

$V_R$	650V
$I_F$	20A
$Q_C$	31nC

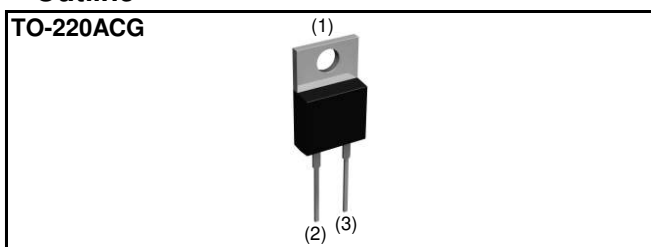
#### ●Features

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

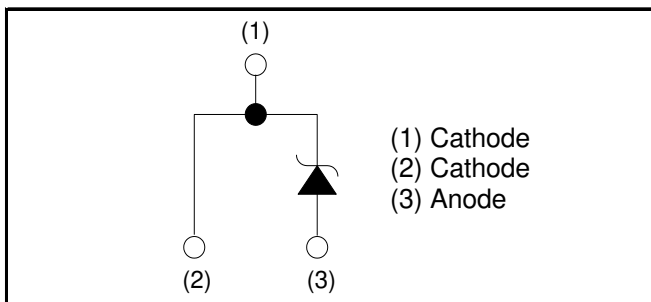
#### ●Applications

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

#### ●Outline



#### ●Inner circuit



#### ●Packaging specifications

Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	50
	Packing code	C17
	Marking	SCS220AG

#### ●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 ( $T_c = 129^\circ\text{C}$ )*1	$I_F$	20	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	$I_{FRM}$	81 *2	A
$i^2t$ value	$\int i^2 dt$	PW=10ms, $T_{vj}=25^\circ\text{C}$	23 $\text{A}^2\text{s}$
		PW=10ms, $T_{vj}=150^\circ\text{C}$	14 $\text{A}^2\text{s}$
Total power dissipation	$P_D$	136 *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** ( $T_{vj} = 25^{\circ}\text{C}$  unless otherwise specified.)

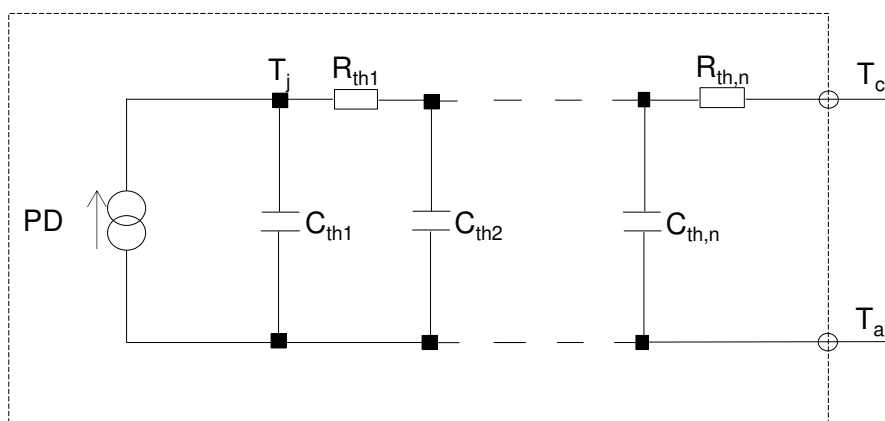
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	$V_{DC}$	$I_R = 4.0\text{mA}$	650	-	-	V
Forward voltage	$V_F$	$I_F = 20\text{A}, T_{vj} = 25^{\circ}\text{C}$	-	1.35	1.55	V
		$I_F = 20\text{A}, T_{vj} = 150^{\circ}\text{C}$	-	1.55	-	V
		$I_F = 20\text{A}, T_{vj} = 175^{\circ}\text{C}$	-	1.63	-	V
Reverse current	$I_R$	$V_R = 600\text{V}, T_{vj} = 25^{\circ}\text{C}$	-	4	400	$\mu\text{A}$
		$V_R = 600\text{V}, T_{vj} = 150^{\circ}\text{C}$	-	60	-	$\mu\text{A}$
		$V_R = 600\text{V}, T_{vj} = 175^{\circ}\text{C}$	-	140	-	$\mu\text{A}$
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	$R_{thJC}$	-	-	0.79	1.1	K/W

**●Typical Transient Thermal Characteristics**

Symbol	Value	Unit	Symbol	Value	Unit
$R_{th1}$	$2.85 \times 10^{-1}$	K/W	$C_{th1}$	$2.86 \times 10^{-3}$	Ws/K
$R_{th2}$	$4.97 \times 10^{-1}$		$C_{th2}$	$6.22 \times 10^{-3}$	
$R_{th3}$	$8.79 \times 10^{-3}$		$C_{th3}$	$1.17 \times 10^0$	



●Electrical characteristic curves

Fig.1  $V_F - I_F$  Characteristics

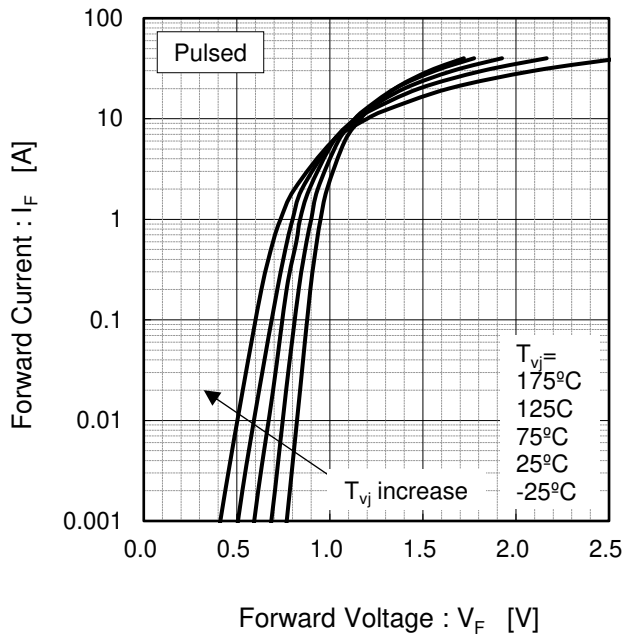


Fig.2  $V_F - I_F$  Characteristics

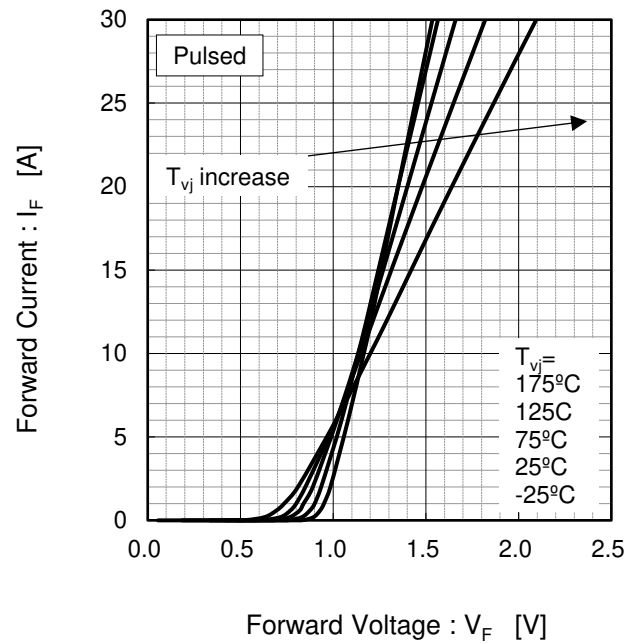


Fig.3  $V_R - I_R$  Characteristics

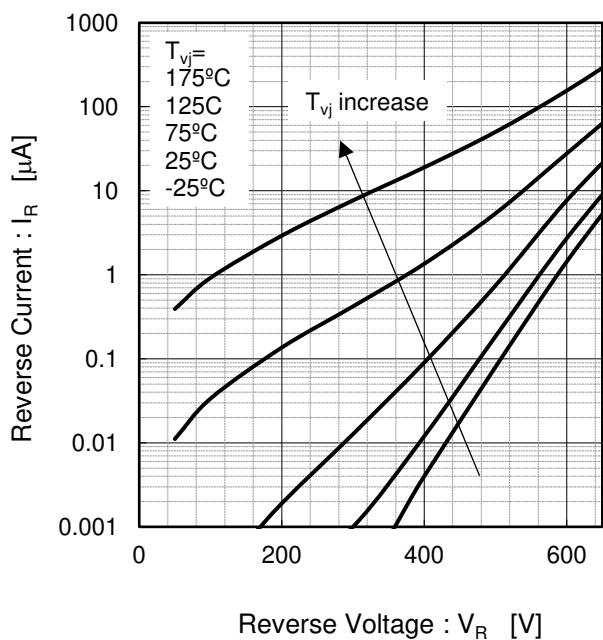
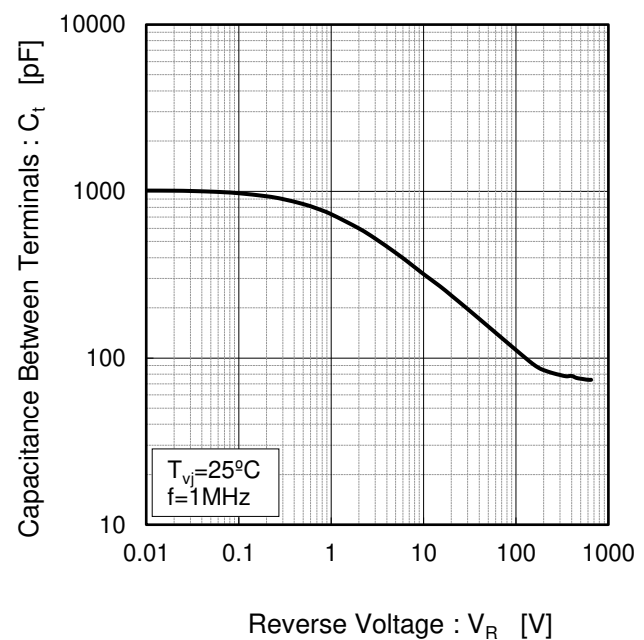


Fig.4  $V_R - C_t$  Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

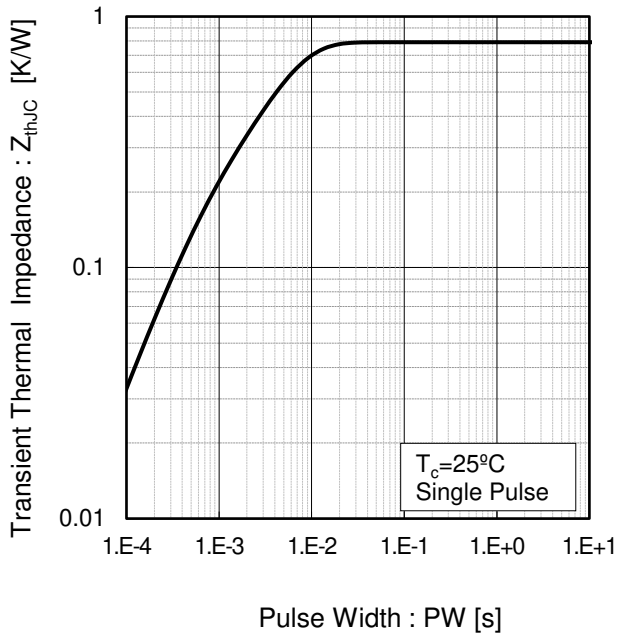


Fig.6 Power Dissipation

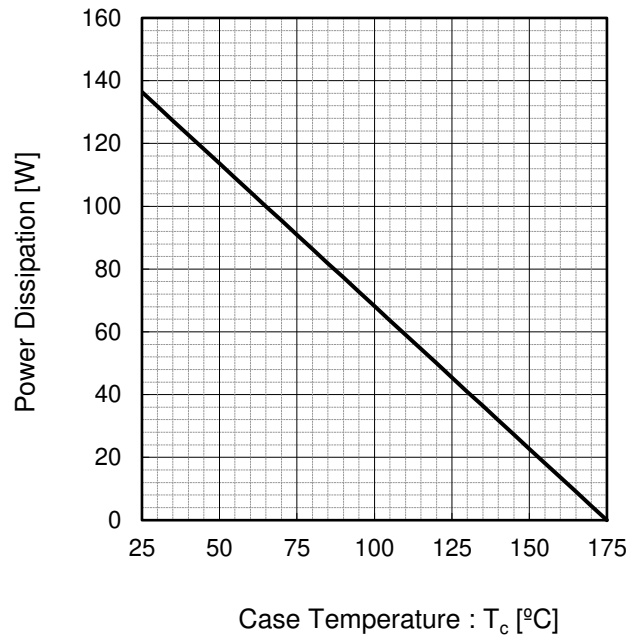
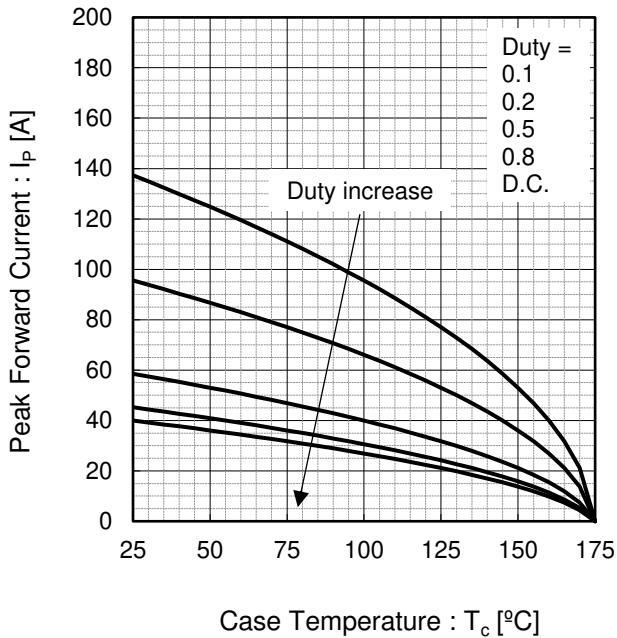
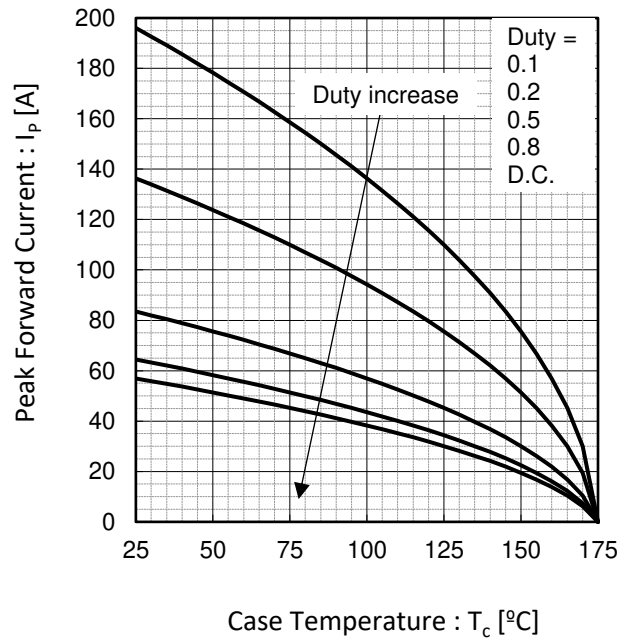


Fig.7\*4 Maximum peak forward current derating curve  $I_p - T_c$



\*4 Based on max 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)

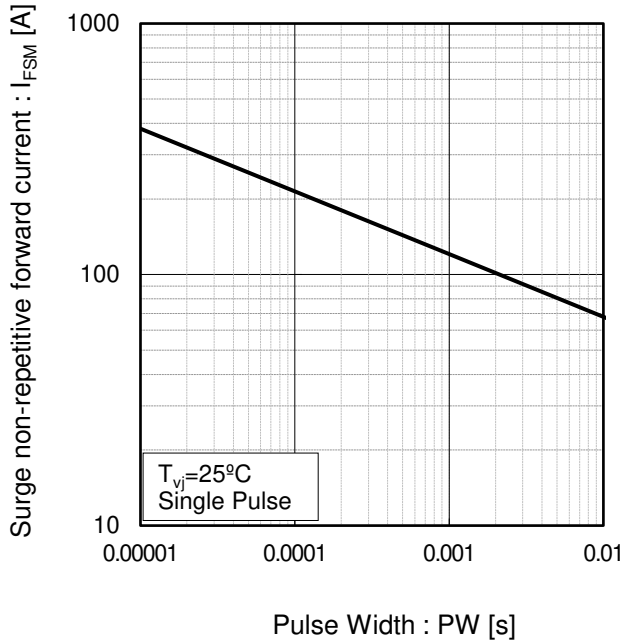
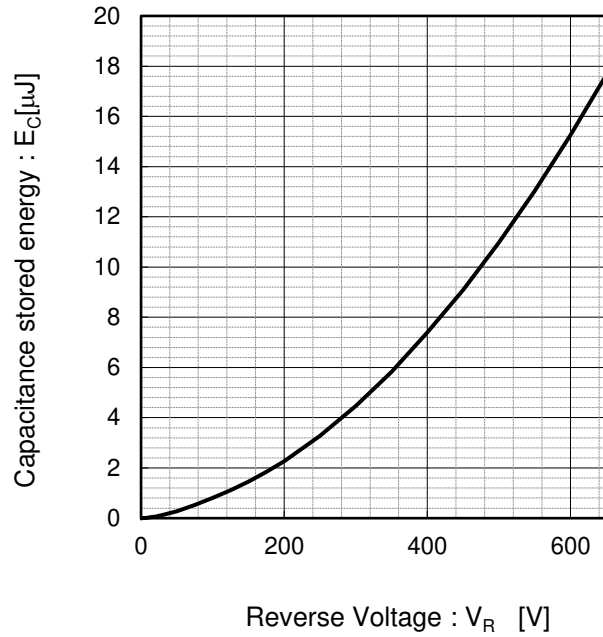
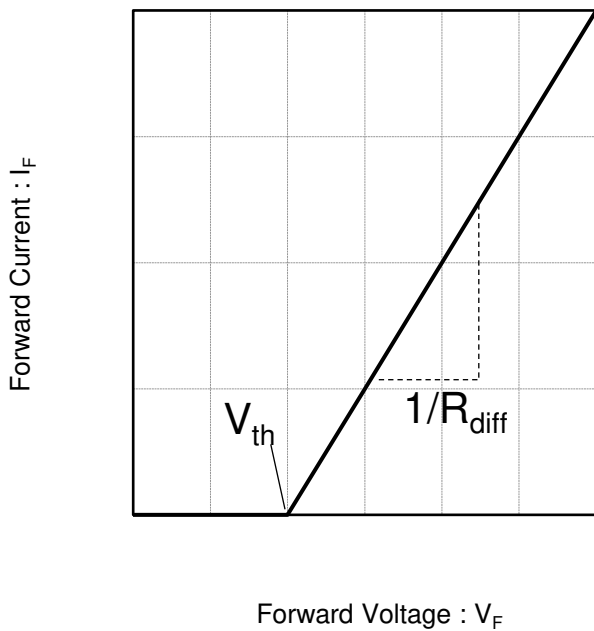


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

Fig.11 Equivalent forward current curve



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

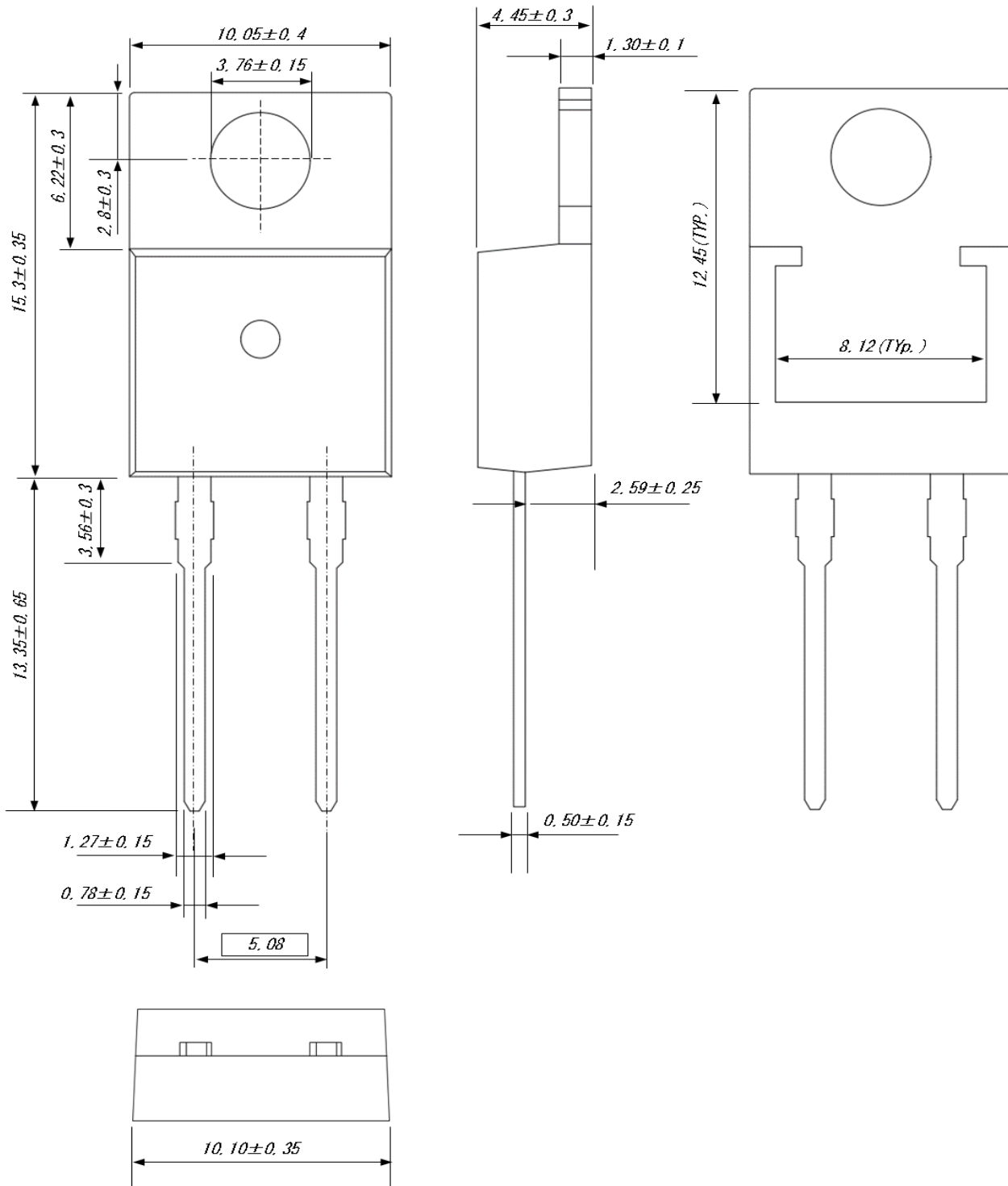
$$V_{th} ( T_{vj} ) = a_0 + a_1 T_{vj}$$

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

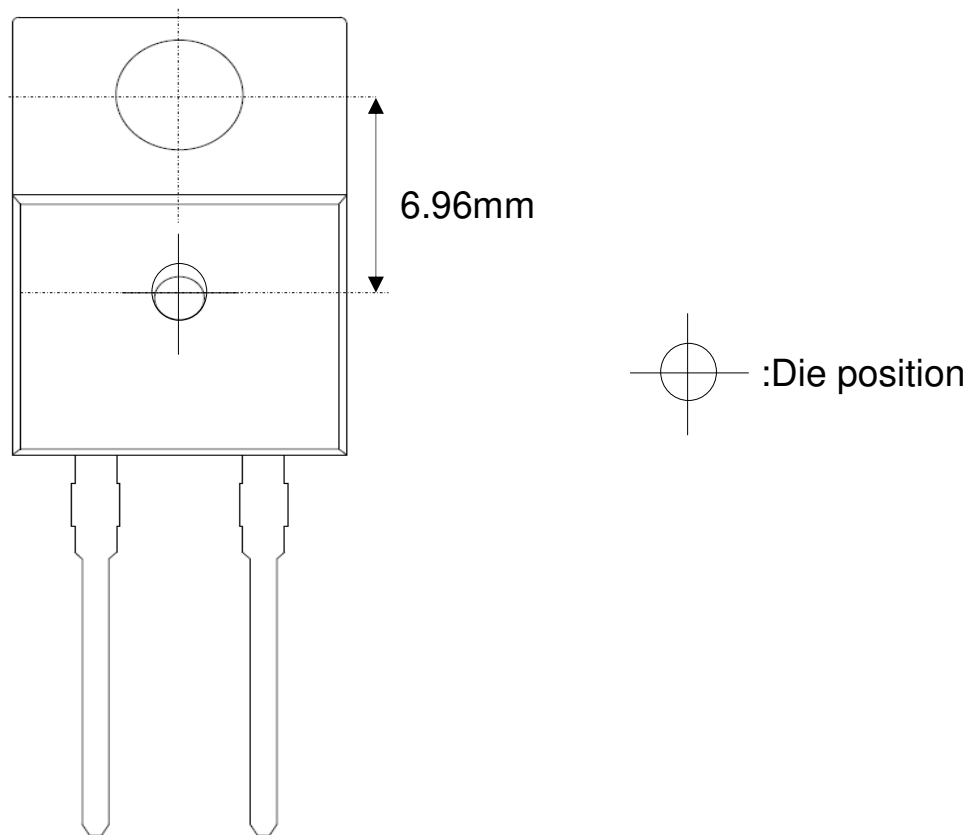
Symbol	Typical Value	Unit
a <sub>0</sub>	9.35 × 10 <sup>-1</sup>	V
a <sub>1</sub>	-1.12 × 10 <sup>-3</sup>	V/°C
b <sub>0</sub>	1.99 × 10 <sup>-2</sup>	Ω
b <sub>1</sub>	5.10 × 10 <sup>-5</sup>	Ω/°C
b <sub>2</sub>	5.40 × 10 <sup>-7</sup>	Ω/°C <sup>2</sup>

T<sub>vj</sub> in °C; -55 °C < T<sub>vj</sub> < 175 °C ; I<sub>F</sub> < 40 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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