BLF7G22L-160; BLF7G22LS-160 Power LDMOS transistor Rev. 3 — 1 September 2015

AMPLEON

Product data sheet

Product profile

1.1 General description

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

Typical performance Table 1.

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

Mode of operation	f	f I _{Dq} V _{DS}		P _{L(AV)}	$P_{L(AV)}$ G_p η_D		ACPR	
	(MHz)	(mA)	(V)	(W)	(dB)	(%)	(dBc)	
2-carrier W-CDMA	2110 to 2170	1300	28	43	18.0	30	-32 ^[1]	

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

1.2 Features and benefits

- Excellent ruggedness
- High efficiency
- Low R_{th} providing excellent thermal stability
- Designed for low memory effects providing excellent pre-distortability
- 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
BLF7G22	L-160 (SOT502A)			
1	drain			,
2	gate		$\begin{array}{cccccccccccccccccccccccccccccccccccc$	ئے.
3	source	<u>[1]</u>		2 - +
				3 sym112
BLF7G22	LS-160 (SOT502B)			
1	drain			,
2	gate		1 3	1 <u> </u>
3	source	<u>[1]</u>	2	2
				3 sym112
				Syll1112

^[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package								
	Name	Description	Version						
BLF7G22L-160	-	flanged LDMOST ceramic package; 2 mounting holes; 2 leads	SOT502A						
BLF7G22LS-160	-	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	Mi	n Max	Unit
V_{DS}	drain-source voltage		-	65	V
V_{GS}	gate-source voltage		-0	.5 +13	V
I _D	drain current		-	36	Α
T _{stg}	storage temperature		-6	5 +150	°C
Tj	junction temperature		-	200	°C

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Тур	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	T_{case} = 80 °C; P_L = 55 W	0.29	K/W

BLF7G22L-160_7G22LS-160#3

6. Characteristics

Table 6. Characteristics

 $T_i = 25$ °C; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V _{(BR)DSS}	drain-source breakdown voltage	$V_{GS} = 0 \text{ V}; I_D = 2.16 \text{ mA}$	65	-	-	V
V _{GS(th)}	gate-source threshold voltage	V_{DS} = 10 V; I_{D} = 216 mA	1.5	1.9	2.3	V
I _{DSS}	drain leakage current	$V_{GS} = 0 \text{ V}; V_{DS} = 28 \text{ V}$	-	-	4.5	μΑ
I _{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75 \text{ V};$ $V_{DS} = 10 \text{ V}$	34	-	-	Α
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} = 10.8 A	-	20	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75 \text{ V};$ $I_D = 7.56 \text{ A}$	-	0.06	-	Ω

7. Test information

Table 7. Application information

Mode of operation: 2-carrier W-CDMA; PAR 8.4 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 PDPCH; 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} = 1300 mA; T_{case} = 25 °C; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Gp	power gain	$P_{L(AV)} = 43 W$	16.5	18.0	-	dB
RLin	input return loss	$P_{L(AV)} = 43 W$	-	-15	-6.5	dB
η_{D}	drain efficiency	$P_{L(AV)} = 43 W$	27	30	-	%
ACPR _{5M}	adjacent channel power ratio (5 MHz)	$P_{L(AV)} = 43 W$	-	-32	-28	dBc

Table 8. Application information

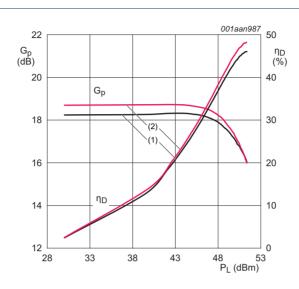
Mode of operation: 1-carrier W-CDMA; PAR 7.2 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 PDPCH; f=2167.5 MHz; RF performance at $V_{DS}=28$ V; $I_{Dq}=1300$ mA; $T_{case}=25$ °C; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
PAR _O	output peak-to-average ratio	P _{L(AV)} = 100 W; at 0.01 % probability on CCDF	3.9	4.15	-	dB

7.1 Ruggedness in class-AB operation

The BLF7G22L-160 and BLF7G22LS-160 are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS} = 28 \text{ V}$; $I_{Dq} = 1300 \text{ mA}$; $P_{L} = 160 \text{ W}$; f = 2110 MHz.

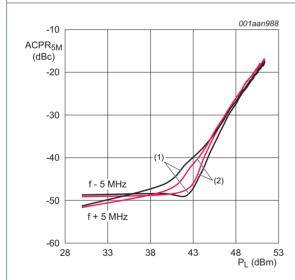
7.2 2-Carrier W-CDMA 5 MHz



 V_{DS} = 28 V; I_{Dq} = 1300 mA.

- (1) f = 2110 MHz
- (2) f = 2170 MHz

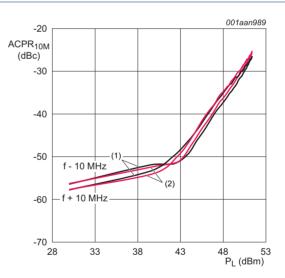
Fig 1. Power gain and drain efficiency as function of load power; typical values



 V_{DS} = 28 V; I_{Dq} = 1300 mA.

- (1) f = 2110 MHz
- (2) f = 2170 MHz

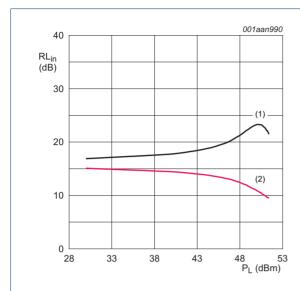
Fig 2. Adjacent channel power ratio (±5 MHz) as a function of load power; typical values



 $V_{DS} = 28 \text{ V}; I_{Dq} = 1300 \text{ mA}.$

- (1) f = 2110 MHz
- (2) f = 2170 MHz

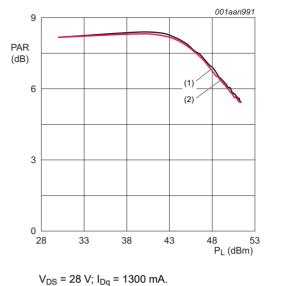
Fig 3. Adjacent channel power ratio (±10 MHz) as a function of load power; typical values



 V_{DS} = 28 V; I_{Dq} = 1300 mA.

- (1) f = 2110 MHz
- (2) f = 2170 MHz

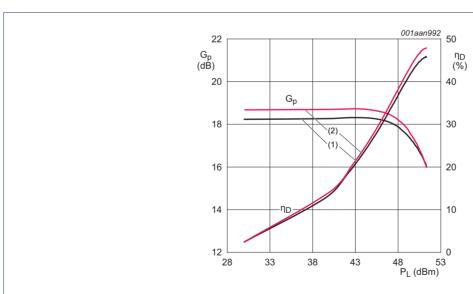
Input return loss as function of load power; typical values



- (1) f = 2110 MHz
- (2) f = 2170 MHz

Fig 5. Peak-to-average power ration as function of load power; typical values

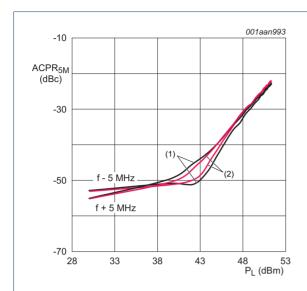
7.3 2-Carrier W-CDMA 10 MHz



 $V_{DS} = 28 \text{ V}; I_{Dq} = 1300 \text{ mA}.$

- (1) f = 2110 MHz
- (2) f = 2170 MHz

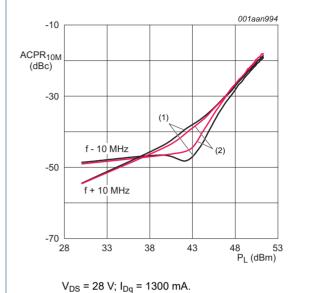
Power gain and drain efficiency as function of load power; typical values Fig 6.



 $V_{DS} = 28 \text{ V}; I_{Dq} = 1300 \text{ mA}.$

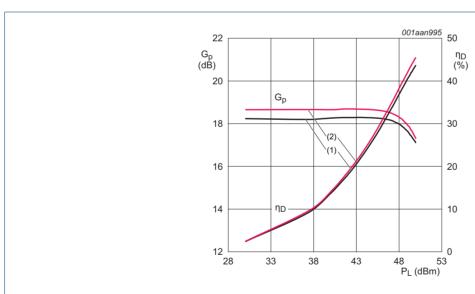
- (1) f = 2110 MHz
- (2) f = 2170 MHz

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



- (1) f = 2110 MHz
- (2) f = 2170 MHz
- Fig 8. Adjacent channel power ratio (±10 MHz) as a function of load power; typical values

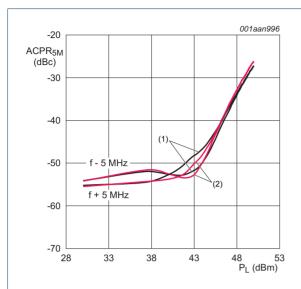
7.4 1-Carrier W-CDMA



 $V_{DS} = 28 \text{ V}; I_{Dq} = 1300 \text{ mA}.$

- (1) f = 2110 MHz
- (2) f = 2170 MHz

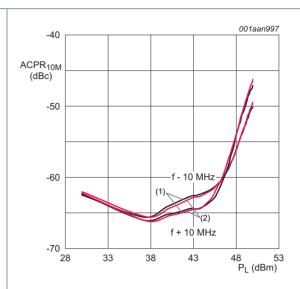
Fig 9. Power gain and drain efficiency as function of load power; typical values



 $V_{DS} = 28 \text{ V}; I_{Dq} = 1300 \text{ mA}.$

- (1) f = 2110 MHz
- (2) f = 2170 MHz

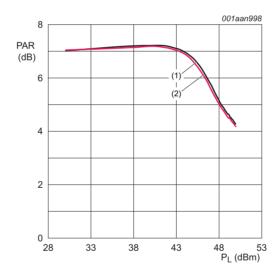
Fig 10. Adjacent channel power ratio (±5 MHz) as a function of load power; typical values



 $V_{DS} = 28 \text{ V}; I_{Dq} = 1300 \text{ mA}.$

- (1) f = 2110 MHz
- (2) f = 2170 MHz

Fig 11. Adjacent channel power ratio (±10 MHz) as a function of load power; typical values

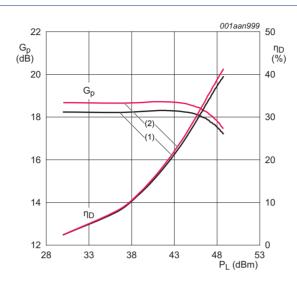


 $V_{DS} = 28 \text{ V}; I_{Dq} = 1300 \text{ mA}.$

- (1) f = 2110 MHz
- (2) f = 2170 MHz

Fig 12. Peak-to-average power ration as function of load power; typical values

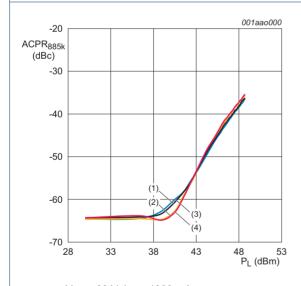
7.5 IS-95



 V_{DS} = 28 V; I_{Dq} = 1300 mA.

- (1) f = 2110 MHz
- (2) f = 2170 MHz

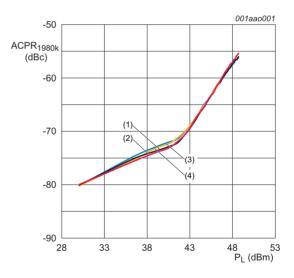
Fig 13. Power gain and drain efficiency as function of load power; typical values



 V_{DS} = 28 V; I_{Dq} = 1300 mA.

- (1) f = 2110 MHz; f + 885 kHz
- (2) f = 2170 MHz; f + 885 kHz
- (3) f = 2110 MHz; f 885 kHz
- (4) f = 2170 MHz; f 885 kHz

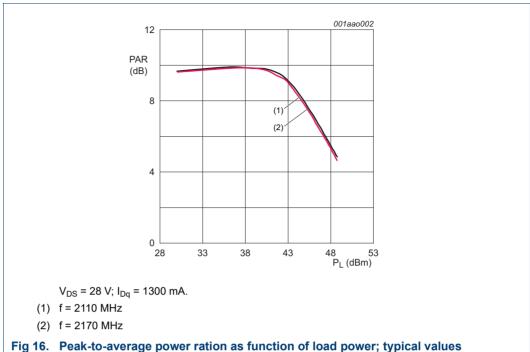
Fig 14. Adjacent channel power ratio (±5 MHz) as a function of load power; typical values



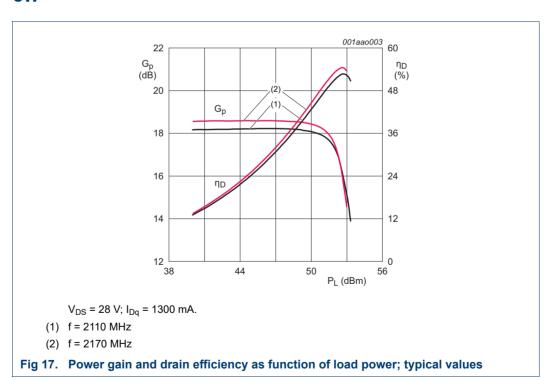
 $V_{DS} = 28 \text{ V}; I_{Da} = 1300 \text{ mA}.$

- (1) f = 2110 MHz; f + 1980 kHz
- (2) f = 2170 MHz; f + 1980 kHz
- (3) f = 2110 MHz; f 1980 kHz
- (4) f = 2170 MHz; f 1980 kHz

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



7.6 CW



7.7 CW-pulsed

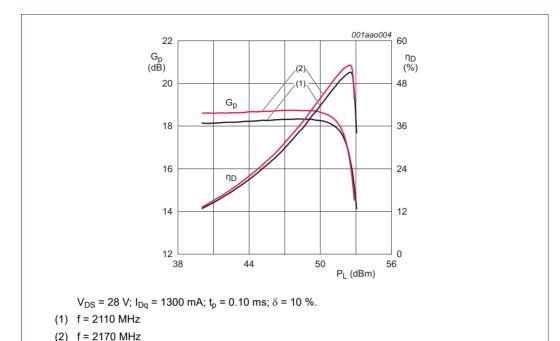


Fig 18. Power gain and drain efficiency as function of load power; typical values

7.8 Test circuit

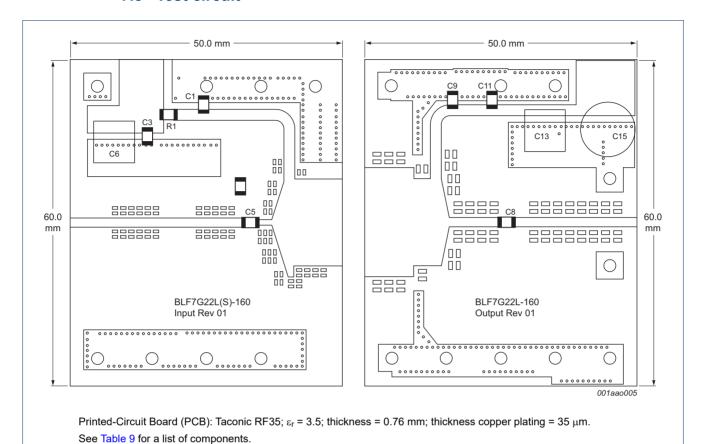


Fig 19. Component layout for class-AB production test circuit

Table 9. List of components For test circuit see Figure 19.

Component	Description	Value	Remarks
C1, C5, C8, C9	multilayer ceramic chip capacitor	68 pF	[1]
C3, C11	multilayer ceramic chip capacitor	820 pF	[2]
C6, C13	multilayer ceramic chip capacitor	10 μF	[3]
C15	electrolytic capacitor	470 μF; 63 V	
R1	SMD resistor	12 Ω	Philips 1206

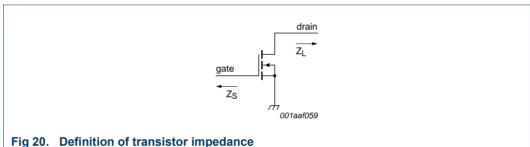
- [1] American Technical Ceramics type 800B or capacitor of same quality.
- [2] American Technical Ceramics type 100A or capacitor of same quality.
- [3] TDK or capacitor of same quality.

7.9 Impedance information

Table 10. Typical impedance

Typical values unless otherwise specified.

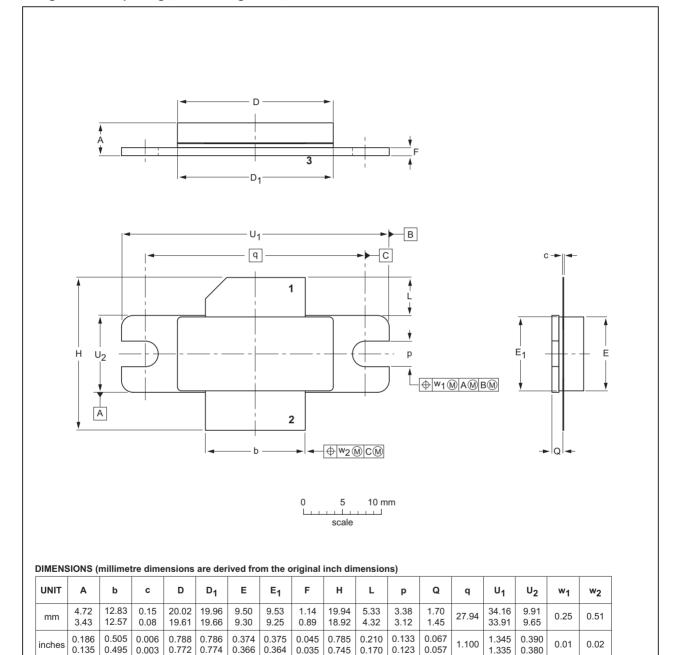
f	Z _S	Z _L
MHz	Ω	Ω
2050	1.39 – j4.13	1.41 – j3.80
2080	1.67 – j3.93	1.38 – j3.63
2110	2.01 – j3.89	1.35 – j3.45
2140	2.28 – j4.09	1.33 – j3.28
2170	2.27 - j4.47	1.31 – j3.12
2200	1.92 – j4.76	1.28 – j2.95
2230	1.42 – j4.75	1.26 – j2.79



8. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads

SOT502A

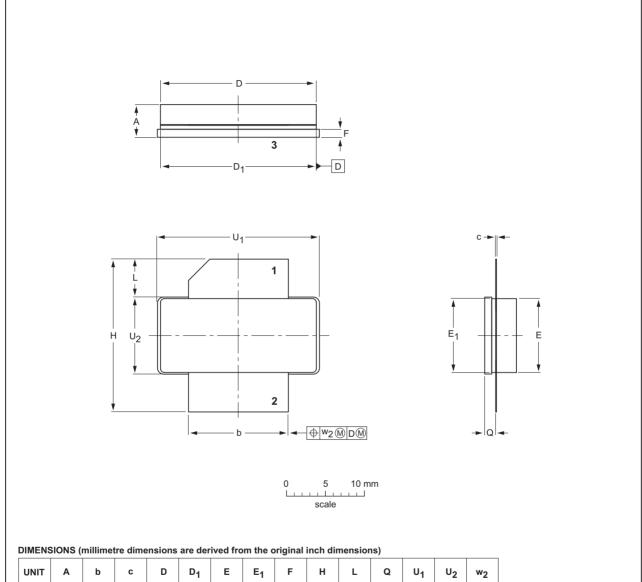


OUTLINE		REFER	EUROPEAN	ISSUE DATE		
VERSION	SION IEC JEDEC		JEITA	PROJECTION	ISSUE DATE	
SOT502A					-03-01-10 - 12-05-02	

Fig 21. Package outline SOT502A

Earless flanged ceramic package; 2 leads

SOT502B



UNIT	Α	b	С	D	D ₁	E	E ₁	F	н	L	Q	U ₁	U ₂	w ₂	
mm	3.43	12.57		19.61	19.66	9.30	9.25	0.89	19.94 18.92	4.32	1.45	20.45	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	REFERENCES				EUROPEAN	ISSUE DATE
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT502B						07-05-09 12-05-02

Fig 22. Package outline SOT502B

9. Abbreviations

Table 11. Abbreviations

Table 11. 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			
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			

10. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF7G22L-160_7G22LS-160#3	20150901	Product data sheet	-	BLF7G22L-160_7G22LS-160 v.2.1
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. 			
BLF7G22L-160_7G22LS-160 v.2.1	20111102	Product data sheet	-	BLF7G22L-160_7G22LS-160 v.2
BLF7G22L-160_7G22LS-160 v.2	20111020	Product data sheet	-	BLF7G22L-160_7G22LS-160 v.1
BLF7G22L-160_7G22LS-160 v.1	20110427	Preliminary 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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BLF7G22L-160 7G22LS-160#3

BLF7G22L-160; BLF7G22LS-160

Power LDMOS transistor

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BLF7G22L-160; BLF7G22LS-160

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Power LDMOS transistor

13. Contents

1	Product profile
1.1	General description 1
1.2	Features and benefits
1.3	Applications
2	Pinning information 2
3	Ordering information
4	Limiting values
5	Thermal characteristics 2
6	Characteristics
7	Test information
7.1	Ruggedness in class-AB operation 3
7.2	2-Carrier W-CDMA 5 MHz 4
7.3	2-Carrier W-CDMA 10 MHz 5
7.4	1-Carrier W-CDMA 6
7.5	IS-95 8
7.6	CW
7.7	CW-pulsed
7.8	Test circuit11
7.9	Impedance information
8	Package outline
9	Abbreviations
10	Revision history
11	Legal information
11.1	Data sheet status
11.2	Definitions
11.3	Disclaimers
11.4	Trademarks
12	Contact information
13	Contents

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

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