

## Dual P-Channel Enhancement Mode MOSFET

### Applications

Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.

### Features

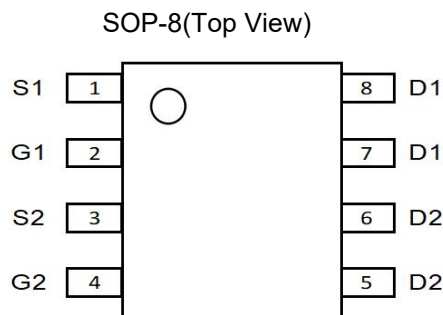
- -30V/-4.9A ,  
 $R_{DS(ON)}=53m\Omega(\text{typ.}) @ V_{GS}=-10V$   
 $R_{DS(ON)}=80m\Omega(\text{typ.}) @ V_{GS}=-4.5V$
- Reliable and Rugged
- Lead Free and Green Device Available (RoHS Compliant)



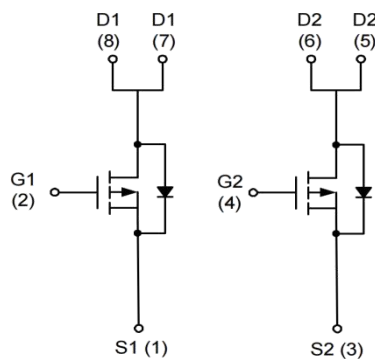
### Ordering Information

| DEVICE     | Package Type | MARKING     | Packing | Packing Qty  |
|------------|--------------|-------------|---------|--------------|
| HG4953M/TR | SOP-8        | HG4953,4953 | REEL    | 2500pcs/reel |

### Pin Description



### P-Channel MOSFET



**Absolute Maximum Ratings<sup>(1)</sup>** (TA= 25°C unless otherwise noted)

| Symbol             | Parameter                                |                        | Rating     | Unit |
|--------------------|------------------------------------------|------------------------|------------|------|
| V <sub>DSS</sub>   | Drain-Source Voltage                     |                        | -30        | V    |
| V <sub>GSS</sub>   | Gate-Source Voltage                      |                        | ±25        |      |
| I <sub>D</sub> *   | Continuous Drain Current                 | V <sub>GS</sub> = -10V | -4.9       | A    |
| I <sub>DM</sub> *  | Pulsed Drain Current                     |                        | -20        |      |
| I <sub>S</sub> *   | Diode Continuous Forward Current         |                        | -2         | A    |
| T <sub>J</sub>     | Maximum Junction Temperature             |                        | 150        | °C   |
| T <sub>STG</sub>   | Storage Temperature Range                |                        | -55 to 150 |      |
| P <sub>D</sub> *   | Power Dissipation for Single Operation   | T <sub>A</sub> =25°C   | 2          | W    |
|                    |                                          | T <sub>A</sub> =100°C  | 0.8        |      |
| R <sub>θJA</sub> * | Thermal Resistance-Junction to Ambient   |                        | 62.5       | °C/W |
| T <sub>L</sub>     | Lead Temperature (Soldering, 10 seconds) |                        | 260        | °C   |

Note:1、Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.

\*Surface Mounted on 1in<sup>2</sup> pad area, t ≤ 10sec.

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

| Symbol                                   | Parameter                        | Test Condition                                                          | HG4953 |      |      | Unit |
|------------------------------------------|----------------------------------|-------------------------------------------------------------------------|--------|------|------|------|
|                                          |                                  |                                                                         | Min.   | Typ. | Max. |      |
| Static Characteristics                   |                                  |                                                                         |        |      |      |      |
| BVDSS                                    | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA                             | -30    |      |      | V    |
| IDSS                                     | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V                              |        |      | -1   | μA   |
|                                          |                                  | T <sub>J</sub> =85°C                                                    |        |      | -30  |      |
| VGS(th)                                  | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA               | -1     | -1.5 | -2   | V    |
| IGSS                                     | Gate Leakage Current             | V <sub>GS</sub> =±25V, V <sub>DS</sub> =0V                              |        |      | ±100 | nA   |
| R <sub>DS(ON)</sub> <sup>a</sup>         | Drain-Source On-state Resistance | V <sub>GS</sub> =-10V, I <sub>DS</sub> =-4.9A                           |        | 53   | 60   | mΩ   |
|                                          |                                  | V <sub>GS</sub> =-4.5V, I <sub>DS</sub> =-3.6A                          |        | 80   | 95   |      |
| V <sub>SD</sub> <sup>a</sup>             | Diode Forward Voltage            | I <sub>SD</sub> =-1.7A, V <sub>GS</sub> =0V                             |        | -0.8 | -1.3 | V    |
| Gate Charge Characteristics <sup>b</sup> |                                  |                                                                         |        |      |      |      |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =-15V, V <sub>GS</sub> =-10V,<br>I <sub>DS</sub> =-4.9A |        | 11.6 | 16   | nC   |
| Q <sub>gs</sub>                          | Gate-Source Charge               |                                                                         |        | 1.3  |      |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                |                                                                         |        | 2.5  |      |      |

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

| Symbol                               | Parameter                    | Test Condition                                                                                                    | SM4953K |      |      | Unit |
|--------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------|---------|------|------|------|
|                                      |                              |                                                                                                                   | Min.    | Typ. | Max. |      |
| Dynamic Characteristics <sup>b</sup> |                              |                                                                                                                   |         |      |      |      |
| R <sub>G</sub>                       | Gate Resistance              | V <sub>GS</sub> =0V,V <sub>DS</sub> =0V,F=1MHz                                                                    |         | 8    |      | Ω    |
| C <sub>iss</sub>                     | Input Capacitance            | V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V,<br>Frequency=1.0MHz                                                   |         | 625  |      | pF   |
| C <sub>oss</sub>                     | Output Capacitance           |                                                                                                                   |         | 100  |      |      |
| C <sub>rss</sub>                     | Reverse Transfer Capacitance |                                                                                                                   |         | 60   |      |      |
| t <sub>d</sub> (ON)                  | 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> =6 |         | 6    | 12   | ns   |
| t <sub>r</sub>                       | Turn-on Rise Time            |                                                                                                                   |         | 12   | 23   |      |
| t <sub>d</sub> (OFF)                 | Turn-off Delay Time          |                                                                                                                   |         | 25   | 46   |      |
| t <sub>f</sub>                       | Turn-off Fall Time           |                                                                                                                   |         | 6    | 12   |      |
| t <sub>rr</sub>                      | Reverse Recovery Time        | I <sub>DS</sub> =-4.9A,<br>dI <sub>SD</sub> /dt=100A/μs                                                           |         | 14   |      | ns   |
| Q <sub>rr</sub>                      | Reverse Recovery Charge      |                                                                                                                   |         | 5    |      | nC   |

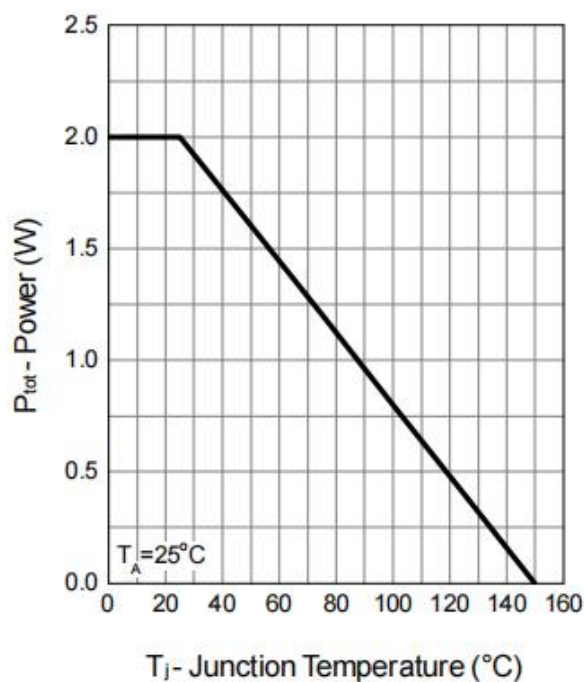
**Notes:**

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

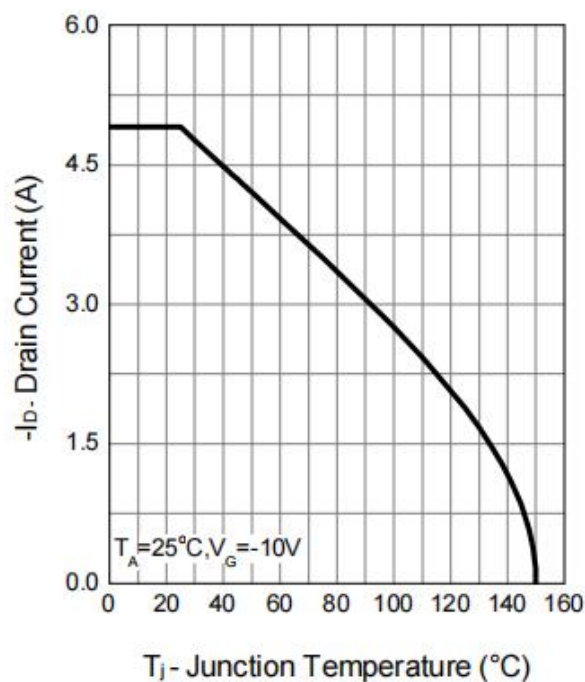
b : Guaranteed by design, not subject to production testing.

## Typical Characteristics

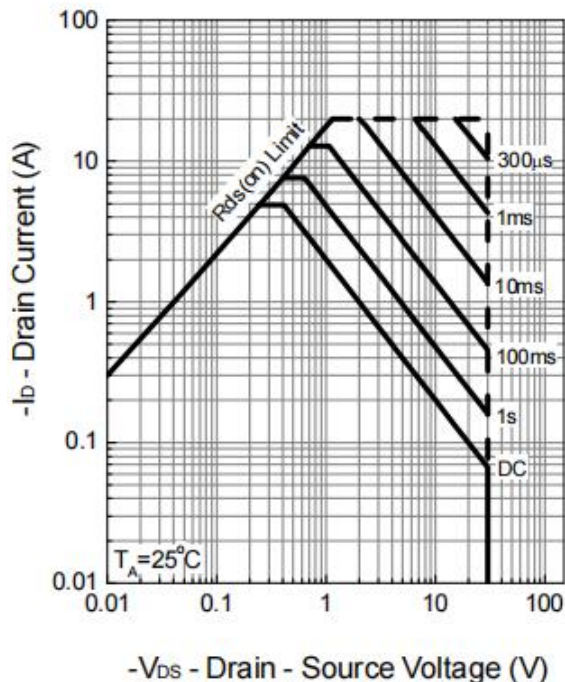
Power Dissipation



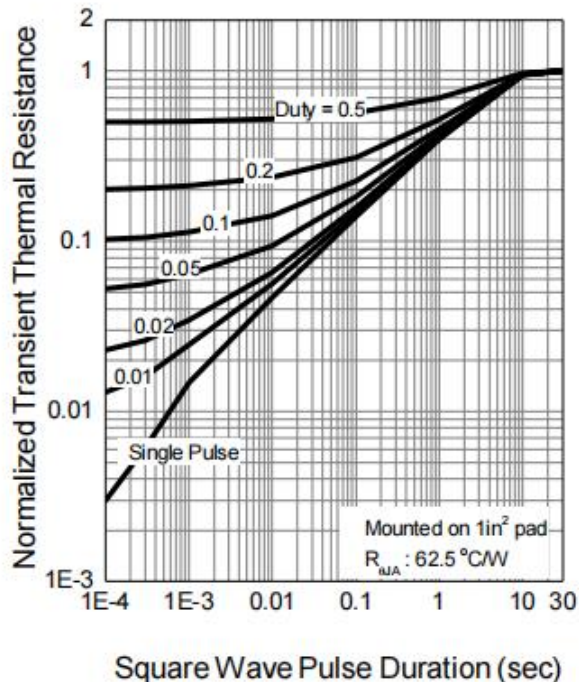
Drain Current



Safe Operation Area

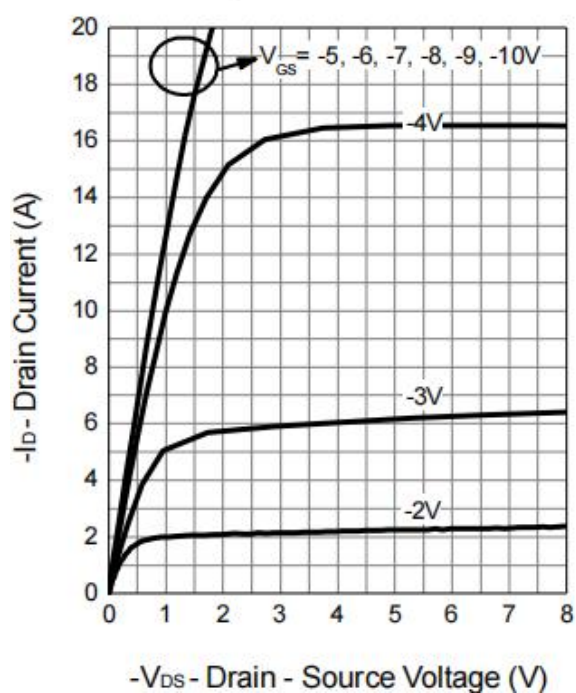


Thermal Transient Impedance

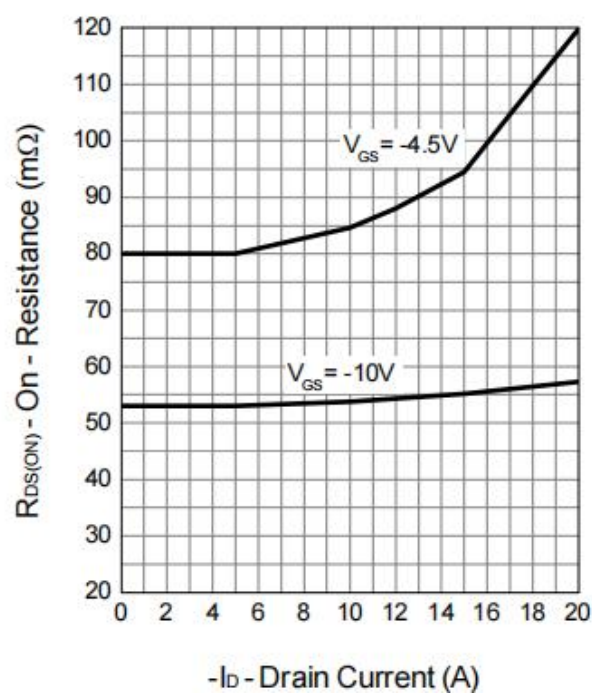


## Typical Characteristics (Cont.)

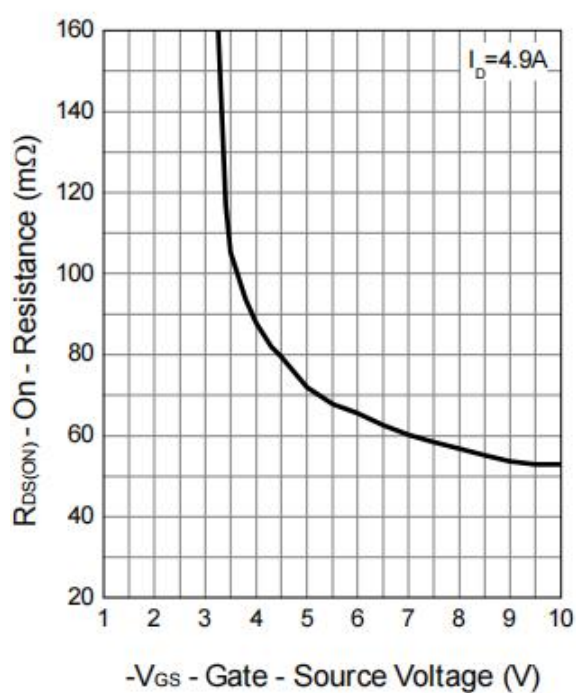
**Output Characteristics**



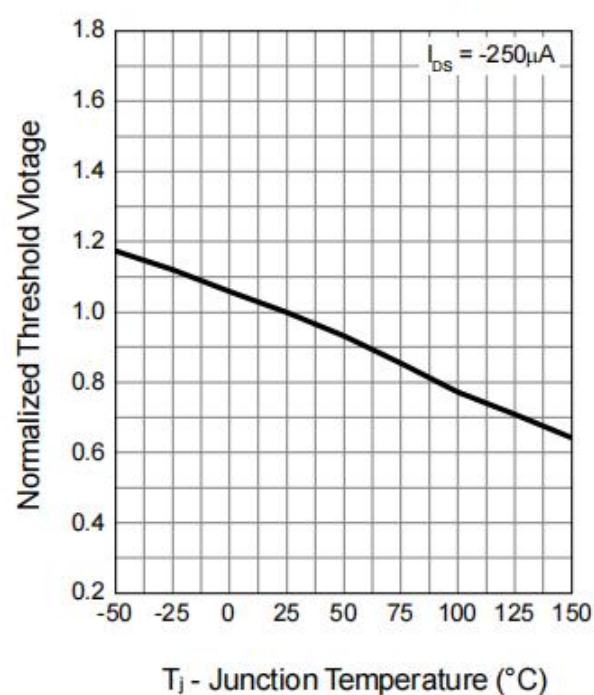
**Drain-Source On Resistance**



**Drain-Source On Resistance**

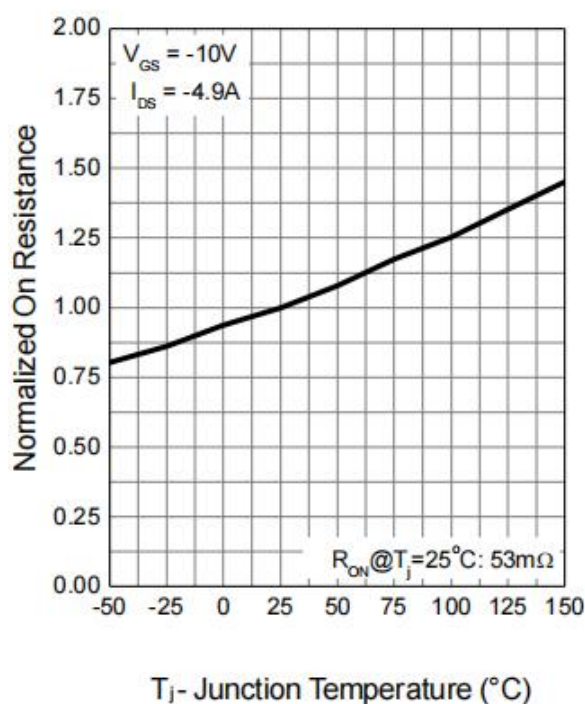


**Gate Threshold Voltage**

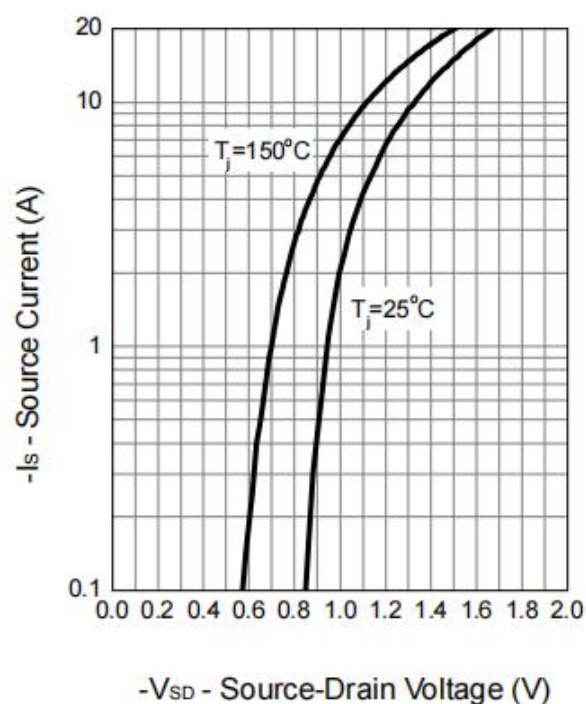


## Typical Characteristics (Cont.)

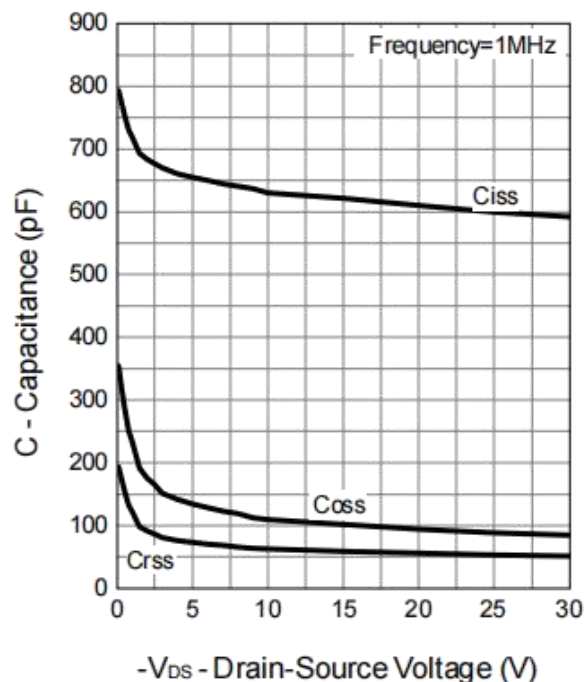
**Drain-Source On Resistance**



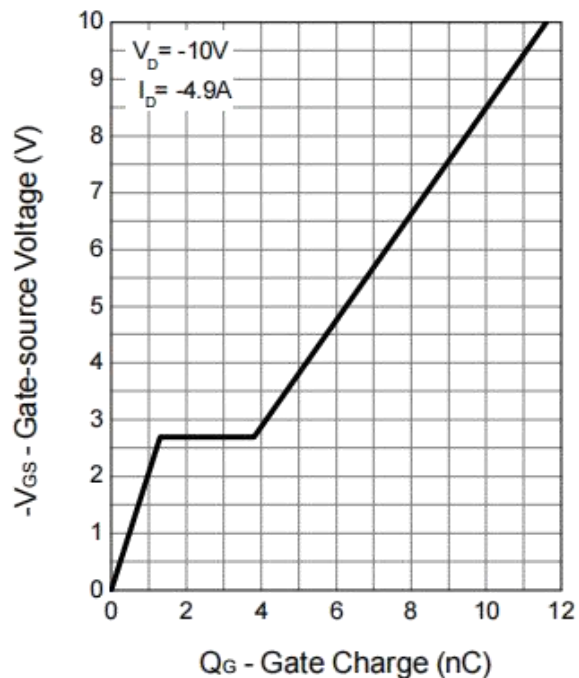
**Source-Drain Diode Forward**



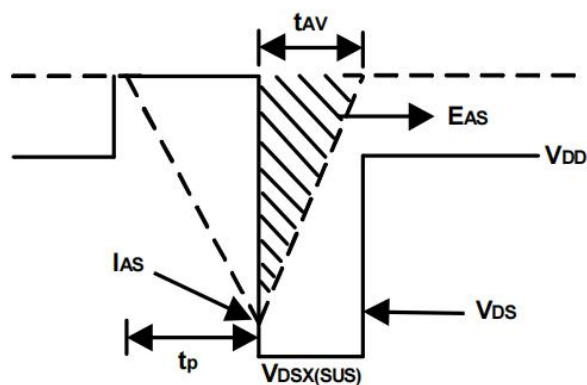
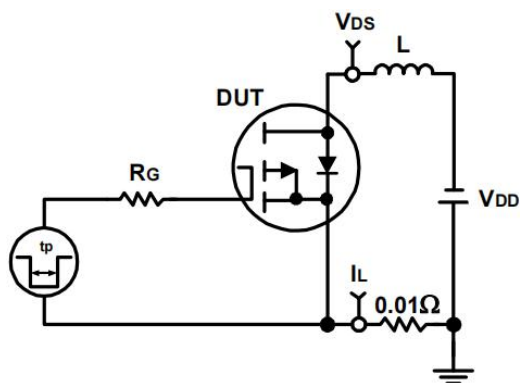
**Capacitance**



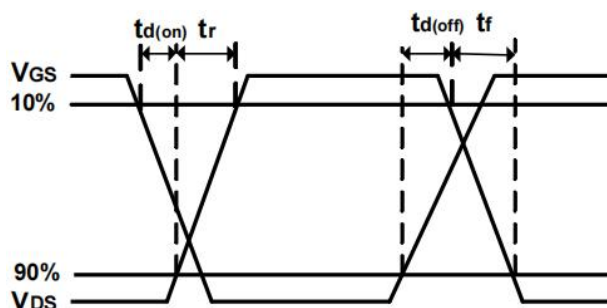
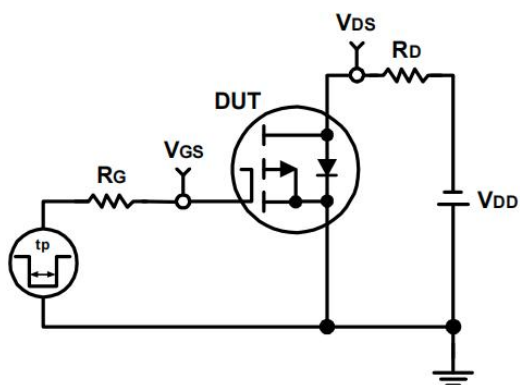
**Gate Charge**



## Avalanche Test Circuit and Waveforms

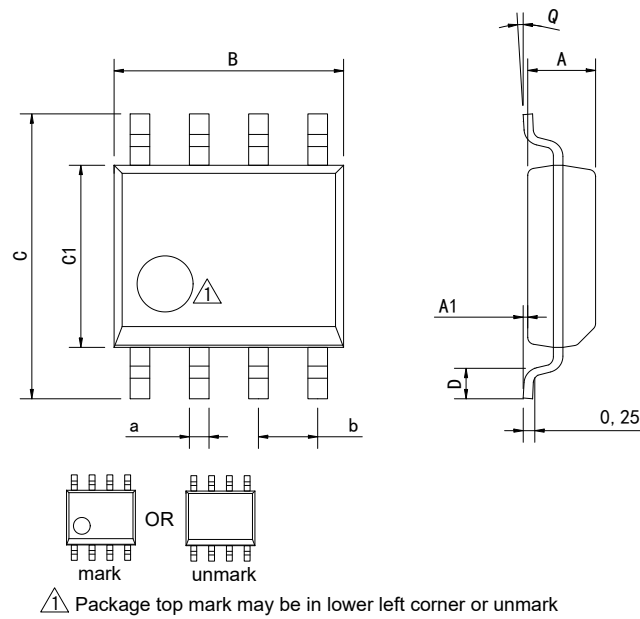


## Switching Time Test Circuit and Waveforms



## Physical Dimensions

### SOP-8



| Dimensions In Millimeters(SOP-8) |      |      |      |      |      |      |    |      |          |
|----------------------------------|------|------|------|------|------|------|----|------|----------|
| Symbol:                          | A    | A1   | B    | C    | C1   | D    | Q  | a    | b        |
| Min:                             | 1.35 | 0.05 | 4.90 | 5.80 | 3.80 | 0.40 | 0° | 0.35 | 1.27 BSC |
| Max:                             | 1.55 | 0.20 | 5.10 | 6.20 | 4.00 | 0.80 | 8° | 0.45 |          |

## Revision History

| REVISION NUMBER | DATE    | REVISION                                                      | PAGE  |
|-----------------|---------|---------------------------------------------------------------|-------|
| V1.0            | 2012-5  | New                                                           | 1-10  |
| V1.1            | 2019-9  | Update encapsulation type、Add annotation for Maximum Ratings. | 1、 2  |
| V1.2            | 2024-11 | Add a model marking name、Update Lead Temperature              | 1、 2  |
| V1.3            | 2025-12 | Update important statements、Update SOP-8 Dimension drawing    | 8、 10 |

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