

$V_R$	1200V
$I_F$	20A
$Q_C$	65nC

### ●Features

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

### ●Applications

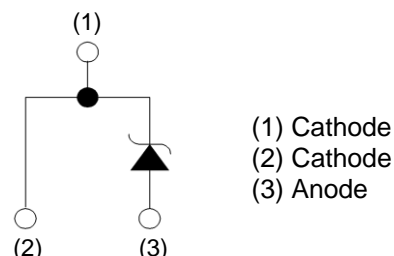
- On Board Charger
- DC/DC Converter
- Wireless Charger
- EV Charger

### ●Outline

TO-220AC



### ●Inner circuit



### ●Packaging specifications

Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	50
	Packing code	C
	Marking	SCS220KG

### ●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 ( $T_c = 133^\circ\text{C}$ )		$I_F$	20	A
Surge non-repetitive forward current	PW=10ms sinusoidal, $T_j=25^\circ\text{C}$	$I_{FSM}$	79	A
	PW=10ms sinusoidal, $T_j=150^\circ\text{C}$		59	A
	PW=10μs square, $T_j=25^\circ\text{C}$		310	A
Repetitive peak forward current		$I_{FRM}$	83 <sup>*1</sup>	A
$i^2t$ value	PW=10ms, $T_j=25^\circ\text{C}$	$\int i^2 dt$	31	A <sup>2</sup> s
	PW=10ms, $T_j=150^\circ\text{C}$		17	A <sup>2</sup> s
Total power dissipation		$P_D$	210 <sup>*2</sup>	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  $T_c=25^\circ\text{C}$

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

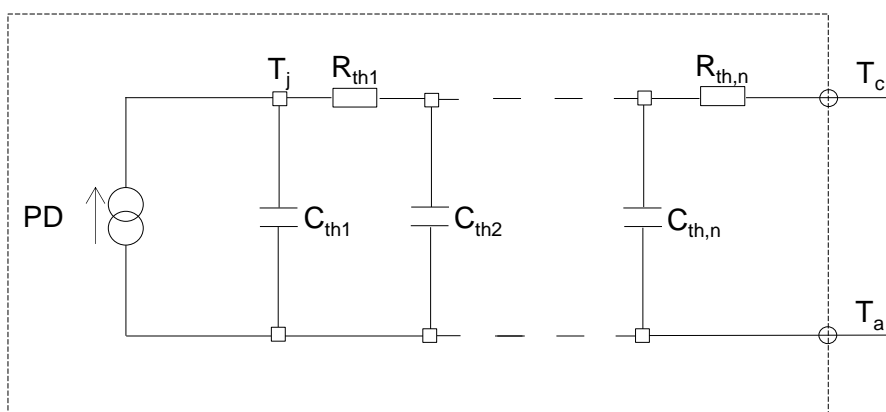
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	$V_{DC}$	$I_R = 0.4\text{mA}$	1200	-	-	V
Forward voltage	$V_F$	$I_F = 20\text{A}, T_j = 25^\circ\text{C}$	-	1.4	1.6	V
		$I_F = 20\text{A}, T_j = 150^\circ\text{C}$	-	1.8	-	V
		$I_F = 20\text{A}, T_j = 175^\circ\text{C}$	-	1.9	-	V
Reverse current	$I_R$	$V_R = 1200\text{V}, T_j = 25^\circ\text{C}$	-	20	400	$\mu\text{A}$
		$V_R = 1200\text{V}, T_j = 150^\circ\text{C}$	-	160	-	$\mu\text{A}$
		$V_R = 1200\text{V}, T_j = 175^\circ\text{C}$	-	260	-	$\mu\text{A}$
Total capacitance	C	$V_R = 1\text{V}, f = 1\text{MHz}$	-	1050	-	pF
		$V_R = 800\text{V}, f = 1\text{MHz}$	-	85	-	pF
Total capacitive charge	$Q_C$	$V_R = 800\text{V}, di/dt = 500\text{A}/\mu\text{s}$	-	65	-	nC
Switching time	$t_C$	$V_R = 800\text{V}, di/dt = 500\text{A}/\mu\text{s}$	-	18	-	ns

**●Thermal characteristics**

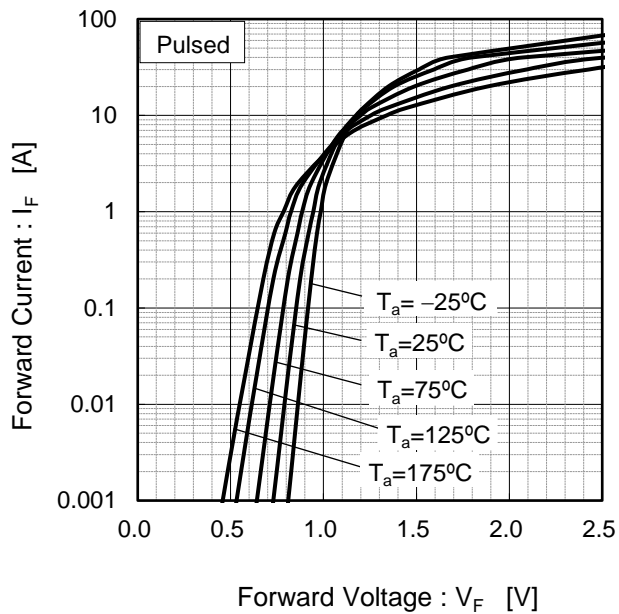
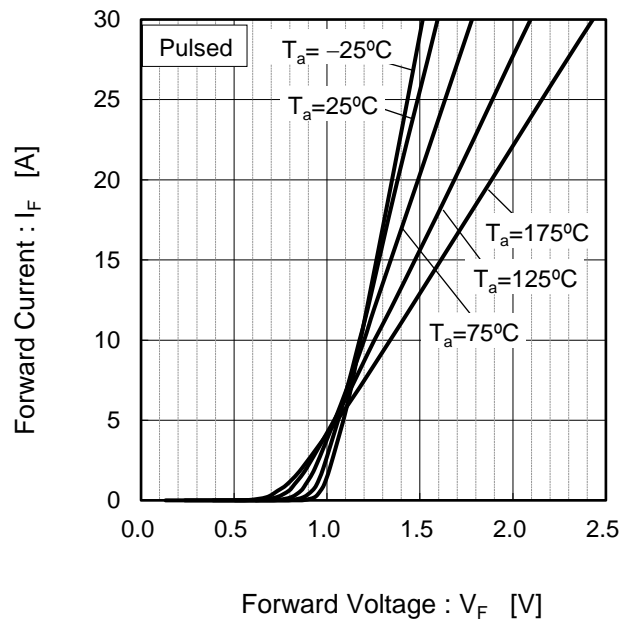
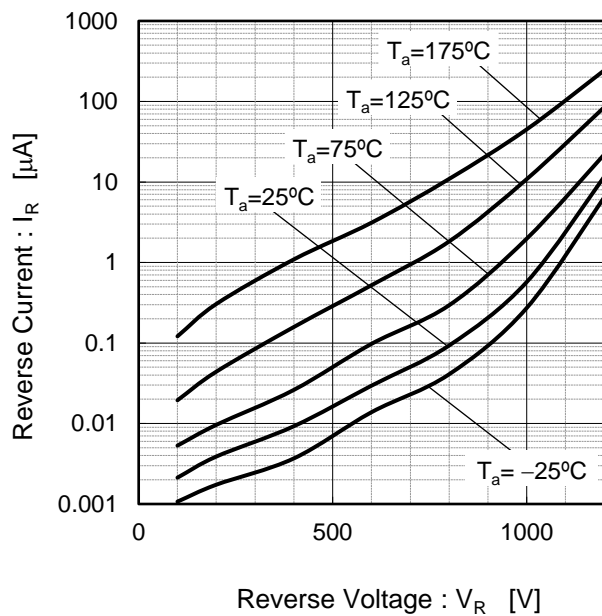
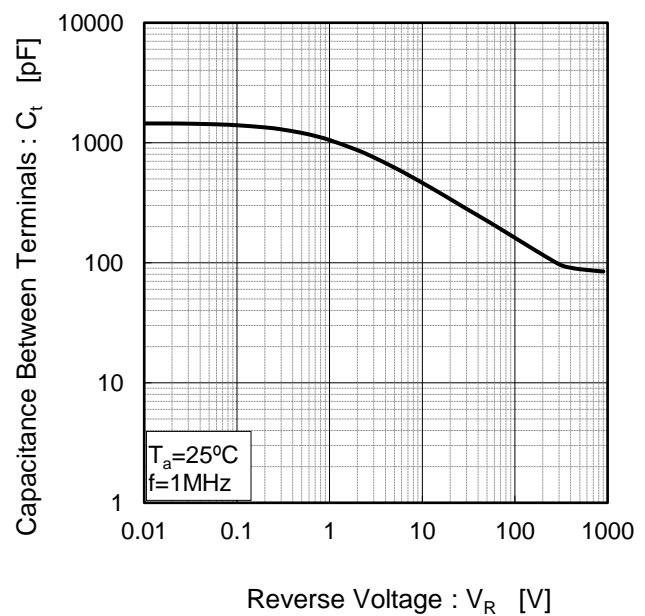
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	-	-	0.62	0.71	$^\circ\text{C}/\text{W}$

**●Typical Transient Thermal Characteristics**

Symbol	Value	Unit	Symbol	Value	Unit
$R_{th1}$	1.59E-01	K/W	$C_{th1}$	5.03E-03	Ws/K
$R_{th2}$	2.74E-01		$C_{th2}$	7.27E-03	
$R_{th3}$	1.87E-01		$C_{th3}$	1.39E-01	



# ●Electrical characteristic curves

Fig.1  $V_F - I_F$  CharacteristicsFig.2  $V_F - I_F$  CharacteristicsFig.3  $V_R - I_R$  CharacteristicsFig.4  $V_R - C_t$  Characteristics

## ●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

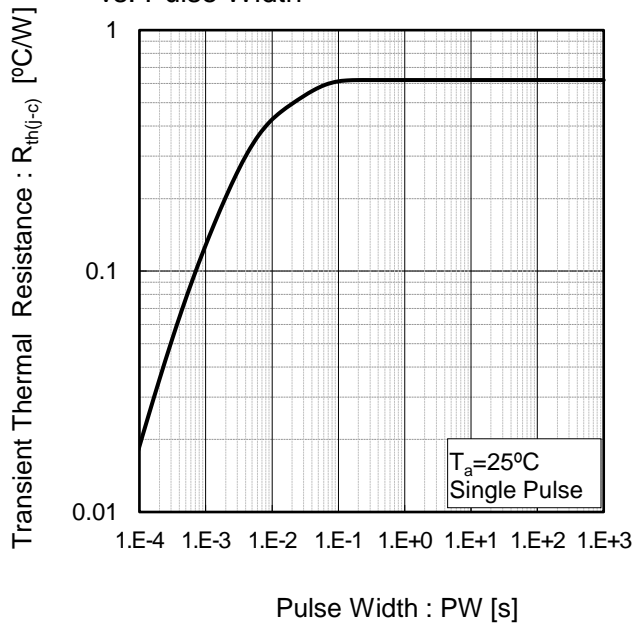


Fig.6 Power Dissipation

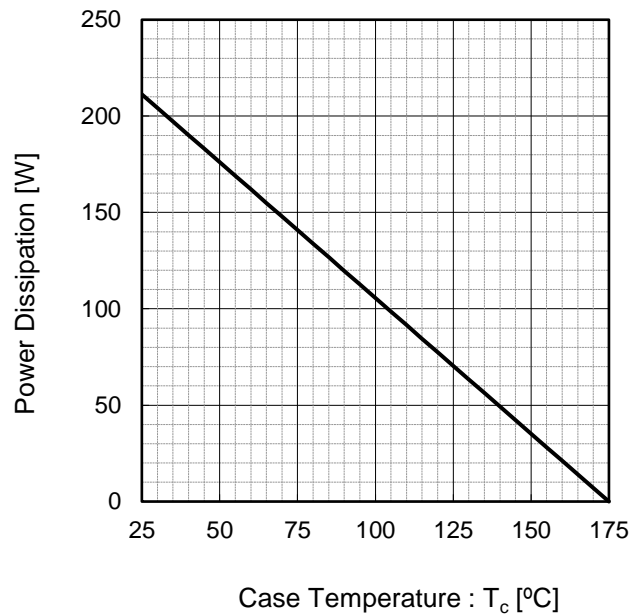
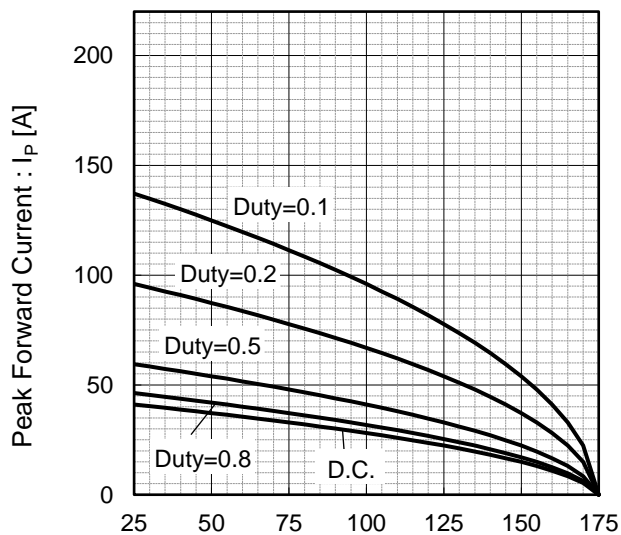


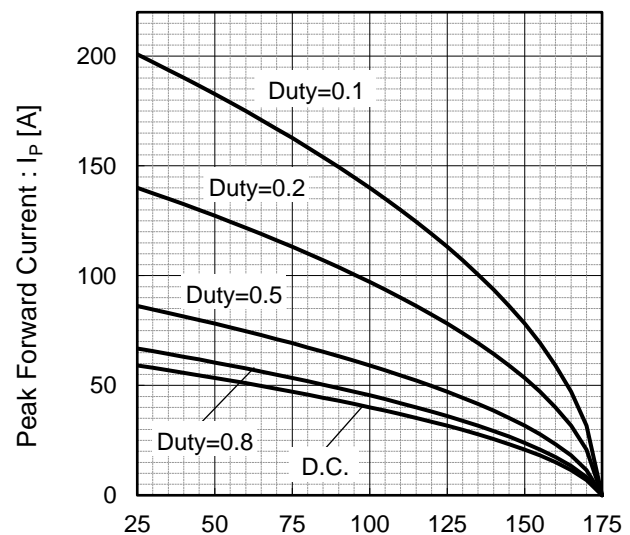
Fig.7\*3 Maximum peak forward current derating curve  $I_P - T_c$



Case Temperature :  $T_c$  [°C]

\*3 Based on max  $V_f$ , 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  $V_f$ , 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)

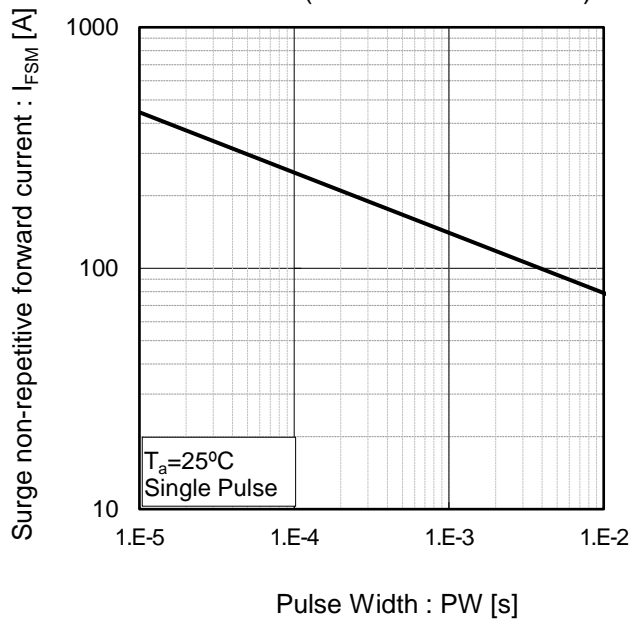
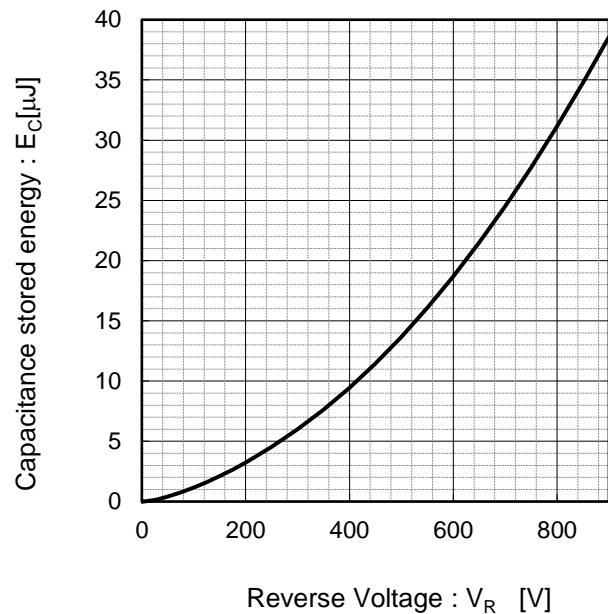


Fig.10 Typical capacitance store energy



## ●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
$a_0$	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 <sup>2</sup>

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

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