

# BLP10H610

## Broadband LDMOS driver transistor

Rev. 3 — 25 September 2014

Product data sheet

## 1. Product profile

### 1.1 General description

A 10 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 (MHz)	V <sub>DS</sub> (V)	P <sub>L</sub> (W)	G <sub>p</sub> (dB)	η <sub>D</sub> (%)
CW	27	50	10	26.7	46
	40	50	20	25	65
	60	50	19	24	65
	80	50	19	25	67
	88 to 108	50	16	25	62
	400 to 450	50	>14	>25.5	>62
	950 to 1225	50	>13	>16	>42
Pulsed RF [1]	860	50	10	22	60
	1190 to 1410	45	11	>14	-
DVB-T	860	50	1	>21	-

[1]  $t_p = 100 \mu\text{s}$ ;  $\delta = 10 \%$ .

### 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)

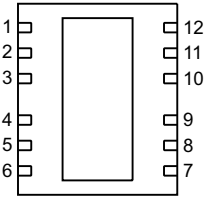
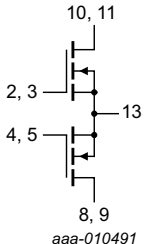
### 1.3 Applications

- Industrial, scientific and medical applications
- Broadcast transmitter applications



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1, 6, 7, 12	n.c.	 <p>Transparent top view</p>	 <p>aaa-010491</p>
2, 3	gate1		
4, 5	gate2		
8, 9	drain2		
10, 11	drain1		
13	source <a href="#">[1]</a>		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLP10H610	HVSON12	plastic thermal enhanced very thin small outline package; no leads; 12 terminals; body 5 × 6 × 0.85 mm	SOT1352-1

## 4. Limiting values

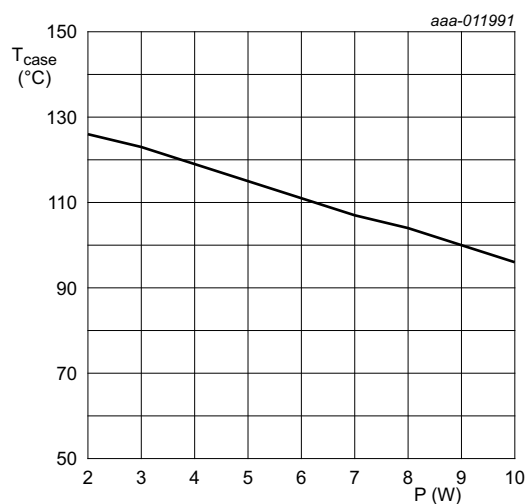
Table 4. Limiting values

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.



**Fig 1. Recommended operating area; case temperature as a function of power dissipation**

## 6. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}$ ; $P_L = 10\text{ W}$ [1]	3.5	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	$V_{GS} = 0\text{ V}$ ; $I_D = 0.12\text{ mA}$	104	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$ ; $I_D = 12\text{ mA}$	1.25	1.75	2.25	V
$V_{GSq}$	gate-source quiescent voltage	$V_{DS} = 50\text{ V}$ ; $I_D = 60\text{ mA}$	1.4	1.8	2.15	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$	-	-	1.4	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $V_{DS} = 10\text{ V}$	-	1.88	-	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	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $I_D = 420\text{ mA}$	-	2300	-	m $\Omega$

**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	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$ ; $f = 1\text{ MHz}$	-	0.13	-	pF
$C_{iss}$	input capacitance	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 0\text{ V}$ ; $f = 1\text{ MHz}$	-	13.5	-	pF
$C_{oss}$	output capacitance	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$ ; $f = 1\text{ MHz}$	-	4.5	-	pF

**Table 8. RF characteristics**Test signal: CW;  $f = 860\text{ MHz}$ ; RF performance at  $V_{DS} = 50\text{ V}$ ;  $I_{Dq} = 60\text{ mA}$ ;  $T_{case} = 25\text{ }^{\circ}\text{C}$ ; unless otherwise specified, in a class-AB production test circuit [1].

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_L = 10\text{ W}$	19.3	22	25.7	dB
$\eta_D$	drain efficiency	$P_L = 10\text{ W}$	56.8	60	-	%

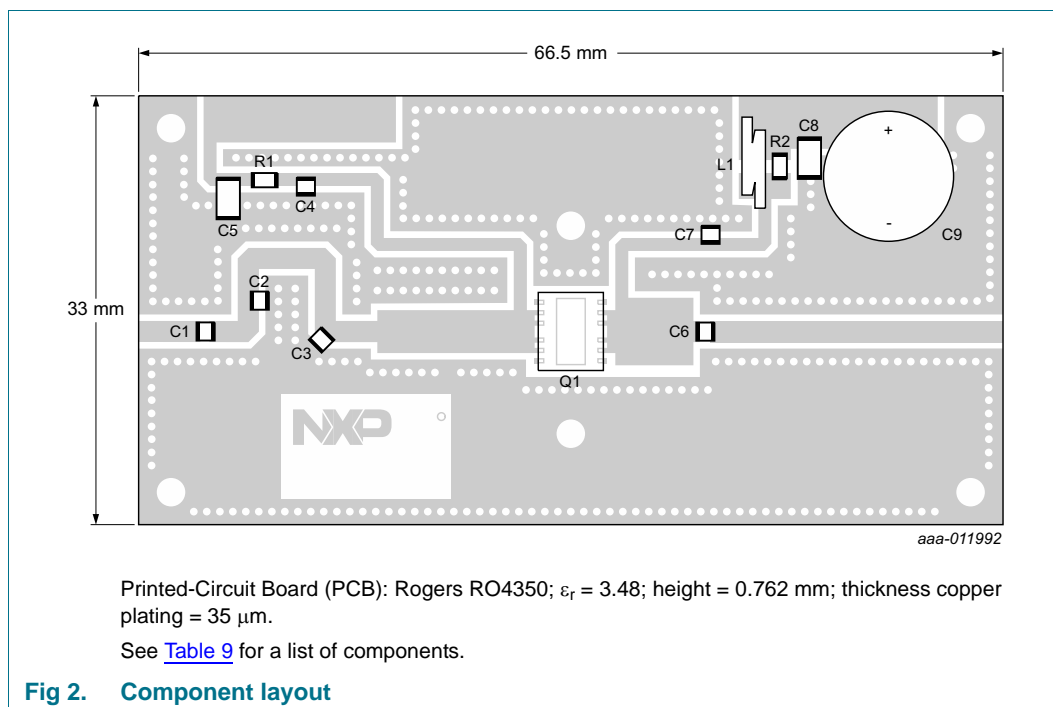
[1] The industrial test method is performed on special hardware to accommodate the requirements of production. The test results in this table are correlated to correspond with a performance in the application.

## 8. Test information

### 8.1 Ruggedness in class-AB operation

The BLP10H610 is capable of withstanding a load mismatch corresponding to  $VSWR = 35 : 1$  through all phases under the following conditions:  $V_{DS} = 50\text{ V}$ ;  $I_{Dq} = 60\text{ mA}$ ;  $P_L = 10\text{ W}$ ;  $f = 860\text{ MHz}$ .

### 8.2 Test circuit



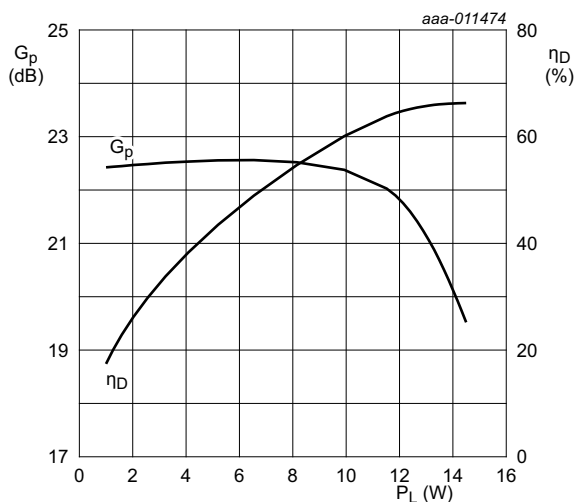
**Table 9. List of components**

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

Component	Description	Value	Remarks
C1, C4, C7	multilayer ceramic chip capacitor	100 pF <a href="#">[1]</a>	
C2	multilayer ceramic chip capacitor	5.6 pF <a href="#">[1]</a>	
C3	multilayer ceramic chip capacitor	3.9 pF <a href="#">[1]</a>	
C5	multilayer ceramic chip capacitor	1 $\mu$ F, 25 V	Murata GRM31MR71E105KA01L
C6	multilayer ceramic chip capacitor	4.3 pF <a href="#">[1]</a>	
C8	multilayer ceramic chip capacitor	1 $\mu$ F, 50 V	Murata GRM32RR71H105KA01L
C9	electrolytic capacitor	220 $\mu$ F, 63 V	
L1	wire inductor, 0.8 mm copper wire	2 turn, D = 3 mm	
R1	resistor	0 $\Omega$	SMD 0805
R2	resistor	20 $\Omega$	SMD 0805
Q1	transistor	-	BLP10H610

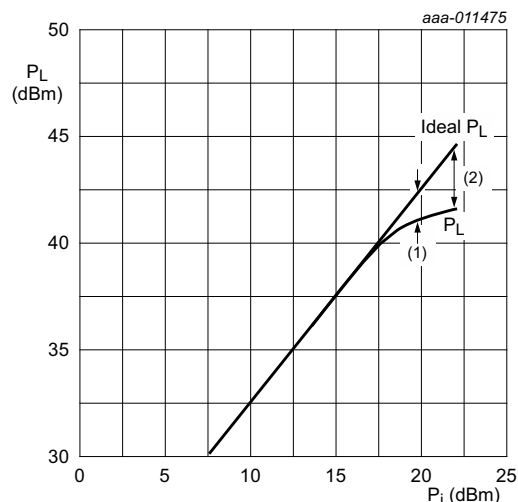
[1] American Technical Ceramics type 100A or capacitor of same quality.

### 8.3 Graphical data



$V_{DS} = 50$  V;  $I_{DQ} = 60$  mA;  $f = 860$  MHz.

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

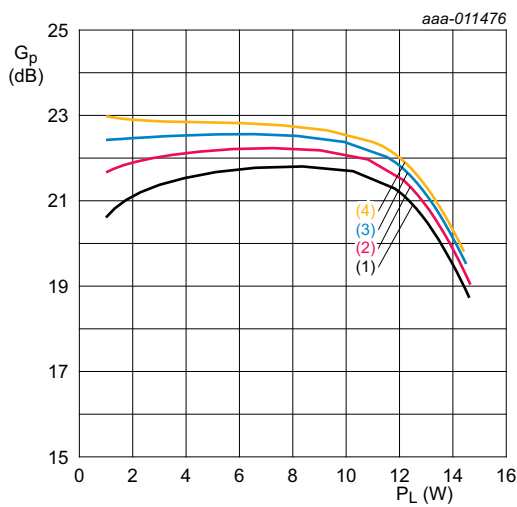


$V_{DS} = 50$  V;  $I_{DQ} = 60$  mA;  $f = 860$  MHz.

(1)  $P_{L(1dB)} = 40.93$  dBm (12.4 W)

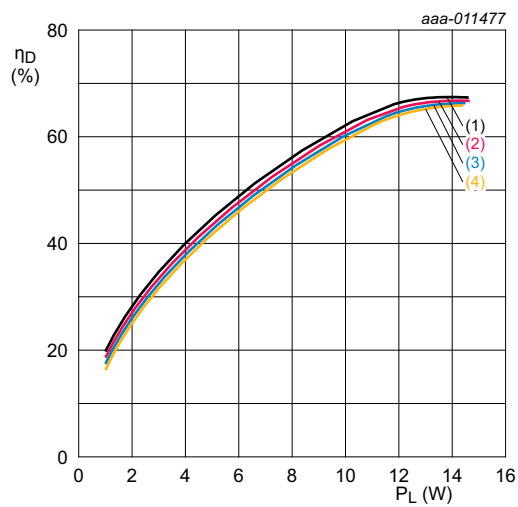
(2)  $P_{L(3dB)} = 41.61$  dBm (14.5 W)

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



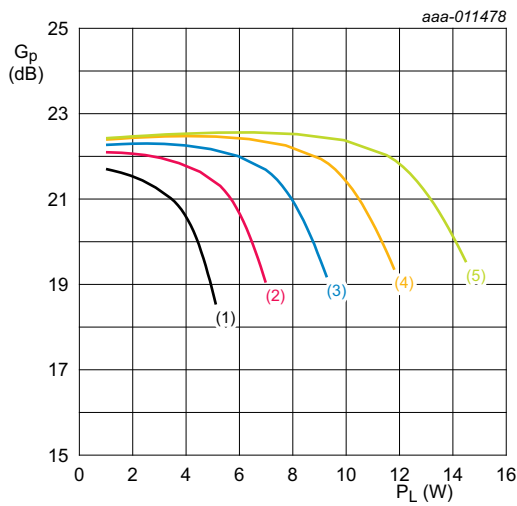
$V_{DS} = 50$  V;  $f = 860$  MHz.  
(1)  $I_{DQ} = 20$  mA  
(2)  $I_{DQ} = 40$  mA  
(3)  $I_{DQ} = 60$  mA  
(4)  $I_{DQ} = 80$  mA

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



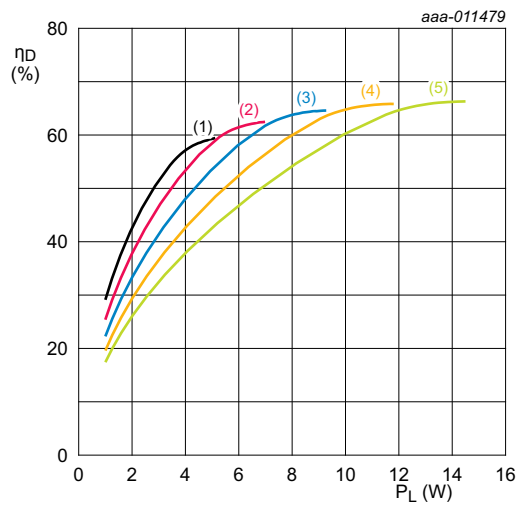
$V_{DS} = 50$  V;  $f = 860$  MHz.  
(1)  $I_{DQ} = 20$  mA  
(2)  $I_{DQ} = 40$  mA  
(3)  $I_{DQ} = 60$  mA  
(4)  $I_{DQ} = 80$  mA

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



$I_{DQ} = 60$  mA;  $f = 860$  MHz.  
(1)  $V_{DS} = 30$  V  
(2)  $V_{DS} = 35$  V  
(3)  $V_{DS} = 40$  V  
(4)  $V_{DS} = 45$  V  
(5)  $V_{DS} = 50$  V

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



$I_{DQ} = 60$  mA;  $f = 860$  MHz.  
(1)  $V_{DS} = 30$  V  
(2)  $V_{DS} = 35$  V  
(3)  $V_{DS} = 40$  V  
(4)  $V_{DS} = 45$  V  
(5)  $V_{DS} = 50$  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

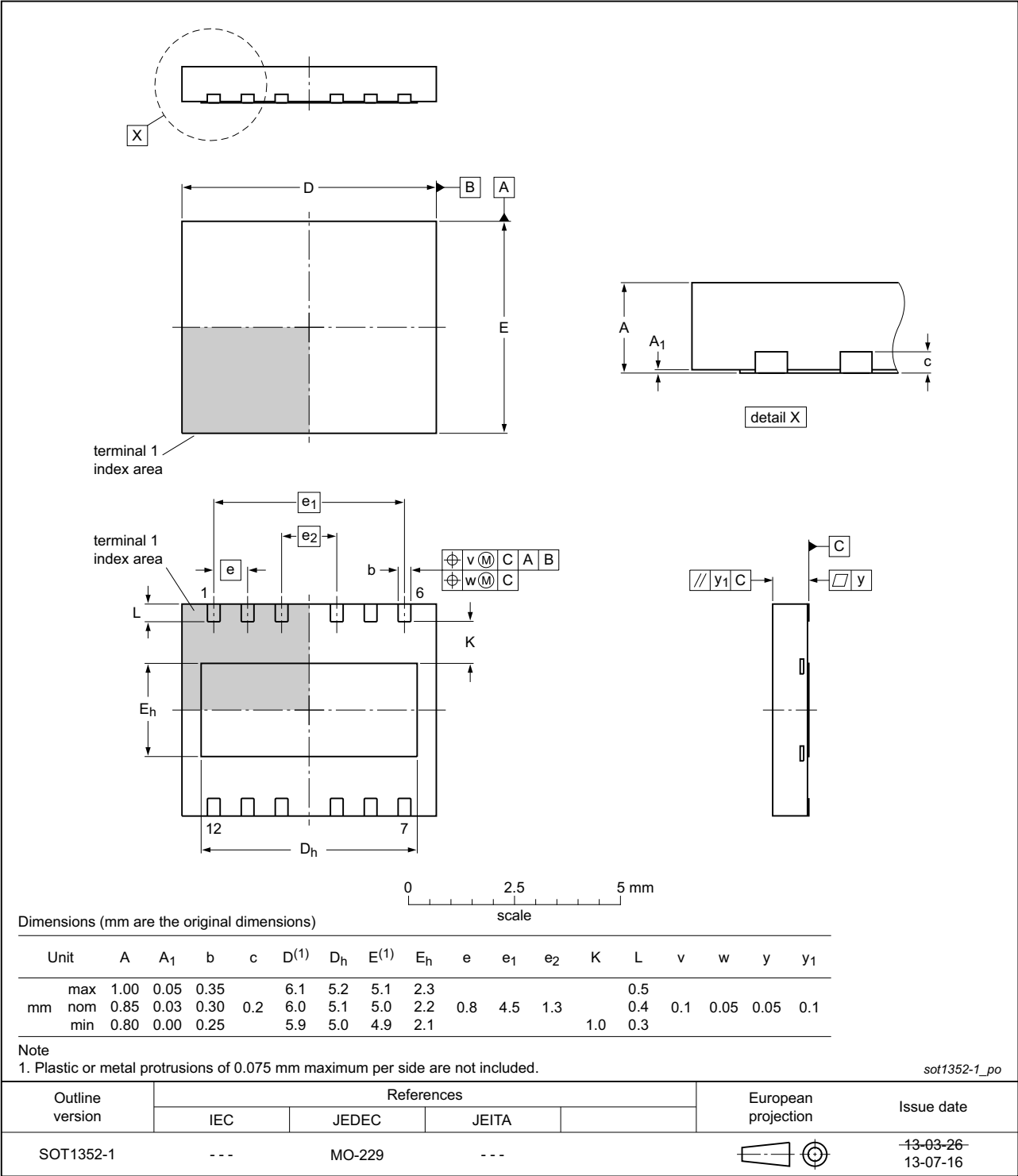


Fig 9. Package outline SOT1352-1 (HVSON12)

## 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
DVB-T	Digital Video Broadcast - Terrestrial
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
BLP10H610 v.3	20140925	Product data sheet	-	BLP10H610 v.2
Modifications	<ul style="list-style-type: none"><li><a href="#">Table 6 on page 3</a>: several changes have been made</li><li><a href="#">Table 8 on page 4</a>: several changes have been made</li></ul>			
BLP10H610 v.2	20140422	Objective data sheet	-	BLP10H610 v.1
BLP10H610 v.1	20140120	Objective data sheet	-	-



## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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