

# BLF7G20L-200; BLF7G20LS-200

Power LDMOS transistor

Rev. 4 — 22 July 2011

Product data sheet

## 1. Product profile

### 1.1 General description

200 W LDMOS power transistor for base station applications at frequencies from 1805 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.

Mode of operation	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	1620	28	55	18	33	-29 <a href="#">[1]</a>

[1] Test signal: 3GPP; test model 1; 64 PDPCH; PAR = 8.4 dB at 0.01 % probability on CCDF.

### 1.2 Features and benefits

- Excellent ruggedness
- High efficiency
- Low  $R_{th}$  providing excellent thermal stability
- Designed for broadband operation (1805 MHz to 1990 MHz)
- Lower output capacitance for improved performance in Doherty applications
- Designed for low-memory effects providing excellent digital pre-distortion capability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

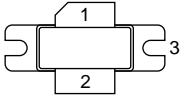
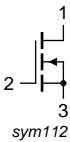
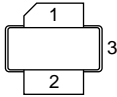
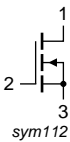
### 1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi-carrier applications in the 1805 MHz to 1990 MHz frequency range



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
<b>BLF7G20L-200 (SOT502A)</b>			
1	drain		 sym112
2	gate		
3	source		
<b>BLF7G20LS-200 (SOT502B)</b>			
1	drain		 sym112
2	gate		
3	source		

[1] Connected to flange

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF7G20L-200	-	flanged LDMOST ceramic package; 2 mounting holes; 2 leads	SOT502A
BLF7G20LS-200	-	earless flanged LDMOST 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		-	225	°C

## 5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}; P_L = 55\text{ W}; V_{DS} = 28\text{ V}; I_{Dq} = 1620\text{ mA}$	0.27	K/W

## 6. Characteristics

**Table 6. 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	$V_{GS} = 0\text{ V}; I_D = 1.5\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 150\text{ mA}$	1.5	1.9	2.3	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	4.2	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	42	50.6	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-420	2.44	420	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 7.5\text{ A}$	-	18.6	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 5.25\text{ A}$	-	0.093	-	$\Omega$

## 7. Test information

**Table 7. Functional test information**

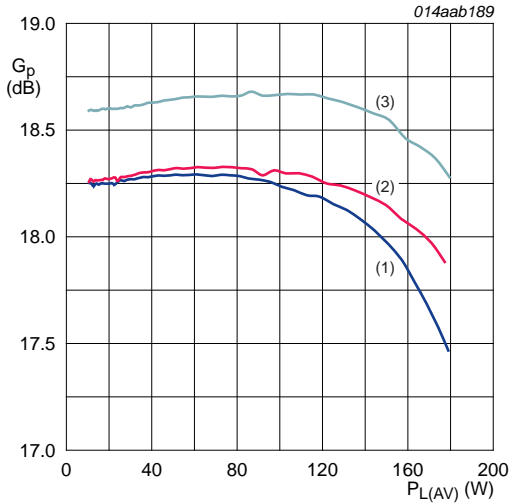
Mode of operation: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on the CCDF; 3GPP test model 1; 64 PDPCH;  $f_1 = 1807.5\text{ MHz}; f_2 = 1812.5\text{ MHz}; f_3 = 1872.5\text{ MHz}; f_4 = 1877.5\text{ MHz};$  RF performance at  $V_{DS} = 28\text{ V}; I_{Dq} = 1620\text{ mA}; T_{case} = 25\text{ }^\circ\text{C};$  unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{L(AV)}$	average output power		-	55	-	W
$G_p$	power gain	$P_{L(AV)} = 55\text{ W}$	17	18	-	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 55\text{ W}$	-	-	-10	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 55\text{ W}$	30	33	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 55\text{ W}$	-	-29	-	dBc

### 7.1 Ruggedness in class-AB operation

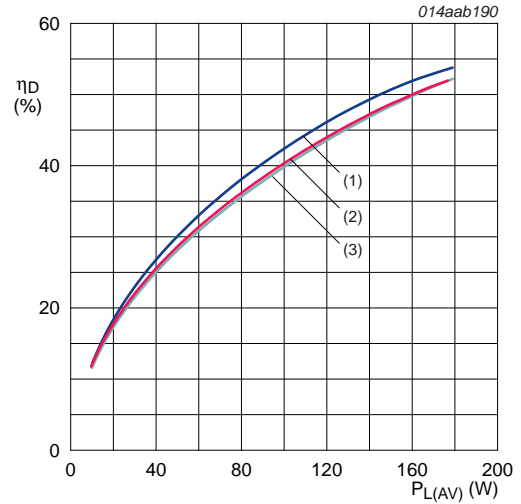
The BLF7G20L-200 and BLF7G20LS-200 are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 30\text{ V}; I_{Dq} = 1620\text{ mA}; P_L = 185\text{ W (CW)}; f = 1805\text{ MHz to }1880\text{ MHz}.$

7.2 1 Tone CW



$V_{DS} = 28\text{ V}; I_{Dq} = 1620\text{ mA}$ .  
 (1)  $f = 1805\text{ MHz}$   
 (2)  $f = 1845\text{ MHz}$   
 (3)  $f = 1880\text{ MHz}$

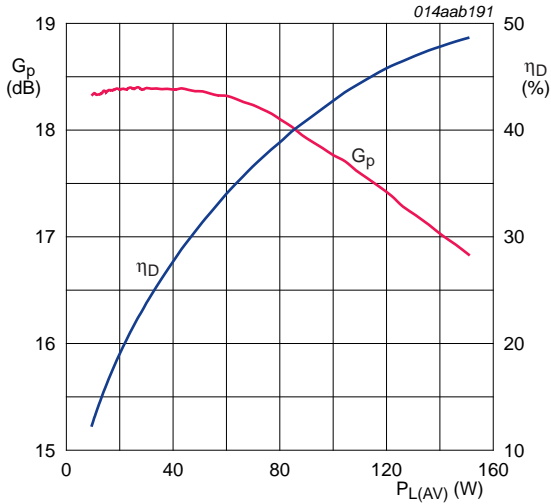
**Fig 1. Power gain as a function of average output power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1620\text{ mA}$ .  
 (1)  $f = 1805\text{ MHz}$   
 (2)  $f = 1845\text{ MHz}$   
 (3)  $f = 1880\text{ MHz}$

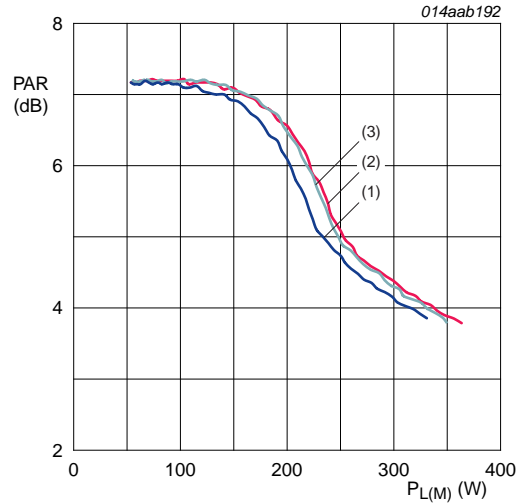
**Fig 2. Drain efficiency as a function of average output power; typical values**

7.3 1-carrier W-CDMA



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1620\text{ mA}$ ;  $f = 1845\text{ MHz}$ ;  $PAR = 7.2\text{ dB}$  at 0.01 % probability on the CCDF.

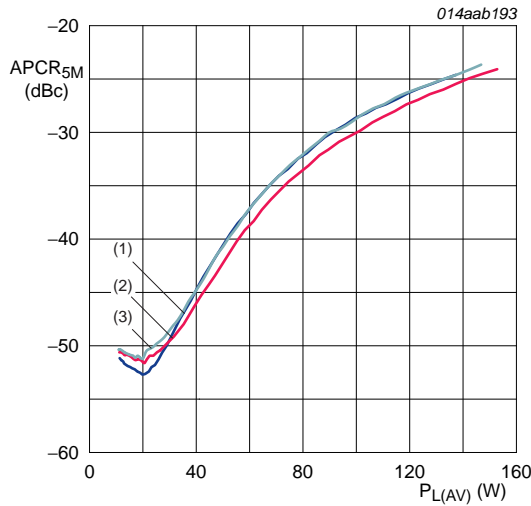
Fig 3. Power gain and drain efficiency as functions of average output power; typical values



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1620\text{ mA}$ ;  $PAR = 7.2\text{ dB}$  at 0.01 % probability on the CCDF.

- (1)  $f = 1805\text{ MHz}$
- (2)  $f = 1845\text{ MHz}$
- (3)  $f = 1880\text{ MHz}$

Fig 4. Peak-to-average power ratio as a function of peak power; typical values

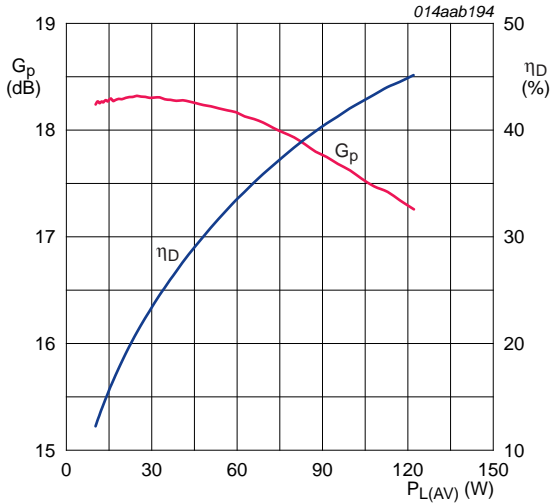


$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1620\text{ mA}$ ;  $PAR = 7.2\text{ dB}$  at 0.01 % probability on the CCDF.

- (1)  $f = 1805\text{ MHz}$
- (2)  $f = 1845\text{ MHz}$
- (3)  $f = 1880\text{ MHz}$

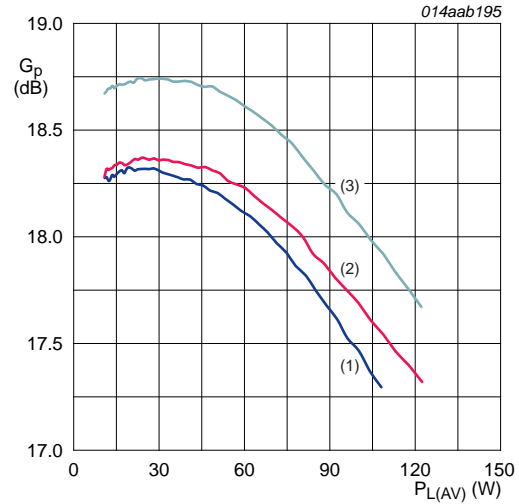
Fig 5. Adjacent power channel ratio (5 MHz) as function of average output power; typical values

7.4 2-carrier W-CDMA



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1620\text{ mA}$ ; channel spacing = 5 MHz; PAR = 8.4 dB at 0.01 % probability on the CCDF.

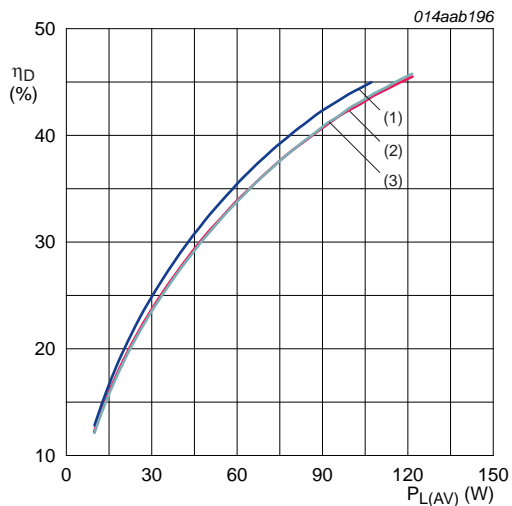
Fig 6. Power gain and drain efficiency as functions of average output power; typical values



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1620\text{ mA}$ ; channel spacing = 5 MHz; PAR = 8.4 dB at 0.01 % probability on the CCDF.

- (1) f = 1805 MHz
- (2) f = 1845 MHz
- (3) f = 1880 MHz

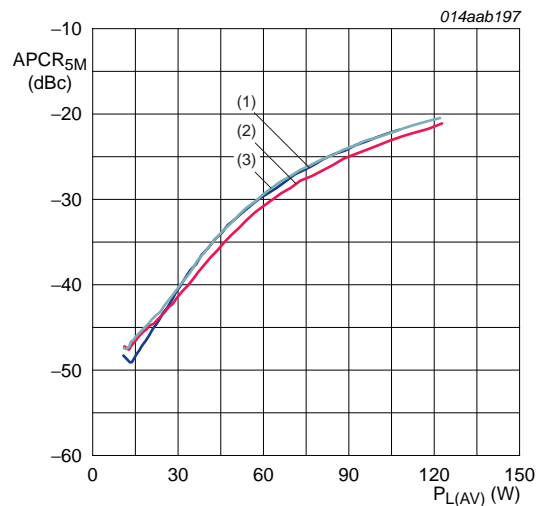
Fig 7. Power gain as a function of average output power; typical values



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1620\text{ mA}$ ; channel spacing = 5 MHz; PAR = 8.4 dB at 0.01 % probability on the CCDF.

- (1) f = 1805 MHz
- (2) f = 1845 MHz
- (3) f = 1880 MHz

Fig 8. Drain efficiency as a function of average output power; typical values

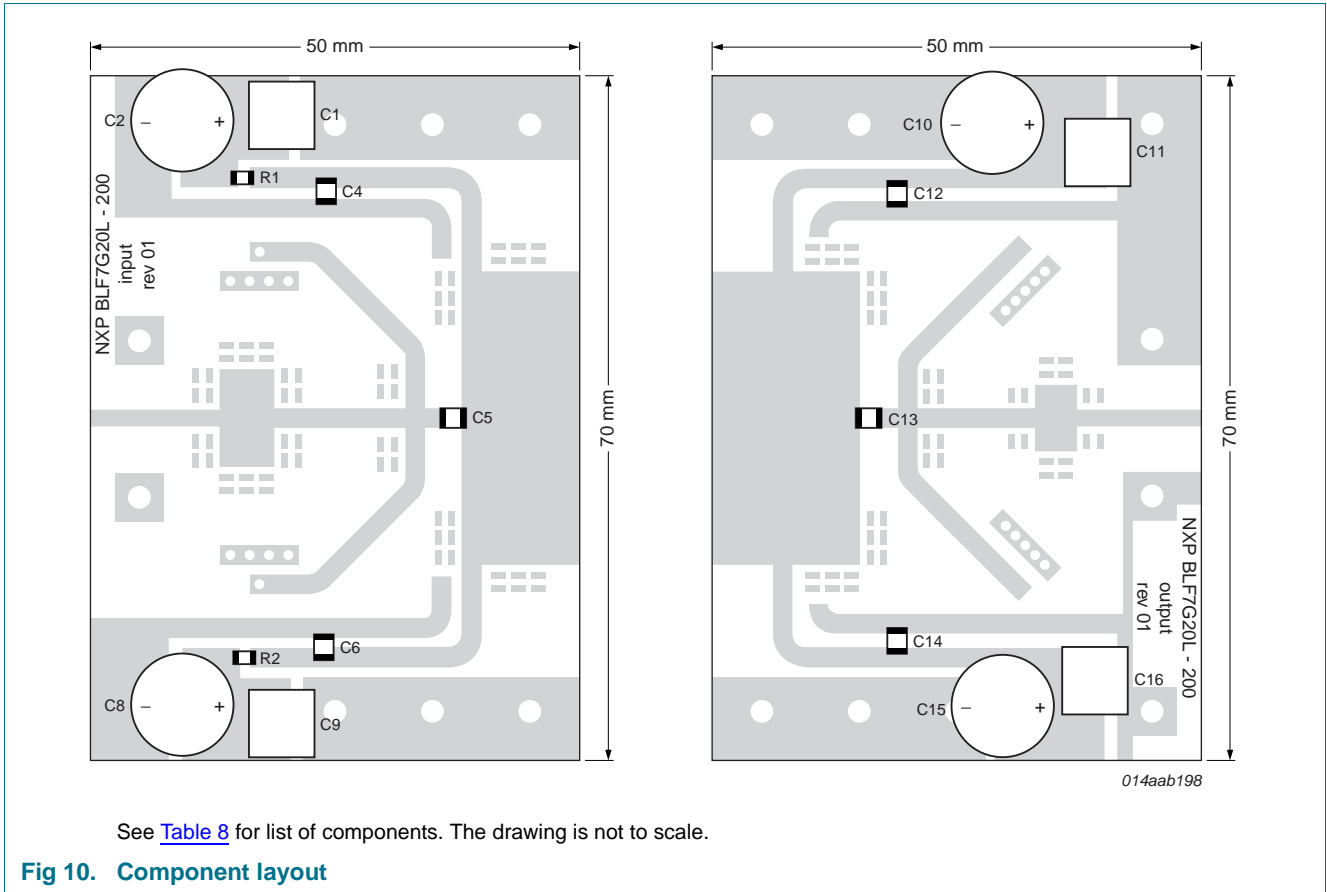


$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1620\text{ mA}$ ; channel spacing = 5 MHz; PAR = 8.4 dB at 0.01 % probability on the CCDF.

- (1) f = 1805 MHz
- (2) f = 1845 MHz
- (3) f = 1880 MHz

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

## 7.5 Test circuit



**Table 8. List of components**

See [Figure 10](#) for component layout.

Component	Description	Value	Remarks
C1, C9, C11, C16	multilayer ceramic chip capacitor	10 $\mu$ F	TDK
C4, C6	multilayer ceramic chip capacitor	68 pF	ATC800B
C5	multilayer ceramic chip capacitor	2.0 pF	ATC800B
C12, C14	multilayer ceramic chip capacitor	100 pF	ATC800B
C13	multilayer ceramic chip capacitor	3.3 pF	ATC800B
C2, C8, C10, C15	electrolytic capacitor	470 $\mu$ F; 63 V	
R1, R2	chip resistor	10 $\Omega$	Philips 0603

8. Package outline

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads

SOT502A

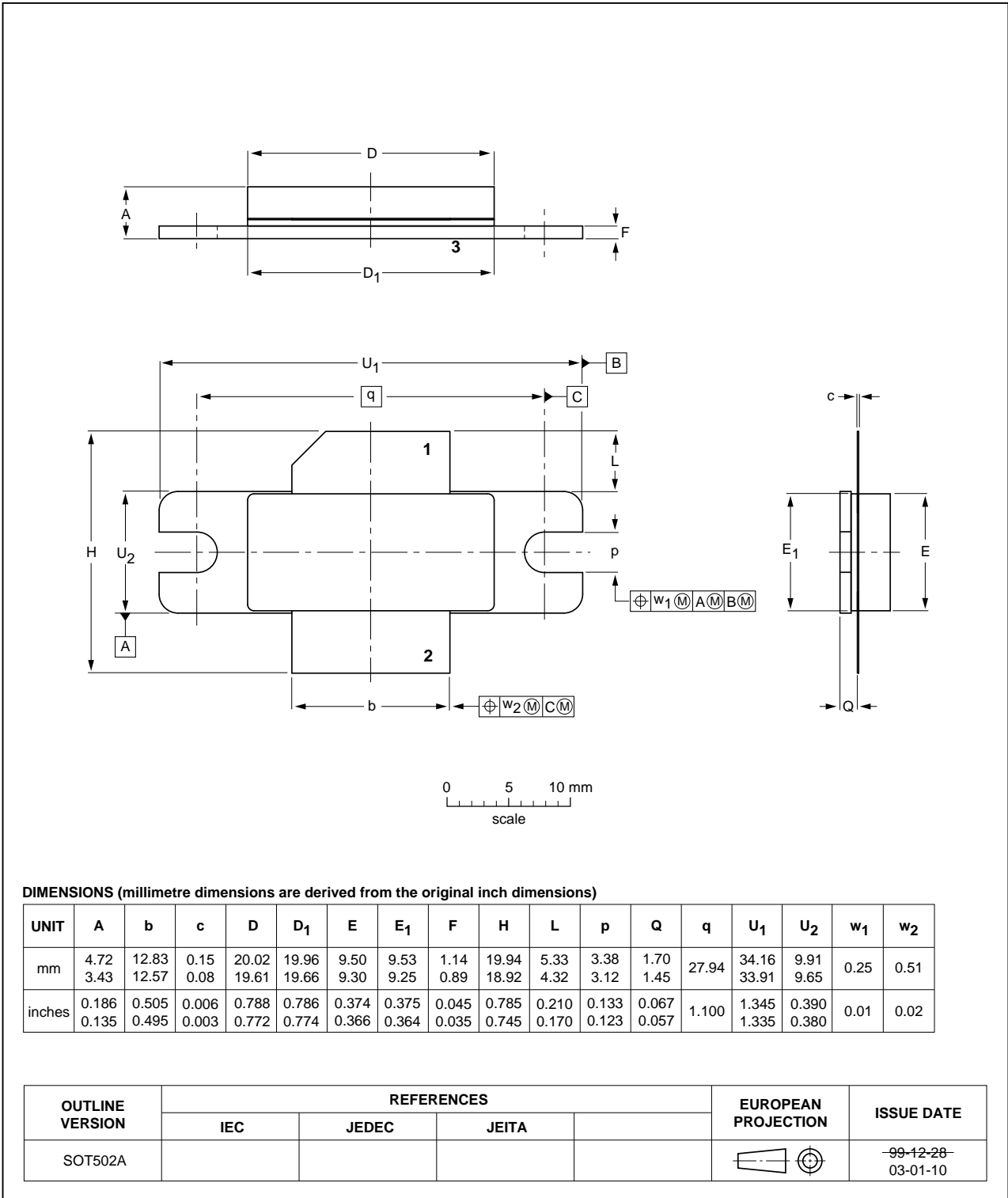


Fig 11. Package outline SOT502A



Earless flanged LDMOST ceramic package; 2 leads

SOT502B

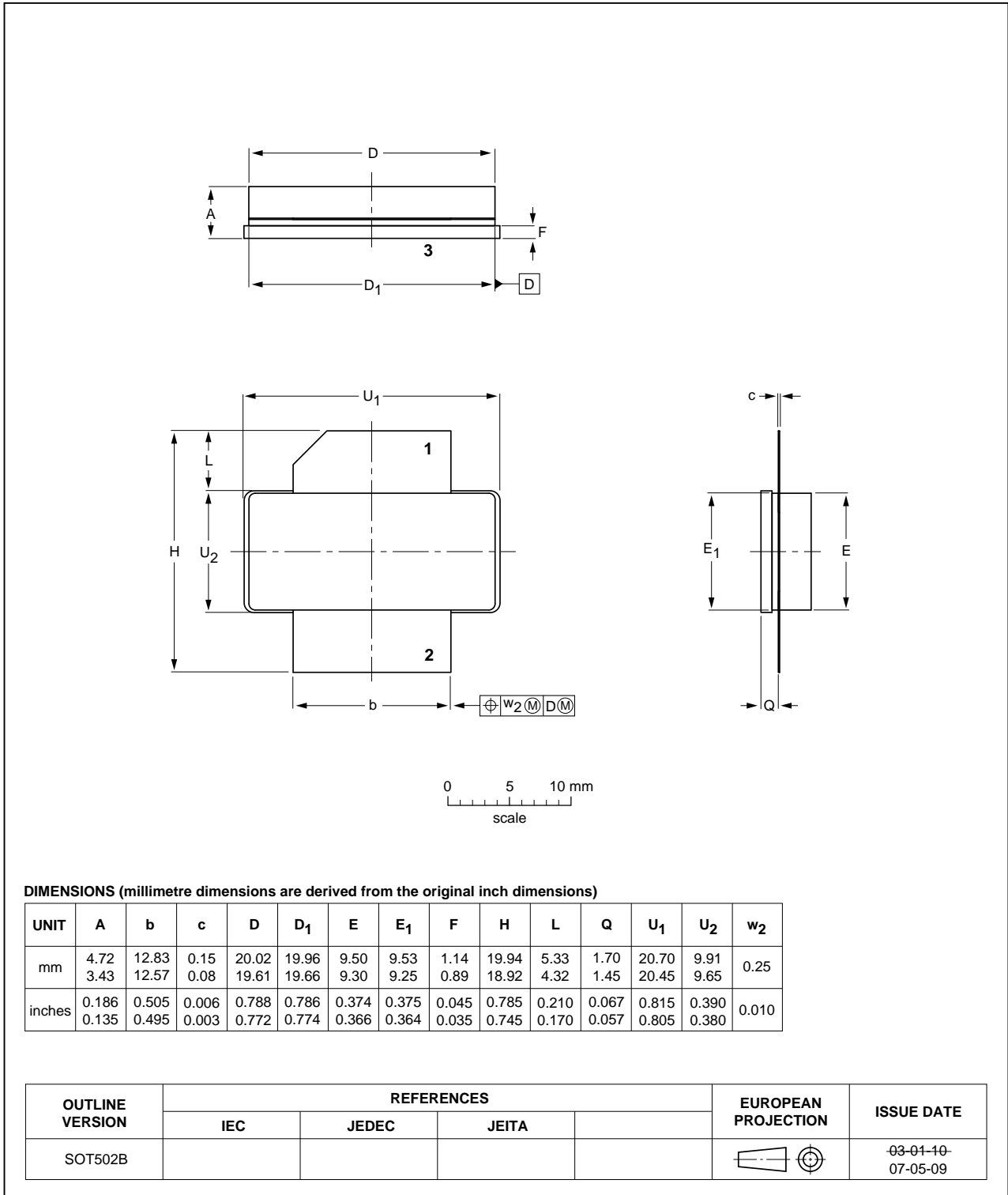


Fig 12. Package outline SOT502B

## 9. Abbreviations

**Table 9. Abbreviations**

Acronym	Description
3GPP	Third 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
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

## 10. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF7G20L-200_7G20LS-200 v.4	20110722	Product data sheet	-	BLF7G20L-200_7G20LS-200 v.3
Modifications:	<ul style="list-style-type: none"> <li>The status of this document has been changed to Product data sheet.</li> </ul>			
BLF7G20L-200_7G20LS-200 v.3	20110301	Preliminary data sheet	-	BLF7G20L-200_7G20LS-200 v.2
BLF7G20L-200_7G20LS-200 v.2	20100827	Preliminary data sheet	-	BLF7G20L-200_7G20LS-200 v.1
BLF7G20L-200_7G20LS-200 v.1	20100603	Objective data sheet	-	-

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

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