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# BLL6H0514L-130; BLL6H0514LS-130

LDMOS driver transistor

Rev. 3 — 1 September 2015

AMPLEON

Product data sheet

## 1. Product profile

### 1.1 General description

130 W LDMOS transistor intended for pulsed applications in the 0.5 GHz to 1.4 GHz range.

**Table 1. Application information**

Typical RF performance at  $T_{case} = 25\text{ }^{\circ}\text{C}$ ;  $I_{DQ} = 50\text{ mA}$ ; in a class-AB application circuit.

| Mode of operation | f<br>(MHz)   | $t_p$<br>( $\mu\text{s}$ ) | $\delta$<br>(%) | $V_{DS}$<br>(V) | $P_L$<br>(W) | $G_p$<br>(dB) | $RL_{in}$<br>(dB) | $\eta_D$<br>(%) | $P_{droop(pulse)}$<br>(dB) | $t_r$<br>(ns) | $t_f$<br>(ns) |
|-------------------|--------------|----------------------------|-----------------|-----------------|--------------|---------------|-------------------|-----------------|----------------------------|---------------|---------------|
| pulsed RF         | 960 to 1215  | 128                        | 10              | 50              | 130          | 19            | 10                | 54              | 0                          | 15            | 8             |
|                   | 1200 to 1400 | 300                        | 10              | 50              | 130          | 17            | 10                | 50              | 0                          | 15            | 8             |

### 1.2 Features and benefits

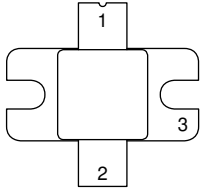
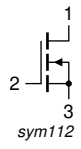
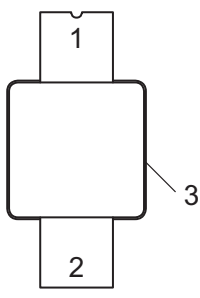
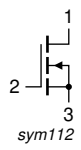
- Easy power control
- Integrated ESD protection
- High flexibility with respect to pulse formats
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (0.5 GHz to 1.4 GHz)
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

### 1.3 Applications

- Amplifiers for pulsed applications in the 0.5 GHz to 1.4 GHz frequency range

## 2. Pinning information

Table 2. Pinning

| Pin                               | Description | Simplified outline  | Graphic symbol  |
|-----------------------------------|-------------|---|---|
| <b>BLL6H0514L-130 (SOT1135A)</b>  |             |   |   |
| 1                                 | drain       |   | <br>sym112 |
| 2                                 | gate        |   |   |
| 3                                 | source      |   |   |
| <b>BLL6H0514LS-130 (SOT1135B)</b> |             |   |   |
| 1                                 | drain       |  | <br>sym112 |
| 2                                 | gate        |   |   |
| 3                                 | source      |   |   |

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

| Type number     | Package |  |          |
|-----------------|---------|--|----------|
|                 | Name    | Description  | Version  |
| BLL6H0514L-130  | -       | flanged ceramic package; 2 mounting holes; 2 leads | SOT1135A |
| BLL6H0514LS-130 | -       | earless flanged ceramic package; 2 leads           | SOT1135B |

## 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 |            | -    | 100  | V    |
| $V_{GS}$  | gate-source voltage  |            | -0.5 | +13  | V    |
| $I_D$     | drain current        |            | -    | 18   | 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 |
|---------------|---|---|------|------|
| $Z_{th(j-c)}$ | transient thermal impedance from junction to case | $T_{case} = 85\text{ °C}; P_L = 130\text{ W}$         |      |      |
|               |   | $t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$ | 0.17 | K/W  |
|               |   | $t_p = 200\text{ }\mu\text{s}; \delta = 10\text{ }\%$ | 0.22 | K/W  |
|               |   | $t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ }\%$ | 0.25 | K/W  |
|               |   | $t_p = 100\text{ }\mu\text{s}; \delta = 20\text{ }\%$ | 0.23 | K/W  |
|               |   | $t_p = 1\text{ ms}; \delta = 10\text{ }\%$            | 0.36 | K/W  |

## 6. Characteristics

**Table 6. DC 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   | $V_{GS} = 0\text{ V}; I_D = 630\text{ mA}$                  | 100  | -   | -    | V                |
| $V_{GS(th)}$  | gate-source threshold voltage    | $V_{DS} = 10\text{ V}; I_D = 135\text{ mA}$                 | 1.3  | 1.8 | 2.25 | V                |
| $I_{DSS}$     | drain leakage current            | $V_{GS} = 0\text{ V}; V_{DS} = 50\text{ V}$                 | -    | -   | 1.4  | $\mu\text{A}$    |
| $I_{DSX}$     | drain cut-off current            | $V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$ | 15.8 | 18  | -    | A                |
| $I_{GSS}$     | gate leakage current             | $V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$                 | -    | -   | 140  | nA               |
| $g_{fs}$      | forward transconductance         | $V_{DS} = 10\text{ V}; I_D = 135\text{ mA}$                 | 806  | -   | 1578 | mS               |
| $R_{DS(on)}$  | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 6.25\text{ V}; I_D = 135\text{ mA}$  | -    | 200 | 275  | $\text{m}\Omega$ |

**Table 7. RF characteristics**

Mode of operation: pulsed RF;  $t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ }\%$ ; RF performance at  $V_{DS} = 50\text{ V}; I_{Dq} = 50\text{ mA}; f = 1.2\text{ GHz to }1.4\text{ GHz}; T_{case} = 25\text{ °C}$ ; unless otherwise specified, in a class-AB production test circuit.

| Symbol             | Parameter            | Conditions           | Min | Typ | Max | Unit |
|--------------------|----------------------|----------------------|-----|-----|-----|------|
| $P_L$              | output power         |                      | 130 | -   | -   | W    |
| $V_{DS}$           | drain-source voltage | $P_L = 130\text{ W}$ | -   | -   | 50  | V    |
| $G_p$              | power gain           | $P_L = 130\text{ W}$ | 15  | 17  | -   | dB   |
| $RL_{in}$          | input return loss    | $P_L = 130\text{ W}$ | 7   | 10  | -   | dB   |
| $\eta_D$           | drain efficiency     | $P_L = 130\text{ W}$ | 45  | 50  | -   | %    |
| $P_{droop(pulse)}$ | pulse droop power    | $P_L = 130\text{ W}$ | -   | 0   | 0.3 | dB   |
| $t_r$              | rise time            | $P_L = 130\text{ W}$ | -   | 20  | 50  | ns   |
| $t_f$              | fall time            | $P_L = 130\text{ W}$ | -   | 6   | 50  | ns   |

6.1 Ruggedness in class-AB operation

The BLL6H0514L-130 and BLL6H0514LS-130 are capable of withstanding a load mismatch corresponding to VSWR = 5 : 1 through all phases under the following conditions:  $V_{DS} = 50\text{ V}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $P_L = 130\text{ W}$ ;  $f = 1.2\text{ GHz to }1.4\text{ GHz}$ ;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\text{ }\%$ .

7. Application information

7.1 Impedance information

Table 8. Typical impedance

| f<br>MHz | Z <sub>S</sub><br>Ω | Z <sub>L</sub><br>Ω |
|----------|---------------------|---------------------|
| 1200     | 1.21 – j3.44        | 2.40 – j0.63        |
| 1300     | 1.56 – j4.49        | 2.30 – j0.87        |
| 1400     | 2.21 – j4.86        | 2.00 – j1.71        |

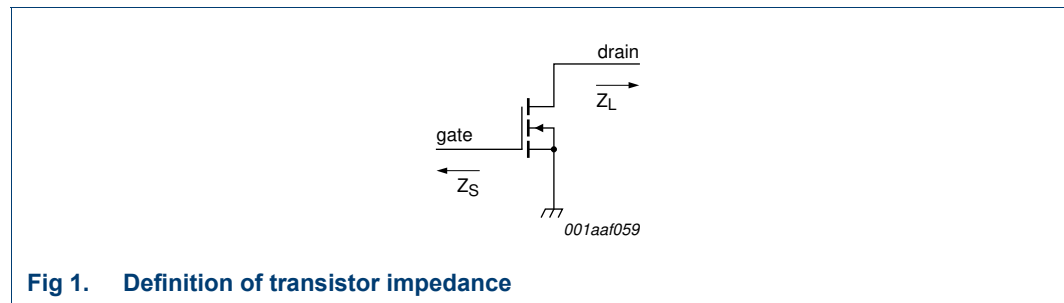
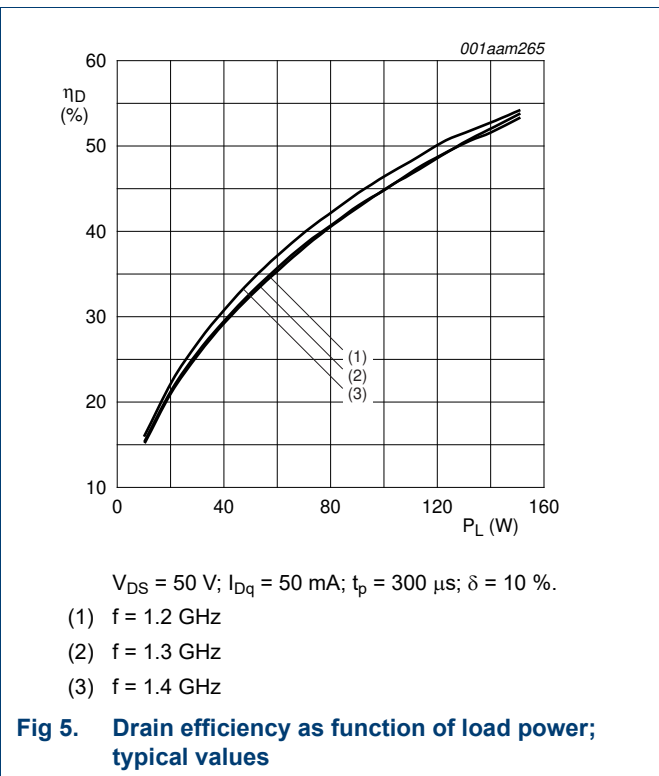
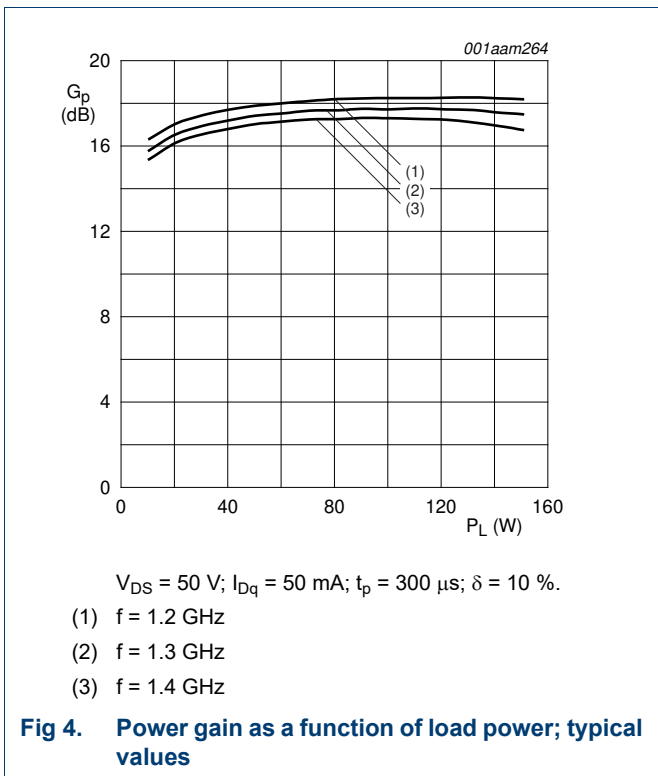
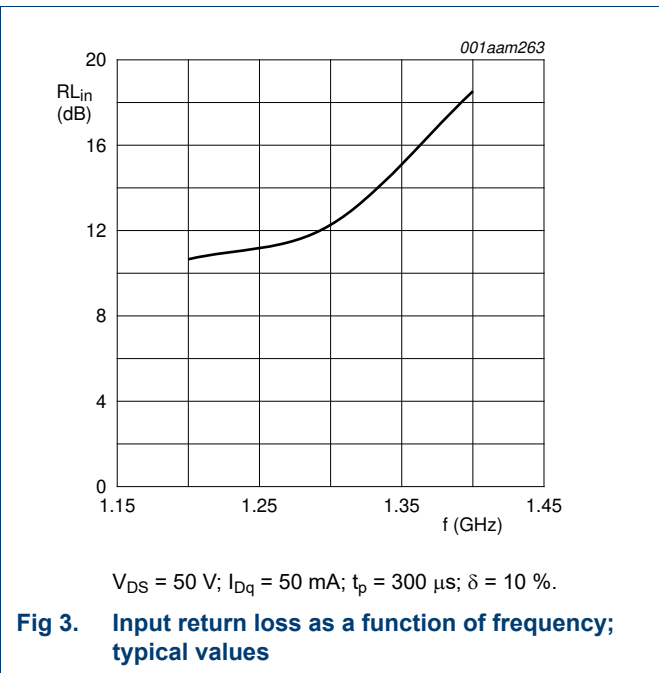
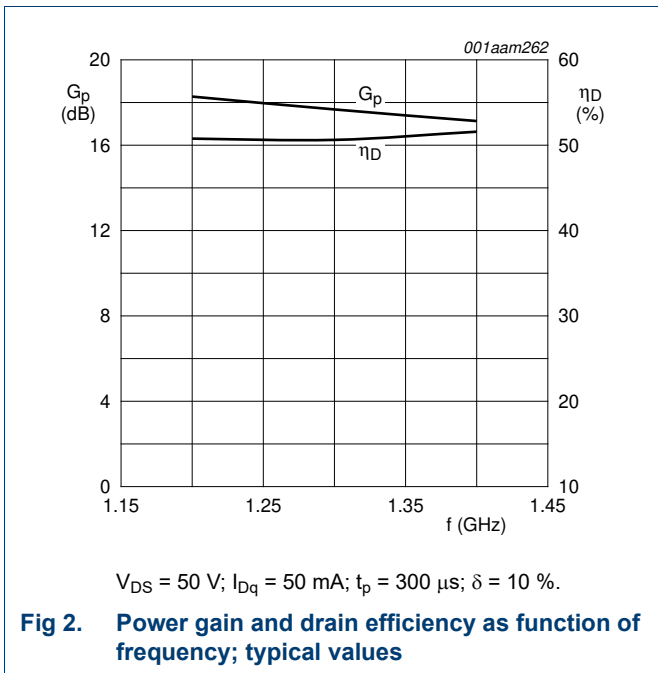
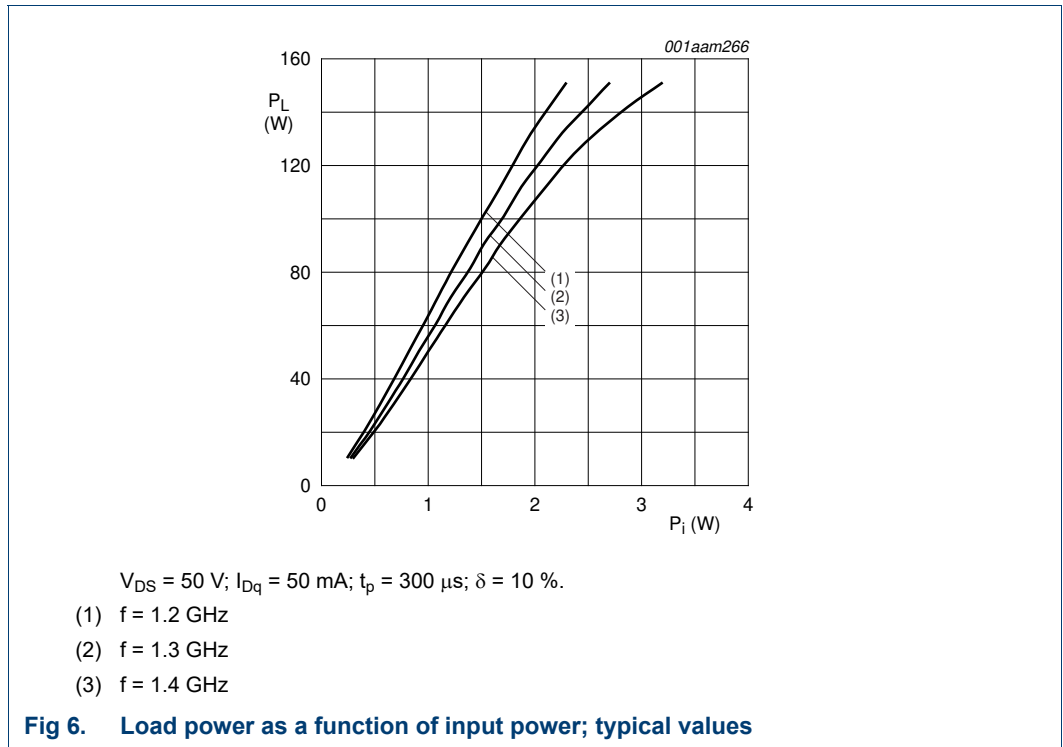


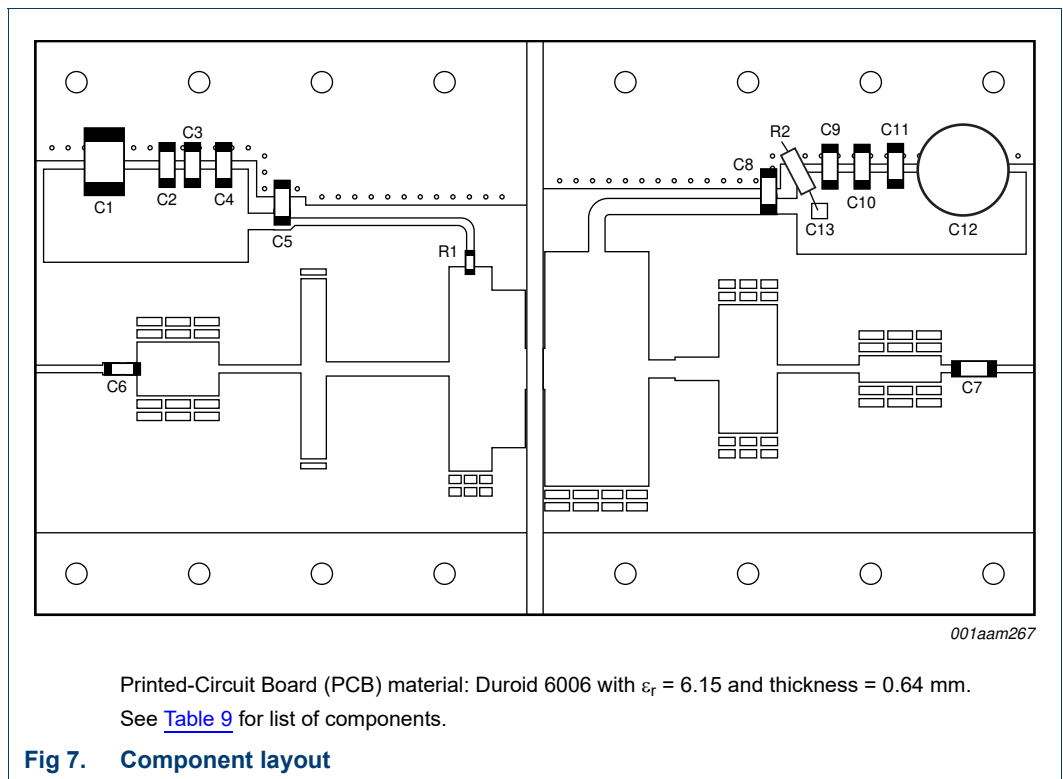
Fig 1. Definition of transistor impedance

7.2 Performance curves





## 8. Test information



**Table 9. List of components**

See [Figure 7](#) for component layout.

| Component           | Description                       | Value                  | Remarks                                 |
|---------------------|-----------------------------------|------------------------|---|
| C1                  | multilayer ceramic chip capacitor | 10 $\mu$ F; 50 V       |   |
| C2, C11             | multilayer ceramic chip capacitor | 1 nF                   | [1]                                     |
| C3, C4, C6, C9, C10 | multilayer ceramic chip capacitor | 100 pF                 | [2]                                     |
| C5, C7, C8          | multilayer ceramic chip capacitor | 43 pF                  | [2]                                     |
| C12                 | electrolytic capacitor            | 220 $\mu$ F; 63 V      |   |
| C13                 | multilayer ceramic chip capacitor | 1 nF                   | [3] fitted vertically in series with R2 |
| R1                  | SMD resistor                      | 10 $\Omega$            | SMD 0603                                |
| R2                  | wirewound lead resistor           | 2.61 $\Omega$ ; 0.25 W | fitted in series with C13               |

[1] American Technical Ceramics type 700A or capacitor of same quality.

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

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



9. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads

SOT1135A

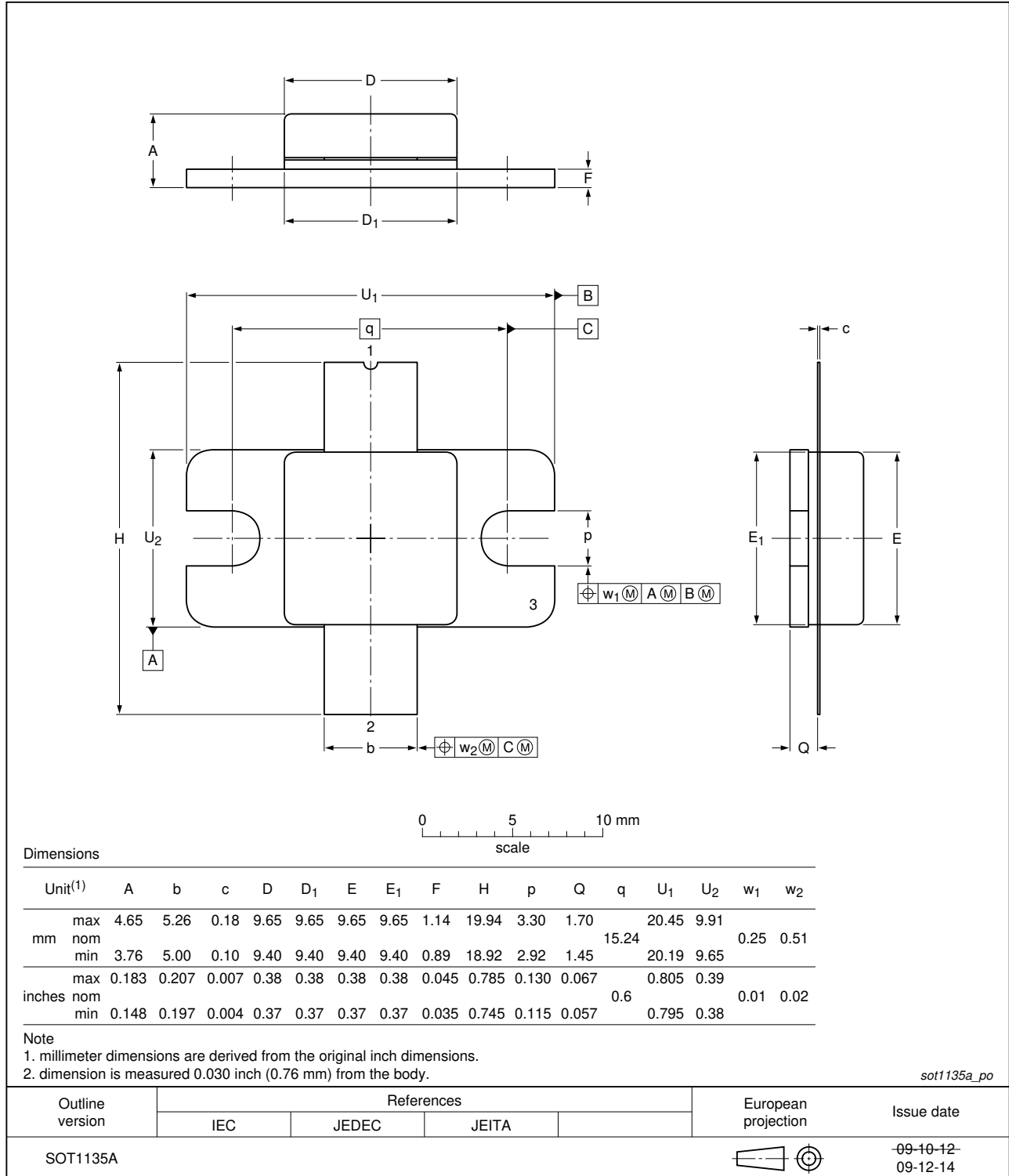
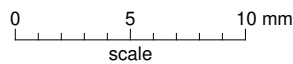
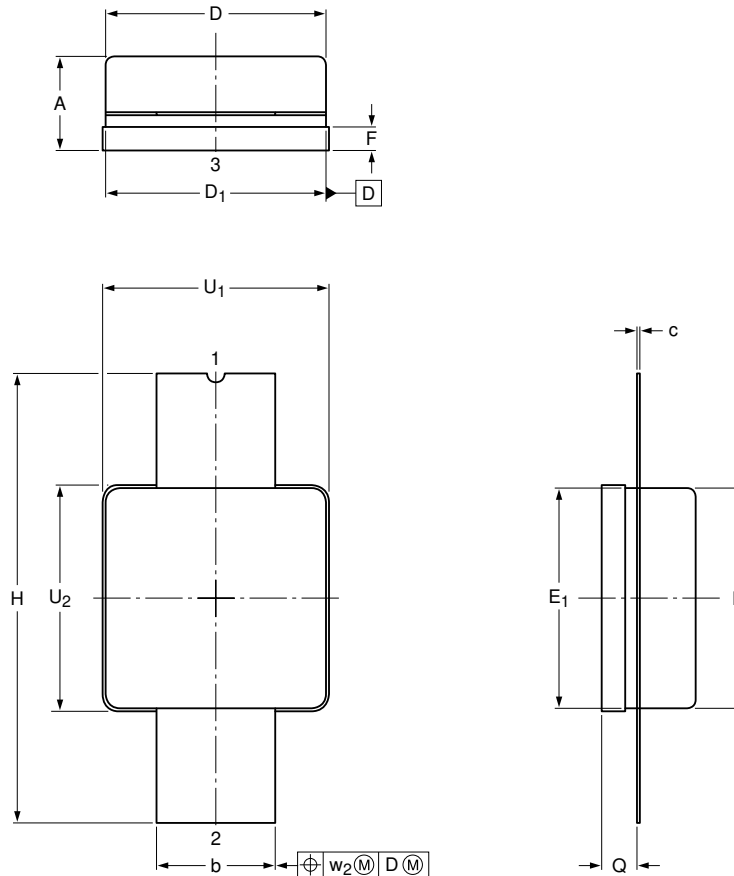


Fig 8. Package outline SOT1135A

Earless flanged ceramic package; 2 leads

SOT1135B



Dimensions

| Unit <sup>(1)</sup> | A   | b     | c     | D     | D <sub>1</sub> | E    | E <sub>1</sub> | F     | H     | Q     | U <sub>1</sub> | U <sub>2</sub> | w <sub>2</sub> |
|---------------------|-----|-------|-------|-------|----------------|------|----------------|-------|-------|-------|----------------|----------------|----------------|
| mm                  | max | 4.65  | 5.26  | 0.18  | 9.65           | 9.65 | 9.65           | 1.14  | 19.94 | 1.70  | 9.91           | 9.91           | 0.51           |
|                     | nom |       |       |       |                |      |                |       |       |       |                |                |                |
|                     | min | 3.76  | 5.00  | 0.10  | 9.40           | 9.40 | 9.40           | 0.89  | 18.92 | 1.45  | 9.65           | 9.65           |                |
| inches              | max | 0.183 | 0.207 | 0.007 | 0.38           | 0.38 | 0.38           | 0.045 | 0.785 | 0.067 | 0.39           | 0.39           | 0.02           |
|                     | nom |       |       |       |                |      |                |       |       |       |                |                |                |
|                     | min | 0.148 | 0.197 | 0.004 | 0.37           | 0.37 | 0.37           | 0.035 | 0.745 | 0.057 | 0.38           | 0.38           |                |

Note

1. millimeter dimensions are derived from the original inch dimensions.
2. dimension is measured 0.030 inch (0.76 mm) from the body.

sot1135b\_po

| Outline version | References |       |       | European projection | Issue date             |
|-----------------|------------|-------|-------|---------------------|------------------------|
|                 | IEC        | JEDEC | JEITA |                     |                        |
| SOT1135B        |            |       |       |                     | -09-10-12-<br>09-12-14 |

Fig 9. Package outline SOT1135B

## 10. 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.

## 11. Abbreviations

Table 10. Abbreviations

| Acronym | Description                                  |
|---------|--|
| LDMOS   | Laterally Diffused Metal-Oxide Semiconductor |
| RF      | Radio Frequency                              |
| SMD     | Surface Mounted Device                       |
| VSWR    | Voltage Standing-Wave Ratio                  |

## 12. Revision history

Table 11. Revision history

| Document ID                   | Release date   | Data sheet status      | Change notice | Supersedes                    |
|-------------------------------|--|------------------------|---------------|-------------------------------|
| BLL6H0514L-130_0514LS-130#3   | 20150901   | Product data sheet     |               | BLL6H0514L-130_0514LS-130 v.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> |                        |               |                               |
| BLL6H0514L-130_0514LS-130 v.2 | 20100913   | Product data sheet     | -             | BLL6H0514L-130_0514LS-130 v.1 |
| BLL6H0514L-130_0514LS-130 v.1 | 20100809   | Preliminary data sheet | -             | -                             |

## 13. Legal information

### 13.1 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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