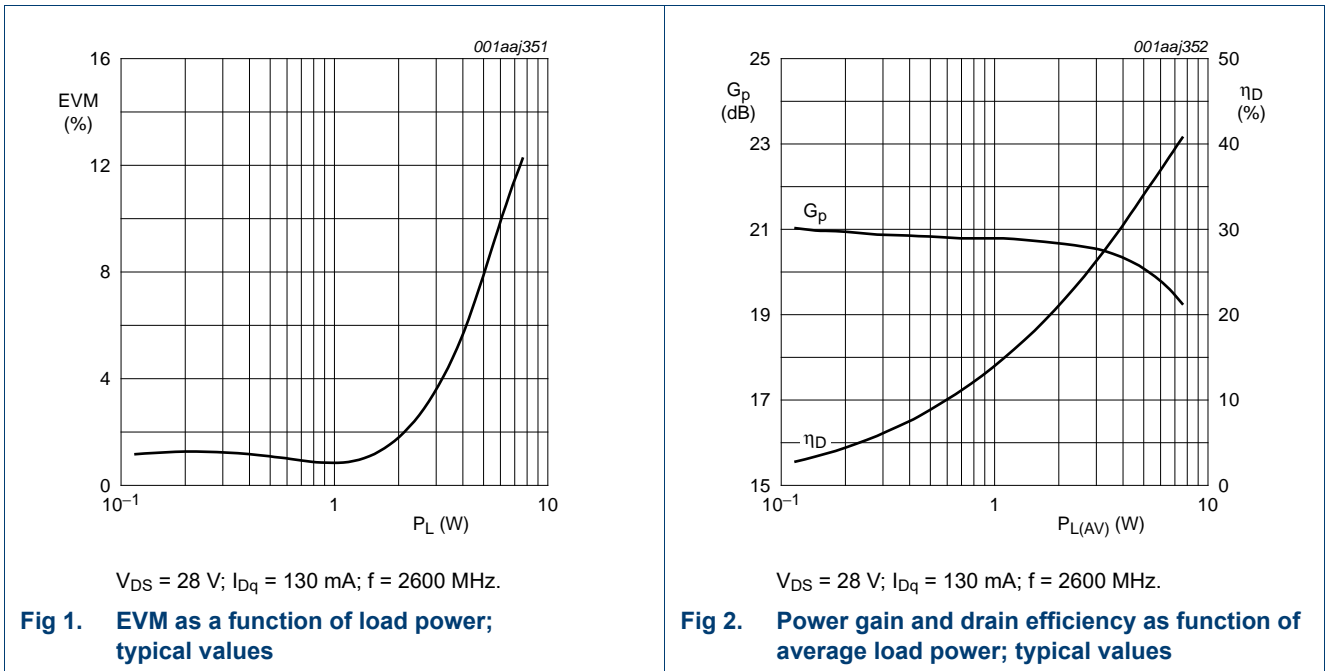
frame duration = 5 ms; bandwidth = 10 MHz; sequency = 1 frame;  
 frequency band = WCS; sampling rate = 11.2 MHz;  $n = 8 / 7$ ;  $G = T_g / T_b = 1 / 8$ ;  
 FFT = 1024; zone type = PUSC;  $\delta = 97.7 \%$ ; number of symbols = 46;  
 number of subchannels = 30; PAR = 9.5 dB.

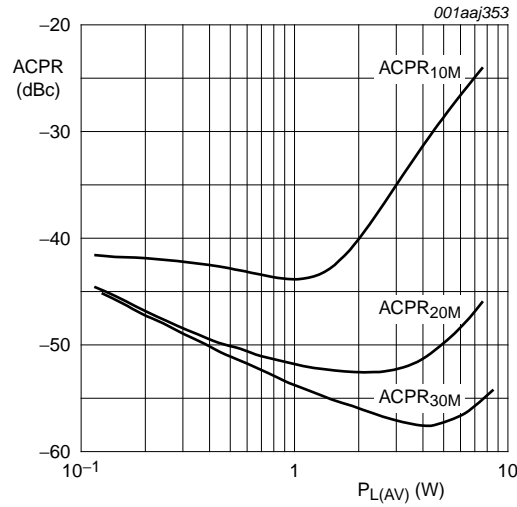
Preamble: 1 symbol  $\times$  30 subchannels;  $P_L = P_{L(nom)} + 3.86$  dB.

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



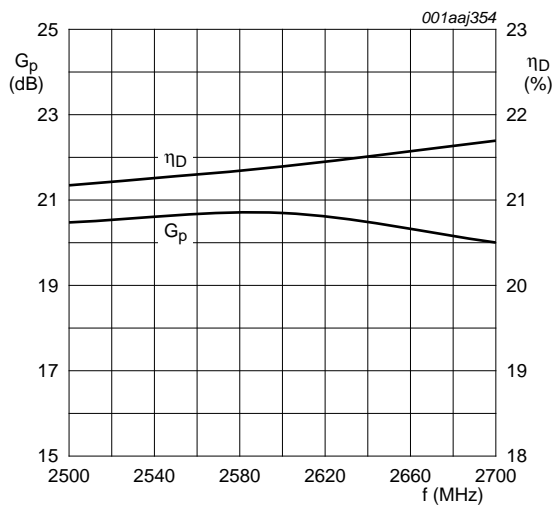


$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 130\text{ mA}$ ;  $f = 2600\text{ MHz}$ .

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

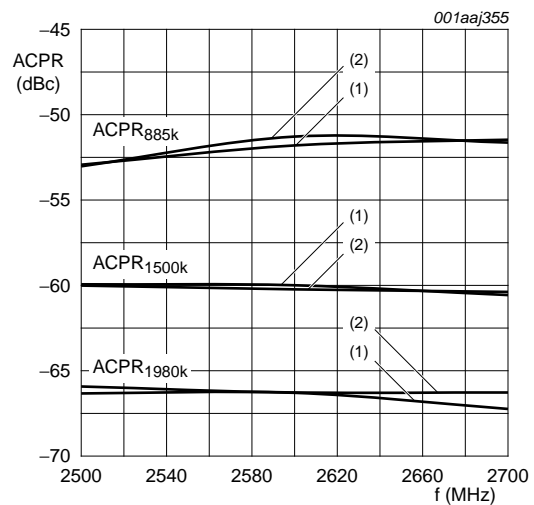
### 7.3 Single carrier NA IS-95 broadband performance at 2 W average

#### 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.

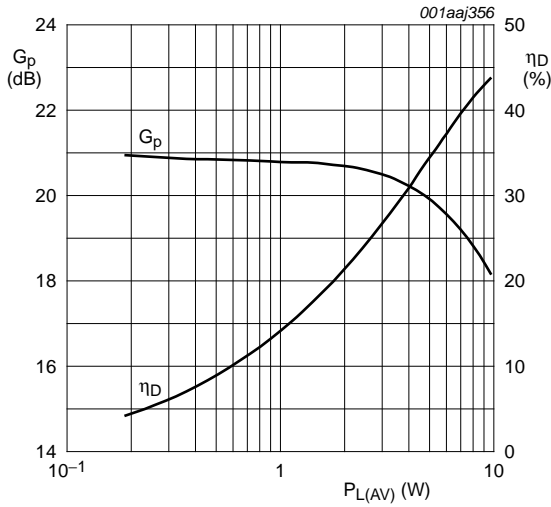
Fig 4. Power gain and drain efficiency as function of frequency; typical values



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

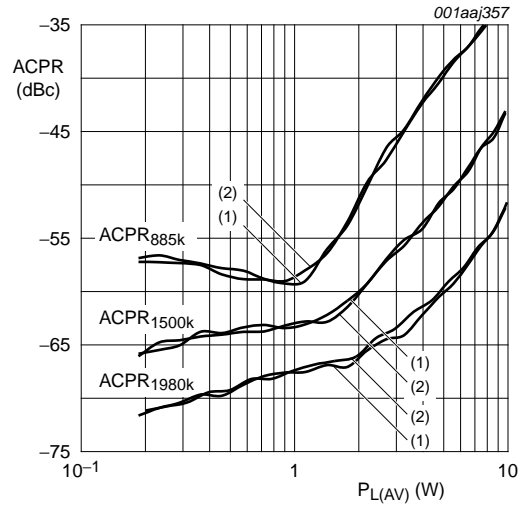
- (1) Low frequency component
- (2) High frequency component

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



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

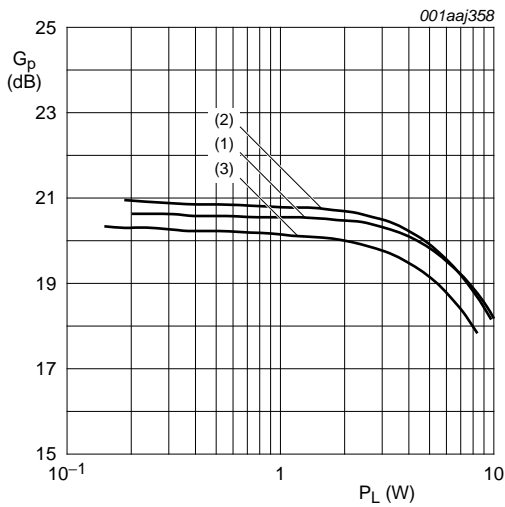
Fig 6. Power gain and drain efficiency as function of load power; typical values



$V_{DS} = 28$  V;  $I_{Dq} = 130$  mA;  $f = 2600$  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

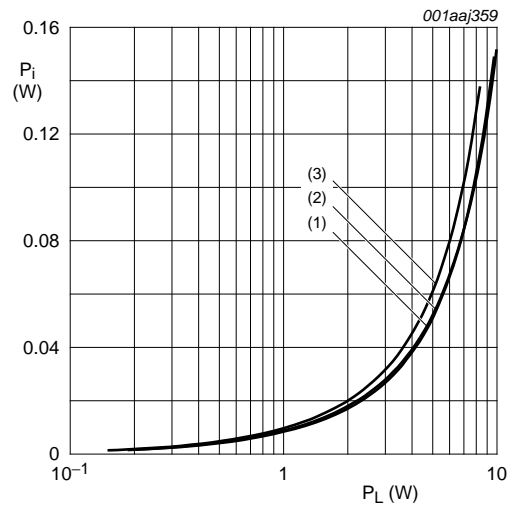
Fig 7. Adjacent channel power ratio as a function of load power; typical values



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

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

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

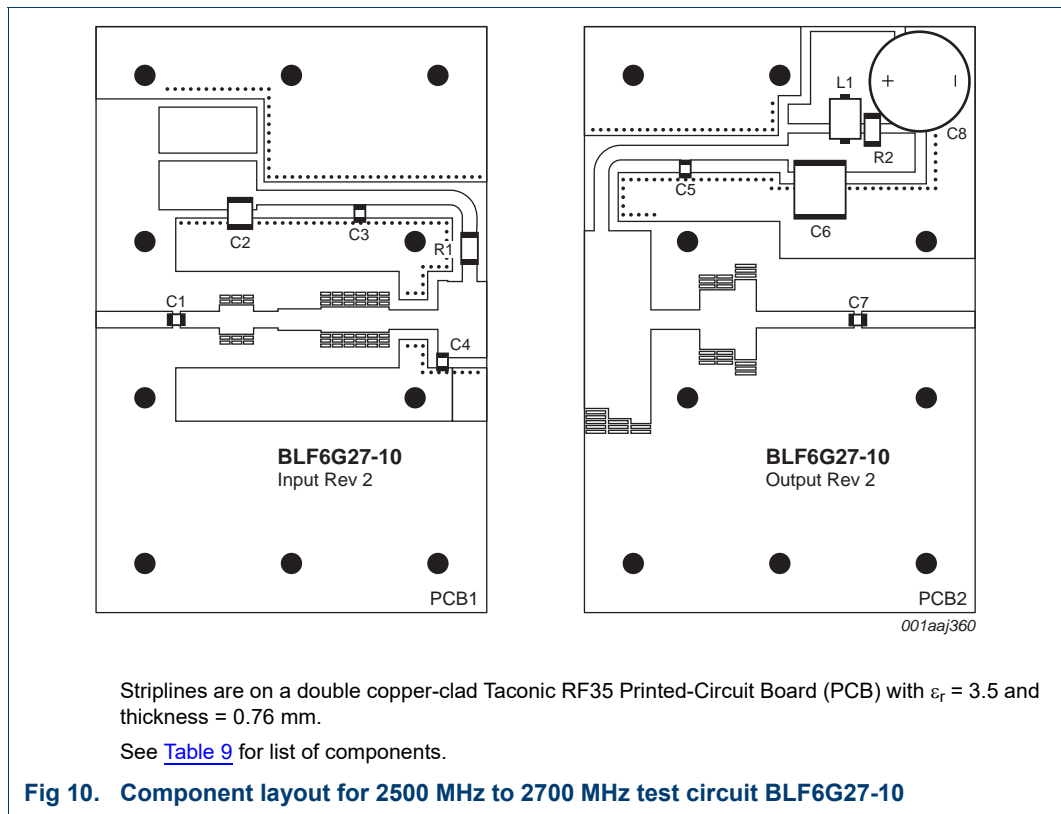


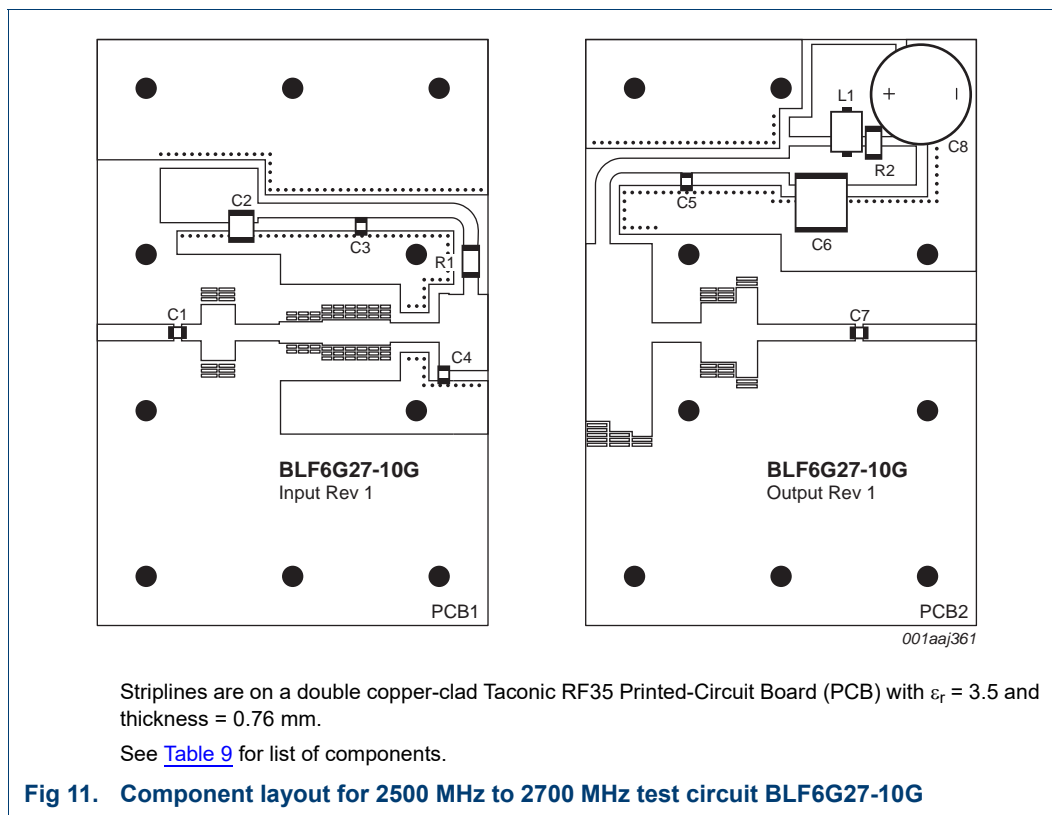
$V_{DS} = 28$  V;  $I_{Dq} = 130$  mA; single carrier IS-95;  
PAR = 9.7 dB at 0.01 % probability;  
channel bandwidth = 1.23 MHz.

- (1)  $f = 2500$  MHz
- (2)  $f = 2600$  MHz
- (3)  $f = 2700$  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 μF	TDK
C4	multilayer ceramic chip capacitor	1.6 pF	ATC 100A
C6	multilayer ceramic chip capacitor	10 μF; 50 V	TDK
C8	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

<b>f</b> <b>(GHz)</b>	<b>Z<sub>i</sub></b> <b>(Ω)</b>	<b>Z<sub>o</sub></b> <b>(Ω)</b>
<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

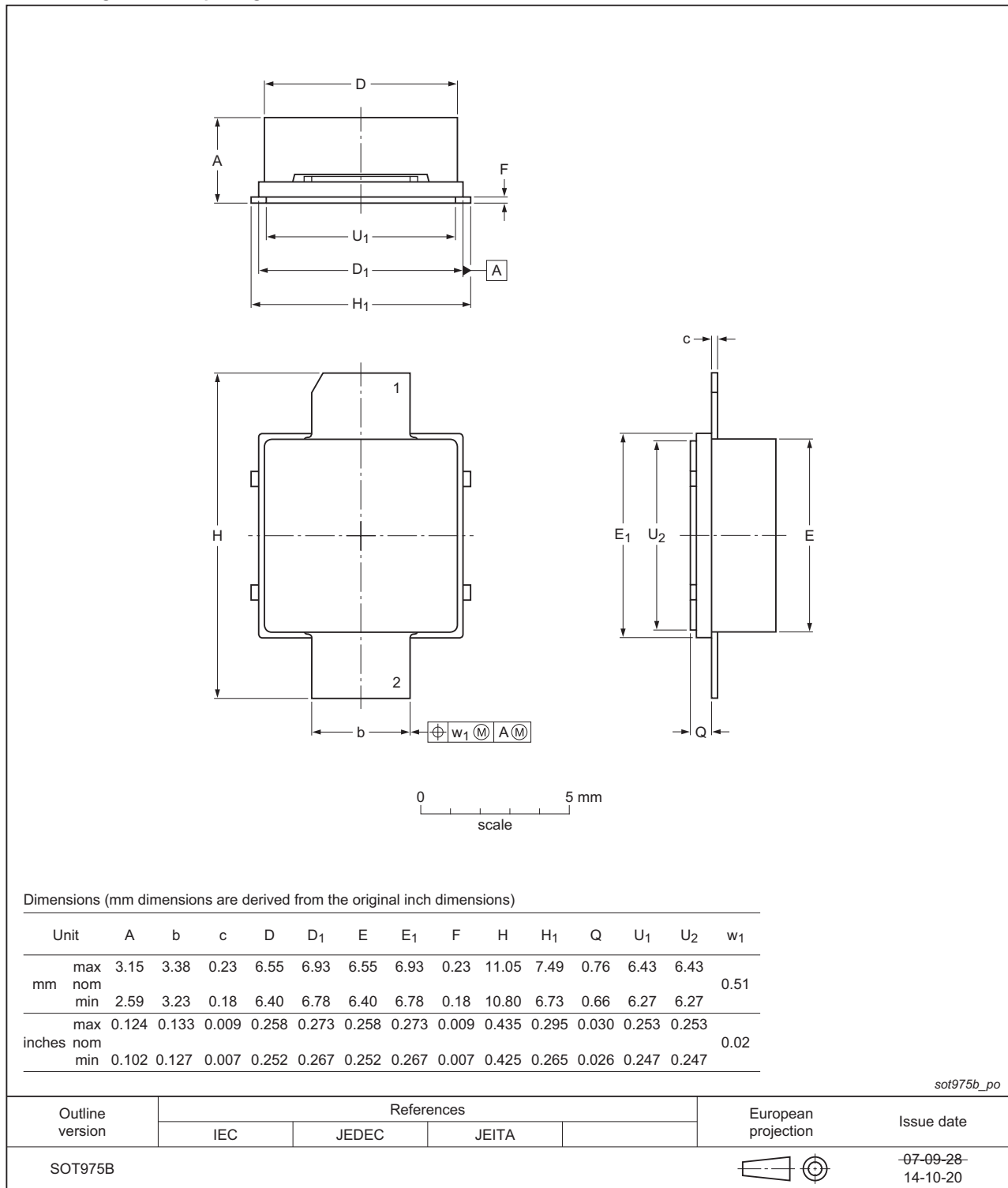


Fig 12. Package outline SOT975B

Earless flanged ceramic package; 2 leads

SOT975C

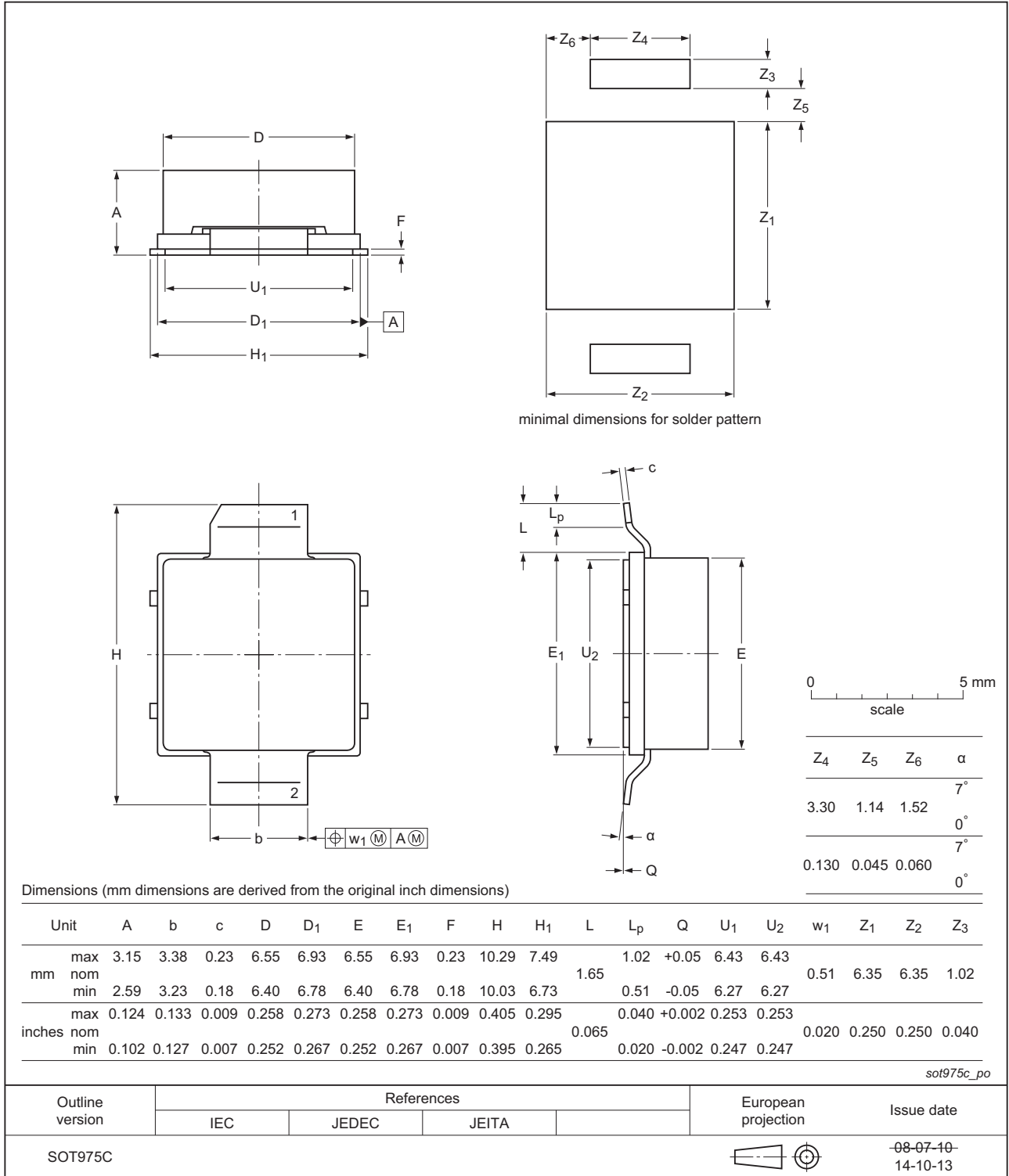


Fig 13. Package outline SOT975C

## 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#5	20150901	Product data sheet	-	BLF6G27-10_BLF6G27-10G v.4
Modifications:	<ul style="list-style-type: none"> <li>The format of this document has been redesigned to comply with the new identity guidelines of Ampleon.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul>			
BLF6G27-10_BLF6G27-10G v.4	20141216	Product data sheet	-	BLF6G27-10_BLF6G27-10G v.3
BLF6G27-10_BLF6G27-10G v.3	20110228	Product data sheet	-	BLF6G27-10_BLF6G27-10G v.2
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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Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
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