

V_R	650V
I_F	12A
Q_C	18nC

●Features

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

●Applications

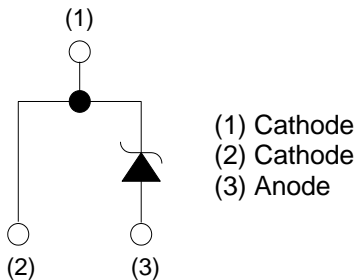
- PFC Boost Topology
- Secondary Side Rectification
- Data Center
- PV Power Conditioners

●Outline

TO-220ACG



●Inner circuit



●Packaging specifications

Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	50
	Packing code	C17
	Marking	SCS212AG

●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 ($T_c = 135^{\circ}\text{C}$) *1		I_F	12	A
Surge non-repetitive forward current	PW=10ms sinusoidal, $T_{vj}=25^{\circ}\text{C}$	I_{FSM}	43	A
	PW=10ms sinusoidal, $T_{vj}=150^{\circ}\text{C}$		34	A
	PW=10μs square, $T_{vj}=25^{\circ}\text{C}$		170	A
Repetitive peak forward current		I_{FRM}	52 *2	A
i^2t value	PW=10ms, $T_{vj}=25^{\circ}\text{C}$	$\int i^2 dt$	9.2	A^2s
	PW=10ms, $T_{vj}=150^{\circ}\text{C}$		5.7	A^2s
Total power dissipation		P_D	93 *1, 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°C unless otherwise specified.)

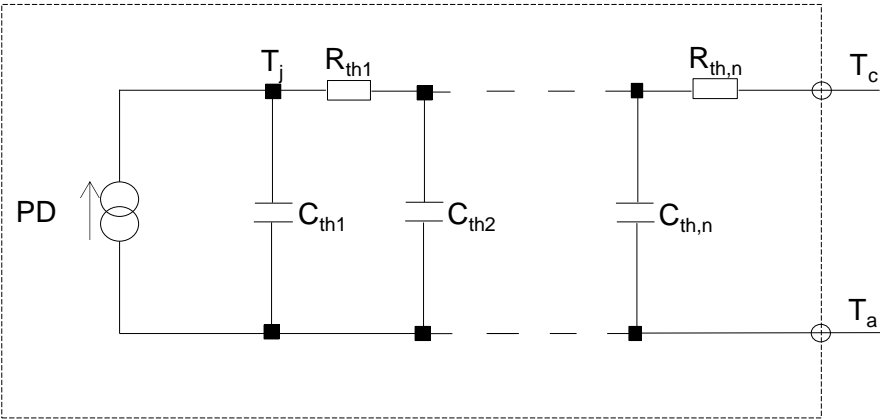
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V _{DC}	I _R = 2.4mA	650	-	-	V
Forward voltage	V _F	I _F = 12A, T _{vj} =25°C	-	1.35	1.55	V
		I _F = 12A, T _{vj} =150°C	-	1.55	-	V
		I _F = 12A, T _{vj} =175°C	-	1.63	-	V
Reverse current	I _R	V _R = 600 V,T _{vj} =25°C	-	2.4	240	μA
		V _R = 600 V,T _{vj} =150°C	-	36	-	μA
		V _R = 600 V,T _{vj} =175°C	-	84	-	μA
Total capacitance	C	V _R = 1V,f=1MHz	-	440	-	pF
		V _R = 600V,f=1MHz	-	44	-	pF
Total capacitive charge	Q _C	V _R =400V,di/dt=350A/μs	-	18	-	nC
Switching time	t _C	V _R =400V,di/dt=350A/μs	-	16	-	ns

●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	R _{thJC}	-	-	1.3	1.6	K/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit	Symbol	Value	Unit
R _{th1}	3.70 × 10 ⁻¹	K/W	C _{th1}	1.98 × 10 ⁻³	Ws/K
R _{th2}	9.23 × 10 ⁻¹		C _{th2}	6.54 × 10 ⁻³	
R _{th3}	2.06 × 10 ⁻³		C _{th3}	1.96 × 10 ⁰	



●Electrical characteristic curves

Fig.1 $V_F - I_F$ Characteristics

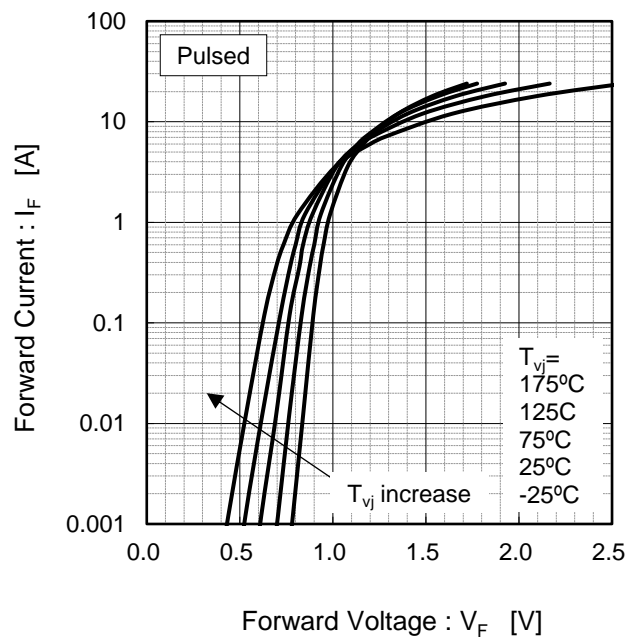


Fig.2 $V_F - I_F$ Characteristics

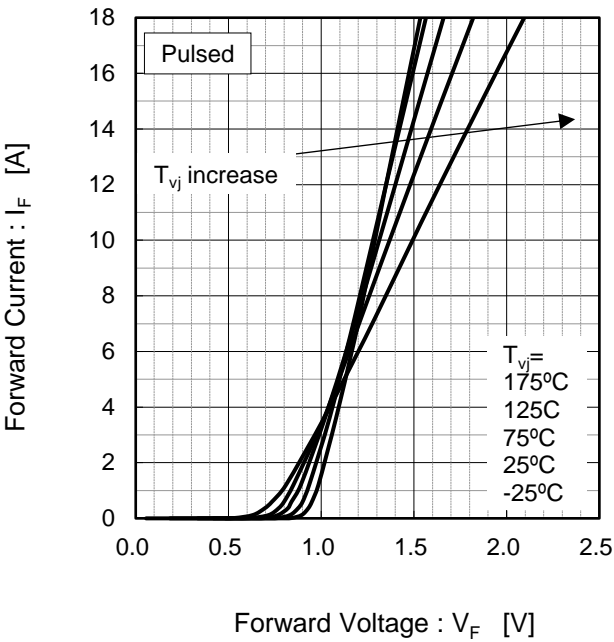


Fig.3 $V_R - I_R$ Characteristics

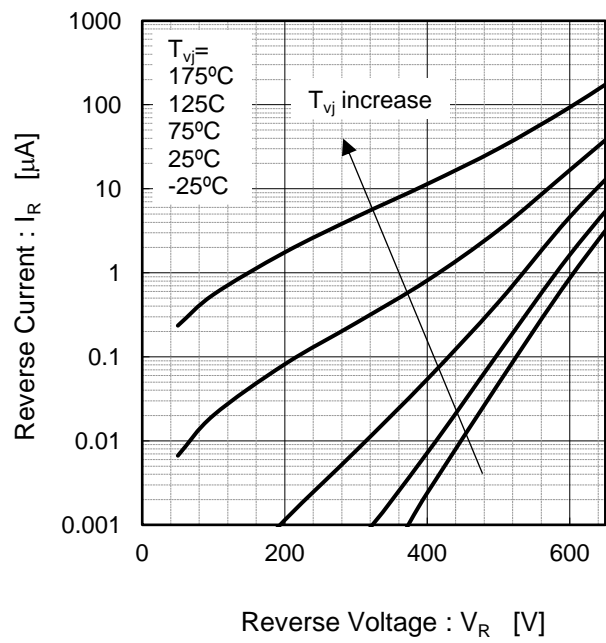
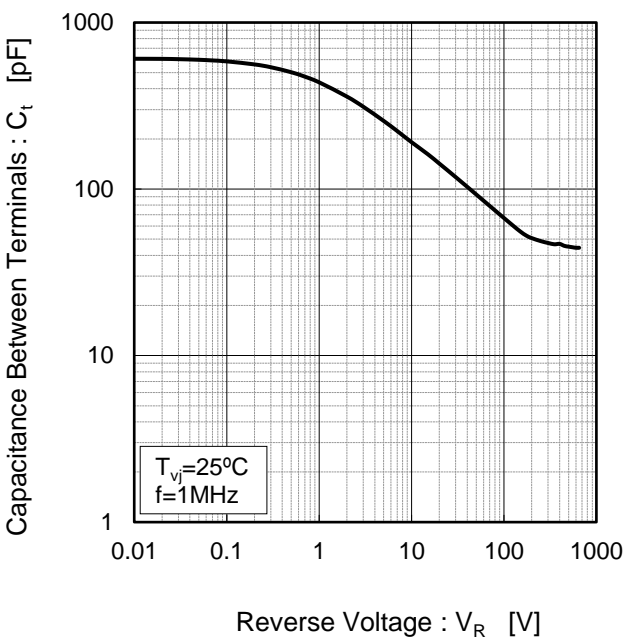


Fig.4 $V_R - C_t$ Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

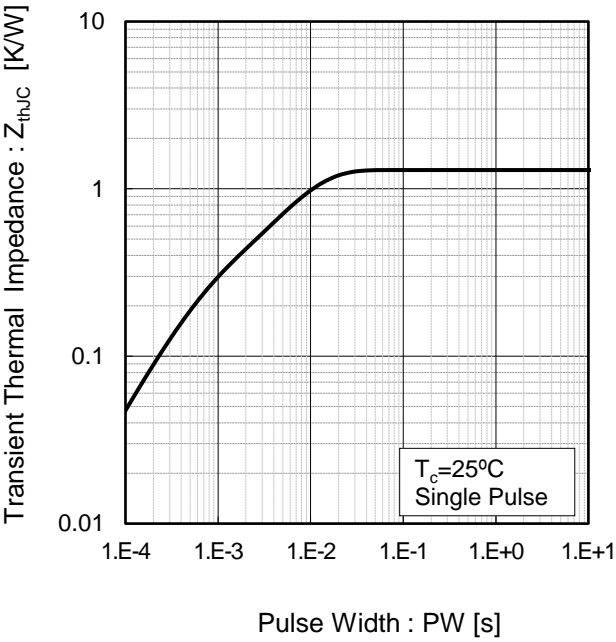


Fig.6 Power Dissipation

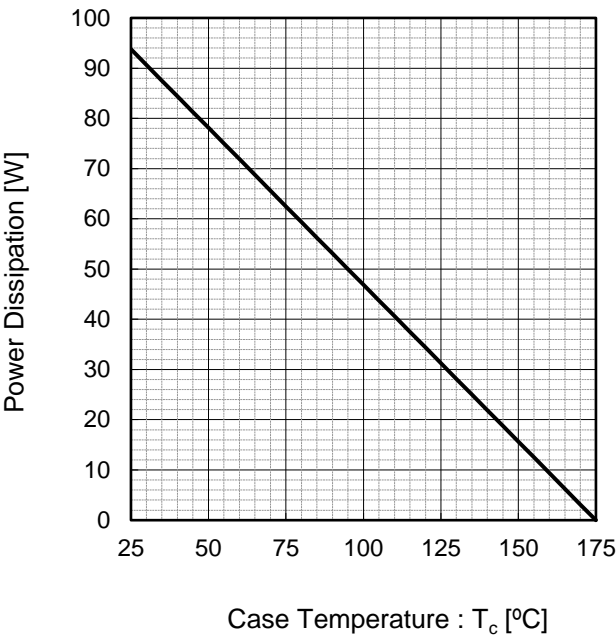
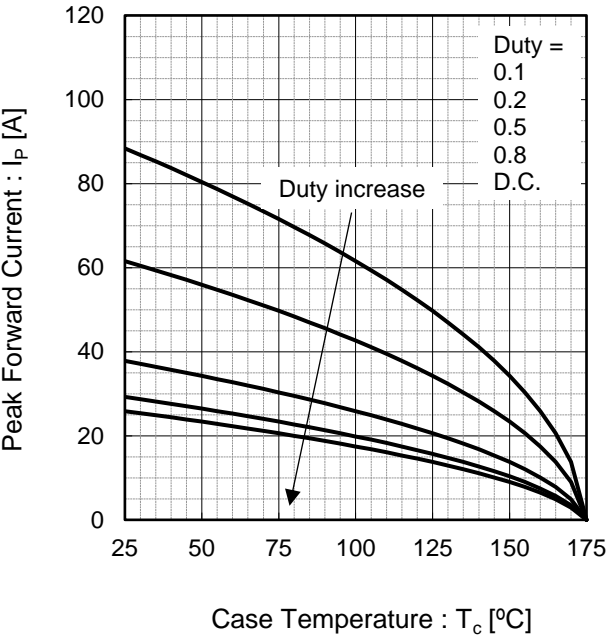
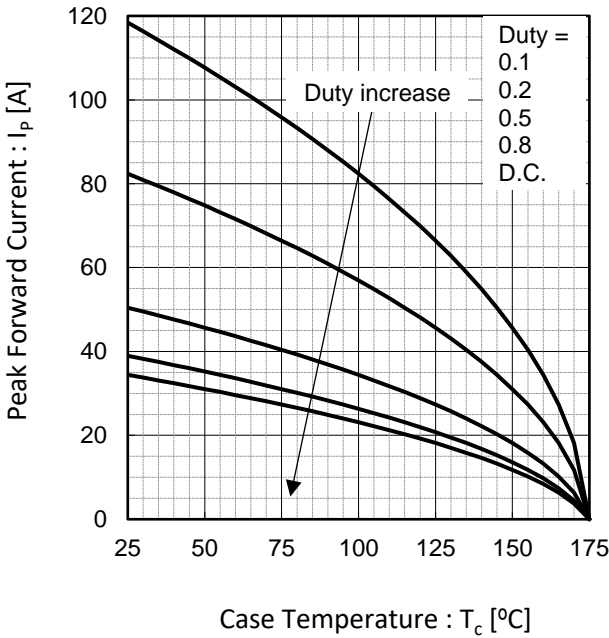


Fig.7*4 Maximum peak forward current derating curve $I_P - T_c$



*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

Fig.9 Surge non-repetitive forward current vs. Pulse width (Sinusoidal waveform)

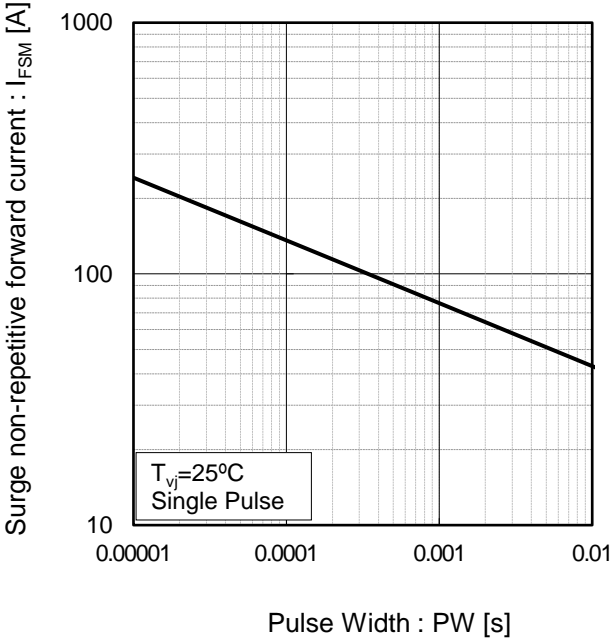
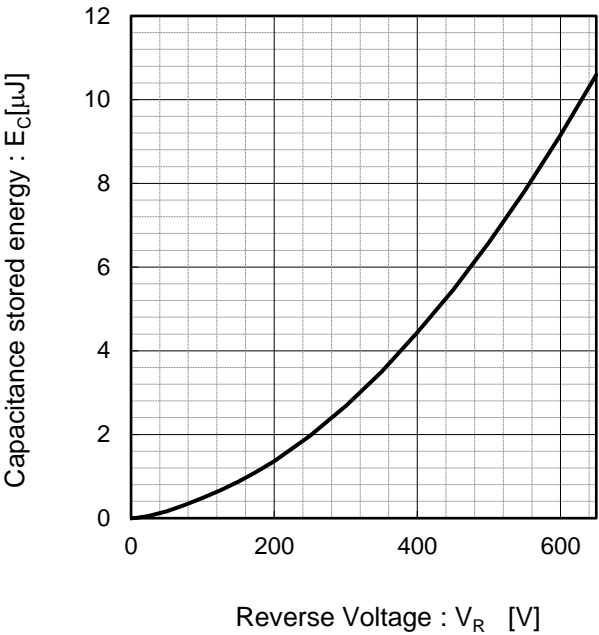
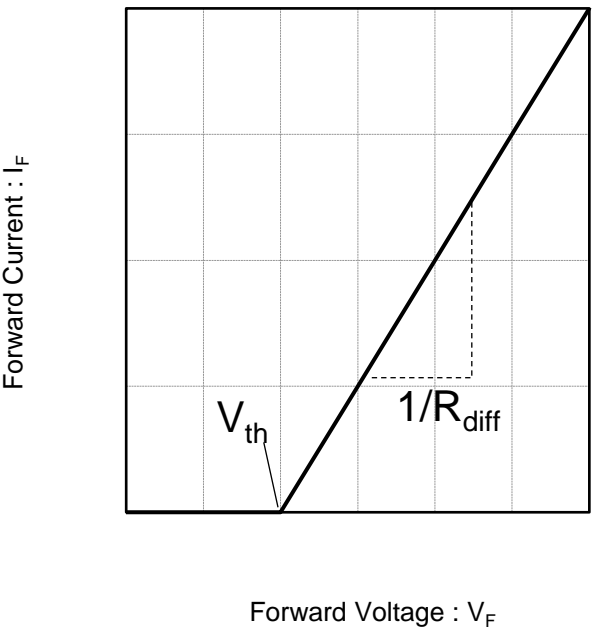


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

Fig.11 Equivalent forward current curve



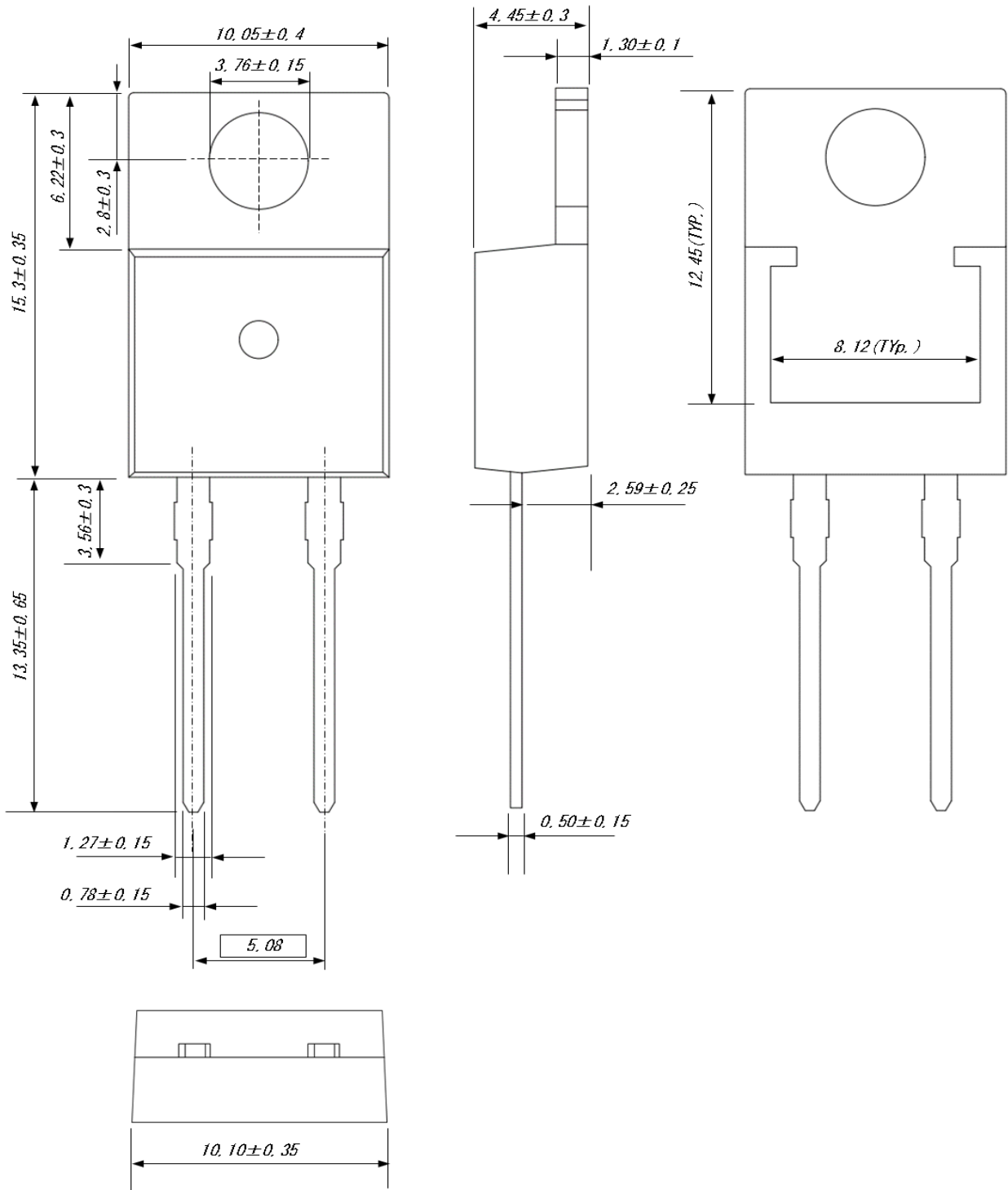
$$V_F = V_{th} + R_{diff} I_F$$

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

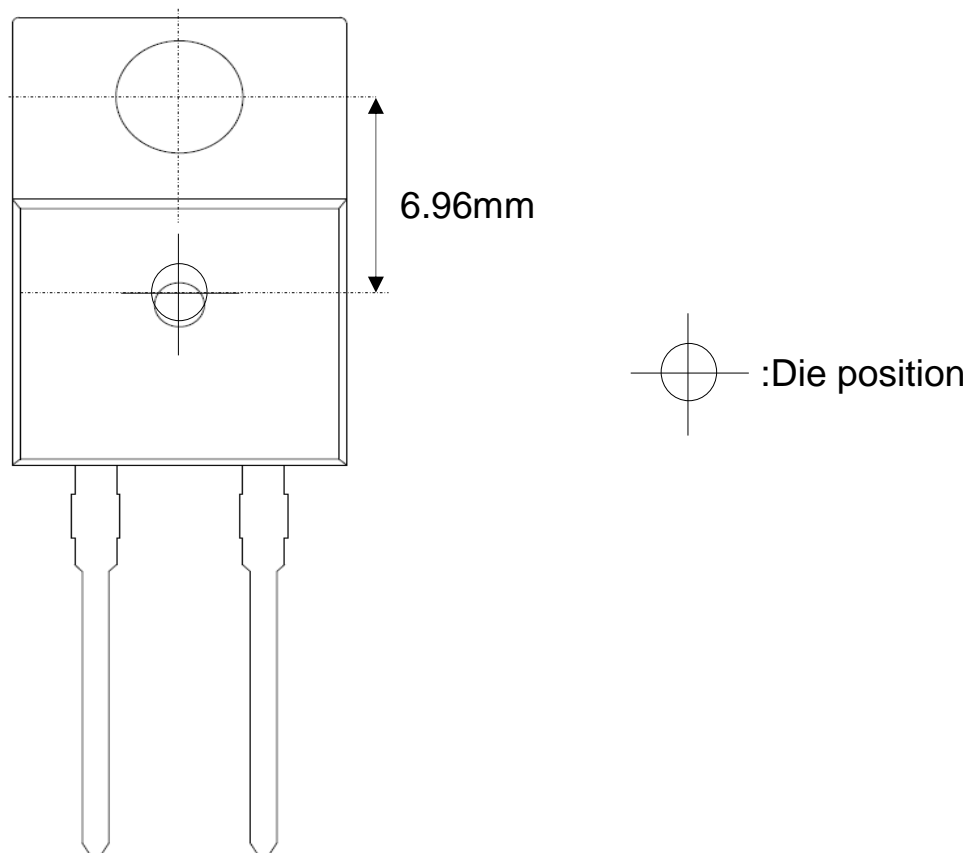
Symbol	Typical Value	Unit
a_0	9.35×10^{-1}	V
a_1	-1.12×10^{-3}	V/°C
b_0	3.32×10^{-2}	Ω
b_1	8.50×10^{-5}	Ω/°C
b_2	9.00×10^{-7}	Ω/°C ²

T_{vj} in °C; $-55^{\circ}\text{C} < T_{vj} < 175^{\circ}\text{C}$; $I_F < 24 \text{ A}$

●Dimensions (Unit : mm)



●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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