# SCS210AG

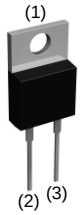
**SiC Schottky Barrier Diode**

Datasheet

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

## ●Outline

**TO-220ACG**



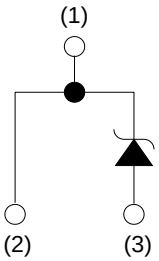

## ●Features

1) Shorter recovery time

2) Reduced temperature dependence

3) High-speed switching possible

## ●Inner circuit




(1) Cathode
(2) Cathode
(3) Anode

## ●Applications

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

## ●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°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°C) | | $I_F$ | 10 | A |
| Surge non-repetitive forward current | PW=10ms sinusoidal, $T_j$=25°C | $I_{FSM}$ | 38 | A |
| | PW=10ms sinusoidal, $T_j$=150°C | | 30 | A |
| | PW=10μs square, $T_j$=25°C | | 150 | A |
| Repetitive peak forward current | | $I_{FRM}$ | 44 *1 | A |
| $i^2t$ value | PW=10ms, $T_j$=25°C | $\int i^2dt$ | 7.2 | $A^2s$ |
| | PW=10ms, $T_j$=150°C | | 4.5 | $A^2s$ |
| Total power disspation | | $P_D$ | 78 *2 | W |
| Junction temperature | | $T_j$ | 175 | °C |
| Range of storage temperature | | $T_{stg}$ | −55 to +175 | °C |

*1 $T_c$=100°C, $T_j$=150°C, Duty cycle=10%  *2 $T_c$=25°C

## ●Electrical characteristics ($T_j$ = 25°C)

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

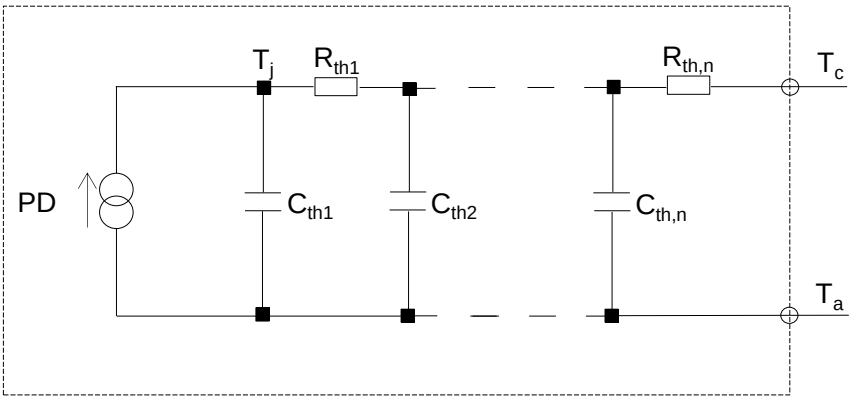
## ●Thermal characteristics

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

## ●Typical Transient Thermal Characteristics

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

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



## ●Electrical characteristic curves

Fig.1 $V_F$ - $I_F$ Characteristics

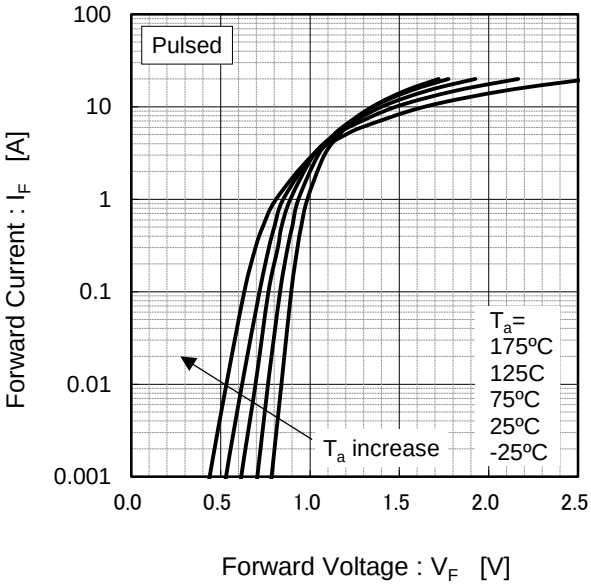



Fig.2 $V_F$ - $I_F$ Characteristics

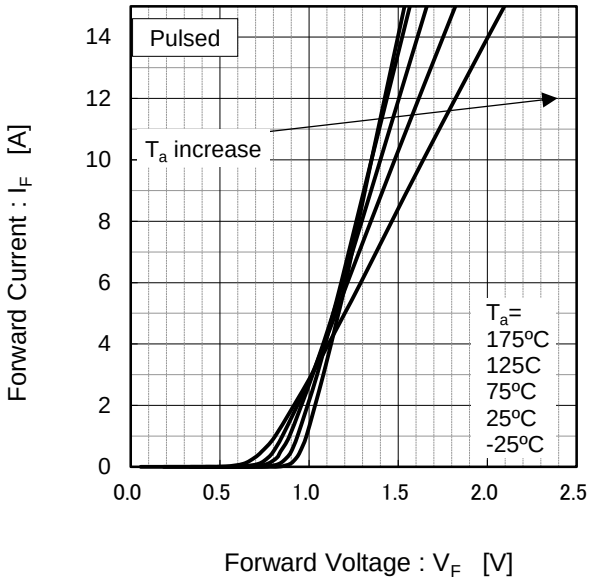



Fig.3 $V_R$ - $I_R$ Characteristics

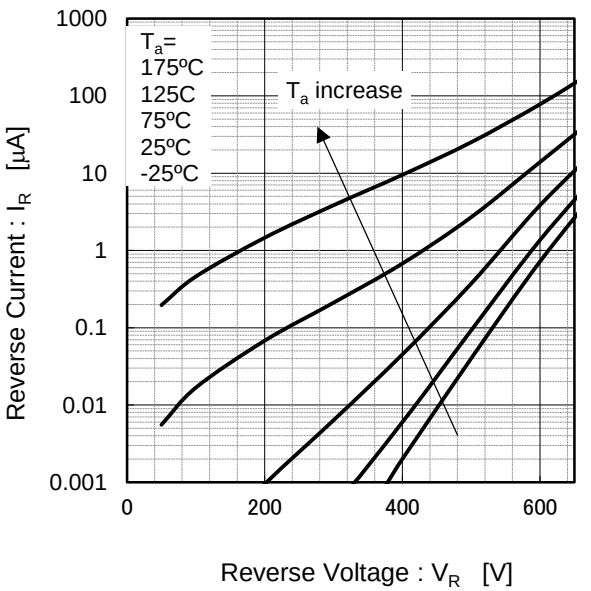
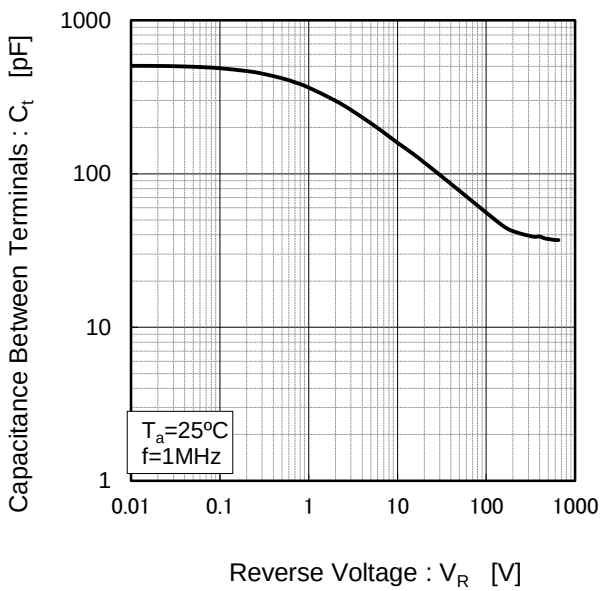



Fig.4 $V_R$-$C_t$ Characteristics



## ●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

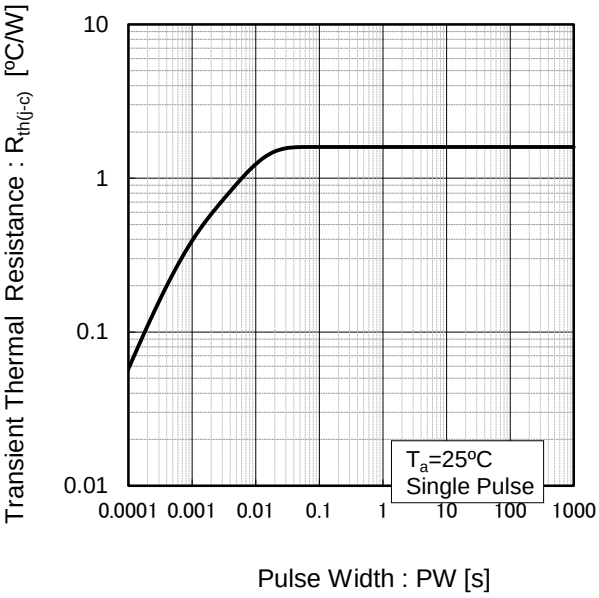



Fig.6 Power Dissipation

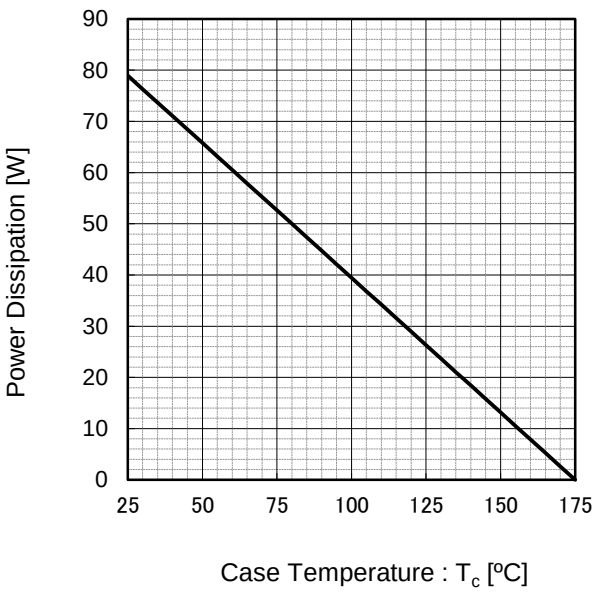
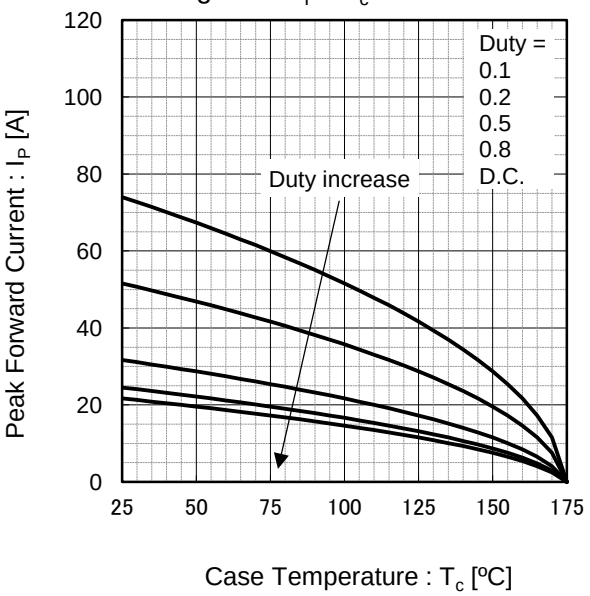
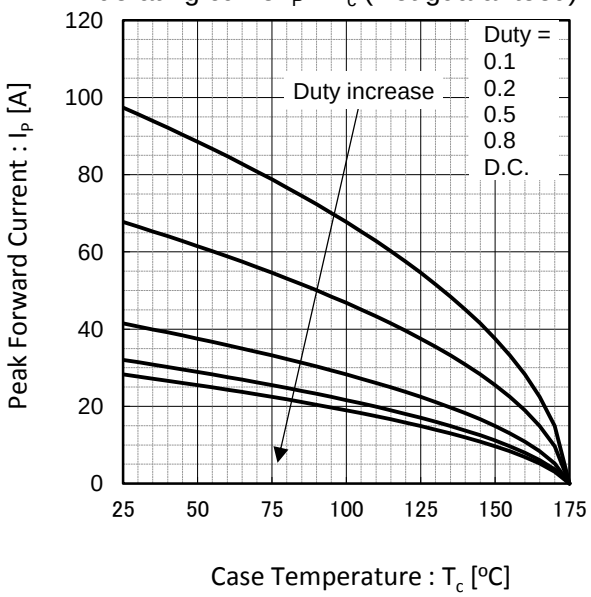



Fig.7*3 Maximum peak forward current derating curve $I_P$ - $T_c$




*3 Based on max 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)




*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)

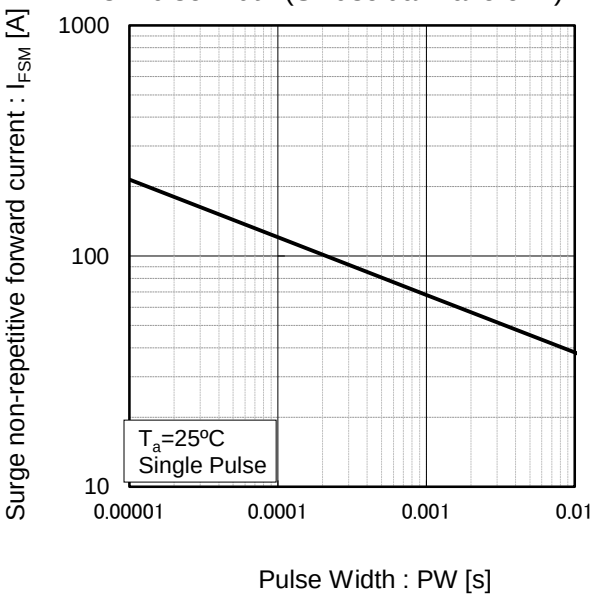
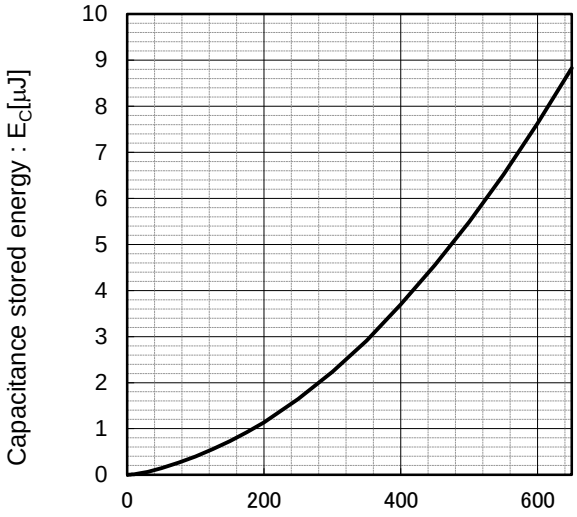
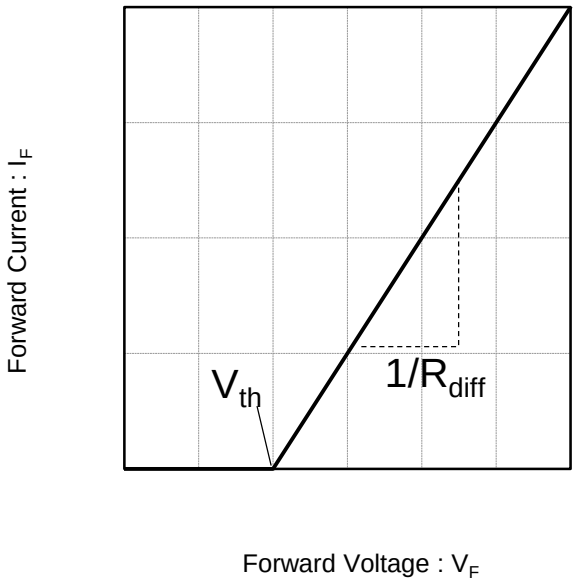



Fig.10 Typical capacitance store energy




## ●Symplified 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 |
| $b_2$ | $1.08 \times 10^{-6}$ | $Ω/°C^2$ |

$T_j$ in ºC; -55 ºC < $T_j$ < ºC ; $I_F$ < 20 A

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