

| | |
|-------|------|
| V_R | 650V |
| I_F | 8A |
| Q_C | 21nC |

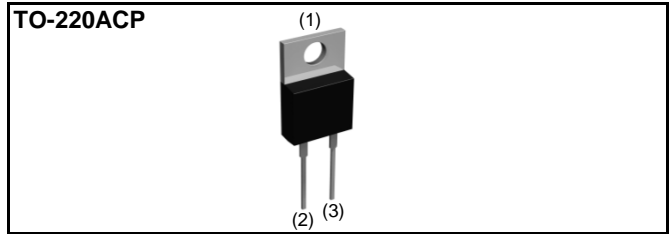
●Features

- 1) Shorter recovery time
- 2) Reduced temperature dependence
- 3) High-speed switching possible
- 4) High surge current capability

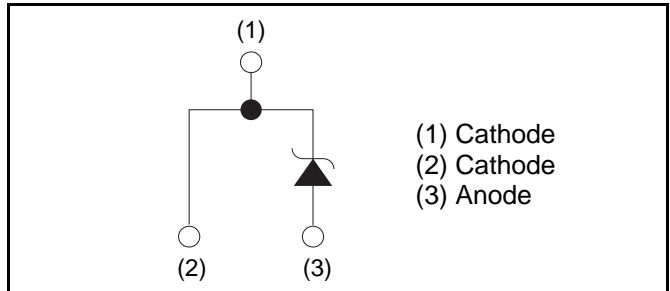
●Construction

Silicon carbide epitaxial planar type

●Outline



●Inner circuit



●Packaging specifications

| Type | Packaging | Tube |
|------|---------------------------|----------|
| | Reel size (mm) | - |
| | Tape width (mm) | - |
| | Basic ordering unit (pcs) | 50 |
| | Packing code | C9 |
| | Marking | SCS308AP |

●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 | 8 | A | |
| Surge non-repetitive forward current | I_{FSM} | PW=10ms sinusoidal, $T_j=25^\circ\text{C}$ | 67 | A |
| | | PW=10ms sinusoidal, $T_j=150^\circ\text{C}$ | 57 | A |
| | | PW=10μs square, $T_j=25^\circ\text{C}$ | 250 | A |
| Repetitive peak forward current | I_{FRM} | 36 *1 | A | |
| i^2t value | $\int i^2 dt$ | $1 \leq PW \leq 10\text{ms}$, $T_j=25^\circ\text{C}$ | 22 | A^2s |
| | | $1 \leq PW \leq 10\text{ms}$, $T_j=150^\circ\text{C}$ | 16 | A^2s |
| Total power dissipation | P_D | 57 *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} | $I_R = 50\mu\text{A}$ | 650 | - | - | V |
| Forward voltage | V_F | $I_F = 8\text{A}, T_j = 25^\circ\text{C}$ | - | 1.35 | 1.50 | V |
| | | $I_F = 8\text{A}, T_j = 150^\circ\text{C}$ | - | 1.44 | 1.71 | V |
| | | $I_F = 8\text{A}, T_j = 175^\circ\text{C}$ | - | 1.50 | - | V |
| Reverse current | I_R | $V_R = 650\text{V}, T_j = 25^\circ\text{C}$ | - | 0.024 | 40 | μA |
| | | $V_R = 650\text{V}, T_j = 150^\circ\text{C}$ | - | 1.6 | 160 | μA |
| | | $V_R = 650\text{V}, T_j = 175^\circ\text{C}$ | - | 4.8 | - | μA |
| Total capacitance | C | $V_R = 1\text{V}, f = 1\text{MHz}$ | - | 400 | - | pF |
| | | $V_R = 650\text{V}, f = 1\text{MHz}$ | - | 36 | - | pF |
| Total capacitive charge | Q_C | $V_R = 400\text{V}, di/dt = 350\text{A}/\mu\text{s}$ | - | 21 | - | nC |
| Switching time | t_C | $V_R = 400\text{V}, di/dt = 350\text{A}/\mu\text{s}$ | - | 15 | - | ns |
| Non-repetitive Avaranche Energy | E_{ava} | $L = 1\text{mH}$ | - | 110 | - | mJ |

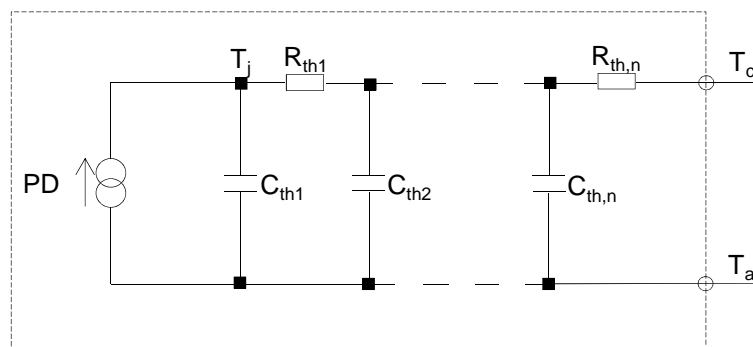
●Thermal characteristics

| Parameter | Symbol | Conditions | Values | | | Unit |
|--------------------|---------------|------------|--------|------|------|---------------------------|
| | | | Min. | Typ. | Max. | |
| Thermal resistance | $R_{th(j-c)}$ | - | - | 1.8 | 2.6 | $^\circ\text{C}/\text{W}$ |

●Typical Transient Thermal Characteristics

| Symbol | Value | Unit |
|-----------|----------|------|
| R_{th1} | 1.89E-02 | K/W |
| R_{th2} | 1.81E-01 | |
| R_{th3} | 1.55E+00 | |

| Symbol | Value | Unit |
|-----------|----------|------|
| C_{th1} | 1.95E-04 | Ws/K |
| C_{th2} | 8.01E-04 | |
| C_{th3} | 1.82E-03 | |



●Electrical characteristic curves

Fig.1 $V_F - I_F$ Characteristics

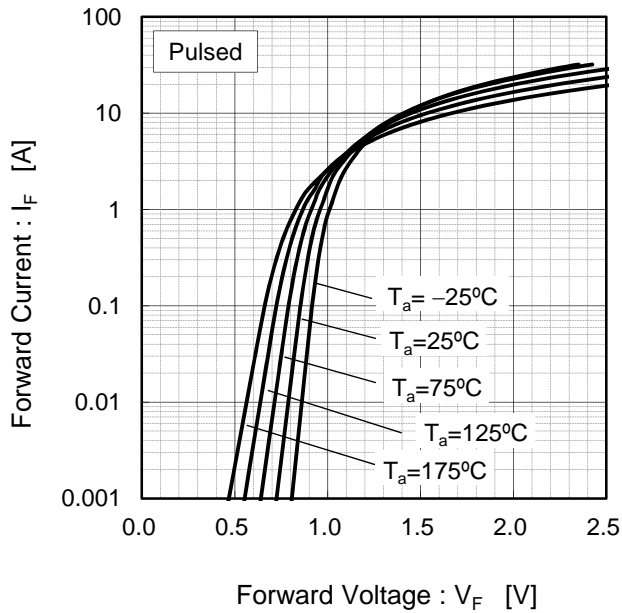


Fig.2 $V_F - I_F$ Characteristics

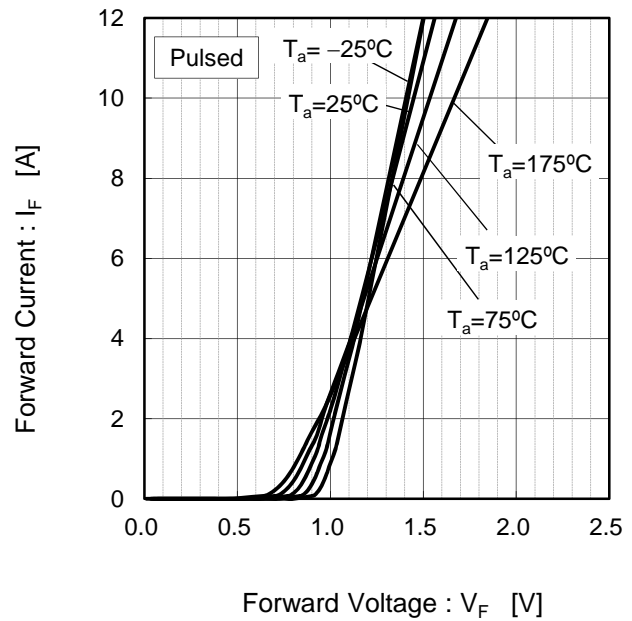


Fig.3 $V_R - I_R$ Characteristics

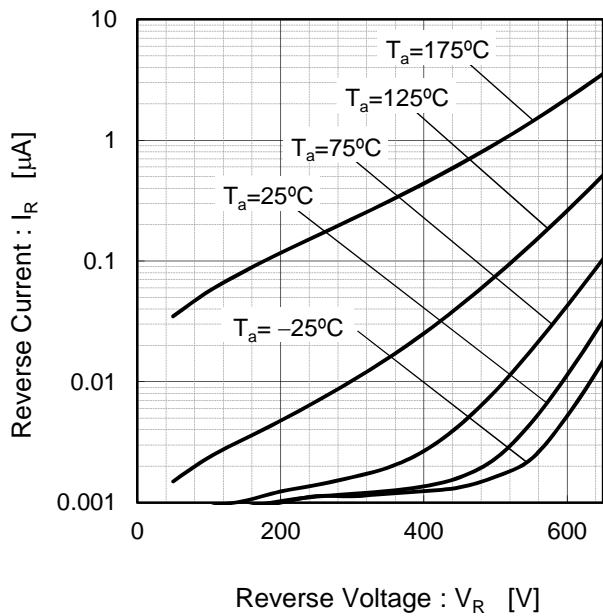
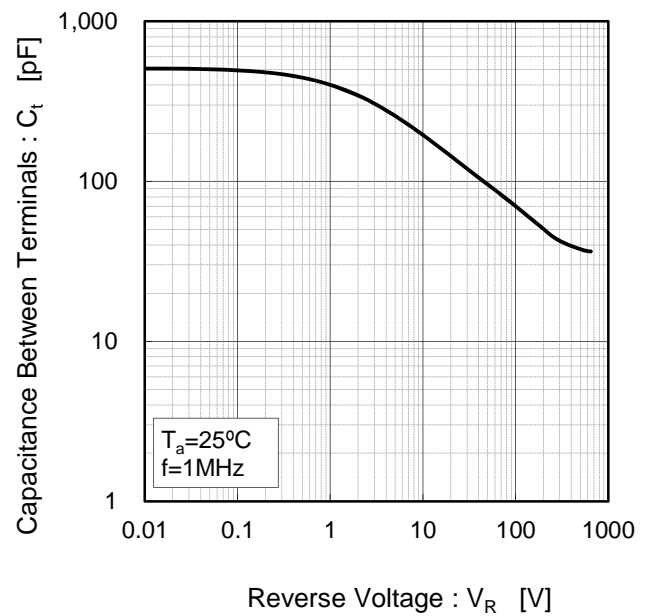


Fig.4 $V_R - C_t$ Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

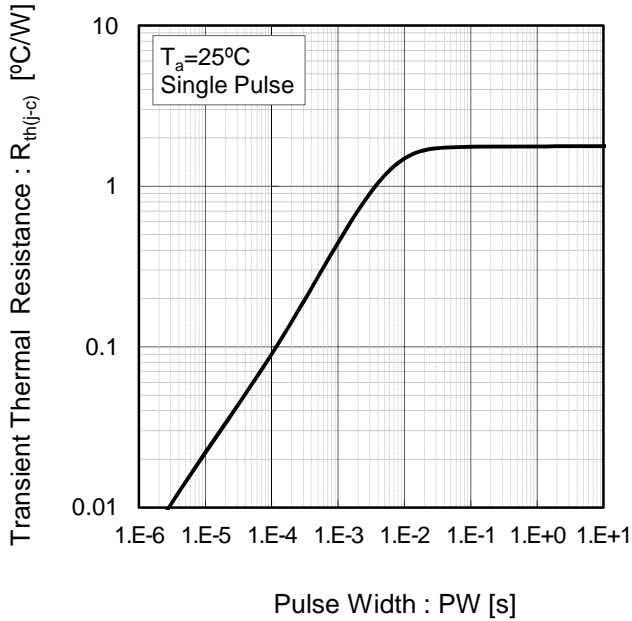


Fig.6 Power Dissipation

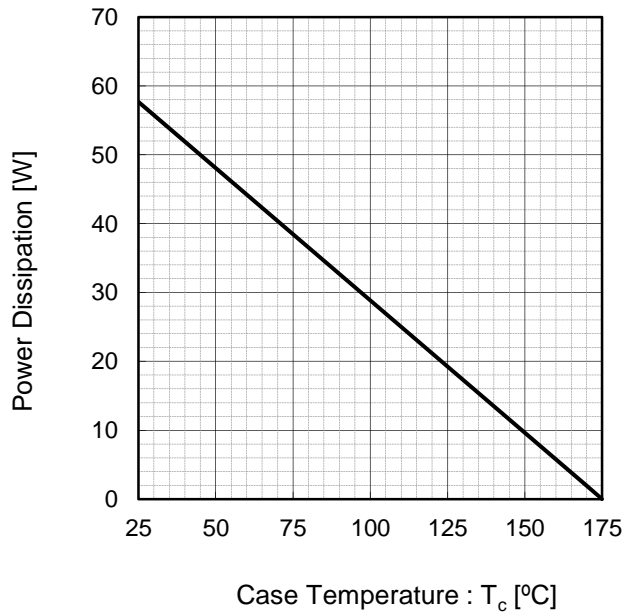
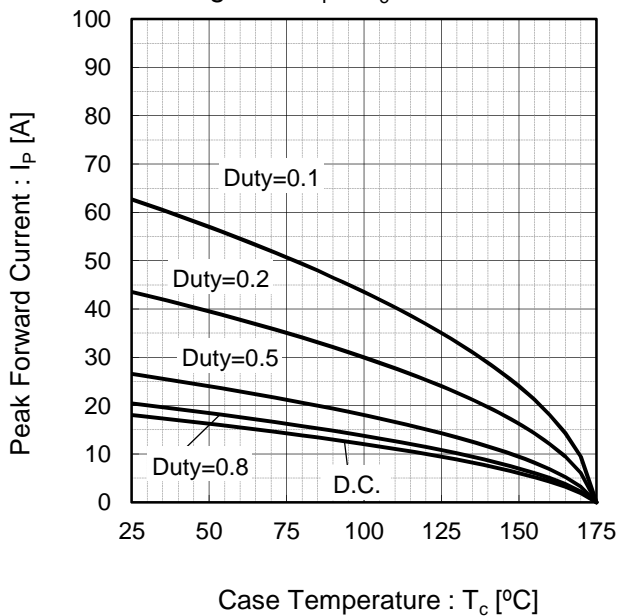
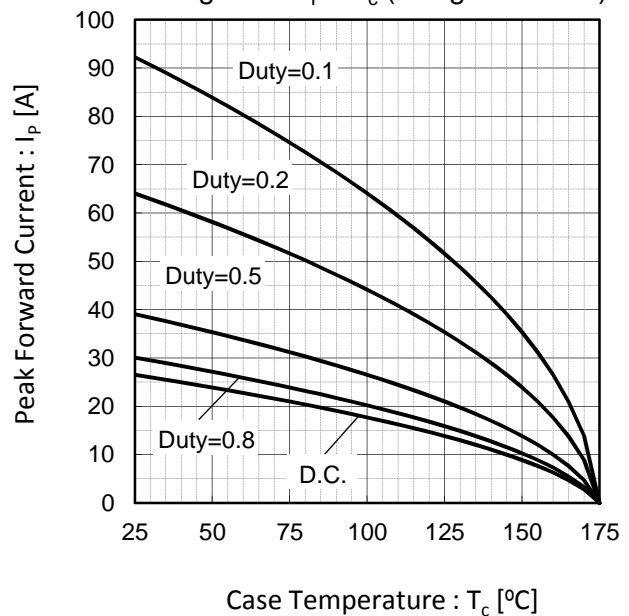


Fig.7*3 Maximum peak forward current derating curve $I_P - T_c$



*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)

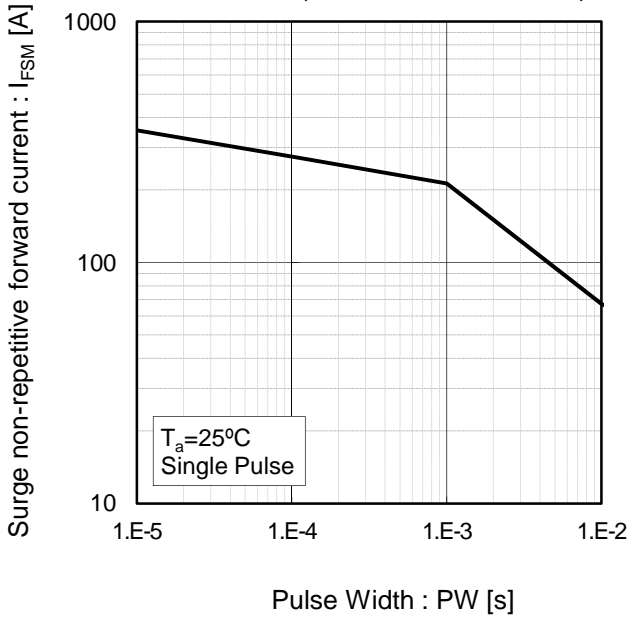
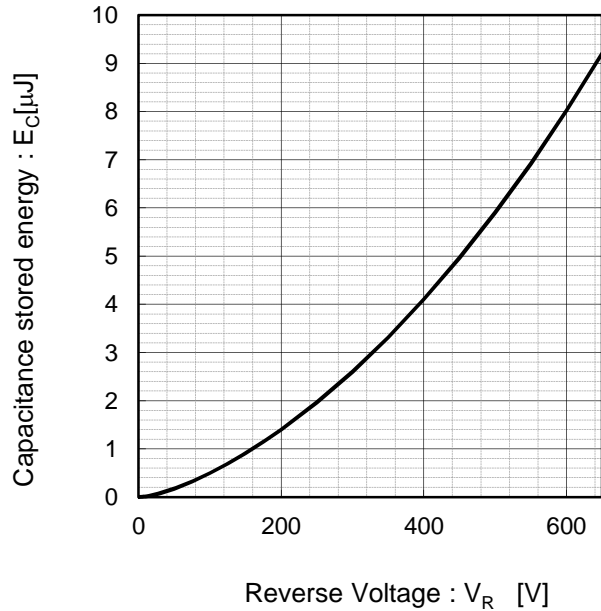
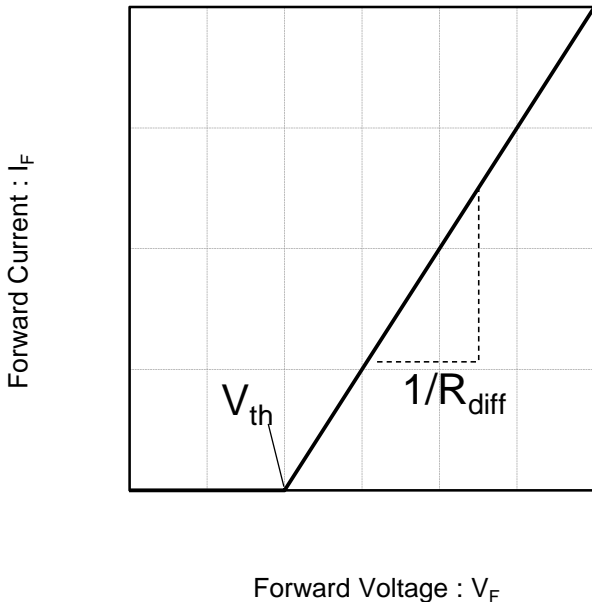


Fig.10 Typical capacitance store energy



●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 | 9.66E-01 | V |
| a ₁ | -1.10E-03 | V/°C |
| b ₀ | 4.40E-02 | Ω |
| b ₁ | 9.33E-05 | Ω/°C |
| b ₂ | 9.60E-07 | Ω/°C ² |

T_j in °C; -55 °C < T_j < 175 °C ; I_F < 16A

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