

BLF7G15LS-300P

Power LDMOS transistor

Rev. 3 — 12 July 2013

Product data sheet

1. Product profile

1.1 General description

300 W LDMOS power transistor for base station applications at frequencies from 1450 MHz to 1550 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 | 1476 to 1511 | 2600 | 28 | 85 | 18 | 31 | -32 [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.

1.2 Features and benefits

- High efficiency
- Low R_{th} providing excellent thermal stability
- Designed for broadband operation (1450 MHz to 1550 MHz)
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

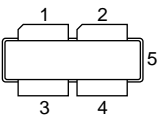
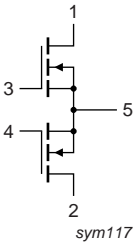
1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier applications in the 1450 MHz to 1550 MHz frequency range



2. Pinning information

Table 2. Discrete pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------|---|---|
| 1 | drain1 |  |  |
| 2 | drain2 | | |
| 3 | gate1 | | |
| 4 | gate2 | | |
| 5 | source | | |

[1]

[1] Connected to flange

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|----------------|---------|--|---------|
| | Name | Description | Version |
| BLF7G15LS-300P | - | 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 |
| I_D | drain current | per section | - | 45 | 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 | $T_{case} = 80\text{ °C}$; $P_L = 85\text{ W}$; $V_{DS} = 28\text{ V}$; $I_{Dq} = 2600\text{ mA}$ | 0.21 | 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 | $V_{GS} = 0\text{ V}$; $I_D = 2.2\text{ mA}$ | 65 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS} = 10\text{ V}$; $I_D = 220\text{ mA}$ | 1.5 | 1.9 | 2.3 | V |
| I_{DSS} | drain leakage current | $V_{GS} = 0\text{ V}$; $V_{DS} = 28\text{ V}$ | - | - | 2.8 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $V_{DS} = 10\text{ V}$ | 34 | 39 | - | A |
| I_{GSS} | gate leakage current | $V_{GS} = 11\text{ V}$; $V_{DS} = 0\text{ V}$ | - | - | 280 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}$; $I_D = 11.0\text{ A}$ | - | 16.2 | - | S |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $I_D = 7.7\text{ A}$ | - | 0.065 | - | Ω |

7. Test information

Table 7. Functional test information

Mode of operation: 2-carrier W-CDMA; PAR = 7.5 dB at 0.01 % probability on the CCDF; 3GPP test model 1; 64 DPCH; $f_1 = 1473.5\text{ MHz}$; $f_2 = 1478.5\text{ MHz}$; $f_3 = 1508.5\text{ MHz}$; $f_4 = 1513.5\text{ MHz}$; RF performance at $V_{DS} = 28\text{ V}$; $I_{Dq} = 2600\text{ mA}$; $T_{case} = 25\text{ °C}$; unless otherwise specified; in a class-AB production test circuit.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|------------------------------|---------------------------|-----|-----|-----|------|
| $P_{L(AV)}$ | average output power | | - | 85 | - | W |
| G_p | power gain | $P_{L(AV)} = 85\text{ W}$ | 17 | 18 | - | dB |
| RL_{in} | input return loss | $P_{L(AV)} = 85\text{ W}$ | - | -7 | -6 | dB |
| η_D | drain efficiency | $P_{L(AV)} = 85\text{ W}$ | 28 | 31 | - | % |
| ACPR | adjacent channel power ratio | $P_{L(AV)} = 85\text{ W}$ | - | -32 | -28 | dBc |

Table 8. PAR performance

Mode of operation: 1-carrier W-CDMA; PAR = 7.5 dB at 0.01 % probability on the CCDF; 3GPP test model 1; 64 DPCH; $f_1 = 1511\text{ MHz}$; RF performance at $V_{DS} = 28\text{ V}$; $I_{Dq} = 2600\text{ mA}$; $T_{case} = 25\text{ °C}$; unless otherwise specified; in a class-AB production test circuit.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------|------------------------------|--|-----|-----|-----|------|
| PAR_O | output peak-to-average ratio | $P_{L(AV)} = 130\text{ W}$ at 0.01 % probability on CCDF | 4.4 | 5.0 | - | dB |

7.1 Ruggedness in class-AB operation

The BLF7G15LS-300P is capable of withstanding a load mismatch corresponding to $V_{SWR} = 10 : 1$ through all phases under the following conditions: $V_{DS} = 28\text{ V}$; $I_{Dq} = 2600\text{ mA}$; $P_L = 100\text{ W (CW)}$; $f = 1450\text{ MHz to }1550\text{ MHz}$.

7.2 Impedance information

Table 9. Typical impedance per section (for the maximum peak power)

$I_{Dq} = 1300 \text{ mA}$; $V_{DS} = 28 \text{ V}$.

Z_S and Z_L defined in [Figure 1](#).

| f (MHz) | Z_S (Ω) | Z_L (Ω) |
|---------|--------------------|--------------------|
| 1410 | $0.65 - j2.06$ | $6.3 - j2.1$ |
| 1480 | $0.55 - j1.92$ | $7.2 - j1.3$ |
| 1560 | $0.63 - j2.14$ | $6.8 + j0.26$ |

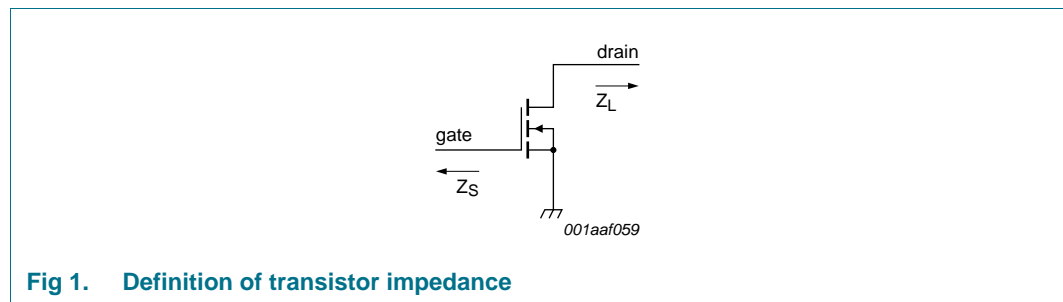


Fig 1. Definition of transistor impedance

7.3 Graphs

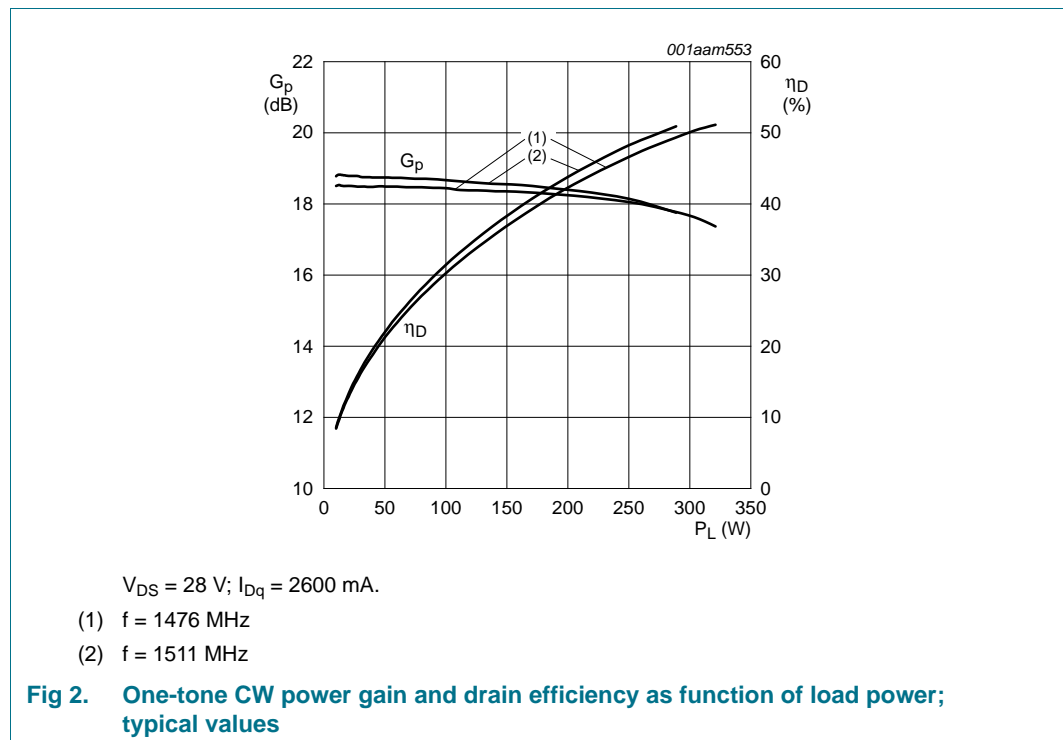
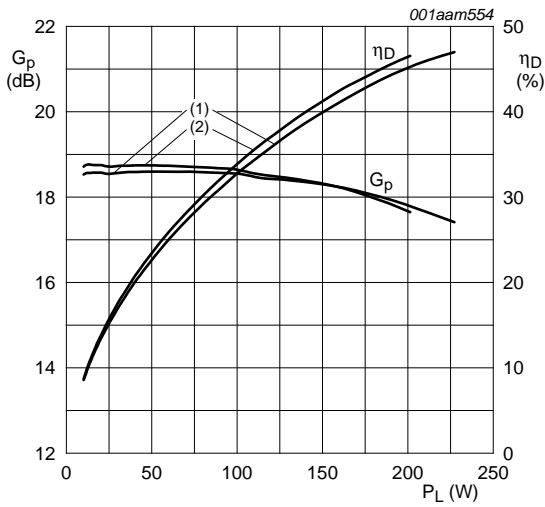


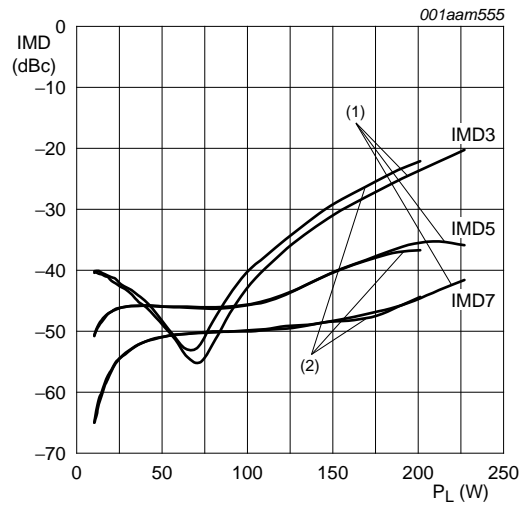
Fig 2. One-tone CW power gain and drain efficiency as function of load power; typical values



$V_{DS} = 28$ V; $I_{DQ} = 2600$ mA;
tone spacing 0.1 MHz.

- (1) $f = 1476$ MHz
- (2) $f = 1511$ MHz

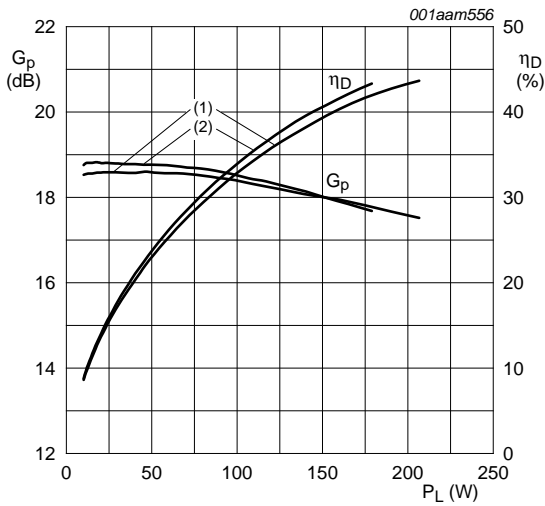
Fig 3. Two-tone CW power gain and drain efficiency as function of average load power; typical values



$V_{DS} = 28$ V; $I_{DQ} = 2600$ mA;
tone spacing 0.1 MHz.

- (1) $f = 1476$ MHz
- (2) $f = 1511$ MHz

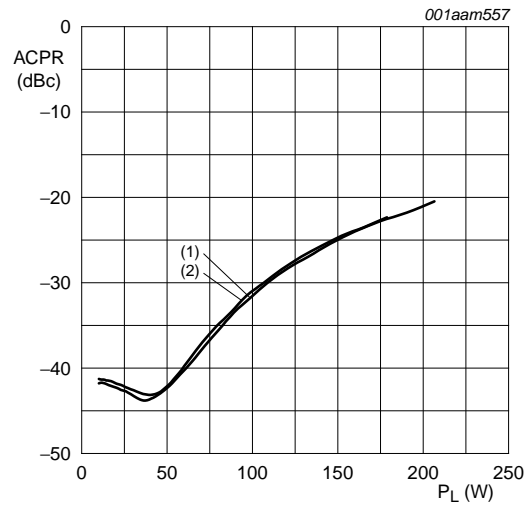
Fig 4. Two-tone intermodulation distortion as a function of average load power; typical values



$V_{DS} = 28$ V; $I_{DQ} = 2600$ mA;
carrier spacing 5 MHz.

- (1) $f = 1476$ MHz
- (2) $f = 1511$ MHz

Fig 5. 2-carrier W-CDMA power gain and drain efficiency as function of load power; typical values



$V_{DS} = 28$ V; $I_{DQ} = 2600$ mA;
carrier spacing 5 MHz.

- (1) $f = 1476$ MHz
- (2) $f = 1511$ MHz

Fig 6. 2-carrier W-CDMA adjacent channel power ratio as function of load power 5 MHz frequency offset; typical values

7.4 Test circuit

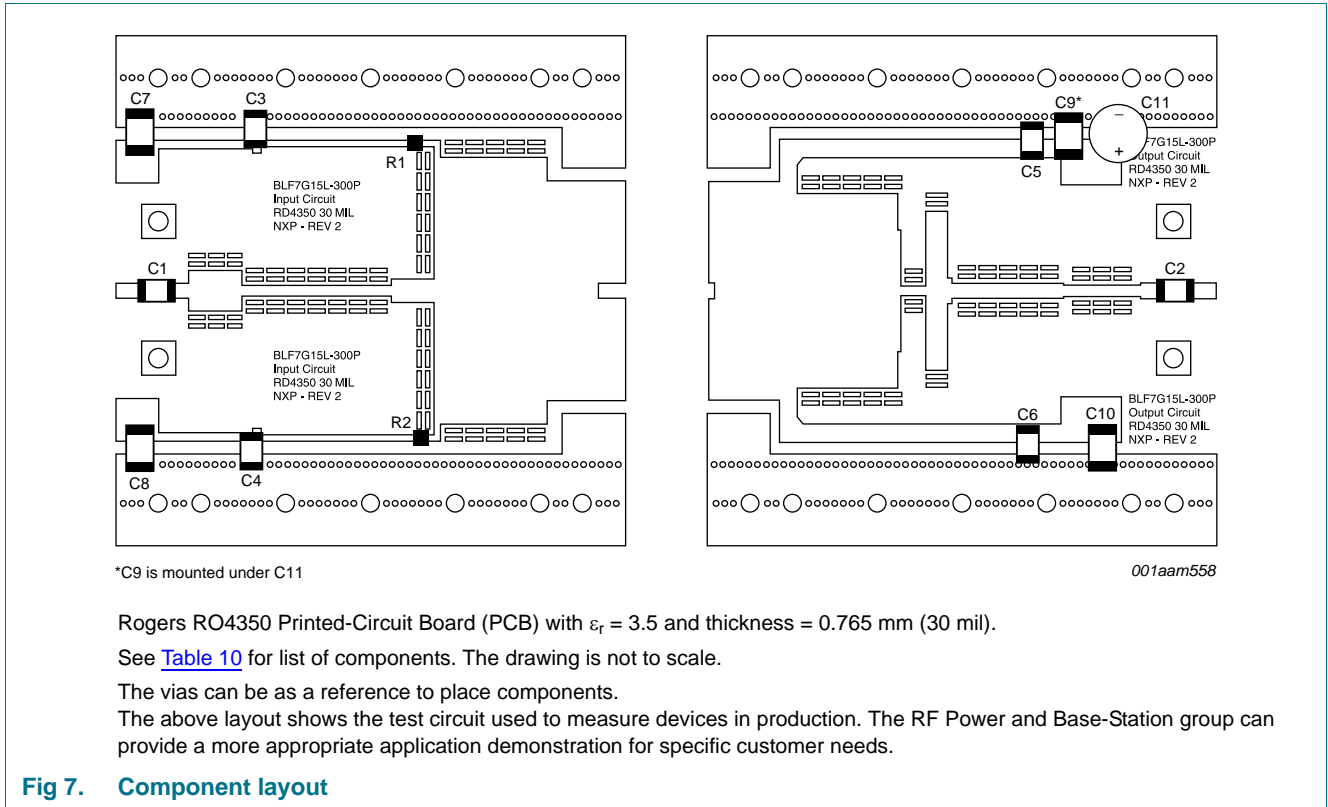


Table 10. List of components

See [Figure 7](#) for test circuit.

| Component | Description | Value | Remarks |
|-----------------|------------------------------------|-------------------|--------------|
| C1, C2 | multi layer ceramic chip capacitor | 100 pF | [1] ATC 800B |
| C3, C4 | multi layer ceramic chip capacitor | 68 pF | [1] ATC 800B |
| C5, C6 | multi layer ceramic chip capacitor | 47 pF | [1] ATC 800A |
| C7, C8, C9, C10 | multi layer ceramic chip capacitor | 10 μ F | Murata |
| C11 | electrolytic capacitor | 470 μ F; 63 V | |
| R1, R2 | chip resistor | 15 Ω | Philips 1206 |

[1] All ATC chip capacitors need to be soldered vertically.

8. Package outline

Earless flanged balanced ceramic package; 4 leads

SOT539B

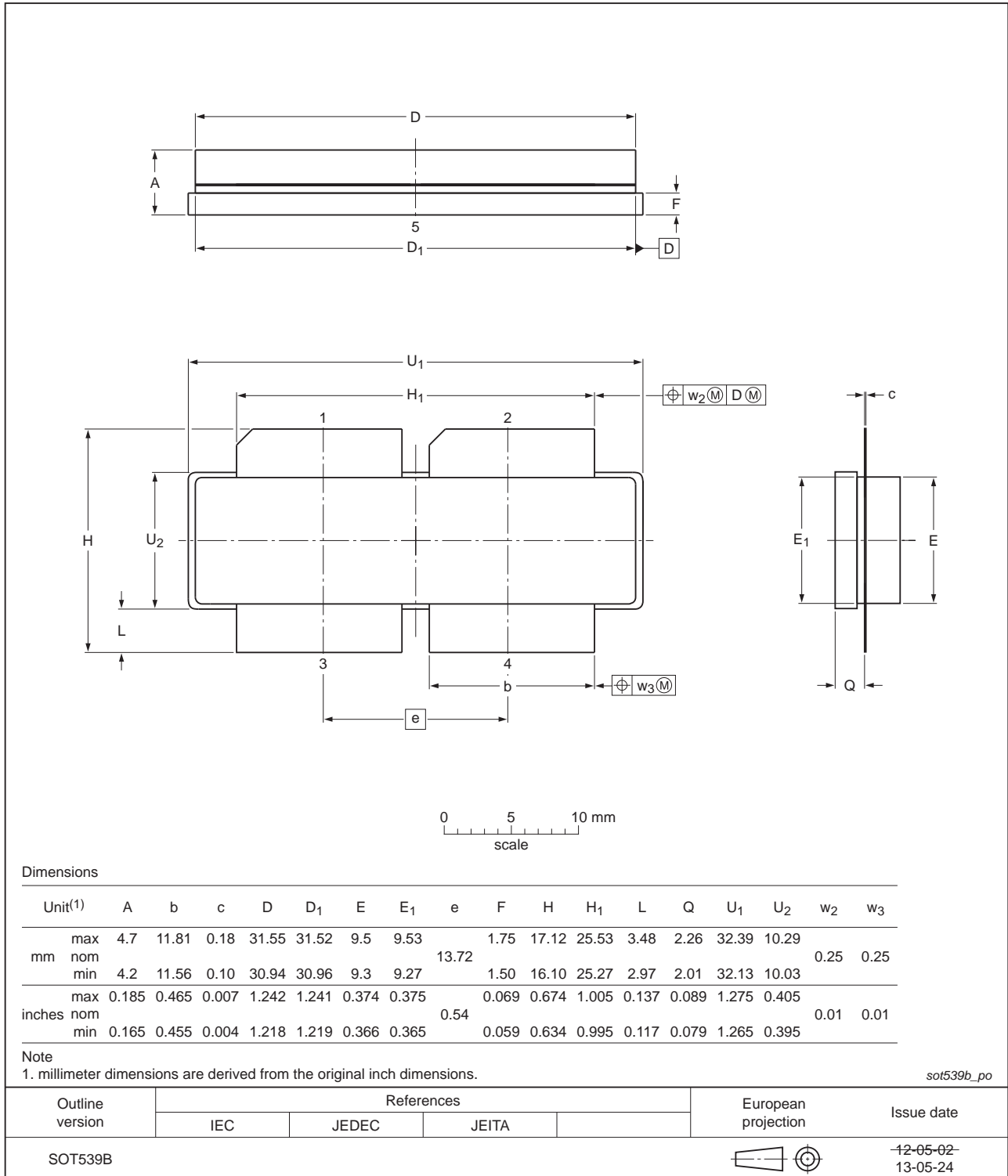


Fig 8. Package outline SOT539B

9. Abbreviations

Table 11. 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 |
| RF | Radio Frequency |
| VSWR | Voltage Standing Wave Ratio |
| W-CDMA | Wideband Code Division Multiple Access |

10. Revision history

Table 12. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|--------------------|--|------------------------|---------------|--------------------|
| BLF7G15LS-300P v.3 | 20130712 | Product data sheet | - | BLF7G15LS-300P v.2 |
| Modifications: | <ul style="list-style-type: none"> The package outline Figure 8 is updated. Translation disclaimer added to the legal text. | | | |
| BLF7G15LS-300P v.2 | 20101203 | Product data sheet | - | BLF7G15LS-300P v.1 |
| Modifications: | <ul style="list-style-type: none"> Section 1.2 on page 1: list item "Excellent ruggedness" removed. Table 7 on page 3: values of RL_{in} have been projected on negative scale. Section "Handling information" removed | | | |
| BLF7G15LS-300P v.1 | 20100921 | Preliminary data sheet | - | - |

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|-----------------------------------|-------------------------------|---|
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