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SCS220KE2

SiC Schottky Barrier Diode

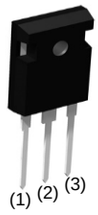
Datasheet

V_R	1200V
I_F	10A/20A*
Q_C	34nC(Per leg)

(*Per leg/ Both legs)

●Outline

TO-247N



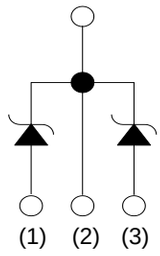
●Features

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	SCS220KE2

●Absolute maximum ratings (T_{vj} = 25°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°C)		I_F	10/20	A
Surge non-repetitive forward current *3	PW=10ms sinusoidal, T_{vj}=25°C	I_{FSM}	42/84	A
	PW=10ms sinusoidal, T_{vj}=150°C		31/62	A
	PW=10μs square, T_{vj}=25°C		160/320	A
Repetitive peak forward current *3		I_{FRM}	47/94 *1	A
i^2t value *3	PW=10ms, T_{vj}=25°C	$\int i^2dt$	9/36	A^2s
	PW=10ms, T_{vj}=150°C		4.8/19	A^2s
Total power dissipation *3		P_D	130/270 *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

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

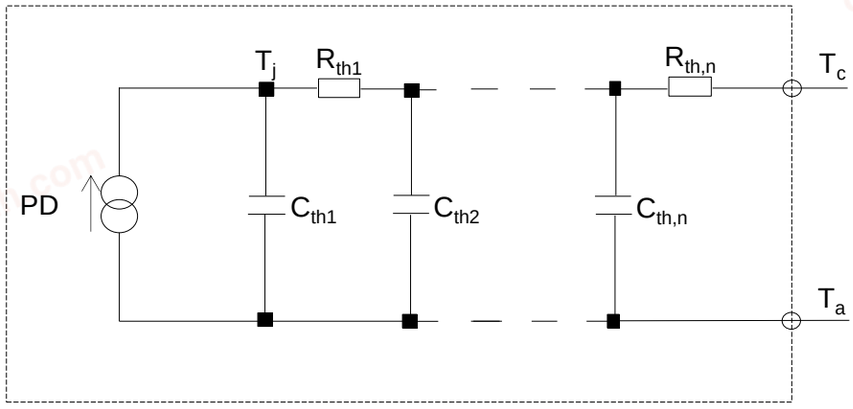
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	I_R =0.2mA	1200	-	-	V
Forward voltage	V_F	I_F=10A,T_{vj}=25°C	-	1.4	1.6	V
		I_F=10A,T_{vj}=150°C	-	1.8	-	V
		I_F=10A,T_{vj}=175°C	-	1.9	-	V
Reverse current	I_R	V_R=1200V,T_{vj}=25°C	-	10	200	μA
		V_R=1200V,T_{vj}=150°C	-	80	-	μA
		V_R=1200V,T_{vj}=175°C	-	130	-	μA
Total capacitance	C	V_R=1V,f=1MHz	-	530	-	pF
		V_R=600V,f=1MHz	-	43	-	pF
Total capacitive charge	Q_C	V_R=800V,di/dt=500A/μs	-	34	-	nC
Switching time	t_C	V_R=800V,di/dt=500A/μs	-	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}	2.88×10 $^{-1}$	K/W	C_{th1}	3.30×10 $^{-3}$	Ws/K
R_{th2}	5.59×10 $^{-1}$		C_{th2}	1.03×10 $^{-2}$	
R_{th3}	2.13×10 $^{-1}$		C_{th3}	2.90×10 $^{-1}$	



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●Electrical characteristic curves

Fig.1 V_F - I_F Characteristics (Per Leg)

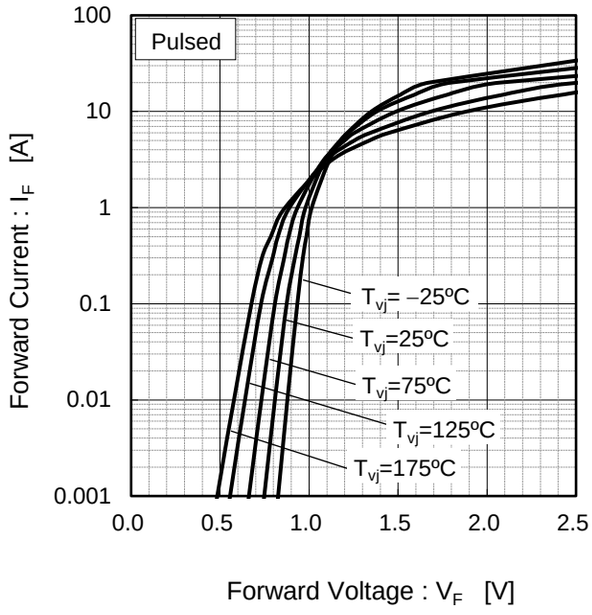


Fig.2 V_F - I_F Characteristics (Per Leg)

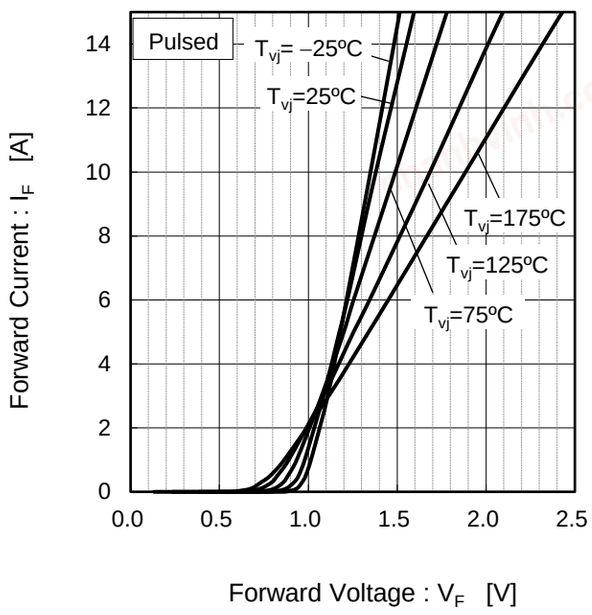


Fig.3 V_R - I_R Characteristics (Per Leg)

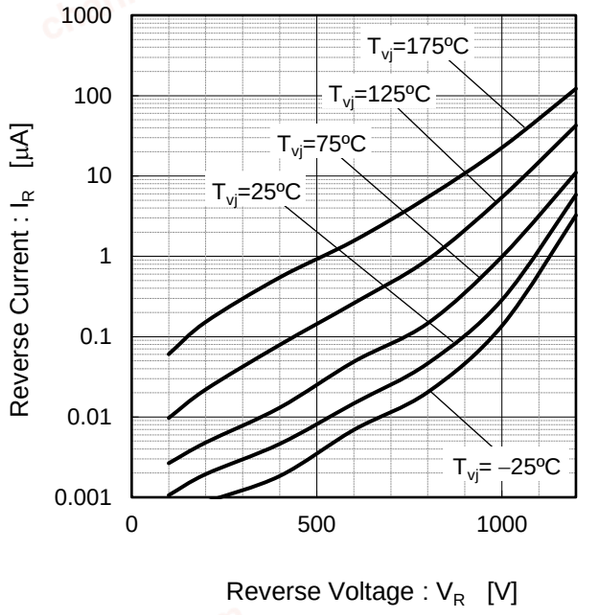
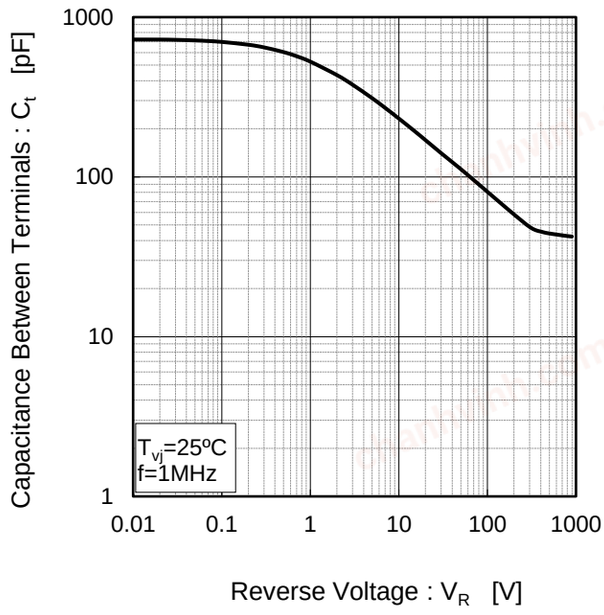


Fig.4 V_R - C_t Characteristics (Per Leg)



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●Electrical characteristic curves

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

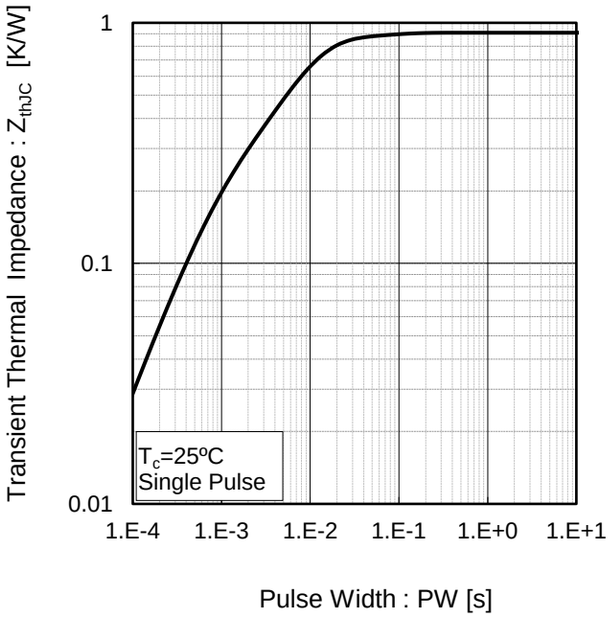


Fig.6 Power Dissipation (Per Leg)

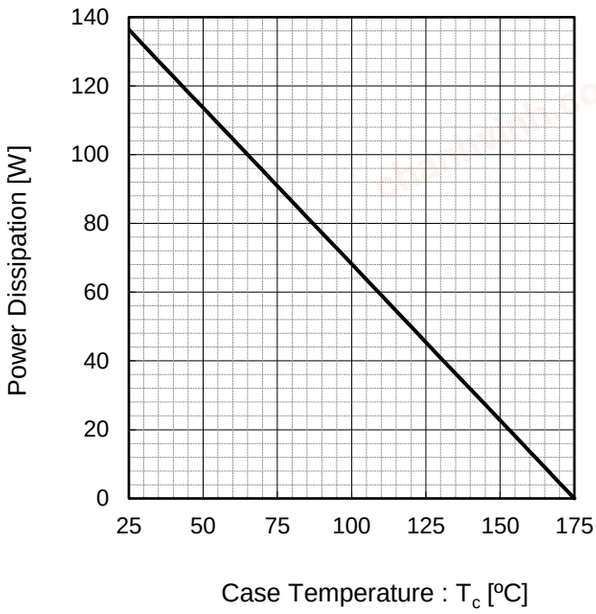
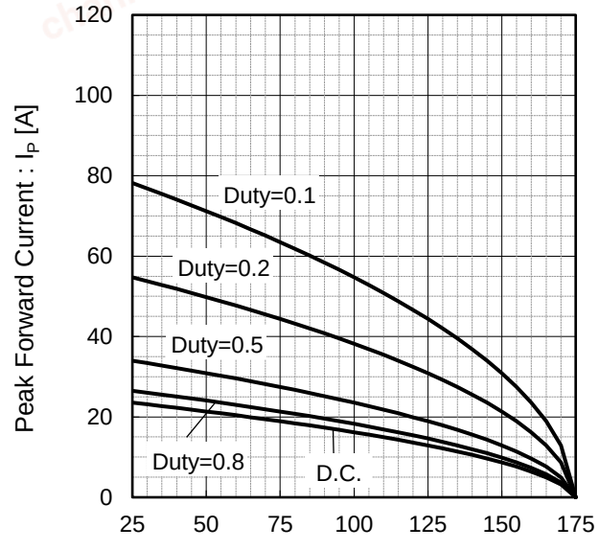
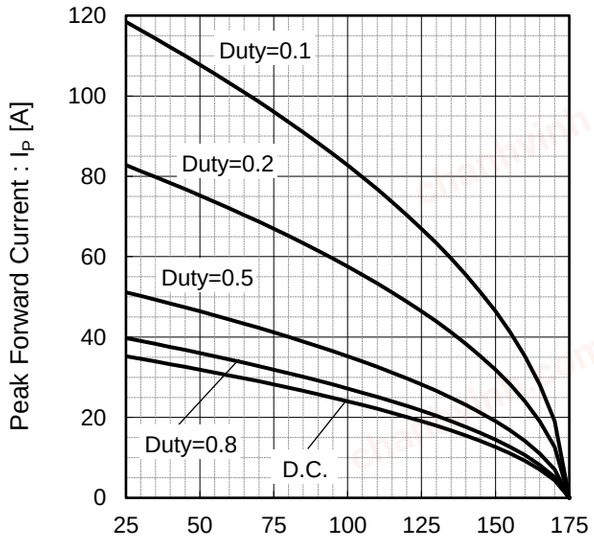


Fig.7*4 Maximum peak forward current derating curve I_P - T_c (Per Leg)



*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

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●Electrical characteristic curves

Fig.9 Surge non-repetitive forward current vs. Pulse width (Sinusoidal waveform) (Per Leg)

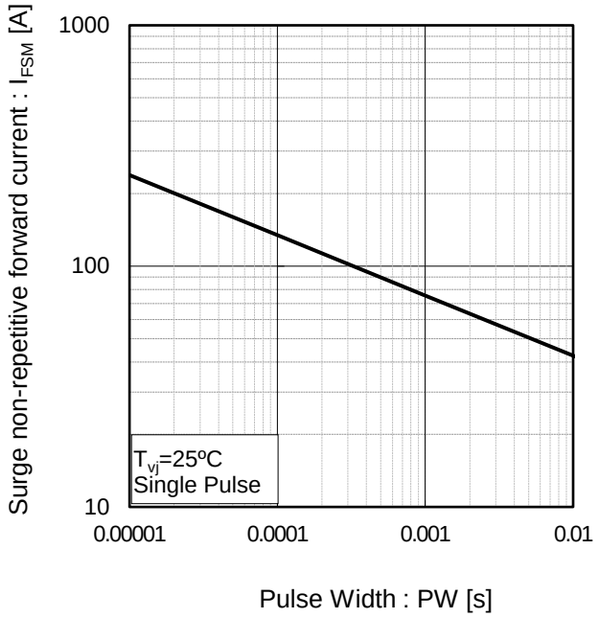
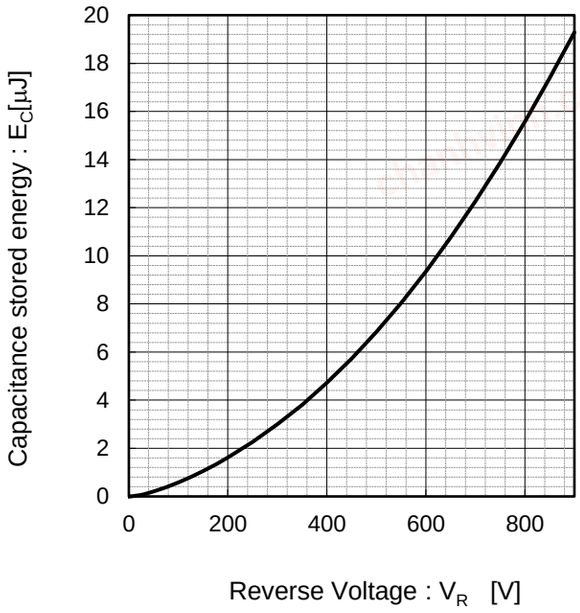
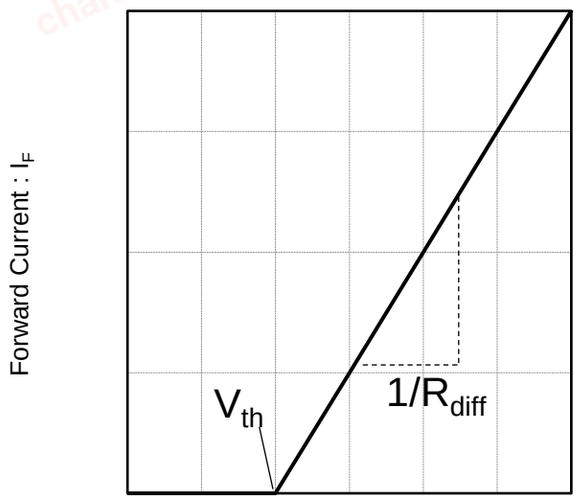


Fig.10 Typical capacitance store energy (Per Leg)



●Symplified forward characteristic model (Per Leg)

Fig.11 Equivalent forward current curve



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

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

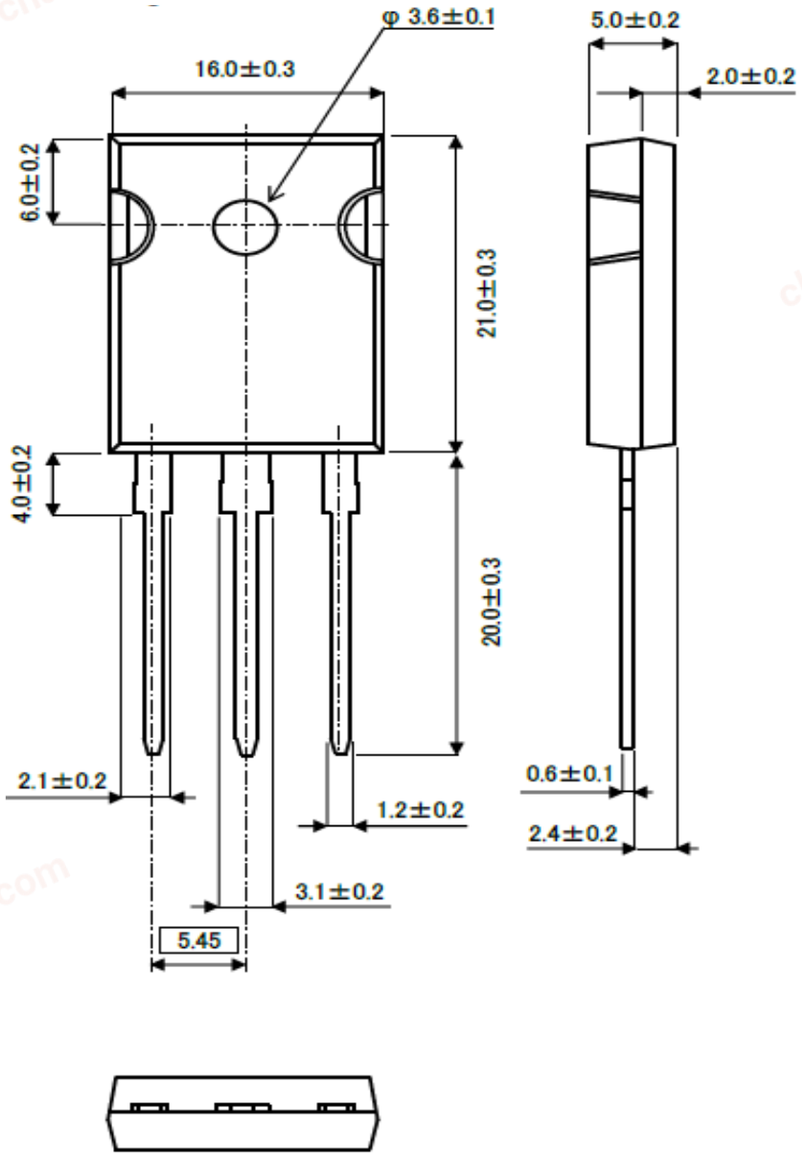
Symbol	Typical Value	Unit
a_0	9.93×10^{-1}	V
a_1	-1.27×10^{-3}	V/°C
b_0	3.65×10^{-2}	Ω
b_1	2.06×10^{-4}	Ω/°C
b_2	1.33×10^{-6}	Ω/°C^2

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

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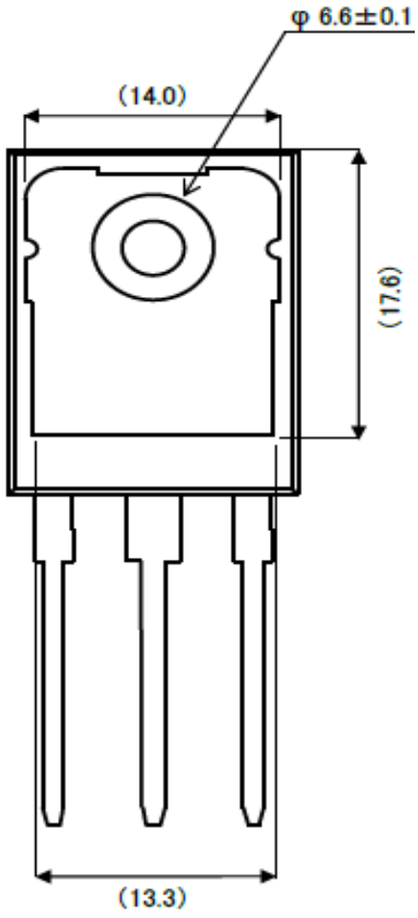
●Package Dimensions



Unit: mm

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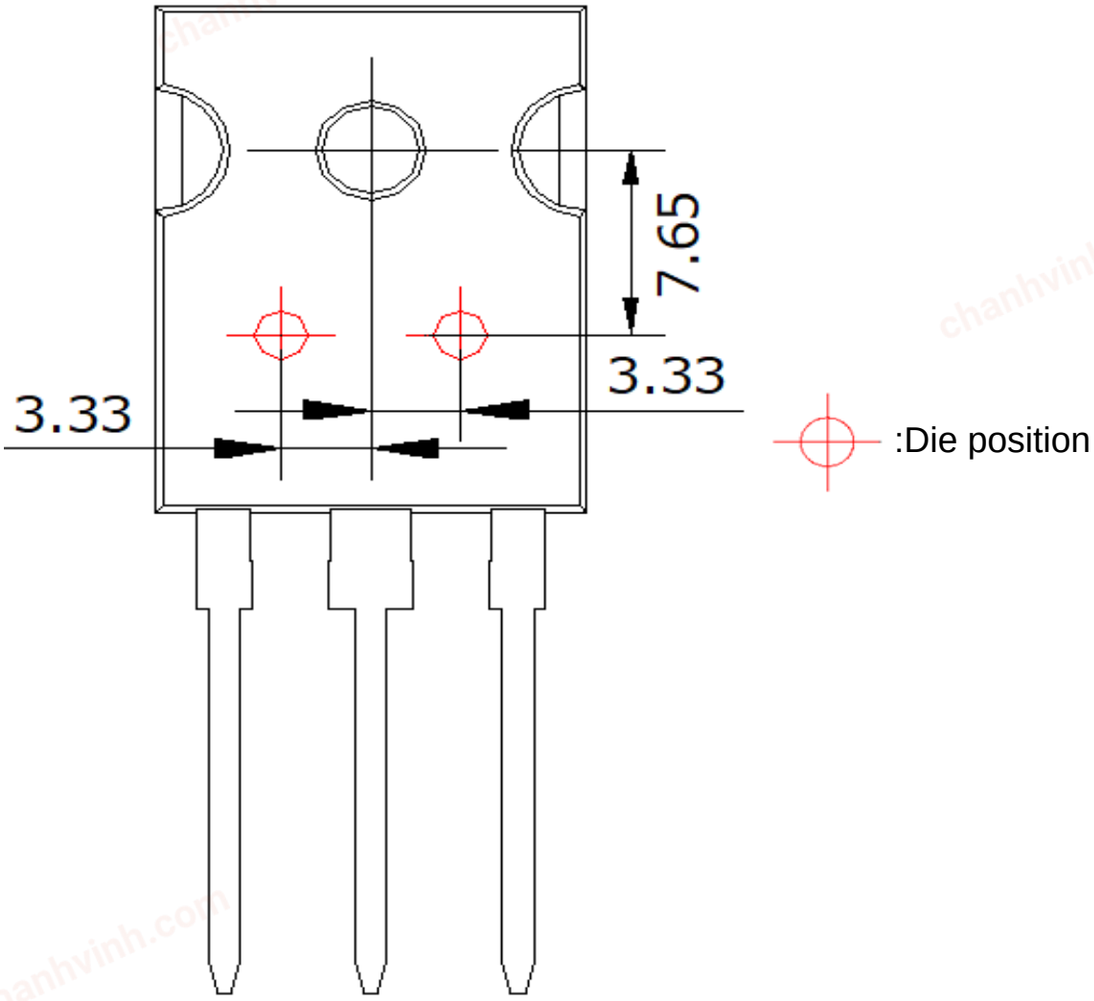


Unit: mm

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●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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