

V_R	1200V
I_F	20A/40A*
Q_C	66nC(Per leg)

(*Per leg/ Both legs)

●Features

- 1) Shorter recovery time
- 2) Reduced temperature dependence
- 3) High-speed switching possible

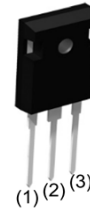
●Construction

Silicon carbide epitaxial planar type

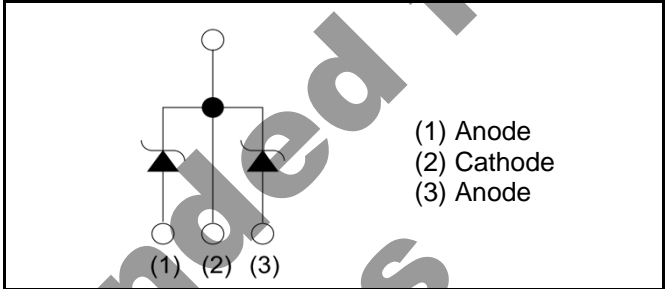
●AEC-Q101 Qualified

●Outline

TO-247



●Inner circuit



●Packaging specifications

Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	30
	Packing code	C
	Marking	SCS240KE2A

●Absolute maximum ratings ($T_j = 25^\circ\text{C}$)

Parameter	Symbol	Value	Unit	
Reverse voltage (repetitive peak)	V_{RM}	1200	V	
Reverse voltage (DC)	V_R	1200	V	
Continuous forward current * ³ ($T_c = 134^\circ\text{C}$)	I_F	20/40	A	
Surge non-repetitive forward current * ³	I_{FSM}	PW=10ms sinusoidal, $T_j=25^\circ\text{C}$	78/150	A
		PW=10ms sinusoidal, $T_j=150^\circ\text{C}$	59/110	A
		PW=10μs square, $T_j=25^\circ\text{C}$	310/620	A
Repetitive peak forward current * ³	I_{FRM}	83/160 * ¹	A	
i^2t value * ³	$\int i^2 dt$	PW=10ms, $T_j=25^\circ\text{C}$	31/120	A ² s
		PW=10ms, $T_j=150^\circ\text{C}$	17/69	A ² s
Total power dissipation * ³	P_D	210/420 * ²	W	
Junction temperature	T_j	175	°C	
Range of storage temperature	T_{stg}	-55 to +175	°C	

*¹ $T_c=100^\circ\text{C}$, $T_j=150^\circ\text{C}$, Duty cycle=10% *² $T_c=25^\circ\text{C}$ *³ Per leg/ Both legs

●Electrical characteristics ($T_j = 25^\circ\text{C}$) (Per Leg)

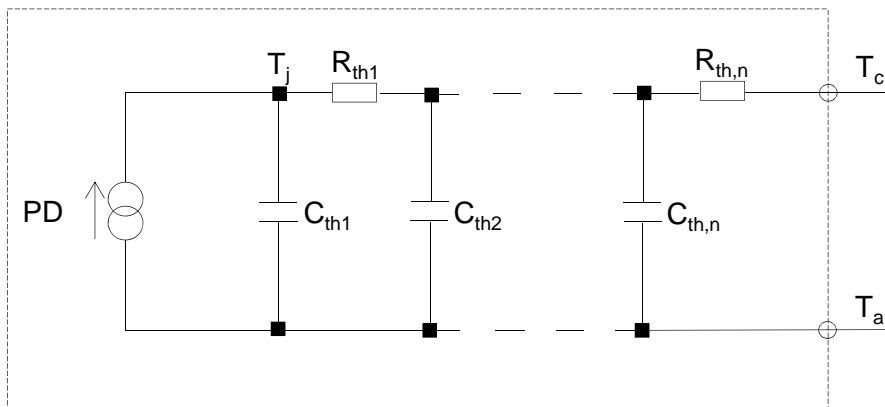
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	$I_R=0.4\text{mA}$	1200	-	-	V
Forward voltage	V_F	$I_F=20\text{A}, T_j=25^\circ\text{C}$	-	1.4	1.6	V
		$I_F=20\text{A}, T_j=150^\circ\text{C}$	-	1.8	-	V
		$I_F=20\text{A}, T_j=175^\circ\text{C}$	-	1.9	-	V
Reverse current	I_R	$V_R=1200\text{V}, T_j=25^\circ\text{C}$	-	20	400	μA
		$V_R=1200\text{V}, T_j=150^\circ\text{C}$	-	160	-	μA
		$V_R=1200\text{V}, T_j=175^\circ\text{C}$	-	260	-	μA
Total capacitance	C	$V_R=1\text{V}, f=1\text{MHz}$	-	1050	-	pF
		$V_R=600\text{V}, f=1\text{MHz}$	-	85	-	pF
Total capacitive charge	Q_C	$V_R=800\text{V}, di/dt=500\text{A}/\mu\text{s}$	-	66	-	nC
Switching time	t_C	$V_R=800\text{V}, di/dt=500\text{A}/\mu\text{s}$	-	18	-	ns

●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	Per Leg	-	0.56	0.70	$^\circ\text{C}/\text{W}$
		Both Legs	-	0.28	0.35	$^\circ\text{C}/\text{W}$

●Typical Transient Thermal Characteristics (Per Leg)

Symbol	Value	Unit	Symbol	Value	Unit
R_{th1}	1.57E-01	K/W	C_{th1}	5.03E-03	Ws/K
R_{th2}	2.46E-01		C_{th2}	6.74E-03	
R_{th3}	1.57E-01		$C_{th,n}$	6.11E-02	



●Electrical characteristic curves

Fig.1 $V_F - I_F$ Characteristics (Per Leg)

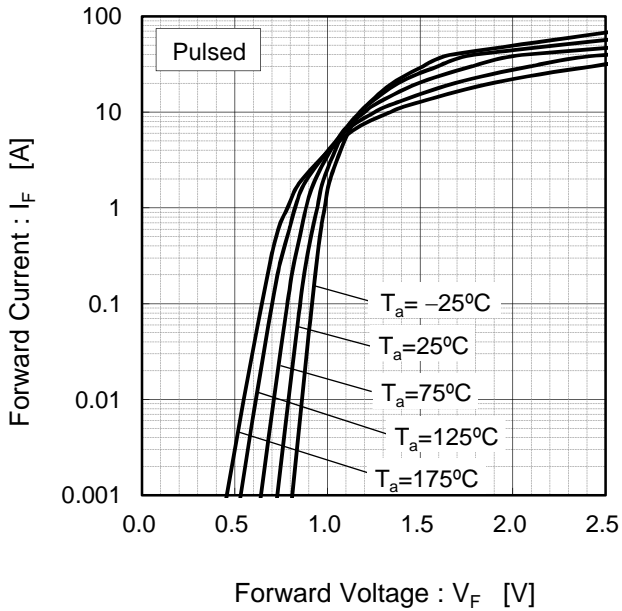


Fig.2 $V_F - I_F$ Characteristics (Per Leg)

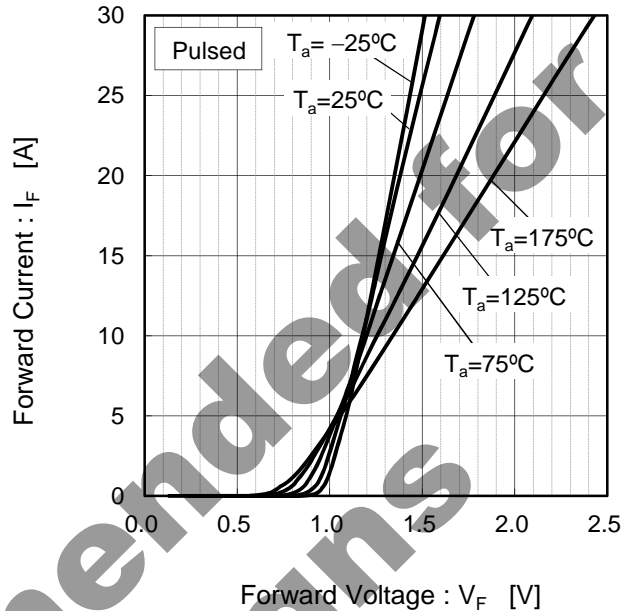


Fig.3 $V_R - I_R$ Characteristics (Per Leg)

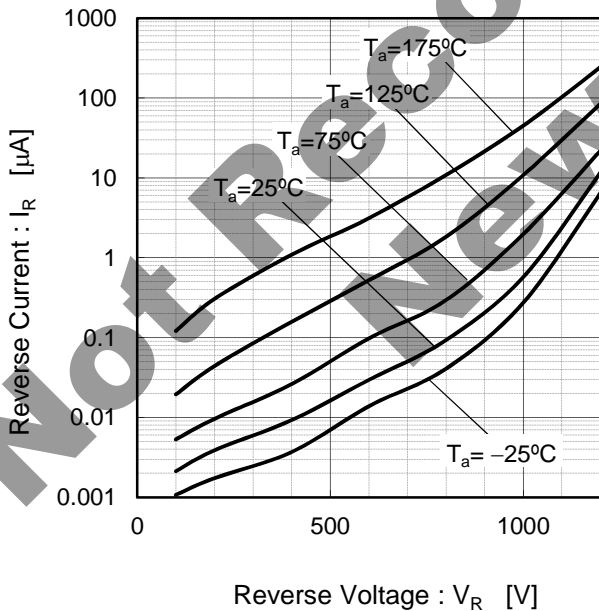
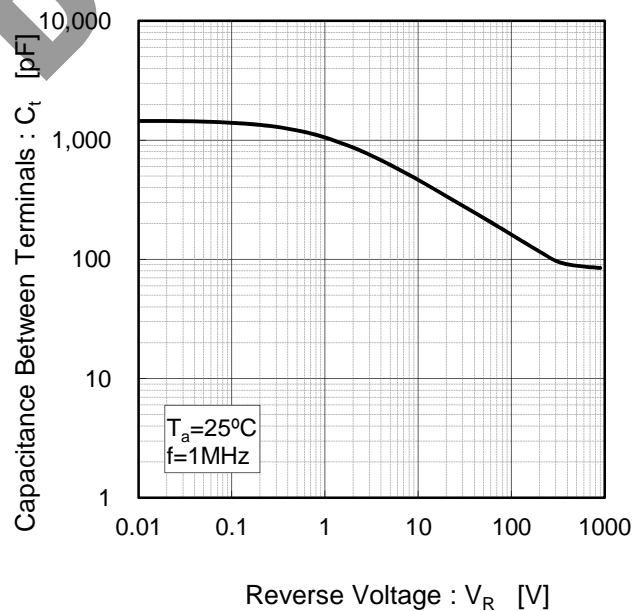


Fig.4 $V_R - C_t$ Characteristics (Per Leg)



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width (Per Leg)

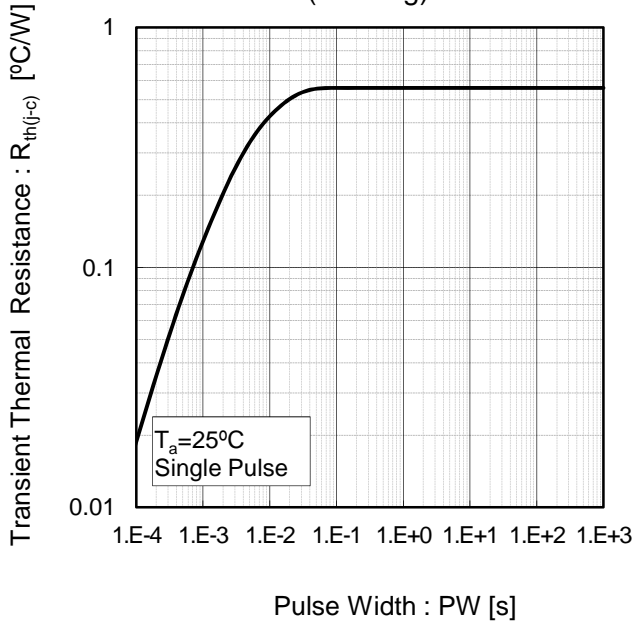


Fig.6 Power Dissipation (Per Leg)

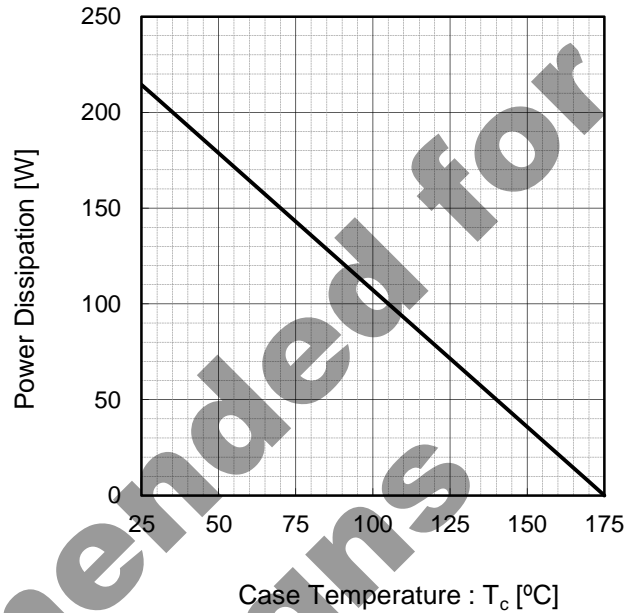
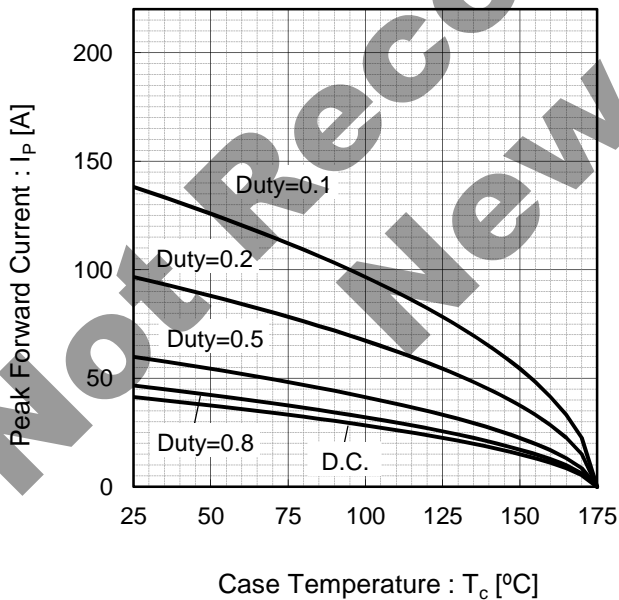
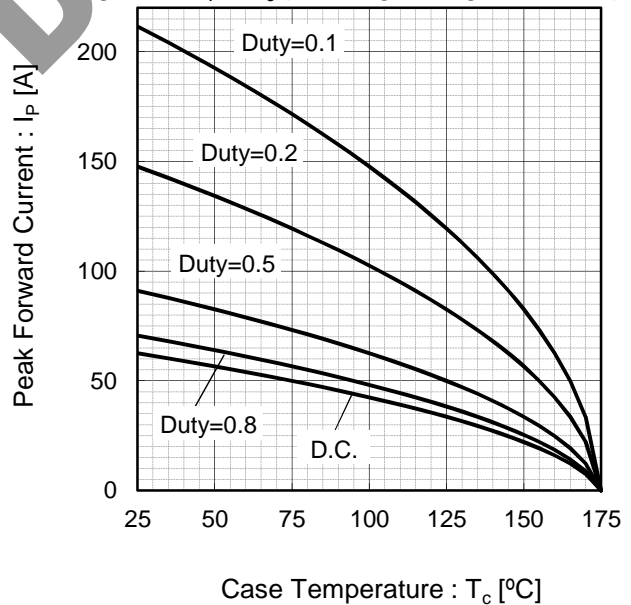


Fig.7*3 Maximum peak forward current derating curve $I_P - T_c$ (Per Leg)



*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 $I_P - T_c$ (Per Leg, 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) (Per Leg)

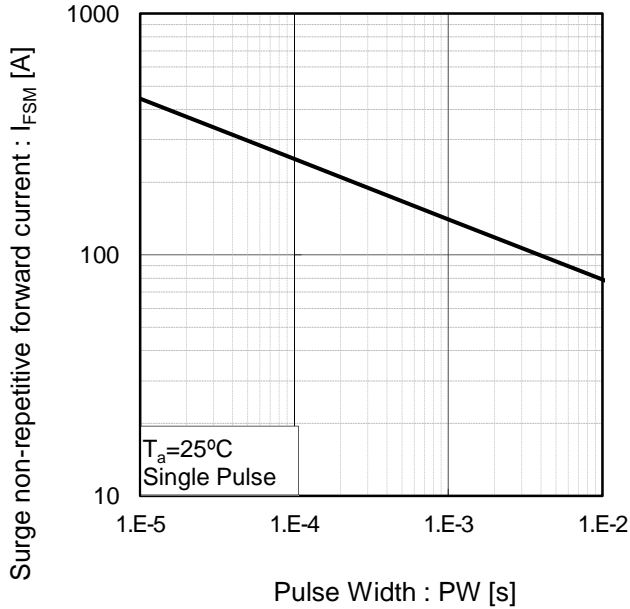
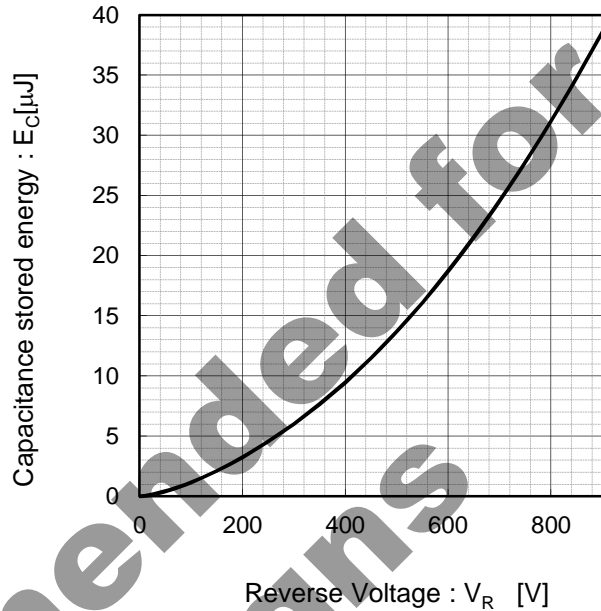
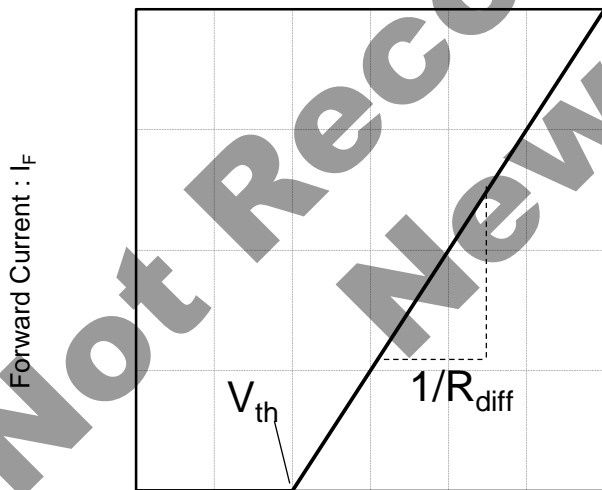


Fig.10 Typical capacitance store energy (Per Leg)



●Simplified forward characteristic model (Per Leg)

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	9.93E-01	V
a ₁	-1.27E-03	V/°C
b ₀	1.83E-02	Ω
b ₁	1.03E-04	Ω/°C
b ₂	6.65E-07	Ω/°C ²

T_j in °C; -55 °C < T_j < 175°C ; I_F < 40A

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