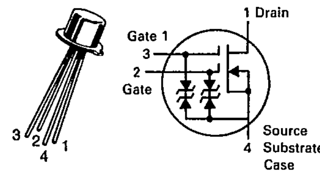
3N211
3N212
3N213

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°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, 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

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage(1) (I_D = 10 μAdc, V_{G1S} = V_{G2S} = −4.0 Vdc)	3N211,212 3N213	$V_{(BR)DSX}$	25 30	— —	Vdc
Instantaneous Drain-Source Breakdown Voltage) (I_D = 10 μAdc, V_{G1S} = V_{G2S} = −4.0 Vdc)	3N211,212 3N213	$V_{(BR)DSX}$	27 35	— —	Vdc
Gate 1-Source Breakdown Voltage(2) (I_{G1} = ±10 mAdc, V_{G2S} = V_{DS} = 0)		$V_{(BR)G1SO}$	±6.0	—	Vdc
Gate 2-Source Breakdown Voltage(2) (I_{G2} = ±10 mAdc, V_{G1S} = V_{DS} = 0)		$V_{(BR)G2SO}$	±6.0	—	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}	— —	±10 −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}	— —	±10 −10	nAdc μAdc
Gate 1 to Source Cutoff Voltage (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 20 μAdc)	3N211,213 3N212	$V_{G1S(off)}$	−0.5 −0.5	−5.5 −4.0	Vdc
Gate 2 to Source Cutoff Voltage (V_{DS} = 15 Vdc, V_{G1S} = 0, I_D = 20 μAdc)	3N211 3N212,213	$V_{G2S(off)}$	−0.2 −0.2	−2.5 −4.0	Vdc
ON CHARACTERISTICS					
Zero-Gate-Voltage Drain Current(3) (V_{DS} = 15 Vdc, V_{G1S} = 0, V_{G2S} = 4.0 Vdc)		I_{DSS}	6.0	40	mAdc
SMALL-SIGNAL CHARACTERISTICS					
Forward Transfer Admittance(4) (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, V_{G1S} = 0, f = 1.0 kHz)	3N211,212 3N213	$\|y_{fs}\|$	17 15	40 35	mmhos
Reverse Transfer Capacitance (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 1.0 mAdc, f = 1.0 MHz)		C_{rss}	0.005	0.05	pF
FUNCTIONAL CHARACTERISTICS					
Noise Figure (V_{DD} = 18 Vdc, V_{GG} = 7.0 Vdc, f = 200 MHz) (V_{DD} = 24 Vdc, V_{GG} = 6.0 Vdc, f = 45 MHz)	3N211 3N211,13	NF	— —	3.5 4.0	dB

T-31-25

3N211, 3N212, 3N213

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

Characteristic		Symbol	Min	Max	Unit
Common Source Power Gain		G_{ps}			dB
(V_{DD} = 18 Vdc, V_{GG} = 7.0 Vdc, f = 200 MHz)	3N211		24	35	
(V_{DD} = 24 Vdc, V_{GG} = 6.0 Vdc, f = 45 MHz)	3N211		29	37	
(V_{DD} = 24 Vdc, V_{GG} = 6.0 Vdc, f = 45 MHz)	3N213		27	35	
(V_{DD} = 18 Vdc, f_{LO} = 245 MHz, f_{RF} = 200 MHz)	3N212	G_c(6)	21	28	
Bandwidth		BW			MHz
(V_{DD} = 18 Vdc, V_{GG} = 7.0 Vdc, f = 200 MHz)	3N211		5.0	12	
(V_{DD} = 18 Vdc, f_{LO} = 245 MHz, f_{RF} = 200 MHz)	3N212		4.0	7.0	
(V_{DD} = 24 Vdc, V_{GG} = 6.0 Vdc, f = 45 MHz)	3N211,213		3.5	6.0	
Gain Control Gate-Supply Voltage(5)		$V_{GG(GC)}$			Vdc
(V_{DD} = 18 Vdc, ΔG_{ps} = −30 dB, f = 200 MHz)	3N211		—	−2.0	
(V_{DD} = 24 Vdc, ΔG_{ps} = −30 dB, f = 45 MHz)	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 μs, Duty Cycle ≤ 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 Volts (3N211) and V_{GG} = 6.0 Volts (3N213).
(6) Power Gain Conversion. Amplitude at input from local oscillator is adjusted for maximum G_c.

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