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## NTE2980 Logic Level MOSFET N-Channel, Enhancement Mode High Speed Switch

**Features:**

- Dynamic dv/dt Rating
- Logic Level Gate Drive
- R<sub>DS(on)</sub> Specified at V<sub>GS</sub> = 4V & 5V
- Fast Switching

**Absolute Maximum Ratings:**

|  |                |
|--|----------------|
| Drain Current, I <sub>D</sub>  |                |
| Continuous (V <sub>GS</sub> = 5V)  |                |
| T <sub>C</sub> = +25°C   | 7.7A           |
| T <sub>C</sub> = +100°C  | 4.9A           |
| Pulsed (Note 1)  | 31A            |
| Total Power Dissipation (T <sub>C</sub> = +25°C), P <sub>D</sub>                         | 25W            |
| Derate Above 25°C  | 0.20W/°C       |
| Total Power Dissipation (PC Board Mount, T <sub>C</sub> = +25°C, Note 2), P <sub>D</sub> | 2.5W           |
| Derate Above 25°C  | 0.02W/°C       |
| Gate-Source Voltage, V <sub>GS</sub>   | ±10V           |
| Single Pulsed Avalanche Energy (Note 3), E <sub>AS</sub>                                 | 47mJ           |
| Peak Diode Recovery dv/dt (Note 4), dv/dt  | 4.5V/ns        |
| Operating Junction Temperature Range, T <sub>J</sub>                                     | -55° to +150°C |
| Storage Temperature Range, T <sub>stg</sub>  | -55° to +150°C |
| Maximum Lead Temperature (During Soldering, 1.6mm from case, 10sec), T <sub>L</sub>      | +260°C         |
| Maximum Thermal Resistance:  |                |
| Junction-to-Case, R <sub>thJC</sub>  | 5.0°C/W        |
| Junction-to-Ambient (PCB Mount, Note 2), R <sub>thJA</sub>                               | 50°C/W         |
| Junction-to-Ambient, R <sub>thJA</sub>   | 110°C/W        |

- Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.  
 Note 2. When mounted on a 1" square PCB (FR-4 or G-10 material).  
 Note 3. L = 924µH, V<sub>DD</sub> = 25V, R<sub>G</sub> = 25Ω, Starting T<sub>J</sub> = +25°C, I<sub>AS</sub> = 7.7A.  
 Note 4. I<sub>SD</sub> ≤ 10A, di/dt ≤ 90A/µs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ +150°C.

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

| Parameter   | Symbol                            | Test Conditions   | Min | Typ   | Max  | Unit               |
|---|-----------------------------------|---|-----|-------|------|--------------------|
| Drain-Source Breakdown Voltage                        | $BV_{DSS}$                        | $V_{GS} = 0V, I_D = 250\mu A$   | 60  | -     | -    | V                  |
| Breakdown Voltage Temperature Coefficient             | $\Delta V_{(BR)DSS} / \Delta T_J$ | Reference to $+25^\circ\text{C}$ , $I_D = 1\text{mA}$                       | -   | 0.073 | -    | $V/^\circ\text{C}$ |
| Static Drain-Source ON Resistance                     | $R_{DS(on)}$                      | $V_{GS} = 5V, I_D = 4.6A$ , Note 5  | -   | -     | 0.20 | $\Omega$           |
|   |                                   | $V_{GS} = 4V, I_D = 3.9A$ , Note 4  | -   | -     | 0.28 | $\Omega$           |
| Gate Threshold Voltage                                | $V_{GS(th)}$                      | $V_{DS} = V_{GS}, I_D = 250\mu A$   | 1.0 | -     | 2.0  | V                  |
| Forward Transconductance                              | $g_{fs}$                          | $V_{DS} = 25V, I_D = 4.6A$ , Note 5   | 3.4 | -     | -    | mhos               |
| Drain-to-Source Leakage Current                       | $I_{DSS}$                         | $V_{DS} = 60V, V_{GS} = 0$  | -   | -     | 25   | $\mu A$            |
|   |                                   | $V_{DS} = 48V, V_{GS} = 0V, T_C = +125^\circ\text{C}$                       | -   | -     | 250  | $\mu A$            |
| Gate-Source Leakage Forward                           | $I_{GSS}$                         | $V_{GS} = 10V$  | -   | -     | 100  | nA                 |
| Gate-Source Leakage Reverse                           | $I_{GSS}$                         | $V_{GS} = -10V$   | -   | -     | -100 | nA                 |
| Total Gate Charge                                     | $Q_g$                             | $V_{GS} = 5V, I_D = 10A, V_{DS} = 48V$ , Note 5                             | -   | -     | 8.4  | nC                 |
| Gate-Source Charge                                    | $Q_{gs}$                          |   | -   | -     | 3.5  | nC                 |
| Gate-Drain ("Miller") Charge                          | $Q_{gd}$                          |   | -   | -     | 6.0  | nC                 |
| Turn-On Delay Time                                    | $t_{d(on)}$                       | $V_{DD} = 30V, I_D = 10A, R_G = 12\Omega, R_D = 2.8\Omega$ , Note 5         | -   | 9.3   | -    | ns                 |
| Rise Time   | $t_r$                             |   | -   | 110   | -    | ns                 |
| Turn-Off Delay Time                                   | $t_{d(off)}$                      |   | -   | 17    | -    | ns                 |
| Fall Time   | $t_f$                             |   | -   | 26    | -    | ns                 |
| Internal Drain Inductance                             | $L_D$                             | Between lead, 6mm (0.25") from package and center of die contact            | -   | 4.5   | -    | nH                 |
| Internal Source Inductance                            | $L_S$                             |   | -   | 7.5   | -    | nH                 |
| Input Capacitance                                     | $C_{iss}$                         | $V_{GS} = 0V, V_{DS} = 25V, f = 1\text{MHz}$                                | -   | 400   | -    | pF                 |
| Output Capacitance                                    | $C_{oss}$                         |   | -   | 170   | -    | pF                 |
| Reverse Transfer Capacitance                          | $C_{rss}$                         |   | -   | 42    | -    | pF                 |
| <b>Source-Drain Diode Ratings and Characteristics</b> |                                   |   |     |       |      |                    |
| Continuous Source Current                             | $I_S$                             | (Body Diode)  | -   | -     | 7.7  | A                  |
| Pulse Source Current                                  | $I_{SM}$                          | (Body Diode) Note 1   | -   | -     | 31   | A                  |
| Diode Forward Voltage                                 | $V_{SD}$                          | $T_J = +25^\circ\text{C}, I_S = 7.7A, V_{GS} = 0V$ , Note 5                 | -   | -     | 1.6  | V                  |
| Reverse Recovery Time                                 | $t_{rr}$                          | $T_J = +25^\circ\text{C}, I_F = 10A, di/dt = 100A/\mu s$ , Note 5           | -   | 65    | 130  | ns                 |
| Reverse Recovery Charge                               | $Q_{rr}$                          |   | -   | 0.33  | 0.65 | $\mu C$            |
| Forward Turn-On Time                                  | $t_{on}$                          | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$ ) |     |       |      |                    |

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

Note 5. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

