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 °C in a class-AB production test circuit.

Mode of operation	f	V_{DS}	$P_{L(AV)}$	G_p	η_D	$ACPR_{885k}$	$ACPR_{1980k}$
	(MHz)	(V)	(W)	(dB)	(%)	(dBc)	(dBc)
1-carrier N-CDMA[1]	2500 to 2700	28	2	19	20	−49[2]	−64[2]
IS-95	2300 to 2400	28	2	22.5	24.8	−47[2]	−64[2]

[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

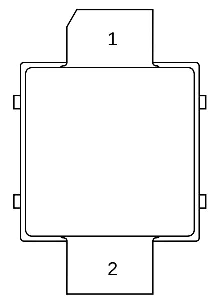
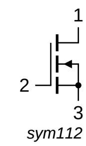
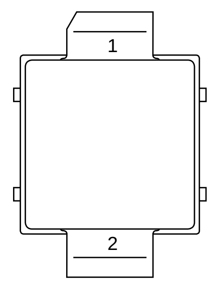
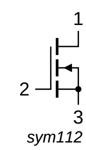
- Typical 1-carrier N-CDMA performance (Single carrier N-CDMA with pilot, paging, sync and 6 traffic channels [Walsh codes 8 - 13]. PAR = 9.7 dB at 0.01 % probability on CCDF. Channel bandwidth is 1.23 MHz), a supply voltage of 28 V and an I_{Dq} of 130 mA:
- Qualified up to a maximum V_{DS} operation 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
BLF6G27-10 (SOT975B)			
1	drain		
2	gate		
3	source [1]		
BLF6G27-10G (SOT975C)			
1	drain		
2	gate		
3	source [1]		

[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 °C; P_L = 10 W (CW)	BLF6G27-10	4.0	K/W
			BLF6G27-10G	4.0	K/W

6. Characteristics

Table 6. Characteristics

T_j = 25 °C per section; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.18 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 18 mA	1.4	1.9	2.4	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	1.4	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	2.7	-	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	140	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 0.9 A	0.8	-	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 0.6 A	328	-	1256	mΩ
C_{rs}	feedback capacitance	V_{GS} = 0 V; V_{DS} = 28 V; f = 1 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 MHz; f_2 = 2600 MHz; f_3 = 2700 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	17.5	19	-	dB
RL_{in}	input return loss	$P_{L(AV)}$ = 2 W	-	–10	-	dB
η_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 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 V; I_{Dq} = 130 mA; P_L = $P_{L(1dB)}$; f = 2700 MHz.

7.2 Ampleon WiMAX signal

7.2.1 WiMAX signal description

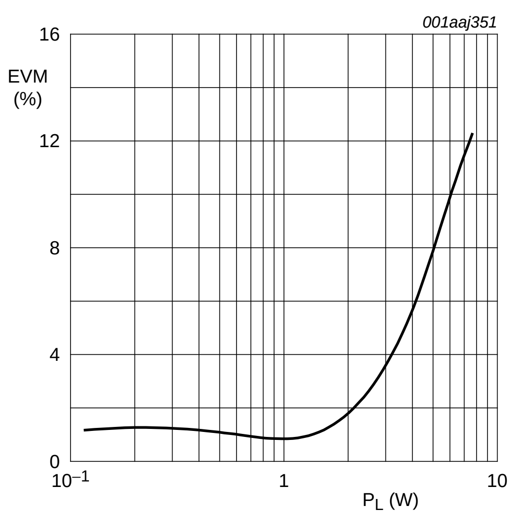
frame duration = 5 ms; bandwidth = 10 MHz; sequency = 1 frame; frequency band = WCS; sampling rate = 11.2 MHz; n = 8 / 7; G = T_g / T_b = 1 / 8; FFT = 1024; zone type = PUSC; δ = 97.7 %; number of symbols = 46; number of subchannels = 30; PAR = 9.5 dB.

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

Table 8. Frame structure

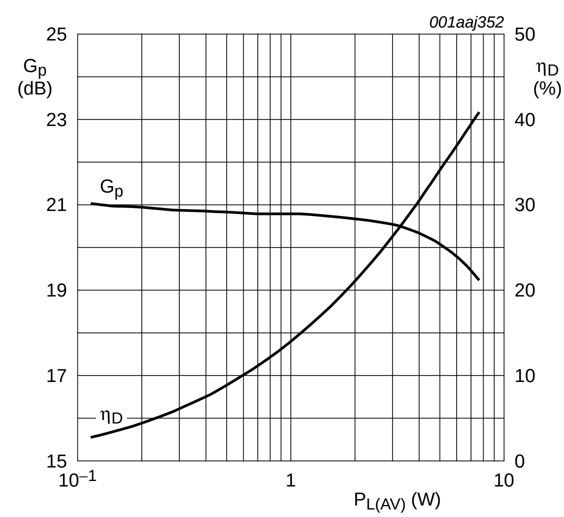
Frame contents			Modulation technique	Data length
Zone 0	FCH	2 symbols × 4 subchannels	QPSK1/2	3 bit
Zone 0	data	2 symbols × 26 subchannels	64QAM3/4	692 bit
Zone 0	data	44 symbols × 30 subchannels	64QAM3/4	10000 bit

7.2.2 Graphs



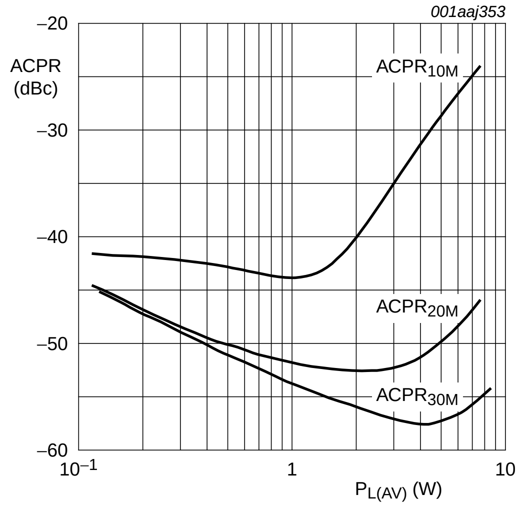
V_{DS} = 28 V; I_{Dq} = 130 mA; f = 2600 MHz.

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



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

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

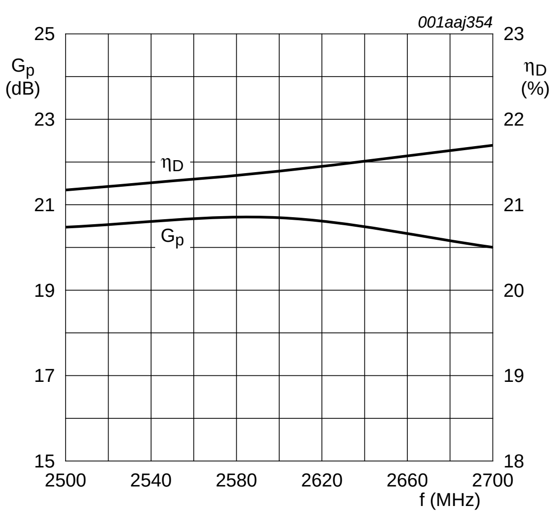


V_{DS} = 28 V; I_{Dq} = 130 mA; f = 2600 MHz.

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

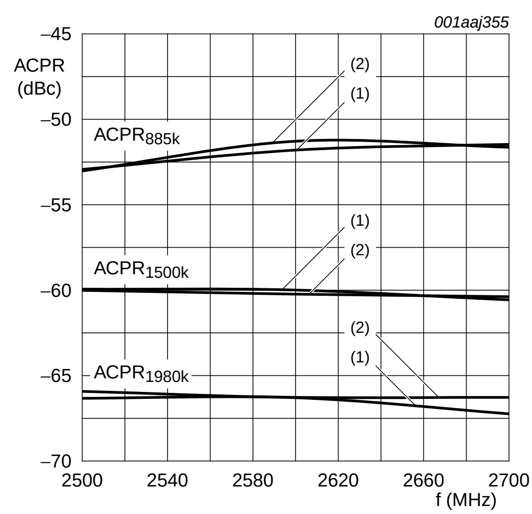
7.3 Single carrier NA IS-95 broadband performance at 2 W average

7.3.1 Graphs



V_{DS} = 28 V; I_{Dq} = 130 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

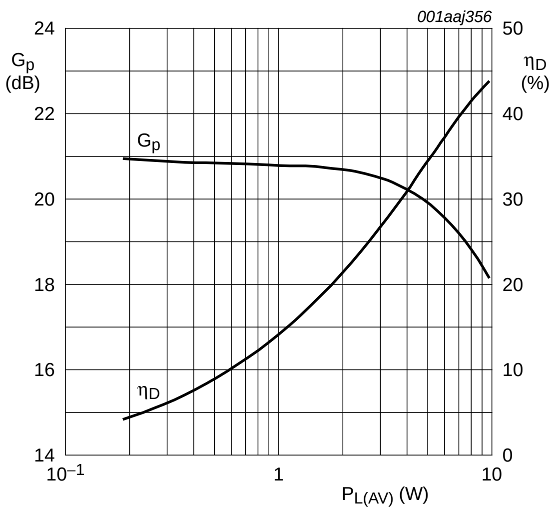


V_{DS} = 28 V; I_{Dq} = 130 mA; single carrier IS-95; PAR = 9.7 dB at .01 % probability.

(1) Low frequency component

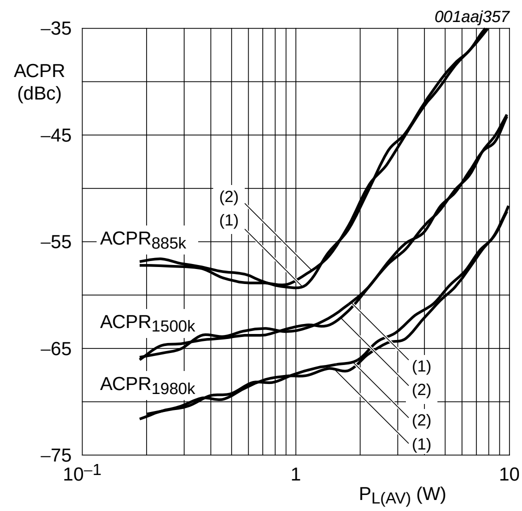
(2) High frequency component

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

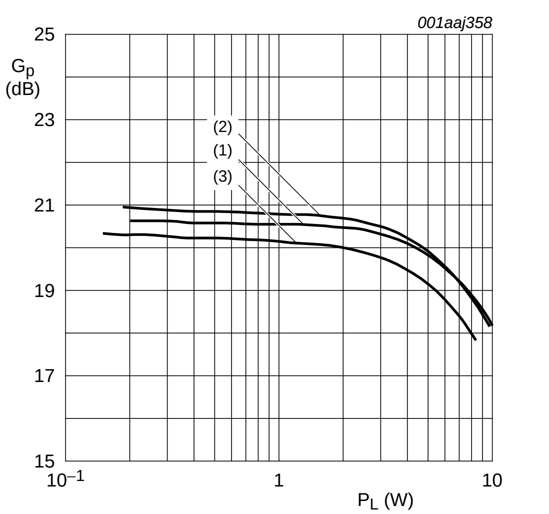


V_{DS} = 28 V; I_{Dq} = 130 mA; f = 2600 MHz;
single carrier IS-95; PAR = 9.7 dB at 0.01 % probability;
channel bandwidth = 1.23 MHz; IBW = 30 kHz.

(1) Low frequency component

(2) High frequency component

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



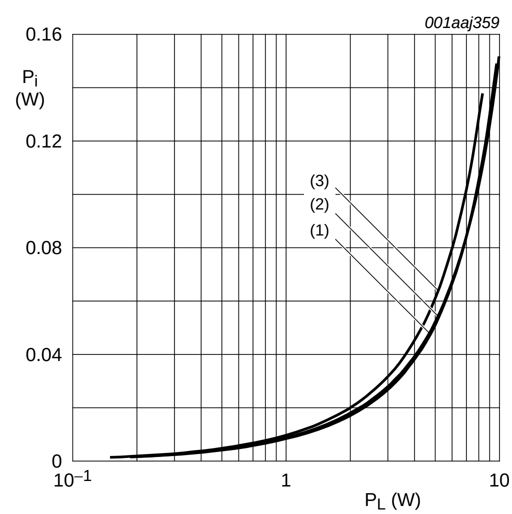
V_{DS} = 28 V; I_{Dq} = 130 mA; single carrier IS-95;
PAR = 9.7 dB at 0.01 % probability;
channel bandwidth = 1.23 MHz.

(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.

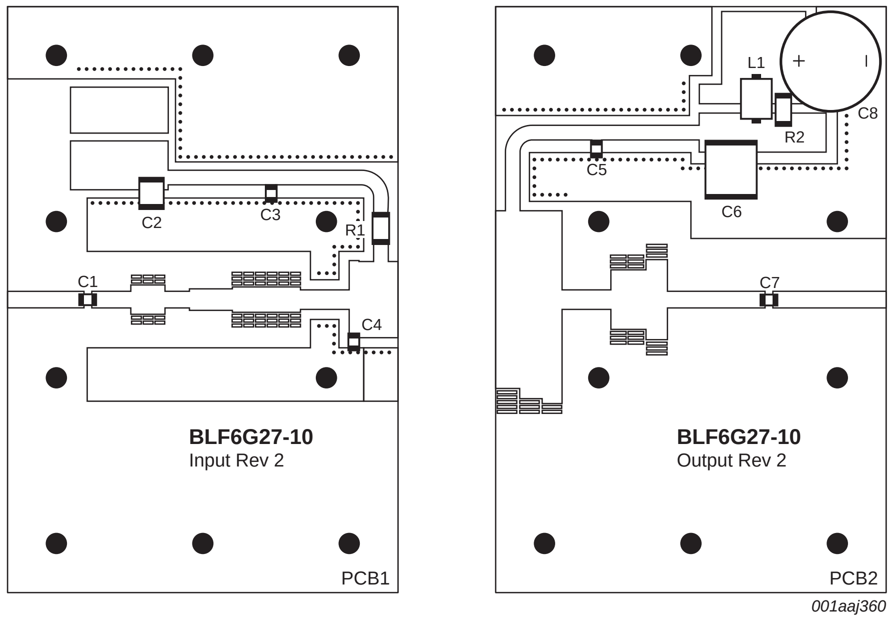
(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

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

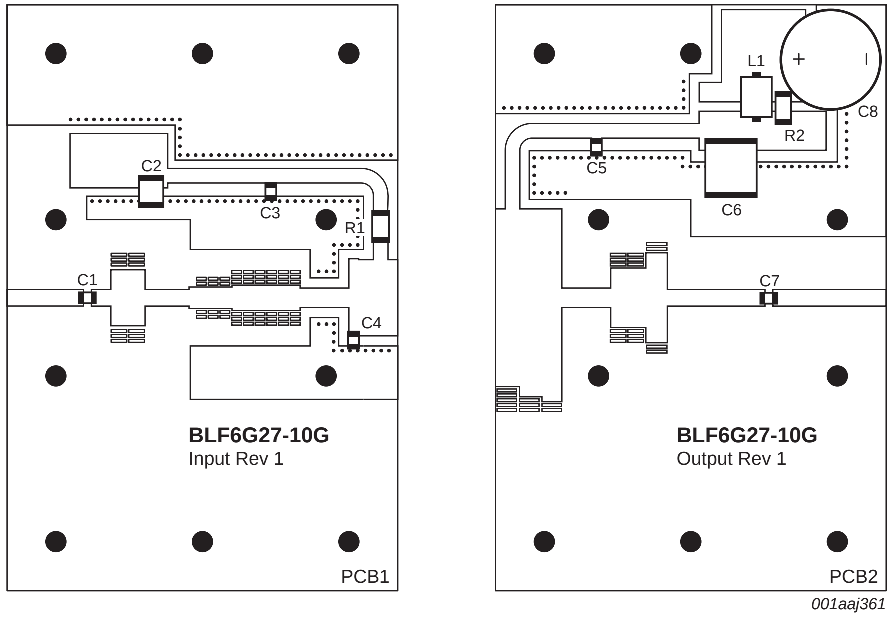
8. Test information



Striplines are on a double copper-clad Taconic RF35 Printed-Circuit Board (PCB) with ε_r = 3.5 and thickness = 0.76 mm.

See Table 9 for list of components.

Fig 10. Component layout for 2500 MHz to 2700 MHz test circuit BLF6G27-10



Striplines are on a double copper-clad Taconic RF35 Printed-Circuit Board (PCB) with ε_r = 3.5 and thickness = 0.76 mm.

See Table 9 for list of components.

Fig 11. Component layout for 2500 MHz to 2700 MHz test circuit BLF6G27-10G

Table 9. List of components

For test circuit, see Figure 10 and Figure 11.

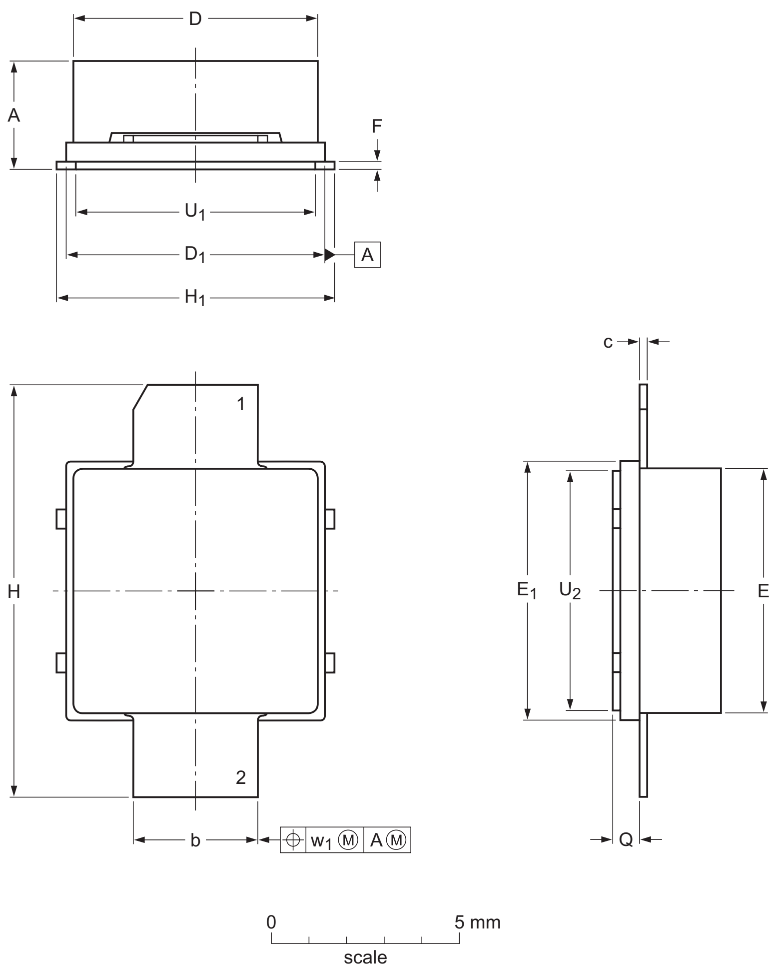
Component	Description	Value	Remarks
C1, C3, C5, C7	multilayer ceramic chip capacitor	22 pF	ATC 100A
C2	multilayer ceramic chip capacitor	1.5 μF	TDK
C4	multilayer ceramic chip capacitor	1.6 pF	ATC 100A
C6	multilayer ceramic chip capacitor	10 μF; 50 V	TDK
C8	electrolytic capacitor	220 μF; 63 V	Elco
L1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

Table 10. Measured test circuit impedances

f	Z_i	Z_o
(GHz)	(Ω)	(Ω)
BLF6G27-10		
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
BLF6G27-10G		
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**



Dimensions (mm dimensions are derived from the original inch dimensions)

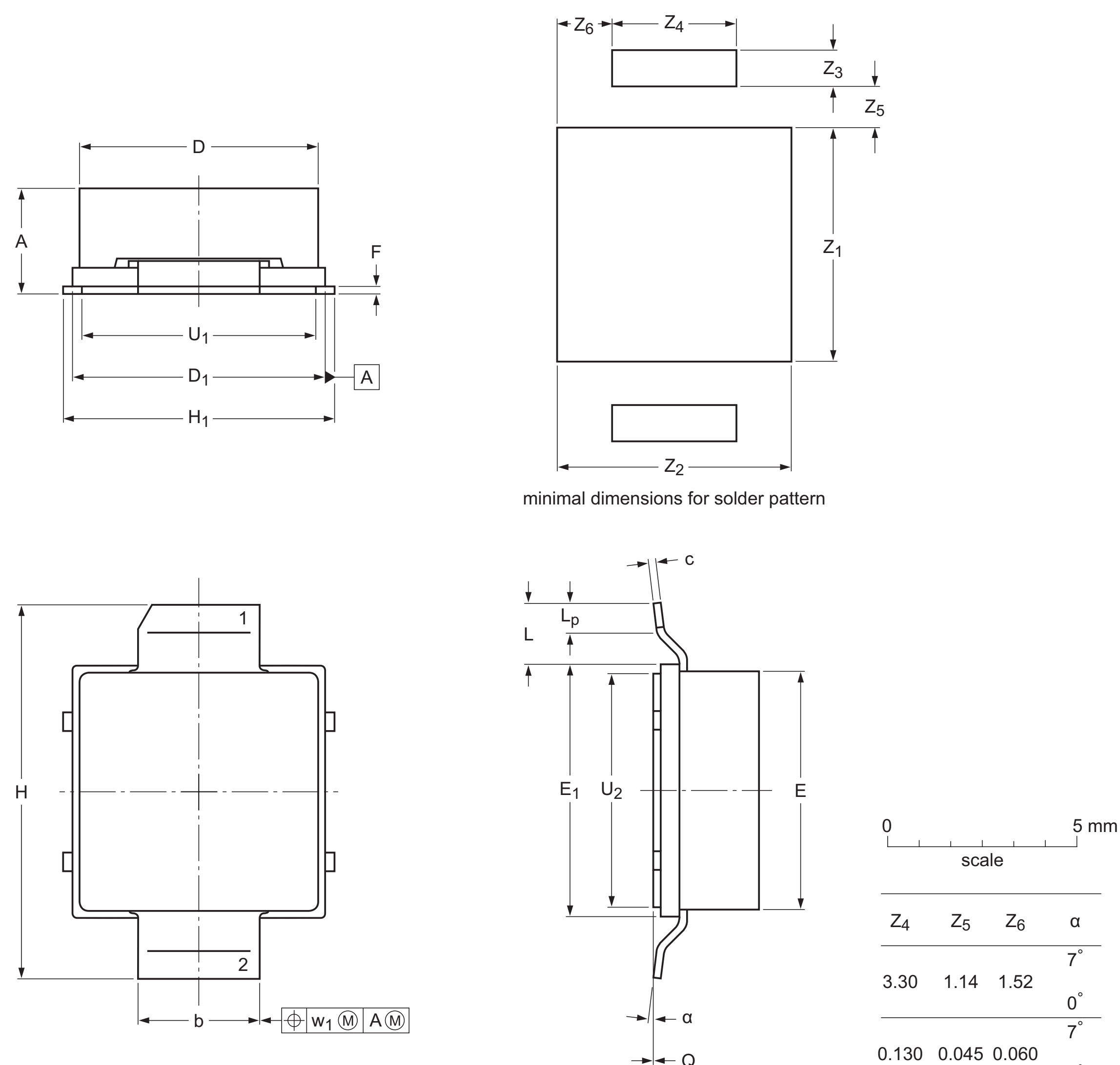
Unit		A	b	c	D	D_1	E	E_1	F	H	H_1	Q	U_1	U_2	w_1
mm	max	3.15	3.38	0.23	6.55	6.93	6.55	6.93	0.23	11.05	7.49	0.76	6.43	6.43	
	nom														0.51
	min	2.59	3.23	0.18	6.40	6.78	6.40	6.78	0.18	10.80	6.73	0.66	6.27	6.27	
inches	max	0.124	0.133	0.009	0.258	0.273	0.258	0.273	0.009	0.435	0.295	0.030	0.253	0.253	
	nom														0.02
	min	0.102	0.127	0.007	0.252	0.267	0.252	0.267	0.007	0.425	0.265	0.026	0.247	0.247	

sot975b_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT975B						~~07-09-28~~ 14-10-20

Fig 12. Package outline SOT975B

Earless flanged ceramic package; 2 leads **SOT975C**



Z4	Z5	Z6	α
3.30	1.14	1.52	7° / 0°
0.130	0.045	0.060	7° / 0°

Dimensions (mm dimensions are derived from the original inch dimensions)

Unit		A	b	c	D	D_1	E	E_1	F	H	H_1	L	L_p	Q	U_1	U_2	w_1	Z_1	Z_2	Z_3
mm	max	3.15	3.38	0.23	6.55	6.93	6.55	6.93	0.23	10.29	7.49		1.02	+0.05	6.43	6.43				
	nom											1.65					0.51	6.35	6.35	1.02
	min	2.59	3.23	0.18	6.40	6.78	6.40	6.78	0.18	10.03	6.73		0.51	-0.05	6.27	6.27				
inches	max	0.124	0.133	0.009	0.258	0.273	0.258	0.273	0.009	0.405	0.295		0.040	+0.002	0.253	0.253				
	nom											0.065					0.020	0.250	0.250	0.040
	min	0.102	0.127	0.007	0.252	0.267	0.252	0.267	0.007	0.395	0.265		0.020	-0.002	0.247	0.247				

sot975c_po

Outline version	References: IEC	References: JEDEC	References: JEITA		European projection	Issue date
SOT975C						~~08-07-10~~ 14-10-13

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:	• The format of this document has been redesigned to comply with the new identity guidelines of Ampleon. • Legal texts have been adapted to the new company name where appropriate.			
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	-	-

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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

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

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.ampleon.com.

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13. Contact information

For more information, please visit: http://www.ampleon.com

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