2MBI650VXA-170E-50

IGBT Modules

IGBT MODULE (V series)
1700V / 650A / 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	Ic	Continuous	Tc=25°C	900	A
				Tc=100°C	650	
		Ic pulse	1ms		1300	
		-Ic			650	
		-Ic pulse	1ms		1300	
	Collector power dissipation	Pc	1 device		4150	W
Junction temperature		Tj			175	°C
Operating junction temperature (under switching conditions)		T_{jop}			150	
Case temperature		T_C			150	
Storage temperature		Tstg			-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 min.	Characteristics typ.	Characteristics max.	Units
Inverter	Zero gate voltage collector current	I_{CES}	V_{GE} = 0V, V_{CE} = 1700V		-	-	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 = 650mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal) (*4)	V_{GE} = 15V, I_C = 650A	Tj=25°C	-	2.10	2.55	V
				Tj=125°C	-	2.50	-	
				Tj=150°C	-	2.55	-	
		$V_{CE(sat)}$ (chip)		Tj=25°C	-	2.00	2.45	
				Tj=125°C	-	2.40	-	
				Tj=150°C	-	2.45	-	
	Internal gate resistance	$R_{g(int)}$	-		-	1.75	-	Ω
	Input capacitance	Cies	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	63	-	nF
	Turn-on time	ton	V_{CC} = 900V, I_C = 650A, V_{GE} = ±15V, R_G = +1.8/-2.7Ω, Ls=70nH		-	1.25	-	μsec
		tr			-	0.50	-	
		tr (i)			-	0.15	-	
	Turn-off time	toff			-	1.55	-	
		tf			-	0.15	-	
	Forward on voltage	V_F (terminal) (*4)	V_{GE} = 0V, I_F = 650A	Tj=25°C	-	1.95	2.40	V
				Tj=125°C	-	2.20	-	
				Tj=150°C	-	2.15	-	
		V_F (chip)		Tj=25°C	-	1.85	2.30	
				Tj=125°C	-	2.10	-	
				Tj=150°C	-	2.05	-	
	Reverse recovery time	trr	I_F = 650A		-	0.24	-	μsec
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.

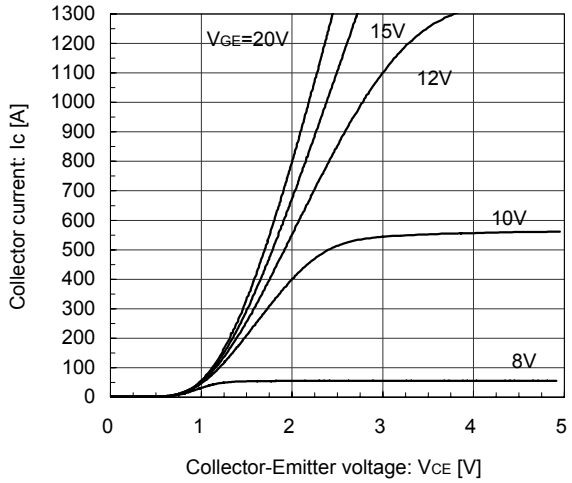
● **Thermal resistance characteristics**

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
Thermal resistance (1device)	Rth(j-c)	Inverter IGBT	-	-	0.036	°C/W
		Inverter FWD	-	-	0.072	
Contact thermal resistance (1device) (*5)	Rth(c-f)	with Thermal Compound	-	0.0125	-	

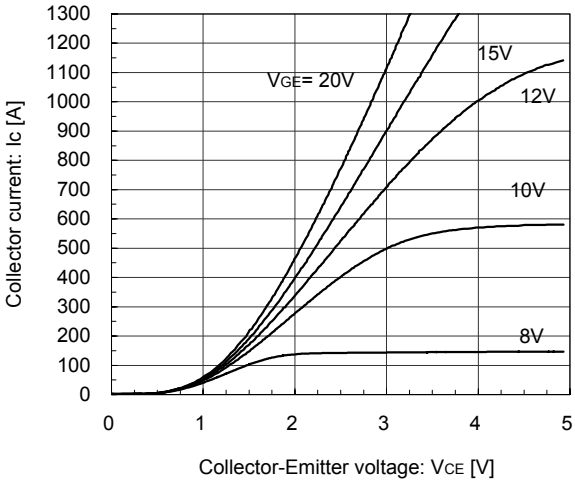
Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

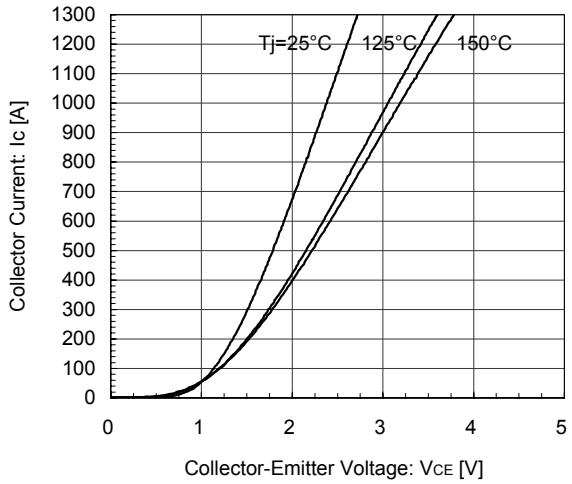
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



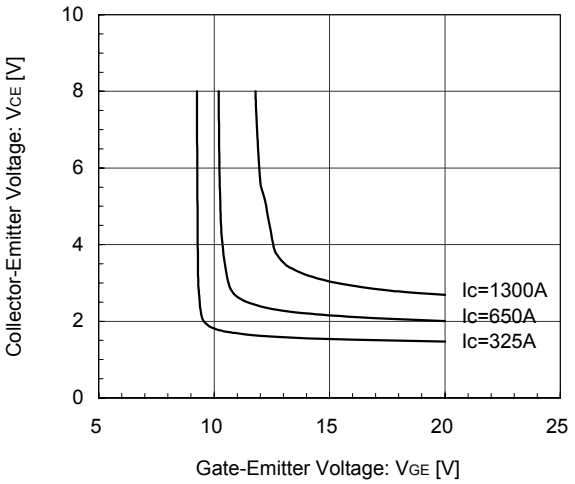
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150°C / chip



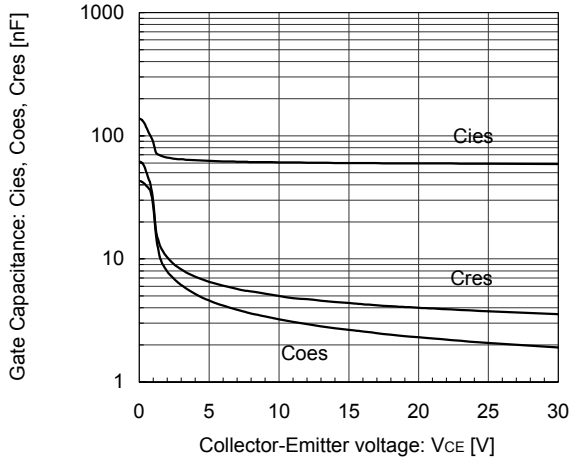
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
VGE= 15V / chip



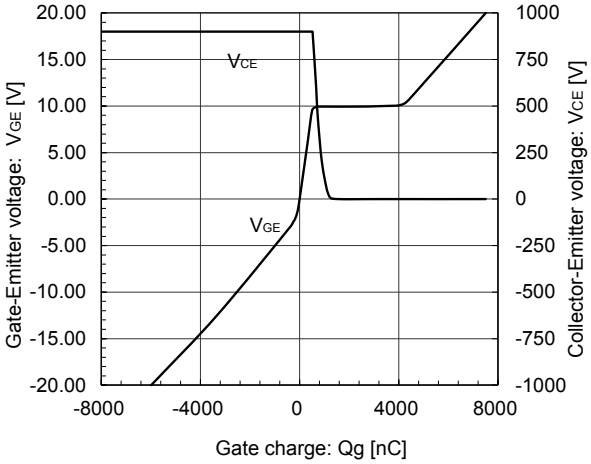
[INVERTER]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj= 25°C / chip



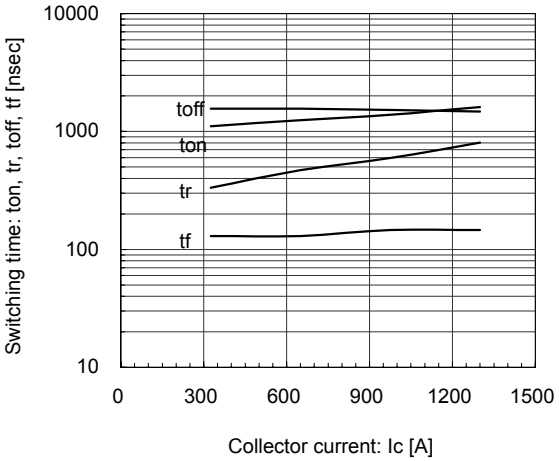
[INVERTER]
Gate Capacitance vs. Collector-Emitter Voltage (typ.)
VGE= 0V, f= 1MHz, Tj= 25°C



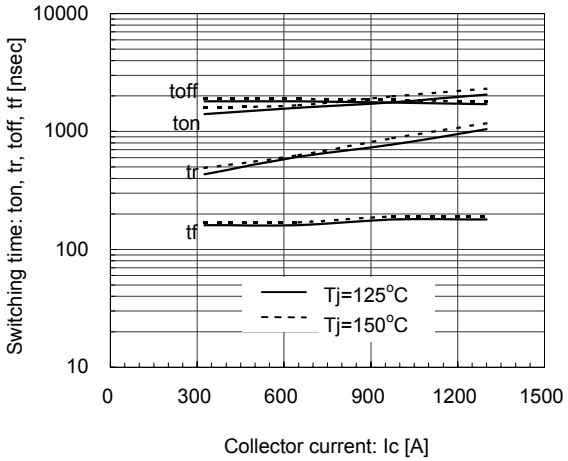
[INVERTER]
Dynamic Gate Charge (typ.)
Vcc=900V, Ic=650A, Tj= 25°C



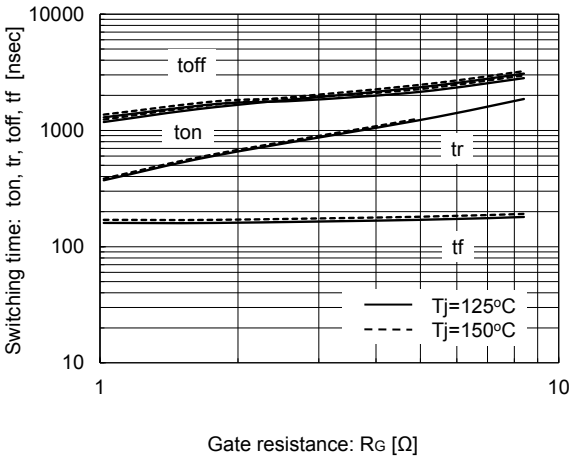
[INVERTER]
Switching time vs. Collector current (typ.)
Vcc=900V, V_{GE}=±15V, R_G=+1.8/-2.7Ω, Tj=25°C



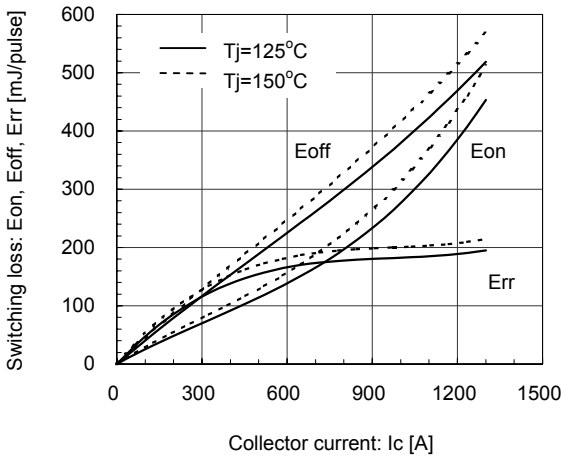
[INVERTER]
Switching time vs. Collector current (typ.)
Vcc=900V, V_{GE}=±15V, R_G=+1.8/-2.7Ω, Tj=125°C, 150°C



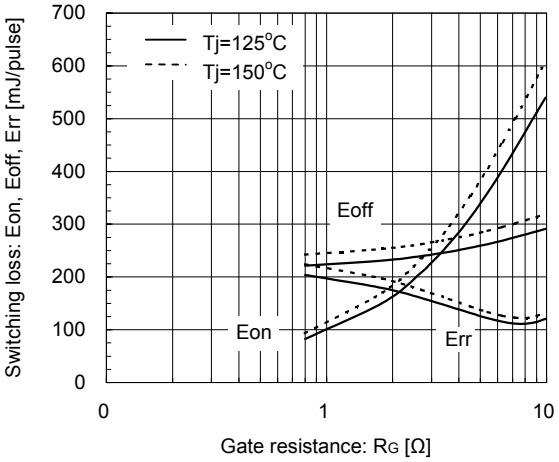
[INVERTER]
Switching time vs. Gate resistance (typ.)
Vcc=900V, Ic=650A, V_{GE}=±15V, Tj=125°C, 150°C



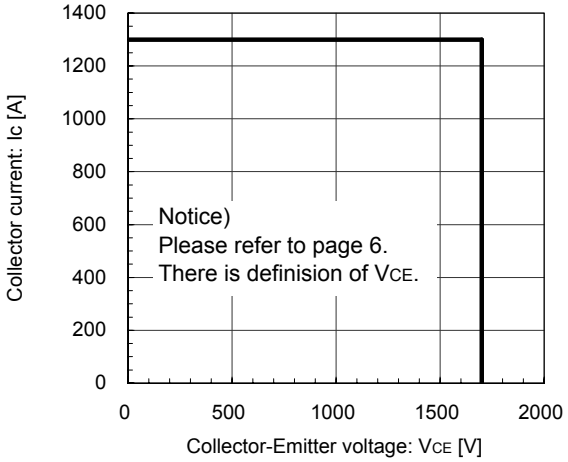
[INVERTER]
Switching loss vs. Collector current (typ.)
Vcc=900V, V_{GE}=±15V, R_G=+1.8/-2.7Ω, Tj=125°C, 150°C



[INVERTER]
Switching loss vs. Gate resistance (typ.)
Vcc=900V, Ic=650A, V_{GE}=±15V, Tj=125°C, 150°C



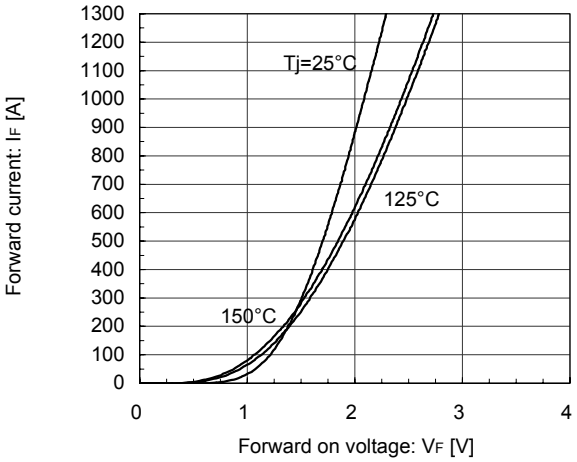
[INVERTER]
Reverse bias safe operating area (max.)
+V_{GE}=15V, -V_{GE}=15V, R_G=+1.8/-2.7Ω, Tj=150°C



[INVERTER]

Forward Current vs. Forward Voltage (typ.)

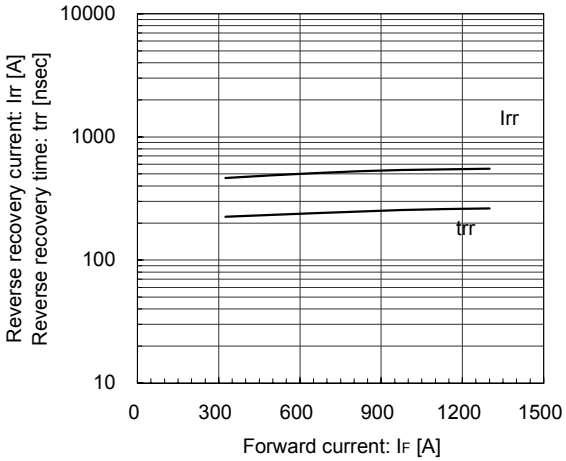
chip



[INVERTER]

Reverse Recovery Characteristics (typ.)

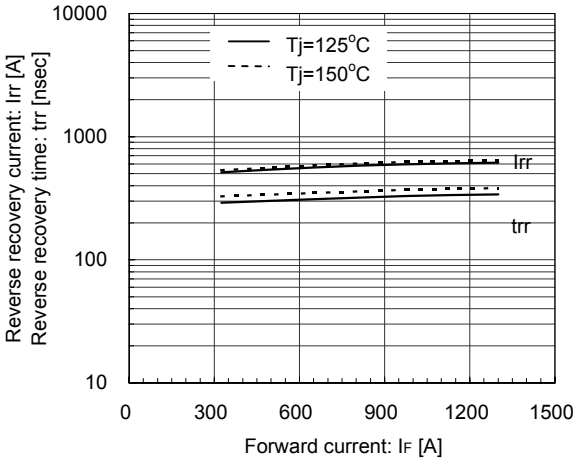
Vcc=900V, VGE=±15V, RG=+1.8/-2.7Ω, Tj=25°C



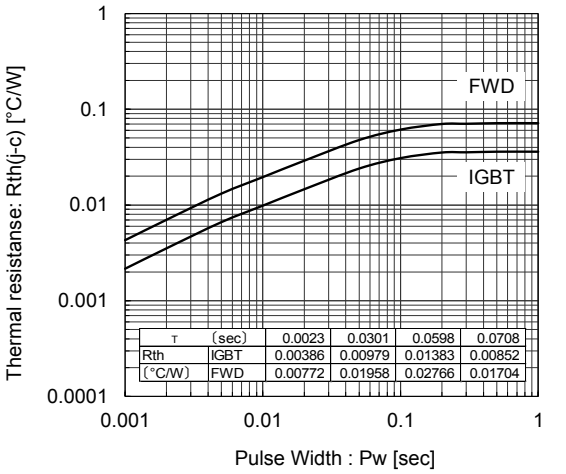
[INVERTER]

Reverse Recovery Characteristics (typ.)

Vcc=900V, VGE=±15V, RG=+1.8/-2.7Ω, Tj=125°C, 150°C



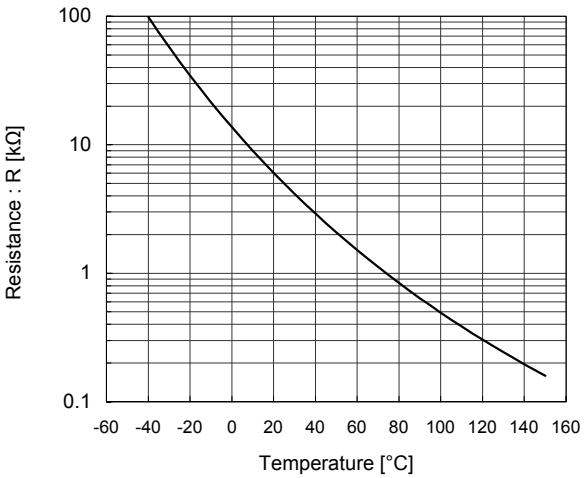
Transient Thermal Resistance (max.)



T	(sec)	0.0023	0.0301	0.0598	0.0708
Rth	IGBT	0.00386	0.00979	0.01383	0.00852
(°C/W)	FWD	0.00772	0.01958	0.02766	0.01704

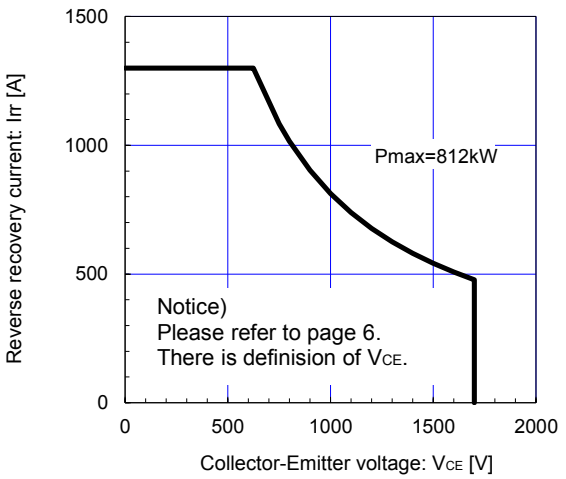
[THERMISTOR]

Temperature characteristic (typ.)

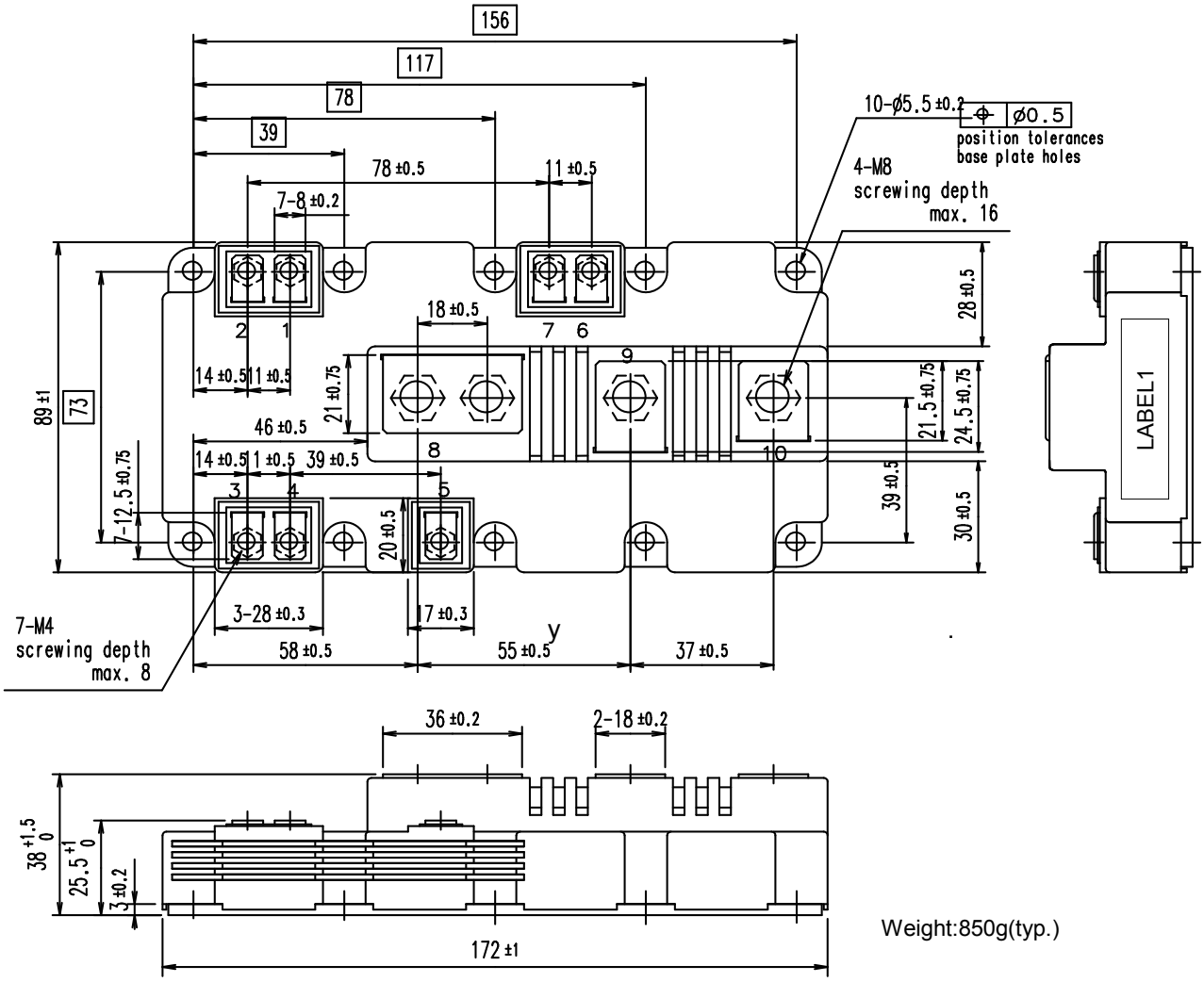


FWD safe operating area (max.)

Tj=150°C

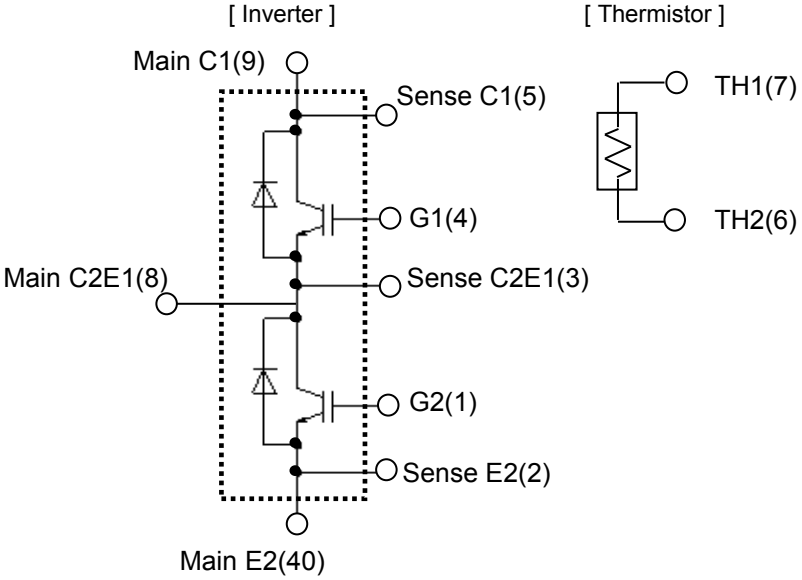


■ Outline Drawings (Unit: mm)

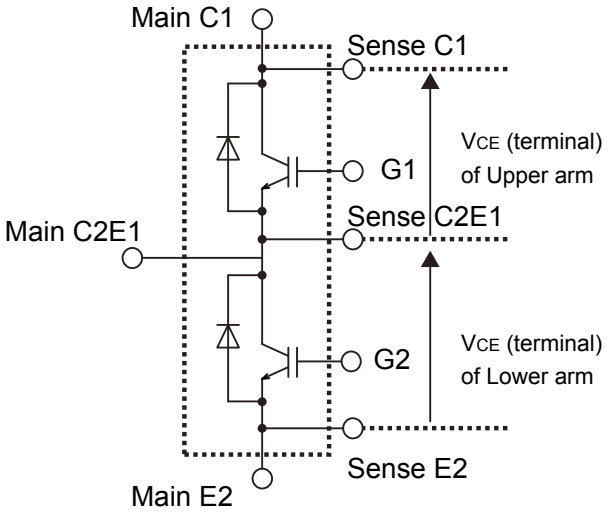


Weight:850g(typ.)

■ Equivalent Circuit



■ 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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The contents are subject to change without notice for specification changes or other reasons. When using a product listed in this Catalog, be sur to obtain the latest specifications.

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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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