

BLF6G20-230PRN; BLF6G20S-230PRN

Power LDMOS transistor

Rev. 02 — 9 February 2010

Product data sheet

1. Product profile

1.1 General description

230 W LDMOS power transistor for base station applications at frequencies from 1800 MHz to 2000 MHz.

Table 1. Typical performance

RF performance at $T_{case} = 25\text{ °C}$ in a common source class-AB production test circuit.

| Mode of operation | f (MHz) | V_{DS} (V) | $P_{L(AV)}$ (W) | G_p (dB) | η_D (%) | ACPR (dBc) |
|-------------------|--------------|-----------------|--------------------|---------------|-----------------|--------------------|
| 2-carrier W-CDMA | 1805 to 1880 | 28 | 65 | 17.5 | 32 | -31 ^[1] |

[1] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 7.5 dB at 0.01 % probability on CCDF per carrier; carrier spacing 5 MHz.

CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

1.2 Features and benefits

- Typical 2-carrier W-CDMA performance at frequencies of 1805 MHz and 1880 MHz, a supply voltage of 28 V and an I_{Dq} of 2000 mA:
 - ◆ Average output power = 65 W
 - ◆ Power gain = 17.5 dB
 - ◆ Efficiency = 32 %
 - ◆ ACPR = -32 dBc
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (1800 MHz to 2000 MHz)
- Internally matched for ease of use
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)



1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier applications in the 1800 MHz to 2000 MHz frequency range

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|----------------------------------|-------------|--------------------|----------------|
| BLF6G20-230PRN (SOT539A) | | | |
| 1 | drain1 | | sym117 |
| 2 | drain2 | | |
| 3 | gate1 | | |
| 4 | gate2 | | |
| 5 | source | | |
| BLF6G20S-230PRN (SOT539B) | | | |
| 1 | drain1 | | sym117 |
| 2 | drain2 | | |
| 3 | gate1 | | |
| 4 | gate2 | | |
| 5 | source | | |

[1] Connected to flange

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-----------------|---------|--|---------|
| | Name | Description | Version |
| BLF6G20-230PRN | - | flanged balanced LDMOST ceramic package; 2 mounting holes; 4 leads | SOT539A |
| BLF6G20S-230PRN | - | earless flanged balanced LDMOST ceramic package; 4 leads | SOT539B |

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_{case} | case temperature | | - | 150 | °C |
| T_j | junction temperature | | - | 225 | °C |

5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Typ | Unit |
|------------------|--|---|------|------|
| $R_{th(j-case)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ °C};$ $P_{L(AV)} = 65\text{ W}$ | 0.38 | K/W |

6. Characteristics

Table 6. Characteristics

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|----------------------------------|--|-----|-----|-------|---------------|
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS} = 0\text{ V}; I_D = 1.8\text{ mA}$ | 65 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS} = 10\text{ V}; I_D = 180\text{ mA}$ | 1.4 | 1.9 | 2.4 | V |
| I_{DSS} | drain leakage current | $V_{GS} = 0\text{ V}$ | | | | |
| | | $V_{DS} = 28\text{ V}$ | - | - | 3 | μA |
| | | $V_{DS} = 60\text{ V}$ | - | - | 5 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $V_{DS} = 10\text{ V}$ | - | 30 | - | A |
| I_{GSS} | gate leakage current | $V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$ | - | - | 300 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}; I_D = 9\text{ A}$ | - | 12 | - | S |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $I_D = 6.3\text{ A}$ | - | 0.1 | 0.165 | Ω |

7. Application information

Table 7. Application information

Mode of operation: 2-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1 to 64 PDPCH; $f_1 = 1802.5$ MHz; $f_2 = 1807.5$ MHz; $f_3 = 1872.5$ MHz; $f_4 = 1877.5$ MHz; RF performance at $V_{DS} = 28$ V; $I_{Dq} = 2000$ 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 | $P_{L(AV)} = 65$ W | 16.3 | 17.5 | 18.7 | dB |
| RL_{in} | input return loss | $P_{L(AV)} = 65$ W | - | -11 | -6.5 | dB |
| η_D | drain efficiency | $P_{L(AV)} = 65$ W | 29 | 32 | - | % |
| ACPR | adjacent channel power ratio | $P_{L(AV)} = 65$ W | - | -31 | -27 | dBc |

Table 8. Application information

Mode of operation: 1-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1 to 64 PDPCH; $f_1 = 1872.5$ MHz; $f_2 = 1877.5$ MHz; RF performance at $V_{DS} = 28$ V; $I_{Dq} = 2000$ mA; $T_{case} = 25$ °C; unless otherwise specified; in a class-AB production test circuit.

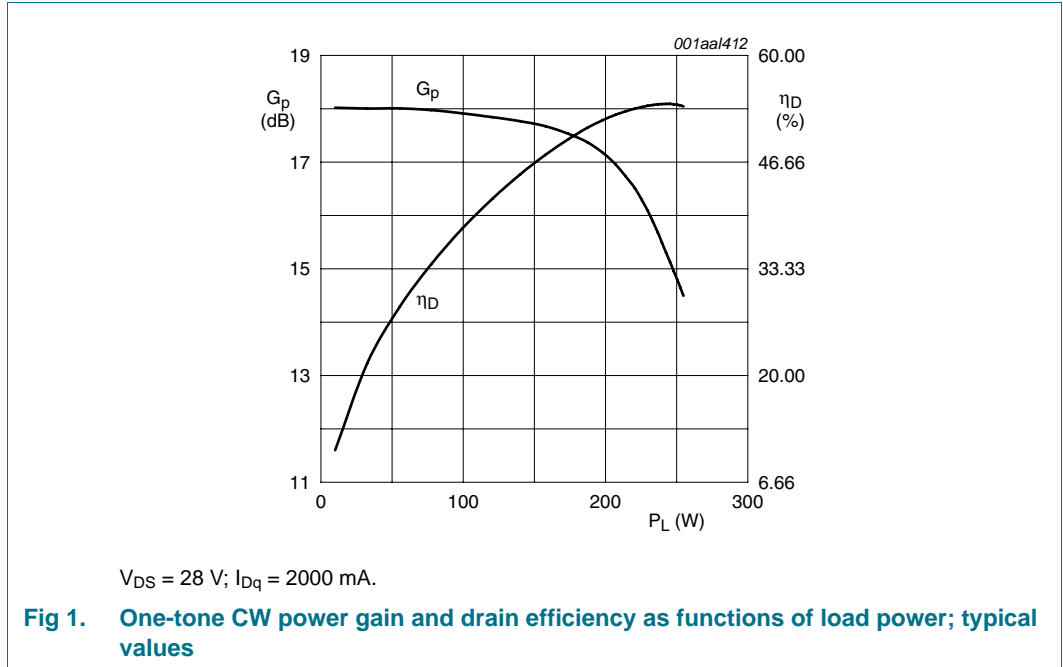
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------|------------------------------|---|-----|-----|-----|------|
| PAR_O | output peak-to-average ratio | $P_{L(AV)} = 125$ W; at 0.01 % probability on CCDF | 3.5 | 4.2 | - | dB |

7.1 Ruggedness in class-AB operation

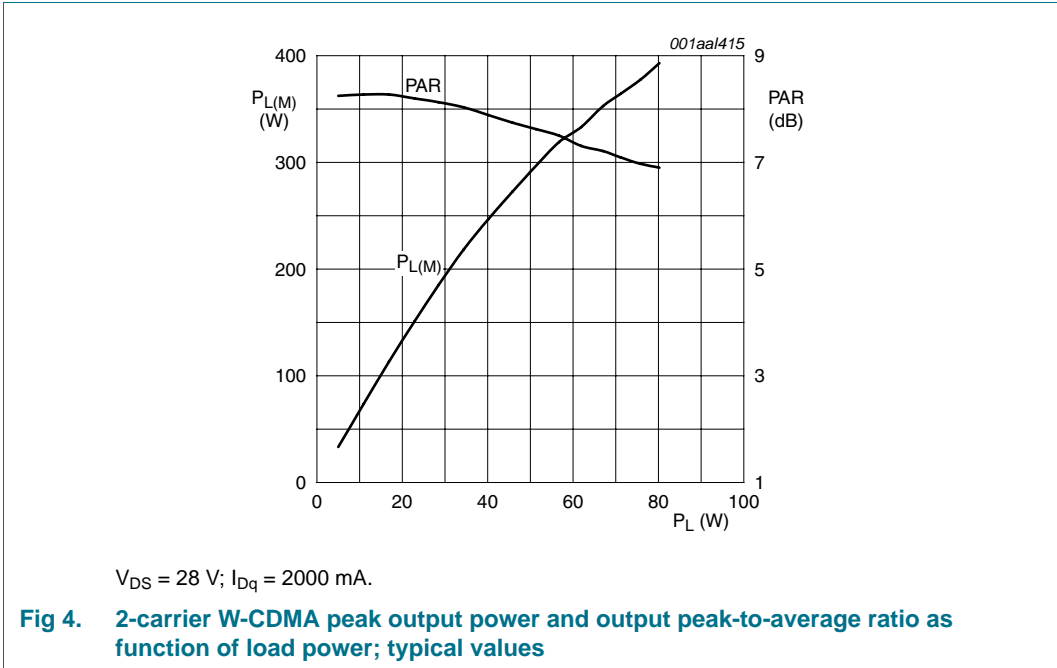
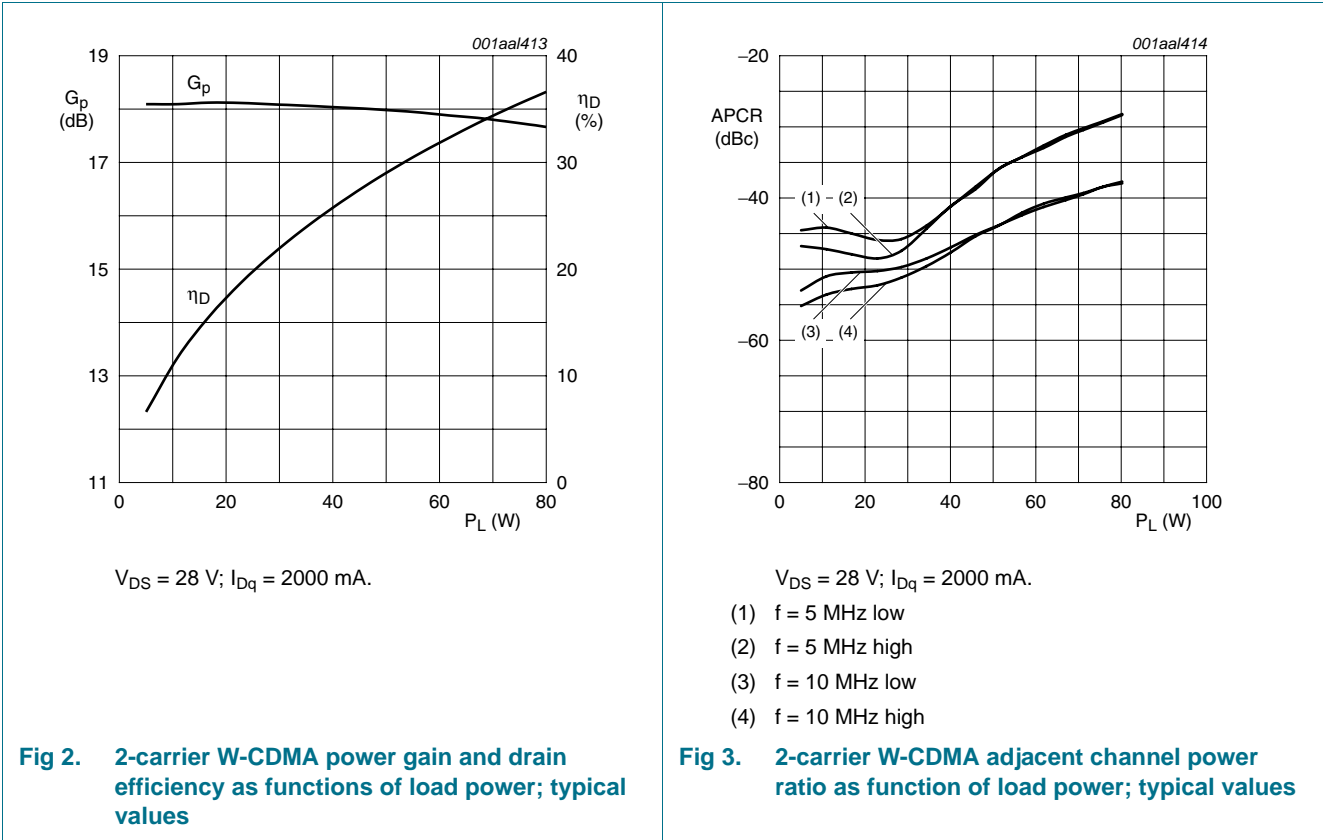
The BLF6G20-230PRN and BLF6G20S-230PRN are capable of withstanding a load mismatch corresponding to $VSWR = 10 : 1$ through all phases under the following conditions: $V_{DS} = 28$ V; $I_{Dq} = 2000$ mA; $P_L = 230$ W (CW); $f = 1805$ MHz.

7.2 Graphs

7.2.1 One tone CW



7.2.2 2-carrier W-CDMA



8. Test information

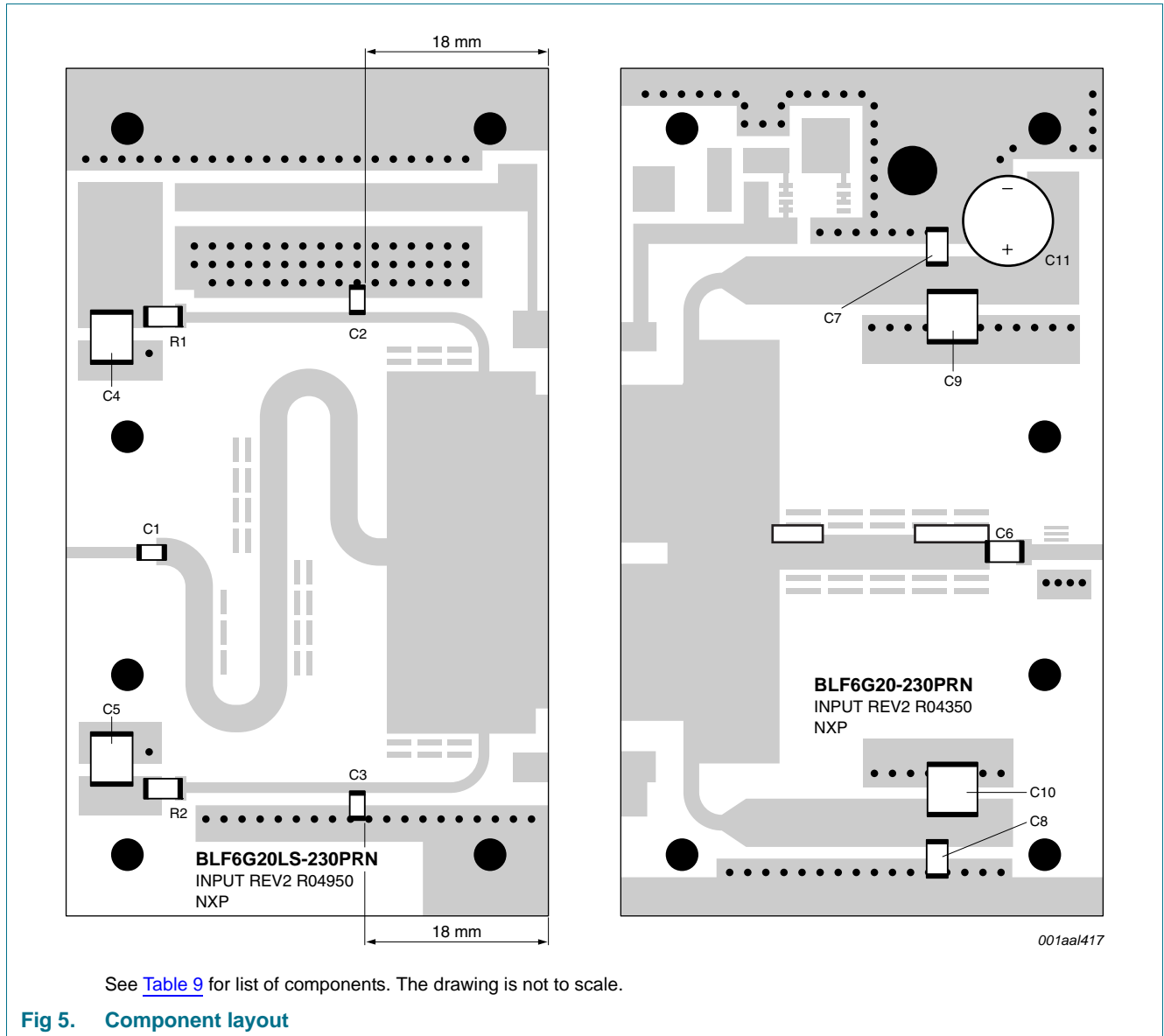


Table 9. List of components

See [Figure 5](#) for component layout.

| Component | Description | Value | Remarks |
|------------|-----------------------------------|------------------|--------------|
| C1, C2, C3 | multilayer ceramic chip capacitor | 24 pF | ATC100A |
| C4, C5 | multilayer ceramic chip capacitor | 4.7 μ F | TDK |
| C6 | multilayer ceramic chip capacitor | 33 pF | ATC8008 |
| C7, C8 | multilayer ceramic chip capacitor | 12 pF | ATC100B |
| C9, C10 | multilayer ceramic chip capacitor | 10 μ F | TDK |
| C11 | electrolytic capacitor | 220 μ F/63 V | |
| R1, R2 | SMD resistor | 10 Ω | Philips 1206 |

9. Package outline

Flanged balanced LDMOST ceramic package; 2 mounting holes; 4 leads

SOT539A

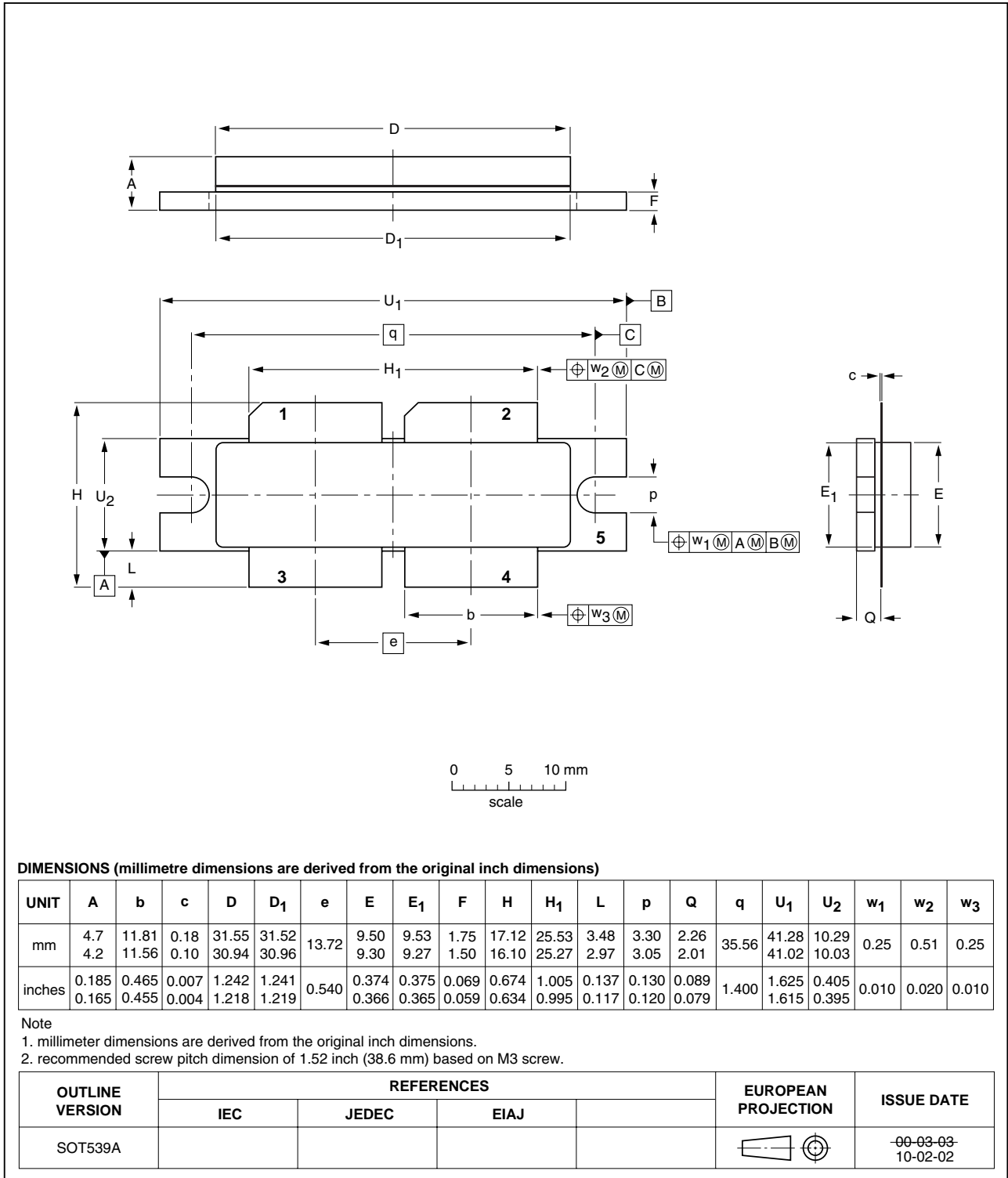


Fig 6. Package outline SOT539A

Earless flanged balanced LDMOST ceramic package; 4 leads

SOT539B

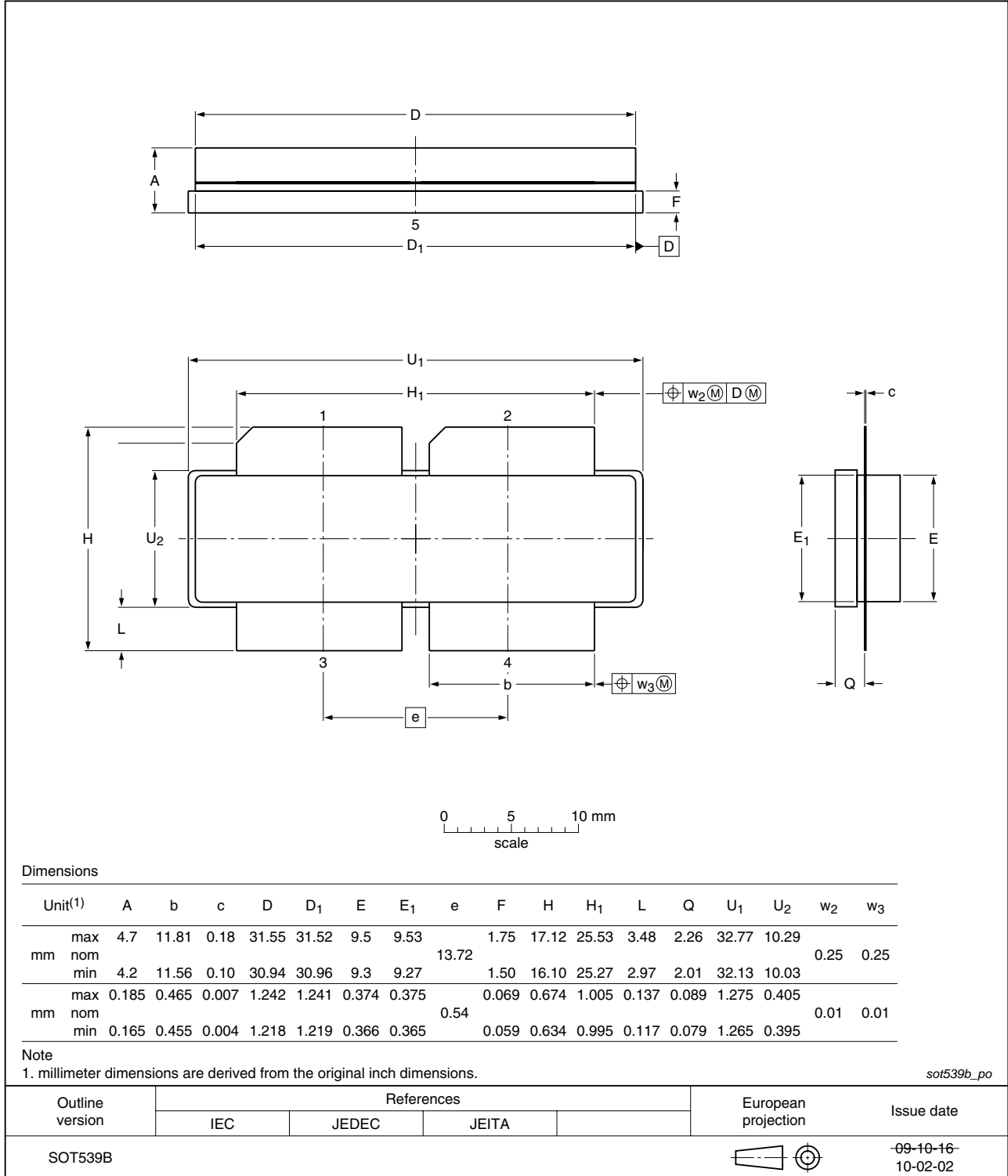


Fig 7. Package outline SOT539B

10. Abbreviations

Table 10. Abbreviations

| Acronym | Description |
|---------|---|
| 3GPP | Third Generation Partnership Project |
| CCDF | Complementary Cumulative Distribution Function |
| DPCH | Dedicated Physical CHannel |
| LDMOS | Laterally Diffused Metal-Oxide Semiconductor |
| LDMOST | Laterally Diffused Metal-Oxide Semiconductor Transistor |
| PAR | Peak-to-Average power Ratio |
| PDPCH | transmission Power of the Dedicated Physical CHannel |
| RF | Radio Frequency |
| W-CDMA | Wideband Code Division Multiple Access |

11. Revision history

Table 11. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------------------|--------------|--|---------------|------------------|
| BLF6G20-230PRN_20S-230PRN_2 | 20100209 | Product data sheet | - | BLF6G20-230PRN_1 |
| Modifications | | <ul style="list-style-type: none"> Data sheet status changed to productive data sheet. Data sheet expanded to include the BLF6G20S-230PRN transistor. Section 12 “Legal information” export control disclaimer added. | | |
| BLF6G20-230PRN_1 | 20081202 | Objective data sheet | - | - |

12. Legal information

12.1 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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14. Contents

1 Product profile 1

1.1 General description 1

1.2 Features and benefits 1

1.3 Applications 2

2 Pinning information 2

3 Ordering information 2

4 Limiting values 3

5 Thermal characteristics 3

6 Characteristics 3

7 Application information 4

7.1 Ruggedness in class-AB operation 4

7.2 Graphs 5

7.2.1 One tone CW 5

7.2.2 2-carrier W-CDMA 6

8 Test information 7

9 Package outline 8

10 Abbreviations 10

11 Revision history 10

12 Legal information 11

12.1 Data sheet status 11

12.2 Definitions 11

12.3 Disclaimers 11

12.4 Trademarks 12

13 Contact information 12

14 Contents 13

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