

# BLF8G22LS-220

Power LDMOS transistor

Rev. 4 — 1 September 2015

AMPLEON

Product data sheet

## 1. Product profile

### 1.1 General description

220 W LDMOS power transistor for base station applications at frequencies from 2110 MHz to 2170 MHz.

**Table 1. Typical performance**

*Typical RF performance at  $T_{case} = 25\text{ °C}$  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	2110 to 2170	1620	28	55	17	33	-30 <sup>[1]</sup>

[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

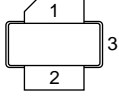
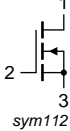
- Excellent ruggedness
- High efficiency
- Low  $R_{th}$  providing excellent thermal stability
- Designed for low memory effects providing excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous 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
1	drain		 sym112
2	gate		
3	source		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF8G22LS-220	-	earless flanged 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	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	[1]	-	225	°C

[1] Continuous use at maximum temperature will affect the reliability.

## 5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}$ ; $P_L = 55\text{ W (CW)}$ ; $V_{DS} = 28\text{ V}$ ; $I_{DQ} = 1620\text{ mA}$	0.26	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	1.7	2.3	V
$V_{GSq}$	gate-source quiescent voltage	$V_{DS} = 28\text{ V}; I_D = 1620\text{ mA}$	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	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	51	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	420	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 0.27\text{ A}$	-	2.41	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 5.25\text{ A}$	-	56.8	-	$\text{m}\Omega$

**Table 7. RF characteristics**

Test signal: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on the CCDF; 3GPP test model 1; 1-64 DPCH;  $f_1 = 2112.5\text{ MHz}; f_2 = 2117.5\text{ MHz}; f_3 = 2162.5\text{ MHz}; f_4 = 2167.5\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}; I_{Dq} = 1620\text{ mA}; T_{case} = 25\text{ °C}$ ; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(AV)} = 55\text{ W}$	15.8	17	-	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 55\text{ W}$	-	-12	-6	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 55\text{ W}$	28	33	-	%
$ACPR_{5M}$	adjacent channel power ratio (5 MHz)	$P_{L(AV)} = 55\text{ W}$	-	-30	-24	dBc

## 7. Test information

### 7.1 Ruggedness in class-AB operation

The BLF8G22LS-220 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28\text{ V}; I_{Dq} = 1620\text{ mA}; P_L = 200\text{ W (CW)}; f = 2110\text{ MHz}$ .

### 7.2 Impedance information

**Table 8. Typical impedance**

Measured load-pull condition data;  $I_{Dq} = 1620\text{ mA}; V_{DS} = 28\text{ V}$ .

f (MHz)	$Z_S$ <sup>[1]</sup> ( $\Omega$ )	$Z_L$ <sup>[1]</sup> ( $\Omega$ )
2110	1.59 – j4.09	1.30 – j2.20
2140	2.16 – j4.45	1.20 – j2.10
2170	2.46 – j3.95	1.20 – j2.30

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

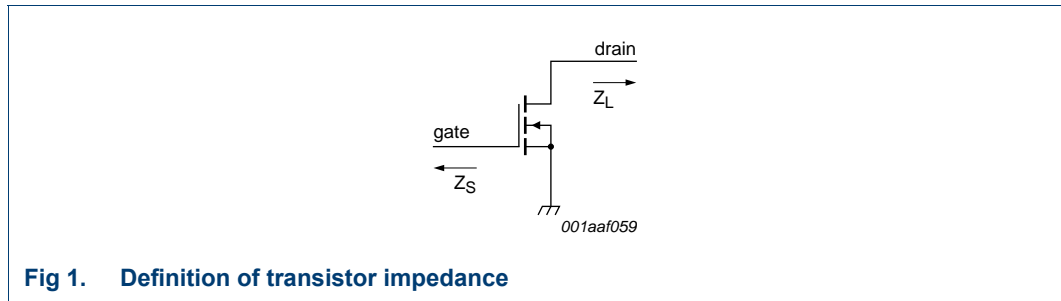
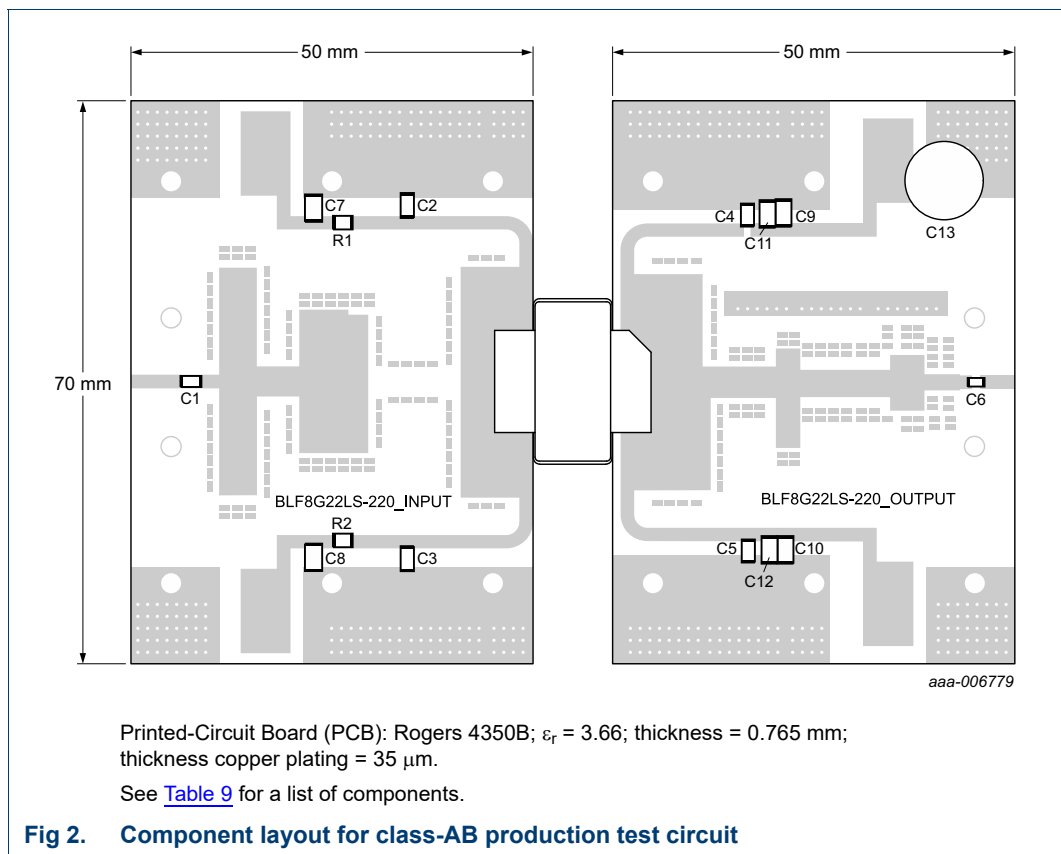


Fig 1. Definition of transistor impedance

### 7.3 Test circuit



Printed-Circuit Board (PCB): Rogers 4350B;  $\epsilon_r = 3.66$ ; thickness = 0.765 mm; thickness copper plating = 35  $\mu\text{m}$ .

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

Fig 2. Component layout for class-AB production test circuit

Table 9. List of components

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

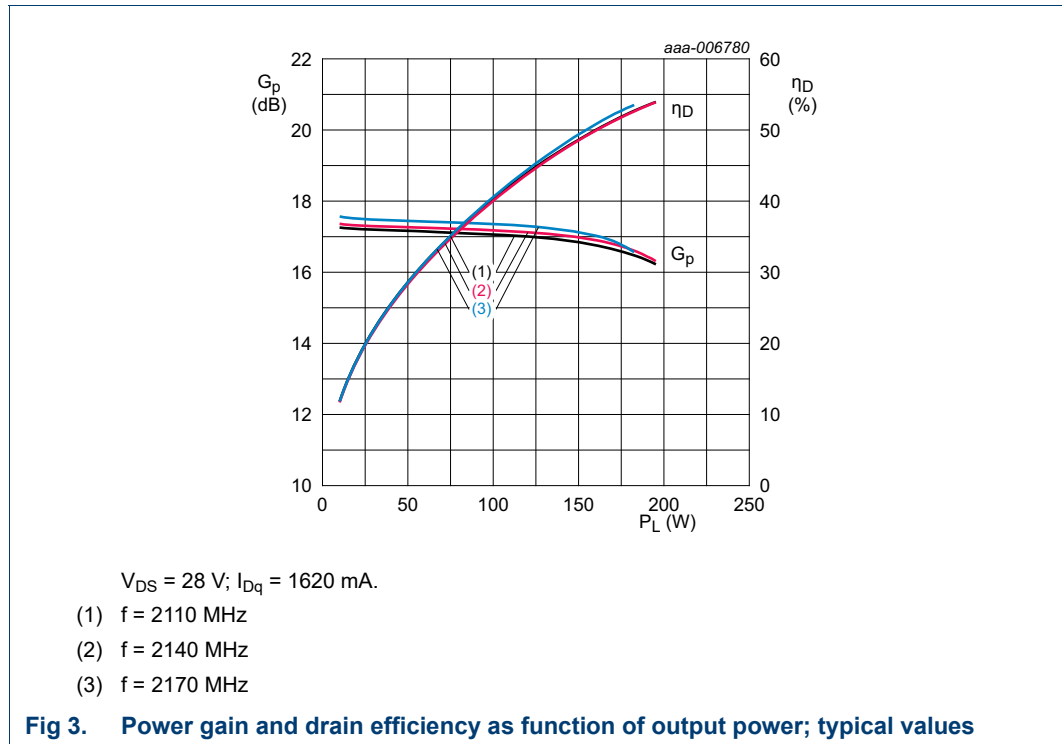
Component	Description	Value	Remarks
C1, C2, C3, C4, C5, C6	multilayer ceramic chip capacitor	9.7 pF	[1] ATC 800B
C7, C8, C9, C10	multilayer ceramic chip capacitor	10 $\mu\text{F}$	[2] Murata
C11, C12	multilayer ceramic chip capacitor	1 $\mu\text{F}$	[2] Murata
C13	electrolytic capacitor	470 $\mu\text{F}$ , 63 V	
R1, R2	resistor	9.1 $\Omega$	Vishay Dale SMD 0805

[1] American Technical Ceramics type 800B or capacitor of same quality.

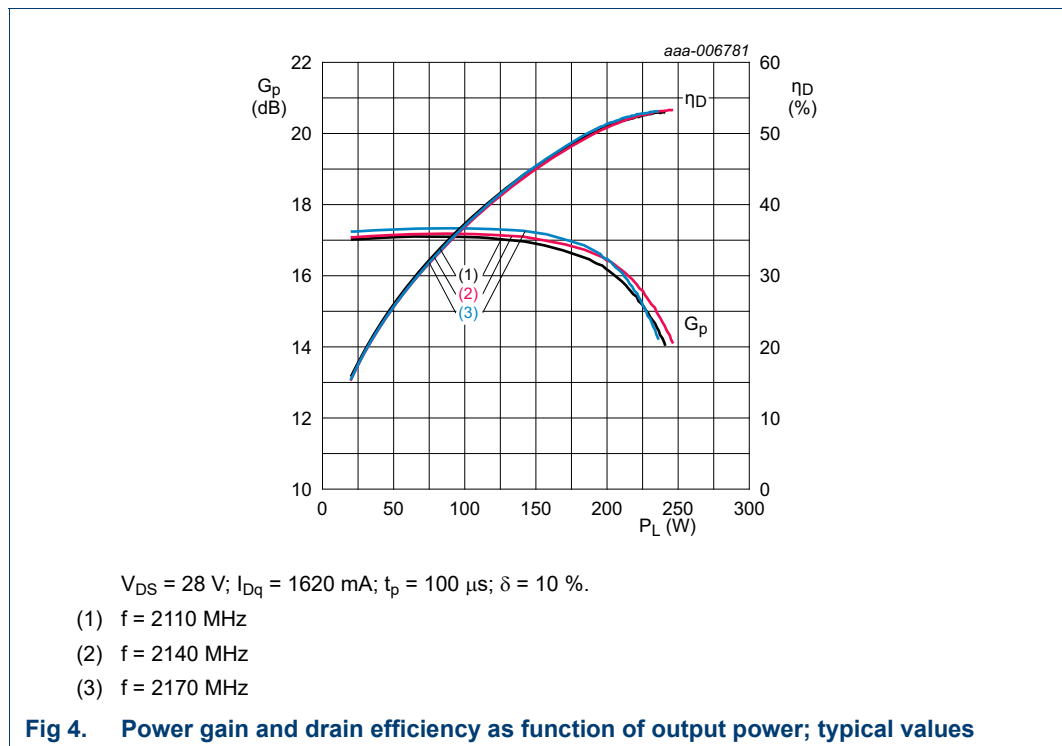
[2] Murata or capacitor of same quality.

7.4 Graphical data

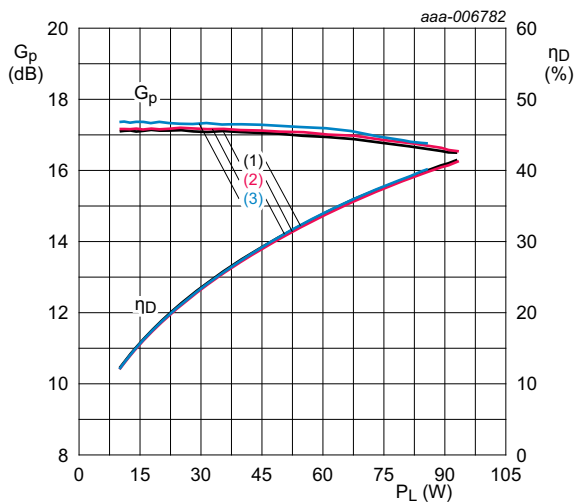
7.4.1 One-tone CW



7.4.2 CW pulsed

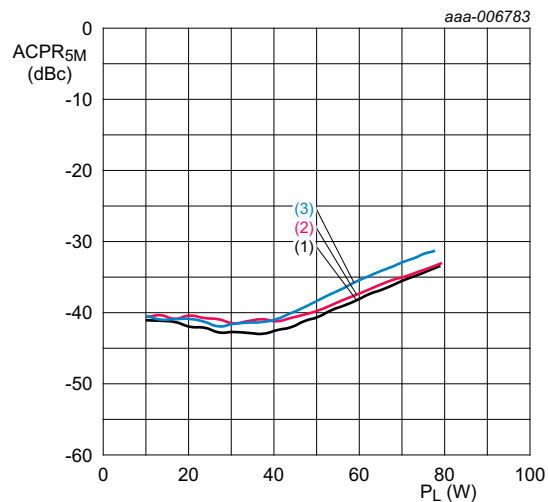


7.4.3 1-Carrier W-CDMA



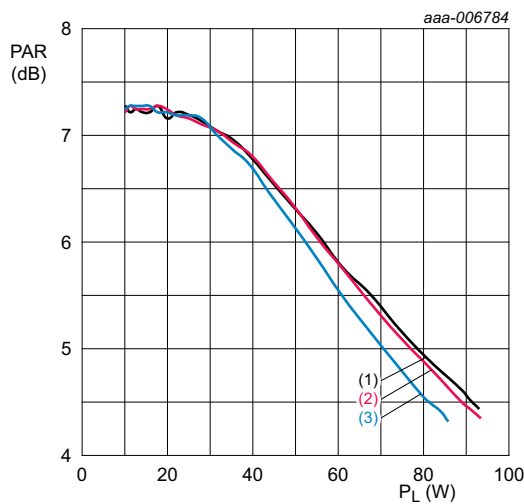
$V_{DS} = 28\text{ V}; I_{Dq} = 1620\text{ mA}$ .  
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

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



$V_{DS} = 28\text{ V}; I_{Dq} = 1620\text{ mA}$ .  
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

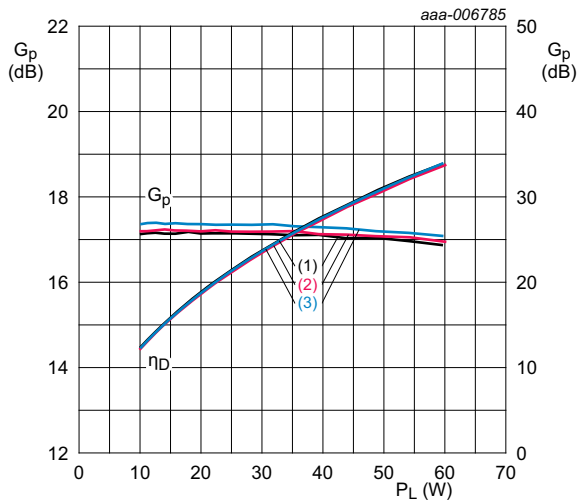
**Fig 6. Adjacent channel power ratio (5 MHz) as a function of output power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1620\text{ mA}$ .  
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

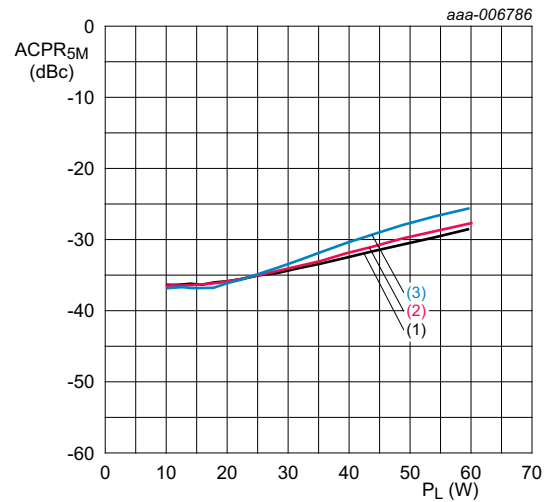
**Fig 7. Peak-to-average ratio as a function of output power; typical values**

7.4.4 2-Carrier W-CDMA



$V_{DS} = 28 \text{ V}; I_{Dq} = 1620 \text{ mA}$ .  
 (1)  $f = 2110 \text{ MHz}$   
 (2)  $f = 2140 \text{ MHz}$   
 (3)  $f = 2170 \text{ MHz}$

**Fig 8. Power gain and drain efficiency as function of output power; typical values**



$V_{DS} = 28 \text{ V}; I_{Dq} = 1620 \text{ mA}$ .  
 (1)  $f = 2110 \text{ MHz}$   
 (2)  $f = 2140 \text{ MHz}$   
 (3)  $f = 2170 \text{ MHz}$

**Fig 9. Adjacent channel power ratio (5 MHz) as a function of output power; typical values**

8. Package outline

Earless flanged ceramic package; 2 leads

SOT502B

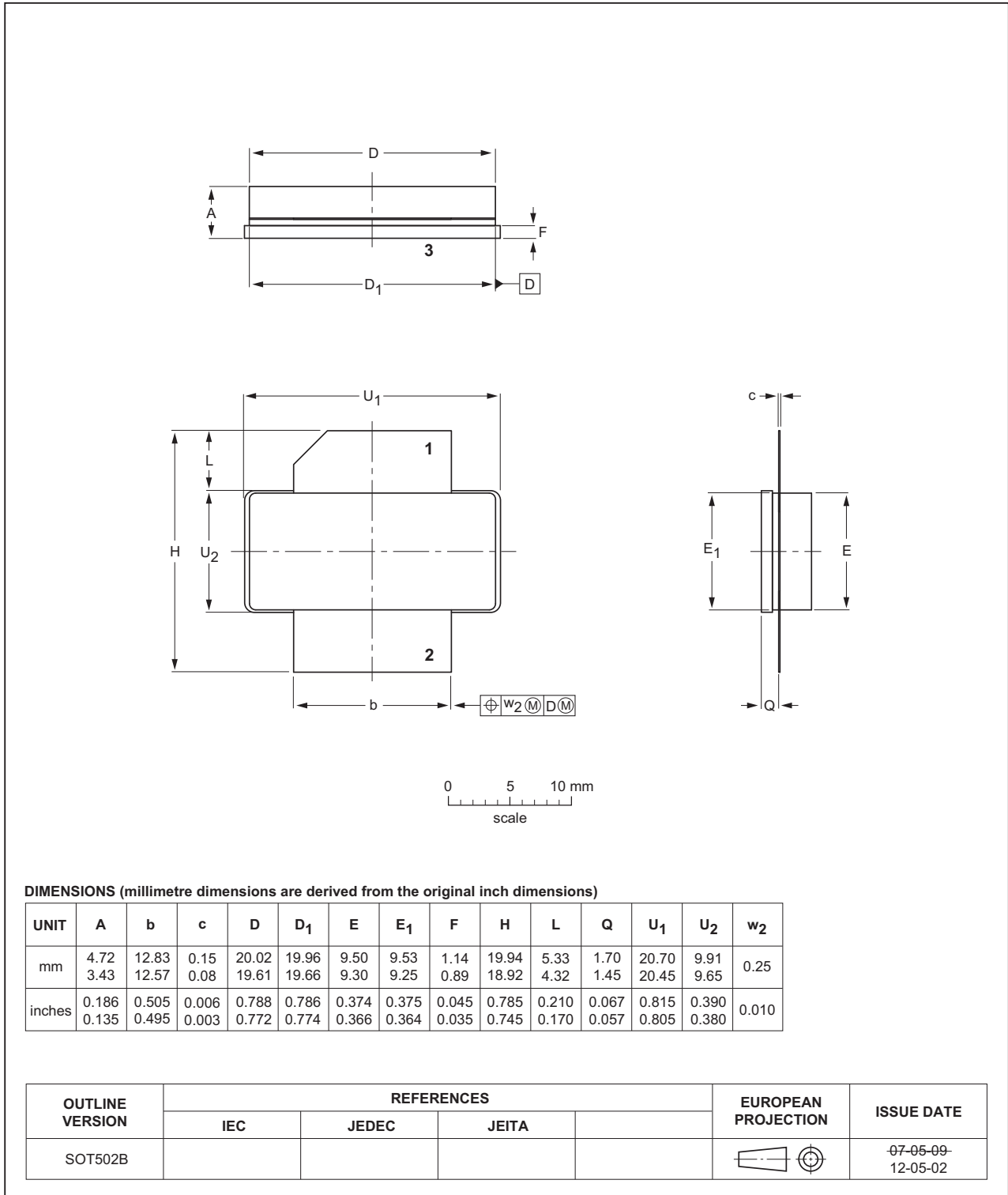


Fig 10. Package outline SOT502B



## 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
LDMOS	Laterally Diffused Metal Oxide Semiconductor
PAR	Peak-to-Average Ratio
SMD	Surface Mounted Device
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
BLF8G22LS-220# 4	20150901	Product data sheet		BLF8G22LS-220 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>			
BLF8G22LS-220 v.3	20130530	Product data sheet	-	BLF8G22LS-220 v.2
BLF8G22LS-220 v.2	20130415	Product data sheet	-	BLF8G22LS-220 v.1
BLF8G22LS-220 v.1	20121220	Objective 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.
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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