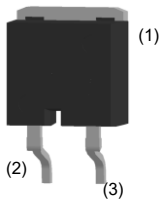
SCS305KNHR

Automotive Grade SiC Schottky Barrier Diode Datasheet

V_R	1200V
I_F	5A
Q_C	10nC

●**Outline**

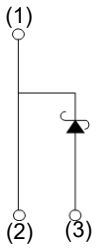
TO-263-2L



●**Features**

1) AEC-Q101 qualified
2) High surge current capability
3) Low leakage current
4) Reduced temperature dependence
5) High-speed switching possible
6) Shorter recovery time
7) 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	SCS305KN

●**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= 149°C)		I_F	5 *1	A
Surge non-repetitive forward current	PW=10ms sinusoidal, T_{vj}=25°C	I_{FSM}	54	A
	PW=10ms sinusoidal, T_{vj}=150°C		40	A
	PW=10μs square, T_{vj}=25°C		210	A
Repetitive peak forward current		I_{FRM}	26 *2	A
i^2t value	1≤PW≤10ms, T_{vj}=25°C	$\int i^2dt$	14	A^2s
	1≤PW≤10ms, T_{vj}=150°C		8	A^2s
Total power dissipation		P_D	75 *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 = 40μA	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	-	2.0	-	V
Reverse current	I_R	V_R = 1200V, T_{vj} = 25°C	-	0.05	20	μA
		V_R = 1200V, T_{vj} = 150°C	-	3.5	50	μA
		V_R = 1200V, T_{vj} = 175°C	-	10	-	μA
Total capacitance	C	V_R = 1V, f= 1MHz	-	260	-	pF
		V_R = 800V, f= 1MHz	-	18	-	pF
Total capacitive charge	Q_C	V_R = 800V, di/dt = 500A/μs	-	10	-	nC
Switching time	t_C	V_R = 800V, di/dt = 500A/μs	-	9	-	ns

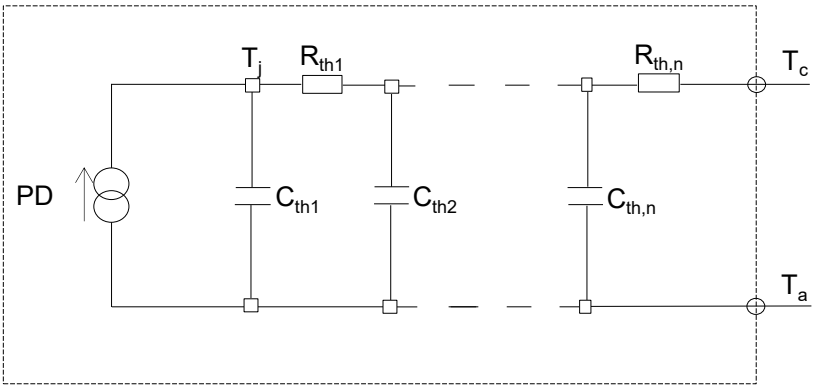
●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	R_{thJC}	-	-	1.40	2.00	K/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit
R_{th1}	10.0×10^{-1}	K/W
R_{th2}	3.7×10^{-1}	
R_{th3}	7.0×10^{-2}	

Symbol	Value	Unit
C_{th1}	1.3×10^{-3}	Ws/K
C_{th2}	8.3×10^{-5}	
C_{th3}	2.5×10^{-2}	



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●Electrical characteristic curves

Fig.1 V_F - I_F Characteristics

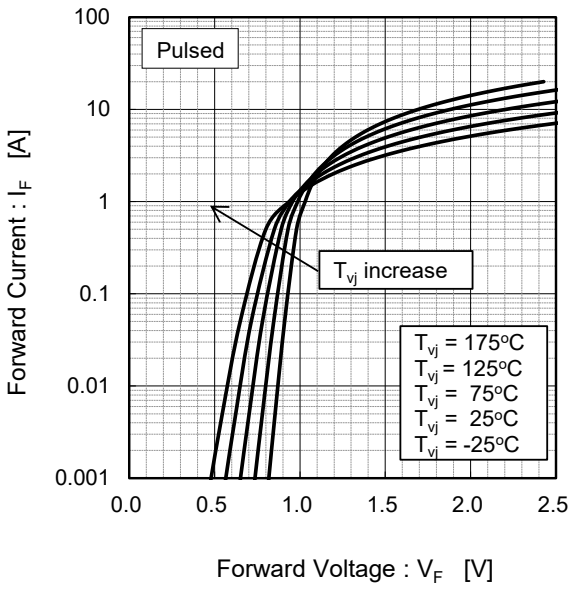


Fig.2 V_F - I_F Characteristics

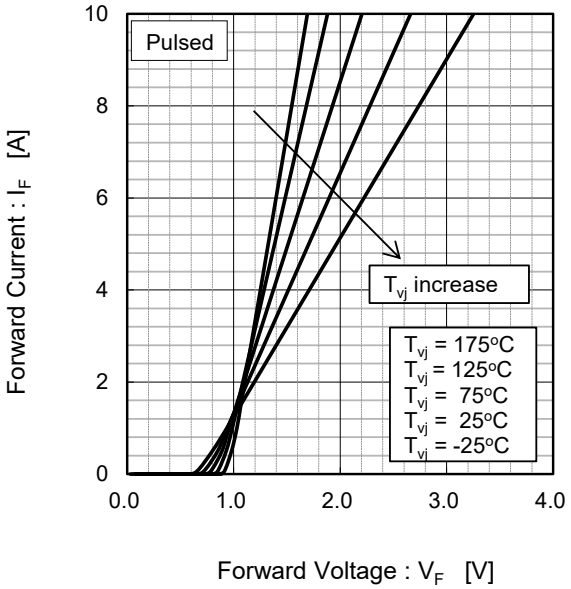


Fig.3 V_R - I_R Characteristics

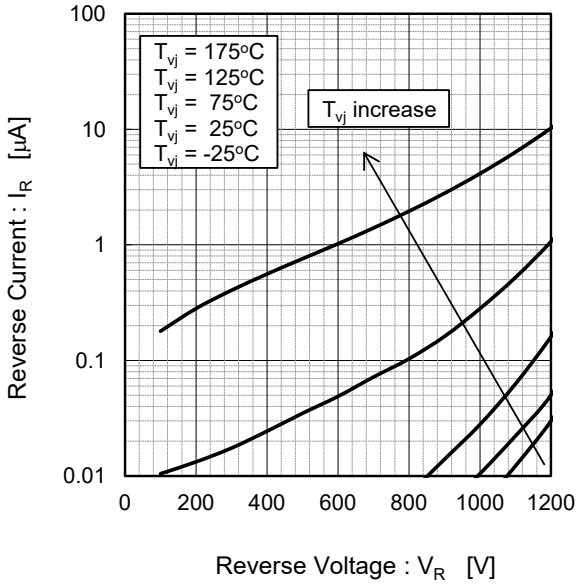
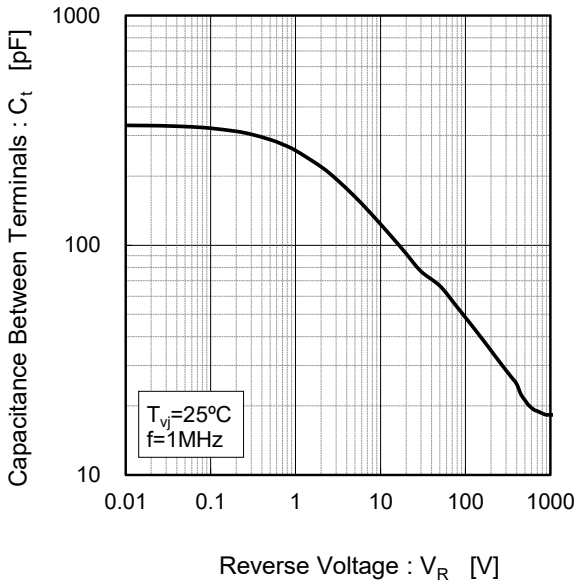


Fig.4 V_R - C_t Characteristics



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●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

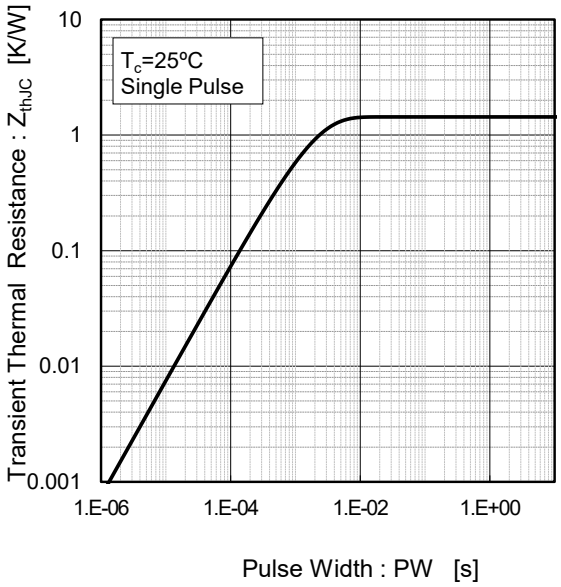


Fig.6 Power Dissipation

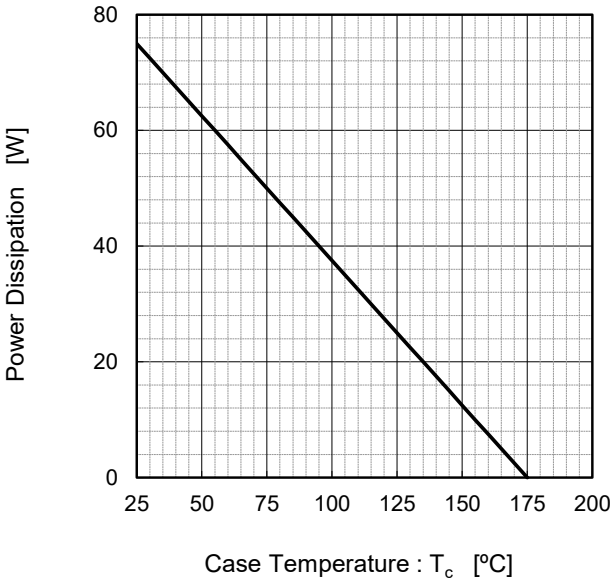
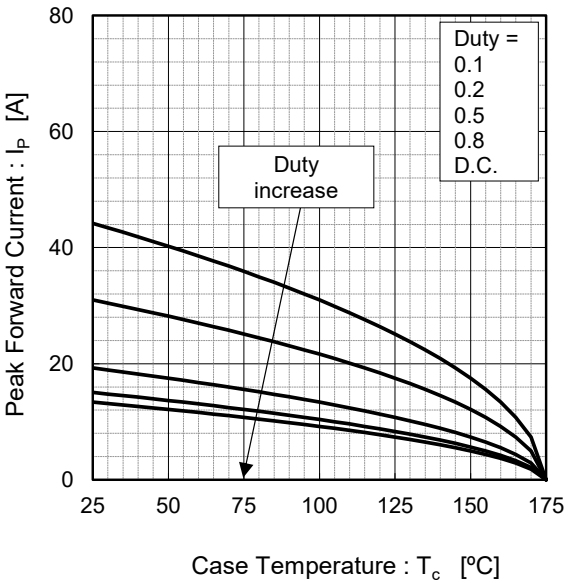
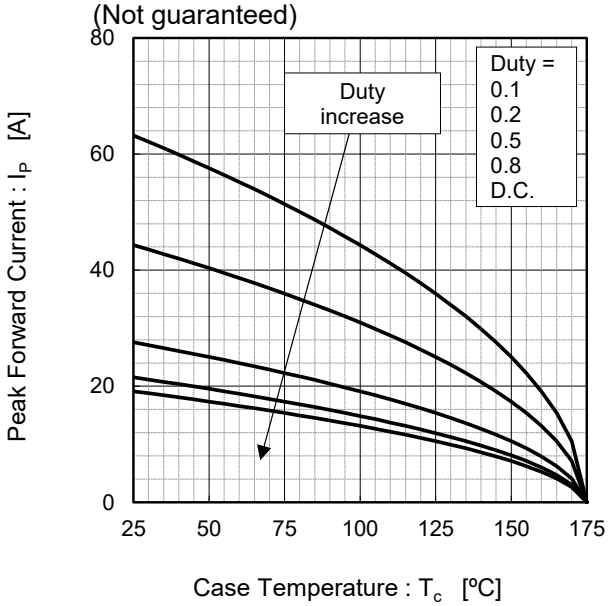


Fig.7*4 Maximum peak forward current derating curve I_P - T_c



*4 Based on max Vf, max 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 (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)

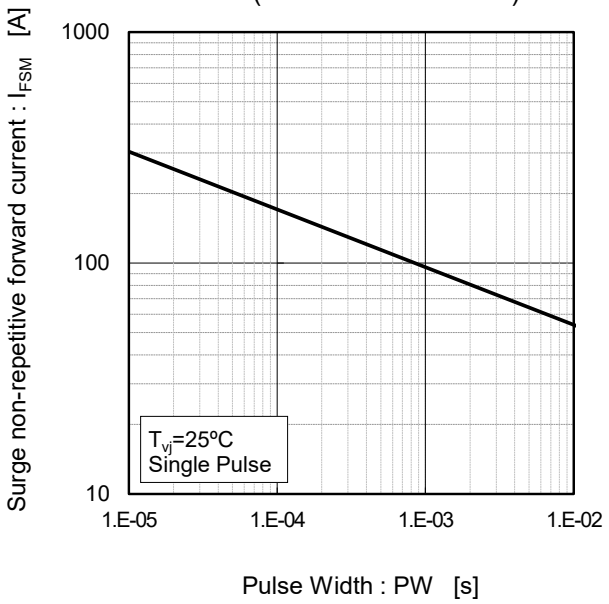
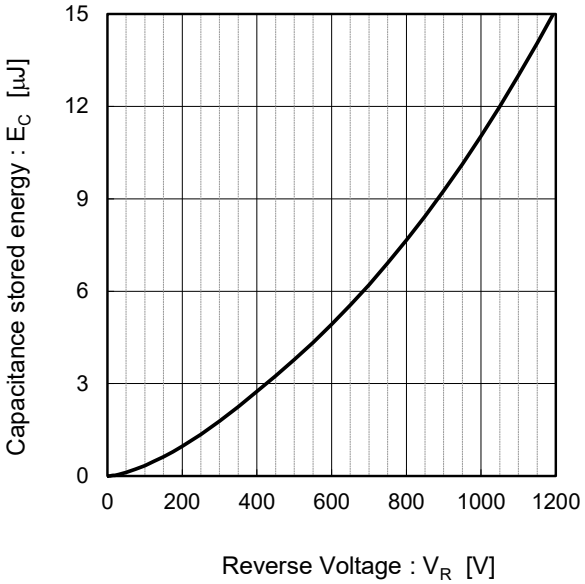
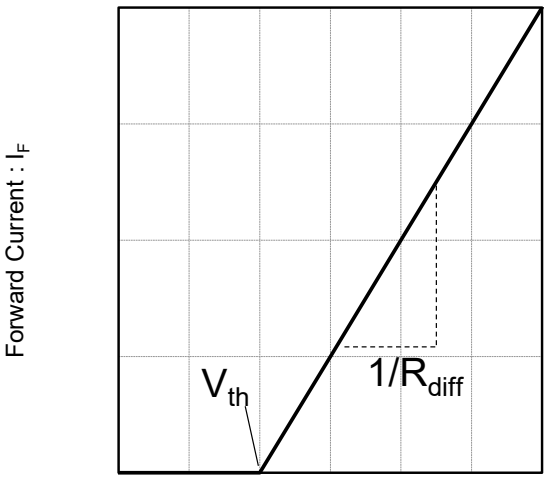


Fig.10 Typical capacitance store energy



●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	0.922	V
a_1	-1.388	mV/°C
b_0	84.80	mΩ
b_1	0.517	mΩ/°C
b_2	2.682	μΩ/°C^2

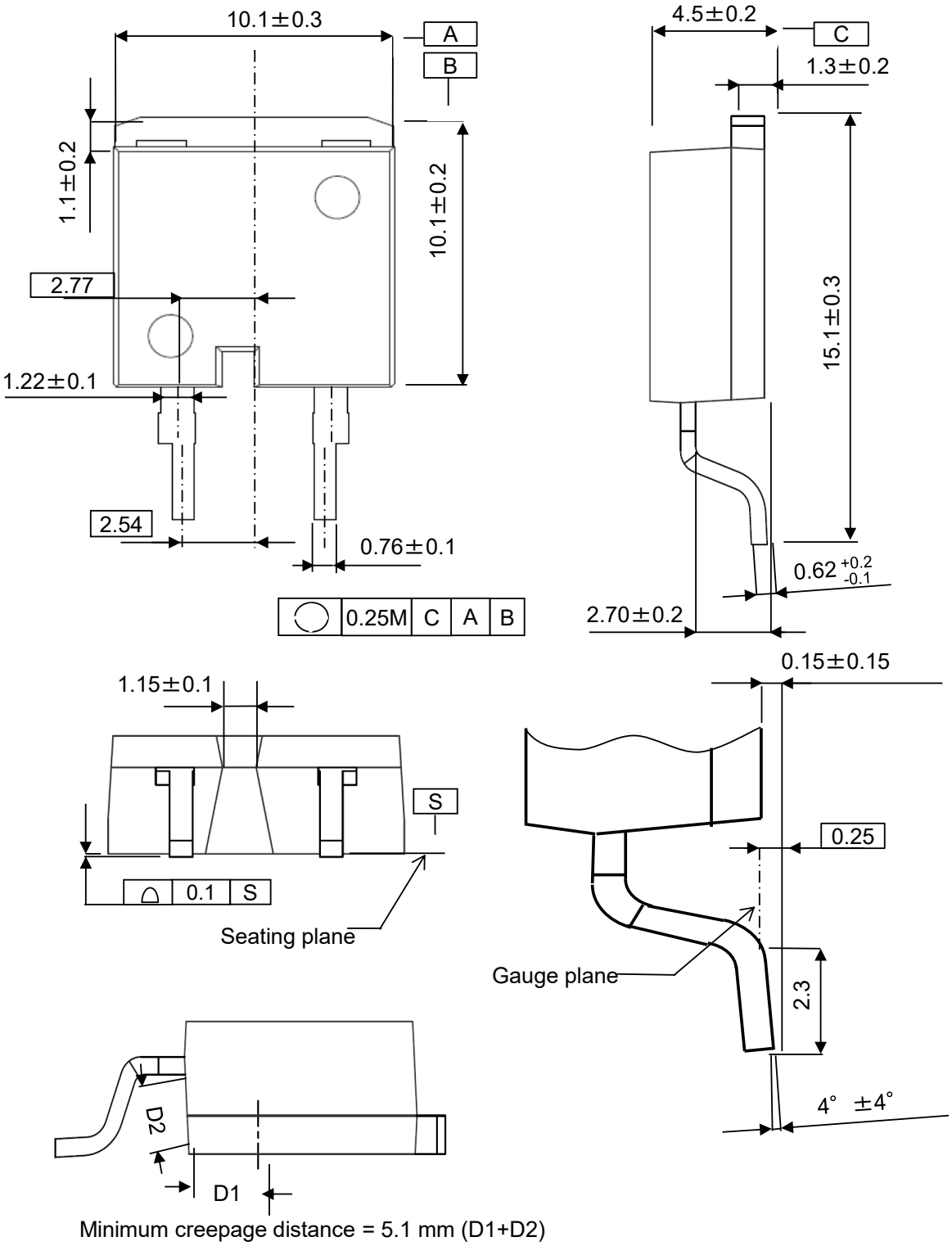
T_{vj} in ºC; -55 ºC < T_{vj} < 175ºC ; I_F < 10 A

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●**Dimensions*** (Unit : mm) *Dimensions do not inculude mold flash, protrusion or gate burrs.

Marking Side

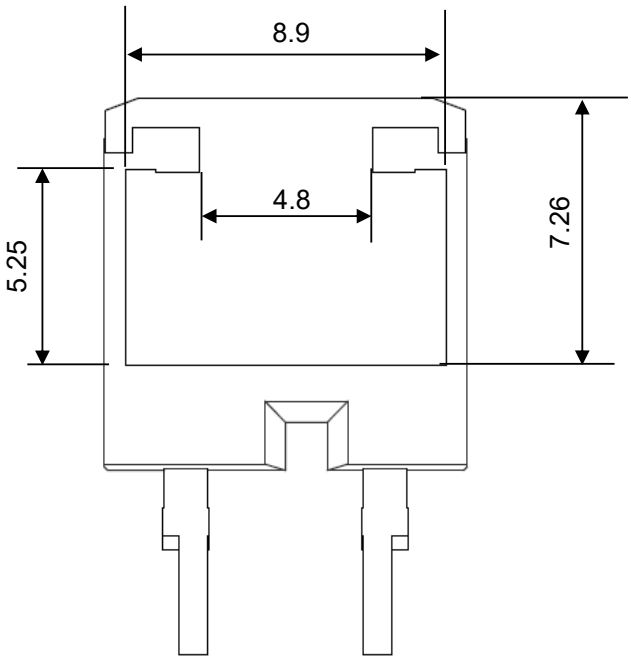


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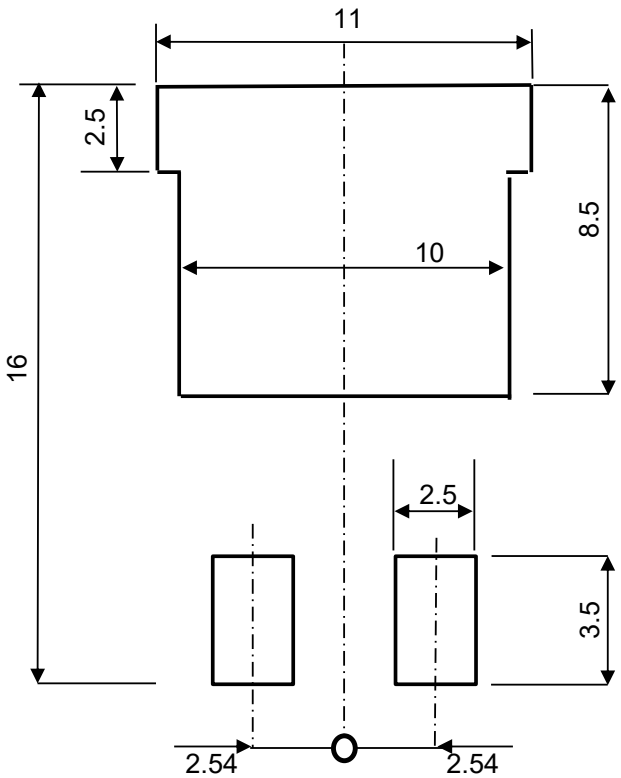
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●**Dimensions*** (Unit : mm) *Dimensions do not inculude mold flash, protrusion or gate burrs.

Back Side



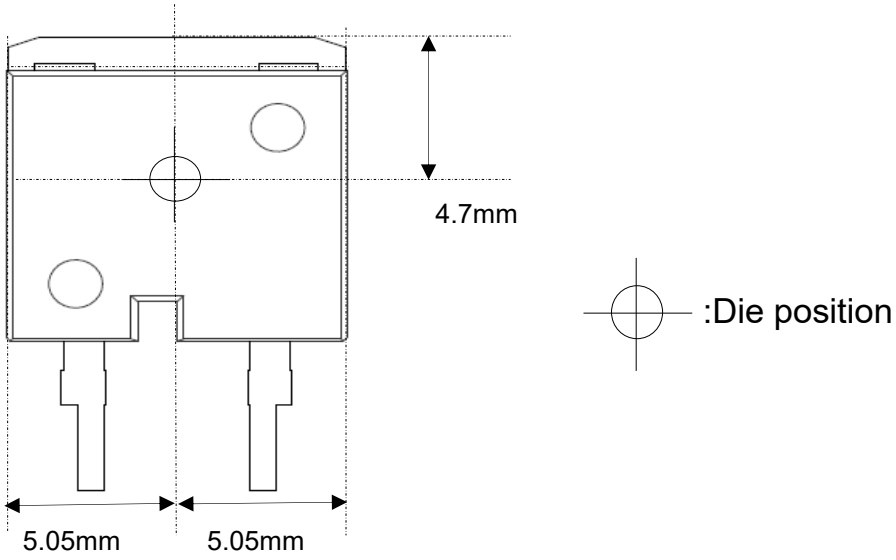
Reference Copper Plate Area Dimension



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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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