

# BLF6G10-160RN; BLF6G10LS-160RN

Power LDMOS transistor

Rev. 3 — 1 September 2015

**AMPLEON**  
Product data sheet

## 1. Product profile

### 1.1 General description

160 W LDMOS power transistor for base station applications at frequencies from 700 MHz to 1000 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<br>(MHz) | $V_{DS}$<br>(V) | $P_{L(AV)}$<br>(W) | $G_p$<br>(dB) | $\eta_D$<br>(%) | ACPR<br>(dBc)      |
|-------------------|------------|-----------------|--------------------|---------------|-----------------|--------------------|
| 2-carrier W-CDMA  | 920 to 960 | 32              | 32                 | 22.5          | 27              | -41 <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.

#### CAUTION



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

### 1.2 Features

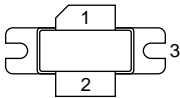
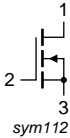
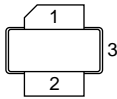
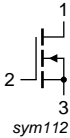
- Typical 2-carrier W-CDMA performance at frequencies of 920 MHz and 960 MHz, a supply voltage of 32 V and an  $I_{Dq}$  of 1200 mA:
  - ◆ Average output power = 32 W
  - ◆ Power gain = 22.5 dB
  - ◆ Efficiency = 27 %
  - ◆ ACPR = -41 dBc
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- 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 GSM, GSM EDGE, W-CDMA and CDMA base stations and multi carrier applications in the 700 MHz to 1000 MHz frequency range.

## 2. Pinning information

Table 2. Pinning

| Pin                              | Description                                  | Simplified outline  | Graphic symbol   |
|----------------------------------|--|---|--|
| <b>BLF6G10-160RN (SOT502A)</b>   |  |   |  |
| 1                                | drain  |  | <br>sym112  |
| 2                                | gate   |   |  |
| 3                                | source <span style="color: blue;">[1]</span> |   |  |
| <b>BLF6G10LS-160RN (SOT502B)</b> |  |   |  |
| 1                                | drain  |  | <br>sym112 |
| 2                                | gate   |   |  |
| 3                                | source <span style="color: blue;">[1]</span> |   |  |

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

| Type number     | Package |   |         |
|-----------------|---------|---|---------|
|                 | Name    | Description   | Version |
| BLF6G10-160RN   | -       | flanged LDMOST ceramic package; 2 mounting holes; 2 leads | SOT502A |
| BLF6G10LS-160RN | -       | 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        |            | -    | 39   | A    |
| $T_{stg}$ | storage temperature  |            | -65  | +150 | °C   |
| $T_j$     | junction temperature |            | -    | 225  | °C   |

## 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>$P_L = 32\text{ W}$ | BLF6G10-160RN   | 0.5  | K/W  |
|                  |  |   | BLF6G10LS-160RN | 0.44 | K/W  |

## 6. Characteristics

**Table 6. Characteristics**

$T_j = 25\text{ °C}$  unless otherwise specified

| Symbol        | Parameter                        | Conditions   | Min  | Typ  | Max | Unit          |
|---------------|----------------------------------|--|------|------|-----|---------------|
| $V_{(BR)DSS}$ | drain-source breakdown voltage   | $V_{GS} = 0\text{ V}; I_D = 0.72\text{ mA}$                        | 65   | -    | -   | V             |
| $V_{GS(th)}$  | gate-source threshold voltage    | $V_{DS} = 10\text{ V}; I_D = 216\text{ mA}$                        | 1.4  | 1.9  | 2.4 | V             |
| $V_{GSq}$     | gate-source quiescent voltage    | $V_{DS} = 32\text{ V};$<br>$I_D = 1300\text{ mA}$                  | 1.7  | 2.2  | 2.7 | V             |
| $I_{DSS}$     | drain leakage current            | $V_{GS} = 0\text{ V}; V_{DS} = 32\text{ V}$                        | -    | -    | 5   | $\mu\text{A}$ |
| $I_{DSX}$     | drain cut-off current            | $V_{GS} = V_{GS(th)} + 3.75\text{ V};$<br>$V_{DS} = 10\text{ V}$   | 30.6 | 39   | -   | A             |
| $I_{GSS}$     | gate leakage current             | $V_{GS} = 13\text{ V}; V_{DS} = 0\text{ V}$                        | -    | -    | 450 | nA            |
| $g_{fs}$      | forward transconductance         | $V_{DS} = 10\text{ V}; I_D = 7.5\text{ A}$                         | -    | 13.5 | -   | S             |
| $R_{DS(on)}$  | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V};$<br>$I_D = 7.5\text{ A}$     | -    | 0.07 | -   | $\Omega$      |
| $C_{rs}$      | feedback capacitance             | $V_{GS} = 0\text{ V}; V_{DS} = 32\text{ V};$<br>$f = 1\text{ MHz}$ | -    | 4.2  | -   | pF            |

## 7. Application information

**Table 7. Application information**

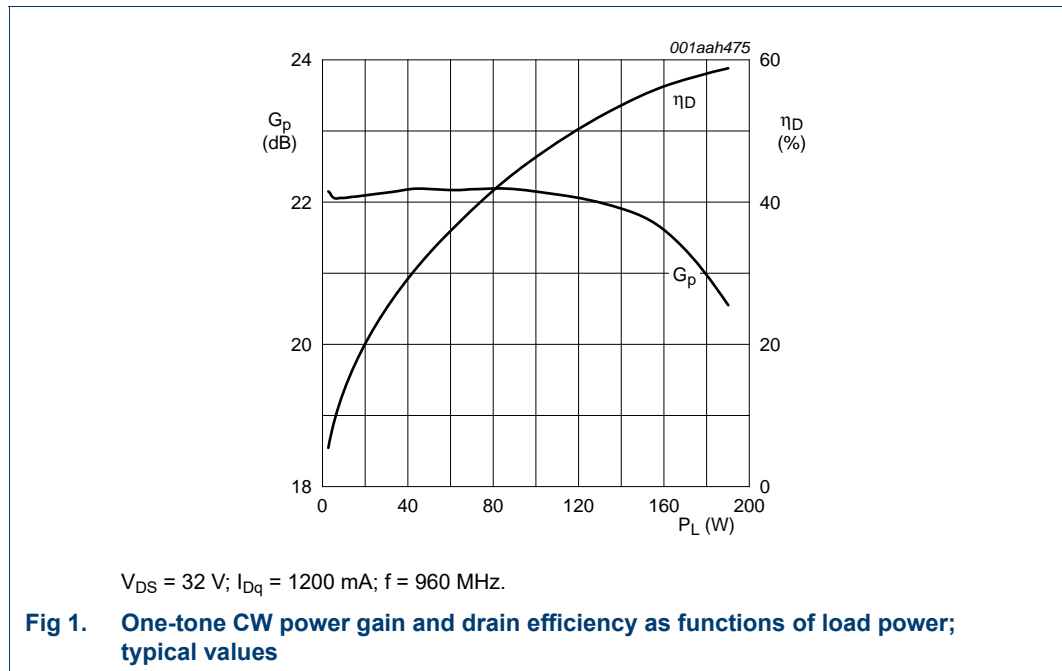
Mode of operation: 2-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 PDPCH;  $f_1 = 922.5\text{ MHz}; f_2 = 927.5\text{ MHz}; f_3 = 952.5\text{ MHz}; f_4 = 957.5\text{ MHz};$  RF performance at  $V_{DS} = 32\text{ V}; I_{Dq} = 1200\text{ mA}; T_{case} = 25\text{ °C};$  unless otherwise specified; in a class-AB production test circuit.

| Symbol      | Parameter                    | Conditions                | Min | Typ  | Max  | Unit |
|-------------|------------------------------|---------------------------|-----|------|------|------|
| $P_{L(AV)}$ | average output power         |                           | -   | 32   | -    | W    |
| $G_p$       | power gain                   | $P_{L(AV)} = 32\text{ W}$ | 21  | 22.5 | -    | dB   |
| $RL_{in}$   | input return loss            | $P_{L(AV)} = 32\text{ W}$ | -   | -8   | -5.5 | dB   |
| $\eta_D$    | drain efficiency             | $P_{L(AV)} = 32\text{ W}$ | 25  | 27   | -    | %    |
| ACPR        | adjacent channel power ratio | $P_{L(AV)} = 32\text{ W}$ | -   | -41  | -38  | dBc  |

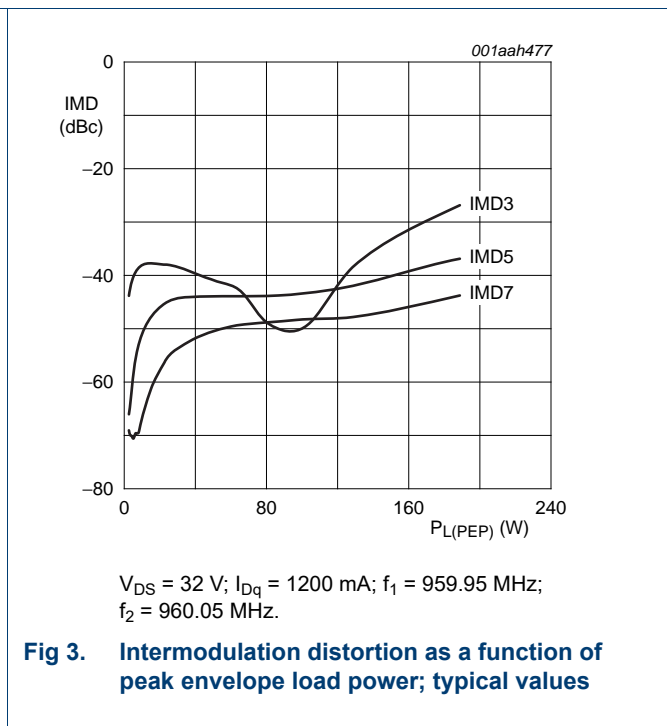
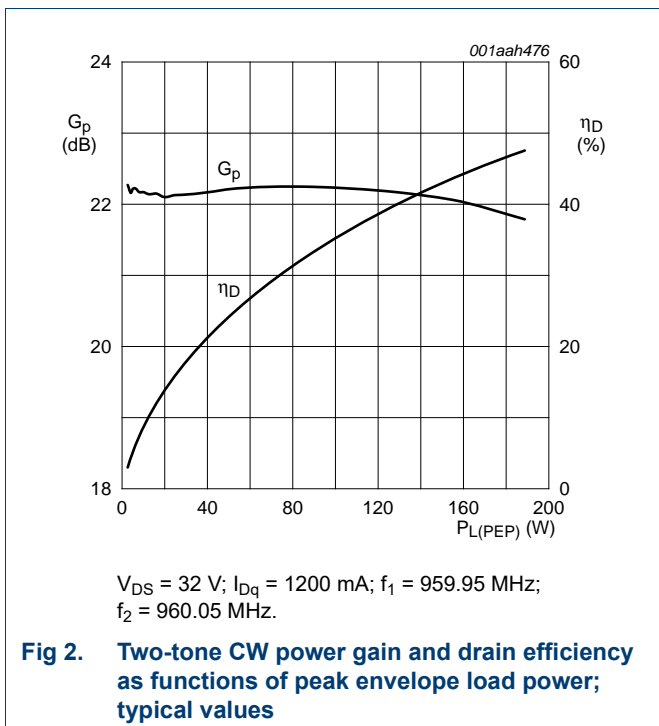
### 7.1 Ruggedness in class-AB operation

The BLF6G10-160RN and BLF6G10LS-160RN are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 32\text{ V}; I_{Dq} = 1200\text{ mA}; P_L = 160\text{ W (CW)}; f = 960\text{ MHz}.$

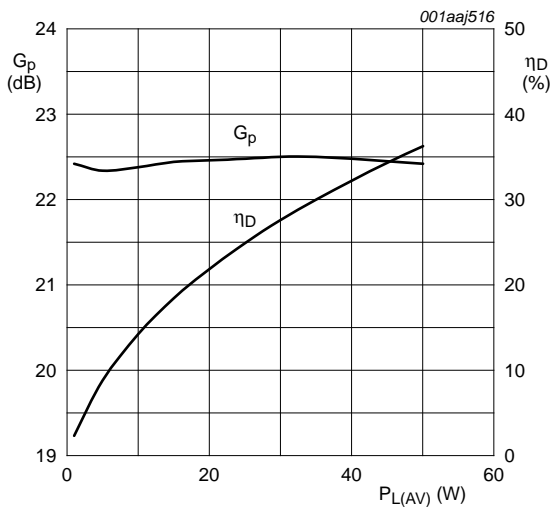
7.2 One-tone CW



7.3 Two-tone CW

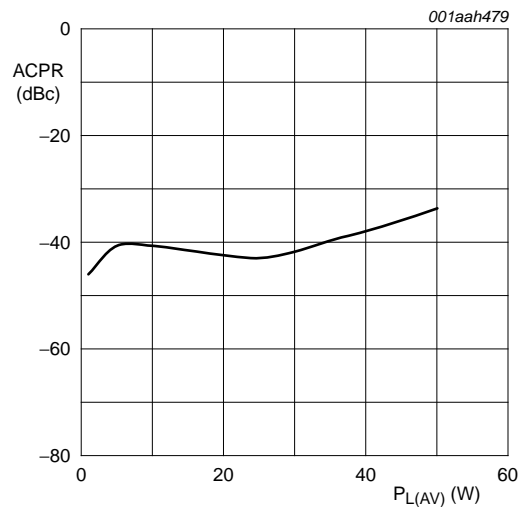


7.4 2-carrier W-CDMA



$V_{DS} = 32\text{ V}$ ;  $I_{DQ} = 1200\text{ mA}$ ;  $f_1 = 952.5\text{ MHz}$ ;  $f_2 = 957.5\text{ MHz}$ ; carrier spacing 5 MHz.

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



$V_{DS} = 32\text{ V}$ ;  $I_{DQ} = 1200\text{ mA}$ ;  $f_1 = 952.5\text{ MHz}$ ;  $f_2 = 957.5\text{ MHz}$ ; carrier spacing 5 MHz.

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

8. Test information

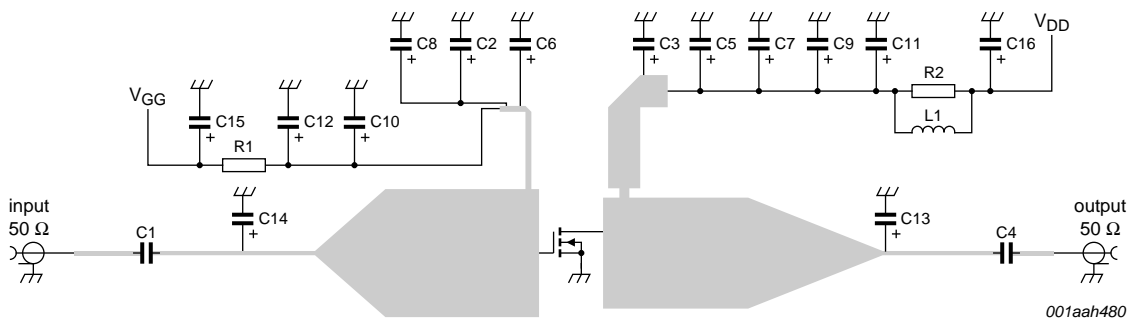
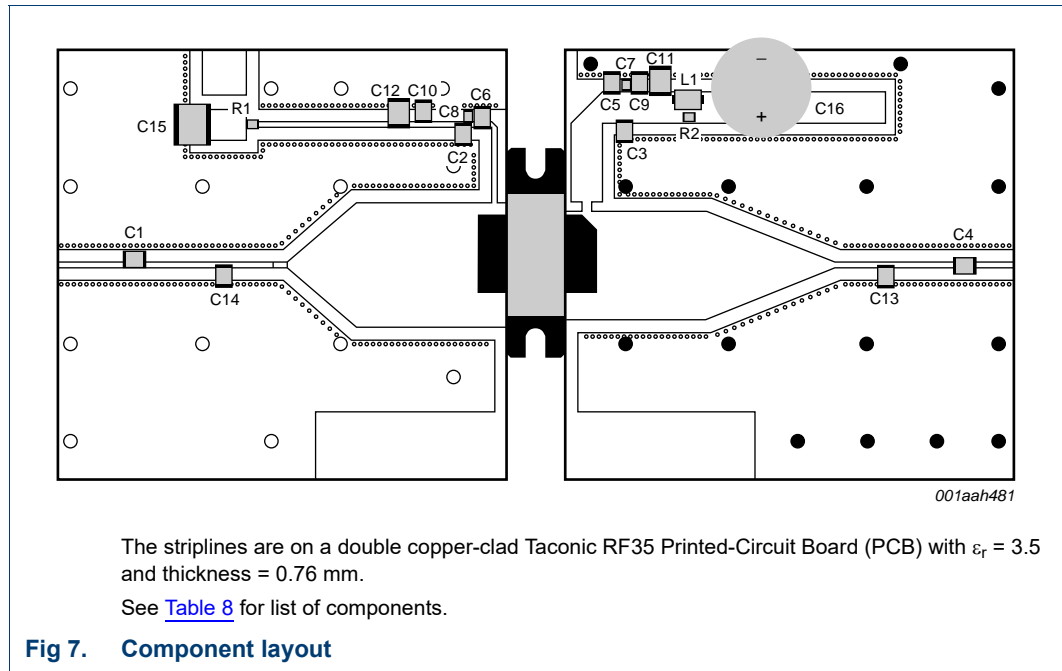


Fig 6. Test circuit for operation at 900 MHz



**Table 8. List of components (see [Figure 6](#) and [Figure 7](#))**

All capacitors should be soldered vertically.

| Component      | Description                       | Value                | Remarks                                  |
|----------------|-----------------------------------|----------------------|--|
| C1, C2, C3, C4 | multilayer ceramic chip capacitor | 68 pF                | [1]                                      |
| C5, C6         | multilayer ceramic chip capacitor | 560 pF               | [1]                                      |
| C7, C8         | multilayer ceramic chip capacitor | 330 nF; 50 V         | [2]                                      |
| C9, C10        | multilayer ceramic chip capacitor | 1.5 $\mu$ F; 50 V    | [2]                                      |
| C11, C12       | multilayer ceramic chip capacitor | 4.5 $\mu$ F; 50 V    | [2]                                      |
| C13            | multilayer ceramic chip capacitor | 2.20 pF              | [1]                                      |
| C14            | multilayer ceramic chip capacitor | 2.7 pF               | [1]                                      |
| C15            | SMD tantalum capacitor            | 47 $\mu$ F; 20 V     |  |
| C16            | electrolytic capacitor            | 220 $\mu$ F          |  |
| L1             | ferrite SMD bead                  | -                    | Ferroxcube BDS 3/3/8.9-4S2 or equivalent |
| R1             | SMD resistor                      | 4.7 $\Omega$ ; 0.1 W |  |
| R2             | SMD resistor                      | 6.8 $\Omega$ ; 0.1 W |  |

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

[2] TDK or capacitor of same quality.

9. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads

SOT502A

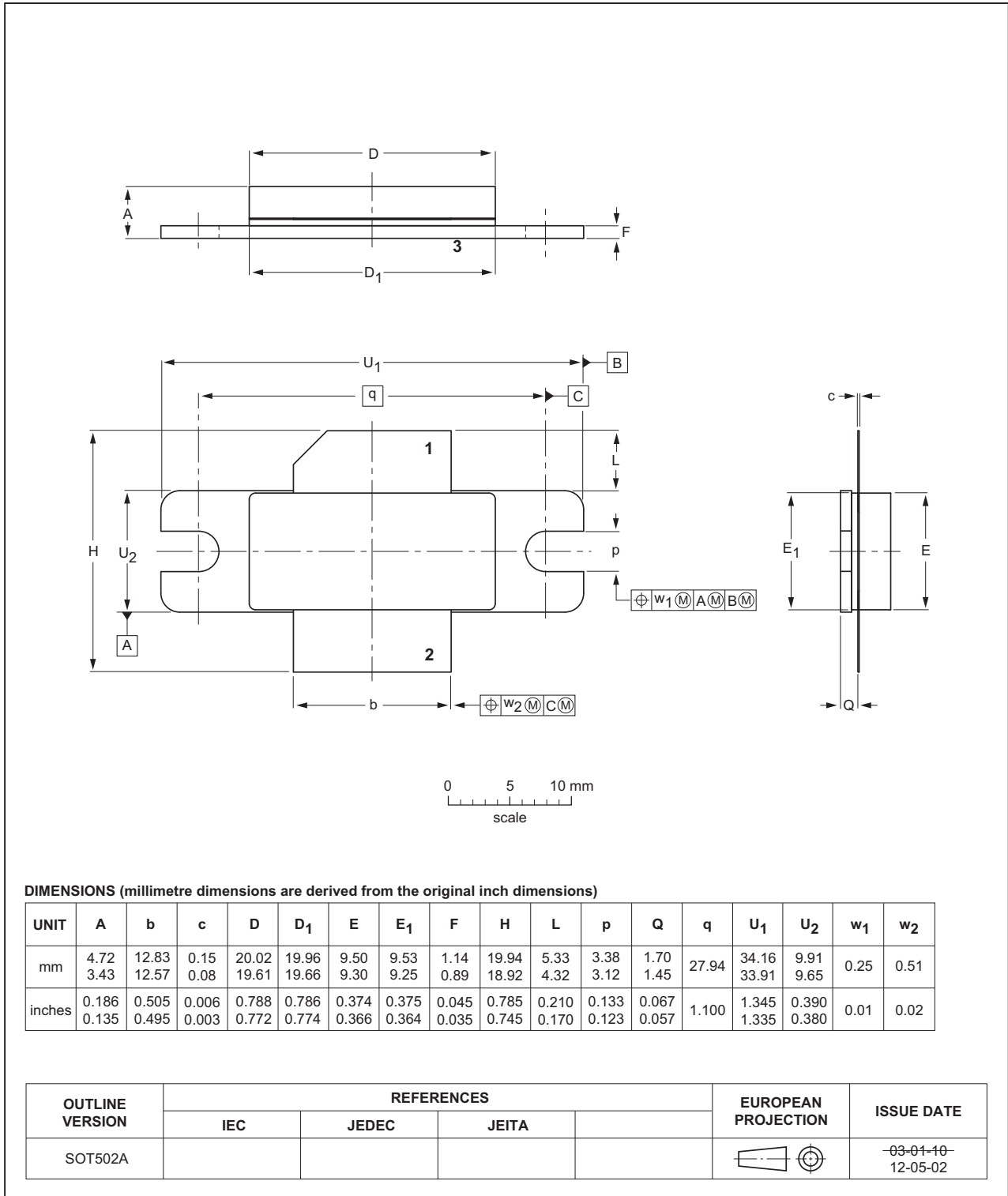


Fig 8. Package outline SOT502A

Earless flanged ceramic package; 2 leads

SOT502B

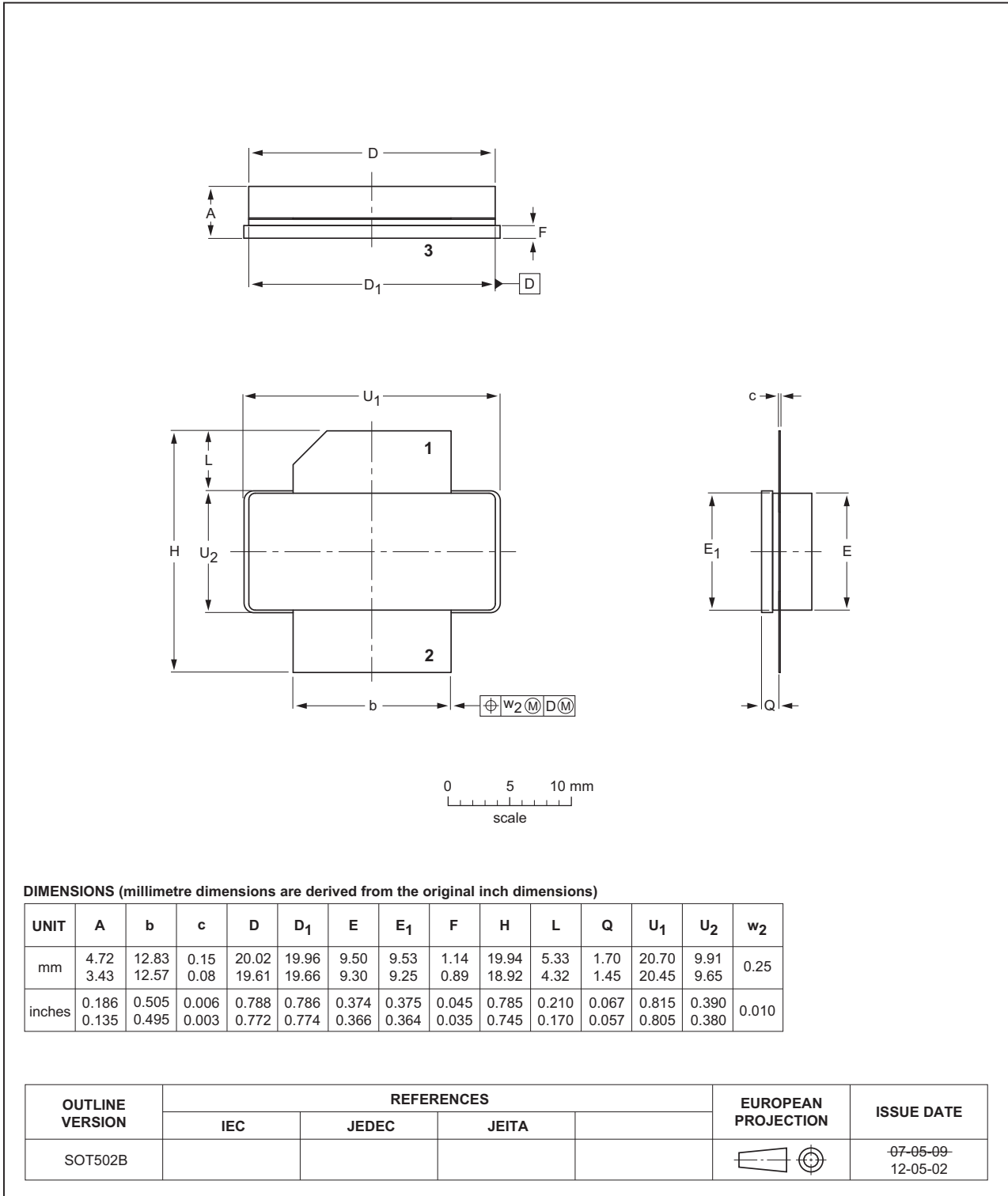


Fig 9. Package outline SOT502B



## 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   |
| SMD     | Surface Mounted Device                                  |
| 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                 |
|----------------------------|--|--------------------|---------------|----------------------------|
| BLF6G10-160RN_10LS-160RN#3 | 20150901   | Product data sheet | -             | BLF6G10-160RN_10LS-160RN_2 |
| Modifications:             | <ul style="list-style-type: none"> <li>The format of this document has been redesigned to comply with the new identity guidelines of Ampleon.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul> |                    |               |                            |
| BLF6G10-160RN_10LS-160RN_2 | 20100121   | Product data sheet | -             | BLF6G10-160RN_10LS-160RN_1 |
| BLF6G10-160RN_10LS-160RN_1 | 20090120   | 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.                                     |

[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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14. Contents

1 **Product profile** . . . . . 1

1.1 General description . . . . . 1

1.2 Features . . . . . 1

1.3 Applications . . . . . 2

2 **Pinning information** . . . . . 2

3 **Ordering information** . . . . . 2

4 **Limiting values** . . . . . 2

5 **Thermal characteristics** . . . . . 3

6 **Characteristics** . . . . . 3

7 **Application information** . . . . . 3

7.1 Ruggedness in class-AB operation . . . . . 3

7.2 One-tone CW . . . . . 4

7.3 Two-tone CW . . . . . 4

7.4 2-carrier W-CDMA . . . . . 5

8 **Test information** . . . . . 5

9 **Package outline** . . . . . 7

10 **Abbreviations** . . . . . 9

11 **Revision history** . . . . . 9

12 **Legal information** . . . . . 10

12.1 Data sheet status . . . . . 10

12.2 Definitions . . . . . 10

12.3 Disclaimers . . . . . 10

12.4 Trademarks . . . . . 11

13 **Contact information** . . . . . 11

14 **Contents** . . . . . 12

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