

BLF7G20L-200; BLF7G20LS-200

Power LDMOS transistor

Rev. 4 — 22 July 2011

Product data sheet

1. Product profile

1.1 General description

200 W LDMOS power transistor for base station applications at frequencies from 1805 MHz to 1990 MHz.

Table 1. Typical performance

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

| Mode of operation | f (MHz) | I_{Dq} (mA) | V_{DS} (V) | $P_{L(AV)}$ (W) | G_p (dB) | η_D (%) | ACPR (dBc) |
|-------------------|--------------|------------------|-----------------|--------------------|---------------|-----------------|-------------------------|
| 2-carrier W-CDMA | 1805 to 1880 | 1620 | 28 | 55 | 18 | 33 | -29 [1] |

[1] Test signal: 3GPP; test model 1; 64 PDPCH; PAR = 8.4 dB at 0.01 % probability on CCDF.

1.2 Features and benefits

- Excellent ruggedness
- High efficiency
- Low R_{th} providing excellent thermal stability
- Designed for broadband operation (1805 MHz to 1990 MHz)
- Lower output capacitance for improved performance in Doherty applications
- Designed for low-memory effects providing excellent digital pre-distortion capability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

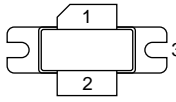
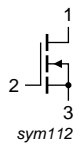
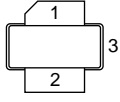
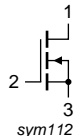
1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi-carrier applications in the 1805 MHz to 1990 MHz frequency range



2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|--------------------------------|-------------|---|---|
| BLF7G20L-200 (SOT502A) | | | |
| 1 | drain |  |  sym112 |
| 2 | gate | | |
| 3 | source | | |
| BLF7G20LS-200 (SOT502B) | | | |
| 1 | drain |  |  sym112 |
| 2 | gate | | |
| 3 | source | | |

[1] Connected to flange

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|---------------|---------|---|---------|
| | Name | Description | Version |
| BLF7G20L-200 | - | flanged LDMOST ceramic package; 2 mounting holes; 2 leads | SOT502A |
| BLF7G20LS-200 | - | earless flanged LDMOST ceramic package; 2 leads | SOT502B |

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 | | - | 225 | °C |

5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Typ | Unit |
|---------------|--|---|------|------|
| $R_{th(j-c)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ °C}$; $P_L = 55\text{ W}$; $V_{DS} = 28\text{ V}$; $I_{Dq} = 1620\text{ mA}$ | 0.27 | K/W |

6. Characteristics

Table 6. Characteristics

T_j = 25 °C unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------------|----------------------------------|---|------|-------|-----|------|
| V _{(BR)DSS} | drain-source breakdown voltage | V _{GS} = 0 V; I _D = 1.5 mA | 65 | - | - | V |
| V _{GS(th)} | gate-source threshold voltage | V _{DS} = 10 V; I _D = 150 mA | 1.5 | 1.9 | 2.3 | V |
| I _{DSS} | drain leakage current | V _{GS} = 0 V; V _{DS} = 28 V | - | - | 4.2 | μA |
| I _{DSX} | drain cut-off current | V _{GS} = V _{GS(th)} + 3.75 V; V _{DS} = 10 V | 42 | 50.6 | - | A |
| I _{GSS} | gate leakage current | V _{GS} = 11 V; V _{DS} = 0 V | -420 | 2.44 | 420 | nA |
| g _{fs} | forward transconductance | V _{DS} = 10 V; I _D = 7.5 A | - | 18.6 | - | S |
| R _{DS(on)} | drain-source on-state resistance | V _{GS} = V _{GS(th)} + 3.75 V; I _D = 5.25 A | - | 0.093 | - | Ω |

7. Test information

Table 7. Functional test information

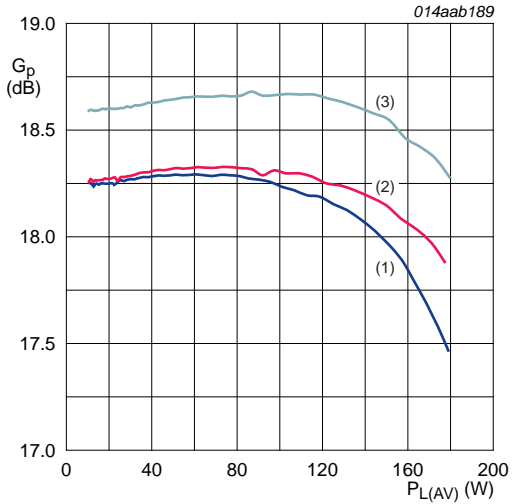
Mode of operation: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on the CCDF; 3GPP test model 1; 64 PDPCH; f₁ = 1807.5 MHz; f₂ = 1812.5 MHz; f₃ = 1872.5 MHz; f₄ = 1877.5 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 1620 mA; T_{case} = 25 °C; unless otherwise specified; in a class-AB production test circuit.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------|------------------------------|---------------------------|-----|-----|-----|------|
| P _{L(AV)} | average output power | | - | 55 | - | W |
| G _p | power gain | P _{L(AV)} = 55 W | 17 | 18 | - | dB |
| RL _{in} | input return loss | P _{L(AV)} = 55 W | - | - | -10 | dB |
| η _D | drain efficiency | P _{L(AV)} = 55 W | 30 | 33 | - | % |
| ACPR | adjacent channel power ratio | P _{L(AV)} = 55 W | - | -29 | - | dBc |

7.1 Ruggedness in class-AB operation

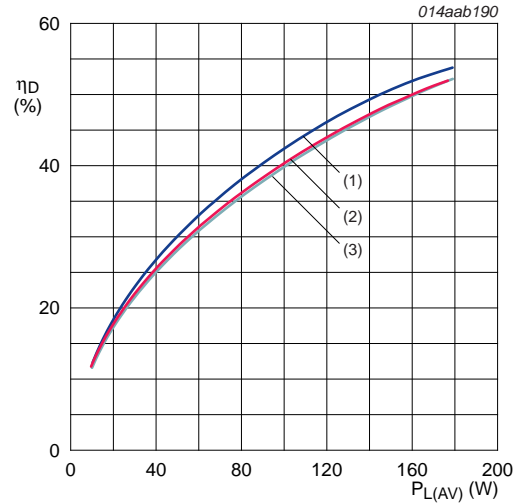
The BLF7G20L-200 and BLF7G20LS-200 are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 30 V; I_{Dq} = 1620 mA; P_L = 185 W (CW); f = 1805 MHz to 1880 MHz.

7.2 1 Tone CW



$V_{DS} = 28\text{ V}; I_{Dq} = 1620\text{ mA}$.
 (1) $f = 1805\text{ MHz}$
 (2) $f = 1845\text{ MHz}$
 (3) $f = 1880\text{ MHz}$

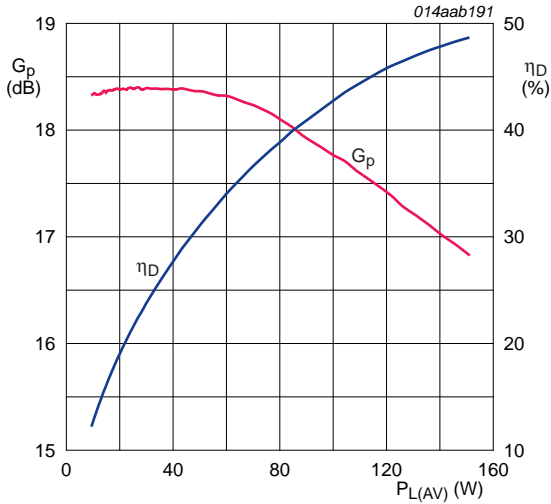
Fig 1. Power gain as a function of average output power; typical values



$V_{DS} = 28\text{ V}; I_{Dq} = 1620\text{ mA}$.
 (1) $f = 1805\text{ MHz}$
 (2) $f = 1845\text{ MHz}$
 (3) $f = 1880\text{ MHz}$

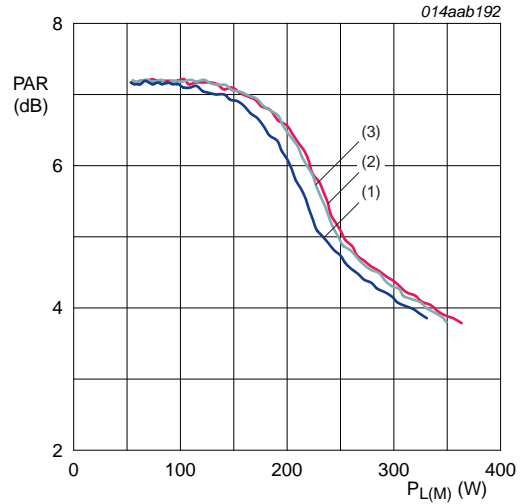
Fig 2. Drain efficiency as a function of average output power; typical values

7.3 1-carrier W-CDMA



$V_{DS} = 28\text{ V}$; $I_{Dq} = 1620\text{ mA}$; $f = 1845\text{ MHz}$; $PAR = 7.2\text{ dB}$ at 0.01 % probability on the CCDF.

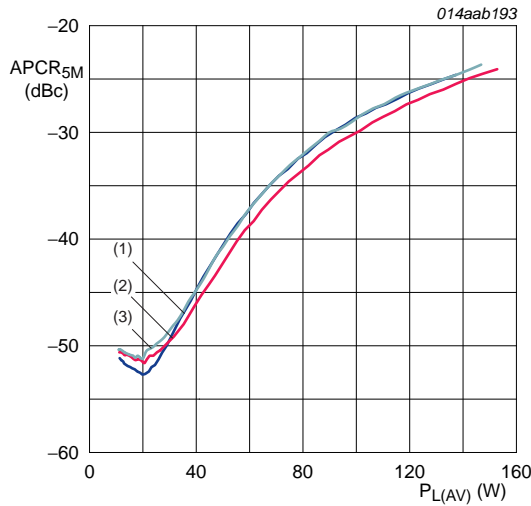
Fig 3. Power gain and drain efficiency as functions of average output power; typical values



$V_{DS} = 28\text{ V}$; $I_{Dq} = 1620\text{ mA}$; $PAR = 7.2\text{ dB}$ at 0.01 % probability on the CCDF.

- (1) $f = 1805\text{ MHz}$
- (2) $f = 1845\text{ MHz}$
- (3) $f = 1880\text{ MHz}$

Fig 4. Peak-to-average power ratio as a function of peak power; typical values

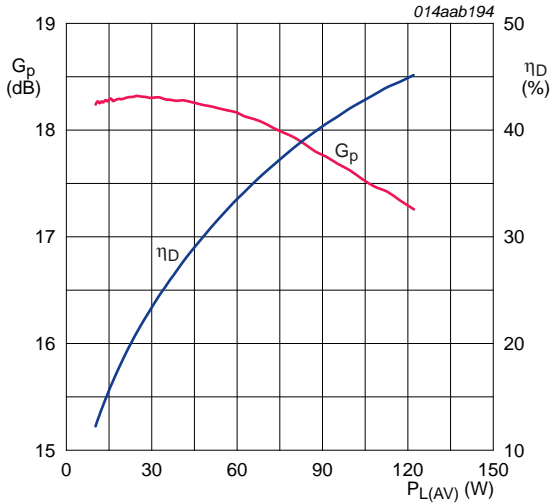


$V_{DS} = 28\text{ V}$; $I_{Dq} = 1620\text{ mA}$; $PAR = 7.2\text{ dB}$ at 0.01 % probability on the CCDF.

- (1) $f = 1805\text{ MHz}$
- (2) $f = 1845\text{ MHz}$
- (3) $f = 1880\text{ MHz}$

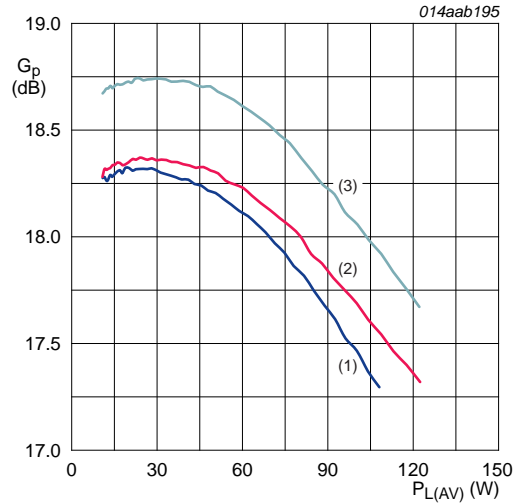
Fig 5. Adjacent power channel ratio (5 MHz) as function of average output power; typical values

7.4 2-carrier W-CDMA



$V_{DS} = 28\text{ V}$; $I_{Dq} = 1620\text{ mA}$; channel spacing = 5 MHz;
PAR = 8.4 dB at 0.01 % probability on the CCDF.

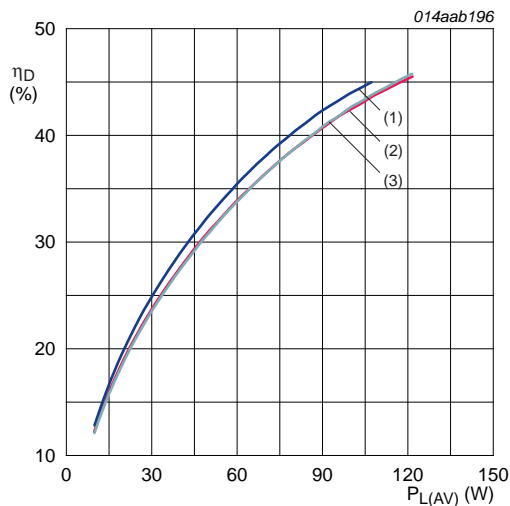
Fig 6. Power gain and drain efficiency as functions of average output power; typical values



$V_{DS} = 28\text{ V}$; $I_{Dq} = 1620\text{ mA}$; channel spacing = 5 MHz;
PAR = 8.4 dB at 0.01 % probability on the CCDF.

- (1) $f = 1805\text{ MHz}$
- (2) $f = 1845\text{ MHz}$
- (3) $f = 1880\text{ MHz}$

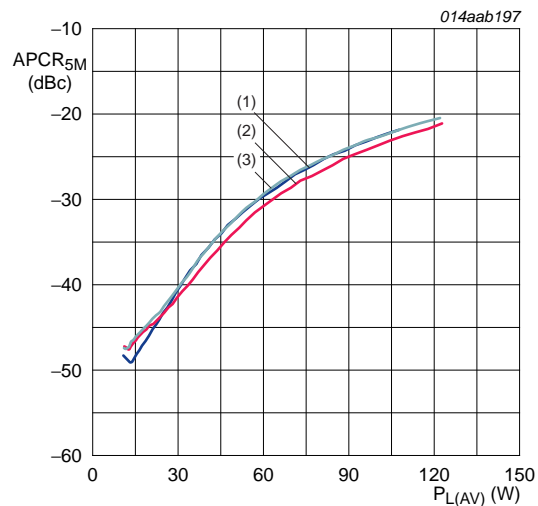
Fig 7. Power gain as a function of average output power; typical values



$V_{DS} = 28\text{ V}$; $I_{Dq} = 1620\text{ mA}$; channel spacing = 5 MHz;
PAR = 8.4 dB at 0.01 % probability on the CCDF.

- (1) $f = 1805\text{ MHz}$
- (2) $f = 1845\text{ MHz}$
- (3) $f = 1880\text{ MHz}$

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



$V_{DS} = 28\text{ V}$; $I_{Dq} = 1620\text{ mA}$; channel spacing = 5 MHz;
PAR = 8.4 dB at 0.01 % probability on the CCDF.

- (1) $f = 1805\text{ MHz}$
- (2) $f = 1845\text{ MHz}$
- (3) $f = 1880\text{ MHz}$

Fig 9. Adjacent power channel ratio (5 MHz) as a function of average output power; typical values

7.5 Test circuit

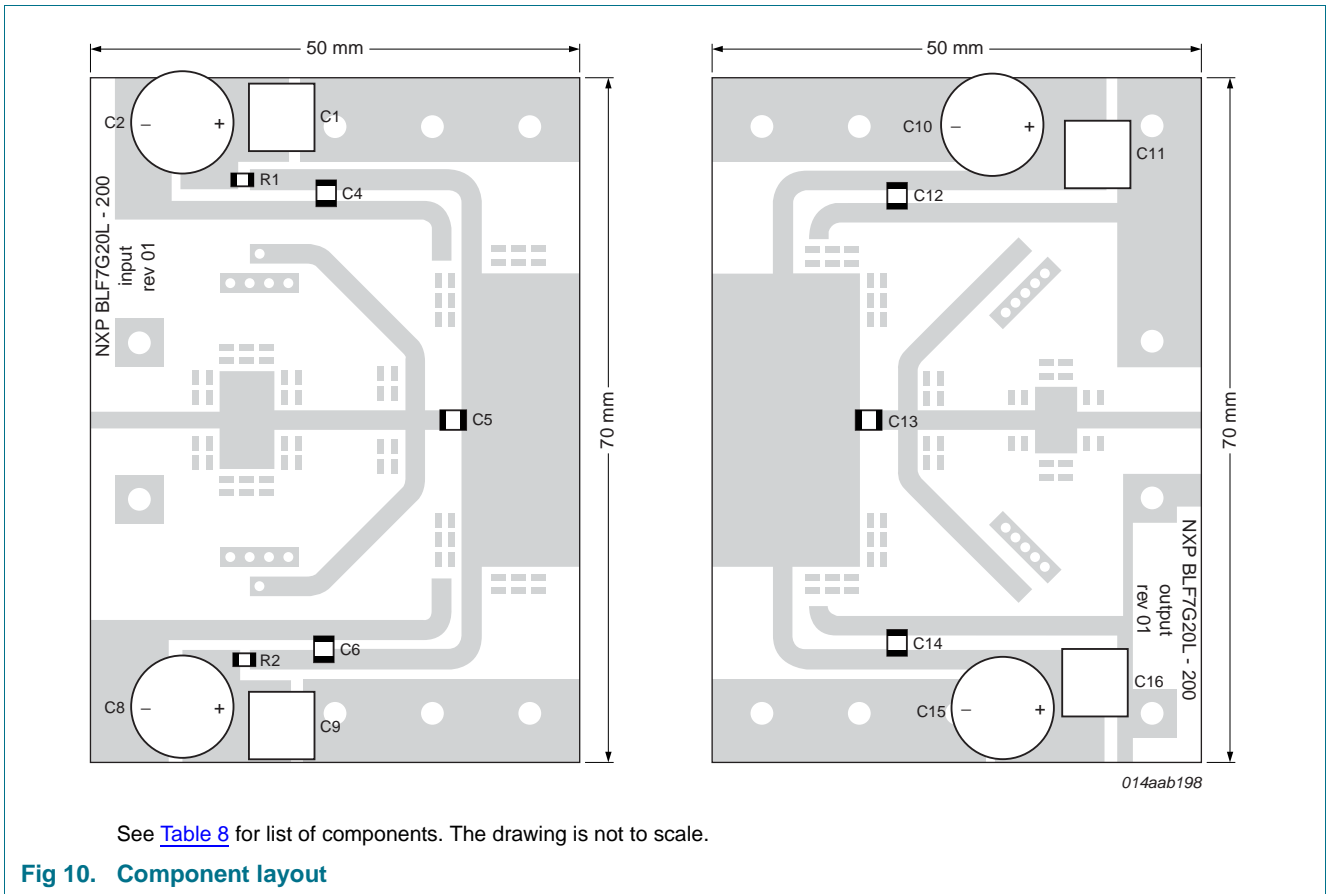


Table 8. List of components

See [Figure 10](#) for component layout.

| Component | Description | Value | Remarks |
|------------------|-----------------------------------|-------------------|--------------|
| C1, C9, C11, C16 | multilayer ceramic chip capacitor | 10 μ F | TDK |
| C4, C6 | multilayer ceramic chip capacitor | 68 pF | ATC800B |
| C5 | multilayer ceramic chip capacitor | 2.0 pF | ATC800B |
| C12, C14 | multilayer ceramic chip capacitor | 100 pF | ATC800B |
| C13 | multilayer ceramic chip capacitor | 3.3 pF | ATC800B |
| C2, C8, C10, C15 | electrolytic capacitor | 470 μ F; 63 V | |
| R1, R2 | chip resistor | 10 Ω | Philips 0603 |

8. Package outline

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads

SOT502A

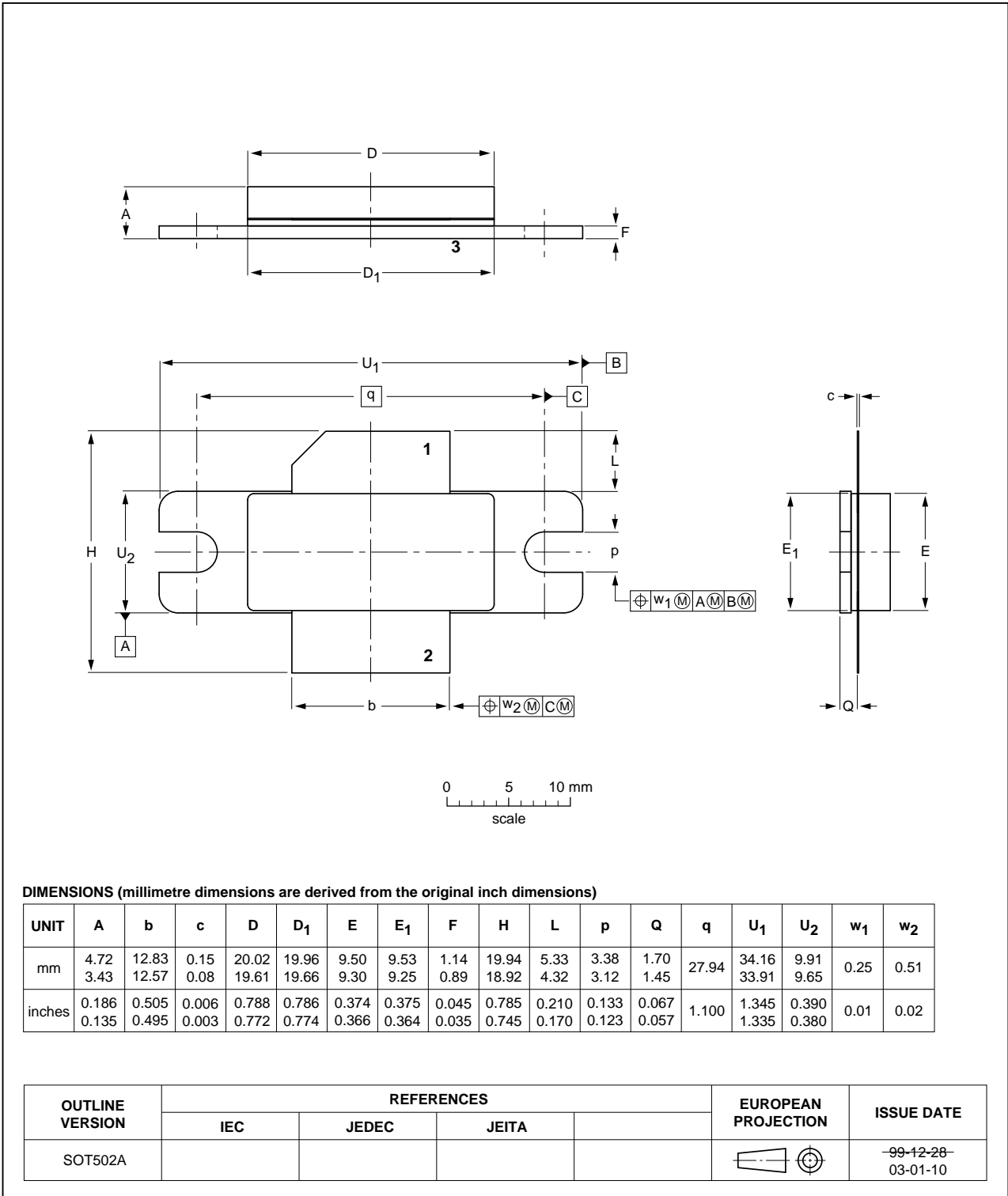


Fig 11. Package outline SOT502A

Earless flanged LDMOST ceramic package; 2 leads

SOT502B

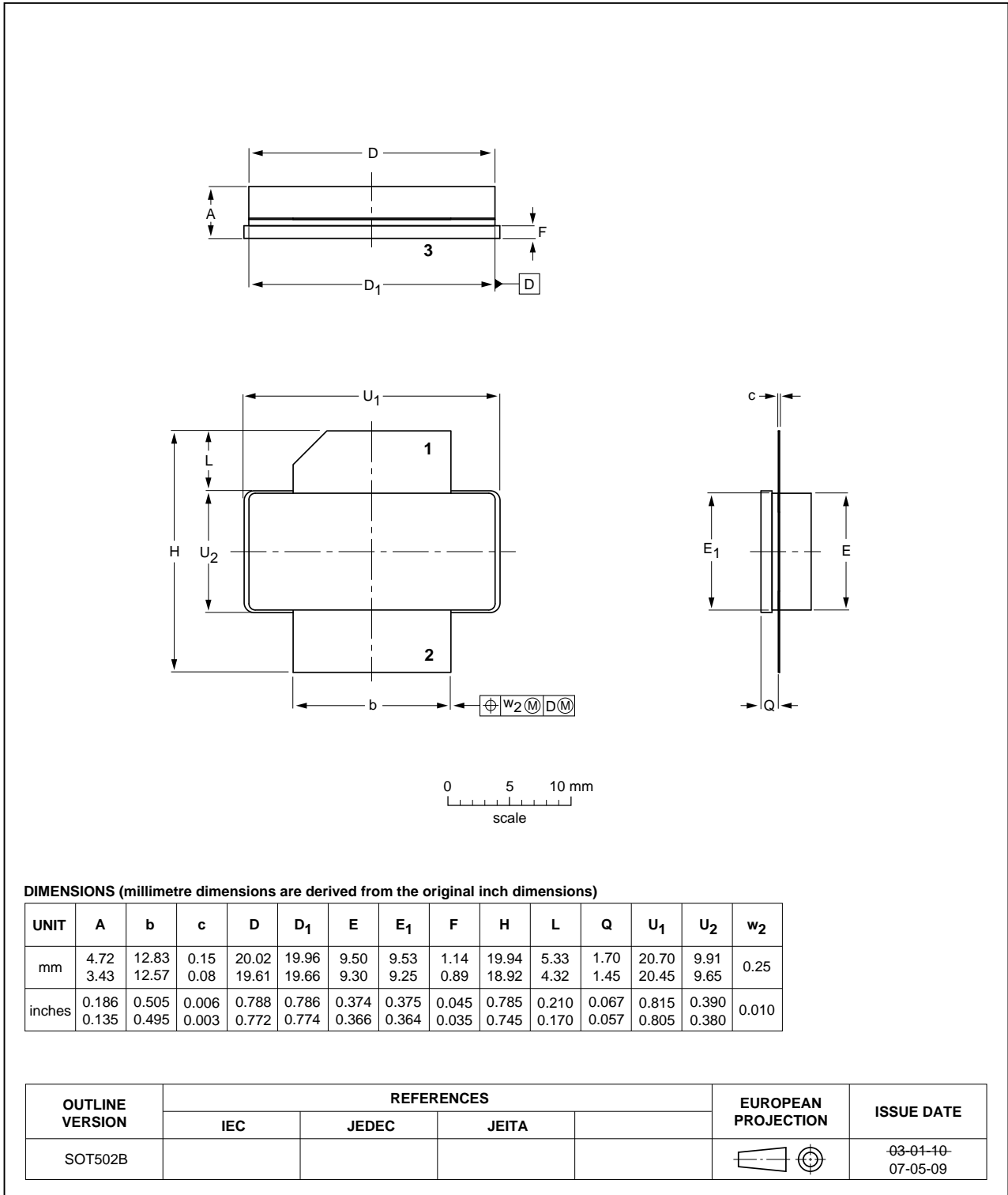


Fig 12. Package outline SOT502B

9. Abbreviations

Table 9. Abbreviations

| Acronym | Description |
|---------|---|
| 3GPP | Third Generation Partnership Project |
| CCDF | Complementary Cumulative Distribution Function |
| CW | Continuous Wave |
| DPCH | Dedicated Physical CHannel |
| ESD | ElectroStatic Discharge |
| 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 |
| VSWR | Voltage Standing Wave Ratio |
| W-CDMA | Wideband Code Division Multiple Access |

10. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------------------|---|------------------------|---------------|-----------------------------|
| BLF7G20L-200_7G20LS-200 v.4 | 20110722 | Product data sheet | - | BLF7G20L-200_7G20LS-200 v.3 |
| Modifications: | <ul style="list-style-type: none"> The status of this document has been changed to Product data sheet. | | | |
| BLF7G20L-200_7G20LS-200 v.3 | 20110301 | Preliminary data sheet | - | BLF7G20L-200_7G20LS-200 v.2 |
| BLF7G20L-200_7G20LS-200 v.2 | 20100827 | Preliminary data sheet | - | BLF7G20L-200_7G20LS-200 v.1 |
| BLF7G20L-200_7G20LS-200 v.1 | 20100603 | Objective data sheet | - | - |

11. Legal information

11.1 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. |
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[2] The term 'short data sheet' is explained in section "Definitions".

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