



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

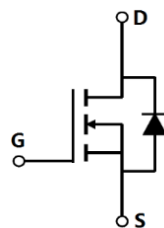
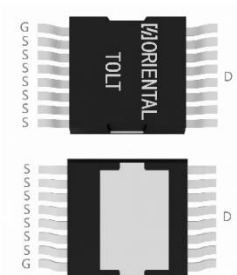
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	100	V
I_D , pulse	1080	A
$R_{DS(ON)}$, max @ $V_{GS}=10V$	1.9	$m\Omega$
Q_g	107	nC

Marking Information

Product Name	Package	Marking
SFS10R019LTNF	TOLT	SFS10R019LTN

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	270	A
Pulsed drain current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{D, \text{pulse}}$	1080	A
Continuous diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_S	270	A
Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{S, \text{pulse}}$	1080	A
Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$	P_D	375	W
Single pulsed avalanche energy ⁵⁾	E_{AS}	504	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	$R_{\theta JC}$	0.4	$^{\circ}\text{C/W}$
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}	100			V	$V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	2		4	V	$V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$
Drain-source on-state resistance	$R_{DS(ON)}$		1.6	1.9	$\text{m}\Omega$	$V_{GS}=10\text{ V}, I_D=50\text{ A}$
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	$V_{DS}=100\text{ V}, V_{GS}=0\text{ V}$
Gate resistance	R_G		0.9		Ω	$f=1\text{ MHz}$, Open drain

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		7790		pF	$V_{GS}=0\text{ V}$, $V_{DS}=25\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		4230		pF	
Reverse transfer capacitance	C_{rss}		250		pF	
Turn-on delay time	$t_{d(on)}$		27		ns	$V_{GS}=10\text{ V}$, $V_{DS}=50\text{ V}$, $R_G=2\ \Omega$, $I_D=25\text{ A}$
Rise time	t_r		22		ns	
Turn-off delay time	$t_{d(off)}$		51		ns	
Fall time	t_f		20		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		106		nC	$V_{GS}=10\text{ V}$, $V_{DS}=50\text{ V}$, $I_D=25\text{ A}$
Gate-source charge	Q_{gs}		30		nC	
Gate-drain charge	Q_{gd}		23		nC	
Gate plateau voltage	$V_{plateau}$		4.4		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	$I_S=20\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		136		ns	$V_R=50\text{ V}$, $I_S=25\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		219		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) 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

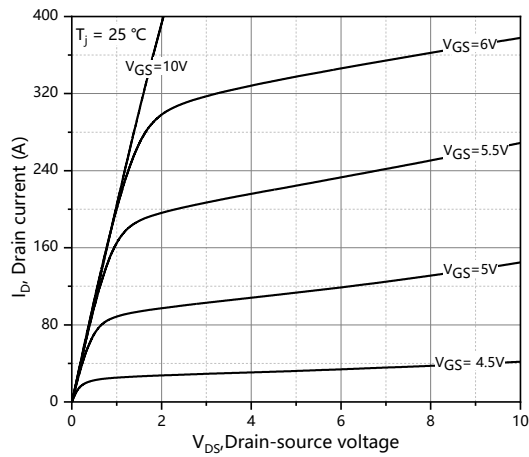


Figure 1. Typ. output characteristics

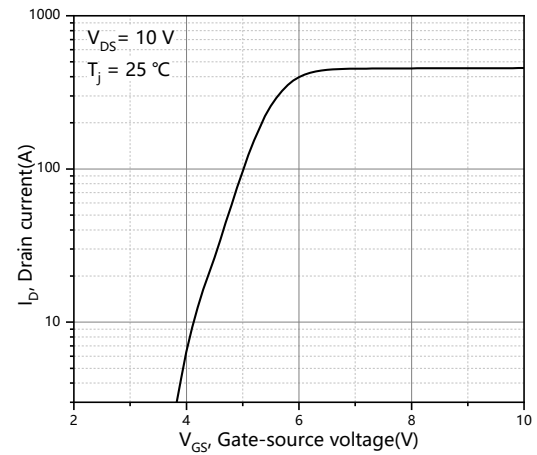


Figure 2. Typ. transfer characteristics

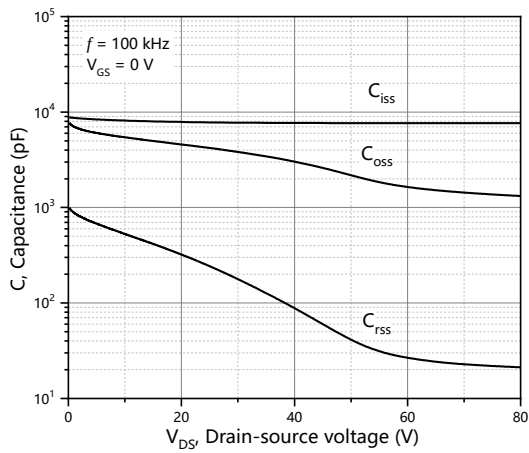


Figure 3. Typ. capacitances

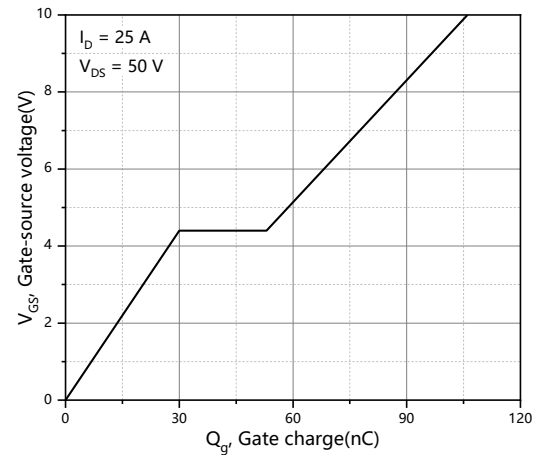


Figure 4. Typ. gate charge

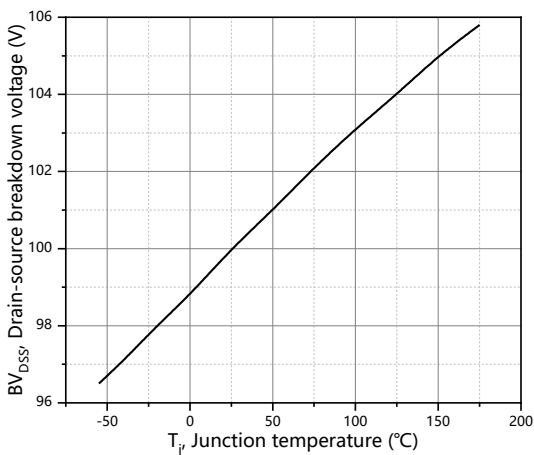


Figure 5. Drain-source breakdown voltage

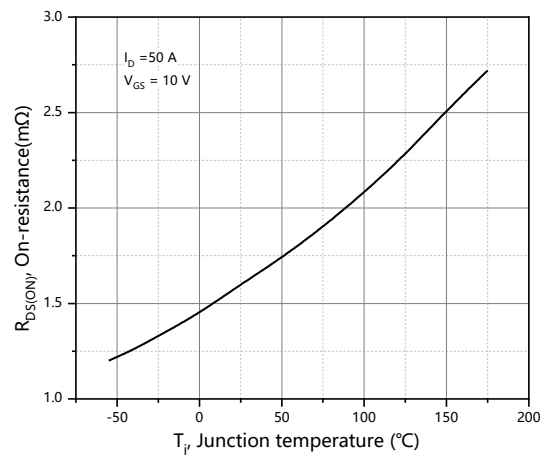


Figure 6. Drain-source on-state resistance

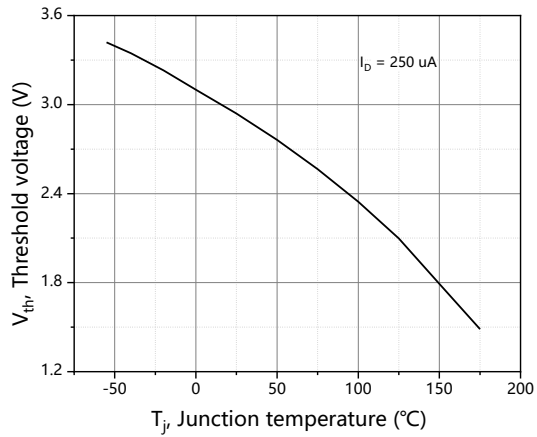


Figure 7. Threshold voltage

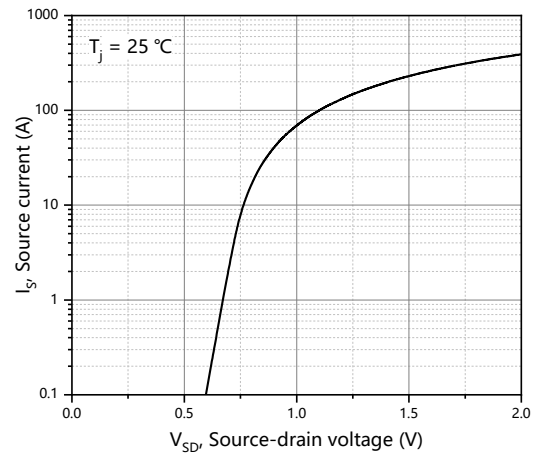


Figure 8. Forward characteristic of body diode

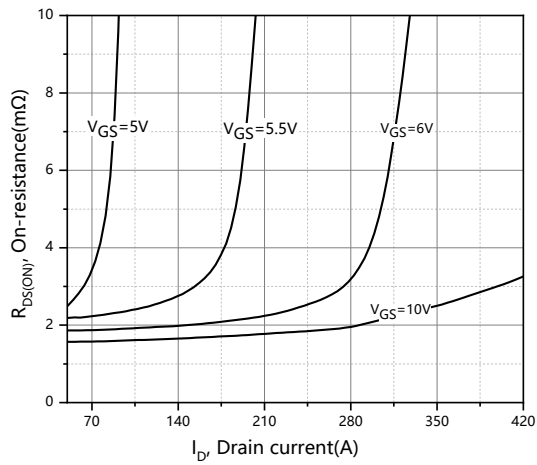


Figure 9. Drain-source on-state resistance

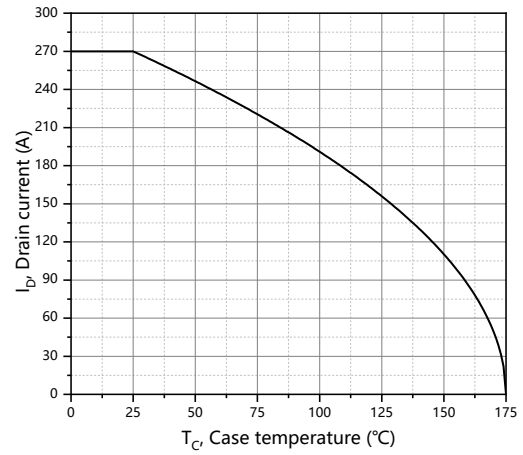


Figure 10. Drain current

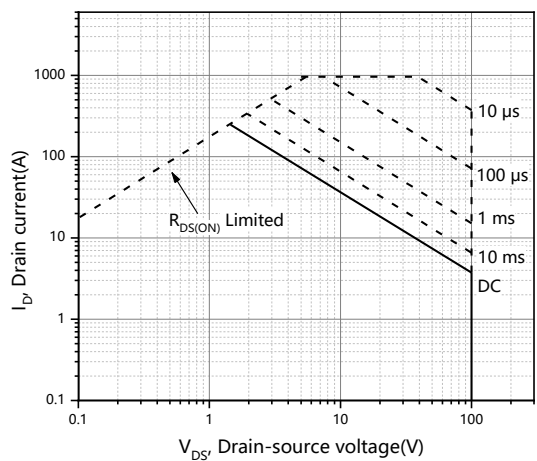


Figure 11. Safe operation area $T_C=25^{\circ}\text{C}$

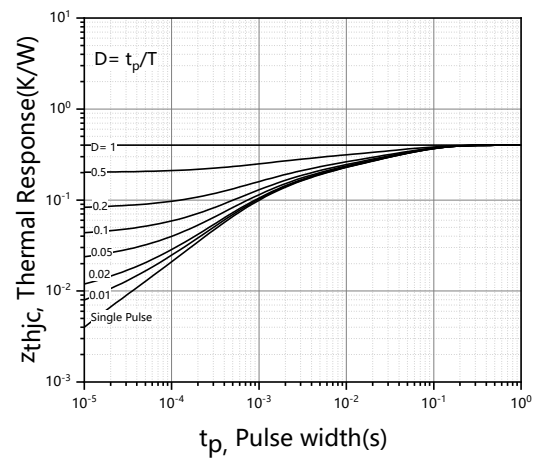


Figure 12. Max. transient thermal impedance

Test circuits and waveforms



Figure 1. Gate charge test circuit & waveform



Figure 2. Switching time test circuit & waveforms

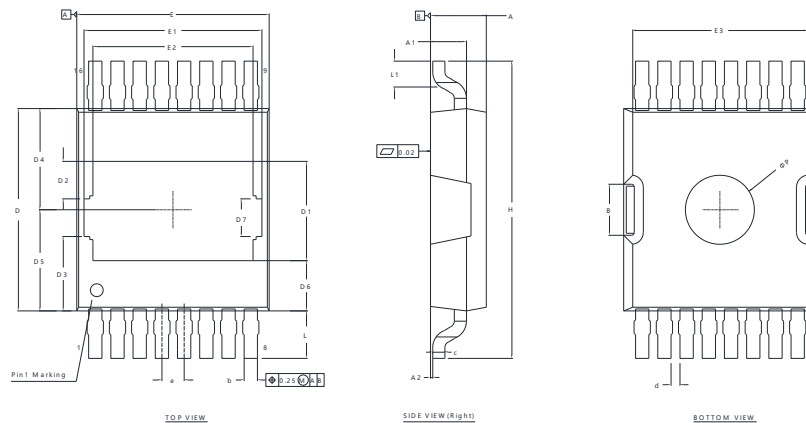


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms



Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Symbol	mm		
	Min	Nom	Max
A	2.250	2.300	2.350
A1	1.440	1.540	1.640
A2	0.010	-	0.160
b	0.600	0.700	0.800
c	0.400	0.500	0.600
d	0.400	0.500	0.600
e	1.200 BSC		
D	10.000	10.100	10.300
D1	4.760	4.960	5.160
D2	1.330	1.530	1.730
D3	4.050 REF		
D4	5.050 REF		
D5	5.050 REF		
D6	2.620 REF		
D7	2.000 REF		
E	9.700	10.000	10.100
E1	9.460 REF		
E2	8.100	8.300	8.500
E3	9.07	9.270	9.470
H	14.800	15.000	15.200
L	2.250	2.450	2.650
L1	1.350	1.500	1.650
ΦP	2.900	3.000	3.100
B	0.812	2.280	1.212
θ	1°	3°	5°
θ1	6°	7°	8°

Version 1: TOLT-W package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels / Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TOLT-W	1800	1	1800	5	9000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
SFS10R019LTNF	TOLT	yes	yes	yes

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