

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	I_c	Continuous	A
		I_c pulse	1ms	
		- I_c		
		- I_c pulse	1ms	
	Collector power dissipation	P_c	1 device	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)	V_{iso}	AC : 1min.	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.		
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			$V_{GE(th)}$	$V_{CE} = 20V, I_C = 450mA$		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage			$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 450A$	$T_J = 25^{\circ}C$	-	2.25	2.70	V
						$T_J = 125^{\circ}C$	-	2.55	-	
				$V_{CE(sat)}$ (chip)		$T_J = 150^{\circ}C$	-	2.60	-	
						$T_J = 25^{\circ}C$	-	1.75	2.20	
						$T_J = 125^{\circ}C$	-	2.05	-	
						$T_J = 150^{\circ}C$	-	2.10	-	
	Input capacitance			C_{ies}	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$		-	41	-	nF
	Turn-on time			t_{on}	$V_{CC} = 600V$ $I_C = 450A$ $V_{GE} = \pm 15V$ $R_G = 0.52\Omega$	-	550	1200	nsec	
				t_r		-	180	600		
				$t_r(i)$		-	120	-		
	Turn-off time			t_{off}		-	1050	2000	nsec	
				t_f		-	110	350		
	Forward on voltage			V_F (terminal)	$V_{GE} = 0V$ $I_F = 450A$	$T_J = 25^{\circ}C$	-	2.20	2.65	V
						$T_J = 125^{\circ}C$	-	2.35	-	
$T_J = 150^{\circ}C$						-	2.30	-		
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}	$I_F = 450A$		-	200	600	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

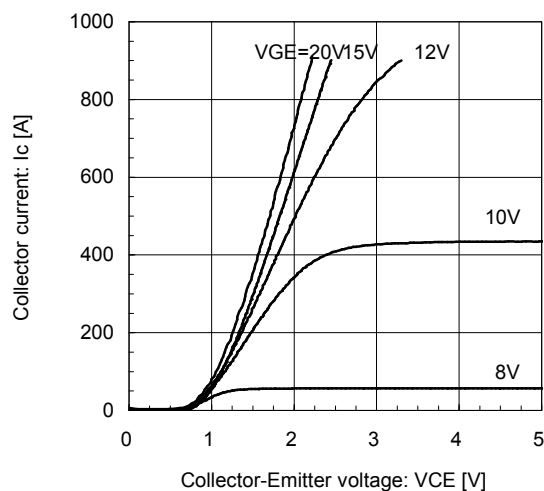
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.066	°C/W
		Inverter FWD	-	-	0.100	
Contact thermal resistance (1device) (*6)	$R_{th(c-f)}$	with Thermal Compound	-	0.0167	-	

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

■ Characteristics (Representative)

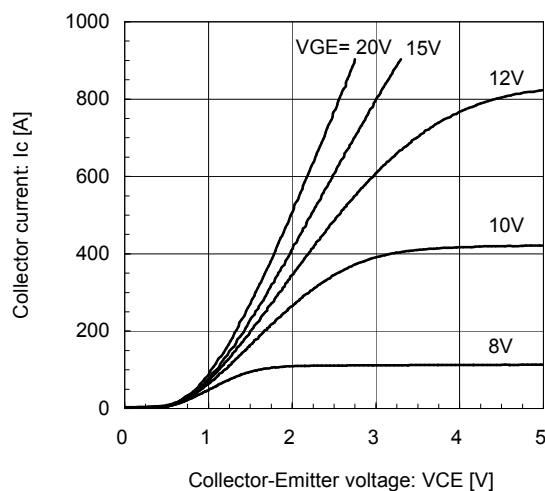
[INVERTER]

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



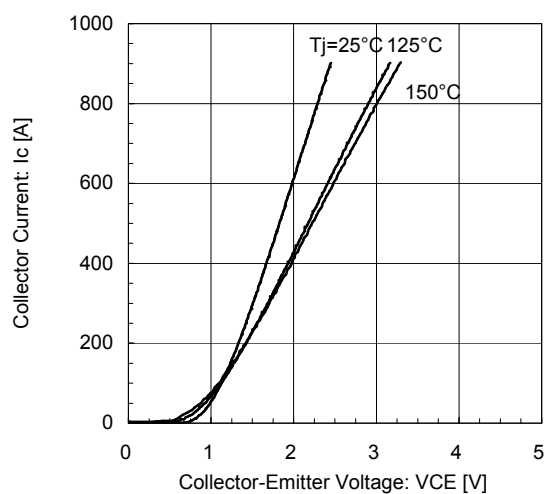
[INVERTER]

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



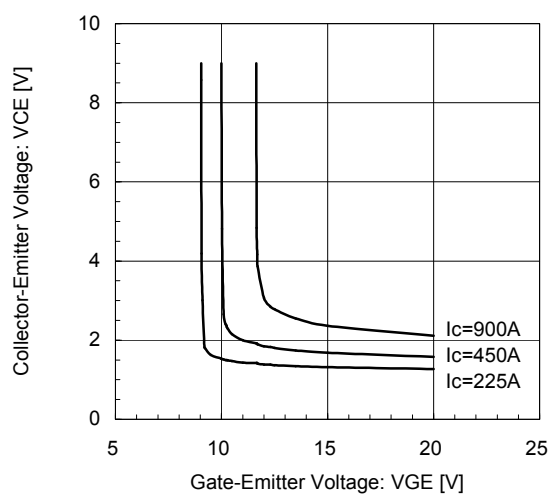
[INVERTER]

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



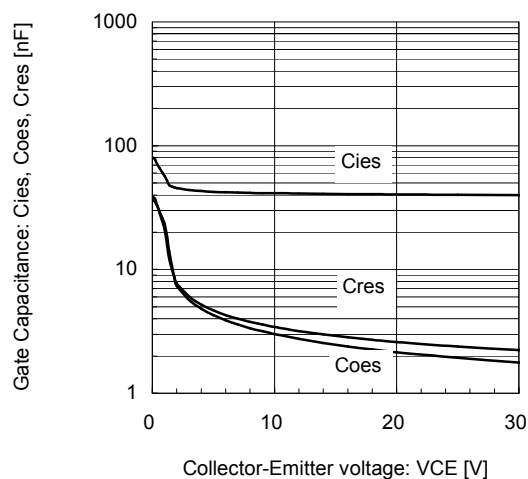
[INVERTER]

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



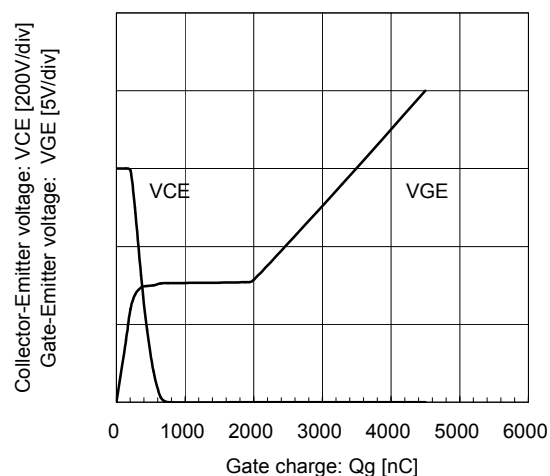
[INVERTER]

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



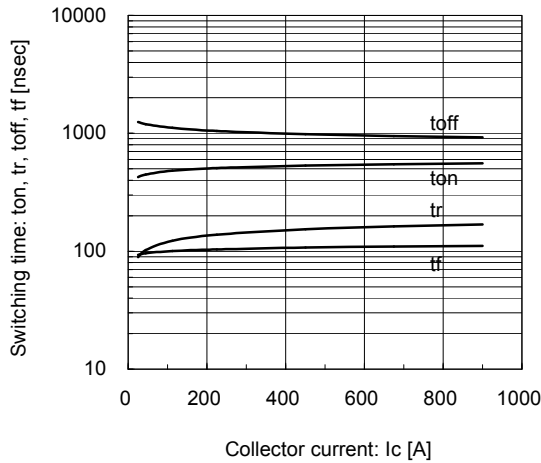
[INVERTER]

Dynamic Gate Charge (typ.)
 $V_{CC} = 600\text{V}$, $I_c = 450\text{A}$, $T_j = 25^\circ\text{C}$



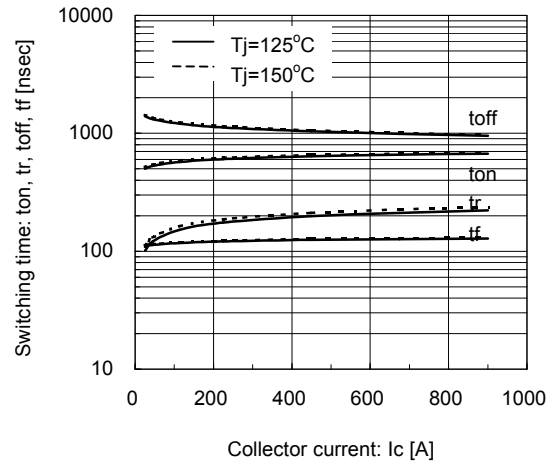
[INVERTER]

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



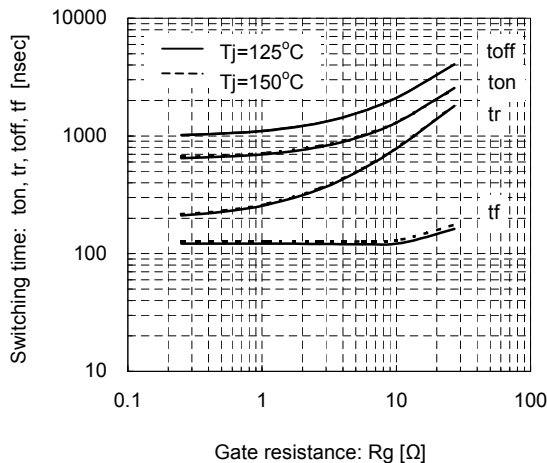
[INVERTER]

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



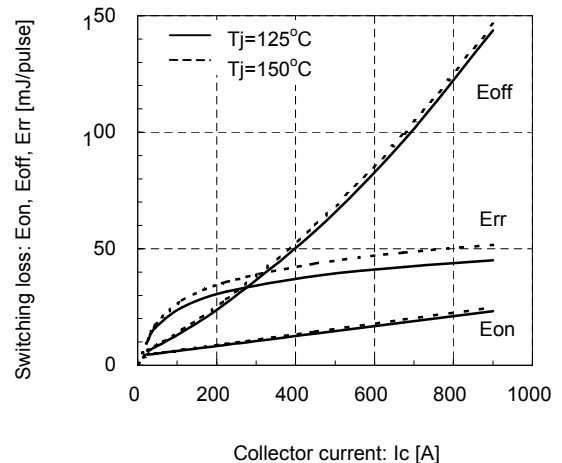
[INVERTER]

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



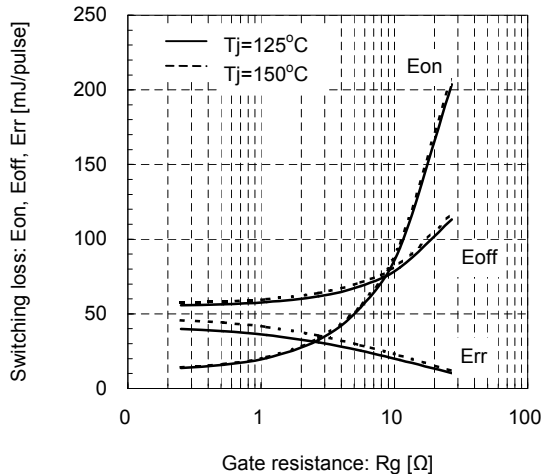
[INVERTER]

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



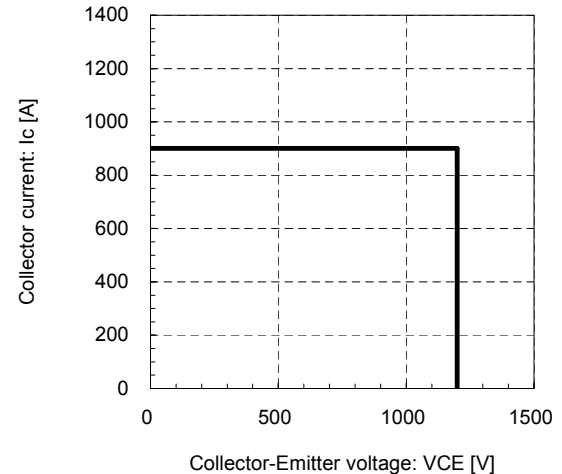
[INVERTER]

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

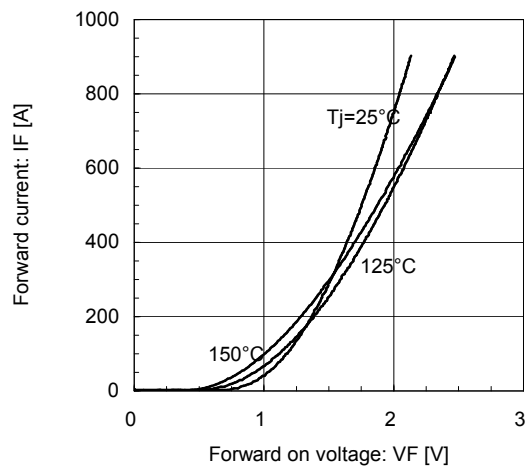


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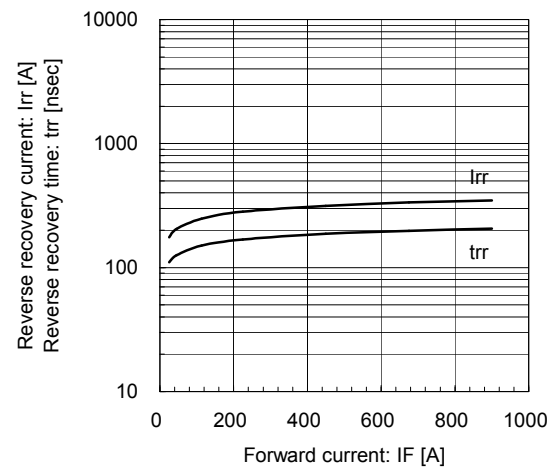
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_g=0.52\Omega$, $T_j=150^\circ C$



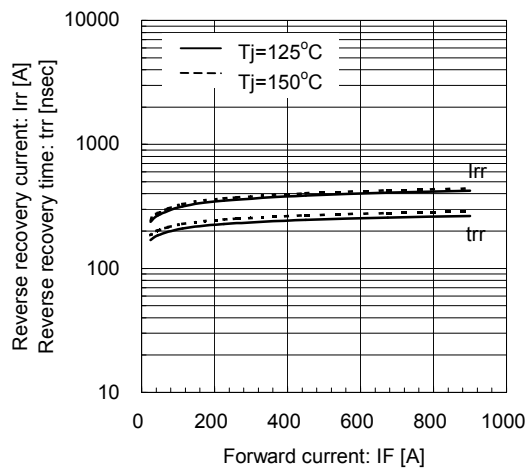
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip

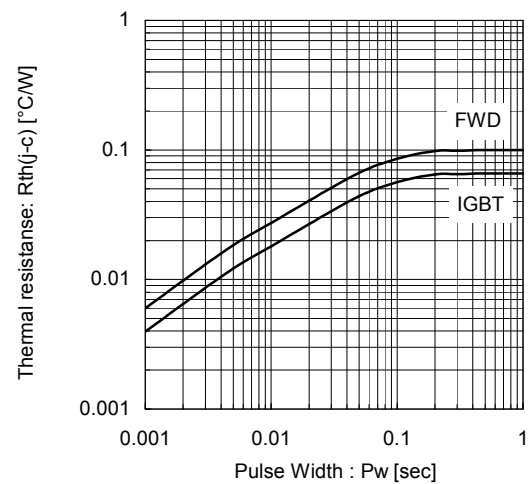
[INVERTER]

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

[INVERTER]

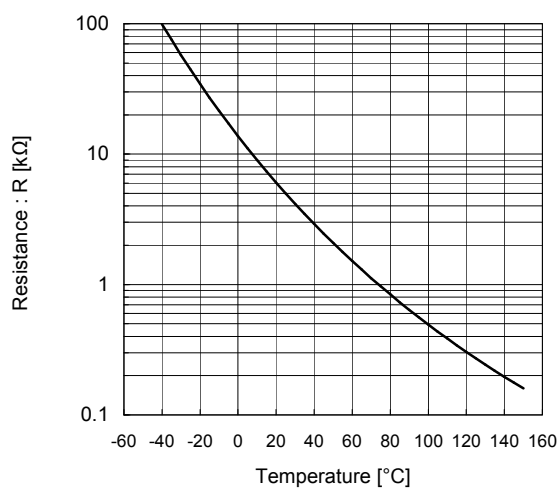
Reverse Recovery Characteristics (typ.)
Vcc=600V, VGE=±15V, Rg=0.52Ω, Tj=125°C, 150°C

Transient Thermal Resistance (max.)

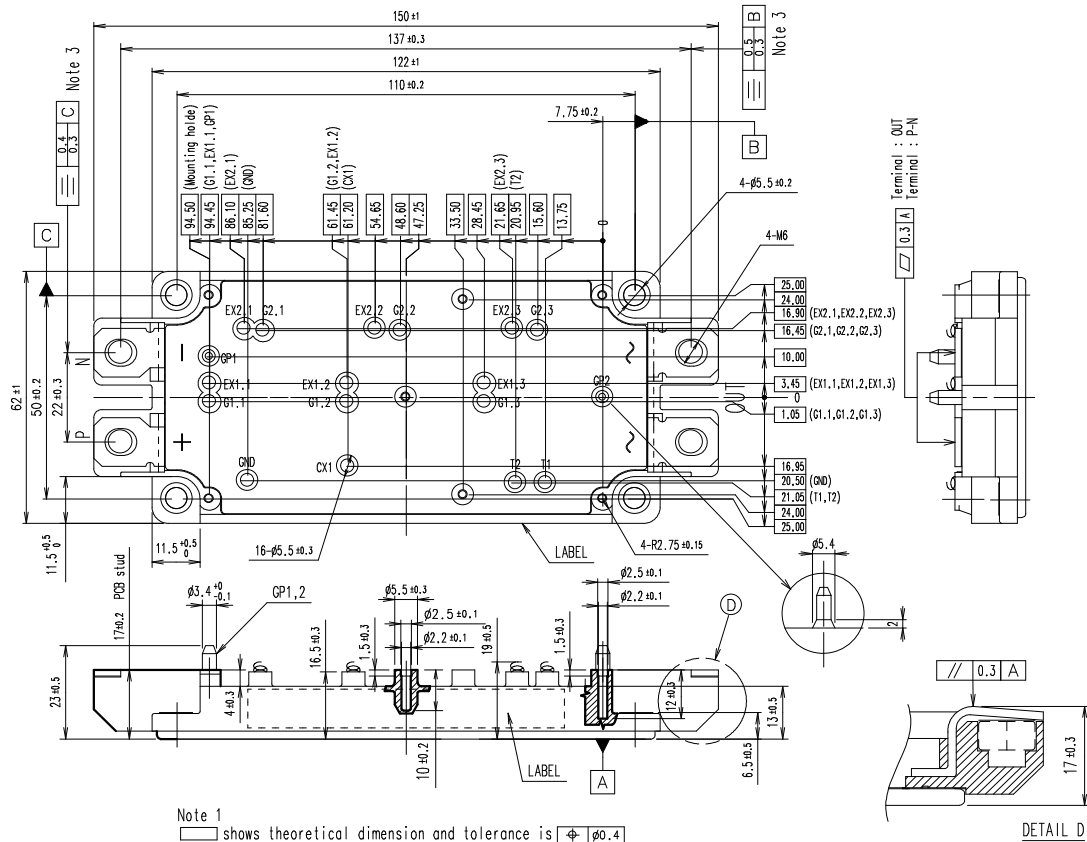


[THERMISTOR]

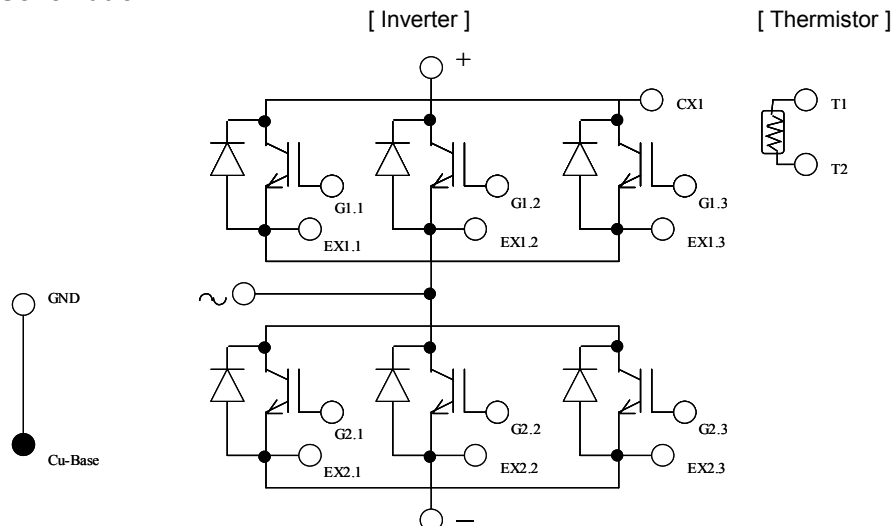
Temperature characteristic (typ.)



Outline Drawings, mm



Equivalent Circuit Schematic



WARNING

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• Submarine repeater equipment		
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