

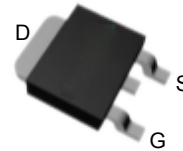
## Features

- 30V/80A,  
 $R_{DS(ON)} = 3.6m\Omega$  (typ.) @  $V_{GS} = 10V$   
 $R_{DS(ON)} = 6.1m\Omega$  (typ.) @  $V_{GS} = 4.5V$
- 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)

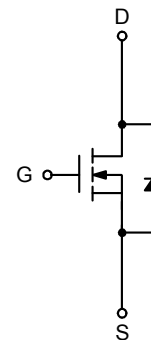
## Applications

- Power Management in Desktop Computer or DC/DC Converters.

## Pin Description



Top View of TO-252



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                   |                       | 30         | V    |
| V <sub>GSS</sub>              | Gate-Source Voltage                    |                       | ±20        |      |
| T <sub>J</sub>                | Maximum Junction Temperature           |                       | 150        | °C   |
| T <sub>STG</sub>              | Storage Temperature Range              |                       | -55 to 150 | °C   |
| I <sub>S</sub>                | Diode Continuous Forward Current       | T <sub>C</sub> =25°C  | 80         | A    |
| I <sub>D</sub>                | Continuous Drain Current               | T <sub>C</sub> =25°C  | 80         | A    |
|                               |                                        | T <sub>C</sub> =100°C | 48         |      |
| I <sub>DM</sub> <sup>b</sup>  | Pulse Drain Current                    | T <sub>C</sub> =25°C  | 240        | A    |
| P <sub>D</sub>                | Maximum Power Dissipation              | T <sub>C</sub> =25°C  | 50         | W    |
|                               |                                        | T <sub>C</sub> =100°C | 20         |      |
| R <sub>θJC</sub>              | Thermal Resistance-Junction to Case    | Steady State          | 2.5        | °C/W |
| R <sub>θJA</sub> <sup>c</sup> | Thermal Resistance-Junction to Ambient | t ≤ 10s               | 20         | °C/W |
|                               |                                        | Steady State          | 60         |      |
| I <sub>AS</sub> <sup>d</sup>  | Avalanche Current, Single pulse        | L=0.5mH               | 18         | A    |
| E <sub>AS</sub> <sup>d</sup>  | Avalanche Energy, Single pulse         | L=0.5mH               | 81         | mJ   |

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

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

Note c : Surface mounted on  $1\text{in}^2$  pad area, steady state  $t = 999\text{s}$ .

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

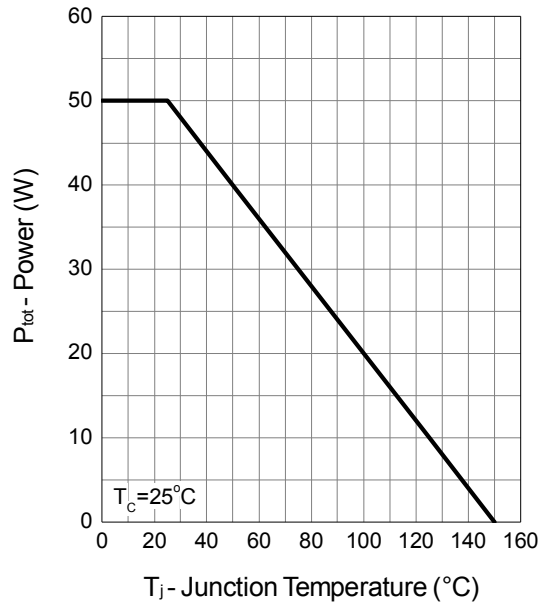
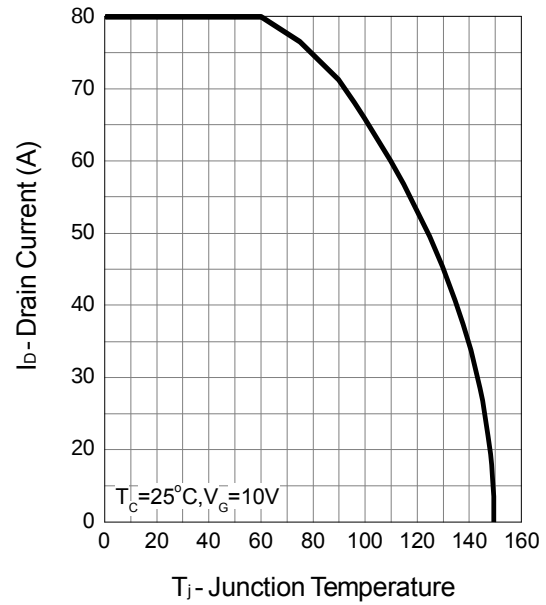
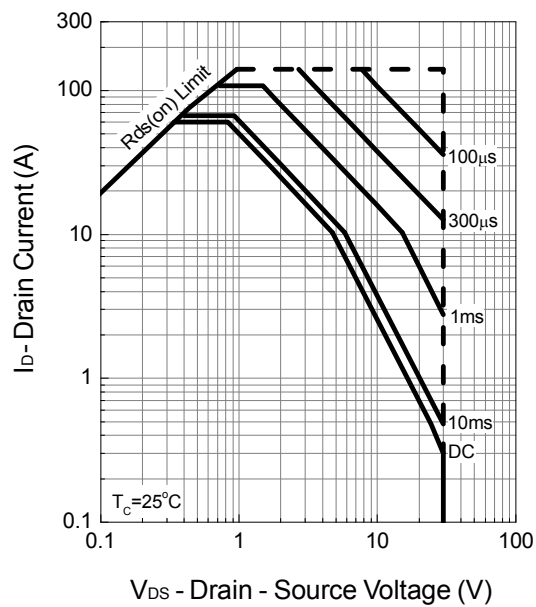
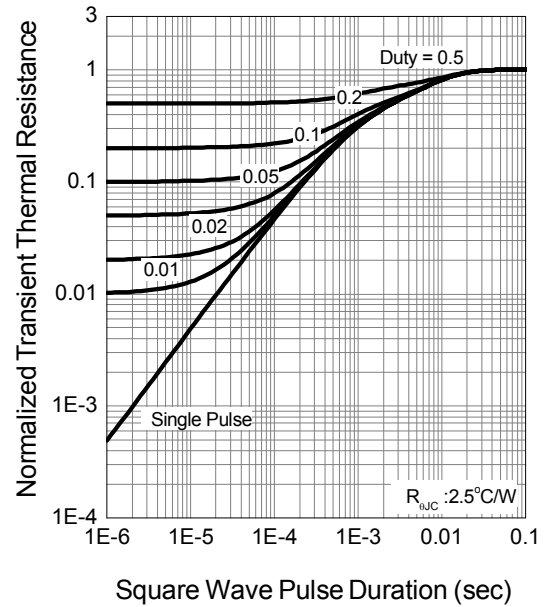
## Electrical Characteristics (T<sub>A</sub> = 25°C unless otherwise noted)

| 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                                                                        | 30          | -                 | -               | V    |
| BV <sub>DSS</sub> t                      | Drain-Source Breakdown Voltage (transient) | V <sub>GS</sub> =0V, I <sub>D(aval)</sub> =20A<br>T <sub>case</sub> =25°C, t <sub>transient</sub> =100ns           | 34          | -                 | -               | V    |
| I <sub>DSS</sub>                         | Zero Gate Voltage Drain Current            | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =85°C                                                  | -<br>-      | -<br>-            | 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               | 2.5             | 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> =40A<br>T <sub>J</sub> =125°C<br>V <sub>GS</sub> =4.5V, I <sub>DS</sub> =20A | -<br>-<br>- | 3.6<br>5.9<br>6.1 | 4.8<br>-<br>7.5 | mΩ   |
| Gfs                                      | Forward Transconductance                   | V <sub>DS</sub> =5V, I <sub>DS</sub> =40A                                                                          | -           | 95                | -               | S    |
| Diode Characteristics                    |                                            |                                                                                                                    |             |                   |                 |      |
| V <sub>SD</sub> <sup>e</sup>             | Diode Forward Voltage                      | I <sub>SD</sub> =20A, V <sub>GS</sub> =0V                                                                          | -           | 0.8               | 1.1             | V    |
| t <sub>rr</sub>                          | Reverse Recovery Time                      | I <sub>DS</sub> =40A, dI <sub>SD</sub> /dt=100A/μs                                                                 | -           | 21                | -               | ns   |
| t <sub>a</sub>                           | Charge Time                                |                                                                                                                    | -           | 13.2              | -               |      |
| t <sub>b</sub>                           | Discharge Time                             |                                                                                                                    | -           | 7.8               | -               |      |
| Q <sub>rr</sub>                          | Reverse Recovery Charge                    |                                                                                                                    | -           | 17                | -               | nC   |
| Dynamic Characteristics <sup>f</sup>     |                                            |                                                                                                                    |             |                   |                 |      |
| R <sub>G</sub>                           | Gate Resistance                            | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                                                   | -           | 3                 | 4.5             | Ω    |
| C <sub>iss</sub>                         | Input Capacitance                          | V <sub>GS</sub> =0V,<br>V <sub>DS</sub> =15V,<br>Frequency=1.0MHz                                                  | 1000        | 1188              | 1620            | pF   |
| C <sub>oss</sub>                         | Output Capacitance                         |                                                                                                                    | 160         | 200               | 310             |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance               |                                                                                                                    | 100         | 200               | 275             |      |
| t <sub>d(ON)</sub>                       | Turn-on Delay Time                         | V <sub>DD</sub> =15V, R <sub>L</sub> =15Ω,<br>I <sub>DS</sub> =1A, V <sub>GEN</sub> =10V,<br>R <sub>G</sub> =6Ω    | -           | 15                | 28              | ns   |
| t <sub>r</sub>                           | Turn-on Rise Time                          |                                                                                                                    | -           | 13                | 24              |      |
| t <sub>d(OFF)</sub>                      | Turn-off Delay Time                        |                                                                                                                    | -           | 32                | 57              |      |
| t <sub>f</sub>                           | Turn-off Fall Time                         |                                                                                                                    | -           | 9                 | 17              |      |
| Gate Charge Characteristics <sup>f</sup> |                                            |                                                                                                                    |             |                   |                 |      |
| Q <sub>g</sub>                           | Total Gate Charge                          | V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V,<br>I <sub>DS</sub> =40A                                               | -           | 12                | 17              | nC   |
| Q <sub>g</sub>                           | Total Gate Charge                          | V <sub>DS</sub> =15V, V <sub>GS</sub> =10V,<br>I <sub>DS</sub> =40A                                                | -           | 25                | 37              |      |
| Q <sub>gth</sub>                         | Threshold Gate Charge                      |                                                                                                                    | -           | 1.5               | -               |      |
| Q <sub>gs</sub>                          | Gate-Source Charge                         |                                                                                                                    | -           | 3                 | -               |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                          |                                                                                                                    | -           | 7.5               | -               |      |

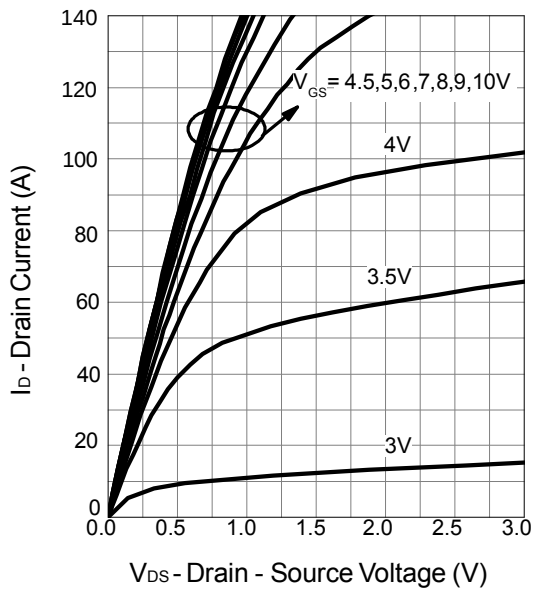
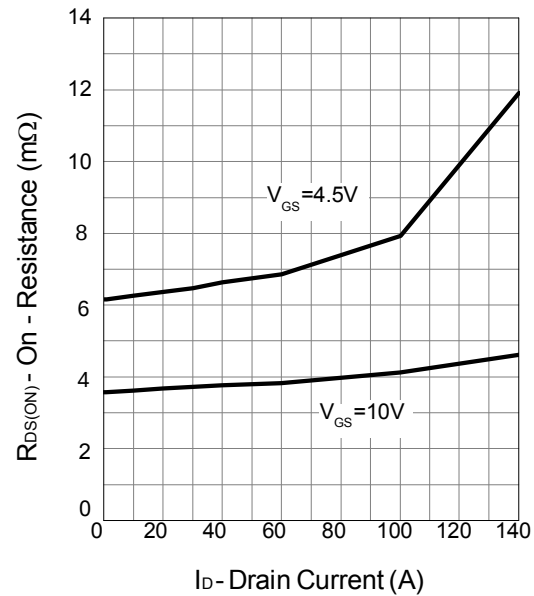
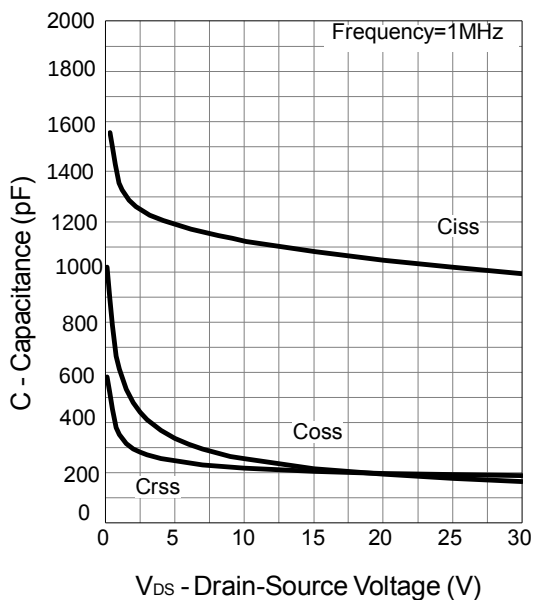
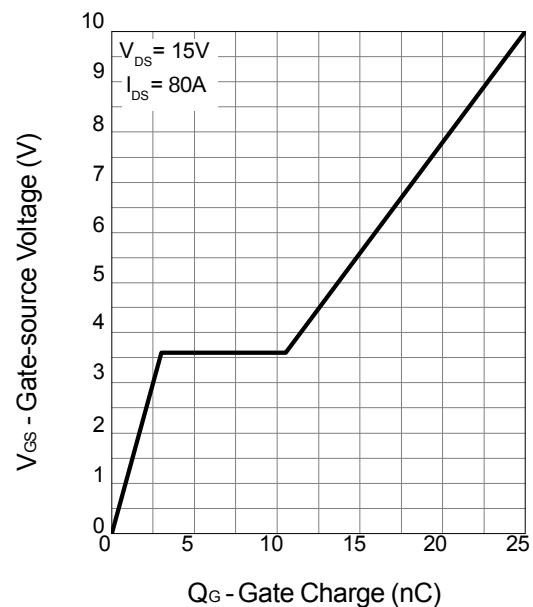
Note e : Pulse test ; pulse width≤300μs, duty cycle≤2%.

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

## Typical Operating Characteristics

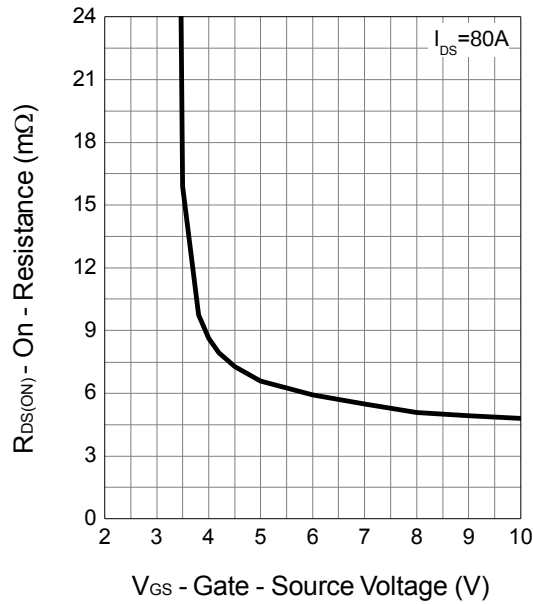
**Power Dissipation**

**Drain Current**

**Safe Operation Area**

**Thermal Transient Impedance**


## Typical Operating Characteristics (Cont.)

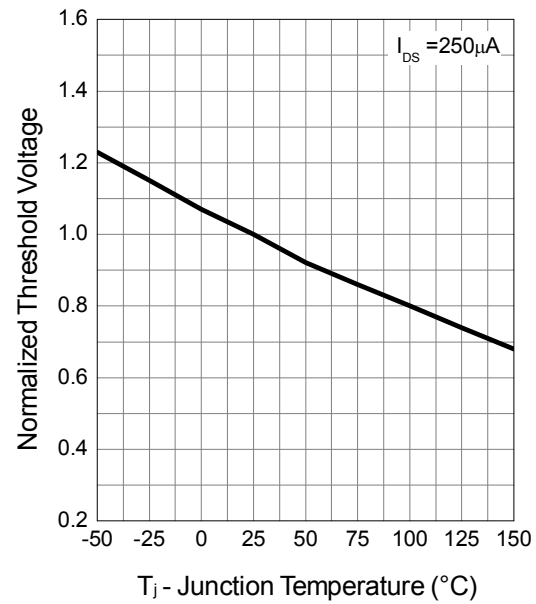
**Output Characteristics**

**Drain-Source On Resistance**

**Capacitance**

**Gate Charge**


## Typical Operating Characteristics (Cont.)

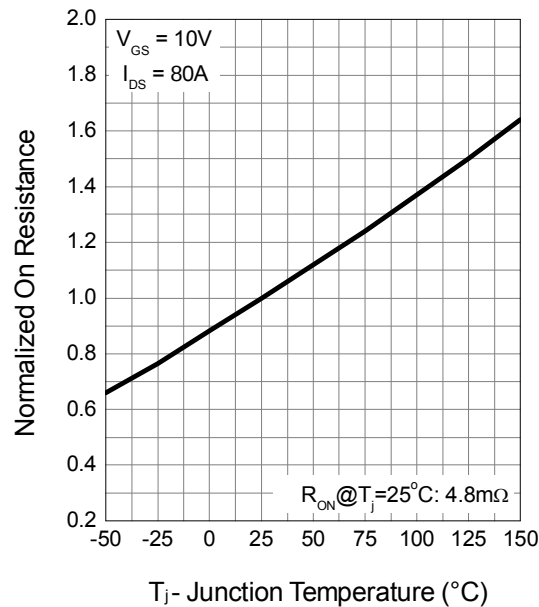
Gate-Source On Resistance



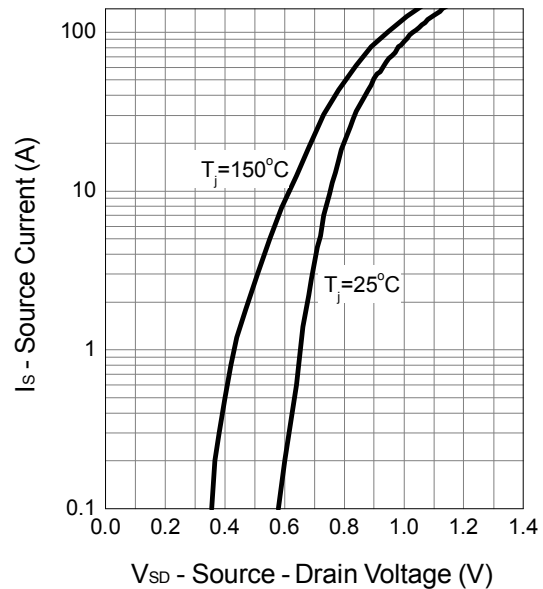
Gate Threshold Voltage



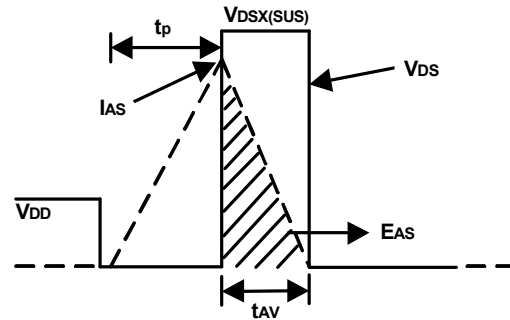
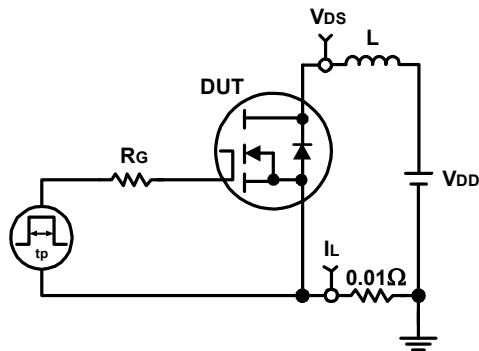
Drain-Source On Resistance



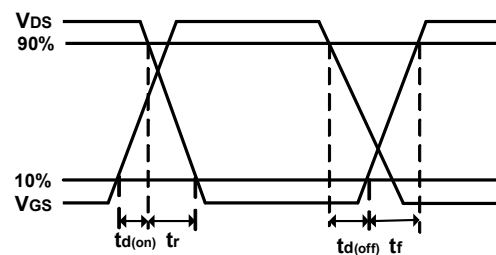
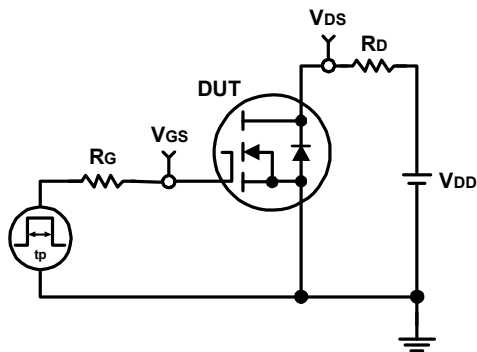
Source-Drain Diode Forward



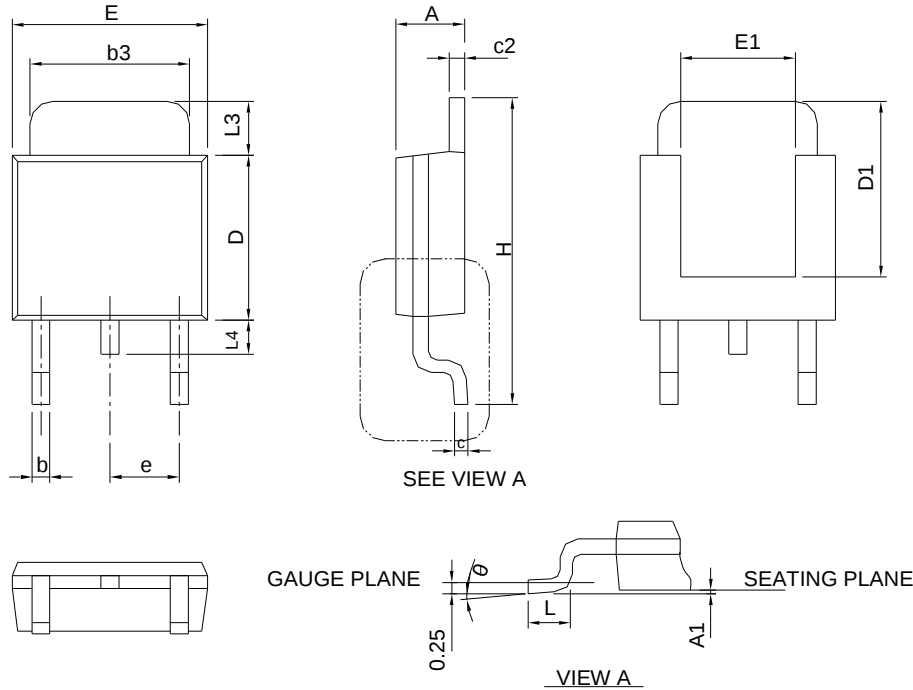
## Avalanche Test Circuit and Waveforms



## Switching Time Test Circuit and Waveforms



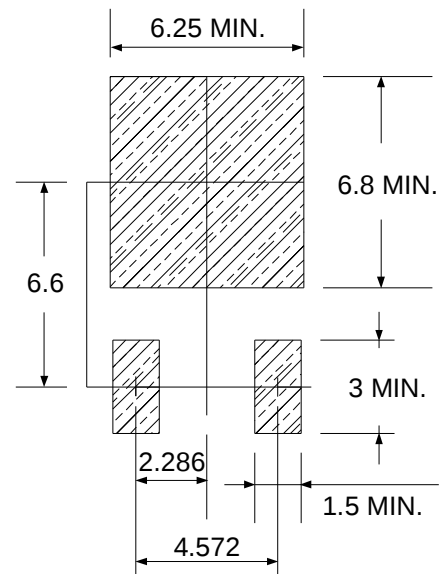
## Package Information



| SYMBOL | TO-252      |       |           |       |
|--------|-------------|-------|-----------|-------|
|        | MILLIMETERS |       | INCHES    |       |
|        | MIN.        | MAX.  | MIN.      | MAX.  |
| A      | 2.18        | 2.39  | 0.086     | 0.094 |
| A1     | -           | 0.13  | -         | 0.005 |
| b      | 0.50        | 0.89  | 0.020     | 0.035 |
| b3     | 4.95        | 5.46  | 0.195     | 0.215 |
| c      | 0.46        | 0.61  | 0.018     | 0.024 |
| c2     | 0.46        | 0.89  | 0.018     | 0.035 |
| D      | 5.33        | 6.22  | 0.210     | 0.245 |
| D1     | 4.57        | 6.00  | 0.180     | 0.236 |
| E      | 6.35        | 6.73  | 0.250     | 0.265 |
| E1     | 3.81        | 6.00  | 0.150     | 0.236 |
| e      | 2.29 BSC    |       | 0.090 BSC |       |
| H      | 9.40        | 10.41 | 0.370     | 0.410 |
| L      | 0.90        | 1.78  | 0.035     | 0.070 |
| L3     | 0.89        | 2.03  | 0.035     | 0.080 |
| L4     | -           | 1.02  | -         | 0.040 |
| θ      | 0°          | 8°    | 0°        | 8°    |

Note : Follow JEDEC TO-252-2 .

### RECOMMENDED LAND PATTERN



UNIT: mm