## General Description

SFGMOS®

$R_{DS(ON)}$, low gate charge, fast switching and excellent avalanche characteristics. The low $V_{th}$ series is specially designed to use in synchronous rectification power systems with low driving voltage.

## Features

- Low $R_{DS(ON)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery

## Applications

- PD charger
- Motor driver
- Switching voltage regulator
- DC-DC convertor
- Switched mode power supply

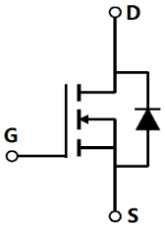
## Key Performance Parameters

| Parameter | Value | Unit |
|---|---|---|
| $V_{DS,\ min}$ @ $T_{j(max)}$ | 100 | V |
| $I_{D,\ pulse}$ | 48 | A |
| $R_{DS(ON),\ max}$ @ $V_{GS}$=10V | 12 | |
| $Q_g$ | 32.1 | nC |

## Marking Information

| Product Name | Package | Marking |
|---|---|---|
| SFG10S12BF | SOP8 | SFG10S12B |

## Package & Pin information



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

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain source voltage | $V_{DS}$ | 100 | V |
| Gate source voltage | $V_{GS}$ | ±20 | V |
| Continuous drain current[1], $T_C$=25 °C | $I_D$ | 12 | A |
| Pulsed drain current[2], $T_C$=25 °C | $I_{D, pulse}$ | 48 | A |
| Continuous diode forward current[1], $T_C$=25 °C | $I_S$ | 12 | A |
| Diode pulsed current[2], $T_C$=25 °C | $I_{S, pulse}$ | 48 | A |
| Power dissipation[3], $T_C$=25 °C | $P_D$ | 4 | W |
| Single pulsed avalanche energy[5] | $E_{AS}$ | 65 | mJ |
| Operation and storage temperature | $T_{stg}$ $T_j$ | -55 to 150 | °C |

## Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal resistance, junction-ambient[4] | R | 31 | °C/W |

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

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Drain-source breakdown voltage | $BV_{DSS}$ | 100 | | | V | $V_{GS}$=0 V, $I_D$=250 A |
| Gate threshold voltage | $V_{GS(th)}$ | 1.5 | | 2.5 | V | $V_{DS}$=$V_{GS}$, $I_D$=250 A |
| Drain-source on-state resistance | $R_{DS(ON)}$ | | 9.2 | 12.0 | | $V_{GS}$=10 V, $I_D$=12 A |
| Drain-source on-state resistance | $R_{DS(ON)}$ | | 12.0 | 16.0 | | $V_{GS}$=4.5 V, $I_D$=9 A |
| Gate-source leakage current | $I_{GSS}$ | | | 100<br>-100 | nA | $V_{GS}$=20 V<br>$V_{GS}$=- |

## Dynamic Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Input capacitance | $C_{iss}$ | | 1918 | | pF | $V_{GS}$=0 V, $V_{DS}$=50 V, 100 kHz |
| Output capacitance | $C_{oss}$ | | 353 | | pF | |
| Reverse transfer capacitance | $C_{rss}$ | | 10.6 | | pF | |
| Turn-on delay time | $t_{d(on)}$ | | 20.1 | | ns | $V_{GS}$=10 V, $V_{DS}$=50 V, $R_G$=2 $I_D$=10 A |
| Rise time | $t_r$ | | 4.5 | | ns | |
| Turn-off delay time | $t_{d(off)}$ | | 44.3 | | ns | |
| Fall time | $t_f$ | | 8.5 | | ns | |

## Gate Charge Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Total gate charge | $Q_g$ | | 32.1 | | nC | $V_{GS}$=10 V, $V_{DS}$=50 V, $I_D$=10 A |
| Gate-source charge | $Q_{gs}$ | | 6.1 | | nC | |
| Gate-drain charge | $Q_{gd}$ | | 8.1 | | nC | |
| Gate plateau voltage | $V_{plateau}$ | | 3.3 | | V | |

## Body Diode Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|---|---|---|---|---|---|---|
| Diode forward voltage | $V_{SD}$ | | | 1.3 | V | $I_S$=12 A, $V_{GS}$=0 V |
| Reverse recovery time | $t_{rr}$ | | 51.0 | | ns | $V_R$=50 V, $I_S$=10 A, |
| Reverse recovery charge | $Q_{rr}$ | | 86.8 | | nC | |
| Peak reverse recovery current | $I_{rrm}$ | | 2.9 | | 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 thermalcase thermalher0 g (en-S)>BDC 7q1.184 354.65

## Electrical Characteristics Diagrams

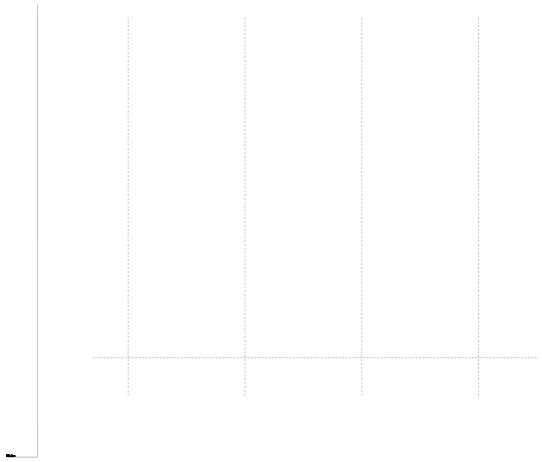


**Figure 7. Drain-source on-state resistance**



**Figure 8. Forward characteristic of body diode**

**Figure 9. Drain current**

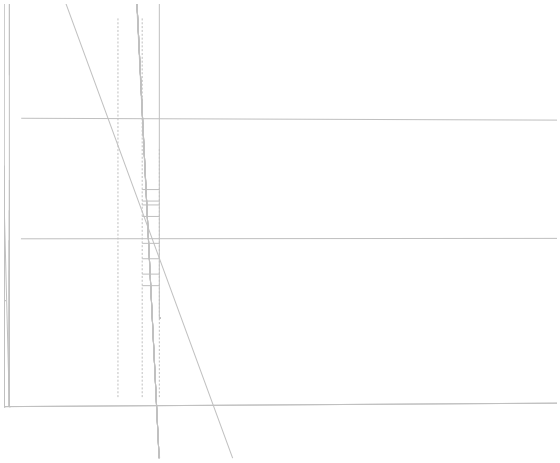


**Figure 10. Safe operation area $T_C$=25 °C**

## Test circuits and waveforms

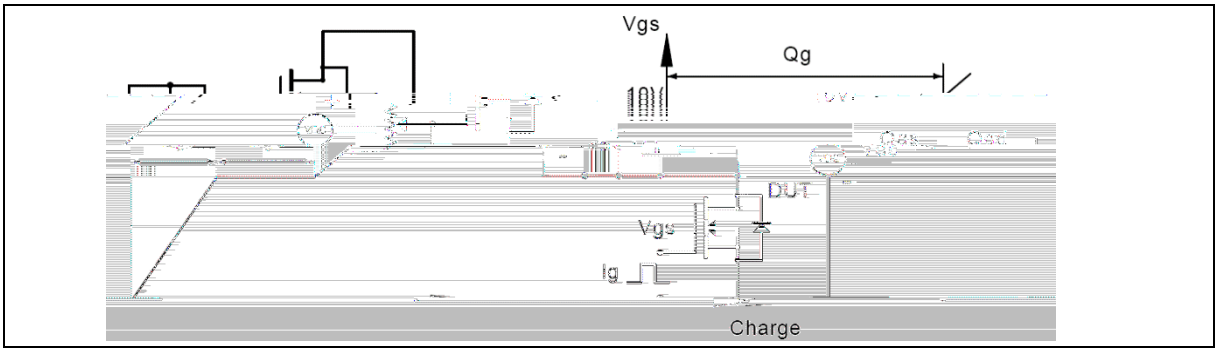



**Figure 1. Gate charge test circuit & waveform**

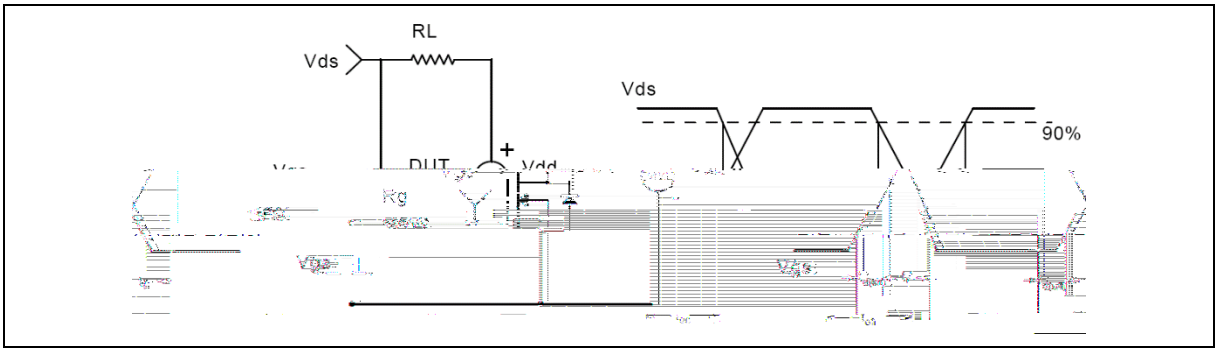



**Figure 2. Switching time test circuit & waveforms**

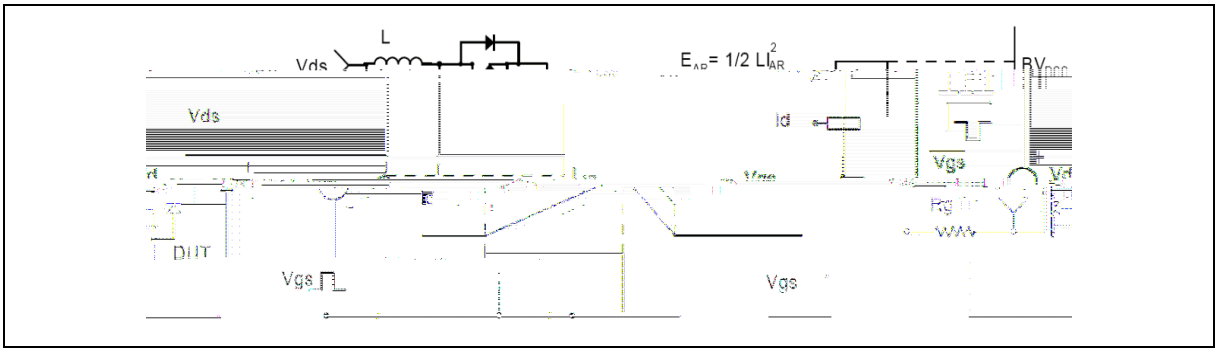



**Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms**

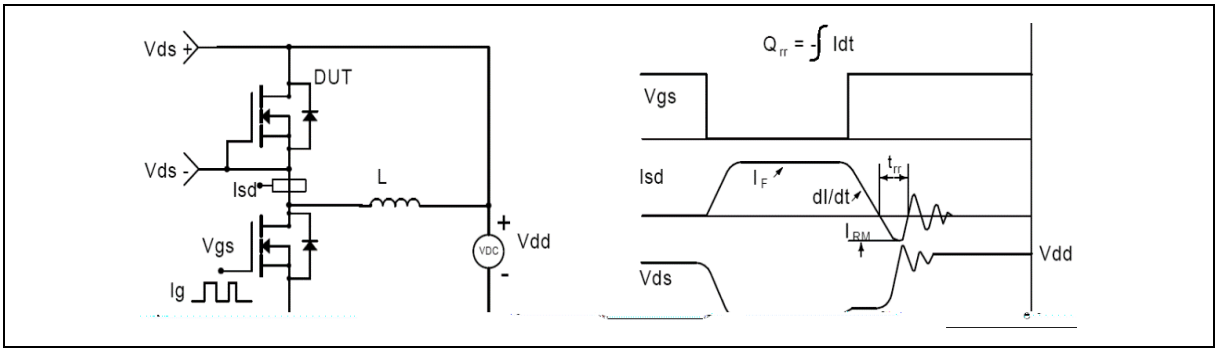



**Figure 4. Diode reverse recovery test circuit & waveforms**

## Package Information

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

## Ordering Information

| Package Type | Units/ Reel | Reels / Inner Box | Units/ Inner Box | Inner Boxes/ Carton Box | Units/ Carton Box |
|---|---|---|---|---|---|
| SOP8-K | 2500 | 2 | 5000 | 6 | 30000 |

## Product Information

| Product | Package | Pb Free | RoHS | Halogen Free |
|---|---|---|---|---|
| SFG10S12BF | SOP8 | yes | yes | yes |

## Legal Disclaimer

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