

BLP10H603

Broadband LDMOS driver transistor

Rev. 2 — 1 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

A 2.5 W plastic LDMOS power transistor for broadcast transmitter and ISM applications at frequencies from HF to 1400 MHz.

Table 1. Application performance

Test signal	f	V _{DS}	P _L	G _p	η _D
	(MHz)	(V)	(W)	(dB)	(%)
CW	860	50	2.5	22.8	62

1.2 Features and benefits

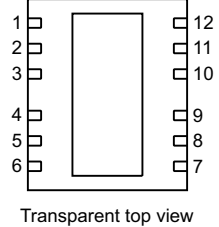
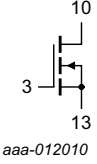
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (HF to 1400 MHz)
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- Industrial, scientific and medical applications
- Broadcast transmitter applications

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1, 2, 4, 5, 6, 7, 8, 9, 11, 12	n.c.		
3	gate1		
10	drain1		
13	source ^[1]		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLP10H603	HVSON12	plastic thermal enhanced very thin small outline package; no leads; 12 terminals; body 5 × 6 × 0.85 mm	SOT1352-1

4. Limiting values

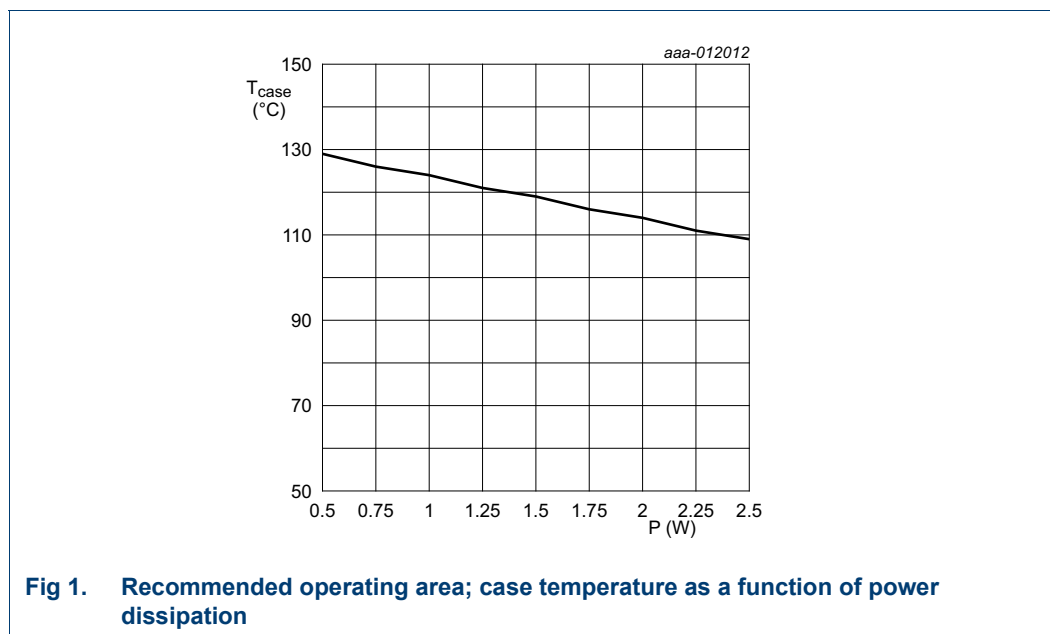
Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage		-	104	V
V_{GS}	gate-source voltage		-6	+11	V
T_{stg}	storage temperature		-65	+150	°C
T_j	junction temperature		-	150	°C

5. Recommended operating conditions

See application note AN11520 for more details.



6. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}$; $P_L = 2.5\text{ W}$ [1]	9.9	K/W

[1] $R_{th(j-c)}$ is measured under RF conditions

7. Characteristics

Table 6. DC characteristics

$T_j = 25\text{ °C}$; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}$; $I_D = 0.03\text{ mA}$	104	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$; $I_D = 3\text{ mA}$	1.25	1.65	2.25	V
V_{GSq}	gate-source quiescent voltage	$V_{DS} = 50\text{ V}$; $I_D = 15\text{ mA}$	1.3	1.73	2.15	V
I_{DSS}	drain leakage current	$V_{GS} = 0\text{ V}$; $V_{DS} = 50\text{ V}$	-	-	1.4	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $V_{DS} = 10\text{ V}$	-	0.5	-	A
I_{GSS}	gate leakage current	$V_{GS} = 11\text{ V}$; $V_{DS} = 0\text{ V}$	-	-	140	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $I_D = 105\text{ mA}$	-	9	-	Ω

Table 7. AC characteristics

$T_j = 25\text{ }^{\circ}\text{C}$; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C_{rs}	feedback capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = 50\text{ V}$; $f = 1\text{ MHz}$	-	0.03	-	pF
C_{iss}	input capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = 0\text{ V}$; $f = 1\text{ MHz}$	-	3.4	-	pF
C_{oss}	output capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = 50\text{ V}$; $f = 1\text{ MHz}$	-	1.12	-	pF

Table 8. RF characteristics

Test signal: pulsed CW; $f = 860\text{ MHz}$; RF performance at $V_{DS} = 50\text{ V}$; $I_{Dq} = 15\text{ mA}$; $t_p = 50\text{ }\mu\text{s}$; $\delta = 10\%$; $T_{case} = 25\text{ }^{\circ}\text{C}$; unless otherwise specified, in a class-AB production test circuit [1].

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	$P_L = 2.5\text{ W}$	21.4	22.8	25.5	dB
η_D	drain efficiency	$P_L = 2.5\text{ W}$	60	62	-	%

[1] The industrial test method is performed on special hardware to accommodate the requirements of production. The test results in this table are correlated to correspond with a performance in the application.

8. Test information

8.1 Ruggedness in class-AB operation

The BLP10H603 is capable of withstanding a load mismatch corresponding to $VSWR = 35 : 1$ through all phases under the following conditions: $V_{DS} = 50\text{ V}$; $I_{Dq} = 15\text{ mA}$; $P_L = 2.5\text{ W}$; $f = 860\text{ MHz}$.

8.2 Test circuit

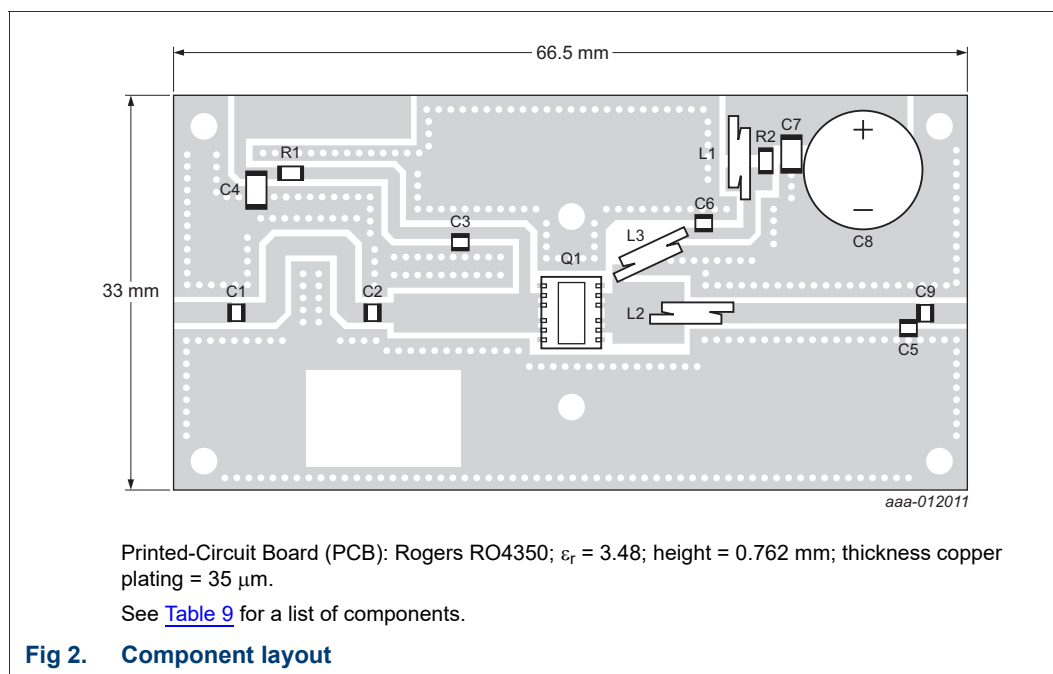


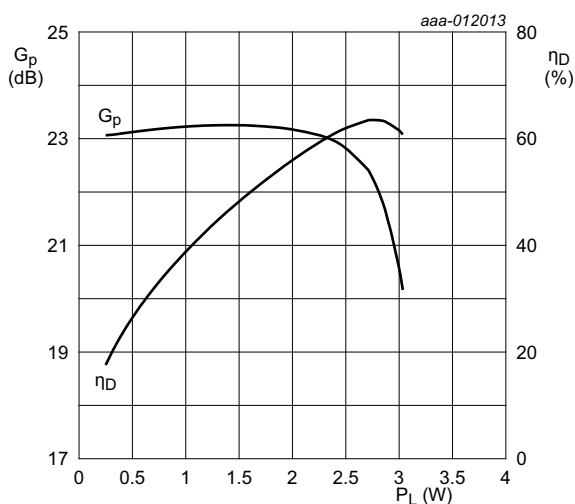
Table 9. List of components

See [Figure 2](#) for component layout.

Component	Description	Value	Remarks
C1, C3, C6, C9	multilayer ceramic chip capacitor	100 pF	[1]
C2	multilayer ceramic chip capacitor	3.9 pF	[1]
C4	multilayer ceramic chip capacitor	1 μ F, 25 V	Murata GRM31MR71E105KA01L
C5	multilayer ceramic chip capacitor	4.7 pF	[1]
C7	multilayer ceramic chip capacitor	1 μ F, 50 V	Murata GRM32RR71H105KA01L
C8	electrolytic capacitor	220 μ F, 63 V	
L1	wire inductor, 0.8 mm copper wire	2 turn, D = 3 mm	
L2	wire inductor, 0.8 mm copper wire	2 turn, D = 2.7 mm	
L3	wire inductor, 0.8 mm copper wire	2 turn, D = 3 mm	
R1	resistor	0 Ω	SMD 0805
R2	resistor	10 Ω	SMD 0805
Q1	transistor	-	BLP10H603

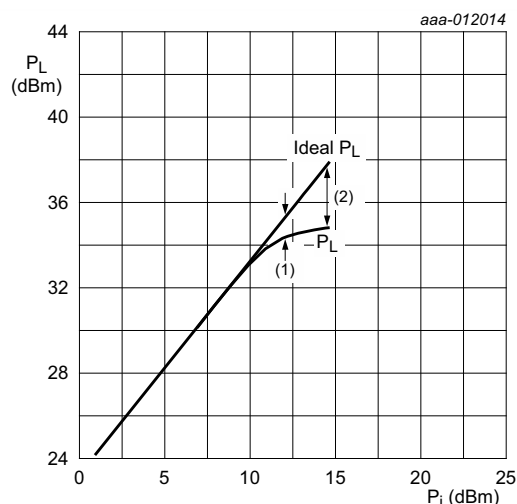
[1] American Technical Ceramics type 100A or capacitor of same quality.

8.3 Graphical data



$V_{DS} = 50$ V; $I_{DQ} = 15$ mA; $f = 860$ MHz.

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

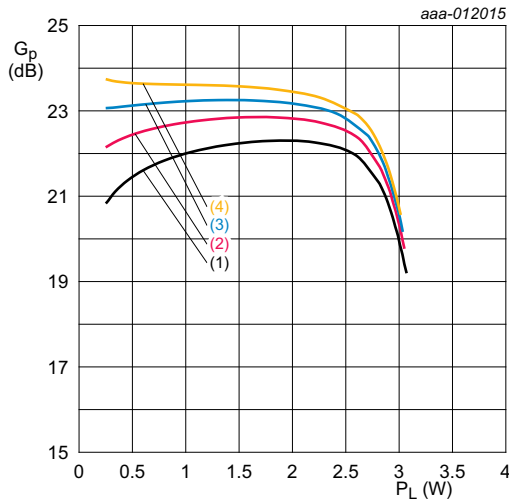


$V_{DS} = 50$ V; $I_{DQ} = 15$ mA; $f = 860$ MHz.

(1) $P_{L(1dB)} = 34.4$ dBm (2.8 W)

(2) $P_{L(3dB)} = 34.8$ dBm (3.0 W)

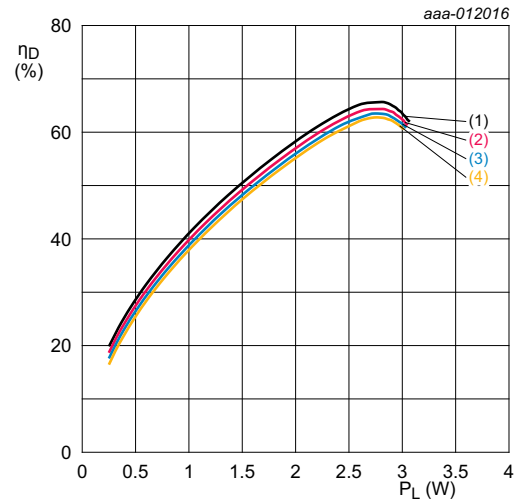
Fig 4. Output power as a function of input power; typical values



$V_{DS} = 50 \text{ V}$; $f = 860 \text{ MHz}$.

- (1) $I_{Dq} = 5 \text{ mA}$
- (2) $I_{Dq} = 10 \text{ mA}$
- (3) $I_{Dq} = 15 \text{ mA}$
- (4) $I_{Dq} = 20 \text{ mA}$

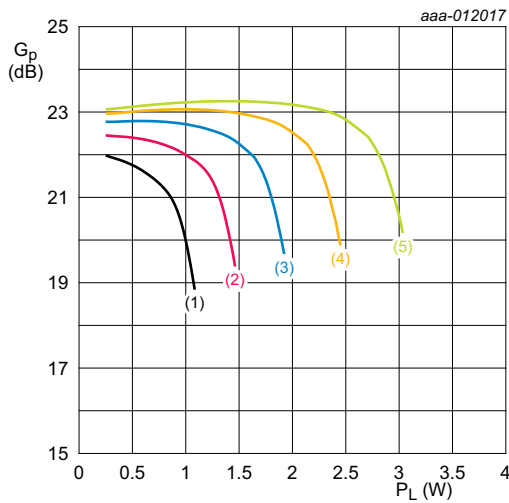
Fig 5. Power gain as a function of output power; typical values



$V_{DS} = 50 \text{ V}$; $f = 860 \text{ MHz}$.

- (1) $I_{Dq} = 5 \text{ mA}$
- (2) $I_{Dq} = 10 \text{ mA}$
- (3) $I_{Dq} = 15 \text{ mA}$
- (4) $I_{Dq} = 20 \text{ mA}$

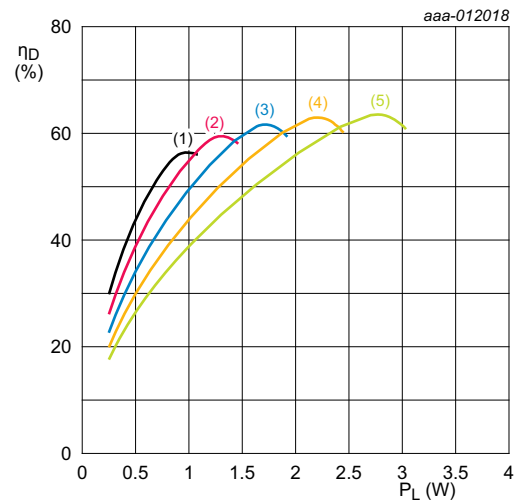
Fig 6. Drain efficiency as a function of output power; typical values



$I_{Dq} = 15 \text{ mA}$; $f = 860 \text{ MHz}$.

- (1) $V_{DS} = 30 \text{ V}$
- (2) $V_{DS} = 35 \text{ V}$
- (3) $V_{DS} = 40 \text{ V}$
- (4) $V_{DS} = 45 \text{ V}$
- (5) $V_{DS} = 50 \text{ V}$

Fig 7. Power gain as a function of output power; typical values



$I_{Dq} = 15 \text{ mA}$; $f = 860 \text{ MHz}$.

- (1) $V_{DS} = 30 \text{ V}$
- (2) $V_{DS} = 35 \text{ V}$
- (3) $V_{DS} = 40 \text{ V}$
- (4) $V_{DS} = 45 \text{ V}$
- (5) $V_{DS} = 50 \text{ V}$

Fig 8. Drain efficiency as a function of output power; typical values

9. Package outline

HVSON12: plastic thermal enhanced very thin small outline package; no leads;
12 terminals; body 5 x 6 x 0.85 mm

SOT1352-1

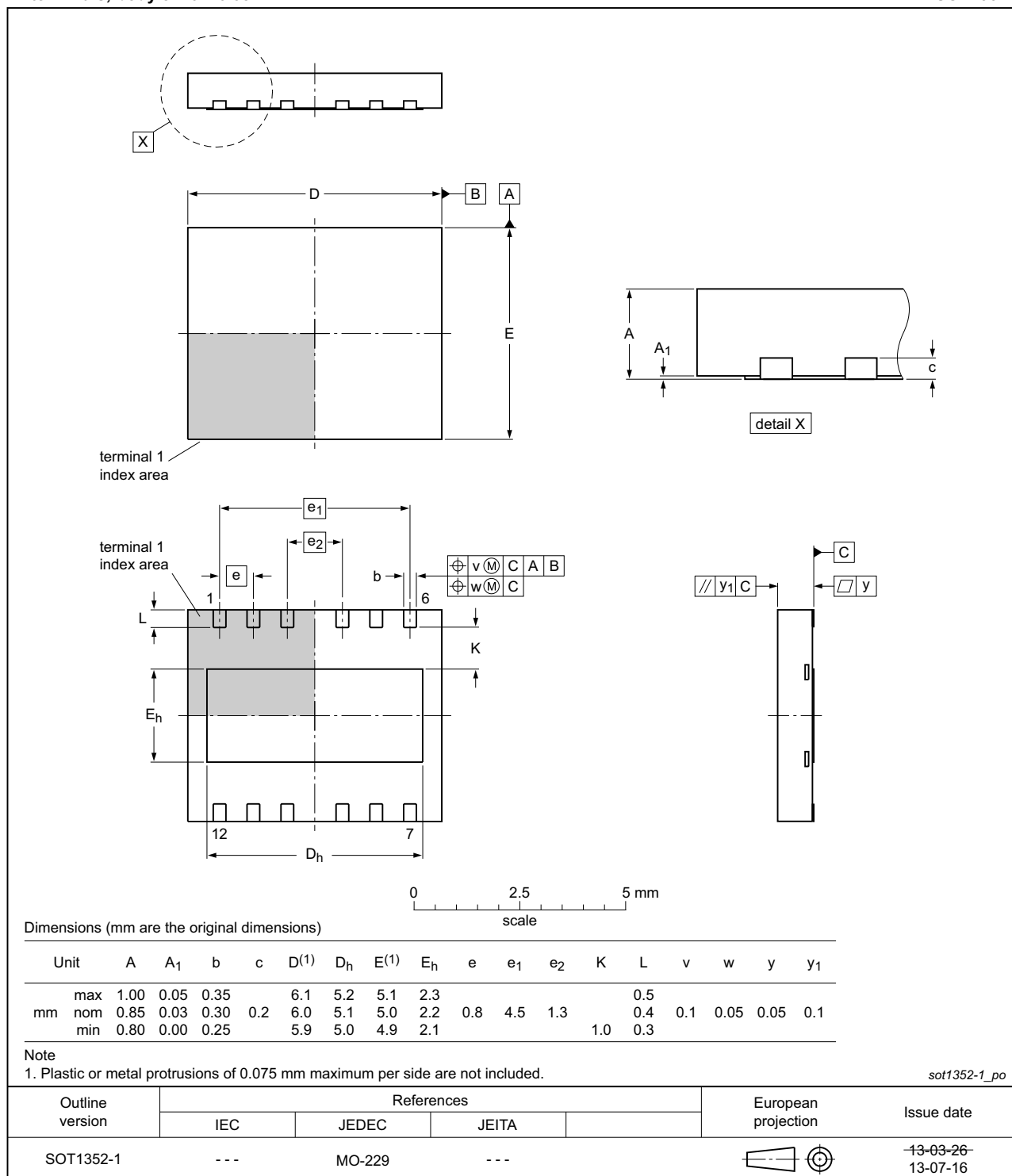


Fig 9. Package outline SOT1352-1 (HVSON12)

10. 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.

11. Abbreviations

Table 10. Abbreviations

Acronym	Description
CW	Continuous Wave
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
HF	High Frequency
ISM	Industrial, Scientific and Medical
SMD	Surface Mounted Device
VSWR	Voltage Standing-Wave Ratio

12. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLP10H603#2	20150901	Product data sheet		BLP10H603 v.1
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.			
BLP10H603 v.1	20141002	Product data sheet	-	-

13. Legal information

13.1 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.ampleon.com>.

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15. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Applications	1
2	Pinning information	2
3	Ordering information	2
4	Limiting values	2
5	Recommended operating conditions	3
6	Thermal characteristics	3
7	Characteristics	3
8	Test information	4
8.1	Ruggedness in class-AB operation	4
8.2	Test circuit	4
8.3	Graphical data	5
9	Package outline	7
10	Handling information	8
11	Abbreviations	8
12	Revision history	8
13	Legal information	9
13.1	Data sheet status	9
13.2	Definitions	9
13.3	Disclaimers	9
13.4	Trademarks	10
14	Contact information	10
15	Contents	11

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Date of release: 1 September 2015
Document identifier: BLP10H603#2