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BLF8G22LS-160BV

Power LDMOS transistor

Rev. 3 — 1 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

160 W LDMOS power transistor with improved video bandwidth for base station applications at frequencies from 2000 MHz to 2200 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	I_{Dq}	V_{DS}	$P_{L(AV)}$	G_p	η_D	ACPR
	(MHz)	(mA)	(V)	(W)	(dB)	(%)	(dBc)
2-carrier W-CDMA	2110 to 2170	1300	32	55	18.0	32	–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

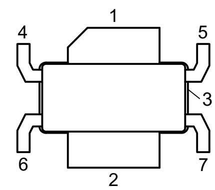
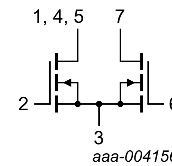
- Excellent ruggedness
- High efficiency
- Low thermal resistance providing excellent thermal stability
- Decoupling leads to enable improved video bandwidth (100 MHz typical)
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection
- Integrated current sense
- 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 2000 MHz to 2200 MHz frequency range

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain		
2	gate		
3	source [1]		
4,5	video decoupling		
6	sense gate		
7	sense drain		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF8G22LS-160BV	-	earless flanged LDMOST ceramic package; 6 leads	SOT1120B

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
$V_{GS(sense)}$	sense gate-source voltage		–0.5	+9	V
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		-	200	°C
T_{case}	case temperature	[1]	-	150	°C

[1] Continuous use at maximum temperature will affect MTTF.

5. Recommended operating conditions

Table 5. Operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{case}	case temperature		–40	-	+125	°C

6. Thermal characteristics

Table 6. 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

7. Characteristics

Table 7. 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
I_{Dq}	quiescent drain current	main transitor: V_{DS} = 32 V sense transitor: I_{DS} = 23.4 mA; V_{DS} = 30.4 V	1175	1300	1425	mA

8. Test information

Table 8. Application information

Test signal: 2-carrier W-CDMA; PAR 8.4 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH; f_1 = 2112.5 MHz; f_2 = 2117.5 MHz; f_3 = 2162.5 MHz; f_4 = 2167.5 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	$P_{L(AV)}$ = 55 W	16.8	18.0	19.7	dB
RL_{in}	input return loss	$P_{L(AV)}$ = 55 W	-	−13	−7	dB
η_D	drain efficiency	$P_{L(AV)}$ = 55 W	29	32	-	%
$ACPR_{5M}$	adjacent channel power ratio (5 MHz)	$P_{L(AV)}$ = 55 W	-	−31	−28	dBc

Table 9. Application information

Mode of operation: 1-carrier W-CDMA; PAR 7.2 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH; f = 2167.5 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
PAR_O	output peak-to-average ratio	$P_{L(AV)}$ = 115 W; at 0.01 % probability on CCDF	3.9	4.3	-	dB
$P_{L(M)}$	peak output power		290	310	-	W

8.1 Ruggedness in class-AB operation

The BLF8G22LS-160BV 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 = 160 W; f = 2110 MHz.

8.2 Impedance information

Table 10. Typical impedance

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

f	Z_S [1]	Z_L [1]
(MHz)	(Ω)	(Ω)
2110	2.2 – j4.6	1.4 – j2.8
2140	2.1 – j4.5	1.4 – j2.6
2170	2.1 – j4.3	1.3 – j2.4

[1] Z_S and Z_L defined in Figure 1.

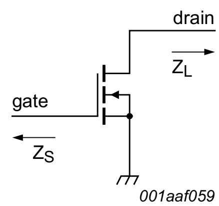
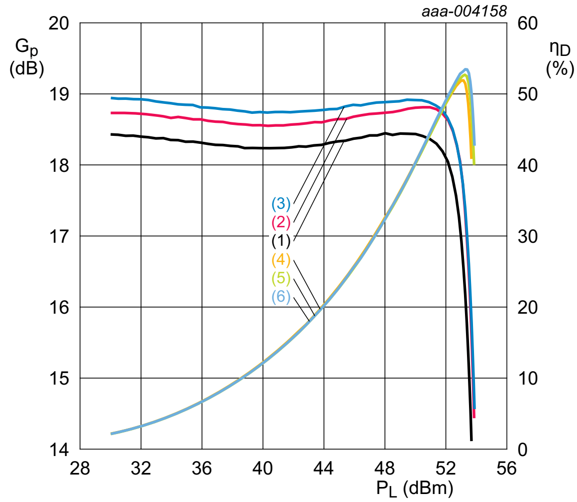


Fig 1. Definition of transistor impedance

8.3 VBW in class-AB operation

The BLF8G22LS-160BV shows 100 MHz (typical) video bandwidth in class-AB test circuit in 2.1 GHz band at 32 V and 1.3 A.

8.4 CW pulse



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

(1) G_p at f = 2110 MHz

(2) G_p at f = 2140 MHz

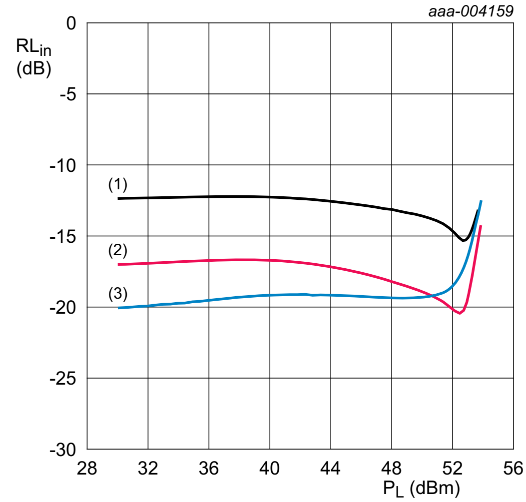
(3) G_p at f = 2170 MHz

(4) η_D at f = 2110 MHz

(5) η_D at f = 2140 MHz

(6) η_D at f = 2170 MHz

Fig 2. Power gain and drain efficiency as function of load power; typical values



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

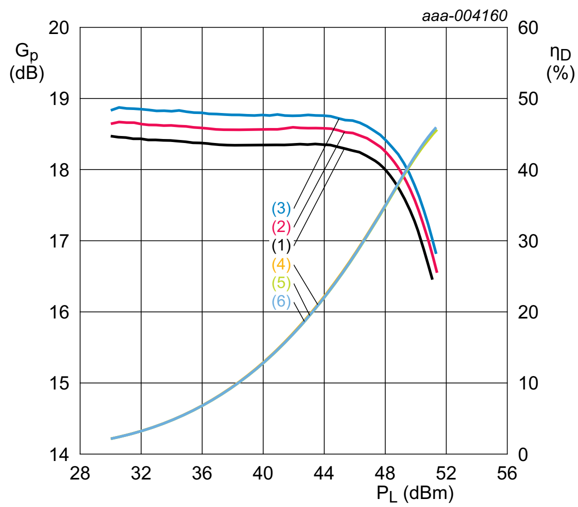
(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

Fig 3. Input return loss as a function of load power; typical values

8.5 2-carrier W-CDMA



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

(1) G_p at f = 2115 MHz

(2) G_p at f = 2140 MHz

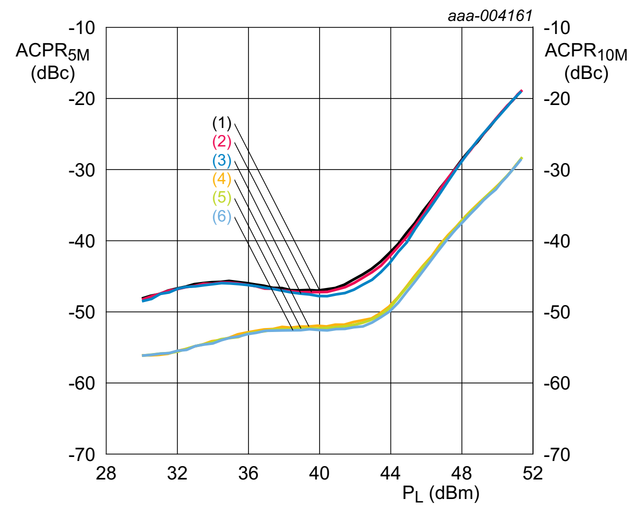
(3) G_p at f = 2165 MHz

(4) η_D at f = 2115 MHz

(5) η_D at f = 2140 MHz

(6) η_D at f = 2165 MHz

Fig 4. Power gain and drain efficiency as function of load power; typical values



V_{DS} = 32 V; V_{GS} = 32 V; f = 5 MHz; δ = 46 %.

(1) $ACPR_{5M}$ at f = 2115 MHz

(2) $ACPR_{5M}$ at f = 2140 MHz

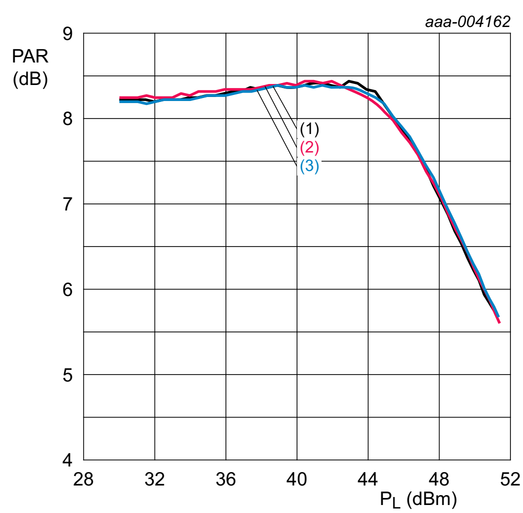
(3) $ACPR_{5M}$ at f = 2165 MHz

(4) $ACPR_{10M}$ at f = 2115 MHz

(5) $ACPR_{10M}$ at f = 2140 MHz

(6) $ACPR_{10M}$ at f = 2165 MHz

Fig 5. Adjacent channel power ratio (5MHz) and adjacent channel power ratio (10MHz) as function of load power; typical values



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

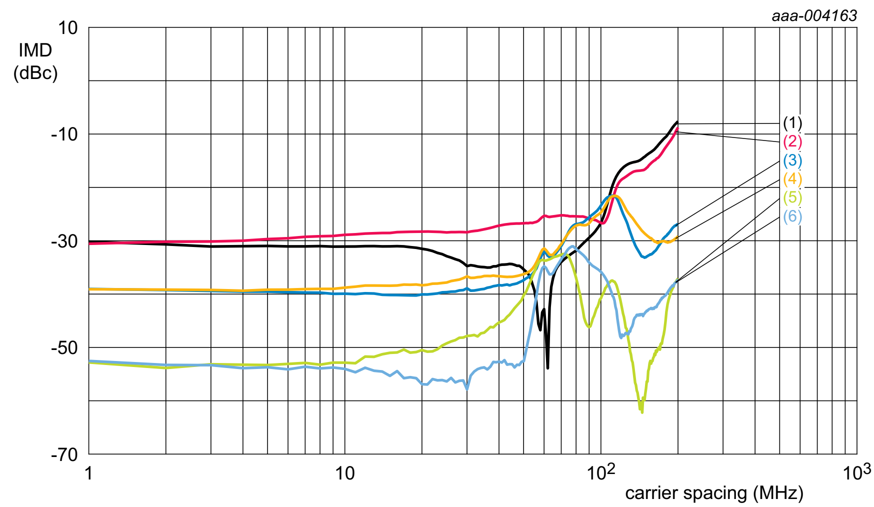
(1) f = 2115 MHz

(2) f = 2140 MHz

(3) f = 2165 MHz

Fig 6. Peak to average power ratio as a function of load power; typical values

8.6 2-tone VBW



V_{DS} = 32 V; I_{Dq} = 1300 mA; f_c = 2140 MHz.

(1) IMD3 low

(2) IMD3 high

(3) IMD5 low

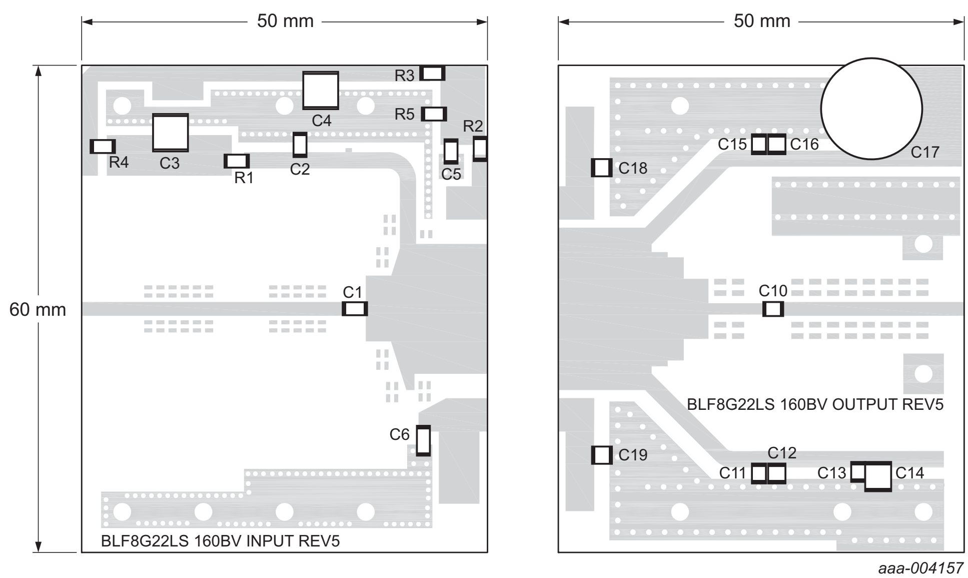
(4) IMD5 high

(5) IMD7 low

(6) IMD7 high

Fig 7. VBW capability in class-AB test circuit

8.7 Test circuit



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

See Table 11 for a list of components.

Fig 8. Component layout for class-AB production test circuit

Table 11. List of components

For test circuit see [8].

Component	Description	Value		Remarks
C1, C2, C10, C11, C13, C15	multilayer ceramic chip capacitor	12 pF	[1]	ATC100B
C5, C6	multilayer ceramic chip capacitor	120 pF	[1]	ATC100B
C3, C4, C12, C16, C18, C19	multilayer ceramic chip capacitor	4.7 μF, 50 V	[2]	Murata
C14	multilayer ceramic chip capacitor	4.7 μF, 100 V	[3]	TDK
C15	electrolytic capacitor	470 μF, 63 V		
R1	SMD resistor	4.7 Ω		Philips 1206
R2	SMD resistor	470 Ω		Philips 1206
R3	SMD resistor	820 Ω		Philips 1206
R4	SMD resistor	12 Ω		Philips 1206
R5	SMD resistor	2200 Ω		Philips 1206

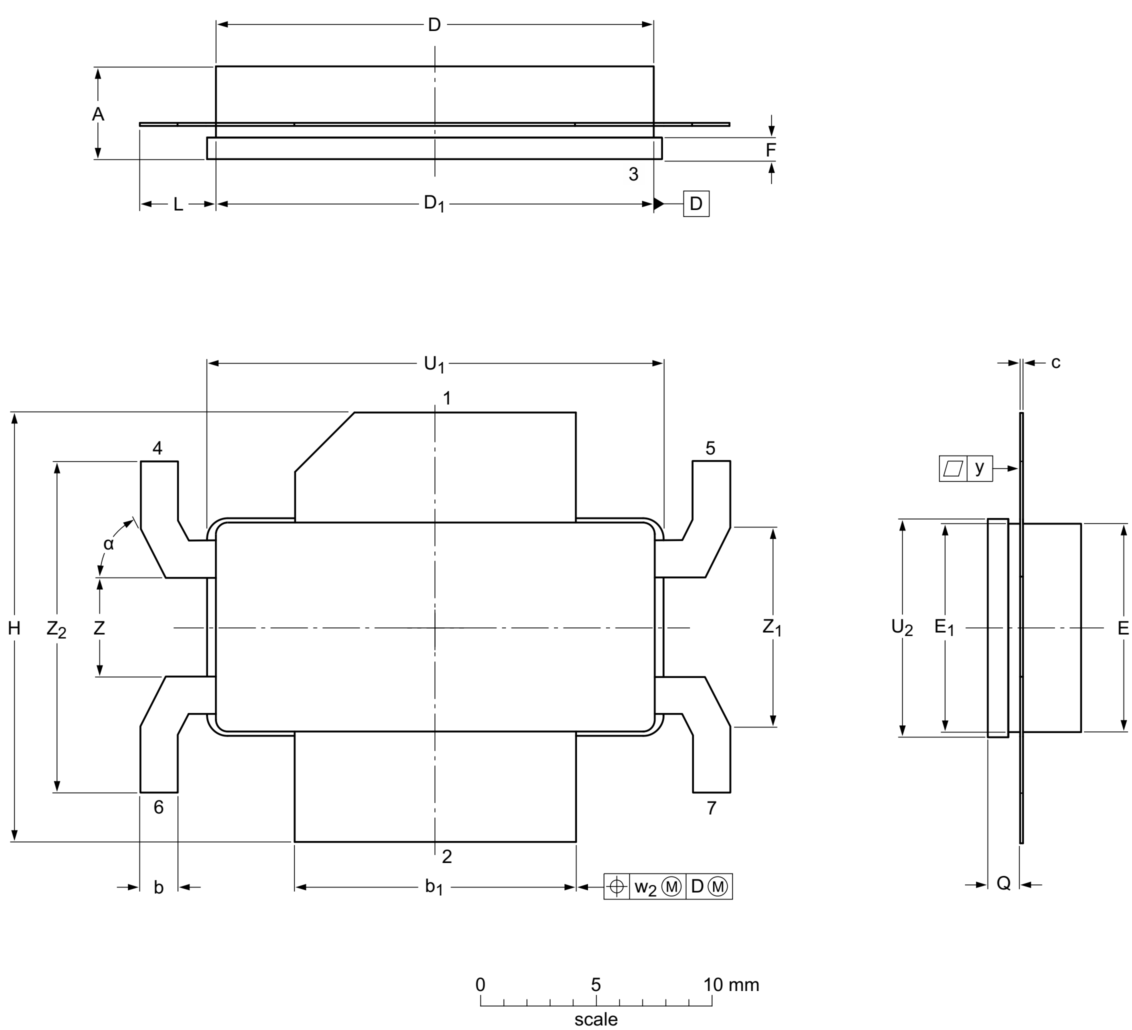
[1] American Technical Ceramics type 100B or capacitor of same quality.

[2] Murata or capacitor of same quality.

[3] TDK or capacitor of same quality.

9. Package outline

Earless flanged LDMOST ceramic package; 6 leads **SOT1120B**



Dimensions

Unit(1)		A	b	b_1	c	D	D_1	E	E_1	F	H	L	Q(2)	U_1	U_2	w_2	y	Z	Z_1	Z_2	α
mm	max	4.75	1.83	12.83	0.18	20.02	19.96	9.53	9.53	1.14	19.94	3.56	1.70	20.70	9.91		0.10	4.60	9.53	15.52	64°
	nom															0.51					
	min	3.45	1.57	12.57	0.10	19.61	19.66	9.27	9.25	0.89	18.92	3.30	1.45	20.45	9.65			4.32	8.71	14.50	60°
inches	max	0.187	0.072	0.505	0.007	0.788	0.786	0.375	0.375	0.045	0.785	0.140	0.067	0.815	0.39		0.004	0.181	0.375	0.611	64°
	nom															0.02					
	min	0.136	0.062	0.495	0.004	0.772	0.774	0.365	0.364	0.035	0.745	0.130	0.057	0.805	0.38			0.170	0.343	0.571	60°

Note
1. millimeter dimensions are derived from the original inch dimensions.
2. dimension is measured 0.030 inch (0.76 mm) from the body.

sot1120b_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1120B						~~12-06-14~~ 13-10-21

Fig 9. Package outline SOT1120B

10. Abbreviations

Table 12. Abbreviations

Acronym	Description
3GPP	Third Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
DPCH	Dedicated Physical CHannel
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal Oxide Semiconductor
LDMOST	Laterally Diffused Metal Oxide Semiconductor Transistor
MTTF	Mean 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 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF8G22LS-160BV#3	20150901	Product data sheet		BLF8G22LS-160BV v.2
Modifications:	• 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.			
BLF8G22LS-160BV v.2	20150501	Product data sheet	-	BLF8G22LS-160BV v.1
BLF8G22LS-160BV v.1	20120625	Product 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".

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