

## Product Summary

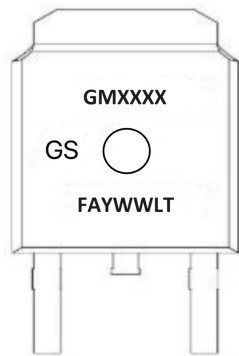
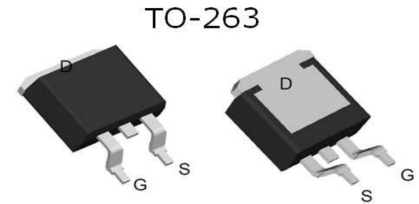
| $V_{DS}$ (V) | $R_{DS(on),max}$ (mΩ) | $I_D$ (A)          |
|--------------|-----------------------|--------------------|
| 150          | 7.2 @ $V_{GS} = 10V$  | 130 <sup>(1)</sup> |

## Features

- Low  $R_{DS(on)}$  trench technology
- Low thermal impedance
- Fast switching speed
- 100% avalanche tested

## Application

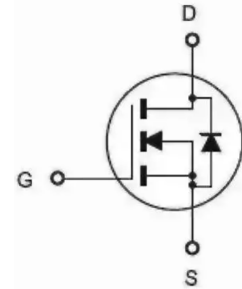
- DC/DC conversion
- Power switch
- Motor drives



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

| Parameter                                        | Symbol                                | Limit      | Unit |
|--------------------------------------------------|---------------------------------------|------------|------|
| Drain-source voltage                             | $V_{DS}$                              | 150        | V    |
| Gate-source voltage                              | $V_{GS}$                              | ±20        |      |
| Continuous drain current                         | $T_C=25^\circ\text{C}$ <sup>(1)</sup> | 130        | A    |
|                                                  | $T_C=100^\circ\text{C}$               | 92         |      |
|                                                  | $T_A=25^\circ\text{C}$ <sup>(4)</sup> | 14         |      |
| Pulsed drain current <sup>(2)</sup>              | $I_{D,pulse}$                         | 520        |      |
| Avalanche energy, single pulse <sup>(3)</sup>    | $E_{AS}$                              | 720        | mJ   |
| Power dissipation                                | $T_C=25^\circ\text{C}$                | 291        | W    |
|                                                  | $T_A=25^\circ\text{C}$ <sup>(4)</sup> | 3.7        |      |
| Operating junction and storage temperature range | $T_J, T_{stg}$                        | -55 to 150 | °C   |

## Thermal Characteristic

| Parameter                                              | Symbol          | Max. | Unit |
|--------------------------------------------------------|-----------------|------|------|
| Thermal resistance, junction-to-case                   | $R_{\theta JC}$ | 0.52 | °C/W |
| Thermal resistance, junction-to-ambient <sup>(4)</sup> | $R_{\theta JA}$ | 40   |      |

**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 V, I <sub>D</sub> = 250 μA                                                    | 150  |      |      | V    |
| Gate-source threshold voltage                | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                       | 2.2  | 2.7  | 3.8  | 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> = 150 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> = 100 A                                                    |      | 5.8  | 7.2  | mΩ   |
| Forward transconductance <sup>(5)</sup>      | g <sub>fs</sub>      | V <sub>DS</sub> = 5 V, I <sub>D</sub> = 100 A                                                     |      | 175  |      | S    |
| Gate resistance                              | R <sub>g</sub>       | f = 1 MHz                                                                                         |      | 2    |      | Ω    |
| Dynamic <sup>(5)</sup>                       |                      |                                                                                                   |      |      |      |      |
| Total gate charge                            | Q <sub>g</sub>       | V <sub>DS</sub> = 75 V, I <sub>D</sub> = 100 A, V <sub>GS</sub> = 10 V                            |      | 144  |      | nC   |
| Gate-source charge                           | Q <sub>gs</sub>      |                                                                                                   |      | 37   |      |      |
| Gate-drain charge                            | Q <sub>gd</sub>      |                                                                                                   |      | 47   |      |      |
| Turn-on delay time                           | t <sub>d(on)</sub>   | V <sub>DS</sub> = 75 V, I <sub>D</sub> = 100 A, V <sub>GS</sub> = 10 V,<br>R <sub>GEN</sub> = 6 Ω |      | 63   |      | ns   |
| Rise time                                    | t <sub>r</sub>       |                                                                                                   |      | 67   |      |      |
| Turn-off delay time                          | t <sub>d(off)</sub>  |                                                                                                   |      | 135  |      |      |
| Fall time                                    | t <sub>f</sub>       |                                                                                                   |      | 51   |      |      |
| Input capacitance                            | C <sub>iss</sub>     | V <sub>DS</sub> = 75 V, V <sub>GS</sub> = 0 V, f = 1 MHz                                          |      | 8090 |      | pF   |
| Output capacitance                           | C <sub>oss</sub>     |                                                                                                   |      | 533  |      |      |
| Reverse transfer capacitance                 | C <sub>rss</sub>     |                                                                                                   |      | 31   |      |      |
| Reverse Diode Characteristics <sup>(5)</sup> |                      |                                                                                                   |      |      |      |      |
| Diode forward voltage                        | V <sub>SD</sub>      | V <sub>GS</sub> = 0 V, I <sub>F</sub> = 100 A                                                     |      | 1    | 1.2  | V    |
| Reverse recovery time                        | t <sub>rr</sub>      | V <sub>DS</sub> =75 V,I <sub>F</sub> = 100 A, di/dt = 100 A/μs                                    |      | 117  |      | ns   |
| Reverse recovery charge                      | Q <sub>rr</sub>      |                                                                                                   |      | 446  |      | nC   |

**Notes**

- (1) Limited by maximum junction temperature.
- (2) Pulse width limited by maximum junction temperature.
- (3) V<sub>DS</sub> = 75 V, V<sub>GS</sub> = 10 V, L = 0.3 mH.
- (4) R<sub>θJA</sub> is determined with the device mounted on a 1 in<sup>2</sup> pad 2 oz copper pad on a 1.5x1.5 in. board of FR-4 material.
- (5) Guaranteed by design, not subject to production testing.

## Typical Performance Characteristics

Fig.1 Typ. transfer characteristics

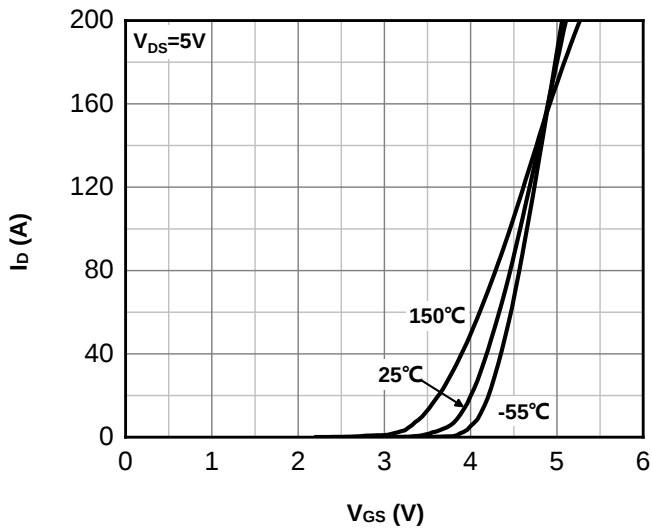


Fig.2 Typ. output characteristics

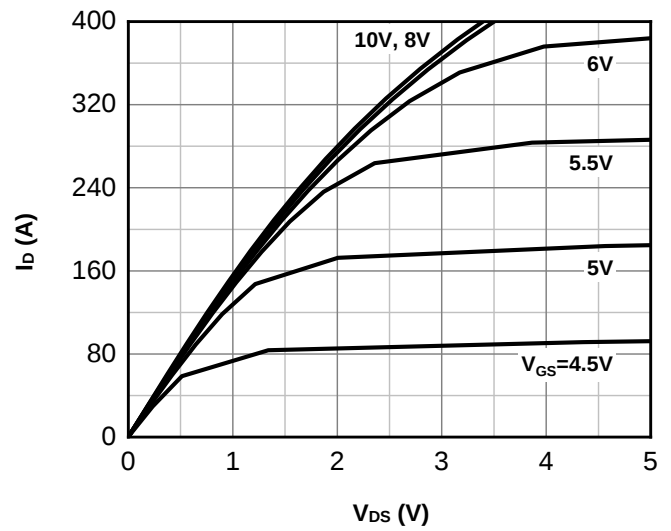


Fig.3 Normalized on-resistance vs drain current

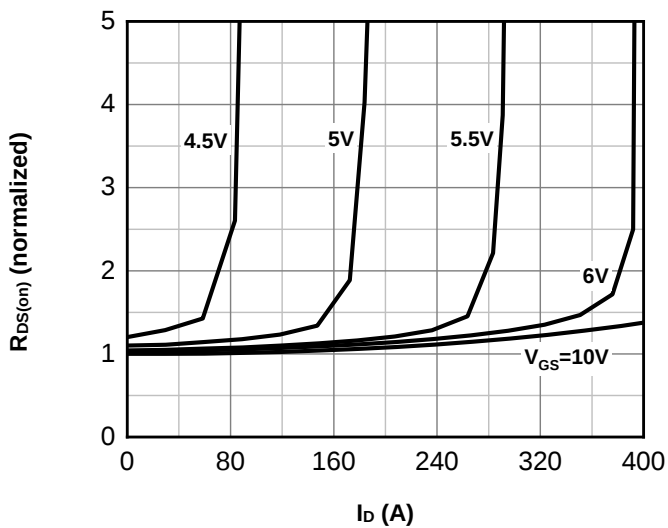


Fig.4 Typ. on-resistance vs gate-source voltage

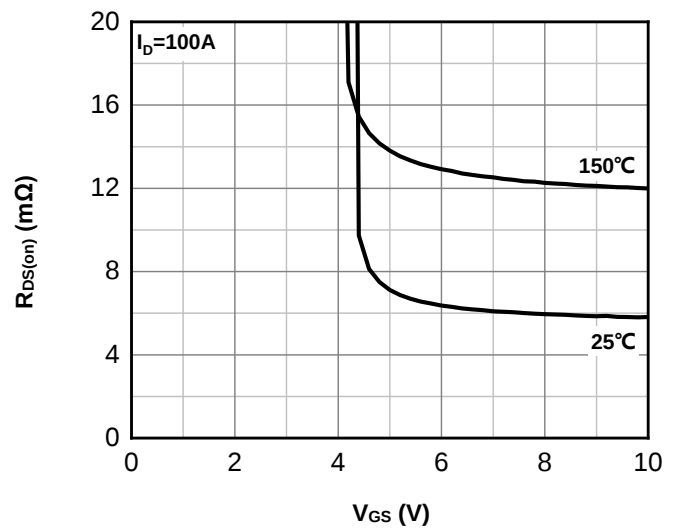


Fig.5 Normalized on-resistance vs junction temperature

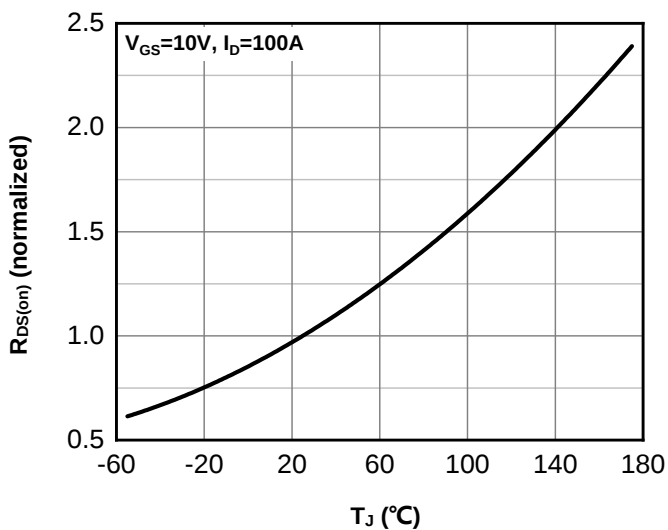
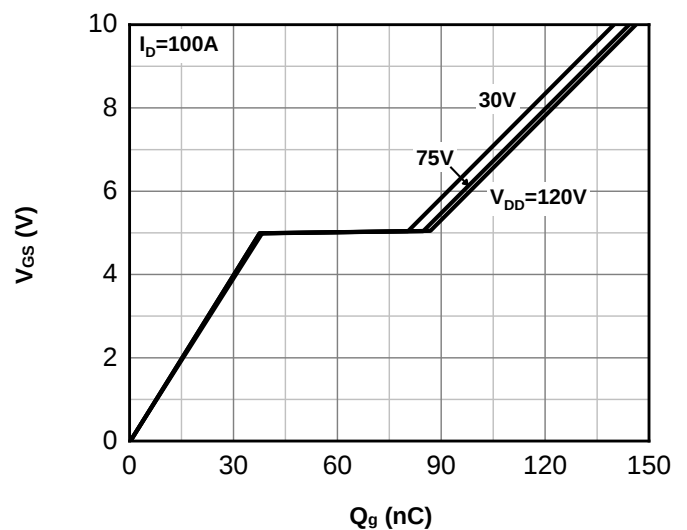
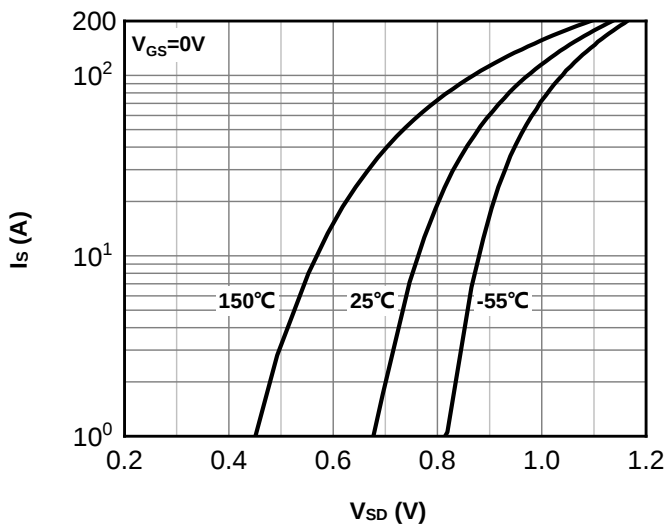
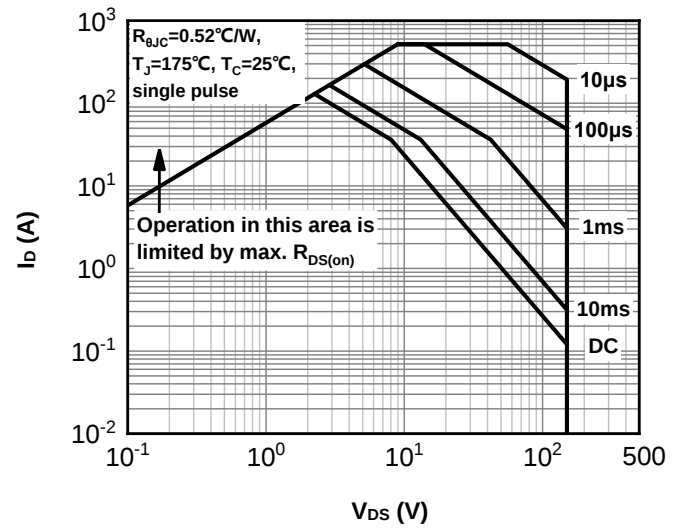
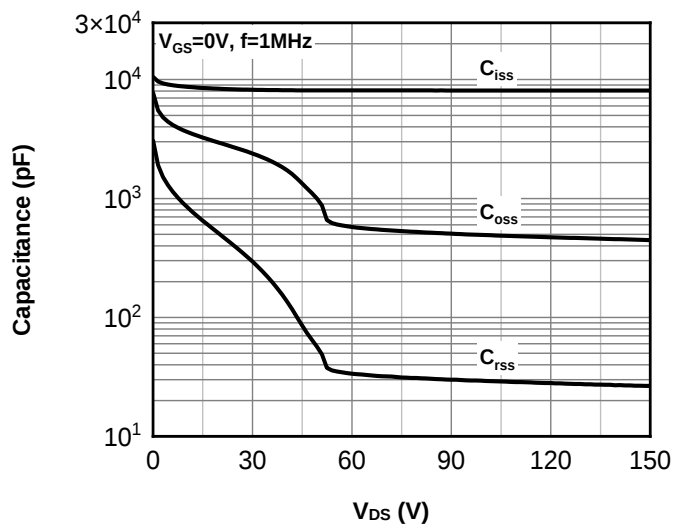
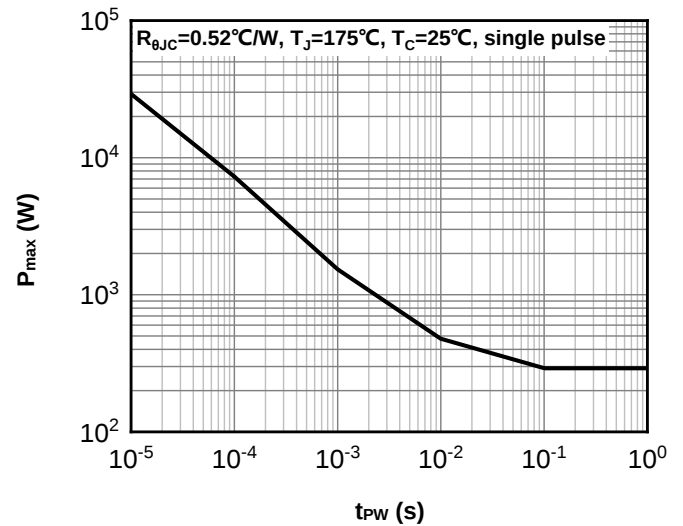
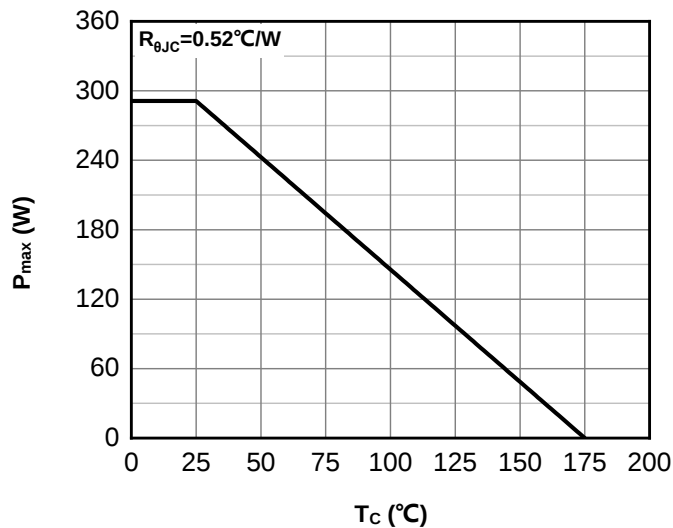
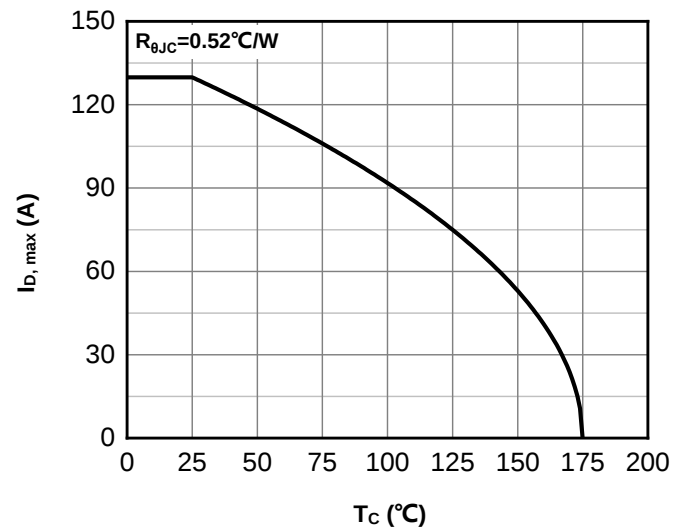
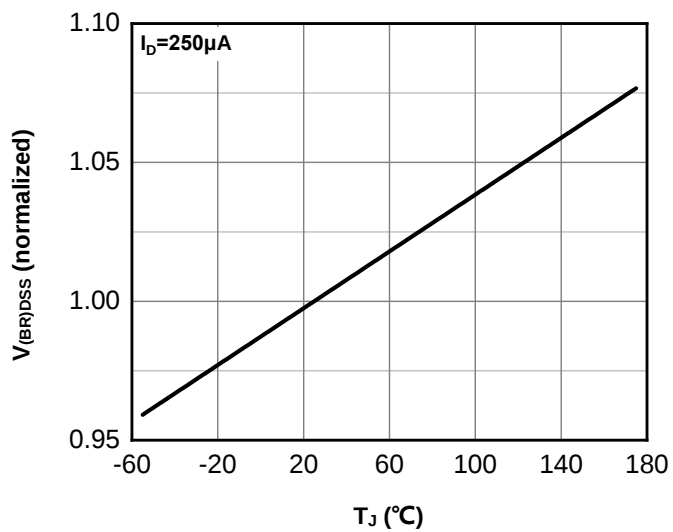
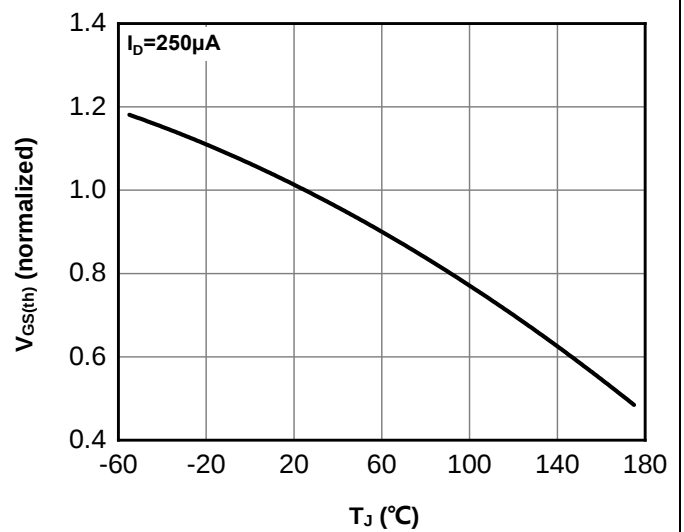
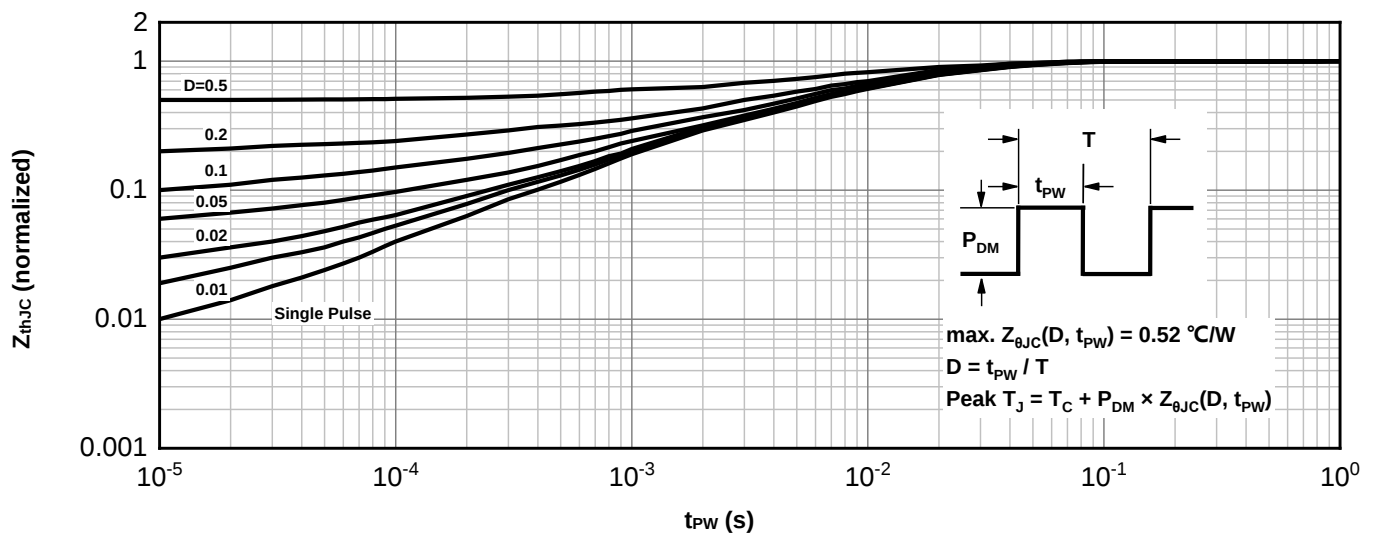


Fig.6 Typ. gate charge



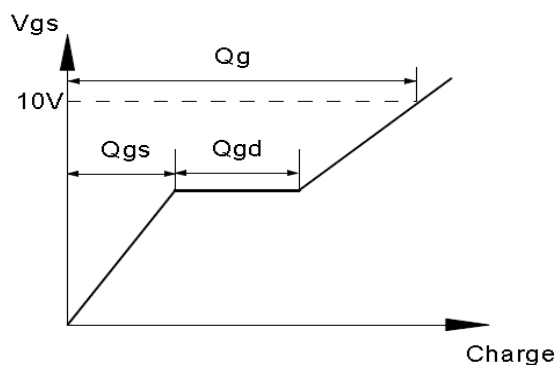
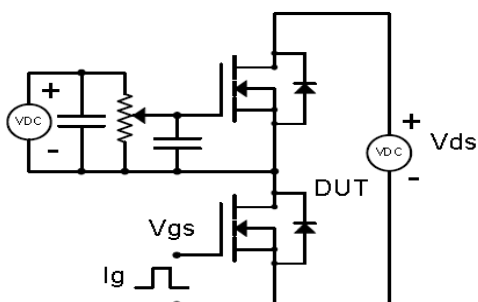
## Typical Performance Characteristics

**Fig.7 Typ. forward characteristics of body diode**

**Fig.8 Safe operating area**

**Fig.9 Typ. Capacitance**

**Fig.10 Single pulse maximum power dissipation**

**Fig.11 Max. power dissipation vs case temperature**

**Fig.12 Max. continuous drain current vs case temperature**


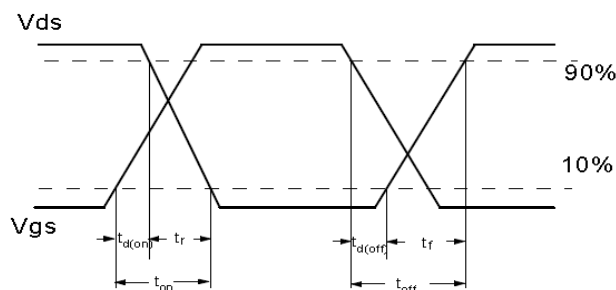
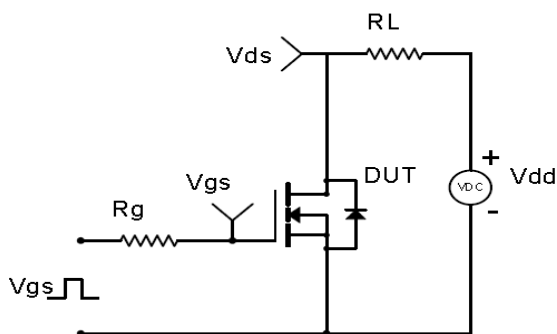
**Typical Performance Characteristics**
**Fig.13 Normalized  $V_{(BR)DSS}$  vs junction temperature**

**Fig.14 Normalized  $V_{GS(th)}$  vs junction temperature**

**Fig.15 Normalized transient thermal impedance from junction to case**


## Test Circuit & Waveform

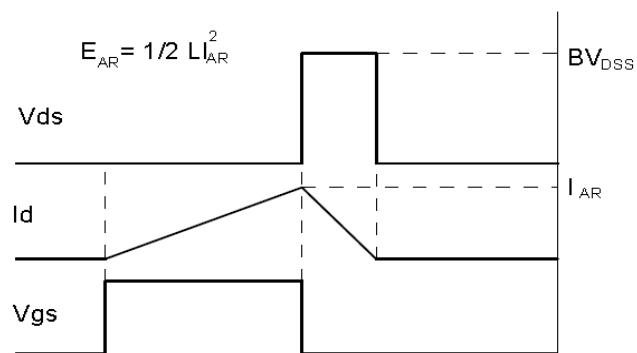
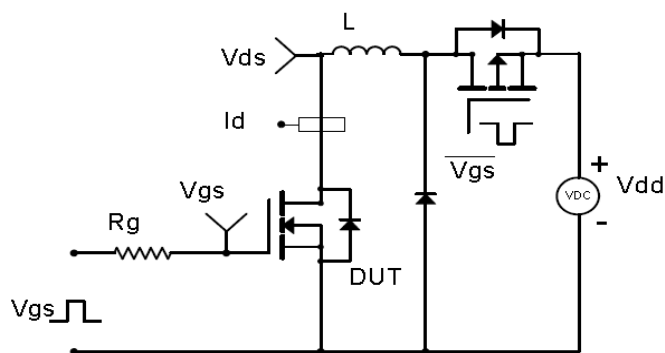
Gate Charge Test Circuit & Waveform



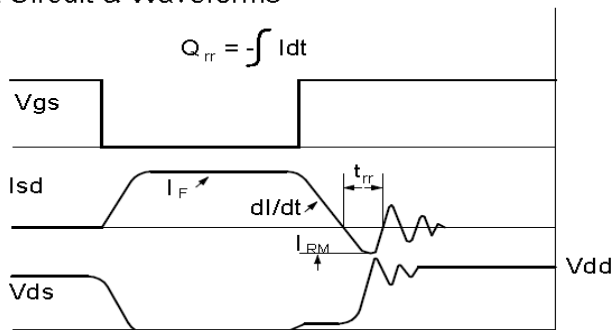
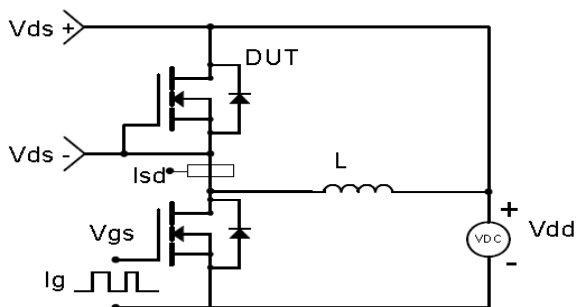
Resistive Switching Test Circuit & Waveforms

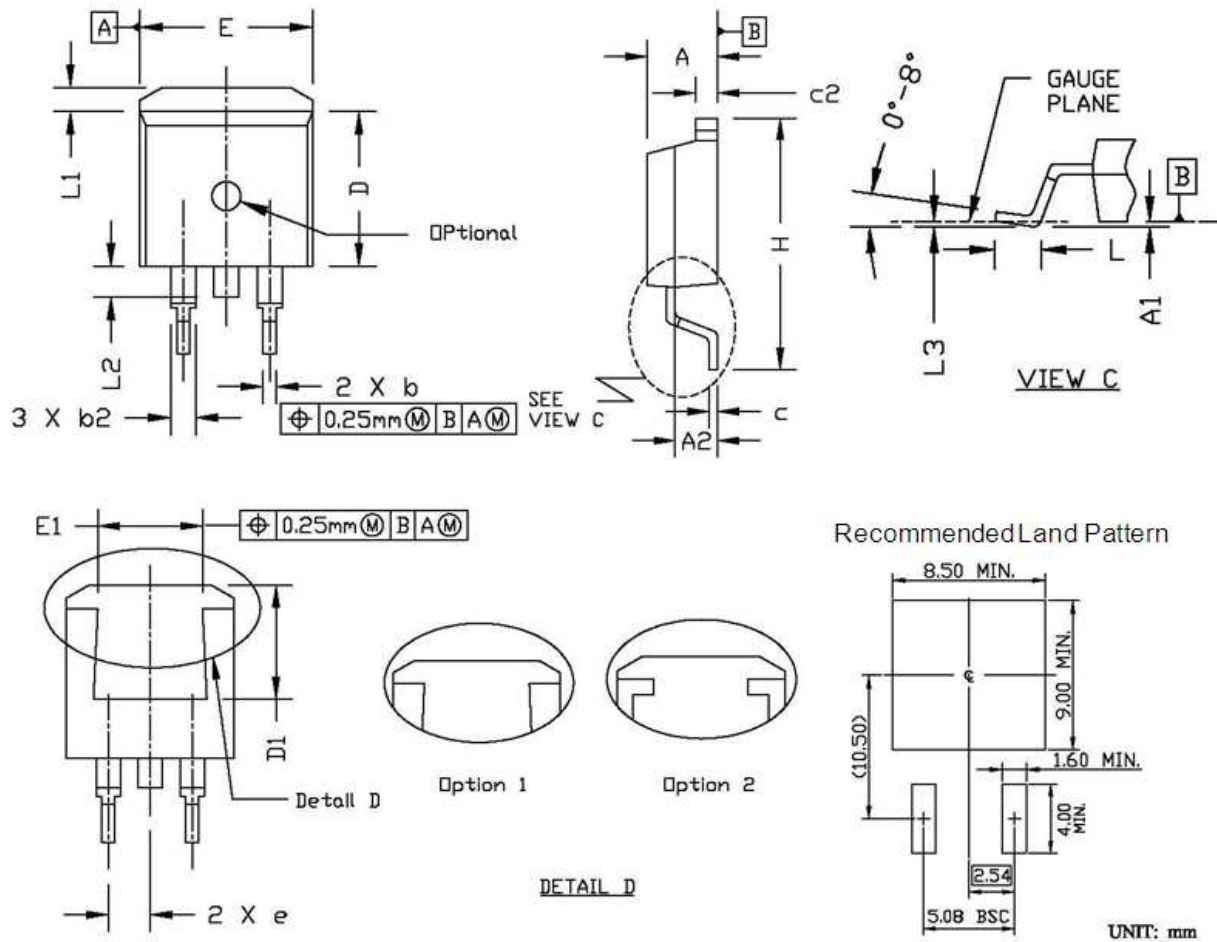


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



**Outline Drawing TO-263**
**Package Outline: 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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