

# BLF8G22LS-200V; BLF8G22LS-200GV

Power LDMOS transistor

Rev. 2 — 10 December 2012

Product data sheet

## 1. Product profile

### 1.1 General description

200 W LDMOS power transistor with improved video bandwidth for base station applications at frequencies from 2110 MHz to 2170 MHz.

**Table 1. Typical performance**

Typical RF performance at  $T_{case} = 25\text{ }^{\circ}\text{C}$  in a common source class-AB production test circuit, tested on straight lead device.

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	2000	28	55	19.0	29	-30 <a href="#">[1]</a>

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

### 1.2 Features and benefits

- Excellent ruggedness
- High efficiency
- Low  $R_{th}$  providing excellent thermal stability
- Designed for broadband operation
- Decoupling leads to enable improved video bandwidth (80 MHz typical)
- 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 base stations and multi carrier applications in the 2110 MHz to 2170 MHz frequency range



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
<b>BLF8G22LS-200V (SOT1244B)</b>			
1	drain		 aaa-003619
2	gate		
3	source		
4	video lead		
5	video lead		
6	n.c.		
7	n.c.		
<b>BLF8G22LS-200GV (SOT1244C)</b>			
1	drain		 aaa-003619
2	gate		
3	source		
4	video lead		
5	video lead		
6	n.c.		
7	n.c.		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF8G22LS-200V	-	earless flanged ceramic package; 6 leads	SOT1244B
BLF8G22LS-200GV	-	earless flanged ceramic package; 6 leads	SOT1244C

## 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		-	225	°C

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}; P_L = 45\text{ W}$	0.26	K/W

## 6. Characteristics

**Table 6. DC 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	$V_{GS} = 0\text{ V}; I_D = 3.3\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 330\text{ mA}$	1.5	1.8	2.3	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	4.2	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	62.4	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	420	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 330\text{ mA}$	-	2.85	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 11.55\text{ A}$	-	0.05	-	$\Omega$

**Table 7. RF characteristics**

Test signal: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on the CCDF; 3GPP test model 1; 1-64 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  $V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}; T_{case} = 25\text{ °C}$ ; unless otherwise specified; in a class-AB production test circuit, tested on straight lead device.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(AV)} = 55\text{ W}$	17.8	19.0	-	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 55\text{ W}$	-	-13	-7	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 55\text{ W}$	26	29	-	%
$ACPR_{5M}$	adjacent channel power ratio (5 MHz)	$P_{L(AV)} = 55\text{ W}$	-	-30	-26	dBc

## 7. Test information

### 7.1 Ruggedness in class-AB operation

The BLF8G22LS-200V and BLF8G22LS-200GV are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}; P_L = 200\text{ W (CW)}; f = 2110\text{ MHz}$ .

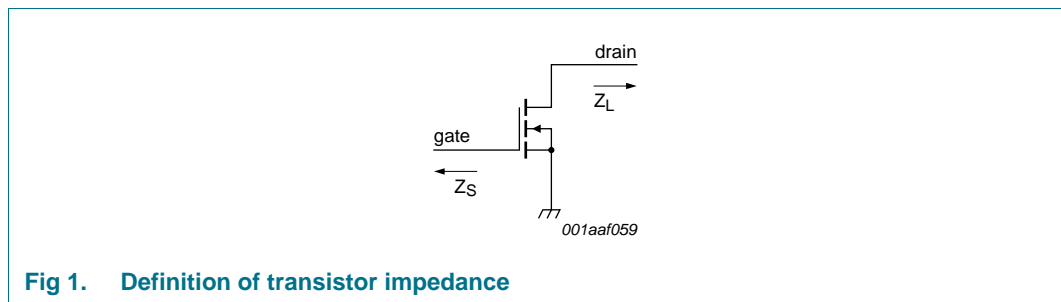
**7.2 Impedance information**

**Table 8. Typical impedance information**

$I_{Dq} = 2000\text{ mA}$ ; main transistor  $V_{DS} = 28\text{ V}$ .

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

<b>f</b> <b>(MHz)</b>	<b><math>Z_S</math></b> <b>(<math>\Omega</math>)</b>	<b><math>Z_L</math></b> <b>(<math>\Omega</math>)</b>
<b>BLF8G22LS-200V</b>		
2110	0.84 – j4.17	2.07 – j2.39
2140	0.95 – j4.43	2.23 – j2.41
2170	1.12 – j5.68	2.53 – j2.40
<b>BLF8G22LS-200GV</b>		
2110	0.77 – j6.22	2.00 – j4.20
2140	0.80 – j6.34	2.33 – j4.00
2170	1.00 – j6.61	2.55 – j4.00



**Fig 1. Definition of transistor impedance**

7.3 Test circuit

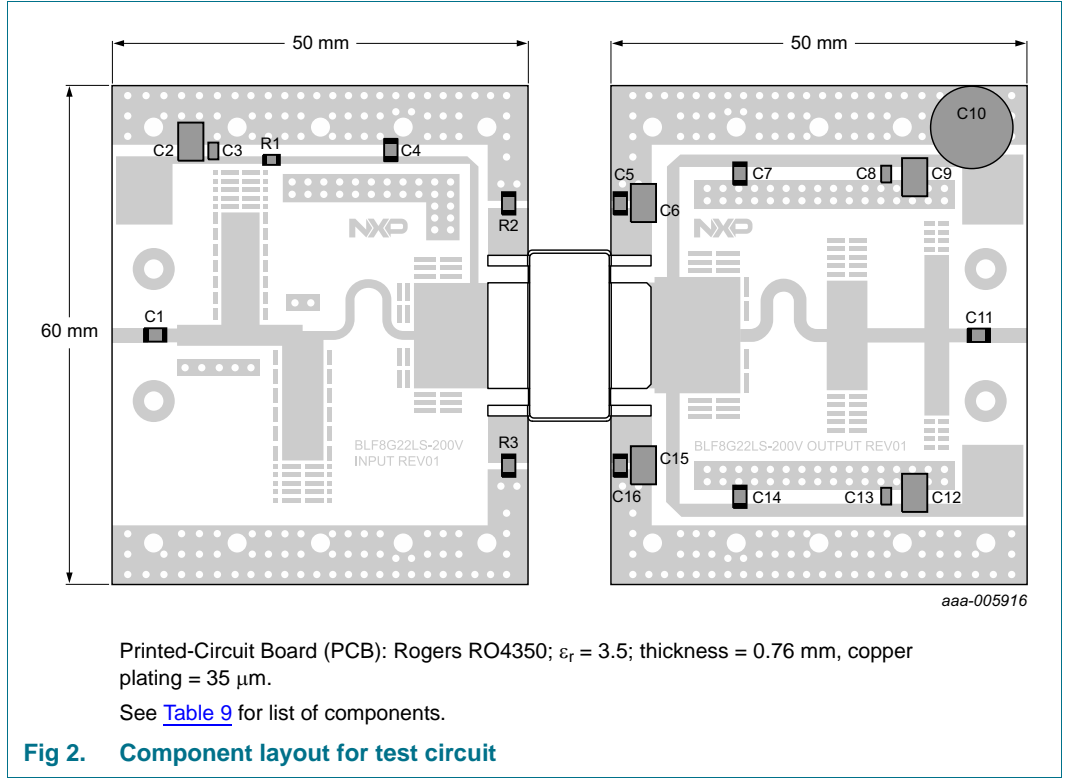


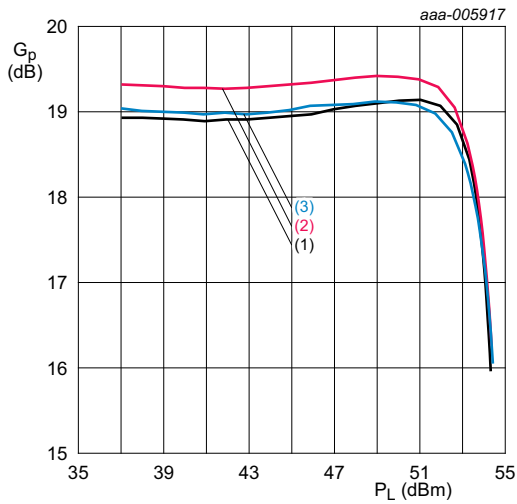
Table 9. List of components

For test circuit, see [Figure 2](#).

Component	Description	Value	Remarks
C1, C4, C7, C11, C14	multilayer ceramic chip capacitor	8.2 pF	ATC100B; vertically mounted
C2	multilayer ceramic chip capacitor	1 $\mu\text{F}$	Murata
C3, C5, C16	multilayer ceramic chip capacitor	100 nF	Murata
C8, C13	multilayer ceramic chip capacitor	220 nF, 50 V	Murata
C6, C9, C12, C15	multilayer ceramic chip capacitor	4.7 $\mu\text{F}$ , 50 V	Murata
C10	electrolytic capacitor	>470 $\mu\text{F}$ , 50 V	low ESR
R1	resistor	2.2 $\Omega$	SMD 0805; tolerance = 1 %
R2, R3	resistor	0 $\Omega$	SMD 0805

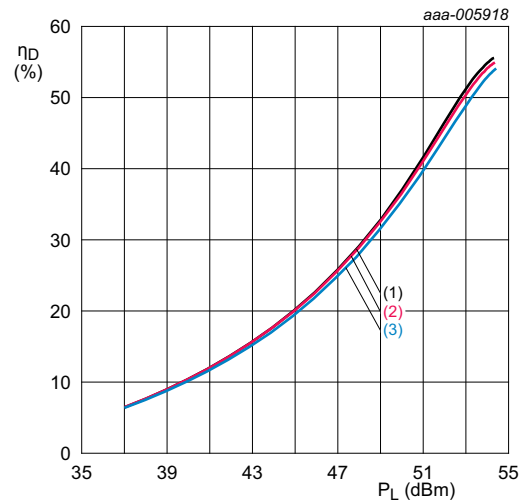
**7.4 Graphs**

**7.4.1 Pulsed CW**



$V_{DS} = 28\text{ V}; I_{DQ} = 2000\text{ mA}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .  
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

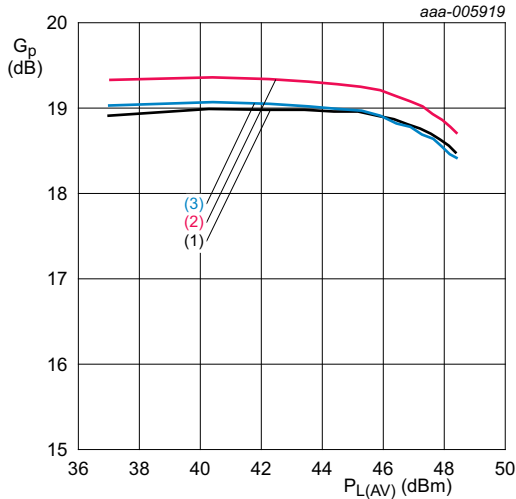
**Fig 3. Power gain as a function of output power; typical values**



$V_{DS} = 28\text{ V}; I_{DQ} = 2000\text{ mA}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .  
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

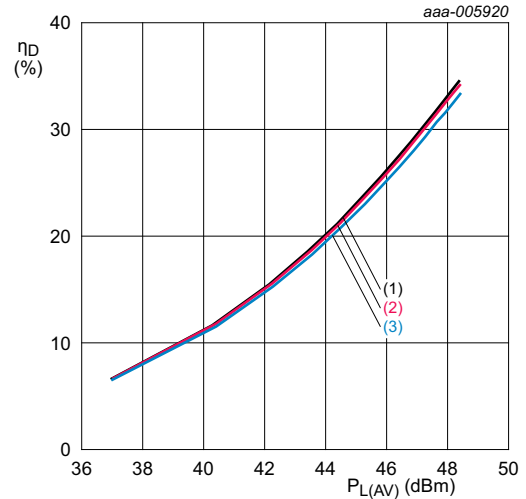
**Fig 4. Drain efficiency as a function of output power; typical values**

7.4.2 IS-95



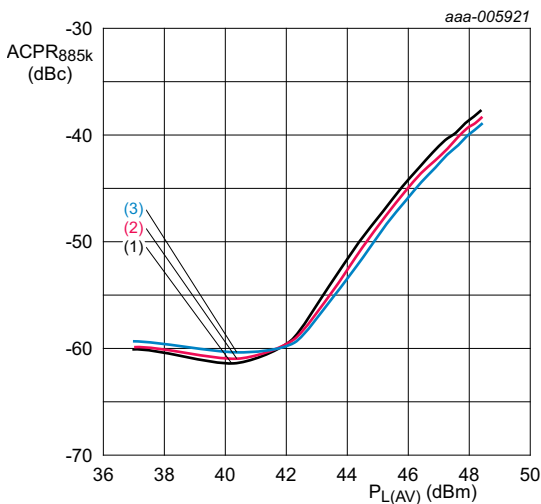
$V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}.$   
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

**Fig 5. Power gain as a function of average output power; typical values**



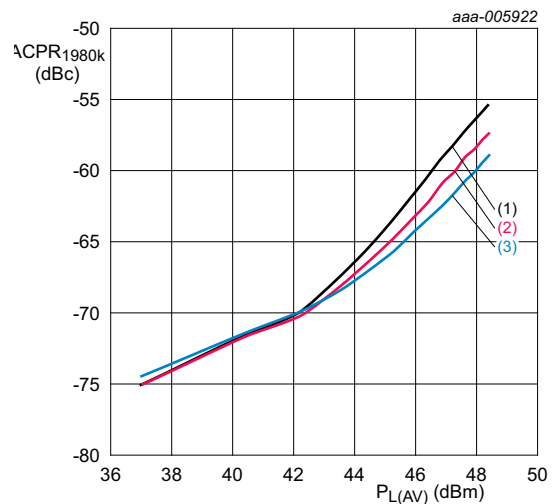
$V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}.$   
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

**Fig 6. Drain efficiency as a function of average output power; typical values**



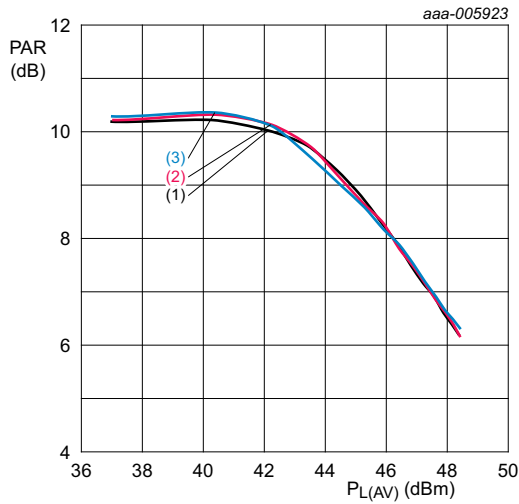
$V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}.$   
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

**Fig 7. Adjacent channel power ratio (885 kHz) as a function of average output power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}.$   
 (1)  $f = 2110\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2170\text{ MHz}$

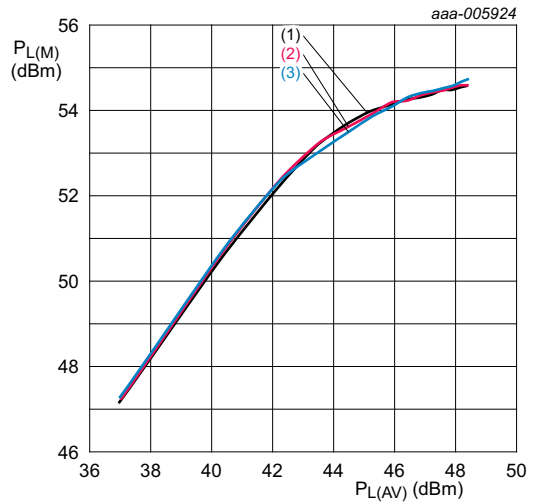
**Fig 8. Adjacent channel power ratio (1980 kHz) as a function of average output power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 2000\text{ mA}$ .

- (1)  $f = 2110\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$
- (3)  $f = 2170\text{ MHz}$

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

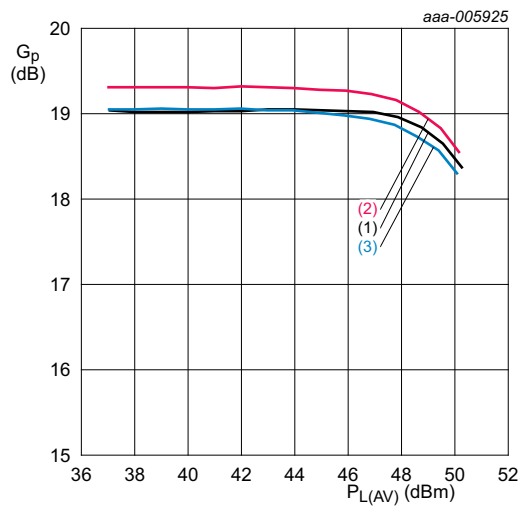


$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 2000\text{ mA}$ .

- (1)  $f = 2110\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$
- (3)  $f = 2170\text{ MHz}$

Fig 10. Peak output power as a function of average output power; typical values

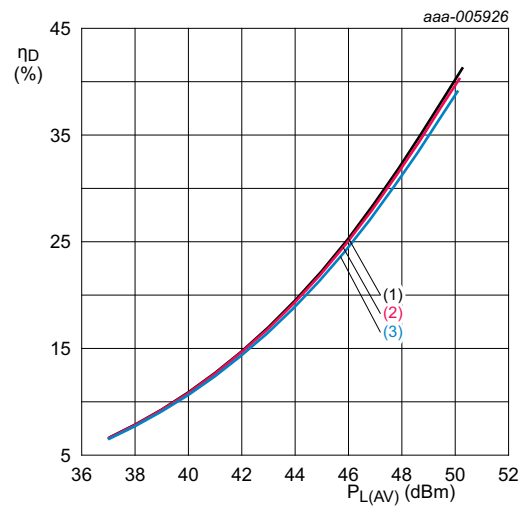
7.4.3 1-Carrier W-CDMA



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 2000\text{ mA}$ .

- (1)  $f = 2112.5\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$
- (3)  $f = 2167.5\text{ MHz}$

Fig 11. Power gain as a function of average output power; typical values

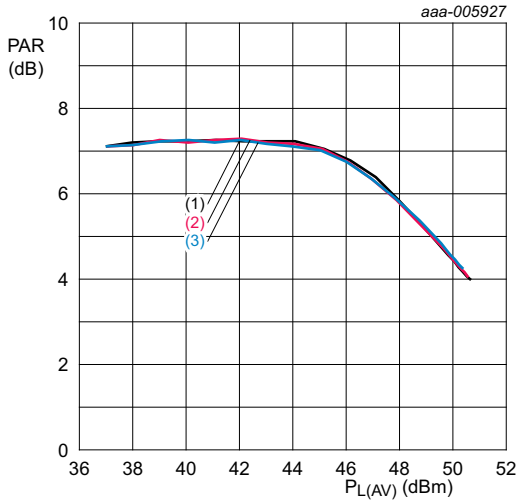


$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 2000\text{ mA}$ .

- (1)  $f = 2112.5\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$
- (3)  $f = 2167.5\text{ MHz}$

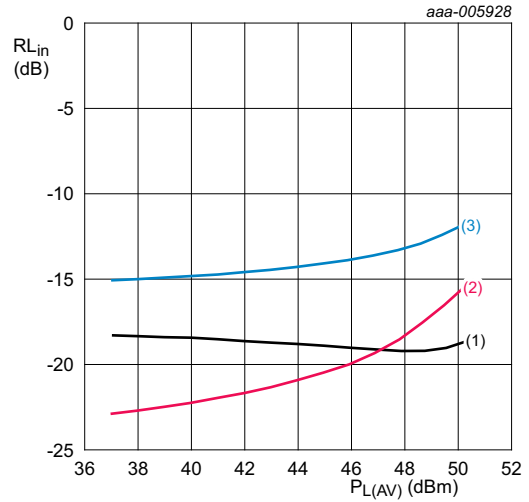
Fig 12. Drain efficiency as a function of average output power; typical values





$V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}.$   
 (1)  $f = 2112.5\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2167.5\text{ MHz}$

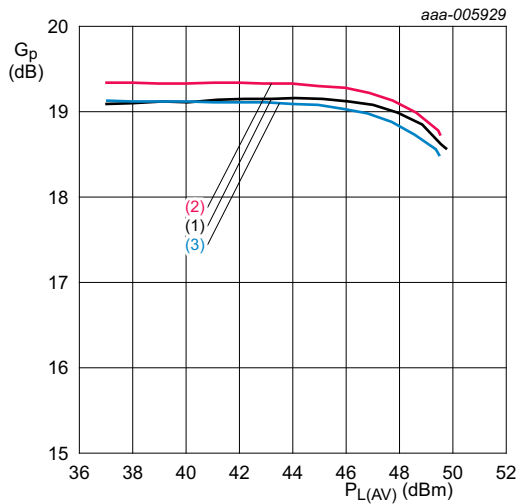
**Fig 13. Peak-to-average power ratio as a function of average output power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}.$   
 (1)  $f = 2112.5\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2167.5\text{ MHz}$

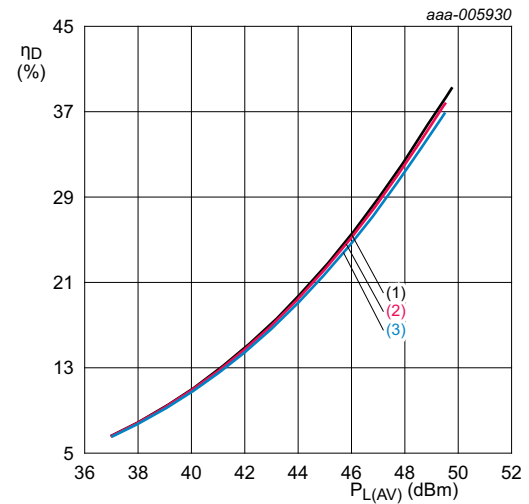
**Fig 14. Input return loss as a function of average output power; typical values**

7.4.4 2-Carrier W-CDMA



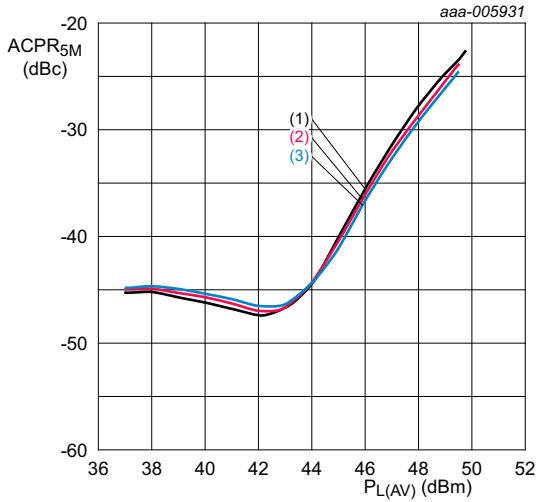
$V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}; 5\text{ MHz carrier spacing}.$   
 (1)  $f = 2115\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2165\text{ MHz}$

**Fig 15. Power gain as a function of average output power; typical values**



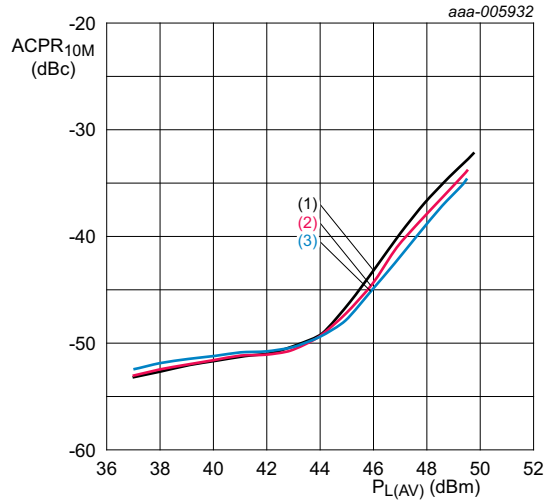
$V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}; 5\text{ MHz carrier spacing}.$   
 (1)  $f = 2115\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2165\text{ MHz}$

**Fig 16. Drain efficiency as a function of average output power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 2000\text{ mA}$ ; 5 MHz carrier spacing.  
 (1)  $f = 2115\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2165\text{ MHz}$

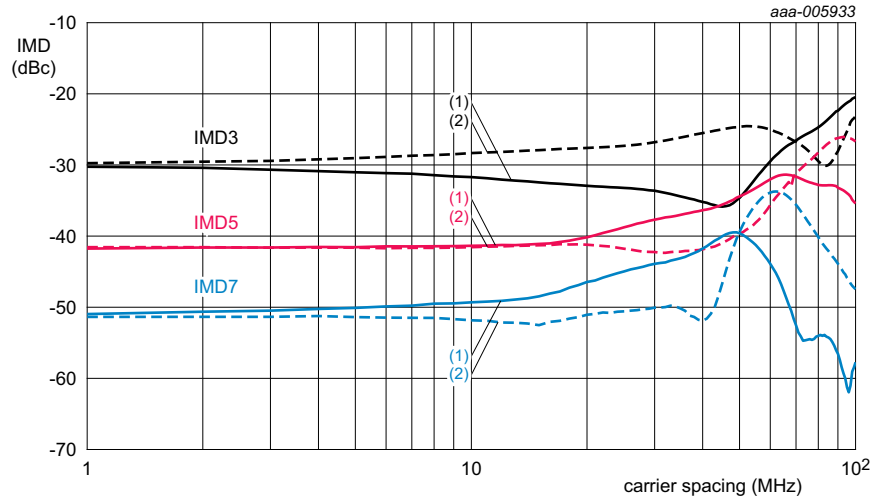
**Fig 17. Adjacent channel power ratio (5 MHz) as a function of average output power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 2000\text{ mA}$ ; 5 MHz carrier spacing.  
 (1)  $f = 2115\text{ MHz}$   
 (2)  $f = 2140\text{ MHz}$   
 (3)  $f = 2165\text{ MHz}$

**Fig 18. Adjacent channel power ratio (10 MHz) as a function of average output power; typical values**

7.4.5 2-Tone VBW



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 2000\text{ mA}$ ;  $f = 2140\text{ MHz}$ .  
 (1) IMD low  
 (2) IMD high

**Fig 19. VBW capability in class-AB test circuit**

8. Package outline

Earless flanged ceramic package; 6 leads

SOT1244B

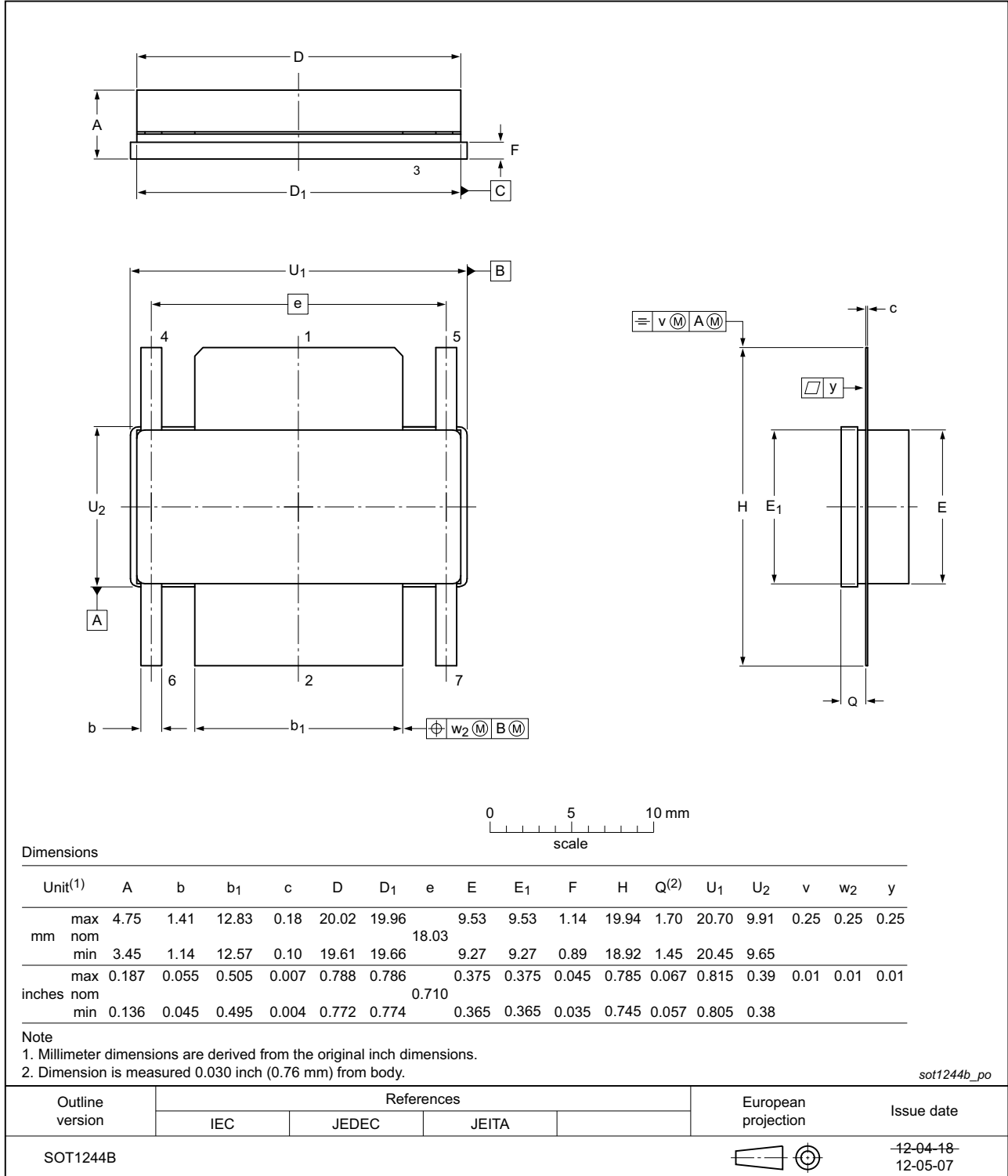


Fig 20. Package outline SOT1244B

Earless flanged ceramic package; 6 leads

SOT1244C

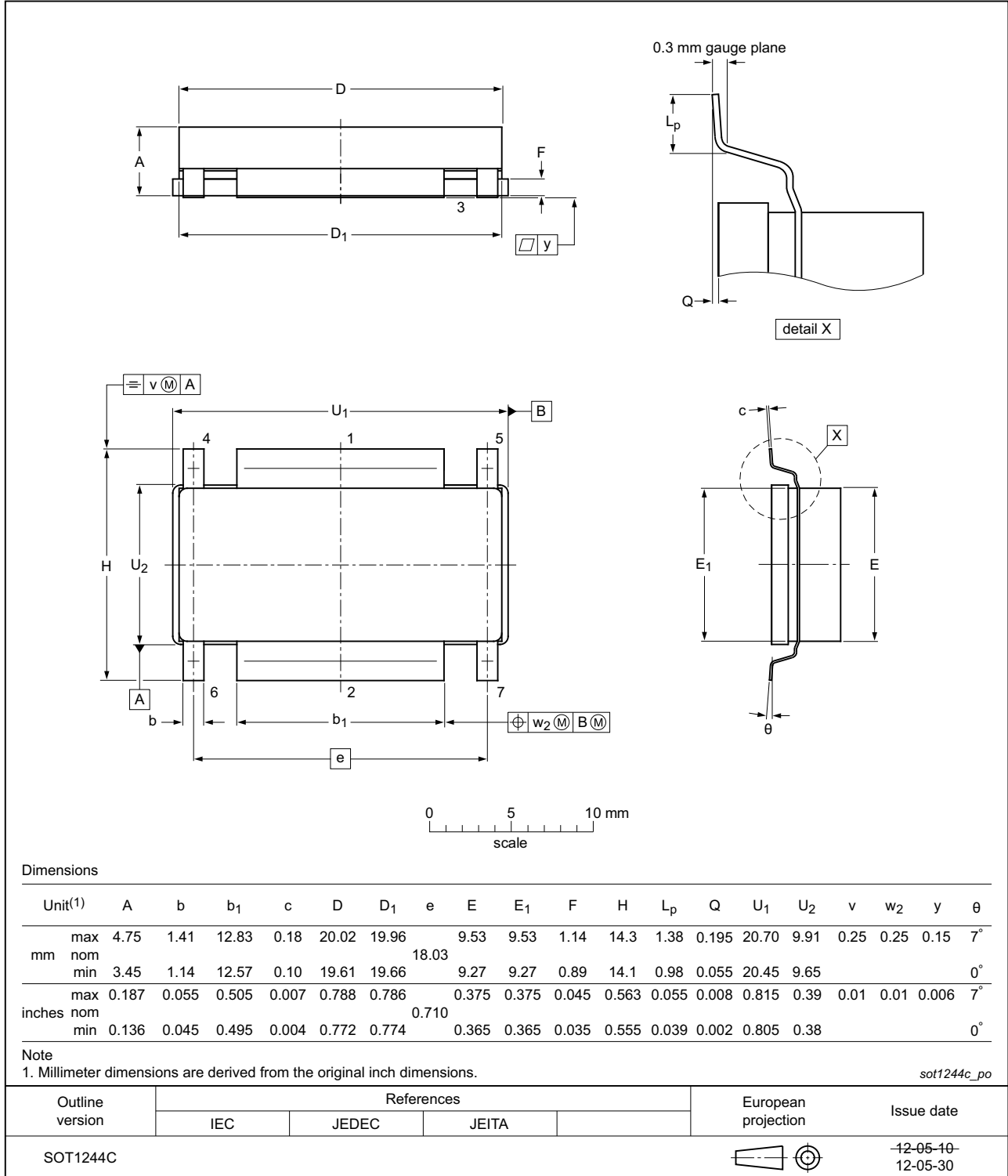


Fig 21. Package outline SOT1244C

## 9. 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.

## 10. Abbreviations

Table 10. Abbreviations

Acronym	Description
3GPP	3rd Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical Channel
ESD	ElectroStatic Discharge
ESR	Equivalent Series Resistance
IMD	InterModulation Distortion
IS-95	Interim Standard 95
LDMOS	Laterally Diffused Metal Oxide Semiconductor
PAR	Peak-to-Average Ratio
SMD	Surface Mounted Device
VBW	Video BandWidth
VSWR	Voltage Standing Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

## 11. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF8G22LS-200V_8G22LS-200GV v.2	20121210	Product data sheet	-	BLF8G22LS-200V_8G22LS-200GV v.1
Modifications:				
<ul style="list-style-type: none"> <li>• <a href="#">Section 1.1 on page 1</a>: improved video bandwidth has been mentioned.</li> <li>• <a href="#">Table 1 on page 1</a>: several values have been changed.</li> <li>• <a href="#">Section 1.2 on page 1</a>: section has been updated.</li> <li>• <a href="#">Table 4 on page 2</a>: row containing <math>I_D</math> has been removed.</li> <li>• <a href="#">Table 5 on page 3</a>: some values have been added.</li> <li>• <a href="#">Table 6 on page 3</a>: the minimum value for <math>I_{DSX}</math> has been removed.</li> <li>• <a href="#">Table 7 on page 3</a>: table has been updated and moved to <a href="#">Section 6 on page 3</a>.</li> <li>• <a href="#">Table 7 on page 3</a>: several values have been changed.</li> <li>• <a href="#">Section 7 on page 3</a>: several new sections have been added.</li> </ul>				
BLF8G22LS-200V_8G22LS-200GV v.1	20120613	Objective data sheet	-	-

## 12. Legal information

### 12.1 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.

[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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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