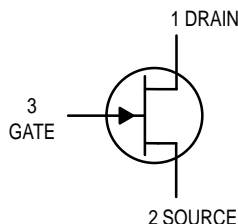
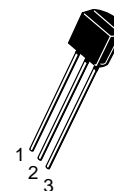


# JFET VHF Amplifier

## 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 $25^\circ\text{C}$	$P_D$	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
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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 ( $V_{GS} = -15 \text{Vdc}$ , $V_{DS} = 0$ ) ( $V_{GS} = -15 \text{Vdc}$ , $V_{DS} = 0$ , $T_A = 100^\circ\text{C}$ )	$I_{GSS}$	— —	-2.0 -2.0	nAdc $\mu\text{Adc}$
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 <sup>(1)</sup> ( $V_{DS} = 15 \text{Vdc}$ , $V_{GS} = 0 \text{Vdc}$ )	$I_{DSS}$	2.0	20	mAdc
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#### SMALL-SIGNAL CHARACTERISTICS

Forward Transfer Admittance <sup>(1)</sup> ( $V_{DS} = 15 \text{Vdc}$ , $V_{GS} = 0$ , $f = 1.0 \text{kHz}$ ) ( $V_{DS} = 15 \text{Vdc}$ , $V_{GS} = 0$ , $f = 100 \text{MHz}$ )	$ y_{fs} $	2000 1600	7500 —	$\mu\text{mhos}$
Input Admittance ( $V_{DS} = 15 \text{Vdc}$ , $V_{GS} = 0$ , $f = 100 \text{MHz}$ )	$\text{Re}(y_{is})$	—	800	$\mu\text{mhos}$
Output Conductance ( $V_{DS} = 15 \text{Vdc}$ , $V_{GS} = 0$ , $f = 100 \text{MHz}$ )	$\text{Re}(y_{os})$	—	200	$\mu\text{mhos}$
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

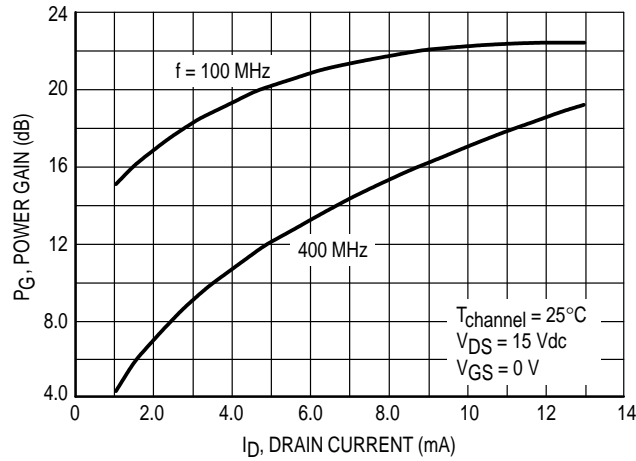
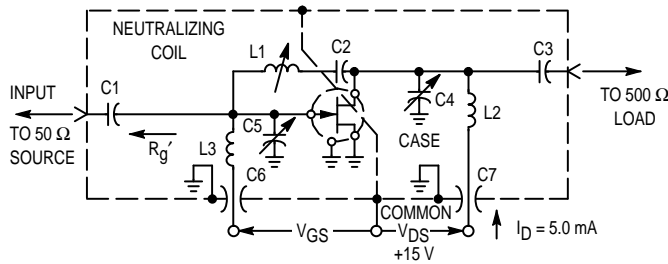


Figure 1. Effects of Drain Current



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

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 2. 100 MHz and 400 MHz Neutralized Test Circuit

**NOISE FIGURE**

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

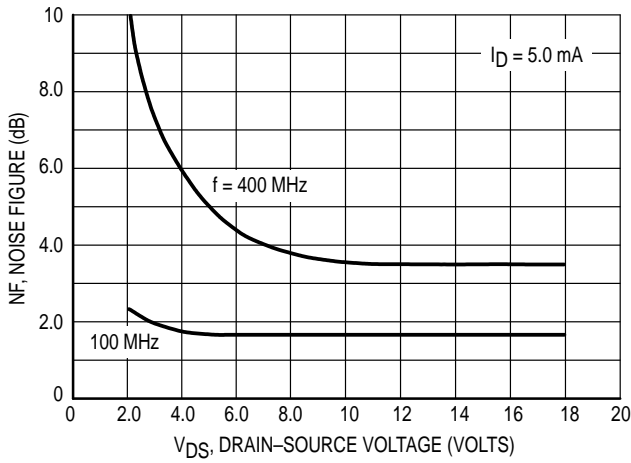


Figure 3. Effects of Drain-Source Voltage

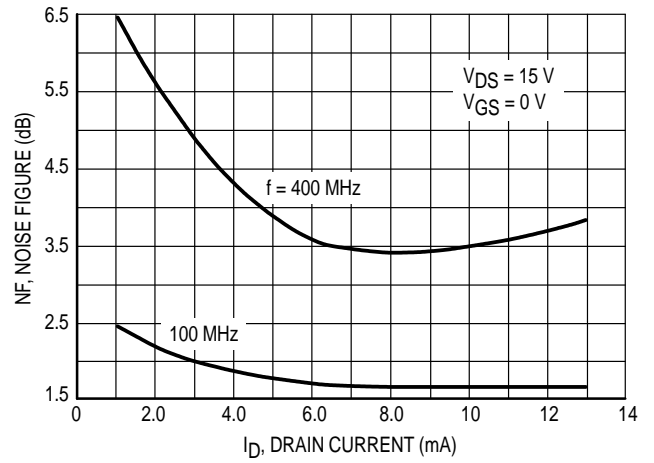


Figure 4. Effects of Drain Current

**INTERMODULATION CHARACTERISTICS**

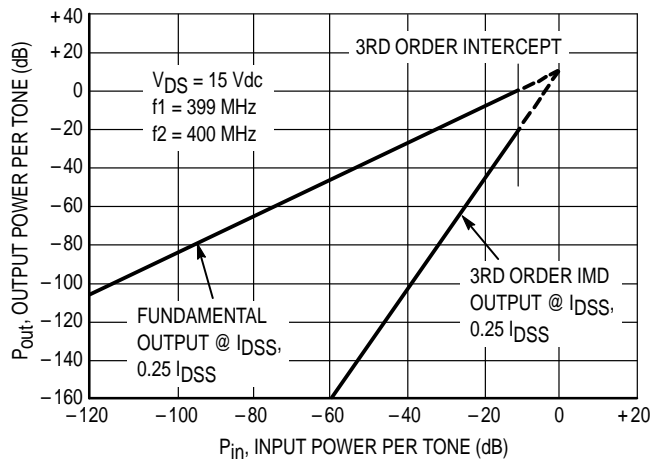


Figure 5. Third Order Intermodulation Distortion

COMMON SOURCE CHARACTERISTICS

ADMITTANCE PARAMETERS

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

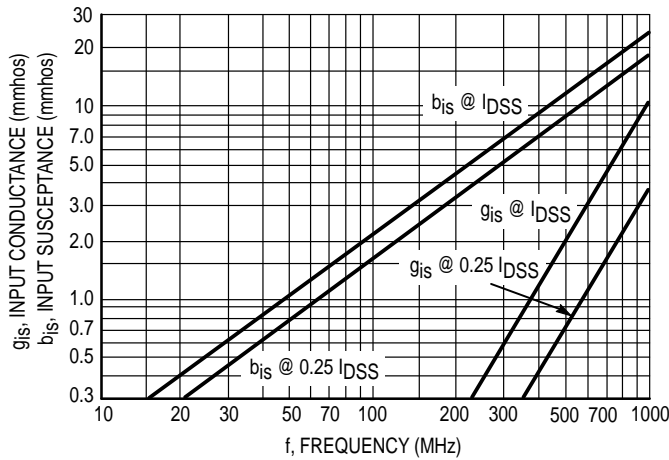


Figure 6. Input Admittance ( $y_{is}$ )

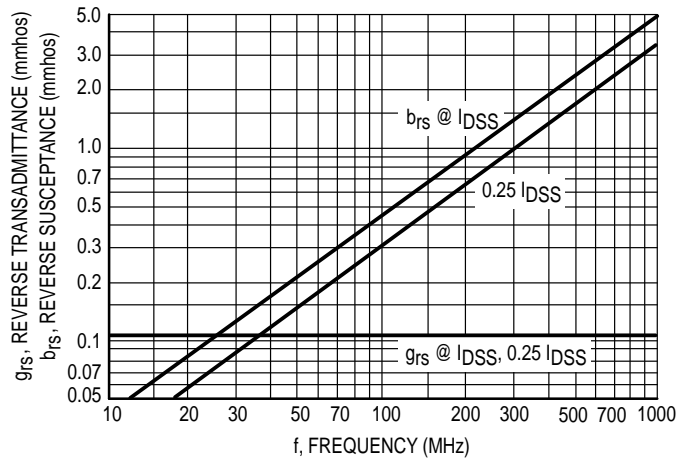


Figure 7. Reverse Transfer Admittance ( $y_{rs}$ )

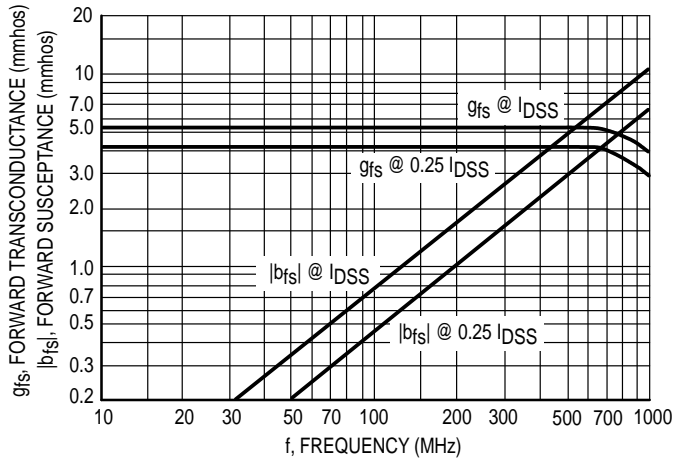


Figure 8. Forward Transadmittance ( $y_{fs}$ )

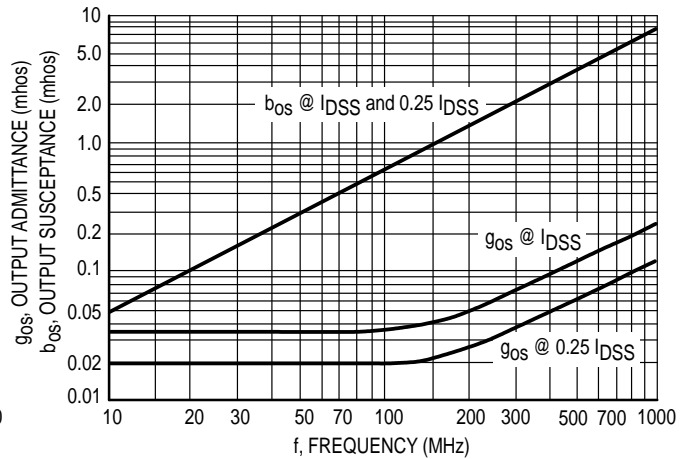


Figure 9. Output Admittance ( $y_{os}$ )

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

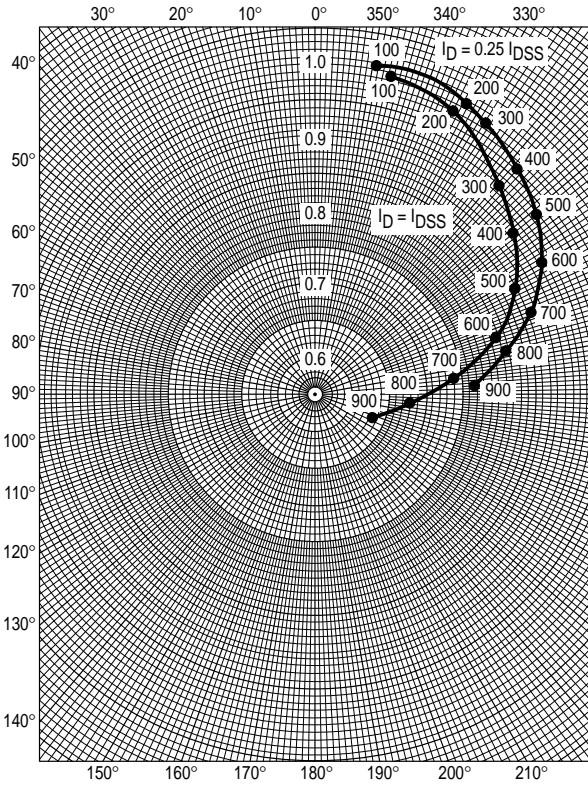


Figure 10.  $S_{11s}$

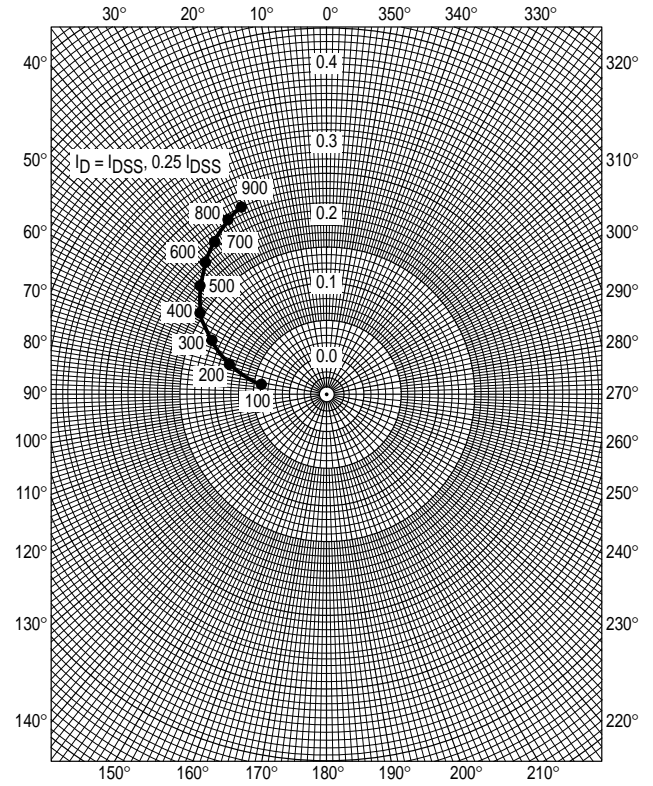


Figure 11.  $S_{12s}$

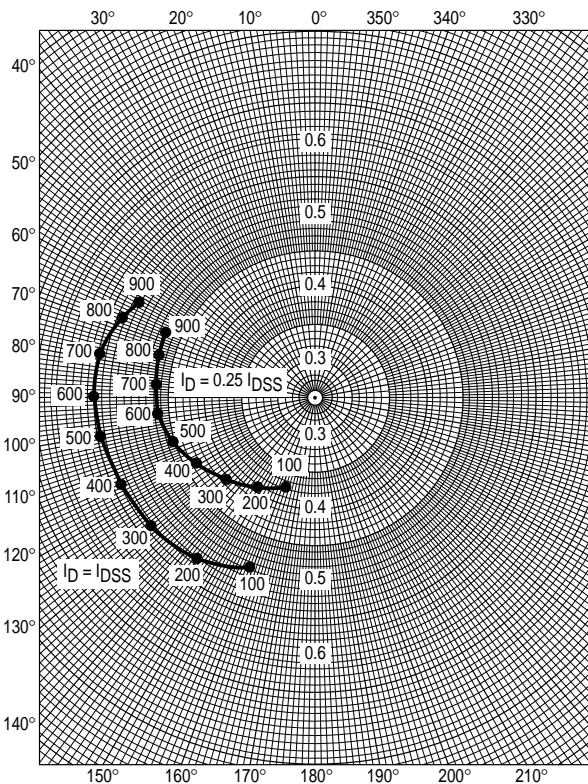


Figure 12.  $S_{21s}$

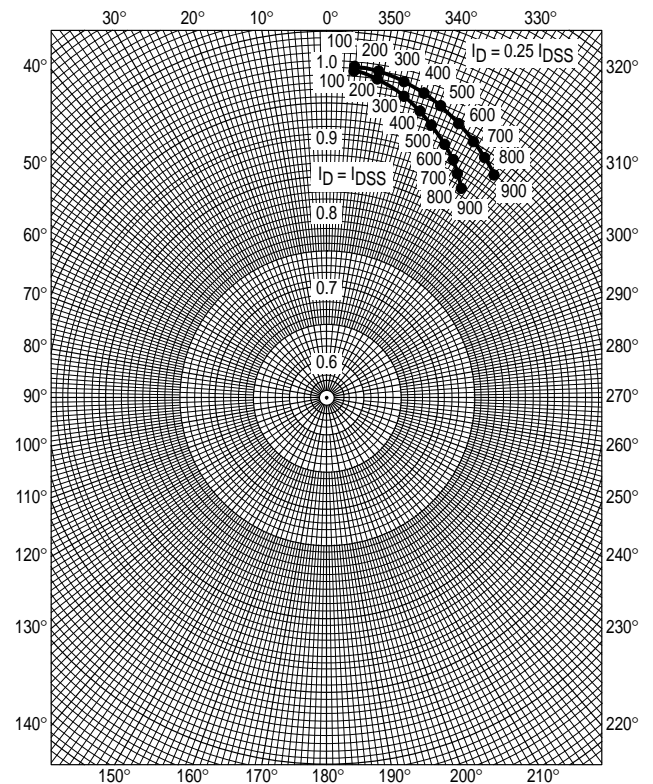


Figure 13.  $S_{22s}$

COMMON GATE CHARACTERISTICS

ADMITTANCE PARAMETERS

(V<sub>DG</sub> = 15 Vdc, T<sub>channel</sub> = 25°C)

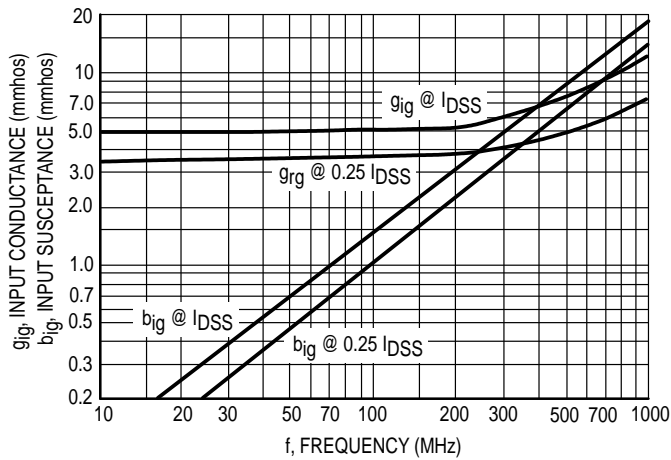


Figure 14. Input Admittance (y<sub>ig</sub>)

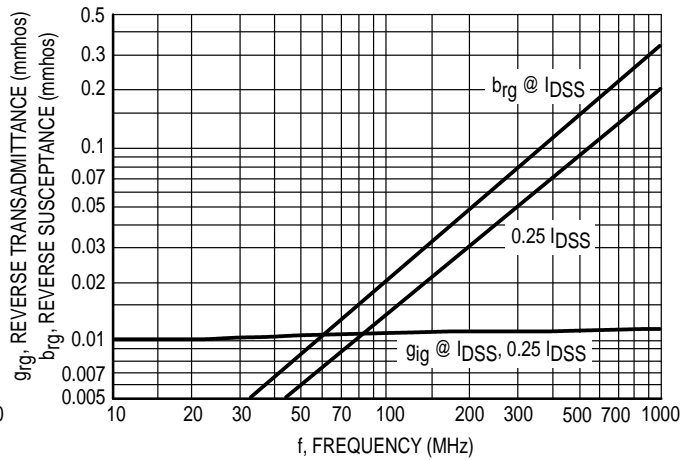


Figure 15. Reverse Transfer Admittance (y<sub>rg</sub>)

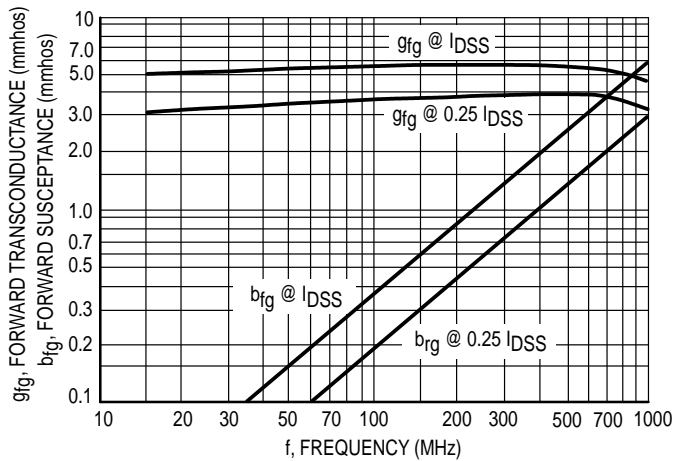


Figure 16. Forward Transfer Admittance (y<sub>fg</sub>)

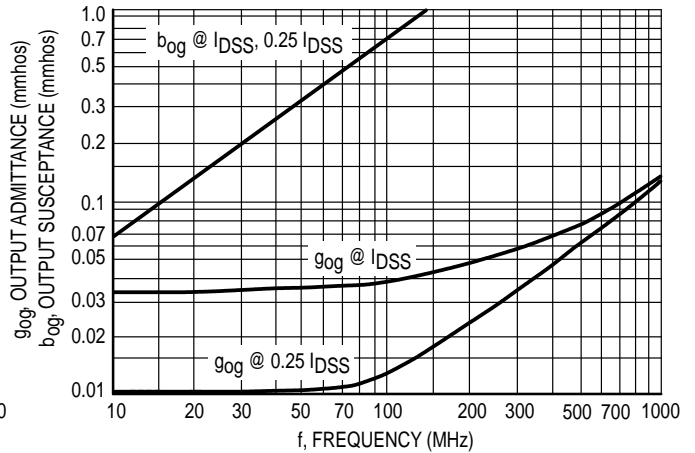


Figure 17. Output Admittance (y<sub>og</sub>)

**COMMON GATE CHARACTERISTICS**  
**S-PARAMETERS**

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

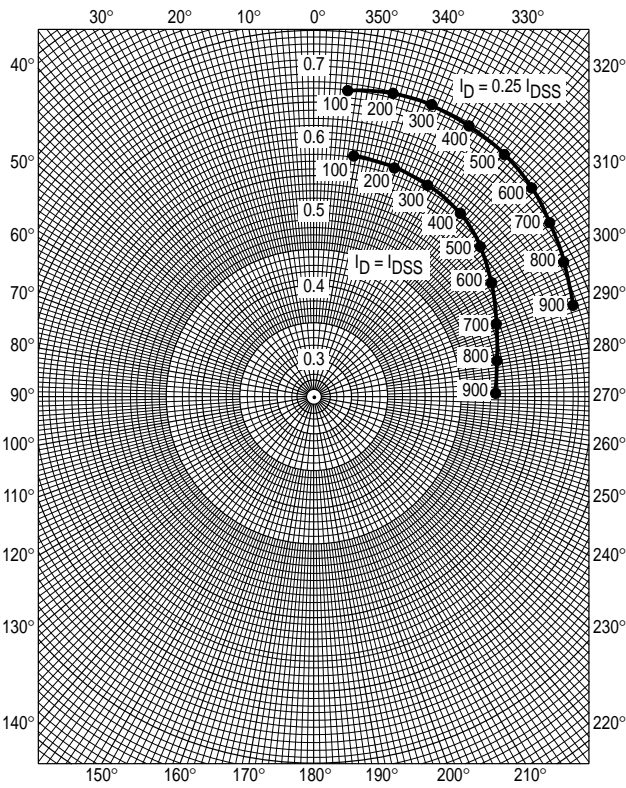


Figure 18. S<sub>11g</sub>

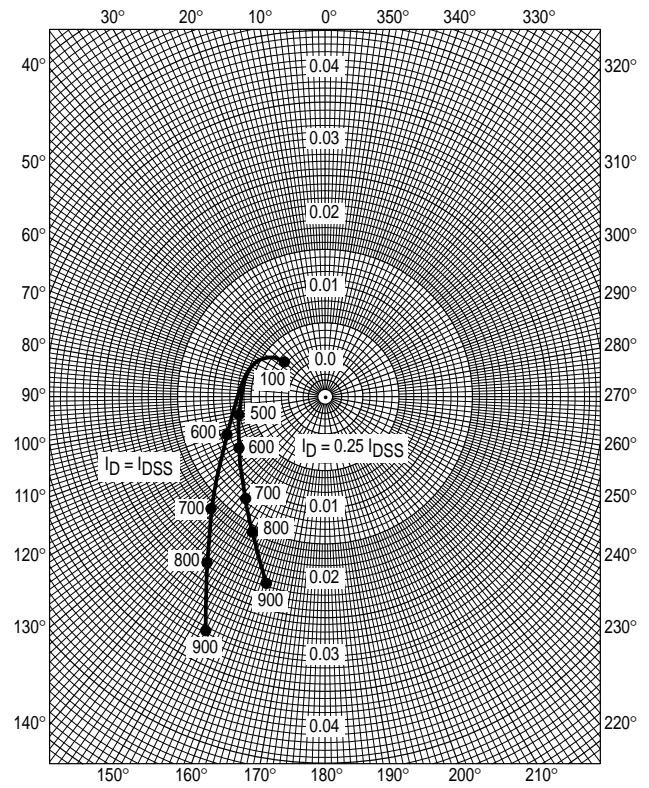


Figure 19. S<sub>12g</sub>

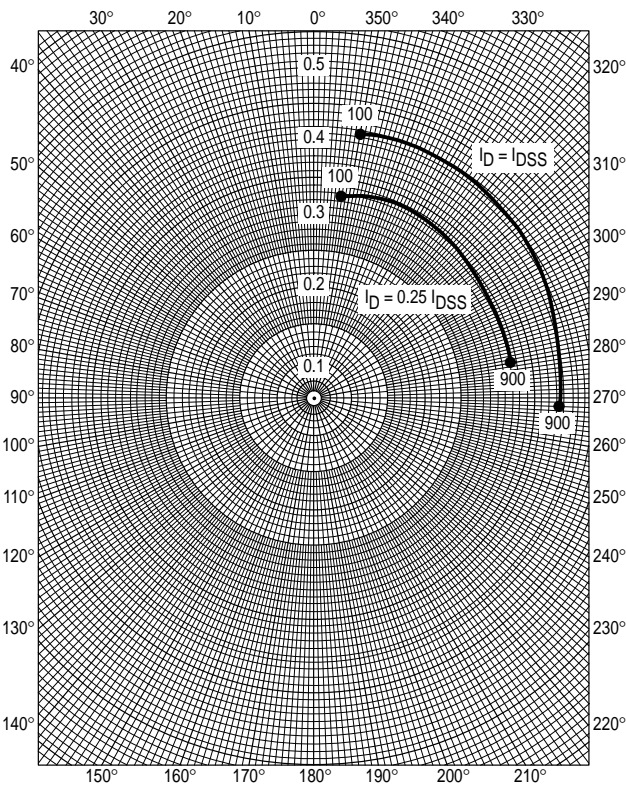


Figure 20. S<sub>21g</sub>

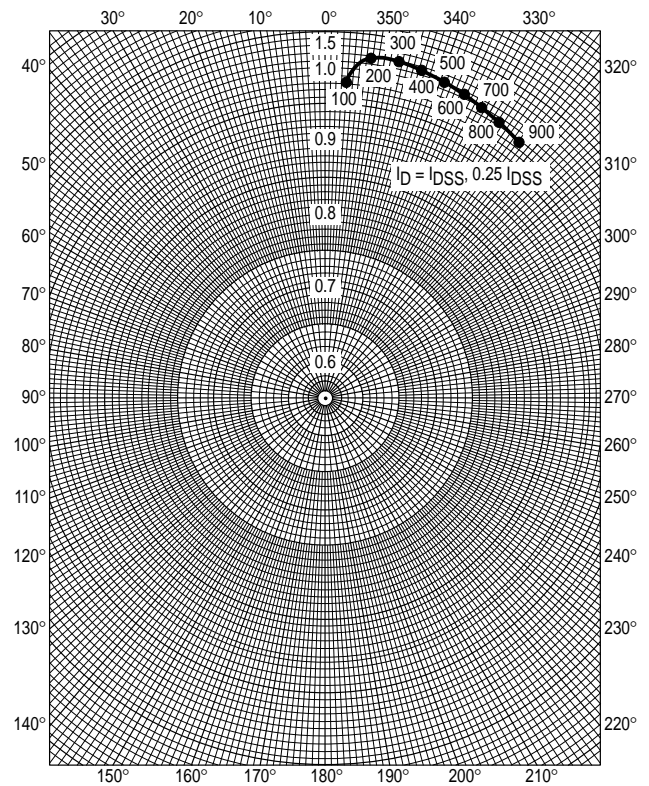
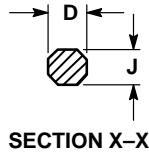
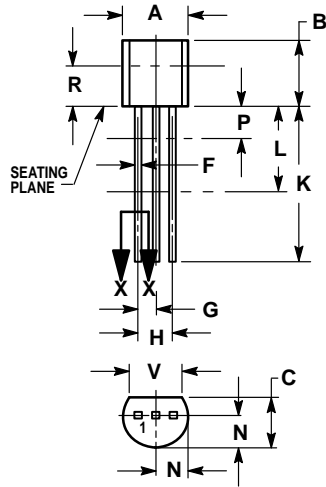


Figure 21. S<sub>22g</sub>

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
2. SOURCE
3. GATE

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