

# BLF8G20LS-230V

Power LDMOS transistor

Rev. 3 — 1 September 2015

AMPLEON

Product data sheet

## 1. Product profile

### 1.1 General description

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

**Table 1. Typical performance**

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

Test signal	f (MHz)	$I_{Dq}$ (mA)	$V_{DS}$ (V)	$P_{L(AV)}$ (W)	$G_p$ (dB)	$\eta_D$ (%)	ACPR (dBc)
2-carrier W-CDMA	1805 to 1880	1800	28	55	18	31.7	-29 <a href="#">[1]</a>

[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

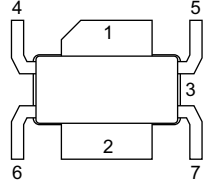
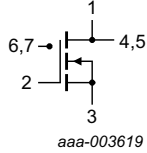
- Excellent ruggedness
- High efficiency
- Low thermal resistance providing excellent thermal stability
- Designed for broadband operation
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent pre-distortability
- Internally 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 multi standard 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
1	drain		
2	gate		
3	source <a href="#">[1]</a>		
4	decoupling lead		
5	decoupling lead		
6	n.c.		
7	n.c.		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF8G20LS-230V	-	earless flanged LDMOST ceramic package; 6 leads	SOT1239B

## 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
$T_j$	junction temperature		<a href="#">[1]</a> -	225	°C

[1] Continuous use at maximum temperature will affect the reliability, for details refer to the on-line MTF calculator.

## 5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}; P_L = 55\text{ W}; V_{DS} = 28\text{ V}; I_{Dq} = 1600\text{ mA}$	0.27	K/W

## 6. Characteristics

**Table 6. DC characteristics**

$T_j = 25\text{ °C}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 2.7\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 270\text{ mA}$	1.5	1.9	2.3	V
$V_{GSq}$	gate-source quiescent voltage	$V_{DS} = 28\text{ V}; I_D = 1.6\text{ A}$	1.7	2.1	2.5	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	4.2	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	50.6	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	420	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 13.5\text{ A}$	-	19.6	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 9.45\text{ A}$	-	0.06	-	$\Omega$

**Table 7. RF characteristics**

Test signal: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH;  $f_1 = 1807.5\text{ MHz}; f_2 = 1812.5\text{ MHz}; f_3 = 1872.5\text{ MHz}; f_4 = 1877.5\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}; I_{Dq} = 1800\text{ mA}; T_{case} = 25\text{ °C}$ ; unless otherwise specified; in a production circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(AV)} = 55\text{ W}$	16.8	18	-	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 55\text{ W}$	27	31.7	-	%
$RL_{in}$	input return loss	$P_{L(AV)} = 55\text{ W}$	-	-10	-6	dB
ACPR	adjacent channel power ratio	$P_{L(AV)} = 55\text{ W}$	-	-29	-24	dBc

## 7. Test information

### 7.1 Ruggedness in class-AB operation

The BLF8G20LS-230V is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28\text{ V}; I_{Dq} = 1800\text{ mA}; P_L = 200\text{ W (CW)}; f = 1805\text{ MHz}$ .

### 7.2 Impedance information

**Table 8. Typical impedance**

Measured load-pull data;  $I_{Dq} = 1600\text{ mA}; V_{DS} = 28\text{ V}$ . Typical values unless otherwise specified.

f (MHz)	$Z_S$ [1] ( $\Omega$ )	$Z_L$ [1] ( $\Omega$ )
1805	1.26 – j3.29	0.90 – j2.12
1843	1.87 – j3.56	0.88 – j2.16
1880	1.97 – j3.73	0.88 – j2.18

[1]  $Z_S$  and  $Z_L$  defined in [Figure 1](#).

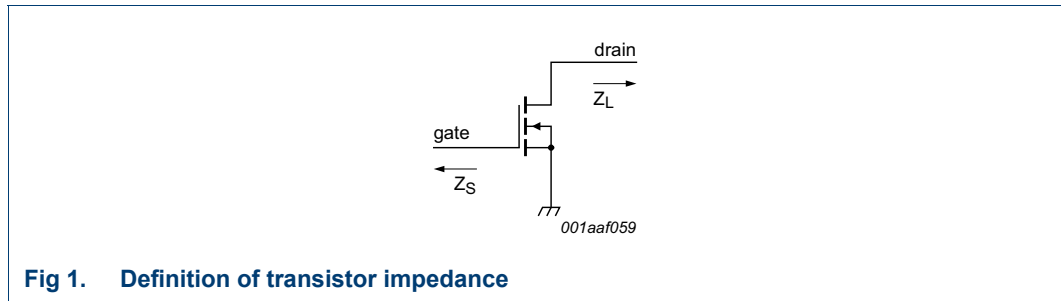
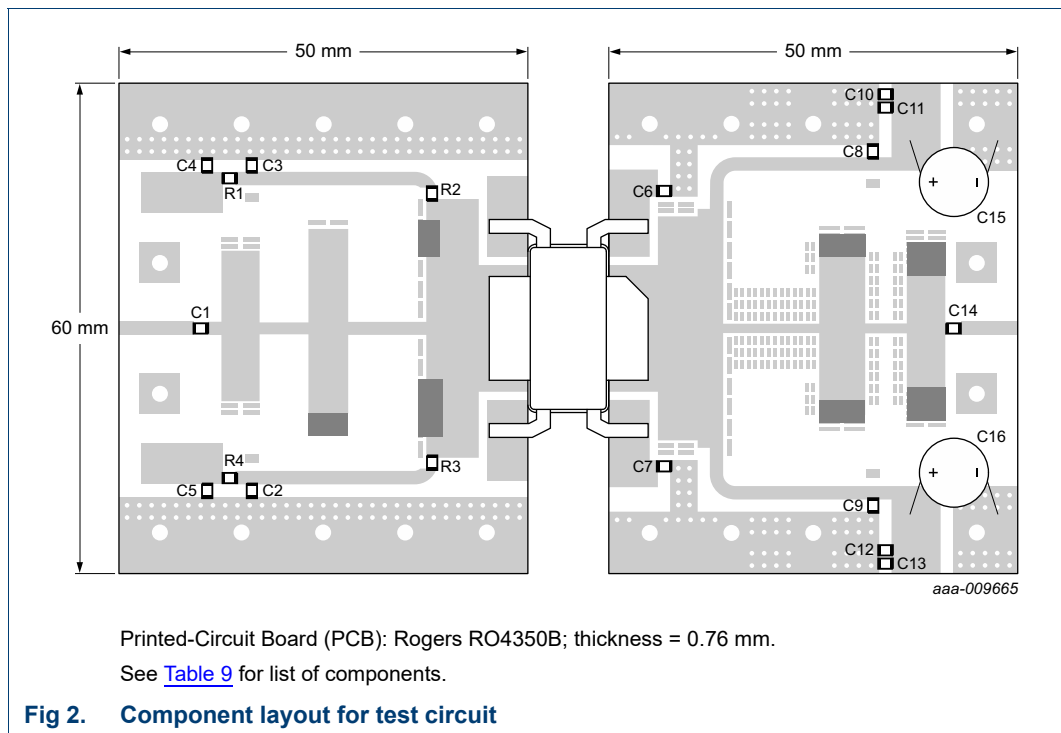


Fig 1. Definition of transistor impedance

### 7.3 VBW in class-AB operation

The BLF8G20LS-230V has a video bandwidth of 65 MHz (typical) when measured in a class-AB test circuit operating at a center frequency of 1843 MHz for  $V_{DS} = 28\text{ V}$  and  $I_{Dq} = 1600\text{ mA}$ .

### 7.4 Test circuit



Printed-Circuit Board (PCB): Rogers RO4350B; thickness = 0.76 mm.

See [Table 9](#) for list of components.

Fig 2. Component layout for test circuit

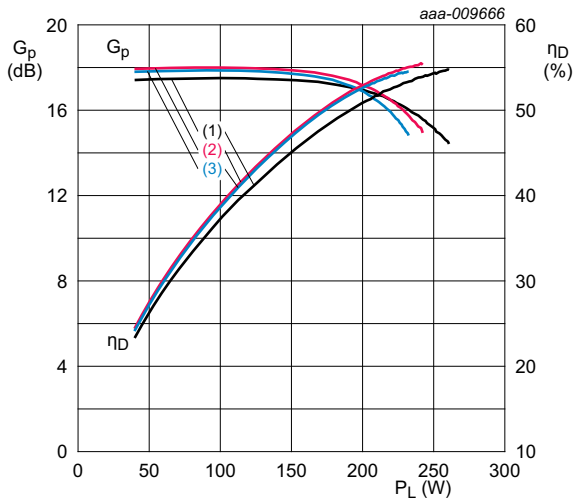
Table 9. List of components

For test circuit, see [Figure 2](#).

Component	Description	Value	Remarks
C1, C2, C3, C8, C9, C14	multilayer ceramic chip capacitor	24 pF	ATC800B
C4, C5, C11, C12	multilayer ceramic chip capacitor	1 $\mu\text{F}$ , 50 V	Murata
C6, C7, C10, C13	multilayer ceramic chip capacitor	10 $\mu\text{F}$ , 50 V	Murata
C15, C16	electrolytic capacitor	2200 $\mu\text{F}$ , 63 V	
R1, R2, R3, R4	chip resistor	5.1 $\Omega$	SMD 0805

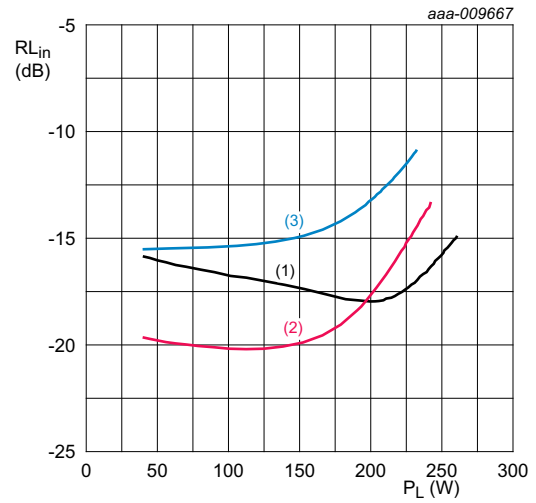
7.5 Graphical data

7.5.1 Pulsed CW



$V_{DS} = 28 \text{ V}; I_{Dq} = 1600 \text{ mA}; t_p = 100 \mu\text{s}; \delta = 10 \%$ .  
 (1)  $f = 1808 \text{ MHz}$   
 (2)  $f = 1843 \text{ MHz}$   
 (3)  $f = 1880 \text{ MHz}$

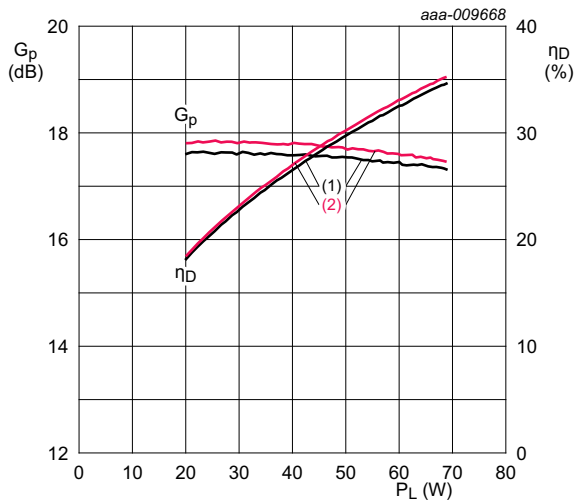
**Fig 3. Power gain and drain efficiency as function of output power; typical values**



$V_{DS} = 28 \text{ V}; I_{Dq} = 1600 \text{ mA}; t_p = 100 \mu\text{s}; \delta = 10 \%$ .  
 (1)  $f = 1808 \text{ MHz}$   
 (2)  $f = 1843 \text{ MHz}$   
 (3)  $f = 1880 \text{ MHz}$

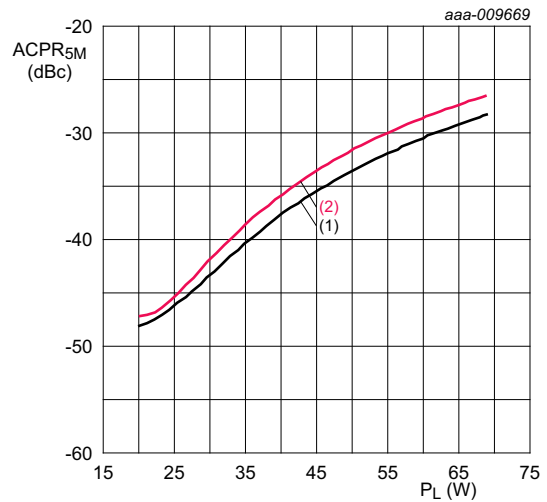
**Fig 4. Input return loss as a function of output power; typical values**

7.5.2 2-Carrier W-CDMA



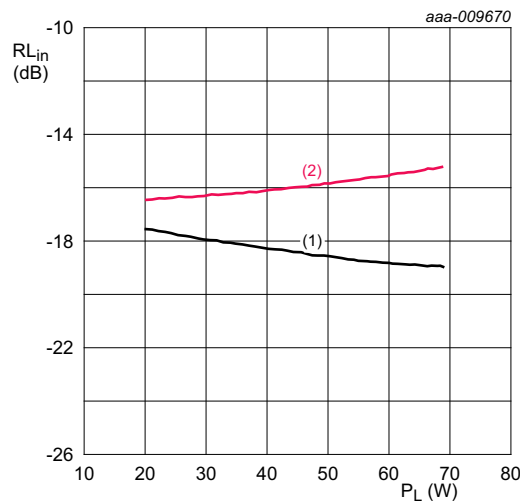
$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1600\text{ mA}$ ; carrier spacing = 5 MHz;  $\delta = 46\%$ .  
 (1)  $f = 1810\text{ MHz}$   
 (2)  $f = 1875\text{ MHz}$

**Fig 5. Power gain and drain efficiency as function of output power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1600\text{ mA}$ ; carrier spacing = 5 MHz;  $\delta = 46\%$ .  
 (1)  $f = 1810\text{ MHz}$   
 (2)  $f = 1875\text{ MHz}$

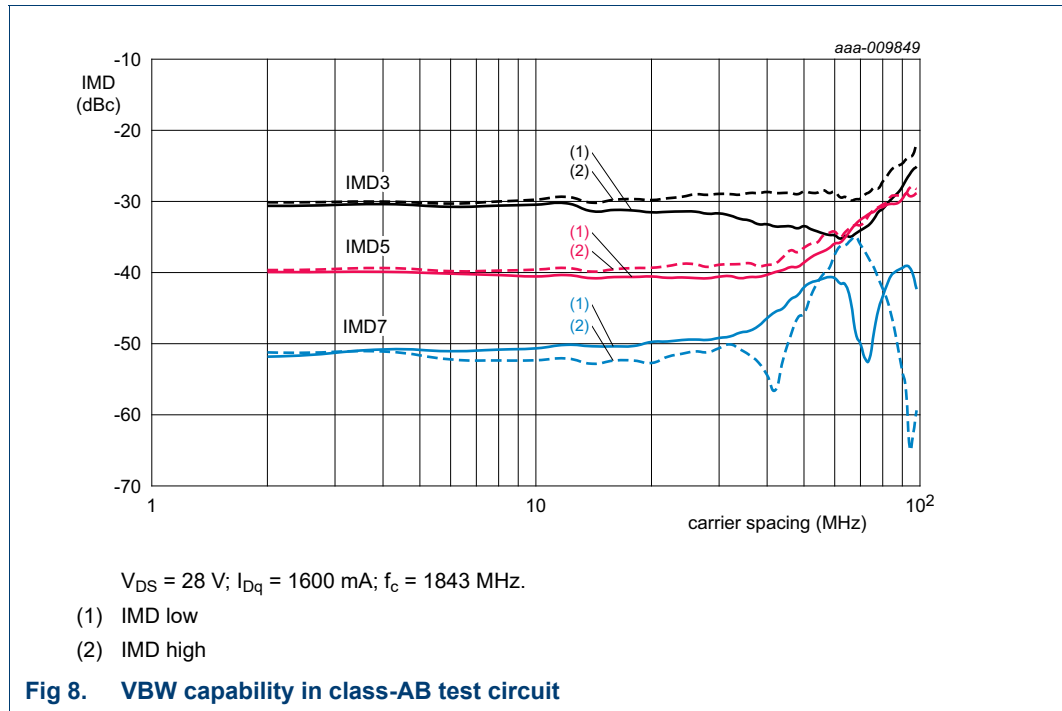
**Fig 6. Adjacent channel power ratio (5 MHz) as a function of output power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1600\text{ mA}$ ; carrier spacing = 5 MHz;  $\delta = 46\%$ .  
 (1)  $f = 1810\text{ MHz}$   
 (2)  $f = 1875\text{ MHz}$

**Fig 7. Input return loss as a function of output power; typical values**

7.5.3 2-Tone VBW



8. Package outline

Earless flanged LDMOST ceramic package; 6 leads

SOT1239B

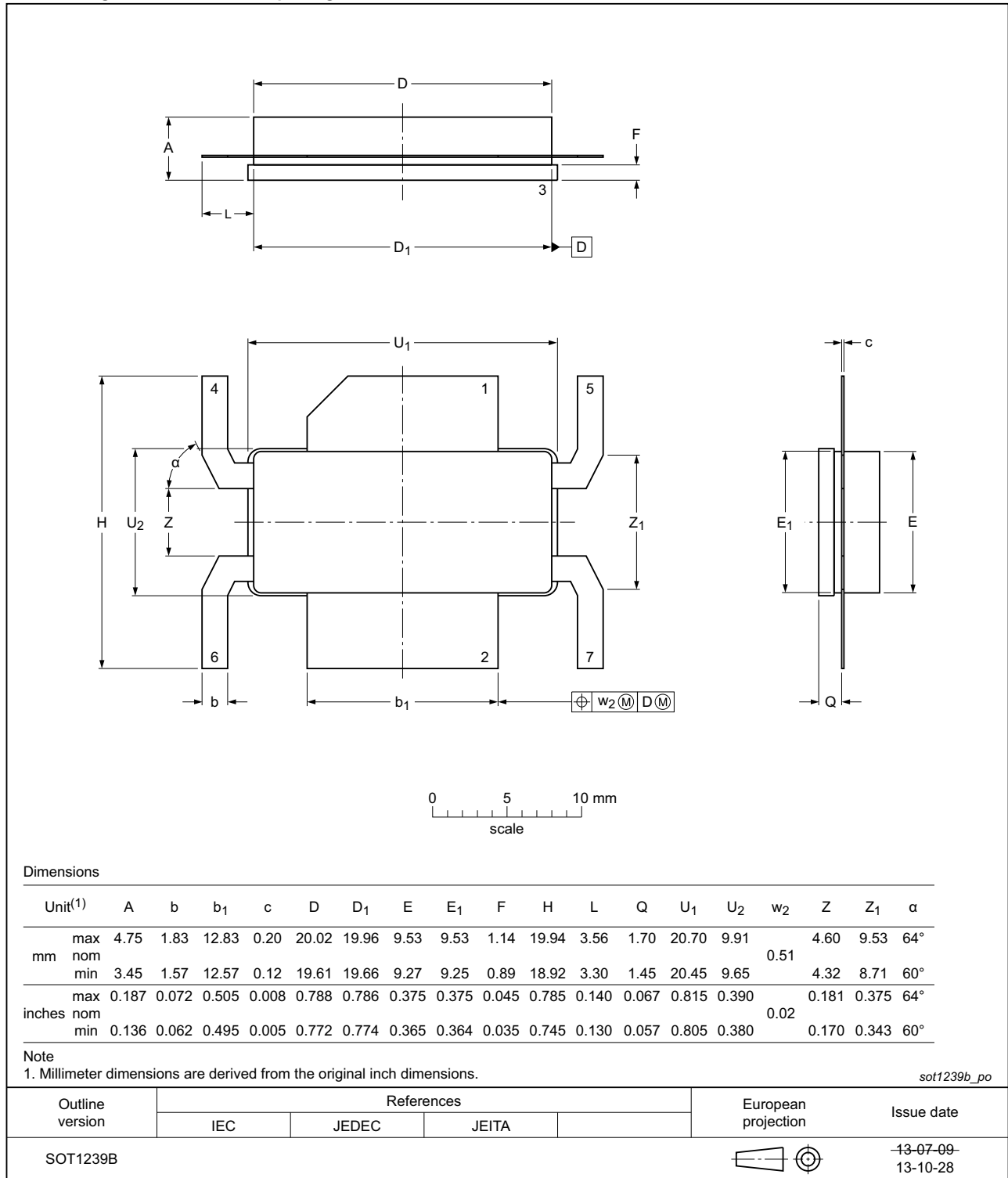


Fig 9. Package outline SOT1239B



## 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	3rd 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
MTF	Median Time to Failure
PAR	Peak-to-Average Ratio
SMD	Surface Mounted Device
VBW	Video BandWidth
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
BLF8G20LS-230V#3	20150901	Product data sheet		BLF8G20LS-230V v.2
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>			
BLF8G20LS-230V v.2	20140221	Product data sheet	-	BLF8G20LS-230V v.1
BLF8G20LS-230V v.1	20131107	Preliminary data sheet	-	-

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

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