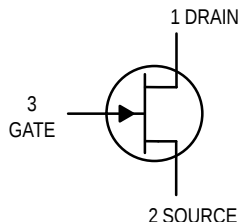
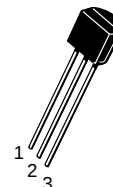


# JFET Switching

## N-Channel — Depletion



**2N5555**



CASE 29-04, STYLE 8  
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                        |
| Forward Gate Current                                                                   | $I_{GF}$  | 10          | mAdc                       |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$     | 350<br>2.8  | mW<br>mW/ $^\circ\text{C}$ |
| Junction Temperature Range                                                             | $T_J$     | -65 to +150 | $^\circ\text{C}$           |
| 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 ( $V_{GS} = 15 \text{ Vdc}$ , $V_{DS} = 0$ )                                                                                                     | $I_{GSS}$     | —  | 1.0       | nAdc                    |
| Drain Cutoff Current ( $V_{DS} = 12 \text{ Vdc}$ , $V_{GS} = -10 \text{ V}$ )<br>( $V_{DS} = 12 \text{ Vdc}$ , $V_{GS} = -10 \text{ V}$ , $T_A = 100^\circ\text{C}$ ) | $I_{D(off)}$  | —  | 10<br>2.0 | nAdc<br>$\mu\text{Adc}$ |

#### ON CHARACTERISTICS

|                                                                                                |              |    |     |      |
|------------------------------------------------------------------------------------------------|--------------|----|-----|------|
| Zero-Gate-Voltage Drain Current <sup>(1)</sup><br>( $V_{DS} = 15 \text{ Vdc}$ , $V_{GS} = 0$ ) | $I_{DSS}$    | 15 | —   | mAdc |
| Gate-Source Forward Voltage<br>( $I_{G(f)} = 1.0 \text{ mAdc}$ , $V_{DS} = 0$ )                | $V_{GS(f)}$  | —  | 1.0 | Vdc  |
| Drain-Source On-Voltage<br>( $I_D = 7.0 \text{ mAdc}$ , $V_{GS} = 0$ )                         | $V_{DS(on)}$ | —  | 1.5 | Vdc  |
| Static Drain-Source On Resistance<br>( $I_D = 0.1 \text{ mAdc}$ , $V_{GS} = 0$ )               | $r_{DS(on)}$ | —  | 150 | Ohms |

#### SMALL-SIGNAL CHARACTERISTICS

|                                                                                                      |              |   |     |      |
|------------------------------------------------------------------------------------------------------|--------------|---|-----|------|
| Small-Signal Drain-Source "ON" Resistance<br>( $V_{GS} = 0$ , $I_D = 0$ , $f = 1.0 \text{ kHz}$ )    | $r_{ds(on)}$ | — | 150 | Ohms |
| Input Capacitance<br>( $V_{DS} = 15 \text{ Vdc}$ , $V_{GS} = 0$ , $f = 1.0 \text{ MHz}$ )            | $C_{iss}$    | — | 5.0 | pF   |
| Reverse Transfer Capacitance<br>( $V_{DS} = 0$ , $V_{GS} = 10 \text{ Vdc}$ , $f = 1.0 \text{ MHz}$ ) | $C_{rss}$    | — | 1.2 | pF   |

#### SWITCHING CHARACTERISTICS

|                     |                                                                                                                                      |              |   |     |    |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------|---|-----|----|
| Turn-On Delay Time  | $(V_{DD} = 10 \text{ Vdc}$ , $I_{D(on)} = 7.0 \text{ mAdc}$ ,<br>$V_{GS(on)} = 0$ , $V_{GS(off)} = -10 \text{ Vdc}$ ) (See Figure 1) | $t_{d(on)}$  | — | 5.0 | ns |
| Rise Time           |                                                                                                                                      | $t_r$        | — | 5.0 | ns |
| Turn-Off Delay Time | $(V_{DD} = 10 \text{ Vdc}$ , $I_{D(on)} = 7.0 \text{ mAdc}$ ,<br>$V_{GS(on)} = 0$ , $V_{GS(off)} = -10 \text{ Vdc}$ ) (See Figure 1) | $t_{d(off)}$ | — | 15  | ns |
| Fall Time           |                                                                                                                                      | $t_f$        | — | 10  | ns |

1. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty Cycle < 3.0%.

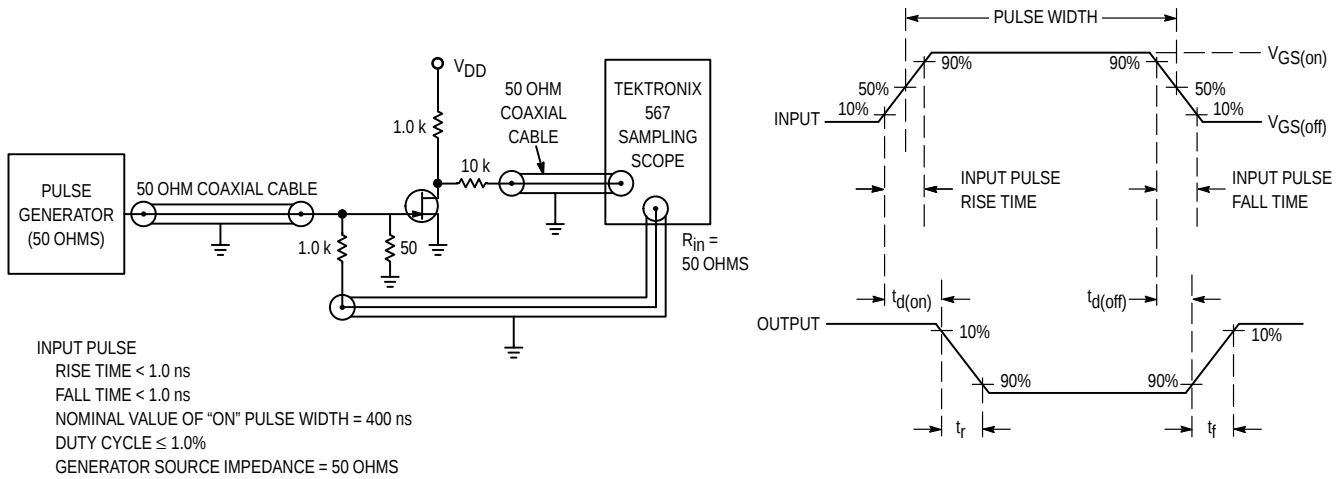


Figure 1. Switching Times Test Circuit

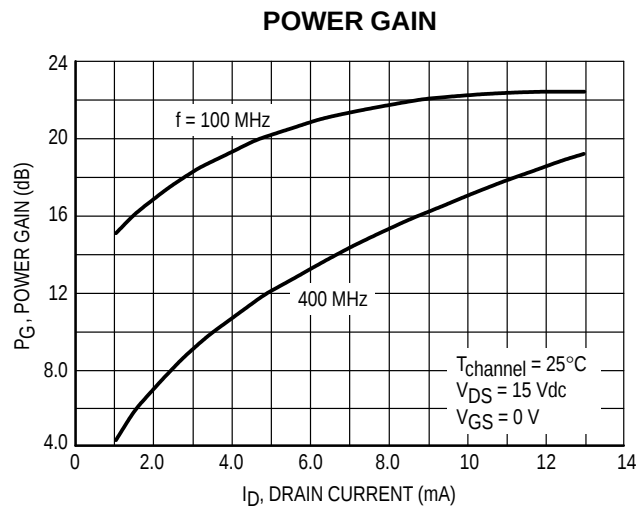
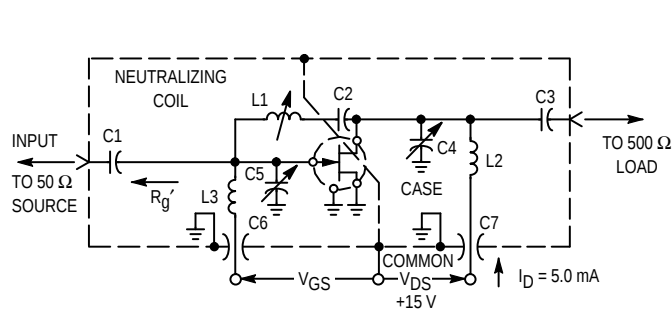


Figure 2. Effects of Drain Current



Adjust  $V_{\text{GS}}$  for  
 $I_D = 5.0 \text{ mA}$   
 $V_{\text{GS}} < 0 \text{ Volts}$

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 $\mu\text{F}$ | 0.001 $\mu\text{F}$      |
| C7                    | 0.0015 $\mu\text{F}$ | 0.001 $\mu\text{F}$      |
| L1                    | 3.0 $\mu\text{H}^*$  | 0.2 $\mu\text{H}^{**}$   |
| L2                    | 0.15 $\mu\text{H}^*$ | 0.03 $\mu\text{H}^{**}$  |
| L3                    | 0.14 $\mu\text{H}^*$ | 0.022 $\mu\text{H}^{**}$ |

- \*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 3. 100 MHz and 400 MHz Neutralized Test Circuit

## NOISE FIGURE

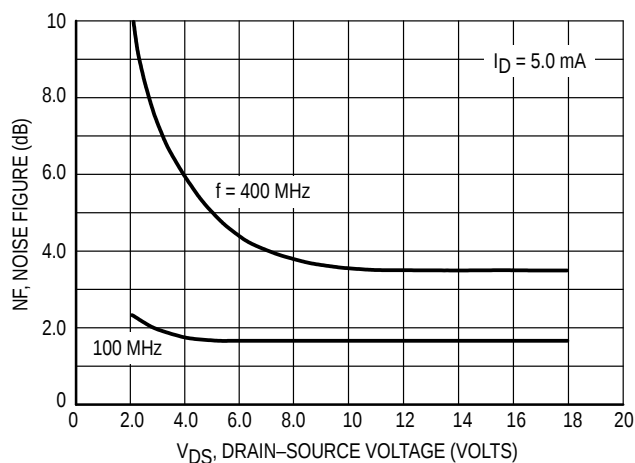
 $(T_{\text{channel}} = 25^{\circ}\text{C})$ 

Figure 4. Effects of Drain-Source Voltage

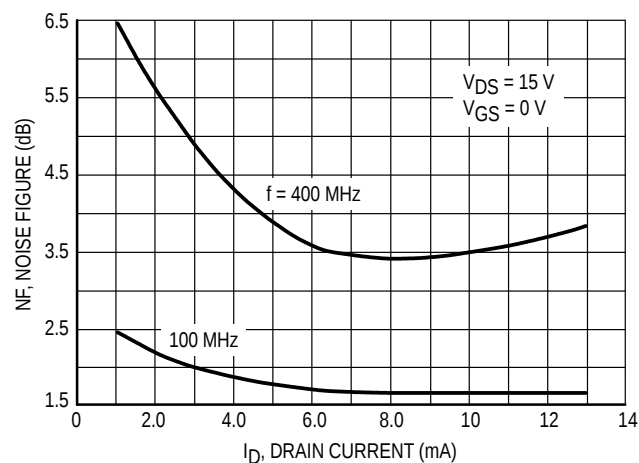


Figure 5. Effects of Drain Current

## INTERMODULATION CHARACTERISTICS

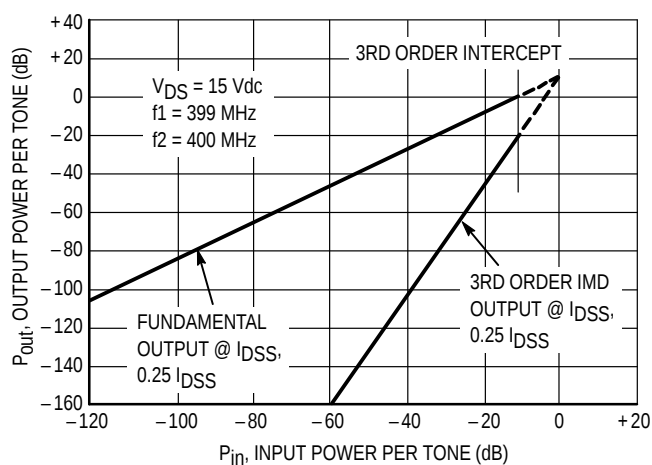
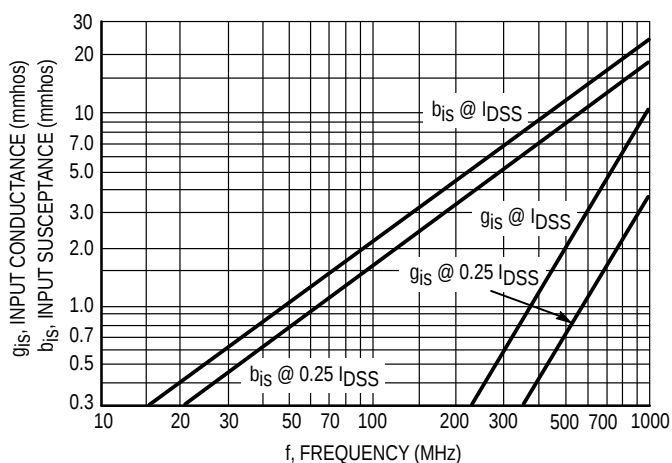
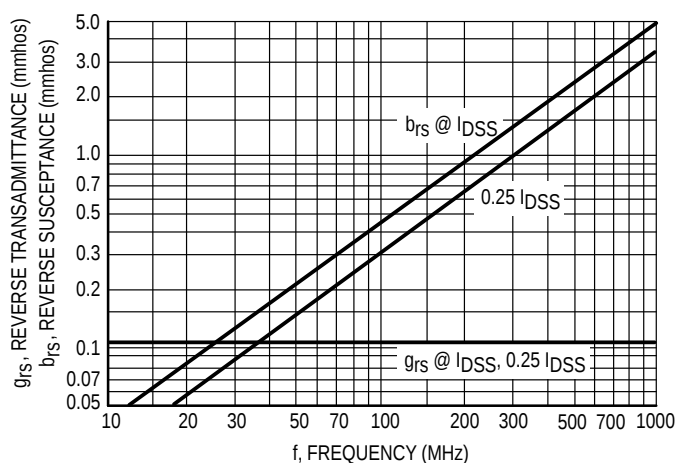
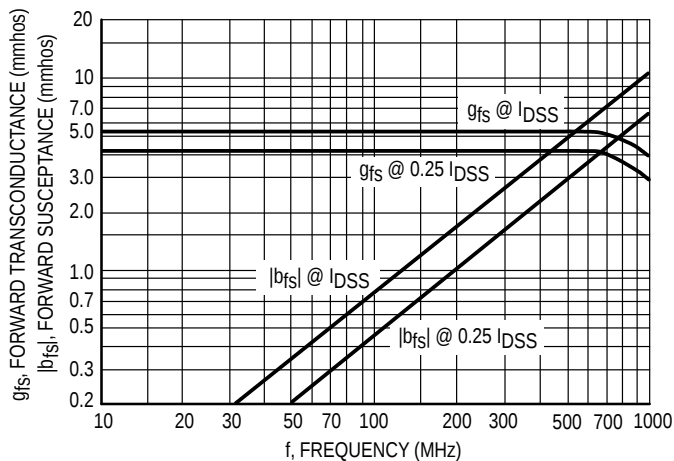
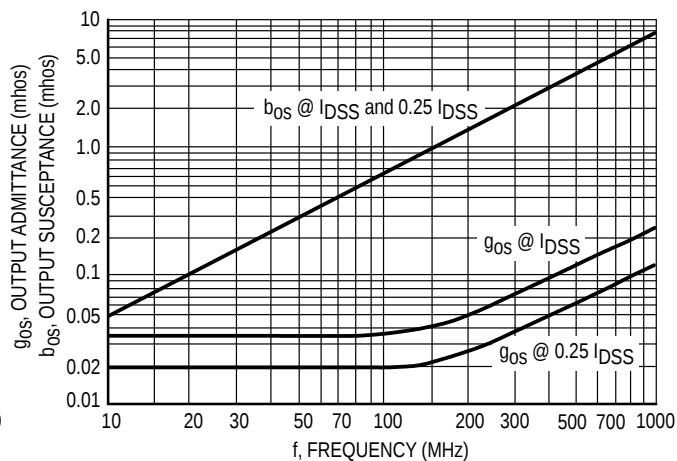


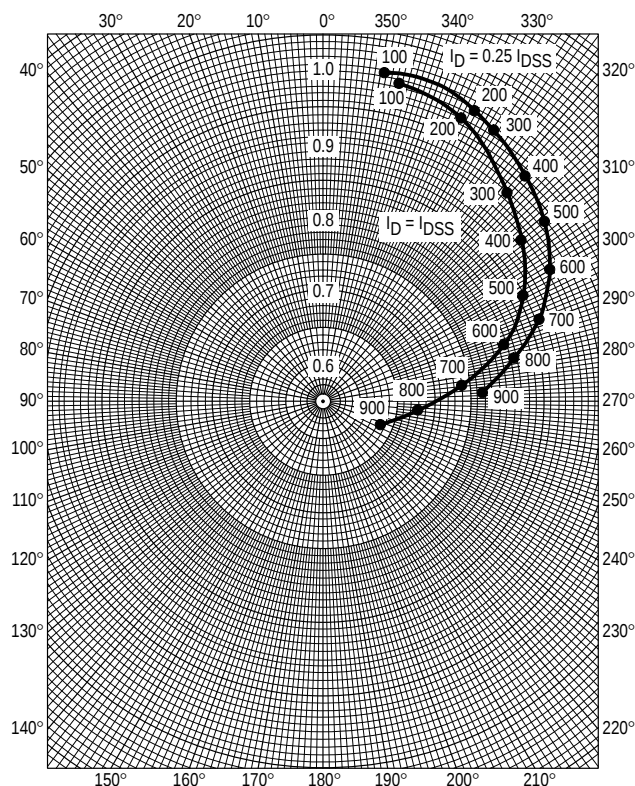
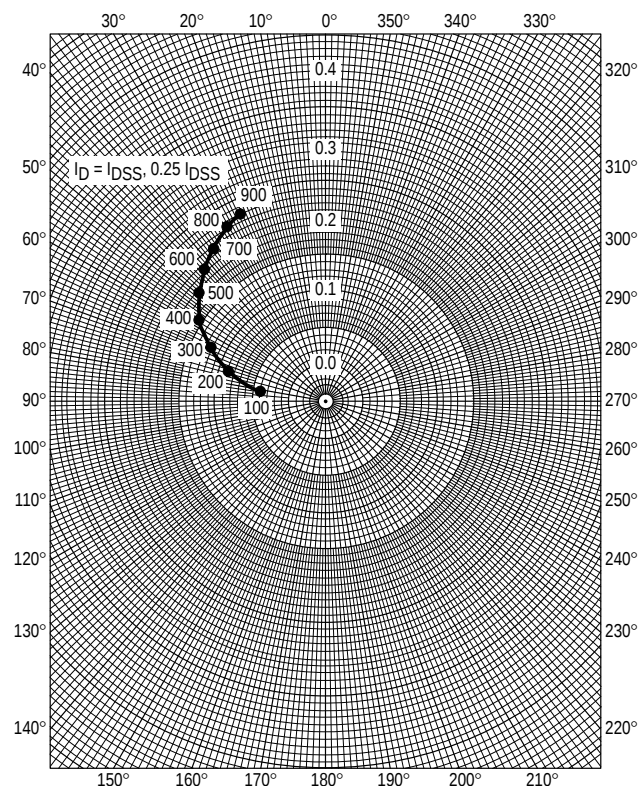
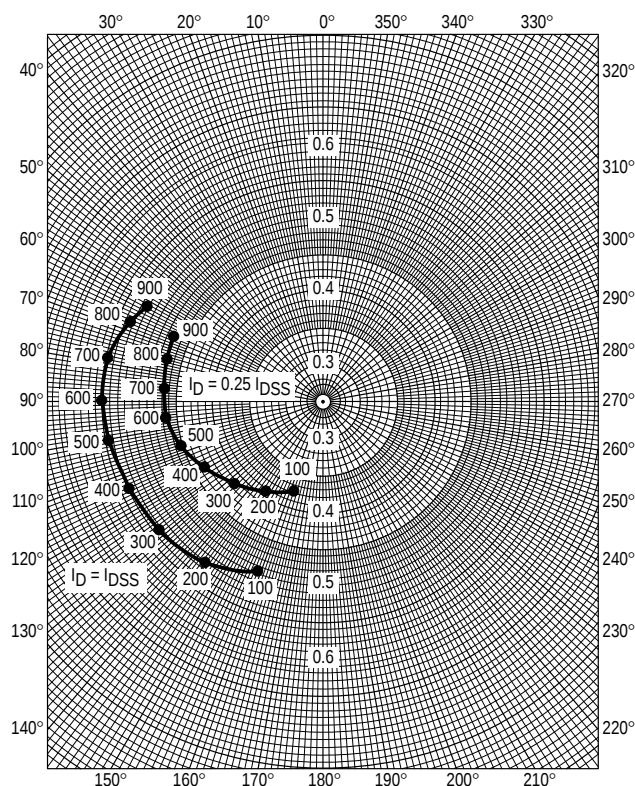
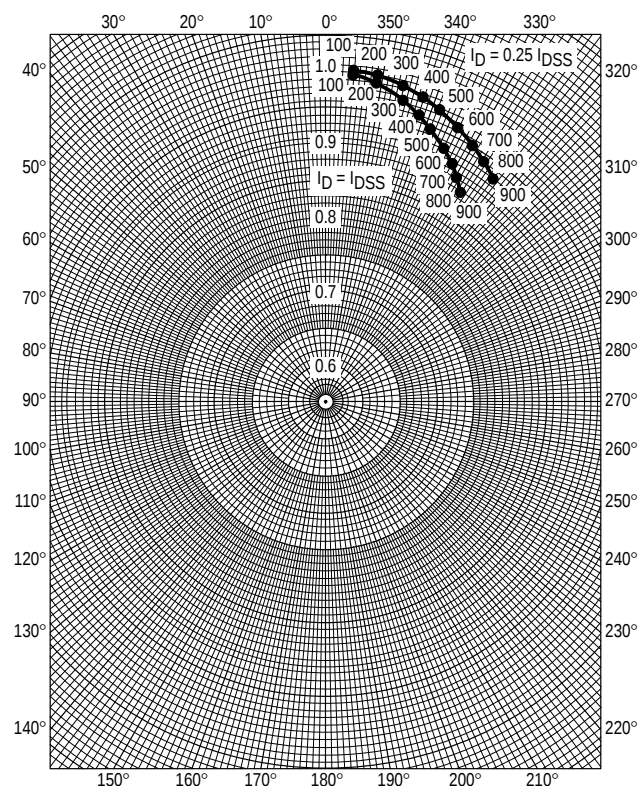
Figure 6. Third Order Intermodulation Distortion

## COMMON SOURCE CHARACTERISTICS

## ADMITTANCE PARAMETERS

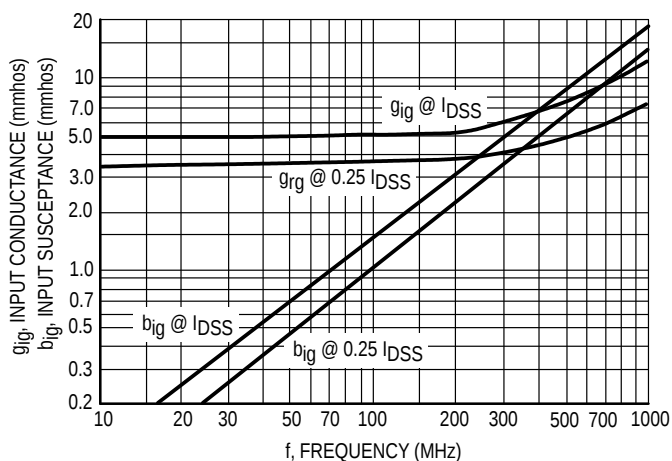
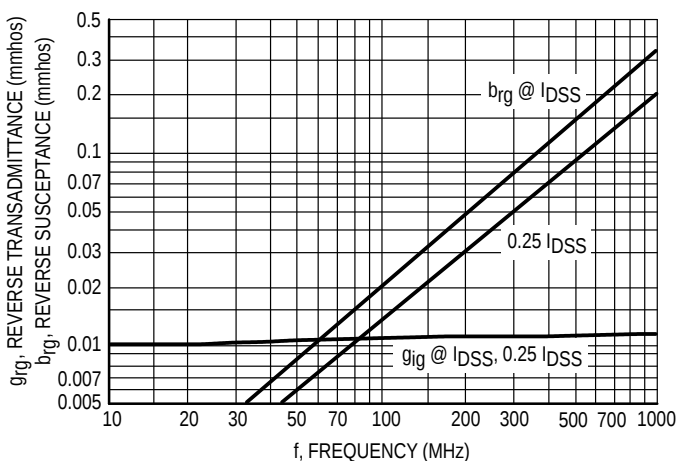
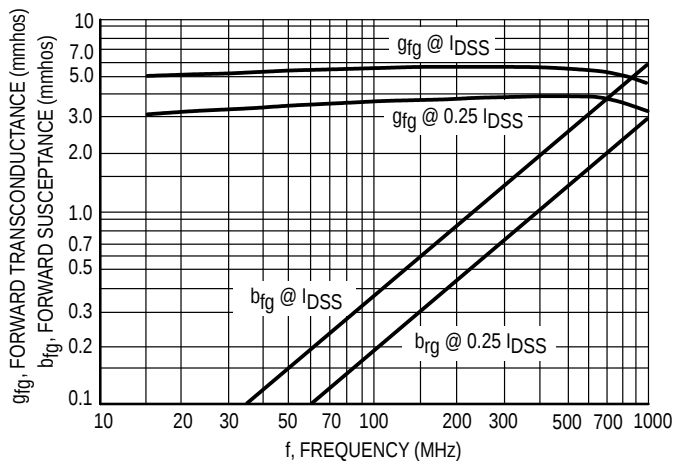
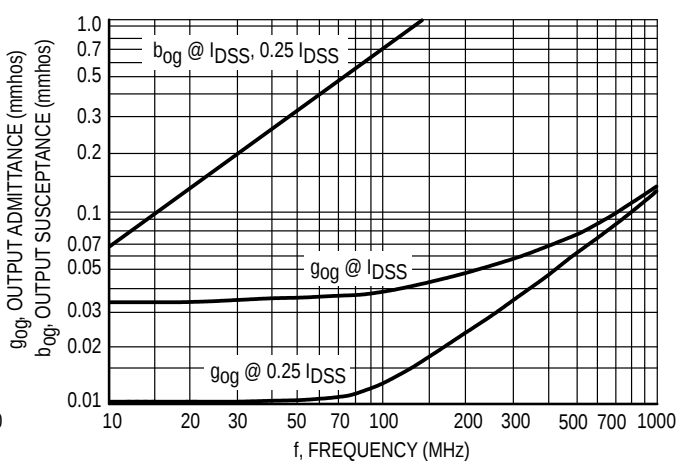
(V<sub>DS</sub> = 15 Vdc, T<sub>channel</sub> = 25°C)Figure 7. Input Admittance ( $y_{is}$ )Figure 8. Reverse Transfer Admittance ( $y_{rs}$ )Figure 9. Forward Transadmittance ( $y_{fs}$ )Figure 10. Output Admittance ( $y_{os}$ )

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

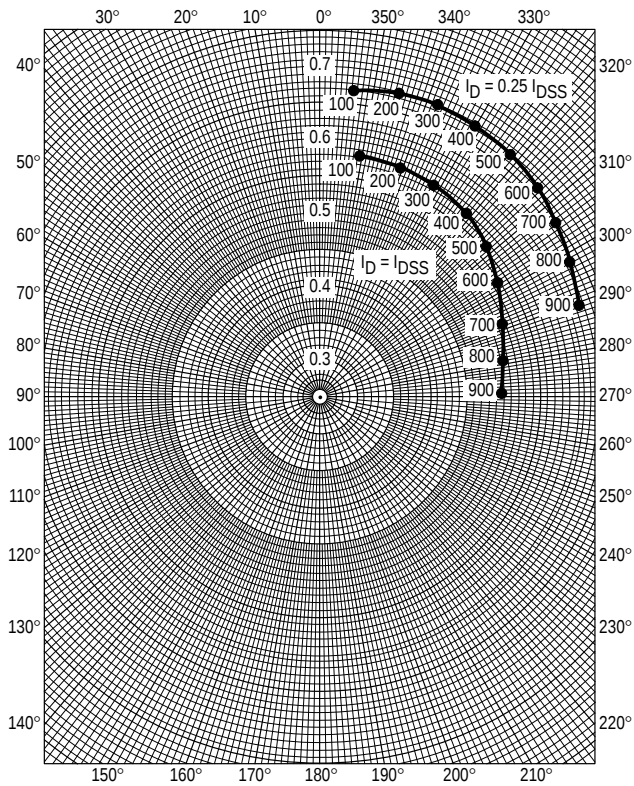
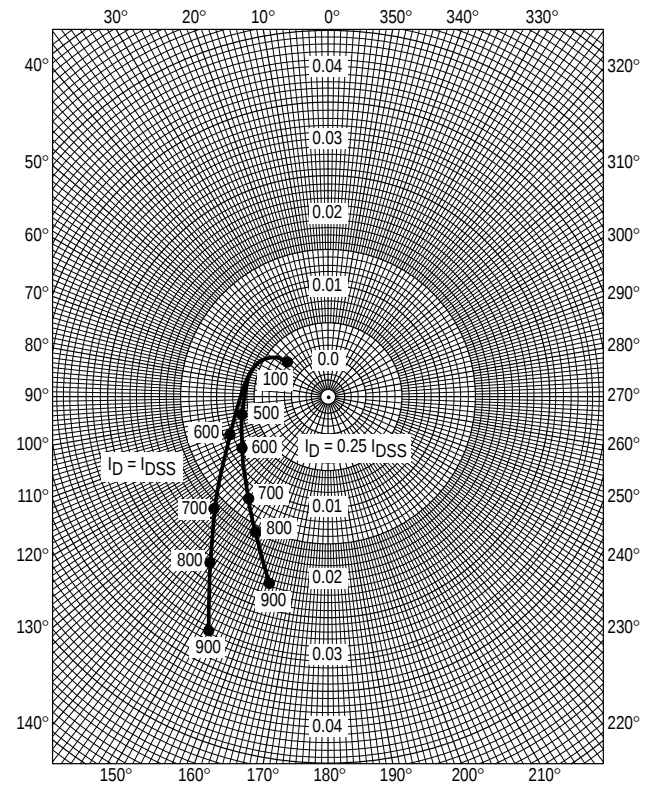
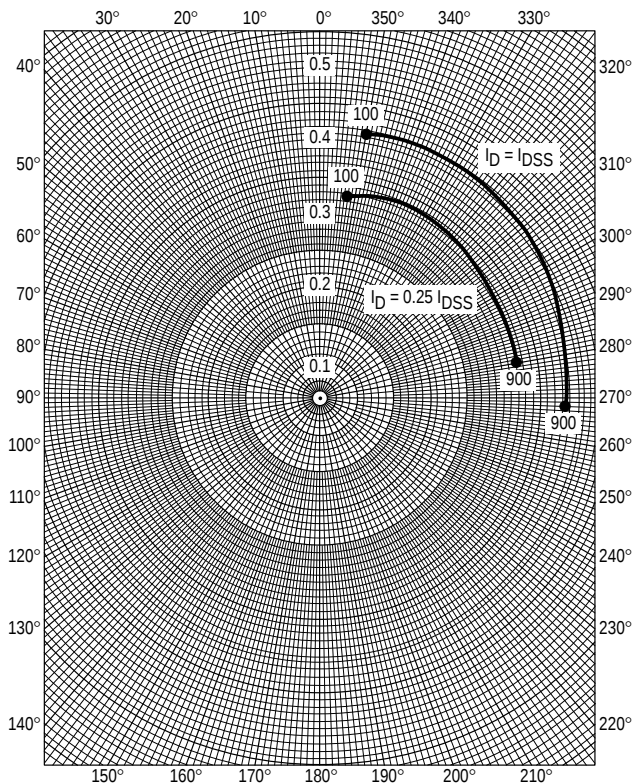
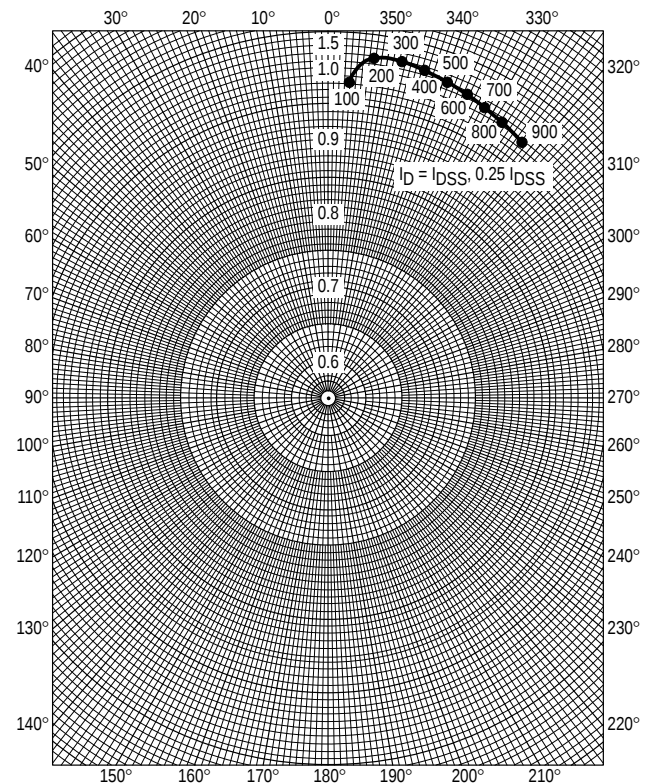
Figure 11.  $S_{11s}$ Figure 12.  $S_{12s}$ Figure 13.  $S_{21s}$ Figure 14.  $S_{22s}$

## COMMON GATE CHARACTERISTICS

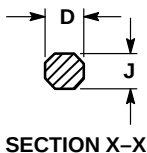
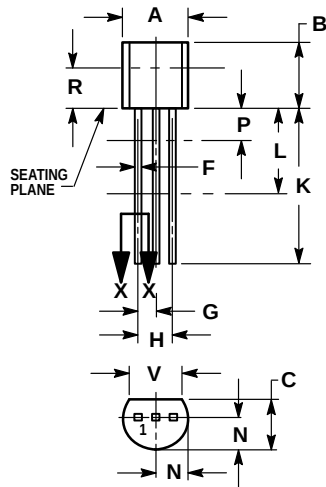
## ADMITTANCE PARAMETERS

(V<sub>DG</sub> = 15 Vdc, T<sub>channel</sub> = 25°C)Figure 15. Input Admittance ( $y_{ig}$ )Figure 16. Reverse Transfer Admittance ( $y_{rg}$ )Figure 17. Forward Transfer Admittance ( $y_{fg}$ )Figure 18. Output Admittance ( $y_{og}$ )

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

Figure 19. S<sub>11g</sub>Figure 20. S<sub>12g</sub>Figure 21. S<sub>21g</sub>Figure 22. S<sub>22g</sub>

## 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
- SOURCE
- GATE

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