

# BLF7G22L-100P; BLF7G22LS-100P

Power LDMOS transistor

Rev. 3 — 2 January 2012

Product data sheet

## 1. Product profile

### 1.1 General description

100 W LDMOS power transistor for base station applications at frequencies from 2000 MHz to 2200 MHz.

**Table 1. Typical performance**

Typical RF performance at  $T_{case} = 25\text{ °C}$  in a common source class-AB production test circuit.

Test signal	f (MHz)	$I_{Dq}$ (mA)	$V_{DS}$ (V)	$P_{L(AV)}$ (W)	$G_p$ (dB)	$\eta_D$ (%)	ACPR <sub>5M</sub> (dBc)
2-carrier W-CDMA	2110 to 2170	720	28	20	19.1	28.5	-34 <sup>[1]</sup>

[1] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on CCDF; carrier spacing 5 MHz.

### 1.2 Features and benefits

- Excellent ruggedness
- High efficiency
- Low  $R_{th}$  providing excellent thermal stability
- Designed for broadband operation (2000 MHz to 2200 MHz)
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

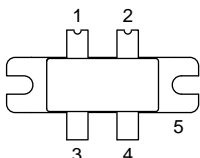
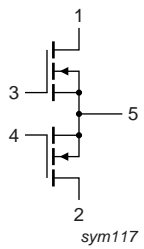
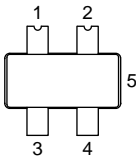
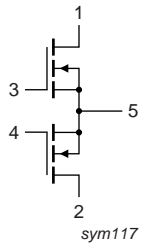
### 1.3 Applications

- 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
<b>BLF7G22L-100P (SOT1121A)</b>			
1	drain1		 sym117
2	drain2		
3	gate1		
4	gate2		
5	source		
<b>BLF7G22LS-100P (SOT1121B)</b>			
1	drain1		 sym117
2	drain2		
3	gate1		
4	gate2		
5	source		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF7G22L-100P	-	flanged LDMOST ceramic package; 2 mounting holes; 4 leads	SOT1121A
BLF7G22LS-100P	-	earless flanged LDMOST ceramic package; 4 leads	SOT1121B

## 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
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	200	°C

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}$ ; $P_L = 20\text{ W}$	0.36	K/W

## 6. Characteristics

**Table 6. 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	$V_{GS} = 0\text{ V}$ ; $I_D = 0.6\text{ mA}$	65	70	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$ ; $I_D = 60\text{ mA}$	1.5	2	2.3	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 28\text{ V}$	-	-	2	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $V_{DS} = 10\text{ V}$	-	12.3	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$	-	-	200	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}$ ; $I_D = 60\text{ mA}$	-	530	-	mS
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $I_D = 2100\text{ mA}$	-	240	-	$\text{m}\Omega$

## 7. Test information

**Table 7. Functional test information**

Test signal: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on the CCDF; 3GPP test model 1, 1-64 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  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 720\text{ mA}$ ;  $T_{case} = 25\text{ °C}$ ; 2 sections combined unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{L(AV)}$	average output power		-	20	-	W
$G_p$	power gain	$P_{L(AV)} = 20\text{ W}$	17.8	19.1	-	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 20\text{ W}$	-	-16	-9	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 20\text{ W}$	24	28.5	-	%
$ACPR_{5M}$	adjacent channel power ratio (5 MHz)	$P_{L(AV)} = 20\text{ W}$	-	-34	-28	dBc

### 7.1 Ruggedness in class-AB operation

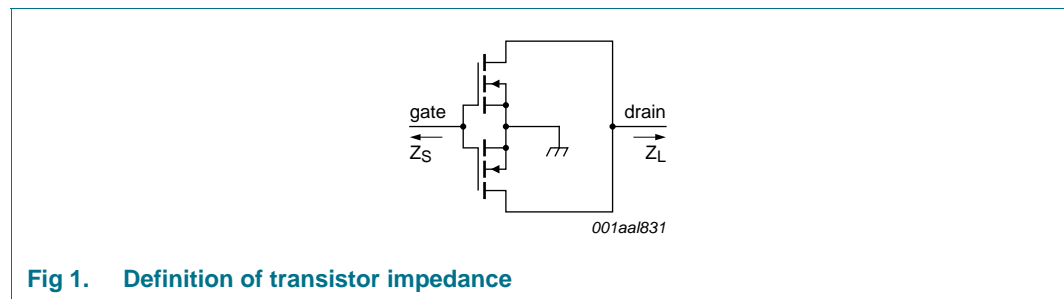
The BLF7G22L-100P and BLF7G22LS-100P are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 720\text{ mA}$ ;  $P_L = 100\text{ W}$  (CW);  $f = 2110\text{ MHz}$ .

## 7.2 Impedance information

**Table 8. Typical push-pull impedance**

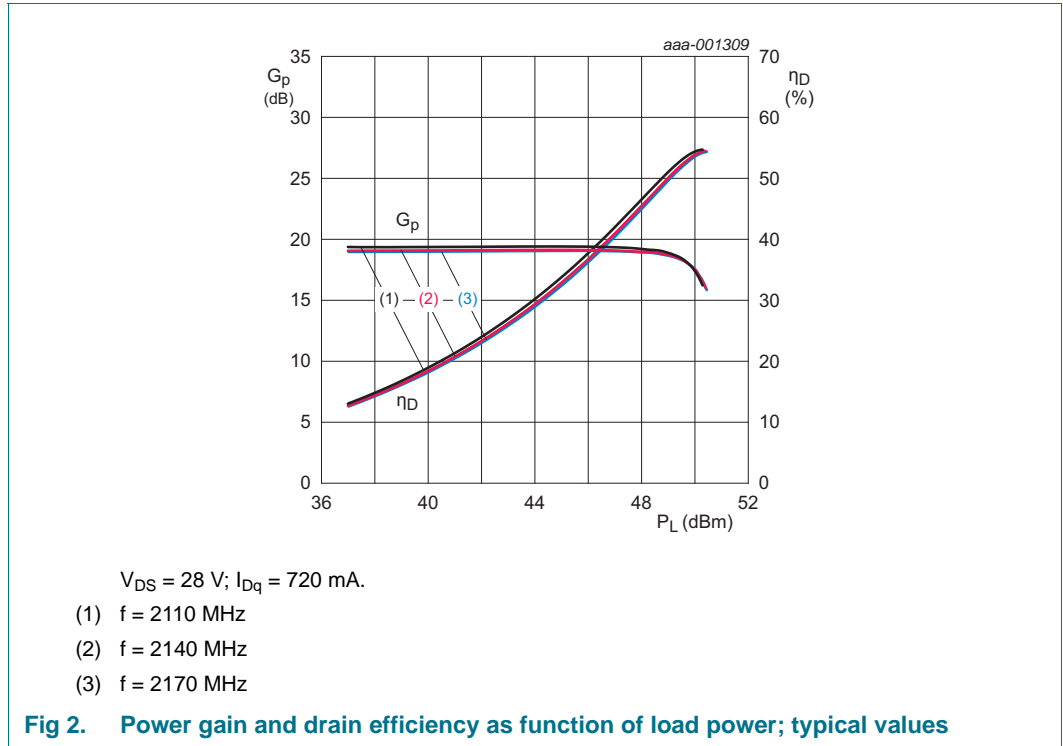
Measured load pull data. Typical values unless otherwise specified.

f MHz	Z <sub>S</sub> Ω	Z <sub>L</sub> Ω
2110	1.79 – j4.95	2.27 – j3.64
2140	2.37 – j5.49	2.27 – j3.64
2170	2.54 – j5.86	1.84 – j3.57

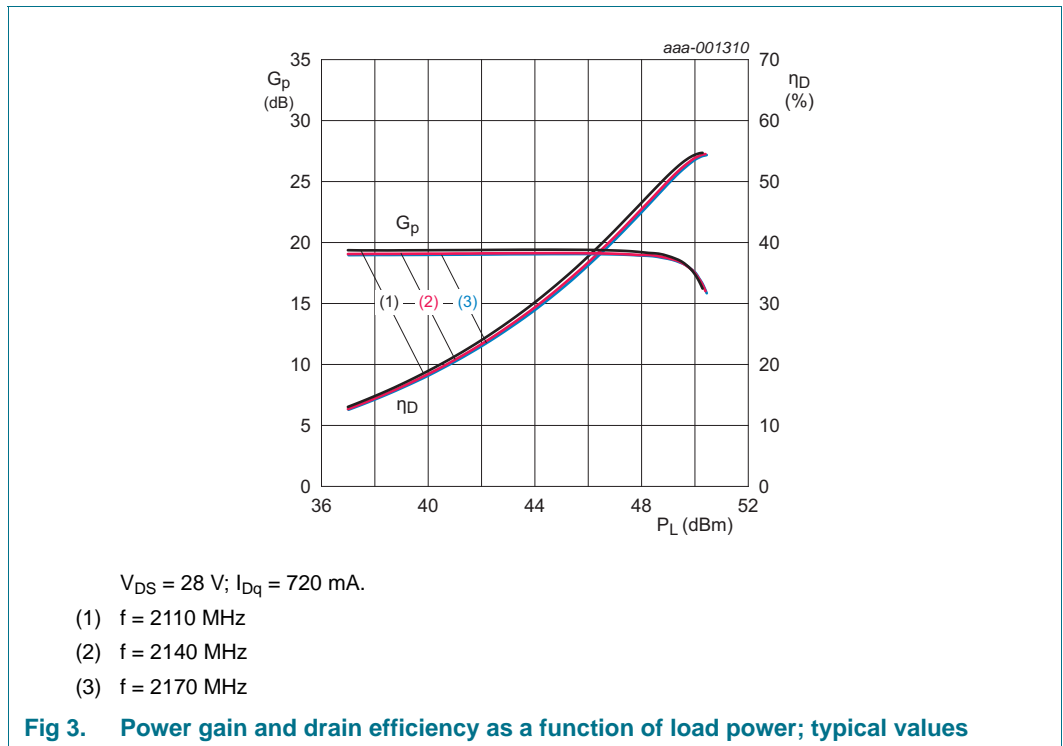


**Fig 1. Definition of transistor impedance**

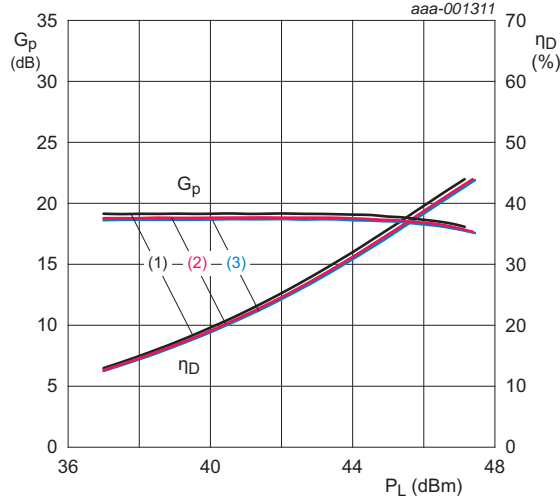
## 7.3 One Tone CW



## 7.4 One Tone CW-Pulsed

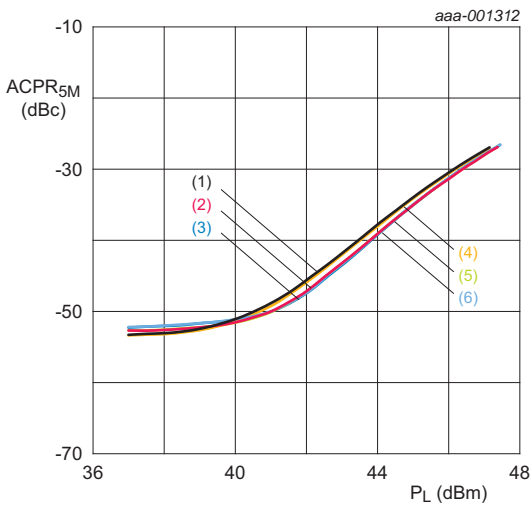


7.5 1-Carrier W-CDMA



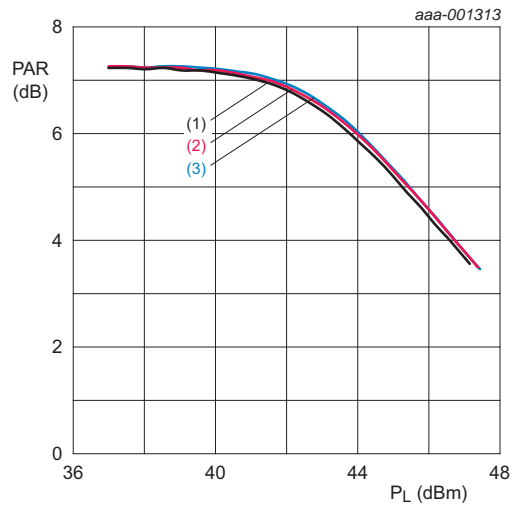
$V_{DS} = 28\text{ V}; I_{Dq} = 720\text{ mA}.$   
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

Fig 4. Power gain and drain efficiency as a function of load power; typical values



$V_{DS} = 28\text{ V}; I_{Dq} = 720\text{ mA}.$   
 (1)  $f = 2110\text{ MHz}; f + 5\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}; f + 5\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}; f + 5\text{ MHz}$   
 (4)  $f = 2110\text{ MHz}; f - 5\text{ MHz}$   
 (5)  $f = 2140\text{ MHz}; f - 5\text{ MHz}$   
 (6)  $f = 2170\text{ MHz}; f - 5\text{ MHz}$

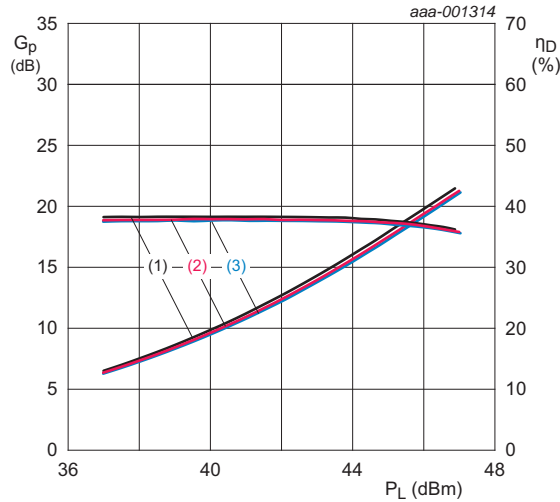
Fig 5. Adjacent channel power ratio ( $\pm 5\text{ MHz}$ ) as a function of load power; typical values



$V_{DS} = 28\text{ V}; I_{Dq} = 720\text{ mA}.$   
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

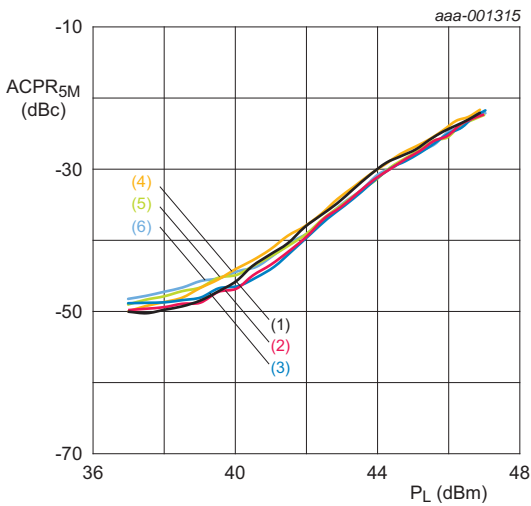
Fig 6. Peak-to-average ratio as a function of load power; typical values

7.6 2-Carrier W-CDMA



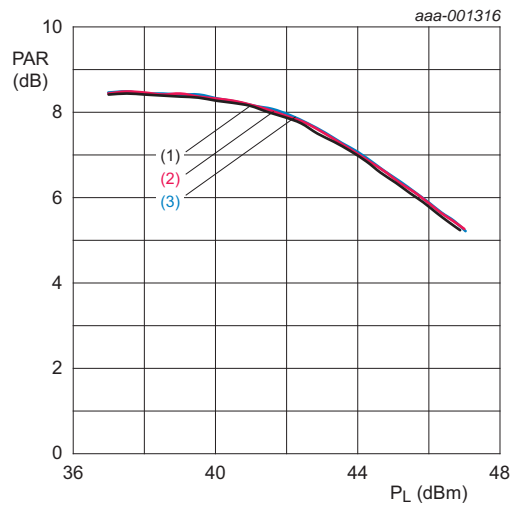
$V_{DS} = 28\text{ V}; I_{Dq} = 720\text{ mA}.$   
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

Fig 7. Power gain and drain efficiency as a function of load power; typical values



$V_{DS} = 28\text{ V}; I_{Dq} = 720\text{ mA}.$   
 (1)  $f = 2110\text{ MHz}; f + 5\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}; f + 5\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}; f + 5\text{ MHz}$   
 (4)  $f = 2110\text{ MHz}; f - 5\text{ MHz}$   
 (5)  $f = 2140\text{ MHz}; f - 5\text{ MHz}$   
 (6)  $f = 2170\text{ MHz}; f - 5\text{ MHz}$

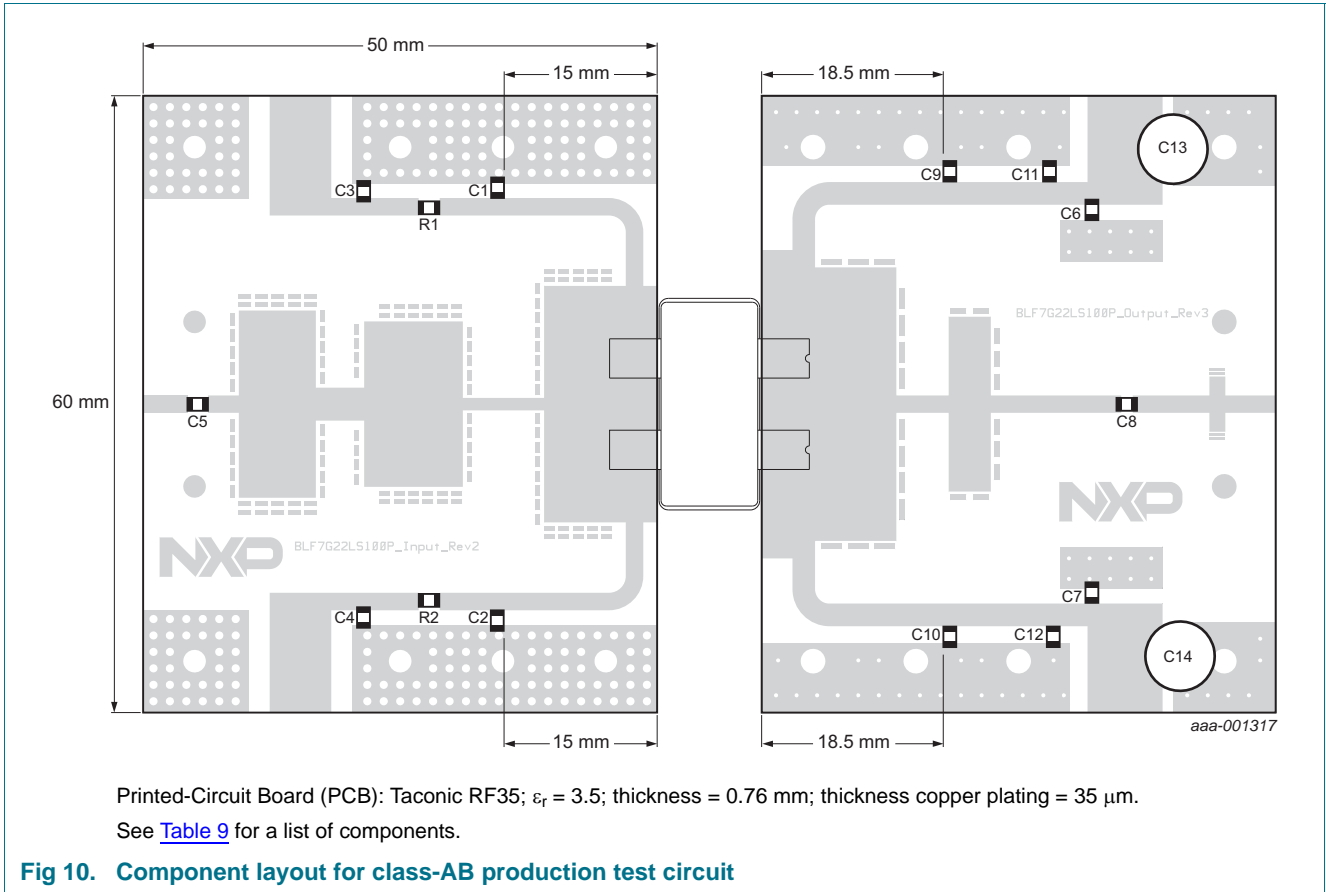
Fig 8. Adjacent channel power ratio ( $\pm 5\text{ MHz}$ ) as a function of load power; typical values



$V_{DS} = 28\text{ V}; I_{Dq} = 720\text{ mA}.$   
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

Fig 9. Peak-to-average ratio as a function of load power; typical values

7.7 Test circuit



**Table 9. List of components**

For test circuit see [Figure 10](#).

Component	Description	Value	Remarks
C1, C2, C9, C10	multilayer ceramic chip capacitor	8.2 pF	[1]
C3, C4, C6, C7	multilayer ceramic chip capacitor	1 $\mu\text{F}$	Murata
C5, C8	multilayer ceramic chip capacitor	33 pF	[2]
C11, C12	multilayer ceramic chip capacitor	0.1 $\mu\text{F}$	Murata
C13, C14	electrolytic capacitor	1000 $\mu\text{F}$ ; 50 V	
R1, R2	Chip resistor	5.1 $\Omega$	Vishay Dale 0805

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

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



8. Package outline

Flanged LDMOST ceramic package; 2 mounting holes; 4 leads

SOT1121A

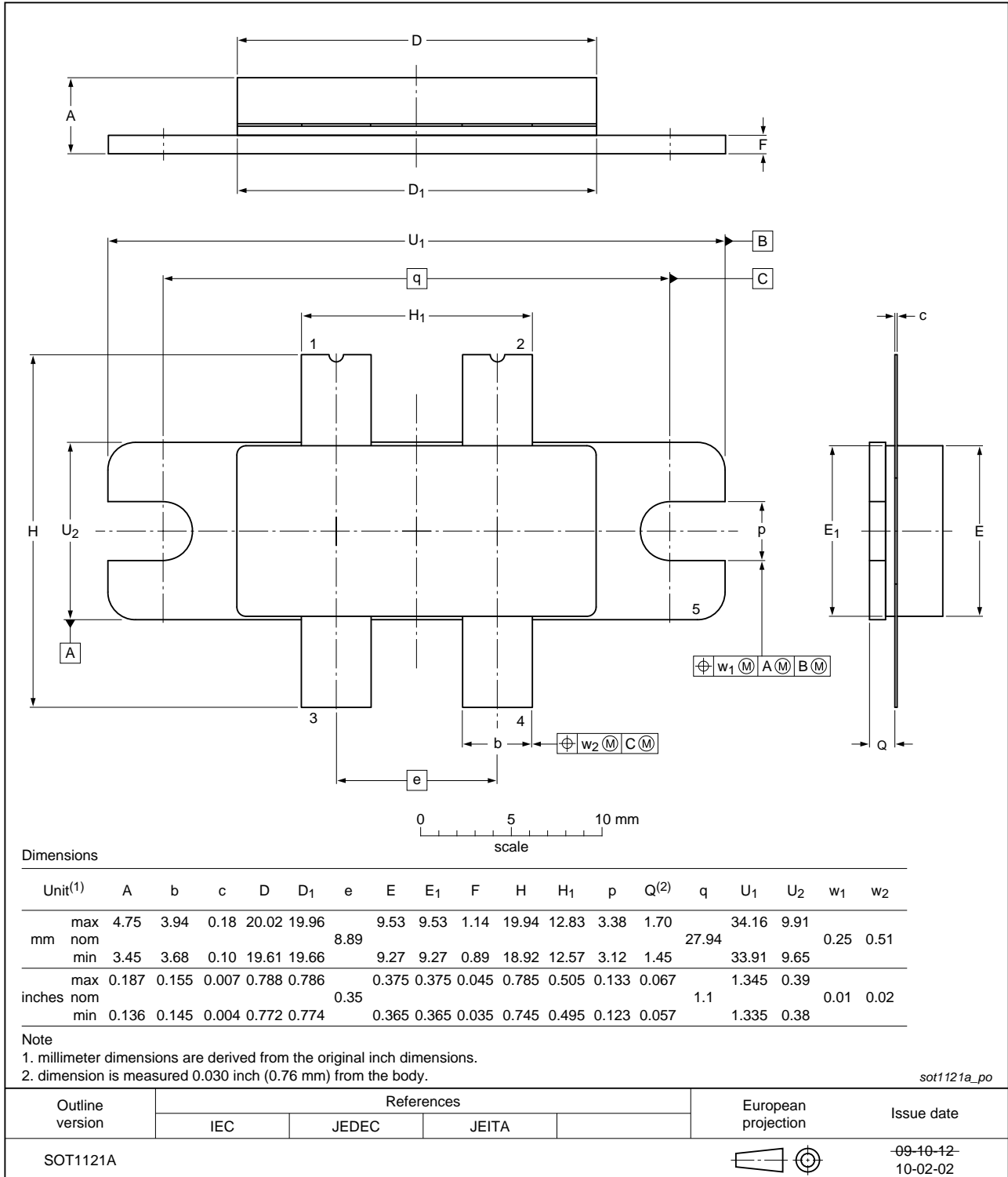


Fig 11. Package outline SOT1121A

Earless flanged LDMOST ceramic package; 4 leads

SOT1121B

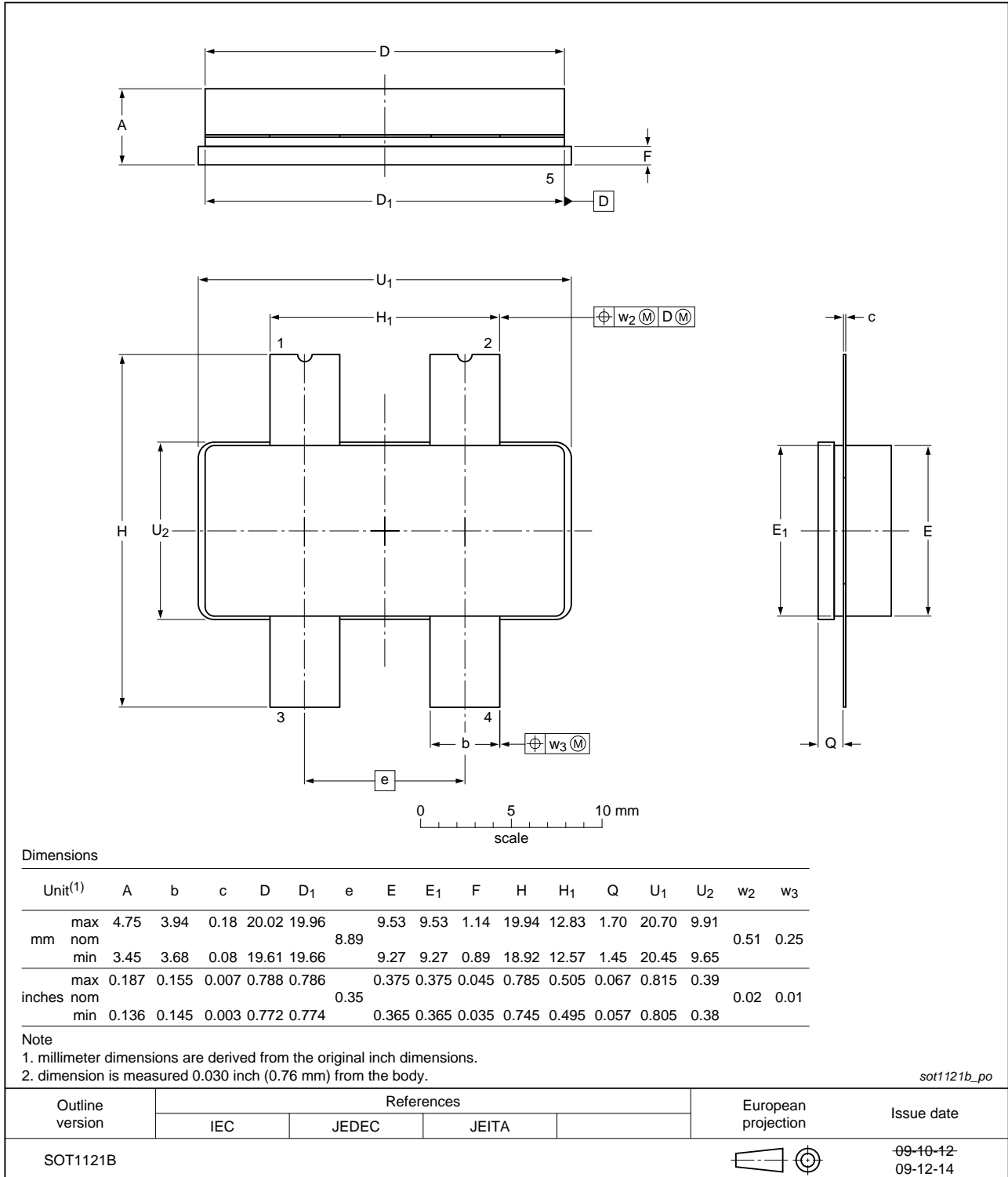


Fig 12. Package outline SOT1121B

## 9. Abbreviations

**Table 10. Abbreviations**

Acronym	Description
3GPP	Third Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical Channel
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal Oxide Semiconductor
LDMOST	Laterally Diffused Metal Oxide Semiconductor Transistor
PAR	Peak-to-Average power Ratio
PDPCH	Transmission Power of Dedicated Physical Channel
RF	Radio Frequency
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
BLF7G22L-100P_BLF7G22LS-100P v.3	20120102	Product data sheet	-	BLF7G22L-100P_BLF7G22LS-100P v.2
Modifications:		<ul style="list-style-type: none"> <li>The status of this document has been changed to Product data sheet.</li> <li><a href="#">Figure 1 on page 4</a>: figure has been changed.</li> </ul>		
BLF7G22L-100P_BLF7G22LS-100P v.2	20111110	Preliminary data sheet	-	BLF7G22L-100P_BLF7G22LS-100P v.1
BLF7G22L-100P_BLF7G22LS-100P v.1	20110519	Objective data sheet	-	-

## 11. 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.
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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