

2MBI600VXA-120E-50

IGBT Modules

IGBT MODULE (V series) 1200V / 600A / 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 _{CE}	1200	V
	Gate-Emitter voltage	V _{GE}	±20	V
	Collector current	I _C	Tc=25°C	800
			Tc=100°C	600
		I _C pulse	1ms	1200
		-I _C		600
		-I _C pulse	1ms	1200
	Collector power dissipation	P _C	1 device	3350
	Junction temperature	T _J		175
	Operating junction temperature (under switching conditions)	T _{JOP}		150
				°C
				150
				°C
				150
				°C
				-40 ~ +150
Isolation voltage	between terminal and copper base (*1)	V _{iso}	AC : 1min.	4000
	between thermistor and others (*2)			
Screw torque (*3)	Mounting	M5		6.0
	Main Terminals	M8		10.0
	Sense Terminals	M4		2.1
				N m

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 : Mounting 3.0 ~ 6.0 Nm (M5) Recommendable Value : Main Terminals 8.0 ~ 10.0 Nm (M8)
Recommendable Value : Sense Terminals 1.8 ~ 2.1 Nm (M4)

● 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	-	-	4.0	mA
	Gate-Emitter leakage current	I _{GES} V _{CE} = 0V, V _{GE} = ±20V	-	-	800	nA
	Gate-Emitter threshold voltage	V _{GE(th)} V _{CE} = 20V, I _C = 600mA	6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	V _{GE(sat)} (terminal) (*4) V _{GE(sat)} (chip) V _{GE} = 15V I _C = 600A	Tj=25°C	1.85	2.30	V
			Tj=125°C	2.15	-	
			Tj=150°C	2.20	-	
			Tj=25°C	1.75	2.20	
			Tj=125°C	2.05	-	
			Tj=150°C	2.10	-	
	Input capacitance	C _{ies} V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	-	55	-	nF
	Turn-on time	V _{CC} = 600V I _C = 600A V _{GE} = ±15V	-	1.00	-	μs
			-	0.40	-	
	Turn-off time	V _{GE} = ±15V R _G = 2.4Ω	-	0.15	-	μs
			-	1.20	-	
	Forward on voltage	V _{GE} = 0V I _F = 600A	Tj=25°C	1.80	2.25	V
			Tj=125°C	1.95	-	
			Tj=150°C	1.90	-	
			Tj=25°C	1.70	2.15	
			Tj=125°C	1.85	-	
			Tj=150°C	1.80	-	
Thermistor	Reverse recovery time	t _{rr} I _F = 600A	-	0.20	-	μs
	Resistance	R T=25°C	-	5000	-	Ω
	B value	B T=25/50°C	3305	3375	3450	K

Note *4: Please refer to page 6, there is definition of on-state voltage at terminal.

● Thermal resistance characteristics

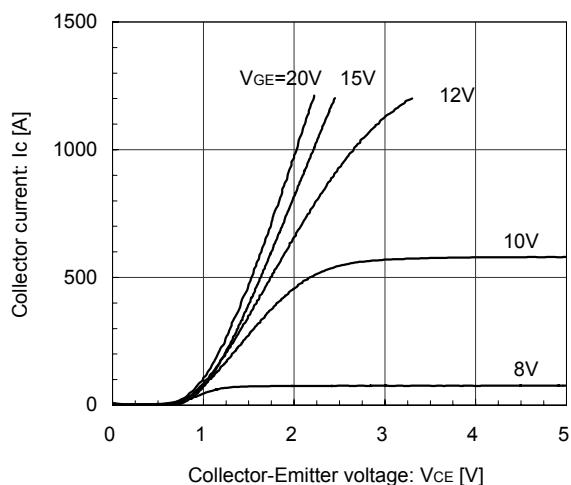
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	Inverter IGBT	-	-	0.045	°C/W
		Inverter FWD	-	-	0.075	
Contact thermal resistance (1device) (*5)	R _{th(c-f)}	with Thermal Compound	-	0.0125	-	

Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

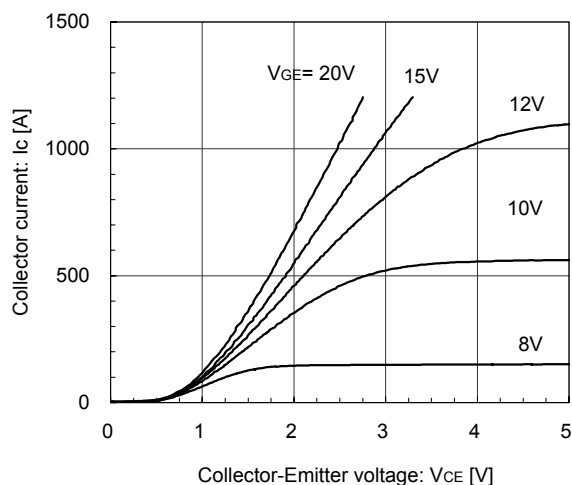
[INVERTER]

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



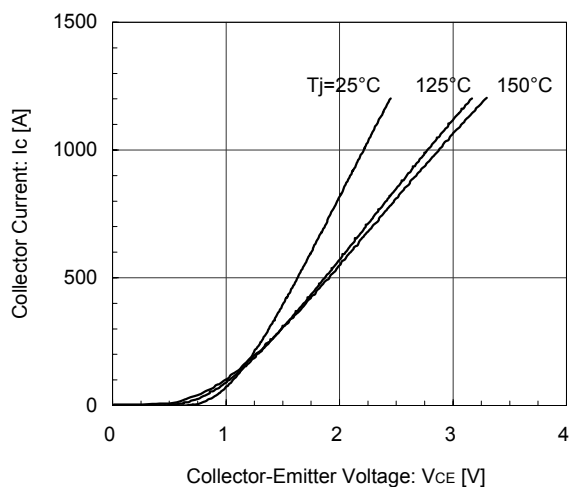
[INVERTER]

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



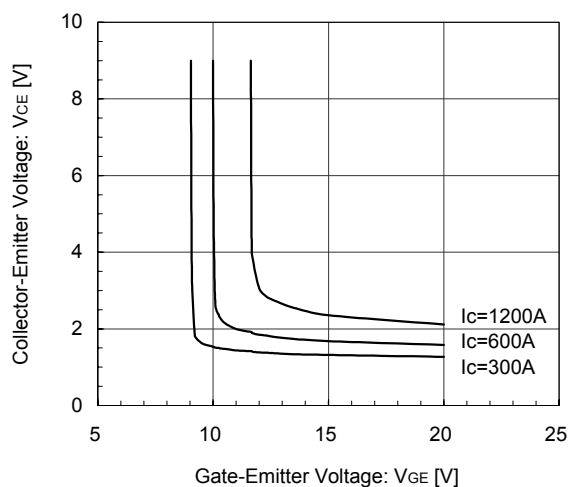
[INVERTER]

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



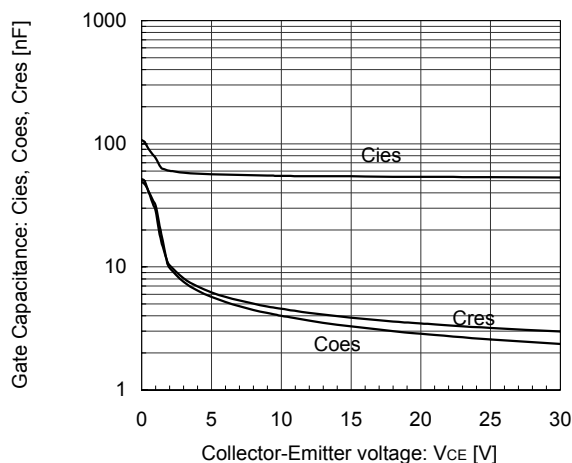
[INVERTER]

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



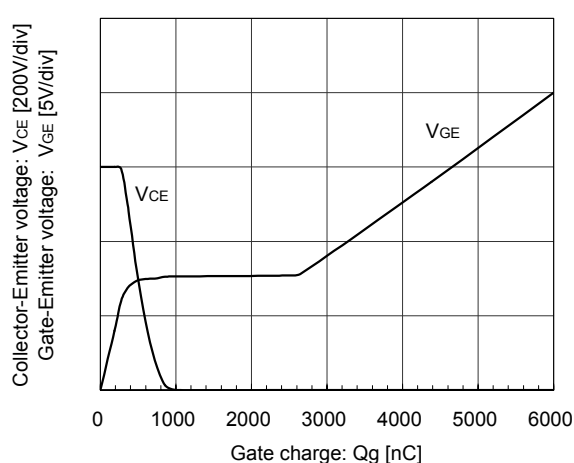
[INVERTER]

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



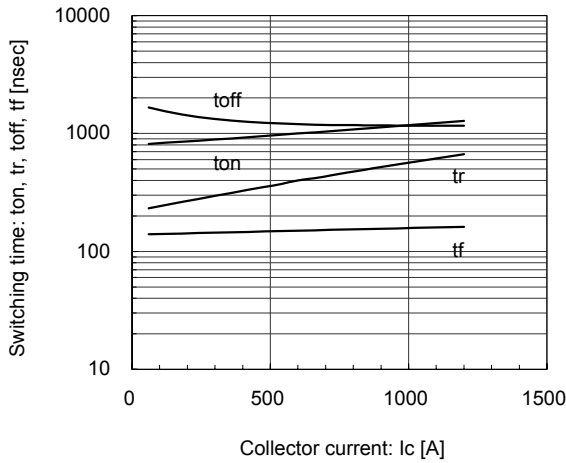
[INVERTER]

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



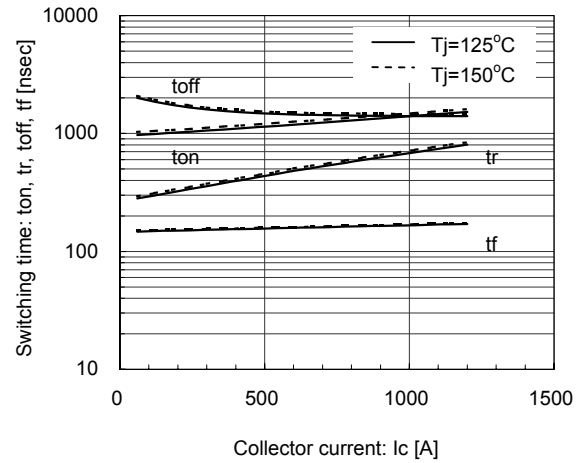
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=2.4\Omega$, $T_J=25^\circ C$



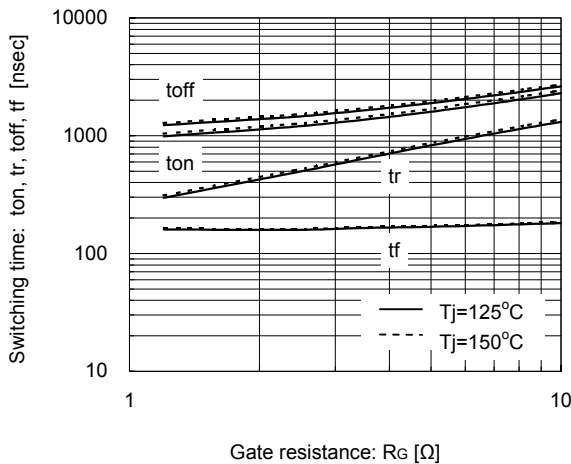
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=2.4\Omega$, $T_J=125^\circ C, 150^\circ C$



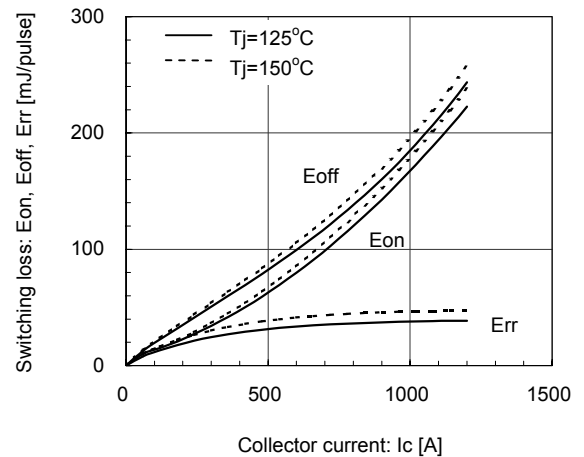
[INVERTER]

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



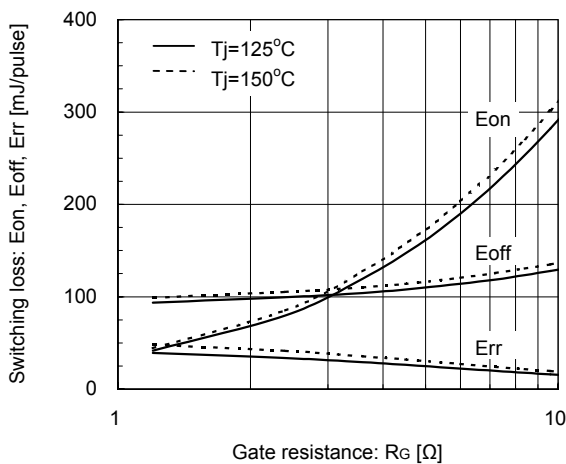
[INVERTER]

Switching loss vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=2.4\Omega$, $T_J=125^\circ C, 150^\circ C$



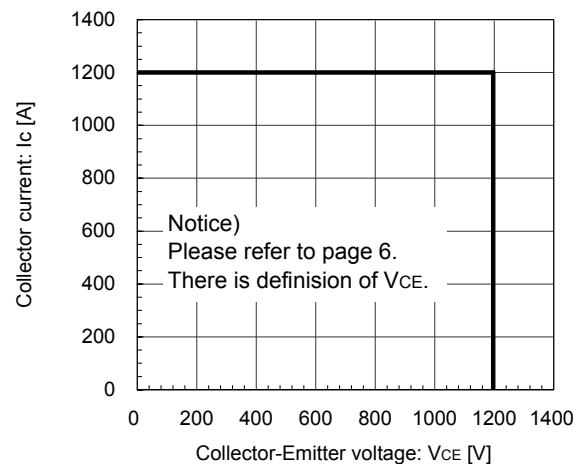
[INVERTER]

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

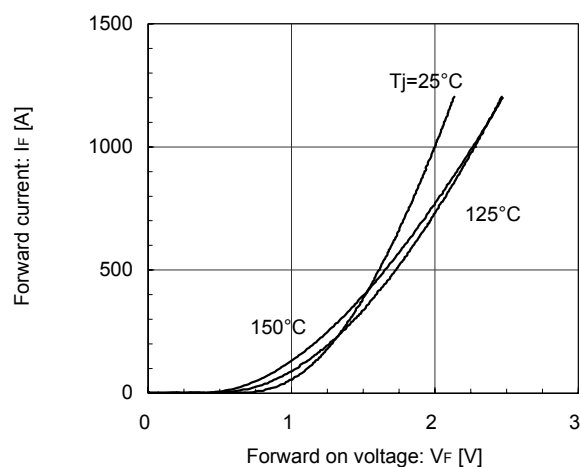


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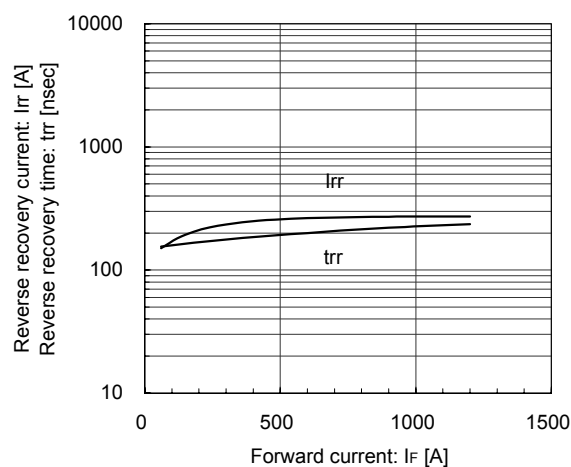
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_G=2.4\Omega$, $T_J=150^\circ C$



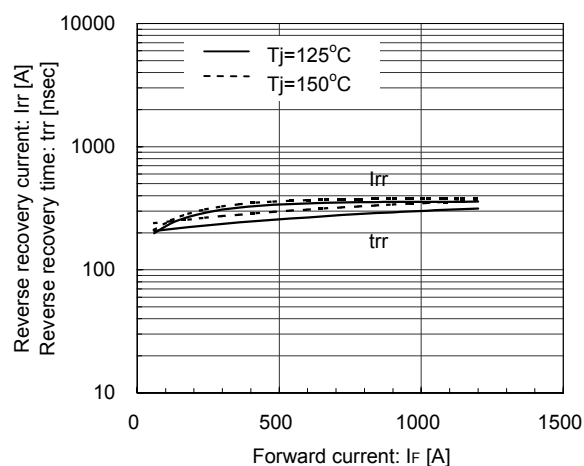
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip

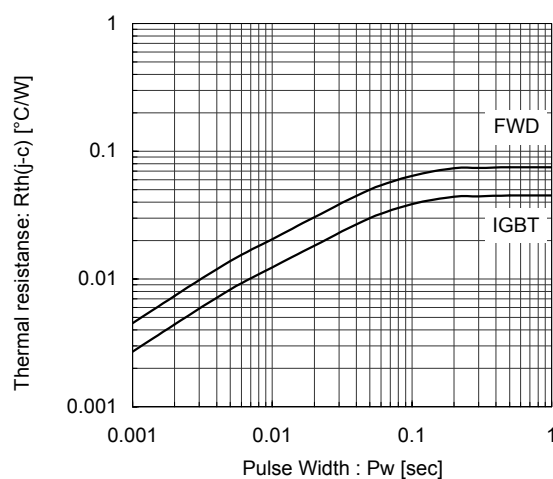
[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{CC}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=2.4\Omega$, $T_J=25^\circ\text{C}$ 

[INVERTER]

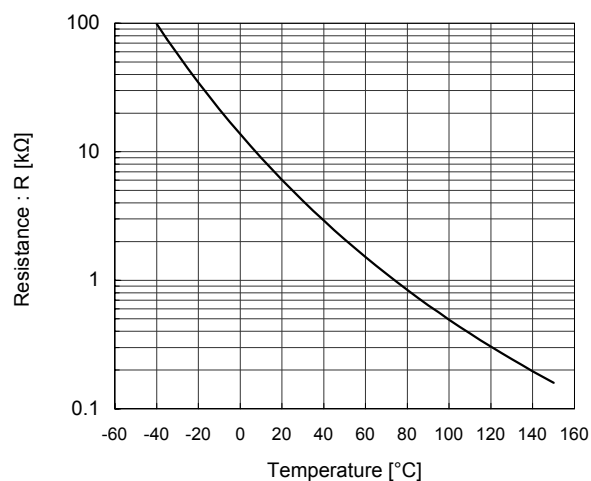
Reverse Recovery Characteristics (typ.)
 $V_{CC}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=2.4\Omega$, $T_J=125^\circ\text{C}$, 150°C 

Transient Thermal Resistance (max.)

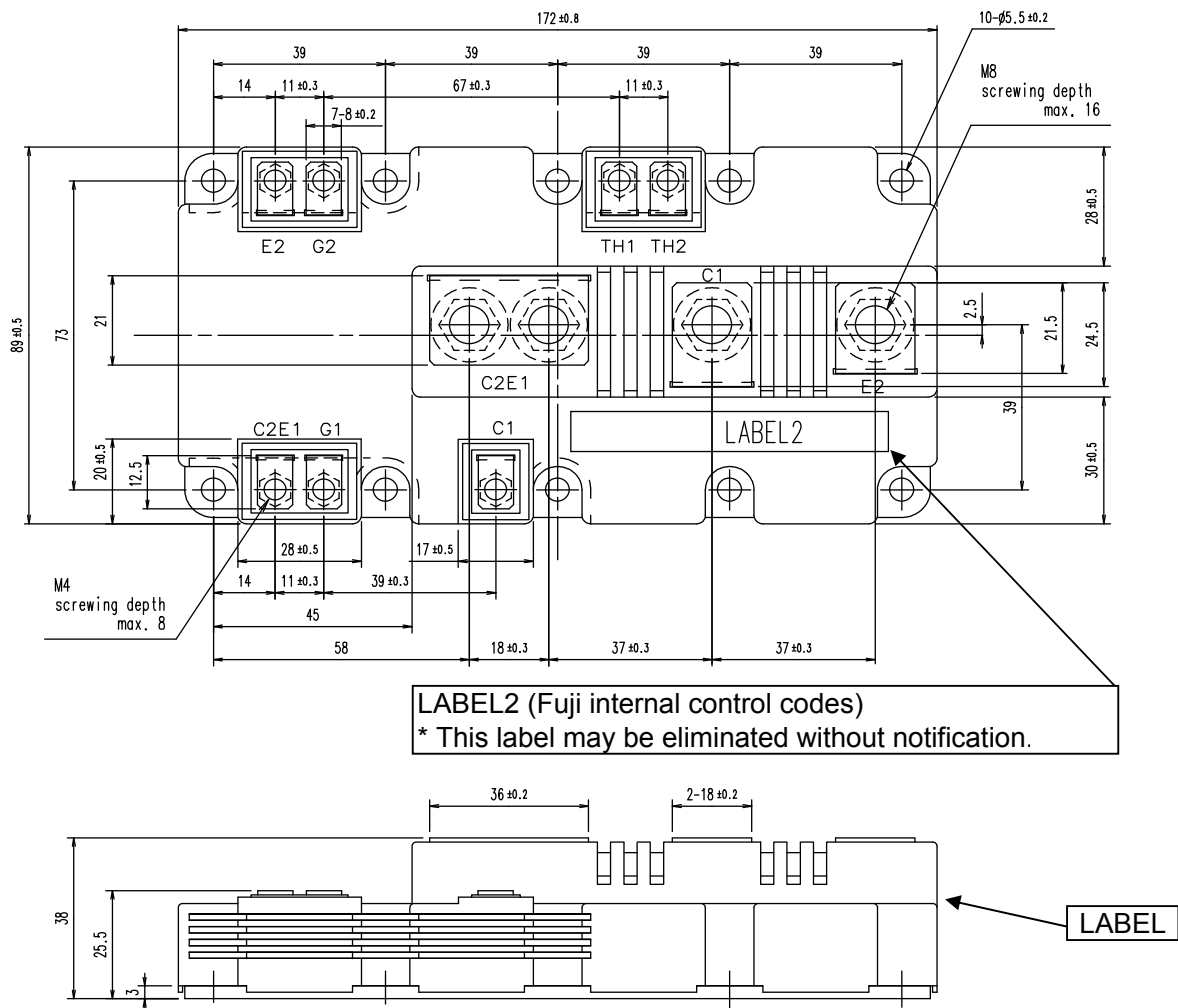


[THERMISTOR]

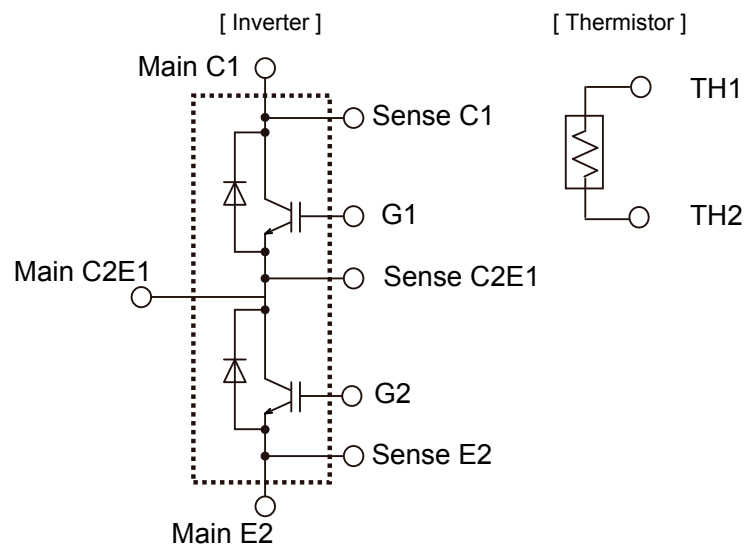
Temperature characteristic (typ.)



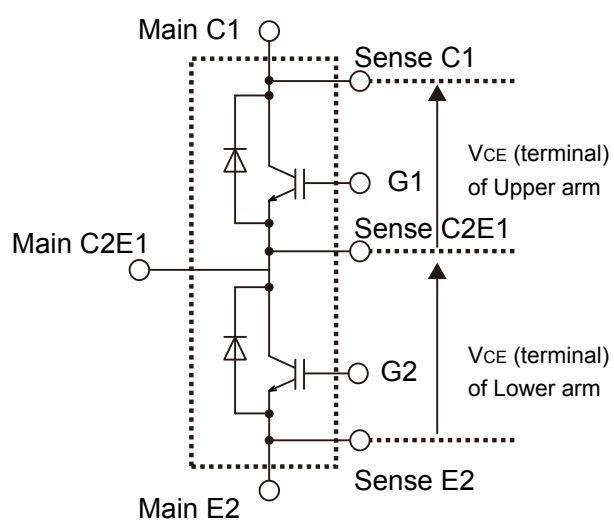
■ Outline Drawings, mm



■ Equivalent Circuit Schematic



■ Definition of on-state voltage at terminal and switching characteristics



Fuji defined V_{CE} value of terminal by using Sense C1 and Sense C2E1 for Upper arm and Sense C2E1 and Sense E2 for Lower arm .

Switching characteristics of V_{CE} also is defined between Sense C1 and Sense C2E1 for Upper arm and Sense C2E1 and Sense E2 for Lower arm .

Please use these terminals whenever measure spike voltage and on-state voltage .

WARNING

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• Machine tools	• Audiovisual equipment	• Electrical home appliances	• Personal equipment
			• Industrial robots etc.
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• Traffic-signal control equipment	• Gas leakage detectors with an auto-shut-off feature
• Emergency equipment for responding to disasters and anti-burglary devices	• Safety devices
• Medical equipment	
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• Submarine repeater equipment		
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