

DIGITRON SEMICONDUCTORS

3N211-3N213

DUAL-GATE VHF AMPLIFIER
N-CHANNEL - DEPLETION

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/ $^\circ\text{C}$
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, 1/16" from Seated Surface for 10 seconds	T_L	300		$^\circ\text{C}$
Junction Temperature Range	T_J	-65 to +175		$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +175		$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ$ unless otherwise noted)

Characteristics		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Drain Source Breakdown Voltage ⁽¹⁾ ($I_D = 10 \mu\text{Adc}$, $V_{G1S} = V_{G2S} = -4.0 \text{ Vdc}$)	3N211, 3N212 3N213	$V_{(BR)DSX}$	25 30	- -	Vdc
Instantaneous Drain Source Breakdown Voltage ($I_D = 10 \mu\text{Adc}$, $V_{G1S} = V_{G2S} = -4.0 \text{ Vdc}$)	3N211, 3N212 3N213	$V_{(BR)DSX}$	27 35	- -	Vdc
Gate 1 – Source Breakdown Voltage ⁽²⁾ ($I_{G1} = \pm 10 \text{ mAdc}$, $V_{G2S} = V_{DS} = 0$)		$V_{(BR)G1S0}$	± 6.0	-	Vdc
Gate 2 – Source Breakdown Voltage ⁽²⁾ ($I_{G2} = \pm 10 \text{ mAdc}$, $V_{G1S} = V_{DS} = 0$)		$V_{(BR)G2S0}$	± 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 ($V_{DS} = 15 \text{ Vdc}$, $V_{G2S} = 4.0 \text{ Vdc}$, $I_D = 20 \mu\text{Adc}$)	3N211, 3N212 3N212	$V_{G1S(off)}$	-0.5 -0.5	-5.5 -4.0	Vdc
Gate 2 Source to Cutoff Voltage ($V_{DS} = 15 \text{ Vdc}$, $V_{G1S} = 0$, $I_D = 20 \mu\text{Adc}$)	3N211 3N212, 3N213	$V_{G2S(off)}$	-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⁾ ($V_{DS} = 15 \text{ Vdc}$, $V_{G2S} = 4.0 \text{ Vdc}$, $V_{G1S} = 0$, $f = 1.0 \text{ kHz}$)	3N211, 3N212 3N213	$ 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 ($V_{DD} = 18 \text{ Vdc}$, $V_{GG} = 7.0 \text{ Vdc}$, $f = 200 \text{ MHz}$) ($V_{DD} = 24 \text{ Vdc}$, $V_{GG} = 6.0 \text{ Vdc}$, $f = 45 \text{ MHz}$)	3N211 3N211, 3N213	NF	- -	3.5 4.0	dB

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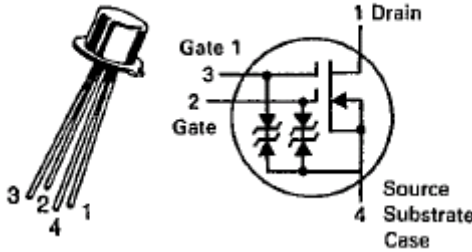
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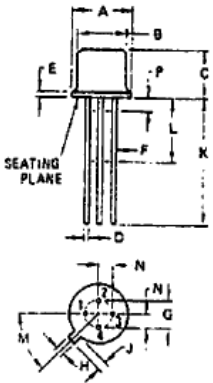
ELECTRICAL CHARACTERISTICS (T_A = 25° unless otherwise noted)

Characteristics	Symbol	Min	Max	Unit
FUNCTIONAL CHARACTERISTICS (con't)				
Common Source Power Gain				
(V _{DD} = 18 Vdc, V _{GG} = 7.0 Vdc, f = 200 MHz)	3N211	24	35	dB
(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	21	28	
Bandwidth				
(V _{DD} = 18 Vdc, V _{GG} = 7.0 Vdc, f = 200 MHz)	3N211	5.0	12	MHz
(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, 3N213	3.5	6.0	
Gain Control Gate Supply Voltage⁽⁵⁾				
(V _{DD} = 18 Vdc, Δ Gps = -30 dB, f = 200 MHz)	3N211	-	-2.0	Vdc
(V _{DD} = 24 Vdc, Δ Gps = -30 dB, f = 45 MHz)	3N211, 3N213	-	±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 = 300μs, 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) Δ Gps 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.



TO-72



Dim	Inches		Millimeters	
	Min	Max	Min	Max
A	-	0.230	-	5.840
B	-	0.195	-	4.950
C	-	0.210	-	5.330
D	-	0.021	-	0.530
E	-	0.030	-	0.760
F	-	0.019	-	0.480
G	0.100 BSC	-	2.540 BSC	-
H	-	0.046	-	1.170
J	-	0.0480	-	1.220
K	0.500	-	12.700	-
L	0.250	-	6.350	-
M	45°C BSC	-	45°C BSC	-
N	0.050 BSC	-	1.270 BSC	-
P	-	0.050	-	1.270

Available Non-RoHS (standard) or RoHS compliant (add PBF suffix).
 Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.