

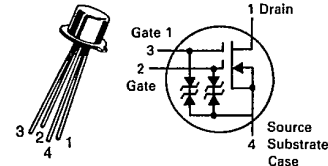
6367254 MOTOROLA SC (XSTRS/R F)

96D 82620 D

T-31-25

3N211
3N212
3N213

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



DUAL-GATE MOSFET
VHF AMPLIFIER

N-CHANNEL — DEPLETION

Refer to MPF211 for graphs.

MAXIMUM RATINGS

Rating	Symbol	3N211 3N212	3N213	Unit
Drain-Source Voltage	V_{DS}	27	35	Vdc
Drain-Gate Voltage	V_{DG1} V_{DG2}	35 35	40 40	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/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.2	8.0	Watt mW/°C
Lead Temperature, 1/16" From Seated Surface for 10 seconds	T_L	300		°C
Junction Temperature Range	T_J	-65 to +175		°C
Storage Temperature Range	T_{stg}	-65 to +175		°C

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Drain-Source Breakdown Voltage(1) ($I_D = 10 \mu\text{Adc}$, $V_{G1S} = V_{G2S} = -4.0 \text{ Vdc}$)	$V_{(BR)DSX}$	25 30	—	Vdc
Instantaneous Drain-Source Breakdown Voltage) ($I_D = 10 \mu\text{Adc}$, $V_{G1S} = V_{G2S} = -4.0 \text{ Vdc}$)	$V_{(BR)DSX}$	27 35	—	Vdc
Gate 1-Source Breakdown Voltage(2) ($I_{G1} = \pm 10 \text{ mAdc}$, $V_{G2S} = V_{DS} = 0$)	$V_{(BR)G1SO}$	± 6.0	—	Vdc
Gate 2-Source Breakdown Voltage(2) ($I_{G2} = \pm 10 \text{ mAdc}$, $V_{G1S} = V_{DS} = 0$)	$V_{(BR)G2SO}$	± 6.0	—	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}	—	± 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}	—	± 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 -0.5	-6.5 -4.0	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 -0.2	-2.5 -4.0	Vdc
ON CHARACTERISTICS				
Zero-Gate-Voltage Drain Current(3) ($V_{DS} = 15 \text{ Vdc}$, $V_{G1S} = 0$, $V_{G2S} = 4.0 \text{ Vdc}$)	I_{DSS}	6.0	40	mAdc
SMALL-SIGNAL CHARACTERISTICS				
Forward Transfer Admittance(4) ($V_{DS} = 15 \text{ Vdc}$, $V_{G2S} = 4.0 \text{ Vdc}$, $V_{G1S} = 0$, $f = 1.0 \text{ kHz}$)	$ y_{fs} $	17 15	40 35	mmhos
Reverse Transfer Capacitance ($V_{DS} = 15 \text{ Vdc}$, $V_{G2S} = 4.0 \text{ Vdc}$, $I_D = 1.0 \text{ mAdc}$, $f = 1.0 \text{ MHz}$)	C_{rss}	0.005	0.05	pF
FUNCTIONAL CHARACTERISTICS				
Noise Figure ($V_{DD} = 18 \text{ Vdc}$, $V_{GG} = 7.0 \text{ Vdc}$, $f = 200 \text{ MHz}$) ($V_{DD} = 24 \text{ Vdc}$, $V_{GG} = 6.0 \text{ Vdc}$, $f = 45 \text{ MHz}$)	NF	—	3.5 4.0	dB

MOTOROLA SMALL-SIGNAL SEMICONDUCTORS

6367254 MOTOROLA SC (XSTRS/R F)

96D 82621 D

3N211, 3N212, 3N213

T-31-25

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

Characteristic		Symbol	Min	Max	Unit
Common Source Power Gain ($V_{DD} = 18\text{ Vdc}$, $V_{GG} = 7.0\text{ Vdc}$, $f = 200\text{ MHz}$) ($V_{DD} = 24\text{ Vdc}$, $V_{GG} = 6.0\text{ Vdc}$, $f = 45\text{ MHz}$) ($V_{DD} = 24\text{ Vdc}$, $V_{GG} = 6.0\text{ Vdc}$, $f = 45\text{ MHz}$) ($V_{DD} = 18\text{ Vdc}$, $f_{LO} = 245\text{ MHz}$, $f_{RF} = 200\text{ MHz}$)	3N211	G_{ps}	24	35	dB
	3N211		29	37	
	3N213	$G_c(6)$	27	35	
	3N212		21	28	
Bandwidth ($V_{DD} = 18\text{ Vdc}$, $V_{GG} = 7.0\text{ Vdc}$, $f = 200\text{ MHz}$) ($V_{DD} = 18\text{ Vdc}$, $f_{LO} = 245\text{ MHz}$, $f_{RF} = 200\text{ MHz}$) ($V_{DD} = 24\text{ Vdc}$, $V_{GG} = 6.0\text{ Vdc}$, $f = 45\text{ MHz}$)	3N211	BW	5.0	12	MHz
	3N212		4.0	7.0	
	3N211,213		3.5	6.0	
Gain Control Gate-Supply Voltage(5) ($V_{DD} = 18\text{ Vdc}$, $\Delta G_{ps} = -30\text{ dB}$, $f = 200\text{ MHz}$) ($V_{DD} = 24\text{ Vdc}$, $\Delta G_{ps} = -30\text{ dB}$, $f = 45\text{ MHz}$)	3N211	$V_{GG}(GC)$	—	-2.0	Vdc
	2N211,213		—	± 1.0	

(1) Measured after five seconds of applied voltage.

(2) 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.

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

(4) This parameter must be measured with bias voltages applied for less than 5 seconds to avoid overheating. The signal is applied to gate 1 with gate 2 at ac ground.

(5) ΔG_{ps} is defined as the change in G_{ps} from the value at $V_{GG} = 7.0\text{ Volts}$ (3N211) and $V_{GG} = 6.0\text{ Volts}$ (3N213).(6) Power Gain Conversion. Amplitude at input from local oscillator is adjusted for maximum G_c .