

V_R	650V
I_F	15A
Q_C	37nC

●Features

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

●Applications

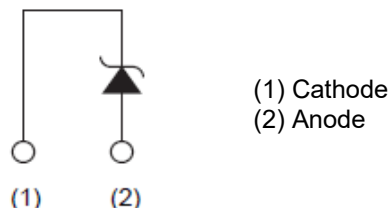
- PFC Boost Topology
- Secondary Side Rectification
- Data Center
- PV Power Conditioners

●Outline

TO-220FM-2LGE



●Inner circuit



●Packaging specifications

Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	50
	Packing code	C7G
	Marking	SCS315AM

●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 ($T_c=65^{\circ}\text{C}$) ^{*1}		I_F	15	A
Surge non-repetitive forward current	PW=10ms sinusoidal, $T_{vj}=25^{\circ}\text{C}$	I_{FSM}	112	A
	PW=10ms sinusoidal, $T_{vj}=150^{\circ}\text{C}$		95	A
	PW=10μs square, $T_{vj}=25^{\circ}\text{C}$		410	A
Repetitive peak forward current		I_{FRM}	39 ^{*2}	A
i^2t value	$1 \leq PW \leq 10\text{ms}$, $T_{vj}=25^{\circ}\text{C}$	$\int i^2 dt$	62	A ² s
	$1 \leq PW \leq 10\text{ms}$, $T_{vj}=150^{\circ}\text{C}$		45	A ² s
Total power dissipation		P_D	39 ^{*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)

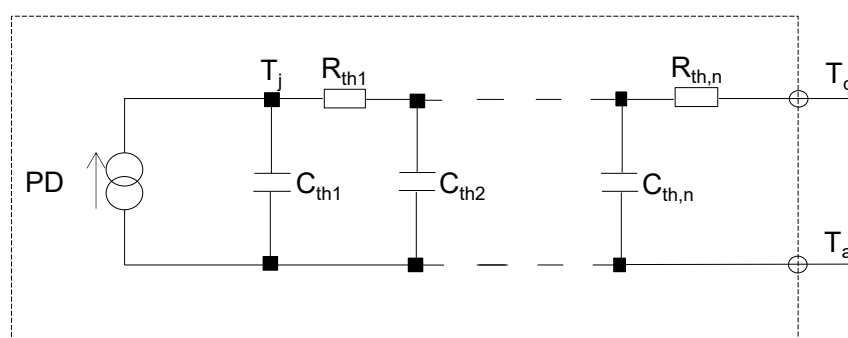
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	$I_R=75\mu\text{A}$	650	-	-	V
Forward voltage	V_F	$I_F=15\text{A}, T_{vj}=25^{\circ}\text{C}$	-	1.35	1.50	V
		$I_F=15\text{A}, T_{vj}=150^{\circ}\text{C}$	-	1.44	1.71	V
		$I_F=15\text{A}, T_{vj}=175^{\circ}\text{C}$	-	1.50	-	V
Reverse current	I_R	$V_R=650\text{V}, T_{vj}=25^{\circ}\text{C}$	-	0.045	75	μA
		$V_R=650\text{V}, T_{vj}=150^{\circ}\text{C}$	-	3	300	μA
		$V_R=650\text{V}, T_{vj}=175^{\circ}\text{C}$	-	9	-	μA
Total capacitance	C	$V_R=1\text{V}, f=1\text{MHz}$	-	750	-	pF
		$V_R=650\text{V}, f=1\text{MHz}$	-	68	-	pF
Total capacitive charge	Q_C	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	37	-	nC
Switching time	t_C	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	21	-	ns
Non-repetitive Avaranche Energy	E_{ava}	$L=1\text{mH}$	-	210	-	mJ

●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	R_{thJC}	-	-	3.3	3.8	K/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit	Symbol	Value	Unit
R_{th1}	1.84E-01	K/W	C_{th1}	7.21E-04	Ws/K
R_{th2}	8.85E-01		C_{th2}	3.77E-03	
R_{th3}	2.23E+00		C_{th3}	3.32E-01	



●Electrical characteristic curves

Fig.1 $V_F - I_F$ Characteristics

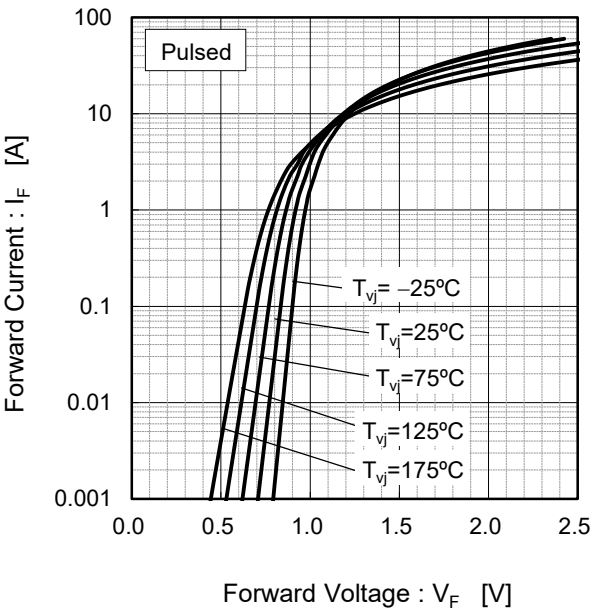


Fig.2 $V_F - I_F$ Characteristics

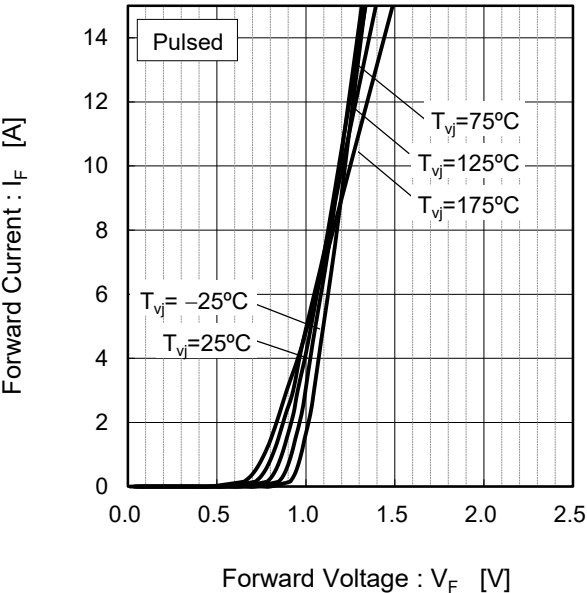


Fig.3 $V_R - I_R$ Characteristics

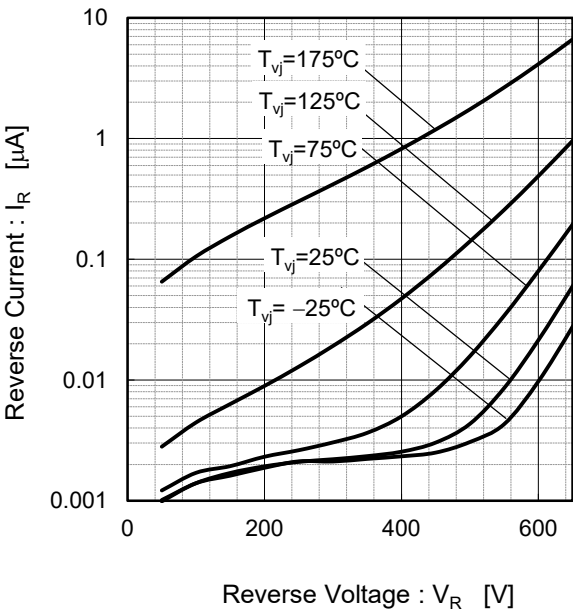
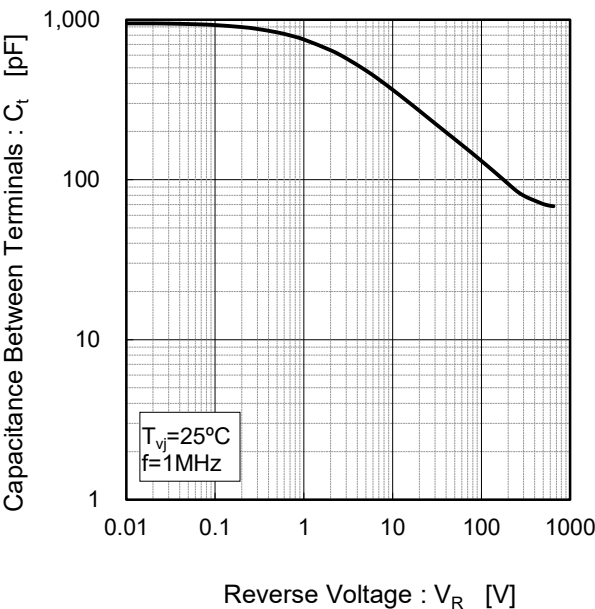


Fig.4 $V_R - C_t$ Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

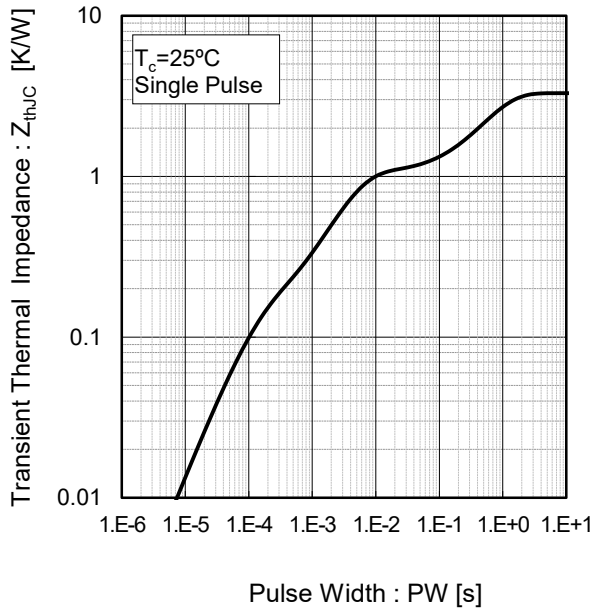


Fig.6 Power Dissipation

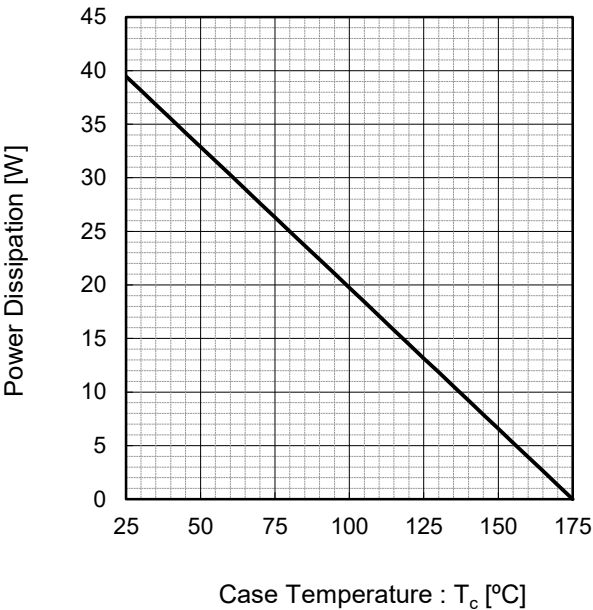
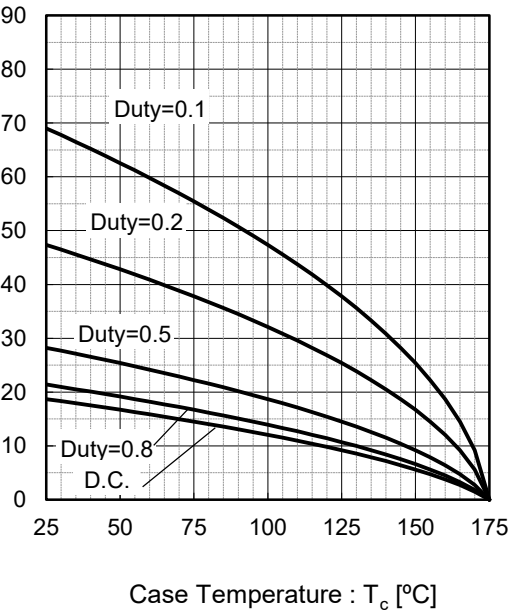
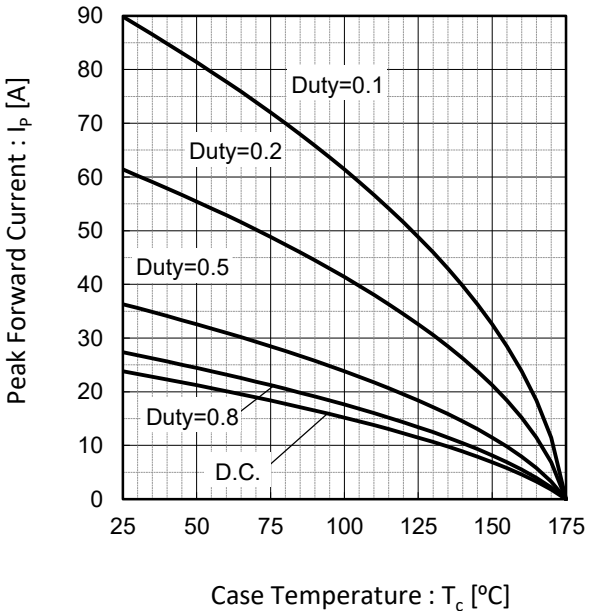


Fig.7*4 Maximum peak forward current derating curve $I_P - T_c$



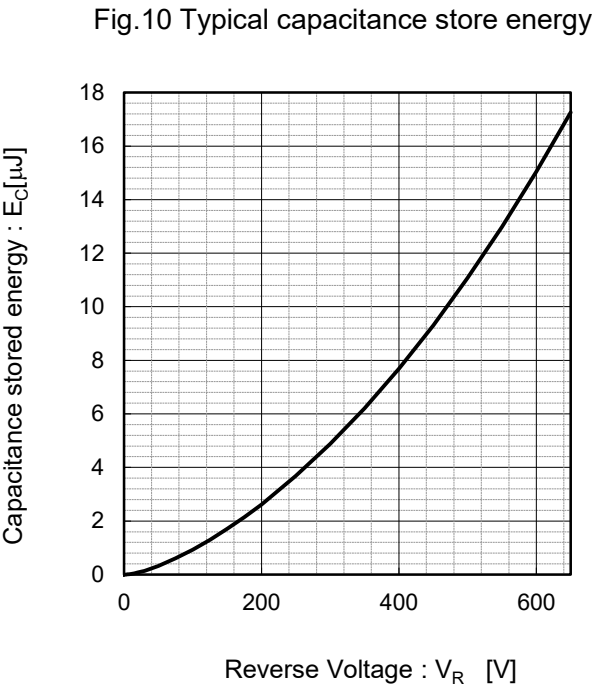
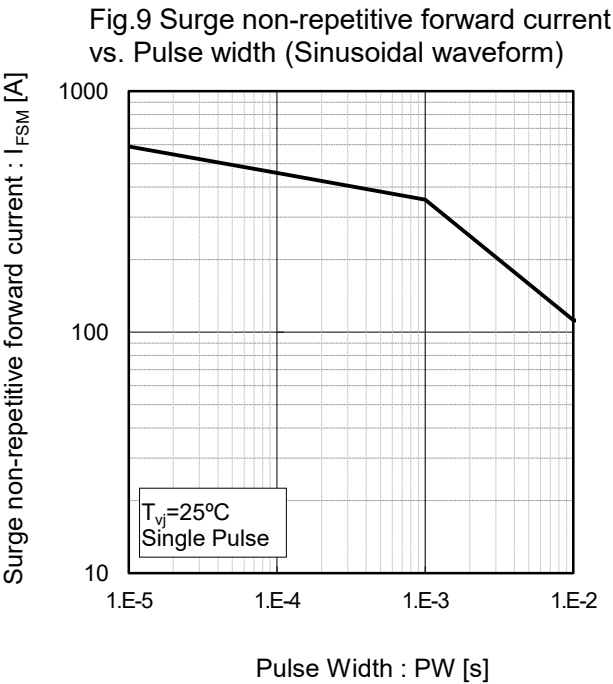
*4 Based on max V_f , max R_{thJC}
Valid for switching of above 10kHz,
excluding D.C. curve.

Fig.8*5 Typical peak forward current derating curve $I_P - T_c$ (Not guaranteed)

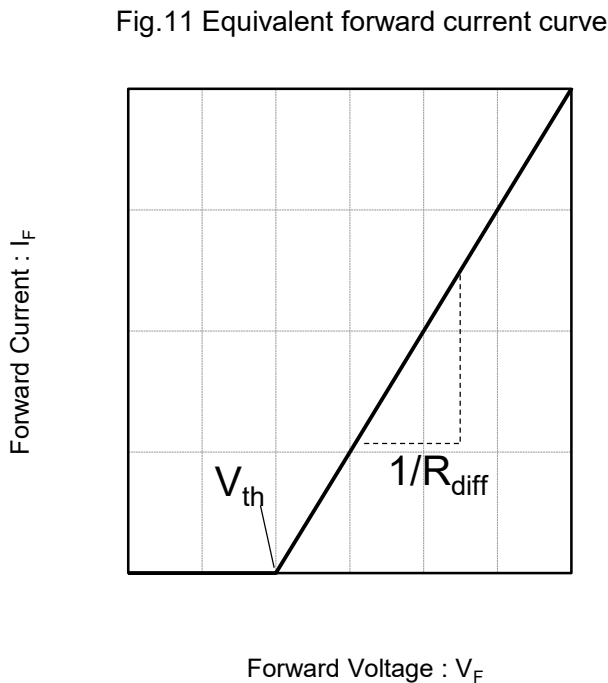


*5 Based on typ V_f , typ R_{thJC}
Typical value, not guaranteed
Valid for switching of above 10kHz,
excluding D.C. curve

●Electrical characteristic curves



●Simplified forward characteristic model



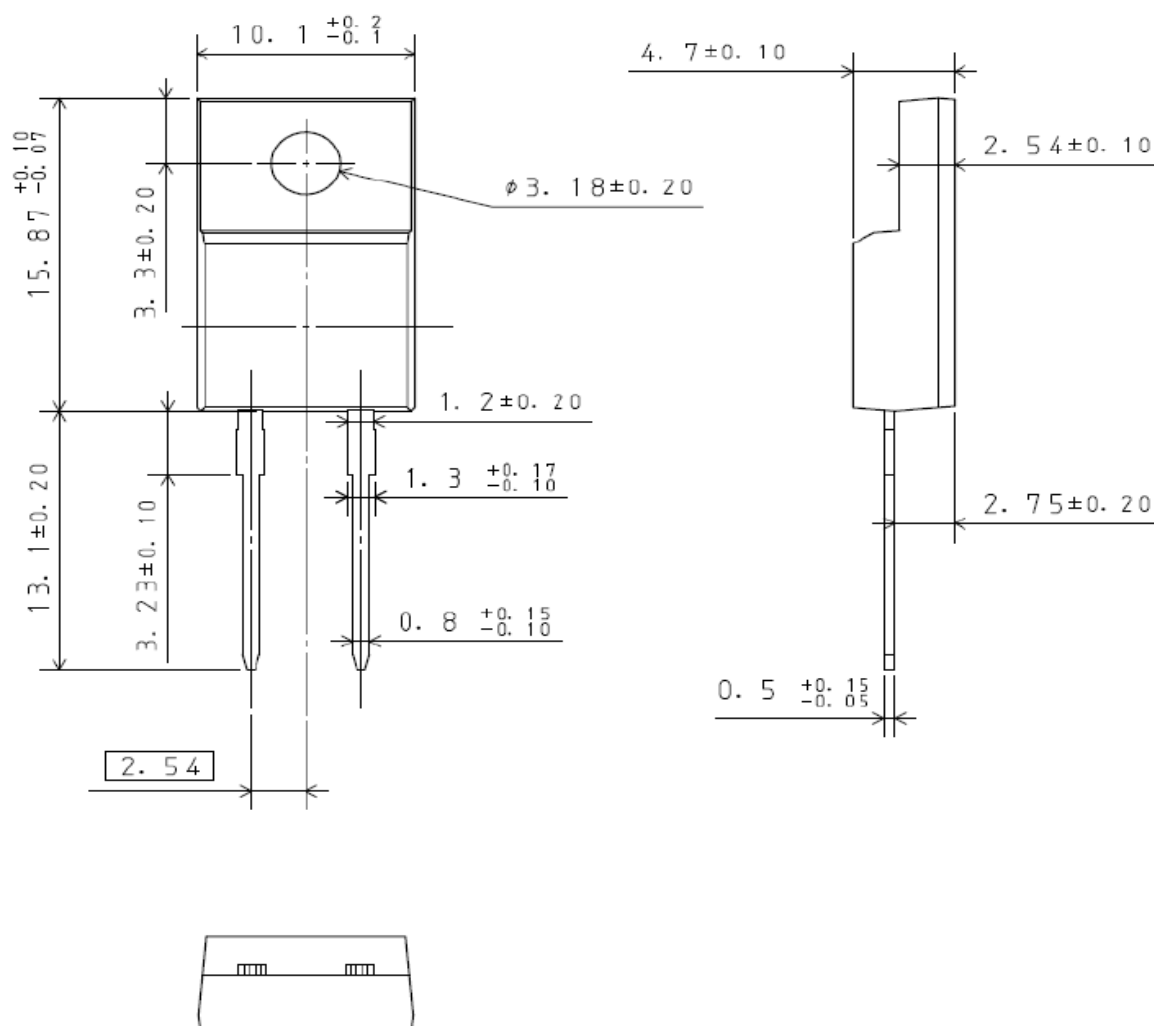
$$V_F = V_{th} + R_{diff} I_F$$
$$V_{th}(T_{vj}) = a_0 + a_1 T_{vj}$$
$$R_{diff}(T_{vj}) = b_0 + b_1 T_{vj} + b_2 T_{vj}^2$$

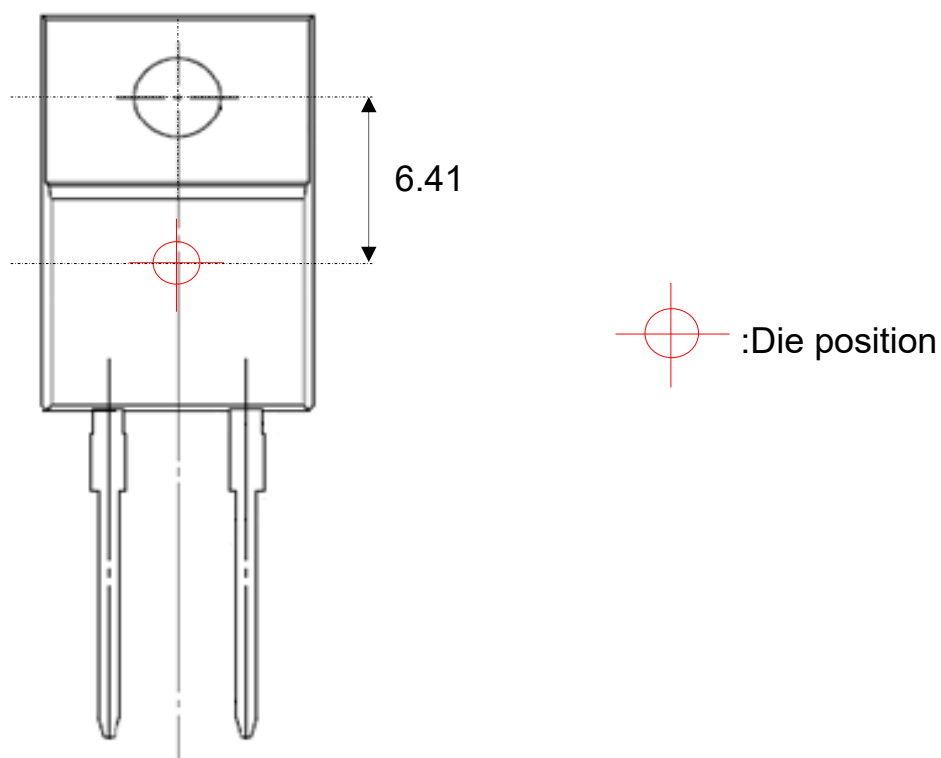
Symbol	Typical Value	Unit
a_0	9.66E-01	V
a_1	-1.10E-03	V/°C
b_0	2.35E-02	Ω
b_1	4.97E-05	Ω/°C
b_2	5.12E-07	Ω/°C ²

T_{vj} in °C; $-55^{\circ}\text{C} < T_{vj} < 175^{\circ}\text{C}$; $I_F < 30\text{ A}$

● **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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