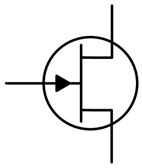
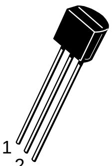
JFET VHF Amplifier

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°C Derate above 25°C	P_D	350 2.8	mW mW/°C
Junction Temperature Range	T_J	125	°C
Storage Temperature Range	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 (I_G = –10 μAdc, V_{DS} = 0)	$V_{(BR)GSS}$	–25	—	Vdc
Gate Reverse Current (V_{GS} = –15 Vdc, V_{DS} = 0) (V_{GS} = –15 Vdc, V_{DS} = 0, T_A = 100°C)	I_{GSS}	 — —	 –2.0 –2.0	 nAdc μAdc
Gate–Source Cutoff Voltage (V_{DS} = 15 Vdc, I_D = 2.0 nAdc)	$V_{GS(off)}$	—	–8.0	Vdc
Gate–Source Voltage (V_{DS} = 15 Vdc, I_D = 0.2 mAdc)	V_{GS}	–0.5	–7.5	Vdc
ON CHARACTERISTICS				
Zero–Gate–Voltage Drain Current(1) (V_{DS} = 15 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	2.0	20	mAdc
SMALL–SIGNAL CHARACTERISTICS				
Forward Transfer Admittance(1) (V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 kHz) (V_{DS} = 15 Vdc, V_{GS} = 0, f = 100 MHz)	$\|y_{fs}\|$	 2000 1600	 7500 —	μmhos
Input Admittance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 100 MHz)	$Re(y_{is})$	—	800	μmhos
Output Conductance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 100 MHz)	$Re(y_{os})$	—	200	μmhos
Input Capacitance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 MHz)	C_{iss}	—	7.0	pF
Reverse Transfer Capacitance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 MHz)	C_{rss}	—	3.0	pF

1. Pulse Test; Pulse Width ≤ 630 ms, Duty Cycle ≤ 10%.

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POWER GAIN

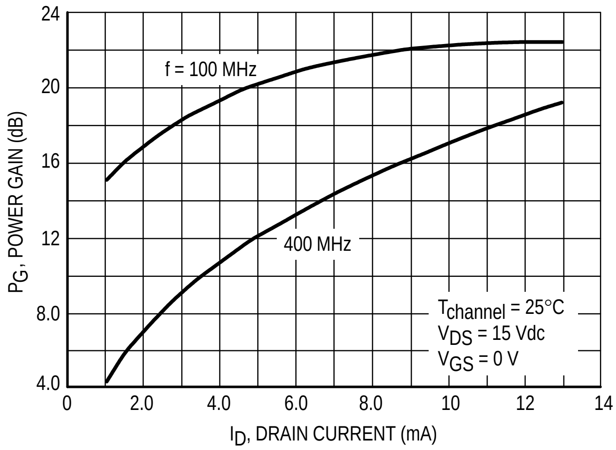
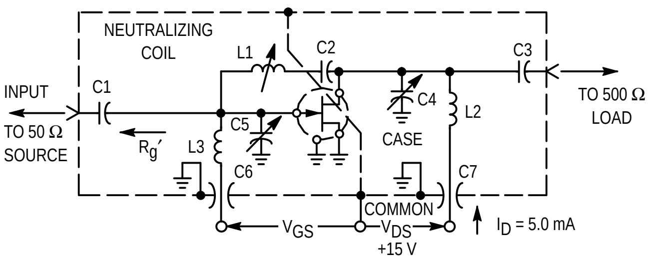


Figure 1. Effects of Drain Current



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**

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).

*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)

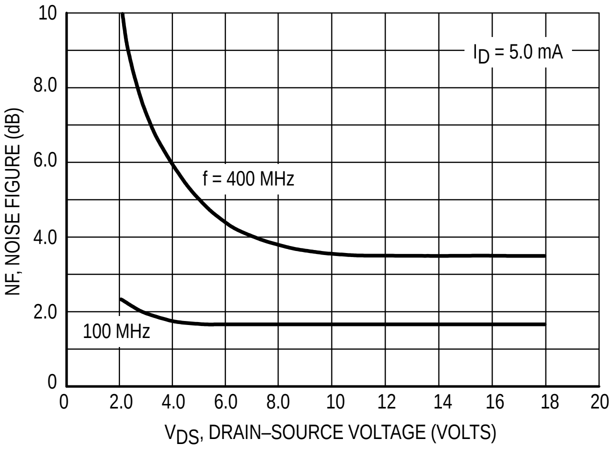


Figure 3. Effects of Drain–Source Voltage

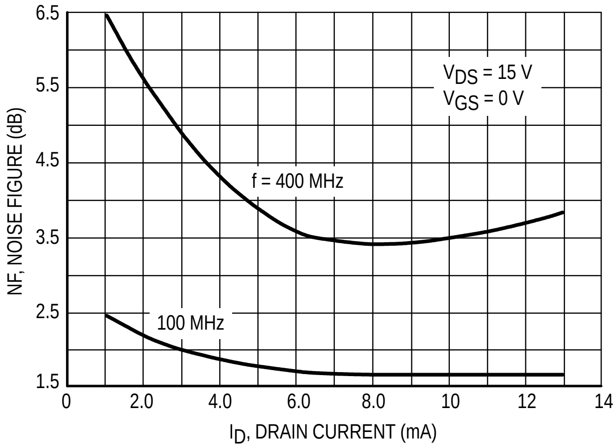


Figure 4. Effects of Drain Current

INTERMODULATION CHARACTERISTICS

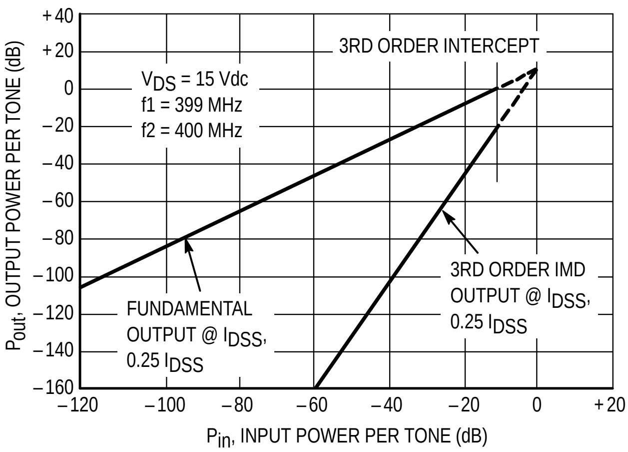


Figure 5. Third Order Intermodulation Distortion

COMMON SOURCE CHARACTERISTICS
ADMITTANCE PARAMETERS
(V_{DS} = 15 Vdc, $T_{channel}$ = 25°C)

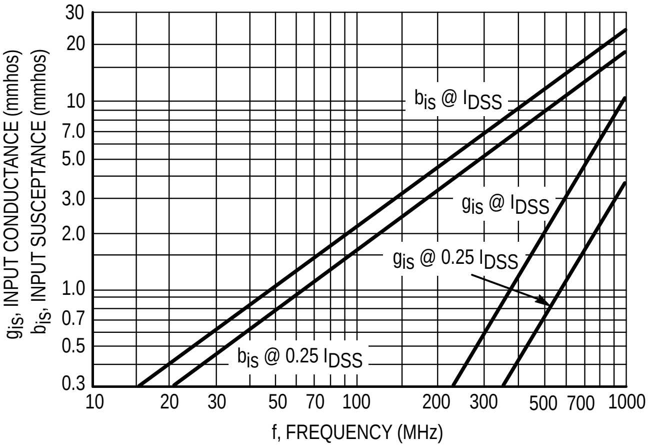


Figure 6. Input Admittance (y_{is})

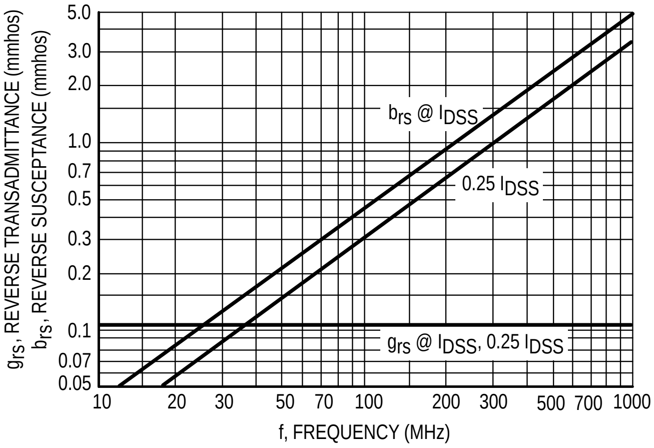


Figure 7. Reverse Transfer Admittance (y_{rs})

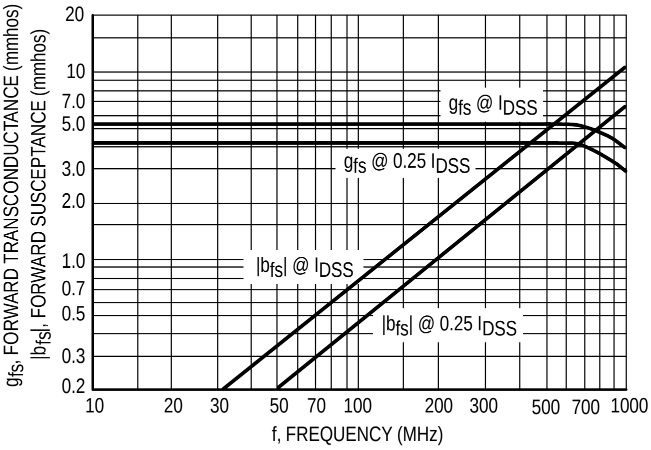


Figure 8. Forward Transadmittance (y_{fs})

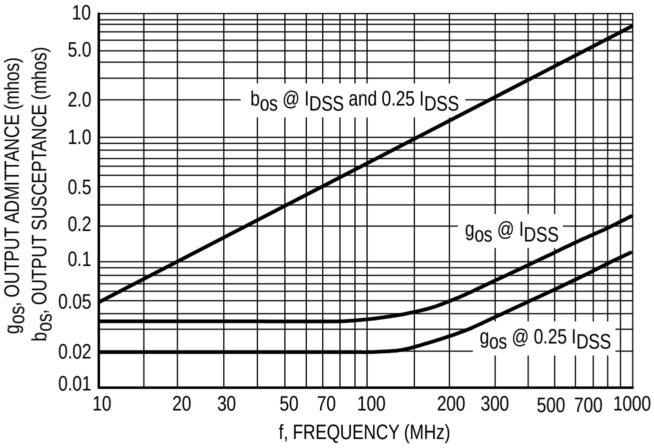


Figure 9. Output Admittance (y_{os})

COMMON SOURCE CHARACTERISTICS

S–PARAMETERS

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

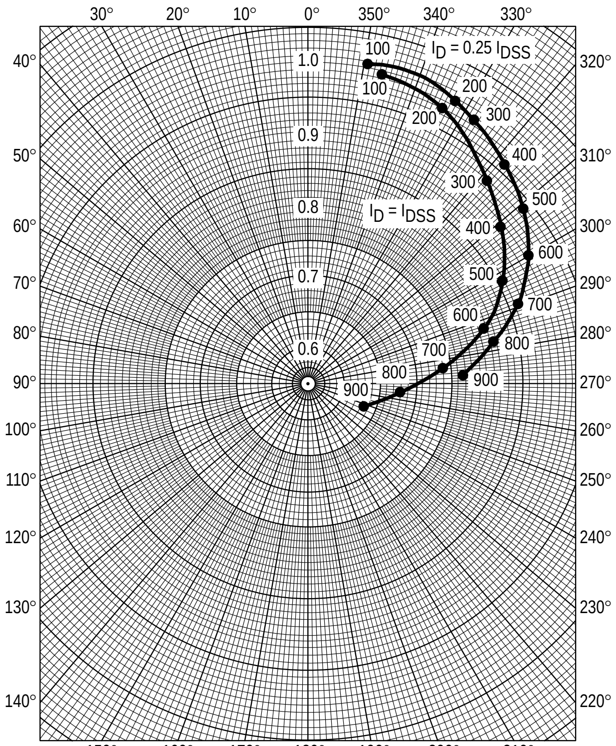


Figure 10. S_{11s}

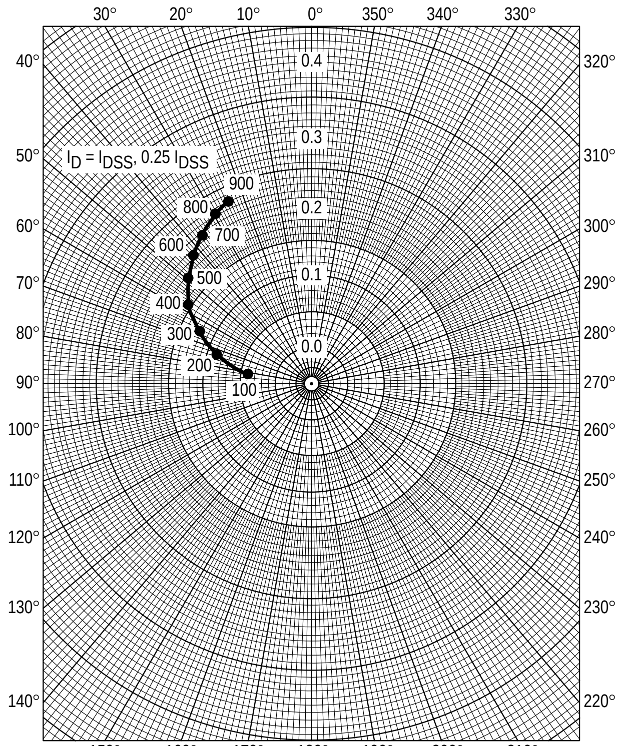


Figure 11. S_{12s}

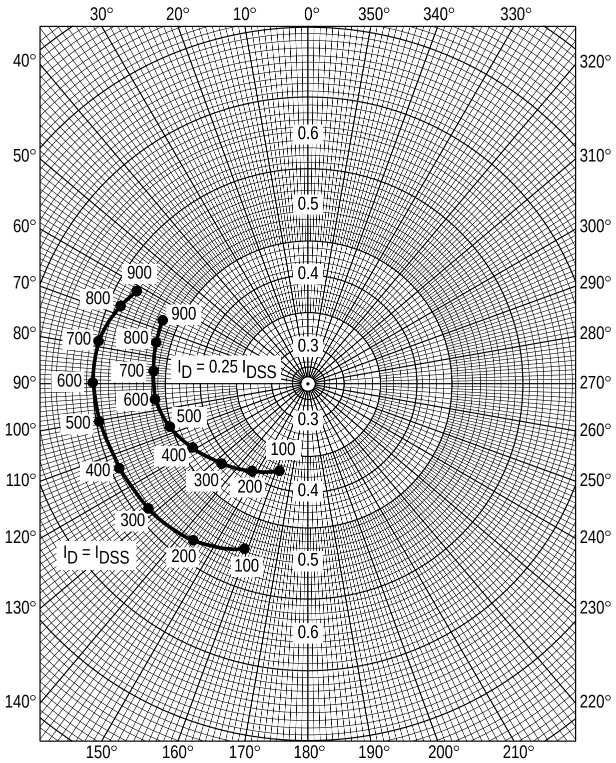


Figure 12. S_{21s}

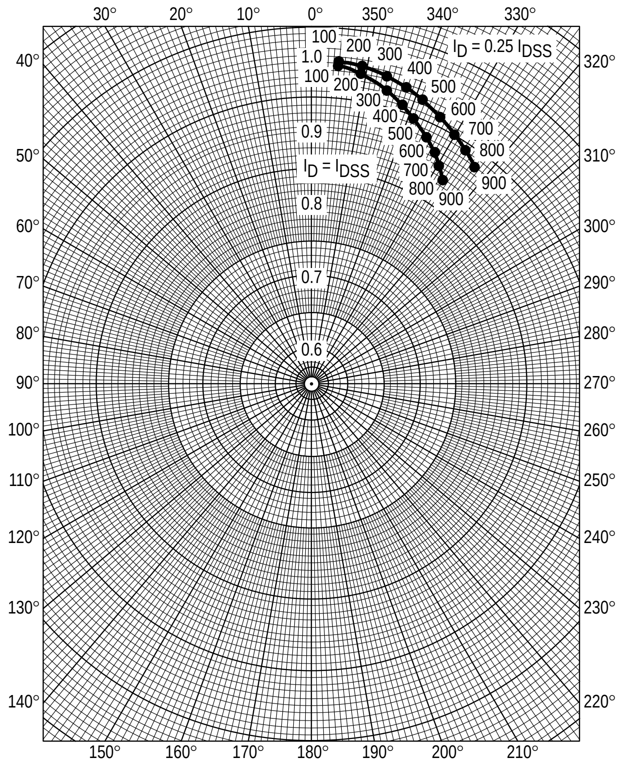


Figure 13. S_{22s}

COMMON GATE CHARACTERISTICS
ADMITTANCE PARAMETERS

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

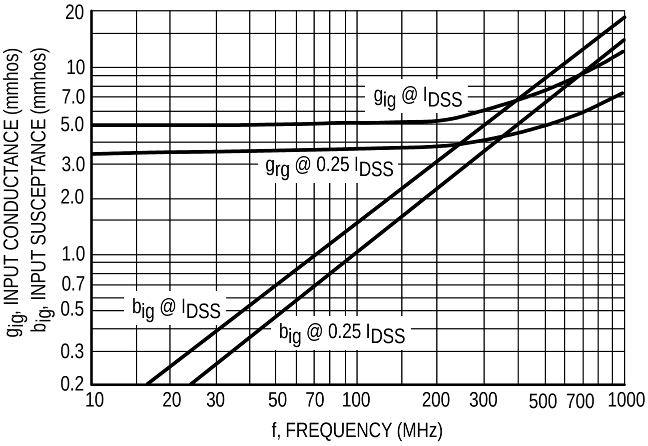


Figure 14. Input Admittance (y_{ig})

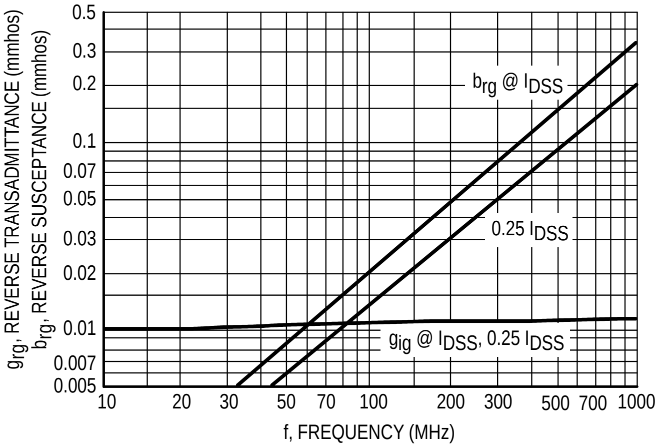


Figure 15. Reverse Transfer Admittance (y_{rg})

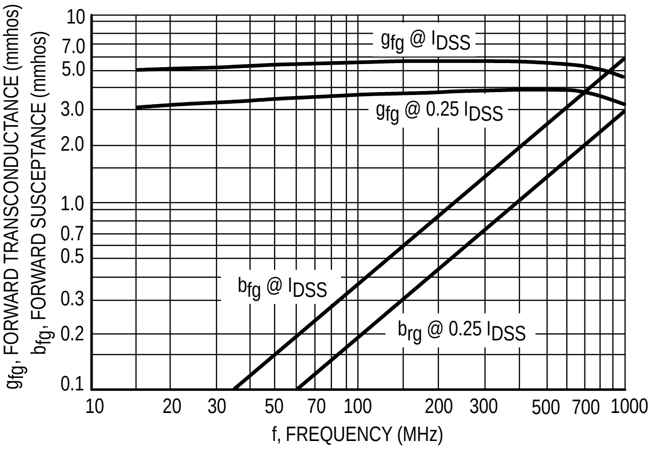


Figure 16. Forward Transfer Admittance (y_{fg})

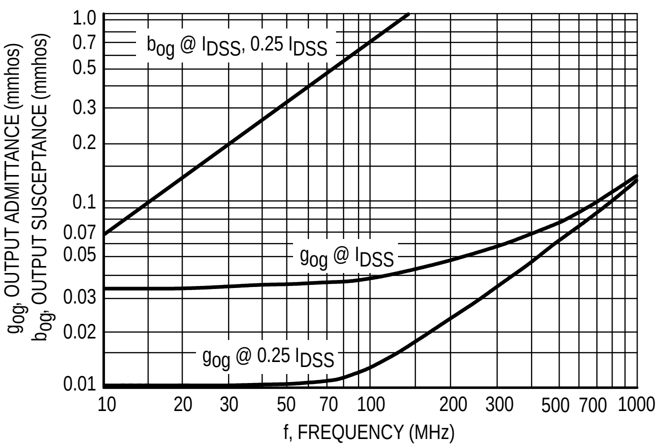


Figure 17. Output Admittance (y_{og})

COMMON GATE CHARACTERISTICS

S–PARAMETERS

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

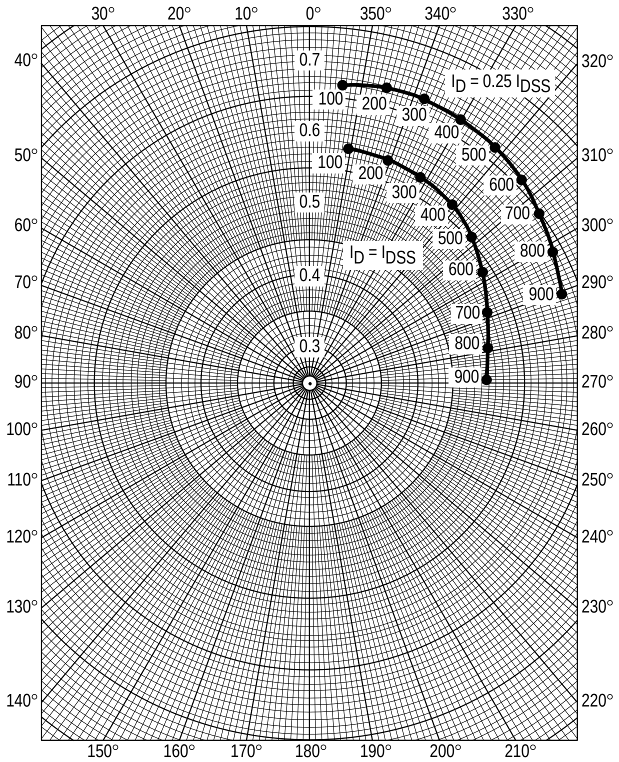


Figure 18. S_{11g}

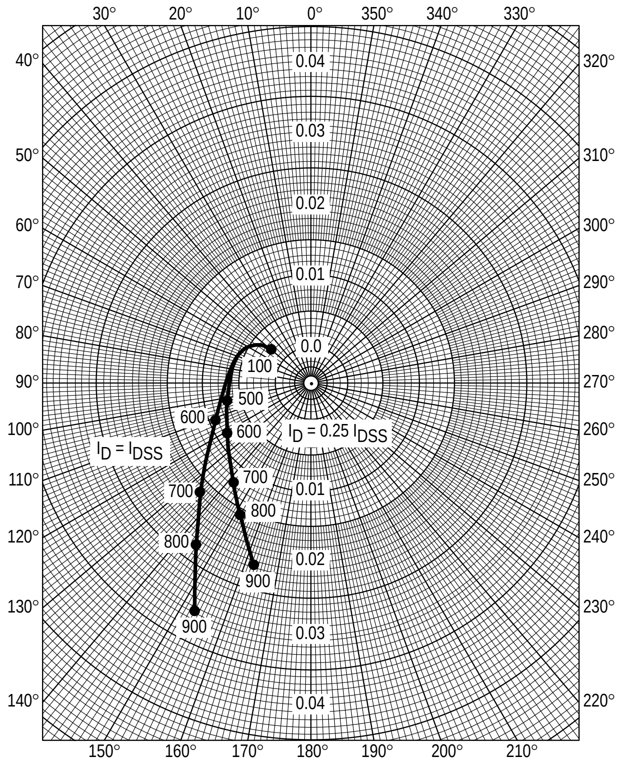


Figure 19. S_{12g}

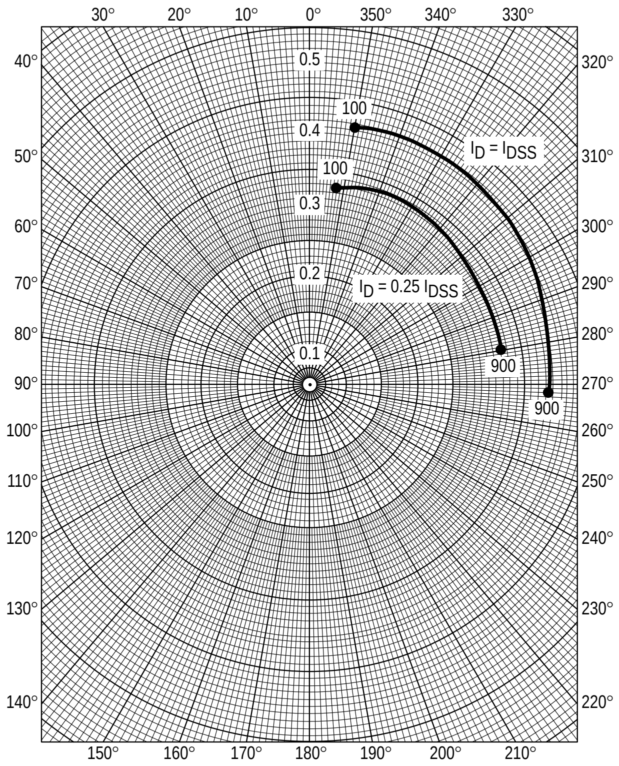


Figure 20. S_{21g}

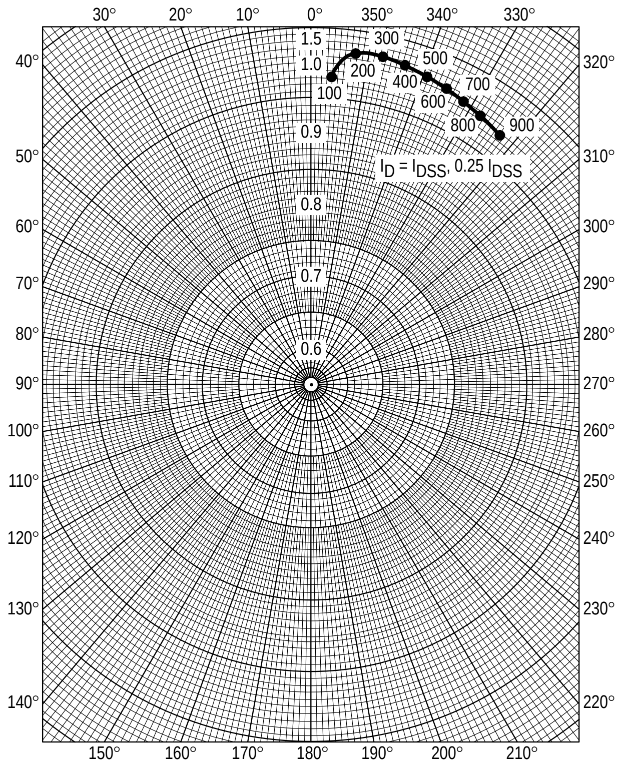
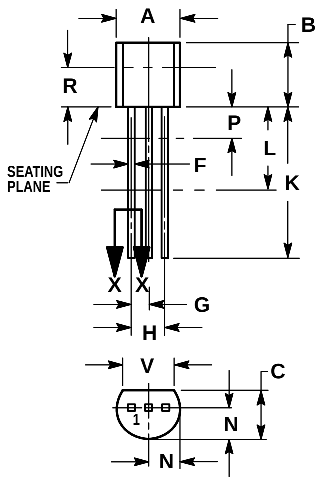
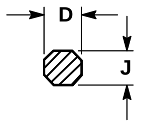


Figure 21. S_{22g}

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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