

### Description

#### Features

- SGT LV MOSFET technology
- Low gate charge
- Improved dv/dt capability

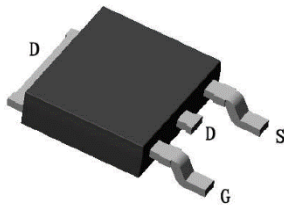
#### Application

- Power management in computing
- Current switching in DC-DC&AC-DC(SR)
- Load switching

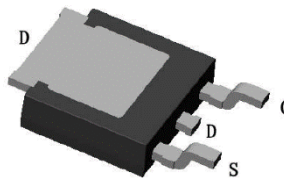
|                             |     |    |
|-----------------------------|-----|----|
| $V_{DS}$                    | 60  | V  |
| $R_{ds(on)typ}@V_{gs}=10V$  | 2.5 | mΩ |
| $R_{ds(on)typ}@V_{gs}=4.5V$ | 3.1 | mΩ |
| $I_D$                       | 160 | A  |



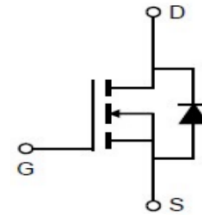
Top View



Bottom View



Pin Configuration



### Package Marking and Ordering Information

| Part      | Marking | Package | Packing | Reel Size | Tape Width | Qty     |
|-----------|---------|---------|---------|-----------|------------|---------|
| CMS60H16U | S60H16U | TO252   | Reel    | NA        | NA         | 2500pcs |

### Key Performance Parameters

| Symbol                 | Parameter                                  | Rating     | Units |
|------------------------|--------------------------------------------|------------|-------|
| $V_{DS}$               | Drain-Source Voltage                       | 60         | V     |
| $V_{GS}$               | Gate-Source Voltage                        | ±20        | V     |
| $I_D@T_c=25^{\circ}C$  | Continuous Drain Current, $V_{GS}=10V$     | 160        | A     |
| $I_D@T_c=100^{\circ}C$ | Continuous Drain Current, $V_{GS}=10V$     | 100        | A     |
| IDM                    | Pulsed Drain Current <sup>1</sup>          | 600        | A     |
| EAS                    | Single Pulse Avalanche Energy <sup>4</sup> | 529        | mJ    |
| $PD@T_c=25^{\circ}C$   | Total Power Dissipation                    | 125        | W     |
| $T_{STG}$              | Storage Temperature Range                  | -55 to 150 | °C    |
| $T_j$                  | Operating Junction Temperature Range       | -55 to 150 | °C    |

## Thermal Data

| Symbol           | Parameter                           | Typ | Max | Units |
|------------------|-------------------------------------|-----|-----|-------|
| R <sub>θJA</sub> | Thermal Resistance Junction-Ambient | 50  | 55  | °C/W  |
| R <sub>θJC</sub> | Thermal Resistance Junction-Case    | 0.9 | 1   | °C/W  |

## Electrical Characteristics (T<sub>J</sub>=25 °C, Unless otherwise noted)

| Symbol              | Parameter                          | Values |      |      | Unit | Note / Test Condition                                                                 |
|---------------------|------------------------------------|--------|------|------|------|---------------------------------------------------------------------------------------|
|                     |                                    | Min.   | Typ. | Max. |      |                                                                                       |
| BVDSS               | Drain-Source Breakdown Voltage     | 60     | --   | --   | V    | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                                            |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance  | --     | 2.5  | 3.1  | mΩ   | V <sub>GS</sub> =10V, I <sub>D</sub> =50A                                             |
|                     |                                    | --     | 3.1  | 4.5  |      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A                                            |
| V <sub>GS(th)</sub> | Gate Threshold Voltage             | 1      | 1.7  | 2.5  | V    | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                              |
| IDSS                | Drain-Source Leakage Current       | --     | --   | 1    | uA   | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                       |
|                     |                                    | --     | --   | 10   | uA   | V <sub>DS</sub> =48V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C                      |
| IGSS                | Gate-Source Leakage Current        | --     | --   | ±100 | nA   | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                            |
| g <sub>fs</sub>     | Forward Transconductance           | --     | 160  | --   | S    | V <sub>DS</sub> =10V, I <sub>D</sub> =50A                                             |
| R <sub>g</sub>      | Gate Resistance                    | --     | 3.1  | --   | Ω    | V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz                                      |
| Q <sub>g</sub>      | Total Gate Charge <sup>2,3</sup>   | --     | 95.4 | --   | nC   | V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =50A                       |
| Q <sub>gs</sub>     | Gate-Source Charge <sup>2,3</sup>  | --     | 15.1 | --   |      |                                                                                       |
| Q <sub>gd</sub>     | Gate-Drain Charge <sup>2,3</sup>   | --     | 20.8 | --   |      |                                                                                       |
| T <sub>d(on)</sub>  | Turn-On Delay Time <sup>2,3</sup>  | --     | 2.5  | --   | ns   | V <sub>DD</sub> =30V, V <sub>GS</sub> =10V, R <sub>G</sub> =1Ω<br>I <sub>D</sub> =50A |
| T <sub>r</sub>      | Rise Time <sup>2,3</sup>           | --     | 6.7  | --   |      |                                                                                       |
| T <sub>d(off)</sub> | Turn-Off Delay Time <sup>2,3</sup> | --     | 40   | --   |      |                                                                                       |
| T <sub>f</sub>      | Fall Time <sup>2,3</sup>           | --     | 19   | --   |      |                                                                                       |
| C <sub>iss</sub>    | Input Capacitance                  | --     | 5300 | --   | pF   | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHz                                     |
| C <sub>oss</sub>    | Output Capacitance                 | --     | 1600 | --   |      |                                                                                       |
| C <sub>rss</sub>    | Reverse Transfer Capacitance       | --     | 68   | --   |      |                                                                                       |

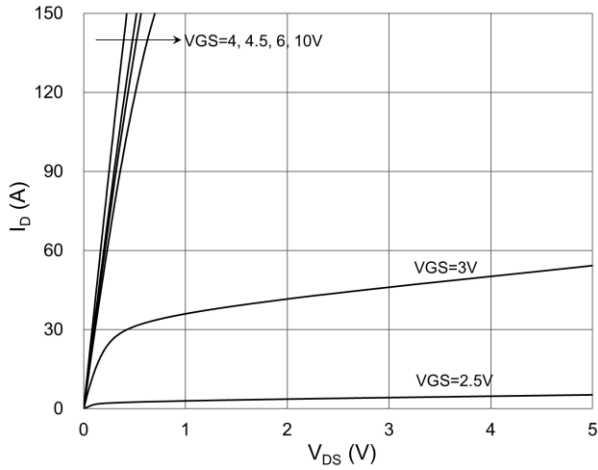
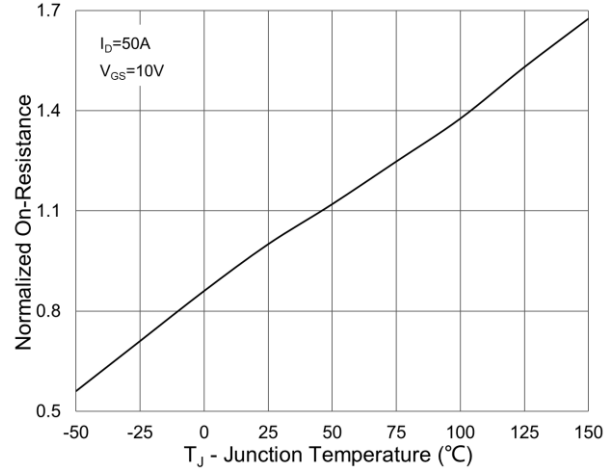
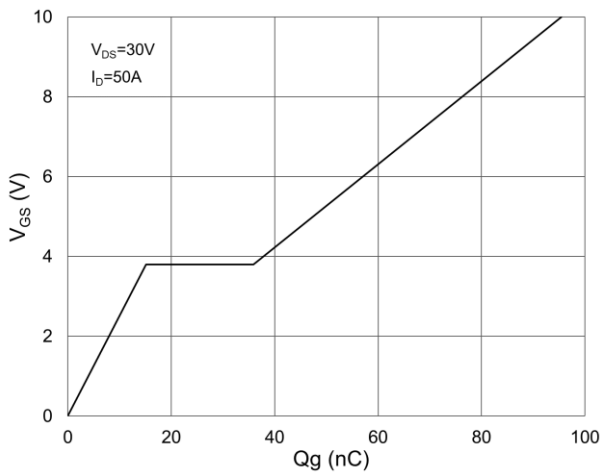
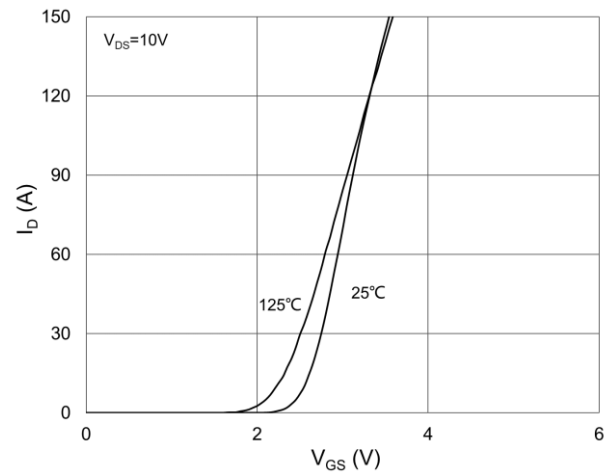
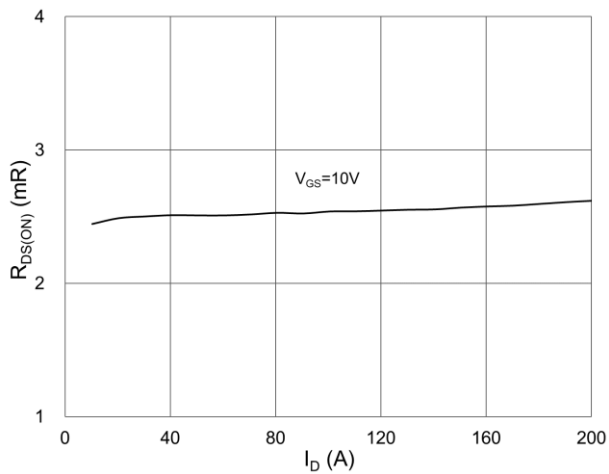
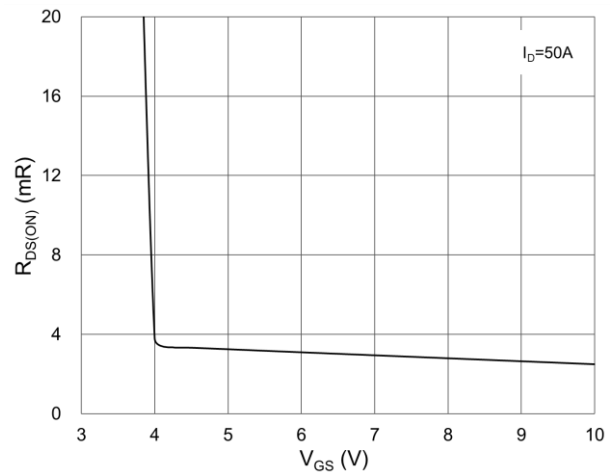
## Diode Characteristics

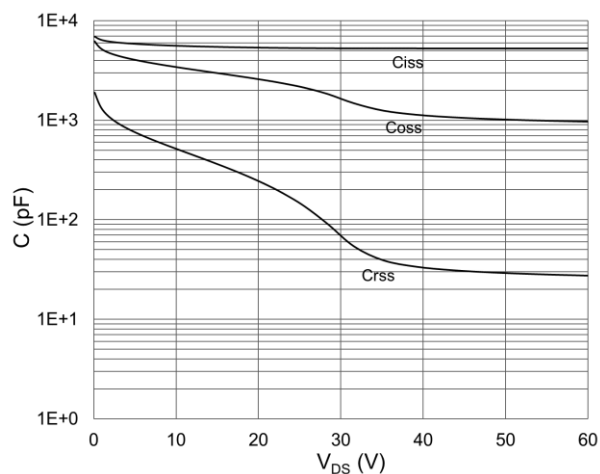
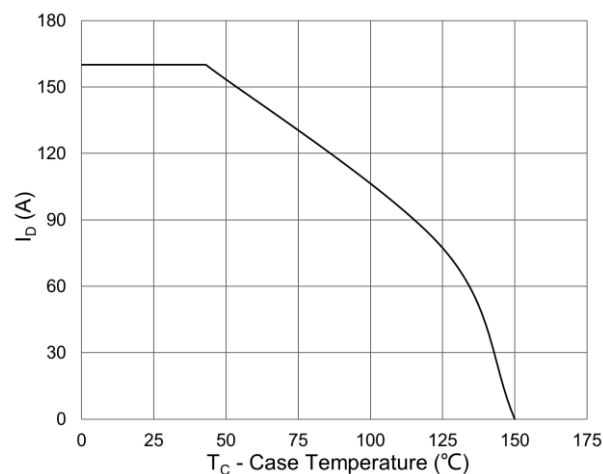
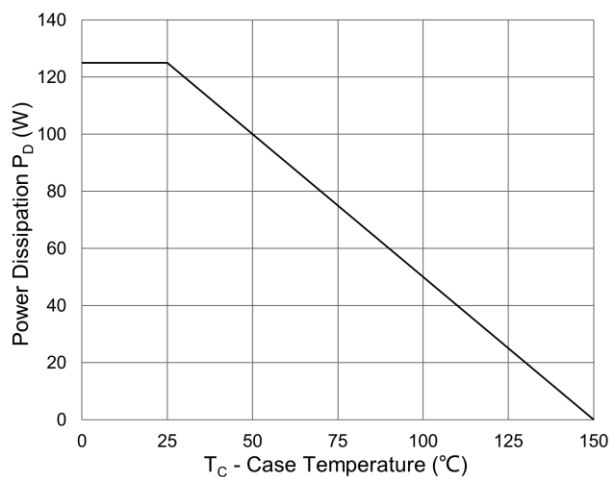
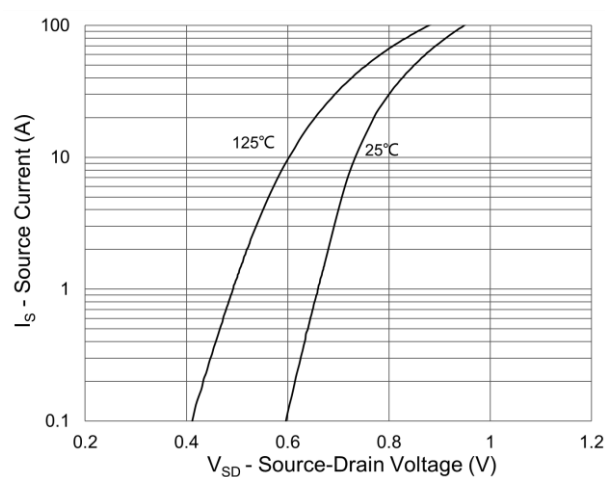
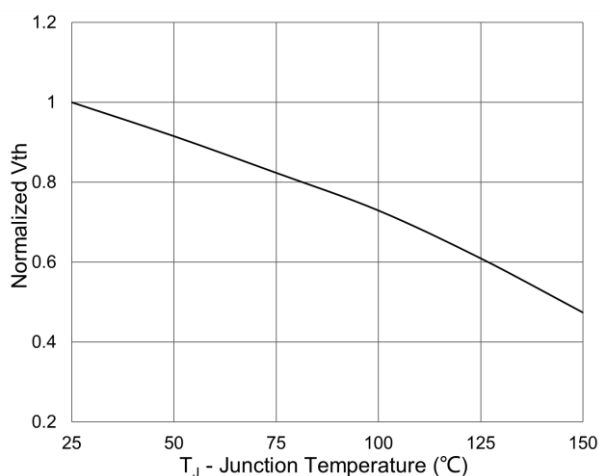
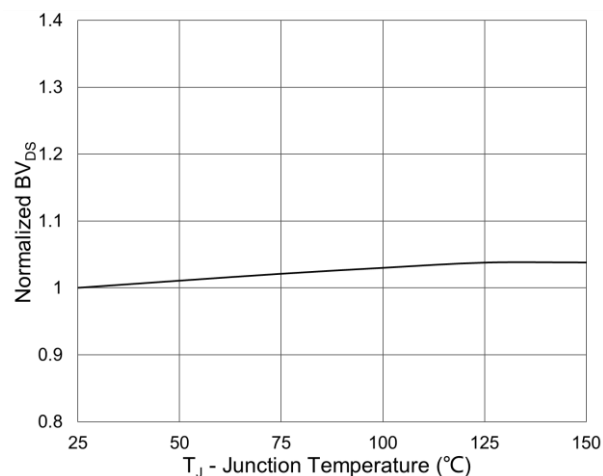
| Symbol          | Parameter                 | Conditions                                                     | Typ | Max | Units |
|-----------------|---------------------------|----------------------------------------------------------------|-----|-----|-------|
| I <sub>S</sub>  | Continuous Source Current | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current              | --  | 160 | A     |
| I <sub>sm</sub> | Pulsed Source Current     |                                                                | --  | 600 | A     |
| V <sub>SD</sub> | Diode Forward Voltage     | V <sub>GS</sub> =0V, I <sub>S</sub> =50A, T <sub>J</sub> =25°C | --  | 1.3 | V     |

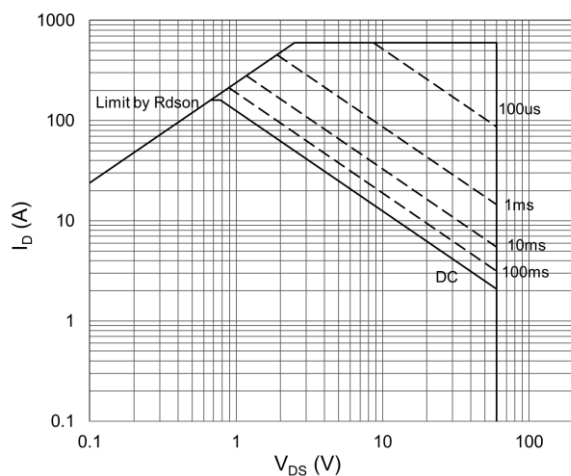
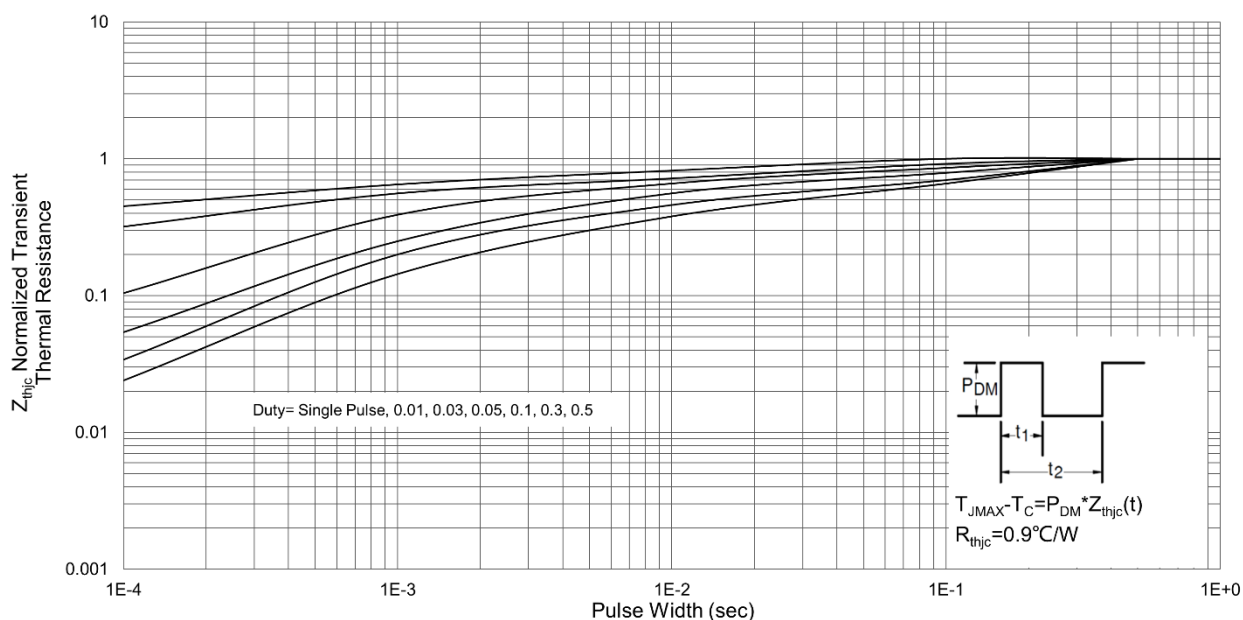
Note:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width ≦ 300us, duty cycle ≦ 2%.
3. Essentially independent of operating temperature.
4. The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=30V, V<sub>GS</sub>=10V, L=0.5mH.

## Typical Performance Characteristics

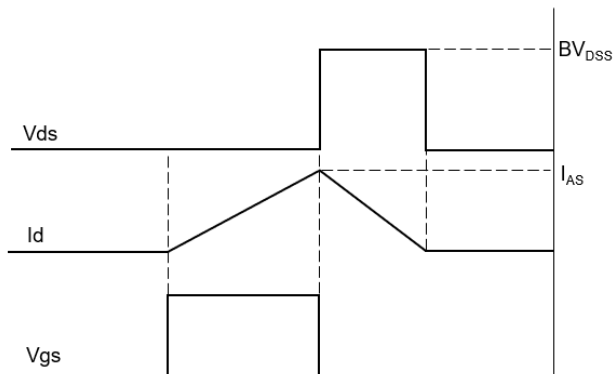
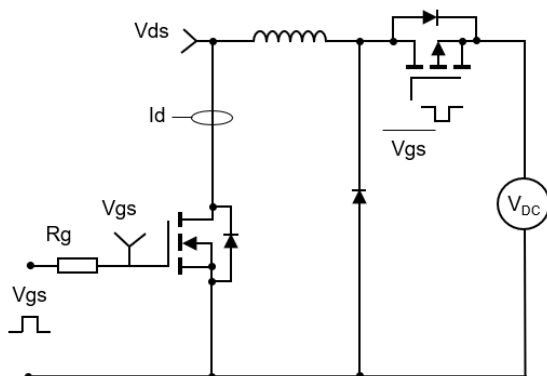
**Fig1 Output Characteristics**

**Fig2 Normalized  $R_{DS(on)}$  vs.  $T_J$** 

**Fig3 Gate Charge Waveform**

**Fig4 Transfer Characteristics**

**Fig5  $R_{DS(on)}$  vs. Drain Current and Gate Voltage**

**Fig6  $R_{DS(on)}$  vs. Gate Voltage**


**Fig7 Capacitance Characteristics**

**Fig8 Drain Current Derating**

**Fig9 Power Dissipation**

**Fig10 Source-Drain Diode Forward Characteristics**

**Fig11 Normalized Threshold Voltage vs. T\_J**

**Fig12 Normalized Breakdown Voltage vs. T\_J**


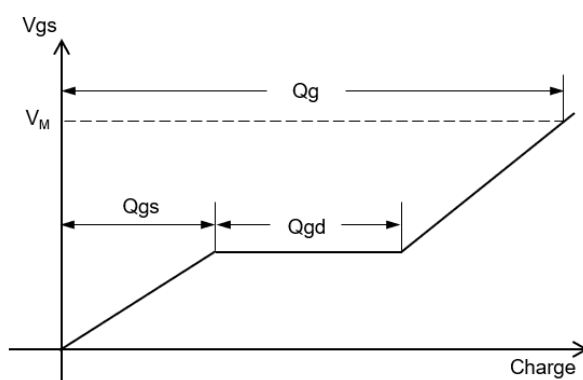
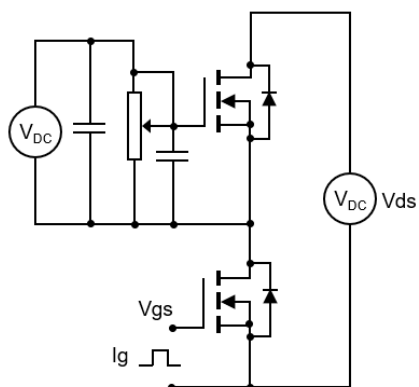
**Fig13 Maximum Safe Operation Area**

**Fig14 Normalized Transient Impedance**


## Test Circuit & Waveform

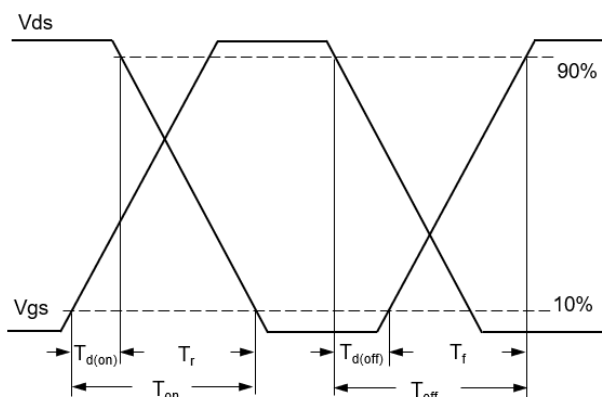
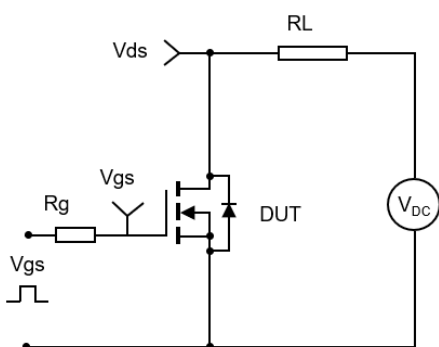
### 1. Unclamped Inductive Switching Test Circuit & Waveform



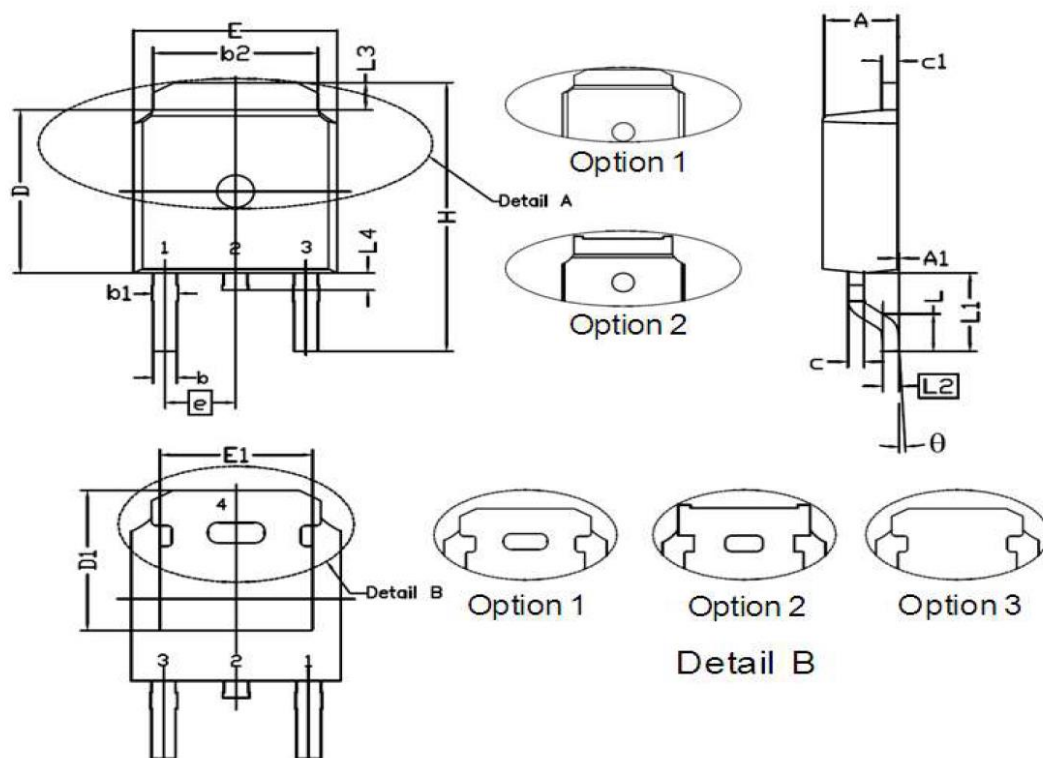
### 2. Gate Charge Test Circuit & Waveform



### 3. Resistive Switching Test Circuit & Waveform



## TO252 Package Information



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 2.15                      | 2.45  | 0.085                | 0.096 |
| A1     | 0.00                      | 0.15  | 0.000                | 0.006 |
| b      | 0.60                      | 0.91  | 0.024                | 0.036 |
| b1     | 0.65                      | 1.15  | 0.026                | 0.045 |
| b2     | 5.00                      | 5.64  | 0.197                | 0.222 |
| c      | 0.45                      | 0.61  | 0.018                | 0.024 |
| c1     | 0.36                      | 0.66  | 0.014                | 0.026 |
| D      | 5.80                      | 6.30  | 0.228                | 0.248 |
| D1     | 5.21                      | --    | 0.205                | --    |
| e      | 2.29 BSC.                 |       | 0.090 BSC.           |       |
| E      | 6.30                      | 6.90  | 0.248                | 0.272 |
| E1     | 4.40                      | --    | 0.173                | --    |
| H      | 9.40                      | 10.48 | 0.370                | 0.413 |
| L      | 1.38                      | 1.78  | 0.054                | 0.070 |
| L1     | 2.92 REF                  |       | 0.115 REF            |       |
| L2     | 0.508 BSC.                |       | 0.020 BSC.           |       |
| L3     | 0.72                      | 1.35  | 0.028                | 0.053 |
| L4     | 0.60                      | 1.20  | 0.024                | 0.047 |
| θ      | 0°                        | 10°   | 0°                   | 10°   |