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# BPC10M6X2S200

## LDMOS 433 MHz power module

Rev. 1 — 29 March 2018

AMPLEON

Product data sheet

# 1. Product profile

## 1.1 General description

200 W LDMOS power module intended for plasma lighting, RF cooking, defrosting and ISM applications driving at the frequency of 433 MHz.

**Table 1. Test information**

*Typical RF performance at $T_{mb}$ = 25 °C; CW and pulsed mode ($\delta$ = 90 %; repetition 100 kHz); $V_{DS}$ = 28 V; $I_{Dq1}$ = 50 mA; $I_{Dq2}$ = 100 mA; unless otherwise specified.*

| Test signal | f | $P_L$ | $RL_{in}$ | $G_p$ | $\eta_{add}$ |
|---|---|---|---|---|---|
| | (MHz) | (W) | (dB) | (dB) | (%) |
| pulsed RF | 433 | 200 | 13 | 38 | 74 |
| CW | 433 | 200 | 13 | 38 | 74 |

## 1.2 Features and benefits

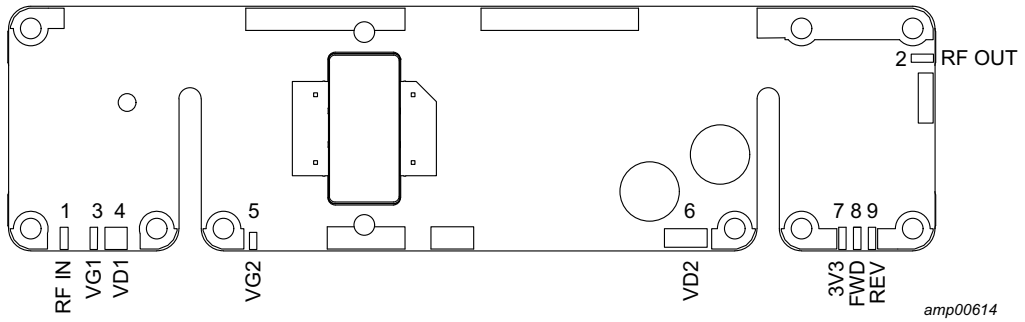
- 200 W pulsed RF power
- Small size: 125 × 33 mm
- Low weight: 85 g
- Sensing forward and reflected power
- Excellent ruggedness, VSWR 10 : 1
- High gain
- Input/output 50 Ω matched
- High efficiency
- Excellent thermal stability
- 100 % RF testing in production
- For RoHS compliance see the product details on the Ampleon website

## 1.3 Applications

- Plasma lighting, industrial heating, RF cooking and defrosting, medical and scientific

# 2. Pinning information

## 2.1 Pinning




Top view.

**Fig 1. Pin configuration**

## 2.2 Pin description

**Table 2. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| RF IN | 1 | RF input |
| RF OUT | 2 | RF output |
| VG1 | 3 | gate voltage driver stage |
| VD1 | 4 | drain voltage driver stage |
| VG2 | 5 | gate voltage final stage |
| VD2 | 6 | drain voltage final stage |
| 3V3 | 7 | detector power supply |
| FWD | 8 | video output of the forward power detector |
| REV | 9 | video output of the reverse (reflected) power detector |

# 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BPC10M6X2S200 | - | pallet; 12 mounting holes; 9 terminations | - |

## 4. Block diagram

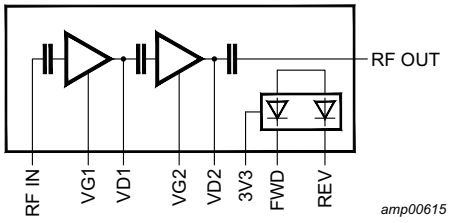



**Fig 2. Block diagram**

# 5. Internal circuitry

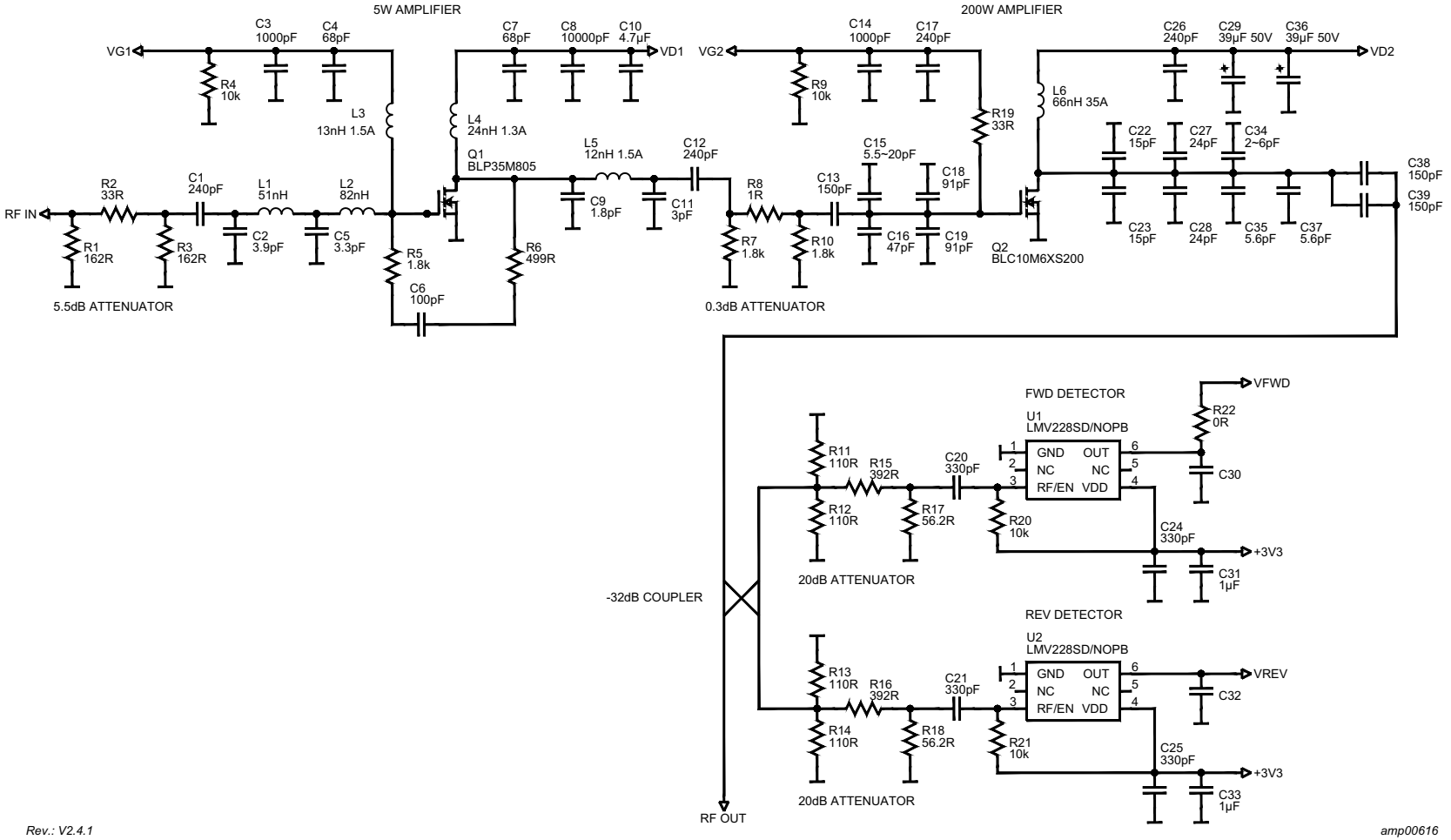



**Fig 3. Electric schematic**

# 6. 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 | | 0 | 65 | V |
| $V_{GS}$ | gate-source voltage | | –6 | +3 | V |
| $T_{stg}$ | storage temperature | | –40 | +60 | °C |
| $T_{mb}$ | mounting base temperature | | –40 | +80 | °C |

# 7. Characteristics

**Table 5. RF characteristics**

*Test signal: CW; $V_{DS}$ = 28 V; $I_{Dq1}$ = 50 mA; $I_{Dq2}$ = 100 mA.; $T_{mb}$ = 25 °C; unless otherwise specified.*

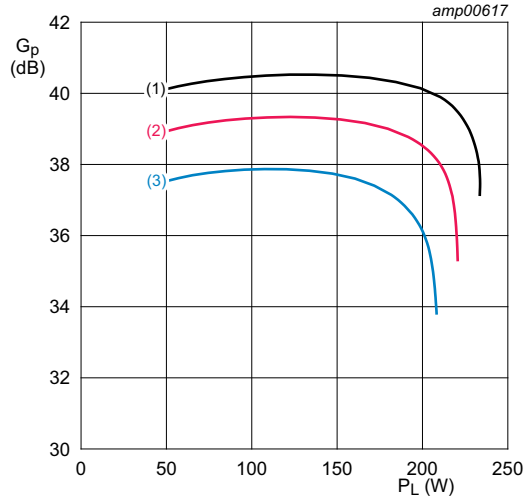
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| f | frequency | operating | 423 | 433 | 443 | MHz |
| $P_L$ | output power | | - | 200 | - | W |
| $P_i$ | input power | | - | 15 | 23 | dBm |
| $G_p$ | power gain | | 30.3 | 38 | 42.5 | dB |
| $\eta_D$ | drain efficiency | | 69 | 74 | 80 | % |
| $\alpha_{sup(H)}$ | harmonic suppression | | - | –30 | - | dBc |
| $P_{cons}$ | power consumption | DC | - | 270 | - | W |
| $D_{cpl}$ | coupler directivity | | - | 28 | - | dB |

## 7.1 Ruggedness

The BPC10M6X2S200 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases for an output power of 200 W CW and pulsed mode (90 % DC, repetition 100 kHz).

# 8. Test information

## 8.1 Graphical data



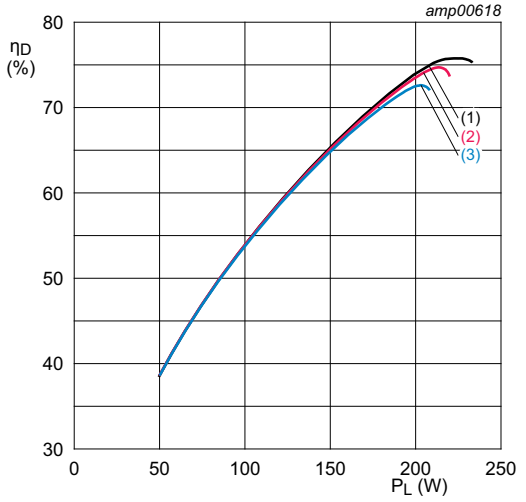

$I_{Dq1}$ = 50 mA; $I_{Dq2}$ = 100 mA; $V_{DS}$ = 28 V; f = 433 MHz.

(1) $T_{mb}$ = −40 °C

(2) $T_{mb}$ = +25 °C

(3) $T_{mb}$ = +80 °C

**Fig 4. Power gain as a function of output power; typical values**



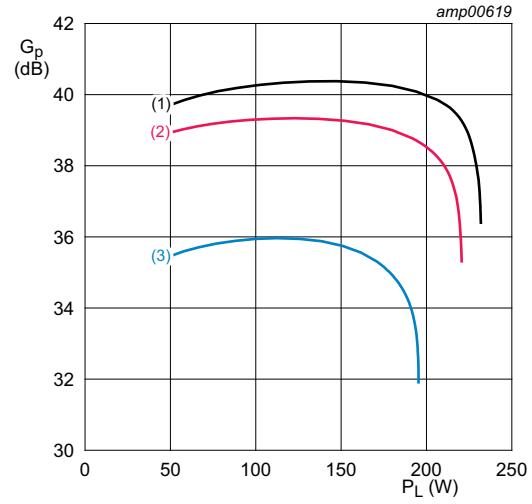

$I_{Dq1}$ = 50 mA; $I_{Dq2}$ = 100 mA; $V_{DS}$ = 28 V; f = 433 MHz.

(1) $T_{mb}$ = −40 °C

(2) $T_{mb}$ = +25 °C

(3) $T_{mb}$ = +80 °C

**Fig 5. Drain efficiency as a function of output power; typical values**



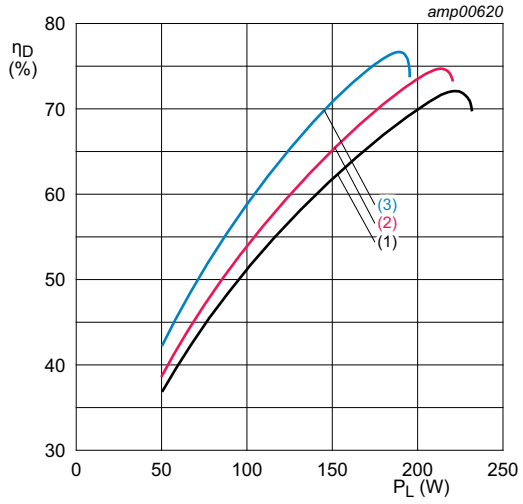

$I_{Dq1}$ = 50 mA; $I_{Dq2}$ = 100 mA; $V_{DS}$ = 28 V; $T_{mb}$ = 25 °C.

(1) f = 423 MHz

(2) f = 433 MHz

(3) f = 443 MHz

**Fig 6. Power gain as a function of output power; typical values**



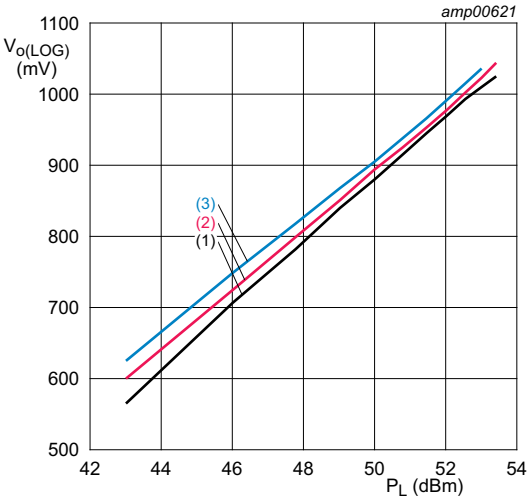

$I_{Dq1}$ = 50 mA; $I_{Dq2}$ = 100 mA; $V_{DS}$ = 28 V; $T_{mb}$ = 25 °C.

(1) f = 423 MHz

(2) f = 433 MHz

(3) f = 443 MHz

**Fig 7. Drain efficiency as a function of output power; typical values**

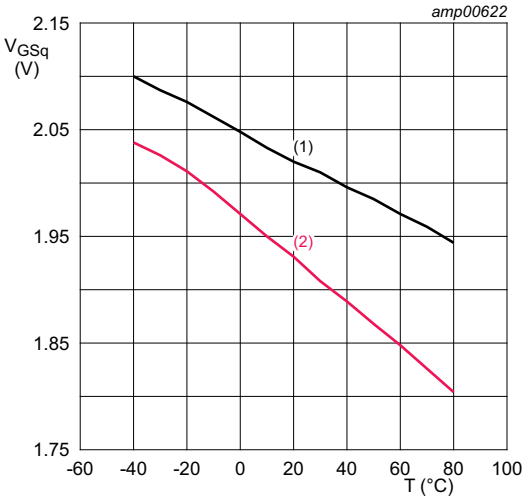



(1) $T_{mb}$ = −40 °C

(2) $T_{mb}$ = +25 °C

(3) $T_{mb}$ = +80 °C

**Fig 8. LOG detector output voltage as a function of output power; typical values**




$V_{DS}$ = 28 V; $T_{mb}$ = 25 °C.

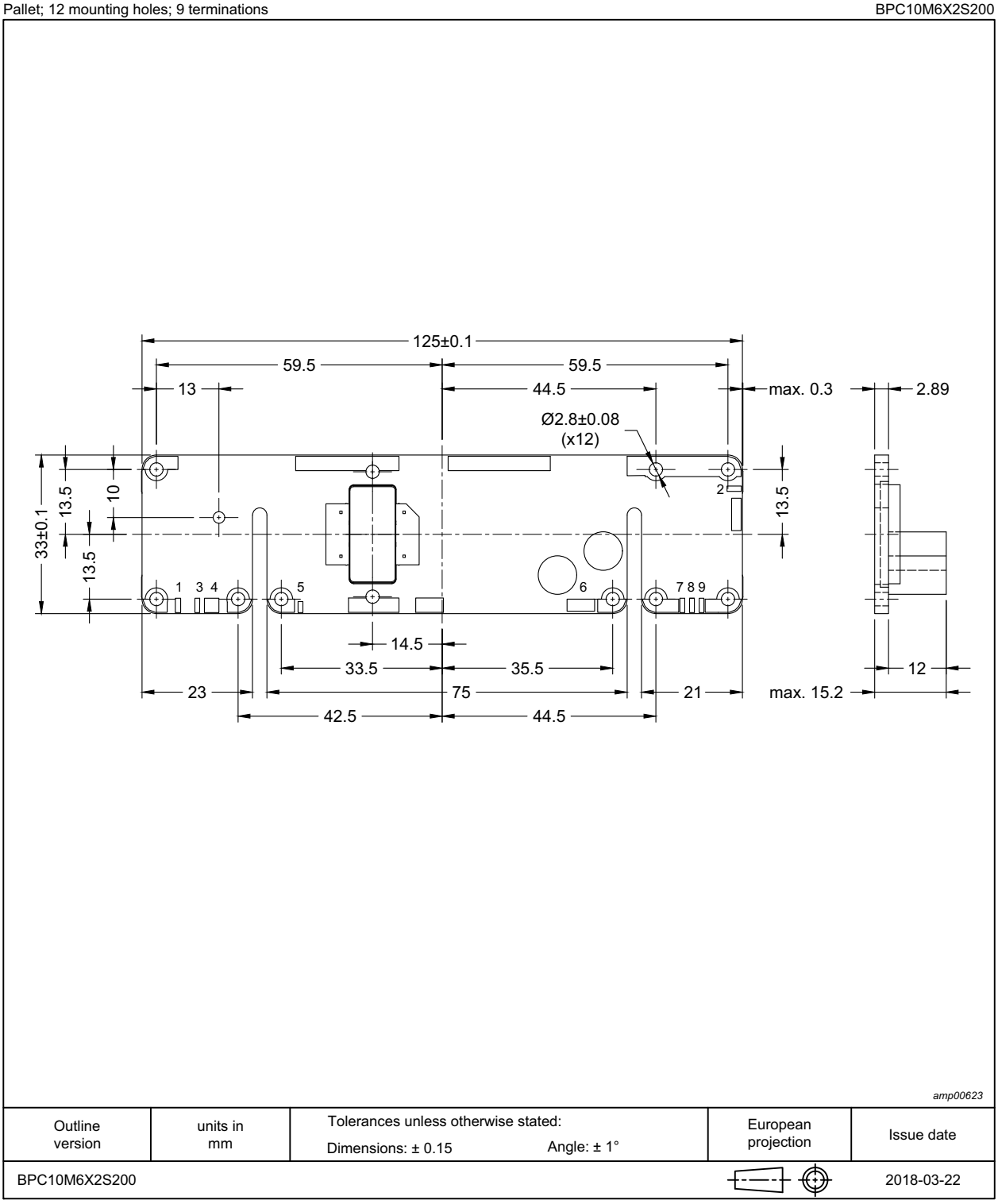
(1) $V_{GS1}$ at $I_{DQ1}$ = 50 mA

(2) $V_{GS2}$ at $I_{DQ2}$ = 100 mA

**Fig 9. Gate-source quiescent currents as a function of temperature; typical values**

# 9. Package outline

Pallet; 12 mounting holes; 9 terminations BPC10M6X2S200




| Outline version | units in mm | Tolerances unless otherwise stated: Dimensions: ± 0.15 Angle: ± 1° | European projection | Issue date |
|---|---|---|---|---|
| BPC10M6X2S200 | | | | 2018-03-22 |

**Fig 10. Package outline**

## 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.

**Table 6. ESD sensitivity**

| ESD model | Class |
|---|---|
| Charged Device Model (CDM); According to ANSI/ESDA/JEDEC standard JS-002 | C1 [1] |
| Human Body Model (HBM); According to ANSI/ESDA/JEDEC standard JS-001 | 2 [2] |

[1] CDM classification C1 is granted to any part that passes after exposure to an ESD pulse of 250 V, but fails after exposure to an ESD pulse of 500 V.

[2] HBM classification 2 is granted to any part that passes after exposure to an ESD pulse of 2000 V, but fails after exposure to an ESD pulse of 4000 V.

## 11. Abbreviations

**Table 7. Abbreviations**

| Acronym | Description |
|---|---|
| CW | Continuous Wave |
| ISM | Industrial, Scientific and Medical |
| LDMOS | Laterally Diffused Metal-Oxide Semiconductor |
| RoHS | Restriction of Hazardous Substances |
| VSWR | Voltage Standing Wave Ratio |

## 12. Revision history

**Table 8. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BPC10M6X2S200 v.1 | 20180329 | 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





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**Document identifier: BPC10M6X2S200**