

# BLF8G24LS-150V; BLF8G24LS-150GV

Power LDMOS transistor

Rev. 3 — 12 May 2014

Product data sheet

## 1. Product profile

### 1.1 General description

150 W LDMOS power transistor with improved video bandwidth for base station applications at frequencies from 2300 MHz to 2400 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	2300 to 2400	1300	28	45	19	33	-30 <a href="#">[1]</a>

[1] 3GPP test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on CCDF; carrier spacing 5 MHz. Channel bandwidth is 3.84 MHz.

### 1.2 Features and benefits

- Excellent ruggedness
- High efficiency
- Low thermal resistance providing excellent thermal stability
- Decoupling leads to enable improved video bandwidth (70 MHz typical)
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent digital pre-distortion capability
- Internally matched for ease of use
- Integrated ESD protection
- Design optimized for gull-wing
- 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 2300 MHz to 2400 MHz frequency range



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
<b>BLF8G24LS-150V (SOT1244B)</b>			
1	drain		 aaa-003619
2	gate		
3	source <a href="#">[1]</a>		
4	decoupling lead		
5	decoupling lead		
6	n.c.		
7	n.c.		
<b>BLF8G24LS-150GV (SOT1244C)</b>			
1	drain		 aaa-003619
2	gate		
3	source <a href="#">[1]</a>		
4	decoupling lead		
5	decoupling lead		
6	n.c.		
7	n.c.		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF8G24LS-150V	-	earless flanged ceramic package; 6 leads	SOT1244B
BLF8G24LS-150GV	-	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	<a href="#">[1]</a>	-	225	°C

[1] Continuous use at maximum temperature will affect the reliability, for details refer to the on-line MTF calculator.

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}; P_L = 45\text{ W}$	0.30	K/W

## 6. Characteristics

**Table 6. DC characteristics**

$T_j = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 2.16\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 216\text{ mA}$	1.5	1.9	2.3	V
$V_{GSq}$	gate-source quiescent voltage	$V_{DS} = 28\text{ V}; I_D = 1300\text{ mA}$	1.6	2	2.4	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	4.5	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	40	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	450	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 10.8\text{ A}$	-	16	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 7.56\text{ A}$	-	0.06	-	$\Omega$

**Table 7. RF characteristics**

Test signal: 2-carrier W-CDMA; 3GPP test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on the CCDF, carrier spacing 5 MHz;  $f_1 = 2302.5\text{ MHz}; f_2 = 2307.5\text{ MHz}; f_3 = 2392.5\text{ MHz}; f_4 = 2397.5\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}; T_{case} = 25\text{ °C}$ ; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(AV)} = 45\text{ W}$	17.5	19	-	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 45\text{ W}$	-	-10	-7	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 45\text{ W}$	29	33	-	%
$ACPR_{5M}$	adjacent channel power ratio (5 MHz)	$P_{L(AV)} = 45\text{ W}$	-	-30	-27	dBc

## 7. Test information

### 7.1 Ruggedness in class-AB operation

The BLF8G24LS-150V and BLF8G24LS-150GV are capable of withstanding a load mismatch corresponding to  $V_{SWR} = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}; P_L = 150\text{ W (CW)}; f = 2300\text{ MHz}$ .

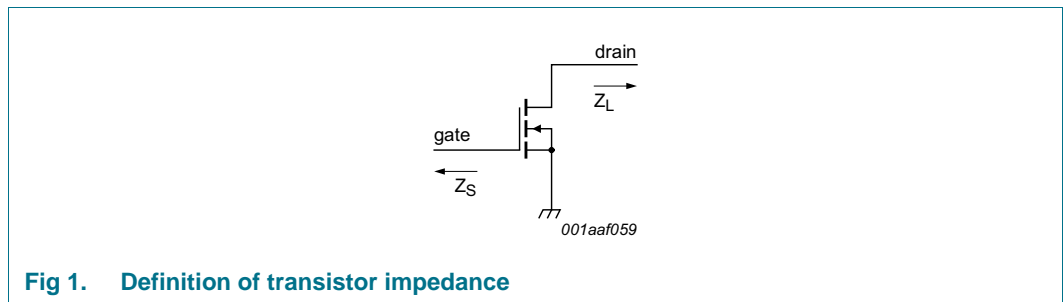
**7.2 Impedance information**

**Table 8. Typical impedance**

Measured load-pull data;  $I_{Dq} = 1300\text{ mA}$ ;  $V_{DS} = 28\text{ V}$ .

f	$Z_S$ [1]	$Z_L$ [1]
(MHz)	( $\Omega$ )	( $\Omega$ )
<b>BLF8G24LS-150V</b>		
2300	1.25 – j4.11	2.95 – j1.20
2400	2.34 – j5.50	2.88 – j1.31
2500	5.65 – j6.35	2.80 – j1.35
<b>BLF8G24LS-150GV</b>		
2300	1.29 – j5.78	3.13 – j3.26
2400	2.15 – j7.09	2.78 – j3.44
2500	6.61 – j7.57	2.98 – j3.66

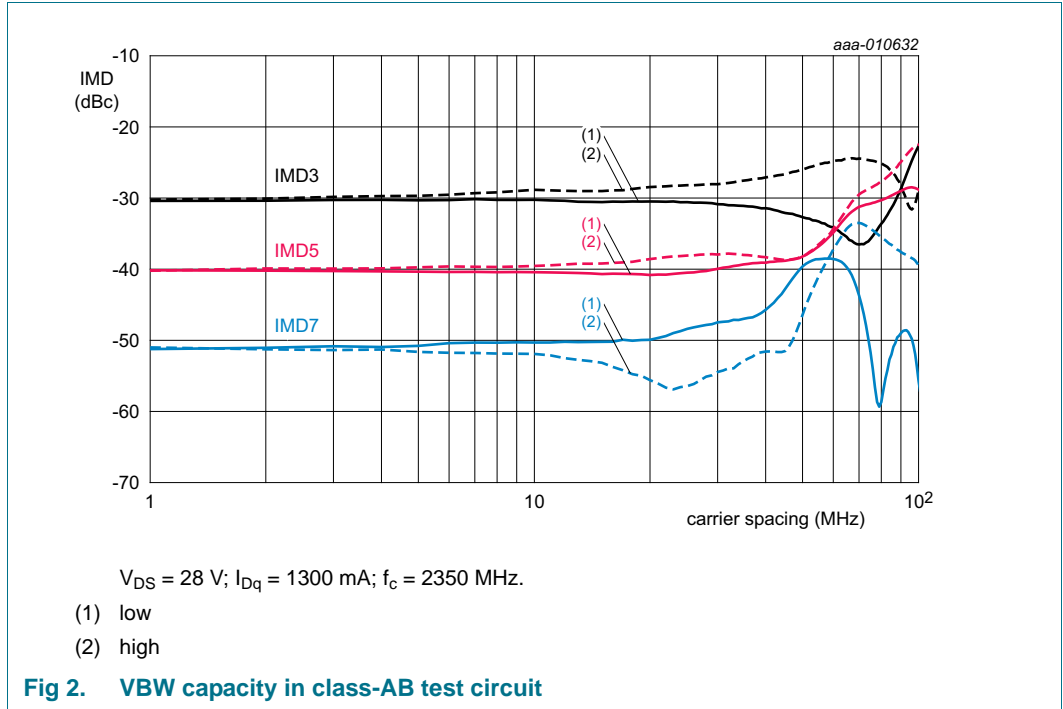
[1]  $Z_S$  and  $Z_L$  defined in [Figure 1](#).



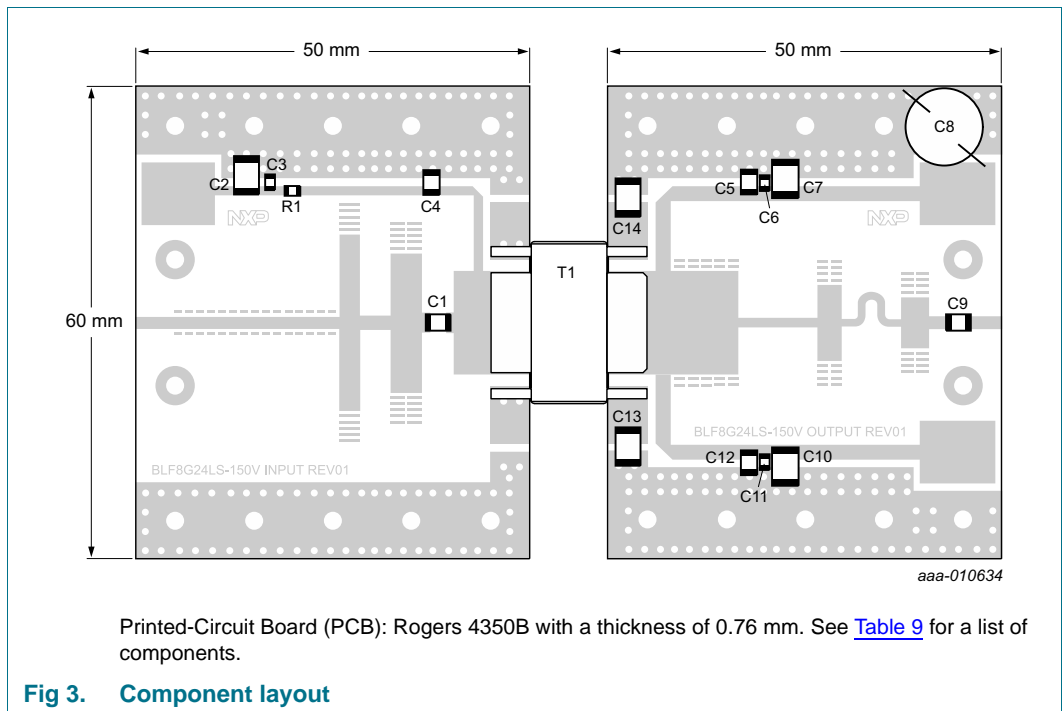
**Fig 1. Definition of transistor impedance**

**7.3 VBW in a class-AB operation**

The BLF8G24LS-150V shows 70 MHz (typical) video bandwidth (IMD third-order intermodulation inflection point) in a class-AB test circuit in the 2.3 GHz to 2.4 GHz band at  $V_{DS} = 28\text{ V}$  and  $I_{Dq} = 1.3\text{ A}$ .



**7.4 Test circuit**



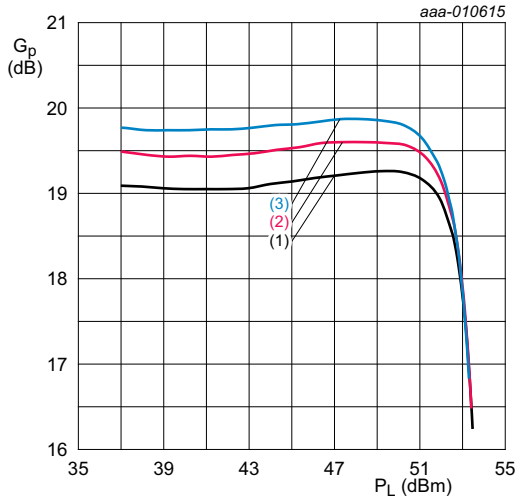
**Table 9. List of components**  
See [Figure 3](#) for component layout.

Component	Description	Value	Remarks
C1	multilayer ceramic chip capacitor	1.2 pF	[1] ATC 800B
C2	multilayer ceramic chip capacitor	1 μF	[2] Murata
C3	multilayer ceramic chip capacitor	100 nF	[2] Murata
C4, C5, C9, C12	multilayer ceramic chip capacitor	24 pF	[1] ATC 800B
C6, C11	multilayer ceramic chip capacitor	220 nF	[2] Murata
C7, C10, C13, C14	multilayer ceramic chip capacitor	4.7 μF, 50 V	[2] Murata
C8	electrolytic capacitor	> 470 μF, 63 V	
R1	chip resistor	4.7 Ω, 1 % tolerance	SMD 0805
T1	transistor	-	NXP BLF8G24LS-150V

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

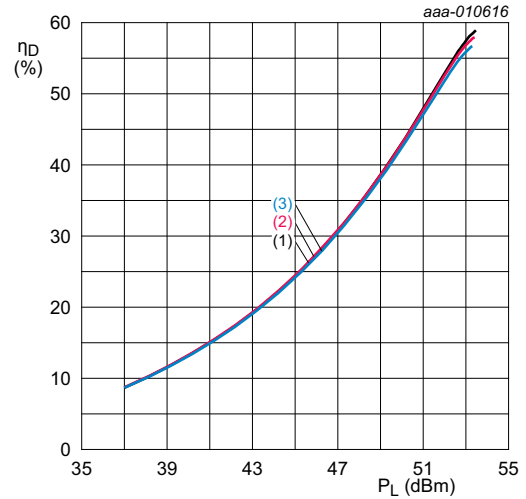
## 7.5 Graphical data

### 7.5.1 Pulsed CW



- $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1300\text{ mA}$ ;  $t_p = 100\text{ }\mu\text{s}$ ;  $\delta = 10\text{ }\%$ .
- (1)  $f = 2300\text{ MHz}$
  - (2)  $f = 2350\text{ MHz}$
  - (3)  $f = 2400\text{ MHz}$

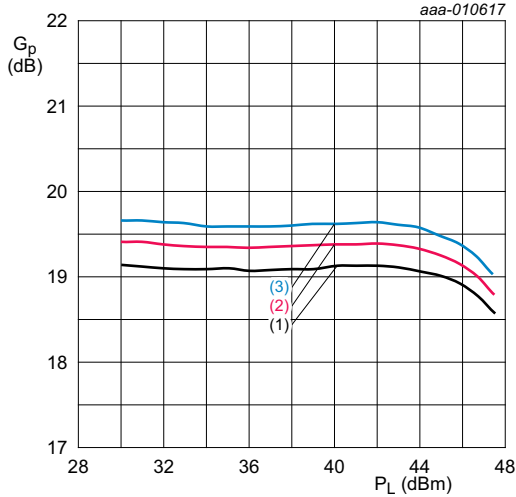
**Fig 4. Power gain as a function of output power; typical values**



- $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1300\text{ mA}$ ;  $t_p = 100\text{ }\mu\text{s}$ ;  $\delta = 10\text{ }\%$ .
- (1)  $f = 2300\text{ MHz}$
  - (2)  $f = 2350\text{ MHz}$
  - (3)  $f = 2400\text{ MHz}$

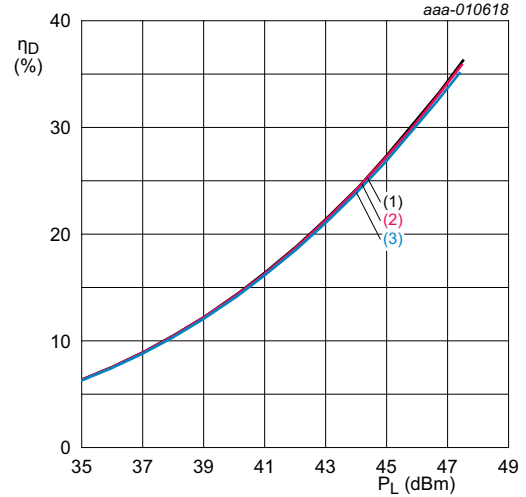
**Fig 5. Drain efficiency as a function of out power; typical values**

7.5.2 IS-95



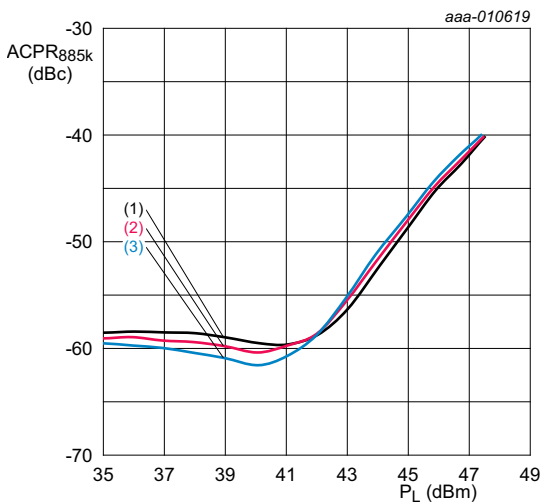
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2305\text{ MHz}$   
 (2)  $f = 2350\text{ MHz}$   
 (3)  $f = 2395\text{ MHz}$

**Fig 6. Power gain as a function of output power; typical values**



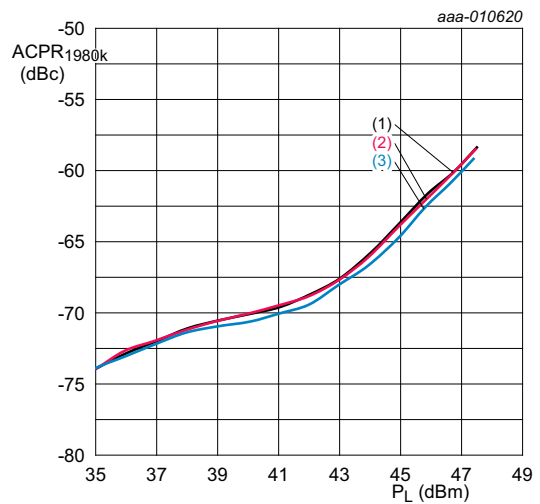
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2305\text{ MHz}$   
 (2)  $f = 2350\text{ MHz}$   
 (3)  $f = 2395\text{ MHz}$

**Fig 7. Drain efficiency as a function of output power; typical values**



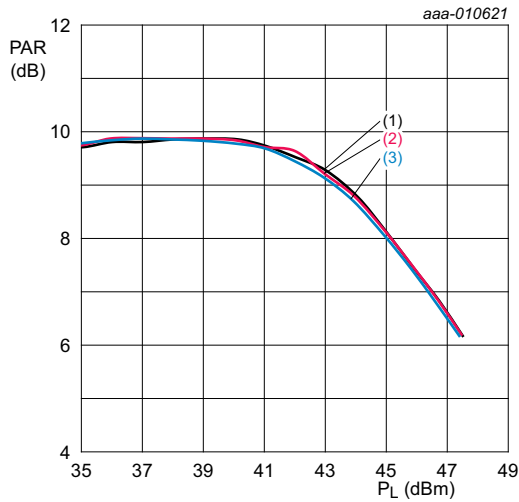
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2305\text{ MHz}$   
 (2)  $f = 2350\text{ MHz}$   
 (3)  $f = 2395\text{ MHz}$

**Fig 8. Adjacent channel power ratio (885 kHz) as a function of output power; typical values**



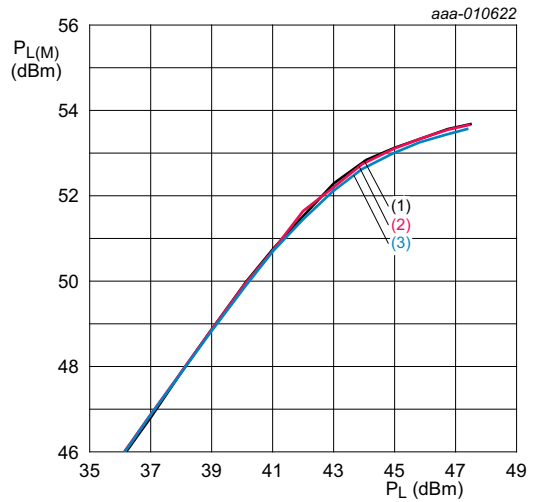
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2305\text{ MHz}$   
 (2)  $f = 2350\text{ MHz}$   
 (3)  $f = 2395\text{ MHz}$

**Fig 9. Adjacent channel power ratio (1980 kHz) as a function of output power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2305\text{ MHz}$   
 (2)  $f = 2350\text{ MHz}$   
 (3)  $f = 2395\text{ MHz}$

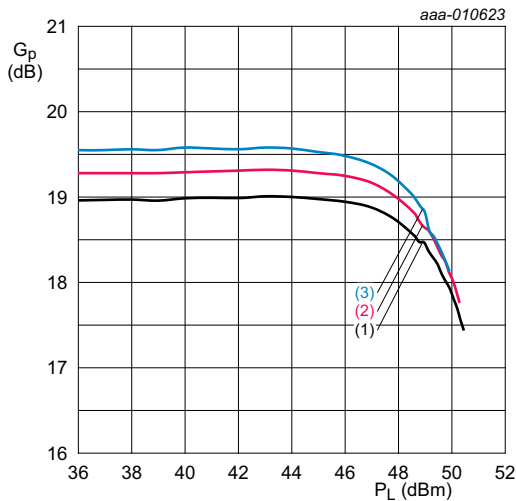
**Fig 10. Peak-to-average ratio as a function of output power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2305\text{ MHz}$   
 (2)  $f = 2350\text{ MHz}$   
 (3)  $f = 2395\text{ MHz}$

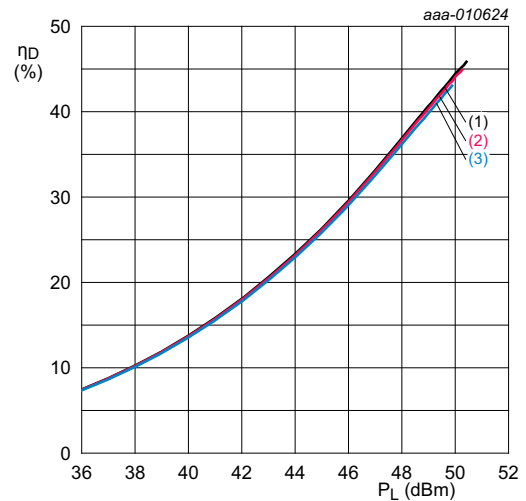
**Fig 11. Peak output power as a function of output power; typical values**

### 7.5.3 1-Carrier W-CDMA



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2302.5\text{ MHz}$   
 (2)  $f = 2350\text{ MHz}$   
 (3)  $f = 2397.5\text{ MHz}$

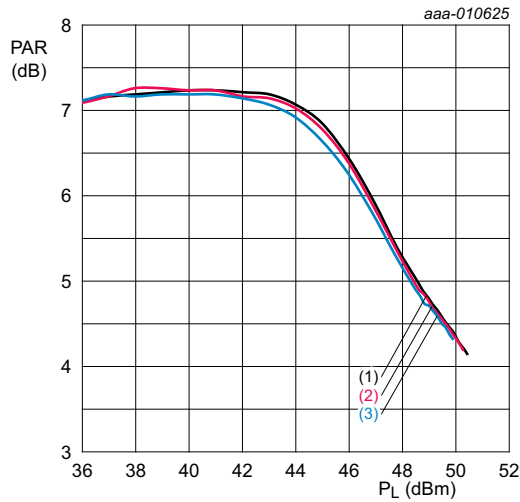
**Fig 12. Power gain as a function of output power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2302.5\text{ MHz}$   
 (2)  $f = 2350\text{ MHz}$   
 (3)  $f = 2397.5\text{ MHz}$

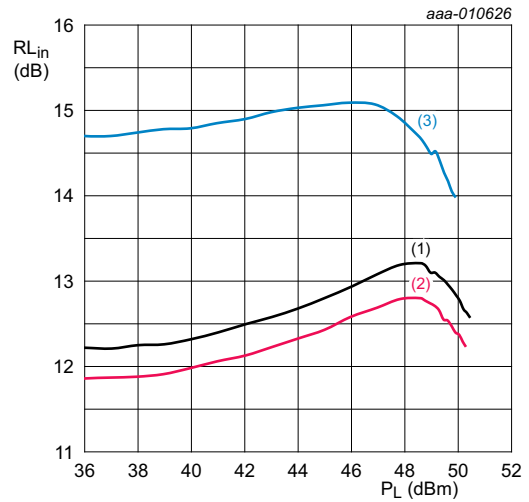
**Fig 13. Drain efficiency as a function of output power; typical values**





$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2302.5\text{ MHz}$   
 (2)  $f = 2350\text{ MHz}$   
 (3)  $f = 2397.5\text{ MHz}$

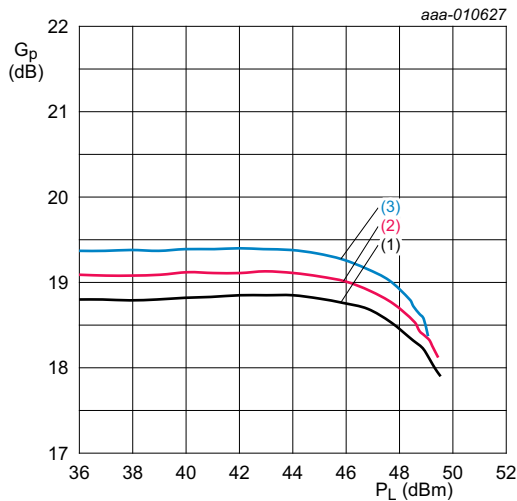
**Fig 14. Peak-to-average ratio as a function of output power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2302.5\text{ MHz}$   
 (2)  $f = 2350\text{ MHz}$   
 (3)  $f = 2397.5\text{ MHz}$

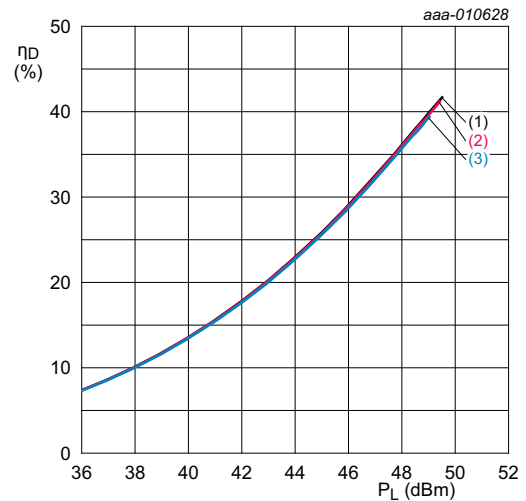
**Fig 15. Input return loss as a function of output power; typical values**

7.5.4 2-Carrier W-CDMA



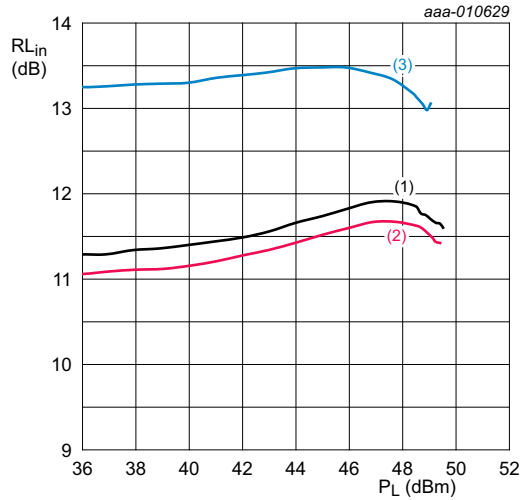
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2305\text{ MHz}$   
 (2)  $f = 2350\text{ MHz}$   
 (3)  $f = 2395\text{ MHz}$

**Fig 16. Power gain as a function of output power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2305\text{ MHz}$   
 (2)  $f = 2350\text{ MHz}$   
 (3)  $f = 2395\text{ MHz}$

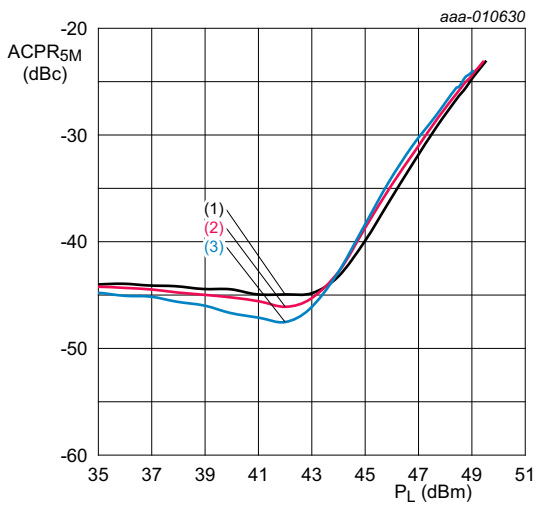
**Fig 17. Drain efficiency as a function of output power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .

- (1)  $f = 2305\text{ MHz}$
- (2)  $f = 2350\text{ MHz}$
- (3)  $f = 2395\text{ MHz}$

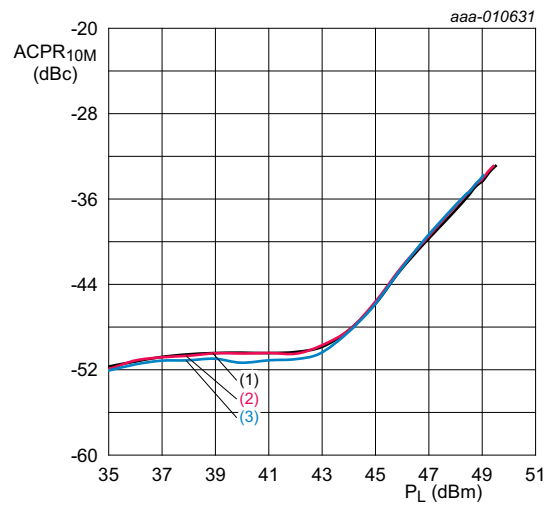
**Fig 18. Input return loss as a function of output power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .

- (1)  $f = 2305\text{ MHz}$
- (2)  $f = 2350\text{ MHz}$
- (3)  $f = 2395\text{ MHz}$

**Fig 19. Adjacent channel power ratio (5 MHz) as a function of output power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .

- (1)  $f = 2305\text{ MHz}$
- (2)  $f = 2350\text{ MHz}$
- (3)  $f = 2395\text{ MHz}$

**Fig 20. Adjacent channel power ratio (10 MHz) as a function of output power; typical values**

8. Package outline

Earless flanged ceramic package; 6 leads

SOT1244B

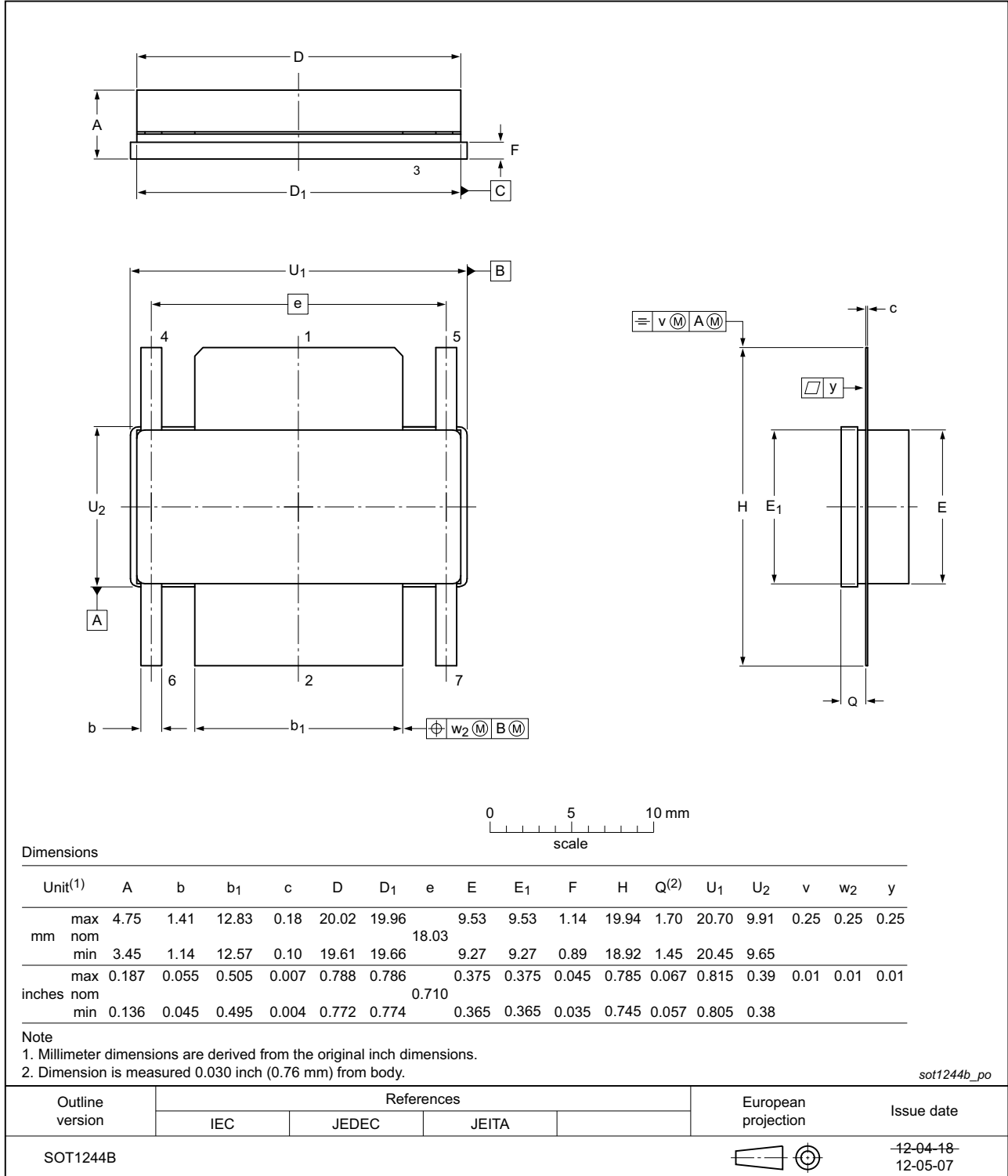


Fig 21. Package outline SOT1244B

Earless flanged ceramic package; 6 leads

SOT1244C

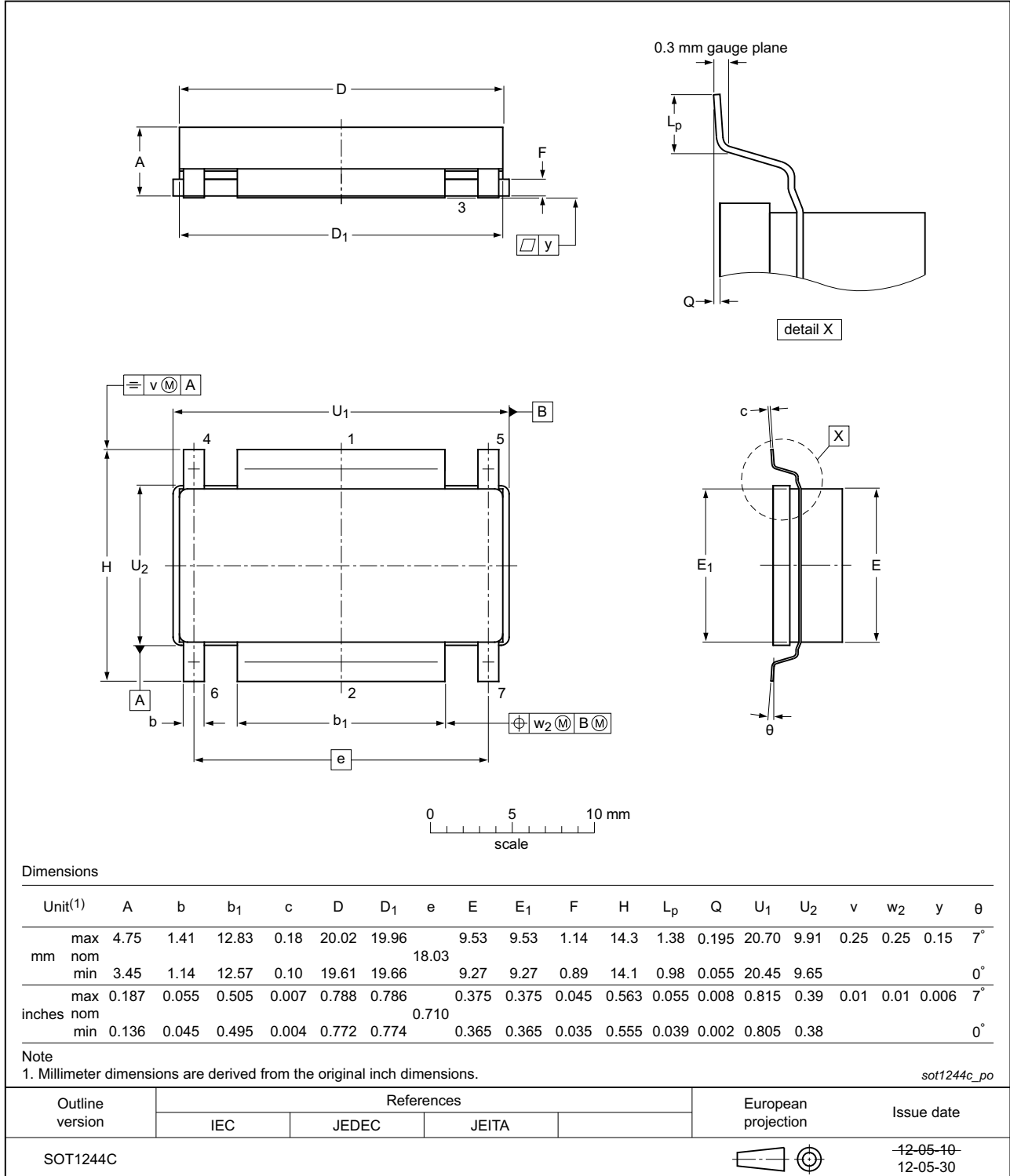


Fig 22. Package outline SOT1244C

## 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
IS-95	Interim Standard 95
LDMOS	Laterally Diffused Metal Oxide Semiconductor
MTF	Median Time to Failure
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
BLF8G24LS-150V_8G24LS-150GV v.3	20140512	Product data sheet	-	BLF8G24LS-150V_8G24LS-150GV v.2
Modifications	<ul style="list-style-type: none"> <li>• <a href="#">Table 1 on page 1</a>: table updated</li> <li>• <a href="#">Table 7 on page 3</a>: table updated</li> </ul>			
BLF8G24LS-150V_8G24LS-150GV v.2	20140224	Objective data sheet	-	BLF8G24LS-150V_8G24LS-150GV v.1
BLF8G24LS-150V_8G24LS-150GV v.1	20131104	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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