

|       |      |
|-------|------|
| $V_R$ | 650V |
| $I_F$ | 10A  |
| $Q_C$ | 15nC |

### ●Features

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

### ●Applications

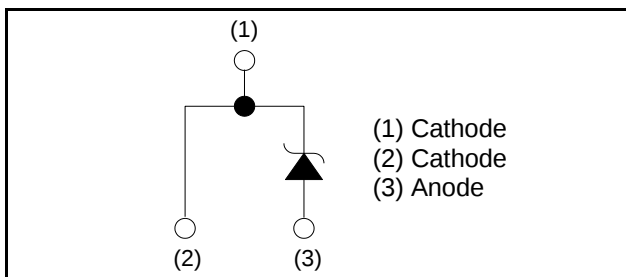
- PFC Boost Topology
- Secondary Side Rectification
- Data Center
- PV Power Conditioners

### ●Outline

TO-220ACG



### ●Inner circuit



### ●Packaging specifications

|      |                           |          |
|------|---------------------------|----------|
| Type | Packaging                 | Tube     |
|      | Reel size (mm)            | -        |
|      | Tape width (mm)           | -        |
|      | Basic ordering unit (pcs) | 50       |
|      | Packing code              | C17      |
|      | Marking                   | SCS210AG |

### ●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 ( $T_c = 135^\circ\text{C}$ ) |                                             | $I_F$         | 10          | A                    |
| Surge non-repetitive forward current                     | PW=10ms sinusoidal, $T_j=25^\circ\text{C}$  | $I_{FSM}$     | 38          | A                    |
|                                                          | PW=10ms sinusoidal, $T_j=150^\circ\text{C}$ |               | 30          | A                    |
|                                                          | PW=10μs square, $T_j=25^\circ\text{C}$      |               | 150         | A                    |
| Repetitive peak forward current                          |                                             | $I_{FRM}$     | 44 *1       | A                    |
| $i^2t$ value                                             | PW=10ms, $T_j=25^\circ\text{C}$             | $\int i^2 dt$ | 7.2         | $\text{A}^2\text{s}$ |
|                                                          | PW=10ms, $T_j=150^\circ\text{C}$            |               | 4.5         | $\text{A}^2\text{s}$ |
| Total power dissipation                                  |                                             | $P_D$         | 78 *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** ( $T_j = 25^\circ\text{C}$ )

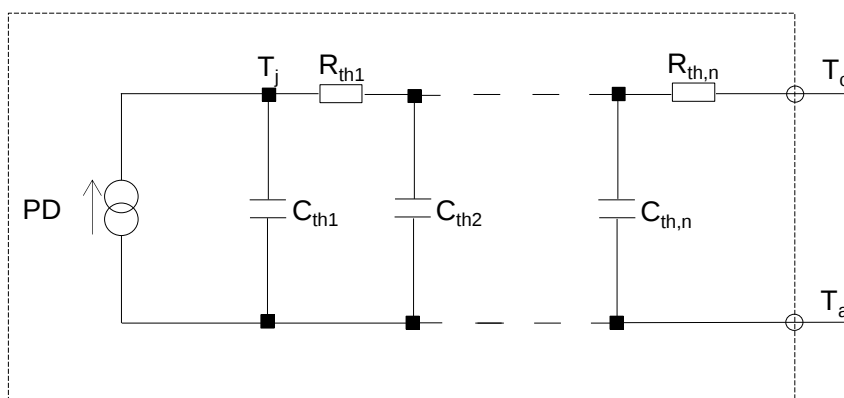
| Parameter               | Symbol   | Conditions                                           | Values |      |      | Unit          |
|-------------------------|----------|------------------------------------------------------|--------|------|------|---------------|
|                         |          |                                                      | Min.   | Typ. | Max. |               |
| DC blocking voltage     | $V_{DC}$ | $I_R = 2.0\text{mA}$                                 | 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  | $\mu\text{A}$ |
|                         |          | $V_R = 600\text{V}, T_j = 150^\circ\text{C}$         | -      | 30   | -    | $\mu\text{A}$ |
|                         |          | $V_R = 600\text{V}, T_j = 175^\circ\text{C}$         | -      | 70   | -    | $\mu\text{A}$ |
| 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**

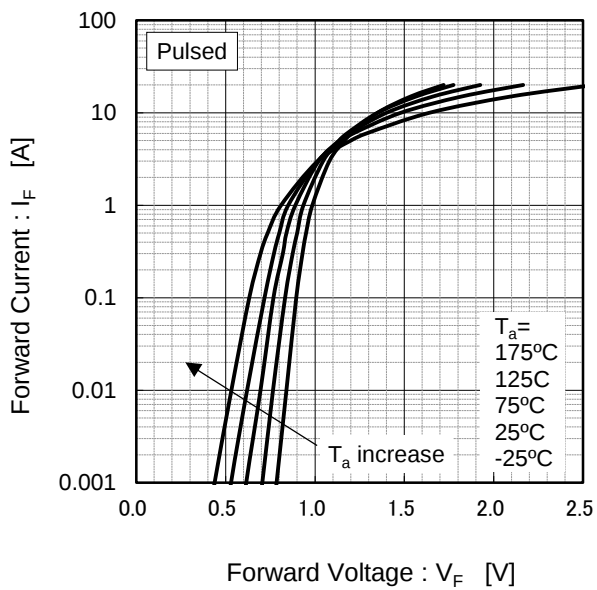
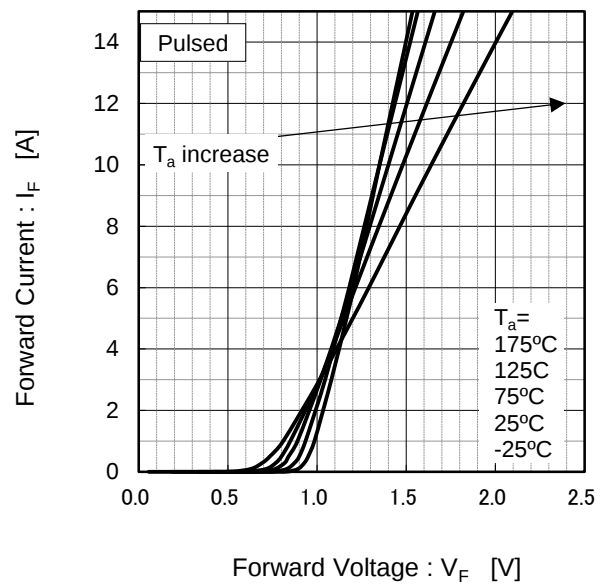
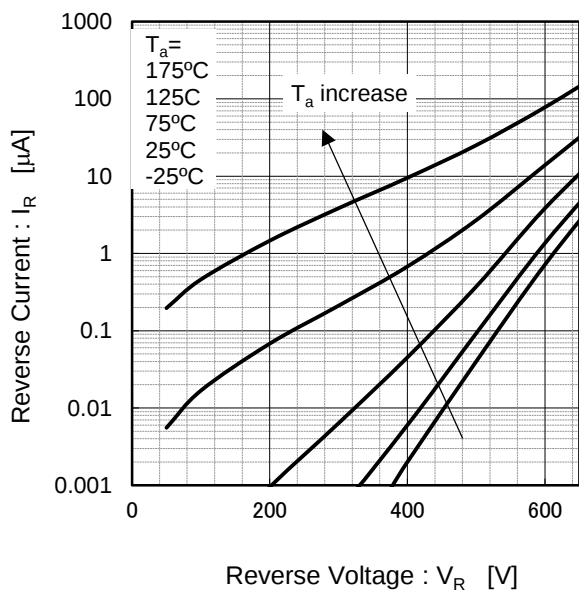
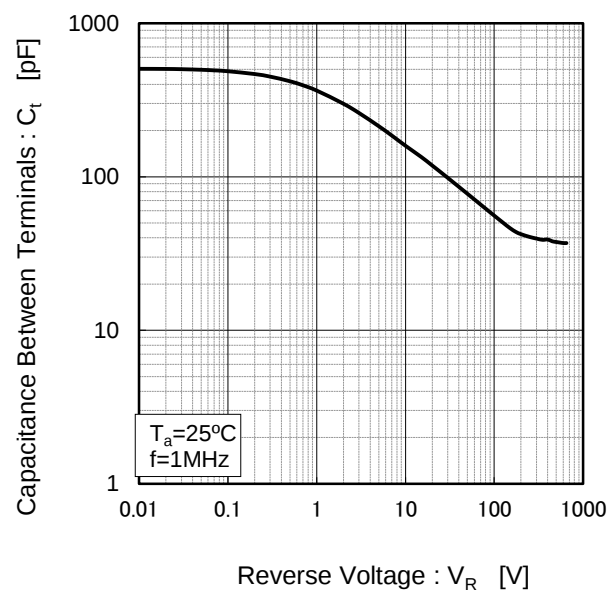
| Parameter          | Symbol        | Conditions | Values |      |      | Unit                      |
|--------------------|---------------|------------|--------|------|------|---------------------------|
|                    |               |            | Min.   | Typ. | Max. |                           |
| Thermal resistance | $R_{th(j-c)}$ | -          | -      | 1.6  | 1.9  | $^\circ\text{C}/\text{W}$ |

**●Typical Transient Thermal Characteristics**

| Symbol    | Value                 | Unit | Symbol    | Value                 | Unit |
|-----------|-----------------------|------|-----------|-----------------------|------|
| $R_{th1}$ | $5.71 \times 10^{-1}$ | K/W  | $C_{th1}$ | $1.65 \times 10^{-3}$ | Ws/K |
| $R_{th2}$ | $1.02 \times 10^0$    |      | $C_{th2}$ | $5.88 \times 10^{-3}$ |      |
| $R_{th3}$ | $5.32 \times 10^{-3}$ |      | $C_{th3}$ | $3.43 \times 10^{-1}$ |      |



# ●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

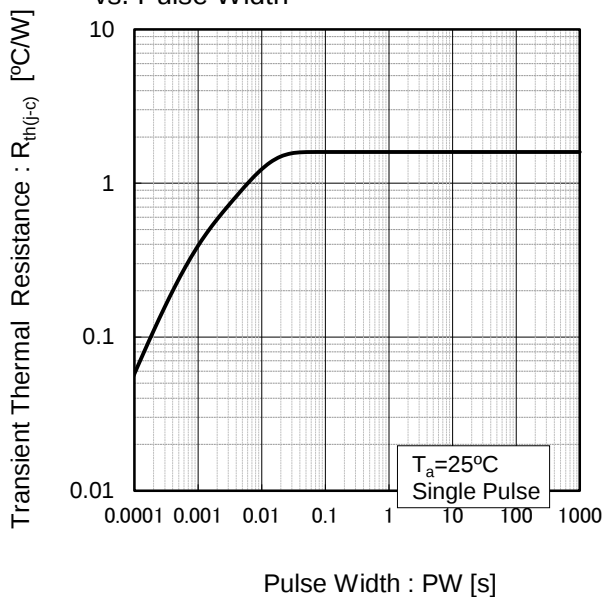


Fig.6 Power Dissipation

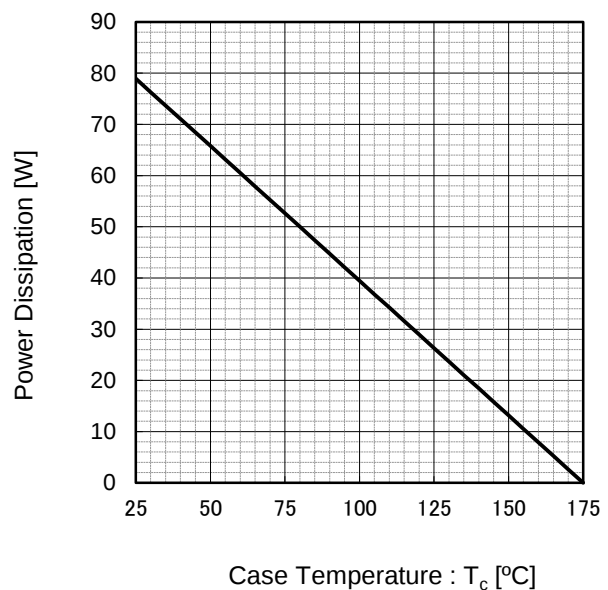
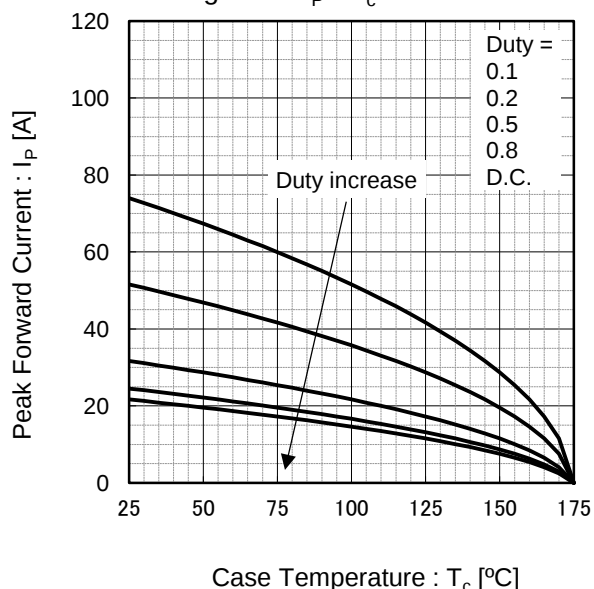
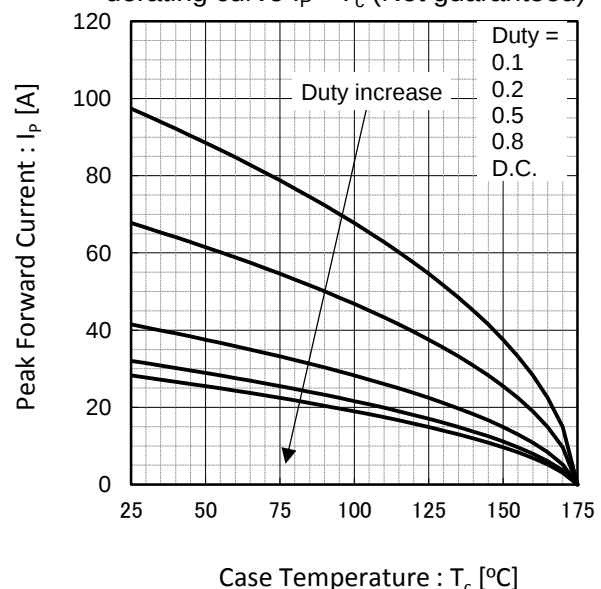


Fig.7\*3 Maximum peak forward current derating curve  $I_P - T_c$



\*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)



\*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)

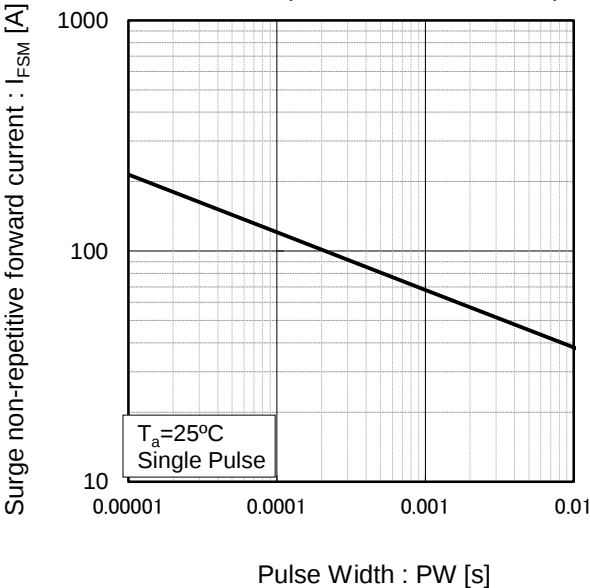
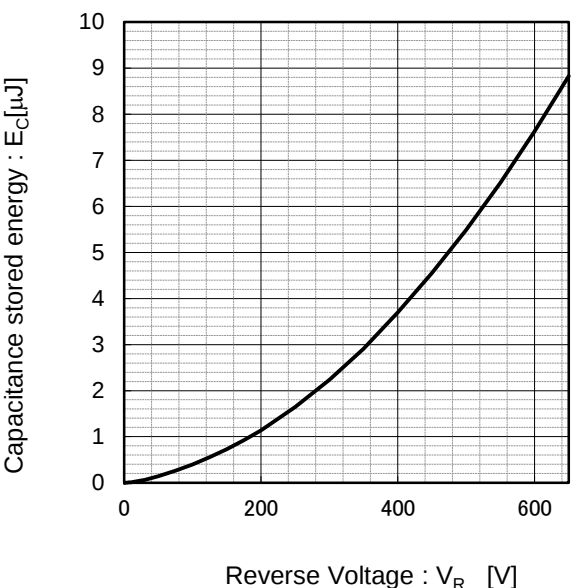
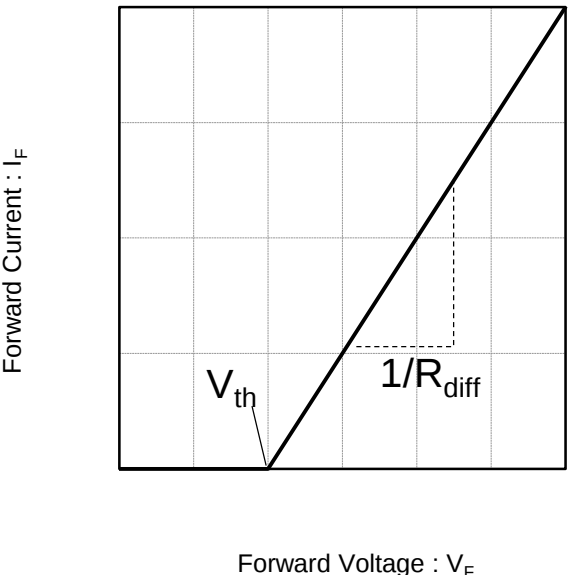


Fig.10 Typical capacitance store energy



●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              |
|--------|------------------------|-------------------|
| $a_0$  | $9.35 \times 10^{-1}$  | V                 |
| $a_1$  | $-1.12 \times 10^{-3}$ | V/°C              |
| $b_0$  | $3.98 \times 10^{-2}$  | Ω                 |
| $b_1$  | $1.02 \times 10^{-4}$  | Ω/°C              |
| $b_2$  | $1.08 \times 10^{-6}$  | Ω/°C <sup>2</sup> |

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

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