BLF6G22LS-130

Power LDMOS transistor

Rev. 01 — 23 May 2008 Product data sheet

1. Product profile

1.1 General description

130 W LDMOS power transistor for base station applications at frequencies from 2000 MHz to 2200 MHz.

Table 1. Typical performance

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

Mode of operation	f	V_{DS}	$P_{L(AV)}$	G_p	η_D	IMD3	ACPR
	(MHz)	(V)	(W)	(dB)	(%)	(dBc)	(dBc)
2-carrier W-CDMA	2110 to 2170	28	30	17	28.5	–37[1]	–40[1]

[1] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 7 dB at 0.01 % probability on CCDF per carrier; carrier spacing 10 MHz.

CAUTION

This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

1.2 Features

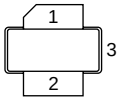
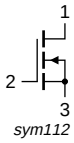
- Typical 2-carrier W-CDMA performance at frequencies of 2110 MHz and 2170 MHz, a supply voltage of 28 V and an I_{Dq} of 1100 mA:
  - Average output power = 30 W
  - Power gain = 17 dB (typ)
  - Efficiency = 28.5 %
  - IMD3 = –37 dBc
  - ACPR = –40 dBc
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (2000 MHz to 2200 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 W-CDMA base stations and multi carrier applications in the 2000 MHz to 2200 MHz frequency range

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain		
2	gate		
3	source [1]		

sym112

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF6G22LS-130	-	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		-	34	A
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		-	225	°C

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j\text{-}case)}$	thermal resistance from junction to case	T_{case} = 80 °C; P_L = 30 W	0.43	K/W

6. Characteristics

Table 6. Characteristics

T_j = 25 °C 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 = 180 mA	1.4	1.9	2.4	V
V_{GSq}	gate-source quiescent voltage	V_{DS} = 28 V; I_D = 1100 mA	1.6	2.1	2.6	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	5	µA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	26.5	34	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	450	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 9 A	-	12	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 6.3 A	-	0.085	0.135	Ω
C_{rs}	feedback capacitance	V_{GS} = 0 V; V_{DS} = 28 V; f = 1 MHz	-	3.15	-	pF

7. Application information

Table 7. Application information

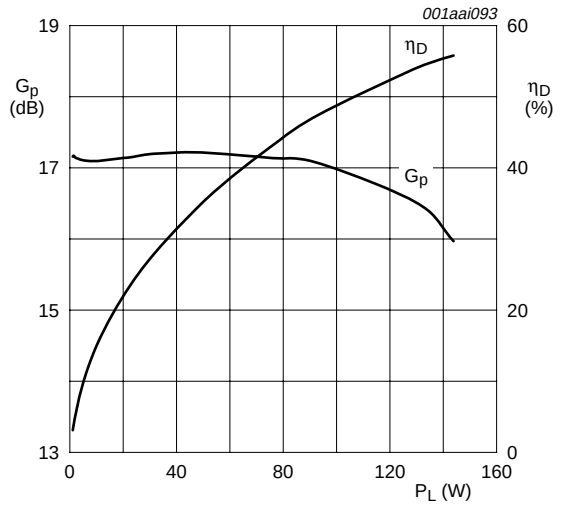
Mode of operation: 2-carrier W-CDMA; PAR 7 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 PDPCH; f_1 = 2112.5 MHz; f_2 = 2122.5 MHz; f_3 = 2157.5 MHz; f_4 = 2167.5 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 1100 mA; T_{case} = 25 °C; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{L(AV)}$	average output power		-	30	-	W
G_p	power gain	$P_{L(AV)}$ = 30 W	16	17	-	dB
RL_{in}	input return loss	$P_{L(AV)}$ = 30 W	-	–9	–6	dB
η_D	drain efficiency	$P_{L(AV)}$ = 30 W	25.5	28.5	-	%
IMD3	third order intermodulation distortion	$P_{L(AV)}$ = 30 W	-	–37	–34.5	dBc
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 30 W	-	–40	–38	dBc

7.1 Ruggedness in class-AB operation

The BLF6G22LS-130 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 28 V; I_{Dq} = 1100 mA; P_L = 130 W (CW); f = 2170 MHz.

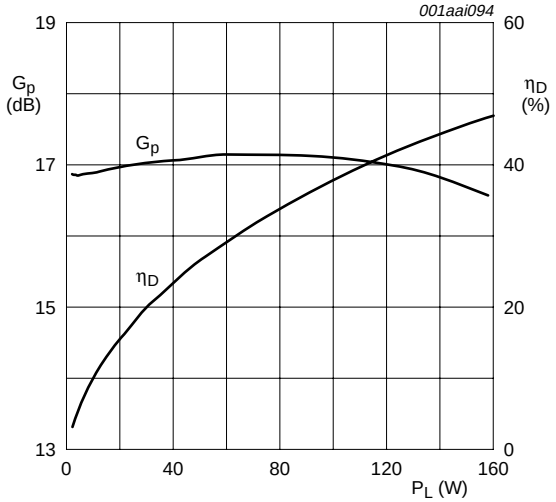
7.2 One-tone CW



V_{DS} = 28 V; I_{Dq} = 1100 mA; f = 2170 MHz.

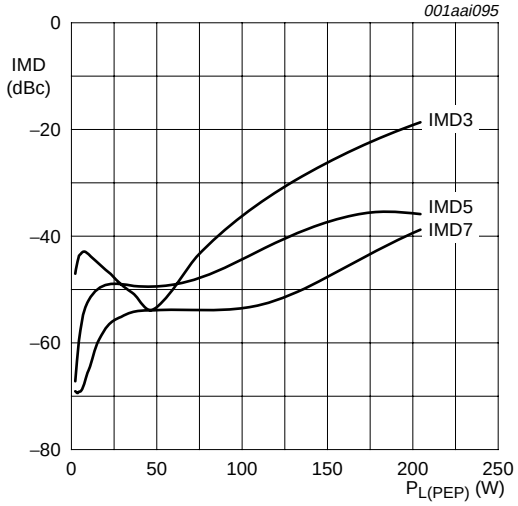
Fig 1. One-tone CW power gain and drain efficiency as functions of load power; typical values

7.3 Two-tone CW



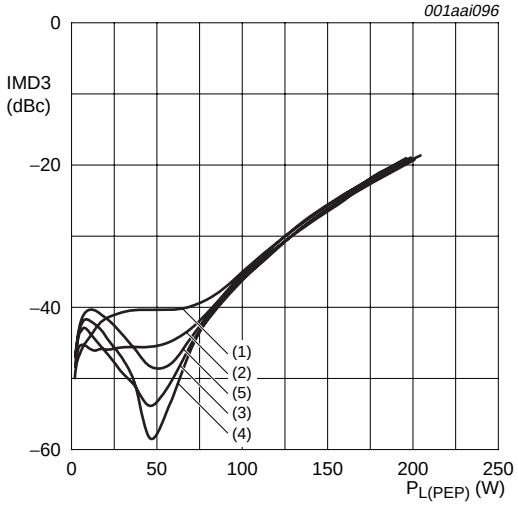
V_{DS} = 28 V; I_{Dq} = 1100 mA; f_1 = 2169.95 MHz; f_2 = 2170.05 MHz.

Fig 2. Two-tone CW power gain and drain efficiency as functions of peak envelope load power; typical values



V_{DS} = 28 V; I_{Dq} = 1100 mA; f_1 = 2169.95 MHz; f_2 = 2170.05 MHz.

Fig 3. Intermodulation distortion as a function of peak envelope load power; typical values

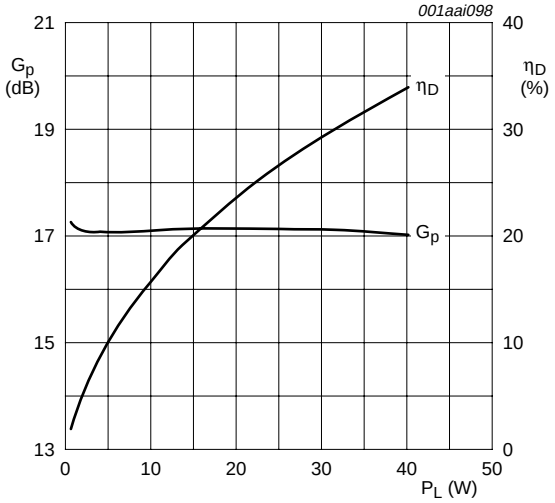


V_{DS} = 28 V; f_1 = 2169.95 MHz; f_2 = 2170.05 MHz.

(1) I_{Dq} = 900 mA
(2) I_{Dq} = 1000 mA
(3) I_{Dq} = 1100 mA
(4) I_{Dq} = 1200 mA
(5) I_{Dq} = 1300 mA

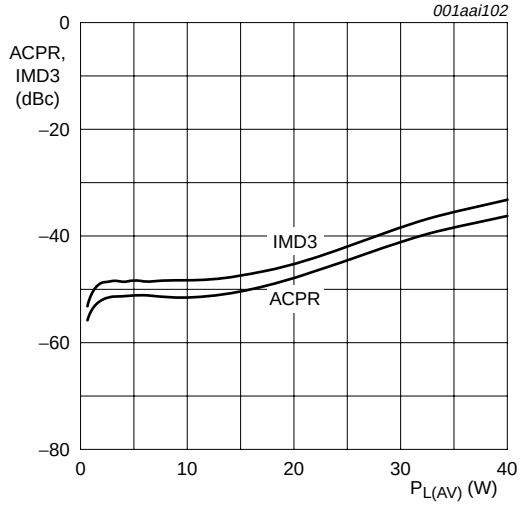
Fig 4. Third order intermodulation distortion as a function of peak envelope load power; typical values

7.4 2-carrier W-CDMA



V_{DS} = 28 V; I_{Dq} = 1100 mA; f_1 = 2157.5 MHz; f_2 = 2167.5 MHz; carrier spacing 10 MHz.

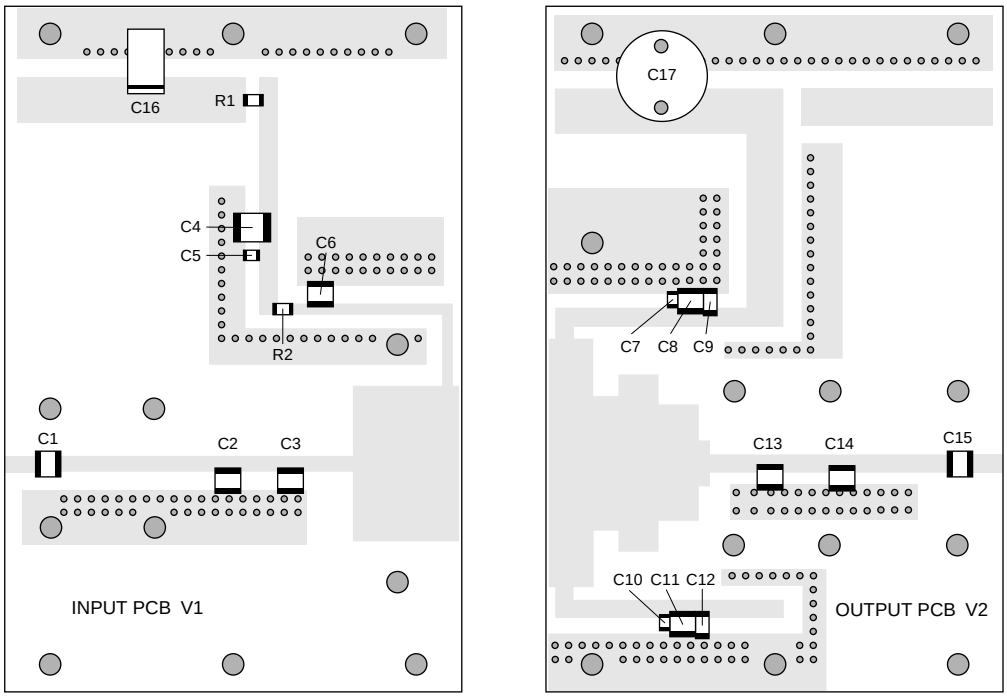
Fig 5. 2-carrier W-CDMA power gain and drain efficiency as functions of average load power; typical values



V_{DS} = 28 V; I_{Dq} = 1100 mA; f_1 = 2169.95 MHz; f_2 = 2170.05 MHz.

Fig 6. 2-carrier W-CDMA adjacent channel leakage ratio and IMD3 as functions of average load power; typical values

8. Test information



The striplines are on a Rogers RO4350B Printed-Circuit Board (PCB) with ε_r = 3.48 and thickness = 0.762 mm.

See Table 8 for list of components.

Fig 7. Component layout for 2110 MHz to 2170 MHz test circuit for 2-carrier W-CDMA

Table 8. List of components (see Figure 7)

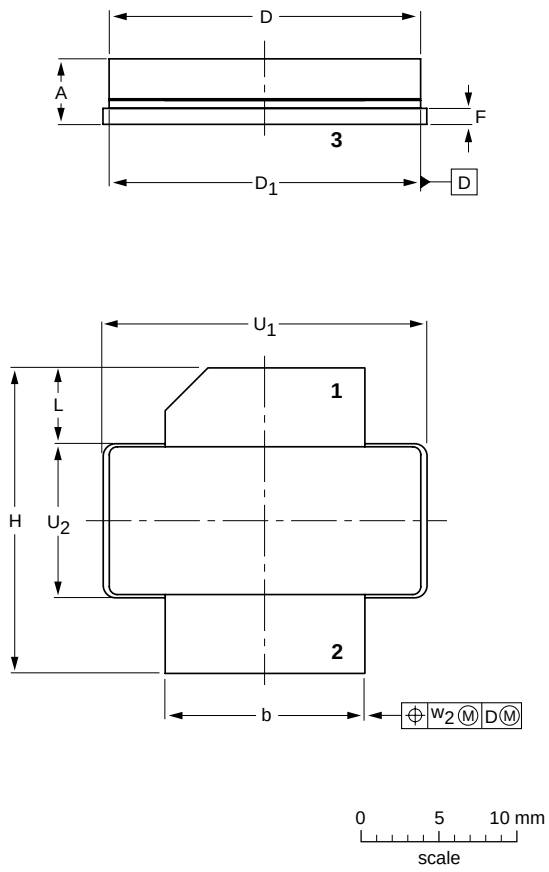
All capacitors should be soldered vertically.

Component	Description	Value		Remarks
C1	multilayer ceramic chip capacitor	3.6 pF	[1]	
C2	multilayer ceramic chip capacitor	0.3 pF	[1]	
C3	multilayer ceramic chip capacitor	1.2 pF	[1]	
C4	multilayer ceramic chip capacitor	4.7 pF		TDK C4532X7R1E475M t020U or equivalent
C5, C7, C10	multilayer ceramic chip capacitor	100 nF		Murata GRM217BR71H104KA11L or equivalent
C6, C8, C11	multilayer ceramic chip capacitor	15 pF	[1]	
C9, C12	multilayer ceramic chip capacitor	220 nF		AVX12065C224K
C13	multilayer ceramic chip capacitor	1.3 pF	[1]	
C14	multilayer ceramic chip capacitor	1.4 pF	[1]	
C15	multilayer ceramic chip capacitor	24 pF	[1]	
C16	tantalum capacitor	10 µF		
C17	electrolytic capacitor	220 µF; 35 V		
R1	chip resistor	4.7 Ω		SMD 0603
R2	chip resistor	2.7 Ω		SMD 0603

[1] American Technical Ceramics type 100B or capacitor of same quality.

9. Package outline

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 8. Package outline SOT502B

10. Abbreviations

Table 9. Abbreviations

Acronym	Description
3GPP	Third Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
LDMOST	Laterally Diffused Metal-Oxide Semiconductor Transistor
PAR	Peak-to-Average power Ratio
PDPCH	transmission Power of the Dedicated Physical CHannel
RF	Radio Frequency
SMD	Surface Mounted Device
VSWR	Voltage Standing-Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

11. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G22LS-130_1	20080523	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".

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Date of release: 23 May 2008

Document identifier: BLF6G22LS-130_1