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
- Switched mode power supply

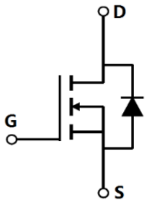
Key Performance Parameters

Parameter	Value	Unit
$V_{DS, min}$ @ $T_{j(max)}$	100	V
$I_{D, pulse}$	210	A
$R_{DS(ON)\ max}$ @ V_{GS}=10V	10	mΩ
Q_g	49.9	nC

Marking Information

Product Name	Package	Marking
SFG10R10AF	TO251	SFG10R10

Package & Pin information



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	70	A
Pulsed drain current[2), T_C=25 °C	$I_{D, pulse}$	210	A
Continuous diode forward current[1), T_C=25 °C	I_S	70	A
Diode pulsed current[2), T_C=25 °C	$I_{S, Pulse}$	210	A
Power dissipation[3), T_C=25 °C	P_D	125	W
Single pulsed avalanche energy[5)	E_{AS}	100	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	°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	$R_{DS(ON)}$		8.5	10.0	mΩ	V_{GS}=10 V, I_D=10 A
Drain-source on-state resistance	$R_{DS(ON)}$		9.5	12.0	mΩ	V_{GS}=4.5 V, I_D=10 A
Gate-source leakage current	I_{GSS}			100		

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		2604		pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Output capacitance	C_{oss}		361		pF	
Reverse transfer capacitance	C_{rss}		6.5		pF	
Turn-on delay time	$t_{d(on)}$		20.6		ns	V_{GS}=10 V, V_{DS}=50 V, R_G=2.2 Ω, I_D=25 A
Rise time	t_r		5		ns	
Turn-off delay time	$t_{d(off)}$		51.8		ns	
Fall time	t_f		9		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		49.9		nC	V_{GS}=10 V, V_{DS}=50 V, I_D=25 A
Gate-source charge	Q_{gs}		6.5		nC	
Gate-drain charge	Q_{gd}		12.4		nC	
Gate plateau voltage	$V_{plateau}$		3.4		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	I_S=12 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		60.4		ns	V_R=50 V,

Electrical Characteristics Diagrams

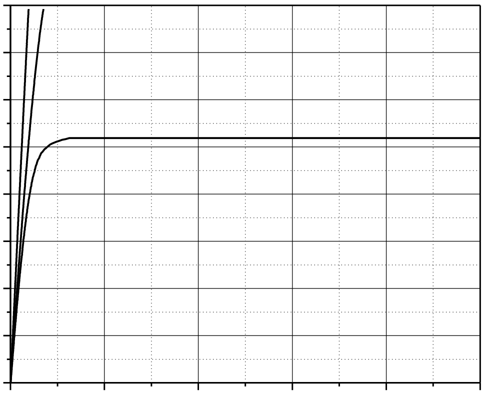


Figure 1. Typ. output characteristics

Figure 2. Typ. transfer characteristics

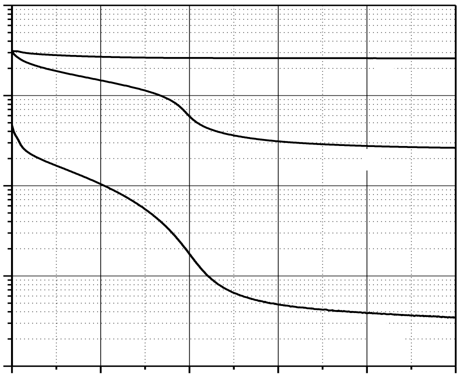


Figure 3. Typ. capacitances

Figure 4. Typ. gate charge

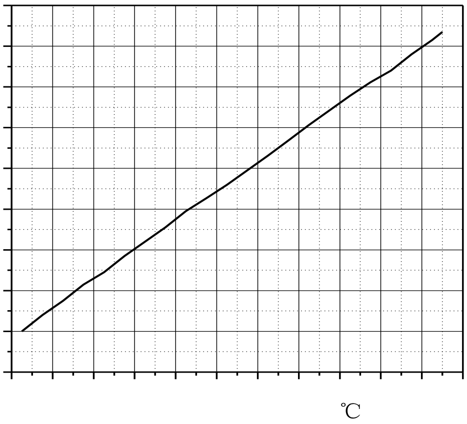


Figure 5. Drain-source breakdown voltage

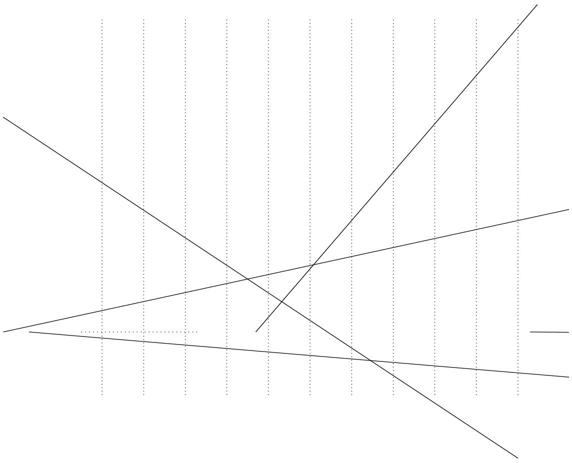


Figure 6. Drain-source on-state resistance

Figure 7. Drain-source on-state resistance

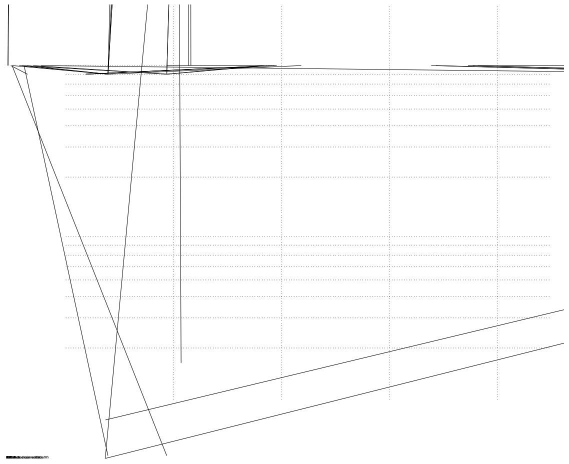


Figure 8. Forward characteristic of body diode

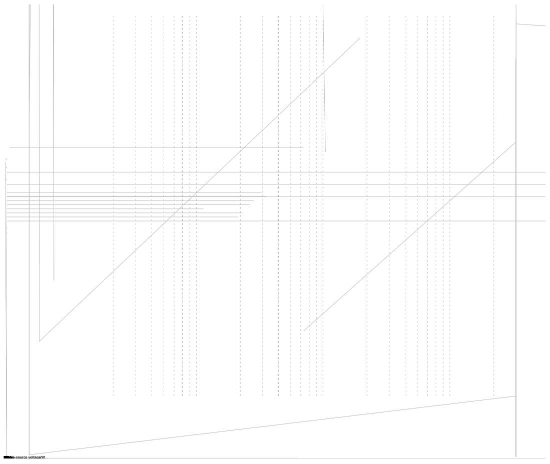


Figure 9. Safe operation area T_C=25 °C

Test circuits and waveforms

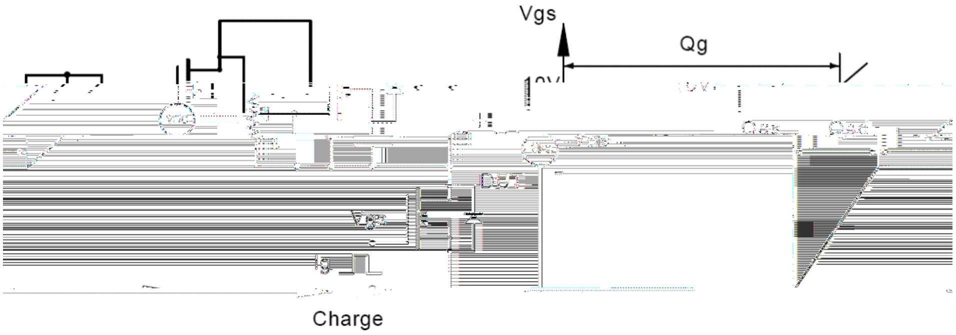


Figure 1. Gate charge test circuit & waveform

Figure 2. Switching time test circuit & waveforms

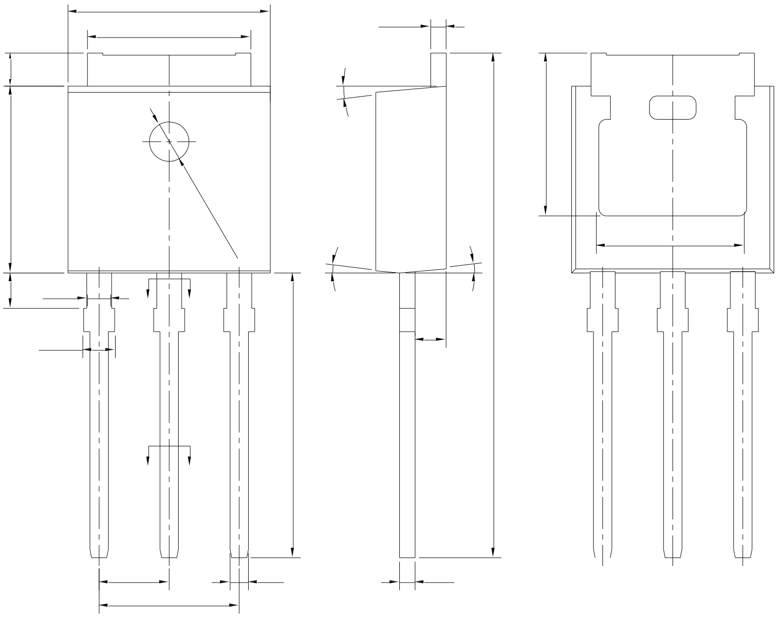
Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

Figure 4. Diode reverse recovery test circuit & waveforms

Package Information

Symbol	mm		
	Min	Nom	Max
A	2.20	2.30	2.40
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b2	0.00	0.04	0.10
b2’	0.00	0.04	0.10
b3	5.20	5.33	5.50
c	0.43	0.53	0.63
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	-	-
e	2.286BSC		
H	16.22	16.52	16.82
L1			

Package Information



Symbol	mm		
	Min	Nom	Max
A	2.20	2.30	2.35
A1	0.90	1.01	1.10
b	0.56	-	0.69
b1	0.55	0.60	0.65
b2	0.77	-	0.90
b3	0.76	0.81	0.86
b4	5.23	5.33	5.43
b5	-	-	1.05
c	0.46	-	0.59
c1	0.45	0.51	0.55
c2	0.46	-	0.59
D	6.00	6.10	6.20
D1	5.20	-	-
E	6.50	6.60	6.70
E1	4.60	4.83	5.00
e	2.24	2.29	2.34
e1	4.47	4.57	4.67
H	16.18	16.48	16.78
L	9.00	9.30	9.60
L1	0.95	1.16	1.35
L2	0.90	1.08	1.25
θ1	3°	5°	7°
θ2	1°	3°	5°

Version 2: TO251-J package outline dimension

Ordering Information

Package Type	Units/ Tube	Tubes / Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO251-C	75	66	4950	6	29700
TO251-J	75	60	4500	5	22500

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
SFG10R10AF	TO251	yes	yes	yes

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