

2MBI1400VXB-170E-54

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	
Collector-Emitter voltage	V _{CES}		1700	V	
Gate-Emitter voltage	V _{GES}		±20	V	
Inverter Collector current	I _c	Continuous	T _c =25°C 1800	A	
	I _{c pulse}	1ms	T _c =100°C 1400		
	-I _c		2800		
	-I _{c pulse}	1ms	1400		
Collector power dissipation	P _C	1 device	2800	W	
Junction temperature	T _j		8820		
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	N m	
			M8		6.0
			M4		10.0
					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_j = 25°C unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units		
			min.	typ.	max.			
Inverter	Zero gate voltage collector current	I _{CE(S)}	V _{GE} = 0V, V _{CE} = 1700V	-	-	12.0	mA	
	Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±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	T _j = 25°C	-	2.35	2.80	V
				T _j = 125°C	-	2.85	-	
				T _j = 150°C	-	2.95	-	
		V _{CE(sat)} (chip)		T _j = 25°C	-	2.15	2.60	
				T _j = 125°C	-	2.65	-	
	Internal gate resistance	R _{g(int)}	-	T _j = 25°C	-	2.25	-	Ω
				T _j = 150°C	-	2.75	-	
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	-	113	-	nF	
	Turn-on time	t _{on}	V _{CC} = 900V I _c = 1400A	-	1350	-	nsec	
		t _r	V _{GE} = ±15V	-	300	-		
	Turn-off time	t _{off}	R _G = +0.47/-0.68Ω L _S = 40nH	-	1600	-	nsec	
		t _r		-	150	-		
Forward on voltage	V _F (terminal) (*4)	V _{GE} = 0V I _F = 1400A	T _j = 25°C	-	2.00	2.45	V	
			T _j = 125°C	-	2.25	-		
			T _j = 150°C	-	2.20	-		
	V _F (chip)		T _j = 25°C	-	1.80	2.25		
			T _j = 125°C	-	2.05	-		
Reverse recovery time	t _{rr}	I _F = 1400A	T _j = 150°C	-	250	-	nsec	
			T = 25°C	-	5000	-		
Thermistor	Resistance	R	T = 100°C	465	495	520	Ω	
	B value	B	T = 25/50°C	3305	3375	3450	K	

Note *4: Please refer to page 7, there is definition of on-state voltage at terminal.

● Thermal resistance characteristics

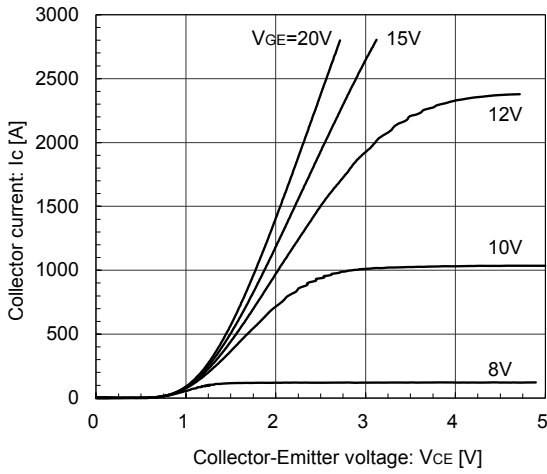
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	Inverter IGBT Inverter FWD	-	-	0.017	°C/W
Contact thermal resistance (1device) (*5)	R _{th(c-f)}	with Thermal Compound	-	0.0042	-	

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

■ Characteristics (Representative)

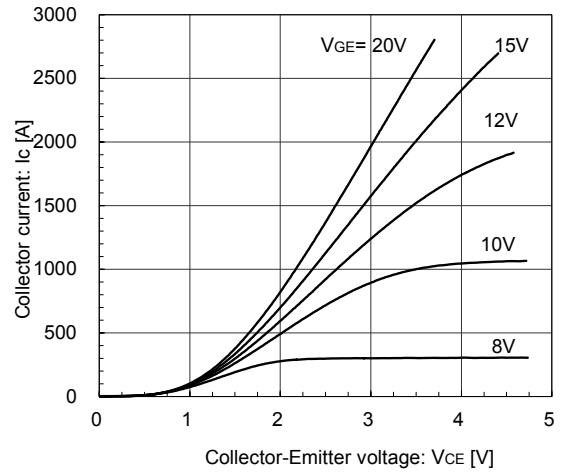
[INVERTER]

Collector current vs. Collector-Emmitter voltage (typ.)
Tj= 25°C / chip



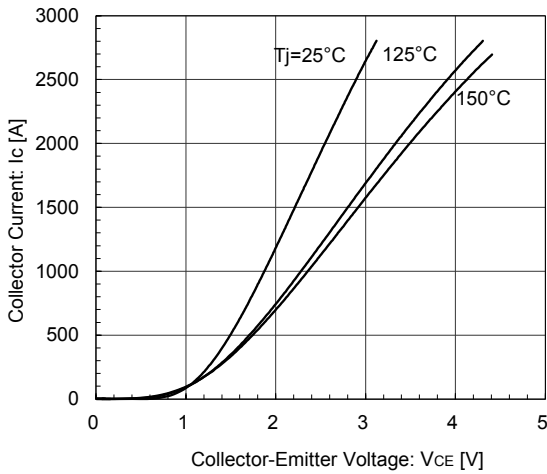
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Collector current vs. Collector-Emmitter voltage (typ.)
Tj= 150°C / chip



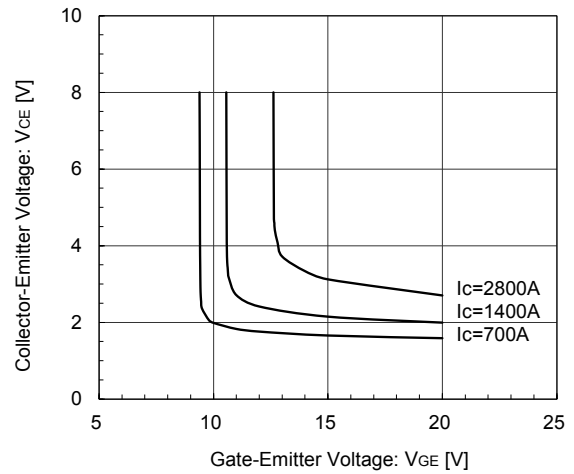
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Collector current vs. Collector-Emmitter voltage (typ.)
VGE= 15V / chip



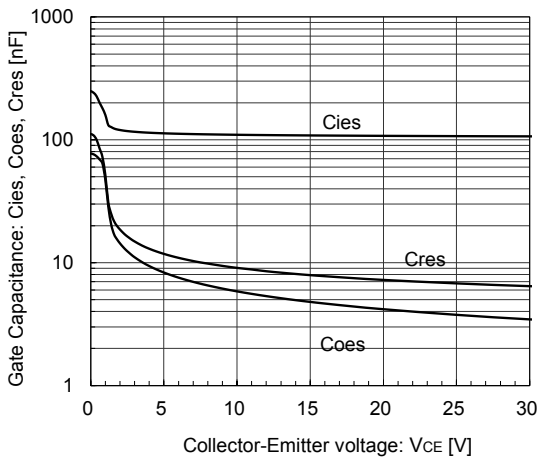
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Collector-Emmitter voltage vs. Gate-Emmitter voltage (typ.)
Tj= 25°C / chip



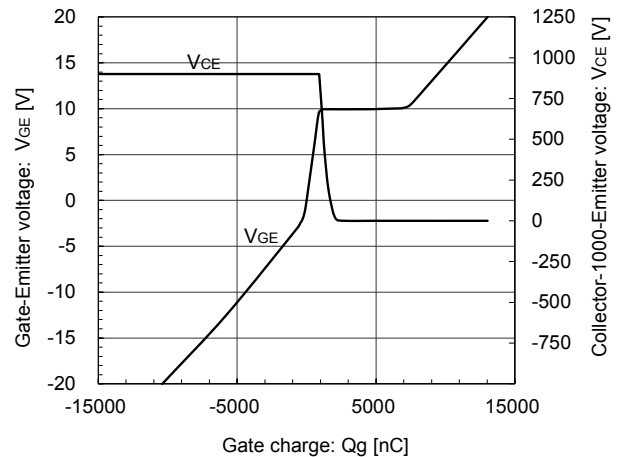
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Gate Capacitance vs. Collector-Emmitter Voltage (typ.)
VGE= 0V, f= 1MHz, Tj= 25°C



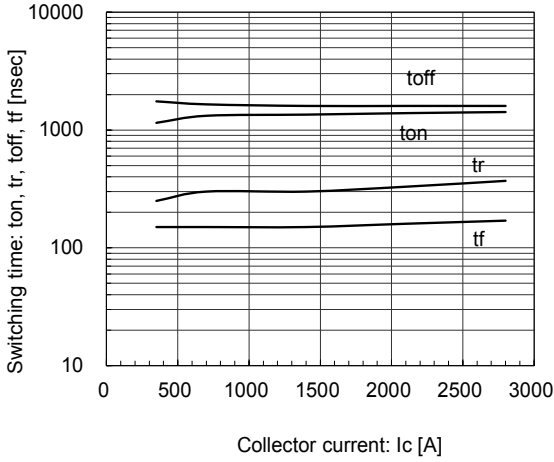
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Dynamic Gate Charge (typ.)
Vcc=900V, Ic=1400A, Tj= 25°C



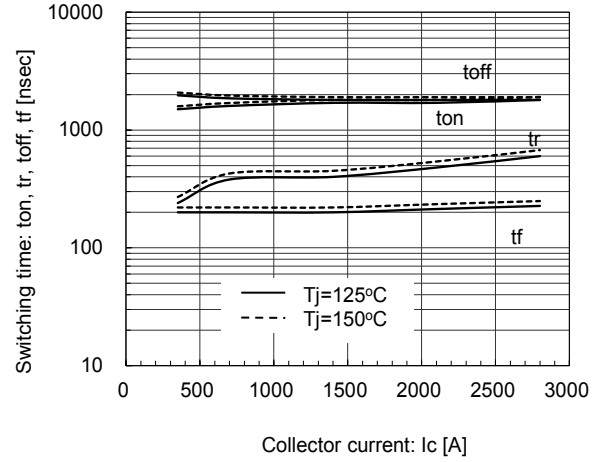
[INVERTER]

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



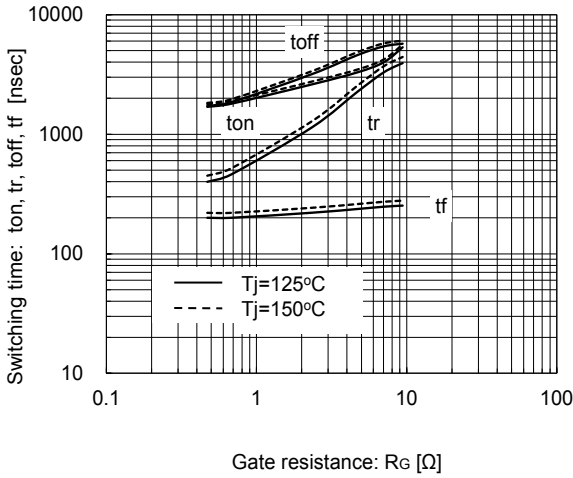
[INVERTER]

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



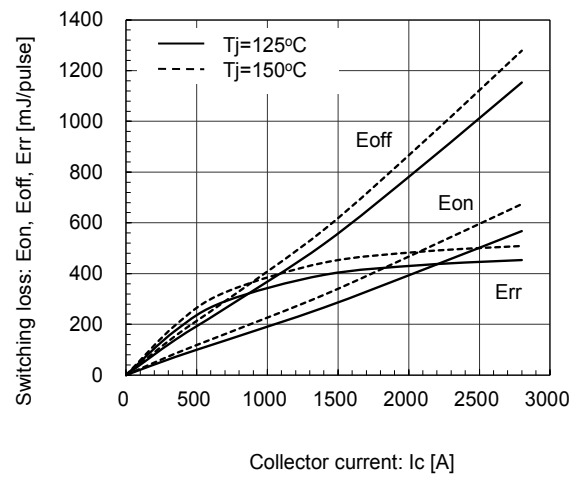
[INVERTER]

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



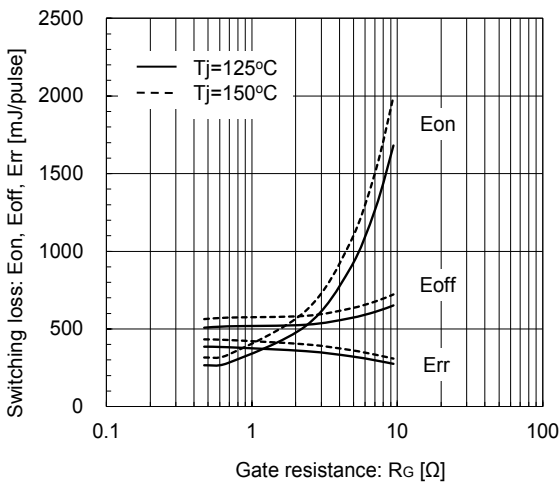
[INVERTER]

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



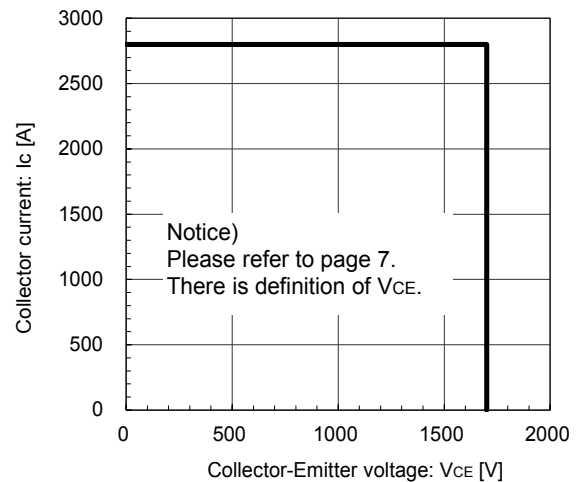
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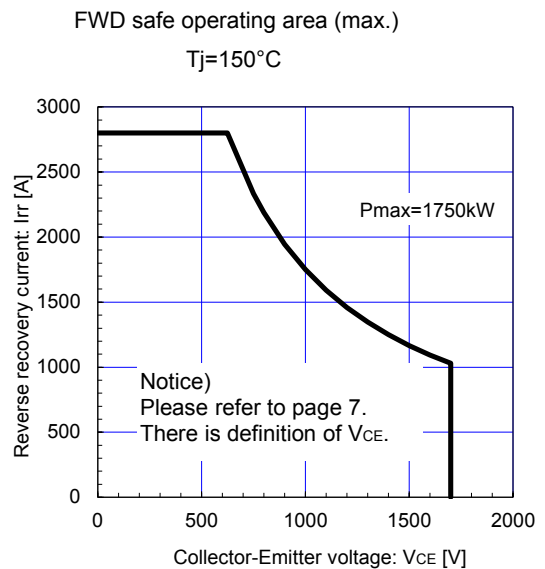
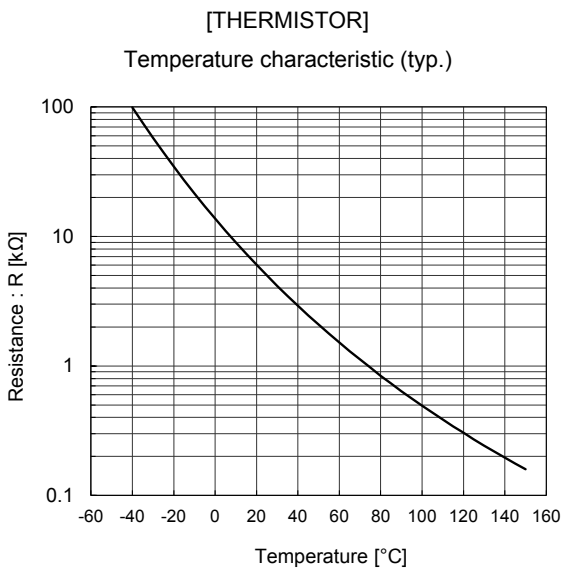
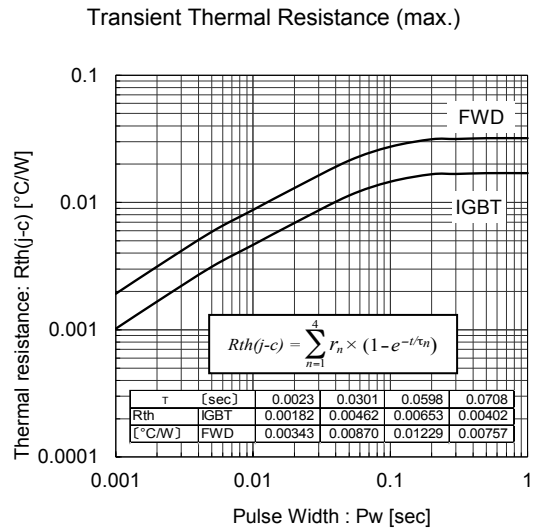
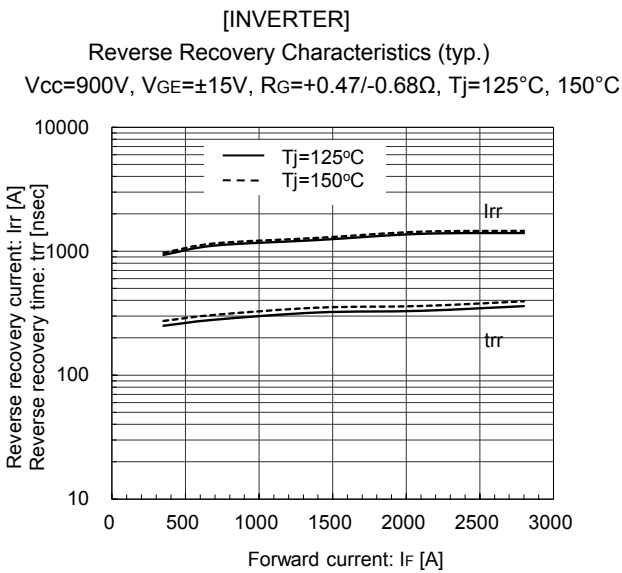
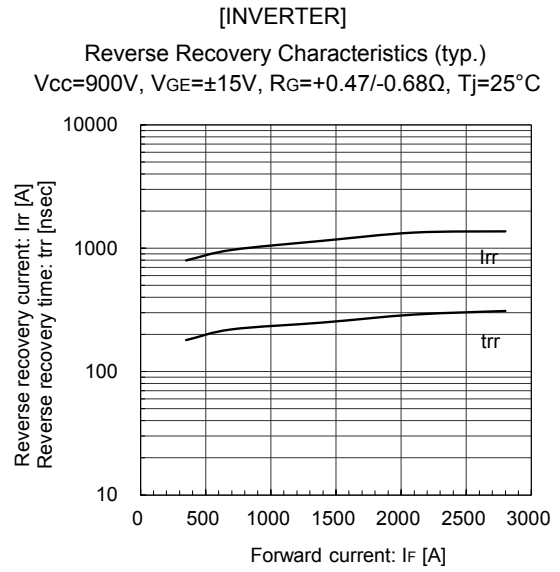
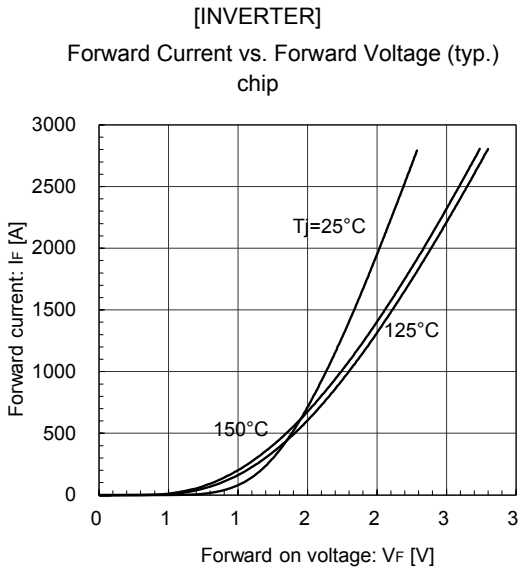
Switching loss vs. Gate resistance (typ.)
 $V_{CC}=900V, I_C=1400A, V_{GE}=\pm 15V, T_j=125^\circ C, 150^\circ C$



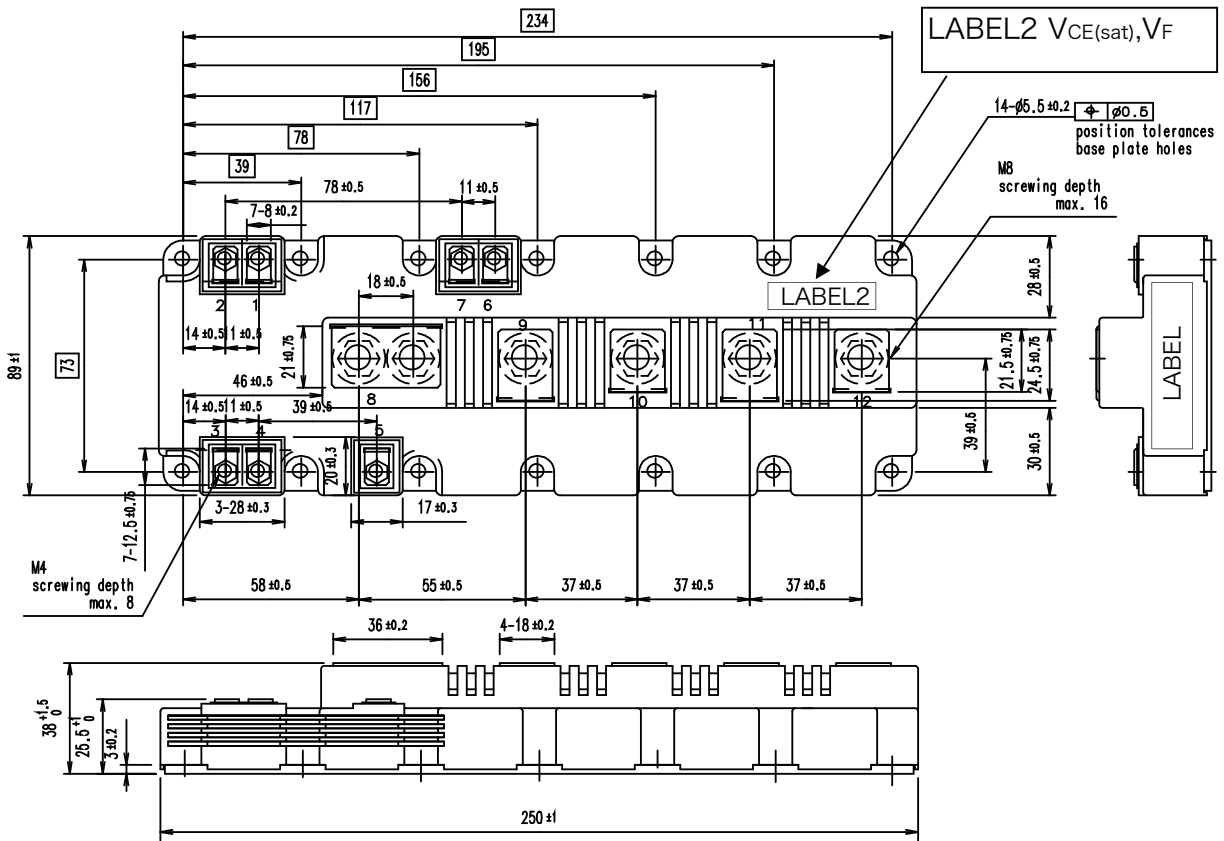
[INVERTER]

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



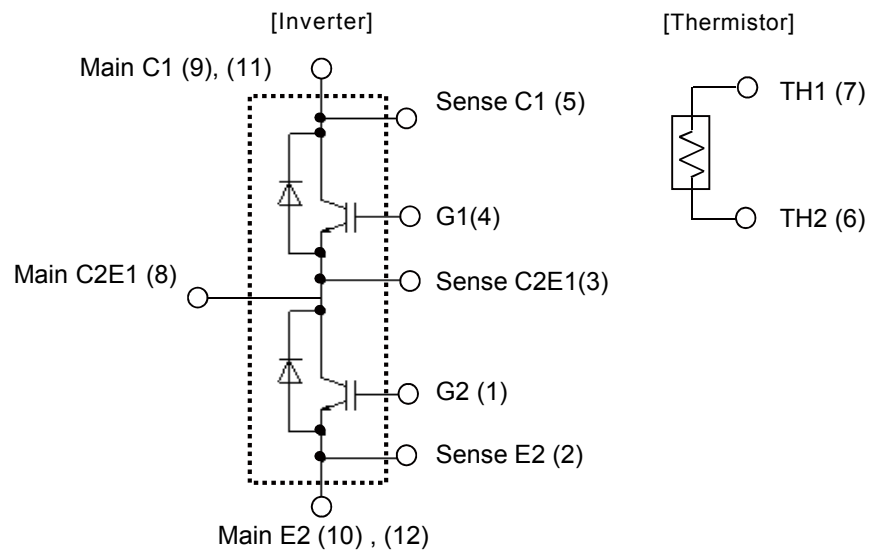


■ Outline Drawings, mm

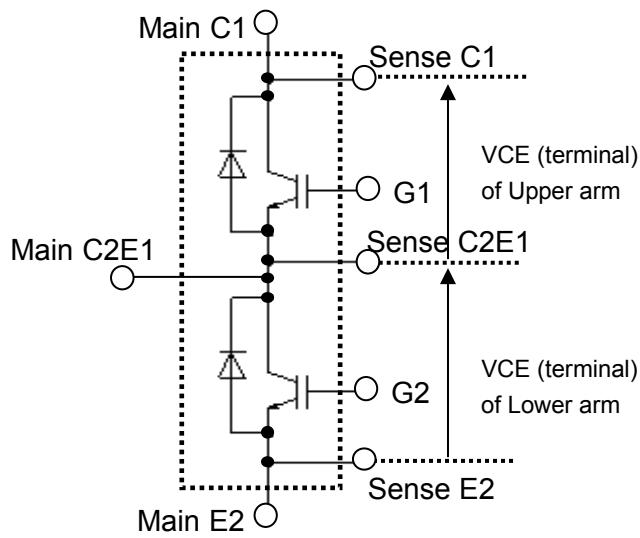


Weight: 1250g(typ.)

■ Equivalent Circuit Schematic



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



Fuji defined VCE 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 VCE 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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