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 °C in a common source class-AB production test circuit.

Mode of operation	f	V_{DS}	$P_{L(AV)}$	G_p	η_D	ACPR
	(MHz)	(V)	(W)	(dB)	(%)	(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

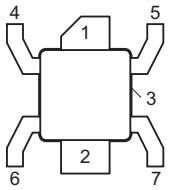
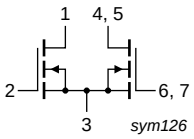
- Typical 2-carrier W-CDMA performance at frequencies of 2110 MHz and 2170 MHz, a supply voltage of 28 V and an I_{Dq} of 345 mA:
  - Average output power = 2.5 W
  - Power gain = 18.5 dB (typ)
  - Efficiency = 16 %
  - ACPR = –50 dBc
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- 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 [1]		
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 °C; P_L = 12.5 W (CW)	1.7	K/W

7. Characteristics

Table 7. Characteristics

T_j = 25 °C per section; unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.5 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 59 mA	1.4	1.9	2.4	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	1.5	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	8.8	10	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	150	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 2.9 A	-	4.3	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 2.1 A	-	0.25	-	Ω
I_{Dq}	quiescent drain current	main transitor: V_{DS} = 28 V sense transitor: I_{DS} = 7.43mA; V_{DS} = 26.7 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 MHz; f_2 = 2117.5 MHz; f_3 = 2162.5 MHz; f_4 = 2167.5 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 345 mA; T_{case} = 25 °C; unless otherwise specified; in a class-AB production test circuit

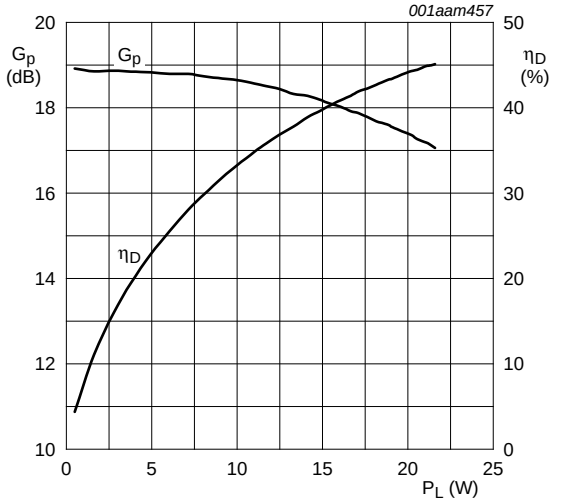
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
G_p	power gain	$P_{L(AV)}$ = 2.5 W		17.5	18.5	19.9	dB
η_D	drain efficiency	$P_{L(AV)}$ = 2.5 W		13	16	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 2.5 W		–57	–50	–45	dBc
PAR_O	output peak-to-average ratio	$P_{L(AV)}$ = 20 W	[1]	3.6	4.0	4.8	dB
RL_{in}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

8.1 Ruggedness in class-AB operation

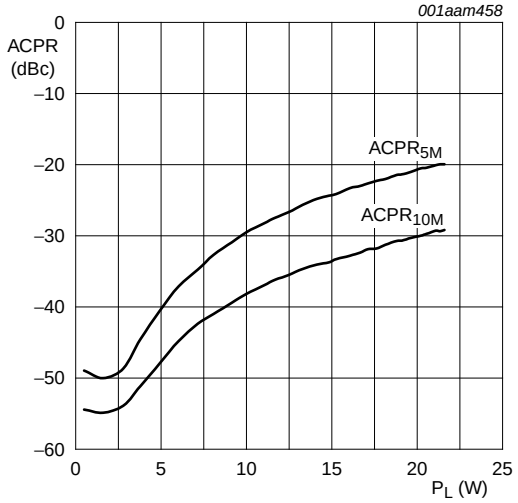
The BLF6G22LS-40BN is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 28 V; I_{Dq} = 345 mA; P_L = 40 W (CW); f = 2140 MHz.

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



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

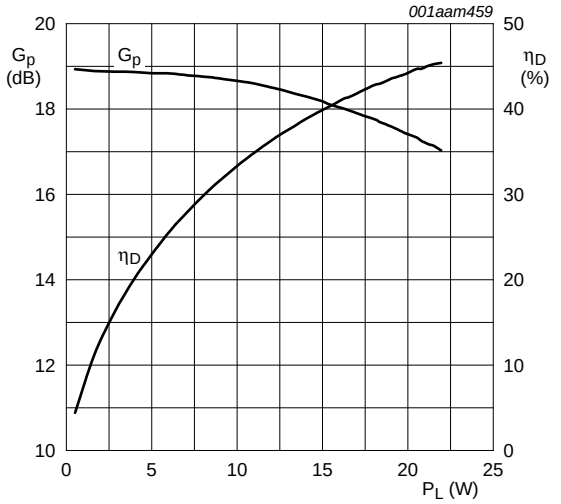
Fig 1. Power gain and drain efficiency as function of load power; typical values



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

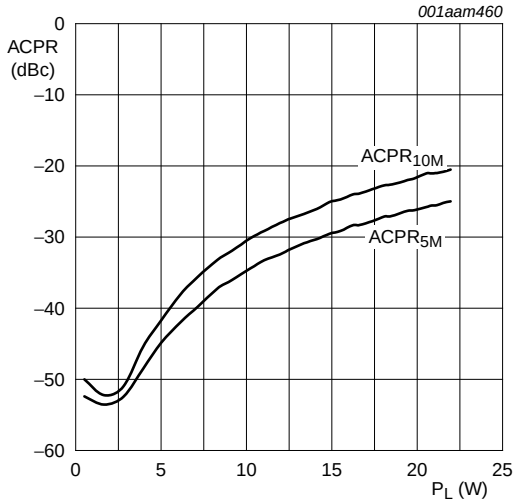
Fig 2. Adjacent channel power ratio at 5 MHz and at 10 MHz as function of load power; typical values

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



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

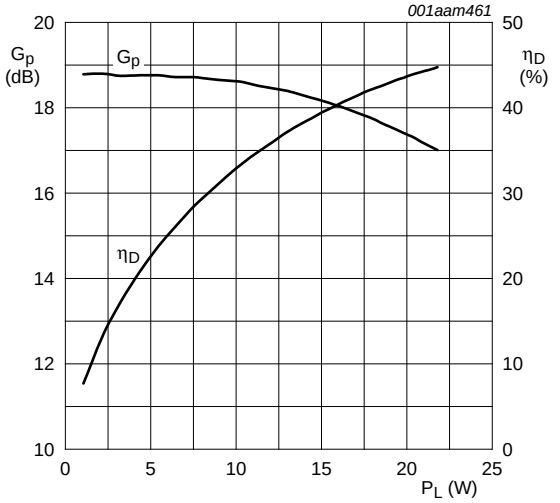
Fig 3. Power gain and drain efficiency as function of load power; typical values



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

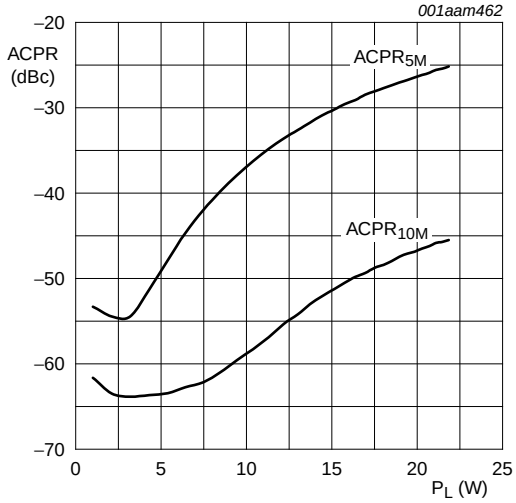
Fig 4. Adjacent channel power ratio at 5 MHz and at 10 MHz as function of load power; typical values

8.4 1-Carrier W-CDMA



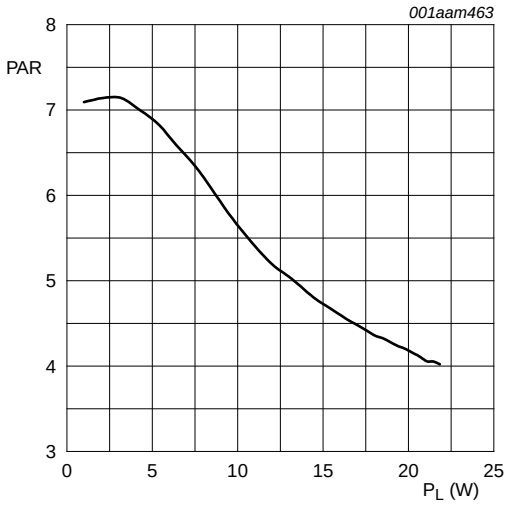
V_{DS} = 28 V; I_{Dq} = 345 mA; f = 2140 MHz.

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



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

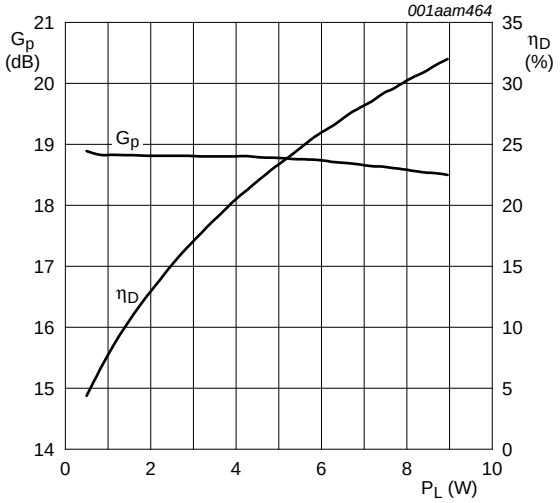
Fig 6. Adjacent channel power ratio at 5 MHz and at 10 MHz as function of load power; typical values



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

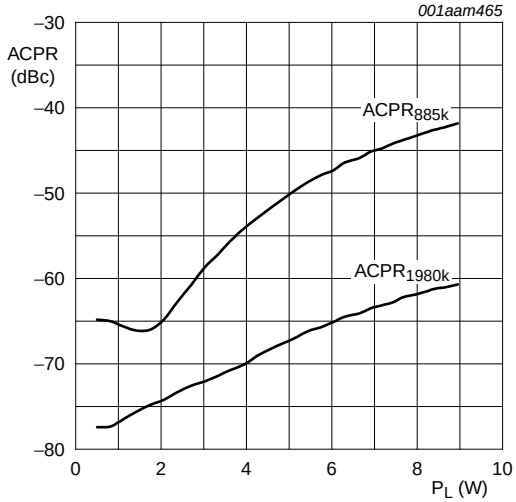
Fig 7. Peak-to-average power ratio as a function of load power; typical values

8.5 1-Carrier IS-95



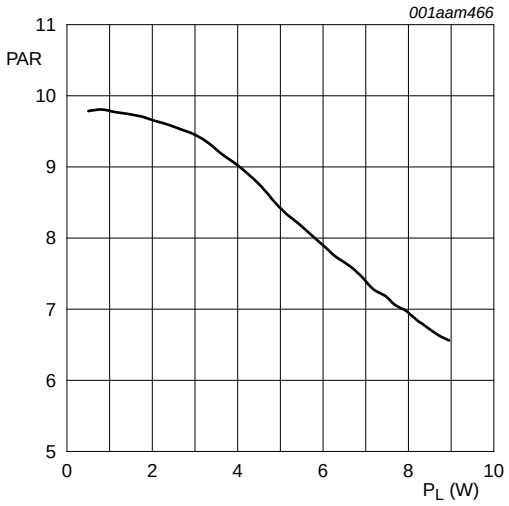
V_{DS} = 28 V; I_{Dq} = 345 mA; f = 2140 MHz.

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.

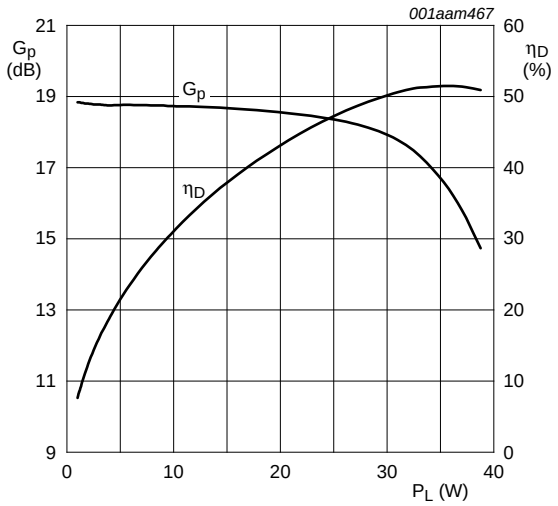
Fig 9. Adjacent channel power ratio at 885 kHz and at 1980 kHz as function of load power; typical values



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



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

Fig 11. Power gain and drain efficiency as function of load power; typical values

8.7 Test circuit

Table 9. List of components

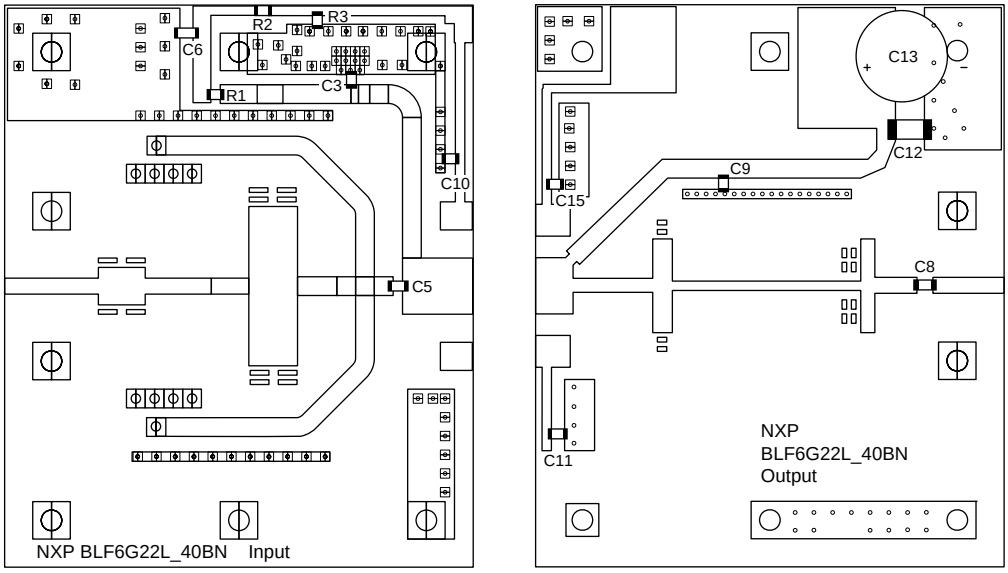
For test circuit see Figure 12.

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.



Printed-Circuit Board (PCB): Taconic RF-35A; ε_r = 3.5 F/m; thickness = 0.765 mm; thickness copper plating = 35 μm.

See Table 9 for a list of components.

Fig 12. Component layout for class-AB production test circuit

8.8 Impedance information

Table 10. Typical impedance

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

f	Z_S	Z_L
(MHz)	(Ω)	(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

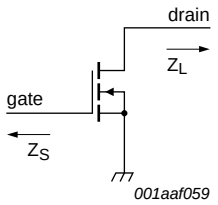
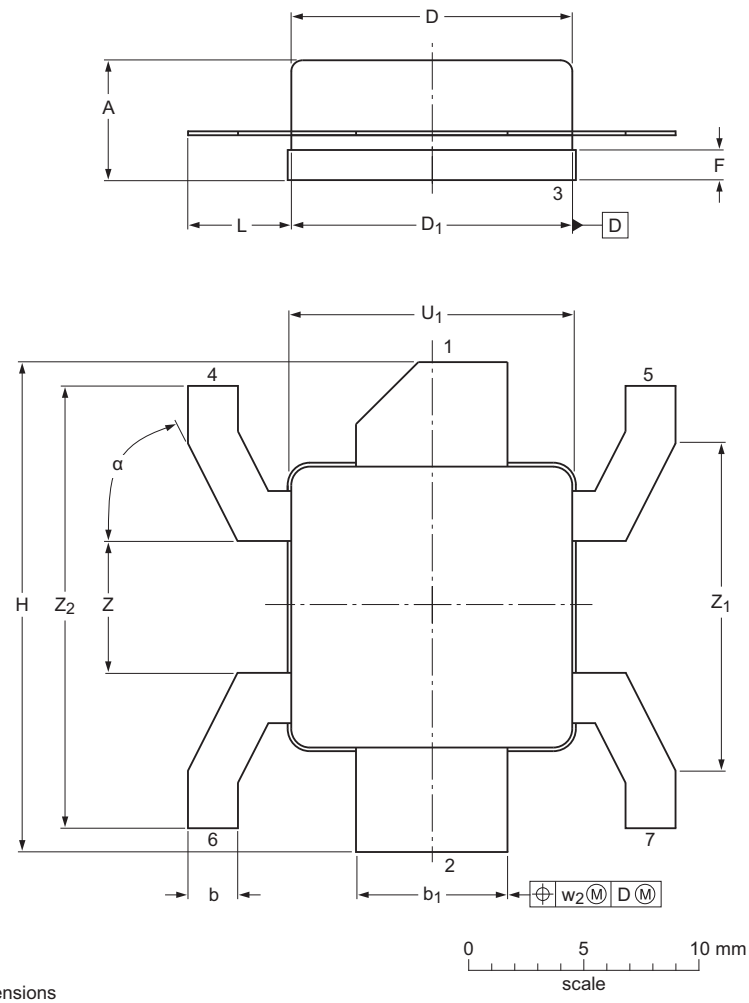


Fig 13. Definition of transistor impedance

9. Package outline

Earless flanged ceramic package; 6 leads **SOT1112B**



Dimensions

Unit(1)		A	b	b1	c	D	D1	E	E1	F	H	L	Q(2)	U1	U2	w2	y	Z	Z1	Z2	α
mm	max	4.65	1.83	5.26	0.18	9.65	9.65	9.65	9.65	1.14	17.12	3.63	1.70	9.91	9.91		0.15	4.60	11.51	15.52	64°
	nom															0.51					
	min	3.76	1.57	5.00	0.10	9.40	9.40	9.40	9.40	0.89	16.10	3.38	1.45	9.65	9.65			4.34	10.62	14.50	62°
inches	max	0.183	0.072	0.207	0.007	0.38	0.38	0.38	0.38	0.045	0.674	0.143	0.067	0.39	0.39		0.0059	0.181	0.453	0.611	64°
	nom															0.02					
	min	0.148	0.062	0.197	0.004	0.37	0.37	0.37	0.37	0.035	0.634	0.133	0.057	0.38	0.38			0.171	0.418	0.571	62°

Note
1. millimeter dimensions are derived from the original inch dimensions.
2. dimension is measured 0.030 inch (0.76 mm) from the body.

sot1112b_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1112B						~~12-04-11~~ 12-06-14

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.

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

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15. Contents

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