

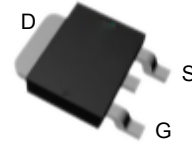
## Features

- 30V/50A,  
 $R_{DS(ON)} = 10m\Omega$  (typ.) @  $V_{GS} = 10V$   
 $R_{DS(ON)} = 12m\Omega$  (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)

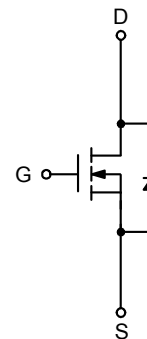
## Applications

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

## Pin Description



Top View of TO-252-2



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 |      |
| I <sub>S</sub>               | Diode Continuous Forward Current       | T <sub>C</sub> =25°C  | 50         | A    |
| I <sub>D</sub>               | Continuous Drain Current               | T <sub>C</sub> =25°C  | 50         |      |
|                              |                                        | T <sub>C</sub> =100°C | 20         |      |
| I <sub>DM</sub> <sup>a</sup> | Pulsed Drain Current                   | T <sub>C</sub> =25°C  | 300        |      |
| P <sub>D</sub>               | Maximum Power Dissipation              | T <sub>C</sub> =25°C  | 41         | W    |
|                              |                                        | T <sub>C</sub> =100°C | 16         |      |
| R <sub>θJC</sub>             | Thermal Resistance-Junction to Case    | Steady State          | 3          | °C/W |
| I <sub>D</sub>               | Continuous Drain Current               | T <sub>A</sub> =25°C  | 12         | A    |
|                              |                                        | T <sub>A</sub> =70°C  | 9.6        |      |
| P <sub>D</sub>               | Maximum Power Dissipation              | T <sub>A</sub> =25°C  | 2.5        | W    |
|                              |                                        | T <sub>A</sub> =70°C  | 1.6        |      |
| R <sub>θJA</sub>             | Thermal Resistance-Junction to Ambient | t ≤ 10s               | 17         | °C/W |
|                              |                                        | Steady State          | 50         |      |
| I <sub>AS</sub> <sup>b</sup> | Avalanche Current, Single pulse        | L=0.1mH               | 20         | A    |
| E <sub>AS</sub> <sup>b</sup> | Avalanche Energy, Single pulse         | L=0.1mH               | 20         | mJ   |

Note a : Pulse width limited by max. junction temperature.

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

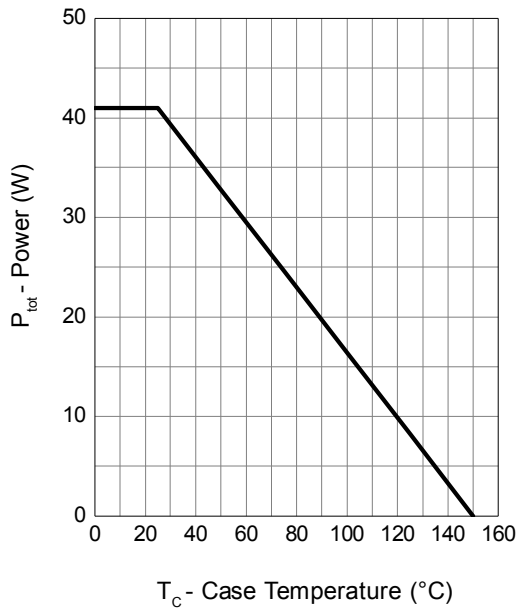
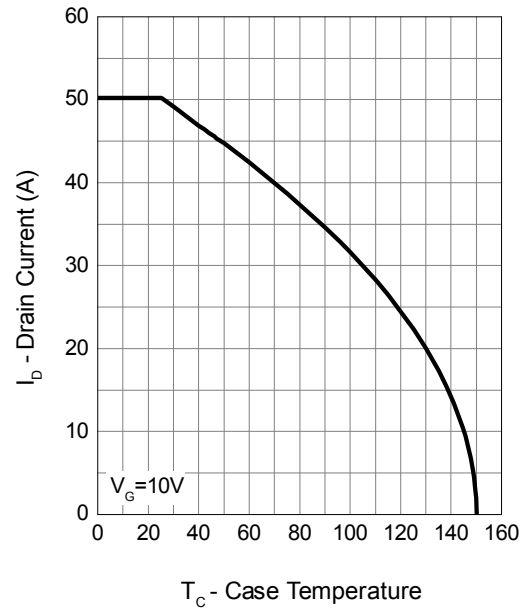
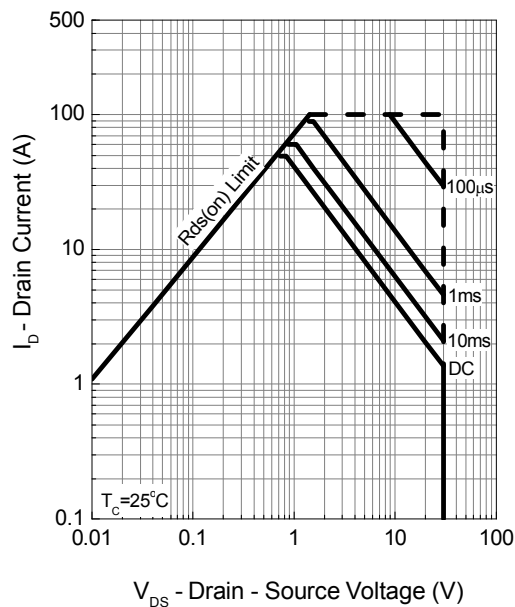
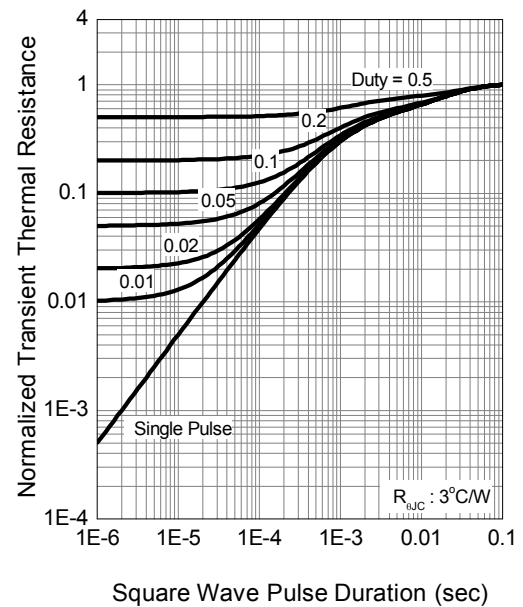
## Electrical Characteristics (T<sub>A</sub> = 25°C unless otherwise noted)

| 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    |
| 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                                                          | 0.5         | 1.5              | 2.0           | 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>c</sup>         | Drain-Source On-state Resistance | V <sub>GS</sub> =10V, I <sub>DS</sub> =20A<br>T <sub>J</sub> =125°C<br>V <sub>GS</sub> =4.5V, I <sub>DS</sub> =10A | -<br>-<br>- | 10<br>12.4<br>12 | 12<br>-<br>15 | mΩ   |
| Gfs                                      | Forward Transconductance         | V <sub>DS</sub> =7.6 , I <sub>D</sub> =8A                                                                          | -           | 28               | -             | S    |
| Diode Characteristics                    |                                  |                                                                                                                    |             |                  |               |      |
| V <sub>SD</sub> <sup>c</sup>             | Diode Forward Voltage            | I <sub>SD</sub> =15A, V <sub>GS</sub> =0V                                                                          | -           | 0.87             | 1.1           | V    |
| t <sub>rr</sub>                          | Reverse Recovery Time            | I <sub>F</sub> =5A, dI <sub>SD</sub> /dt=100A/μs                                                                   | -           | 12               | -             | ns   |
| t <sub>a</sub>                           | Charge Time                      |                                                                                                                    | -           | 7                | -             |      |
| t <sub>b</sub>                           | Discharge Time                   |                                                                                                                    | -           | 5                | -             |      |
| Q <sub>rr</sub>                          | Reverse Recovery Charge          |                                                                                                                    | -           | 5.4              | -             | nC   |
| Dynamic Characteristics <sup>d</sup>     |                                  |                                                                                                                    |             |                  |               |      |
| R <sub>G</sub>                           | Gate Resistance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                                                   | 0.5         | 0.75             | 1.5           | Ω    |
| C <sub>iss</sub>                         | Input Capacitance                | V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, Frequency=1.0MHz                                                        | 880         | 1090             | 1300          | pF   |
| C <sub>oss</sub>                         | Output Capacitance               |                                                                                                                    | 120         | 142              | 163           |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance     |                                                                                                                    | 74          | 93               | 110           |      |
| t <sub>d(ON)</sub>                       | Turn-on Delay Time               | V <sub>DD</sub> =15V, R <sub>L</sub> =15Ω, I <sub>DS</sub> =1A, V <sub>GEN</sub> =10V, R <sub>G</sub> =1Ω          | -           | 12               | 16            | ns   |
| t <sub>r</sub>                           | Turn-on Rise Time                |                                                                                                                    | -           | 11.8             | 16            |      |
| t <sub>d(OFF)</sub>                      | Turn-off Delay Time              |                                                                                                                    | -           | 23.2             | 30            |      |
| t <sub>f</sub>                           | Turn-off Fall Time               |                                                                                                                    | -           | 4.4              | 5.7           |      |
| Gate Charge Characteristics <sup>d</sup> |                                  |                                                                                                                    |             |                  |               |      |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>DS</sub> =20A                                                  | -           | 8.8              | 11            | nC   |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>DS</sub> =20A                                                   | -           | 19.5             | 23            |      |
| Q <sub>gth</sub>                         | Threshold Gate Charge            |                                                                                                                    | -           | 1.13             | 1.3           |      |
| Q <sub>gs</sub>                          | Gate-Source Charge               |                                                                                                                    | -           | 3.8              | 4.9           |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                |                                                                                                                    | -           | 3.1              | 4             |      |

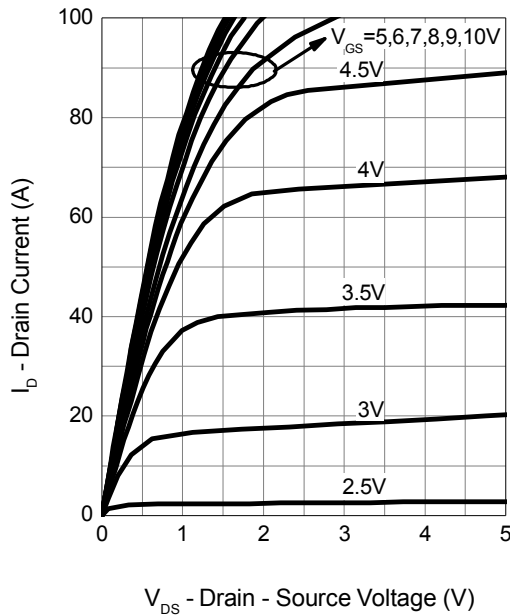
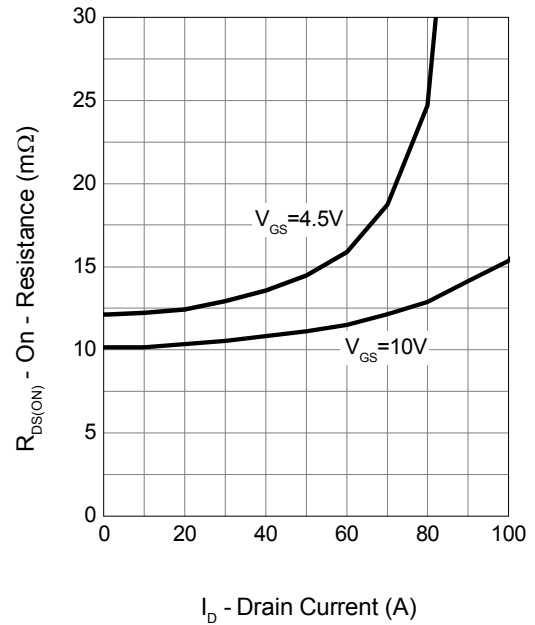
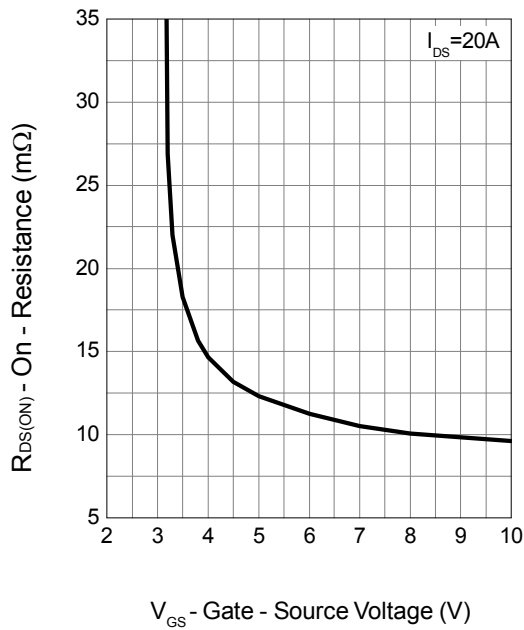
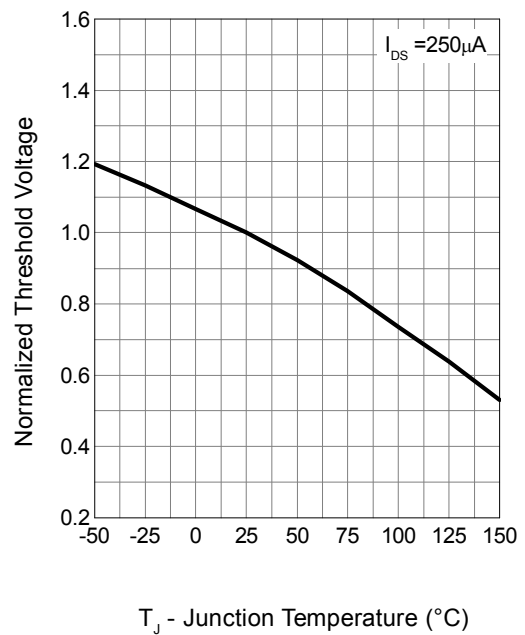
Note c : Pulse test ; pulse width≤300μs, duty cycle≤2%.

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

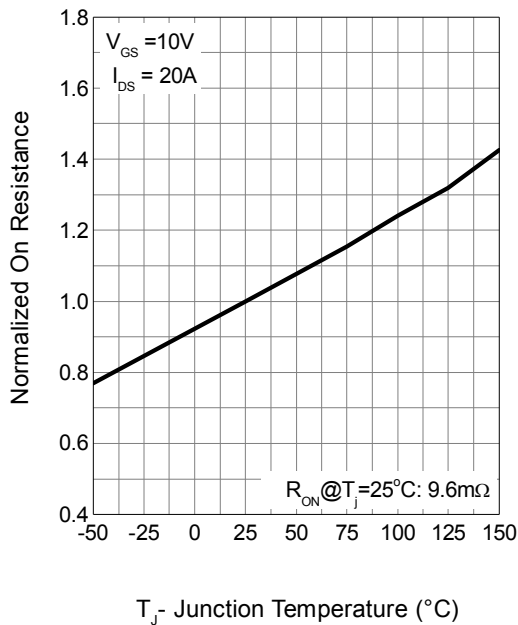
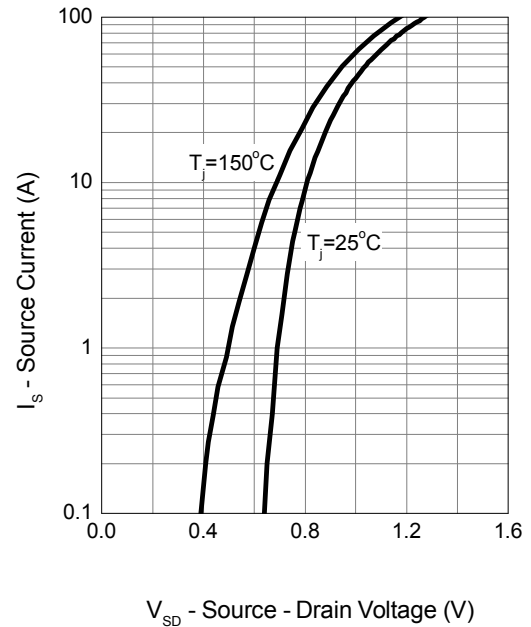
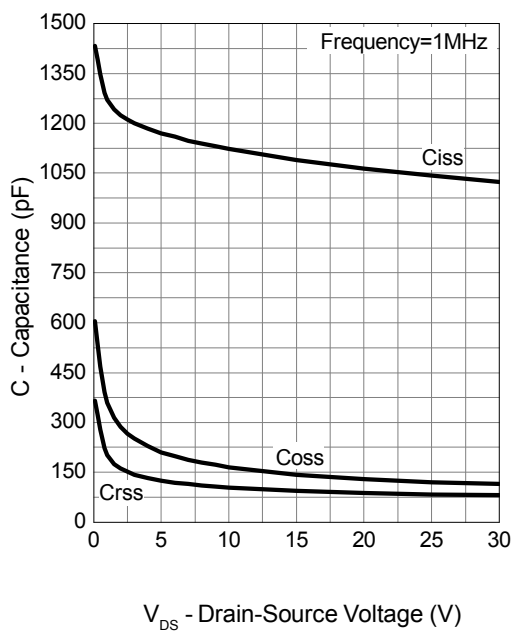
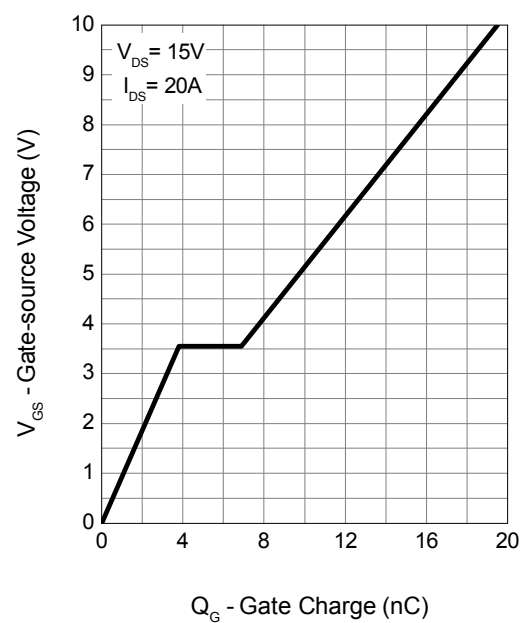
## Typical Operating Characteristics

**Power Dissipation**

**Drain Current**

**Safe Operation Area**

**Thermal Transient Impedance**


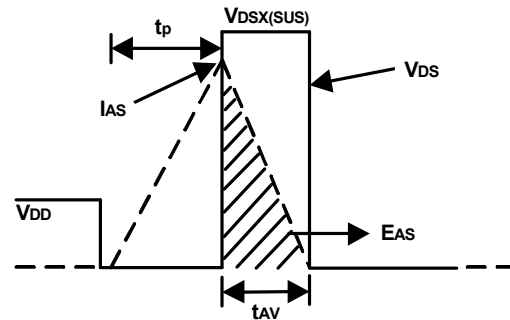
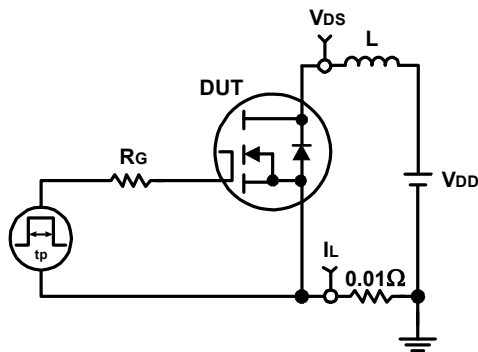
## Typical Operating Characteristics (Cont.)

**Output Characteristics**

**Drain-Source On Resistance**

**Transfer Characteristics**

**Gate Threshold Voltage**


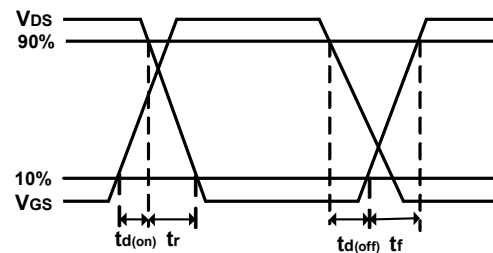
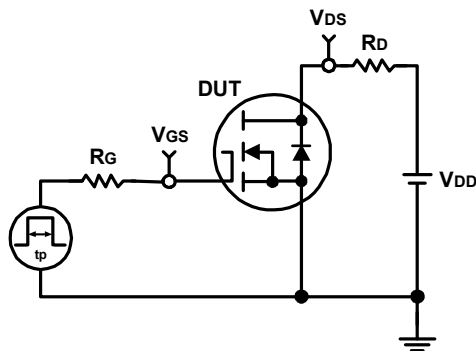
## Typical Operating Characteristics (Cont.)

**Drain-Source On Resistance**

**Source-Drain Diode Forward**

**Capacitance**

**Gate Charge**


## Avalanche Test Circuit and Waveforms

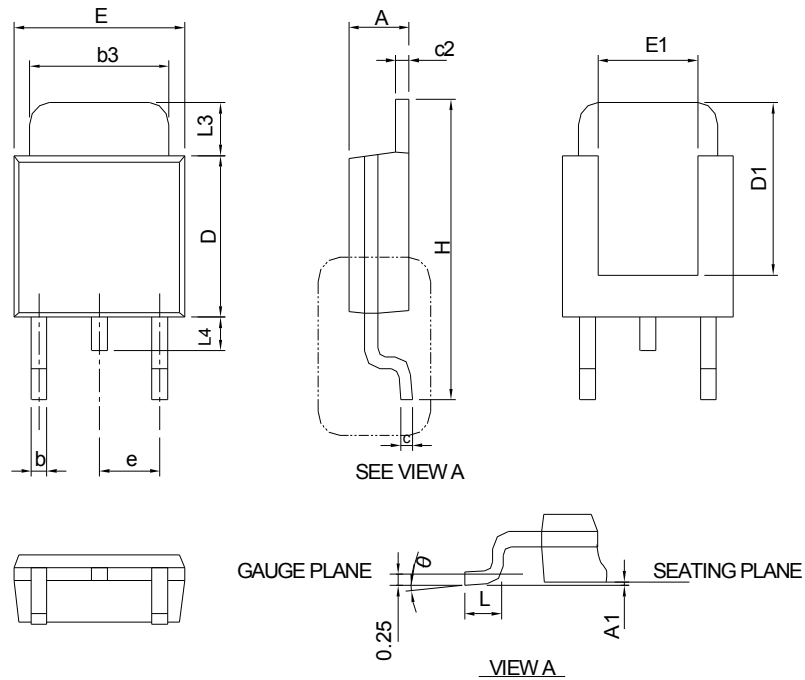


## Switching Time Test Circuit and Waveforms



## Package Information

TO-252-2



| SYMBOL | 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°    |

Note : Follow JEDEC TO-252 - 2 .

### RECOMMENDED LAND PATTERN

