

#### Product Summary

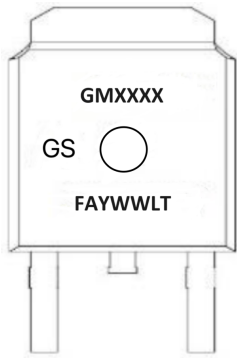
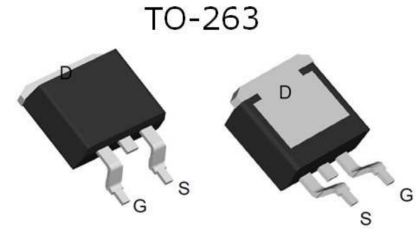
| V <sub>DS</sub> (V) | R <sub>DS(on),max</sub> (mΩ) | I <sub>D</sub> (A) |
|---------------------|------------------------------|--------------------|
| 40                  | 4.7@ V <sub>GS</sub> = 10V   | 100 <sup>(1)</sup> |

#### Features

- Low R<sub>DS(on)</sub> SGT technology
- Low thermal impedance
- Fast switching speed
- 100% avalanche tested

#### Application

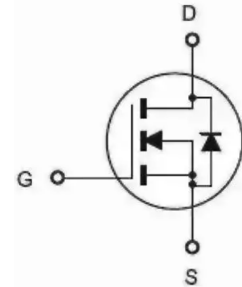
- DC/DC conversion
- Power switch
- Synchronous Rectification in SMPS



TO-263

NOTE:  
 LOGO - GS  
 GMXXXXX- Part number code  
 F - Fab location code  
 A - Assembly location code  
 Y - Year code  
 WW - Week code  
 L&T - Assembly lot code

#### Equivalent circuit



#### Absolute maximum rating@25°C

| Symbol                                | Parameter                                                    | Rating     | Units |
|---------------------------------------|--------------------------------------------------------------|------------|-------|
| V <sub>DS</sub>                       | Drain-Source Voltage                                         | 30         | V     |
| V <sub>GS</sub>                       | Gate-Source Voltage                                          | ±20        | V     |
| I <sub>D</sub> @T <sub>C</sub> =25°C  | Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup> | 100        | A     |
| I <sub>D</sub> @T <sub>C</sub> =100°C | Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup> | 65         | A     |
| I <sub>DM</sub>                       | Pulsed Drain Current <sup>2</sup>                            | 320        | A     |
| EAS                                   | Single Pulse Avalanche Energy <sup>3</sup>                   | 280        | mJ    |
| P <sub>D</sub> @T <sub>C</sub> =25°C  | Total Power Dissipation <sup>4</sup>                         | 70         | W     |
| T <sub>STG</sub>                      | Storage Temperature Range                                    | -55 to 150 | °C    |
| T <sub>J</sub>                        | Operating Junction Temperature Range                         | -55 to 150 | °C    |

#### Thermal Characteristic

| Parameter                                              |              | Symbol           | Max. | Unit |
|--------------------------------------------------------|--------------|------------------|------|------|
| Thermal resistance, junction-to-case                   | Steady state | R <sub>θJC</sub> | 1.8  | °C/W |
| Thermal resistance, junction-to-ambient <sup>(4)</sup> | Steady state | R <sub>θJA</sub> | 50   |      |

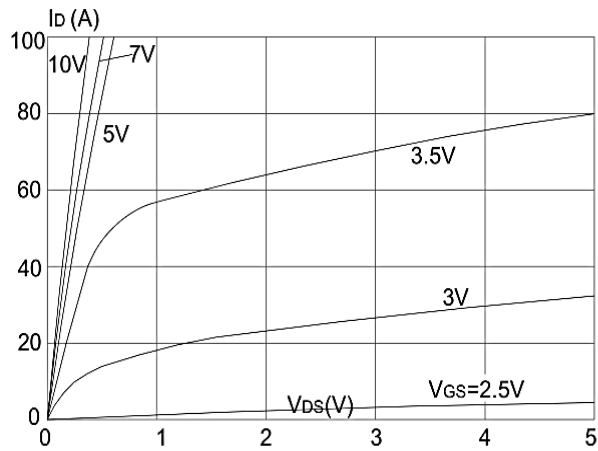
**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

| Parameter                                  | Symbol               | Test conditions                                                                                    | Min. | Typ. | Max. | Unit |
|--------------------------------------------|----------------------|----------------------------------------------------------------------------------------------------|------|------|------|------|
| Static parameter                           |                      |                                                                                                    |      |      |      |      |
| Drain to source breakdown voltage          | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0, I <sub>D</sub> = 250 μA                                                       | 30   |      |      | V    |
| Gate-source threshold voltage              | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                        | 1.0  | 1.5  | 2.0  | V    |
| Gate-body leakage                          | I <sub>GSS</sub>     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V                                                     |      |      | ±100 | nA   |
| Zero gate voltage drain current            | I <sub>DSS</sub>     | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V                                                      |      |      | 1    | μA   |
| Drain-source on-resistance                 | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A                                                      |      | 4.1  | 4.7  | mΩ   |
|                                            | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 30 A                                                     |      | 6.7  | 7.4  | mΩ   |
| Dynamic <sup>(5)</sup>                     |                      |                                                                                                    |      |      |      |      |
| Total gate charge    V <sub>GS</sub> = 10V | Q <sub>g</sub>       | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A, V <sub>GS</sub> = 10 V                              |      | 39.2 |      | nC   |
| Gate-source charge                         | Q <sub>gs</sub>      |                                                                                                    |      | 6    |      |      |
| Gate-drain charge                          | Q <sub>gd</sub>      |                                                                                                    |      | 8.2  |      |      |
| Turn-on delay time                         | t <sub>d(on)</sub>   | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A, V <sub>GS</sub> = 10 V,<br>R <sub>GEN</sub> = 2.9 Ω |      | 22   |      | ns   |
| Rise time                                  | t <sub>r</sub>       |                                                                                                    |      | 26   |      |      |
| Turn-off delay time                        | t <sub>d(off)</sub>  |                                                                                                    |      | 44   |      |      |
| Fall time                                  | t <sub>f</sub>       |                                                                                                    |      | 14   |      |      |
| Input capacitance                          | C <sub>iss</sub>     | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz                                           |      | 1950 |      | pF   |
| Output capacitance                         | C <sub>oss</sub>     |                                                                                                    |      | 220  |      |      |
| Reverse transfer capacitance               | C <sub>rss</sub>     |                                                                                                    |      | 165  |      |      |
| Diode Characteristics                      |                      |                                                                                                    |      |      |      |      |
| Parameter                                  | Symbol               | Conditions                                                                                         | Min. | Typ. | Max. | Unit |
| Continuous Source Current <sup>1,6</sup>   | I <sub>S</sub>       | V <sub>G</sub> =V <sub>S</sub> =0V , Force Current                                                 | ---  | ---  | 100  | A    |
| Pulsed Source Current <sup>2,6</sup>       | I <sub>SM</sub>      |                                                                                                    | ---  | ---  | 320  | A    |
| Diode Forward Voltage <sup>2</sup>         | V <sub>SD</sub>      | V <sub>GS</sub> =0V , I <sub>S</sub> =20A , T <sub>J</sub> =25°C                                   | ---  | ---  | 1    | V    |

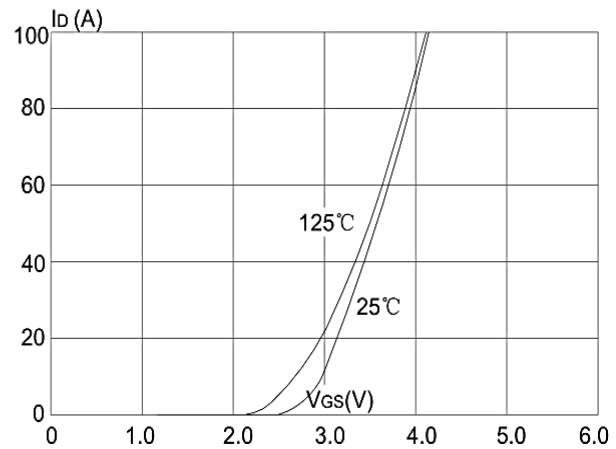
**Notes**

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper, t<10sec.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.5mH,I<sub>AS</sub>=75A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.Guaranteed by design, not subject to production testing.
- 6.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

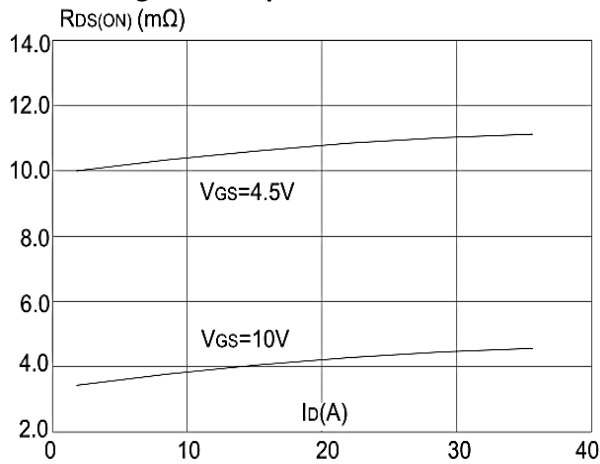
## Typical Performance Characteristics



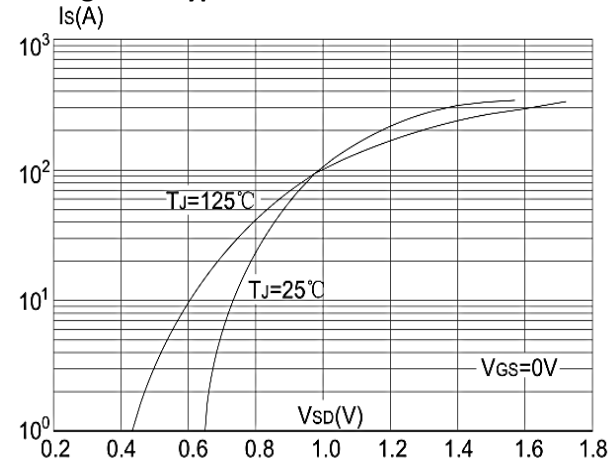
**Figure 1: Output Characteristics**



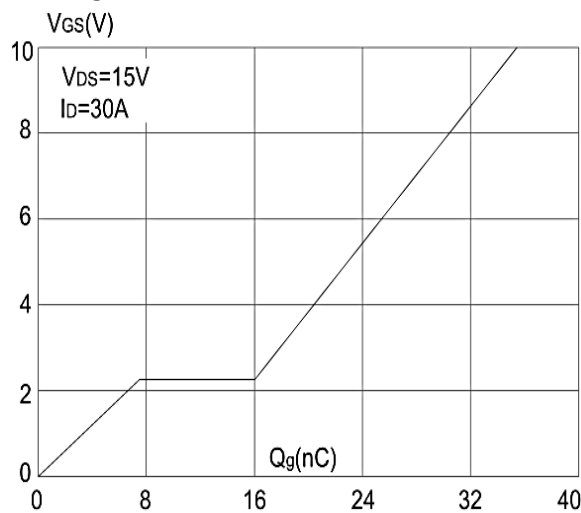
**Figure 2: Typical Transfer Characteristics**



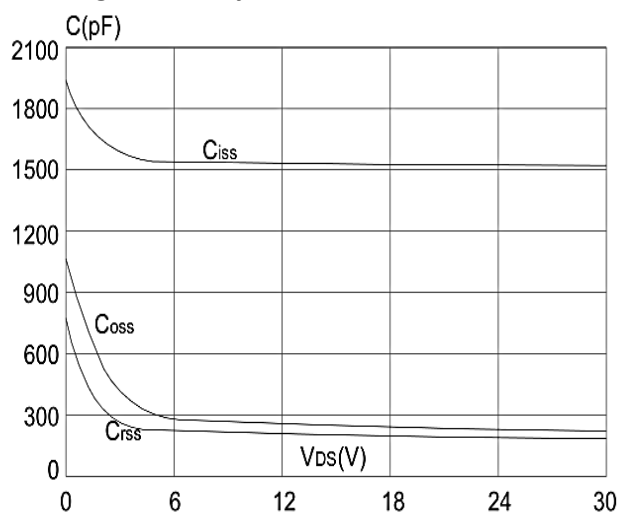
**Figure 3: On-resistance vs. Drain Current**



**Figure 4: Body Diode Characteristics**

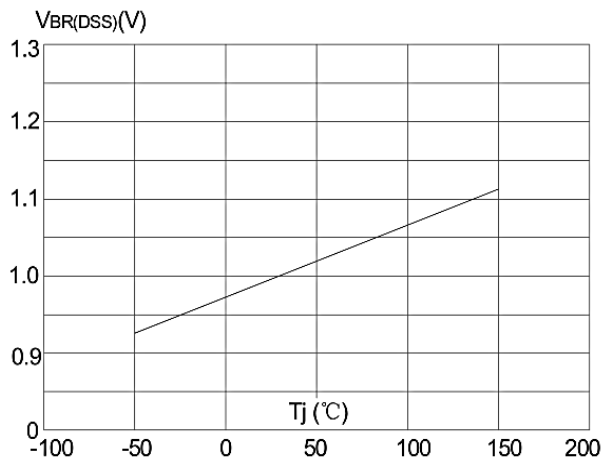


**Figure 5: Gate Charge Characteristics**

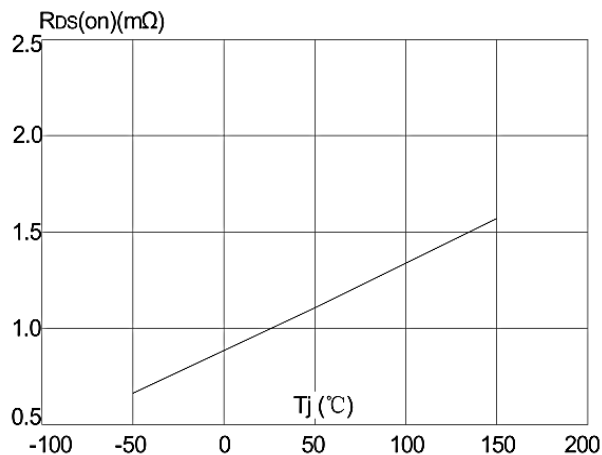


**Figure 6: Capacitance Characteristics**

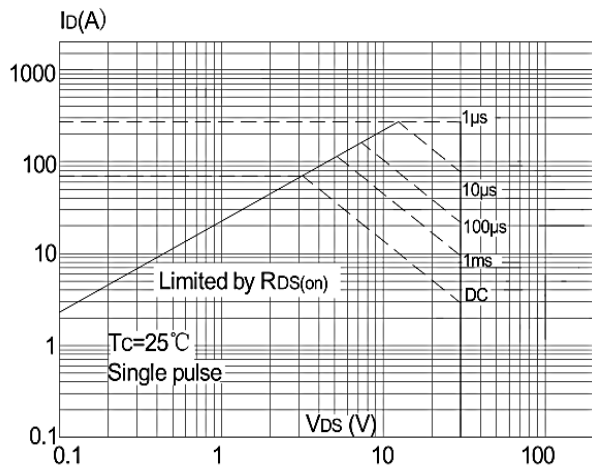
## Typical Performance Characteristics



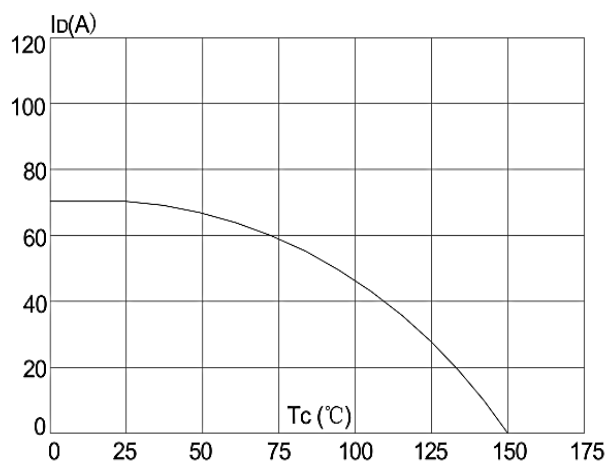
**Figure 7: Normalized Breakdown Voltage vs. Junction Temperature**



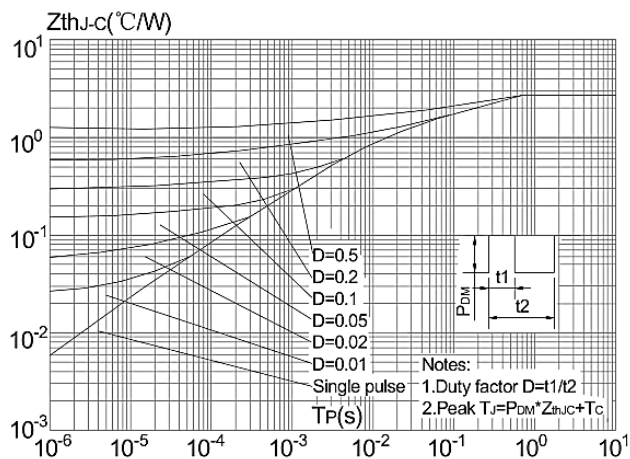
**Figure 8: Normalized on Resistance vs. Junction Temperature**



**Figure 9: Maximum Safe Operating Area vs. Case Temperature**



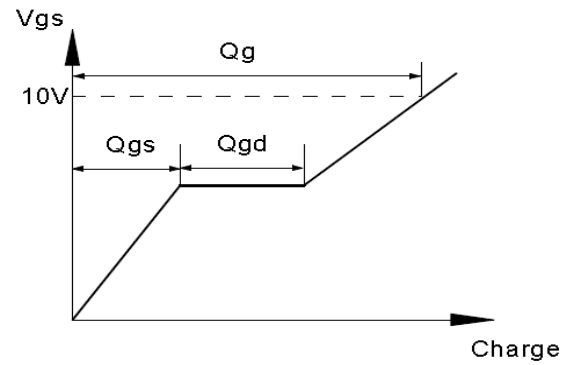
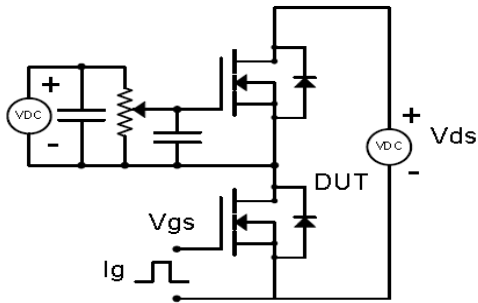
**Figure 10: Maximum Continuous Drain Current**



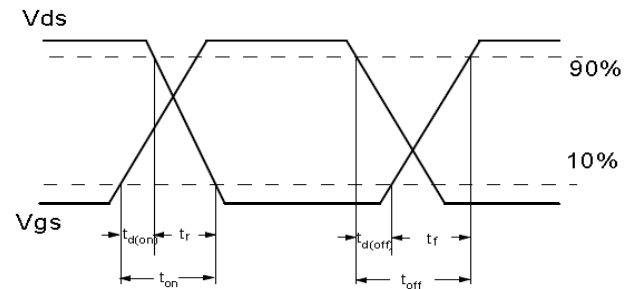
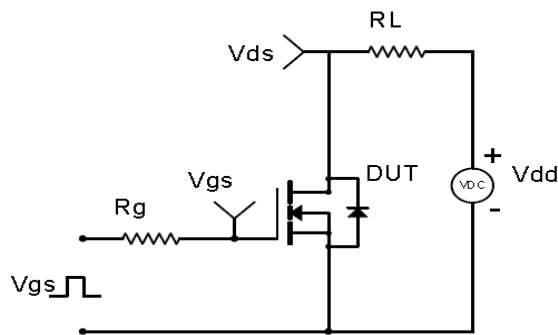
**Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case**

## Test Circuit & Waveform

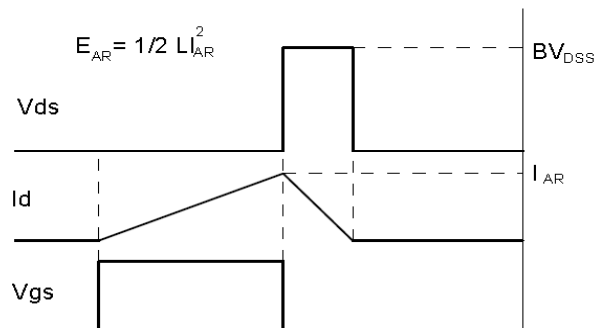
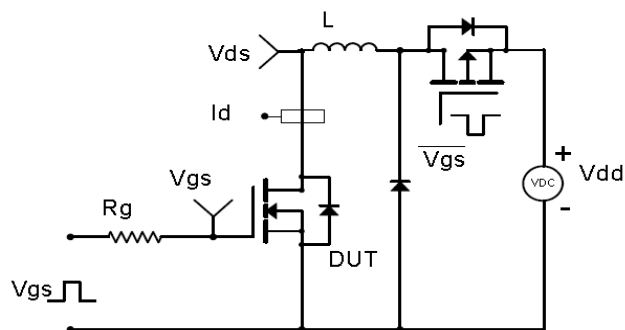
### Gate Charge Test Circuit & Waveform



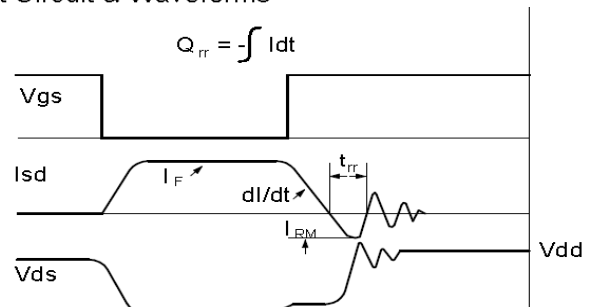
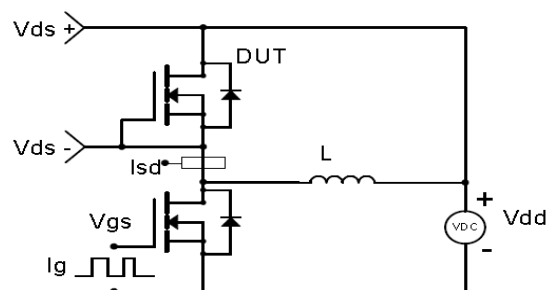
### Resistive Switching Test Circuit & Waveforms



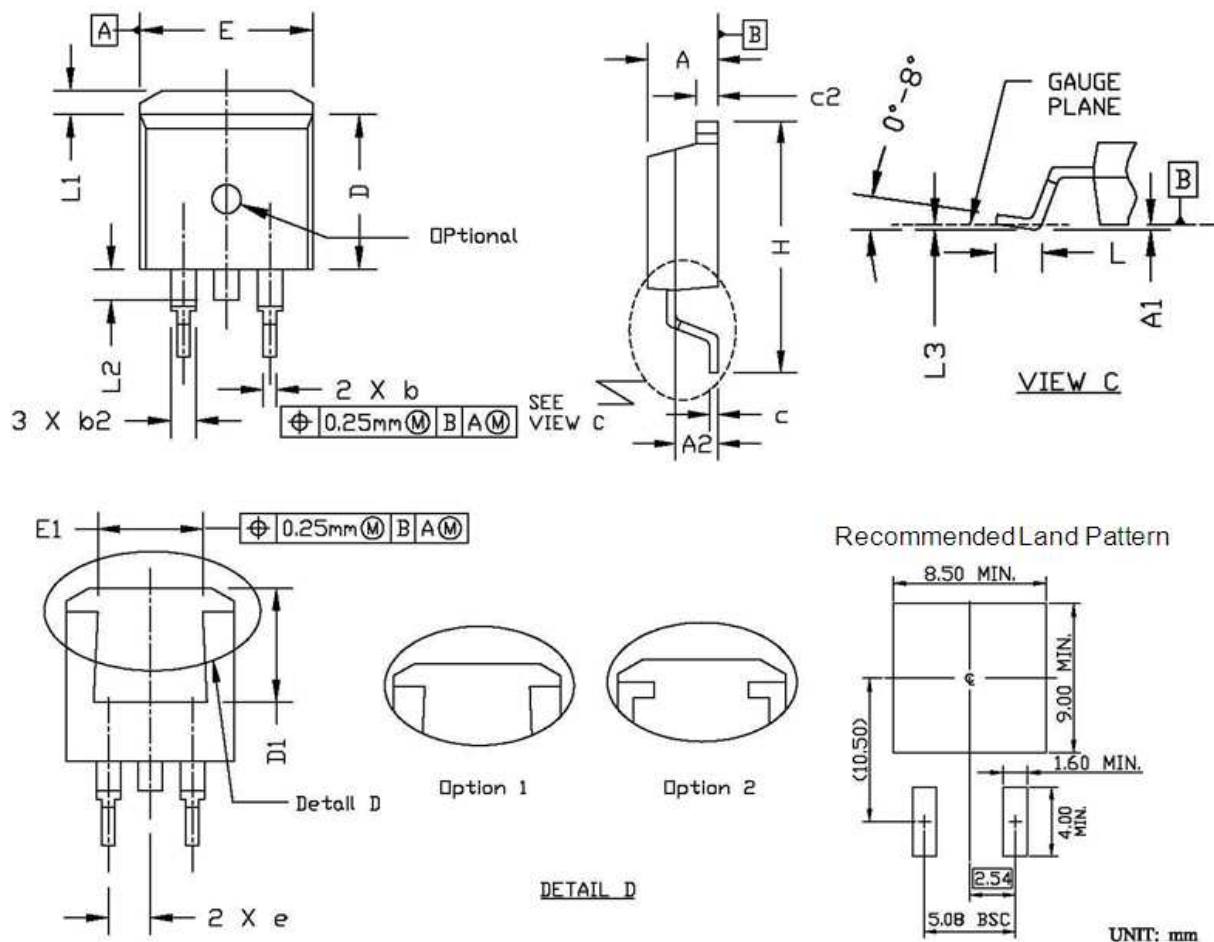
### Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



### Diode Recovery Test Circuit & Waveforms



## Package outline dimensions:TO-263



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 4.30                      | 4.86  | 0.169                | 0.191 |
| A1     | 0.00                      | 0.25  | 0.000                | 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      | 2.54 BSC.                 |       | 0.100 BSC.           |       |
| 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 |
| L      | 2.24                      | 3.00  | 0.088                | 0.118 |
| L1     | 0.70                      | 1.60  | 0.028                | 0.063 |
| L2     | 1.00                      | 1.78  | 0.039                | 0.070 |
| L3     | 0.00                      | 0.25  | 0.000                | 0.010 |

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