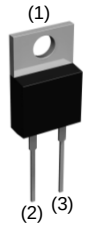
SCS304AP

SiC Schottky Barrier Diode Datasheet

V_R	650V
I_F	4A
Q_C	11nC

●Outline

TO-220ACP



●Features

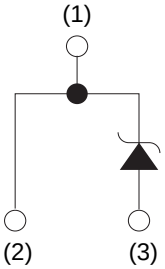
1) Shorter recovery time

2) Reduced temperature dependence

3) High-speed switching possible

4) High surge current capability

●Inner circuit



(1) Cathode
(2) Cathode
(3) Anode

●Packaging specifications

Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	50
	Packing code	C9
	Marking	SCS304AP

●Construction

Silicon carbide epitaxial planar type

●Absolute maximum ratings (T_j = 25°C)

Parameter		Symbol	Value	Unit
Reverse voltage (repetitive peak)		V_{RM}	650	V
Reverse voltage (DC)		V_R	650	V
Continuous forward current (T_c= 140°C)		I_F	4	A
Surge non-repetitive forward current	PW=10ms sinusoidal, T_j=25°C	I_{FSM}	27	A
	PW=10ms sinusoidal, T_j=150°C		22	A
	PW=10μs square, T_j=25°C		100	A
Repetitive peak forward current		I_{FRM}	20 *1	A
i^2t value	1≦PW≦10ms, T_j=25°C	$\int i^2dt$	3.6	A^2s
	1≦PW≦10ms, T_j=150°C		2.4	A^2s
Total power disspation		P_D	34 *2	W
Junction temperature		T_j	175	°C
Range of storage temperature		T_{stg}	−55 to +175	°C

*1 T_c=100°C, T_j=150°C, Duty cycle=10% *2 T_c=25°C

●Electrical characteristics (T_j = 25°C)

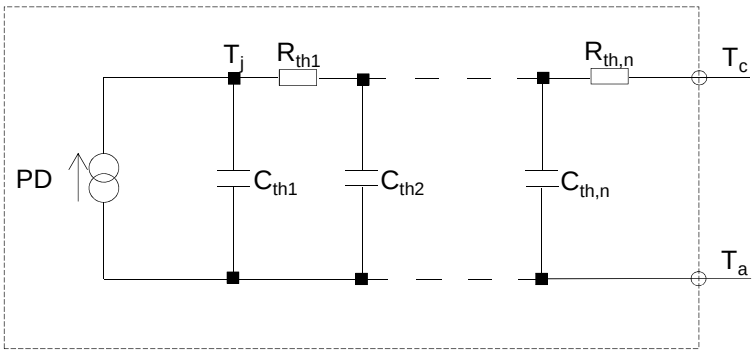
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	I_R =20μA	650	-	-	V
Forward voltage	V_F	I_F=4A,T_j=25°C	-	1.35	1.50	V
		I_F=4A,T_j=150°C	-	1.44	1.71	V
		I_F=4A,T_j=175°C	-	1.50	-	V
Reverse current	I_R	V_R=650V,T_j=25°C	-	0.012	20	μA
		V_R=650V,T_j=150°C	-	0.8	80	μA
		V_R=650V,T_j=175°C	-	2.4	-	μA
Total capacitance	C	V_R=1V,f=1MHz	-	200	-	pF
		V_R=650V,f=1MHz	-	18	-	pF
Total capacitive charge	Q_C	V_R=400V,di/dt=350A/μs	-	11	-	nC
Switching time	t_C	V_R=400V,di/dt=350A/μs	-	14	-	ns
Non-repetetive Avaranche Energy	E_{ava}	L=1mH	-	48	-	mJ

●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	-	-	3.0	4.4	°C/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit	Symbol	Value	Unit
R_{th1}	3.91E-02	K/W	C_{th1}	1.01E-04	Ws/K
R_{th2}	3.76E-01		C_{th2}	4.02E-04	
R_{th3}	2.54E+00		C_{th3}	1.19E-03	



●Electrical characteristic curves

Fig.1 V_F - I_F Characteristics

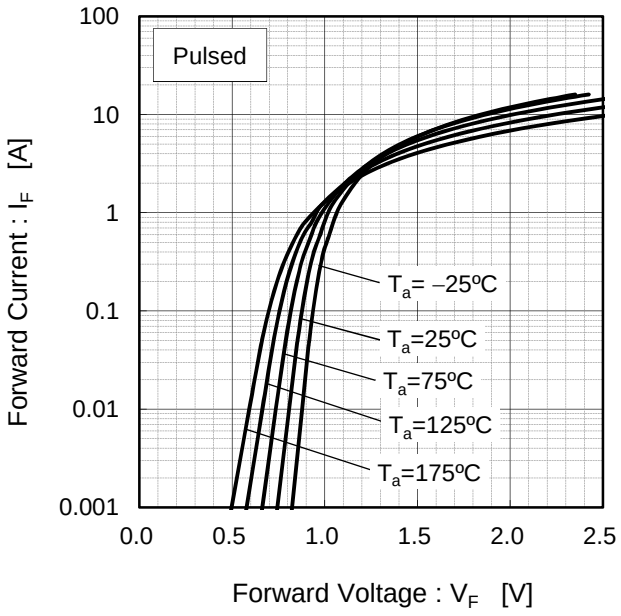


Fig.2 V_F - I_F Characteristics

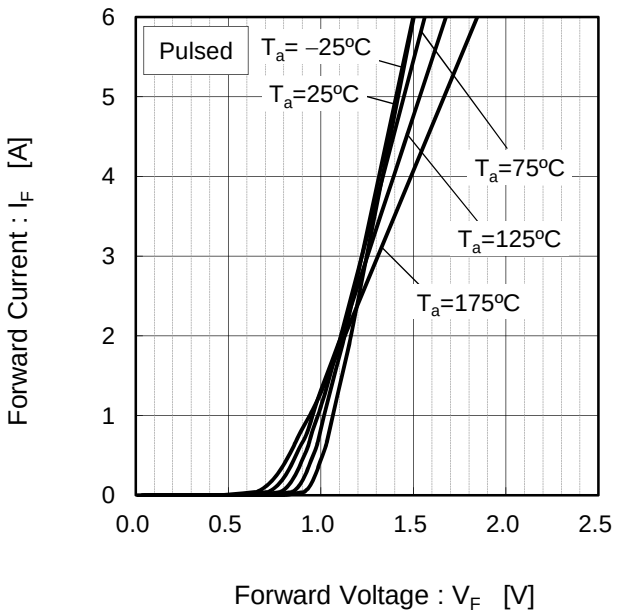


Fig.3 V_R - I_R Characteristics

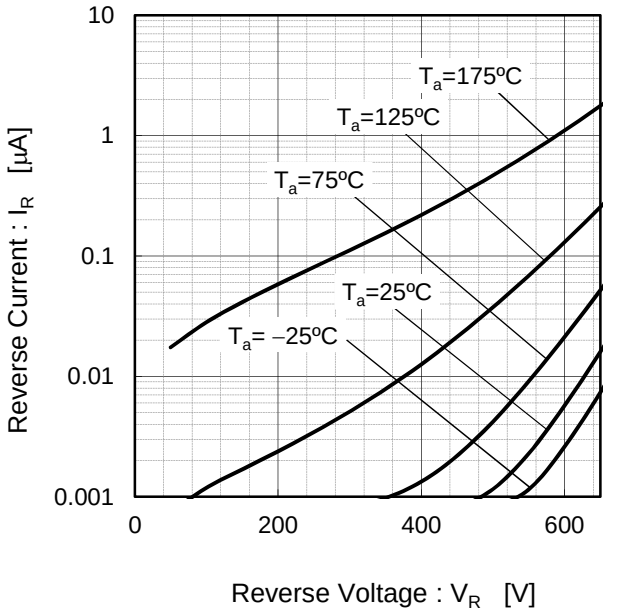
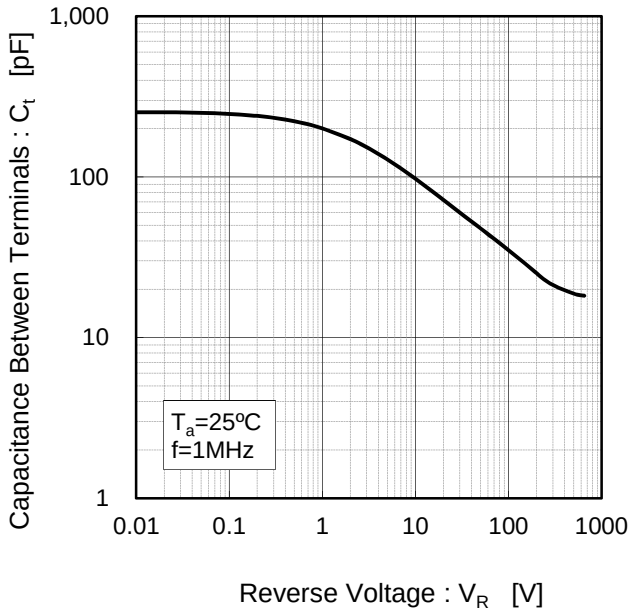


Fig.4 V_R-C_t Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

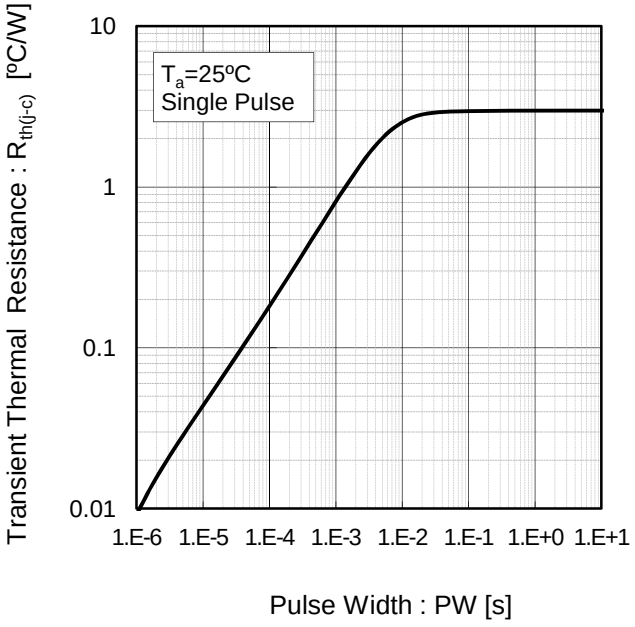


Fig.6 Power Dissipation

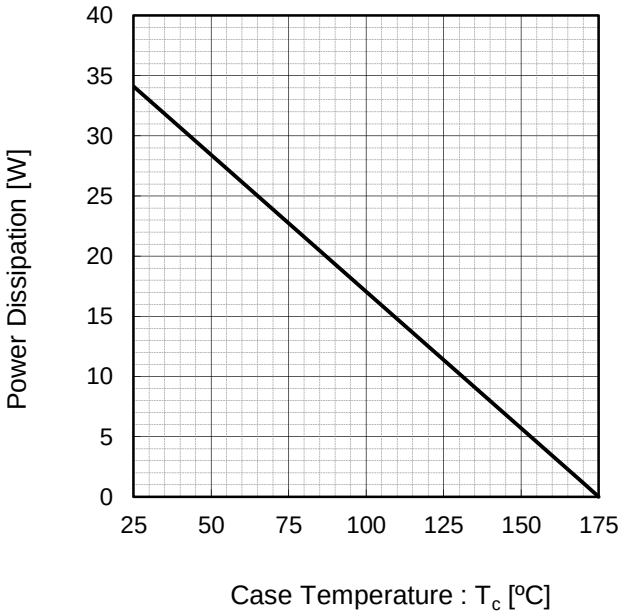
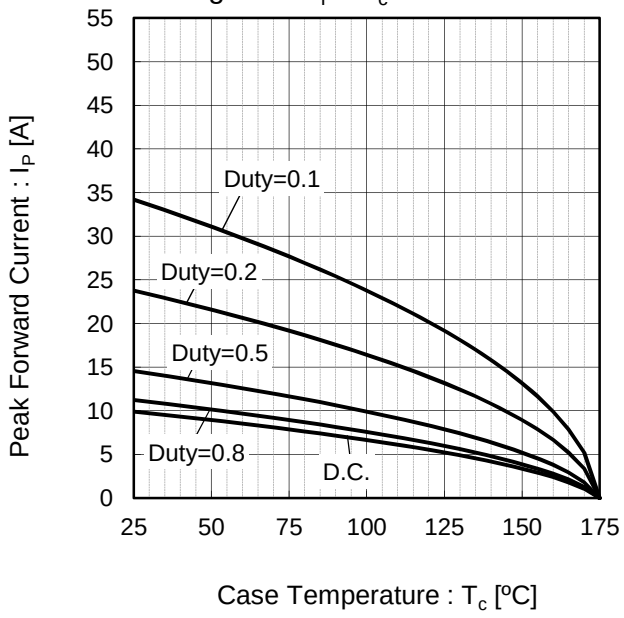
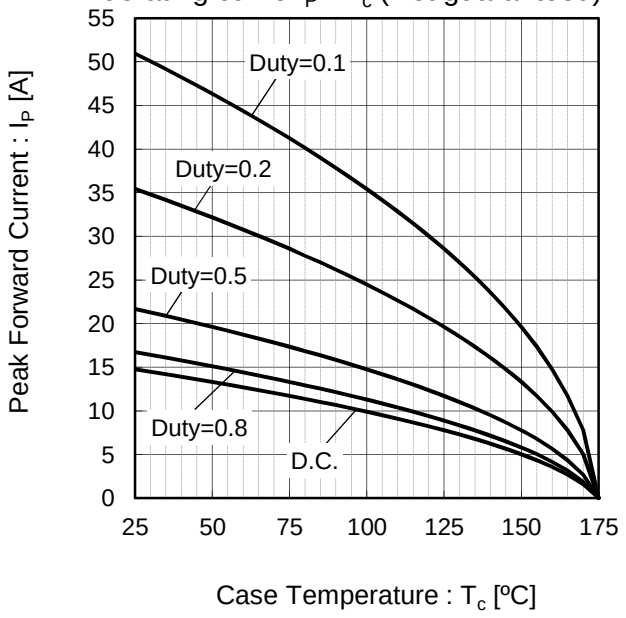


Fig.7*3 Maximum peak forward current derating curve I_P - T_c



*3 Based on max Vf, max $R_{th(j-c)}$
Valid for switching of above 10kHz, excluding D.C. curve.

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



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

●Electrical characteristic curves

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

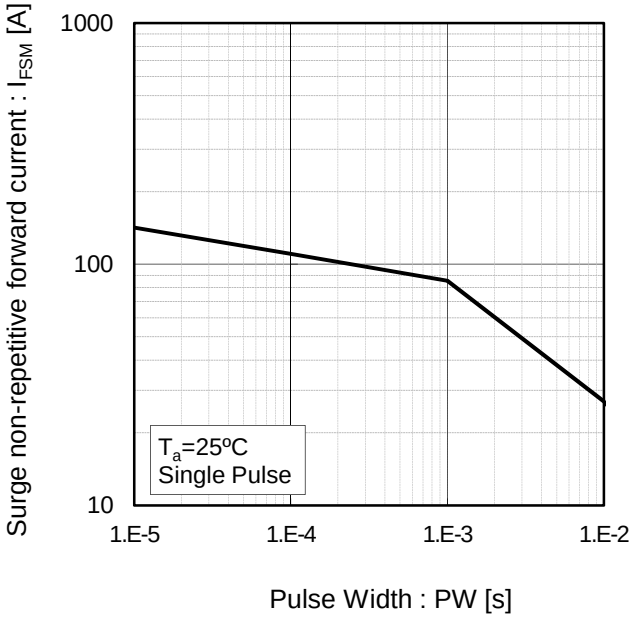
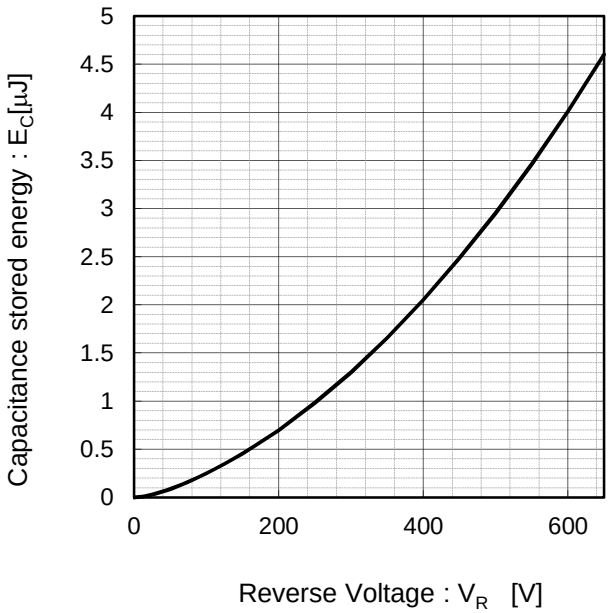
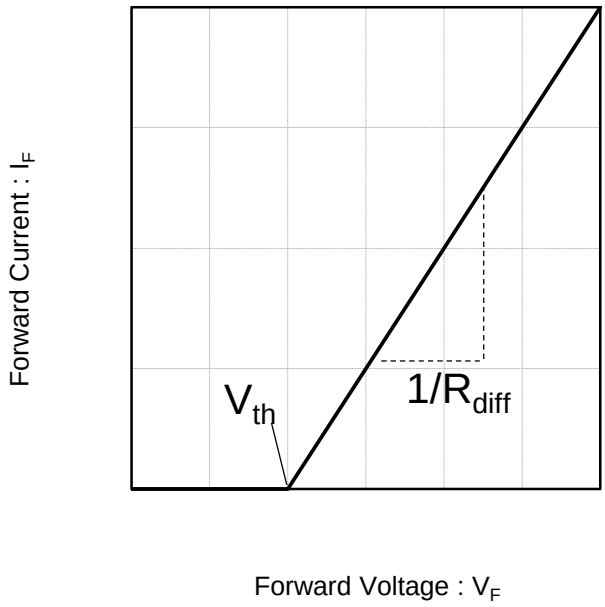


Fig.10 Typical capacitance store energy



●Symplified 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-0.3	V/°C
b_0	8.80E-02	Ω
b_1	1.87E-04	Ω/°C
b_2	1.92E-06	Ω/°C^2

T_j in ºC; −55 ºC < T_j <175 ºC ; I_F <8 A

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