

BF908; BF908R

Dual-gate MOS-FETs

Rev. 03 — 14 November 2007

Product data sheet

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NXP Semiconductors

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FEATURES

- High forward transfer admittance
- 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.

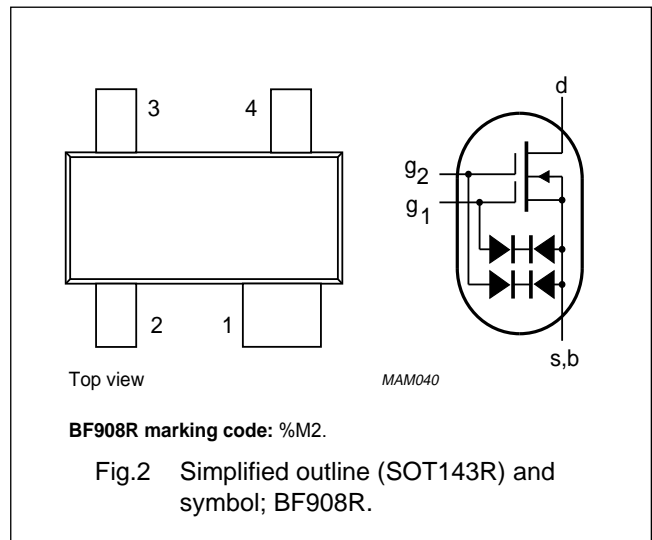
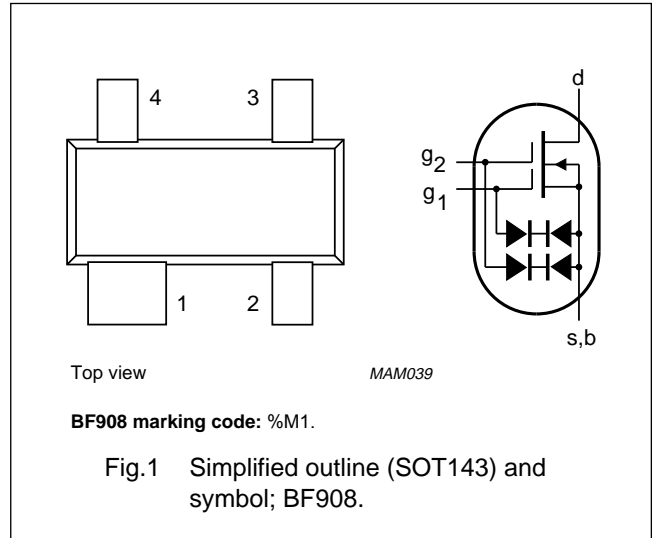
DESCRIPTION

Depletion type field-effect transistor in a plastic microminiature SOT143 or SOT143R package. 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 | MIN. | TYP. | MAX. | UNIT |
|--------------------|--------------------------------|-------------|------|------|------|------|
| V _{DS} | drain-source voltage | | – | – | 12 | V |
| I _D | drain current | | – | – | 40 | mA |
| P _{tot} | total power dissipation | | – | – | 200 | mW |
| T _j | operating junction temperature | | – | – | 150 | °C |
| y _{fs} | forward transfer admittance | | 36 | 43 | 50 | mS |
| C _{ig1-s} | input capacitance at gate 1 | | 2.4 | 3.1 | 4 | pF |
| C _{rs} | reverse transfer capacitance | f = 1 MHz | 20 | 30 | 45 | pF |
| F | noise figure | f = 800 MHz | – | 1.5 | 2.5 | dB |

Dual-gate MOS-FETs

BF908; BF908R

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 | | – | 40 | mA |
| $\pm I_{G1}$ | gate 1 current | | – | 10 | mA |
| $\pm I_{G2}$ | gate 2 current | | – | 10 | mA |
| P_{tot} | total power dissipation BF908 BF908R | see Fig.3; note 1 up to $T_{amb} = 50\text{ }^\circ\text{C}$ up to $T_{amb} = 40\text{ }^\circ\text{C}$ | – | 200 200 | mW mW |
| T_{stg} | storage temperature | | –65 | +150 | $^\circ\text{C}$ |
| T_j | operating junction temperature | | – | 150 | $^\circ\text{C}$ |

Note

1. Device mounted on a printed-circuit board.

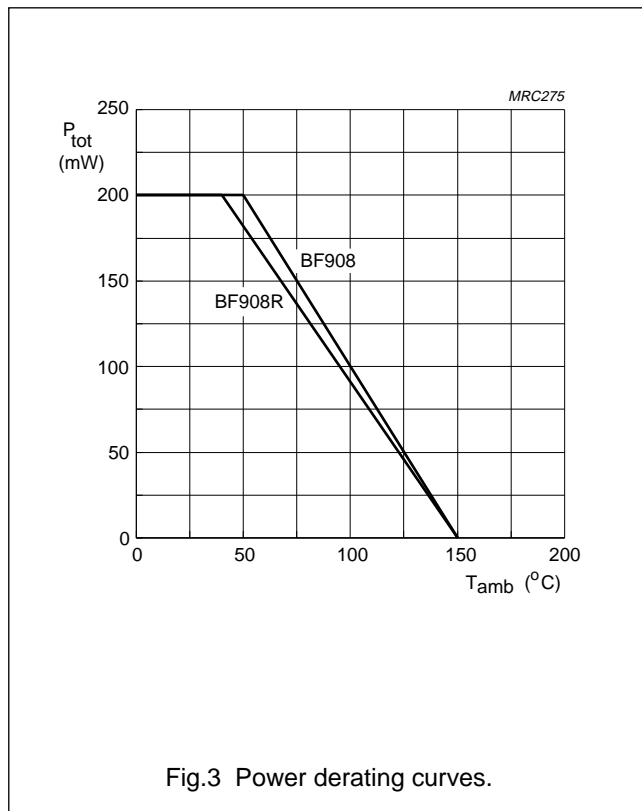


Fig.3 Power derating curves.

Dual-gate MOS-FETs

BF908; BF908R

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---------------|---|------------|-------|------|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient | note 1 | | |
| | BF908 | | 500 | K/W |
| | BF908R | | 550 | K/W |

Note

1. Device mounted on a printed-circuit board.

STATIC CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---------------------|---------------------------------|---|------|------|------|------|
| $\pm V_{(BR)G1-SS}$ | gate 1-source breakdown voltage | $V_{G2-S} = V_{DS} = 0$; $I_{G1-S} = 10\text{ mA}$ | 8 | – | 20 | V |
| $\pm V_{(BR)G2-SS}$ | gate 2-source breakdown voltage | $V_{G1-S} = V_{DS} = 0$; $I_{G2-S} = 10\text{ mA}$ | 8 | – | 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 | V |
| $-V_{(P)G2-S}$ | gate 2-source cut-off voltage | $V_{G1-S} = 4\text{ V}$; $V_{DS} = 8\text{ V}$; $I_D = 20\text{ }\mu\text{A}$ | – | – | 1.5 | V |
| I_{DSS} | drain-source current | $V_{G2-S} = 4\text{ V}$; $V_{DS} = 8\text{ V}$; $V_{G1-S} = 0$ | 3 | 15 | 27 | mA |
| $\pm I_{G1-SS}$ | gate 1 cut-off current | $V_{G2-S} = V_{DS} = 0$; $V_{G1-S} = 5\text{ V}$ | – | – | 50 | nA |
| $\pm I_{G2-SS}$ | gate 2 cut-off current | $V_{G1-S} = V_{DS} = 0$; $V_{G2-S} = 5\text{ V}$ | – | – | 50 | nA |

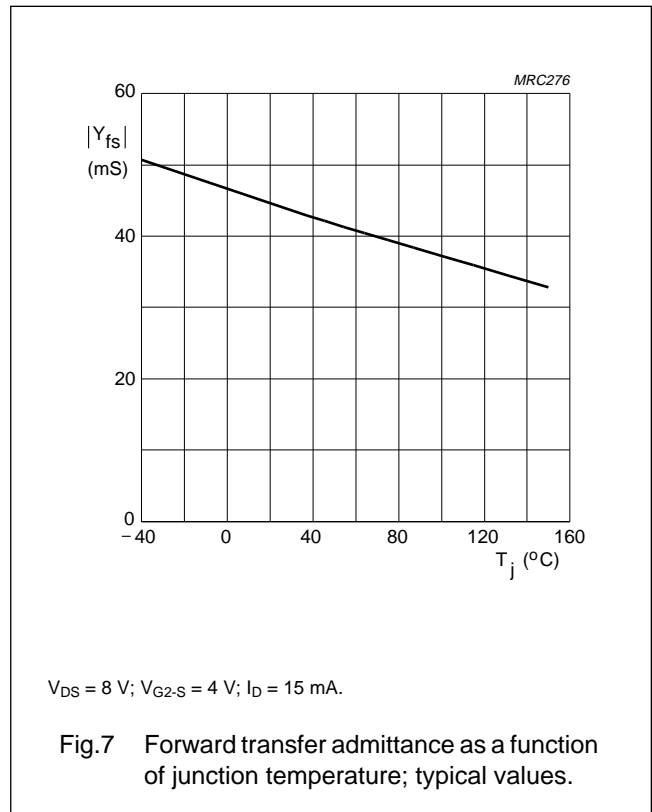
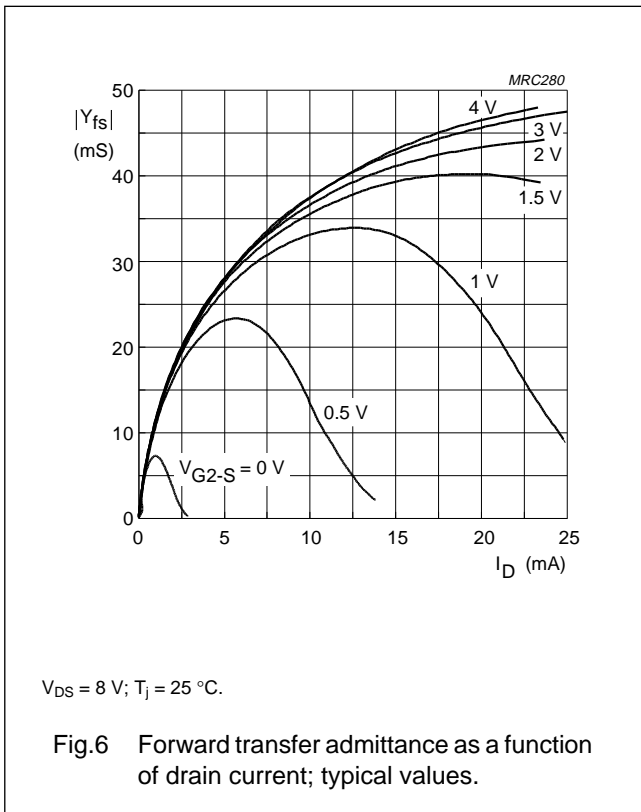
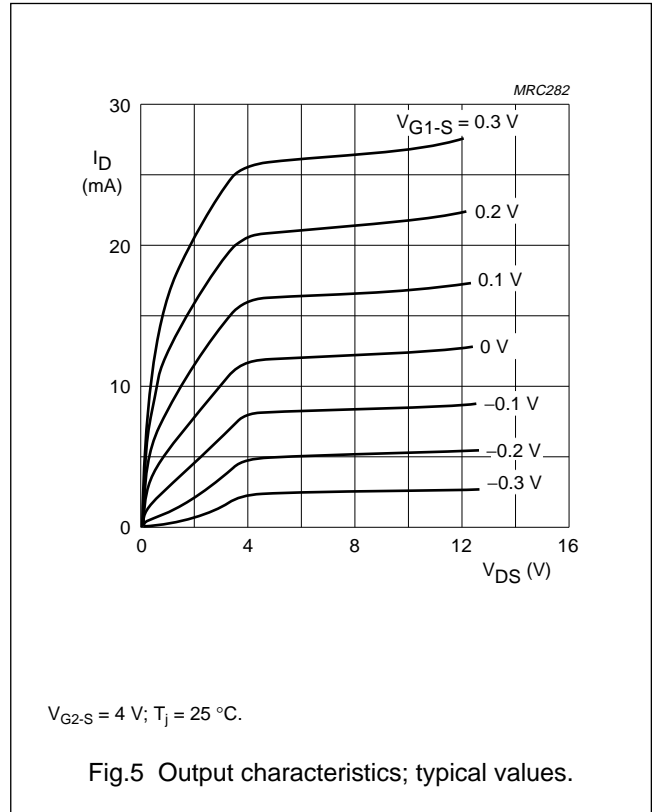
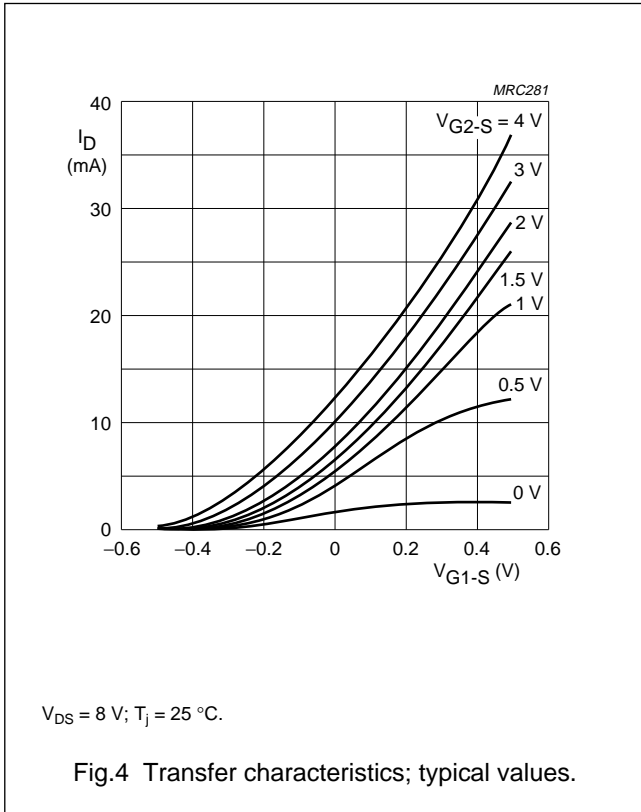
DYNAMIC CHARACTERISTICS

Common source; $T_{amb} = 25\text{ °C}$; $V_{DS} = 8\text{ V}$; $V_{G2-S} = 4\text{ V}$; $I_D = 15\text{ mA}$; unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-------------|------------------------------|---|------|------|------|------|
| $ y_{fs} $ | forward transfer admittance | pulsed; $T_j = 25\text{ °C}$; $f = 1\text{ MHz}$ | 36 | 43 | 50 | mS |
| C_{ig1-s} | input capacitance at gate 1 | $f = 1\text{ MHz}$ | 2.4 | 3.1 | 4 | pF |
| C_{ig2-s} | input capacitance at gate 2 | $f = 1\text{ MHz}$ | 1.2 | 1.8 | 2.5 | pF |
| C_{os} | output capacitance | $f = 1\text{ MHz}$ | 1.2 | 1.7 | 2.2 | pF |
| C_{rs} | reverse transfer capacitance | $f = 1\text{ MHz}$ | 20 | 30 | 45 | fF |
| F | noise figure | $f = 200\text{ MHz}$; $G_S = 2\text{ mS}$; $B_S = B_{Sopt}$ | – | 0.6 | 1.2 | dB |
| | | $f = 800\text{ MHz}$; $G_S = G_{Sopt}$; $B_S = B_{Sopt}$ | – | 1.5 | 2.5 | dB |

Dual-gate MOS-FETs

BF908; BF908R



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BF908; BF908R

Table 1 Scattering parameters

| f (MHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|--|----------------------|----------------|----------------------|----------------|----------------------|----------------|----------------------|----------------|
| | MAGNITUDE (ratio) | ANGLE (deg) | MAGNITUDE (ratio) | ANGLE (deg) | MAGNITUDE (ratio) | ANGLE (deg) | MAGNITUDE (ratio) | ANGLE (deg) |
| V_{DS} = 8 V; V_{G2-S} = 4 V; I_D = 10 mA; T_{amb} = 25 °C. | | | | | | | | |
| 50 | 0.998 | -5.1 | 3.537 | 173.5 | 0.001 | 98.2 | 0.996 | -2.4 |
| 100 | 0.994 | -10.4 | 3.502 | 167.7 | 0.001 | 88.8 | 0.994 | -4.9 |
| 200 | 0.979 | -20.8 | 3.450 | 154.9 | 0.003 | 74.6 | 0.987 | -9.5 |
| 300 | 0.962 | -30.3 | 3.318 | 143.7 | 0.004 | 69.5 | 0.983 | -13.9 |
| 400 | 0.939 | -40.1 | 3.234 | 131.9 | 0.005 | 65.6 | 0.980 | -18.5 |
| 500 | 0.914 | -49.1 | 3.093 | 120.7 | 0.006 | 64.4 | 0.974 | -22.8 |
| 600 | 0.892 | -57.1 | 2.912 | 111.1 | 0.005 | 63.1 | 0.969 | -27.0 |
| 700 | 0.865 | -64.4 | 2.774 | 101.0 | 0.005 | 65.2 | 0.966 | -31.2 |
| 800 | 0.837 | -71.6 | 2.616 | 91.4 | 0.004 | 70.8 | 0.965 | -35.4 |
| 900 | 0.811 | -78.1 | 2.479 | 81.9 | 0.004 | 87.4 | 0.965 | -39.4 |
| 1000 | 0.785 | -84.5 | 3.329 | 72.5 | 0.003 | 108.0 | 0.966 | -43.7 |
| V_{DS} = 8 V; V_{G2-S} = 4 V; I_D = 15 mA; T_{amb} = 25 °C. | | | | | | | | |
| 50 | 0.998 | -5.3 | 3.983 | 173.4 | 0.001 | 95.5 | 0.994 | -2.4 |
| 100 | 0.994 | -10.9 | 3.943 | 167.5 | 0.001 | 93.6 | 0.991 | -5.0 |
| 200 | 0.976 | -21.6 | 3.878 | 154.7 | 0.003 | 74.3 | 0.984 | -9.7 |
| 300 | 0.957 | -31.7 | 3.722 | 143.3 | 0.004 | 70.0 | 0.979 | -14.2 |
| 400 | 0.934 | -41.7 | 3.614 | 131.6 | 0.005 | 63.5 | 0.975 | -18.8 |
| 500 | 0.907 | -51.1 | 3.446 | 120.4 | 0.006 | 62.2 | 0.969 | -23.2 |
| 600 | 0.885 | -59.1 | 3.240 | 110.9 | 0.005 | 59.6 | 0.964 | -27.4 |
| 700 | 0.851 | -66.8 | 3.072 | 100.9 | 0.005 | 64.8 | 0.961 | -31.6 |
| 800 | 0.826 | -73.9 | 2.891 | 91.3 | 0.004 | 67.8 | 0.959 | -35.9 |
| 900 | 0.797 | -80.7 | 2.733 | 81.9 | 0.004 | 85.0 | 0.958 | -40.0 |
| 1000 | 0.773 | -87.0 | 2.569 | 72.8 | 0.004 | 102.9 | 0.958 | -44.2 |

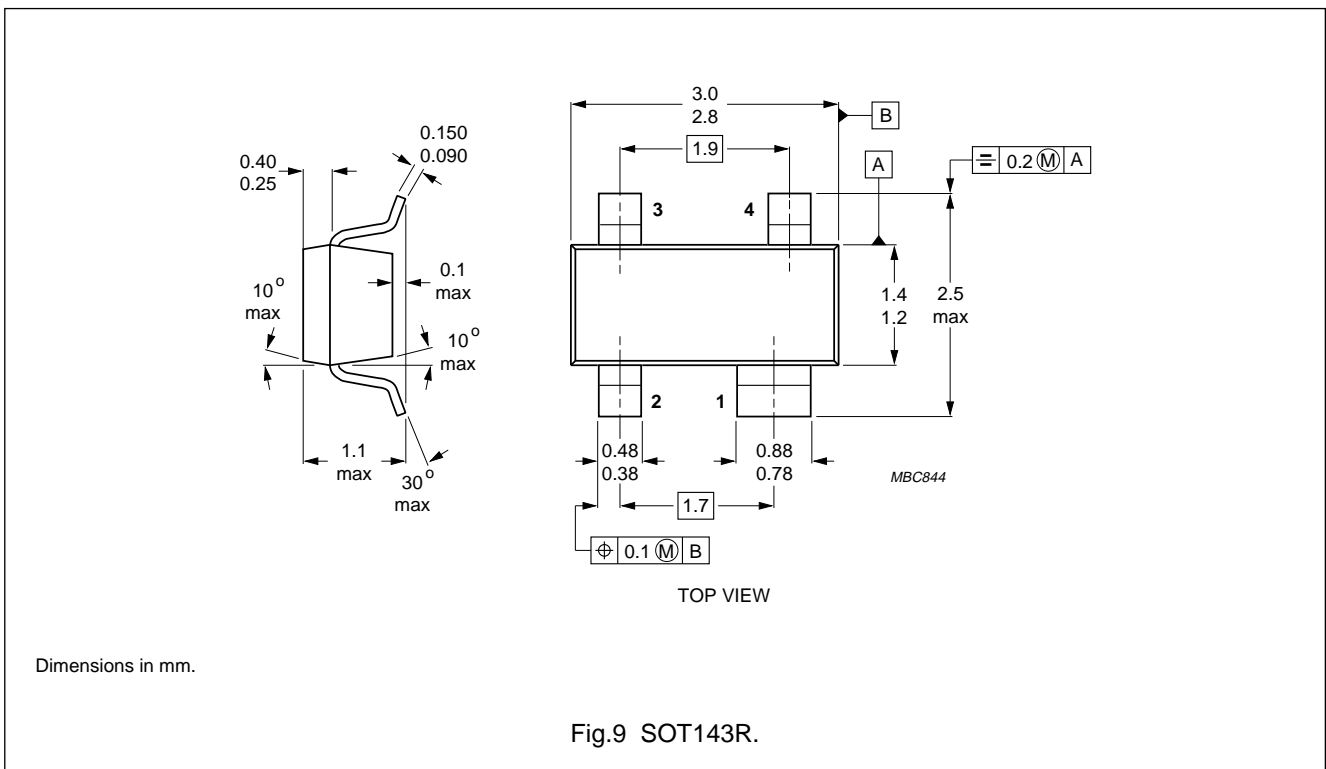
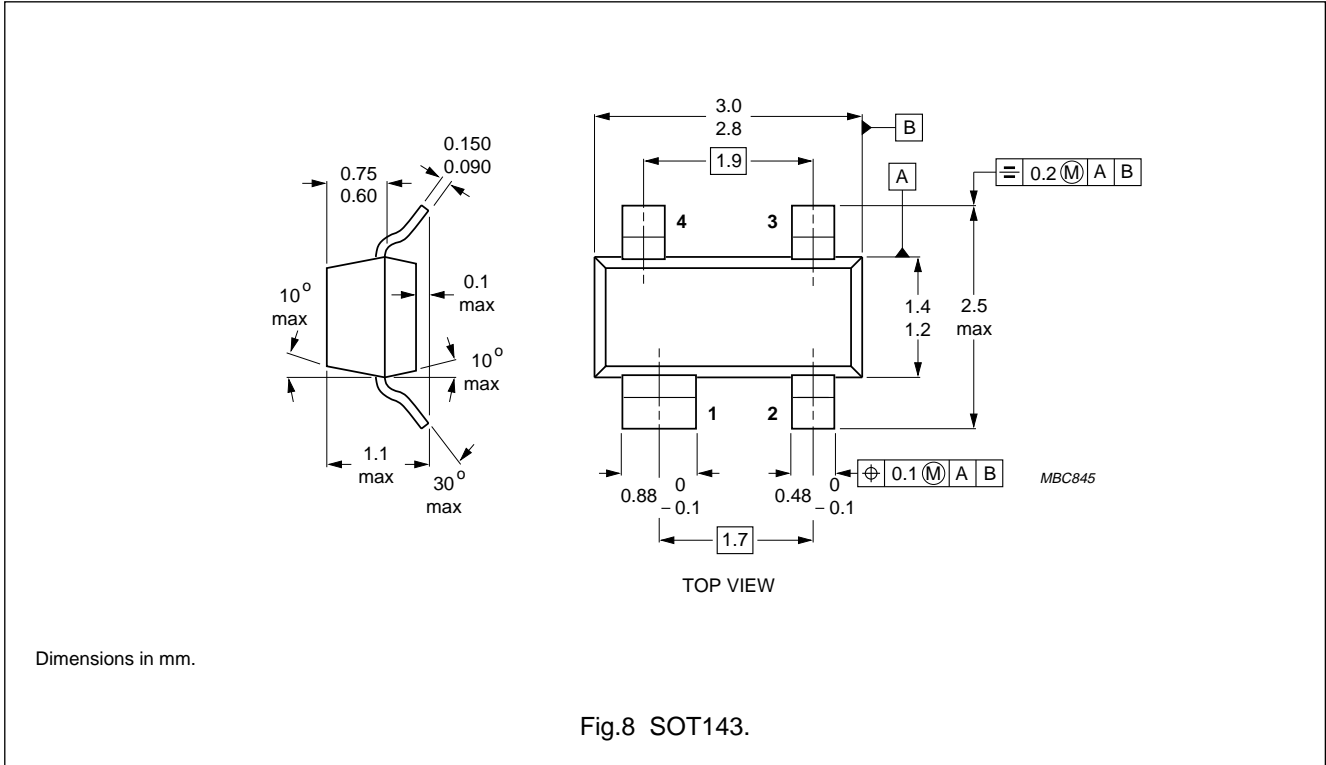
Table 2 Noise data

| f (MHz) | F _{min} (dB) | Γ _{opt} | | r _n |
|--|--------------------------|------------------|-------|----------------|
| | | (ratio) | (deg) | |
| V_{DS} = 8 V; V_{G2-S} = 4 V; I_D = 10 mA; T_{amb} = 25 °C. | | | | |
| 800 | 1.50 | 0.720 | 56.7 | 0.580 |
| V_{DS} = 8 V; V_{G2-S} = 4 V; I_D = 15 mA; T_{amb} = 25 °C. | | | | |
| 800 | 1.50 | 0.700 | 59.2 | 0.520 |

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|-----------------------------------|-------------------------------|---|
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| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|---|-----------------------|---------------|------------|
| BF908-R_N_3 | 20071114 | Product data sheet | - | BF908-R_2 |
| Modifications: | • Fig. 1 and 2 on page 2; Figure note changed | | | |
| BF908-R_2 | 19960730 | Product specification | - | BF908R_1 |
| BF908R_1 | - | - | - | - |

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