

# BLF6G22L-40BN

Power LDMOS transistor

Rev. 1 — 30 August 2010

Product data sheet

## 1. Product profile

### 1.1 General description

40 W LDMOS power transistor for base station applications at frequencies from 2000 MHz to 2200 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	2110 to 2170	28	2.5	19	16	-50 <sup>[1]</sup>

[1] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 8.4 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 2110 MHz and 2170 MHz, a supply voltage of 28 V and an I<sub>DQ</sub> of 345 mA:
  - ◆ Average output power = 2.5 W
  - ◆ Power gain = 19 dB (typ)
  - ◆ Efficiency = 16 %
  - ◆ ACPR = -50 dBc
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (2000 MHz to 2200 MHz)
- Internally matched for ease of use
- Integrated current sense
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

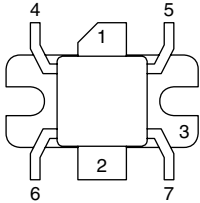
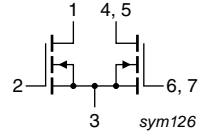


## 1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier applications in the 2000 MHz to 2200 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
BLF6G22L-40BN	-	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	+13	V
$V_{GS(sense)}$	sense gate-source voltage		-0.5	+9	V
$T_{stg}$	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	$T_{case} = 80\text{ °C}$ ; $P_L = 12.5\text{ W (CW)}$	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
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	1.5	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	8.8	10	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	150	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 2.9\text{ A}$	-	4.3	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 2.1\text{ A}$	-	0.25	-	$\Omega$
$I_{Dq}$	quiescent drain current	main transistor: $V_{DS} = 28\text{ V}$ sense transistor: $I_{DS} = 7.43\text{ mA}; V_{DS} = 26.7\text{ V}$	310	345	380	mA

## 7. Test information

**Table 7. Application information**

Mode of operation: 2-carrier W-CDMA; PAR 8.4 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1 to 64 PDPCH;  $f_1 = 2112.5\text{ MHz}; f_2 = 2117.5\text{ MHz}; f_3 = 2162.5\text{ MHz}; f_4 = 2167.5\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}; I_{Dq} = 345\text{ mA}; T_{case} = 25\text{ }^\circ\text{C}$ ; unless otherwise specified; in a class-AB production test circuit

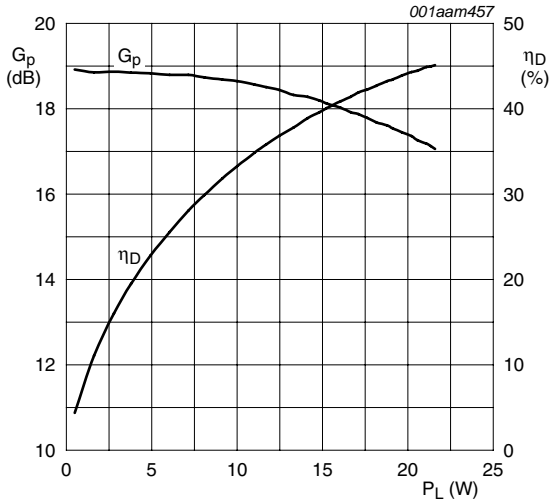
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$G_p$	power gain	$P_{L(AV)} = 2.5\text{ W}$	17.8	19	21.0	dB	
$\eta_D$	drain efficiency	$P_{L(AV)} = 2.5\text{ W}$	13	16	-	%	
ACPR	adjacent channel power ratio	$P_{L(AV)} = 2.5\text{ W}$	-57	-50	-45	dBc	
$PAR_O$	output peak-to-average ratio	$P_{L(AV)} = 20\text{ W}$	[1]	3.6	4.0	4.8	dB

[1] Mode of operation: 1-carrier W-CDMA; PAR 7.2 dB at 0.01 % probability on CCDF;  $f = 2167.5\text{ MHz}$ .

### 7.1 Ruggedness in class-AB operation

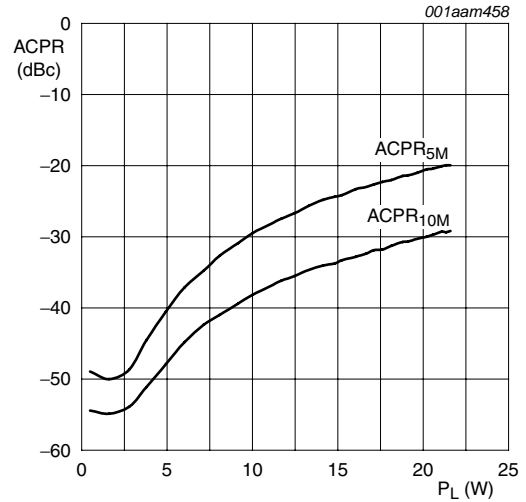
The BLF6G22L-40BN is capable of withstanding a load mismatch corresponding to  $V_{SWR} = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 28\text{ V}; I_{Dq} = 345\text{ mA}; P_L = 40\text{ W (CW)}; f = 2140\text{ MHz}$ .

**7.2 2-Carrier W-CDMA with 5 MHz carrier spacing**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 345\text{ mA}$ ;  $f = 2140\text{ MHz}$ .

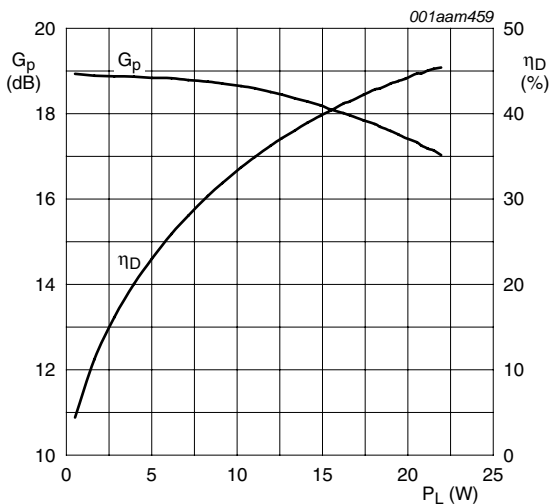
**Fig 1. Power gain and drain efficiency as function of load power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 345\text{ mA}$ ;  $f = 2140\text{ MHz}$ .

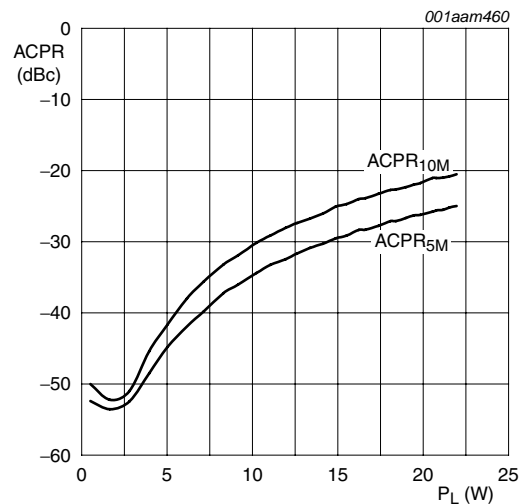
**Fig 2. ACPR at 5 MHz and at 10 MHz as function of load power; typical values**

**7.3 2-Carrier W-CDMA with 10 MHz carrier spacing**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 345\text{ mA}$ ;  $f = 2140\text{ MHz}$ .

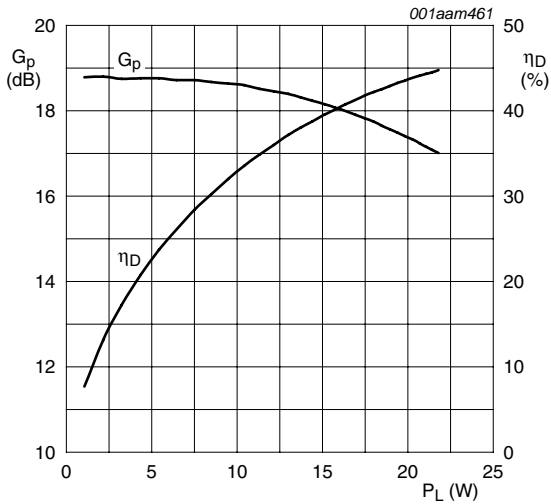
**Fig 3. Power gain and drain efficiency as function of load power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 345\text{ mA}$ ;  $f = 2140\text{ MHz}$ .

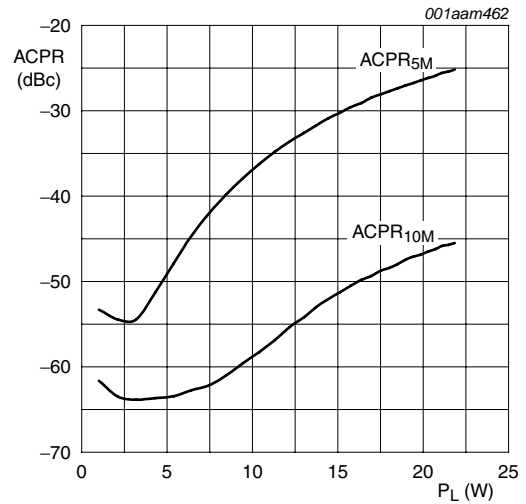
**Fig 4. ACPR at 5 MHz and at 10 MHz as function of load power; typical values**

**7.4 1-Carrier W-CDMA**



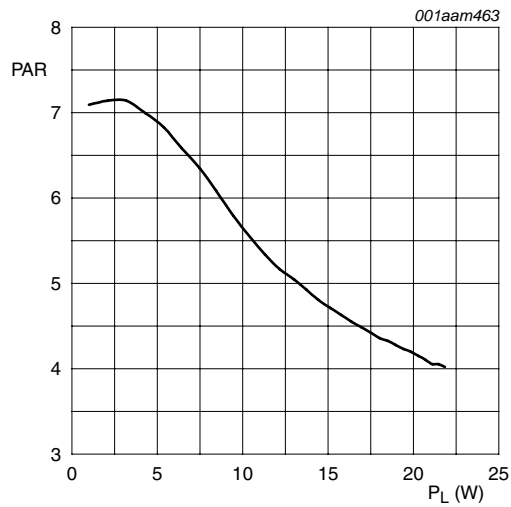
$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 345\text{ mA}$ ;  $f = 2140\text{ MHz}$ .

**Fig 5. Power gain and drain efficiency as function of load power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 345\text{ mA}$ ;  $f = 2140\text{ MHz}$ .

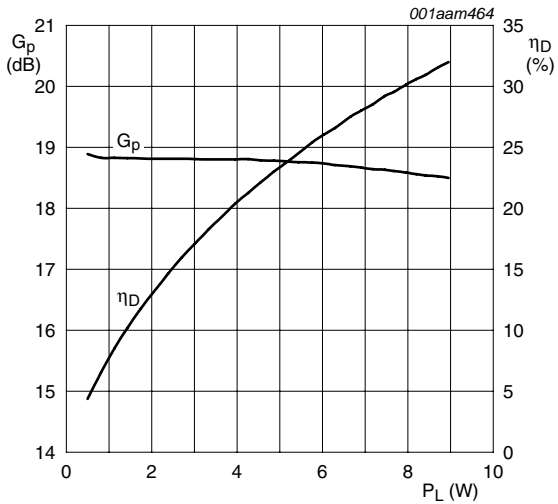
**Fig 6. ACPR at 5 MHz and at 10 MHz as function of load power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 345\text{ mA}$ ;  $f = 2140\text{ MHz}$ .

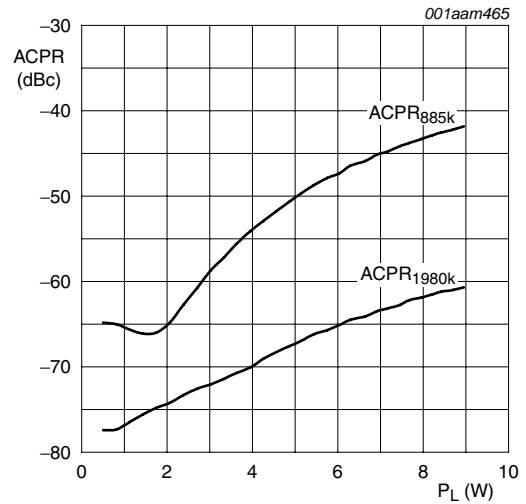
**Fig 7. Peak-to-average power ratio as a function of load power; typical values**

**7.5 1-Carrier IS-95**



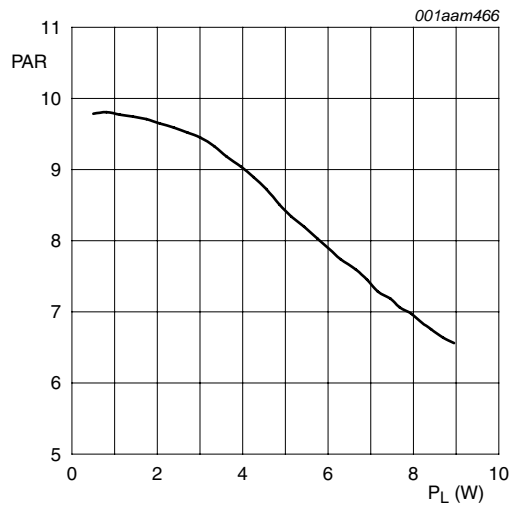
$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 345\text{ mA}$ ;  $f = 2140\text{ MHz}$ .

**Fig 8. Power gain and drain efficiency as function of load power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 345\text{ mA}$ ;  $f = 2140\text{ MHz}$ .

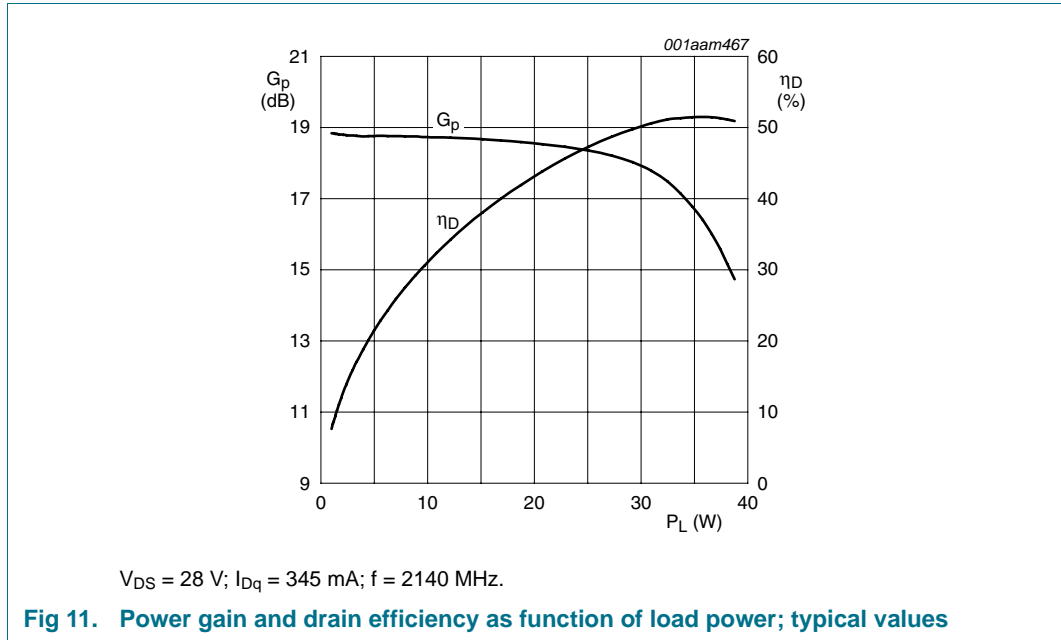
**Fig 9. ACPR at 885 kHz and at 1980 kHz as function of load power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 345\text{ mA}$ ;  $f = 2140\text{ MHz}$ .

**Fig 10. Peak-to-average power ratio as a function of load power; typical values**

**7.6 1-Tone CW**



**7.7 Test circuit**

**Table 8. List of components**

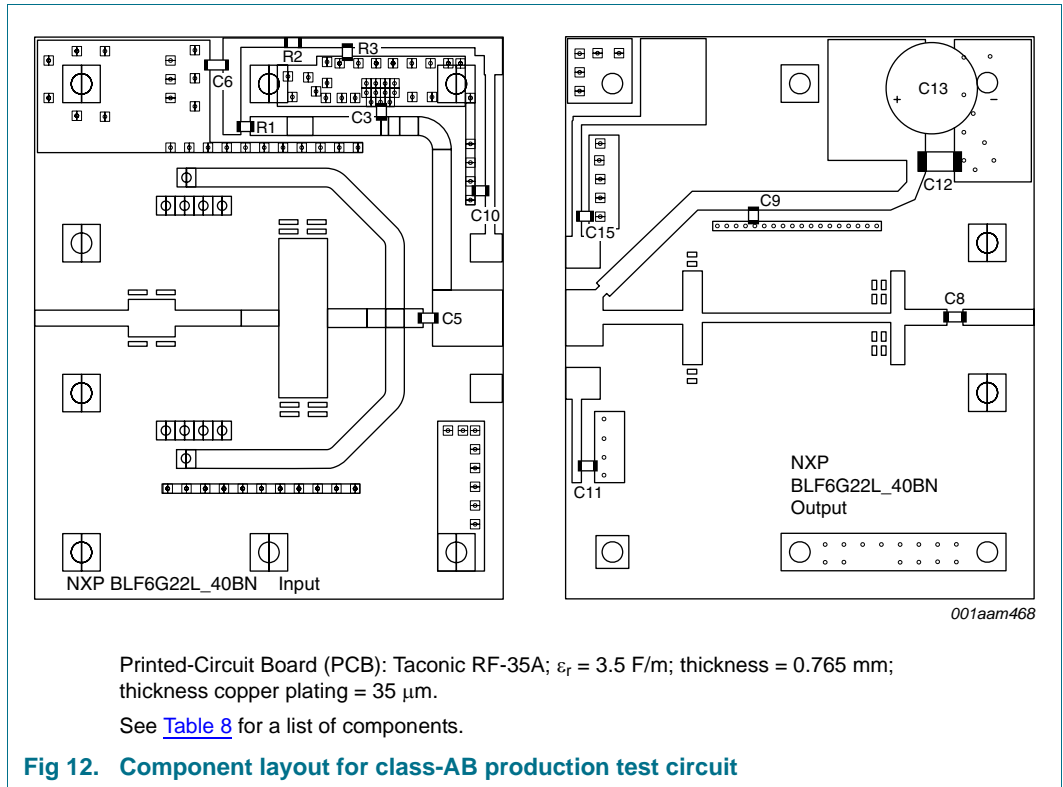
For test circuit see [Figure 12](#).

Component	Description	Value	Remarks
C3, C8, C9	multilayer ceramic chip capacitor	33 pF	[1]
C5	multilayer ceramic chip capacitor	1.0 pF	[1]
C6	multilayer ceramic chip capacitor	100 nF	[2]
C10	multilayer ceramic chip capacitor	33 pF	[3]
C11, C15	multilayer ceramic chip capacitor	47 pF	[3]
C12	multilayer ceramic chip capacitor	10 $\mu$ F	[2]
C13	electrolytic capacitor	470 $\mu$ F; 63 V	
R1	SMD resistor	10 $\Omega$	Philips 0603
R2	SMD resistor	820 $\Omega$	Philips 0603
R3	SMD resistor	1.8 k $\Omega$	Philips 0603

[1] American Technical Ceramics type 800B or capacitor of same quality.

[2] TDK or capacitor of same quality.

[3] American Technical Ceramics type 100A or capacitor of same quality.

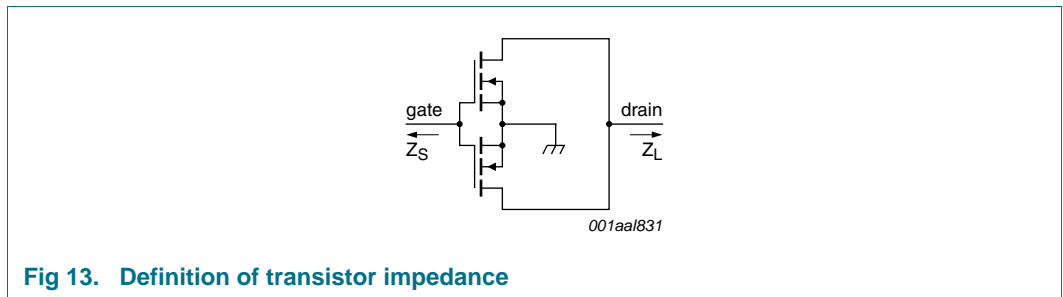


**7.8 Impedance information**

**Table 9. Typical impedance**

Typical values valid for both section in parallel unless otherwise specified.

f (MHz)	$Z_S$ ( $\Omega$ )	$Z_L$ ( $\Omega$ )
2050	3.3 – j12.2	13 – j11.2
2140	4.5 – j12.8	12.2 – j6.9
2230	10 – j15.3	13.3 – j5.5





8. Package outline

Flanged ceramic package; 2 mounting holes; 6 leads

SOT1112A

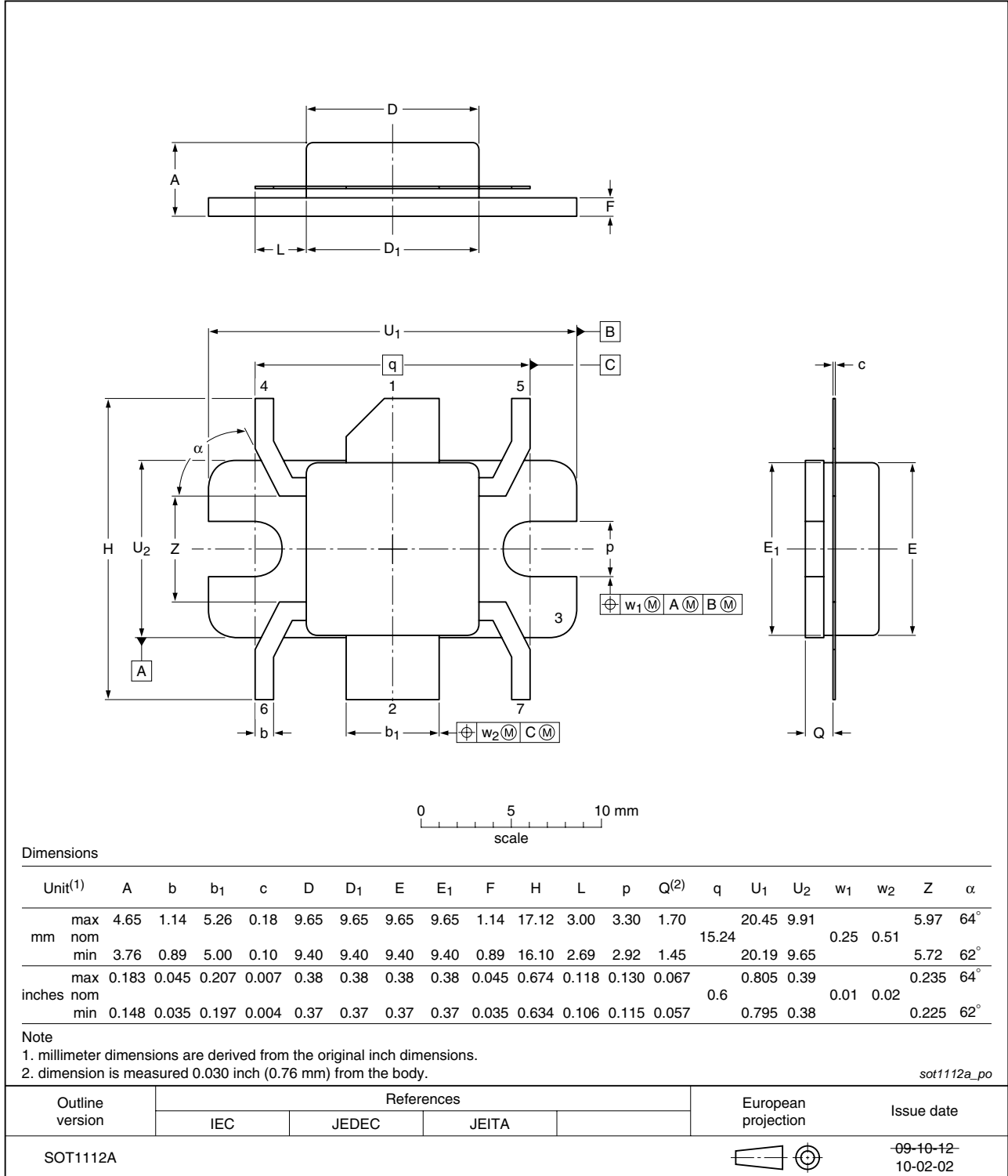


Fig 14. Package outline SOT1112A

## 9. Abbreviations

**Table 10. Abbreviations**

Acronym	Description
3GPP	3rd Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Waveform
DPCH	Dedicated Physical CHannel
ESD	ElectroStatic Discharge
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
SMD	Surface Mounted Device
VSWR	Voltage Standing-Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

## 10. Revision history

**Table 11. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G22L-40BN v.1	20100830	Product data sheet	-	-

## 11. Legal information

### 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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