

$V_R$	650V
$I_F$	20A/40A*
$Q_C$	31nC(Per leg)

(\*Per leg/ Both legs)

### ●Features

- 1) AEC-Q101 qualified
- 2) Low forward voltage
- 3) Negligible recovery time/current
- 4) Temperature independent switching behavior

### ●Applications

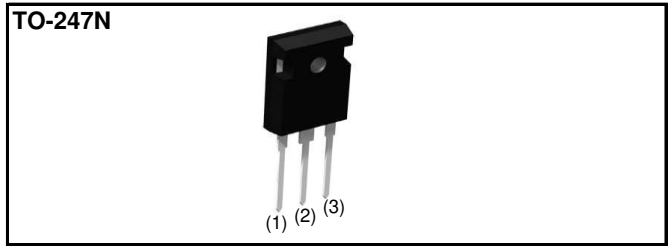
- On Board Charger
- DC/DC Converter
- Wireless Charger
- EV Charger

### ●Absolute maximum ratings ( $T_{vj} = 25^\circ\text{C}$ )

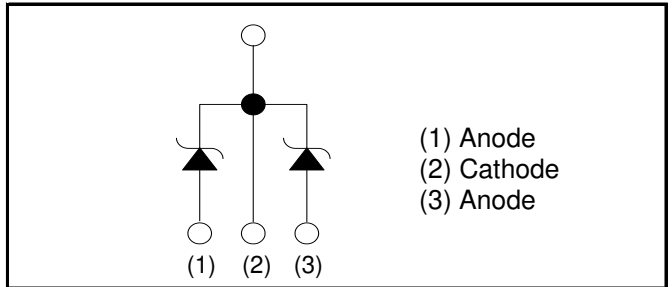
Parameter	Symbol	Value	Unit	
Reverse voltage (repetitive peak)	$V_{RM}$	650	V	
Reverse voltage (DC)	$V_R$	650	V	
Continuous forward current *3 ( $T_c = 129^\circ\text{C}$ )	$I_F$	20/40	A	
Surge non-repetitive forward current *3	$I_{FSM}$	PW=10ms sinusoidal, $T_{vj}=25^\circ\text{C}$	67/130	A
		PW=10ms sinusoidal, $T_{vj}=150^\circ\text{C}$	53/100	A
		PW=10μs square, $T_{vj}=25^\circ\text{C}$	260/520	A
Repetitive peak forward current *3	$I_{FRM}$	81/160*1	A	
$i^2t$ value*3	$\int i^2 dt$	PW=10ms, $T_{vj}=25^\circ\text{C}$	22/91	$\text{A}^2\text{s}$
		PW=10ms, $T_{vj}=150^\circ\text{C}$	14/56	$\text{A}^2\text{s}$
Total power dissipation *3	$P_D$	130/270*2	W	
Virtual Junction temperature	$T_{vj}$	175	$^\circ\text{C}$	
Range of storage temperature	$T_{stg}$	-55 to +175	$^\circ\text{C}$	

\*1  $T_c=100^\circ\text{C}$ ,  $T_{vj}=150^\circ\text{C}$ , Duty cycle=10% \*2  $T_c=25^\circ\text{C}$  \*3 Per leg/ Both legs

### ●Outline



### ●Inner circuit



### ●Packaging specifications

Package	TO-247N	
Type	Packing	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	30
	Packing code	C11
	Marking	SCS240AE2

**●Electrical characteristics** ( $T_{vj} = 25^{\circ}\text{C}$ ) (Per Leg)

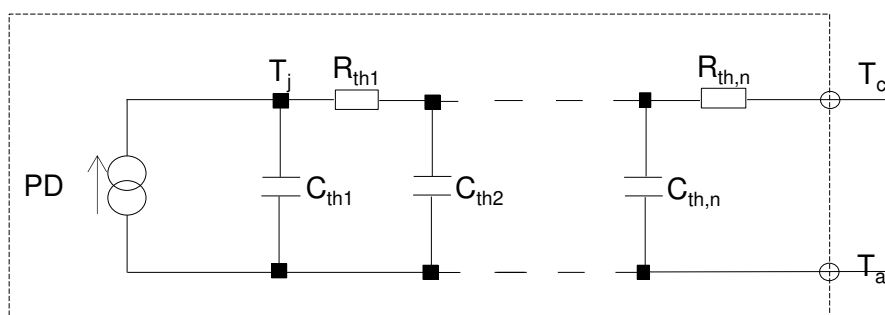
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	$V_{DC}$	$I_R=4.0\text{mA}$	650	-	-	V
Forward voltage	$V_F$	$I_F=20\text{A}, T_{vj}=25^{\circ}\text{C}$	-	1.35	1.55	V
		$I_F=20\text{A}, T_{vj}=150^{\circ}\text{C}$	-	1.55	-	V
		$I_F=20\text{A}, T_{vj}=175^{\circ}\text{C}$	-	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	$R_{thJC}$	Per Leg	-	0.92	1.1	K/W
		Both Legs	-	0.46	0.55	K/W

**●Typical Transient Thermal Characteristics (Per Leg)**

Symbol	Value	Unit	Symbol	Value	Unit
$R_{th1}$	$1.94 \times 10^{-1}$	K/W	$C_{th1}$	$3.08 \times 10^{-3}$	Ws/K
$R_{th2}$	$7.23 \times 10^{-1}$		$C_{th2}$	$8.36 \times 10^{-3}$	
$R_{th3}$	$5.52 \times 10^{-3}$		$C_{th3}$	$1.03 \times 10^0$	



●Electrical characteristic curves

Fig.1  $V_F - I_F$  Characteristics (Per Leg)

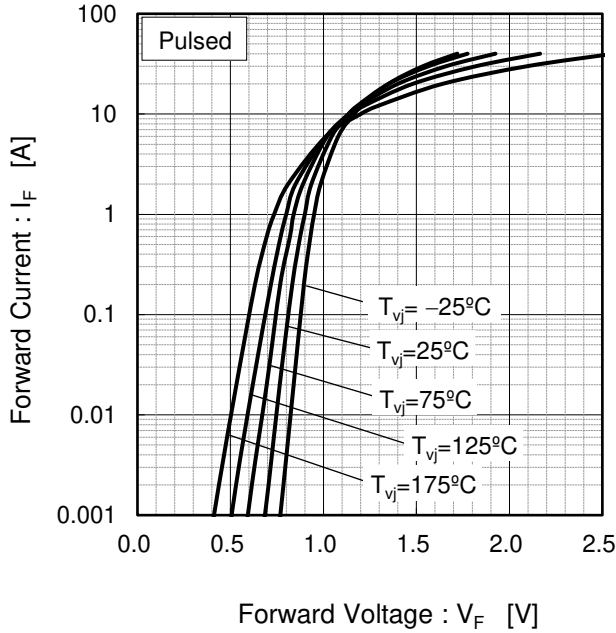


Fig.2  $V_F - I_F$  Characteristics (Per Leg)

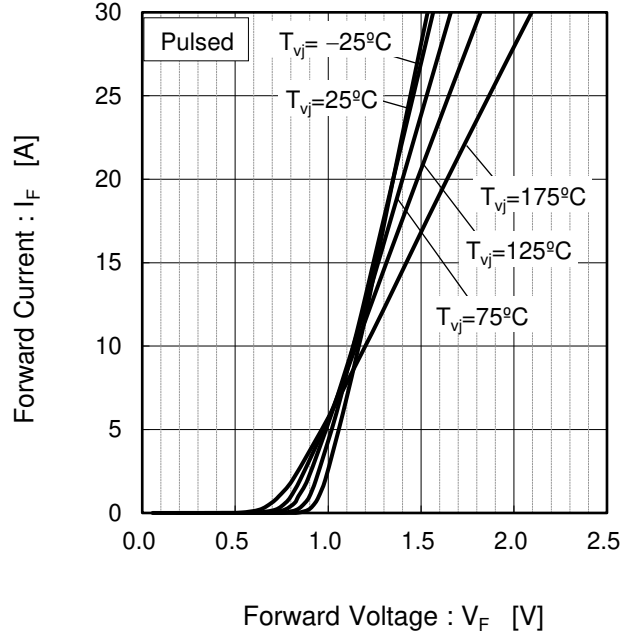


Fig.3  $V_R - I_R$  Characteristics (Per Leg)

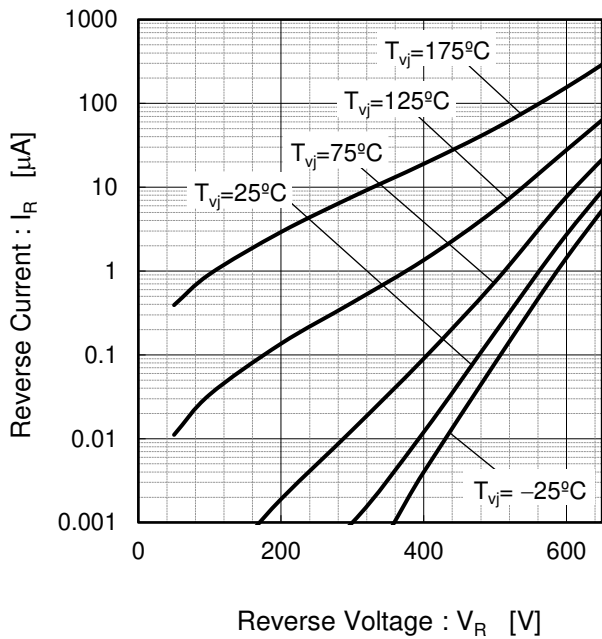
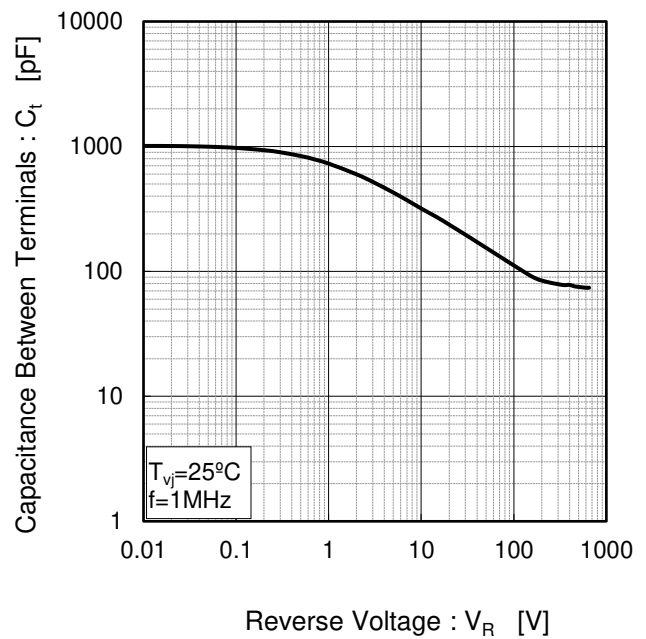


Fig.4  $V_R - C_t$  Characteristics (Per Leg)



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width (Per Leg)

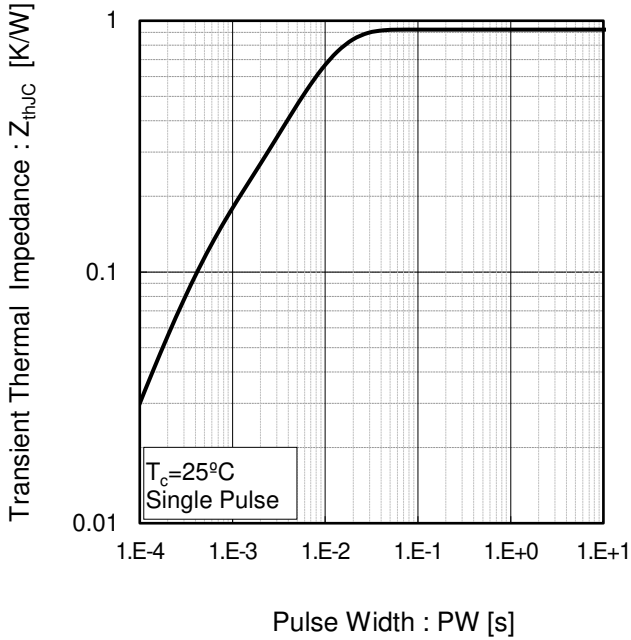


Fig.6 Power Dissipation (Per Leg)

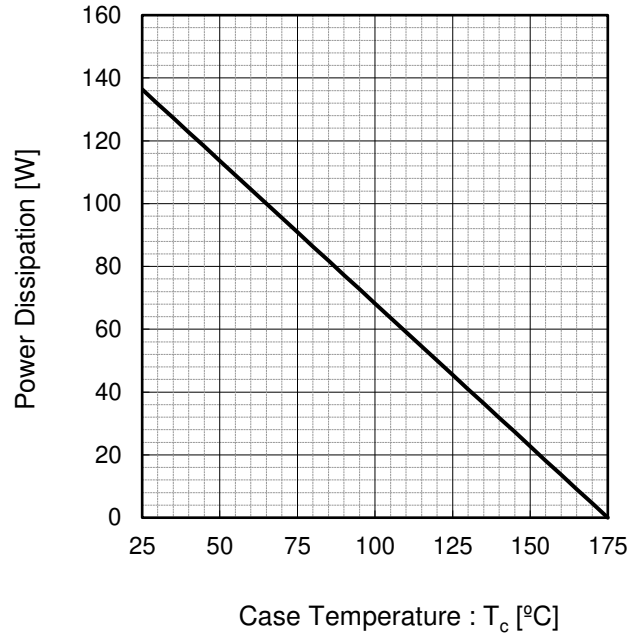
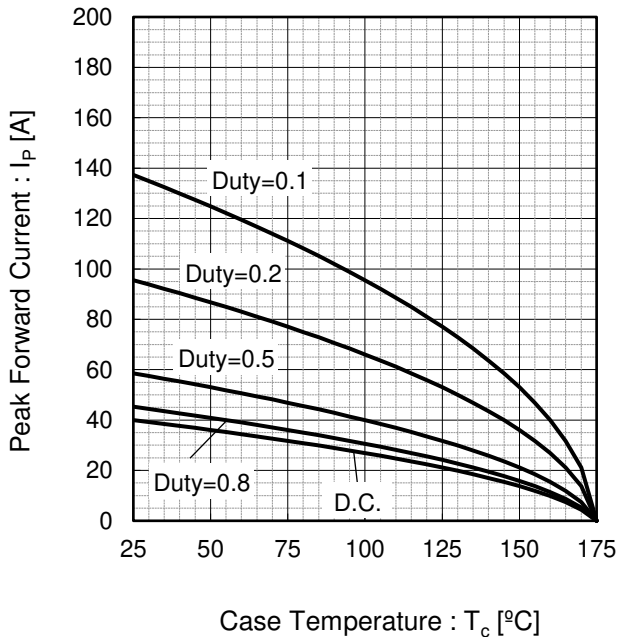
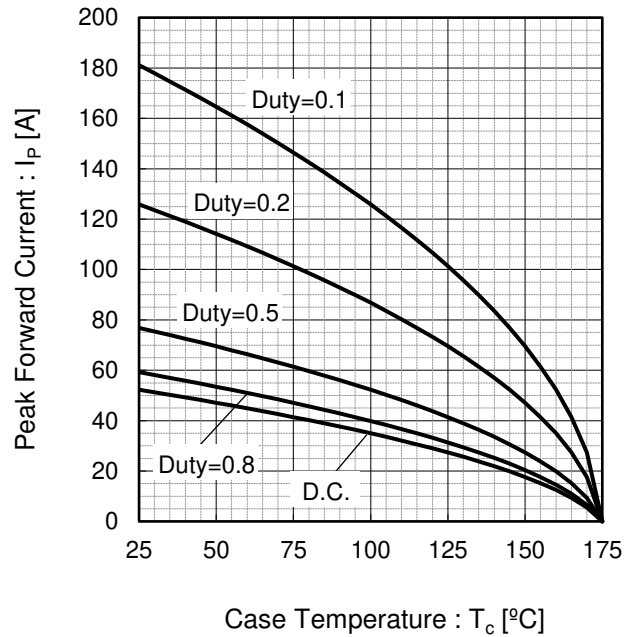


Fig.7\*5 Maximum peak forward current derating curve  $I_P - T_C$  (Per Leg)



\*4 Based on max Vf, max  $R_{thjC}$   
Valid for switching of above 10kHz, excluding D.C. curve.

Fig.8\*6 Typical peak forward current derating curve  $I_P - T_C$  (Per Leg, 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) (Per Leg)

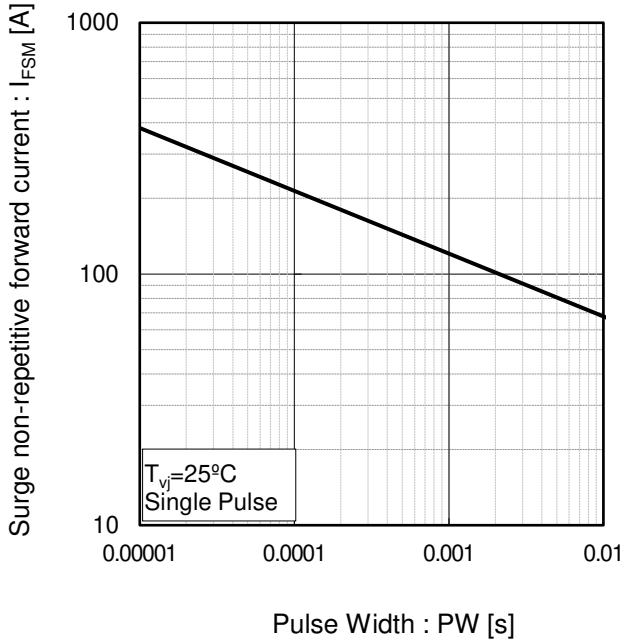
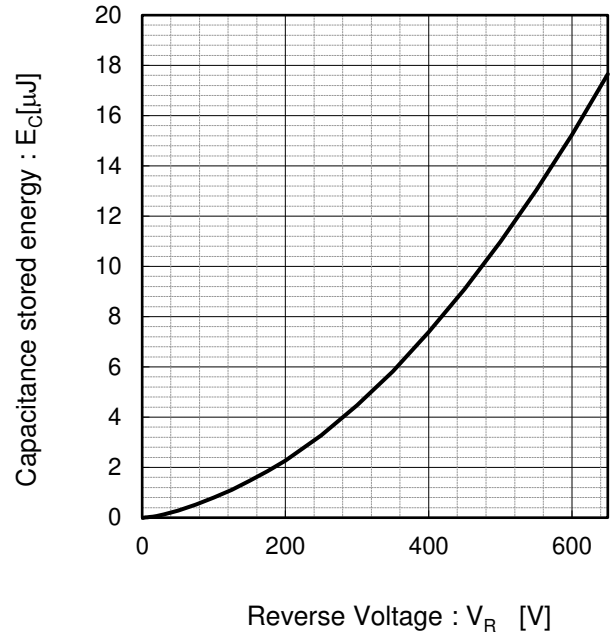
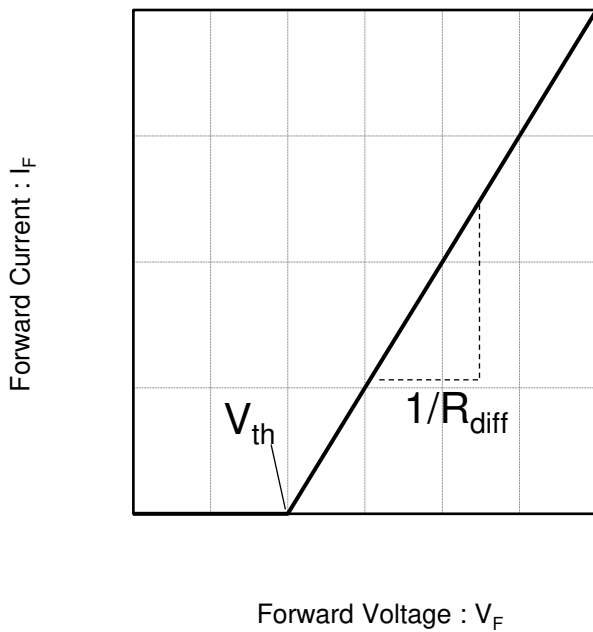


Fig.10 Typical capacitance store energy (Per Leg)



●Simplified forward characteristic model (Per Leg)

Fig.11 Equivalent forward current curve



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

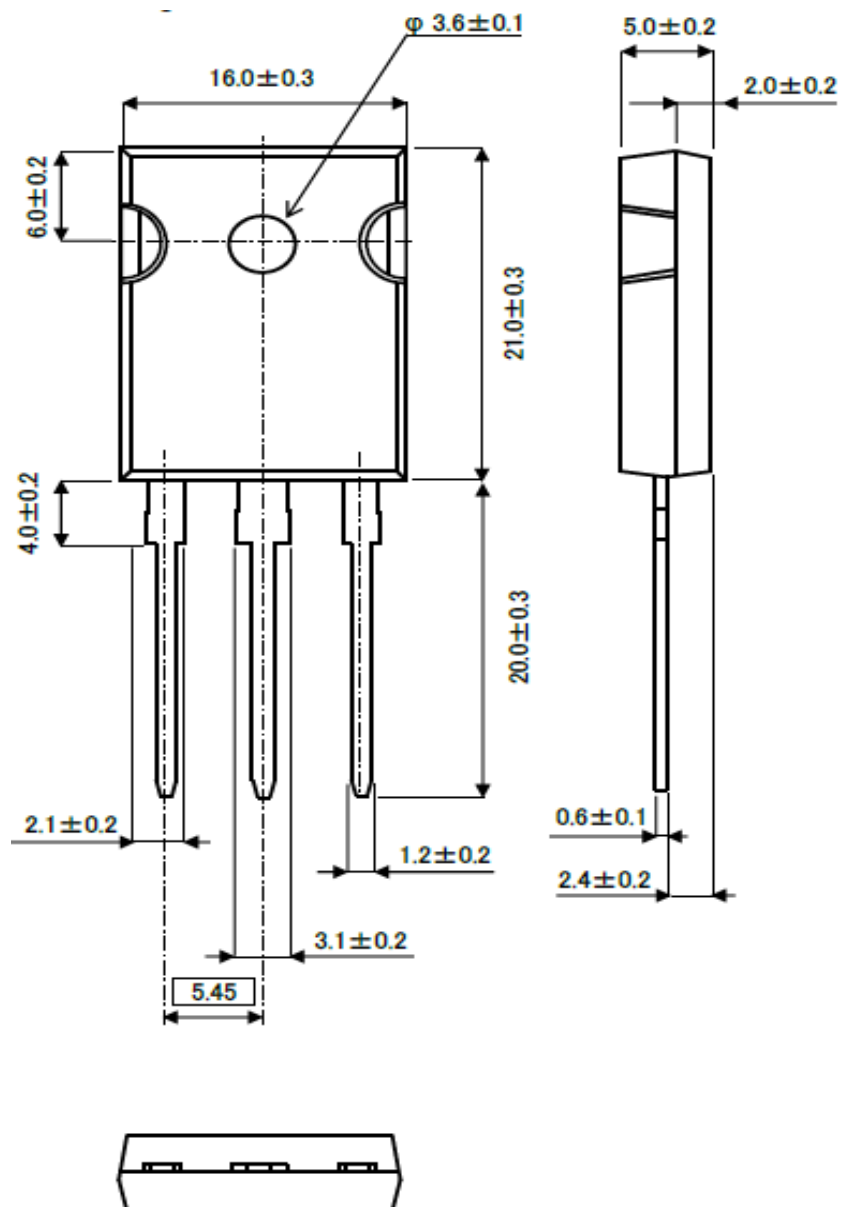
$$V_{th} ( T_{vj} ) = a_0 + a_1 T_{vj}$$

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

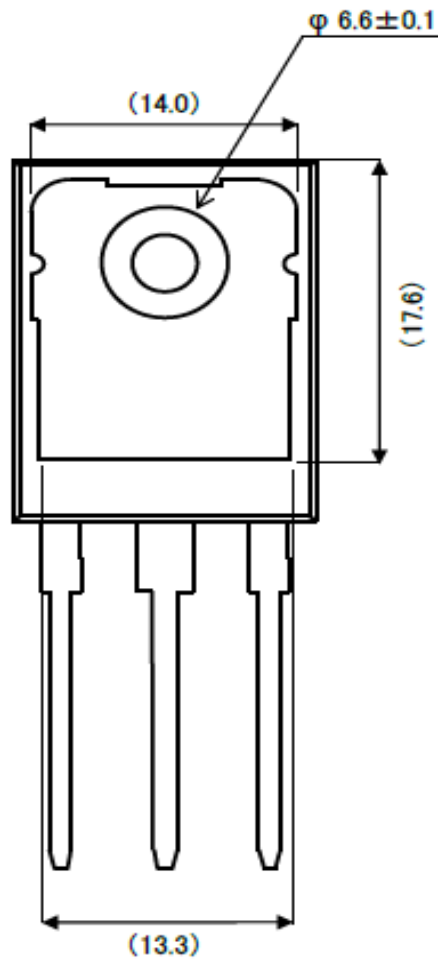
Symbol	Typical Value	Unit
$a_0$	$9.35 \times 10^{-1}$	V
$a_1$	$-1.12 \times 10^{-3}$	V/°C
$b_0$	$1.99 \times 10^{-2}$	Ω
$b_1$	$5.10 \times 10^{-5}$	Ω/°C
$b_2$	$5.40 \times 10^{-7}$	Ω/°C <sup>2</sup>

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

## ● Package Dimensions

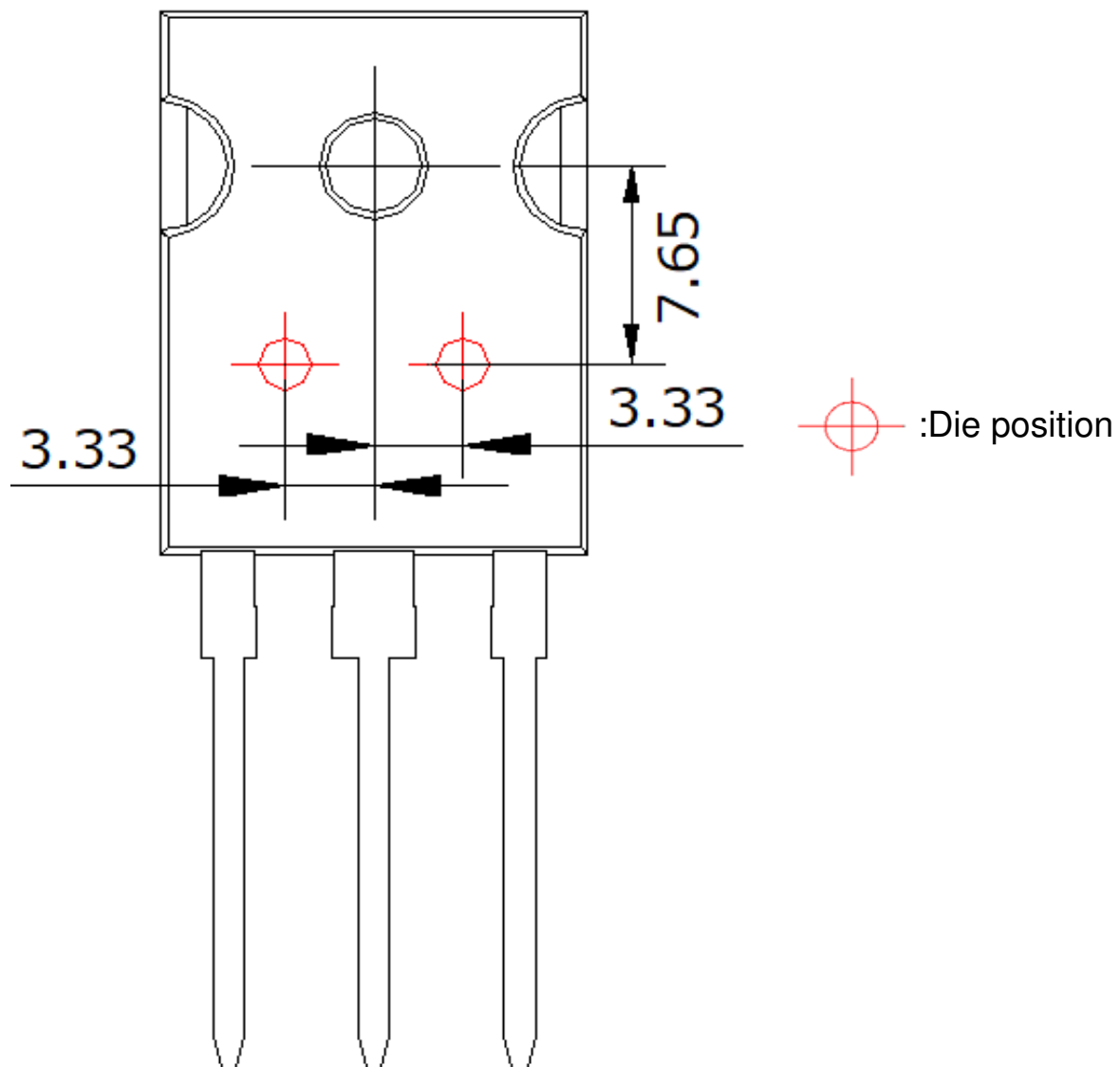


Unit: mm



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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