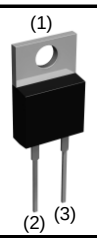
SCS320AH

SiC Schottky Barrier Diode Datasheet

V_R	650V
I_F	20A
Q_C	47nC

●Outline

TO-220ACP



●Features

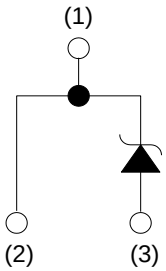
1) Shorter recovery time

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	SCS320AH

●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= 125°C)		I_F	20	A
Surge non-repetitive forward current	PW=10ms sinusoidal, T_j=25°C	I_{FSM}	123	A
	PW=10ms sinusoidal, T_j=150°C		104	A
	PW=10μs square, T_j=25°C		450	A
Repetitive peak forward current		I_{FRM}	81 *1	A
i^2t value	1≦PW≦10ms, T_j=25°C	$\int i^2dt$	75	A^2s
	1≦PW≦10ms, T_j=150°C		54	A^2s
Total power disspation		P_D	115*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 =100μA	650	-	-	V
Forward voltage	V_F	I_F=20A,T_j=25°C	-	1.35	1.50	V
		I_F=20A,T_j=150°C	-	1.44	1.71	V
		I_F=20A,T_j=175°C	-	1.50	-	V
Reverse current	I_R	V_R=650V,T_j=25°C	-	0.06	100	μA
		V_R=650V,T_j=150°C	-	4	400	μA
		V_R=650V,T_j=175°C	-	12	-	μA
Total capacitance	C	V_R=1V,f=1MHz	-	1000	-	pF
		V_R=650V,f=1MHz	-	91	-	pF
Total capacitive charge	Q_C	V_R=400V,di/dt=350A/μs	-	47	-	nC
Switching time	t_C	V_R=400V,di/dt=350A/μs	-	25	-	ns
Non-repetetive Avaranche Energy	E_{ava}	L=1mH	-	220	-	mJ

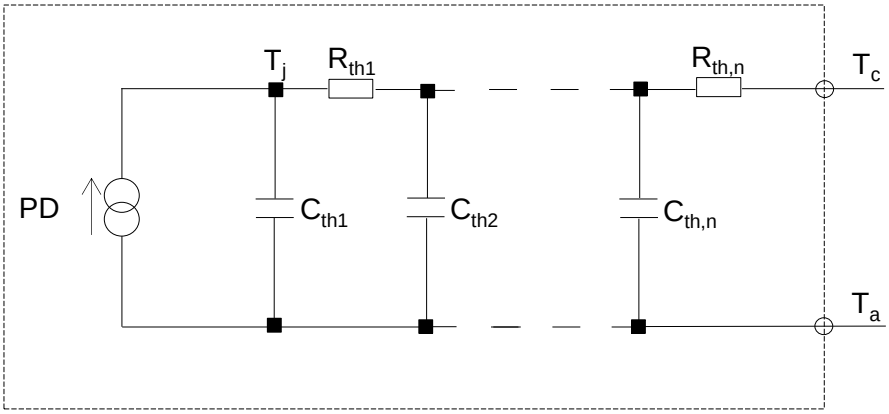
●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	-	-	0.87	1.3	K/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit
R_{th1}	8.13×10^{-4}	K/W
R_{th2}	4.07×10^{-2}	
R_{th3}	8.31×10^{-1}	

Symbol	Value	Unit
C_{th1}	9.17×10^{-5}	Ws/K
C_{th2}	5.94×10^{-4}	
C_{th3}	1.68×10^{-3}	



●Electrical characteristic curves

Fig.1 V_F - I_F Characteristics

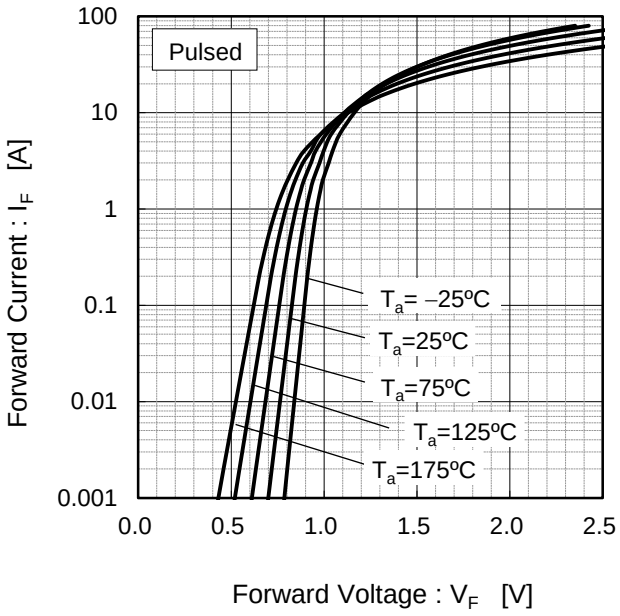


Fig.2 V_F - I_F Characteristics

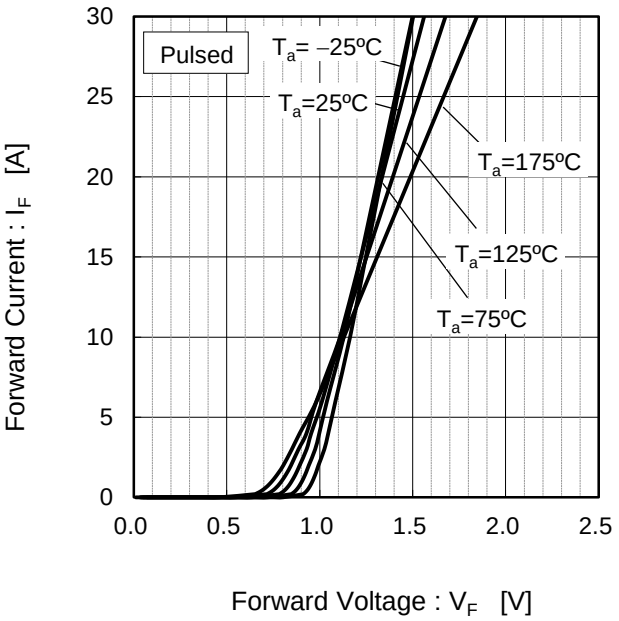


Fig.3 V_R - I_R Characteristics

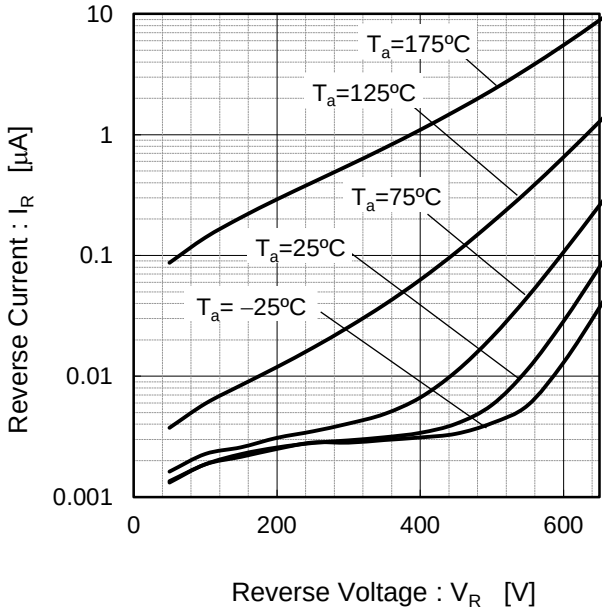
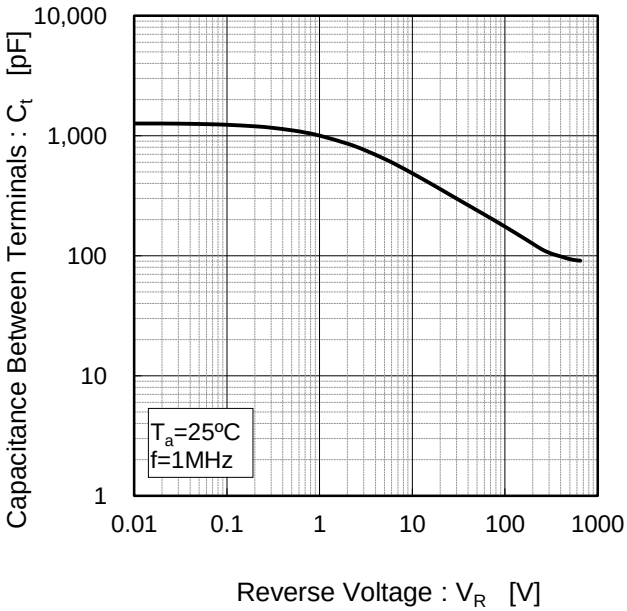


Fig.4 V_R-C_t Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

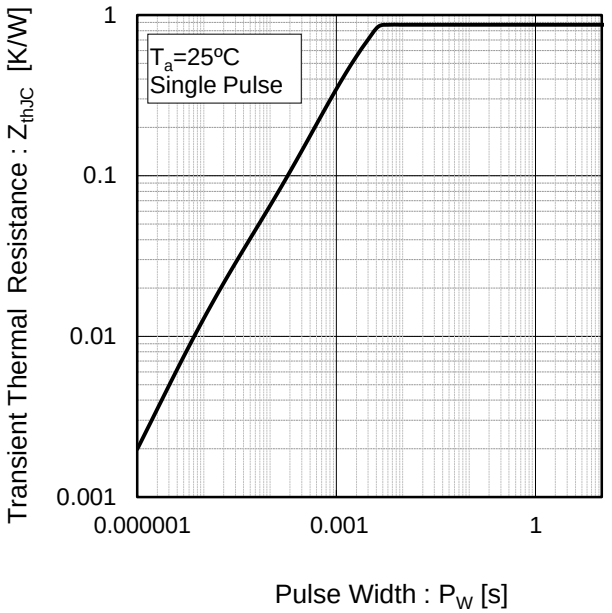


Fig.6 Power Dissipation

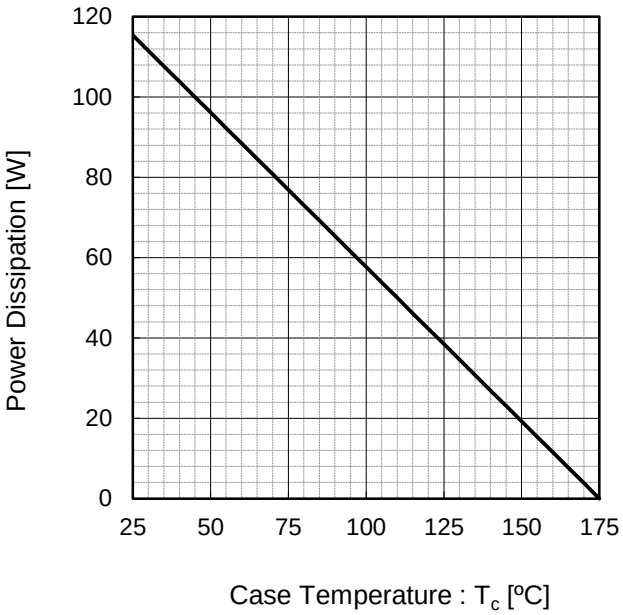
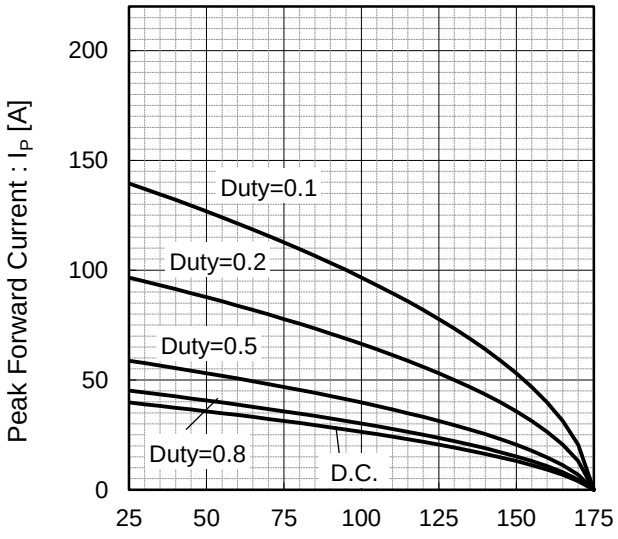
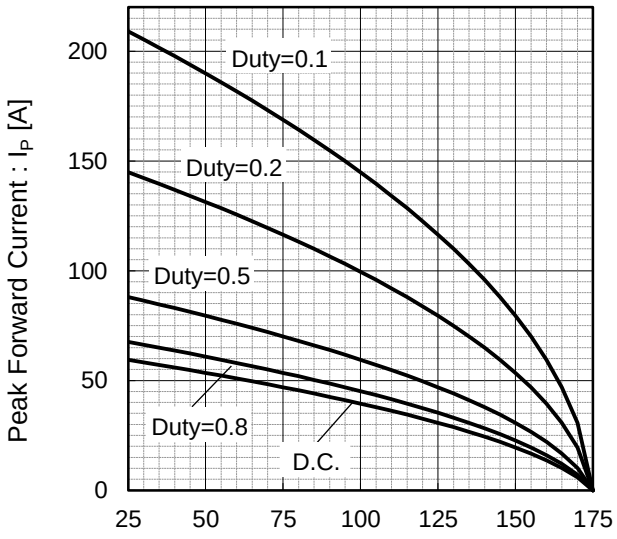


Fig.7*3 Maximum peak forward current derating curve I_P - T_c



*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)

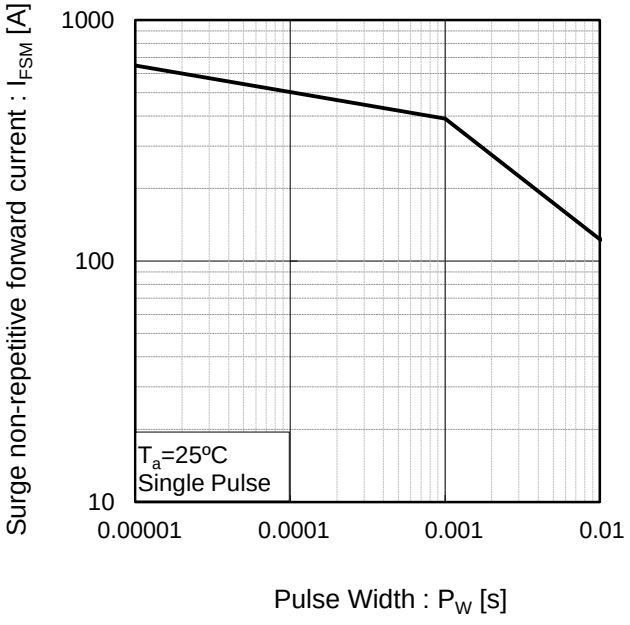
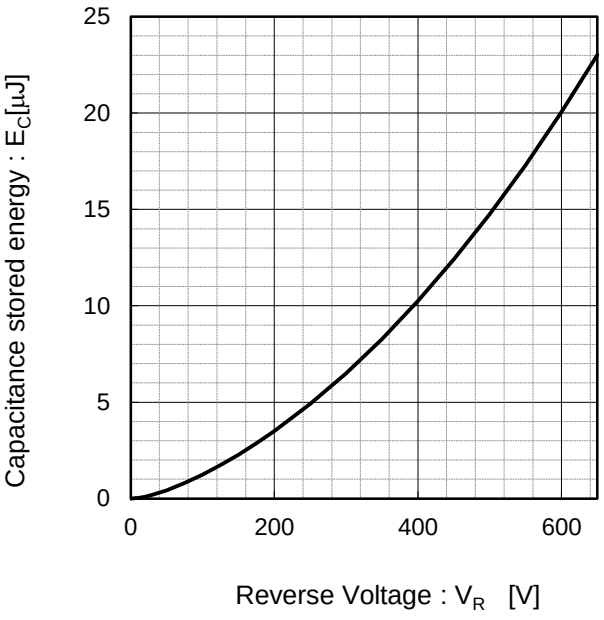
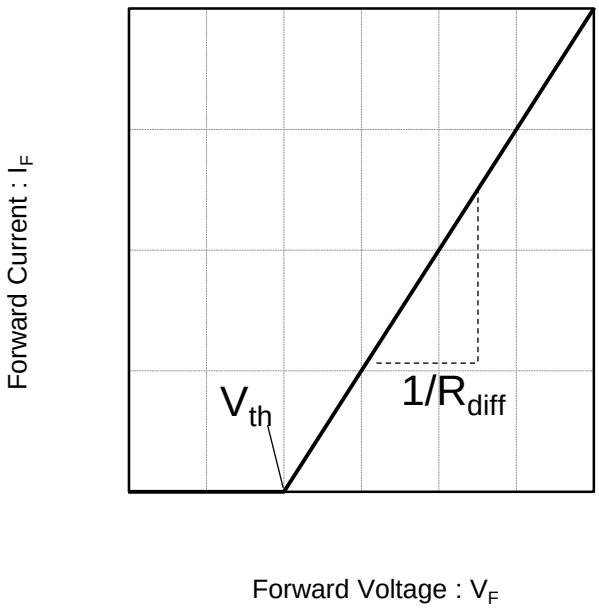


Fig.10 Typical capacitance store energy



●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	9.66×10^{-1}	V
a_1	-1.1×10^{-3}	V/°C
b_0	1.76×10^{-2}	Ω
b_1	3.73×10^{-5}	Ω/°C
b_2	3.84×10^{-7}	Ω/°C^2

T_j in ºC; -55 ºC < T_j < 175ºC ; I_F < 40 A

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