

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.

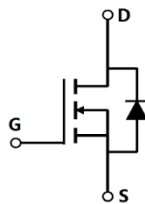
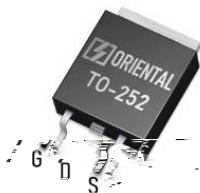
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- Switched mode power supply

Parameter	Value	Unit
$V_{DS, min} @ T_{j(max)}$	60	V
$I_{D, pulse}$	480	A
$R_{DS(ON) max} @ V_{GS}=10V$	3.5	
$Q_g$	66.1	nC

Product Name	Package	Marking
SFS06R03DF	TO252	SFS06R03D



**Absolute Maximum Ratings** at  $T_j=25$  unless otherwise noted

Parameter	Symbol	Value	Unit
Drain source voltage	$V_{DS}$	60	V
Gate source voltage	$V_{GS}$	$\pm 20$	V
Continuous drain current <sup>1)</sup> , $T_C=25$ °C	$I_D$	160	A
Pulsed drain current <sup>2)</sup> , $T_C=25$ °C	$I_{D, pulse}$	480	A
Continuous diode forward current <sup>1)</sup> , $T_C=25$ °C	$I_S$	160	A
Diode pulsed current <sup>2)</sup> , $T_C=25$ °C	$I_{S, Pulse}$	480	A
Power dissipation <sup>3)</sup> , $T_C=25$ °C	$P_D$	168	W
Single pulsed avalanche energy <sup>5)</sup>	$E_{AS}$	200	mJ
Operation and storage temperature	$T_{stg}$ $T_j$	-55 to 175	°C

**Thermal Characteristics**

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	R	0.89	°C/W
Thermal resistance, junction-ambient <sup>4)</sup>	R	62	°C/W

**Electrical Characteristics** at  $T_j=25$  unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	$BV_{DSS}$	60			V	$V_{GS}=0$ V, $I_D=250$ A
Gate threshold voltage	$V_{GS(th)}$	1.3		2.5	V	$V_{DS}=V_{GS}$ , $I_D=250$ A
Drain-source on-state resistance	$R_{DS(ON)}$		3.0	3.5		$V_{GS}=10$ V, $I_D=20$ A
Drain-source on-state resistance	$R_{DS(ON)}$		3.5	4.5		$V_{GS}=4.5$ V, $I_D=10$ 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	A	$V_{DS}=60$ V, $V_{GS}=0$ V

### Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	$C_{iss}$		5377		pF	$V_{GS}=0\text{ V}$ , $V_{DS}=25\text{ V}$ , 211 kHz
Output capacitance	$C_{oss}$		1666		pF	
Reverse transfer capacitance	$C_{rss}$		77.7		pF	
Turn-on delay time	$t_{d(on)}$		22.5		ns	$V_{GS}=10\text{ V}$ , $V_{DS}=30\text{ V}$ , $R_G$ - $I_D=25\text{ A}$
Rise time	$t_r$		6.7		ns	
Turn-off delay time	$t_{d(off)}$		80.3		ns	
Fall time	$t_f$		26.8		ns	

### Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	$Q_g$		66.1		nC	$V_{GS}=10\text{ V}$ , $V_{DS}=30\text{ V}$ , $I_D=25\text{ A}$
Gate-source charge	$Q_{gs}$		10.7		nC	
Gate-drain charge	$Q_{gd}$		10.9		nC	
Gate plateau voltage	$V_{plateau}$		2.9		V	

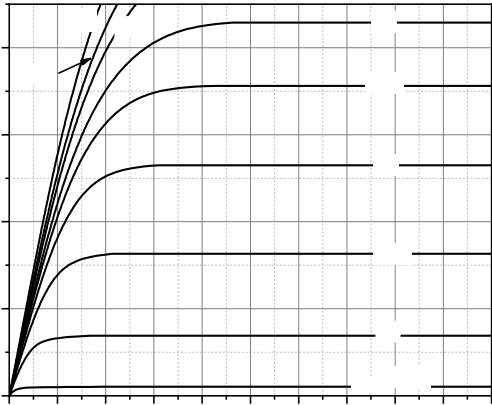
### Body Diode Characteristics

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	$t_{rr}$		68.3		ns	$V_R=30\text{ V}$ , $I_S=25\text{ A}$ , 0 211 0
Reverse recovery charge	$Q_{rr}$		73.0		nC	
Peak reverse recovery current	$I_{rrm}$		1.9		A	

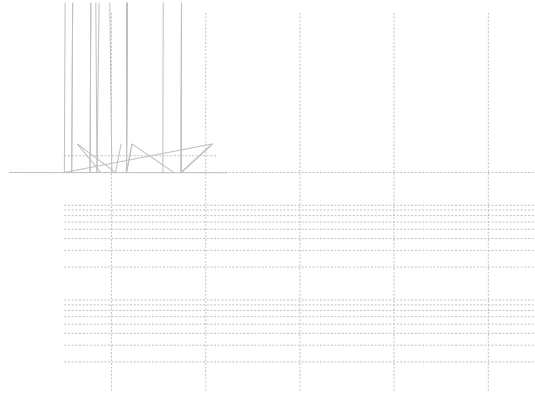
### Note

- 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  $R_{\theta j-c}$  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)  $V_{DD}=30\text{ V}$ ,  $V_{GS}=10\text{ V}$ ,  $L=0.3\text{ mH}$ , starting  $T_j=25\text{ }^\circ\text{C}$ .

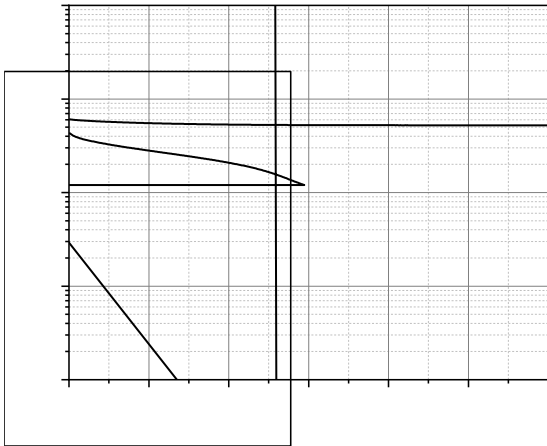
**Electrical Characteristics Diagrams**



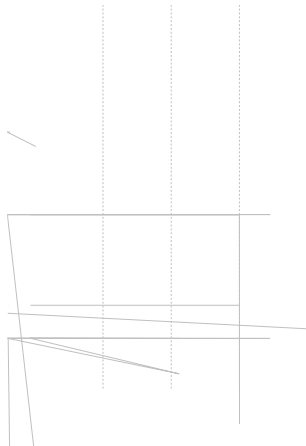
**Figure 1. Typ. output characteristics**



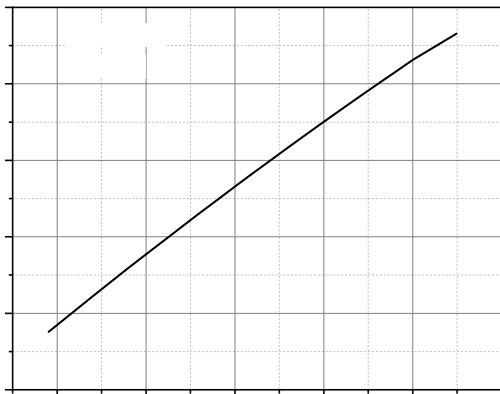
**Figure 2. Typ. transfer characteristics**



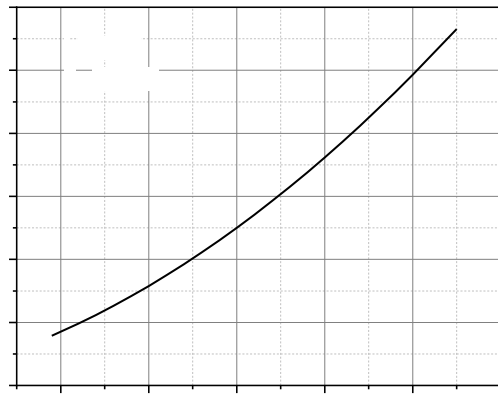
**Figure 3. Typ. capacitances**



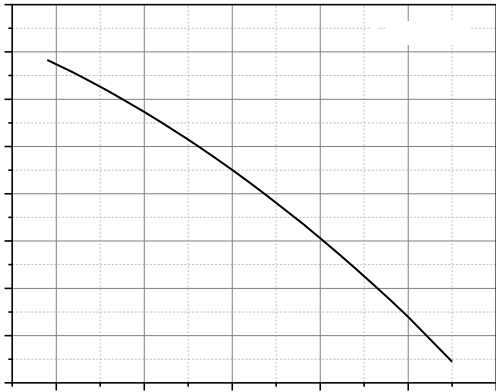
**Figure 4. Typ. gate charge**



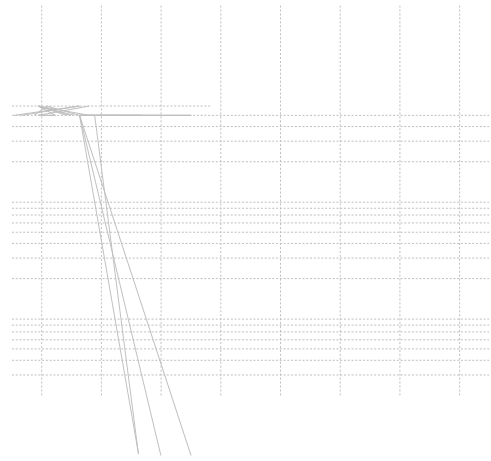
**Figure 5. Drain-source breakdown voltage**



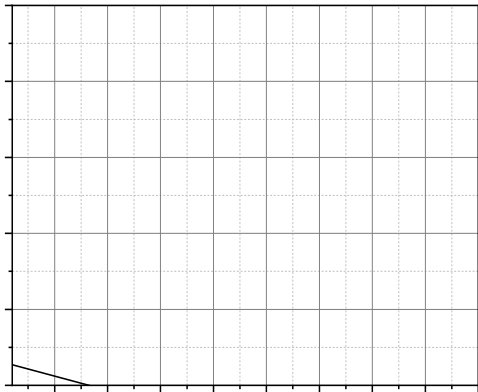
**Figure 6. Drain-source on-state resistance**



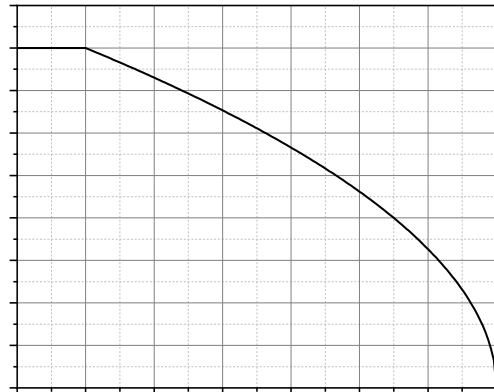
**Figure 7. Threshold voltage**



**Figure 8. Forward characteristic of body diode**



**Figure 9. Drain-source on-state resistance**



**Figure 10. Drain current**



**Figure 11. Safe operation area T<sub>c</sub>=25 °C**



**Figure 12. Max. transient thermal impedance**



## Package Information

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Enhancement Mode N-



**Ordering Information**

Package Type	Units/ Reel	Reels / Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO252-J	2500	2	5000	5	25000
TO252-P	2500	2	5000	5	25000

**Product Information**

Product	Package	Pb Free	RoHS	Halogen Free
SFS06R03DF	TO252	yes	yes	yes