# SCS220AM

#### **SiC Schottky Barrier Diode**

Datasheet

$V_R$	650V
I <sub>F</sub>	20A
$Q_C$	31nC

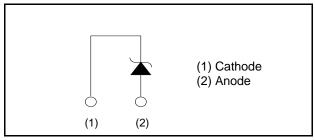
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# Outline TO-220FM

#### Features

- 1) Shorter recovery time
- 2) Reduced temperature dependence
- 3) High-speed switching possible

#### •Inner circuit



#### Applications

- · PFC Boost Topology
- · Secondary Side Rectification
- Data Center
- PV Power Conditioners

#### Packaging specifications

	J	
	Packaging	Tube
	Reel size (mm)	-
Type	Tape width (mm)	-
Туре	Basic ordering unit (pcs)	50
	Packing code	С
	Marking	SCS220AM

## ● Absolute maximum ratings (T<sub>vj</sub> = 25°C unless otherwise specified)

Parameter		Symbol	Value	Unit
Reverse voltage (re	petitive peak)	$V_{RM}$	650	V
Reverse voltage (De	C)	$V_R$	650	V
Continuous forward	current (T <sub>c</sub> = 21°C)	I <sub>F</sub>	20 *1	А
PW=10ms sinusoidal, T <sub>vj</sub> =25°C			68	А
repetitive forward	PW=10ms sinusoidal, T <sub>vj</sub> =150°C	I <sub>FSM</sub>	53	А
current	PW=10μs square, T <sub>vj</sub> =25°C		260	А
Repetitive peak forward current		I <sub>FRM</sub>	41 * <sup>2</sup>	А
PW=10ms, T <sub>vj</sub> =25°C		∫ i²dt	23	A <sup>2</sup> s
i <sup>2</sup> t value	PW=10ms, T <sub>vj</sub> =150°C	J i-at	14	A <sup>2</sup> s
Total power disspation		$P_{D}$	40 *3	W
Virtual Junction temperature		T <sub>vj</sub>	175	°C
Range of storage temperature		T <sub>stg</sub>	-55 to +175	°C

<sup>\*1</sup> Limited by maximum  $T_{vj}$  and for Max.  $R_{thJC}$ .

<sup>\*2</sup>  $T_c$ =100°C,  $T_{vj}$ =150°C, Duty cycle=10% \*3  $T_c$ =25°C

# ullet Electrical characteristics (T<sub>vj</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Conditions	Values			Lloit
			Min.	Тур.	Max.	Unit
DC blocking voltage	$V_{DC}$	I <sub>R</sub> =4.0mA	650	-	-	V
	V <sub>F</sub>	I <sub>F</sub> =20A,T <sub>vj</sub> =25°C	-	1.35	1.55	V
Forward voltage		I <sub>F</sub> =20A,T <sub>vj</sub> =150°C	-	1.55	-	V
		I <sub>F</sub> =20A,T <sub>vj</sub> =175°C	-	1.63	-	V
Reverse current	I <sub>R</sub>	V <sub>R</sub> =650V,T <sub>vj</sub> =25°C	-	4	400	μΑ
		V <sub>R</sub> =650V,T <sub>vj</sub> =150°C	-	60	-	μΑ
		V <sub>R</sub> =650V,T <sub>vj</sub> =175°C	-	140	-	μΑ
Total capacitance	С	V <sub>R</sub> =1V,f=1MHz	-	730	-	pF
		V <sub>R</sub> =600V,f=1MHz	-	74	-	pF
Total capacitive charge	Q <sub>C</sub>	V <sub>R</sub> =400V,di/dt=350A/μs	-	31	-	nC
Switching time	t <sub>C</sub>	V <sub>R</sub> =400V,di/dt=350A/μs	-	19	-	ns

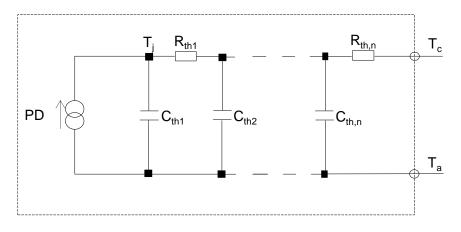
#### Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Тур.	Max.	Offic
Thermal resistance	$R_{thJC}$	-	-	3.2	3.7	K/W

## ●Typical Transient Thermal Characteristics

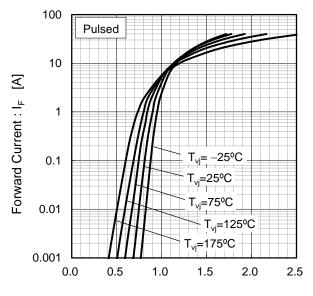
Symbol	Value	Unit
R <sub>th1</sub>	5.45E-01	
R <sub>th2</sub>	1.17E+00	K/W
R <sub>th3</sub>	1.50E+00	

Symbol	Value	Unit
C <sub>th1</sub>	2.76E-03	
C <sub>th2</sub>	9.35E-03	Ws/K
C <sub>th3</sub>	8.16E-01	



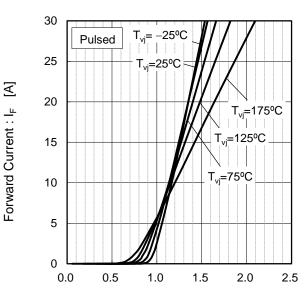
#### •Electrical characteristic curves

Fig.1  $V_F$  -  $I_F$  Characteristics



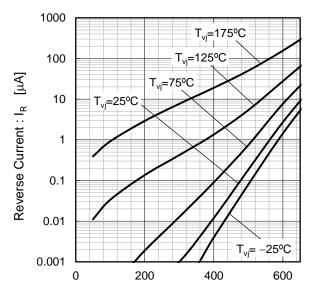
Forward Voltage : V<sub>F</sub> [V]

Fig.2 V<sub>F</sub> - I<sub>F</sub> Characteristics



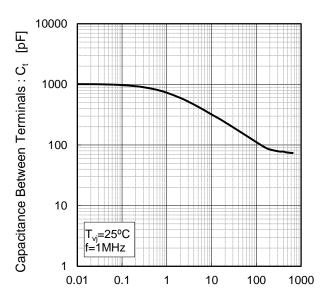
Forward Voltage : V<sub>F</sub> [V]

Fig.3  $V_R$  -  $I_R$  Characteristics



Reverse Voltage : V<sub>R</sub> [V]

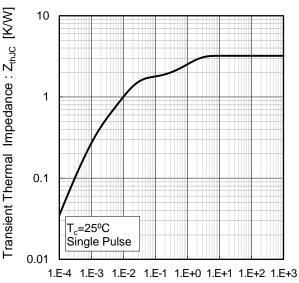
Fig.4 V<sub>R</sub> - C<sub>t</sub> Characteristics



Reverse Voltage : V<sub>R</sub> [V]

#### •Electrical characteristic curves

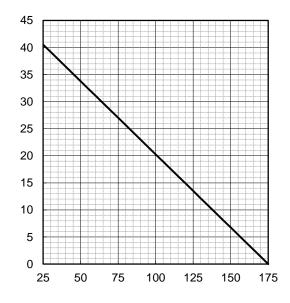
Fig.5 Typical Transient Thermal Impedance vs. Pulse Width



Pulse Width: PW [s]

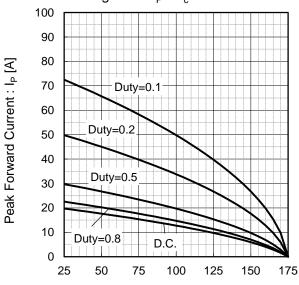
Fig.6 Power Dissipation

Power Dissipation [W]



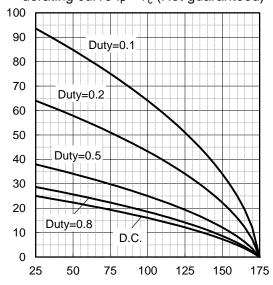
Case Temperature : T<sub>c</sub> [°C]

Fig.7\*4 Maximum peak forward current derating curve  $I_P$  -  $T_c$ 



Case Temperature :  $T_c$  [°C] \*4 Based on max Vf, max  $Z_{thJC}$  Valid for switching of above 10kHz, excluding D.C. curve.

Fig.8\*5 Typical peak forward current derating curve  $I_P$  -  $T_c$  (Not guaranteed)



Case Temperature :  $T_c$  [°C] \*5 Based on typ Vf, typ  $Z_{thJC}$  Typical value, not guaranteed Valid for switching of above 10kHz, excluding D.C. curve

Peak Forward Current: IP [A]

#### •Electrical characteristic curves

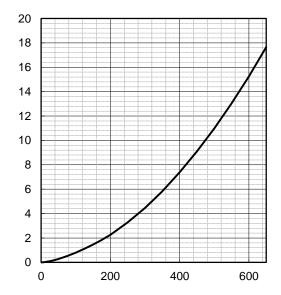
vs. Pulse width (Sinusoidal waveform) Surge non-repetitive forward current : I<sub>FSM</sub> [A] 1000 100

Fig.9 Surge non-repetitive forward current

Pulse Width: PW [s]

1.E-3

Fig.10 Typical capacitance store energy



Capacitance stored energy :  $E_{\rm C}[\mu J]$ 

1.E-2

Reverse Voltage: V<sub>R</sub> [V]

#### Symplified forward characteristic model

1.E-4

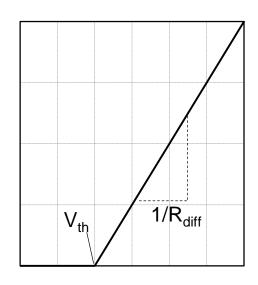
T<sub>vi</sub>=25°C

1.E-5

Forward Current: Is

Single Pulse

Fig.11 Equivalent forward current curve



Forward Voltage: V<sub>F</sub>

$$V_F = V_{th} + R_{diff} I_F$$

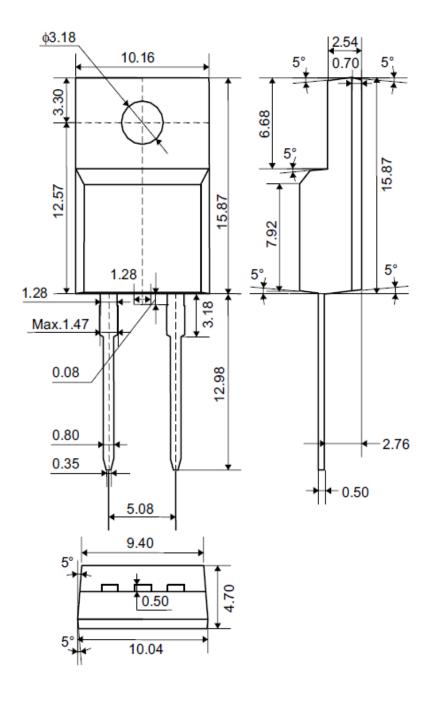
$$\begin{aligned} &V_{th} \left( \ T_{vj} \ \right) = a_0 + a_1 \, T_{vj} \\ &R_{diff} \left( \ T_{vj} \ \right) = b_0 + b_1 \, T_{vj} + b_2 \, T_{vj}^2 \end{aligned}$$

Symbol	Typical Value	Unit
<b>a</b> <sub>0</sub>	9.35E-01	V
a <sub>1</sub>	-1.12E-03	V/°C
b <sub>0</sub>	1.99E-02	Ω
b <sub>1</sub>	5.10E-05	Ω/°C
b <sub>2</sub>	5.40E-07	$\Omega/^{\circ}C^{2}$

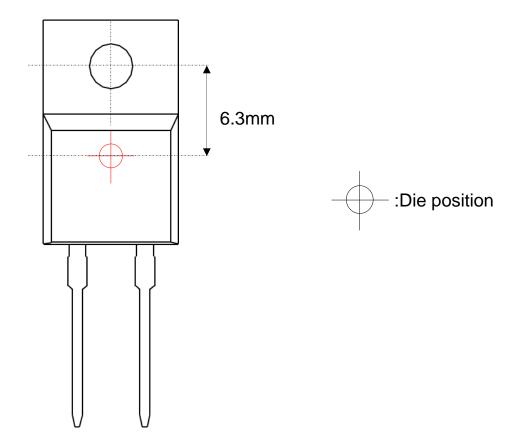
 $T_{vj}$  in °C; -55°C <  $T_{vj}$  < 175°C ;  $I_F$  < 40

#### ●Dimensions (Unit: mm)

#### TO-220FM (2pin)



# **●**Die Bonding Layout



- •Front view of the packaging.
- •Dimensions are design values.
- ·If the heat sink is to be installed, it should be in contact with the die bonding point.

Unit: mm

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