## Absolute Maximum Ratings at $T_j$=25 unless otherwise noted

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-source voltage | $V_{DS}$ | 600 | V |
| Gate-source voltage | $V_{GS}$ | ±30 | V |
| Continuous drain current[1], $T_C$=25 °C | $I_D$ | 11 | A |
| Continuous drain current[1], $T_C$=100 °C | | 7 | |
| Pulsed drain current[2], $T_C$=25 °C | $I_{D, pulse}$ | | |

## Dynamic Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Input capacitance | $C_{iss}$ | | 690 | | pF | $V_{GS}$=0 V, $V_{DS}$=50 V, Hz |
| Output capacitance | $C_{oss}$ | | 57 | | pF | |
| Reverse transfer capacitance | $C_{rss}$ | | 2.47 | | pF | |
| Turn-on delay time | $t_{d(on)}$ | | 26 | | ns | $V_{GS}$=10 V, $V_{DS}$=380 V, $R_G$=25 $I_D$=11 A |
| Rise time | $t_r$ | | 28.3 | | ns | |
| Turn-off delay time | $t_{d(off)}$ | | 34 | | ns | |
| Fall time | $t_f$ | | 33.2 | | ns | |

## Gate Charge Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Total gate charge | $Q_g$ | | 13 | | nC | $V_{GS}$=11 V, $V_{DS}$=480 V, $I_D$=10 A |
| Gate-source charge | $Q_{gs}$ | | 3.6 | | nC | |
| Gate-drain charge | $Q_{gd}$ | | 5.6 | | nC | |
| Gate plateau voltage | $V_{plateau}$ | | 5.6 | | V | |

## Body Diode Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Diode forward voltage | $V_{SD}$ | | | 1.3 | V | $I_S$=11 A, $V_{GS}$=0 V |
| Reverse recovery time | $t_{rr}$ | | 266 | | ns | $V_R$=400 V, $I_S$=11 A, |
| Reverse recovery charge | $Q_{rr}$ | | 2.8 | | C | |
| Peak reverse recovery current | $I_{rrm}$ | | 19.6 | | A | |

**Note**

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) Pd is based on max. junction temperature, using junction-case thermal resistance.
4) The value of R is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_a$=25 °C.
5) $V_{DD}$=50 V, $V_{GS}$=10 V, L=10.8 mH, starting $T_j$=25 °C.

## Electrical Characteristics Diagrams

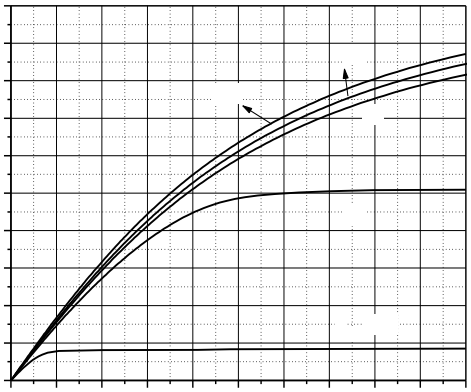

Figure 1. Typ. output characteristics

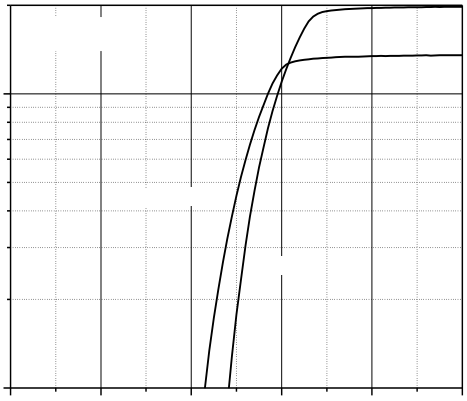

Figure 2. Typ. transfer characteristics

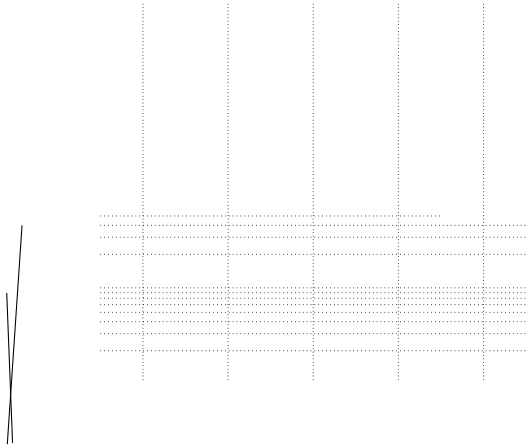

Figure 3. Typ. capacitances

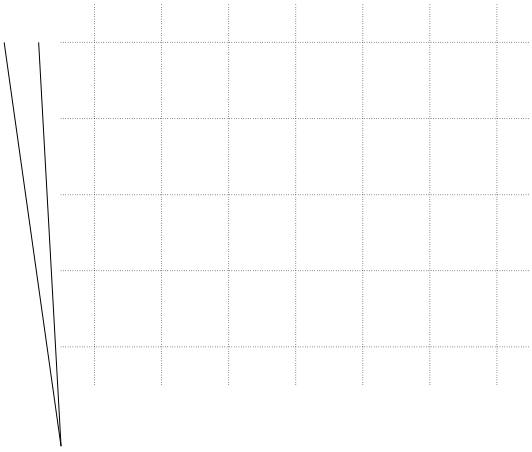

Figure 4. Typ. gate charge

Figure 5. Drain-source breakdown voltage

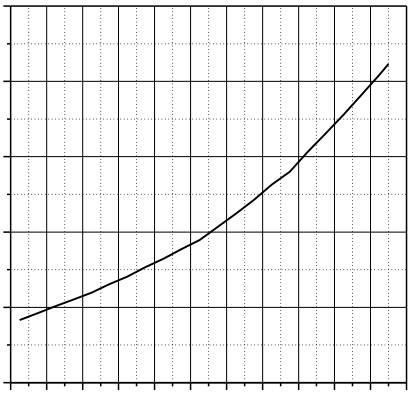

Figure 6. Drain-source on-state resistance

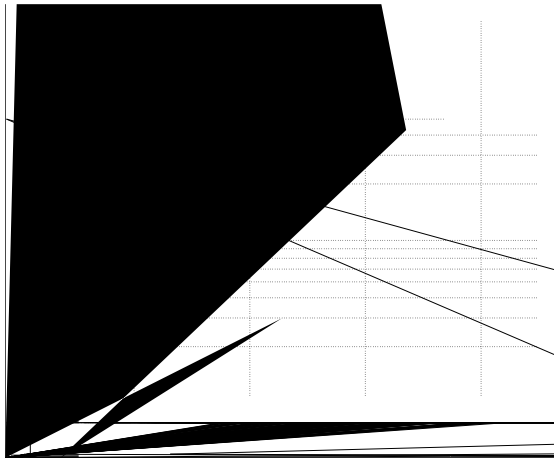

**Figure 7. Forward characteristic of body diode**

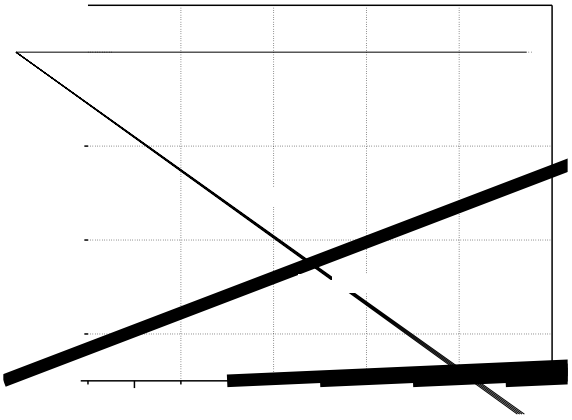

**Figure 8. Drain-source on-state resistance**

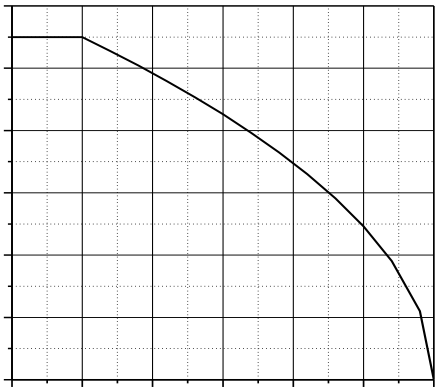

**Figure 9. Drain current**

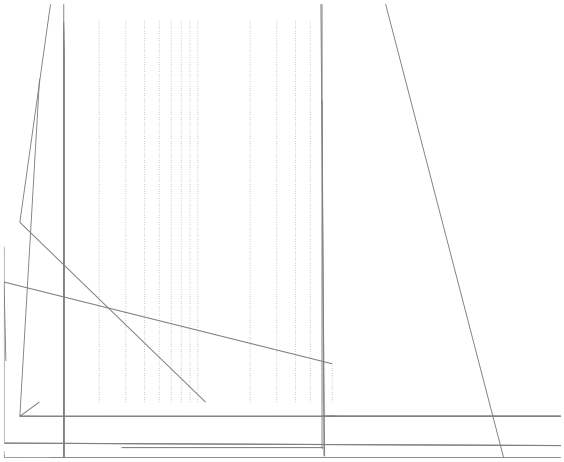

**Figure 10. Safe operation area $T_C$=25 °C**

## Test circuits and waveforms

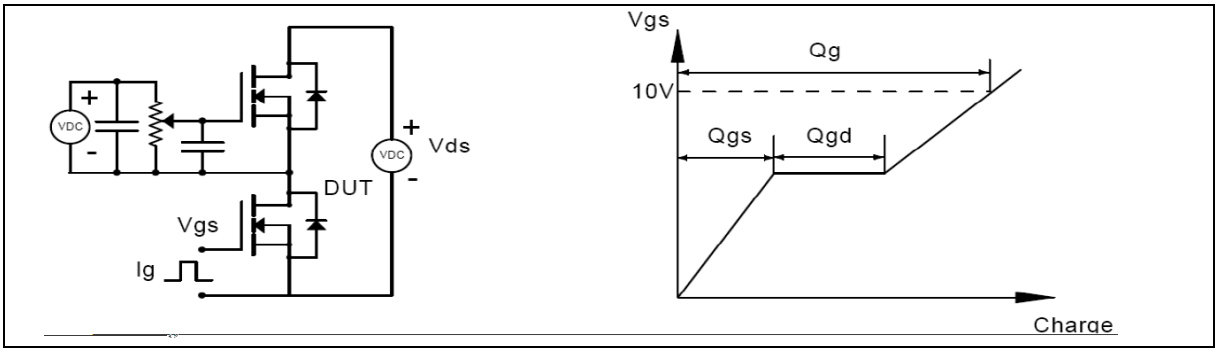


**Figure 1. Gate charge test circuit & waveform**

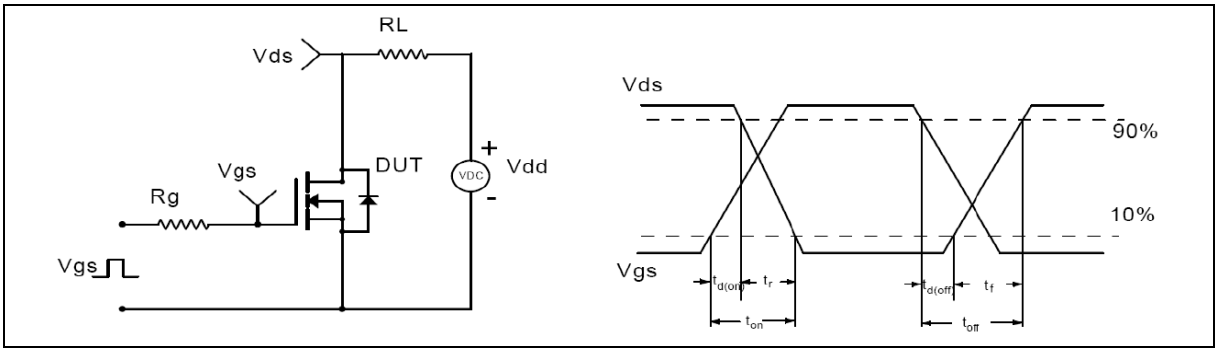


**Figure 2. Switching time test circuit & waveforms**

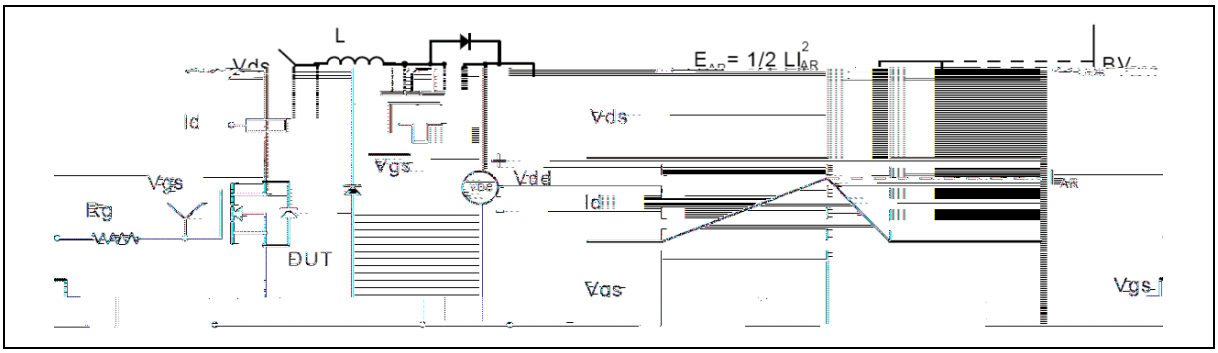


**Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms**

**Figure 4. Diode reverse recovery test circuit & waveforms**

## Package Information

| Symbol | mm | |
|---|---|---|
| | Min | Nom |

## Ordering Information

| Package Type | Units/ Tube | Tubes / Inner Box | Units/ Inner Box | Inner Boxes/ Carton Box | Units/ Carton Box |
|---|---|---|---|---|---|
| TO220-P | 50 | 20 | 1000 | 6 | |