DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

# 3N204-3N205

## DUAL GATE MOSFET VHF AMPLIFIER

### FEATURES

- Available as “HR” (high reliability) screened per MIL-PRF-19500, JANTX level. Add “HR” suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding “-PBF” suffix.

### MAXIMUM RATINGS

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **SMALL SIGNAL CHARACTERISTICS** | | | | | | |
| **Forward transfer admittance**[3] | | | | | | |
| ($V_{DS}$ = 15Vdc, $V_{G2S}$ = 4.0Vdc, $V_{G1S}$ = 0, f = 1.0kHz) | 3N201, 3N202 | $\lvert Y_{fs} \rvert$ | 8.0 | 12.8 | 20 | mmhos |
| | 3N203 | | 7.0 | 12.5 | 15 | |
| **Input capacitance** ($V_{DS}$ = 15Vdc, $V_{G2S}$ = 4.0Vdc, $I_D$ = $I_{DSS}$, f = 1.0MHz) | | $C_{iss}$ | - | 3.3 | - | pF |
| **Reverse transfer capacitance** ($V_{DS}$ = 15Vdc, $V_{G2S}$ = 4.0Vdc, $I_D$ = 10mAdc, f = 1.0MHz) | | $C_{rss}$ | 0.005 | 0.014 | 0.03 | pF |
| **Output capacitance** ($V_{DS}$ = 15Vdc, $V_{G2S}$ = 4.0Vdc, $I_D$ = $I_{DSS}$, f = 1.0MHz) | | $C_{oss}$ | - | 1.7 | - | pF |
| **FUNCTIONAL CHARACTERISTICS** | | | | | | |
| **Noise figure** | | | | | | |
| ($V_{DD}$ = 18Vdc, $V_{GG}$ = 7.0Vdc, f = 200MHz) | 3N201 | NF | - | 1.8 | 4.5 | dB |
| ($V_{DD}$ = 18Vdc, $V_{GG}$ = 6.0Vdc, f = 45MHz) | 3N203 | | - | 5.3 | 6.0 | |
| **Common source power gain** | | | | | | |
| ($V_{DD}$ = 18Vdc, $V_{GG}$ = 7.0Vdc, f = 200MHz) | 3N201 | $G_{ps}$ | 15 | 20 | 25 | dB |
| ($V_{DD}$ = 18Vdc, $V_{GG}$ = 6.0Vdc, f = 45MHz) | 3N203 | | 20 | 25 | 30 | |
| ($V_{DD}$ = 18Vdc, $f_{LO}$ = 245MHz, $f_{RF}$ = 200MHz) | 3N202 | $G_c$(5) | 15 | 19 | 25 | |
| **Bandwidth** | | | | | | |
| ($V_{DD}$ = 18Vdc, $V_{GG}$ = 7.0Vdc, f = 200MHz) | 3N201 | $B_W$ | 5.0 | - | 9.0 | MHz |
| ($V_{DD}$ = 18Vdc, $f_{LO}$ = 245MHz, $f_{RF}$ = 200MHz) | 3N202 | | 4.5 | - | 7.5 | |
| ($V_{DD}$ = 18Vdc, $V_{GG}$ = 6.0Vdc, f = 45MHz) | 3N203 | | 3.0 | - | 6.0 | |
| **Gain control gate-supply voltage**[4] | | | | | | |
| ($V_{DD}$ = 18Vdc, $\Delta G_{ps}$ = -30dB, f = 200MHz) | 3N201 | $V_{GG(GC)}$ | 0 | -1.0 | -3.0 | Vdc |
| ($V_{DD}$ = 18Vdc, $\Delta G_{ps}$ = -30dB, f = 45MHz) | 3N203 | | 0 | -0.6 | -3.0 | |

### ELECTRICAL CHARACTERISTICS ($T_C$ = 25°C)

| CHARACTERISTIC | SYMBOL | MIN | MAX | UNIT |
|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | |
| **Drain-Source Breakdown Voltage** ($I_D$=10µA, $V_{G1}$=$V_{G2}$=-5.0V) | $V_{(BR)DSX}$ | 25 | - | Vdc |
| **Gate 1-Source Breakdown Voltage** ($I_{G1}$=+/- 10 mA) Note 1 | $V_{(BR)G1SO}$ | +/-6 | +/-30 | Vdc |
| **Gate 2-Source Breakdown Voltage** ($I_{G2}$=+/-10mA) Note 1 | $V_{(BR)G2SO}$ | +/-6 | +/-30 | Vdc |
| **Gate 1 Leakage Current** ($V_{G1S}$=+/-5.0V, $V_{G2S}$=$V_{DS}$=0) | $I_{G1SS}$ | - | +/-10 | nA |
| **Gate 2 Leakage Current** ($V_{G2S}$=+/-5.0V, $V_{G1S}$=$V_{DS}$=0) | $I_{G2SS}$ | - | +/-10 | nA |
| **Gate 1 to Source Cutoff Voltage** ($V_{DS}$=15V, $V_{G2S}$=4.0V, $I_D$=20µA) | $V_{G1S(off)}$ | -0.5 | -4.0 | Vdc |

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# 3N204-3N205

## DUAL GATE MOSFET VHF AMPLIFIER

### ELECTRICAL CHARACTERISTICS ($T_C$ = 25°C)

| CHARACTERISTIC | SYMBOL | MIN | MAX | UNIT |
|---|---|---|---|---|
| **Gate 2 to Source Cutoff Voltage**<br>($V_{DS}$=15V, $V_{G1S}$=0V, $I_D$=20μA) | $V_{G2S(off)}$ | -0.2 | -4.0 | Vdc |
| **ON CHARACTERISTICS** | | | | |
| **Zero-Gate-Voltage Drain Current ***<br>($V_{DS}$=15V, $V_{G2S}$=4.0V, $V_{G1S}$=0V) | $I_{DSS}$* | 6 | 30 | mA |
| **SMALL SIGNAL CHARACTERISTICS** | | | | |
| **Forward Transfer Admittance**<br>($V_{DS}$=15V, $V_{G2S}$=4.0V, $V_{G1S}$=0V, f=1.0kHz) Note 2 | $\|Y_{fs}\|$ | 10 | 22 | mmhos |
| **Input Capacitance**<br>($V_{DS}$=15V, $V_{G2S}$=4.0V, $I_D$=$I_{DSS}$, f=1.0Mhz) | $C_{iss}$ | TYP.3.0 | | pF |
| **Reverse Transfer Capacitance**<br>($V_{DS}$=15V, $V_{G2S}$=4.0V, $I_D$=10mA, f=1.0MHz) | $C_{rss}$ | 0.005 | 0.03 | pF |
| **Output Capacitance**<br>($V_{DS}$=15V, $V_{G2S}$=4.0V, $I_D$=$I_{DSS}$, f=1.0MHz) | $C_{oss}$ | TYP. 1.4 | | pF |
| **FUNCTIONAL CHARACTERISTICS** | | | | |
| **Noise Figure**<br>($V_{DD}$=18V, $V_{GG}$=7.0V, f=200MHz) 3N204<br>($V_{DS}$=15V, $V_{G2S}$=4.0v, $I_D$=10mA, f=450MHZ) 3N204 | NF | -<br>- | 3.5<br>5.0 | dB |
| **Common Source Power Gain**<br>($V_{DD}$=18V, $V_{GG}$=7.0V, f=200MHz) 3N204<br>($V_{DS}$=15V, $V_{G2S}$=4.0V, $I_D$=10mA, f=450MHz) 3N204 | $G_{ps}$ | 20<br>14 | 28<br>- | dB |
| **Bandwidth**<br>($V_{DD}$=18V, $V_{GG}$=7.0V, f=200MHz) 3N204<br>($V_{DD}$=18V, $f_{LO}$=245MHz, $f_{RF}$=200MHz)Note 4 3N205 | BW | 7.0<br>4.0 | 12<br>7.0 | MHz |
| **Gain Control Gate Supply Voltage**(Note 3)<br>($V_{DD}$=18V, △GPS=300dB,f=200MHz) 3N204 | $V_{GG(GC)}$ | 0 | -2.0 | Vdc |
| **Conversion Gain** (Note 4)<br>($V_{DD}$=18V, $f_{LO}$=245MHz, $f_{RF}$=200MHz) 3N205 | $G_{(conv.)}$ | 17 | 28 | dB |

*PW=30μs, Duty Cycle ≤ 2.0%.

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

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

3) $\triangle G_{ps}$ is defined as the change in $G_{ps}$ from the value at $V_{GG}$=7.0V.

4) Amplitude at input from local oscillator is 3 volts RMS.

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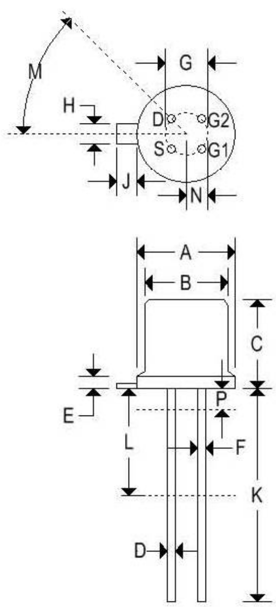
## DUAL GATE MOSFET VHF AMPLIFIER

**MECHANICAL CHARACTERISTICS**

| | |
|---|---|
| **Case:** | TO-72 |
| **Marking:** | Body painted, alpha-numeric |
| **Pin out:** | See below |




| | TO-72 | | | |
|---|---|---|---|---|
| | 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 | - | 0.048 | - | 1.220 |
| K | 0.500 | - | 12.700 | - |
| L | 0.250 | - | - | 6.350 |
| M | 45° BSC | | 45° BSC | |
| N | 0.050 BDC | | 1.270 BSC | |
| P | - | 0.050 | - | 1.270 |