

V_R	650V
I_F	10A/20A*
Q_C	15nC(Per leg)

(*Per leg/ Both legs)

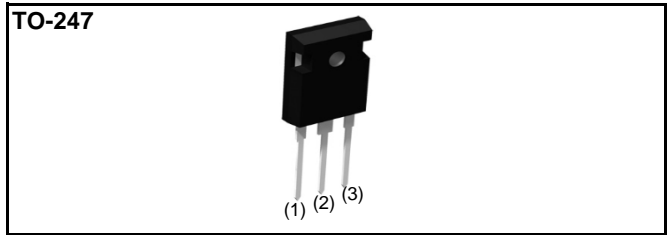
●Features

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

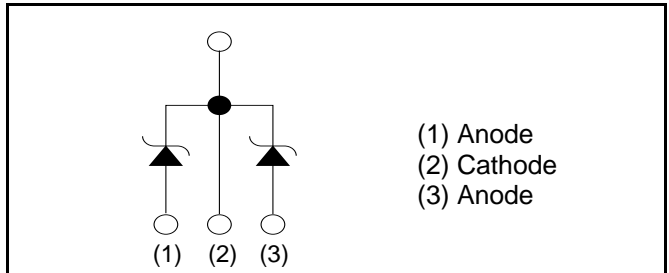
●Applications

- PFC Boost Topology
- Secondary Side Rectification
- Data Center
- PV Power Conditioners

●Outline



●Inner circuit



●Packaging specifications

Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	30
	Packing code	C
	Marking	SCS220AE2

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

Parameter	Symbol	Value	Unit	
Reverse voltage (repetitive peak)	V_{RM}	650	V	
Reverse voltage (DC)	V_R	650	V	
Continuous forward current ^{*3} ($T_c = 137^\circ\text{C}$)	I_F	10/20	A	
Surge non-repetitive forward current ^{*3}	I_{FSM}	PW=10ms sinusoidal, $T_j=25^\circ\text{C}$	38/76	A
		PW=10ms sinusoidal, $T_j=150^\circ\text{C}$	30/60	A
		PW=10μs square, $T_j=25^\circ\text{C}$	150/300	A
Repetitive peak forward current ^{*3}	I_{FRM}	45/91 ^{*1}	A	
i^2t value ^{*3}	$\int i^2 dt$	PW=10ms, $T_j=25^\circ\text{C}$	7.2/29	A^2s
		PW=10ms, $T_j=150^\circ\text{C}$	4.5/18	A^2s
Total power dissipation ^{*3}	P_D	83/160 ^{*2}	W	
Junction temperature	T_j	175	$^\circ\text{C}$	
Range of storage temperature	T_{stg}	-55 to +175	$^\circ\text{C}$	

*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)

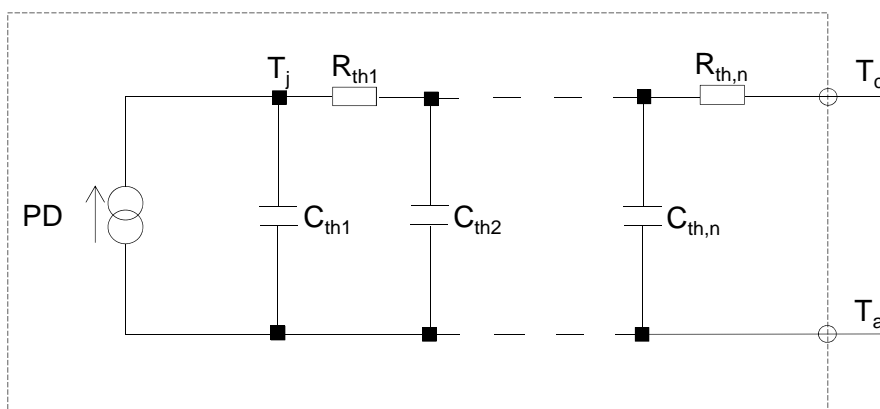
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	$I_R=2.0\text{mA}$	650	-	-	V
Forward voltage	V_F	$I_F=10\text{A}, T_j=25^\circ\text{C}$	-	1.35	1.55	V
		$I_F=10\text{A}, T_j=150^\circ\text{C}$	-	1.55	-	V
		$I_F=10\text{A}, T_j=175^\circ\text{C}$	-	1.63	-	V
Reverse current	I_R	$V_R=600\text{V}, T_j=25^\circ\text{C}$	-	2	200	μA
		$V_R=600\text{V}, T_j=150^\circ\text{C}$	-	30	-	μA
		$V_R=600\text{V}, T_j=175^\circ\text{C}$	-	70	-	μA
Total capacitance	C	$V_R=1\text{V}, f=1\text{MHz}$	-	360	-	pF
		$V_R=600\text{V}, f=1\text{MHz}$	-	37	-	pF
Total capacitive charge	Q_C	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	15	-	nC
Switching time	t_C	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	15	-	ns

●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	Per Leg	-	1.6	1.8	$^\circ\text{C}/\text{W}$
		Both Legs	-	0.80	0.90	$^\circ\text{C}/\text{W}$

●Typical Transient Thermal Characteristics (Per Leg)

Symbol	Value	Unit	Symbol	Value	Unit
R_{th1}	4.16E-01	K/W	C_{th1}	1.55E-03	Ws/K
R_{th2}	9.92E-01		C_{th2}	6.13E-03	
R_{th3}	1.93E-01		C_{th3}	1.34E-01	



●Electrical characteristic curves

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

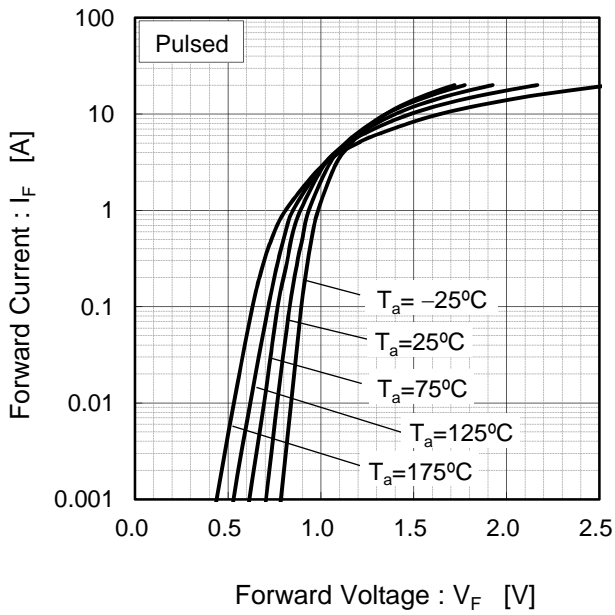


Fig.2 $V_F - I_F$ Characteristics (Per Leg)

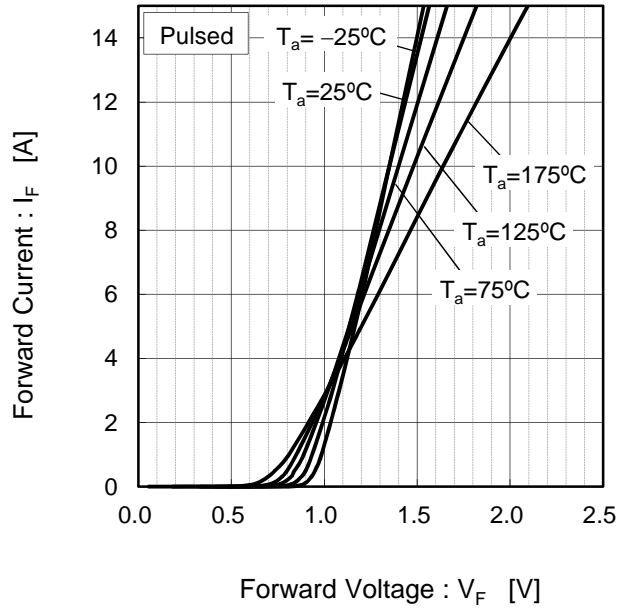


Fig.3 $V_R - I_R$ Characteristics (Per Leg)

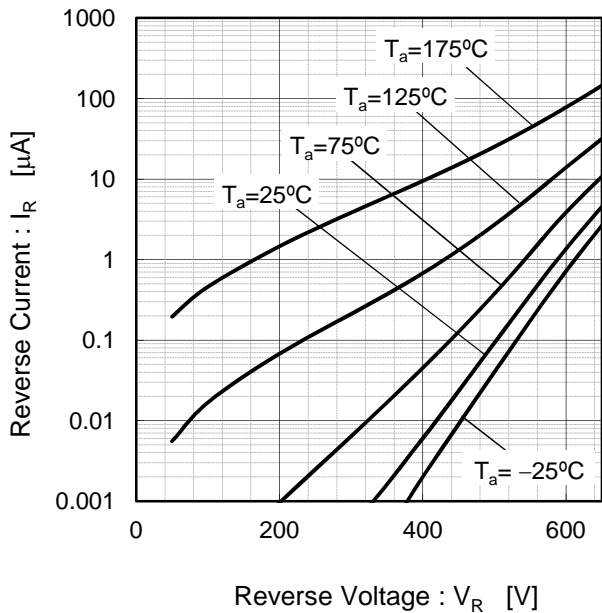
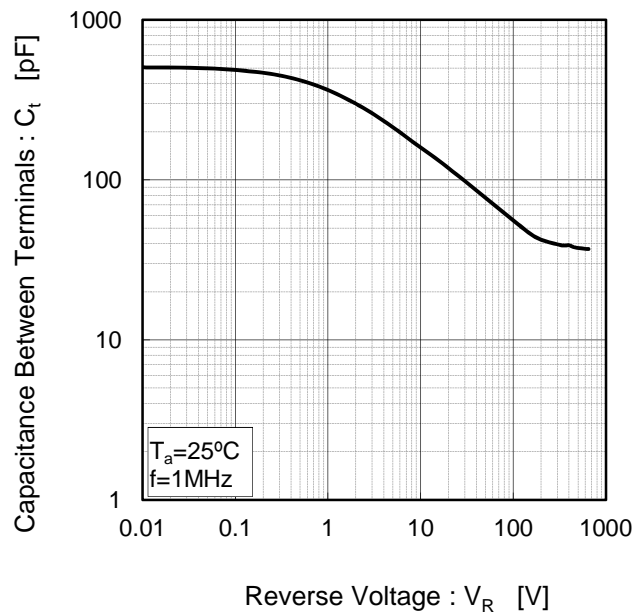


Fig.4 $V_R - C_t$ Characteristics (Per Leg)



●Electrical characteristic curves

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

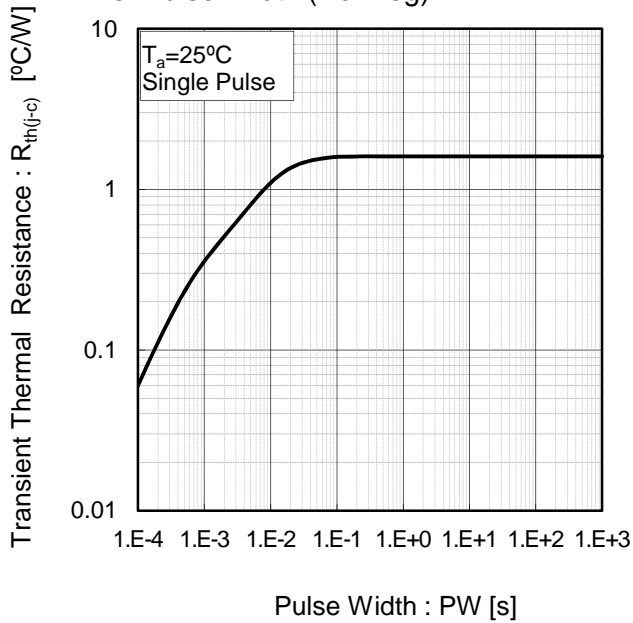


Fig.6 Power Dissipation (Per Leg)

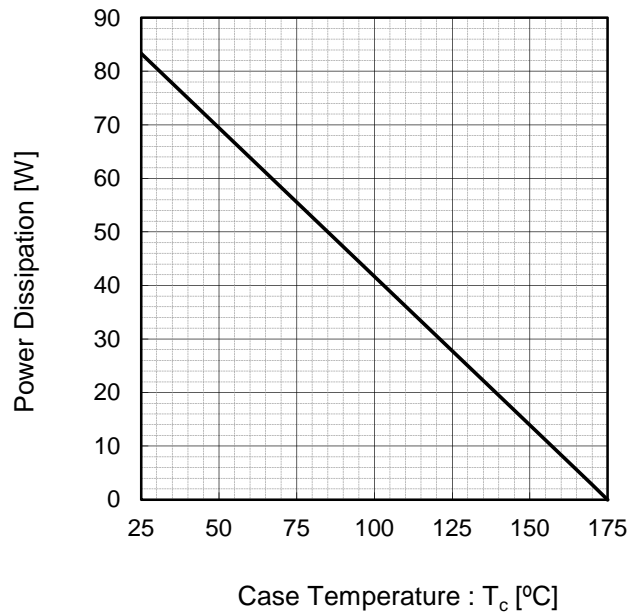
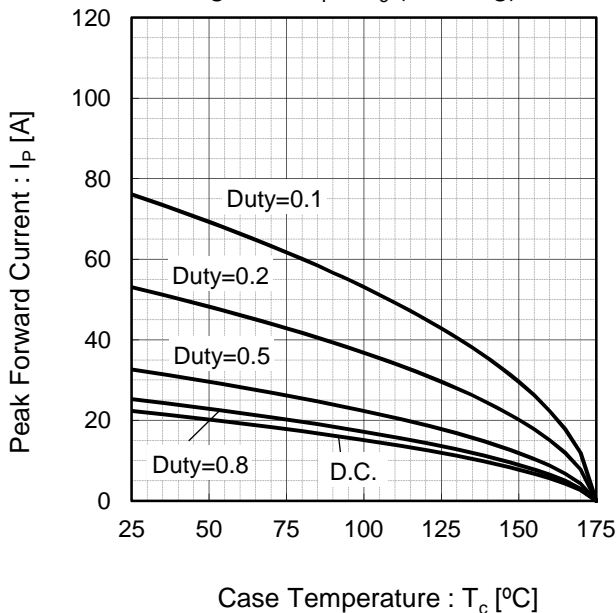
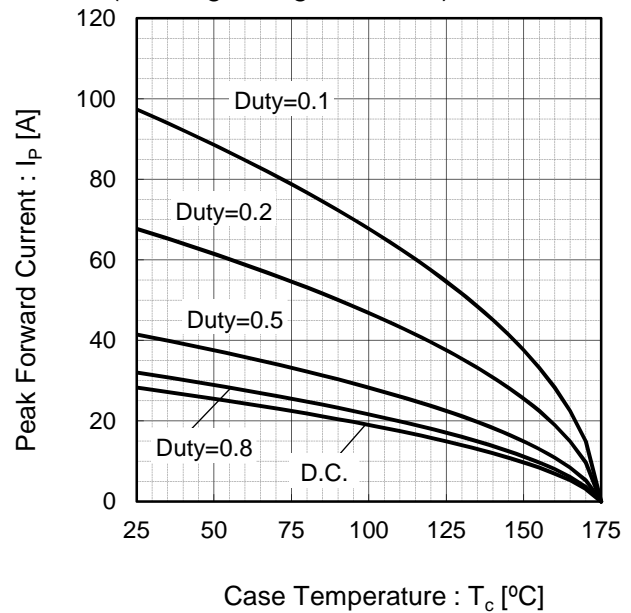


Fig.7*3 Maximum peak forward current derating curve $I_P - T_c$ (Per Leg)



Case Temperature : T_c [°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 $I_P - T_c$ (Per Leg, Not guaranteed)



Case Temperature : T_c [°C]
 *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)

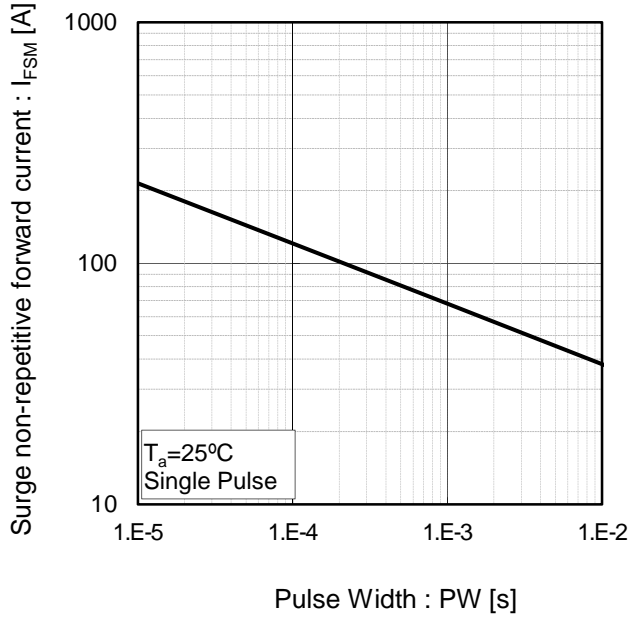
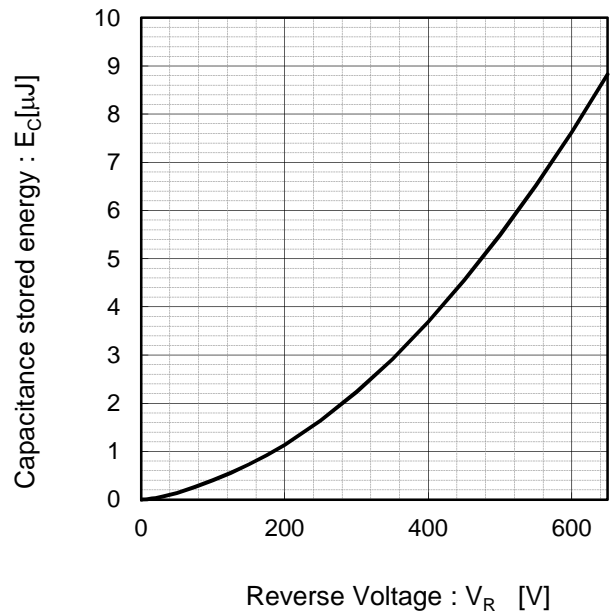
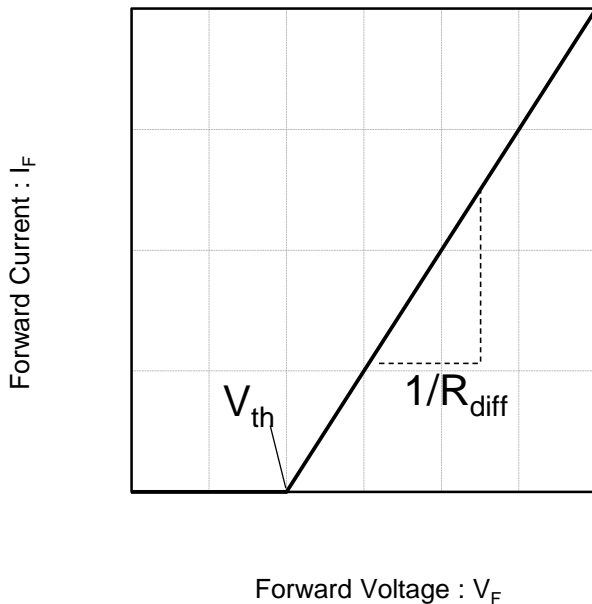


Fig.10 Typical capacitance store energy (Per Leg)



●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	9.35E-01	V
a ₁	-1.12E-03	V/°C
b ₀	3.98E-02	Ω
b ₁	1.02E-04	Ω/°C
b ₂	1.08E-06	Ω/°C ²

T_j in °C; -55 °C < T_j < °C ; I_F < 20 A

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