

2MBI1400VXB-170E-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_{stg}		-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	-	2.35	2.80	V
				Tj=125°C	-	2.85	-	
		Tj=150°C		-	2.95	-		
		$V_{CE(sat)}$ (chip)		Tj=25°C	-	2.15	2.60	
		Tj=125°C		-	2.65	-		
	Tj=150°C	-	2.75	-				
	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}	$V_{CC}=900V, I_c=1400A, V_{GE}=\pm 15V,$ $R_g=+0.47/-0.68\Omega, L_s=40nH$	-	1350	-	nsec	
		t_r		-	300	-		
		$t_r(i)$		-	150	-		
	Turn-off time	t_{off}	-	1600	-	nsec		
t_f		-	150	-				
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			
Thermistor 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

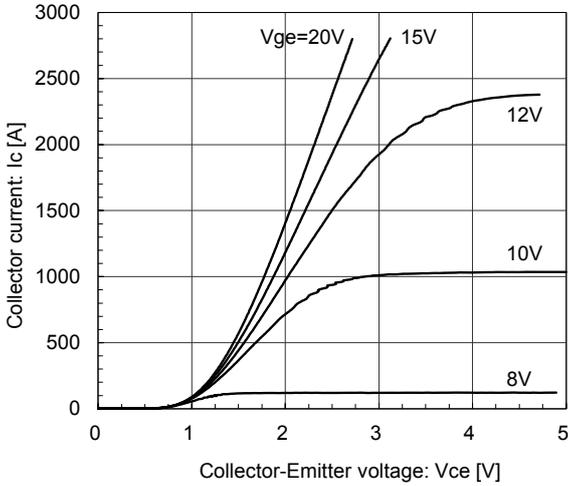
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.017	°C/W
		Inverter FWD	-	-	0.032	
Contact thermal resistance (1device) (*5)	$R_{th(c-f)}$	with Thermal Compound	-	0.0042	-	

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

■ Characteristics (Representative)

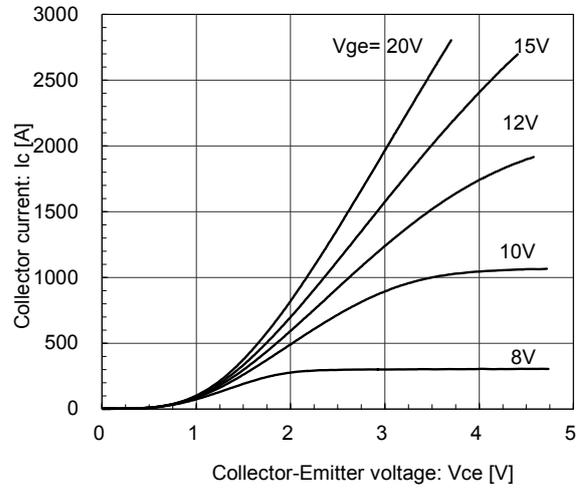
[INVERTER]

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



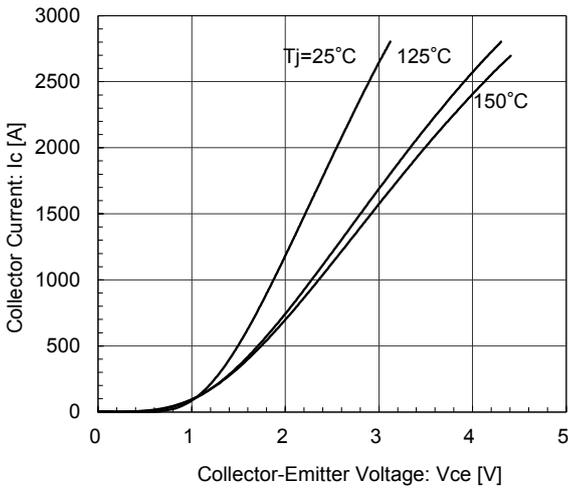
[INVERTER]

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



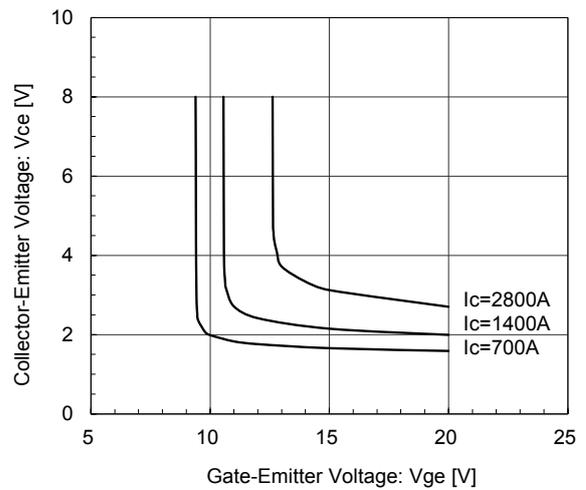
[INVERTER]

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



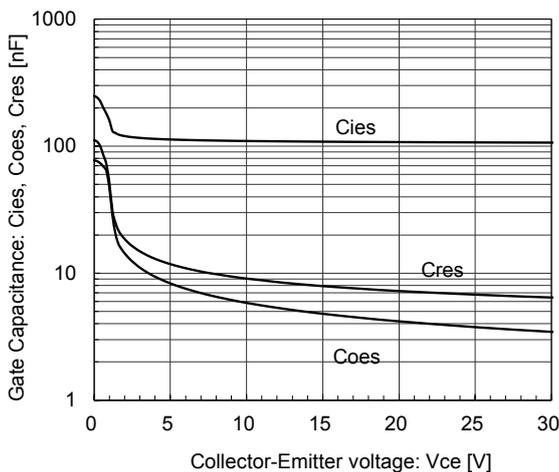
[INVERTER]

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



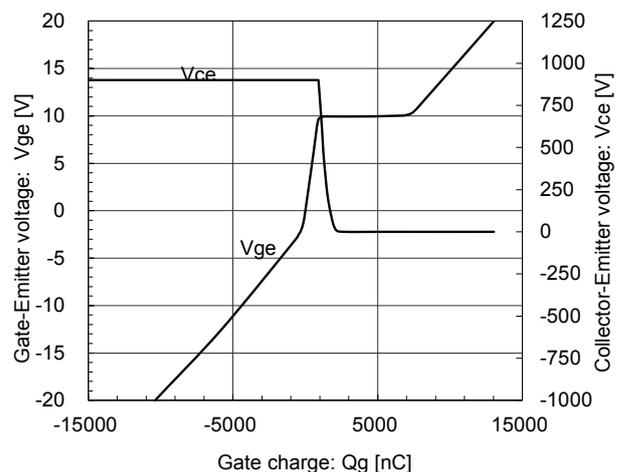
[INVERTER]

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



[INVERTER]

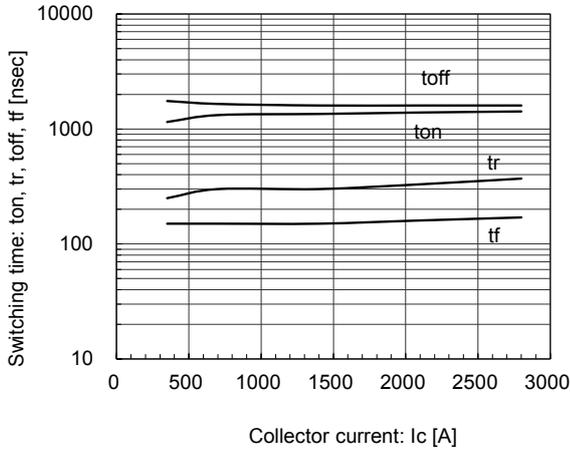
Dynamic Gate Charge (typ.)
Vcc=900V, Ic=1400A, Tj= 25°C



[INVERTER]

Switching time vs. Collector current (typ.)

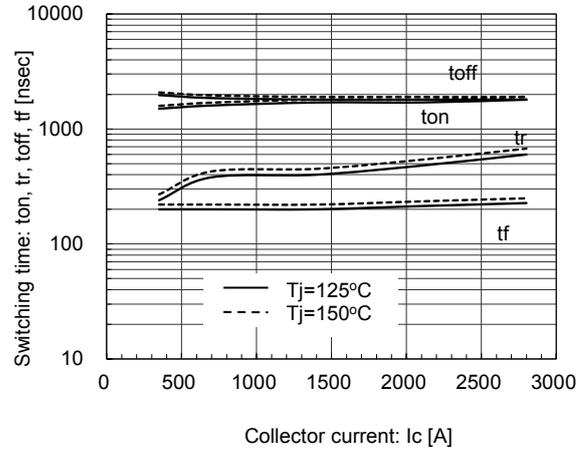
Vcc=900V, Vge=±15V, Rg=+0.47/-0.68Ω, Tj=25°C



[INVERTER]

Switching time vs. Collector current (typ.)

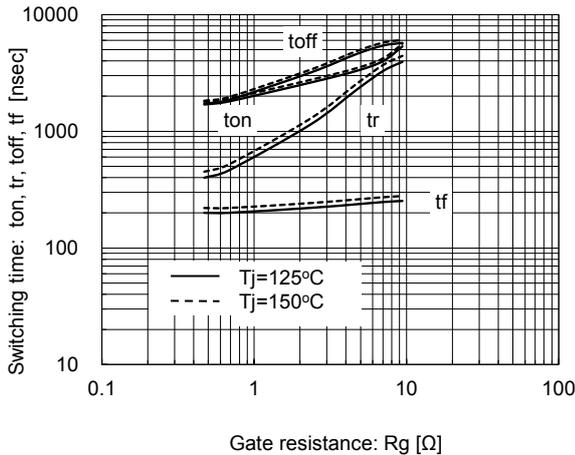
Vcc=900V, Vge=±15V, Rg=+0.47/-0.68Ω, Tj=125°C, 150°C



[INVERTER]

Switching time vs. Gate resistance (typ.)

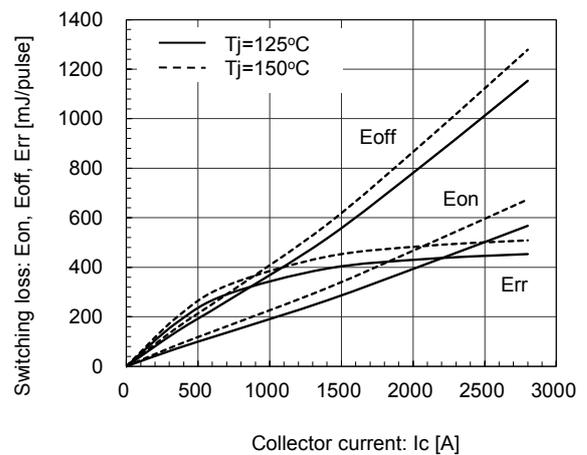
Vcc=900V, Ic=1400A, Vge=±15V, Tj=125°C, 150°C



[INVERTER]

Switching loss vs. Collector current (typ.)

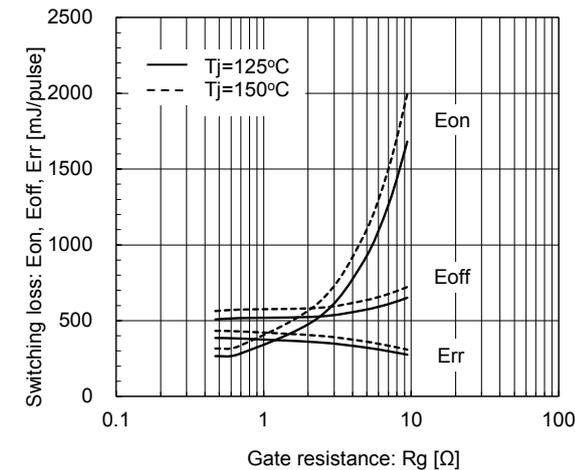
Vcc=900V, Vge=±15V, Rg=+0.47/-0.68Ω, Tj=125°C, 150°C



[INVERTER]

Switching loss vs. Gate resistance (typ.)

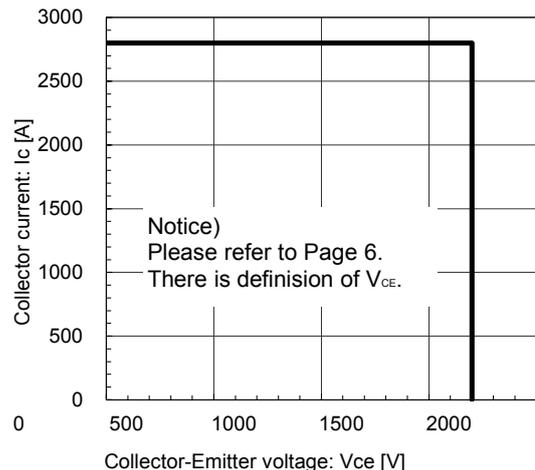
Vcc=900V, Ic=1400A, Vge=±15V, Tj=125°C, 150°C



[INVERTER]

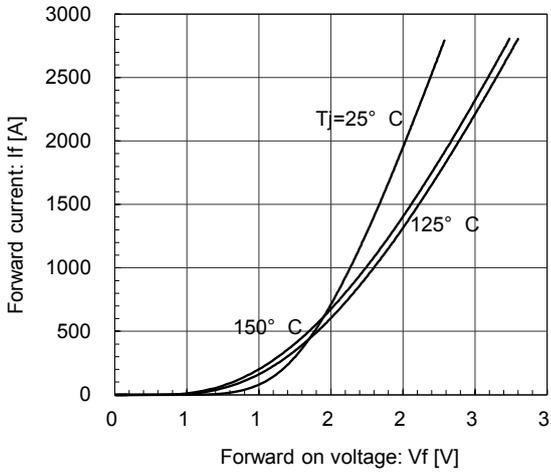
Reverse bias safe operating area (max.)

+Vge=15V, -Vge=15V, Rg=+0.47/-0.68Ω, Tj=150°C



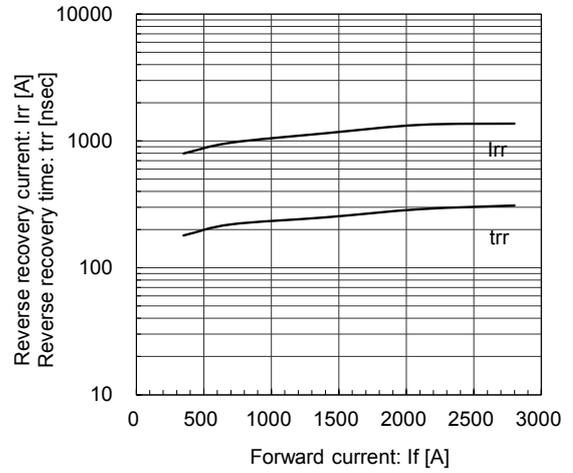
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip



[INVERTER]

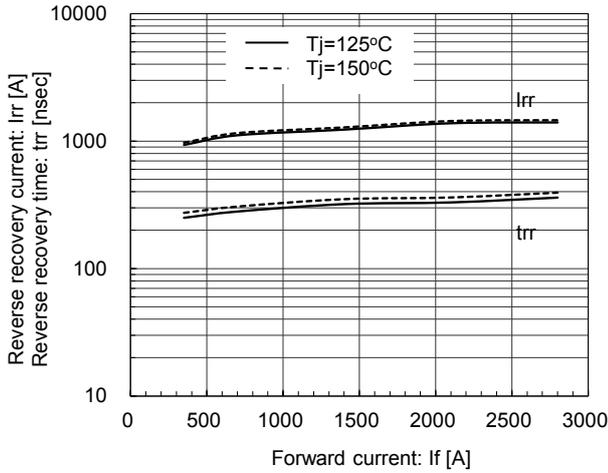
Reverse Recovery Characteristics (typ.)
Vcc=900V, Vge=±15V, Rg=+0.47/-0.68Ω, Tj=25°C



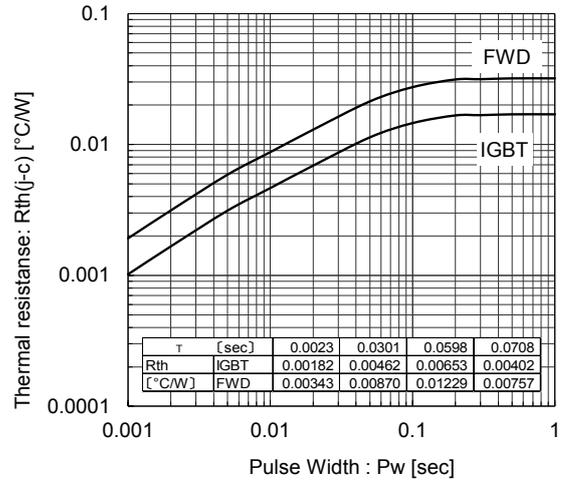
[INVERTER]

Reverse Recovery Characteristics (typ.)

Vcc=900V, Vge=±15V, Rg=+0.47/-0.68Ω, Tj=125°C, 150°C

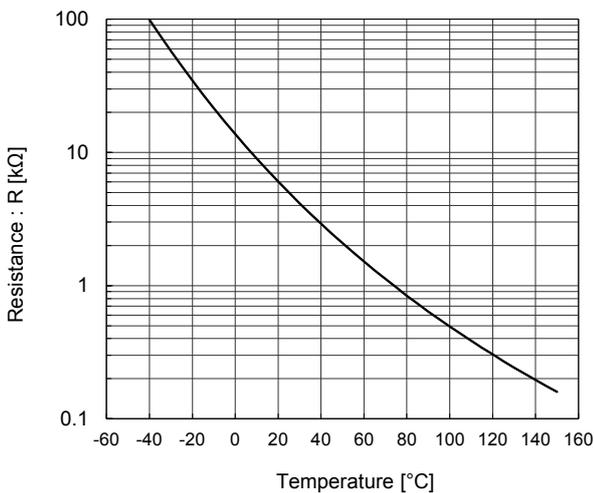


Transient Thermal Resistance (max.)



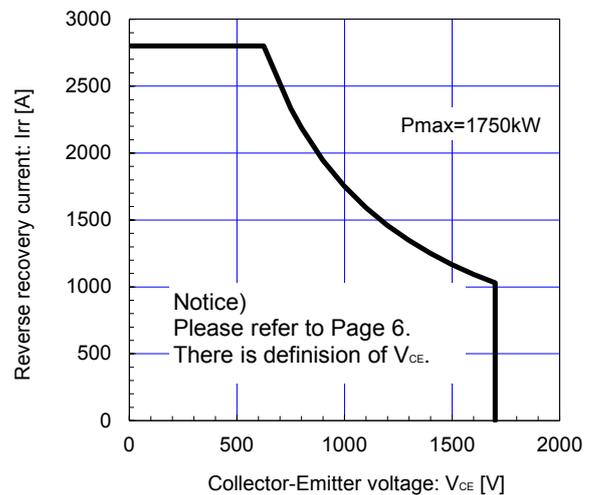
[THERMISTOR]

Temperature characteristic (typ.)

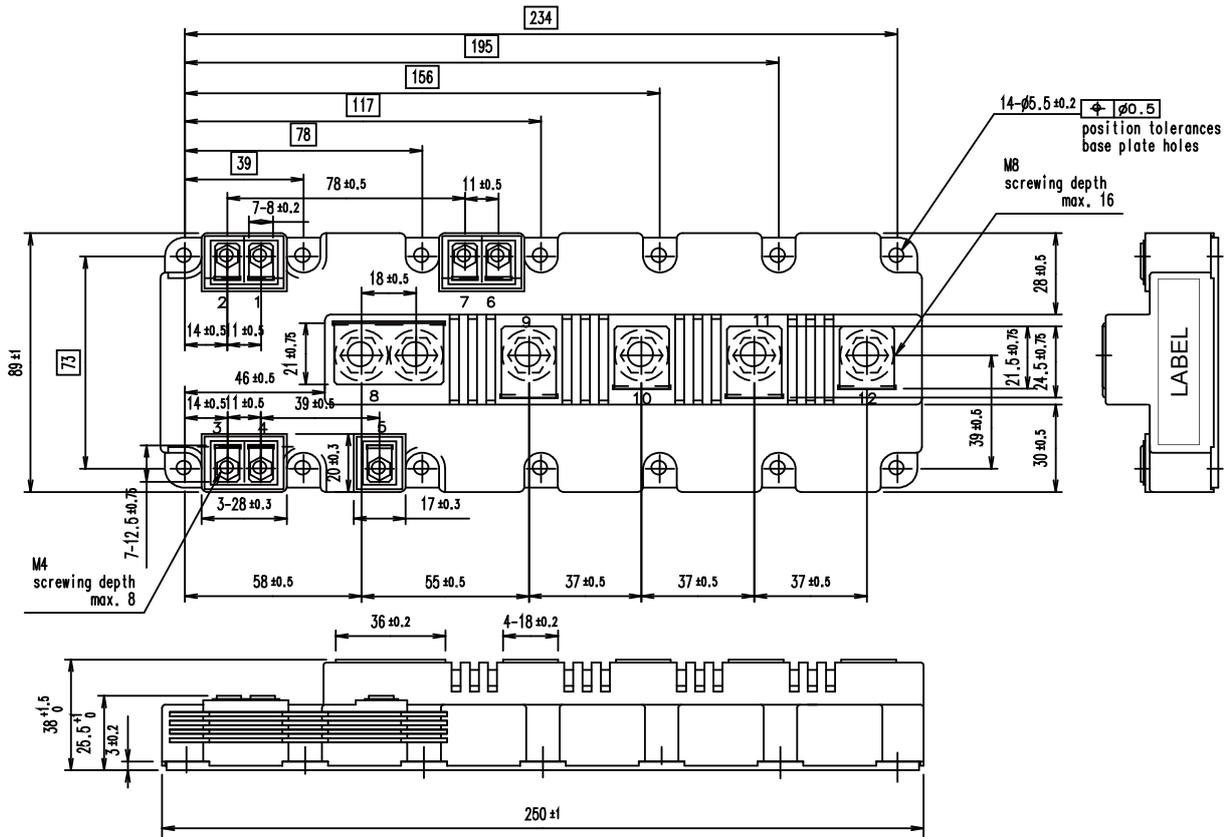


FWD safe operating area (max.)

Tj=150°C

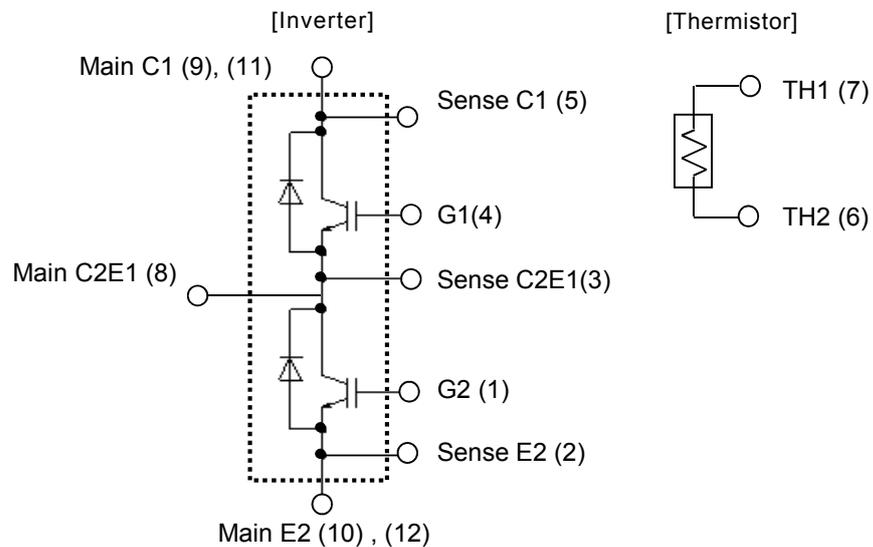


■ Outline Drawings, mm

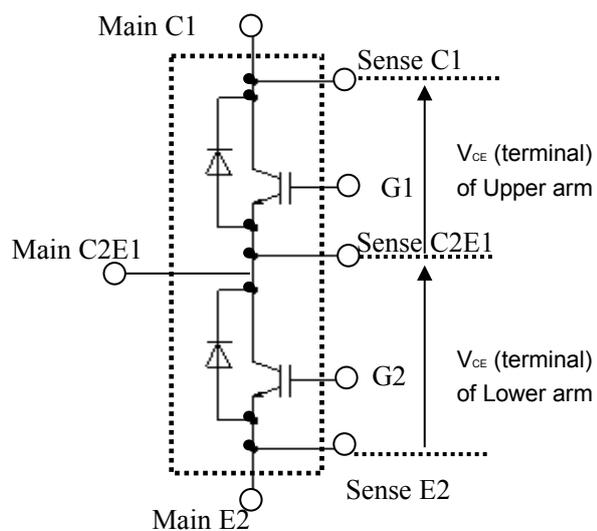


Weight:1250g(typ.)

■ 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 .

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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