



# THE DATASHEET OF SCS220AJTLL



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

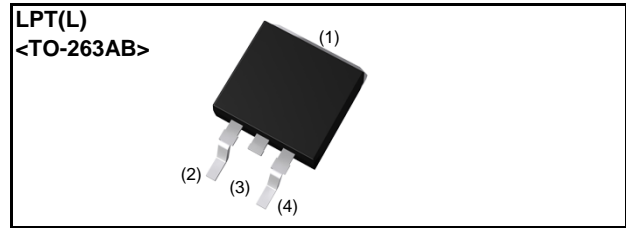
### ●Features

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

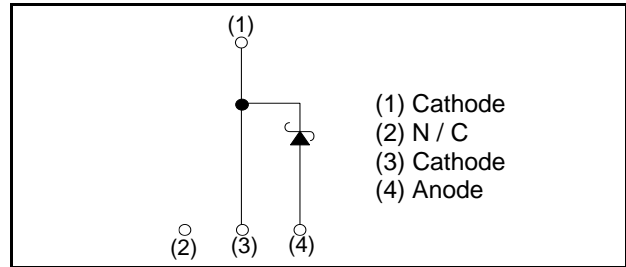
### ●Applications

- 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)	1000
	Packing code	TLL
	Marking	SCS220AJ

### ●Absolute maximum ratings ( $T_{vj} = 25^\circ\text{C}$ 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 ( $T_c = 116^\circ\text{C}$ )	$I_F$	20 *1	A	
Surge non-repetitive forward current	$I_{FSM}$	PW=10ms sinusoidal, $T_{vj}=25^\circ\text{C}$	68	A
		PW=10ms sinusoidal, $T_{vj}=150^\circ\text{C}$	53	A
		PW=10 $\mu\text{s}$ square, $T_{vj}=25^\circ\text{C}$	260	A
Repetitive peak forward current	$I_{FRM}$	71 *2	A	
$i^2t$ value	$\int i^2 dt$	PW=10ms, $T_{vj}=25^\circ\text{C}$	23	$\text{A}^2\text{s}$
		PW=10ms, $T_{vj}=150^\circ\text{C}$	14	$\text{A}^2\text{s}$
Total power dissipation	$P_D$	100 *3	W	
Virtual Junction temperature	$T_{vj}$	175	$^\circ\text{C}$	
	$T_{stg}$	-55 to +175	$^\circ\text{C}$	

\*1 Limited by maximum  $T_{vj}$  and for Max.  $R_{thJC}$ .

\*2  $T_c=100^\circ\text{C}$ ,  $T_{vj}=150^\circ\text{C}$ , Duty cycle=10% \*3  $T_c=25^\circ\text{C}$

● **Electrical characteristics** ( $T_{vj} = 25^{\circ}\text{C}$  unless otherwise specified)

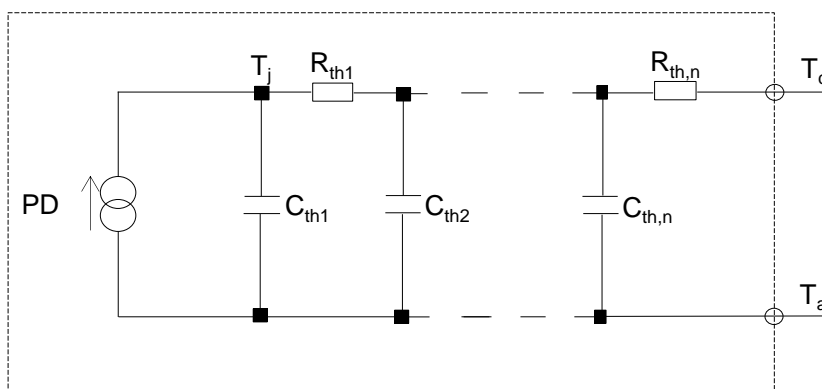
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	$V_{DC}$	$I_R = 4.0\text{mA}$	650	-	-	V
Forward voltage	$V_F$	$I_F = 20\text{A}, T_{vj} = 25^{\circ}\text{C}$	-	1.35	1.55	V
		$I_F = 20\text{A}, T_{vj} = 150^{\circ}\text{C}$	-	1.55	-	V
		$I_F = 20\text{A}, T_{vj} = 175^{\circ}\text{C}$	-	1.63	-	V
Reverse current	$I_R$	$V_R = 600\text{V}, T_{vj} = 25^{\circ}\text{C}$	-	4	400	$\mu\text{A}$
		$V_R = 600\text{V}, T_{vj} = 150^{\circ}\text{C}$	-	60	-	$\mu\text{A}$
		$V_R = 600\text{V}, T_{vj} = 175^{\circ}\text{C}$	-	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	K/W

● **Typical Transient Thermal Characteristics**

Symbol	Value	Unit	Symbol	Value	Unit
$R_{th1}$	$2.4 \times 10^{-2}$	K/W	$C_{th1}$	$3.1 \times 10^{-3}$	Ws/K
$R_{th2}$	$7.5 \times 10^{-1}$		$C_{th2}$	$1.0 \times 10^{-3}$	
$R_{th3}$	$3.2 \times 10^{-1}$		$C_{th3}$	$1.5 \times 10^{-1}$	



●Electrical characteristic curves

Fig.1  $V_F - I_F$  Characteristics

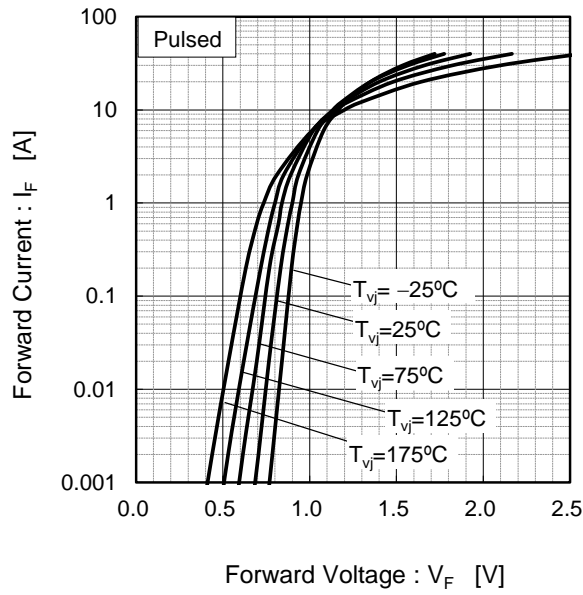


Fig.2  $V_F - I_F$  Characteristics

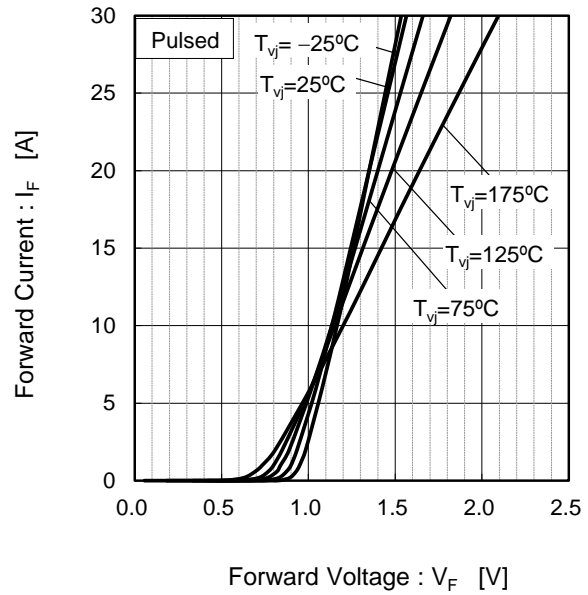


Fig.3  $V_R - I_R$  Characteristics

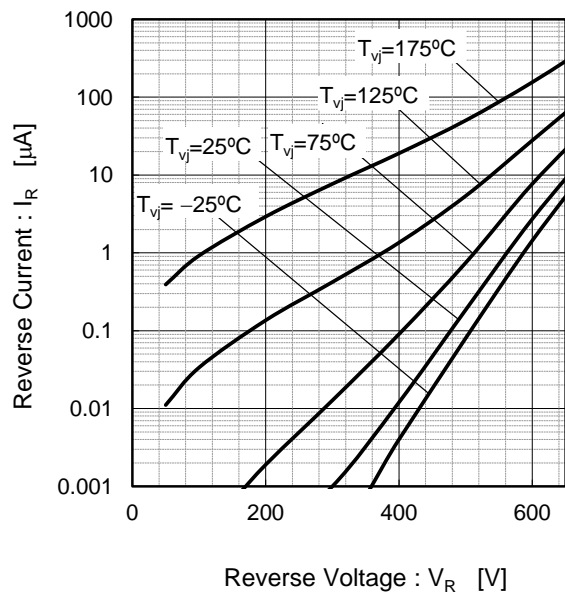
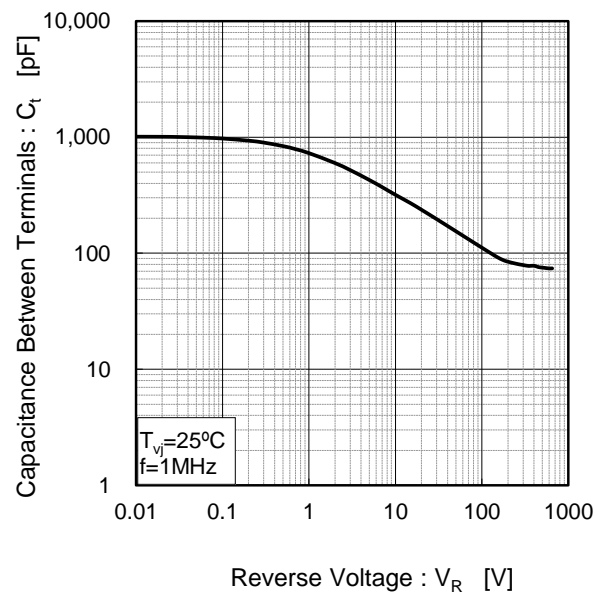


Fig.4  $V_R - C_t$  Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

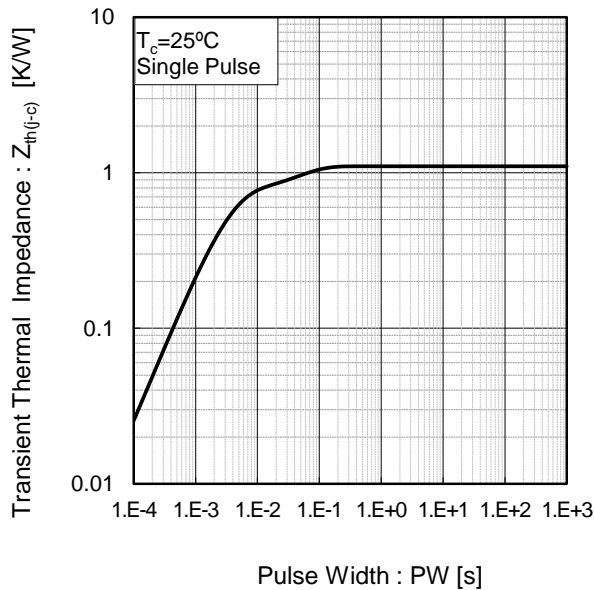


Fig.6 Power Dissipation

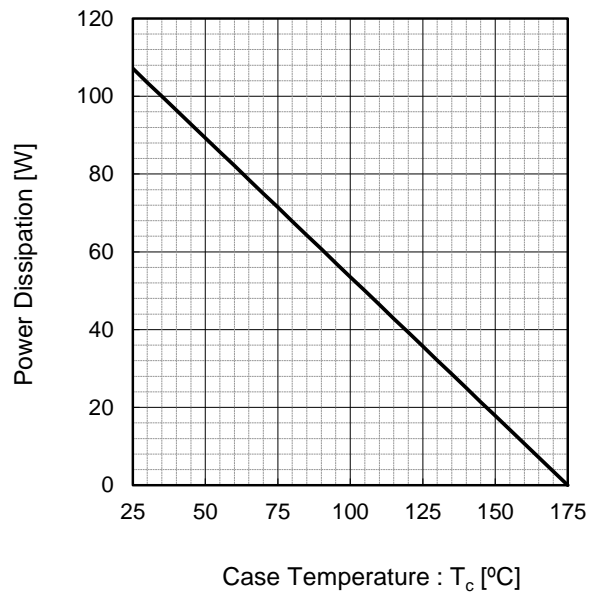
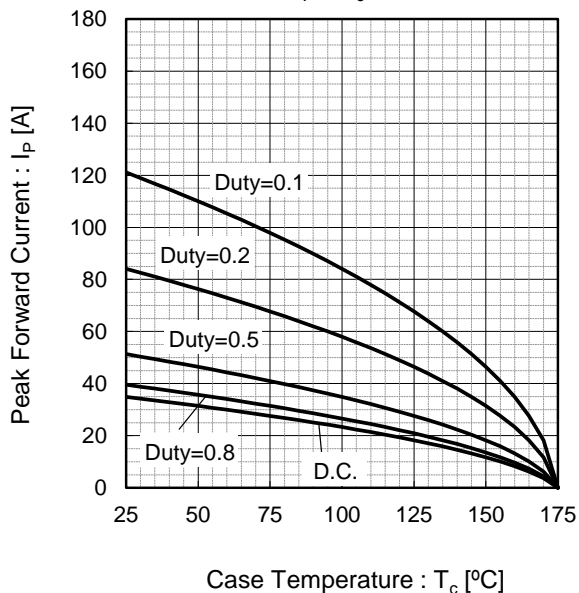
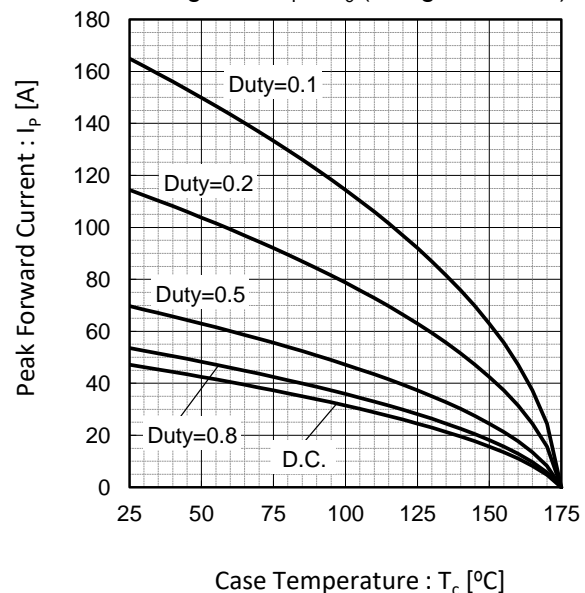


Fig.7\*4 Maximum peak forward current derating curve  $I_P - T_C$



Case Temperature :  $T_C$  [°C]  
 \*4 Based on max Vf, max  $Z_{th(j-c)}$   
 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)



Case Temperature :  $T_C$  [°C]  
 \*5 Based on typ Vf, typ  $Z_{th(j-c)}$   
 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)

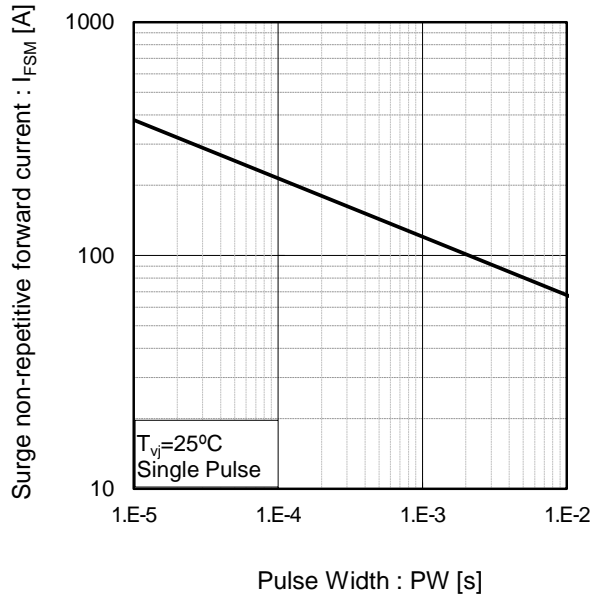
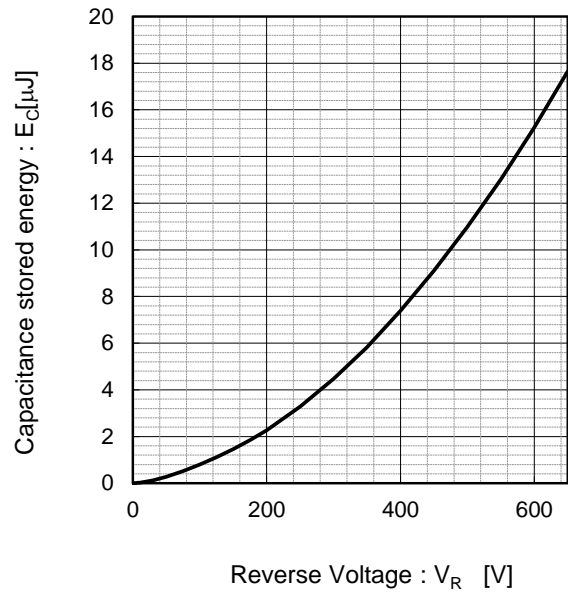
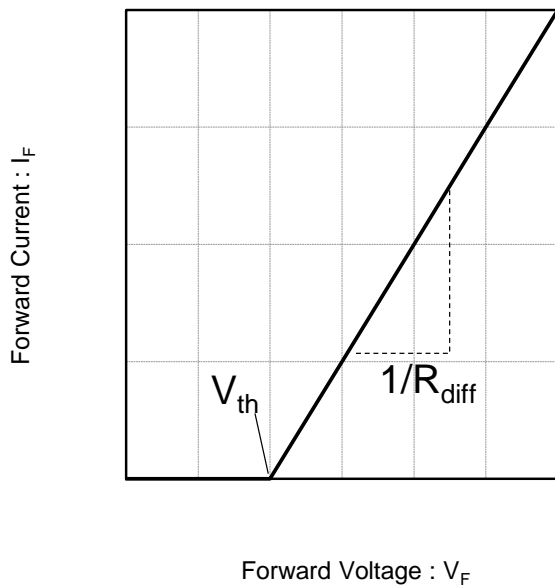


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

Fig.11 Equivalent forward current curve



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

$$V_{th} (T_{vj}) = a_0 + a_1 T_{vj}$$

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

Symbol	Typical Value	Unit
$a_0$	$9.4 \times 10^{-1}$	V
$a_1$	$-1.1 \times 10^{-3}$	V/°C
$b_0$	$2.0 \times 10^{-2}$	Ω
$b_1$	$5.1 \times 10^{-5}$	Ω/°C
$b_2$	$5.4 \times 10^{-7}$	Ω/°C <sup>2</sup>

$T_{vj}$  in °C;  $-55\text{ °C} < T_{vj} < 175\text{ °C}$ ;  $I_F < 40\text{ A}$

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