BLP8G21S-160PV

Power LDMOS transistor

Rev. 5 — 28 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

160 W LDMOS transistor for base station applications at frequencies from 1880 MHz to 2025 MHz.

Table 1. Typical performance

Typical RF performance per section 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	1880 to 1920	600	28	20	17.5	31	−30 [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

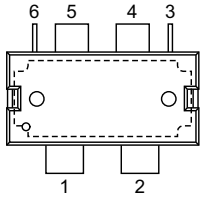
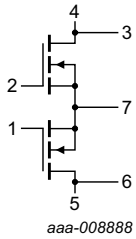
- Designed for broadband operation (1880 MHz to 2025 MHz)
- Decoupling leads to enable improved video bandwidth
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Internally matched for ease of use
- High power gain
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- RF power amplifiers for base station and multi-carrier applications in the 1880 MHz to 2025 MHz frequency range

2. Pinning information

Table 2. Pinning

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

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLP8G21S-160PV	HSOP6F	plastic, heatsink small outline package; 6 leads (flat)	SOT1221-2

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, for details refer to the on-line MTF calculator.

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j\text{-}case)}$	thermal resistance from junction to case	T_{case} = 80 °C; P_L = 80 W	0.356	K/W

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6. Characteristics

Table 6. DC characteristics

T_j = 25 °C per section, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0 V; I_D = 1.14 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 114 mA	1.5	1.9	2.3	V
V_{GSq}	gate-source quiescent voltage	V_{DS} = 28 V; I_D = 684 mA	1.7	2.1	2.5	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	1.4	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	-	20.4	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	140	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 114 mA	-	1.0	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 3.99 A	-	0.1	-	Ω

Table 7. RF characteristics

Test signal: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on CCDF; carrier spacing = 5 MHz; 3GPP test model 1; 64 DPCH; f_1 = 1882.5 MHz; f_2 = 1887.5 MHz; f_3 = 1912.5 MHz; f_4 = 1917.5 MHz; RF performance per section at V_{DS} = 28 V; I_{Dq} = 600 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	$P_{L(AV)}$ = 20 W	16.3	17.5	-	dB
η_D	drain efficiency	$P_{L(AV)}$ = 20 W	26	31	-	%
RL_{in}	input return loss	$P_{L(AV)}$ = 20 W	-	−10	−6	dB
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 20 W	-	−30	−25	dBc

7. Application information

7.1 Ruggedness in class-AB operation

The BLP8G21S-160PV is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: per section; V_{DS} = 28 V; I_{Dq} = 600 mA; P_L = 80 W (CW); f = 1880 MHz.

7.2 Impedance information

Table 8. Typical impedance

Measured per section load-pull data; I_{Dq} = 600 mA; V_{DS} = 28 V. Typical values unless otherwise specified.

f	Z_S [1]	Z_L [1]
(MHz)	(Ω)	(Ω)
1880	2.353 – j8.430	2.508 – j8.375
1920	3.032 – j9.435	2.407 – j8.091
2025	6.435 – j13.55	2.148 – j7.389

[1] Z_S and Z_L defined in Figure 1.

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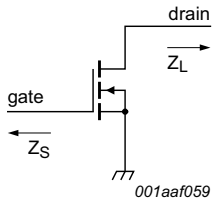
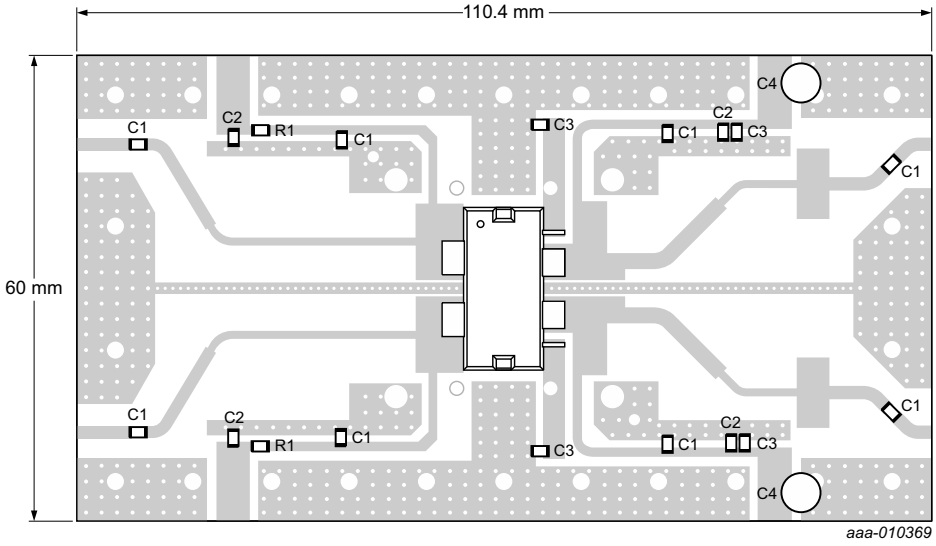


Fig 1. Definition of transistor impedance

7.3 Test circuit



Printed-Circuit Board (PCB): Rogers RO4350B; thickness = 0.76 mm.

See Table 9 for list of components.

Fig 2. Component layout for test circuit

Table 9. List of components

For test circuit, see Figure 2.

Component	Description	Value	Remarks
C1	multilayer ceramic chip capacitor	30 pF	ATC800B
C2	multilayer ceramic chip capacitor	2.2 μF	Murata
C3	multilayer ceramic chip capacitor	10 μF	Murata
C4	electrolytic capacitor	1000 μF, 63 V	
R1	chip resistor	5.1 Ω	Vishay Dale SMD 0805

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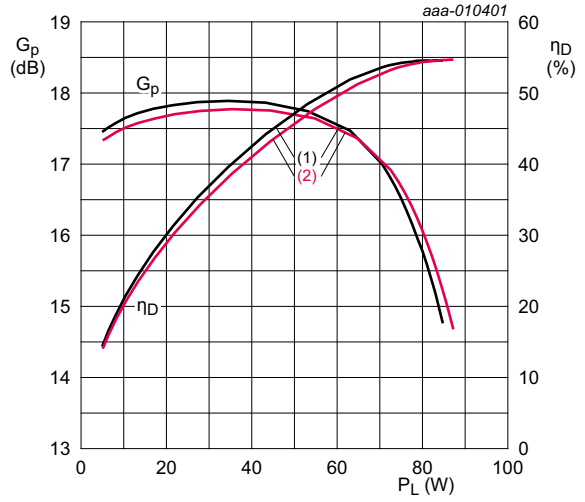
7.4 Graphical data

7.4.1 Pulsed CW

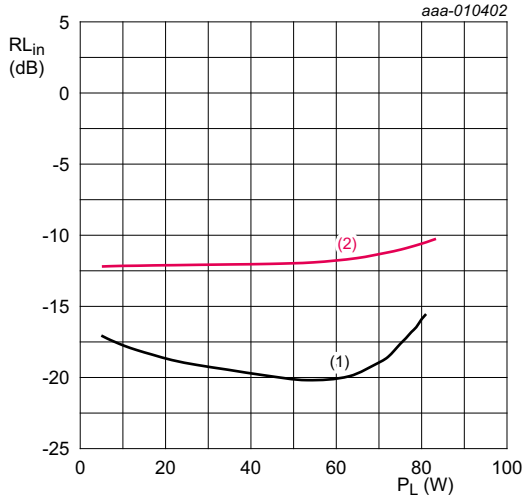


V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 1880 MHz

(2) f = 1920 MHz

Fig 3. Power gain and drain efficiency as function of output power; typical values per section



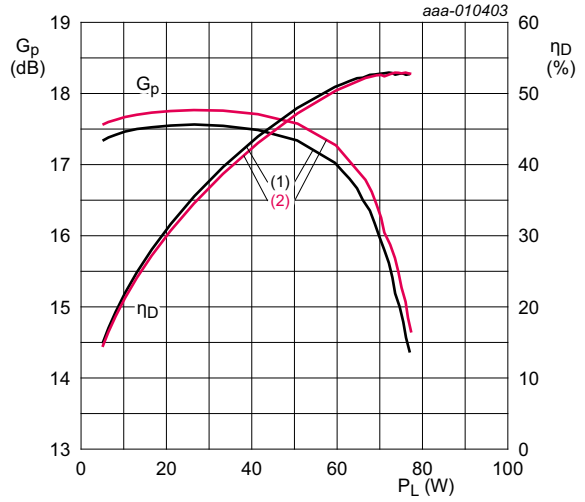
V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 1880 MHz

(2) f = 1920 MHz

Fig 4. Input return loss as a function of output power; typical values per section

7.4.2 CW

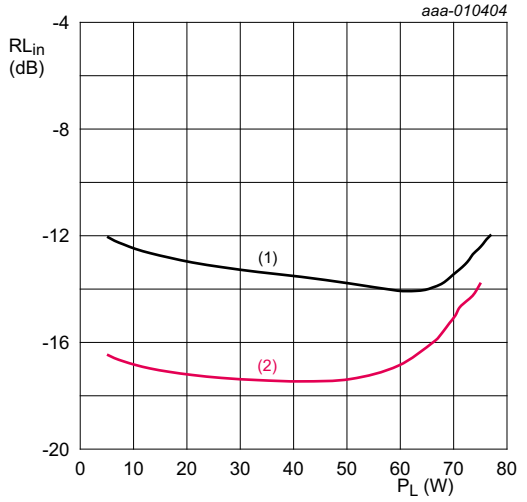


V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 1880 MHz

(2) f = 1920 MHz

Fig 5. Power gain and drain efficiency as function of output power; typical values per section



V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 1880 MHz

(2) f = 1920 MHz

Fig 6. Input return loss as a function of output power; typical values per section

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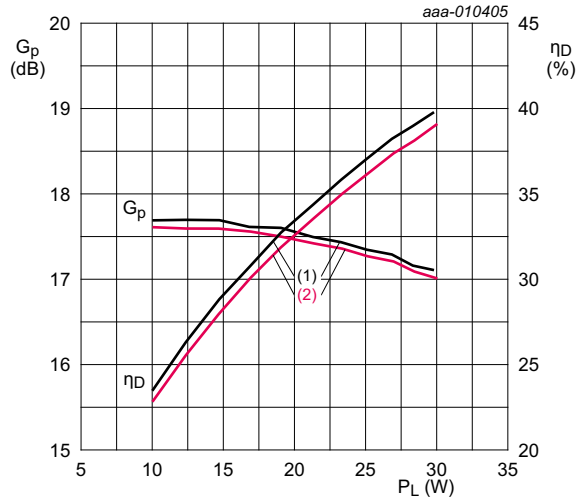
7.4.3 2-Carrier W-CDMA

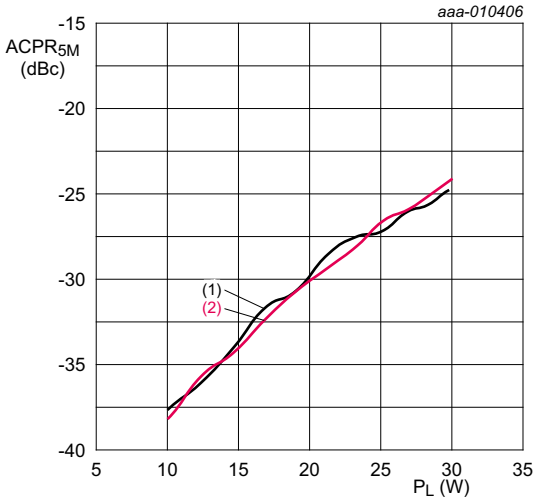


V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 1885 MHz

(2) f = 1915 MHz

Fig 7. Power gain and drain efficiency as function of output power; typical values per section

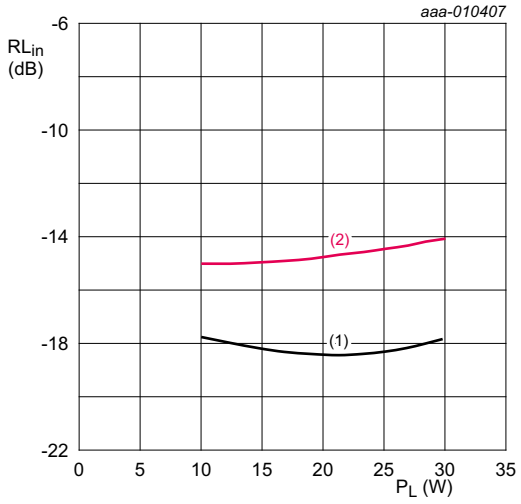


V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 1885 MHz

(2) f = 1915 MHz

Fig 8. Adjacent channel power ratio (5 MHz) as a function of output power; typical values per section



V_{DS} = 28 V; I_{Dq} = 600 mA.

(1) f = 1885 MHz

(2) f = 1915 MHz

Fig 9. Input return loss as a function of output power; typical values per section

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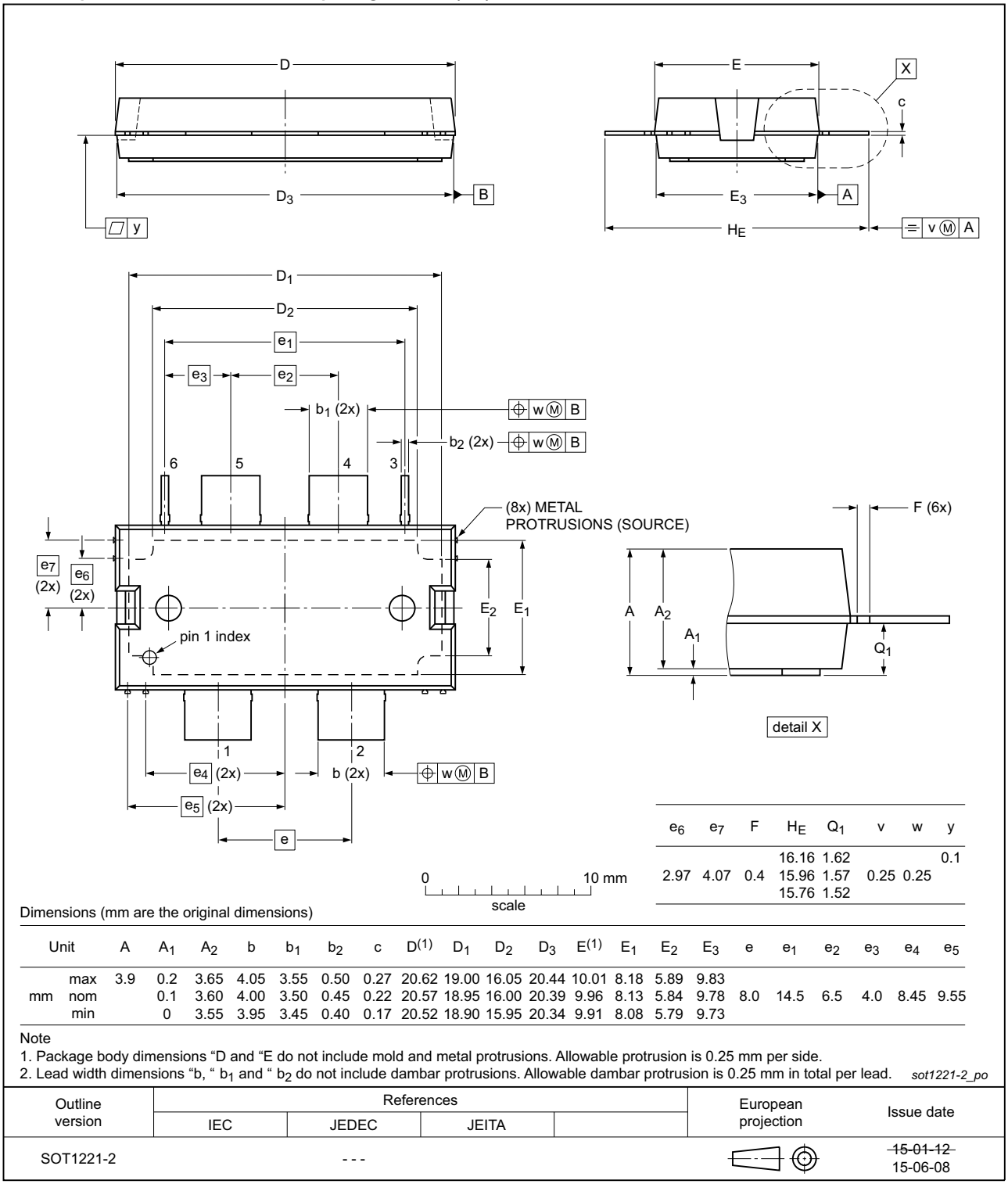
8. Package outline

HSOP6F: plastic, heatsink small outline package; 6 leads(flat) **SOT1221-2**



e6	e7	F	HE	Q1	v	w	y
			16.16	1.62			0.1
2.97	4.07	0.4	15.96	1.57	0.25	0.25	
			15.76	1.52			

Dimensions (mm are the original dimensions)

Unit		A	A1	A2	b	b1	b2	c	D(1)	D1	D2	D3	E(1)	E1	E2	E3	e	e1	e2	e3	e4	e5
	max	3.9	0.2	3.65	4.05	3.55	0.50	0.27	20.62	19.00	16.05	20.44	10.01	8.18	5.89	9.83						
mm	nom		0.1	3.60	4.00	3.50	0.45	0.22	20.57	18.95	16.00	20.39	9.96	8.13	5.84	9.78	8.0	14.5	6.5	4.0	8.45	9.55
	min		0	3.55	3.95	3.45	0.40	0.17	20.52	18.90	15.95	20.34	9.91	8.08	5.79	9.73						

Note
1. Package body dimensions “D and “E do not include mold and metal protrusions. Allowable protrusion is 0.25 mm per side.
2. Lead width dimensions “b, “ b_1 and “ b_2 do not include dambar protrusions. Allowable dambar protrusion is 0.25 mm in total per lead. *sot1221-2_po*

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1221-2		- - -				~~15-01-12~~ 15-06-08

Fig 10. Package outline SOT1221-2 (HSOP6F)

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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
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
BLP8G21S-160PV v.5	20150928	Product data sheet	-	BLP8G21S-160PV#4
Modifications	• Table 3 on page 2: package outline version changed from SOT1221-1 to SOT1221-2 • Figure 10 on page 7: package outline version changed from SOT1221-1 to SOT1221-2			
BLP8G21S-160PV#4	20150901	Product data sheet	-	BLP8G21S-160PV v.3
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			
BLP8G21S-160PV v.3	20140701	Product data sheet	-	BLP8G21S-160PV v.2
BLP8G21S-160PV v.2	20131219	Objective data sheet	-	BLP8G21S-160PV v.1
BLP8G21S-160PV v.1	20130808	Objective data sheet	-	-

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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.
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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