

BLF6G15L-40RN; BLF6G15LS-40RN

Power LDMOS transistor

Rev. 3 — 1 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

40 W LDMOS power transistor for base station applications at frequencies from 1450 MHz to 1550 MHz.

Table 1. Typical performance

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

| Test signal | f (MHz) | V_{DS} (V) | $P_{L(AV)}$ (W) | G_p (dB) | η_D (%) | ACPR (dBc) |
|------------------|--------------|-----------------|--------------------|---------------|-----------------|--------------------|
| 2-carrier W-CDMA | 1476 to 1511 | 28 | 2.5 | 22.5 | 13.5 | -45 ^[1] |

[1] Test signal: 3GPP test model 1; 64 DPCH; PAR = 8.4 dB at probability of 0.01 % on CCDF carrier; carrier spacing 5 MHz.

1.2 Features and benefits

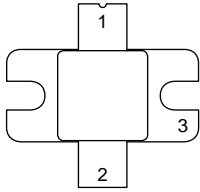
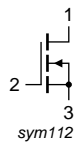
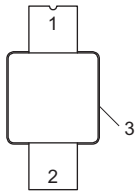
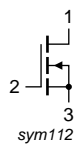
- Typical 2-carrier W-CDMA performance at frequencies of 1476 MHz and 1511 MHz, a supply voltage of 28 V and an I_{DQ} of 375 mA:
 - ◆ Average output power = 2.5 W
 - ◆ Power gain = 22.5 dB
 - ◆ Efficiency = 13.5 %
 - ◆ ACPR = -45 dBc
- Easy power control
- Integrated ESD protection
- Enhanced ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (1450 MHz to 1550 MHz)
- Internally matched for ease of use
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier applications in the 1450 MHz to 1550 MHz frequency range

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|----------------------------------|-------------|---|---|
| BLF6G15L-40RN (SOT1135A) | | | |
| 1 | drain |  |  sym112 |
| 2 | gate | | |
| 3 | source | | |
| BLF6G15LS-40RN (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 |
| BLF6G15L-40RN | - | flanged ceramic package; 2 mounting holes; 2 leads | SOT1135A |
| BLF6G15LS-40RN | - | 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 | | - | 65 | V |
| V_{GS} | gate-source voltage | | -0.5 | +11 | V |
| 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 |
|------------------|--|--|------|------|
| $R_{th(j-case)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ °C}; P_L = 2.5\text{ W (CW)}$ | 1.30 | K/W |

6. Characteristics

Table 6. Characteristics

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|----------------------------------|---|-----|------|-----|---------------|
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS} = 0\text{ V}; I_D = 0.59\text{ mA}$ | 65 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS} = 10\text{ V}; I_D = 59\text{ mA}$ | 1.4 | 1.8 | 2.4 | V |
| I_{DSS} | drain leakage current | $V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$ | - | - | 1.4 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$ | - | 9.4 | - | A |
| I_{GSS} | gate leakage current | $V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$ | - | - | 140 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}; I_D = 58.9\text{ mA}$ | - | 0.5 | - | S |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 2.06\text{ A}$ | - | 0.32 | - | Ω |

7. Application information

Table 7. 2-carrier W-CDMA RF performance

Class-AB production test circuit; PAR 8.4 dB at 0.01 % probability on CCDF; carrier spacing 5 MHz; 3GPP test model 1; 64 DPCH; $f_1 = 1476\text{ MHz}; f_2 = 1511\text{ MHz};$ RF performance at $V_{DS} = 28\text{ V}; I_{Dq} = 375\text{ mA}; T_{case} = 25\text{ }^\circ\text{C};$ unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|------------------------------|----------------------------|------|------|-----|------|
| $P_{L(AV)}$ | average output power | | - | 2.5 | - | W |
| G_p | power gain | $P_{L(AV)} = 2.5\text{ W}$ | 19.8 | 22.5 | - | dB |
| RL_{in} | input return loss | $P_{L(AV)} = 2.5\text{ W}$ | - | -16 | -11 | dB |
| η_D | drain efficiency | $P_{L(AV)} = 2.5\text{ W}$ | 11.5 | 13.5 | - | % |
| ACPR | adjacent channel power ratio | $P_{L(AV)} = 2.5\text{ W}$ | - | -45 | -40 | dBc |

7.1 Ruggedness in Class-AB operations

The BLF6G15L-40RN and the BLF6G15LS-40RN are capable of withstanding a load mismatch corresponding to VSWR 10 : 1 through all phases under following conditions: $V_{DS} = 28\text{ V}; I_{Dq} = 375\text{ mA}; P_L = 40\text{ W}; f = 1476\text{ MHz}$ (CW).

8. Test information

8.1 Impedance information

Table 8. Typical impedance

Measured load-pull data. Typical values per section. $I_{Dq} = 330\text{ mA};$ main transistor $V_{DS} = 28\text{ V}$ Z_S and Z_L defined in [Figure 1](#).

| f (MHz) | Z_S (Ω) | Z_L (Ω) |
|---------|--------------------|--------------------|
| 1450 | 4.4 – j5.9 | 5.5 – j4.6 |
| 1480 | 4.4 – j4.1 | 5.0 – j5.0 |
| 1510 | 6.4 – j4.7 | 5.0 – j5.0 |

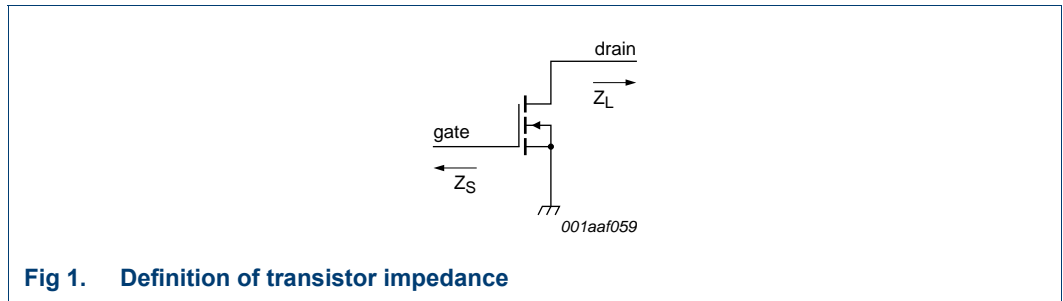


Fig 1. Definition of transistor impedance

8.2 One-tone graphs

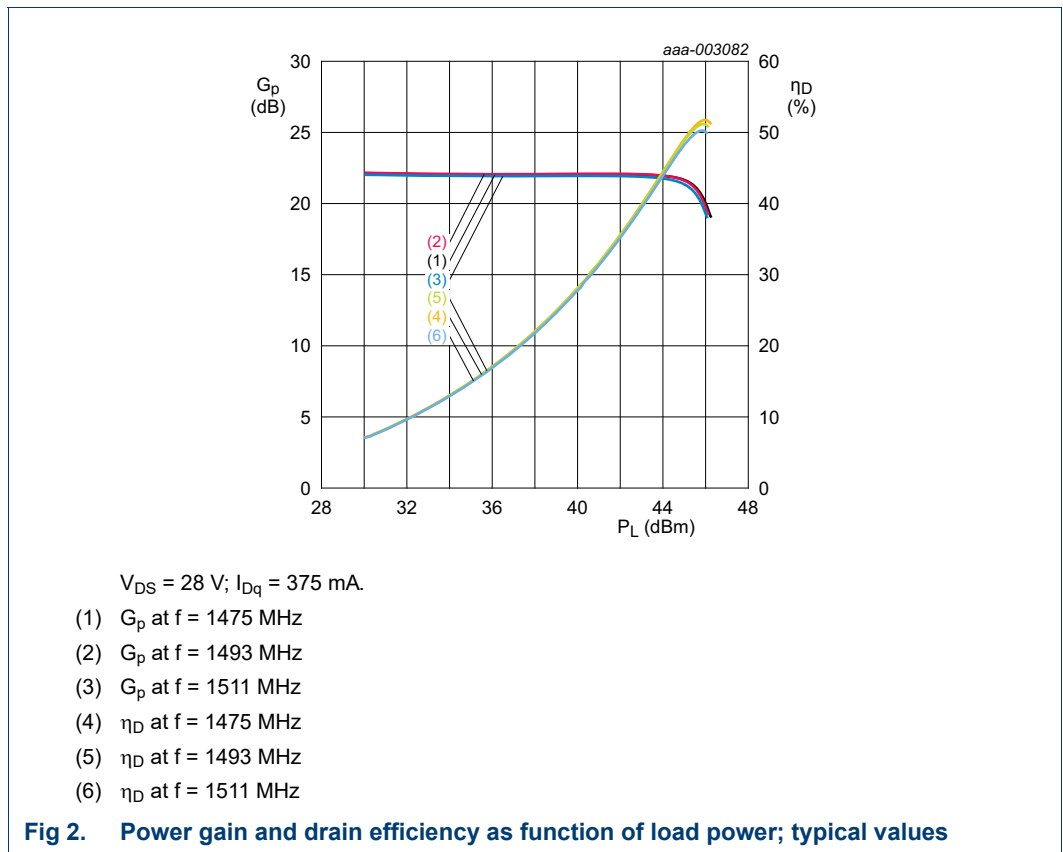
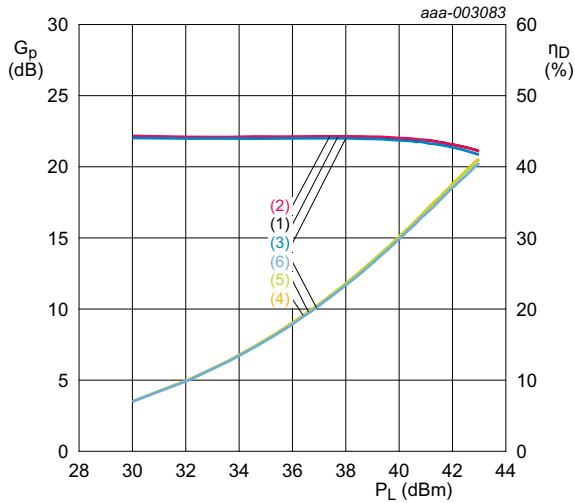


Fig 2. Power gain and drain efficiency as function of load power; typical values

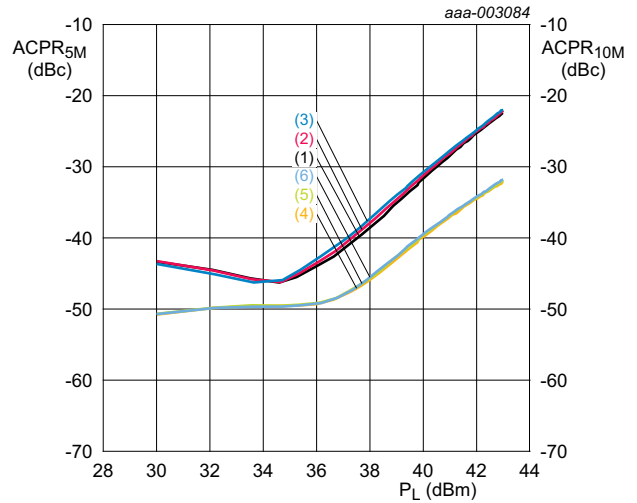
8.3 2-Carrier W-CDMA graphs

3GPP, test model 1; 64 DPCH, PAR = 8.4 dB at 0.01 % probability, 5 MHz carrier spacing.



- T_{amb} = 25 °C.
- (1) G_p at f = 1475 MHz
 - (2) G_p at f = 1493 MHz
 - (3) G_p at f = 1511 MHz
 - (4) η_D at f = 1475 MHz
 - (5) η_D at f = 1493 MHz
 - (6) η_D at f = 1511 MHz

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



- T_{amb} = 25 °C.
- (1) ACPR_{5M} at f = 1475 MHz
 - (2) ACPR_{5M} at f = 1493 MHz
 - (3) ACPR_{5M} at f = 1511 MHz
 - (4) ACPR_{10M} at f = 1475 MHz
 - (5) ACPR_{10M} at f = 1493 MHz
 - (6) ACPR_{10M} at f = 1511 MHz

Fig 4. Adjacent channel power ratio (5 MHz and 10 MHz) as a function of load power; typical values

8.4 Test circuit

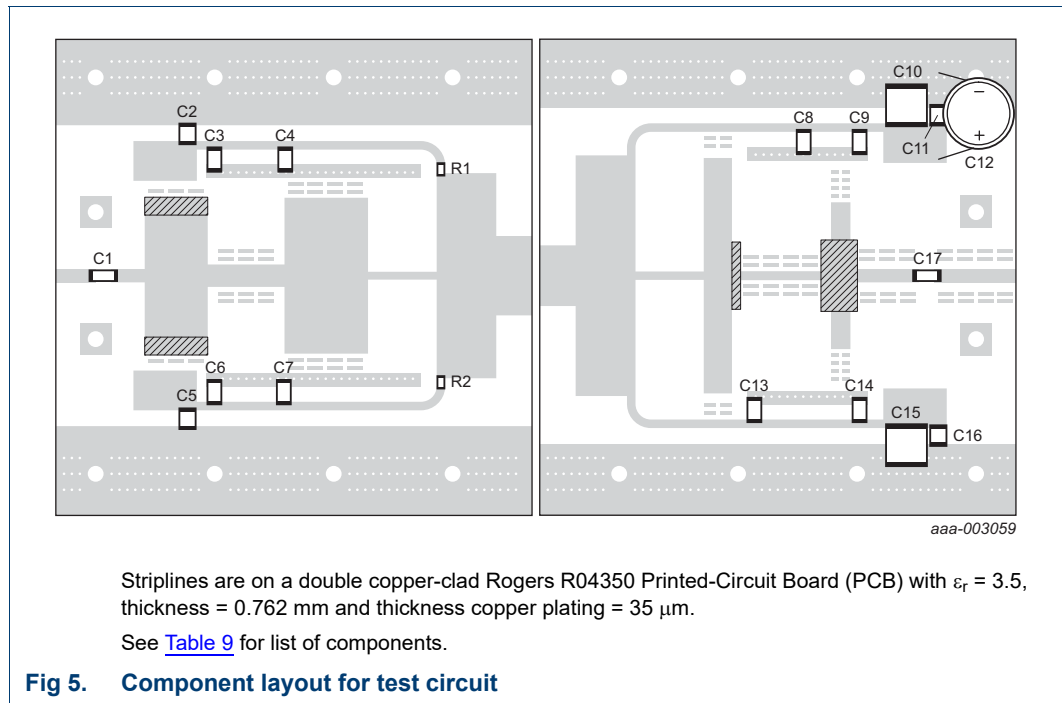


Table 9. List of components

For test circuit, see [Figure 5](#).

| Component | Description | Value | Remarks |
|------------------|-----------------------------------|---------------------------|---------|
| C1, C17 | multilayer ceramic chip capacitor | 24 pF | [1] |
| C3, C6 | multilayer ceramic chip capacitor | 68 pF | [2] |
| C4, C7, C8 | multilayer ceramic chip capacitor | 150 pF | [2] |
| C9, C14 | multilayer ceramic chip capacitor | 47 pF | [2] |
| C13 | multilayer ceramic chip capacitor | 15 pF | [2] |
| C2, C5, C11, C16 | multilayer ceramic chip capacitor | 10 μF | [3] |
| C10, C15 | multilayer ceramic chip capacitor | 0.1 μF | [3] |
| C12 | electrolytic capacitor | 2200 μF , 50 V | |
| R1, R2 | chip resistor | 15 Ω | |

[1] American technical ceramics type 800B or capacitor of same quality.

[2] American technical ceramics type 100B or capacitor of same quality.

[3] TDK or capacitor of same quality.

9. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads

SOT1135A

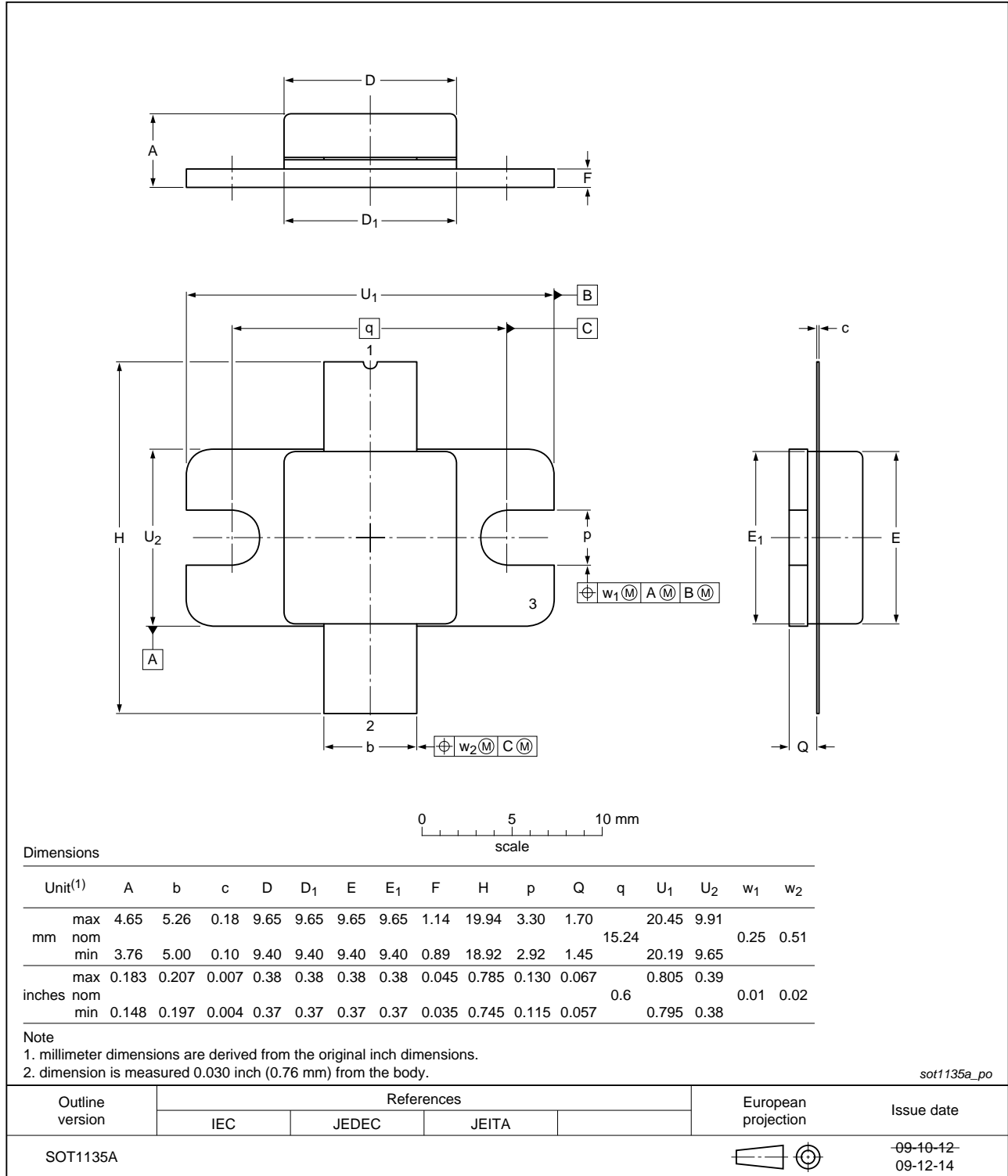
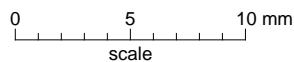
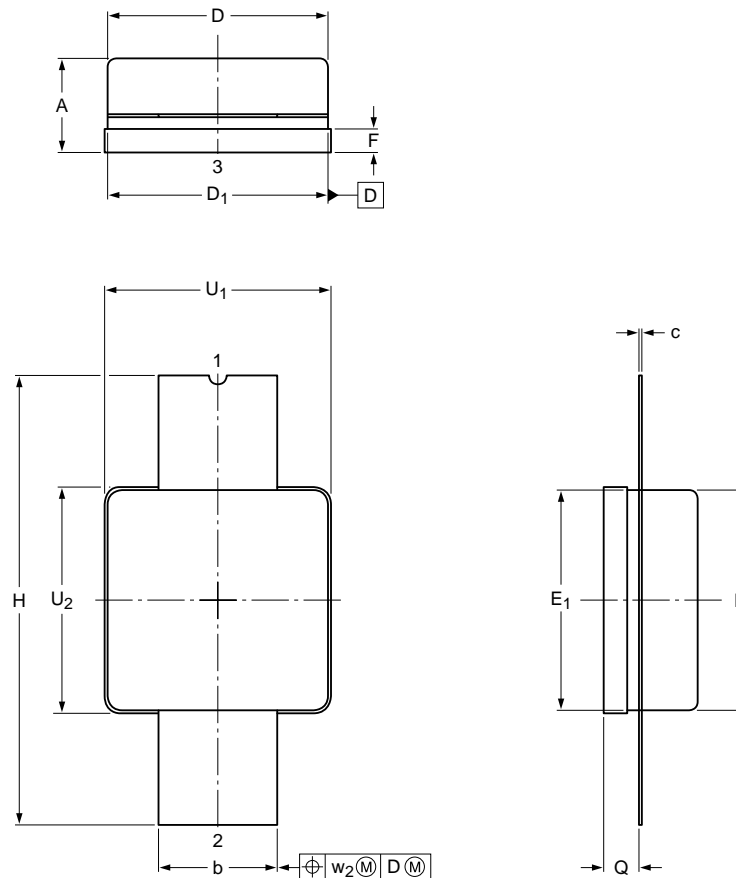


Fig 6. Package outline SOT1135A

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 7. 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 |
|---------|--|
| 3GPP | 3rd Generation Partnership Project |
| CCDF | Complementary Cumulative Distribution Function |
| CW | Continuous Wave |
| DPCH | Dedicated Physical Channel |
| ESD | ElectroStatic Discharge |
| LDMOS | Laterally Diffused Metal-Oxide Semiconductor |
| PAR | Peak-to-Average Ratio |
| RF | Radio Frequency |
| VSWR | Voltage Standing-Wave Ratio |
| W-CDMA | Wideband Code Division Multiple Access |

12. Revision history

Table 11. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------------------------|--|----------------------|---------------|-------------------------------|
| BLF6G15L-40RN_6G15LS-40RN#3 | 20150901 | Product data sheet | - | BLF6G15L-40RN_6G15LS-40RN 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. | | | |
| BLF6G15L-40RN_6G15LS-40RN v.2 | 20120514 | Product data sheet | - | BLF6G15L-40RN_6G15LS-40RN v.1 |
| BLF6G15L-40RN_6G15LS-40RN v.1 | 20111027 | Objective data sheet | - | - |

13. Legal information

13.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | 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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[2] The term 'short data sheet' is explained in section "Definitions".

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