

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



Applications

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

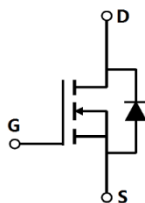
Key Performance Parameters

Parameter	Value	Unit
$V_{DS, min} @ T_{j(max)}$	60	V
$I_{D, pulse}$	180	A
$R_{DS(ON), max} @ V_{GS}=10V$	4.5	m Ω
Q_g	31.3	nC

Marking Information

Product Name	Package	Marking
SFS06R045UNF	PDFN3.3*3.3	SFS06R045UN

Package & Pin information



Absolute Maximum Ratings at $T_j=25^\circ\text{C}$ 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⁾ , $T_C=25^\circ\text{C}$	I_D	60	A
Pulsed drain current ²⁾ , $T_C=25^\circ\text{C}$	$I_{D, pulse}$	180	A
Continuous diode forward current ¹⁾ , $T_C=25^\circ\text{C}$	I_S	60	A
Diode pulsed current ²⁾ , $T_C=25^\circ\text{C}$	$I_{S, pulse}$	180	A
Power dissipation ³⁾ , $T_C=25^\circ\text{C}$	P_D	31	W
Single pulsed avalanche energy ⁵⁾	E_{AS}	49	mJ
Operation and storage temperature	T_{stg}, T_j	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	4.03	$^\circ\text{C/W}$
Thermal resistance, junction-ambient ⁴⁾	$R_{\theta JA}$	62	$^\circ\text{C/W}$

Electrical Characteristics at $T_j=25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	60			V	$V_{GS}=0\text{ V}, I_D=250\ \mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	1.3		2.4	V	$V_{DS}=V_{GS}, I_D=250\ \mu\text{A}$
Drain-source on-state resistance	$R_{DS(ON)}$		3.7	4.5	m Ω	$V_{GS}=10\text{ V}, I_D=20\text{ A}$
Drain-source on-state resistance	$R_{DS(ON)}$		5.3	6.5	m Ω	$V_{GS}=4.5\text{ V}, I_D=20\text{ A}$
Gate-source leakage current	I_{GSS}			100	nA	$V_{GS}=20\text{ V}$
				-100		$V_{GS}=-20\text{ V}$
Drain-source leakage current	I_{DSS}			1	μA	$V_{DS}=60\text{ V}, V_{GS}=0\text{ V}$
Gate resistance	R_G		2.9		Ω	$f=1\text{ MHz}, \text{Open drain}$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		2110		pF	$V_{GS}=0\text{ V}$, $V_{DS}=25\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		604		pF	
Reverse transfer capacitance	C_{rss}		50.6		pF	
Turn-on delay time	$t_{d(on)}$		19.2		ns	$V_{GS}=10\text{ V}$, $V_{DS}=30\text{ V}$, $R_G=2\ \Omega$, $I_D=60\text{ A}$
Rise time	t_r		6.2		ns	
Turn-off delay time	$t_{d(off)}$		43.2		ns	
Fall time	t_f		8.6		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		31.3		nC	$V_{GS}=10\text{ V}$, $V_{DS}=30\text{ V}$, $I_D=60\text{ A}$
Gate-source charge	Q_{gs}		6.2		nC	
Gate-drain charge	Q_{gd}		5.9		nC	
Gate plateau voltage	$V_{plateau}$		3.6		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	$I_S=20\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		61.2		ns	$V_R=48\text{ V}$, $I_S=50\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		35		nC	
Peak reverse recovery current	I_{rrm}		1		A	

Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) P_d 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 $T_a=25\text{ }^\circ\text{C}$.
- 5) $V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $L=0.3\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

Electrical Characteristics Diagrams

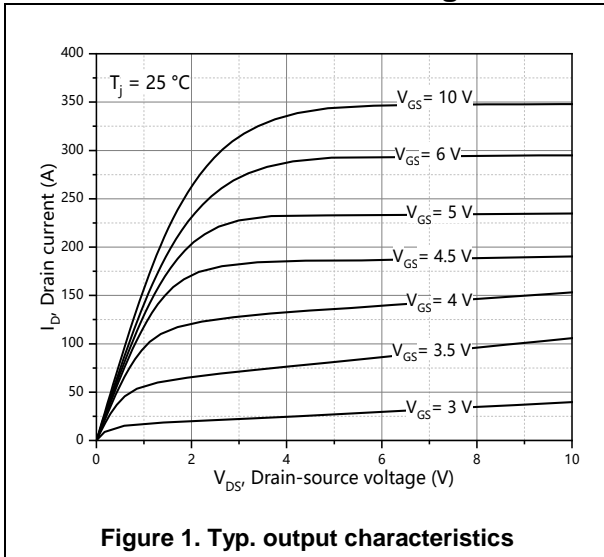


Figure 1. Typ. output characteristics

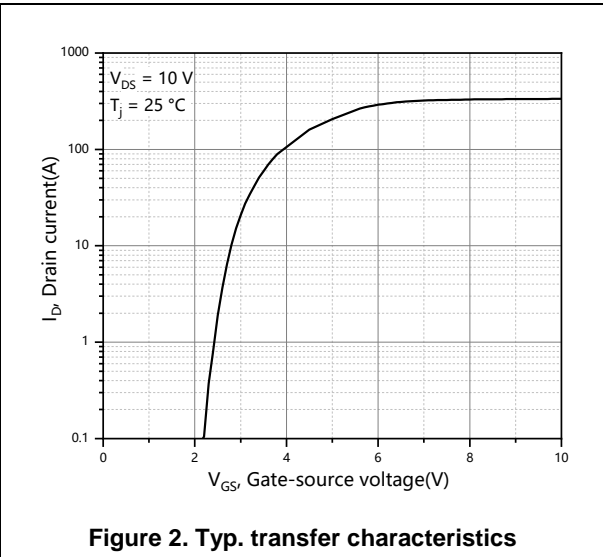


Figure 2. Typ. transfer characteristics

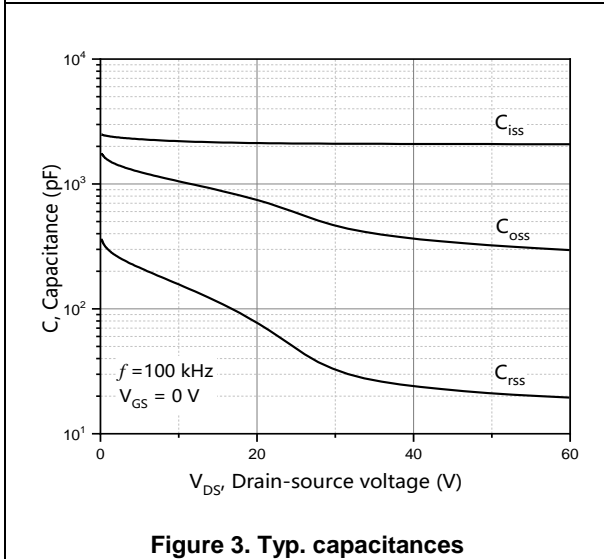


Figure 3. Typ. capacitances

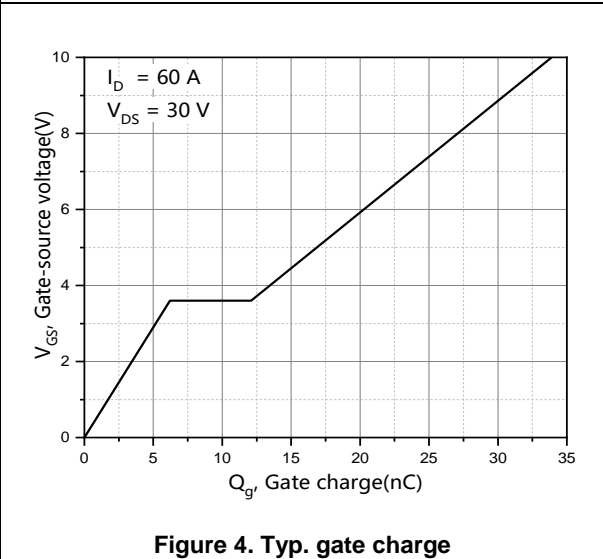


Figure 4. Typ. gate charge

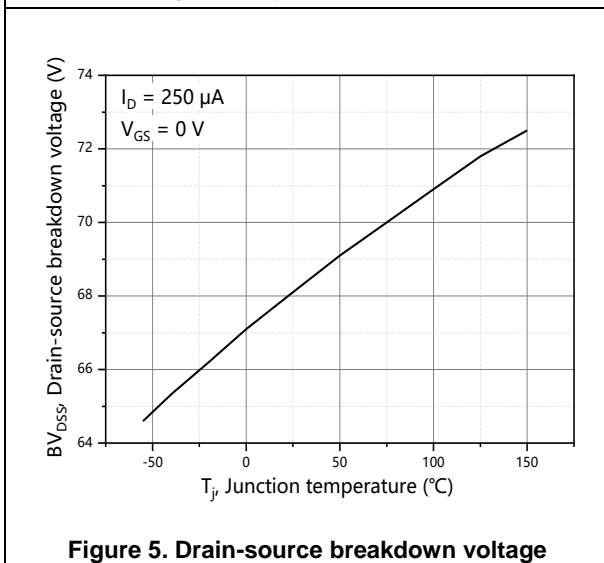


Figure 5. Drain-source breakdown voltage

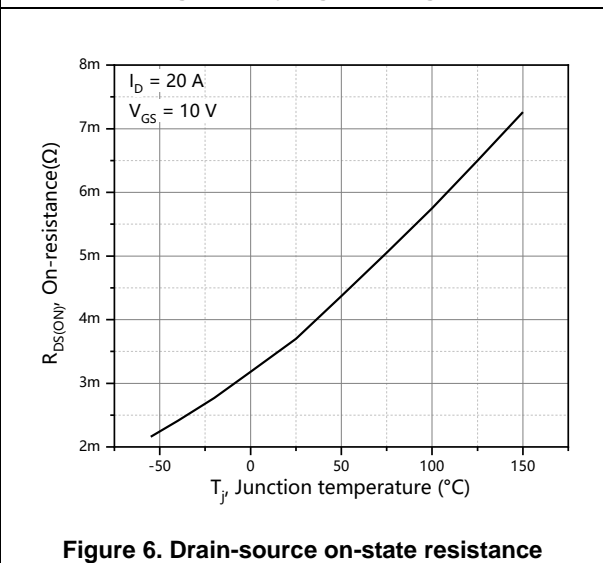
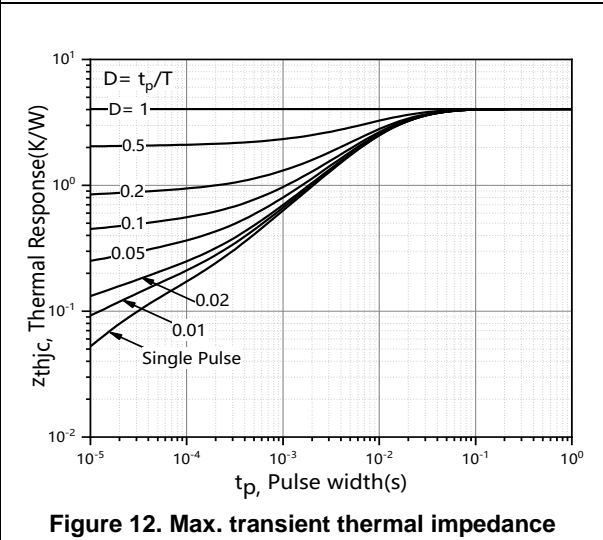
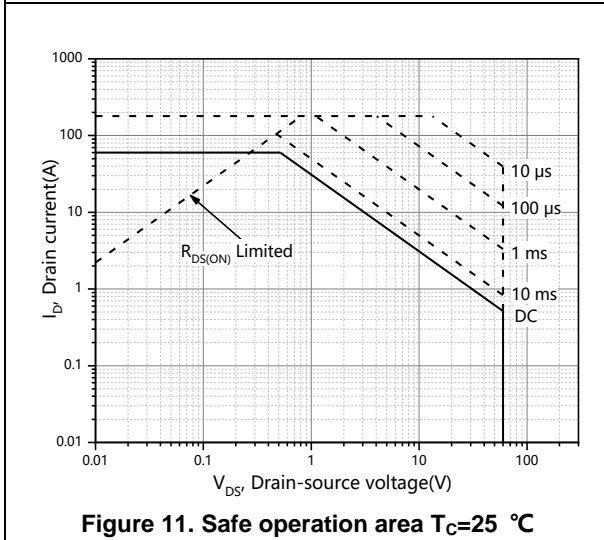
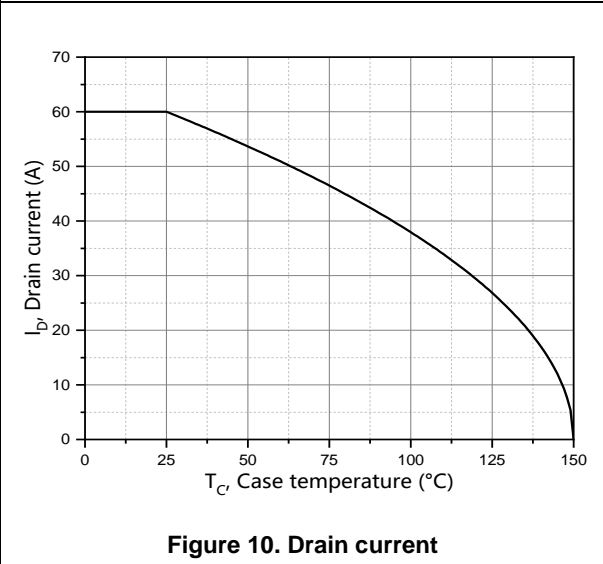
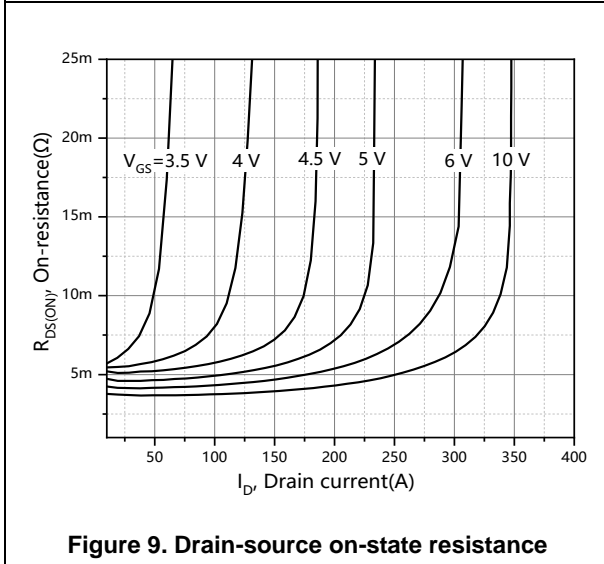
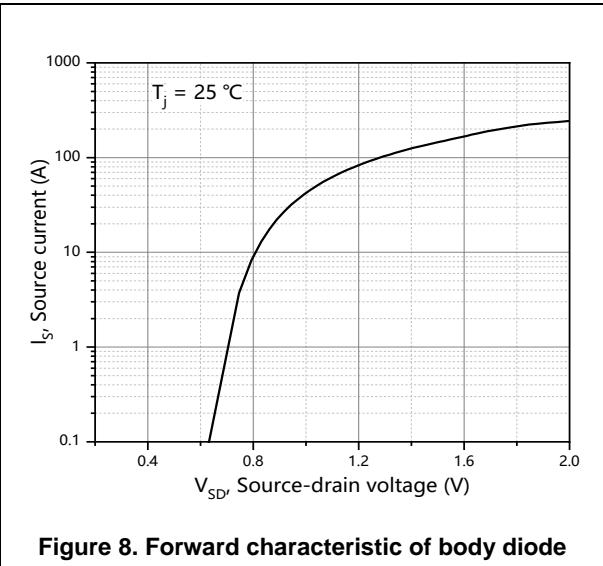
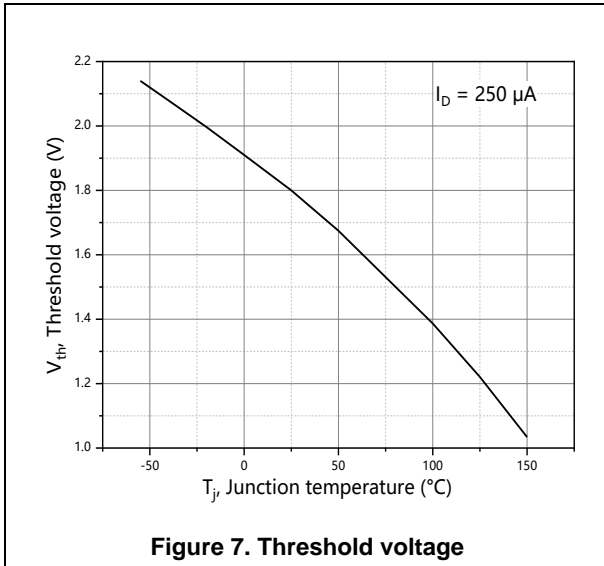


Figure 6. Drain-source on-state resistance



Test circuits and waveforms

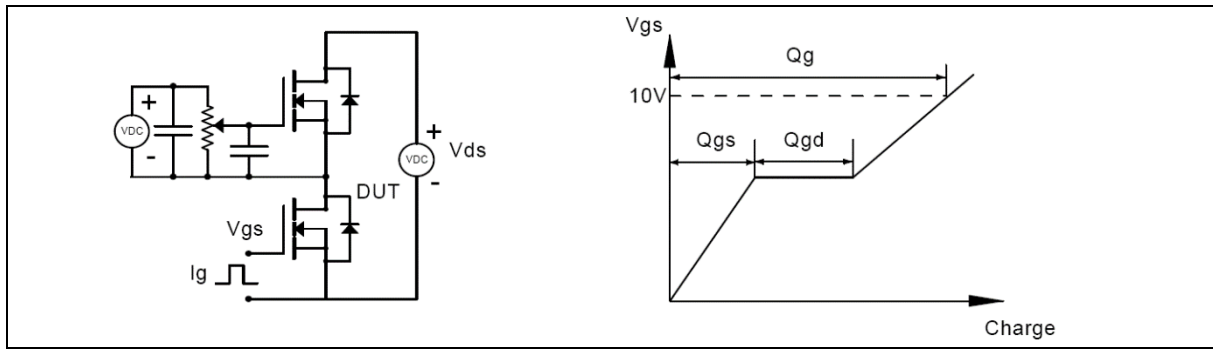


Figure 1. Gate charge test circuit & waveform

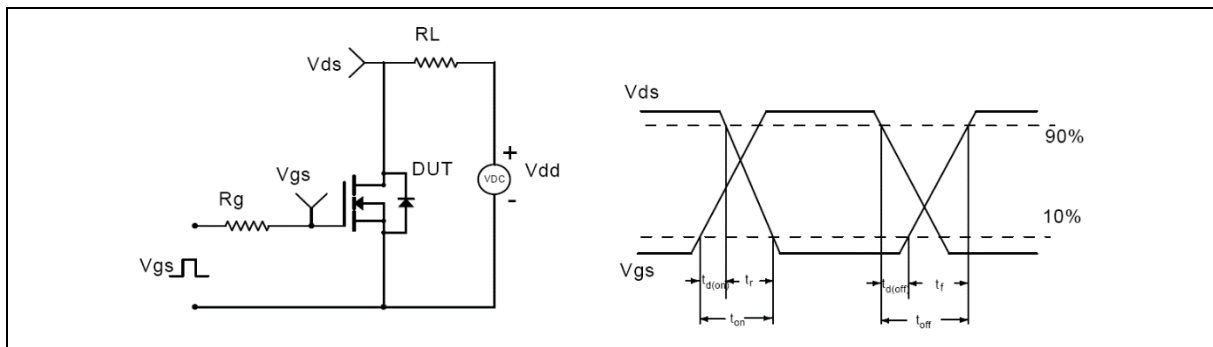


Figure 2. Switching time test circuit & waveforms

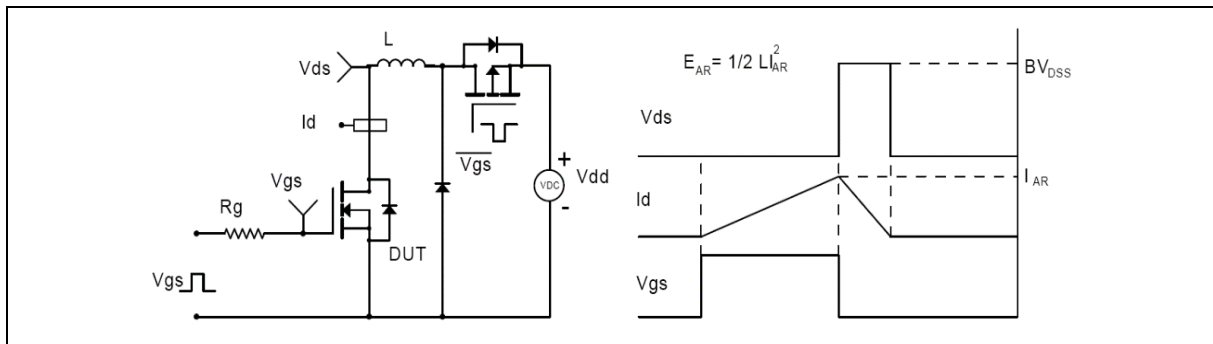


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

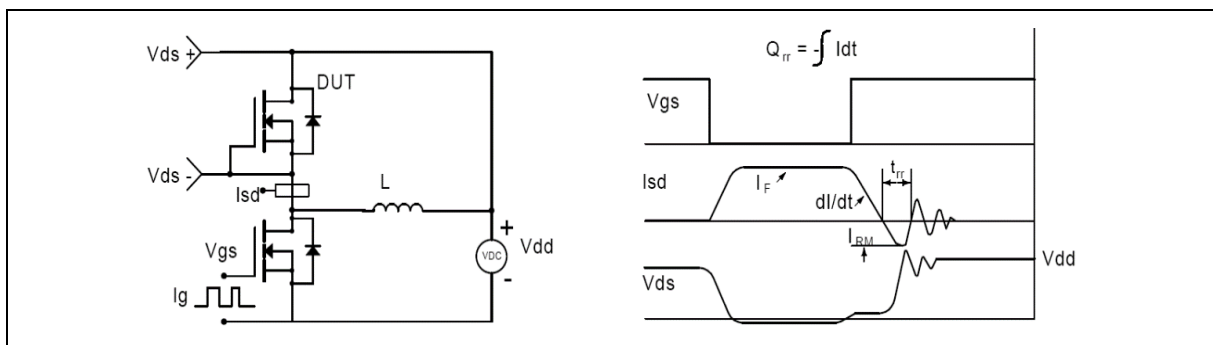
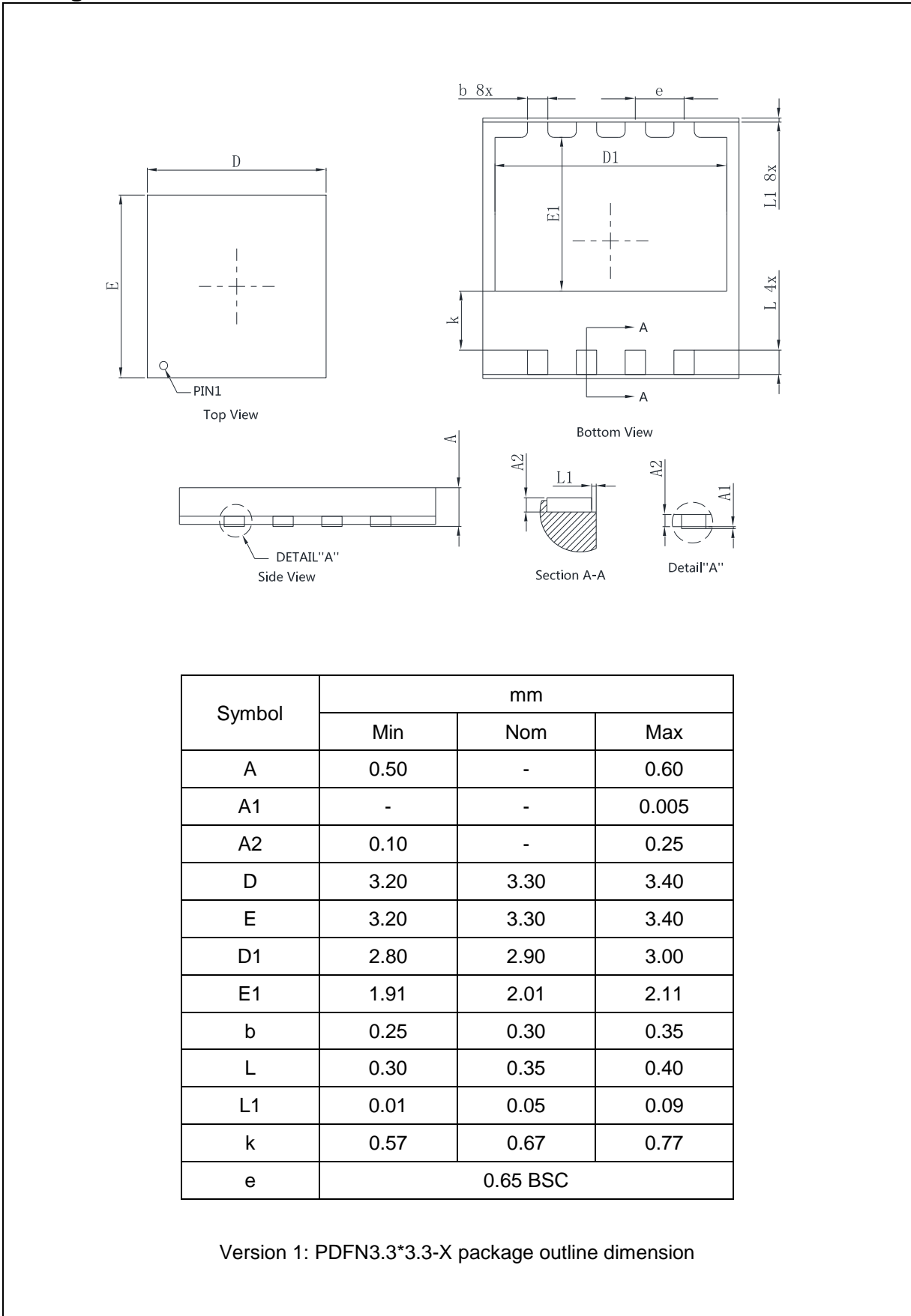


Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
PDFN3.3*3.3-X	5000	1	5000	8	40000

Product Information

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

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