

V_R	1200V
I_F	10A/20A*
Q_C	34nC(Per leg)

(*Per leg/ Both legs)

●Features

- 1) AEC-Q101 qualified
- 2) Low forward voltage
- 3) Negligible recovery time/current
- 4) Temperature independent switching behavior

●Applications

- On Board Charger
- DC/DC Converter
- Wireless Charger
- EV Charger

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

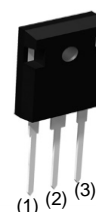
Parameter		Symbol	Value	Unit
Reverse voltage (repetitive peak)		V_{RM}	1200	V
Reverse voltage (DC)		V_R	1200	V
Continuous forward current *4 (T _c = 143°C)		I _F	10/20	A
Surge non-repetitive forward current *4	PW=10ms sinusoidal, T _j =25°C	I _{FSM}	42/84	A
	PW=10ms sinusoidal, T _j =150°C		31/62	A
	PW=10μs square, T _j =25°C		160/320	A
Repetitive peak forward current *4		I _{FRM}	47/94*2	A
i ² t value*4	PW=10ms, T _j =25°C	∫ i ² dt	9/36	A ² s
	PW=10ms, T _j =150°C		4.8/19	A ² s
Total power dissipation *4		P _D	130/270*3	W
Junction temperature		T _j	175	°C
Range of storage temperature		T _{sta}	−55 to +175	°C

*1 Tolerances of dimensions and packing specifications slightly differ between TO-247 and TO-247N, which is unlikely to influence compatibility for mounting. Please refer to corresponding specifications of dimensions for more details.

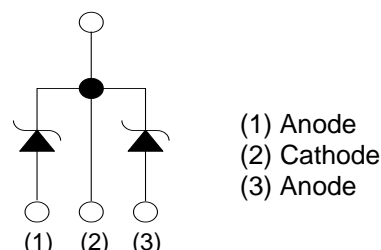
*2 $T_c=100^\circ\text{C}$, $T_j=150^\circ\text{C}$, Duty cycle=10% *3 $T_c=25^\circ\text{C}$ *4 Per leg/ Both legs

●Outline

TO-247
TO-247N



●Inner circuit



●Packaging specifications*1

Package	TO-247	TO-247N
Type	Packing	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	30
	Packing code	C C11
	Marking	SCS220KE2

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

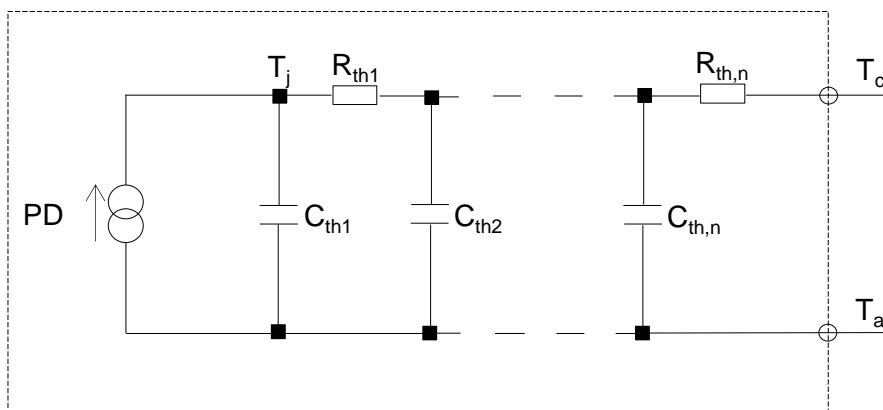
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	$I_R = 0.2\text{mA}$	1200	-	-	V
Forward voltage	V_F	$I_F = 10\text{A}, T_j = 25^\circ\text{C}$	-	1.4	1.6	V
		$I_F = 10\text{A}, T_j = 150^\circ\text{C}$	-	1.8	-	V
		$I_F = 10\text{A}, T_j = 175^\circ\text{C}$	-	1.9	-	V
Reverse current	I_R	$V_R = 1200\text{V}, T_j = 25^\circ\text{C}$	-	10	200	μA
		$V_R = 1200\text{V}, T_j = 150^\circ\text{C}$	-	80	-	μA
		$V_R = 1200\text{V}, T_j = 175^\circ\text{C}$	-	130	-	μA
Total capacitance	C	$V_R = 1\text{V}, f = 1\text{MHz}$	-	530	-	pF
		$V_R = 600\text{V}, f = 1\text{MHz}$	-	43	-	pF
Total capacitive charge	Q_C	$V_R = 800\text{V}, di/dt = 500\text{A}/\mu\text{s}$	-	34	-	nC
Switching time	t_C	$V_R = 800\text{V}, di/dt = 500\text{A}/\mu\text{s}$	-	15	-	ns

●Thermal characteristics

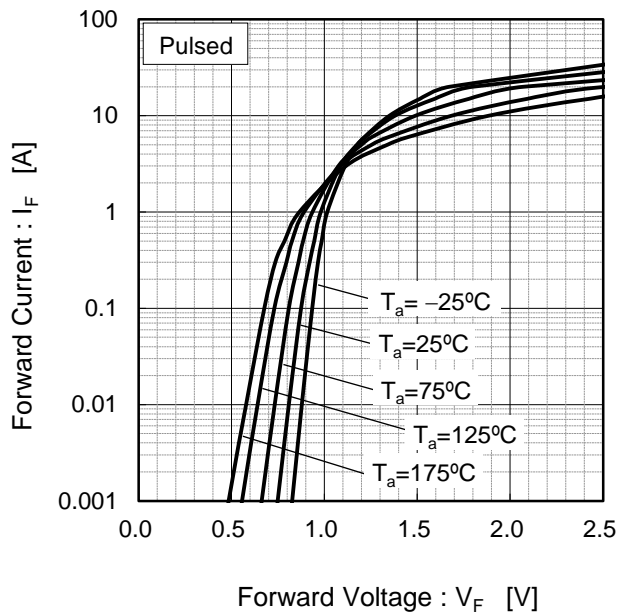
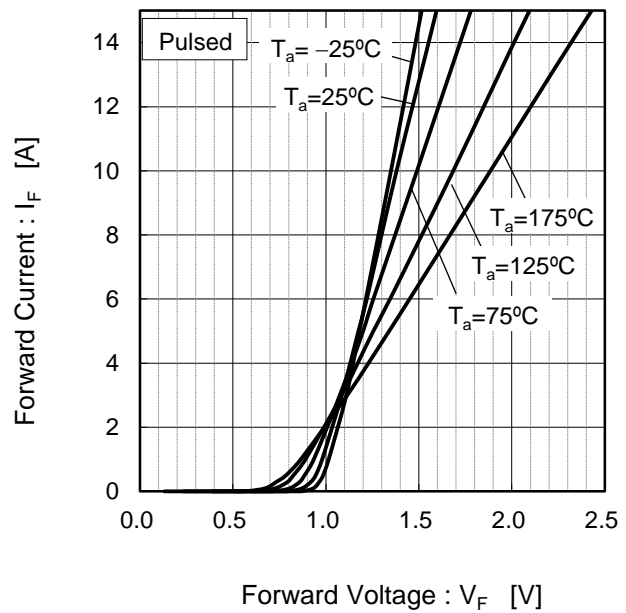
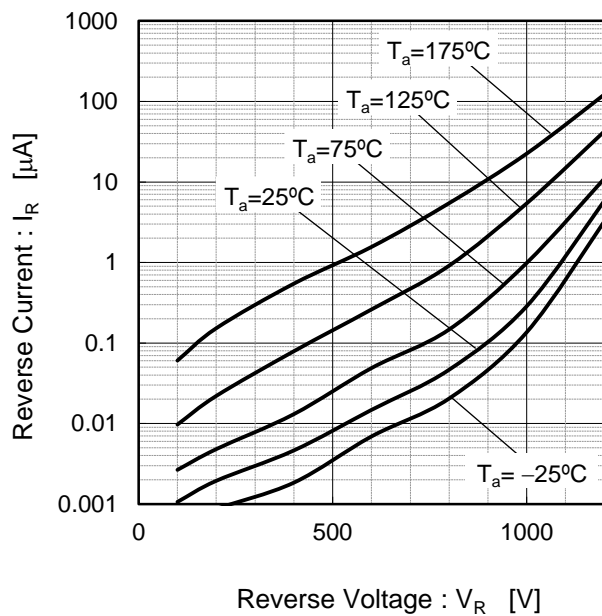
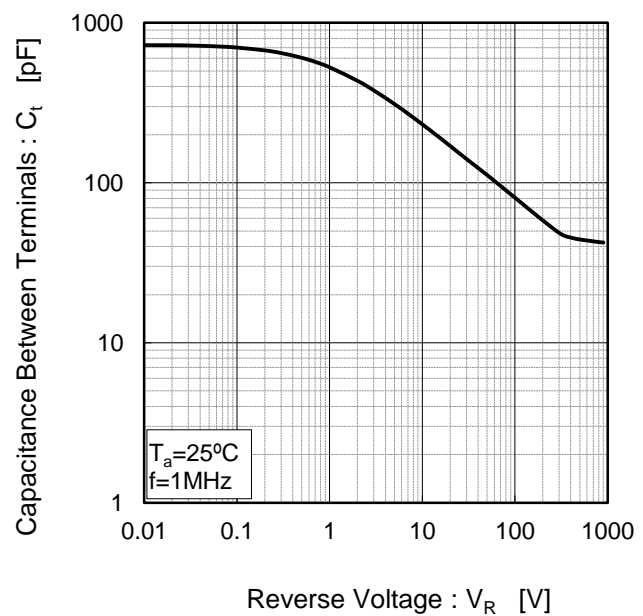
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	Per Leg	-	0.9	1.1	$^\circ\text{C}/\text{W}$
		Both Legs	-	0.45	0.55	$^\circ\text{C}/\text{W}$

●Typical Transient Thermal Characteristics (Per Leg)

Symbol	Value	Unit	Symbol	Value	Unit
R_{th1}	2.88×10^{-1}	K/W	C_{th1}	3.30×10^{-3}	Ws/K
R_{th2}	5.59×10^{-1}		C_{th2}	1.03×10^{-2}	
R_{th3}	2.13×10^{-1}		C_{th3}	2.90×10^{-1}	



●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)

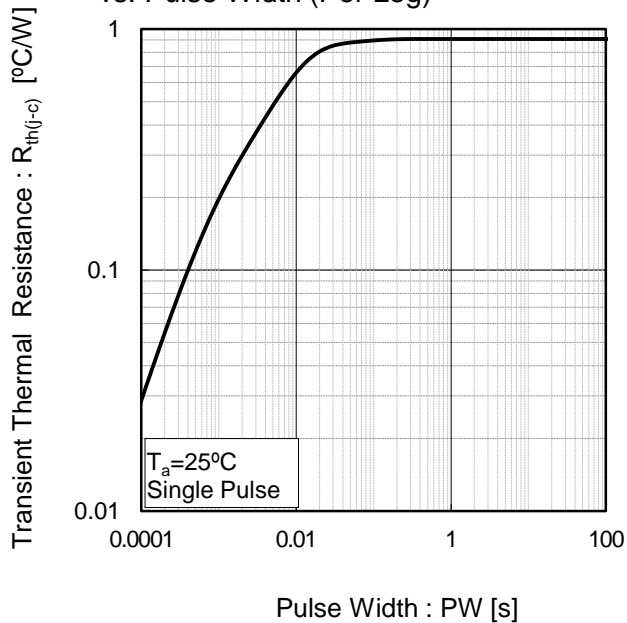


Fig.6 Power Dissipation (Per Leg)

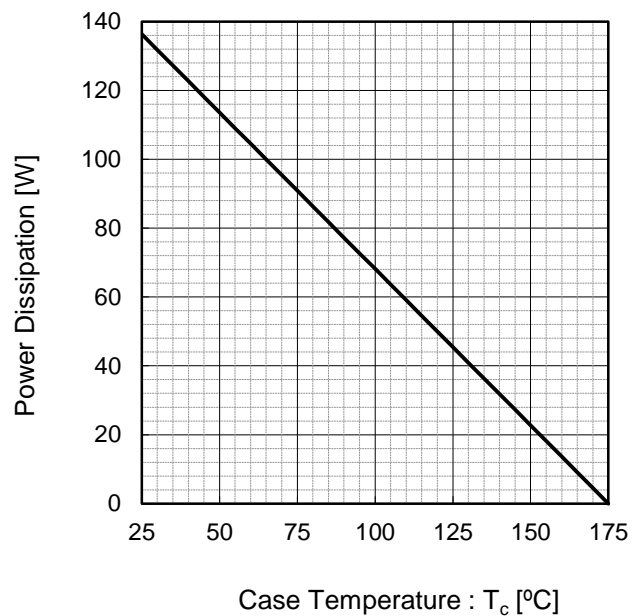
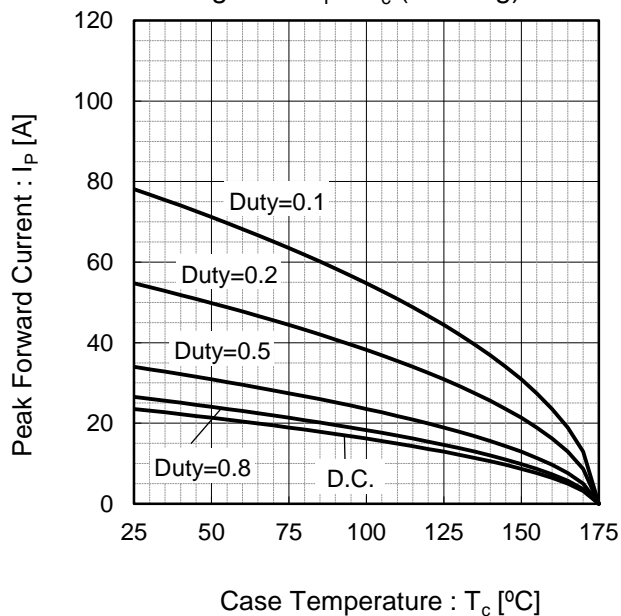
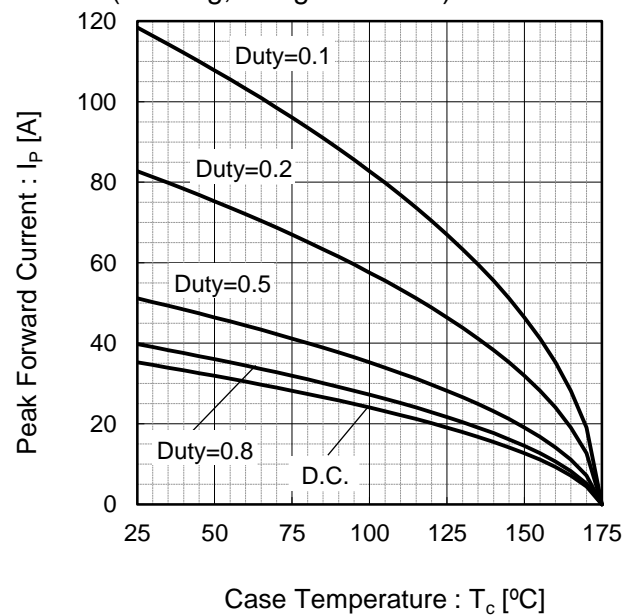


Fig.7*5 Maximum peak forward current derating curve $I_P - T_c$ (Per Leg)



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

Fig.8*6 Typical peak forward current derating curve $I_P - T_c$ (Per Leg, Not guaranteed)



*6 Based on typ V_f , 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)

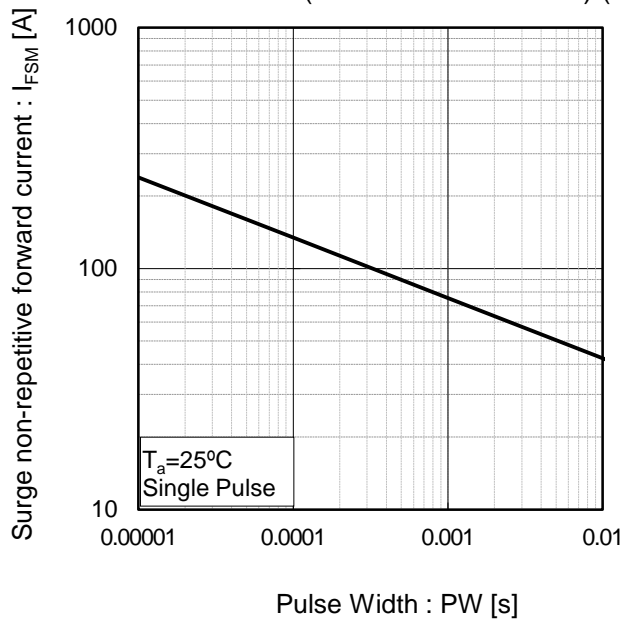
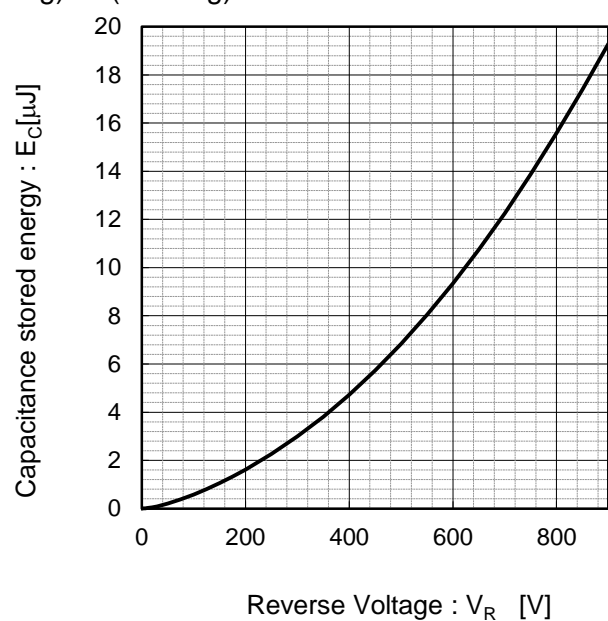
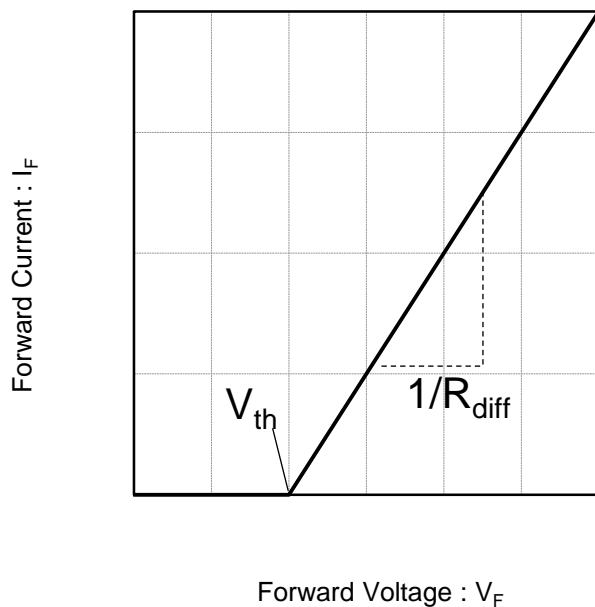


Fig.10 Typical capacitance store energy (Per Leg)



●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	9.93×10^{-1}	V
a_1	-1.27×10^{-3}	V/°C
b_0	3.65×10^{-2}	Ω
b_1	2.06×10^{-4}	Ω/°C
b_2	1.33×10^{-6}	Ω/°C ²

T_j in °C; $-55^\circ\text{C} < T_j < 175^\circ\text{C}$; $I_F < 20 \text{ A}$

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