

BLF6G15LS-250PBRN

Power LDMOS transistor

Rev. 3 — 1 September 2015

AMMPLÉON

Product data sheet

1. Product profile

1.1 General description

250 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 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 | 1476 to 1511 | 28 | 60 | 18.5 | 34.0 | -30 [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

- Typical 2-carrier W-CDMA performance at frequencies of 1476 MHz and 1511 MHz, a supply voltage of 28 V and an I_{DQ} of 1410 mA:
 - ◆ Average output power = 60 W
 - ◆ Power gain = 18.5 dB
 - ◆ Efficiency = 34.0 %
 - ◆ ACPR = -30 dBc
- Easy power control
- Integrated ESD protection
- Enhanced ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (1450 MHz to 1550 MHz)
- Internally matched for ease of use
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC
- Integrated current sense

1.3 Applications

- RF power amplifiers for GSM, GSM EDGE, CDMA and W-CDMA and multi carrier applications in the 1450 MHz to 1550 MHz frequency range

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|------|-------------|--------------------|----------------|
| 1 | drain1 | | |
| 2 | drain2 | | |
| 3 | gate1 | | |
| 4 | gate2 | | |
| 5 | source | | |
| 6, 7 | sense drain | | |
| 8, 9 | sense gate | | |

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------------|---------|---|----------|
| | Name | Description | Version |
| BLF6G15LS-250PBRN | - | earless flanged LDMOST ceramic package; 8 leads | SOT1110B |

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 | +11 | V |
| I_D | drain current | | - | 64 | A |
| T_{stg} | storage temperature | | -65 | +150 | °C |
| T_j | junction temperature | | - | 200 | °C |
| T_{case} | case temperature | | [1] | 150 | °C |

[1] Continuous use at maximum temperature will affect MTTF.

5. Recommended operating conditions

Table 5. Operating conditions

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------|------------------|------------|-----|------|------|
| T_{case} | case temperature | | -40 | +125 | °C |

6. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Typ | Unit |
|------------------|--|---|------|------|
| $R_{th(j-case)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ °C}; P_L = 60\text{ W (CW)}$ | 0.29 | K/W |

7. Characteristics

Table 7. 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 | 75 | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS} = 10\text{ V}; I_D = 180\text{ mA}$ | 1.4 | 1.8 | 2.4 | V |
| I_{Dq} | quiescent drain current | sense transistor: $I_{DS} = 20.1\text{ mA};$ $V_{DS} = 12\text{ V}$ main transistor: $V_{DS} = 28\text{ V}$ | 1.31 | 1.41 | 1.51 | A |
| I_{DSS} | drain leakage current | $V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$ | - | - | 2.8 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $V_{DS} = 10\text{ V}$ | 25.3 | 29 | - | A |
| I_{GSS} | gate leakage current | $V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$ | - | - | 280 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}; I_D = 9\text{ A}$ | 8.1 | 12.3 | - | S |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $I_D = 6.3\text{ A}$ | 0.03 | 0.1 | 0.16 | Ω |

8. Application information

Table 8. RF performance

Mode of operation: 2-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH; $f_1 = 1473.4\text{ MHz}; f_2 = 1478.4\text{ MHz}; f_3 = 1508.4\text{ MHz}; f_4 = 1513.4\text{ MHz}$; RF performance at $V_{DS} = 28\text{ V}; I_{Dq} = 1410\text{ mA}; T_{case} = 25\text{ °C}$; unless otherwise specified in a class-AB production test circuit.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|------------------------------|---------------------------|------|------|-----|------|
| $P_{L(AV)}$ | average output power | | - | 60 | - | W |
| G_p | power gain | $P_{L(AV)} = 60\text{ W}$ | 16.5 | 18.5 | - | dB |
| RL_{in} | input return loss | $P_{L(AV)} = 60\text{ W}$ | - | -11 | -7 | dB |
| η_D | drain efficiency | $P_{L(AV)} = 60\text{ W}$ | 31 | 34 | - | % |
| ACPR | adjacent channel power ratio | $P_{L(AV)} = 60\text{ W}$ | - | -30 | -27 | dBc |

Table 9. PAR performance

Mode of operation; 1-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH; $f_1 = 1510.9$ MHz; RF performance at $V_{DS} = 28$ V; $I_{Dq} = 1410$ 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 | $P_{L(AV)} = 120$ W at 0.01 % probability on CCDF | 3.4 | 4.2 | - | dB |

8.1 Ruggedness in class-AB operation

The BLF6G15LS-250PBRN is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS} = 28$ V; $I_{Dq} = 1410$ mA; $P_L = 200$ W; $f = 1475$ MHz.

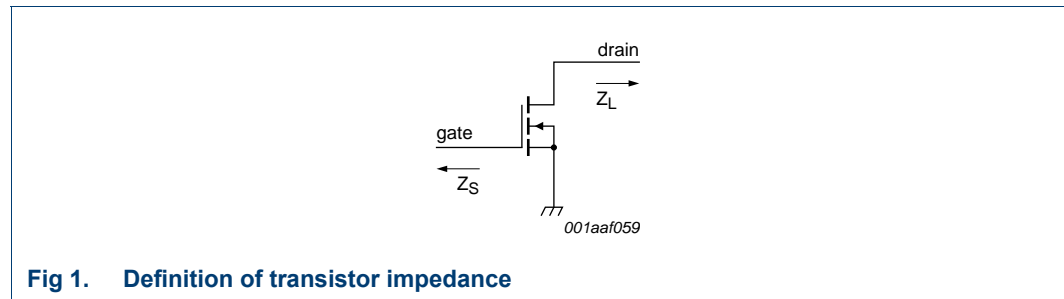
8.2 Impedance information

Table 10. Typical impedance per section

$I_{Dq} = 950$ mA; main transistor $V_{DS} = 28$ V

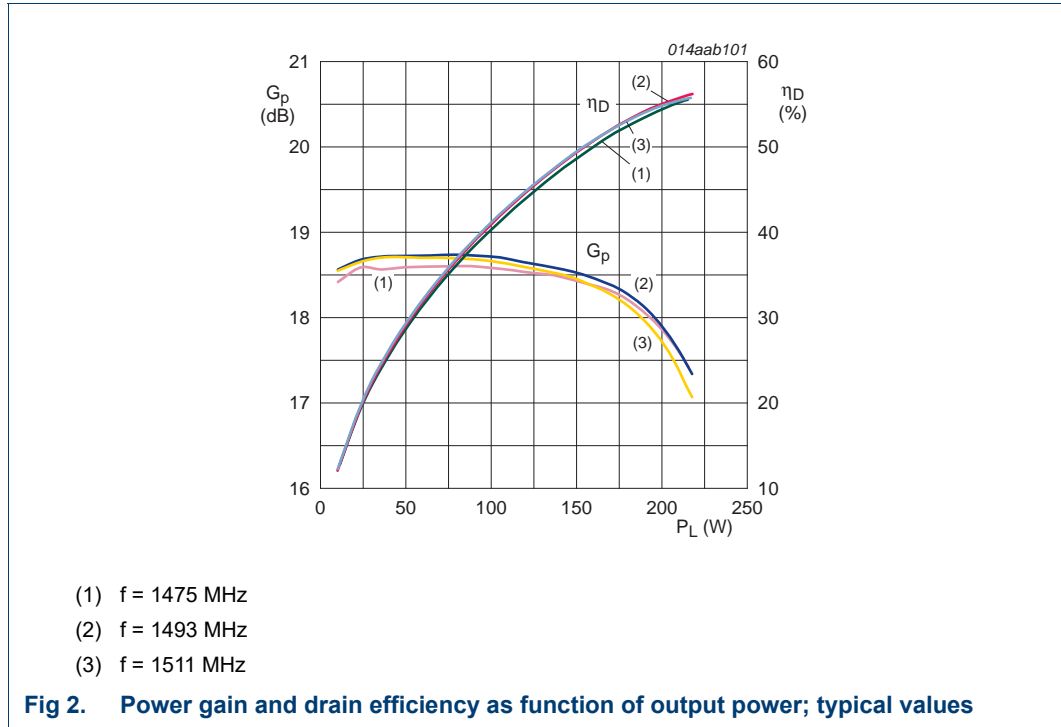
| f (MHz) | Z _S ^[1] (Ω) | Z _L ^[1] (Ω) |
|---------|-----------------------------------|-----------------------------------|
| 1480 | 1.1 – j2.8 | 2.3 – j3.2 |
| 1510 | 1.3 – j2.8 | 2.1 – j2.8 |

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

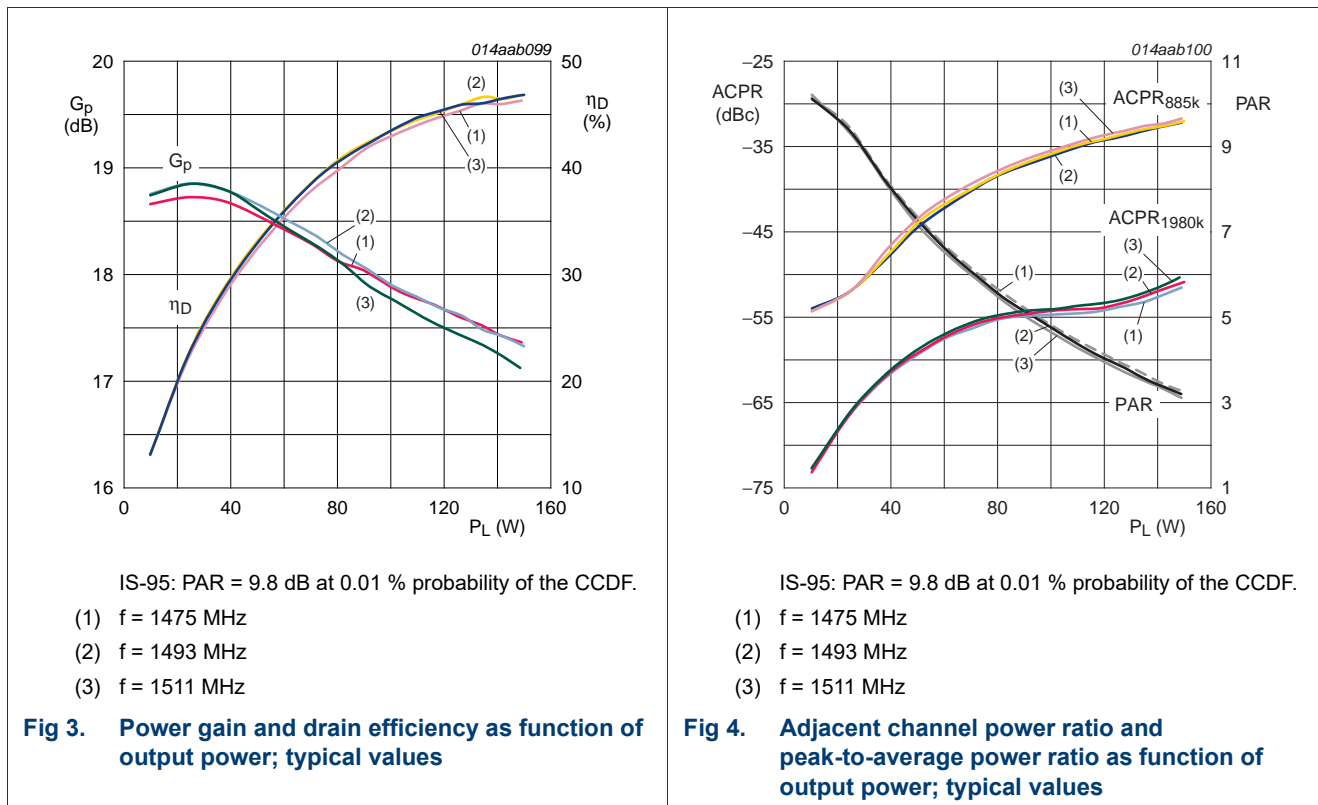


8.3 Graphs

8.3.1 CW



8.3.2 IS-95



8.3.3 2-Carrier W-CDMA (5 MHz spacing)

RF performance sweep with 2-carrier W-CDMA is unavailable for the BLF6G15LS-250PBRN. The typical 2-carrier W-CDMA sweep of the BLF6G15L-250PBRN can be found in its data sheet.

9. Test information

Table 11. List of components

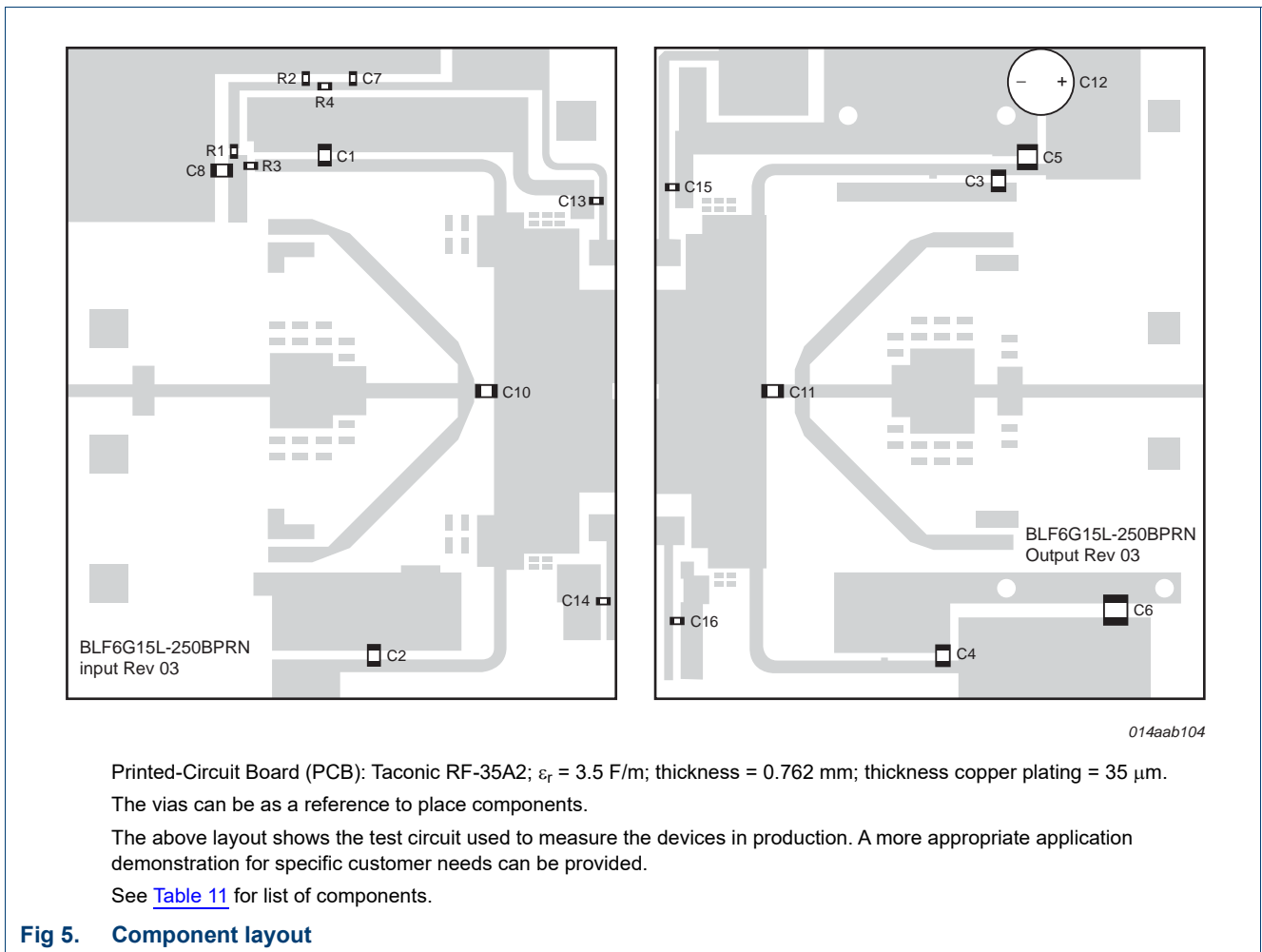
See Figure 5 for component layout.

| Component | Description | Value | Remarks |
|--------------------|------------------------------------|--------------|---------------------------------|
| C1, C2, C3, C4 | multi layer ceramic chip capacitor | 100 pF | [1] |
| C5, C6 | multi layer ceramic chip capacitor | 10 μF | [2] |
| C7 | multi layer ceramic chip capacitor | 10 nF | [2] on input gate line as shown |
| C8 | multi layer ceramic chip capacitor | 100 nF | [2] |
| C10 | multi layer ceramic chip capacitor | 2.4 pF | [1] |
| C11 | multi layer ceramic chip capacitor | 3.6 pF | [3] |
| C12 | electrolytic capacitor | 470 μF; 63 V | |
| C13, C14, C15, C16 | multi layer ceramic chip capacitor | 33 pF | [3] |
| R1 | chip resistor | 3.9 kΩ | Philips 0603 |

Table 11. List of components ...continued
See [Figure 5](#) for component layout.

| Component | Description | Value | Remarks |
|-----------|---------------|----------------|--------------|
| R2 | chip resistor | 2.2 k Ω | Philips 0603 |
| R3 | chip resistor | 10 Ω | Philips 0603 |
| R4 | chip resistor | 0 Ω | Philips 0603 |

- [1] American Technical Ceramics type 800B or capacitor of same quality.
- [2] TDK or capacitor of same quality.
- [3] American Technical Ceramics type 100B or capacitor of same quality.



10. Package outline

Earless flanged LDMOST ceramic package; 8 leads

SOT1110B

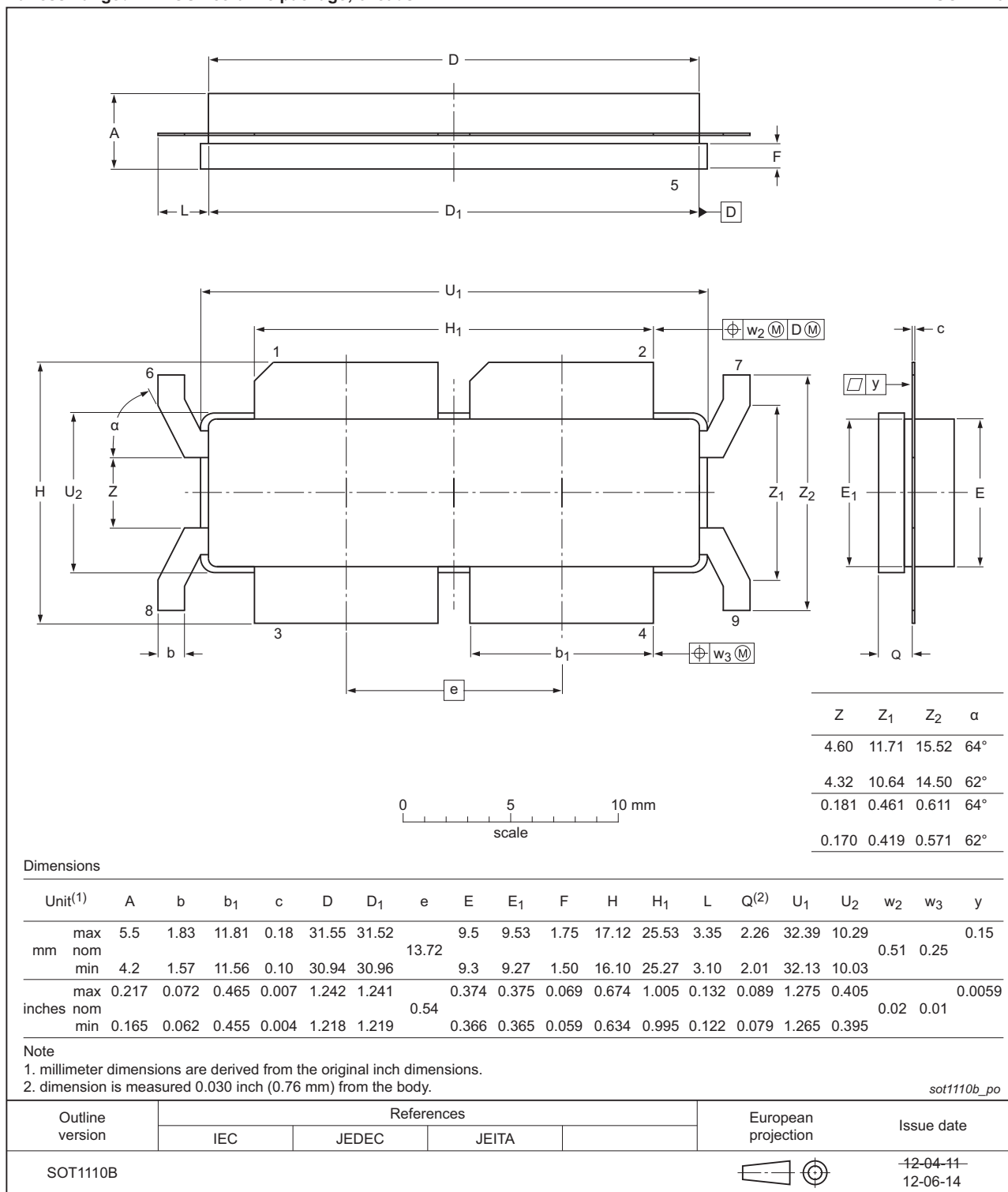


Fig 6. Package outline SOT1110B

11. Abbreviations

Table 12. Abbreviations

| Acronym | Description |
|---------|---|
| CCDF | Complementary Cumulative Distribution Function |
| CDMA | Code Division Multiple Access |
| CW | Continuous Wave |
| DPCH | Dedicated Physical CHannel |
| EDGE | Enhanced Data rates for GSM Evolution |
| ESD | ElectroStatic Discharge |
| GSM | Global System for Mobile communications |
| IS-95 | Interim Standard 95 |
| LDMOS | Laterally Diffused Metal-Oxide Semiconductor |
| LDMOST | Laterally Diffused Metal-Oxide Semiconductor Transistor |
| MTTF | Mean Time To Failure |
| PAR | Peak-to-Average Ratio |
| VSWR | Voltage Standing-Wave Ratio |
| W-CDMA | Wideband Code Division Multiple Access |

12. Revision history

Table 13. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------------|--|--------------------|---------------|-----------------------|
| BLF6G15LS-250PBRN#3 | 20150901 | Product data sheet | - | BLF6G15LS-250PBRN v.2 |
| Modifications: | <ul style="list-style-type: none"> The format of this document has been redesigned to comply with the new identity guidelines of Ampleon. Legal texts have been adapted to the new company name where appropriate. | | | |
| BLF6G15LS-250PBRN v.2 | 20120718 | Product data sheet | - | BLF6G15LS-250PBRN v.1 |
| BLF6G15LS-250PBRN v.1 | 20120611 | Product data sheet | - | - |

13. Legal information

13.1 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. |

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15. Contents

1 Product profile 1

1.1 General description 1

1.2 Features and benefits 1

1.3 Applications 1

2 Pinning information 2

3 Ordering information 2

4 Limiting values 2

5 Recommended operating conditions 2

6 Thermal characteristics 3

7 Characteristics 3

8 Application information 3

8.1 Ruggedness in class-AB operation 4

8.2 Impedance information 4

8.3 Graphs 5

8.3.1 CW 5

8.3.2 IS-95 6

8.3.3 2-Carrier W-CDMA (5 MHz spacing) 6

9 Test information 6

10 Package outline 8

11 Abbreviations 9

12 Revision history 9

13 Legal information 10

13.1 Data sheet status 10

13.2 Definitions 10

13.3 Disclaimers 10

13.4 Trademarks 11

14 Contact information 11

15 Contents 12

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