ORDERING INFORMATION

Device	Temperature Range	Package
MC1550F	−55°C to +125°C	Ceramic Flat
MC1550G	−55°C to +125°C	Metal Can

MC1550G

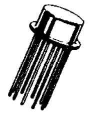
RF – IF AMPLIFIER

SILICON MONOLITHIC INTEGRATED CIRCUIT

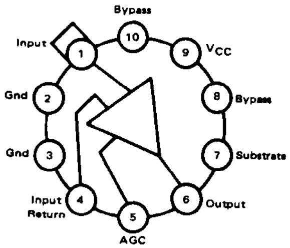
RF – IF AMPLIFIER

. . . a versatile, common-emitter, common-base cascode circuit for use in communications applications. See Application Note AN-215A for additional information.

- Constant Input Impedance over entire AGC range
- Extremely Low y_{12} – 4.3 μmhos at 60 MHz
- High Power Gain – 30 dB @ 60 MHz (0.5 MHz BW)
- Good Noise Figure – 5 dB @ 60 MHz



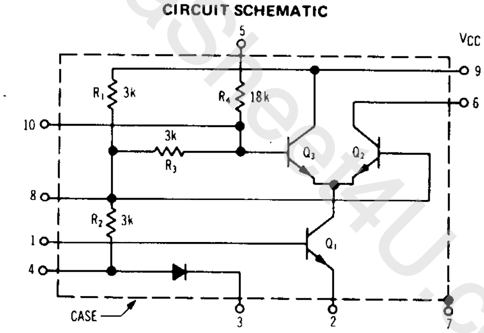
G SUFFIX
METAL PACKAGE
CASE 603B



MAXIMUM RATINGS (T_A = +25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Power Supply Voltage, Pin 9	V_{CC}	20	Vdc
AGC Supply Voltage	V_{AGC}	20	Vdc
Input Differential Voltage, Pin 1 to Pin 4 (R_S = 500 ohms)	V_{ID}	±5.0	V(rms)
Power Dissipation (Package Limitation)	P_D		
Metal Can		680	mW
Derate above T_A = +25°C		4.6	mW/°C
Flat Package		500	mW
Derate above T_A = +25°C		3.3	mW/°C
Operating Ambient Temperature Range	T_A	-55 to +125	°C
Storage Temperature Range	T_{stg}	-65 to +150	°C

CIRCUIT SCHEMATIC



CIRCUIT DESCRIPTION

The MC1550 is built with monolithic fabrication techniques utilizing diffused resistors and small–geometry transistors. Excellent AGC performance is obtained by shunting the signal through the AGC transistor Q_3 maintaining the operating point of the input transistor Q_1. This keeps the input impedance constant over the entire AGC range.

The amplifier is intended to be used in a common-emitter, common-base configuration (Q_1 and Q_2) with Q_3 acting as an AGC transistor. The input signal is applied between pins 1 and 4, where pin 4 is ac-coupled to ground. DC source resistance between pins 1 and 4 should be small (less than 100 ohms). Pins 2 and 3 should be connected together and grounded. Pins 8 and 10 should be bypassed to ground. The positive supply voltage is applied at pin 9 and at higher frequencies, pin 9 should also be bypassed to ground. The output is taken between pins 6 and 9. The substrate is connected to pin 7 and should be grounded. AGC voltage is applied to pin 5.

ELECTRICAL CHARACTERIS

Characteristic
DC CHARACTERISTICS
Output Voltage
Test Voltage
Supply Drain Current
AGC Supply Drain Current
SMALL-SIGNAL CHARACTERISTIC
Small-Signal Voltage Gain
Bandwidth
Transducer Power Gain

FIGURE 1 – DC CHARACT

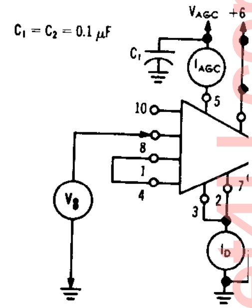
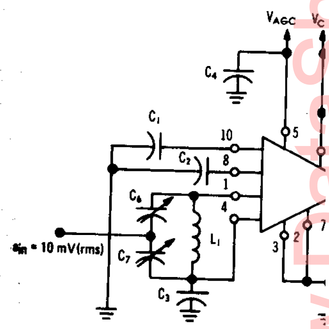


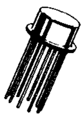
FIGURE 3 – POWER GAIN T



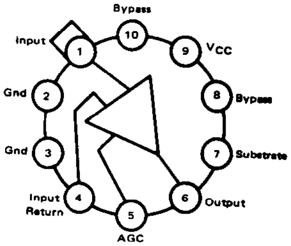
MC1550G

RF – IF AMPLIFIER

SILICON MONOLITHIC INTEGRATED CIRCUIT



G SUFFIX
METAL PACKAGE
CASE 603B



LECTRICAL CHARACTERISTICS (V^+ = +6 Vdc, T_A = +25°C)

Characteristic	Conditions	Figure	Symbol	Min	Typ	Max	Unit
C CHARACTERISTICS							
utput Voltage	V_{AGC} = 0 Vdc V_{AGC} = +6 Vdc	1	V_O	3.80 5.90	– –	4.65 6.00	Vdc
st Voltage	V_{AGC} = 0 Vdc V_{AGC} = +6 Vdc	1	V8	2.85 3.25	– –	3.40 3.80	Vdc
upply Drain Current	V_{AGC} = 0 Vdc V_{AGC} = +6 Vdc	1	I_D	– –	– –	2.2 2.5	mAdc
AGC Supply Drain Current	V_{AGC} = 0 Vdc V_{AGC} = +6 Vdc	1	I_{AGC}	– –	– –	-0.2 0.18	mAdc
MALL-SIGNAL CHARACTERISTICS							
Small-Signal Voltage Gain	f = 500 kHz	2	A_V	22	–	29	dB
Bandwidth	-3.0 dB	2	BW	22	–	–	MHz
Transducer Power Gain	f = 60 MHz, BW = 6 MHz f = 100 MHz, BW = 6 MHz	3	Ap	– –	25 21	– –	dB

TYPICAL CHARACTERISTICS

(V_{CC} = 6.0 Vdc, T_A = +25°C unless otherwise noted.)

FIGURE 1 – DC CHARACTERISTICS TEST CIRCUIT

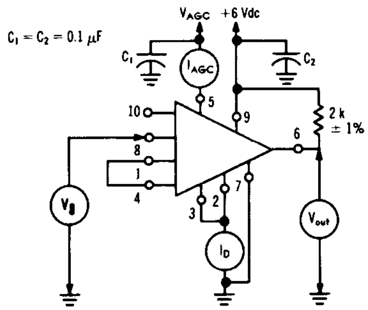


FIGURE 2 – VOLTAGE GAIN AND BANDWIDTH TEST CIRCUIT

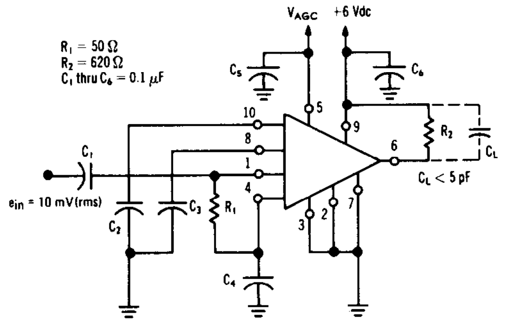


FIGURE 3 – POWER GAIN TEST CIRCUIT @ 60 MHz

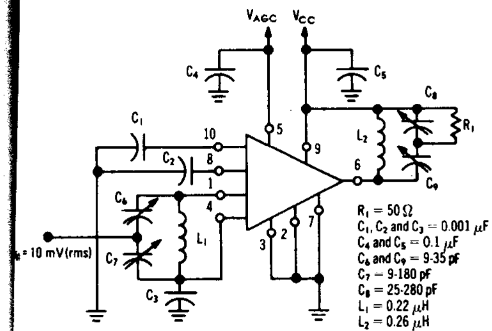
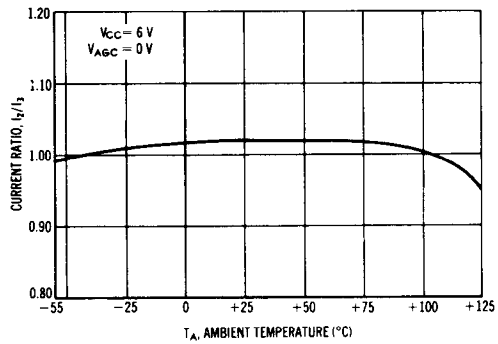


FIGURE 4 – DRAIN CURRENT TEMPERATURE CHARACTERISTICS



CIRCUIT DESCRIPTION

1550 is built with monolithic fabrication techniques ffused resistors and small–geometry transistors. GC performance is obtained by shunting the signal AGC transistor Q_3 maintaining the operating point ut transistor Q_1. This keeps the input impedance ver the entire AGC range.

lifier is intended to be used in a common-emitter, ase configuration (Q_1 and Q_2) with Q_1 acting as an stor. The input signal is applied between pins 1 and n 4 is ac-coupled to ground. DC source resistance ns 1 and 4 should be small (less than 100 ohms). 3 should be connected together and grounded. Pins hould be bypassed to ground. The positive supply applied at pin 9 and at higher frequencies, pin 9 be bypassed to ground. The output is taken be- 6 and 9. The substrate is connected to pin 7 and rounded. AGC voltage is applied to pin 5.

TYPICAL CHARACTERISTICS (continued)

FIGURE 5 – INPUT RESISTANCE AND CAPACITANCE versus FREQUENCY

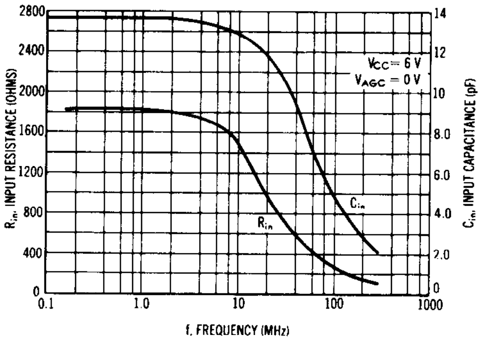


FIGURE 6 – INPUT RESISTANCE AND CAPACITANCE versus AGC VOLTAGE

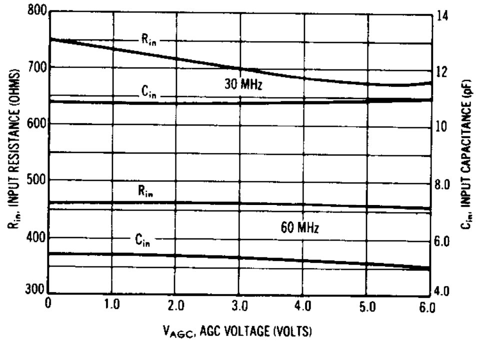


FIGURE 7 – OUTPUT RESISTANCE AND CAPACITANCE versus FREQUENCY

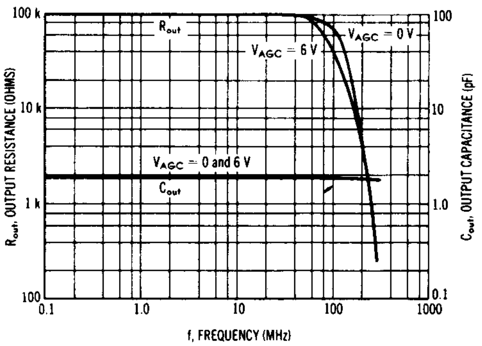


FIGURE 8 – OUTPUT RESISTANCE AND CAPACITANCE versus AGC VOLTAGE

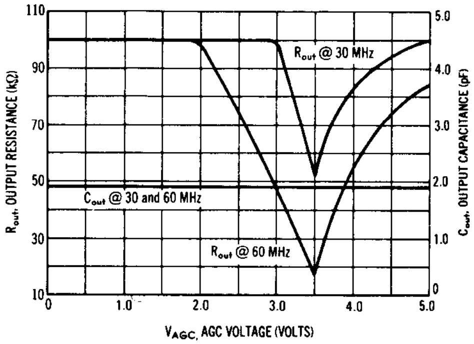


FIGURE 9 – MAXIMUM TRANSDUCER POWER GAIN versus FREQUENCY

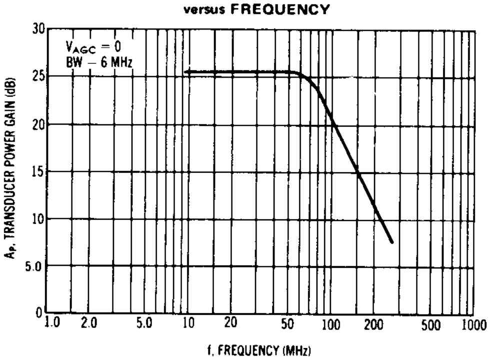
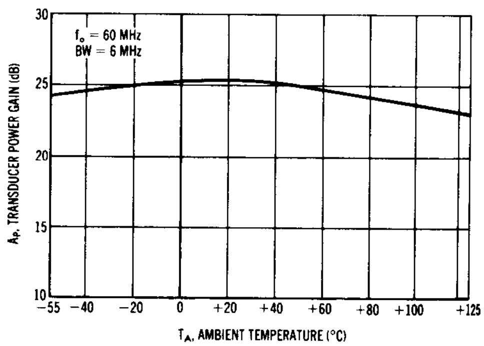


FIGURE 10 – TRANSDUCER POWER GAIN versus TEMPERATURE



FIGURI

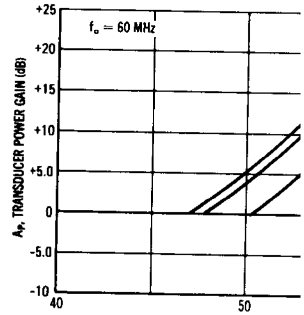


FIGURE 12 – NOISE FIGURE A RESISTANCE versus F

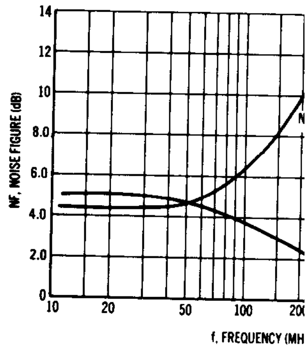
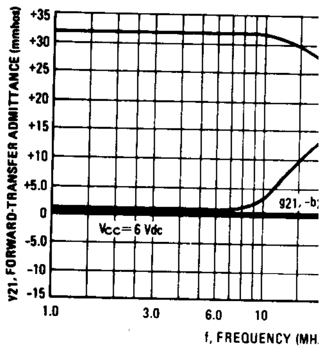
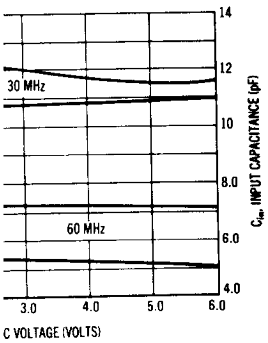


FIGURE 14 – y_{21}, FORWARD-TRAN versus FREQUEN(

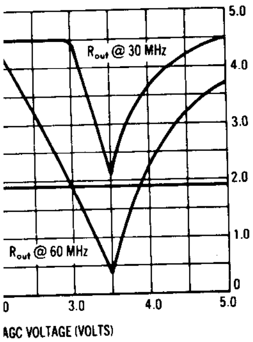


TYPICAL CHARACTERISTICS (continued)

NPUT RESISTANCE AND
ɔE versus AGC VOLTAGE



OUTPUT RESISTANCE AND
NCE versus AGC VOLTAGE



TRANSDUCER POWER GAIN
IS TEMPERATURE

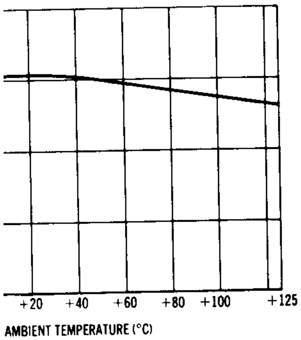


FIGURE 11 – TRANSDUCER POWER BANDWIDTH versus AGC VOLTAGE

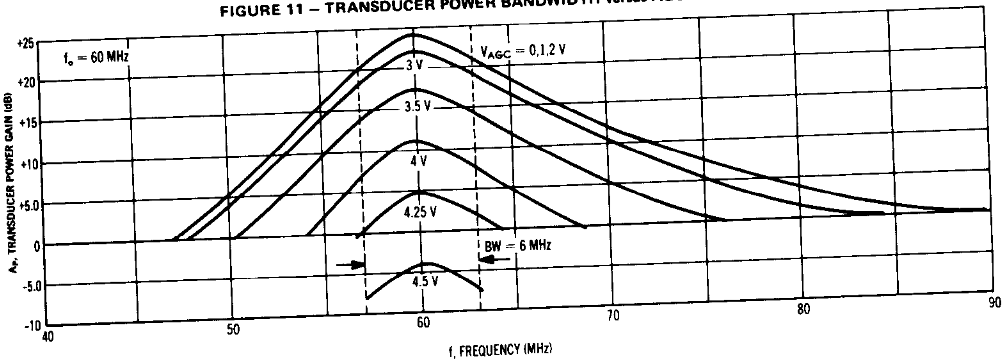


FIGURE 12 – NOISE FIGURE AND OPTIMUM SOURCE RESISTANCE versus FREQUENCY

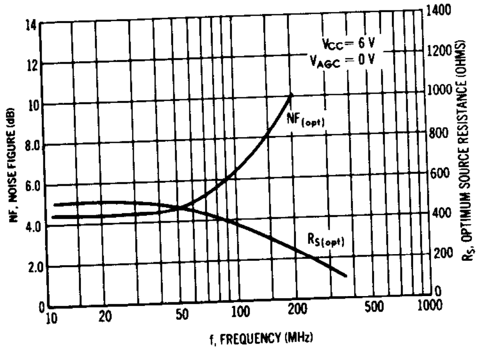


FIGURE 13 – NOISE FIGURE versus SOURCE RESISTANCE

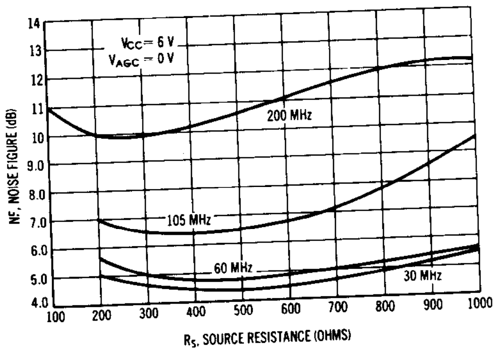


FIGURE 14 – y_{21}, FORWARD-TRANSFER ADMITTANCE versus FREQUENCY

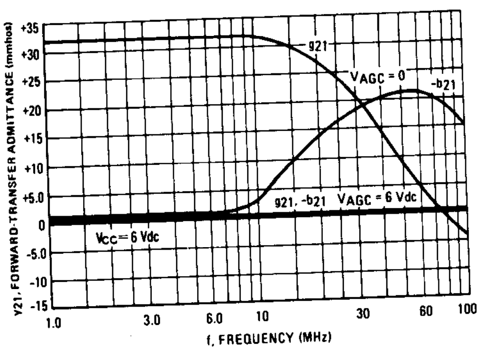
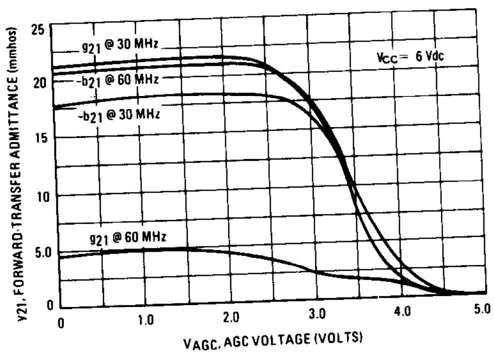


FIGURE 15 – y_{21}, FORWARD-TRANSFER ADMITTANCE versus AGC VOLTAGE



6

TYPICAL CHARACTERISTICS

(V_{CC} = 6.0 Vdc, T_A = +25°C unless otherwise noted.)

FIGURE 16 – y_{12}, REVERSE TRANSFER-ADMITTANCE versus FREQUENCY

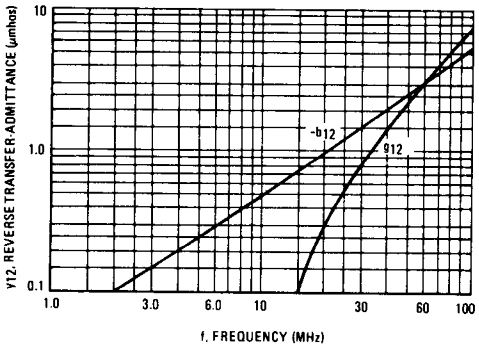
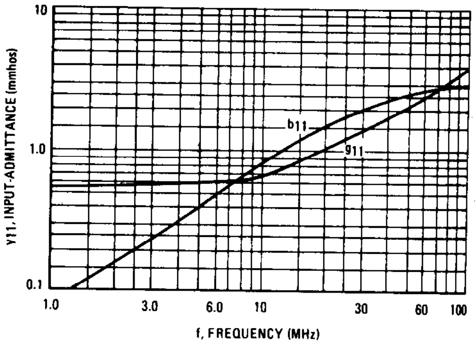


FIGURE 17 – y_{11}, INPUT-ADMITTANCE versus FREQUENCY



The y_{12} shown in Figure 16 illustrates the extremely low feedback of the MC1550 with no contribution from the external mounting circuitry. However, in many cases the external circuitry may contribute as much or more to the total feedback than does the MC1550.

To perform more accurate design calculations of gain, stability, and input - output impedances it is recommended that the designer first determine the total feedback of device plus circuitry.

This can be done in one of two ways:

(1) Measure the total y_{12} or s_{12} of the MC1550 installed in its mounting circuitry, or

(2) Measure the y_{12} of the circuitry alone (without the MC1550 installed) and add the circuit y_{12} to the y_{12} for the MC1550 given in Figure 16.

FIGURE 19 – s_{11} AND s_{22}, INPUT AND OUTPUT REFLECTION COEFFICIENT

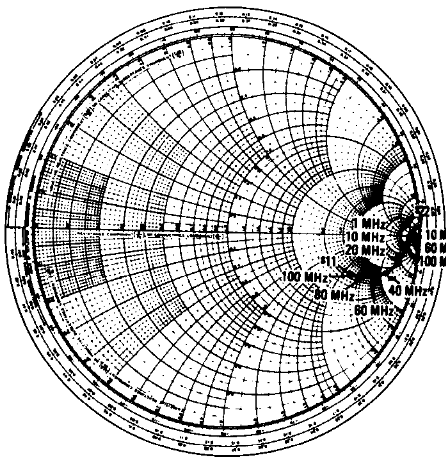


FIGURE 18 – y_{22}, OUTPUT-ADMITTANCE versus FREQUENCY

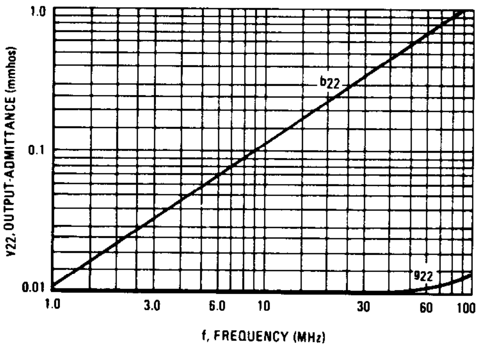


FIGURE 20 – s_{11}, INPU COEFFICIENT versus

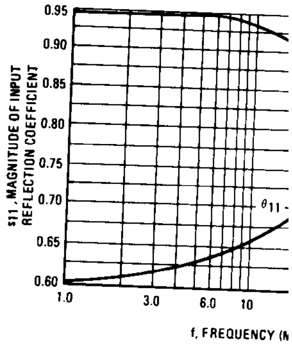
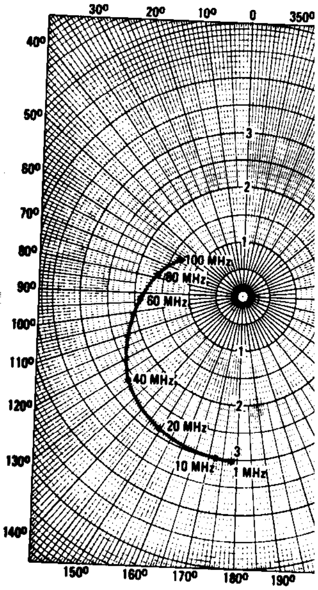


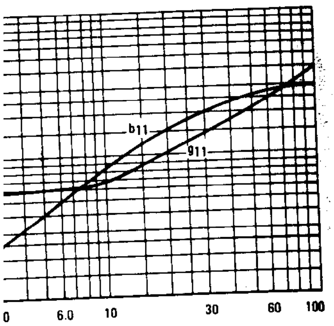
FIGURE 22 – s_{21}, FORWARD COEFFICIENT (



TYPICAL CHARACTERISTICS (continued)

(V_{CC} = 6.0 Vdc, T_A = +25°C unless otherwise noted.)

NPUT-ADMITTANCE versus FREQUENCY



9 – s_{11} AND s_{22}, INPUT AND OUTPUT REFLECTION COEFFICIENT

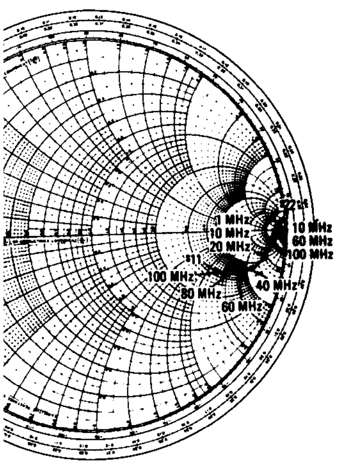


FIGURE 20 – s_{11}, INPUT REFLECTION COEFFICIENT versus FREQUENCY

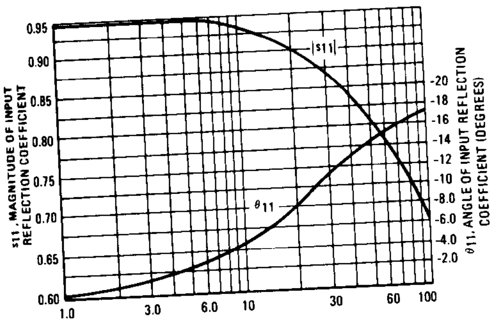


FIGURE 21 – s_{22}, OUTPUT REFLECTION COEFFICIENT versus FREQUENCY

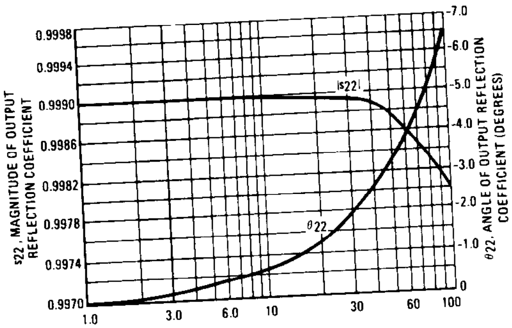


FIGURE 22 – s_{21}, FORWARD TRANSMISSION COEFFICIENT (GAIN)

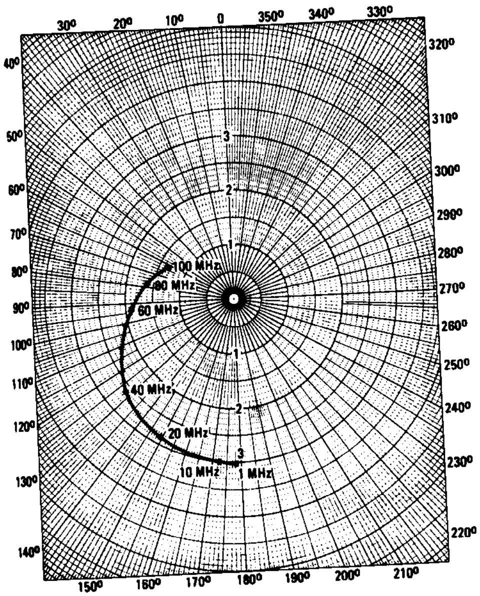


FIGURE 23 – s_{12}, REVERSE TRANSMISSION COEFFICIENT (FEEDBACK)