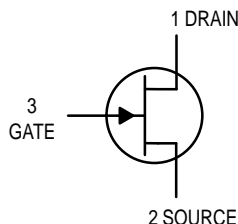
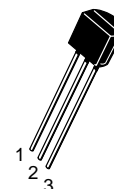


# JFET Switching

## N-Channel — Depletion



**2N5555**



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
Forward Gate Current	$I_{GF}$	10	mAdc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	350 2.8	mW 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
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#### 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 ( $V_{DS} = 12 \text{Vdc}$ , $V_{GS} = -10 \text{V}$ ) ( $V_{DS} = 12 \text{Vdc}$ , $V_{GS} = -10 \text{V}$ , $T_A = 100^\circ\text{C}$ )	$I_{D(off)}$	—	10 2.0	nAdc $\mu\text{Adc}$

#### ON CHARACTERISTICS

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

#### SMALL-SIGNAL CHARACTERISTICS

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

#### SWITCHING CHARACTERISTICS

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

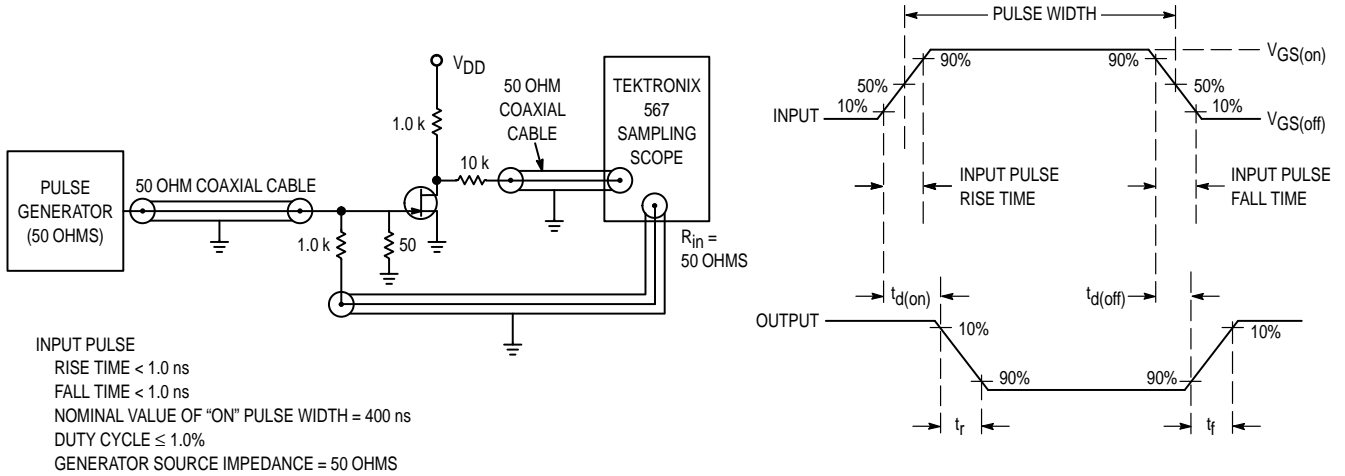


Figure 1. Switching Times Test Circuit

POWER GAIN

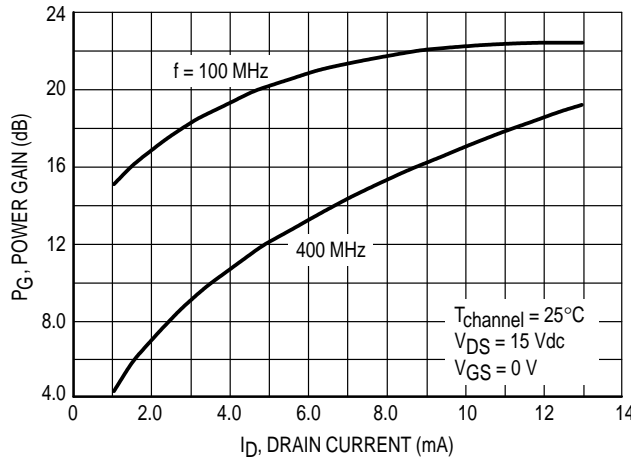
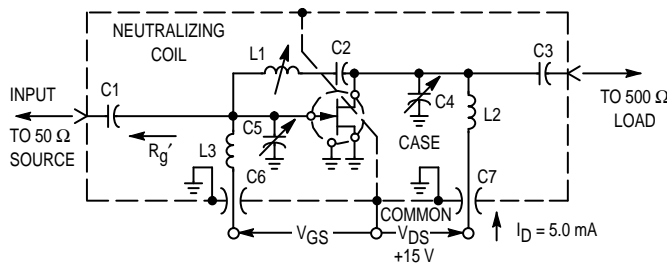


Figure 2. Effects of Drain Current



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 $\mu\text{F}$	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**

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

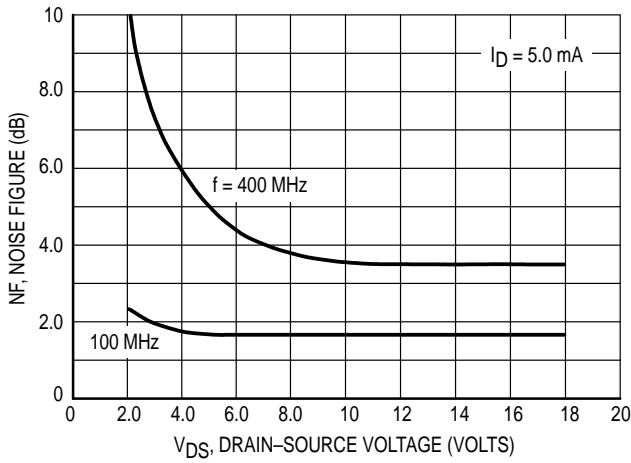


Figure 4. Effects of Drain-Source Voltage

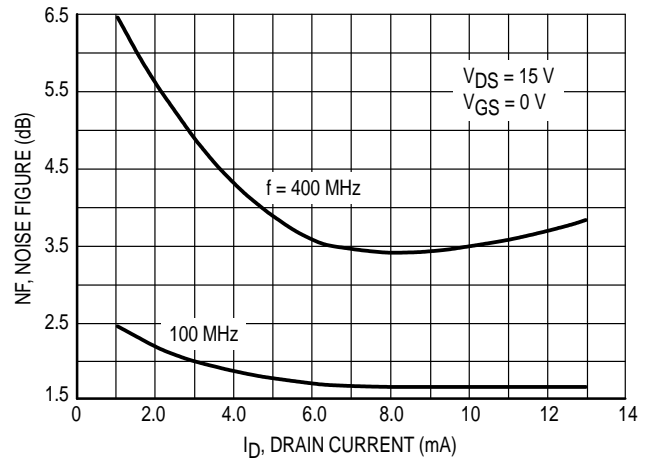


Figure 5. Effects of Drain Current

**INTERMODULATION CHARACTERISTICS**

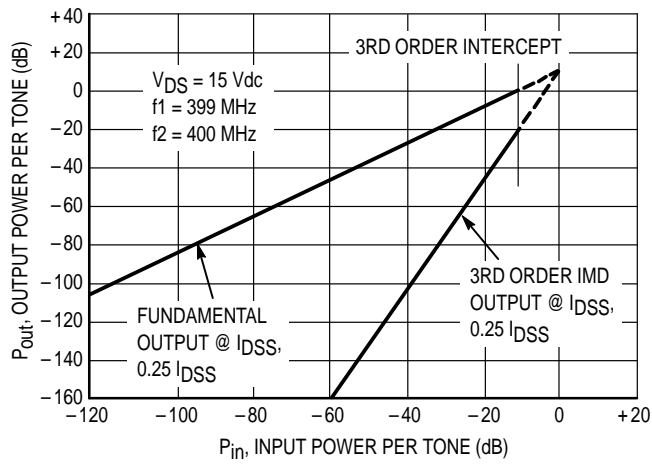


Figure 6. Third Order Intermodulation Distortion

COMMON SOURCE CHARACTERISTICS

ADMITTANCE PARAMETERS

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

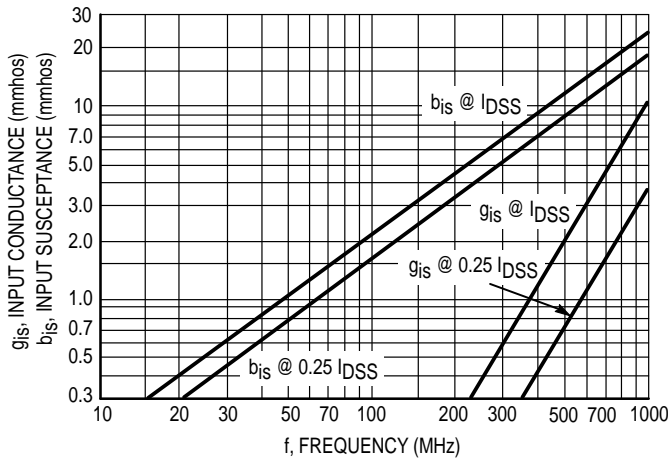


Figure 7. Input Admittance ( $y_{is}$ )

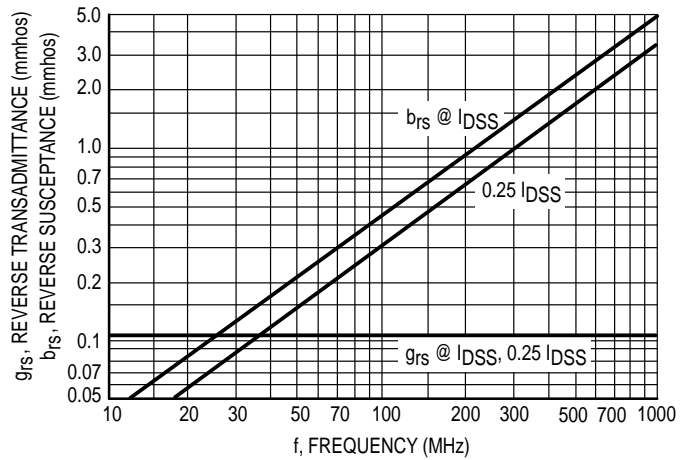


Figure 8. Reverse Transfer Admittance ( $y_{rs}$ )

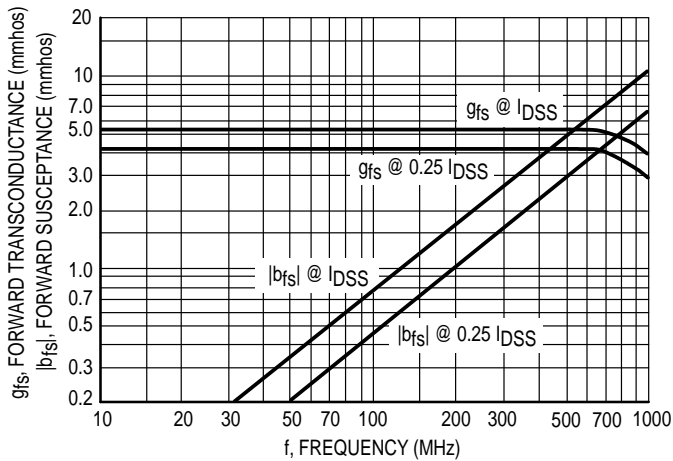


Figure 9. Forward Transadmittance ( $y_{fs}$ )

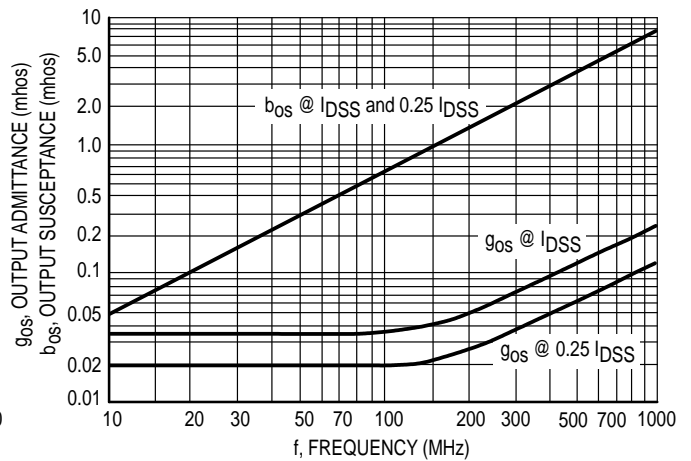


Figure 10. Output Admittance ( $y_{os}$ )

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

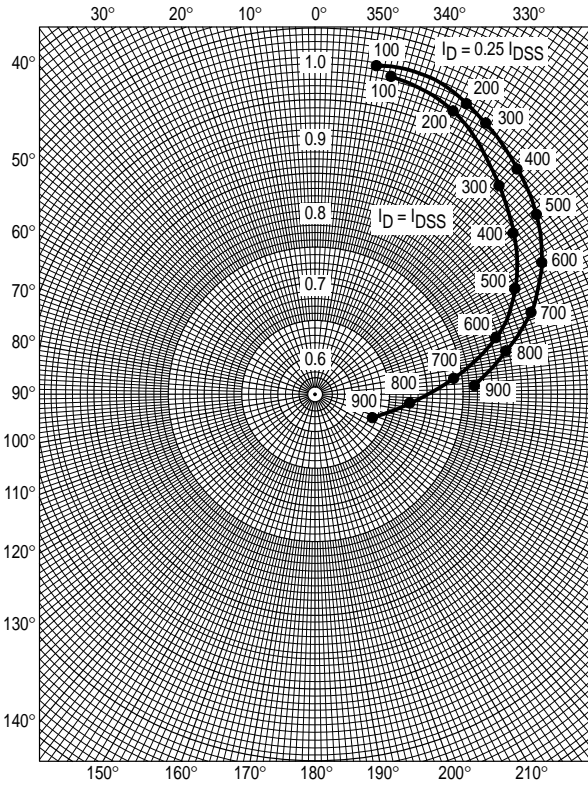


Figure 11.  $S_{11s}$

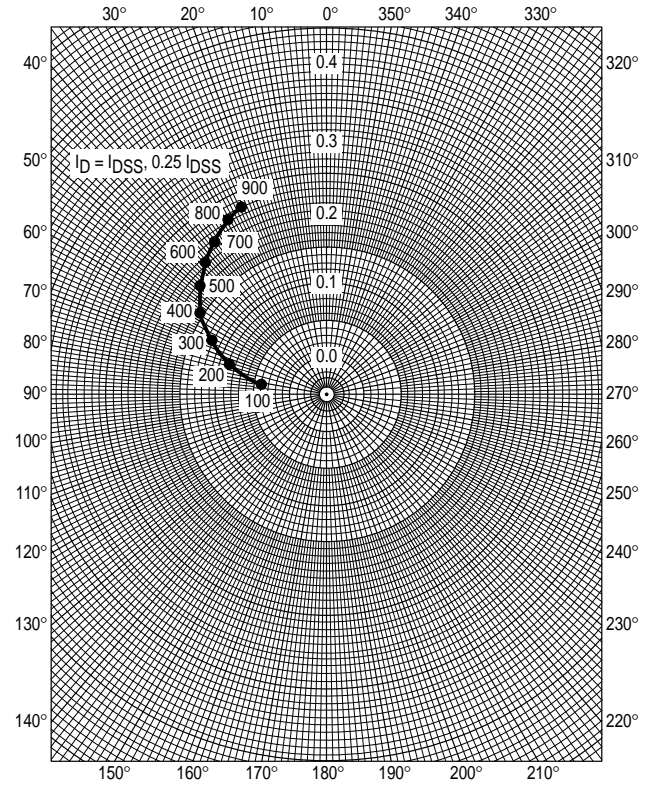


Figure 12.  $S_{12s}$

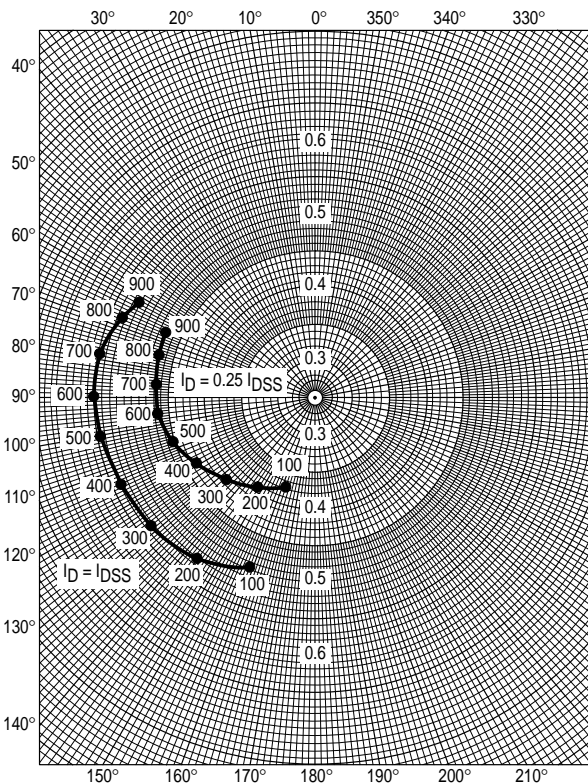


Figure 13.  $S_{21s}$

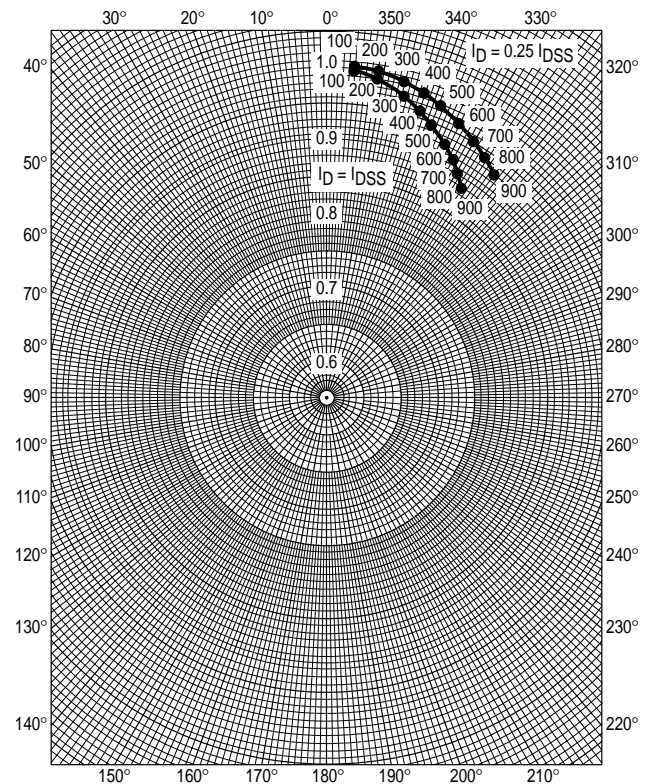


Figure 14.  $S_{22s}$

COMMON GATE CHARACTERISTICS

ADMITTANCE PARAMETERS

(VDG = 15 Vdc, Tchannel = 25°C)

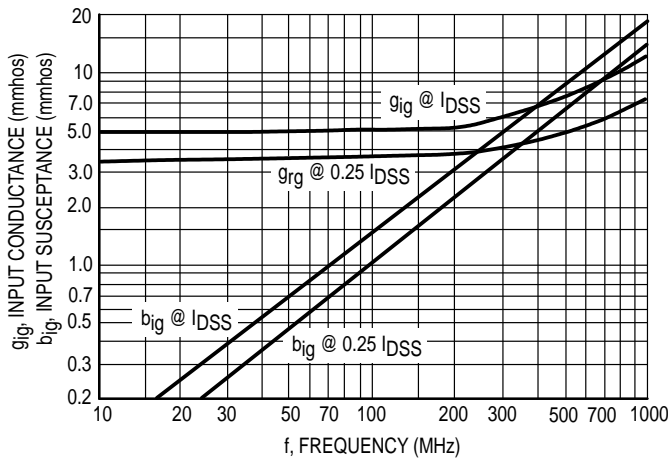


Figure 15. Input Admittance (y<sub>ig</sub>)

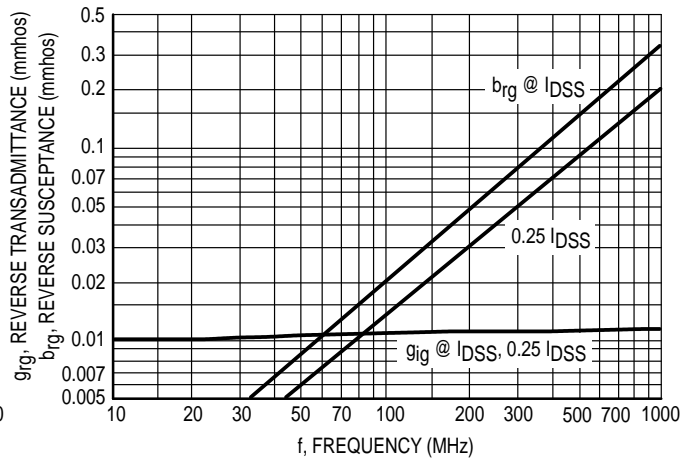


Figure 16. Reverse Transfer Admittance (y<sub>rg</sub>)

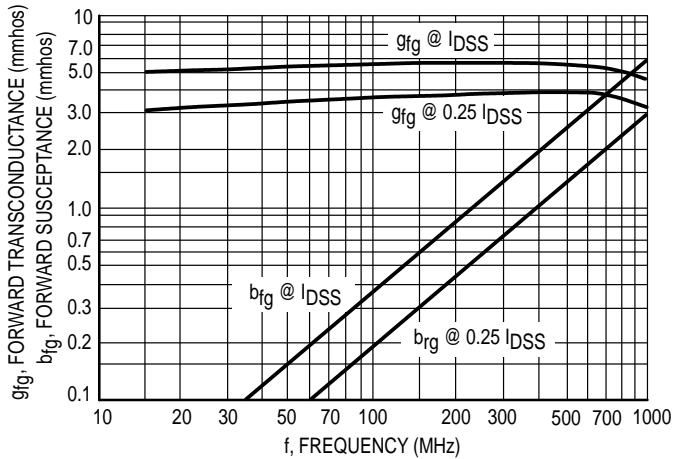


Figure 17. Forward Transfer Admittance (y<sub>fg</sub>)

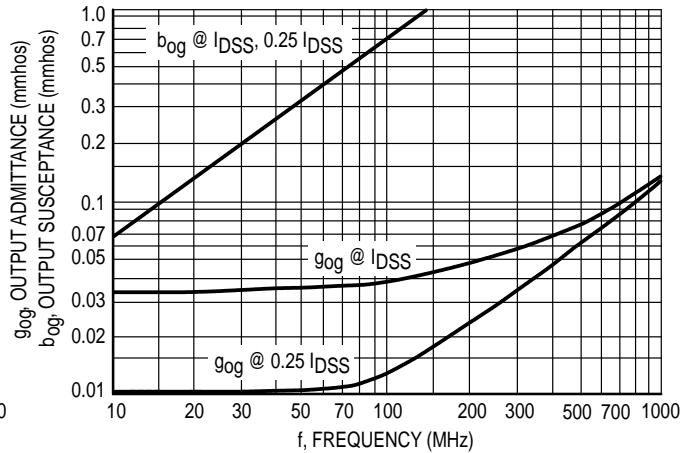


Figure 18. Output Admittance (y<sub>og</sub>)

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

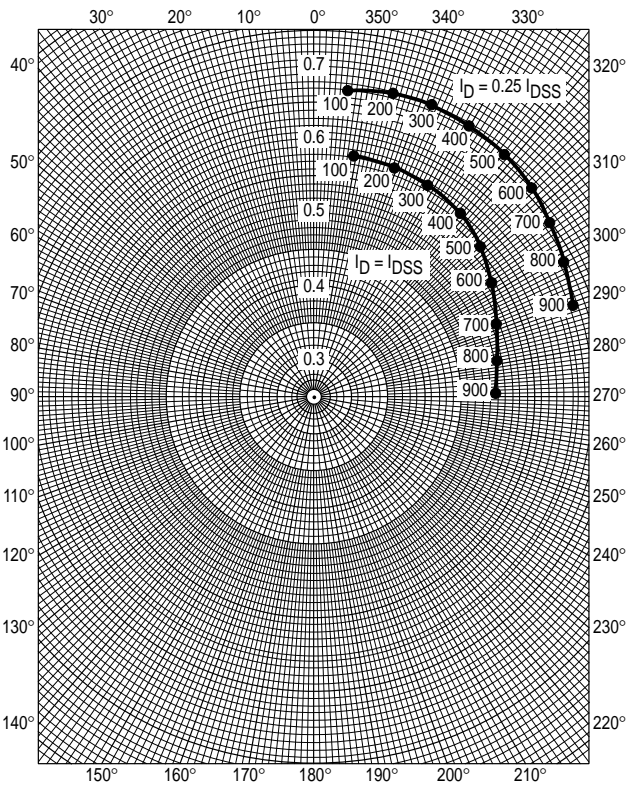


Figure 19.  $S_{11g}$

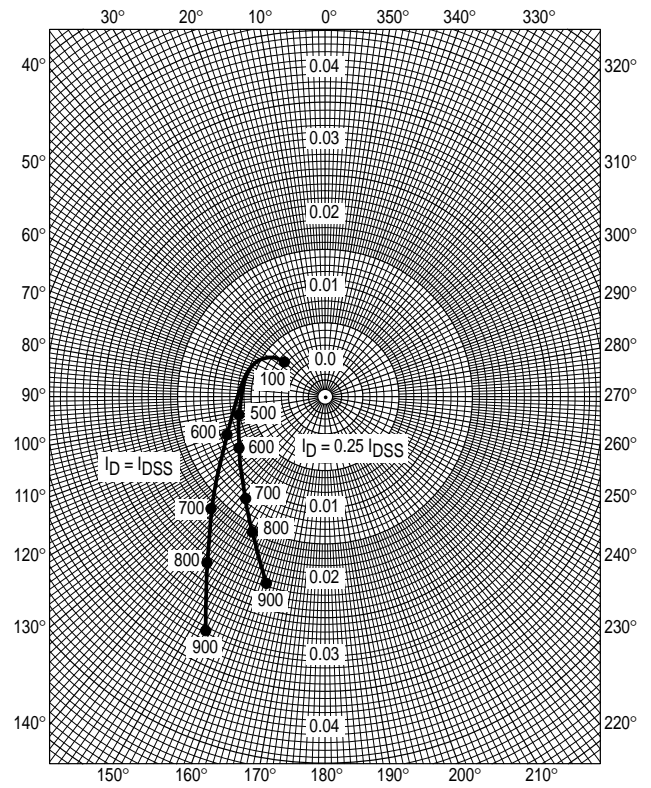


Figure 20.  $S_{12g}$

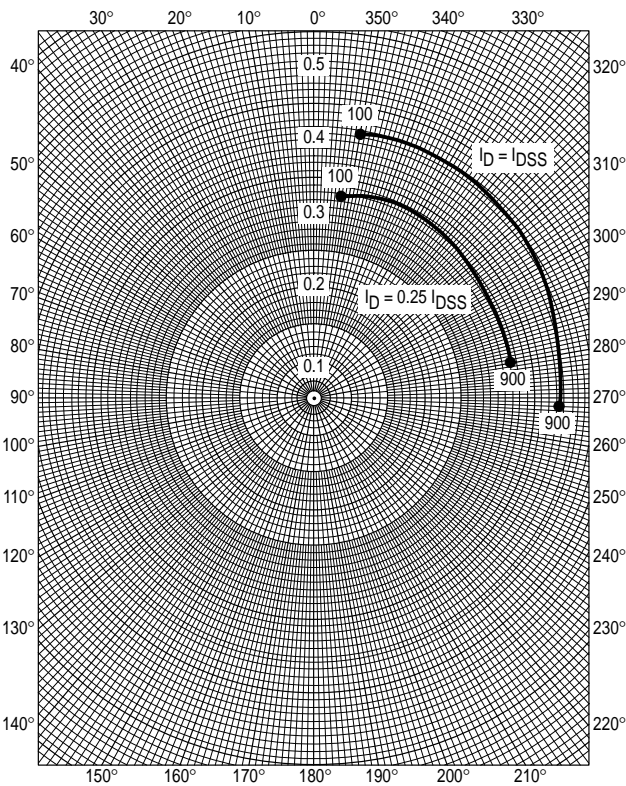


Figure 21.  $S_{21g}$

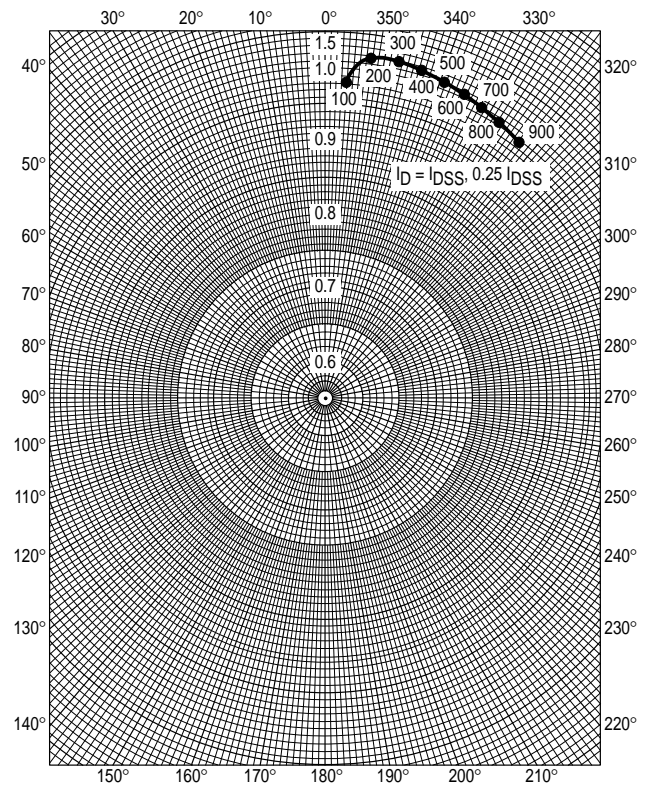
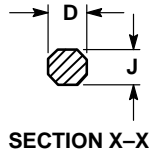
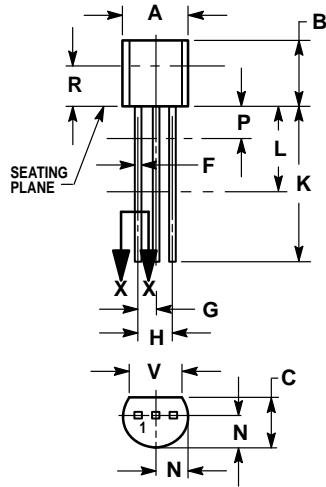


Figure 22.  $S_{22g}$

PACKAGE DIMENSIONS



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

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	—

STYLE 5:

- PIN 1. DRAIN
2. SOURCE
3. GATE

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