

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

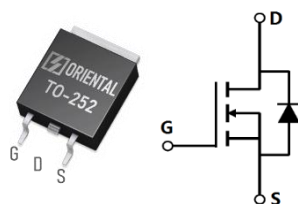
Key Performance Parameters

| Parameter | Value | Unit |
|---|-------|------|
| V _{DS} | 80 | V |
| I _{D, pulse} | 520 | A |
| R _{DS(ON), max @ V_{GS}=10V} | 3.4 | mΩ |
| Q _g | 70 | nC |
| PD | 132 | W |

Marking Information

| Product Name | Package | Marking |
|--------------|---------|------------|
| SFS08R03DNF | TO252 | SFS08R03DN |

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 | 130 | A |
| Pulsed drain current ²⁾ , $T_C=25^\circ\text{C}$ | $I_{D, pulse}$ | 520 | A |
| Continuous diode forward current ¹⁾ , $T_C=25^\circ\text{C}$ | I_S | 130 | A |
| Diode pulsed current ²⁾ , $T_C=25^\circ\text{C}$ | $I_{S, pulse}$ | 520 | A |
| Power dissipation ³⁾ , $T_C=25^\circ\text{C}$ | P_D | 132 | W |
| Single pulsed avalanche energy ⁵⁾ | E_{AS} | 205 | mJ |
| Operation and storage temperature | T_{stg}, T_j | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|--|-----------------|-------|--------------------|
| Thermal resistance, junction-case | $R_{\theta JC}$ | 0.94 | $^\circ\text{C/W}$ |
| 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 | $R_{DS(ON)}$ | | 3 | 3.4 | $\text{m}\Omega$ | $V_{GS}=10\text{ V}, I_D=50\text{ A}$ |
| 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 | | 1.8 | | Ω | $f=1\text{ MHz}$, Open drain |

Dynamic Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|------------------------------|--------------|------|------|------|------|--|
| Input capacitance | C_{iss} | | 5530 | | pF | $V_{GS}=0\text{ V}$, $V_{DS}=25\text{ V}$, $f=100\text{ kHz}$ |
| Output capacitance | C_{oss} | | 2080 | | pF | |
| Reverse transfer capacitance | C_{rss} | | 117 | | pF | |
| Turn-on delay time | $t_{d(on)}$ | | 20 | | ns | $V_{GS}=10\text{ V}$, $V_{DS}=40\text{ V}$, $R_G=2\ \Omega$, $I_D=50\text{ A}$ |
| Rise time | t_r | | 7 | | ns | |
| Turn-off delay time | $t_{d(off)}$ | | 38 | | ns | |
| Fall time | t_f | | 8 | | ns | |

Gate Charge Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|----------------------|---------------|------|------|------|------|---|
| Total gate charge | Q_g | | 69.9 | | nC | $V_{GS}=10\text{ V}$, $V_{DS}=40\text{ V}$, $I_D=50\text{ A}$ |
| Gate-source charge | Q_{gs} | | 21 | | nC | |
| Gate-drain charge | Q_{gd} | | 10.5 | | nC | |
| Gate plateau voltage | $V_{plateau}$ | | 4.3 | | V | |

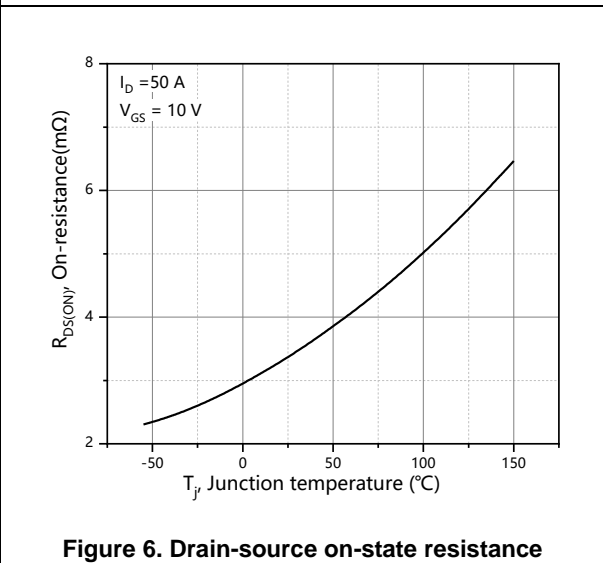
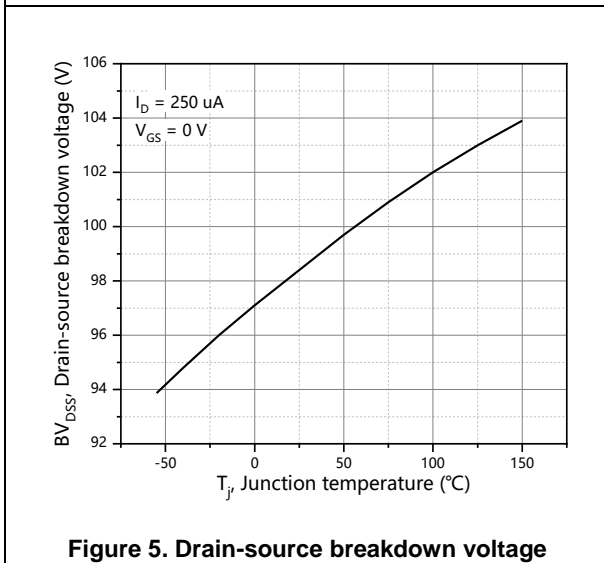
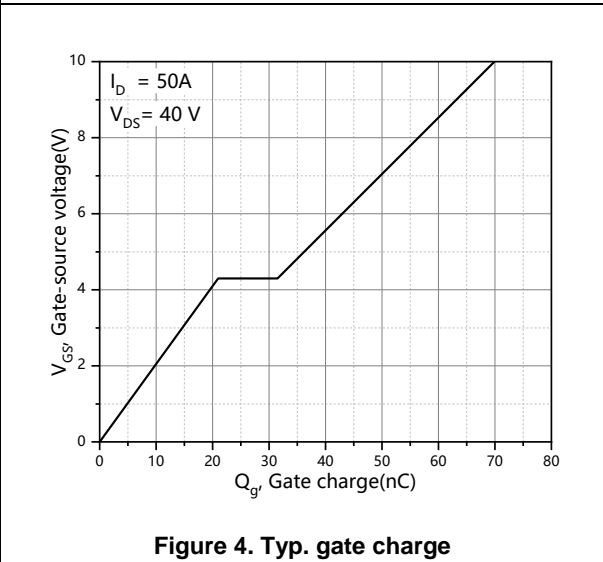
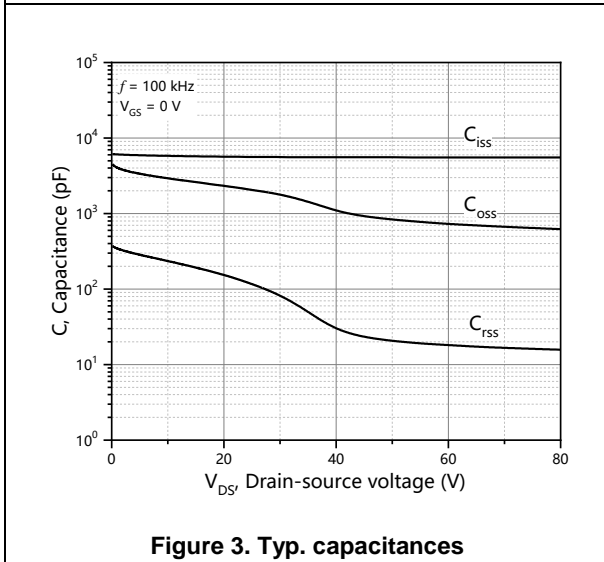
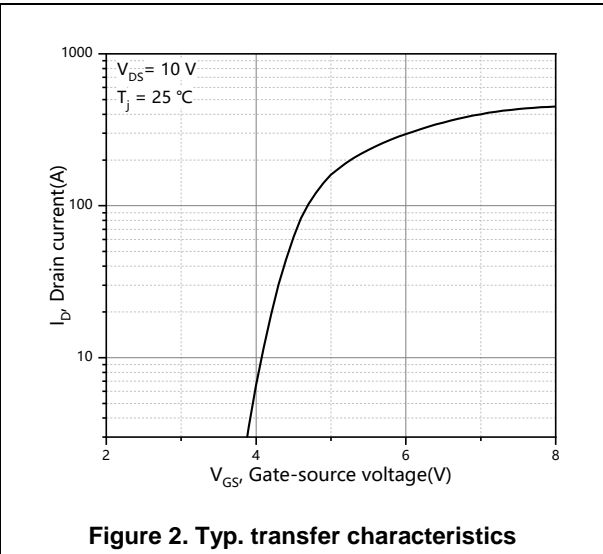
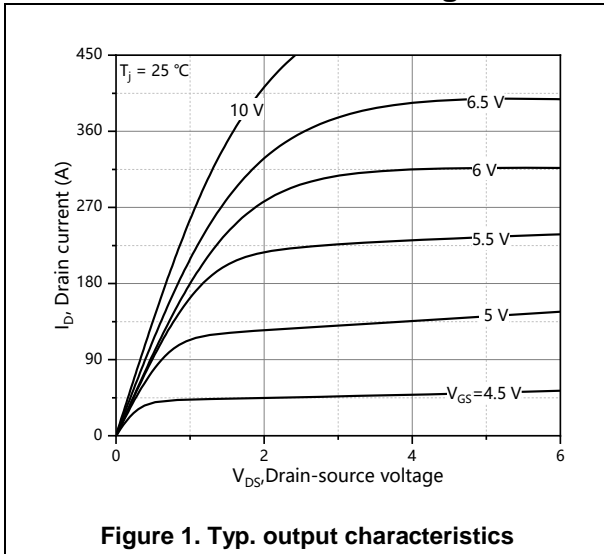
Body Diode Characteristics

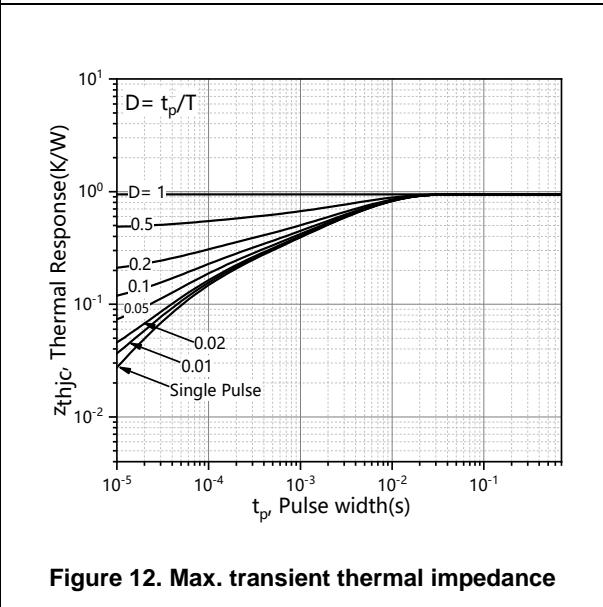
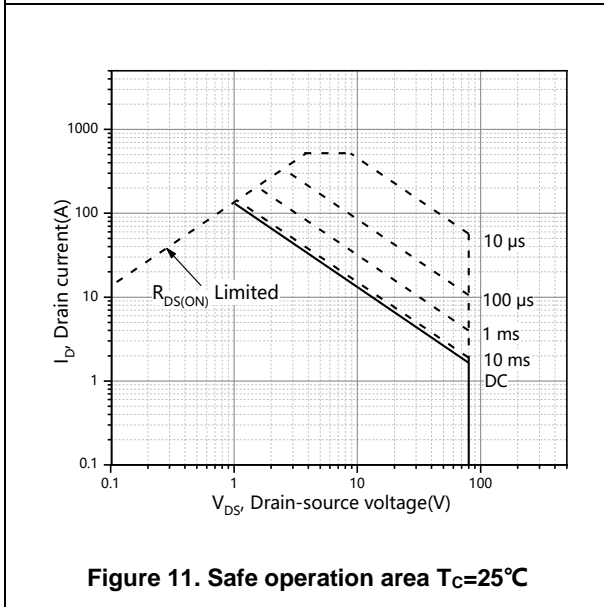
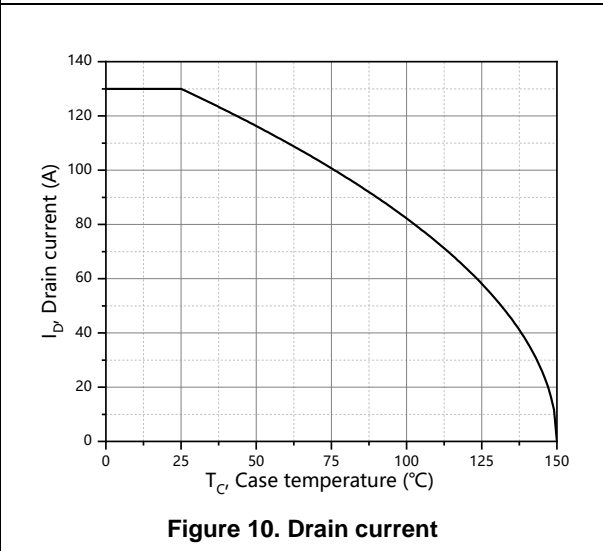
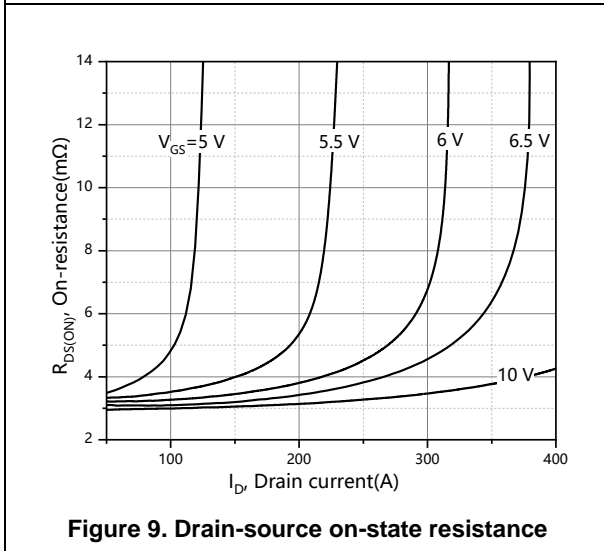
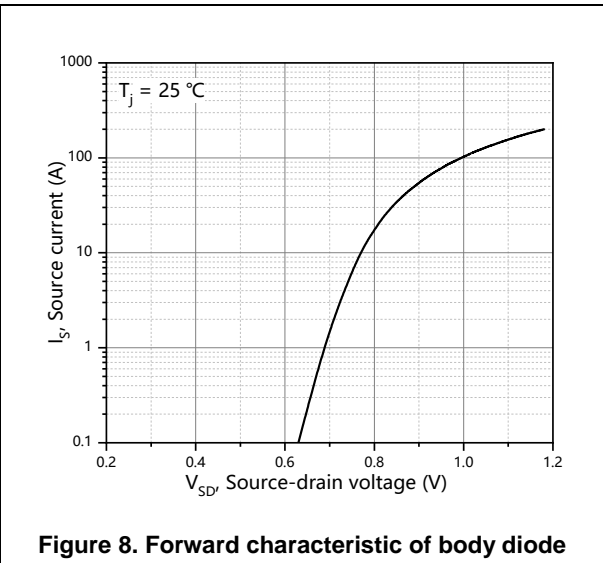
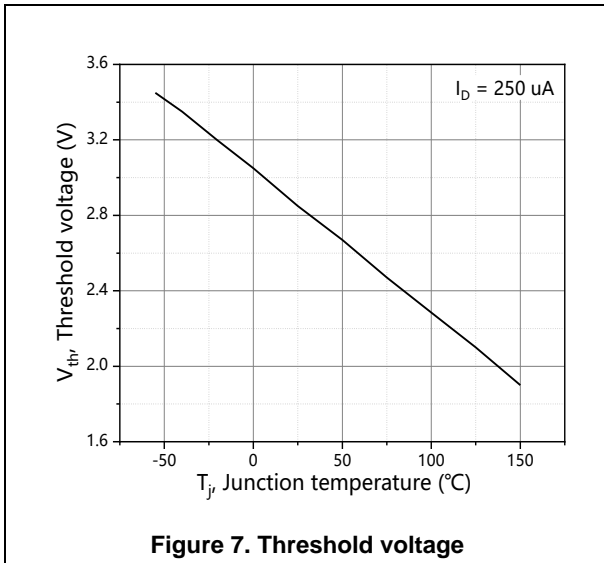
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test condition |
|-------------------------------|-----------|------|------|------|------|--|
| Diode forward voltage | V_{SD} | | | 1.3 | V | $I_S=12\text{ A}$, $V_{GS}=0\text{ V}$ |
| Reverse recovery time | t_{rr} | | 89 | | ns | $V_R=40\text{ V}$, $I_S=50\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$ |
| Reverse recovery charge | Q_{rr} | | 117 | | 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 in² 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





Test circuits and waveforms



Figure 1. Gate charge test circuit & waveform



Figure 2. Switching time test circuit & waveforms

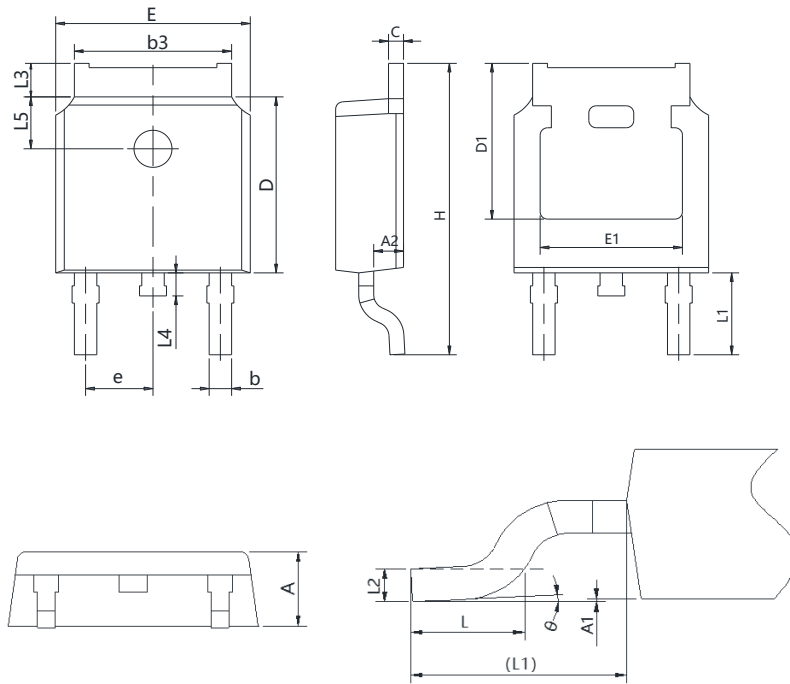


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms



Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



| Symbol | mm | | |
|--------|-----------|-------|-------|
| | Min | Nom | Max |
| A | 2.20 | 2.30 | 2.38 |
| A1 | 0.00 | - | 0.20 |
| A2 | 0.97 | 1.07 | 1.17 |
| b | 0.68 | 0.78 | 0.90 |
| b3 | 5.20 | 5.33 | 5.46 |
| c | 0.43 | 0.53 | 0.61 |
| D | 5.98 | 6.10 | 6.22 |
| D1 | 5.30 REF | | |
| E | 6.40 | 6.60 | 6.73 |
| E1 | 4.63 | - | - |
| e | 2.286 BSC | | |
| H | 9.40 | 10.10 | 10.50 |
| L | 1.38 | 1.50 | 1.75 |
| L1 | 2.90 REF | | |
| L2 | 0.51 BSC | | |
| L3 | 0.88 | - | 1.28 |
| L4 | 0.50 | - | 1.00 |
| L5 | 1.65 | 1.80 | 1.95 |
| θ | 0° | - | 8° |

Version 1: TO252-P package outline dimension

Ordering Information

| Package Type | Units/ Reel | Reels / Inner Box | Units/ Inner Box | Inner Boxes/ Carton Box | Units/ Carton Box |
|--------------|-------------|-------------------|------------------|-------------------------|-------------------|
| TO252 | 2500 | 2 | 5000 | 5 | 25000 |

Product Information

| Product | Package | Pb Free | RoHS | Halogen Free |
|-------------|---------|---------|------|--------------|
| SFS08R03DNF | TO252 | yes | yes | yes |

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