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 power supply systems with driving voltage of more than 10V.

Features

- Low $R_{DS(on)}$ & FOM (Figure of Merit)
- Extremely low switching loss
- Excellent reliability and uniformity
- Fast switching and soft recovery

Applications

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

RoHS compliant

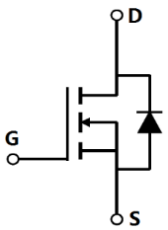
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	120	V
$I_{D,\ pulse}$	420	A
$R_{DS(ON),\ max}$ @ V_{GS}=10V	7	mΩ
Q_g	73.6	nC

Marking Information

Product Name	Package	Marking
SFS12R08GNF	PDFN5 x 6	SFS12R08GN

Package & Pin information



Absolute Maximum Ratings at T_j=25°C unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	120	V
Gate-source voltage	V_{GS}	±20	V
Continuous drain current[1], T_C=25 °C	I_D	105	A
Pulsed drain current[2], T_C=25 °C	$I_{D,\ pulse}$	420	A
Continuous diode forward current[1], T_C=25 °C	I_S	105	A
Diode pulsed current[2], T_C=25 °C	$I_{S,\ pulse}$	420	A
Power dissipation[3], T_C=25 °C	P_D	156	W
Single pulsed avalanche energy[5]	E_{AS}	60	mJ
Operation and storage temperature	T_{stg}, T_j	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	0.8	°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}	120			V	V_{GS}=0 V, I_D=250 μA
Gate threshold voltage	$V_{GS(th)}$	2.5		4.0	V	V_{DS}=V_{GS}, I_D=250 μA
Drain-source on-state resistance	$R_{DS(ON)}$		5.5	7.0	mΩ	V_{GS}=10 V, I_D=20 A
Gate-source leakage current	I_{GSS}			100	nA	V_{GS}=20 V
				-100		V_{GS}=-20 V
Drain-source leakage current	I_{DSS}			1	μA	V_{DS}=120 V, V_{GS}=0 V
Gate resistance	R_G		2.6		Ω	f=1 MHz, Open drain

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		5305		pF	V_{GS}=0 V, V_{DS}=25 V, f=100 kHz
Output capacitance	C_{oss}		1547		pF	
Reverse transfer capacitance	C_{rss}		170		pF	
Turn-on delay time	$t_{d(on)}$		33.2		ns	V_{GS}=10 V, V_{DS}=60 V, R_G=2 Ω, I_D=30 A
Rise time	t_r		47		ns	
Turn-off delay time	$t_{d(off)}$		59.2		ns	
Fall time	t_f		13		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		73.6		nC	V_{GS}=10 V, V_{DS}=60 V, I_D=30 A
Gate-source charge	Q_{gs}		23.5		nC	
Gate-drain charge	Q_{gd}		17.5		nC	
Gate plateau voltage	$V_{plateau}$		5.1		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	I_S=20 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		73.6		ns	V_R=80 V, I_S=30 A, di/dt=100 A/μs
Reverse recovery charge	Q_{rr}		160		nC	
Peak reverse recovery current	I_{rrm}		3.8		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.

Electrical Characteristics Diagrams

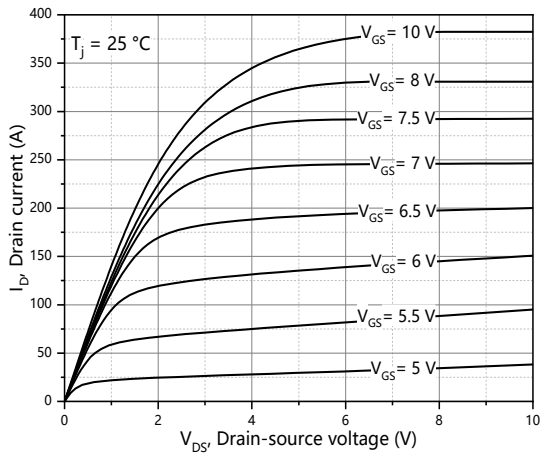


Figure 1. Typ. output characteristics

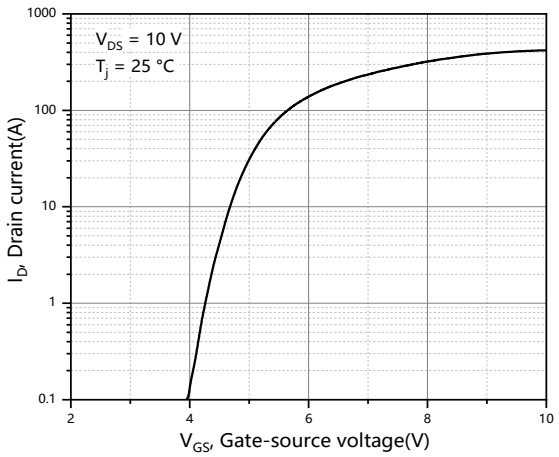


Figure 2. Typ. transfer characteristics

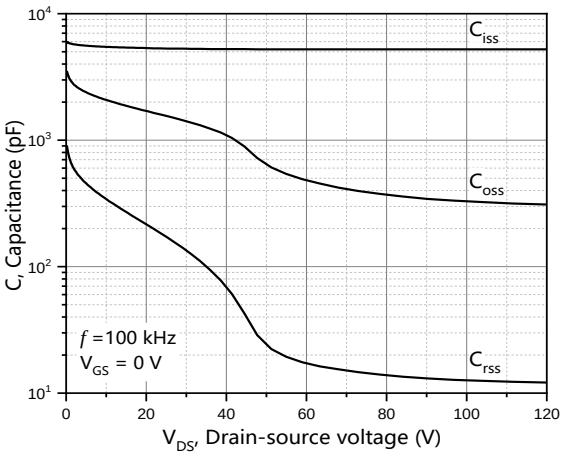


Figure 3. Typ. capacitances

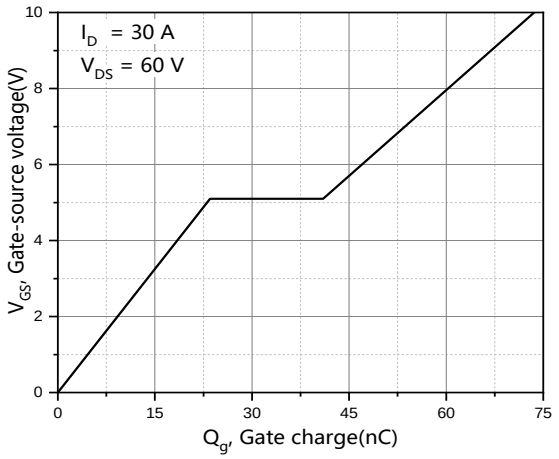


Figure 4. Typ. gate charge

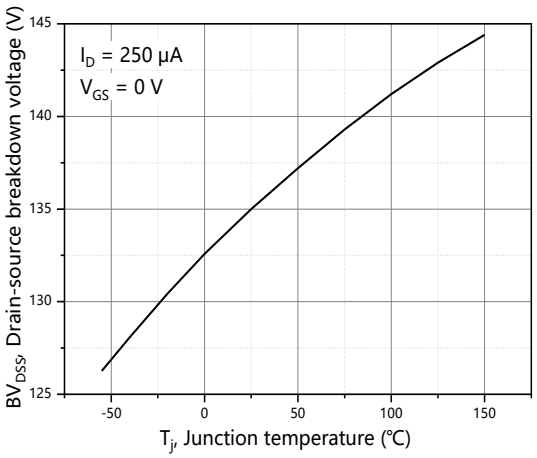


Figure 5. Drain-source breakdown voltage

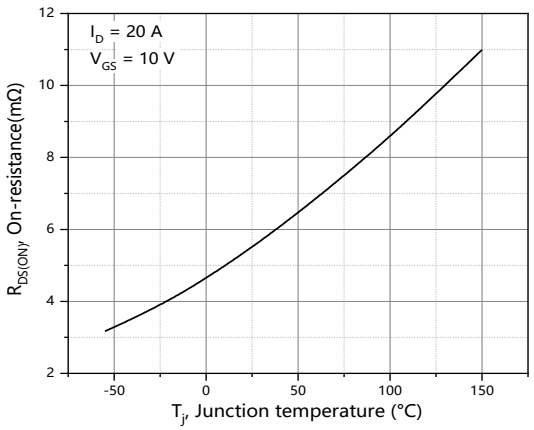


Figure 6. Drain-source on-state resistance

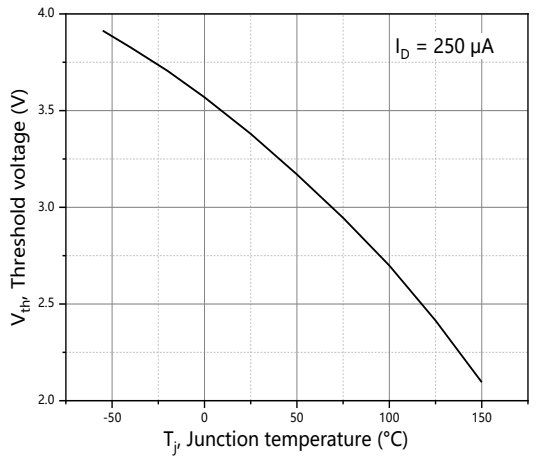


Figure 7. Threshold voltage

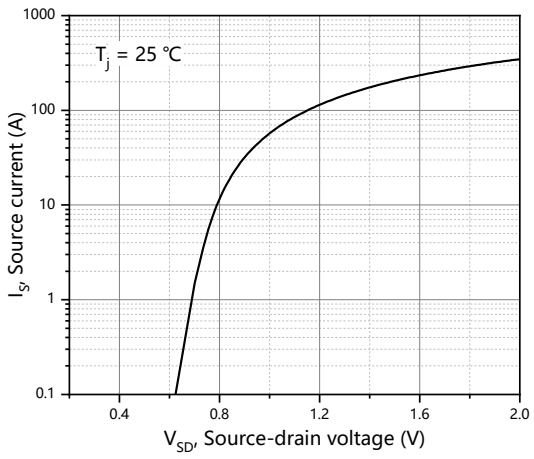


Figure 8. Forward characteristic of body diode

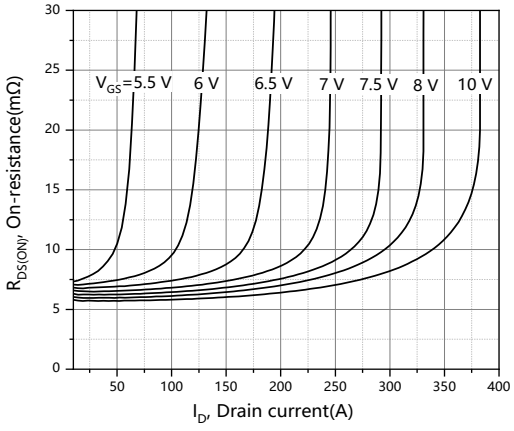


Figure 9. Drain-source on-state resistance

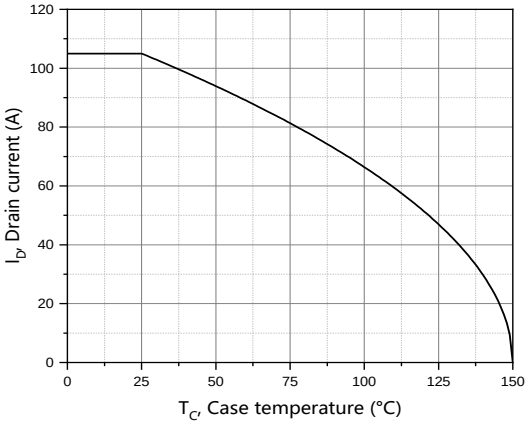


Figure 10. Drain current

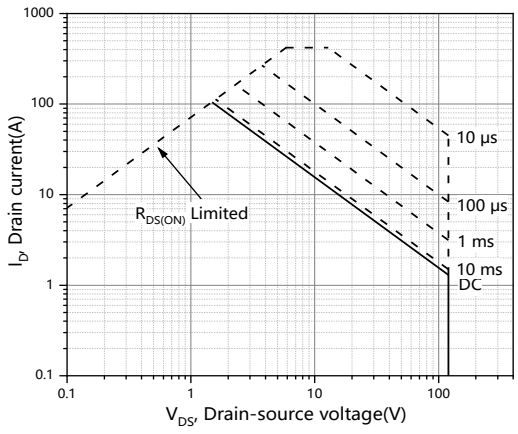


Figure 11. Safe operation area TC=25 ℃

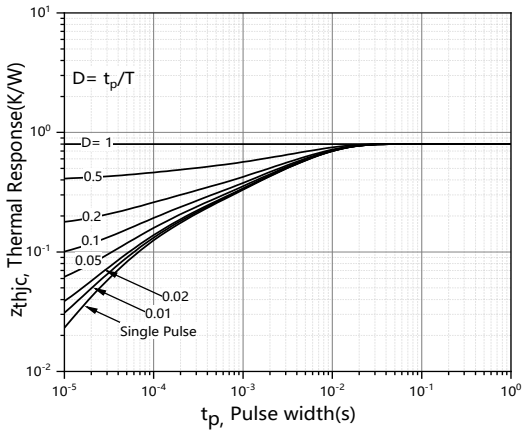


Figure 12. Max. transient thermal impedance

Test circuits and waveforms

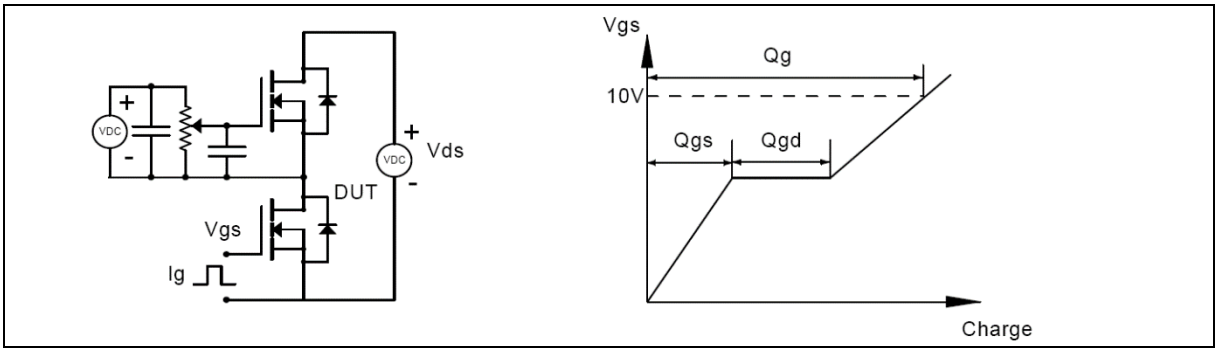


Figure 1. Gate charge test circuit & waveform

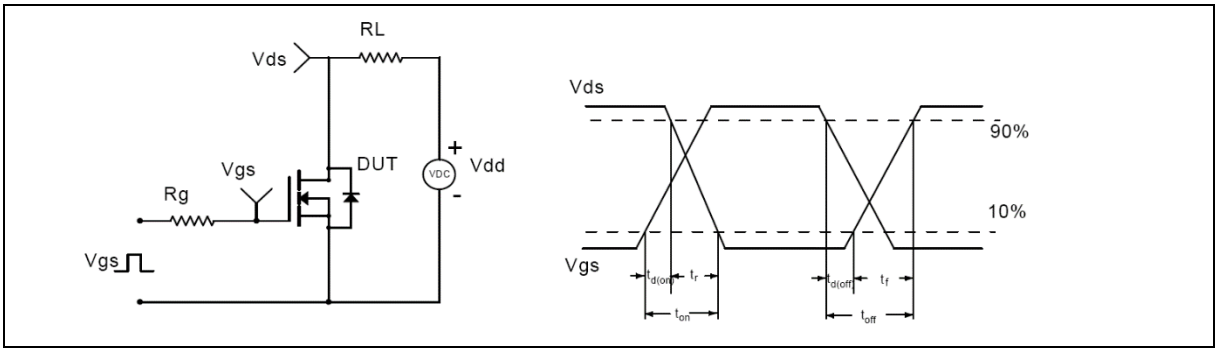


Figure 2. Switching time test circuit & waveforms

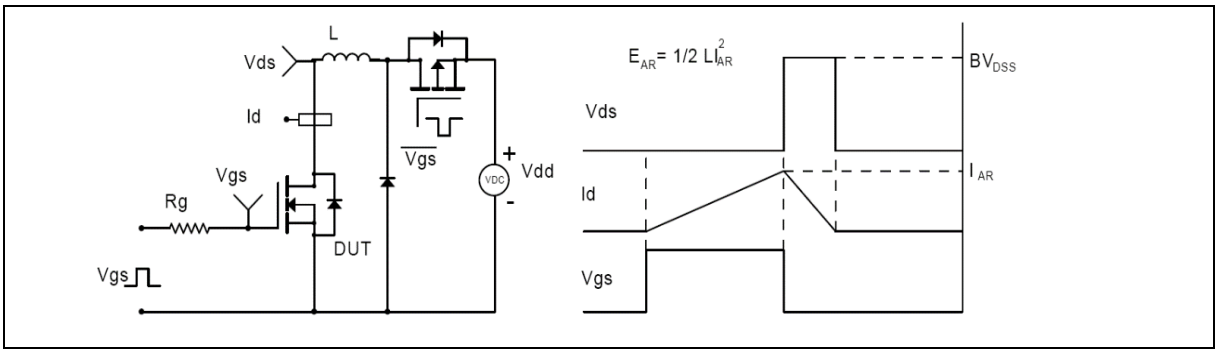


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

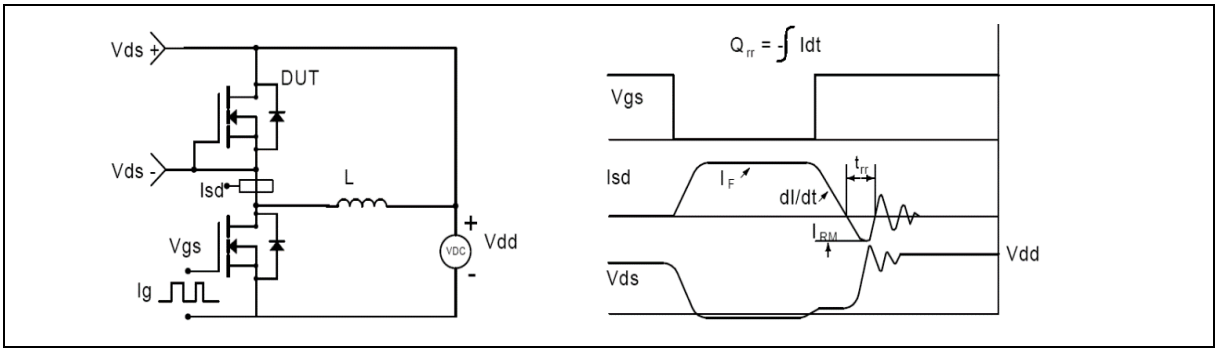
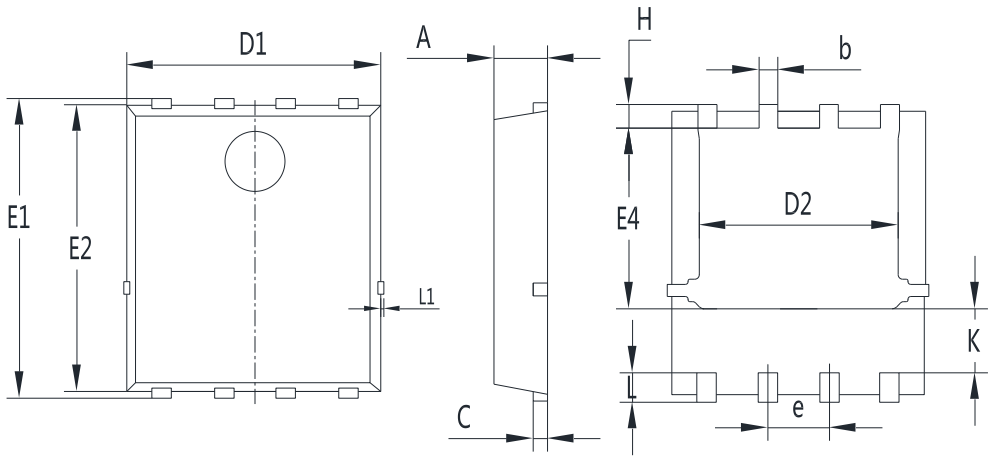


Figure 4. Diode reverse recovery test circuit & waveforms

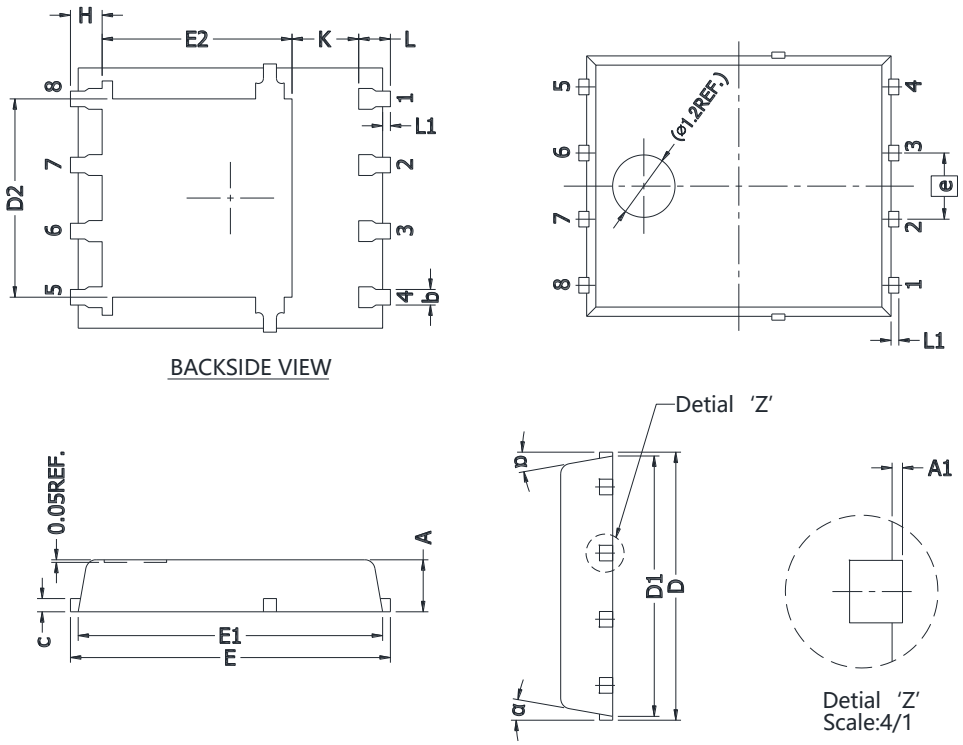
Package Information



Symbol	mm		
	Min	Nom	Max
A	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 1, PDFN5 x 6-P package outline dimension

Package Information



Symbol	mm		
	Min	Nom	Max
A	0.90	1.00	1.10
A1	0.00	-	0.05
b	0.30	0.40	0.50
c	0.20	0.25	0.30
D		5.15 BSC	
D1		5.00 BSC	
D2	3.76	3.81	3.86
E		6.15 BSC	
E1	5.80	5.85	5.90
E2	3.45	3.65	3.85
e		1.27 BSC	
H	0.51	0.61	0.71
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.08	0.15	0.23
α	10º	11º	12º

Version 2: PDFN5 x 6-J package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Box/ Carton Box	Units/ Carton Box
PDFN5 x 6-P	5000	2	10000	5	50000
PDFN5 x 6-J	5000	1	5000	5	25000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
SFS12R08GNF	PDFN5 x 6	yes	yes	yes

Revision History

Version	Revision History	Date
V1.0	Initial release	2020-07-20
V2.0	Update PD,ID and Rthjc Update Figure 10, Figure 11, Figure 12	2022-09-26

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