

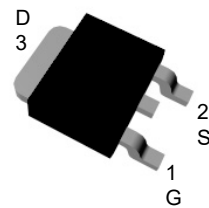
## Features

- 30V/120A,  
 $R_{DS(ON)} = 2.4m\Omega$  (typ.) @  $V_{GS} = 10V$   
 $R_{DS(ON)} = 3.6m\Omega$  (typ.) @  $V_{GS} = 4.5V$
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

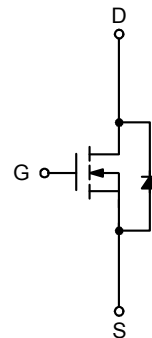
## Applications

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

## Pin Description



Top View of TO-252-2



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                   |                       | 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       |                       | 120        | A    |
| I <sub>DP</sub>              | Pulse Drain Current Tested             | T <sub>C</sub> =25°C  | 360        | A    |
| I <sub>D</sub> <sup>a</sup>  | Continuous Drain Current               | T <sub>C</sub> =25°C  | 120        | A    |
|                              |                                        | T <sub>C</sub> =100°C | 80         |      |
| 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>             | Thermal Resistance-Junction to Ambient | t ≤ 10s               | 15         | °C/W |
|                              |                                        | Steady State          | 50         |      |
| I <sub>AS</sub> <sup>a</sup> | Avalanche Current, Single pulse        | L=0.5mH               | 36         | A    |
| E <sub>AS</sub> <sup>a</sup> | Avalanche Energy, Single pulse         | L=0.5mH               | 324        | mJ   |

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

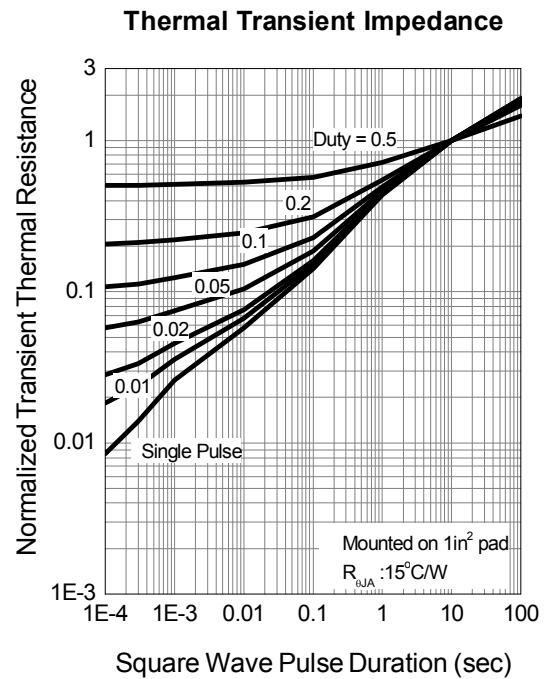
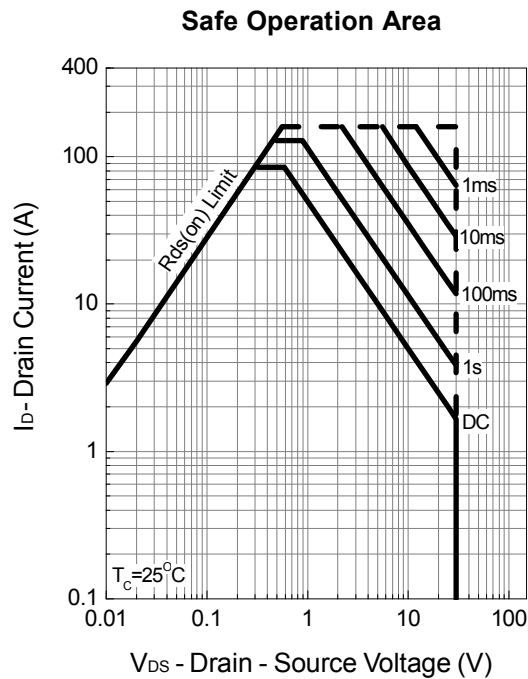
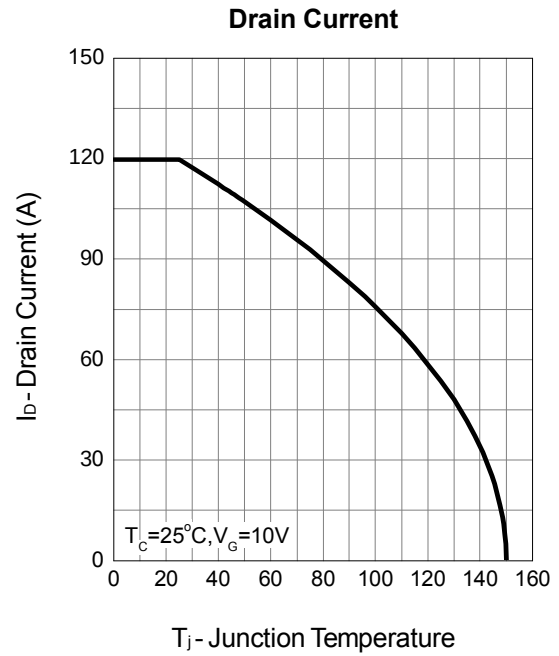
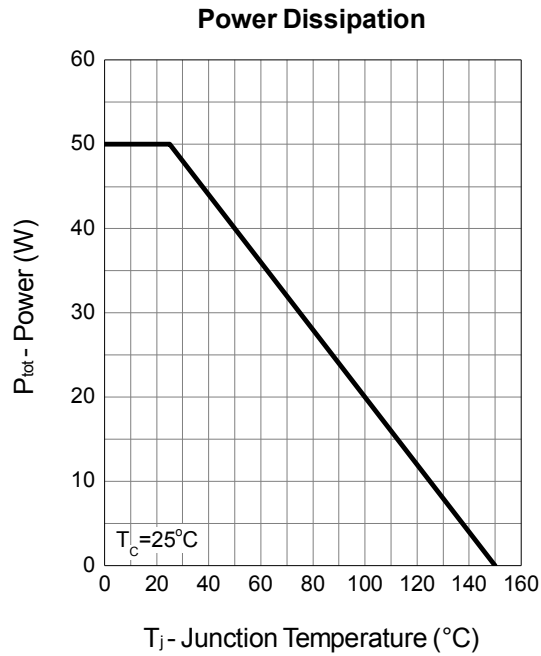
## Electrical Characteristics (T<sub>A</sub> = 25°C unless otherwise noted)

| 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> =30A<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                                                       | 1.2    | 1.9        | 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>b</sup>         | Drain-Source On-state Resistance           | V <sub>GS</sub> =10V, I <sub>DS</sub> =30A<br>T <sub>J</sub> =125°C                                             | -<br>- | 2.4<br>3.7 | 3<br>-  | mΩ   |
|                                          |                                            | V <sub>GS</sub> =4.5V, I <sub>DS</sub> =15A                                                                     | -      | 3.6        | 4.6     |      |
| Gfs                                      | Forward Transconductance                   | V <sub>DS</sub> =5V, I <sub>DS</sub> =15A                                                                       | -      | 50         | -       | S    |
| Diode Characteristics                    |                                            |                                                                                                                 |        |            |         |      |
| V <sub>SD</sub> <sup>b</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> =30A, dI <sub>SD</sub> /dt=100A/μs                                                              | -      | 23         | -       | ns   |
| t <sub>a</sub>                           | Charge Time                                |                                                                                                                 | -      | 13         | -       |      |
| t <sub>b</sub>                           | Discharge Time                             |                                                                                                                 | -      | 11         | -       |      |
| Q <sub>rr</sub>                          | Reverse Recovery Charge                    |                                                                                                                 | -      | 9          | -       | nC   |
| Dynamic Characteristics <sup>c</sup>     |                                            |                                                                                                                 |        |            |         |      |
| R <sub>G</sub>                           | Gate Resistance                            | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                                                | -      | 1.4        | -       | Ω    |
| C <sub>iss</sub>                         | Input Capacitance                          | V <sub>GS</sub> =0V,<br>V <sub>DS</sub> =15V,<br>Frequency=1.0MHz                                               | -      | 1700       | -       | pF   |
| C <sub>oss</sub>                         | Output Capacitance                         |                                                                                                                 | -      | 460        | -       |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance               |                                                                                                                 | -      | 85         | -       |      |
| 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 | -      | 18         | -       | ns   |
| t <sub>r</sub>                           | Turn-on Rise Time                          |                                                                                                                 | -      | 14         | -       |      |
| t <sub>d(OFF)</sub>                      | Turn-off Delay Time                        |                                                                                                                 | -      | 46         | -       |      |
| t <sub>f</sub>                           | Turn-off Fall Time                         |                                                                                                                 | -      | 19         | -       |      |
| Gate Charge Characteristics <sup>c</sup> |                                            |                                                                                                                 |        |            |         |      |
| Q <sub>g</sub>                           | Total Gate Charge                          | V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V,<br>I <sub>DS</sub> =30A                                            | -      | 6          | -       | nC   |
| Q <sub>g</sub>                           | Total Gate Charge                          | V <sub>DS</sub> =15V, V <sub>GS</sub> =10V,<br>I <sub>DS</sub> =30A                                             | -      | 10         | -       |      |
| Q <sub>gth</sub>                         | Threshold Gate Charge                      |                                                                                                                 | -      | 0.8        | -       |      |
| Q <sub>gs</sub>                          | Gate-Source Charge                         |                                                                                                                 | -      | 2          | -       |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                          |                                                                                                                 | -      | 3.5        | -       |      |

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

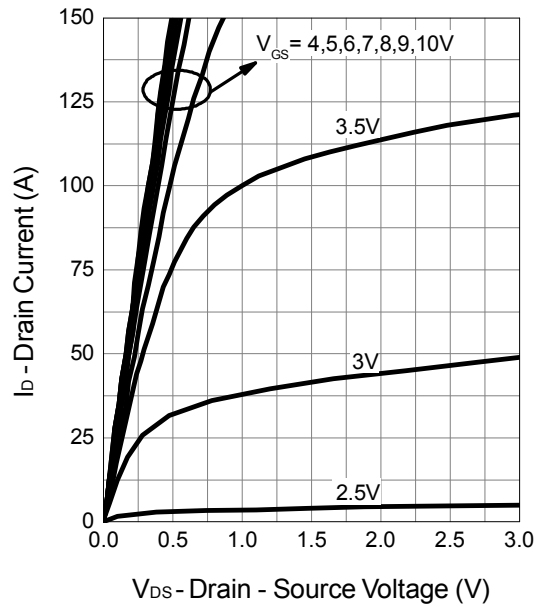
Note c : Guaranteed by design, not subject to production testing.

## Typical Operating Characteristics

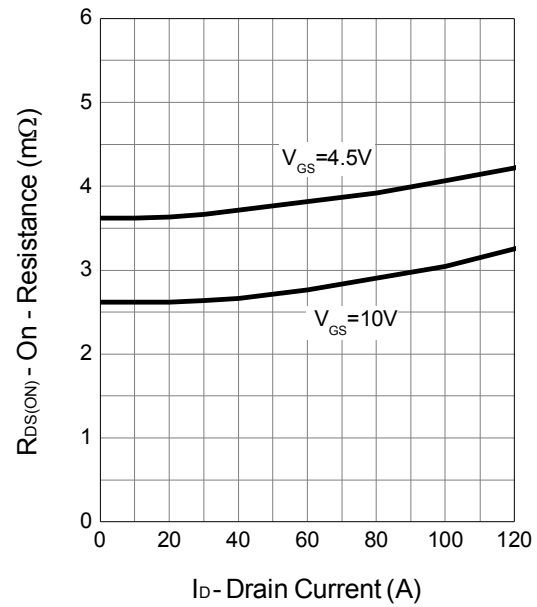


## Typical Operating Characteristics (Cont.)

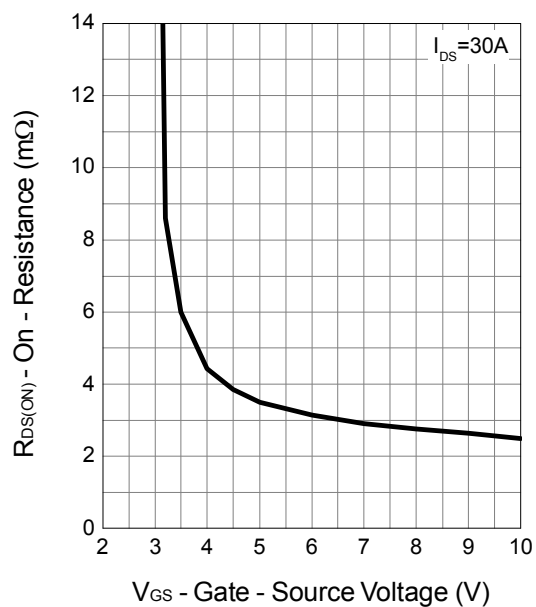
Output Characteristics



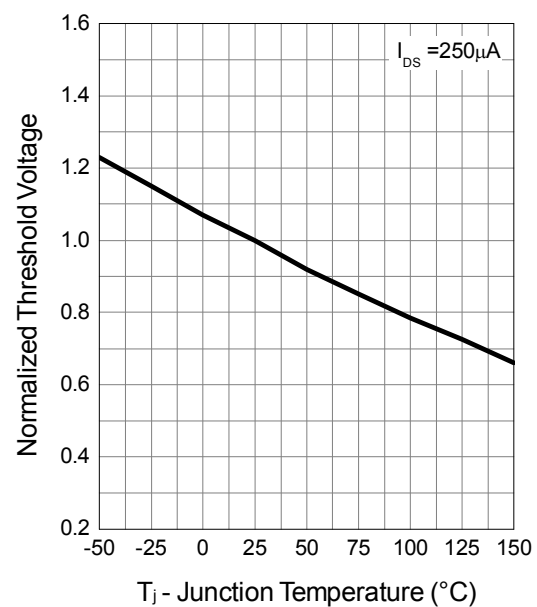
Drain-Source On Resistance



Gate-Source On Resistance

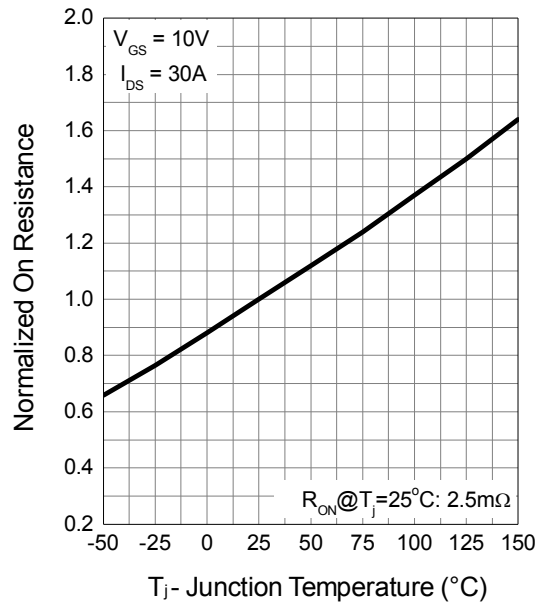


Gate Threshold Voltage

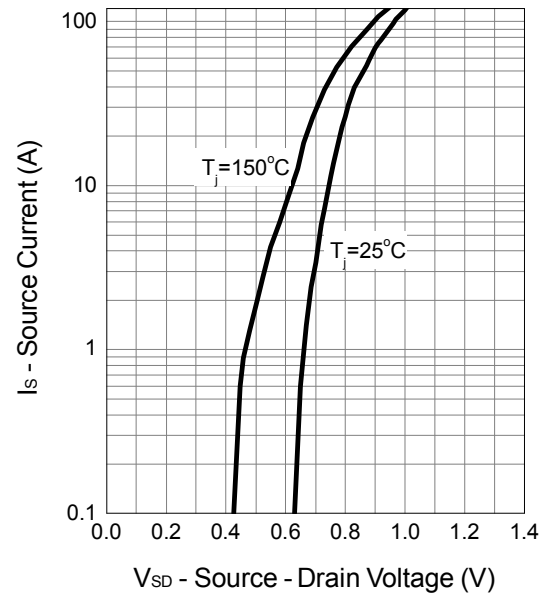


## Typical Operating Characteristics (Cont.)

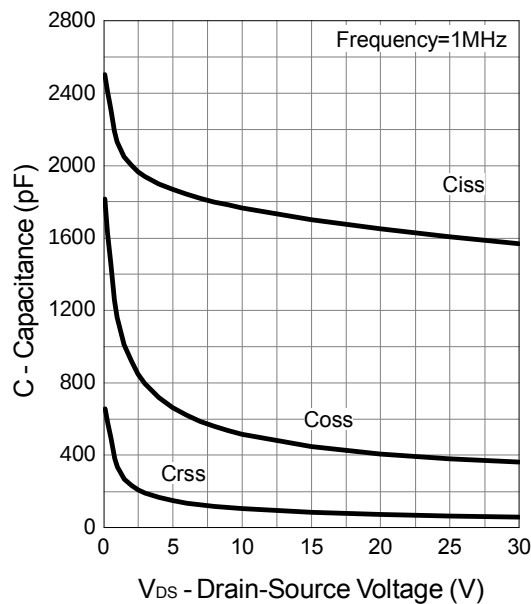
Drain-Source On Resistance



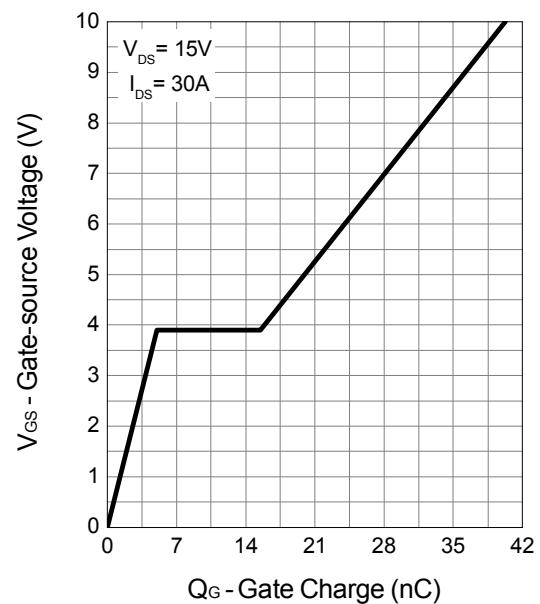
Source-Drain Diode Forward



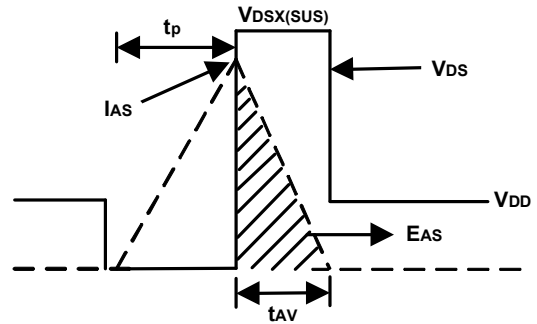
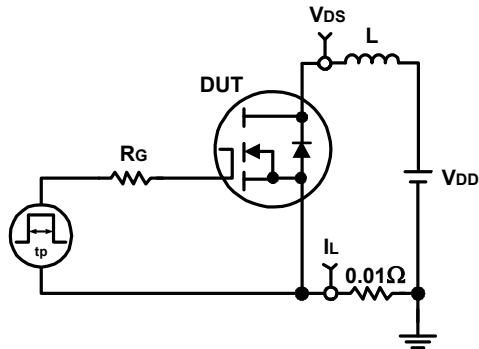
Capacitance



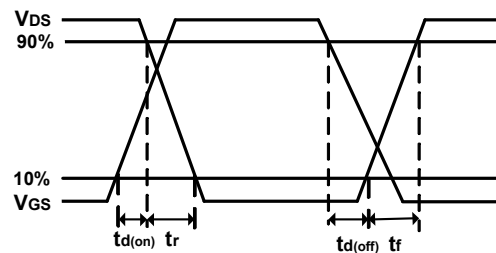
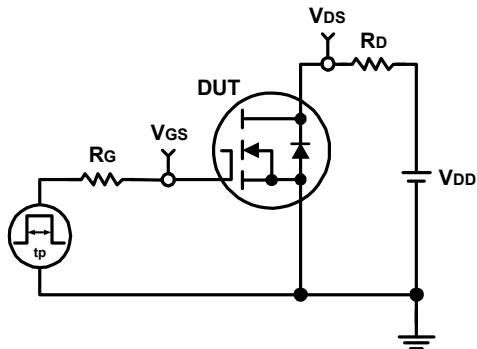
Gate Charge



## Avalanche Test Circuit and Waveforms

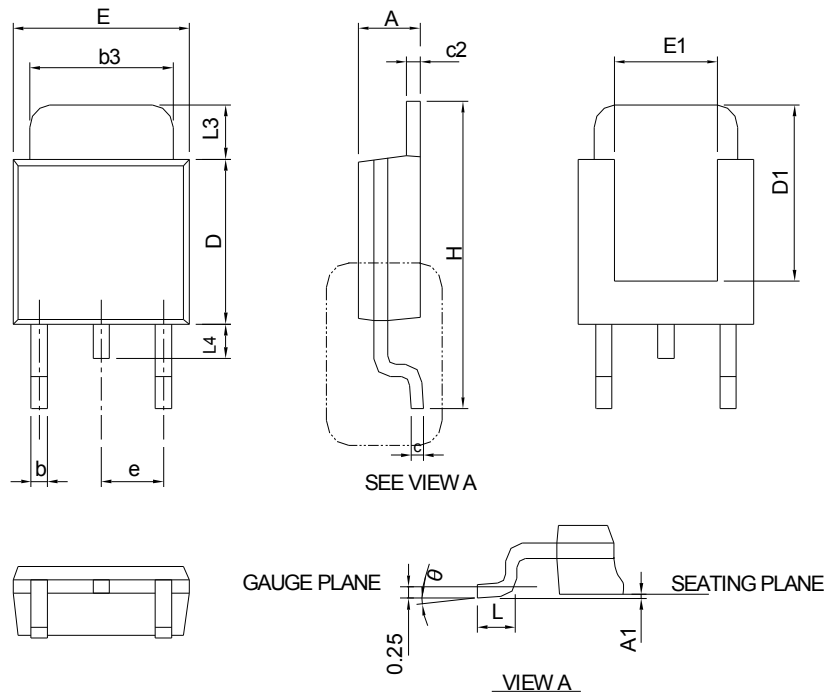


## Switching Time Test Circuit and Waveforms



## Package Information

TO-252-2



| DIMENSIONS | TO-252-2    |       |           |       |
|------------|-------------|-------|-----------|-------|
|            | 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°    |

## RECOMMENDED LAND PATTERN

