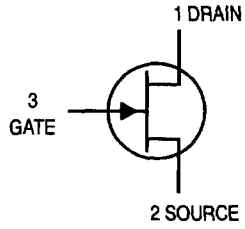
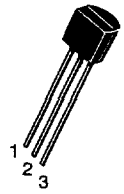
# JFET High Frequency Amplifiers
## N–Channel — Depletion

**J304**
**J305**




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

### MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Drain–Gate Voltage | $V_{DG}$ | –30 | Vdc |
| Gate–Source Voltage | $V_{GS}$ | –30 | Vdc |
| Gate Current | $I_G$ | 10 | mA |
| Total Device Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 350<br>2.8 | mW<br>mW/°C |
| Lead Temperature<br>(1/16″ from Case for 10 Seconds) | $T_L$ | 300 | °C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | –65 to +150 | °C |

### ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise noted)

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Gate–Source Breakdown Voltage<br>($I_G$ = 1.0 μAdc, $V_{DS}$ = 0) | | $V_{(BR)GSS}$ | 30 | — | Vdc |
| Gate Reverse Current<br>($V_{GS}$ = –20 Vdc, $V_{DS}$ = 0) | | $I_{GSS}$ | — | 100 | pA |
| Gate–Source Cutoff Voltage<br>($V_{DS}$ = 15 Vdc, $I_D$ = 1.0 nAdc) | J304<br>J305 | $V_{GS(off)}$ | <br>–2.0<br>–0.5 | <br>–6.0<br>–3.0 | Vdc |
| **ON CHARACTERISTICS** | | | | | |
| Zero–Gate–Voltage Drain Current<br>($V_{DS}$ = 15 Vdc, $V_{GS}$ = 0) | <br>J304<br>J305 | $I_{DSS}$ | <br>5.0<br>1.0 | <br>15<br>8.0 | mA |
| **SMALL–SIGNAL CHARACTERISTICS** | | | | | |
| Output Admittance<br>($V_{DS}$ = 15 Vdc, $V_{GS}$ = 0, f = 1.0 kHz) | | $\lvert y_{os} \rvert$ | — | 50 | μmhos |
| Forward Transconductance<br>($V_{DS}$ = 15 Vdc, $V_{GS}$ = 0, f = 1.0 kHz) | <br>J304<br>J305 | $Re(y_{fs})$ | <br>4500<br>3000 | <br>7500<br>— | μmhos |

## POWER GAIN

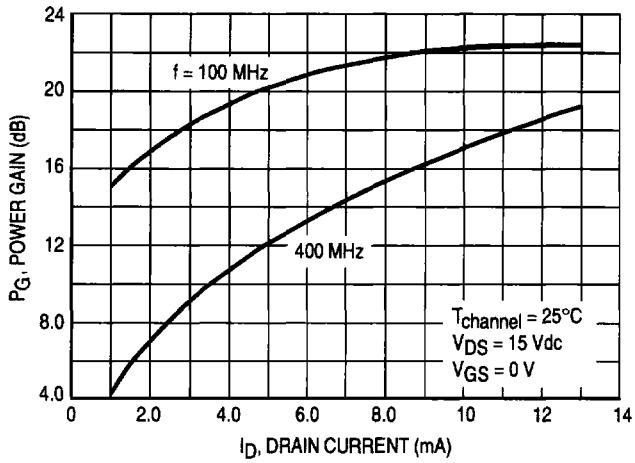
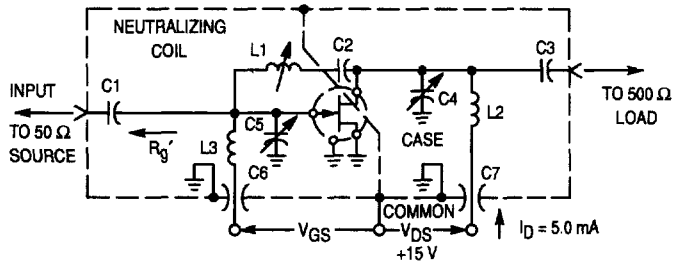



**Figure 1. Effects of Drain Current**




Adjust $V_{GS}$ for
$I_D$ = 50 mA
$V_{GS}$ < 0 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°C)

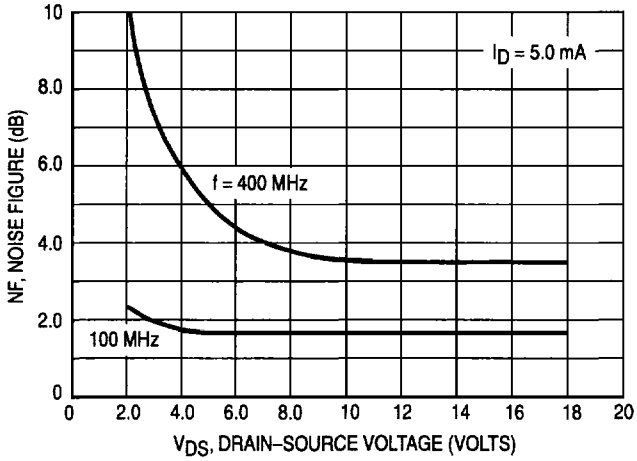



**Figure 3. Effects of Drain–Source Voltage**

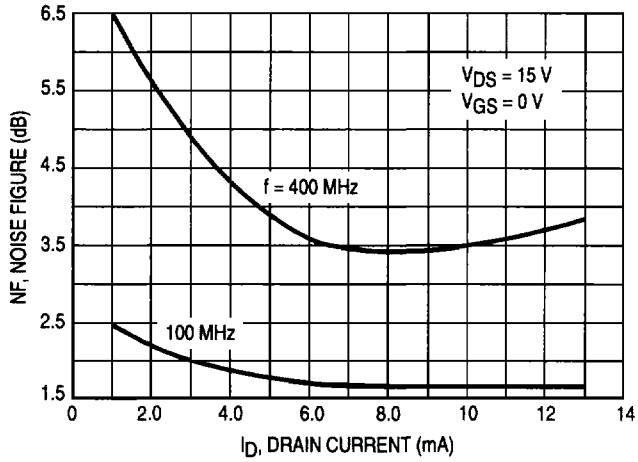



**Figure 4. Effects of Drain Current**

## INTERMODULATION CHARACTERISTICS

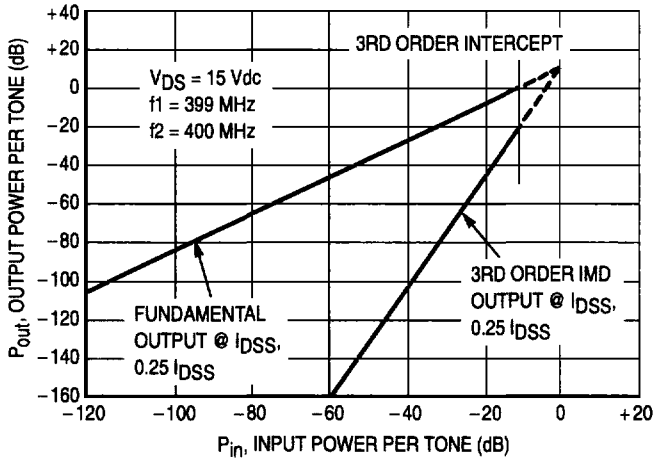



**Figure 5. Third Order Intermodulation Distortion**

## COMMON SOURCE CHARACTERISTICS

### ADMITTANCE PARAMETERS

($V_{DS}$ = 15 Vdc, $T_{channel}$ = 25°C)

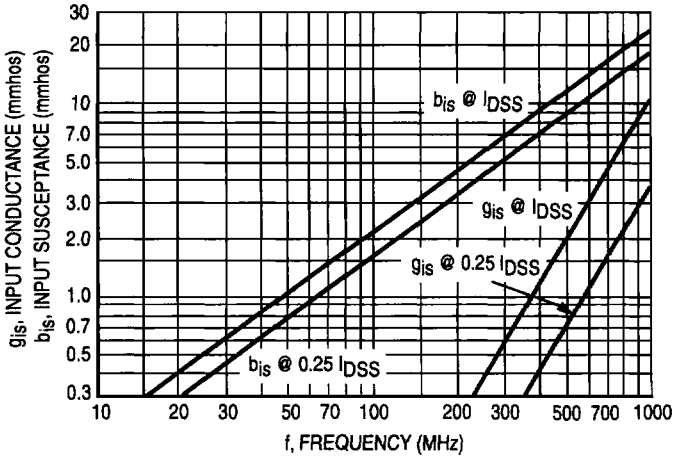



**Figure 6. Input Admittance ($y_{is}$)**

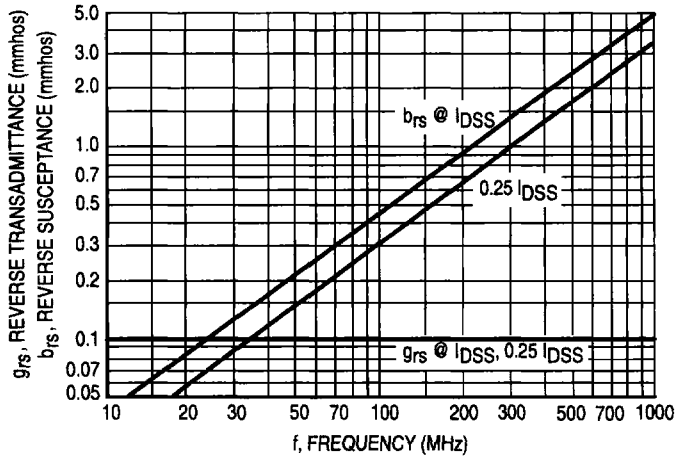



**Figure 7. Reverse Transfer Admittance ($y_{rs}$)**

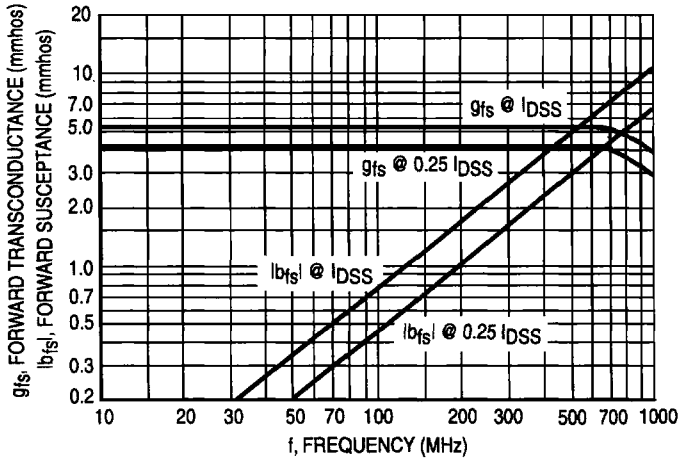



**Figure 8. Forward Transadmittance ($y_{fs}$)**

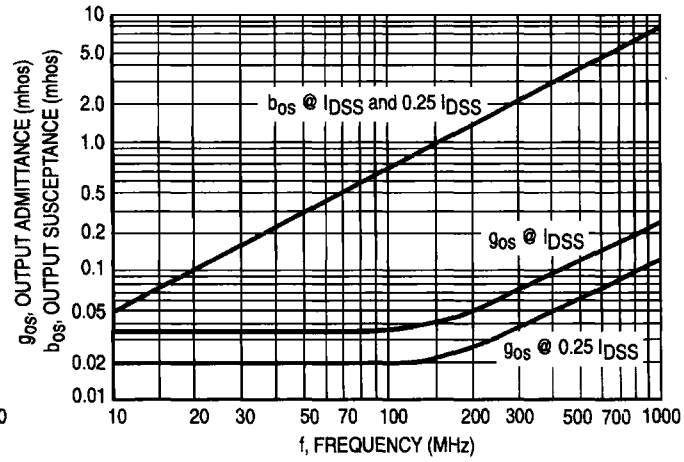



**Figure 9. Output Admittance ($y_{os}$)**

## COMMON SOURCE CHARACTERISTICS

### S–PARAMETERS

($V_{DS}$ = 15 Vdc, $T_{channel}$ = 25°C, Data Points in MHz)

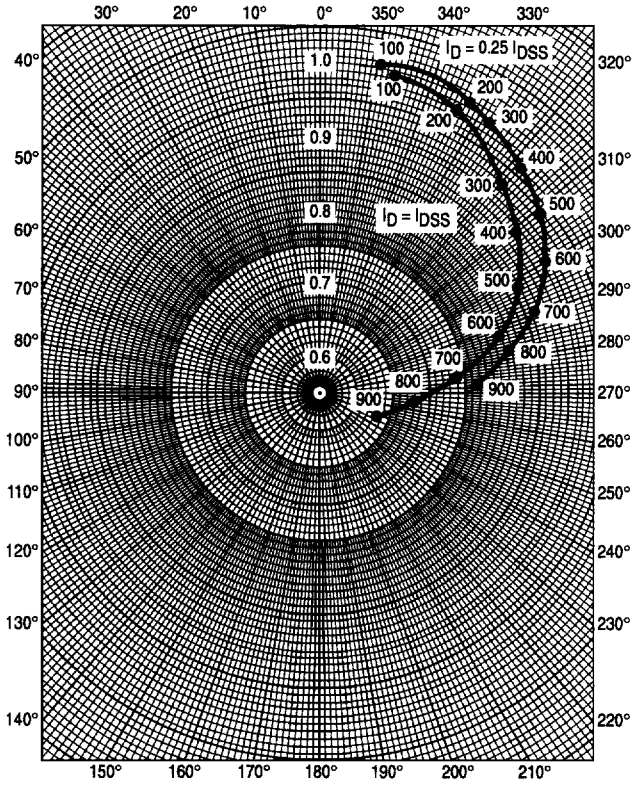



**Figure 10. $S_{11s}$**

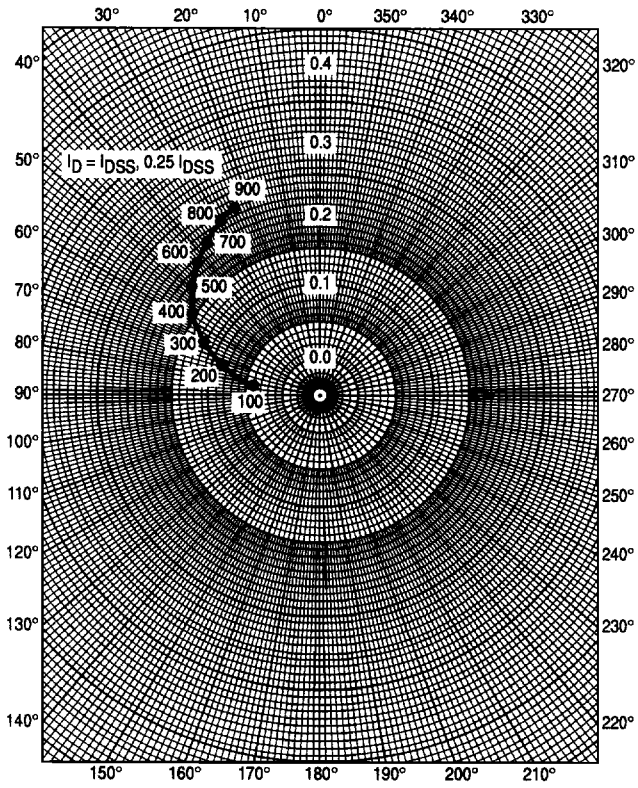



**Figure 11. $S_{12s}$**

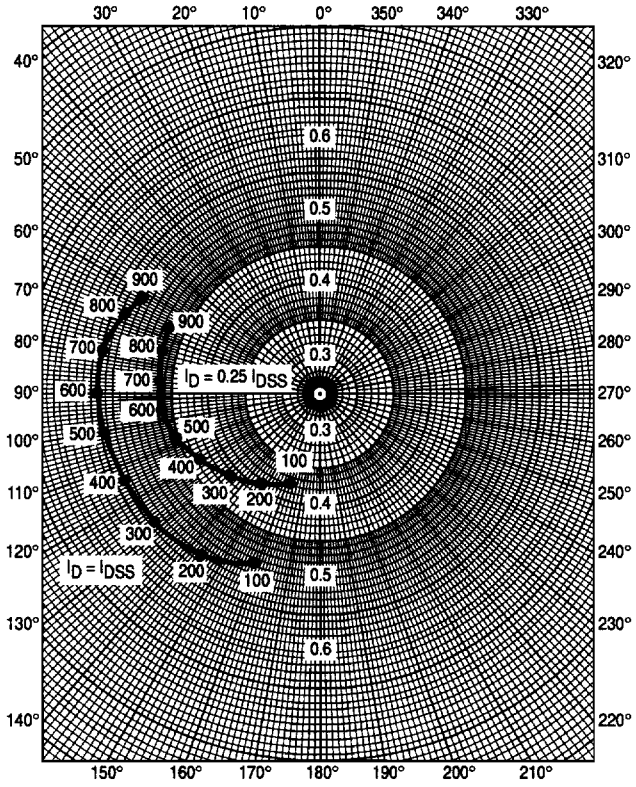



**Figure 12. $S_{21s}$**

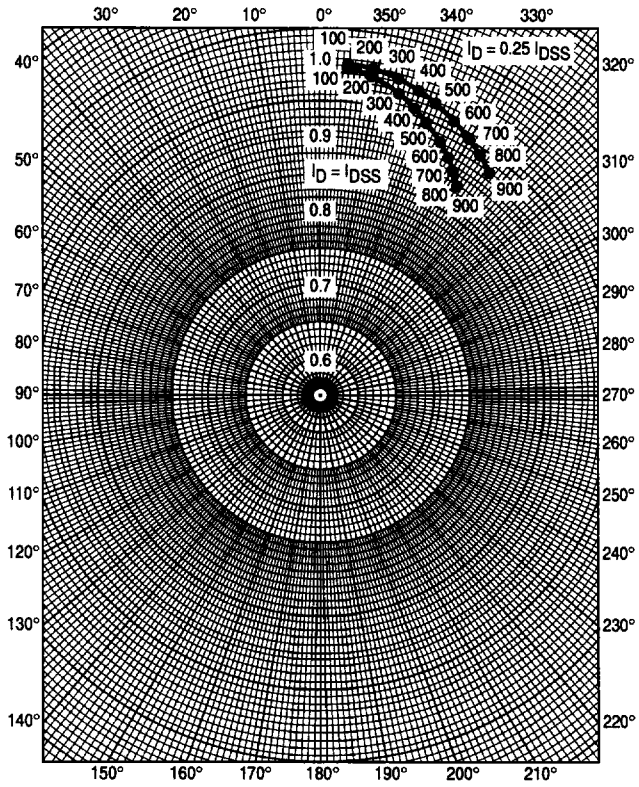



**Figure 13. $S_{22s}$**

## COMMON GATE CHARACTERISTICS
### ADMITTANCE PARAMETERS
($V_{DG}$ = 15 Vdc, $T_{channel}$ = 25°C)

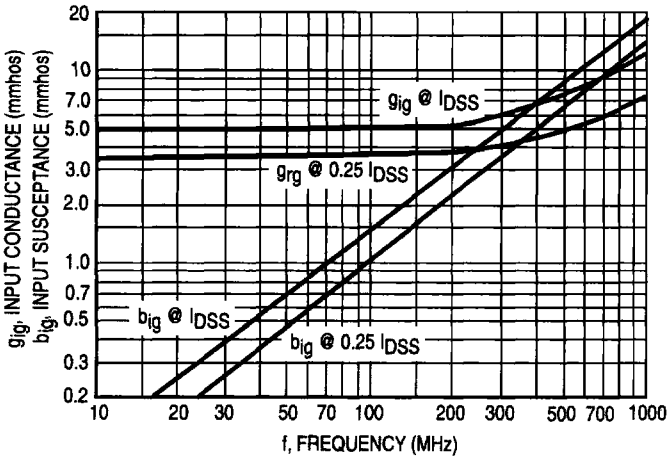



**Figure 14. Input Admittance ($y_{ig}$)**

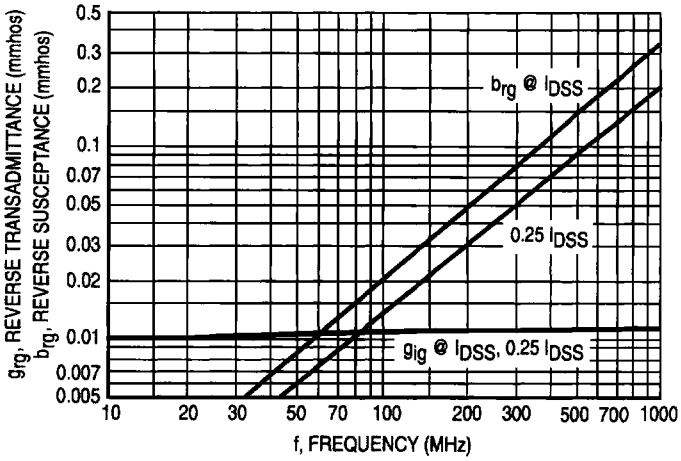



**Figure 15. Reverse Transfer Admittance ($y_{rg}$)**

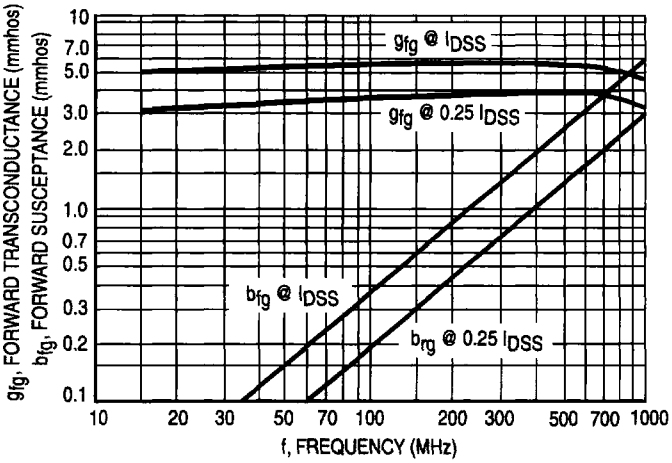



**Figure 16. Forward Transfer Admittance ($y_{fg}$)**

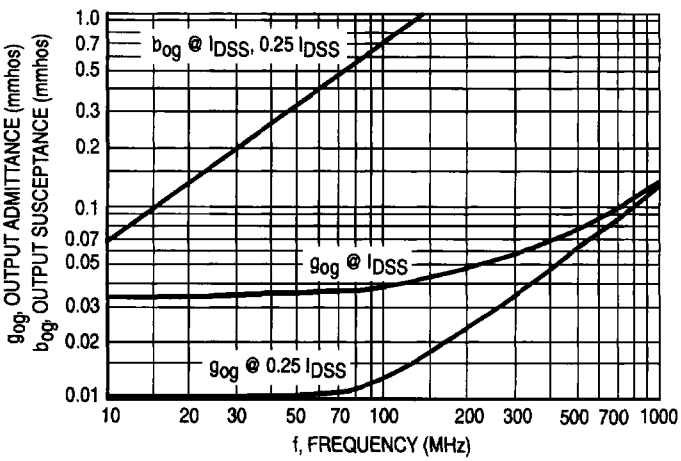



**Figure 17. Output Admittance ($y_{og}$)**

## COMMON GATE CHARACTERISTICS

### S-PARAMETERS

($V_{DS}$ = 15 Vdc, $T_{channel}$ = 25°C, Data Points in MHz)

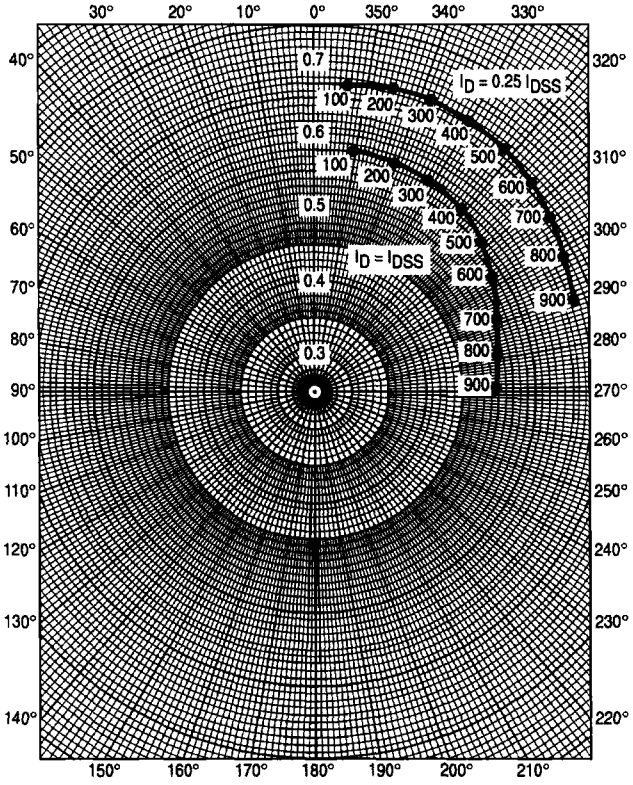



**Figure 18. $S_{11g}$**

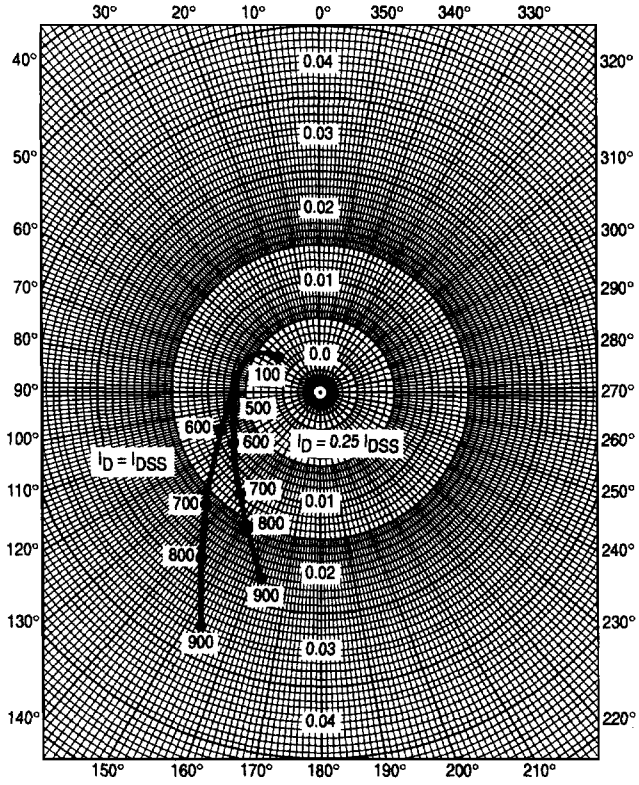



**Figure 19. $S_{12g}$**

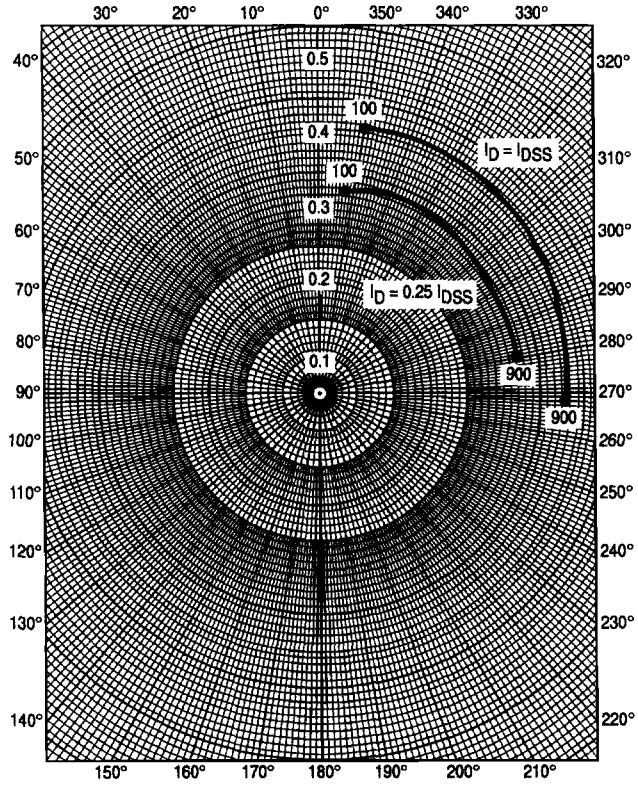



**Figure 20. $S_{21g}$**

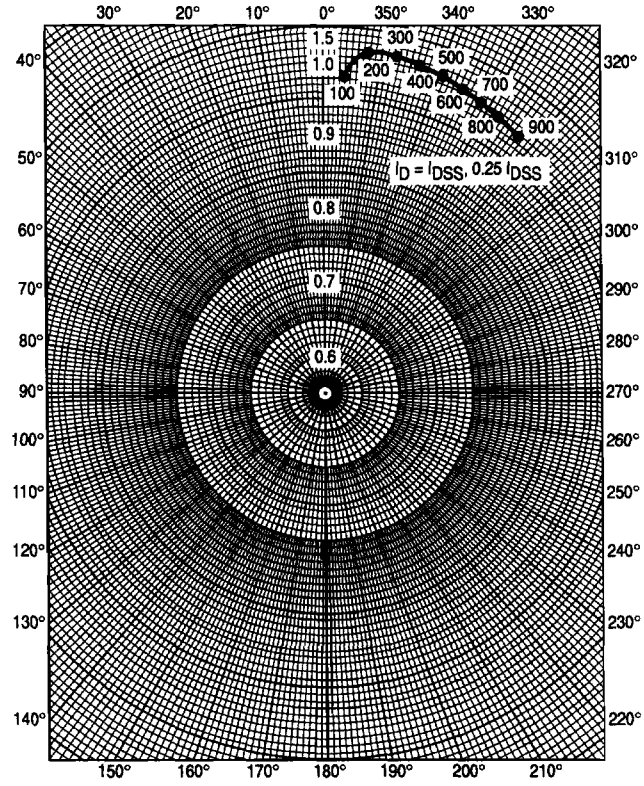
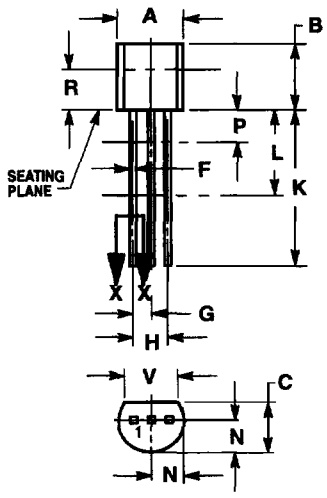
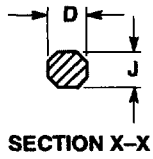



**Figure 21. $S_{22g}$**

## PACKAGE DIMENSIONS




SECTION X–X

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.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | 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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**ASIA/PACIFIC**: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park, 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298