

# BLF6G20-110; BLF6G20LS-110

Power LDMOS transistor

Rev. 03 — 13 January 2009

Product data sheet

## 1. Product profile

### 1.1 General description

110 W LDMOS power transistor for base station applications at frequencies from 1800 MHz to 2000 MHz.

**Table 1. Typical performance**

*RF performance at  $T_{case} = 25\text{ }^{\circ}\text{C}$  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)	$\eta_D$ (%)	IMD3 (dBc)	ACPR (dBc)
2-carrier W-CDMA	1930 to 1990	28	25	19	32	-34 <sup>[1]</sup>	-38 <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

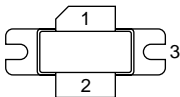
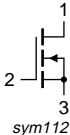
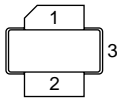
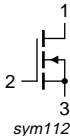
- Typical 2-carrier W-CDMA performance at frequencies of 1930 MHz and 1990 MHz, a supply voltage of 28 V and an I<sub>DQ</sub> of 900 mA:
  - ◆ Average output power = 25 W
  - ◆ Power gain = 19 dB
  - ◆ Efficiency = 32 %
  - ◆ IMD3 = -34 dBc
  - ◆ ACPR = -38 dBc
- Easy power control
- Integrated ESD 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 GSM, GSM EDGE, W-CDMA and CDMA base stations and multicarrier applications in the 1800 MHz to 2000 MHz frequency range

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
<b>BLF6G20-110 (SOT502A)</b>			
1	drain		
2	gate		
3	source <a href="#">[1]</a>		
<b>BLF6G20LS-110 (SOT502B)</b>			
1	drain		
2	gate		
3	source <a href="#">[1]</a>		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF6G20-110	-	flanged LDMOST ceramic package; 2 mounting holes; 2 leads	SOT502A
BLF6G20LS-110	-	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		-	29	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
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ }^{\circ}\text{C};$ $P_L = 25\text{ W (CW)}$	BLF6G20-110	0.52	K/W
			BLF6G20LS-110	0.45	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	$V_{GS} = 0\text{ V}; I_D = 0.5\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 150\text{ mA}$	1.4	2	2.4	V
$V_{GSq}$	gate-source quiescent voltage	$V_{DS} = 28\text{ V}; I_D = 950\text{ mA}$	1.6	2.1	2.6	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	5	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $V_{DS} = 10\text{ V}$	22.3	27	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 13\text{ V}; V_{DS} = 0\text{ V}$	-	-	450	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 7.5\text{ A}$	-	10.5	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $I_D = 5.25\text{ A}$	-	0.1	0.160	$\Omega$
$C_{rs}$	feedback capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V};$ $f = 1\text{ MHz}$	-	2.1	-	pF

## 7. Application information

**Table 7. Application information**

Mode of operation: 2-carrier W-CDMA; PAR 7 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 PDPCH;  $f_1 = 1932.5\text{ MHz}; f_2 = 1942.5\text{ MHz}; f_3 = 1977.5\text{ MHz}; f_4 = 1987.5\text{ MHz};$  RF performance at  $V_{DS} = 28\text{ V}; I_{Dq} = 900\text{ mA}; T_{case} = 25\text{ }^{\circ}\text{C};$  unless otherwise specified; in a class-AB production test circuit.

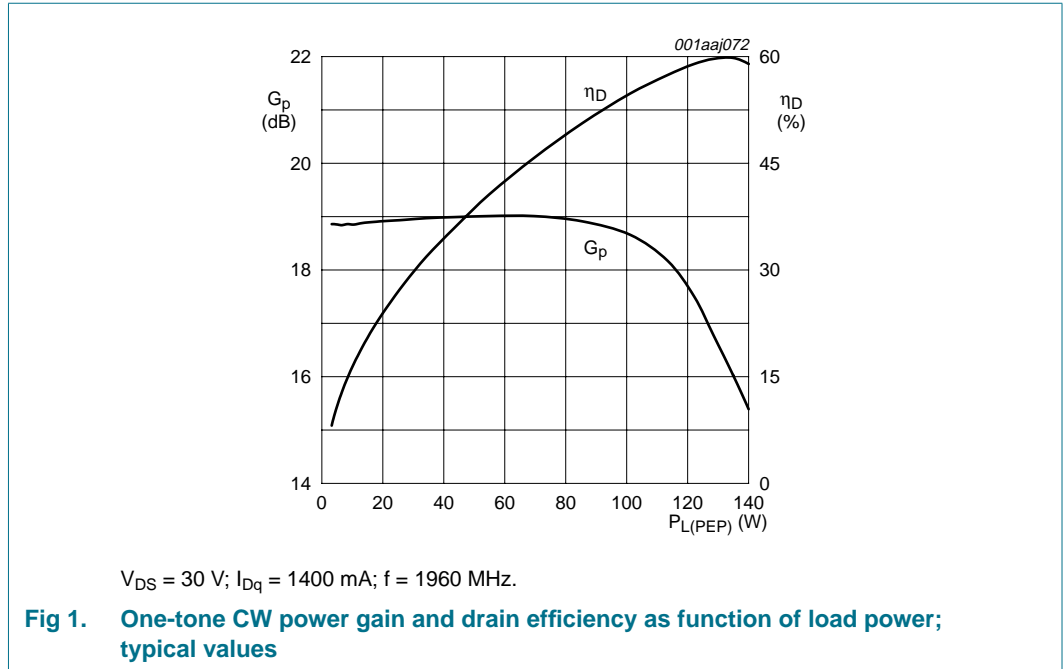
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{L(AV)}$	average output power		-	25	-	W
$G_p$	power gain	$P_{L(AV)} = 25\text{ W}$	18	19	-	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 25\text{ W}$	28	32	-	%
IMD3	third order intermodulation distortion	$P_{L(AV)} = 25\text{ W}$	-	-34	-28	dBc
ACPR	adjacent channel power ratio	$P_{L(AV)} = 25\text{ W}$	-	-38	-33	dBc

### 7.1 Ruggedness in class-AB operation

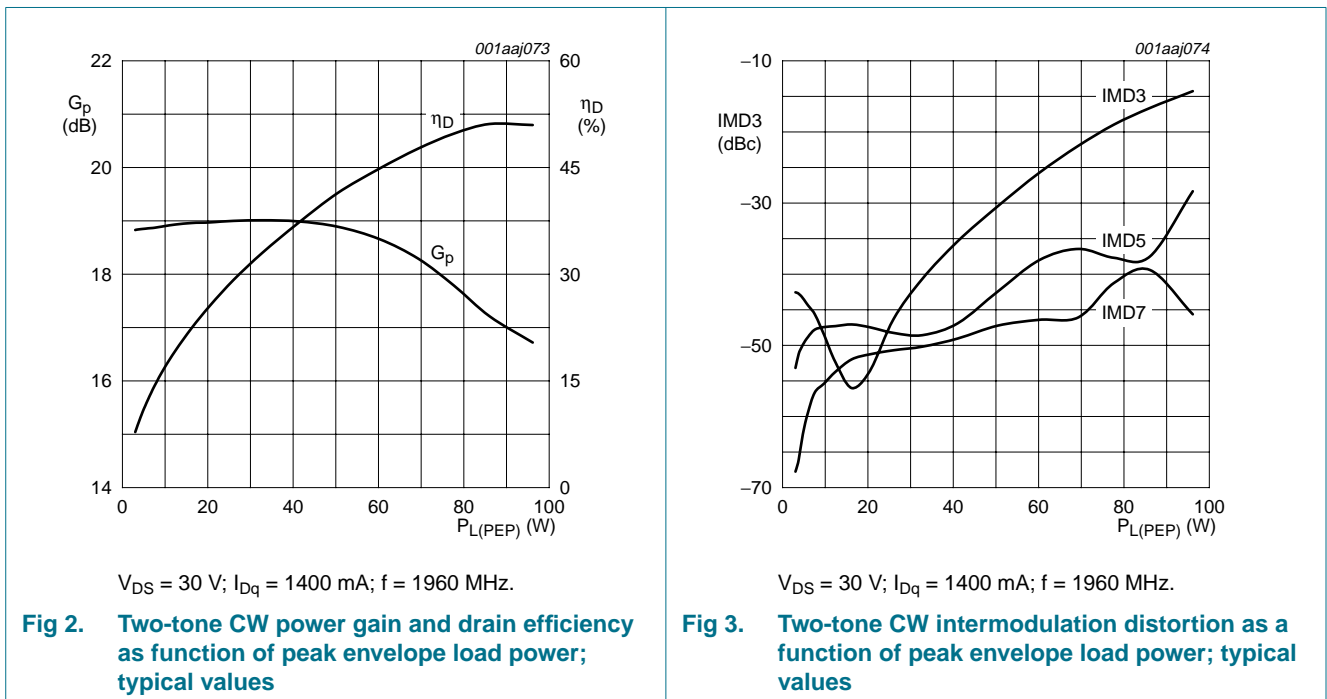
The BLF6G20-110 and BLF6G20LS-110 are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:

$V_{DS} = 28\text{ V}; I_{Dq} = 900\text{ mA}; P_L = 110\text{ W (CW)}; f = 1990\text{ MHz}.$

## 7.2 One-tone CW



## 7.3 Two-tone CW



8. Test information

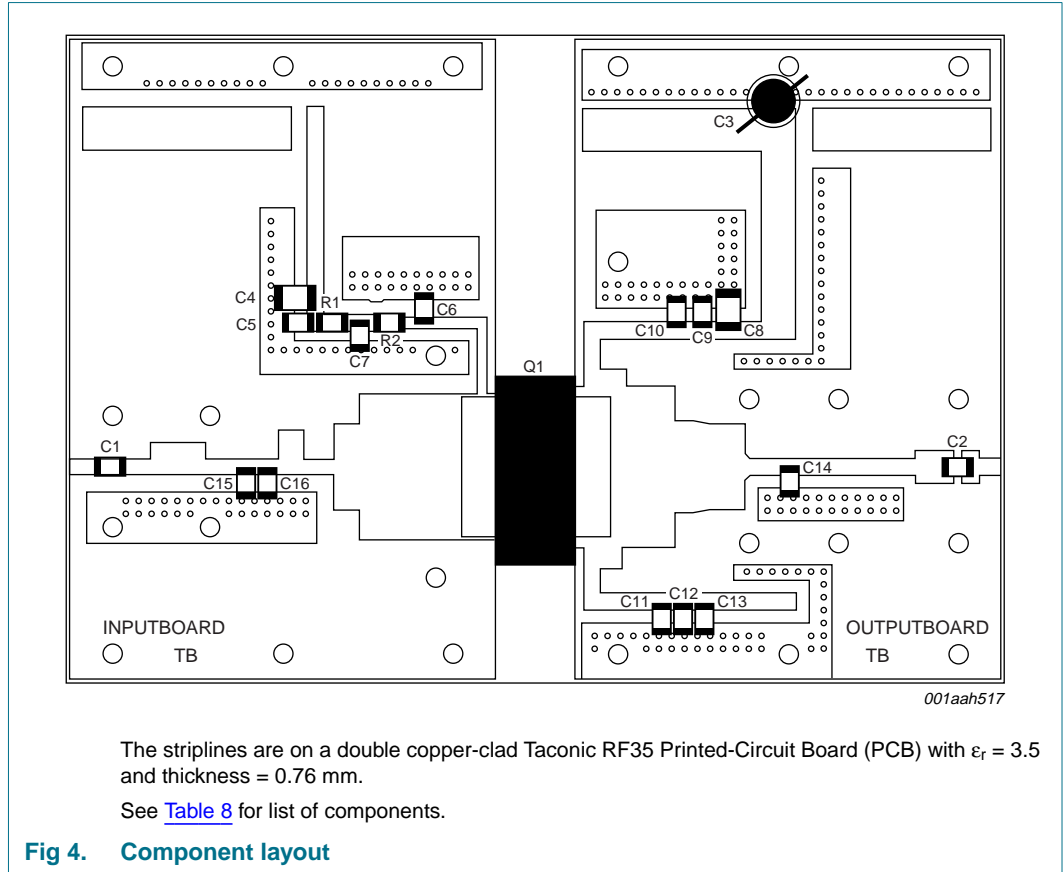


Table 8. List of components (see [Figure 4](#)).

Component	Description	Value	Remarks
C1	multilayer ceramic chip capacitor	8.2 pF	[1]
C2	multilayer ceramic chip capacitor	10 pF	[1]
C3	electrolytic capacitor	100 $\mu$ F; 63 V	
C4, C8	multilayer ceramic chip capacitor	4.7 $\mu$ F; 25 V	[2]
C5, C7, C12, C13	multilayer ceramic chip capacitor	220 nF; 50 V	[3]
C6, C10, C11	multilayer ceramic chip capacitor	13 pF	[1]
C9	multilayer ceramic chip capacitor	330 nF; 50 V	[3]
C14	multilayer ceramic chip capacitor	1.0 pF	[1]
C15	multilayer ceramic chip capacitor	1.5 pF	[1]
C16	multilayer ceramic chip capacitor	0.6 pF	[1]
Q1	BLF6G20-110 or BLF6G20LS-110	-	
R1	SMD resistor	1.0 $\Omega$	
R2	SMD resistor	2.7 $\Omega$	

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

[2] TDK or capacitor of same quality.

[3] AVX or capacitor of same quality.

9. Package outline

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads

SOT502A

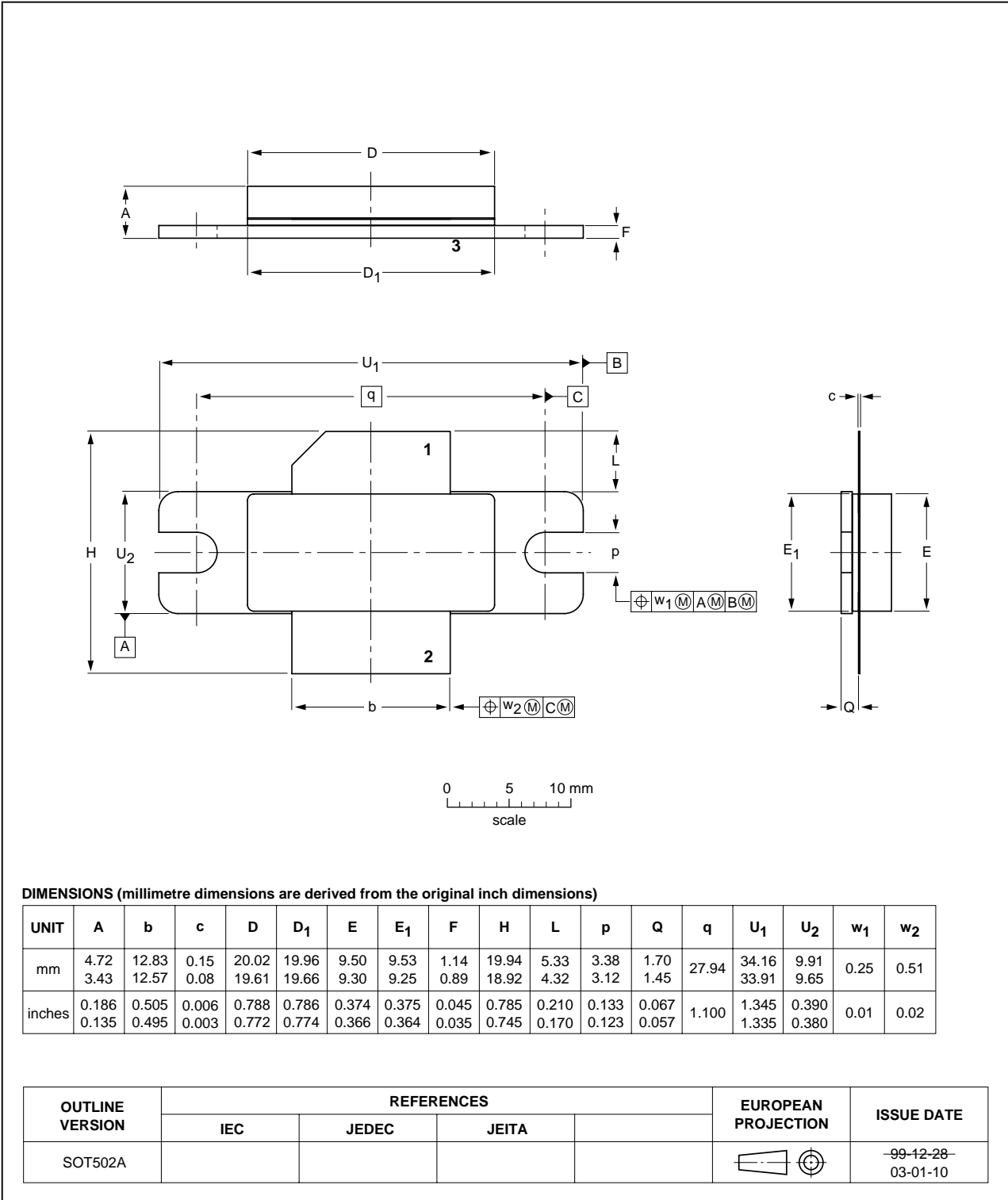


Fig 5. Package outline SOT502A

Earless flanged LDMOST ceramic package; 2 leads

SOT502B

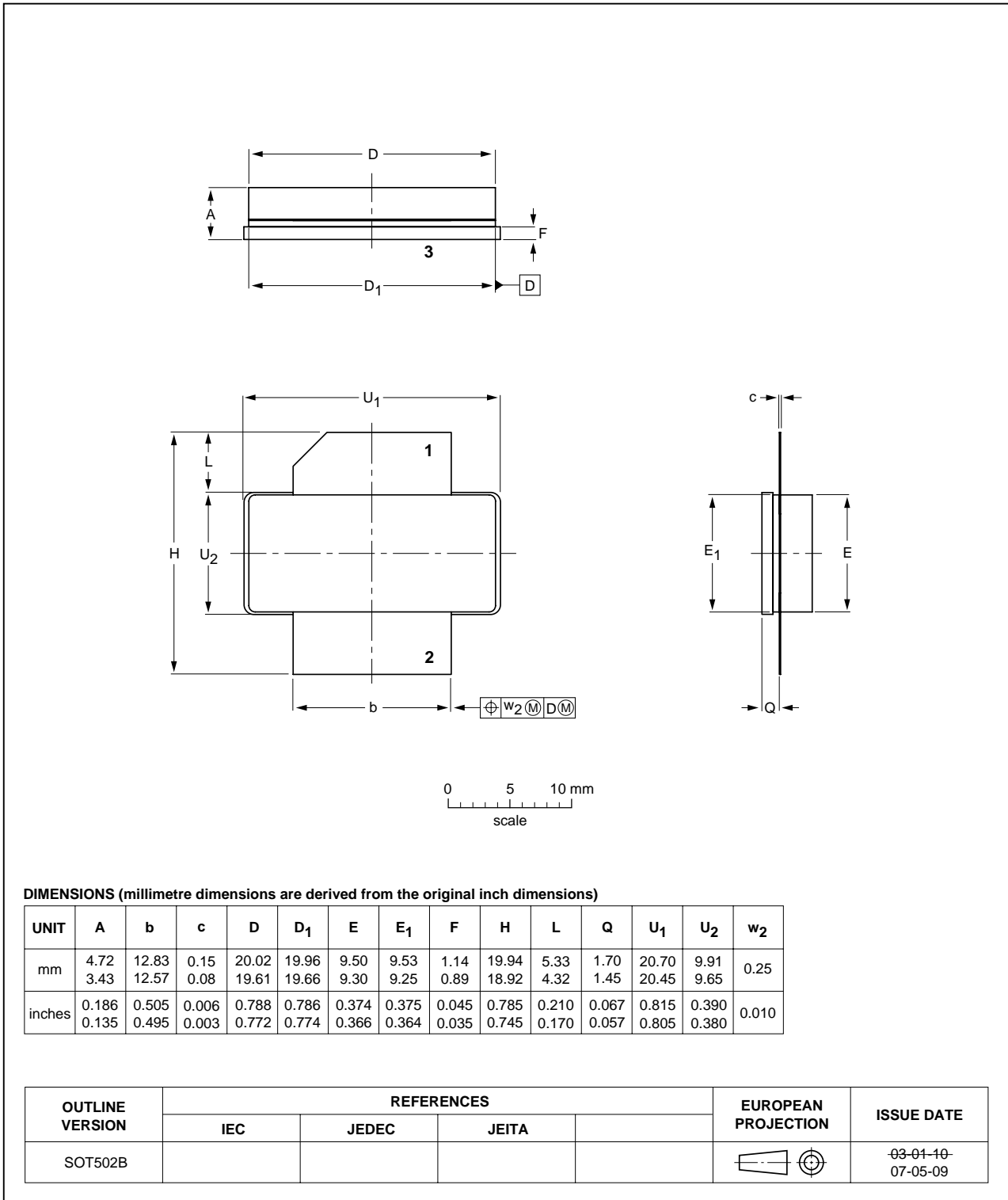


Fig 6. Package outline SOT502B

## 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
EVM	Error Vector Magnitude
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
SMD	Surface Mounted Device
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
BLF6G20-110_BLF6G20LS-110_3	20090113	Product data sheet	-	BLF6G20-110_BLF6G20LS-110_2
Modifications:			<ul style="list-style-type: none"> <li>• <a href="#">Figure 1 on page 4</a>: Power gain curve corrected</li> <li>• <a href="#">Figure 2 on page 4</a>: Power gain curve corrected</li> </ul>	
BLF6G20-110_BLF6G20LS-110_2	20081117	Product data sheet	-	BLF6G20-110_BLF6G20LS-110_1
BLF6G20-110_BLF6G20LS-110_1	20080128	Preliminary 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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