

# SCS308AM



## SiC Schottky Barrier Diode

Datasheet

|       |      |
|-------|------|
| $V_R$ | 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

### ●Applications

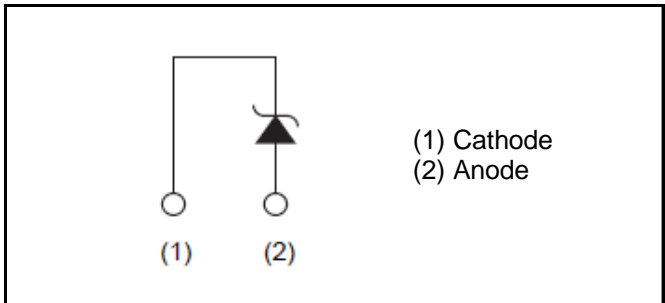
- PFC Boost Topology
- Secondary Side Rectification
- Data Center
- PV Power Conditioners

### ●Outline

TO-220FM



### ●Inner circuit



### ●Packaging specifications

|      |                           |          |
|------|---------------------------|----------|
| Type | Packaging                 | Tube     |
|      | Reel size (mm)            | -        |
|      | Tape width (mm)           | -        |
|      | Basic ordering unit (pcs) | 50       |
|      | Packing code              | C        |
|      | Marking                   | SCS308AM |

### ●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 ( $T_c=105^{\circ}\text{C}$ )*1 | $I_F$         | 8   | A                  |                      |
| Surge non-repetitive forward current                       | $I_{FSM}$     | PW=10ms sinusoidal, $T_{vj}=25^{\circ}\text{C}$             | 67                 | A                    |
|  |               | PW=10ms sinusoidal, $T_{vj}=150^{\circ}\text{C}$            | 57                 | A                    |
|  |               | PW=10μs square, $T_{vj}=25^{\circ}\text{C}$                 | 250                | A                    |
| Repetitive peak forward current                            | $I_{FRM}$     | 27*2  | A                  |                      |
| $i^2t$ value   | $\int i^2 dt$ | $1 \leq PW \leq 10\text{ms}$ , $T_{vj}=25^{\circ}\text{C}$  | 22                 | $\text{A}^2\text{s}$ |
|  |               | $1 \leq PW \leq 10\text{ms}$ , $T_{vj}=150^{\circ}\text{C}$ | 16                 | $\text{A}^2\text{s}$ |
| Total power dissipation                                    | $P_D$         | 33*3  | W                  |                      |
| Virtual Junction temperature                               | $T_{vj}$      | 175   | $^{\circ}\text{C}$ |                      |
| Range of storage temperature                               | $T_{stg}$     | -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)

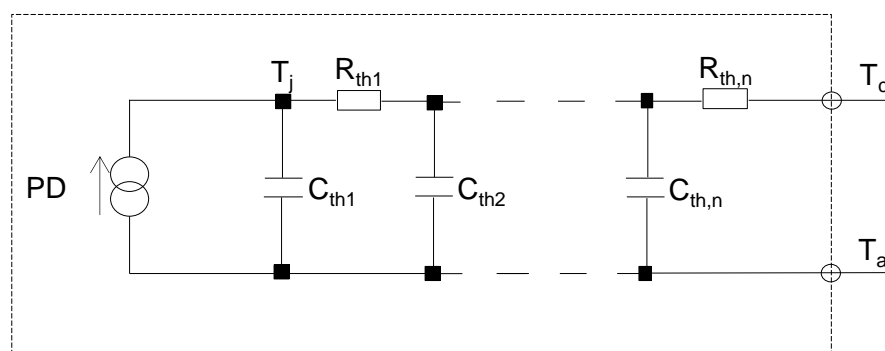
| Parameter                          | Symbol    | Conditions                                       | Values |       |      | Unit          |
|------------------------------------|-----------|--|--------|-------|------|---------------|
|                                    |           |  | Min.   | Typ.  | Max. |               |
| DC blocking voltage                | $V_{DC}$  | $I_R=40\mu\text{A}$                              | 650    | -     | -    | V             |
| Forward voltage                    | $V_F$     | $I_F=8\text{A}, T_{vj}=25^{\circ}\text{C}$       | -      | 1.35  | 1.50 | V             |
|                                    |           | $I_F=8\text{A}, T_{vj}=150^{\circ}\text{C}$      | -      | 1.44  | 1.71 | V             |
|                                    |           | $I_F=8\text{A}, T_{vj}=175^{\circ}\text{C}$      | -      | 1.50  | -    | V             |
| Reverse current                    | $I_R$     | $V_R=650\text{V}, T_{vj}=25^{\circ}\text{C}$     | -      | 0.024 | 40   | $\mu\text{A}$ |
|                                    |           | $V_R=650\text{V}, T_{vj}=150^{\circ}\text{C}$    | -      | 1.6   | 160  | $\mu\text{A}$ |
|                                    |           | $V_R=650\text{V}, T_{vj}=175^{\circ}\text{C}$    | -      | 4.8   | -    | $\mu\text{A}$ |
| 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<br>Avaranche Energy | $E_{ava}$ | $L=1\text{mH}$                                   | -      | 110   | -    | mJ            |

**●Thermal characteristics**

| Parameter          | Symbol     | Conditions | Values |      |      | Unit |
|--------------------|------------|------------|--------|------|------|------|
|                    |            |            | Min.   | Typ. | Max. |      |
| Thermal resistance | $R_{thJC}$ | -          | -      | 3.9  | 4.5  | K/W  |

**●Typical Transient Thermal Characteristics**

| Symbol    | Value    | Unit | Symbol    | Value    | Unit |
|-----------|----------|------|-----------|----------|------|
| $R_{th1}$ | 2.15E-01 | K/W  | $C_{th1}$ | 2.62E-04 | Ws/K |
| $R_{th2}$ | 1.40E+00 |      | $C_{th2}$ | 2.27E-03 |      |
| $R_{th3}$ | 2.28E+00 |      | $C_{th3}$ | 3.28E-01 |      |



●Electrical characteristic curves

Fig.1  $V_F - I_F$  Characteristics

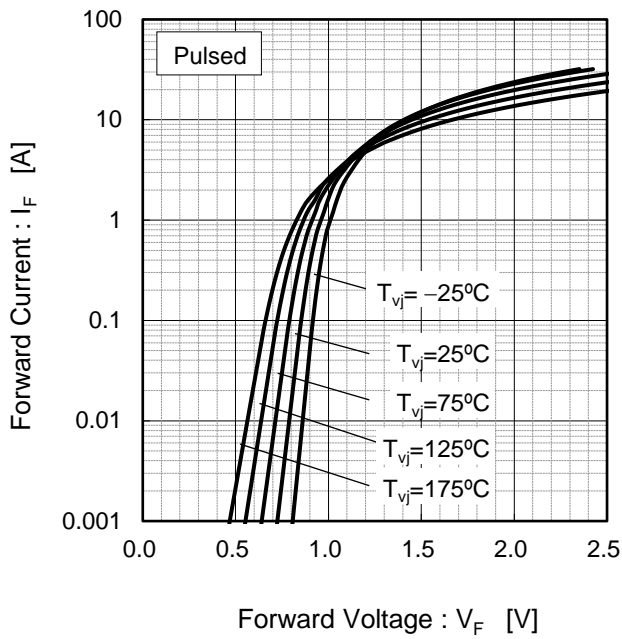


Fig.2  $V_F - I_F$  Characteristics

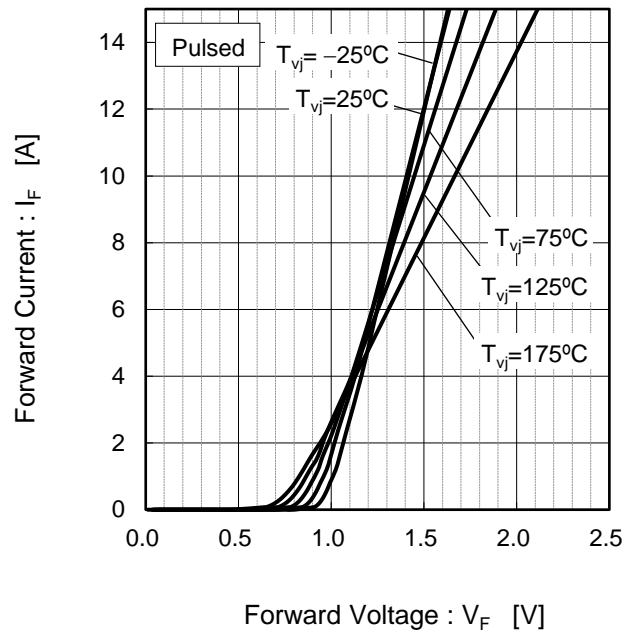


Fig.3  $V_R - I_R$  Characteristics

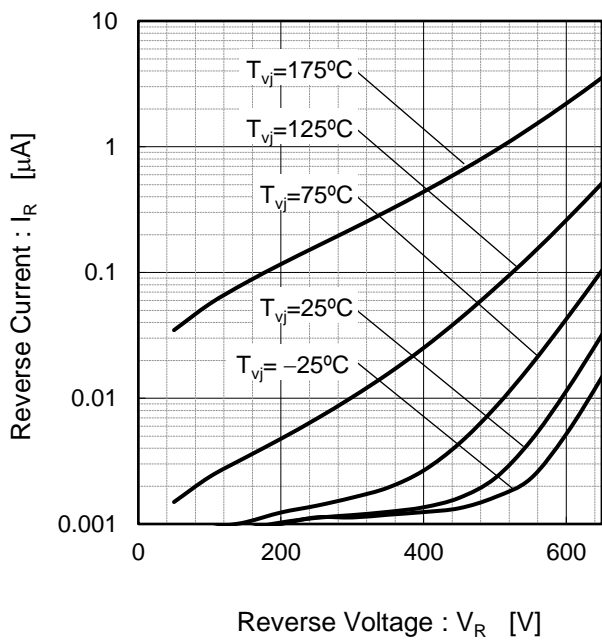
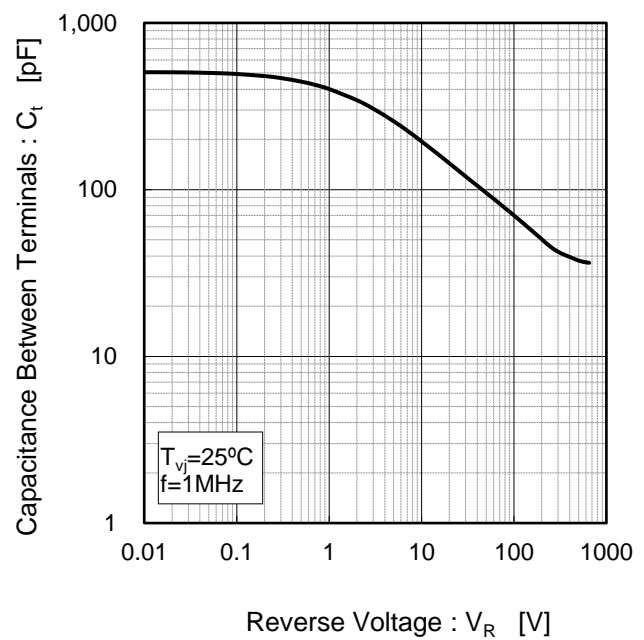


Fig.4  $V_R - C_t$  Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

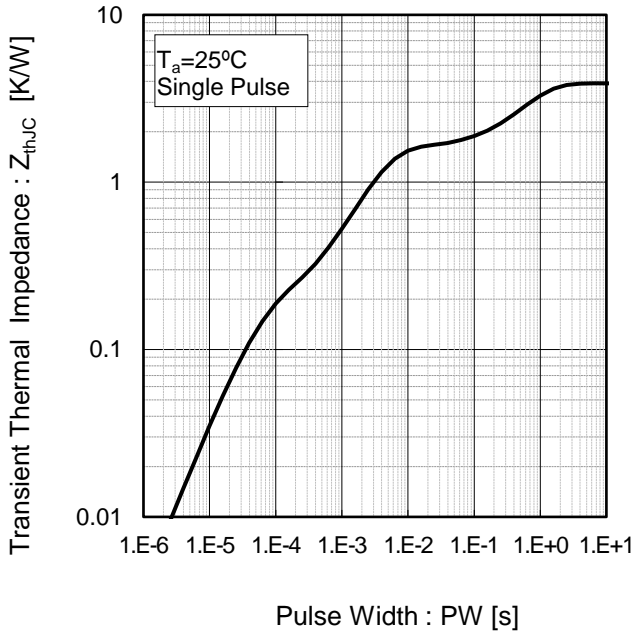


Fig.6 Power Dissipation

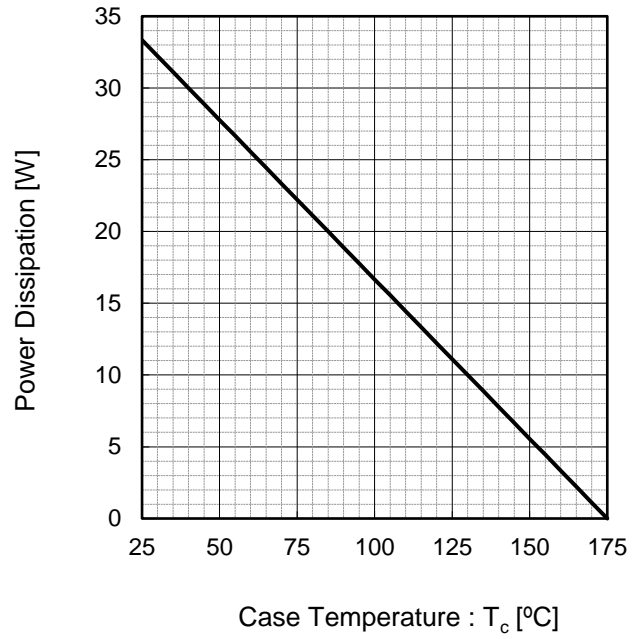
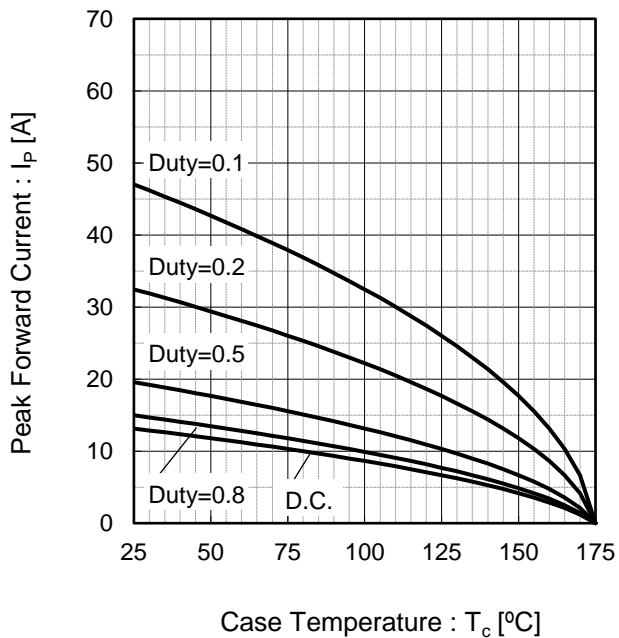
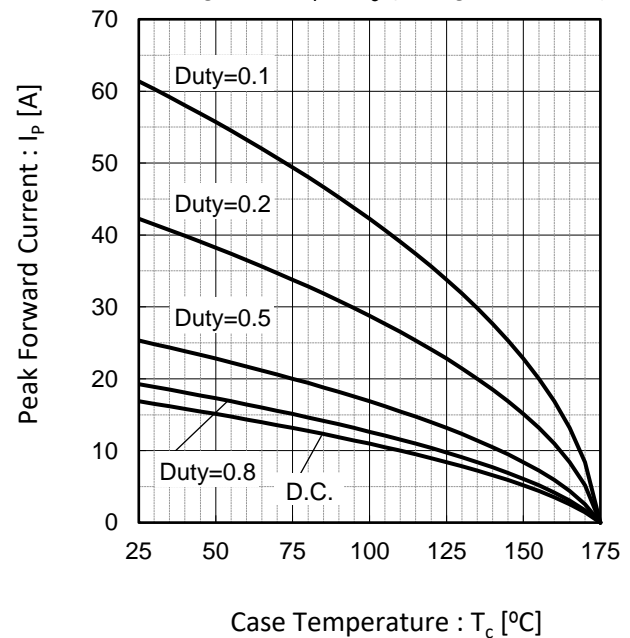


Fig.7\*4 Maximum peak forward current derating curve  $I_P - T_c$



\*4 Based on max Vf, max  $R_{thJC}$   
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)



\*5 Based on typ Vf, typ  $R_{thJC}$   
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)

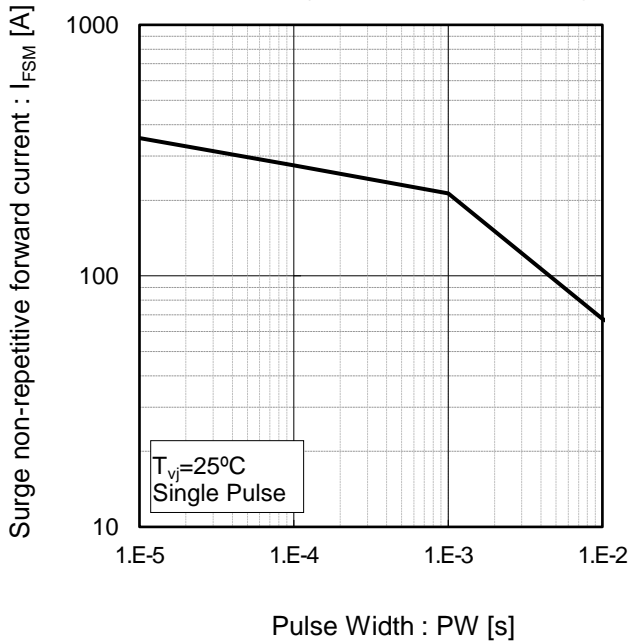
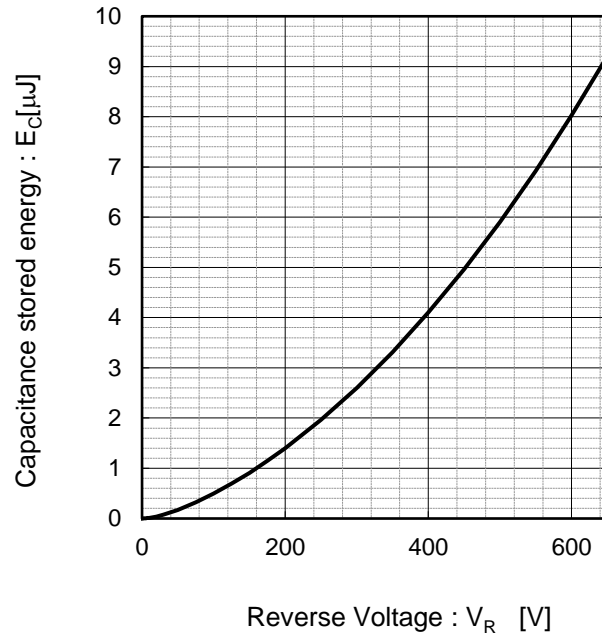
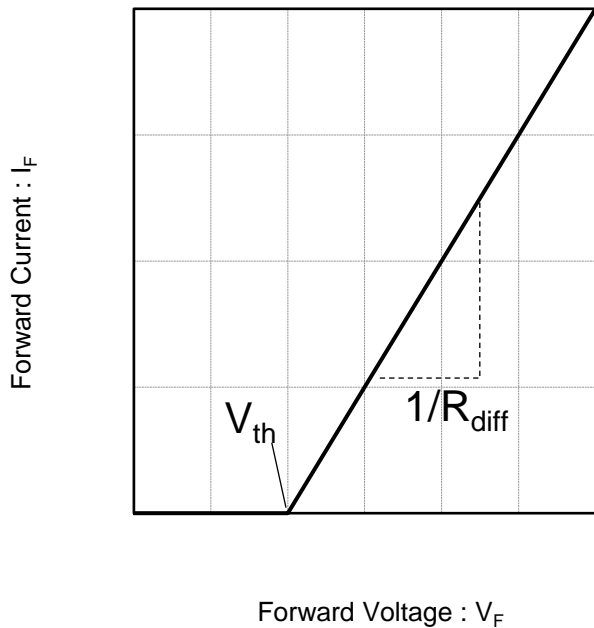


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

Fig.11 Equivalent forward current curve



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

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

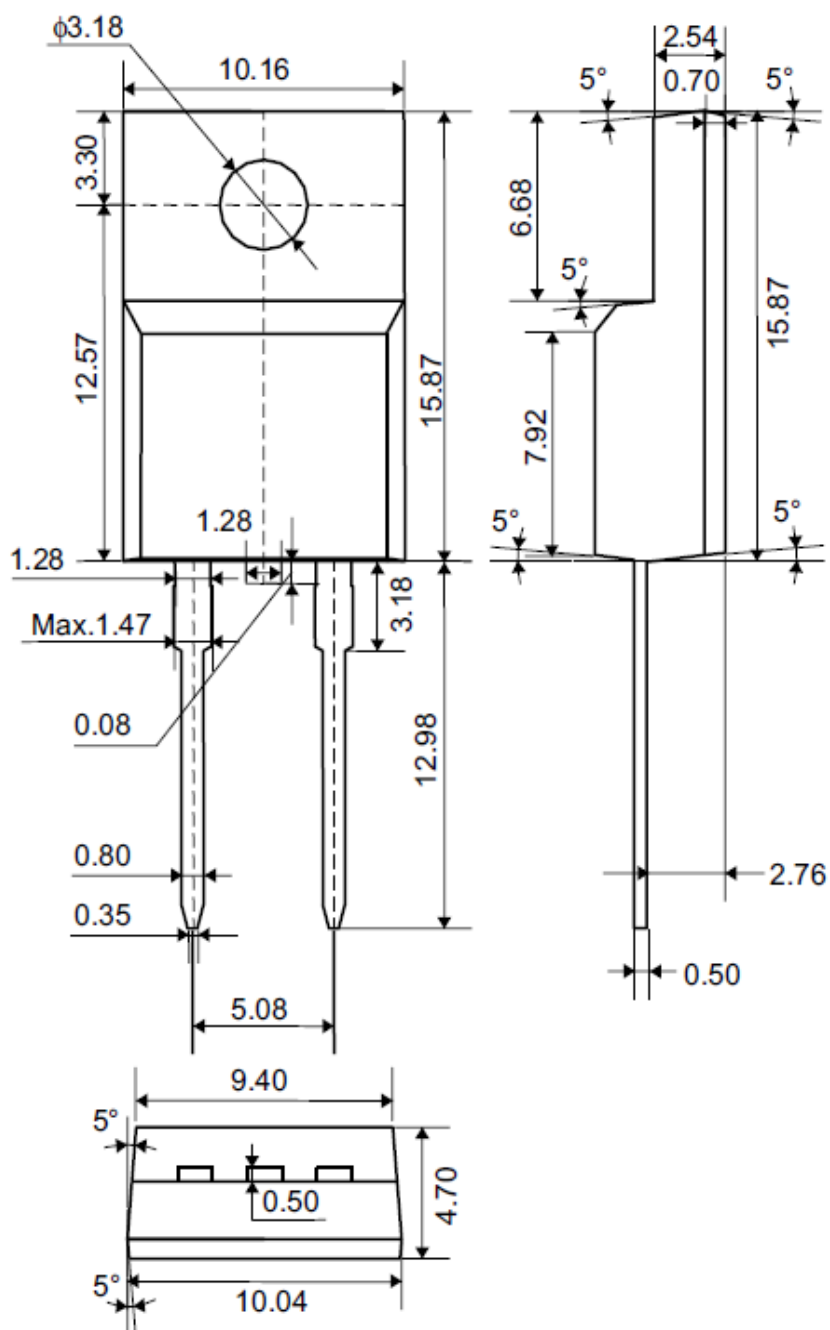
$$R_{diff} ( T_{vj} ) = b_0 + b_1 T_{vj} + b_2 T_{vj}^2$$

| Symbol | Typical Value | Unit                      |
|--------|---------------|---------------------------|
| $a_0$  | 9.66E-01      | V                         |
| $a_1$  | -1.10E-03     | V/°C                      |
| $b_0$  | 4.40E-02      | $\Omega$                  |
| $b_1$  | 9.33E-05      | $\Omega/^\circ\text{C}$   |
| $b_2$  | 9.60E-07      | $\Omega/^\circ\text{C}^2$ |

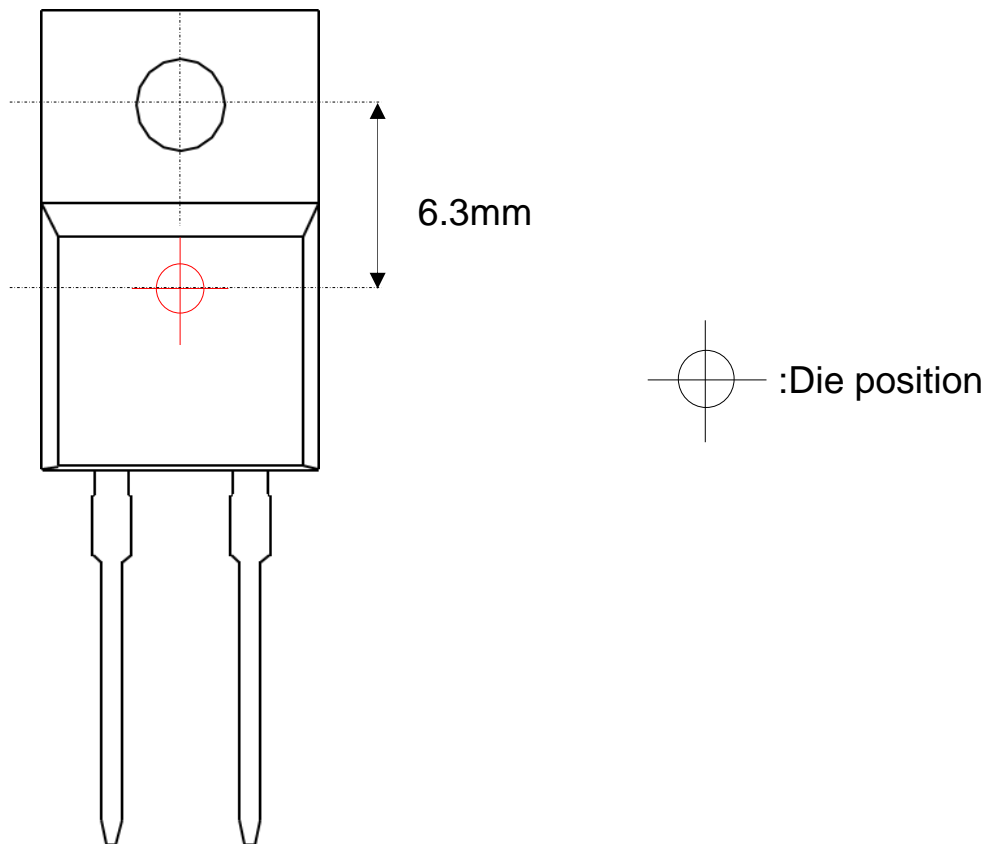
$T_{vj}$  in °C;  $-55\text{ }^\circ\text{C} < T_{vj} < 175\text{ }^\circ\text{C}$ ;  $I_F < 16\text{ A}$

## ●Dimensions (Unit : mm)

## TO-220FM (2pin)



## ● Die Bonding Layout



- Front view of the packaging.
- Dimensions are design values.
- If the heat sink is to be installed, it should be in contact with the die bonding point.

Unit: mm

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