

## Features

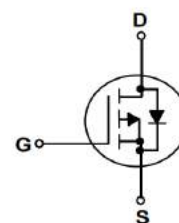
- P-Channel
- Fast Switching
- Low Gate Charge and  $R_{DS(ON)}$
- Low Reverse transfer capacitances
- 100% EAS Tested

|                               |      |            |
|-------------------------------|------|------------|
| $V_{DS}$                      | -100 | V          |
| $R_{DS(on),TYP}@ V_{GS}=-10V$ | 23   | m $\Omega$ |
| $I_D$                         | -65  | A          |

TO-263



| Part ID   | Package Type | Marking   | Packing      |
|-----------|--------------|-----------|--------------|
| ZTG23P10B | TO-263       | ZTG23P10B | 1000pcs/Reel |



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

| Symbol   | Parameter   | Rating                           | Unit                        |   |
|--|---|----------------------------------|-----------------------------|---|
| <b>Common Ratings (<math>T_c=25^{\circ}\text{C}</math> Unless Otherwise Noted)</b> |   |                                  |                             |   |
| $V_{GS}$   | Gate-Source Voltage                               | $\pm 20$                         | V                           |   |
| $V_{(BR)DSS}$  | Drain-Source Breakdown Voltage                    | -100                             | V                           |   |
| $T_J$  | Maximum Junction Temperature                      | 150                              | $^{\circ}\text{C}$          |   |
| $T_{STG}$  | Storage Temperature Range                         | -55 to 150                       | $^{\circ}\text{C}$          |   |
| $I_{DM}$   | Drain Current-Continuous@ Current-Pulsed (Note 1) | $T_c=25^{\circ}\text{C}$<br>-260 | A                           |   |
| <b>Mounted on Large Heat Sink</b>  |   |                                  |                             |   |
| $I_D$  | Drain Current-Continuous                          | $T_c=25^{\circ}\text{C}$         | -65                         | A |
|  |   | $T_c=100^{\circ}\text{C}$        | -41                         | A |
| $P_D$  | Maximum Power Dissipation                         | 250                              | W                           |   |
| $R_{\theta JC}$  | Thermal Resistance-Junction to Case               | 0.5                              | $^{\circ}\text{C}/\text{W}$ |   |
| $R_{\theta JA}$  | Thermal Resistance Junction-Ambient               | 62                               | $^{\circ}\text{C}/\text{W}$ |   |
| <b>Drain-Source Avalanche Ratings</b>  |   |                                  |                             |   |
| EAS  | Avalanche Energy, Single Pulsed (Note 2)          | 467                              | mJ                          |   |

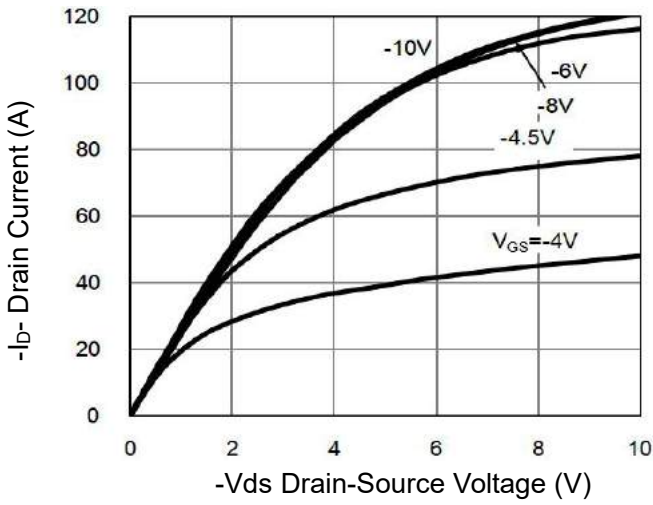
**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

| Symbol  | Parameter                                | Condition   | Min. | Typ. | Max. | Unit |
|---|--|---|------|------|------|------|
| <b>Static Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>   |  |   |      |      |      |      |
| V <sub>(BR)DSS</sub>  | Drain-Source Breakdown Voltage           | V <sub>GS</sub> =0V I <sub>D</sub> =-250μA  | -100 | --   | --   | V    |
| I <sub>DSS</sub>  | Zero Gate Voltage Drain Current(Tc=25°C) | V <sub>DS</sub> =-100V, V <sub>GS</sub> =0V   | --   | --   | 1    | μA   |
| I <sub>GSS</sub>  | Gate-Body Leakage Current                | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V  | --   | --   | ±100 | nA   |
| V <sub>GS(TH)</sub>   | Gate Threshold Voltage                   | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                       | -2   | -3   | -4   | V    |
| R <sub>DS(ON)</sub>   | Drain-Source On-State Resistance         | V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A   | --   | 23   | 25   | mΩ   |
| <b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>  |  |   |      |      |      |      |
| C <sub>iss</sub>  | Input Capacitance                        | V <sub>DS</sub> =-50V, V <sub>GS</sub> =0V,<br>f=1MHz   | --   | 4275 | --   | pF   |
| C <sub>oss</sub>  | Output Capacitance                       |   | --   | 335  | --   | pF   |
| C <sub>rss</sub>  | Reverse Transfer Capacitance             |   | --   | 25   | --   | pF   |
| Q <sub>g</sub>  | Total Gate Charge                        | V <sub>DS</sub> =-50V, I <sub>D</sub> =-20A,<br>V <sub>GS</sub> =-10V                           | --   | 52   | --   | nC   |
| Q <sub>gs</sub>   | Gate-Source Charge                       |   | --   | 16   | --   | nC   |
| Q <sub>gd</sub>   | Gate-Drain Charge                        |   | --   | 7    | --   | nC   |
| <b>Switching Characteristics</b>  |  |   |      |      |      |      |
| t <sub>d(on)</sub>  | Turn-on Delay Time                       | V <sub>DS</sub> =-50V,<br>I <sub>D</sub> =-20A,<br>R <sub>G</sub> =5Ω,<br>V <sub>GS</sub> =-10V | --   | 15   | --   | nS   |
| t <sub>r</sub>  | Turn-on Rise Time                        |   | --   | 18   | --   | nS   |
| t <sub>d(off)</sub>   | Turn-Off Delay Time                      |   | --   | 50   | --   | nS   |
| t <sub>f</sub>  | Turn-Off Fall Time                       |   | --   | 19   | --   | nS   |
| <b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b> |  |   |      |      |      |      |
| I <sub>SD</sub>   | Source-drain current(Body Diode)         |   | --   | --   | -65  | A    |
| V <sub>SD</sub>   | Forward on voltage                       | I <sub>S</sub> =-20A, V <sub>GS</sub> =0V   | --   | --   | 1.2  | V    |
| t <sub>rr</sub>   | Reverse Recovery Time                    | I <sub>S</sub> =-20A, V <sub>DD</sub> =-50V<br>di/dt=100A/μs                                    | --   | 55   | --   | ns   |
| Q <sub>rr</sub>   | Reverse Recovery Charge                  |   | --   | 102  | --   | nC   |

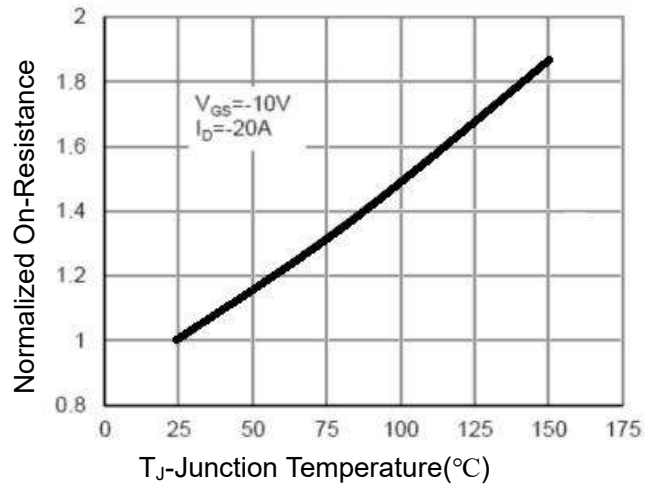
**Notes:**

- 1 : Repetitive rating; pulse width limited by maximum junction temperature
- 2 : L=0.5mH, R<sub>g</sub>=25Ω, Starting T<sub>J</sub>=25 °C

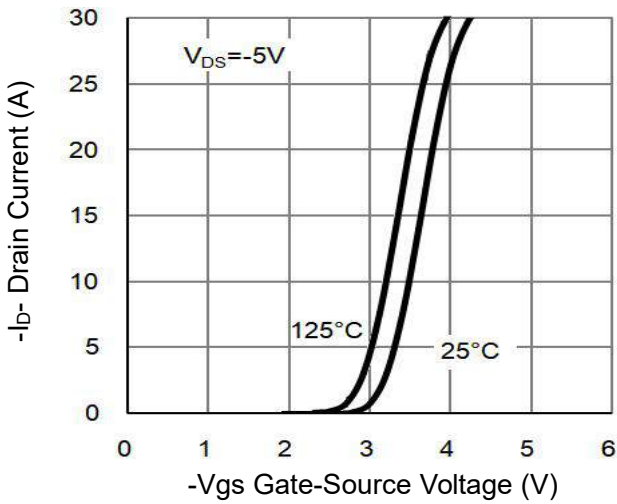
**Typical Electrical and Thermal Characteristics**



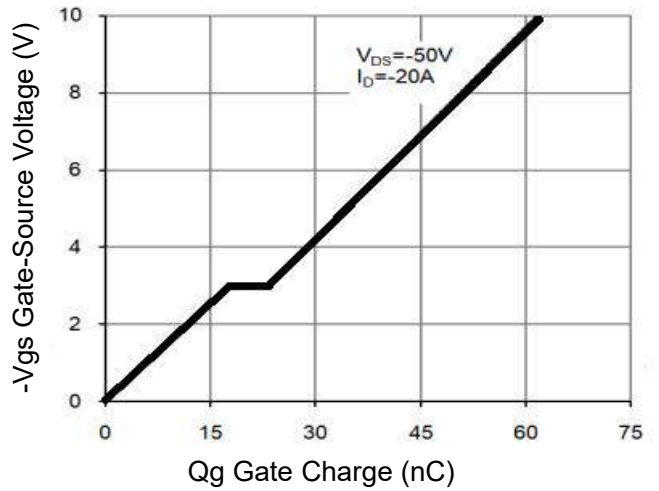
**Figure 1 Output Characteristics**



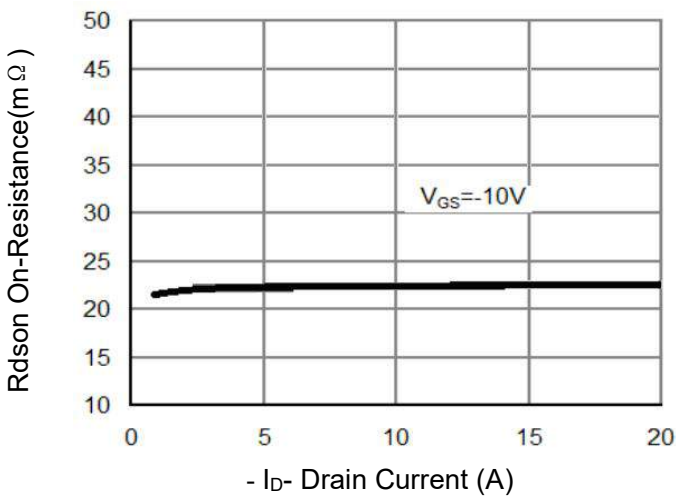
**Figure 4 R<sub>DS(on)</sub>-Junction Temperature**



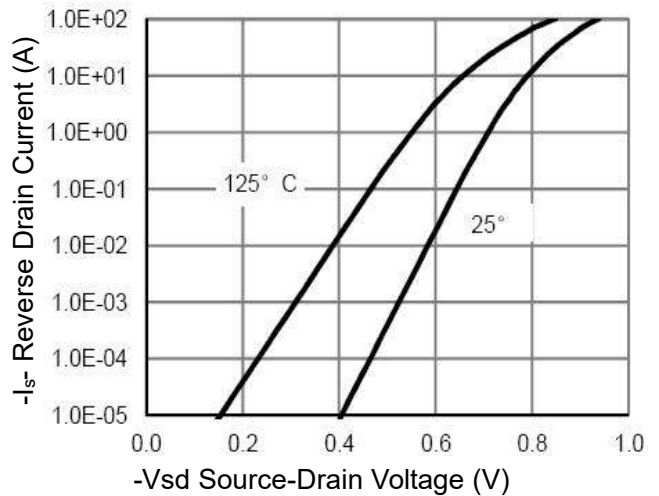
**Figure 2 Transfer Characteristics**



**Figure 5 Gate Charge**



**Figure 3 R<sub>DS(on)</sub>- Drain Current**



**Figure 6 Source- Drain Diode Forward**

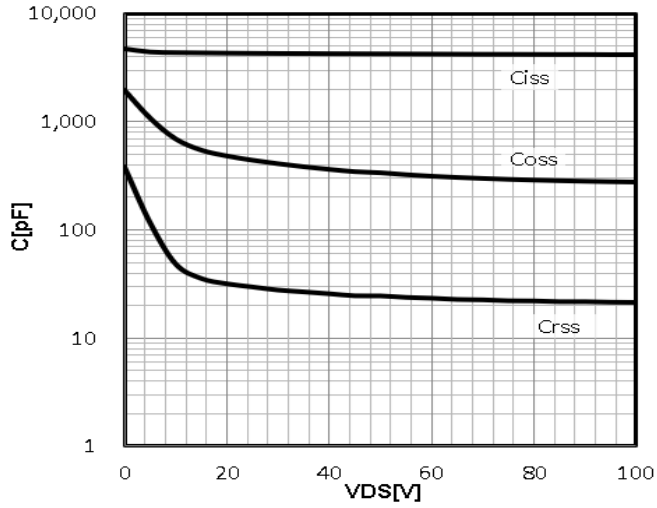


Figure 7 Capacitance vs Vds

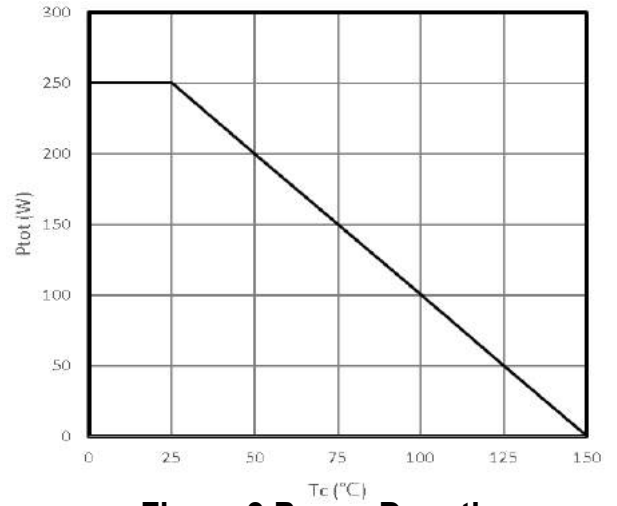


Figure 9 Power De-rating

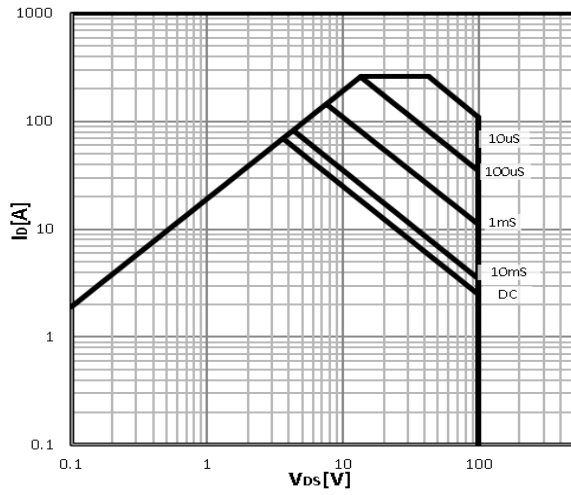


Figure 8 Safe Operation Area

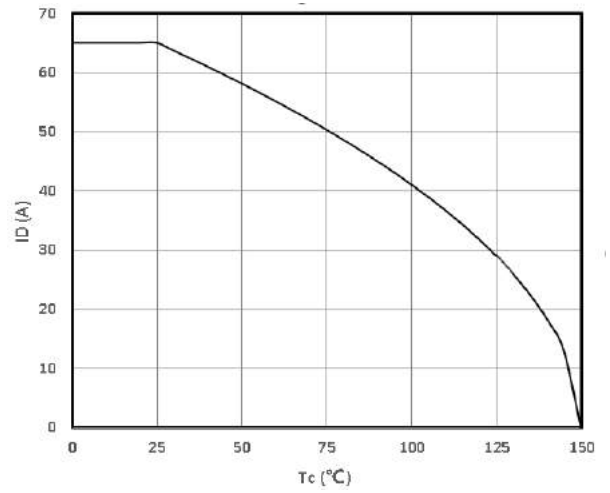


Figure 10 Current De-rating

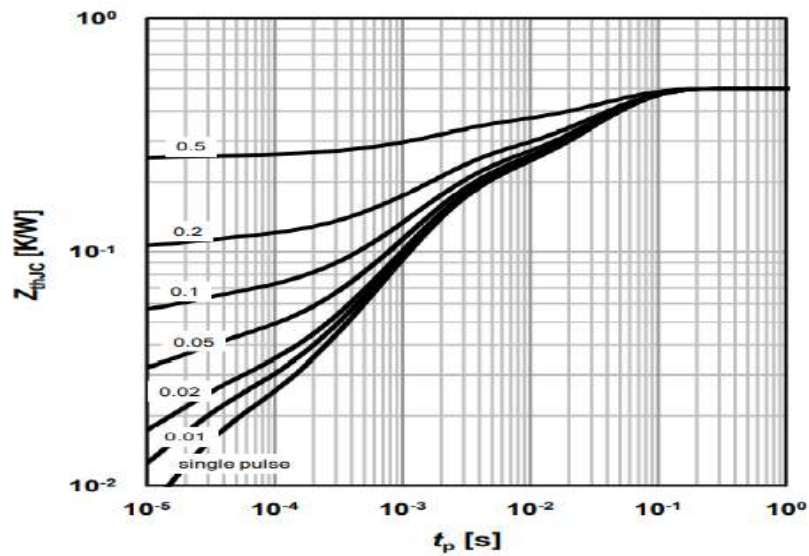
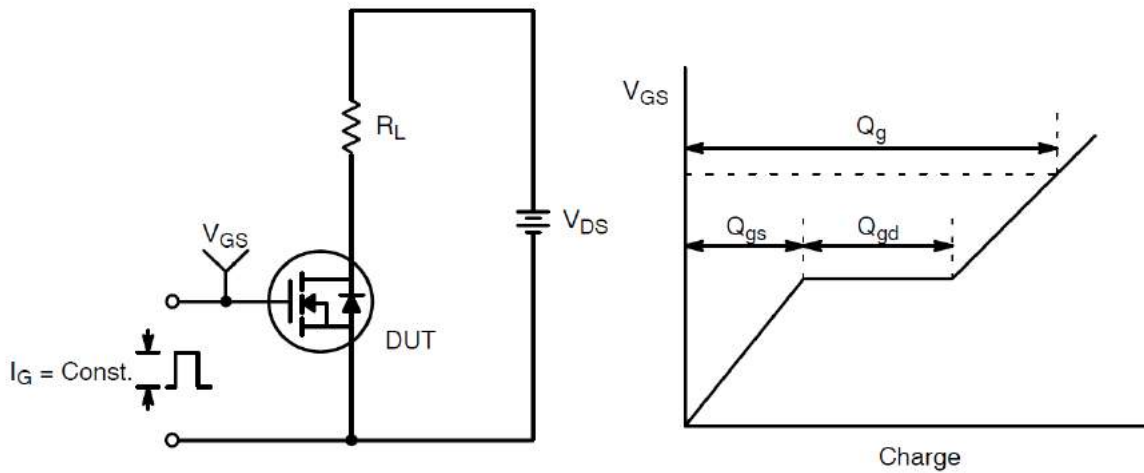
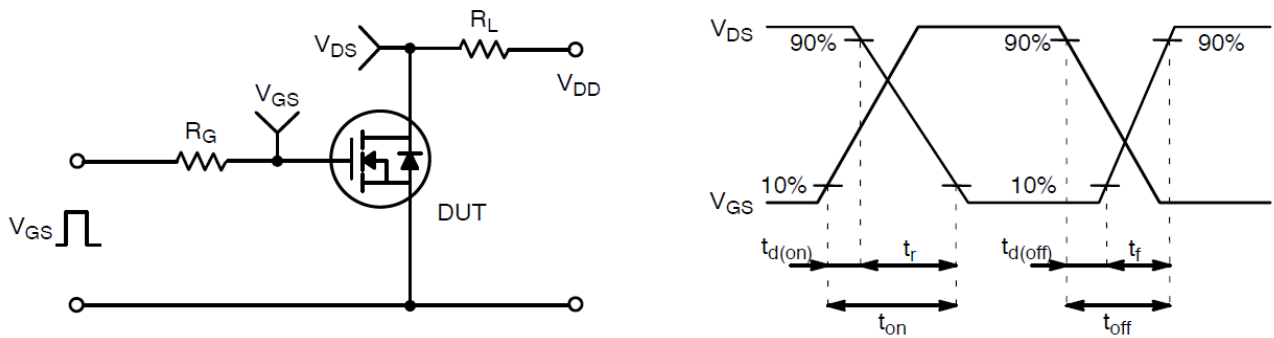


Figure 11 Normalized Maximum Transient Thermal Impedance

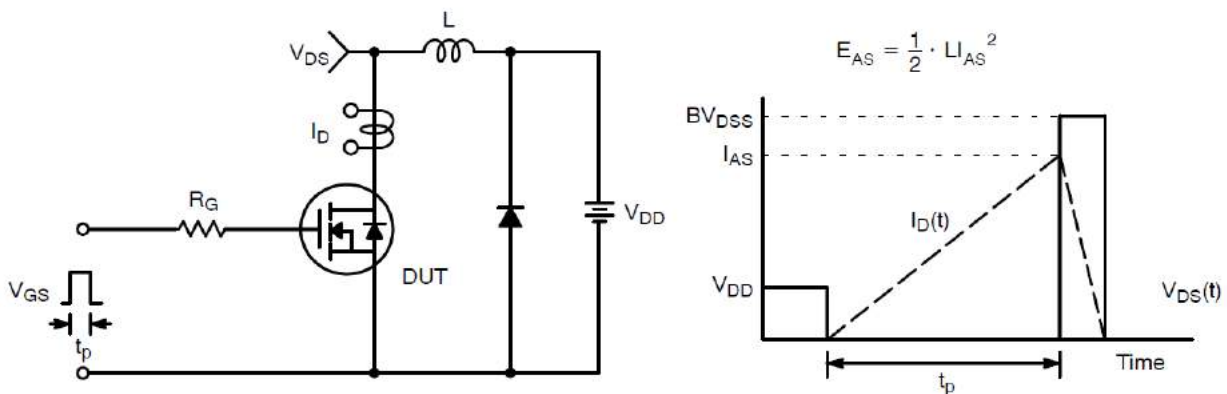
**Test Circuit and Waveform:**



**Gate Charge Test Circuit & Waveform**

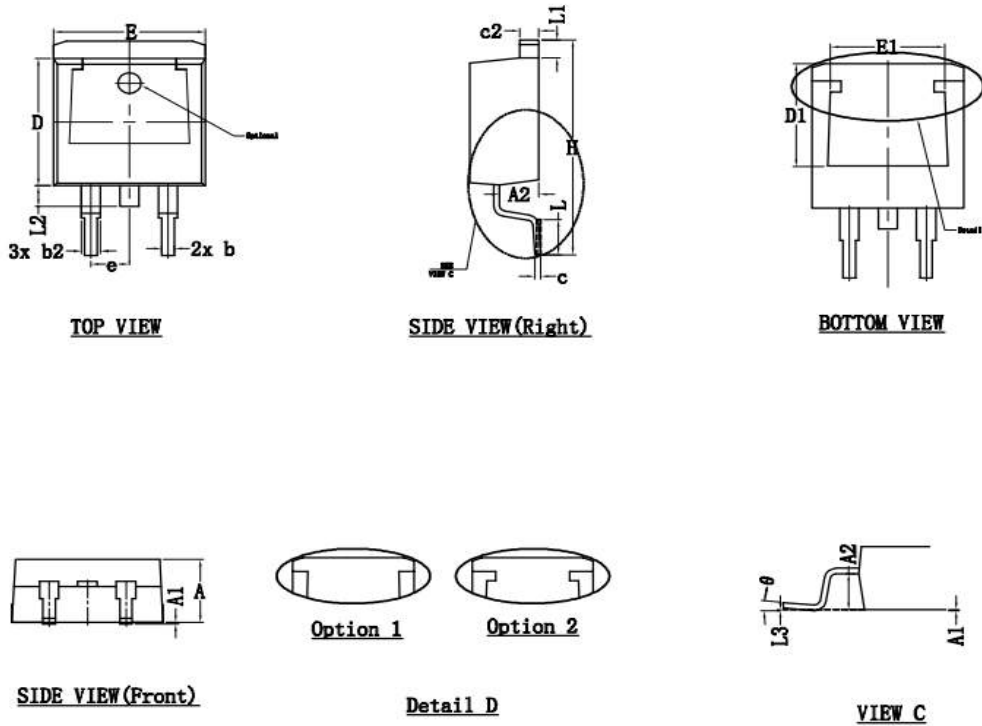


**Resistive Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching Test Circuit & Waveforms**

## TO-263-2L Package Information



| SYMBOL   | DIMENSIONS |       |            |       |
|----------|------------|-------|------------|-------|
|          | mm         |       | inch       |       |
|          | MIN.       | MAX.  | MIN.       | MAX.  |
| A        | 4.30       | 4.86  | 0.169      | 0.191 |
| A1       | 0.00       | 0.25  | 0.00       | 0.010 |
| A2       | 2.34       | 2.79  | 0.092      | 0.110 |
| b        | 0.68       | 0.94  | 0.027      | 0.037 |
| b2       | 1.15       | 1.35  | 0.045      | 0.053 |
| c        | 0.33       | 0.65  | 0.013      | 0.026 |
| c2       | 1.17       | 1.40  | 0.046      | 0.055 |
| D        | 8.38       | 9.45  | 0.330      | 0.372 |
| D1       | 6.90       | 8.17  | 0.272      | 0.322 |
| E        | 9.78       | 10.50 | 0.385      | 0.413 |
| E1       | 6.50       | 8.60  | 0.256      | 0.339 |
| H        | 14.61      | 15.88 | 0.575      | 0.625 |
| e        | 2.54 BSC.  |       | 0.100 BSC. |       |
| L        | 1.78       | 2.79  | 0.070      | 0.110 |
| L1       | 0.70       | 1.60  | 0.028      | 0.063 |
| L2       | 1.00       | 1.78  | 0.039      | 0.070 |
| L3       | 0.254 BSC. |       | 0.010 BSC. |       |
| $\theta$ | 0°         | 8°    | 0.00       | 0.315 |

## Customer Service

Sales and Service:

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