

General Description

FSMOS[®]

$R_{DS(ON)}$, 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 (Figure of Merit)
- Extremely low switching loss
- Excellent reliability and uniformity
- Fast switching and soft recovery



Applications

- Consumer electronic power supply
- Motor control
- Synchronous rectification
- Isolated DC/DC convertor
- Invertors

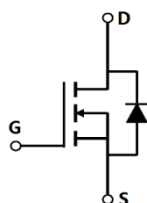
Key Performance Parameters

Parameter	Value	Unit
$V_{DS, min} @ T_{j(max)}$	60	V
$I_{D, pulse}$	480	A
$R_{DS(ON) max} @ V_{GS}=10V$	2.3	
Q_g	109.6	nC

Marking Information

Product Name	Package	Marking
SFS06R02UGF	PDFN5*6	SFS06R02UG

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	160	A
Pulsed drain current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{D, pulse}$	480	A
Continuous diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_S	160	A
Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{S, Pulse}$	480	A
Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$	P_D	132	W
Single pulsed avalanche energy ⁵⁾	E_{AS}	453	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	0.95	$^{\circ}\text{C/W}$
Thermal resistance, junction-ambient ⁴⁾	R	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	$V_{GS}=0\text{ V}$, $I_D=250\text{ A}$
Gate threshold voltage	$V_{GS(th)}$	1.2		2.5	V	$V_{DS}=V_{GS}$, $I_D=250\text{ A}$
Drain-source on-state resistance	$R_{DS(ON)}$		2.0	2.3		$V_{GS}=10\text{ V}$, $I_D=50\text{ A}$
Drain-source on-state resistance	$R_{DS(ON)}$		2.6	3.0		$V_{GS}=4.5\text{ V}$, $I_D=30\text{ A}$
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	A	$V_{DS}=60\text{ V}$, $V_{GS}=0\text{ V}$
Gate resistance	R_G		1.95			

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		6851		pF	$V_{GS}=0\text{ V}$, $V_{DS}=25\text{ V}$, kHz
Output capacitance	C_{oss}		1254		pF	
Reverse transfer capacitance	C_{rss}		68.6		pF	
Turn-on delay time	$t_{d(on)}$		29.2		ns	$V_{GS}=10\text{ V}$, $V_{DS}=50\text{ V}$, R_G $I_D=50\text{ A}$
Rise time	t_r		67.6		ns	
Turn-off delay time	$t_{d(off)}$		90.8		ns	
Fall time	t_f		23.6		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		109.6		nC	$V_{GS}=10\text{ V}$ $V_{DS}=50\text{ V}$, $I_D=50\text{ A}$,
Gate-source charge	Q_{gs}		17.6		nC	
Gate-drain charge	Q_{gd}		21.7		nC	
Gate plateau voltage	$V_{plateau}$		3.4		V	

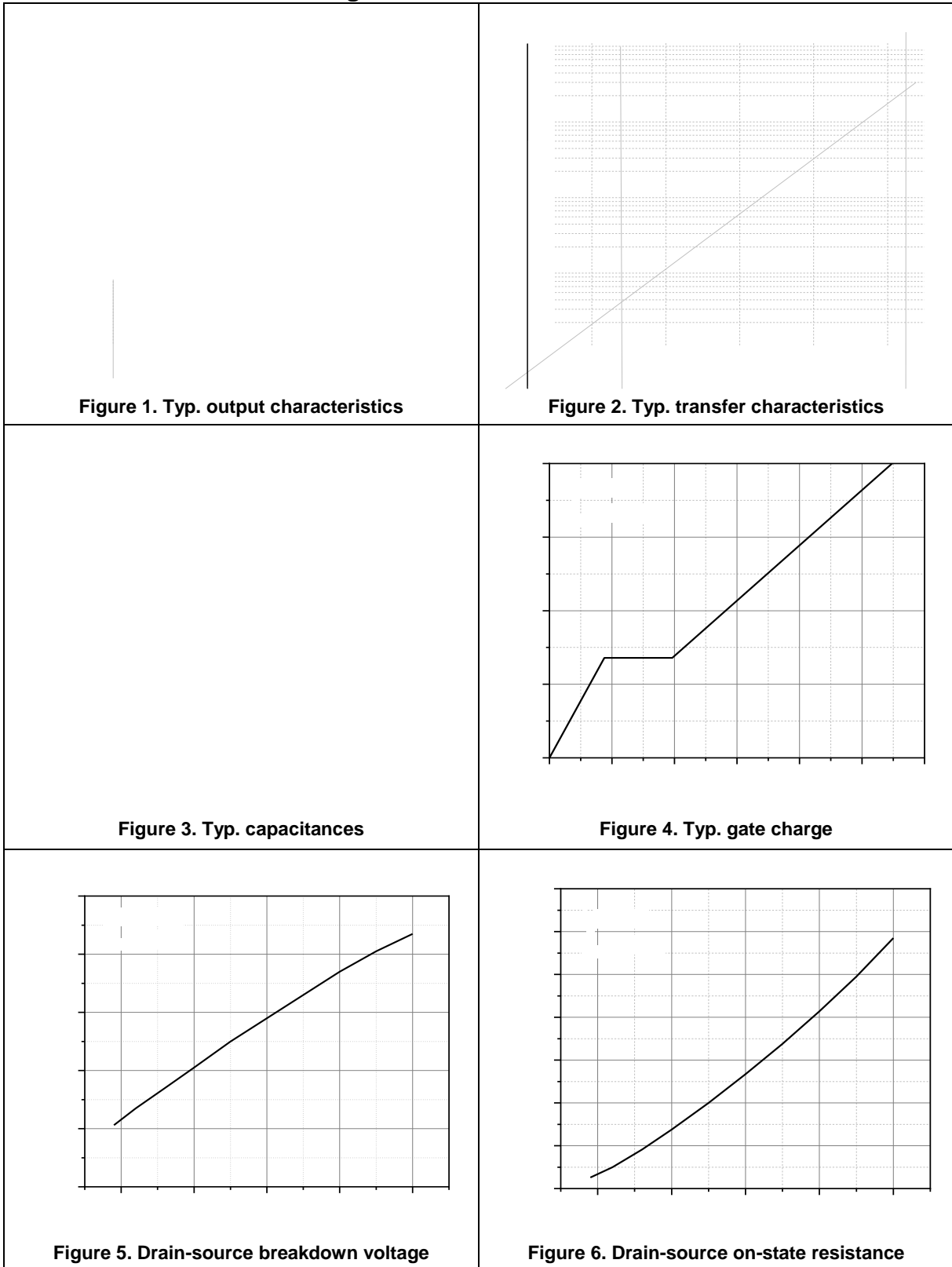
Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	$I_S=20\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		80		ns	$V_R=50\text{ V}$, $I_S=50\text{ A}$,
Reverse recovery charge	Q_{rr}		131.7		nC	
Peak reverse recovery current	I_{rrm}		2.8		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_{θ} 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) $V_{DD}=30\text{ V}$, $V_G=10\text{ V}$, $L=0.3\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

Electrical Characteristics Diagrams



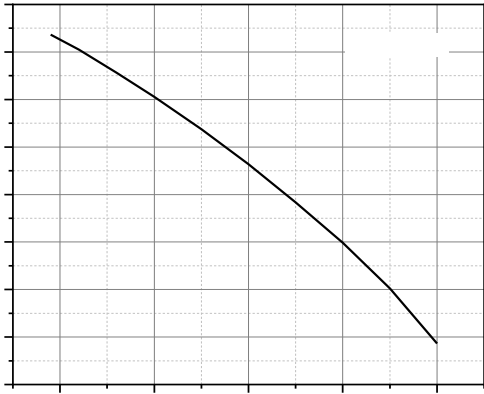


Figure 7. Threshold voltage



Figure 8. Forward characteristic of body diode

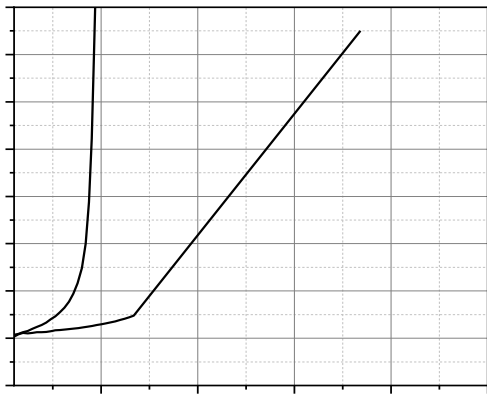


Figure 9. Drain-source on-state resistance

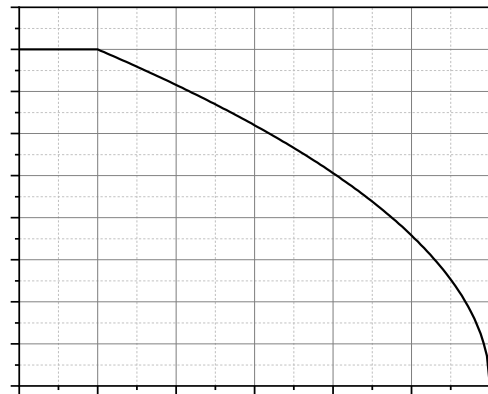


Figure 10. Drain current



Figure 11. Safe operation area T_c=25 °C

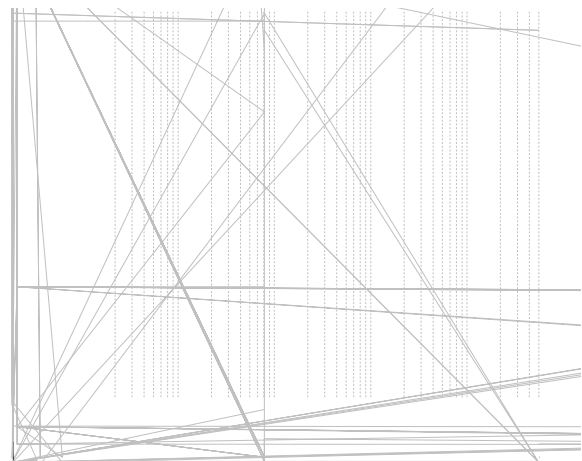


Figure 12. Max transient thermal impedance

Test circuits and waveforms

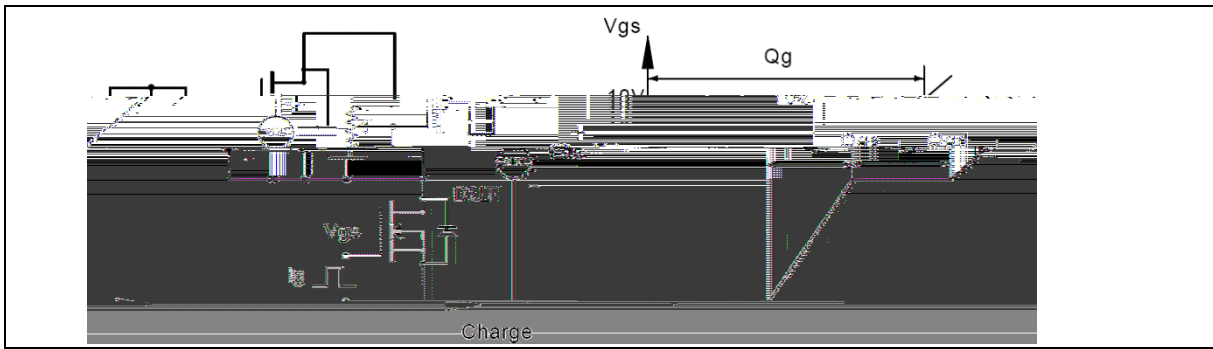


Figure 1. Gate charge test circuit & waveform

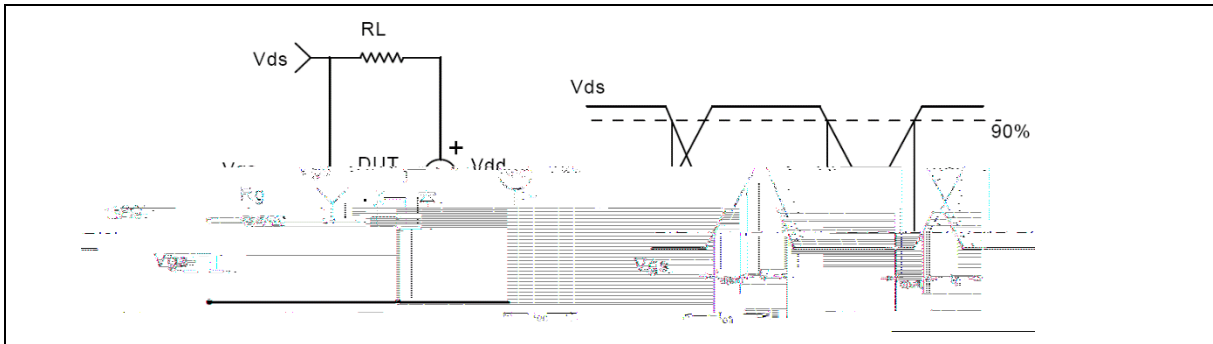


Figure 2. Switching time test circuit & waveforms

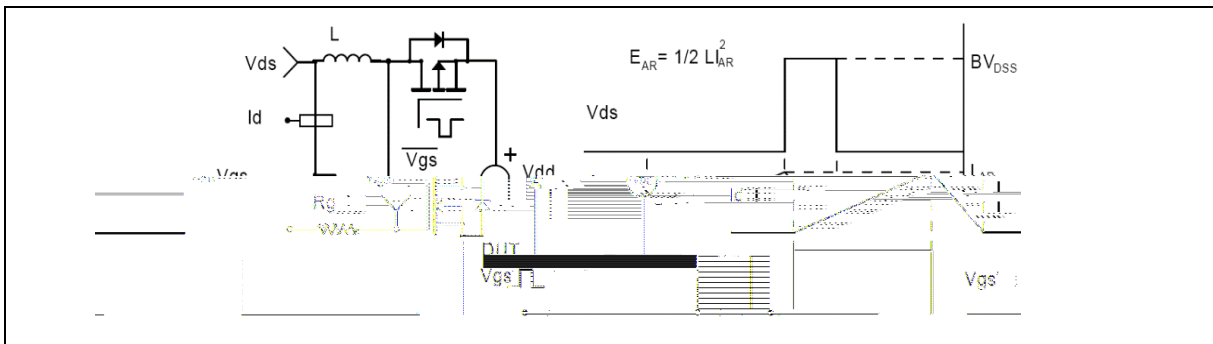


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

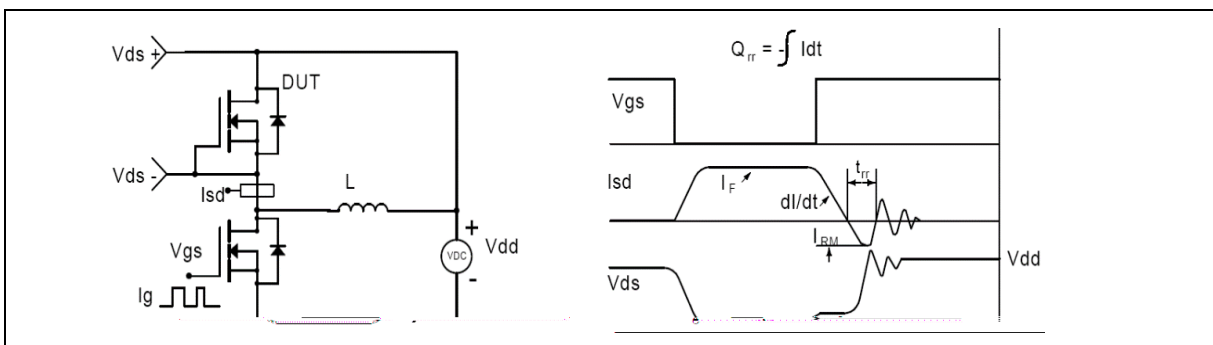


Figure 4. Diode reverse recovery test circuit & waveforms

Ordering Information

Package Type	Units/ Reel	Reels / Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
PDFN5*6	5000	2	10000	5	50000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
SFS06R02UGF	PDFN5*6	yes	yes	yes

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