

## NTE2944 MOSFET N-Channel, Enhancement Mode High Speed Switch

### **Features:**

- Low Static Drain-Source ON Resistance
- Improved Inductive Ruggedness
- Fast Switching Times
- Low Input Capacitance
- Extended Safe Operating Area
- Improved High Temperature Reliability
- TO220 Type Isolated Package

### **Absolute Maximum Ratings:**

|                                                                               |                               |
|-------------------------------------------------------------------------------|-------------------------------|
| Drain-Source Voltage (Note 1), $V_{DSS}$                                      | 200V                          |
| Drain-Gate Voltage ( $R_{GS} = 1M\Omega$ , Note 1), $V_{DGR}$                 | 200V                          |
| Gate-Source Voltage, $V_{GS}$                                                 | $\pm 20V$                     |
| Drain Current, $I_D$                                                          |                               |
| Continuous                                                                    |                               |
| $T_C = +25^\circ C$                                                           | 9.8A                          |
| $T_C = +100^\circ C$                                                          | 6.8A                          |
| Pulsed (Note 2)                                                               | 72A                           |
| Gate Current (Pulsed), $I_{GM}$                                               | $\pm 1.5A$                    |
| Single Pulsed Avalanche Energy (Note 3), $E_{AS}$                             | 178mJ                         |
| Avalanche Current, $I_{AS}$                                                   | 9.8A                          |
| Total Power Dissipation ( $T_C = +25^\circ C$ ), $P_D$                        | 40W                           |
| Derate Above $25^\circ C$                                                     | 0.32W/ $^\circ C$             |
| 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, $R_{thJC}$                                          | 3.12K/W                       |
| Typical Case-to-Sink (Mounting surface flat, smooth, and greased), $R_{thCS}$ | 0.5K/W                        |
| Maximum Junction-to-Ambient (Free Air Operation), $R_{thJA}$                  | 62.5K/W                       |

Note 1.  $T_J = +25^\circ$  to  $+150^\circ C$ .

Note 2. Repetitive Rating: Pulse width limited by maximum junction temperature.

Note 3.  $L = 2.7mH$ ,  $V_{DD} = 50V$ ,  $R_G = 25\Omega$ , 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 <sub>DSS</sub>   | V <sub>GS</sub> = 0v, I <sub>D</sub> = 250μA                                                                                                                            | 200 | –    | –    | V    |
| Gate Threshold Voltage                             | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                                                                                              | 2.0 | –    | 4.0  | V    |
| Gate–Source Leakage Forward                        | I <sub>GSS</sub>    | V <sub>GS</sub> = 20V                                                                                                                                                   | –   | –    | 100  | nA   |
| Gate–Source Leakage Reverse                        | I <sub>GSS</sub>    | V <sub>GS</sub> = –20V                                                                                                                                                  | –   | –    | –100 | nA   |
| Zero Gate Voltage Drain Current                    | I <sub>DSS</sub>    | V <sub>DS</sub> = Max. Rating, V <sub>GS</sub> = 0                                                                                                                      | –   | –    | 250  | μA   |
|                                                    |                     | V <sub>DS</sub> = 0.8 Max. Rating, T <sub>C</sub> = +125°C                                                                                                              | –   | –    | 1000 | μA   |
| Static Drain–Source ON Resistance                  | R <sub>DS(on)</sub> | V <sub>GS</sub> = 10V, I <sub>D</sub> = 9A, Note 4                                                                                                                      | –   | –    | 0.18 | Ω    |
| Forward Transconductance                           | g <sub>fs</sub>     | V <sub>DS</sub> ≥ 50V, I <sub>D</sub> = 9A, Note 4                                                                                                                      | 6.0 | 9.5  | –    | mhos |
| Input Capacitance                                  | C <sub>iss</sub>    | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 25V, f = 1MHz                                                                                                                   | –   | 1400 | –    | pF   |
| Output Capacitance                                 | C <sub>oss</sub>    |                                                                                                                                                                         | –   | 240  | –    | pF   |
| Reverse Transfer Capacitance                       | C <sub>rss</sub>    |                                                                                                                                                                         | –   | 95   | –    | pF   |
| Turn–On Delay Time                                 | t <sub>d(on)</sub>  | V <sub>DD</sub> = 0.5 BV <sub>DSS</sub> , I <sub>D</sub> = 18A, Z <sub>O</sub> = 9.1Ω,<br>(MOSFET switching times are essentially independent of operating temperature) | –   | –    | 30   | ns   |
| Rise Time                                          | t <sub>r</sub>      |                                                                                                                                                                         | –   | –    | 60   | ns   |
| Turn–Off Delay Time                                | t <sub>d(off)</sub> |                                                                                                                                                                         | –   | –    | 80   | ns   |
| Fall Time                                          | t <sub>f</sub>      |                                                                                                                                                                         | –   | –    | 60   | ns   |
| Total Gate Charge<br>(Gate–Source Plus Gate–Drain) | Q <sub>g</sub>      | V <sub>GS</sub> = 10V, I <sub>D</sub> = 18A, V <sub>DS</sub> = 0.8 Max.<br>Rating, (Gate charge is essentially independent of operating temperature)                    | –   | –    | 64   | nC   |
| Gate–Source Charge                                 | Q <sub>gs</sub>     |                                                                                                                                                                         | –   | 12.3 | –    | nC   |
| Gate–Drain (“Miller”) Charge                       | Q <sub>gd</sub>     |                                                                                                                                                                         | –   | 25.3 | –    | nC   |
| Source–Drain Diode Ratings and Characteristics     |                     |                                                                                                                                                                         |     |      |      |      |
| Continuous Source Current                          | I <sub>S</sub>      | (Body Diode)                                                                                                                                                            | –   | –    | 18   | A    |
| Pulse Source Current                               | I <sub>SM</sub>     | (Body Diode) Note 2                                                                                                                                                     | –   | –    | 72   | A    |
| Diode Forward Voltage                              | V <sub>SD</sub>     | T <sub>J</sub> = +25°C, I <sub>S</sub> = 18A, V <sub>GS</sub> = 0V, Note 4                                                                                              | –   | –    | 2    | V    |
| Reverse Recovery Time                              | t <sub>rr</sub>     | T <sub>J</sub> = +25°C, I <sub>F</sub> = 18A, dI <sub>F</sub> /dt = 100A/μs                                                                                             | –   | 650  | –    | ns   |

Note 2. Repetitive Rating: Pulse width limited by maximum junction temperature.

Note 4. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

