BLF7G22L-250P; BLF7G22LS-250P

Power LDMOS transistor

AMPLEON

Rev. 4 — 1 September 2015

Product data sheet

1. Product profile

1.1 General description

250 W LDMOS power transistor for base station applications at frequencies from 2110 MHz to 2170 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	1900	28	70	18.5	31	−30[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

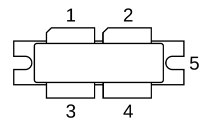
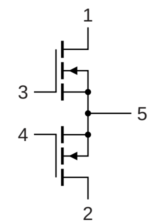
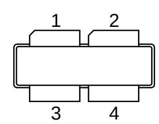
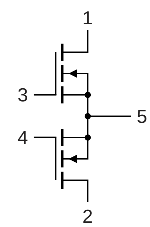
- Excellent ruggedness
- High efficiency
- Low R_{th} providing excellent thermal stability
- Designed for low memory effects providing excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier applications in the 2110 MHz to 2170 MHz frequency range

2. Pinning information

Table 2. Pinning

Pin	Description		Simplified outline	Graphic symbol
BLF7G22L-250P (SOT539A)				
1	drain1			 sym117
2	drain2			
3	gate1			
4	gate2			
5	source	[1]		
BLF7G22LS-250P (SOT539B)				
1	drain1			 sym117
2	drain2			
3	gate1			
4	gate2			
5	source	[1]		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF7G22L-250P	-	Flanged balanced LDMOST ceramic package; 2 mounting holes; 4 leads	SOT539A
BLF7G22LS-250P	-	Earless flanged LDMOST ceramic package; 4 leads	SOT539B

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		-	65	A
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		-	200	°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 = 70 W; V_{DS} = 28 V; I_{Dq} = 1900 mA	0.20	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 = 1.8 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 180 mA	1.5	1.9	2.3	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	2.8	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	28	34.2	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	280	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 9 A	-	13.7	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 6.3 A	-	0.081	-	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; 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} = 1900 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		-	70	-	W
G_p	power gain	$P_{L(AV)}$ = 70 W	17	18.5	-	dB
RL_{in}	input return loss	$P_{L(AV)}$ = 70 W	-	−15	−5	dB
η_D	drain efficiency	$P_{L(AV)}$ = 70 W	27	31	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 70 W	-	−30	−25	dBc

7.1 Ruggedness in class-AB operation

The BLF7G22L-250P and BLF7G22LS-250P are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 30 V; I_{Dq} = 1900 mA; P_L = 250 W (CW); f = 2110 MHz to 2170 MHz.

7.2 Impedance information

Table 8. Typical impedance
Measured load-pull data half device; I_{Dq} = 1900 mA; V_{DS} = 28 V.

f (MHz)	Z_S [1] (Ω)	Z_L [1] (Ω)
2050	1.50 – j5.20	3.03 – j2.92
2110	2.08 – j5.64	2.76 – j2.70
2140	2.16 – j5.89	2.31 – j2.74
2170	2.43 – j5.97	2.31 – j2.74
2230	3.94 – j7.60	2.10 – j2.96

[1] Z_S and Z_L defined in Figure 1.

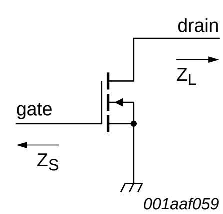
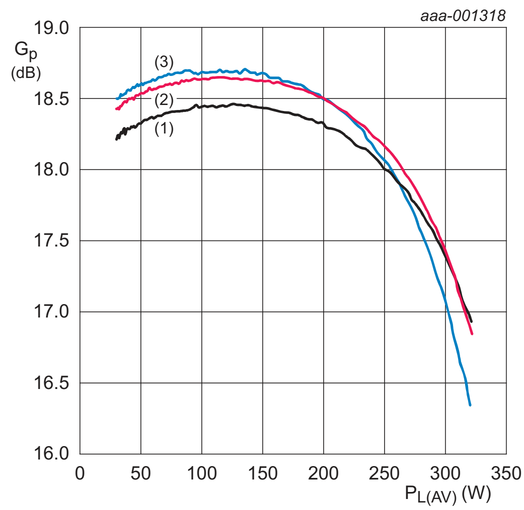


Fig 1. Definition of transistor impedance

7.3 1 Tone CW



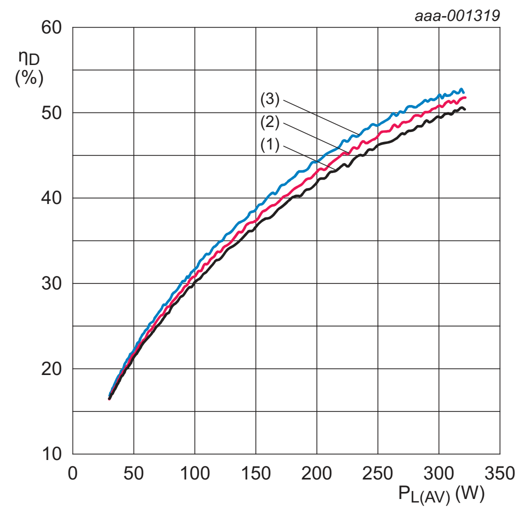
V_{DS} = 28 V; I_{Dq} = 1900 mA.

(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

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



V_{DS} = 28 V; I_{Dq} = 1900 mA.

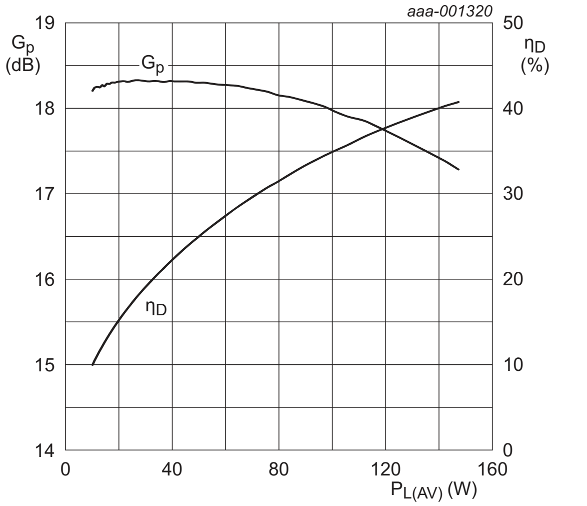
(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

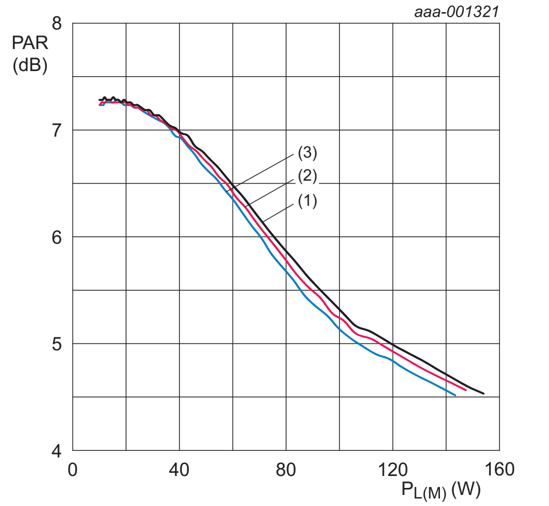
Fig 3. Drain efficiency as a function of average load power; typical values

7.4 1-carrier W-CDMA



V_{DS} = 28 V; I_{Dq} = 1900 mA; f = 2140 MHz; PAR = 7.2 dB at 0.01 % probability on the CCDF.

Fig 4. Power gain and drain efficiency as functions of average load power; typical values



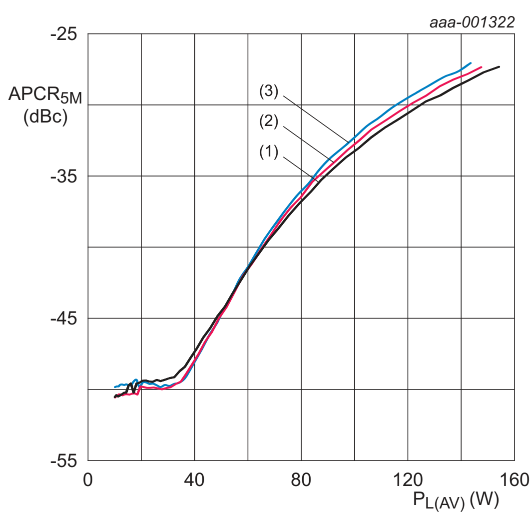
V_{DS} = 28 V; I_{Dq} = 1900 mA; PAR = 7.2 dB at 0.01 % probability on the CCDF.

(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

Fig 5. Peak-to-average power ratio as function of peak power; typical values



V_{DS} = 28 V; I_{Dq} = 1900 mA; PAR = 7.2 dB at 0.01 % probability on the CCDF.

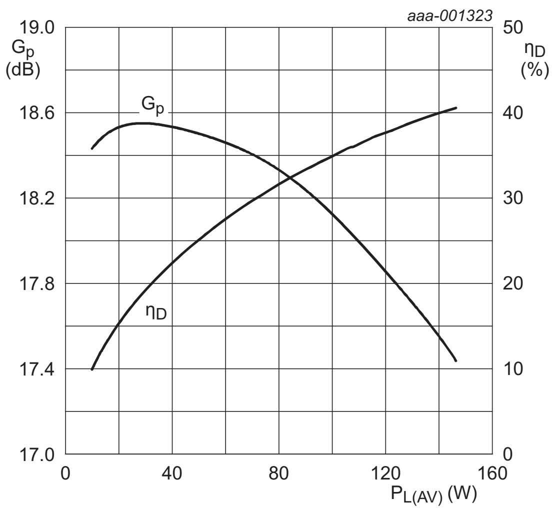
(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

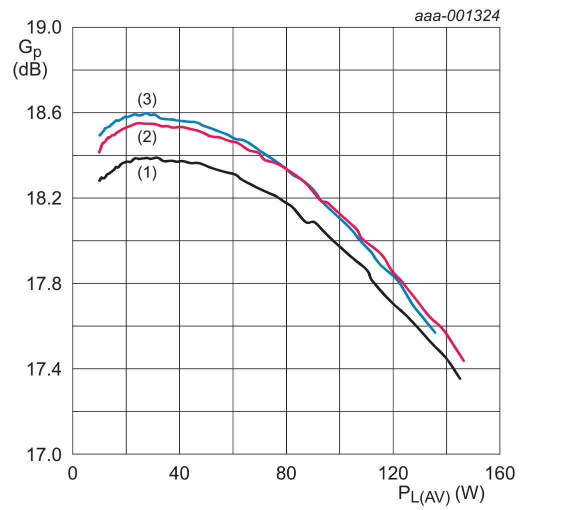
Fig 6. Adjacent power channel ratio (5 MHZ) as function of average load power; typical values

7.5 2-carrier W-CDMA



V_{DS} = 28 V; I_{Dq} = 1900 mA; f = 2140 MHz; Channel Spacing = 5 MHz; PAR = 8.4 dB at 0.01 % probability on the CCDF.

Fig 7. Power gain and drain efficiency as functions of average load power; typical values



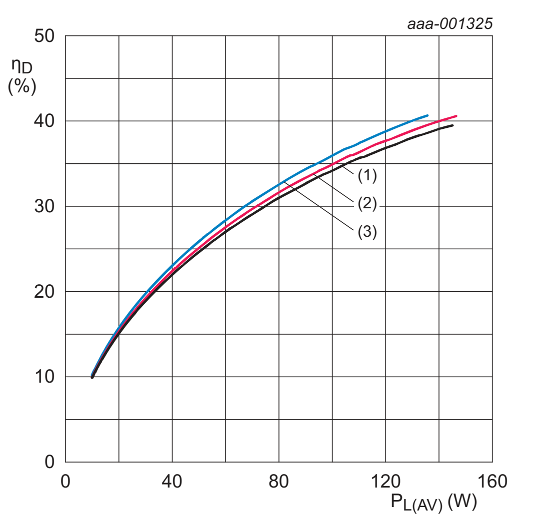
V_{DS} = 28 V; I_{Dq} = 1900 mA; Channel Spacing = 5 MHz; PAR = 8.4 dB at 0.01 % probability on the CCDF.

(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

Fig 8. Power gain as a function of average load power; typical values



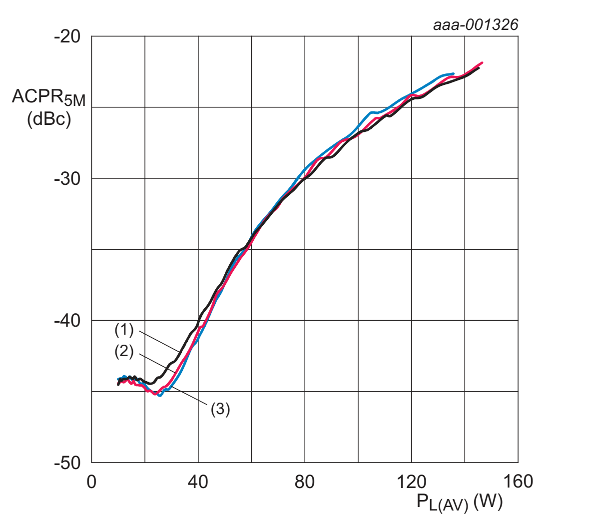
V_{DS} = 28 V; I_{Dq} = 1900 mA; Channel Spacing = 5 MHz; PAR = 8.4 dB at 0.01 % probability on the CCDF.

(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

Fig 9. Drain efficiency as function of average load power; typical values



V_{DS} = 28 V; I_{Dq} = 1900 mA; Channel Spacing = 5 MHz; PAR = 8.4 dB at 0.01 % probability on the CCDF.

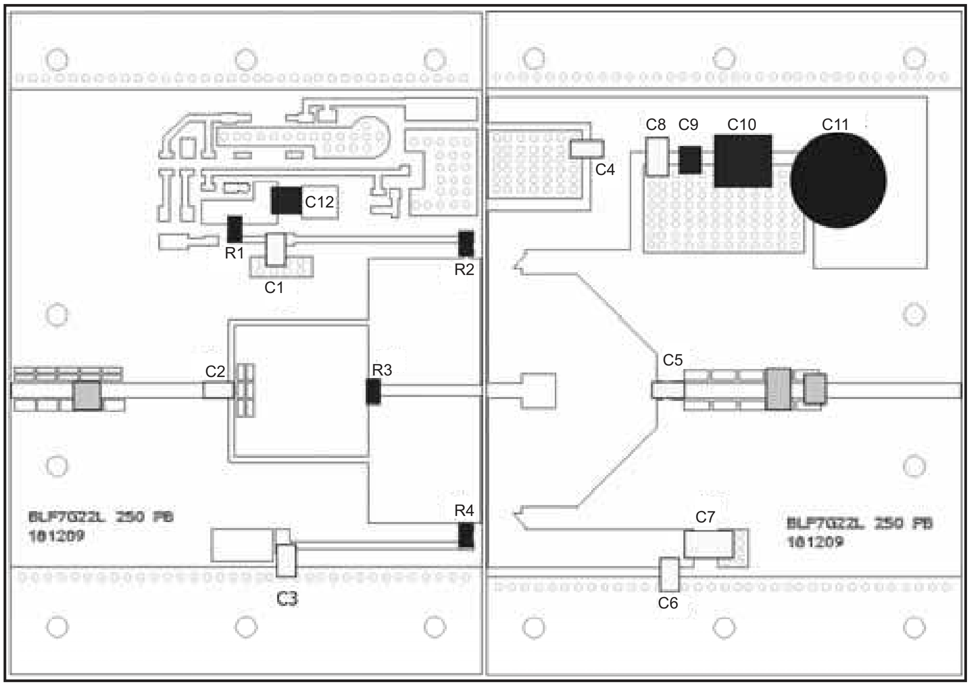
(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

Fig 10. Adjacent power channel ratio (5 MHZ) as function of average load power; typical values

7.6 Test circuit



See Table 9 for list of components.

Fig 11. Component layout

Table 9. List of components

See Figure 11 for component layout.

Component	Description	Value		Remarks
C2	multilayer ceramic chip capacitor	8.2 pF	[1]	ATC100A
C1, C3, C4, C5, C6	multilayer ceramic chip capacitor	8.2 pF	[2]	ATC100B
C7, C8	multilayer ceramic chip capacitor	470 nF	[3]	TDK
C9, C12	multilayer ceramic chip capacitor	4.7 μF	[3]	TDK
C10	multilayer ceramic chip capacitor	10 μF	[3]	TDK
C11	electrolytic capacitor	470 μF		
R1	chip resistor	4.7 Ω		Philips 0603
R2, R4	chip resistor	10 Ω		Philips 0603
R3	chip resistor	33 Ω		Philips 0603

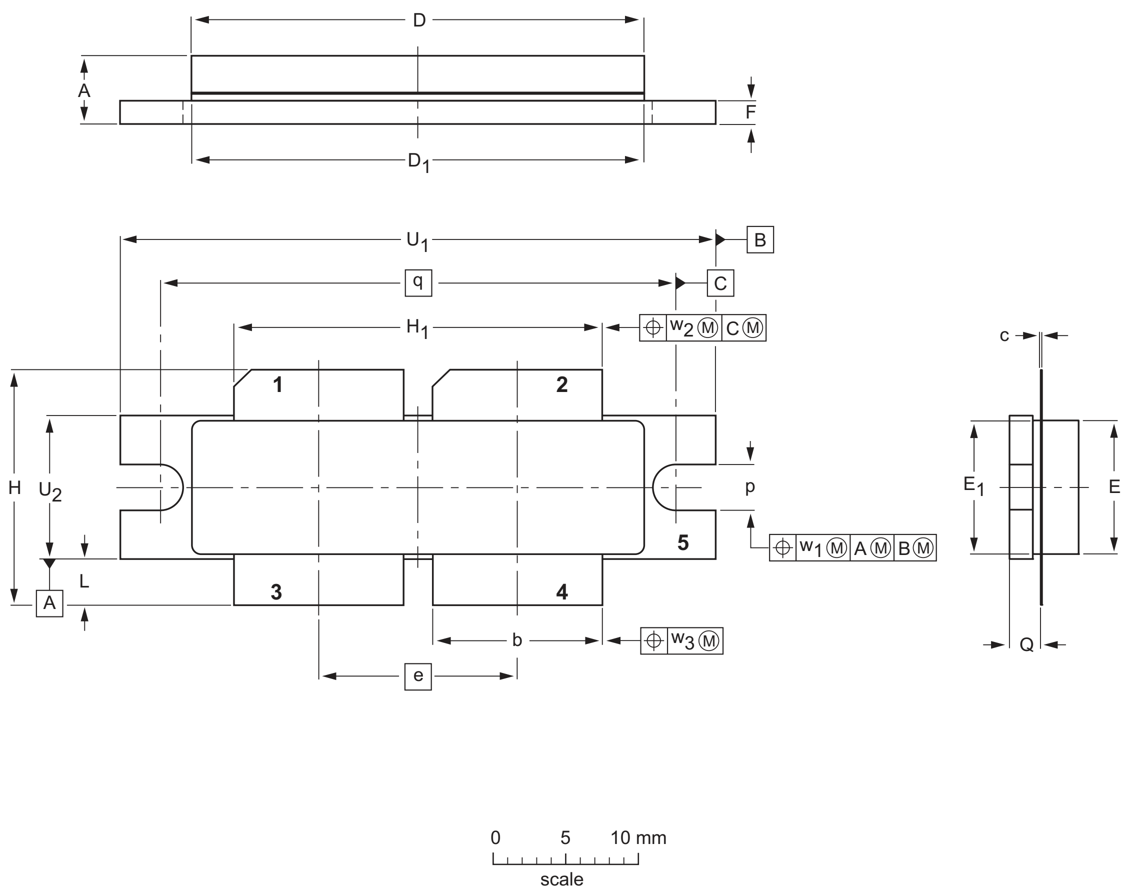
[1] American Technical Ceramics type 100A or capacitor of same quality.

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

[3] TDK or capacitor of same quality.

8. Package outline

Flanged balanced ceramic package; 2 mounting holes; 4 leads **SOT539A**



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

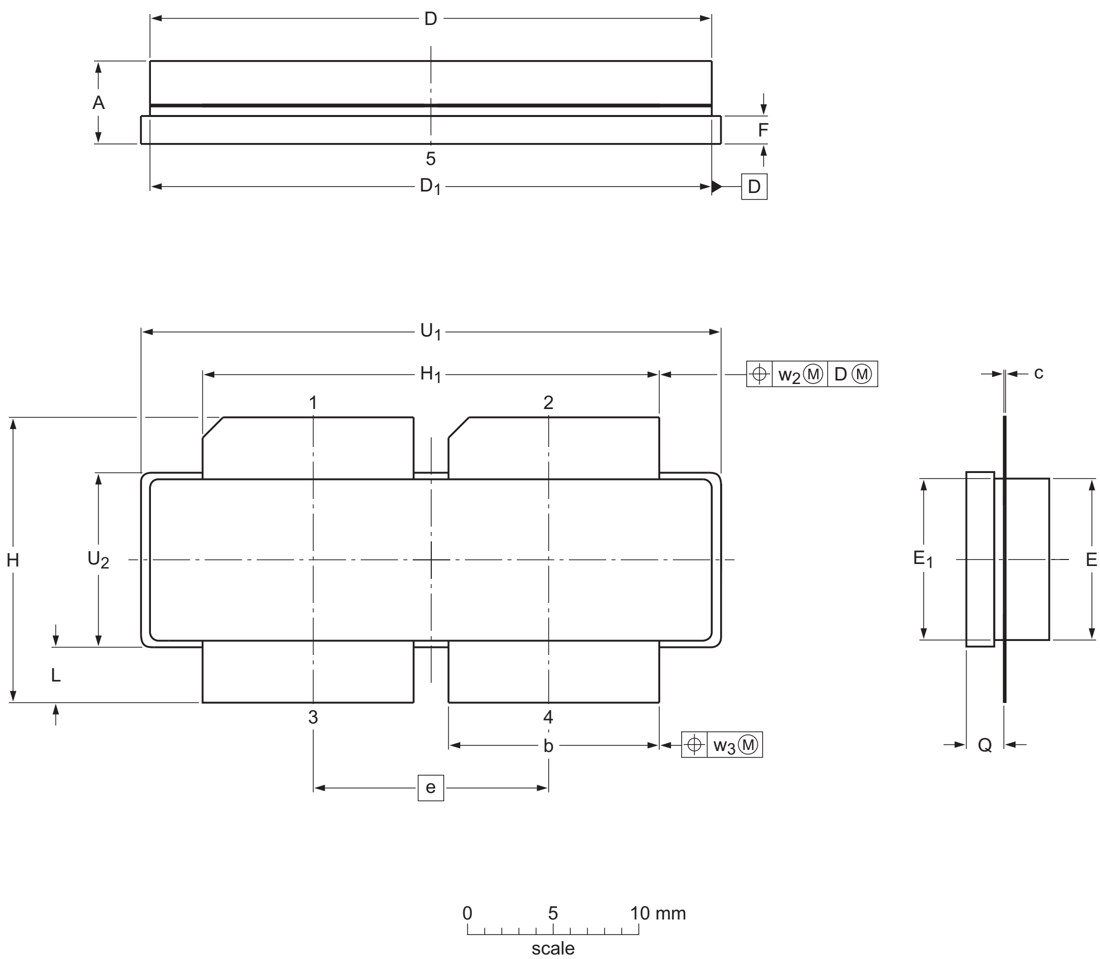
UNIT	A	b	c	D	D_1	e	E	E_1	F	H	H_1	L	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	4.7 4.2	11.81 11.56	0.18 0.10	31.55 30.94	31.52 30.96	13.72	9.50 9.30	9.53 9.27	1.75 1.50	17.12 16.10	25.53 25.27	3.48 2.97	3.30 3.05	2.26 2.01	35.56	41.28 41.02	10.29 10.03	0.25	0.51	0.25
inches	0.185 0.165	0.465 0.455	0.007 0.004	1.242 1.218	1.241 1.219	0.540	0.374 0.366	0.375 0.365	0.069 0.059	0.674 0.634	1.005 0.995	0.137 0.117	0.130 0.120	0.089 0.079	1.400	1.625 1.615	0.405 0.395	0.010	0.020	0.010

Note
1. millimeter dimensions are derived from the original inch dimensions.
2. recommended screw pitch dimension of 1.52 inch (38.6 mm) based on M3 screw.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT539A						~~10-02-02~~ 12-05-02

Fig 12. Package outline SOT539A

Earless flanged balanced ceramic package; 4 leads **SOT539B**



Dimensions

Unit(1)		A	b	c	D	D_1	E	E_1	e	F	H	H_1	L	Q	U_1	U_2	w_2	w_3
mm	max	4.7	11.81	0.18	31.55	31.52	9.5	9.53		1.75	17.12	25.53	3.48	2.26	32.39	10.29		
	nom								13.72								0.25	0.25
	min	4.2	11.56	0.10	30.94	30.96	9.3	9.27		1.50	16.10	25.27	2.97	2.01	32.13	10.03		
inches	max	0.185	0.465	0.007	1.242	1.241	0.374	0.375		0.069	0.674	1.005	0.137	0.089	1.275	0.405		
	nom								0.54								0.01	0.01
	min	0.165	0.455	0.004	1.218	1.219	0.366	0.365		0.059	0.634	0.995	0.117	0.079	1.265	0.395		

Note
1. millimeter dimensions are derived from the original inch dimensions.

sot539b_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT539B						~~12-05-02~~ 13-05-24

Fig 13. Package outline SOT539B

9. Handling information

CAUTION	
	This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices. Such precautions are described in the *ANSI/ESD S20.20*, *IEC/ST 61340-5*, *JESD625-A* or equivalent standards.

10. Abbreviations

Table 10. 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
RF	Radio Frequency
VSWR	Voltage Standing Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

11. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF7G22L-250P_22LS-250P#4	20150901	Product data sheet	-	BLF7G22L-250P_22LS-250P v.3
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-250P_22LS-250P v.3	20130712	Product data sheet	-	BLF7G22L-250P_22LS-250P v.2
BLF7G22L-250P_22LS-250P v.2	20111028	Product data sheet	-	BLF7G22L-250P_22LS-250P v.1
BLF7G22L-250P_22LS-250P v.1	20100506	Objective 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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14. Contents

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