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 °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 %
  - $ACPR_{885}$ = –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

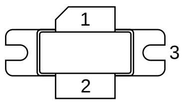
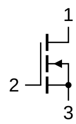
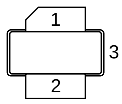
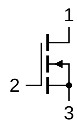
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

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		 sym112
2	gate		
3	source [1]		
BLF6G27LS-75 (SOT502B)			
1	drain		 sym112
2	gate		
3	source [1]		

[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 °C; P_L = 60 W (CW)	BLF6G27-75	0.85	K/W
			BLF6G27LS-75	0.75	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 = 0.5 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 100 mA	1.4	2	2.4	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	3	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	14.9	18	-	A
I_{GSS}	gate leakage current	V_{GS} = +11 V; V_{DS} = 0 V	-	-	300	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 5 A	-	7	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)}$ + 3.75 V; I_D = 3.5 A	-	0.14	0.25	Ω
C_{rs}	feedback capacitance	V_{GS} = 0 V; V_{DS} = 28 V; f = 1 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 MHz; f_2 = 2600 MHz; f_3 = 2700 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 600 mA; T_{case} = 25 °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 W		15	17	-	dB
RL_{in}	input return loss	$P_{L(AV)}$ = 9 W		-	−10	-	dB
η_D	drain efficiency	$P_{L(AV)}$ = 9 W		19.0	23	-	%
$ACPR_{885k}$	adjacent channel power ratio (885 kHz)	$P_{L(AV)}$ = 9 W	[1]	-	−50	−45	dBc
$ACPR_{1980k}$	adjacent channel power ratio (1980 kHz)	$P_{L(AV)}$ = 9 W	[1]	-	−60	−55	dBc
$P_{L(M)}$	peak output power		[2]	70	75	-	W

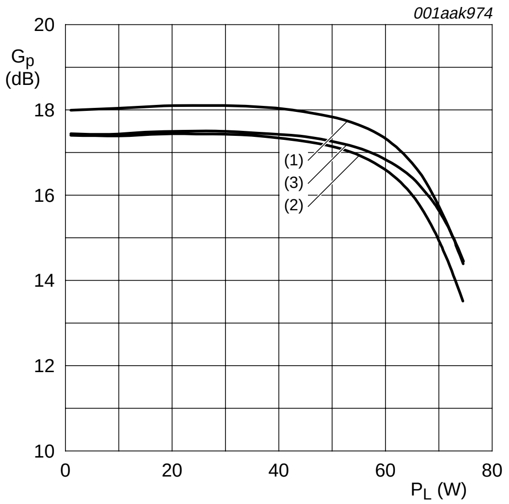
[1] Measured within 30 kHz bandwidth.

[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 V; I_{Dq} = 600 mA; P_L = 65 W (CW); f = 2500 MHz.

7.2 One-tone CW



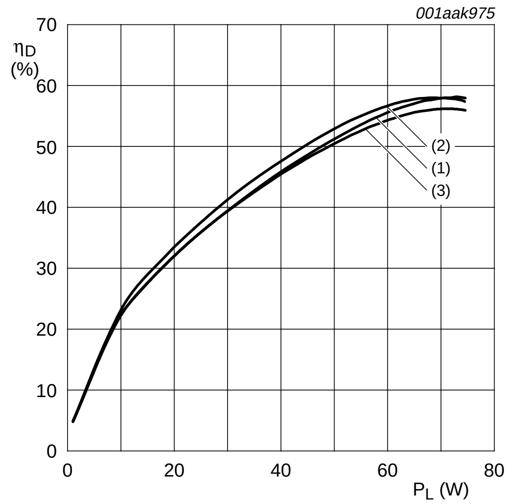
V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

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



V_{DS} = 28 V; I_{Dq} = 600 mA.

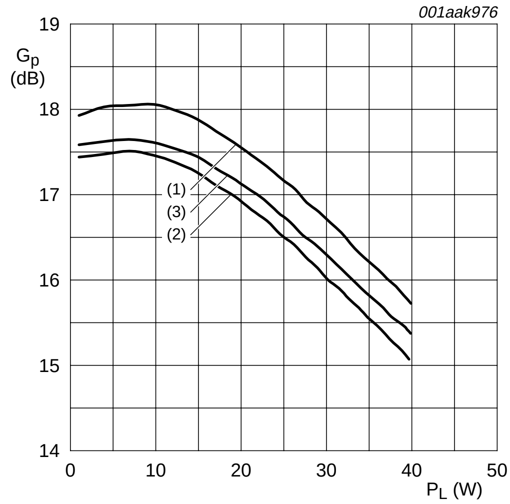
(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

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

7.3 Single carrier IS-95



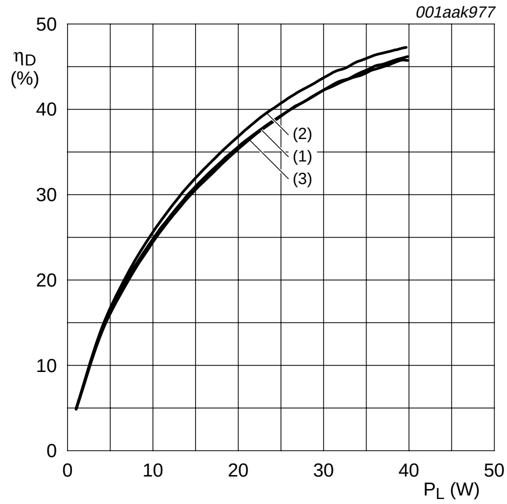
V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

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



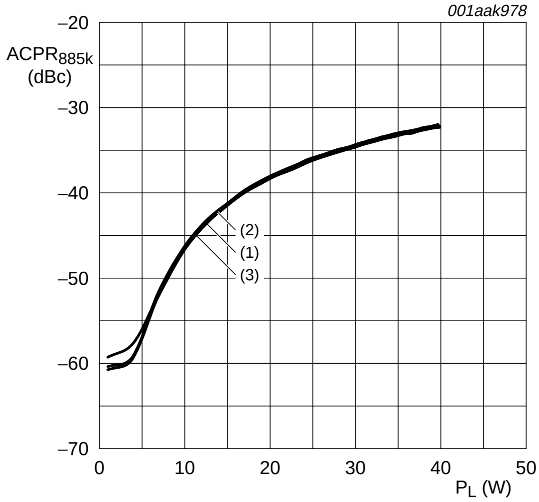
V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

Fig 4. Drain efficiency as a function of load power; typical values



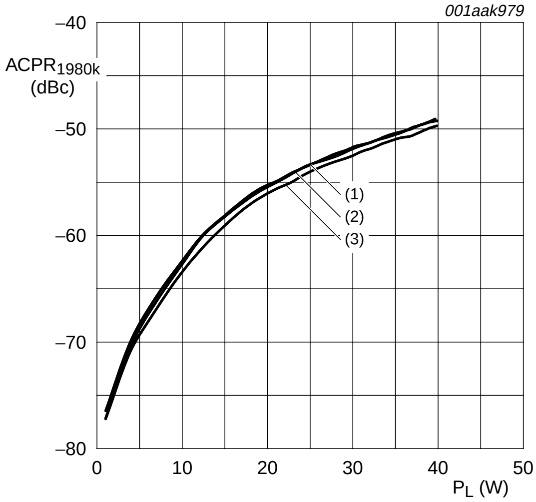
V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

Fig 5. Adjacent channel power ratio (885 kHz) as a function of load power; typical values



V_{DS} = 28 V; I_{Dq} = 600 mA.

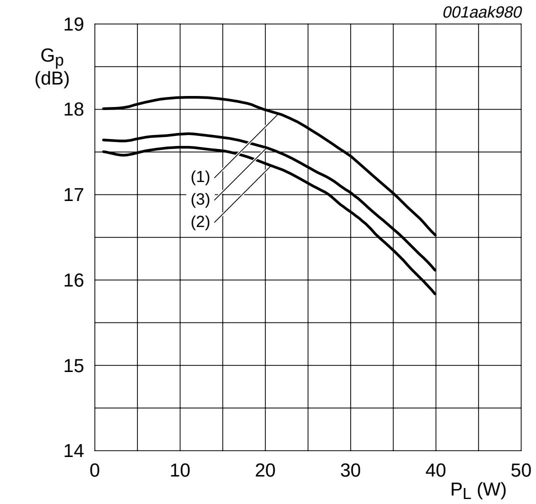
(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

Fig 6. Adjacent channel power ratio (1980 kHz) as a function of load power; typical values

7.4 Single carrier W-CDMA



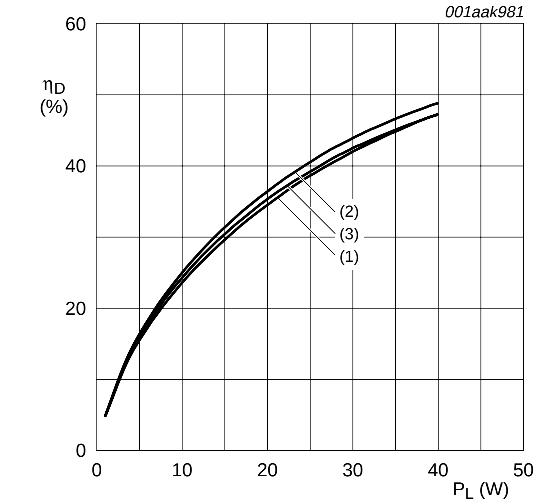
V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

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



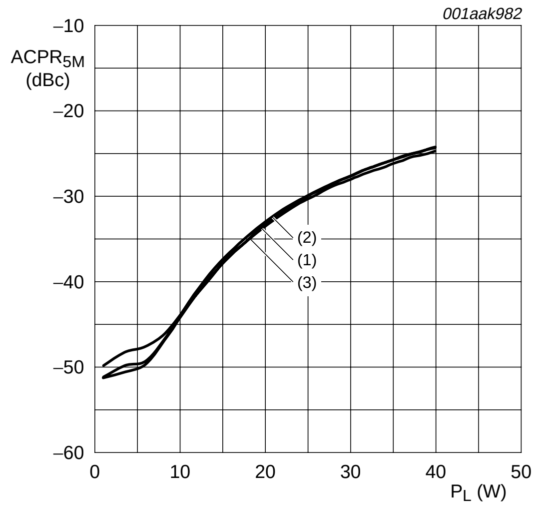
V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

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



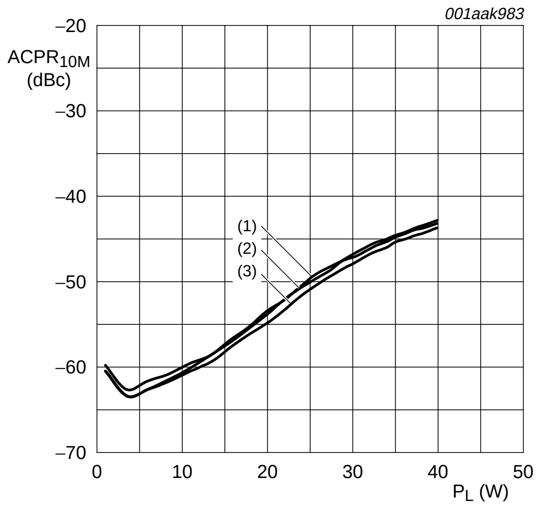
V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

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



V_{DS} = 28 V; I_{Dq} = 600 mA.

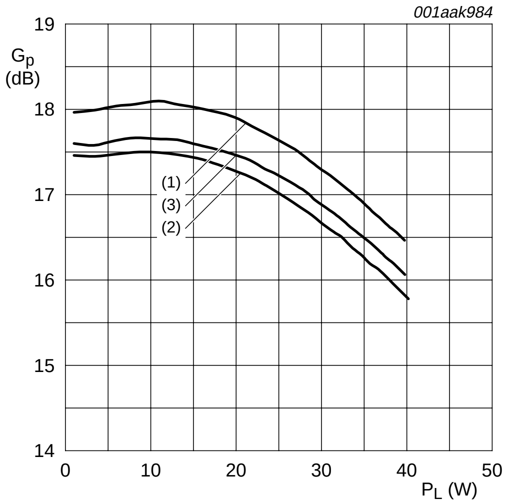
(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

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

7.5 2-carrier W-CDMA



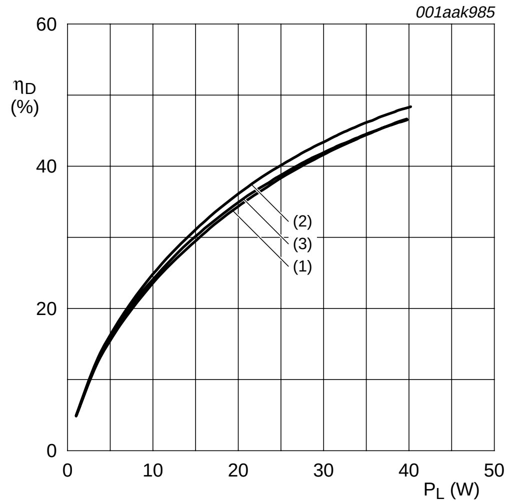
V_{DS} = 28 V; I_{Dq} = 600 mA; carrier spacing = 10 MHz.

(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

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



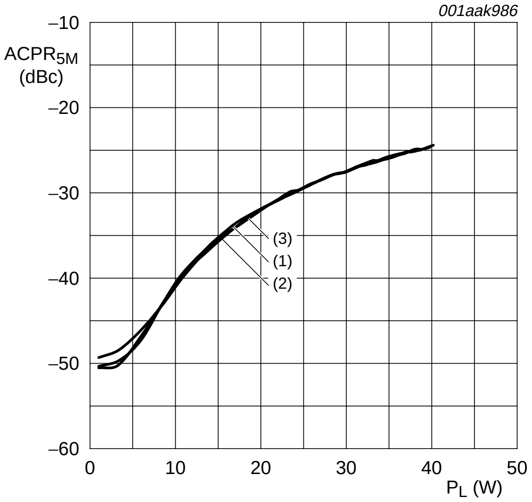
V_{DS} = 28 V; I_{Dq} = 600 mA; carrier spacing = 10 MHz.

(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

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



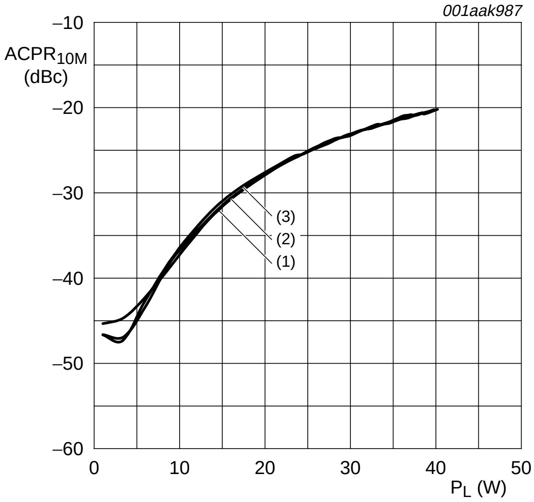
V_{DS} = 28 V; I_{Dq} = 600 mA; carrier spacing = 10 MHz.

(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 MHz

Fig 13. Adjacent channel power ratio (5 MHz) as a function of load power; typical values



V_{DS} = 28 V; I_{Dq} = 600 mA; carrier spacing = 10 MHz.

(1) f = 2500 MHz

(2) f = 2600 MHz

(3) f = 2700 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 GHz	Z_S Ω	Z_L 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

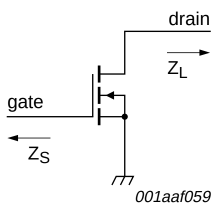
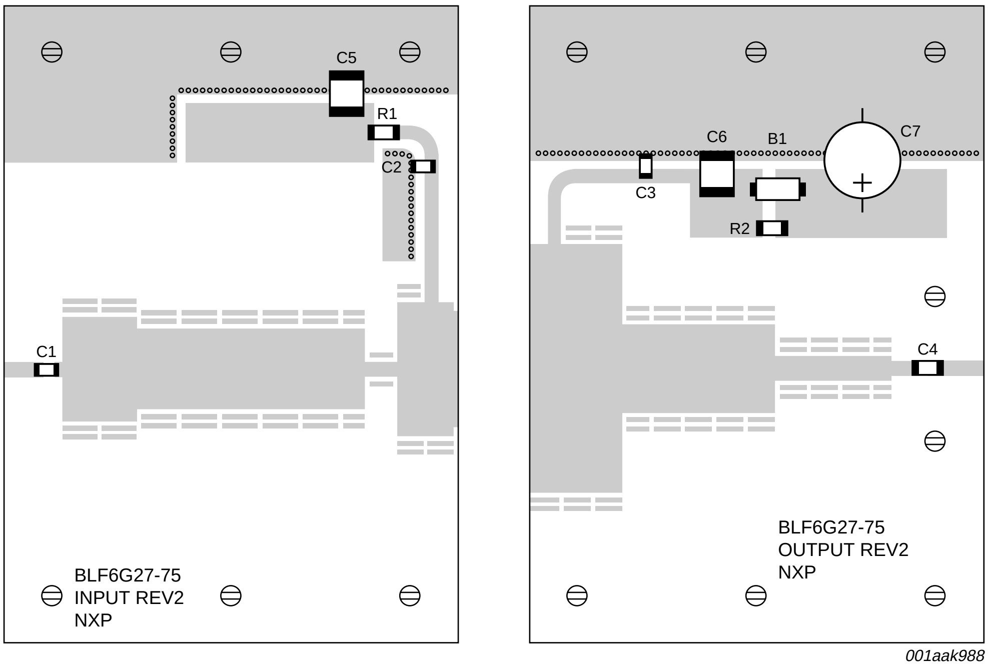


Fig 15. Definition of transistor impedance

8.2 Test circuit



Printed-Circuit Board (PCB) material: Taconic RF35 with ε_r = 3.5 and thickness = 0.762 mm.

See Table 9 for list of components.

Fig 16. Component layout

Table 9. List of components

See Figure 16 for component layout.

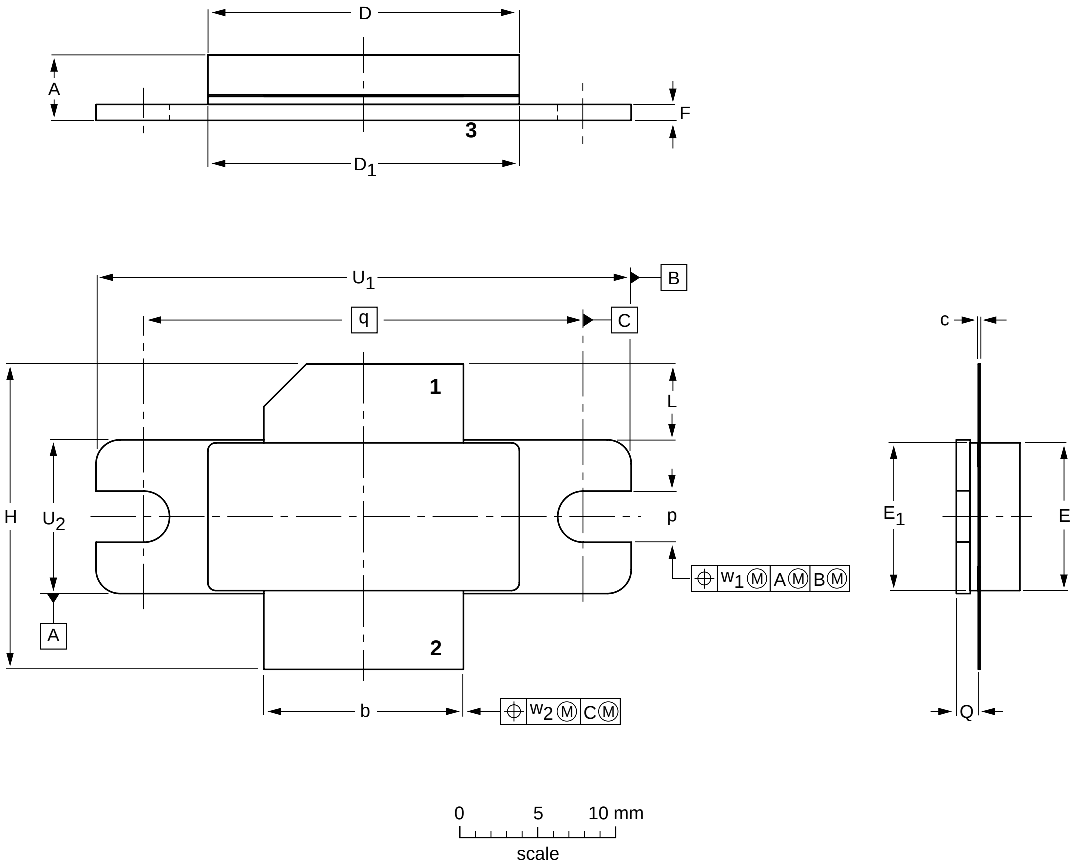
Component	Description	Value		Remarks
B1	ferrite bead	-		
C1, C2, C3	multilayer ceramic chip capacitor	13 pF	[1]	
C4	multilayer ceramic chip capacitor	10 pF	[2]	
C5, C6	multilayer ceramic chip capacitor	4.7 μF		TDK
C7	electrolytic capacitor	220 μF; 63 V		
R1, R2	SMD resistor	10 Ω		SMD 1206

[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**



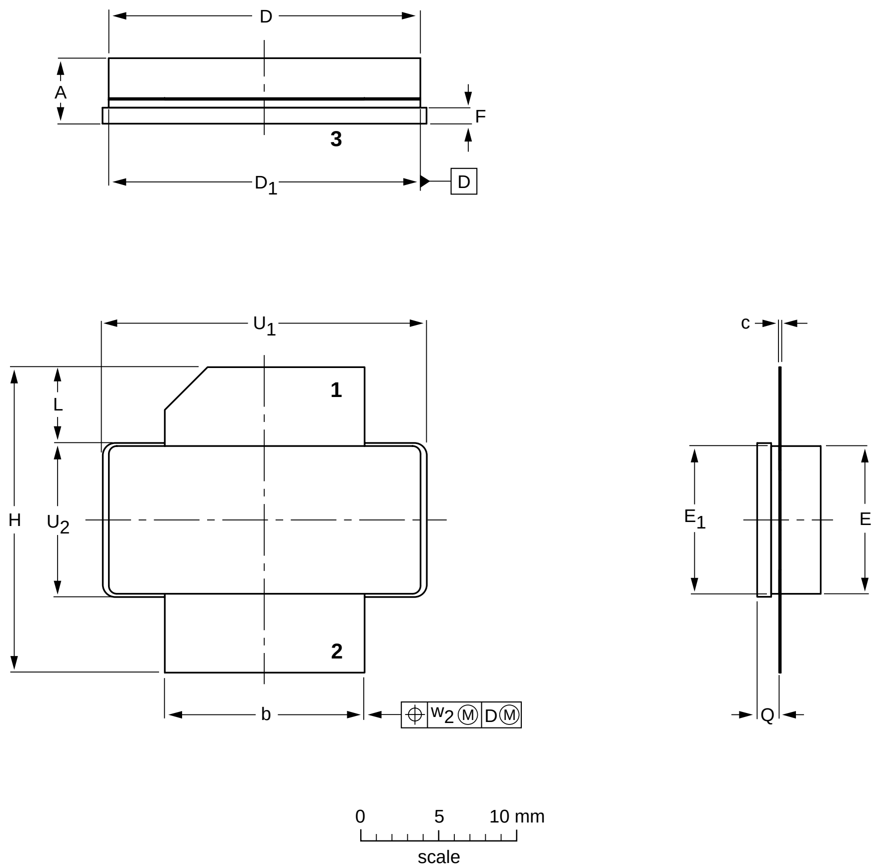
DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	L	p	Q	q	U_1	U_2	w_1	w_2
mm	4.72 3.43	12.83 12.57	0.15 0.08	20.02 19.61	19.96 19.66	9.50 9.30	9.53 9.25	1.14 0.89	19.94 18.92	5.33 4.32	3.38 3.12	1.70 1.45	27.94	34.16 33.91	9.91 9.65	0.25	0.51
inches	0.186 0.135	0.505 0.495	0.006 0.003	0.788 0.772	0.786 0.774	0.374 0.366	0.375 0.364	0.045 0.035	0.785 0.745	0.210 0.170	0.133 0.123	0.067 0.057	1.100	1.345 1.335	0.390 0.380	0.01	0.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT502A						~~99-12-28~~ 03-01-10

Fig 17. Package outline SOT502A

Earless flanged LDMOST ceramic package; 2 leads **SOT502B**



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	L	Q	U_1	U_2	w_2
mm	4.72 3.43	12.83 12.57	0.15 0.08	20.02 19.61	19.96 19.66	9.50 9.30	9.53 9.25	1.14 0.89	19.94 18.92	5.33 4.32	1.70 1.45	20.70 20.45	9.91 9.65	0.25
inches	0.186 0.135	0.505 0.495	0.006 0.003	0.788 0.772	0.786 0.774	0.374 0.366	0.375 0.364	0.045 0.035	0.785 0.745	0.210 0.170	0.067 0.057	0.815 0.805	0.390 0.380	0.010

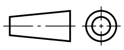
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT502B						~~03-01-10~~ 07-05-09

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.
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.nxp.com.

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14. Contents

1 Product profile . . . 1
1.1 General description. . . . 1
1.2 Features . . . 1
1.3 Applications . . . 2
2 Pinning information . . . 2
3 Ordering information . . . 2
4 Limiting values . . . 2
5 Thermal characteristics . . . 3
6 Characteristics . . . 3
7 Application information . . . 3
7.1 Ruggedness in class-AB operation . . . 4
7.2 One-tone CW . . . 4
7.3 Single carrier IS-95 . . . 5
7.4 Single carrier W-CDMA . . . 6
7.5 2-carrier W-CDMA . . . 7
8 Test information . . . 8
8.1 Impedance information . . . 8
8.2 Test circuit . . . 8
9 Package outline . . . 10
10 Abbreviations . . . 12
11 Revision history . . . 12
12 Legal information . . . 13
12.1 Data sheet status . . . 13
12.2 Definitions . . . 13
12.3 Disclaimers . . . 13
12.4 Trademarks . . . 13
13 Contact information . . . 13
14 Contents . . . 14

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