

DATA SHEET

BLW898 UHF linear power transistor

Product specification
Supersedes data of 1995 Oct 04

1996 Jul 16

UHF linear power transistor

BLW898

FEATURES

- Internal input matching for wideband operation and high power gain
- Polysilicon emitter ballasting resistors for an optimum temperature profile
- Gold metallization ensures excellent reliability.

APPLICATION

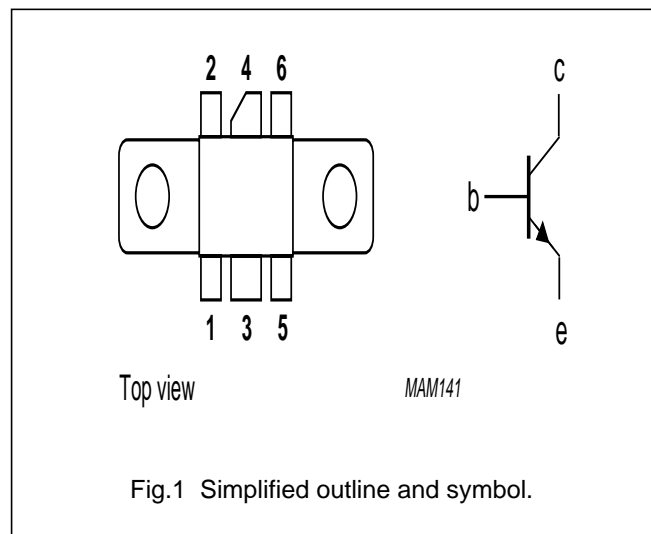
- Common emitter class-A operation in linear transposers/transmitters (television) in the 470 to 860 MHz frequency band.

DESCRIPTION

NPN silicon planar transistor in a SOT171A 6-lead rectangular flange package, with a ceramic cap. The transistor delivers a $P_{o\ sync} = 3\text{ W}$ in class-A operation at 860 MHz and a supply voltage of 25 V.

PINNING SOT171A

| PIN | DESCRIPTION |
|-----|-------------|
| 1 | emitter |
| 2 | emitter |
| 3 | base |
| 4 | collector |
| 5 | emitter |
| 6 | emitter |



QUICK REFERENCE DATA

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

| MODE OF OPERATION | f (MHz) | V_{CE} (V) | I_{CQ} (A) | $P_{o\ sync}$ (W) | G_p (dB) |
|-------------------|---------|--------------|--------------|-------------------|----------------|
| CW class-A | 860 | 25 | 1.1 | $\geq 3^{(1)}$ | $\geq 9^{(1)}$ |

Note

1. Three-tone test signal (-8, -16, and -10 dB); $d_{im} = -63\text{ dB}$.

| WARNING |
|--|
| Product and environmental safety - toxic materials |
| This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is 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. |

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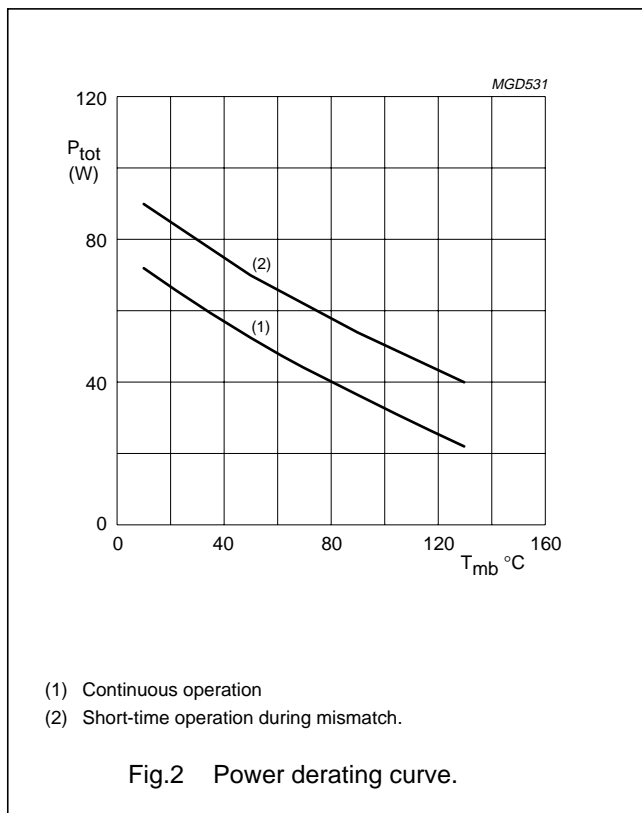
LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|-------------|--------------------------------|-------------------------------|------|------|------|
| V_{CBO} | collector-base voltage | open emitter | – | 60 | V |
| V_{CEO} | collector-emitter voltage | open base | – | 28 | V |
| V_{EBO} | emitter-base voltage | open collector | – | 2.5 | V |
| I_C | collector current (DC) | | – | 3.7 | A |
| $I_{C(AV)}$ | average collector current | | – | 3.7 | A |
| P_{tot} | total power dissipation | up to $T_{mb} = 70\text{ °C}$ | – | 44 | W |
| T_{stg} | storage temperature | | –65 | +150 | °C |
| T_j | operating junction temperature | | – | 200 | °C |

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|----------------|---|--|-------|------|
| $R_{th\ j-mb}$ | thermal resistance from junction to mounting-base | $P_{tot} = 44\text{ W}; T_{mb} = 70\text{ °C}$ | 3 | K/W |
| $R_{th\ mb-h}$ | thermal resistance from mounting-base to heatsink | | 0.3 | K/W |



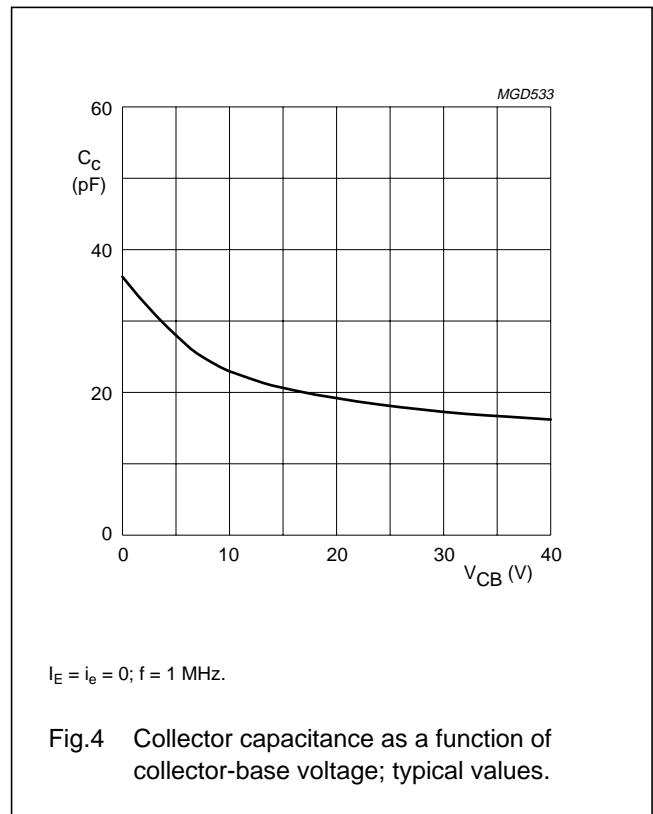
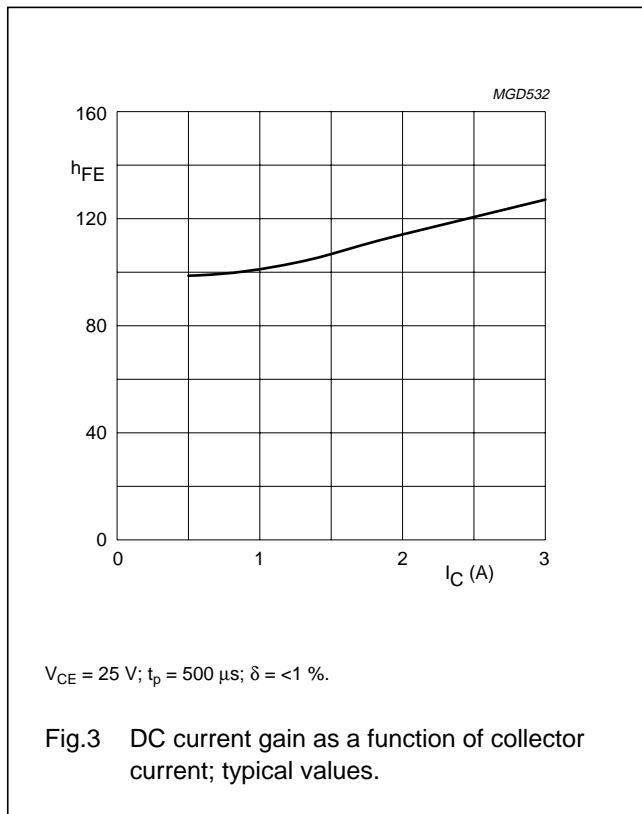
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CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---------------|-------------------------------------|--|------|------|------|------|
| $V_{(BR)CBO}$ | collector-base breakdown voltage | $I_C = 15\text{ mA}; I_E = 0$ | 60 | – | – | V |
| $V_{(BR)CEO}$ | collector-emitter breakdown voltage | $I_C = 30\text{ mA}; I_B = 0$ | 28 | – | – | V |
| $V_{(BR)EBO}$ | emitter-base breakdown voltage | $I_E = 0.6\text{ mA}; I_C = 0$ | 2.5 | – | – | V |
| I_{CBO} | collector-base leakage current | $V_{BE} = 0; V_{CB} = 28\text{ V}$ | – | – | 1.5 | mA |
| I_{CEO} | collector-emitter leakage current | $V_{CE} = 20\text{ V}$ | – | – | 3 | mA |
| h_{FE} | DC current gain | $V_{CE} = 25\text{ V}; I_C = 1.1\text{ A}$ | 30 | – | 140 | |
| C_c | collector capacitance | $V_{CB} = 25\text{ V}; I_E = i_e = 0;$ $f = 1\text{ MHz}$ | – | 18 | – | pF |
| C_{re} | feedback capacitance | $V_{CB} = 25\text{ V}; I_C = 0; f = 1\text{ MHz}$ | – | 11 | – | pF |



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APPLICATION INFORMATION

RF performance at $T_h = 25\text{ }^\circ\text{C}$ in a common emitter class-A test circuit.

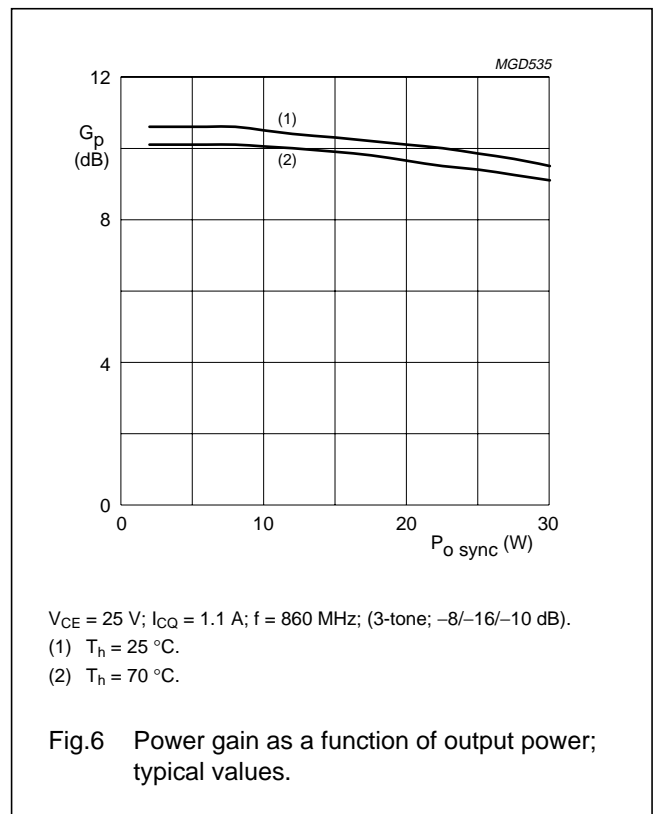
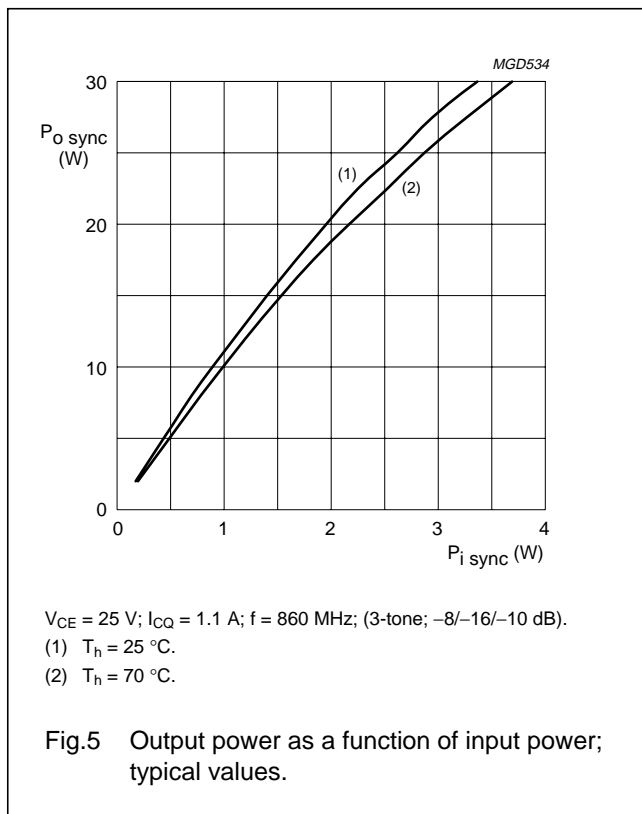
| MODE OF OPERATION | f (MHz) | V _{CE} (V) | I _{CQ} (A) | P _{O sync} (W) | G _p (dB) | d _{im} (dB) |
|-------------------|---------|---------------------|---------------------|-------------------------|---------------------|----------------------|
| CW class-A | 860 | 25 | 1.1 | ≥3 ⁽¹⁾ | ≥9 ⁽¹⁾ | <-63 ⁽¹⁾ |
| CW class-A | 860 | 25 | 1.1 | ≥3 ⁽²⁾ | ≥9 ⁽²⁾ | <-60 ⁽²⁾ |

Notes

- Three-tone test method (vision carrier -8 dB, sound carrier -10 dB, sideband signal -16 dB), 0 dB corresponds to peak sync level.
- Three-tone test method (vision carrier -8 dB, sound carrier -7 dB, sideband signal -16 dB), 0 dB corresponds to peak sync level.

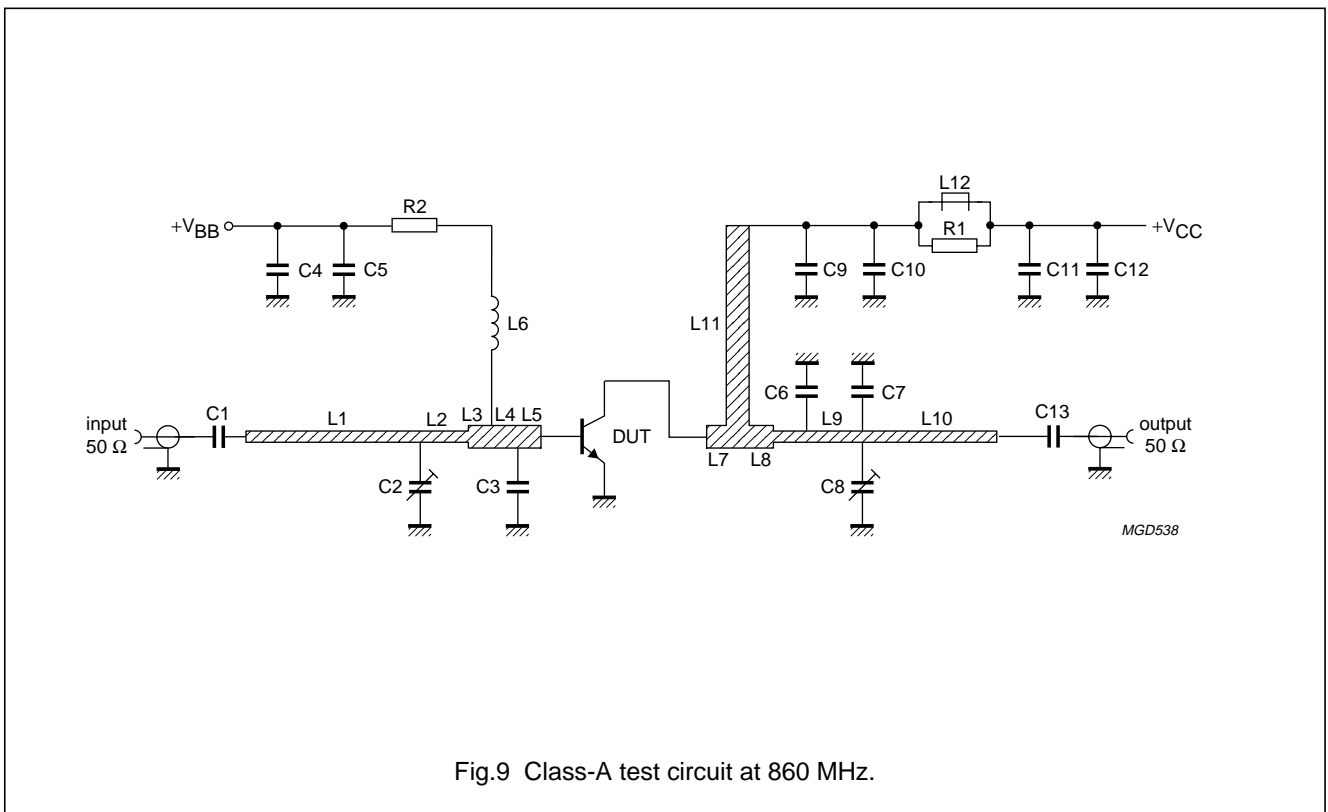
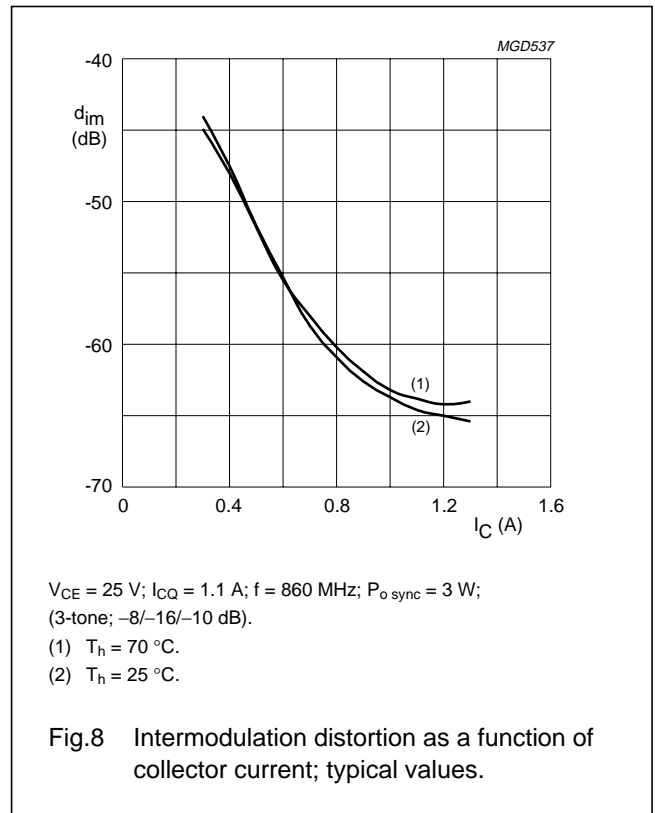
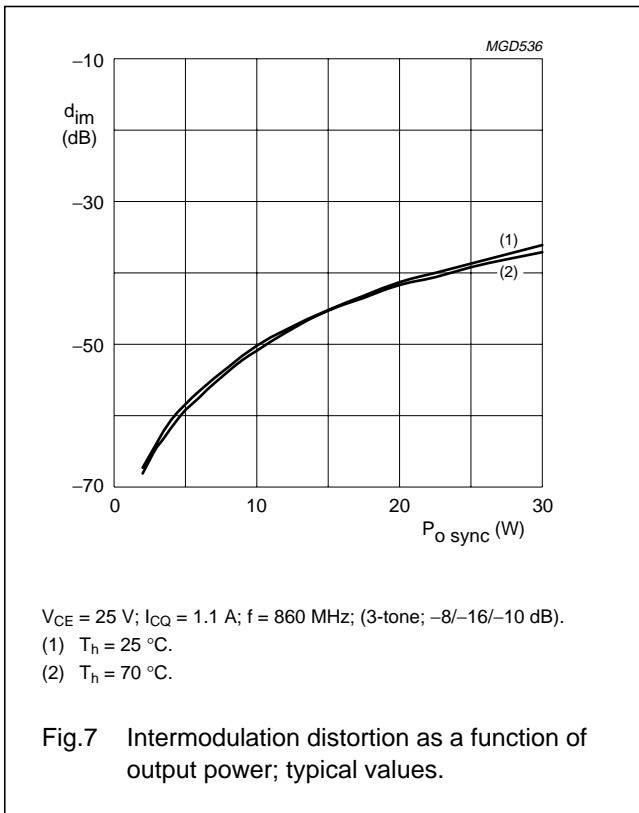
Ruggedness in class-A operation

The BLW898 is capable of withstanding a load mismatch corresponding to VSWR = 50 : 1 through all phases, under the conditions: V_{CE} = 25 V; I_{CQ} = 1.1 A; T_h = 25 °C; f = 860 MHz; P_{O sync} = 3 W.



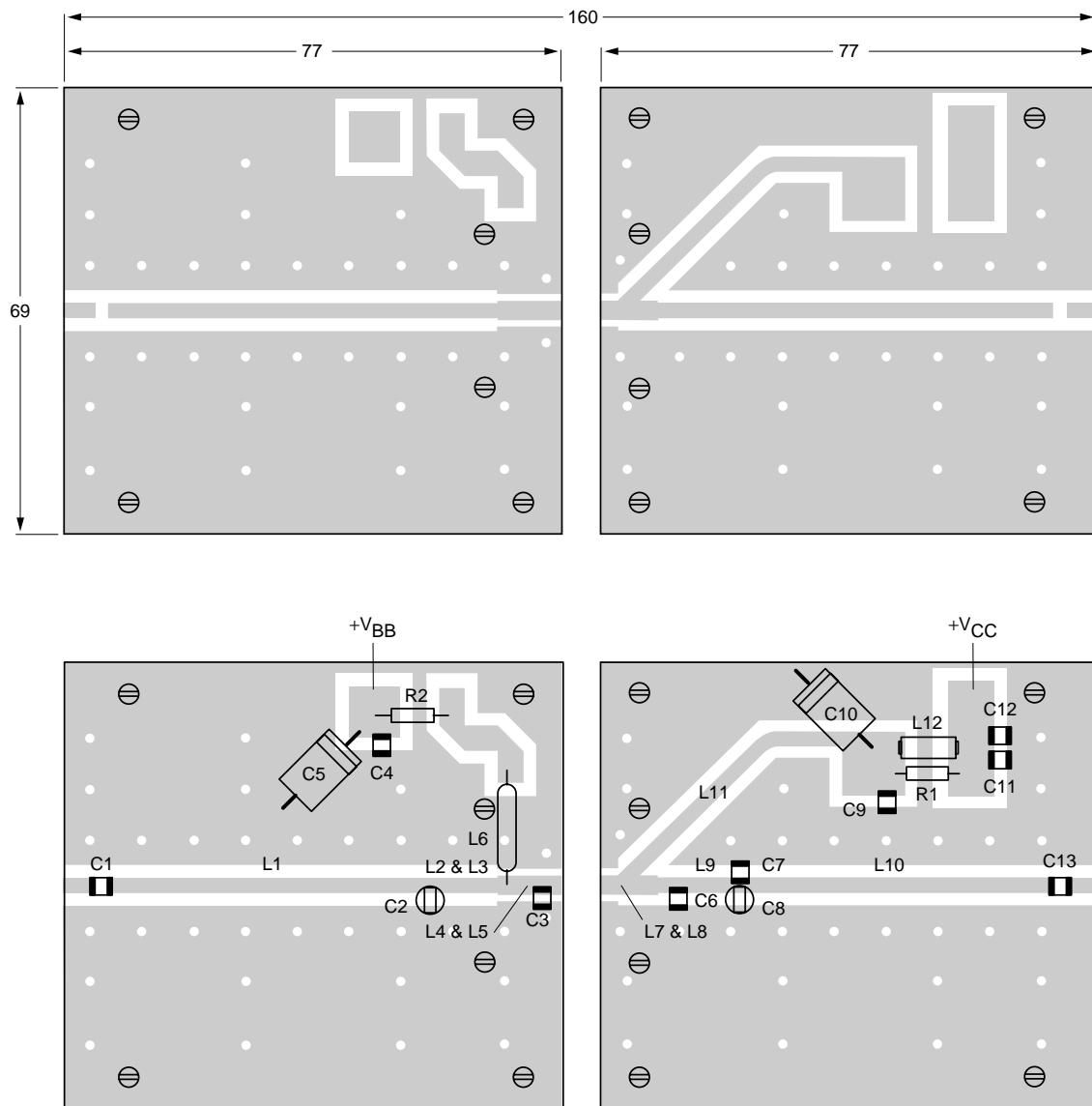
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MGD539

Dimensions in mm.

Fig.10 Printed-circuit board and component lay-out for 860 MHz class-A test circuit.

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List of components

| COMPONENT | DESCRIPTION | VALUE | DIMENSIONS | CATALOGUE No. |
|-----------|--|---------------------|-----------------------|----------------|
| C1 | multilayer ceramic chip capacitor; note 1 | 8.2 pF | | |
| C2, C8 | Tekelec Giga trim 37271 | 0.6 to 4.5 pF | | |
| C3 | multilayer ceramic chip capacitor; note 1 | 15 pF | | |
| C4, C12 | multilayer ceramic chip capacitor | 10 nF; 63 V | | 2222 592 16627 |
| C5 | solid aluminium capacitor | 10 μ F; 63 V | | 2222 030 38109 |
| C6 | multilayer ceramic chip capacitor; note 2 | 10 pF | | |
| C7 | multilayer ceramic chip capacitor; note 2 | 2.4 pF | | |
| C9 | multilayer ceramic chip capacitor; note 2 | 500 pF | | |
| C10 | solid aluminium capacitor | 47 μ F; 63 V | | 2222 031 38479 |
| C11 | multilayer ceramic chip capacitor; note 2 | 330 pF | | |
| C13 | multilayer ceramic chip capacitor; note 1 | 5.1 pF | | |
| L1 | stripline; note 3 | 50 Ω | 50 \times 2.3 mm | |
| L2 | stripline; note 3 | 50 Ω | 10 \times 2.3 mm | |
| L3 | stripline; note 3 | 40 Ω | 2 \times 3.25 mm | |
| L4, L5 | stripline; note 3 | 40 Ω | 4 \times 3.25 mm | |
| L6 | RF choke | 220 nH | | |
| L7 | stripline; note 3 | 40 Ω | 9 \times 3.25 mm | |
| L8 | stripline; note 3 | 40 Ω | 3.5 \times 3.25 mm | |
| L9 | stripline; note 3 | 50 Ω | 9 \times 2.3 mm | |
| L10 | stripline; note 3 | 50 Ω | 48.5 \times 2.3 mm | |
| L11 | stripline; note 3 | 40 Ω | 41.5 \times 3.25 mm | |
| L12 | grade 4S2 ferroxcube wideband RF choke | | | 4330 030 36301 |
| R1 | metal film resistor | 50 Ω ; 0.6 W | | 2322 156 14999 |
| R2 | metal film resistor | 10 Ω ; 0.6 W | | 2322 156 11009 |

Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. American Technical Ceramics type 100B or capacitor of same quality.
3. The striplines are on a double copper-clad PCB with PTFE fibre-glass dielectric ($\epsilon_r = 2.2$); thickness 0.79 mm.

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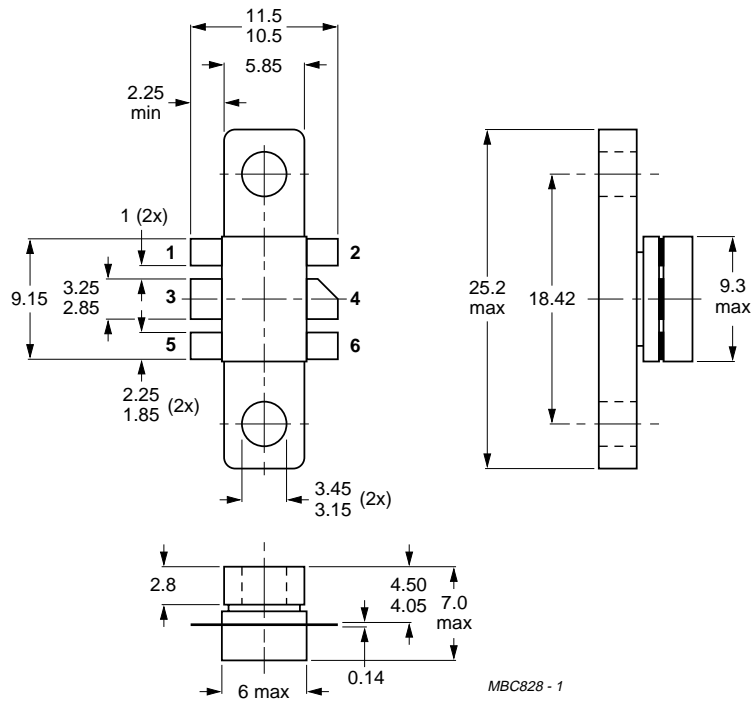
Table 1 Common emitter scattering parameter, $I_{CQ} = 1.1$ A; $V_{CE} = 25$ V.

| f (MHZ) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | G _{UM} (dB) |
|------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-------------------------|
| | MAG. (RAT) | ANG. (DEG) | MAG. (RAT) | ANG. (DEG) | MAG. (RAT) | ANG. (DEG) | MAG. (ANG) | ANG. (DEG) | |
| 470 | 0.962 | 176.1 | 1.002 | 68.3 | 0.017 | 32.6 | 0.802 | -178.2 | 15.7 |
| 495 | 0.961 | 175.9 | 0.961 | 66.9 | 0.017 | 32.8 | 0.803 | -178.2 | 15.2 |
| 520 | 0.959 | 175.7 | 0.923 | 65.7 | 0.017 | 33.6 | 0.804 | -178.2 | 14.7 |
| 545 | 0.958 | 175.5 | 0.891 | 64.4 | 0.018 | 34.9 | 0.803 | -178.3 | 14.3 |
| 570 | 0.957 | 175.3 | 0.861 | 63.2 | 0.018 | 35.8 | 0.804 | -178.2 | 14.0 |
| 595 | 0.955 | 175.0 | 0.835 | 62.0 | 0.018 | 36.1 | 0.805 | -178.2 | 13.5 |
| 620 | 0.953 | 174.8 | 0.815 | 61.0 | 0.019 | 36.8 | 0.804 | -178.2 | 13.0 |
| 645 | 0.951 | 174.5 | 0.795 | 59.7 | 0.019 | 37.3 | 0.805 | -178.1 | 12.7 |
| 670 | 0.950 | 174.2 | 0.775 | 58.6 | 0.019 | 37.4 | 0.807 | -178.0 | 12.5 |
| 695 | 0.947 | 173.9 | 0.757 | 57.7 | 0.020 | 37.8 | 0.806 | -178.0 | 12.0 |
| 720 | 0.943 | 173.7 | 0.744 | 56.6 | 0.021 | 38.5 | 0.805 | -178.1 | 11.5 |
| 745 | 0.942 | 173.4 | 0.732 | 55.4 | 0.021 | 38.6 | 0.807 | -177.9 | 11.3 |
| 770 | 0.941 | 173.1 | 0.724 | 54.4 | 0.021 | 39.8 | 0.808 | -177.8 | 11.1 |
| 795 | 0.938 | 172.8 | 0.716 | 53.3 | 0.021 | 40.1 | 0.807 | -177.8 | 10.8 |
| 820 | 0.935 | 172.5 | 0.707 | 51.8 | 0.022 | 39.1 | 0.808 | -177.8 | 10.6 |
| 845 | 0.933 | 172.1 | 0.701 | 50.9 | 0.021 | 39.3 | 0.810 | -177.6 | 10.4 |
| 860 | 0.932 | 171.9 | 0.700 | 50.2 | 0.022 | 39.4 | 0.809 | -177.5 | 10.3 |

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PACKAGE OUTLINE



MBC828 - 1

Dimensions in mm.

Fig.11 SOT171A.

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DEFINITIONS

| Data Sheet Status | |
|---|---|
| Objective specification | This data sheet contains target or goal specifications for product development. |
| Preliminary specification | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification | This data sheet contains final product specifications. |
| Limiting values | |
| Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). 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. | |
| Application information | |
| Where application information is given, it is advisory and does not form part of the specification. | |

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Printed in The Netherlands

127041/1200/02/pp12

Date of release: 1996 Jul 16

Document order number: 9397 750 00966

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