

1. Product profile

1.1 General description

A 5 W plastic LDMOS power transistor for base station applications from 700 MHz to 2700 MHz band.

Table 1. Application information

Typical RF performance at $T_{case} = 25\text{ °C}$; in a class-AB application circuit.

| Test signal | f (MHz) | I_{DQ} (mA) | V_{DS} (V) | $P_{L(AV)}$ (W) | G_p (dB) | η_D (%) | ACPR (dBc) |
|----------------------|------------|------------------|-----------------|--------------------|---------------|-----------------|---------------|
| IS-95 [1] | 788 | 60 | 28 | 1 | 23.9 | 25 | -41 |
| 2-carrier W-CDMA [2] | 2140 | 55 | 28 | 1 | 16.7 | 27 | -40 |
| Pulsed CW | 2700 | 55 | 28 | 5 | 14.5 | 45 | - |

[1] Single carrier IS-95 with pilot, paging, sync and 6 traffic channels (Walsh codes 8 - 13). PAR = 9.7 dB at 0.01 % probability on the CCDF. Channel bandwidth is 1.2288 MHz.

[2] Test signal: 2-carrier W-CDMA: carrier spacing = 5 MHz. PAR = 8.4 dB at 0.01% probability on CCDF; RF performance at $V_{DS} = 28\text{ V}$; $I_{DQ} = 55\text{ mA}$.

1.2 Features and benefits

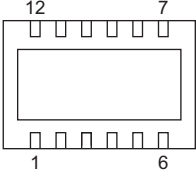
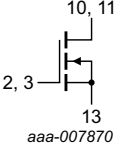
- High efficiency
- Excellent ruggedness
- Designed for broadband operation
- Excellent thermal stability
- High power gain
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- CDMA
- W-CDMA
- GSM EDGE
- MC-GSM
- LTE
- WiMAX

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-------------------------|----------------------------|--|---|
| 1, 4, 5, 6, 7, 8, 9, 12 | n.c. |  <p>Transparent top view</p> |  <p>aaa-007870</p> |
| 2, 3 | gate | | |
| 10, 11 | drain | | |
| 13 | source [1] | | |

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|-----------|
| | Name | Description | Version |
| BLP7G22-05 | HVSON12 | plastic thermal enhanced very thin small outline package; no leads; 12 terminals; body 6 × 4 × 0.85 mm | SOT1179-2 |

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 | | - | 150 | °C |

5. Recommended operating conditions

See application note *AN11198* for more details.

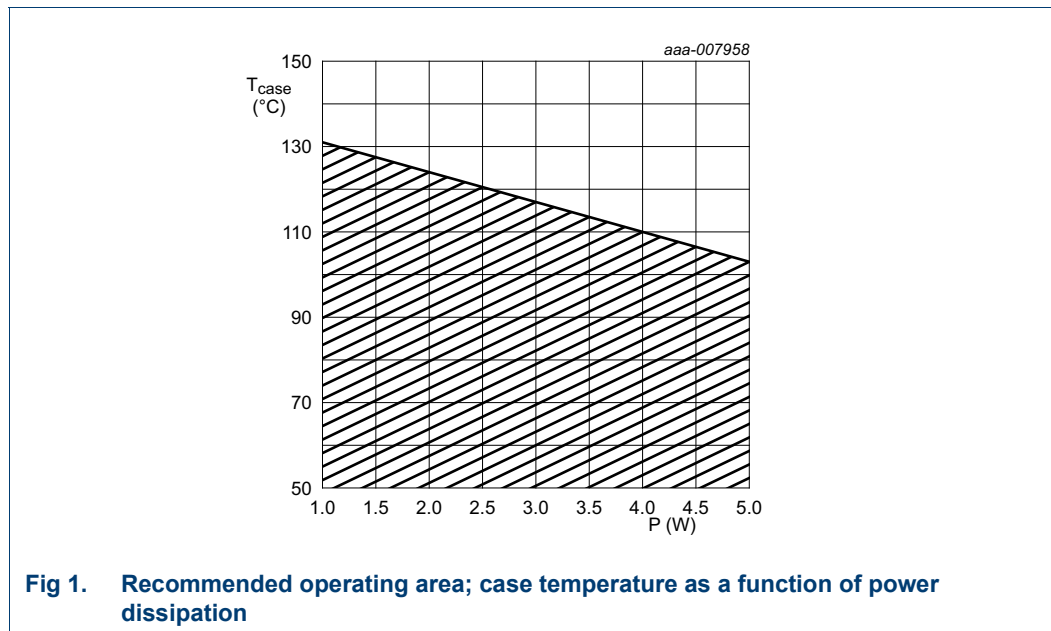


Fig 1. Recommended operating area; case temperature as a function of power dissipation

6. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Typ | Unit |
|---------------|--|--|---------|------|
| $R_{th(j-c)}$ | thermal resistance from junction to case | $T_{case} = 80^\circ\text{C}$; $P_L = 5\text{ W}$ | [1] 6.4 | K/W |

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

7. Characteristics

Table 6. DC characteristics

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|----------------------------------|--|------|-----|------|---------------|
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS} = 0\text{ V}$; $I_D = 0.09\text{ mA}$ | 65 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS} = 10\text{ V}$; $I_D = 9\text{ mA}$ | 1.5 | 1.9 | 2.3 | V |
| V_{GSq} | gate-source quiescent voltage | $V_{DS} = 28\text{ V}$; $I_D = 55\text{ mA}$ | 1.45 | 2.0 | 2.55 | V |
| I_{DSS} | drain leakage current | $V_{GS} = 0\text{ V}$; $V_{DS} = 28\text{ V}$ | - | - | 1.4 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $V_{DS} = 10\text{ V}$ | - | 1.6 | - | A |
| I_{GSS} | gate leakage current | $V_{GS} = 11\text{ V}$; $V_{DS} = 0\text{ V}$ | - | - | 140 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}$; $I_D = 9\text{ mA}$ | - | 80 | - | mS |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $I_D = 315\text{ mA}$ | - | 2 | - | Ω |

Table 7. RF characteristics

Test signal: 1-tone pulsed; $t_p = 50 \mu\text{s}$; $\delta = 10 \%$; $f = 2140 \text{ MHz}$; RF performance at $V_{DS} = 28 \text{ V}$; $I_{DQ} = 55 \text{ mA}$; $T_{case} = 25 \text{ }^\circ\text{C}$; unless otherwise specified, in a production circuit.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------|---------------------------------------|---------------------------|-----|-----|-----|------|
| G_p | power gain | $P_{L(AV)} = 1 \text{ W}$ | 15 | 16 | - | dB |
| η_D | drain efficiency | $P_{L(AV)} = 1 \text{ W}$ | 20 | 23 | - | % |
| $P_{L(1dB)}$ | output power at 1 dB gain compression | | 5.5 | - | - | W |
| RL_{in} | input return loss | $P_{L(AV)} = 1 \text{ W}$ | - | -16 | -12 | dB |

8. Application information

8.1 Application circuit

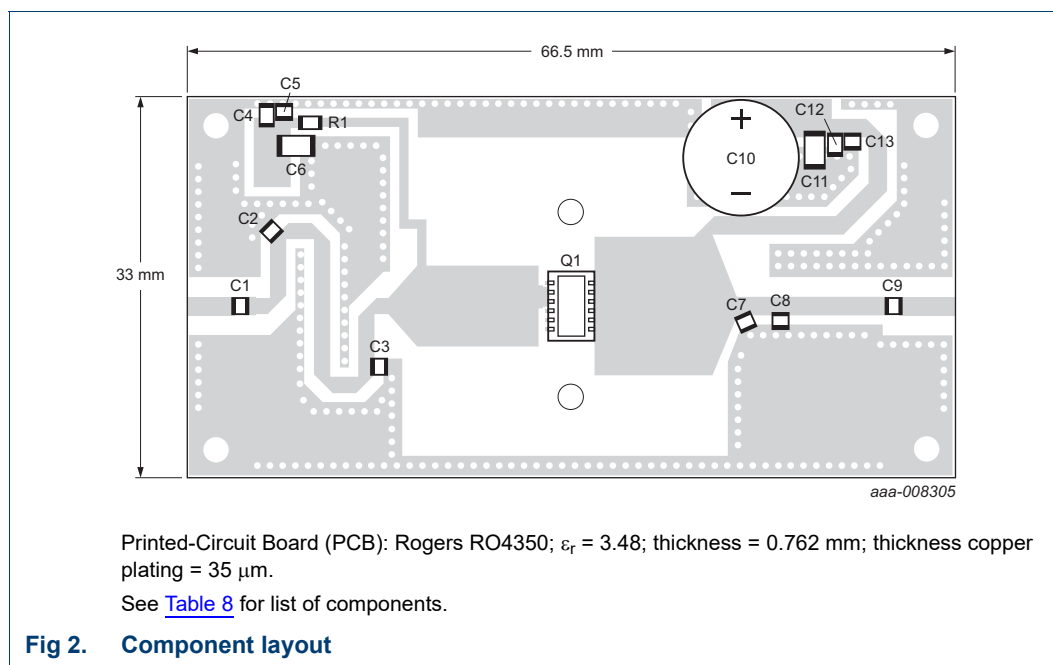


Table 8. List of components

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

| Component | Description | Value | Remarks |
|-----------|-----------------------------------|------------------------|---------|
| C1, C9 | multilayer ceramic chip capacitor | 15 pF | [1] |
| C2 | multilayer ceramic chip capacitor | 1.8 pF | [1] |
| C3 | multilayer ceramic chip capacitor | 1.6 pF | [1] |
| C4, C12 | multilayer ceramic chip capacitor | 100 nF, 50 V | [2] |
| C5, C13 | multilayer ceramic chip capacitor | 10 pF | [1] |
| C6, C11 | multilayer ceramic chip capacitor | 1 μF , 50 V | [2] |
| C7 | multilayer ceramic chip capacitor | 3.0 pF | [1] |
| C8 | multilayer ceramic chip capacitor | 1.6 pF | [1] |

Table 8. List of components ...continued

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

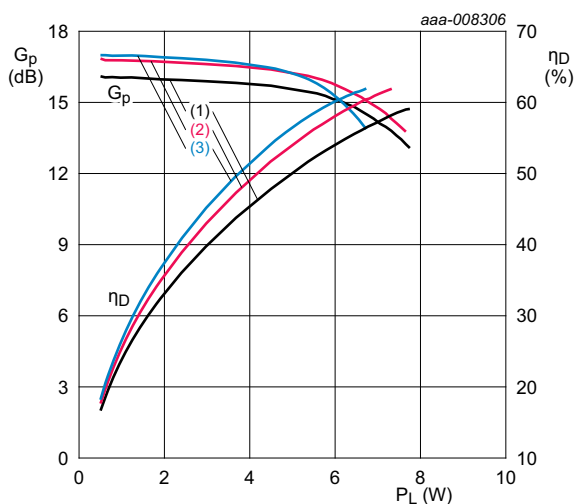
| Component | Description | Value | Remarks |
|-----------|------------------------|-------------------|------------|
| C10 | electrolytic capacitor | 220 μ F, 63 V | |
| R1 | chip resistor | 4.7 Ω | SMD 0805 |
| Q1 | transistor | - | BLP7G22-05 |

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

[2] Murata GRM32RR71H05KA01L or capacitor of same quality.

8.2 Graphical data

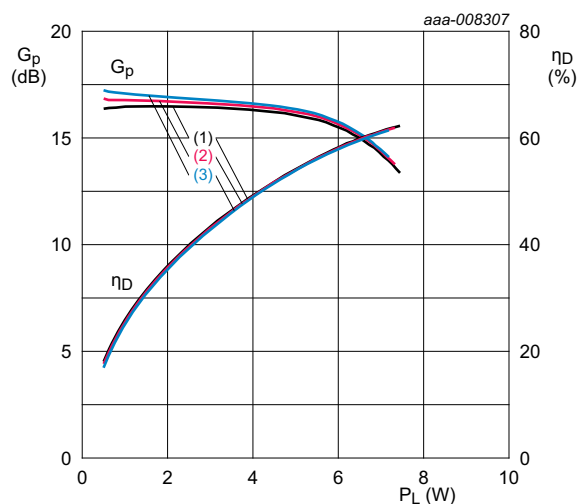
8.2.1 Pulsed CW



$V_{DS} = 28$ V; $I_{Dq} = 50$ mA; $T_{case} = 25$ °C; $\delta = 10$ %;
 $t_p = 20$ μ s.

- (1) $f = 2110$ MHz
- (2) $f = 2140$ MHz
- (3) $f = 2170$ MHz

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

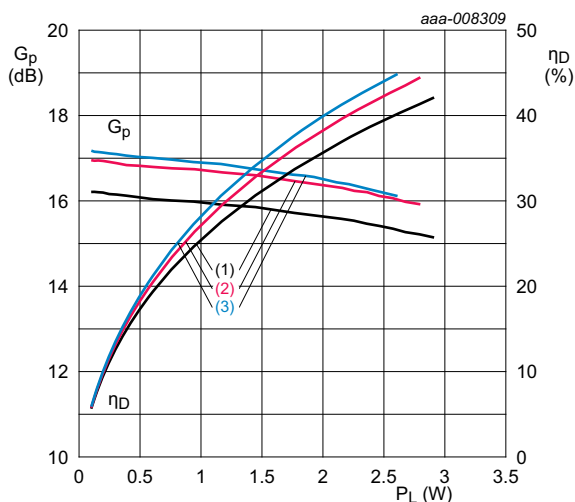


$V_{DS} = 28$ V; $f = 2140$ MHz; $T_{case} = 25$ °C; $\delta = 10$ %;
 $t_p = 20$ μ s.

- (1) $I_{Dq} = 40$ mA
- (2) $I_{Dq} = 50$ mA
- (3) $I_{Dq} = 60$ mA

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

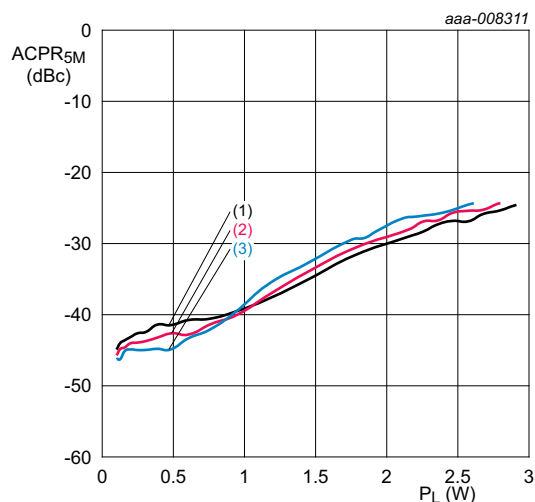
8.2.2 2-Carrier W-CDMA



$V_{DS} = 28 \text{ V}$; $I_{DQ} = 50 \text{ mA}$; $T_{case} = 25 \text{ }^{\circ}\text{C}$;
carrier spacing = 5 MHz; 46 % clipping; PAR = 8.4 dB at
0.01 % probability on CCDF.

- (1) $f = 2110 \text{ MHz}$
- (2) $f = 2140 \text{ MHz}$
- (3) $f = 2170 \text{ MHz}$

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



$V_{DS} = 28 \text{ V}$; $I_{DQ} = 50 \text{ mA}$; $T_{case} = 25 \text{ }^{\circ}\text{C}$;
carrier spacing = 5 MHz; 46 % clipping; PAR = 8.4 dB at
0.01 % probability on CCDF.

- (1) $f = 2110 \text{ MHz}$
- (2) $f = 2140 \text{ MHz}$
- (3) $f = 2170 \text{ MHz}$

Fig 6. Adjacent channel power ratio (5 MHz) as a function of output power; typical values

9. Test information

9.1 Ruggedness in class-AB operation

The BLP7G22-05 is capable of withstanding a load mismatch corresponding to $V_{SWR} = 10:1$ through all phases under the following conditions: $V_{DS} = 28 \text{ V}$; $I_{DQ} = 55 \text{ mA}$; $P_L = 5 \text{ W (CW)}$.

10. Package outline

HVSON12: plastic thermal enhanced very thin small outline package; no leads;
12 terminals; body 4 x 6 x 0.85 mm

SOT1179-2

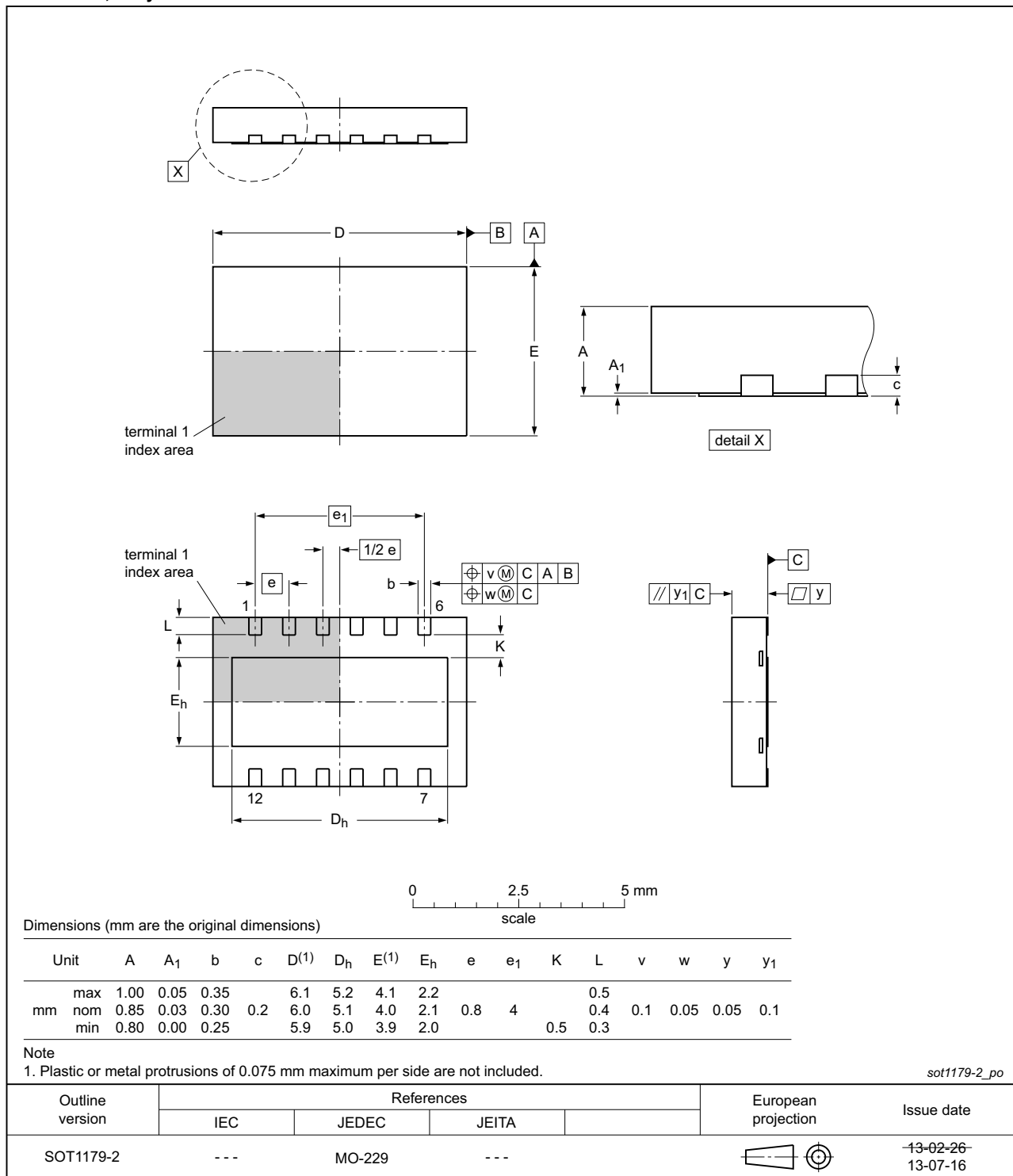


Fig 7. Package outline SOT1179-2 (HVSON12)

11. 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.

12. Abbreviations

Table 9. Abbreviations

| Acronym | Description |
|---------|---|
| CCDF | Complementary Cumulative Distribution Function |
| CDMA | Code Division Multiple Access |
| CW | Continuous Wave |
| EDGE | Enhanced Data rates for GSM Evolution |
| ESD | ElectroStatic Discharge |
| GSM | Global System for Mobile Communication |
| IS-95 | Interim Standard 95 |
| LDMOS | Laterally Diffused Metal-Oxide Semiconductor |
| LTE | Long Term Evolution |
| MC-GSM | Multi Carrier GSM |
| PAR | Peak-to-Average Ratio |
| SMD | Surface Mounted Device |
| VSWR | Voltage Standing-Wave Ratio |
| W-CDMA | Wideband Code Division Multiple Access |
| WiMAX | Worldwide Interoperability for Microwave Access |

13. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--|----------------------|---------------|----------------|
| BLP7G22-05#3 | 20150901 | Product data sheet | | BLP7G22-05 v.2 |
| Modifications: | <ul style="list-style-type: none"> 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. | | | |
| BLP7G22-05 v.2 | 20130820 | Product data sheet | - | BLP7G22-05 v.1 |
| BLP7G22-05 v.1 | 20130528 | Objective data sheet | - | - |

14. Legal information

14.1 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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