BLF8G20LS-400PV; BLF8G20LS-400PGV Power LDMOS transistor

Rev. 5 — 1 September 2015

AMPLEON Product data sheet

Product profile 1.

1.1 General description

400 W LDMOS power transistor with improved video bandwidth for base station applications at frequencies from 1805 MHz to 1995 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	1805 to 1995	3400	28	95	19	28	-33 <mark>[1]</mark>

[1] Test signal: 3GPP test model 1; 64 DPCH; PAR = 7.5 dB at 0.01 % probability on CCDF; carrier spacing = 5 MHz; f₁ = 1807.5 MHz; f₂ = 1812.5 MHz; f₃ = 1872.5 MHz; f₄ = 1877.5 MHz.

1.2 Features and benefits

- Decoupling leads to enable improved Video BandWidth (VBW) (120 MHz typical)
- High efficiency
- Low thermal resistance providing excellent thermal stability
- Designed for broadband operation
- 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
- Design optimized for gull-wing
- Excellent ruggedness
- 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 1805 MHz to 1995 MHz frequency range

Power LDMOS transistor

2. Pinning information

Table 2.	Pinning		
Pin	Description	Simplified outline	Graphic symbol
BLF8G20I	LS-400PV (SOT1242B)		
1	drain1		
2	drain2		1
3	gate1		8•
4	gate2	\	3-4-5
5	source		4-1-3
6	decoupling1	5	9•−− ⊦ ≠−
7	decoupling2		27
8	n.c.		aaa-007816
9	n.c.		
BLF8G20I	LS-400PGV (SOT1242C)	· · · · · · · · · · · · · · · · · · ·	
1	drain1		
2	drain2		6
3	gate1		8•
4	gate2		3-4-5
5	source		
6	decoupling1		9•−− F 4 - ² ⊢
7	decoupling2		7
8	n.c.		aaa-007816
9	n.c.		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Packag	Package		
	Name	Name Description Ve		
BLF8G20LS-400PV	-	earless flanged ceramic package; 8 leads	SOT1242B	
BLF8G20LS-400PGV	-	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]	-	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	$T_{case} = 80 \ ^{\circ}C; P_{L} = 80 W$	0.23	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 = 3.0 mA	65	-	-	V
V _{GS(th)}	gate-source threshold voltage	V _{DS} = 10 V; I _D = 300 mA	1.5	1.9	2.3	V
I _{DSS}	drain leakage current	V _{GS} = 0 V; V _{DS} = 28 V	-	-	3.0	μA
I _{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75 V;$ $V_{DS} = 10 V$		51.5	-	A
I _{GSS}	gate leakage current	V _{GS} = 11 V; V _{DS} = 0 V	-	-	300	nA
9 _{fs}	forward transconductance	V _{DS} = 10 V; I _D = 15 A	-	20.6	-	S
R _{DS(on)}	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75 V;$ $I_D = 10.5 A$	-	0.055	-	Ω

Table 7. RF characteristics

Test signal: 2-carrier W-CDMA; PAR = 7.5 dB at 0.01 % probability on the CCDF; 3GPP test model 1; 1-64 DPCH; $f_1 = 1807.5$ MHz; $f_2 = 1812.5$ MHz; $f_3 = 1872.5$ MHz; $f_4 = 1877.5$ 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	Max	Unit
G _p	power gain	P _{L(AV)} = 95 W	17.8	19	-	dB
RL _{in}	input return loss	P _{L(AV)} = 95 W	-	-12	-6	dB
η _D	drain efficiency	P _{L(AV)} = 95 W	24	28	-	%
ACPR _{5M}	adjacent channel power ratio (5 MHz)	P _{L(AV)} = 95 W	-	-33	-28	dBc

7. Test information

7.1 Ruggedness in class-AB operation

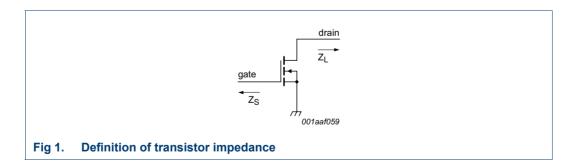
The BLF8G20LS-400PV and BLF8G20LS-400PGV are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS} = 28 \text{ V}$; $I_{Dq} = 3300 \text{ mA}$; 2-carrier W-CDMA signal; $P_L = 200 \text{ W}$; $f_c = 1800 \text{ MHz}$; 5 MHz spacing, 46 % clipping.

7.2 Impedance information

Table 8.Typical impedance for the top-half of the push-pull packageMeasured load-pull data; $I_{Dq} = 1800 \text{ mA}$; $V_{DS} = 28 \text{ V}$; $T_{case} = 25 \text{ °C}$, water cooled.

f	Z _S [1]	Z _L [1]
(MHz)	(Ω)	(Ω)
BLF8G20LS-400PV (straight le	ad)	
1800	4.1 – j4.66	4.1 – j4.5
1840	5.2 – j3.6	4.4 – j4.4
1880	4.6 – j1.45	4.85 – j4.25
1930	2.8 – j0.3	4.5 – j4.3
1960	2.1 – j0.5	5.5 – j3.5
1990	1.56 – j0.6	5.5 – j3.4
BLF8G20LS-400PGV (gull-wing	g)	
1800	3.7 – j7.6	4.2 – j6.8
1840	4.34 – j6.1	4.4 – j6.7
1880	4.75 – j5.2	4 – j6.4
1930	3.17 – j3.4	4.6 – j6.5
1960	2 – j3.05	5.8 – j5.5
1990	2.5 – j2.6	5.8– j5.7

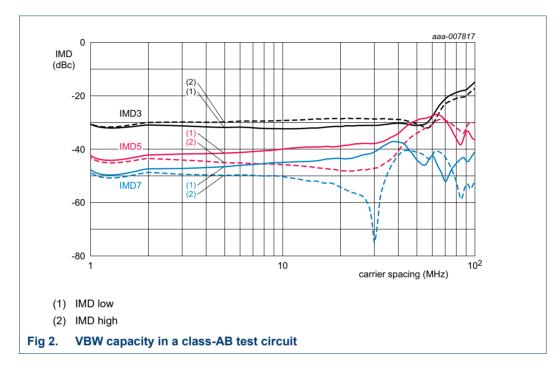
[1] Z_S and Z_L defined in Figure 1.



7.3 VBW in class-AB operation

The BLF8G20LS-400PV and BLF8G20LS-400PGV have a video bandwidth of 120 MHz (typical) when measured in a class-AB test circuit operating in the 1800 MHz to 1880 MHz frequency band for V_{DS} = 28 V and I_{Dq} = 3.3 A, where the VBW is defined as the location of the resonance in the base-band impedance measurement obtained using a low-frequency probe.

The VBW measurement based on the 2-tone IMD test as a function of carrier spacing is shown below.



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7.4 Test circuit

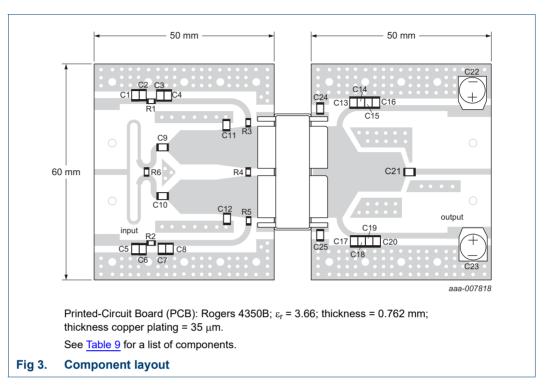


Table 9. List of components

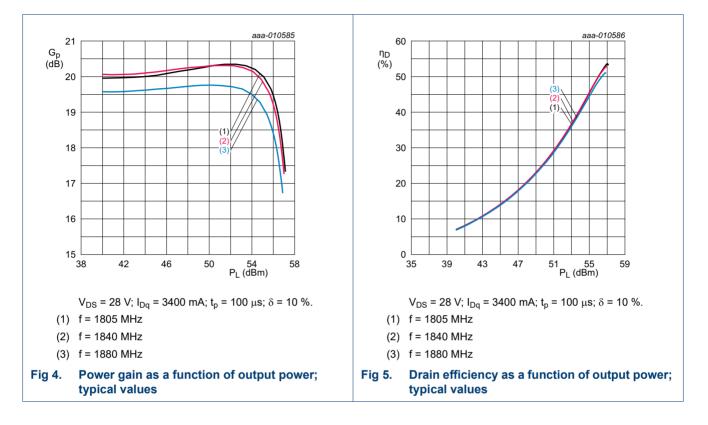
See Figure 3 for component layout.

Component	Description	Value	Remarks	
C1, C5, C16, C20	multilayer ceramic chip capacitor	10 μF, 50 V	Murata, SMD 2220	
C2, C6, C15, C19, C24, C25	multilayer ceramic chip capacitor	4.7 μF, 50 V	Murata	
C3, C7, C14, C18	multilayer ceramic chip capacitor	1 nF	ATC100B	
C4, C8, C9, C10, C13, C17, C21	multilayer ceramic chip capacitor	24 pF	ATC100B	
C11, C12	multilayer ceramic chip capacitor	100 pF	ATC100B	
C22, C23	electrolytic capacitor	2200 μF, 63 V		
R1, R2	resistor	10 Ω	SMD 1206	
R3, R5	resistor	5.1 Ω	SMD 1206	
R4	resistor	33 Ω	SMD 1206	
R6	resistor	100 Ω	SMD 1206	

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7.5 Graphical data

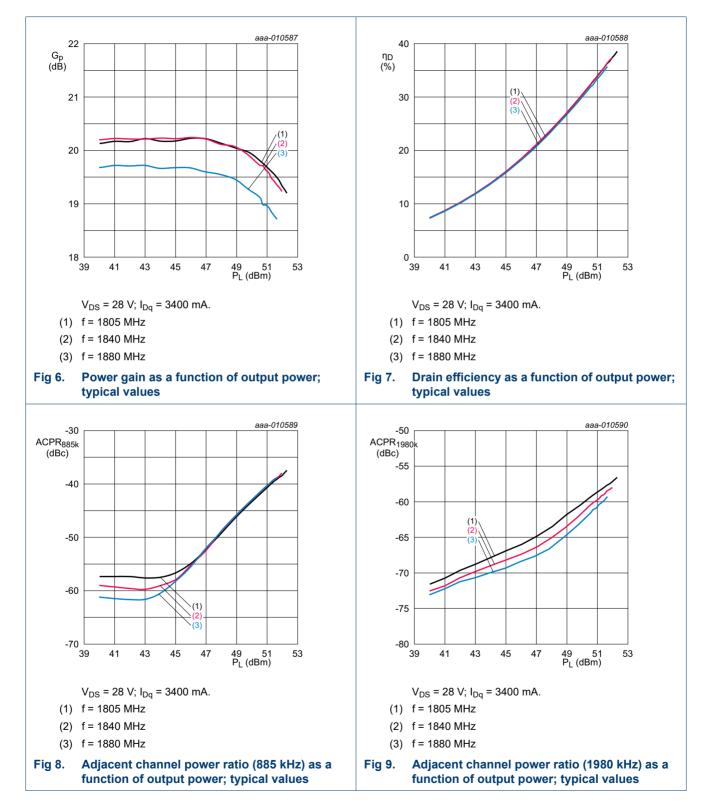
7.5.1 Pulsed CW



BLF8G20LS-400P(G)V

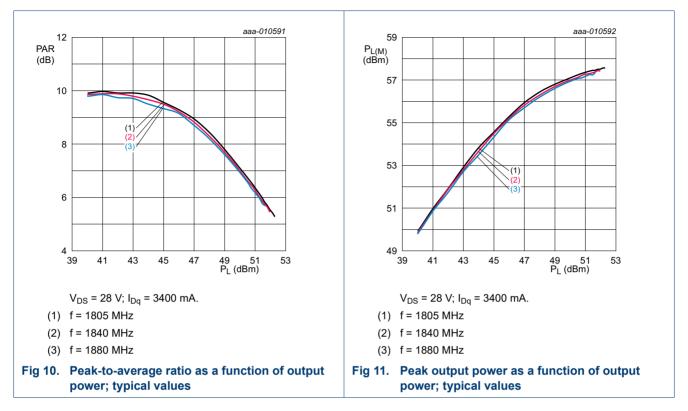
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7.5.2 IS-95

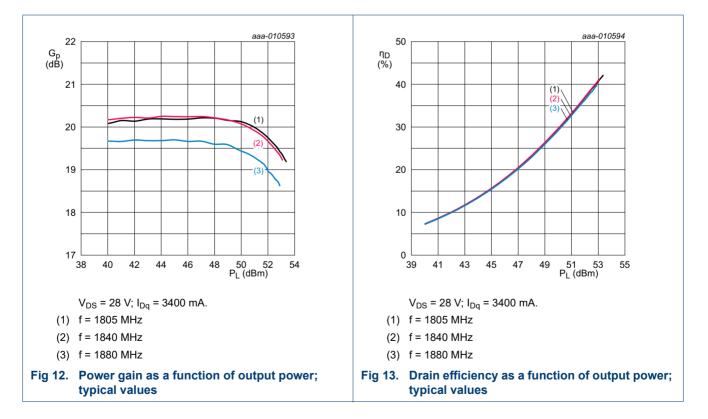


BLF8G20LS-400P(G)V

Power LDMOS transistor

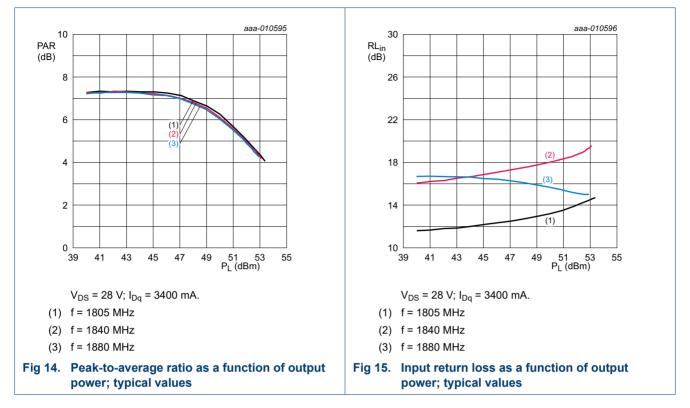


7.5.3 1-Carrier W-CDMA

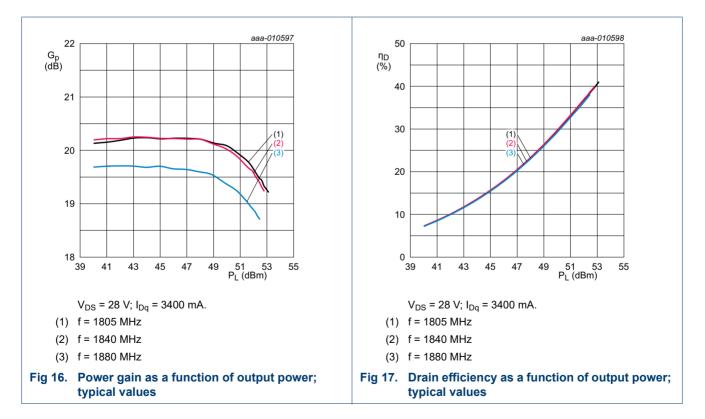


BLF8G20LS-400P(G)V

Power LDMOS transistor



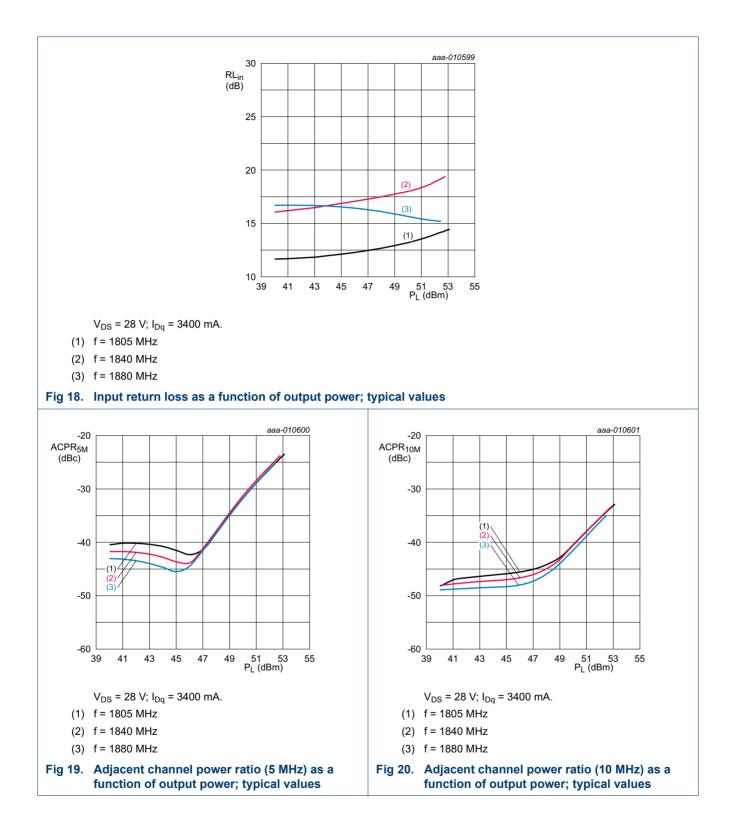
7.5.4 2-Carrier W-CDMA



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BLF8G20LS-400P(G)V

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8. Package outline

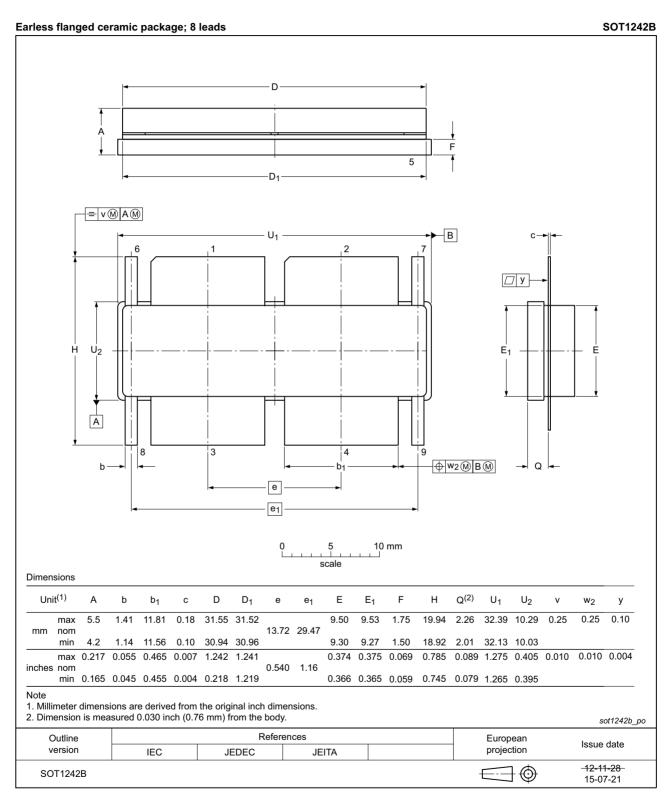


Fig 21. Package outline SOT1242B

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SOT1242C



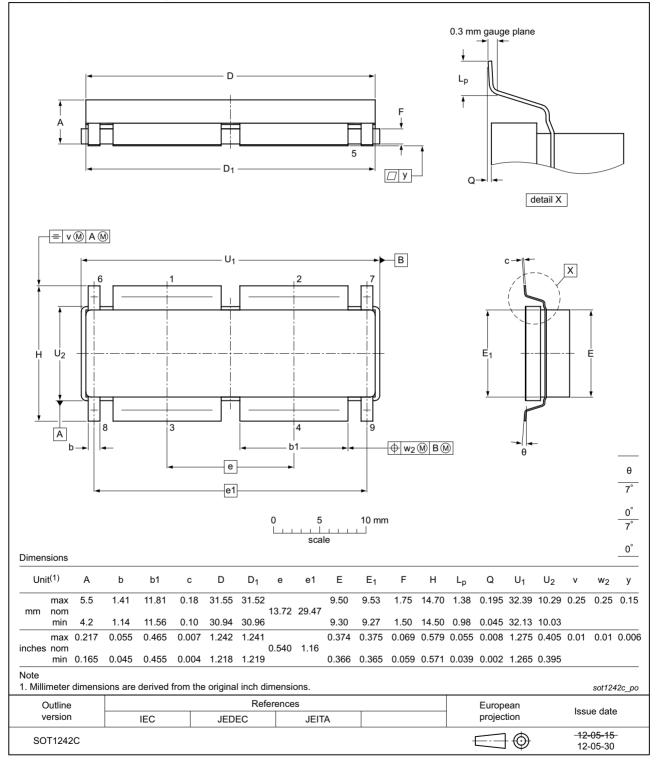


Fig 22. Package outline SOT1242C

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. Abbre	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		
IMD	InterModulation Distortion		
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		
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
BLF8G20LS-400PV_LS-400PGV#5	20150901	Product data sheet		BLF8G20LS-400PV _LS-400PGV v.4
Modifications:	ations: • The format of this document has been redesigned to comply with the new identity guidelines of Ampleon.			
	 Legal texts have been adapted to the new company name where appropriate. 			
BLF8G20LS-400PV_LS-400PGV v.4	20150728	Product data sheet	-	BLF8G20LS-400PV _LS-400PGV v.3
BLF8G20LS-400PV_LS-400PGV v.3	20140603	Product data sheet	-	BLF8G20LS-400PV _LS-400PGV v.2
BLF8G20LS-400PV_LS-400PGV v.2	20130625	Product data sheet	-	BLF8G20LS-400PV _LS-400PGV v.1
BLF8G20LS-400PV_LS-400PGV v.1	20130606	Preliminary data sheet	-	-

12. Legal information

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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.	
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