

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 reliability and uniformity
- Fast switching and soft recovery



Applications

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

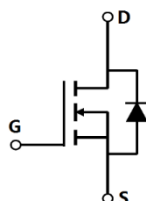
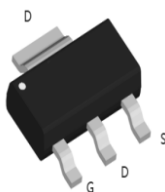
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	100	V
I_D , pulse	21	A
$R_{DS(ON)}$ max @ $V_{GS}=10V$	140	m Ω
Q_g	4.3	nC

Marking Information

Product Name	Package	Marking
SFG10R140QF	SOT-223-3L	10140

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	7	A
Pulsed drain current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{D, \text{pulse}}$	21	A
Continuous diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_S	7	A
Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{S, \text{Pulse}}$	21	A
Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$	P_D	17	W
Single pulsed avalanche energy ⁵⁾	E_{AS}	1.2	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	$R_{\theta JC}$	7.4	$^{\circ}\text{C/W}$
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	$V_{GS(th)}$	1.5		2.5	V	$V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$
Drain-source on-state resistance	$R_{DS(ON)}$		100	140	$\text{m}\Omega$	$V_{GS}=10\text{ V}, I_D=5\text{ A}$
Drain-source on-state resistance	$R_{DS(ON)}$		160	300	$\text{m}\Omega$	$V_{GS}=4.5\text{ V}, I_D=3\text{ A}$
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}		206		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		28.9		pF	
Reverse transfer capacitance	C_{rss}		1.4		pF	
Turn-on delay time	$t_{d(on)}$		14.7		ns	$V_{GS}=10\text{ V}$, $V_{DS}=50\text{ V}$, $R_G=2\ \Omega$, $I_D=5\text{ A}$
Rise time	t_r		3.5		ns	
Turn-off delay time	$t_{d(off)}$		20.9		ns	
Fall time	t_f		2.7		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		4.3		nC	$V_{GS}=10\text{ V}$, $V_{DS}=50\text{ V}$, $I_D=5\text{ A}$
Gate-source charge	Q_{gs}		1.5		nC	
Gate-drain charge	Q_{gd}		1.1		nC	
Gate plateau voltage	$V_{plateau}$		5.0		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}		32.1		ns	$V_R=50\text{ V}$, $I_S=5\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		39.4		nC	
Peak reverse recovery current	I_{rrm}		2.1		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) $V_{DD}=30\text{ V}$, $V_{GS}=10\text{ V}$, $L=0.3\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

Electrical Characteristics Diagrams

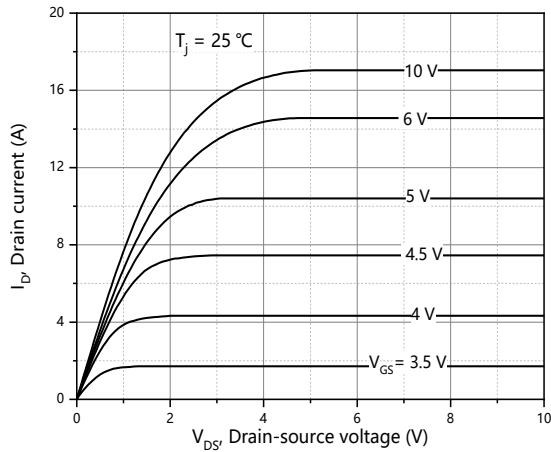


Figure 1. Typ. output characteristics

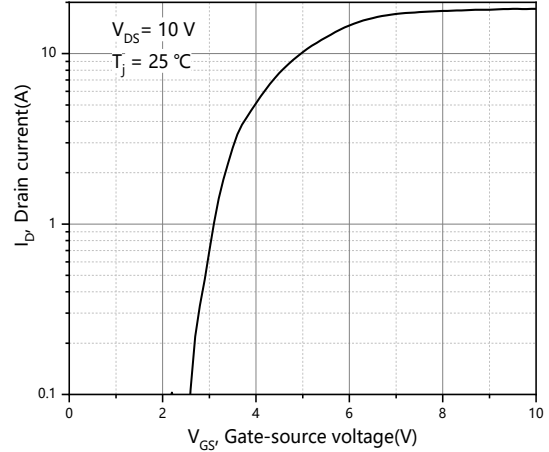


Figure 2. Typ. transfer characteristics

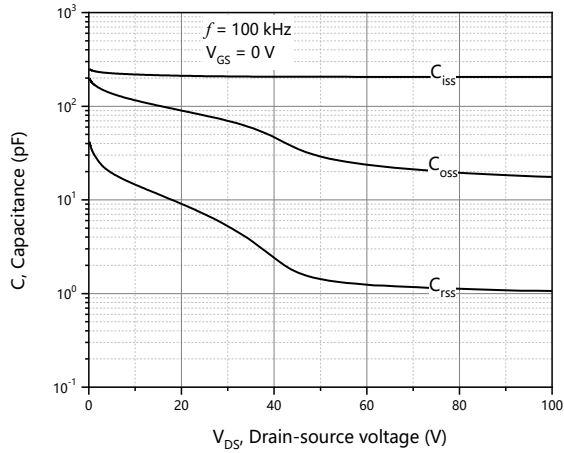


Figure 3. Typ. capacitances

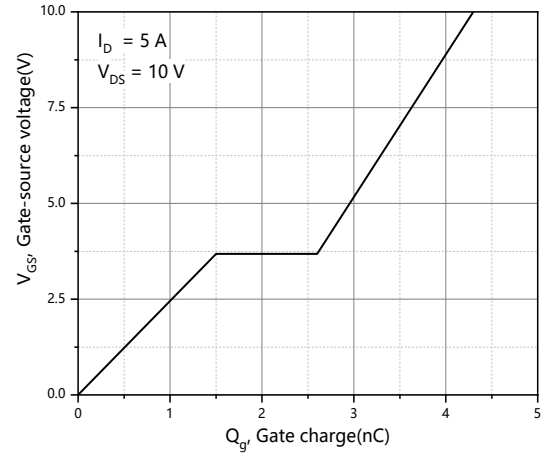


Figure 4. Typ. gate charge

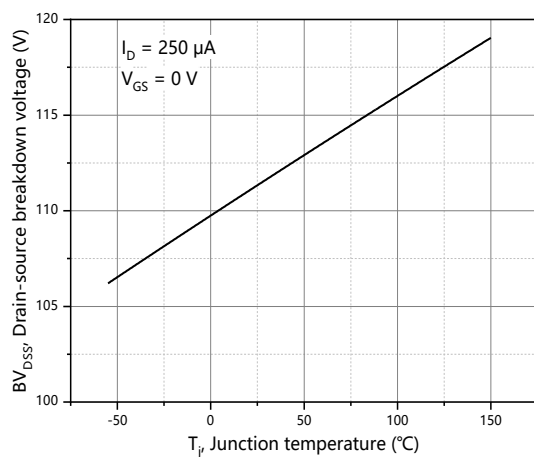


Figure 5. Drain-source breakdown voltage

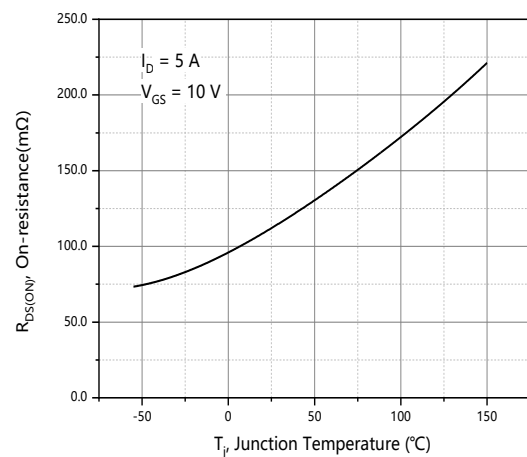


Figure 6. Drain-source on-state resistance

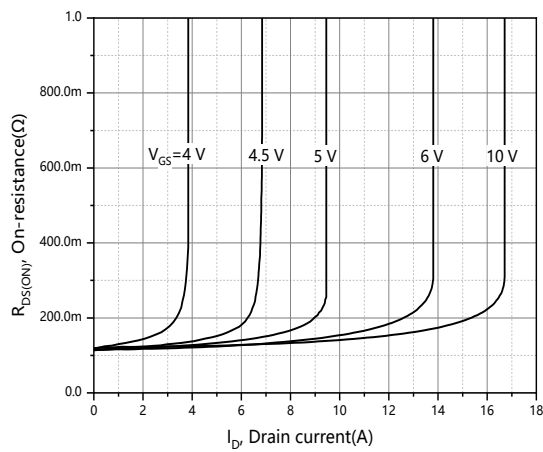


Figure 7. Drain-source on-state resistance

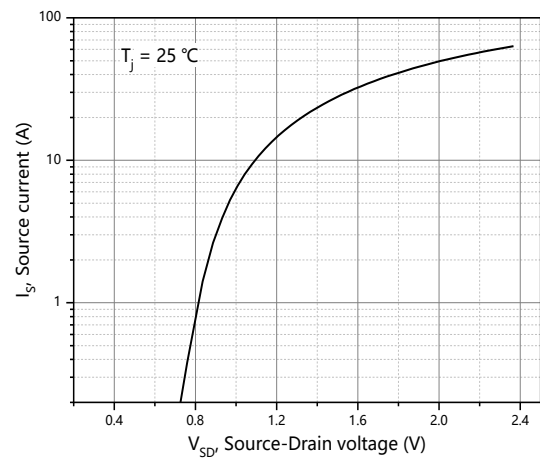


Figure 8. Forward characteristic of body diode

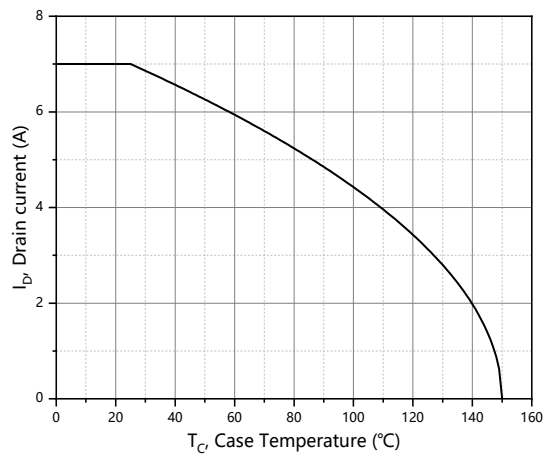


Figure 9. Drain current

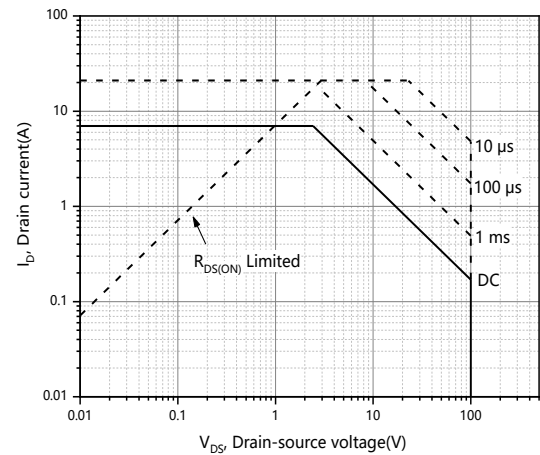


Figure 10. Safe operation area $T_C=25^\circ\text{C}$

Test circuits and waveforms

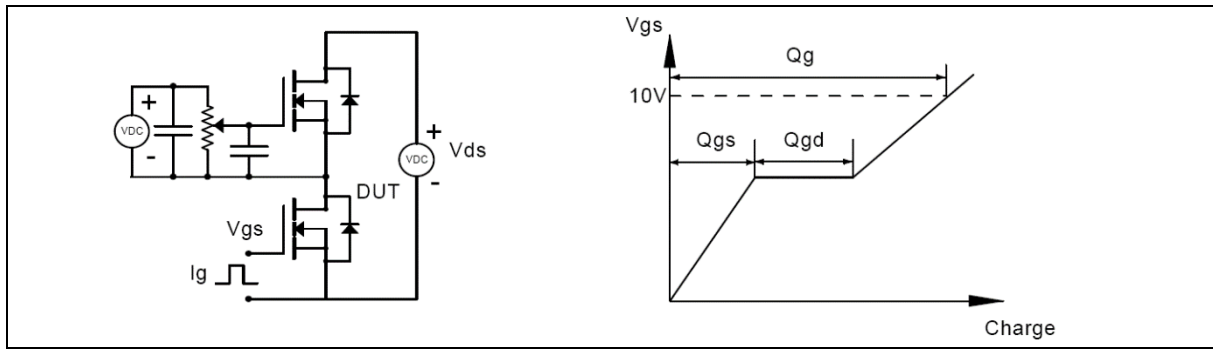


Figure 1. Gate charge test circuit & waveform



Figure 2. Switching time test circuit & waveforms

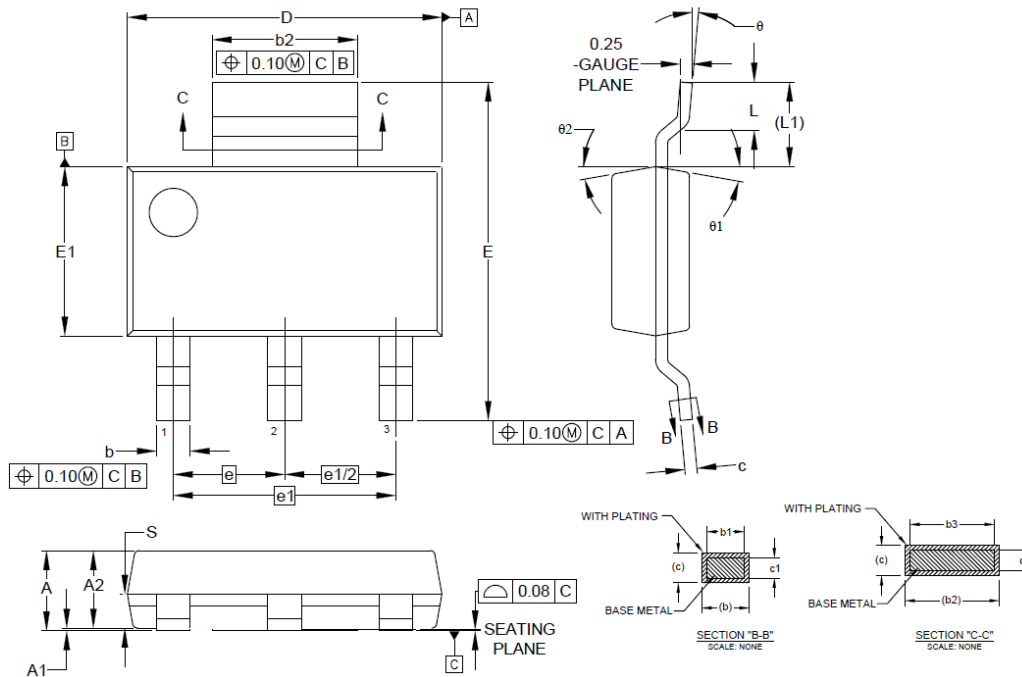


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms



Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Symbol	mm	
	Min	Max
A	1.52	1.80
A1	0.02	0.10
A2	1.50	1.70
b	0.60	0.80
b1	0.60	0.78
b2	2.95	3.10
b3	2.95	3.05
c	0.24	0.32
c1	0.24	0.30
D	6.30	6.70
E	6.70	7.30
E1	3.30	3.70
e	2.30 BSC	
e1	4.60 BSC	
L	0.90	1.10
L1	1.75 REF.	
S	0.70 REF.	
θ	0°	10°
θ1	10° REF.	
θ2	10° REF.	

Version : SOT-223-3L-S package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels / Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
SOT-223-3L-S	4000	1	4000	5	20000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
SFG10R140QF	SOT-223-3L	yes	yes	yes

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