

### ■ Features

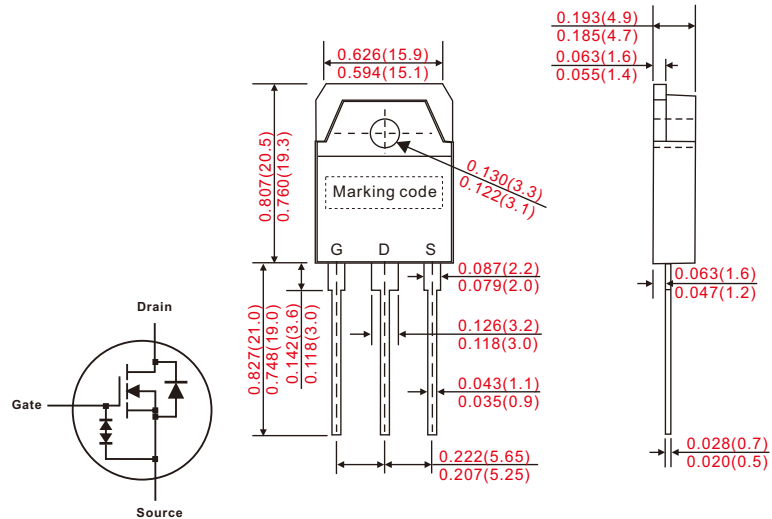
- Fast switching.
- ESD improved capability.
- Low gate charge.
- Low reverse transfer capacitances.
- 100% single pulse avalanche energy test.

### ■ Mechanical data

- Epoxy : UL94-V0 rated flame retardant.
- Case : JEDEC TO-3P molded plastic body.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Polarity: As marked.
- Mounting Position : Any.
- Weight : Approximated 5.60 gram.

### ■ Outline

TO-3P



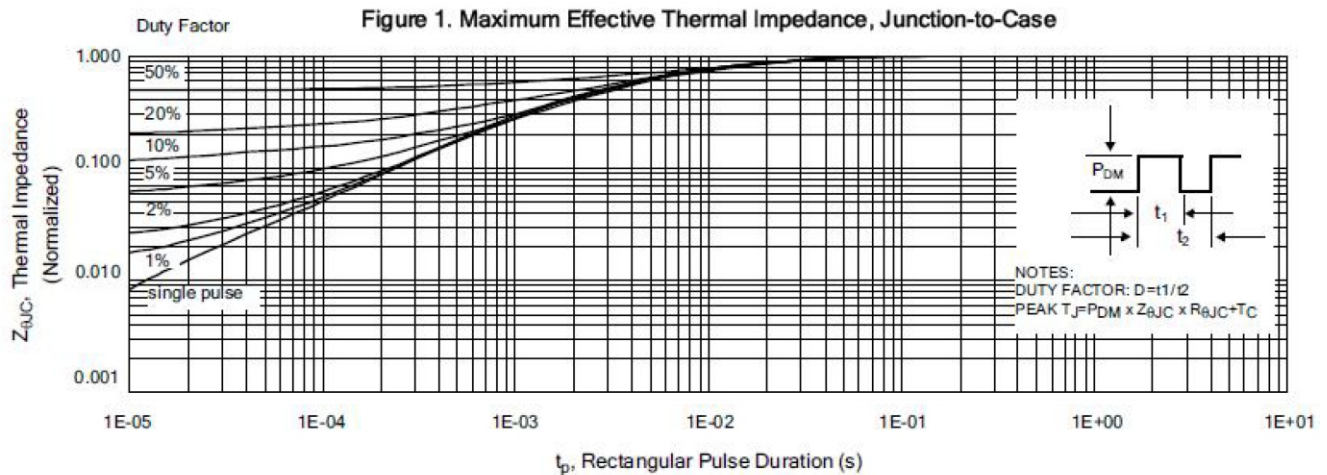
### ■ Absolute( $T_c = 25^\circ\text{C}$ unless otherwise specified)

| PARAMETER                               | CONDITIONS                               | Symbol         | CS2837AND  | UNIT                |
|-----------------------------------------|------------------------------------------|----------------|------------|---------------------|
| Drain-Source Voltage                    |                                          | $V_{DS}$       | 500        | V                   |
| Continuous Drain Current                |                                          | $I_D$          | 20         | A                   |
| Continuous Drain Current                | $T_c = 100^\circ\text{C}$                |                | 13         |                     |
| Pulsed Drain Current(1)                 |                                          |                | 80         |                     |
| Gate-Source Voltage                     |                                          | $V_{GS}$       | $\pm 30$   | V                   |
| Single Pulse Avalanche Energy(2)        |                                          | $E_{AS}$       | 1500       | mJ                  |
| Avalanche Current(1)                    |                                          | $I_{AR}$       | 7.1        | A                   |
| Repetitive Avalanche Energy(1)          |                                          | $E_{AR}$       | 250        | mJ                  |
| Power Dissipation                       |                                          | $P_D$          | 230        | W                   |
|                                         | Derating factor above $25^\circ\text{C}$ |                | 1.84       | W/ $^\circ\text{C}$ |
| Peak Diode Recovery dv/dt(3)            |                                          | dV/dt          | 5.0        | V/ns                |
| Gate source ESD                         | HBM-C = 100pf, R = 1.5k $\Omega$         | $V_{ESD(G-S)}$ | 6000       | V                   |
| Operating and Storage Temperature Range |                                          | $T_J, T_{STG}$ | -55 ~ +150 | $^\circ\text{C}$    |
| Maximum temperature for soldering       |                                          | $T_L$          | 300        | $^\circ\text{C}$    |

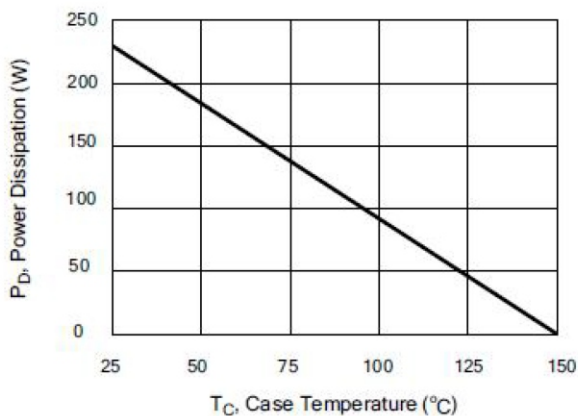
NOTE : 1.Repetitive rating; pulse width limited by maximum junction temperature.  
 2.L=10.0mH,  $I_o = 17.3\text{A}$ , Start  $T_J = 25^\circ\text{C}$ .  
 3. $I_{SP} = 20\text{A}$ , di/dt  $\leq 100\text{A/us}$ ,  $V_{DS} \leq BV_{DS}$ , Start  $T_J = 25^\circ\text{C}$ .

| ■ Electrical characteristics(T <sub>c</sub> = 25°C unless otherwise specified) |                                                                                                  |                                    |      |      |      |      |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------------|------|------|------|------|
| PARAMETER                                                                      | CONDITIONS                                                                                       | Symbol                             | MIN. | TYP. | MAX. | UNIT |
| Drain-Source Breakdown Voltage                                                 | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                                     | V <sub>DSS</sub>                   | 500  |      |      | V    |
| Bvdss Temperature Coefficient                                                  | I <sub>D</sub> = 250uA, Reference 25°C                                                           | BV <sub>DSS</sub> / T <sub>J</sub> |      | 0.6  |      | V/°C |
| Drain-Source Leakage Current                                                   | V <sub>DS</sub> = 500V, V <sub>GS</sub> = 0V, T <sub>a</sub> = 25°C                              | I <sub>DSS</sub>                   |      |      | 1    | uA   |
|                                                                                | V <sub>DS</sub> = 400V, V <sub>GS</sub> = 0V, T <sub>a</sub> = 125°C                             |                                    |      |      | 10   |      |
| Gate-Source Leakage Current, Forward                                           | V <sub>GS</sub> = 30V                                                                            | I <sub>GSS(F)</sub>                |      |      | 10   | uA   |
| Gate-Source Leakage Current, Reverse                                           | V <sub>GS</sub> = -30V                                                                           | I <sub>GSS(R)</sub>                |      |      | -10  |      |
| ■ ON Characteristics                                                           |                                                                                                  |                                    |      |      |      |      |
| PARAMETER                                                                      | CONDITIONS                                                                                       | Symbol                             | MIN. | TYP. | MAX. | UNIT |
| Gate Threshold Voltage                                                         | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                       | V <sub>GS(th)</sub>                | 2.0  |      | 4.0  | V    |
| Static Drain-Source On-Resistance                                              | V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A                                                      | R <sub>DS(on)</sub>                |      | 0.18 | 0.26 | Ω    |
| ■ Dynamic Characteristics                                                      |                                                                                                  |                                    |      |      |      |      |
| PARAMETER                                                                      | CONDITIONS                                                                                       | Symbol                             | MIN. | TYP. | MAX. | UNIT |
| Forward Transconductance                                                       | V <sub>DS</sub> = 15V, I <sub>D</sub> = 10A                                                      | g <sub>fs</sub>                    |      | 18   |      | S    |
| Input Capacitance                                                              | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz                                          | C <sub>iss</sub>                   |      | 4900 |      | pF   |
| Output Capacitance                                                             |                                                                                                  | C <sub>oss</sub>                   |      | 410  |      |      |
| Reverse Transfer Capacitance                                                   |                                                                                                  | C <sub>rss</sub>                   |      | 44   |      |      |
| ■ Resistive Switching Characteristics                                          |                                                                                                  |                                    |      |      |      |      |
| PARAMETER                                                                      | CONDITIONS                                                                                       | Symbol                             | MIN. | TYP. | MAX. | UNIT |
| Turn-on Delay Time                                                             | I <sub>D</sub> = 20A, V <sub>DD</sub> = 250V, V <sub>GS</sub> = 10V, R <sub>G</sub> = 25Ω        | td <sub>(ON)</sub>                 |      | 53   |      | ns   |
| Rise Time                                                                      |                                                                                                  | tr                                 |      | 117  |      |      |
| Turn-off Delay Time                                                            |                                                                                                  | td <sub>(OFF)</sub>                |      | 307  |      |      |
| Fail Time                                                                      |                                                                                                  | tf                                 |      | 138  |      |      |
| Total Gate Charge                                                              | I <sub>D</sub> = 20A, V <sub>DD</sub> = 250V, V <sub>GS</sub> = 10V                              | Q <sub>g</sub>                     |      | 96   |      | nC   |
| Gate-Source Charge                                                             |                                                                                                  | Q <sub>gs</sub>                    |      | 18   |      |      |
| Gate-Drain Charge                                                              |                                                                                                  | Q <sub>gd</sub>                    |      | 41   |      |      |
| ■ Source-Drain Diode Characteristics                                           |                                                                                                  |                                    |      |      |      |      |
| PARAMETER                                                                      | CONDITIONS                                                                                       | Symbol                             | MIN. | TYP. | MAX. | UNIT |
| Continuous Source-Drain Diode Current                                          | Boby Diode                                                                                       | I <sub>s</sub>                     |      |      | 20   | A    |
| Pulse Diode Forward Current                                                    | Boby Diode                                                                                       | I <sub>SM</sub>                    |      |      | 80   |      |
| Body Diode Voltage                                                             | I <sub>s</sub> = 20A, V <sub>GS</sub> = 0V                                                       | V <sub>SD</sub>                    |      |      | 1.5  | V    |
| Reverse recovery time                                                          | I <sub>s</sub> = 20A, T <sub>J</sub> = 25°C, dI <sub>F</sub> /dt = 100A/μs, V <sub>GS</sub> = 0V | t <sub>rr</sub>                    |      | 558  |      | ns   |
| Reverse recovery charge                                                        |                                                                                                  | Q <sub>rr</sub>                    |      | 6.1  |      | uC   |
| ■ Thermal characteristics                                                      |                                                                                                  |                                    |      |      |      |      |
| PARAMETER                                                                      | CONDITIONS                                                                                       | Symbol                             | MIN. | TYP. | MAX. | UNIT |
| Thermal Resistance                                                             | Junction to Case                                                                                 | R <sub>BJC</sub>                   |      | 0.54 |      | °C/W |
|                                                                                | Junction to Ambient                                                                              | R <sub>BJA</sub>                   |      | 40   |      |      |
| ■ Thermal characteristics                                                      |                                                                                                  |                                    |      |      |      |      |
| PARAMETER                                                                      | CONDITIONS                                                                                       | Symbol                             | MIN. | TYP. | MAX. | UNIT |
| Gate-Source Breakdown Voltage                                                  | I <sub>GS</sub> = ±1mA(open Drain)                                                               | V <sub>GSO</sub>                   | 30   |      |      | V    |

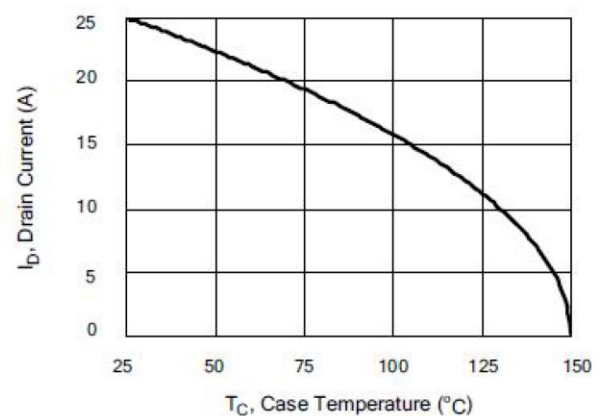
■ Rating and characteristic curves



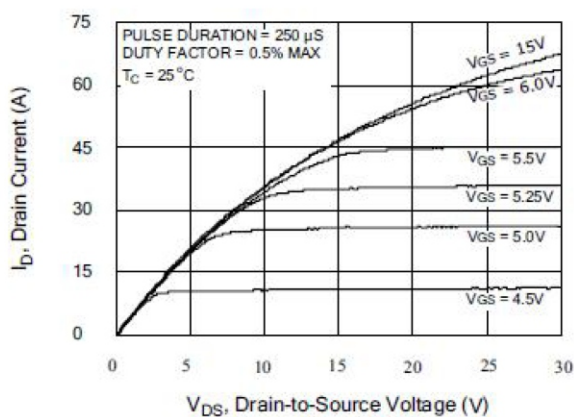
**Figure 2. Maximum Power Dissipation vs Case Temperature**



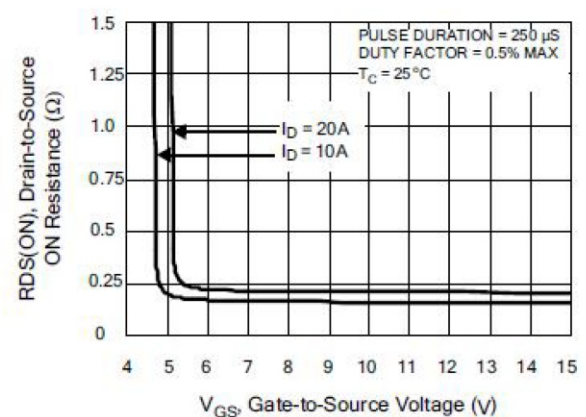
**Figure3. Maximum Continuous Drain Current vs Case Temperature**



**Figure 4. Typical Output Characteristics**



**Figure5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current**



■ Rating and characteristic curves

Figure 6. Maximum Peak Current Capability

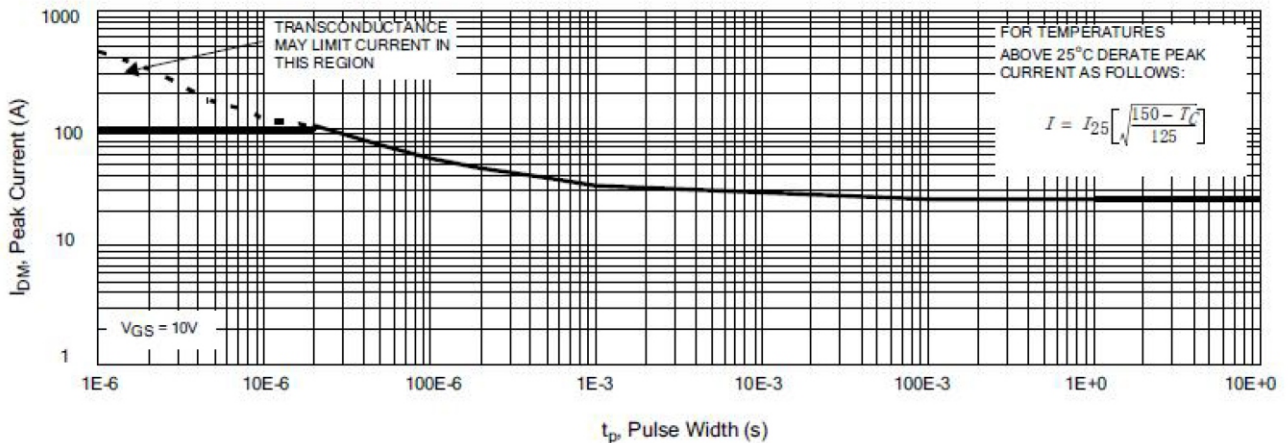


Figure 7. Typical Transfer Characteristics

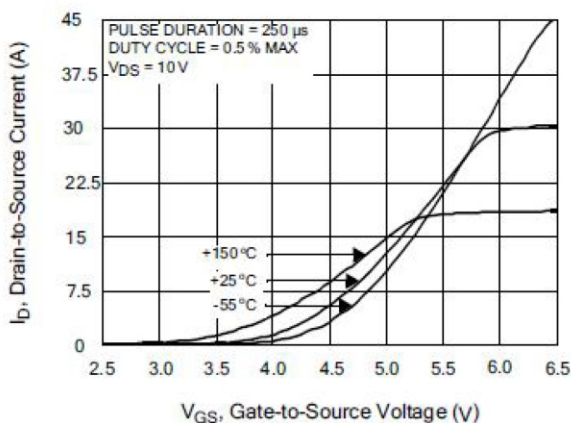


Figure 8. Unclamped Inductive Switching Capability

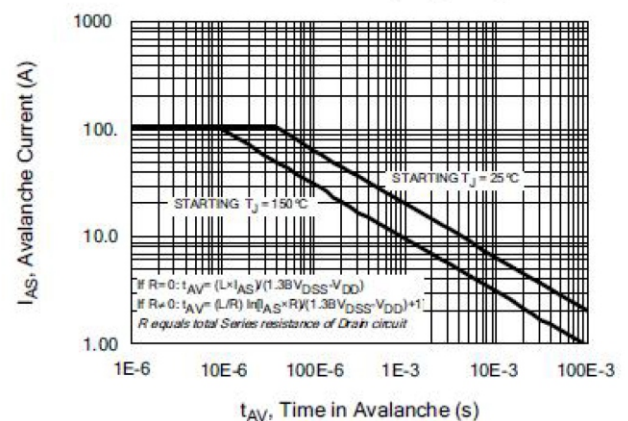


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

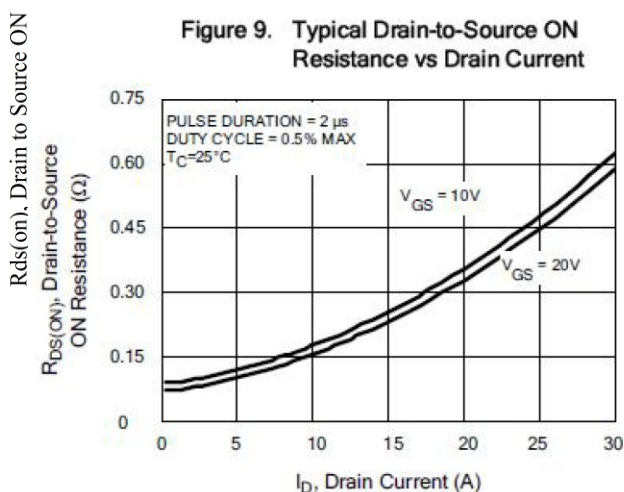
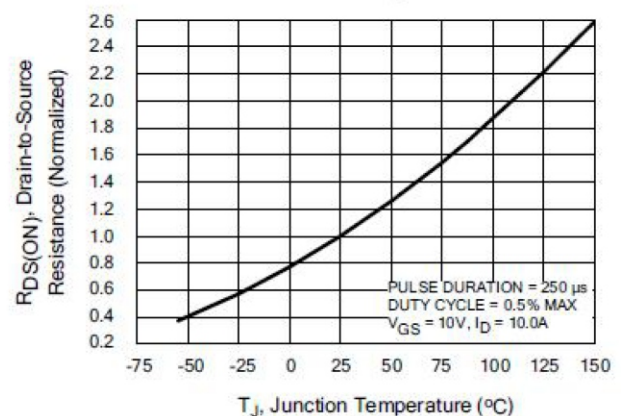


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature



■ Rating and characteristic curves

Figure 11. Typical Breakdown Voltage vs Junction Temperature

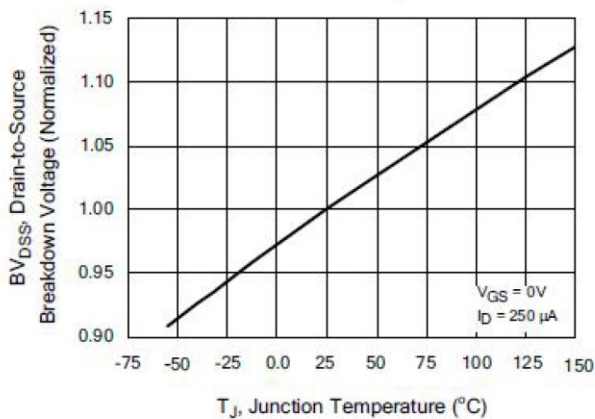


Figure 12. Typical Threshold Voltage vs Junction Temperature

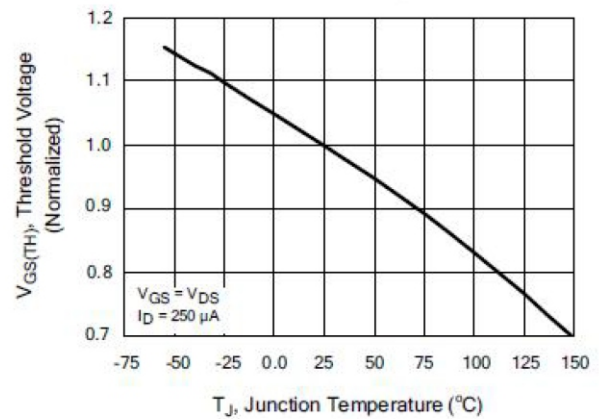


Figure 13. Maximum Forward Bias Safe Operating Area

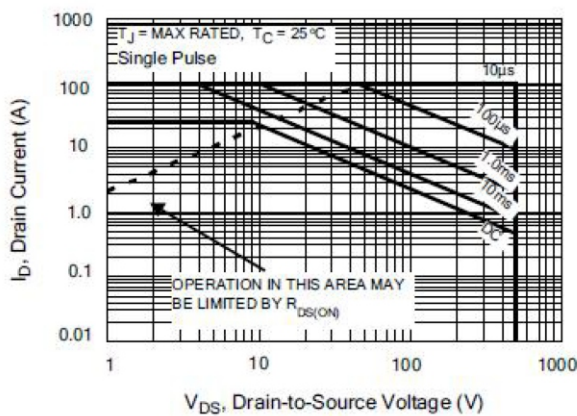


Figure 14. Typical Capacitance vs

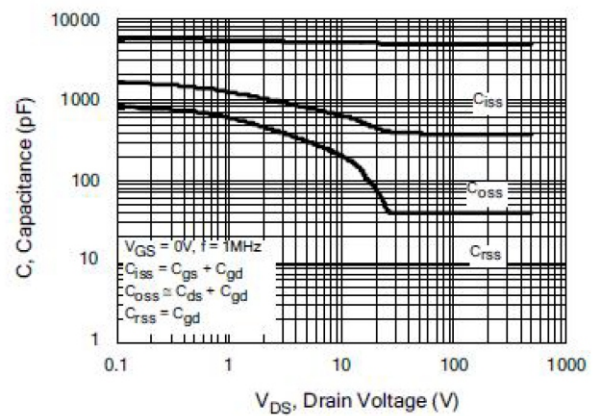


Figure 15. Typical Gate Charge vs Gate-to-Source Voltage

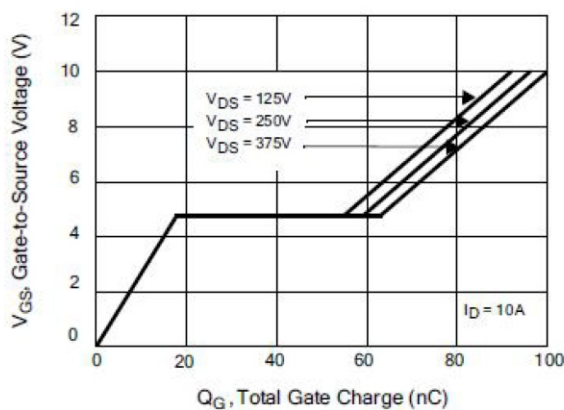
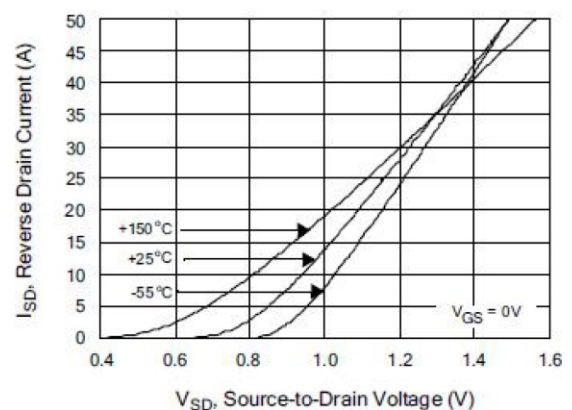


Figure 16. Typical Body Diode Transfer Characteristics



■ Test circuit and waveform

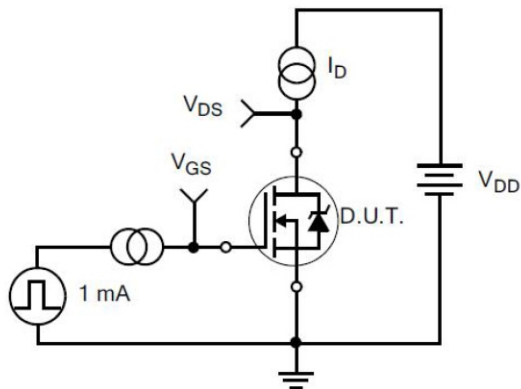


Figure 17. Gate Charge Test Circuit

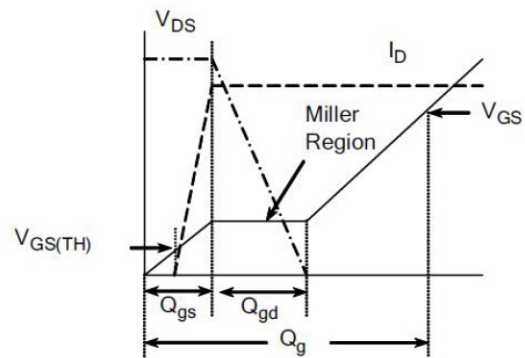


Figure 18. Gate Charge Waveform

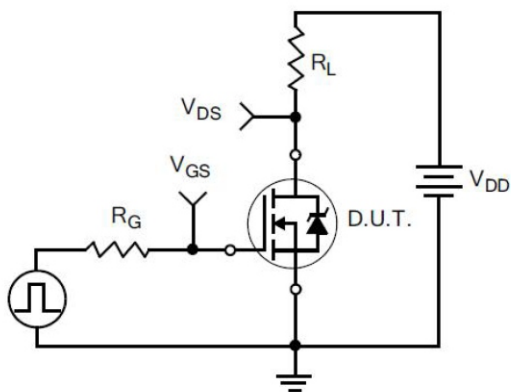


Figure 19. Resistive Switching Test Circuit

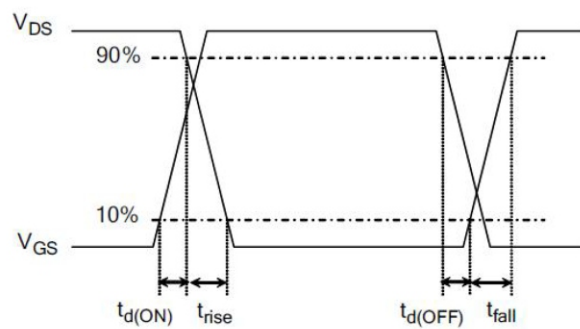


Figure 20. Resistive Switching Waveforms

■ Test circuit and waveform

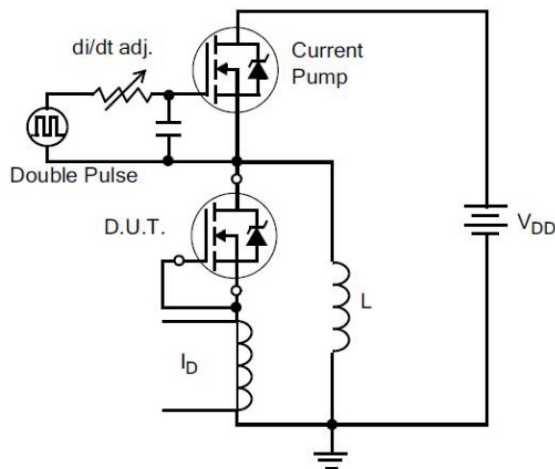


Figure 21. Diode Reverse Recovery Test Circuit

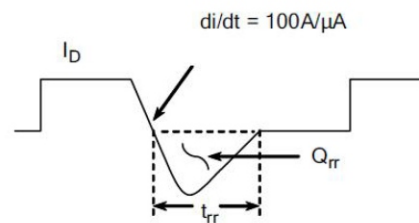


Figure 22. Diode Reverse Recovery Waveform

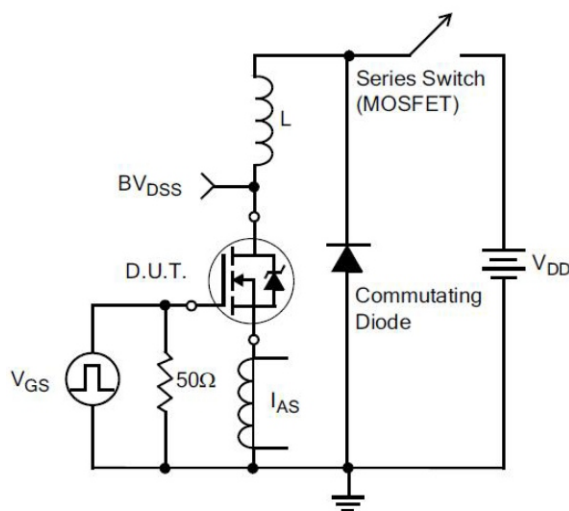


Figure 23. Unclamped Inductive Switching Test Circuit

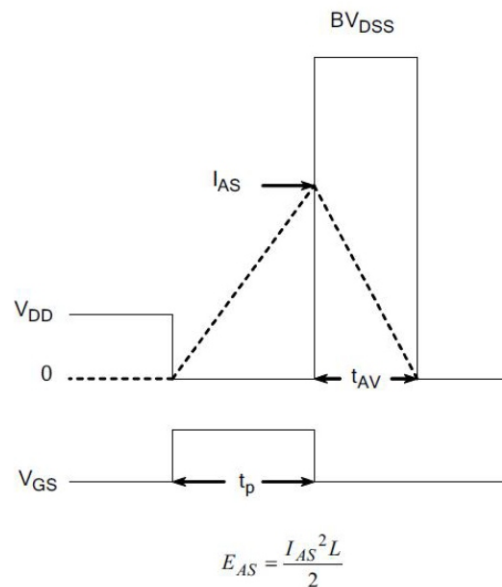


Figure 24. Unclamped Inductive Switching Waveforms

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