



THE DATASHEET OF SCS310AMC



| | |
|-------|------|
| V_R | 650V |
| I_F | 10A |
| Q_C | 24nC |

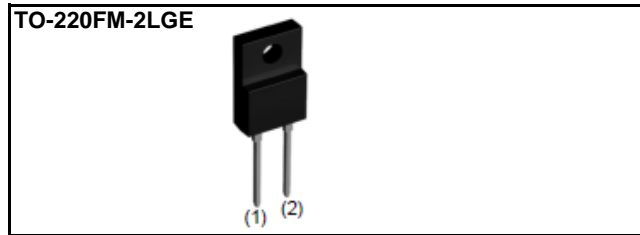
●Features

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

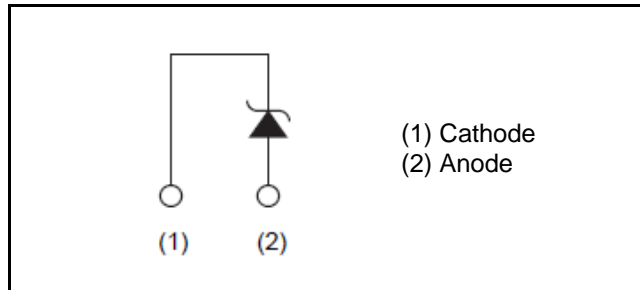
●Construction

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 | C7G |
| | Marking | SCS310AM |

●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 ($T_c=95^{\circ}\text{C}$) *1 | I_F | 10 | A | |
| Surge non-repetitive forward current | I_{FSM} | PW=10ms sinusoidal, $T_{vj}=25^{\circ}\text{C}$ | 82 | A |
| | | PW=10ms sinusoidal, $T_{vj}=150^{\circ}\text{C}$ | 69 | A |
| | | PW=10μs square, $T_{vj}=25^{\circ}\text{C}$ | 300 | A |
| Repetitive peak forward current | I_{FRM} | 30 *2 | A | |
| i^2t value | $\int i^2 dt$ | $1 \leq PW \leq 10\text{ms}$, $T_{vj}=25^{\circ}\text{C}$ | 33 | A^2s |
| | | $1 \leq PW \leq 10\text{ms}$, $T_{vj}=150^{\circ}\text{C}$ | 23 | A^2s |
| Total power dissipation | P_D | 34 *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)

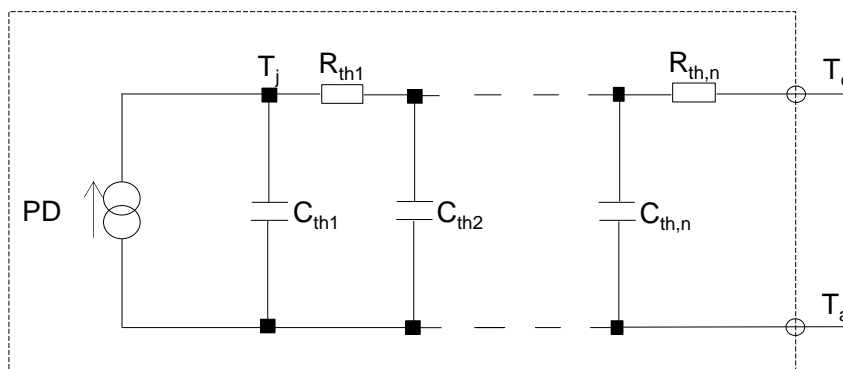
| Parameter | Symbol | Conditions | Values | | | Unit |
|---------------------------------|-----------|--|--------|------|------|---------------|
| | | | Min. | Typ. | Max. | |
| DC blocking voltage | V_{DC} | $I_R=50\mu\text{A}$ | 650 | - | - | V |
| Forward voltage | V_F | $I_F=10\text{A}, T_{vj}=25^{\circ}\text{C}$ | - | 1.35 | 1.50 | V |
| | | $I_F=10\text{A}, T_{vj}=150^{\circ}\text{C}$ | - | 1.44 | 1.71 | V |
| | | $I_F=10\text{A}, T_{vj}=175^{\circ}\text{C}$ | - | 1.50 | - | V |
| Reverse current | I_R | $V_R=650\text{V}, T_{vj}=25^{\circ}\text{C}$ | - | 0.03 | 50 | μA |
| | | $V_R=650\text{V}, T_{vj}=150^{\circ}\text{C}$ | - | 2 | 200 | μA |
| | | $V_R=650\text{V}, T_{vj}=175^{\circ}\text{C}$ | - | 6 | - | μA |
| Total capacitance | C | $V_R=1\text{V}, f=1\text{MHz}$ | - | 500 | - | pF |
| | | $V_R=650\text{V}, f=1\text{MHz}$ | - | 46 | - | pF |
| Total capacitive charge | Q_C | $V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$ | - | 24 | - | 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} | $L=1\text{mH}$ | - | 130 | - | mJ |

●Thermal characteristics

| Parameter | Symbol | Conditions | Values | | | Unit |
|--------------------|------------|------------|--------|------|------|------|
| | | | Min. | Typ. | Max. | |
| Thermal resistance | R_{thJC} | - | - | 3.6 | 4.3 | K/W |

●Typical Transient Thermal Characteristics

| Symbol | Value | Unit | Symbol | Value | Unit |
|-----------|----------|------|-----------|----------|------|
| R_{th1} | 1.94E-01 | K/W | C_{th1} | 4.93E-04 | Ws/K |
| R_{th2} | 1.19E+00 | | C_{th2} | 2.71E-03 | |
| R_{th3} | 2.24E+00 | | C_{th3} | 3.83E-01 | |



● Electrical characteristic curves

Fig.1 $V_F - I_F$ Characteristics

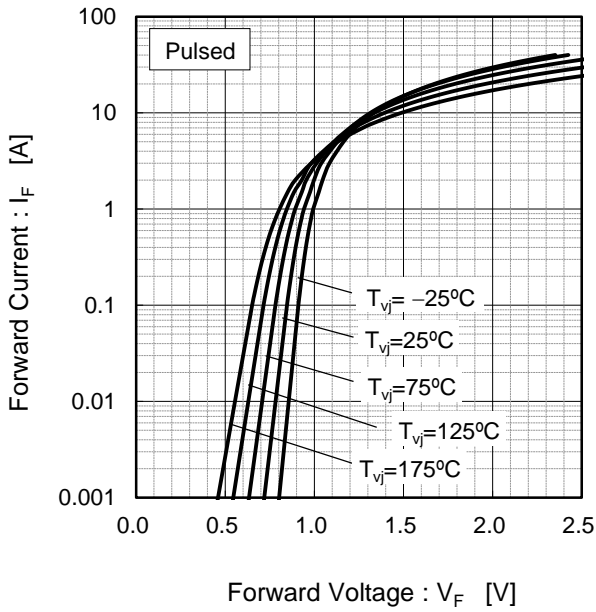


Fig.2 $V_F - I_F$ Characteristics

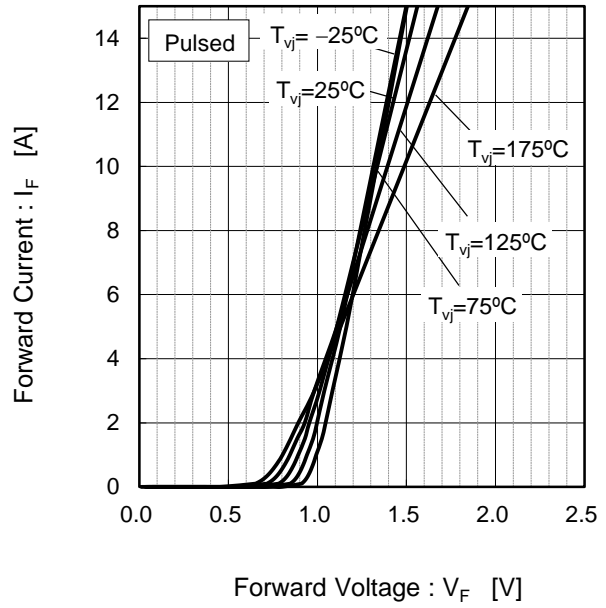


Fig.3 $V_R - I_R$ Characteristics

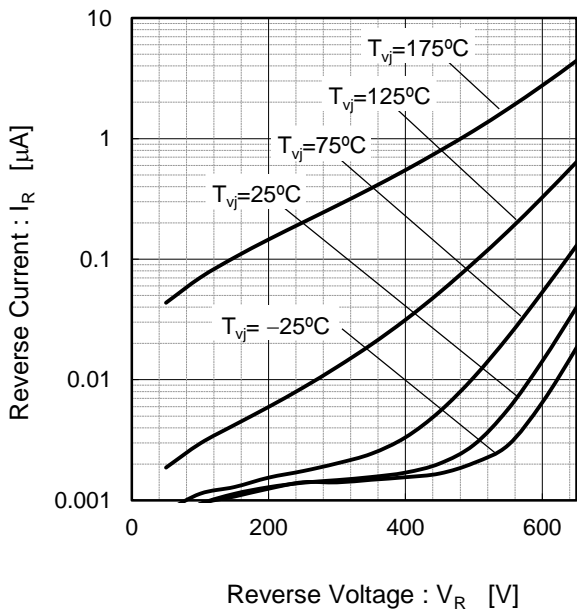
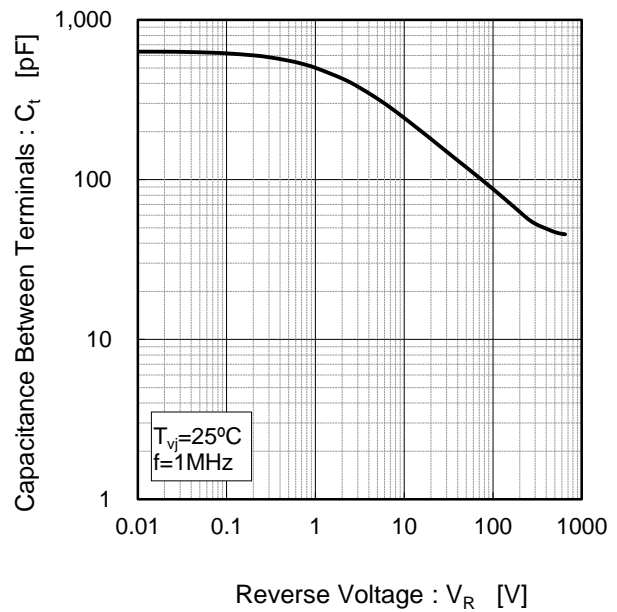


Fig.4 $V_R - C_t$ Characteristics



● Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

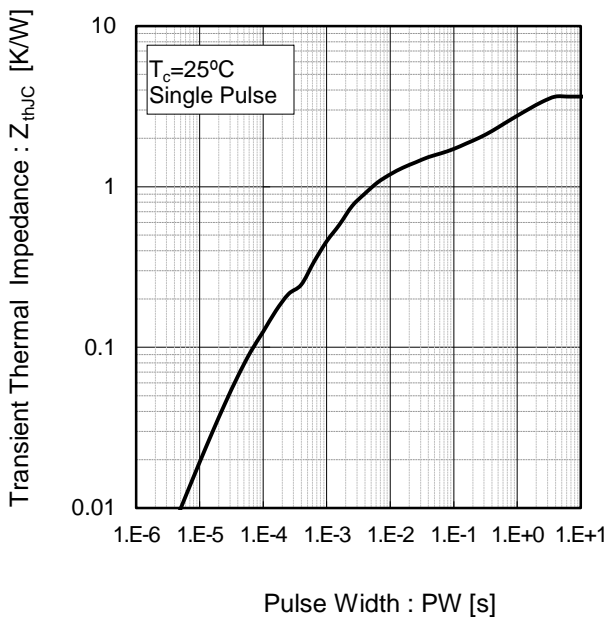


Fig.6 Power Dissipation

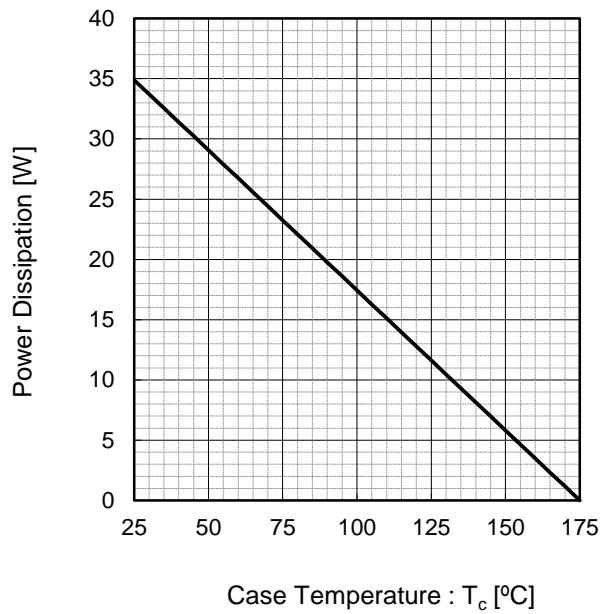
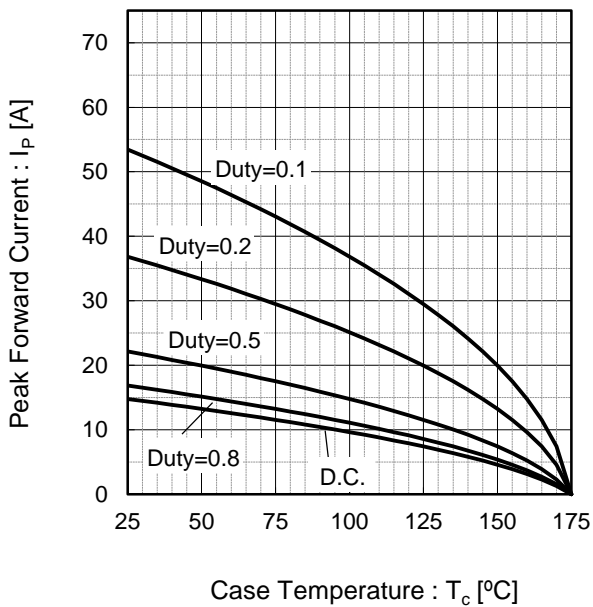
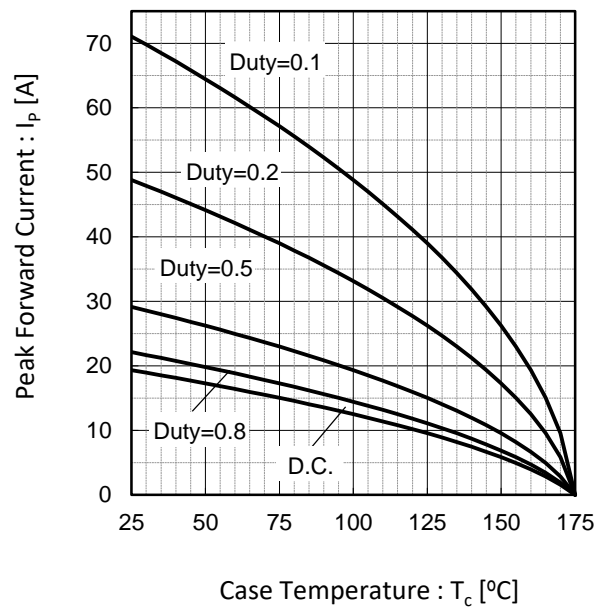


Fig.7*4 Maximum peak forward current derating curve $I_P - T_c$



*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)

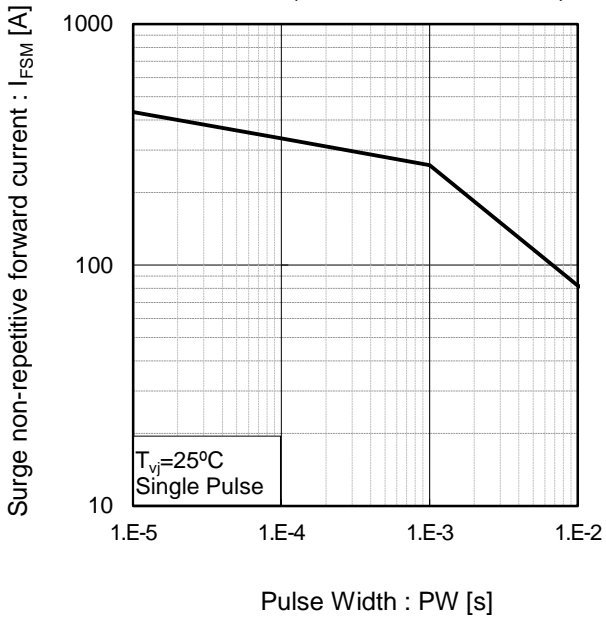
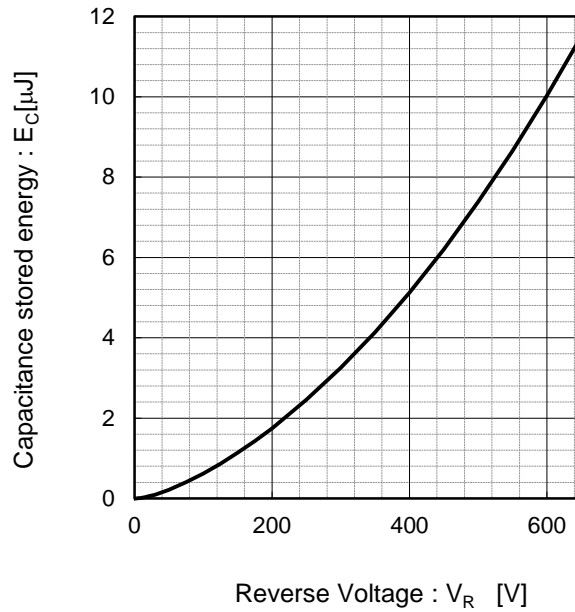
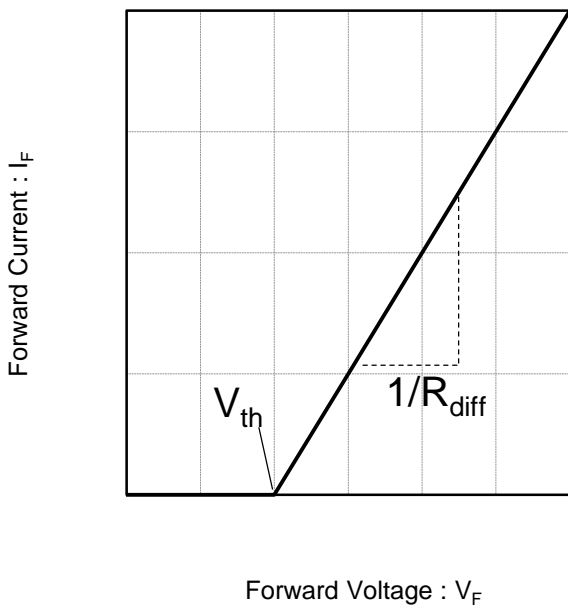


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

Fig.11 Equivalent forward current curve



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

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

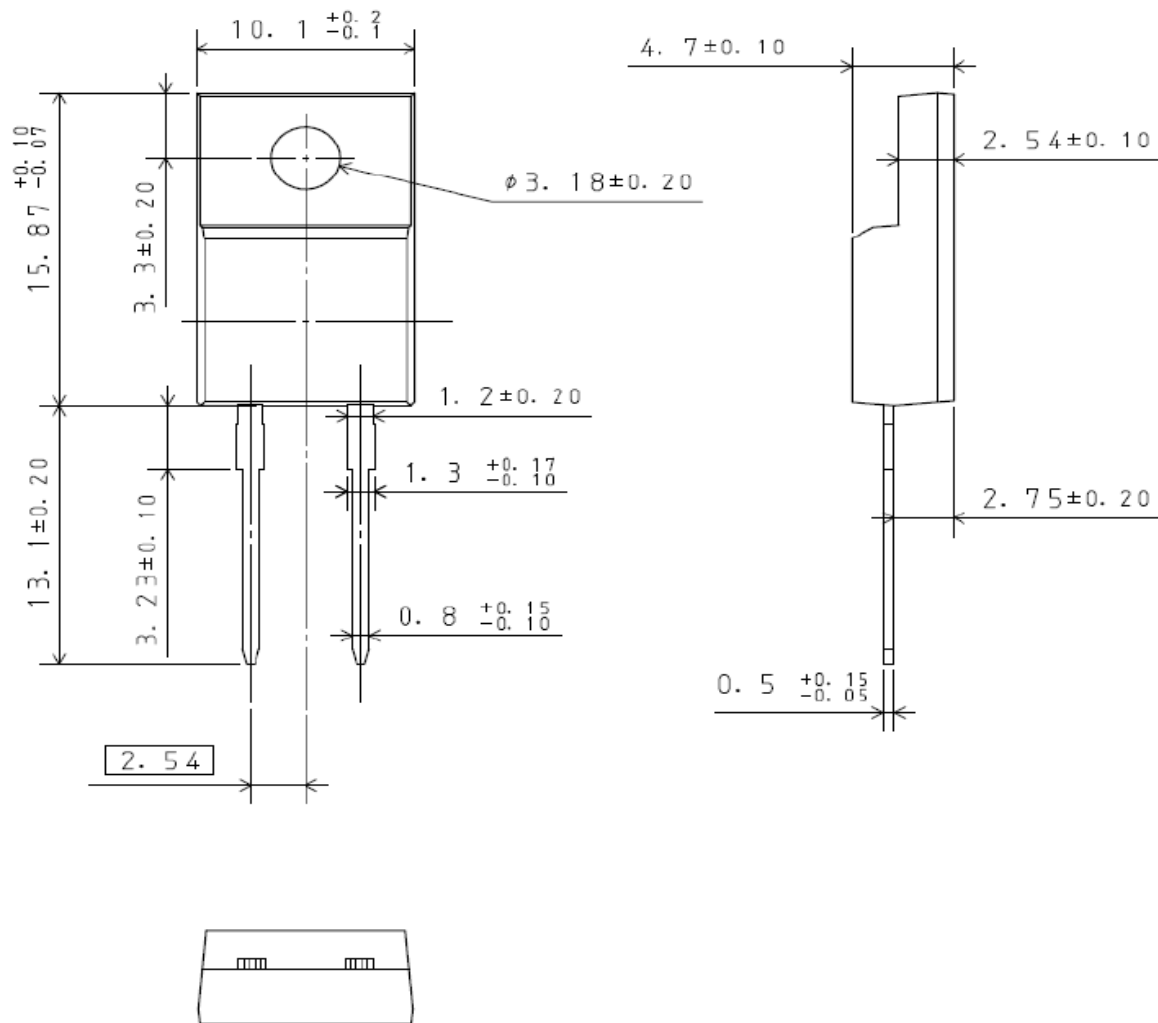
$$R_{diff} (T_{vj}) = b_0 + b_1 T_{vj} + b_2 T_{vj}^2$$

| Symbol | Typical Value | Unit |
|----------------|---------------|-------------------|
| a ₀ | 9.66E-01 | V |
| a ₁ | -1.10E-03 | V/°C |
| b ₀ | 3.52E-02 | Ω |
| b ₁ | 7.46E-05 | Ω/°C |
| b ₂ | 7.68E-07 | Ω/°C ² |

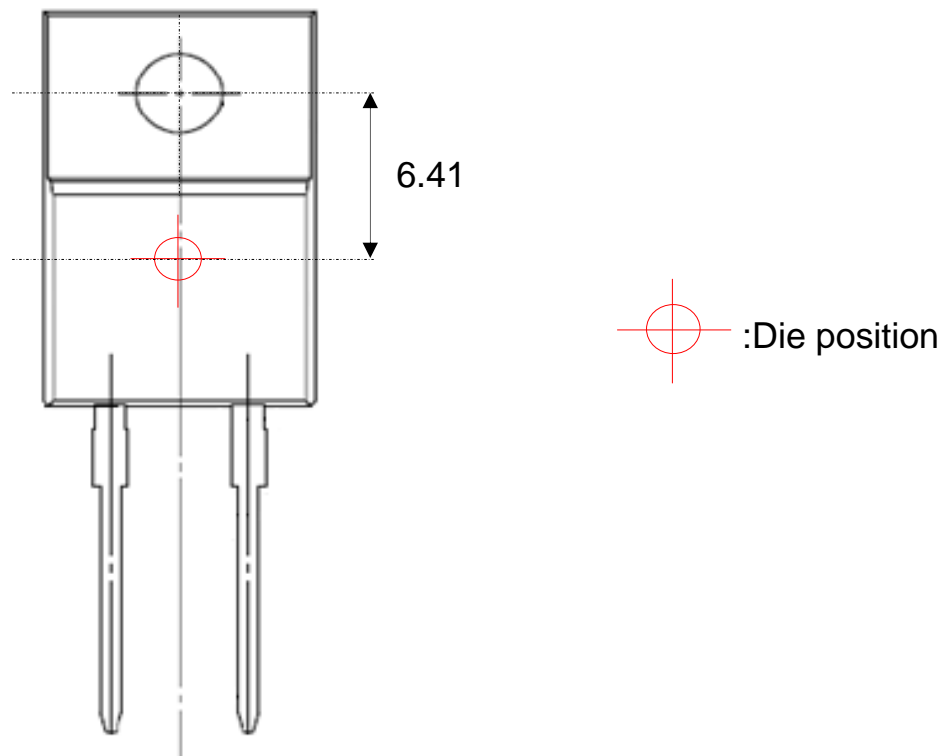
T_{vj} in °C; -55 °C < T_{vj} < 175°C ; I_F < 20 A

●Dimensions (Unit : mm)

TO-220FM-2LGE



●Die Bonding Layout (Unit : mm)



- 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.

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