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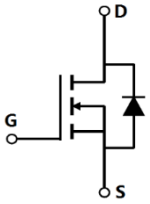
| Parameter | Value | Unit |
|---|---|---|
| $V_{DS,\ min}$ @ $T_{j(max)}$ | 80 | V |
| $I_{D,\ pulse}$ | 750 | A |
| $R_{DS(ON),\ max}$ @ $V_{GS}$=10V | 3.2 | |
| $Q_g$ | 148.4 | nC |

| Product Name | Package | Marking |
|---|---|---|
| SFG250N08PF | TO220 | SFG250N08P |

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

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain source voltage | $V_{DS}$ | 80 | V |
| Gate source voltage | $V_{GS}$ | ±20 | V |
| Continuous drain current[1], $T_C$=25 °C | $I_D$ | 250 | A |
| Pulsed drain current[2], $T_C$=25 °C | $I_{D,\ pulse}$ | 750 | A |
| Continuous diode forward current[1], $T_C$=25 °C | $I_S$ | 250 | A |
| Diode pulsed current[2], $T_C$=25 °C | $I_{S,\ pulse}$ | 750 | A |
| Power dissipation[3], $T_C$=25 °C | $P_D$ | 300 | W |
| Single pulsed avalanche energy[5] | $E_{AS}$ | 1000 | mJ |
| Operation and storage temperature | $T_{stg}$, $T_j$ | -55 to 150 | °C |

## Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal resistance, junction-case | R | 0.42 | °C/W |
| Thermal resistance, junction-ambient[4] | R | 62 | °C/W |

## Electrical Characteristics at $T_j$=25 unless otherwise specified

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Drain-source breakdown voltage | $BV_{DSS}$ | 80 | | | V | $V_{GS}$=0 V, $I_D$=250 A |
| Gate threshold voltage | $V_{GS(th)}$ | 2.0 | | 4.0 | V | $V_{DS}$=$V_{GS}$, $I_D$=250 A |
| Drain-source on-state resistance | $R_{DS(ON)}$ | | 2.9 | 3.2 | | $V_{GS}$=10 V, $I_D$=30 A |
| Gate-source leakage current | $I_{GSS}$ | | | 100 | nA | $V_{GS}$=20 V |
| | | | | -100 | | $V_{GS}$=-20 V |
| Drain-source leakage current | $I_{DSS}$ | | | 1 | A | $V_{DS}$=80 V, $V_{GS}$=0 V |

## Dynamic Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Input capacitance | $C_{iss}$ | | 9322 | | pF | $V_{GS}$=0 V, $V_{DS}$=40 V, 00 kHz |
| Output capacitance | $C_{oss}$ | | 2710 | | pF | |
| Reverse transfer capacitance | $C_{rss}$ | | 91 | | pF | |
| Turn-on delay time | $t_{d(on)}$ | | 36.1 | | ns | $V_{GS}$=10 V, $V_{DS}$=50 V, $R_G$ $I_D$=25 A |
| Rise time | $t_r$ | | 42.3 | | ns | |
| Turn-off delay time | $t_{d(off)}$ | | 102.3 | | ns | |
| Fall time | $t_f$ | | 30.5 | | ns | |

## Gate Charge Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Total gate charge | $Q_g$ | | 148.4 | | nC | $V_{GS}$=10 V, $V_{DS}$=50 V, $I_D$=25 A |
| Gate-source charge | $Q_{gs}$ | | 34.5 | | nC | |
| Gate-drain charge | $Q_{gd}$ | | 40.9 | | nC | |
| Gate plateau voltage | $V_{plateau}$ | | 4.7 | | V | |

## Body Diode Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Diode forward voltage | $V_{SD}$ | | | 1.3 | V | $I_S$=25 A, $V_{GS}$=0 V |
| Reverse recovery time | $t_{rr}$ | | 108.2 | | ns | $V_R$=50 V, $I_S$=25 A, |
| Reverse recovery charge | $Q_{rr}$ | | 428.9 | | nC | |
| Peak reverse recovery current | $I_{rrm}$ | | 6.5 | | 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=0.3 mH, starting $T_j$=25 °C.

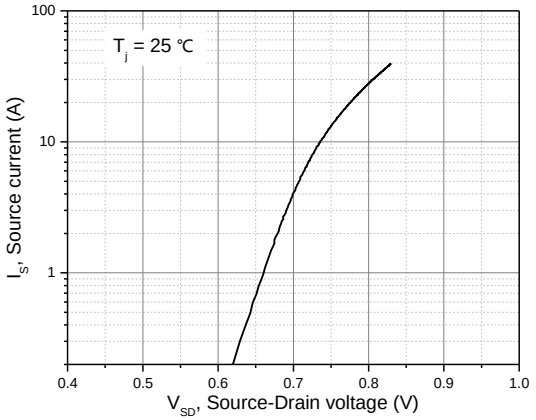



**Figure 7. Forward characteristic of body diode**

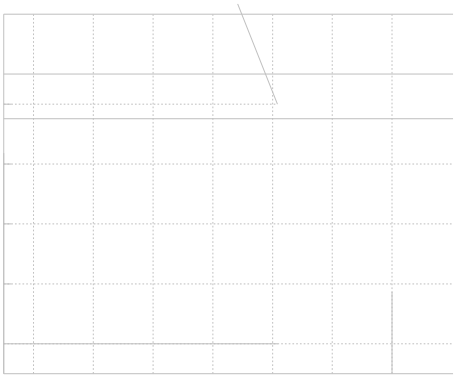


**Figure 8. Drain current**

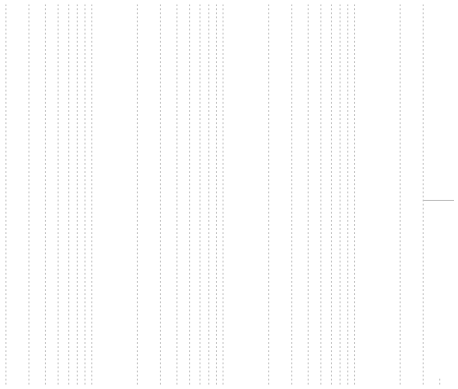


**Figure 9. Safe operation area $T_C$=25 °C**

## Test circuits and waveforms

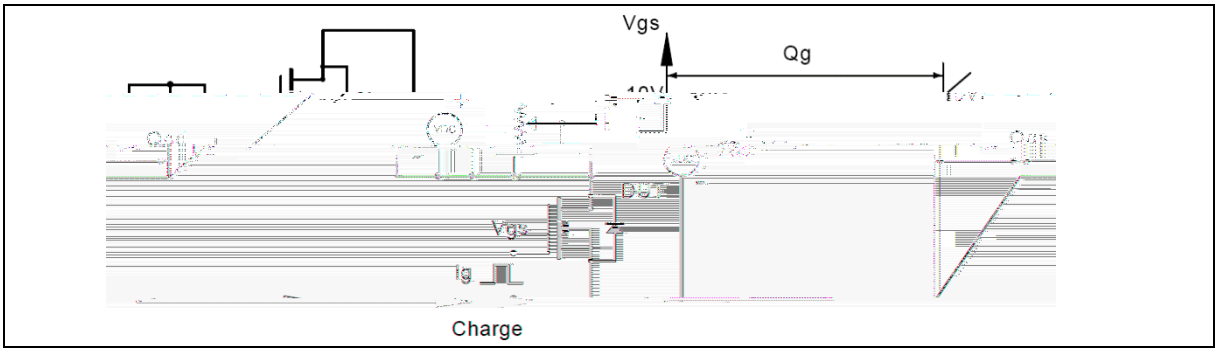



**Figure 1. Gate charge test circuit & waveform**

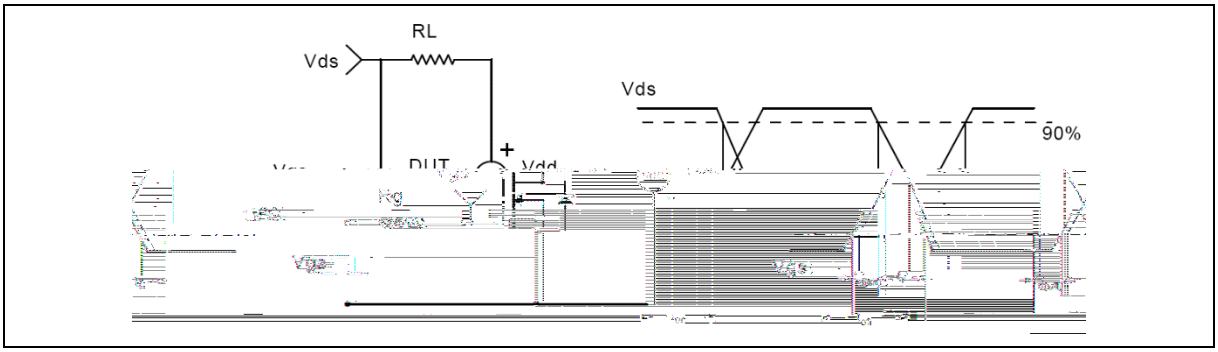



**Figure 2. Switching time test circuit & waveforms**

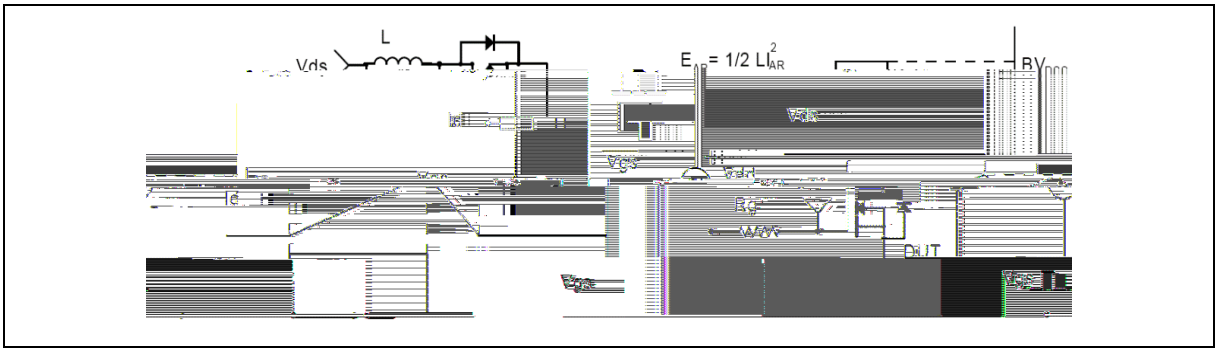



**Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms**

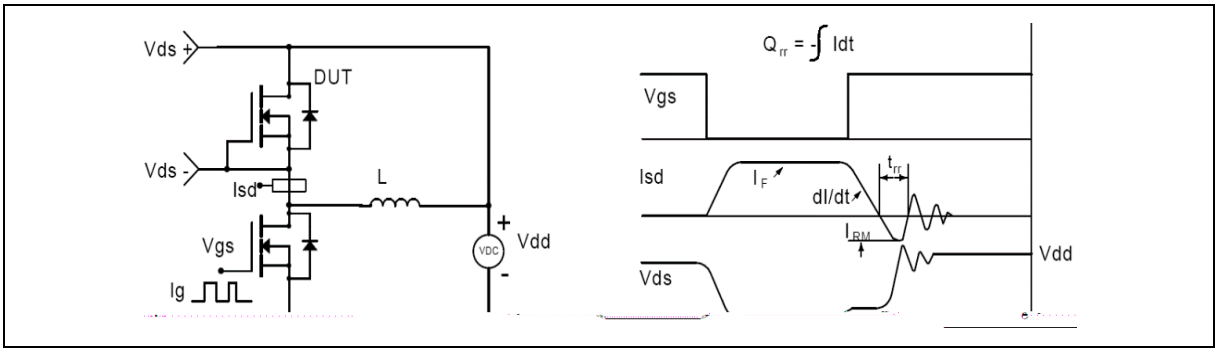
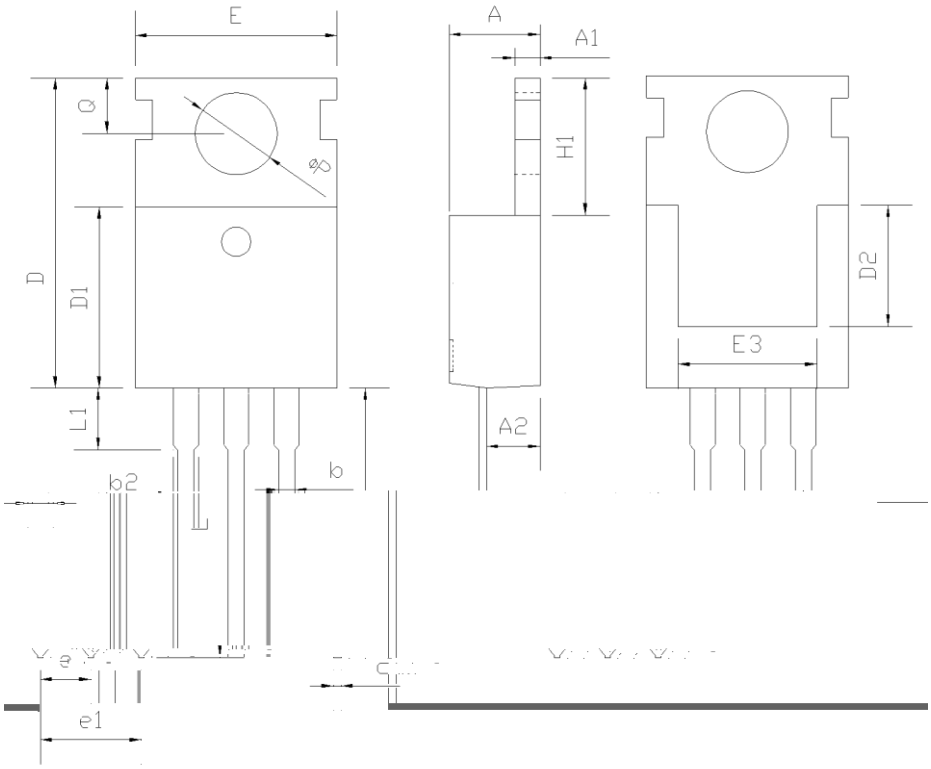



**Figure 4. Diode reverse recovery test circuit & waveforms**

## Package Information




| Symbol | mm | | |
|---|---|---|---|
| | Min | Nom | Max |
| A | 4.37 | 4.57 | 4.77 |
| A1 | 1.25 | 1.30 | 1.45 |
| A2 | 2.20 | 2.40 | 2.60 |
| b | 0.70 | 0.80 | 0.95 |
| b2 | 1.17 | 1.27 | 1.47 |
| c | 0.40 | 0.50 | 0.65 |
| D | 15.10 | 15.60 | 16.10 |
| D1 | 8.80 | 9.10 | 9.40 |
| D2 | 5.50 | - | - |
| E | 9.70 | 10.00 | 10.30 |
| E3 | 7.00 | - | - |
| e | 2.54 BSC | | |
| e1 | 5.08 BSC | | |
| H1 | 6.25 | 6.50 | 6.85 |
| L | 12.75 | 13.50 | 13.80 |
| L1 | - | 3.10 | 3.40 |
| | 3.40 | 3.60 | 3.80 |
| Q | 2.60 | 2.80 | 3.00 |

Version 1: TO220-C package outline dimension

## Ordering Information

| Package Type | Units/ Tube | Tubes / Inner Box | Units/ Inner Box | Inner Boxes/ Carton Box | Units/ Carton Box |
|---|---|---|---|---|---|