

General Description

FSMOS[®] 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 high V_{th} series is specially designed to use in motor control systems with driving voltage of more than 10V.

Features

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



Applications

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

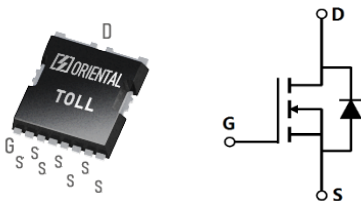
Key Performance Parameters

| Parameter | Value | Unit |
|----------------------------------|-------|-----------|
| V_{DS} | 80 | V |
| I_D , pulse | 1200 | A |
| $R_{DS(ON), max}$ @ $V_{GS}=10V$ | 1.2 | $m\Omega$ |
| Q_g | 152 | nC |

Marking Information

| Product Name | Package | Marking |
|--------------|---------|-------------|
| SFS08R012TNF | TOLL | SFS08R012TN |

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} | 80 | V |
| Gate-source voltage | V_{GS} | ± 20 | V |
| Continuous drain current ¹⁾ , $T_C=25^{\circ}\text{C}$ | I_D | 350 | A |
| Pulsed drain current ²⁾ , $T_C=25^{\circ}\text{C}$ | $I_{D, pulse}$ | 1200 | A |
| Continuous diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$ | I_S | 350 | A |
| Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$ | $I_{S, pulse}$ | 1200 | A |
| Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$ | P_D | 450 | W |
| Single pulsed avalanche energy ⁵⁾ | E_{AS} | 735 | mJ |
| Operation and storage temperature | T_{stg}, T_j | -55 to 175 | $^{\circ}\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|--|-----------------|-------|----------------------|
| Thermal resistance, junction-case | $R_{\theta JC}$ | 0.33 | $^{\circ}\text{C/W}$ |
| Thermal resistance, junction-ambient ⁴⁾ | $R_{\theta JA}$ | 62 | $^{\circ}\text{C/W}$ |

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} | 80 | | | V | $V_{GS}=0\text{ V}, I_D=250\ \mu\text{A}$ |
| Gate threshold voltage | $V_{GS(th)}$ | 2 | | 4 | V | $V_{DS}=V_{GS}, I_D=250\ \mu\text{A}$ |
| Drain-source on-state resistance | $R_{DS(ON)}$ | | 1 | 1.2 | m Ω | $V_{GS}=10\text{ V}, I_D=50\text{ A}$ |
| 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 | $V_{DS}=80\text{ V}, V_{GS}=0\text{ V}$ |
| Gate resistance | R_G | | 1.4 | | Ω | $f=1\text{ MHz}$, Open drain |

Dynamic Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|------------------------------|--------------|------|-------|------|------|--|
| Input capacitance | C_{iss} | | 11400 | | pF | $V_{GS}=0\text{ V}$, $V_{DS}=25\text{ V}$, $f=100\text{ kHz}$ |
| Output capacitance | C_{oss} | | 5700 | | pF | |
| Reverse transfer capacitance | C_{rss} | | 292 | | pF | |
| Turn-on delay time | $t_{d(on)}$ | | 29 | | ns | $V_{GS}=10\text{ V}$, $V_{DS}=40\text{ V}$, $R_G=2\ \Omega$, $I_D=40\text{ A}$ |
| Rise time | t_r | | 26 | | ns | |
| Turn-off delay time | $t_{d(off)}$ | | 69 | | ns | |
| Fall time | t_f | | 28 | | ns | |

Gate Charge Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|----------------------|---------------|------|------|------|------|---|
| Total gate charge | Q_g | | 152 | | nC | $V_{GS}=10\text{ V}$, $V_{DS}=40\text{ V}$, $I_D=40\text{ A}$ |
| Gate-source charge | Q_{gs} | | 43 | | nC | |
| Gate-drain charge | Q_{gd} | | 24 | | nC | |
| Gate plateau voltage | $V_{plateau}$ | | 4.1 | | V | |

Body Diode Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|-------------------------------|-----------|------|------|------|------|--|
| Diode forward voltage | V_{SD} | | | 1.3 | V | $I_S=30\text{ A}$, $V_{GS}=0\text{ V}$ |
| Reverse recovery time | t_{rr} | | 125 | | ns | $V_R=40\text{ V}$, $I_S=20\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$ |
| Reverse recovery charge | Q_{rr} | | 280 | | nC | |
| Peak reverse recovery current | I_{rrm} | | 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 inch² 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

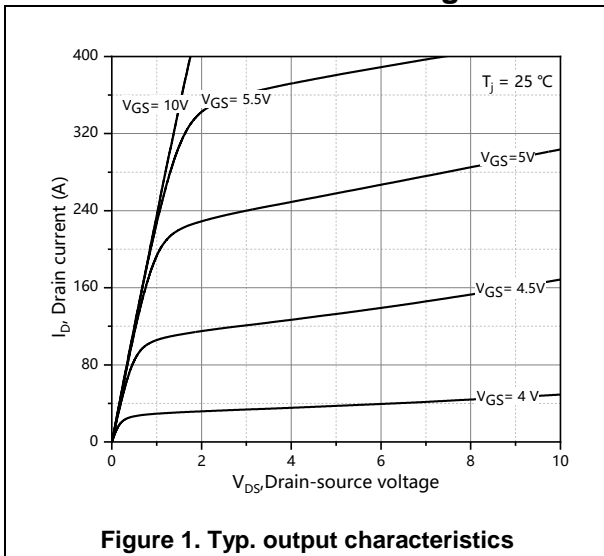


Figure 1. Typ. output characteristics

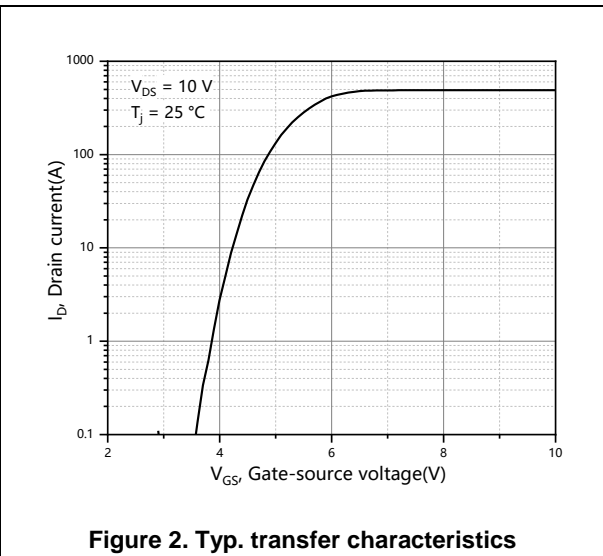


Figure 2. Typ. transfer characteristics

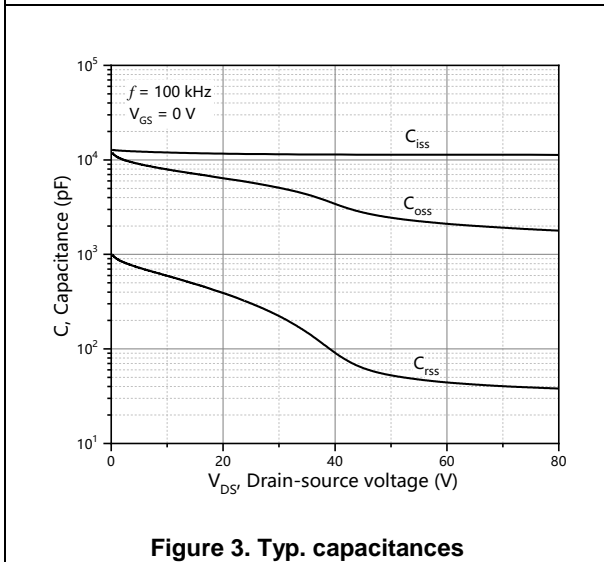


Figure 3. Typ. capacitances

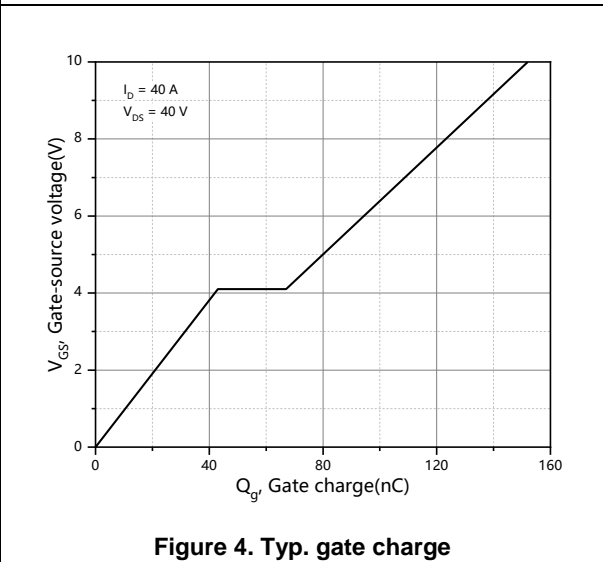


Figure 4. Typ. gate charge

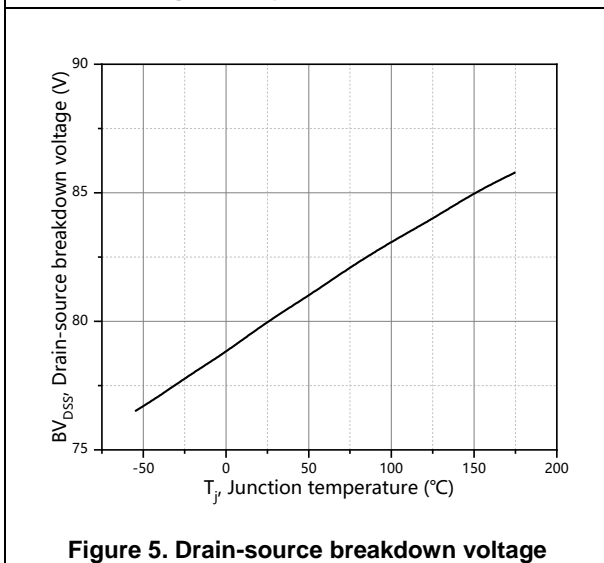


Figure 5. Drain-source breakdown voltage

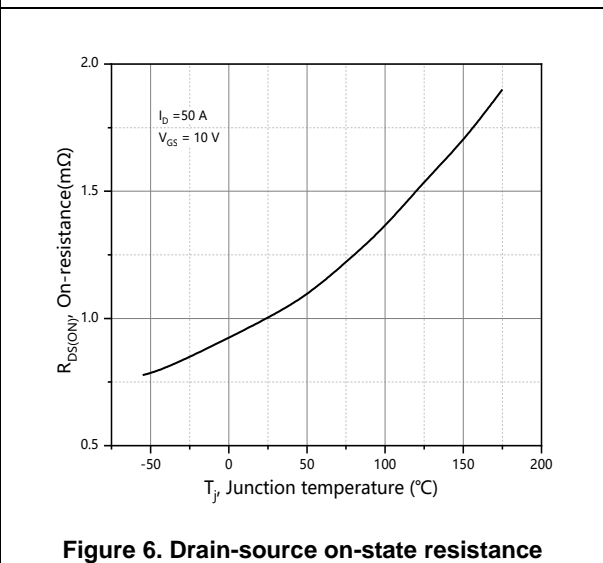
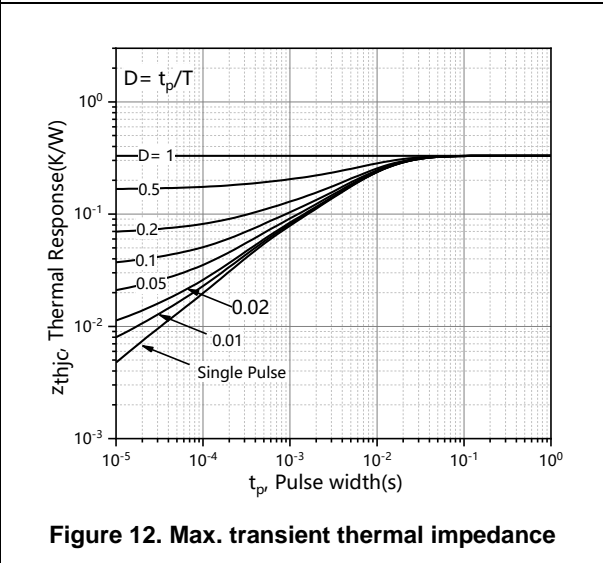
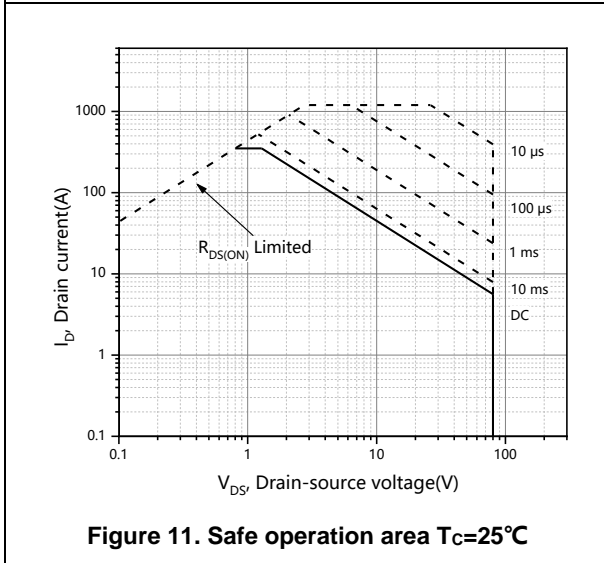
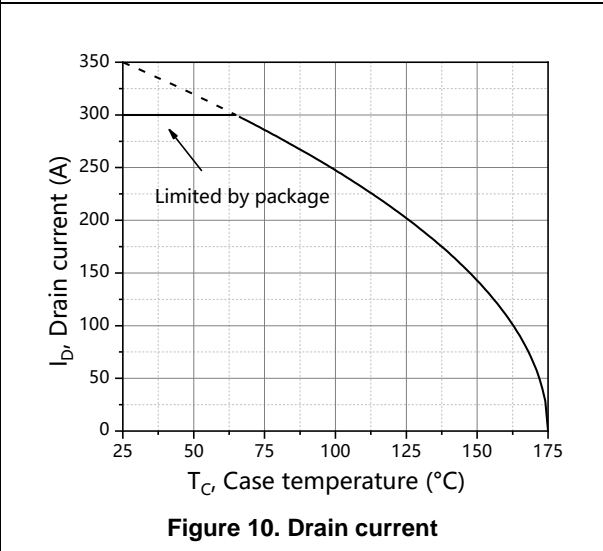
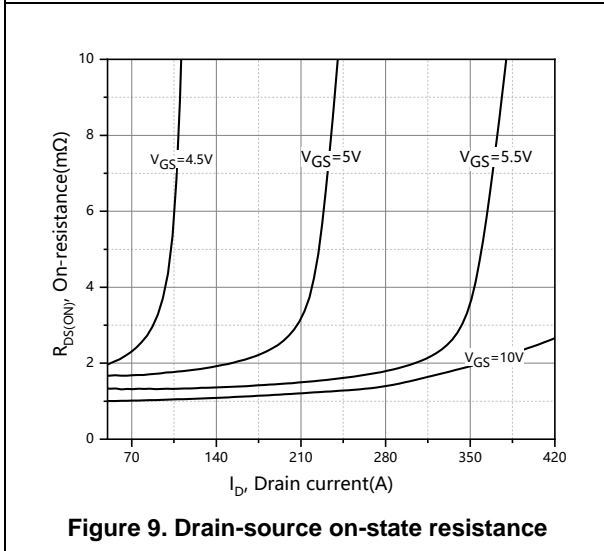
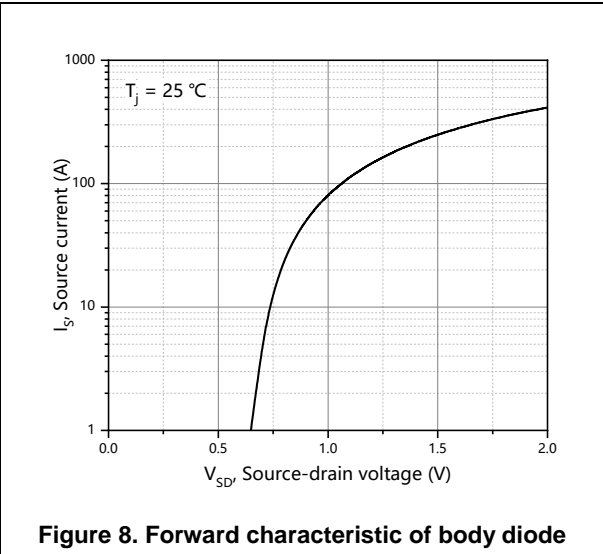
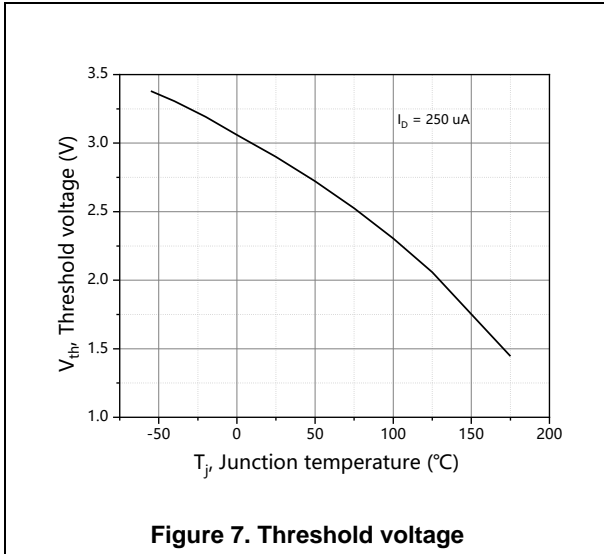


Figure 6. Drain-source on-state resistance



Test circuits and waveforms



Figure 1. Gate charge test circuit & waveform



Figure 2. Switching time test circuit & waveforms

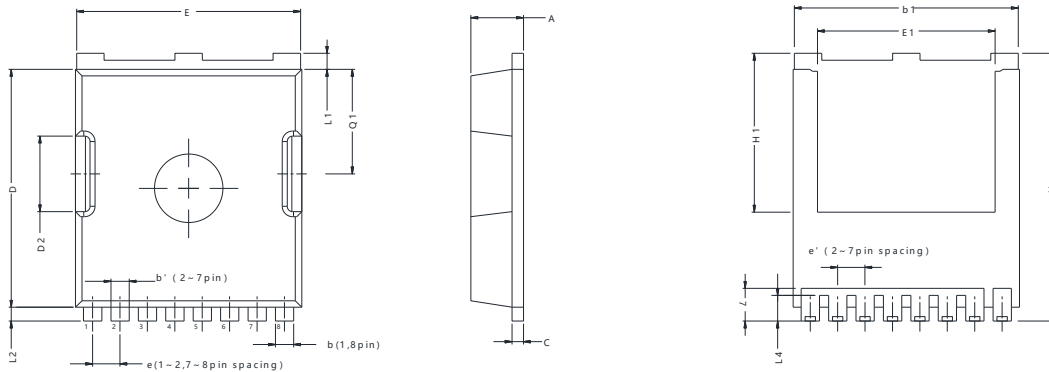


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms



Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



| Symbol | mm | | |
|--------|-----------|-------|-------|
| | Min | Nom | Max |
| A | 2.15 | 2.30 | 2.45 |
| b | 0.75 | 0.75 | 0.85 |
| b' | 0.70 | 0.70 | 0.80 |
| b1 | 9.65 | 9.80 | 9.95 |
| C | 0.45 | 0.50 | 0.60 |
| D | 10.18 | 10.38 | 10.58 |
| D2 | 3.15 | 3.30 | 3.45 |
| E | 9.70 | 9.90 | 10.10 |
| E1 | 7.95 | 8.10 | 8.25 |
| e | BSC 1.225 | | |
| e' | BSC 1.20 | | |
| Q1 | 4.40 | 4.55 | 4.70 |
| H | 11.48 | 11.68 | 11.88 |
| H1 | 6.80 | 6.95 | 7.10 |
| L | 1.60 | 1.80 | 2.00 |
| L1 | 0.50 | 0.70 | 0.90 |
| L2 | 0.48 | 0.60 | 0.72 |
| L4 | 1.00 | 1.15 | 1.30 |

Version 1: TOLL-P package outline dimension

Ordering Information

| Package Type | Units/ Reel | Reels / Inner Box | Units/ Inner Box | Inner Boxes/ Carton Box | Units/ Carton Box |
|--------------|-------------|-------------------|------------------|-------------------------|-------------------|
| TOLL-P | 1200 | 1 | 1200 | 5 | 6000 |

Product Information

| Product | Package | Pb Free | RoHS | Halogen Free |
|--------------|---------|---------|------|--------------|
| SFS08R012TNF | TOLL | yes | yes | yes |

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