



**TMN2030D**

**N-Channel Enhancement Mosfet**

**General Description**

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

**Applications**

- Load switch
- PWM

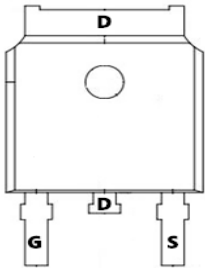
**General Features**

$V_{DS} = 20V$   $I_D = 30A$

$R_{DS(ON)} = 10\text{ m}\Omega(\text{typ.}) @ V_{GS} = 4.5V$

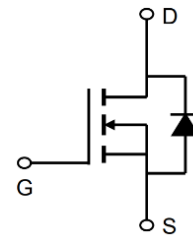
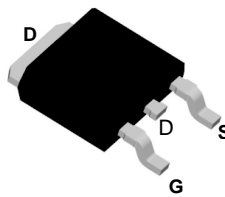
100% UIS Tested

100%  $R_g$  Tested



Marking: 30N02

D:TO-252-3L



**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$  Unless Otherwise Noted)

| Symbol                          | Parameter                                  | Rating     | Units            |
|---------------------------------|--|------------|------------------|
| $V_{DS}$                        | Drain-Source Voltage                       | 20         | V                |
| $V_{GS}$                        | Gate-Source Voltage                        | $\pm 20$   | V                |
| $I_D @ T_C = 25^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 30         | A                |
| $I_D @ T_C = 100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 18         | A                |
| $I_D @ T_A = 25^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 8.2        | A                |
| $I_D @ T_A = 70^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 6.5        | A                |
| $I_{DM}$                        | Pulsed Drain Current <sup>2</sup>          | 60         | A                |
| EAS                             | Single Pulse Avalanche Energy <sup>3</sup> | 12.1       | mJ               |
| $I_{AS}$                        | Avalanche Current                          | 11         | A                |
| $P_D @ T_C = 25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>       | 5          | W                |
| $P_D @ T_A = 25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>       | 2          | W                |
| $T_{STG}$                       | Storage Temperature Range                  | -55 to 150 | $^\circ\text{C}$ |
| $T_J$                           | Operating Junction Temperature Range       | -55 to 150 | $^\circ\text{C}$ |

**Thermal Data**

| Symbol          | Parameter   | Typ. | Max. | Unit               |
|-----------------|---|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient (Steady State) <sup>1</sup> | ---  | 100  | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>                   | ---  | ---  | $^\circ\text{C/W}$ |

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**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

| Parameter                                     | Symbol                    | Test Condition   | Min. | Typ. | Max. | Unit |
|---|---------------------------|--|------|------|------|------|
| <b>Static Characteristics</b>                 |                           |  |      |      |      |      |
| Drain-Source Breakdown Voltage                | <b>BV<sub>DSS</sub></b>   | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250μA  | 20   | -    | -    | V    |
| Gate Leakage Current                          | <b>I<sub>GSS</sub></b>    | V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0 V  | -    | -    | ±100 | nA   |
| Drain Cut-off Current                         | <b>I<sub>DSS</sub></b>    | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0 V   | -    | -    | 1    | μA   |
| Gate Threshold Voltage                        | <b>V<sub>GS(th)</sub></b> | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250μA                                 | 0.45 | 0.7  | 1    | V    |
| Drain-Source On-State Resistance <sup>3</sup> | <b>R<sub>DS(on)</sub></b> | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5A  | -    | 10   | 12   | mΩ   |
|   |                           | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 4.7A  | -    | 12   | 30   |      |
|   |                           | V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 4.3A  | -    | 28   | 50   |      |
| <b>Dynamic Characteristics<sup>4</sup></b>    |                           |  |      |      |      |      |
| Input Capacitance                             | <b>C<sub>iss</sub></b>    | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 10V,<br>f = 1MHz                                   | -    | 700  | -    | pF   |
| Output Capacitance                            | <b>C<sub>oss</sub></b>    |  | -    | 120  | -    |      |
| Reverse Transfer Capacitance                  | <b>C<sub>rss</sub></b>    |  | -    | 105  | -    |      |
| <b>Switching Characteristics<sup>4</sup></b>  |                           |  |      |      |      |      |
| Total Gate Charge                             | <b>Q<sub>g</sub></b>      | V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V,<br>I <sub>D</sub> = 5A                      | -    | 10.5 | -    | nC   |
| Gate-Source Charge                            | <b>Q<sub>gs</sub></b>     |  | -    | 2    | -    |      |
| Gate-Drain Charge                             | <b>Q<sub>gd</sub></b>     |  | -    | 2.5  | -    |      |
| Turn-On Time                                  | <b>t<sub>d(on)</sub></b>  | V <sub>GEN</sub> = 5V, V <sub>DD</sub> = 10V,<br>I <sub>D</sub> = 5A, R <sub>G</sub> = 3Ω, | -    | 10   | -    | ns   |
| Rise Time                                     | <b>t<sub>r</sub></b>      |  | -    | 20   | -    |      |
| Turn-Off Time                                 | <b>t<sub>d(off)</sub></b> |  | -    | 32   | -    |      |
| Fall Time                                     | <b>t<sub>f</sub></b>      |  | -    | 12   | -    |      |
| <b>Source-Drain Diode Characteristics</b>     |                           |  |      |      |      |      |
| Body Diode Voltage <sup>3</sup>               | <b>V<sub>SD</sub></b>     | I <sub>S</sub> = 4A, V <sub>GS</sub> = 0V  | -    | -    | 1.2  | V    |
| Continuous Source Current                     | <b>I<sub>S</sub></b>      |  | -    | -    | 30   | A    |

**Notes:**

1. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub> = 150°C.
2. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
3. Pulse Test: Pulse width ≤ 300μs, duty cycle ≤ 2%.
4. This value is guaranteed by design hence it is not included in the production test.

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Typical Characteristics

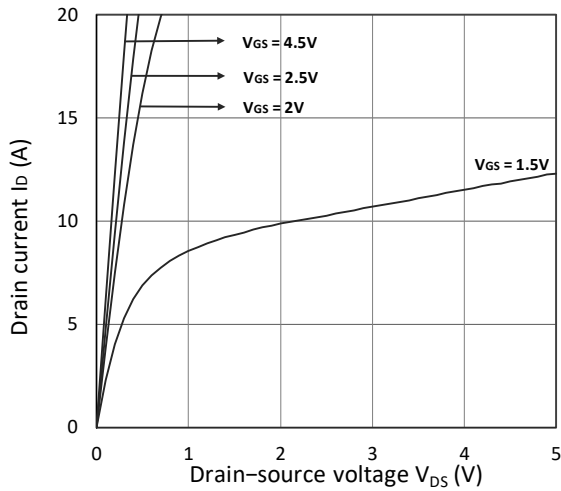


Figure 1. Output Characteristics

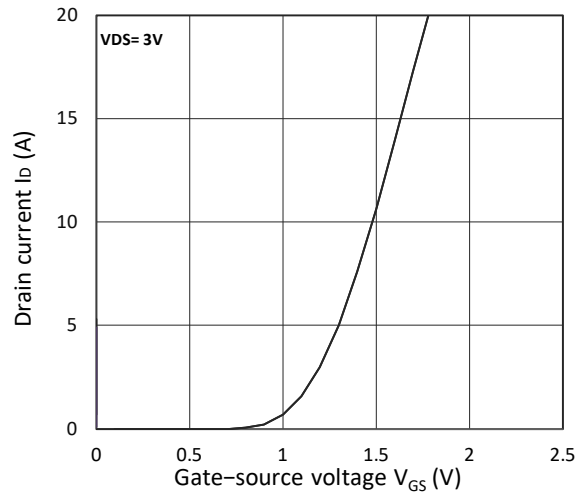


Figure 2. Transfer Characteristics

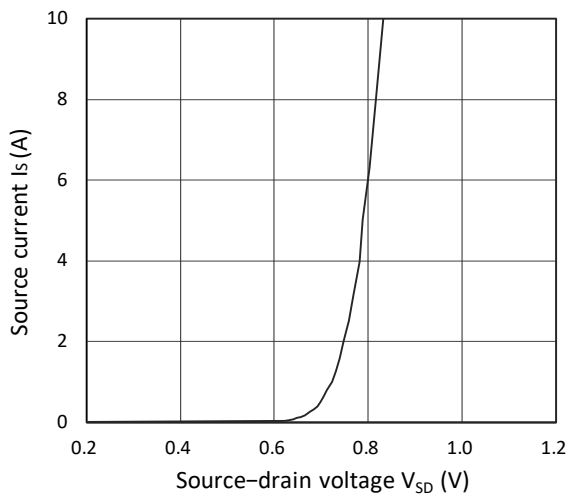


Figure 3. Forward Characteristics of Reverse

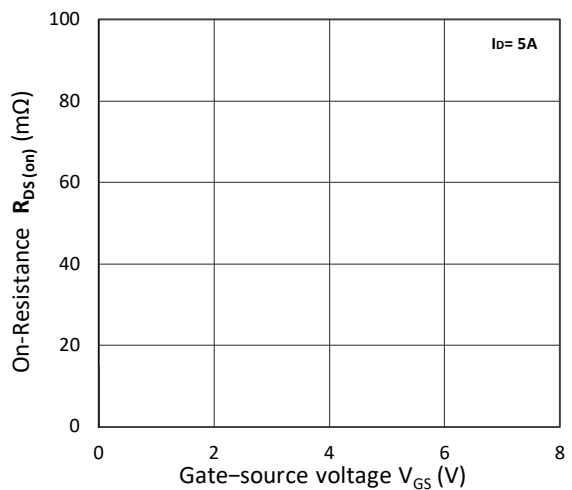


Figure 4.  $R_{DS(ON)}$  vs.  $V_{GS}$

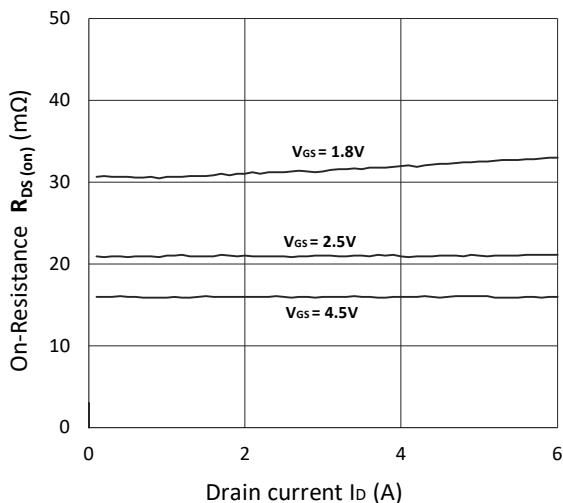


Figure 5.  $R_{DS(ON)}$  vs.  $I_D$

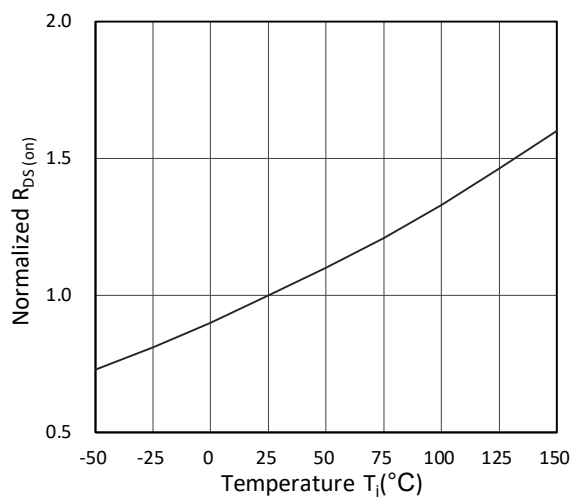


Figure 6. Normalized  $R_{DS(ON)}$  vs. Temperature



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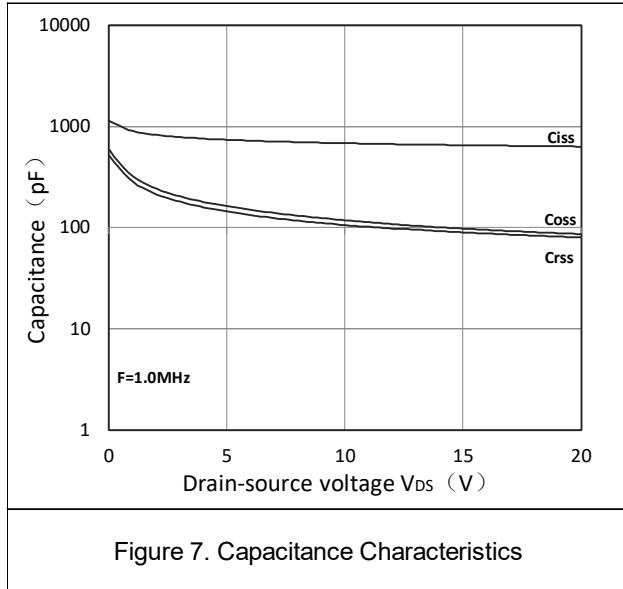


Figure 7. Capacitance Characteristics

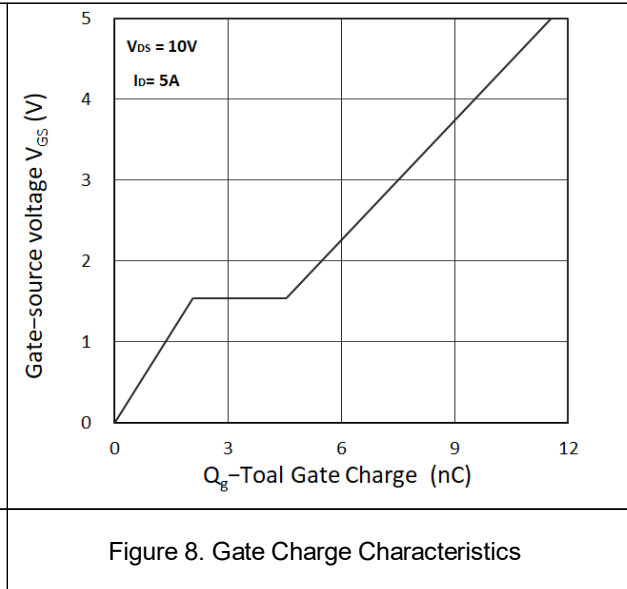
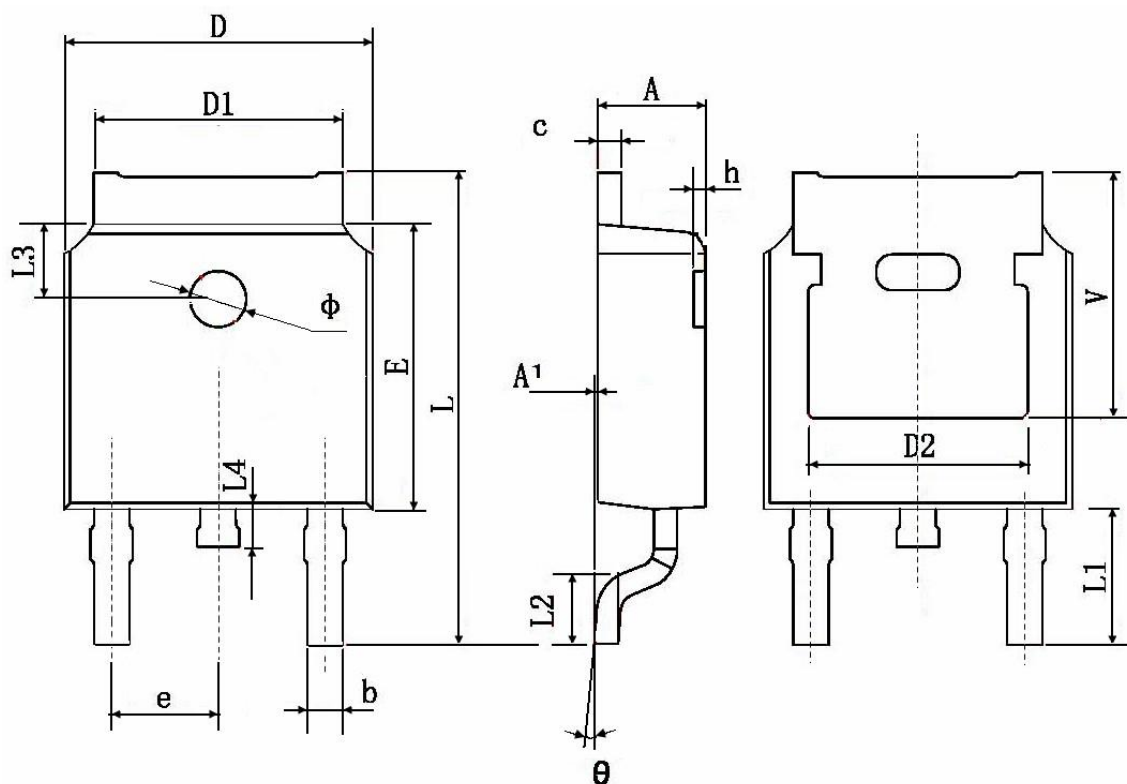


Figure 8. Gate Charge Characteristics



### Package Information:TO-252-3L



| Symbol   | Dimensions In Millimeters |        | Dimensions In Inches |       |
|----------|---------------------------|--------|----------------------|-------|
|          | Min.                      | Max.   | Min.                 | Max.  |
| A        | 2.200                     | 2.400  | 0.087                | 0.094 |
| A1       | 0.000                     | 0.127  | 0.000                | 0.005 |
| b        | 0.660                     | 0.860  | 0.026                | 0.034 |
| c        | 0.460                     | 0.580  | 0.018                | 0.023 |
| D        | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1       | 5.100                     | 5.460  | 0.201                | 0.215 |
| D2       | 4.830 TYP.                |        | 0.190 TYP.           |       |
| E        | 6.000                     | 6.200  | 0.236                | 0.244 |
| e        | 2.186                     | 2.386  | 0.086                | 0.094 |
| L        | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1       | 2.900 TYP.                |        | 0.114 TYP.           |       |
| L2       | 1.400                     | 1.700  | 0.055                | 0.067 |
| L3       | 1.600 TYP.                |        | 0.063 TYP.           |       |
| L4       | 0.600                     | 1.000  | 0.024                | 0.039 |
| $\phi$   | 1.100                     | 1.300  | 0.043                | 0.051 |
| $\theta$ | 0°                        | 8°     | 0°                   | 8°    |
| h        | 0.000                     | 0.300  | 0.000                | 0.012 |
| V        | 5.350 TYP.                |        | 0.211 TYP.           |       |

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