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BLF8G09LS-400PW; BLF8G09LS-400PGW Power LDMOS transistor Rev. 5 – 1 September 2015

AMPLEON Product data sheet

Product profile 1.

1.1 General description

400 W LDMOS power transistor for base station applications at frequencies from 716 MHz to 960 MHz.

Table 1. **Typical performance**

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

Test signal	f	I _{Dq}	V _{DS}	P _{L(AV)}	G _p	η _D	ACPR _{5M}
	(MHz)	(mA)	(V)	(W)	(dB)	(%)	(dBc)
2-carrier W-CDMA	716 to 728	3400	28	95	20.6	30	-35 <mark>[1]</mark>

[1] 3GPP test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on CCDF; 10 MHz carrier spacing.

1.2 Features and benefits

- Excellent ruggedness
- Device can operate with the supply current delivered through the video leads
- High efficiency
- Low thermal resistance providing excellent thermal stability
- Designed for broadband operation
- Lower output capacitance for improved performance in Doherty applications
- Decoupling leads to enable improved video bandwidth (45 MHz typical)
- Designed for low memory effects providing excellent pre-distortability
- 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 716 MHz to 960 MHz frequency range

Power LDMOS transistor

2. Pinning information

Table 2. Pi	nning		
Pin	Description	Simplified outline	Graphic symbol
BLF8G09LS-4	400PW (SOT1242B)		
1	drain1	<u> </u>	
2	drain2		6
3	gate1		8•
4	gate2		3-4-5
5	source [1]		
6	decoupling1 [2]	5	9• F=
7	decoupling2 [2]		7
8	n.c.		aaa-007816
9	n.c.		
BLF8G09LS-4	400PGW (SOT1242C)		
1	drain1		
2	drain2		
3	gate1		8-
4	gate2		3
5	source [1]	5	
6	decoupling1 [2]		9 ⊷ <mark> </mark> ♣²
7	decoupling2 [2]		7
8	n.c.		2 aaa-007816
9	n.c.		

[1] Connected to flange.

[2] Device can operate with the supply current delivered through the combined decoupling leads.

3. Ordering information

Table 3. Ordering information

Type number	Packag	Package			
	Name	Description	Version		
BLF8G09LS-400PW	-	earless flanged ceramic package; 8 leads	SOT1242B		
BLF8G09LS-400PGW	-	earless flanged ceramic package; 8 leads	SOT1242C		

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
Tj	junction temperature	[1	l -	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	Тур	Unit	
R _{th(j-c)}	thermal resistance from junction to case	T_{case} = 80 °C; P _L = 95 W	0.26	K/W	

6. Characteristics

Table 6. DC characteristics

 $T_i = 25 \ ^{\circ}C$; per section unless otherwise specified.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V _{(BR)DSS}	drain-source breakdown voltage	V _{GS} = 0 V; I _D = 3 mA	65	-	-	V
V _{GS(th)}	gate-source threshold voltage	V _{DS} = 10 V; I _D = 300 mA	1.5	1.8	2.3	V
V _{GSq}	gate-source quiescent voltage	V _{DS} = 28 V; I _D = 1700 mA	1.7	2	2.5	V
I _{DSS}	drain leakage current	V _{GS} = 0 V; V _{DS} = 28 V	-	-	2.8	μA
I _{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75 V;$ $V_{DS} = 10 V$		55	-	A
I _{GSS}	gate leakage current	V _{GS} = 11 V; V _{DS} = 0 V	-	-	280	nA
g fs	forward transconductance	V _{DS} = 10 V; I _D = 15 A	-	26	-	S
R _{DS(on)}	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75 V;$ $I_D = 12.25 A$	-	0.06	-	Ω

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 = 718.5 MHz; f_2 = 723.5 MHz; f_3 = 720.5 MHz; f_4 = 725.5 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 3400 mA; T_{case} = 25 °C; unless otherwise specified; in a class-AB production test circuit, tested on straight lead device.

Symbol	Parameter	Conditions	Min	Тур	Мах	Unit
G _p	power gain	P _{L(AV)} = 95 W	18.8	20.6	-	dB
RL _{in}	input return loss	P _{L(AV)} = 95 W	-	–19	-11	dB
η _D	drain efficiency	P _{L(AV)} = 95 W	26	30	-	%
$ACPR_{5M}$	adjacent channel power ratio (5 MHz)	P _{L(AV)} = 95 W	-	-35	-32	dBc

7. Test information

7.1 Ruggedness in class-AB operation

The BLF8G09LS-400PW and BLF8G09LS-400PGW are capable of withstanding a load mismatch corresponding to VSWR = 7 : 1 through all phases under the following conditions: V_{DS} = 28 V; I_{Dq} = 3400 mA; 2-carrier W-CDMA signal; P_L = 200 W; f = 716 MHz; 5 MHz carrier spacing; 46 % clipping.

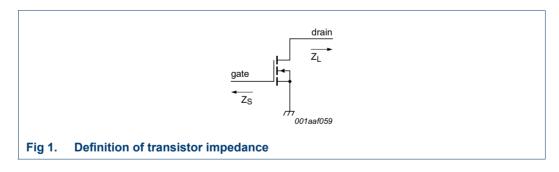
7.2 Impedance information

Table 8.Typical impedance

Measured load-pull data for the top-half of the push-pull package; $I_{Dq} = 1800 \text{ mA}$; $V_{DS} = 28 \text{ V}$; $T_{case} = 25 \text{ °C}$, water cooled.

f	Z _S [1]	Z _L [1]		
(MHz)	(Ω)	(Ω)		
BLF8G09LS-400PW (straight lead)				
720	1.26 – j2.89	1.8 – j1.94		
757	1.44 – j3.82	2 – j1.6		
769	1.55 – j3.64	1.9 – j1.75		
805	1.7 – j4.5	1.5 – j1.3		
BLF8G09LS-400PGW (gull-win	g)			
720	1.37 – j3	1.7 – j2.1		
757	1.4 – j3.6	1.6 – j2.3		
769	1.3 – j3.9	1.7 – j2.2		
805	1.6 – j4.3	1.48 – j1.97		

[1] Z_S and Z_L defined in Figure 1.



7.3 VBW in class-AB operation

The BLF8G09LS-400PW and BLF8G09LS-400PGW show 45 MHz (typical) video bandwidth in class-AB test circuit in 722 MHz band at V_{DS} = 28 V and I_{Dq} = 3400 mA.

7.4 Test circuit

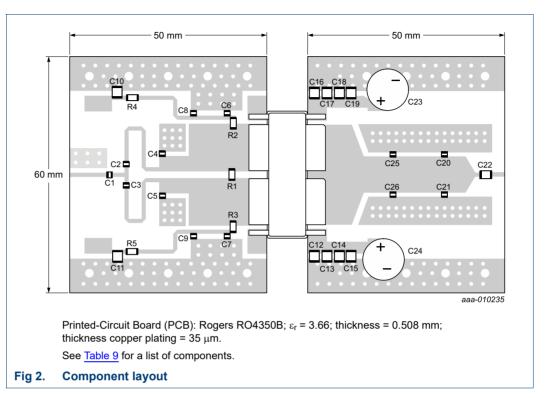


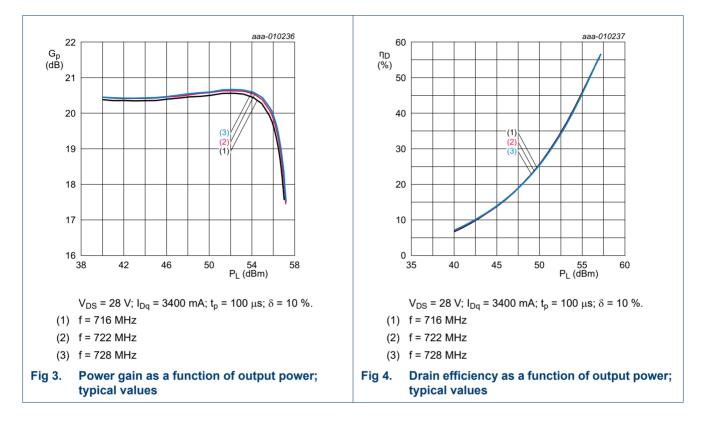
Table 9. List of components

For test circuit see Figure 2.

Component	Description	Value	Remarks
C1, C2, C3, C8, C9	multilayer ceramic chip capacitor	100 pF	ATC 100A
C4, C5	multilayer ceramic chip capacitor	9.1 pF	ATC 100A
C6, C7	multilayer ceramic chip capacitor	10 pF	ATC 100A
C10, C11, C13, C17	multilayer ceramic chip capacitor	1 μF, 50 V	Murata
C12, C16	multilayer ceramic chip capacitor	100 nF, 50 V	Murata
C14, C15, C18, C19	multilayer ceramic chip capacitor	10 μF, 50 V	Murata
C20, C21	multilayer ceramic chip capacitor	5.1 pF	ATC 100A
C22	multilayer ceramic chip capacitor	82 pF	ATC 100B
C23, C24	electrolytic capacitor	470 μF, 63 V	
C25, C26	multilayer ceramic chip capacitor	3 pF	ATC 100A
R1	resistor	10 Ω	
R2, R3, R4, R5	resistor	5.1 Ω	

7.5 Graphical data

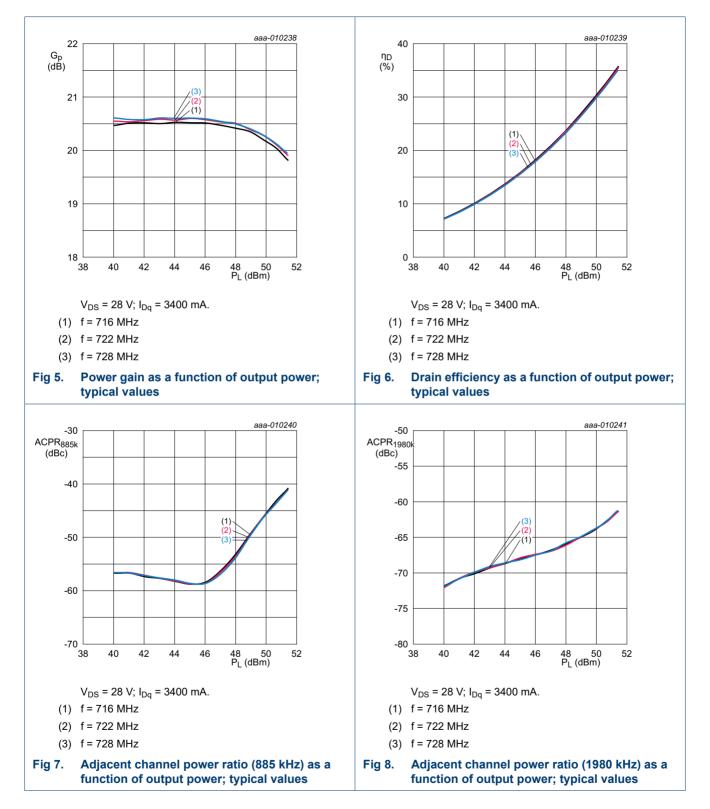
7.5.1 Pulsed CW



BLF8G09LS-400P(G)W

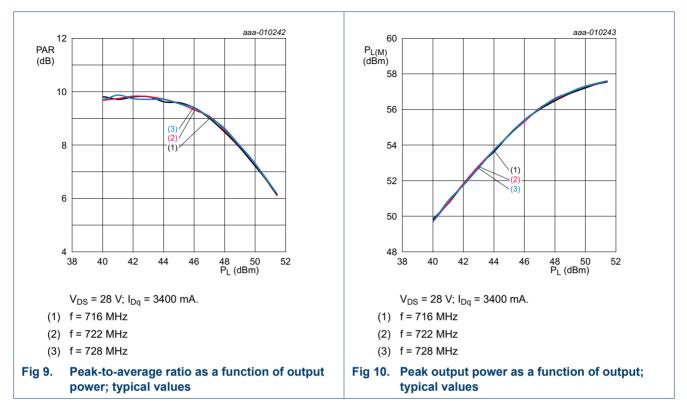
Power LDMOS transistor

7.5.2 IS-95

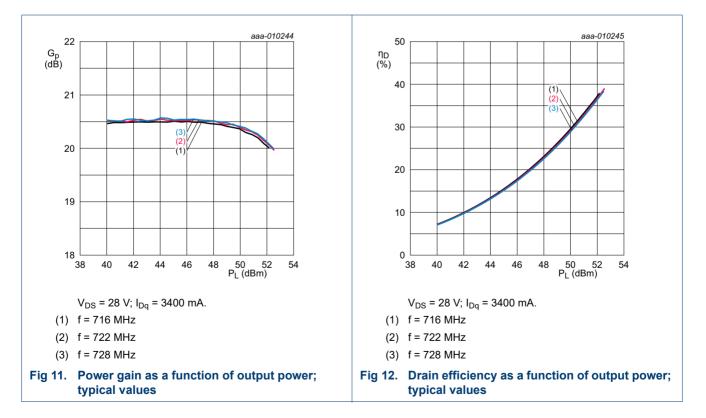


BLF8G09LS-400P(G)W

Power LDMOS transistor

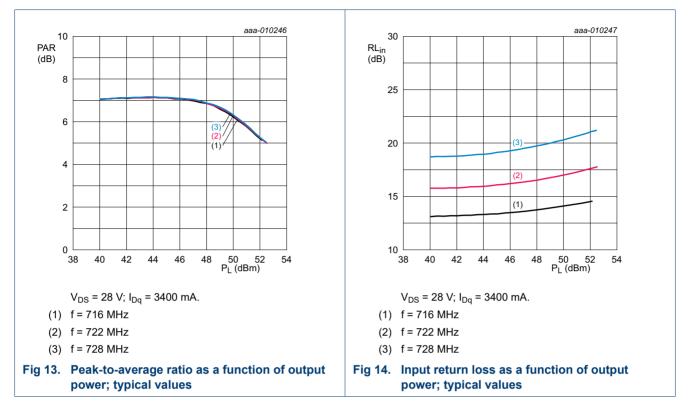


7.5.3 1-Carrier W-CDMA

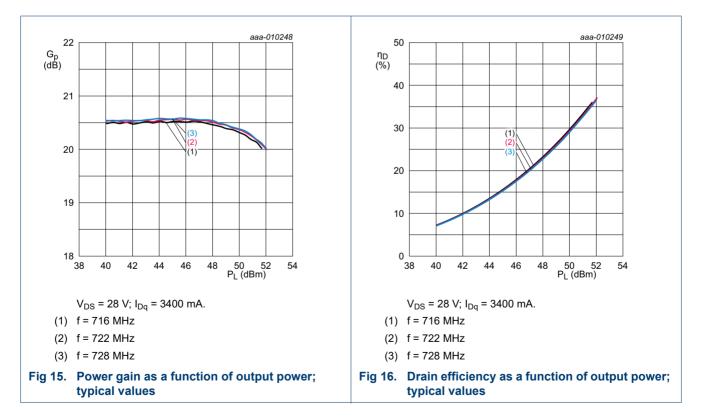


BLF8G09LS-400P(G)W

Power LDMOS transistor



7.5.4 2-Carrier W-CDMA



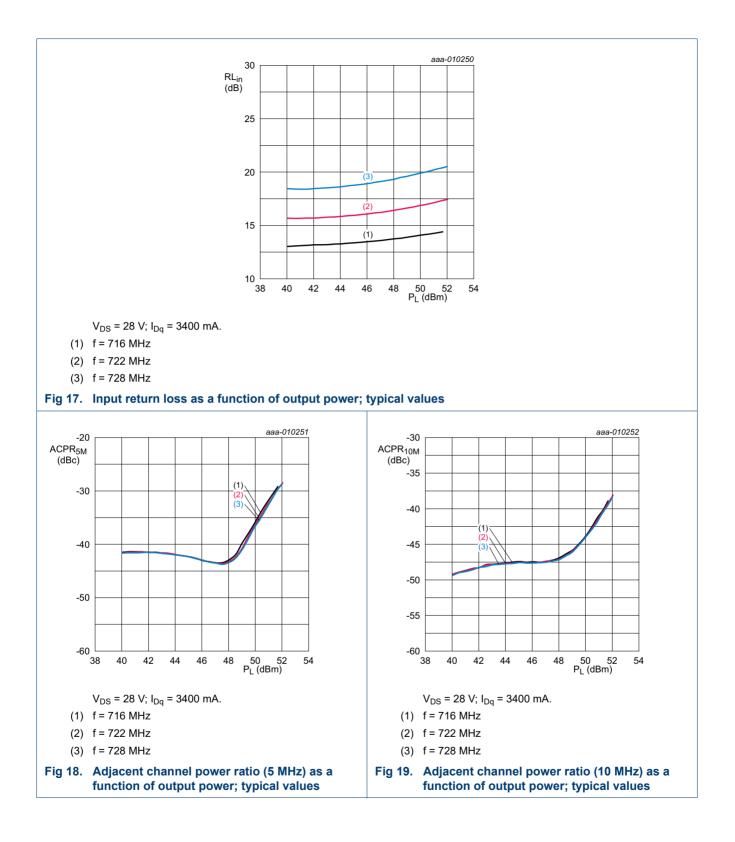
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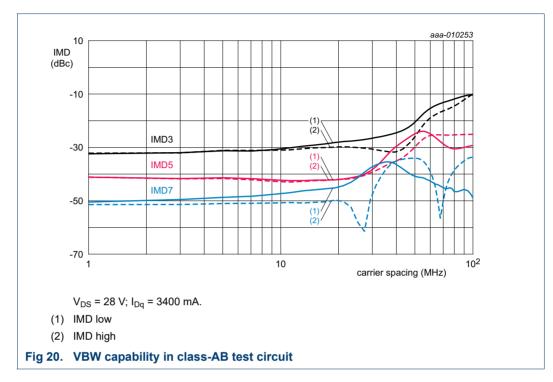
BLF8G09LS-400P(G)W

Power LDMOS transistor



Power LDMOS transistor

7.5.5 2-Tone VBW



BLF8G09LS-400PW_8G09LS-400PGW#5

Power LDMOS transistor

8. Package outline

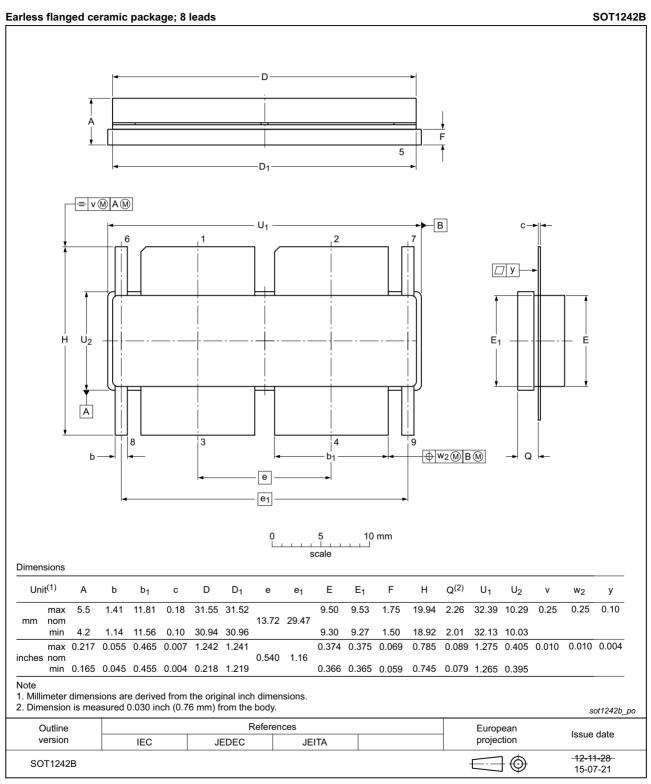


Fig 21. Package outline SOT1242B

SOT1242C

Earless flanged ceramic package; 8 leads

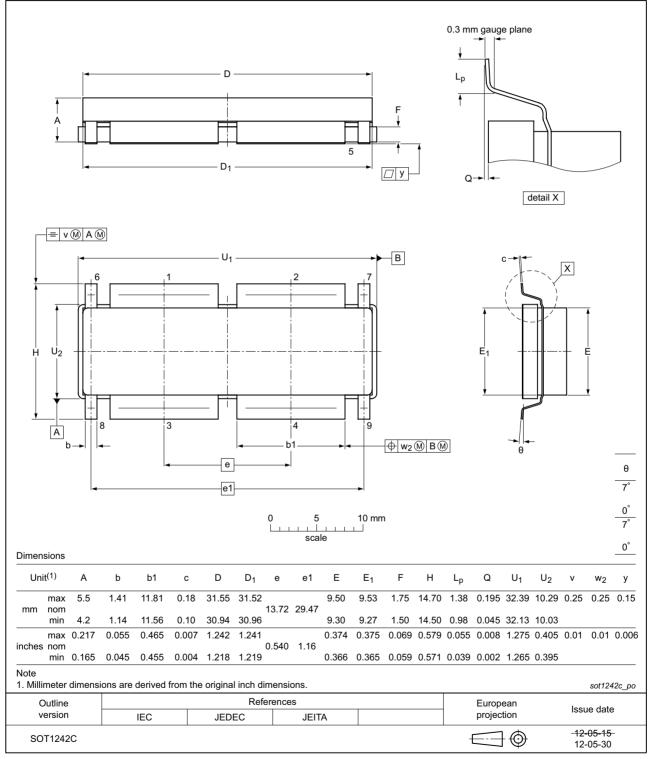


Fig 22. Package outline SOT1242C

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		
VBW	Video Bandwidth		
VSWR	Voltage Standing Wave Ratio		
W-CDMA	Wideband Code Division Multiple Access		

11. Revision history

Table 11.	Revision	history
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Document ID	Release date	Data sheet status	Change notice	Supersedes	
BLF8G09LS-400PW_ 8G09LS-400PGW#5	20150901	Product data sheet	-	BLF8G09LS-400PW_ 8G09LS-400PGW v.4	
Modifications:	• The format of this document has been redesigned to comply with the new identity guidelin Ampleon.				
	 Legal texts have 	e been adapted to the new compa	any name where approp	oriate.	
BLF8G09LS-400PW_ 8G09LS-400PGW v.4	20150728	Product data sheet	-	BLF8G09LS-400PW_ 8G09LS-400PGW v.3	
BLF8G09LS-400PW_ 8G09LS-400PGW v.3	20140324	Product data sheet	-	BLF8G09LS-400PW_ 8G09LS-400PGW v.2	
BLF8G09LS-400PW_ 8G09LS-400PGW v.2	20131220	Preliminary data sheet	-	BLF8G09LS-400PW_ 8G09LS-400PGW v.1	
BLF8G09LS-400PW_ 8G09LS-400PGW v.1	20130927	Objective data sheet	-	-	

12. Legal information

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Document status ^{[1][2]}	Product status ^[3]	Definition
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Date of release: 1 September 2015 Document identifier: BLF8G09LS-400PW_8G09LS-400PGW#5