

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 (MHz) | t_p (μs) | δ (%) | V_{DS} (V) | P_L (W) | G_p (dB) | RL_{in} (dB) | η_D (%) | $P_{droop(pulse)}$ (dB) | t_r (ns) | t_f (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

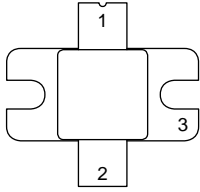
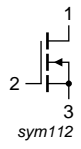
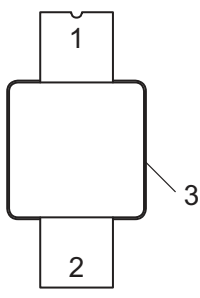
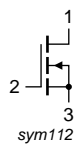
- Easy power control
- Integrated ESD protection
- High flexibility with respect to pulse formats
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (0.5 GHz to 1.4 GHz)
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (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 |
|-----------------------------------|-------------|---|---|
| BLL6H0514L-130 (SOT1135A) | | | |
| 1 | drain |  |  sym112 |
| 2 | gate | | |
| 3 | source | | |
| BLL6H0514LS-130 (SOT1135B) | | | |
| 1 | drain |  |  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 | μA |
| 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 | m Ω |

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 |
| η_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 GHz ; $t_p = 300\text{ }\mu\text{s}$; $\delta = 10\text{ }\%$.

7. Application information

7.1 Impedance information

Table 8. Typical impedance

| f MHz | Z_S Ω | Z_L Ω |
|----------|-------------------|-------------------|
| 1200 | $1.21 - j3.44$ | $2.40 - j0.63$ |
| 1300 | $1.56 - j4.49$ | $2.30 - j0.87$ |
| 1400 | $2.21 - j4.86$ | $2.00 - j1.71$ |

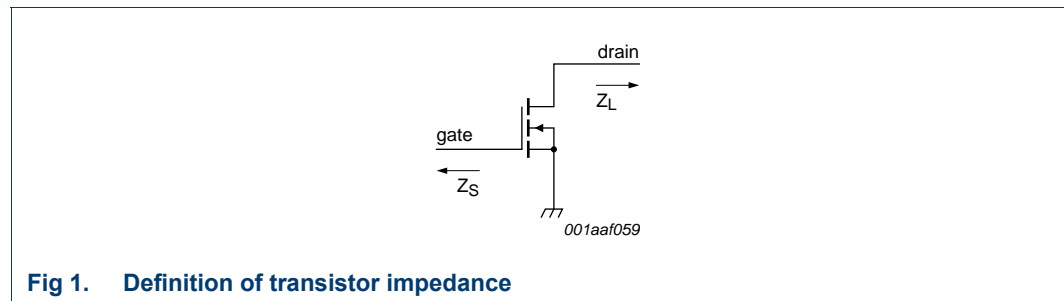
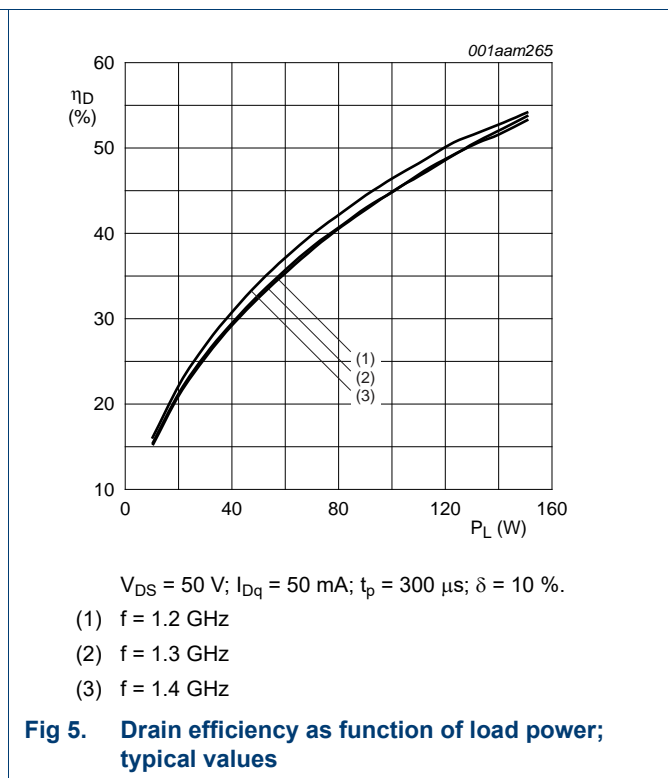
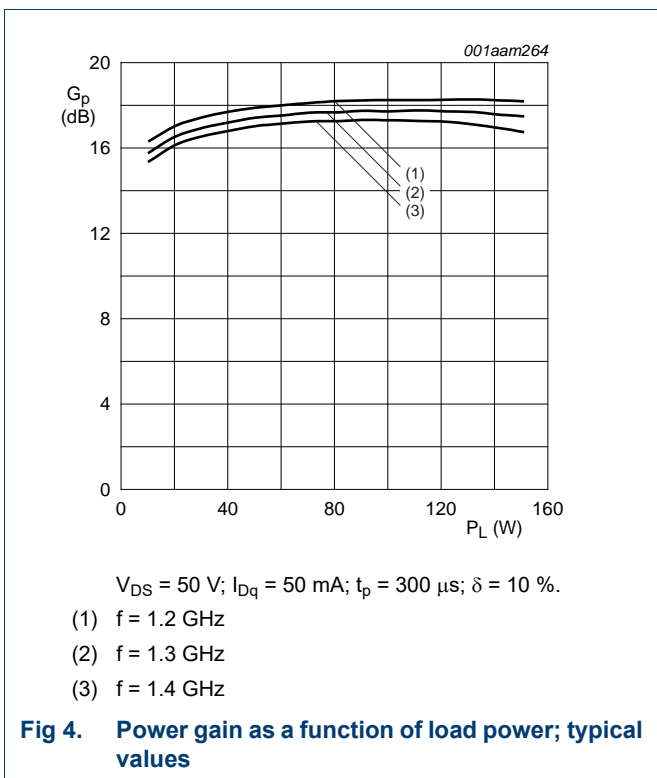
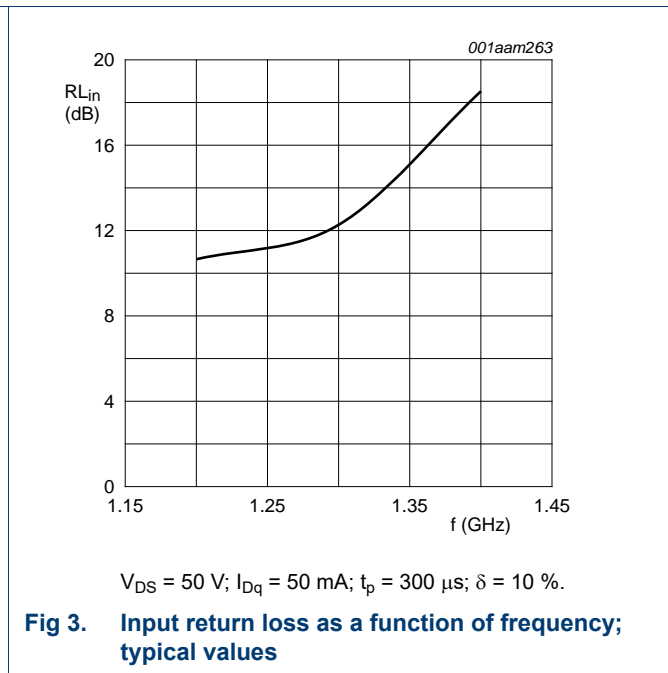
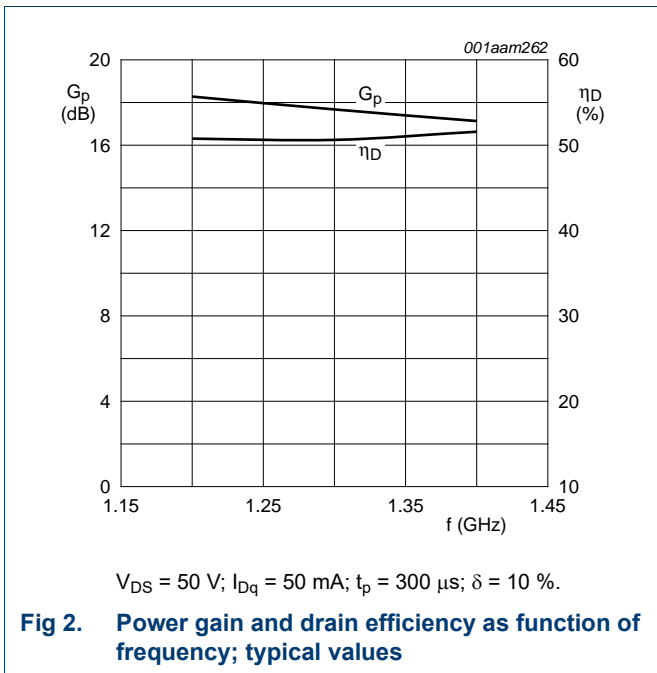
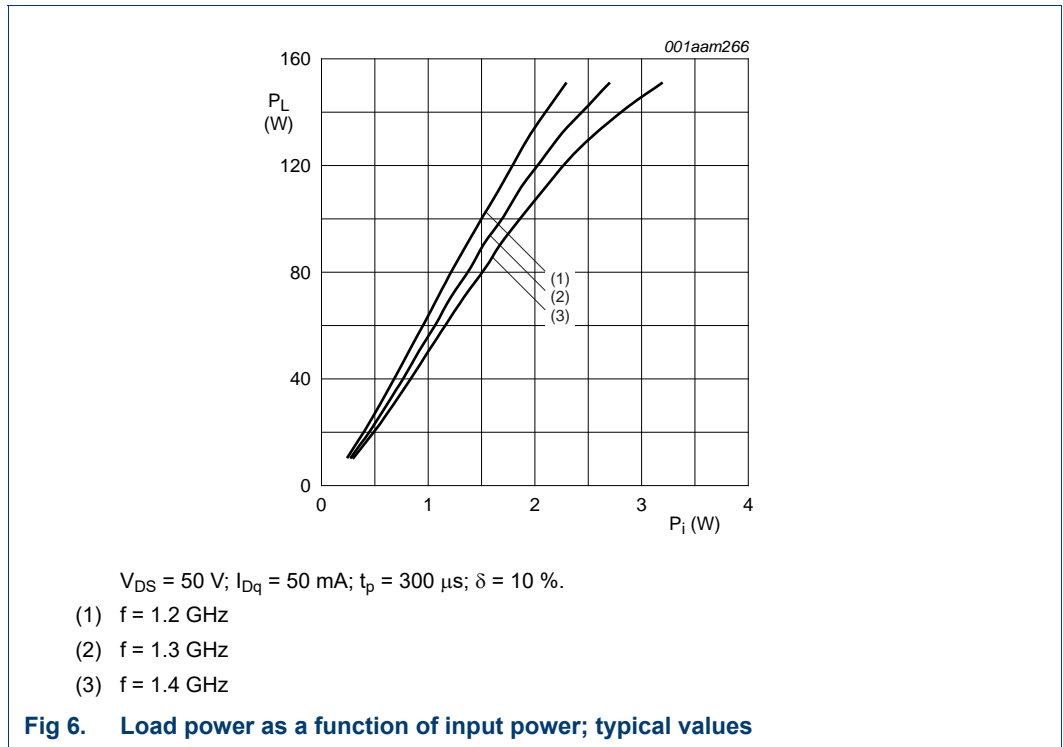


Fig 1. Definition of transistor impedance

7.2 Performance curves





8. Test information

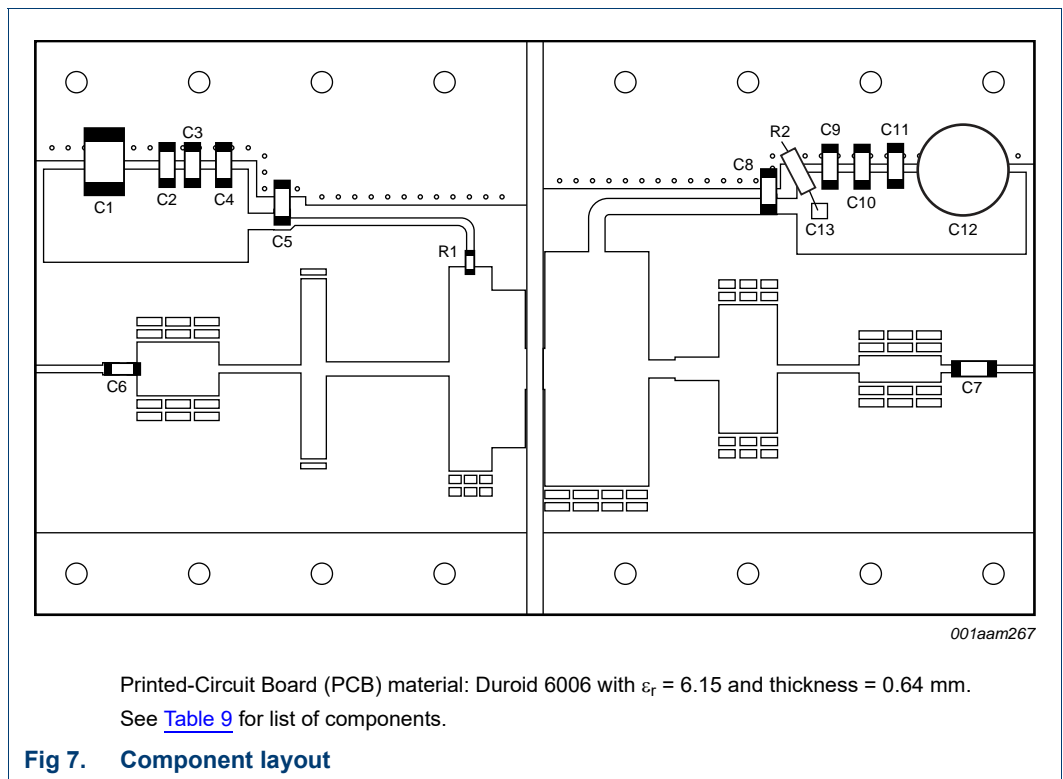


Table 9. List of components

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

| Component | Description | Value | Remarks |
|---------------------|-----------------------------------|------------------------|---|
| C1 | multilayer ceramic chip capacitor | 10 μ 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 μ F; 63 V | |
| C13 | multilayer ceramic chip capacitor | 1 nF | [3] fitted vertically in series with R2 |
| R1 | SMD resistor | 10 Ω | SMD 0603 |
| R2 | wirewound lead resistor | 2.61 Ω ; 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

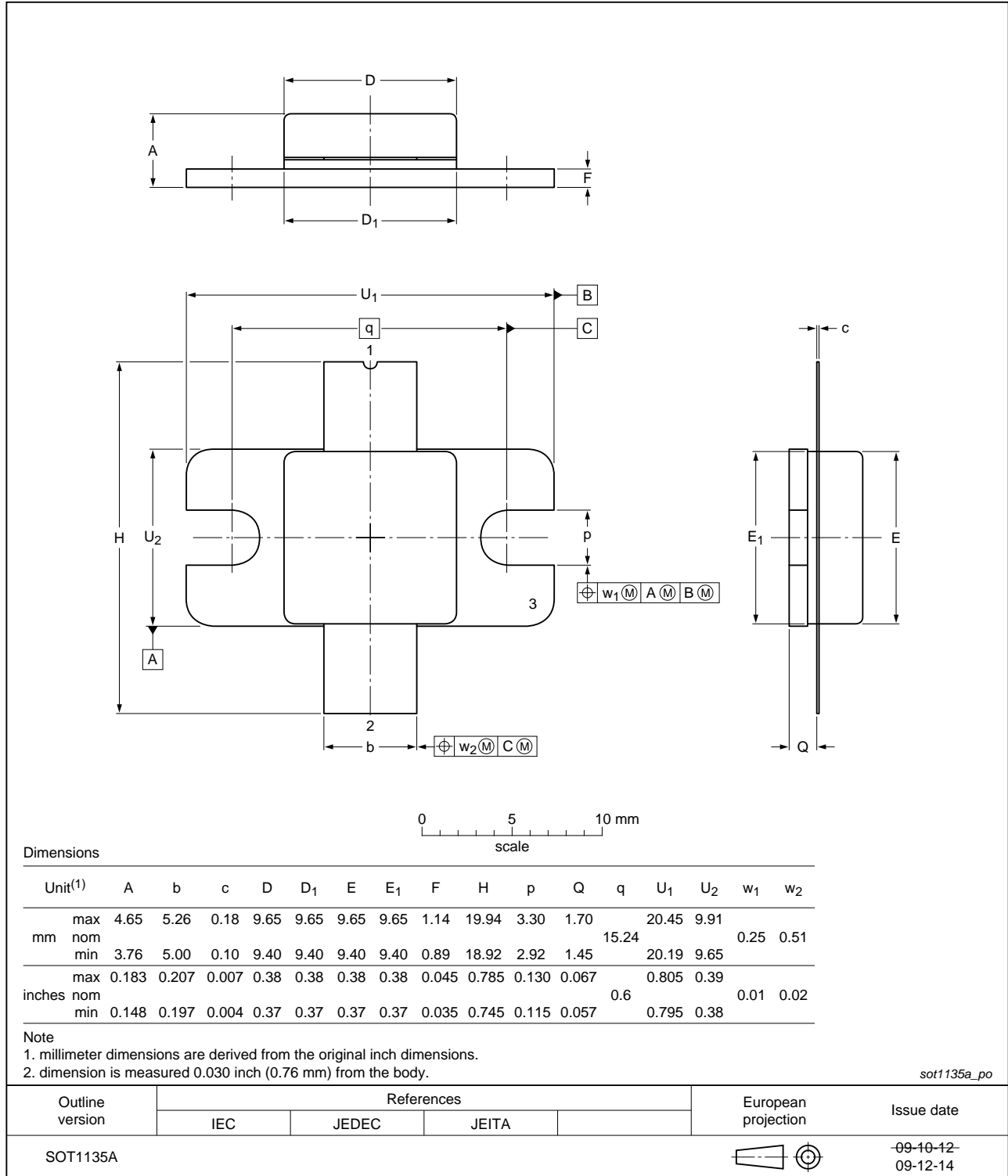
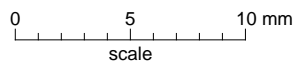
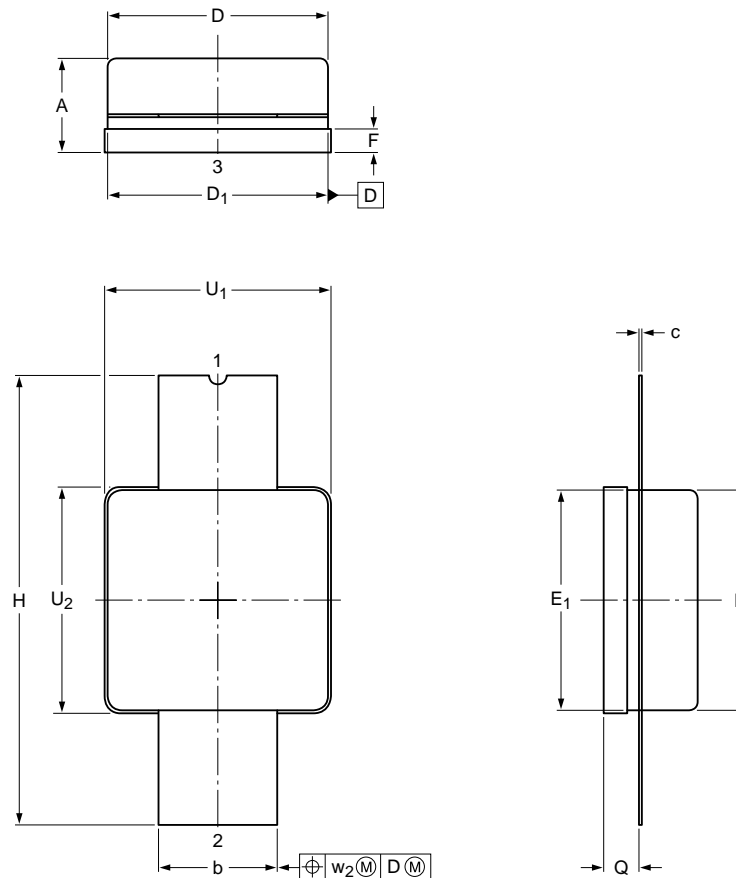


Fig 8. Package outline SOT1135A

Earless flanged ceramic package; 2 leads

SOT1135B



Dimensions

| Unit ⁽¹⁾ | A | b | c | D | D ₁ | E | E ₁ | F | H | Q | U ₁ | U ₂ | w ₂ |
|---------------------|-----|-------|-------|-------|----------------|------|----------------|-------|-------|-------|----------------|----------------|----------------|
| 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- 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"> 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. | | | |
| 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

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| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
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