

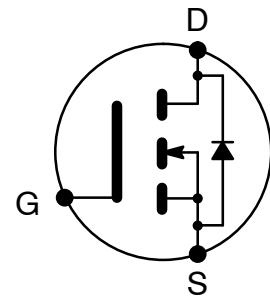


ELECTRONICS, INC.  
 44 FARRAND STREET  
 BLOOMFIELD, NJ 07003  
 (973) 748-5089  
<http://www.nteinc.com>

## NTE2987 Logic Level MOSFET N-Channel, Enhancement Mode High Speed Switch TO220 Type Package

### Features:

- Avalanche Rugged Technology
- Logic Level Gate Drive
- $R_{DS(on)} = 0.09\Omega$  Typ. at  $V_{GS} = 5V$
- +175°C Operating Temperature
- Fast Switching
- Low Gate Charge
- High Current Capability



### Absolute Maximum Ratings:

|   |                  |
|---|------------------|
| Drain Current, $I_D$  |                  |
| Continuous  |                  |
| $T_C = +25^\circ C$ .....   | 20A              |
| $T_C = +100^\circ C$ .....  | 14A              |
| Pulsed (Note 1) .....   | 80A              |
| Total Power Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....                        | 105W             |
| Derate Above $25^\circ C$ .....   | 0.7W/ $^\circ C$ |
| Gate-Source Voltage, $V_{GS}$ .....   | $\pm 15V$        |
| Avalanche Current, Repetitive or Non-Repetitive (Note 2), $I_{AR}$ .....            | 20A              |
| Single Pulsed Avalanche Energy (Note 3), $E_{AS}$ .....                             | 120mJ            |
| Repetitive Avalanche Energy (Note 2), $E_{AR}$ .....                                | 30mJ             |
| Avalanche Current, Repetitive or Non-Repetitive (Note 4), $I_{AR}$ .....            | 14A              |
| Drain-Source Voltage ( $V_{GS} = 0$ ), $V_{DS}$ .....                               | 100V             |
| Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ ), $V_{DGR}$ .....                        | 100V             |
| Operating Junction Temperature, $T_J$ .....   | +175°C           |
| Storage Temperature Range, $T_{stg}$ .....  | -65° to +175°C   |
| Maximum Lead Temperature (During Soldering, 1.6mm from case, 10sec), $T_L$ .....    | +300°C           |
| Thermal Resistance:   |                  |
| Maximum Junction-to-Case, $R_{thJC}$ .....  | 1.43°C/W         |
| Typical Case-to-Sink (Mounting surface flat, smooth, and greased), $R_{thCS}$ ..... | 0.5°C/W          |
| Maximum Junction-to-Ambient (Free Air Operation), $R_{thJA}$ .....                  | 62.5°C/W         |

Note 1. Pulse width limited by safe operating area.

Note 2. Pulse width limited by  $T_J$  max, Duty Cycle < 1%.

Note 3.  $V_{DD} = 25V$ ,  $I_D = I_{AR}$ , Starting  $T_J = +175^\circ C$ .

Note 4.  $T_C = +100^\circ C$ , Pulse width limited by  $T_J$  max, Duty Cycle < 1%.

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

| Parameter   | Symbol       | Test Conditions  | Min | Typ  | Max  | Unit          |
|---|--------------|--|-----|------|------|---------------|
| <b>OFF</b>  |              |  |     |      |      |               |
| Drain–Source Breakdown Voltage                        | $BV_{DSS}$   | $V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$   | 100 | –    | –    | V             |
| Drain–to–Source Leakage Current                       | $I_{DSS}$    | $V_{DS} = 100\text{V}, V_{GS} = 0$   | –   | –    | 1    | $\mu\text{A}$ |
|   |              | $V_{DS} = 80\text{V}, V_{GS} = 0\text{V}, T_C = +150^\circ\text{C}$  | –   | –    | 10   | $\mu\text{A}$ |
| Gate–Source Leakage Forward                           | $I_{GSS}$    | $V_{GS} = 15\text{V}$  | –   | –    | 100  | nA            |
| Gate–Source Leakage Reverse                           | $I_{GSS}$    | $V_{GS} = -15\text{V}$   | –   | –    | -100 | nA            |
| <b>ON (Note 5)</b>                                    |              |  |     |      |      |               |
| Gate Threshold Voltage                                | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$  | 1.0 | 1.6  | 2.5  | V             |
| Static Drain–Source ON Resistance                     | $R_{DS(on)}$ | $V_{GS} = 5\text{V}, I_D = 10\text{A}$   | –   | 0.09 | 0.12 | $\Omega$      |
| On–State Drain Current                                | $I_{D(on)}$  | $V_{DS} > I_{D(on)} \times R_{DS(on)}\text{max}, V_{GS} = 10\text{V}$                                      | 20  | –    | –    | A             |
| <b>Dynamic</b>  |              |  |     |      |      |               |
| Forward Transconductance                              | $g_{fs}$     | $V_{DS} > I_{D(on)} \times R_{DS(on)}\text{max}, I_D = 10\text{A},$<br>Note 5                              | 10  | 16   | –    | mhos          |
| Input Capacitance                                     | $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$   | –   | 1200 | 1500 | pF            |
| Output Capacitance                                    | $C_{oss}$    |  | –   | 250  | 350  | pF            |
| Reverse Transfer Capacitance                          | $C_{rss}$    |  | –   | 60   | 90   | pF            |
| <b>Switching</b>                                      |              |  |     |      |      |               |
| Total Gate Charge                                     | $Q_g$        | $V_{GS} = 5\text{V}, I_D = 20\text{A}, V_{DD} = 80\text{V}$  | –   | 22   | 30   | nC            |
| Gate–Source Charge                                    | $Q_{gs}$     |  | –   | 6    | –    | nC            |
| Gate–Drain (“Miller”) Charge                          | $Q_{gd}$     |  | –   | 12   | –    | nC            |
| Turn–On Delay Time                                    | $t_{d(on)}$  | $V_{DD} = 30\text{V}, I_D = 10\text{A}, R_G = 50\Omega,$<br>$V_{GS} = 5\text{V}$                           | –   | 50   | 70   | ns            |
| Rise Time   | $t_r$        |  | –   | 140  | 200  | ns            |
| Turn–Off Delay Time                                   | $t_{d(off)}$ | $V_{DD} = 80\text{V}, I_D = 20\text{A}, R_G = 50\Omega,$<br>$V_{GS} = 5\text{V}$                           | –   | 80   | 110  | ns            |
| Fall Time   | $t_f$        |  | –   | 80   | 110  | ns            |
| <b>Source–Drain Diode Ratings and Characteristics</b> |              |  |     |      |      |               |
| Continuous Source Current                             | $I_S$        | (Body Diode)   | –   | –    | 20   | A             |
| Pulse Source Current                                  | $I_{SM}$     | (Body Diode) Note 1  | –   | –    | 80   | A             |
| Diode Forward Voltage                                 | $V_{SD}$     | $I_{SD} = 20\text{A}, V_{GS} = 0\text{V},$ Note 5  | –   | –    | 1.5  | V             |
| Reverse Recovery Time                                 | $t_{rr}$     | $T_J = +150^\circ\text{C}, V_{DD} = 50\text{V}, I_{SD} = 20\text{A},$<br>$di/dt = 100\text{A}/\mu\text{s}$ | –   | 130  | –    | ns            |
| Reverse Recovery Charge                               | $Q_{rr}$     |  | –   | 0.4  | –    | $\mu\text{C}$ |
| Reverse Recovery Current                              | $I_{RRM}$    |  | –   | 6    | –    | A             |

Note 1. Pulse width limited by safe operating area.

Note 5. Pulse Test: Pulse Width =  $300\mu\text{s}$ , Duty Cycle = 1.5%.

