

BLF1043

UHF power LDMOS transistor

Rev. 9 — 1 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

10 W LDMOS power transistor for base station applications at frequencies from HF to 1000 MHz.

Table 1. Typical performance

RF performance at $T_h = 25\text{ °C}$ in a common source test circuit.

| Mode of operation | f (MHz) | V_{DS} (V) | I_{DQ} (mA) | P_L (W) | G_p (dB) | η_D (%) | d_{im} (dBc) |
|----------------------|--------------------------|-----------------|------------------|--------------|---------------|-----------------|-------------------|
| CW, 2-tone, class-AB | $f_1 = 960; f_2 = 960.1$ | 26 | 85 | 10 (PEP) | 18.5 | 40 | ≤ -31 |
| CW, 1-tone, class-AB | $f = 960$ | 26 | 85 | 10 | 18.5 | 52 | - |

CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

1.2 Features and benefits

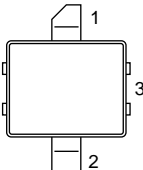
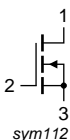
- Typical 2-tone performance at a supply voltage of 26 V and I_{DQ} of 85 mA
 - ◆ Output power = 10 W (PEP)
 - ◆ Gain = 18.5 dB
 - ◆ Efficiency = 40%
 - ◆ $d_{im} = -31\text{ dBc}$
- Easy power control
- Excellent ruggedness
- High power gain
- Excellent thermal stability
- Designed for broadband operation (HF to 1000 MHz)
- No internal matching for broadband operation
- SMD package.

1.3 Applications

- RF power amplifiers for GSM, EDGE and CDMA base stations and multicarrier applications in the 800 to 1000 MHz frequency range
- Broadcast drivers.

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-----------------------------|---|---|
| 1 | drain |  |  |
| 2 | gate | | |
| 3 | source, connected to flange | | |

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| BLF1043 | - | ceramic surface mounted package; 2 leads | SOT538A |

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 | | - | ± 15 | V |
| I_D | drain current (DC) | | - | 2.2 | 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 |
|---------------|--|-------------------------|-------|------|
| $R_{th\ j-h}$ | thermal resistance from junction to heatsink | $T_{mb} = 25\text{ °C}$ | [1] 9 | K/W |

[1] Thermal resistance is determined under RF operating conditions. Typical value with device soldered on PC board with 32 via holes (diameter 0.3 mm) and thermal compound between PCB and heatsink.

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 | $V_{GS} = 0$; $I_D = 0.2\text{ mA}$ | 65 | - | - | V |
| V_{GSth} | gate-source threshold voltage | $V_{DS} = 10\text{ V}$; $I_D = 20\text{ mA}$ | 4 | - | 5 | V |
| I_{DSS} | drain-source leakage current | $V_{GS} = 0$; $V_{DS} = 26\text{ V}$ | - | - | 1.5 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GSth} + 9\text{ V}$; $V_{DS} = 10\text{ V}$ | 2.8 | - | - | A |
| I_{GSS} | gate leakage current | $V_{GS} = \pm 15\text{ V}$; $V_{DS} = 0$ | - | - | 40 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}$; $I_D = 0.75\text{ A}$ | - | 0.5 | - | S |
| R_{DSon} | drain-source on-state resistance | $V_{DS} = 10\text{ V}$; $I_D = 0.75\text{ A}$ | - | 1.05 | - | Ω |
| C_{iss} | input capacitance | $V_{GS} = 0$; $V_{DS} = 26\text{ V}$; $f = 1\text{ MHz}$ | - | 11 | - | pF |
| C_{oss} | output capacitance | $V_{GS} = 0$; $V_{DS} = 26\text{ V}$; $f = 1\text{ MHz}$ | - | 9 | - | pF |
| C_{rss} | feedback capacitance | $V_{GS} = 0$; $V_{DS} = 26\text{ V}$; $f = 1\text{ MHz}$ | - | 0.5 | - | pF |

7. Application information

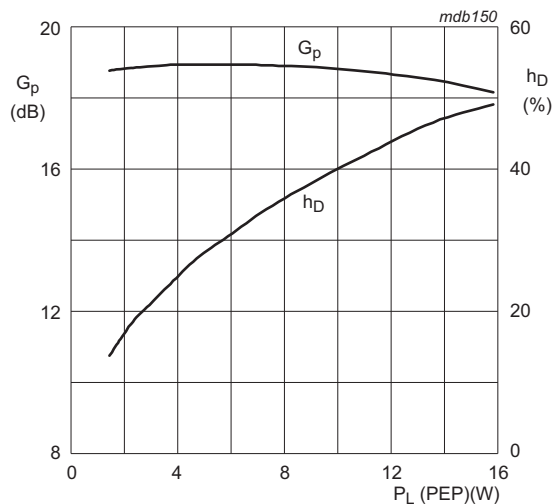
Table 7. RF performance in a common source class-AB circuit

$T_h = 25\text{ }^{\circ}\text{C}$; $R_{th\ j-h} = 9\text{ K/W}$, unless otherwise specified.

| Mode of operation | f (MHz) | V_{DS} (V) | I_{DQ} (mA) | P_L (W) | G_p (dB) | η_D (%) | d_{im} (dBc) |
|----------------------|-----------------------------|-----------------|------------------|--------------|---------------|-----------------|-------------------|
| CW, 2-tone, class-AB | $f_1 = 960$; $f_2 = 960.1$ | 26 | 85 | 10 (PEP) | >16.5 | >38 | ≤ -25 |

7.1 Ruggedness in class-AB operation

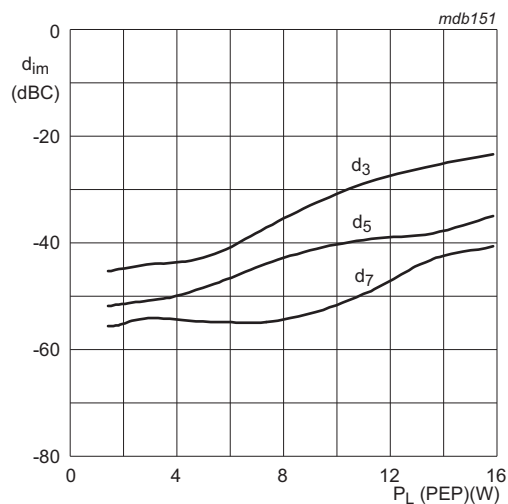
The BLF1043 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS} = 26\text{ V}$; $f = 960\text{ MHz}$ at rated load power.



Two-tone performance.

$V_{DS} = 26 \text{ V}$; $I_{DQ} = 85 \text{ mA}$; $T_h \leq 25 \text{ }^\circ\text{C}$;
 $f_1 = 960 \text{ MHz}$; $f_2 = 960.1 \text{ MHz}$.

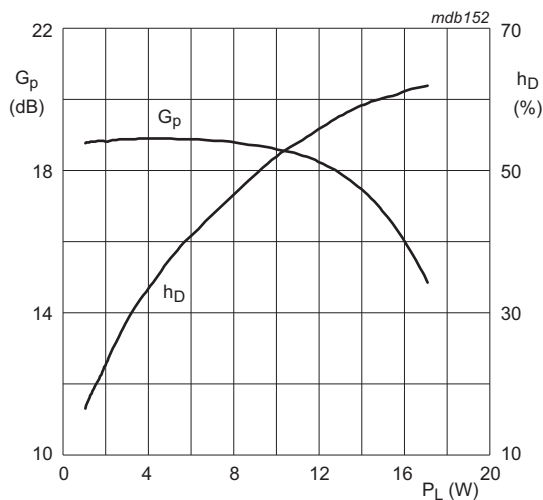
Fig 1. Power gain and efficiency as functions of peak envelope load power; typical values.



Two-tone performance.

$V_{DS} = 26 \text{ V}$; $I_{DQ} = 85 \text{ mA}$; $T_h \leq 25 \text{ }^\circ\text{C}$;
 $f_1 = 960 \text{ MHz}$; $f = 960.1 \text{ MHz}$.

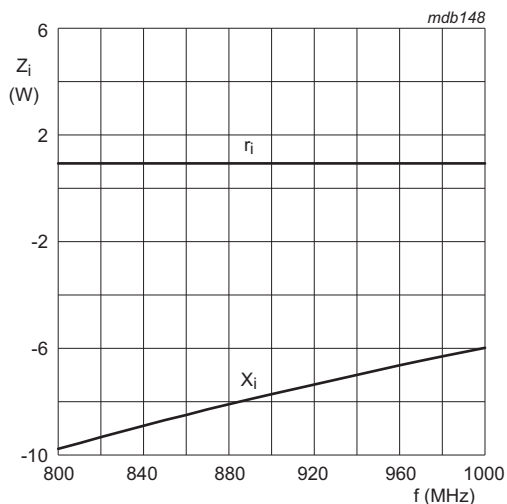
Fig 2. Intermodulation distortion as a function of peak envelope load power; typical values.



Single-tone performance.

$V_{DS} = 26 \text{ V}$; $I_{DQ} = 85 \text{ mA}$; $T_h \leq 25 \text{ }^\circ\text{C}$;
 $f = 960 \text{ MHz}$.

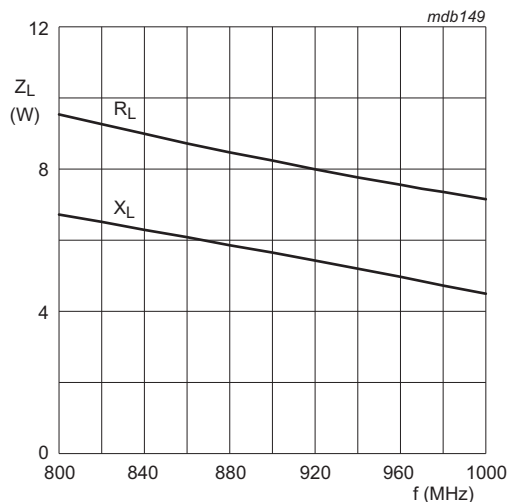
Fig 3. Power gain and efficiency as functions of load power; typical values.



$V_{DS} = 26 \text{ V}$; $I_{DQ} = 85 \text{ mA}$; $P_L = 10 \text{ W}$; $T_h \leq 25 \text{ }^\circ\text{C}$.

Impedance measured at reference planes; see [Figure 6](#).

Fig 4. Input impedance as a function of frequency (series components); typical values.



$V_{DS} = 26 \text{ V}$; $I_{DQ} = 85 \text{ mA}$; $T_h \leq 25^\circ \text{C}$.

Impedance measured at reference planes; see Figure 6.

Fig 5. Input impedance as a function of frequency (series components); typical values.

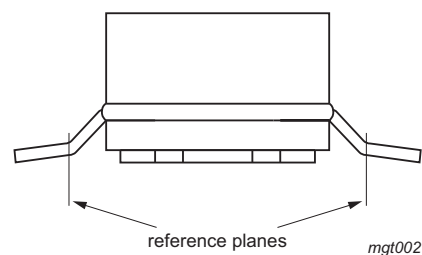


Fig 6. Measuring reference planes: SOT538A.

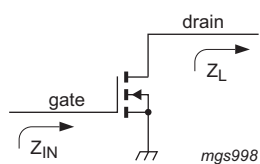


Fig 7. Definition of transistor impedance.

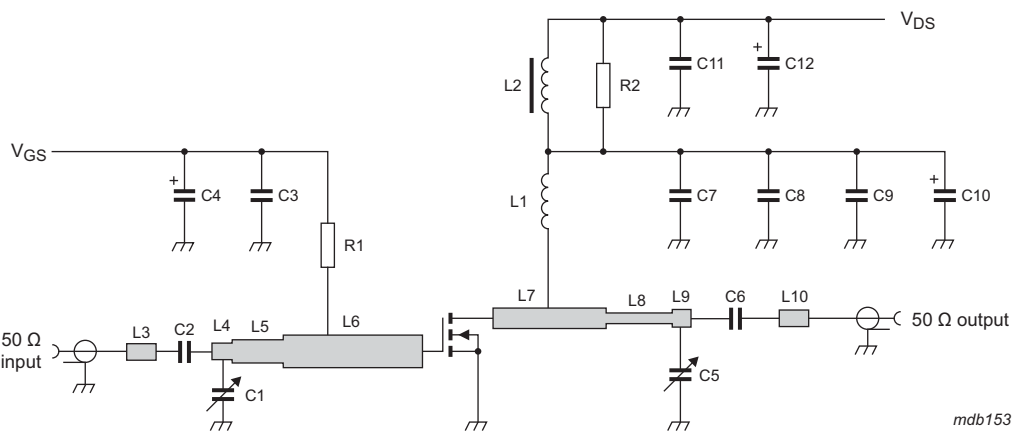


Fig 8. Class-AB test circuit for 960 MHz.

8. Test information

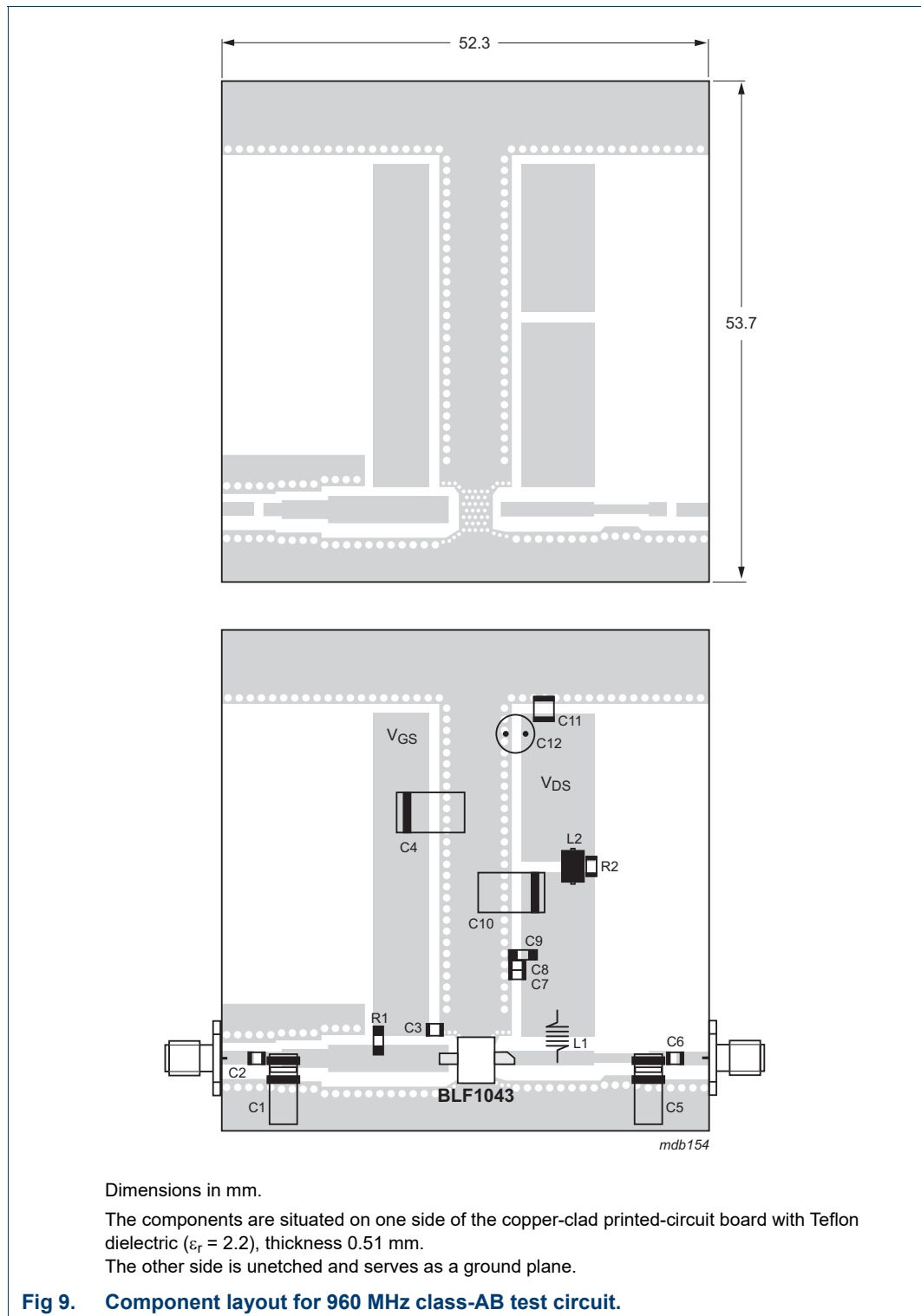
Table 8. List of components
(see [Figure 8](#) and [Figure 9](#))

| Component | Description | Value | Dimension | Catalogue no. |
|----------------|--|---------------------|---------------------|----------------|
| C1, C5 | Tekelec variable capacitor | 0.8 to 8 pF | | |
| C2, C3, C6, C7 | multilayer ceramic chip capacitor | [1] 56 pF | | |
| C4, C10 | tantalum SMD capacitor | 10 μ F; 35 V | | |
| C8 | multilayer ceramic chip capacitor | [1] 1 nF | | |
| C9 | multilayer ceramic chip capacitor | 100 nF | | 2222 581 16641 |
| C11 | multilayer ceramic chip capacitor | [2] 1 nF | | |
| C12 | electrolytic capacitor | 100 μ F; 63 V | | 2222 037 58101 |
| L1 | 3 turns enamelled 0.5 mm copper wire | | 3 loops; d = 3.5 mm | |
| L2 | ferrite bead; ferroxcube CBD4.6/3/3-4S2 | | | |
| L3 | stripline | [3] 50 Ω | 3.5 x 1.5 mm | |
| L4 | stripline | [3] 50 Ω | 2 x 1.5 mm | |
| L5 | stripline | [3] 42 Ω | 5 x 2 mm | |
| L6 | stripline | [3] 31 Ω | 13 x 3 mm | |
| L7 | stripline | [3] 50 Ω | 10 x 1.5 mm | |
| L8 | stripline | [3] 65 Ω | 5.9 x 1 mm | |
| L9 | stripline | [3] 50 Ω | 2 x 1.5 mm | |
| L10 | stripline | [3] 50 Ω | 3.5 x 1.5 mm | |
| R1 | metal film resistor | 39 Ω , 0.6 W | | |
| R2 | metal film resistor | 10 Ω , 0.6 W | | 2322 256 11009 |

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

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

[3] The striplines are on a double copper-clad printed-circuit board with Rogers 5880 dielectric ($\epsilon_r = 2.2$); thickness 0.51 mm.



9. Package outline

Ceramic surface-mounted package; 2 leads

SOT538A

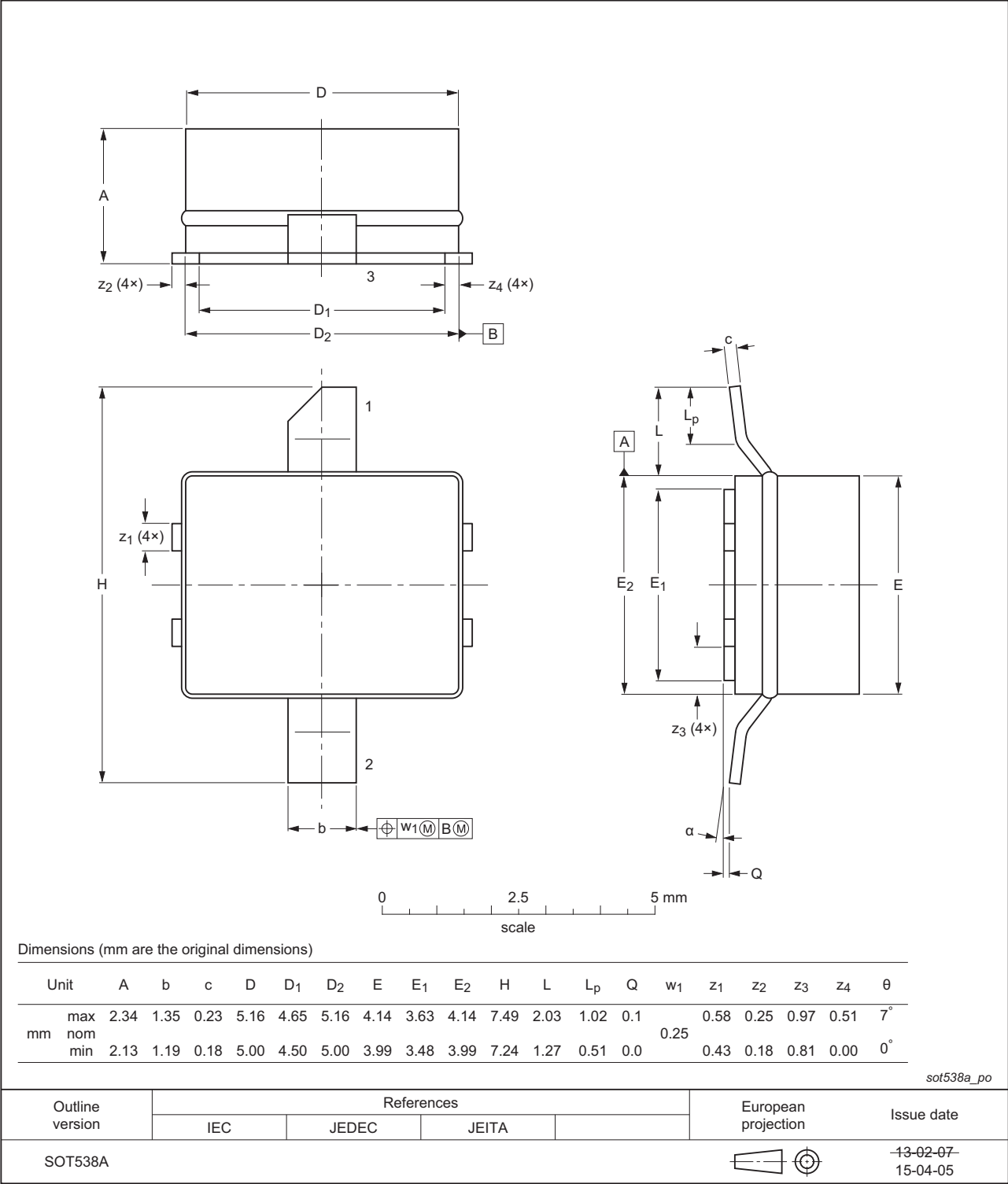


Fig 10. Package outline SOT538A

10. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--|-----------------------|---------------|-------------|
| BLF1043#9 | 20150901 | Product data sheet | - | BLF1043 v.8 |
| 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. | | | |
| BLF1043 v.8 | 20130506 | Product data sheet | - | BLF1043 v.7 |
| BLF1043 v.7 | 20030313 | Product specification | - | BLF1043 v.6 |

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|-----------------------------------|-------------------------------|---|
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| Product [short] data sheet | Production | This document contains the product specification. |

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