

$V_R$	1200V
$I_F$	10A/20A*
$Q_C$	34nC(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

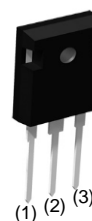
### ●Absolute maximum ratings ( $T_{vj} = 25^{\circ}\text{C}$ )

Parameter		Symbol	Value	Unit
Reverse voltage (repetitive peak)		$V_{RM}$	1200	V
Reverse voltage (DC)		$V_R$	1200	V
Continuous forward current *3 ( $T_c = 143^{\circ}\text{C}$ )		$I_F$	10/20	A
Surge non-repetitive forward current *3	PW=10ms sinusoidal, $T_{vj}=25^{\circ}\text{C}$	$I_{FSM}$	42/84	A
	PW=10ms sinusoidal, $T_{vj}=150^{\circ}\text{C}$		31/62	A
	PW=10μs square, $T_{vj}=25^{\circ}\text{C}$		160/320	A
Repetitive peak forward current *3		$I_{FRM}$	47/94*1	A
$i^2t$ value*3	PW=10ms, $T_{vj}=25^{\circ}\text{C}$	$\int i^2 dt$	9/36	$\text{A}^2\text{s}$
	PW=10ms, $T_{vj}=150^{\circ}\text{C}$		4.8/19	$\text{A}^2\text{s}$
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	$^{\circ}\text{C}$

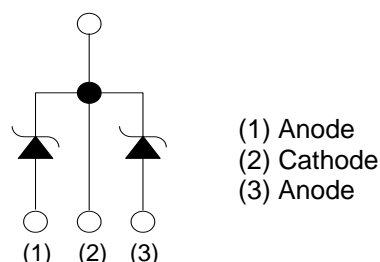
\*1  $T_c=100^{\circ}\text{C}$ ,  $T_{vj}=150^{\circ}\text{C}$ , Duty cycle=10% \*2  $T_c=25^{\circ}\text{C}$  \*3 Per leg/ Both legs

### ●Outline

TO-247N



### ●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	SCS220KE2

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

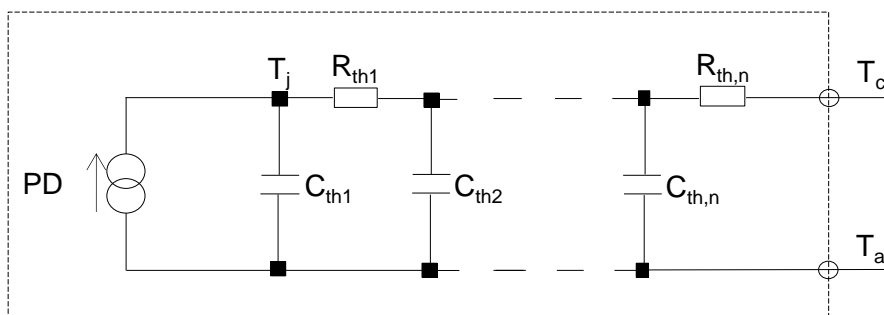
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	$V_{DC}$	$I_R = 0.2\text{mA}$	1200	-	-	V
Forward voltage	$V_F$	$I_F = 10\text{A}, T_{vj} = 25^{\circ}\text{C}$	-	1.4	1.6	V
		$I_F = 10\text{A}, T_{vj} = 150^{\circ}\text{C}$	-	1.8	-	V
		$I_F = 10\text{A}, T_{vj} = 175^{\circ}\text{C}$	-	1.9	-	V
Reverse current	$I_R$	$V_R = 1200\text{V}, T_{vj} = 25^{\circ}\text{C}$	-	10	200	$\mu\text{A}$
		$V_R = 1200\text{V}, T_{vj} = 150^{\circ}\text{C}$	-	80	-	$\mu\text{A}$
		$V_R = 1200\text{V}, T_{vj} = 175^{\circ}\text{C}$	-	130	-	$\mu\text{A}$
Total capacitance	$C$	$V_R = 1\text{V}, f = 1\text{MHz}$	-	530	-	pF
		$V_R = 600\text{V}, f = 1\text{MHz}$	-	43	-	pF
Total capacitive charge	$Q_C$	$V_R = 800\text{V}, di/dt = 500\text{A}/\mu\text{s}$	-	34	-	nC
Switching time	$t_C$	$V_R = 800\text{V}, di/dt = 500\text{A}/\mu\text{s}$	-	15	-	ns

**●Thermal characteristics**

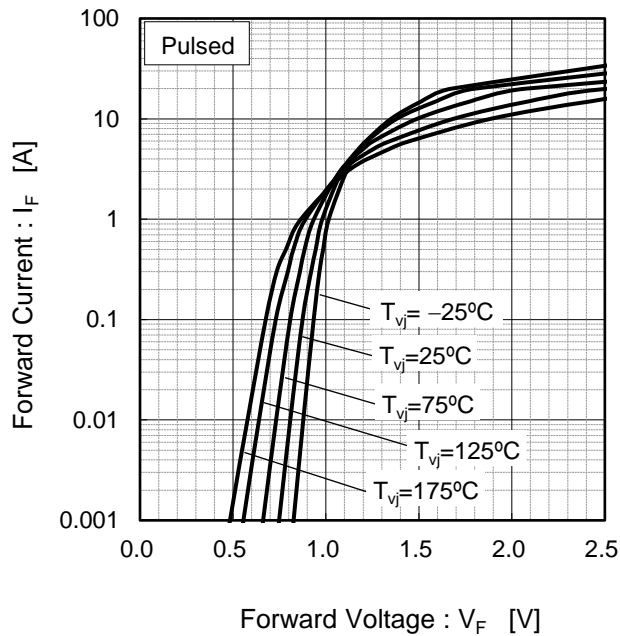
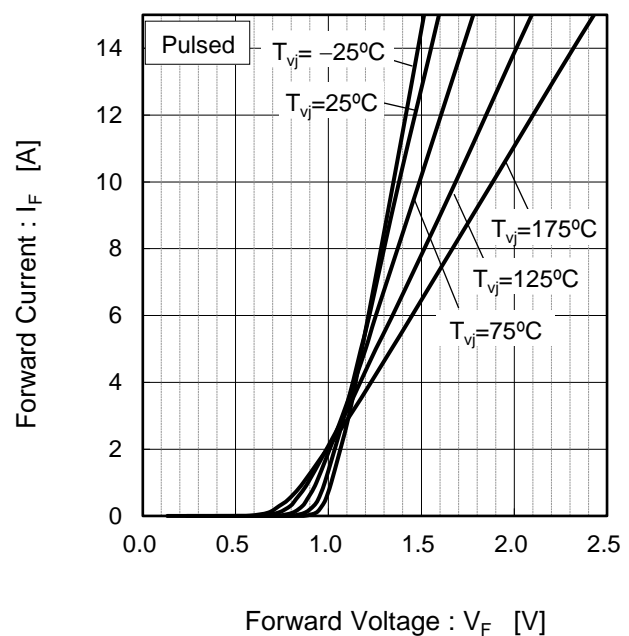
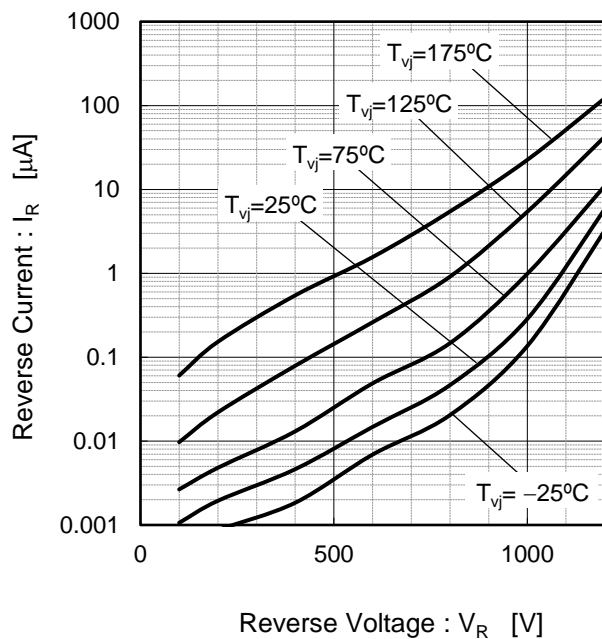
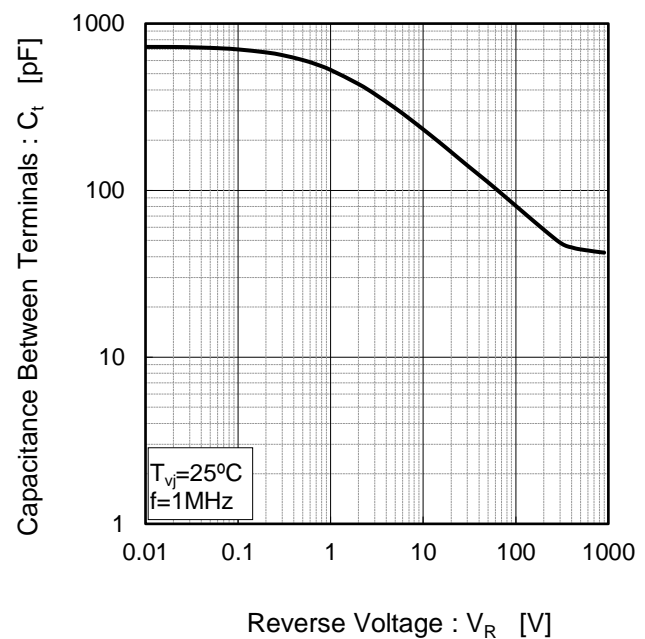
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{thJC}$	Per Leg	-	0.9	1.1	K/W
		Both Legs	-	0.45	0.55	K/W

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

Symbol	Value	Unit	Symbol	Value	Unit
$R_{th1}$	$2.88 \times 10^{-1}$	K/W	$C_{th1}$	$3.30 \times 10^{-3}$	Ws/K
$R_{th2}$	$5.59 \times 10^{-1}$		$C_{th2}$	$1.03 \times 10^{-2}$	
$R_{th3}$	$2.13 \times 10^{-1}$		$C_{th3}$	$2.90 \times 10^{-1}$	



# ●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)

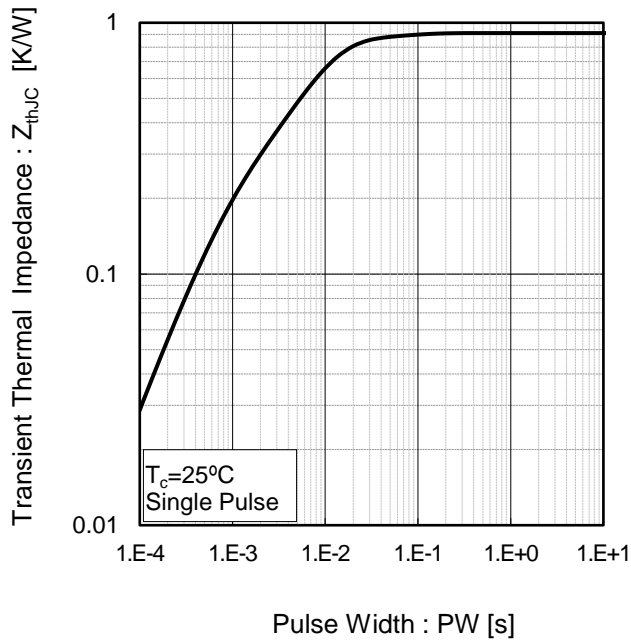


Fig.6 Power Dissipation (Per Leg)

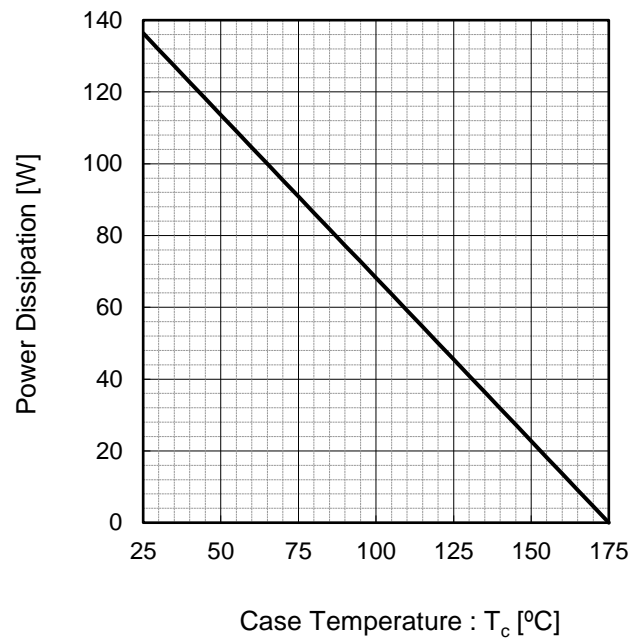
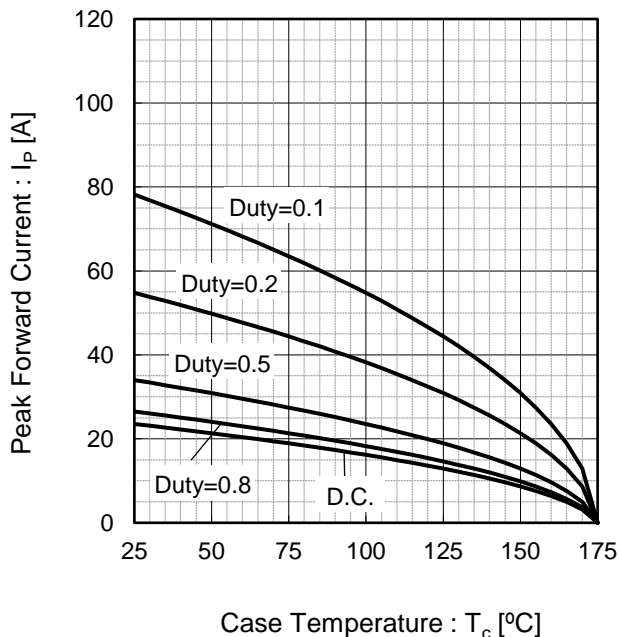
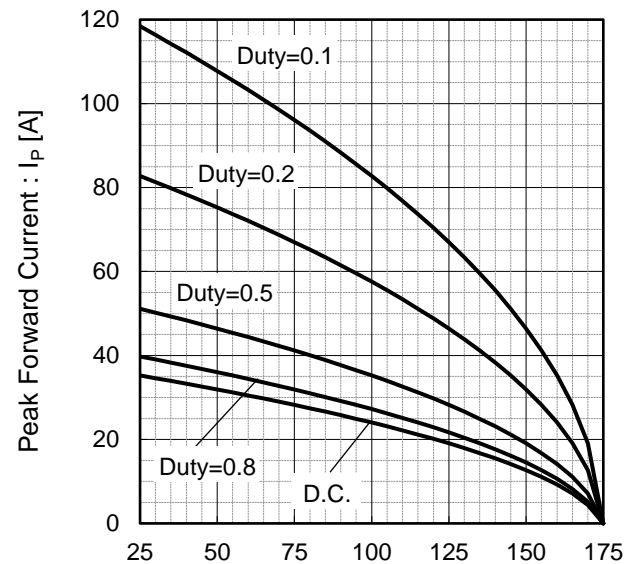


Fig.7\*4 Maximum peak forward current derating curve  $I_P - T_c$  (Per Leg)



Case Temperature :  $T_c$  [ $^\circ\text{C}$ ]  
 \*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  $I_P - T_c$  (Per Leg, Not guaranteed)



Case Temperature :  $T_c$  [ $^\circ\text{C}$ ]  
 \*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) (Per Leg)

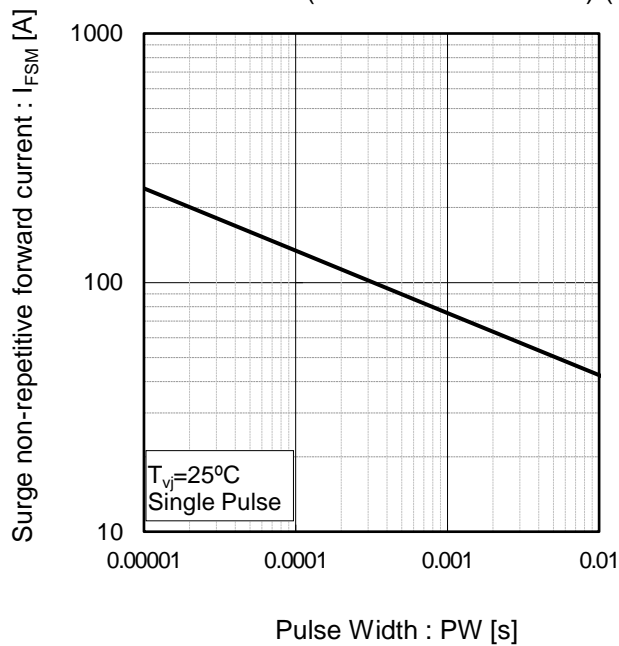
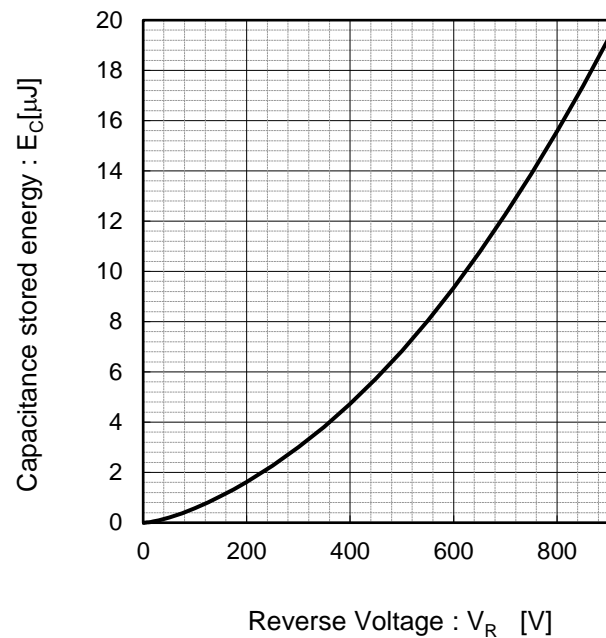
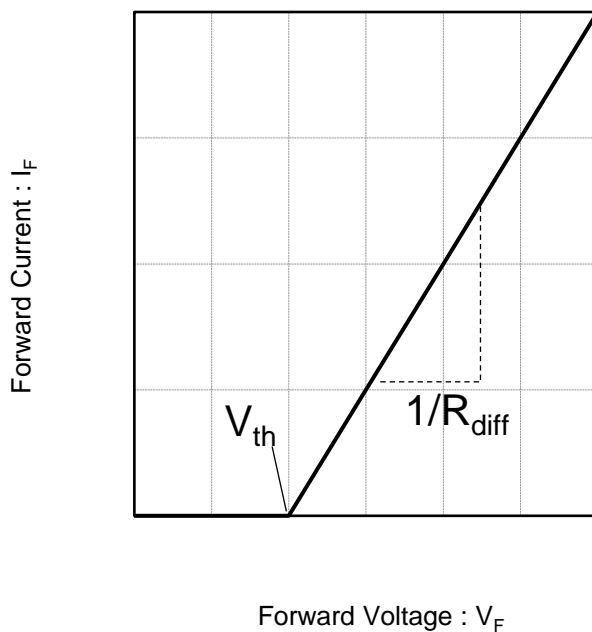


Fig.10 Typical capacitance store energy (Per Leg)



## ●Simplified forward characteristic model (Per Leg)

Fig.11 Equivalent forward current curve



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

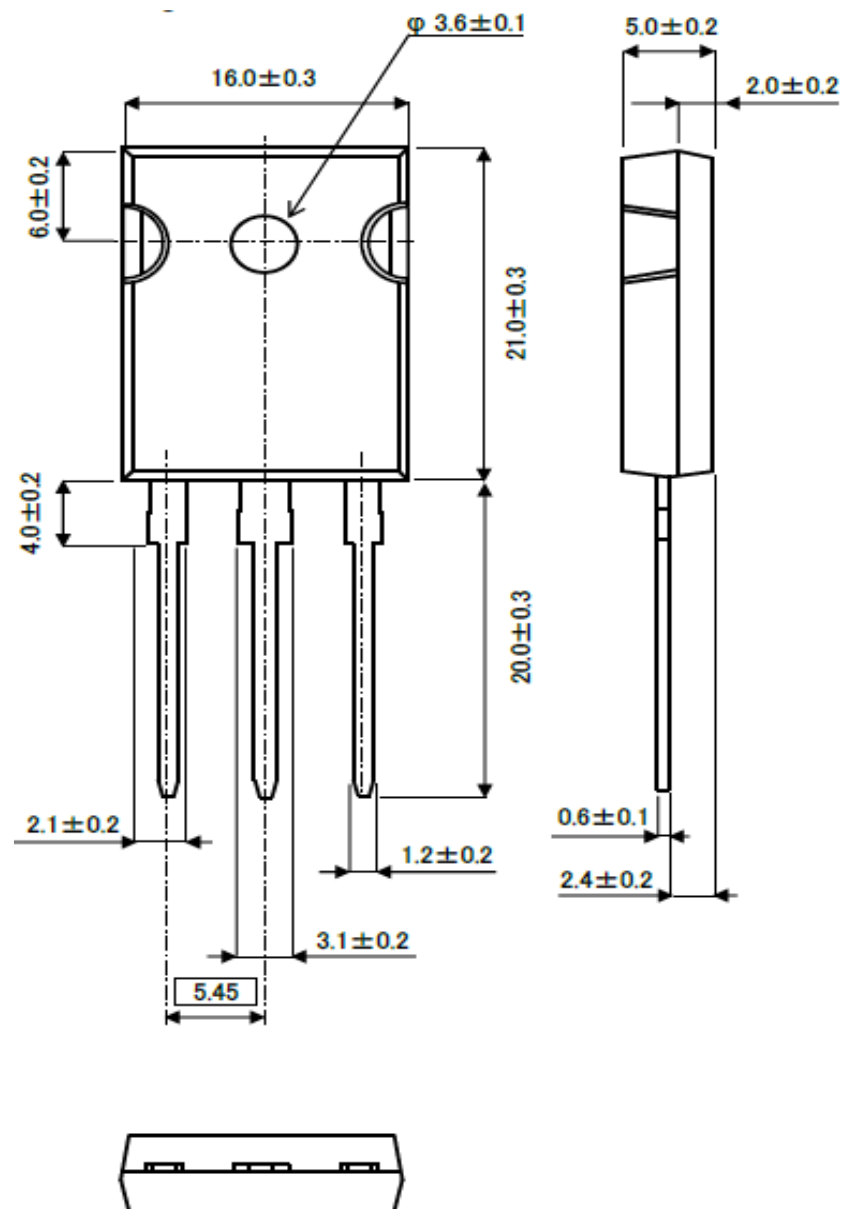
$$V_{th}(T_{vj}) = a_0 + a_1 T_{vj}$$

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

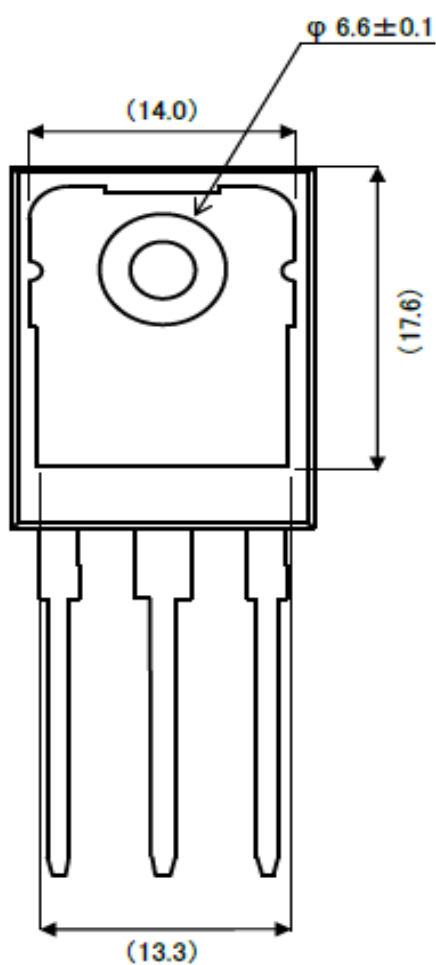
Symbol	Typical Value	Unit
$a_0$	$9.93 \times 10^{-1}$	V
$a_1$	$-1.27 \times 10^{-3}$	V/°C
$b_0$	$3.65 \times 10^{-2}$	Ω
$b_1$	$2.06 \times 10^{-4}$	Ω/°C
$b_2$	$1.33 \times 10^{-6}$	Ω/°C <sup>2</sup>

$T_{vj}$  in °C;  $-55^{\circ}\text{C} < T_{vj} < 175^{\circ}\text{C}$ ;  $I_F < 20 \text{ A}$

## ●Package Dimensions

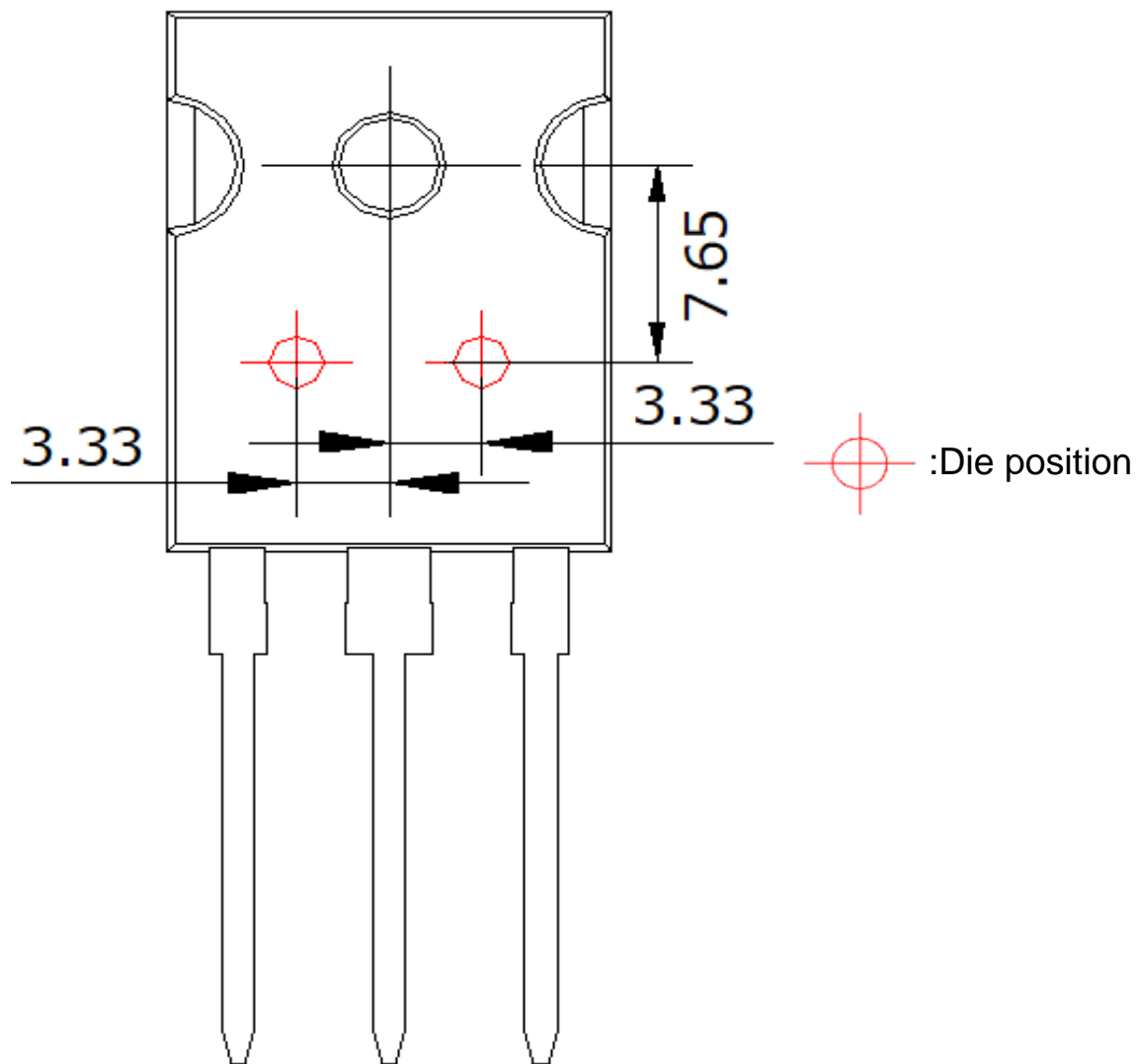


Unit: mm



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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