

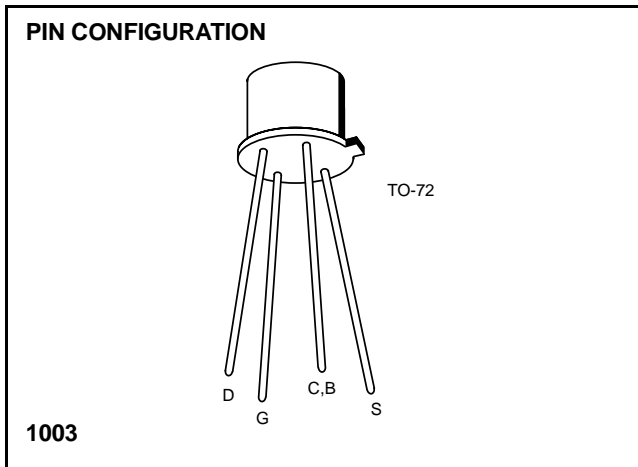
# N-Channel Enhancement Mode MOSFET Switch



## 3N170 / 3N171

### FEATURES

- Low Switching Voltages
- Fast Switching Times
- Low Drain-Source Resistance
- Low Reverse Transfer Capacitance



### HANDLING PRECAUTIONS

MOS field-effect transistors have extremely high input resistance and can be damaged by the accumulation of excess static charge. To avoid possible damage to the device while wiring, testing, or in actual operation, follow the procedures outlined below.

1. To avoid the build-up of static charge, the leads of the devices should remain shorted together with a metal ring except when being tested or used.
2. Avoid unnecessary handling. Pick up devices by the case instead of the leads.
3. Do not insert or remove devices from circuits with the power on as transient voltages may cause permanent damage to the devices.

### ABSOLUTE MAXIMUM RATINGS

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

|                                     |                 |
|-------------------------------------|-----------------|
| Drain-Gate Voltage                  | ±35V            |
| Drain-Source Voltage                | 25V             |
| Gate-Source Voltage                 | ±35V            |
| Drain Current                       | 30mA            |
| Storage Temperature Range           | -65°C to +200°C |
| Operating Temperature Range         | -55°C to +150°C |
| Lead Temperature (Soldering, 10sec) | +300°C          |
| Power Dissipation                   | 300mW           |
| Derate above 25°C                   | 2.4mW/°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 |
|-----------|--------------------------|-------------------|
| 3N170-71  | Hermetic TO-72           | -55°C to +150°C   |
| X3N170-71 | Sorted Chips in Carriers | -55°C to +150°C   |

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise specified) Substrate connected to source.

| SYMBOL       | PARAMETER                             | MIN   | MAX      | UNITS         | TEST CONDITIONS  |   |
|--------------|---------------------------------------|-------|----------|---------------|--|---|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage        | 25    |          | V             | $I_D = 10\mu\text{A}$ , $V_{GS} = 0$   |   |
| $I_{GSS}$    | Gate Leakage Current                  |       | $\pm 10$ | $\mu\text{A}$ | $V_{GS} = \pm 35\text{V}$ , $V_{DS} = 0$   |   |
|              |                                       |       | 100      |               | $V_{GS} = 35\text{V}$ , $V_{DS} = 0$ , $T_A = 125^\circ\text{C}$   |   |
| $I_{DSS}$    | Zero-Gate-Voltage Drain Current       |       | 10       | nA            | $V_{DS} = 10\text{V}$ , $V_{GS} = 0$   |   |
|              |                                       |       | 1.0      | $\mu\text{A}$ | $T_A = 125^\circ\text{C}$  |   |
| $V_{GS(th)}$ | Gate-Source Threshold Voltage         | 3N170 | 1.0      | 2.0           | V  | $V_{DS} = 10\text{V}$ , $I_D = 10\mu\text{A}$ |
|              |                                       | 3N171 | 1.5      | 3.0           |  |   |
| $I_{D(on)}$  | "ON" Drain Current                    | 10    |          | mA            | $V_{GS} = 10\text{V}$ , $V_{DS} = 10\text{V}$  |   |
| $V_{DS(on)}$ | Drain-Source "ON" Voltage             |       | 2.0      | V             | $I_D = 10\text{mA}$ , $V_{GS} = 10\text{V}$  |   |
| $r_{ds(on)}$ | Drain-Source ON Resistance            |       | 200      | $\Omega$      | $V_{GS} = 10\text{V}$ , $I_D = 0$ , $f = 1\text{kHz}$  |   |
| $ Y_{fs} $   | Forward Transfer Admittance           | 1000  |          | $\mu\text{S}$ | $V_{DS} = 10\text{V}$ , $I_D = 2.0\text{mA}$ , $f = 1\text{kHz}$   |   |
| $C_{rSS}$    | Reverse Transfer Capacitance (Note 1) |       | 1.3      | $\text{pF}$   | $V_{DS} = 0$ , $V_{GS} = 0$ , $f = 1\text{MHz}$  |   |
| $C_{iSS}$    | Input Capacitance (Note 1)            |       | 5.0      |               | $V_{DS} = 10\text{V}$ , $V_{GS} = 0$ , $f = 1\text{MHz}$   |   |
| $C_{d(sub)}$ | Drain-Substrate Capacitance (Note 1)  |       | 5.0      |               | $V_{D(SUB)} = 10\text{V}$ , $f = 1\text{MHz}$  |   |
| $t_{d(on)}$  | Turn-On Delay Time (Note 1)           |       | 3.0      | ns            | $V_{DD} = 10\text{V}$ , $I_{D(on)} = 10\text{mA}$ ,<br>$V_{GS(on)} = 10\text{V}$ , $V_{GS(off)} = 0$ ,<br>$R_G = 50\Omega$ |   |
| $t_r$        | Rise Time (Note 1)                    |       | 10       |               |  |   |
| $t_{d(off)}$ | Turn-Off Delay Time (Note 1)          |       | 3.0      |               |  |   |
| $t_f$        | Fall Time (Note 1)                    |       | 15       |               |  |   |

**NOTE 1:** For design reference only, not 100% tested.