

TM100N04T

N-Channel Enhancement Mosfet

**General Description**

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

**Applications**

- Load switch
- PWM

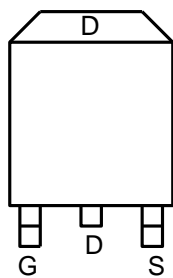
**General Features**

$V_{DS} = 40V$   $I_D = 100A$

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

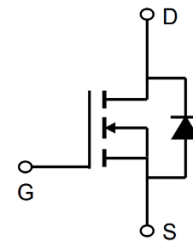
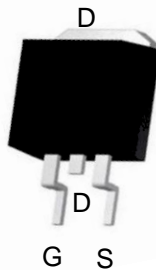
100% UIS Tested

100%  $R_g$  Tested



Marking: 100N04

T:TO-263-3L



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

| Symbol                | Parameter                              | Rating                    | Unit         |
|-----------------------|--|---------------------------|--------------|
| <b>Common Ratings</b> |  |                           |              |
| $V_{DSS}$             | Drain-Source Voltage                   | 40                        | V            |
| $V_{GSS}$             | Gate-Source Voltage                    | $\pm 20$                  |              |
| $T_J$                 | Maximum Junction Temperature           | 150                       | $^\circ C$   |
| $T_{STG}$             | Storage Temperature Range              | -55 to 150                |              |
| $I_S$                 | Diode Continuous Forward Current       | $T_C = 25^\circ C$<br>100 | A            |
| $I_D^a$               | Continuous Drain Current               | $T_C = 25^\circ C$<br>100 |              |
|                       |  | $T_C = 100^\circ C$<br>40 |              |
| $I_{DM}^b$            | Pulsed Drain Current                   | $T_C = 25^\circ C$<br>300 |              |
| $P_D$                 | Maximum Power Dissipation              | $T_C = 25^\circ C$<br>54  | W            |
|                       |  | $T_C = 100^\circ C$<br>22 |              |
| $R_{\theta JC}$       | Thermal Resistance-Junction to Case    | Steady State<br>2.3       | $^\circ C/W$ |
| $R_{\theta JA}^c$     | Thermal Resistance-Junction to Ambient | $t \leq 10s$<br>17        | $^\circ C/W$ |
|                       |  | Steady State<br>50        |              |
| $I_{AS}^d$            | Avalanche Current, Single pulse        | $L = 0.1mH$<br>40         | A            |
| $E_{AS}^d$            | Avalanche Energy, Single pulse         | $L = 0.1mH$<br>80         | mJ           |

Note a : Max. continue current is limited by bonding wire.

Note b : Pulse width is limited by max. junction temperature.

Note c : Surface mounted on 1in2 pad area, steady state  $t = 999s$ .

Note d : UIS tested and pulse width limited by maximum junction temperature  $150^\circ C$  (initial temperature  $T_J = 25^\circ C$ ).



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

| Symbol   | Parameter                        | Test Conditions   | Min. | Typ.       | Max.       | Unit |
|--|----------------------------------|---|------|------------|------------|------|
| <b>Static Characteristics</b>                  |                                  |   |      |            |            |      |
| BV <sub>DSS</sub>                              | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA   | 40   | -          | -          | V    |
| I <sub>DSS</sub>                               | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =32V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =85°C   | -    | -          | 1<br>30    | μA   |
| V <sub>GS(th)</sub>                            | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA   | 1.0  | 1.5        | 2.2        | V    |
| I <sub>GSS</sub>                               | Gate Leakage Current             | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V  | -    | -          | ±100       | nA   |
| R <sub>DS(ON)</sub> <sup>e</sup>               | Drain-Source On-state Resistance | V <sub>GS</sub> =10V, I <sub>DS</sub> =20A<br>V <sub>GS</sub> =4.5V, I <sub>DS</sub> =15A                       | -    | 4.5<br>5.5 | 5.6<br>7.5 | mΩ   |
| G <sub>fs</sub>                                | Forward Transconductance         | V <sub>DS</sub> =5V, I <sub>DS</sub> =20A   | -    | 31         | -          | S    |
| <b>Diode Characteristics</b>                   |                                  |   |      |            |            |      |
| V <sub>SD</sub> <sup>e</sup>                   | Diode Forward Voltage            | I <sub>SD</sub> =20A, V <sub>GS</sub> =0V   | -    | 0.75       | 1.1        | V    |
| t <sub>rr</sub>                                | Reverse Recovery Time            | I <sub>SD</sub> =20A, dI <sub>SD</sub> /dt=100A/μs  | -    | 28         | -          | ns   |
| t <sub>a</sub>                                 | Charge Time                      |   | -    | 17         | -          |      |
| t <sub>b</sub>                                 | Discharge Time                   |   | -    | 12         | -          |      |
| Q <sub>rr</sub>                                | Reverse Recovery Charge          |   | -    | 20         | -          |      |
| <b>Dynamic Characteristics<sup>f</sup></b>     |                                  |   |      |            |            |      |
| R <sub>G</sub>                                 | Gate Resistance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz  | -    | 1          | 2          | Ω    |
| C <sub>iSS</sub>                               | Input Capacitance                | V <sub>GS</sub> =0V,<br>V <sub>DS</sub> =20V,<br>Frequency=1.0MHz   | -    | 1645       | 2139       | pF   |
| C <sub>oss</sub>                               | Output Capacitance               |   | -    | 385        | -          |      |
| C <sub>rss</sub>                               | Reverse Transfer Capacitance     |   | -    | 55         | -          |      |
| t <sub>d(ON)</sub>                             | Turn-on Delay Time               | V <sub>DD</sub> =20V, R <sub>L</sub> =20Ω,<br>I <sub>DS</sub> =1A, V <sub>GEN</sub> =10V,<br>R <sub>G</sub> =6Ω | -    | 14.3       | 26         | ns   |
| t <sub>r</sub>                                 | Turn-on Rise Time                |   | -    | 7.7        | 14         |      |
| t <sub>d(OFF)</sub>                            | Turn-off Delay Time              |   | -    | 32.6       | 59         |      |
| t <sub>f</sub>                                 | Turn-off Fall Time               |   | -    | 26.6       | 48         |      |
| <b>Gate Charge Characteristics<sup>f</sup></b> |                                  |   |      |            |            |      |
| Q <sub>g</sub>                                 | Total Gate Charge                | V <sub>DS</sub> =20V, V <sub>GS</sub> =10V,<br>I <sub>DS</sub> =20A   | -    | 24.8       | 34.7       | nC   |
| Q <sub>g</sub>                                 | Total Gate Charge                | V <sub>DS</sub> =20V, V <sub>GS</sub> =4.5V,<br>I <sub>DS</sub> =20A  | -    | 11.5       | -          |      |
| Q <sub>gth</sub>                               | Threshold Gate Charge            |   | -    | 3          | -          |      |
| Q <sub>gs</sub>                                | Gate-Source Charge               |   | -    | 5.2        | -          |      |
| Q <sub>gd</sub>                                | Gate-Drain Charge                |   | -    | 2.6        | -          |      |

Note e : Pulse test ; pulse width≤300μs, duty cycle≤2%.

Note f : Guaranteed by design, not subject to production testing.

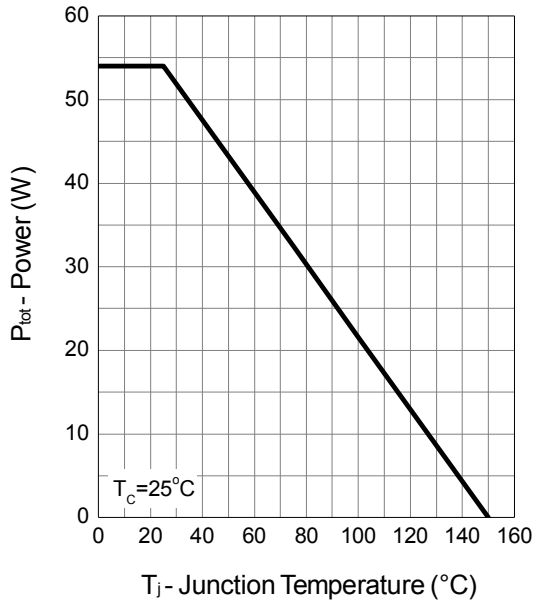


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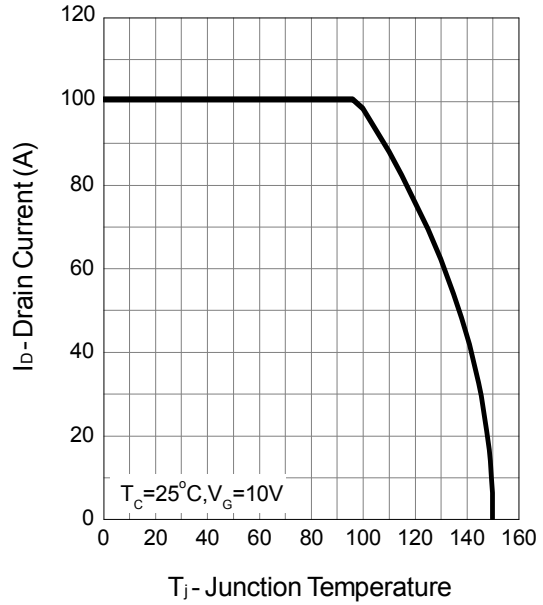
N-Channel Enhancement Mosfet

Typical Characteristics

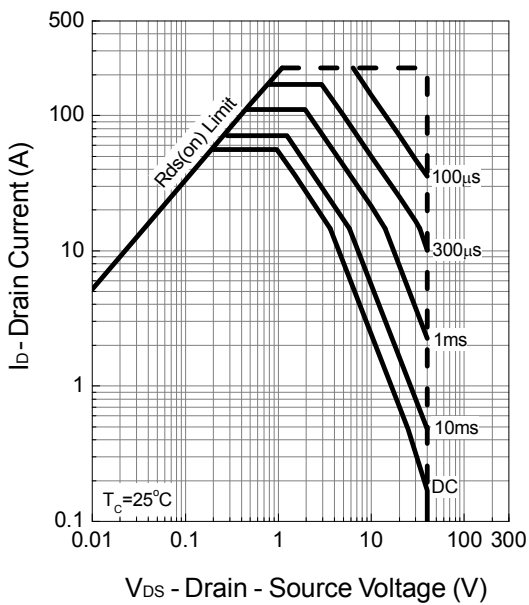
Power Dissipation



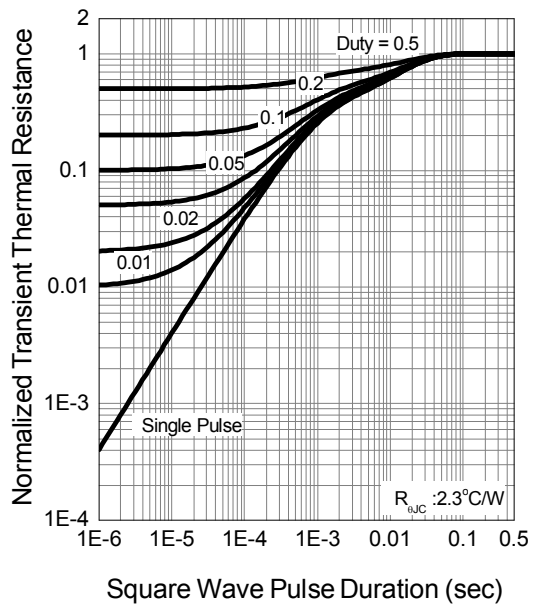
Drain Current



Safe Operation Area



Thermal Transient Impedance

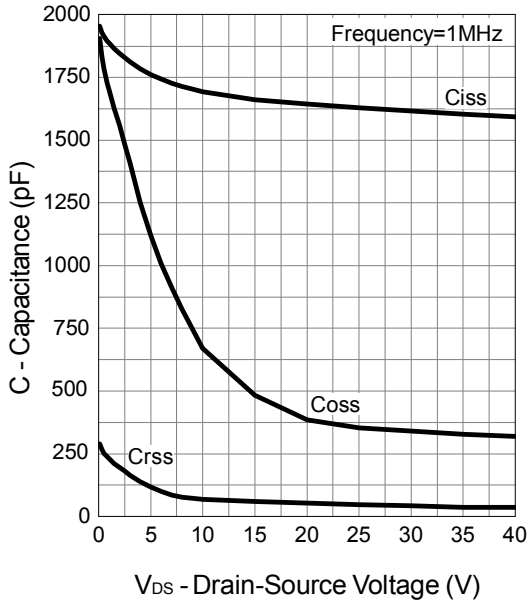




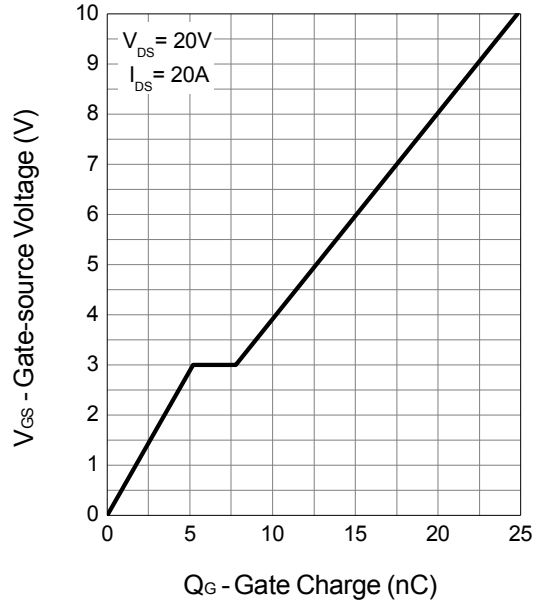
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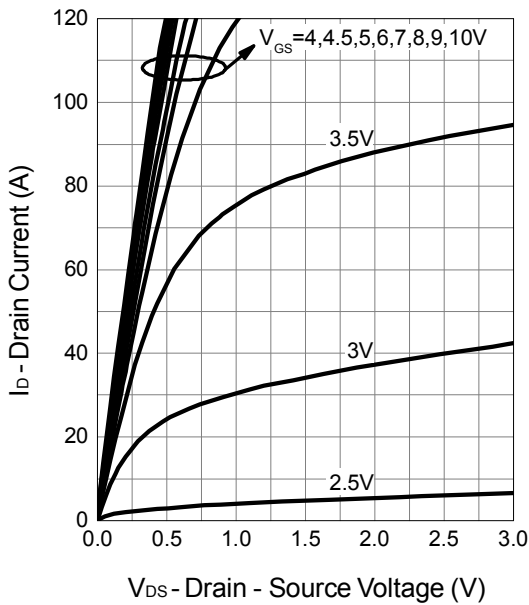
### Capacitance



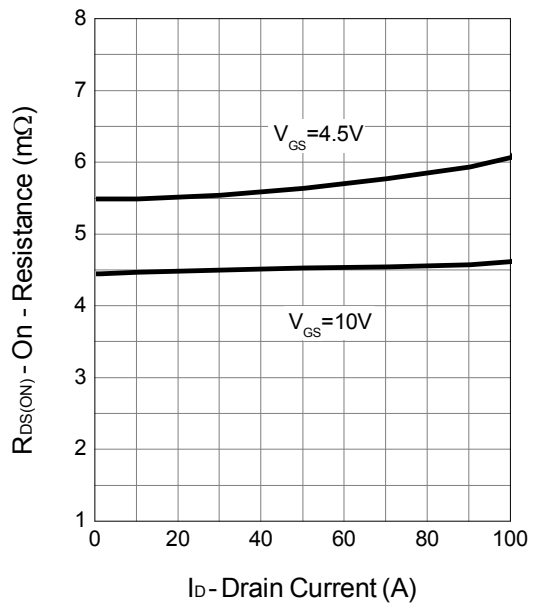
### Gate Charge



### Output Characteristics



### Drain-Source On Resistance

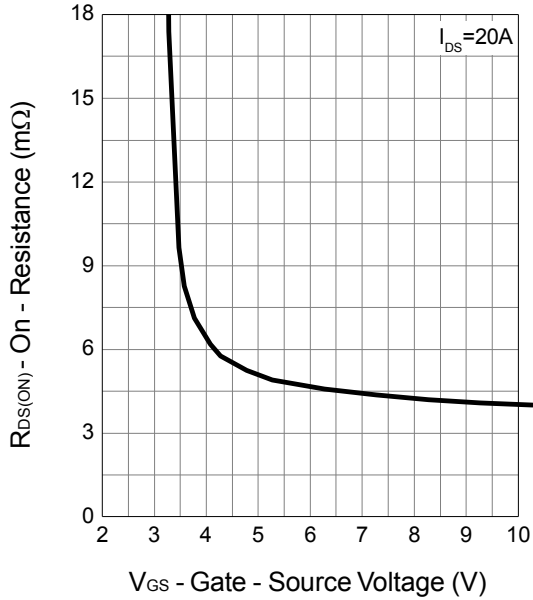




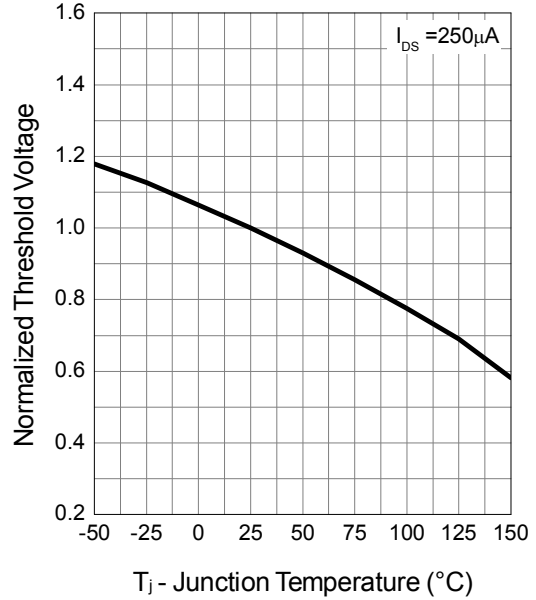
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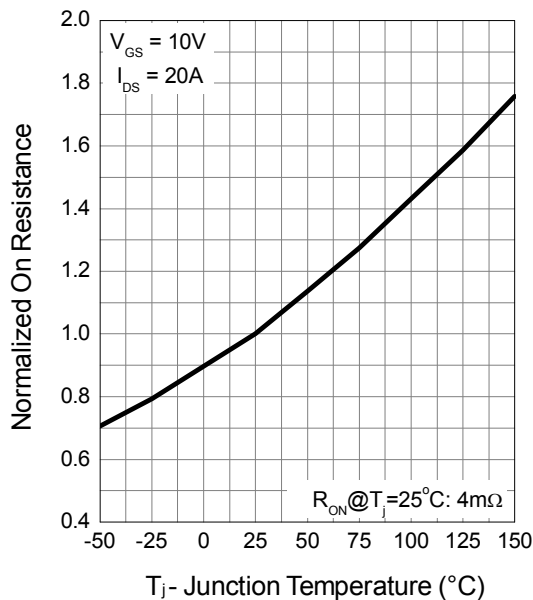
Gate-Source On Resistance



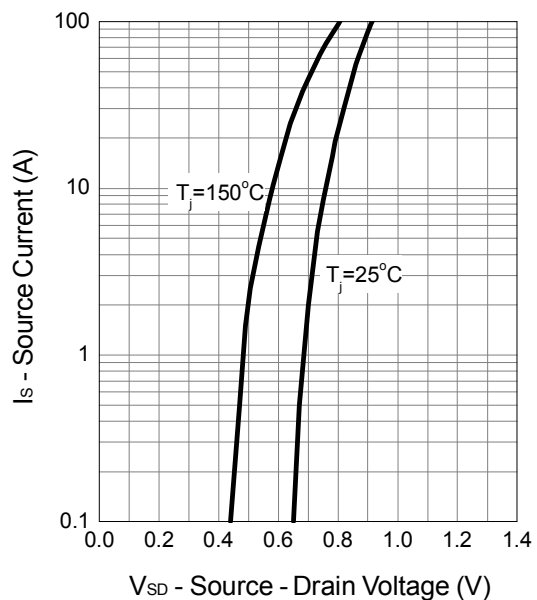
Gate Threshold Voltage



Drain-Source On Resistance

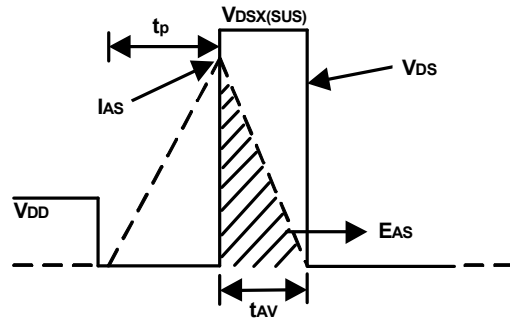
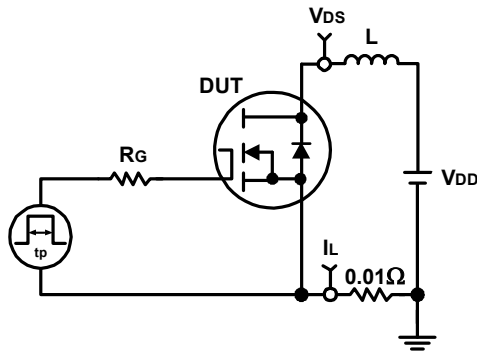


Source-Drain Diode Forward

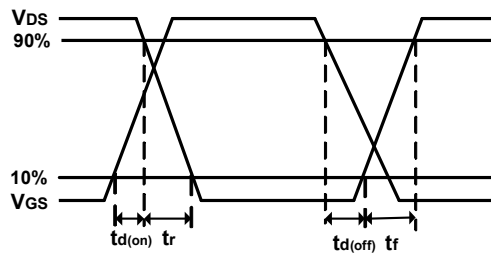
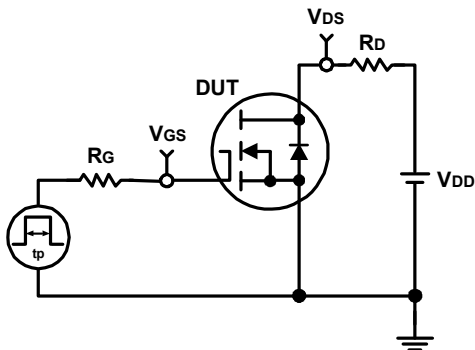




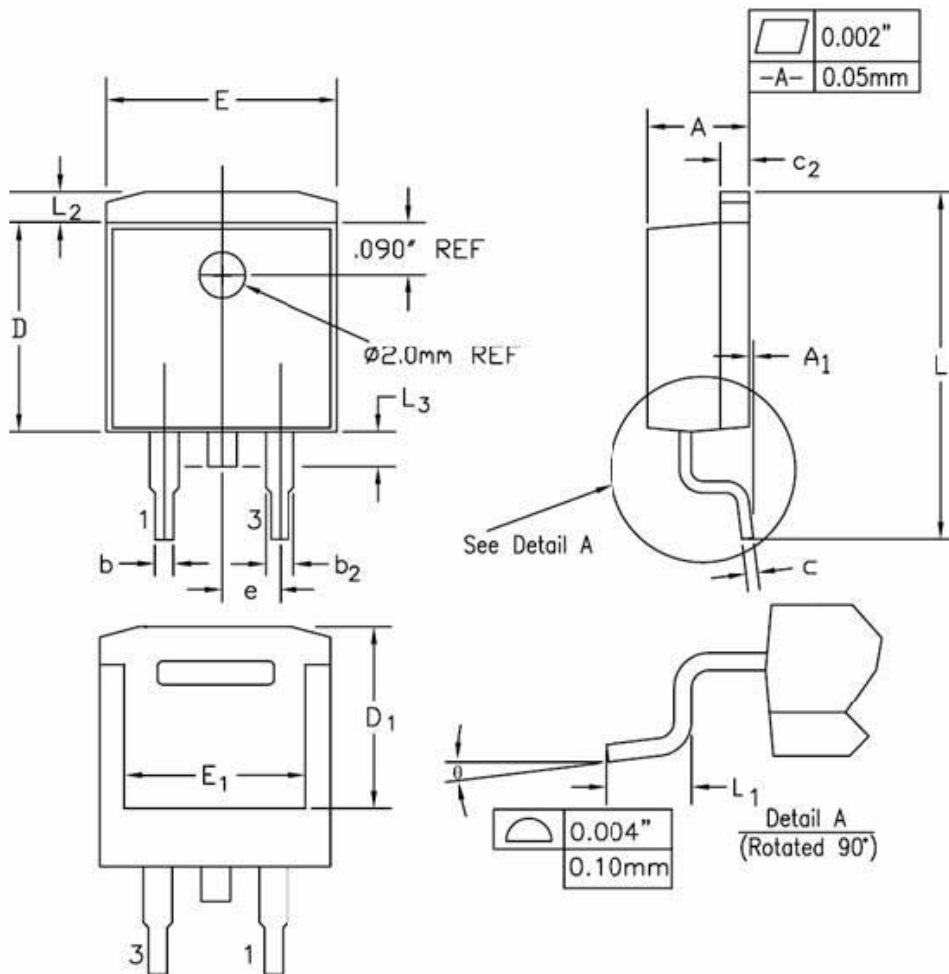
### Avalanche Test Circuit and Waveforms



### Switching Time Test Circuit and Waveforms



# Package Information: TO-263-3L



| SYMBOL   | INCHES     |       | MILLIMETERS |       | NOTES |
|----------|------------|-------|-------------|-------|-------|
|          | MIN        | MAX   | MIN         | MAX   |       |
| A        | 0.170      | 0.180 | 4.32        | 4.57  |       |
| A1       | -          | 0.010 | -           | 0.25  |       |
| b        | 0.028      | 0.037 | 0.71        | 0.94  |       |
| b2       | 0.045      | 0.055 | 1.15        | 1.40  |       |
| c        | 0.018      | 0.024 | 0.46        | 0.61  |       |
| c2       | 0.048      | 0.055 | 1.22        | 1.40  |       |
| D        | 0.350      | 0.370 | 8.89        | 9.40  |       |
| D1       | 0.315      | 0.324 | 8.01        | 8.23  |       |
| E        | 0.395      | 0.405 | 10.04       | 10.28 |       |
| E1       | 0.310      | 0.318 | 7.88        | 8.08  |       |
| e        | 0.100 BSC. |       | 2.54 BSC.   |       |       |
| L        | 0.580      | 0.620 | 14.73       | 15.75 |       |
| L1       | 0.090      | 0.110 | 2.29        | 2.79  |       |
| L2       | 0.045      | 0.055 | 1.15        | 1.39  |       |
| L3       | 0.050      | 0.070 | 1.27        | 1.77  |       |
| $\theta$ | 0°         | 8°    | 0°          | 8°    |       |

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