

2MBI225VJ-120-50

IGBT Modules

IGBT MODULE (V series) 1200V / 225A / 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 _{CES}	1200		V	
	Gate-Emitter voltage	V _{GES}	±20		V	
	Collector current	I _c	Continuous	T _c =25°C	300	A
				T _c =100°C	225	
		I _c pulse	1ms	450		
		-I _c		225		
		-I _c pulse	1ms	450		
	Collector power dissipation	P _c	1 device	1070	W	
Junction temperature		T _j	175	°C		
Operating junction temperature (under switching conditions)		T _{jop}	150			
Case temperature		T _c	125			
Storage temperature		T _{stg}	-40 to +125			
Isolation voltage	between terminal and copper base (*1) between thermistor and others (*2)	V _{iso}	AC : 1min.	2500	VAC	
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.	
Inverter	Zero gate voltage collector current	I_{CES}	$V_{GE} = 0V, V_{CE} = 1200V$		-	-	3.0	mA
	Gate-Emitter leakage current	I_{GES}	$V_{CE} = 0V, V_{GE} = \pm 20V$		-	-	600	nA
	Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_C = 225mA$		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 225A$	$T_J=25^{\circ}C$	-	2.20	2.65	V
				$T_J=125^{\circ}C$	-	2.55	-	
				$T_J=150^{\circ}C$	-	2.60	-	
		$V_{CE(sat)}$ (chip)		$T_J=25^{\circ}C$	-	1.85	2.30	
				$T_J=125^{\circ}C$	-	2.20	-	
			$T_J=150^{\circ}C$	-	2.25	-		
		Internal gate resistance	$R_g(int)$	-		-	3.33	-
	Input capacitance	C_{ies}	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$		-	18	-	nF
	Turn-on time	t_{on}	$V_{CC} = 600V$		-	550	-	nsec
		t_r	$I_C = 225A$		-	180	-	
		$t_r(i)$	$V_{GE} = \pm 15V$		-	120	-	
	Turn-off time	t_{off}	$R_G = 1.6\Omega$		-	1050	-	nsec
		t_f	$L_S = 80nH$		-	110	-	
Forward on voltage	V_F (terminal)	$V_{GE} = 0V$ $I_F = 225A$	$T_J=25^{\circ}C$	-	2.05	2.50	V	
			$T_J=125^{\circ}C$	-	2.20	-		
			$T_J=150^{\circ}C$	-	2.15	-		
	V_F (chip)		$T_J=25^{\circ}C$	-	1.70	2.15		
			$T_J=125^{\circ}C$	-	1.85	-		
		$T_J=150^{\circ}C$	-	1.80	-			
Reverse recovery time	t_{rr}	$I_F = 225A$		-	200	-	nsec	
Thermistor	Resistance	R	$T=25^{\circ}C$		-	5000	-	Ω
			$T=100^{\circ}C$		465	495	520	
	B value	B	$T=25/50^{\circ}C$		3305	3375	3450	K



● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	Rth(j-c)	Inverter IGBT	-	-	0.14	°C/W
		Inverter FWD	-	-	0.19	
Contact thermal resistance (1device) (*6)	Rth(c-f)	with Thermal Compound	-	0.0167	-	

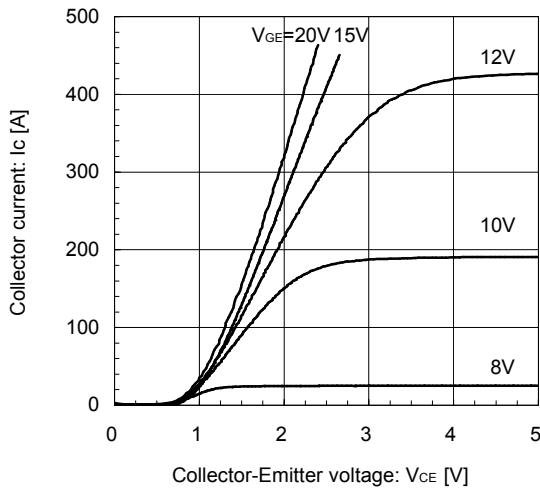
Note *6: This is the value which is defined mounting on the additional cooling fin with thermal compound.



■ Characteristics (Representative)

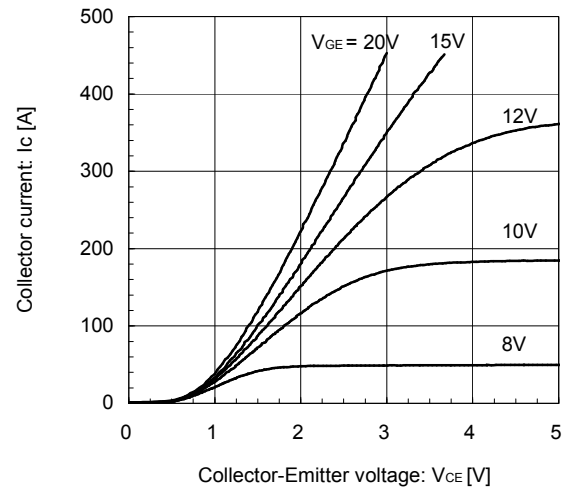
[INVERTER]

Collector current vs. Collector-Emitter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



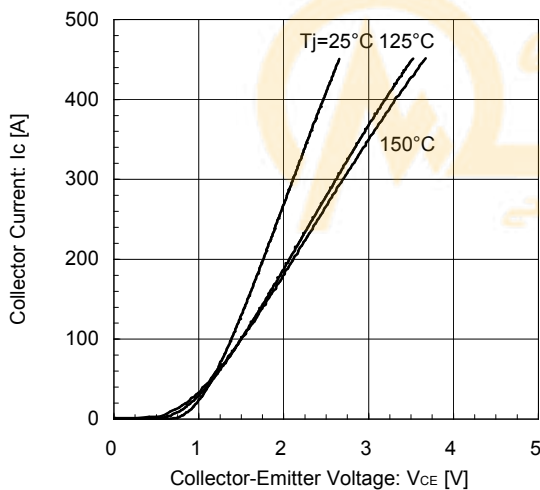
[INVERTER]

Collector current vs. Collector-Emitter voltage (typ.)
 $T_j = 150^\circ\text{C}$ / chip



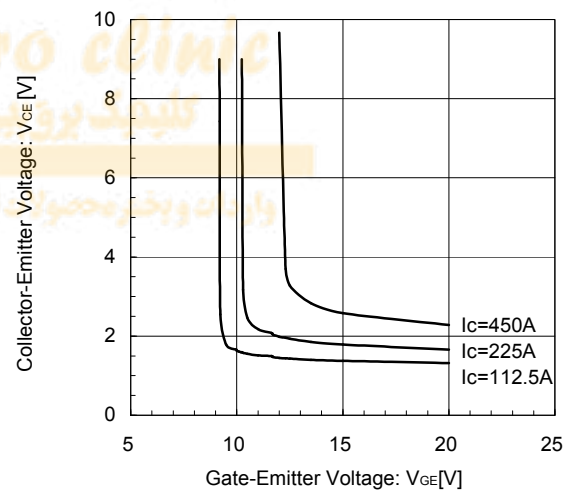
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Collector current vs. Collector-Emitter voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



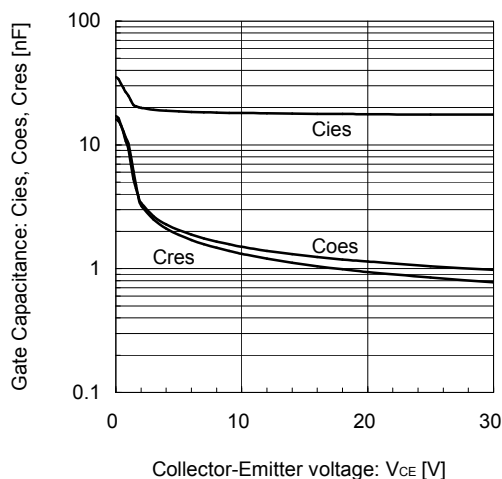
[INVERTER]

Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



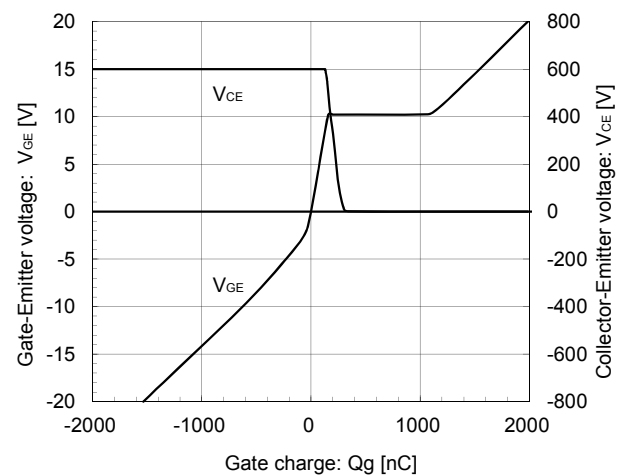
[INVERTER]

Gate Capacitance vs. Collector-Emitter Voltage (typ.)
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$



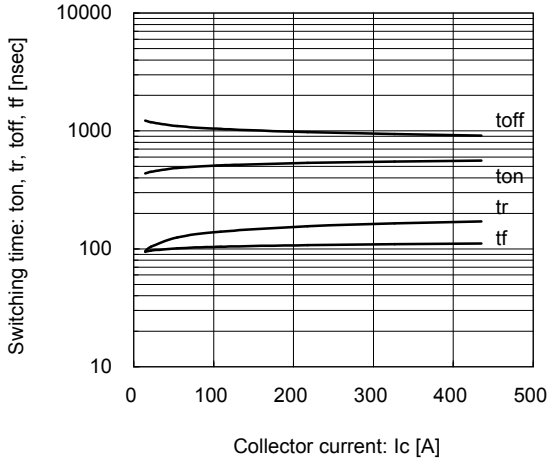
[INVERTER]

Dynamic Gate Charge (typ.)
 $V_{CC} = 600\text{V}$, $I_C = 225\text{A}$, $T_j = 25^\circ\text{C}$



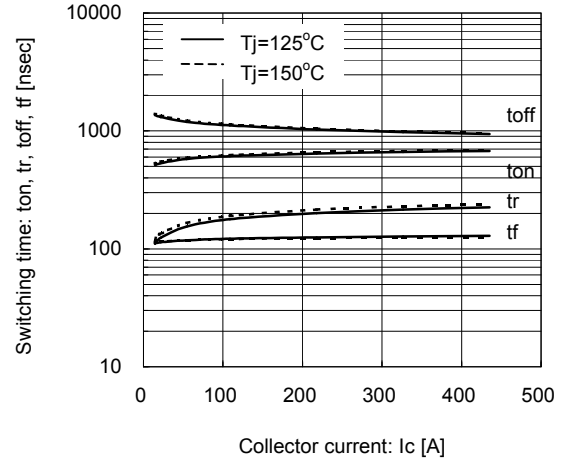
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=1.6\Omega$, $T_j=25^\circ C$



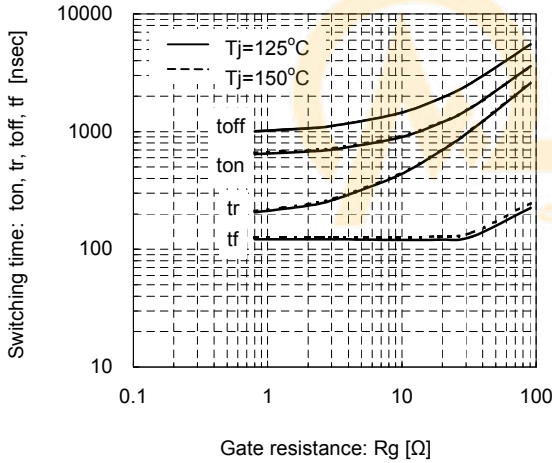
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=1.6\Omega$, $T_j=125^\circ C, 150^\circ C$



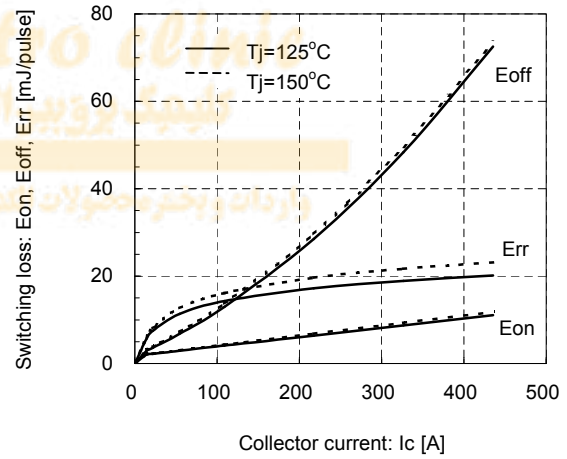
[INVERTER]

Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_c=225A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C, 150^\circ C$



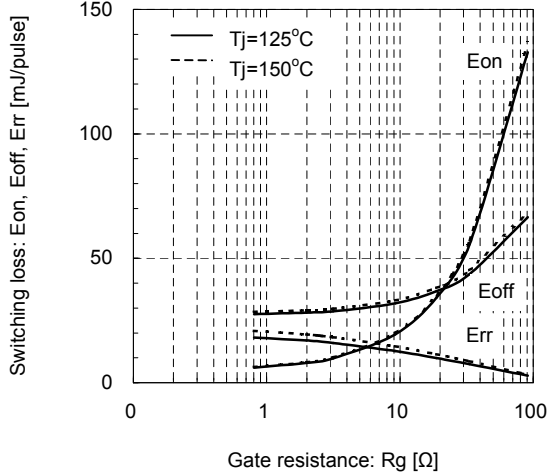
[INVERTER]

Switching loss vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=1.6\Omega$, $T_j=125^\circ C, 150^\circ C$



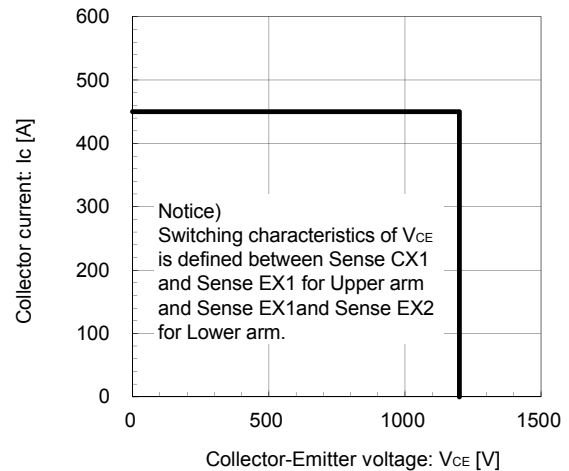
[INVERTER]

Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_c=225A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C, 150^\circ C$

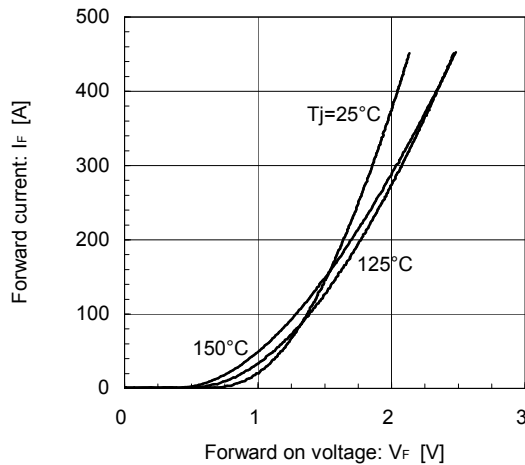


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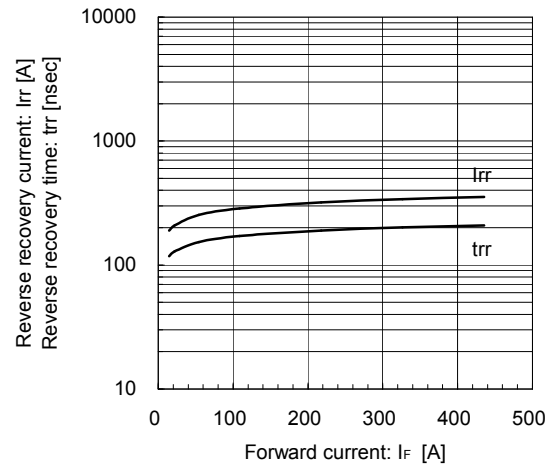
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_g=1.6\Omega$, $T_j=150^\circ C$



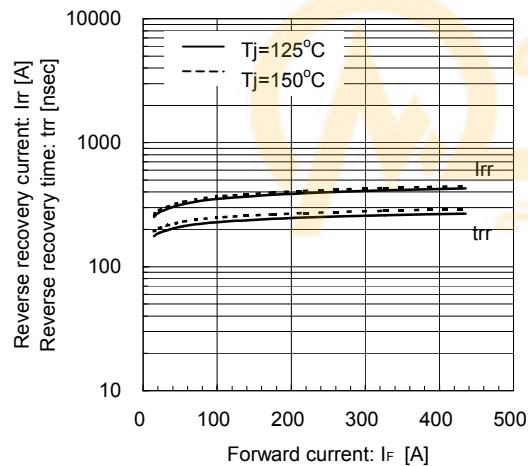
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip

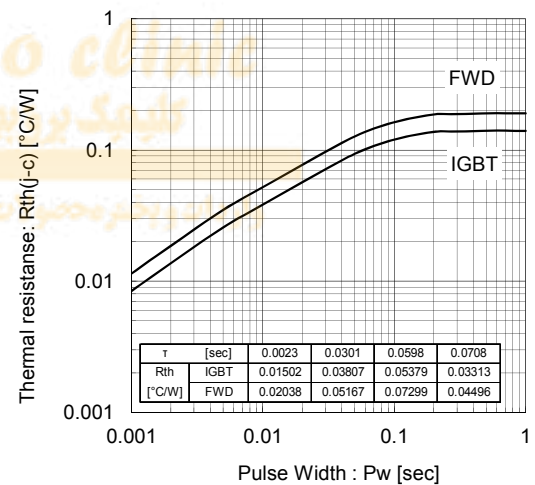
[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=1.6\Omega$, $T_J=25^\circ C$ 

[INVERTER]

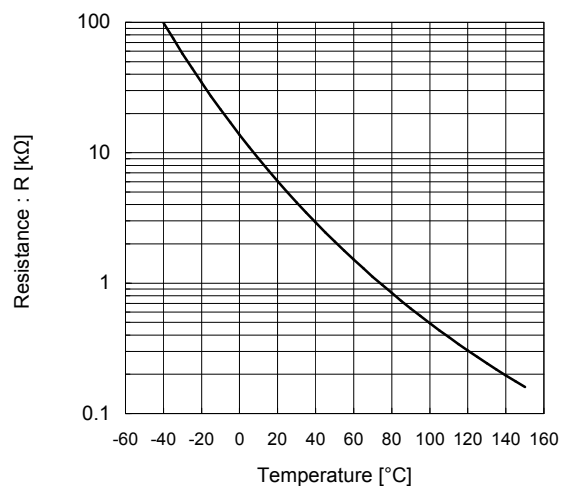
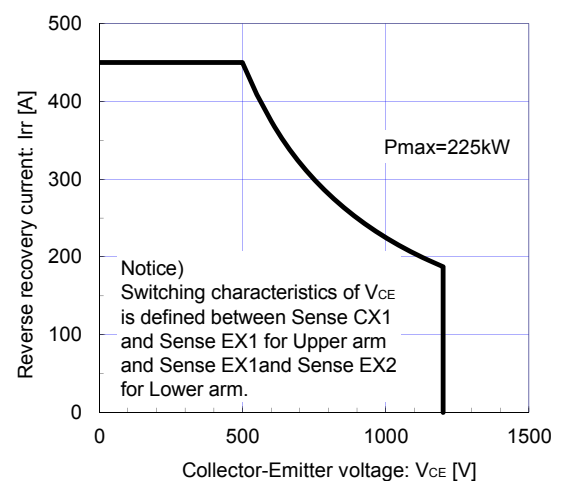
Reverse Recovery Characteristics (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=1.6\Omega$, $T_J=125^\circ C, 150^\circ C$ 

Transient Thermal Resistance (max.)

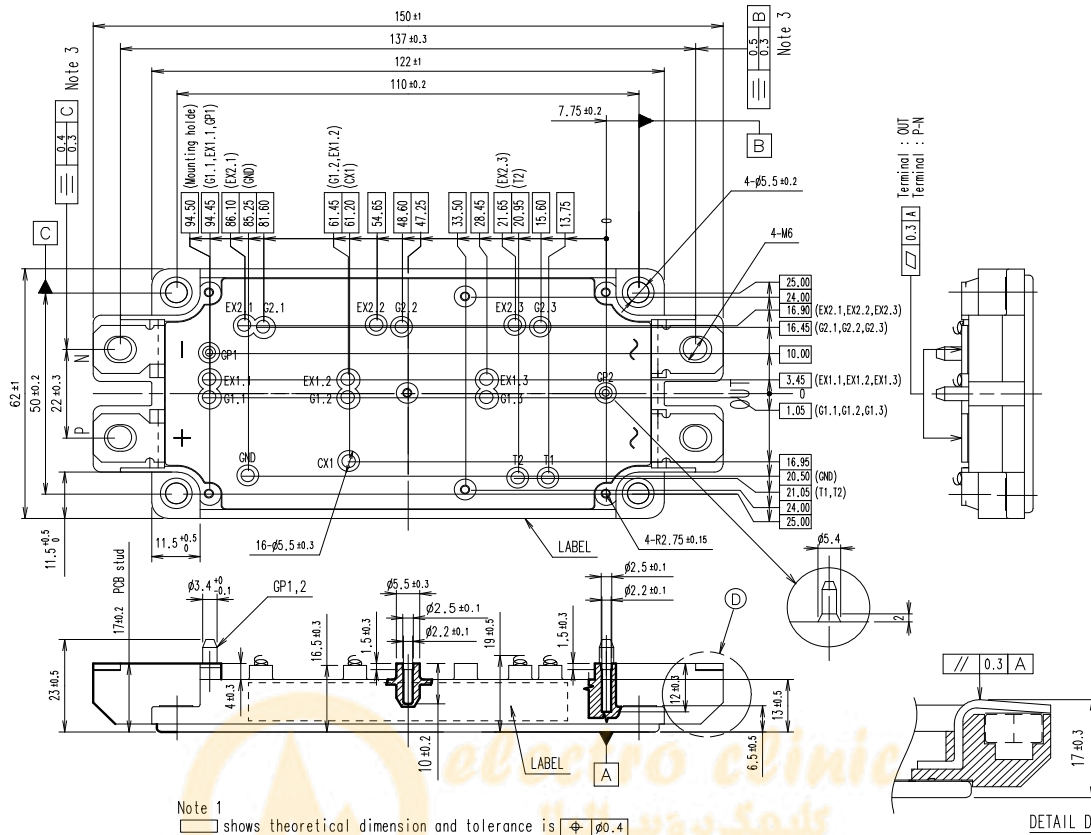


[THERMISTOR]

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

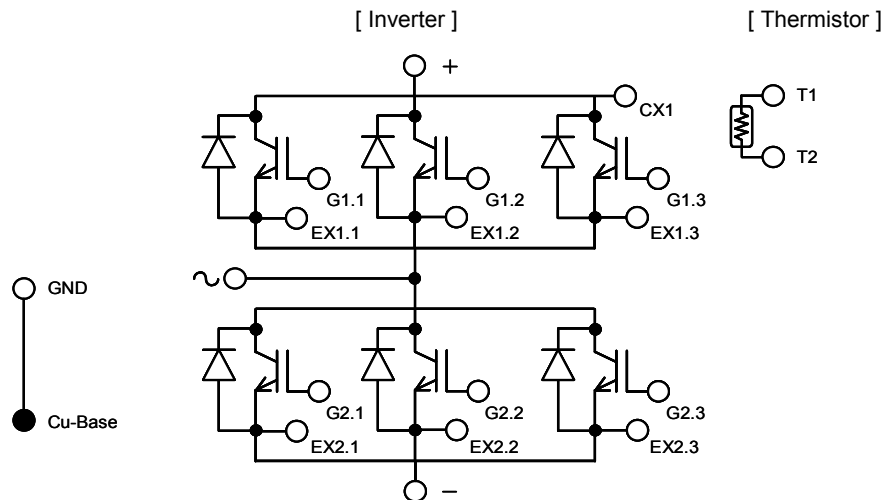
Note 2
 Rule for PCB
 · Guide pin hole : $\phi 4.0 \pm 0.1$
 · Guide pin distance : 94.45 ± 0.1
 · Spring contact pad : $\phi 3.8 \pm 0.2$
 · Position tol. pad : ± 0.4

Weight: 300g (typ.)

Note 3

 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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