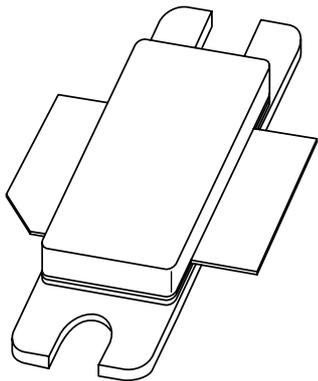


DATA SHEET



BLF1820-90 UHF power LDMOS transistor

Product specification
Supersedes data of 2001 Mar 07

2003 Feb 10

UHF power LDMOS transistor

BLF1820-90

FEATURES

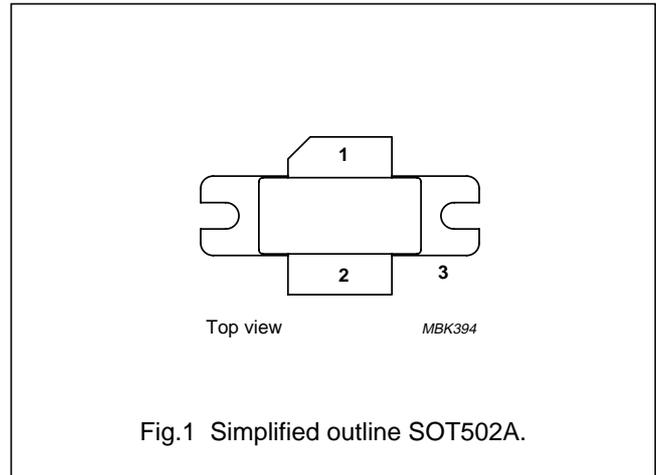
- Typical 2-tone performance at a supply voltage of 26 V and I_{DQ} of 500 mA:
 - Output power = 90 W (PEP)
 - Gain = 12 dB
 - Efficiency = 32%
 - $d_{im} = -26$ dBc
- Easy power control
- Excellent ruggedness
- High power gain
- Excellent thermal stability
- Designed for broadband operation (1800 to 2000 MHz)
- Internally matched for ease of use.

APPLICATIONS

- RF power amplifiers for GSM, EDGE and CDMA base stations and multicarrier applications in the 1800 to 2000 MHz frequency range.

PINNING

| PIN | DESCRIPTION |
|-----|-----------------------------|
| 1 | drain |
| 2 | gate |
| 3 | source, connected to flange |



DESCRIPTION

90 W LDMOS power transistor for base station applications at frequencies from 1800 to 2000 MHz.

QUICK REFERENCE DATA

RF performance at $T_h = 25$ °C in a common source test circuit.

| MODE OF OPERATION | f (MHz) | V_{DS} (V) | P_L (W) | G_p (dB) | η_D (%) | d_{im} (dBc) |
|-------------------|----------------------------|--------------|-----------|------------|--------------|----------------|
| 2-tone, class-AB | $f_1 = 2000; f_2 = 2000.1$ | 26 | 90 (PEP) | >11 | >30 | ≤ -25 |

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

| SYMBOL | PARAMETER | MIN. | MAX. | UNIT |
|-----------|----------------------|------|----------|------|
| V_{DS} | drain-source voltage | – | 65 | V |
| V_{GS} | gate-source voltage | – | ± 15 | V |
| I_D | DC drain current | – | 12 | A |
| T_{stg} | storage temperature | –65 | +150 | °C |
| T_j | junction temperature | – | 200 | °C |

CAUTION

This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

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THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---------------|--|-------------------------------|-------|------|
| $R_{th\ j-h}$ | thermal resistance from junction to heatsink | $T_h = 25\text{ °C}$; note 1 | 0.81 | K/W |

Note

1. Determined under specified RF operating conditions.

CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---------------|----------------------------------|---|------|------|------|---------------|
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS} = 0$; $I_D = 2.1\text{ mA}$ | 65 | – | – | V |
| V_{GSth} | gate-source threshold voltage | $V_{DS} = 10\text{ V}$; $I_D = 210\text{ mA}$ | 4.4 | – | 5.5 | V |
| I_{DSS} | drain-source leakage current | $V_{GS} = 0$; $V_{DS} = 26\text{ V}$ | – | – | 15 | μA |
| I_{DSX} | on-state drain current | $V_{GS} = V_{GSth} + 9\text{ V}$; $V_{DS} = 10\text{ V}$ | 27 | – | – | A |
| I_{GSS} | gate leakage current | $V_{GS} = \pm 15\text{ V}$; $V_{DS} = 0$ | – | – | 38 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}$; $I_D = 7.5\text{ A}$ | – | 6.2 | – | S |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = V_{GSth} + 9\text{ V}$; $I_D = 7.5\text{ A}$ | – | 0.1 | – | Ω |
| C_{rss} | feedback capacitance | $V_{GS} = 0$; $V_{DS} = 26\text{ V}$; $f = 1\text{ MHz}$; note 1 | – | 5.1 | – | pF |

Note

1. The value of capacitance is that of the die only.

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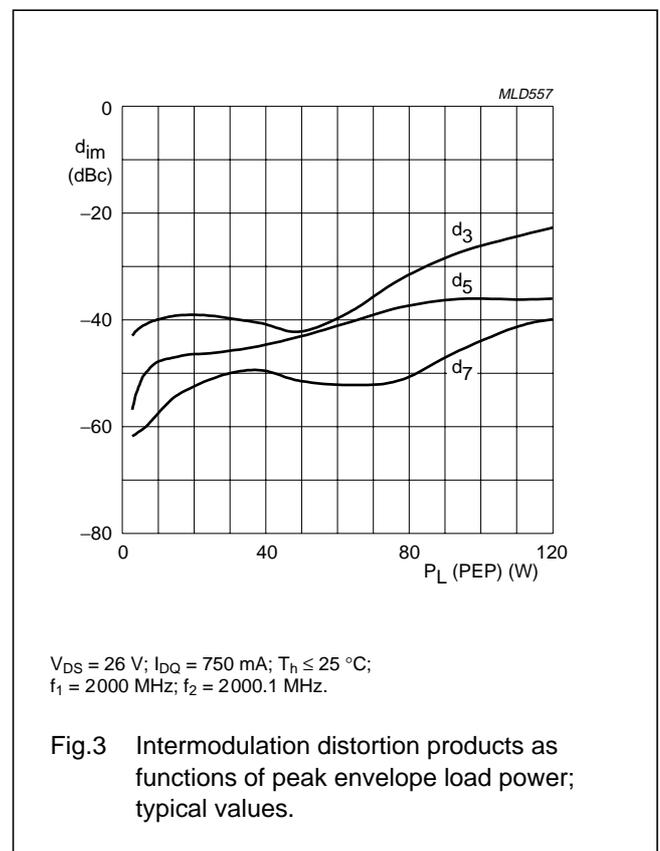
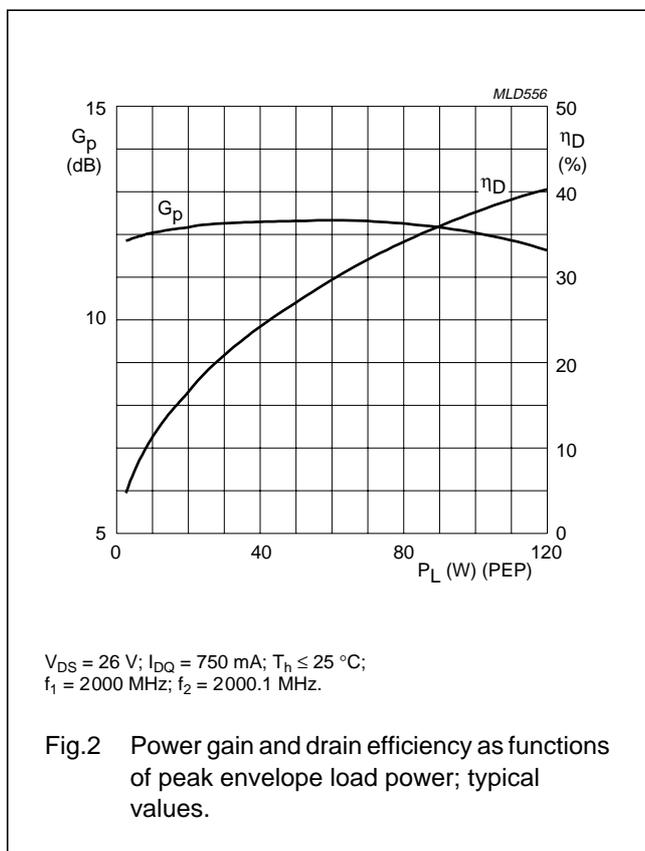
APPLICATION INFORMATION

RF performance in a common source class-AB circuit. $T_h = 25\text{ }^\circ\text{C}$; $R_{th\ j-h} = 0.81\text{ K/W}$; unless otherwise specified.

| MODE OF OPERATION | f (MHz) | V _{DS} (V) | I _{DQ} (mA) | P _L (W) | G _p (dB) | η _D (%) | d _{im} (dBc) |
|--------------------|--|---------------------|----------------------|--------------------|---------------------|--------------------|-----------------------|
| Two-tone, class-AB | f ₁ = 2000; f ₂ = 2000.1 | 26 | 750 | 90 (PEP) | >11 | >30 | ≤-25 |

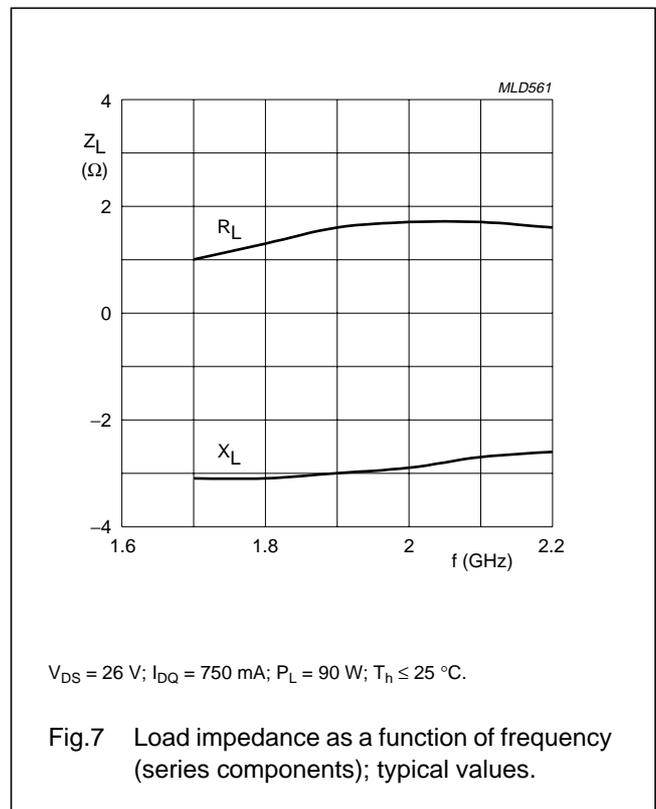
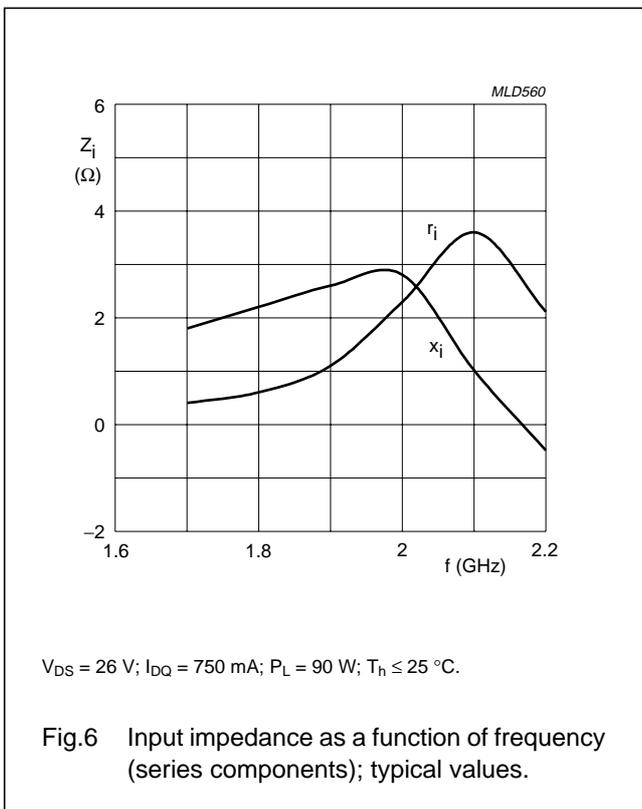
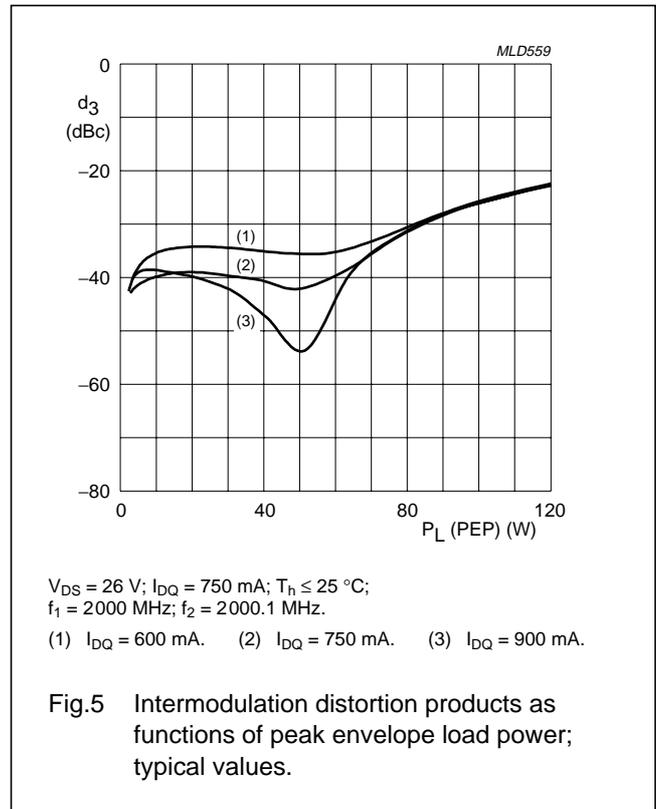
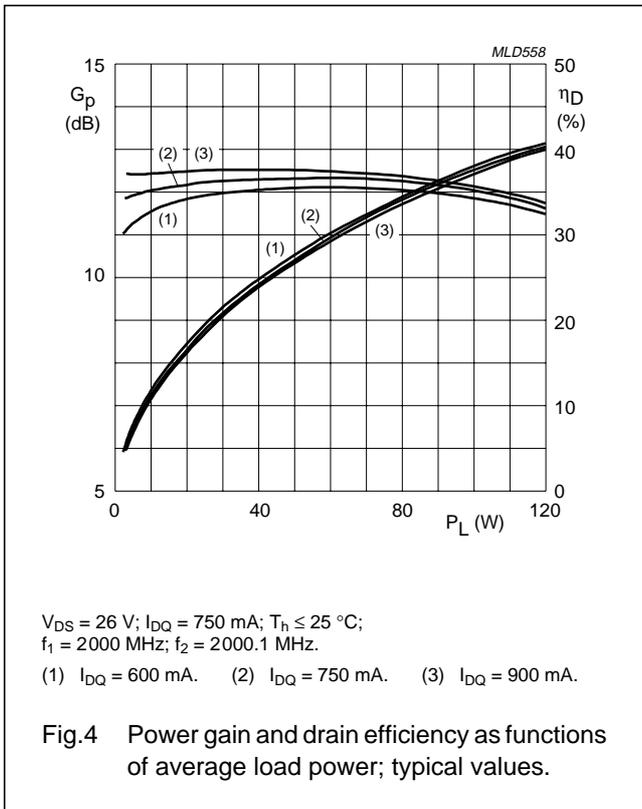
Ruggedness in class-AB operation

The BLF1820-90 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 26 V; I_{DQ} = 750 mA; P_L = 90 W; f = 2000 MHz (single tone).



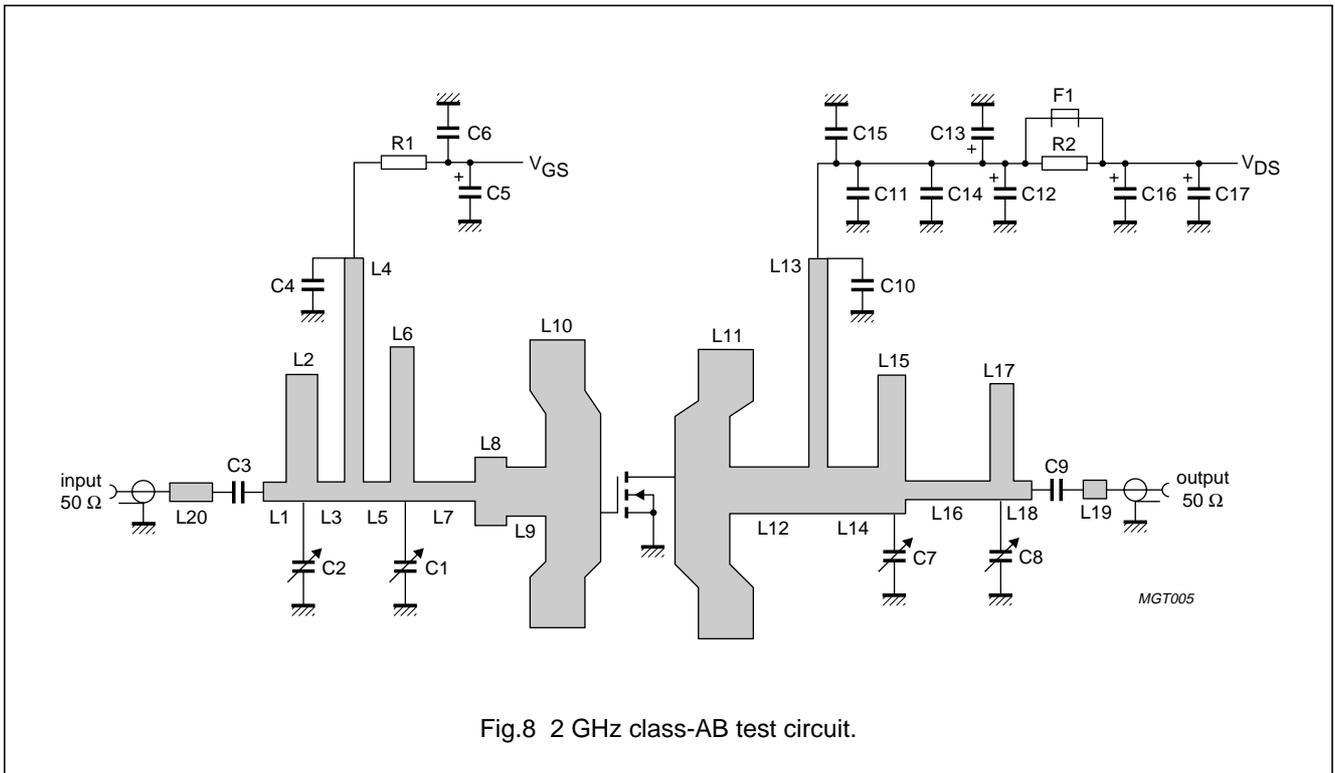
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List of components

See Figs 8 and 9.

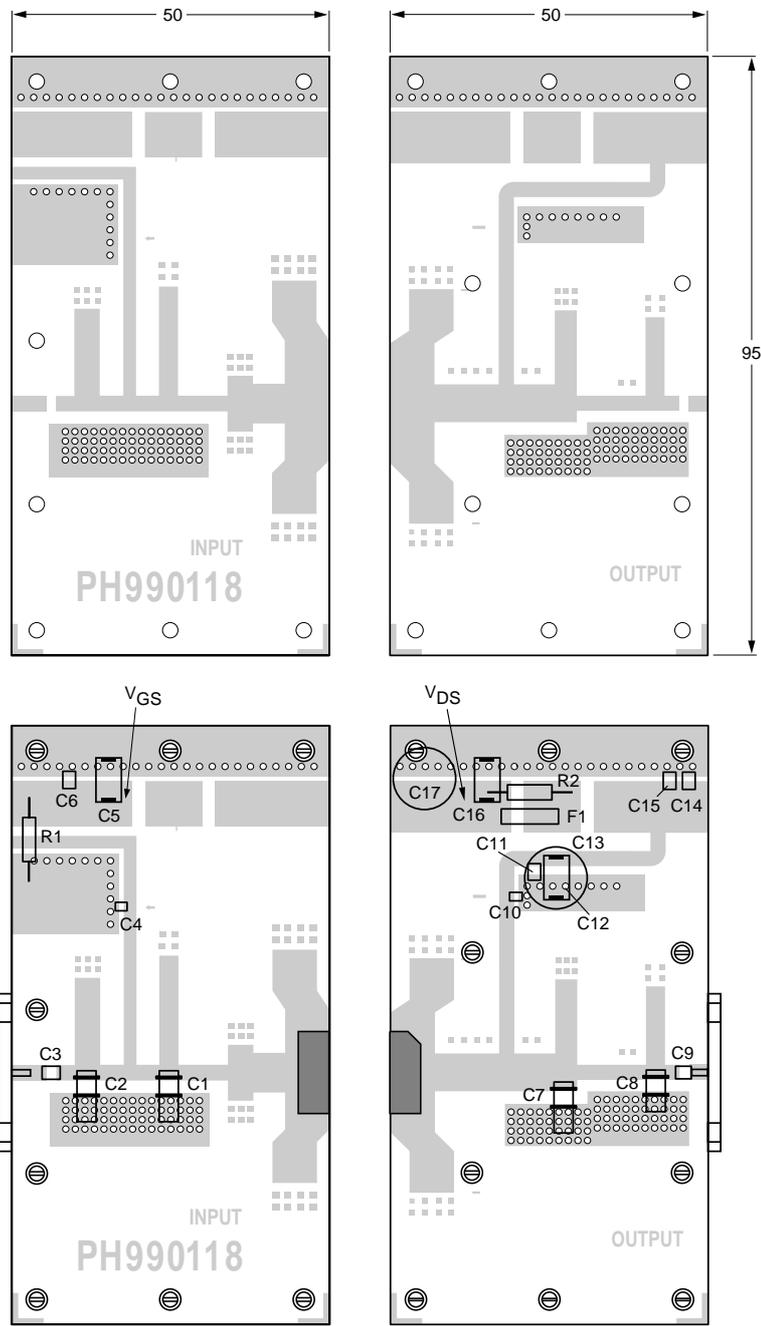
| COMPONENT | DESCRIPTION | VALUE | DIMENSIONS | CATALOGUE NO. |
|----------------|---|---------------------|----------------------|----------------|
| C1, C2, C7, C8 | Tekelec variable capacitor; type 37271 | 0.6 to 4.5 pF | | |
| C3, C9 | multilayer ceramic chip capacitor; note 1 | 12 pF | | |
| C4, C10 | multilayer ceramic chip capacitor; note 2 | 12 pF | | |
| C5, C12, C16 | electrolytic capacitor | 4.5 μ F; 50 V | | |
| C6, C11, C15 | multilayer ceramic chip capacitor; note 1 | 1 nF | | |
| C13, C17 | electrolytic capacitor | 100 μ F; 63 V | | 2222 037 58101 |
| C14 | multilayer ceramic chip capacitor | 100 nF | | 2222 581 16641 |
| F1 | Ferroxcube chip-bead 8DS3/3/8/9-4S2 | | | 4330 030 36301 |
| L1 | stripline; note 3 | 50 Ω | 2.9 \times 2.4 mm | |
| L2 | | 10.8 Ω | 4 \times 16.3 mm | |
| L3 | | 50 Ω | 3.7 \times 2.4 mm | |
| L4 | | 6 Ω | 2 \times 30.8 mm | |
| L5 | | 50 Ω | 3.6 \times 2.4 mm | |
| L6 | | 9 Ω | 3 \times 19.9 mm | |
| L7 | | 50 Ω | 7.8 \times 2.4 mm | |
| L8 | | 18.5 Ω | 4 \times 8.8 mm | |
| L9 | | 24.4 Ω | 5 \times 6.3 mm | |
| L10 | | 5.1 Ω | 7 \times 37 mm | |
| L11 | | 5.1 Ω | 7 \times 40.9 mm | |
| L12 | | 25.4 Ω | 10.1 \times 6 mm | |
| L13 | | 5.7 Ω | 2.4 \times 32.8 mm | |
| L14 | | 25.4 Ω | 6.4 \times 6 mm | |
| L15 | | 10 Ω | 3.5 \times 20.7 mm | |
| L16 | | 50 Ω | 10.8 \times 2.4 mm | |
| L17 | | 11.8 Ω | 3 \times 7.9 mm | |
| L18 | | 50 Ω | 2.3 \times 2.4 mm | |
| L19 | | 50 Ω | 3 \times 2.4 mm | |
| L20 | | 50 Ω | 5.5 \times 2.4 mm | |
| R1, R2 | metal film resistor | 10 Ω , 0.6 W | | 2322 156 11009 |

Notes

- American Technical Ceramics type 100B or capacitor of same quality.
- American Technical Ceramics type 100A or capacitor of same quality.
- The striplines are on a double copper-clad printed-circuit board with Teflon dielectric ($\epsilon_r = 2.2$); thickness 0.79 mm.

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MGU327

Dimensions in mm.
 The components are situated on one side of the copper-clad printed-circuit board with Teflon dielectric ($\epsilon_r = 2.2$), thickness 0.79 mm.
 The other side is unetched and serves as a ground plane.

Fig.9 Component layout for 2 GHz class-AB test circuit.

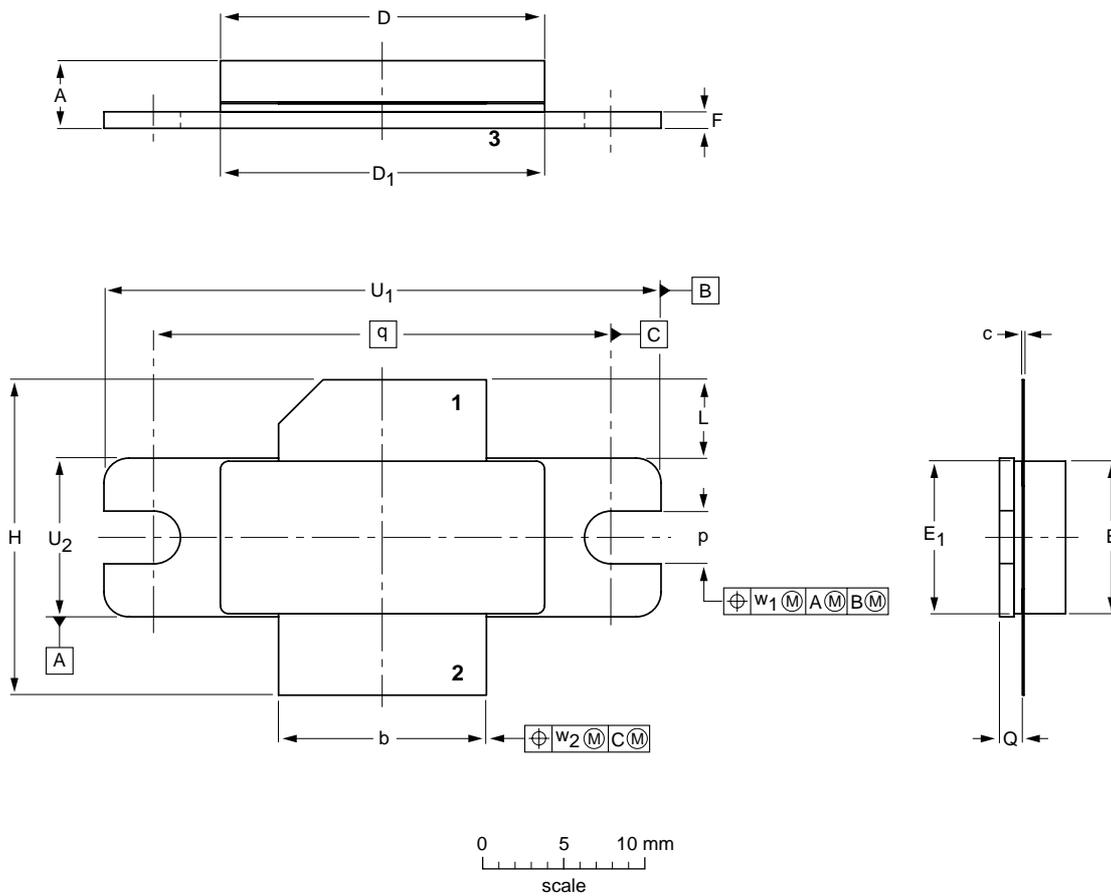
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PACKAGE OUTLINE

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads

SOT502A



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

| UNIT | A | b | c | D | D ₁ | E | E ₁ | F | H | L | p | Q | q | U ₁ | U ₂ | w ₁ | w ₂ |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-------|----------------|----------------|----------------|----------------|
| mm | 4.72 3.43 | 12.83 12.57 | 0.15 0.08 | 20.02 19.61 | 19.96 19.66 | 9.50 9.30 | 9.53 9.25 | 1.14 0.89 | 19.94 18.92 | 5.33 4.32 | 3.38 3.12 | 1.70 1.45 | 27.94 | 34.16 33.91 | 9.91 9.65 | 0.25 | 0.51 |
| inches | 0.186 0.135 | 0.505 0.495 | 0.006 0.003 | 0.788 0.772 | 0.786 0.774 | 0.374 0.366 | 0.375 0.364 | 0.045 0.035 | 0.785 0.745 | 0.210 0.170 | 0.133 0.123 | 0.067 0.057 | 1.100 | 1.345 1.335 | 0.390 0.380 | 0.01 | 0.02 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|-------|--|---------------------|-----------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT502A | | | | | | 99-12-28- 03-01-10 |

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|-------|----------------------------------|----------------------------------|--|
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