

# 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	T <sub>c</sub> =25°C T <sub>c</sub> =100°C	450 300
			I <sub>c</sub> pulse	1ms	600
		-I <sub>c</sub>	-I <sub>c</sub>	300	A
			-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	V <sub>iso</sub>	AC : 1min.	2500	VAC	
Screw torque				between terminal and copper base (*1) between thermistor and others (*2)	
	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>CE</sub> = 0V, V <sub>GE</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	T <sub>j</sub> =25°C	-	2.15	2.60	V
			T <sub>j</sub> =125°C	-	2.45	-	
			T <sub>j</sub> =150°C	-	2.50	-	
	T <sub>j</sub> =25°C		-	1.75	2.20		
	T <sub>j</sub> =125°C		-	2.05	-		
	T <sub>j</sub> =150°C		-	2.10	-		
Internal gate resistance	R <sub>g(int)</sub>	-	-	2.50	-	Ω	
Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz	-	27	-	nF	
Turn-on time	ton	V <sub>CC</sub> = 600V	-	550	-	nsec	
	tr	I <sub>c</sub> = 300A	-	180	-		
	tr (i)	V <sub>GE</sub> = ±15V	-	120	-		
	toff	R <sub>G</sub> = 0.93Ω	-	1050	-		
Turn-off time	tf	L <sub>s</sub> = 80nH	-	110	-	nsec	
Forward on voltage	V <sub>F</sub> (terminal)	V <sub>GE</sub> = 0V I <sub>F</sub> = 300A	T <sub>j</sub> =25°C	-	2.10	2.55	V
			T <sub>j</sub> =125°C	-	2.25	-	
			T <sub>j</sub> =150°C	-	2.20	-	
	T <sub>j</sub> =25°C		-	1.70	2.15		
	T <sub>j</sub> =125°C		-	1.85	-		
	T <sub>j</sub> =150°C		-	1.80	-		
Reverse recovery time	trr	I <sub>F</sub> = 300A	-	200	-	nsec	
Resistance	R	T=25°C	-	5000	-	Ω	
		T=100°C	465	495	520		
B value	B	T=25/50°C	3305	3375	3450	K	

● Thermal resistance characteristics

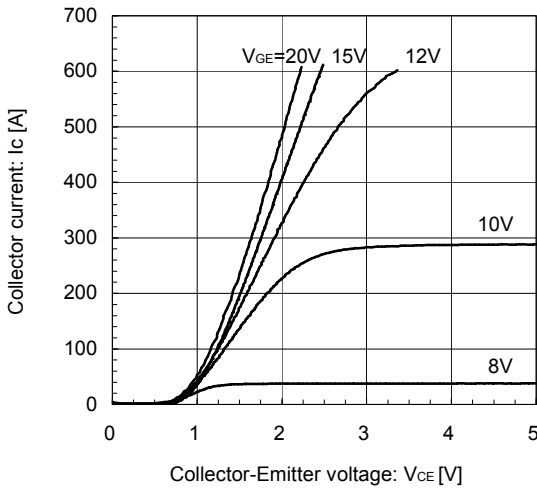
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	Rth(j-c)	Inverter IGBT	-	-	0.094	°C/W
		Inverter FWD	-	-	0.150	
Contact thermal resistance (1device) (*6)	Rth(c-f)	with Thermal Compound	-	0.0167	-	

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

■ Characteristics (Representative)

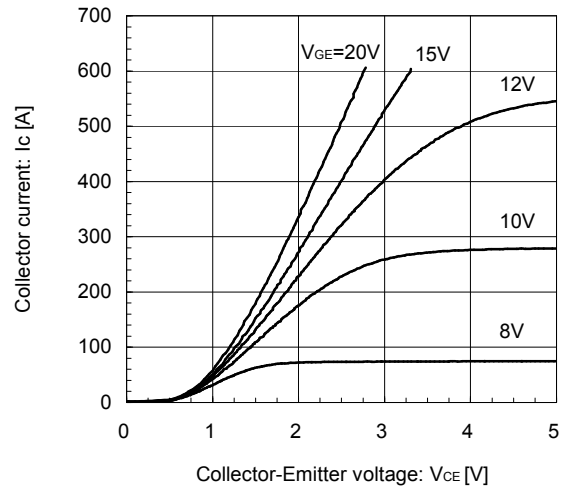
[INVERTER]

Collector current vs. Collector-Emittter voltage (typ.)  
T<sub>j</sub> = 25°C / chip



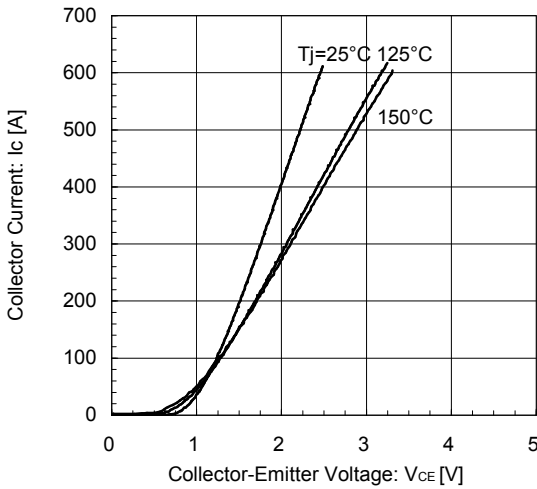
[INVERTER]

Collector current vs. Collector-Emittter voltage (typ.)  
T<sub>j</sub> = 150°C / chip



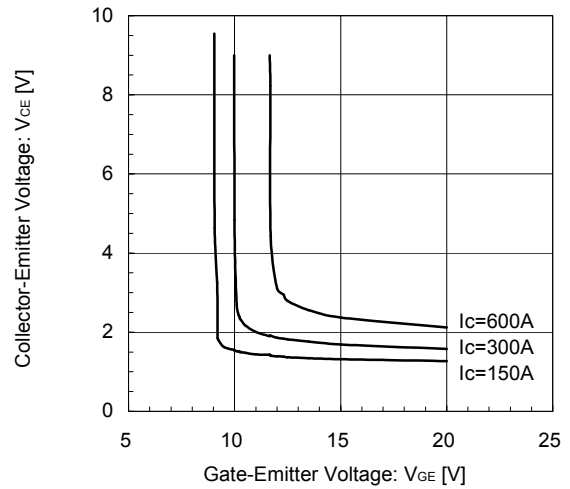
[INVERTER]

Collector current vs. Collector-Emittter voltage (typ.)  
V<sub>GE</sub> = 15V / chip



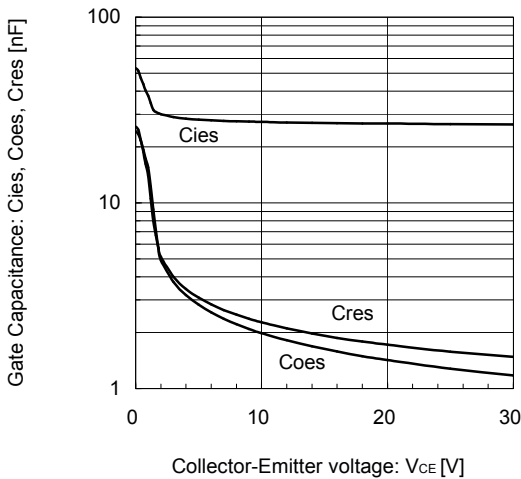
[INVERTER]

Collector-Emittter voltage vs. Gate-Emittter voltage (typ.)  
T<sub>j</sub> = 25°C / chip



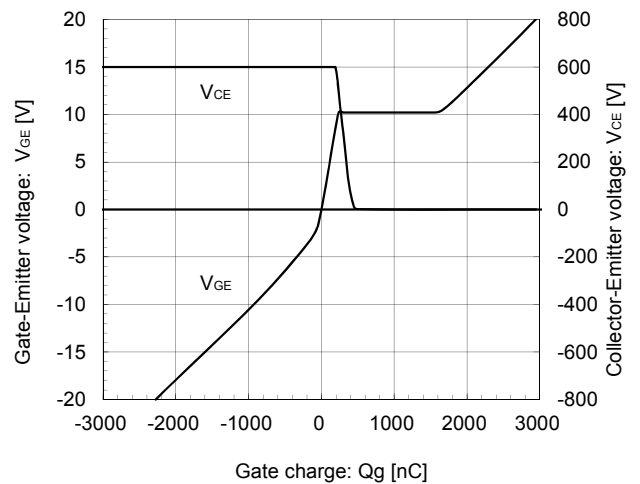
[INVERTER]

Gate Capacitance vs. Collector-Emittter Voltage (typ.)  
V<sub>GE</sub> = 0V, f = 1MHz, T<sub>j</sub> = 25°C



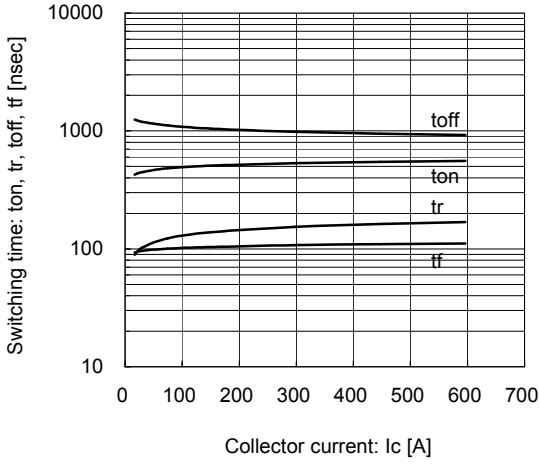
[INVERTER]

Dynamic Gate Charge (typ.)  
V<sub>CC</sub> = 600V, I<sub>C</sub> = 300A, T<sub>j</sub> = 25°C



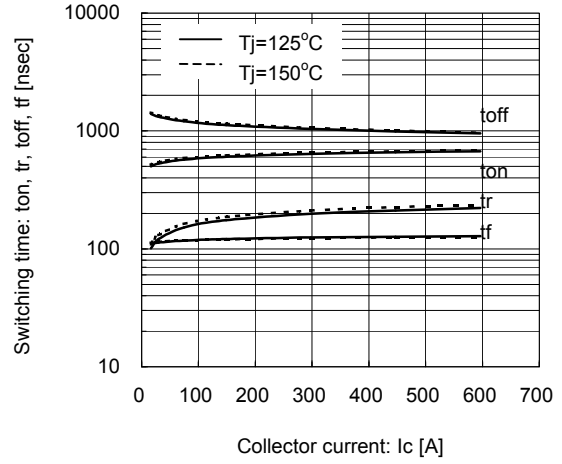
[INVERTER]

Switching time vs. Collector current (typ.)  
 $V_{CC}=600V, V_{GE}=\pm 15V, R_g=0.93\Omega, T_j=25^\circ C$



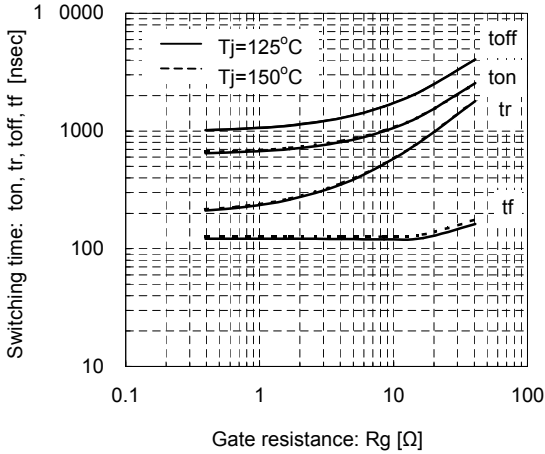
[INVERTER]

Switching time vs. Collector current (typ.)  
 $V_{CC}=600V, V_{GE}=\pm 15V, R_g=0.93\Omega, T_j=125^\circ C, 150^\circ C$



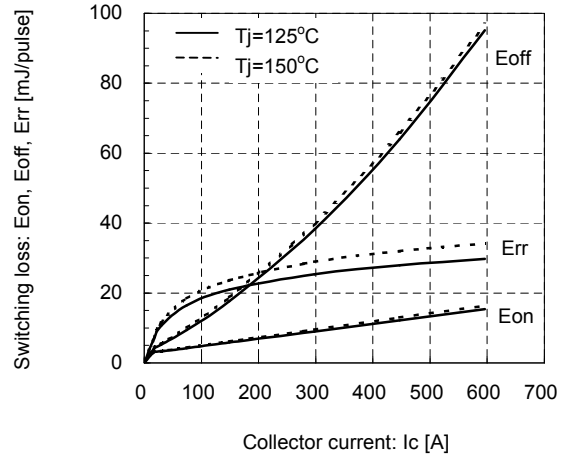
[INVERTER]

Switching time vs. Gate resistance (typ.)  
 $V_{CC}=600V, I_c=300A, V_{GE}=\pm 15V, T_j=125^\circ C, 150^\circ C$



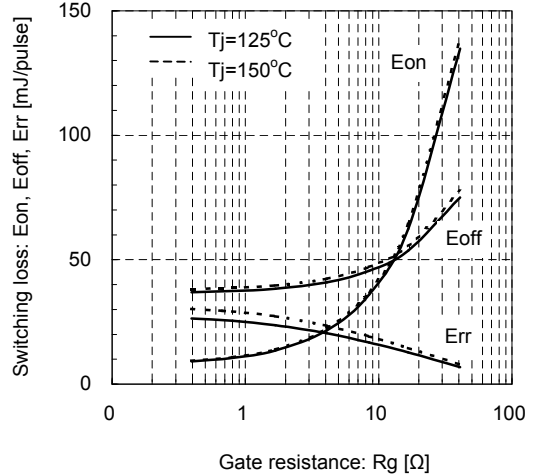
[INVERTER]

Switching loss vs. Collector current (typ.)  
 $V_{CC}=600V, V_{GE}=\pm 15V, R_g=0.93\Omega, T_j=125^\circ C, 150^\circ C$



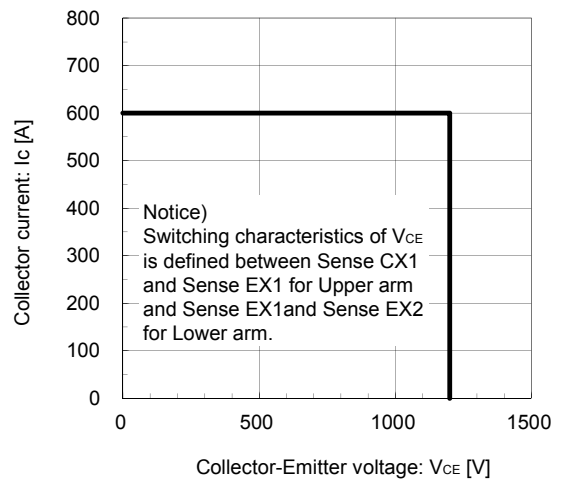
[INVERTER]

Switching loss vs. Gate resistance (typ.)  
 $V_{CC}=600V, I_c=300A, V_{GE}=\pm 15V, T_j=125^\circ C, 150^\circ C$



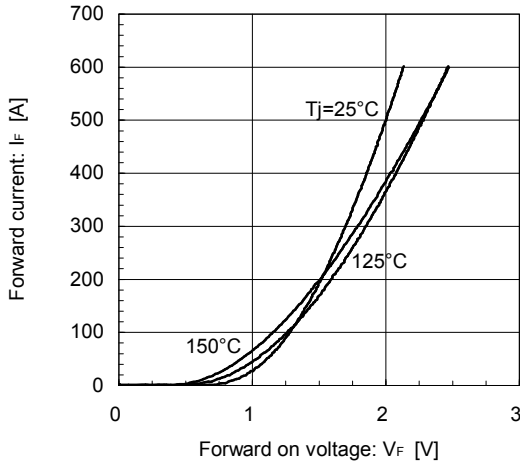
[INVERTER]

Reverse bias safe operating area (max.)  
 $+V_{GE}=15V, -V_{GE}=15V, R_g=0.93\Omega, T_j=150^\circ C$



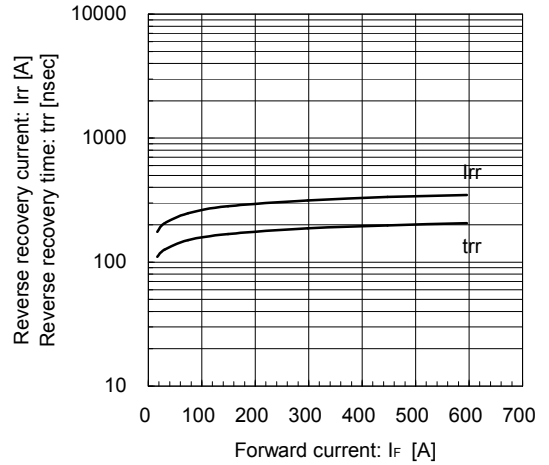
[INVERTER]

Forward Current vs. Forward Voltage (typ.)  
chip



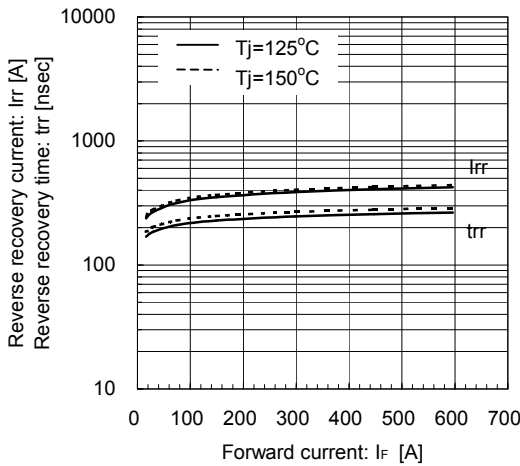
[INVERTER]

Reverse Recovery Characteristics (typ.)  
V<sub>CC</sub>=600V, V<sub>GE</sub>=±15V, R<sub>G</sub>=0.93Ω, T<sub>J</sub>=25°C

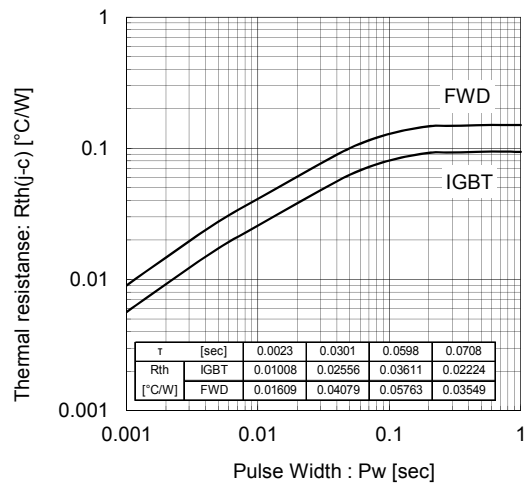


[INVERTER]

Reverse Recovery Characteristics (typ.)  
V<sub>CC</sub>=600V, V<sub>GE</sub>=±15V, R<sub>G</sub>=0.93Ω, T<sub>J</sub>=125°C, 150°C

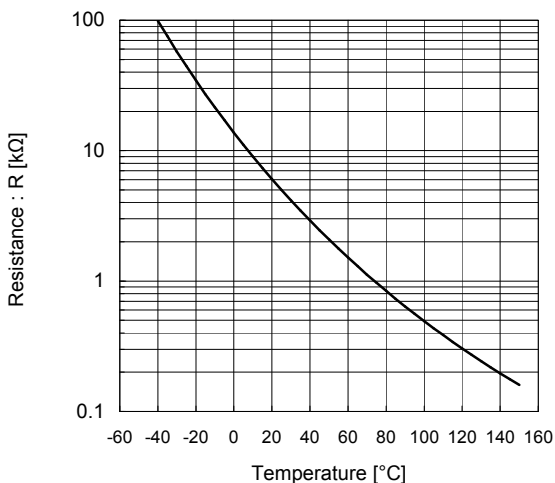


Transient Thermal Resistance (max.)

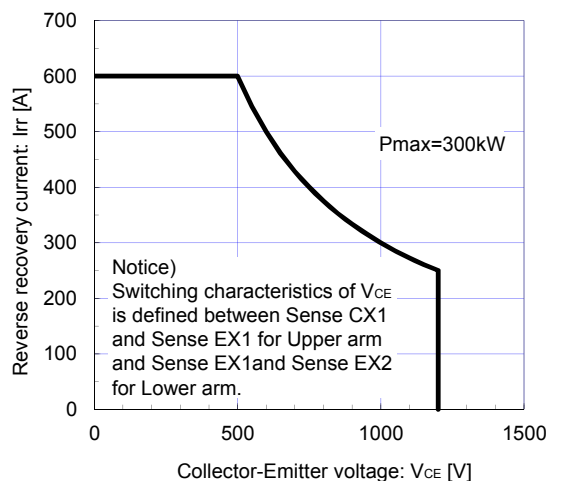


[THERMISTOR]

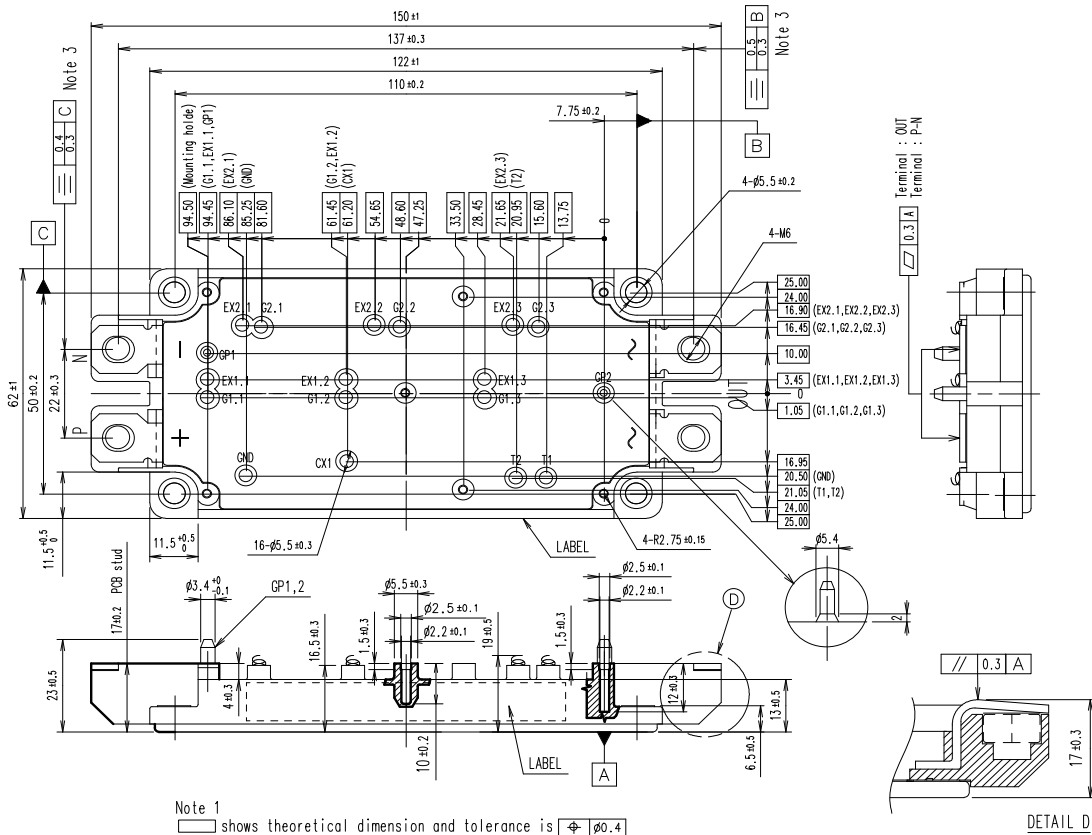
Temperature characteristic (typ.)



FWD safe operating area (max.)  
T<sub>J</sub>=150°C



Outline Drawings (Unit : mm)



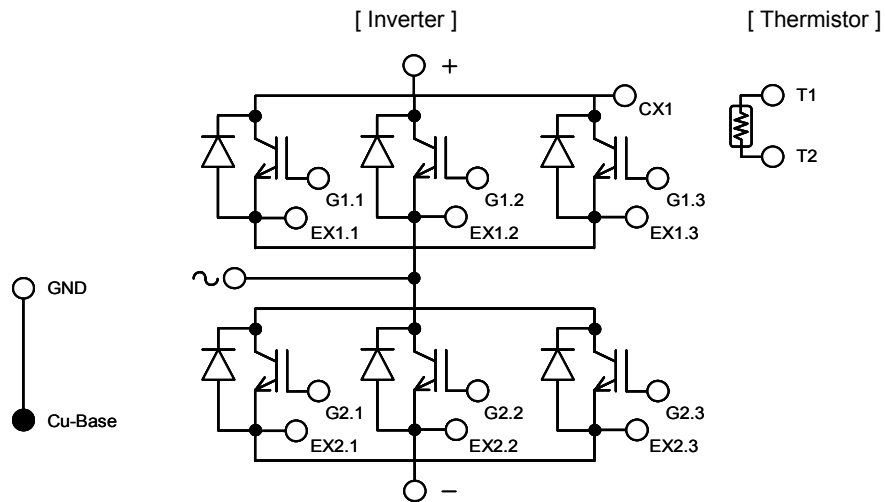
Note 1  
 shows theoretical dimension and tolerance is  $\pm \phi 0.4$

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 :  $\pm \phi 0.4$

Weight: 300g (typ.)

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

Equivalent circuit



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**IGBT Modules**

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