

$V_R$	650V
$I_F$	6A
$Q_C$	9nC

### ●Features

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

### ●Applications

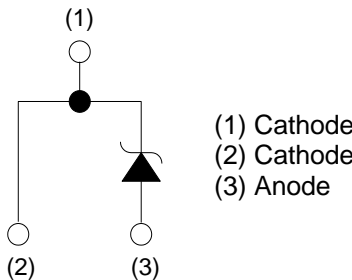
- PFC Boost Topology
- Secondary Side Rectification
- Data Center
- PV Power Conditioners

### ●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	SCS206AG

### ●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 ( $T_c = 138^\circ\text{C}$ )*1		$I_F$	6	A
Surge non-repetitive forward current	PW=10ms sinusoidal, $T_{vj}=25^\circ\text{C}$	$I_{FSM}$	23	A
	PW=10ms sinusoidal, $T_{vj}=150^\circ\text{C}$		18	A
	PW=10μs square, $T_{vj}=25^\circ\text{C}$		90	A
Repetitive peak forward current		$I_{FRM}$	27 *2	A
$i^2t$ value	PW=10ms, $T_{vj}=25^\circ\text{C}$	$\int i^2 dt$	2.6	A <sup>2</sup> s
	PW=10ms, $T_{vj}=150^\circ\text{C}$		1.6	A <sup>2</sup> s
Total power dissipation		$P_D$	51 *1, 3	W
Virtual Junction temperature		$T_{vj}$	175	°C
Range of storage temperature		$T_{stg}$	-55 to +175	°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<sub>vj</sub> = 25°C unless otherwise specified)

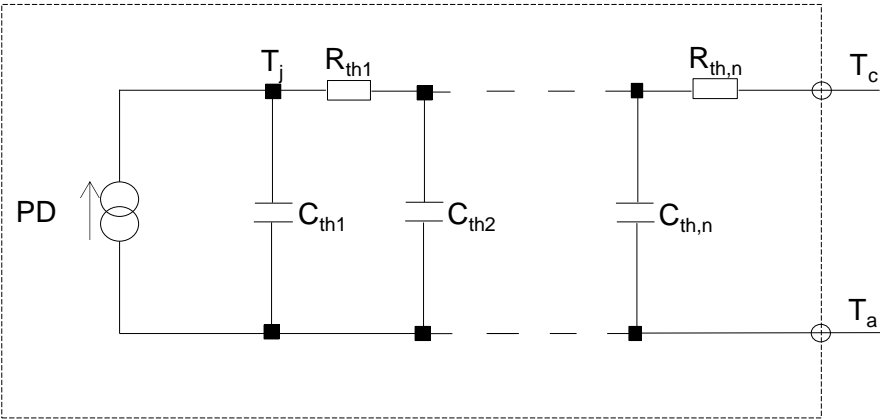
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V <sub>DC</sub>	I <sub>R</sub> = 1.2mA	650	-	-	V
Forward voltage	V <sub>F</sub>	I <sub>F</sub> = 6A, T <sub>vj</sub> =25°C	-	1.35	1.55	V
		I <sub>F</sub> = 6A, T <sub>vj</sub> =150°C	-	1.55	-	V
		I <sub>F</sub> = 6A, T <sub>vj</sub> =175°C	-	1.63	-	V
Reverse current	I <sub>R</sub>	V <sub>R</sub> = 600 V,T <sub>vj</sub> =25°C	-	1.2	120	μA
		V <sub>R</sub> = 600 V,T <sub>vj</sub> =150°C	-	18	-	μA
		V <sub>R</sub> = 600 V,T <sub>vj</sub> =175°C	-	42	-	μA
Total capacitance	C	V <sub>R</sub> = 1V,f=1MHz	-	220	-	pF
		V <sub>R</sub> = 600V,f=1MHz	-	22	-	pF
Total capacitive charge	Q <sub>C</sub>	V <sub>R</sub> =400V,di/dt=350A/μs	-	9	-	nC
Switching time	t <sub>C</sub>	V <sub>R</sub> =400V,di/dt=350A/μs	-	12	-	ns

●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	R <sub>thJC</sub>	-	-	2.6	2.9	K/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit	Symbol	Value	Unit
R <sub>th1</sub>	1.00 × 10 <sup>0</sup>	K/W	C <sub>th1</sub>	1.13 × 10 <sup>-3</sup>	Ws/K
R <sub>th2</sub>	1.28 × 10 <sup>0</sup>		C <sub>th2</sub>	3.44 × 10 <sup>-3</sup>	
R <sub>th3</sub>	2.70 × 10 <sup>-1</sup>		C <sub>th3</sub>	3.11 × 10 <sup>-1</sup>	



●Electrical characteristic curves

Fig.1  $V_F - I_F$  Characteristics

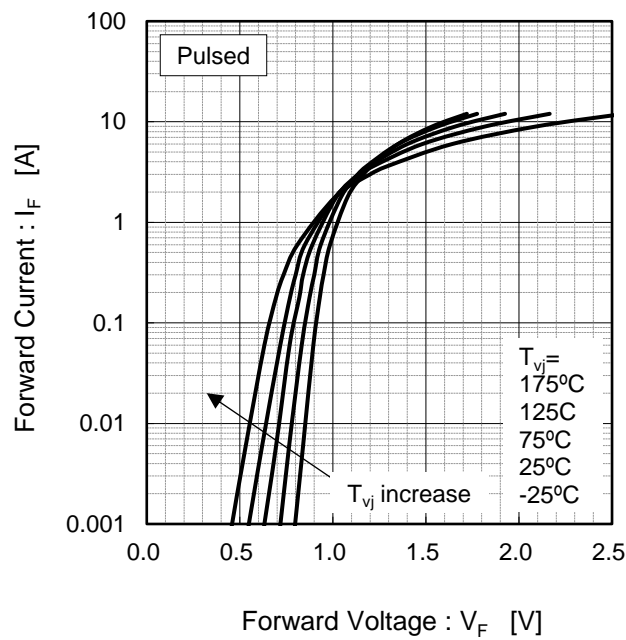


Fig.2  $V_F - I_F$  Characteristics

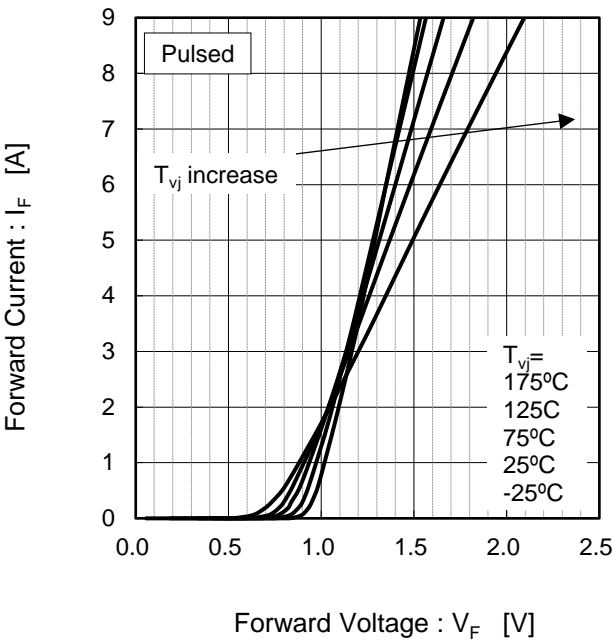


Fig.3  $V_R - I_R$  Characteristics

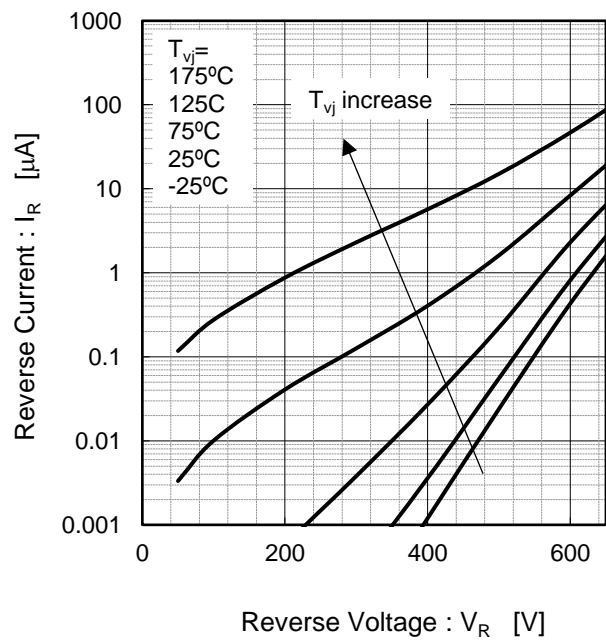
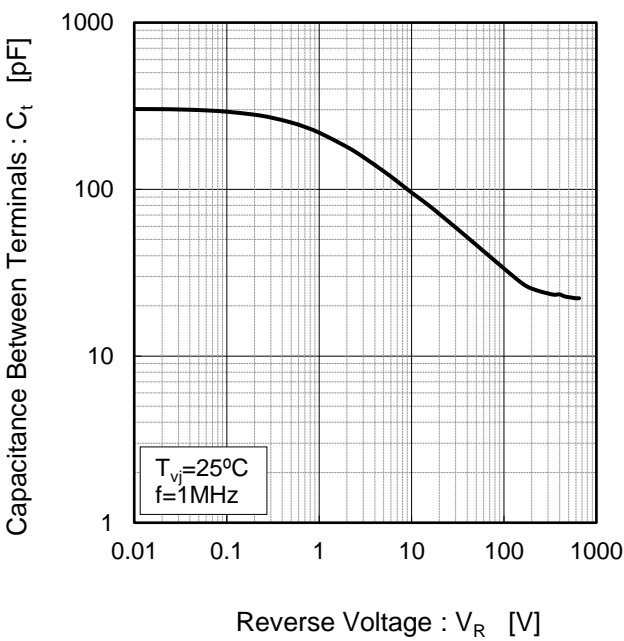


Fig.4  $V_R - C_t$  Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

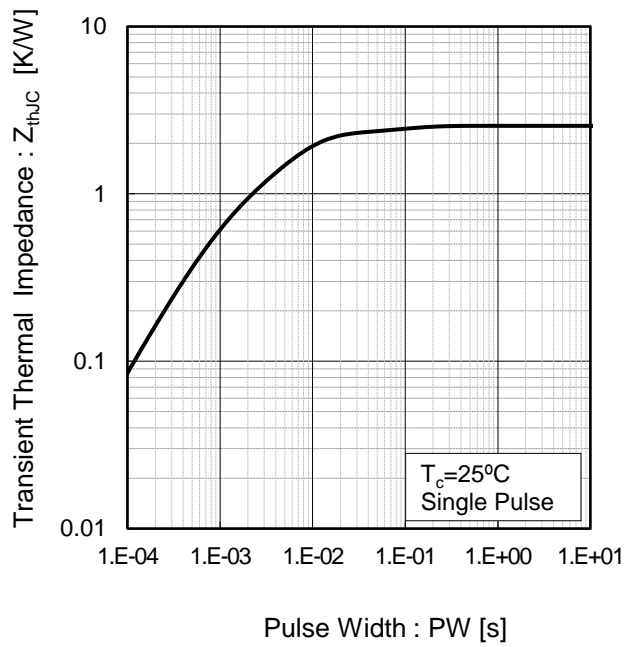


Fig.6 Power Dissipation

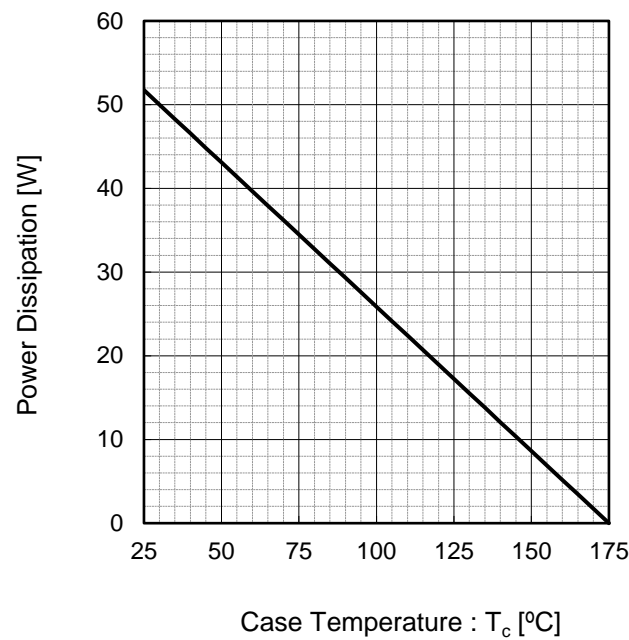
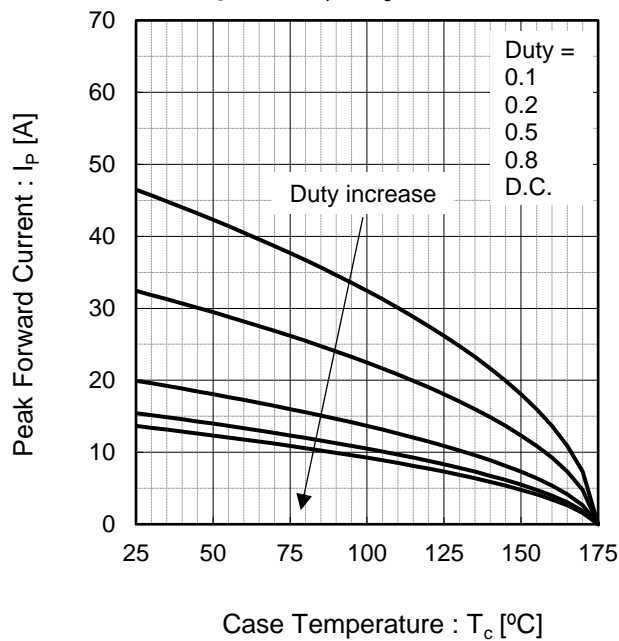
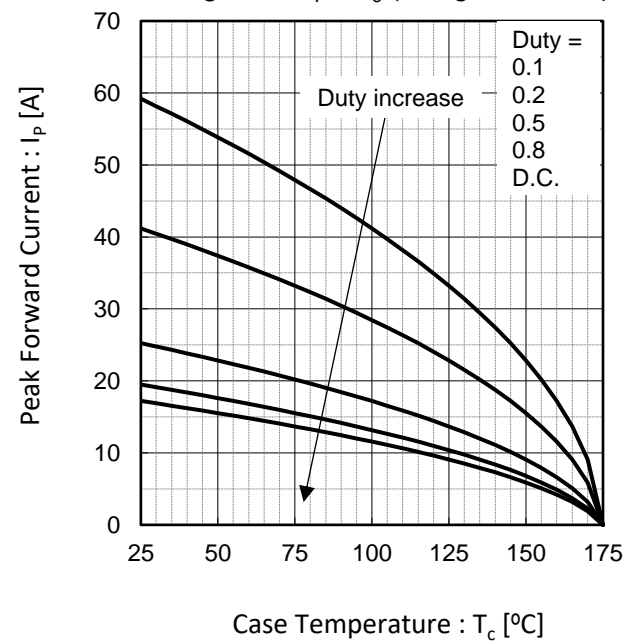


Fig.7\*4 Maximum peak forward current derating curve  $I_P - T_c$



\*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)

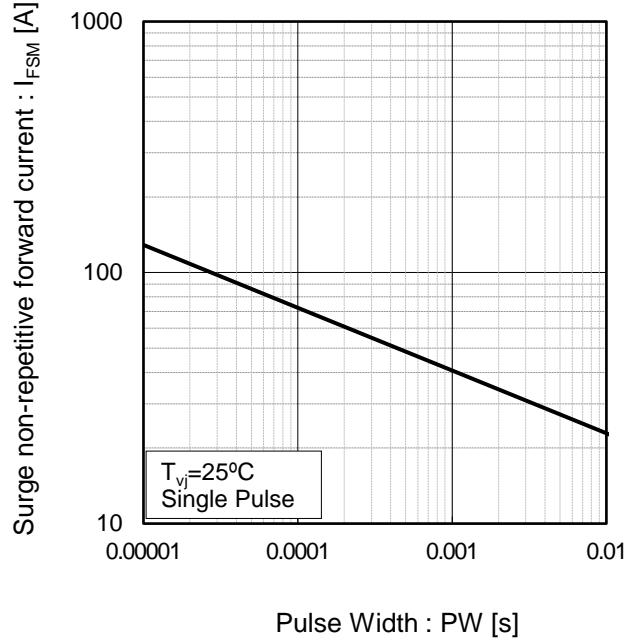
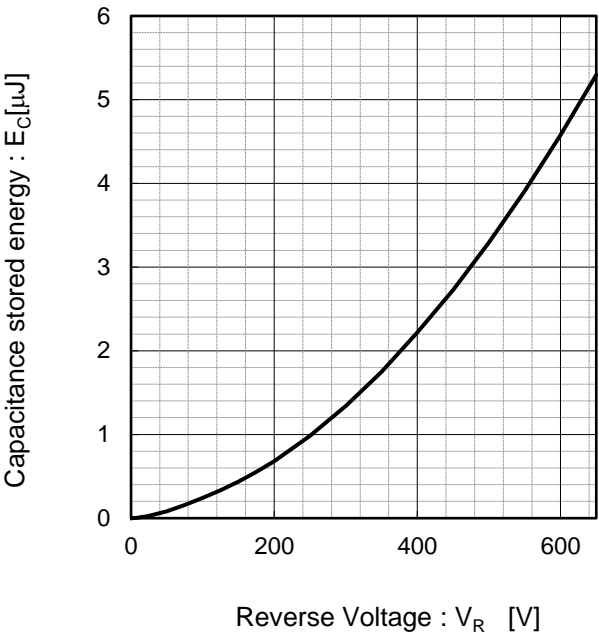
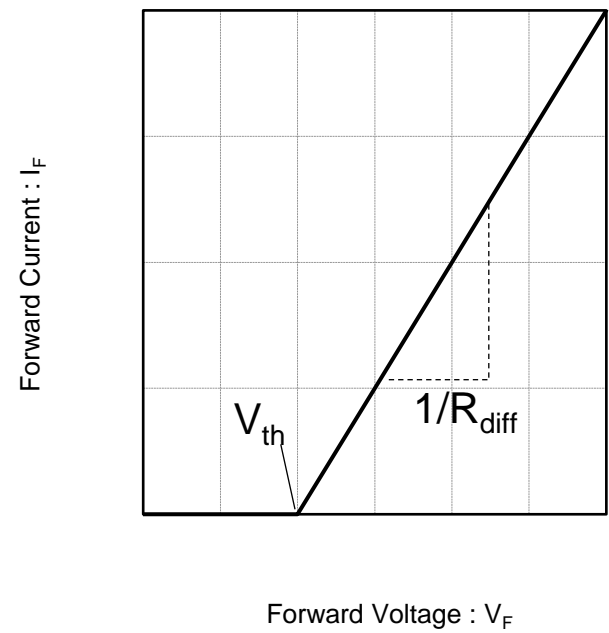


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

Fig.11 Equivalent forward current curve



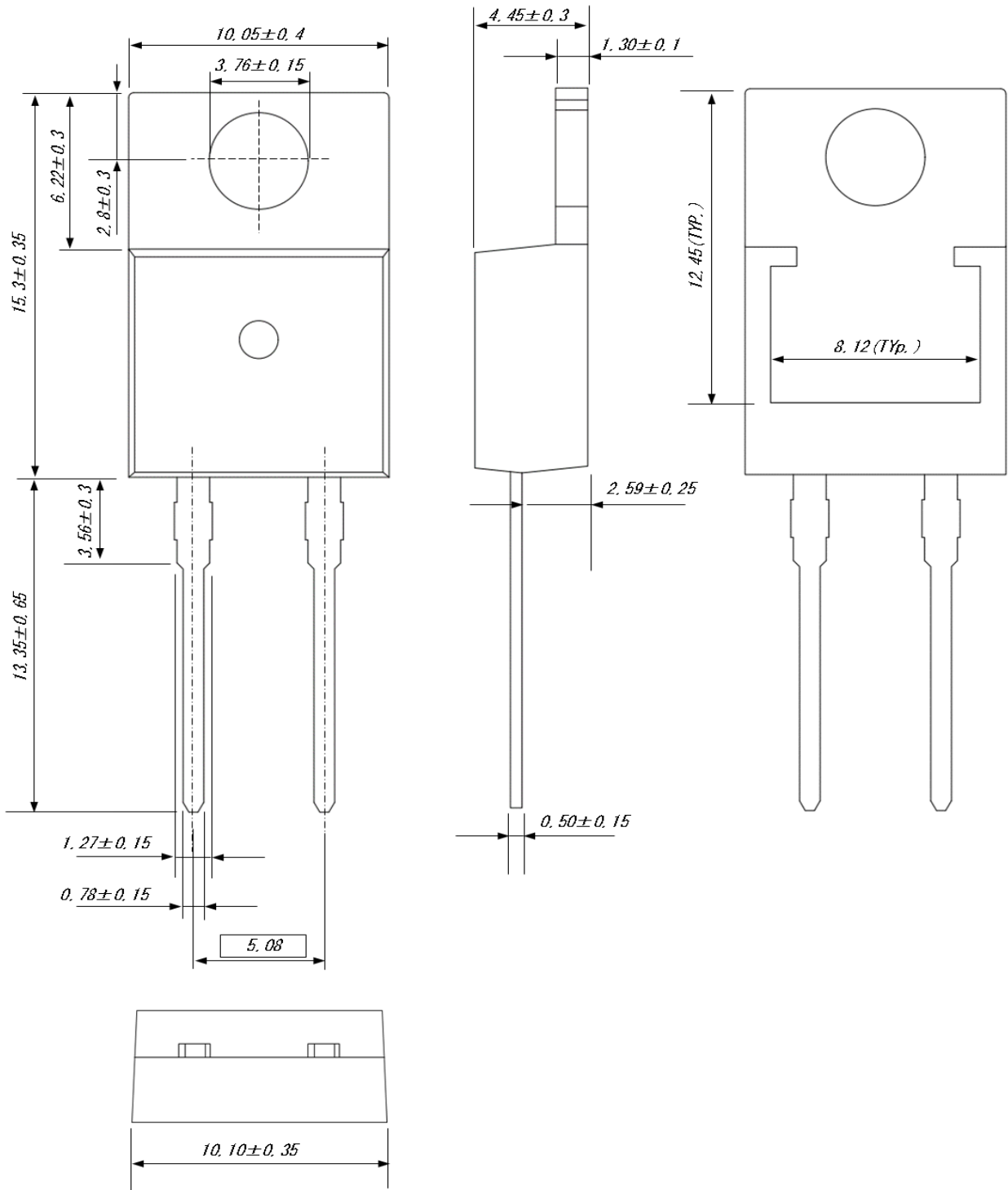
$$V_F = V_{th} + R_{diff} I_F$$

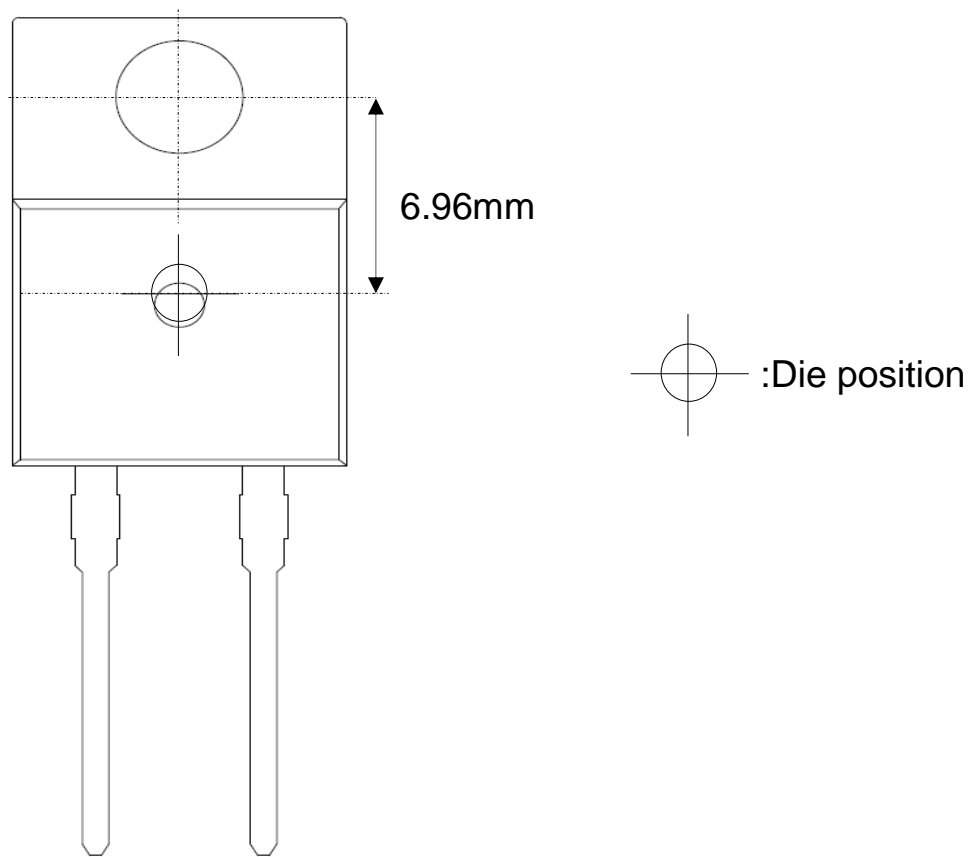
$$V_{th}(T_{vj}) = a_0 + a_1 T_{vj}$$
$$R_{diff}(T_{vj}) = b_0 + b_1 T_{vj} + b_2 T_{vj}^2$$

Symbol	Typical Value	Unit
$a_0$	$9.35 \times 10^{-1}$	V
$a_1$	$-1.12 \times 10^{-3}$	V/°C
$b_0$	$6.63 \times 10^{-2}$	Ω
$b_1$	$1.70 \times 10^{-4}$	Ω/°C
$b_2$	$1.80 \times 10^{-6}$	Ω/°C <sup>2</sup>

$T_{vj}$  in °C;  $-55^{\circ}\text{C} < T_{vj} < 175^{\circ}\text{C}$ ;  $I_F < 12 \text{ A}$

●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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