

# BLF6G22-180RN; BLF6G22LS-180RN

Power LDMOS transistor

Rev. 01 — 20 November 2008

Product data sheet

## 1. Product profile

### 1.1 General description

180 W LDMOS power transistor for base station applications at frequencies from 2000 MHz to 2200 MHz.

**Table 1. Typical performance**

Typical RF performance at  $T_{case} = 25\text{ }^{\circ}\text{C}$  in a class-AB production test circuit.

Mode of operation	f (MHz)	$V_{DS}$ (V)	$P_{L(AV)}$ (W)	$G_p$ (dB)	$\eta_D$ (%)	IMD3 (dBc)	ACPR (dBc)
2-carrier W-CDMA	2110 to 2170	30	40	16.0	25	-38 <sup>[1]</sup>	-42 <sup>[1]</sup>

[1] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 7 dB at 0.01 % probability on CCDF per carrier; carrier spacing 10 MHz.

#### CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

### 1.2 Features

- Typical 2-carrier W-CDMA performance at frequencies of 2110 MHz and 2170 MHz, a supply voltage of 30 V and an  $I_{DQ}$  of 1400 mA:
  - ◆ Average output power = 40 W
  - ◆ Power gain = 16.0 dB
  - ◆ Efficiency = 25 %
  - ◆ IMD3 = -38 dBc
  - ◆ ACPR = -42 dBc
- Easy power control
- Integrated ESD protection
- Enhanced ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (2000 MHz to 2200 MHz)
- Internally matched for ease of use

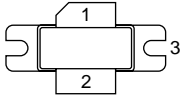
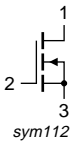
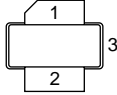
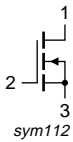
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

**1.3 Applications**

- RF power amplifiers for GSM, GSM EDGE, W-CDMA and CDMA base stations and multi carrier applications in the 2000 MHz to 2200 MHz frequency range

**2. Pinning information**

**Table 2. Pinning**

Pin	Description	Simplified outline	Graphic symbol
<b>BLF6G22-180RN (SOT502A)</b>			
1	drain		 sym112
2	gate		
3	source		
<b>BLF6G22LS-180RN (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
BLF6G22-180RN	-	flanged LDMOST ceramic package; 2 mounting holes; 2 leads	SOT502A
BLF6G22LS-180RN	-	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
$I_D$	drain current		-	49	A
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	225	°C

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Type	Typ	Unit
R <sub>th(j-case)</sub>	thermal resistance from junction to case	T <sub>case</sub> = 80 °C; P <sub>L</sub> = 40 W	BLF6G22-180RN	0.50	K/W
			BLF6G22LS-180RN	0.37	K/W

## 6. Characteristics

**Table 6. Characteristics**

T<sub>j</sub> = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>(BR)DSS</sub>	drain-source breakdown voltage	V <sub>GS</sub> = 0 V; I <sub>D</sub> = 0.9 mA	65	-	-	V
V <sub>GS(th)</sub>	gate-source threshold voltage	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 270 mA	1.4	2.0	2.4	V
V <sub>GSq</sub>	gate-source quiescent voltage	V <sub>DS</sub> = 28 V; I <sub>D</sub> = 1.62 A	1.5	2.0	2.5	V
I <sub>DSS</sub>	drain leakage current	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 28 V	-	-	5	μA
I <sub>DSX</sub>	drain cut-off current	V <sub>GS</sub> = V <sub>GS(th)</sub> + 3.75 V; V <sub>DS</sub> = 10 V	40	45	-	A
I <sub>GSS</sub>	gate leakage current	V <sub>GS</sub> = 13 V; V <sub>DS</sub> = 0 V	-	-	450	nA
g <sub>fs</sub>	forward transconductance	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 13.5 A	-	19.5	-	S
R <sub>DS(on)</sub>	drain-source on-state resistance	V <sub>GS</sub> = V <sub>GS(th)</sub> + 3.75 V; I <sub>D</sub> = 9.45 A	-	0.06	-	Ω
C <sub>rs</sub>	feedback capacitance	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 30 V; f = 1 MHz	-	3.3	-	pF

## 7. Application information

**Table 7. Application information**

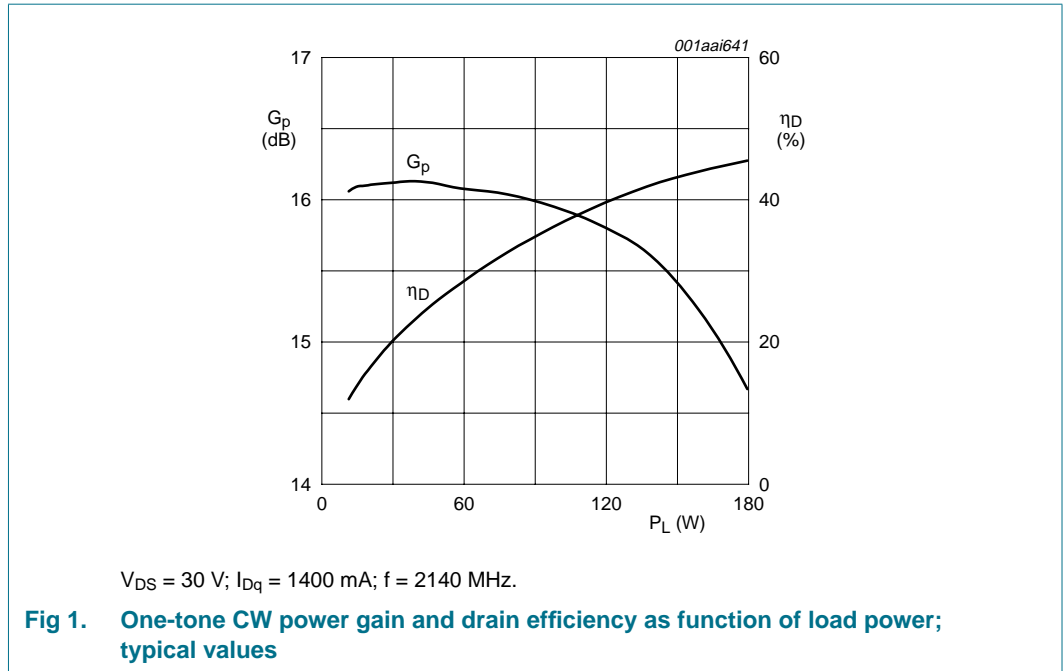
Mode of operation: 2-carrier W-CDMA; PAR = 7 dB at 0.01 % probability on the CCDF; 3GPP test model 1; 1-64 PDPCH; f<sub>1</sub> = 2112.5 MHz; f<sub>2</sub> = 2122.5 MHz; f<sub>3</sub> = 2157.5 MHz; f<sub>4</sub> = 2167.5 MHz; RF performance at V<sub>DS</sub> = 30 V; I<sub>Dq</sub> = 1400 mA; T<sub>case</sub> = 25 °C; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
P <sub>L(AV)</sub>	average output power		-	40	-	W
G <sub>p</sub>	power gain	P <sub>L(AV)</sub> = 40 W	15.0	16.0	-	dB
RL <sub>in</sub>	input return loss	P <sub>L(AV)</sub> = 40 W	-	-11	-8	dB
η <sub>D</sub>	drain efficiency	P <sub>L(AV)</sub> = 40 W	22	25	-	%
IMD3	third order intermodulation distortion	P <sub>L(AV)</sub> = 40 W	-	-38	-34.5	dBc
ACPR	adjacent channel power ratio	P <sub>L(AV)</sub> = 40 W	-	-42	-39	dBc

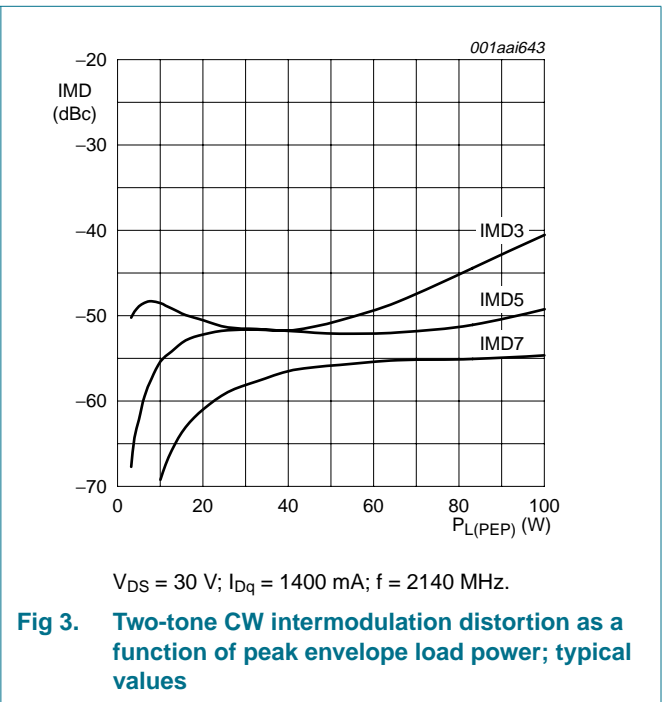
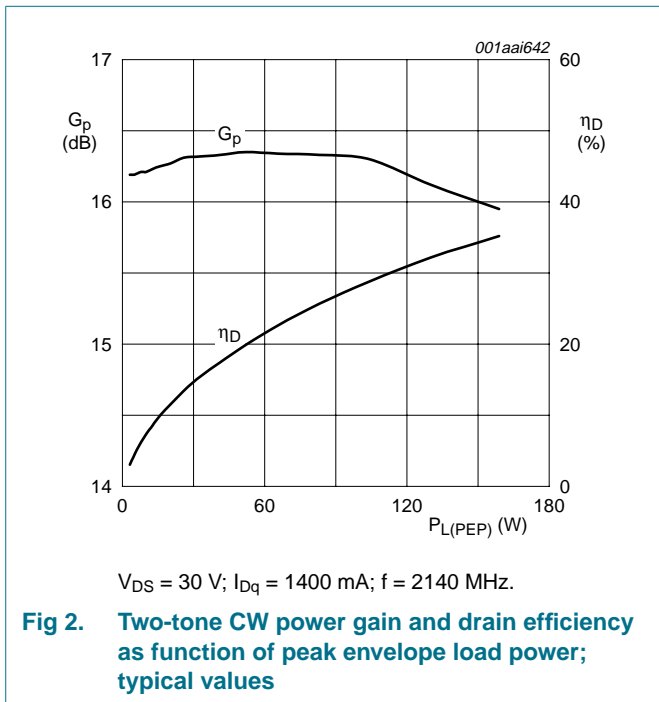
### 7.1 Ruggedness in class-AB operation

The BLF6G22-180RN and BLF6G22LS-180RN are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V<sub>DS</sub> = 30 V; I<sub>Dq</sub> = 1400 mA; P<sub>L</sub> = 180 W (CW); f = 2170 MHz.

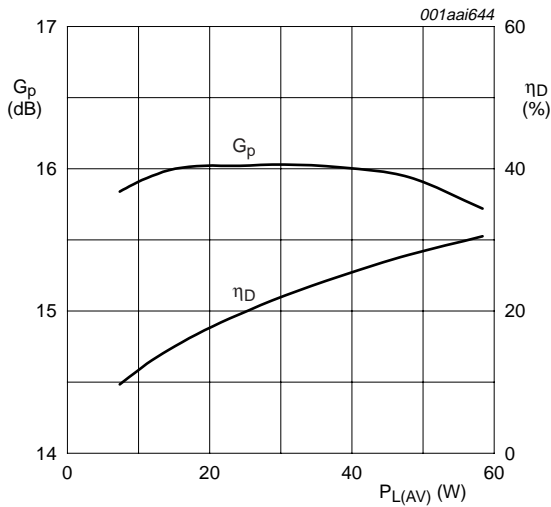
**7.2 One-tone CW**



**7.3 Two-tone CW**

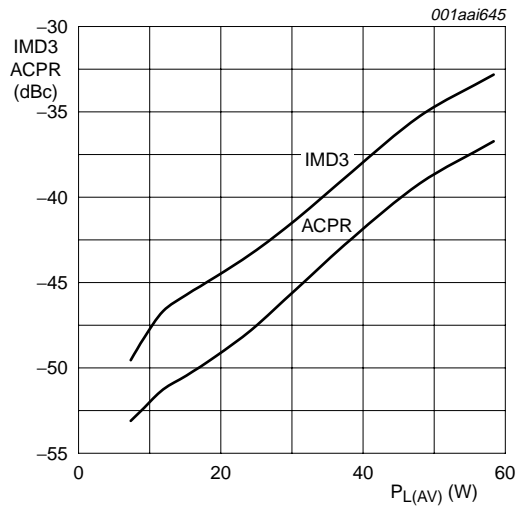


**7.4 2-carrier W-CDMA**



$V_{DS} = 30\text{ V}$ ;  $I_{Dq} = 1400\text{ mA}$ ;  $f = 2140\text{ MHz}$  ( $\pm 5\text{ MHz}$ );  
carrier spacing 10 MHz.

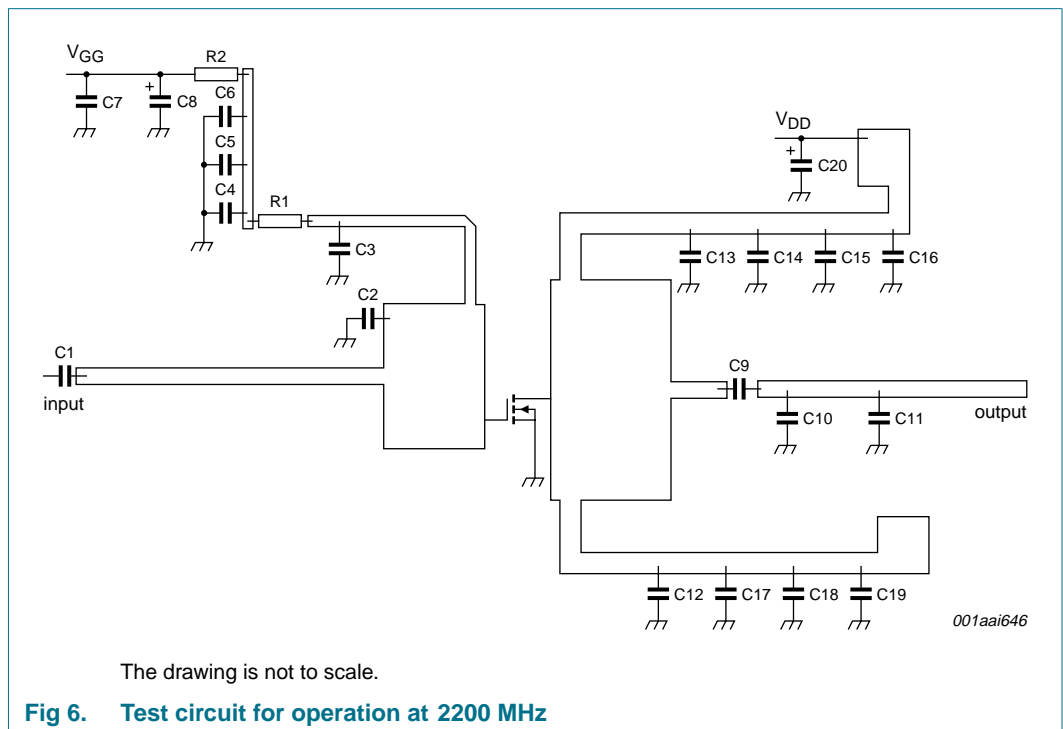
**Fig 4. 2-carrier W-CDMA power gain and drain efficiency as function of average load power; typical values**



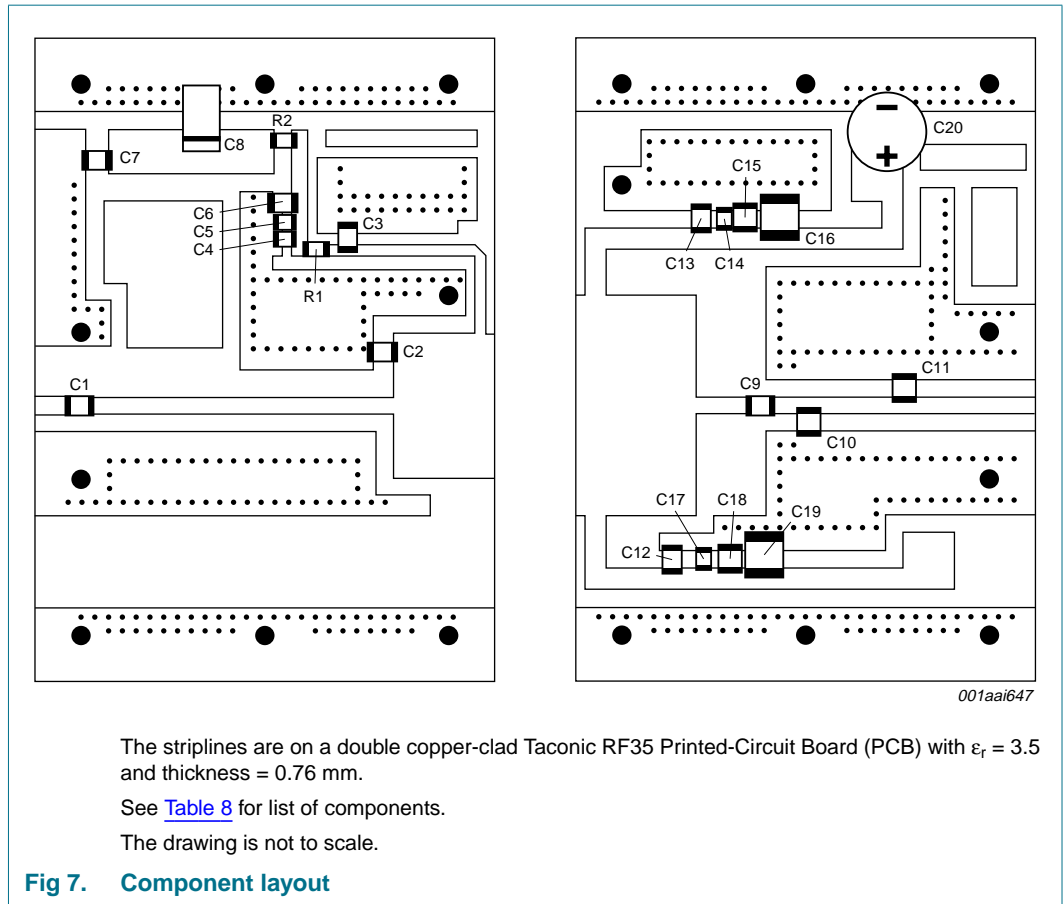
$V_{DS} = 30\text{ V}$ ;  $I_{Dq} = 1400\text{ mA}$ ;  $f = 2140\text{ MHz}$  ( $\pm 5\text{ MHz}$ );  
carrier spacing 10 MHz.

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

**8. Test information**



**Fig 6. Test circuit for operation at 2200 MHz**



**Table 8. List of components (see [Figure 6](#) and [Figure 7](#))**

The Printed-Circuit Board (PCB) used is a double copper-clad Taconic RF35 with  $\epsilon_r = 3.5$  and thickness = 0.76 mm.

Component	Description	Value	Remarks
C1, C3, C12, C13	multilayer ceramic chip capacitor	13 pF	[1] ATC 100B or capacitor of same quality
C2	multilayer ceramic chip capacitor	1.4 pF	[1] ATC 100B or capacitor of same quality
C4, C5, C14, C17	multilayer ceramic chip capacitor	220 nF	Vishay or capacitor of same quality
C6, C7	multilayer ceramic chip capacitor	100 nF	Vishay or capacitor of same quality
C8	multilayer ceramic chip capacitor	10 $\mu$ F	
C9	multilayer ceramic chip capacitor	12 pF	[1] ATC 100B or capacitor of same quality
C10	multilayer ceramic chip capacitor	1.1 pF	[1] ATC 100B or capacitor of same quality
C11	multilayer ceramic chip capacitor	0.7 pF	[1] ATC 100B or capacitor of same quality
C15, C18	multilayer ceramic chip capacitor	1.5 $\mu$ F	
C16, C19	multilayer ceramic chip capacitor	10 $\mu$ F; 50 V	TDK or capacitor of same quality
C20	electrolytic capacitor	220 $\mu$ F; 63 V	
L1	ferrite SMD bead	-	Ferroxcube BDS 3/3/4.6-4S2 or equivalent
R1	SMD resistor	2.7 $\Omega$	
R2, R3	SMD resistor	6.8 $\Omega$	

[1] Solder vertically.

9. Package outline

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads

SOT502A

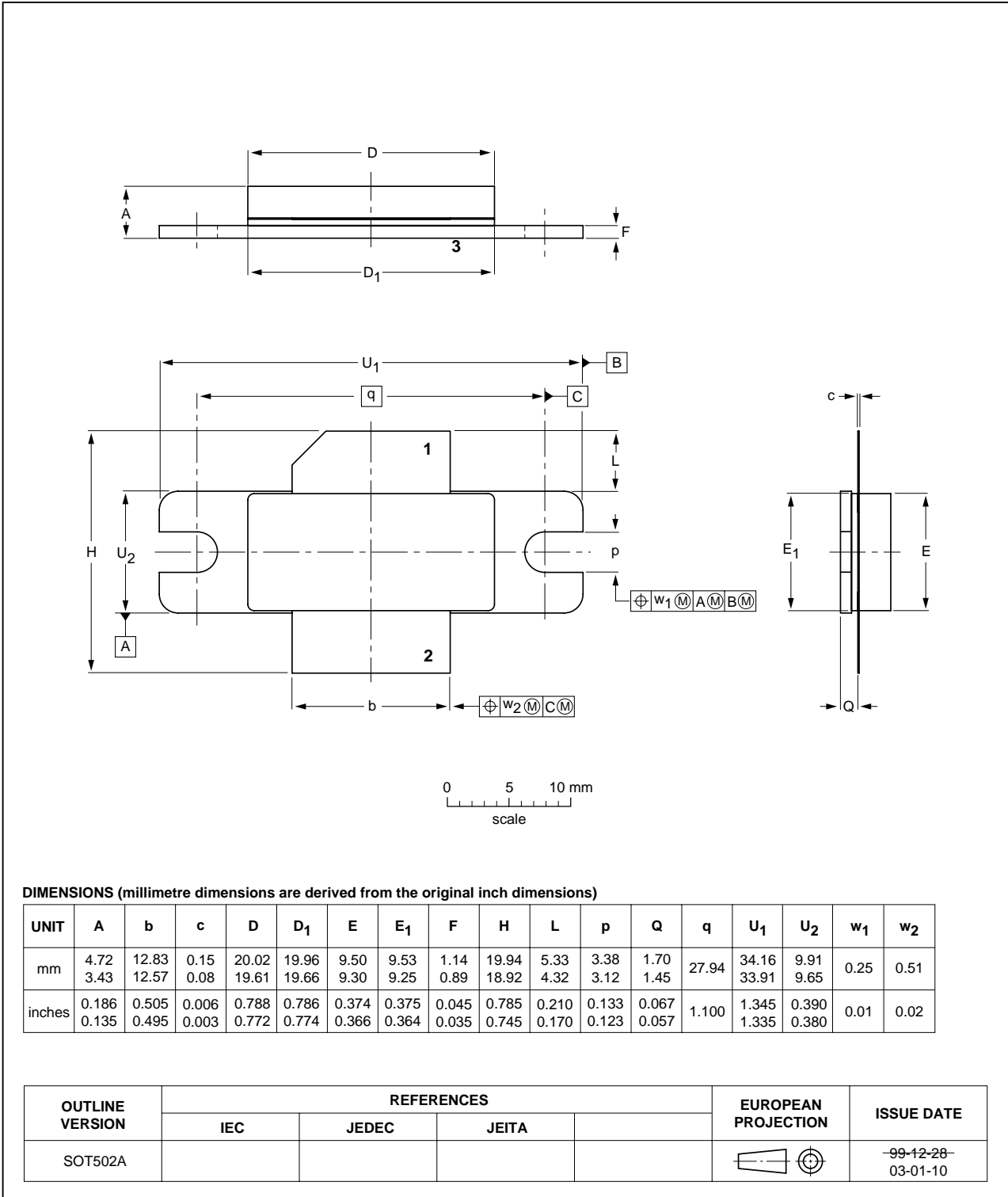


Fig 8. Package outline SOT502A

Earless flanged LDMOST ceramic package; 2 leads

SOT502B

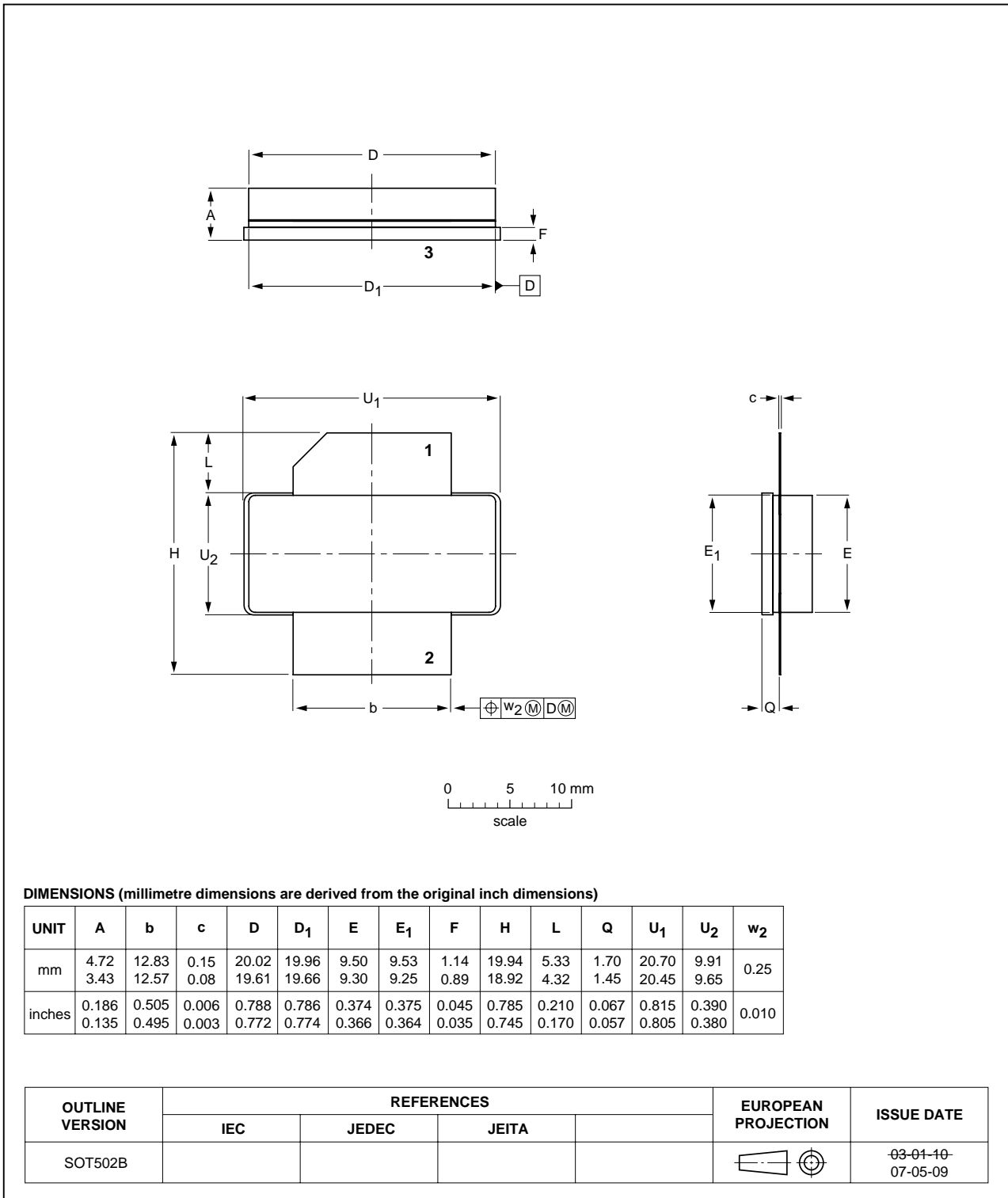


Fig 9. Package outline SOT502B



## 10. Abbreviations

**Table 9. Abbreviations**

Acronym	Description
3GPP	Third Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CDMA	Code Division Multiple Access
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
EDGE	Enhanced Data rates for GSM Evolution
GSM	Global System for Mobile communications
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

## 11. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G22-180RN_22LS-180RN_1	20081120	Product 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.
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Date of release: 20 November 2008

Document identifier: BLF6G22-180RN\_22LS-180RN\_1