

# 2MBI1000VXB-170E-54

**IGBT Modules**

## IGBT MODULE (V series) 1700V / 1000A / 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	$V_{CES}$	1700	V	
	Gate-Emitter voltage	$V_{GES}$	±20	V	
	Collector current	$I_c$	Continuous	$T_c=25^\circ\text{C}$ 1400	A
		$I_{c\ pulse}$	1ms	$T_c=100^\circ\text{C}$ 1000	
		$-I_c$		2000	
		$-I_{c\ pulse}$	1ms	1000	
	Collector power dissipation	$P_C$	1 device	2000	W
	Junction temperature	$T_j$		6250	
	Operating junction temperature (under switching conditions)	$T_{jop}$		175	°C
	Case temperature	$T_c$		150	
Storage temperature	$T_{stg}$		150		
Isolation voltage	$V_{iso}$	AC : 1min.	-40 ~ +150	VAC	
			between terminal and copper base (*1) between thermistor and others (*2)		4000
Screw torque (*3)	-	M5	6.0	N m	
		M8	10.0		
		M4	2.1		

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 T<sub>j</sub> = 25°C unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units		
			min.	typ.	max.			
Inverter	Zero gate voltage collector current	I <sub>CES</sub>	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 1700V	-	-	6.0	mA	
	Gate-Emitter leakage current	I <sub>GES</sub>	V <sub>CE</sub> = 0V, V <sub>GE</sub> = ±20V	-	-	1200	nA	
	Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> = 20V, I <sub>c</sub> = 1000mA	6.0	6.5	7.0	V	
	Collector-Emitter saturation voltage	V <sub>CE(sat)</sub> (terminal) (*4)	V <sub>GE</sub> = 15V I <sub>c</sub> = 1000A	T <sub>j</sub> = 25°C	-	2.10	2.55	V
				T <sub>j</sub> = 125°C	-	2.50	-	
				T <sub>j</sub> = 150°C	-	2.55	-	
		V <sub>CE(sat)</sub> (chip)		T <sub>j</sub> = 25°C	-	2.00	2.45	
				T <sub>j</sub> = 125°C	-	2.40	-	
	Input capacitance	R <sub>g(int)</sub>	-	-	1.17	-	Ω	
		C <sub>ies</sub>	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz	-	94	-	nF	
	Turn-on time	t <sub>on</sub>	V <sub>CC</sub> = 900V I <sub>c</sub> = 1000A	-	1250	-	nsec	
		t <sub>r(l)</sub>	V <sub>GE</sub> = ±15V	-	500	-		
	Turn-off time	t <sub>off</sub>	R <sub>G</sub> = +1.2/-1.8Ω	-	1550	-	nsec	
		t <sub>r</sub>	L <sub>S</sub> = 60nH	-	150	-		
	Forward on voltage	V <sub>F</sub> (terminal) (*4)	V <sub>GE</sub> = 0V I <sub>F</sub> = 1000A	T <sub>j</sub> = 25°C	-	1.95	2.40	V
T <sub>j</sub> = 125°C				-	2.20	-		
T <sub>j</sub> = 150°C				-	2.15	-		
V <sub>F</sub> (chip)		T <sub>j</sub> = 25°C		-	1.85	2.30		
		T <sub>j</sub> = 125°C		-	2.10	-		
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 1000A	-	240	-	nsec		
	Resistance	R	T = 25°C	-	5000	-	Ω	
T = 100°C			465	495	520			
Thermistor	B value	B	T = 25/50°C	3305	3375	3450	K	

Note \*1: Please refer to page 7, there is definition of on-state voltage at terminal.

● Thermal resistance characteristics

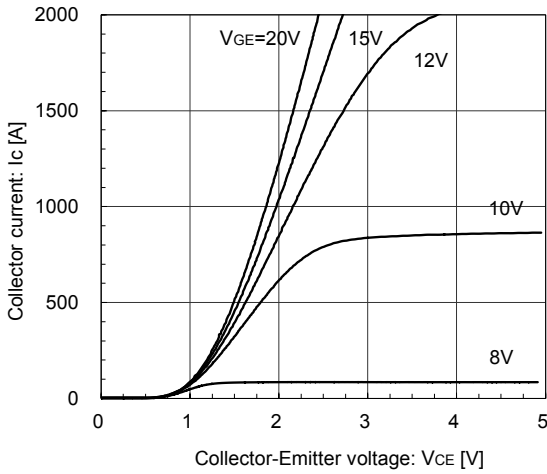
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R <sub>th(j-c)</sub>	Inverter IGBT Inverter FWD	-	-	0.024	°C/W
Contact thermal resistance (1device) (*5)	R <sub>th(c-f)</sub>	with Thermal Compound	-	0.0083	-	

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

■ Characteristics (Representative)

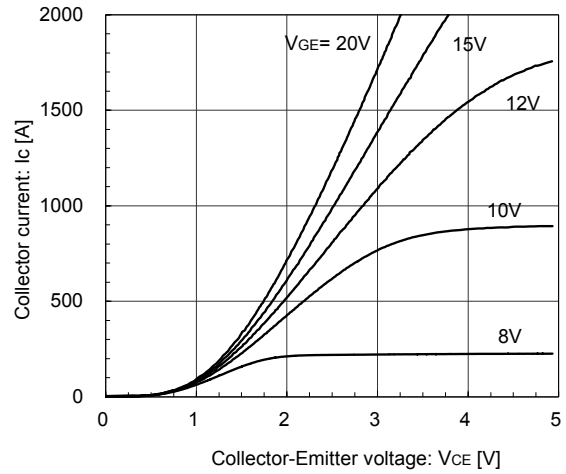
[INVERTER]

Collector current vs. Collector-Emittter voltage (typ.)  
T<sub>j</sub> = 25°C / chip



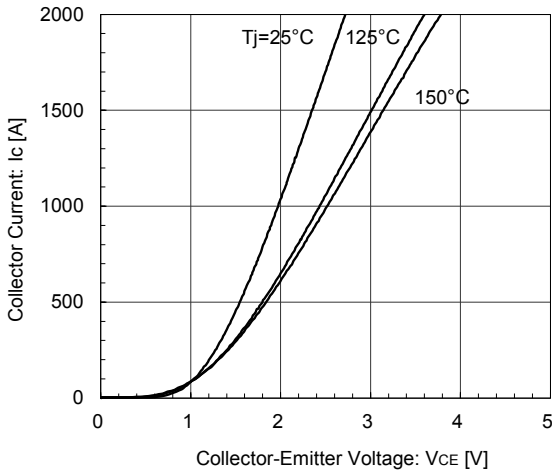
[INVERTER]

Collector current vs. Collector-Emittter voltage (typ.)  
T<sub>j</sub> = 150°C / chip



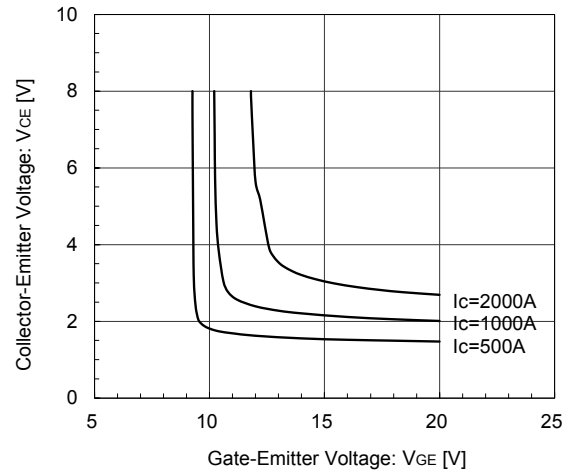
[INVERTER]

Collector current vs. Collector-Emittter voltage (typ.)  
V<sub>GE</sub> = 15V / chip



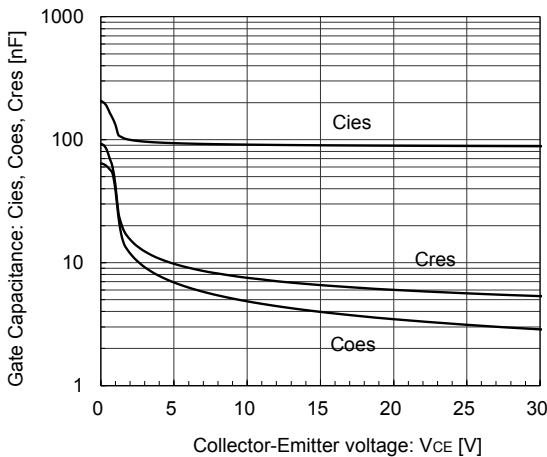
[INVERTER]

Collector-Emittter voltage vs. Gate-Emittter voltage (typ.)  
T<sub>j</sub> = 25°C / chip



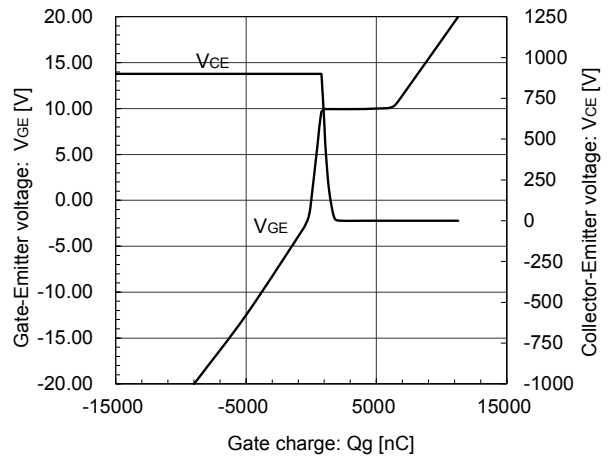
[INVERTER]

Gate Capacitance vs. Collector-Emittter Voltage (typ.)  
V<sub>GE</sub> = 0V, f = 1MHz, T<sub>j</sub> = 25°C



[INVERTER]

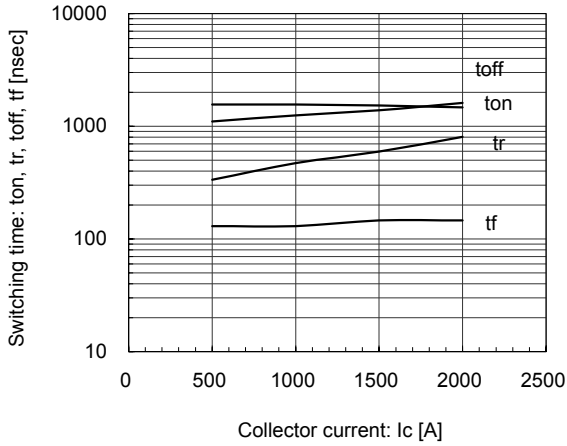
Dynamic Gate Charge (typ.)  
V<sub>CC</sub> = 900V, I<sub>c</sub> = 1000A, T<sub>j</sub> = 25°C



[INVERTER]

Switching time vs. Collector current (typ.)

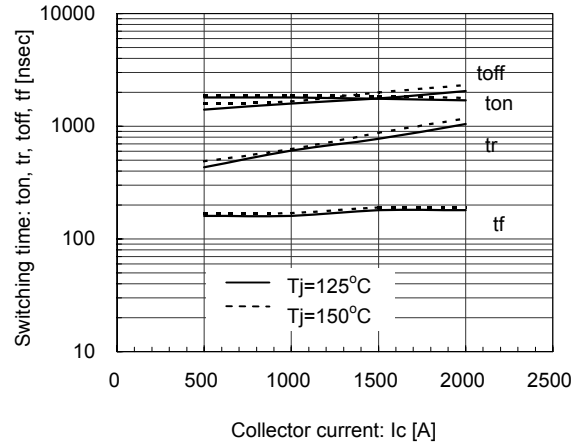
V<sub>CC</sub>=900V, V<sub>GE</sub>=±15V, R<sub>G</sub>=+1.2/-1.8Ω, T<sub>J</sub>=25°C



[INVERTER]

Switching time vs. Collector current (typ.)

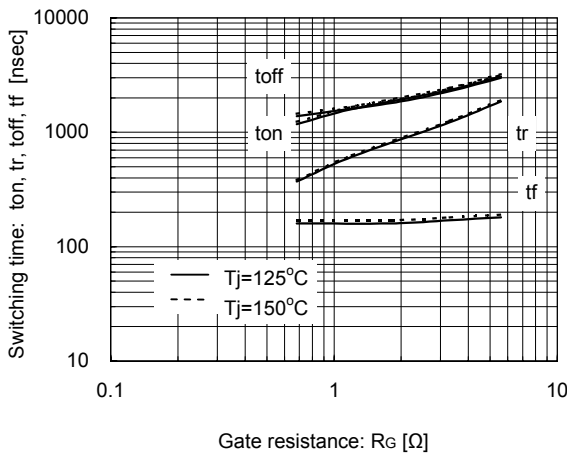
V<sub>CC</sub>=900V, V<sub>GE</sub>=±15V, R<sub>G</sub>=+1.2/-1.8Ω, T<sub>J</sub>=125°C, 150°C



[INVERTER]

Switching time vs. Gate resistance (typ.)

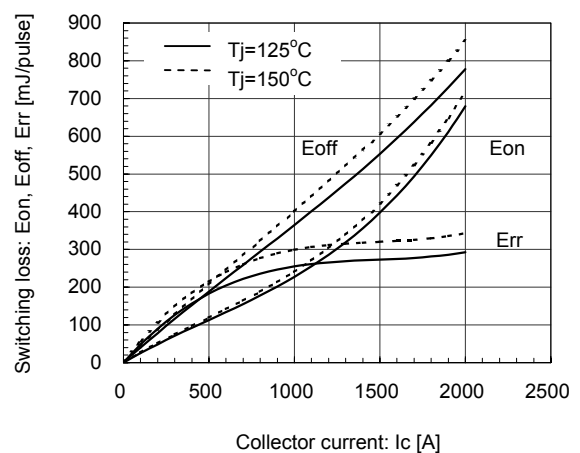
V<sub>CC</sub>=900V, I<sub>C</sub>=1000A, V<sub>GE</sub>=±15V, T<sub>J</sub>=125°C, 150°C



[INVERTER]

Switching loss vs. Collector current (typ.)

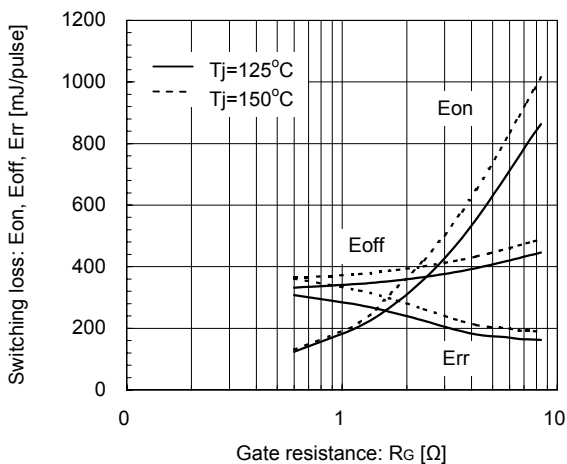
V<sub>CC</sub>=900V, V<sub>GE</sub>=±15V, R<sub>G</sub>=+1.2/-1.8Ω, T<sub>J</sub>=125°C, 150°C



[INVERTER]

Switching loss vs. Gate resistance (typ.)

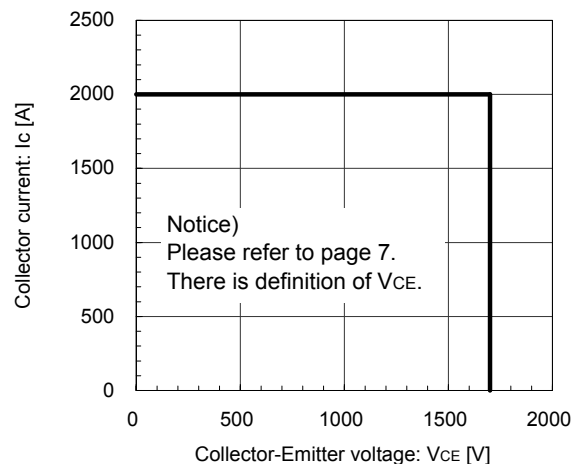
V<sub>CC</sub>=900V, I<sub>C</sub>=1000A, V<sub>GE</sub>=±15V, T<sub>J</sub>=125°C, 150°C

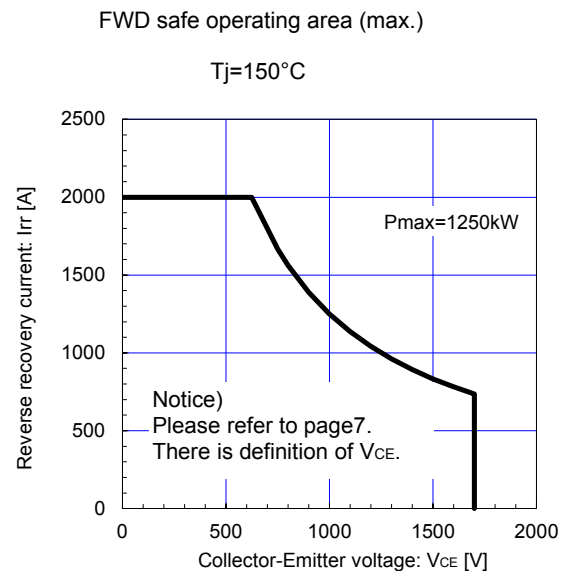
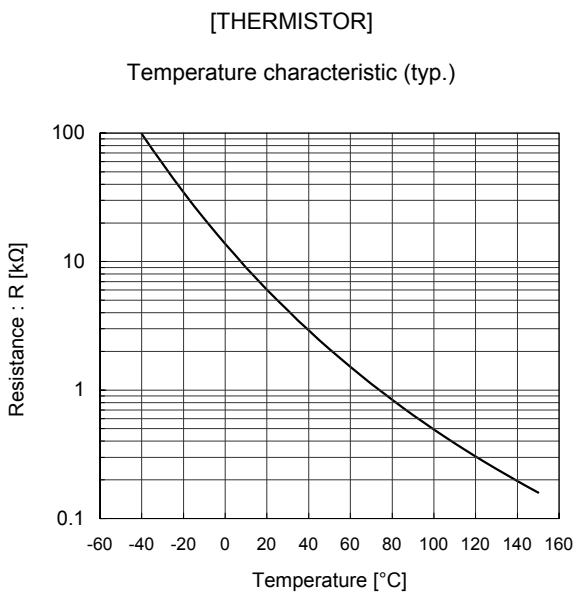
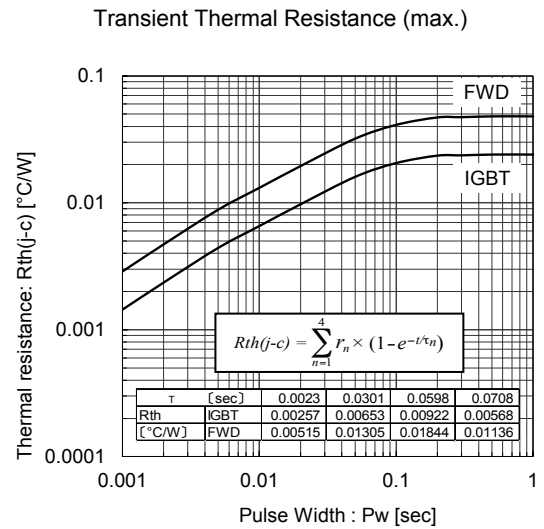
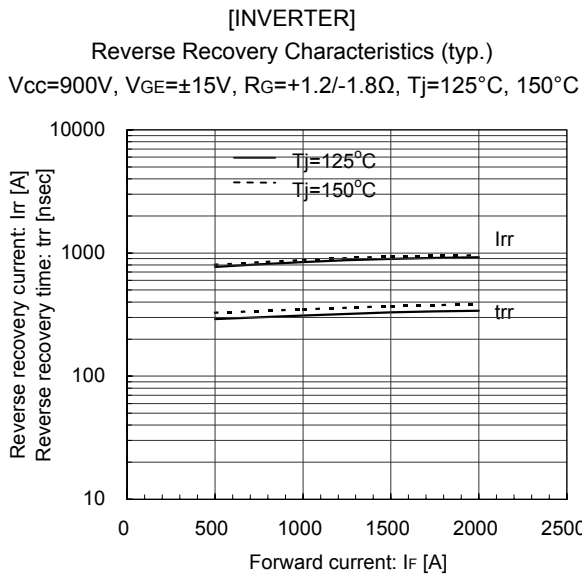
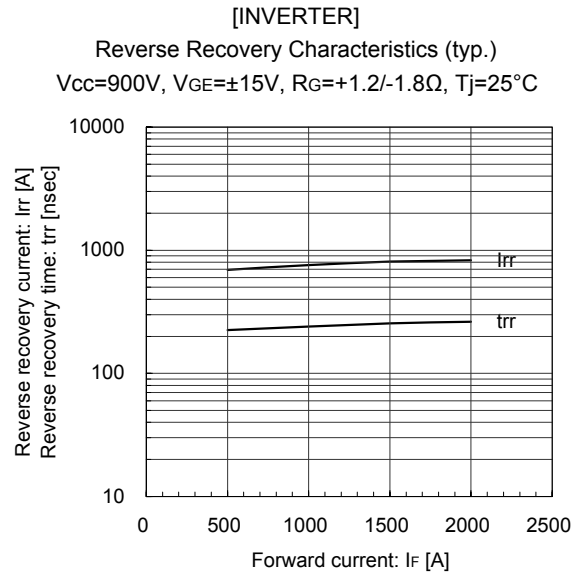
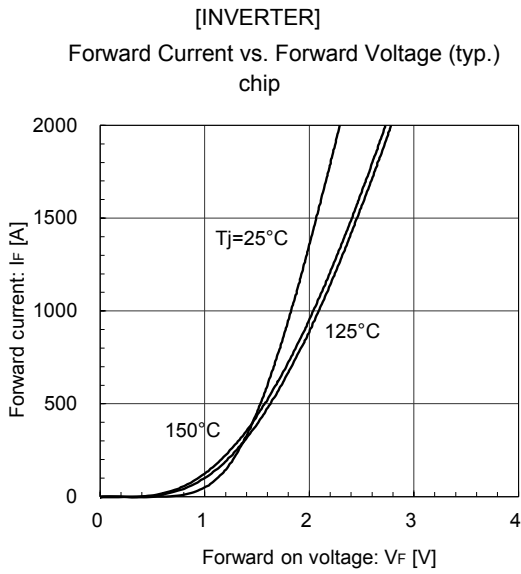


[INVERTER]

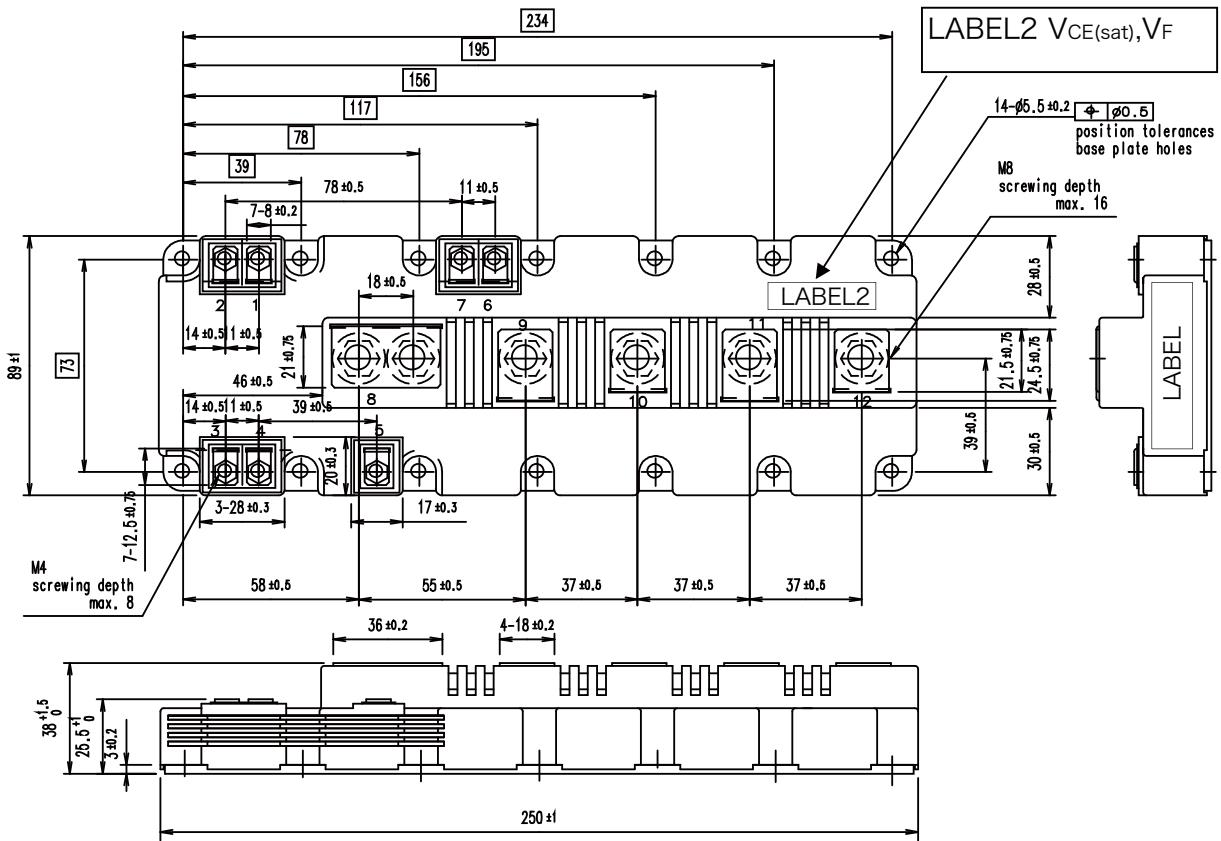
Reverse bias safe operating area (max.)

+V<sub>GE</sub>=15V, -V<sub>GE</sub>=15V, R<sub>G</sub>=+1.2/-1.8Ω, T<sub>J</sub>=150°C



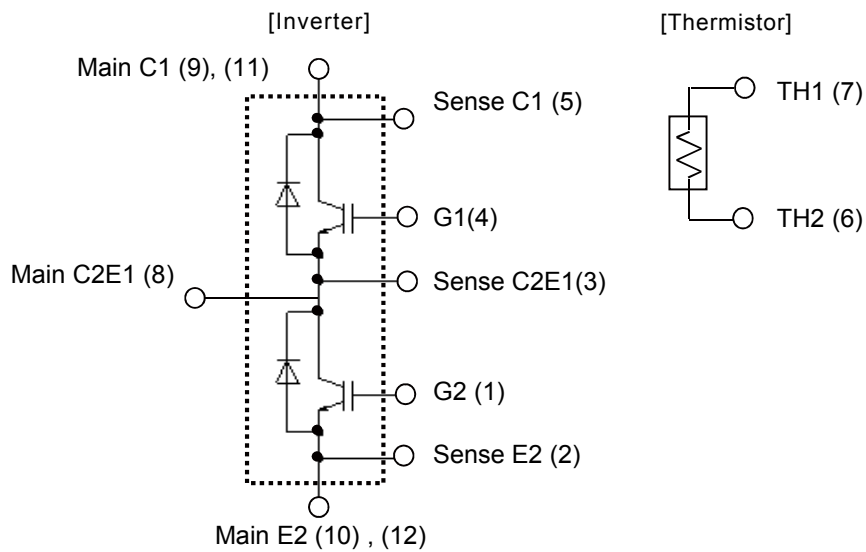


■ Outline Drawings, mm

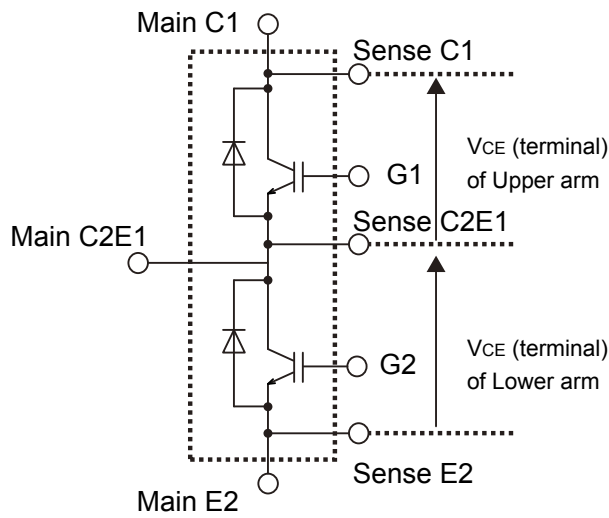


Weight: 1250g(typ.)

■ Equivalent Circuit Schematic



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



Fuji defined V<sub>CE</sub> 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<sub>CE</sub> 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 .

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