

# BLF8G27LS-140

Power LDMOS transistor

Rev. 2 — 5 June 2013

Product data sheet

## 1. Product profile

### 1.1 General description

140 W LDMOS power transistor for base station applications at frequencies from 2500 MHz to 2700 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 <sub>Dq</sub> (mA)	V <sub>DS</sub> (V)	P <sub>L(AV)</sub> (W)	G <sub>p</sub> (dB)	η <sub>D</sub> (%)	ACPR (dBc)
2-carrier W-CDMA	2600 to 2700	1300	32	45	17.4	32	-30 <a href="#">[1]</a>
2-carrier W-CDMA	2600 to 2700	1300	28	35	17.0	29	-31 <a href="#">[1]</a>

[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<sub>th</sub> providing excellent thermal stability
- 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)

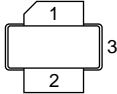
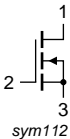
### 1.3 Applications

- RF power amplifier for W-CDMA base stations and multi carrier applications in the 2500 MHz to 2700 MHz frequency range



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain		 sym112
2	gate		
3	source <a href="#">[1]</a>		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF8G27LS-140	-	earless flanged ceramic package; 2 leads	SOT502B

## 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.

## 5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}$ ; $P_L = 55\text{ W}$	0.27	K/W

## 6. Characteristics

**Table 6. DC characteristics**

$T_j = 25\text{ }^\circ\text{C}$ ; 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
$I_{DSS}$	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; PAR 8.4 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH;  $f_1 = 2622.5\text{ MHz}$ ;  $f_2 = 2627.5\text{ MHz}$ ;  $f_3 = 2682.5\text{ MHz}$ ;  $f_4 = 2687.5\text{ MHz}$ ; RF performance at  $V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 1300\text{ mA}$ ;  $T_{case} = 25\text{ }^\circ\text{C}$ ; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(AV)} = 45\text{ W}$	15.8	17.4	-	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 45\text{ W}$	-	-18	-8	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 45\text{ W}$	27	32	-	%
$ACPR_{5M}$	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 BLF8G27LS-140 is capable to withstand a load mismatch corresponding to  $VSWR = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 1300\text{ mA}$ ;  $P_L = 180\text{ W (CW)}$ ;  $f = 2620\text{ MHz}$ .

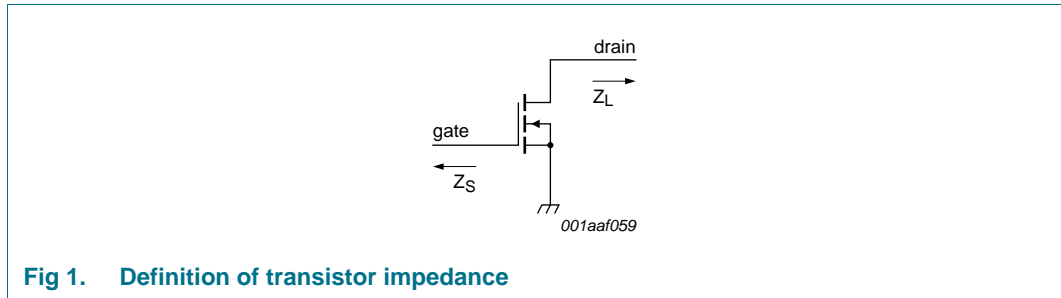
### 7.2 Impedance information

**Table 8. Typical impedance**

$I_{Dq} = 1300\text{ mA}$ ;  $V_{DS} = 32\text{ V}$ .

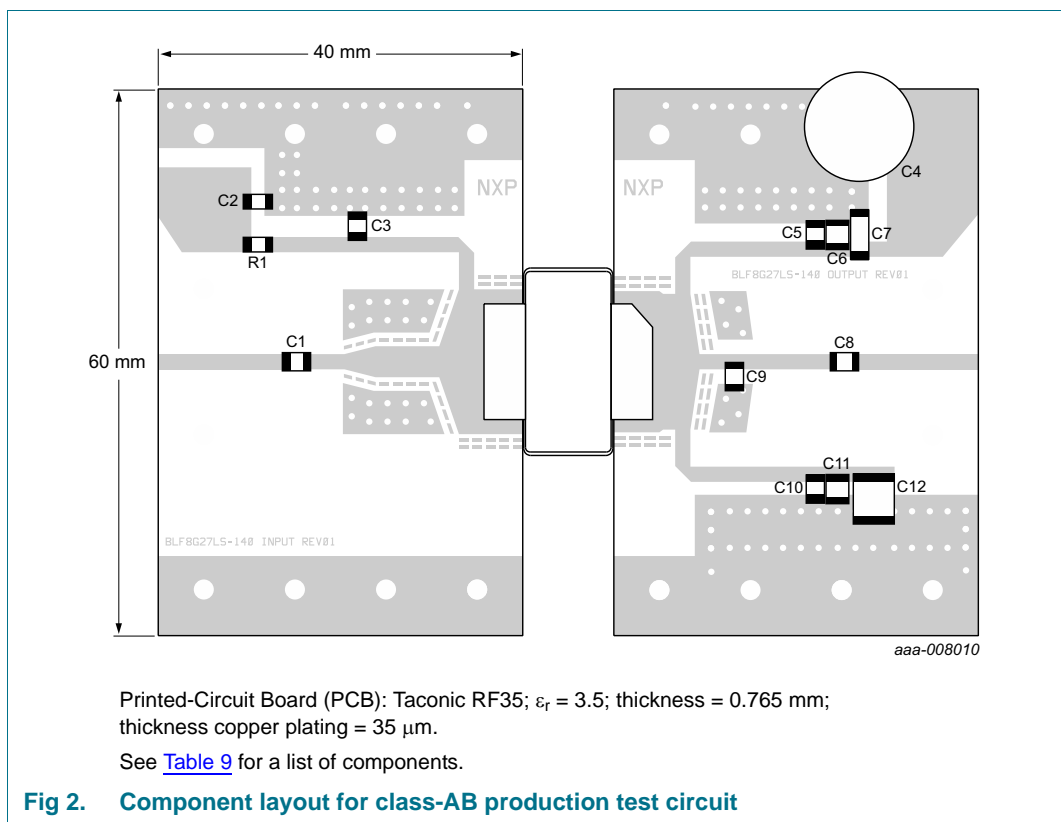
f (MHz)	$Z_S$ <sup>[1]</sup> ( $\Omega$ )	$Z_L$ <sup>[1]</sup> ( $\Omega$ )
2600	2.30 – j4.90	1.40 – j3.10
2700	3.80 – j4.50	1.40 – j3.10

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



**Fig 1. Definition of transistor impedance**

**7.3 Test circuit**



Printed-Circuit Board (PCB): Taconic RF35;  $\epsilon_r = 3.5$ ; thickness = 0.765 mm; thickness copper plating = 35  $\mu\text{m}$ .

See [Table 9](#) for a list of components.

**Fig 2. Component layout for class-AB production test circuit**

**Table 9. List of components**

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

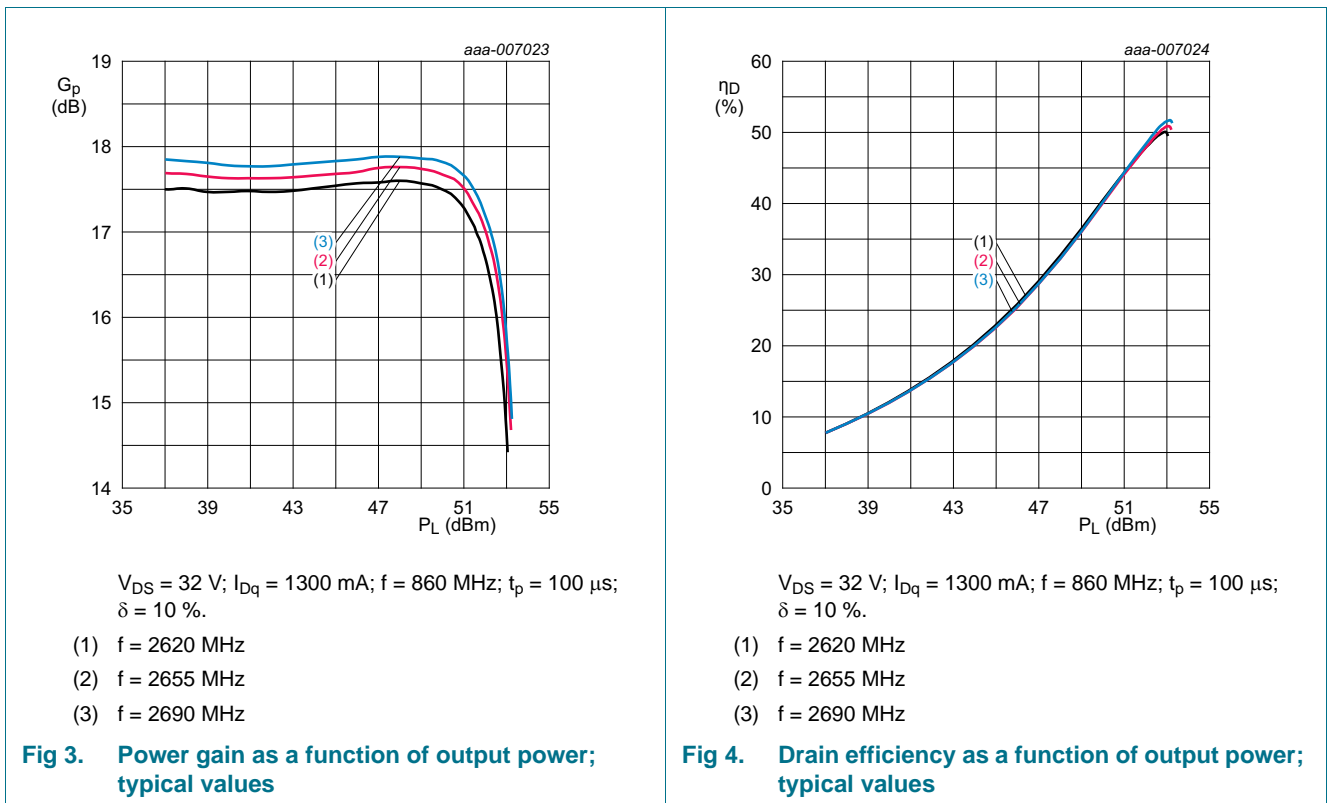
Component	Description	Value	Remarks
C1, C3, C5, C8, C10	multilayer ceramic chip capacitor	10 pF	[1] ATC100B
C2	multilayer ceramic chip capacitor	1 μF, 25 V	[2] Murata
C4	electrolytic capacitor	470 μF, 63 V	
C6, C11	multilayer ceramic chip capacitor	1 μF, 50 V	[2] Murata
C7, C12	multilayer ceramic chip capacitor	10 μF, 50 V	[2] Murata
C9	multilayer ceramic chip capacitor	0.5 pF	[1] ATC100B
R1	chip resistor	3.9 Ω, 1% tolerance	Philips SMD 1206

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

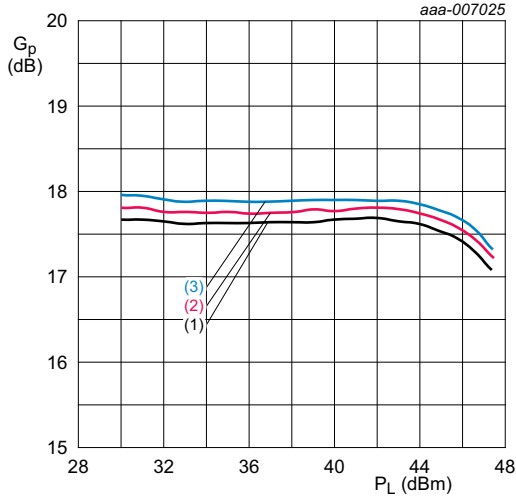
[2] Murata or capacitor of same quality.

## 7.4 Graphical data

### 7.4.1 Pulsed CW

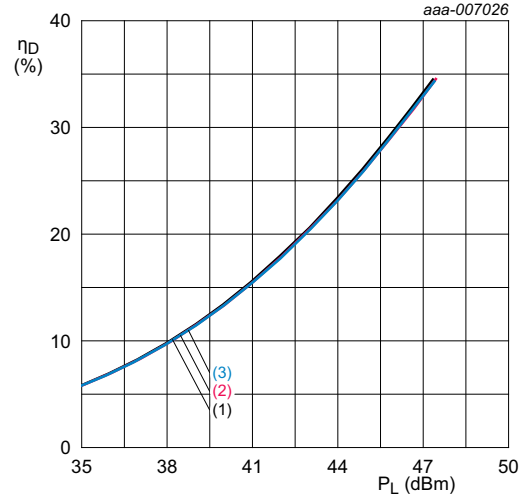


7.4.2 IS-95



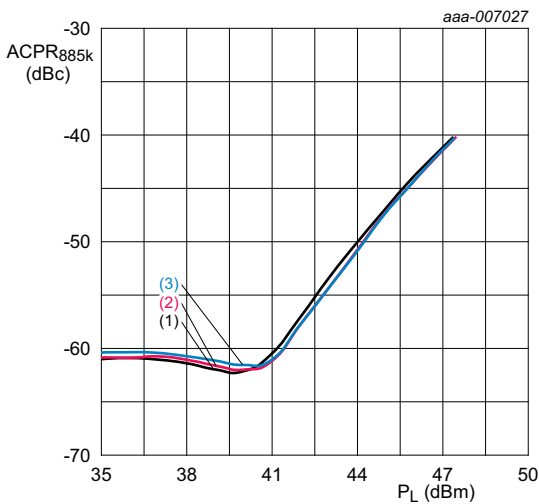
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2620\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2690\text{ MHz}$

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



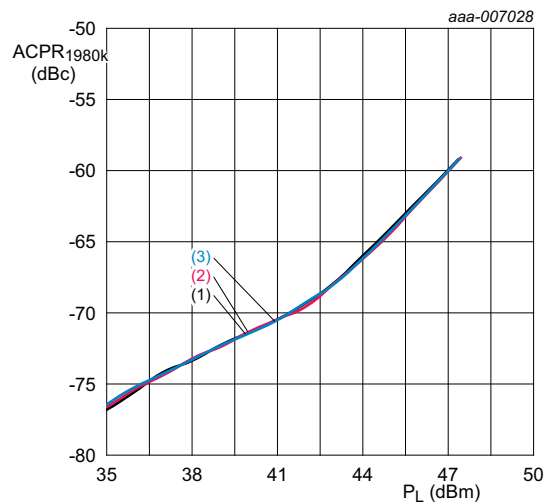
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2620\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2690\text{ MHz}$

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



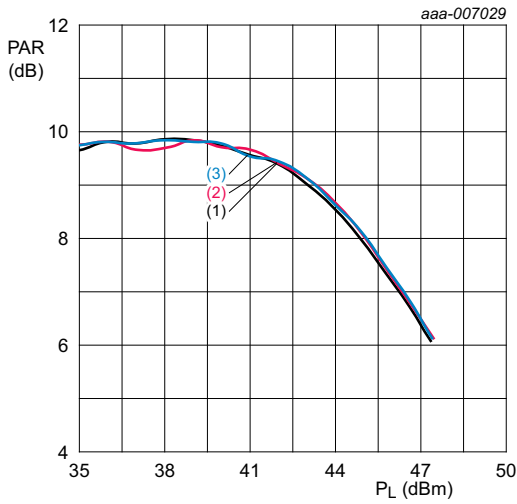
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2620\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2690\text{ MHz}$

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



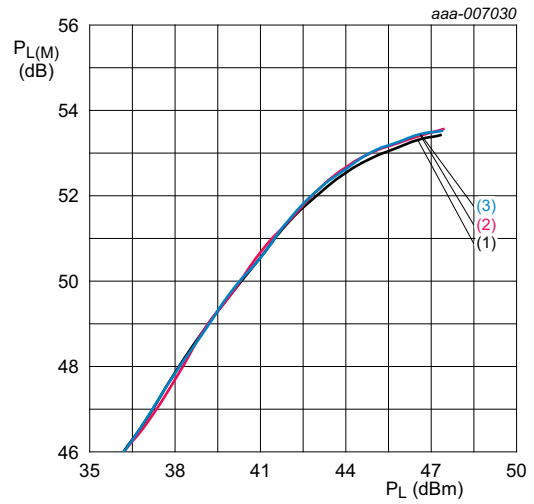
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2620\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2690\text{ MHz}$

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



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2620\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2690\text{ MHz}$

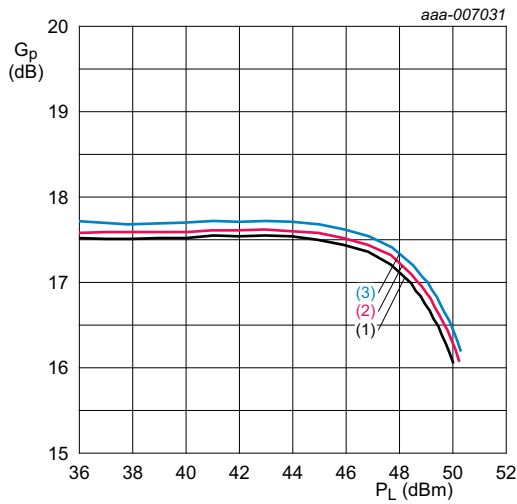
**Fig 9. Peak-to-average power ratio as a function of output power; typical values**



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2620\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2690\text{ MHz}$

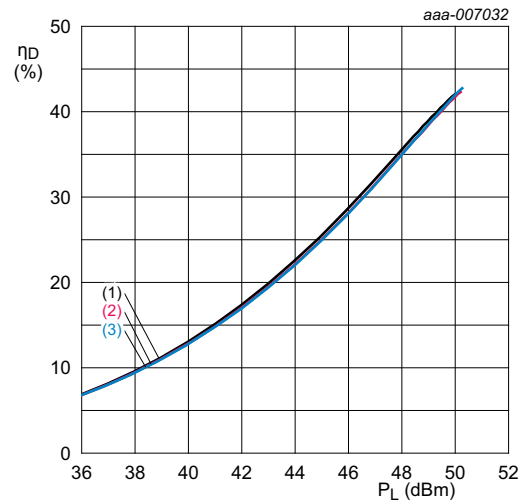
**Fig 10. Peak output power as a function of output power; typical values**

7.4.3 1-Carrier W-CDMA



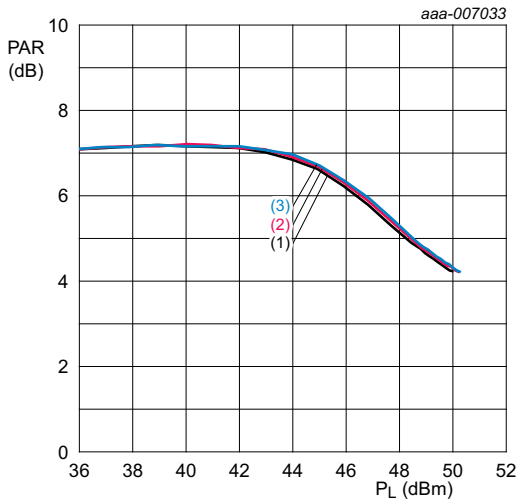
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2622.5\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2687.5\text{ MHz}$

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



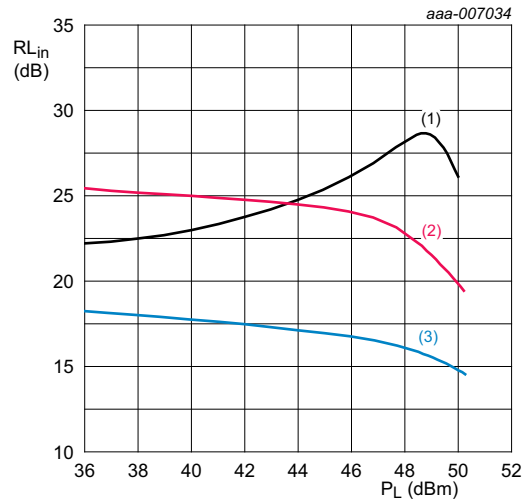
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2622.5\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2687.5\text{ MHz}$

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



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2622.5\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2687.5\text{ MHz}$

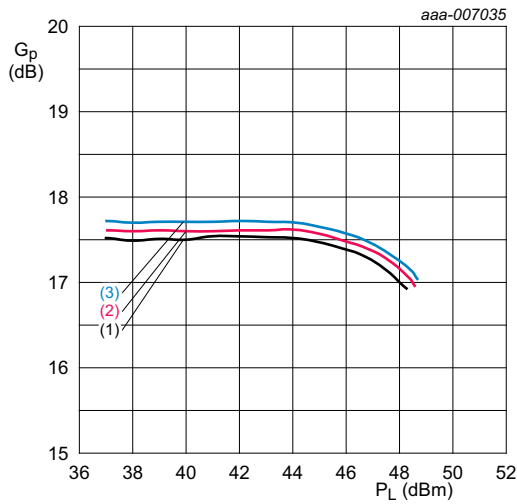
**Fig 13. Peak-to-average power ratio as a function of output power; typical values**



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2622.5\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2687.5\text{ MHz}$

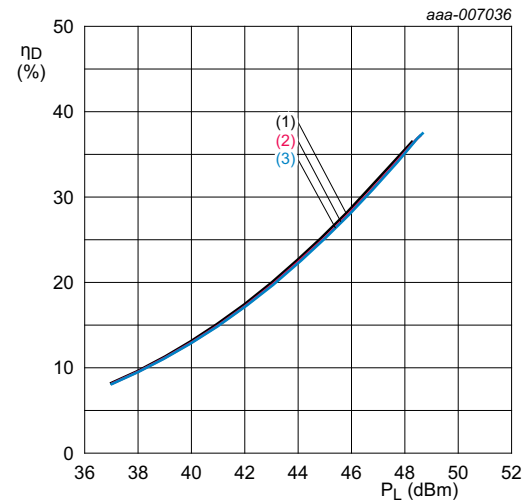
**Fig 14. Input return loss as a function of output power; typical values**

7.4.4 2-Carrier W-CDMA



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2625\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2685\text{ MHz}$

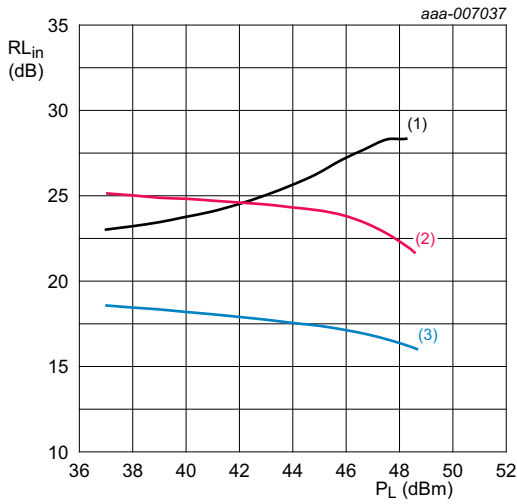
**Fig 15. Power gain as a function of output power; typical values**



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$   
 (1)  $f = 2625\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2685\text{ MHz}$

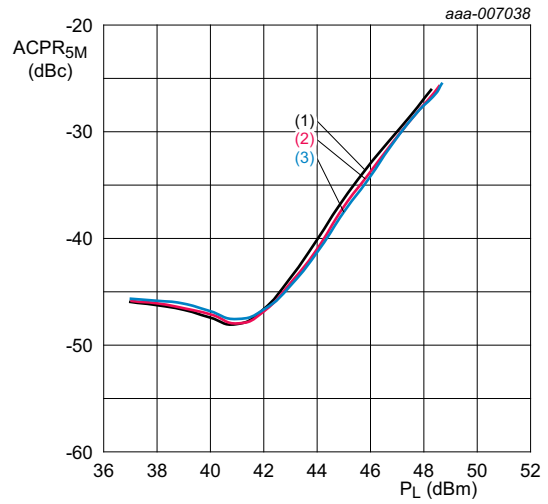
**Fig 16. Drain efficiency as a function of output power; typical values**





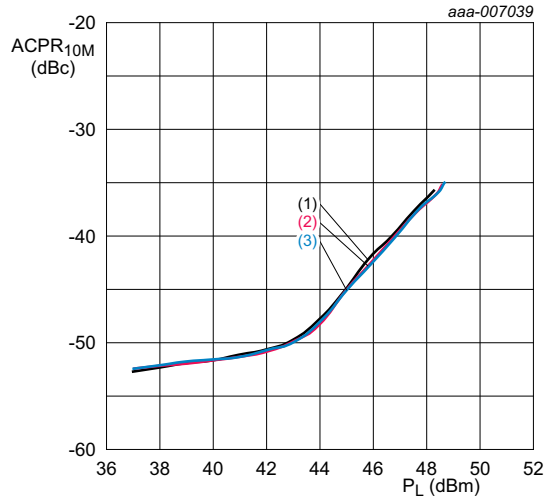
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2625\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2685\text{ MHz}$

**Fig 17. Input return loss as a function of output power; typical values**



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2625\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2685\text{ MHz}$

**Fig 18. Adjacent channel power ratio (5 MHz) as a function of output power; typical values**



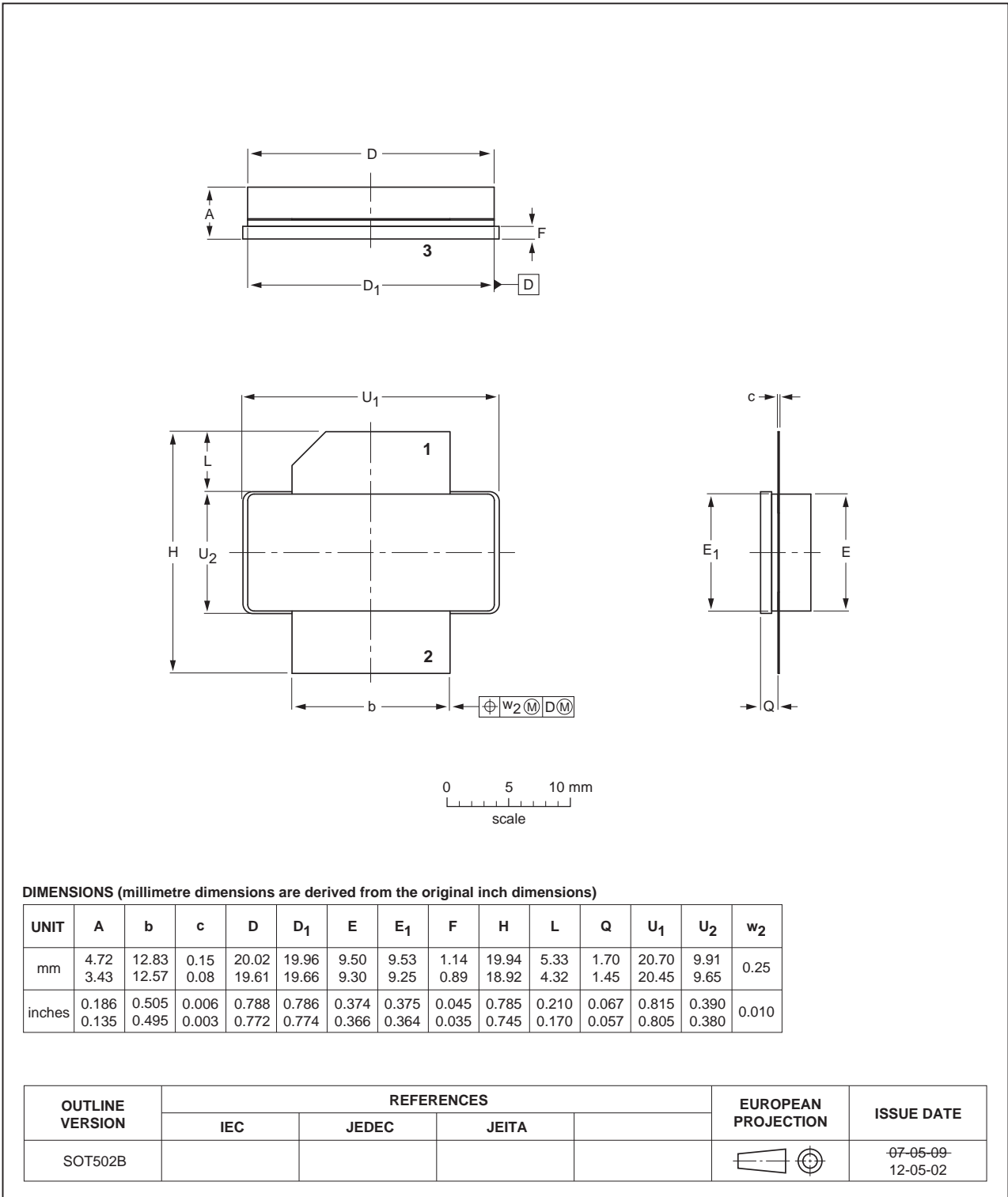
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2625\text{ MHz}$   
 (2)  $f = 2655\text{ MHz}$   
 (3)  $f = 2685\text{ MHz}$

**Fig 19. Adjacent channel power ratio (10 MHz) as a function of output power; typical values**

**8. Package outline**

Earless flanged ceramic package; 2 leads

SOT502B



**Fig 20. Package outline SOT502B**

## 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
PAR	Peak-to-Average Ratio
SMD	Surface Mounted Device
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
BLF8G27LS-140 v.2	20130605	Product data sheet	-	BLF8G27LS-140 v.1
Modifications:	<ul style="list-style-type: none"> <li>• <a href="#">Table 7 on page 3</a>: table has been updated.</li> <li>• <a href="#">Section 7.2 on page 3</a>: section has been added.</li> <li>• <a href="#">Section 7.3 on page 4</a>: section has been added.</li> </ul>			
BLF8G27LS-140 v.1	20130328	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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For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

## 14. Contents

<b>1</b>	<b>Product profile</b> . . . . .	<b>1</b>
1.1	General description . . . . .	1
1.2	Features and benefits . . . . .	1
1.3	Applications . . . . .	1
<b>2</b>	<b>Pinning information</b> . . . . .	<b>2</b>
<b>3</b>	<b>Ordering information</b> . . . . .	<b>2</b>
<b>4</b>	<b>Limiting values</b> . . . . .	<b>2</b>
<b>5</b>	<b>Thermal characteristics</b> . . . . .	<b>2</b>
<b>6</b>	<b>Characteristics</b> . . . . .	<b>3</b>
<b>7</b>	<b>Test information</b> . . . . .	<b>3</b>
7.1	Ruggedness in class-AB operation . . . . .	3
7.2	Impedance information . . . . .	3
7.3	Test circuit . . . . .	4
7.4	Graphical data . . . . .	5
7.4.1	Pulsed CW . . . . .	5
7.4.2	IS-95 . . . . .	6
7.4.3	1-Carrier W-CDMA . . . . .	7
7.4.4	2-Carrier W-CDMA . . . . .	8
<b>8</b>	<b>Package outline</b> . . . . .	<b>10</b>
<b>9</b>	<b>Handling information</b> . . . . .	<b>11</b>
<b>10</b>	<b>Abbreviations</b> . . . . .	<b>11</b>
<b>11</b>	<b>Revision history</b> . . . . .	<b>11</b>
<b>12</b>	<b>Legal information</b> . . . . .	<b>12</b>
12.1	Data sheet status . . . . .	12
12.2	Definitions . . . . .	12
12.3	Disclaimers . . . . .	12
12.4	Trademarks . . . . .	13
<b>13</b>	<b>Contact information</b> . . . . .	<b>13</b>
<b>14</b>	<b>Contents</b> . . . . .	<b>14</b>

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