

## SiC Schottky Barrier Diode

VOLTAGE RANGE: 650V

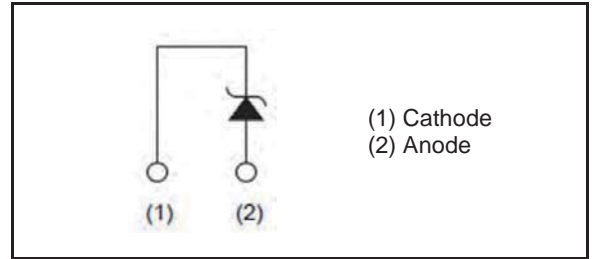
### Features

- Shorter recove time
- Reduced tperature dependence
- High-speeditching possible
- High surge current capabili

### MECHANICAL DATA

- Case style:TO-220 molded plastic
- Mounting position:any
- Silicon carbide epitaxial planar type

### ●Inner circuit



### ●Packaging specifications

Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	50
	Packing code	C
	Marking	SCS306AM

## MAXIMUM RATINGS AND CHARACTERISTICS

@ 25°C Ambient Temperature (unless otherwise noted)

Parameter		Symbol	Value	Unit
Reverse voltage (repetitive peak)		$V_{RM}$	650	V
Reverse voltage (DC)		$V_R$	650	V
Continuous forward current ( $T_c=120^\circ\text{C}$ )		$I_F$	6	A
Surge non-repetitive forward current	PW=10ms sinusoidal, $T_j=25^\circ\text{C}$	$I_{FSM}$	47	A
	PW=10ms sinusoidal, $T_j=150^\circ\text{C}$		40	A
	PW=10μs square, $T_j=25^\circ\text{C}$		170	A
Repetitive peak forward current		$I_{FRM}$	22 <sup>*1</sup>	A
$i^2t$ value	$1 \leq PW \leq 10\text{ms}$ , $T_j=25^\circ\text{C}$	$\int i^2 dt$	11	$\text{A}^2\text{s}$
	$1 \leq PW \leq 10\text{ms}$ , $T_j=150^\circ\text{C}$		8.0	$\text{A}^2\text{s}$
Total power dissipation		$P_D$	30 <sup>*2</sup>	W
Junction temperature		$T_j$	175	$^\circ\text{C}$
Range of storage temperature		$T_{stg}$	-55 to +175	$^\circ\text{C}$

\*1  $T_c=100^\circ\text{C}$ ,  $T_j=150^\circ\text{C}$ , Duty cycle=10% \*2  $T_c=25^\circ\text{C}$

# RATINGS AND CHARACTERISTIC CURVES

Electrical Specification ( $T_A=25^{\circ}\text{C}$  unless otherwise specified)

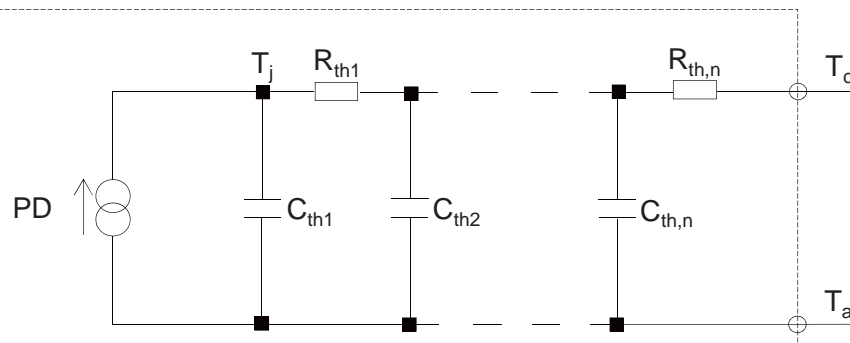
## ●Electrical characteristics ( $T_j = 25^{\circ}\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	$V_F$	$I_F=6\text{A}, T_j=25^{\circ}\text{C}$	-	1.35	1.50	V
		$I_F=6\text{A}, T_j=150^{\circ}\text{C}$	-	1.44	1.71	V
		$I_F=6\text{A}, T_j=175^{\circ}\text{C}$	-	1.50	-	V
Reverse current	$I_R$	$V_R=650\text{V}, T_j=25^{\circ}\text{C}$	-	0.018	30	$\mu\text{A}$
		$V_R=650\text{V}, T_j=150^{\circ}\text{C}$	-	1.2	120	$\mu\text{A}$
		$V_R=650\text{V}, T_j=175^{\circ}\text{C}$	-	3.6	-	$\mu\text{A}$
Total capacitance	C	$V_R=1\text{V}, f=1\text{MHz}$	-	300	-	pF
		$V_R=650\text{V}, f=1\text{MHz}$	-	27	-	pF
Total capacitive charge	$Q_C$	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	19	-	nC
Switching time	$t_C$	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	15	-	ns
Non-repetitive Avaranche Energy	$E_{ava}$	$L=1\text{mH}$	-	71	-	mJ
Thermal resistance	$R_{th(j-c)}$	-	-	4.2	4.9	$^{\circ}\text{C}/\text{W}$

## ●Typical Transient Thermal Characteristics

Symbol	Value	Unit
$R_{th1}$	4.19E-01	K/W
$R_{th2}$	1.64E+00	
$R_{th3}$	2.13E+00	

Symbol	Value	Unit
$C_{th1}$	3.12E-04	Ws/K
$C_{th2}$	1.71E-03	
$C_{th3}$	3.97E-01	



# RATINGS AND CHARACTERISTIC CURVES

Fig.1  $V_F - I_F$  Characteristics

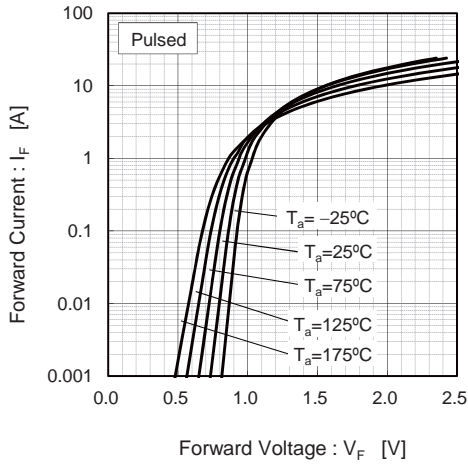


Fig.2  $V_F - I_F$  Characteristics

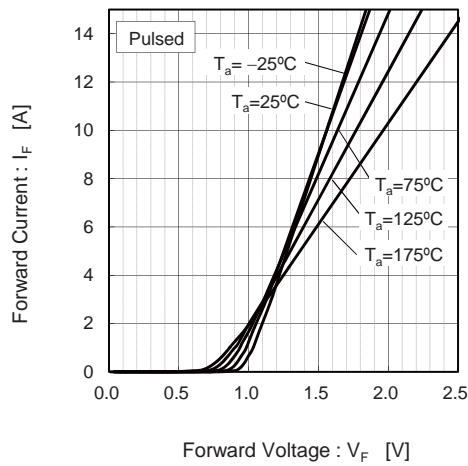


Fig.3  $V_R - I_R$  Characteristics

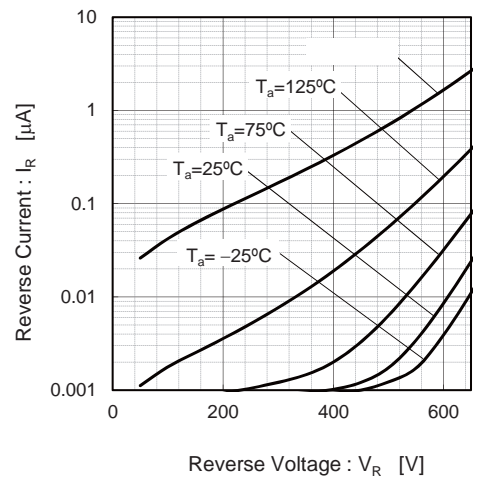


Fig.4  $V_R - C_t$  Characteristics

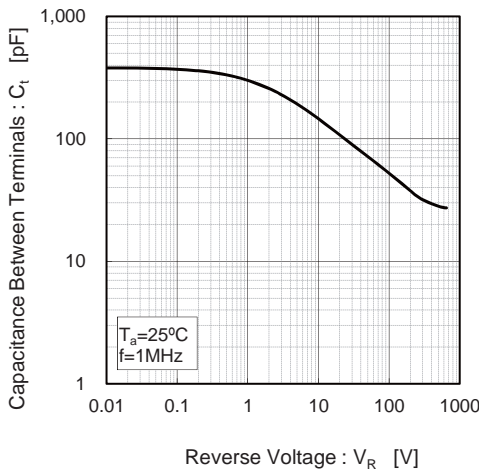


Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

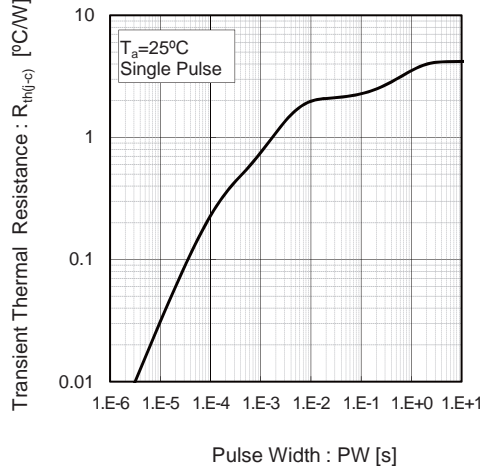


Fig.6 Power Dissipation

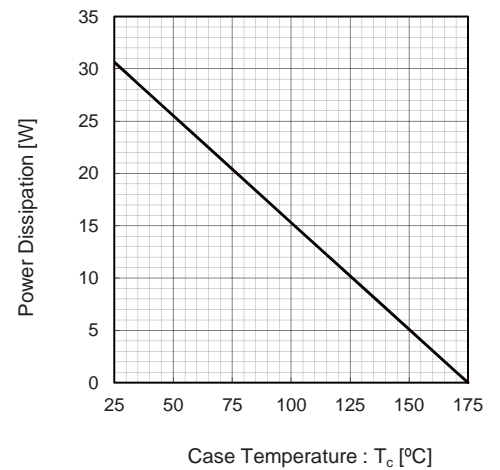
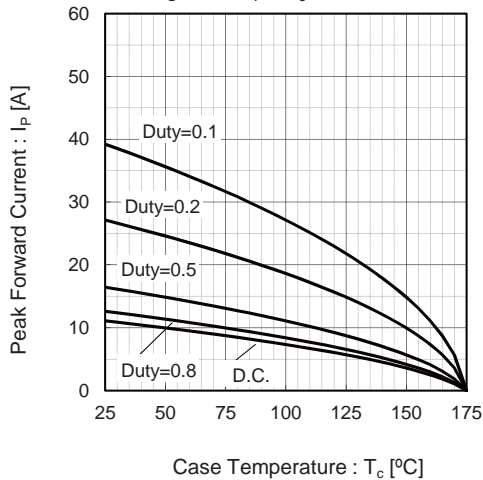
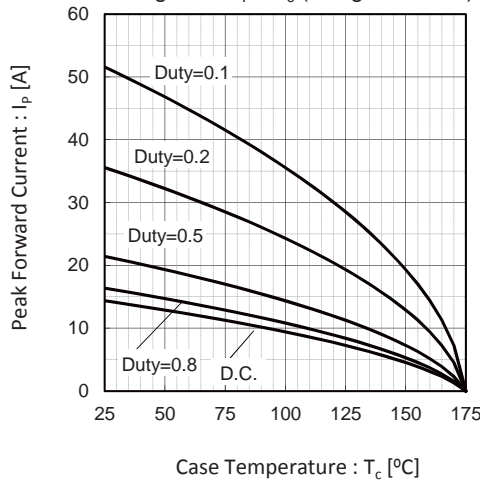


Fig.7\*3 Maximum peak forward current derating curve  $I_P - T_c$



\*3 Based on max  $V_f$ , max  $R_{th(j-c)}$   
 Valid for switching of above 10kHz,

Fig.8\*4 Typical peak forward current derating curve  $I_P - T_c$  (Not guaranteed)



\*4 Based on typ  $V_f$ , typ  $R_{th(j-c)}$   
 Typical value, not guaranteed

Fig.9 Surge non-repetitive forward current vs. Pulse width (Sinusoidal waveform)

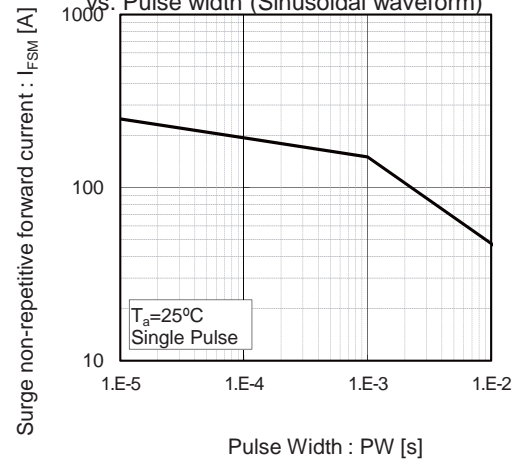
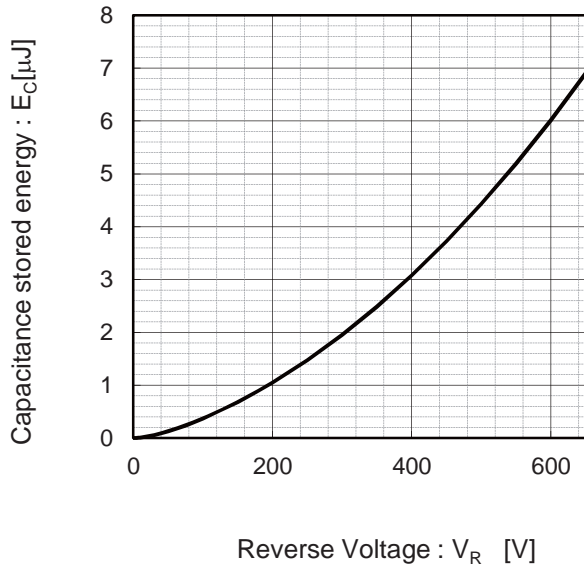
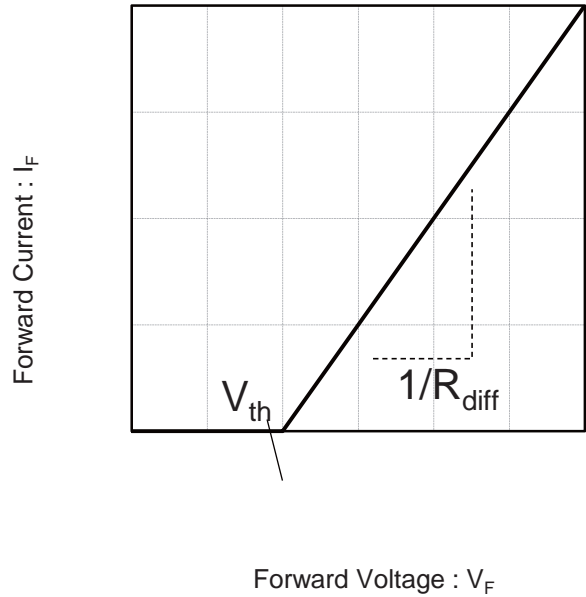


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

Fig.11 Equivalent forward current curve



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

$$V_{th}(T_j) = a_0 + a_1 T_j$$

$$R_{diff}(T_j) = b_0 + b_1 T_j + b_2 T_j^2$$

Symbol	Typical Value	Unit
$a_0$	9.66E-01	V
$a_1$	-1.10E-03	V/°C
$b_0$	5.87E-02	$\Omega$
$b_1$	1.24E-04	$\Omega/^\circ C$
$b_2$	1.28E-06	$\Omega/^\circ C^2$

$T_j$  in °C;  $-55\text{ }^\circ\text{C} < T_j < 175\text{ }^\circ\text{C}$ ;  $I_F < 12\text{ A}$