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 °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)	η_D (%)	ACPR (dBc)
2-carrier W-CDMA	2600 to 2700	1300	32	45	17.4	32	–30 [1]
2-carrier W-CDMA	2600 to 2700	1300	28	35	17.0	29	–31 [1]

[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

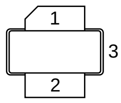
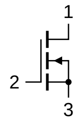
- Excellent ruggedness
- High efficiency
- Low R_{th} providing excellent thermal stability
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection
- 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 [1]		

[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	[1]	-	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 °C; P_L = 55 W	0.27	K/W

6. Characteristics

Table 6. DC characteristics

T_j = 25 °C; unless otherwise specified.

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

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 MHz; f_2 = 2627.5 MHz; f_3 = 2682.5 MHz; f_4 = 2687.5 MHz; RF performance at V_{DS} = 32 V; I_{Dq} = 1300 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	$P_{L(AV)}$ = 45 W	15.8	17.4	-	dB
RL_{in}	input return loss	$P_{L(AV)}$ = 45 W	-	–18	–8	dB
η_D	drain efficiency	$P_{L(AV)}$ = 45 W	27	32	-	%
$ACPR_{5M}$	adjacent channel power ratio (5 MHz)	$P_{L(AV)}$ = 45 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 V; I_{Dq} = 1300 mA; P_L = 180 W (CW); f = 2620 MHz.

7.2 Impedance information

Table 8. Typical impedance

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

f (MHz)	Z_S [1] (Ω)	Z_L [1] (Ω)
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.

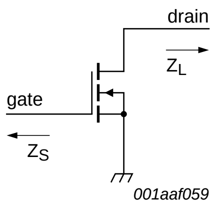
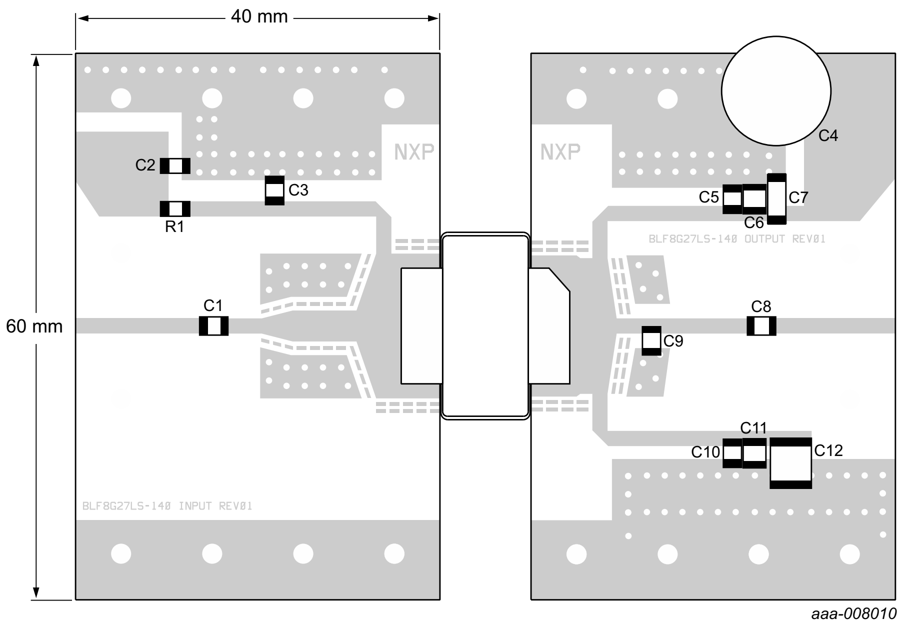


Fig 1. Definition of transistor impedance

7.3 Test circuit



Printed-Circuit Board (PCB): Taconic RF35; ε_r = 3.5; thickness = 0.765 mm; thickness copper plating = 35 μm.

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.

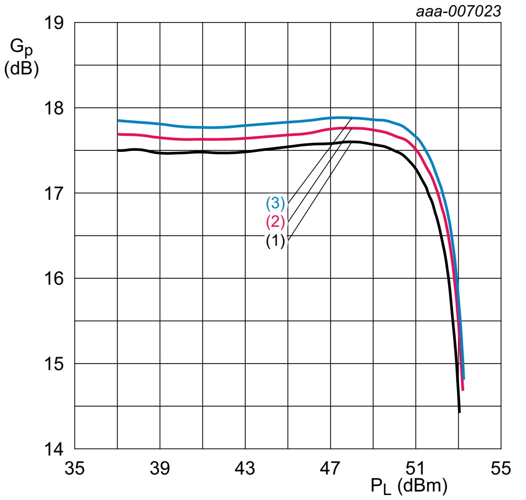
Component	Description	Value		Remarks
C1, C3, C5, C8, C10	multilayer ceramic chip capacitor	10 pF	[1]	ATC100B
C2	multilayer ceramic chip capacitor	1 μF, 25 V	[2]	Murata
C4	electrolytic capacitor	470 μF, 63 V		
C6, C11	multilayer ceramic chip capacitor	1 μF, 50 V	[2]	Murata
C7, C12	multilayer ceramic chip 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



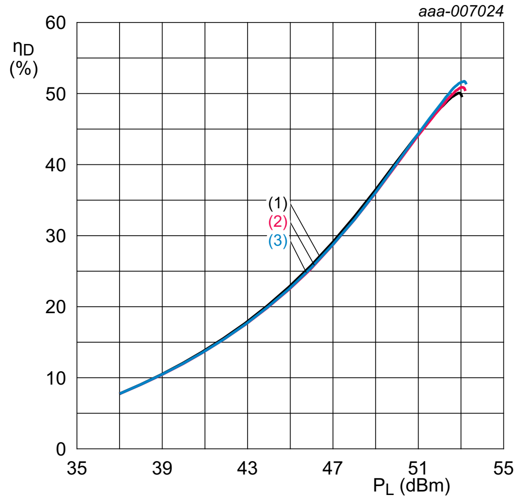
V_{DS} = 32 V; I_{Dq} = 1300 mA; f = 860 MHz; t_p = 100 μs; δ = 10 %.

(1) f = 2620 MHz

(2) f = 2655 MHz

(3) f = 2690 MHz

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



V_{DS} = 32 V; I_{Dq} = 1300 mA; f = 860 MHz; t_p = 100 μs; δ = 10 %.

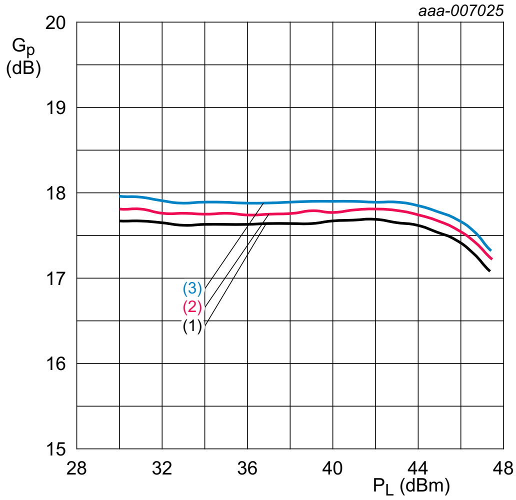
(1) f = 2620 MHz

(2) f = 2655 MHz

(3) f = 2690 MHz

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

7.4.2 IS-95



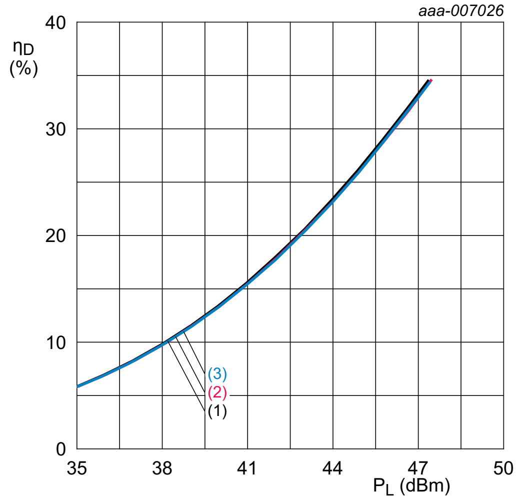
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 2620 MHz

(2) f = 2655 MHz

(3) f = 2690 MHz

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



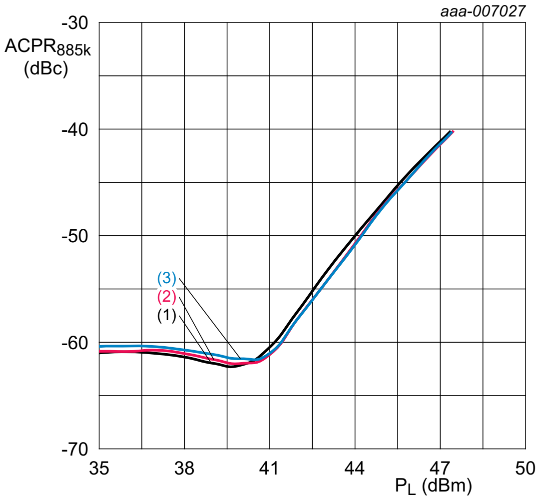
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 2620 MHz

(2) f = 2655 MHz

(3) f = 2690 MHz

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



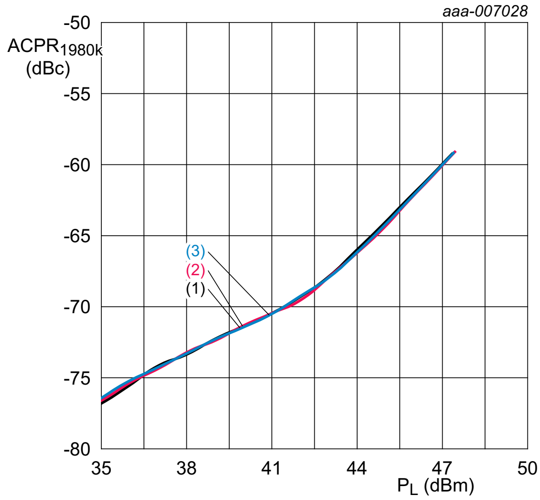
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 2620 MHz

(2) f = 2655 MHz

(3) f = 2690 MHz

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



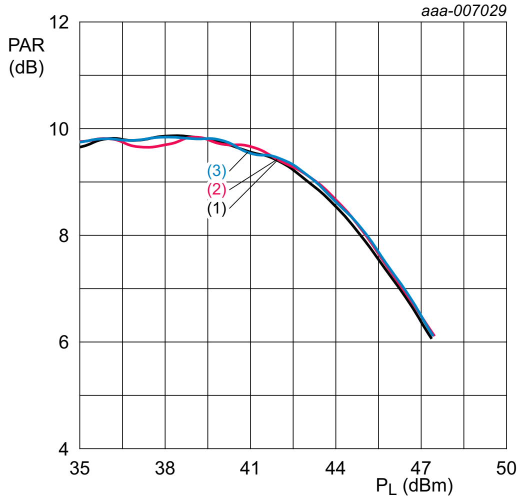
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 2620 MHz

(2) f = 2655 MHz

(3) f = 2690 MHz

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



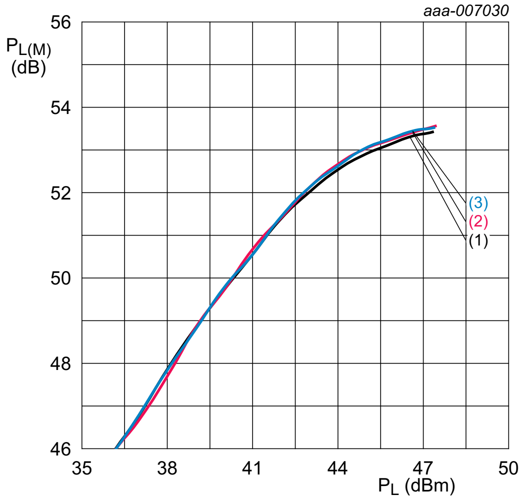
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 2620 MHz

(2) f = 2655 MHz

(3) f = 2690 MHz

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



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

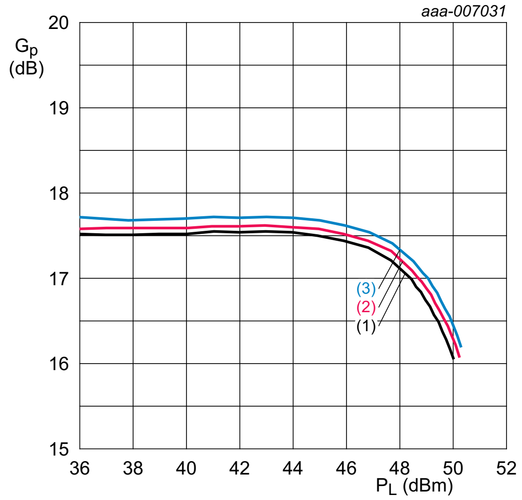
(1) f = 2620 MHz

(2) f = 2655 MHz

(3) f = 2690 MHz

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

7.4.3 1-Carrier W-CDMA



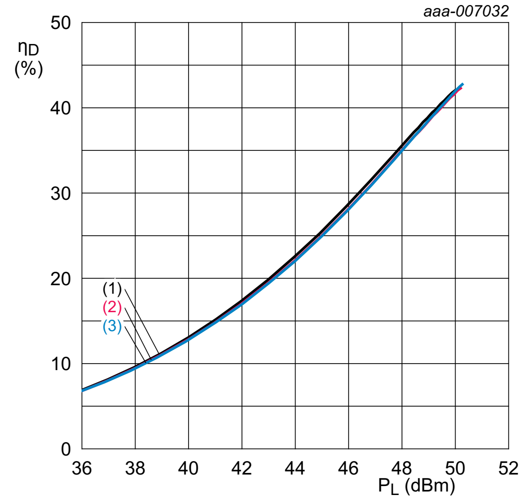
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 2622.5 MHz

(2) f = 2655 MHz

(3) f = 2687.5 MHz

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



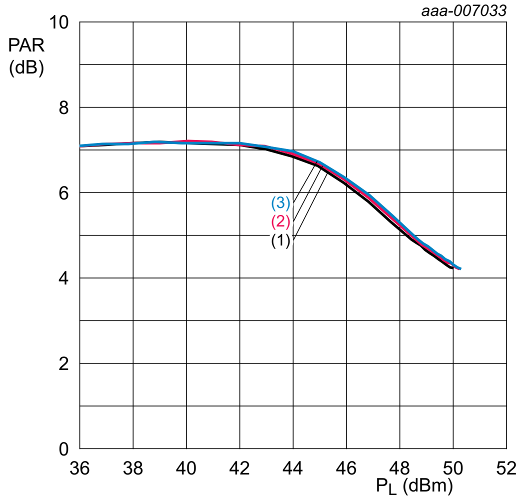
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 2622.5 MHz

(2) f = 2655 MHz

(3) f = 2687.5 MHz

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



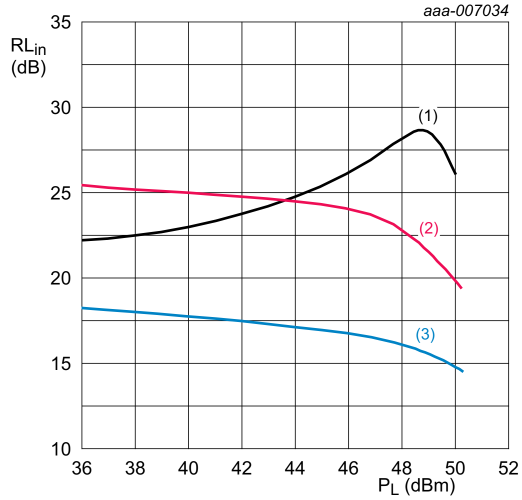
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 2622.5 MHz

(2) f = 2655 MHz

(3) f = 2687.5 MHz

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



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

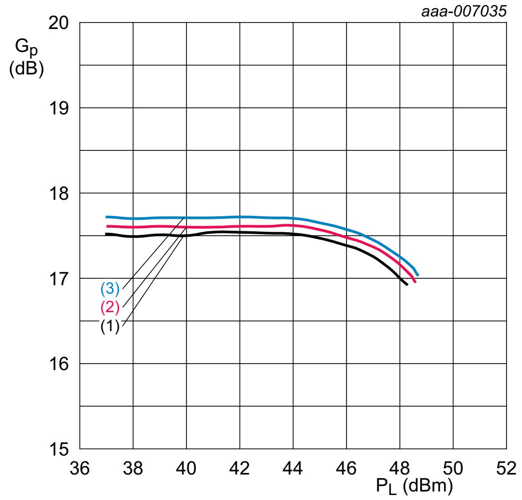
(1) f = 2622.5 MHz

(2) f = 2655 MHz

(3) f = 2687.5 MHz

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

7.4.4 2-Carrier W-CDMA



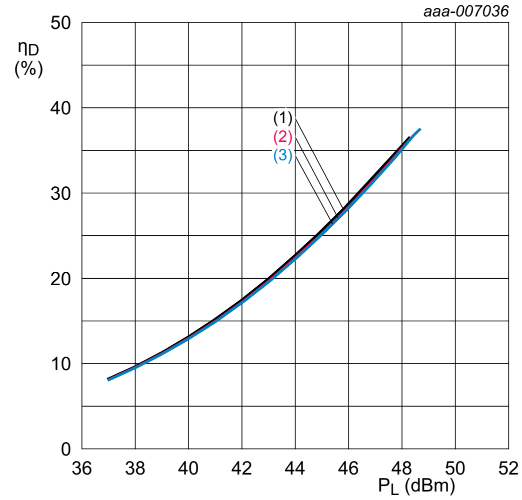
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 2625 MHz

(2) f = 2655 MHz

(3) f = 2685 MHz

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



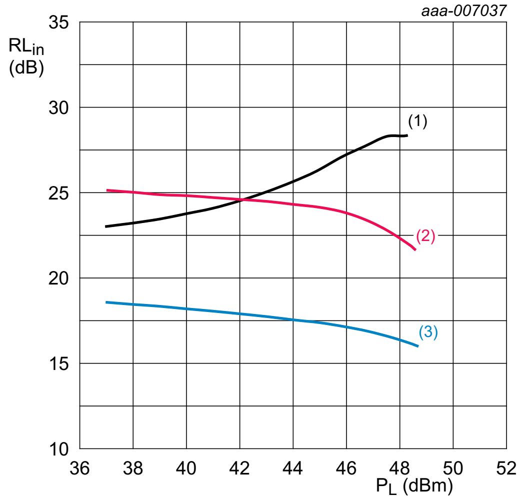
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 2625 MHz

(2) f = 2655 MHz

(3) f = 2685 MHz

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



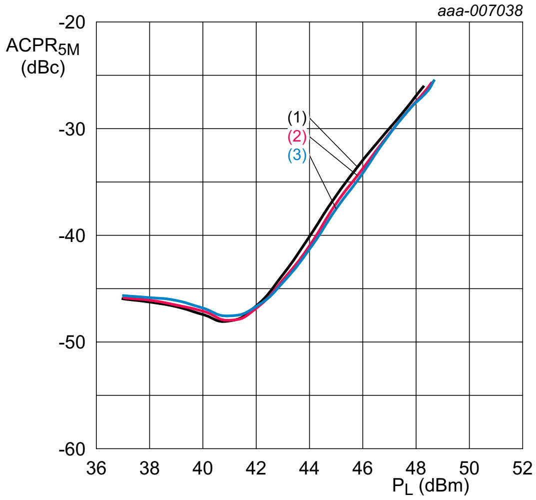
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 2625 MHz

(2) f = 2655 MHz

(3) f = 2685 MHz

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



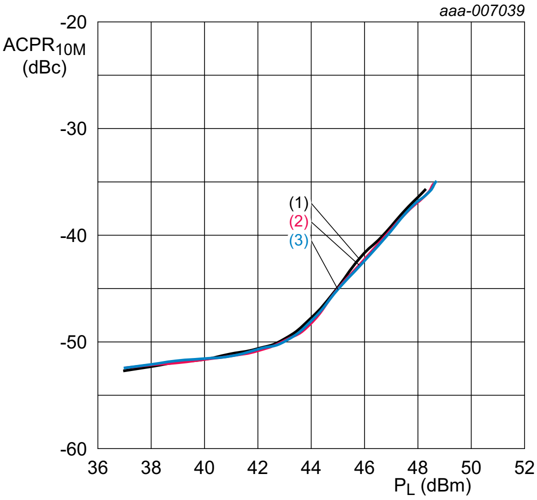
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 2625 MHz

(2) f = 2655 MHz

(3) f = 2685 MHz

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



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

(1) f = 2625 MHz

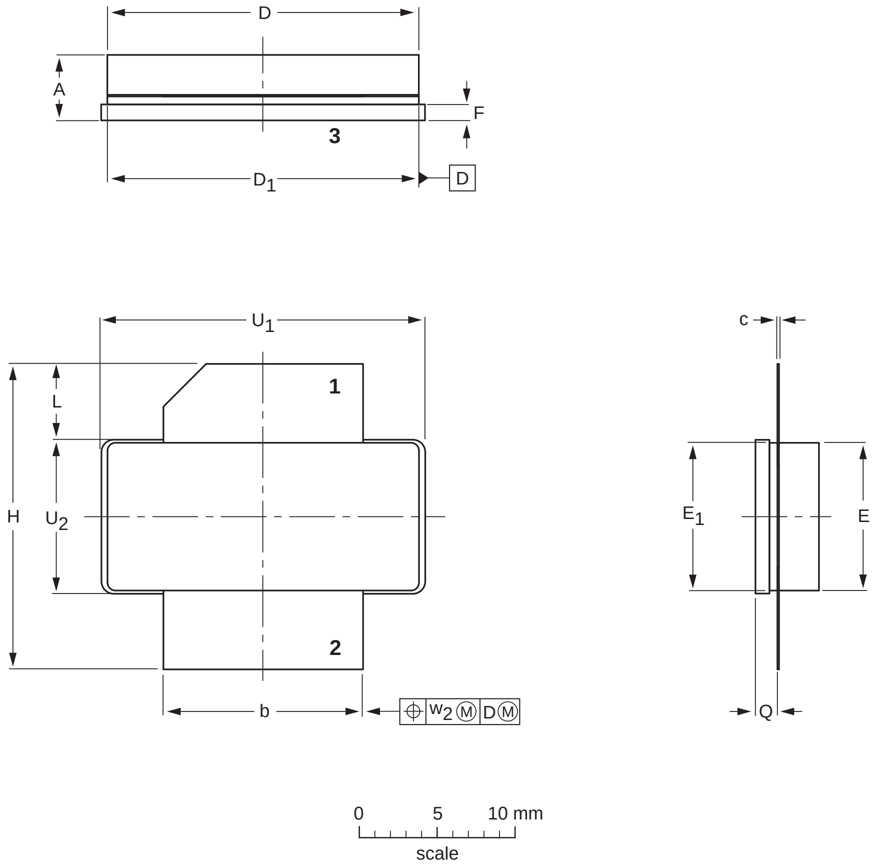
(2) f = 2655 MHz

(3) f = 2685 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**



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	L	Q	U_1	U_2	w_2
mm	4.72 3.43	12.83 12.57	0.15 0.08	20.02 19.61	19.96 19.66	9.50 9.30	9.53 9.25	1.14 0.89	19.94 18.92	5.33 4.32	1.70 1.45	20.70 20.45	9.91 9.65	0.25
inches	0.186 0.135	0.505 0.495	0.006 0.003	0.788 0.772	0.786 0.774	0.374 0.366	0.375 0.364	0.045 0.035	0.785 0.745	0.210 0.170	0.067 0.057	0.815 0.805	0.390 0.380	0.010

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT502B						~~07-05-09~~ 12-05-02

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:	• Table 7 on page 3: table has been updated. • Section 7.2 on page 3: section has been added. • Section 7.3 on page 4: section has been added.			
BLF8G27LS-140 v.1	20130328	Objective data sheet	-	-

12. Legal information

12.1 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.

[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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14. Contents

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Document identifier: BLF8G27LS-140