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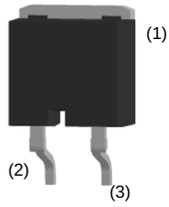
SCS220KNHR

Automotive Grade SiC Schottky Barrier Diode Datasheet

V_R	1200V
I_F	20A
Q_C	68nC

●Outline

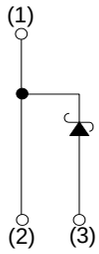
TO-263-2L



●Features

1) AEC-Q101 qualified
2) Low forward voltage
3) Negligible recovery time/current
4) Temperature independent switching behavior
5) Wide creepage distance = min. 5.10mm

●Inner circuit



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

●Applications

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

●Packaging specifications

Type	Packaging	Embossed tape
	Reel size (mm)	330
	Tape width (mm)	24
	Basic ordering unit (pcs)	1000
	Packing code	TRL
	Marking	SCS220KN

●Absolute maximum ratings (T_{vj} = 25°C unless otherwise specified)

Parameter		Symbol	Value	Unit
Reverse voltage (repetitive peak)		V_{RM}	1200	V
Reverse voltage (DC)		V_R	1200	V
Continuous forward current (T_c = 143°C)		I_F	20 *1	A
Surge non-repetitive forward current	PW = 10ms sinusoidal, T_{vj} = 25°C	I_{FSM}	84	A
	PW = 10ms sinusoidal, T_{vj} = 150°C		63	A
	PW = 10μs square, T_{vj} = 25°C		330	A
Repetitive peak forward current		I_{FRM}	94 *2	A
i^2t value	PW = 10ms, T_{vj} = 25°C	$\int i^2dt$	35.2	A^2s
	PW = 10ms, T_{vj} = 150°C		19.8	A^2s
Total power dissipation		P_D	272*3	W
Virtual Junction temperature		T_{vj}	175	°C
Range of storage temperature		T_{stg}	-40 to +175	°C

*1 Limited by maximum T_{vj} and for Max. R_{thJC}.

*2 T_c = 100°C, T_{vj} = 150°C, Duty cycle = 10% *3 T_c = 25°C

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●Electrical characteristics (T_{vj} = 25°C unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	I_R = 0.4mA	1200	-	-	V
Forward voltage	V_F	I_F = 20A, T_{vj} = 25°C	-	1.4	1.6	V
		I_F = 20A, T_{vj} = 150°C	-	1.8	-	V
		I_F = 20A, T_{vj} = 175°C	-	1.9	-	V
Reverse current	I_R	V_R = 1200V, T_{vj} = 25°C	-	10	400	μA
		V_R = 1200V, T_{vj} = 150°C	-	160	-	μA
		V_R = 1200V, T_{vj} = 175°C	-	260	-	μA
Total capacitance	C	V_R = 1V, f= 1MHz	-	1050	-	pF
		V_R= 800V, f= 1MHz	-	85	-	pF
Total capacitive charge	Q_C	V_R = 800V, di/dt = 500A/μs	-	68	-	nC
Switching time	t_C	V_R = 800V, di/dt = 500A/μs	-	33	-	ns

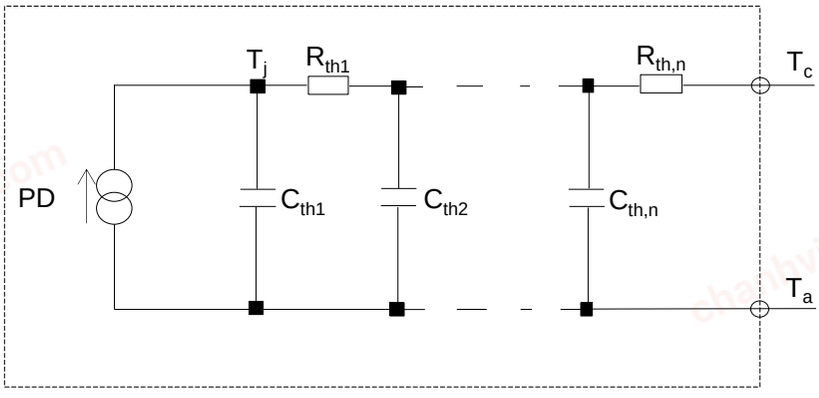
●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	R_{thJC}	-	-	0.42	0.55	K/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit
R_{th1}	1.58×10^{-1}	K/W
R_{th2}	1.09×10^{0}	
R_{th3}	1.18×10^{-5}	

Symbol	Value	Unit
C_{th1}	1.06×10^{-3}	Ws/K
C_{th2}	4.27×10^{4}	
C_{th3}	9.09×10^{1}	



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●Electrical characteristic curves

Fig.1 V_F - I_F Characteristics

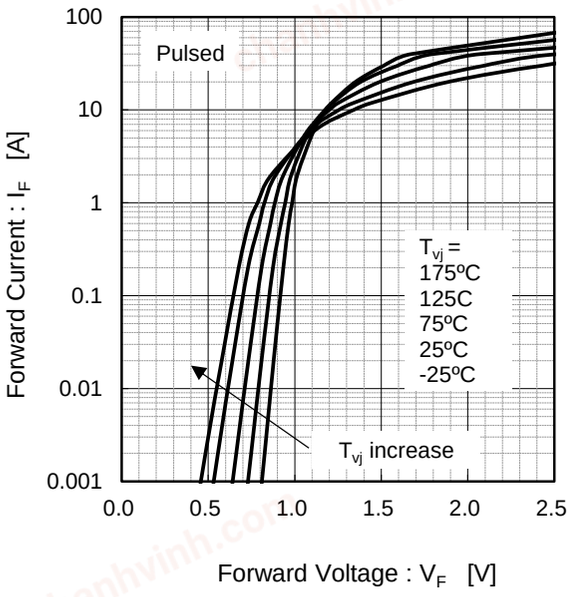


Fig.2 V_F - I_F Characteristics

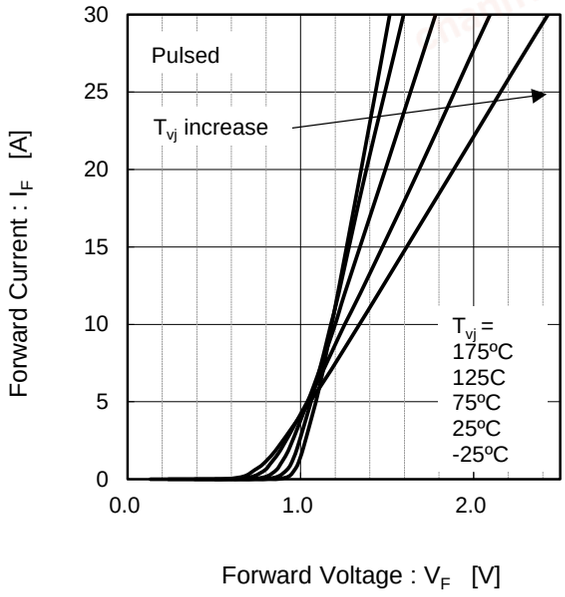


Fig.3 V_R - I_R Characteristics

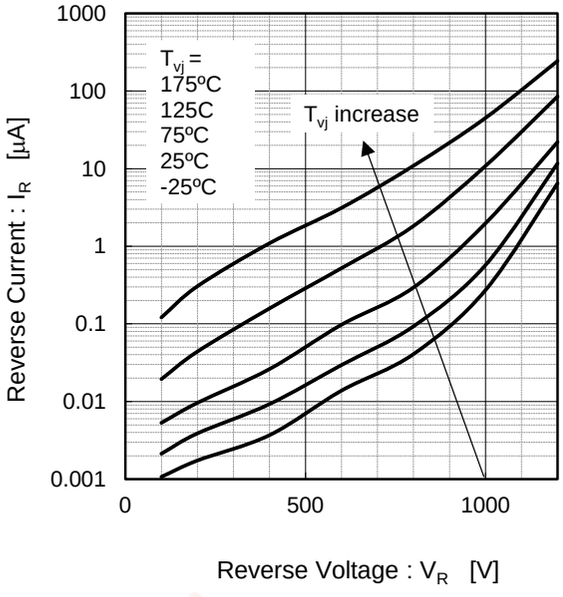
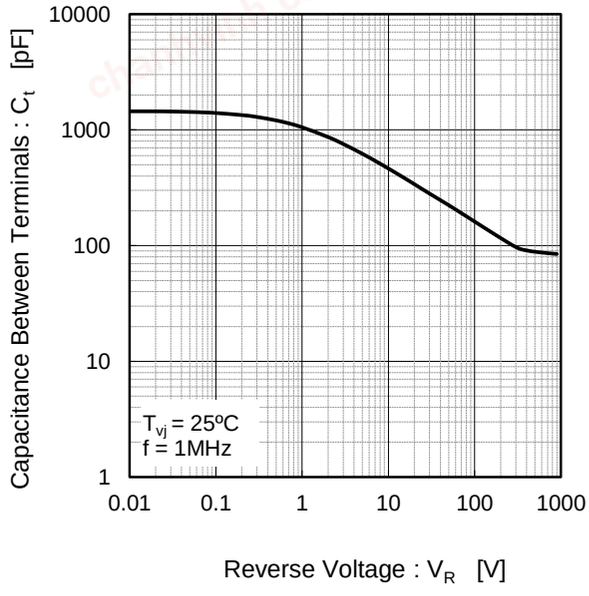


Fig.4 V_R - C_t Characteristics



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●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

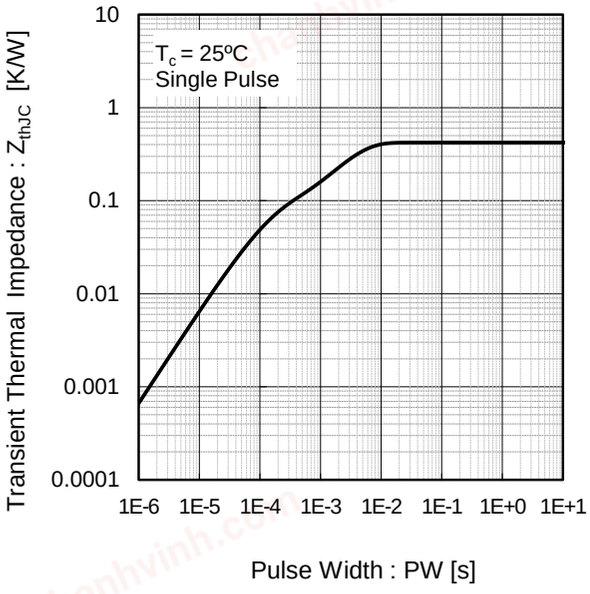


Fig.6 Power Dissipation

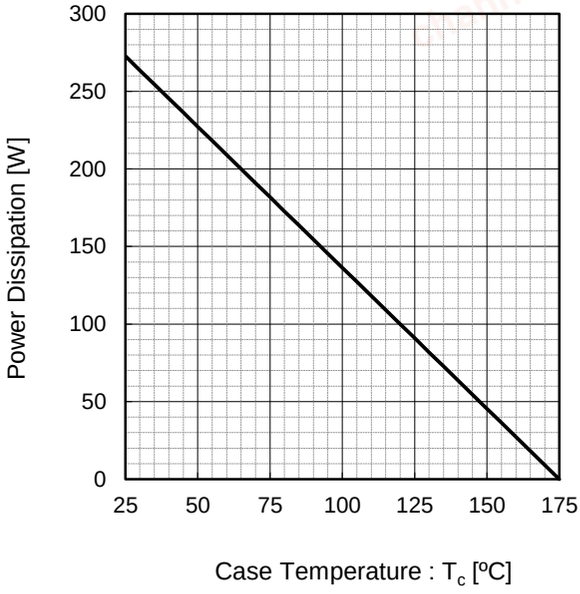
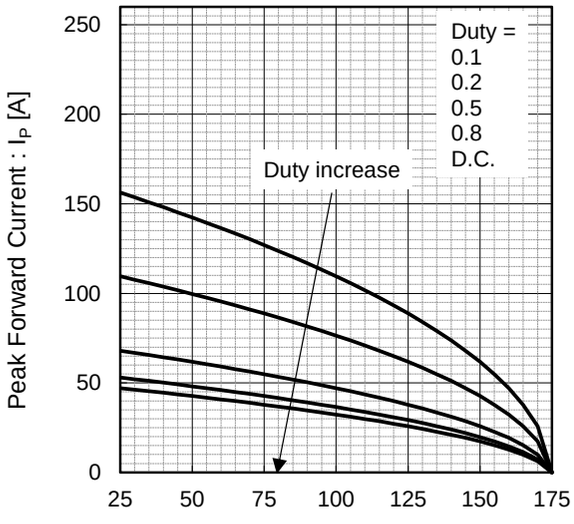
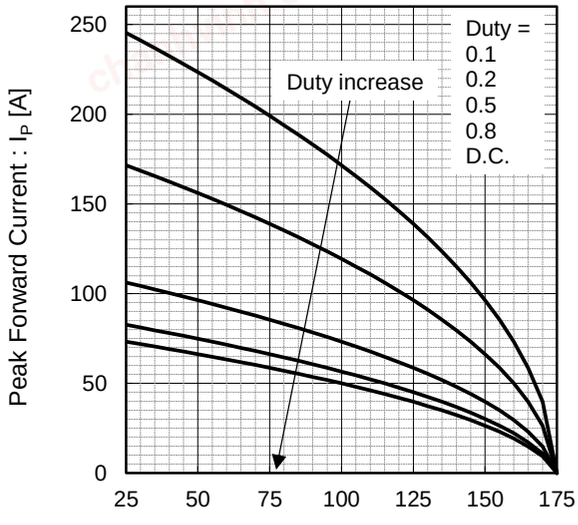


Fig.7*4 Maximum peak forward current derating curve I_P - T_c



*4 Based on max Vf, max Z_{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 Z_{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)

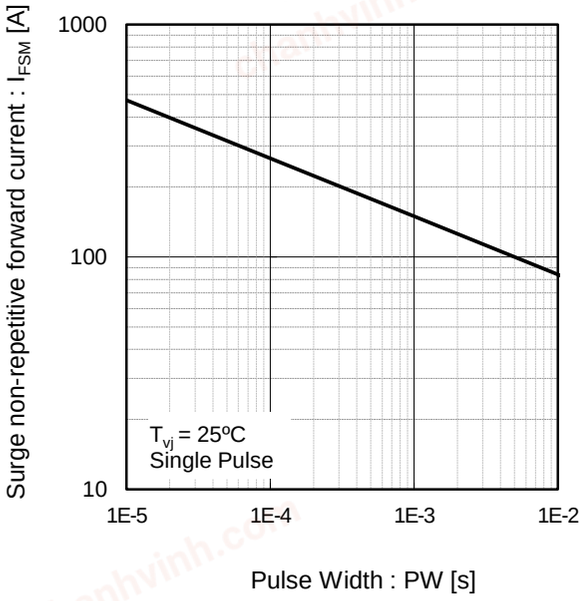
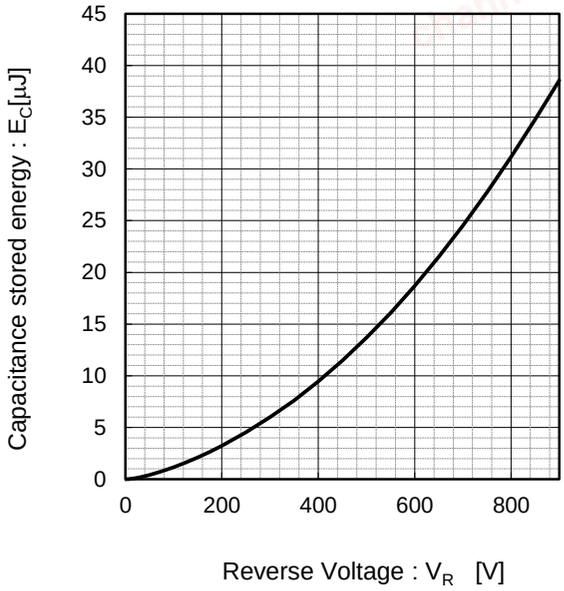
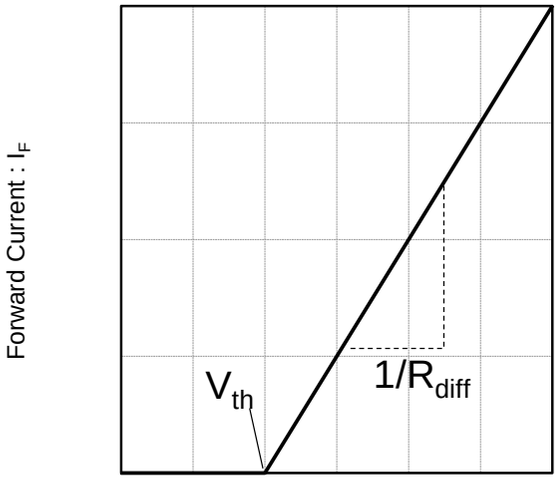


Fig.10 Typical capacitance stored energy



●Symplified 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_0	9.93×10^{-1}	V
a_1	-1.27×10^{-3}	V/°C
b_0	1.83×10^{-2}	Ω
b_1	1.03×10^{-4}	Ω/°C
b_2	6.65×10^{-7}	Ω/°C^2

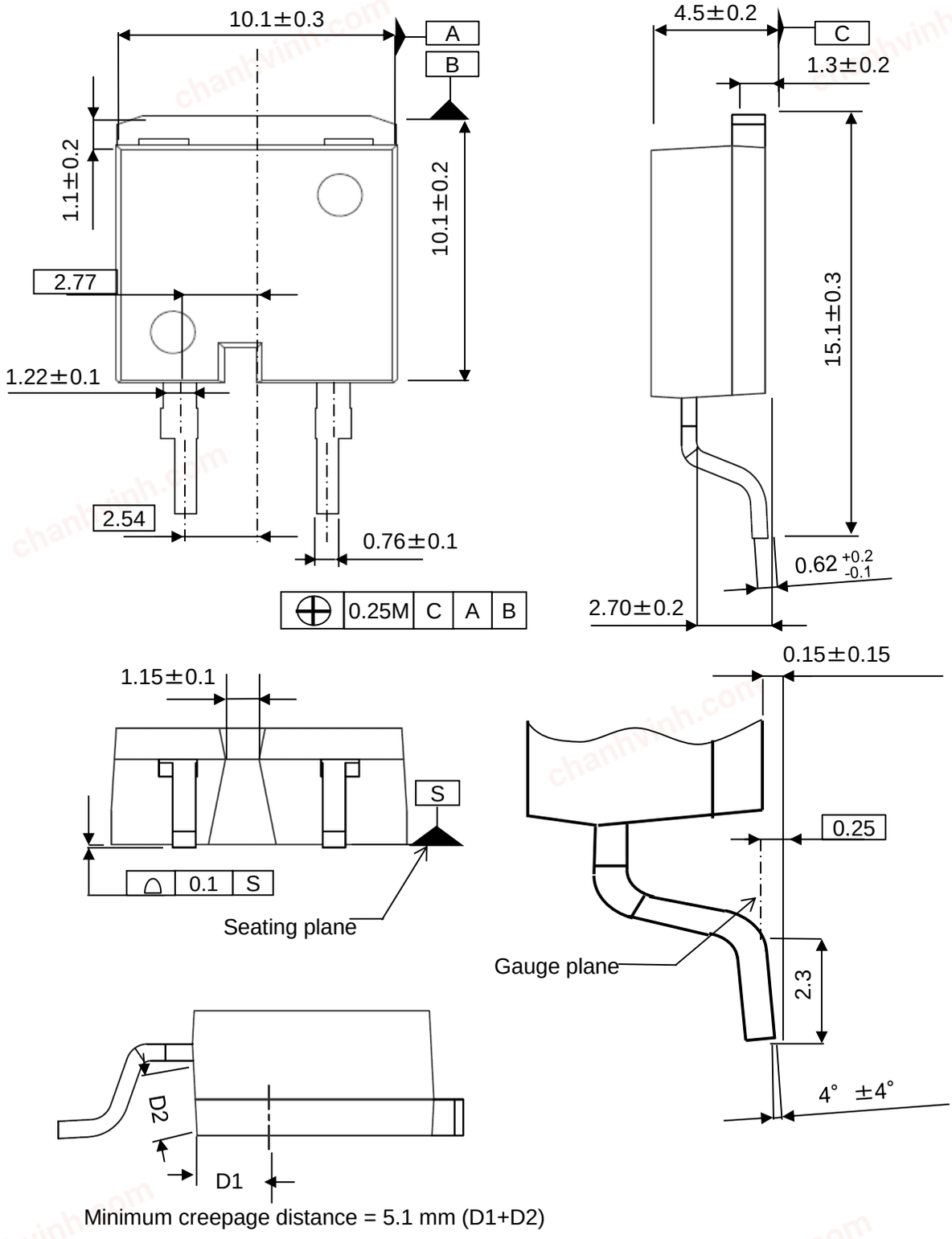
T_{vj} in ºC; -40 ºC < T_{vj} < 175 ºC ; I_F < 40 A

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●**Dimensions** (Unit : mm)

Marking Side



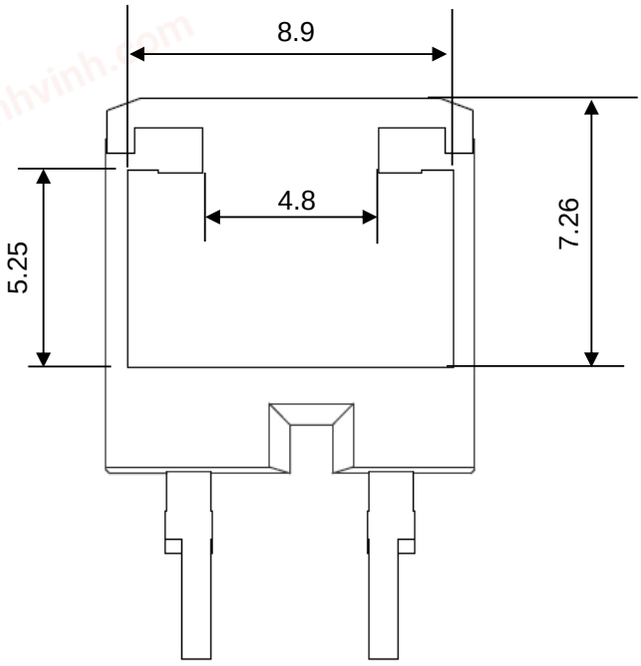
Minimum creepage distance = 5.1 mm (D1+D2)

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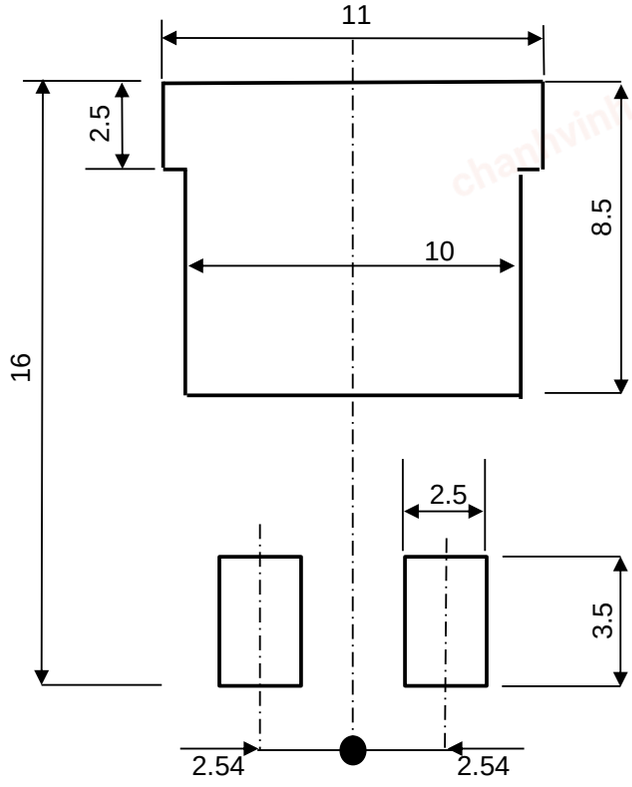
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●**Dimensions** (Unit : mm)

Back Side



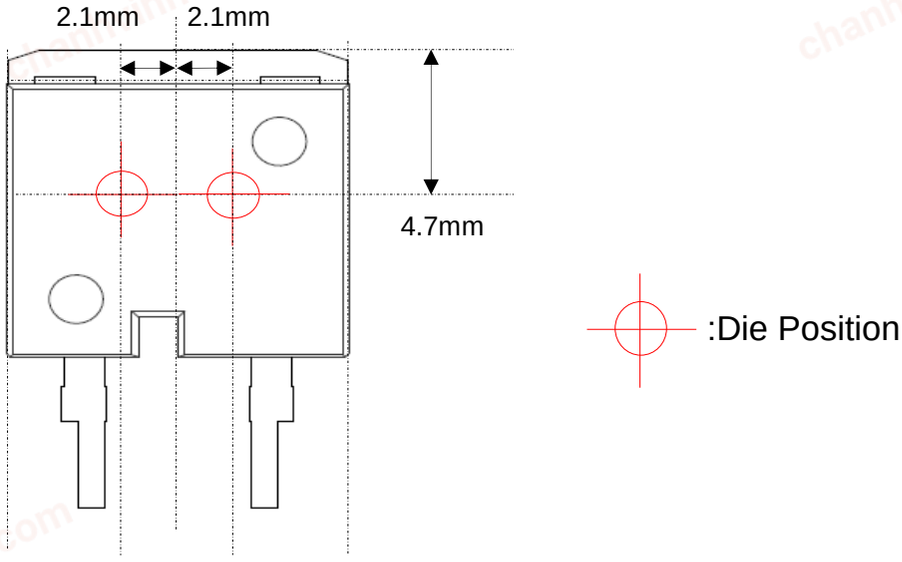
Reference Copper Plate Area Dimension



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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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