

6367254 MOTOROLA SC (XSTRS/R F)

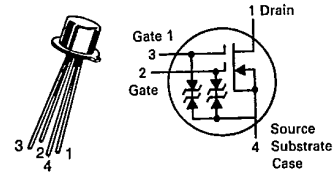
96D 82608 D
T-31-25

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°C Derate above 25°C	P _D	360 2.4	mW mW/°C
Total Device Dissipation @ T _C = 25°C Derate above 25°C	P _D	1.2 8.0	Watt mW/°C
Lead Temperature	T _L	300	°C
Junction Temperature Range	T _J	-65 to +175	°C
Storage Channel Temperature Range	T _{stg}	-65 to +175	°C

**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.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

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

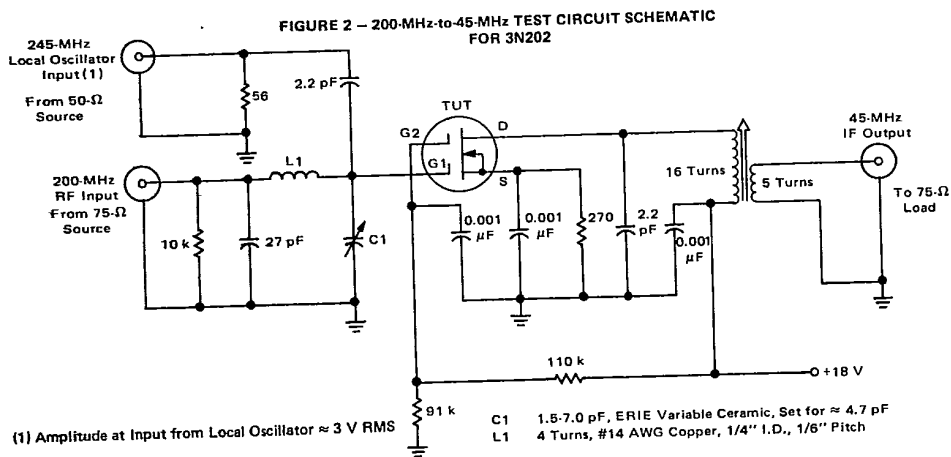
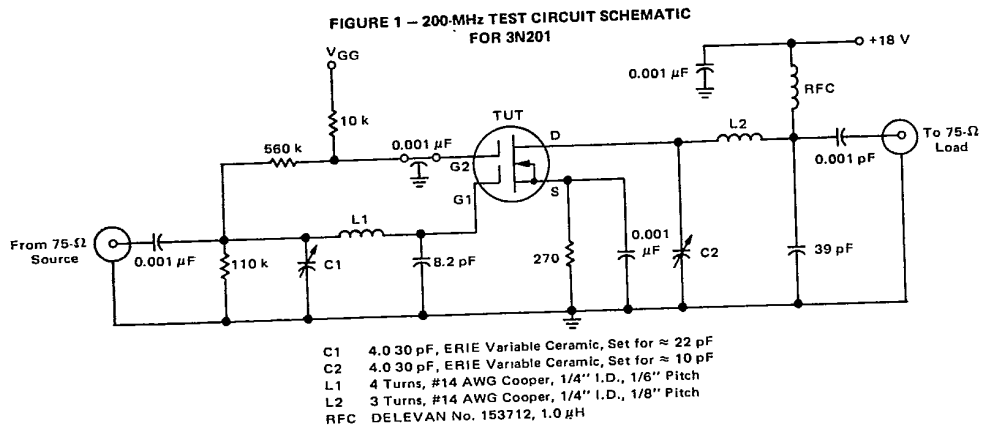
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ELECTRICAL CHARACTERISTICS (continued) ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

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)	3N201	15	20	25	dB
	3N203	20	25	30	
	3N202	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)	3N201	5.0	—	9.0	MHz
	3N202	4.5	—	7.5	
	3N203	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)	3N201	0	-1.0	-3.0	Vdc
	3N203	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 μs , 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



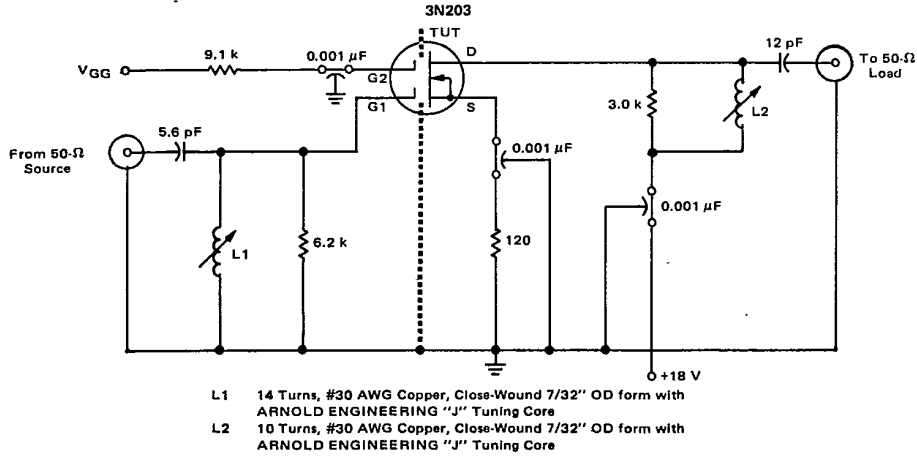
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FIGURE 3 - 45-MHz TEST CIRCUIT SCHEMATIC



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TYPICAL CHARACTERISTICS

FIGURE 4 - DRAIN CURRENT versus DRAIN to SOURCE VOLTAGE

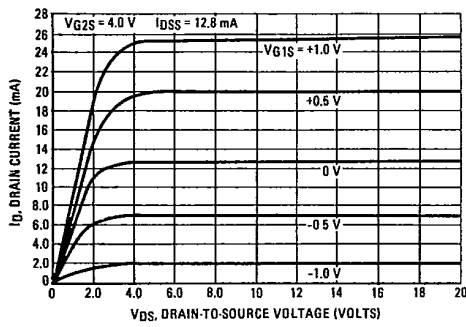


FIGURE 5 - DRAIN CURRENT versus GATE-ONE to SOURCE VOLTAGE

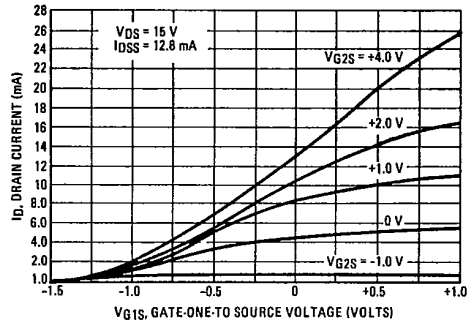


FIGURE 6 - SMALL-SIGNAL COMMON-SOURCE GATE-ONE FORWARD TRANSFER ADMITTANCE versus DRAIN CURRENT

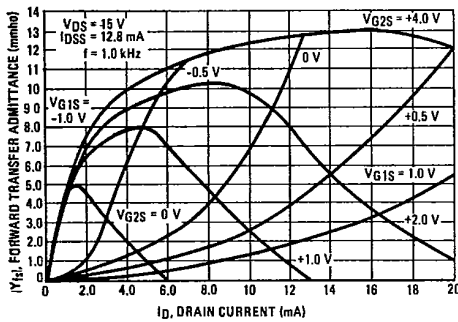
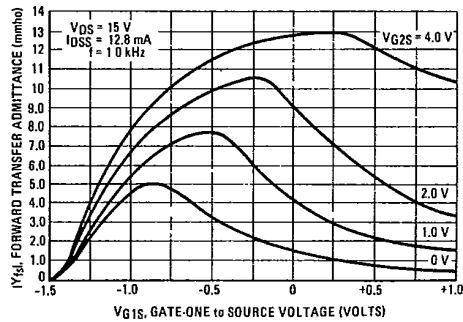


FIGURE 7 - SMALL-SIGNAL COMMON-SOURCE GATE-ONE FORWARD TRANSFER ADMITTANCE versus GATE-ONE to SOURCE VOLTAGE



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

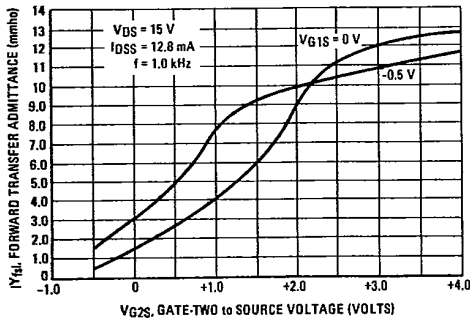
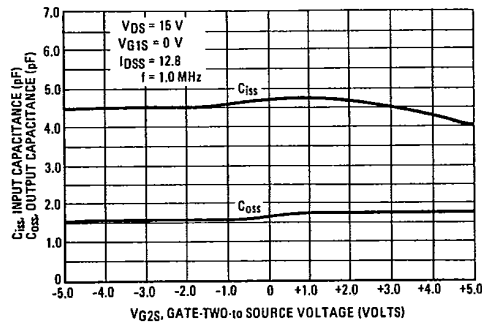


FIGURE 9 - SMALL-SIGNAL COMMON-SOURCE GATE-ONE INPUT AND OUTPUT CAPACITANCE versus GATE-TWO to SOURCE VOLTAGE



TYPICAL CHARACTERISTICS

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

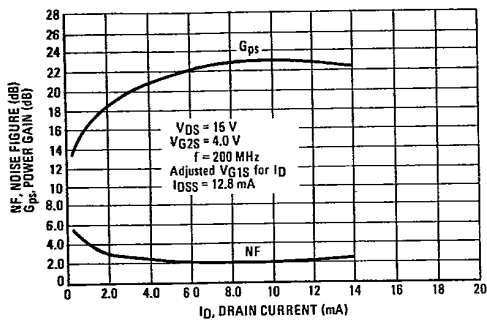


FIGURE 11 - COMMON-SOURCE POWER GAIN AND SPOT NOISE FIGURE versus GAIN CONTROL GATE-SUPPLY VOLTAGE - 3N201

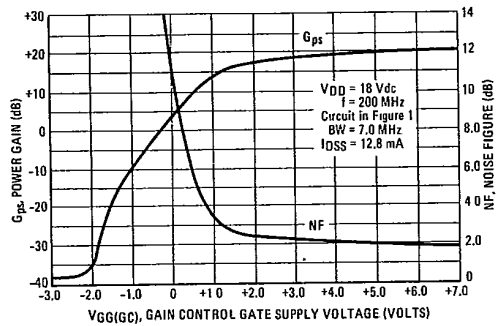


FIGURE 12 - COMMON-SOURCE POWER GAIN versus DRAIN SUPPLY CURRENT - 3N201

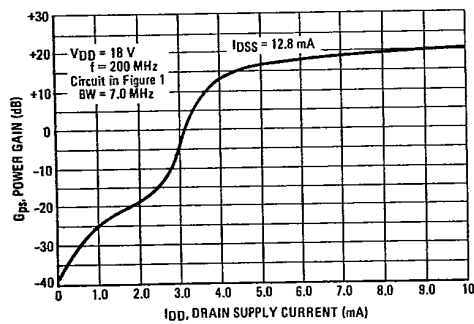
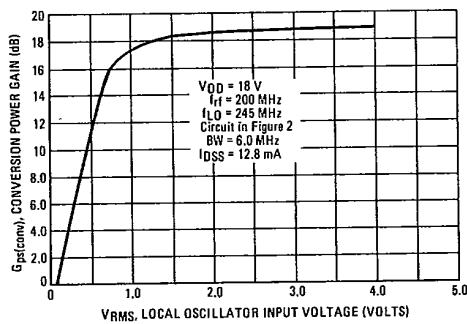


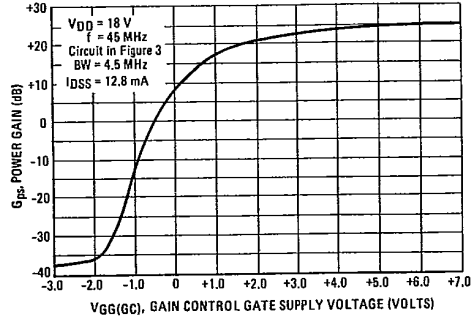
FIGURE 13 - SMALL-SIGNAL COMMON-SOURCE CONVERSION POWER GAIN versus LOCAL OSCILLATOR INPUT VOLTAGE - 3N202



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



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TYPICAL CHARACTERISTICS

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

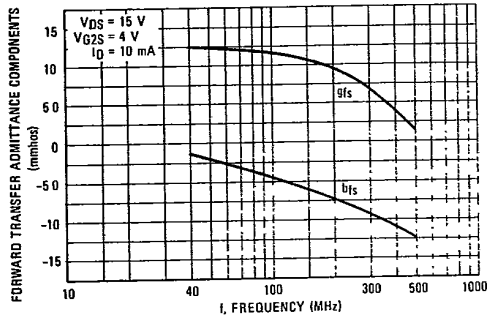


FIGURE 16 - SMALL-SIGNAL GATE ONE INPUT
 ADMITTANCE versus FREQUENCY

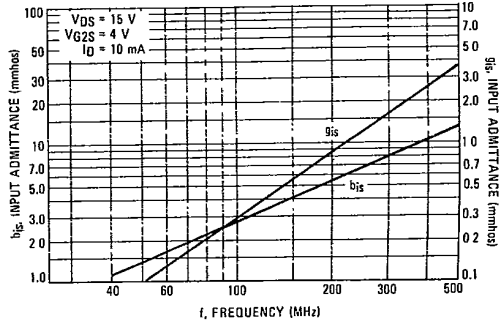
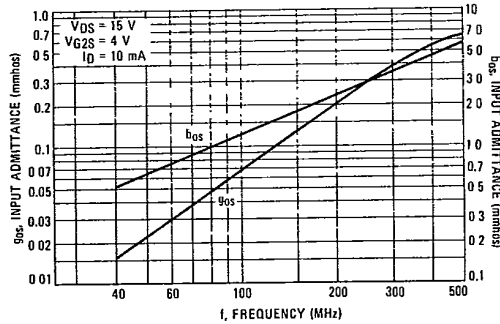


FIGURE 17 - SMALL-SIGNAL GATE ONE OUTPUT
 ADMITTANCE versus FREQUENCY



MOTOROLA SMALL-SIGNAL SEMICONDUCTORS