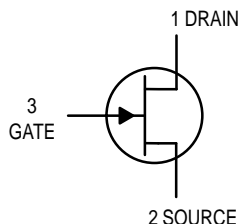
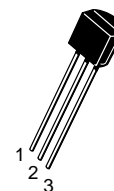


JFET VHF Amplifier

N-Channel — Depletion



MPF102



CASE 29-04, STYLE 5
TO-92 (TO-226AA)

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|-----------|-------------|----------------------------|
| Drain-Source Voltage | V_{DS} | 25 | Vdc |
| Drain-Gate Voltage | V_{DG} | 25 | Vdc |
| Gate-Source Voltage | V_{GS} | -25 | Vdc |
| Gate Current | I_G | 10 | mAdc |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 350 2.8 | mW mW/ $^\circ\text{C}$ |
| Junction Temperature Range | T_J | 125 | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | -65 to +150 | $^\circ\text{C}$ |

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

OFF CHARACTERISTICS

| | | | | |
|--|---------------|--------|--------------|-------------------------|
| Gate-Source Breakdown Voltage ($I_G = -10 \mu\text{Adc}$, $V_{DS} = 0$) | $V_{(BR)GSS}$ | -25 | — | Vdc |
| Gate Reverse Current ($V_{GS} = -15 \text{Vdc}$, $V_{DS} = 0$) ($V_{GS} = -15 \text{Vdc}$, $V_{DS} = 0$, $T_A = 100^\circ\text{C}$) | I_{GSS} | — — | -2.0 -2.0 | nAdc μAdc |
| Gate-Source Cutoff Voltage ($V_{DS} = 15 \text{Vdc}$, $I_D = 2.0 \text{nAdc}$) | $V_{GS(off)}$ | — | -8.0 | Vdc |
| Gate-Source Voltage ($V_{DS} = 15 \text{Vdc}$, $I_D = 0.2 \text{mAdc}$) | V_{GS} | -0.5 | -7.5 | Vdc |

ON CHARACTERISTICS

| | | | | |
|--|-----------|-----|----|------|
| Zero-Gate-Voltage Drain Current ⁽¹⁾ ($V_{DS} = 15 \text{Vdc}$, $V_{GS} = 0 \text{Vdc}$) | I_{DSS} | 2.0 | 20 | mAdc |
|--|-----------|-----|----|------|

SMALL-SIGNAL CHARACTERISTICS

| | | | | |
|--|---------------------|--------------|-----------|------------------|
| Forward Transfer Admittance ⁽¹⁾ ($V_{DS} = 15 \text{Vdc}$, $V_{GS} = 0$, $f = 1.0 \text{kHz}$) ($V_{DS} = 15 \text{Vdc}$, $V_{GS} = 0$, $f = 100 \text{MHz}$) | $ y_{fs} $ | 2000 1600 | 7500 — | μmhos |
| Input Admittance ($V_{DS} = 15 \text{Vdc}$, $V_{GS} = 0$, $f = 100 \text{MHz}$) | $\text{Re}(y_{is})$ | — | 800 | μmhos |
| Output Conductance ($V_{DS} = 15 \text{Vdc}$, $V_{GS} = 0$, $f = 100 \text{MHz}$) | $\text{Re}(y_{os})$ | — | 200 | μmhos |
| Input Capacitance ($V_{DS} = 15 \text{Vdc}$, $V_{GS} = 0$, $f = 1.0 \text{MHz}$) | C_{iss} | — | 7.0 | pF |
| Reverse Transfer Capacitance ($V_{DS} = 15 \text{Vdc}$, $V_{GS} = 0$, $f = 1.0 \text{MHz}$) | C_{rss} | — | 3.0 | pF |

1. Pulse Test; Pulse Width $\leq 630 \text{ms}$, Duty Cycle $\leq 10\%$.

POWER GAIN

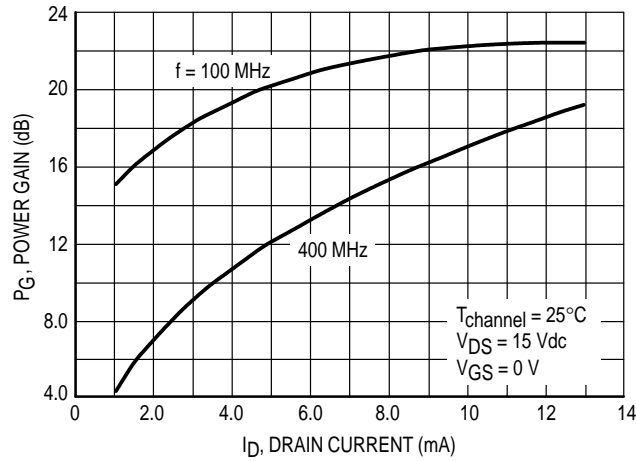
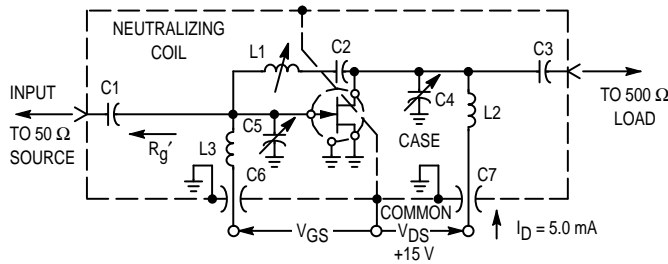


Figure 1. Effects of Drain Current



Adjust V_{GS} for $I_D = 50 \text{ mA}$
 $V_{GS} < 0 \text{ Volts}$

NOTE: The noise source is a hot-cold body (AIL type 70 or equivalent) with a test receiver (AIL type 136 or equivalent).

| Reference Designation | VALUE | |
|-----------------------|----------------------|--------------------------|
| | 100 MHz | 400 MHz |
| C1 | 7.0 pF | 1.8 pF |
| C2 | 1000 pF | 17 pF |
| C3 | 3.0 pF | 1.0 pF |
| C4 | 1-12 pF | 0.8-8.0 pF |
| C5 | 1-12 pF | 0.8-8.0 pF |
| C6 | 0.0015 μF | 0.001 μF |
| C7 | 0.0015 μF | 0.001 μF |
| L1 | 3.0 μH^* | 0.2 μH^{**} |
| L2 | 0.15 μH^* | 0.03 μH^{**} |
| L3 | 0.14 μH^* | 0.022 μH^{**} |

- *L1 17 turns, (approx. — depends upon circuit layout) AWG #28 enameled copper wire, close wound on 9/32" ceramic coil form. Tuning provided by a powdered iron slug.
- L2 4-1/2 turns, AWG #18 enameled copper wire, 5/16" long, 3/8" I.D. (AIR CORE).
- L3 3-1/2 turns, AWG #18 enameled copper wire, 1/4" long, 3/8" I.D. (AIR CORE).

- **L1 6 turns, (approx. — depends upon circuit layout) AWG #24 enameled copper wire, close wound on 7/32" ceramic coil form. Tuning provided by an aluminum slug.
- L2 1 turn, AWG #16 enameled copper wire, 3/8" I.D. (AIR CORE).
- L3 1/2 turn, AWG #16 enameled copper wire, 1/4" I.D. (AIR CORE).

Figure 2. 100 MHz and 400 MHz Neutralized Test Circuit

NOISE FIGURE

($T_{channel} = 25^{\circ}C$)

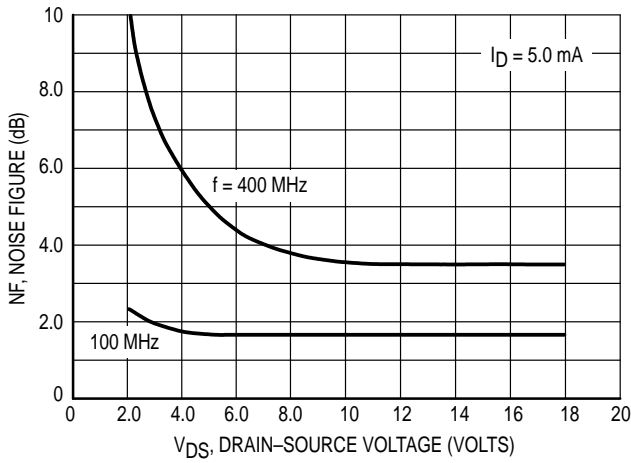


Figure 3. Effects of Drain-Source Voltage

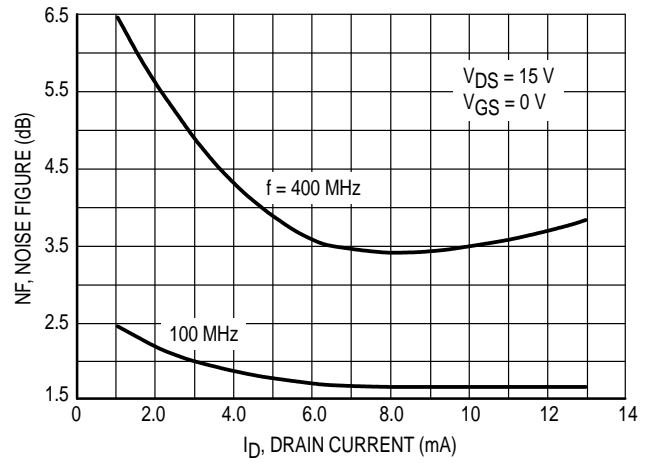


Figure 4. Effects of Drain Current

INTERMODULATION CHARACTERISTICS

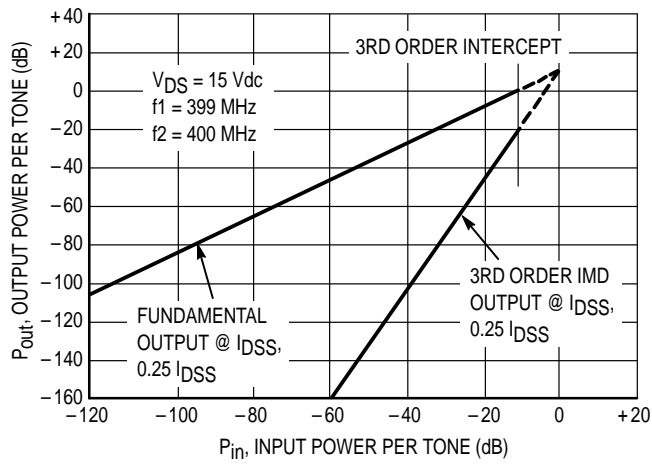


Figure 5. Third Order Intermodulation Distortion

COMMON SOURCE CHARACTERISTICS

ADMITTANCE PARAMETERS

($V_{DS} = 15 \text{ Vdc}$, $T_{channel} = 25^\circ\text{C}$)

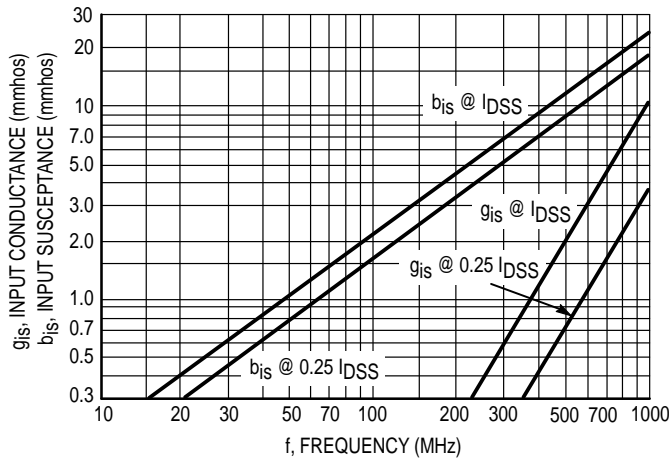


Figure 6. Input Admittance (y_{is})

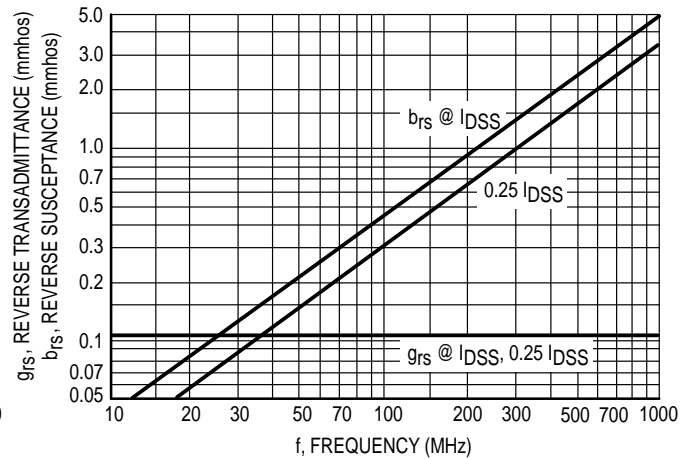


Figure 7. Reverse Transfer Admittance (y_{rs})

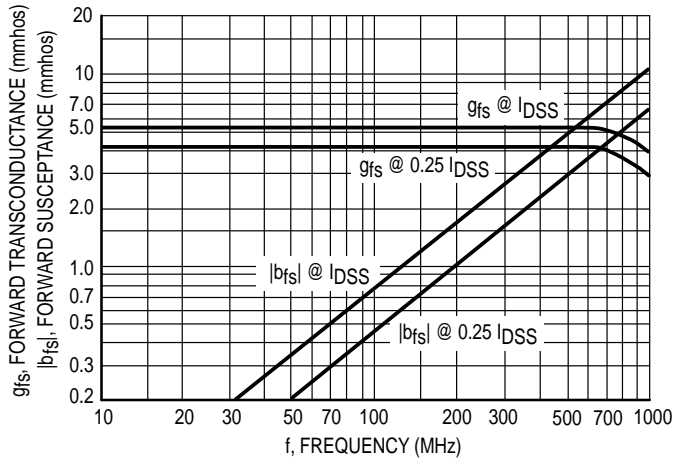


Figure 8. Forward Transadmittance (y_{fs})

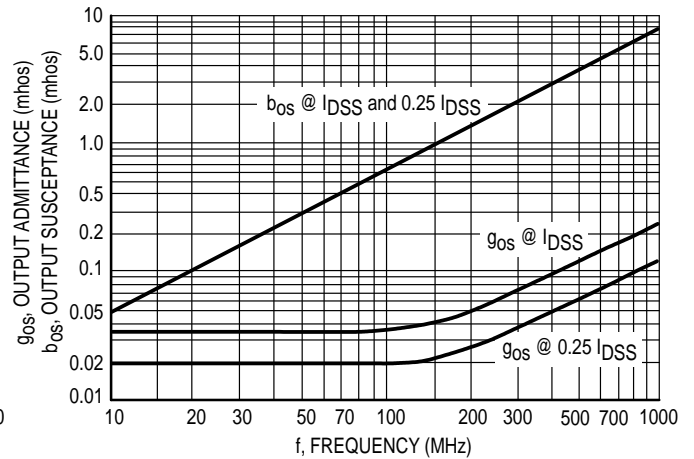


Figure 9. Output Admittance (y_{os})

COMMON SOURCE CHARACTERISTICS
S-PARAMETERS
 ($V_{DS} = 15 \text{ Vdc}$, $T_{\text{channel}} = 25^\circ\text{C}$, Data Points in MHz)

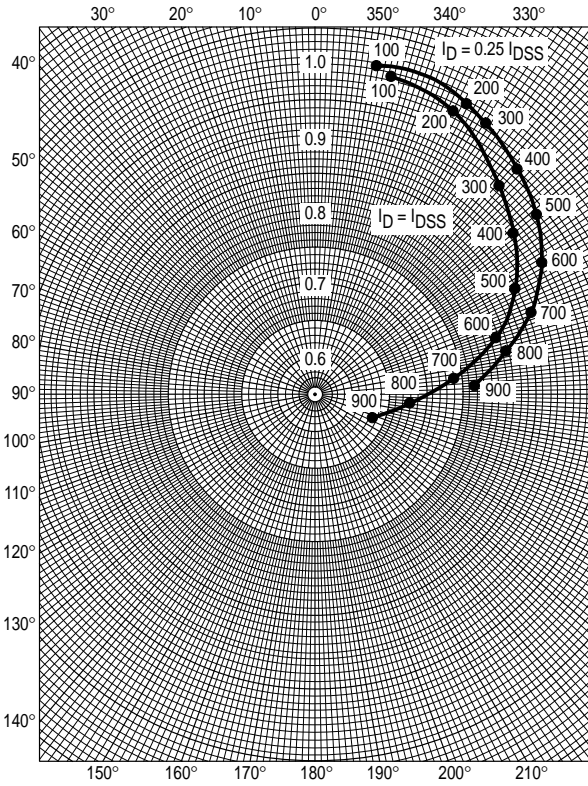


Figure 10. S_{11s}

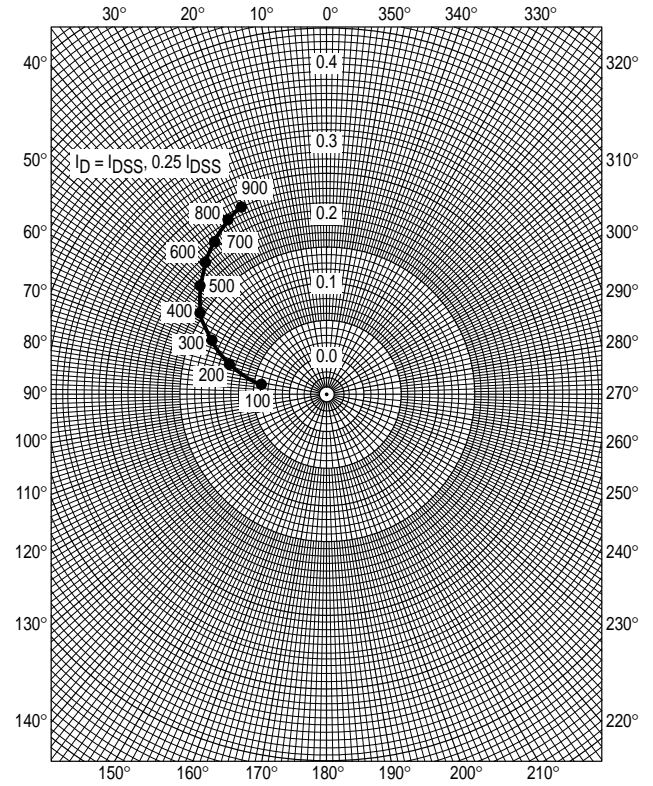


Figure 11. S_{12s}

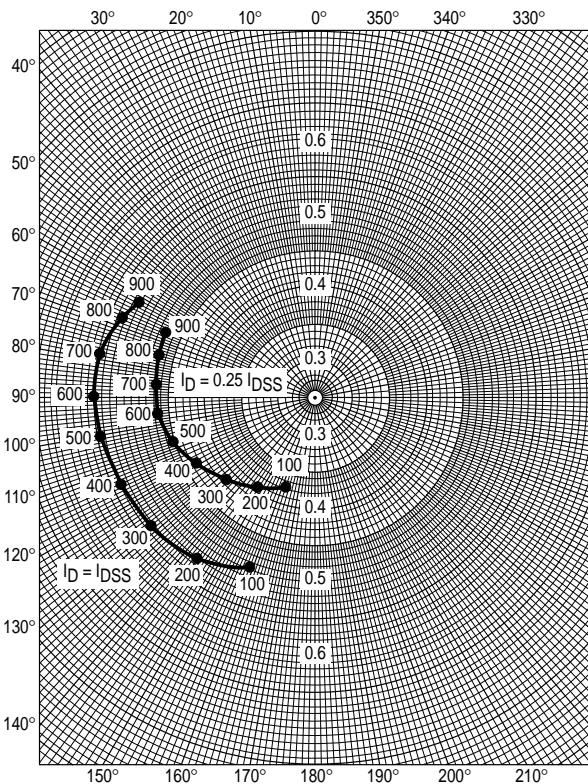


Figure 12. S_{21s}

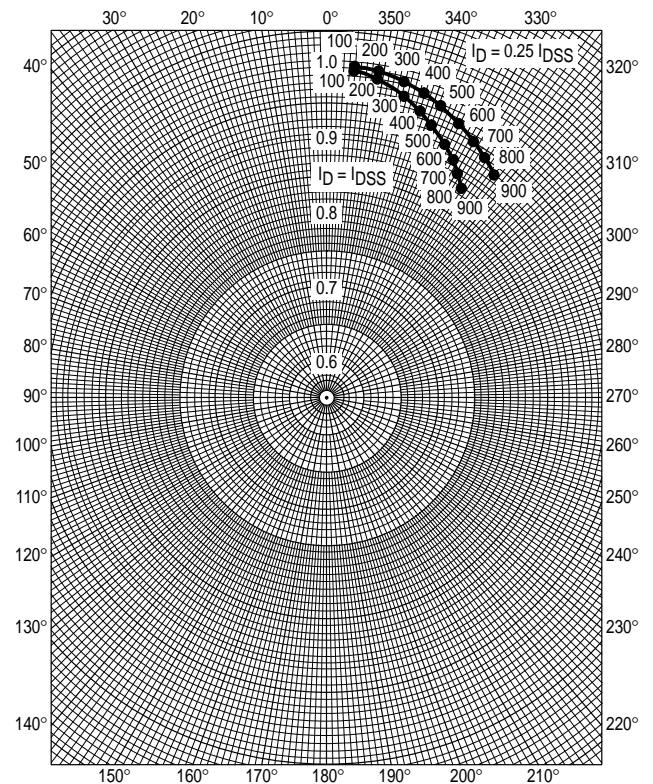


Figure 13. S_{22s}

COMMON GATE CHARACTERISTICS

ADMITTANCE PARAMETERS

(V_{DG} = 15 Vdc, T_{channel} = 25°C)

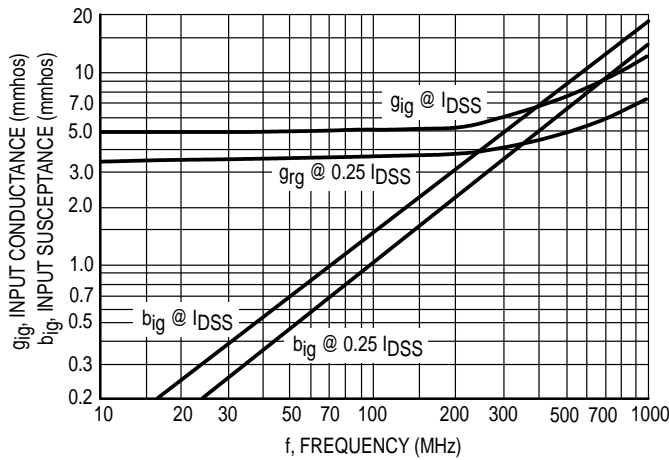


Figure 14. Input Admittance (y_{ig})

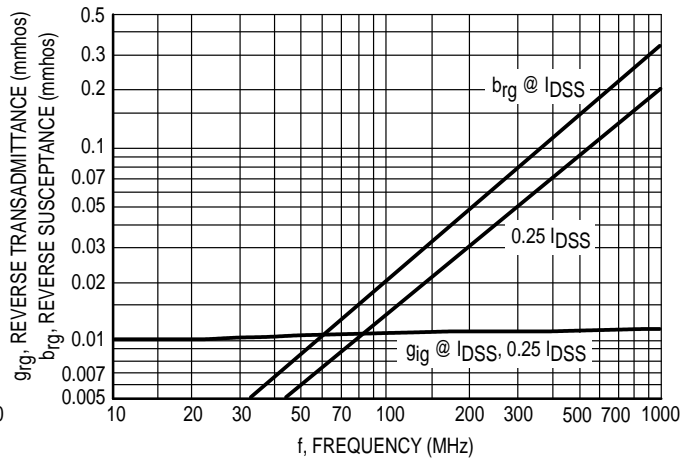


Figure 15. Reverse Transfer Admittance (y_{rg})

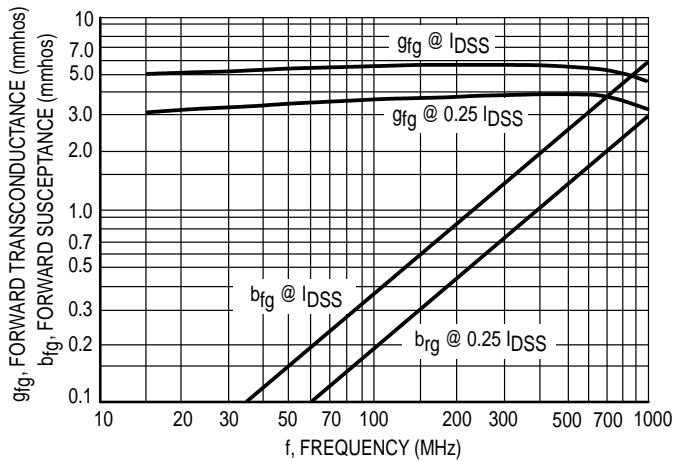


Figure 16. Forward Transfer Admittance (y_{fg})

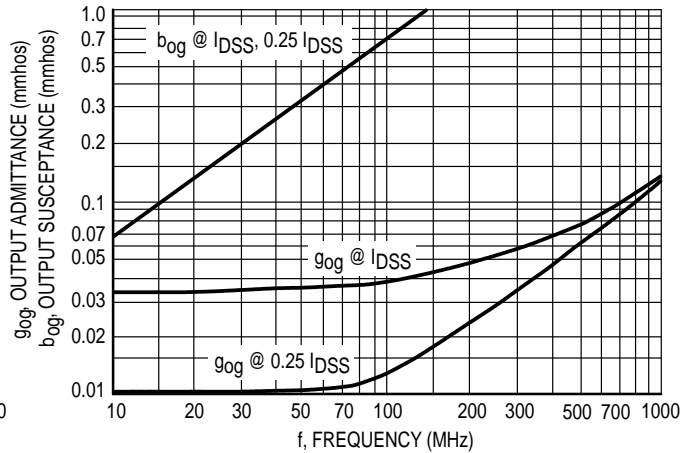


Figure 17. Output Admittance (y_{og})

COMMON GATE CHARACTERISTICS
S-PARAMETERS

($V_{DS} = 15 \text{ Vdc}$, $T_{channel} = 25^\circ\text{C}$, Data Points in MHz)

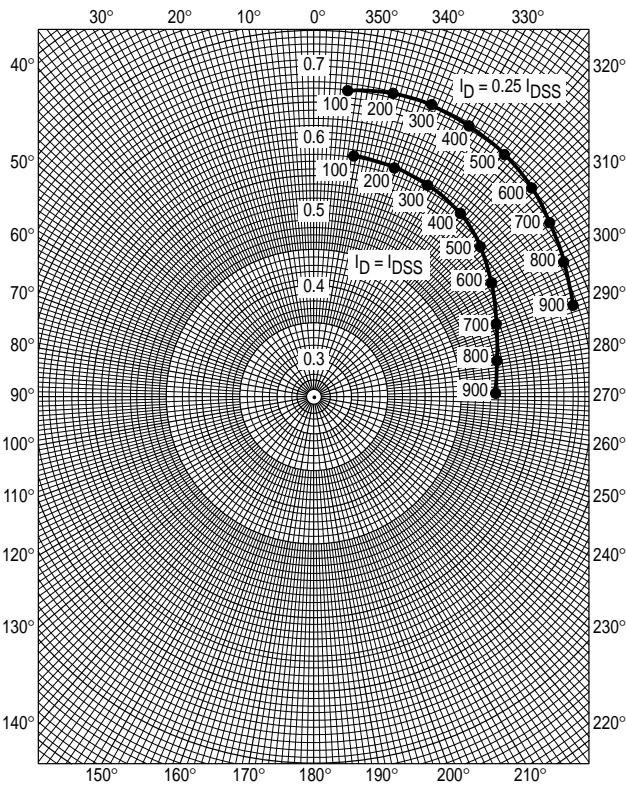


Figure 18. S_{11g}

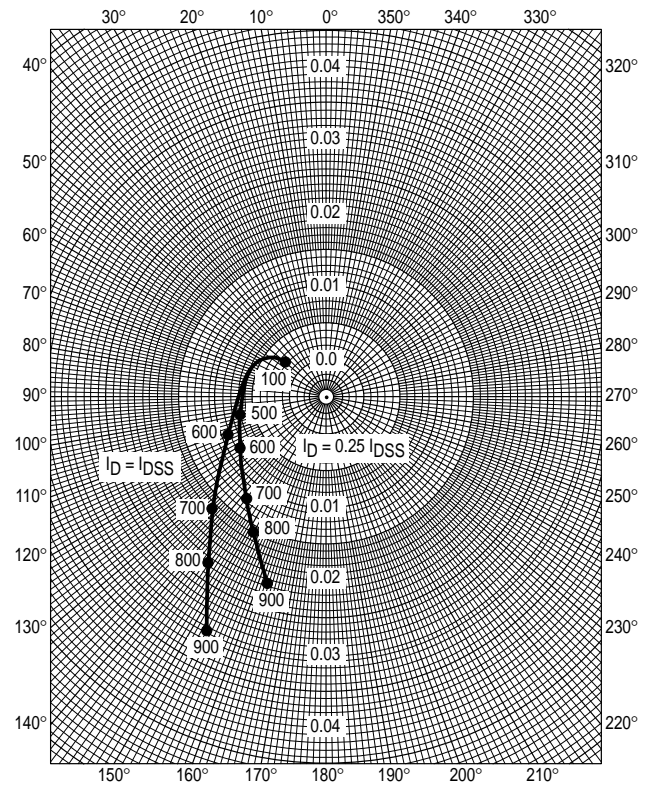


Figure 19. S_{12g}

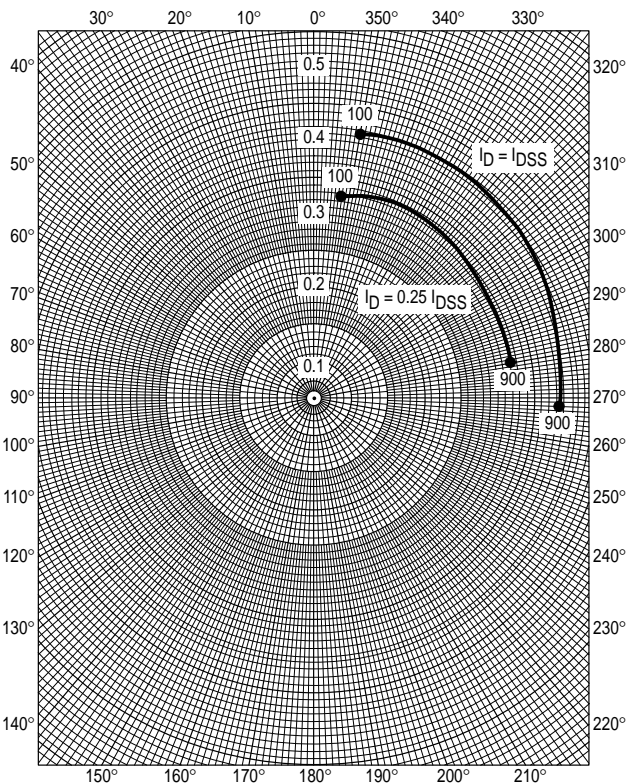


Figure 20. S_{21g}

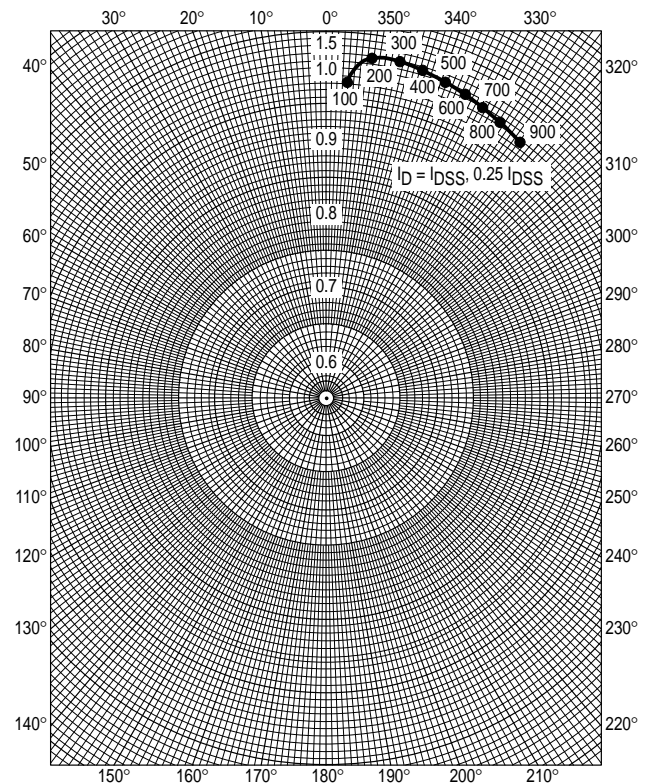
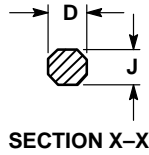
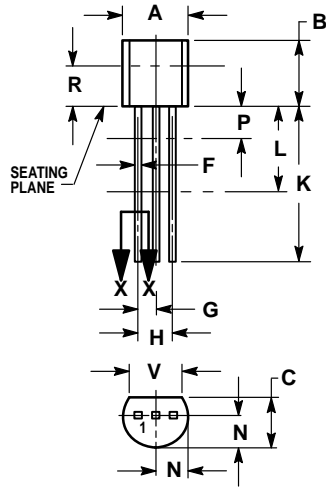


Figure 21. S_{22g}

PACKAGE DIMENSIONS



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.175 | 0.205 | 4.45 | 5.20 |
| B | 0.170 | 0.210 | 4.32 | 5.33 |
| C | 0.125 | 0.165 | 3.18 | 4.19 |
| D | 0.016 | 0.022 | 0.41 | 0.55 |
| F | 0.016 | 0.019 | 0.41 | 0.48 |
| G | 0.045 | 0.055 | 1.15 | 1.39 |
| H | 0.095 | 0.105 | 2.42 | 2.66 |
| J | 0.015 | 0.020 | 0.39 | 0.50 |
| K | 0.500 | — | 12.70 | — |
| L | 0.250 | — | 6.35 | — |
| N | 0.080 | 0.105 | 2.04 | 2.66 |
| P | — | 0.100 | — | 2.54 |
| R | 0.115 | — | 2.93 | — |
| V | 0.135 | — | 3.43 | — |

CASE 029-04
(TO-226AA)
ISSUE AD

STYLE 5:

- PIN 1. DRAIN
2. SOURCE
3. GATE

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