

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 power supply 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

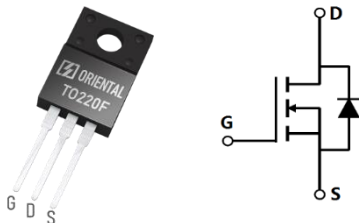
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	250	V
I_D , pulse	80	A
$R_{DS(ON)}$, max @ $V_{GS}=10V$	60	m Ω
Q_g	62	nC

Marking Information

Product Name	Package	Marking
SFS25R60FNF	TO220F	SFS25R60FN

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}	250	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current ¹⁾ , $T_C=25^\circ\text{C}$	I_D	20	A
Pulsed drain current ²⁾ , $T_C=25^\circ\text{C}$	$I_{D, pulse}$	80	A
Continuous diode forward current ¹⁾ , $T_C=25^\circ\text{C}$	I_S	20	A
Diode pulsed current ²⁾ , $T_C=25^\circ\text{C}$	$I_{S, pulse}$	80	A
Power dissipation ³⁾ , $T_C=25^\circ\text{C}$	P_D	75	W
Single pulsed avalanche energy ⁴⁾	E_{AS}	212	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	$R_{\theta JC}$	1.65	$^\circ\text{C/W}$
Thermal resistance, junction-ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

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}	250			V	$V_{GS}=0\text{ V}, I_D=250\ \mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	3		4.5	V	$V_{DS}=V_{GS}, I_D=250\ \mu\text{A}$
Drain-source on-state resistance	$R_{DS(ON)}$		54.5	60	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	$V_{DS}=250\text{ V}, V_{GS}=0\text{ V}$
Gate resistance	R_G		2.4		Ω	$f=1\text{ MHz}, \text{Open drain}$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		4878		pF	$V_{GS}=0\text{ V}$, $V_{DS}=125\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		115		pF	
Reverse transfer capacitance	C_{rss}		8.3		pF	
Turn-on delay time	$t_{d(on)}$		24		ns	$V_{GS}=10\text{ V}$, $V_{DS}=100\text{ V}$, $R_G=2\ \Omega$, $I_D=25\text{ A}$
Rise time	t_r		13		ns	
Turn-off delay time	$t_{d(off)}$		35		ns	
Fall time	t_f		7.6		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		62		nC	$V_{GS}=10\text{ V}$, $V_{DS}=100\text{ V}$, $I_D=25\text{ A}$
Gate-source charge	Q_{gs}		27		nC	
Gate-drain charge	Q_{gd}		12		nC	
Gate plateau voltage	$V_{plateau}$		6.1		V	

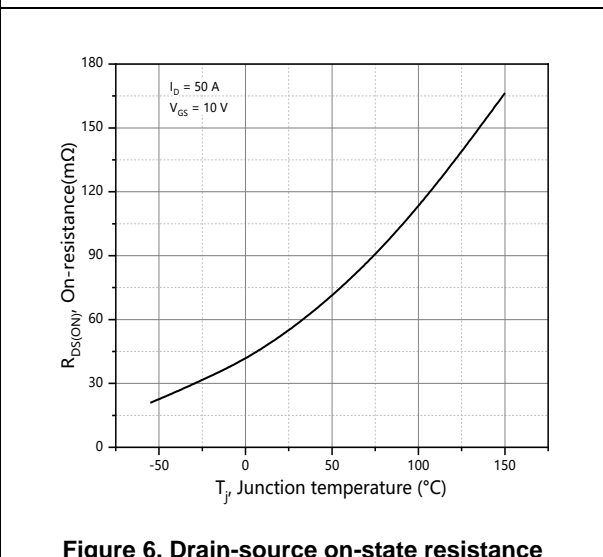
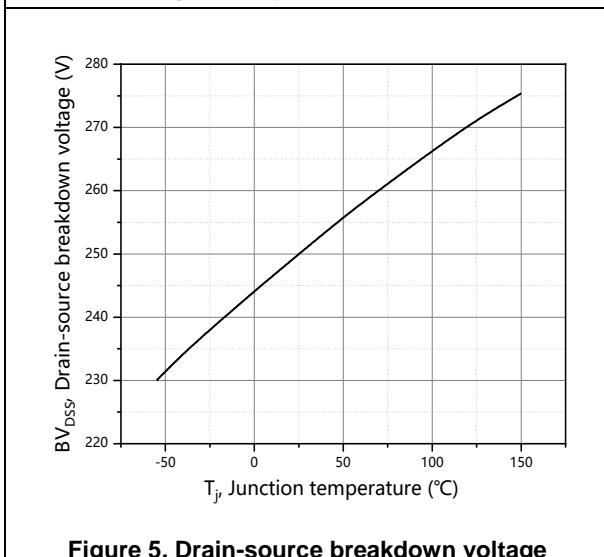
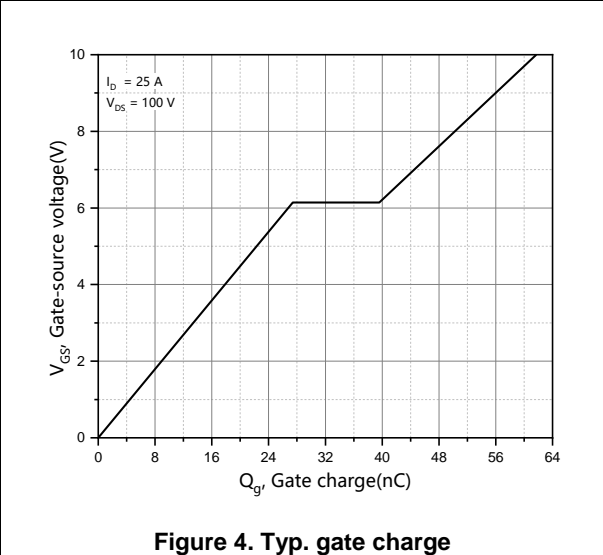
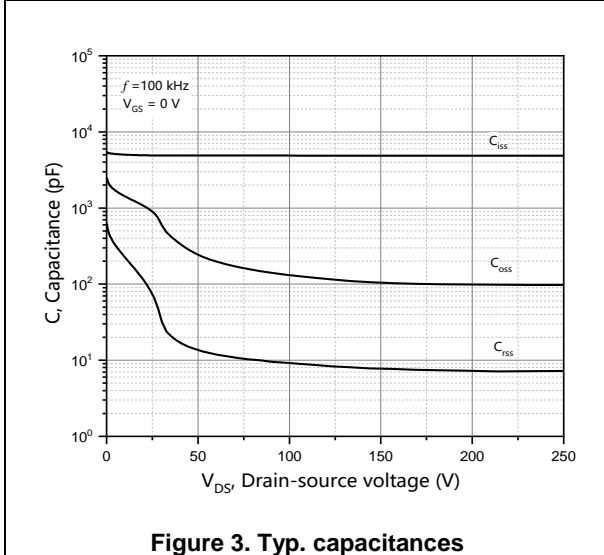
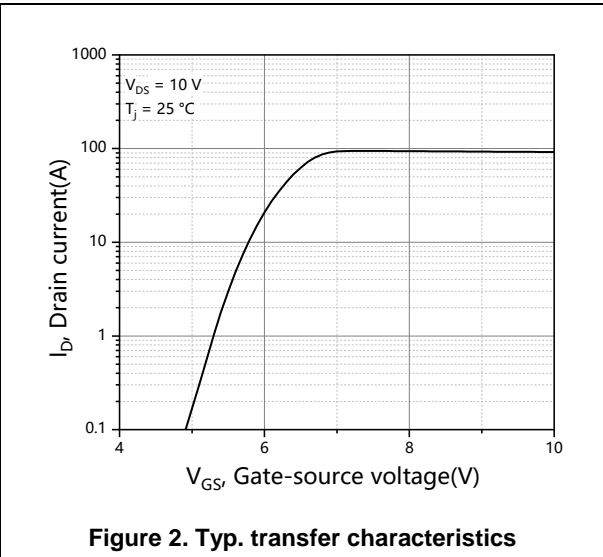
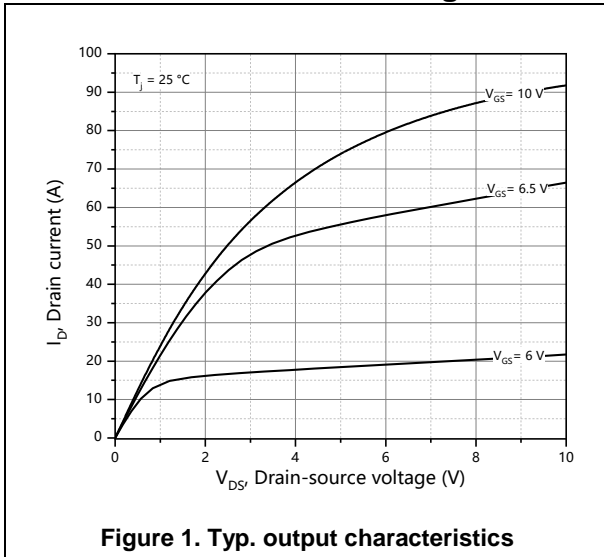
Body Diode Characteristics

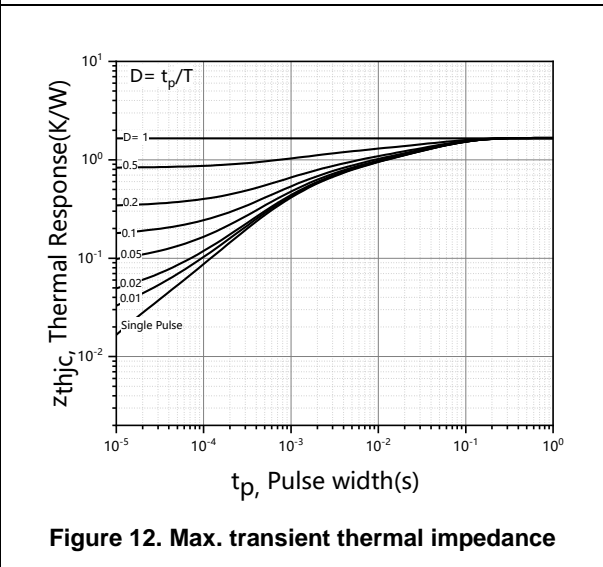
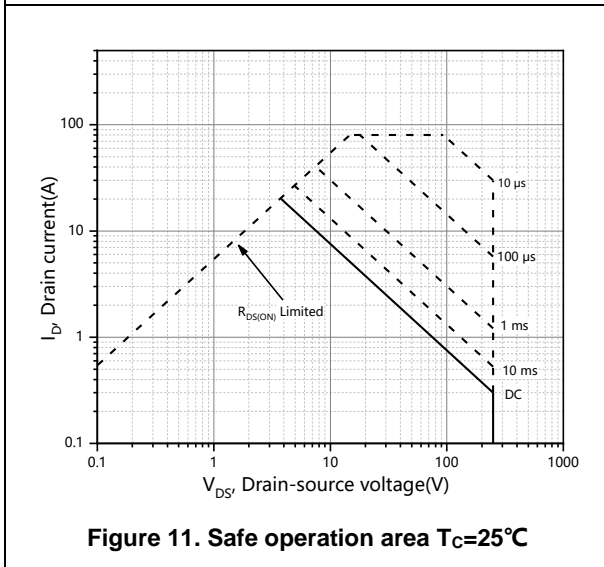
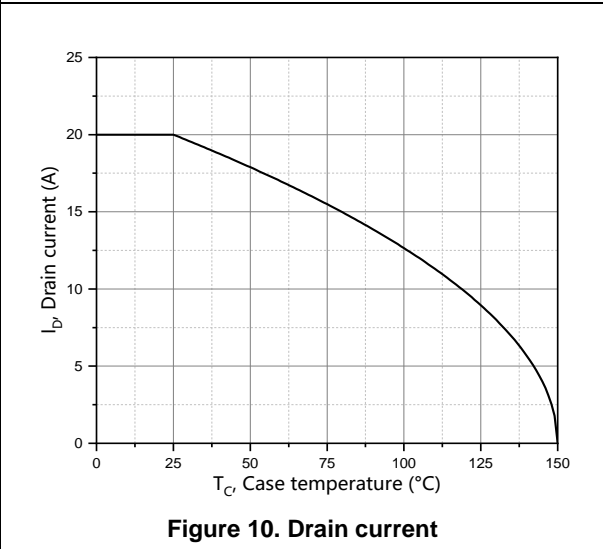
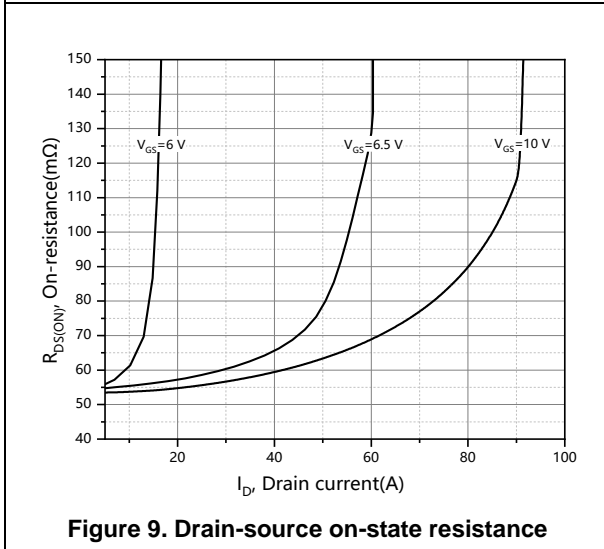
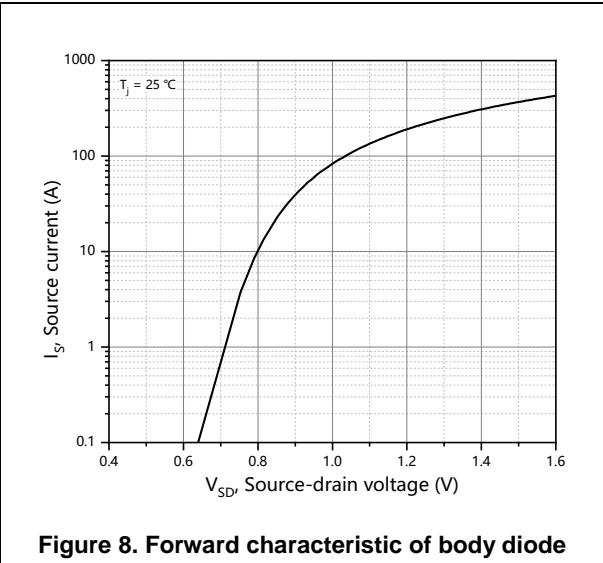
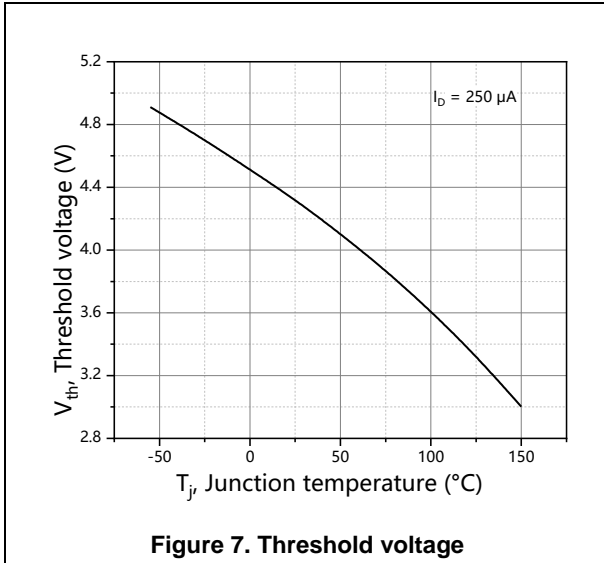
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	$I_S=50\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		131		ns	$V_R=100\text{ V}$, $I_S=25\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		665		nC	
Peak reverse recovery current	I_{rrm}		9.2		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) $V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $L=0.3\text{ mH}$, 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

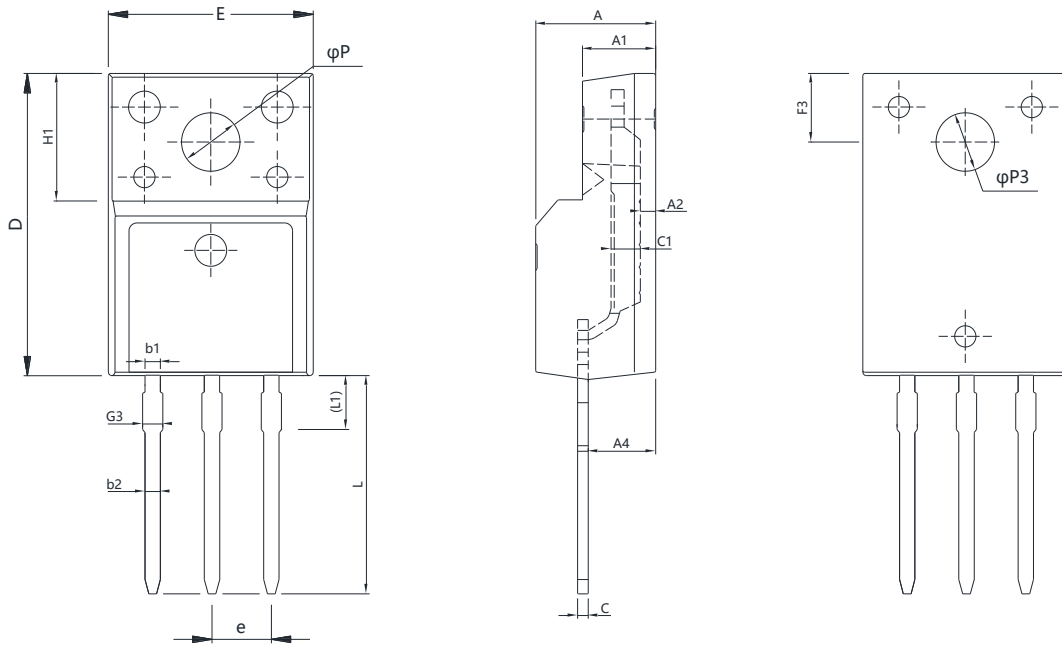


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms



Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Symbol	mm		
	Min	Nom	Max
E	9.96	10.16	10.36
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.30	0.45	0.60
A4	2.56	2.76	2.96
c	0.40	0.50	0.65
C1	1.20	1.30	1.35
D	15.57	15.87	16.17
H1	6.70REF		
e	2.54BSC		
L	12.68	12.98	13.28
L1	2.88	3.03	3.18
ΦP	3.03	3.18	3.38
ΦP3	3.15	3.45	3.65
F3	3.15	3.30	3.45
G3	1.25	1.35	1.55
b1	1.18	1.28	1.43
b2	0.70	0.80	0.95

Version : TO220F-P package outline dimension

Ordering Information

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO220F -P	50	20	1000	6	6000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
SFS25R60FNF	TO220F	yes	yes	yes

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