SCS220AE2

SiC Schottky Barrier Diode

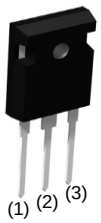
Datasheet

V_R	650V
I_F	10A/20A*
Q_C	15nC(Per leg)

(*Per leg/ Both legs)

●Outline

TO-247N



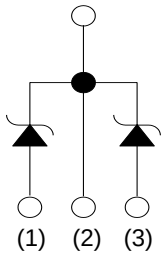
●Features

1) Low forward voltage

2) Negligible recovery time/current

3) Temperature independent switching behavior

●Inner circuit



(1) Anode
(2) Cathode
(3) Anode

●Applications

- Switch Mode Power Supply
- Uninterruptible Power Supply
- Solar Inverter
- Motor Drive
- Air Conditioner
- EV Charger

●Packaging specifications

Package		TO-247N
Type	Packing	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	30
	Packing code	C11
	Marking	SCS220AE2

●Absolute maximum ratings (T_{vj} = 25°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= 137°C)		I_F	10/20	A
Surge non-repetitive forward current*3	PW=10ms sinusoidal, T_{vj}=25°C	I_{FSM}	38/76	A
	PW=10ms sinusoidal, T_{vj}=150°C		30/60	A
	PW=10µs square, T_{vj}=25°C		150/300	A
Repetitive peak forward current*3		I_{FRM}	45/91 *1	A
i^2t value*3	PW=10ms, T_{vj}=25°C	$\int i^2dt$	7.2/29	A^2s
	PW=10ms, T_{vj}=150°C		4.5/18	A^2s
Total power dissipation*3		P_D	83/160 *2	W
Virtual Junction temperature		T_{vj}	175	°C
Range of storage temperature		T_{stg}	−55 to +175	°C

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

●Electrical characteristics (T_{vj} = 25°C) (Per Leg)

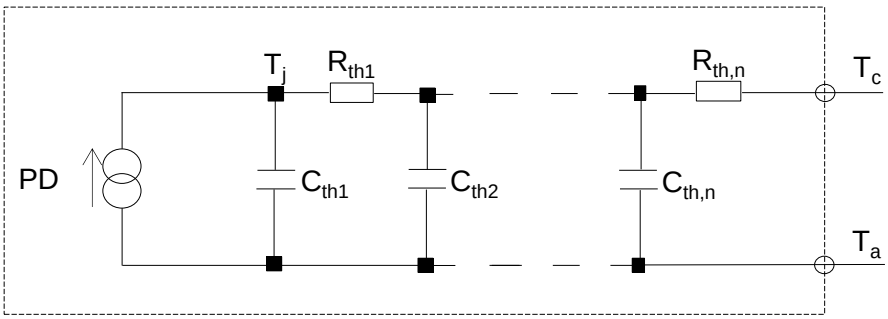
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	I_R =2.0mA	650	-	-	V
Forward voltage	V_F	I_F=10A,T_{vj}=25°C	-	1.35	1.55	V
		I_F=10A,T_{vj}=150°C	-	1.55	-	V
		I_F=10A,T_{vj}=175°C	-	1.63	-	V
Reverse current	I_R	V_R=600V,T_{vj}=25°C	-	2	200	μA
		V_R=600V,T_{vj}=150°C	-	30	-	μA
		V_R=600V,T_{vj}=175°C	-	70	-	μA
Total capacitance	C	V_R=1V,f=1MHz	-	360	-	pF
		V_R=600V,f=1MHz	-	37	-	pF
Total capacitive charge	Q_C	V_R=400V,di/dt=350A/μs	-	15	-	nC
Switching time	t_C	V_R=400V,di/dt=350A/μs	-	15	-	ns

●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	R_{thJC}	Per Leg	-	1.6	1.8	K/W
		Both Legs	-	0.80	0.90	K/W

●Typical Transient Thermal Characteristics (Per Leg)

Symbol	Value	Unit	Symbol	Value	Unit
R_{th1}	4.16×10^{-1}	K/W	C_{th1}	1.55×10^{-3}	Ws/K
R_{th2}	9.92×10^{-1}		C_{th2}	6.13×10^{-3}	
R_{th3}	1.93×10^{-1}		C_{th3}	1.34×10^{-1}	



●Electrical characteristic curves

Fig.1 V_F - I_F Characteristics (Per Leg)

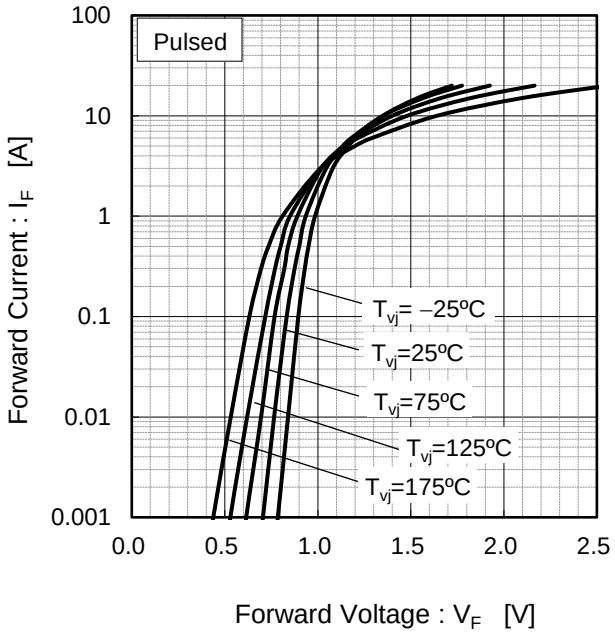


Fig.2 V_F - I_F Characteristics (Per Leg)

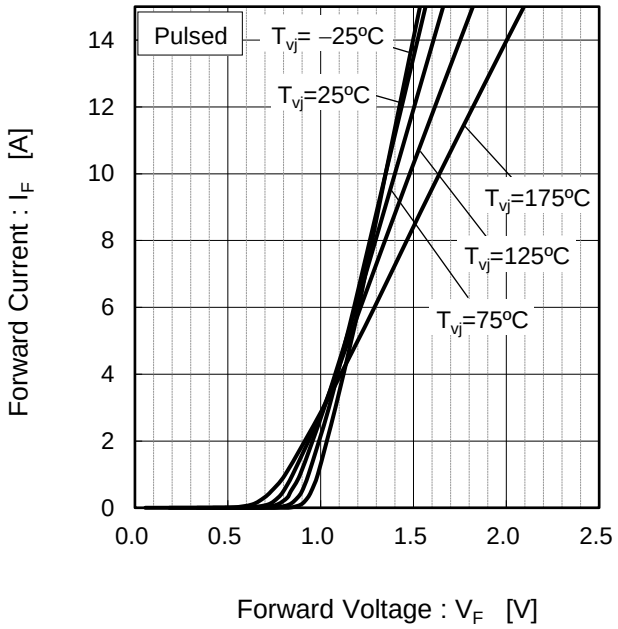


Fig.3 V_R - I_R Characteristics (Per Leg)

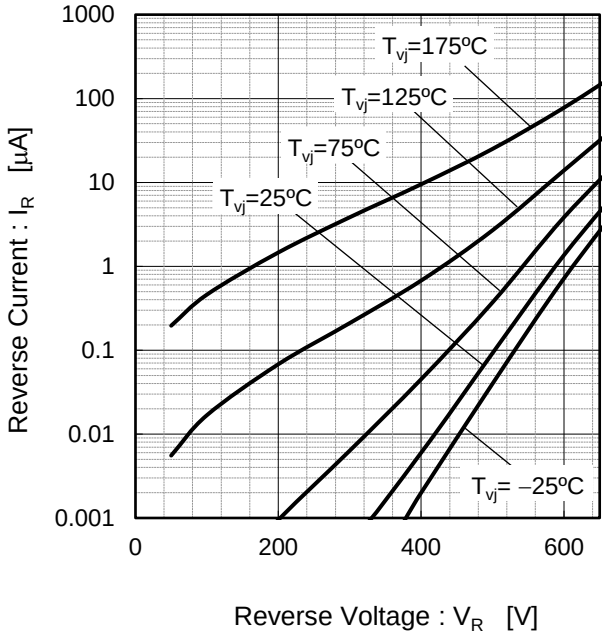
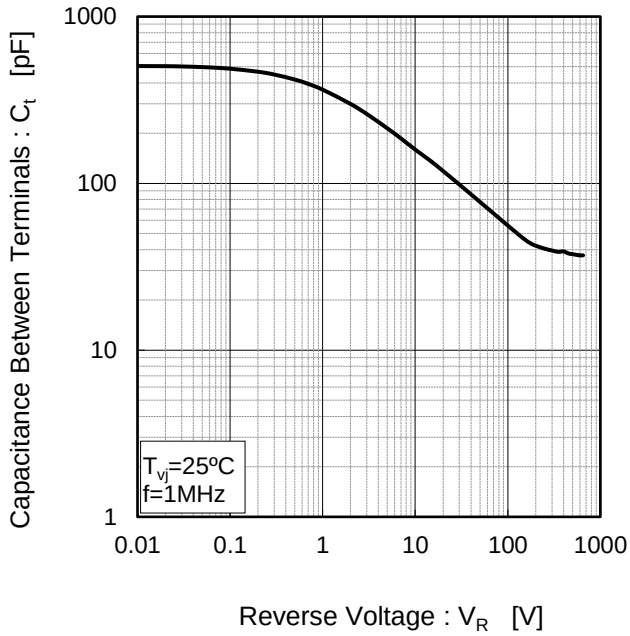


Fig.4 V_R - C_t Characteristics (Per Leg)



●Electrical characteristic curves

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

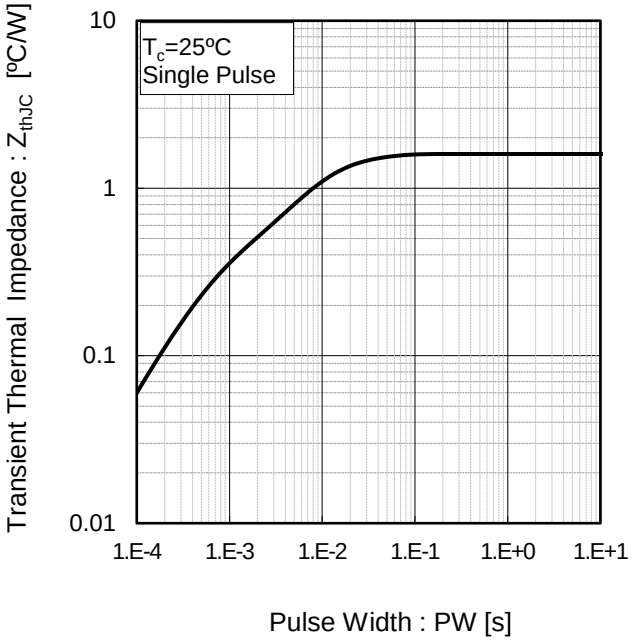


Fig.6 Power Dissipation (Per Leg)

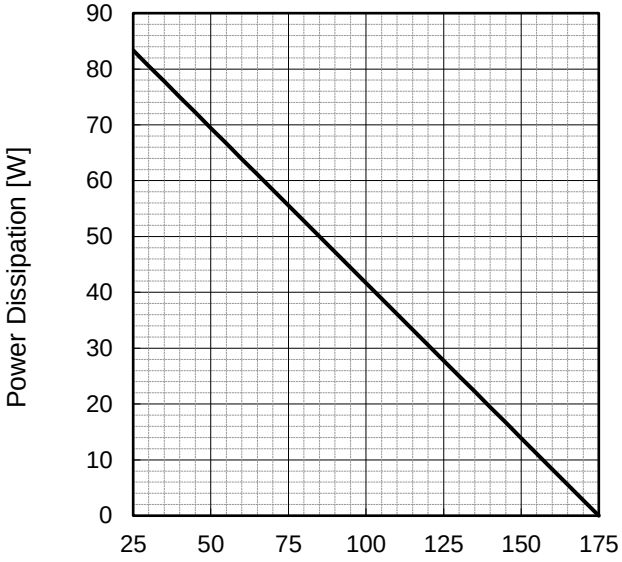
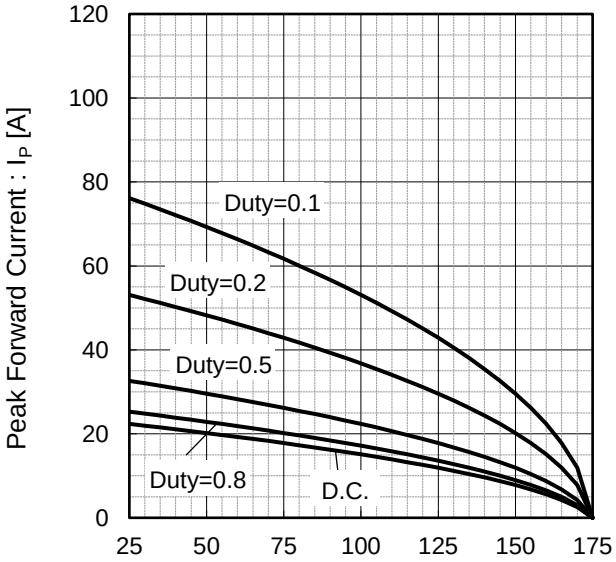
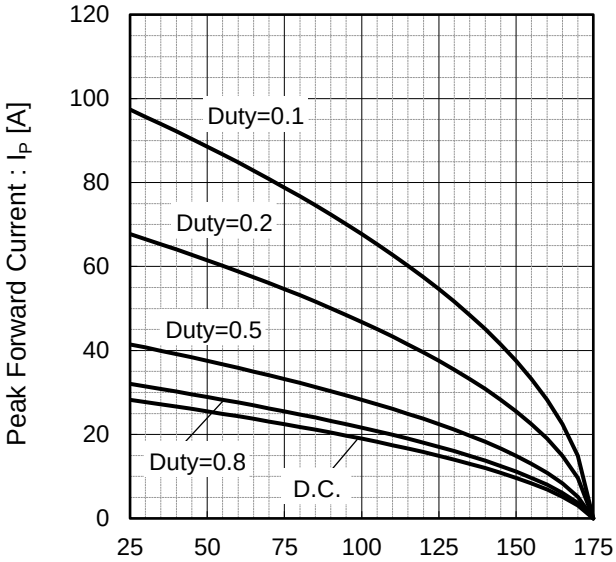


Fig.7*4 Maximum peak forward current derating curve I_P - T_c (Per Leg)



*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 (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)

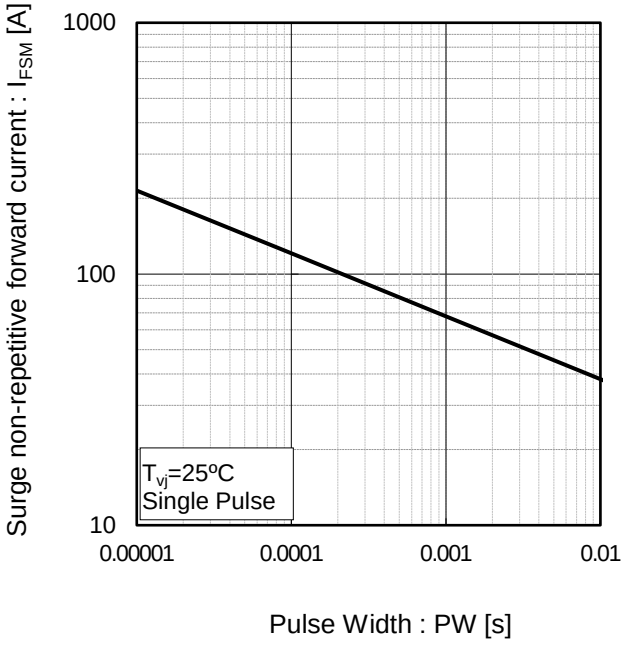
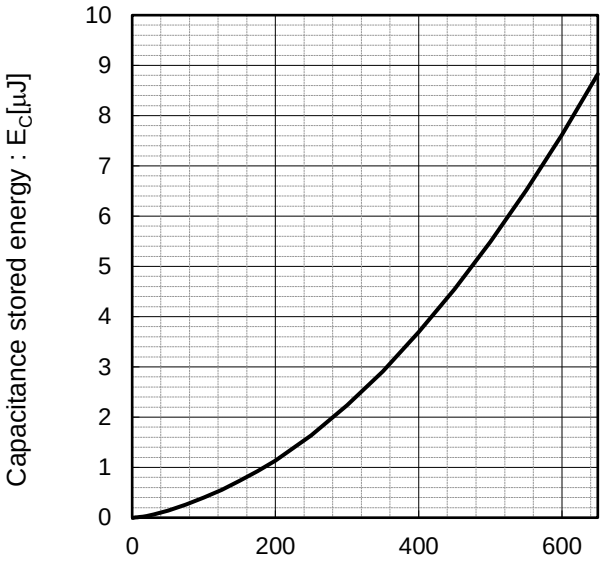
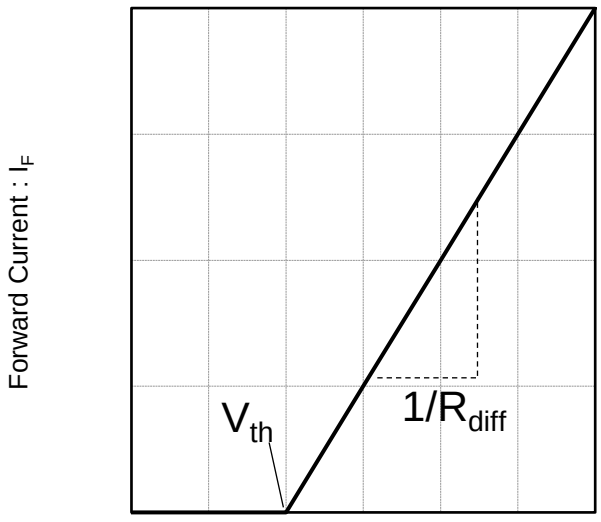


Fig.10 Typical capacitance store energy (Per Leg)



●Symplified forward characteristic model (Per Leg)

Fig.11 Equivalent forward current curve



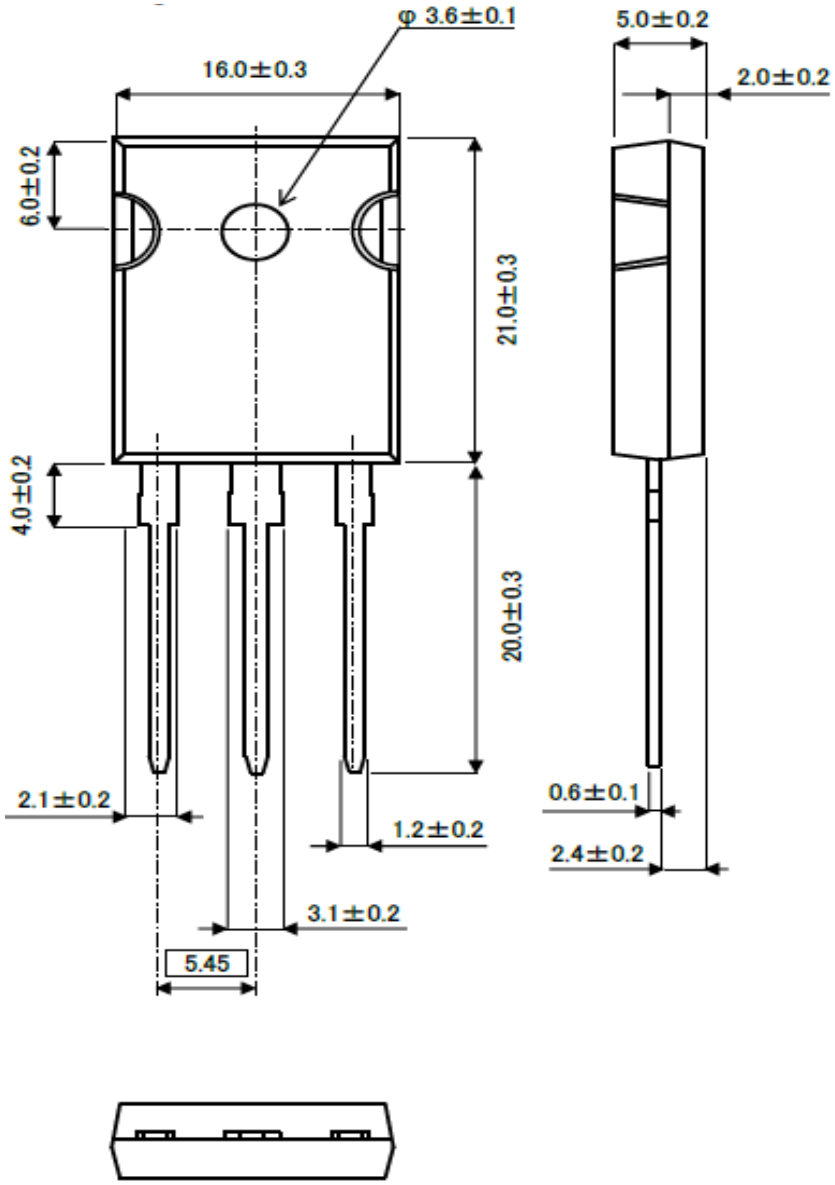
$$V_F = V_{th} + R_{diff} I_F$$

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

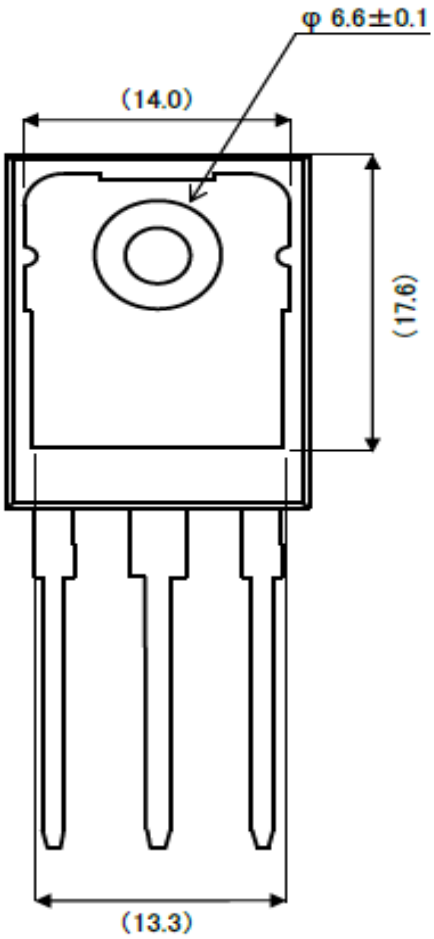
Symbol	Typical Value	Unit
a_0	9.35×10^{-1}	V
a_1	-1.12×10^{-3}	V/°C
b_0	3.98×10^{-2}	Ω
b_1	1.02×10^{-4}	Ω/°C
b_2	1.08×10^{-6}	Ω/°C^2

T_{vj} in ºC; -55 ºC < T_{vj} < 175ºC ; I_F < 20 A

●Package Dimensions

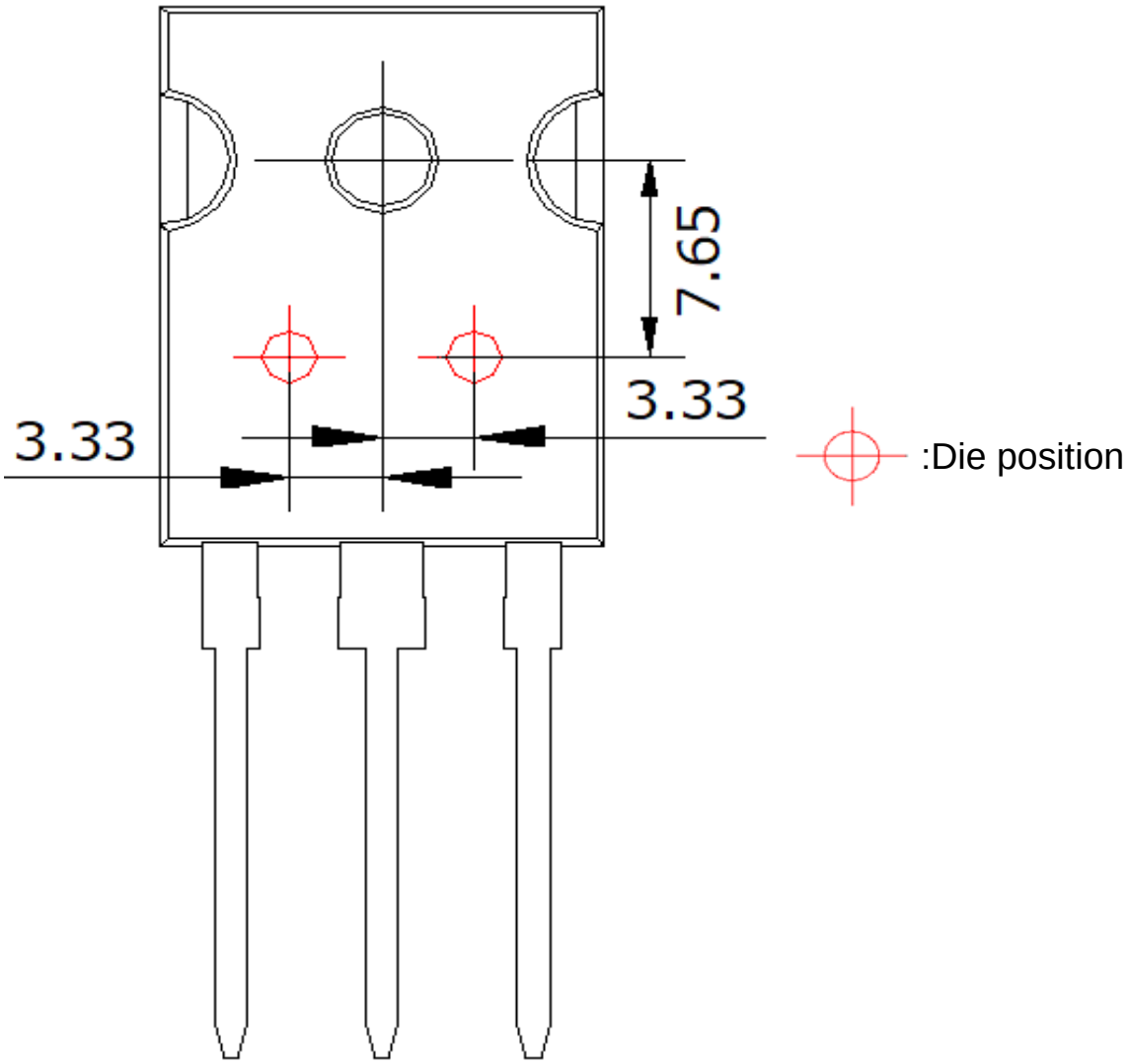


Unit: mm



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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