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 low V_{th} series is specially optimized for synchronous rectification 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

- Switching mode power supply
- Motor driver
- Battery protection
- DC-DC convertor
- Inverter
- UPS

Key Performance Parameters

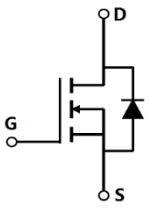
Parameter	Value	Unit
V_{DS}	60	V
$I_{D,\ pulse}$	240	A
$R_{DS(ON),\ max}$ @ V_{GS}=10V	4.5	mΩ
Q_g	31.6	nC

Marking Information

Product Name	Package	Marking
SFS06R045UNF	PDFN 3.3×3.3	06045U

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}	60	V
Gate-source voltage	V_{GS}	±20	V
Continuous drain current[1], T_C=25 °C	I_D	60	A
Pulsed drain current[2], T_C=25 °C	$I_{D,\ pulse}$	240	A
Continuous diode forward current[1], T_C=25 °C	I_S	60	A
Diode pulsed current[2], T_C=25 °C	$I_{S,\ pulse}$	240	A
Power dissipation[3], T_C=25 °C	P_D	37	W
Single pulsed avalanche energy[5]	E_{AS}	10	mJ
Operation and storage temperature	T_{stg}, T_j	-55 to 175	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	4.03	°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}	60			V	V_{GS}=0 V, I_D=250 μA
Gate threshold voltage	$V_{GS(th)}$	1.3		2.3	V	V_{DS}=V_{GS}, I_D=250 μA
Drain-source on-state resistance	$R_{DS(ON)}$		3.5	4.5	mΩ	V_{GS}=10 V, I_D=55 A
Drain-source on-state resistance	$R_{DS(ON)}$		5.1	6.5	mΩ	V_{GS}=4.5 V, I_D=55 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}=60 V, V_{GS}=0 V
Gate resistance	R_G		2.9		Ω	f=1 MHz, Open drain

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Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		1891		pF	V_{GS}=0 V, V_{DS}=25 V, f=100 kHz
Output capacitance	C_{oss}		792		pF	
Reverse transfer capacitance	C_{rss}		63		pF	
Turn-on delay time	$t_{d(on)}$		8.6		ns	V_{GS}=10 V, V_{DS}=30 V, R_G=2 Ω, I_D=30 A
Rise time	t_r		6.2		ns	
Turn-off delay time	$t_{d(off)}$		28.4		ns	
Fall time	t_f		7.4		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		31.6		nC	V_{GS}=10 V, V_{DS}=30 V, I_D=30 A
Gate-source charge	Q_{gs}		5		nC	
Gate-drain charge	Q_{gd}		6.4		nC	
Gate plateau voltage	$V_{plateau}$		3.1		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}		49		ns	V_R=30 V, I_S=30 A, di/dt=100 A/μs
Reverse recovery charge	Q_{rr}		28		nC	
Peak reverse recovery current	I_{rrm}		1.1		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 inch^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

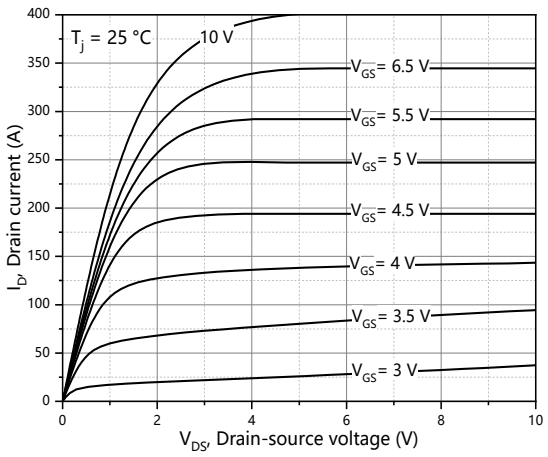


Figure 1. Typ. output characteristics

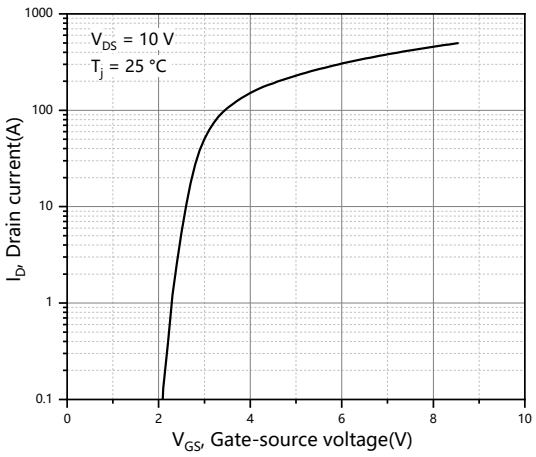


Figure 2. Typ. transfer characteristics

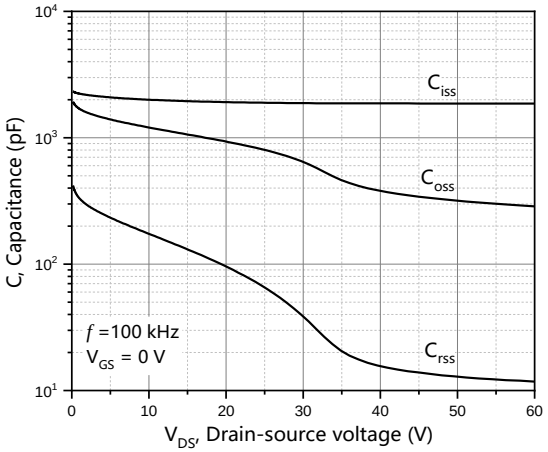


Figure 3. Typ. capacitances

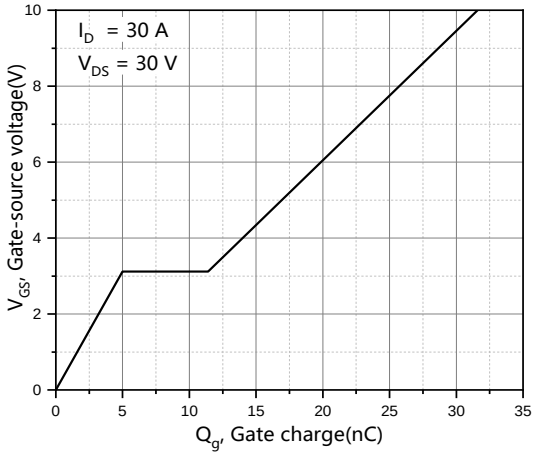


Figure 4. Typ. gate charge

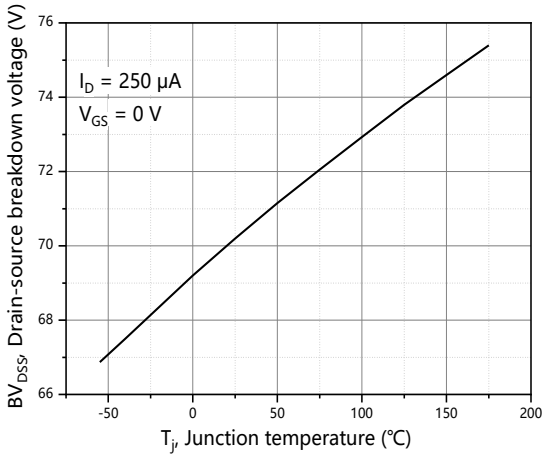


Figure 5. Drain-source breakdown voltage

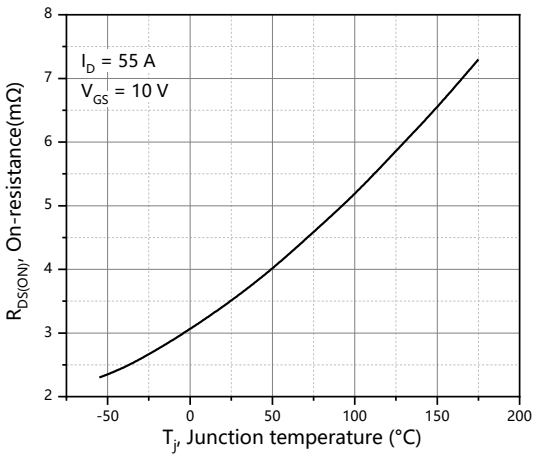


Figure 6. Drain-source on-state resistance

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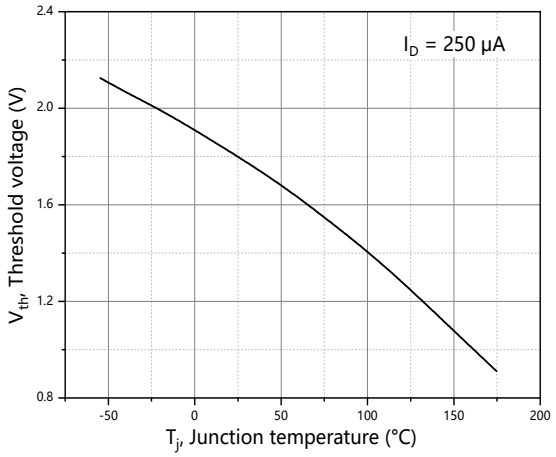


Figure 7. Threshold voltage

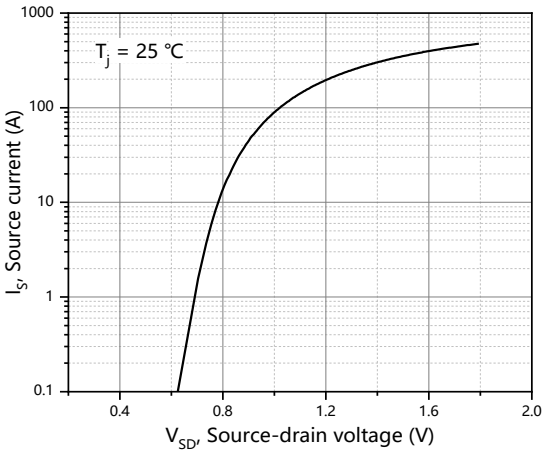


Figure 8. Forward characteristic of body diode

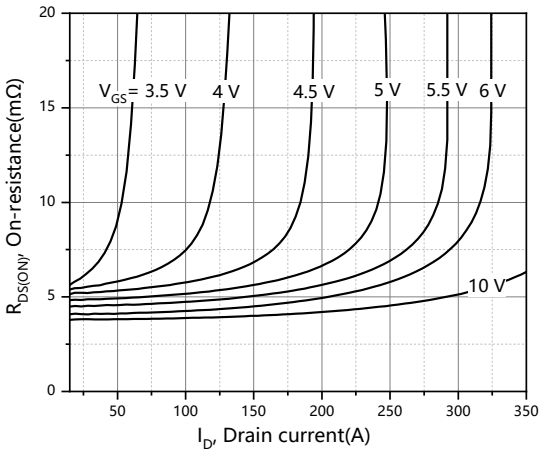


Figure 9. Drain-source on-state resistance

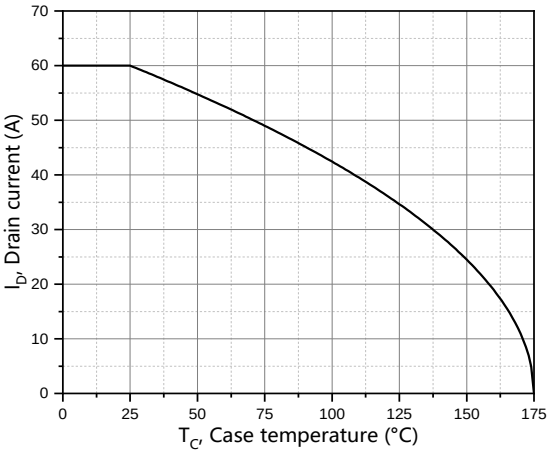


Figure 10. Drain current

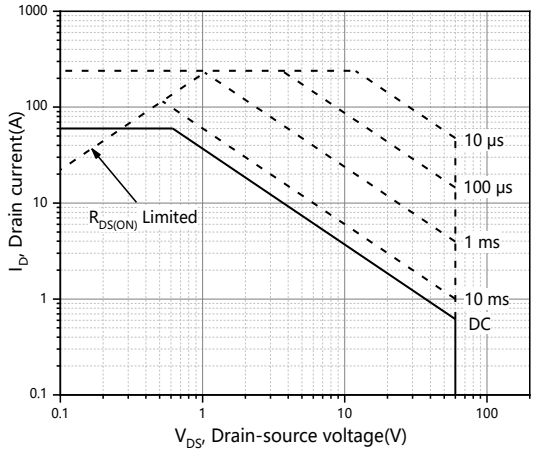


Figure 11. Safe operation area T_C=25 ℃

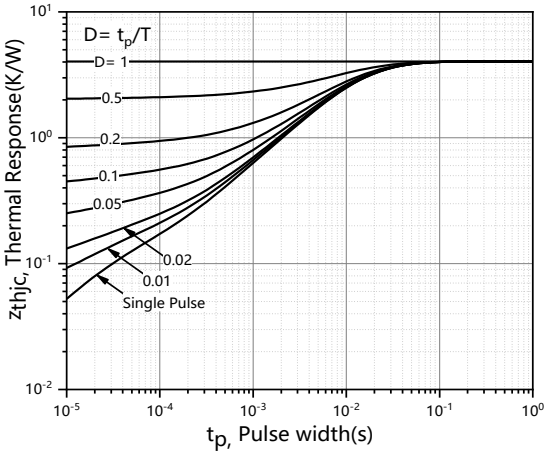


Figure 12. Max. transient thermal impedance

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Test circuits and waveforms

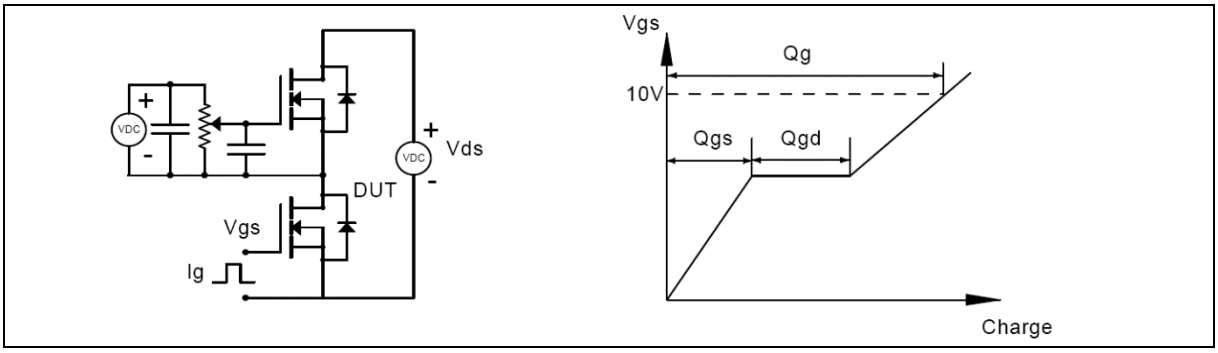


Figure 1. Gate charge test circuit & waveform

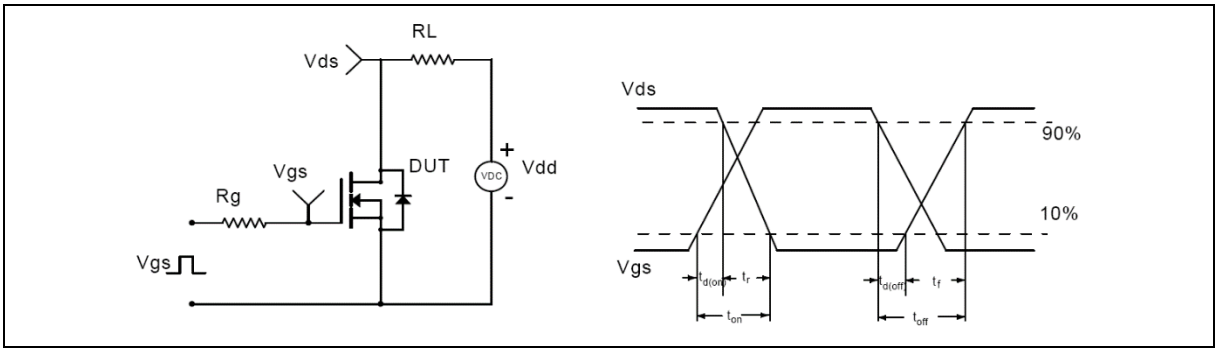


Figure 2. Switching time test circuit & waveforms

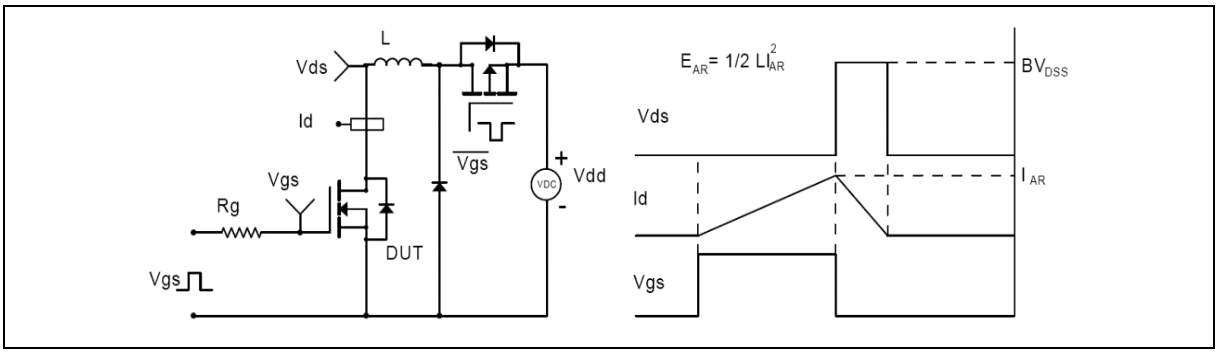


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

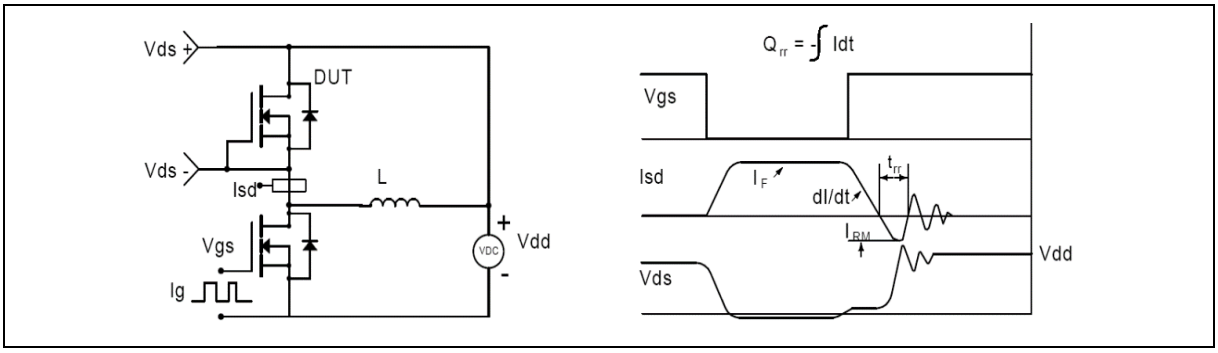
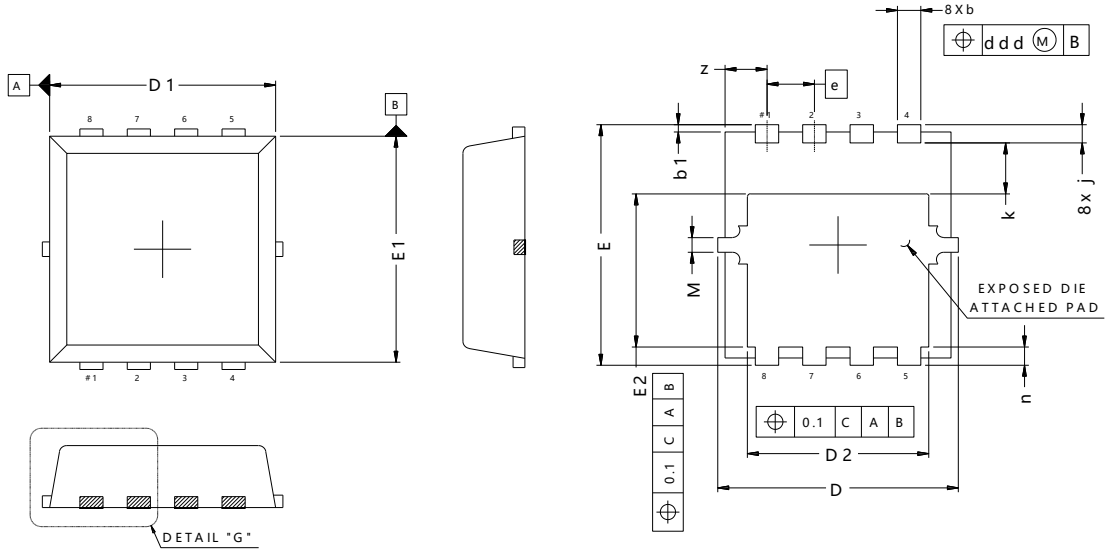


Figure 4. Diode reverse recovery test circuit & waveforms

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Package Information

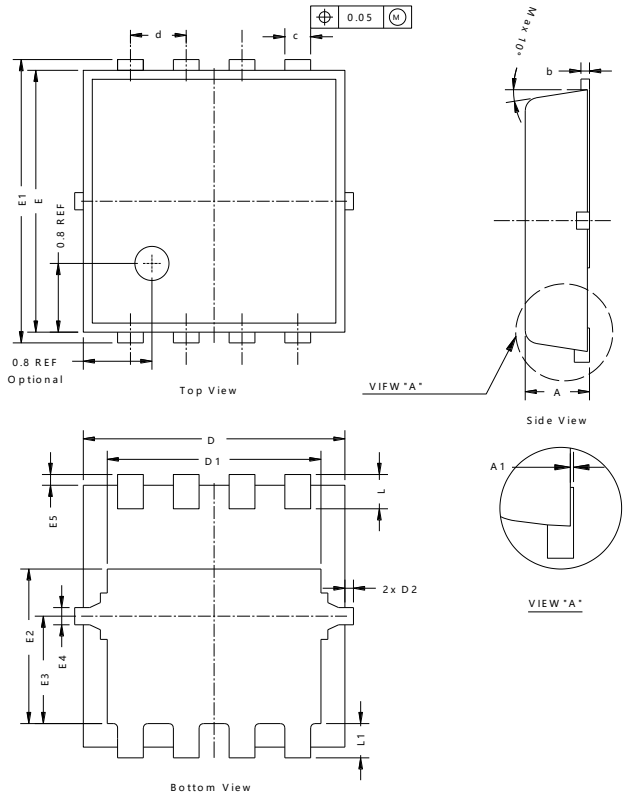


Symbol	mm	
	Min	Max
A	0.80	0.90
A1	0.12	0.22
b	0.22	0.42
b1	0.05	0.15
D	3.30 BSC	
D1	3.10 BSC	
D2	2.29	2.69
E	3.30 BSC	
E1	3.10 BSC	
E2	1.85	2.05
e	0.65 BSC	
j	0.15	0.35
k	0.75	0.95
n	0.15	0.35
M	0.20	
P	9°	11°
z	0.58	

Version 1: PDFN3.3×3.3-S package outline dimension

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Package Information

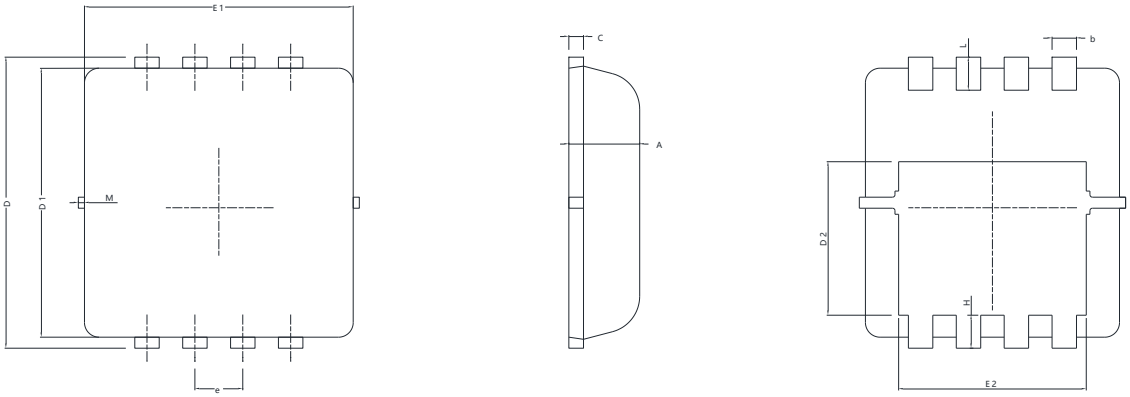


SWMBOLS	DIMESION IN MM		
	MIN	NOM	MAX
A	0.700	0.750	0.800
A1	-	-	0.05
b	0.144	0.152	0.202
c	0.250	0.300	0.350
d	0.615 BSC		
D	2.950	3.050	3.150
D1	2.390	2.490	2.590
D2	-	-	0.125
E	2.950	3.050	3.150
E1	3.200	3.300	3.400
E2	1.700	1.800	1.900
E3	1.150	1.250	1.350
E4	0.150	0.200	0.250
E5	0.075	0.125	0.175
L	0.300	0.400	0.500
L1	0.300	0.400	0.500

Version 2: PDFN3.3×3.3-H package outline dimension

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Package Information



SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
b	0.25	0.30	0.35
b2	0.10	0.15	0.25
c	3.25	3.35	3.45
D	3.00	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
E1	3.10	3.20	3.30
E2	2.44	2.54	2.64
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
M	\	\	0.10

Version: PDFN3.3×3.3-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
PDFN3.3×3.3-S	5000	1	5000	10	50000
PDFN3.3×3.3-H	5000	2	10000	5	50000
PDFN3.3×3.3-P	5000	2	10000	5	50000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
SFS06R045UNF	PDFN3.3×3.3	yes	yes	yes

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