

# BLF6G20-230PRN; BLF6G20S-230PRN

Power LDMOS transistor

Rev. 4 — 1 September 2015

AMPLEON

Product data sheet

## 1. Product profile

### 1.1 General description

230 W LDMOS power transistor for base station applications at frequencies from 1800 MHz to 2000 MHz.

**Table 1. Typical performance**

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

Mode of operation	f (MHz)	V <sub>DS</sub> (V)	P <sub>L(AV)</sub> (W)	G <sub>p</sub> (dB)	η <sub>D</sub> (%)	ACPR (dBc)
2-carrier W-CDMA	1805 to 1880	28	65	17.5	32	-31 <sup>[1]</sup>

[1] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 7.5 dB at 0.01 % probability on CCDF per carrier; carrier spacing 5 MHz.

#### CAUTION



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

### 1.2 Features and benefits

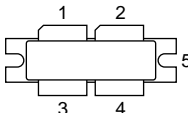
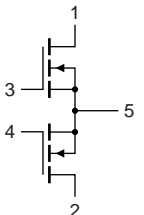
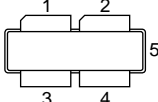
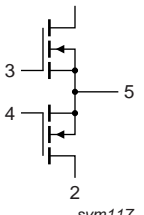
- Typical 2-carrier W-CDMA performance at frequencies of 1805 MHz and 1880 MHz, a supply voltage of 28 V and an I<sub>DQ</sub> of 2000 mA:
  - ◆ Average output power = 65 W
  - ◆ Power gain = 17.5 dB
  - ◆ Efficiency = 32 %
  - ◆ ACPR = -32 dBc
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (1800 MHz to 2000 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 W-CDMA base stations and multi carrier applications in the 1800 MHz to 2000 MHz frequency range

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
<b>BLF6G20-230PRN (SOT539A)</b>			
1	drain1		 sym117
2	drain2		
3	gate1		
4	gate2		
5	source		
<b>BLF6G20S-230PRN (SOT539B)</b>			
1	drain1		 sym117
2	drain2		
3	gate1		
4	gate2		
5	source		

[1] Connected to flange

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF6G20-230PRN	-	flanged balanced LDMOST ceramic package; 2 mounting holes; 4 leads	SOT539A
BLF6G20S-230PRN	-	earless flanged balanced 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
$T_{stg}$	storage temperature		-65	+150	°C
$T_{case}$	case temperature		-	150	°C
$T_j$	junction temperature		-	225	°C

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C};$ $P_{L(AV)} = 65\text{ W}$	0.38	K/W

## 6. Characteristics

**Table 6. Characteristics**

*$T_j = 25\text{ °C}$  per section; unless otherwise specified.*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 1.8\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 180\text{ mA}$	1.4	1.9	2.4	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}$				
		$V_{DS} = 28\text{ V}$	-	-	3	μA
		$V_{DS} = 60\text{ V}$	-	-	5	μA
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $V_{DS} = 10\text{ V}$	-	30	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	300	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 9\text{ A}$	-	12	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $I_D = 6.3\text{ A}$	-	0.1	0.165	Ω

## 7. Application information

**Table 7. Application information**

Mode of operation: 2-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1 to 64 PDPCH;  $f_1 = 1802.5$  MHz;  $f_2 = 1807.5$  MHz;  $f_3 = 1872.5$  MHz;  $f_4 = 1877.5$  MHz; RF performance at  $V_{DS} = 28$  V;  $I_{DQ} = 2000$  mA;  $T_{case} = 25$  °C; unless otherwise specified; in a class-AB production test circuit

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(AV)} = 65$ W	16.3	17.5	18.7	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 65$ W	-	-11	-6.5	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 65$ W	29	32	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 65$ W	-	-31	-27	dBc

**Table 8. Application information**

Mode of operation: 1-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1 to 64 PDPCH;  $f_1 = 1872.5$  MHz;  $f_2 = 1877.5$  MHz; RF performance at  $V_{DS} = 28$  V;  $I_{DQ} = 2000$  mA;  $T_{case} = 25$  °C; unless otherwise specified; in a class-AB production test circuit.

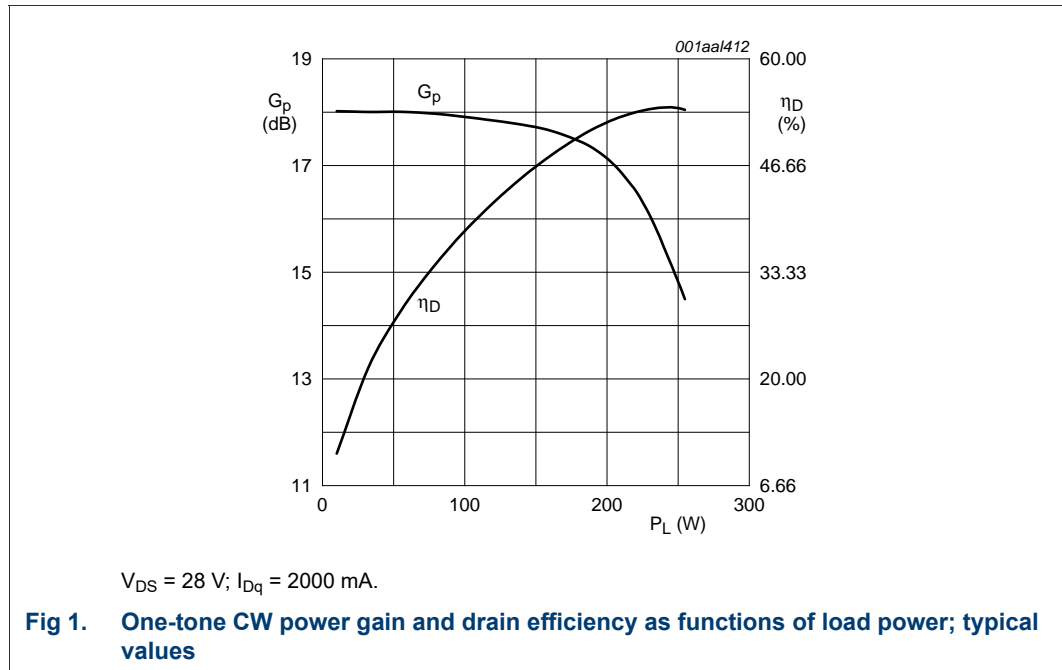
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$PAR_O$	output peak-to-average ratio	$P_{L(AV)} = 125$ W; at 0.01 % probability on CCDF	3.5	4.2	-	dB

### 7.1 Ruggedness in class-AB operation

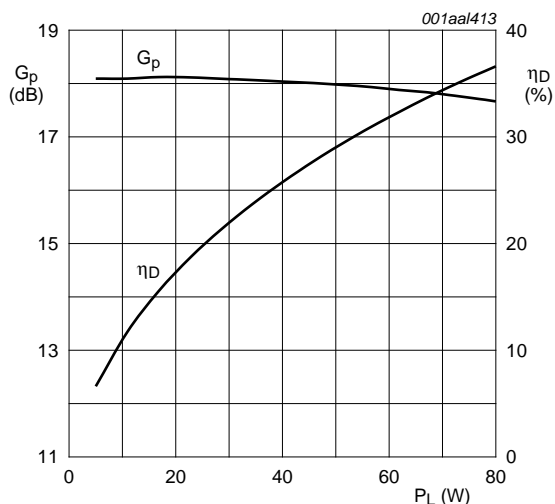
The BLF6G20-230PRN and BLF6G20S-230PRN are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28$  V;  $I_{DQ} = 2000$  mA;  $P_L = 230$  W (CW);  $f = 1805$  MHz.

## 7.2 Graphs

### 7.2.1 One tone CW

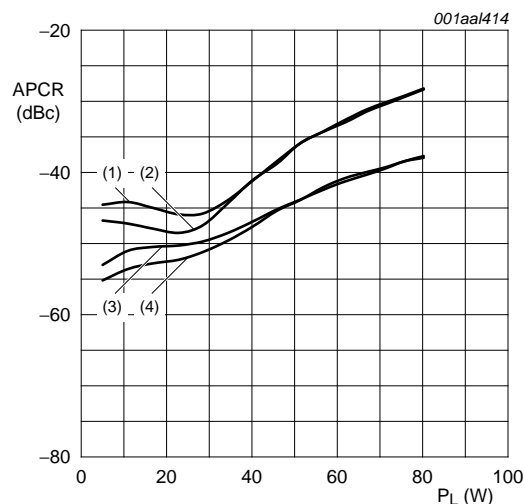


## 7.2.2 2-carrier W-CDMA



$V_{DS} = 28 \text{ V}$ ;  $I_{Dq} = 2000 \text{ mA}$ .

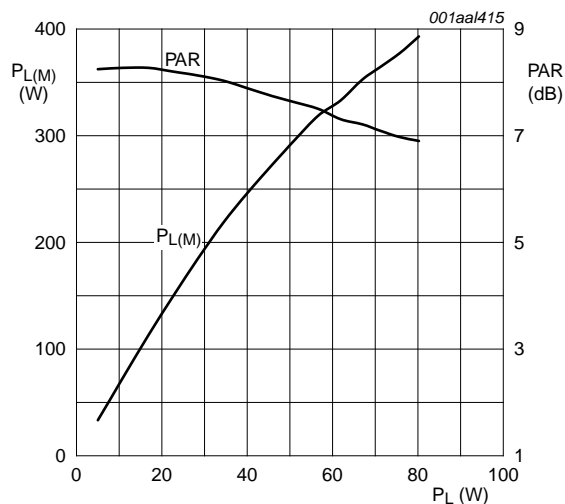
**Fig 2. 2-carrier W-CDMA power gain and drain efficiency as functions of load power; typical values**



$V_{DS} = 28 \text{ V}$ ;  $I_{Dq} = 2000 \text{ mA}$ .

- (1)  $f = 5 \text{ MHz}$  low
- (2)  $f = 5 \text{ MHz}$  high
- (3)  $f = 10 \text{ MHz}$  low
- (4)  $f = 10 \text{ MHz}$  high

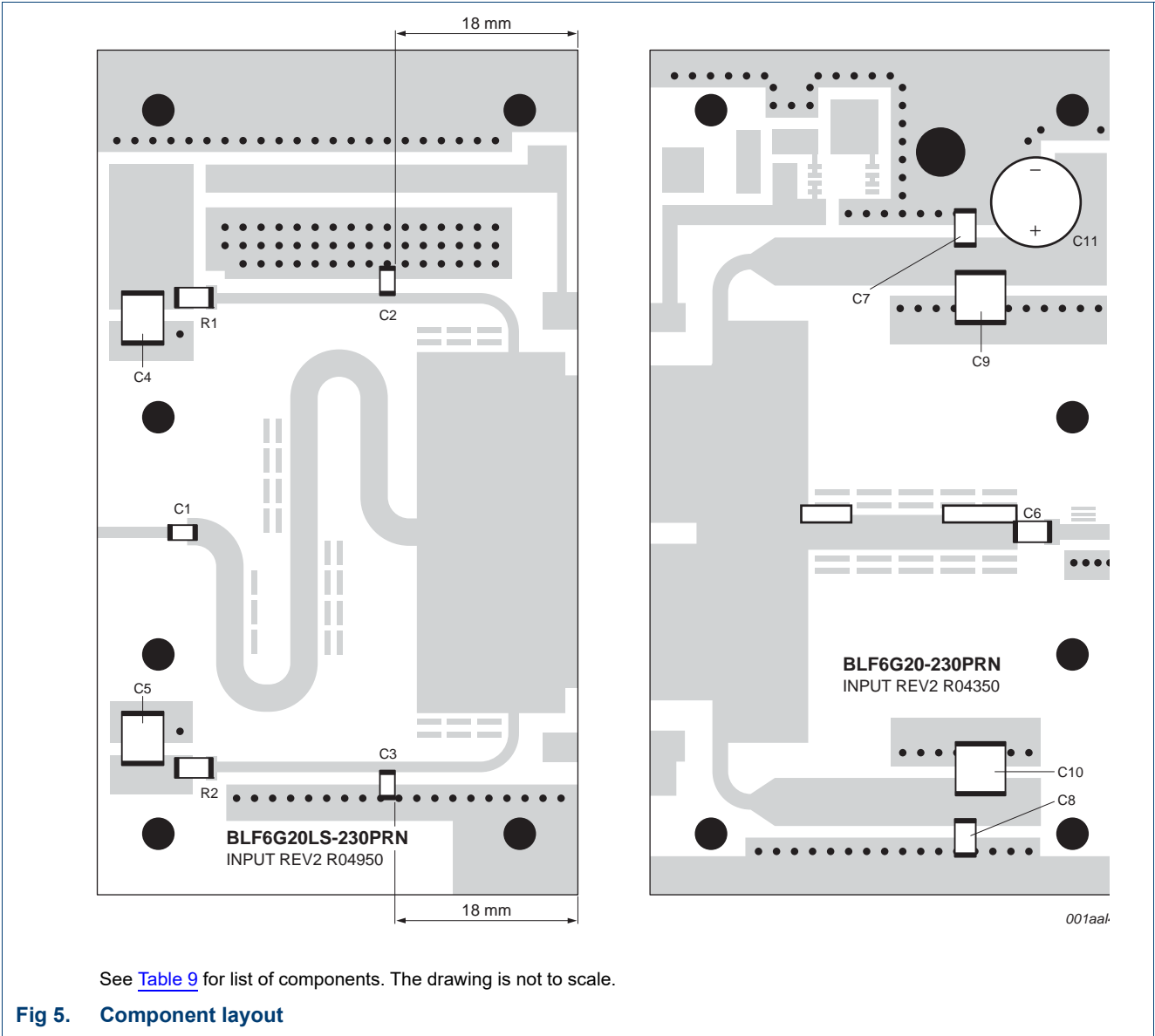
**Fig 3. 2-carrier W-CDMA adjacent channel power ratio as function of load power; typical values**



$V_{DS} = 28 \text{ V}$ ;  $I_{Dq} = 2000 \text{ mA}$ .

**Fig 4. 2-carrier W-CDMA peak output power and output peak-to-average ratio as function of load power; typical values**

8. Test information



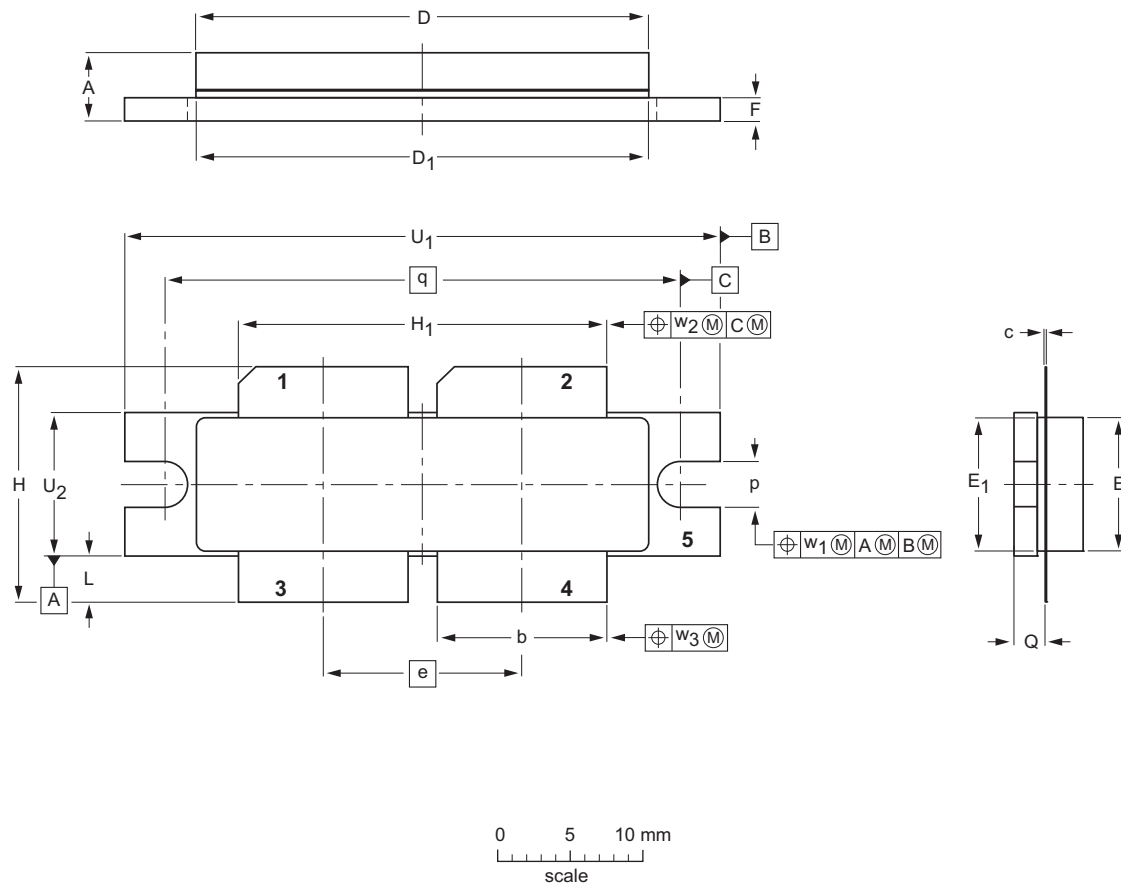
**Table 9. List of components**  
See [Figure 5](#) for component layout.

Component	Description	Value	Remarks
C1, C2, C3	multilayer ceramic chip capacitor	24 pF	ATC100A
C4, C5	multilayer ceramic chip capacitor	4.7 $\mu$ F	TDK
C6	multilayer ceramic chip capacitor	33 pF	ATC8008
C7, C8	multilayer ceramic chip capacitor	12 pF	ATC100B
C9, C10	multilayer ceramic chip capacitor	10 $\mu$ F	TDK
C11	electrolytic capacitor	220 $\mu$ F/63 V	
R1, R2	SMD resistor	10 $\Omega$	Philips 1206

## 9. 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 <sub>1</sub>	e	E	E <sub>1</sub>	F	H	H <sub>1</sub>	L	p	Q	q	U <sub>1</sub>	U <sub>2</sub>	w <sub>1</sub>	w <sub>2</sub>	w <sub>3</sub>
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.

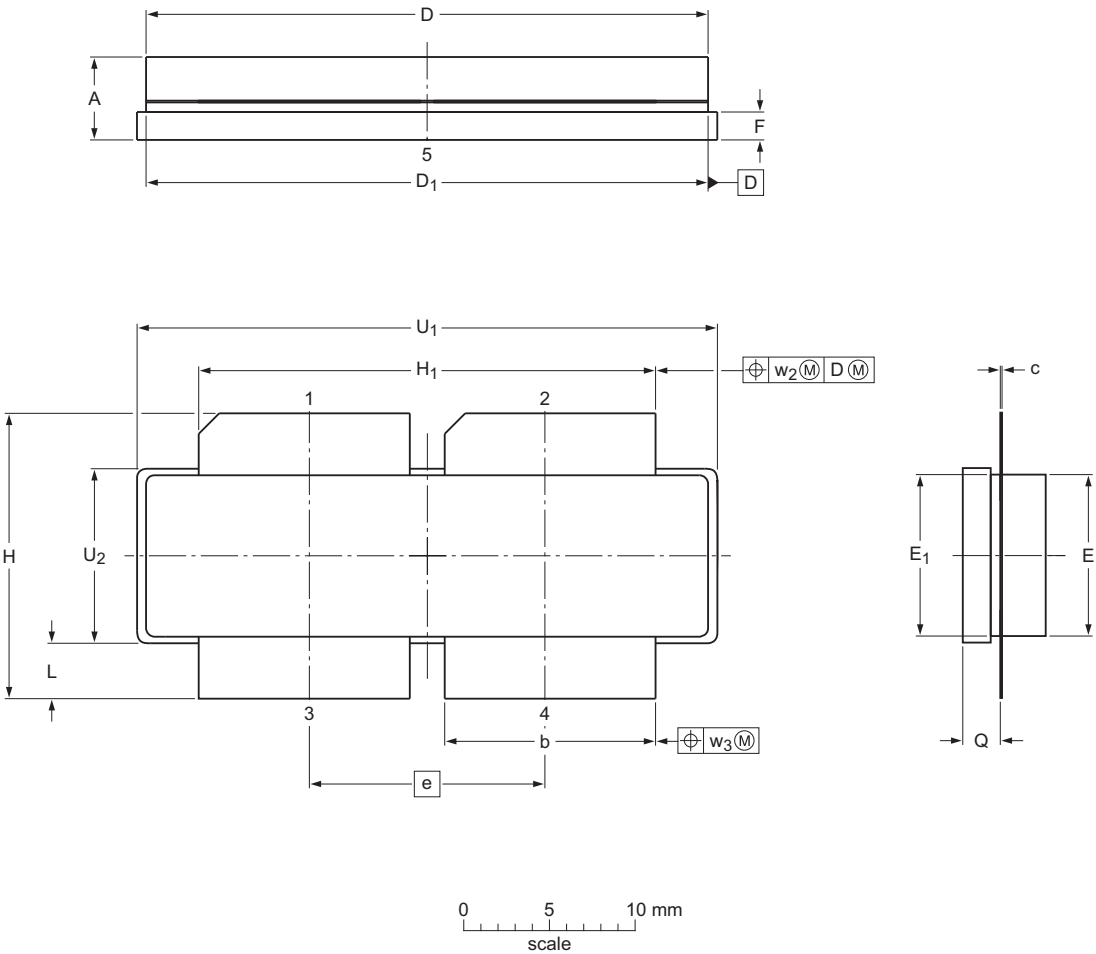
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT539A						10-02-02 12-05-02

Fig 6. Package outline SOT539A



Earless flanged balanced ceramic package; 4 leads

SOT539B



Dimensions																	
Unit <sup>(1)</sup>	A	b	c	D	D <sub>1</sub>	E	E <sub>1</sub>	e	F	H	H <sub>1</sub>	L	Q	U <sub>1</sub>	U <sub>2</sub>	w <sub>2</sub>	w <sub>3</sub>
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 7. Package outline SOT539B

## 10. Abbreviations

Table 10. Abbreviations

Acronym	Description
3GPP	Third Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
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
W-CDMA	Wideband Code Division Multiple Access

## 11. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G20-230PRN_20S230PRN#4	20150901	Product data sheet	-	BLF6G20-230PRN_20S230PRN_V.3
Modifications:	<ul style="list-style-type: none"> <li>The format of this document has been redesigned to comply with the new identity guidelines of Ampleon.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul>			
BLF6G20-230PRN_20S230PRN_V.3	20130712	Product data sheet	-	BLF6G20-230PRN_20S230PRN_V.2
BLF6G20-230PRN_20S230PRN_V.2	20100209	Product data sheet	-	BLF6G20-230PRN_1
BLF6G20-230PRN_1	20081202	Objective data sheet	-	-

## 12. Legal information

### 12.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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