

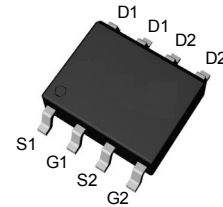
## Features

- 60V/7A,  
 $R_{DS(ON)} = 26m\Omega$  (typ.) @  $V_{GS} = 10V$   
 $R_{DS(ON)} = 30m\Omega$  (typ.) @  $V_{GS} = 4.5V$
- 100% UIS +  $R_g$  Tested
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

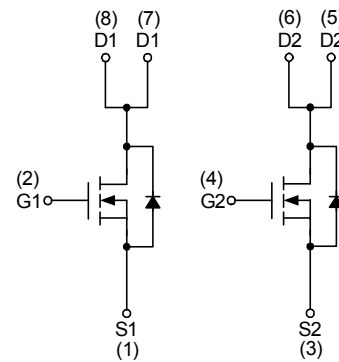
## Applications

- Power Management in Note book.
- Battery Powered System.
- DC/DC Converter.
- Load Switch.

## Pin Description



Top View of SOP8



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                   |                           | 60         | V    |
| V <sub>GSS</sub>             | Gate-Source Voltage                    |                           | ±20        | V    |
| 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>A</sub> =25°C      | 7          | A    |
| I <sub>D</sub>               | Continuous Drain Current               | T <sub>A</sub> =25°C      | 7          | A    |
|                              |                                        | T <sub>A</sub> =70°C      | 5          |      |
| I <sub>DM</sub> <sup>a</sup> | Pulse Drain Current Tested             | T <sub>A</sub> =25°C      | 21         | A    |
| P <sub>D</sub>               | Maximum Power Dissipation              | T <sub>A</sub> =25°C      | 2          | W    |
|                              |                                        | T <sub>A</sub> =70°C      | 1.28       |      |
| R <sub>θJL</sub>             | Thermal Resistance-Junction to Lead    | Steady State              | 50         | °C/W |
| R <sub>θJA</sub>             | Thermal Resistance-Junction to Ambient | t ≤ 10s                   | 62.5       | °C/W |
|                              |                                        | Steady State <sup>b</sup> | 110        |      |
| I <sub>AS</sub> <sup>c</sup> | Avalanche Current, Single pulse        | L=0.5mH                   | 10         | A    |
| E <sub>AS</sub> <sup>c</sup> | Avalanche Energy, Single pulse         | L=0.5mH                   | 25         | mJ   |

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

Note b : Surface Mounted on 1in<sup>2</sup> pad area,  $t = 999\text{sec}$ .

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

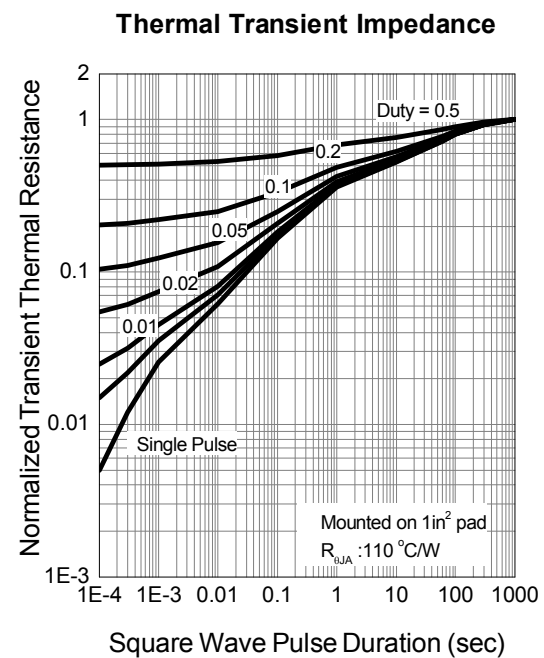
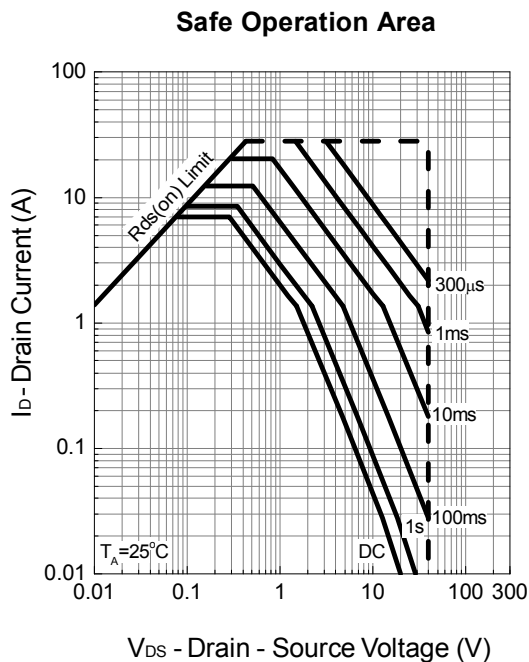
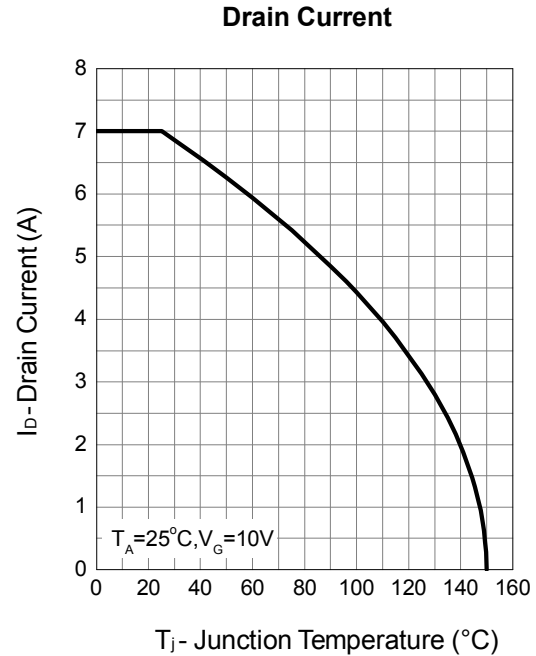
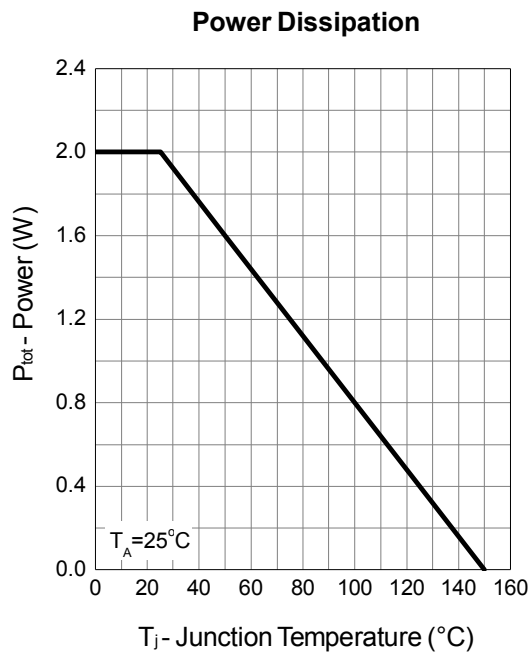
## Electrical Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| 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                                                               | 60   | -    | -    | V    |
| I <sub>DSS</sub>                         | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =48V, 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                                                 | 1.5  | 2    | 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>c</sup>         | Drain-Source On-state Resistance | V <sub>GS</sub> =10V, I <sub>DS</sub> =6A                                                                 | -    | 26   | 30   | mΩ   |
|                                          |                                  | V <sub>GS</sub> =4.5V, I <sub>DS</sub> =5A                                                                | -    | 30   | 35   |      |
| Diode Characteristics                    |                                  |                                                                                                           |      |      |      |      |
| V <sub>SD</sub> <sup>c</sup>             | Diode Forward Voltage            | I <sub>SD</sub> =1A, V <sub>GS</sub> =0V                                                                  | -    | 0.75 | 1.1  | V    |
| t <sub>rr</sub>                          | Reverse Recovery Time            | I <sub>DS</sub> =6A, dI <sub>SD</sub> /dt=100A/μs                                                         | -    | 13   | -    | ns   |
| Q <sub>rr</sub>                          | Reverse Recovery Charge          |                                                                                                           | -    | 8.7  | -    | nC   |
| Dynamic Characteristics <sup>d</sup>     |                                  |                                                                                                           |      |      |      |      |
| R <sub>G</sub>                           | Gate Resistance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                                          | -    | 2.5  | -    | Ω    |
| C <sub>iss</sub>                         | Input Capacitance                | V <sub>GS</sub> =0V, V <sub>DS</sub> =20V, Frequency=1.0MHz                                               | -    | 815  | -    | pF   |
| C <sub>oss</sub>                         | Output Capacitance               |                                                                                                           | -    | 95   | -    |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance     |                                                                                                           | -    | 60   | -    |      |
| t <sub>d(ON)</sub>                       | Turn-on Delay Time               | V <sub>DD</sub> =20V, R <sub>L</sub> =20Ω, I <sub>DS</sub> =1A, V <sub>GEN</sub> =10V, R <sub>G</sub> =6Ω | -    | 7.8  | -    | ns   |
| t <sub>r</sub>                           | Turn-on Rise Time                |                                                                                                           | -    | 6.9  | -    |      |
| t <sub>d(OFF)</sub>                      | Turn-off Delay Time              |                                                                                                           | -    | 22.4 | -    |      |
| t <sub>f</sub>                           | Turn-off Fall Time               |                                                                                                           | -    | 4.8  | -    |      |
| Gate Charge Characteristics <sup>d</sup> |                                  |                                                                                                           |      |      |      |      |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =20V, V <sub>GS</sub> =10V, I <sub>DS</sub> =6A                                           | -    | 15.7 | 22   | nC   |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =20V, V <sub>GS</sub> =4.5V, I <sub>DS</sub> =6A                                          | -    | 7.5  | 10.5 |      |
| Q <sub>gth</sub>                         | Threshold Gate Charge            |                                                                                                           | -    | 1.85 | -    |      |
| Q <sub>gs</sub>                          | Gate-Source Charge               |                                                                                                           | -    | 3.24 | -    |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                |                                                                                                           | -    | 2.75 | -    |      |

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

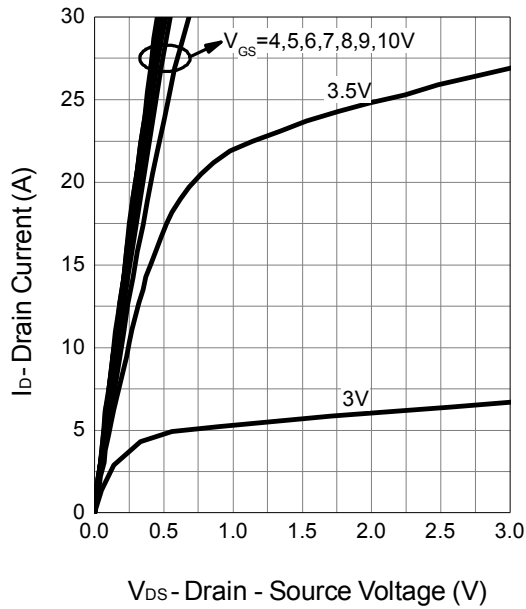
Note d : Guaranteed by design, not subject to production testing.

## Typical Operating Characteristics

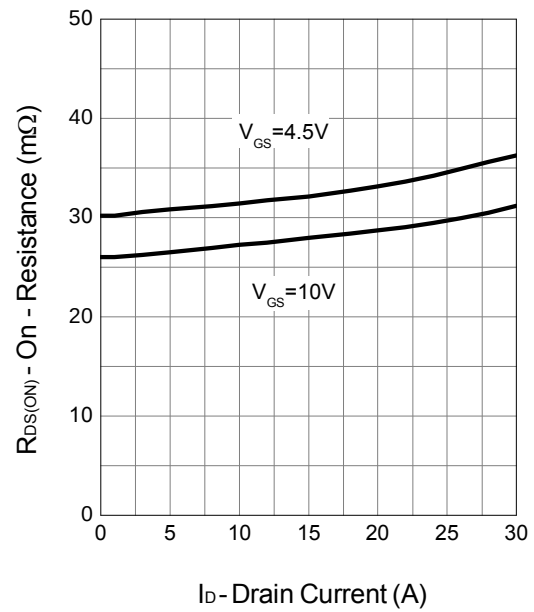


## Typical Operating Characteristics (Cont.)

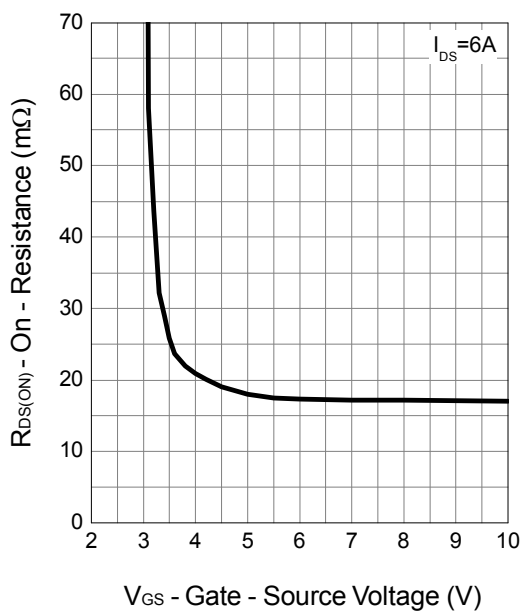
Output Characteristics



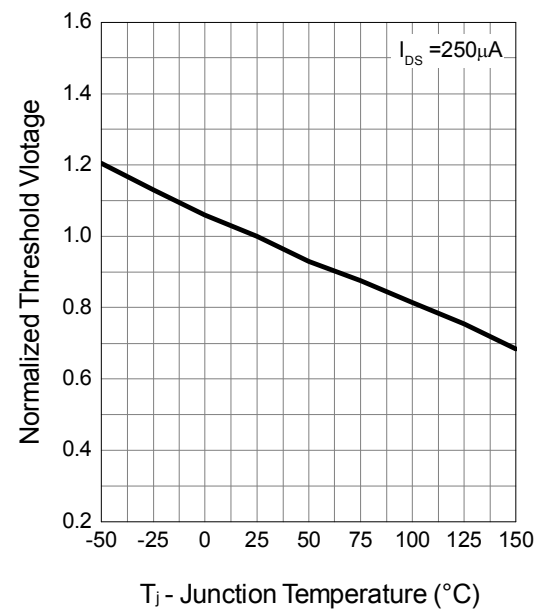
Drain-Source On Resistance



Gate-Source On Resistance

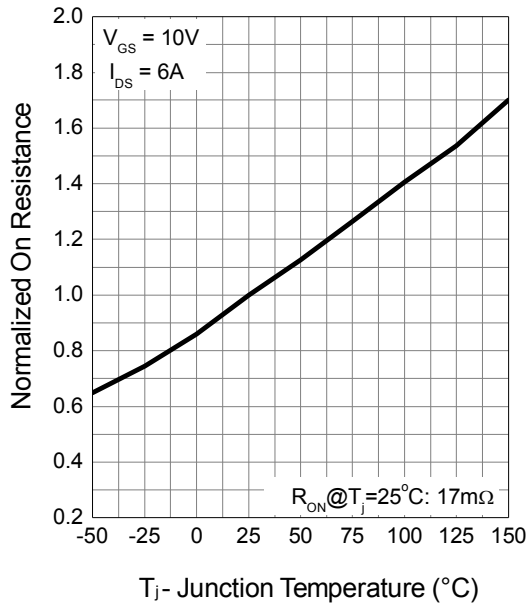


Gate Threshold Voltage

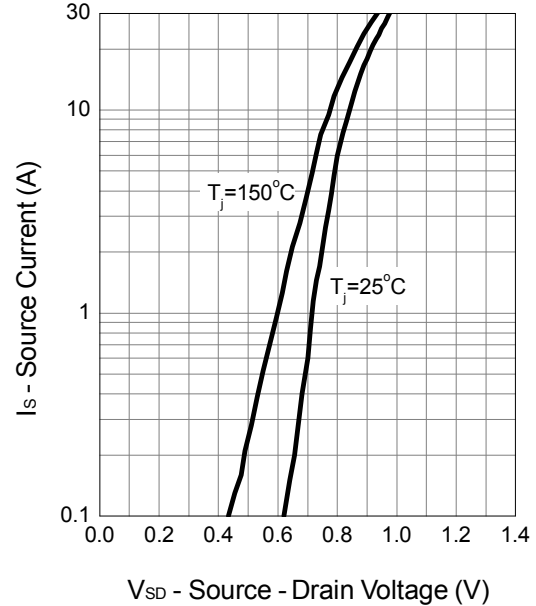


## Typical Operating Characteristics (Cont.)

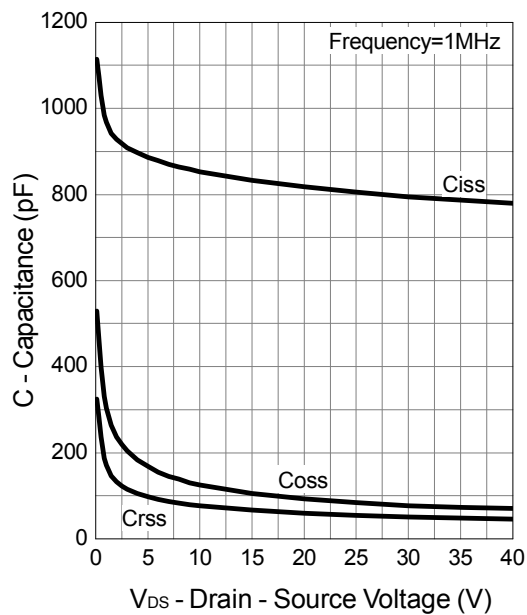
Drain-Source On Resistance



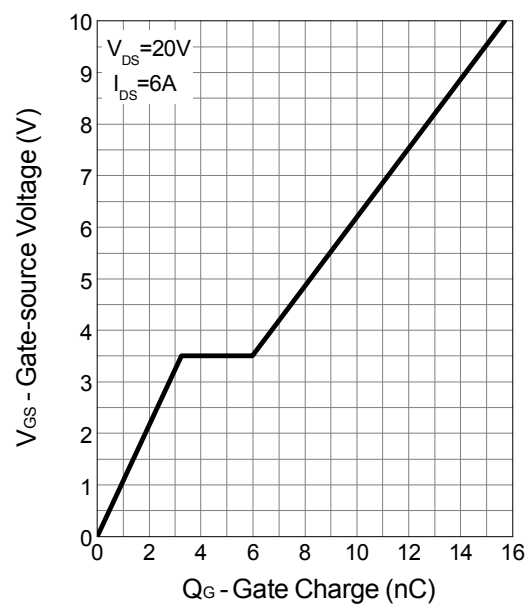
Source-Drain Diode Forward



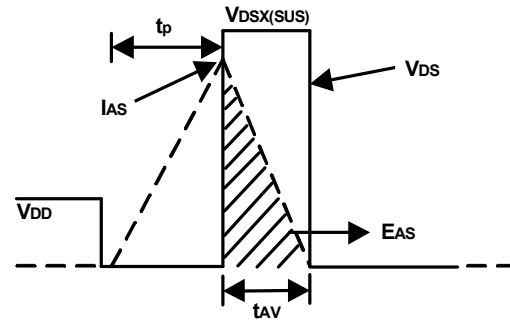
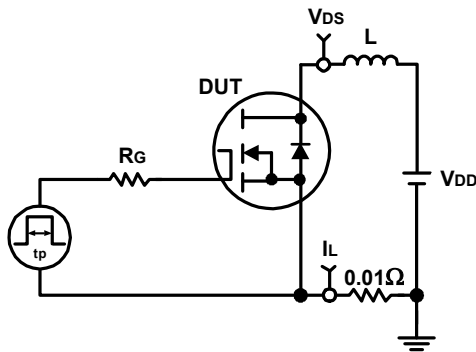
Capacitance



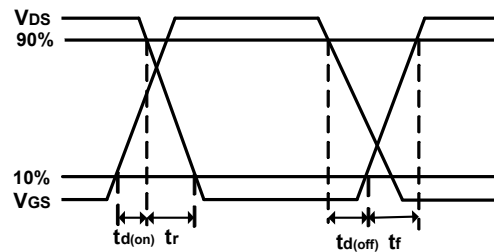
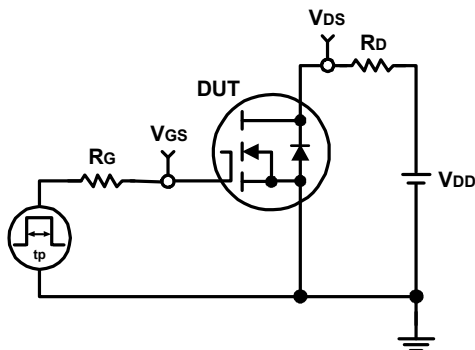
Gate Charge



## Avalanche Test Circuit and Waveforms

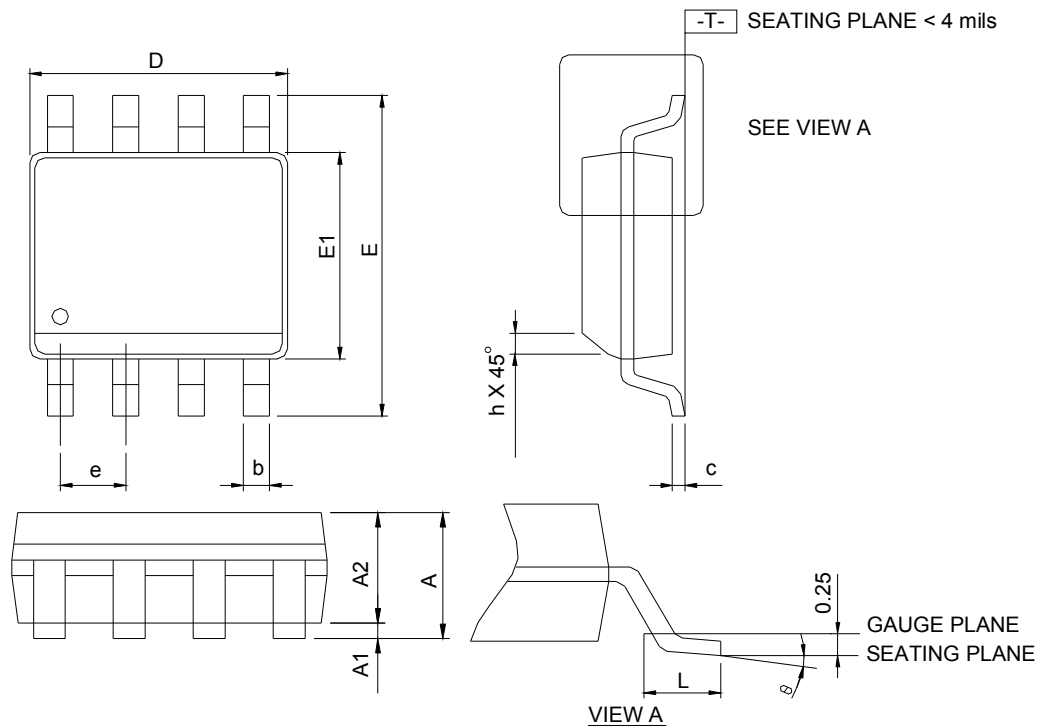


## Switching Time Test Circuit and Waveforms



## Package Information

### SOP8



|    | SOP8        |      |           |       |
|----|-------------|------|-----------|-------|
|    | MILLIMETERS |      | INCHES    |       |
|    | MIN.        | MAX. | MIN.      | MAX.  |
| A  | -           | 1.75 | -         | 0.069 |
| A1 | 0.10        | 0.25 | 0.004     | 0.010 |
| A2 | 1.25        | -    | 0.049     | -     |
| b  | 0.31        | 0.51 | 0.012     | 0.020 |
| c  | 0.17        | 0.25 | 0.007     | 0.010 |
| D  | 4.80        | 5.00 | 0.189     | 0.197 |
| E  | 5.80        | 6.20 | 0.228     | 0.244 |
| E1 | 3.80        | 4.00 | 0.150     | 0.157 |
| e  | 1.27 BSC    |      | 0.050 BSC |       |
| h  | 0.25        | 0.50 | 0.010     | 0.020 |
| L  | 0.40        | 1.27 | 0.016     | 0.050 |
| θ  | 0°          | 8°   | 0°        | 8°    |

Note: 1. Follow JEDEC MS-012 AA.

- Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.
- Dimension "E" does not include inter-lead flash or protrusions. Inter-lead flash and protrusions shall not exceed 10 mil per side.

### RECOMMENDED LAND PATTERN

