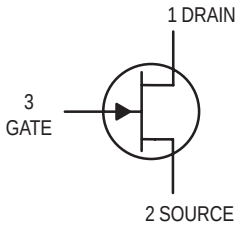
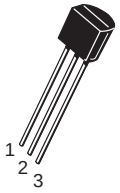
JFET High Frequency Amplifier

N–Channel — Depletion



J304



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 Derate above 25°C	P_D	350 2.8	mW mW/°C
Lead Temperature (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 (I_G = 1.0 μAdc, V_{DS} = 0)	$V_{(BR)GSS}$	30	—	Vdc
Gate Reverse Current (V_{GS} = –20 Vdc, V_{DS} = 0)	I_{GSS}	—	100	pA
Gate–Source Cutoff Voltage (V_{DS} = 15 Vdc, I_D = 1.0 nAdc)	$V_{GS(off)}$	–2.0	–6.0	Vdc
ON CHARACTERISTICS				
Zero–Gate–Voltage Drain Current (V_{DS} = 15 Vdc, V_{GS} = 0)	I_{DSS}	5.0	15	mA
SMALL–SIGNAL CHARACTERISTICS				
Output Admittance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 kHz)	$\lvert y_{os} \rvert$	—	50	μmhos
Forward Transconductance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 kHz)	$Re(y_{fs})$	4500	7500	μmhos

REV 1

POWER GAIN

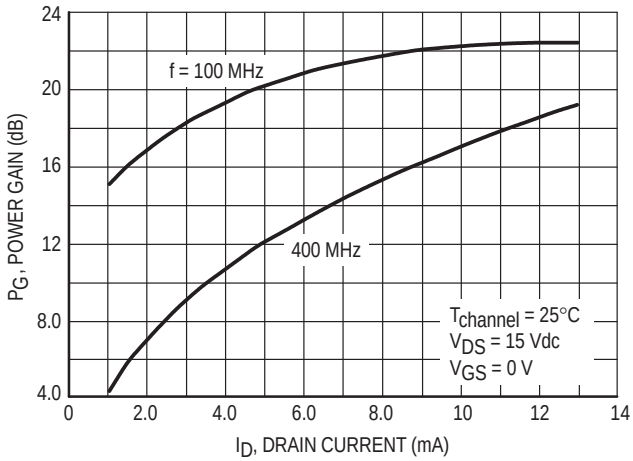
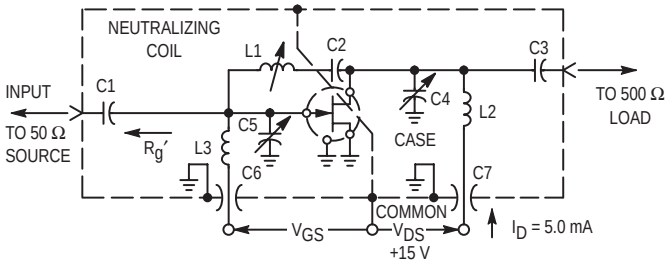


Figure 1. Effects of Drain Current



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)

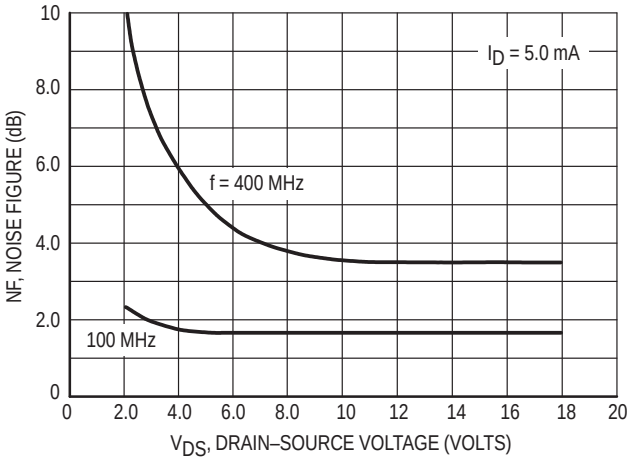


Figure 3. Effects of Drain–Source Voltage

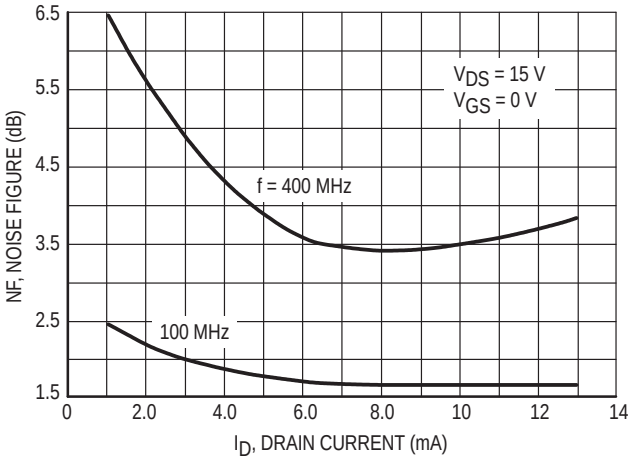


Figure 4. Effects of Drain Current

INTERMODULATION CHARACTERISTICS

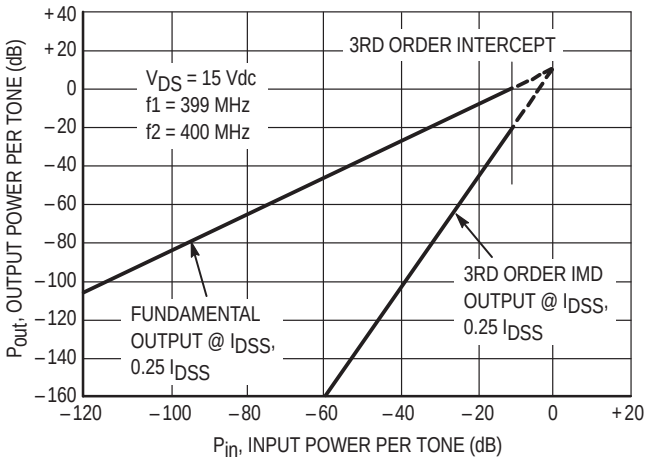


Figure 5. Third Order Intermodulation Distortion

COMMON SOURCE CHARACTERISTICS

ADMITTANCE PARAMETERS

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

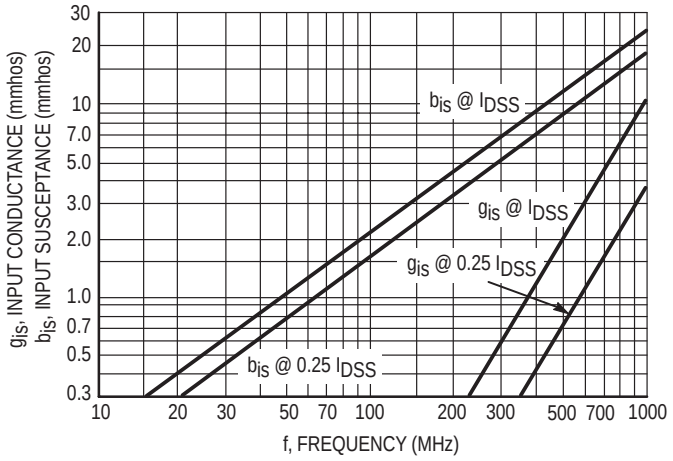


Figure 6. Input Admittance (y_{is})

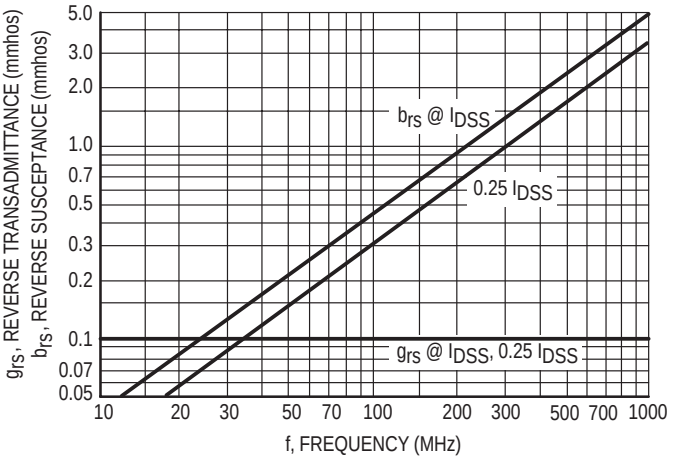


Figure 7. Reverse Transfer Admittance (y_{rs})

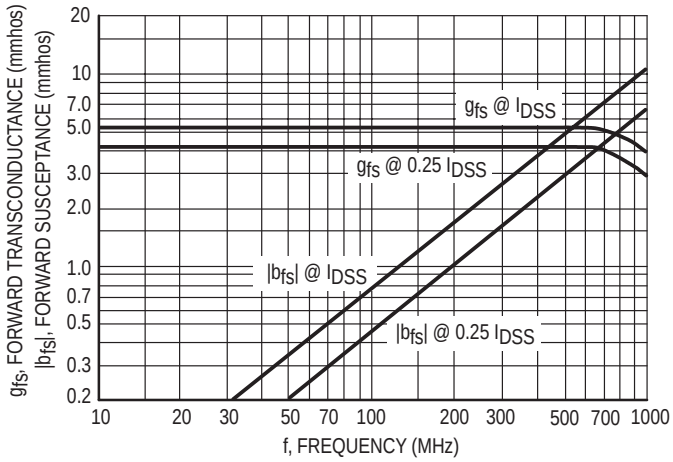


Figure 8. Forward Transadmittance (y_{fs})

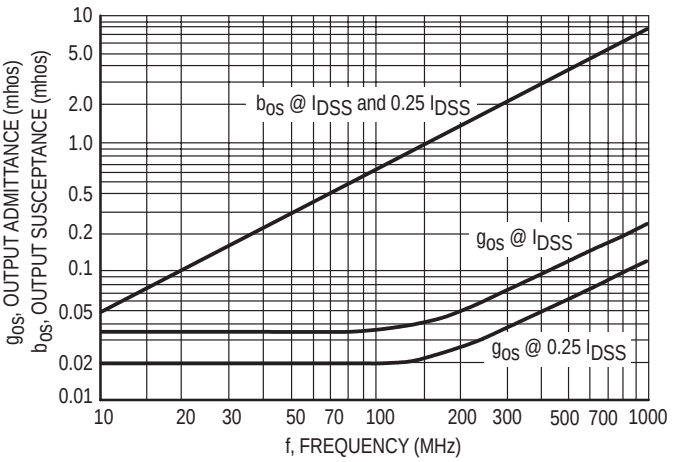


Figure 9. Output Admittance (y_{os})

COMMON SOURCE CHARACTERISTICS
S–PARAMETERS
(V_{DS} = 15 Vdc, $T_{channel}$ = 25°C, Data Points in MHz)

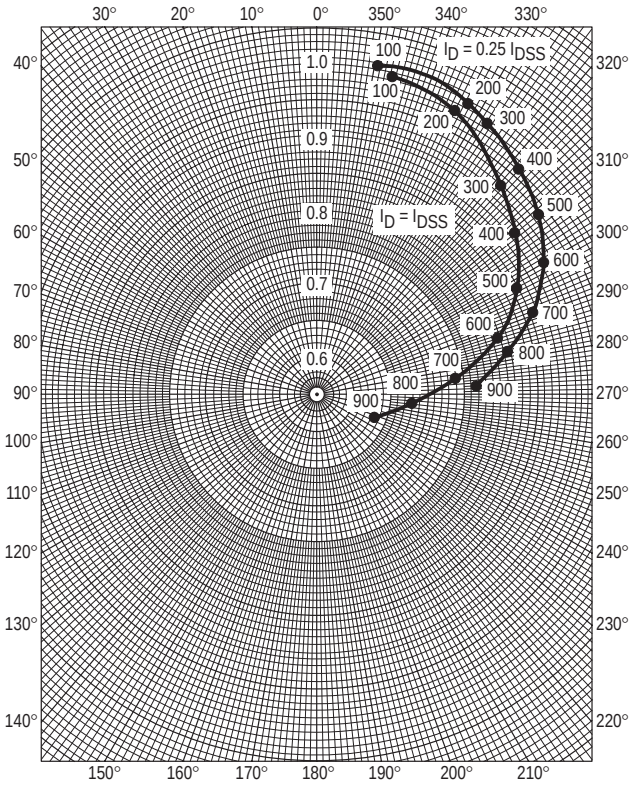


Figure 10. S_{11s}

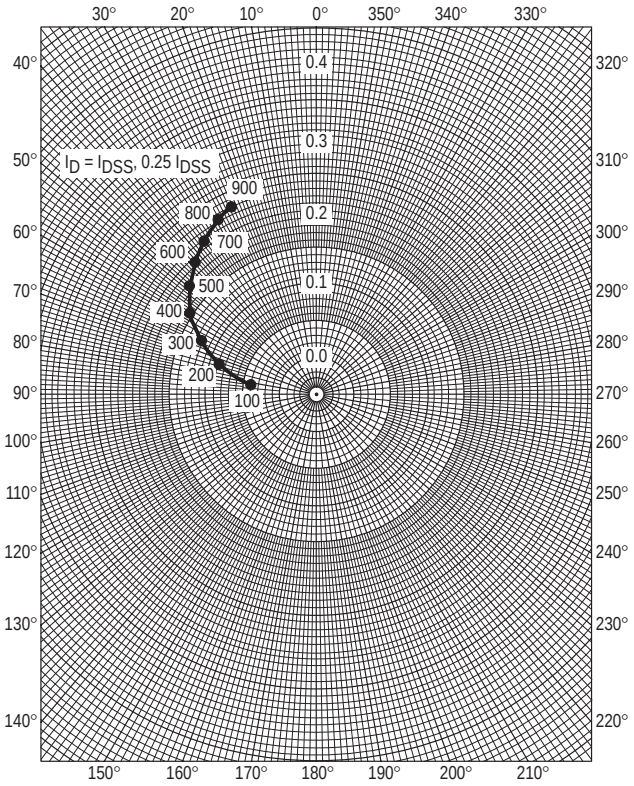


Figure 11. S_{12s}

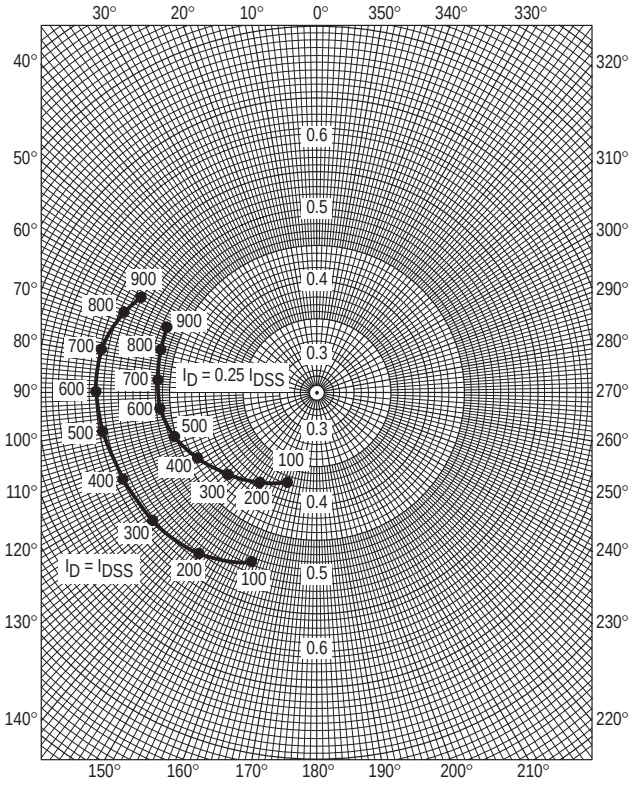


Figure 12. S_{21s}

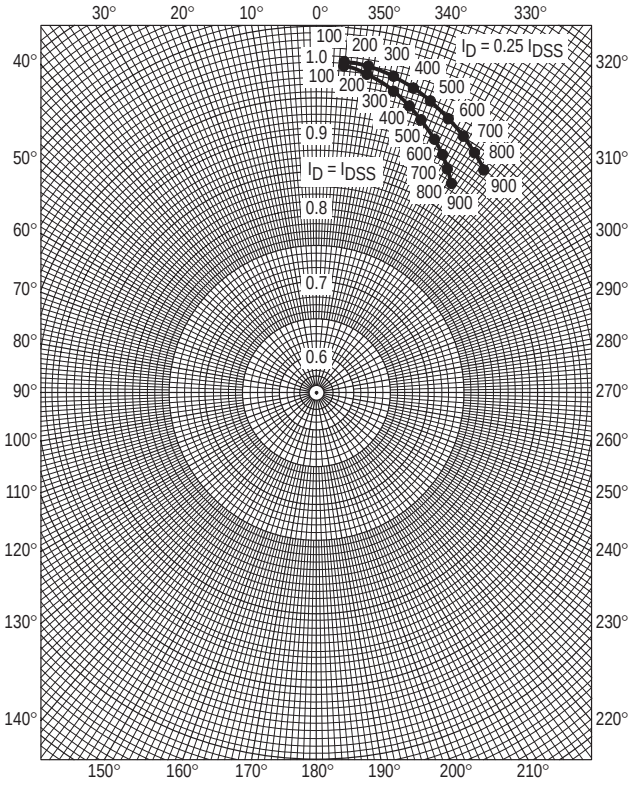


Figure 13. S_{22s}

COMMON GATE CHARACTERISTICS

ADMITTANCE PARAMETERS

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

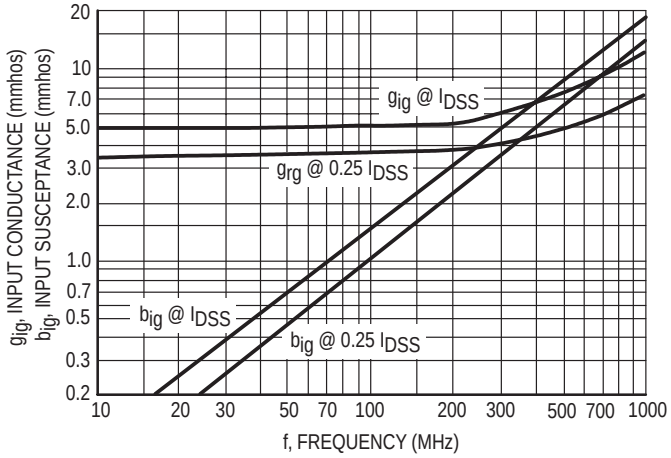


Figure 14. Input Admittance (y_{ig})

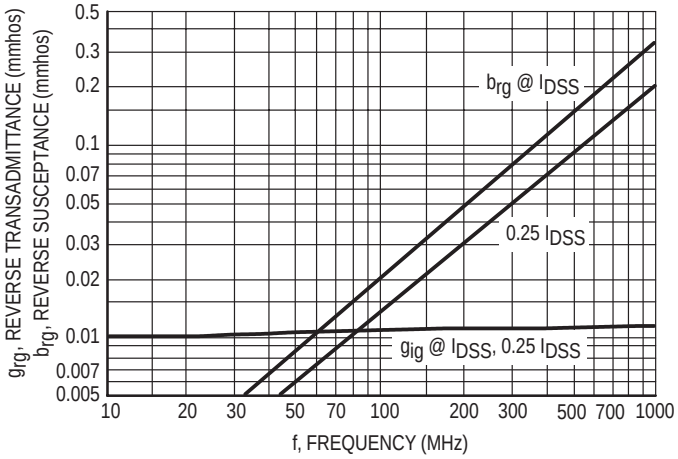


Figure 15. Reverse Transfer Admittance (y_{rg})

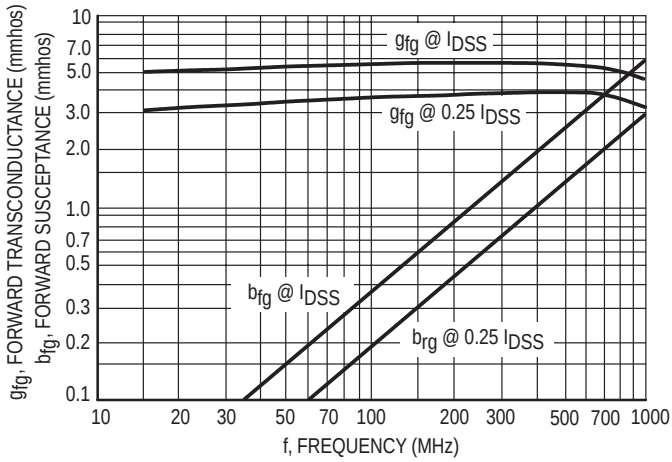


Figure 16. Forward Transfer Admittance (y_{fg})

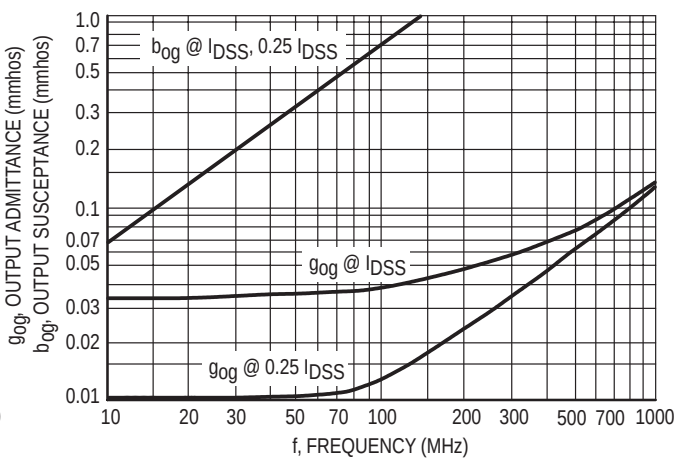


Figure 17. Output Admittance (y_{og})

COMMON GATE CHARACTERISTICS
S–PARAMETERS
(V_{DS} = 15 Vdc, $T_{channel}$ = 25°C, Data Points in MHz)

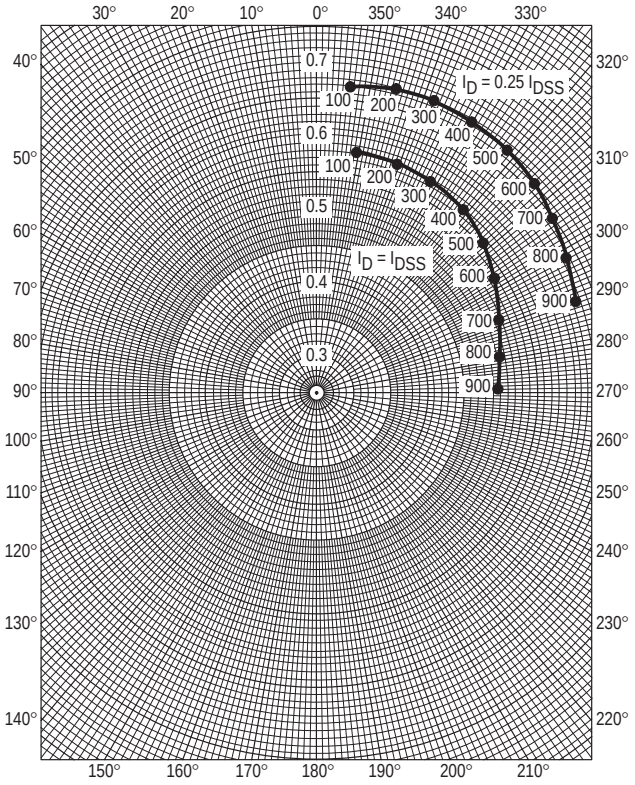


Figure 18. S_{11g}

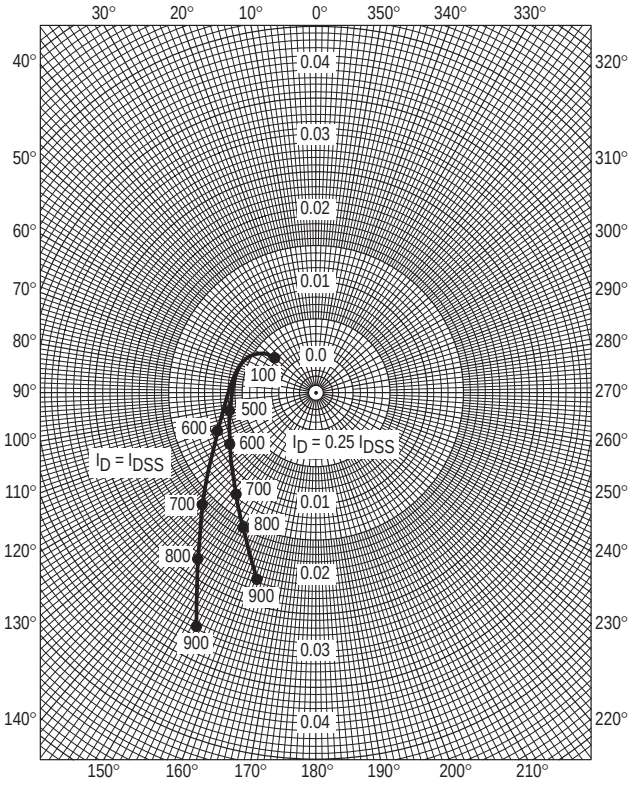


Figure 19. S_{12g}

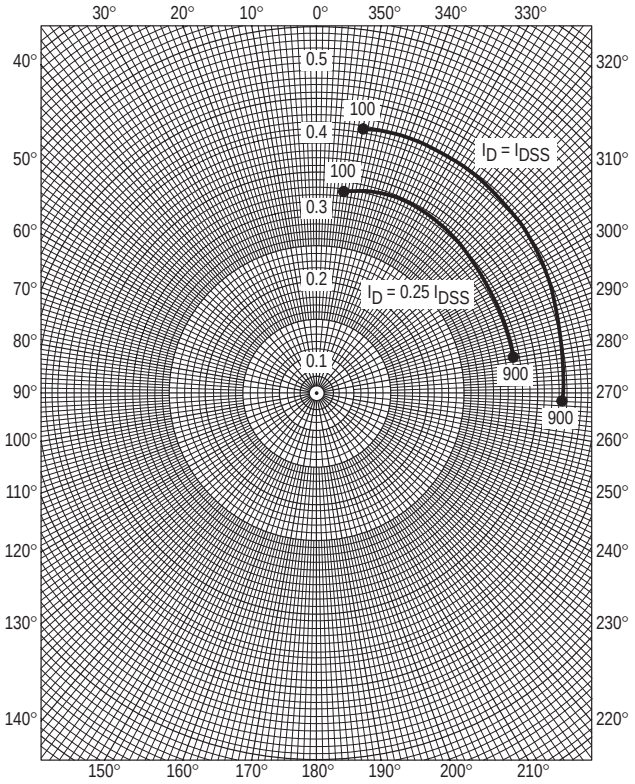


Figure 20. S_{21g}

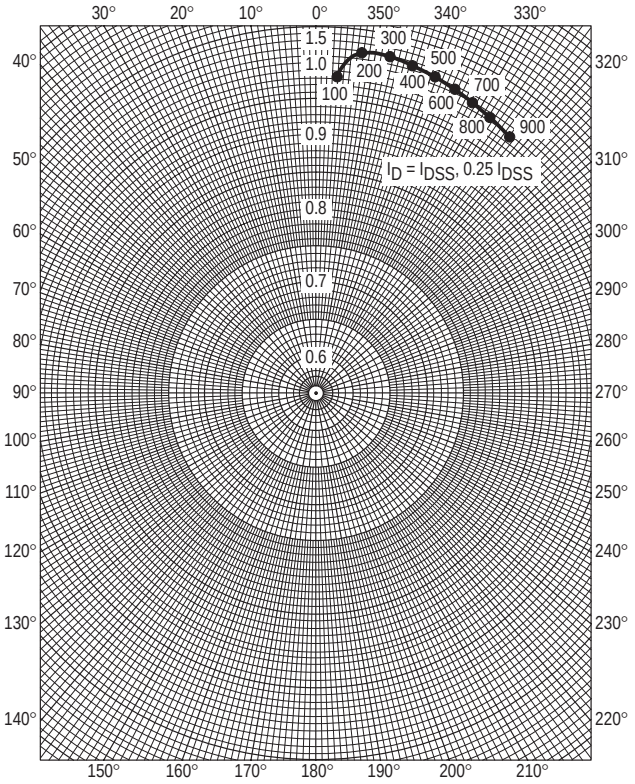


Figure 21. S_{22g}