

BLF6G22LS-40BN

Power LDMOS transistor

Rev. 1 — 28 June 2012

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 _{DS} (V)	P _{L(AV)} (W)	G _p (dB)	η _D (%)	ACPR (dBc)
2-carrier W-CDMA	2110 to 2170	28	2.5	18.5	16	-50 ^[1]

[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

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_{DQ} of 345 mA:
 - ◆ Average output power = 2.5 W
 - ◆ Power gain = 18.5 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
BLF6G22LS-40BN	-	earless flanged ceramic package; 6 leads	SOT1112B

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
T_{case}	case temperature	[1]	-	150	°C

[1] Continuous use at maximum temperature will affect MTTF.

5. Recommended operating conditions

Table 5. Operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{case}	case temperature		-40	-	+125	°C

6. Thermal characteristics

Table 6. 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

7. Characteristics

Table 7. Characteristics

$T_j = 25\text{ °C}$ 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	μA
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	-	Ω
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

8. Test information

Table 8. 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 DPCH; $f_1 = 2112.5\text{ MHz}; f_2 = 2117.5\text{ MHz}; f_3 = 2162.5\text{ MHz}; f_4 = 2167.5\text{ MHz}$; RF performance at $V_{DS} = 28\text{ V}; I_{Dq} = 345\text{ mA}; T_{case} = 25\text{ °C}$; unless otherwise specified; in a class-AB production test circuit

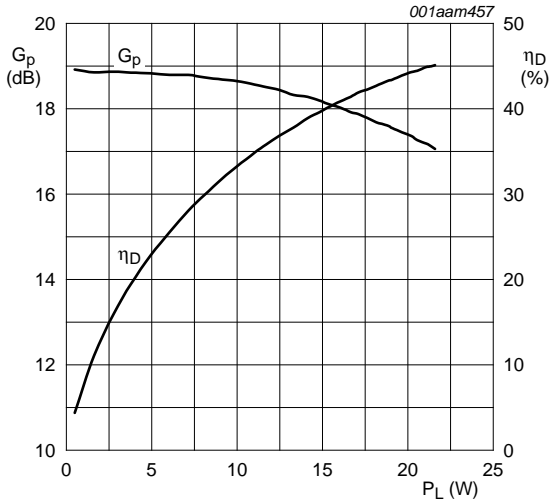
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
G_p	power gain	$P_{L(AV)} = 2.5\text{ W}$	17.5	18.5	19.9	dB	
η_D	drain efficiency	$P_{L(AV)} = 2.5\text{ W}$	13	16	-	%	
ACPR	adjacent channel power ratio	$P_{L(AV)} = 2.5\text{ W}$	-57	-50	-45	dBc	
PAR_O	output peak-to-average ratio	$P_{L(AV)} = 20\text{ W}$	[1]	3.6	4.0	4.8	dB
RL_{in}	input return loss	$P_{L(AV)} = 20\text{ W}$	-	-16	-9	dB	

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

8.1 Ruggedness in class-AB operation

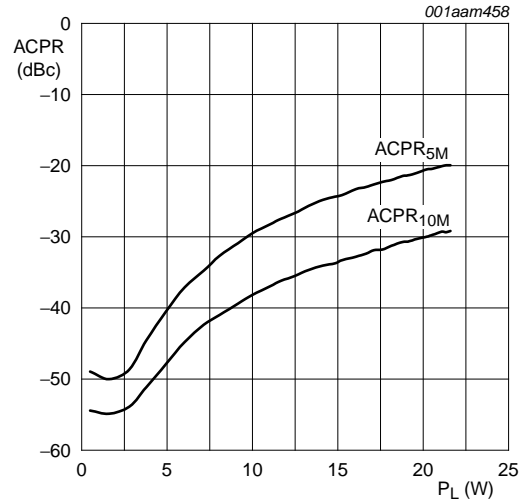
The BLF6G22LS-40BN is capable of withstanding a load mismatch corresponding to $V_{SWR} = 10 : 1$ through all phases under the following conditions: $V_{DS} = 28\text{ V}; I_{Dq} = 345\text{ mA}; P_L = 40\text{ W (CW)}; f = 2140\text{ MHz}$.

8.2 2-Carrier W-CDMA with 5 MHz carrier spacing



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

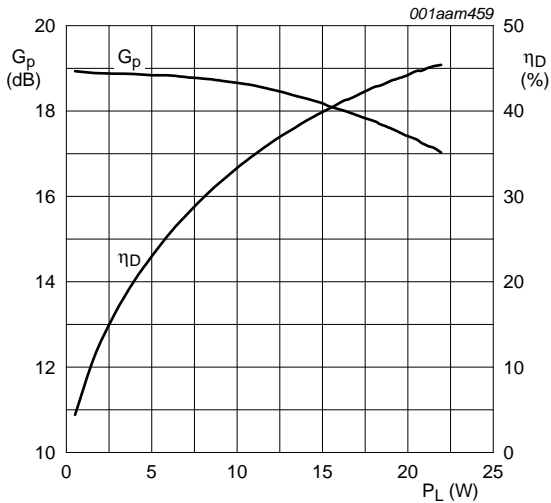
Fig 1. Power gain and drain efficiency as function of load power; typical values



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

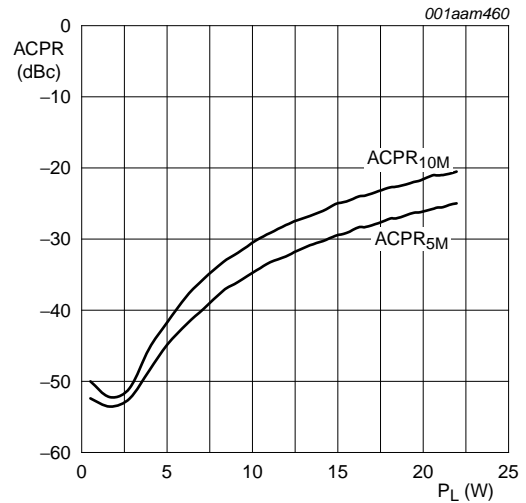
Fig 2. Adjacent channel power ratio at 5 MHz and at 10 MHz as function of load power; typical values

8.3 2-Carrier W-CDMA with 10 MHz carrier spacing



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

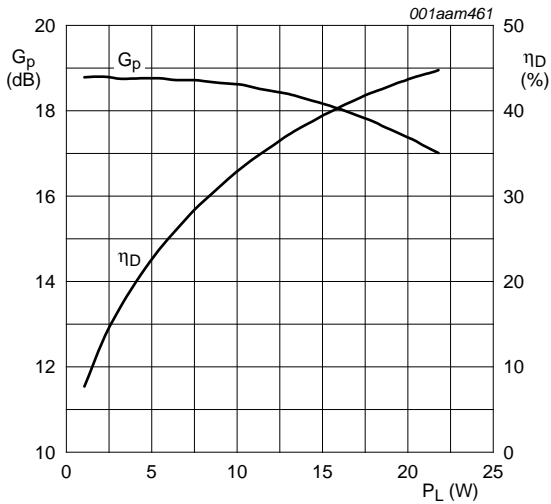
Fig 3. Power gain and drain efficiency as function of load power; typical values



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

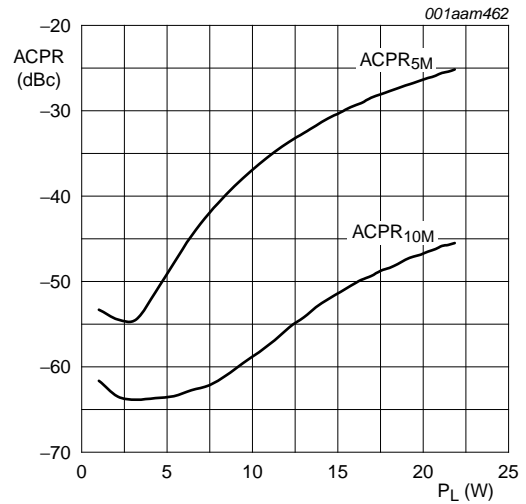
Fig 4. Adjacent channel power ratio at 5 MHz and at 10 MHz as function of load power; typical values

8.4 1-Carrier W-CDMA



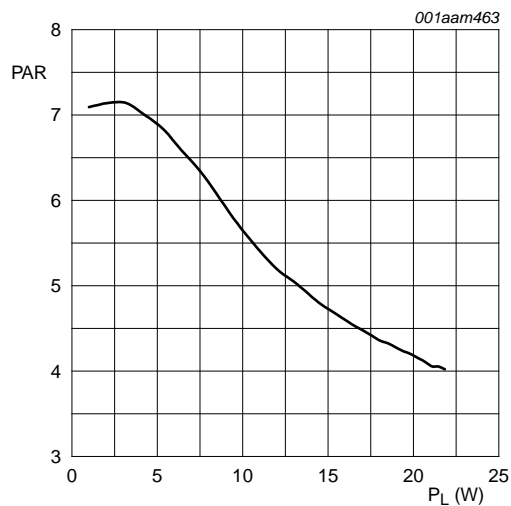
$V_{DS} = 28\text{ V}$; $I_{Dq} = 345\text{ mA}$; $f = 2140\text{ MHz}$.

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



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

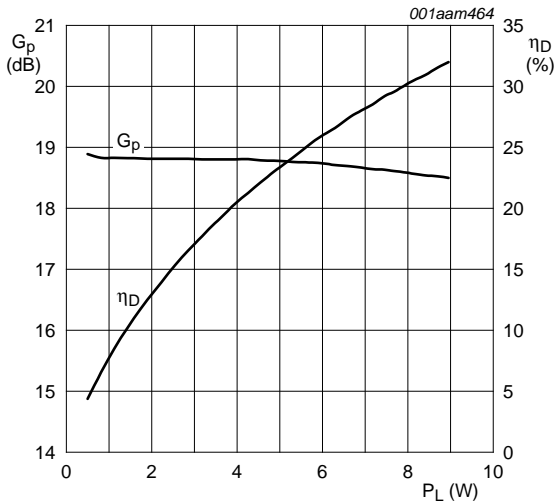
Fig 6. Adjacent channel power ratio at 5 MHz and at 10 MHz as function of load power; typical values



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

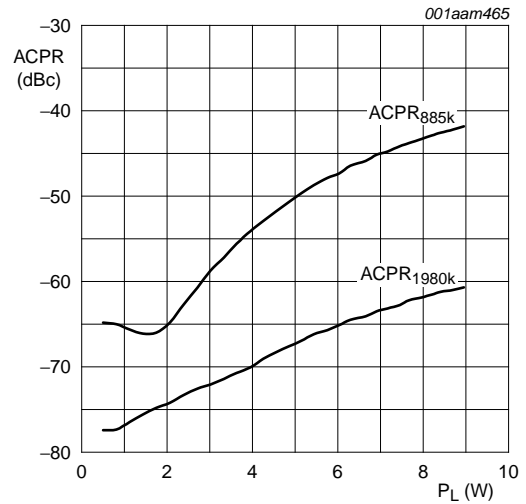
Fig 7. Peak-to-average power ratio as a function of load power; typical values

8.5 1-Carrier IS-95



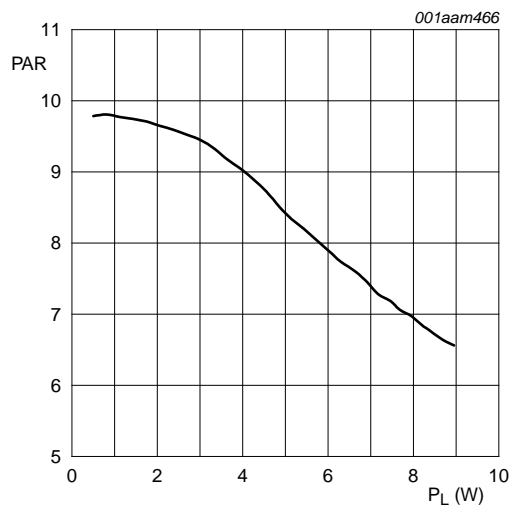
$V_{DS} = 28$ V; $I_{Dq} = 345$ mA; $f = 2140$ MHz.

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



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

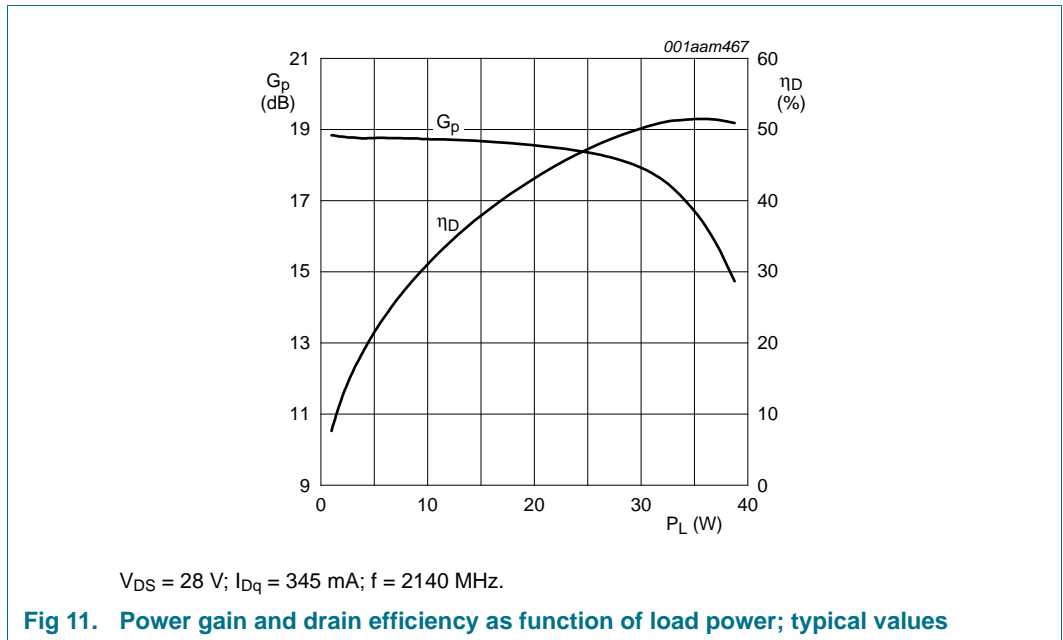
Fig 9. Adjacent channel power ratio at 885 kHz and at 1980 kHz as function of load power; typical values



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

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

8.6 1-Tone CW



8.7 Test circuit

Table 9. List of components

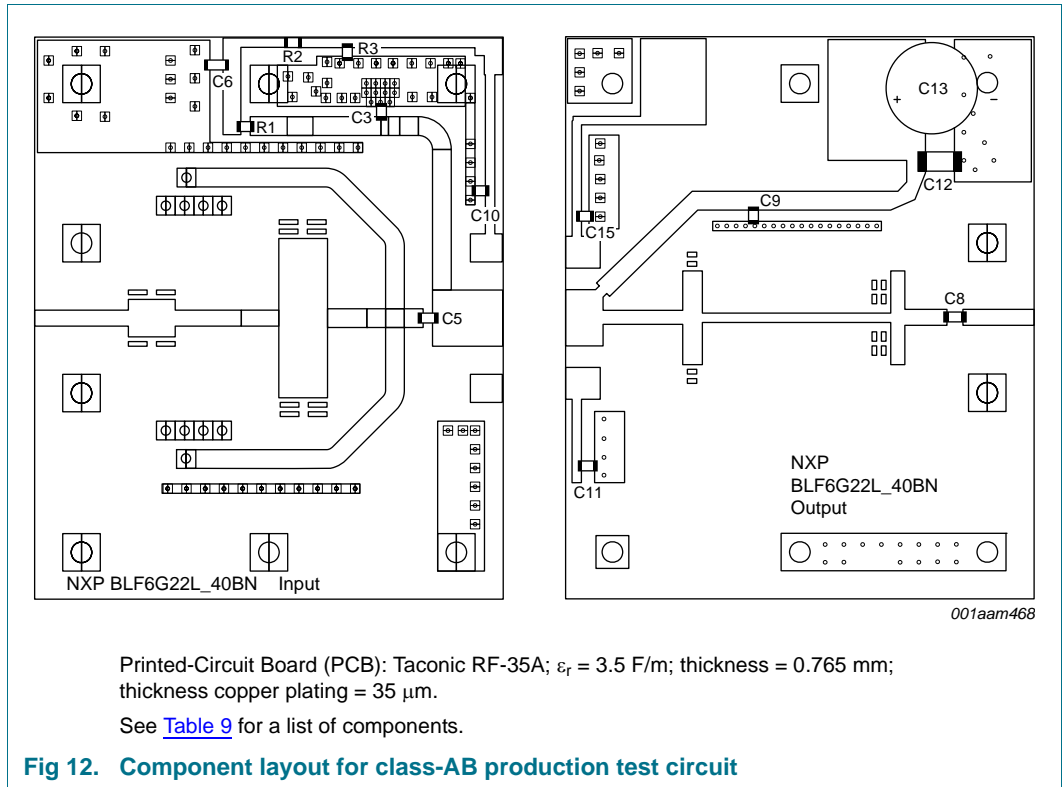
For test circuit see [Figure 12](#).

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 μF	[2]
C13	electrolytic capacitor	470 μF; 63 V	
R1	SMD resistor	10 Ω	Philips 0603
R2	SMD resistor	820 Ω	Philips 0603
R3	SMD resistor	1.8 kΩ	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.

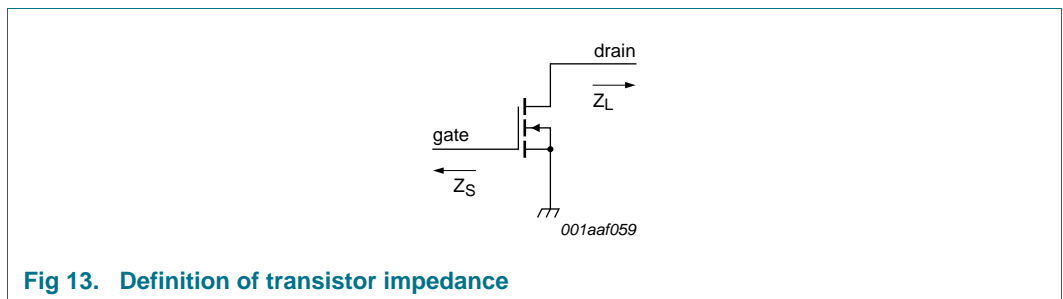


8.8 Impedance information

Table 10. Typical impedance

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

f (MHz)	Z_S (Ω)	Z_L (Ω)
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



9. Package outline

Earless flanged ceramic package; 6 leads

SOT1112B

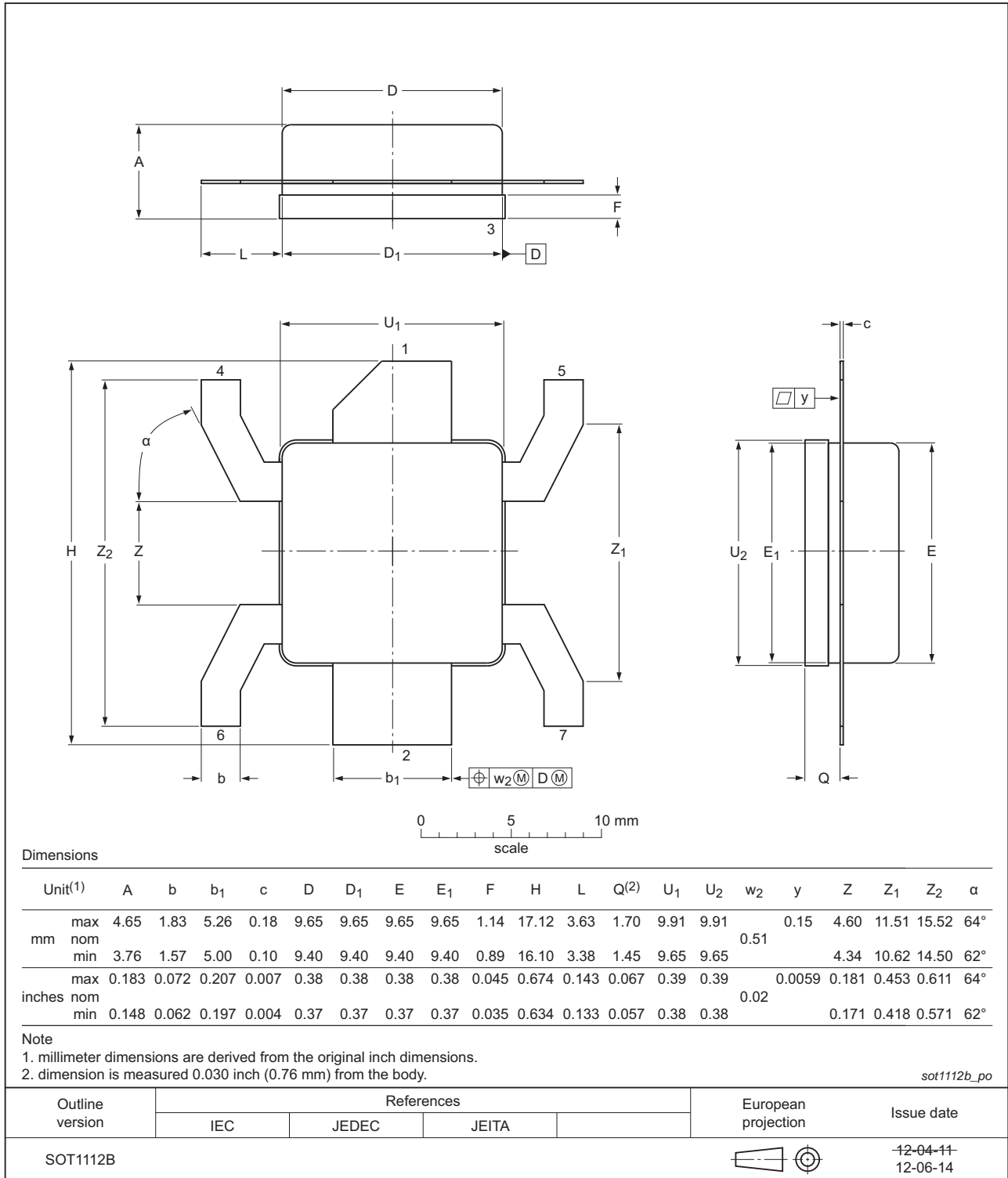


Fig 14. Package outline SOT1112B

10. Handling information

CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices.

Such precautions are described in the *ANSI/ESD S20.20, IEC/ST 61340-5, JESD625-A* or equivalent standards.

11. Abbreviations

Table 11. Abbreviations

Acronym	Description
3GPP	3rd Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Waveform
DPCH	Dedicated Physical CHannel
ESD	ElectroStatic Discharge
IS-95	Interim Standard 95
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
MTTF	Mean Time To Failure
PAR	Peak-to-Average Ratio
SMD	Surface Mounted Device
VSWR	Voltage Standing-Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

12. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G22LS-40BN v.1	20120628	Product data sheet	-	-

13. Legal information

13.1 Data sheet status

Document status ^{[1][2]}	Product status ^[3]	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.

[1] Please consult the most recently issued document before initiating or completing a design.

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

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