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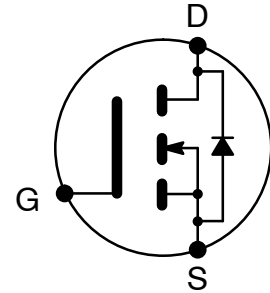
## NTE2969 MOSFET N-Channel, Enhancement Mode High Speed Switch TO3P Type Package

**Description:**

The NTE2969 is an N-channel enhancement mode power field effect transistor in a TO3P type package especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. This device is well suited for use in applications such as a high efficiency switch mode power supply or an electronic lamp ballast on half bridge.

**Features:**

- 30A, 400V,  $R_{DS(on)} = 0.14\pm @ V_{GS} = 10V$
- Low gate Charge (90nC Typ)
- Low  $C_{rss}$  (60pF Typ)
- Fast Switching
- 100% Avalanche Tested
- Improved dv/dt Capability



**Absolute Maximum Ratings:** ( $T_C = +25^\circ C$  unless otherwise specified)

|  |                                 |
|--|---------------------------------|
| Drain-Source Voltage, $V_{DSS}$ .....  | 400V                            |
| Drain Current, $I_D$   |                                 |
| Continuous   |                                 |
| $T_C = +25^\circ C$ .....  | 30A                             |
| $T_C = +100^\circ C$ .....   | 19A                             |
| Pulsed (Note 1) .....  | 120A                            |
| Gate-Source Voltage, $V_{GS}$ .....  | $\pm 30V$                       |
| Gate Current (Pulsed), $I_{GM}$ .....  | $\pm 1.5A$                      |
| Single Pulsed Avalanche Energy (Note 2), $E_{AS}$ .....                        | 1400mJ                          |
| Avalanche Current (Note 1), $I_{AS}$ .....                                     | 30A                             |
| Repetitive Avalanche Energy (Note 1), $E_{AR}$ .....                           | 29mJ                            |
| Peak Diode Recovery dv/dt (Note 3), dv/dt .....                                | 4.5V/ns                         |
| Total Power Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....                   | 290W                            |
| Derate Above $25^\circ C$ .....  | 2.33W/ $^\circ C$               |
| Operating Junction Temperature Range, $T_J$ .....                              | $-55^\circ C$ to $+150^\circ C$ |
| Storage Temperature Range, $T_{stg}$ .....                                     | $-55^\circ C$ 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, $R_{thJC}$ .....                                     | 0.43 $^\circ C/W$               |
| 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.  $L = 2.7mH$ ,  $I_{AS} = 30A$ ,  $V_{DD} = 50V$ ,  $R_G = 27\pm$ , Starting  $T_J = +25^\circ C$ .

Note 3.  $I_{SD} \leq 30A$ ,  $di/dt \leq 200A/\mu s$ ,  $V_{DD} \leq BV_{DSS}$ , 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               |
|---|------------------------|--|-----|-------|------|--------------------|
| <b>OFF Characteristics</b>                            |                        |  |     |       |      |                    |
| Drain–Source Breakdown Voltage                        | $BV_{DSS}$             | $V_{GS} = 0V, I_D = 250\mu A$                                | 400 | –     | –    | V                  |
| Breakdown Voltage Temperature Coefficient             | $\Delta BV/\Delta T_J$ | $I_D = 250\mu A$ , Referenced to $+25^\circ\text{C}$         | –   | 0.4   | –    | $V/^\circ\text{C}$ |
| Zero Gate Voltage Drain Current                       | $I_{DSS}$              | $V_{DS} = 400V, V_{GS} = 0$                                  | –   | –     | 1    | $\mu A$            |
|   |                        | $V_{DS} = 320V, T_C = +125^\circ\text{C}$                    | –   | –     | 10   | $\mu A$            |
| Gate–Source Leakage Forward                           | $I_{GSSF}$             | $V_{GS} = 30V, V_{DS} = 0V$                                  | –   | –     | 100  | nA                 |
| Gate–Source Leakage Reverse                           | $I_{GSSR}$             | $V_{GS} = -30V, V_{DS} = 0V$                                 | –   | –     | -100 | nA                 |
| <b>ON Characteristics</b>                             |                        |  |     |       |      |                    |
| Gate Threshold Voltage                                | $V_{GS(th)}$           | $V_{DS} = V_{GS}, I_D = 250\mu A$                            | 3.0 | –     | 5.0  | V                  |
| Static Drain–Source ON Resistance                     | $R_{DS(on)}$           | $V_{GS} = 10V, I_D = 12.5A$                                  | –   | 0.107 | 0.14 | $\pm$              |
| Forward Transconductance                              | $g_{fs}$               | $V_{DS} = 50V, I_D = 15A$ , Note 4                           | –   | 20    | –    | mhos               |
| <b>Dynamic Characteristics</b>                        |                        |  |     |       |      |                    |
| Input Capacitance                                     | $C_{iss}$              | $V_{GS} = 0V, V_{DS} = 25V, f = 1\text{MHz}$                 | –   | 3400  | 4400 | pF                 |
| Output Capacitance                                    | $C_{oss}$              |  | –   | 580   | 750  | pF                 |
| Reverse Transfer Capacitance                          | $C_{rss}$              |  | –   | 60    | 80   | pF                 |
| <b>Switching Characteristics</b>                      |                        |  |     |       |      |                    |
| Turn–On Delay Time                                    | $t_{d(on)}$            | $V_{DD} = 200V, I_D = 30A, R_G = 25\pm$ ,<br>Note 4, Note 5  | –   | 80    | 170  | ns                 |
| Rise Time   | $t_r$                  |  | –   | 320   | 650  | ns                 |
| Turn–Off Delay Time                                   | $t_{d(off)}$           |  | –   | 190   | 390  | ns                 |
| Fall Time   | $t_f$                  |  | –   | 170   | 350  | ns                 |
| Total Gate Charge                                     | $Q_g$                  | $V_{GS} = 10V, I_D = 30A, V_{DS} = 320V$ ,<br>Note 4, Note 5 | –   | 90    | 120  | nC                 |
| Gate–Source Charge                                    | $Q_{gs}$               |  | –   | 22    | –    | nC                 |
| Gate–Drain (“Miller”) Charge                          | $Q_{gd}$               |  | –   | 46    | –    | nC                 |
| <b>Source–Drain Diode Ratings and Characteristics</b> |                        |  |     |       |      |                    |
| Continuous Source Current                             | $I_S$                  | (Body Diode)   | –   | –     | 30   | A                  |
| Pulse Source Current                                  | $I_{SM}$               | (Body Diode)   | –   | –     | 120  | A                  |
| Diode Forward Voltage                                 | $V_{SD}$               | $I_S = 30A, V_{GS} = 0V$                                     | –   | –     | 1.5  | V                  |
| Reverse Recovery Time                                 | $t_{rr}$               | $V_{GS} = 0V, I_S = 30A, di_F/dt = 100A/\mu s$ ,<br>Note 4   | –   | 370   | –    | ns                 |
| Reverse Recovery Charge                               | $Q_{rr}$               |  | –   | 3.9   | –    | $\mu C$            |

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

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

Note 5. Essentially independent of operating temperature.

