



**ELECTRONICS, INC.**  
 44 FARRAND STREET  
 BLOOMFIELD, NJ 07003  
 (973) 748-5089

## NTE2969 MOSFET N-Channel, Enhancement Mode High Speed Switch

**Features:**

- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Low Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current
- Low Static Drain-Source On-State Resistance

**Absolute Maximum Ratings:**

|  |                               |
|--|-------------------------------|
| Drain-Source Voltage, $V_{DSS}$ .....  | 400V                          |
| Drain Current, $I_D$   |                               |
| Continuous   |                               |
| $T_C = +25^\circ C$ .....  | 25A                           |
| $T_C = +100^\circ C$ .....   | 15.1A                         |
| Pulsed (Note 1) .....  | 100A                          |
| Gate-Source Voltage, $V_{GS}$ .....  | $\pm 30V$                     |
| Gate Current (Pulsed), $I_{GM}$ .....  | $\pm 1.5A$                    |
| Single Pulsed Avalanche Energy (Note 2), $E_{AS}$ .....                        | 1429mJ                        |
| Avalanche Current (Note 1), $I_{AS}$ .....                                     | 25A                           |
| Repetitive Avalanche Energy (Note 1), $E_{AR}$ .....                           | 27.8mJ                        |
| Peak Diode Recovery $dv/dt$ (Note 3), $dv/dt$ .....                            | 4.0V/ns                       |
| Total Power Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....                   | 278W                          |
| Derate Above $25^\circ C$ .....  | 2.22W/ $^\circ C$             |
| Operating Junction Temperature Range, $T_J$ .....                              | $-55^\circ$ to $+150^\circ C$ |
| Storage Temperature Range, $T_{stg}$ .....                                     | $-55^\circ$ to $+150^\circ C$ |
| Maximum Lead Temperature (During Soldering, 1/8" from case, 5sec), $T_L$ ..... | $+300^\circ C$                |
| Thermal Resistance:  |                               |
| Maximum Junction-to-Case, $R_{thJC}$ .....                                     | 0.45 $^\circ C/W$             |
| Typical Case-to-Sink, $R_{thCS}$ .....   | 0.24 $^\circ C/W$             |
| Maximum Junction-to-Ambient, $R_{thJA}$ .....                                  | 40 $^\circ C/W$               |

Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.  
 Note 2.  $L = 4mH$ ,  $I_{AS} = 25A$ ,  $V_{DD} = 50V$ ,  $R_G = 27\Omega$ , Starting  $T_J = +25^\circ C$ .  
 Note 3.  $I_{SD} \leq 25A$ ,  $di/dt \leq 320A/\mu s$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = +25^\circ C$ .

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

| Parameter   | Symbol                 | Test Conditions  | Min | Typ   | Max  | Unit     |
|---|------------------------|--|-----|-------|------|----------|
| Drain–Source Breakdown Voltage                        | $BV_{DSS}$             | $V_{GS} = 0V, I_D = 250\mu A$                                      | 400 | –     | –    | V        |
| Breakdown Voltage Temperature Coefficient             | $\Delta BV/\Delta T_J$ | $I_D = 250\mu A$   | –   | 0.20  | –    | V/°C     |
| Gate Threshold Voltage                                | $V_{GS(th)}$           | $V_{DS} = 5V, I_D = 250\mu A$                                      | 2.0 | –     | 4.0  | V        |
| Gate–Source Leakage Forward                           | $I_{GSS}$              | $V_{GS} = 30V$   | –   | –     | 100  | nA       |
| Gate–Source Leakage Reverse                           | $I_{GSS}$              | $V_{GS} = -30V$  | –   | –     | -100 | nA       |
| Zero Gate Voltage Drain Current                       | $I_{DSS}$              | $V_{DS} = 400V, V_{GS} = 0$  | –   | –     | 10   | $\mu A$  |
|   |                        | $V_{DS} = 320V, T_C = +150^\circ\text{C}$                          | –   | –     | 100  | $\mu A$  |
| Static Drain–Source ON Resistance                     | $R_{DS(on)}$           | $V_{GS} = 10V, I_D = 12.5A, \text{Note 4}$                         | –   | –     | 0.2  | $\Omega$ |
| Forward Transconductance                              | $g_{fs}$               | $V_{DS} = 50V, I_D = 12.5A, \text{Note 4}$                         | –   | 18.91 | –    | mhos     |
| Input Capacitance                                     | $C_{iss}$              | $V_{GS} = 0V, V_{DS} = 25V, f = 1\text{MHz}$                       | –   | 3180  | 4130 | pF       |
| Output Capacitance                                    | $C_{oss}$              |  | –   | 435   | 500  | pF       |
| Reverse Transfer Capacitance                          | $C_{rss}$              |  | –   | 200   | 240  | pF       |
| Turn–On Delay Time                                    | $t_{d(on)}$            | $V_{DD} = 200V, I_D = 25A, R_G = 5.3\Omega, \text{Note 4, Note 5}$ | –   | 22    | 55   | ns       |
| Rise Time   | $t_r$                  |  | –   | 22    | 60   | ns       |
| Turn–Off Delay Time                                   | $t_{d(off)}$           |  | –   | 127   | 260  | ns       |
| Fall Time   | $t_f$                  |  | –   | 38    | 85   | ns       |
| Total Gate Charge                                     | $Q_g$                  | $V_{GS} = 10V, I_D = 25A, V_{DS} = 320V, \text{Note 4, Note 5}$    | –   | 140   | 182  | nC       |
| Gate–Source Charge                                    | $Q_{gs}$               |  | –   | 21    | –    | nC       |
| Gate–Drain (“Miller”) Charge                          | $Q_{gd}$               |  | –   | 64.8  | –    | nC       |
| <b>Source–Drain Diode Ratings and Characteristics</b> |                        |  |     |       |      |          |
| Continuous Source Current                             | $I_S$                  | (Body Diode)   | –   | –     | 25   | A        |
| Pulse Source Current                                  | $I_{SM}$               | (Body Diode) Note 1  | –   | –     | 100  | A        |
| Diode Forward Voltage                                 | $V_{SD}$               | $T_J = +25^\circ\text{C}, I_S = 25A, V_{GS} = 0V, \text{Note 4}$   | –   | –     | 1.5  | V        |
| Reverse Recovery Time                                 | $t_{rr}$               | $T_J = +25^\circ\text{C}, I_F = 25A, di_F/dt = 100A/\mu s$         | –   | 484   | –    | ns       |
| Reverse Recovery Charge                               | $Q_{rr}$               |  | –   | 7.6   | –    | $\mu C$  |

Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

Note 4. Pulse Test: Pulse Width  $\leq 250\mu s$ , Duty Cycle  $\leq 2\%$ .

Note 5. Essentially independent of operating temperature.

