

## Features

- 150V/135A  
 $R_{DS(ON)}=5m\Omega(\text{typ.})@V_{GS}=10V$
- 100% UIS +  $R_g$  Tested
- Reliable and Rugged
- Lead Free and Green Devices Available  
(RoHS Compliant)
- Moisture Sensitivity Level MSL1  
(per JEDEC J-STD-020D)

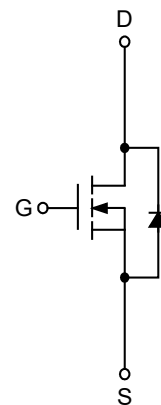
## Applications

- Synchronous Rectification.
- Uninterruptible Power Supply.
- Motion Control Applications.

## Pin Description



TO-263-2



N-Channel MOSFET

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

| Symbol                        | Parameter                              |                       | Rating     | Unit |
|-------------------------------|----------------------------------------|-----------------------|------------|------|
| Common Ratings                |                                        |                       |            |      |
| V <sub>DSS</sub>              | Drain-Source Voltage                   |                       | 150        | V    |
| V <sub>GSS</sub>              | Gate-Source Voltage                    |                       | ±20        |      |
| T <sub>J</sub>                | Maximum Junction Temperature           |                       | 175        | °C   |
| T <sub>STG</sub>              | Storage Temperature Range              |                       | -55 to 175 |      |
| I <sub>S</sub>                | Diode Continuous Forward Current       | T <sub>C</sub> =25°C  | 135        | A    |
| I <sub>D</sub>                | Continuous Drain Current               | T <sub>C</sub> =25°C  | 135        |      |
|                               | Continuous Drain Current               | T <sub>C</sub> =100°C | 102        |      |
| I <sub>DM</sub> <sup>a</sup>  | Pulsed Drain Current                   | T <sub>C</sub> =25°C  | 405        |      |
| P <sub>D</sub>                | Maximum Power Dissipation              | T <sub>C</sub> =25°C  | 375        | W    |
|                               |                                        | T <sub>C</sub> =100°C | 187        |      |
| R <sub>θJC</sub>              | Thermal Resistance-Junction to Case    |                       | 0.4        | °C/W |
| R <sub>θJA</sub> <sup>c</sup> | Thermal Resistance-Junction to Ambient |                       | 50         | °C/W |
| I <sub>AS</sub> <sup>b</sup>  | Avalanche Current, Single pulse        | L=0.5mH               | 90         | A    |
| E <sub>AS</sub> <sup>b</sup>  | Avalanche Energy, Single pulse         | L=0.5mH               | 2025       | mJ   |

Note a : Pulse width limited by maximum junction temperature.

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

Note c : Surface mounted on  $1\text{in}^2$  pad area.

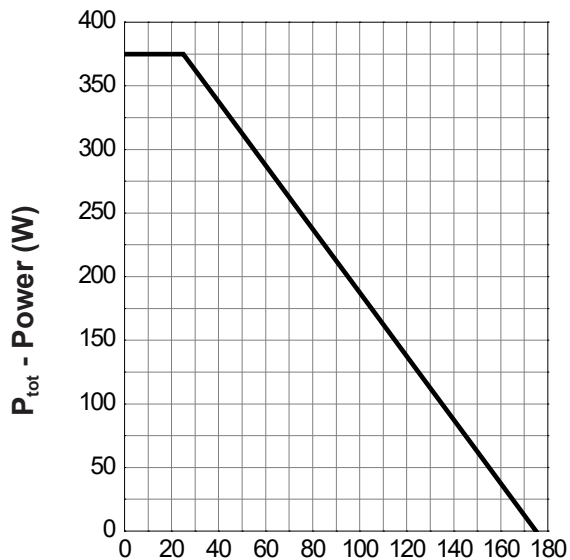
**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

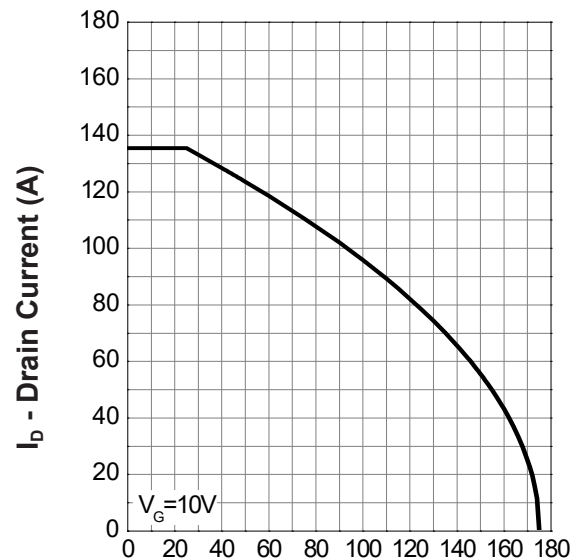
| Symbol                                   | Parameter                        | Test Conditions                                                                                                 | Min. | Typ. | Max. | Unit |
|------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------|------|------|------|------|
| Static Characteristics                   |                                  |                                                                                                                 |      |      |      |      |
| BV <sub>DSS</sub>                        | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA                                                                     | 150  | -    | -    | V    |
| I <sub>DSS</sub>                         | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =120V, V <sub>GS</sub> =0V                                                                      | -    | -    | 1    | μA   |
|                                          |                                  | T <sub>J</sub> =85°C                                                                                            | -    | -    | 30   |      |
| V <sub>GS(th)</sub>                      | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA                                                       | 2    | 3    | 4    | 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>d</sup>         | Drain-Source On-state Resistance | V <sub>GS</sub> =10V, I <sub>DS</sub> =40A                                                                      | -    | 5    | 7    | mΩ   |
| Diode Characteristics                    |                                  |                                                                                                                 |      |      |      |      |
| V <sub>SD</sub> <sup>d</sup>             | Diode Forward Voltage            | I <sub>SD</sub> =40A, V <sub>GS</sub> =0V                                                                       | -    | 0.8  | 1.3  | V    |
| t <sub>rr</sub> <sup>e</sup>             | Reverse Recovery Time            | I <sub>SD</sub> =40A, dI <sub>SD</sub> /dt=100A/μs                                                              | -    | 105  | -    | ns   |
| Q <sub>rr</sub> <sup>e</sup>             | Reverse Recovery Charge          |                                                                                                                 | -    | 450  | -    | nC   |
| Dynamic Characteristics <sup>e</sup>     |                                  |                                                                                                                 |      |      |      |      |
| R <sub>G</sub>                           | Gate Resistance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                                                | -    | 2    | -    | Ω    |
| C <sub>iss</sub>                         | Input Capacitance                | V <sub>GS</sub> =0V,<br>V <sub>DS</sub> =50V,<br>Frequency=1.0MHz                                               | -    | 5700 | 9000 | pF   |
| C <sub>oss</sub>                         | Output Capacitance               |                                                                                                                 | -    | 575  | -    |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance     |                                                                                                                 | -    | 20   | -    |      |
| t <sub>d(ON)</sub>                       | Turn-on Delay Time               | V <sub>DD</sub> =30V, R <sub>L</sub> =30Ω,<br>I <sub>DS</sub> =1A, V <sub>GEN</sub> =10V,<br>R <sub>G</sub> =6Ω | -    | 42   | 76   | ns   |
| t <sub>r</sub>                           | Turn-on Rise Time                |                                                                                                                 | -    | 28   | 51   |      |
| t <sub>d(OFF)</sub>                      | Turn-off Delay Time              |                                                                                                                 | -    | 104  | 188  |      |
| t <sub>f</sub>                           | Turn-off Fall Time               |                                                                                                                 | -    | 248  | 447  |      |
| Gate Charge Characteristics <sup>e</sup> |                                  |                                                                                                                 |      |      |      |      |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =75V, V <sub>GS</sub> =10V,<br>I <sub>DS</sub> =40A                                             | -    | 115  | 160  | nC   |
| Q <sub>gs</sub>                          | Gate-Source Charge               |                                                                                                                 | -    | 38   | -    |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                |                                                                                                                 | -    | 24   | -    |      |

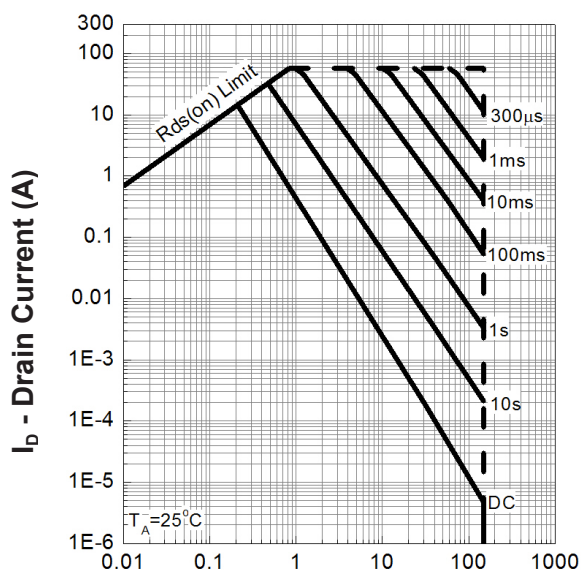
Note d : Pulse test ; pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ .

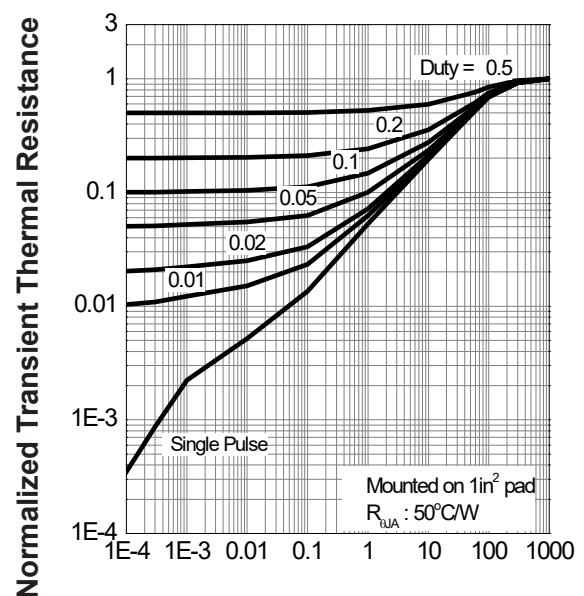
Note e : Guaranteed by design, not subject to production testing.

## Typical Operating Characteristics

**Power Dissipation**

 $T_c$  - Case Temperature ( $^{\circ}\text{C}$ )

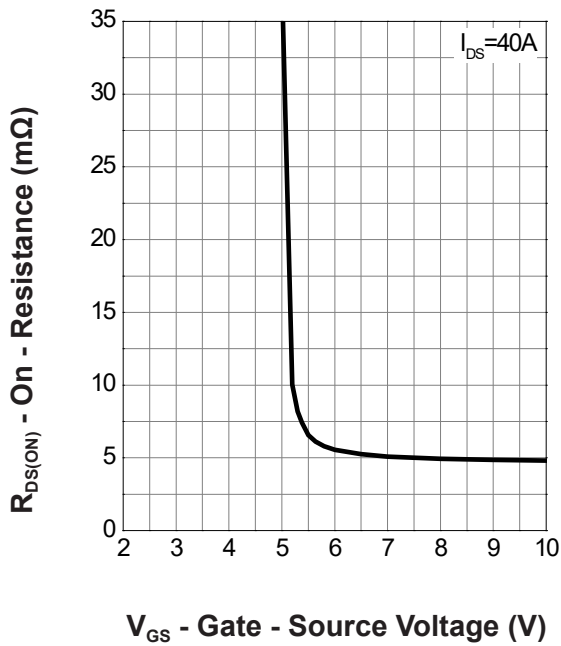
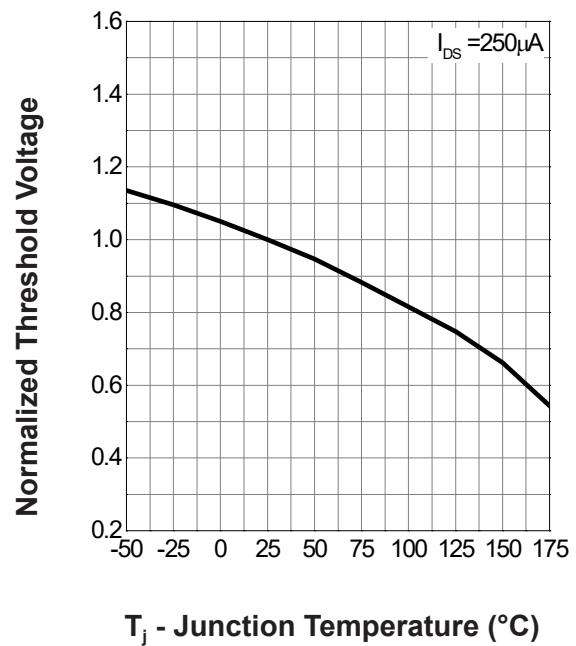
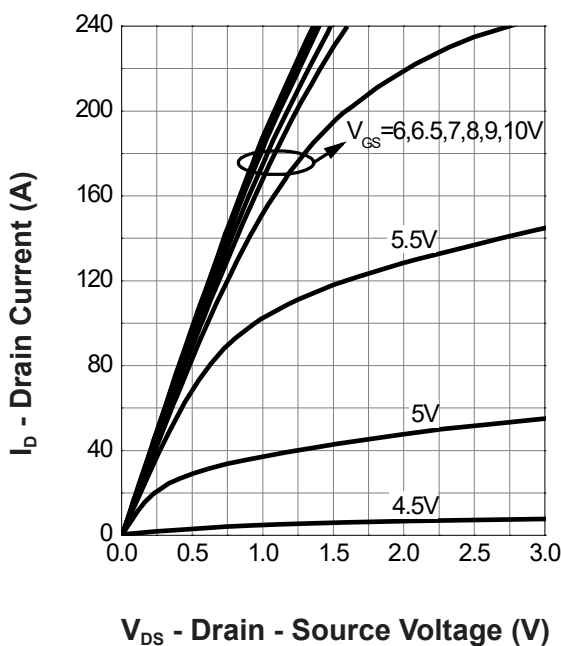
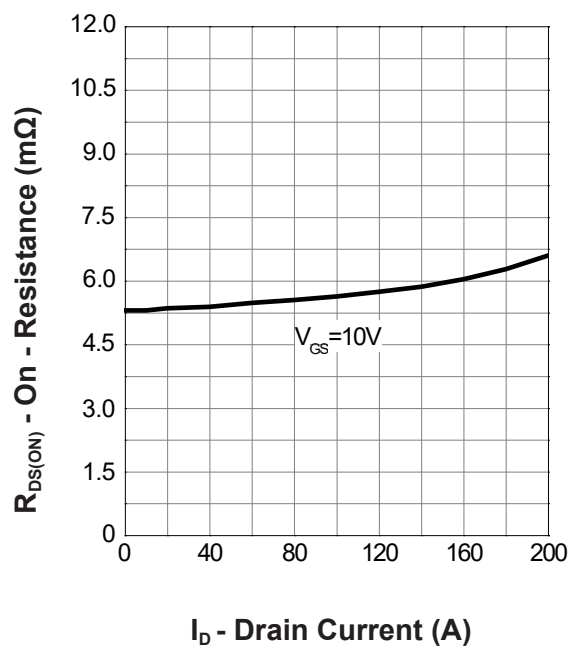
**Drain Current**

 $T_c$  - Case Temperature ( $^{\circ}\text{C}$ )

**Safe Operation Area**

 $V_{DS}$  - Drain - Source Voltage (V)

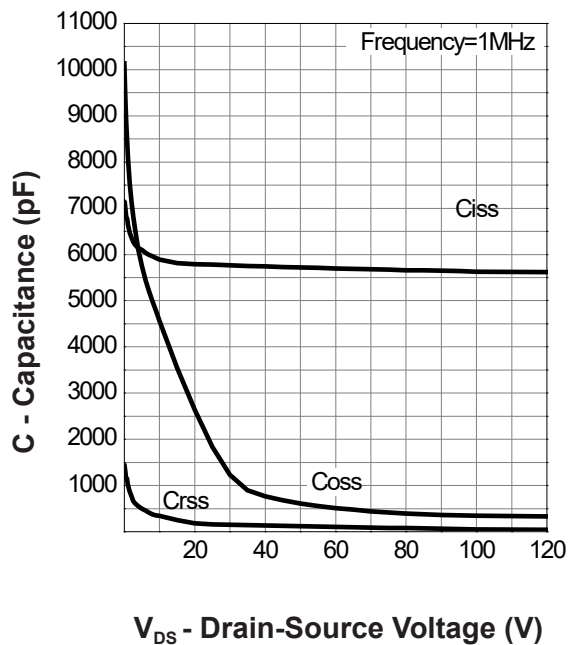
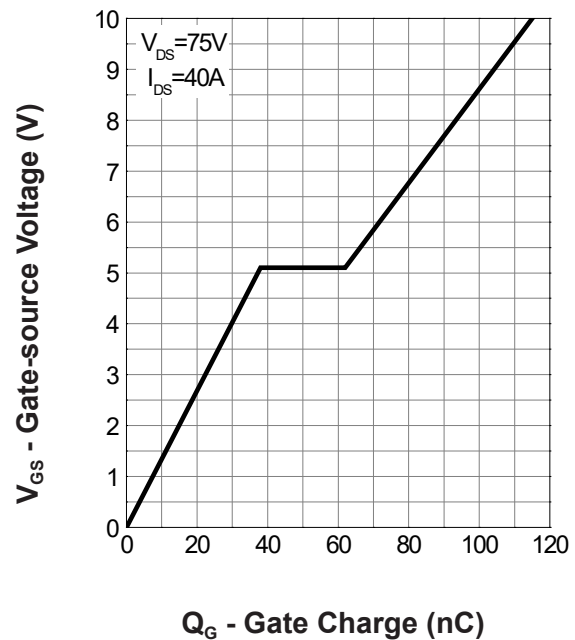
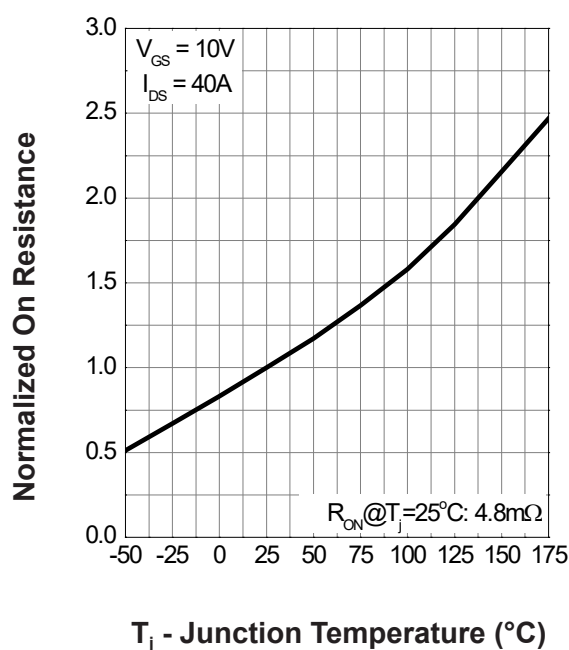
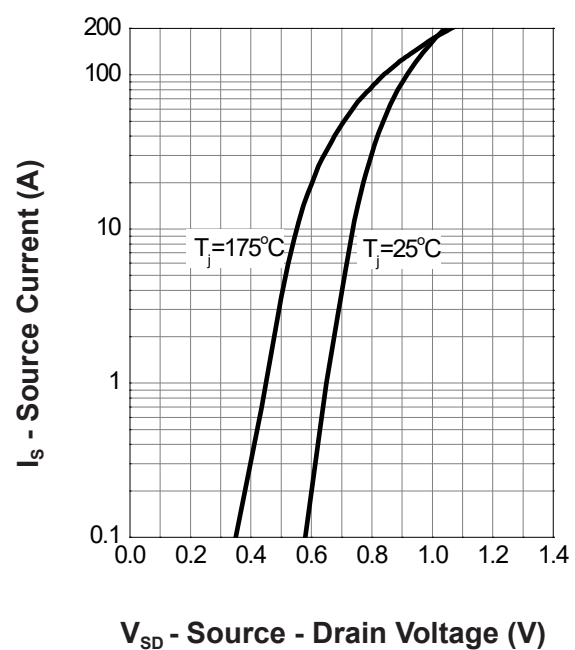
**Thermal Transient Impedance**


Square Wave Pulse Duration (sec)

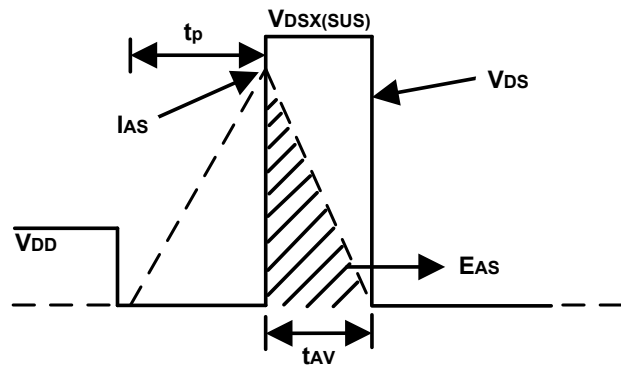
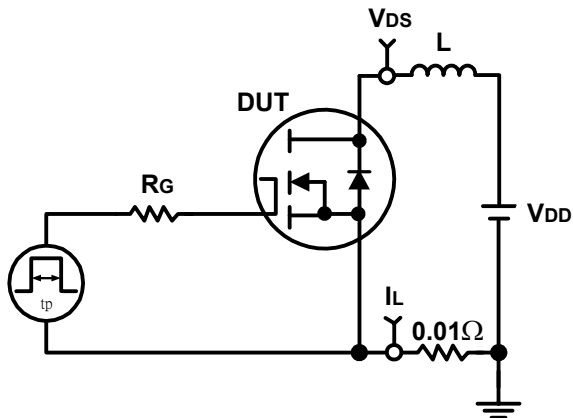
## Typical Operating Characteristics(Cont.)

**Gate-Source On Resistance**

**Gate Threshold Voltage**

**Output Characteristics**

**Drain-Source On Resistance**


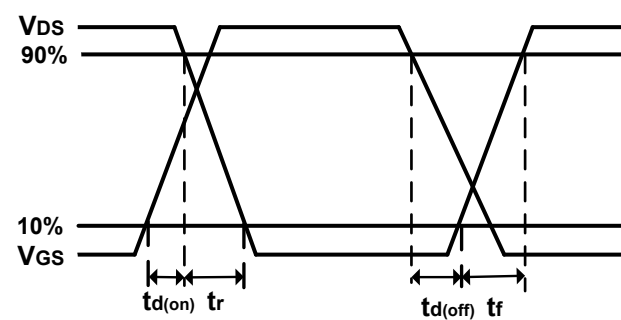
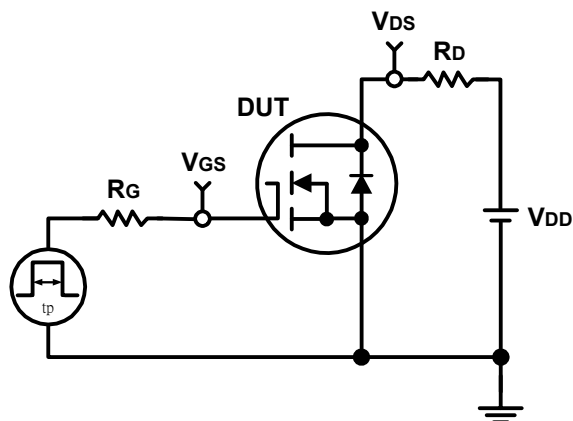
## Typical Operating Characteristics(Cont.)

**Capacitance**

**Gate Charge**

**Drain-Source On Resistance**

**Source-Drain Diode Forward**


## Avalanche Test Circuit and Waveforms

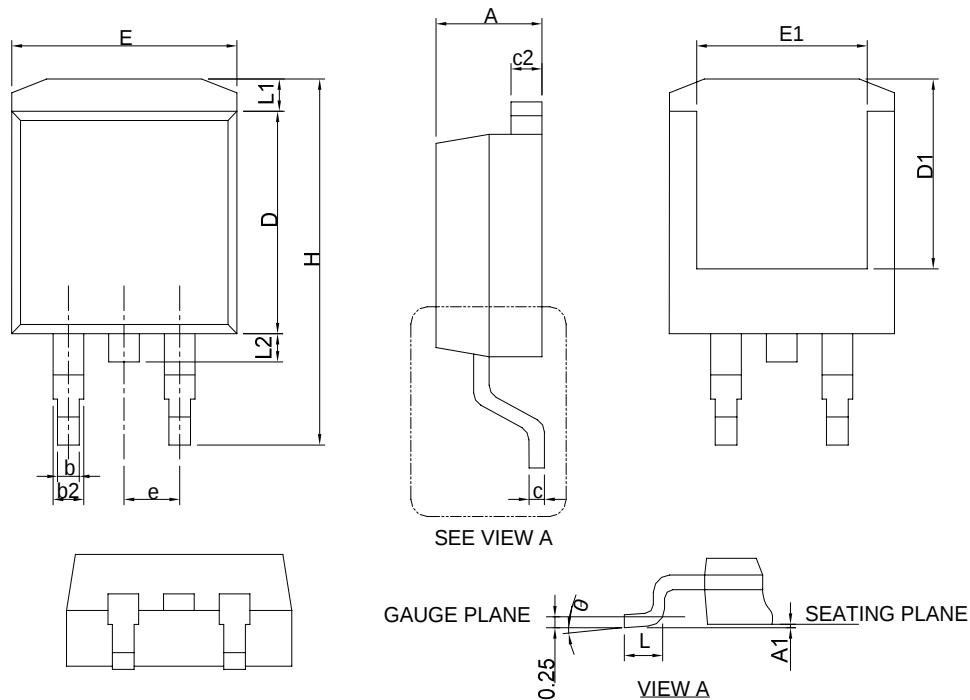


## Switching Time Test Circuit and Waveforms



## Package Information

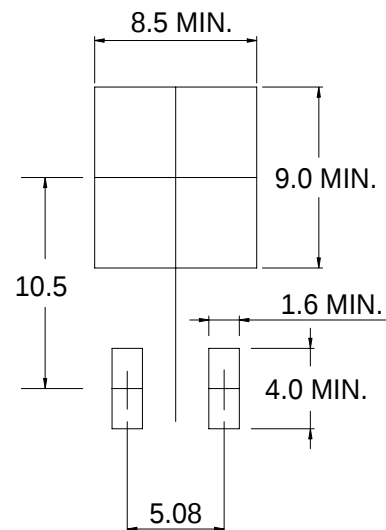
TO-263



| SYMBOL   | TO-263      |       |           |       |
|----------|-------------|-------|-----------|-------|
|          | MILLIMETERS |       | INCHES    |       |
|          | MIN.        | MAX.  | MIN.      | MAX.  |
| A        | 4.06        | 4.83  | 0.160     | 0.190 |
| A1       | 0.00        | 0.25  | 0.000     | 0.010 |
| b        | 0.51        | 0.99  | 0.020     | 0.039 |
| b2       | 1.14        | 1.78  | 0.045     | 0.070 |
| c        | 0.38        | 0.74  | 0.015     | 0.029 |
| c2       | 1.14        | 1.65  | 0.045     | 0.065 |
| D        | 8.38        | 9.65  | 0.330     | 0.380 |
| D1       | 6.00        | 9.00  | 0.236     | 0.354 |
| E        | 9.65        | 11.43 | 0.380     | 0.450 |
| E1       | 6.22        | 9.00  | 0.245     | 0.354 |
| e        | 2.54 BSC    |       | 0.100 BSC |       |
| H        | 14.61       | 15.88 | 0.575     | 0.625 |
| L        | 1.78        | 2.79  | 0.070     | 0.110 |
| L1       | -           | 1.68  | -         | 0.066 |
| L2       | -           | 1.78  | -         | 0.070 |
| $\theta$ | 0°          | 8°    | 0°        | 8°    |

Note : Follow JEDEC TO-263 AB.

### RECOMMENDED LAND PATTERN



UNIT: mm