

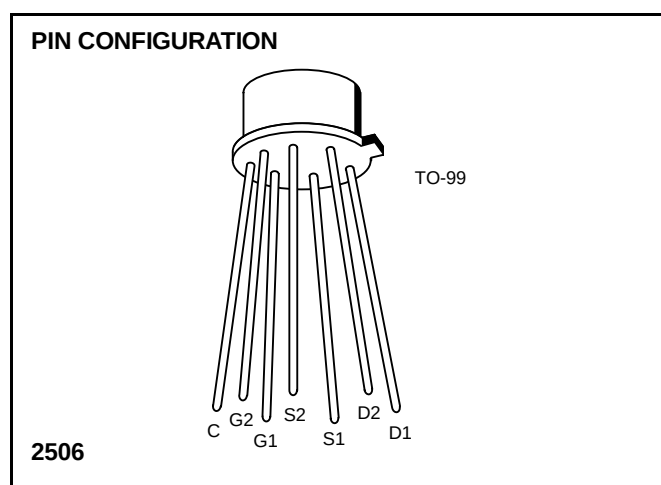
# Dual P-Channel Enhancement Mode MOSFET General Purpose Amplifier



## 3N190 / 3N191

### FEATURES

- Very High Input Impedance
- High Gate Breakdown 3N190-3N191
- Low Capacitance



### ABSOLUTE MAXIMUM RATINGS

( $T_A = 25^\circ\text{C}$  unless otherwise specified)

Drain-Source or Drain-Gate Voltage (Note 1)

3N190, 3N191 ..... 40V

Transient Gate-Source Voltage (Note 1 and 2) .....  $\pm 125\text{V}$

Gate-Gate Voltage .....  $\pm 80\text{V}$

Drain Current (Note 1) ..... 50mA

Storage Temperature .....  $-65^\circ\text{C}$  to  $+200^\circ\text{C}$

Operating Temperature .....  $-55^\circ\text{C}$  to  $+150^\circ\text{C}$

Lead Temperature (Soldering, 10sec) .....  $+300^\circ\text{C}$

Power Dissipation

One Side ..... 300mW

Both Sides ..... 525mW

Total Derating above  $25^\circ\text{C}$  ..... 4.2mW/ $^\circ\text{C}$

**NOTE:** Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### ORDERING INFORMATION

| Part      | Package                  | Temperature Range                           |
|-----------|--------------------------|---------------------------------------------|
| 3N190-91  | Hermetic TO-99           | $-55^\circ\text{C}$ to $+150^\circ\text{C}$ |
| X3N190-91 | Sorted Chips in Carriers | $-55^\circ\text{C}$ to $+150^\circ\text{C}$ |

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ and $V_{BS} = 0$ unless otherwise specified)

| SYMBOL       | PARAMETER                       | 3N190/91 |       | UNITS | TEST CONDITIONS                               |
|--------------|---------------------------------|----------|-------|-------|-----------------------------------------------|
|              |                                 | MIN      | MAX   |       |                                               |
| $I_{GSSR}$   | Gate Reverse Current            |          | 10    | pA    | $V_{GS} = 40\text{V}$                         |
| $I_{GSSF}$   | Gate Forward Current            |          | -10   |       | $V_{GS} = -40\text{V}$                        |
|              |                                 |          | -25   |       | $T_A = +125^\circ\text{C}$                    |
| $BV_{DSS}$   | Drain-Source Breakdown Voltage  | -40      |       | V     | $I_D = -10\mu\text{A}$                        |
| $BV_{SDS}$   | Source-Drain Breakdown Voltage  | -40      |       |       | $I_S = -10\mu\text{A}, V_{BD} = 0$            |
| $V_{GS(th)}$ | Threshold Voltage               | -2.0     | -5.0  |       | $V_{DS} = -15\text{V}, I_D = -10\mu\text{A}$  |
|              |                                 | -2.0     | -5.0  |       | $V_{DS} = V_{GS}, I_D = -10\mu\text{A}$       |
| $V_{GS}$     | Gate Source Voltage             | -3.0     | -6.5  |       | $V_{DS} = -15\text{V}, I_D = -500\mu\text{A}$ |
| $I_{DSS}$    | Zero Gate Voltage Drain Current |          | -200  |       | $V_{DS} = -15\text{V}$                        |
| $I_{SDS}$    | Source Drain Current            |          | -400  |       | $V_{SD} = -15\text{V}, V_{DB} = 0$            |
| $r_{DS(on)}$ | Drain-Source on Resistance      |          | 300   |       | $V_{DS} = -20\text{V}, I_D = -100\mu\text{A}$ |
| $I_{D(on)}$  | On Drain Current                | -5.0     | -30.0 | mA    | $V_{DS} = -15\text{V}, V_{GS} = -10\text{V}$  |

**ELECTRICAL CHARACTERISTICS** (Continued) ( $T_A = 25^{\circ}\text{C}$  and  $V_{BS} = 0$  unless otherwise specified)

| SYMBOL           | PARAMETER                                 | 3N190/91 |      | UNITS | TEST CONDITIONS                                |          |
|------------------|-------------------------------------------|----------|------|-------|------------------------------------------------|----------|
|                  |                                           | MIN      | MAX  |       |                                                |          |
| g <sub>fs</sub>  | Forward Transconductance (Note 3)         | 1500     | 4000 | μS    | V <sub>DS</sub> = -15V, I <sub>D</sub> = -10mA | f = 1kHz |
| Y <sub>os</sub>  | Output Admittance                         |          | 300  |       |                                                |          |
| C <sub>iss</sub> | Input Capacitance Output Shorted (Note 5) |          | 4.5  | pF    |                                                | f = 1MHz |
| C <sub>rss</sub> | Reverse Transfer Capacitance (Note 5)     |          | 1.0  |       |                                                |          |
| C <sub>oss</sub> | Output Capacitance Input Shorted (Note 5) |          | 3.0  |       |                                                |          |

**SWITCHING CHARACTERISTICS** ( $T_A = 25^{\circ}\text{C}$  and  $V_{BS} = 0$  unless otherwise specified)

| SYMBOL      | PARAMETER          | MIN | MAX | UNITS | TEST CONDITIONS                                                                          |
|-------------|--------------------|-----|-----|-------|------------------------------------------------------------------------------------------|
| $t_{d(on)}$ | Turn On Delay Time |     | 15  | ns    | $V_{DD} = -15\text{V}$ , $I_D = -10\text{mA}$ , $R_G = R_L = 1.4\text{k}\Omega$ (Note 5) |
| $t_r$       | Rise Time          |     | 30  |       |                                                                                          |
| $t_{off}$   | Turn Off Time      |     | 50  |       |                                                                                          |

**MATCHING CHARACTERISTICS** ( $T_A = 25^{\circ}\text{C}$  and  $V_{BS} = 0$  unless otherwise specified) 3N188 and 3N190

| SYMBOL                              | PARAMETER                                                                   | MIN  | MAX | UNITS                          | TEST CONDITIONS                                                                                        |
|-------------------------------------|-----------------------------------------------------------------------------|------|-----|--------------------------------|--------------------------------------------------------------------------------------------------------|
| $Y_{fs1} / Y_{fs2}$                 | Forward Transconductance Ratio                                              | 0.85 | 1.0 |                                | $V_{DS} = -15\text{V}$ , $I_D = -500\mu\text{A}$ , $f = 1\text{kHz}$                                   |
| $V_{GS1-2}$                         | Gate Source Threshold Voltage Differential                                  |      | 100 | mV                             | $V_{DS} = -15\text{V}$ , $I_D = -500\mu\text{A}$                                                       |
| $\frac{\Delta V_{GS1-2}}{\Delta T}$ | Gate Source Threshold Voltage Differential Change with Temperature (Note 4) |      | 100 | $\mu\text{V}/^{\circ}\text{C}$ | $V_{DS} = -15\text{V}$ , $I_D = -500\mu\text{A}$ , $T = -55^{\circ}\text{C}$ to $+25^{\circ}\text{C}$  |
| $\frac{\Delta V_{GS1-2}}{\Delta T}$ | Gate Source Threshold Voltage Differential Change with Temperature (Note 4) |      | 100 | $\mu\text{V}/^{\circ}\text{C}$ | $V_{DS} = -15\text{V}$ , $I_D = -500\mu\text{A}$ , $T = +25^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ |

- NOTES:**
1. Per transistor.
  2. Approximately doubles for every  $10^{\circ}\text{C}$  increase in  $T_A$ .
  3. Pulse test duration =  $300\mu\text{s}$ ; duty cycle  $\leq 3\%$ .
  4. Measured at end points,  $T_A$  and  $T_B$ .
  5. For design reference only, not 100% tested.