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 high V_{th} series is specially optimized for high systems with gate driving voltage greater than 10V.

Features

- Low $R_{DS(ON)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery

RoHS compliant

Applications

- Switched mode power supply
- Motor driver
- Battery protection
- DC-DC convertor
- Solar inverter
- UPS and energy inverter

Key Performance Parameters

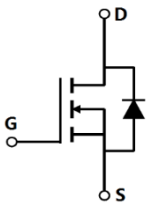
Parameter	Value	Unit
V_{DS}	100	V
$I_{D, pulse}$	510	A
$R_{DS(ON), max}$ @ V_{GS}=10V	3	mΩ
Q_g	114.5	nC
PD	340	W

Marking Information

Product Name	Package	Marking
SFG170N10KF	TO263	SFG170N10K

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	170	A
Pulsed drain current[2], T_C=25 °C	$I_{D, pulse}$	510	A
Continuous diode forward current[1], T_C=25 °C	I_S	170	A
Diode pulsed current[2], T_C=25 °C	$I_{S, pulse}$	510	A
Power dissipation[3], T_C=25 °C	P_D	340	W
Single pulsed avalanche energy[5]	E_{AS}	540	mJ
Operation and storage temperature	T_{stg}, T_j	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	0.37	°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	$V_{GS(th)}$	2.0		4.0	V	V_{DS}=V_{GS}, I_D=250 μA
Drain-source on-state resistance	$R_{DS(ON)}$		2.8	3.0	mΩ	V_{GS}=10 V, I_D=30 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}		9644		pF	V_{GS}=0 V, V_{DS}=50 V, f=100 kHz
Output capacitance	C_{oss}		1300		pF	
Reverse transfer capacitance	C_{rss}		24.6		pF	
Turn-on delay time	$t_{d(on)}$		43.7		ns	V_{GS}=10 V, V_{DS}=50 V, R_G=2 Ω, I_D=20 A
Rise time	t_r		19.7		ns	
Turn-off delay time	$t_{d(off)}$		102.3		ns	
Fall time	t_f		22.5		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		115		nC	V_{GS}=10 V, V_{DS}=50 V, I_D=20 A
Gate-source charge	Q_{gs}		34.8		nC	
Gate-drain charge	Q_{gd}		23.2		nC	
Gate plateau voltage	$V_{plateau}$		4.6		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	I_S=30 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		105		ns	V_R=50 V, I_S=20 A, di/dt=100 A/μs
Reverse recovery charge	Q_{rr}		415		nC	
Peak reverse recovery current	I_{rrm}		6.6		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}=50 V,V_{GS}=10 V, L=0.3 mH, starting T_j=25 °C.

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Electrical Characteristics Diagrams

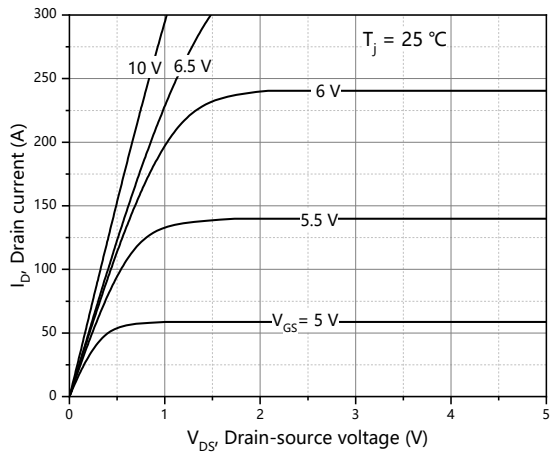


Figure 1. Typ. output characteristics

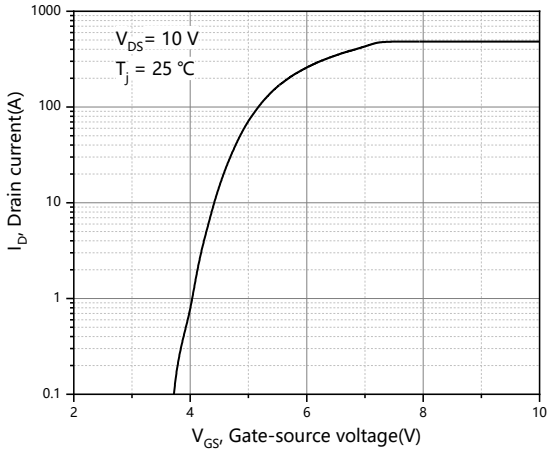


Figure 2. Typ. transfer characteristics

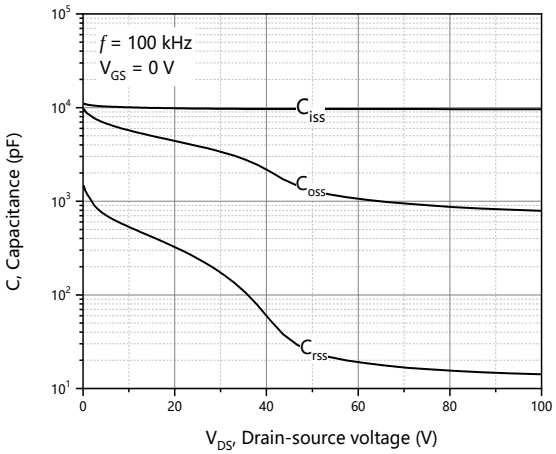


Figure 3. Typ. capacitances

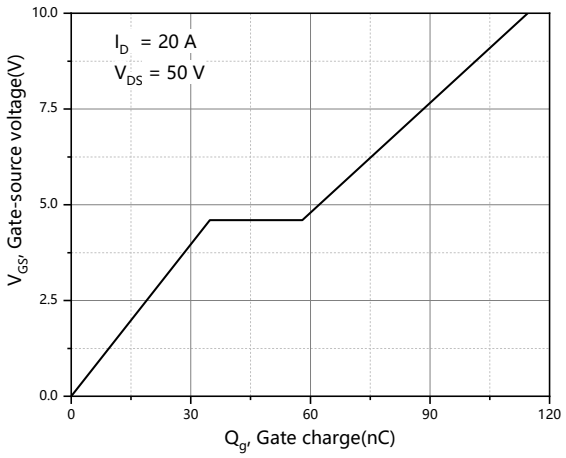


Figure 4. Typ. gate charge

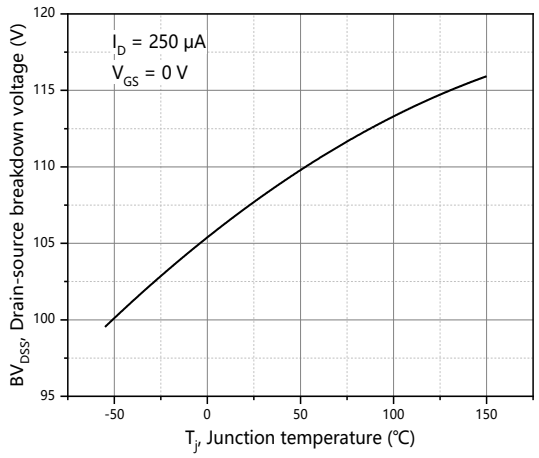


Figure 5. Drain-source breakdown voltage

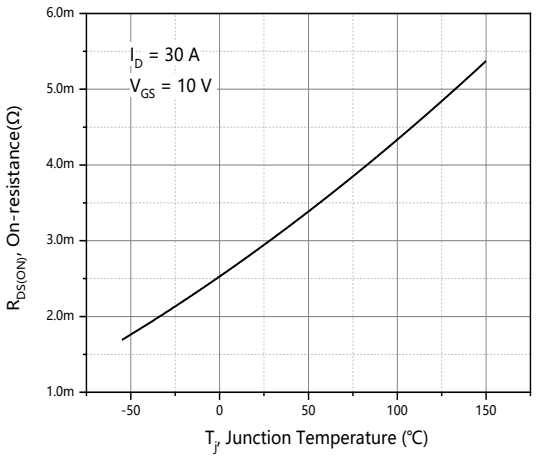


Figure 6. Drain-source on-state resistance

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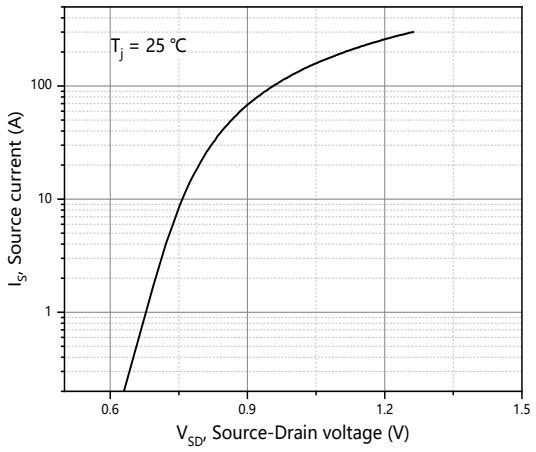


Figure 7. Forward characteristic of body diode

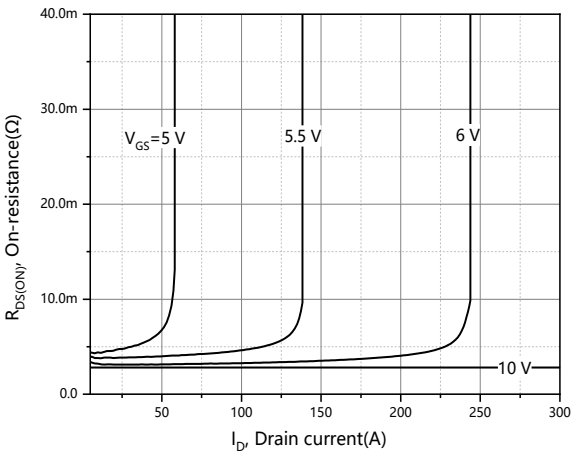


Figure 8. Drain-source on-state resistance

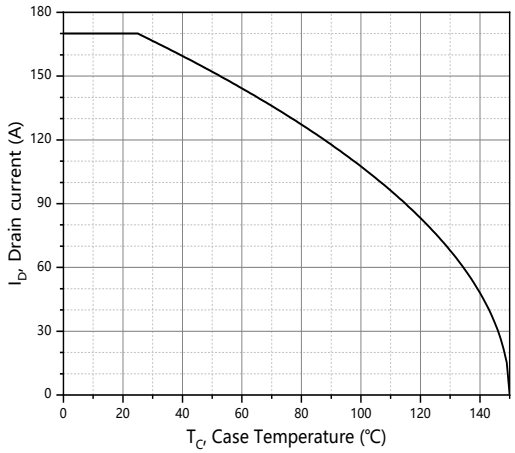


Figure 9. Drain current

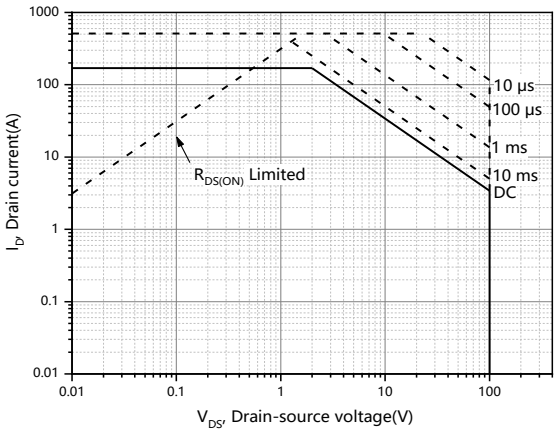


Figure 10. Safe operation area T_C=25 °C

Test circuits and waveforms

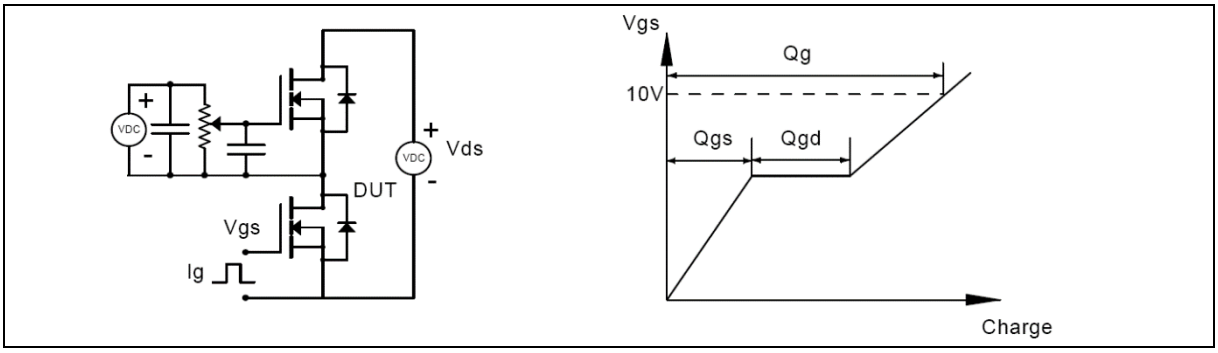


Figure 1. Gate charge test circuit & waveform

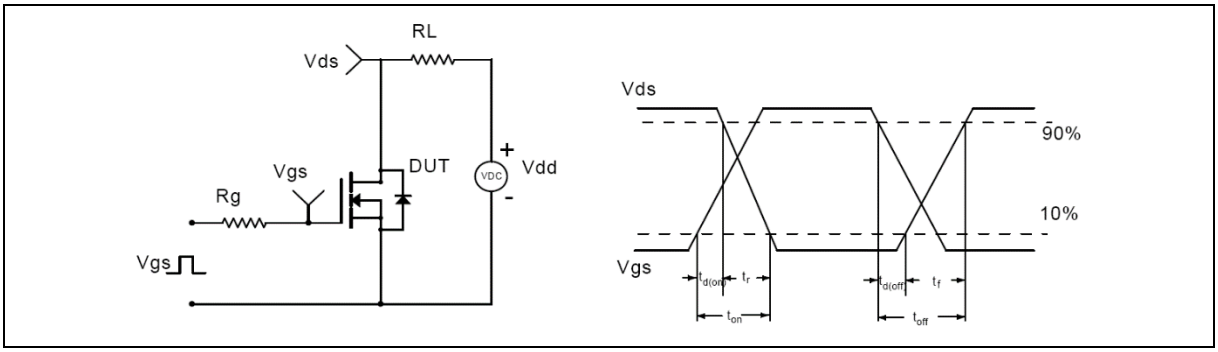


Figure 2. Switching time test circuit & waveforms

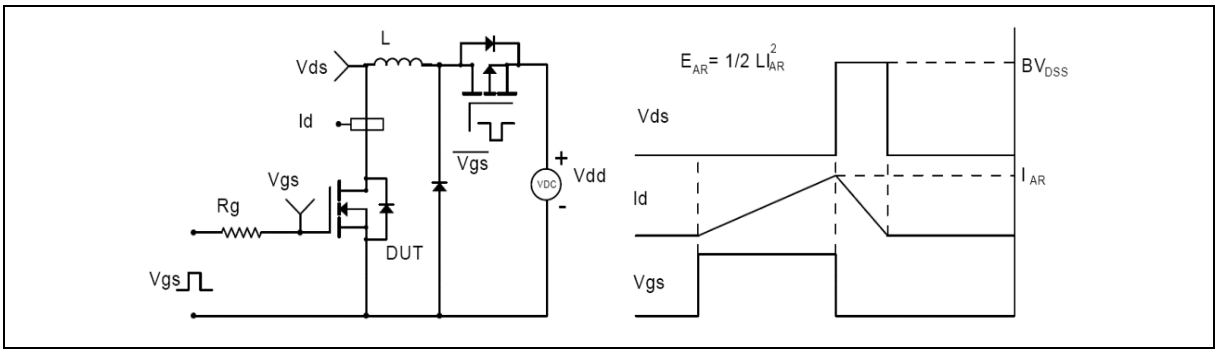


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

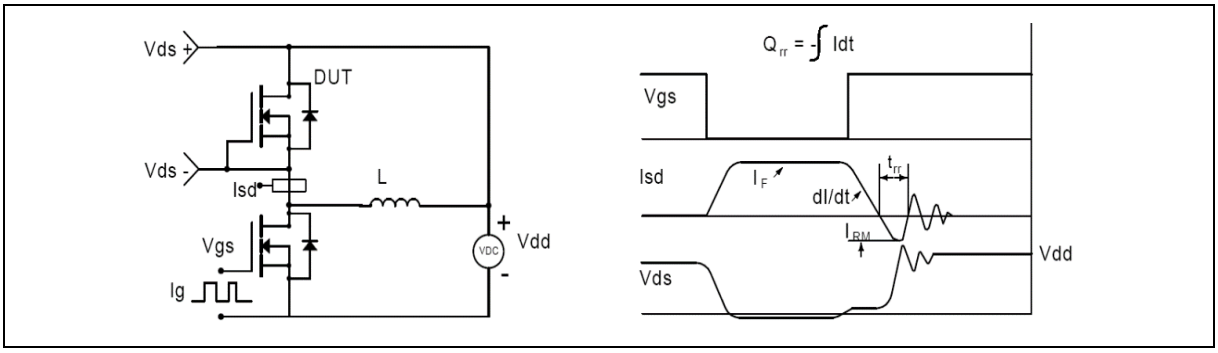
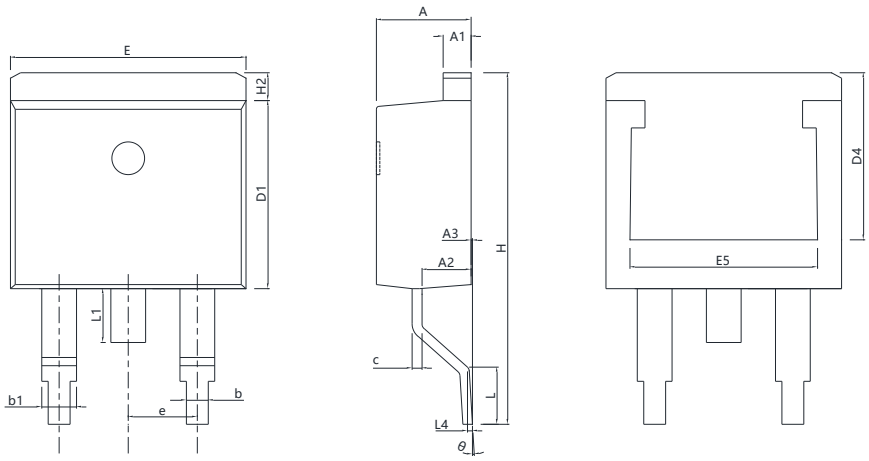


Figure 4. Diode reverse recovery test circuit & waveforms

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Package Information

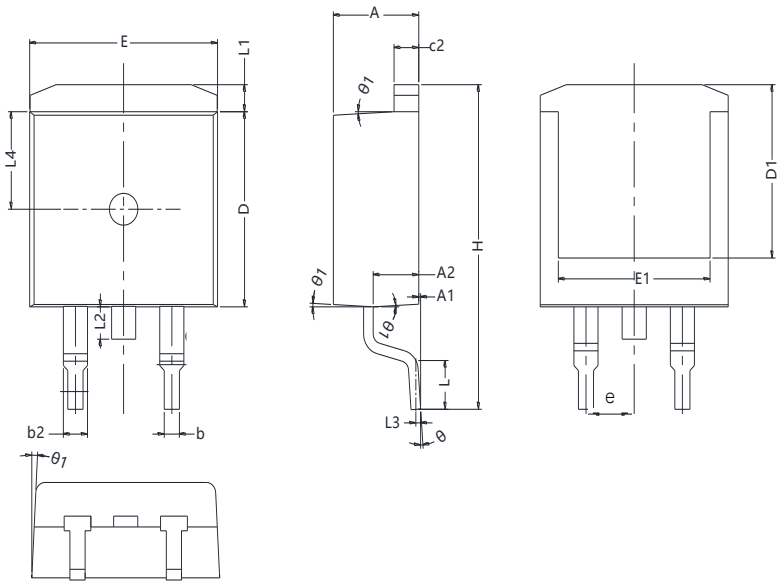


Symbol	mm		
	Min	Nom	Max
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0.00	0.13	0.25
b	0.70	0.81	0.96
b1	1.17	1.27	1.47
c	0.30	0.38	0.53
D1	8.50	8.70	8.90
D4	6.60	-	-
E	9.86	10.16	10.36
E5	7.06	-	-
e	2.54 BSC		
H	14.70	15.10	15.50
H2	1.07	1.27	1.47
L	2.00	2.30	2.60
L1	1.40	1.55	1.70
L4	0.25 BSC		
θ	0°	5°	9°

Veision 1：TO263-P package outline dimension

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Package Information



Symbol	mm		
	Min	Nom	Max
A	4.40	4.50	4.60
A1	0.00	0.10	0.25
A2	2.20	2.40	2.60
b	0.76	-	0.89
b2	1.23	-	1.37
c2	1.25	1.30	1.35
D	9.10	9.20	9.30
D1	8.00	-	-
E	9.80	9.90	10.00
E1	7.80	-	-
e	2.54 BSC		
H	14.90	15.30	15.70
L	2.00	2.30	2.60
L1	1.17	1.27	1.40
L2	-	-	1.75
L3	0.25 BSC		
L4	4.60 REF		
θ	0°	-	8°
θ1	1°	3°	5°

Version 2: TO263-J 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
TO263-P	800	1	800	5	4000
TO263-J	800	1	800	10	8000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
SFG170N10KF	TO263	yes	yes	yes

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