

2MBI450VJ-120-50

IGBT Modules

IGBT MODULE (V series) 1200V / 450A / 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
Collector-Emitter voltage	V _{CE}		1200	V
Gate-Emitter voltage	V _{GE}		±20	V
Inverter	I _C	Continuous	T _C =25°C	A
			T _C =100°C	
		1ms	600	
			450	
			900	
Collector current	-I _C	1ms	450	A
			900	
		1ms	900	
Collector power dissipation	P _C	1 device	2270	W
Junction temperature	T _J		175	°C
Operating junction temperature (under switching conditions)	T _{JP}		150	
Case temperature	T _C		125	
Storage temperature	T _{stg}		-40 to +125	
Isolation voltage	V _{iso}	AC : 1min.	2500	VAC
Screw torque	between terminal and copper base (*1)			N m
	between thermistor and others (*2)			
	Mounting (*3)		3.5	
	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.	
Inverter	Zero gate voltage collector current	I _{CES}	V _{GE} = 0V, V _{CE} = 1200V		-	-	3.0	mA
	Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V		-	-	600	nA
	Gate-Emitter threshold voltage	V _{GE (th)}	V _{CE} = 20V, I _c = 450mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	V _{CE (sat)} (terminal)	V _{GE} = 15V I _c = 450A	T _J =25°C	-	2.25	2.70	V
				T _J =125°C	-	2.55	-	
				T _J =150°C	-	2.60	-	
		V _{CE (sat)} (chip)		T _J =25°C	-	1.75	2.20	
				T _J =125°C	-	2.05	-	
				T _J =150°C	-	2.10	-	
	Internal gate resistance	R _{g(int)}	-		-	1.67	-	Ω
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz		-	41	-	nF
	Turn-on time	t _{on}	V _{CC} = 600V		-	550	-	nsec
		t _r	I _c = 450A		-	180	-	
		t _{r (i)}	V _{GE} = ±15V		-	120	-	
	Turn-off time	t _{off}	R _G = 0.52Ω		-	1050	-	nsec
		t _f	L _S = 80nH		-	110	-	
			Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 450A	T _J =25°C	-	
T _J =125°C	-	2.35				-		
T _J =150°C	-	2.30				-		
V _F (chip)	T _J =25°C	-		1.70		2.15		
	T _J =125°C	-		1.85		-		
	T _J =150°C	-		1.80		-		
Reverse recovery time	t _{rr}	I _F = 450A		-	200	-	nsec	
Thermistor	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	-	-	0.066	°C/W
		Inverter FWD	-	-	0.100	
Contact thermal resistance (1device) (*6)	Rth(c-f)	with Thermal Compound	-	0.0167	-	

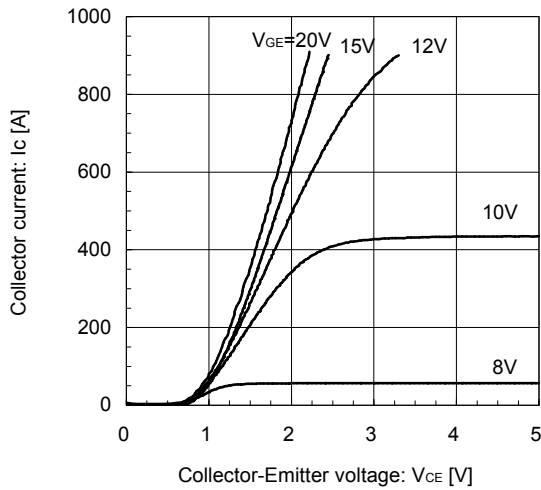
Note *6: This is the value which is defined mounting on the additional cooling fin with thermal compound.



■ Characteristics (Representative)

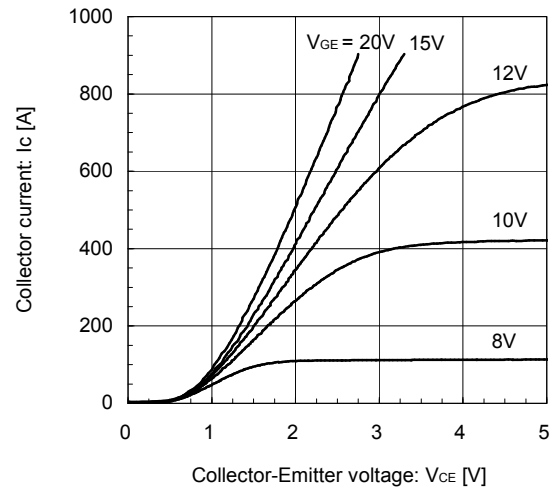
[INVERTER]

Collector current vs. Collector-Emittter voltage (typ.)
T_j = 25°C / chip



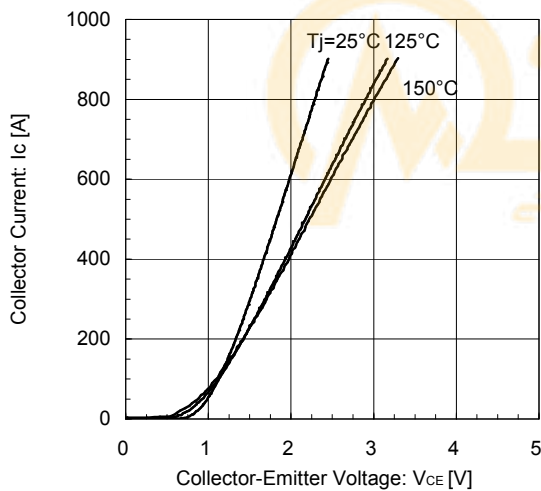
[INVERTER]

Collector current vs. Collector-Emittter voltage (typ.)
T_j = 150°C / chip



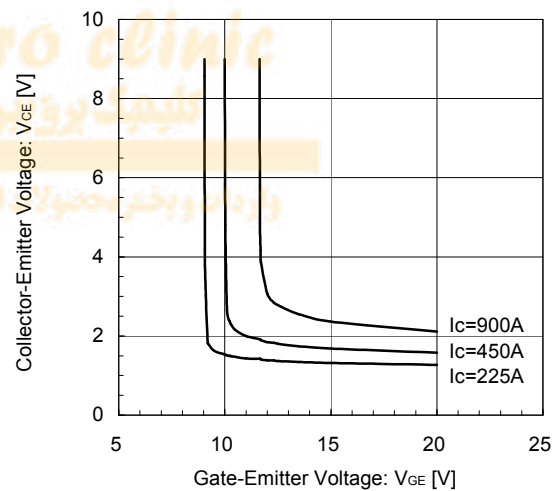
[INVERTER]

Collector current vs. Collector-Emittter voltage (typ.)
V_{GE} = 15V / chip



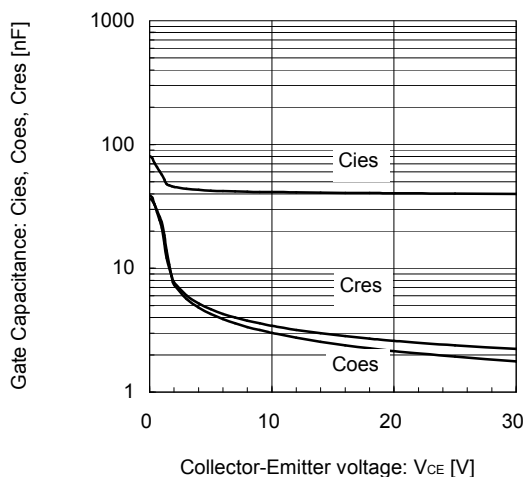
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Collector-Emittter voltage vs. Gate-Emittter voltage (typ.)
T_j = 25°C / chip



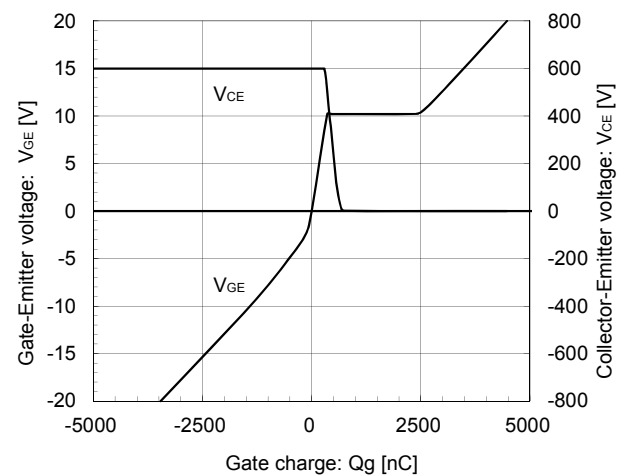
[INVERTER]

Gate Capacitance vs. Collector-Emittter Voltage (typ.)
V_{GE} = 0V, f = 1MHz, T_j = 25°C



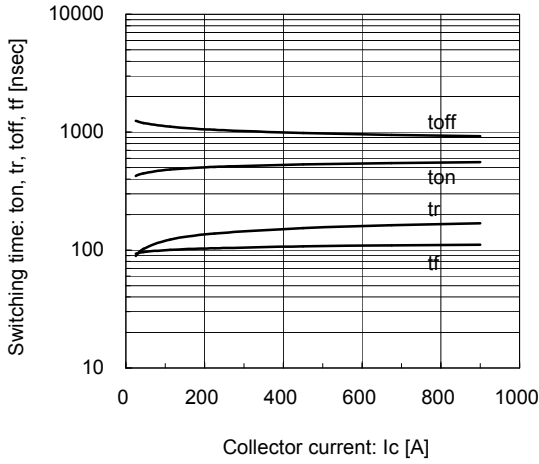
[INVERTER]

Dynamic Gate Charge (typ.)
V_{CC} = 600V, I_C = 450A, T_j = 25°C



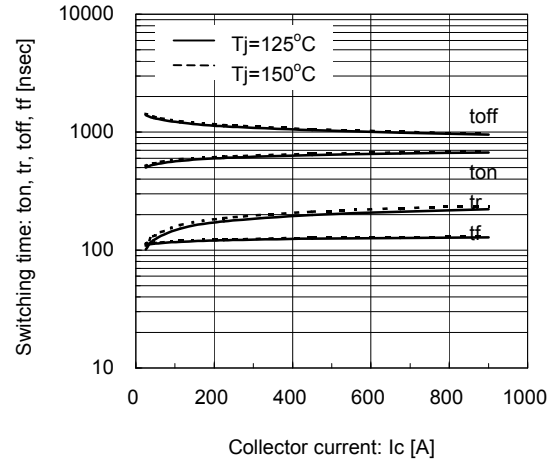
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=0.52\Omega$, $T_j=25^\circ C$



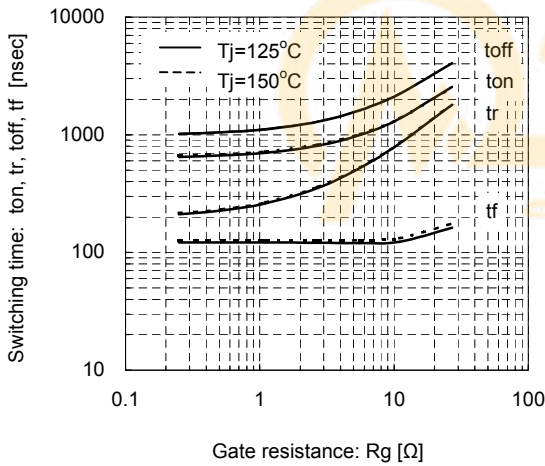
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=0.52\Omega$, $T_j=125^\circ C, 150^\circ C$



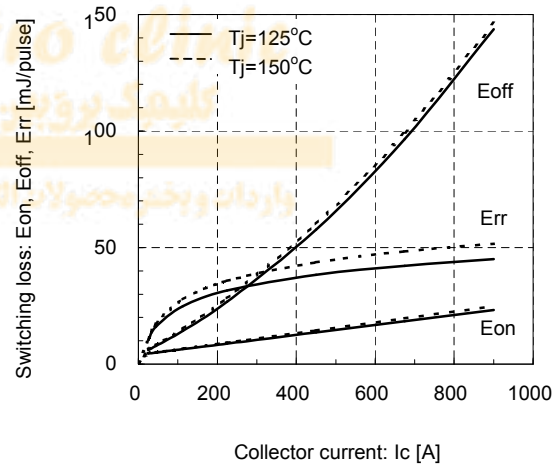
[INVERTER]

Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_c=450A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C, 150^\circ C$



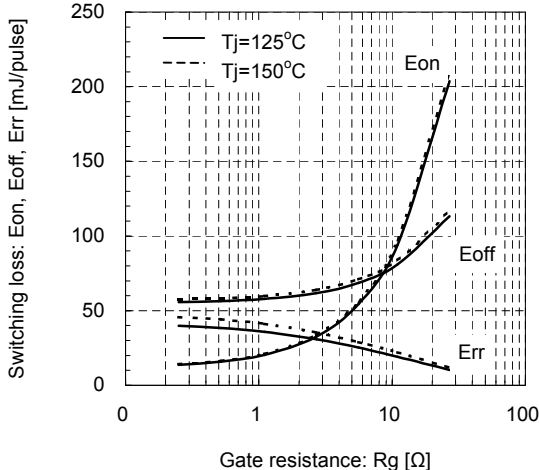
[INVERTER]

Switching loss vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=0.52\Omega$, $T_j=125^\circ C, 150^\circ C$



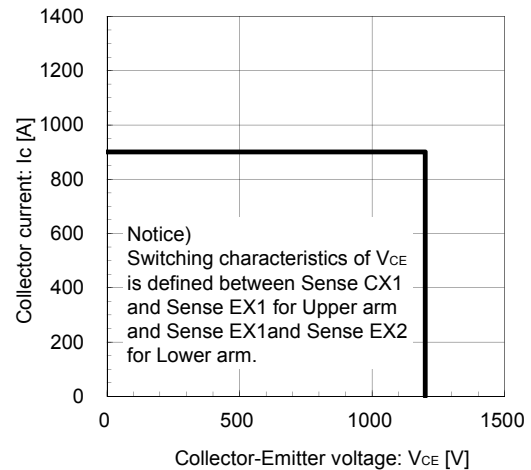
[INVERTER]

Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_c=450A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C, 150^\circ C$

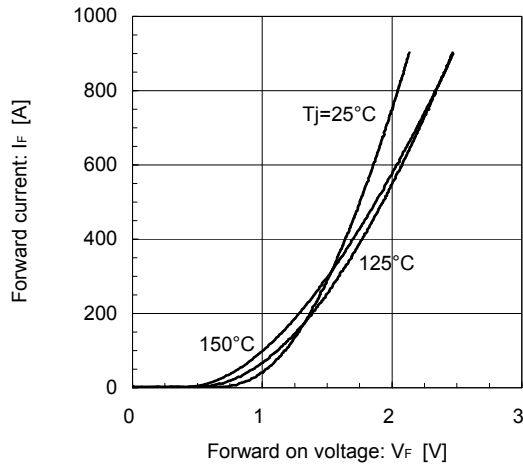


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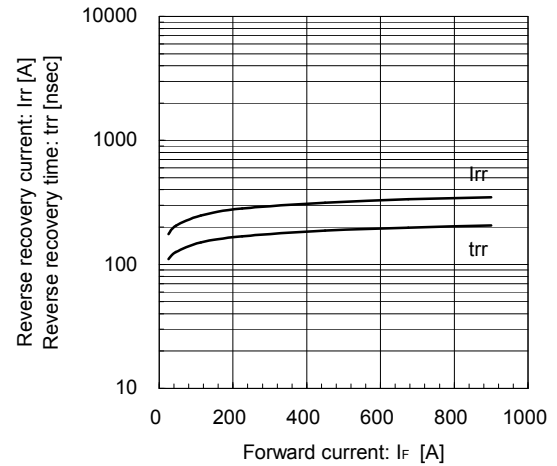
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_g=0.52\Omega$, $T_j=150^\circ C$



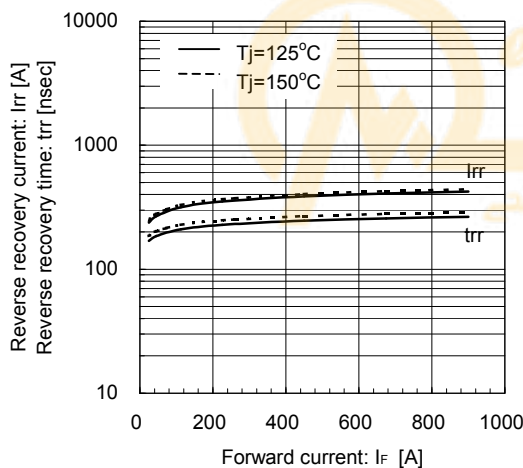
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip

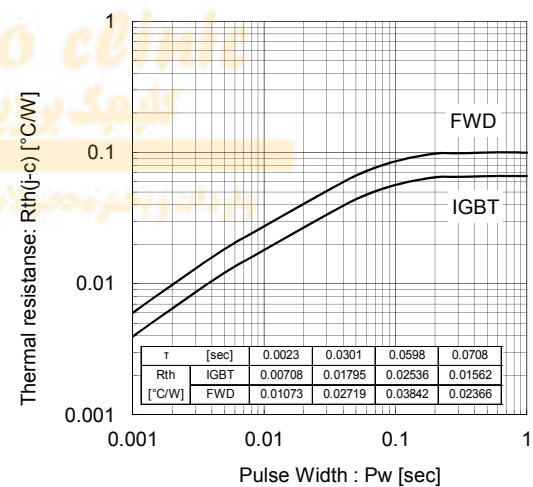
[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=0.52\Omega$, $T_J=25^\circ C$ 

[INVERTER]

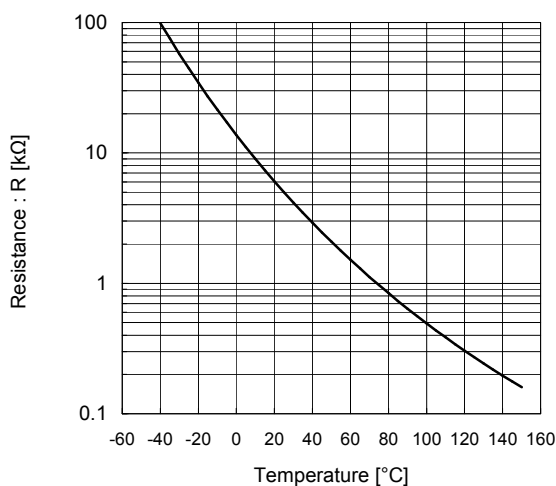
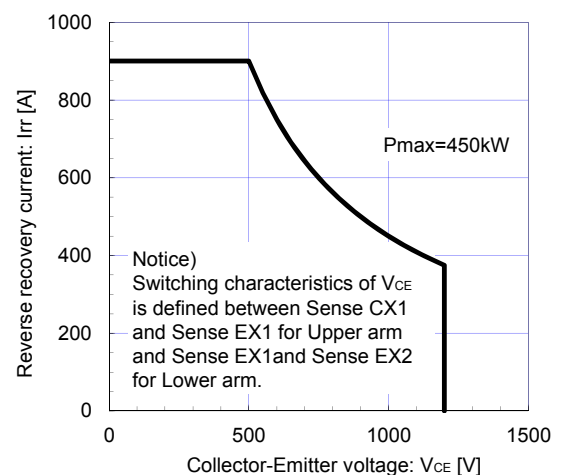
Reverse Recovery Characteristics (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=0.52\Omega$, $T_J=125^\circ C$, $150^\circ C$ 

Transient Thermal Resistance (max.)

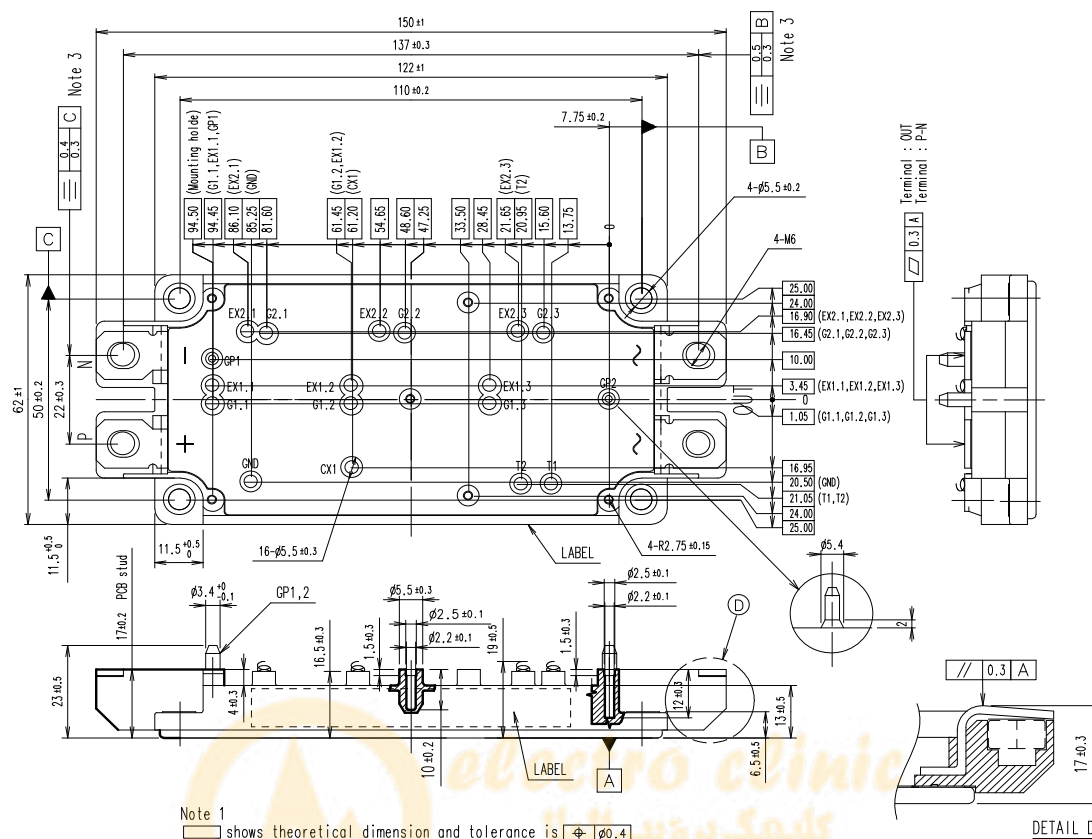


[THERMISTOR]

Temperature characteristic (typ.)

FWD safe operating area (max.)
 $T_J=150^\circ C$ 

Outline Drawings (Unit : mm)



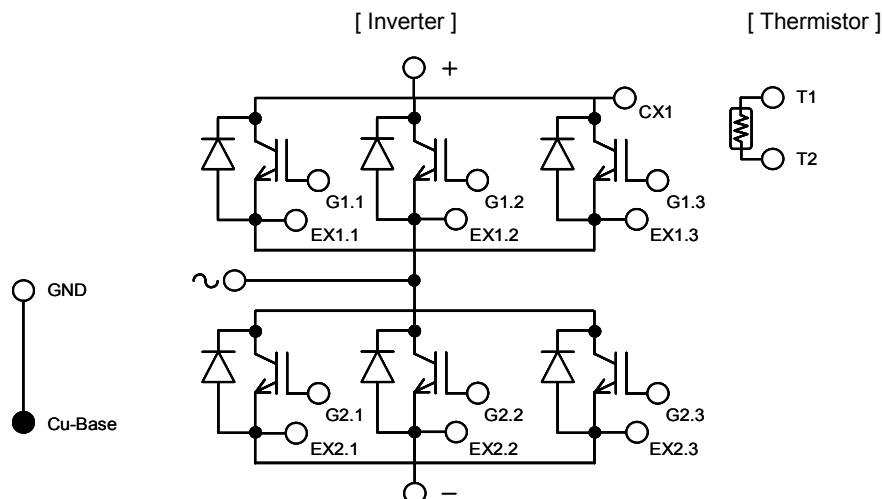
Note 1
 shows theoretical dimension and tolerance is ± 0.4

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

Weight: 300g (typ.)

Note 3
 ± 0.3 B ± 0.4 C
 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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