

BLF573S

HF / VHF power LDMOS transistor

Rev. 02 — 17 February 2009

Product data sheet

1. Product profile

1.1 General description

A 300 W LDMOS RF power transistor for broadcast applications and industrial, scientific and medical applications in the HF to 500 MHz band.

Table 1. Production test information

| Mode of operation | f (MHz) | V _{DS} (V) | P _L (W) | G _p (dB) | η _D (%) |
|-------------------|------------|------------------------|-----------------------|------------------------|-----------------------|
| CW | 225 | 50 | 300 | 27.2 | 70 |

CAUTION



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

1.2 Features

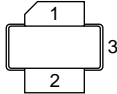
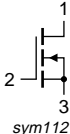
- Typical CW performance at frequency of 225 MHz, a supply voltage of 50 V and an I_{Dq} of 900 mA:
 - ◆ Average output power = 300 W
 - ◆ Power gain = 27.2 dB
 - ◆ Efficiency = 70 %
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (HF and VHF band)
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- Industrial, scientific and medical applications
- Broadcast transmitter applications

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|----------------------------|---|---|
| 1 | drain |  |  sym112 |
| 2 | gate | | |
| 3 | source [1] | | |

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|---|---------|
| | Name | Description | Version |
| BLF573S | - | 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 | | - | 110 | V |
| V_{GS} | gate-source voltage | | -0.5 | +11 | V |
| I_D | drain current | | - | 42 | A |
| T_{stg} | storage temperature | | -65 | +150 | °C |
| T_j | junction temperature | | - | 225 | °C |

5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Typ | Unit |
|---------------|--|---|------|------|
| $R_{th(j-c)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ °C}; P_L = 300\text{ W}$ [1] | 0.21 | K/W |

[1] $R_{th(j-c)}$ is measured under RF conditions.

6. Characteristics

Table 6. DC characteristics

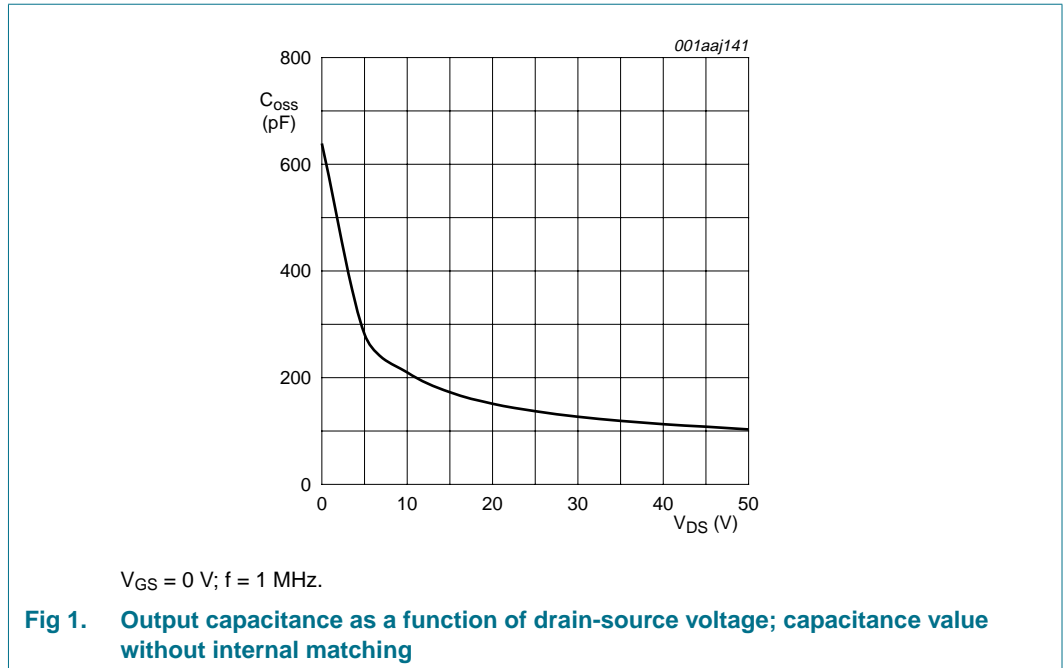
$T_j = 25^\circ\text{C}$ unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|----------------------------------|--|------|------|------|---------------|
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS} = 0\text{ V}; I_D = 3.75\text{ mA}$ | 110 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS} = 10\text{ V}; I_D = 375\text{ mA}$ | 1.25 | 1.7 | 2.25 | V |
| V_{GSq} | gate-source quiescent voltage | $V_{DS} = 50\text{ V}; I_D = 900\text{ mA}$ | 1.45 | 1.95 | 2.45 | V |
| I_{DSS} | drain leakage current | $V_{GS} = 0\text{ V}; V_{DS} = 50\text{ V}$ | - | - | 4.2 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $V_{DS} = 10\text{ V}$ | 44 | 56 | - | A |
| I_{GSS} | gate leakage current | $V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$ | - | - | 420 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}; I_D = 18.75\text{ A}$ | - | 20 | - | S |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $I_D = 12.49\text{ A}$ | - | 0.09 | - | Ω |
| C_{rs} | feedback capacitance | $V_{GS} = 0\text{ V}; V_{DS} = 50\text{ V};$ $f = 1\text{ MHz}$ | - | 2.3 | - | pF |
| C_{iss} | input capacitance | $V_{GS} = 0\text{ V}; V_{DS} = 50\text{ V};$ $f = 1\text{ MHz}$ | - | 300 | - | pF |
| C_{oss} | output capacitance | $V_{GS} = 0\text{ V}; V_{DS} = 50\text{ V};$ $f = 1\text{ MHz}$ | - | 103 | - | pF |

Table 7. RF characteristics

Mode of operation: CW; $f = 225\text{ MHz}$; RF performance at $V_{DS} = 50\text{ V}; I_{Dq} = 900\text{ mA}; T_{case} = 25^\circ\text{C}$; unless otherwise specified; in a class-AB production test circuit.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|-------------------|----------------------|-----|------|------|------|
| G_p | power gain | $P_L = 300\text{ W}$ | 26 | 27.2 | 28.4 | dB |
| RL_{in} | input return loss | $P_L = 300\text{ W}$ | 10 | 13 | - | dB |
| η_D | drain efficiency | $P_L = 300\text{ W}$ | 67 | 70 | - | % |



6.1 Ruggedness in class-AB operation

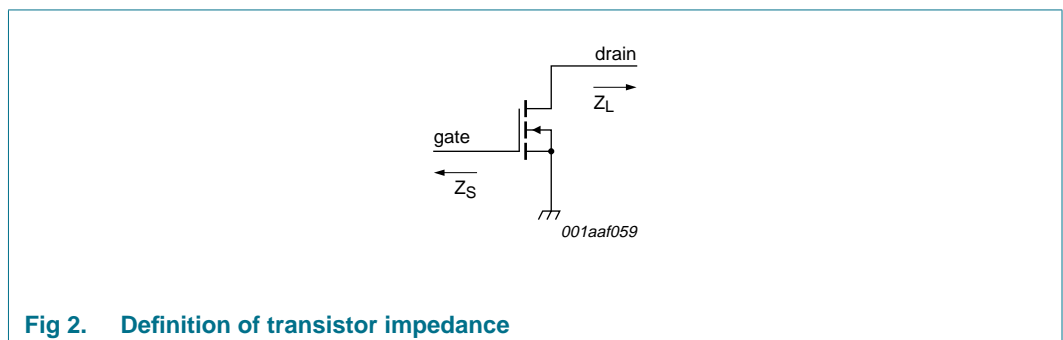
The BLF573S is capable of withstanding a load mismatch corresponding to VSWR = 13 : 1 through all phases under the following conditions: V_{DS} = 50 V; I_{Dq} = 900 mA; P_L = 300 W; f = 225 MHz.

7. Application information

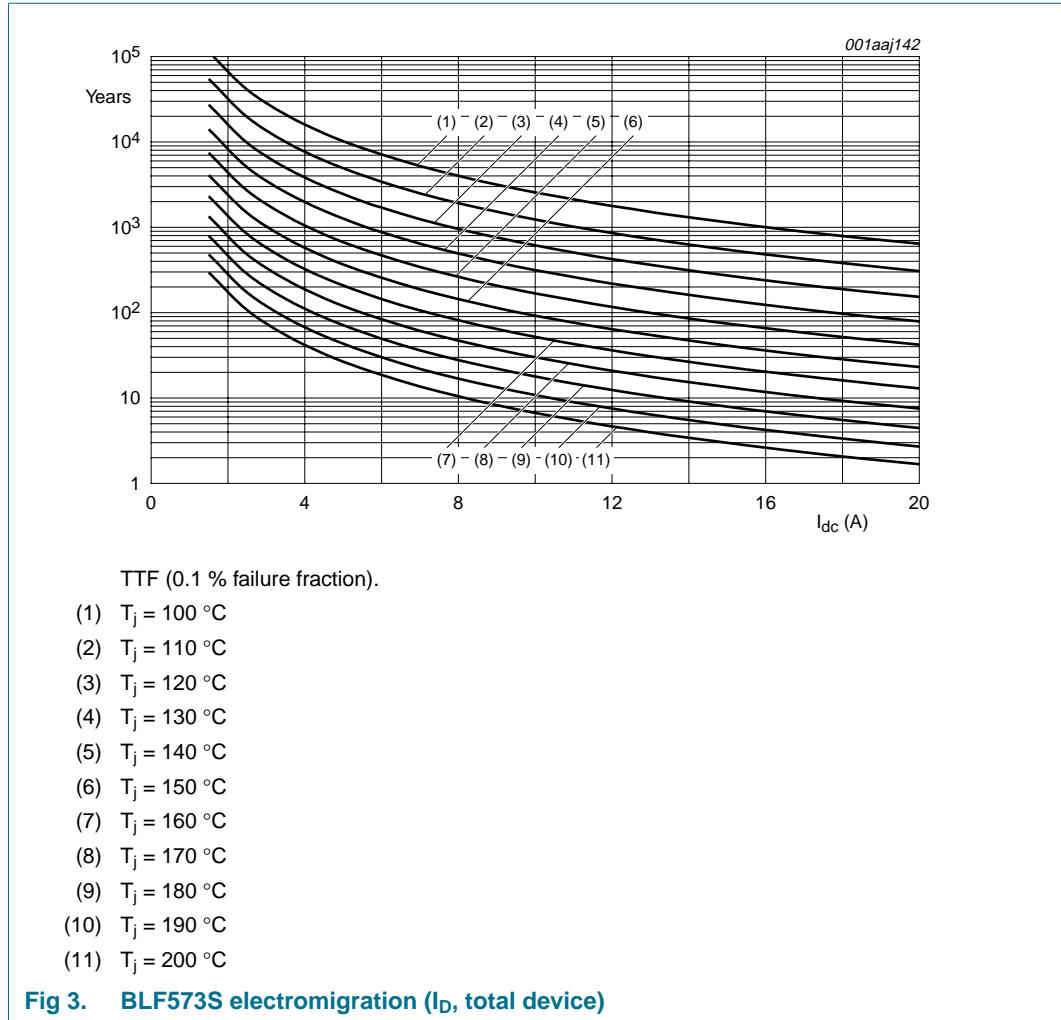
7.1 Impedance information

Table 8. Typical impedance
Measured Z_S and Z_L test circuit impedances.

| f | Z _S | Z _L |
|-----|----------------|----------------|
| MHz | Ω | Ω |
| 225 | 0.7 + j2.0 | 1.95 + j2.0 |



7.2 Reliability

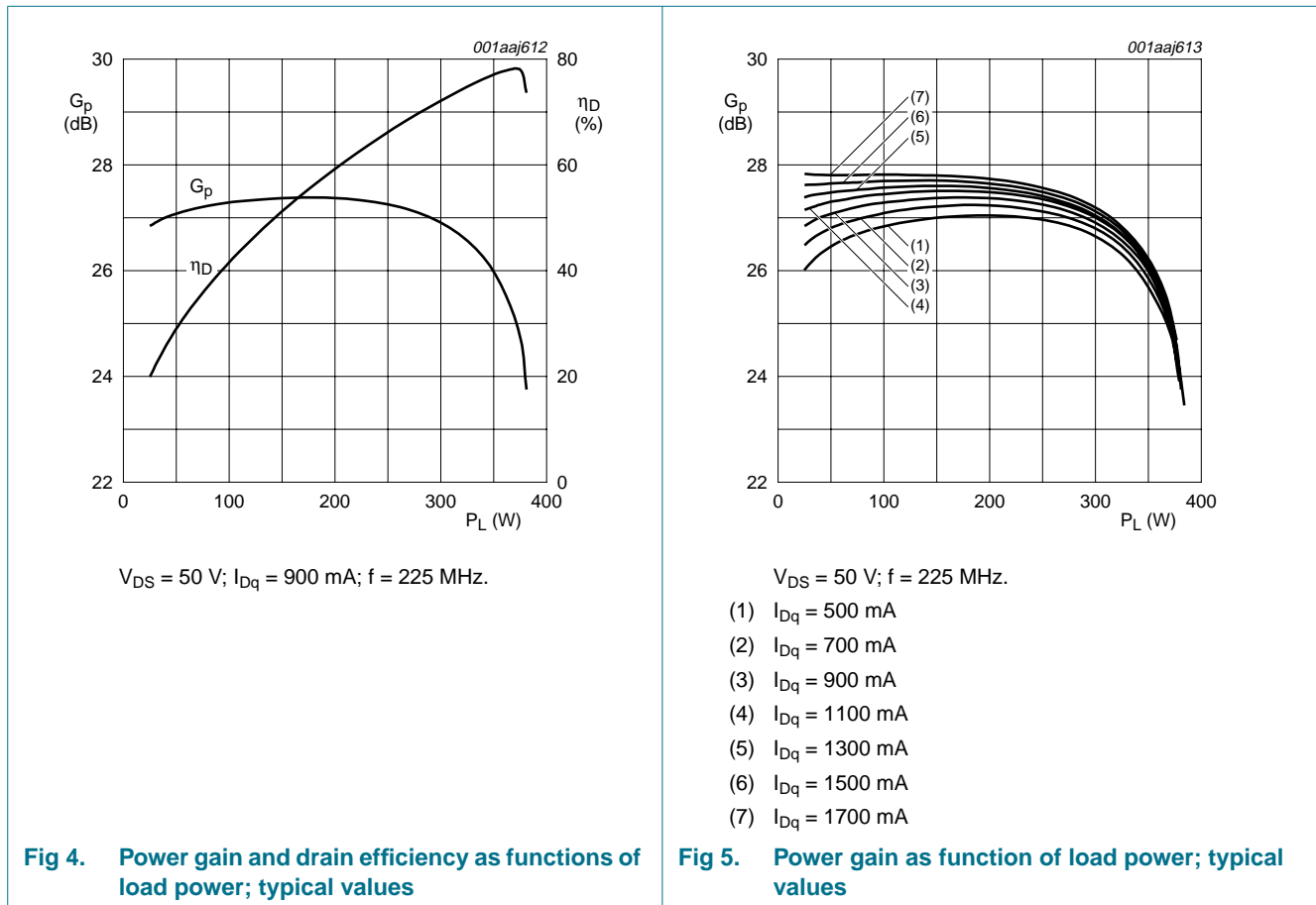


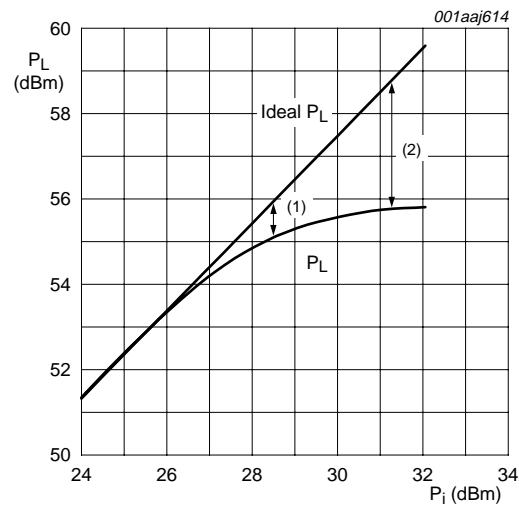
8. Test information

8.1 RF Performance

The following figures are measured in a class-AB production test circuit.

8.1.1 1-Tone CW



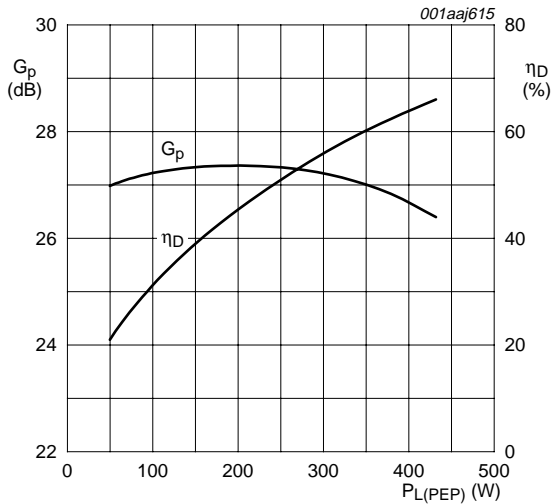


$V_{DS} = 50\text{ V}$; $I_{Dq} = 900\text{ mA}$; $f = 225\text{ MHz}$.

- (1) $P_{L(1dB)} = 55.2\text{ dBm}$ (330 W)
- (2) $P_{L(3dB)} = 55.8\text{ dBm}$ (380 W)

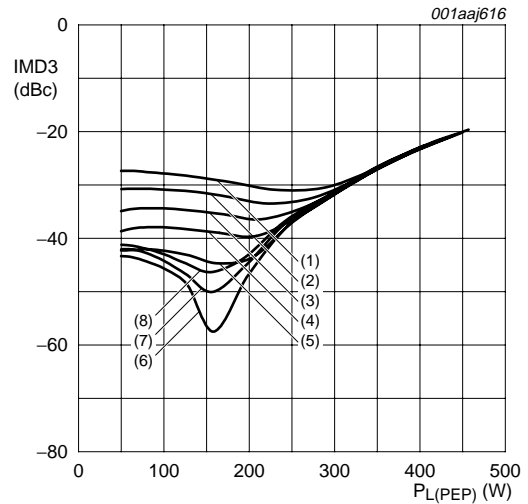
Fig 6. Load power as function of input power; typical values

8.1.2 2-Tone CW



$V_{DS} = 50\text{ V}$; $I_{Dq} = 900\text{ mA}$; $f_1 = 224.95\text{ MHz}$; $f_2 = 225.05\text{ MHz}$.

Fig 7. Power gain and drain efficiency as functions of peak envelope load power; typical values



$V_{DS} = 50\text{ V}$; $f_1 = 224.95\text{ MHz}$; $f_2 = 225.05\text{ MHz}$.

- (1) $I_{Dq} = 500\text{ mA}$
- (2) $I_{Dq} = 700\text{ mA}$
- (3) $I_{Dq} = 900\text{ mA}$
- (4) $I_{Dq} = 1100\text{ mA}$
- (5) $I_{Dq} = 1300\text{ mA}$
- (6) $I_{Dq} = 1500\text{ mA}$
- (7) $I_{Dq} = 1700\text{ mA}$
- (8) $I_{Dq} = 1800\text{ mA}$

Fig 8. Third order intermodulation distortion as a function of peak envelope load power; typical values

8.2 Test circuit

Table 9. List of components

For production test circuit, see Figure 9 and Figure 10.

Printed-Circuit Board (PCB): Rogers 5880; $\epsilon_r = 2.2\text{ F/m}$; height = 0.79 mm; Cu (top/bottom metallization); thickness copper plating = 35 μm .

| Component | Description | Value | Remarks |
|---------------|-----------------------------------|------------------------|---|
| B1 | ferrite SMD bead | 100 Ω ; 100 MHz | Ferroxcube BDS3/3/8.9-4S2 or equivalent |
| C1, C18 | multilayer ceramic chip capacitor | 100 pF | [1] |
| C2 | multilayer ceramic chip capacitor | 39 pF | [1] |
| C3, C4 | multilayer ceramic chip capacitor | 180 pF | [1] |
| C5, C6, C7 | multilayer ceramic chip capacitor | 220 pF | [1] |
| C8, C20 | multilayer ceramic chip capacitor | 1 nF | [1] |
| C9 | multilayer ceramic chip capacitor | 4.7 μF | TDK C4532X7R1E475MT020U or equivalent |
| C10 | multilayer ceramic chip capacitor | 30 pF | [1] |
| C11, C12, C13 | multilayer ceramic chip capacitor | 51 pF | [1] |
| C14 | multilayer ceramic chip capacitor | 43 pF | [1] |

Table 9. List of components ...continued

For production test circuit, see [Figure 9](#) and [Figure 10](#).

Printed-Circuit Board (PCB): Rogers 5880; $\epsilon_r = 2.2$ F/m; height = 0.79 mm; Cu (top/bottom metallization); thickness copper plating = 35 μm .

| Component | Description | Value | Remarks |
|-----------|-----------------------------------|--|-------------------------------------|
| C15 | multilayer ceramic chip capacitor | 33 pF | [1] |
| C16 | multilayer ceramic chip capacitor | 36 pF | [1] |
| C17 | multilayer ceramic chip capacitor | 16 pF | [1] |
| C19 | electrolytic capacitor | 220 μF ; 63 V | |
| L1 | 2 turns enamelled copper wire | D = 3 mm; d = 1 mm; length = 2 mm; leads = 2 \times 6 mm | |
| L2 | 4 turns enamelled copper wire | D = 2 mm; d = 1 mm; length = 13 mm; leads = 2 \times 5 mm | |
| L3 | stripline | - | (L \times W) 96 mm \times 3 mm |
| L4, L5 | stripline | - | (L \times W) 15 mm \times 8 mm |
| L6 | stripline | - | (L \times W) 105 mm \times 6 mm |
| L7 | stripline | - | (L \times W) 3 mm \times 6 mm |
| L8 | stripline | - | (L \times W) 12 mm \times 6 mm |
| R1 | metal film resistor | 100 Ω ; 0.6 W | |

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

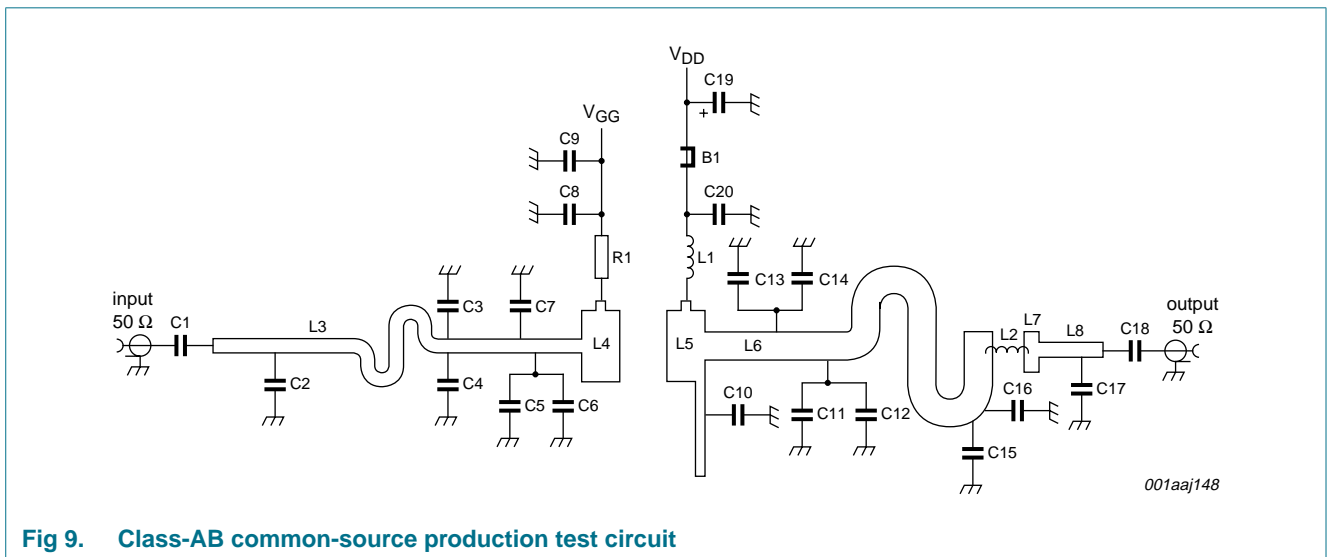


Fig 9. Class-AB common-source production test circuit

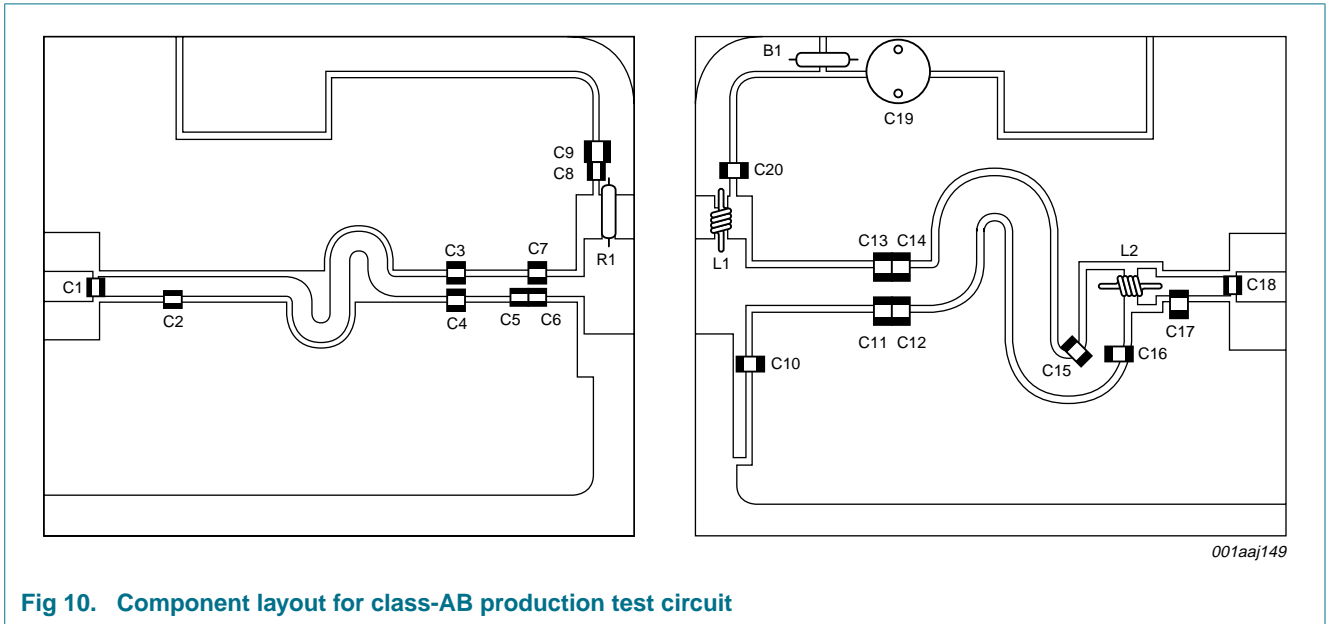


Fig 10. Component layout for class-AB production test circuit

9. Package outline

Earless flanged LDMOST ceramic package; 2 leads

SOT502B

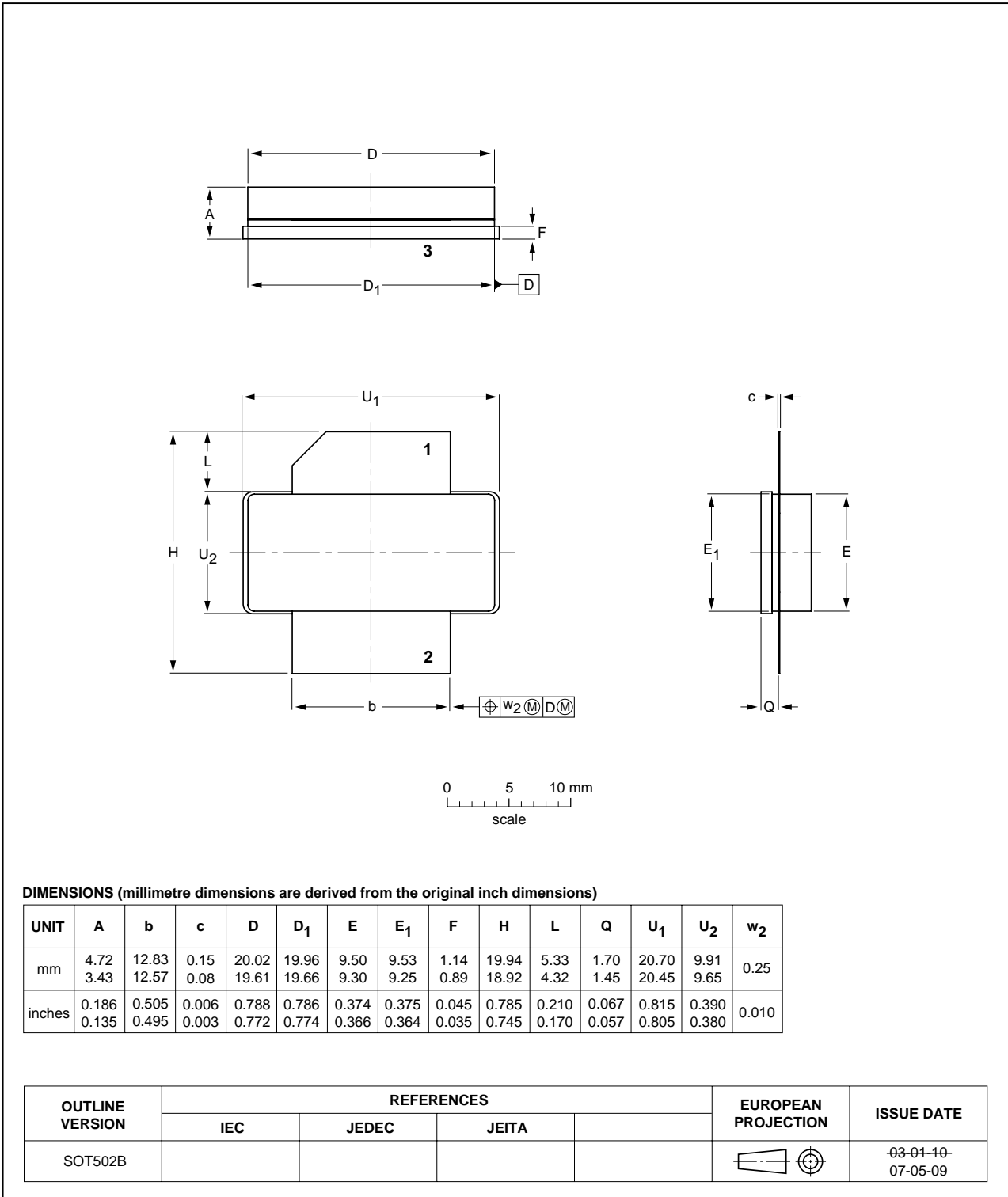


Fig 11. Package outline SOT502B

10. Abbreviations

Table 10. Abbreviations

| Acronym | Description |
|---------|---|
| CW | Continuous Wave |
| EDGE | Enhanced Data rates for GSM Evolution |
| GSM | Global System for Mobile communications |
| HF | High Frequency |
| LDMOS | Laterally Diffused Metal-Oxide Semiconductor |
| LDMOST | Laterally Diffused Metal-Oxide Semiconductor Transistor |
| RF | Radio Frequency |
| SMD | Surface Mount Device |
| TTF | Time To Failure |
| VHF | Very High Frequency |
| VSWR | Voltage Standing-Wave Ratio |

11. Revision history

Table 11. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|---|------------------------|---------------|------------|
| BLF573S_2 | 20090217 | Product data sheet | - | BLF573S_1 |
| Modifications: | <ul style="list-style-type: none"> • Table 1 on page 1: changed the value for G_p • Section 1.2 on page 1: changed the value for G_p • Table 7 on page 3: changed the values for G_p • Section 8.1 on page 6: changed the graphs | | | |
| BLF573S_1 | 20081208 | Preliminary data sheet | - | - |

12. Legal information

12.1 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. |

[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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