

## N and P Channel Enhancement Mode Power MOSFET

### Description

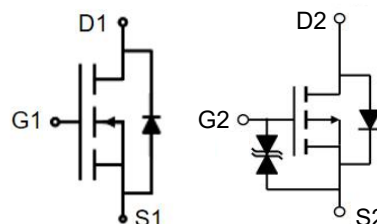
The G1K2C10S2 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge. It can be used in a wide variety of applications.

### General Features

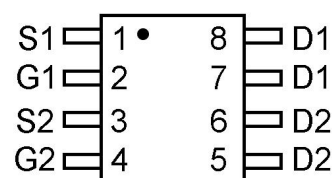
- NMOS
- $V_{DS}$  100V
- $I_D$  (at  $V_{GS} = 10V$ ) 3A
- $R_{DS(ON)}$  (at  $V_{GS} = 10V$ ) < 130m $\Omega$
- $R_{DS(ON)}$  (at  $V_{GS} = 4.5V$ ) < 145m $\Omega$
- 100% Avalanche Tested
- RoHS Compliant
- PMOS
- $V_{DS}$  -100V
- $I_D$  (at  $V_{GS} = -10V$ ) -3.5A
- $R_{DS(ON)}$  (at  $V_{GS} = -10V$ ) < 200m $\Omega$
- $R_{DS(ON)}$  (at  $V_{GS} = -4.5V$ ) < 215m $\Omega$
- 100% Avalanche Tested
- RoHS Compliant
- ESD (HBM) : 6KV

### Application

- Power switch
- DC/DC converters



Schematic diagram



pin assignment



SOP-8 Dual

### Ordering Information

| Device    | Package    | Marking  | Packaging    |
|-----------|------------|----------|--------------|
| G1K2C10S2 | SOP-8 Dual | G1K2C10D | 4000pcs/Reel |

### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted

| Parameter                                        | Symbol                    | NMOS       | PMOS       | Unit             |
|--------------------------------------------------|---------------------------|------------|------------|------------------|
| Drain-Source Voltage                             | $V_{DS}$                  | 100        | -100       | V                |
| Continuous Drain Current                         | $T_C = 25^\circ\text{C}$  | 3          | -3.5       | A                |
|                                                  | $T_C = 100^\circ\text{C}$ | 1.9        | -2.2       |                  |
| Pulsed Drain Current (note1)                     | $I_{DM}$                  | 12         | -14        | A                |
| Gate-Source Voltage                              | $V_{GS}$                  | $\pm 20$   | $\pm 20$   | V                |
| Power Dissipation                                | $P_D$                     | 2          | 3.1        | W                |
| Operating Junction and Storage Temperature Range | $T_J, T_{stg}$            | -55 To 150 | -55 To 150 | $^\circ\text{C}$ |

### Thermal Resistance

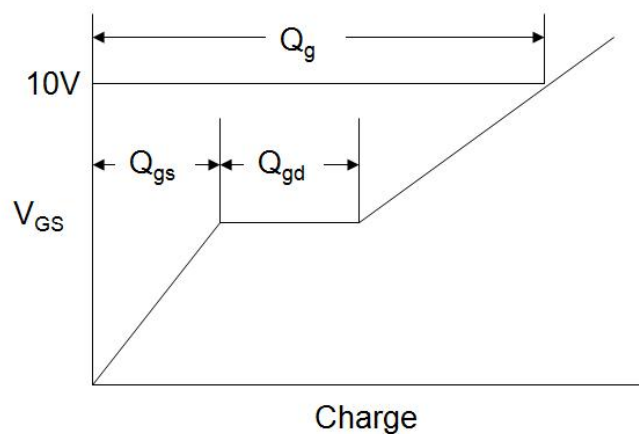
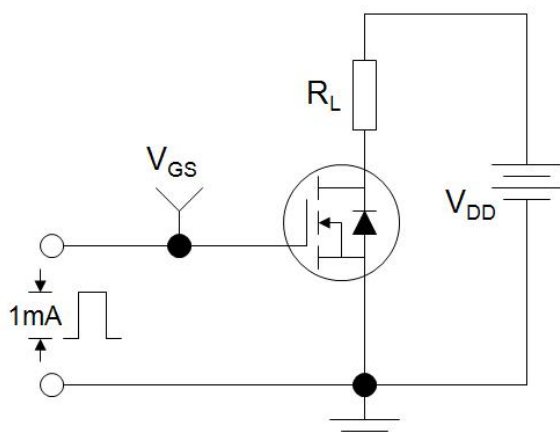
| Parameter                               | Symbol     | NMOS | PMOS | Unit               |
|-----------------------------------------|------------|------|------|--------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 62.5 | 40   | $^\circ\text{C/W}$ |

| NMOS Specifications T <sub>J</sub> = 25°C, unless otherwise noted |                      |                                                                         |       |      |      |      |
|-------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------|-------|------|------|------|
| Parameter                                                         | Symbol               | Test Conditions                                                         | Value |      |      | Unit |
|                                                                   |                      |                                                                         | Min.  | Typ. | Max. |      |
| Static Parameters                                                 |                      |                                                                         |       |      |      |      |
| Drain-Source Breakdown Voltage                                    | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                            | 100   | --   | --   | V    |
| Zero Gate Voltage Drain Current                                   | I <sub>DSS</sub>     | V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V                            | --    | --   | 1    | μA   |
| Gate-Source Leakage                                               | I <sub>GSS</sub>     | V <sub>GS</sub> = ±20V                                                  | --    | --   | ±100 | nA   |
| Gate-Source Threshold Voltage                                     | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA              | 1.0   | 1.5  | 2.5  | V    |
| Drain-Source On-Resistance                                        | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 5A                              | --    | 110  | 130  | mΩ   |
|                                                                   |                      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5A                             | --    | 120  | 145  |      |
| Forward Transconductance                                          | g <sub>FS</sub>      | V <sub>GS</sub> = 5V, I <sub>D</sub> = 5A                               | --    | 4    | --   | S    |
| Dynamic Parameters                                                |                      |                                                                         |       |      |      |      |
| Input Capacitance                                                 | C <sub>iss</sub>     | V <sub>GS</sub> = 0V,<br>V <sub>DS</sub> = 50V,<br>f = 1.0MHz           | --    | 670  | --   | pF   |
| Output Capacitance                                                | C <sub>oss</sub>     |                                                                         | --    | 25   | --   |      |
| Reverse Transfer Capacitance                                      | C <sub>rss</sub>     |                                                                         | --    | 16   | --   |      |
| Total Gate Charge                                                 | Q <sub>g</sub>       | V <sub>DD</sub> = 50V,<br>I <sub>D</sub> = 5A,<br>V <sub>GS</sub> = 10V | --    | 22   | --   | nC   |
| Gate-Source Charge                                                | Q <sub>gs</sub>      |                                                                         | --    | 3    | --   |      |
| Gate-Drain Charge                                                 | Q <sub>gd</sub>      |                                                                         | --    | 6    | --   |      |
| Turn-on Delay Time                                                | t <sub>d(on)</sub>   | V <sub>DD</sub> = 50V,<br>I <sub>D</sub> = 5A,<br>R <sub>G</sub> = 2.5Ω | --    | 11   | --   | ns   |
| Turn-on Rise Time                                                 | t <sub>r</sub>       |                                                                         | --    | 7    | --   |      |
| Turn-off Delay Time                                               | t <sub>d(off)</sub>  |                                                                         | --    | 35   | --   |      |
| Turn-off Fall Time                                                | t <sub>f</sub>       |                                                                         | --    | 9    | --   |      |
| Drain-Source Body Diode Characteristics                           |                      |                                                                         |       |      |      |      |
| Continuous Body Diode Current                                     | I <sub>S</sub>       | T <sub>C</sub> = 25°C                                                   | --    | --   | 3    | A    |
| Body Diode Voltage                                                | V <sub>SD</sub>      | T <sub>J</sub> = 25°C, I <sub>SD</sub> =5A, V <sub>GS</sub> = 0V        | --    | --   | 1.2  | V    |
| Reverse Recovery Charge                                           | Q <sub>rr</sub>      | I <sub>F</sub> = 5A, V <sub>GS</sub> = 0V<br>di/dt=100A/us              | --    | 27   | --   | nC   |
| Reverse Recovery Time                                             | T <sub>rr</sub>      |                                                                         | --    | 26   | --   | ns   |

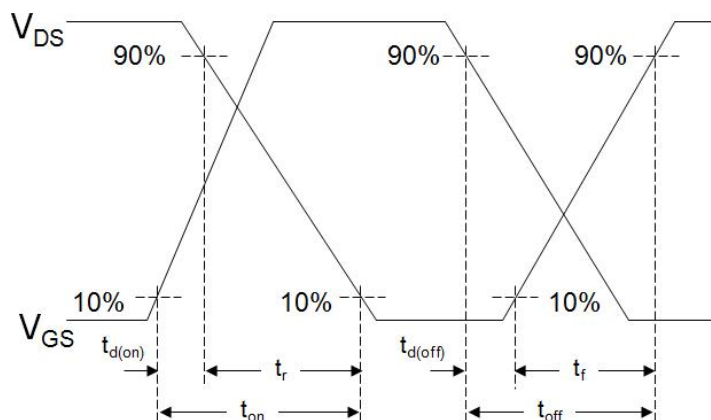
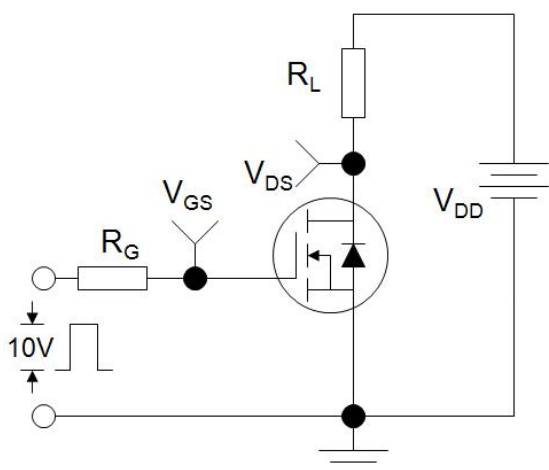
## Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Identical low side and high side switch with identical  $R_G$

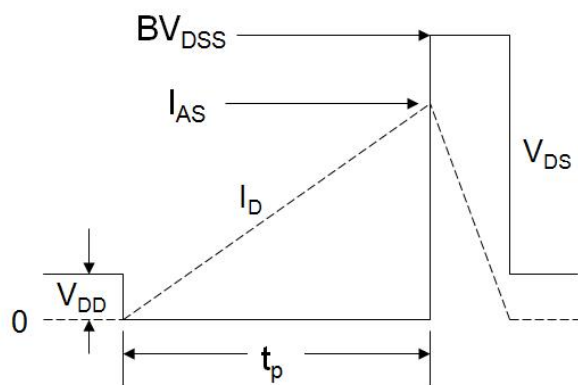
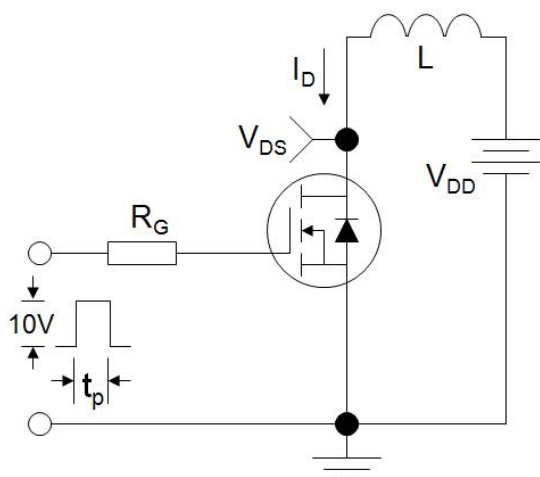
### Gate Charge Test Circuit



### Switch Time Test Circuit

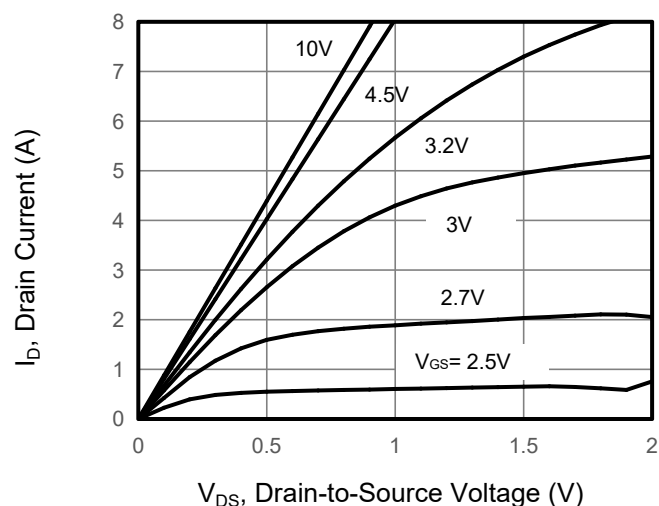


### EAS Test Circuit

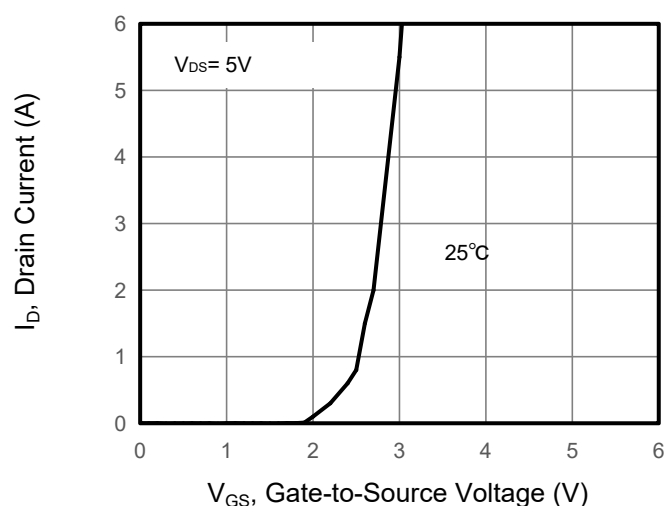


## NMOS Typical Characteristics $T_J = 25^\circ\text{C}$ , unless otherwise noted

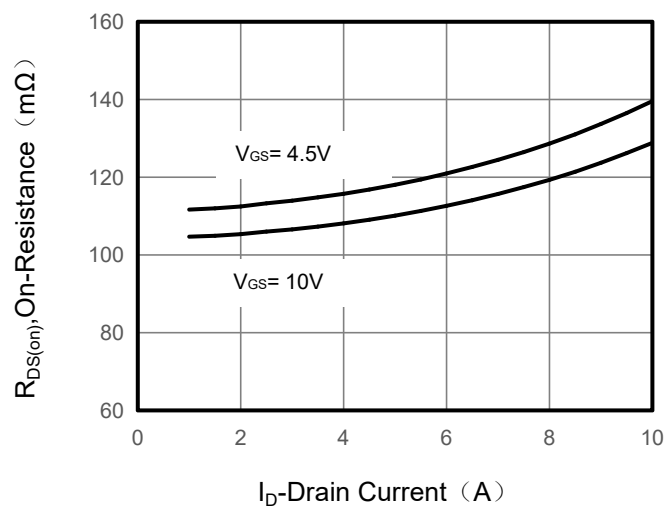
**Figure 1. Output Characteristics**



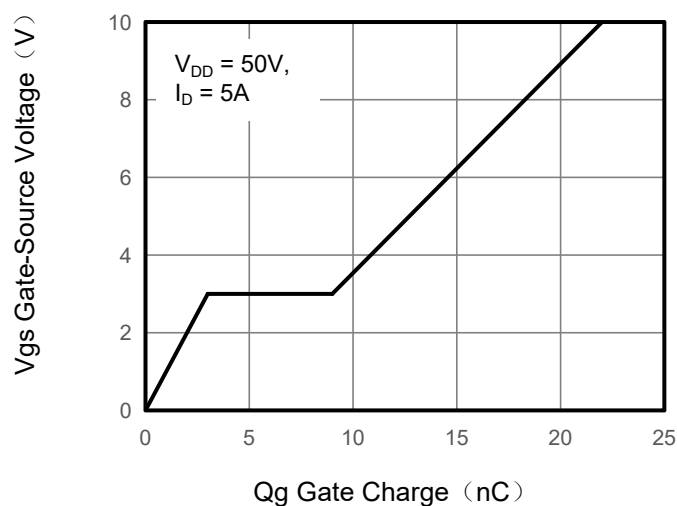
**Figure 2. Transfer Characteristics**



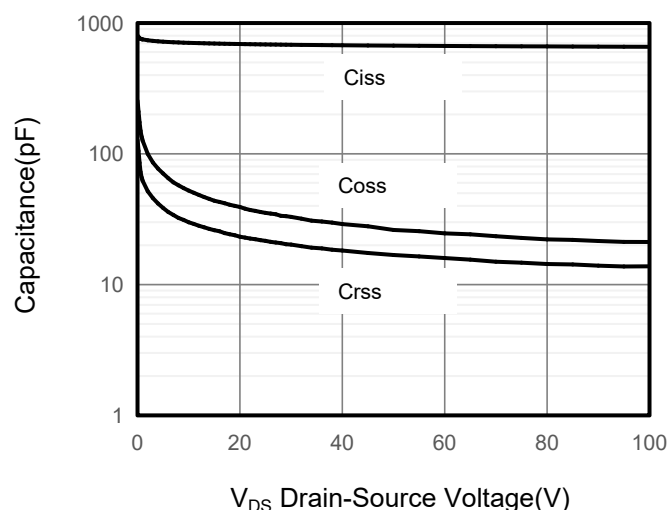
**Figure 3. Drain Source On Resistance**



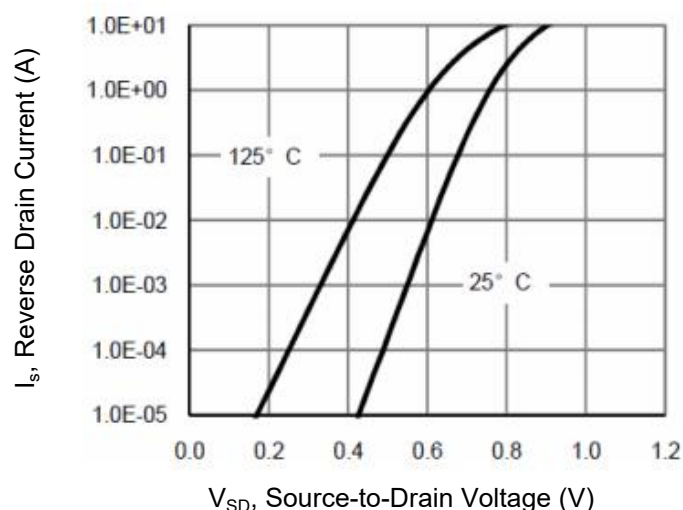
**Figure 4. Gate Charge**



**Figure 5. Capacitance**



**Figure 6. Source-Drain Diode Forward**



## NMOS Typical Characteristics $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 7. Drain-Source On-Resistance

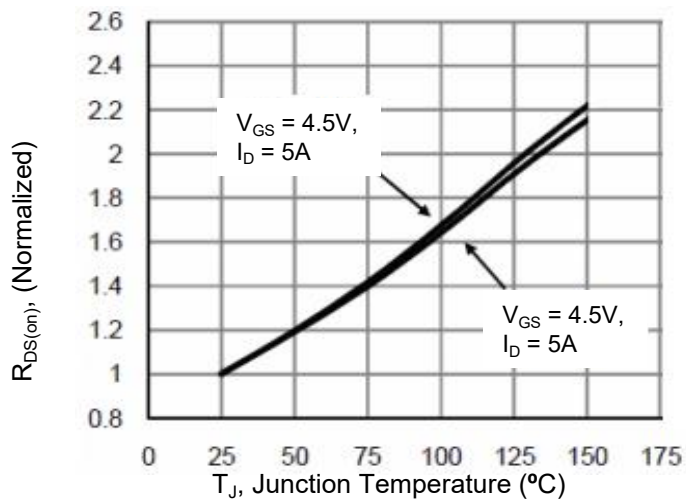


Figure 8. Safe Operation Area

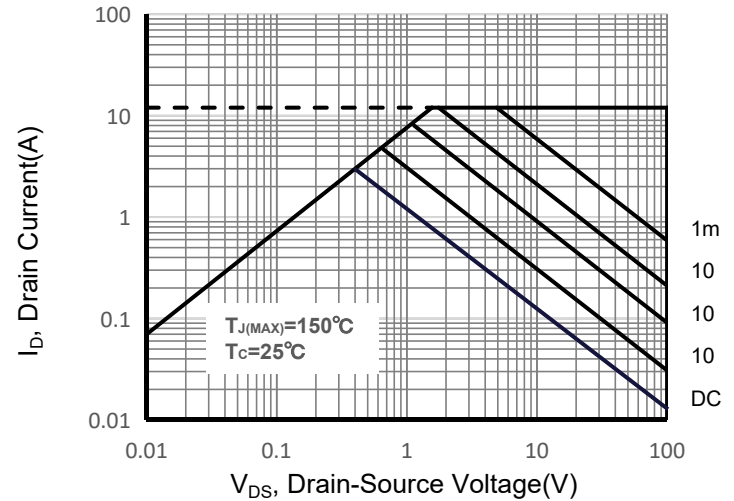


Figure 9. Maximum Continuous Drain Current vs Case Temperature

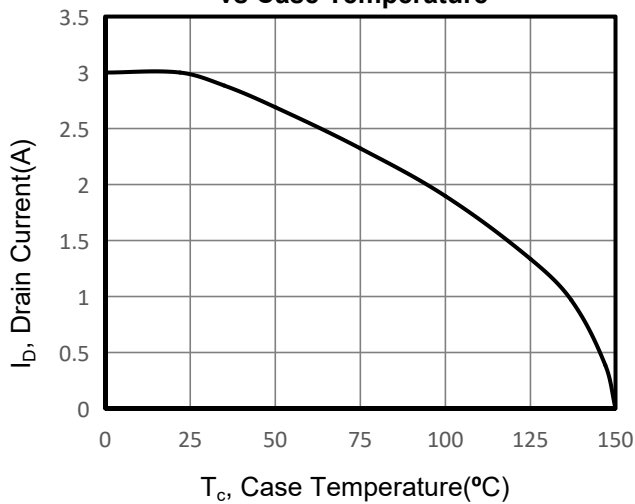
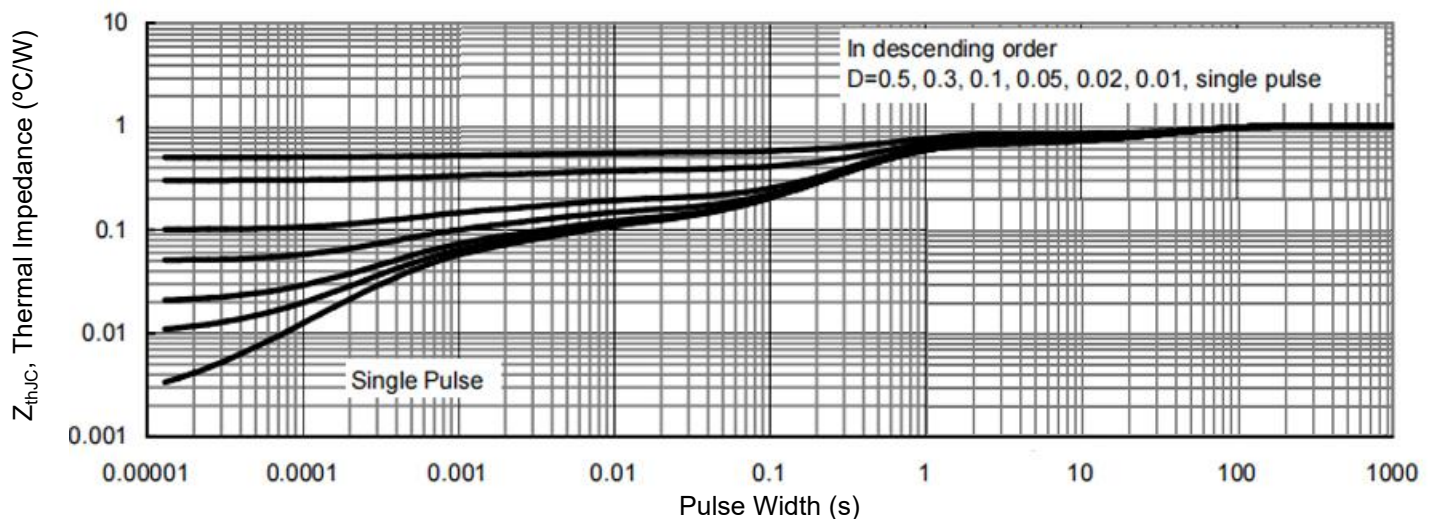


Figure 10. Normalized Maximum Transient Thermal Impedance

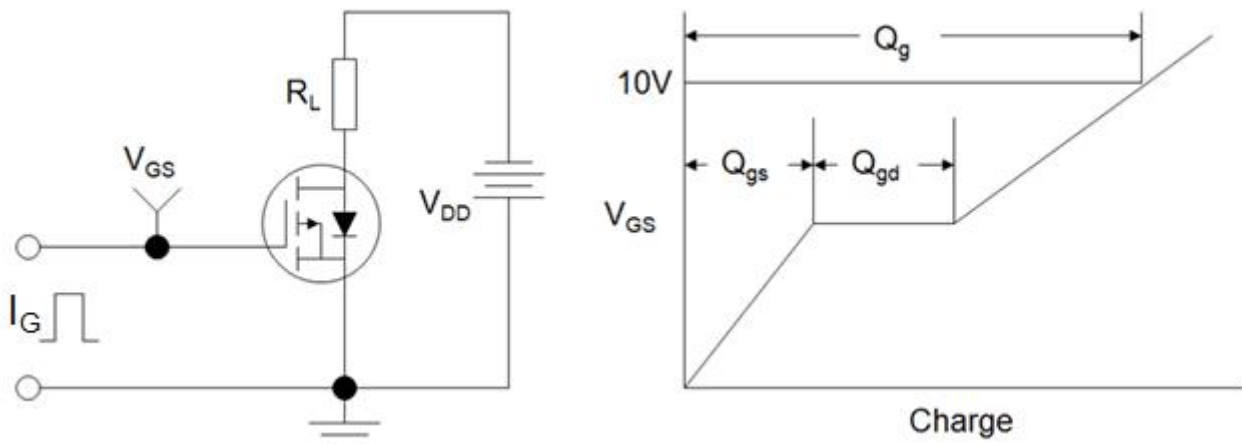


| PMOS Specifications T <sub>J</sub> = 25°C, unless otherwise noted |                      |                                                                            |       |      |      |      |
|-------------------------------------------------------------------|----------------------|----------------------------------------------------------------------------|-------|------|------|------|
| Parameter                                                         | Symbol               | Test Conditions                                                            | Value |      |      | Unit |
|                                                                   |                      |                                                                            | Min.  | Typ. | Max. |      |
| Static Parameters                                                 |                      |                                                                            |       |      |      |      |
| Drain-Source Breakdown Voltage                                    | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA                              | -100  | --   | --   | V    |
| Zero Gate Voltage Drain Current                                   | I <sub>DSS</sub>     | V <sub>DS</sub> = -100V, V <sub>GS</sub> = 0V                              | --    | --   | -1   | μA   |
| Gate-Source Leakage                                               | I <sub>GSS</sub>     | V <sub>GS</sub> = ±20V                                                     | --    | --   | ±10  | uA   |
| Gate-Source Threshold Voltage                                     | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                | -1.0  | -1.8 | -2.5 | V    |
| Drain-Source On-Resistance                                        | R <sub>DS(on)</sub>  | V <sub>GS</sub> = -10V, I <sub>D</sub> = -3A                               | --    | 165  | 200  | mΩ   |
|                                                                   |                      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -2A                              | --    | 175  | 215  |      |
| Forward Transconductance                                          | g <sub>FS</sub>      | V <sub>DS</sub> = -5V, I <sub>b</sub> = -3A                                | --    | 8    | --   | S    |
| Dynamic Parameters                                                |                      |                                                                            |       |      |      |      |
| Input Capacitance                                                 | C <sub>iss</sub>     | V <sub>GS</sub> = 0V,<br>V <sub>DS</sub> = -50V,<br>f = 1.0MHz             | --    | 1700 | --   | pF   |
| Output Capacitance                                                | C <sub>oss</sub>     |                                                                            | --    | 45   | --   |      |
| Reverse Transfer Capacitance                                      | C <sub>rss</sub>     |                                                                            | --    | 43   | --   |      |
| Total Gate Charge                                                 | Q <sub>g</sub>       | V <sub>DD</sub> = -50V,<br>I <sub>D</sub> = -3A,<br>V <sub>GS</sub> = -10V | --    | 32   | --   | nC   |
| Gate-Source Charge                                                | Q <sub>gs</sub>      |                                                                            | --    | 5    | --   |      |
| Gate-Drain Charge                                                 | Q <sub>gd</sub>      |                                                                            | --    | 7    | --   |      |
| Turn-on Delay Time                                                | t <sub>d(on)</sub>   | V <sub>DD</sub> = -50V,<br>I <sub>D</sub> = -3A,<br>R <sub>G</sub> = 3Ω    | --    | 24   | --   | ns   |
| Turn-on Rise Time                                                 | t <sub>r</sub>       |                                                                            | --    | 5    | --   |      |
| Turn-off Delay Time                                               | t <sub>d(off)</sub>  |                                                                            | --    | 19   | --   |      |
| Turn-off Fall Time                                                | t <sub>f</sub>       |                                                                            | --    | 11   | --   |      |
| Drain-Source Body Diode Characteristics                           |                      |                                                                            |       |      |      |      |
| Continuous Body Diode Current                                     | I <sub>S</sub>       | T <sub>C</sub> = 25°C                                                      | --    | --   | -3.5 | A    |
| Body Diode Voltage                                                | V <sub>SD</sub>      | T <sub>J</sub> = 25°C, I <sub>SD</sub> = -3A, V <sub>GS</sub> = 0V         | --    | --   | -1.2 | V    |
| Reverse Recovery Charge                                           | Q <sub>rr</sub>      | I <sub>F</sub> = -3A, V <sub>GS</sub> = 0V<br>di/dt=-100A/us               | --    | 22   | --   | nC   |
| Reverse Recovery Time                                             | T <sub>rr</sub>      |                                                                            | --    | 29   | --   | ns   |

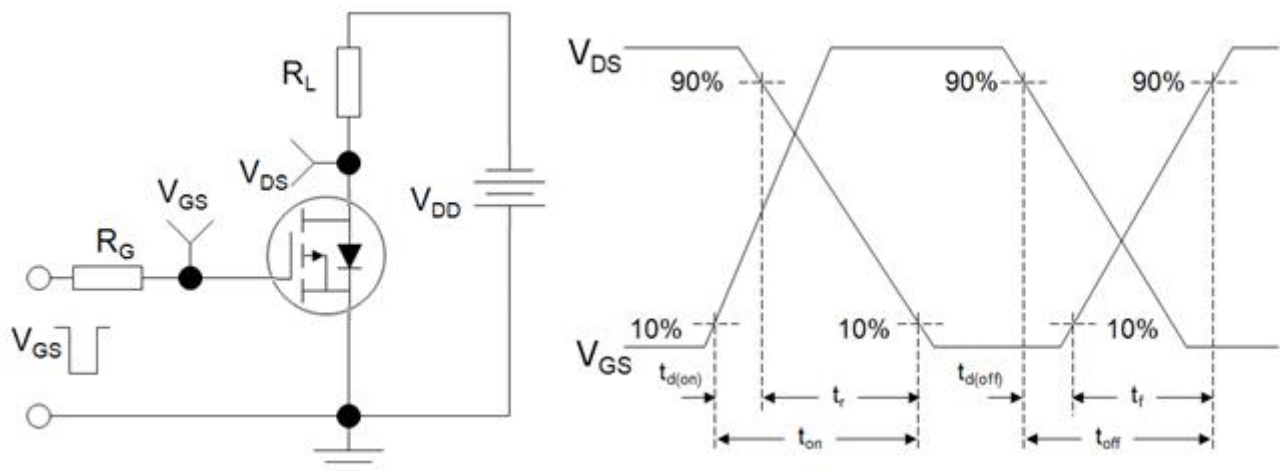
## Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Identical low side and high side switch with identical  $R_G$

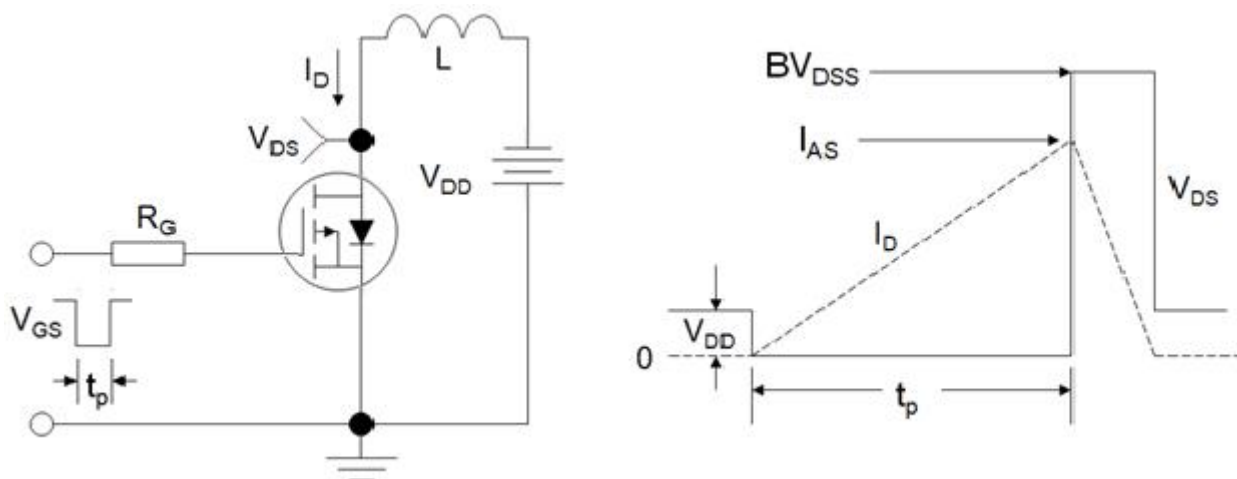
### Gate Charge Test Circuit



### Switch Time Test Circuit



### EAS Test Circuit



## PMOS Typical Characteristics $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 1. Output Characteristics

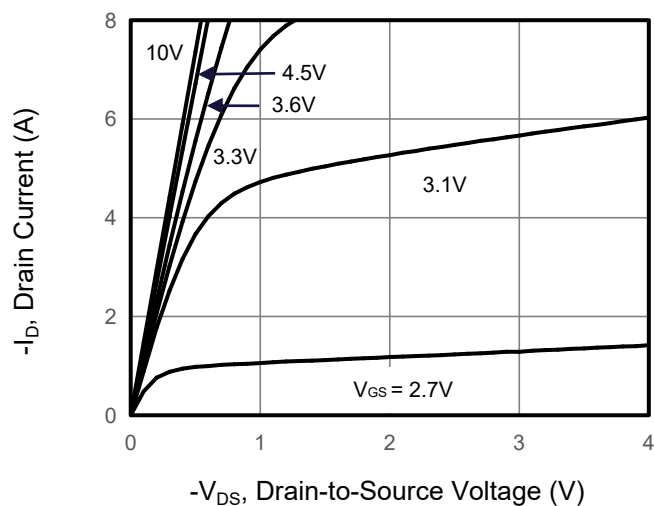


Figure 2. Transfer Characteristics

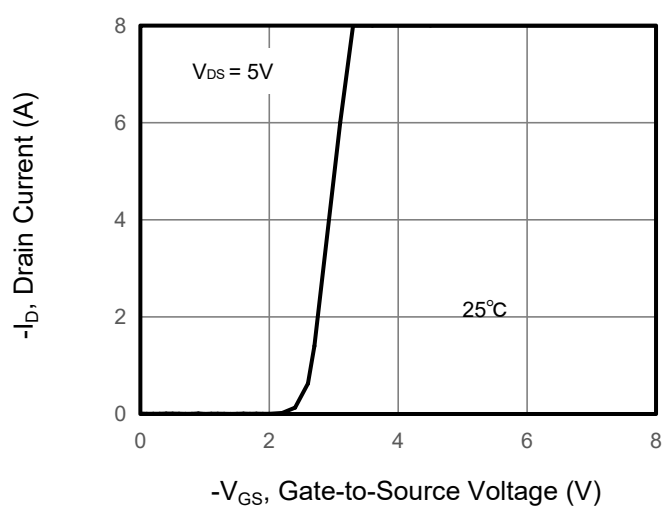


Figure 3. Drain Source On Resistance

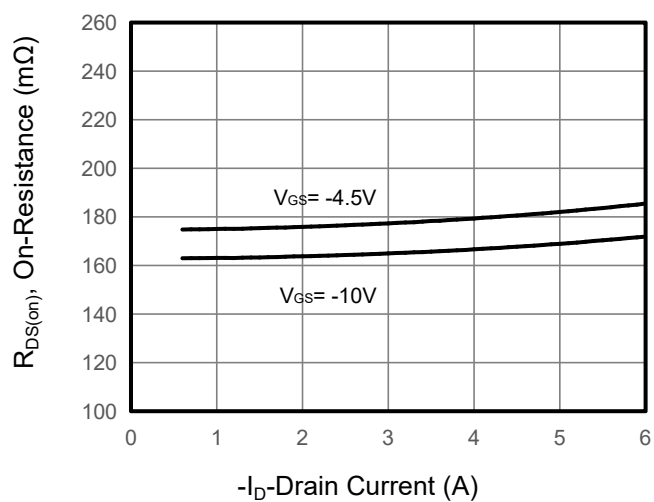


Figure 4. Gate Charge

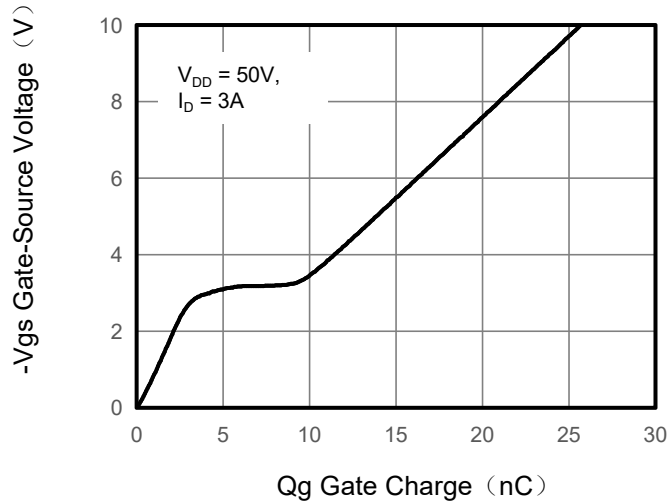


Figure 5. Capacitance

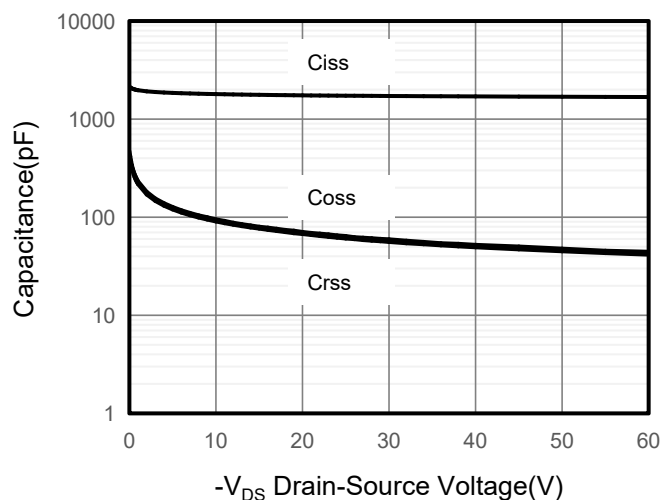
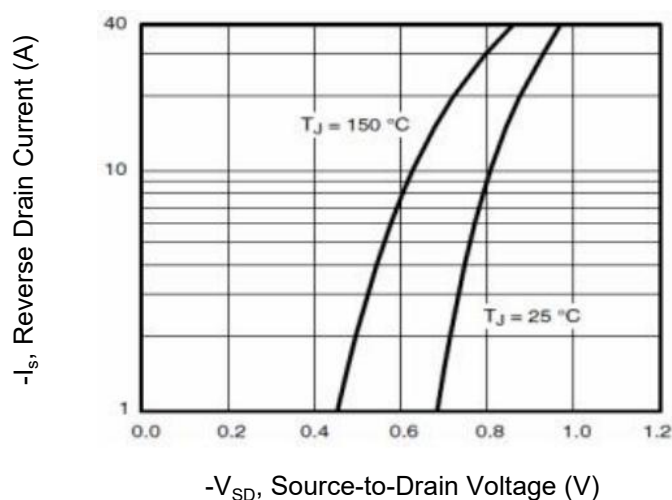


Figure 6. Source-Drain Diode Forward



## PMOS Typical Characteristics $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 7. Drain-Source On-Resistance

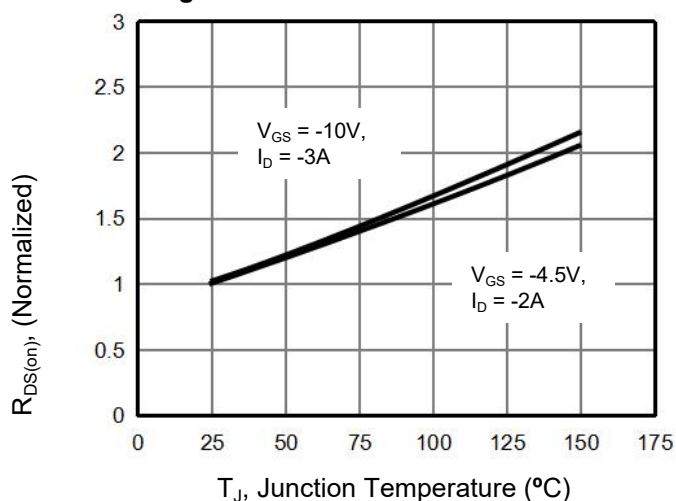


Figure 8. Safe Operation Area

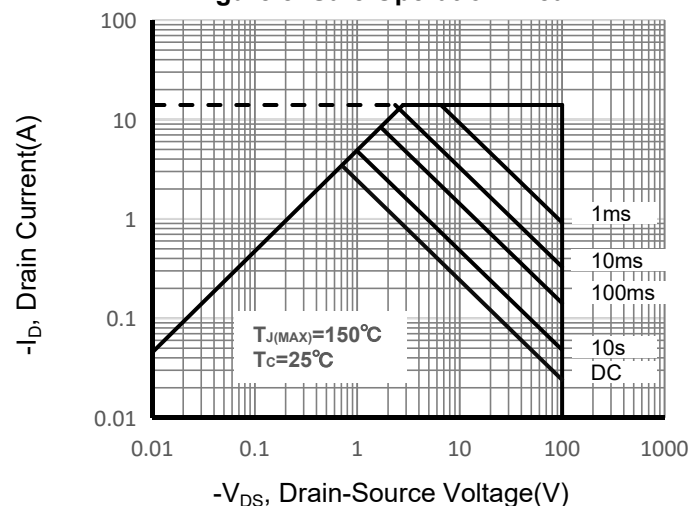


Figure 9. Maximum Continuous Drain Current vs Case Temperature

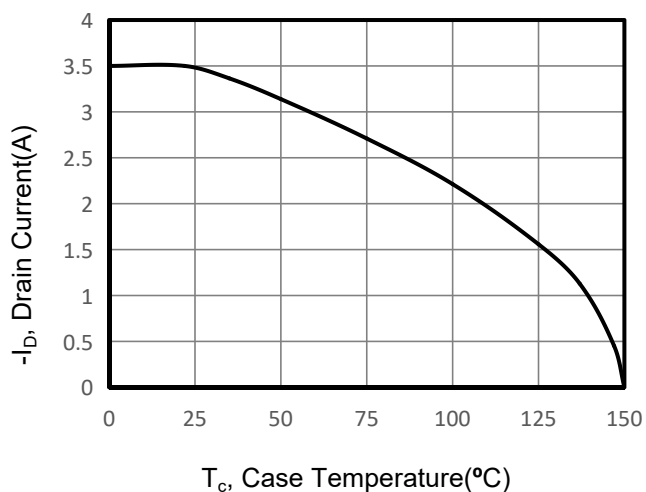
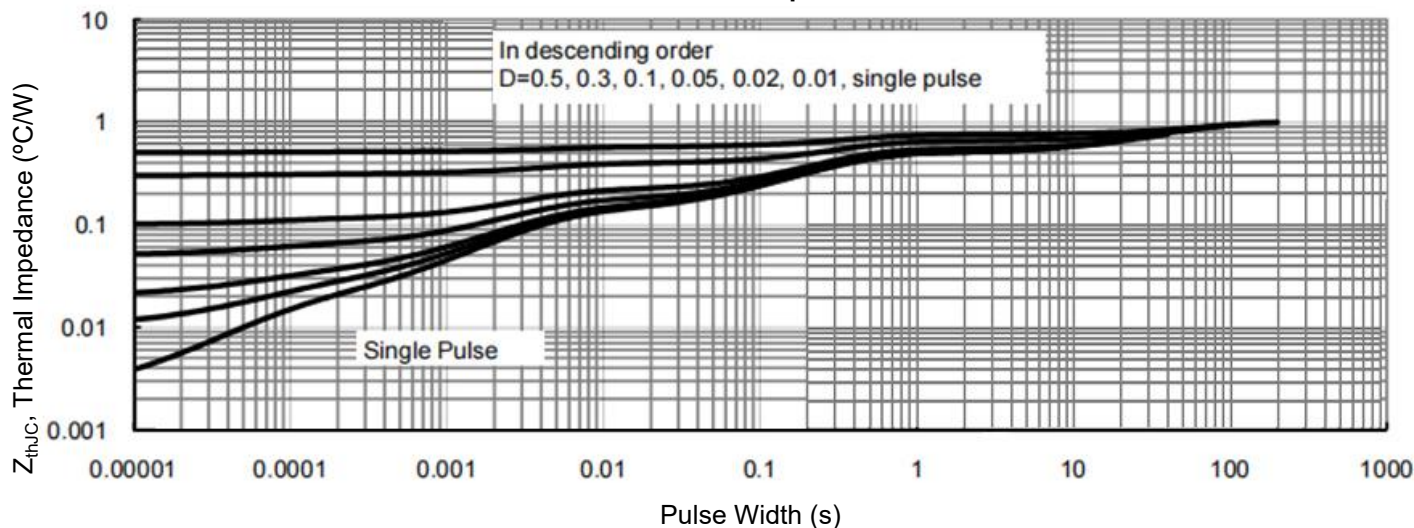
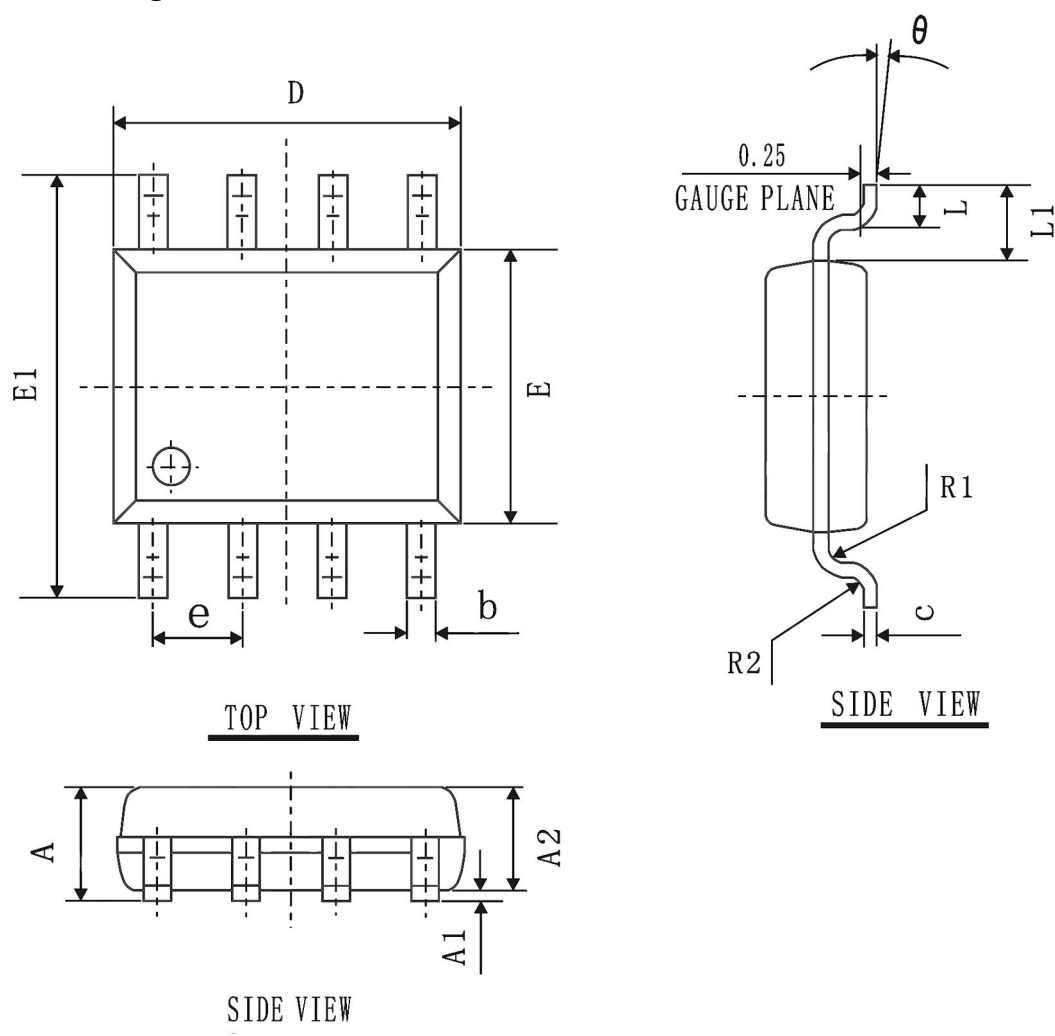


Figure 10. Normalized Maximum Transient Thermal Impedance



## SOP-8 Dual Package Information



COMMON DIMENSIONS  
(UNITS OF MEASURE=mm)

| SYMBOL   | MIN      | NOM   | MAX   |
|----------|----------|-------|-------|
| A        | 1.40     | 1.60  | 1.80  |
| A1       | 0.05     | 0.15  | 0.25  |
| A2       | 1.35     | 1.45  | 1.55  |
| b        | 0.30     | 0.40  | 0.50  |
| c        | 0.153    | 0.203 | 0.253 |
| D        | 4.80     | 4.90  | 5.00  |
| E        | 3.80     | 3.90  | 4.00  |
| E1       | 5.80     | 6.00  | 6.20  |
| L        | 0.45     | 0.70  | 1.00  |
| $\theta$ | 2°       | 4°    | 6°    |
| L 1      | 1.04 REF |       |       |
| e        | 1.27 BSC |       |       |
| R1       | 0.07 TYP |       |       |
| R2       | 0.07 TYP |       |       |