SCS302AH

SiC Schottky Barrier Diode

Datasheet

V_R	650V
I_F	2A
Q_C	6nC

●Outline

TO-220ACP

●Features

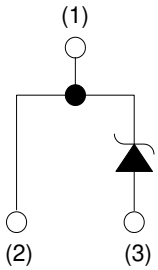
1) Shorter recovery time

2) Reduced temperature dependence

3) High-speed switching possible

4) High surge current capability

●Inner circuit



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

●Construction

Silicon carbide epitaxial planar type

●Packaging specifications

Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	50
	Packing code	C9
	Marking	SCS302AH

●Absolute maximum ratings (T_{vj}=25°C unless otherwise specified)

Parameter		Symbol	Value	Unit
Reverse voltage (repetitive peak)		V_{RM}	650	V
Reverse voltage (DC)		V_R	650	V
Continuous forward current (T_c= 145°C) *1		I_F	2.15	A
Surge non-repetitive forward current	PW=10ms sinusoidal, T_{vj}=25°C	I_{FSM}	19	A
	PW=10ms sinusoidal, T_{vj}=150°C		16	A
	PW=10μs square, T_{vj}=25°C		70	A
Repetitive peak forward current		I_{FRM}	12 *2	A
i^2t value	1≤PW≤10ms, T_{vj}=25°C	$\int i^2dt$	1.8	A^2s
	1≤PW≤10ms, T_{vj}=150°C		1.2	A^2s
Total power disspation		P_D	22 *3	W
Virtual junction temperature		T_{vj}	175	°C
Range of storage temperature		T_{stg}	−55 to +175	°C

*1 Limited by maximum T_{vj} and for Max. R_{thJC}. *2 T_c=100°C, T_{vj}=150°C, Duty cycle=10% *3 T_c=25°C

●Electrical characteristics (T_{vj}=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	I_R =10.8μA	650	-	-	V
Forward voltage	V_F	I_F=2A,T_{vj}=25°C	-	1.35	1.50	V
		I_F=2A,T_{vj}=150°C	-	1.44	1.71	V
		I_F=2A,T_{vj}=175°C	-	1.50	-	V
Reverse current	I_R	V_R=650V,T_{vj}=25°C	-	0.0065	10.8	μA
		V_R=650V,T_{vj}=150°C	-	0.43	43	μA
		V_R=650V,T_{vj}=175°C	-	1.29	-	μA
Total capacitance	C	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	-	18	-	mJ

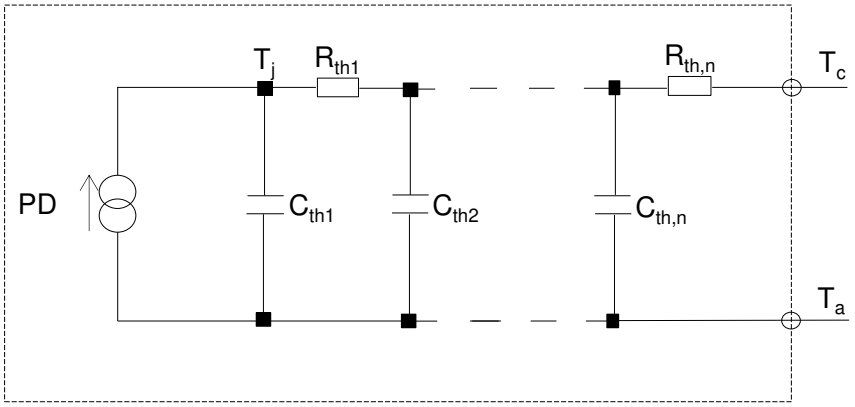
●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	R_{thJC}	-	-	4.5	6.7	K/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit
R_{th1}	8.21×10^{-2}	K/W
R_{th2}	5.99×10^{-1}	
R_{th3}	3.80×10^{0}	

Symbol	Value	Unit
C_{th1}	6.35×10^{-5}	Ws/K
C_{th2}	2.10×10^{-4}	
C_{th3}	8.17×10^{-4}	



●Electrical characteristic curves

Fig.1 V_F - I_F Characteristics

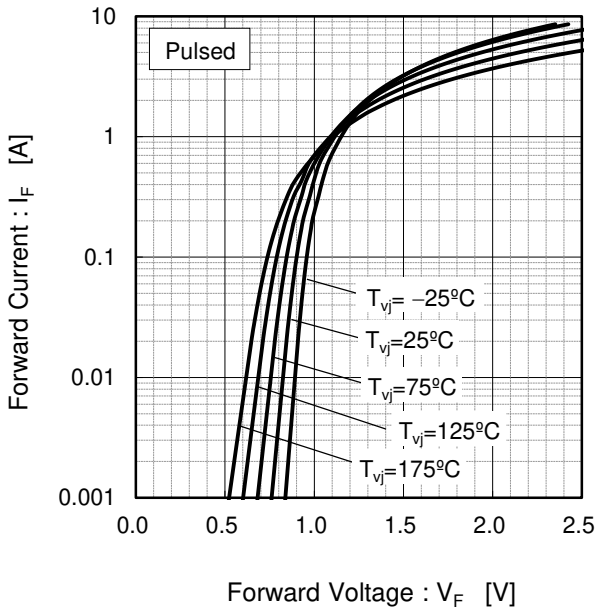


Fig.2 V_F - I_F Characteristics

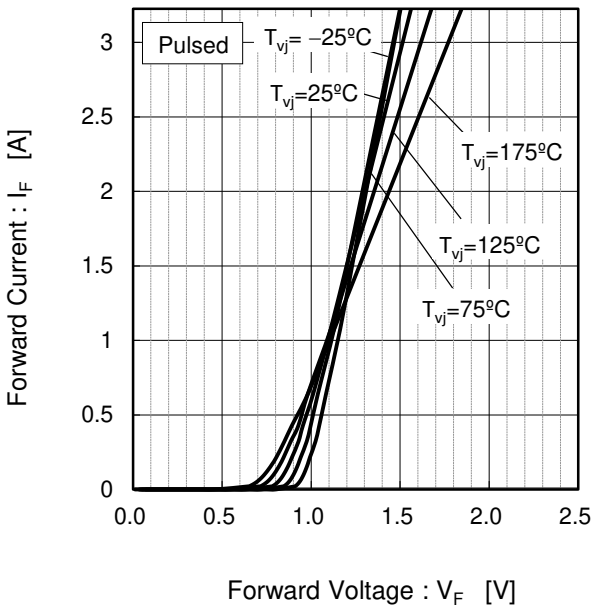


Fig.3 V_R - I_R Characteristics

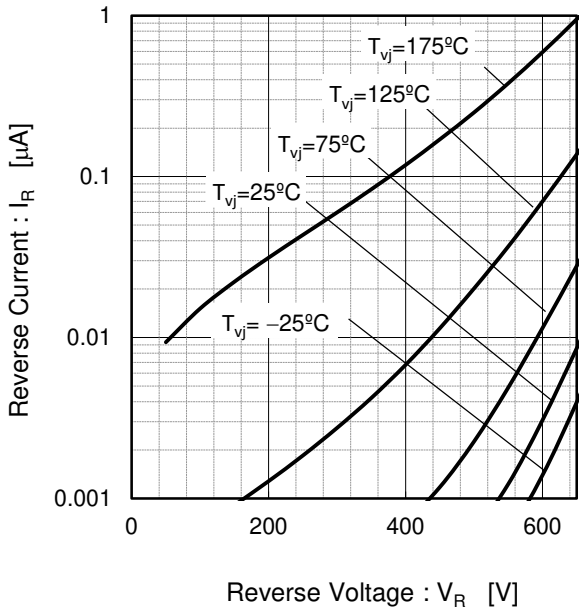
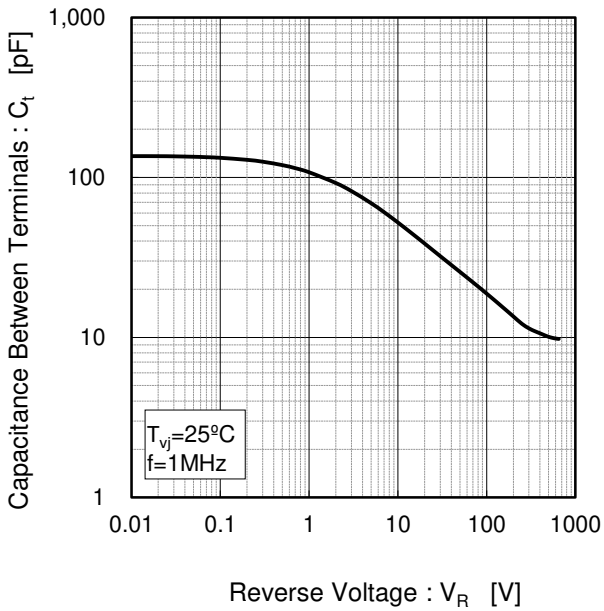


Fig.4 V_R-C_t Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

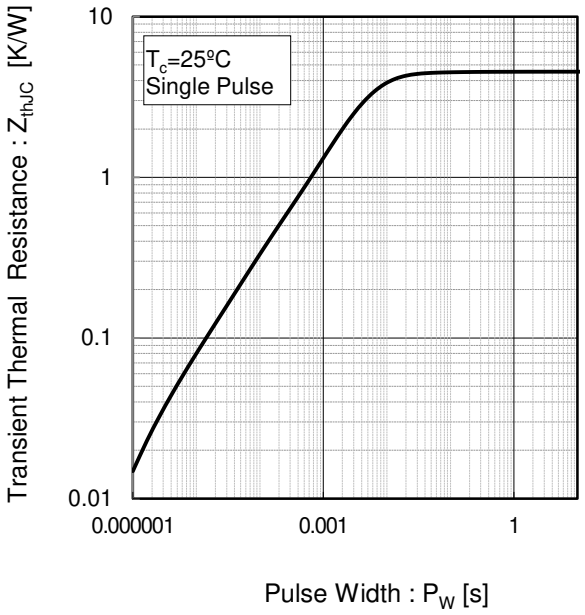


Fig.6 Power Dissipation

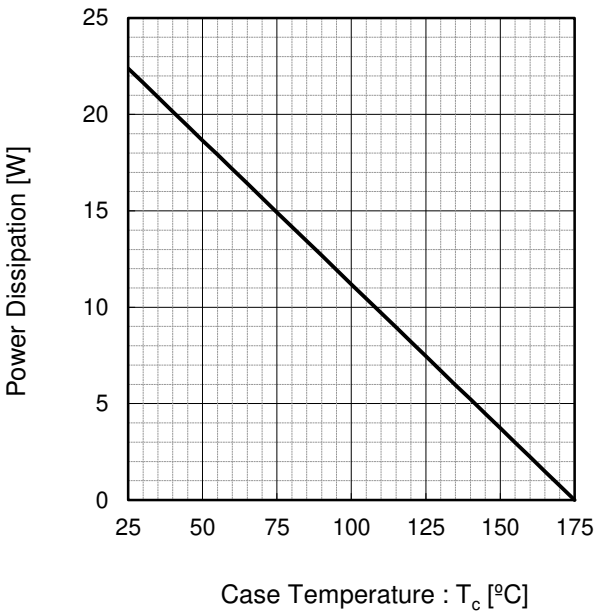
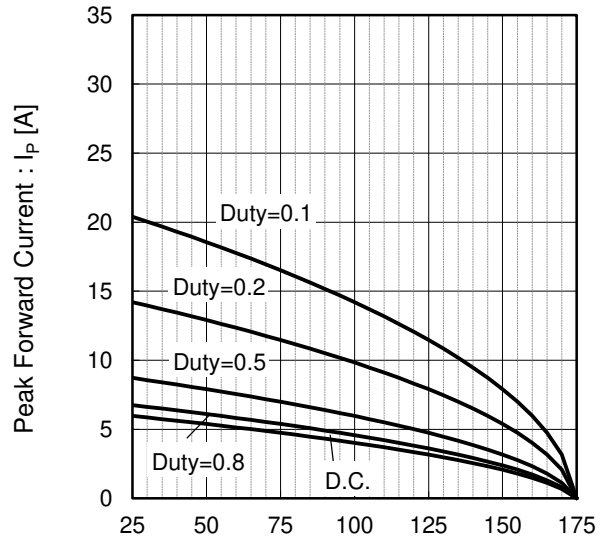
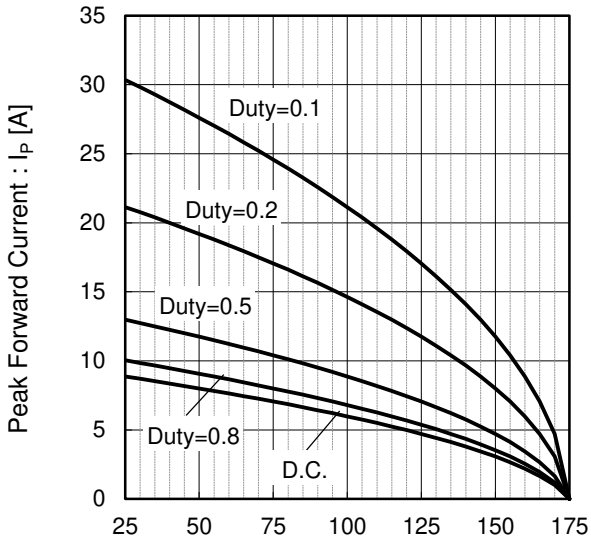


Fig.7*4 Maximum peak forward current derating curve I_P - T_c



*4 Based on max Vf, max R_{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)



*5 Based on typ Vf, typ R_{thJC}
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)

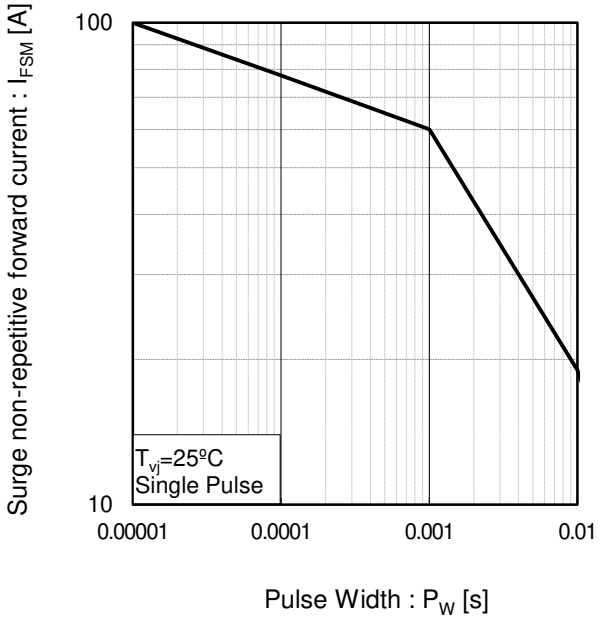
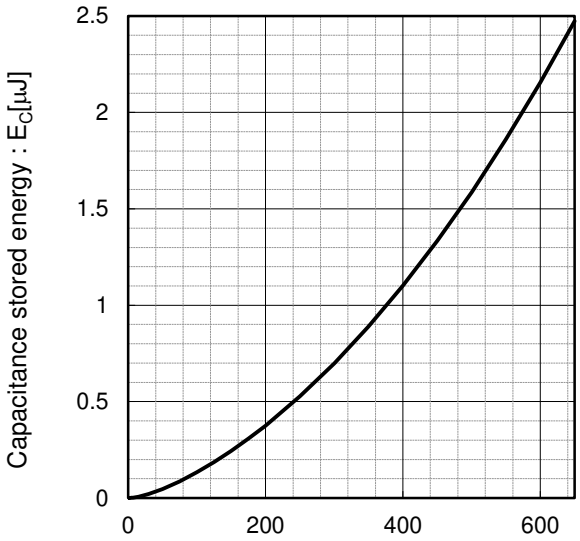
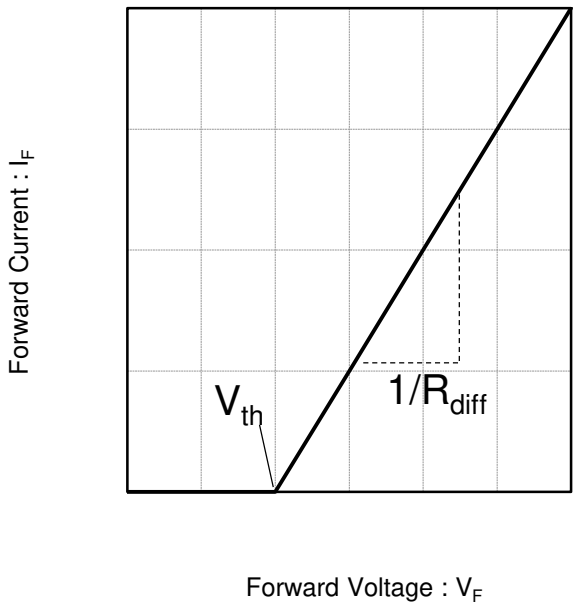


Fig.10 Typical capacitance store energy



●Symplified forward characteristic model

Fig.11 Equivalent forward current curve



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

$$V_{th}(T_{vj}) = a_0 + a_1 T_{vj}$$
$$R_{diff}(T_{vj}) = b_0 + b_1 T_{vj} + b_2 T_{vj}^2$$

Symbol	Typical Value	Unit
a_0	9.66×10^{-1}	V
a_1	-1.1×10^{-3}	V/°C
b_0	1.64×10^{-1}	Ω
b_1	3.47×10^{-4}	Ω/°C
b_2	3.57×10^{-6}	Ω/°C^2

T_{vj} in ºC; -55 ºC < T_{vj} < 175ºC ; I_F < 4 A

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