

## NTE2975 MOSFET N-Channel, Enhancement Mode High Speed Switch

### **Features:**

- Advanced Process Technology
- Ultra Low On-State Resistance
- Dynamic dv/dt Rating
- +175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated

### **Absolute Maximum Ratings:**

|                                                                                    |                               |
|------------------------------------------------------------------------------------|-------------------------------|
| Drain Current, $I_D$                                                               |                               |
| Continuous ( $V_{GS} = 10V$ )                                                      |                               |
| $T_C = +25^\circ C$ (Note 1) .....                                                 | 53A                           |
| $T_C = +100^\circ C$ .....                                                         | 37A                           |
| Pulse (Note 2) .....                                                               | 180A                          |
| Power Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....                             | 107W                          |
| Derate above $+25^\circ C$ .....                                                   | 0.71W/ $^\circ C$             |
| Gate-Source Voltage, $V_{GS}$ .....                                                | $\pm 20V$                     |
| Avalanche Current (Note 2), $I_{AR}$ .....                                         | 28A                           |
| Repetitive Avalanche Energy (Note 2), $E_{AR}$ .....                               | 11mJ                          |
| Single Pulse Avalanche Energy (Note 3, Note 4), $E_{AS}$ .....                     | 152mJ                         |
| Peak Diode Recovery (Note 5), dv/dt .....                                          | 5.0V/ns                       |
| Operating Junction Temperature Range, $T_J$ .....                                  | $-55^\circ$ to $+175^\circ C$ |
| Storage Temperature Range, $T_{stg}$ .....                                         | $-55^\circ$ to $+175^\circ C$ |
| Lead Temperature (During Soldering, 1.6mm from case, 10sec max), $T_L$ .....       | $+300^\circ C$                |
| Maximum Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....                     | 1.4 $^\circ C/W$              |
| Typical Thermal Resistance, Case-to-Sink (Flat, greased surface), $R_{thCS}$ ..... | 0.5 $^\circ C/W$              |
| Maximum Thermal Resistance, Junction-to-Ambient, $R_{thJA}$ .....                  | 62 $^\circ C/W$               |

Note 1. Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 39A.

Note 2. Repetitive rating; pulse width limited by maximum junction temperature.

Note 3. Starting  $T_J = +25^\circ C$ ,  $L = 389\mu H$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 28A$ .

Note 4. This is a calculated value limited to  $T_J = +175^\circ C$ .

Note 5.  $I_{SD} \leq 28A$ ,  $di/dt \leq 220A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq +175^\circ C$

**Electrical Characteristics:** ( $T_J = +25^{\circ}\text{C}$  unless otherwise specified)

| Parameter                                 | Symbol                                  | Test Conditions                                                             | Min | Typ   | Max  | Unit |
|-------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------|-----|-------|------|------|
| Drain–Source Breakdown Voltage            | $V_{(BR)DSS}$                           | $V_{GS} = 0V, I_D = 250\mu A$                                               | 55  | –     | –    | V    |
| Breakdown Voltage Temperature Coefficient | $\frac{\Delta V_{(BR)DSS}}{\Delta T_J}$ | Reference to +25°C, $I_D = 1mA$                                             | –   | 0.057 | –    | V/°C |
| Static Drain–Source On–Resistance         | $R_{DS(on)}$                            | $V_{GS} = 10V, I_D = 28A$ , Note 6                                          | –   | –     | 16.5 | mΩ   |
| Gate Threshold Voltage                    | $V_{GS(th)}$                            | $V_{DS} = V_{GS}, I_D = 250\mu A$                                           | 2.0 | –     | 4.0  | V    |
| Forward Transconductance                  | $g_{fs}$                                | $V_{DS} = 25V, I_D = 28A$ , Note 6                                          | 19  | –     | –    | S    |
| Drain–Source Leakage Current              | $I_{DSS}$                               | $V_{DS} = 55V, V_{GS} = 0$                                                  | –   | –     | 25   | μA   |
|                                           |                                         | $V_{DS} = 44V, V_{GS} = 0, T_J = +150^{\circ}C$                             | –   | –     | 250  | μA   |
| Gate–Source Forward Leakage Current       | $I_{GSS}$                               | $V_{GS} = 20V$                                                              | –   | –     | 100  | nA   |
|                                           |                                         | $V_{GS} = -20V$                                                             | –   | –     | –100 | nA   |
| Total Gate Charge                         | $Q_G$                                   | $V_{GS} = 10V, I_D = 28A, V_{DS} = 44V$                                     | –   | –     | 72   | nC   |
| Gate–Source Charge                        | $Q_{GS}$                                |                                                                             | –   | –     | 11   | nC   |
| Gate–Drain (“Miller”) Charge              | $Q_{GD}$                                |                                                                             | –   | –     | 26   | nC   |
| Turn–On Delay Time                        | $t_{d(on)}$                             | $V_{GS} = 10V, V_{DD} = 28V, I_D = 28A, R_G = 12\Omega$                     | –   | 14    | –    | ns   |
| Rise Time                                 | $t_r$                                   |                                                                             | –   | 76    | –    | ns   |
| Turn–Off Delay Time                       | $t_{d(off)}$                            |                                                                             | –   | 52    | –    | ns   |
| Fall Time                                 | $t_f$                                   |                                                                             | –   | 57    | –    | ns   |
| Internal Drain Inductance                 | $L_D$                                   | Between lead, .250 (6mm) from package and center of die contact             | –   | 4.5   | –    | nH   |
| Internal Source Inductance                | $L_S$                                   |                                                                             | –   | 7.5   | –    | nH   |
| Input Capacitance                         | $C_{iss}$                               | $V_{DS} = 25V, V_{GS} = 0, f = 1MHz$                                        | –   | 1696  | –    | pF   |
| Output Capacitance                        | $C_{oss}$                               |                                                                             | –   | 407   | –    | pF   |
| Reverse Transfer Capacitance              | $C_{rss}$                               |                                                                             | –   | 110   | –    | pF   |
| Source–Drain Ratings and Characteristics  |                                         |                                                                             |     |       |      |      |
| Continuous Source Current (Body Diode)    | $I_S$                                   |                                                                             | –   | –     | 53   | A    |
| Pulsed Source Current (Body Diode)        | $I_{SM}$                                | Note 2                                                                      | –   | –     | 180  | A    |
| Diode Forward Voltage                     | $V_{F(S-D)}$                            | $T_J = +25^{\circ}C, I_S = 28A, V_{GS} = 0$ , Note 6                        | –   | –     | 1.3  | V    |
| Reverse Recovery Time                     | $t_{rr}$                                | $T_J = +25^{\circ}C, I_F = 28A, di/dt = 100A/\mu s$ , Note 6                | –   | 67    | 101  | ns   |
| Reverse Recovery Charge                   | $Q_{rr}$                                |                                                                             | –   | 208   | 312  | nC   |
| Forward Turn–On Time                      | $t_{on}$                                | Intrinsic turn–on time is negligible (turn–on is dominated by $L_S + L_D$ ) |     |       |      |      |

Note 2. Repetitive rating; pulse width limited by maximum junction temperature.

Note 6. Pulse width  $\leq 400\mu\text{s}$ , duty cycle  $\leq 2\%$ .

