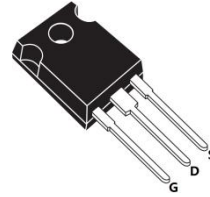


### Features

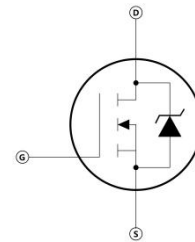
- 100% avalanche tested
- Improved dv/dt capability
- Gate charge minimized
- Very low intrinsic capacitances
- High speed switching
- Very low on-resistance



### General Description

### Applications

- Welder
- UPS
- PV Inverter
- Switching applications



### Electrical ratings

| Absolute maximum ratings                                          |           |            |                       |
|-------------------------------------------------------------------|-----------|------------|-----------------------|
| Parameter                                                         | Symbol    | Value      | Unit                  |
| Drain-source voltage ( $V_{GS} = 0$ )                             | $V_{DS}$  | 1500       | V                     |
| Gate- source voltage                                              | $V_{GS}$  | $\pm 30$   |                       |
| Drain current (continuous) at $T_C = 25\text{ }^{\circ}\text{C}$  | $I_D$     | 9          | A                     |
| Drain current (continuous) at $T_C = 100\text{ }^{\circ}\text{C}$ |           | 6          |                       |
| Drain current (pulsed)                                            | $I_{DM}$  | 27         |                       |
| Power dissipation at $T_C = 25\text{ }^{\circ}\text{C}$           | $P_D$     | 150        | W                     |
| Derating factor                                                   |           | 3.57       | W/ $^{\circ}\text{C}$ |
| Operating junction temperature                                    | $T_J$     | -55 to 150 | $^{\circ}\text{C}$    |
| Storage temperature                                               | $T_{stg}$ |            |                       |
| Maximum lead temperature for soldering purpose                    | $T_J$     | 300        |                       |

| Thermal data                            |                |       |                       |
|-----------------------------------------|----------------|-------|-----------------------|
| Parameter                               | Symbol         | Value | Unit                  |
| Thermal resistance junction-case max    | $R_{thj-case}$ | 0.83  | W/ $^{\circ}\text{C}$ |
| Thermal resistance junction-ambient max | $R_{thj-amb}$  | 36    |                       |

| <b>Avalanche characteristics</b>                                                                                          |               |                  |             |
|---------------------------------------------------------------------------------------------------------------------------|---------------|------------------|-------------|
| <b>Parameter</b>                                                                                                          | <b>Symbol</b> | <b>Max value</b> | <b>Unit</b> |
| Avalanche current, repetitive or not-repetitive<br>(pulse width limited by $T_J$ max)                                     | $I_{AR}$      | 6                | A           |
| Single pulse avalanche energy<br>(starting $T_J = 25\text{ }^{\circ}\text{C}$ , $I_D = I_{AR}$ , $V_{DD} = 50\text{ V}$ ) | $E_{AS}$      | 540              | mJ          |

**Electrical Characteristics ( $T_J = 25^{\circ}\text{C}$  unless otherwise specified)**

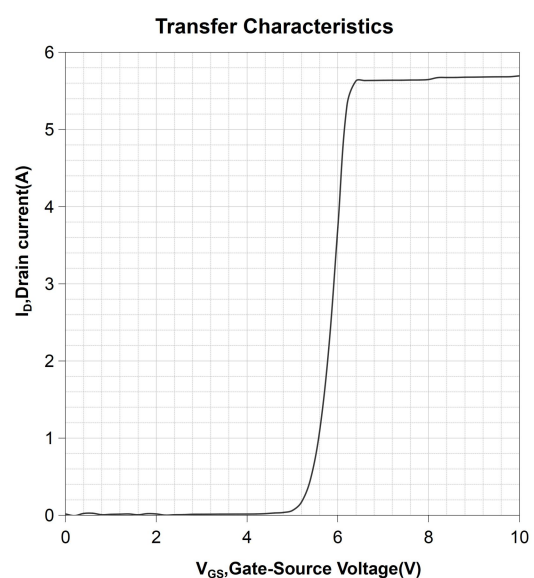
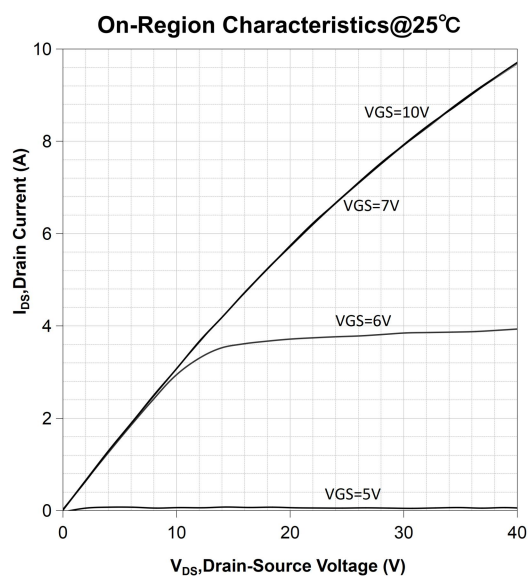
| <b>On /off states</b>                            |               |                                                                                                    |            |              |            |               |
|--------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------|------------|--------------|------------|---------------|
| <b>Parameter</b>                                 | <b>Symbol</b> | <b>Test conditions</b>                                                                             | <b>Min</b> | <b>Typ</b>   | <b>Max</b> | <b>Unit</b>   |
| Drain-source breakdown voltage                   | $V_{(BR)DSS}$ | $I_D = 1\text{ mA}$ , $V_{GS} = 0$                                                                 | 1500       | 1640         |            | V             |
| Zero gate voltage drain current ( $V_{GS} = 0$ ) | $I_{DSS}$     | $V_{DS} = \text{Max rating}$<br>$V_{DS} = \text{Max rating}$ , $T_C = 125\text{ }^{\circ}\text{C}$ |            | 0.44<br>21.5 | 10<br>500  | $\mu\text{A}$ |
| Gate-body leakage current ( $V_{DS} = 0$ )       | $I_{GSS}$     | $V_{GS} = \pm 30\text{ V}$                                                                         |            | $\pm 1$      | $\pm 100$  | nA            |
| Gate threshold voltage                           | $V_{GS(th)}$  | $V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$                                                 | 3          | 4.3          | 5.5        | V             |
| Static drain-source on resistance                | $R_{DS(on)}$  | $V_{GS} = 10\text{ V}$ , $I_D = 1\text{ A}$                                                        | 2          | 2.9          | 3.8        | $\Omega$      |

| <b>Dynamic</b>                |                      |                                                                               |            |            |            |             |
|-------------------------------|----------------------|-------------------------------------------------------------------------------|------------|------------|------------|-------------|
| <b>Parameter</b>              | <b>Symbol</b>        | <b>Test conditions</b>                                                        | <b>Min</b> | <b>Typ</b> | <b>Max</b> | <b>Unit</b> |
| Forward transconductance      | $g_{fs}$             | $V_{DS} = 15\text{ V}$ , $I_D = 4$                                            |            | 4.5        |            | S           |
| Input capacitance             | $C_{iss}$            | $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0$                    |            | 1682       |            | pF          |
| Output capacitance            | $C_{oss}$            |                                                                               |            | 205        |            |             |
| Reverse transfer capacitance  | $C_{rss}$            |                                                                               |            | 31         |            |             |
| Equivalent Output capacitance | $C_{oss\text{ eq.}}$ | $V_{GS} = 0$ , $V_{DS} = 0$ to $1200\text{ V}$                                |            | 84         |            |             |
| Gate input resistance         | $R_g$                | $f = 1\text{ MHz}$ Gate DC Bias = 0<br>Test signal level = 20mV<br>open drain |            | 1.6        |            | $\Omega$    |
| Total gate charge             | $Q_g$                | $V_{DD} = 1200\text{ V}$ , $I_D = 8\text{ A}$<br>$V_{GS} = 10\text{ V}$       |            | 77         |            | nC          |
| Gate-source charge            | $Q_{gs}$             |                                                                               |            | 13         |            |             |
| Gate-drain charge             | $Q_{gd}$             |                                                                               |            | 48         |            |             |

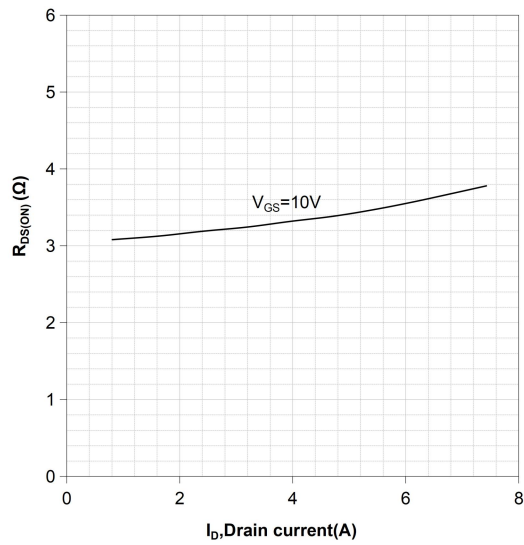
| Switching times     |              |                                                                                           |     |     |     |      |
|---------------------|--------------|-------------------------------------------------------------------------------------------|-----|-----|-----|------|
| Parameter           | Symbol       | Test conditions                                                                           | Min | Typ | Max | Unit |
| Turn-on delay time  | $t_{d(on)}$  | $V_{DD} = 750 \text{ V}, I_D = 4 \text{ A},$<br>$R_G = 1.6 \Omega, V_{GS} = 10 \text{ V}$ |     | 17  |     | ns   |
| Rise time           | $t_r$        |                                                                                           |     | 29  |     |      |
| Turn-off-delay time | $t_{d(off)}$ |                                                                                           |     | 60  |     |      |
| Fall time           | $t_f$        |                                                                                           |     | 37  |     |      |

| Source drain diode            |           |                                                                                                            |     |     |     |               |
|-------------------------------|-----------|------------------------------------------------------------------------------------------------------------|-----|-----|-----|---------------|
| Parameter                     | Symbol    | Test conditions                                                                                            | Min | Typ | Max | Unit          |
| Source-drain current          | $I_{SD}$  |                                                                                                            |     |     | 9   | A             |
| Source-drain current (pulsed) | $I_{SDM}$ |                                                                                                            |     |     | 46  |               |
| Forward on voltage            | $V_{SD}$  | $I_{SD} = 8 \text{ A}, V_{GS} = 0$                                                                         |     | 0.9 | 1.2 | V             |
| Reverse recovery time         | $t_{rr}$  | $I_{SD} = 8 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$<br>$V_{DD} = 60 \text{ V}$                       |     | 550 |     | ns            |
| Reverse recovery charge       | $Q_{rr}$  |                                                                                                            |     | 5.6 |     | $\mu\text{C}$ |
| Reverse recovery current      | $I_{RRM}$ |                                                                                                            |     | 22  |     | A             |
| Reverse recovery time         | $t_{rr}$  | $S_D = 8 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$<br>$V_{DD} = 60 \text{ V}, T_J = 150^\circ\text{C}$ |     | 620 |     | ns            |
| Reverse recovery charge       | $Q_{rr}$  |                                                                                                            |     | 6.2 |     | $\mu\text{C}$ |
| Reverse recovery current      | $I_{RRM}$ |                                                                                                            |     | 22  |     | A             |

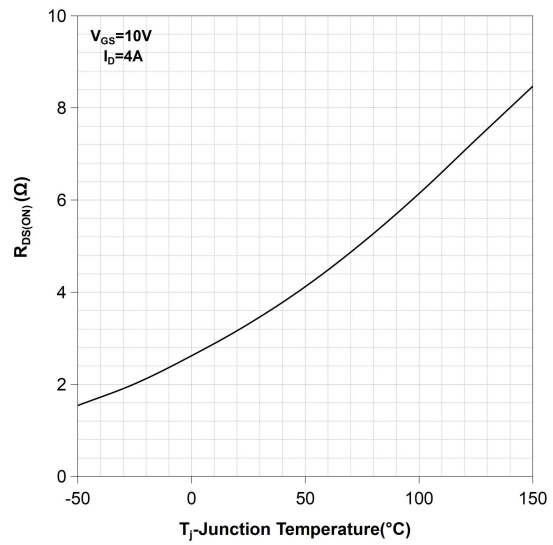
## Electrical characteristics



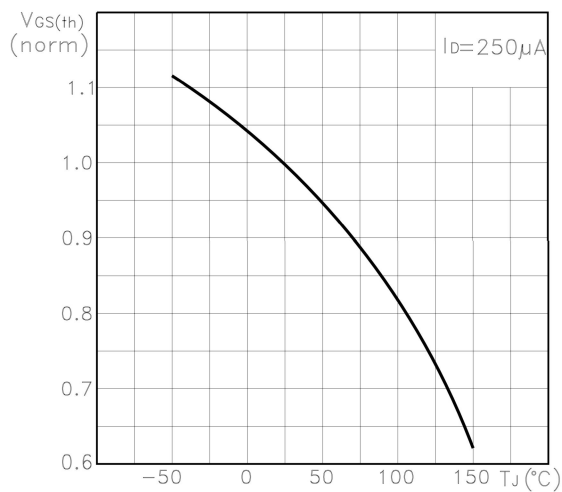
On-Resistance Variation vs Drain Current



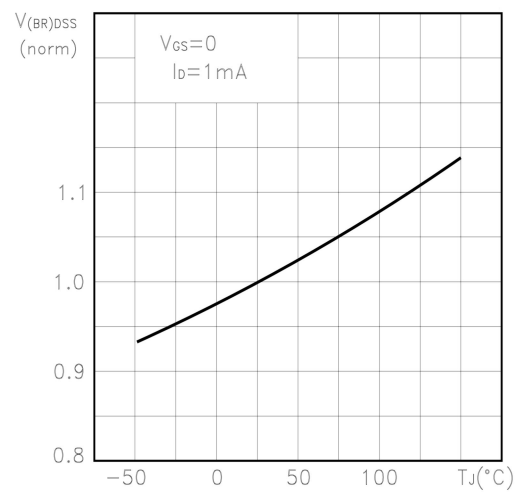
On-Resistance variation vs Temperature



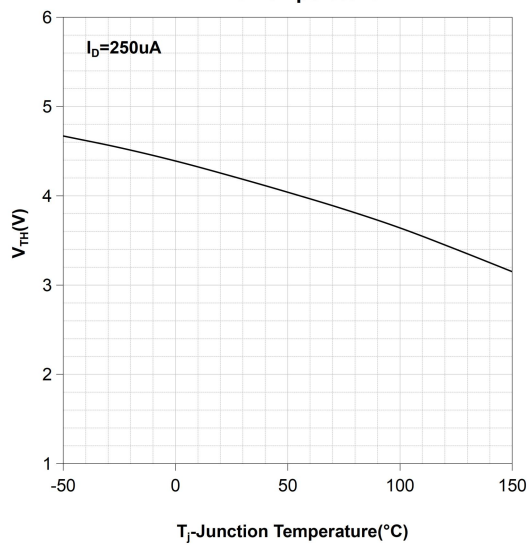
Normalized gate threshold voltage vs temperature



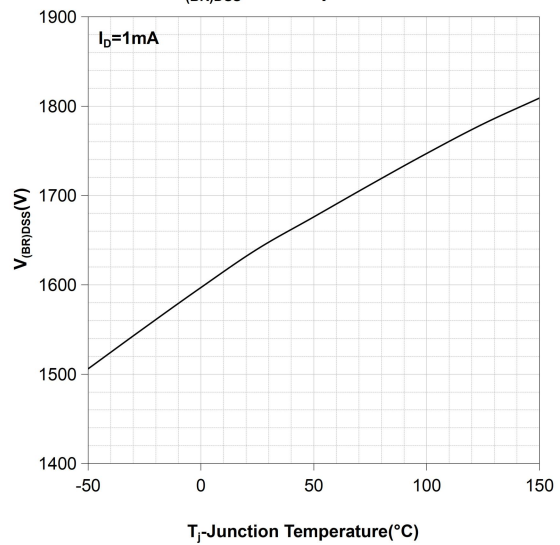
Normalized BVDSS vs temperature



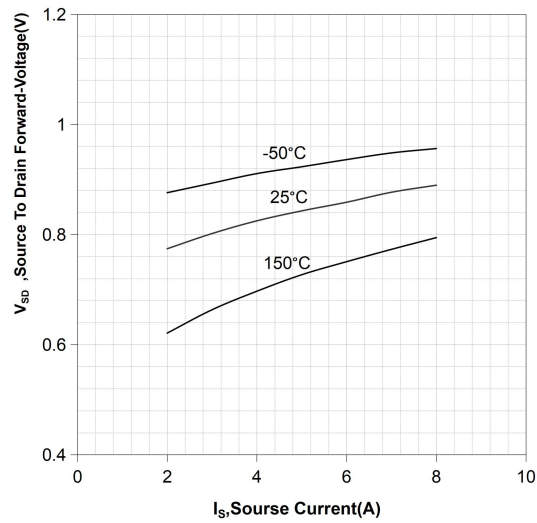
VTH VS Temperature



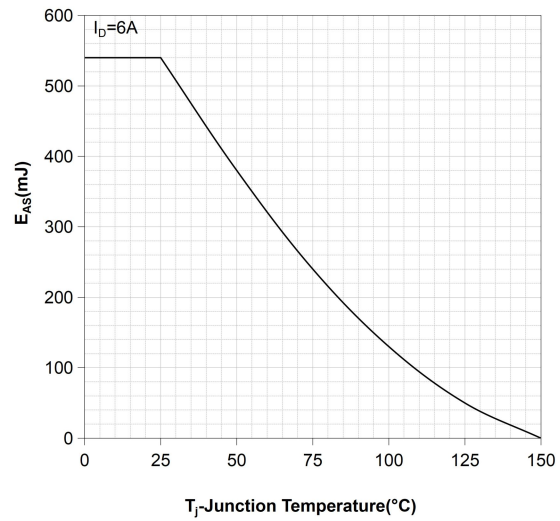
$V_{(BR)DSS}$  vs Temperature



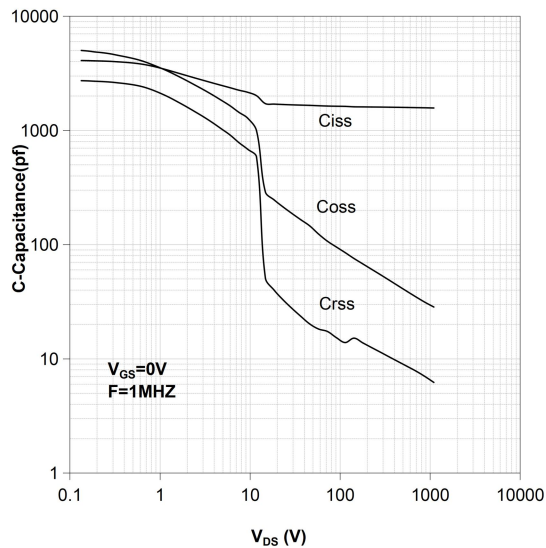
Source-drain diode forward characteristics



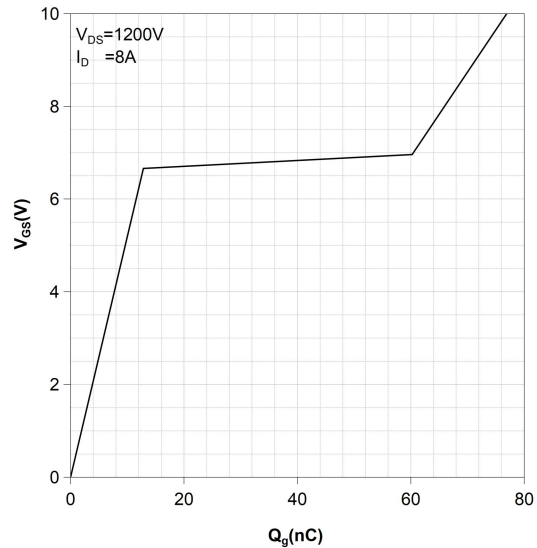
Maximum avalanche energy vs temperature



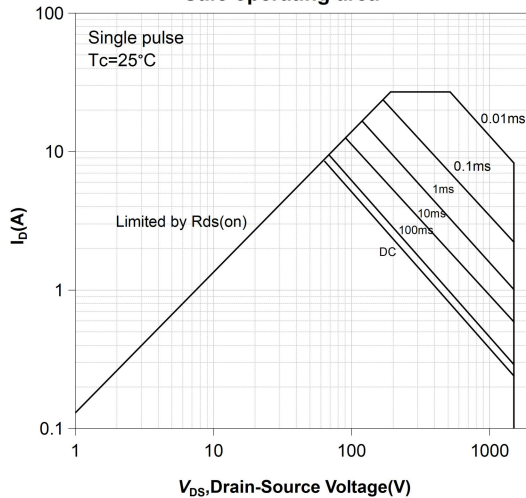
Capacitance variations



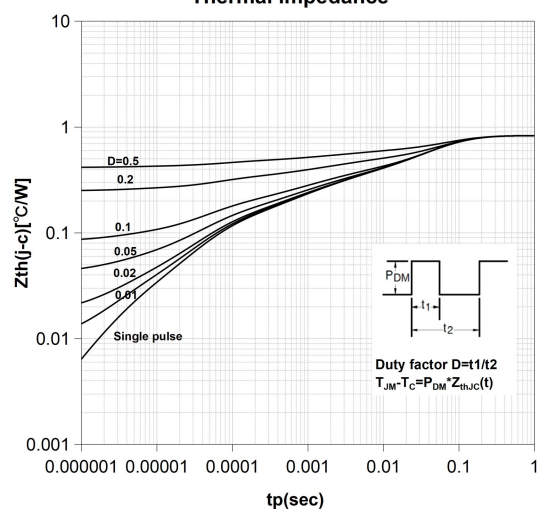
Gate charge vs gate-source voltage



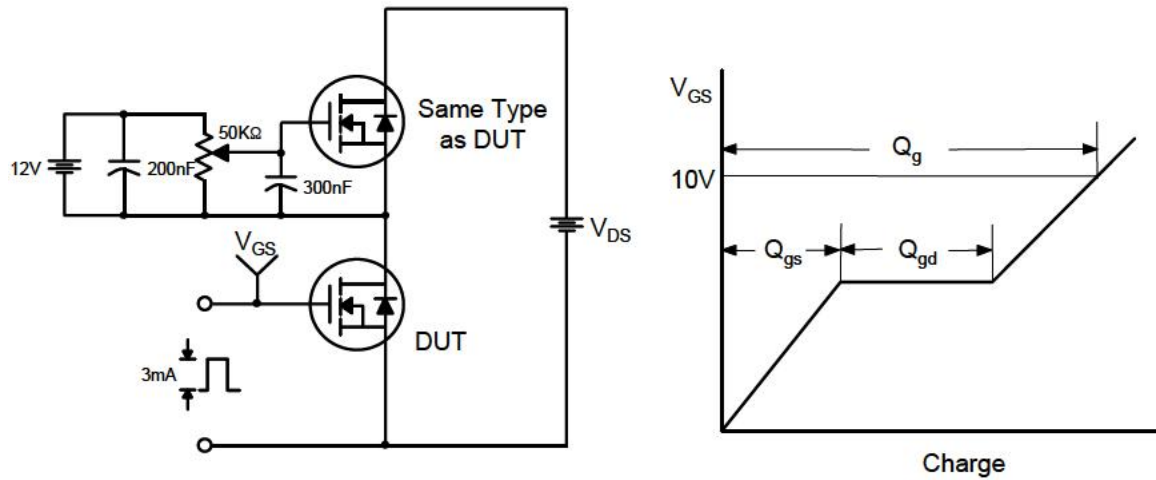
Safe operating area



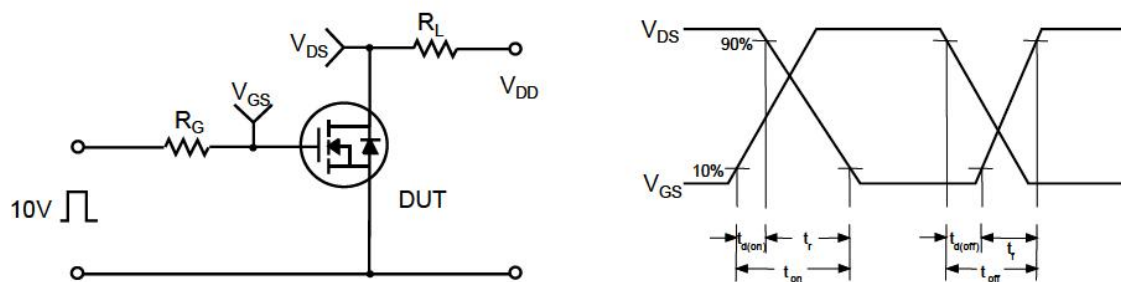
Thermal impedance



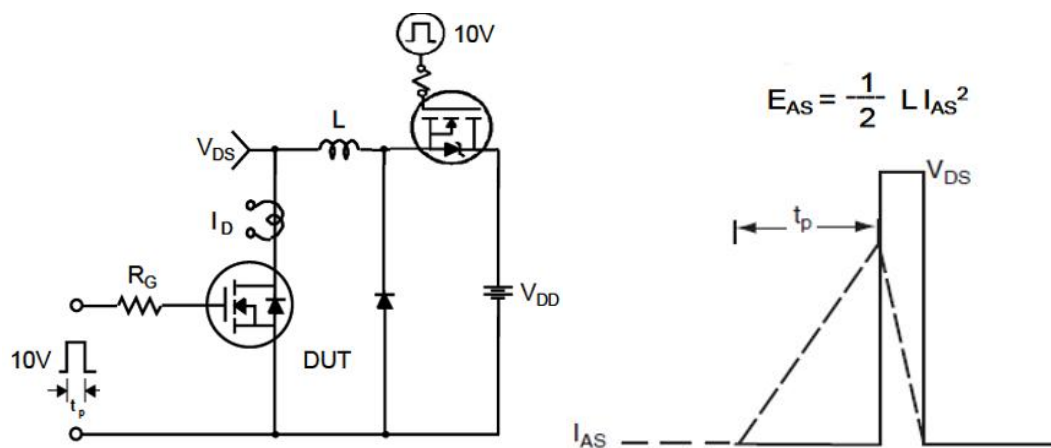
### Gate Charge Test Circuit & Waveform



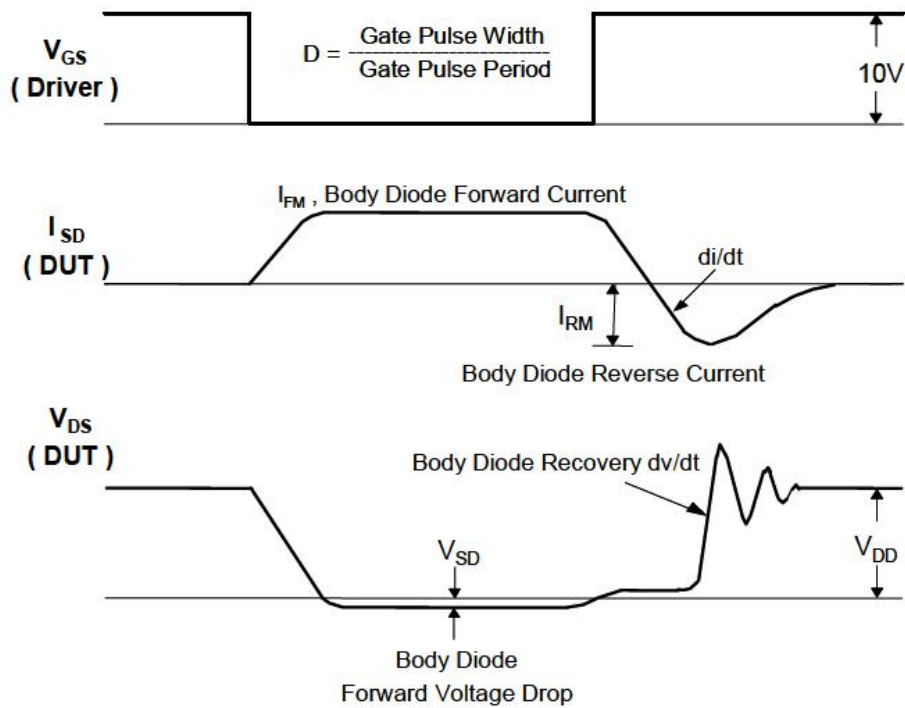
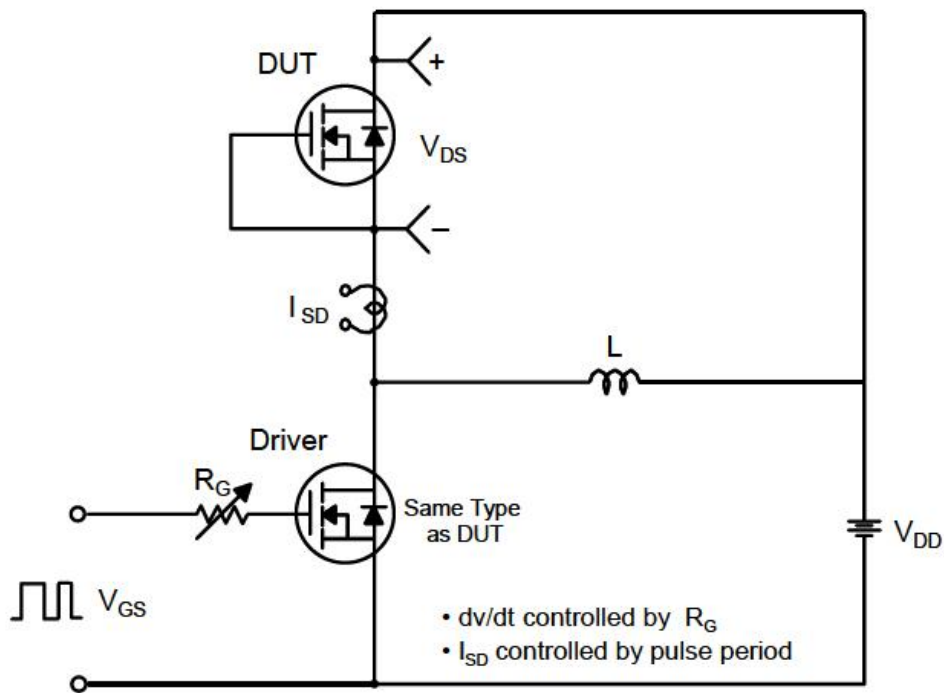
### Resistive Switching Test Circuit & Waveforms



### Unclamped Inductive Switching Test Circuit & Waveforms



### Peak Diode Recovery dv/dt Test Circuit & Waveforms



### Package outline dimension

