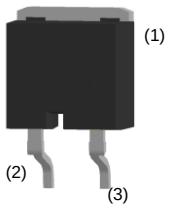
SCS205KNHR

Automotive Grade SiC Schottky Barrier Diode Datasheet

V_R	1200V
I_F	5A
Q_C	12nC

●**Outline**

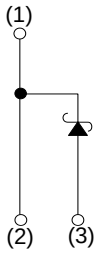
TO-263-2L



●**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	SCS205KN

●**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 = 148°C)		I_F	5*1	A
Surge non-repetitive forward current	PW = 10ms sinusoidal, T_{vj} = 25°C	I_{FSM}	23	A
	PW = 10ms sinusoidal, T_{vj} = 150°C		17	A
	PW = 10μs square, T_{vj} = 25°C		80	A
Repetitive peak forward current		I_{FRM}	26 *2	A
i^2t value	PW = 10ms, T_{vj} = 25°C	$\int i^2dt$	2.5	A^2S
	PW = 10ms, T_{vj} = 150°C		1.4	A^2S
Total power dissipation		P_D	83 *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

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	I_R = 0.1mA	1200	-	-	V
Forward voltage	V_F	I_F = 5A, T_{vj} = 25°C	-	1.4	1.6	V
		I_F = 5A, T_{vj} = 150°C	-	1.8	-	V
		I_F = 5A, T_{vj} = 175°C	-	1.9	-	V
Reverse current	I_R	V_R = 1200V, T_{vj} = 25°C	-	2.5	100	μA
		V_R = 1200V, T_{vj} = 150°C	-	40	-	μA
		V_R = 1200V, T_{vj} = 175°C	-	65	-	μA
Total capacitance	C	V_R = 1V, f= 1MHz	-	260	-	pF
		V_R= 800V, f= 1MHz	-	21	-	pF
Total capacitive charge	Q_C	V_R = 800V, di/dt = 500A/μs	-	12	-	nC
Switching time	t_C	V_R = 800V, di/dt = 500A/μs	-	10	-	ns

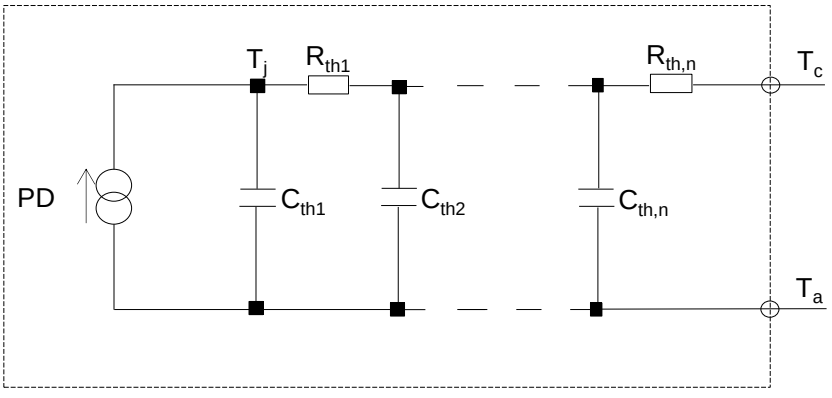
●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	R_{thJC}	-	-	1.3	1.8	K/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit
R_{th1}	4.32×10^{-1}	K/W
R_{th2}	8.83×10^{-1}	
R_{th3}	3.74×10^{-5}	

Symbol	Value	Unit
C_{th1}	4.38×10^{-4}	Ws/K
C_{th2}	1.52×10^{-3}	
C_{th3}	3.83×10^{0}	



●Electrical characteristic curves

Fig.1 V_F - I_F Characteristics

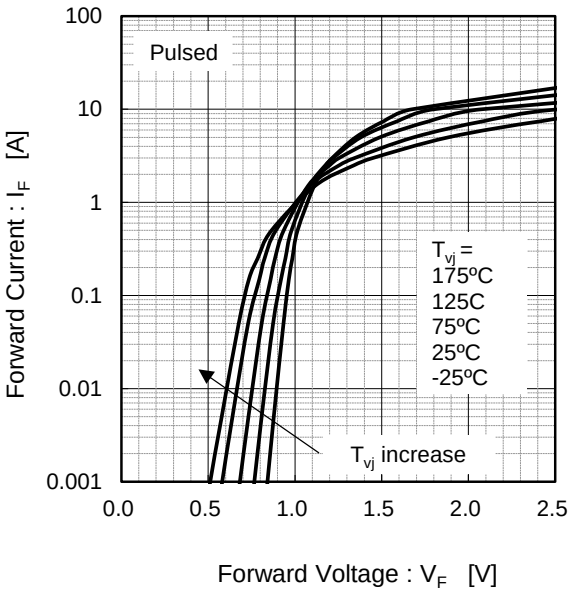


Fig.2 V_F - I_F Characteristics

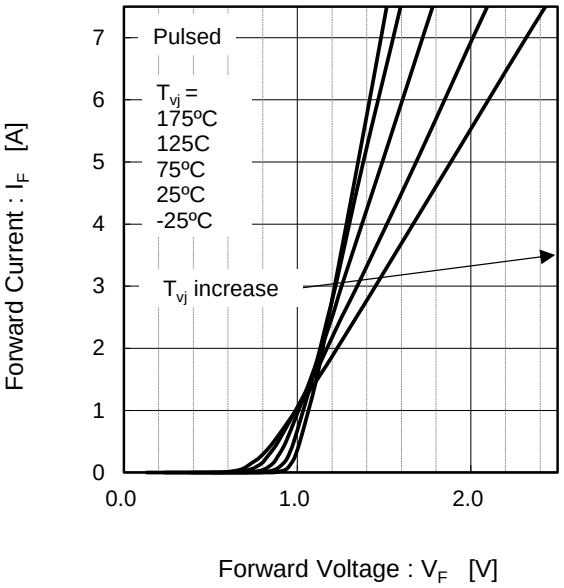


Fig.3 V_R - I_R Characteristics

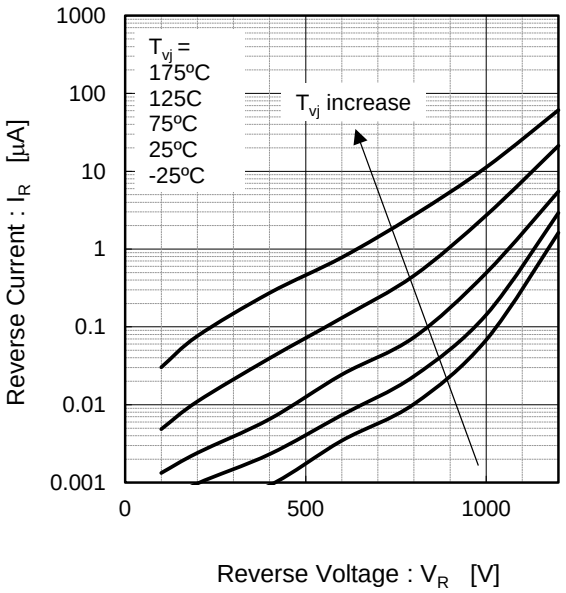
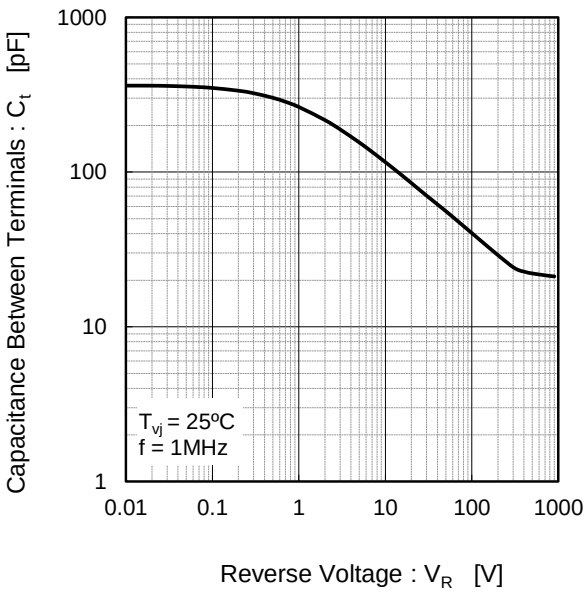


Fig.4 V_R - C_t Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

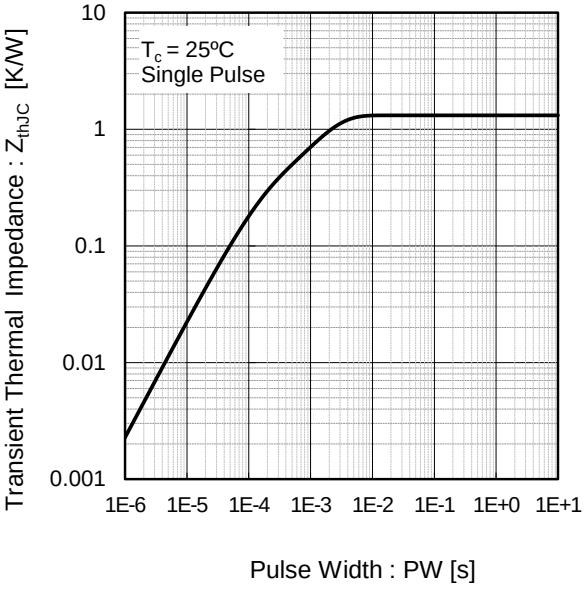


Fig.6 Power Dissipation

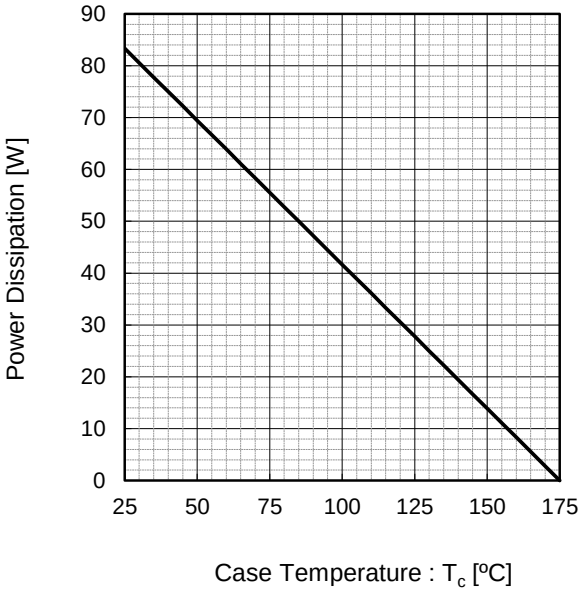
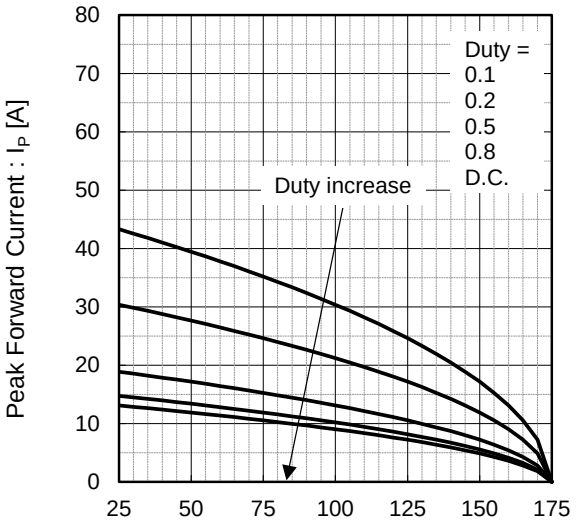
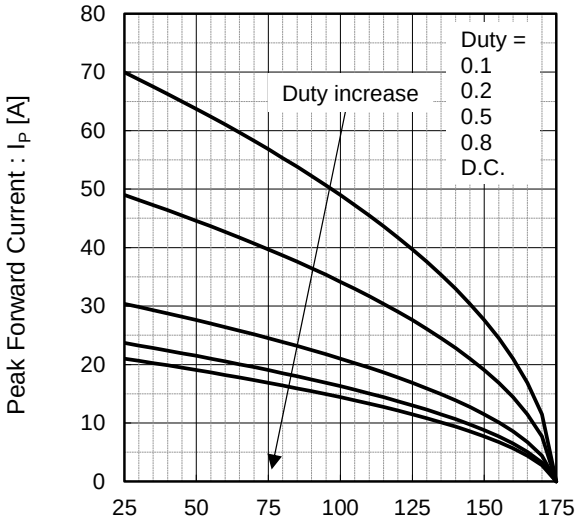


Fig.7*4 Maximum peak forward current derating curve I_P - T_c



*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

●Electrical characteristic curves

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

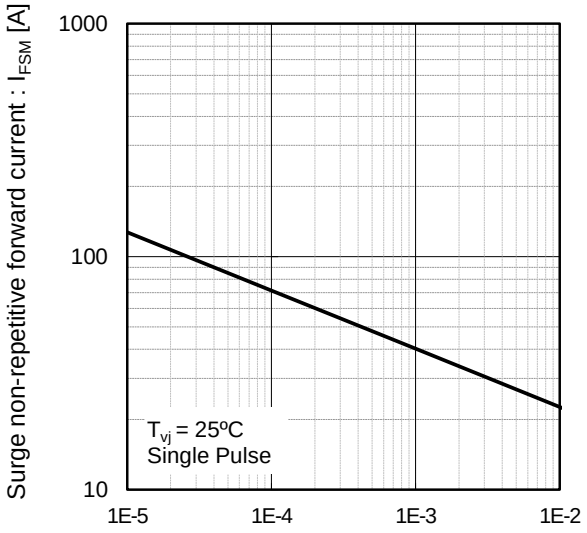
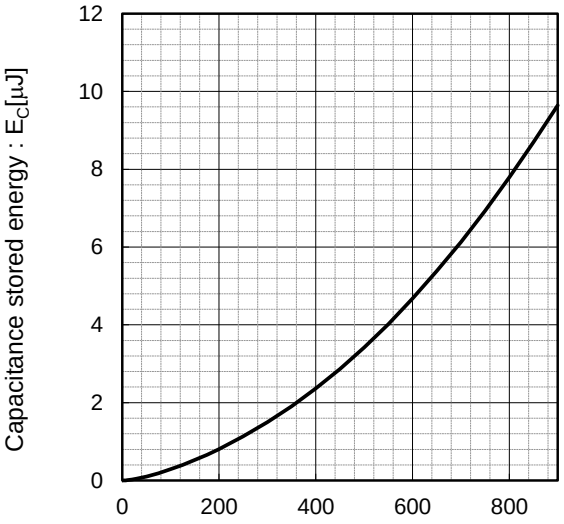
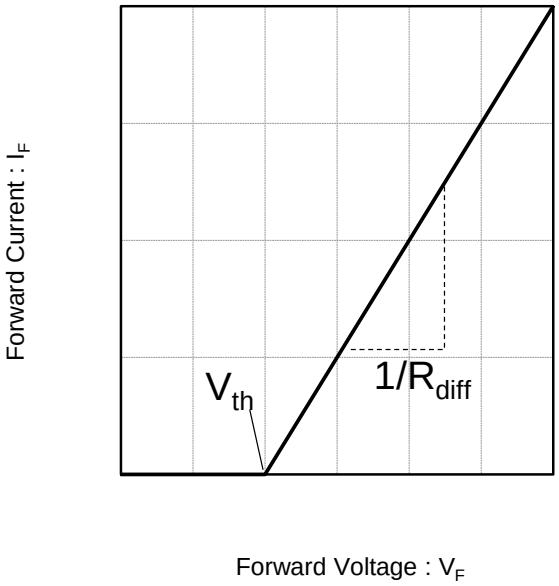


Fig.10 Typical capacitance stored energy



●Symplified forward characteristic model

Fig.11 Equivalent forward current curve



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

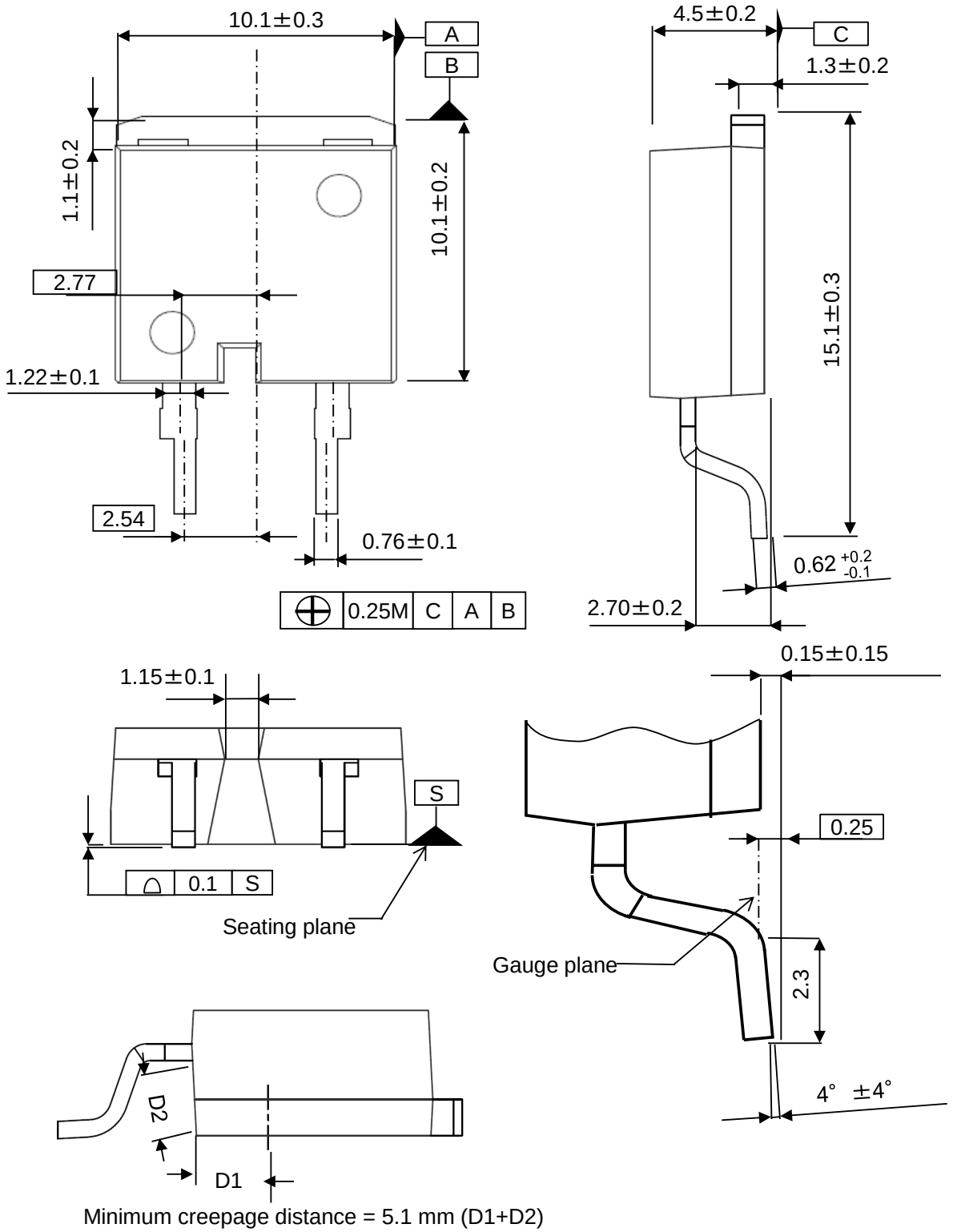
$$V_{th}(T_{vj}) = a_0 + a_1 T_{vj}$$
$$R_{diff}(T_{vj}) = b_0 + b_1 T_{vj} + b_2 T_{vj}^2$$

Symbol	Typical Value	Unit
a_0	9.93×10^{-1}	V
a_1	-1.27×10^{-3}	V/°C
b_0	7.30×10^{-2}	Ω
b_1	4.12×10^{-4}	Ω/°C
b_2	2.66×10^{-6}	Ω/°C^2

T_{vj} in ºC; -40 ºC < T_{vj} < 175 ºC ; I_F < 10 A

●**Dimensions** (Unit : mm)

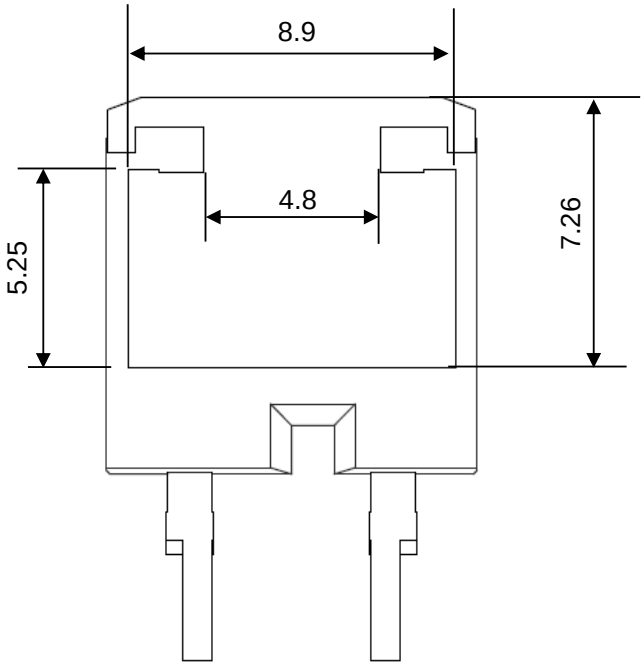
Marking Side



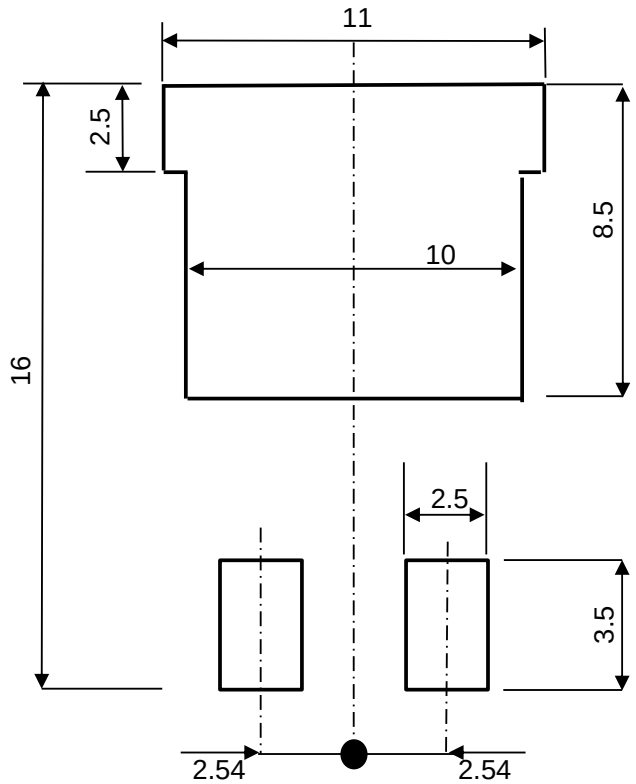
Minimum creepage distance = 5.1 mm (D1+D2)

●**Dimensions** (Unit : mm)

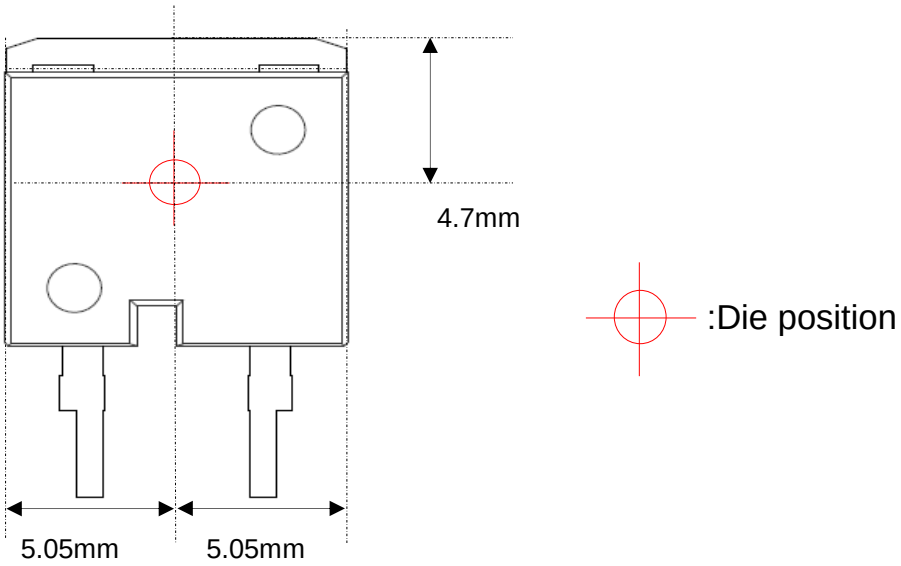
Back Side



Reference Copper Plate Area Dimension



●**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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