

BLF7G27L-140; BLF7G27LS-140

Power LDMOS transistor

Rev. 3 — 22 July 2011

Product data sheet

1. Product profile

1.1 General description

140 W LDMOS power transistor for base station applications at frequencies from 2500 MHz to 2700 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 _{885k} (dBc) | ACPR _{5M} (dBc) |
|-----------------------|--------------|------------------|-----------------|--------------------|---------------|-----------------|-------------------------------|-----------------------------|
| IS-95 | 2500 to 2700 | 1300 | 28 | 30 | 16.5 | 22 | -48 ^[1] | - |
| Single carrier W-CDMA | 2500 to 2700 | 1300 | 28 | 50 | 16.5 | 27 | - | -38 ^[2] |

[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] 3GPP; test model 1; 64 DPCH; PAR = 7.2 dB at 0.01 % probability on CCDF. Channel bandwidth is 3.84 MHz.

1.2 Features and benefits

- Excellent ruggedness
- High efficiency
- Low R_{th} providing excellent thermal stability
- Designed for low memory effects providing excellent digital pre-distortion capability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

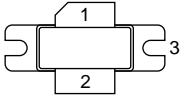
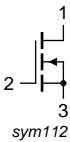
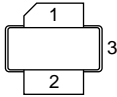
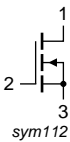
1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier applications in the 2500 MHz to 2700 MHz frequency range



2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|--------------------------------|-------------|---|---|
| BLF7G27L-140 (SOT502A) | | | |
| 1 | drain |  |  sym112 |
| 2 | gate | | |
| 3 | source | | |
| BLF7G27LS-140 (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 |
| BLF7G27L-140 | - | flanged LDMOST ceramic package; 2 mounting holes; 2 leads | SOT502A |
| BLF7G27LS-140 | - | 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 |
| I_D | drain current | | - | 28 | A |
| T_{stg} | storage temperature | | -65 | +150 | °C |
| T_j | junction temperature | | - | 200 | °C |

5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Typ | Unit |
|---------------|--|---|------|------|
| $R_{th(j-c)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ °C}; P_L = 125\text{ W}$ | 0.28 | K/W |

6. Characteristics

Table 6. Characteristics

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|----------------------------------|---|------|------|-----|---------------|
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS} = 0\text{ V}; I_D = 1\text{ mA}$ | 65 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS} = 10\text{ V}; I_D = 216\text{ mA}$ | 1.5 | 1.8 | 2.3 | V |
| I_{DSS} | drain leakage current | $V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$ | - | - | 5 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$ | 34.2 | 40.5 | - | A |
| I_{GSS} | gate leakage current | $V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$ | - | - | 500 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}; I_D = 216\text{ mA}$ | - | 1.87 | - | S |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 7.56\text{ A}$ | - | 0.07 | - | Ω |

7. Test information

Remark: All testing performed in a class-AB production test circuit.

Table 7. Functional test information

Mode of operation: 1-carrier N-CDMA, 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; $f_1 = 2500\text{ MHz}; f_2 = 2700\text{ MHz};$ RF performance at $V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}; T_{case} = 25\text{ °C};$ unless otherwise specified.

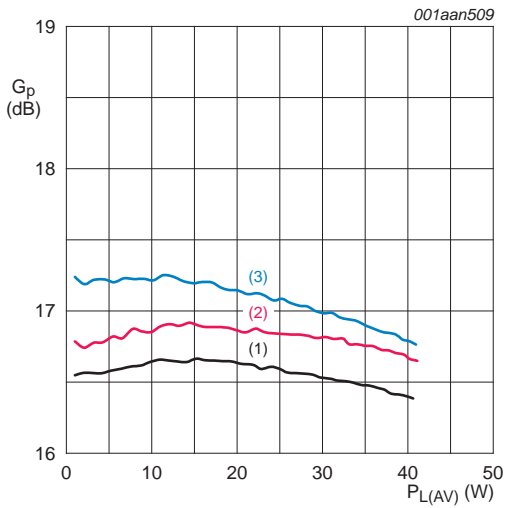
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|--|------------|------|------|-----|------|
| $P_{L(AV)}$ | average output power | | - | 30 | - | W |
| G_p | power gain | | 15.3 | 16.5 | - | dB |
| RL_{in} | input return loss | | - | -10 | - | dB |
| η_D | drain efficiency | | 19 | 22 | - | % |
| $ACPR_{885k}$ | adjacent channel power ratio (885 kHz) | | -44 | -48 | - | dBc |

7.1 Ruggedness in class-AB operation

The BLF7G27L-140 and BLF7G27LS-140 are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}; P_L = 140\text{ W (CW)}; f = 2500\text{ MHz}.$

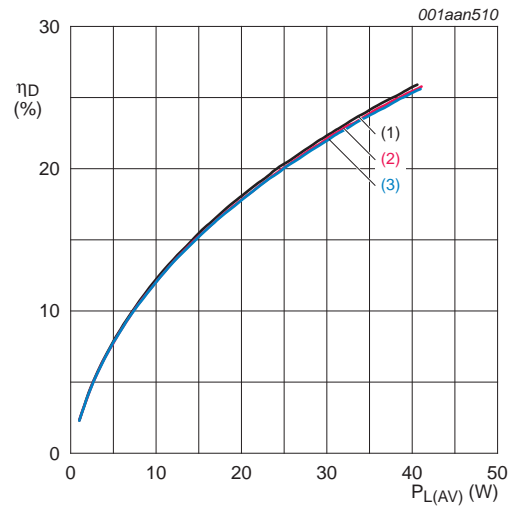
7.2 Single carrier IS-95

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.



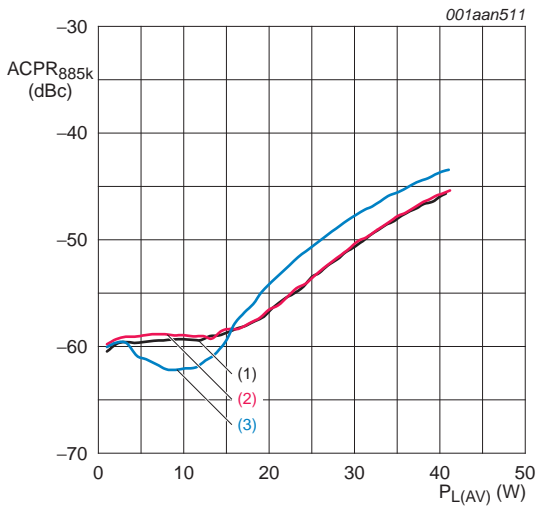
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$.
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

Fig 1. Single carrier IS-95 power gain as a function of average output power; typical values



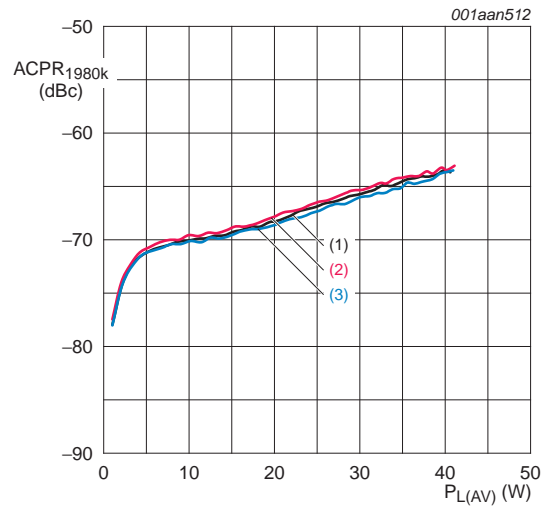
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$.
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

Fig 2. Single carrier IS-95 drain efficiency as a function of average output power; typical values



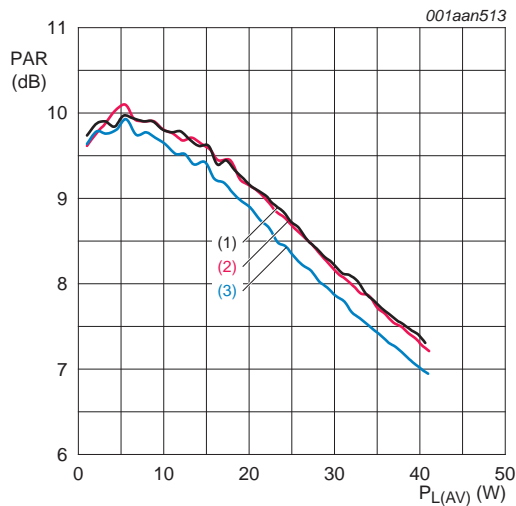
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

Fig 3. Single carrier IS-95 ACPR at 885 kHz as a function of average output power; typical values



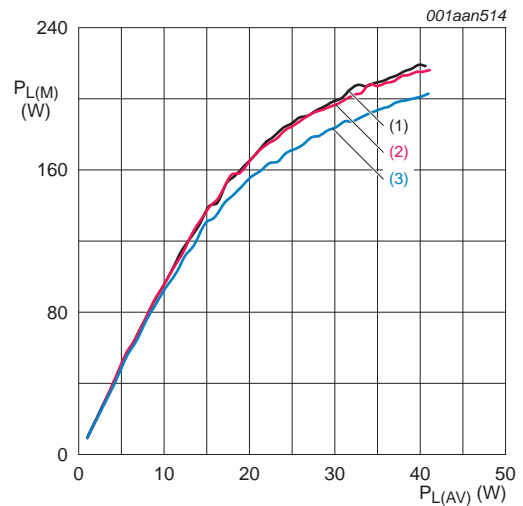
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

Fig 4. Single carrier IS-95 ACPR at 1980 kHz as a function of average output power; typical values



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

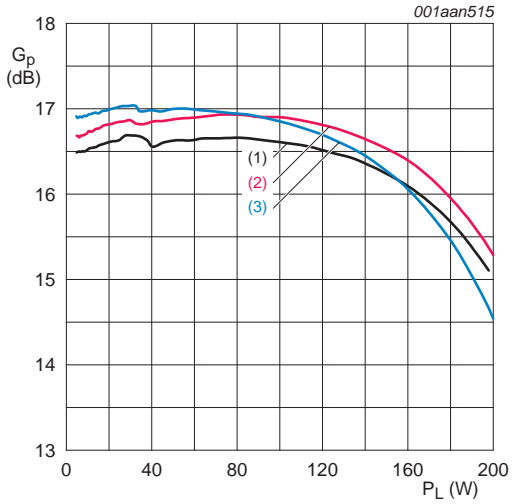
Fig 5. Single carrier IS-95 peak-to-average power ratio as a function of average output power; typical values



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

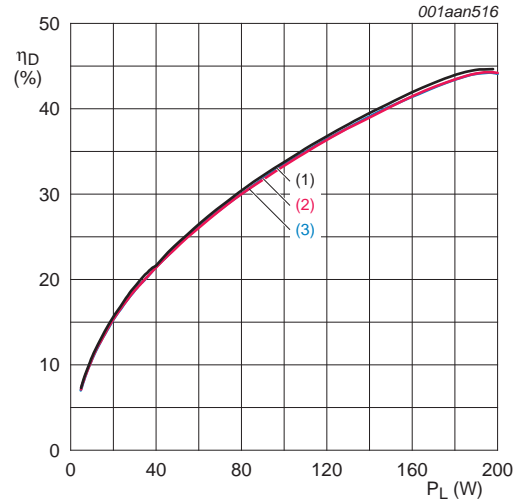
Fig 6. Single carrier IS-95 peak output power as a function of average output power; typical values

7.3 Pulsed CW



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

Fig 7. Pulsed CW power gain as a function of output power; typical values

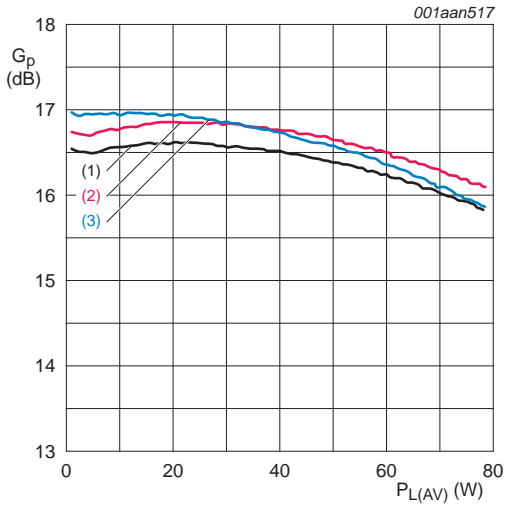


$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

Fig 8. Pulsed CW drain efficiency as a function of output power; typical values

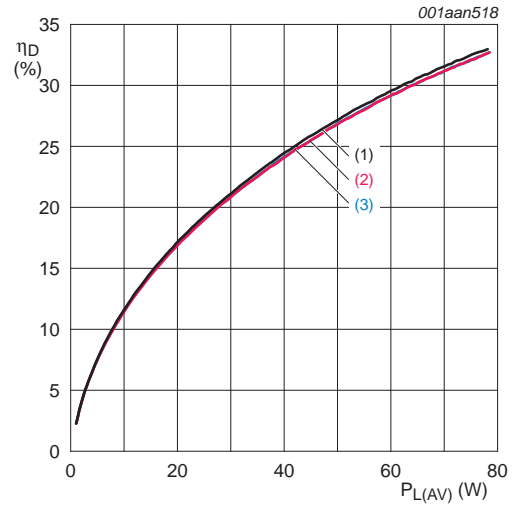
7.4 Single carrier W-CDMA

3GPP; test model 1; 64 DPCH; PAR = 7.2 dB at 0.01 % probability on CCDF.
Channel bandwidth is 3.84 MHz.



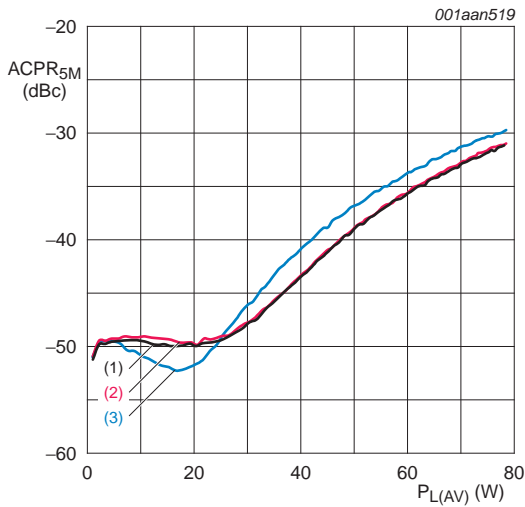
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$.
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

Fig 9. Single carrier W-CDMA power gain as a function of average output power; typical values



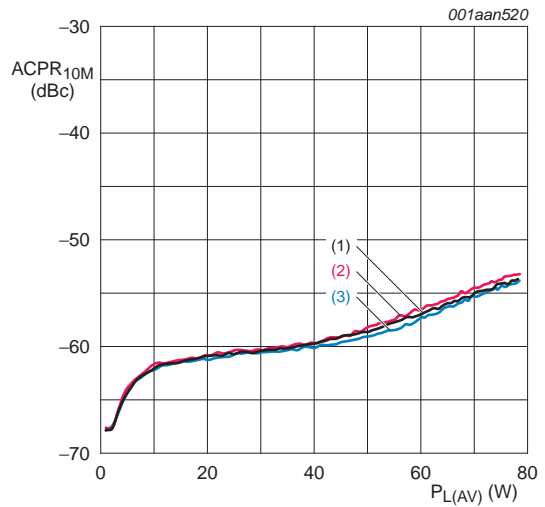
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$.
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

Fig 10. Single carrier W-CDMA drain efficiency as a function of average output power; typical values



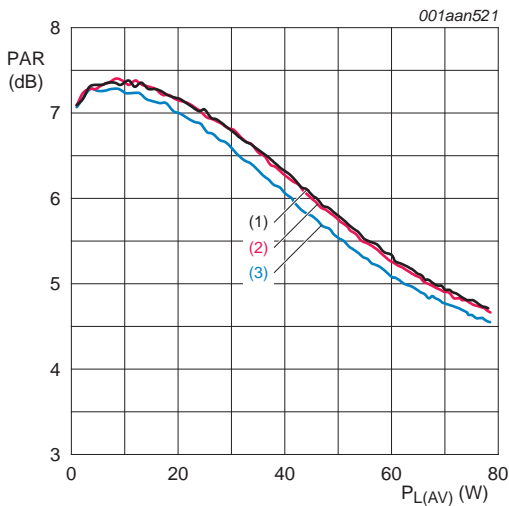
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$.
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

Fig 11. Single carrier W-CDMA ACPR at 5 MHz as a function of average output power; typical values



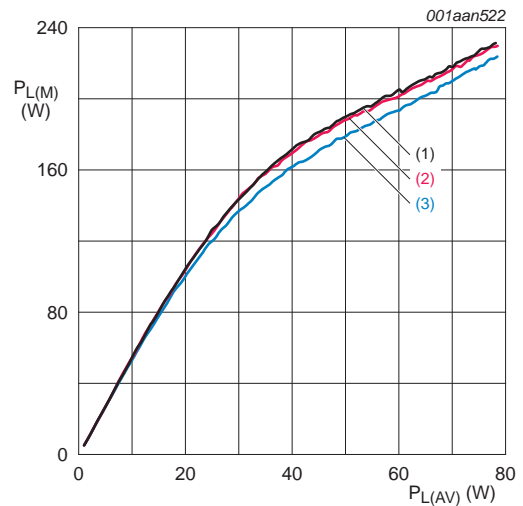
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$.
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

Fig 12. Single carrier W-CDMA ACPR at 10 MHz as a function of average output power; typical values



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$.
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

Fig 13. Single carrier W-CDMA peak-to-average power ratio as a function of average output power; typical values



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$.
 (1) $f = 2500\text{ MHz}$
 (2) $f = 2600\text{ MHz}$
 (3) $f = 2700\text{ MHz}$

Fig 14. Single carrier W-CDMA peak output power as a function of average output power; typical values

8. Package outline

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads

SOT502A

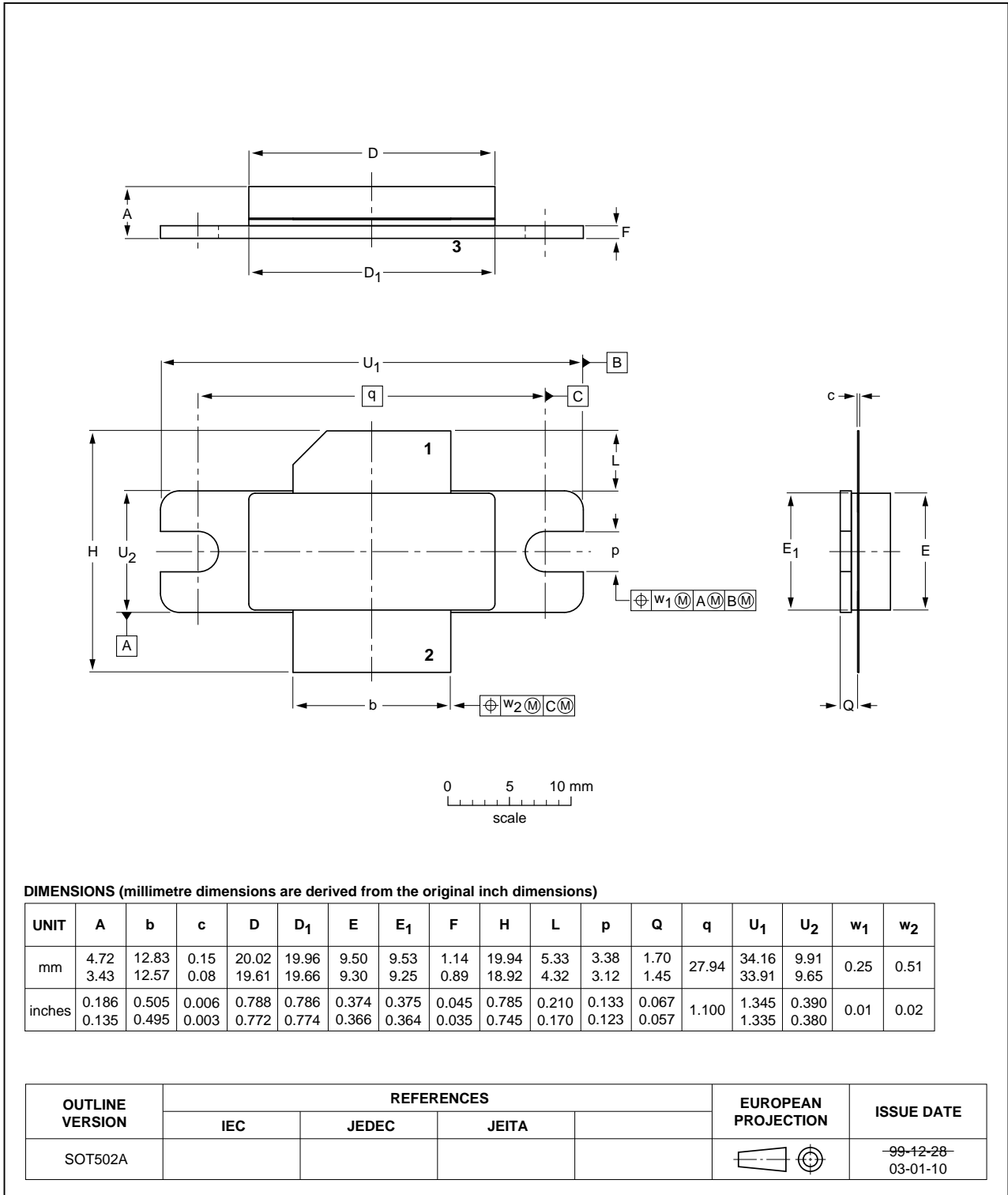


Fig 15. Package outline SOT502A

Earless flanged LDMOST ceramic package; 2 leads

SOT502B

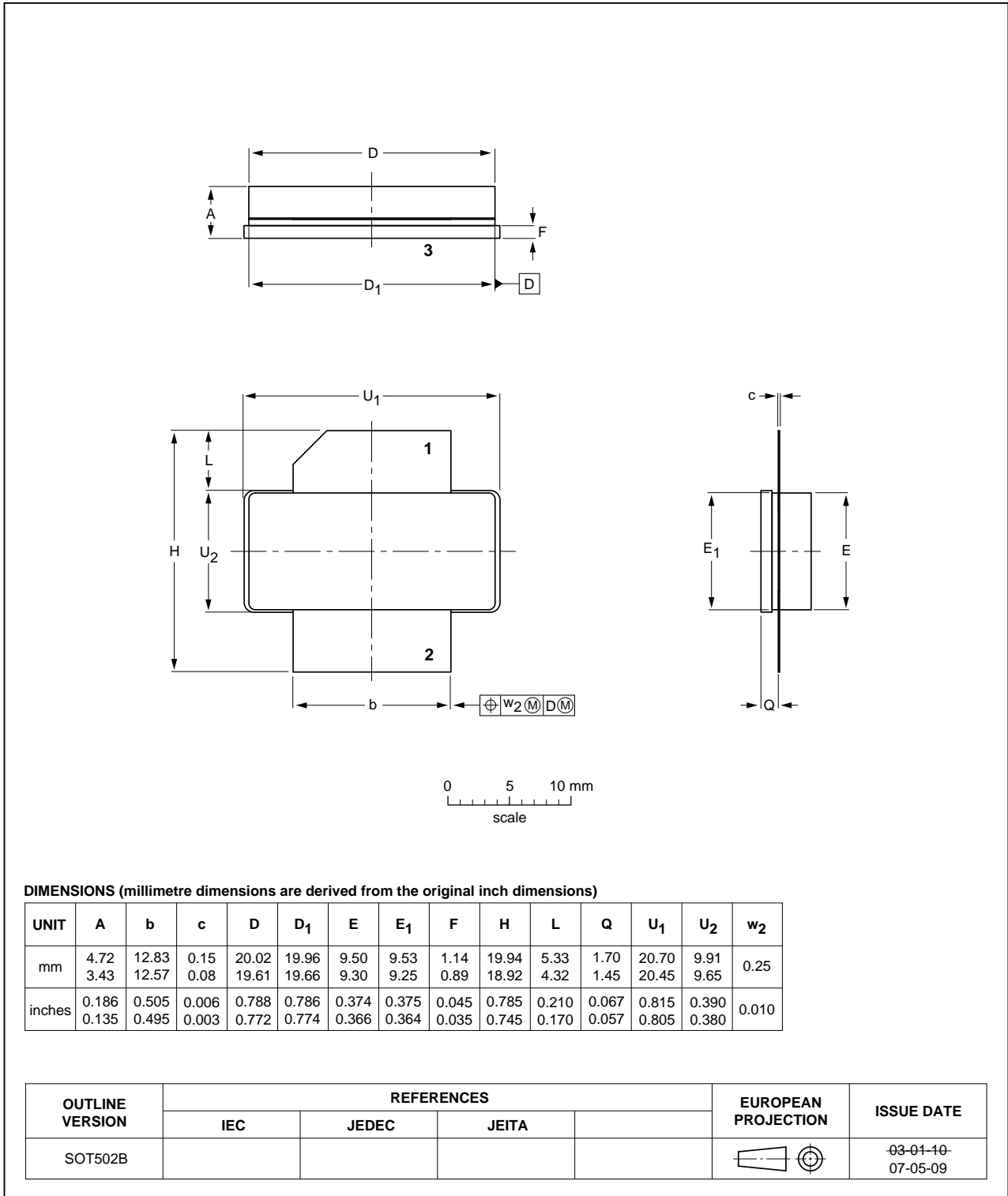


Fig 16. Package outline SOT502B

9. Abbreviations

Table 8. Abbreviations

| Acronym | Description |
|---------|---|
| 3GPP | Third Generation Partnership Project |
| CCDF | Complementary Cumulative Distribution Function |
| CW | Continuous Wave |
| DPCH | Dedicated Physical Channel |
| IS-95 | Interim Standard 95 |
| ESD | ElectroStatic Discharge |
| LDMOS | Laterally Diffused Metal Oxide Semiconductor |
| LDMOST | Laterally Diffused Metal Oxide Semiconductor Transistor |
| N-CDMA | Narrowband Code Division Multiple Access |
| PAR | Peak-to-Average power Ratio |
| RF | Radio Frequency |
| VSWR | Voltage Standing Wave Ratio |
| W-CDMA | Wideband Code Division Multiple Access |

10. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------------------|--------------|--|---------------|-----------------------------|
| BLF7G27L-140_7G27LS-140 v.3 | 20110722 | Product data sheet | - | BLF7G27L-140_7G27LS-140 v.2 |
| Modifications: | | <ul style="list-style-type: none"> The status of this data sheet has been changed to Product data sheet | | |
| BLF7G27L-140_7G27LS-140 v.2 | 20110405 | Preliminary data sheet | - | BLF7G27L-140_7G27LS-140 v.1 |
| BLF7G27L-140_7G27LS-140 v.1 | 20100527 | Objective data sheet | - | - |

11. Legal information

11.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
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| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
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[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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