

V_R	650V
I_F	20A
Q_C	31nC

●Features

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

●Applications

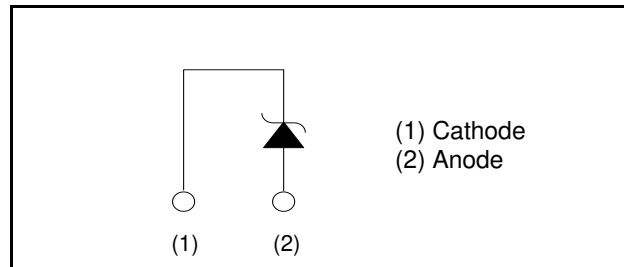
- PFC Boost Topology
- Secondary Side Rectification
- Data Center
- PV Power Conditioners

●Outline

TO-220FM



●Inner circuit



●Packaging specifications

Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	50
	Packing code	C
	Marking	SCS220AM

●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 ($T_c = 21^\circ\text{C}$)	I_F	20 *1	A	
Surge non-repetitive forward current	I_{FSM}	PW=10ms sinusoidal, $T_{vj}=25^\circ\text{C}$	68	A
		PW=10ms sinusoidal, $T_{vj}=150^\circ\text{C}$	53	A
		PW=10μs square, $T_{vj}=25^\circ\text{C}$	260	A
Repetitive peak forward current	I_{FRM}	41 *2	A	
i^2t value	$\int i^2 dt$	PW=10ms, $T_{vj}=25^\circ\text{C}$	23	A^2s
		PW=10ms, $T_{vj}=150^\circ\text{C}$	14	A^2s
Total power dissipation	P_D	40 *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)

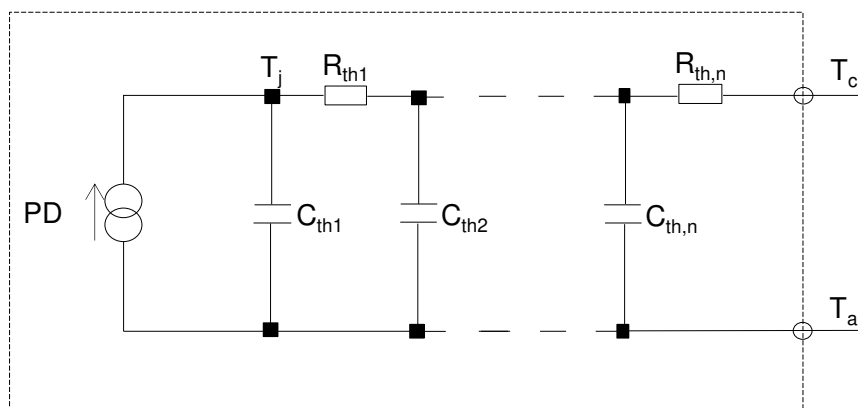
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	$I_R=4.0\text{mA}$	650	-	-	V
Forward voltage	V_F	$I_F=20\text{A}, T_{vj}=25^{\circ}\text{C}$	-	1.35	1.55	V
		$I_F=20\text{A}, T_{vj}=150^{\circ}\text{C}$	-	1.55	-	V
		$I_F=20\text{A}, T_{vj}=175^{\circ}\text{C}$	-	1.63	-	V
Reverse current	I_R	$V_R=650\text{V}, T_{vj}=25^{\circ}\text{C}$	-	4	400	μA
		$V_R=650\text{V}, T_{vj}=150^{\circ}\text{C}$	-	60	-	μA
		$V_R=650\text{V}, T_{vj}=175^{\circ}\text{C}$	-	140	-	μA
Total capacitance	C	$V_R=1\text{V}, f=1\text{MHz}$	-	730	-	pF
		$V_R=600\text{V}, f=1\text{MHz}$	-	74	-	pF
Total capacitive charge	Q_C	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	31	-	nC
Switching time	t_C	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	19	-	ns

●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	R_{thJC}	-	-	3.2	3.7	K/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit	Symbol	Value	Unit
R_{th1}	5.45E-01	K/W	C_{th1}	2.76E-03	Ws/K
R_{th2}	1.17E+00		C_{th2}	9.35E-03	
R_{th3}	1.50E+00		C_{th3}	8.16E-01	



●Electrical characteristic curves

Fig.1 $V_F - I_F$ Characteristics

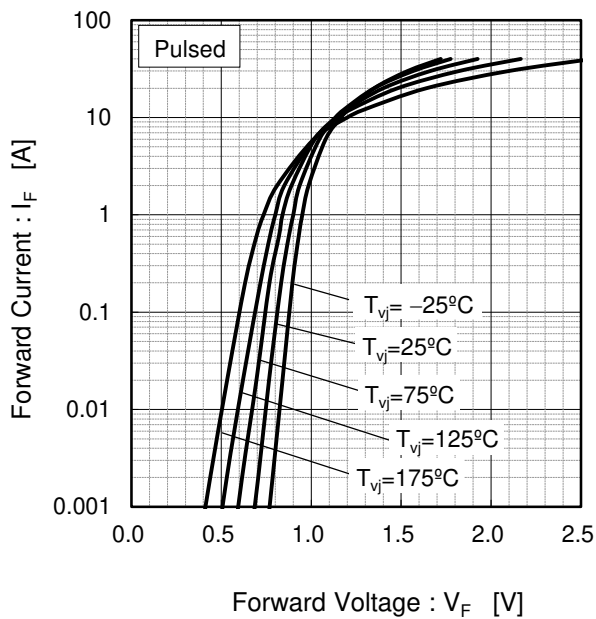


Fig.2 $V_F - I_F$ Characteristics

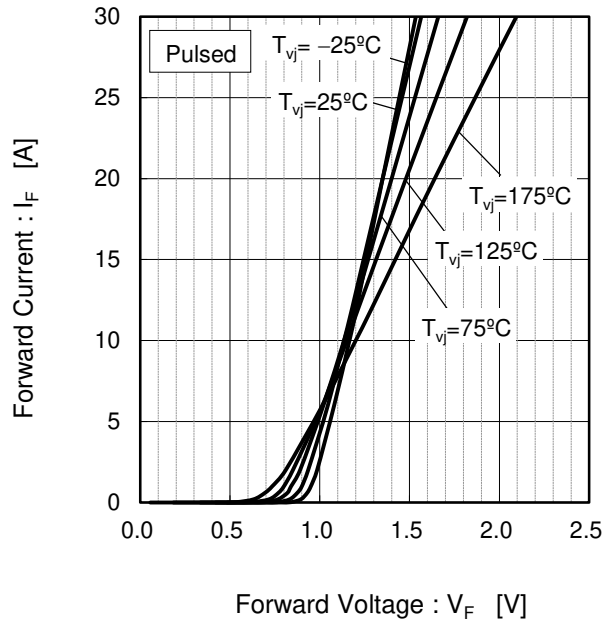


Fig.3 $V_R - I_R$ Characteristics

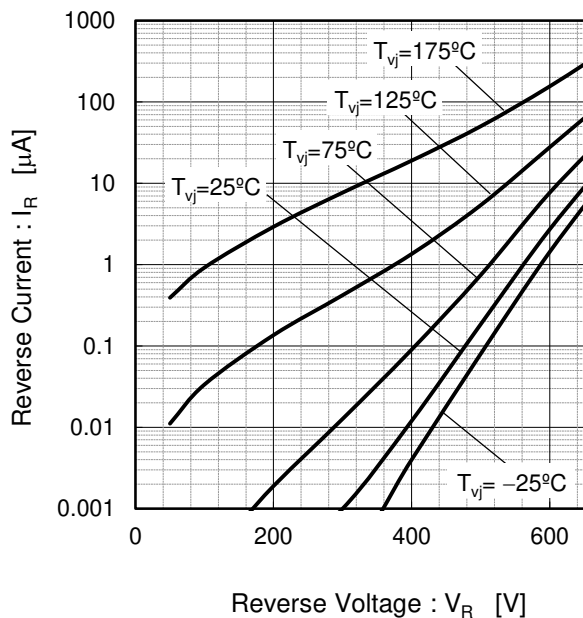
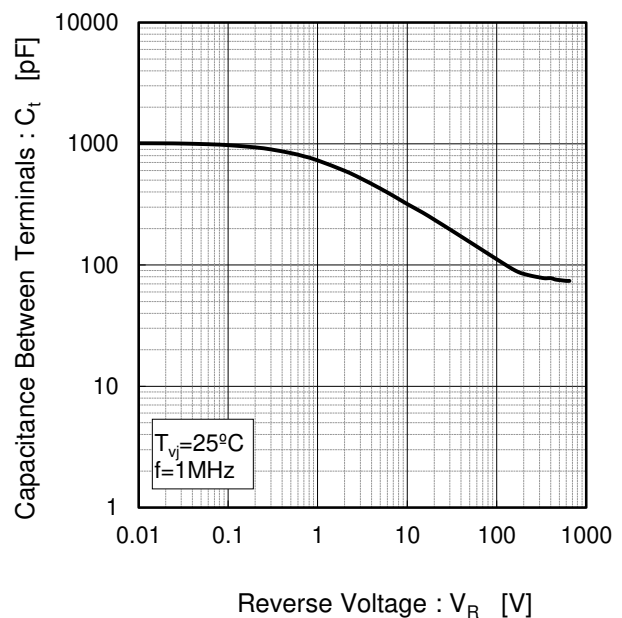


Fig.4 $V_R - C_t$ Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

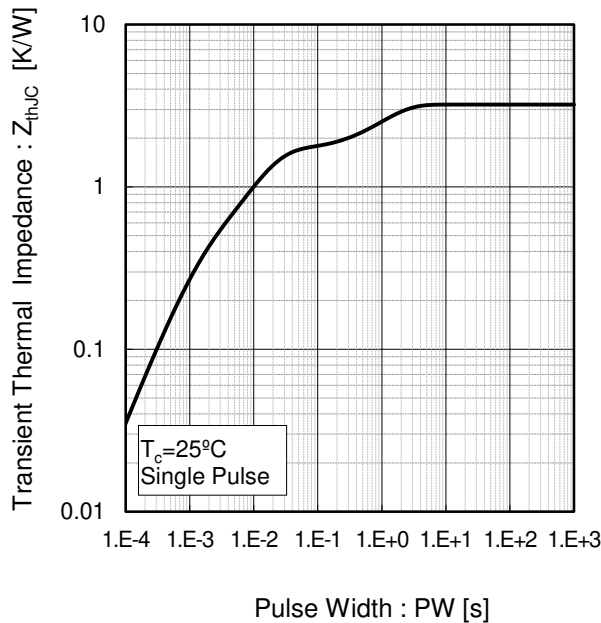


Fig.6 Power Dissipation

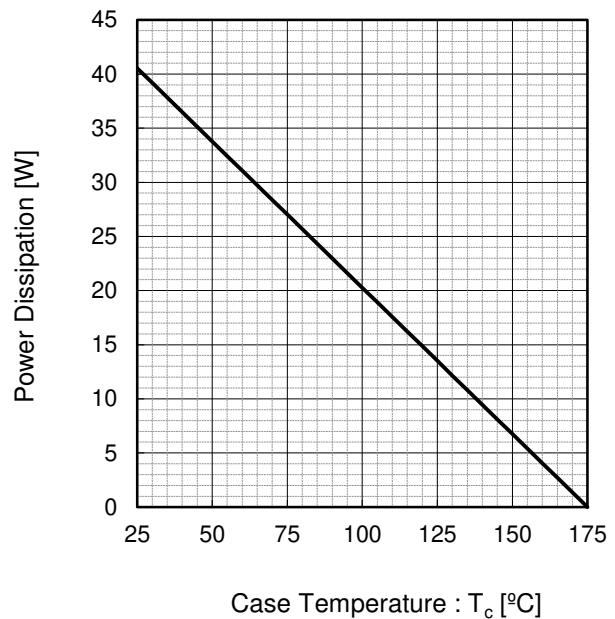
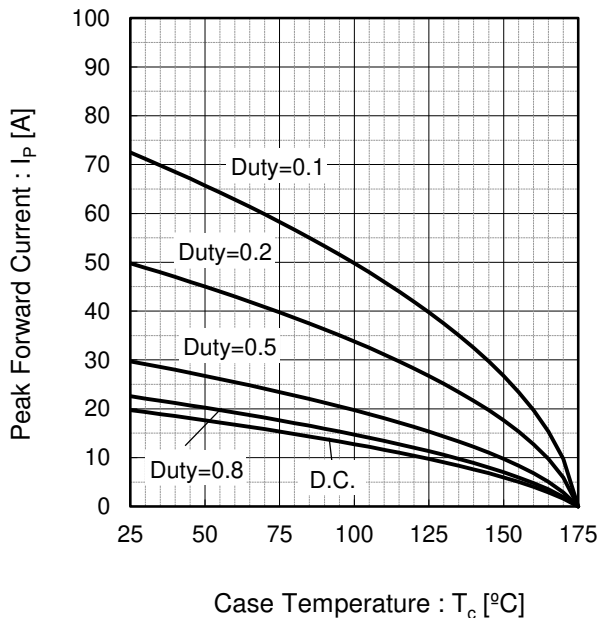
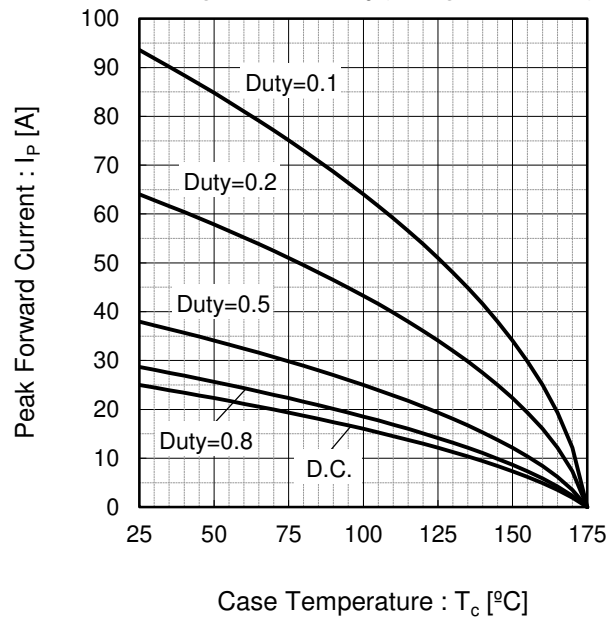


Fig.7*4 Maximum peak forward current derating curve $I_P - T_c$



*4 Based on max Vf, max Z_{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 Z_{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)

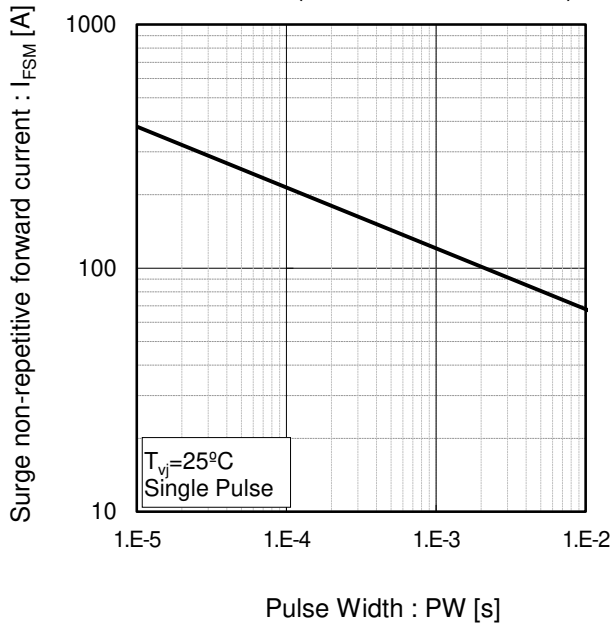
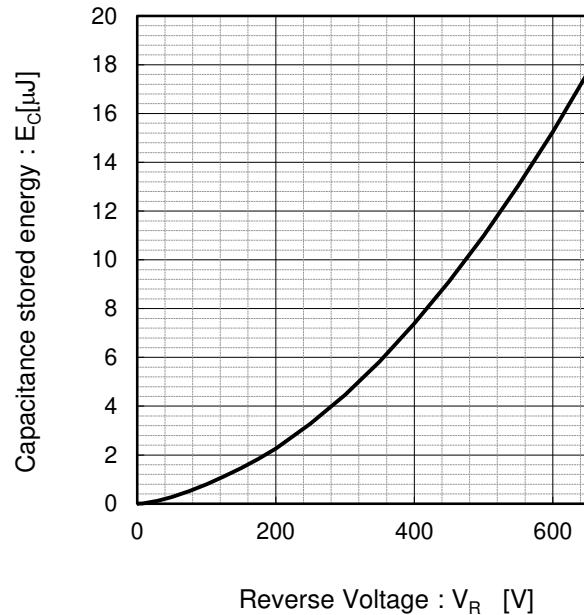
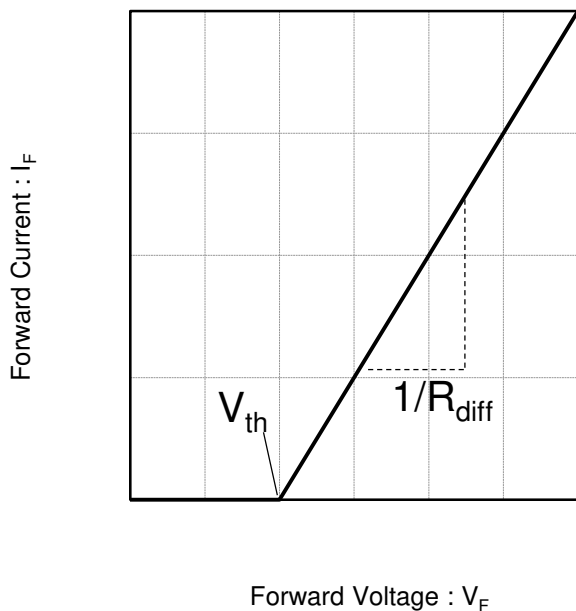


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

Fig.11 Equivalent forward current curve



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

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

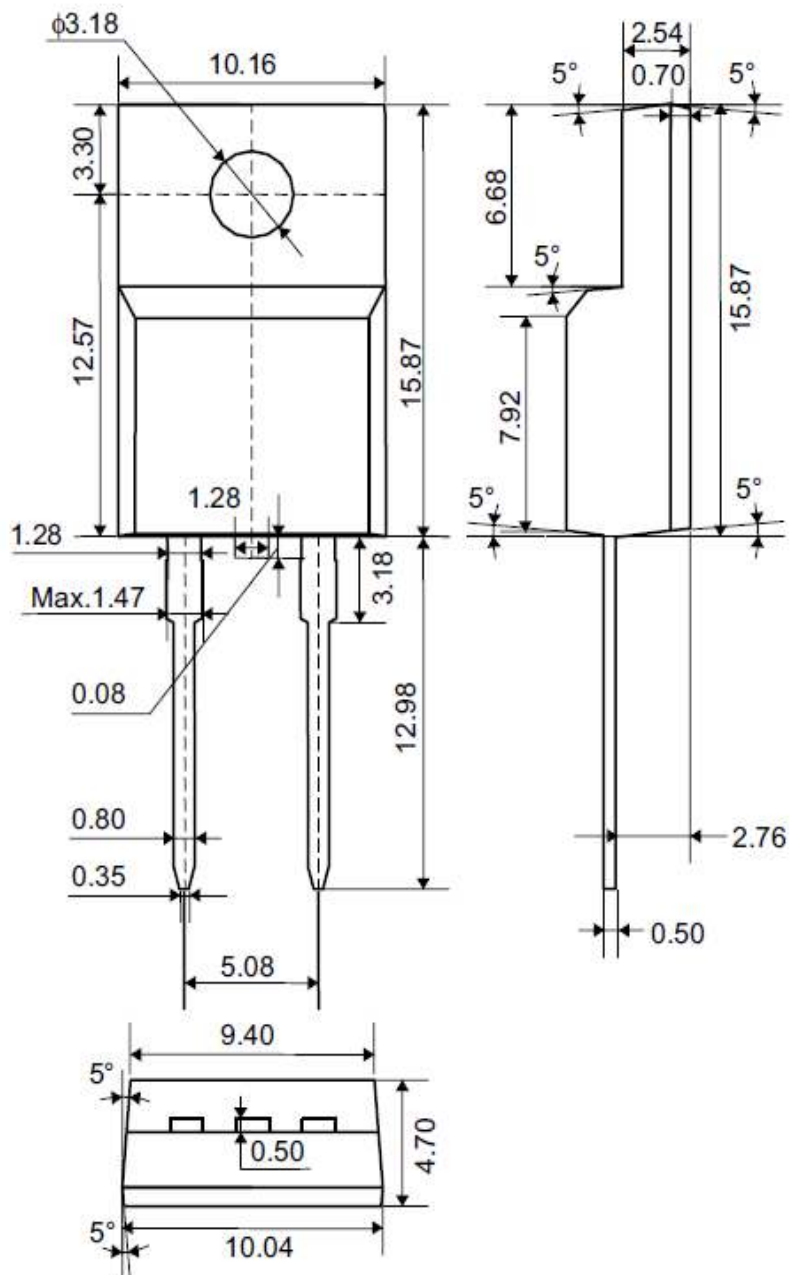
$$R_{diff} (T_{vj}) = b_0 + b_1 T_{vj} + b_2 T_{vj}^2$$

Symbol	Typical Value	Unit
a ₀	9.35E-01	V
a ₁	-1.12E-03	V/°C
b ₀	1.99E-02	Ω
b ₁	5.10E-05	Ω/°C
b ₂	5.40E-07	Ω/°C ²

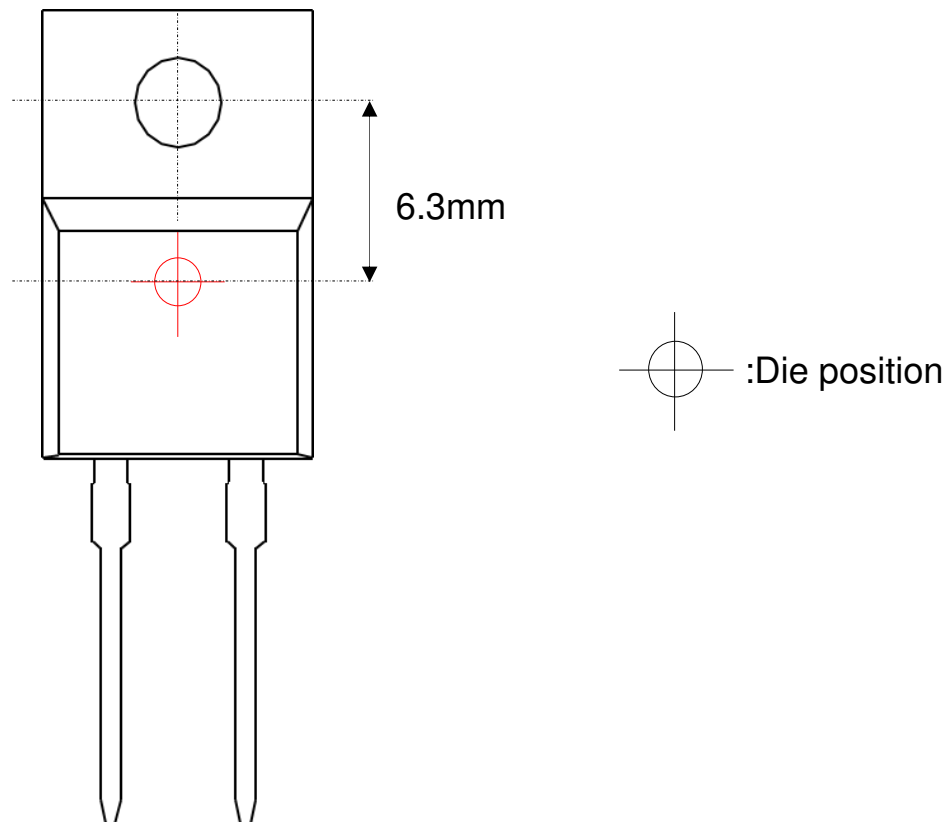
T_{vj} in °C; -55°C < T_{vj} < 175°C ; I_F < 40 A

●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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