

# BLF6G20-45; BLF6G20S-45

Power LDMOS transistor

Rev. 4 — 1 September 2015

AMPLEON

Product data sheet

## 1. Product profile

### 1.1 General description

45 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	2.5	19.2	14	-50 <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

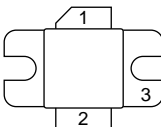
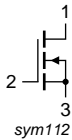
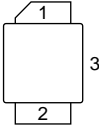
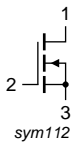
- Typical 2-carrier W-CDMA performance at frequencies of 1805 MHz and 1880 MHz, a supply voltage of 28 V and an I<sub>DQ</sub> of 360 mA:
  - ◆ Average output power = 2.5 W
  - ◆ Power gain = 19.2 dB (typ)
  - ◆ Efficiency = 14 %
  - ◆ ACPR = -50 dBc
- Easy power control
- Integrated ESD protection
- 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
BLF6G20-45 (SOT608A)			
1	drain		 sym112
2	gate		
3	source		
BLF6G20S-45 (SOT608B)			
1	drain		 sym112
2	gate		
3	source		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF6G20-45	-	flanged ceramic package; 2 mounting holes; 2 leads	SOT608A
BLF6G20S-45	-	ceramic earless flanged package; 2 leads	SOT608B

## 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		-	13	A
$T_{stg}$	storage temperature		-65	+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	$T_{case} = 80\text{ °C}$ ; $P_{L(AV)} = 12.5\text{ W}$	1.7	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	$V_{GS} = 0\text{ V}$ ; $I_D = 0.5\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$ ; $I_D = 72\text{ mA}$	1.4	1.9	2.4	V
$V_{GSq}$	gate-source quiescent voltage	$V_{DS} = 28\text{ V}$ ; $I_D = 300\text{ mA}$	1.70	2.30	2.79	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 28\text{ V}$	-	-	1.5	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $V_{DS} = 10\text{ V}$	-	12.5	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$	-	-	150	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}$ ; $I_D = 3.6\text{ A}$	-	5	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $I_D = 2.5\text{ A}$	-	0.2	-	$\Omega$

## 7. Application information

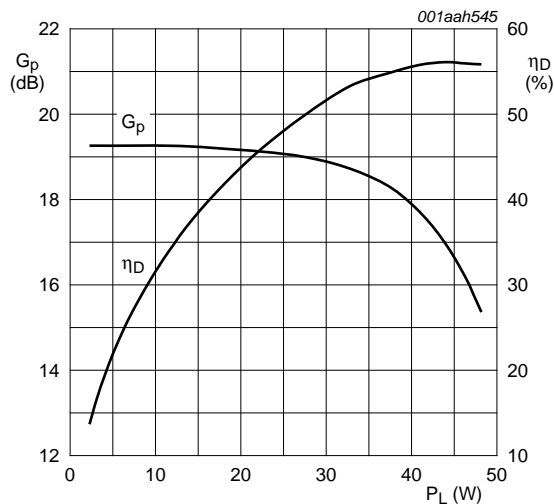
Table 7. Application information

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;  $f_1 = 1802.5\text{ MHz}$ ;  $f_2 = 1807.5\text{ MHz}$ ;  $f_3 = 1872.5\text{ MHz}$ ;  $f_4 = 1877.5\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 360\text{ mA}$ ;  $T_{case} = 25\text{ °C}$ ; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(AV)} = 2.5\text{ W}$	18.3	19.2	20.8	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 2.5\text{ W}$	-	-10	-6.5	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 2.5\text{ W}$	12	14	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 2.5\text{ W}$	-	-50	-46	dBc

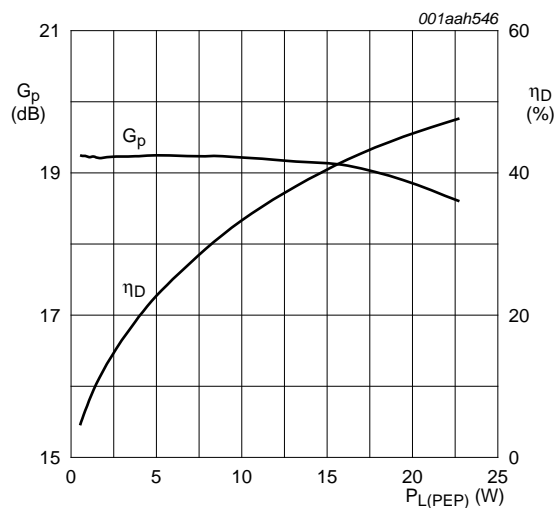
### 7.1 Ruggedness in class-AB operation

The BLF6G20-45 and BLF6G20S-45 are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 360\text{ mA}$ ;  $P_L = 45\text{ W}$  (CW);  $f = 1880\text{ MHz}$ .



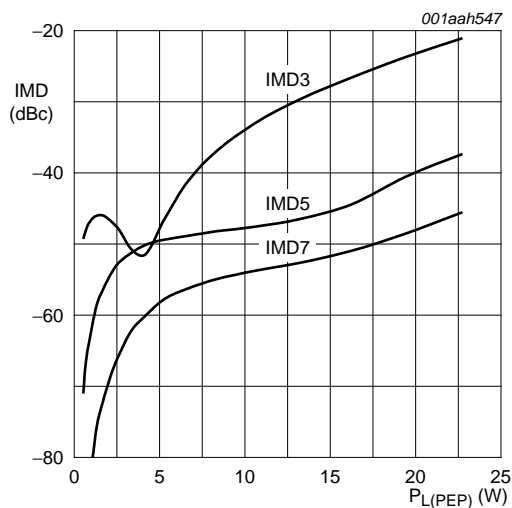
$V_{DS} = 28$  V;  $I_{DQ} = 360$  mA;  $f = 1842$  MHz.

**Fig 1. One-tone CW power gain and drain efficiency as functions of load power; typical values**



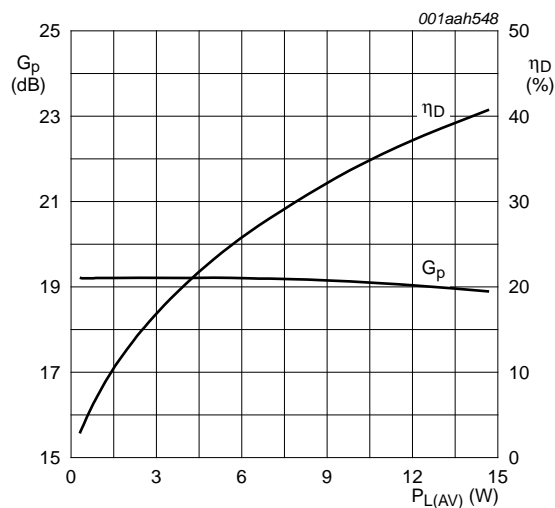
$V_{DS} = 28$  V;  $I_{DQ} = 360$  mA;  $f_1 = 1843$  MHz;  $f_2 = 1843.1$  MHz.

**Fig 2. Two-tone CW power gain and drain efficiency as functions of peak envelope load power; typical values**



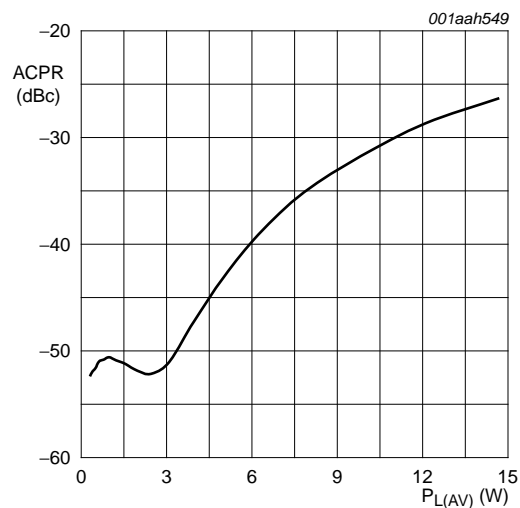
$V_{DS} = 28$  V;  $I_{DQ} = 360$  mA;  $f_1 = 1843$  MHz;  $f_2 = 1843.1$  MHz.

**Fig 3. Two-tone CW intermodulation distortion as a function of peak envelope load power; typical values**



$V_{DS} = 28$  V;  $I_{DQ} = 360$  mA;  $f_1 = 1840.5$  MHz;  $f_2 = 1845.5$  MHz; carrier spacing 5 MHz.

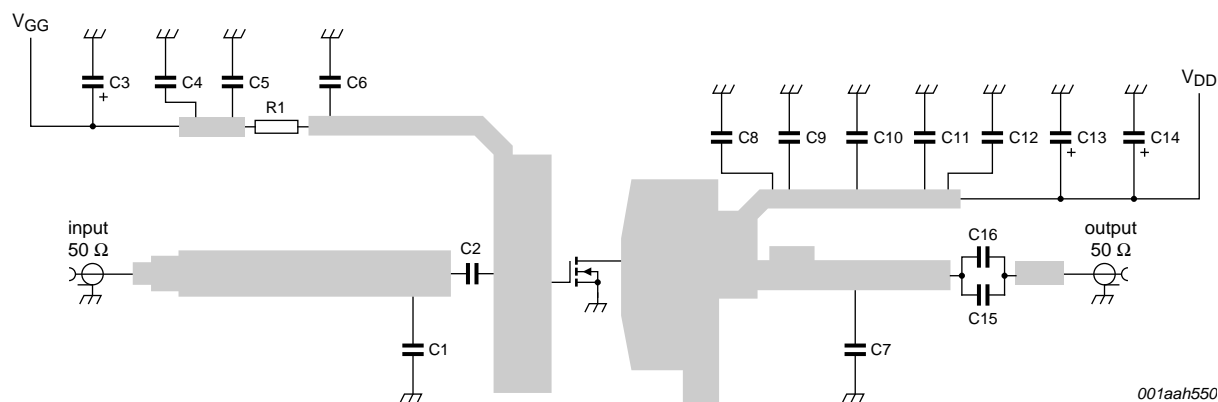
**Fig 4. 2-carrier W-CDMA power gain and drain efficiency as functions of average load power; typical values**



$V_{DS} = 28$  V;  $I_{DQ} = 360$  mA;  $f_1 = 1840.5$  MHz;  $f_2 = 1845.5$  MHz; carrier spacing 5 MHz.

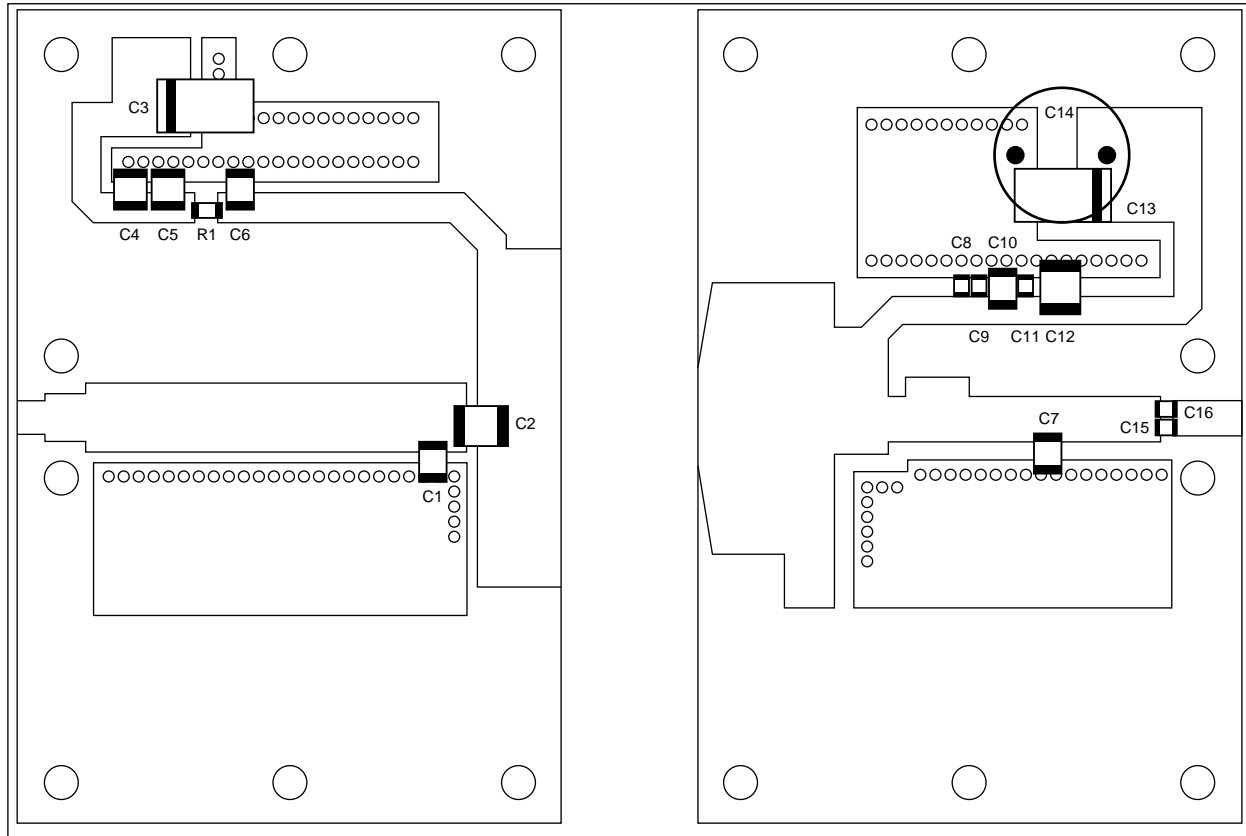
**Fig 5. 2-carrier W-CDMA adjacent power channel ratio as function of average load power; typical values**

## 8. Test information



See [Table 8](#) for list of components.

**Fig 6. Test circuit for operation at 1805 MHz and 1880 MHz**



001aah551

Striplines are on a double copper-clad Rogers Duroid 5880 Printed-Circuit Board (PCB) ( $\epsilon_r = 2.2$ ), thickness = 0.79 mm.

See [Table 8](#) for list of components.

**Fig 7. Component layout for 1805 MHz and 1880 MHz test circuit**

**Table 8. List of components**

For test circuit, see [Figure 6](#) and [Figure 7](#).

Component	Description	Value	Remarks
C1	multilayer ceramic chip capacitor	0.7 pF	[1]
C2	multilayer ceramic chip capacitor	3.9 pF	[1]
C3, C13	tantalum capacitor	10 $\mu$ F	
C4, C5	multilayer ceramic chip capacitor	1.5 $\mu$ F	
C6, C10	multilayer ceramic chip capacitor	10 pF	[1]
C7	multilayer ceramic chip capacitor	1.2 pF	[1]
C8, C9	multilayer ceramic chip capacitor	100 nF	
C11	multilayer ceramic chip capacitor	220 nF	
C12	multilayer ceramic chip capacitor	4.7 $\mu$ F	
C14	Philips electrolytic capacitor	220 $\mu$ F, 63 V	
C15, C16	multilayer ceramic chip capacitor	6.8 pF	[2]
R1	Philips chip resistor	5.6 $\Omega$	

[1] American technical ceramics type 100B or capacitor of same quality.

[2] American technical ceramics type 100A or capacitor of same quality.

9. Package outline

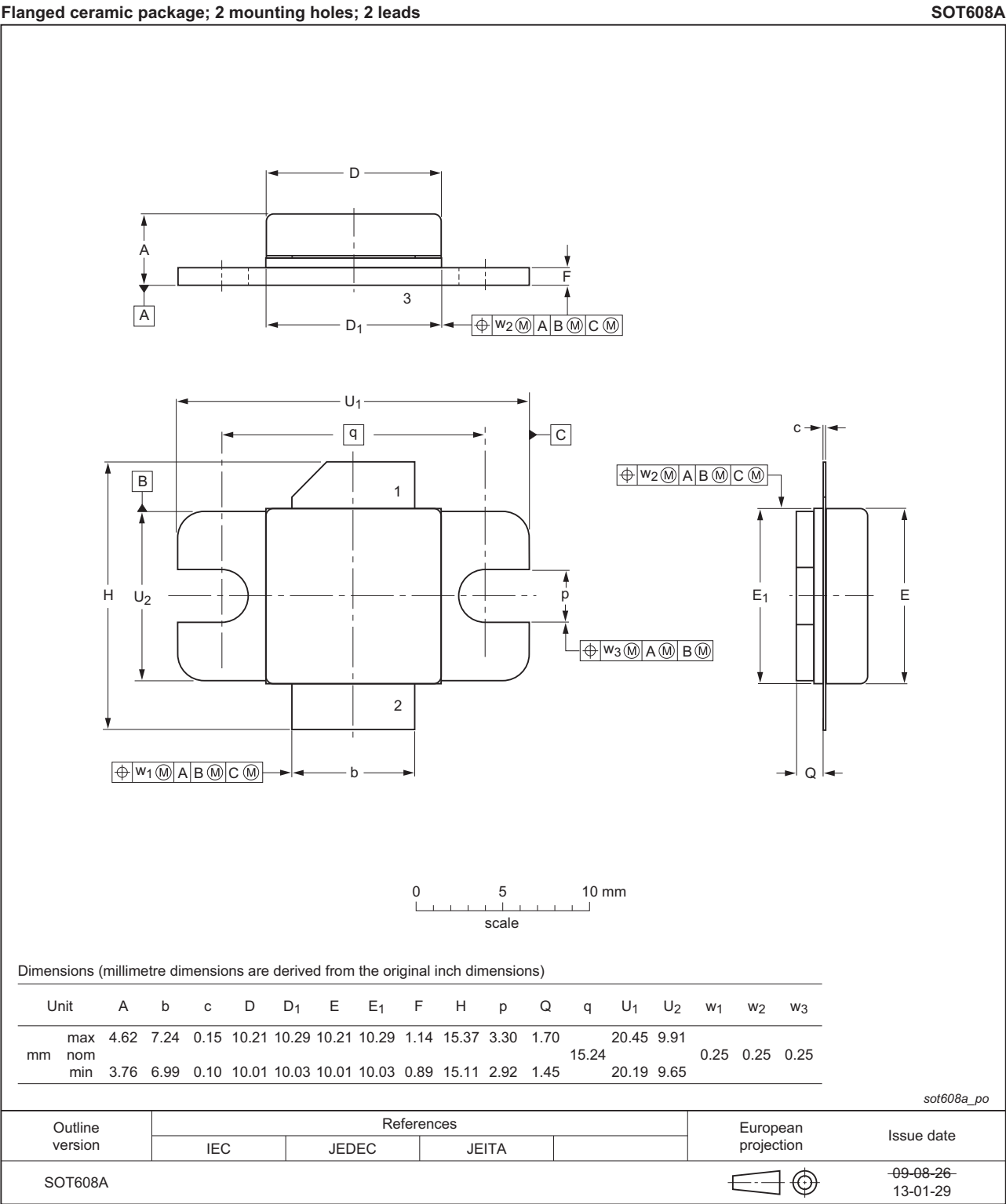
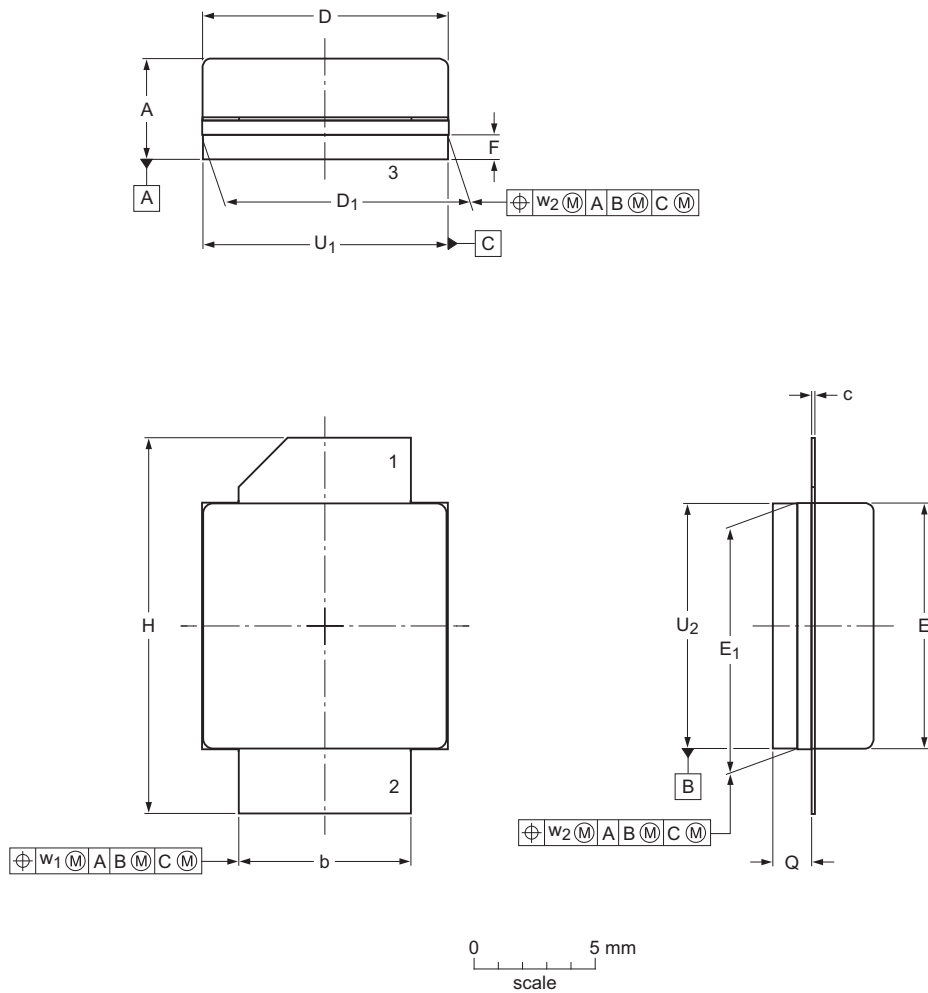


Fig 8. Package outline SOT608A



**Ceramic earless flanged package; 2 leads**


**SOT608B**



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

Unit		A	b	c	D	D <sub>1</sub>	E	E <sub>1</sub>	F	H	Q	U <sub>1</sub>	U <sub>2</sub>	w <sub>1</sub>	w <sub>2</sub>
mm	max	4.62	7.24	0.15	10.21	10.29	10.21	10.29	1.14	15.37	1.70	10.24	10.24	0.25	0.25
	min	3.76	6.99	0.10	10.01	10.03	10.01	10.03	0.89	15.11	1.45	9.98	9.98		

*sot608b\_po*

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT608B						<del>09-08-26</del> 13-01-29

**Fig 9. Package outline SOT608B**

## 10. Abbreviations

Table 9. Abbreviations

Acronym	Description
3GPP	Third Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
IMD	InterModulation Distortion
LDMOS	Laterally Diffused Metal Oxide Semiconductor
PAR	Peak-to-Average power Ratio
PDPCH	transmission Power of the Dedicated Physical CHannel
RF	Radio Frequency
VSWR	Voltage Standing Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

## 11. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G20-45_BLF6G20S-45#4	20150901	Product data sheet		BLF6G20-45_BLF6G20S-45_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>			
BLF6G20-45_BLF6G20S-45 v.3	20130311	Product data sheet		BLF6G20-45_BLF6G20S-45_2
BLF6G20-45_BLF6G20S-45_2	20080825	Product data sheet	-	BLF6G20-45_1
BLF6G20-45_1	20060220	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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