# TM150N02NF

## N-Channel Enhancement Mosfet

### General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

### Applications

- Load switch
- PWM

### General Features

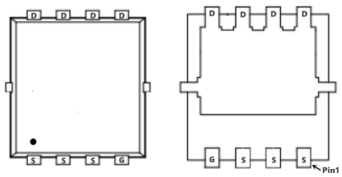
$V_{DS}$ = 20V $I_D$ = 150A

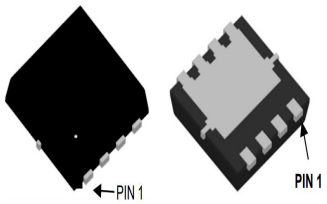
$R_{DS(ON)}$=1.6mΩ (typ.) @$V_{GS}$=4.5V

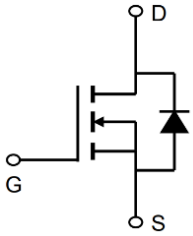
100% UIS Tested
100% $R_g$ Tested

Green Product

NF:DFN5x6-8L






Marking: 150N02 OR 20150

### Absolute Maximum Ratings ($T_A$=25°C Unless Otherwise Noted)

| Symbol | Parameter | | Rating | Unit |
|---|---|---|---|---|
| **Common Ratings ($T_A$=25°C Unless Otherwise Noted)** | | | | |
| $V_{DSS}$ | Drain-Source Voltage | | 20 | V |
| $V_{GSS}$ | Gate-Source Voltage | | ±12 | |
| $T_J$ | Maximum Junction Temperature | | 150 | °C |
| $T_{STG}$ | Storage Temperature Range | | -55 to 150 | |
| $I_S$ | Diode Continuous Forward Current | $T_C$=25°C | 150 | A |
| $I_D$ [a] | Continuous Drain Current | $T_C$=25°C | 150 | A |
| | | $T_C$=100°C | 48 | |
| $I_{DM}$ [b] | Pulsed Drain Current | $T_C$=25°C | 360 | |
| $P_D$ | Maximum Power Dissipation | $T_C$=25°C | 35 | W |
| | | $T_C$=100°C | 14 | |
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | Steady State | 3.5 | °C/W |
| | | | | |
| $P_D$ [c] | Maximum Power Dissipation | $T_A$=25°C | 1.6 | W |
| | | $T_A$=70°C | 1 | |
| $R_{\theta JA}$ [d] | Thermal Resistance-Junction to Ambient | Steady State | 78 | °C/W |
| $I_{AS}$ [e] | Avalanche Current, Single pulse (L=0.1mH) | | 45 | A |
| $E_{AS}$ [e] | Avalanche Energy, Single pulse (L=0.1mH) | | 100 | mJ |

Note a: Package is limited by 50A
b: Pulse width limited by max. junction temperature.
c: $R_{\theta JA}$ steady state=999s.
d: $R_{\theta JA}$ steady state=999s. $R_{\theta JA}$ is measured with the device mounted on 1in2, Fr-4 board with 2oz.Copper.
e: UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature Tj=25°C).

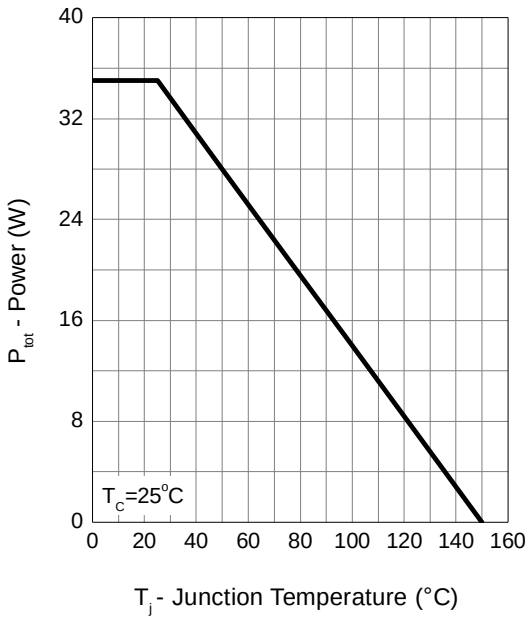
## Electrical Characteristics ($T_A$ = 25°C Unless Otherwise Noted)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_{DS}$=250μA | 20 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=16V, $V_{GS}$=0V | - | - | 1 | μA |
| | | $T_J$=85°C | - | - | 30 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_{DS}$=250μA | 0.5 | 0.7 | 1 | V |
| $I_{GSS}$ | Gate Leakage Current | $V_{GS}$=±12V, $V_{DS}$=0V | - | - | ±100 | nA |
| $R_{DS(ON)}$ [g] | Drain-Source On-state Resistance | $V_{GS}$=4.5V, $I_{DS}$=13.5A | - | 1.6 | 2.0 | mΩ |
| | | $V_{GS}$=2.5V, $I_{DS}$=10A | - | 2.5 | 3.0 | |
| Gfs | Forward Transconductance | $V_{DS}$=5V, $I_{DS}$=10A | - | 34 | - | S |
| **Diode Characteristics** | | | | | | |
| $V_{SD}$ [d] | Diode Forward Voltage | $I_{SD}$=2A, $V_{GS}$=0V | - | 0.7 | 1.1 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_{SD}$=13.5A, $dI_{SD}/dt$=100A/μs | - | 18 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 6.2 | - | nC |
| **Dynamic Characteristics** [g] | | | | | | |
| $R_G$ | Gate Resistance | $V_{GS}$=0V,$V_{DS}$=0V,f=1MHz | - | 2 | 3.6 | Ω |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=10V, Frequency=1.0MHz | - | 3275 | 3910 | pF |
| $C_{oss}$ | Output Capacitance | | - | 730 | - | |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 525 | - | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}$=10V, $R_L$=10Ω, $I_{DS}$=1A, $V_{GEN}$=10V, $R_G$=6Ω | - | 14 | 26 | ns |
| $t_r$ | Turn-on Rise Time | | - | 14.5 | 27 | |
| $t_{d(OFF)}$ | Turn-off Delay Time | | - | 130 | 234 | |
| $t_f$ | Turn-off Fall Time | | - | 70 | 126 | |
| **Gate Charge Characteristics** [g] | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{DS}$=10V, $V_{GS}$=4.5V, $I_{DS}$=13.5A | - | 35 | 50 | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 4.7 | - | |
| $Q_{gd}$ | Gate-Drain Charge | | - | 11.5 | - | |

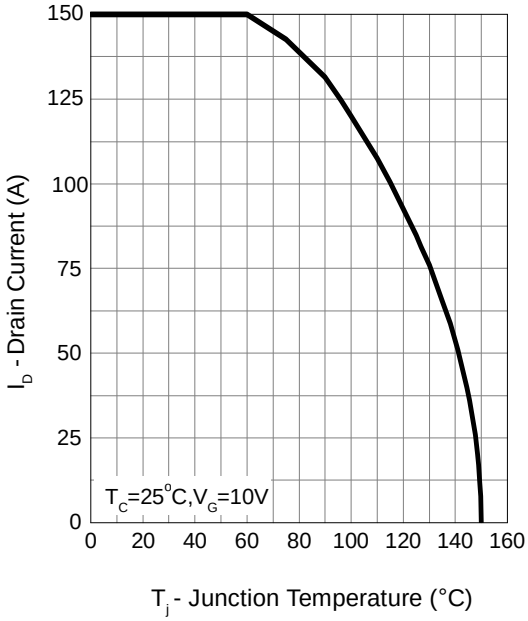
Note f: Pulse test; pulse width≤300μs, duty cycle≤2%.
Note g: Guaranteed by design, not subject to production testing.

## Typical Operating Characteristics

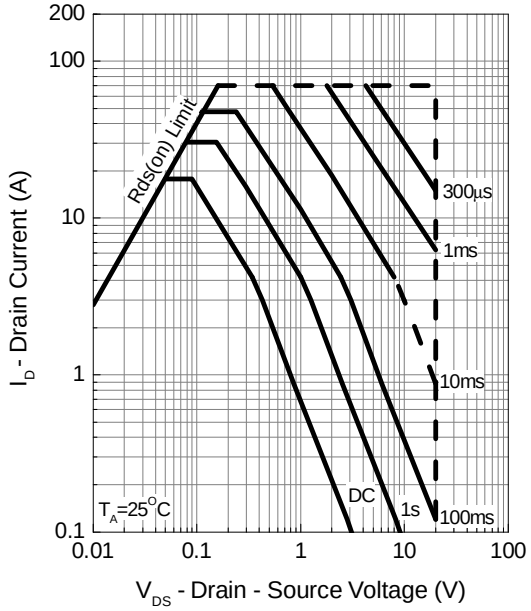
### Power Dissipation



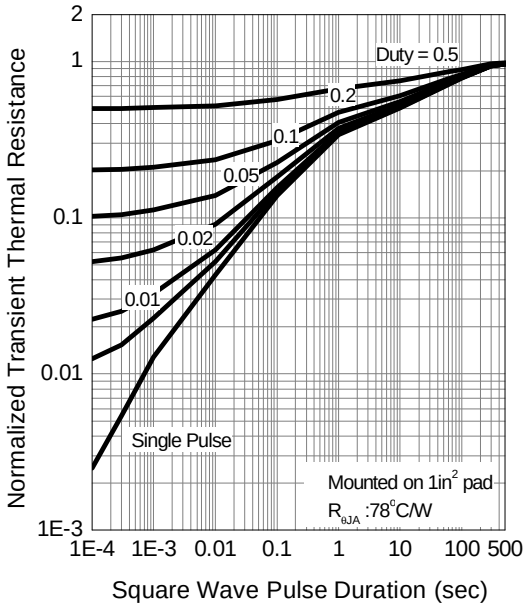

### Drain Current



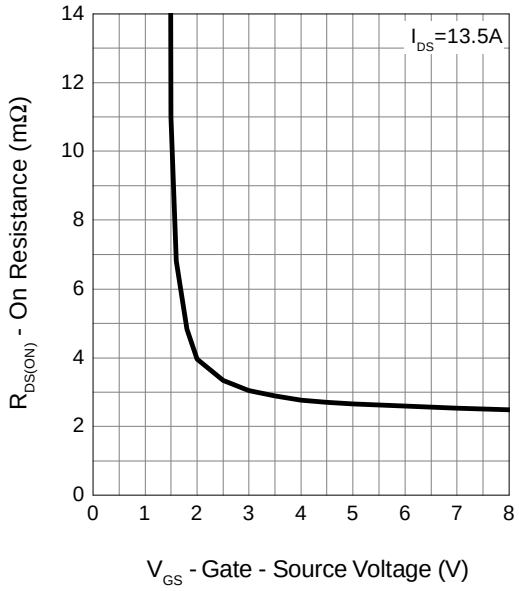

### Safe Operation Area



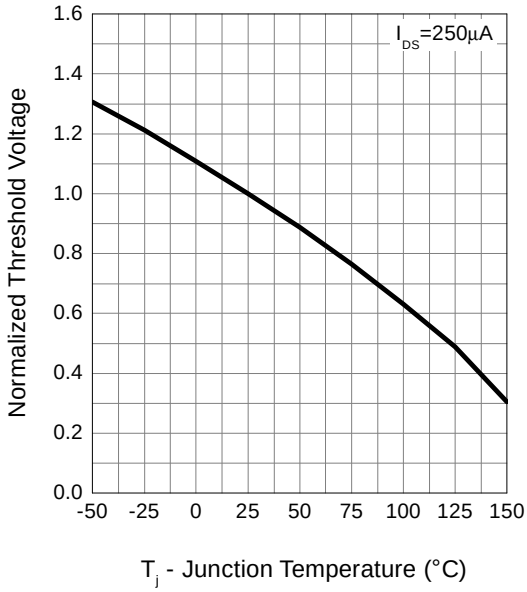

### Thermal Transient Impedance



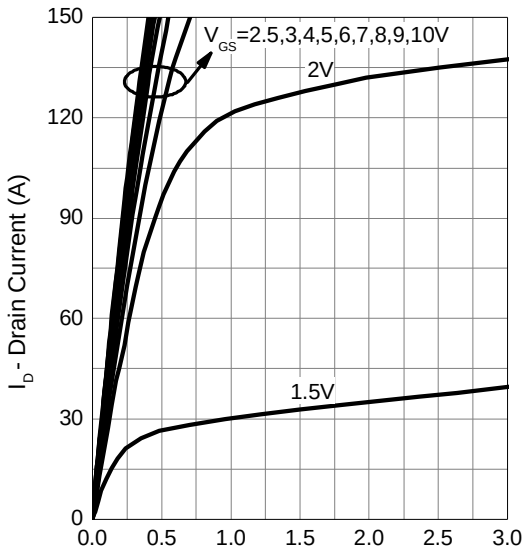
**Gate-Source On Resistance**



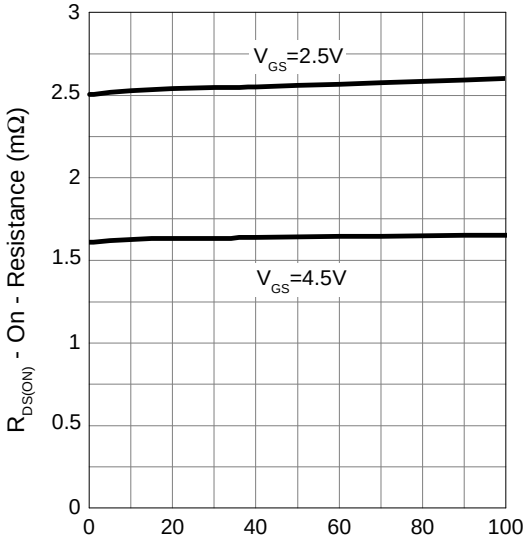

**Gate Threshold Voltage**



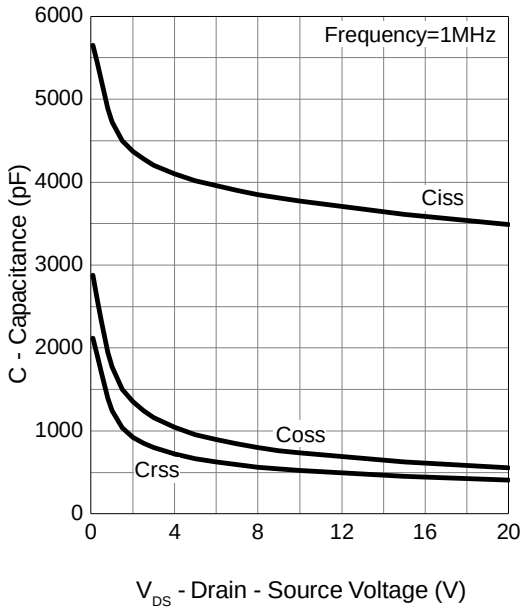

**Output Characteristics**



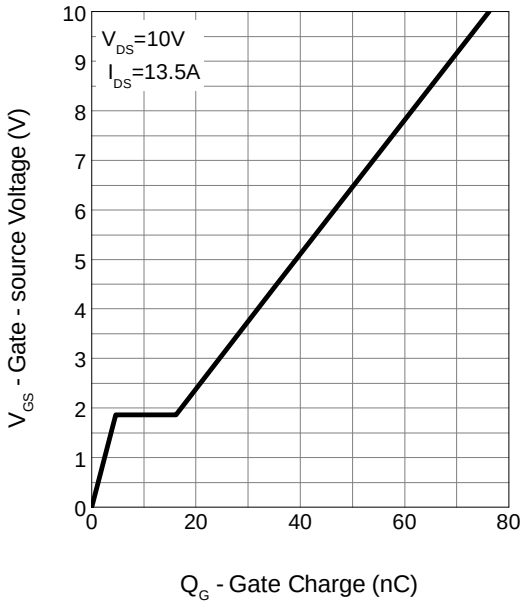

**Drain-Source On Resistance**



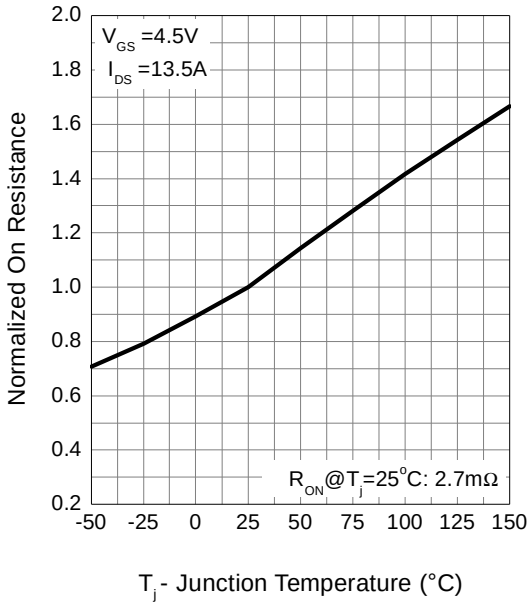
### Capacitance



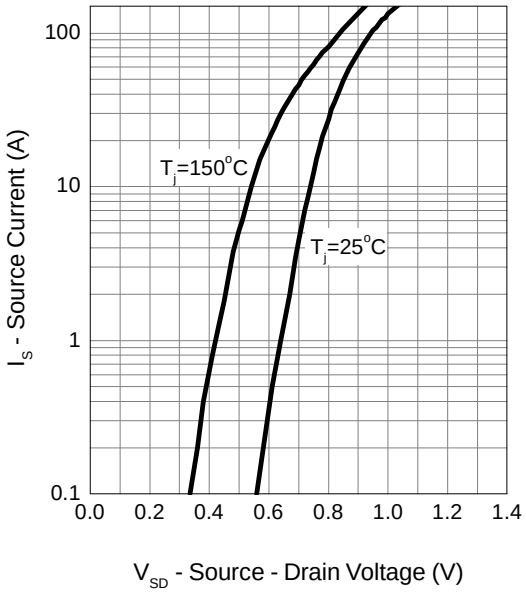

### Gate Charge



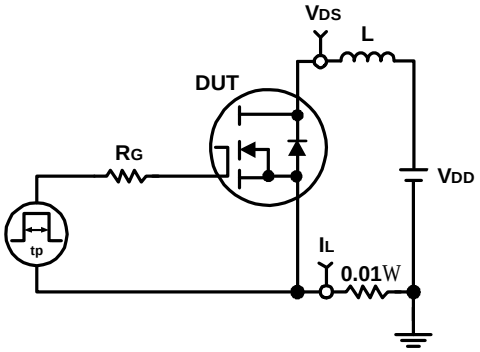

### Drain-Source On Resistance

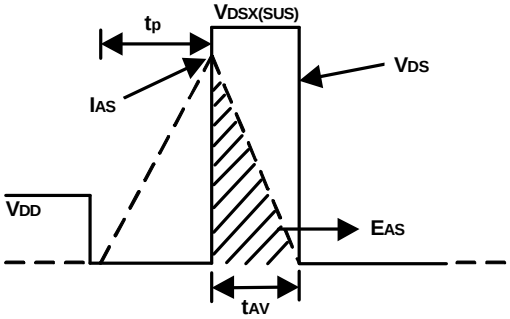



### Source-Drain Diode Forward

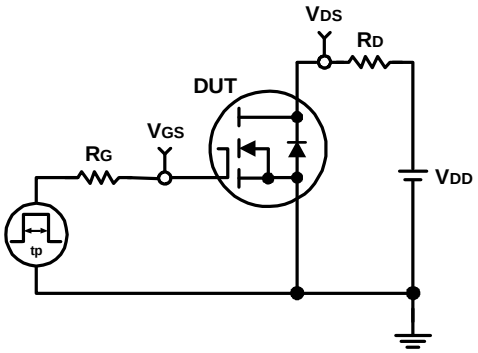


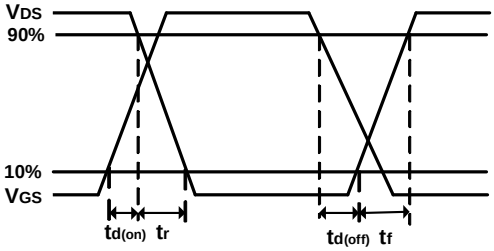
## Avalanche Test Circuit and Waveforms



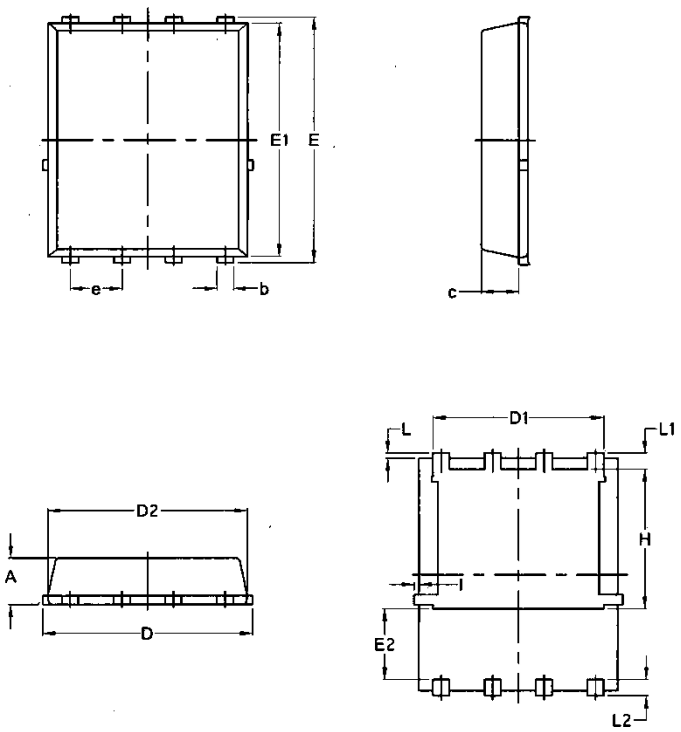




## Switching Time Test Circuit and Waveforms



## Package Mechanical Data：DFN5x6-8L




| Symbol | Common | | | |
|---|---|---|---|---|
| | mm | | Inch | |
| | Mim | Max | Min | Max |
| A | 1.03 | 1.17 | 0.0406 | 0.0461 |
| b | 0.34 | 0.48 | 0.0134 | 0.0189 |
| c | 0.824 | 0.0970 | 0.0324 | 0.082 |
| D | 4.80 | 5.40 | 0.1890 | 0.2126 |
| D1 | 4.11 | 4.31 | 0.1618 | 0.1697 |
| D2 | 4.80 | 5.00 | 0.1890 | 0.1969 |
| E | 5.95 | 6.15 | 0.2343 | 0.2421 |
| E1 | 5.65 | 5.85 | 0.2224 | 0.2303 |
| E2 | 1.60 | / | 0.0630 | / |
| e | 1.27 BSC | | 0.05 BSC | |
| L | 0.05 | 0.25 | 0.0020 | 0.0098 |
| L1 | 0.38 | 0.50 | 0.0150 | 0.0197 |
| L2 | 0.38 | 0.50 | 0.0150 | 0.0197 |
| H | 3.30 | 3.50 | 0.1299 | 0.1378 |
| I | / | 0.18 | / | 0.0070 |