

# BLF8G19LS-170BV

Power LDMOS transistor

Rev. 4 — 1 September 2015

AMMPLERON

Product data sheet

## 1. Product profile

### 1.1 General description

170 W LDMOS power transistor with improved video bandwidth for base station applications at frequencies from 1800 MHz to 1990 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 [1]	1930 to 1990	1300	32	60	18.0	32	-31
1-carrier W-CDMA [2]	1805 to 1880	1300	28	33	19.8	29	-40

[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 thermal resistance providing excellent thermal stability
- Decoupling leads to enable improved video bandwidth (100 MHz typical)
- 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
- Integrated current sense
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

### 1.3 Applications

- RF power amplifier for W-CDMA base stations and multi carrier applications in the 1800 MHz to 1990 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>		
4,5	video decoupling		
6	sense gate		
7	sense drain		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF8G19LS-170BV	-	earless flanged LDMOST ceramic package; 6 leads	SOT1120B

## 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
$V_{GS(sense)}$	sense gate-source voltage		-0.5	+9	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	$T_{case} = 80\text{ °C}; P_L = 55\text{ W}$	0.27	K/W

## 6. Characteristics

**Table 6. DC characteristics**

$T_j = 25\text{ }^\circ\text{C}$ ; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ ; $I_D = 2.16\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$ ; $I_D = 216\text{ mA}$	1.5	1.9	2.3	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 28\text{ V}$	-	-	4.5	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $V_{DS} = 10\text{ V}$	-	40	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$	-	-	450	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}$ ; $I_D = 10.8\text{ A}$	-	16	-	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	-	$\Omega$
$I_{Dq}$	quiescent drain current	main transistor: $V_{DS} = 32\text{ V}$ sense transistor: $I_{DS} = 23.4\text{ mA}$ ; $V_{DS} = 30.4\text{ V}$	1175	1300	1425	mA

**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;  $f_1 = 1937.5\text{ MHz}$ ;  $f_2 = 1962.5\text{ MHz}$ ;  $f_3 = 1982.5\text{ MHz}$ ;  $f_4 = 1987.5\text{ MHz}$ ; RF performance at  $V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 1300\text{ mA}$ ;  $T_{case} = 25\text{ }^\circ\text{C}$ ; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(AV)} = 60\text{ W}$	17.3	18.0	20.2	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 60\text{ W}$	-	-13	-7	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 60\text{ W}$	28	32	-	%
$ACPR_{5M}$	adjacent channel power ratio (5 MHz)	$P_{L(AV)} = 60\text{ W}$	-	-31	-28	dBc

## 7. Test information

### 7.1 Ruggedness in class-AB operation

The BLF8G19LS-170BV is capable to withstand a load mismatch corresponding to  $VSWR = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 1300\text{ mA}$ ;  $P_L = 214\text{ W (CW)}$ ;  $f = 1930\text{ MHz}$  and also under the following conditions:  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1300\text{ mA}$ ;  $P_L = 170\text{ W (CW)}$ ;  $f = 1805\text{ MHz}$ .

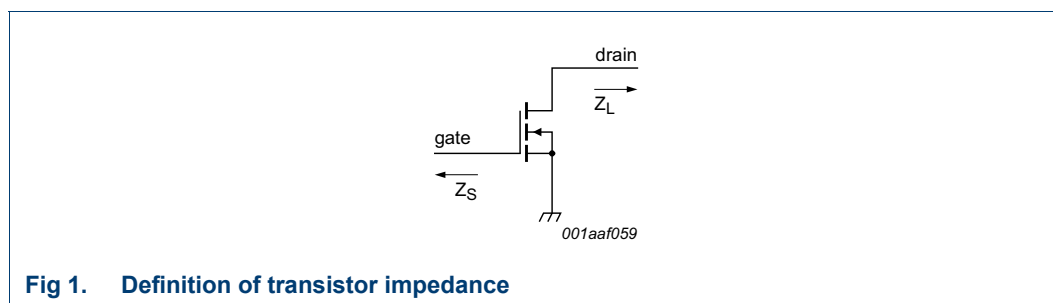
## 7.2 Impedance information

**Table 8. Typical impedance**

$I_{Dq} = 1300\text{ mA}$ ; main transistor  $V_{DS} = 32\text{ V}$ .

f (MHz)	$Z_S$ <sup>[1]</sup> ( $\Omega$ )	$Z_L$ <sup>[1]</sup> ( $\Omega$ )
1930	1.8 – j3.4	1.1 – j2.8
1960	1.8 – j3.4	1.1 – j2.8
1990	1.9 – j4.0	1.0 – j2.8

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

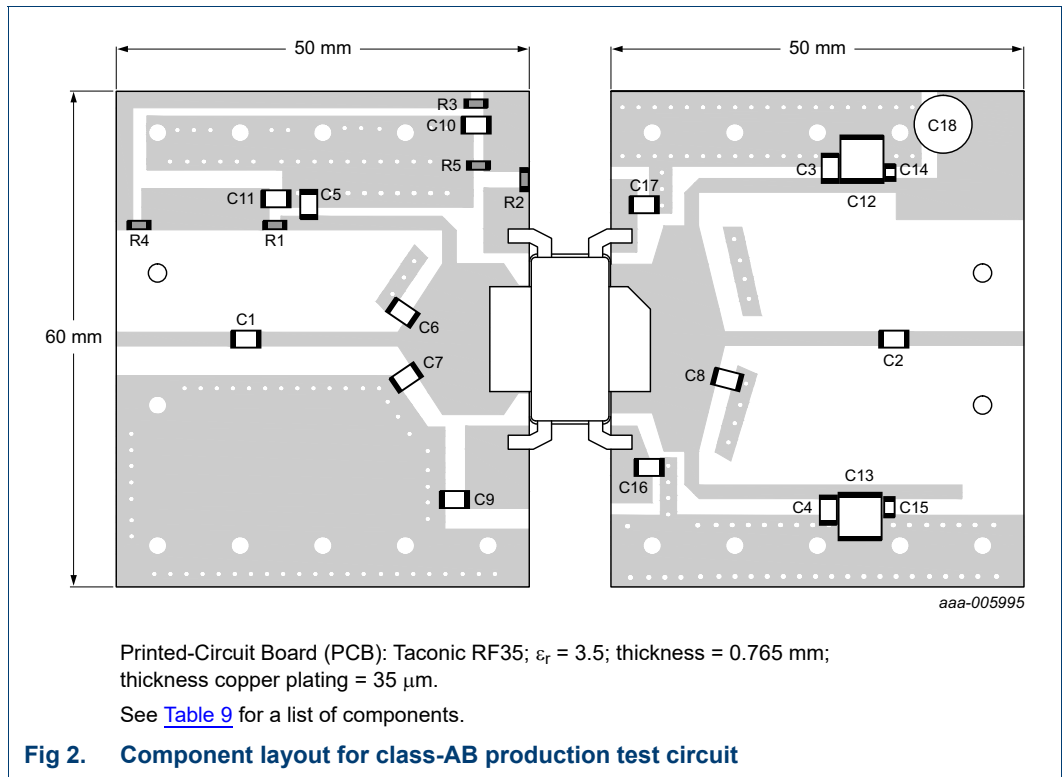


**Fig 1. Definition of transistor impedance**

## 7.3 VBW in class-AB operation

The BLF8G19LS-170BV shows 100 MHz (typical) video bandwidth in a class-AB test circuit in the 1900 MHz band at  $V_{DS} = 32\text{ V}$  and  $I_{Dq} = 1.3\text{ A}$ .

7.4 Test circuit



**Table 9. List of components**

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

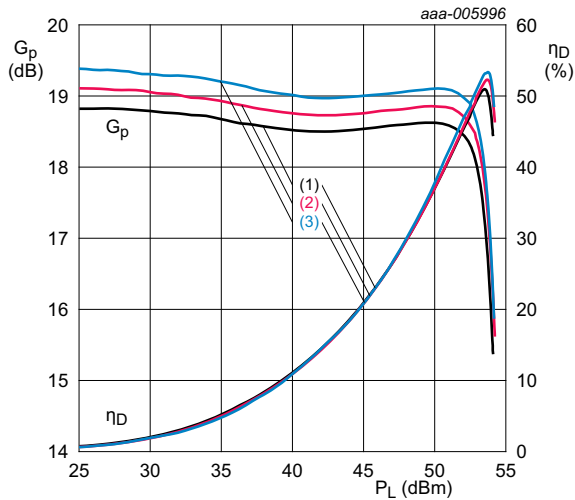
Component	Description	Value	Remarks
C1, C2, C3, C4, C5	multilayer ceramic chip capacitor	10 pF	[1] ATC100B
C6, C8	multilayer ceramic chip capacitor	0.1 pF	[1] ATC100B
C7	multilayer ceramic chip capacitor	0.2 pF	[1] ATC100B
C9, C10	multilayer ceramic chip capacitor	120 pF	[1] ATC100B
C11, C16, C17	multilayer ceramic chip capacitor	4.7 $\mu\text{F}$ , 50 V	[2] Murata
C12, C13	multilayer ceramic chip capacitor	10 $\mu\text{F}$ , 50 V	[2] Murata
C14, C15	multilayer ceramic chip capacitor	1 $\mu\text{F}$ , 50 V	[2] Murata
C18	electrolytic capacitor	470 $\mu\text{F}$ , 63 V	
R1	SMD resistor	4.7 $\Omega$	Philips 1206
R2	SMD resistor	470 $\Omega$	Philips 1206
R3	SMD resistor	820 $\Omega$	Philips 1206
R4	SMD resistor	12 $\Omega$	Philips 1206
R5	SMD resistor	2200 $\Omega$	Philips 1206

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

[2] Murata or capacitor of same quality.

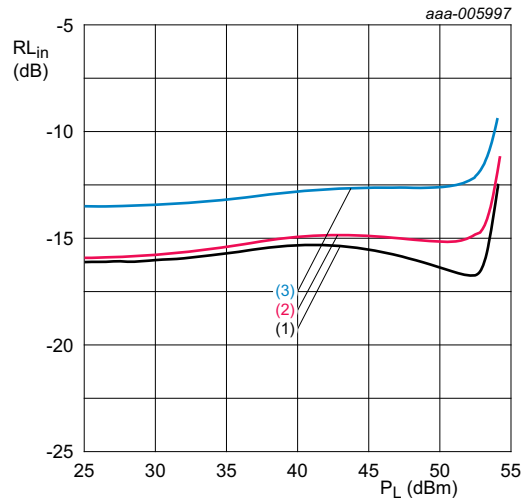
7.5 Graphs

7.5.1 CW pulse



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .  
 (1)  $f = 1935\text{ MHz}$   
 (2)  $f = 1960\text{ MHz}$   
 (3)  $f = 1985\text{ MHz}$

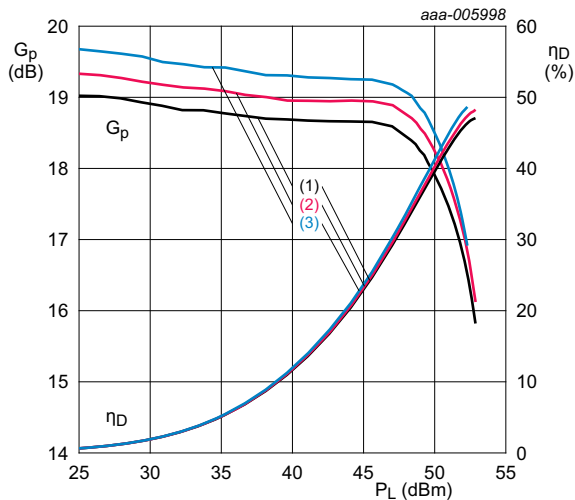
Fig 3. Power gain and drain efficiency as function of output power; typical values



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .  
 (1)  $f = 1935\text{ MHz}$   
 (2)  $f = 1960\text{ MHz}$   
 (3)  $f = 1985\text{ MHz}$

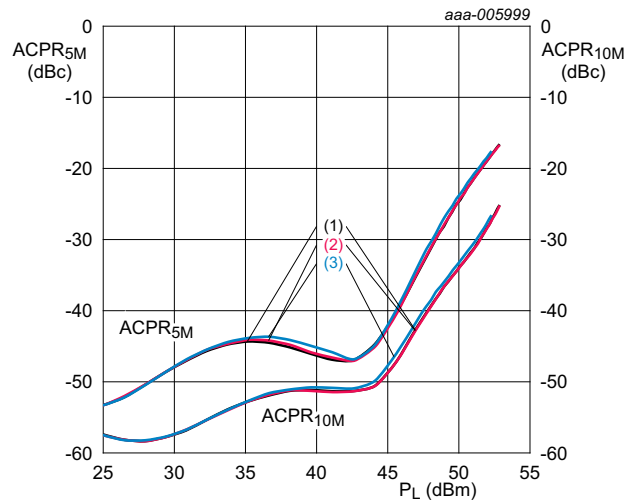
Fig 4. Input return loss as a function of output power; typical values

7.5.2 2-Carrier W-CDMA



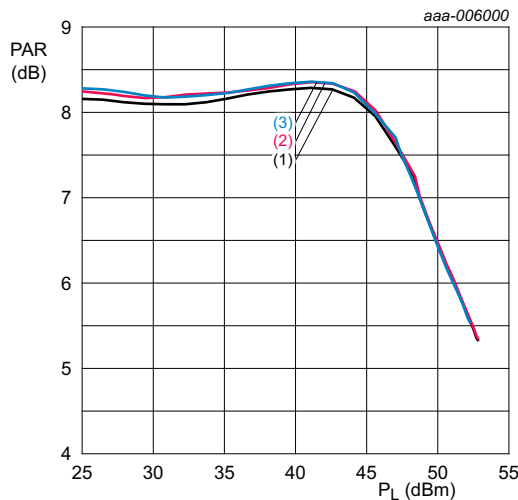
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 1935\text{ MHz}$   
 (2)  $f = 1960\text{ MHz}$   
 (3)  $f = 1985\text{ MHz}$

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



$V_{DS} = 32\text{ V}; V_{GS} = 32\text{ V}$   
 (1)  $f = 1935\text{ MHz}$   
 (2)  $f = 1960\text{ MHz}$   
 (3)  $f = 1985\text{ MHz}$

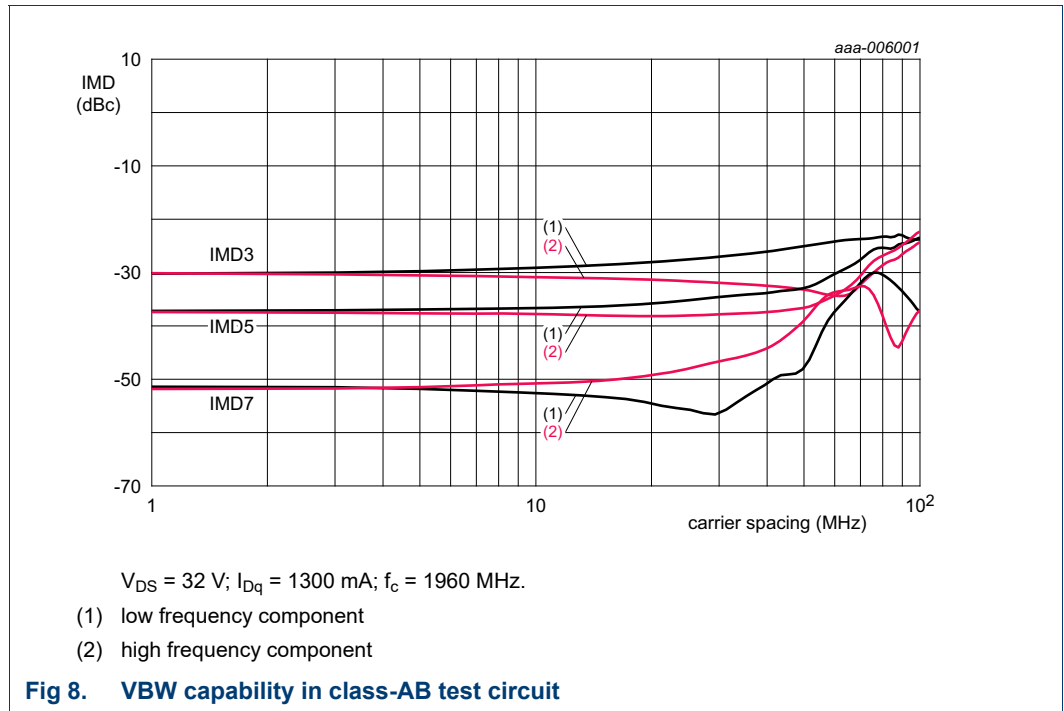
**Fig 6. Adjacent channel power ratio (5 MHz) and adjacent channel power ratio (10 MHz) as function of output power; typical values**



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 1935\text{ MHz}$   
 (2)  $f = 1960\text{ MHz}$   
 (3)  $f = 1985\text{ MHz}$

**Fig 7. Peak-to-average power ratio as a function of output power; typical values**

7.5.3 2-Tone VBW

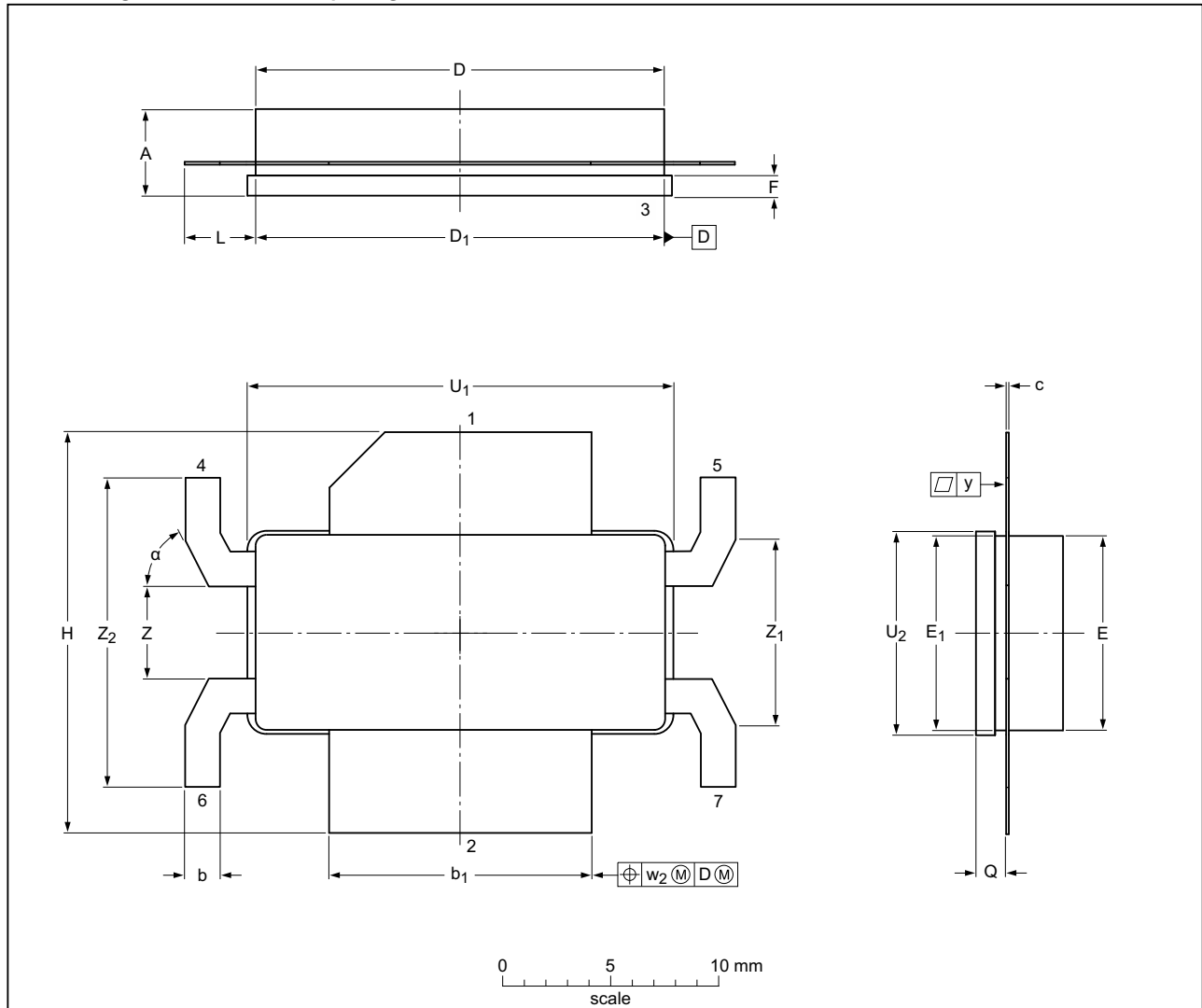




8. Package outline

Earless flanged LDMOST ceramic package; 6 leads

SOT1120B



Dimensions

Unit <sup>(1)</sup>	A	b	b <sub>1</sub>	c	D	D <sub>1</sub>	E	E <sub>1</sub>	F	H	L	Q <sup>(2)</sup>	U <sub>1</sub>	U <sub>2</sub>	w <sub>2</sub>	y	Z	Z <sub>1</sub>	Z <sub>2</sub>	α							
mm	max	4.75	1.83	12.83	0.18	20.02	19.96	9.53	9.53	1.14	19.94	3.56	1.70	20.70	9.91	0.51	0.10	4.60	9.53	15.52	64°						
	nom																										
	min	3.45	1.57	12.57	0.10	19.61	19.66	9.27	9.25	0.89	18.92	3.30	1.45	20.45	9.65									4.32	8.71	14.50	60°
inches	max	0.187	0.072	0.505	0.007	0.788	0.786	0.375	0.375	0.045	0.785	0.140	0.067	0.815	0.39	0.02	0.004	0.181	0.375	0.611	64°						
	nom																										
	min	0.136	0.062	0.495	0.004	0.772	0.774	0.365	0.364	0.035	0.745	0.130	0.057	0.805	0.38									0.170	0.343	0.571	60°

Note

- 1. millimeter dimensions are derived from the original inch dimensions.
- 2. dimension is measured 0.030 inch (0.76 mm) from the body.

sot1120b\_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOT1120B					12-06-14 13-10-21

Fig 9. Package outline SOT1120B

## 9. 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
VBW	Video BandWidth
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
BLF8G19LS-170BV#4	20150901	Product data sheet		BLF8G19LS-170BV 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>			
BLF8G19LS-170BV v.3	20150501	Product data sheet	-	BLF8G19LS-170BV v.2
BLF8G19LS-170BV v.2	20130328	Product data sheet	-	BLF8G19LS-170BV v.1
BLF8G19LS-170BV v.1	20130108	Preliminary data sheet	-	-

## 11. Legal information

### 11.1 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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