

BLF6G10LS-135R

Power LDMOS transistor

Rev. 01 — 17 November 2008

Product data sheet

1. Product profile

1.1 General description

135 W LDMOS power transistor for base station applications at frequencies from 800 MHz to 1000 MHz.

Table 1. Typical performance

Typical RF performance at $T_{case} = 25\text{ }^{\circ}\text{C}$ in a 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 | 869 to 894 | 28 | 26.5 | 21.0 | 28.0 | -39 ^[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

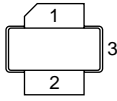
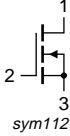
- Typical 2-carrier W-CDMA performance at frequencies of 869 MHz and 894 MHz, a supply voltage of 28 V and an I_{DQ} of 950 mA:
 - ◆ Average output power = 26.5 W
 - ◆ Power gain = 21.0 dB
 - ◆ Efficiency = 28.0 %
 - ◆ ACPR = -39 dBc
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (800 MHz to 1000 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 GSM, GSM EDGE, W-CDMA and CDMA base stations and multi carrier applications in the 800 MHz to 1000 MHz frequency range

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------|---|---|
| 1 | drain |  |  sym112 |
| 2 | gate | | |
| 3 | source | | |

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|----------------|---------|---|---------|
| | Name | Description | Version |
| BLF6G10LS-135R | - | 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 | | - | 32 | A |
| 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 |
|------------------|--|--|------|------|
| $R_{th(j-case)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ °C}; P_L = 25\text{ W}$ | 0.56 | K/W |

6. Characteristics

Table 6. Characteristics

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|----------------------------------|---|-----|-----|-----|---------------|
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS} = 0\text{ V}; I_D = 0.8\text{ mA}$ | 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 |
| V_{GSq} | gate-source quiescent voltage | $V_{DS} = 28\text{ V}; I_D = 950\text{ mA}$ | 1.6 | 2.1 | 2.6 | V |
| I_{DSS} | drain leakage current | $V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$ | - | - | 3 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$ | 24 | 32 | - | A |
| I_{GSS} | gate leakage current | $V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$ | - | - | 300 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}; I_D = 9\text{ A}$ | 7 | 13 | - | 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 | - | Ω |
| C_{rs} | feedback capacitance | $V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}; f = 1\text{ MHz}$ | - | 2.0 | - | pF |

7. Application information

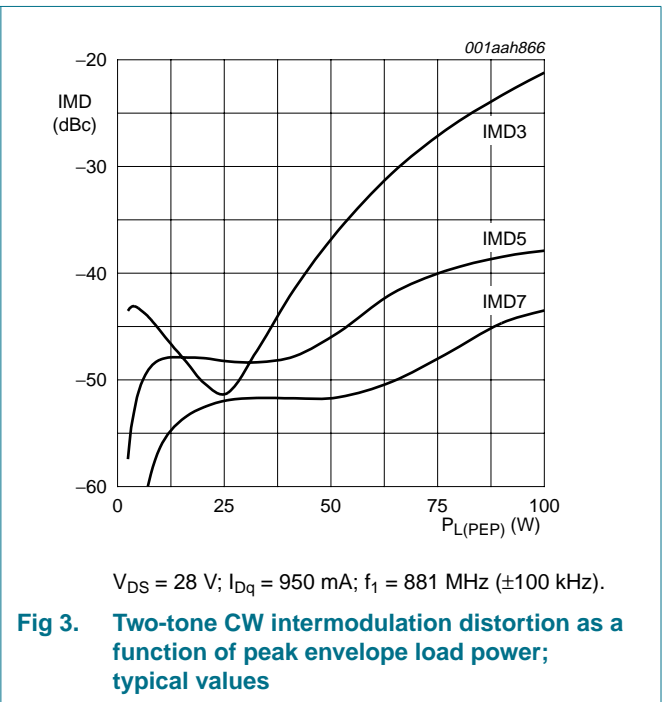
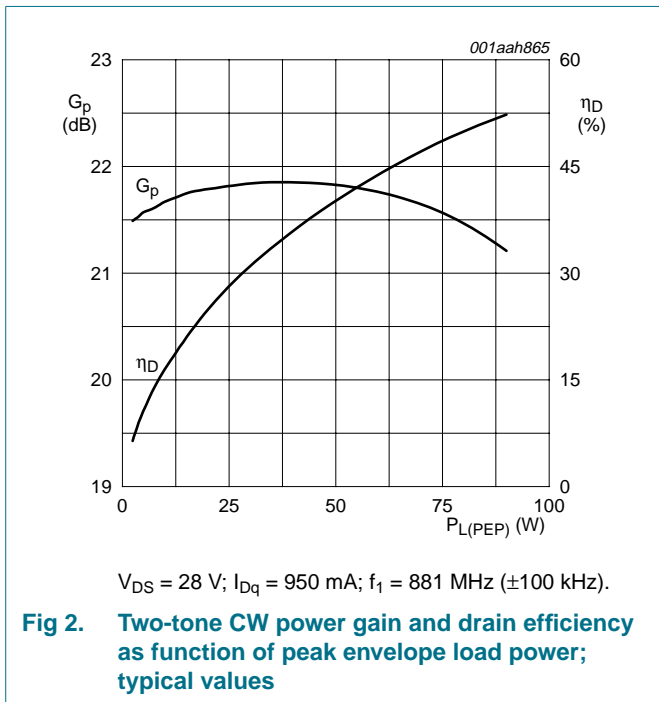
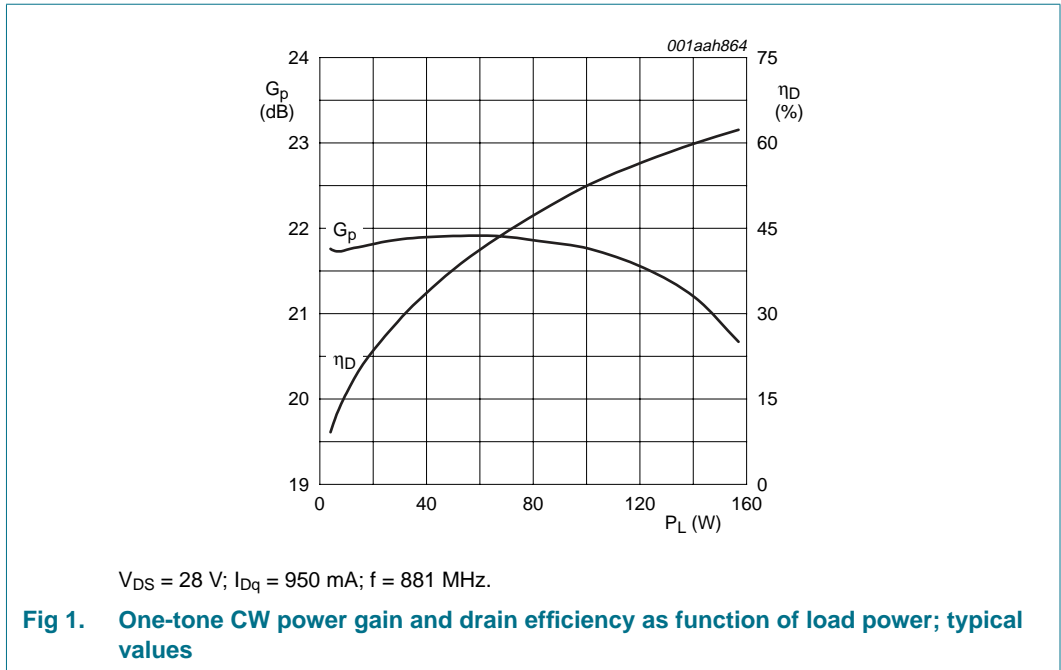
Table 7. Application information

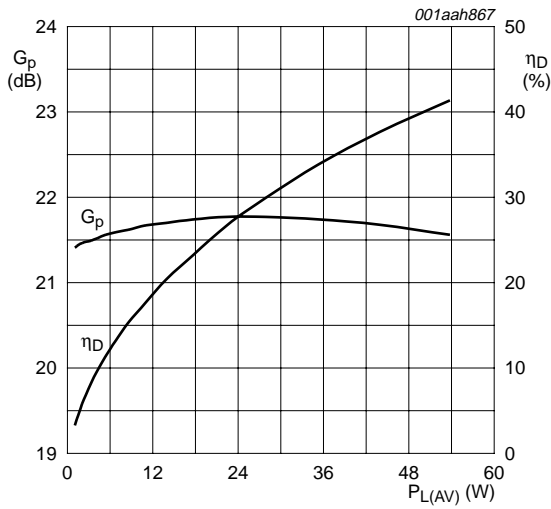
Mode of operation: 2-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 PDPCH; $f_1 = 871.5\text{ MHz}; f_2 = 876.5\text{ MHz}; f_3 = 886.5\text{ MHz}; f_4 = 891.5\text{ MHz}$; RF performance at $V_{DS} = 28\text{ V}; I_{Dq} = 950\text{ mA}; T_{case} = 25\text{ }^\circ\text{C}$; unless otherwise specified; in a class-AB production test circuit.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|------------------------------|-----------------------------|------|-------|-------|------|
| $P_{L(AV)}$ | average output power | | - | 26.5 | - | W |
| G_p | power gain | $P_{L(AV)} = 26.5\text{ W}$ | 20.0 | 21.0 | - | dB |
| RL_{in} | input return loss | $P_{L(AV)} = 26.5\text{ W}$ | - | -11.0 | -8.0 | dB |
| η_D | drain efficiency | $P_{L(AV)} = 26.5\text{ W}$ | 26.0 | 28.0 | - | % |
| ACPR | adjacent channel power ratio | $P_{L(AV)} = 26.5\text{ W}$ | - | -39 | -36.5 | dBc |

7.1 Ruggedness in class-AB operation

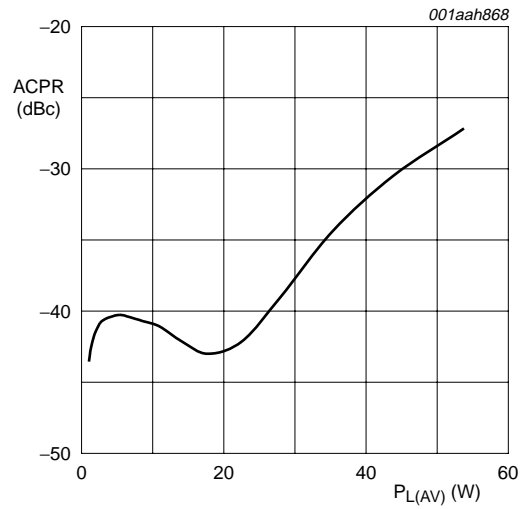
The BLF6G10LS-135R is capable of withstanding a load mismatch corresponding to $V_{SWR} = 10 : 1$ through all phases under the following conditions: $V_{DS} = 28\text{ V}; I_{Dq} = 950\text{ mA}; P_L = 135\text{ W}; f = 894\text{ MHz}$.





$V_{DS} = 28\text{ V}$; $I_{DQ} = 950\text{ mA}$; $f_1 = 881\text{ MHz}$; $f_2 = 886\text{ MHz}$; carrier spacing 5 MHz.

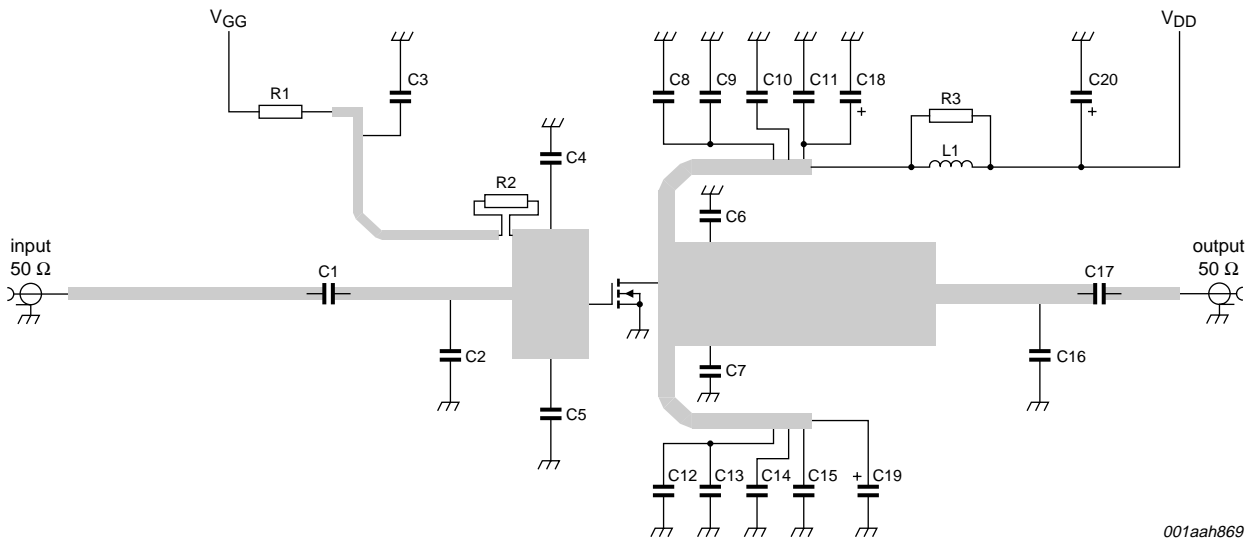
Fig 4. 2-carrier W-CDMA power gain and drain efficiency as function of average load power; typical values



$V_{DS} = 28\text{ V}$; $I_{DQ} = 950\text{ mA}$; $f_1 = 881\text{ MHz}$; $f_2 = 886\text{ MHz}$; carrier spacing 5 MHz.

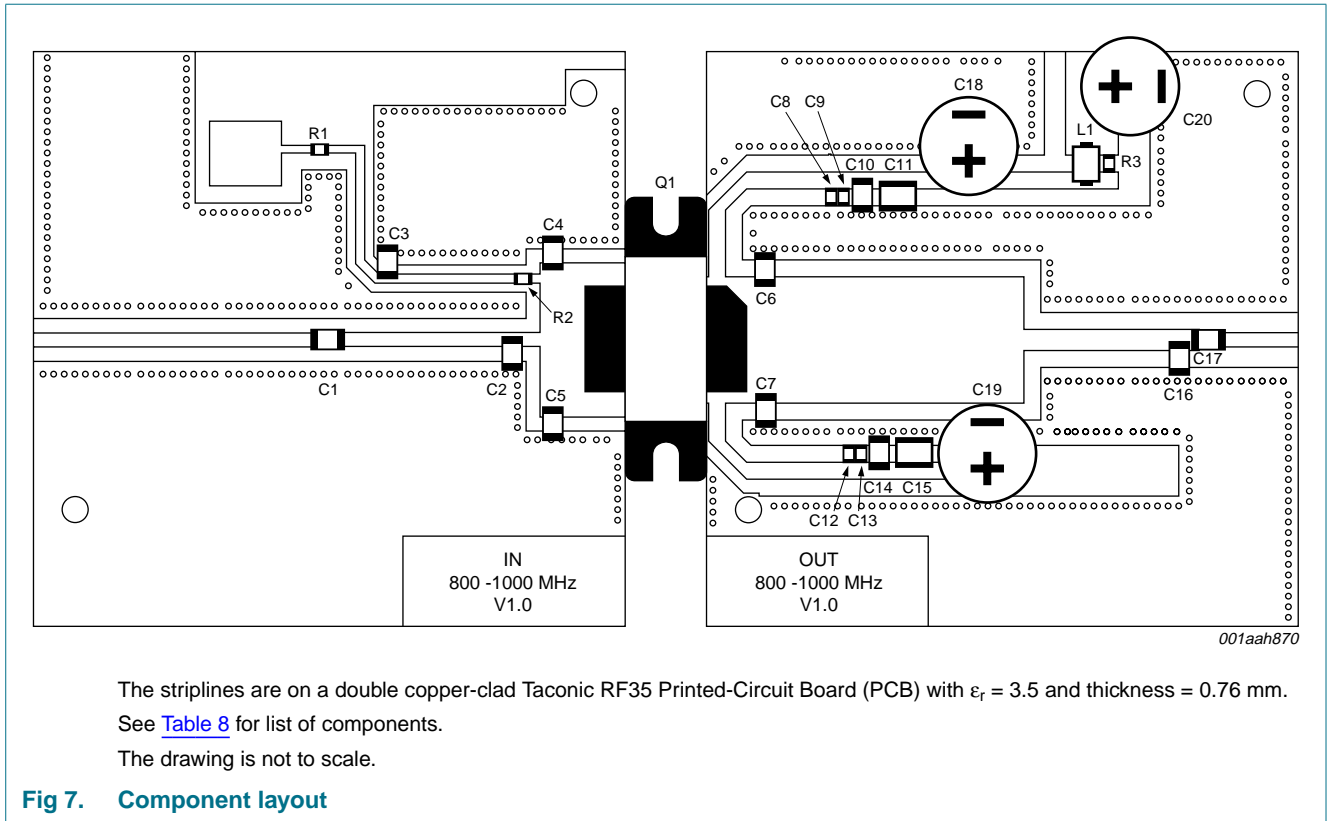
Fig 5. 2-carrier W-CDMA adjacent power channel ratio as a function of average load power; typical values

8. Test information



The drawing is not to scale.

Fig 6. Test circuit for operation at 800 MHz



The striplines are on a double copper-clad Taconic RF35 Printed-Circuit Board (PCB) with $\epsilon_r = 3.5$ and thickness = 0.76 mm.
See Table 8 for list of components.
The drawing is not to scale.

Fig 7. Component layout

Table 8. List of components (see Figure 6 and 7).

| Component | Description | Value | Remarks |
|-----------------------|-----------------------------------|----------------------|--|
| C1, C3, C10, C14, C17 | multilayer ceramic chip capacitor | 68 pF | [1] solder vertically |
| C2, C4, C5 | multilayer ceramic chip capacitor | 8.2 pF | [1] solder vertically |
| C6, C7 | multilayer ceramic chip capacitor | 10 pF | [1] solder vertically |
| C8, C9, C12, C13 | electrolytic capacitor | 100 nF | Vishay or capacitor of same quality. |
| C11, C15 | multilayer ceramic chip capacitor | 4.7 μ F; 50 V | [2] |
| C16 | multilayer ceramic chip capacitor | 3.0 pF | [1] solder vertically |
| C18, C19, C20 | electrolytic capacitor | 220 μ F; 63 V | |
| L1 | ferrite SMD bead | | Ferroxcube BDS 3/3/4.6-4S2 or equivalent |
| Q1 | BLF6G10LS-135R | | |
| R1, R2, R3 | SMD resistor | 9.1 Ω ; 0.1 W | |

[1] American Technical Ceramics type 100B or capacitor of same quality.

[2] TDK or capacitor of same quality.

9. Package outline

Earless flanged LDMOST ceramic package; 2 leads

SOT502B

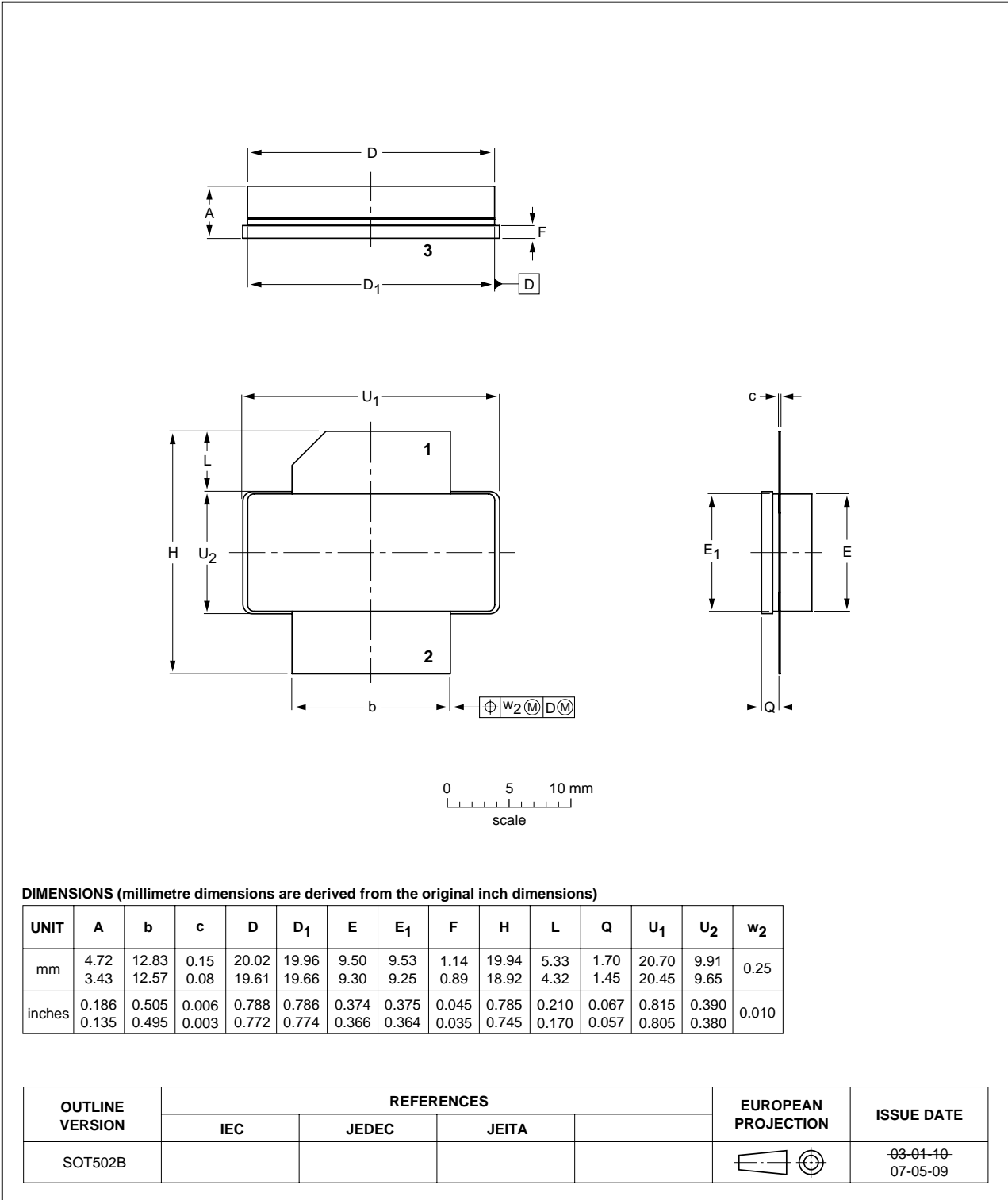


Fig 8. Package outline SOT502B

10. Abbreviations

Table 9. Abbreviations

| Acronym | Description |
|---------|---|
| 3GPP | Third Generation Partnership Project |
| CCDF | Complementary Cumulative Distribution Function |
| CDMA | Code Division Multiple Access |
| CW | Continuous Wave |
| DPCH | Dedicated Physical CHannel |
| EDGE | Enhanced Data rates for GSM Evolution |
| GSM | Global System for Mobile communications |
| 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 |

11. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------|--------------|--------------------|---------------|------------|
| BLF6G10LS-135R_1 | 20081117 | Product 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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