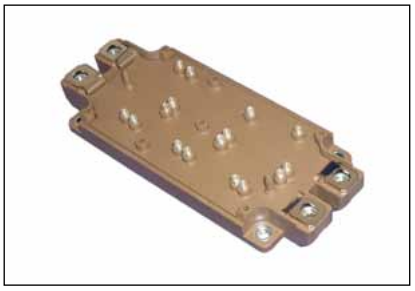
2MBI450VJ-120-50

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
Inverter	Collector-Emitter voltage	V_{CES}			1200	V
	Gate-Emitter voltage	V_{GES}			±20	V
	Collector current	Ic	Continuous	Tc=25°C	600	A
				Tc=100°C	450	
		Ic pulse	1ms		900	
		-Ic			450	
		-Ic pulse	1ms		900	
	Collector power dissipation	Pc	1 device		2270	W
Junction temperature		Tj			175	°C
Operating junction temperature (under switching conditions)		T_{jop}			150	
Case temperature		T_C			125	
Storage temperature		Tstg			-40 to +125	
Isolation voltage	between terminal and copper base (*1)	V_{iso}	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 min.	typ.	max.	Units
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	Tj=25°C	-	2.25	2.70	V
				Tj=125°C	-	2.55	-	
				Tj=150°C	-	2.60	-	
		$V_{CE(sat)}$ (chip)		Tj=25°C	-	1.75	2.20	
				Tj=125°C	-	2.05	-	
				Tj=150°C	-	2.10	-	
	Internal gate resistance	Rg(int)	-		-	1.67	-	Ω
	Input capacitance	Cies	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	41	-	nF
	Turn-on time	ton	V_{CC} = 600V, I_C = 450A, V_{GE} = ±15V, R_G = 0.52Ω, L_S = 80nH		-	550	-	nsec
		tr			-	180	-	
		tr (i)			-	120	-	
	Turn-off time	toff			-	1050	-	
		tf			-	110	-	
	Forward on voltage	V_F (terminal)	V_{GE} = 0V, I_F = 450A	Tj=25°C	-	2.20	2.65	V
				Tj=125°C	-	2.35	-	
				Tj=150°C	-	2.30	-	
		V_F (chip)		Tj=25°C	-	1.70	2.15	
				Tj=125°C	-	1.85	-	
				Tj=150°C	-	1.80	-	
	Reverse recovery time	trr	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

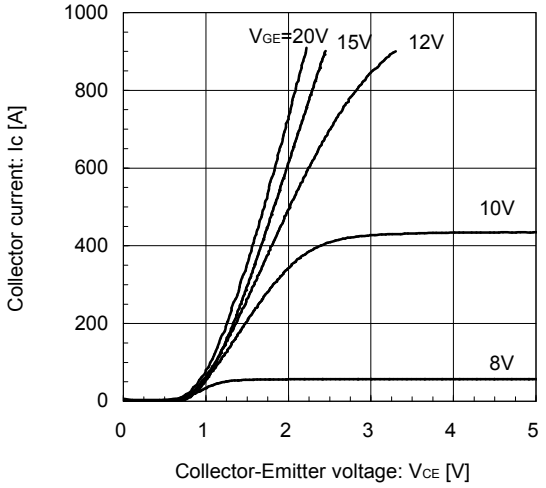
● Thermal resistance characteristics

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	-	

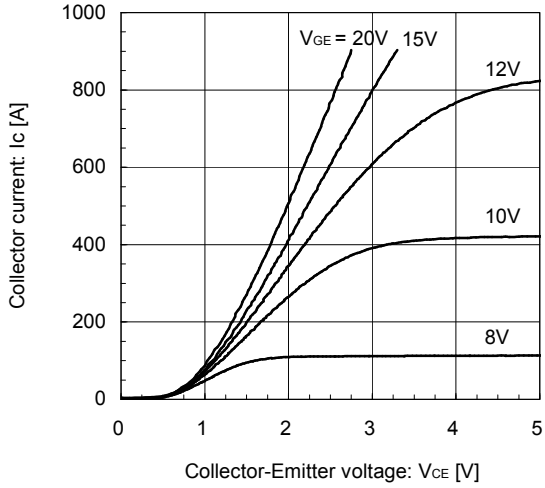
Note *6: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

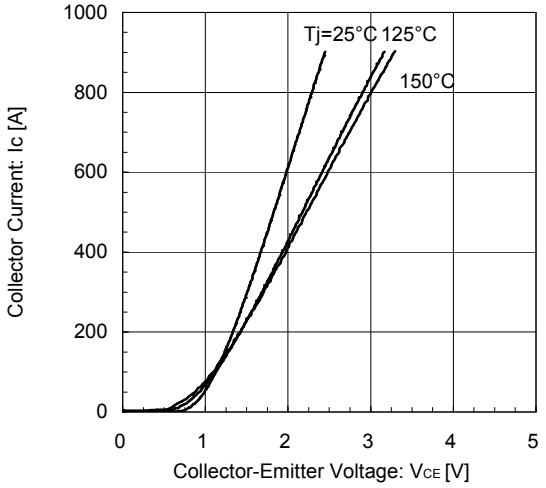
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



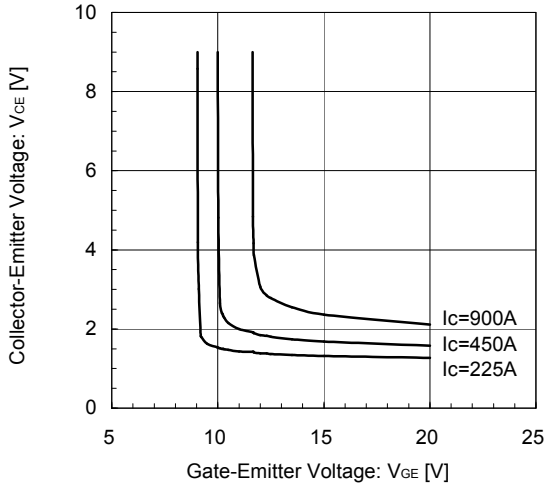
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150°C / chip



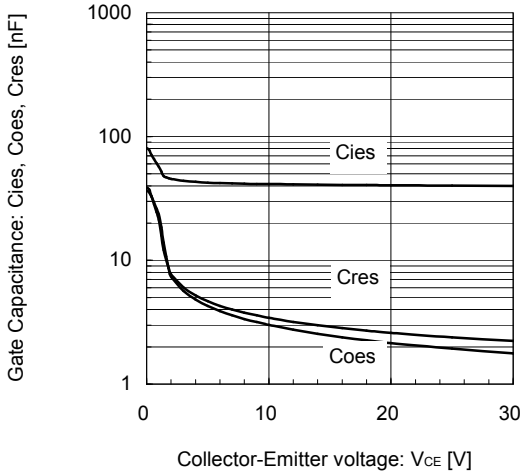
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
VGE = 15V / chip



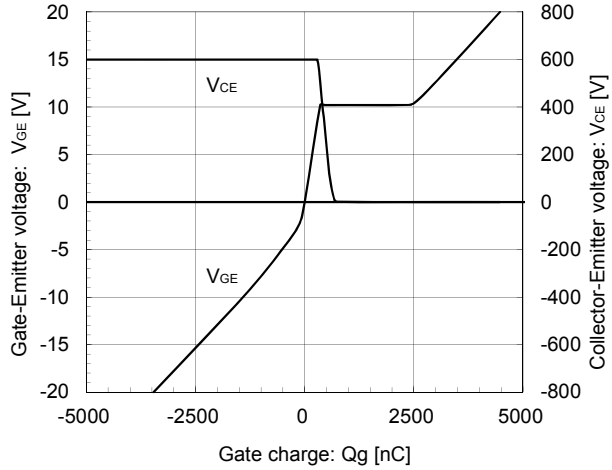
[INVERTER]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj= 25°C / chip



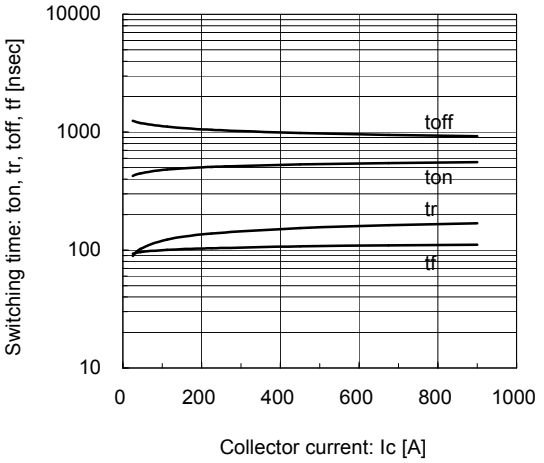
[INVERTER]
Gate Capacitance vs. Collector-Emitter Voltage (typ.)
VGE=0V, f=1MHz, Tj=25°C



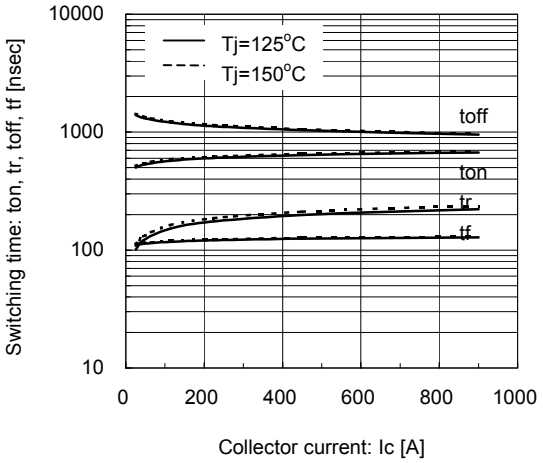
[INVERTER]
Dynamic Gate Charge (typ.)
Vcc=600V, Ic=450A, Tj= 25°C



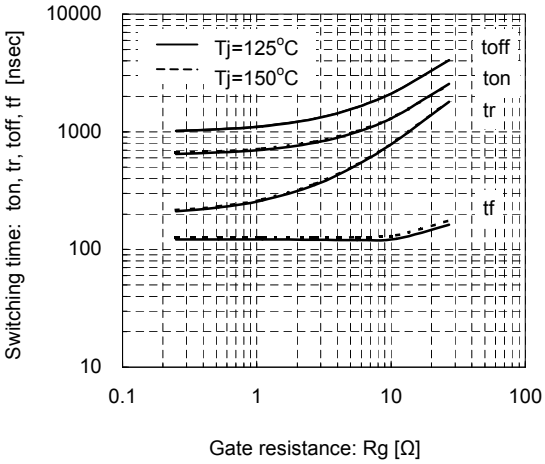
[INVERTER]
Switching time vs. Collector current (typ.)
Vcc=600V, V_{GE}=±15V, Rg=0.52Ω, Tj=25°C



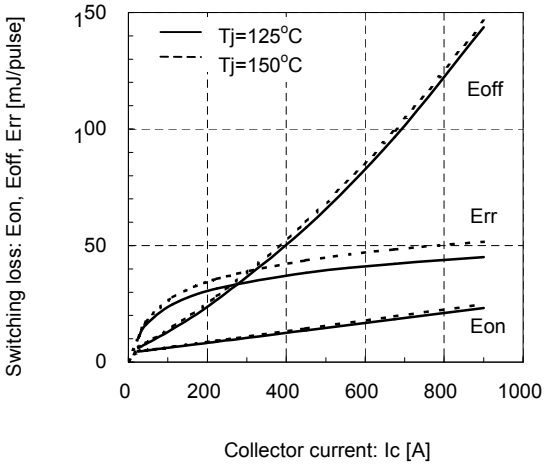
[INVERTER]
Switching time vs. Collector current (typ.)
Vcc=600V, V_{GE}=±15V, Rg=0.52Ω, Tj=125°C, 150°C



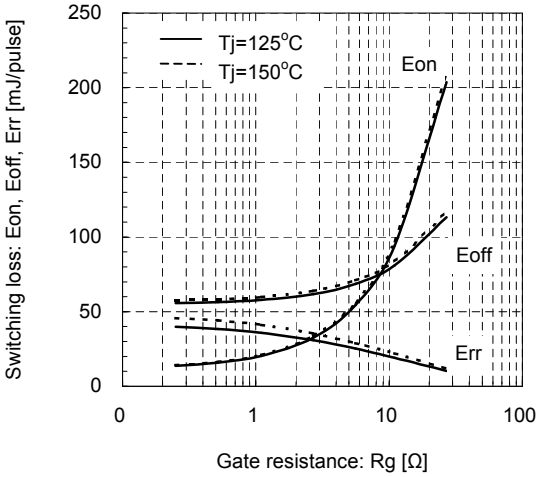
[INVERTER]
Switching time vs. Gate resistance (typ.)
Vcc=600V, Ic=450A, V_{GE}=±15V, Tj=125°C, 150°C



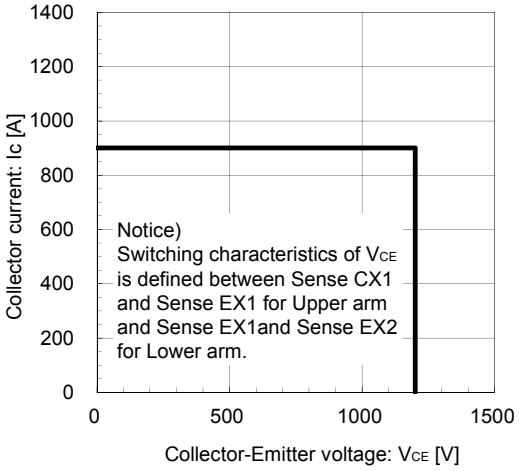
[INVERTER]
Switching loss vs. Collector current (typ.)
Vcc=600V, V_{GE}=±15V, Rg=0.52Ω, Tj=125°C, 150°C



[INVERTER]
Switching loss vs. Gate resistance (typ.)
Vcc=600V, Ic=450A, V_{GE}=±15V, Tj=125°C, 150°C

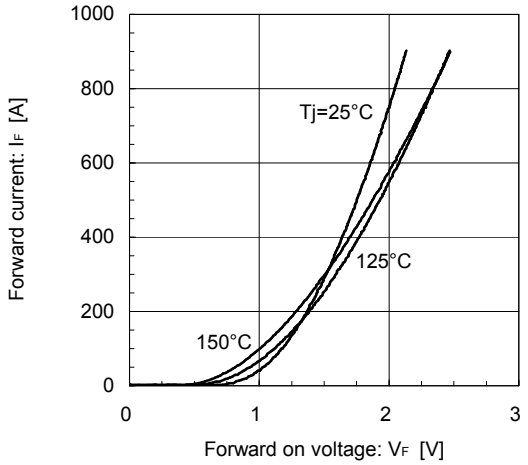


[INVERTER]
Reverse bias safe operating area (max.)
+V_{GE}=15V, -V_{GE}=15V, Rg=0.52 Ω, Tj=150°C



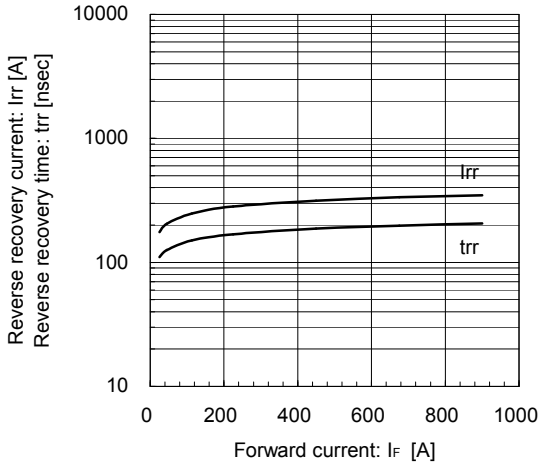
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip



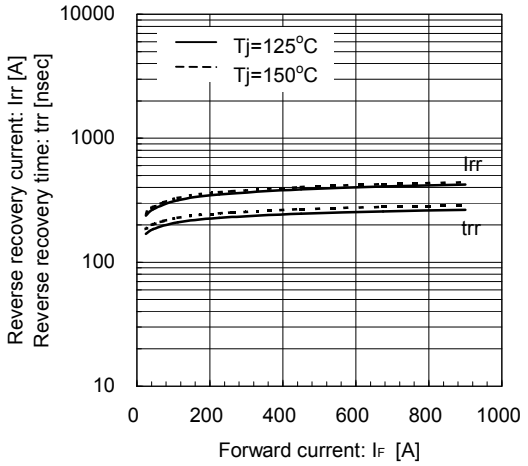
[INVERTER]

Reverse Recovery Characteristics (typ.)
Vcc=600V, VGE=±15V, Rg=0.52Ω, Tj=25°C

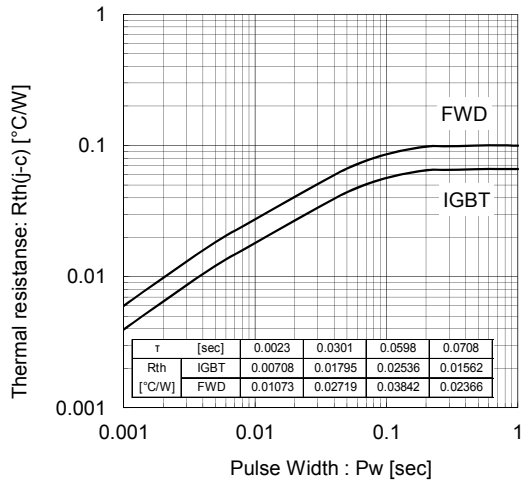


[INVERTER]

Reverse Recovery Characteristics (typ.)
Vcc=600V, VGE=±15V, Rg=0.52Ω, Tj=125°C, 150°C



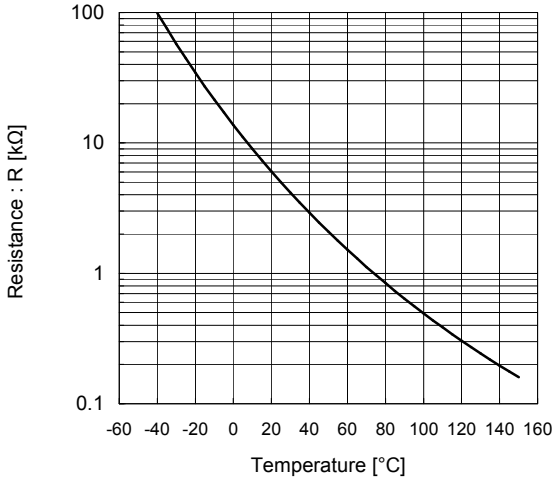
Transient Thermal Resistance (max.)



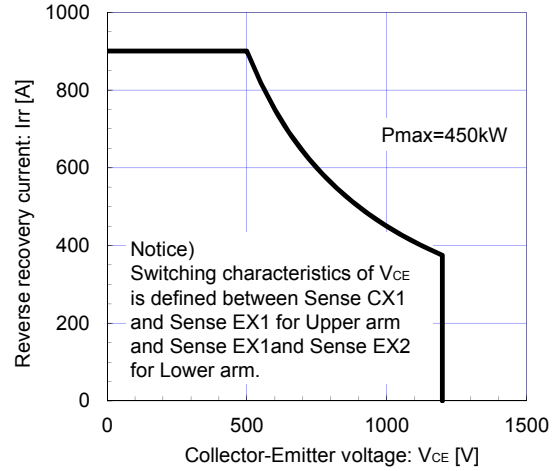
τ	[sec]	0.0023	0.0301	0.0598	0.0708
Rth	IGBT	0.00708	0.01795	0.02536	0.01562
[°C/W]	FWD	0.01073	0.02719	0.03842	0.02366

[THERMISTOR]

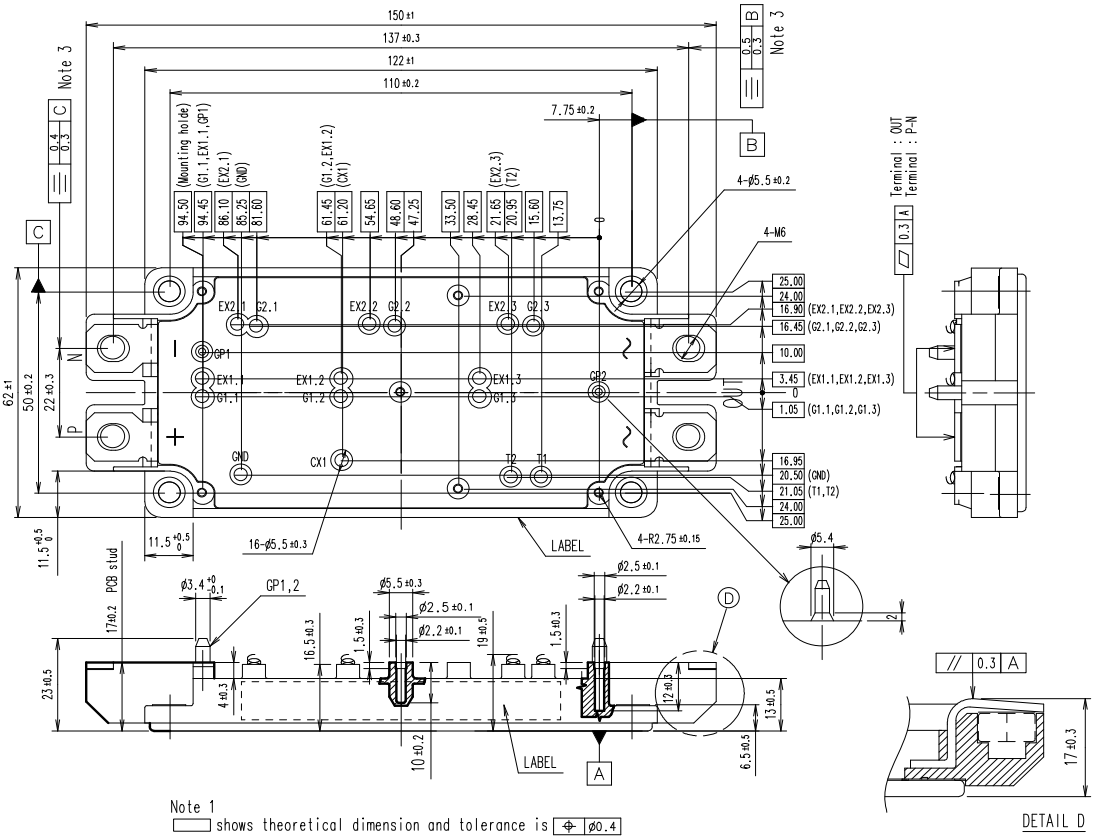
Temperature characteristic (typ.)



FWD safe operating area (max.)
Tj=150°C



■ Outline Drawings (Unit : mm)



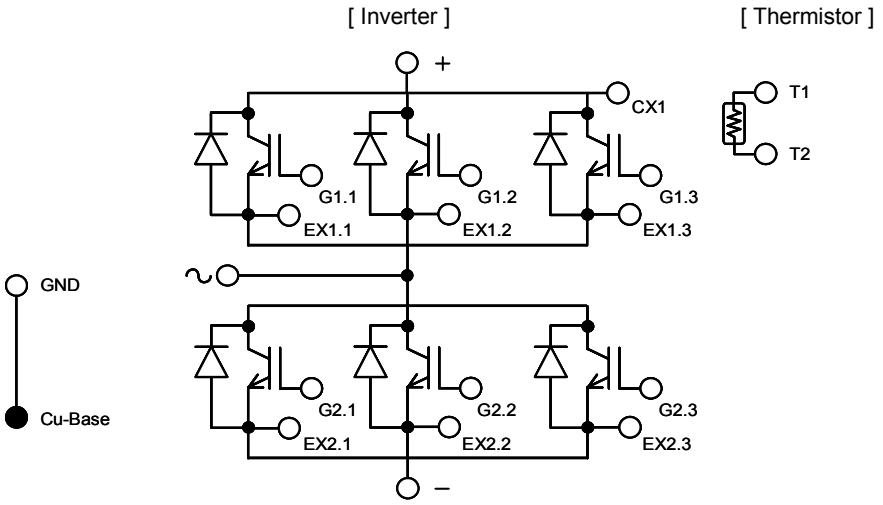
Note 1
shows theoretical dimension and tolerance is ⌖ φ0.4

Note 2
Rule for PCB
- Guide pin hole : φ4.0±0.1
- Guide pin distance : 94.45±0.1
- Spring contact pad : φ3.8±0.2
- Position tol.pad : ⌖ φ0.4

Note 3
0.5/0.3 B, 0.4/0.3 C
Upper value : Terminal hole center
Lower value : Nut center
(Including margin of the nut position.)

Weight: 300g (typ.)

■ Equivalent circuit



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