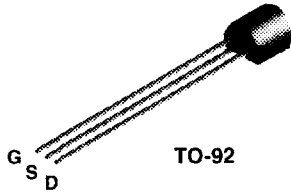
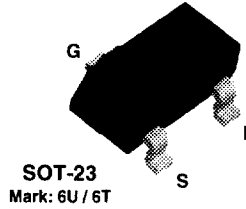


**J309**  
**J310**



**MMBFJ309**  
**MMBFJ310**



## N-Channel RF Amplifier

This device is designed for VHF/UHF amplifier, oscillator and mixer applications. As a common gate amplifier, 16 dB at 100 MHz and 12 dB at 450 MHz can be realized. Sourced from Process 92.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

| Symbol                            | Parameter  | Value       | Units |
|-----------------------------------|--|-------------|-------|
| V <sub>DS</sub>                   | Drain-Source Voltage                             | 25          | V     |
| V <sub>GS</sub>                   | Gate-Source Voltage                              | - 25        | V     |
| I <sub>GF</sub>                   | Forward Gate Current                             | 10          | mA    |
| T <sub>J</sub> , T <sub>stg</sub> | Operating and Storage Junction Temperature Range | -55 to +150 | °C    |

\*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

#### NOTES:

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

### Thermal Characteristics

TA = 25°C unless otherwise noted

| Symbol           | Characteristic                                | Max         |           | Units |
|------------------|---|-------------|-----------|-------|
|                  |   | J309 / J310 | *MMBFJ309 |       |
| P <sub>D</sub>   | Total Device Dissipation<br>Derate above 25°C | 350         | 225       | mW    |
|                  |   | 2.8         | 1.8       | mW/°C |
| R <sub>θJC</sub> | Thermal Resistance, Junction to Case          | 125         |           | °C/W  |
| R <sub>θJA</sub> | Thermal Resistance, Junction to Ambient       | 357         | 556       | °C/W  |

\* Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06."

## N-Channel RF Amplifier

(continued)

### Electrical Characteristics

TA = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|--------|-----------|-----------------|-----|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-----|-------|

#### OFF CHARACTERISTICS

|               |                               |   |              |  |              |               |
|---------------|-------------------------------|---|--------------|--|--------------|---------------|
| $V_{(BR)GSS}$ | Gate-Source Breakdown Voltage | $I_G = -1.0 \mu A, V_{DS} = 0$  | -25          |  |              | V             |
| $I_{GSS}$     | Gate Reverse Current          | $V_{GS} = -15 V, V_{DS} = 0$<br>$V_{GS} = -15 V, V_{DS} = 0, T_A = 125^\circ C$ |              |  | -1.0<br>-1.0 | nA<br>$\mu A$ |
| $V_{GS(off)}$ | Gate-Source Cutoff Voltage    | $V_{DS} = 10 V, I_D = 1.0 nA$   | -1.0<br>-2.0 |  | -4.0<br>-6.5 | V<br>V        |

#### ON CHARACTERISTICS

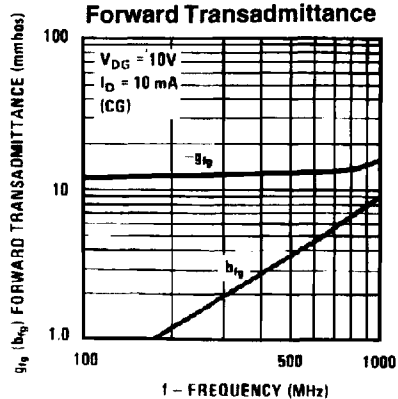
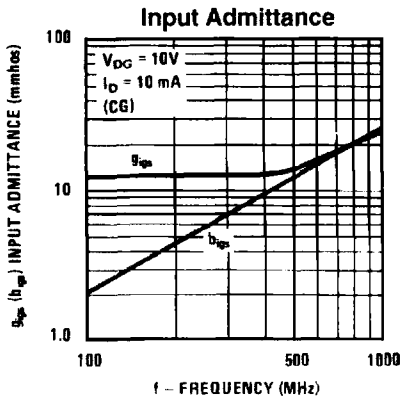
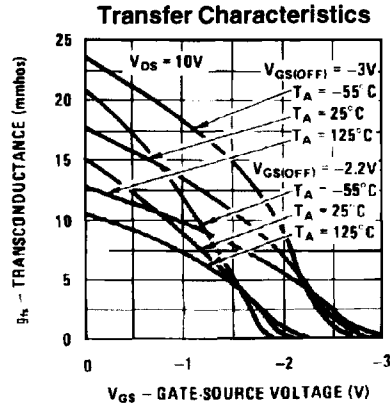
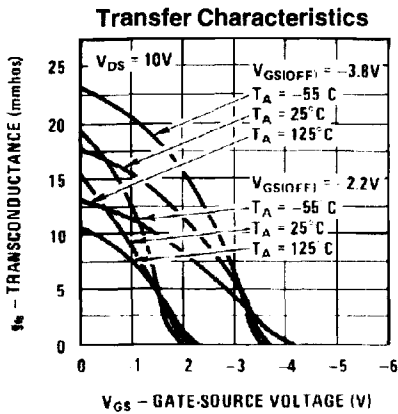
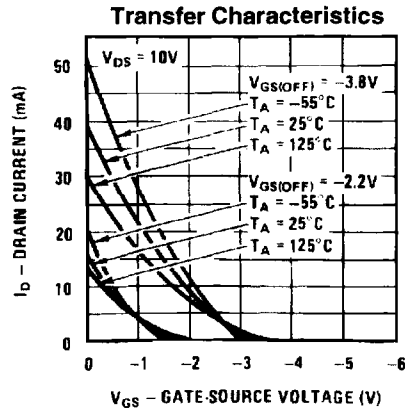
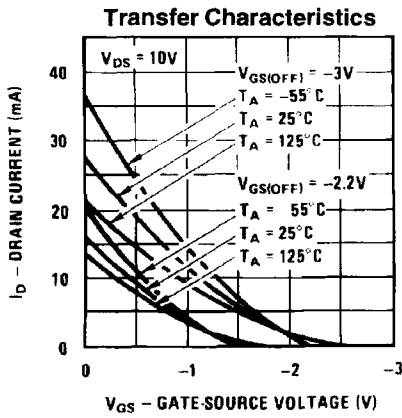
|             |                                  |                             |                            |          |          |          |
|-------------|----------------------------------|-----------------------------|----------------------------|----------|----------|----------|
| $I_{DSS}$   | Zero-Gate Voltage Drain Current* | $V_{DS} = 10 V, V_{GS} = 0$ | <b>J309</b><br><b>J310</b> | 12<br>24 | 30<br>60 | mA<br>mA |
| $V_{GS(f)}$ | Gate-Source Forward Voltage      | $V_{DS} = 0, I_G = 1.0 mA$  |                            |          | 1.0      | V        |

#### SMALL SIGNAL CHARACTERISTICS

|              |  |   |                |                  |                  |                          |
|--------------|--|---|----------------|------------------|------------------|--------------------------|
| $Re(y_{is})$ | Common-Source Input Conductance              | $V_{DS} = 10, I_D = 10 mA, f = 100 MHz$<br><b>J309</b><br><b>J310</b> |                | 0.7<br>0.5       |                  | mmhos<br>mmhos           |
| $Re(y_{os})$ | Common-Source Output Conductance             | $V_{DS} = 10, I_D = 10 mA, f = 100 MHz$                               |                | 0.25             |                  | mmhos                    |
| $G_{pg}$     | Common-Gate Power Gain                       | $V_{DS} = 10, I_D = 10 mA, f = 100 MHz$                               |                | 16               |                  | dB                       |
| $Re(y_{fs})$ | Common-Source Forward Transconductance       | $V_{DS} = 10, I_D = 10 mA, f = 100 MHz$                               |                | 12               |                  | mmhos                    |
| $Re(y_{fg})$ | Common-Gate Input Conductance                | $V_{DS} = 10, I_D = 10 mA, f = 100 MHz$                               |                | 12               |                  | mmhos                    |
| $g_{fs}$     | Common-Source Forward Transconductance       | $V_{DS} = 10, I_D = 10 mA, f = 1.0 kHz$<br><b>J309</b><br><b>J310</b> | 10,000<br>8000 |                  | 20,000<br>18,000 | $\mu mhos$<br>$\mu mhos$ |
| $g_{os}$     | Common-Source Output Conductance             | $V_{DS} = 10, I_D = 10 mA, f = 1.0 kHz$                               |                |                  | 150              | $\mu mhos$               |
| $g_{fg}$     | Common-Gate Forward Conductance              | $V_{DS} = 10, I_D = 10 mA, f = 1.0 kHz$<br><b>J309</b><br><b>J310</b> |                | 13,000<br>12,000 |                  | $\mu mhos$<br>$\mu mhos$ |
| $g_{og}$     | Common-Gate Output Conductance               | $V_{DS} = 10, I_D = 10 mA, f = 1.0 kHz$<br><b>J309</b><br><b>J310</b> |                | 100<br>150       |                  | $\mu mhos$<br>$\mu mhos$ |
| $C_{dg}$     | Drain-Gate Capacitance                       | $V_{DS} = 0, V_{GS} = -10, f = 1.0 MHz$                               |                | 2.0              | 2.5              | pF                       |
| $C_{sq}$     | Source-Gate Capacitance                      | $V_{DS} = 0, V_{GS} = -10, f = 1.0 MHz$                               |                | 4.1              | 5.0              | pF                       |
| NF           | Noise Figure                                 | $V_{DS} = 10 V, I_D = 10 mA,$<br>$f = 450 MHz$                        |                | 3.0              |                  | dB                       |
| $e_n$        | Equivalent Short-Circuit Input Noise Voltage | $V_{DS} = 10 V, I_D = 10 mA,$<br>$f = 100 Hz$                         |                | 6.0              |                  | nV/ $\sqrt{Hz}$          |

\*Pulse Test: Pulse Width  $\leq 300 \mu s$ , Duty Cycle  $\leq 2.0\%$

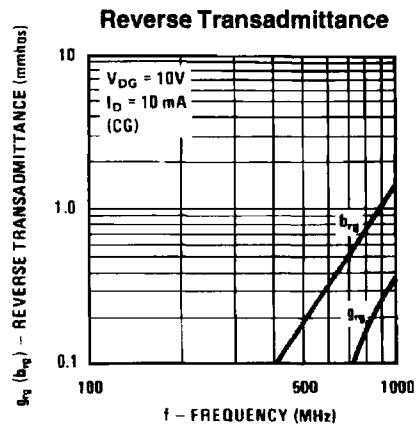
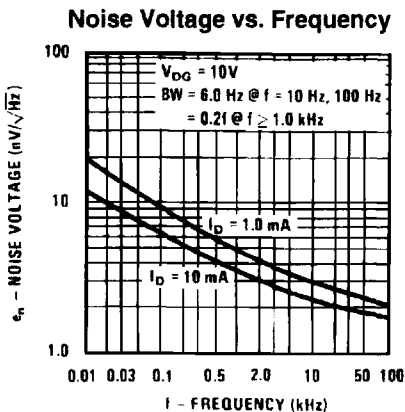
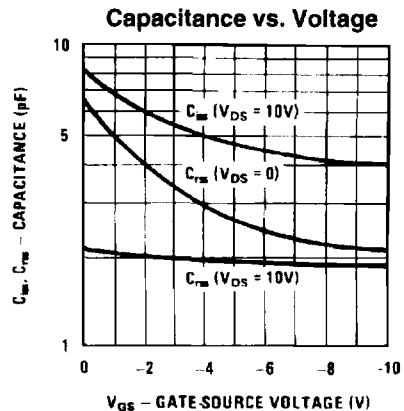
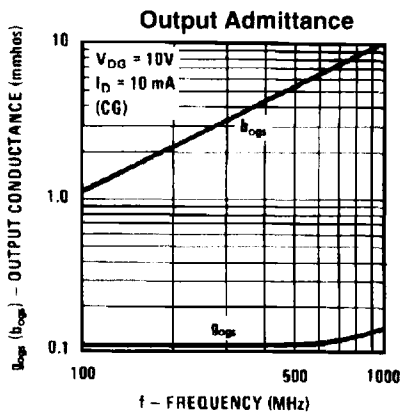
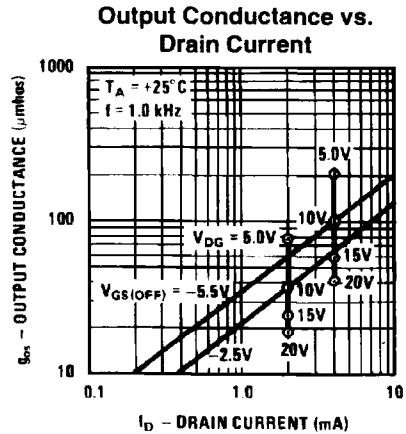
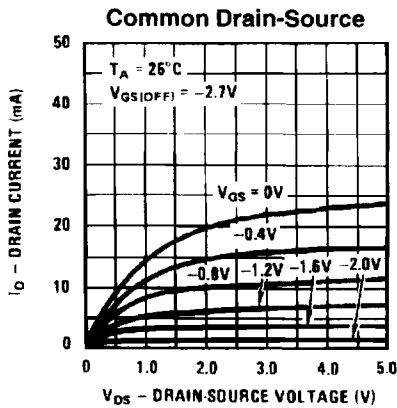
Typical Characteristics



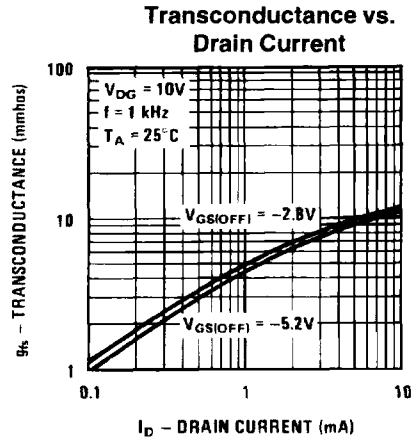
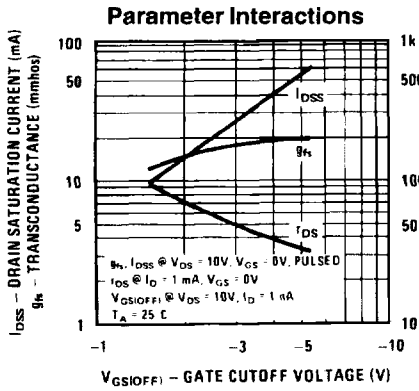
# N-Channel RF Amplifier

(continued)

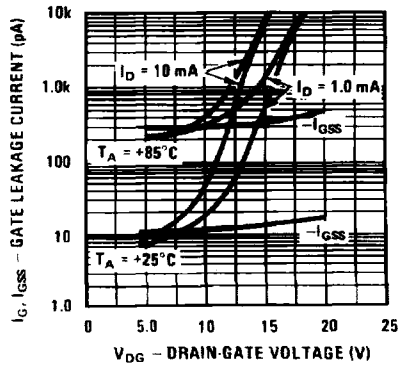
## Typical Characteristics (continued)



Typical Characteristics (continued)



Leakage Current vs. Voltage



POWER DISSIPATION vs AMBIENT TEMPERATURE

