

# BLF6G10L-40BRN

Power LDMOS transistor

Rev. 3 — 16 November 2010

Product data sheet

## 1. Product profile

### 1.1 General description

40 W LDMOS power transistor for base station applications at frequencies from 700 MHz to 1 GHz.

**Table 1. Typical performance**

Typical RF performance at  $T_{case} = 25\text{ °C}$  in a 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 <sup>[1]</sup>	791 to 821	28	2.5	23.0	15.0	-42.5

[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.

### 1.2 Features and benefits

- Typical 2-carrier W-CDMA performance at frequencies of 791 MHz and 821 MHz, a supply voltage of 28 V and an I<sub>DQ</sub> of 390 mA:
  - ◆ Average output power = 2.5 W
  - ◆ Power gain = 23.0 dB
  - ◆ Efficiency = 15.0 %
  - ◆ ACPR = -42.5 dBc
- Easy power control
- Integrated ESD protection
- Enhanced ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (728 MHz to 960 MHz)
- Internally matched for ease of use
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)
- Integrated current sense

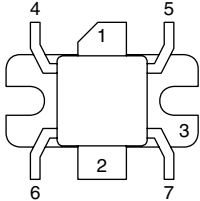
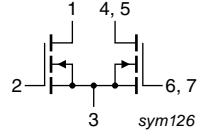
### 1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier GSM and LTE applications in the 728 MHz to 960 MHz frequency range



## 2. Pinning information

**Table 2. Pinning**

Pin	Description	Simplified outline	Graphic symbol
1	drain		
2	gate		
3	source		
4, 5	sense drain		
6, 7	sense gate		

[1] Connected to flange.

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
BLF6G10L-40BRN	-	flanged ceramic package; 2 mounting holes; 6 leads	SOT1112A

## 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	+11	V
$V_{GS(sense)}$	sense gate-source voltage		-0.5	+9	V
$I_D$	drain current		-	11	A
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	200	°C

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}; P_L = 2.5\text{ W(CW)}$	1.7	K/W

## 6. Characteristics

**Table 6. Characteristics**

$T_j = 25\text{ }^\circ\text{C}$  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	$V_{DS} = 10\text{ V}; I_D = 59\text{ mA}$	1.4	1.9	2.4	V
$I_{Dq}$	quiescent drain current	sense transistor: $I_{DS} = 8.2\text{ mA};$ $V_{DS} = 26.5\text{ V}$ main transistor: $V_{DS} = 28\text{ V}$	340	390	440	mA
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	1.4	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $V_{DS} = 10\text{ V}$	8.8	10	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	140	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 2.9\text{ A}$	2.7	4.3	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $I_D = 2.063\text{ A}$	0.09	0.25	0.39	$\Omega$

## 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; 64 DPCH;  $f_1 = 788.5\text{ MHz}; f_2 = 793.5\text{ MHz}; f_3 = 818.5\text{ MHz}; f_4 = 823.5\text{ MHz};$  RF performance at  $V_{DS} = 28\text{ V}; I_{Dq(nom)} = 390\text{ mA}; T_{case} = 25\text{ }^\circ\text{C};$  unless otherwise specified in a class AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{L(AV)}$	average output power		-	2.5	-	W
$G_p$	power gain	$P_{L(AV)} = 2.5\text{ W}$	22	23.0	-	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 2.5\text{ W}$	-	-15	-10	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 2.5\text{ W}$	13	15	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 2.5\text{ W}$	-	-42.5	-38	dBc

**Table 8. Application information**

Mode of operation; 1-carrier W-CDMA; PAR = 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH;  $f = 821\text{ MHz};$  RF performance at  $V_{DS} = 28\text{ V}; I_{Dq(nom)} = 390\text{ mA}; T_{case} = 25\text{ }^\circ\text{C};$  unless otherwise specified in a class AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
PAR	peak-to-average ratio	$P_{L(AV)} = 10\text{ W}$ at 0.01 % probability on CCDF	5.5	5.9	-	dB

### 7.1 Ruggedness in class-AB operation

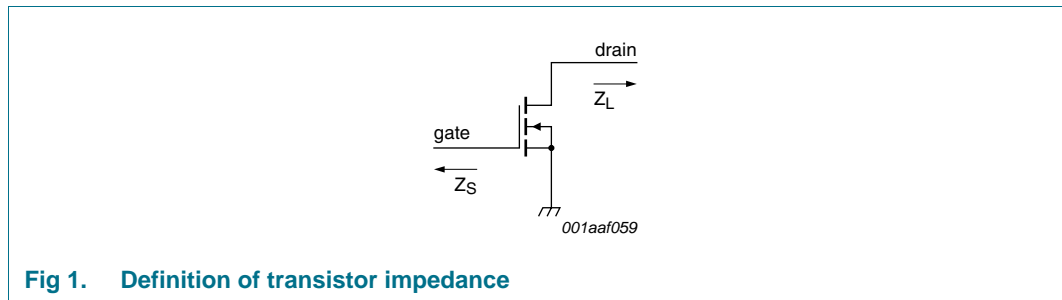
The BLF6G10L-40BRN is capable of withstanding a load mismatch corresponding to  $V_{SWR} = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 28\text{ V}; I_{Dq} = 390\text{ mA}; P_L = 32\text{ W}; f = 791\text{ MHz}$  and  $821\text{ MHz}.$

**7.2 Impedance information**

**Table 9. Typical impedance per section**  
 $I_{Dq} = 390 \text{ mA}$ ; main transistor  $V_{DS} = 28 \text{ V}$

f (MHz)	$Z_S$ [1] ( $\Omega$ )	$Z_L$ [1] ( $\Omega$ )
800	$2.0 - j5.0$	$5.3 + j2.9$
810	$2.0 - j5.5$	$5.6 + j2.3$

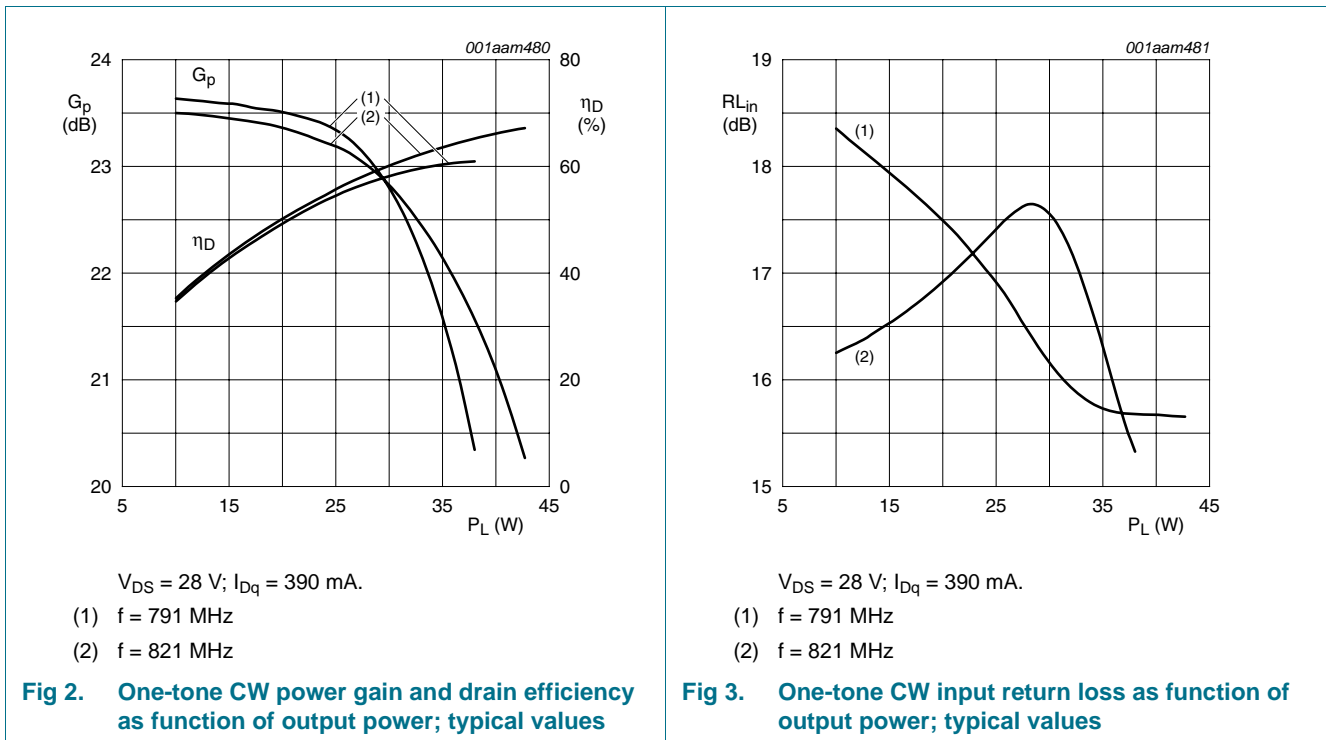
[1]  $Z_S$  and  $Z_L$  defined in [Figure 1](#).



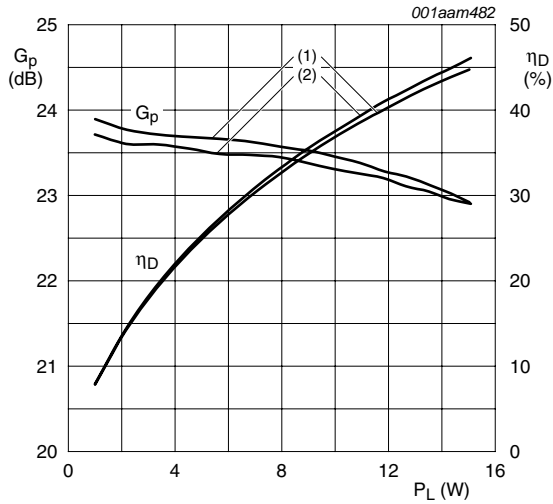
**Fig 1. Definition of transistor impedance**

**7.3 Graphs**

**7.3.1 1 Tone CW**



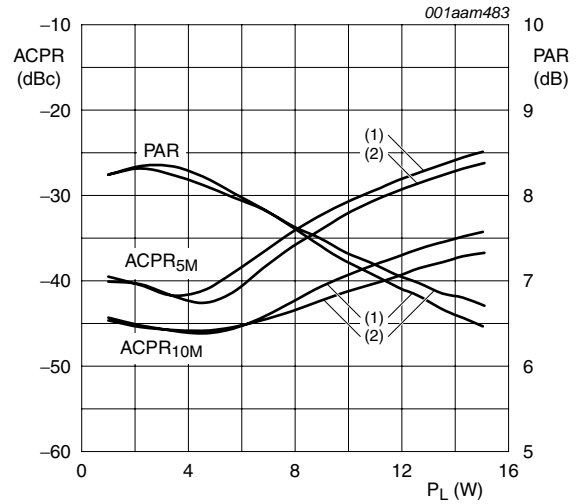
**7.3.2 2-carrier W-CDMA (5 MHz spacing)**



3GPP; Test Model 1; 64 DPCH, PAR = 7.5 dB at 0.01 % probability per carrier; carrier spacing 5 MHz;  $V_{DS} = 28$  V;  $I_{Dq} = 390$  mA.

- (1)  $f = 791$  MHz
- (2)  $f = 821$  MHz

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



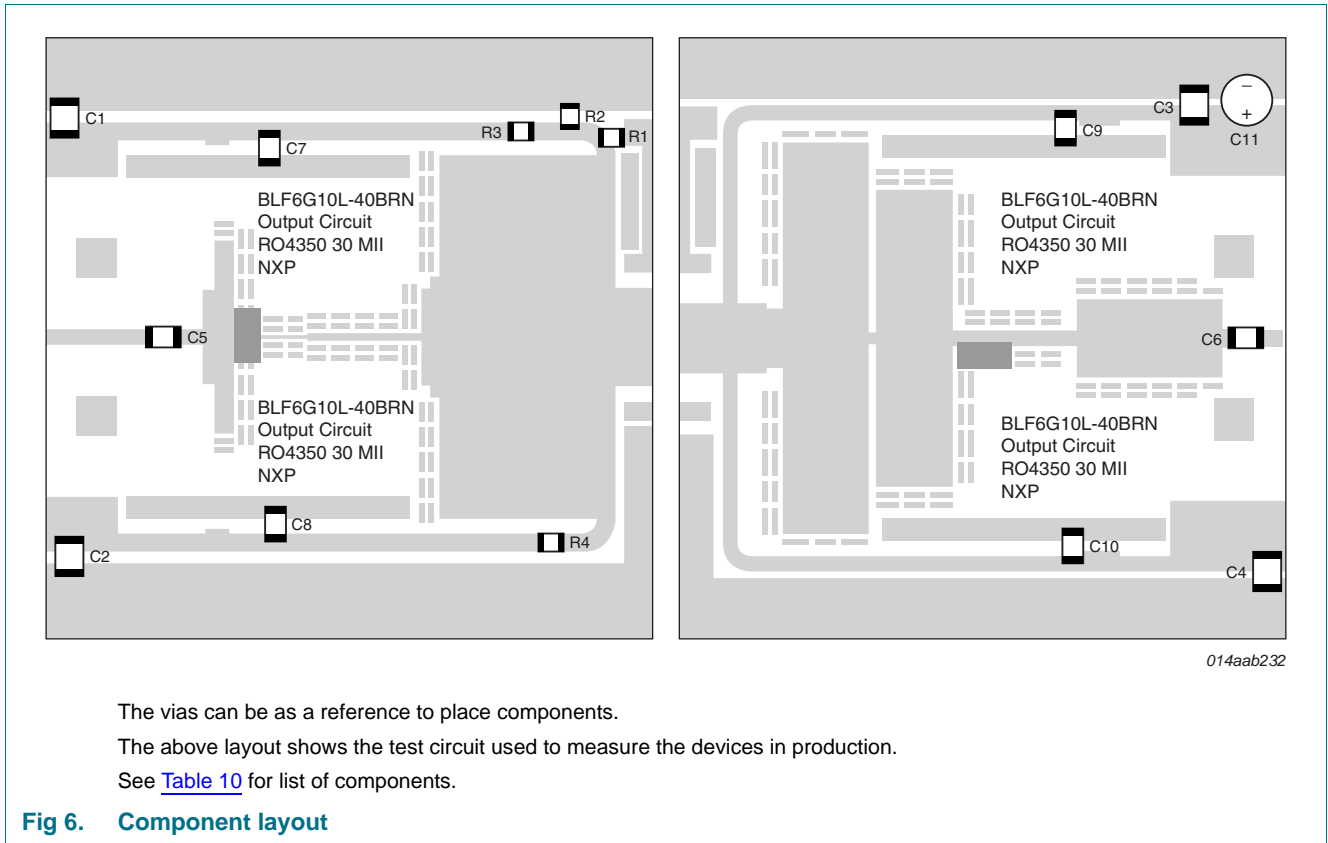
3GPP; Test Model 1; 64 DPCH, PAR = 7.5 dB at 0.01 % probability per carrier; carrier spacing 5 MHz;  $V_{DS} = 28$  V;  $I_{Dq} = 390$  mA.

- (1)  $f = 791$  MHz
- (2)  $f = 821$  MHz

**Fig 5. 2-carrier W-CDMA adjacent channel power ratio and peak aspect ratio as function of output power; typical values**

**8. Test information**

**8.1 Test circuit**



**Table 10. List of components**

See [Figure 6](#) for component layout.

Component	Description	Value	Remarks
C1, C2, C3, C4	multilayer ceramic chip capacitor	10 $\mu$ F	[1]
C5, C6	multilayer ceramic chip capacitor	47 pF	[2]
C7, C8	multilayer ceramic chip capacitor	100 pF	[2]
C9, C10	multilayer ceramic chip capacitor	30 pF	[2]
C11	electrolytic capacitor	470 $\mu$ F; 63 V	
R1	chip resistor	820 $\Omega$	[3] 1206
R2	chip resistor	2.2 k $\Omega$	[3] 1206
R3, R4	chip resistor	15 $\Omega$	[3] 1206

[1] Murata or capacitor of same quality.

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

[3] Philips or resistor of same quality.

9. Package outline

Flanged ceramic package; 2 mounting holes; 6 leads

SOT1112A

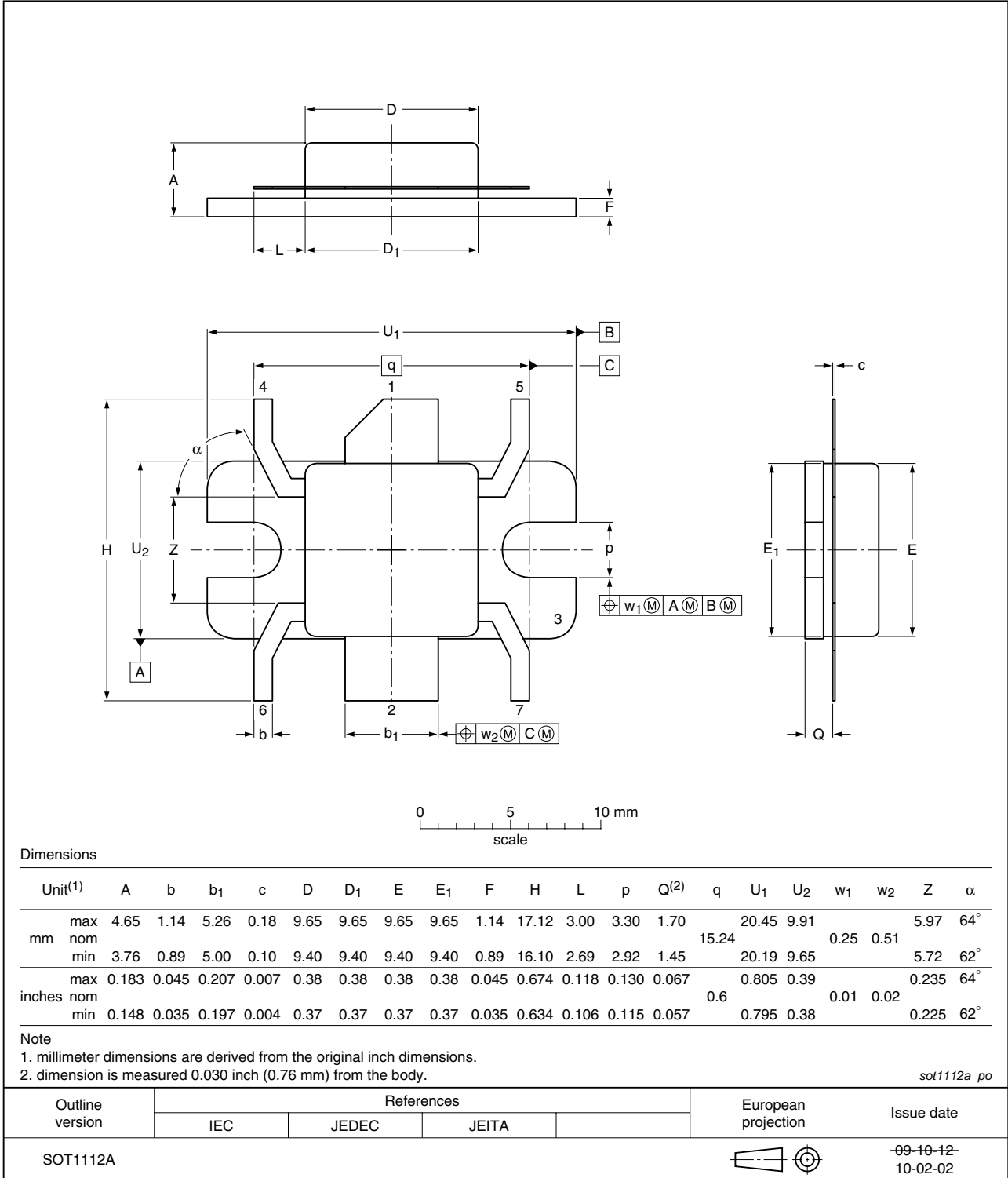


Fig 7. Package outline SOT1112A

## 10. Abbreviations

Table 11. Abbreviations

Acronym	Description
3GPP	3rd Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
DPCH	Dedicated Physical CHannel
ESD	ElectroStatic Discharge
GSM	Global System for Mobile communications
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
LTE	Long Term Evolution
PAR	Peak-to-Average power Ratio
RF	Radio Frequency
VSWR	Voltage Standing-Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

## 11. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G10L-40BRN v.3	20101116	Product data sheet	-	BLF6G10L-40BRN v.2
Modifications:	<ul style="list-style-type: none"> <li>• In the entire data sheet the typical value of <math>I_{Dq}</math> has been changed to 390 mA.</li> <li>• <a href="#">Table 6 on page 3</a>: the values of <math>I_{Dq}</math> have been changed.</li> <li>• <a href="#">Table 7 on page 3</a>: Some values have been changed.</li> <li>• <a href="#">Section 7.1 on page 3</a>: The value of VSWR has been corrected.</li> </ul>			
BLF6G10L-40BRN v.2	20100827	Preliminary data sheet	-	BLF6G10L-40BRN v.1
BLF6G10L-40BRN v.1	20100809	Preliminary data sheet	-	-



## 12. Legal information

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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.
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