

# 2MBI300VJ-120-50

IGBT Modules

## IGBT MODULE (V series) 1200V / 300A / 2 in one package

### ■ Features

- High speed switching
- Voltage drive
- Low Inductance module structure

### ■ Applications

- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply
- Industrial machines, such as Welding machines



### ■ Maximum Ratings and Characteristics

#### ● Absolute Maximum Ratings (at Tc=25°C unless otherwise specified)

Items	Symbols	Conditions	Maximum ratings	Units	
Inverter	Collector-Emitter voltage	V <sub>CEs</sub>	1200	V	
	Gate-Emitter voltage	V <sub>GES</sub>	±20	V	
	Collector current	I <sub>c</sub>	Continuous Tc=80°C	300	A
		I <sub>c</sub> pulse	1ms Tc=80°C	600	
		-I <sub>c</sub>		300	
		-I <sub>c</sub> pulse	1ms	600	
Collector power dissipation	P <sub>c</sub>	1 device	1595	W	
Junction temperature	T <sub>j</sub>		175	°C	
Operating junction temperature (under switching conditions)	T <sub>jop</sub>		150		
Case temperature	T <sub>c</sub>		125		
Storage temperature	T <sub>stg</sub>		-40 to +125		
Isolation voltage	between terminal and copper base (*1)	V <sub>iso</sub>	AC : 1min.	2500	VAC
	between thermistor and others (*2)				
Screw torque	Mounting (*3)		3.5	N m	
	Terminals (*4)		4.5		
	PC-Board (*5)		0.6		

Note \*1: All terminals should be connected together during the test.

Note \*2: Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.

Note \*3: Recommendable value : 2.5-3.5 Nm (M5) Note \*4: Recommendable value : 3.5-4.5 Nm (M6)

Note \*5: Recommendable value : 0.4-0.6 Nm (M2.5)

#### ● Electrical characteristics (at Tj= 25°C unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage collector current	I <sub>CEs</sub>	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 1200V	-	-	3.0	mA	
Gate-Emitter leakage current	I <sub>GES</sub>	V <sub>GE</sub> = 0V, V <sub>CE</sub> = ±20V	-	-	600	nA	
Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> = 20V, I <sub>c</sub> = 300mA	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub> (terminal)	V <sub>GE</sub> = 15V I <sub>c</sub> = 300A	Tj=25°C	-	2.15	2.60	V
			Tj=125°C	-	2.45	-	
			Tj=150°C	-	2.50	-	
	V <sub>CE(sat)</sub> (chip)		Tj=25°C	-	1.75	2.20	
			Tj=125°C	-	2.05	-	
			Tj=150°C	-	2.10	-	
Inverter	Cies	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz	-	27	-	nF	
Turn-on time	ton	V <sub>CC</sub> = 600V I <sub>c</sub> = 300A V <sub>GE</sub> = ±15V R <sub>G</sub> = 0.93Ω	-	550	1200	nsec	
	tr		-	180	600		
	tr (i)		-	120	-		
	toff		-	1050	2000		
Turn-off time	tf		-	110	350		
			-	110	350		
Forward on voltage	V <sub>F</sub> (terminal)	V <sub>GE</sub> = 0V I <sub>F</sub> = 300A	Tj=25°C	-	2.10	2.55	V
			Tj=125°C	-	2.25	-	
			Tj=150°C	-	2.20	-	
	V <sub>F</sub> (chip)		Tj=25°C	-	1.70	2.15	
			Tj=125°C	-	1.85	-	
			Tj=150°C	-	1.80	-	
Reverse recovery time	trr	I <sub>F</sub> = 300A	-	200	600	nsec	
Thermistor	Resistance	T=25°C	-	5000	-	Ω	
		T=100°C	465	495	520		
	B value	T=25/50°C	3305	3375	3450	K	

#### ● Thermal resistance characteristics

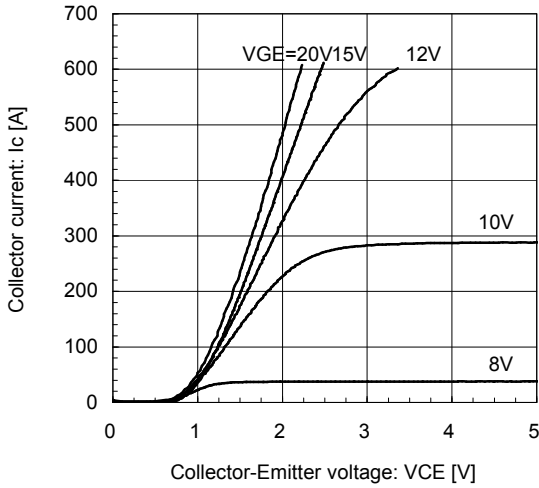
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R <sub>th(j-c)</sub>	Inverter IGBT	-	-	0.094	°C/W
		Inverter FWD	-	-	0.150	
Contact thermal resistance (1device) (*6)	R <sub>th(c-f)</sub>	with Thermal Compound	-	0.0167	-	

Note \*6: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

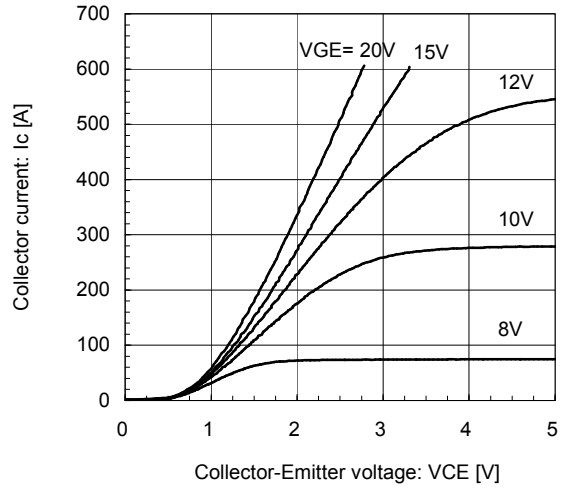
[INVERTER]

Collector current vs. Collector-Emittor voltage (typ.)  
Tj= 25°C / chip



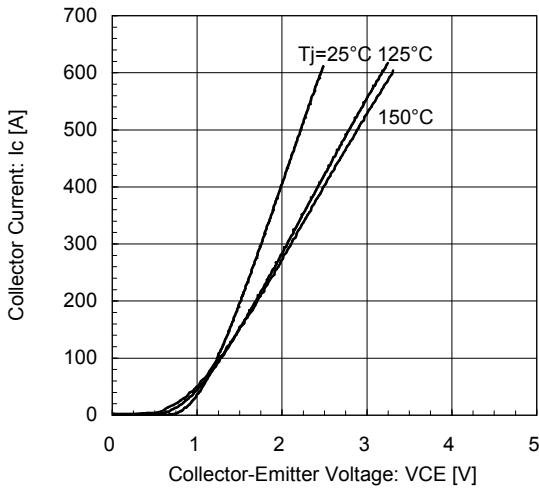
[INVERTER]

Collector current vs. Collector-Emittor voltage (typ.)  
Tj= 150°C / chip



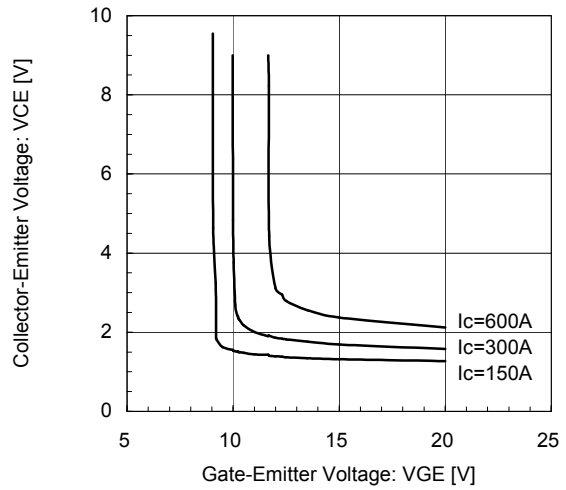
[INVERTER]

Collector current vs. Collector-Emittor voltage (typ.)  
VGE= 15V / chip



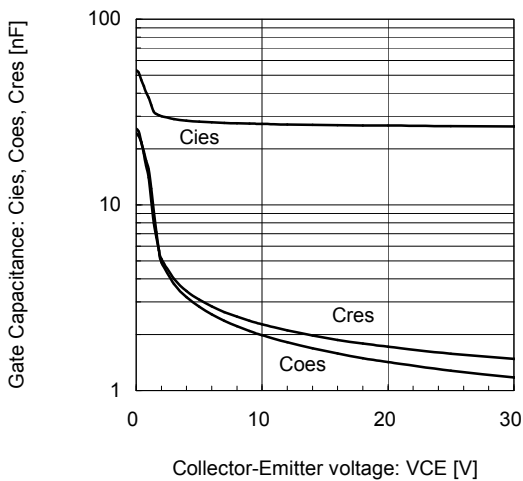
[INVERTER]

Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)  
Tj= 25°C / chip



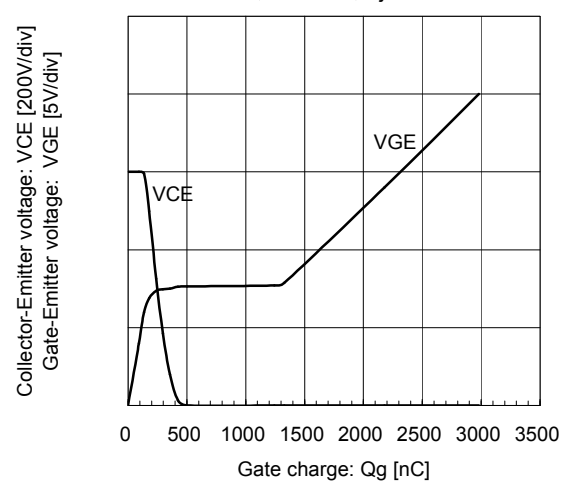
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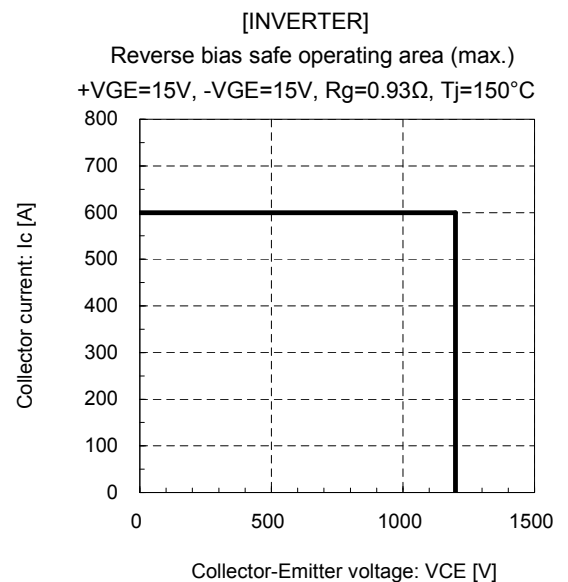
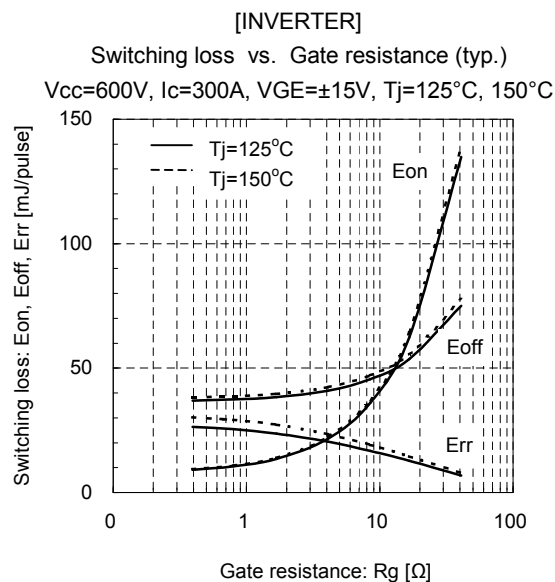
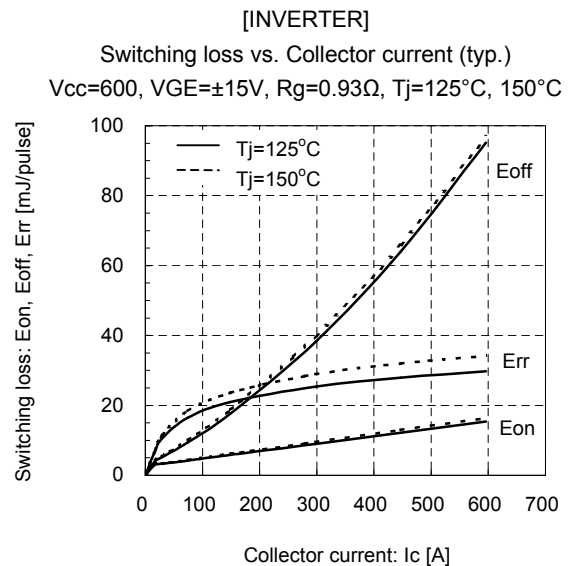
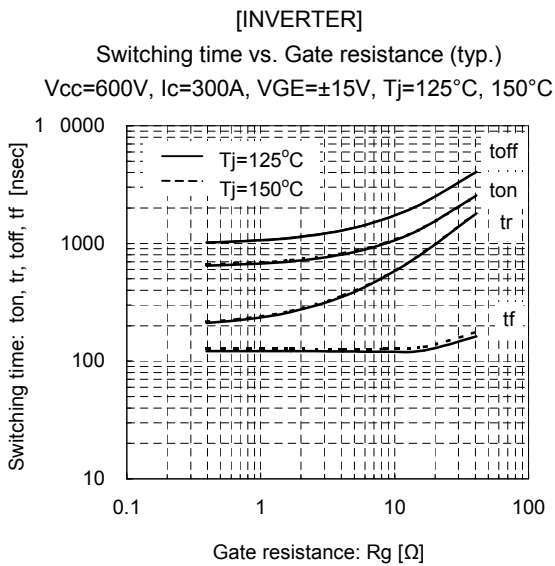
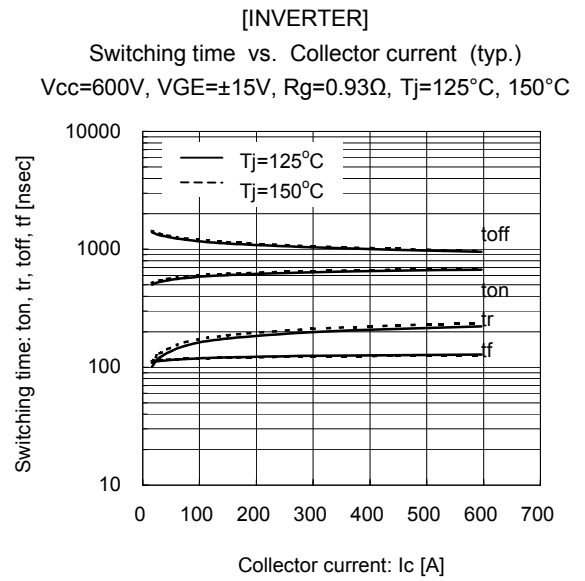
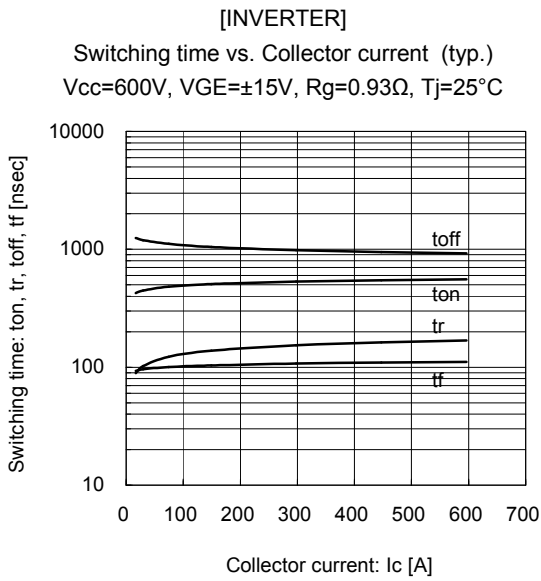
Gate Capacitance vs. Collector-Emittor Voltage (typ.)  
VGE= 0V, f= 1MHz, Tj= 25°C



[INVERTER]

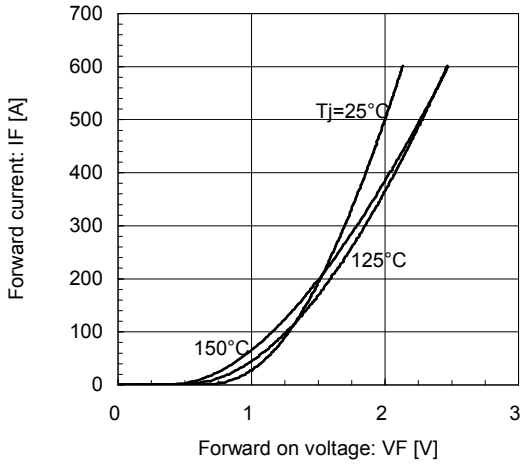
Dynamic Gate Charge (typ.)  
Vcc=600V, Ic=300A, Tj= 25°C





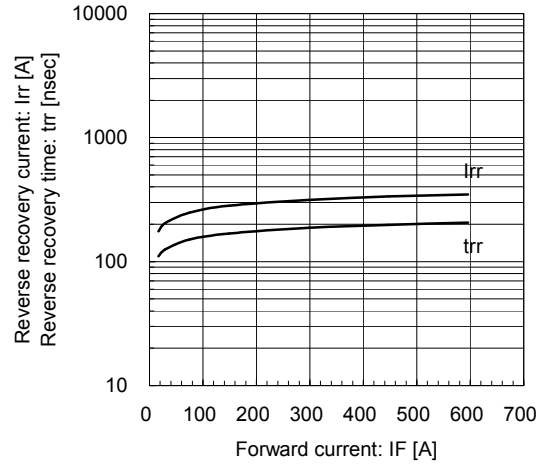
[INVERTER]

Forward Current vs. Forward Voltage (typ.)  
chip



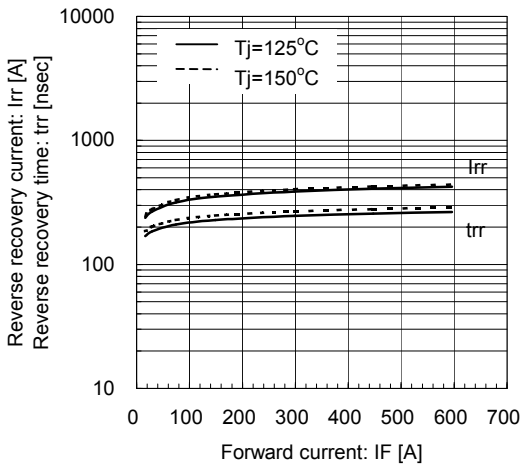
[INVERTER]

Reverse Recovery Characteristics (typ.)  
Vcc=600V, VGE=±15V, Rg=0.93Ω, Tj=25°C

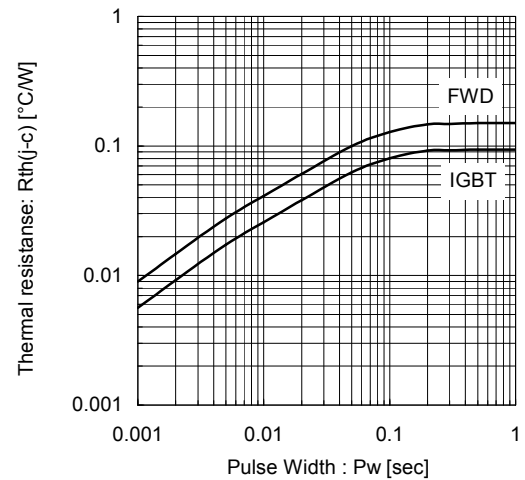


[INVERTER]

Reverse Recovery Characteristics (typ.)  
Vcc=600V, VGE=±15V, Rg=0.93Ω, Tj=125°C, 150°C

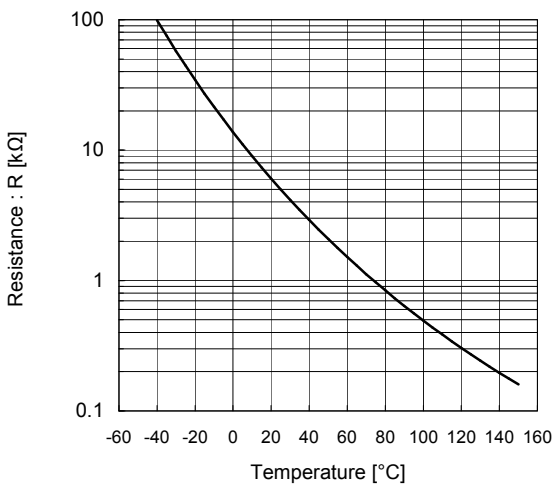


Transient Thermal Resistance (max.)

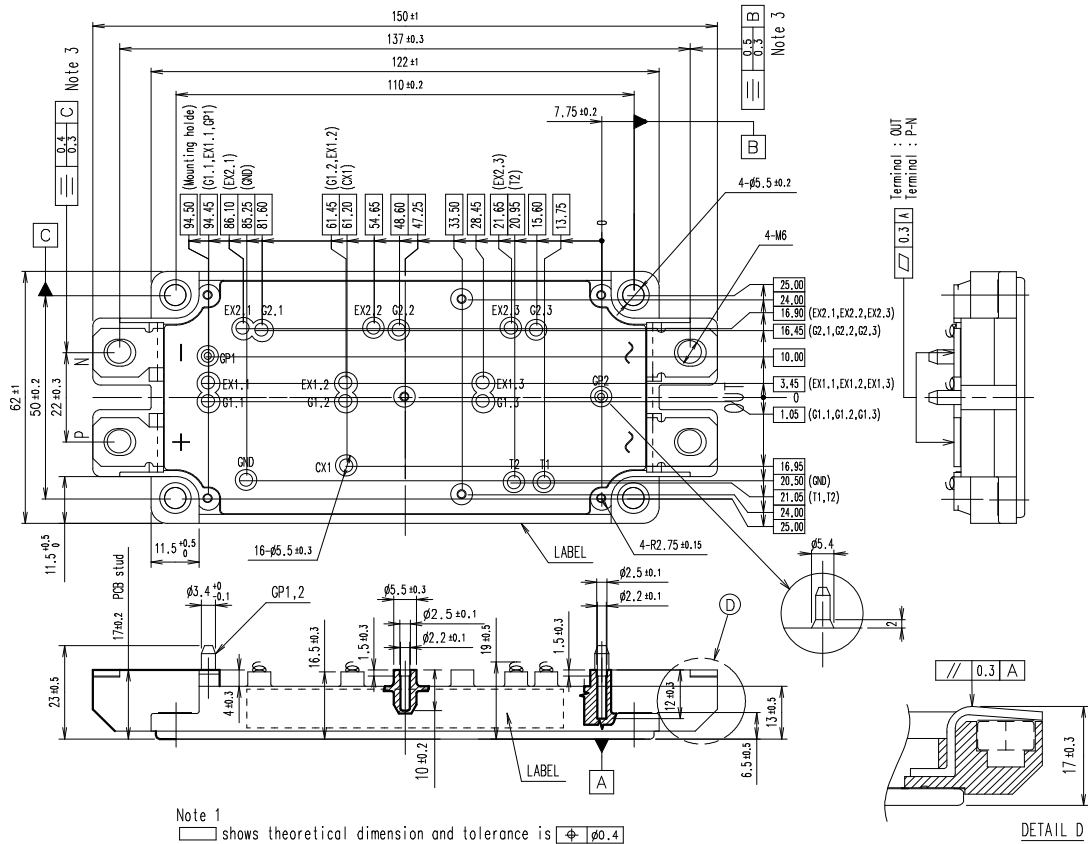


[THERMISTOR]

Temperature characteristic (typ.)



Outline Drawings, mm

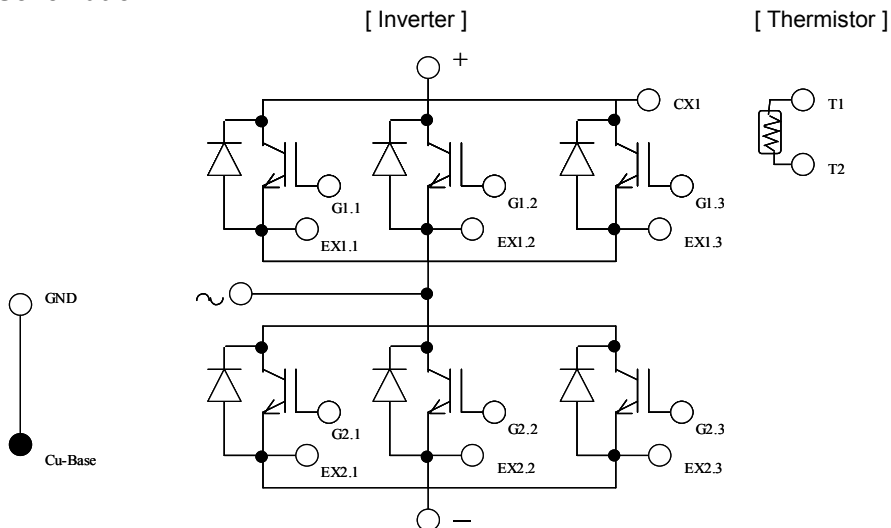


Note 1  
 shows theoretical dimension and tolerance is  $\phi \pm 0.4$

Note 2  
 Rule for PCB  
 · Guide pin hole :  $\phi 4.0 \pm 0.1$   
 · Guide pin distance :  $94.45 \pm 0.1$   
 · Spring contact pad :  $\phi 3.8 \pm 0.2$   
 · Position tol.pad :  $\phi \pm 0.4$

Note 3  
  
 Upper value : Terminal hole center  
 Lower value : Nut center  
 (Including margin of the nut position.)

Equivalent Circuit Schematic



**WARNING**

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