

IMPORTANT NOTICE

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As of December 7th, 2015 BL RF Power of NXP Semiconductors will operate as an independent company under the new trade name Ampleon, which will be used in future data sheets together with new contact details.

In data sheets, where the previous Philips references is mentioned, please use the new links as shown below.

<http://www.philips.semiconductors.com> use <http://www.ampleon.com>

<http://www.semiconductors.philips.com> use <http://www.ampleon.com> (Internet)

sales.addresses@www.semiconductors.philips.com use
<http://www.ampleon.com/sales>

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Thank you for your cooperation and understanding,

Ampleon

VHF push-pull power MOS transistor

BLF248

FEATURES

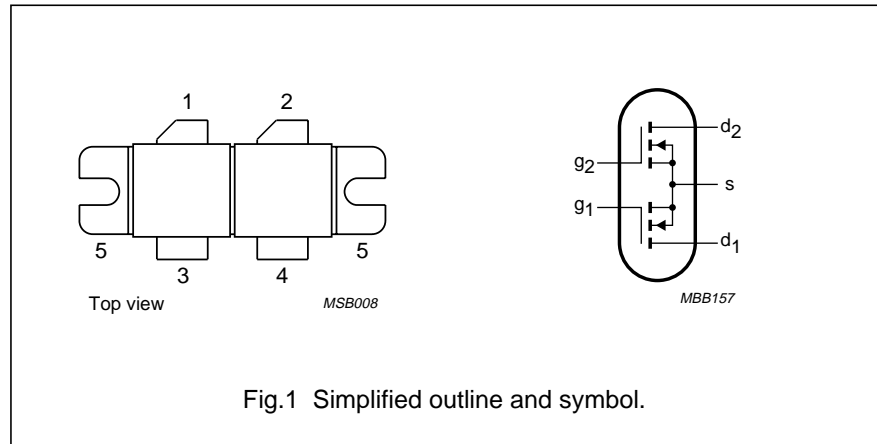
- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability.

DESCRIPTION

Dual push-pull silicon N-channel enhancement mode vertical D-MOS transistor, designed for large signal amplifier applications in the VHF frequency range.

The transistor is encapsulated in a 4-lead SOT262 A1 balanced flange package, with two ceramic caps. The mounting flange provides the common source connection for the transistors.

PIN CONFIGURATION



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.

PINNING - SOT262 A1

| PIN | DESCRIPTION |
|-----|-------------|
| 1 | drain 1 |
| 2 | drain 2 |
| 3 | gate 1 |
| 4 | gate 2 |
| 5 | source |

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at $T_h = 25\text{ }^\circ\text{C}$ in a push-pull common source test circuit.

| MODE OF OPERATION | f (MHz) | V _{DS} (V) | P _L (W) | G _p (dB) | η _D (%) |
|-------------------|---------|---------------------|--------------------|---------------------|--------------------|
| class-AB | 225 | 28 | 300 | >10 | >55 |
| | 175 | 28 | 300 | typ. 13 | typ. 67 |

VHF push-pull power MOS transistor

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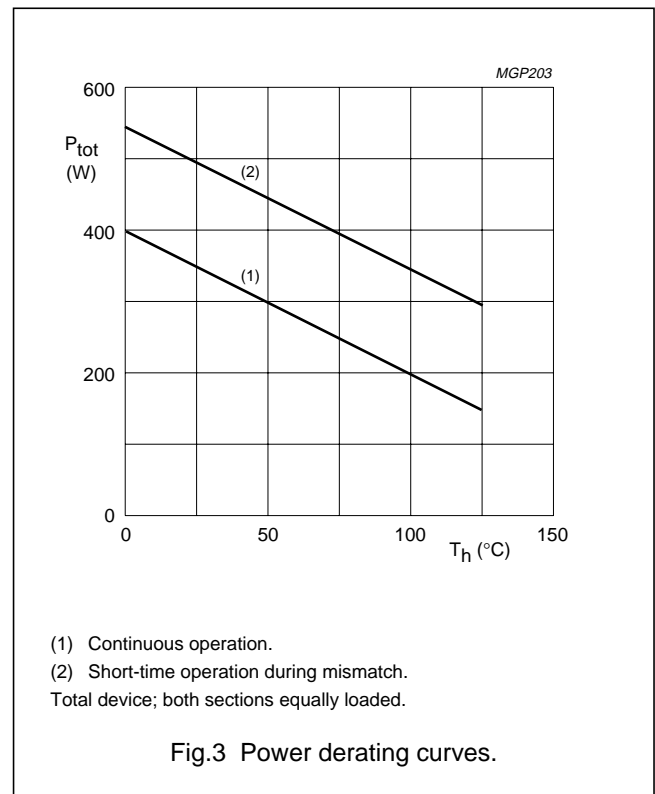
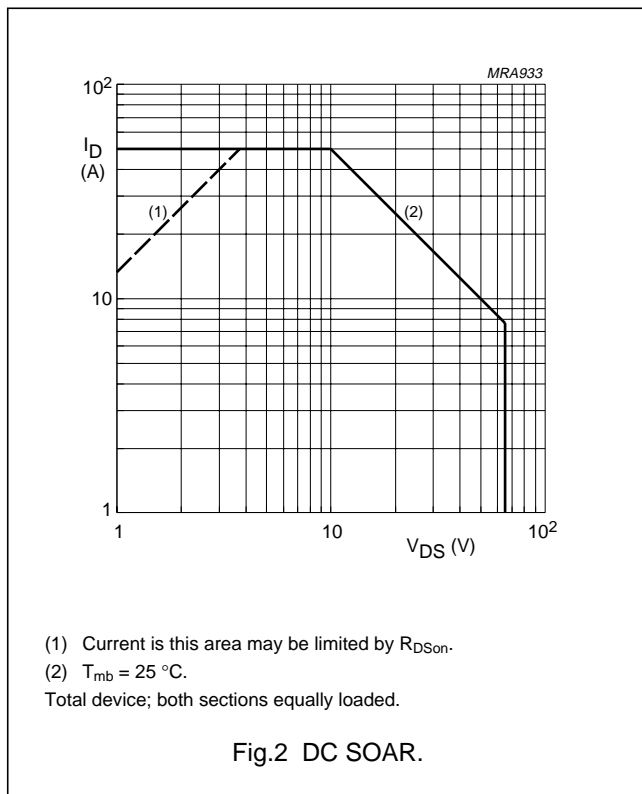
LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 60134).
Per transistor section unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|-----------|-------------------------|--|------|----------|------------------|
| V_{DS} | drain-source voltage | | – | 65 | V |
| V_{GS} | gate-source voltage | | – | ± 20 | V |
| I_D | drain current (DC) | | – | 25 | A |
| P_{tot} | total power dissipation | $T_{mb} \leq 25\text{ }^\circ\text{C}$ total device; both sections equally loaded | – | 500 | W |
| T_{stg} | storage temperature | | –65 | 150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|----------------|---|---|-------|------|
| $R_{th\ j-mb}$ | thermal resistance from junction to mounting base | total device; both sections equally loaded. | 0.35 | K/W |
| $R_{th\ mb-h}$ | thermal resistance from mounting base to heatsink | total device; both sections equally loaded. | 0.15 | K/W |



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CHARACTERISTICS

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

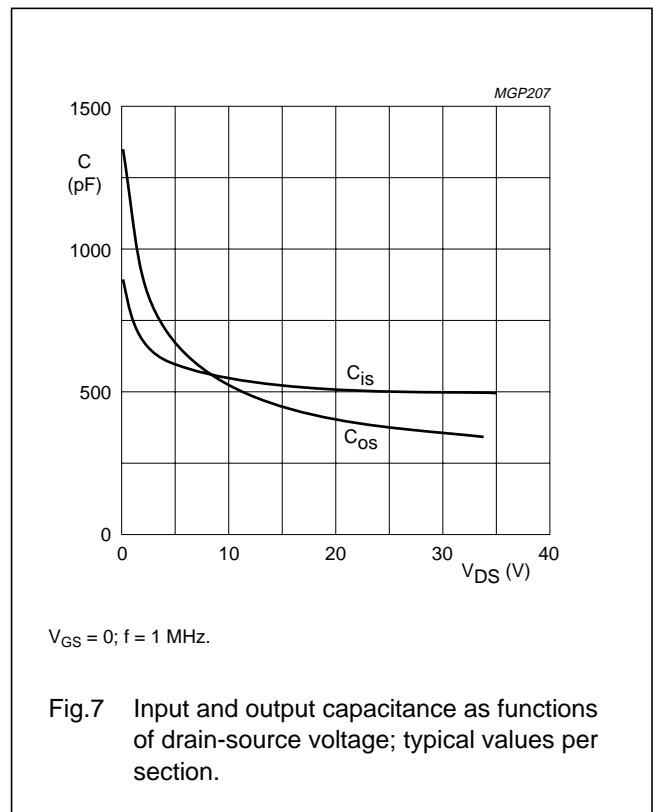
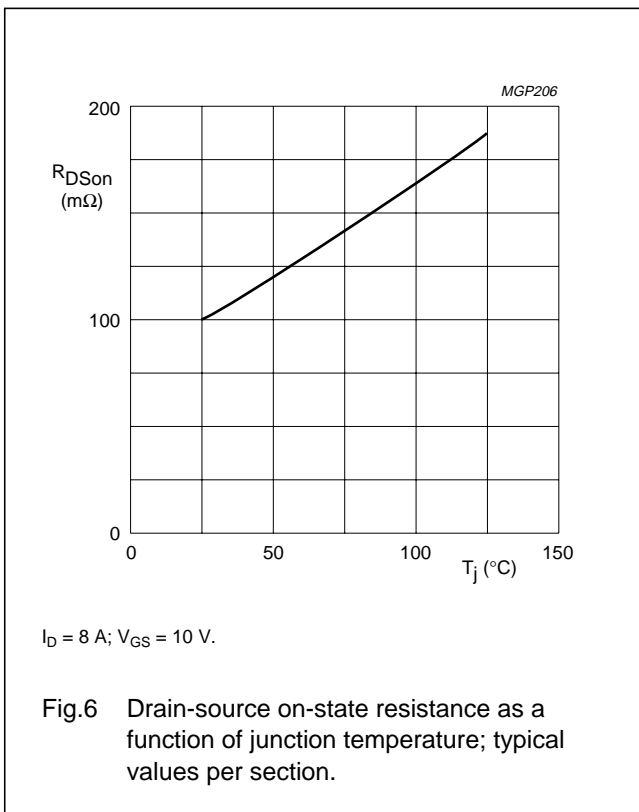
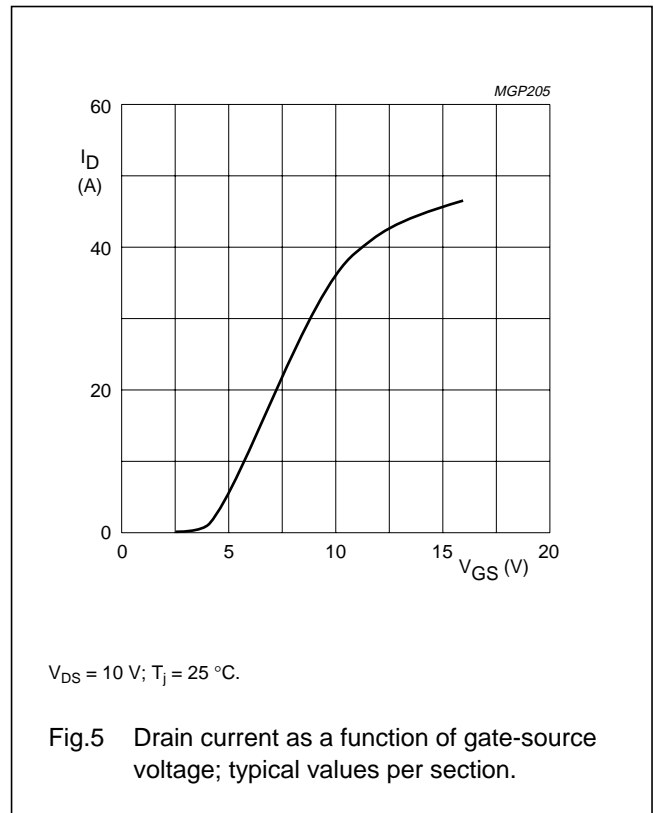
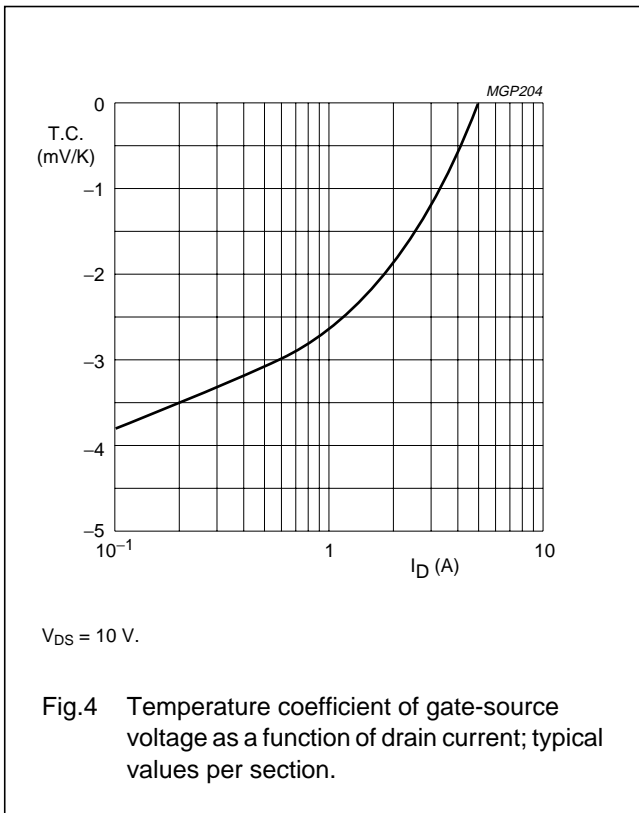
| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|--------------------|--|--|------|------|------|---------------|
| Per section | | | | | | |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS} = 0; I_D = 100\text{ mA}$ | 65 | – | – | V |
| I_{DSS} | drain-source leakage current | $V_{GS} = 0; V_{DS} = 28\text{ V}$ | – | – | 5 | mA |
| I_{GSS} | gate-source leakage current | $V_{GS} = \pm 20\text{ V}; V_{DS} = 0$ | – | – | 1 | μA |
| V_{GSth} | gate-source threshold voltage | $I_D = 100\text{ mA}; V_{DS} = 10\text{ V}$ | 2 | – | 4.5 | V |
| ΔV_{GS} | gate-source voltage difference of both transistor sections | $I_D = 100\text{ mA}; V_{DS} = 10\text{ V}$ | – | – | 100 | mV |
| g_{fs} | forward transconductance | $I_D = 8\text{ A}; V_{DS} = 10\text{ V}$ | 5 | 7.5 | – | S |
| g_{fs1}/g_{fs2} | forward transconductance ratio of both transistor sections | $I_D = 8\text{ A}; V_{DS} = 10\text{ V}$ | 0.9 | – | 1.1 | |
| R_{DSon} | drain-source on-state resistance | $I_D = 8\text{ A}; V_{GS} = 10\text{ V}$ | – | 0.1 | 0.15 | Ω |
| I_{DSX} | on-state drain current | $V_{GS} = 10\text{ V}; V_{DS} = 10\text{ V}$ | – | 37 | – | A |
| C_{is} | input capacitance | $V_{GS} = 0; V_{DS} = 28\text{ V}; f = 1\text{ MHz}$ | – | 500 | – | pF |
| C_{os} | output capacitance | $V_{GS} = 0; V_{DS} = 28\text{ V}; f = 1\text{ MHz}$ | – | 360 | – | pF |
| C_{rs} | feedback capacitance | $V_{GS} = 0; V_{DS} = 28\text{ V}; f = 1\text{ MHz}$ | – | 46 | – | pF |

V_{GS} group indicator

| GROUP | LIMITS (V) | | GROUP | LIMITS (V) | |
|-------|------------|------|-------|------------|------|
| | MIN. | MAX. | | MIN. | MAX. |
| A | 2.0 | 2.1 | O | 3.3 | 3.4 |
| B | 2.1 | 2.2 | P | 3.4 | 3.5 |
| C | 2.2 | 2.3 | Q | 3.5 | 3.6 |
| D | 2.3 | 2.4 | R | 3.6 | 3.7 |
| E | 2.4 | 2.5 | S | 3.7 | 3.8 |
| F | 2.5 | 2.6 | T | 3.8 | 3.9 |
| G | 2.6 | 2.7 | U | 3.9 | 4.0 |
| H | 2.7 | 2.8 | V | 4.0 | 4.1 |
| J | 2.8 | 2.9 | W | 4.1 | 4.2 |
| K | 2.9 | 3.0 | X | 4.2 | 4.3 |
| L | 3.0 | 3.1 | Y | 4.3 | 4.4 |
| M | 3.1 | 3.2 | Z | 4.4 | 4.5 |
| N | 3.2 | 3.3 | | | |

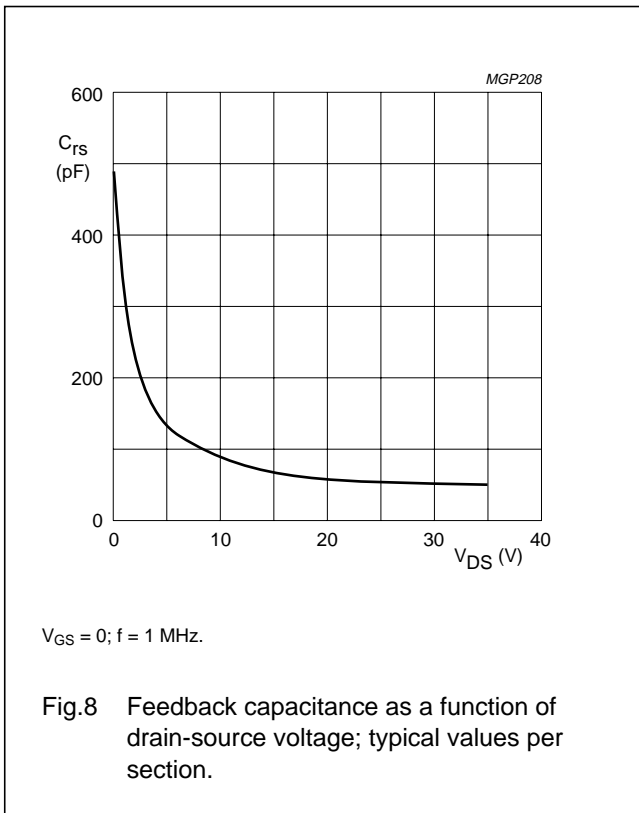
VHF push-pull power MOS transistor

BLF248



VHF push-pull power MOS transistor

BLF248



APPLICATION INFORMATION FOR CLASS-AB OPERATION

$T_h = 25$ °C; $R_{th\ mb-h} = 0.15$ K/W, unless otherwise specified.

RF performance in a linear amplifier in a common source class-AB circuit.

$R_{GS} = 536$ Ω per section; optimum load impedance per section = $0.79 - j0.11$ Ω .

| MODE OF OPERATION | f (MHz) | V_{DS} (V) | P_L (W) | G_p (dB) | η_D (%) |
|-------------------|---------|--------------|-----------|------------------|----------------|
| class-AB | 225 | 28 | 300 | >10 typ. 11.5 | >55 typ. 65 |
| | 175 | 28 | 300 | typ. 13 | typ. 67 |

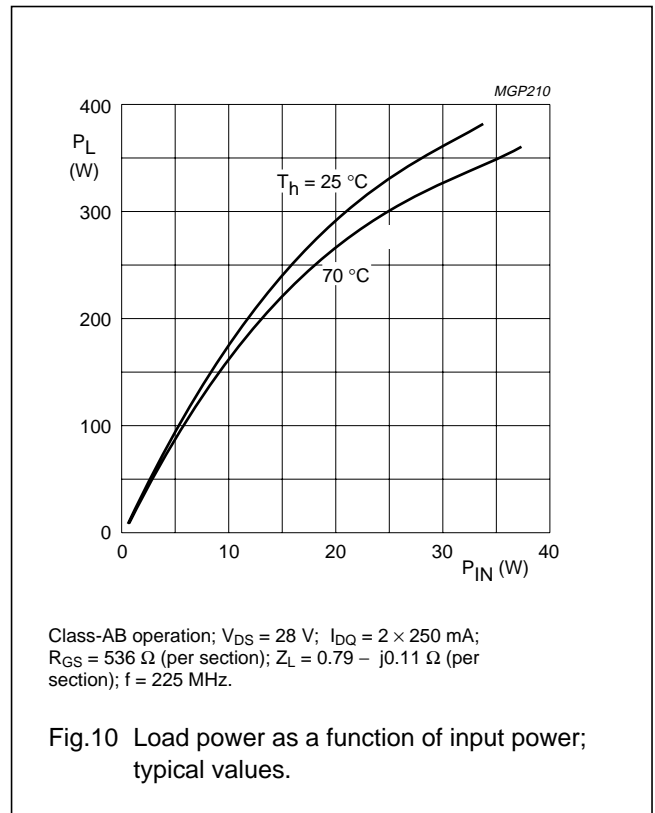
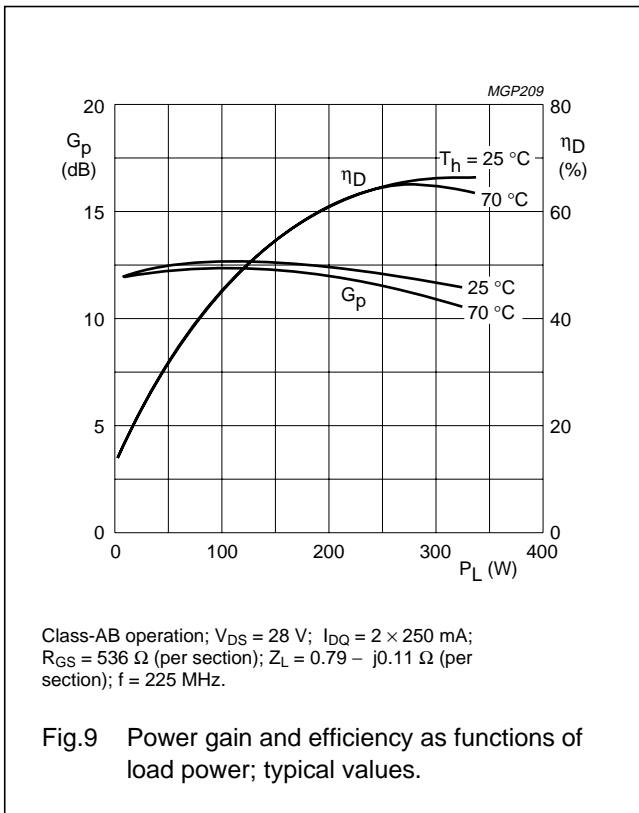
Ruggedness in class-AB operation

The BLF248 is capable of withstanding a load mismatch corresponding to $V_{SWR} = 50$ through all phases under the following conditions:

$V_{DS} = 28$ V; $f = 225$ MHz at rated output power.

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VHF push-pull power MOS transistor

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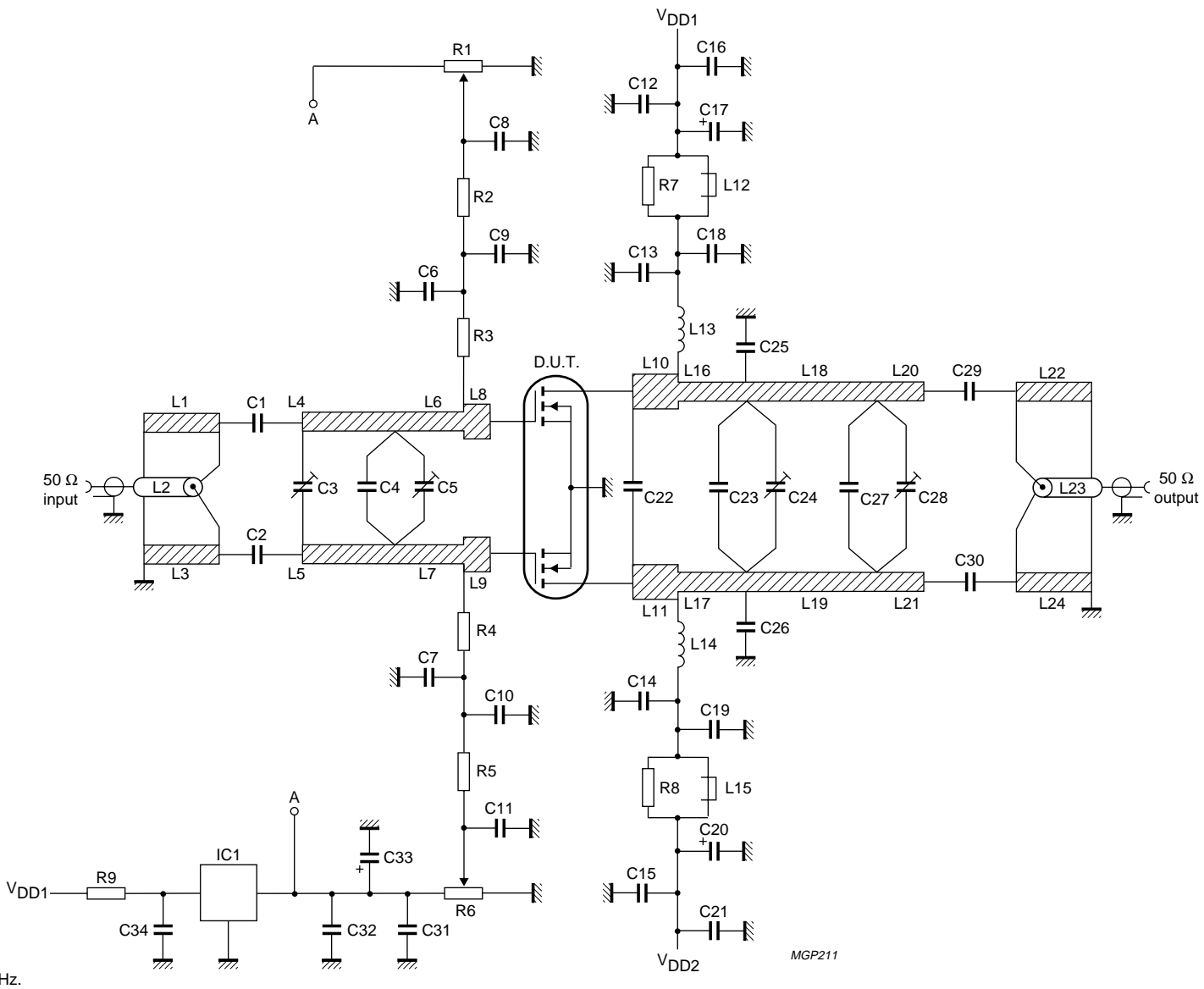


Fig.11 Test circuit for class-AB operation.

VHF push-pull power MOS transistor

BLF248

List of components class-AB test circuit; (see Figs 11 and 12)

| COMPONENT | DESCRIPTION | VALUE | DIMENSIONS | CATALOGUE NO. |
|---|--|---|---|----------------|
| C1, C2 | multilayer ceramic chip capacitor; note 1 | 2×56 pF + 18 pF in parallel, 500 V | | |
| C3 | film dielectric trimmer | 2 to 9 pF | | 2222 809 09005 |
| C4 | multilayer ceramic chip capacitor; note 1 | 47 pF, 500 V | | |
| C5 | film dielectric trimmer | 5 to 60 pF | | 2222 809 08003 |
| C6, C7, C9, C10, C12, C15, C31, C34 | multilayer ceramic chip capacitor; note 1 | 1 nF, 500 V | | |
| C8, C11, C16, C21, C32 | multilayer ceramic chip capacitor | 100 nF, 50 V | | 2222 852 47104 |
| C13, C14, C18, C19 | multilayer ceramic chip capacitor; note 1 | 510 pF, 500 V | | |
| C17, C20, C33 | electrolytic capacitor | 10 μ F, 63 V | | |
| C22 | multilayer ceramic chip capacitor; note 1 | 82 pF, 500 V | | |
| C23 | multilayer ceramic chip capacitor; note 1 | 10 pF + 30 pF in parallel, 500 V | | |
| C24, C28 | film dielectric trimmer | 2 to 18 pF | | 2222 809 09006 |
| C25, C26 | multilayer ceramic chip capacitor; note 1 | 39 pF + 47 pF in parallel, 500 V | | |
| C27 | multilayer ceramic chip capacitor; note 1 | 18 pF, 500 V | | |
| C29, C30 | multilayer ceramic chip capacitor; note 1 | 3×100 pF in parallel, 500 V | | |
| L1, L3, L22, L24 | stripline; note 2 | 50 Ω | 4.8 \times 80 mm | |
| L2, L23 | semi-rigid cable; note 3 | 50 Ω | ext. dia. 3.6 mm ext. conductor length 80 mm | |
| L4, L5 | stripline; note 2 | 43 Ω | 6 \times 32.5 mm | |
| L6, L7, L10, L11 | stripline; note 2 | 43 Ω | 6 \times 10.5 mm | |
| L8, L9 | stripline; note 2 | 43 Ω | 6 \times 3 mm | |
| L12, L15 | grade 3B Ferroxcube wide-band HF choke | 2 in parallel | | 4312 020 36642 |
| L13, L14 | 2 turns enamelled 1.6 mm copper wire | 25 nH | int. dia. 5 mm leads 2 \times 7 mm space 2.5 mm | |
| L16, L17 | stripline; notes 2 and 4 | 43 Ω | 6 \times 3 mm | |
| L18, L19 | stripline; notes 2 and 4 | 43 Ω | 6 \times 35 mm | |
| L20, L21 | stripline; notes 2 and 4 | 43 Ω | 6 \times 9 mm | |
| R1, R6 | 10 turns potentiometer | 50 k Ω | | |
| R2, R5 | 0.4 W metal film resistor | 1 k Ω | | |

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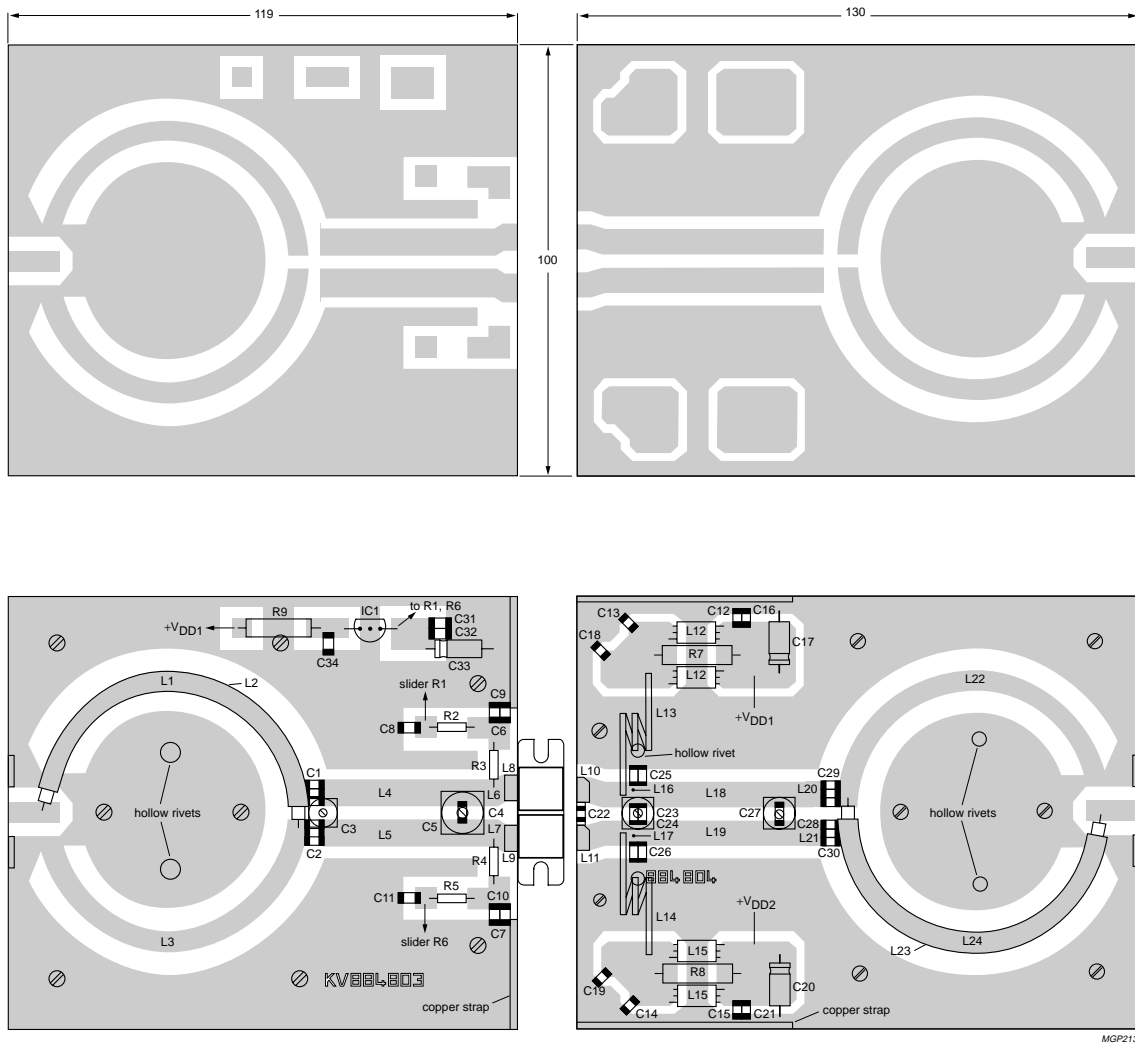
| COMPONENT | DESCRIPTION | VALUE | DIMENSIONS | CATALOGUE NO. |
|-----------|---------------------------|---------------------|------------|---------------|
| R3, R4 | 0.4 W metal film resistor | 536 Ω | | |
| R7, R8 | 1 W metal film resistor | 10 $\Omega \pm 5\%$ | | |
| R9 | 1 W metal film resistor | 3.16 k Ω | | |
| IC1 | 78L05 voltage regulator | | | |

Notes

1. American Technical Ceramics (ATC) capacitor, type 100B or other capacitor of the same quality.
2. L1, L3 to L11, L16 to L22 and L24 are micro-striplines on a double copper-clad printed-circuit board, with glass microfibre PTFE dielectric ($\epsilon_r = 2.2$), thickness $\frac{1}{16}$ inch, thickness of copper sheet $2 \times 35 \mu\text{m}$.
3. L2 and L23 are soldered on striplines L1 and L24 respectively.
4. A copper strap, thickness 0.8 mm, is soldered on striplines L16 to L21.

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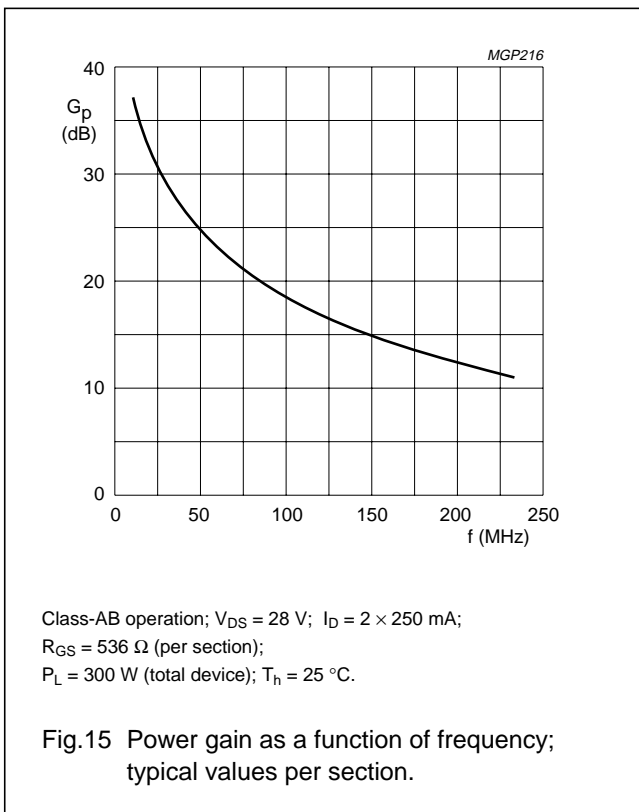
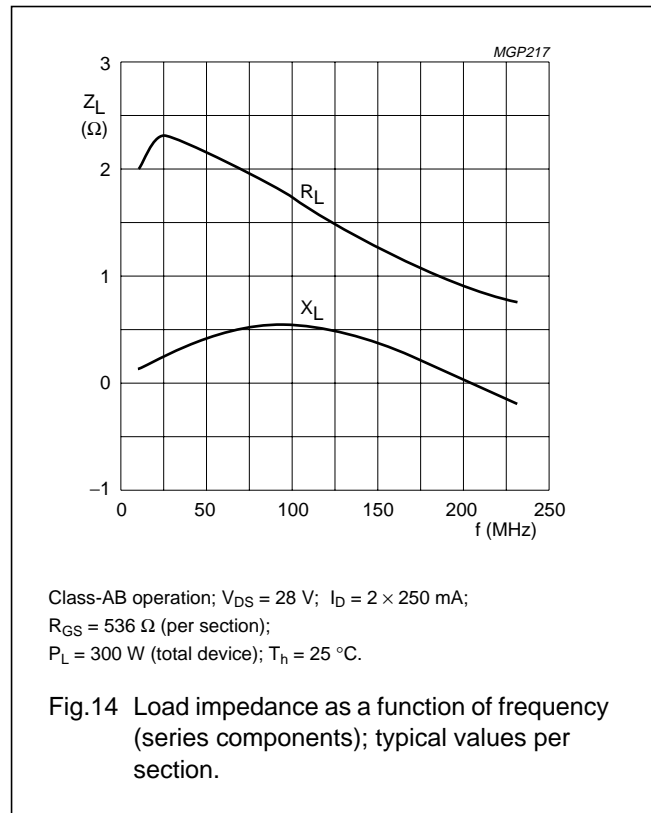
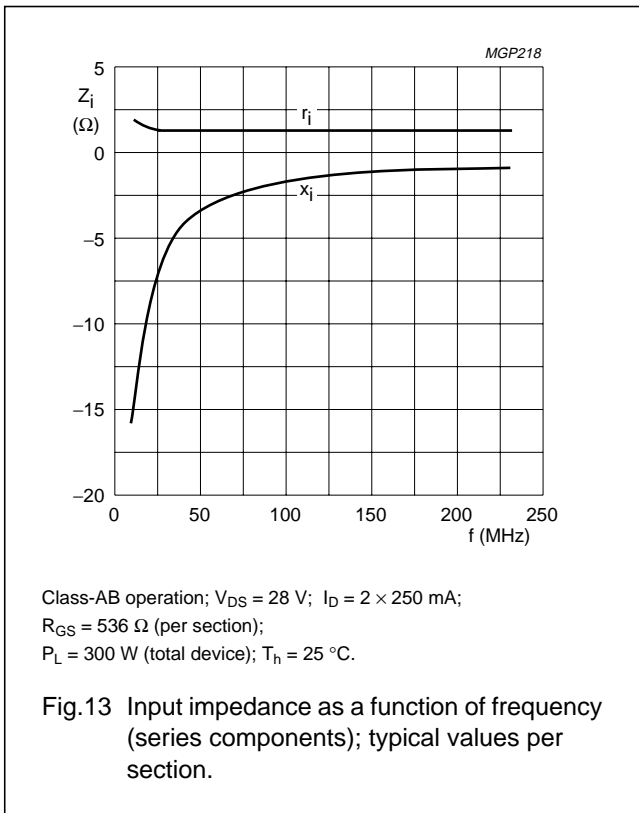
Dimensions in mm.

The circuit and components are situated on one side of the printed circuit board, the other side being fully metallized, to serve as a ground plane. Earth connections are made by means of copper straps and hollow rivets.

Fig.12 Component layout for 225 MHz class-AB test circuit.

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VHF push-pull power MOS transistor

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BLF248 scattering parameters $V_{DS} = 28\text{ V}$; $I_D = 250\text{ mA}$; note 1

| f (MHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|---------|-----------------|--------|-----------------|------|-----------------|-------|-----------------|--------|
| | s ₁₁ | ∠ Φ | s ₂₁ | ∠ Φ | s ₁₂ | ∠ Φ | s ₂₂ | ∠ Φ |
| 5 | 0.85 | -158.7 | 22.19 | 97.0 | 0.01 | -1.4 | 0.90 | 168.9 |
| 10 | 0.85 | -168.6 | 11.27 | 88.5 | 0.01 | 20.7 | 0.85 | 174.2 |
| 20 | 0.85 | -173.2 | 5.51 | 79.0 | 0.01 | 18.2 | 0.83 | 178.2 |
| 30 | 0.86 | -174.1 | 3.57 | 72.0 | 0.02 | 8.2 | 0.83 | -179.8 |
| 40 | 0.87 | -174.3 | 2.56 | 65.9 | 0.02 | -0.2 | 0.83 | -178.0 |
| 50 | 0.88 | -174.4 | 1.96 | 60.6 | 0.02 | -7.2 | 0.85 | -176.6 |
| 60 | 0.89 | -174.6 | 1.55 | 55.7 | 0.01 | -13.1 | 0.86 | -175.8 |
| 70 | 0.90 | -174.8 | 1.26 | 51.3 | 0.01 | -17.8 | 0.87 | -175.3 |
| 80 | 0.91 | -175.1 | 1.05 | 47.5 | 0.01 | -21.6 | 0.89 | -175.0 |
| 90 | 0.92 | -175.5 | 0.88 | 44.0 | 0.01 | -24.6 | 0.90 | -174.9 |
| 100 | 0.93 | -175.8 | 0.76 | 40.6 | 0.01 | -27.0 | 0.91 | -175.0 |
| 125 | 0.95 | -176.7 | 0.53 | 33.6 | 0.01 | -30.2 | 0.93 | -175.6 |
| 150 | 0.96 | -177.6 | 0.38 | 28.9 | 0.01 | -28.2 | 0.94 | -175.6 |
| 175 | 0.97 | -178.4 | 0.30 | 25.5 | 0.00 | -21.2 | 0.96 | -176.0 |
| 200 | 0.97 | -179.2 | 0.23 | 22.3 | 0.00 | -5.3 | 0.97 | -176.7 |
| 250 | 0.98 | 179.4 | 0.16 | 18.6 | 0.00 | 47.5 | 0.98 | -177.6 |
| 300 | 0.98 | 178.2 | 0.11 | 17.2 | 0.01 | 71.9 | 0.98 | -178.5 |
| 350 | 0.98 | 177.1 | 0.08 | 16.7 | 0.01 | 78.0 | 0.99 | -179.1 |
| 400 | 0.99 | 176.2 | 0.07 | 18.9 | 0.01 | 84.9 | 0.99 | -179.9 |
| 450 | 0.99 | 175.2 | 0.05 | 21.7 | 0.01 | 88.1 | 0.99 | 179.6 |
| 500 | 0.99 | 174.2 | 0.05 | 26.7 | 0.01 | 88.6 | 0.99 | 179.0 |
| 600 | 0.99 | 172.3 | 0.04 | 38.3 | 0.02 | 89.4 | 1.00 | 177.9 |
| 700 | 0.99 | 170.4 | 0.03 | 50.8 | 0.02 | 90.0 | 1.00 | 176.9 |
| 800 | 0.99 | 168.6 | 0.03 | 63.7 | 0.03 | 91.0 | 1.00 | 176.0 |
| 900 | 0.99 | 166.6 | 0.04 | 71.0 | 0.03 | 91.6 | 1.00 | 175.0 |
| 1000 | 0.99 | 164.7 | 0.04 | 77.6 | 0.04 | 92.3 | 1.00 | 174.1 |

Note

- For more extensive s-parameters see internet:
<http://www.semiconductors.philips.com/markets/communications/wirelesscommunication/broadcast>

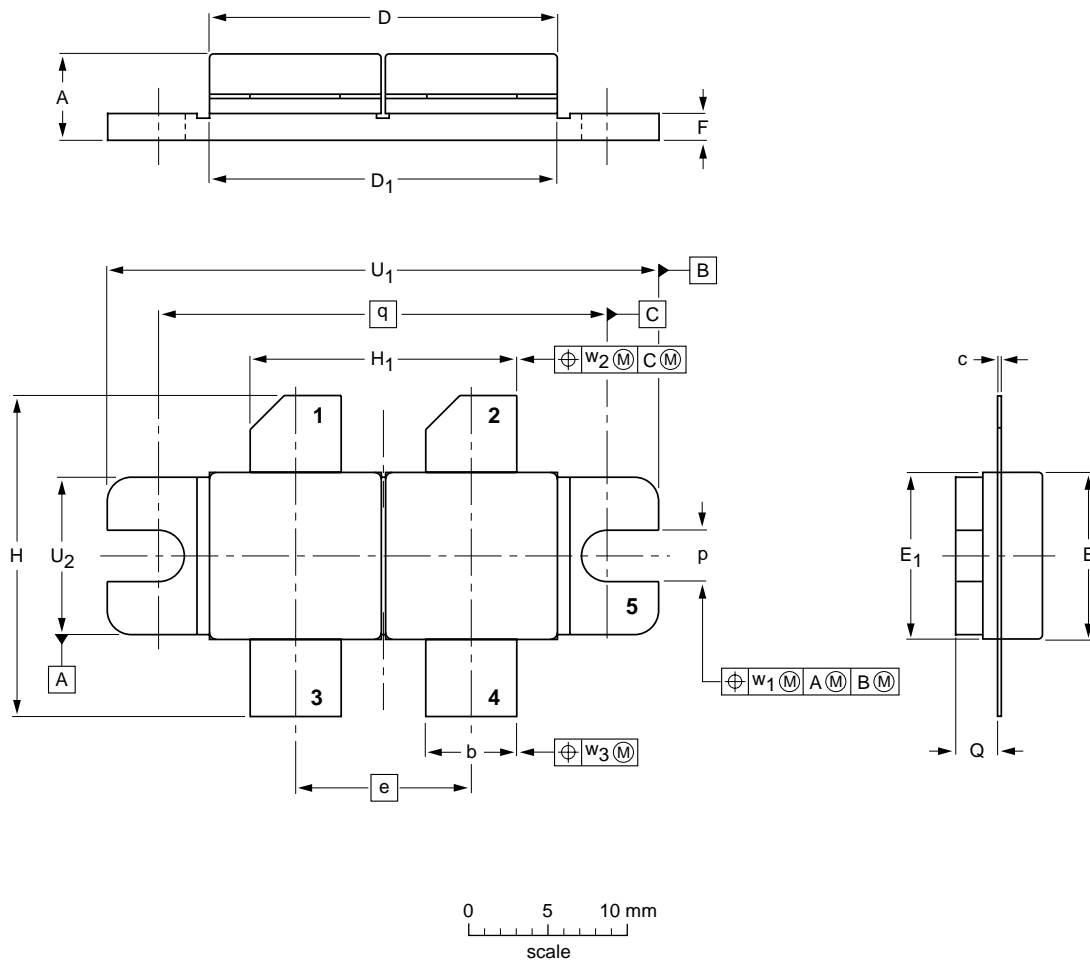
VHF push-pull power MOS transistor

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PACKAGE OUTLINE

Flanged double-ended ceramic package; 2 mounting holes; 4 leads

SOT262A1



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

| UNIT | A | b | c | D | D ₁ | e | E | E ₁ | F | H | H ₁ | p | Q | q | U ₁ | U ₂ | w ₁ | w ₂ | w ₃ |
|--------|----------------|----------------|----------------|----------------|----------------|-------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-------|----------------|----------------|----------------|----------------|----------------|
| mm | 5.77 5.00 | 5.85 5.58 | 0.16 0.10 | 22.17 21.46 | 21.98 21.71 | 11.05 | 10.27 10.05 | 10.29 10.03 | 1.78 1.52 | 21.08 19.56 | 17.02 16.51 | 3.28 3.02 | 2.85 2.59 | 27.94 | 34.17 33.90 | 9.91 9.65 | 0.25 | 0.51 | 0.25 |
| inches | 0.227 0.197 | 0.230 0.220 | 0.006 0.004 | 0.873 0.845 | 0.865 0.855 | 0.435 | 0.404 0.396 | 0.405 0.396 | 0.070 0.060 | 0.830 0.770 | 0.670 0.650 | 0.129 0.119 | 0.112 0.102 | 1.100 | 1.345 1.335 | 0.390 0.380 | 0.010 | 0.020 | 0.010 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|------|--|---------------------|------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT262A1 | | | | | | 99-03-29 |

VHF push-pull power MOS transistor

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DATA SHEET STATUS

| LEVEL | DATA SHEET STATUS ⁽¹⁾ | PRODUCT STATUS ⁽²⁾⁽³⁾ | DEFINITION |
|-------|----------------------------------|----------------------------------|--|
| I | Objective data | Development | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice. |
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3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

DEFINITIONS

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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