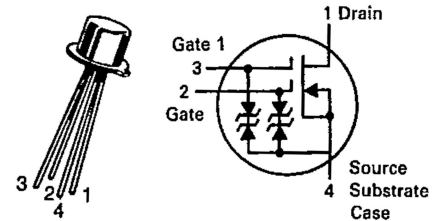


3N201 3N202 3N203

CASE 20-03, STYLE 9
TO-72 (TO-206AF)



**DUAL-GATE MOSFET
VHF AMPLIFIER**

N-CHANNEL — DEPLETION

Refer to MPF201 for additional graphs.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	25	Vdc
Drain-Gate Voltage	V_{DG1} V_{DG2}	30 30	Vdc
Drain Current	I_D	50	mAdc
Gate Current	I_{G1} I_{G2}	± 10 ± 10	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	360 2.4	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.2 8.0	Watt mW/ $^\circ\text{C}$
Lead Temperature	T_L	300	$^\circ\text{C}$
Junction Temperature Range	T_J	-65 to +175	$^\circ\text{C}$
Storage Channel Temperature Range	T_{stg}	-65 to +175	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage ($I_D = 10 \mu\text{Adc}$, $V_S = 0$, $V_{G1S} = V_{G2S} = -5.0 \text{ Vdc}$)	$V_{(BR)DSX}$	25	—	—	Vdc
Gate 1-Source Breakdown Voltage(1) ($I_{G1} = \pm 10 \text{ mAdc}$, $V_{G2S} = V_{DS} = 0$)	$V_{(BR)G1SO}$	± 6.0	± 12	± 30	Vdc
Gate 2-Source Breakdown Voltage(1) ($I_{G2} = \pm 10 \text{ mAdc}$, $V_{G1S} = V_{DS} = 0$)	$V_{(BR)G2SO}$	± 6.0	± 12	± 30	Vdc
Gate 1 Leakage Current ($V_{G1S} = \pm 5.0 \text{ Vdc}$, $V_{G2S} = V_{DS} = 0$) ($V_{G1S} = -5.0 \text{ Vdc}$, $V_{G2S} = V_{DS} = 0$, $T_A = 150^\circ\text{C}$)	I_{G1SS}	— —	$\pm .040$ —	± 10 -10	nAdc μAdc
Gate 2 Leakage Current ($V_{G2S} = \pm 5.0 \text{ Vdc}$, $V_{G1S} = V_{DS} = 0$) ($V_{G2S} = -5.0 \text{ Vdc}$, $V_{G1S} = V_{DS} = 0$, $T_A = 150^\circ\text{C}$)	I_{G2SS}	— —	$\pm .050$ —	± 10 -10	nAdc μAdc
Gate 1 to Source Cutoff Voltage ($V_{DS} = 15 \text{ Vdc}$, $V_{G2S} = 4.0 \text{ Vdc}$, $I_D = 20 \mu\text{Adc}$)	$V_{G1S(off)}$	-0.5	-1.5	-5.0	Vdc
Gate 2 to Source Cutoff Voltage ($V_{DS} = 15 \text{ Vdc}$, $V_{G1S} = 0$, $I_D = 20 \mu\text{Adc}$)	$V_{G2S(off)}$	-0.2	-1.4	-5.0	Vdc
ON CHARACTERISTICS					
Zero-Gate-Voltage Drain Current(2) ($V_{DS} = 15 \text{ Vdc}$, $V_{G1S} = 0$, $V_{G2S} = 4.0 \text{ Vdc}$)	I_{DSS}	6.0 3.0	13 11	30 15	mAdc
SMALL-SIGNAL CHARACTERISTICS					
Forward Transfer Admittance(3) ($V_{DS} = 15 \text{ Vdc}$, $V_{G2S} = 4.0 \text{ Vdc}$, $V_{G1S} = 0$, $f = 1.0 \text{ kHz}$)	$ Y_{fs} $	8.0 7.0	12.8 12.5	20 15	mmhos
Input Capacitance ($V_{DS} = 15 \text{ Vdc}$, $V_{G2S} = 4.0 \text{ Vdc}$, $I_D = I_{DSS}$, $f = 1.0 \text{ MHz}$)	C_{iss}	—	3.3	—	pF
Reverse Transfer Capacitance ($V_{DS} = 15 \text{ Vdc}$, $V_{G2S} = 4.0 \text{ Vdc}$, $I_D = 10 \text{ mAdc}$, $f = 1.0 \text{ MHz}$)	C_{rss}	0.005	0.014	0.03	pF
Output Capacitance ($V_{DS} = 15 \text{ Vdc}$, $V_{G2S} = 4.0 \text{ Vdc}$, $I_D = I_{DSS}$, $f = 1.0 \text{ MHz}$)	C_{oss}	—	1.7	—	pF
FUNCTIONAL CHARACTERISTICS					
Noise Figure ($V_{DD} = 18 \text{ Vdc}$, $V_{GG} = 7.0 \text{ Vdc}$, $f = 200 \text{ MHz}$) (Figure 1) ($V_{DD} = 18 \text{ Vdc}$, $V_{GG} = 6.0 \text{ Vdc}$, $f = 45 \text{ MHz}$) (Figure 3)	NF	— —	1.8 5.3	4.5 6.0	dB

3N201, 3N202, 3N203

ELECTRICAL CHARACTERISTICS (continued) ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Common Source Power Gain ($V_{DD} = 18\text{ Vdc}$, $V_{GG} = 7.0\text{ Vdc}$, $f = 200\text{ MHz}$) (Figure 1) ($V_{DD} = 18\text{ Vdc}$, $V_{GG} = 6.0\text{ Vdc}$, $f = 45\text{ MHz}$) (Figure 3) ($V_{DD} = 18\text{ Vdc}$, $f_{LO} = 245\text{ MHz}$, $f_{RF} = 200\text{ MHz}$) (Figure 2)	G_{ps}	15	20	25	dB
		20	25	30	
		15	19	25	
Bandwidth ($V_{DD} = 18\text{ Vdc}$, $V_{GG} = 7.0\text{ Vdc}$, $f = 200\text{ MHz}$) (Figure 1) ($V_{DD} = 18\text{ Vdc}$, $f_{LO} = 245\text{ MHz}$, $f_{RF} = 200\text{ MHz}$) (Figure 2) ($V_{DD} = 18\text{ Vdc}$, $V_{GG} = 6.0\text{ Vdc}$, $f = 45\text{ MHz}$) (Figure 3)	BW	5.0	—	9.0	MHz
		4.5	—	7.5	
		3.0	—	6.0	
Gain Control Gate-Supply Voltage(4) ($V_{DD} = 18\text{ Vdc}$, $\Delta G_{ps} = -30\text{ dB}$, $f = 200\text{ MHz}$) (Figure 1) ($V_{DD} = 18\text{ Vdc}$, $\Delta G_{ps} = -30\text{ dB}$, $f = 45\text{ MHz}$) (Figure 3)	$V_{GG}(\text{GC})$	0	-1.0	-3.0	Vdc
		0	-0.6	-3.0	

(1) All gate breakdown voltages are measured while the device is conducting rated gate current. This ensures that the gate-voltage limiting network is functioning properly.

(2) Pulse Test: Pulse Width = $300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

(3) This parameter must be measured with bias voltages applied for less than 5 seconds to avoid overheating.

(4) ΔG_{ps} is defined as the change in G_{ps} from the value at $V_{GG} = 7.0\text{ volts}$ (3N201) and $V_{GG} = 6.0\text{ volts}$ (3N203).

(5) Power Gain Conversion

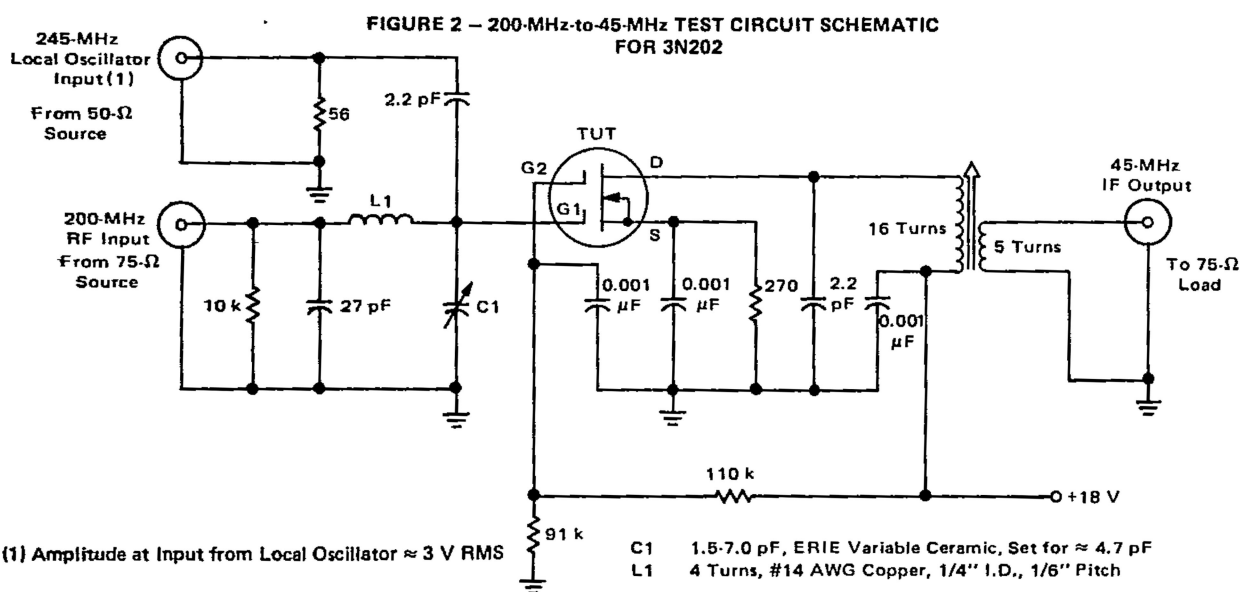
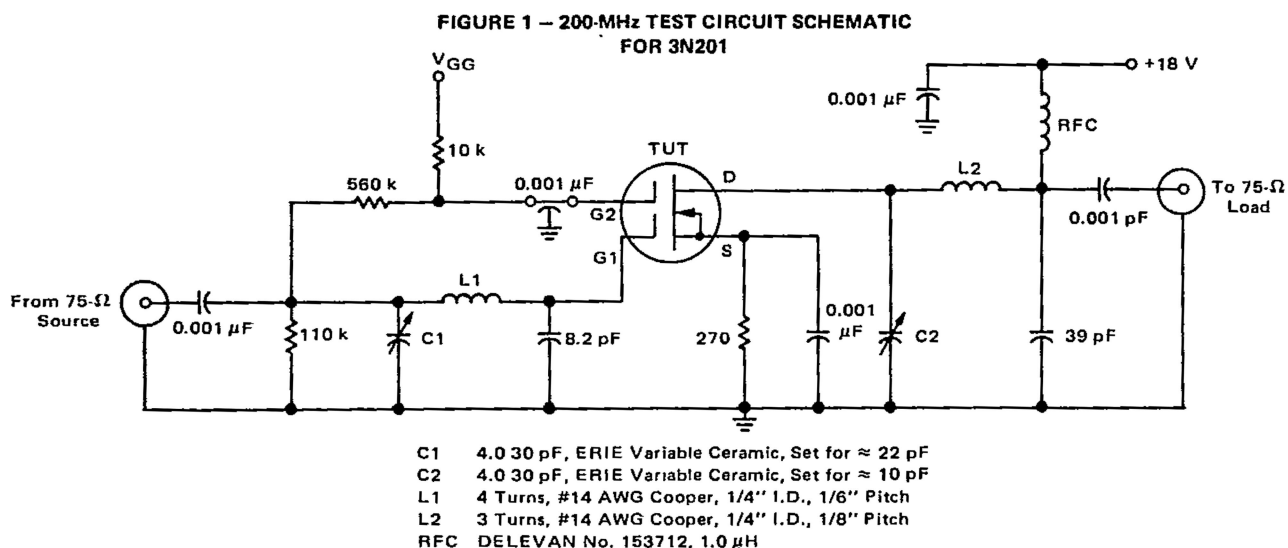
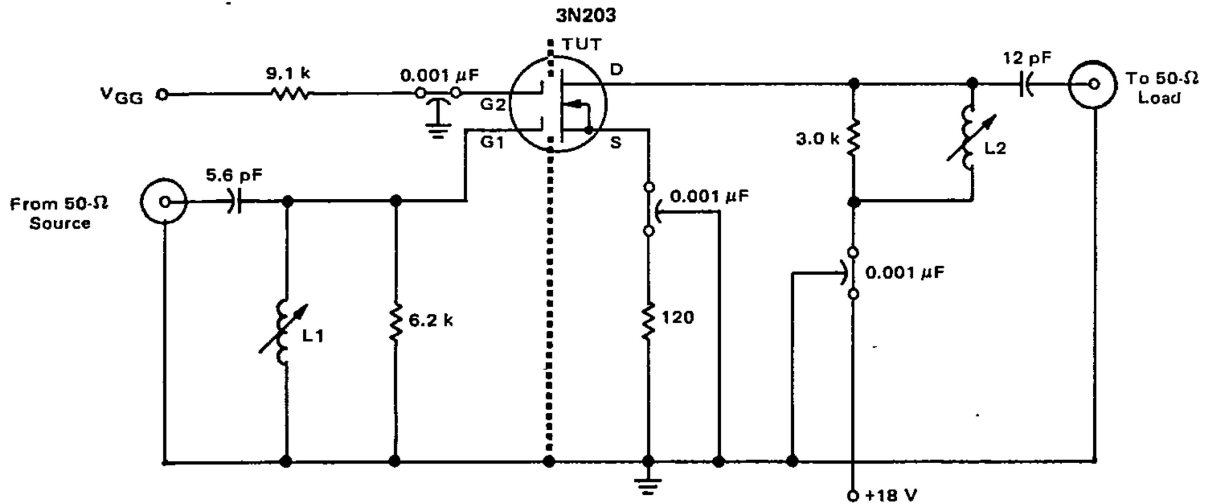


FIGURE 3 - 45-MHz TEST CIRCUIT SCHEMATIC



- L1 14 Turns, #30 AWG Copper, Close-Wound 7/32" OD form with ARNOLD ENGINEERING "J" Tuning Core
- L2 10 Turns, #30 AWG Copper, Close-Wound 7/32" OD form with ARNOLD ENGINEERING "J" Tuning Core

TYPICAL CHARACTERISTICS

FIGURE 4 - DRAIN CURRENT versus DRAIN to SOURCE VOLTAGE

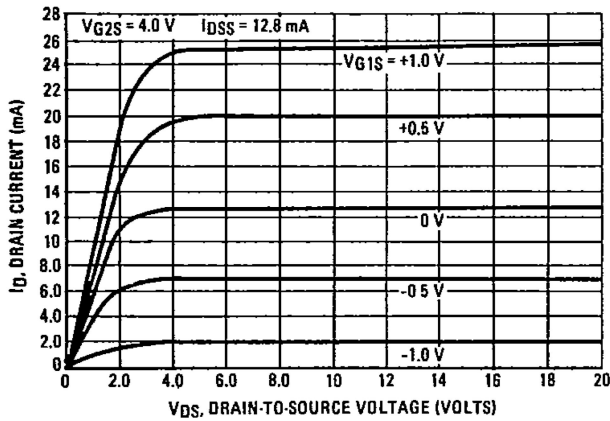


FIGURE 5 - DRAIN CURRENT versus GATE-ONE to SOURCE VOLTAGE

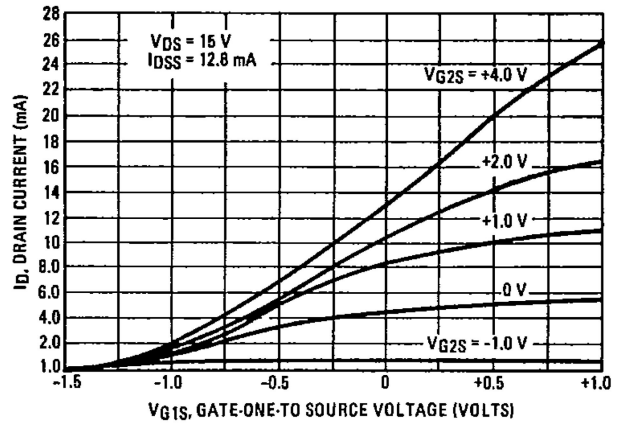


FIGURE 6 - SMALL-SIGNAL COMMON-SOURCE GATE-ONE FORWARD TRANSFER ADMITTANCE versus DRAIN CURRENT

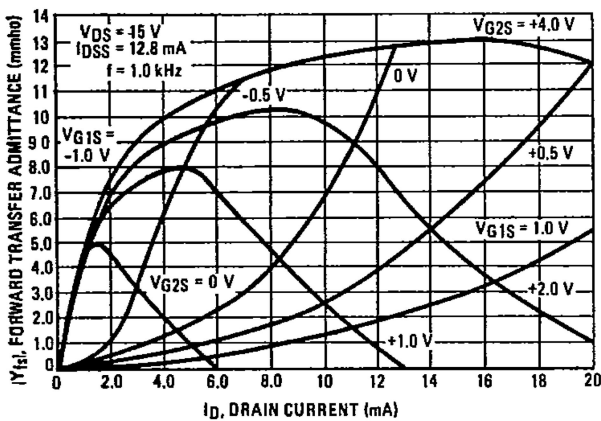


FIGURE 7 - SMALL-SIGNAL COMMON-SOURCE GATE-ONE FORWARD TRANSFER ADMITTANCE versus GATE-ONE to SOURCE VOLTAGE

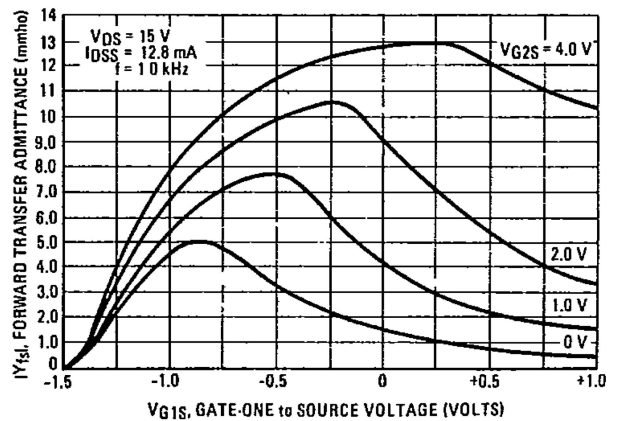


FIGURE 8 – SMALL-SIGNAL COMMON-SOURCE GATE-ONE FORWARD TRANSFER ADMITTANCE versus GATE-TWO to SOURCE VOLTAGE

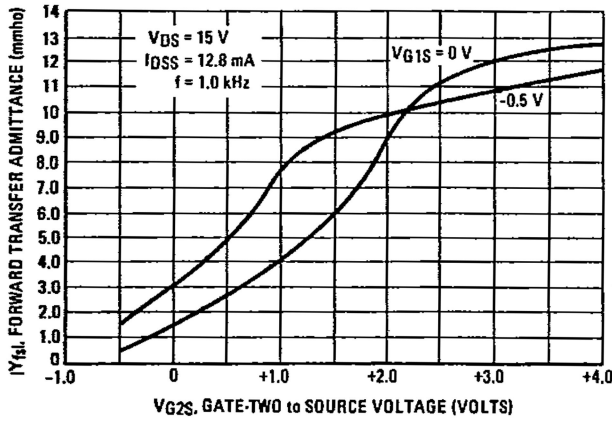
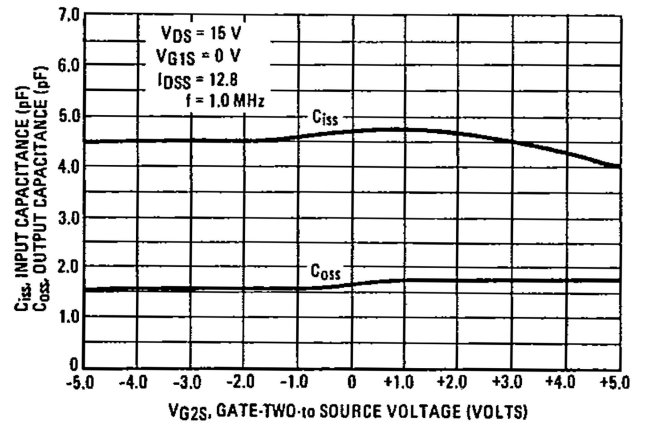


FIGURE 9 – SMALL-SIGNAL COMMON-SOURCE GATE-ONE INPUT AND OUTPUT CAPACITANCE versus GATE-TWO to SOURCE VOLTAGE



TYPICAL CHARACTERISTICS

FIGURE 10 – COMMON-SOURCE POWER GAIN AND SPOT NOISE FIGURE versus DRAIN CURRENT

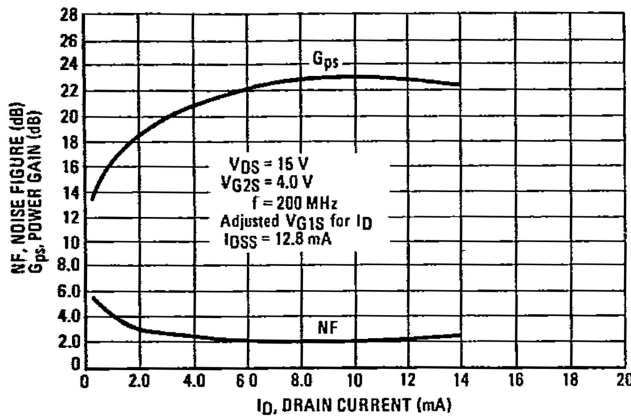


FIGURE 11 – COMMON-SOURCE POWER GAIN AND SPOT NOISE FIGURE versus GAIN CONTROL GATE SUPPLY VOLTAGE – 3N201

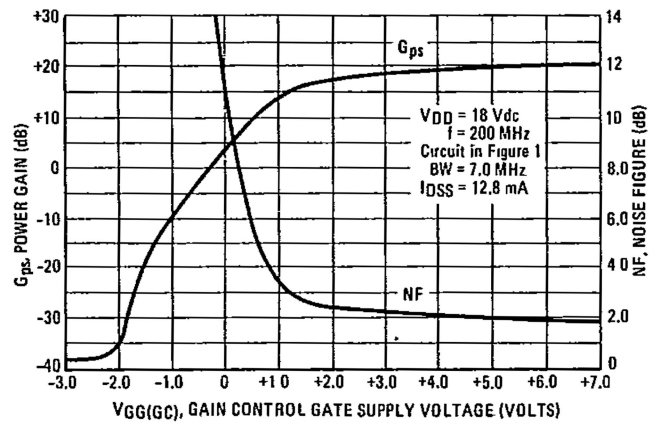


FIGURE 12 – COMMON-SOURCE POWER GAIN versus DRAIN SUPPLY CURRENT – 3N201

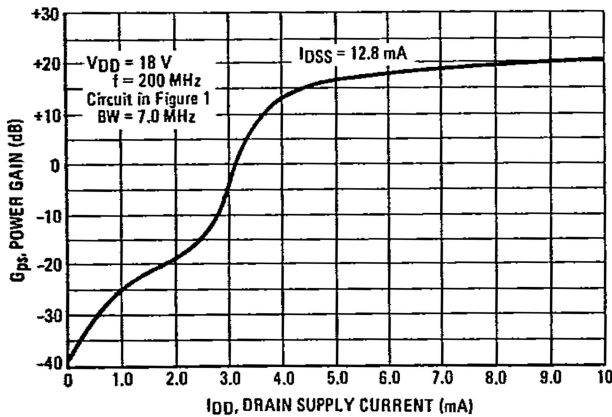


FIGURE 13 – SMALL-SIGNAL COMMON-SOURCE CONVERSION POWER GAIN versus LOCAL OSCILLATOR INPUT VOLTAGE – 3N202

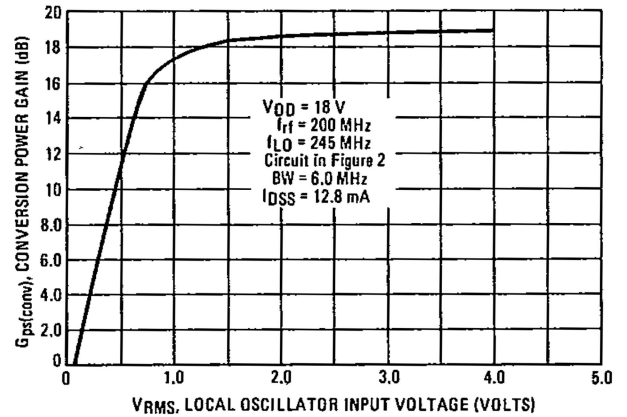
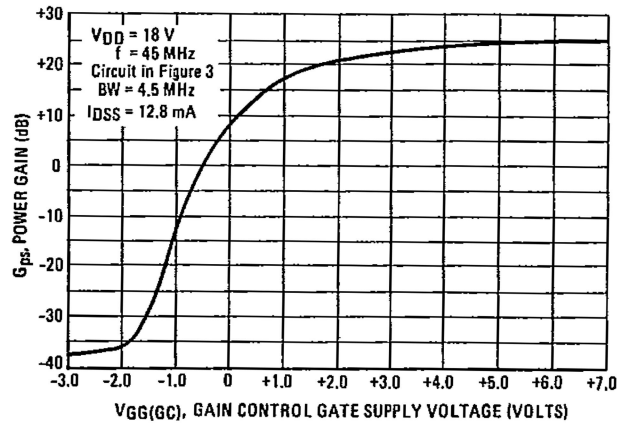


FIGURE 14 – SMALL-SIGNAL COMMON SOURCE
INSERTION POWER GAIN versus GAIN CONTROL
GATE-SUPPLY VOLTAGE – 3N203



TYPICAL CHARACTERISTICS

FIGURE 15 – SMALL-SIGNAL GATE ONE FORWARD
TRANSFER ADMITTANCE versus FREQUENCY

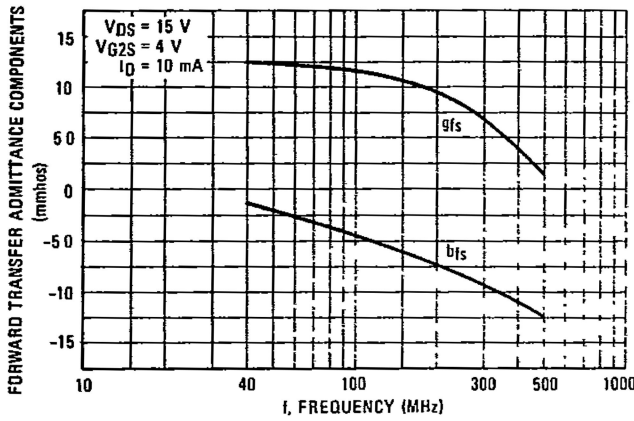


FIGURE 16 – SMALL-SIGNAL GATE ONE INPUT
ADMITTANCE versus FREQUENCY

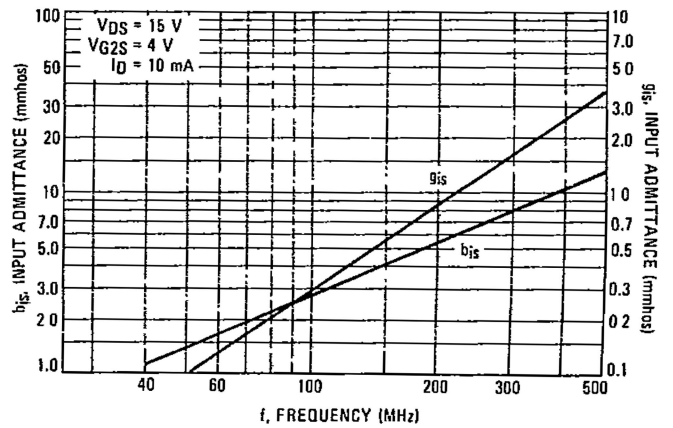


FIGURE 17 – SMALL-SIGNAL GATE ONE OUTPUT
ADMITTANCE versus FREQUENCY

