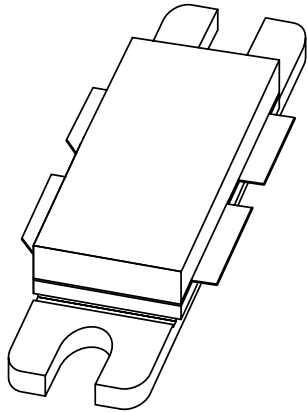


DATA SHEET



BLF861A UHF power LDMOS transistor

Product specification
Supersedes data of 2000 Aug 04

2001 Feb 09

UHF power LDMOS transistor

BLF861A

FEATURES

- High power gain
- Easy power control
- Excellent ruggedness
- Designed to withstand abrupt load mismatch errors
- Source on underside eliminates DC isolators; reducing common mode inductance
- Designed for broadband operation (UHF band)
- Internal input and output matching for high gain and optimum broadband operation.

APPLICATIONS

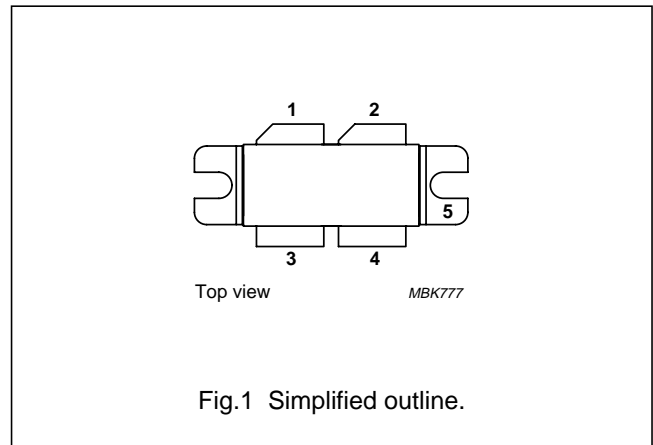
- Communication transmitter applications in the UHF frequency range.

DESCRIPTION

Silicon N-channel enhancement mode lateral D-MOS push-pull transistor in a SOT540A package with ceramic cap. The common source is connected to the mounting flange.

PINNING - SOT540A

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



QUICK REFERENCE DATA

RF performance at $T_h = 25\text{ °C}$ in a common source 860 MHz test circuit.

| MODE OF OPERATION | f (MHz) | V_{DS} (V) | P_L (W) | G_p (dB) | η_D (%) | ΔG_p (dB) |
|-----------------------|-------------|--------------|---------------------------------|--------------------|--------------|-------------------|
| CW, class-AB | 860 | 32 | 150 | >13.5 typ. 14.5 | >50 | ≤ 1 |
| PAL BG (TV); class-AB | 860 (ch 69) | 32 | >150 typ. 170 (peak sync) | >14 | >40 | note 1 |

Note

1. Sync compression: input sync $\geq 33\%$; output sync 27%.

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 | | – | ± 15 | V |
| I_D | drain current (DC) | | – | 18 | A |
| P_{tot} | total power dissipation | $T_{mb} \leq 25\text{ °C}$ | – | 318 | W |
| T_{stg} | storage temperature | | –65 | +150 | $^{\circ}\text{C}$ |
| T_j | junction temperature | | – | 200 | $^{\circ}\text{C}$ |

UHF power LDMOS transistor

BLF861A

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|----------------|---|---|-------|------|
| $R_{th\ j-mb}$ | thermal resistance from junction to mounting base | $T_{mb} = 25\text{ °C}; P_{tot} = 318\text{ W}$ | 0.55 | K/W |
| $R_{th\ mb-h}$ | thermal resistance from mounting base to heatsink | | 0.2 | K/W |

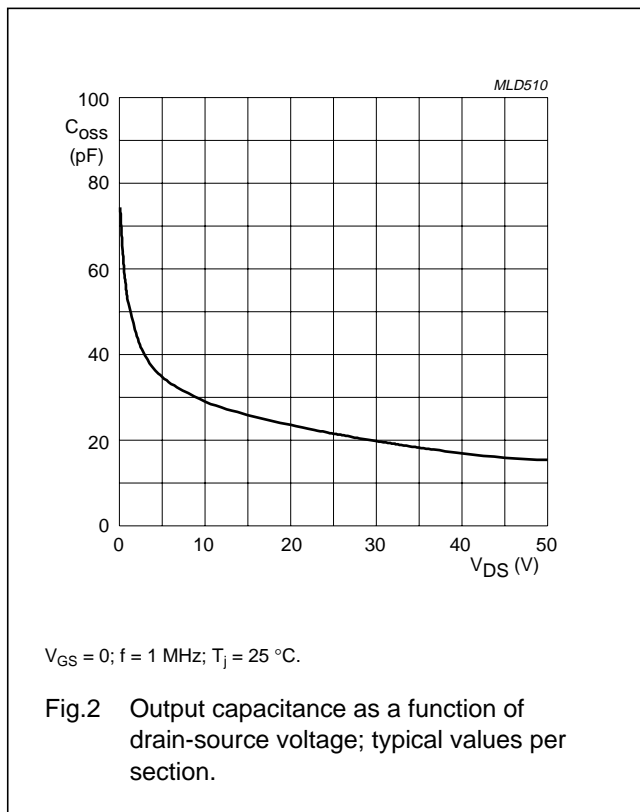
CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---------------|----------------------------------|--|------|------|------|------------------|
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS} = 0; I_D = 1.5\text{ mA}$ | 65 | – | – | V |
| V_{GSth} | gate-source threshold voltage | $V_{DS} = 10\text{ V}; I_D = 150\text{ mA}$ | 4 | – | 5.5 | V |
| I_{DSS} | drain-source leakage current | $V_{GS} = 0; V_{DS} = 32\text{ V}$ | – | – | 2.2 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GSth} + 9\text{ V}; V_{DS} = 10\text{ V}$ | 18 | – | – | A |
| I_{GSS} | gate leakage current | $V_{GS} = \pm 15\text{ V}; V_{DS} = 0$ | – | – | 25 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}; I_D = 4\text{ A}$ | – | 4 | – | S |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = V_{GSth} + 9\text{ V}; I_D = 4\text{ A}$ | – | 160 | – | $\text{m}\Omega$ |
| C_{iss} | input capacitance | $V_{GS} = 0; V_{DS} = 32\text{ V}; f = 1\text{ MHz}^{(1)}$ | – | 82 | – | pF |
| C_{oss} | output capacitance | $V_{GS} = 0; V_{DS} = 32\text{ V}; f = 1\text{ MHz}^{(1)}$ | – | 40 | – | pF |
| C_{rss} | feedback capacitance | $V_{GS} = 0; V_{DS} = 32\text{ V}; f = 1\text{ MHz}^{(1)}$ | – | 6 | – | pF |

Note

1. Capacitance values without internal matching.



UHF power LDMOS transistor

BLF861A

APPLICATION INFORMATION

RF performance in a common source 860 MHz test circuit. $T_h = 25\text{ }^\circ\text{C}$; $R_{th\text{ mb-h}} = 0.15\text{ K/W}$; unless otherwise specified.

| MODE OF OPERATION | f (MHz) | V_{DS} (V) | I_{DQ} (A) | P_L (W) | G_p (dB) | η_D (%) | d_{Im} (dBc) | ΔG_p (dB) |
|-----------------------|------------------------------|--------------|--------------|----------------------------------|--------------------|--------------|----------------|-------------------|
| CW; class-AB | 860 | 32 | 1 | 150 | >13.5 typ. 14.5 | >50 | – | ≤ 1 |
| 2-tone; class-AB | $f_1 = 860$ $f_2 = 860.1$ | 32 | 1 | 150 (PEP) | >14 | >40 | ≤ -25 | – |
| PAL BG (TV); class-AB | 860 (ch 69) | 32 | 1 | > 150 typ. 170 (peak sync) | >14 | >40 | – | note 1 |

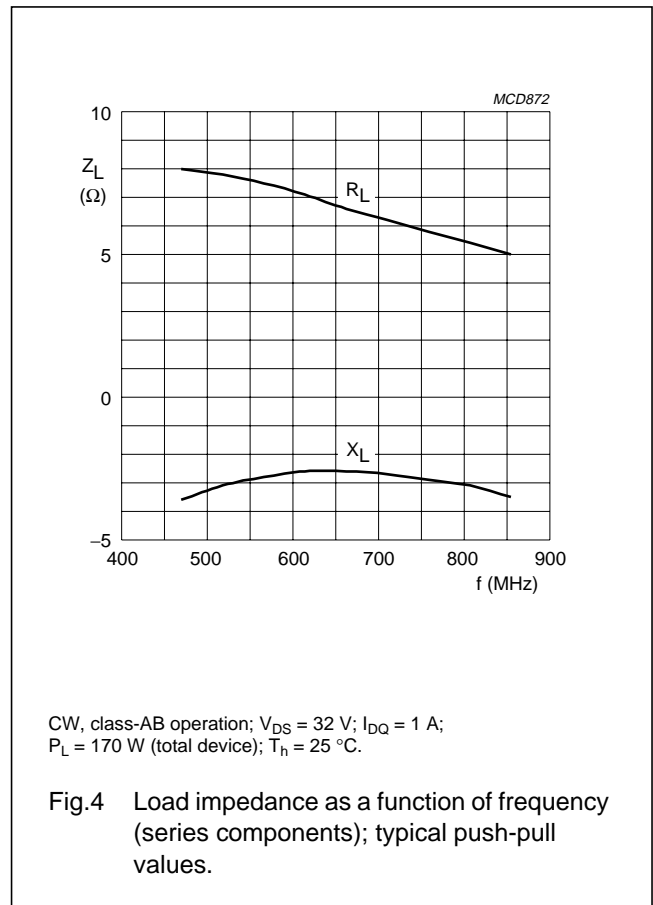
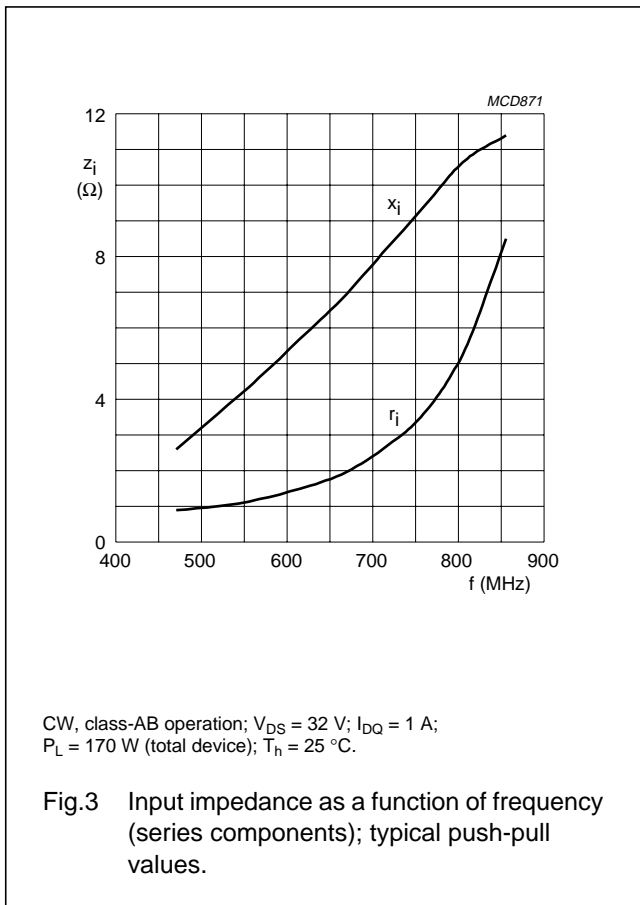
Note

1. Sync compression: input sync $\geq 33\%$; output sync 27% measured in an 860 MHz test circuit.

Ruggedness in class-AB operation

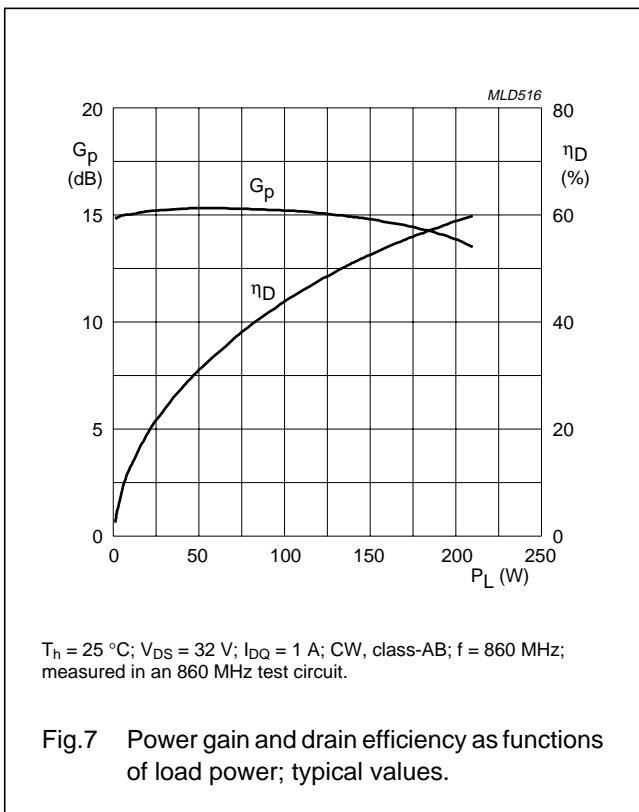
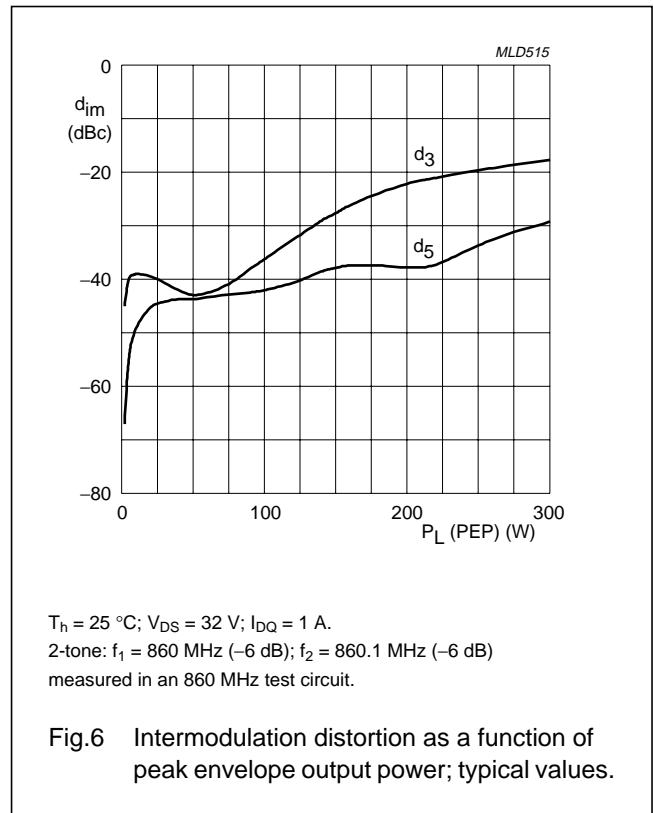
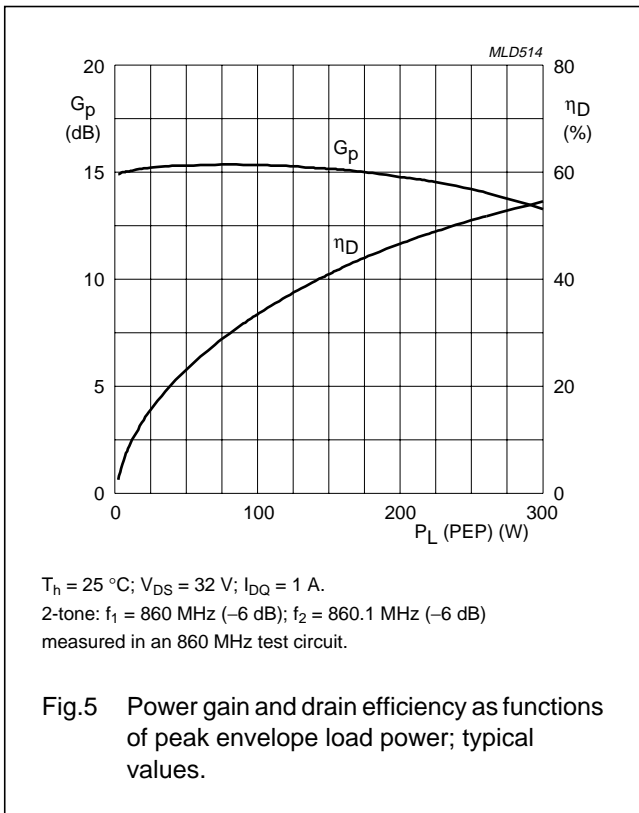
The BLF861A is capable of withstanding a load mismatch corresponding to $VSWR = 10 : 1$ through all phases under the following conditions: $V_{DS} = 32\text{ V}$; $f = 860\text{ MHz}$ at rated load power.

The BLF861A is an improved version of the BLF861 on ruggedness and is capable to withstand abrupt source or load mismatch errors under the nominal power condition.



UHF power LDMOS transistor

BLF861A



UHF power LDMOS transistor

BLF861A

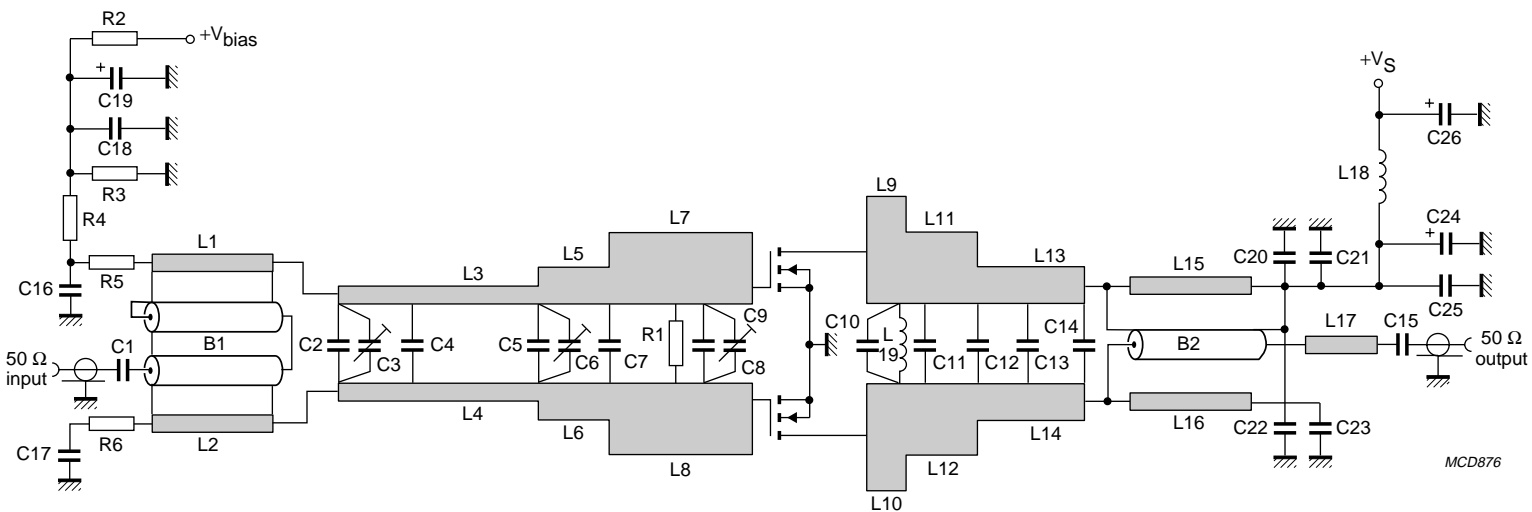


Fig.8 Class-AB common source broadband test circuit.

UHF power LDMOS transistor

BLF861A

List of components class-AB broadband test circuit (see Figs 8 and 9)

| COMPONENT | DESCRIPTION | VALUE | DIMENSIONS | CATALOGUE No. |
|--------------------|---|------------------------------------|----------------------|----------------|
| C1 | multilayer ceramic chip capacitor; note 1 | 20 pF | | |
| C2 | multilayer ceramic chip capacitor; note 1 | 4.3 pF | | |
| C3, C6, C9 | tekelec trimmer | 0.6 to 4.5 pF | | |
| C4 | multilayer ceramic chip capacitor; note 1 | 9.1 pF | | |
| C5 | multilayer ceramic chip capacitor; note 1 | 10 pF | | |
| C7 | multilayer ceramic chip capacitor; note 1 | 5.1 pF | | |
| C8 | multilayer ceramic chip capacitor; note 1 | 13 pF | | |
| C10, C11 | multilayer ceramic chip capacitor; note 2 | 8.2 pF | | |
| C12, C13 | multilayer ceramic chip capacitor; note 2 | 6.8 pF | | |
| C14 | multilayer ceramic chip capacitor; note 3 | 1 pF | | |
| C15 | multilayer ceramic chip capacitor; note 3 | 20 pF | | |
| C16, C17 | multilayer ceramic chip capacitor | 1 nF | | |
| C18 | multilayer ceramic chip capacitor | 100 nF | | |
| C19, C26 | multilayer ceramic chip capacitor | 100 μ F | | |
| C20, C21, C22, C23 | multilayer ceramic chip capacitor; note 2 | 100 pF | | |
| C24 | electrolytic capacitor | 1 000 μ F | | |
| C25 | multilayer ceramic chip capacitor | 1 μ F | | 2222 595 16754 |
| L1, L2 | stripline; note 4 | | 30.6 \times 2.4 mm | |
| L3, L4 | stripline; note 4 | | 28 \times 2.4 mm | |
| L5, L6 | stripline; note 4 | | 10 \times 5 mm | |
| L7, L8 | stripline; note 4 | | 20 \times 10 mm | |
| L9, L10 | stripline; note 4 | | 5.5 \times 15 mm | |
| L11, L12 | stripline; note 4 | | 10 \times 10 mm | |
| L13, L14 | stripline; note 4 | | 15 \times 5 mm | |
| L15, L16 | stripline; note 4 | | 48.5 \times 2.4 mm | |
| L17 | stripline; note 4 | | 10 \times 2.4 mm | |
| L18 | ferrite | | | |
| L19 | wire inductor (hairpin) | | length = 17 mm | |
| B1 | semi rigid coax balun UT70-25 | Z = 25 Ω \pm 1.5 Ω | 70 mm | |
| B2 | semi rigid coax balun UT70-25 | Z = 25 Ω \pm 1.5 Ω | 48.5 mm | |

UHF power LDMOS transistor

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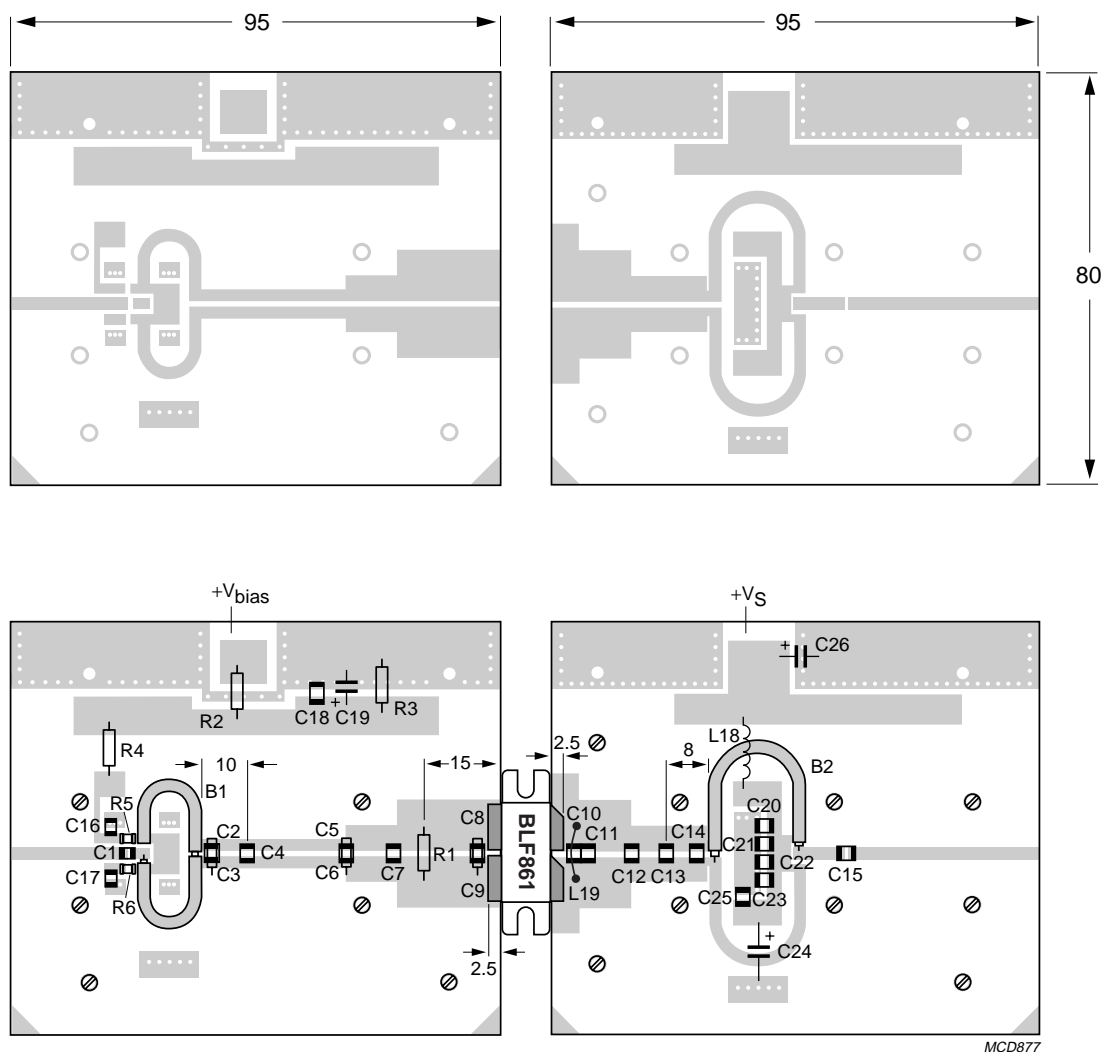
| COMPONENT | DESCRIPTION | VALUE | DIMENSIONS | CATALOGUE No. |
|-----------|--------------|----------------|------------|---------------|
| R1 | resistor | 33 Ω | | |
| R2 | resistor | 1 k Ω | | |
| R3 | resistor | 100 k Ω | | |
| R4 | resistor | 100 Ω | | |
| R5, R6 | SMD resistor | 3.9 Ω | | |

Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. American Technical Ceramics type 180R or capacitor of same quality.
3. American Technical Ceramics type 100B or capacitor of same quality.
4. The striplines are on a double copper-clad printed-circuit board: Rogers 5880 ($\epsilon_r = 2.2$); thickness 0.79 mm.

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BLF861A



MCD877

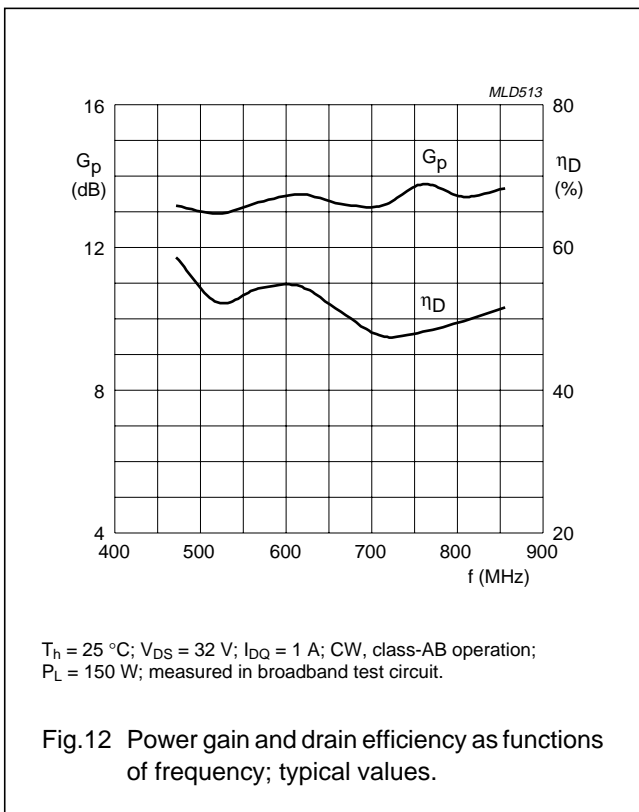
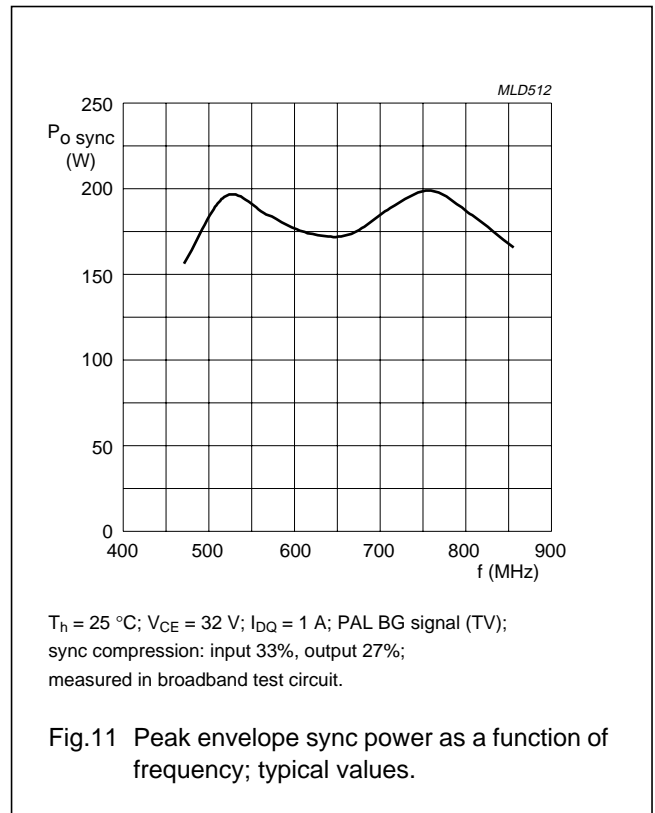
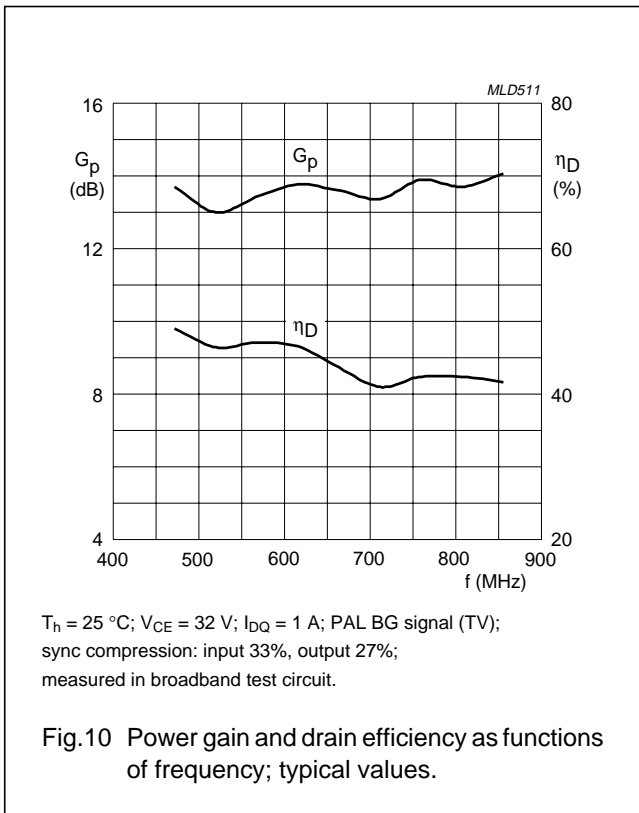
Dimensions in mm.

The components are situated on one side of the Rogers 5880 printed-circuit board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through-metallization.

Fig.9 Printed-circuit board and component layout for class-AB broadband test circuit.

UHF power LDMOS transistor

BLF861A



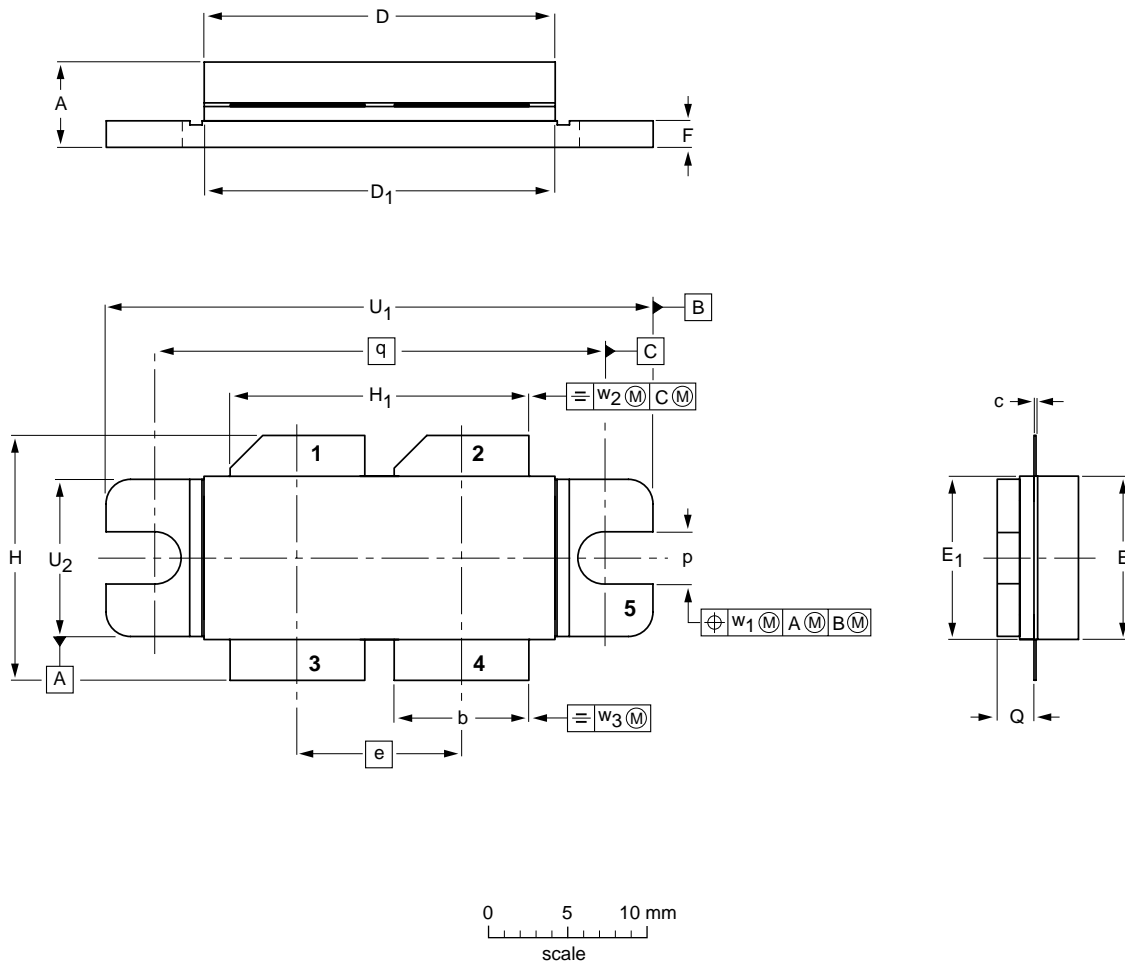
UHF power LDMOS transistor

BLF861A

PACKAGE OUTLINE

Flanged balanced LDMOST ceramic package; 2 mounting holes; 4 leads

SOT540A



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 | 8.51 8.26 | 0.15 0.10 | 22.05 21.64 | 22.05 21.64 | 10.21 | 10.26 10.06 | 10.31 10.01 | 1.78 1.52 | 15.75 14.73 | 18.72 18.47 | 3.38 3.12 | 2.72 2.46 | 27.94 | 34.16 33.91 | 9.91 9.65 | 0.25 | 0.51 | 0.25 |
| inches | 0.227 0.197 | 0.335 0.325 | 0.006 0.004 | 0.868 0.852 | 0.868 0.852 | 0.402 | 0.404 0.396 | 0.406 0.394 | 0.070 0.060 | 0.620 0.580 | 0.737 0.727 | 0.133 0.123 | 0.107 0.097 | 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 | | | |
| SOT540A | | | | | | 99-08-27 99-12-28 |

UHF power LDMOS transistor

BLF861A

DATA SHEET STATUS

| DATA SHEET STATUS | PRODUCT STATUS | DEFINITIONS ⁽¹⁾ |
|---------------------------|----------------|--|
| Objective specification | Development | This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice. |
| Preliminary specification | Qualification | This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product. |
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Note

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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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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.

UHF power LDMOS transistor

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NOTES

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NOTES

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