

$V_R$	650V
$I_F$	20A
$Q_C$	31nC

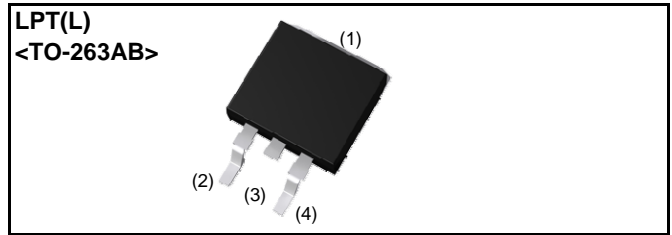
### ●Features

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

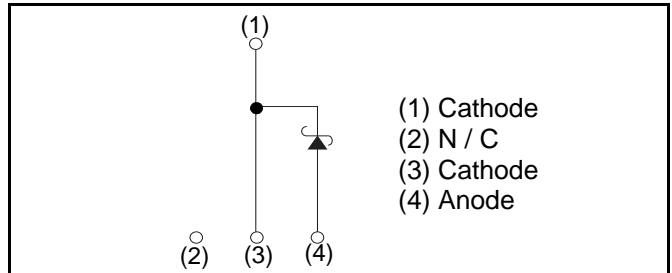
### ●Applications

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

### ●Outline



### ●Inner circuit



### ●Packaging specifications

Type	Packaging	Embossed tape
	Reel size (mm)	330
	Tape width (mm)	24
	Basic ordering unit (pcs)	1 000
	Packing code	TLL
	Marking	SCS220AJ

### ●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 ( $T_c = 116^\circ\text{C}$ )		$I_F$	20	A
Surge non-repetitive forward current	PW=10ms sinusoidal, $T_j=25^\circ\text{C}$	$I_{FSM}$	68	A
	PW=10ms sinusoidal, $T_j=150^\circ\text{C}$		53	A
	PW=10 $\mu\text{s}$ square, $T_j=25^\circ\text{C}$		260	A
Repetitive peak forward current		$I_{FRM}$	71 *1	A
$i^2t$ value	PW=10ms, $T_j=25^\circ\text{C}$	$\int i^2 dt$	23	$\text{A}^2\text{s}$
	PW=10ms, $T_j=150^\circ\text{C}$		14	$\text{A}^2\text{s}$
Total power dissipation		$P_D$	100 *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  $T_c=25^\circ\text{C}$

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

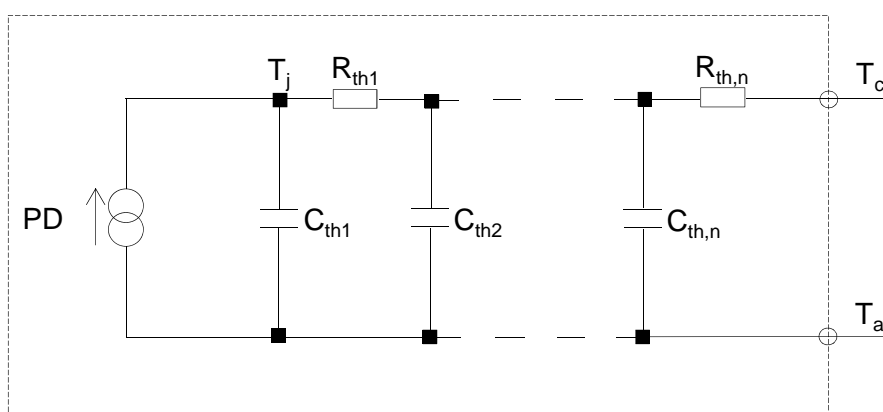
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	$V_{DC}$	$I_R=4.0\text{mA}$	650	-	-	V
Forward voltage	$V_F$	$I_F=20\text{A}, T_j=25^\circ\text{C}$	-	1.35	1.55	V
		$I_F=20\text{A}, T_j=150^\circ\text{C}$	-	1.55	-	V
		$I_F=20\text{A}, T_j=175^\circ\text{C}$	-	1.63	-	V
Reverse current	$I_R$	$V_R=600\text{V}, T_j=25^\circ\text{C}$	-	4	400	$\mu\text{A}$
		$V_R=600\text{V}, T_j=150^\circ\text{C}$	-	60	-	$\mu\text{A}$
		$V_R=600\text{V}, T_j=175^\circ\text{C}$	-	140	-	$\mu\text{A}$
Total capacitance	C	$V_R=1\text{V}, f=1\text{MHz}$	-	730	-	pF
		$V_R=600\text{V}, f=1\text{MHz}$	-	74	-	pF
Total capacitive charge	$Q_C$	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	31	-	nC
Switching time	$t_C$	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	19	-	ns

**●Thermal characteristics**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	-	-	1.1	1.4	$^\circ\text{C}/\text{W}$

**●Typical Transient Thermal Characteristics**

Symbol	Value	Unit	Symbol	Value	Unit
$R_{th1}$	2.43E-02	K/W	$C_{th1}$	3.11E-03	Ws/K
$R_{th2}$	7.53E-01		$C_{th2}$	1.03E-03	
$R_{th3}$	3.23E-01		$C_{th,n}$	1.55E-01	



●Electrical characteristic curves

Fig.1  $V_F - I_F$  Characteristics

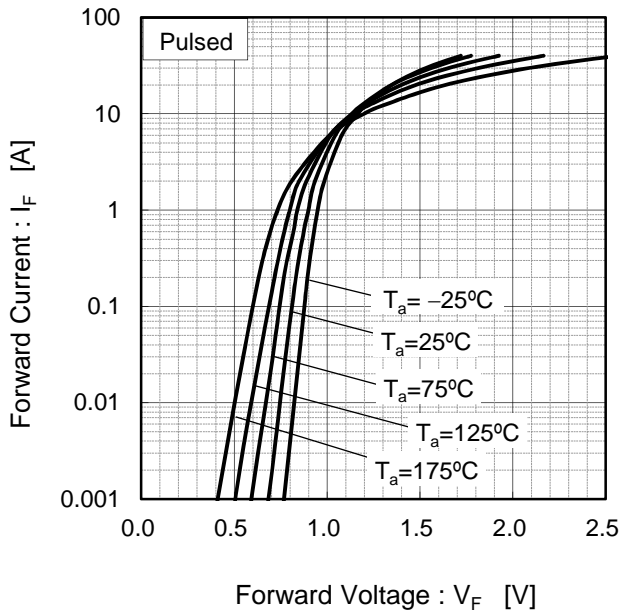


Fig.2  $V_F - I_F$  Characteristics

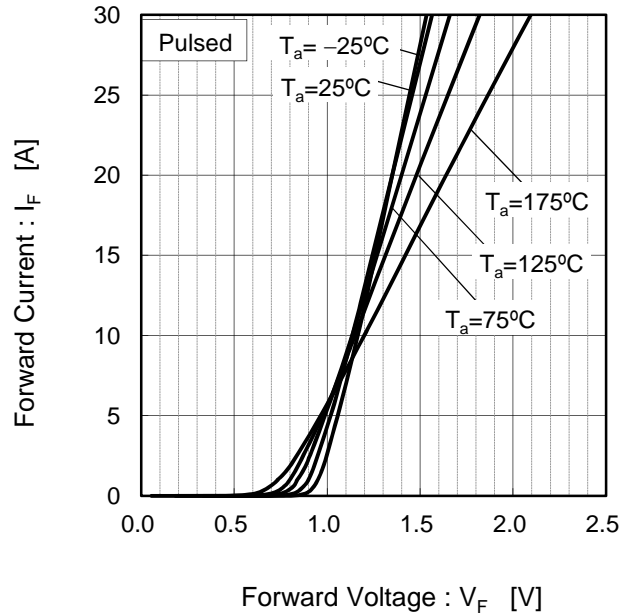


Fig.3  $V_R - I_R$  Characteristics

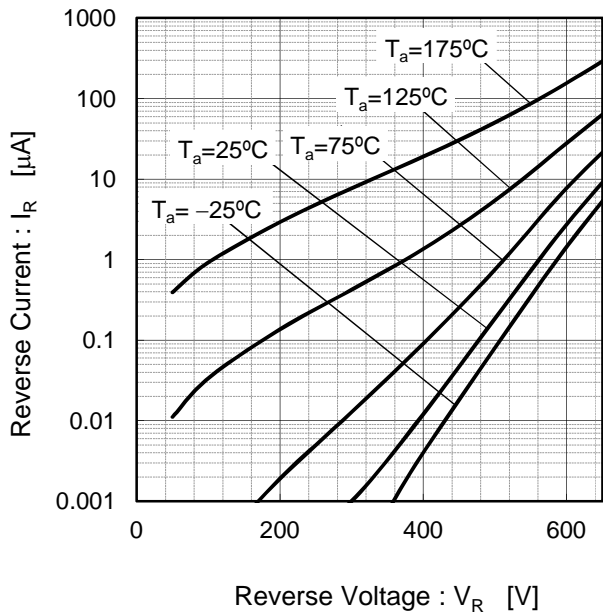
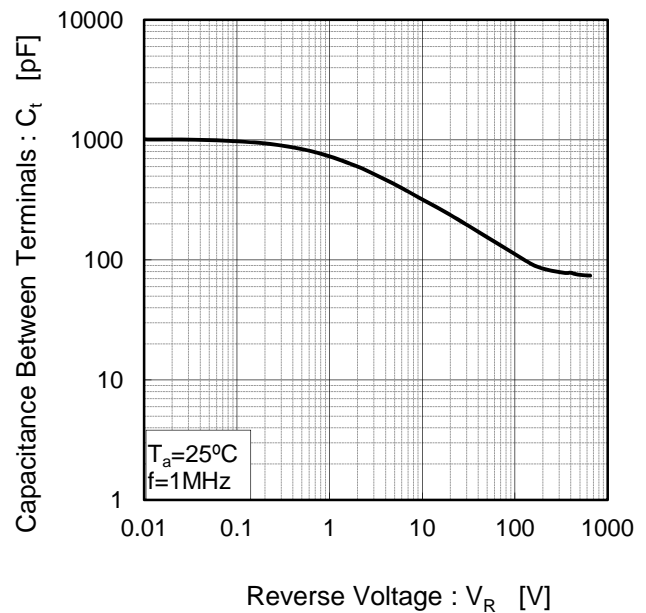


Fig.4  $V_R - C_t$  Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

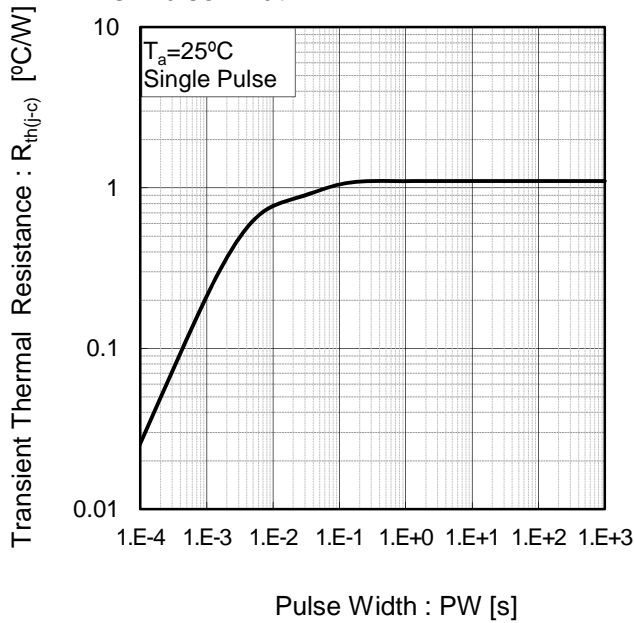


Fig.6 Power Dissipation

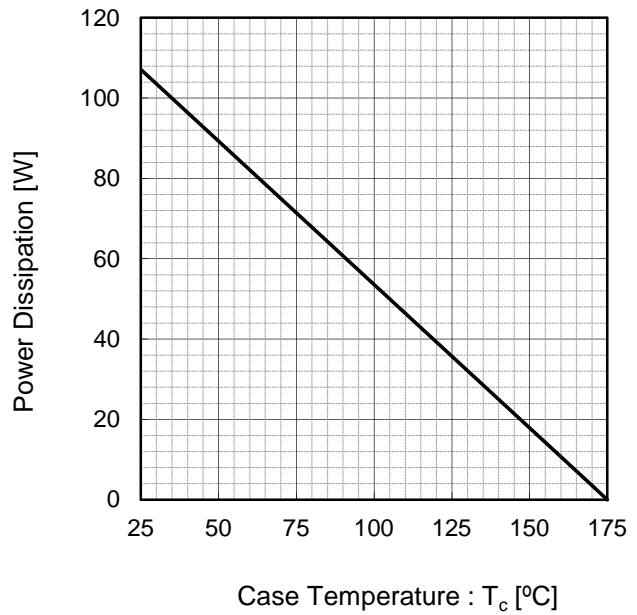
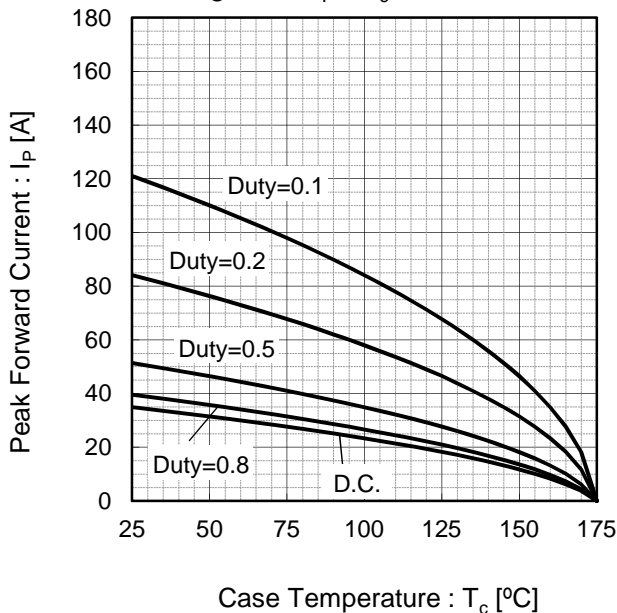
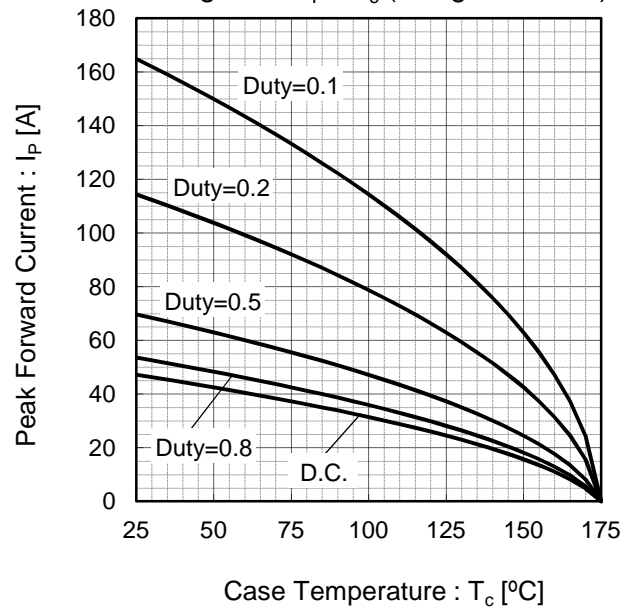


Fig.7\*3 Maximum peak forward current derating curve  $I_P - T_c$



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  $I_P - T_c$  (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)

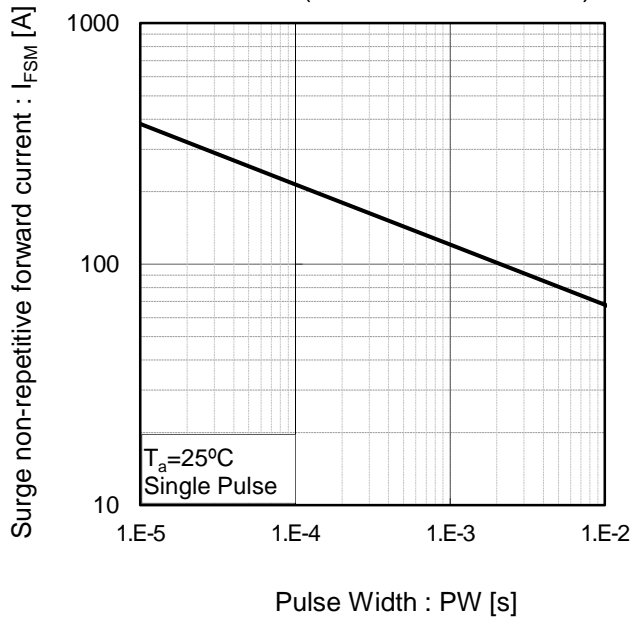
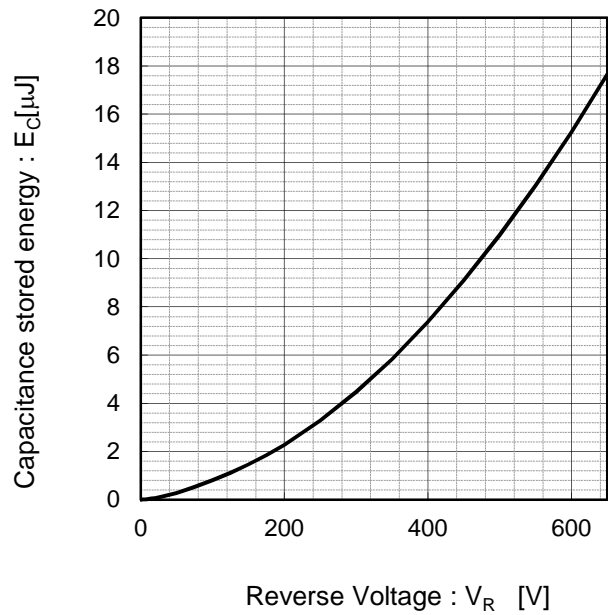
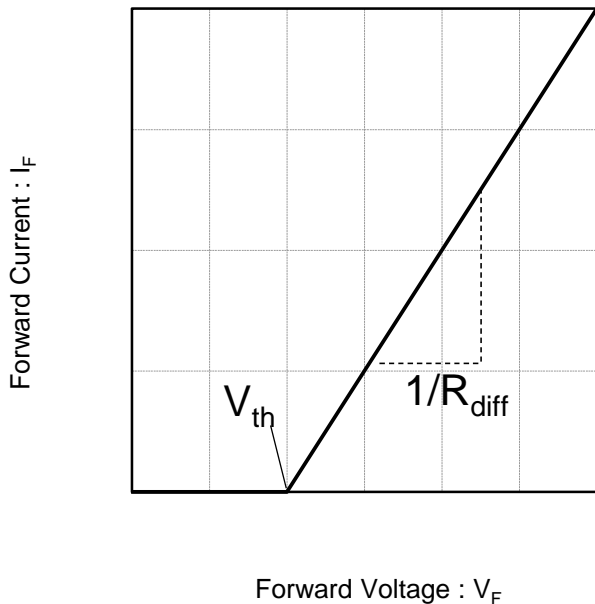


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

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 <sub>0</sub>	9.35E-01	V
a <sub>1</sub>	-1.12E-03	V/°C
b <sub>0</sub>	1.99E-02	Ω
b <sub>1</sub>	5.10E-05	Ω/°C
b <sub>2</sub>	5.40E-07	Ω/°C <sup>2</sup>

T<sub>j</sub> in °C; -55 °C < T<sub>j</sub> < °C; I<sub>F</sub> < 40 A

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