

SiC Schottky Barrier Diode

V_R	650V
I _F	2A
Q_{C}	6nC

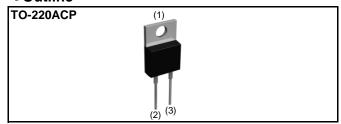
Features

- 1) Shorter recovery time
- 2) Reduced temperature dependence
- 3) High-speed switching possible
- 4) High surge current capability

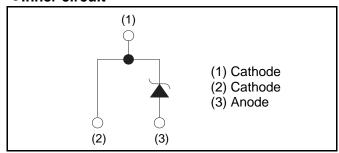
Construction

Silicon carbide epitaxial planar type

Outline



•Inner circuit



Packaging specifications

	ging opcomouncing	
	Packaging	Tube
	Reel size (mm)	-
Type	Tape width (mm)	-
Туре	Basic ordering unit (pcs)	50
	Packing code	C9
	Marking	SCS302AP

•Absolute maximum ratings $(T_i = 25^{\circ}C)$

	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 _c = 145°C)	I _F	2	А
Surge non-	PW=10ms sinusoidal, T _j =25°C		19	А
repetitive forward	PW=10ms sinusoidal, T _j =150°C	I _{FSM}	16	А
current	PW=10μs square, T _j =25°C		70	А
Repetitive peak forward current		I _{FRM}	12 * ¹	А
1≦PW≦10ms, T_j =25°C i ² t value		$\int i^2 dt$	1.8	A ² s
i t value	1≦PW≦10ms, T _j =150°C	J i at	1.2	A ² s
Total power disspation		P_{D}	22 * ²	W
Junction temperature		T _j	175	°C
Range of storage temperature		T _{stg}	-55 to +175	°C

^{*1} T_c=100°C, T_i=150°C, Duty cycle=10% *2 T_c=25°C

●Electrical characteristics (T_j = 25°C)

Parameter	Symbol	Conditions	Values			Lloit
Farameter			Min.	Тур.	Max.	Unit
DC blocking voltage	V_{DC}	I _R =10.8μA	650	-	-	V
	V _F	I _F =2A,T _j =25°C	-	1.35	1.50	V
Forward voltage		I _F =2A,T _j =150°C	-	1.44	1.71	V
		I _F =2A,T _j =175°C	-	1.50	-	V
Reverse current	I _R	V _R =650V,T _j =25°C	-	0.0065	10.8	μΑ
		V _R =650V,T _j =150°C	-	0.43	43	μΑ
		V _R =650V,T _j =175°C	-	1.29	-	μΑ
Total capacitance	С	V _R =1V,f=1MHz	-	110	-	pF
		V _R =650V,f=1MHz	-	10	-	pF
Total capacitive charge	Q _C	V _R =400V,di/dt=350A/μs	-	6	-	nC
Switching time	t _C	V _R =400V,di/dt=350A/μs	-	11	-	ns
Non-repetetive Avaranche Energy	E _{ava}	L=1mH	ı	18	-	mJ

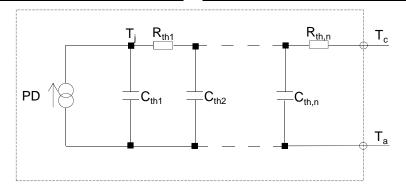
Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Тур.	Max.	Offic
Thermal resistance	$R_{\text{th(j-c)}}$	-	-	4.5	6.7	°C/W

● Typical Transient Thermal Characteristics

Symbol	Value	Unit
R _{th1}	8.21E-02	
R _{th2}	5.99E-01	K/W
R _{th3}	3.80E+00	

Symbol	Value	Unit
C_{th1}	6.35E-05	
C_{th2}	2.10E-04	Ws/K
C _{th3}	8.17E-04	



• Electrical characteristic curves

Fig.1 V_F - I_F Characteristics

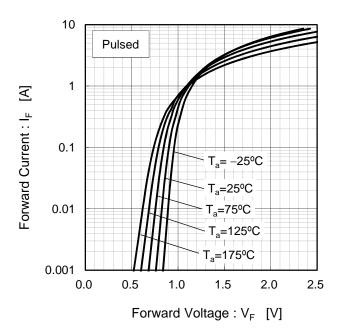
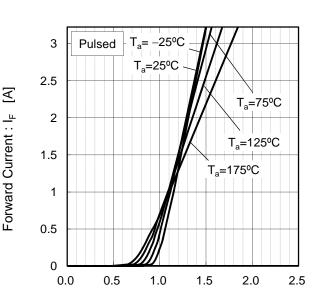


Fig.2 V_F - I_F Characteristics



Forward Voltage : V_F [V]

Fig.3 V_R - I_R Characteristics

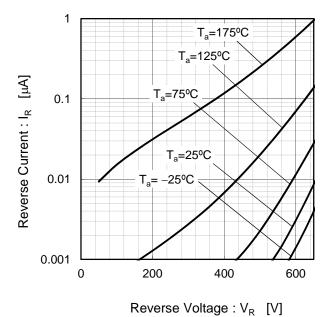
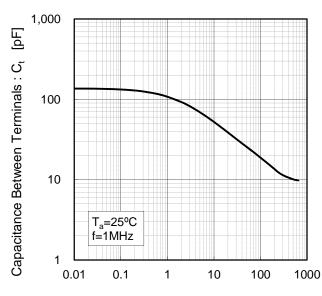


Fig.4 V_R-C_t Characteristics



Reverse Voltage : V_R [V]

•Electrical characteristic curves

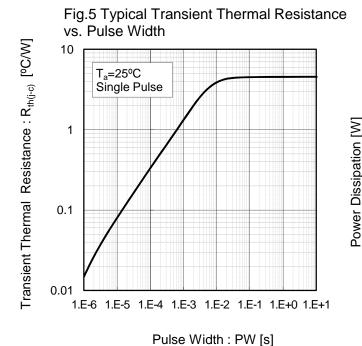
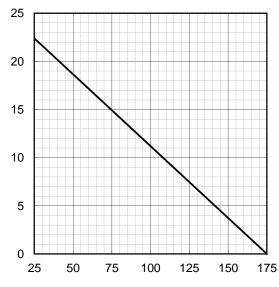


Fig.6 Power Dissipation



Case Temperature : T_c [°C]

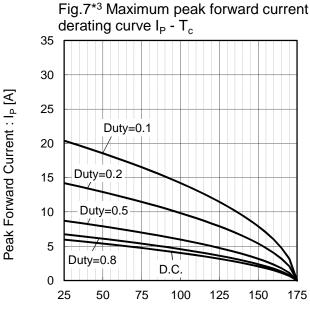
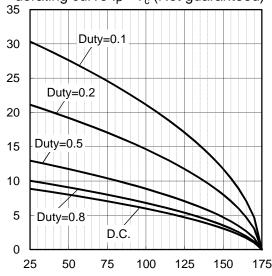


Fig.8*4 Typical peak forward current derating curve I_P - T_c (Not guaranteed)



Case Temperature : T_c [°C]

*4 Based on typ Vf, typ R_{th(j-c)} Typical value, not guaranteed Valid for switching of above 10kHz, excluding D.C. curve

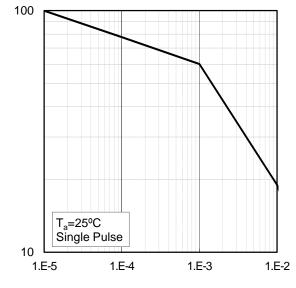
Peak Forward Current: Ip [A]

Surge non-repetitive forward current : I_{FSM} [A]

Forward Current: IF

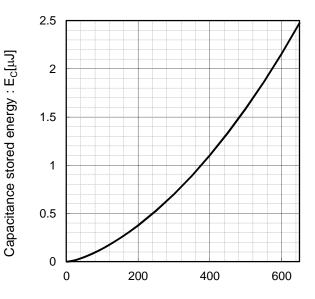
• Electrical characteristic curves

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



Pulse Width: PW [s]

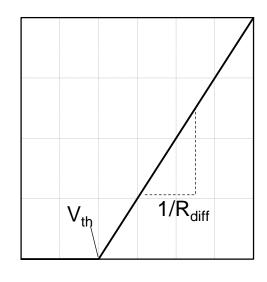
Fig.10 Typical capacitance store energy



Reverse Voltage: V_R [V]

Symplified forward characteristic model

Fig.11 Equivalent forward current curve



Forward Voltage: V_F

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

$$\begin{aligned} &V_{th}\left(\ T_{j}\ \right) = a_{0} + a_{1} \, T_{j} \\ &R_{diff}\left(\ T_{j}\ \right) = b_{0} + b_{1} \, T_{j} + b_{2} \, T_{j}^{2} \end{aligned}$$

Symbol	Typical Value	Unit
a ₀	9.66E-01	V
a ₁	-1.10E-0.3	V/°C
b ₀	1.64E-01	Ω
b ₁	3.47E-04	Ω/°C
b ₂	3.57E-06	Ω /°C ²

 T_i in °C; -55 °C < T_i < 175°C ; I_F <4 A

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