BLF7G22L-130N

Power LDMOS transistor

Rev. 1 — 25 February 2011 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

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

Mode of operation	f (MHz)	I_{Dq} (mA)	V_{DS} (V)	$P_{L(AV)}$ (W)	G_p (dB)	η_D (%)	ACPR (dBc)
2-carrier W-CDMA	2110 to 2170	950	28	30	18.5	32	−32[1]
1-carrier W-CDMA	2110 to 2170	950	28	33	18.5	33	−39[2]

[1] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on CCDF; carrier spacing 5 MHz.

[2] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 7.2 dB at 0.01 % probability on CCDF.

1.2 Features and benefits

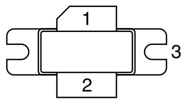
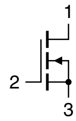
- Excellent ruggedness
- High efficiency
- Low R_{th} providing excellent thermal stability
- Designed for broadband operation (2000 MHz to 2200 MHz)
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent digital pre-distortion capability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- RF power amplifiers for 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		 sym112
2	gate		
3	source [1]		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF7G22L-130N	-	flanged LDMOST ceramic package; 2 mounting holes; 2 leads	SOT502A

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		-	28	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
$R_{th(j-c)}$	thermal resistance from junction to case	T_{case} = 80 °C; P_L = 30 W	0.35	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 = 1.5 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 150 mA	1.3	1.8	2.3	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	5	μA

Table 6. Characteristics *...continued*

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75$ V; $V_{DS} = 10$ V	25	29.5	-	A
I_{GSS}	gate leakage current	$V_{GS} = 11$ V; $V_{DS} = 0$ V	-	-	450	nA
g_{fs}	forward transconductance	$V_{DS} = 10$ V; $I_D = 7.5$ A	-	10	11	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75$ V; $I_D = 5.25$ A	-	0.1	0.16	Ω

7. Test information

Table 7. Functional test information

Mode of operation: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on the CCDF; 3GPP test model 1; 64 DPCH; f_1 = 2112.5 MHz; f_2 = 2117.5 MHz; f_3 = 2162.5 MHz; f_4 = 2167.5 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 950 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	17	18.5	-	dB
RL_{in}	input return loss	$P_{L(AV)} = 30$ W	-	−15	−9	dB
η_D	drain efficiency	$P_{L(AV)} = 30$ W	29	32	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 30$ W	-	−31	−28	dBc

7.1 Ruggedness in class-AB operation

The BLF7G22L-130N 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} = 950 mA; P_L = 130 W (CW); f = 2110 MHz.

7.2 Impedance information

Table 8. Typical impedance information

I_{Dq} = 950 mA; main transistor V_{DS} = 28 V. Z_S and Z_L defined in Figure 1.

f (MHz)	Z_S (Ω)	Z_L (Ω)
2050	1.3 – j3.6	2.2 – j2.6
2140	1.9 – j4.2	2.0 – j2.6
2230	3.1 – j4.7	1.9 – j2.8

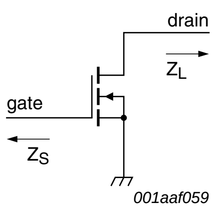
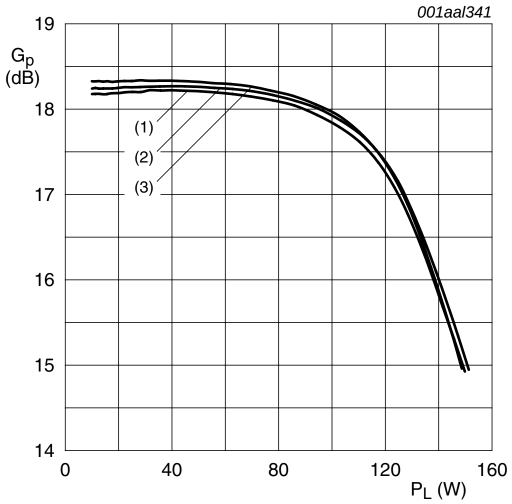


Fig 1. Definition of transistor impedance

7.3 1 Tone CW



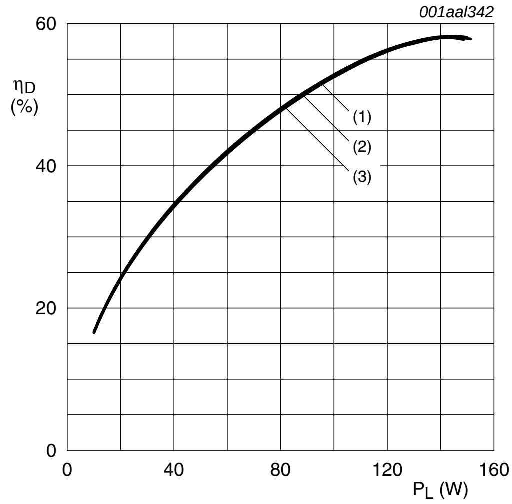
V_{DS} = 28 V; I_{Dq} = 950 mA.

(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

Fig 2. Power gain as a function of load power; typical values



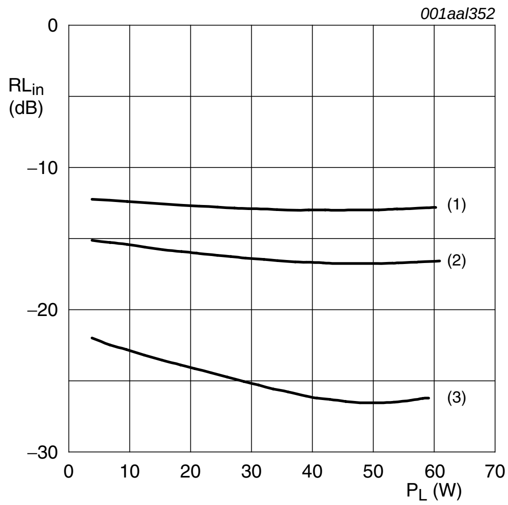
V_{DS} = 28 V; I_{Dq} = 950 mA.

(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

Fig 3. Drain efficiency as a function of load power; typical values



V_{DS} = 28 V; I_{Dq} = 950 mA.

(1) f = 2110 MHz

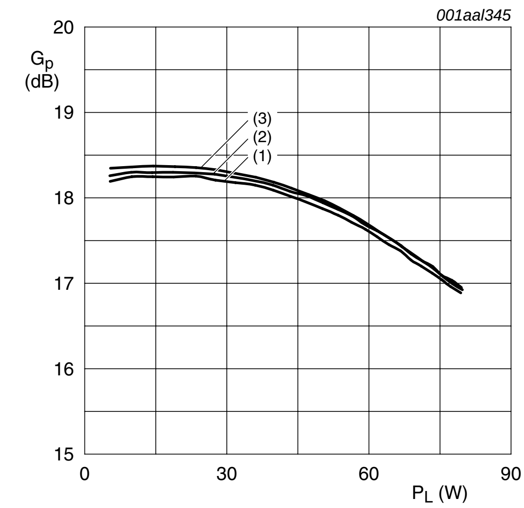
(2) f = 2140 MHz

(3) f = 2170 MHz

Fig 4. Input return loss as a function of load power; typical values

7.4 1-carrier W-CDMA

Test signal: 3GPP; test model 1; 64 DPCH; PAR = 7.2 dB at 0.01 % probability on CCDF.



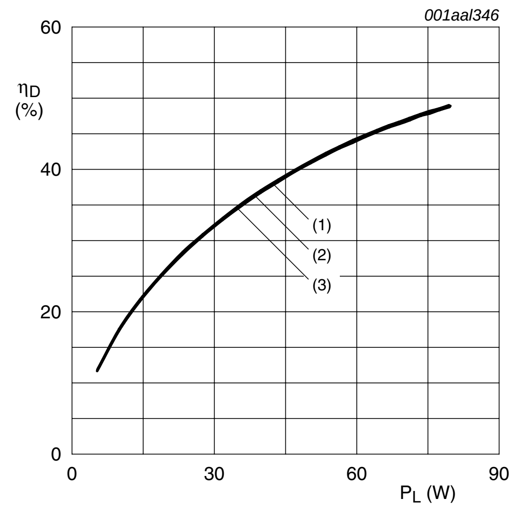
V_{DS} = 28 V; I_{Dq} = 950 mA.

(1) f = 2112.5 MHz

(2) f = 2140 MHz

(3) f = 2167.5 MHz

Fig 5. Power gain as a function of load power; typical values



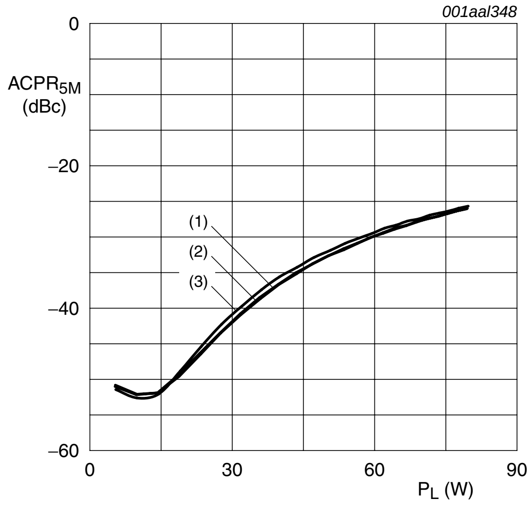
V_{DS} = 28 V; I_{Dq} = 950 mA.

(1) f = 2112.5 MHz

(2) f = 2140 MHz

(3) f = 2167.5 MHz

Fig 6. Drain efficiency as a function of load power; typical values



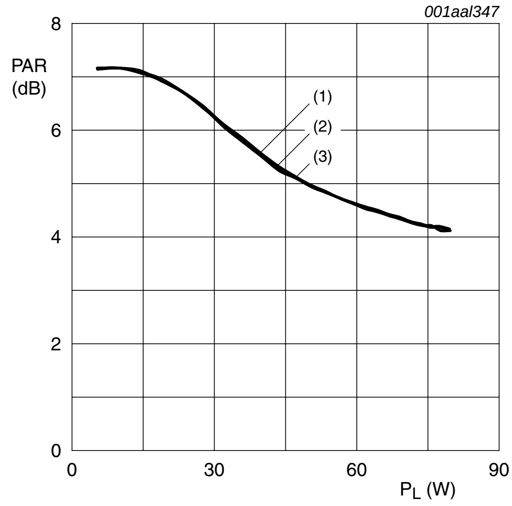
V_{DS} = 28 V; I_{Dq} = 950 mA.

(1) f = 2112.5 MHz

(2) f = 2140 MHz

(3) f = 2167.5 MHz

Fig 7. Adjacent channel power ratio (5 MHz) as a function of load power; typical values



V_{DS} = 28 V; I_{Dq} = 950 mA.

(1) f = 2112.5 MHz

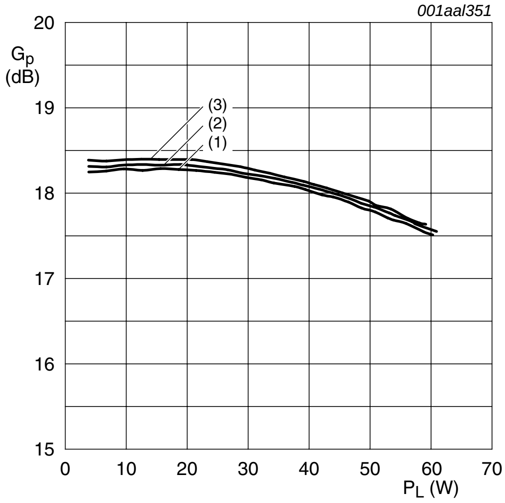
(2) f = 2140 MHz

(3) f = 2167.5 MHz

Fig 8. Peak-to-average power ratio as a function of load power; typical values

7.5 2-carrier W-CDMA (5 MHz carrier spacing)

Test signal: 3GPP; test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on CCDF.



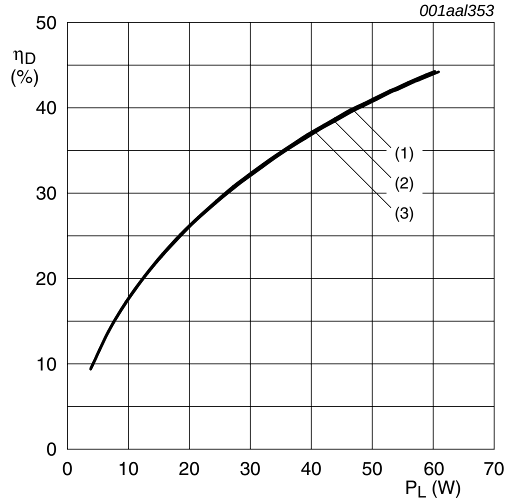
V_{DS} = 28 V; I_{Dq} = 950 mA; carrier spacing 5 MHz.

(1) f = 2115 MHz

(2) f = 2140 MHz

(3) f = 2165 MHz

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



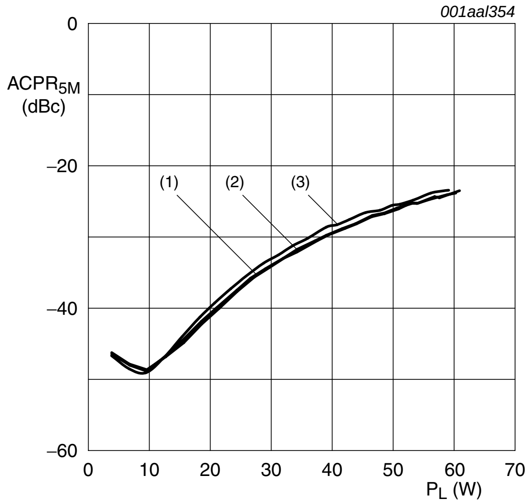
V_{DS} = 28 V; I_{Dq} = 950 mA; carrier spacing 5 MHz.

(1) f = 2115 MHz

(2) f = 2140 MHz

(3) f = 2165 MHz

Fig 10. drain efficiency as a function of load power; typical values



V_{DS} = 28 V; I_{Dq} = 950 mA; carrier spacing 5 MHz.

(1) f = 2115 MHz

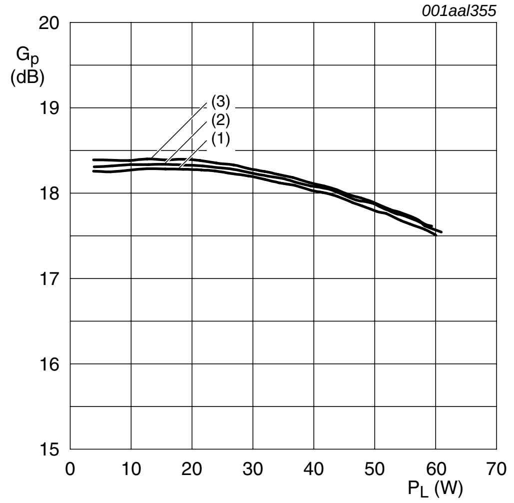
(2) f = 2140 MHz

(3) f = 2165 MHz

Fig 11. Adjacent channel power ratio (5 MHz) as a function of load power; typical values

7.6 2-carrier W-CDMA (10 MHz carrier spacing)

Test signal: 3GPP; test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on CCDF.



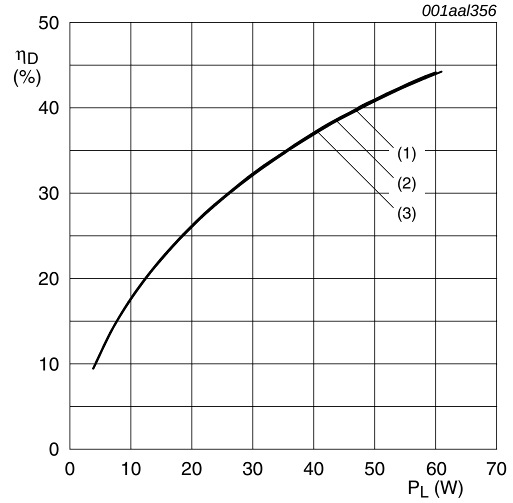
V_{DS} = 28 V; I_{Dq} = 950 mA; carrier spacing 10 MHz.

(1) f = 2117.5 MHz

(2) f = 2140 MHz

(3) f = 2162.5 MHz

Fig 12. Power gain as a function of load power; typical values



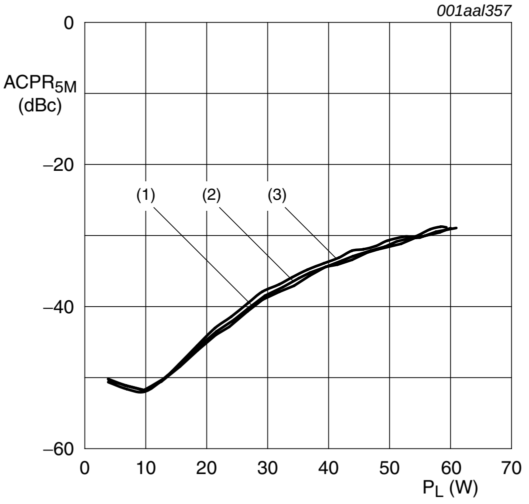
V_{DS} = 28 V; I_{Dq} = 950 mA; carrier spacing 10 MHz.

(1) f = 2117.5 MHz

(2) f = 2140 MHz

(3) f = 2162.5 MHz

Fig 13. Drain efficiency as a function of load power; typical values



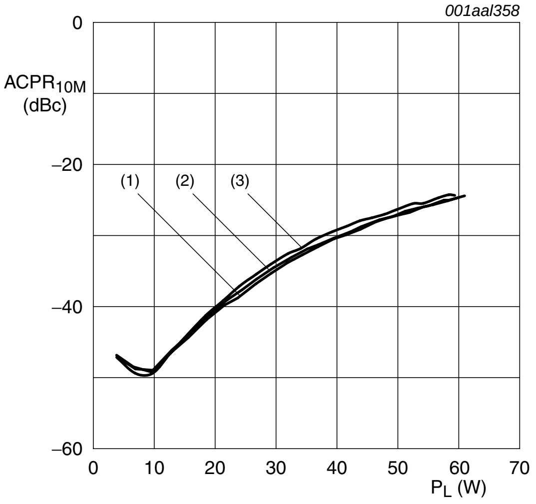
V_{DS} = 28 V; I_{Dq} = 950 mA; carrier spacing 10 MHz.

(1) f = 2117.5 MHz

(2) f = 2140 MHz

(3) f = 2162.5 MHz

Fig 14. Adjacent channel power ratio (5 MHz) as a function of load power; typical values



V_{DS} = 28 V; I_{Dq} = 950 mA; carrier spacing 10 MHz.

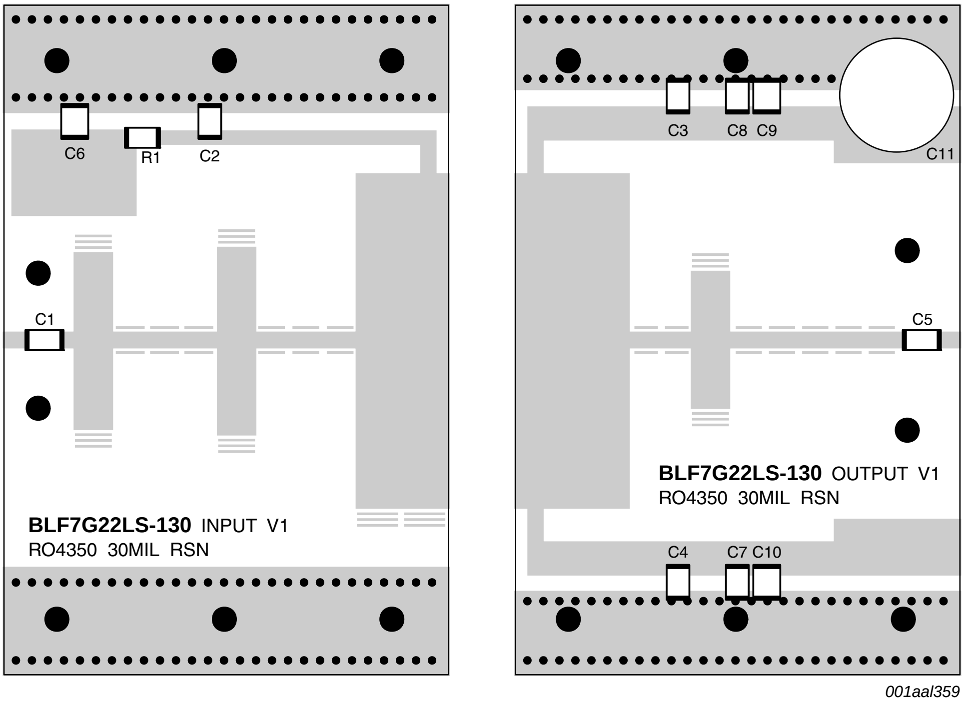
(1) f = 2117.5 MHz

(2) f = 2140 MHz

(3) f = 2162.5 MHz

Fig 15. Adjacent channel power ratio (10 MHz) as a function of load power; typical values

7.7 Test circuit



See Table 9 for list of components. The drawing is not to scale.

Fig 16. Component layout

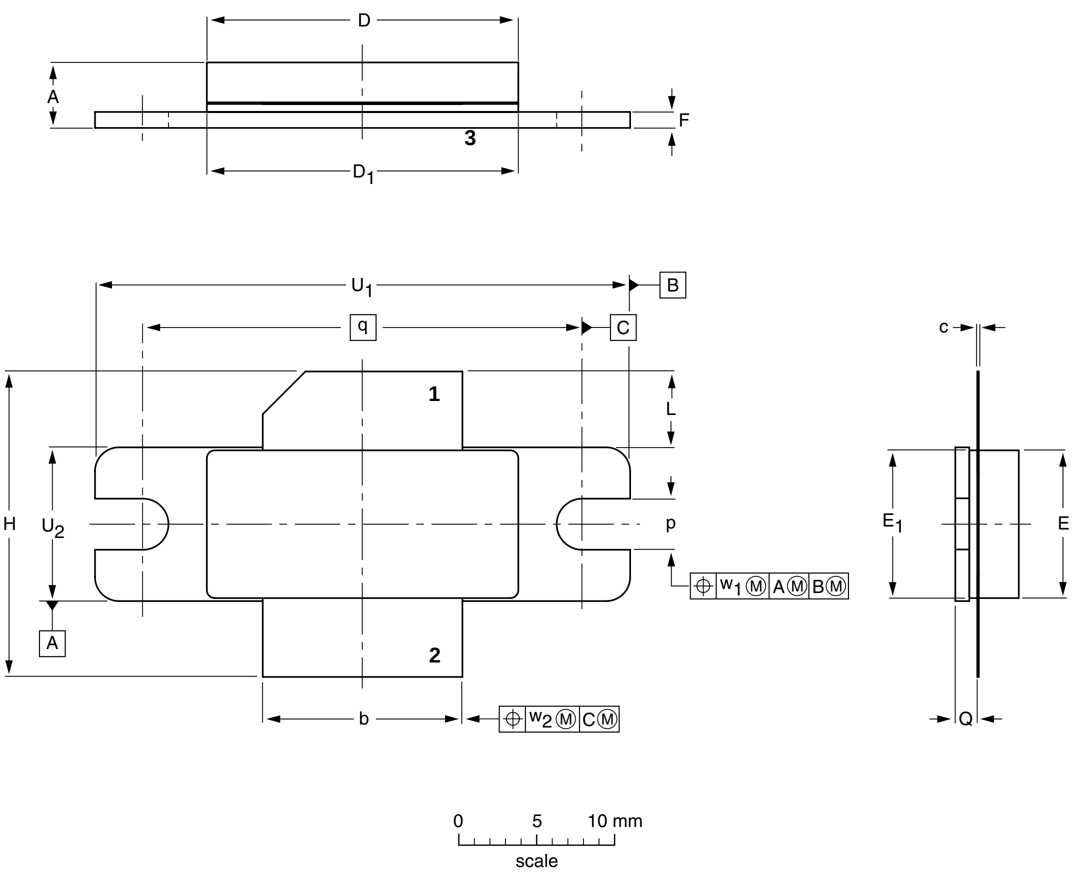
Table 9. List of components

See Figure 16 for component layout.

Component	Description	Value	Remarks
C1, C2, C3, C4, C5	multilayer ceramic chip capacitor	9.1 pF	ATC100B
C6, C7	multilayer ceramic chip capacitor	220 nF	AVX1206
C8, C9, C10	multilayer ceramic chip capacitor	4.7 μF; 50 V	Kemet
C11	electrolytic capacitor	220 μF; 63 V	BC
R1	SMD resistor	6.2 Ω	Philips 1206

8. 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

9. Abbreviations

Table 10. Abbreviations

Acronym	Description
3GPP	Third Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal Oxide Semiconductor
LDMOST	Laterally Diffused Metal Oxide Semiconductor Transistor
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

10. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF7G22L-130N v.1	20110225	Product data sheet	-	-

11. Legal information

11.1 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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13. Contents

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