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

RoHS compliant

Applications

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

Key Performance Parameters

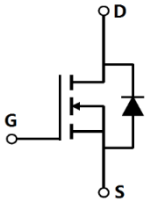
Parameter	Value	Unit
V_{DS}	100	V
$I_{D, pulse}$	120	A
$R_{DS(ON)\ max}$ @ V_{GS}=10V	20	mΩ
Q_g	19.8	nC

Marking Information

Product Name	Package	Marking
SFG10R20GF	PDFN5 x 6	SFG10R20G

Package & Pin information





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Absolute Maximum Ratings at T_j=25°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 °C	I_D	40	A
Pulsed drain current[2], T_C=25 °C	$I_{D,\ pulse}$	120	A
Continuous diode forward current[1], T_C=25 °C	I_S	40	A
Diode pulsed current[2], T_C=25 °C	$I_{S,\ Pulse}$	120	A
Power dissipation[3], T_C=25 °C	P_D	72	W
Single pulsed avalanche energy[5]	E_{AS}	30	mJ
Operation and storage temperature	T_{stg}, T_j	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	1.74	°C/W
Thermal resistance, junction-ambient[4]	$R_{\theta JA}$	62	°C/W

Electrical Characteristics at T_j=25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	100			V	V_{GS}=0 V, I_D=250 μA
Gate threshold voltage	$V_{GS(th)}$	1.0		2.5	V	V_{DS}=V_{GS}, I_D=250 μA
Drain-source on-state resistance	$R_{DS(ON)}$		17	20	mΩ	V_{GS}=10 V, I_D=8 A
Drain-source on-state resistance	$R_{DS(ON)}$			26	mΩ	V_{GS}=4.5 V, I_D=6 A
Gate-source leakage current	I_{GSS}			100	nA	V_{GS}=20 V
Drain-source leakage current	I_{DSS}			1	μA	V_{DS}=100 V, V_{GS}=0 V

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Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		1191		pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Output capacitance	C_{oss}		195		pF	
Reverse transfer capacitance	C_{rss}		4.1		pF	
Turn-on delay time	$t_{d(on)}$		17.8		ns	V_{GS}=10 V, V_{DS}=50 V, R_G=2.2 Ω, I_D=10 A
Rise time	t_r		3.9		ns	
Turn-off delay time	$t_{d(off)}$		33.5		ns	
Fall time	t_f		3.2		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		19.8		nC	V_{GS}=10 V, V_{DS}=50 V, I_D=8 A
Gate-source charge	Q_{gs}		2.4		nC	
Gate-drain charge	Q_{gd}		5.3		nC	
Gate plateau voltage	$V_{plateau}$		3.2		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	I_S=8 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		50.2		ns	V_R=50 V, I_S=8 A, di/dt=100 A/μs
Reverse recovery charge	Q_{rr}		95.1		nC	
Peak reverse recovery current	I_{rrm}		2.5		A	

Note

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) Pd 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 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_a=25 °C.
5) V_{DD}=30 V,V_{GS}=10 V, L=0.3 mH, starting T_j=25 °C.

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Electrical Characteristics Diagrams

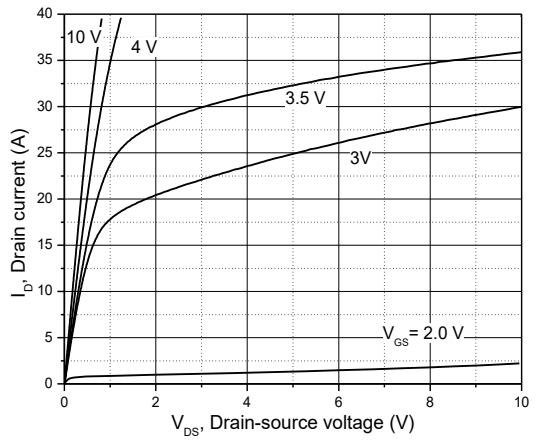


Figure 1. Typ. output characteristics

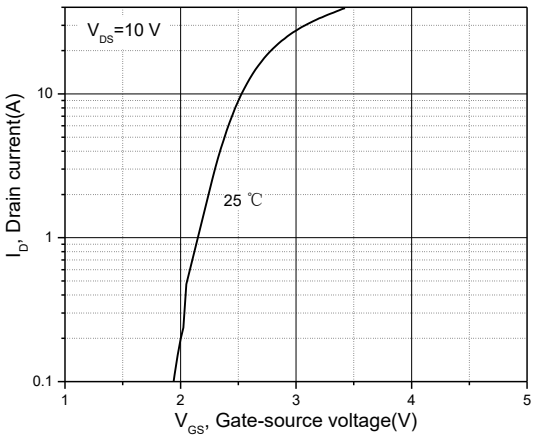


Figure 2. Typ. transfer characteristics

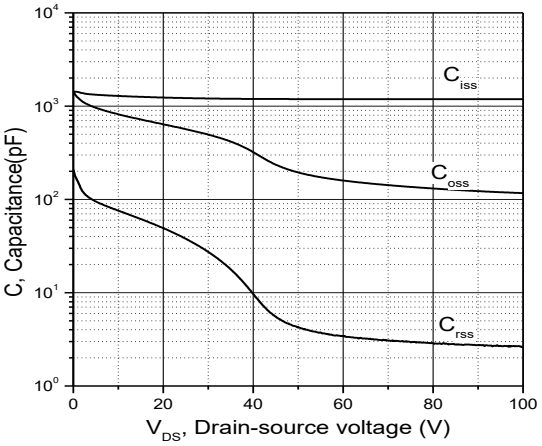


Figure 3. Typ. capacitances

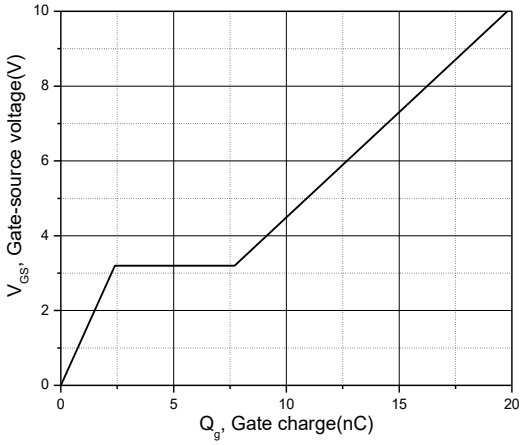


Figure 4. Typ. gate charge

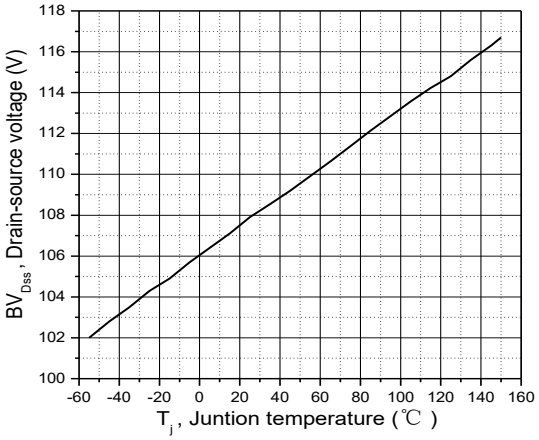


Figure 5. Drain-source breakdown voltage

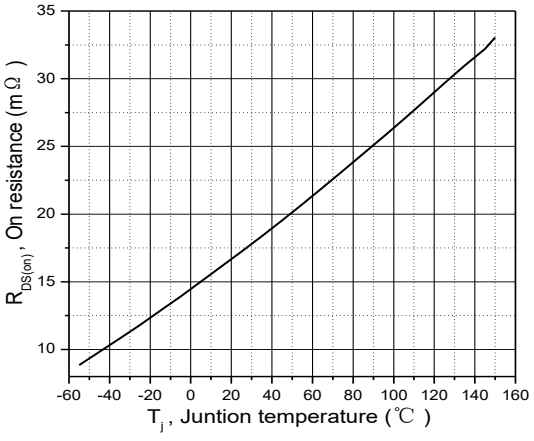


Figure 6. Drain-source on-state resistance

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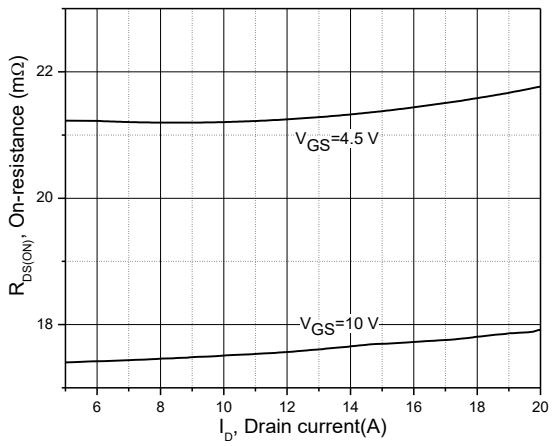


Figure 7. Drain-source on-state resistance

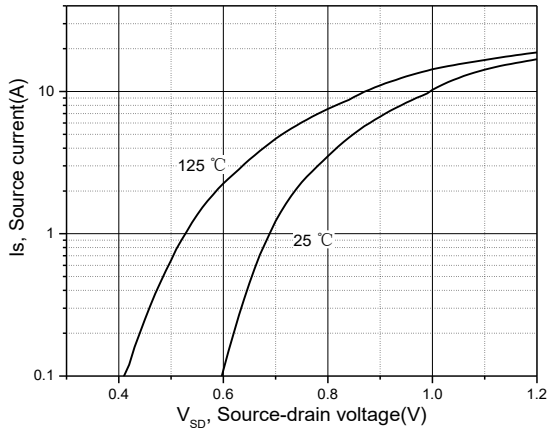


Figure 8. Forward characteristic of body diode

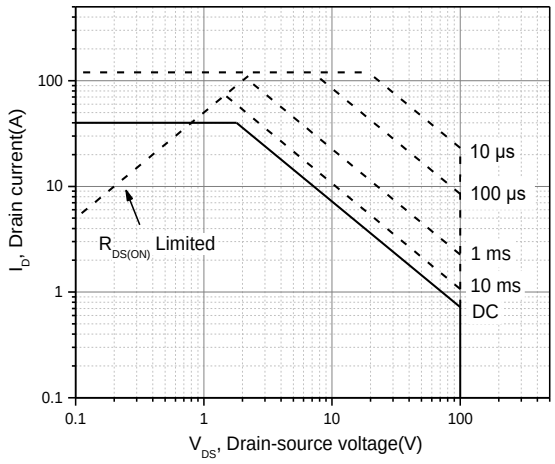


Figure 9. Safe operation area T_C=25 °C

Test circuits and waveforms

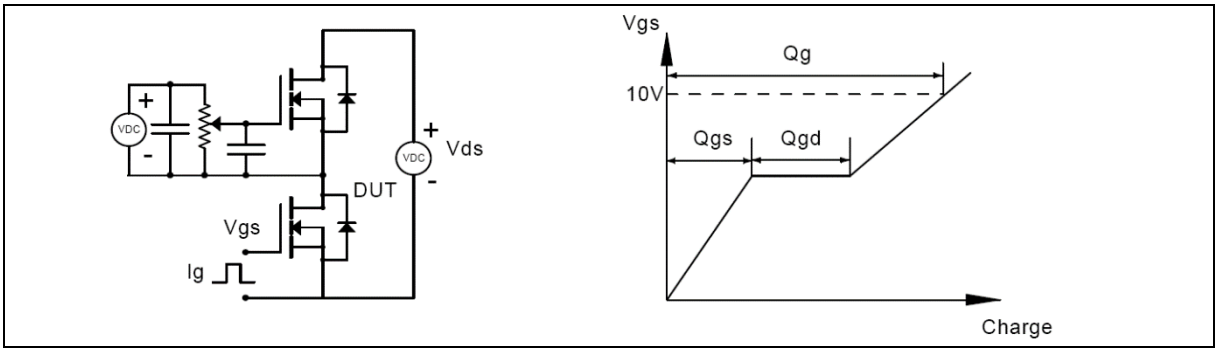


Figure 1. Gate charge test circuit & waveform

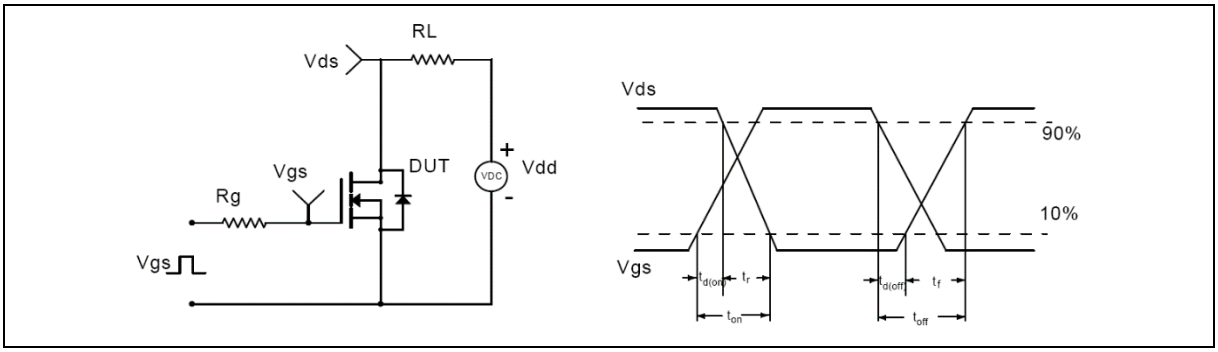


Figure 2. Switching time test circuit & waveforms

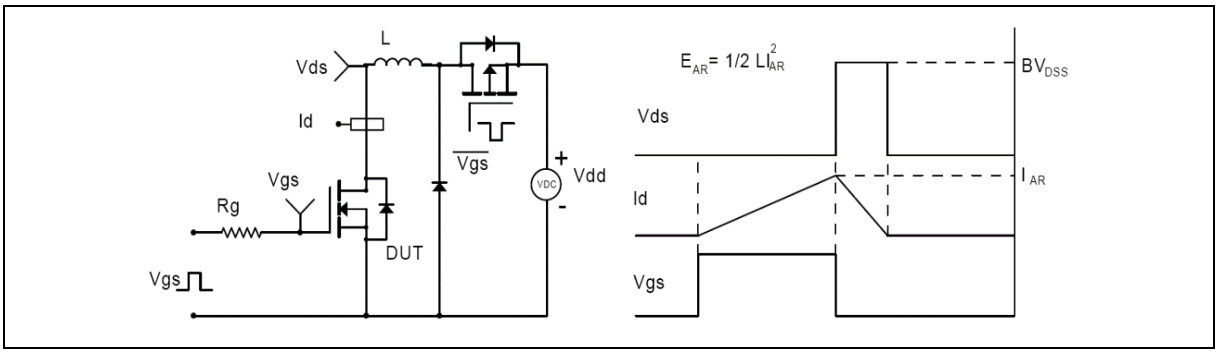


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

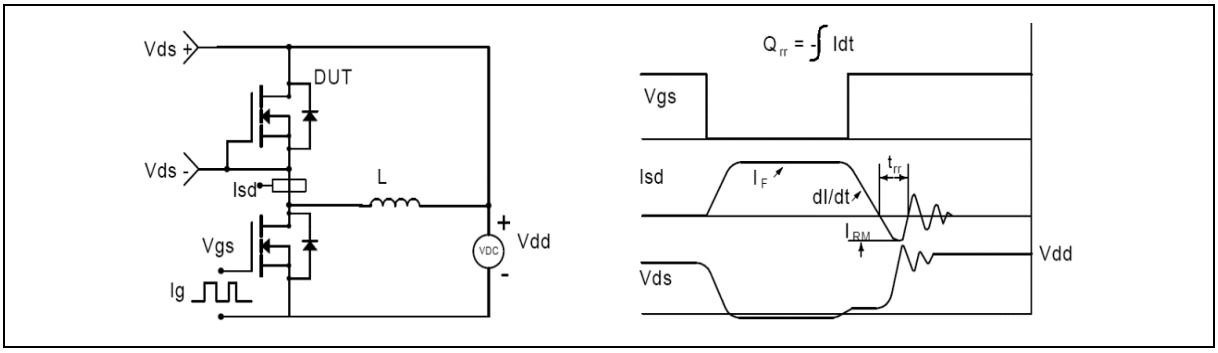
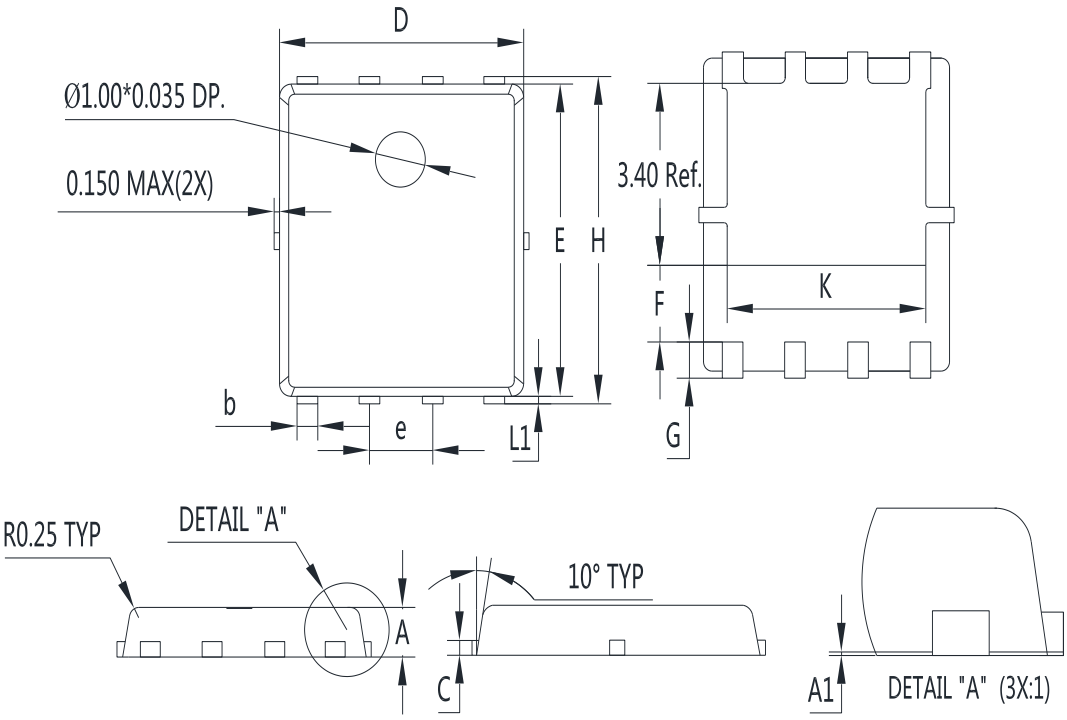


Figure 4. Diode reverse recovery test circuit & waveforms

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Package Information

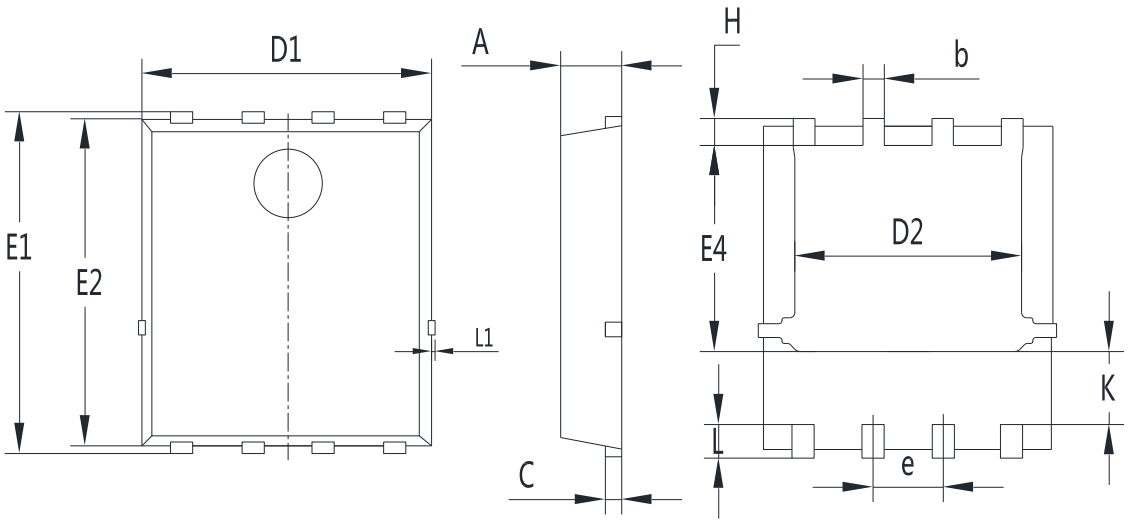


Symbol	mm		
	Min	Nom	Max
A	0.8	0.9	1.0
A1	0	0.03	0.05
b	0.35	0.42	0.49
c		0.254 REF	
D	4.9	5.0	5.1
F		1.40 REF	
E	5.7	5.8	5.9
e		1.27 BSC	
H	5.95	6.08	6.20
L1	0.10	0.14	0.18
G		0.60 REF	
K		4.00 REF	

Version 1: PDFN5 x 6-K package outline dimension

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Package Information



Symbol	mm		
	Min	Nom	Max
A	1.00	1.10	1.20
b	0.30	0.40	0.50
c	0.154	0.254	0.354
D1	5.00	5.20	5.40
D2	3.80	4.10	4.25
e	1.17	1.27	1.37
E1	5.95	6.15	6.35
E2	5.66	5.86	6.06
E4	3.52	3.72	3.92
H	0.40	0.50	0.60
L	0.30	0.60	0.70
L1	0.12 REF		
K	1.15	1.30	1.45

Version 2: PDFN5 x 6-P package outline dimension

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Ordering Information

Package Type	Units/ Reel	Reels / Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
PDFN5 x 6-K	5000	2	10000	5	50000
PDFN5 x 6-P	5000	2	10000	5	50000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
SFG10R20GF	PDFN5 x 6	yes	yes	yes

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