

# 2MBI1400VXB-170P-50

**IGBT Modules**

## IGBT MODULE (V series) 1700V / 1400A / 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	Tc=25°C	1800
				Tc=100°C	1400
		$I_{c\ pulse}$	1ms	2800	A
		$-I_c$		1400	
	$-I_{c\ pulse}$	1ms	2800		
Collector power dissipation	$P_C$	1 device	8820	W	
Junction temperature	$T_j$		175		
Operating junction temperature (under switching conditions)	$T_{jop}$		150	°C	
Case temperature	$T_c$		150		
Storage temperature	$T_{sig}$		-40 ~ +150		
Isolation voltage	between terminal and copper base (*1)	$V_{iso}$	AC : 1min.	4000	VAC
	between thermistor and others (*2)				
Screw torque (*3)	Mounting		M5	6.0	N m
	Main Terminals		M8	10.0	
	Sense Terminals		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 Tj= 25°C unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units		
			min.	typ.	max.			
Inverter	Zero gate voltage collector current	$I_{CES}$	$V_{GE} = 0V, V_{CE} = 1700V$	-	-	12.0	mA	
	Gate-Emitter leakage current	$I_{GES}$	$V_{CE} = 0V, V_{GE} = \pm 20V$	-	-	2400	nA	
	Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_c = 1400mA$	6.0	6.5	7.0	V	
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal) (*4)	$V_{GE} = 15V$ $I_c = 1400A$	Tj=25°C	-	2.10	2.55	V
				Tj=125°C	-	2.45	-	
		Tj=150°C		-	2.55	-		
		$V_{CE(sat)}$ (chip)		Tj=25°C	-	1.90	2.35	
		Tj=125°C		-	2.25	-		
	Tj=150°C	-	2.35	-				
	Internal gate resistance	$R_{g(int)}$	-	-	2.25	-	Ω	
	Input capacitance	$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	-	113	-	nF	
	Turn-on time	$t_{on}$		-	1350	-	nsec	
		$t_r$	$V_{CC}=900V, I_c=1400A$	-	300	-		
		$t_r(i)$	$V_{GE}=\pm 15V, R_G=+0.47/-0.68\Omega,$ $L_s=40nH$	-	150	-		
	Turn-off time	$t_{off}$		-	1800	-	nsec	
$t_f$			-	200	-			
Forward on voltage	$V_F$ (terminal) (*4)	$V_{GE}=0V$ $I_F=1400A$	Tj=25°C	-	2.00	2.45	V	
			Tj=125°C	-	2.25	-		
	Tj=150°C		-	2.20	-			
	$V_F$ (chip)		Tj=25°C	-	1.80	2.25		
	Tj=125°C		-	2.05	-			
Tj=150°C	-	2.00	-					
Reverse recovery time	$t_{rr}$	$I_F = 1400A$	-	250	-	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		

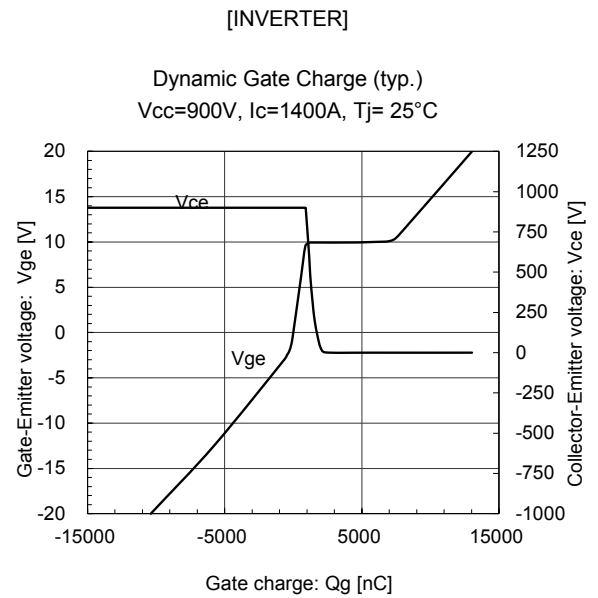
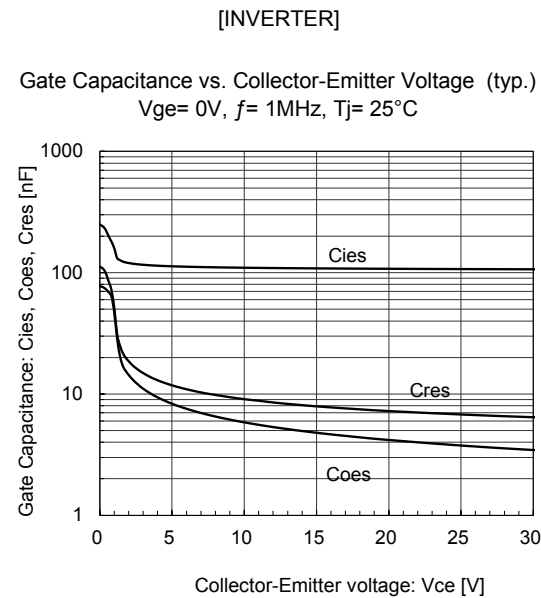
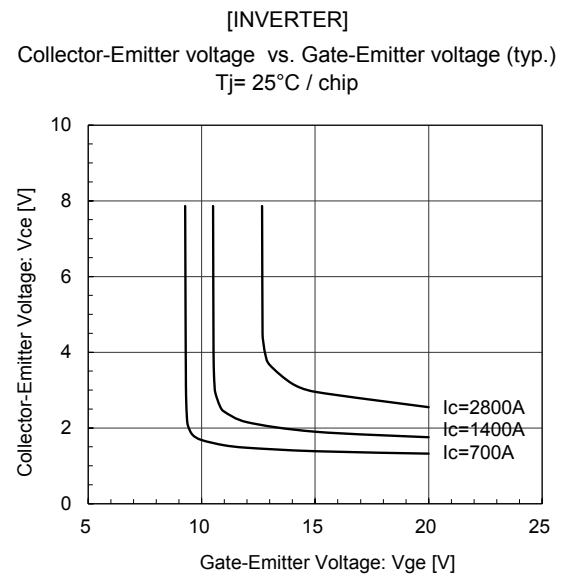
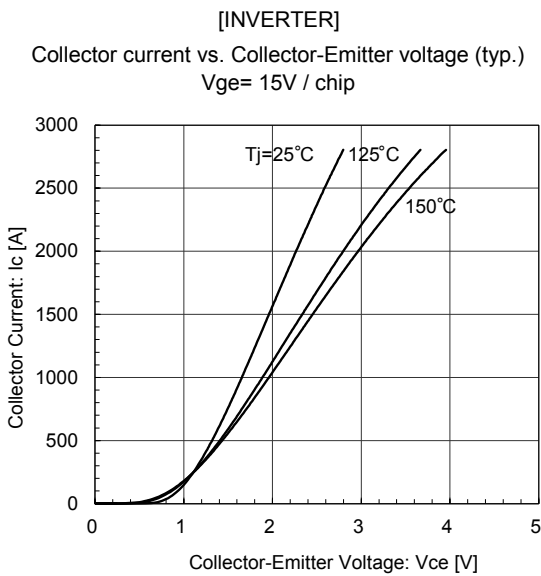
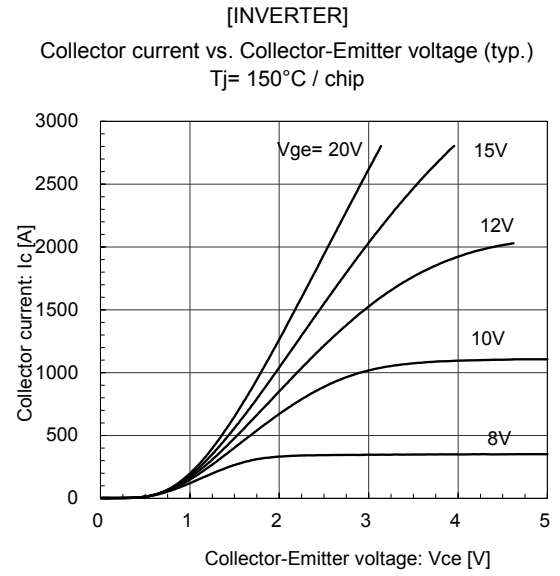
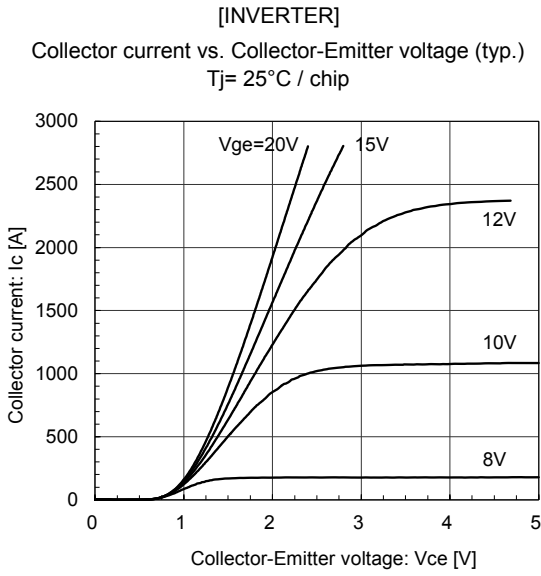
Note \*4: Please refer to Page 6, there is definition of on-state voltage at terminal .

#### ● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.017	°C/W
		Inverter FWD	-	-	0.032	
Contact thermal resistance (1device) (*5)	$R_{th(c-f)}$	with Thermal Compound	-	0.0042	-	

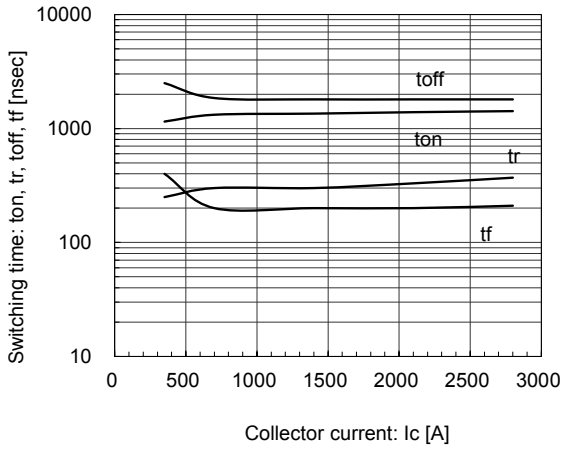
Note \*5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)



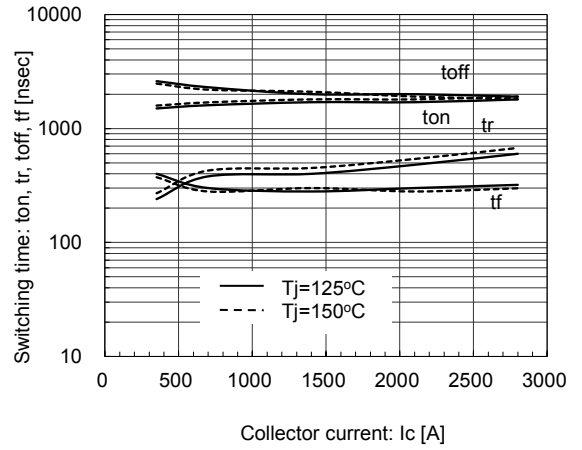
[INVERTER]

Switching time vs. Collector current (typ.)  
 $V_{cc}=900V, V_{ge}=\pm 15V, R_g=+0.47/-0.68\Omega, T_j=25^\circ C$



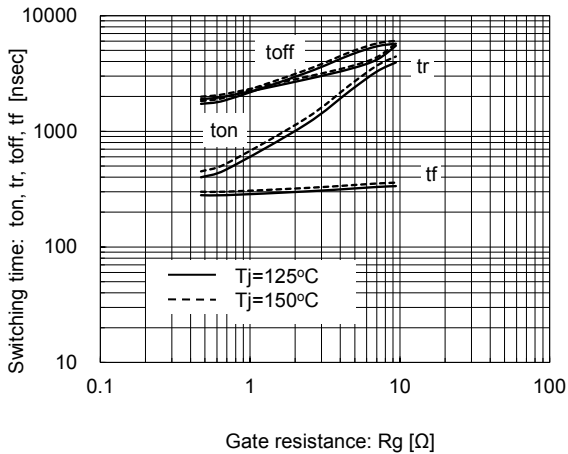
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Switching time vs. Collector current (typ.)  
 $V_{cc}=900V, V_{ge}=\pm 15V, R_g=+0.47/-0.68\Omega, T_j=125^\circ C, 150^\circ C$



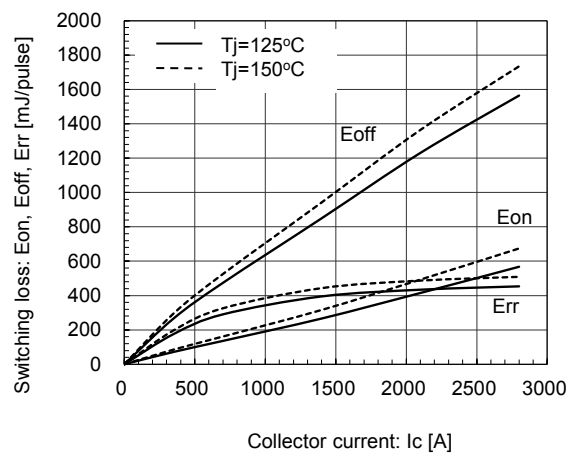
[INVERTER]

Switching time vs. Gate resistance (typ.)  
 $V_{cc}=900V, I_c=1400A, V_{ge}=\pm 15V, T_j=125^\circ C, 150^\circ C$



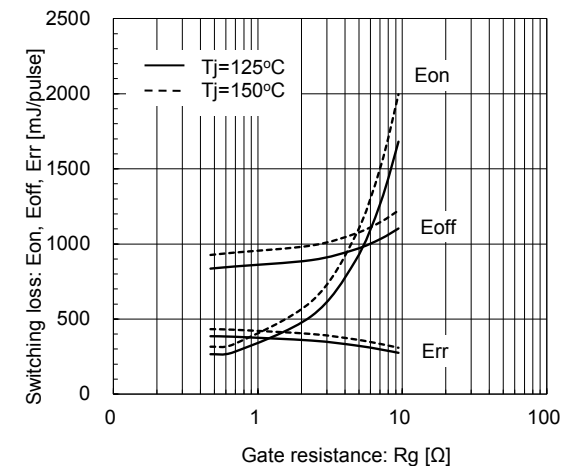
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Switching loss vs. Collector current (typ.)  
 $V_{cc}=900V, V_{ge}=\pm 15V, R_g=+0.47/-0.68\Omega, T_j=125^\circ C, 150^\circ C$



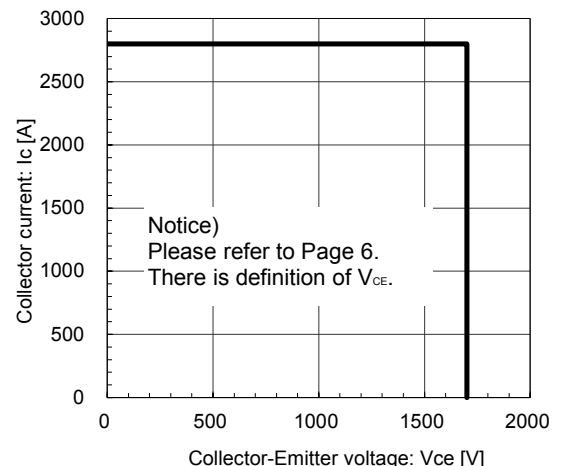
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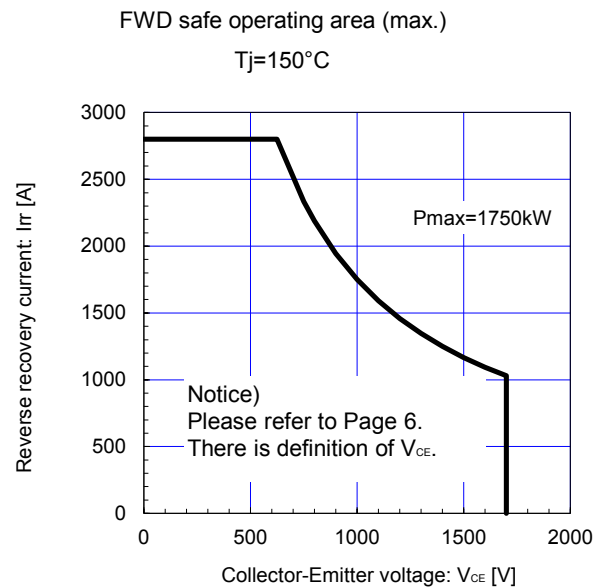
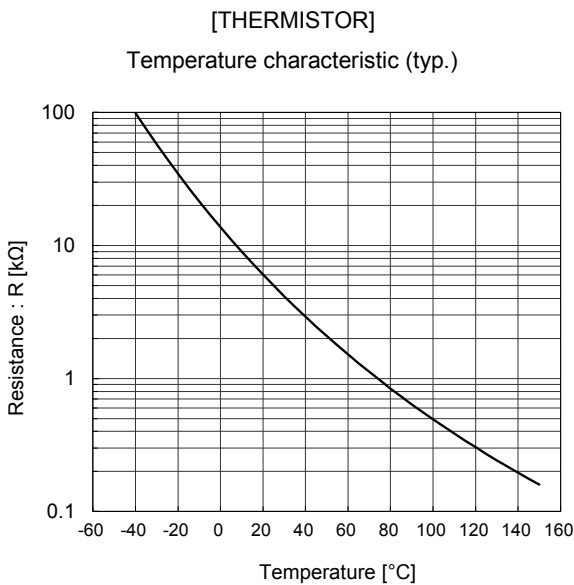
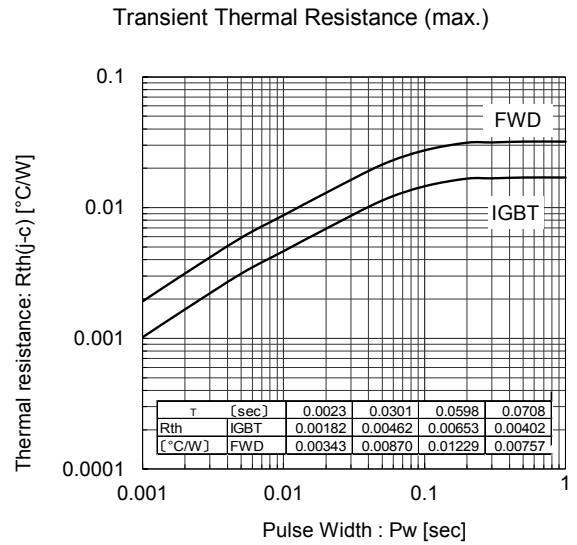
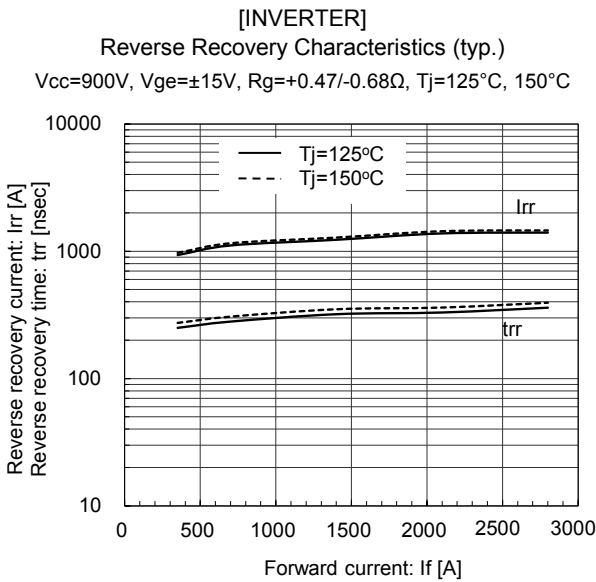
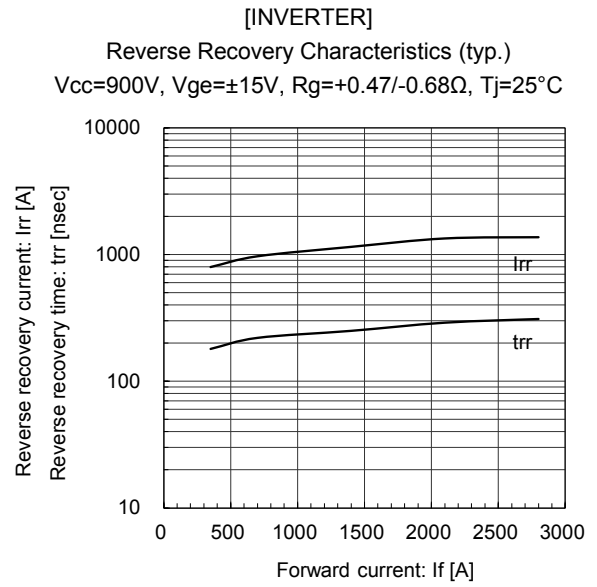
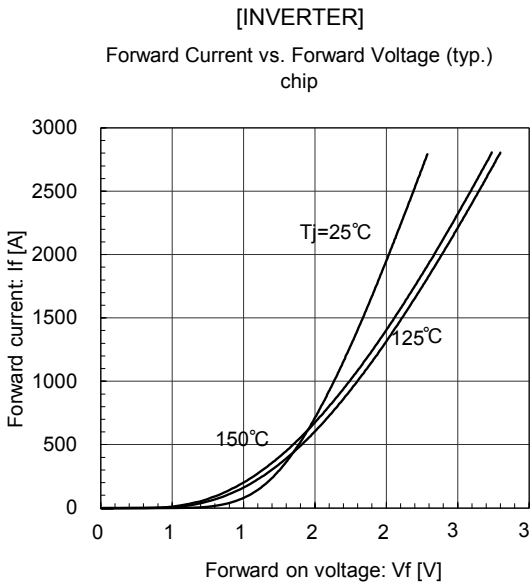
Switching loss vs. Gate resistance (typ.)  
 $V_{cc}=900V, I_c=1400A, V_{ge}=\pm 15V, T_j=125^\circ C, 150^\circ C$



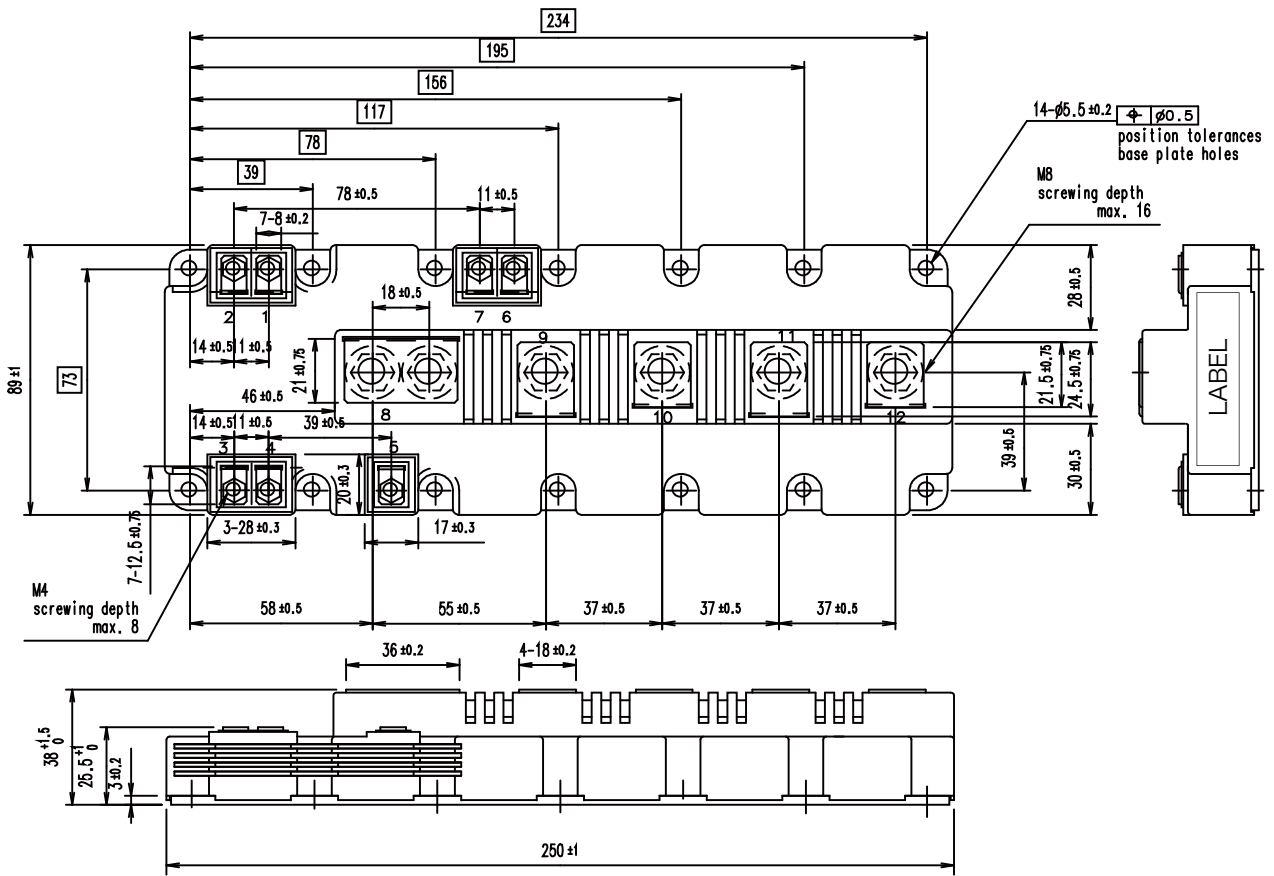
[INVERTER]

Reverse bias safe operating area (max.)  
 $+V_{ge}=15V, -V_{ge}=15V, R_g=+0.47/-0.68\Omega, T_j=150^\circ C$



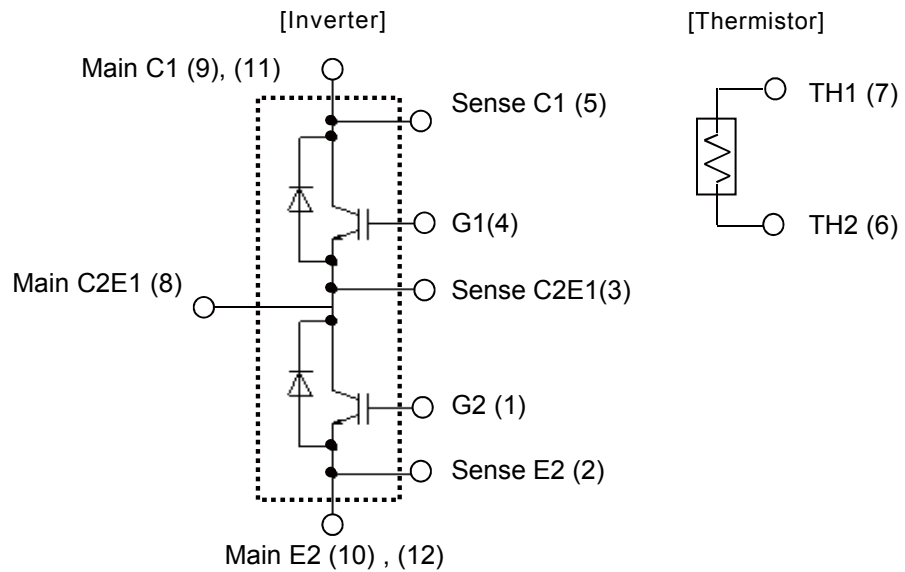


■ Outline Drawings, mm

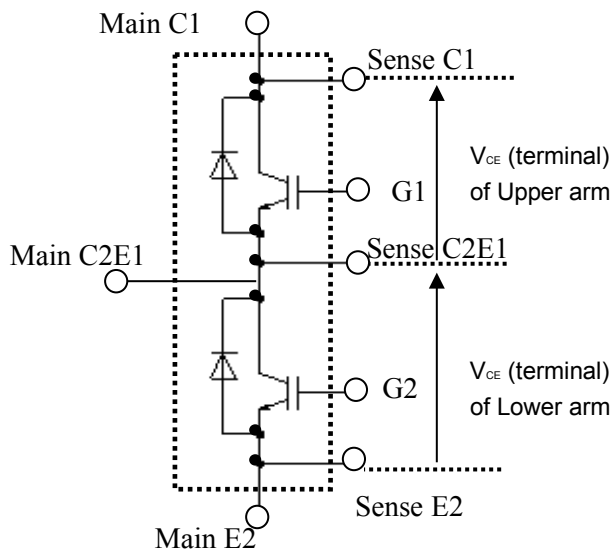


Weight: 1250g(typ.)

■ 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 .

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