

Silicon N-channel dual-gate MOS-FETs

BF998; BF998R

FEATURES

- Short channel transistor with high forward transfer admittance to input capacitance ratio
- Low noise gain controlled amplifier up to 1 GHz.

APPLICATIONS

- VHF and UHF applications with 12 V supply voltage, such as television tuners and professional communications equipment.

DESCRIPTION

Depletion type field effect transistor in a plastic microminiature SOT143B or SOT143R package with source and substrate interconnected. The transistors are protected against excessive input voltage surges by integrated back-to-back diodes between gates and source.

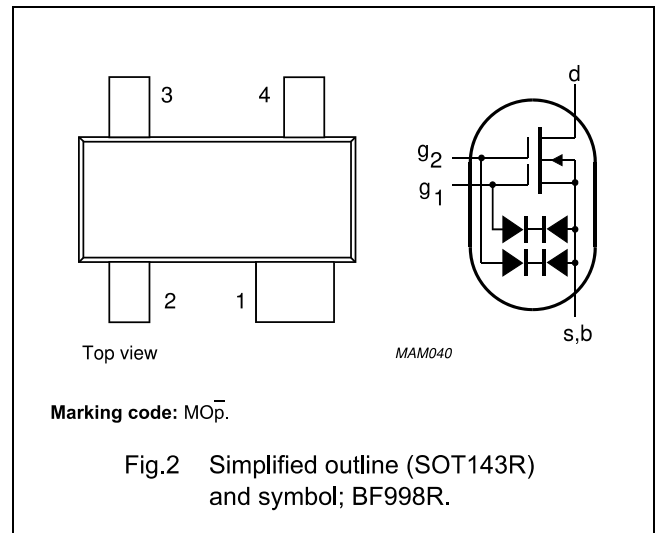
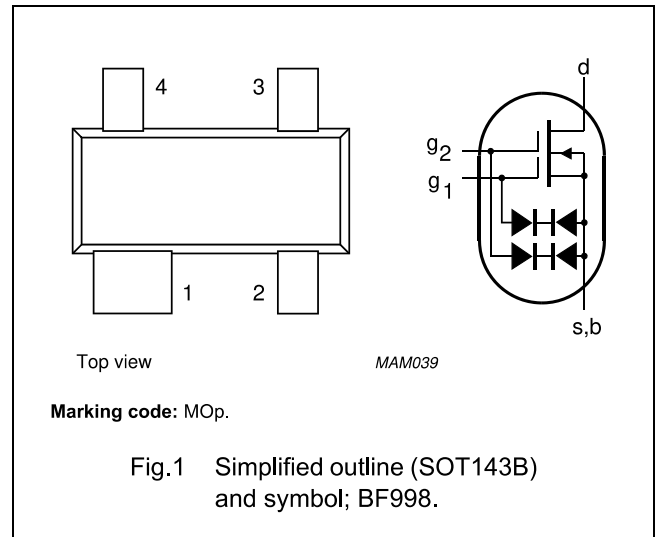
| CAUTION | |
|---|--|
| The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling. | |

PINNING

| PIN | SYMBOL | DESCRIPTION |
|-----|----------------|-------------|
| 1 | s, b | source |
| 2 | d | drain |
| 3 | g ₂ | gate 2 |
| 4 | g ₁ | gate 1 |

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | TYP. | MAX. | UNIT |
|--------------------|--------------------------------|-------------|------|------|------|
| V _{DS} | drain-source voltage | | – | 12 | V |
| I _D | drain current | | – | 30 | mA |
| P _{tot} | total power dissipation | | – | 200 | mW |
| y _{fs} | forward transfer admittance | | 24 | – | mS |
| C _{ig1-s} | input capacitance at gate 1 | | 2.1 | – | pF |
| C _{rs} | reverse transfer capacitance | f = 1 MHz | 25 | – | fF |
| F | noise figure | f = 800 MHz | 1 | – | dB |
| T _j | operating junction temperature | | – | 150 | °C |



Silicon N-channel dual-gate MOS-FETs

BF998; BF998R

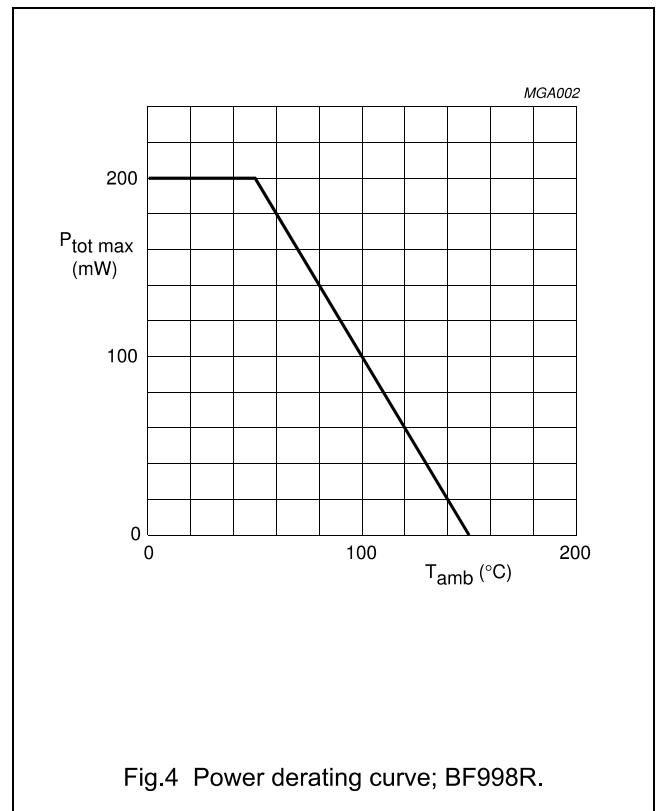
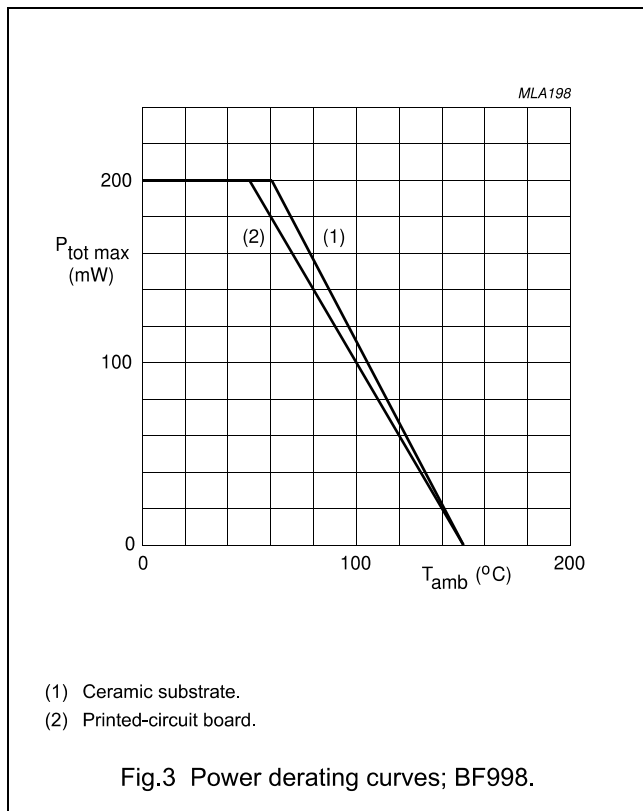
LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|--------------|---------------------------------|--|------|------|------------------|
| V_{DS} | drain-source voltage | | - | 12 | V |
| I_D | drain current | | - | 30 | mA |
| $\pm I_{G1}$ | gate 1 current | | - | 10 | mA |
| $\pm I_{G2}$ | gate 2 current | | - | 10 | mA |
| P_{tot} | total power dissipation; BF998 | up to $T_{amb} = 60\text{ }^\circ\text{C}$; see Fig.3; note 1 | - | 200 | mW |
| | | up to $T_{amb} = 50\text{ }^\circ\text{C}$; see Fig.3; note 2 | - | 200 | mW |
| P_{tot} | total power dissipation; BF998R | up to $T_{amb} = 50\text{ }^\circ\text{C}$; see Fig.4; note 1 | - | 200 | mW |
| T_{stg} | storage temperature | | -65 | +150 | $^\circ\text{C}$ |
| T_j | operating junction temperature | | - | 150 | $^\circ\text{C}$ |

Notes

1. Device mounted on a ceramic substrate, 8 mm × 10 mm × 0.7 mm.
2. Device mounted on a printed-circuit board.



Silicon N-channel dual-gate MOS-FETs

BF998; BF998R

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---------------|---|------------|-------|------|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient in free air; BF998 | note 1 | 460 | K/W |
| | | note 2 | 500 | K/W |
| $R_{th\ j-a}$ | thermal resistance from junction to ambient in free air; BF998R | note 1 | 500 | K/W |

Notes

- Device mounted on a ceramic substrate, 8 mm × 10 mm × 0.7 mm.
- Device mounted on a printed-circuit board.

STATIC CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---------------------|---------------------------------|---|------|------|------|
| $\pm V_{(BR)G1-SS}$ | gate 1-source breakdown voltage | $V_{G2-S} = V_{DS} = 0$; $I_{G1-SS} = \pm 10\text{ mA}$ | 6 | 20 | V |
| $\pm V_{(BR)G2-SS}$ | gate 2-source breakdown voltage | $V_{G1-S} = V_{DS} = 0$; $I_{G2-SS} = \pm 10\text{ mA}$ | 6 | 20 | V |
| $-V_{(P)G1-S}$ | gate 1-source cut-off voltage | $V_{G2-S} = 4\text{ V}$; $V_{DS} = 8\text{ V}$; $I_D = 20\text{ }\mu\text{A}$ | – | 2.0 | V |
| $-V_{(P)G2-S}$ | gate 2-source cut-off voltage | $V_{G1-S} = 0$; $V_{DS} = 8\text{ V}$; $I_D = 20\text{ }\mu\text{A}$ | – | 1.5 | V |
| I_{DSS} | drain-source current | $V_{G2-S} = 4\text{ V}$; $V_{DS} = 8\text{ V}$; $V_{G1-S} = 0$; note 1 | 2 | 18 | mA |
| $\pm I_{G1-SS}$ | gate 1 cut-off current | $V_{G2-S} = V_{DS} = 0$; $V_{G1-S} = \pm 5\text{ V}$ | – | 50 | nA |
| $\pm I_{G2-SS}$ | gate 2 cut-off current | $V_{G1-S} = V_{DS} = 0$; $V_{G2-S} = \pm 5\text{ V}$ | – | 50 | nA |

Note

- Measured under pulse condition.

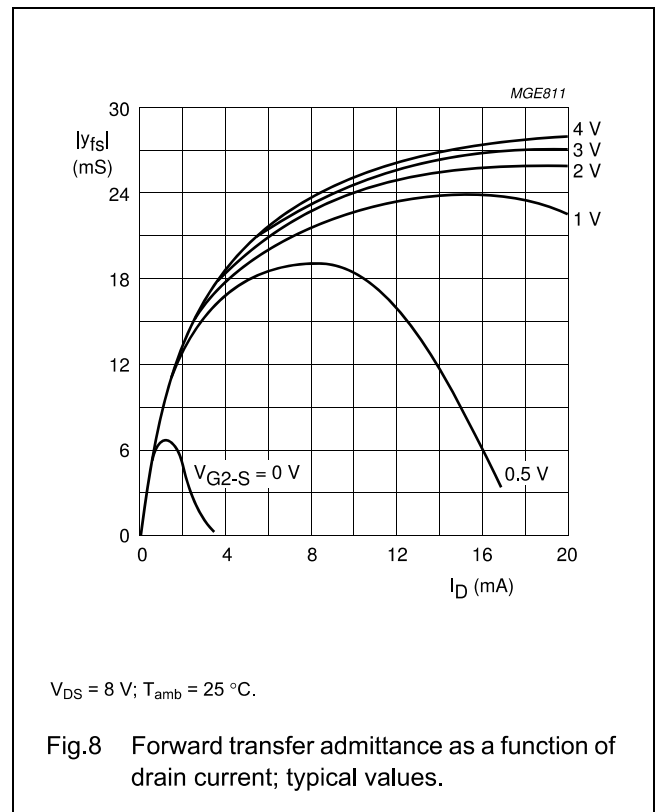
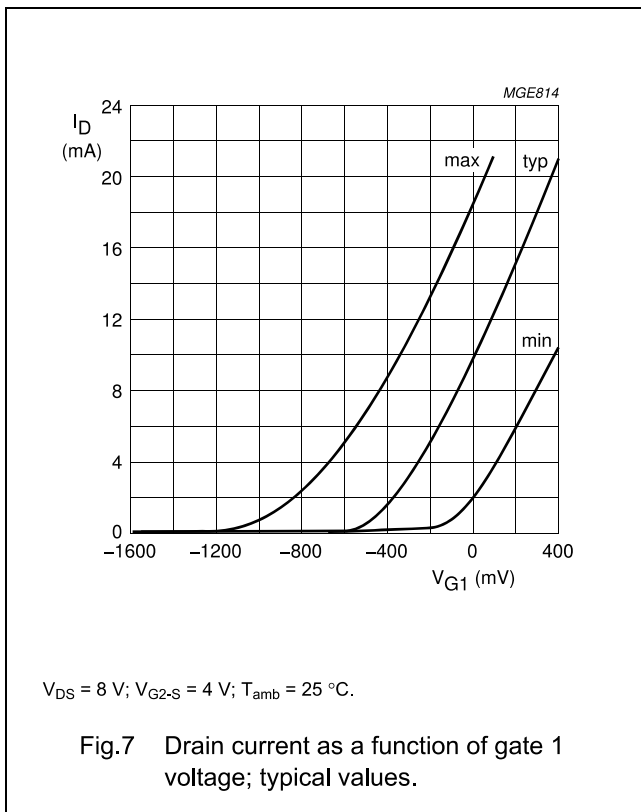
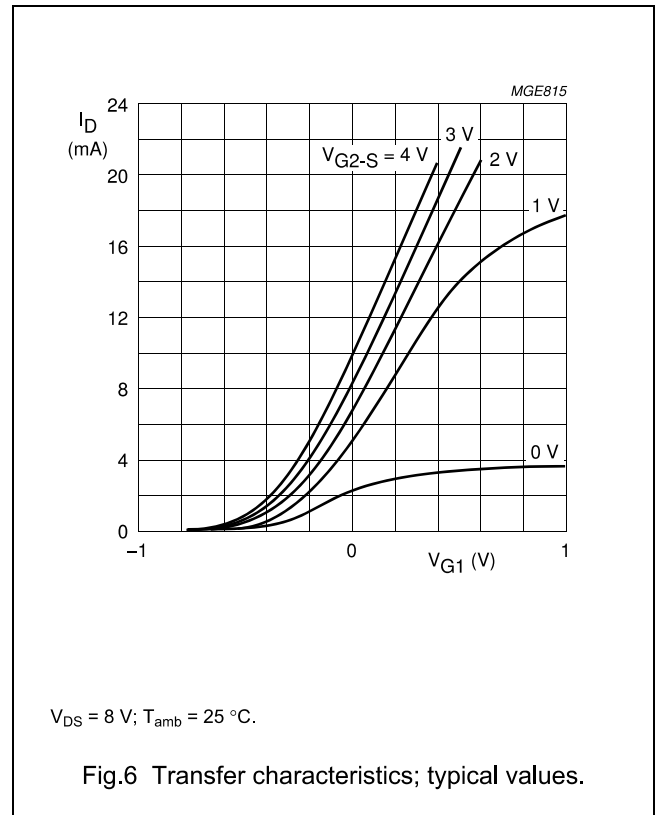
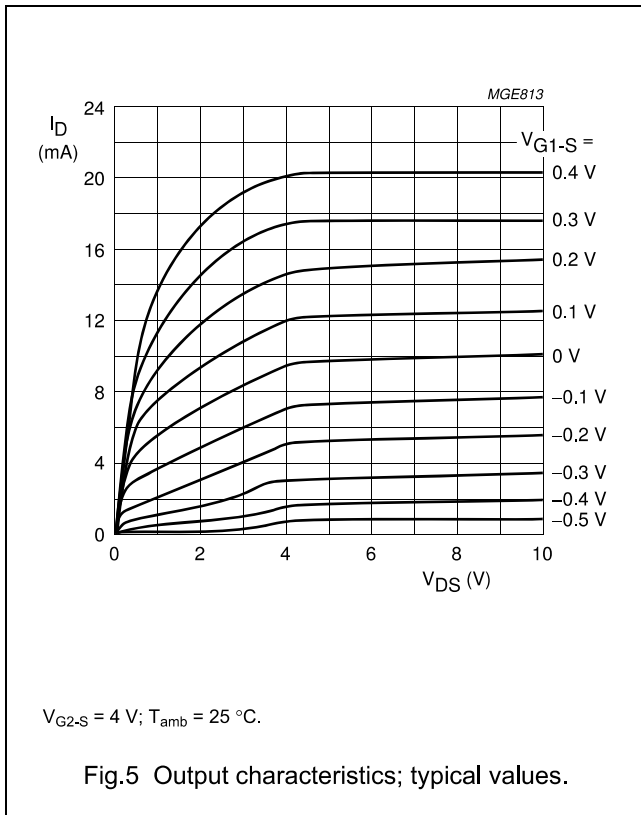
DYNAMIC CHARACTERISTICS

Common source; $T_{amb} = 25\text{ °C}$; $V_{DS} = 8\text{ V}$; $V_{G2-S} = 4\text{ V}$; $I_D = 10\text{ mA}$.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-------------|------------------------------|---|------|------|------|------|
| $ y_{fs} $ | forward transfer admittance | $f = 1\text{ kHz}$ | 21 | 24 | – | mS |
| C_{ig1-s} | input capacitance at gate 1 | $f = 1\text{ MHz}$ | – | 2.1 | 2.5 | pF |
| C_{ig2-s} | input capacitance at gate 2 | $f = 1\text{ MHz}$ | – | 1.2 | – | pF |
| C_{os} | output capacitance | $f = 1\text{ MHz}$ | – | 1.05 | – | pF |
| C_{rs} | reverse transfer capacitance | $f = 1\text{ MHz}$ | – | 25 | – | fF |
| F | noise figure | $f = 200\text{ MHz}$; $G_S = 2\text{ mS}$; $B_S = B_{Sopt}$ | – | 0.6 | – | dB |
| | | $f = 800\text{ MHz}$; $G_S = 3.3\text{ mS}$; $B_S = B_{Sopt}$ | – | 1.0 | – | dB |

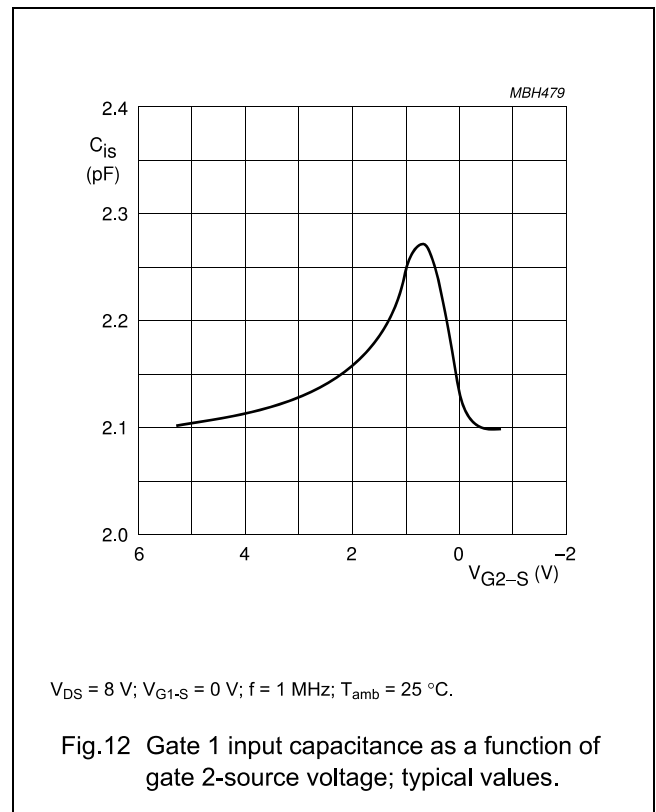
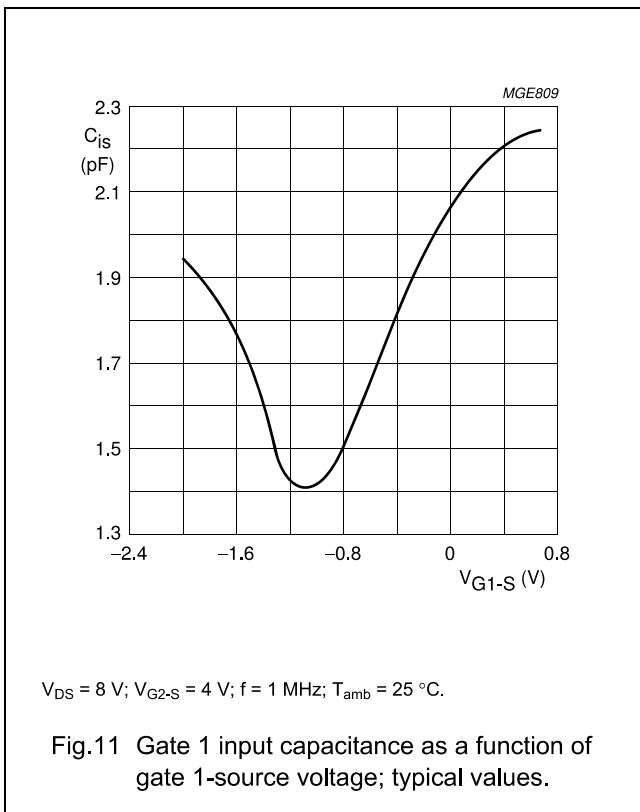
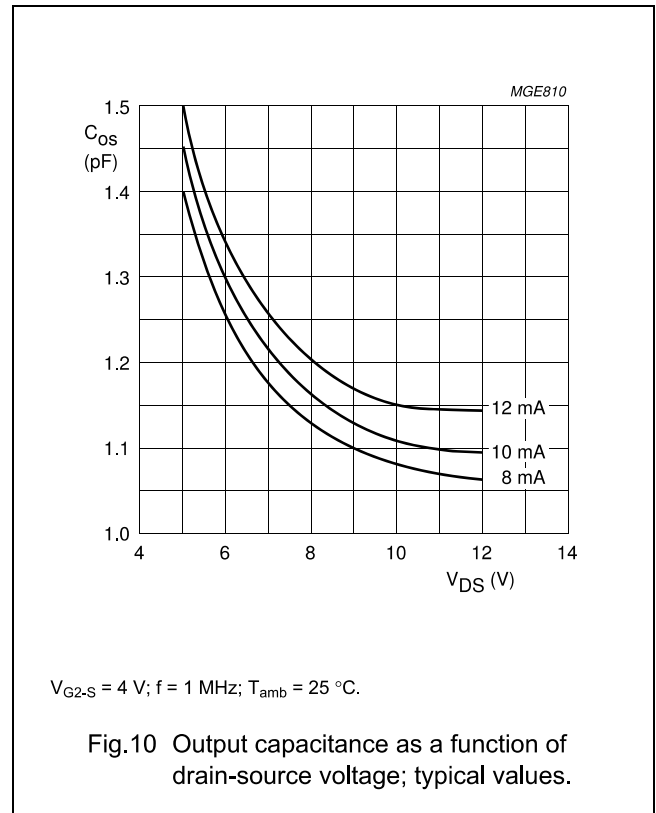
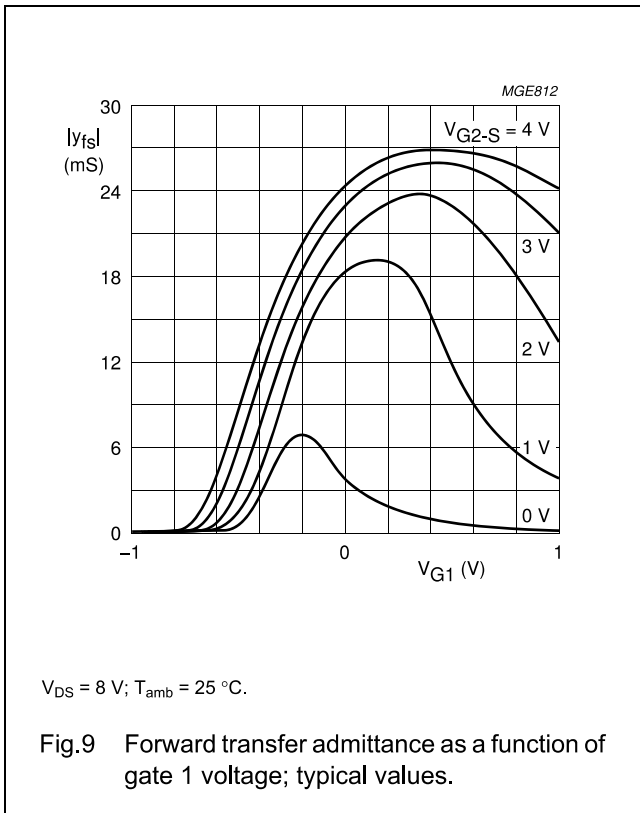
Silicon N-channel dual-gate MOS-FETs

BF998; BF998R



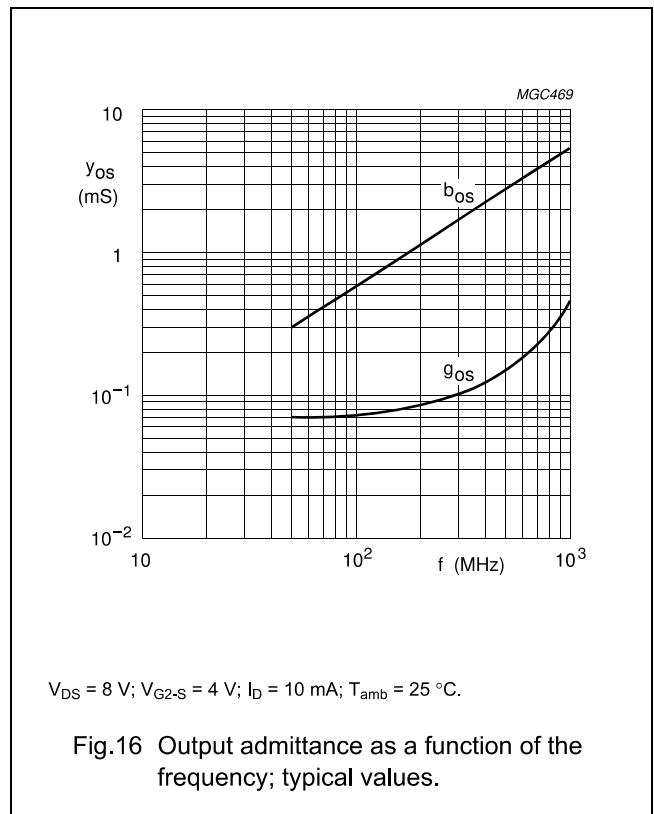
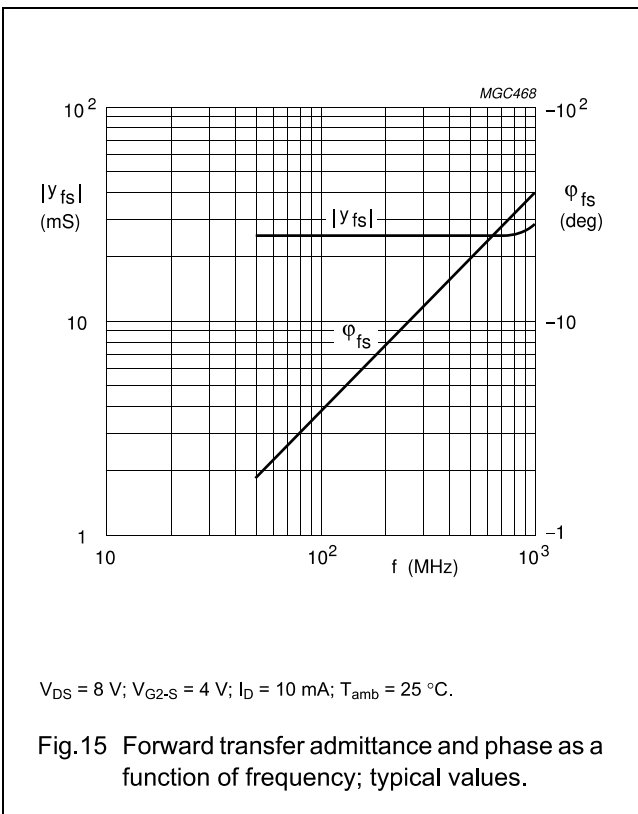
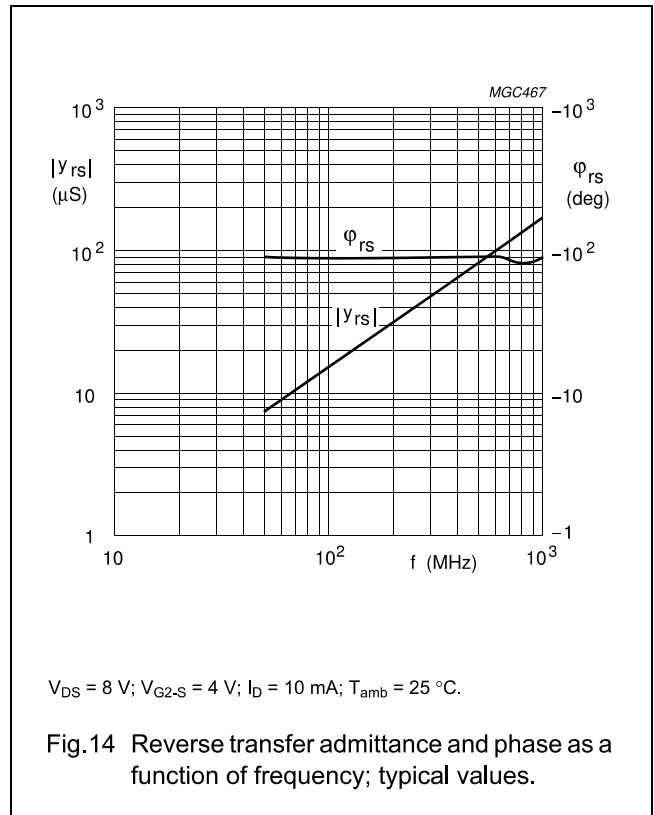
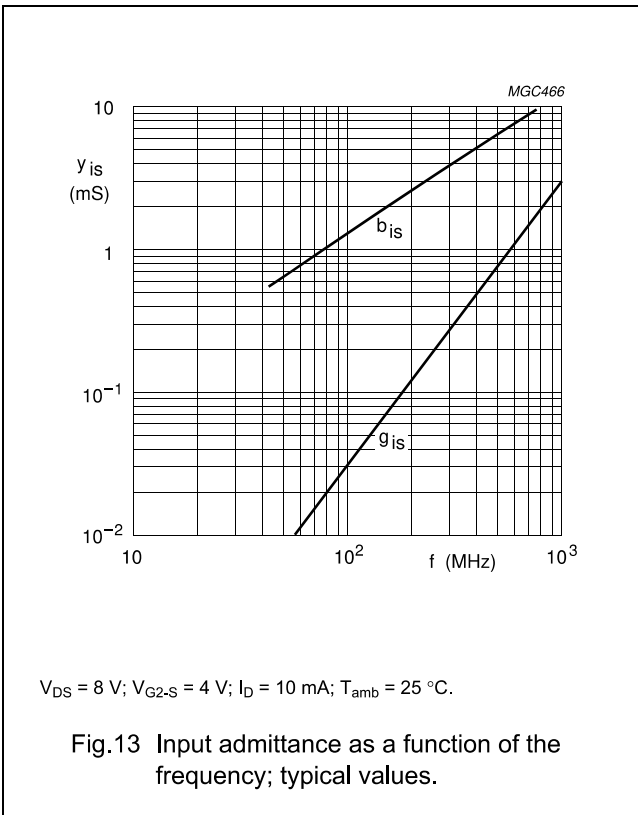
Silicon N-channel dual-gate MOS-FETs

BF998; BF998R



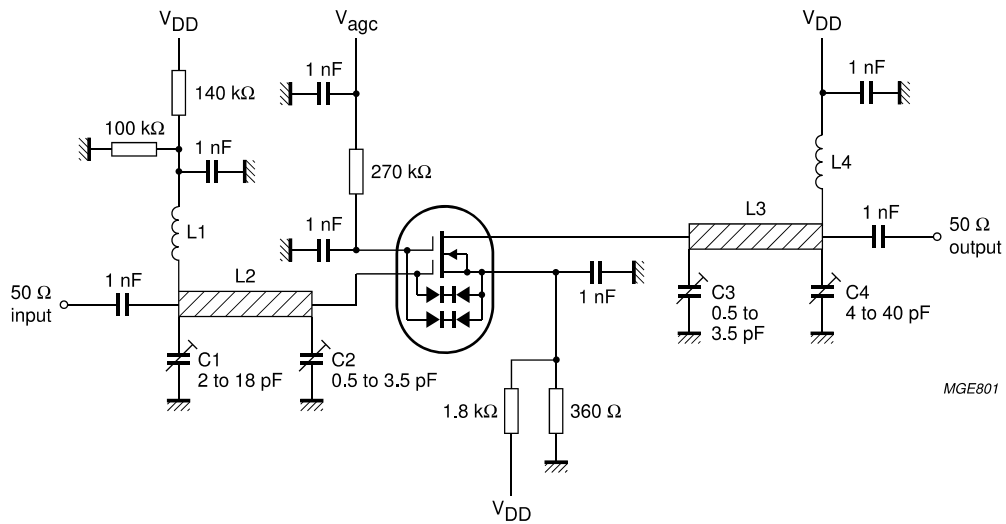
Silicon N-channel dual-gate MOS-FETs

BF998; BF998R



Silicon N-channel dual-gate MOS-FETs

BF998; BF998R



MGE801

$V_{DD} = 12\text{ V}$; $G_S = 3.3\text{ mS}$; $G_L = 1\text{ mS}$.

$L1 = L4 = 200\text{ nH}$; 11 turns 0.5 mm copper wire, without spacing, internal diameter 3 mm.

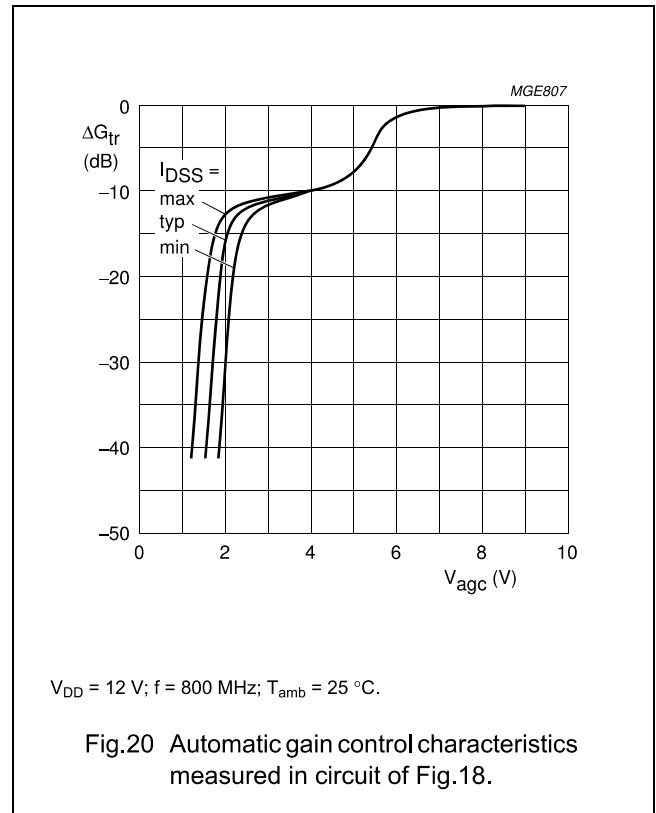
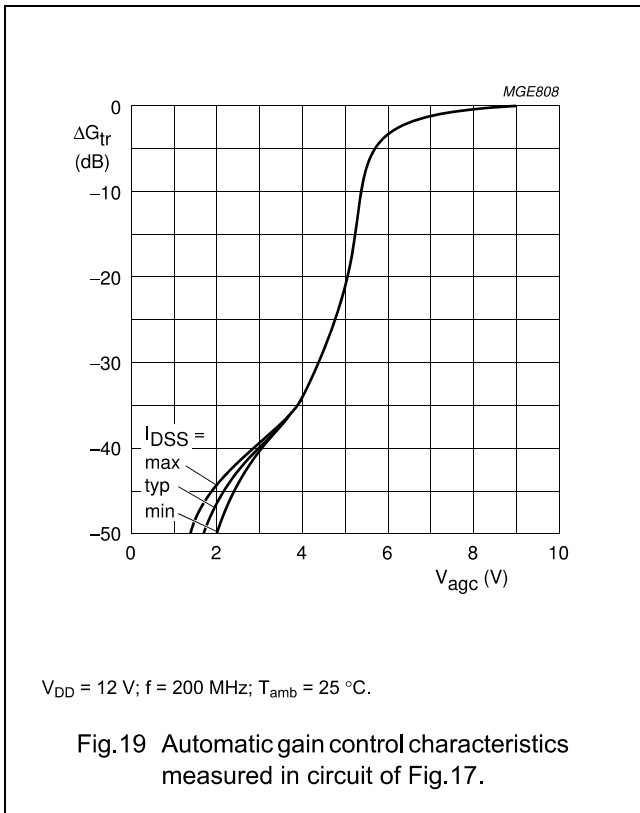
$L2 = 2\text{ cm}$, silvered 0.8 mm copper wire, 4 mm above ground plane.

$L3 = 2\text{ cm}$, silvered 0.5 mm copper wire, 4 mm above ground plane.

Fig.18 Gain control test circuit at $f = 800\text{ MHz}$.

Silicon N-channel dual-gate MOS-FETs

BF998; BF998R



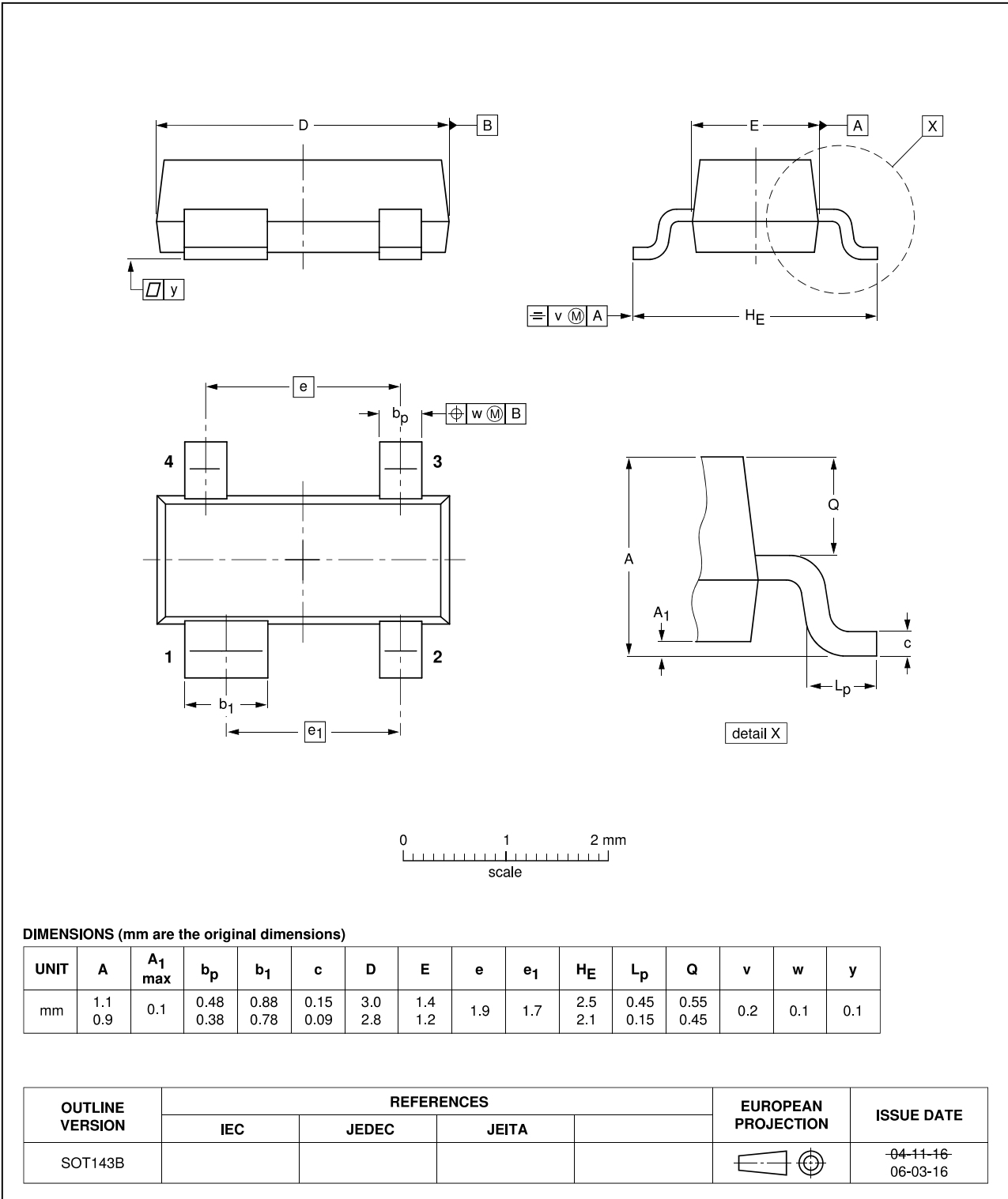
Silicon N-channel dual-gate MOS-FETs

BF998; BF998R

PACKAGE OUTLINES

Plastic surface-mounted package; 4 leads

SOT143B

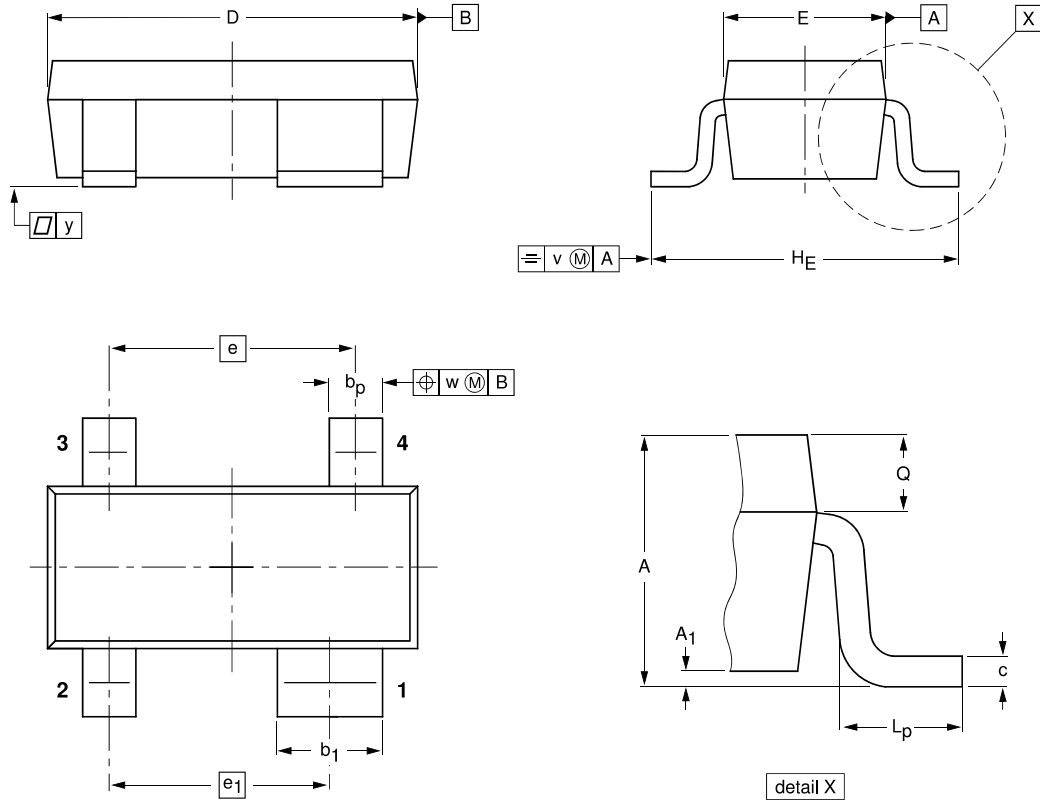


Silicon N-channel dual-gate MOS-FETs

BF998; BF998R

Plastic surface-mounted package; reverse pinning; 4 leads

SOT143R



DIMENSIONS (mm are the original dimensions)

| UNIT | A | A ₁ max | b _p | b ₁ | c | D | E | e | e ₁ | H _E | L _p | Q | v | w | y |
|------|------------|-----------------------|----------------|----------------|--------------|------------|------------|-----|----------------|----------------|----------------|--------------|-----|-----|-----|
| mm | 1.1 0.9 | 0.1 | 0.48 0.38 | 0.88 0.78 | 0.15 0.09 | 3.0 2.8 | 1.4 1.2 | 1.9 | 1.7 | 2.5 2.1 | 0.55 0.25 | 0.45 0.25 | 0.2 | 0.1 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|---------|--|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT143R | | | SC-61AA | | | 04-11-16 06-03-16 |