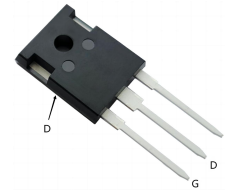


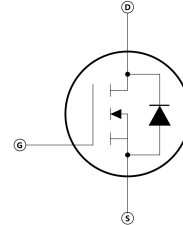
### Features

- Ultra low  $R_{DS(on)(typ.)}=40m\Omega$
- Ultra low gate charge(typ.  $Q_g=95nC$ )
- 100% UIS tested
- RoHS compliant



### Applications

- Power factor correction(PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible power supply(UPS)



### Absolute Ratings ( $T_c=25^\circ C$ unless otherwise specified)

| Parameter                                                                   | Symbol                           |                      | Value    | Unit |
|-----------------------------------------------------------------------------|----------------------------------|----------------------|----------|------|
| Drain-Source Voltage                                                        | V <sub>DSS</sub>                 |                      | 650      | V    |
| Transient Gate-Source Voltage                                               | V <sub>GSM</sub>                 |                      | ±30      | V    |
| Continuous Gate-Source Voltage(DC)                                          | V <sub>GSS</sub>                 |                      | ±20      | V    |
| Drain Current -continuous                                                   | I <sub>D</sub>                   | T <sub>C</sub> =25℃  | 80       | A    |
|                                                                             |                                  | T <sub>C</sub> =100℃ | 45       | A    |
| Drain Current - pulse (note 1)                                              | I <sub>DM</sub>                  |                      | 240      | A    |
| Avalanche current-single pulse                                              | I <sub>AS</sub>                  |                      | 12       | A    |
| Single Pulsed Avalanche Energy<br>(note 2)                                  | E <sub>AS</sub>                  |                      | 250      | mJ   |
| Repetitive Avalanche Energy                                                 | E <sub>AR</sub>                  |                      | 1.25     | mJ   |
| Power Dissipation                                                           | P <sub>D</sub>                   |                      | 227      | W    |
| Operating and Storage Temperature<br>Range                                  | T <sub>J</sub> ,T <sub>STG</sub> |                      | -55~+150 | ℃    |
| Solding temperature,wave soldering only<br>allowed at leads.(1.6mm for 10s) | T <sub>sold</sub>                |                      | 260      | ℃    |

### Electrical Characteristics( $T_{CASE}=25^\circ C$ unless otherwise specified)

| Parameter                          | Symbol     | Tests conditions                              | Min | Typ | Max | Units   |
|------------------------------------|------------|-----------------------------------------------|-----|-----|-----|---------|
| <b>Off-Characteristics</b>         |            |                                               |     |     |     |         |
| Drain-Source Voltage               | $BV_{DSS}$ | $I_D=250\mu A, V_{GS}=0V$                     | 650 | -   | -   | V       |
| Zero Gate Voltage<br>Drain Current | $I_{DSS}$  | $V_{DS}=650V, V_{GS}=0V,$<br>$T_C=25^\circ C$ | -   | -   | 2   | $\mu A$ |
| Gate-body leakage<br>current       | $I_{GSS}$  | $V_{DS}=0V, V_{GS}=20V$                       | -   | -   | 100 | nA      |

| On-Characteristics                                     |              |                                                                    |                    |     |       |     |    |
|--------------------------------------------------------|--------------|--------------------------------------------------------------------|--------------------|-----|-------|-----|----|
| Gate Threshold Voltage                                 | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                                      |                    | 2.0 | 3.0   | 4.0 | V  |
| Static Drain-Source On-Resistance                      | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=35A$                                              | $T_J=25^{\circ}C$  | -   | 40    | 60  | mΩ |
|                                                        |              |                                                                    | $T_J=150^{\circ}C$ | -   | 96    | -   |    |
| Forward Transconductance                               | $g_{fs}$     | $V_{DS}=10V, I_D=35A$<br>(note 4)                                  |                    | -   | 3.2   | -   | S  |
| Dynamic Characteristics                                |              |                                                                    |                    |     |       |     |    |
| Gate resistance                                        | $R_g$        | F=1.0MHz open drain                                                |                    | -   | 0.85  | -   | Ω  |
| Input capacitance                                      | $C_{iss}$    | $V_{DS}=400V, V_{GS}=0V, f=250kHz$                                 |                    | -   | 4346  | -   | pF |
| Output capacitance                                     | $C_{oss}$    |                                                                    |                    | -   | 75    | -   | pF |
| Reverse transfer capacitance                           | $C_{rss}$    |                                                                    |                    | -   | 12    | -   | pF |
| Switching Characteristics                              |              |                                                                    |                    |     |       |     |    |
| Turn-On delay time                                     | $t_{d(on)}$  | $V_{DD}=400V, I_D=25A, V_{GS}=10V, R_G=3.3\Omega$<br>(note 4,5)    |                    | -   | 27    | -   | ns |
| Turn-On rise time                                      | $t_r$        |                                                                    |                    | -   | 15    | -   | ns |
| Turn-Off delay time                                    | $t_{d(off)}$ |                                                                    |                    | -   | 80    | -   | ns |
| Turn-Off Fall time                                     | $t_f$        |                                                                    |                    | -   | 9     | -   | ns |
| Total Gate Charge                                      | $Q_g$        | $V_{DS}=400V, I_D=25A, V_{GS}=0 \text{ to } 10V$<br>(note4,5)      |                    | -   | 95    | -   | nC |
| Gate-Source charge                                     | $Q_{gs}$     |                                                                    |                    | -   | 24    | -   | nC |
| Gate-Drain charge                                      | $Q_{gd}$     |                                                                    |                    | -   | 32    | -   | nC |
| Gate-plateau voltage                                   | $V_p$        |                                                                    |                    | -   | 5.4   | -   | V  |
| Drain-Source Diode Characteristics and Maximum Ratings |              |                                                                    |                    |     |       |     |    |
| Continuous Diode Forward Current                       | $I_S$        | $T_C=25^{\circ}C$                                                  |                    | -   | -     | 80  | A  |
| Diode Pulsed Current                                   | $I_{SM}$     | $T_C=25^{\circ}C$                                                  |                    | -   | -     | 240 | A  |
| Drain-Source Diode Forward Voltage                     | $V_{SD}$     | $V_{GS}=0V, I_S=35A$                                               |                    | -   | 0.84  | 1.2 | V  |
| Reverse recovery time                                  | $t_{rr}$     | $V_{GS}=0V, I_S=46A$<br>$di_F/dt=60A/us$<br>$V_R=400V$<br>(note 4) |                    | -   | 730   | -   | ns |
| Reverse recovery charge                                | $Q_{rr}$     |                                                                    |                    | -   | 13000 | -   | uC |
| Peak reverse recovery current                          | $I_{RRM}$    |                                                                    |                    | -   | 36    | -   | A  |

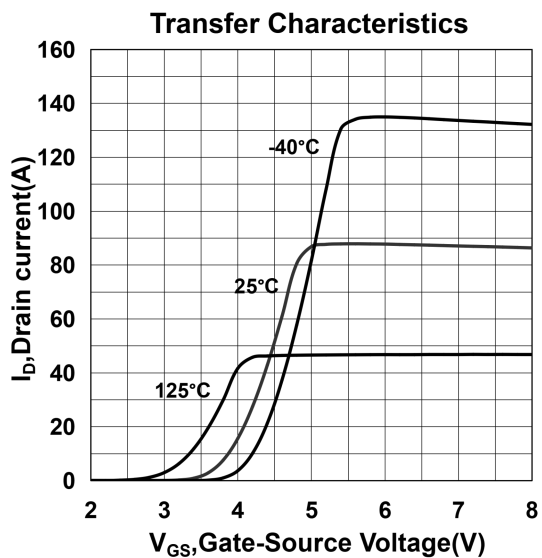
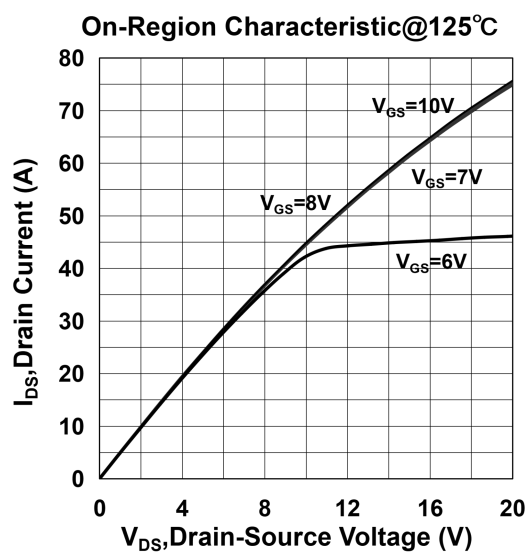
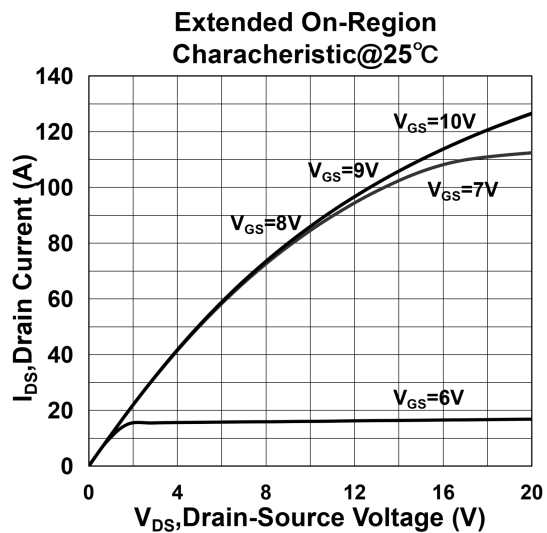
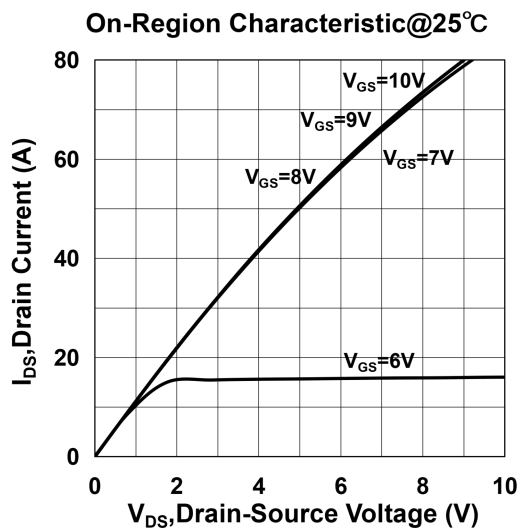
## Thermal Characteristics

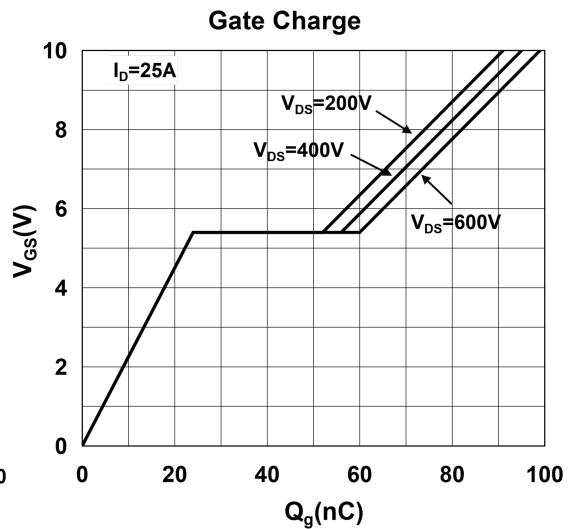
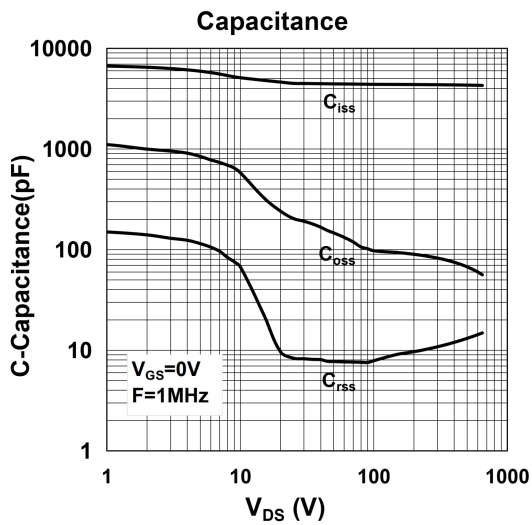
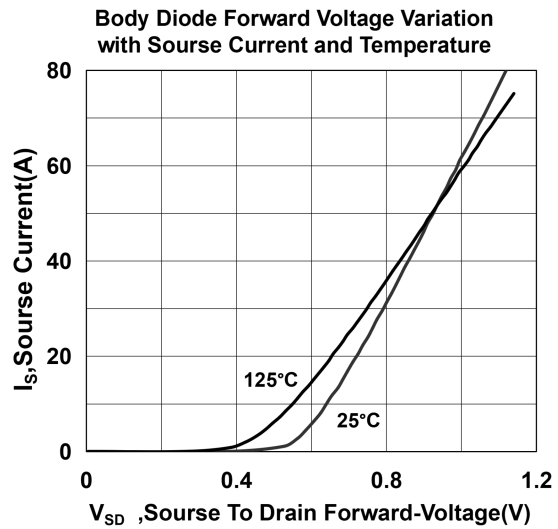
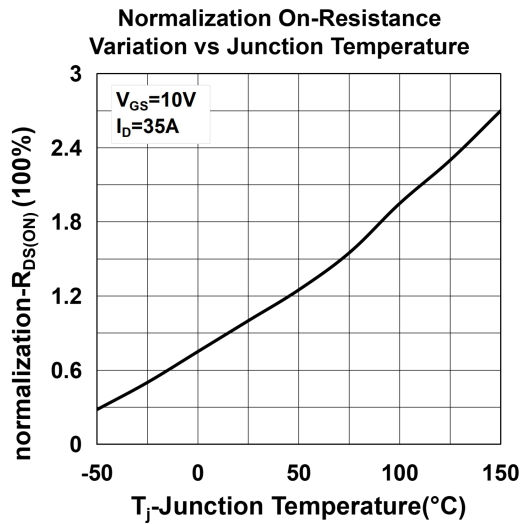
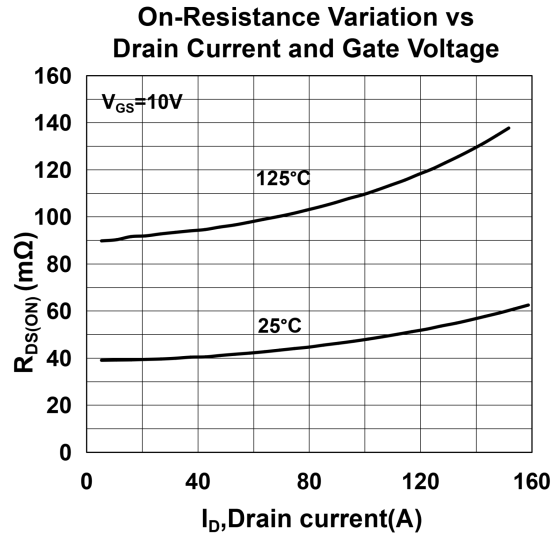
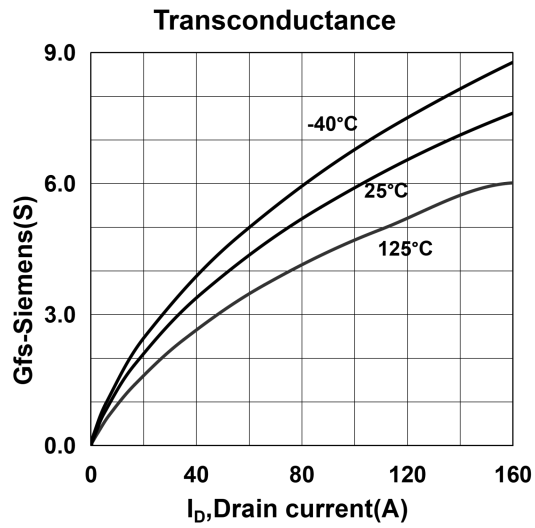
| Parameter                                                               | Symbol        | Value | Unit         |
|-------------------------------------------------------------------------|---------------|-------|--------------|
| Thermal Resistance, Junction-to-Case                                    | $R_{th(J-C)}$ | 0.55  | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Ambient, minimal Footprint <sup>4</sup> | $R_{th(J-A)}$ | 62    |              |

### Notes:

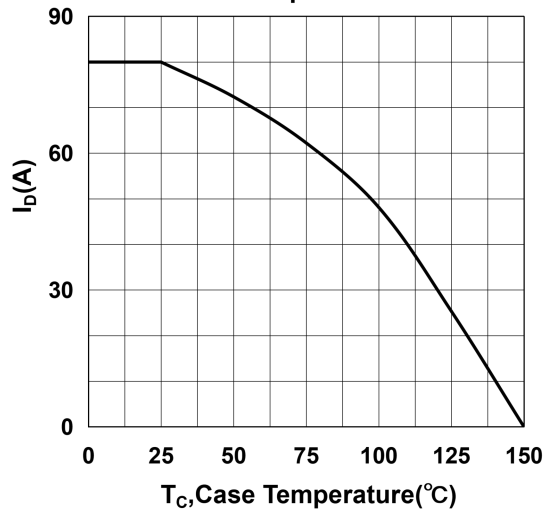
- 1: Pulse width limited by maximum junction temperature
- 2:  $L=3.5\text{mH}$ ,  $I_{AS}=12\text{A}$ ,  $V_{DD}=50\text{V}$ , Starting  $T_J=25^\circ\text{C}$
- 3:  $I_{SD}\leq 10\text{A}$ ,  $di/dt\leq 200\text{A/us}$ ,  $V_{DD}\leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$
- 4: Pulse Test: Pulse Width  $\leq 200\text{us}$ , Duty Cycle  $\leq 2\%$
- 5: Essentially independent of operating temperature

## Electrical Characteristics Diagrams

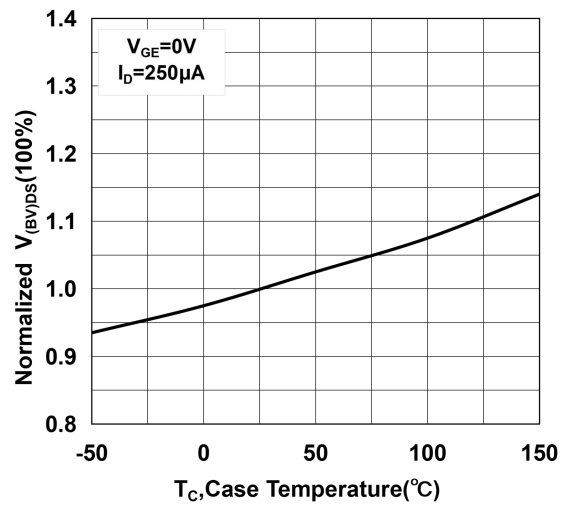




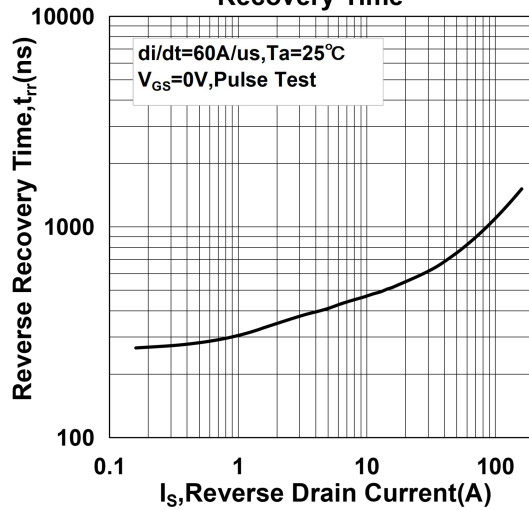
Maximum Drain Current vs Case Temperature



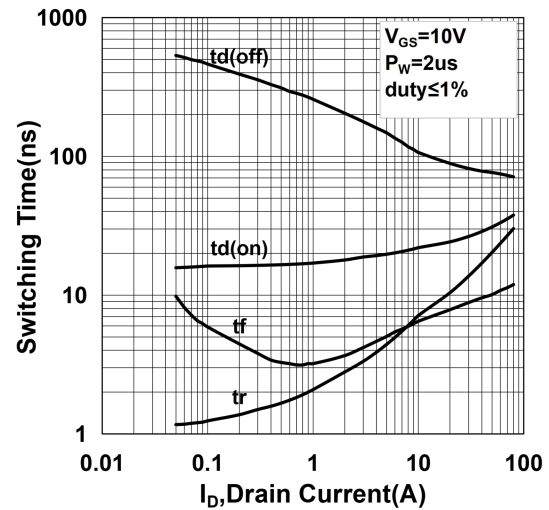
Normalized  $V_{(BV)DS}$  vs temperature



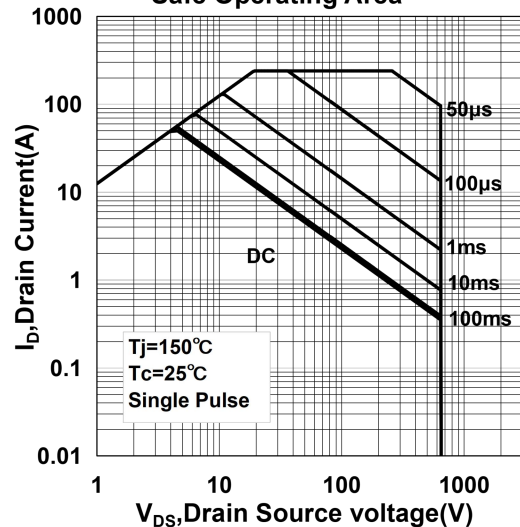
Body to Drain Diode Reverse Recovery Time



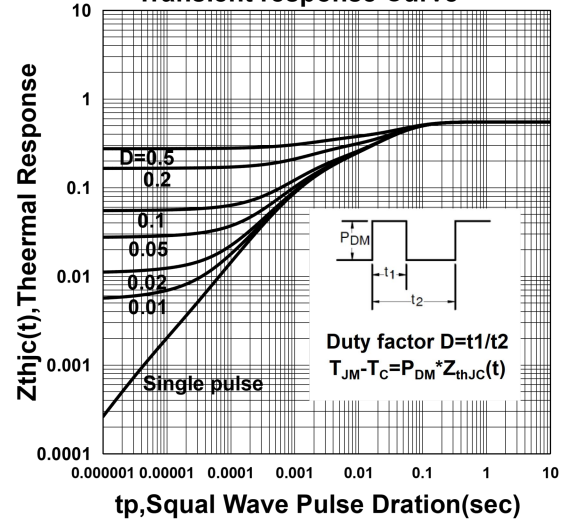
Switching Characteristics



Safe Operating Area

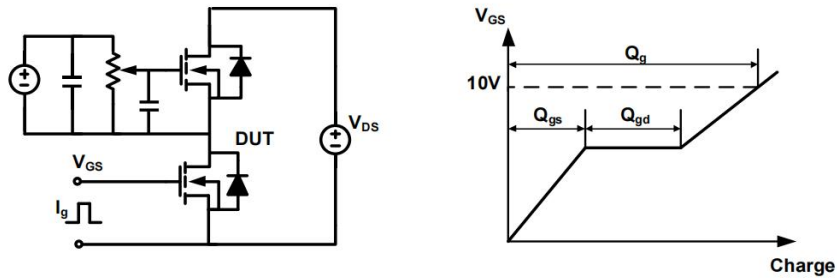


Transient response Curve

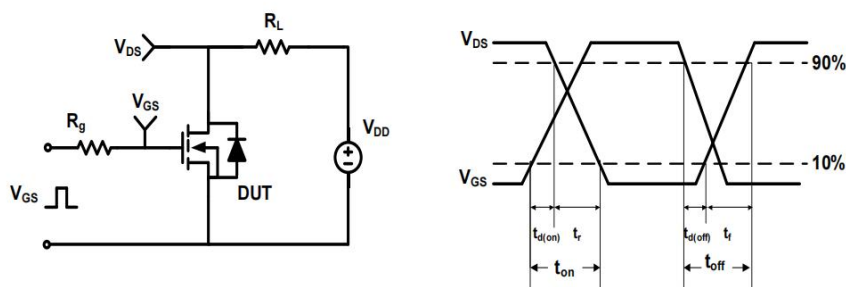


### Test Circuit & Waveforms

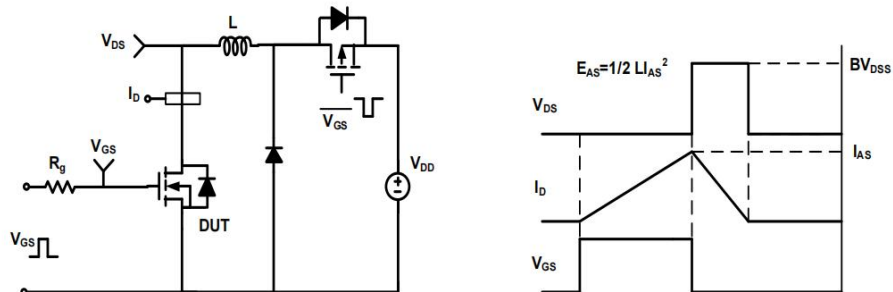
Gate Charge Test Circuit & Waveform



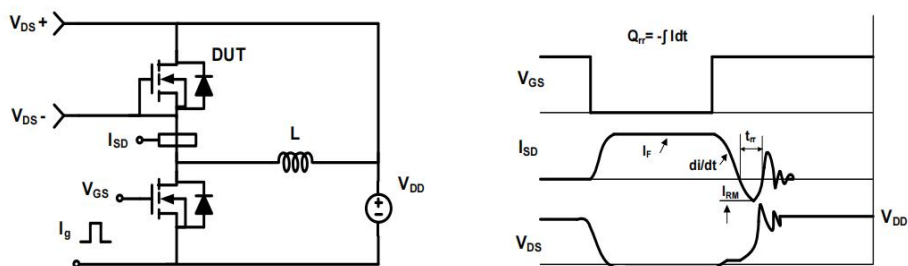
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform



Diode Recovery Test Circuit & Waveform



## Package Mechanical DATA

