SCS304AG

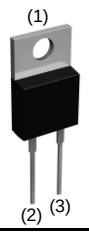
SiC Schottky Barrier Diode

Datasheet

V_R	650V
I_F	4A
Q_C	11nC

●**Outline**

TO-220ACGE



●**Features**

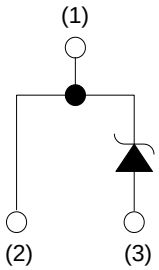
1) Shorter recovery time

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	C16
	Marking	SCS304AG

●**Construction**

Silicon carbide epitaxial planar type

●**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= 140°C) *1		I_F	4	A
Surge non-repetitive forward current	PW=10ms sinusoidal, T_{vj}=25°C	I_{FSM}	27	A
	PW=10ms sinusoidal, T_{vj}=150°C		22	A
	PW=10μs square, T_{vj}=25°C		100	A
Repetitive peak forward current		I_{FRM}	20 *2	A
i^2t value	1≤PW≤10ms, T_{vj}=25°C	$\int i^2dt$	3.6	A^2s
	1≤PW≤10ms, T_{vj}=150°C		2.4	A^2s
Total power disspation		P_D	34 *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 =20μA	650	-	-	V
Forward voltage	V_F	I_F=4A,T_{vj}=25°C	-	1.35	1.50	V
		I_F=4A,T_{vj}=150°C	-	1.44	1.71	V
		I_F=4A,T_{vj}=175°C	-	1.50	-	V
Reverse current	I_R	V_R=650V,T_{vj}=25°C	-	0.012	20.0	μA
		V_R=650V,T_{vj}=150°C	-	0.8	80	μA
		V_R=650V,T_{vj}=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

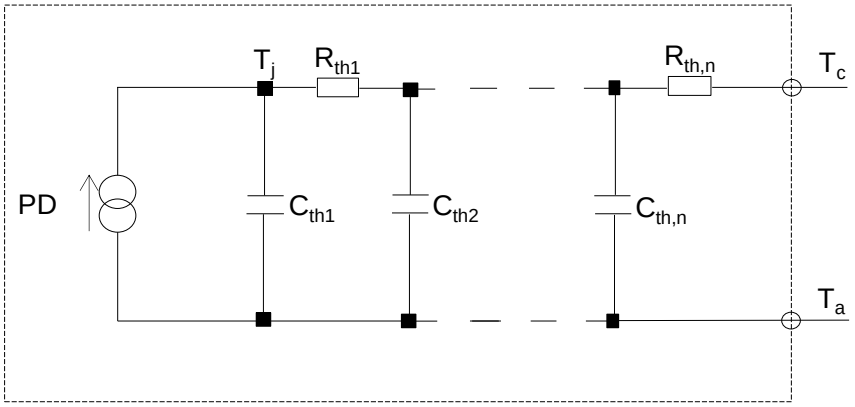
●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	R_{thJC}	-	-	3.0	4.4	K/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit
R_{th1}	3.91×10^{-2}	K/W
R_{th2}	3.76×10^{-1}	
R_{th3}	2.54×10^{0}	

Symbol	Value	Unit
C_{th1}	1.01×10^{-4}	Ws/K
C_{th2}	4.02×10^{-4}	
C_{th3}	1.19×10^{-3}	



●Electrical characteristic curves

Fig.1 V_F - I_F Characteristics

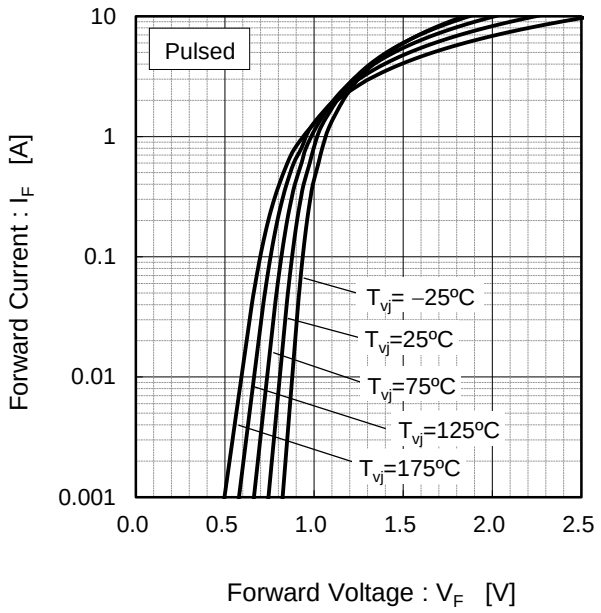


Fig.2 V_F - I_F Characteristics

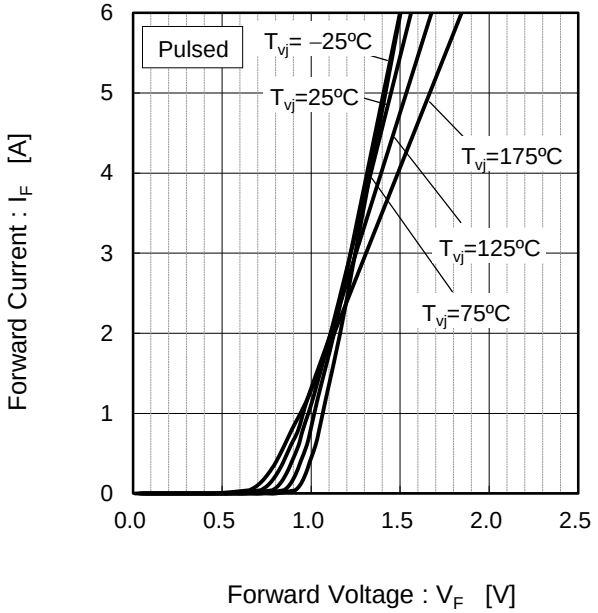


Fig.3 V_R - I_R Characteristics

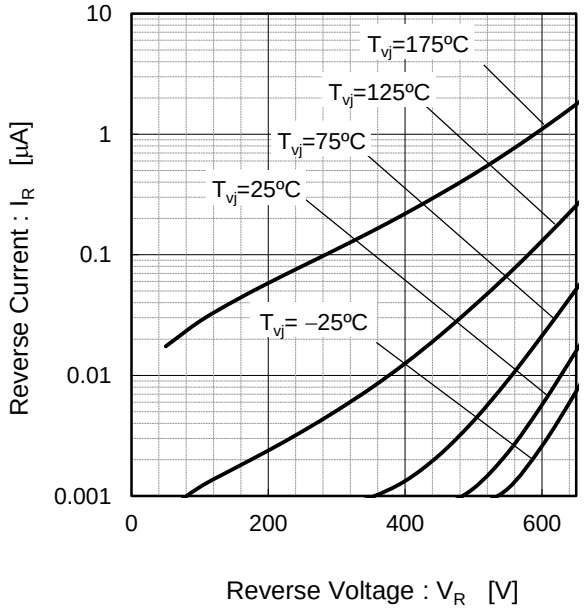
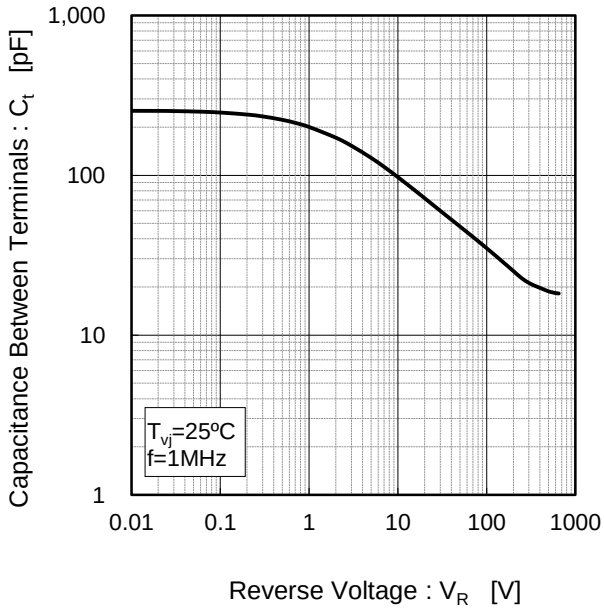


Fig.4 V_R-C_t Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

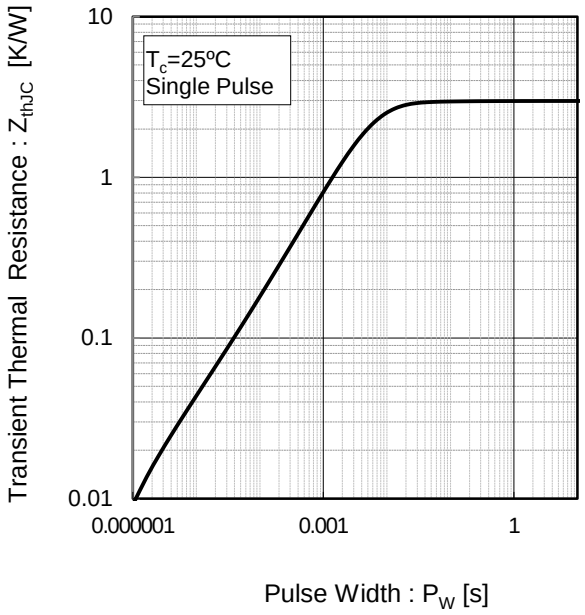


Fig.6 Power Dissipation

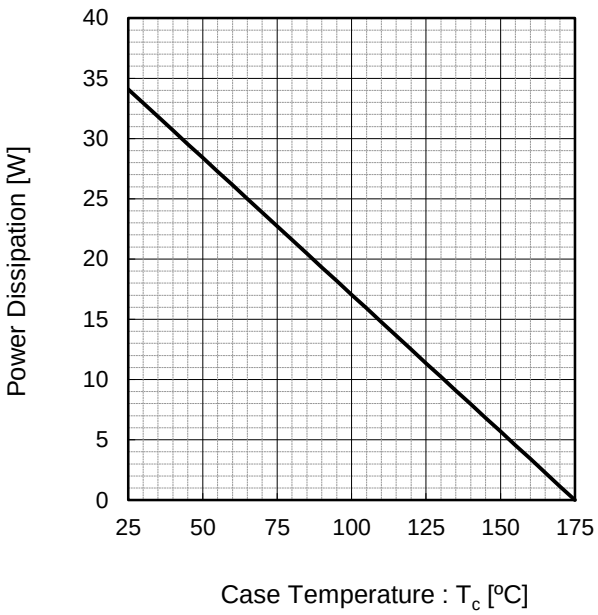
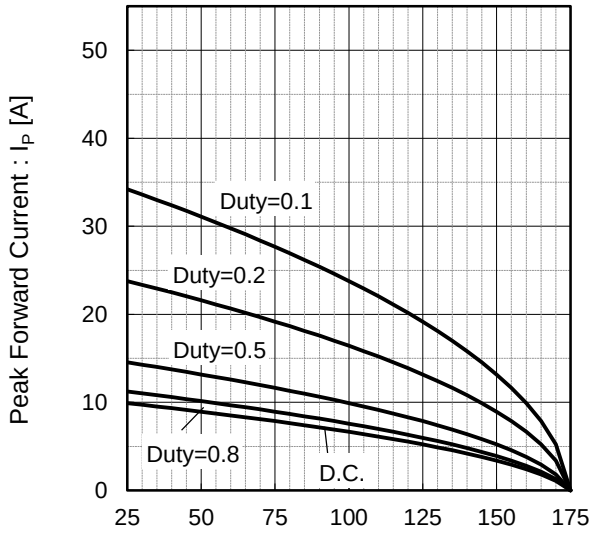
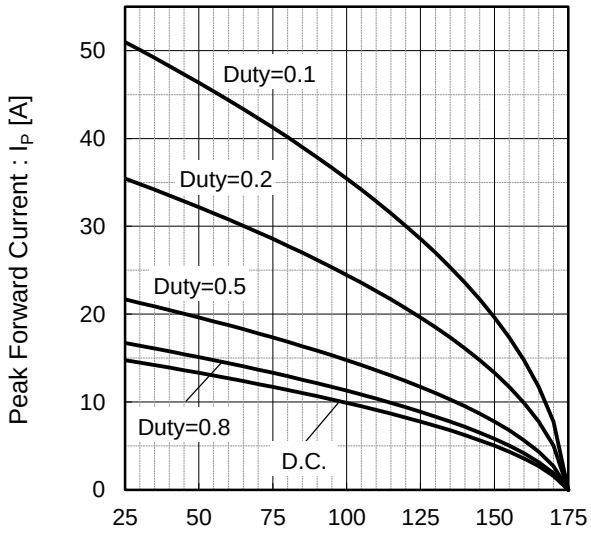


Fig.7*4 Maximum peak forward current derating curve I_P - T_c



*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)

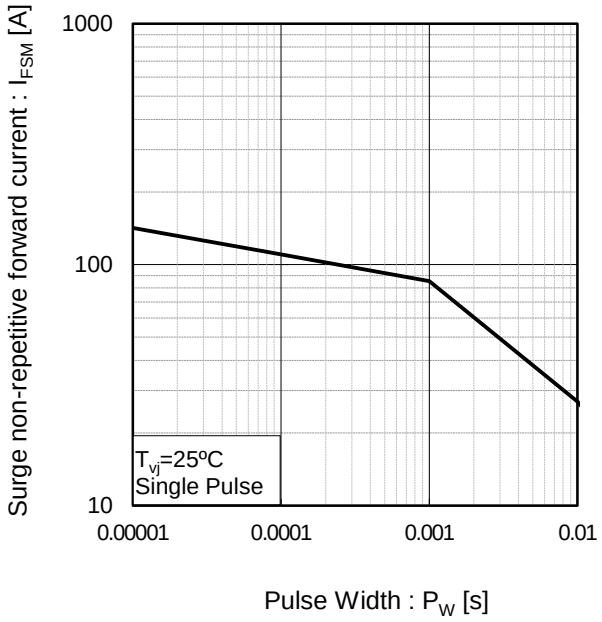
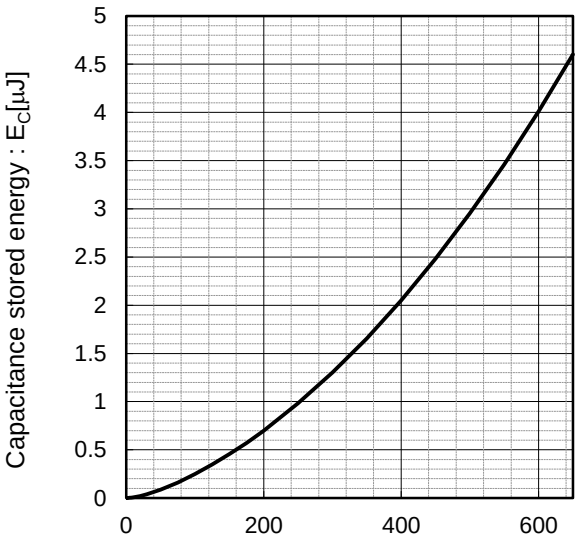
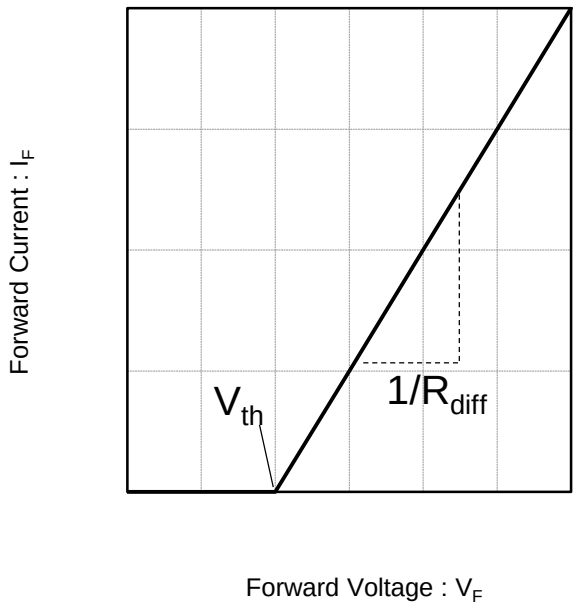


Fig.10 Typical capacitance store energy



●Symplified forward characteristic model

Fig.11 Equivalent forward current curve



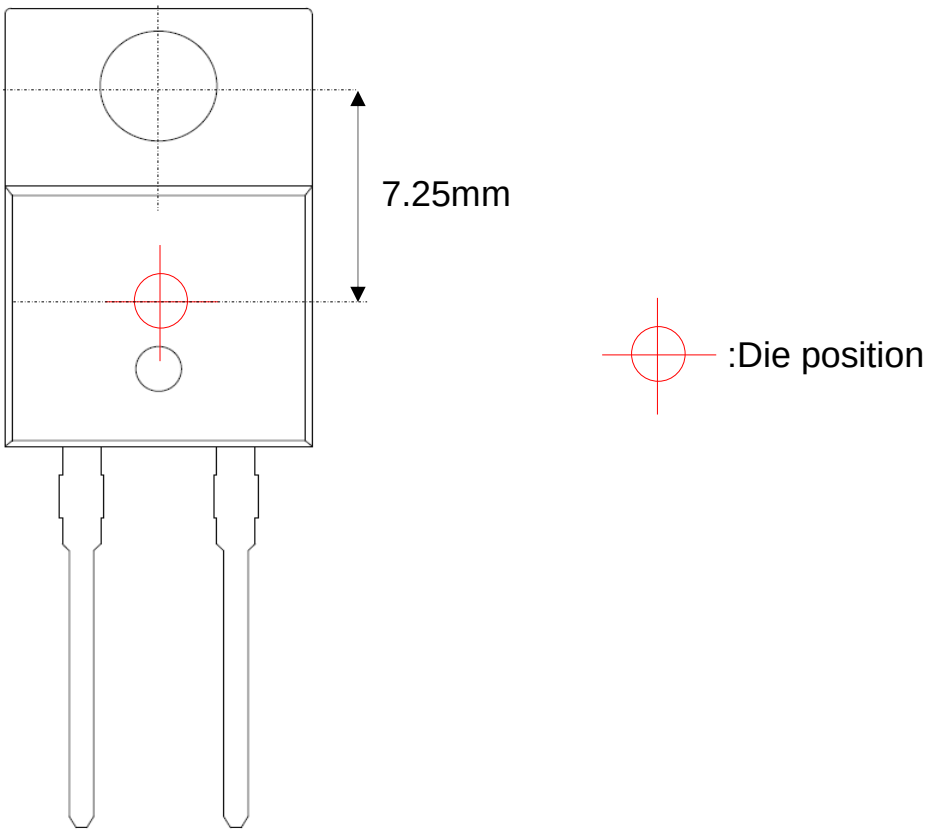
$$V_F = V_{th} + R_{diff} I_F$$

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

Symbol	Typical Value	Unit
a_0	9.66×10^{-1}	V
a_1	-1.1×10^{-3}	V/°C
b_0	8.80×10^{-2}	Ω
b_1	1.87×10^{-4}	Ω/°C
b_2	1.92×10^{-6}	Ω/°C^2

T_{vj} in ºC; -55 ºC < T_{vj} < 175ºC ; I_F < 8 A

●Die Bonding Layout



・Front view of the packaging.

・Dimensions are design values.

・If the heat sink is to be installed, it should be in contact with the die bonding point.

Unit: mm

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