

## SEMITRANS® M Power MOSFET Modules SKM 181 F



### SEMITRANS M1



#### Features

- N Channel, enhancement mode
- Fast inverse diode
- Short internal connections avoid oscillations
- Switching kW's in less than 1  $\mu$ s
- Isolated copper baseplate
- All electrical connections on top for easy busbaring
- Large clearances and creepage distances
- UL recognized, file no. E 63 532

#### Typical Applications

- Switched mode power supplies
- DC servo and robot drives
- DC choppers
- Resonant and welding inverters
- Induction heaters
- AC motor drives
- Laser power supplies
- UPS equipment
- Plasma cutting
- Not suitable for linear amplification

This is an electrostatic discharge sensitive device (ESDS). Please observe the international standard IEC 747-1, Chapter IX.

Absolute Maximum Ratings		Values	Units
Symbol	Conditions <sup>1)</sup>		
V <sub>DS</sub>	R <sub>GS</sub> = 20 k $\Omega$	800	V
V <sub>DGR</sub>		800	V
I <sub>D</sub>		34	A
I <sub>DM</sub>		136	A
V <sub>GS</sub>		$\pm 20$	V
P <sub>D</sub>		700	W
T <sub>j</sub> , T <sub>stg</sub>		- 55 ... +150	$^{\circ}$ C
V <sub>isol</sub>	AC, 1 min	2 500	V
humidity	DIN 40 040	Class F	
climate	DIN IEC 68 T.1	55/150/56	
Inverse Diode			
I <sub>F</sub> = - I <sub>D</sub>		34	A
I <sub>FM</sub> = - I <sub>DM</sub>		136	A

Characteristics		min.	typ.	max.	Units
Symbol	Conditions <sup>1)</sup>				
V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0, I <sub>D</sub> = 0,25 mA	800	-	-	V
V <sub>GS(th)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 1 mA	2,1	3,0	4,0	V
I <sub>DSS</sub>	V <sub>GS</sub> = 0, } T <sub>j</sub> = 25 $^{\circ}$ C V <sub>DS</sub> = 800 V } T <sub>j</sub> = 125 $^{\circ}$ C	-	20	250	$\mu$ A
		-	300	1000	$\mu$ A
I <sub>GSS</sub>	V <sub>GS</sub> = 20 V, V <sub>DS</sub> = 0	-	10	100	nA
R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 21 A	-	250	320	m $\Omega$
g <sub>fs</sub>	V <sub>DS</sub> = 25 V, I <sub>D</sub> = 21 A	15	35	-	S

C <sub>CHC</sub>	} V <sub>GS</sub> = 0 V <sub>DS</sub> = 25 V f = 1 MHz	-	-	160	pF
C <sub>iss</sub>		-	22	30	nF
C <sub>oss</sub>		-	1	1,5	nF
C <sub>rss</sub>		-	0,48	0,8	nF
L <sub>DS</sub>		-	-	20	nH
t <sub>d(on)</sub>	} V <sub>DD</sub> = 400 V I <sub>D</sub> = 21 A	-	60	-	ns
t <sub>r</sub>		-	30	-	ns
t <sub>d(off)</sub>	} V <sub>GS</sub> = 10 V R <sub>GS</sub> = 3,3 $\Omega$	-	350	-	ns
t <sub>f</sub>		-	70	-	ns

Inverse Diode		min.	typ.	max.	Units
V <sub>SD</sub>	I <sub>F</sub> = 60 A, V <sub>GS</sub> = 0				
t <sub>rr</sub>	T <sub>j</sub> = 25 $^{\circ}$ C <sup>2)</sup>	-	300	-	ns
	T <sub>j</sub> = 150 $^{\circ}$ C <sup>2)</sup>	-	-	-	ns
Q <sub>rr</sub>	T <sub>j</sub> = 25/150 $^{\circ}$ C <sup>2)</sup>	-	-	2/16	$\mu$ C
I <sub>RRM</sub>	T <sub>j</sub> = 25/150 $^{\circ}$ C <sup>2)</sup>	-	-	16/40	A

Thermal Characteristics		min.	typ.	max.	Units
R <sub>thjc</sub>					
R <sub>thch</sub>	M <sub>1</sub> , surface 10 $\mu$ m	-	-	0,05	$^{\circ}$ C/W

Mechanical Data		min.	typ.	max.	Units
M <sub>1</sub>	to heatsink, SI Units				
M <sub>2</sub>	to heatsink, US Units	35	-	44	lb.in.
	for terminals, SI Units	2,5	-	3,5	Nm
a	for terminals, US Units	22	-	24	lb.in.
		-	-	5x9,81	m/s <sup>2</sup>
w		-	-	150	g
Case	→ page B 5 - 2		D 15		

<sup>1)</sup> T<sub>case</sub> = 25  $^{\circ}$ C, unless otherwise specified.

<sup>2)</sup> I<sub>F</sub> = - I<sub>D</sub>, V<sub>R</sub> = 100 V, - di<sub>F</sub>/dt = 100 A/ $\mu$ s

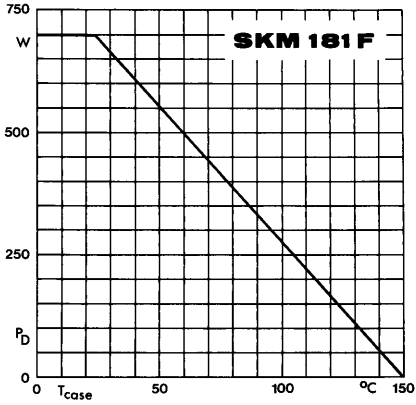


Fig. 1 Rated power dissipation vs. temperature

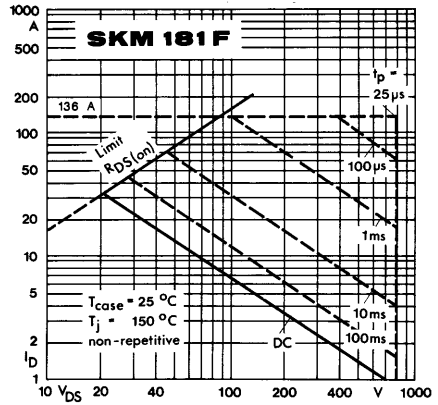


Fig. 2 Maximum safe operating area

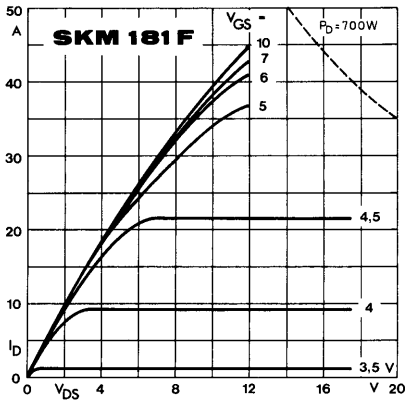


Fig. 3 Output characteristic

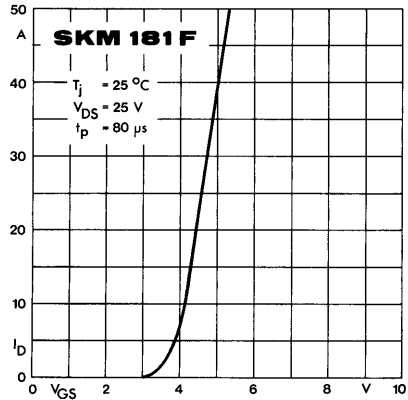


Fig. 4 Transfer characteristic

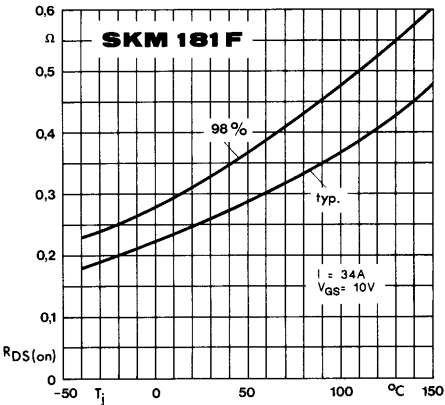


Fig. 5 On-resistance vs. temperature

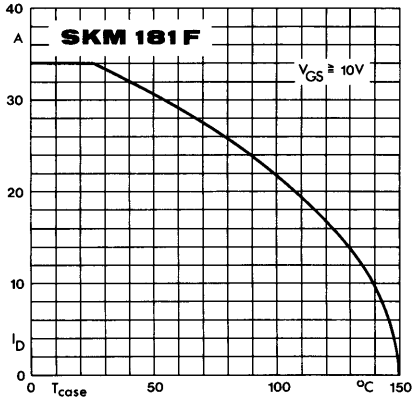


Fig. 6 Rated current vs. temperature

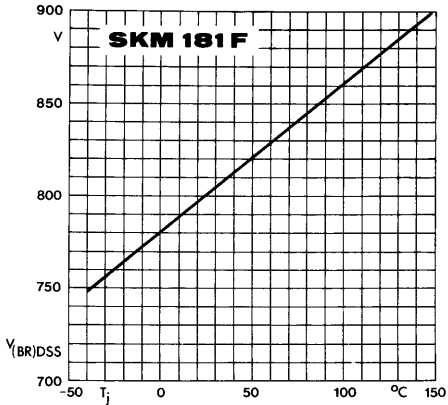


Fig. 7 Breakdown voltage vs. temperature

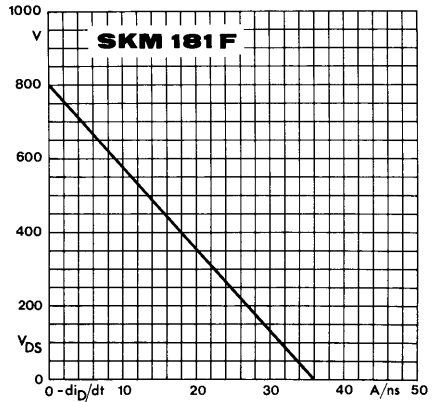


Fig. 8 Drain-source voltage derating

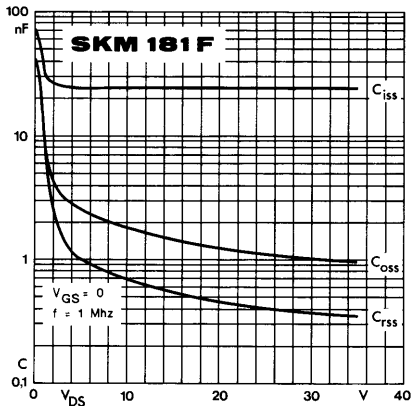


Fig. 9 Capacitances vs. drain-source voltage

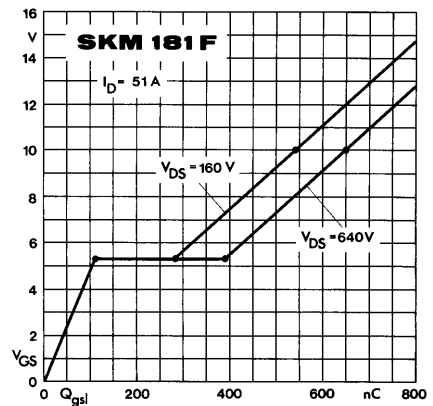


Fig. 10 Gate charge characteristic

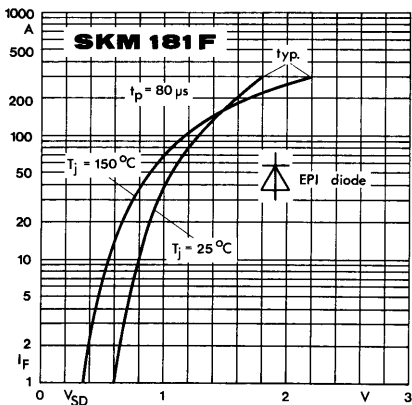


Fig. 11 Diode forward characteristic

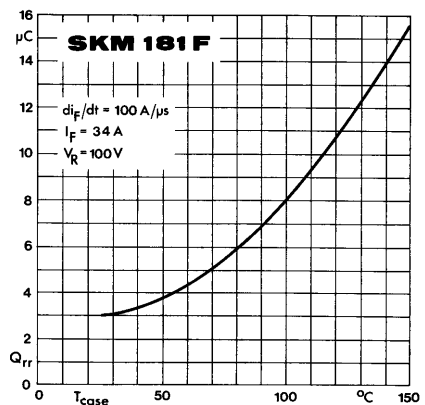


Fig. 12 Diode recovered charge

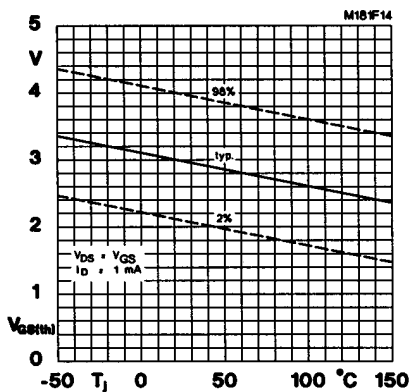


Fig. 14 Gate-source threshold voltage

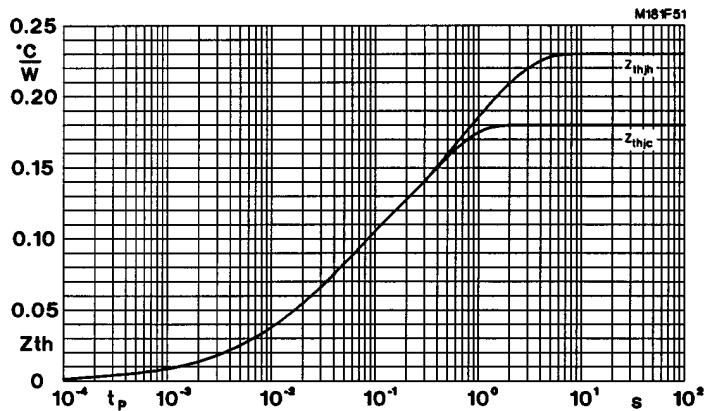


Fig. 51 Transient thermal impedance

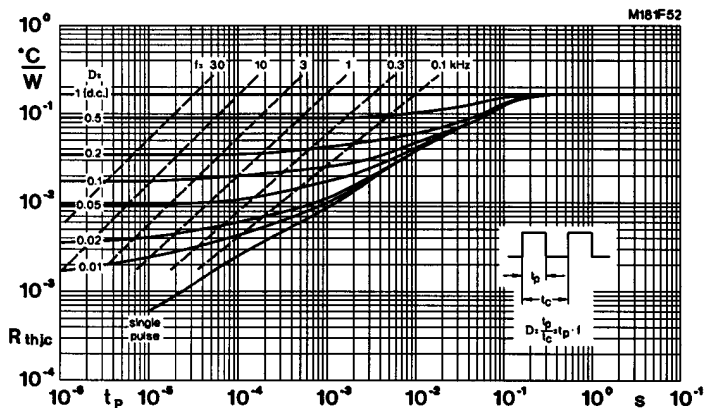


Fig. 52 Thermal impedance under pulse conditions