

V_R	650V
I_F	20A
Q_C	31nC

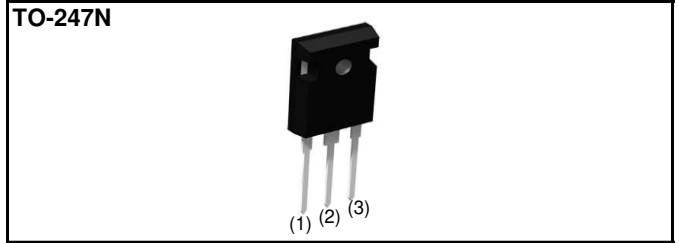
●Features

- 1) Shorter recovery time
- 2) Reduced temperature dependence
- 3) High-speed switching possible

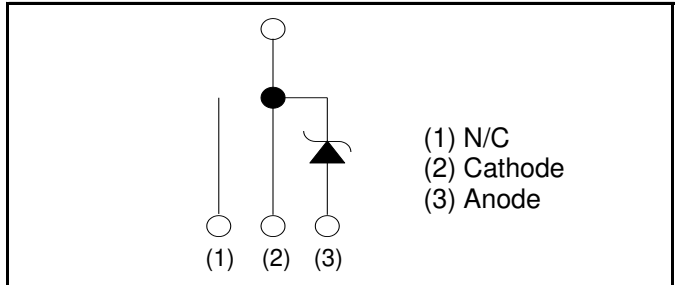
●Applications

- PFC Boost Topology
- Secondary Side Rectification
- Data Center
- PV Power Conditioners

●Outline



●Inner circuit



●Packaging specifications

Package		TO-247N
Type	Packaging	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	30
	Packing code	C11
	Marking	SCS220AE

●Absolute maximum ratings ($T_{vj} = 25^\circ\text{C}$)

Parameter		Symbol	Value	Unit
Reverse voltage (repetitive peak)		V_{RM}	650	V
Reverse voltage (DC)		V_R	650	V
Continuous forward current ($T_c = 129^\circ\text{C}$)		I_F	20	A
Surge non-repetitive forward current	PW=10ms sinusoidal, $T_{vj}=25^\circ\text{C}$	I_{FSM}	67	A
	PW=10ms sinusoidal, $T_{vj}=150^\circ\text{C}$		53	A
	PW=10 μs square, $T_{vj}=25^\circ\text{C}$		260	A
Repetitive peak forward current		I_{FRM}	81 ^{*1}	A
i^2t value	PW=10ms, $T_{vj}=25^\circ\text{C}$	$\int i^2 dt$	22	A^2s
	PW=10ms, $T_{vj}=150^\circ\text{C}$		14	A^2s
Total power dissipation		P_D	130 ^{*2}	W
Virtual Junction temperature		T_{vj}	175	$^\circ\text{C}$
Range of storage temperature		T_{stg}	-55 to +175	$^\circ\text{C}$

*1 $T_c=100^\circ\text{C}$, $T_{vj}=150^\circ\text{C}$, Duty cycle=10% *2 $T_c=25^\circ\text{C}$

●Electrical characteristics ($T_{vj} = 25^{\circ}\text{C}$)

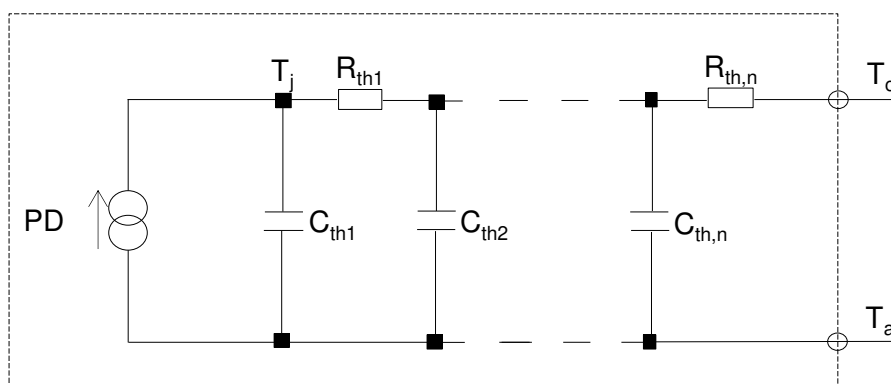
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	$I_R=4.0\text{mA}$	650	-	-	V
Forward voltage	V_F	$I_F=20\text{A}, T_{vj}=25^{\circ}\text{C}$	-	1.35	1.55	V
		$I_F=20\text{A}, T_{vj}=150^{\circ}\text{C}$	-	1.55	-	V
		$I_F=20\text{A}, T_{vj}=175^{\circ}\text{C}$	-	1.63	-	V
Reverse current	I_R	$V_R=600\text{V}, T_{vj}=25^{\circ}\text{C}$	-	4	400	μA
		$V_R=600\text{V}, T_{vj}=150^{\circ}\text{C}$	-	60	-	μA
		$V_R=600\text{V}, T_{vj}=175^{\circ}\text{C}$	-	140	-	μA
Total capacitance	C	$V_R=1\text{V}, f=1\text{MHz}$	-	730	-	pF
		$V_R=600\text{V}, f=1\text{MHz}$	-	74	-	pF
Total capacitive charge	Q_C	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	31	-	nC
Switching time	t_C	$V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$	-	19	-	ns

●Thermal characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance	R_{thJC}	-	-	0.92	1.1	KW

●Typical Transient Thermal Characteristics

Symbol	Value	Unit	Symbol	Value	Unit
R_{th1}	1.94×10^{-1}	K/W	C_{th1}	3.08×10^{-3}	Ws/K
R_{th2}	7.23×10^{-1}		C_{th2}	8.36×10^{-3}	
R_{th3}	5.52×10^{-3}		C_{th3}	1.03×10^0	



●Electrical characteristic curves

Fig.1 $V_F - I_F$ Characteristics

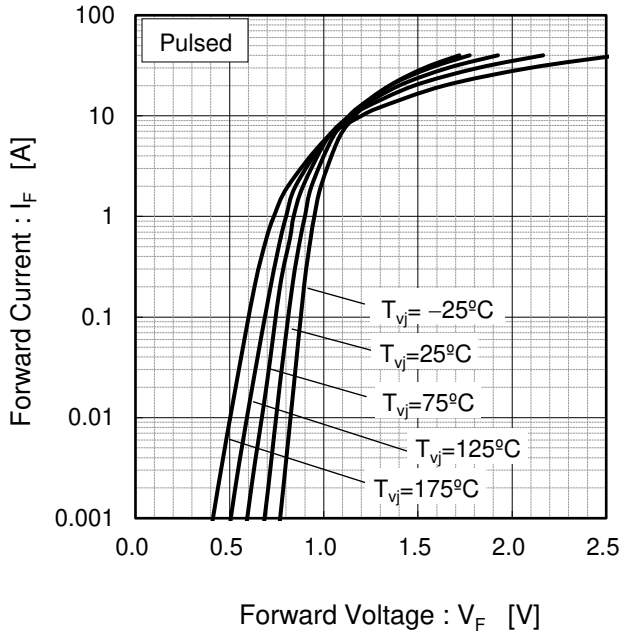


Fig.2 $V_F - I_F$ Characteristics

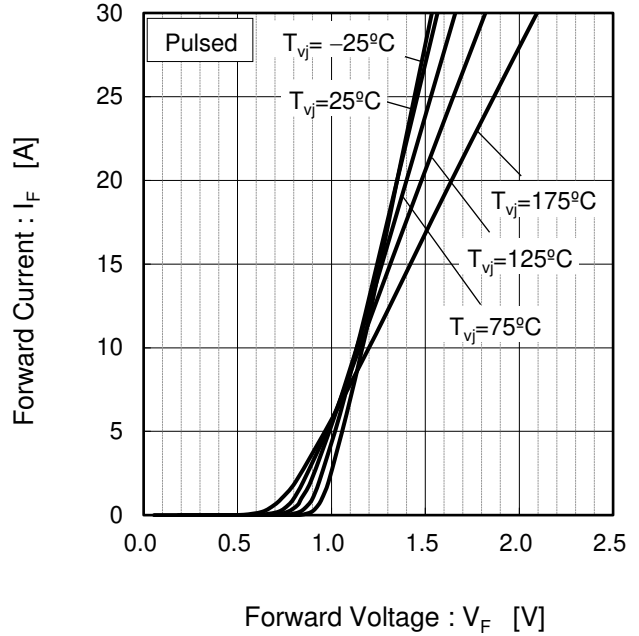


Fig.3 $V_R - I_R$ Characteristics

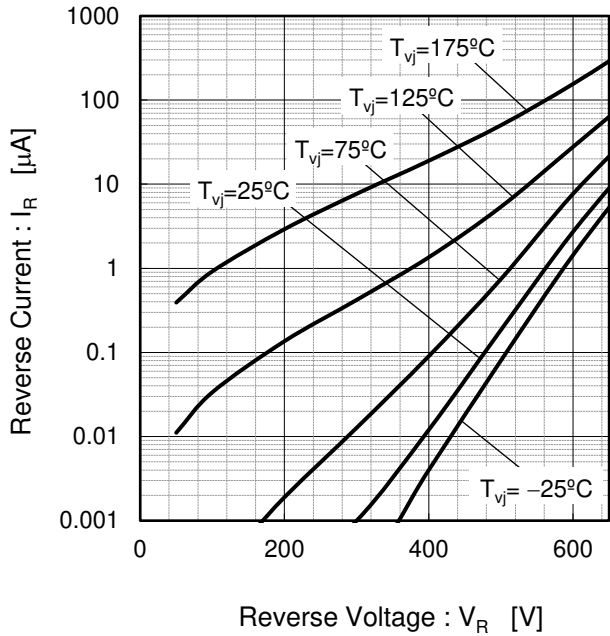
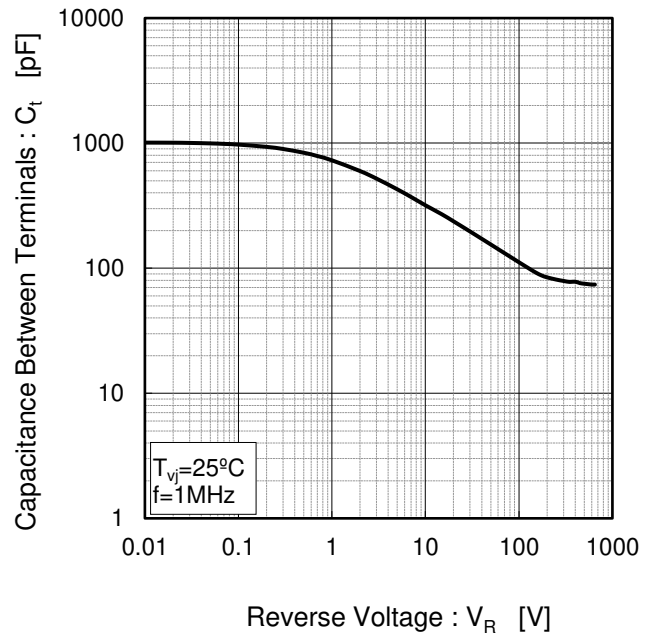


Fig.4 $V_R - C_t$ Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

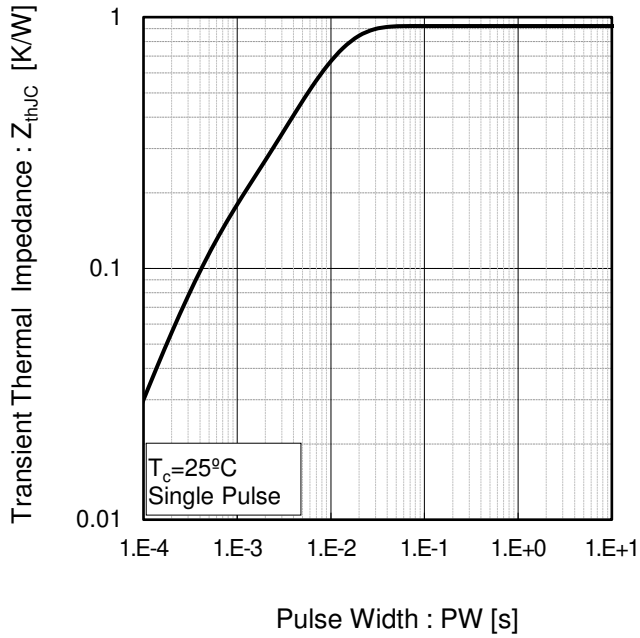


Fig.6 Power Dissipation

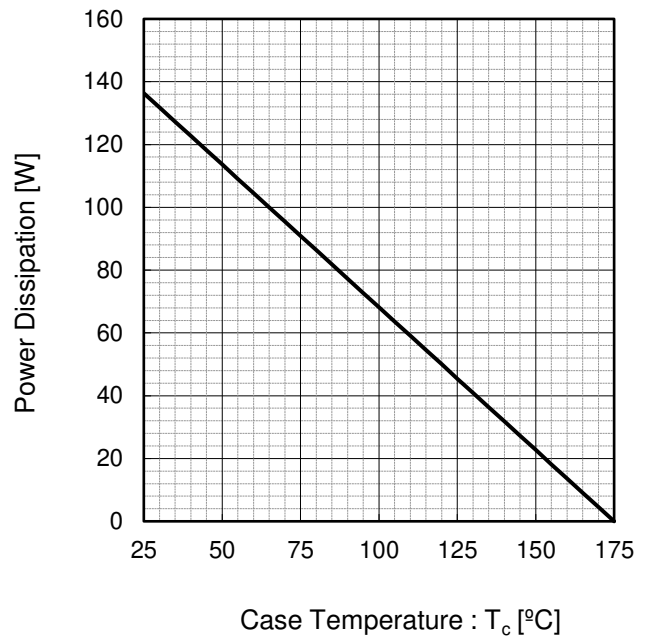
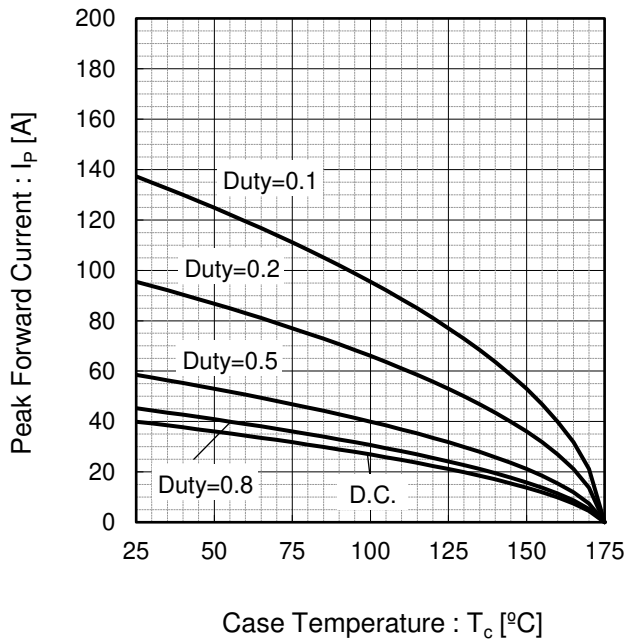
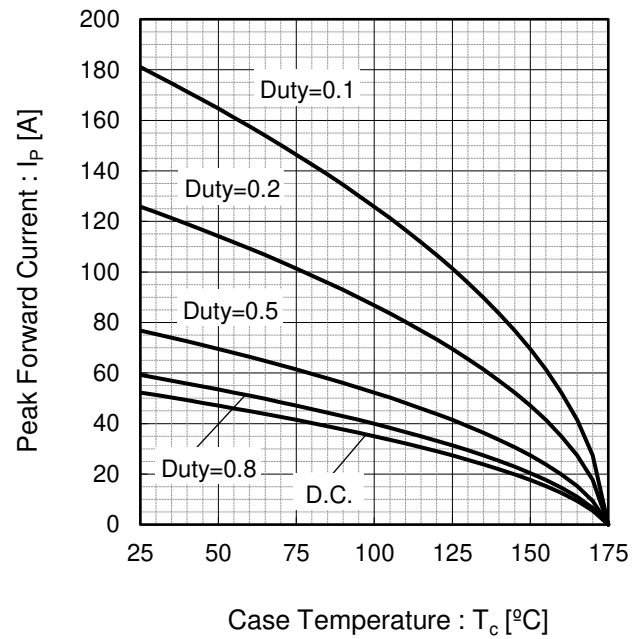


Fig.7 Maximum peak forward current derating curve $I_P - T_c$



Case Temperature : T_c [°C]
 *3 Based on max V_f , max R_{thJC}
 Valid for switching of above 10kHz,
 excluding D.C. curve.

Fig.8 Typical peak forward current derating curve $I_P - T_c$ (Not guaranteed)



Case Temperature : T_c [°C]
 *4 Based on typ V_f , 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)

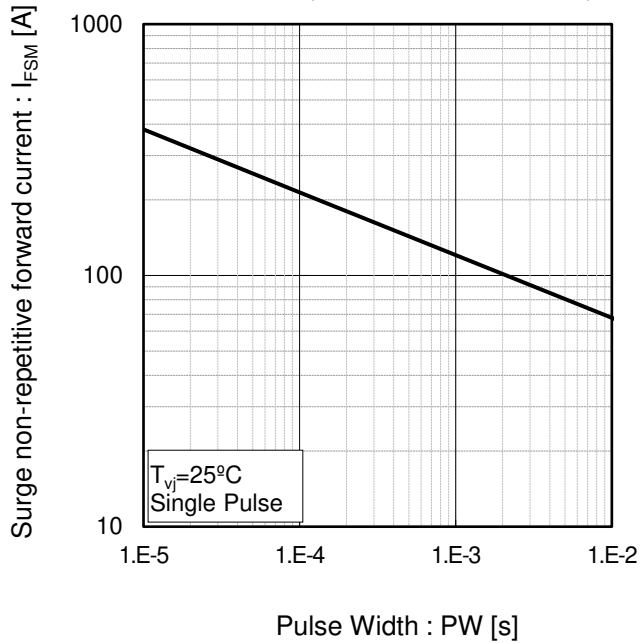
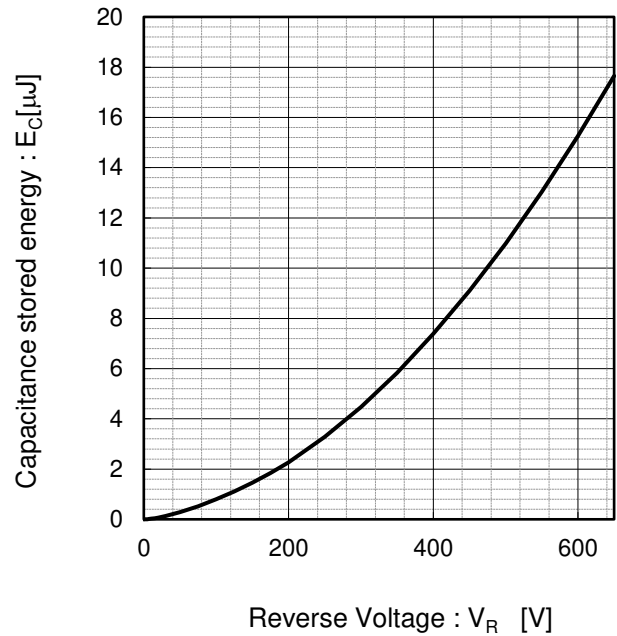
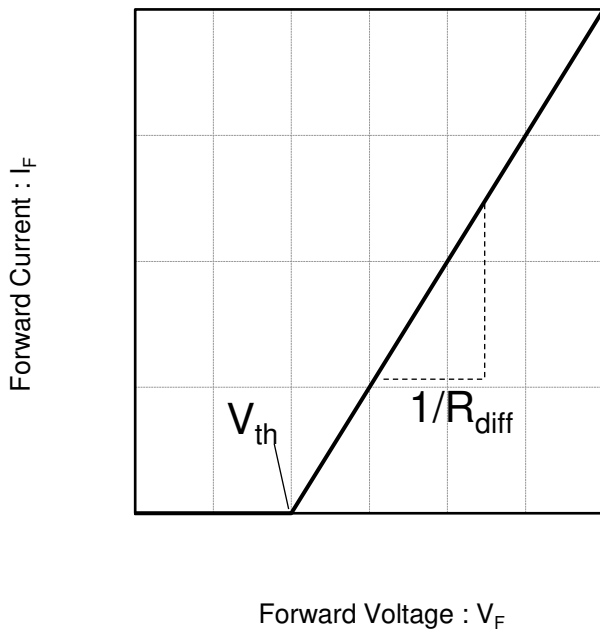


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

Fig.11 Equivalent forward current curve



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

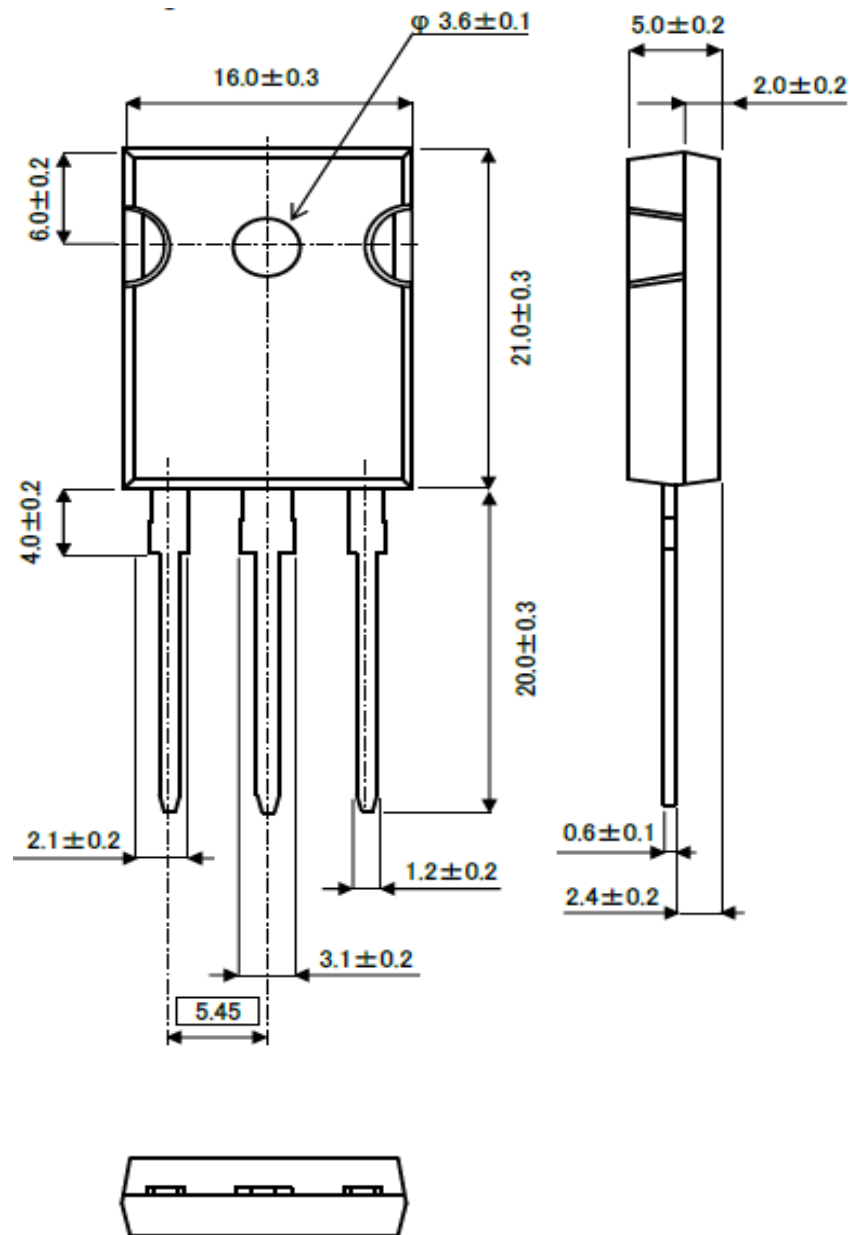
$$V_{th} (T_{vj}) = a_0 + a_1 T_{vj}$$

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

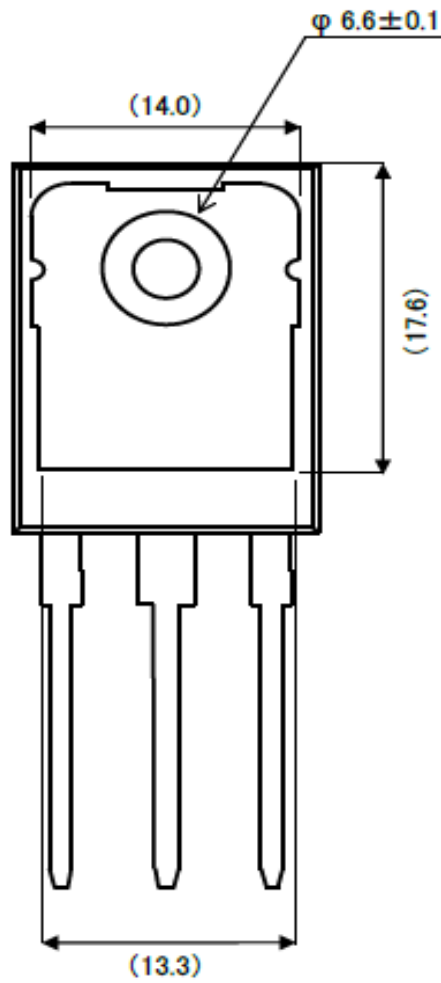
Symbol	Typical Value	Unit
a ₀	9.35E-01	V
a ₁	-1.12E-03	V/°C
b ₀	1.99E-02	Ω
b ₁	5.10E-05	Ω/°C
b ₂	5.40E-07	Ω/°C ²

T_{vj} in °C; -55 °C < T_{vj} < °C ; I_F < 40 A

●Package Dimensions

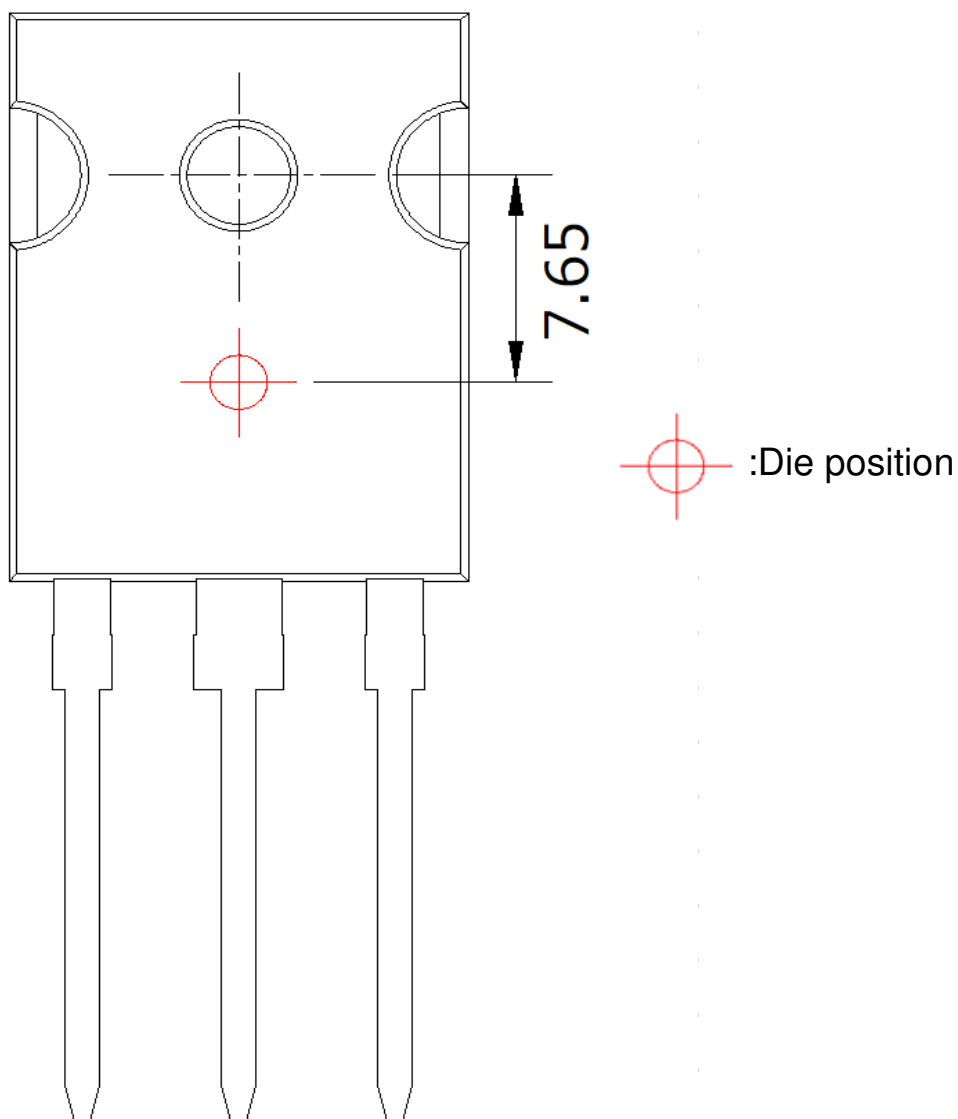


Unit: mm



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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