

# BLF10M6200; BLF10M6LS200

Power LDMOS transistor

Rev. 1 — 1 July 2013

Product data sheet

## 1. Product profile

### 1.1 General description

200 W LDMOS power transistor for ISM applications at frequencies from 700 MHz to 1000 MHz.

**Table 1. Typical performance**

Typical RF performance at  $T_{case} = 25\text{ °C}$  in a common source class-AB production test circuit.

| Test signal      | f<br>(MHz) | V <sub>DS</sub><br>(V) | P <sub>L(AV)</sub><br>(W) | G <sub>p</sub><br>(dB) | η <sub>D</sub><br>(%) | ACPR<br>(dBc)      |
|------------------|------------|------------------------|---------------------------|------------------------|-----------------------|--------------------|
| 2-carrier W-CDMA | 869 to 894 | 28                     | 40                        | 20                     | 28.5                  | -39 <sup>[1]</sup> |

[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

- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (700 MHz to 1000 MHz)
- Internally matched for ease of use
- Compliant to Directive 2002/95/EC, regarding restriction of hazardous substances (RoHS)

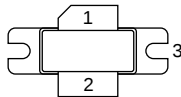
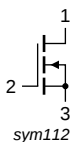
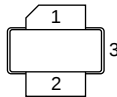
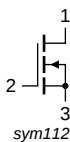
### 1.3 Applications

- RF power amplifiers for ISM applications in the 700 MHz to 1000 MHz frequency range.



## 2. Pinning information

Table 2. Pinning

| Pin                    | Description | Simplified outline                                                                  | Graphic symbol                                                                      |
|------------------------|-------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| BLF10M6200 (SOT502A)   |             |                                                                                     |                                                                                     |
| 1                      | drain       |  |  |
| 2                      | gate        |                                                                                     |                                                                                     |
| 3                      | source      |                                                                                     |                                                                                     |
| BLF10M6LS200 (SOT502B) |             |                                                                                     |                                                                                     |
| 1                      | drain       |  |  |
| 2                      | gate        |                                                                                     |                                                                                     |
| 3                      | source      |                                                                                     |                                                                                     |

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

| Type number  | Package |                                                    |         |
|--------------|---------|----------------------------------------------------|---------|
|              | Name    | Description                                        | Version |
| BLF10M6200   | -       | flanged ceramic package; 2 mounting holes; 2 leads | SOT502A |
| BLF10M6LS200 | -       | earless flanged 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    |
| $T_{stg}$ | storage temperature  |            | -65  | +150 | °C   |
| $T_j$     | junction temperature | [1]        | -    | 225  | °C   |

[1] Continuous use at maximum temperature will affect the reliability

## 5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol           | Parameter                                | Conditions                                        | Type         | Typ  | Unit |
|------------------|------------------------------------------|---------------------------------------------------|--------------|------|------|
| $R_{th(j-case)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ °C};$<br>$P_L = 40\text{ W}$ | BLF10M6200   | 0.50 | K/W  |
|                  |                                          |                                                   | BLF10M6LS200 | 0.35 | K/W  |

## 6. Characteristics

**Table 6. DC 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   | $V_{GS} = 0\text{ V}$ ; $I_D = 0.9\text{ mA}$                     | 65  | -    | -   | V             |
| $V_{GS(th)}$  | gate-source threshold voltage    | $V_{DS} = 10\text{ V}$ ; $I_D = 270\text{ mA}$                    | 1.4 | 2.0  | 2.4 | V             |
| $V_{GSq}$     | gate-source quiescent voltage    | $V_{DS} = 28\text{ V}$ ; $I_D = 1620\text{ mA}$                   | 1.7 | 2.2  | 2.7 | V             |
| $I_{DSS}$     | drain leakage current            | $V_{GS} = 0\text{ V}$ ; $V_{DS} = 28\text{ V}$                    | -   | -    | 4.2 | $\mu\text{A}$ |
| $I_{DSX}$     | drain cut-off current            | $V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ;<br>$V_{DS} = 10\text{ V}$ | -   | 48   | -   | A             |
| $I_{GSS}$     | gate leakage current             | $V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$                    | -   | -    | 420 | nA            |
| $g_{fs}$      | forward transconductance         | $V_{DS} = 10\text{ V}$ ; $I_D = 9.45\text{ A}$                    | -   | 18   | -   | S             |
| $R_{DS(on)}$  | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ;<br>$I_D = 9.45\text{ A}$  | -   | 0.07 | -   | $\Omega$      |

**Table 7. AC characteristics**

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

| Symbol   | Parameter            | Conditions                                                          | Min | Typ | Max | Unit |
|----------|----------------------|---------------------------------------------------------------------|-----|-----|-----|------|
| $C_{rs}$ | feedback capacitance | $V_{GS} = 0\text{ V}$ ; $V_{DS} = 28\text{ V}$ ; $f = 1\text{ MHz}$ | -   | 3   | -   | pF   |

**Table 8. RF characteristics**

Test signal: 2-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 DPCH;  $f_1 = 871.5\text{ MHz}$ ;  $f_2 = 876.5\text{ MHz}$ ;  $f_3 = 886.5\text{ MHz}$ ;  $f_4 = 891.5\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1400\text{ mA}$ ;  $T_{case} = 25\text{ }^{\circ}\text{C}$ ; unless otherwise specified; in a class-AB production test circuit.

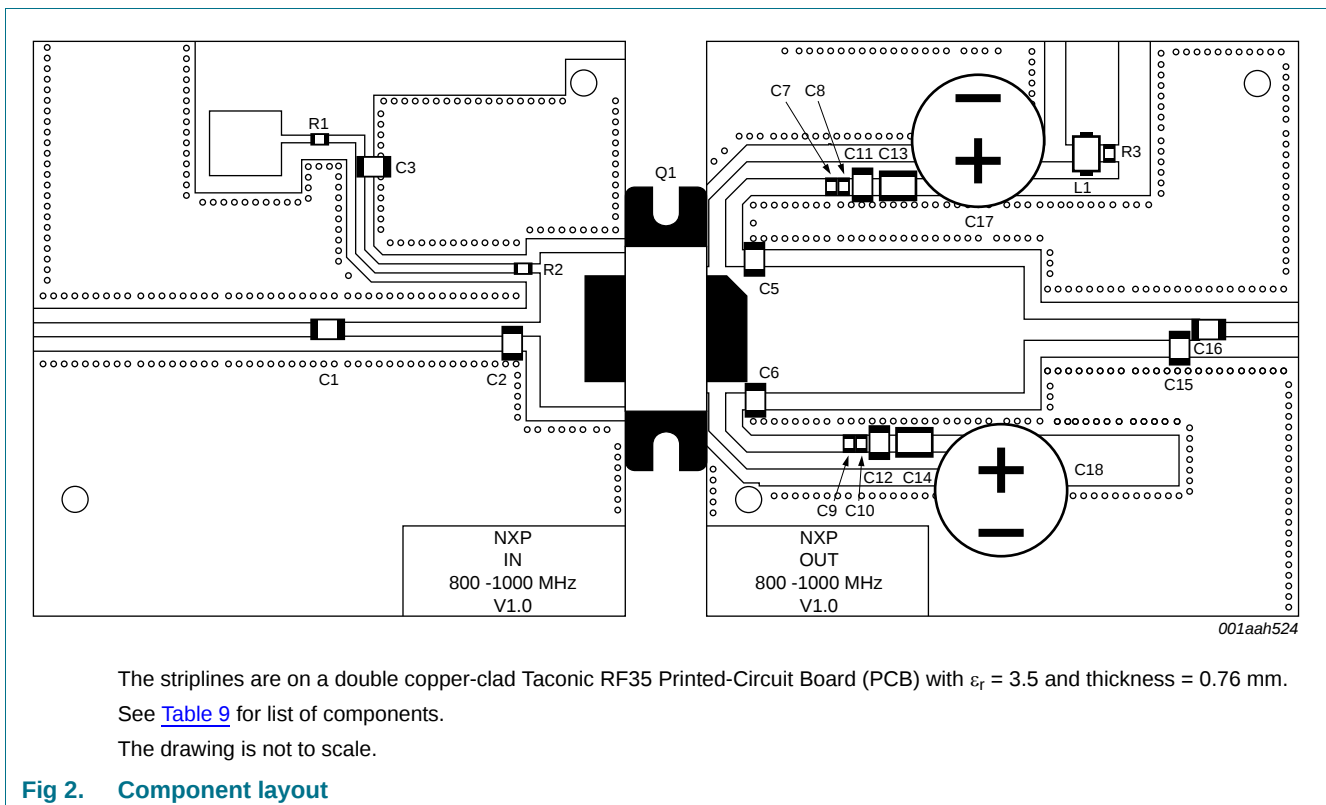
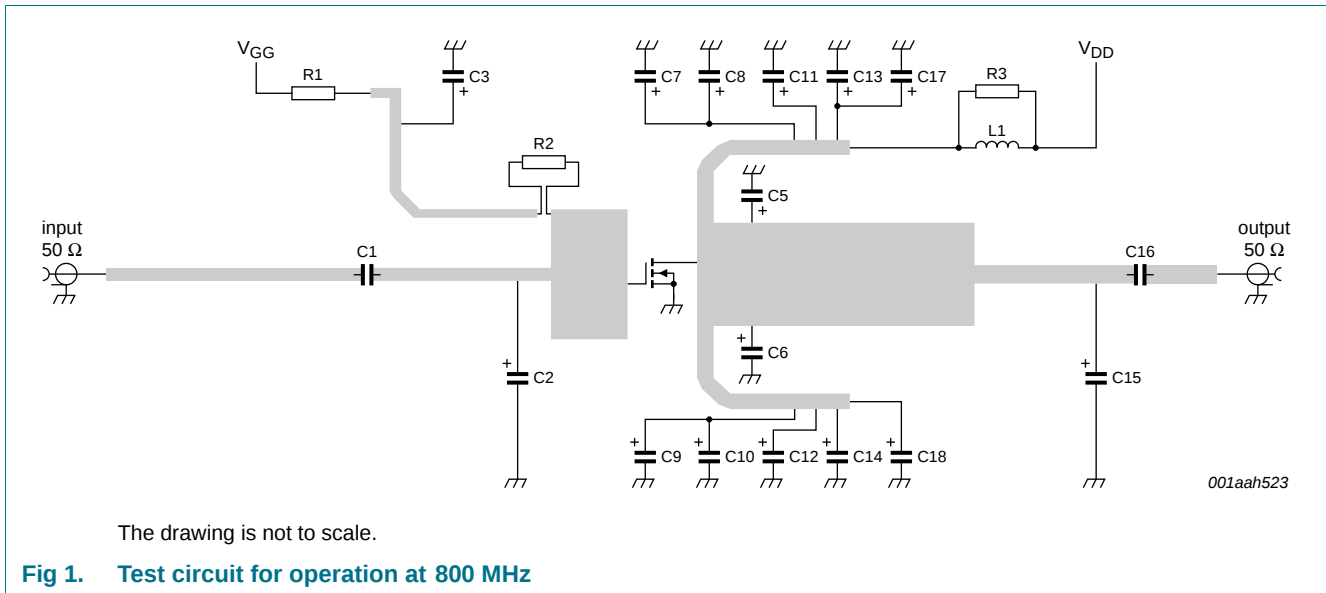
| Symbol    | Parameter                    | Conditions                | Min | Typ   | Max  | Unit |
|-----------|------------------------------|---------------------------|-----|-------|------|------|
| $G_p$     | power gain                   | $P_{L(AV)} = 40\text{ W}$ | 19  | 20    | -    | dB   |
| $\eta_D$  | drain efficiency             | $P_{L(AV)} = 40\text{ W}$ | 25  | 28.5  | -    | %    |
| $RL_{in}$ | input return loss            | $P_{L(AV)} = 40\text{ W}$ | -   | -6.4  | -4.5 | dB   |
| ACPR      | adjacent channel power ratio | $P_{L(AV)} = 40\text{ W}$ | -   | -39.4 | -36  | dBc  |

## 7. Test information

### 7.1 Ruggedness in class-AB operation

The BLF10M6200 and BLF10M6LS200 are enhanced rugged devices and capable of withstanding a load mismatch corresponding to  $V_{SWR} = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1400\text{ mA}$ ;  $P_L = 200\text{ W}$ ;  $f = 894\text{ MHz}$

## 7.2 Test circuit



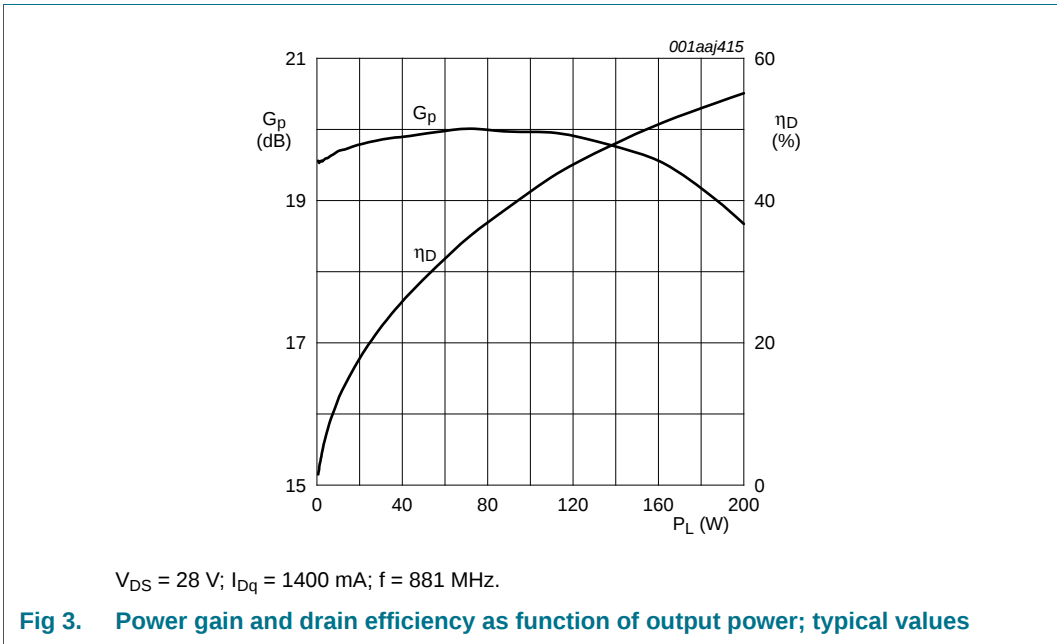
**Table 9. List of components**  
 See [Figure 1](#) and [Figure 2](#).

| Component             | Description                       | Value                | Remarks                                  |
|-----------------------|-----------------------------------|----------------------|------------------------------------------|
| C1, C3, C11, C12, C16 | multilayer ceramic chip capacitor | 68 pF                | [1] solder vertically                    |
| C2                    | multilayer ceramic chip capacitor | 13 pF                | [1] solder vertically                    |
| C5, C6                | multilayer ceramic chip capacitor | 10 pF                | [1] solder vertically                    |
| C7, C8, C9, C10       | electrolytic capacitor            | 220 nF               | Vishay VJ1206Y224KXB                     |
| C13, C14              | multilayer ceramic chip capacitor | 4.7 $\mu$ F, 50 V    | [2]                                      |
| C15                   | multilayer ceramic chip capacitor | 1.5 pF               | [1] solder vertically                    |
| C17, C18              | electrolytic capacitor            | 220 $\mu$ F, 63 V    |                                          |
| L1                    | ferrite SMD bead                  | -                    | Ferroxcube BDS 3/3/4.6-4S2 or equivalent |
| Q1                    | BLF10M6200                        | -                    |                                          |
| R1, R2, R3            | SMD resistor                      | 9.1 $\Omega$ , 0.1 W |                                          |

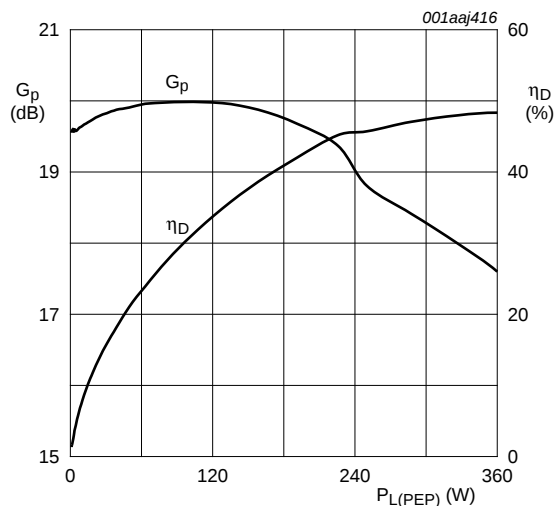
- [1] American Technical Ceramics type 100B or capacitor of same quality.  
 [2] TDK or capacitor of same quality.

### 7.3 Graphical data

#### 7.3.1 One-tone CW

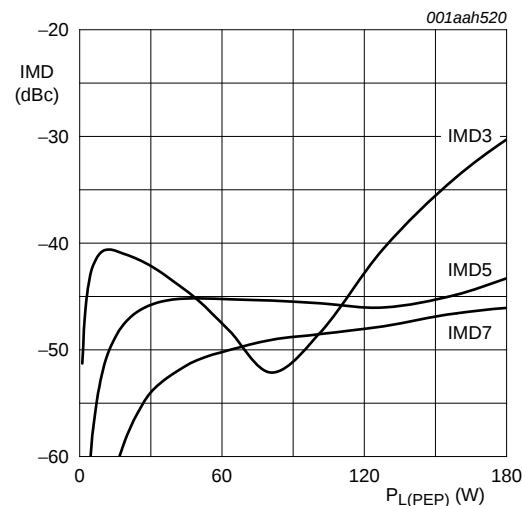


7.3.2 Two-tone CW



$V_{DS} = 28\text{ V}$ ;  $I_{DQ} = 1400\text{ mA}$ ;  $f = 881\text{ MHz}$  ( $\pm 100\text{ kHz}$ ).

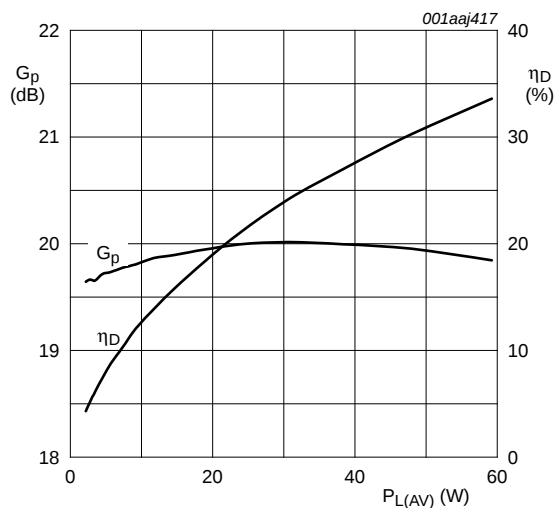
Fig 4. Power gain and drain efficiency as function of peak envelope power load power; typical values



$V_{DS} = 28\text{ V}$ ;  $I_{DQ} = 1400\text{ mA}$ ;  $f = 881\text{ MHz}$  ( $\pm 100\text{ kHz}$ ).

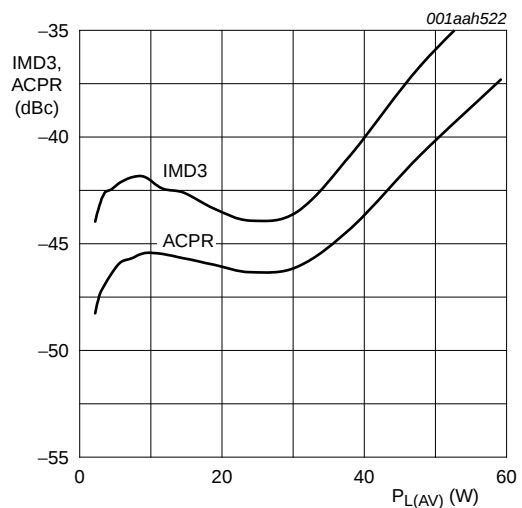
Fig 5. Intermodulation distortion as a function of peak envelope power load power; typical values

7.3.3 2-carrier W-CDMA



$V_{DS} = 28\text{ V}$ ;  $I_{DQ} = 1400\text{ mA}$ ;  $f = 881\text{ MHz}$  ( $\pm 5\text{ MHz}$ ); carrier spacing 10 MHz.

Fig 6. Power gain and drain efficiency as function of average output power; typical values



$V_{DS} = 28\text{ V}$ ;  $I_{DQ} = 1400\text{ mA}$ ;  $f = 881\text{ MHz}$  ( $\pm 5\text{ MHz}$ ); carrier spacing 10 MHz.

Fig 7. Adjacent channel power ratio and third order intermodulation distortion as function of average output power; typical values

8. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads

SOT502A

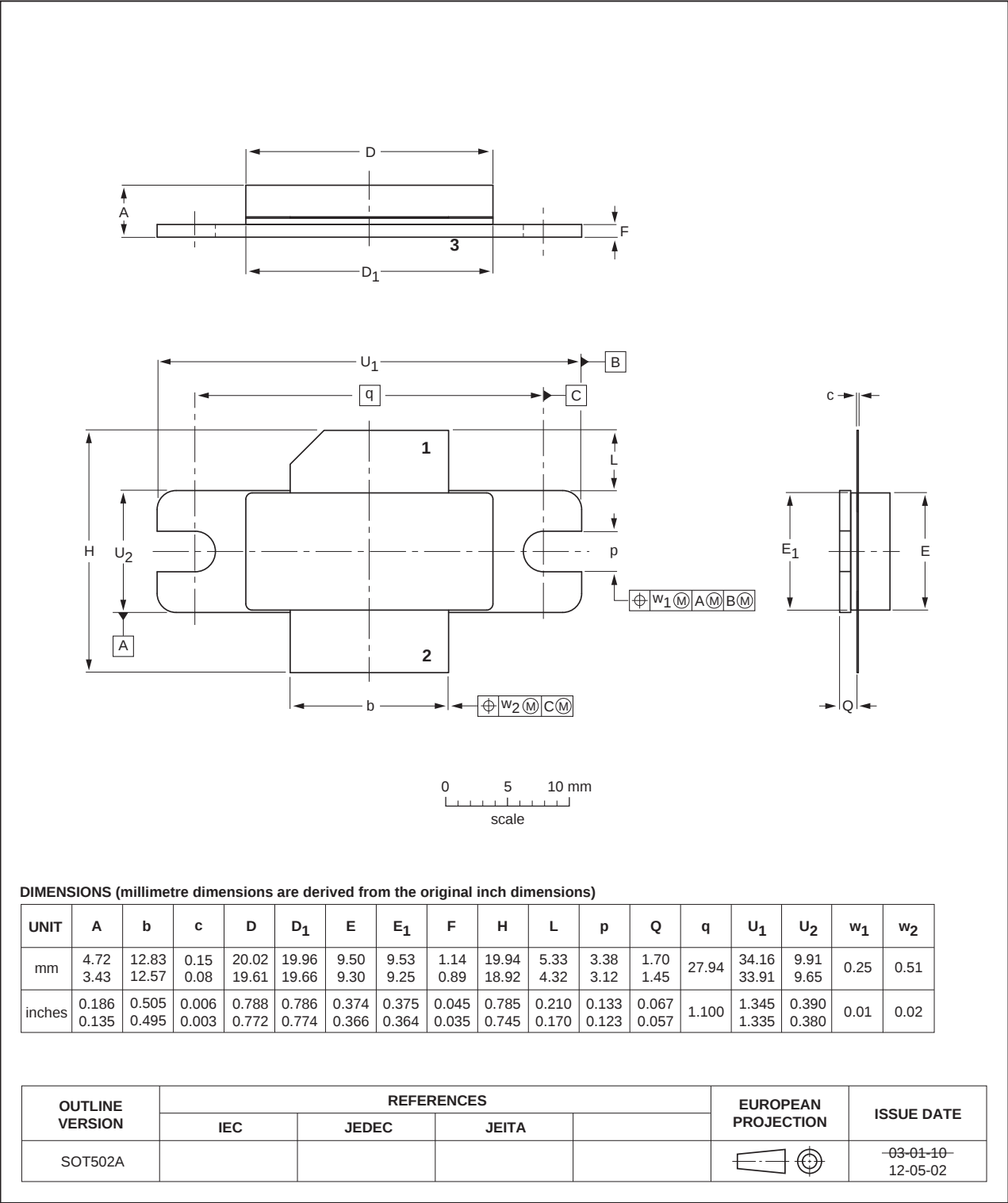


Fig 8. Package outline SOT502A

Earless flanged ceramic package; 2 leads

SOT502B

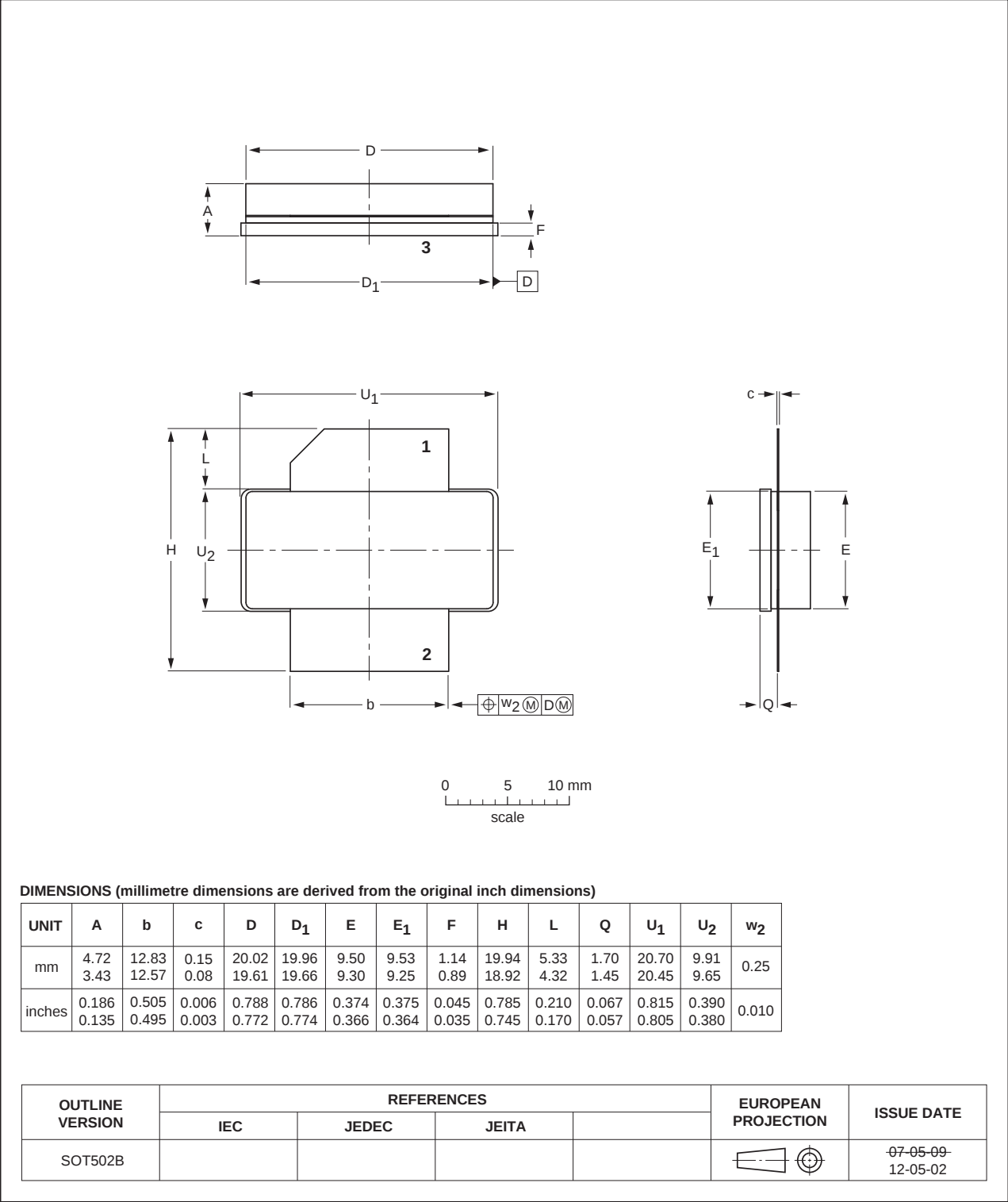


Fig 9. Package outline SOT502B

## 9. Handling information

### CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices.

Such precautions are described in the *ANSI/ESD S20.20*, *IEC/ST 61340-5*, *JESD625-A* or equivalent standards.

## 10. Abbreviations

Table 10. Abbreviations

| Acronym | Description                                    |
|---------|------------------------------------------------|
| 3GPP    | 3rd Generation Partnership Project             |
| CCDF    | Complementary Cumulative Distribution Function |
| CW      | Continuous Wave                                |
| DPCH    | Dedicated Physical CHannel                     |
| ESD     | ElectroStatic Discharge                        |
| ISM     | Industrial, Scientific and Medical             |
| LDMOS   | Laterally Diffused Metal-Oxide Semiconductor   |
| PAR     | Peak-to-Average Ratio                          |
| SMD     | Surface Mounted Device                         |
| VSWR    | Voltage Standing-Wave Ratio                    |
| W-CDMA  | Wideband Code Division Multiple Access         |

## 11. Revision history

Table 11. Revision history

| Document ID                 | Release date | Data sheet status  | Change notice | Supersedes |
|-----------------------------|--------------|--------------------|---------------|------------|
| BLF10M6200_BLF10M6LS200 v.1 | 20130701     | Product data sheet | -             | -          |

## 12. Legal information

### 12.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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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