

General Description

SFGMOS[®] MOSFET is based on Oriental Semiconductor's unique device design to achieve low $R_{DS(ON)}$, 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

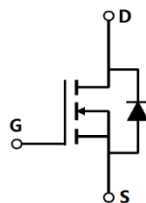
Key Performance Parameters

| Parameter | Value | Unit |
|--------------------------------|-------|------------|
| $V_{DS, min} @ T_{j(max)}$ | 100 | V |
| $I_{D, pulse}$ | 18 | A |
| $R_{DS(ON), max} @ V_{GS}=10V$ | 20 | m Ω |
| Q_g | 16.2 | nC |

Marking Information

| Product Name | Package | Marking |
|--------------|---------|-----------|
| SFG10S20BF | SOP8 | SFG10S20B |

Package & Pin information



Absolute Maximum Ratings at $T_j=25^\circ\text{C}$ 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⁾ , $T_C=25^\circ\text{C}$ | I_D | 6 | A |
| Pulsed drain current ²⁾ , $T_C=25^\circ\text{C}$ | $I_{D, pulse}$ | 18 | A |
| Continuous diode forward current ¹⁾ , $T_C=25^\circ\text{C}$ | I_S | 6 | A |
| Diode pulsed current ²⁾ , $T_C=25^\circ\text{C}$ | $I_{S, pulse}$ | 18 | A |
| Power dissipation ³⁾ , $T_C=25^\circ\text{C}$ | P_D | 4 | W |
| Single pulsed avalanche energy ⁵⁾ | E_{AS} | 57 | mJ |
| Operation and storage temperature | T_{stg}, T_j | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|--|-----------------|-------|--------------------|
| Thermal resistance, junction-ambient ⁴⁾ | $R_{\theta JA}$ | 31 | $^\circ\text{C/W}$ |

Electrical Characteristics at $T_j=25^\circ\text{C}$ unless otherwise specified

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|----------------------------------|--------------|------|------|------|---------------|---|
| Drain-source breakdown voltage | BV_{DSS} | 100 | | | V | $V_{GS}=0\text{ V}, I_D=250\ \mu\text{A}$ |
| Gate threshold voltage | $V_{GS(th)}$ | 1.4 | | 2.5 | V | $V_{DS}=V_{GS}, I_D=250\ \mu\text{A}$ |
| Drain-source on-state resistance | $R_{DS(ON)}$ | | 15.3 | 20.0 | m Ω | $V_{GS}=10\text{ V}, I_D=10\text{ A}$ |
| Drain-source on-state resistance | $R_{DS(ON)}$ | | 18.9 | 26.0 | m Ω | $V_{GS}=4.5\text{ V}, I_D=7\text{ A}$ |
| Gate-source leakage current | I_{GSS} | | | 100 | nA | $V_{GS}=20\text{ V}$ |
| | | | | -100 | | $V_{GS}=-20\text{ V}$ |
| Drain-source leakage current | I_{DSS} | | | 1 | μA | $V_{DS}=100\text{ V}, V_{GS}=0\text{ V}$ |

Dynamic Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|------------------------------|--------------|------|------|------|------|--|
| Input capacitance | C_{iss} | | 1004 | | pF | $V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=100\text{ kHz}$ |
| Output capacitance | C_{oss} | | 185 | | pF | |
| Reverse transfer capacitance | C_{rss} | | 9.8 | | pF | |
| Turn-on delay time | $t_{d(on)}$ | | 16.6 | | ns | $V_{GS}=10\text{ V}$, $V_{DS}=50\text{ V}$, $R_G=10\ \Omega$, $I_D=5\text{ A}$ |
| Rise time | t_r | | 3.8 | | ns | |
| Turn-off delay time | $t_{d(off)}$ | | 75.5 | | ns | |
| Fall time | t_f | | 46 | | ns | |

Gate Charge Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|----------------------|---------------|------|------|------|------|--|
| Total gate charge | Q_g | | 16.2 | | nC | $V_{GS}=10\text{ V}$, $V_{DS}=50\text{ V}$, $I_D=5\text{ A}$ |
| Gate-source charge | Q_{gs} | | 2.8 | | nC | |
| Gate-drain charge | Q_{gd} | | 4.1 | | nC | |
| Gate plateau voltage | $V_{plateau}$ | | 3 | | V | |

Body Diode Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|-------------------------------|-----------|------|------|------|------|---|
| Diode forward voltage | V_{SD} | | | 1.3 | V | $I_S=12\text{ A}$, $V_{GS}=0\text{ V}$ |
| Reverse recovery time | t_{rr} | | 49 | | ns | $V_R=50\text{ V}$, $I_S=5\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$ |
| Reverse recovery charge | Q_{rr} | | 61.8 | | nC | |
| Peak reverse recovery current | I_{rrm} | | 2.4 | | A | |

Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) P_d is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_a=25\text{ }^\circ\text{C}$.
- 5) $V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $L=0.3\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

Electrical Characteristics Diagrams

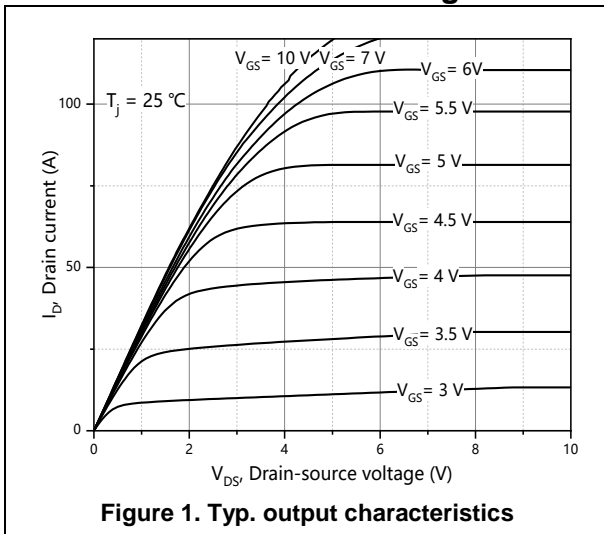


Figure 1. Typ. output characteristics

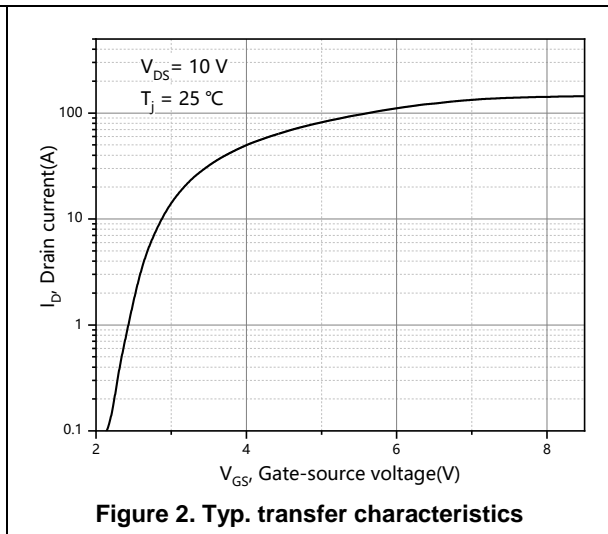


Figure 2. Typ. transfer characteristics

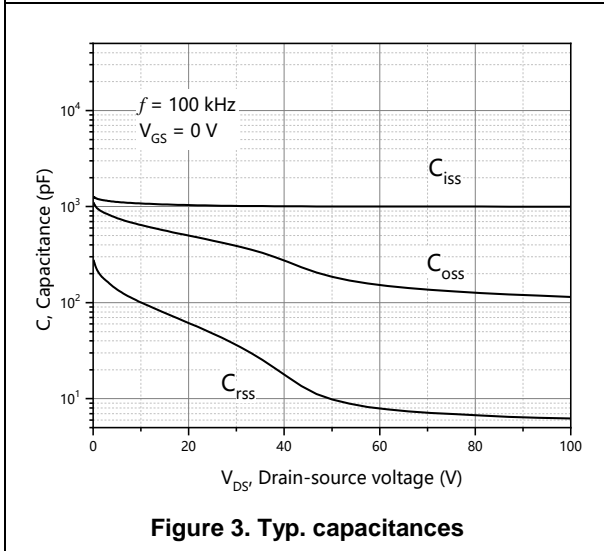


Figure 3. Typ. capacitances

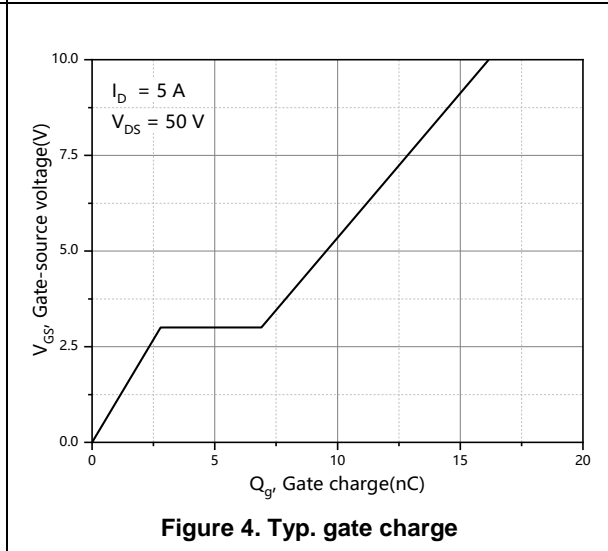


Figure 4. Typ. gate charge

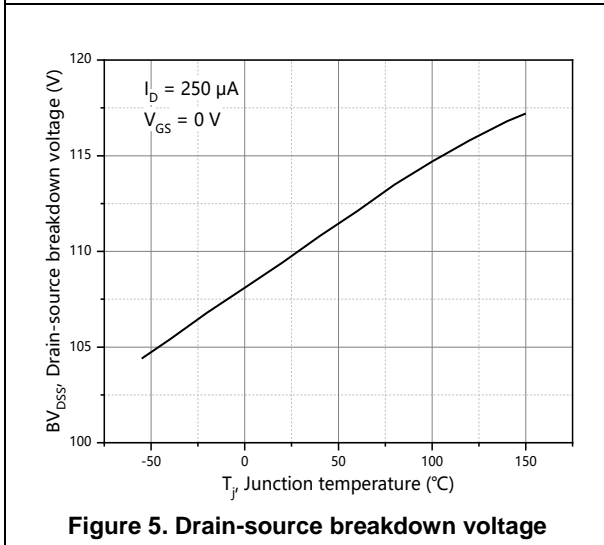


Figure 5. Drain-source breakdown voltage

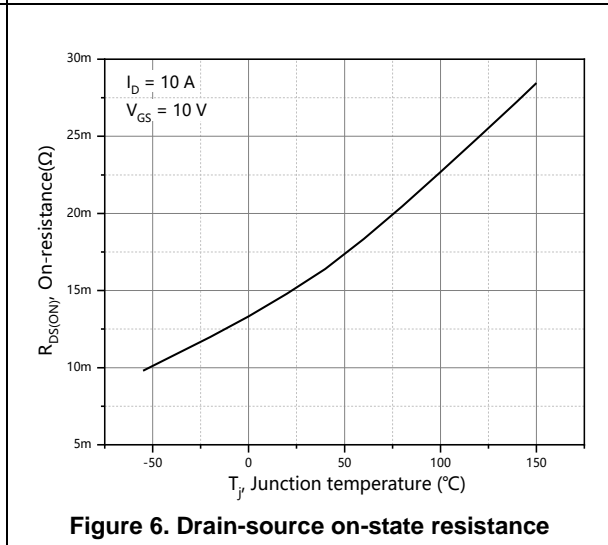
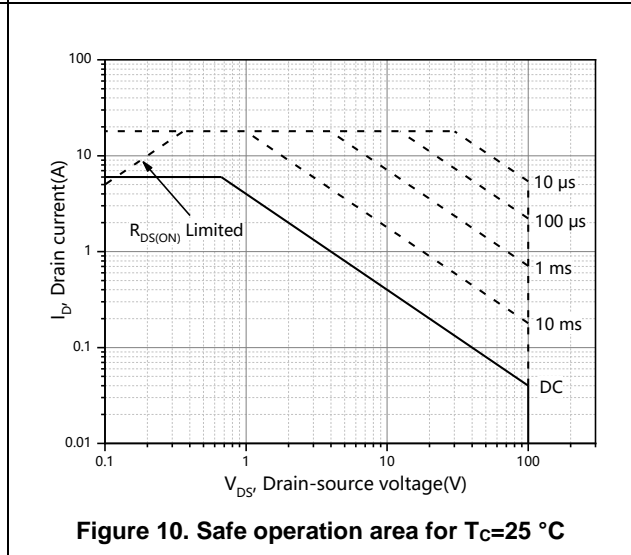
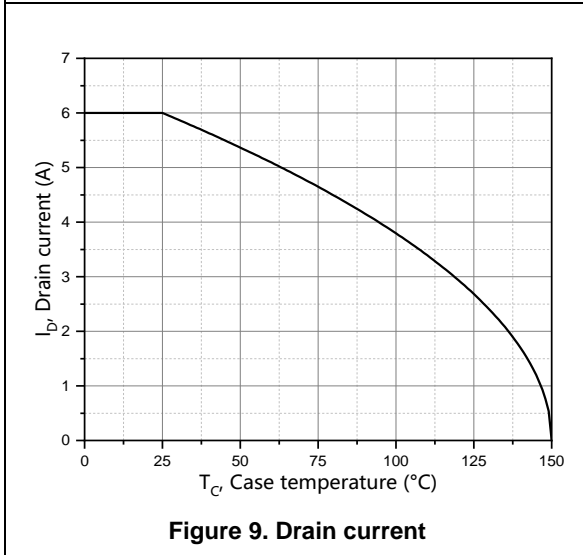
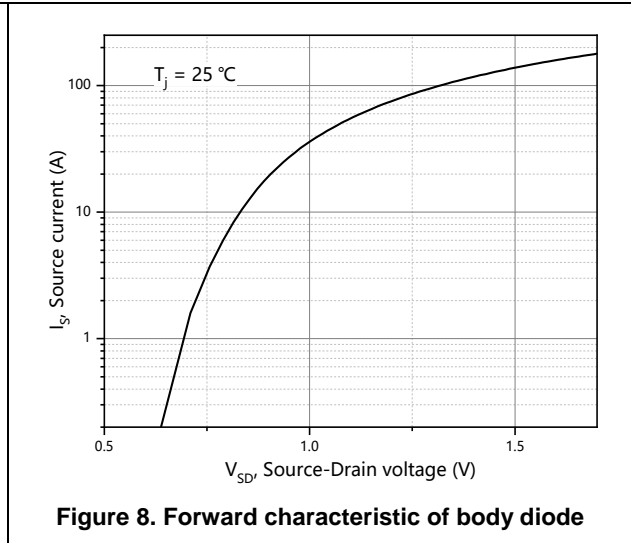
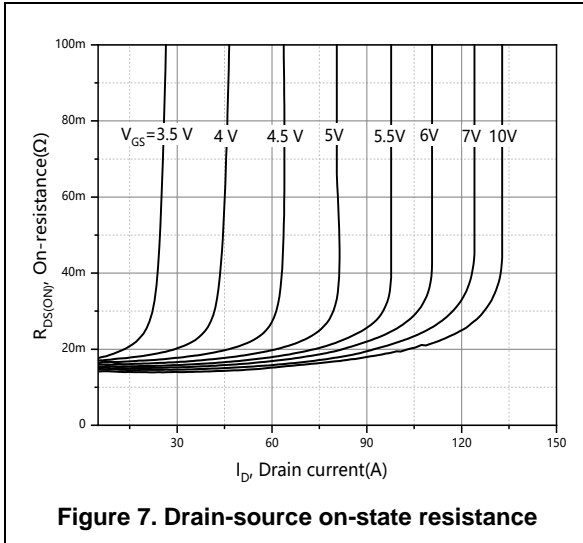


Figure 6. Drain-source on-state resistance



Test circuits and waveforms

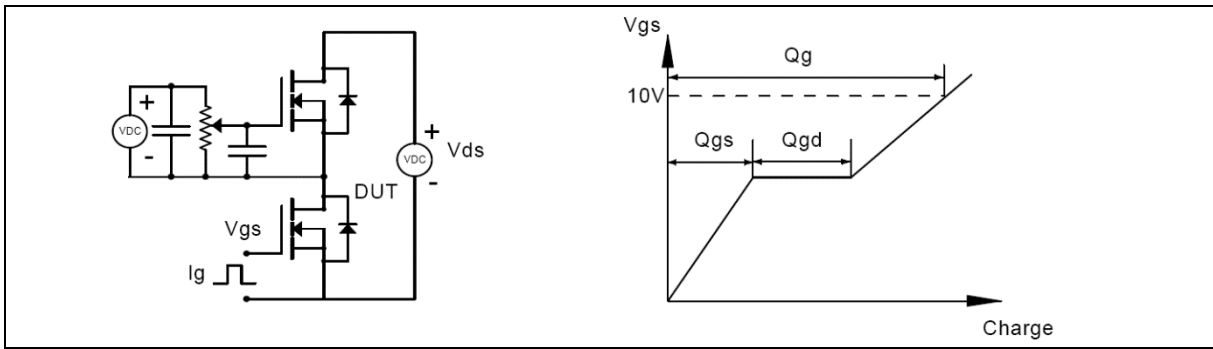


Figure 1. Gate charge test circuit & waveform



Figure 2. Switching time test circuit & waveforms

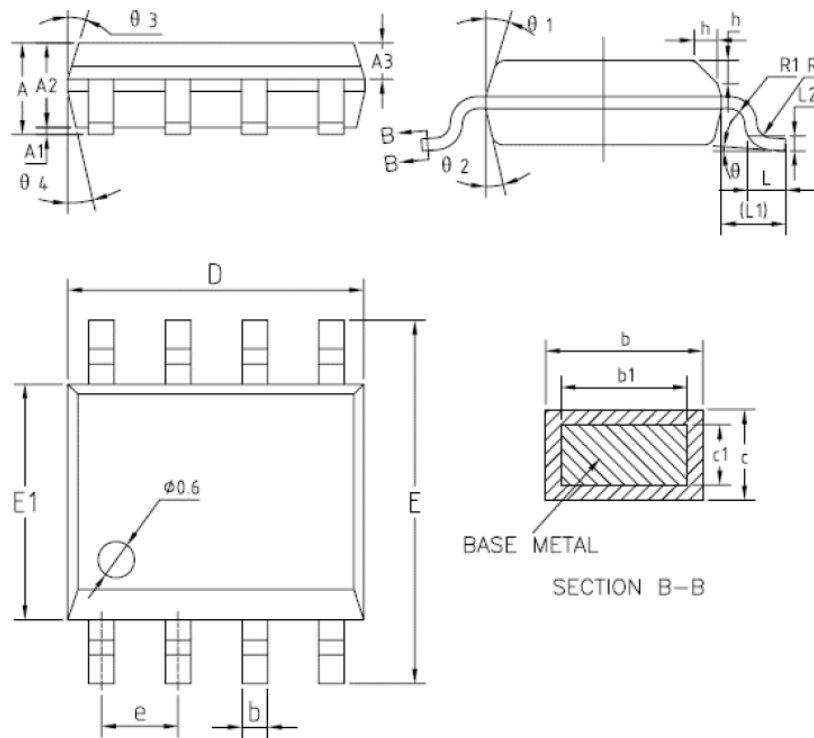


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms



Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



| Symbol | mm | | |
|------------|----------|------|------|
| | Min | Nom | Max |
| A | 1.35 | 1.55 | 1.75 |
| A1 | 0.10 | 0.15 | 0.25 |
| A2 | 1.25 | 1.40 | 1.65 |
| A3 | 0.50 | 0.60 | 0.70 |
| b | 0.38 | - | 0.51 |
| L1 | 1.04 REF | | |
| L2 | 0.25 BSC | | |
| b1 | 0.37 | 0.42 | 0.47 |
| c | 0.18 | - | 0.25 |
| c1 | 0.17 | 0.20 | 0.23 |
| D | 4.80 | 4.90 | 5 |
| E | 5.80 | 6.00 | 6.20 |
| E1 | 3.80 | 3.90 | 4.00 |
| e | 1.17 | 1.27 | 1.37 |
| L | 0.45 | 0.60 | 0.80 |
| R | 0.07 | - | - |
| R1 | 0.07 | - | - |
| h | 0.30 | 0.40 | 0.50 |
| θ | 0° | - | 8° |
| θ_1 | 15° | 17° | 19° |
| θ_2 | 11° | 13° | 15° |
| θ_3 | 15° | 17° | 19° |
| θ_4 | 11° | 13° | 15° |

Version 1: SOP8-K package outline dimension

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 |
|------------|---------|---------|------|--------------|
| SFG10S20BF | SOP8 | yes | yes | yes |

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