

2MBI900VXA-120E-54

IGBT Modules

IGBT MODULE (V series) 1200V / 900A / 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 $T_c=25^\circ\text{C}$ unless otherwise specified)

Items	Symbols	Conditions	Maximum ratings	Units
Inverter	Collector-Emitter voltage	V_{CES}	1200	V
	Gate-Emitter voltage	V_{GES}	± 20	V
	Collector current	Continuous	$T_c=25^\circ\text{C}$ 1200	A
			$T_c=100^\circ\text{C}$ 900	
		$I_{C\ pulse}$	1ms 1800	
		$-I_C$	900	
		$-I_{C\ pulse}$	1ms 1800	
	Collector power dissipation	P_C	1 device 5100	W
Junction temperature		T_j	175	$^\circ\text{C}$
Operating junction temperature (under switching conditions)		T_{jop}	150	
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	-	6.0	N m
	Main Terminals	-	10.0	
	Sense Terminals	-	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 _{CES}	V _{GE} = 0V, V _{CE} = 1200V		-	-	8.0	mA
	Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V		-	-	1600	nA
	Gate-Emitter threshold voltage	V _{GE (th)}	V _{CE} = 20V, I _C = 900mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	V _{CE (sat)} (terminal) (*4)	V _{GE} = 15V I _C = 900A	T _J =25°C	-	1.85	2.30	V
				T _J =125°C	-	2.15	-	
				T _J =150°C	-	2.20	-	
		V _{CE (sat)} (chip)		T _J =25°C	-	1.75	2.20	
				T _J =125°C	-	2.05	-	
			T _J =150°C	-	2.10	-		
	Internal gate resistance	R _{G (int)}	-		-	1.19	-	Ω
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz		-	83	-	nF
	Turn-on time	t _{on}	V _{CC} = 600V		-	1000	-	nsec
		t _r	I _C = 900A		-	400	-	
		t _{r (l)}	V _{GE} = ±15V		-	150	-	
	Turn-off time	t _{off}	R _G = 1.6Ω		-	1200	-	nsec
		t _t	L _S = 70nH		-	150	-	
Forward on voltage	V _F (terminal) (*4)	V _{GE} = 0V I _F = 900A	T _J =25°C	-	1.90	2.35	V	
			T _J =125°C	-	2.05	-		
			T _J =150°C	-	2.00	-		
	V _F (chip)		T _J =25°C	-	1.80	2.25		
			T _J =125°C	-	1.95	-		
		T _J =150°C	-	1.90	-			
Reverse recovery time	t _{rr}	I _F = 900A		-	200	-	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: 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.

● Thermal resistance characteristics

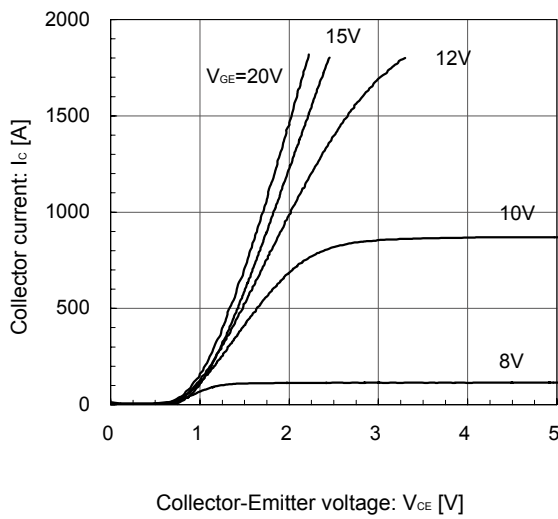
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance(1device)	R _{th(j-c)}	Inverter IGBT	-	-	0.030	°C/W
		Inverter FWD	-	-	0.054	
Contact thermal resistance (1device) (*5)	R _{th(c-f)}	with Thermal Compound	-	0.00625	-	

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

■ Characteristics (Representative)

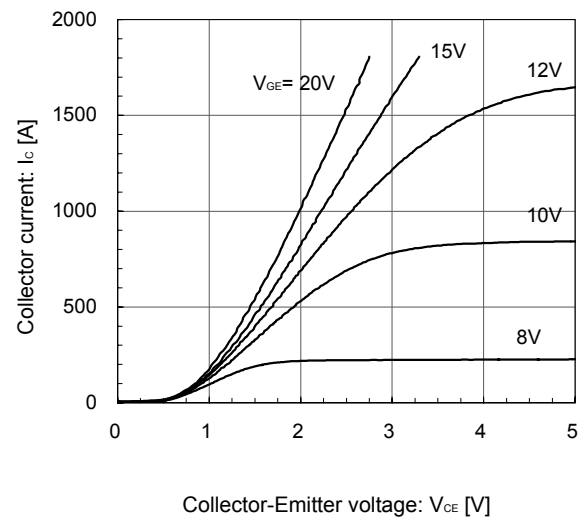
[INVERTER]

Collector current vs. Collector-Emittor voltage (typ.)
 $T_J = 25^\circ\text{C}$ / chip



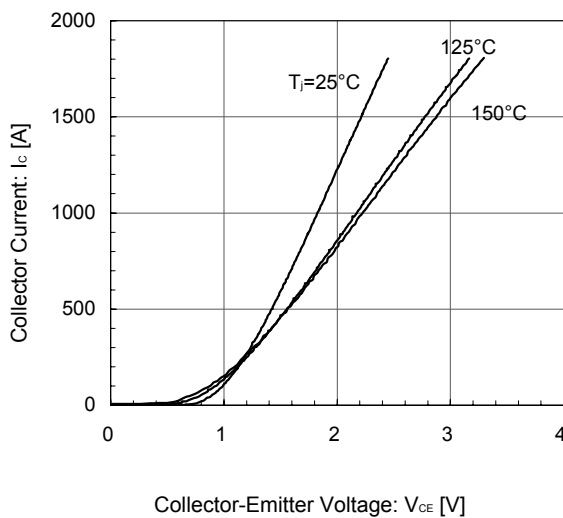
[INVERTER]

Collector current vs. Collector-Emittor voltage (typ.)
 $T_J = 150^\circ\text{C}$ / chip



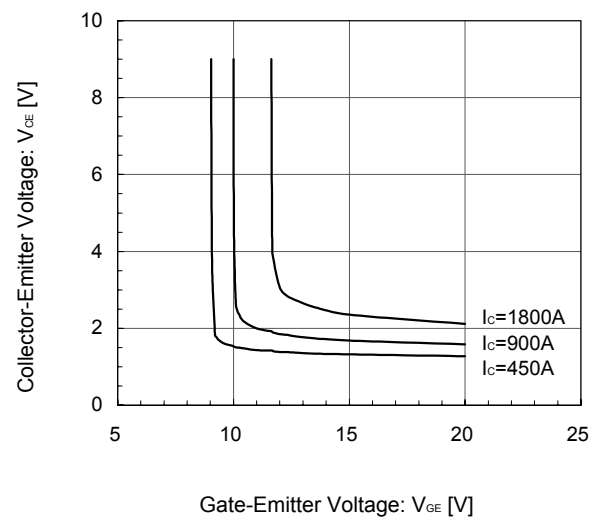
[INVERTER]

Collector current vs. Collector-Emittor voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



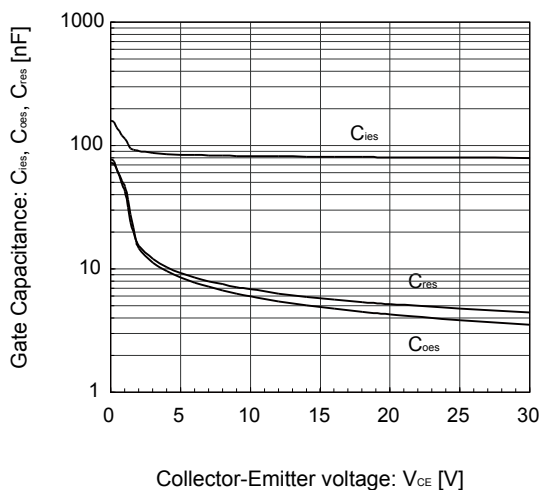
[INVERTER]

Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)
 $T_J = 25^\circ\text{C}$ / chip



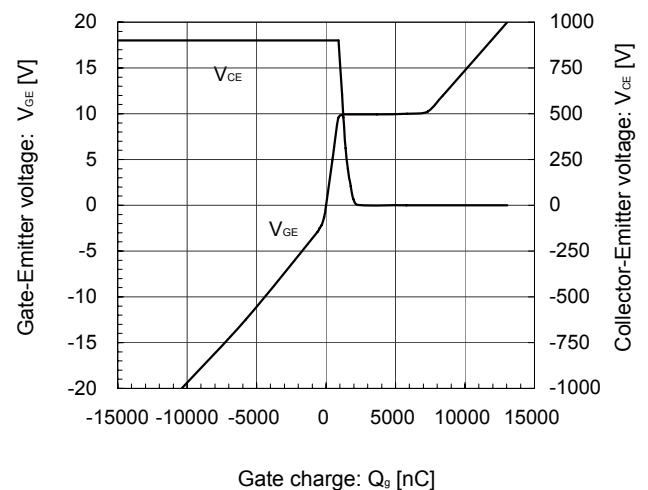
[INVERTER]

Gate Capacitance vs. Collector-Emittor Voltage (typ.)
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$



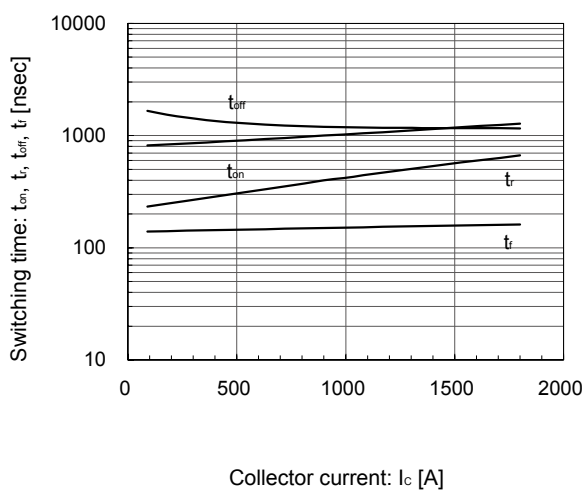
[INVERTER]

Dynamic Gate Charge (typ.)
 $V_{CC} = 600\text{V}$, $I_C = 900\text{A}$, $T_J = 25^\circ\text{C}$



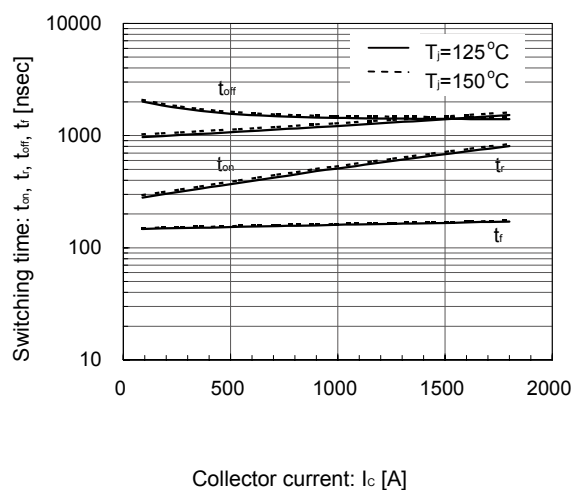
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=1.6\Omega$, $T_J=25^\circ C$



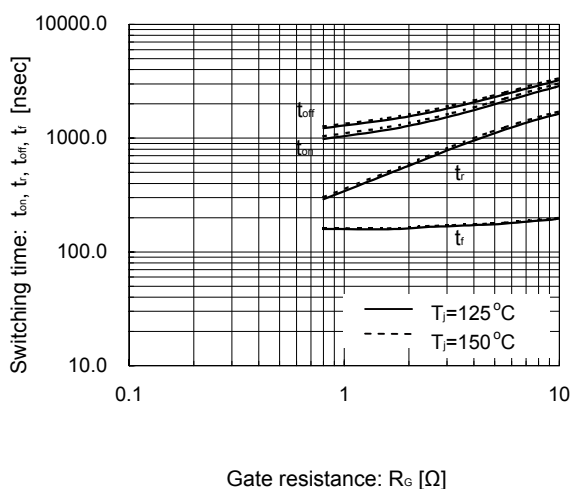
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=1.6\Omega$, $T_J=125^\circ C, 150^\circ C$



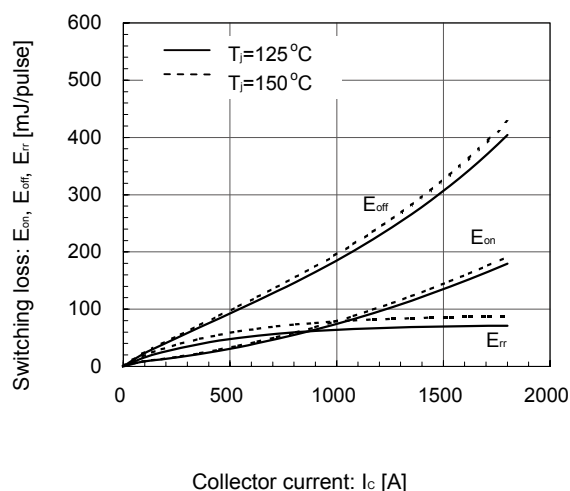
[INVERTER]

Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_C=900A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C, 150^\circ C$



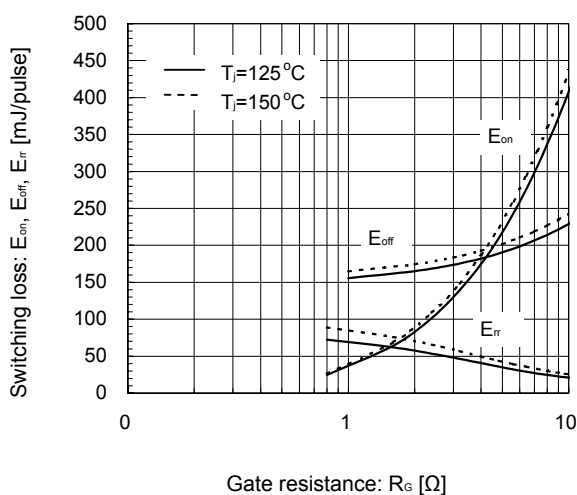
[INVERTER]

Switching loss vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=1.6\Omega$, $T_J=125^\circ C, 150^\circ C$



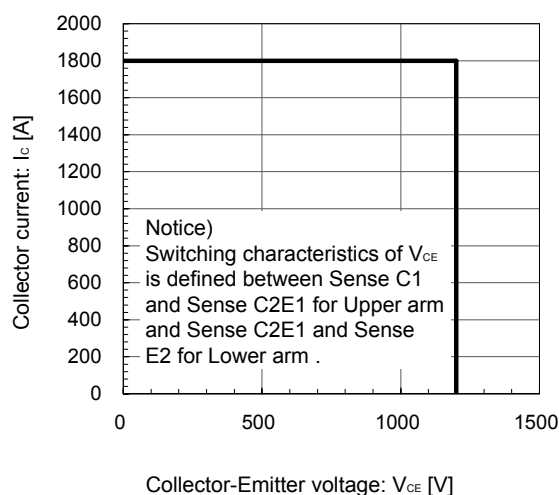
[INVERTER]

Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_C=900A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C, 150^\circ C$

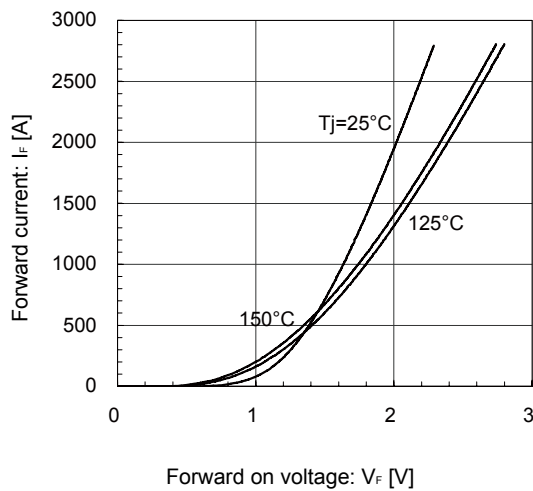


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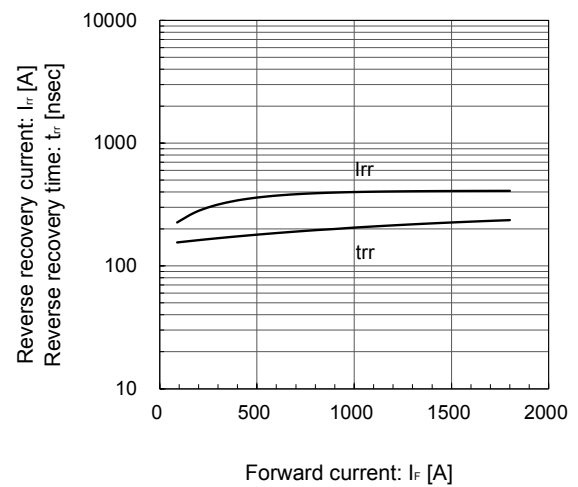
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_G=1.6\Omega$, $T_J=150^\circ C$



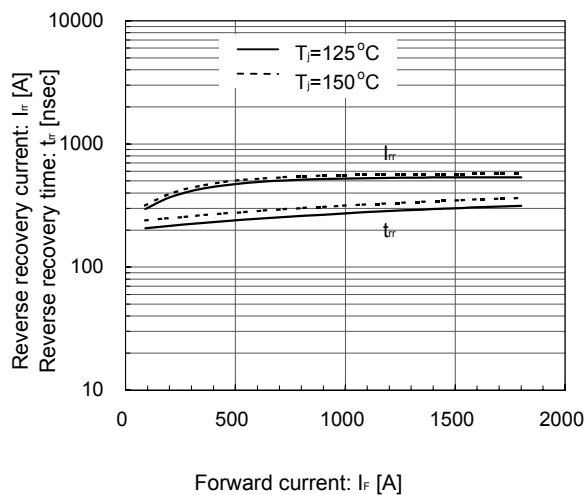
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip

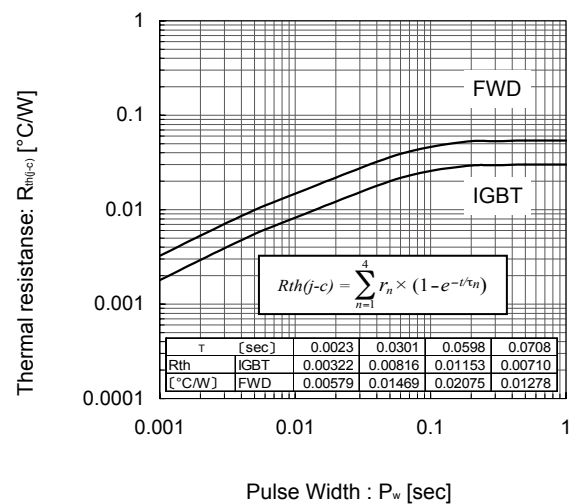
[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=1.6\Omega$, $T_J=25^\circ C$ 

[INVERTER]

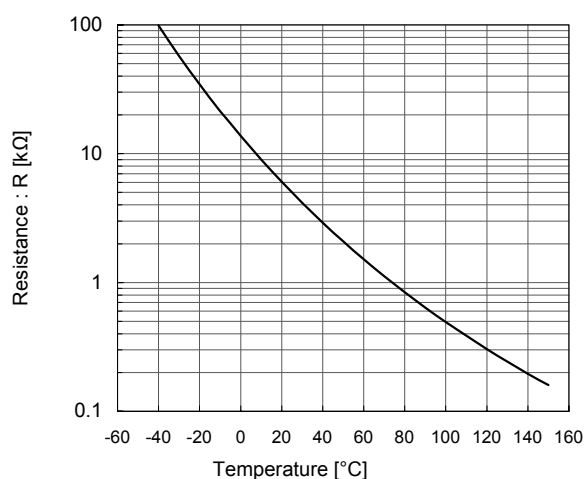
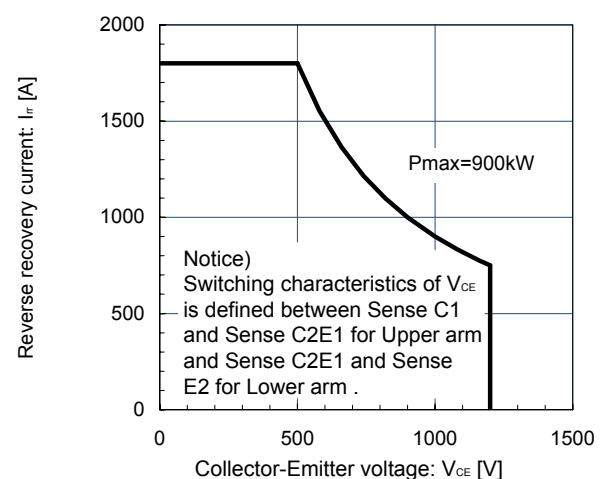
Reverse Recovery Characteristics (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=1.6\Omega$, $T_J=125^\circ C$, $150^\circ C$ 

Transient Thermal Resistance (max.)

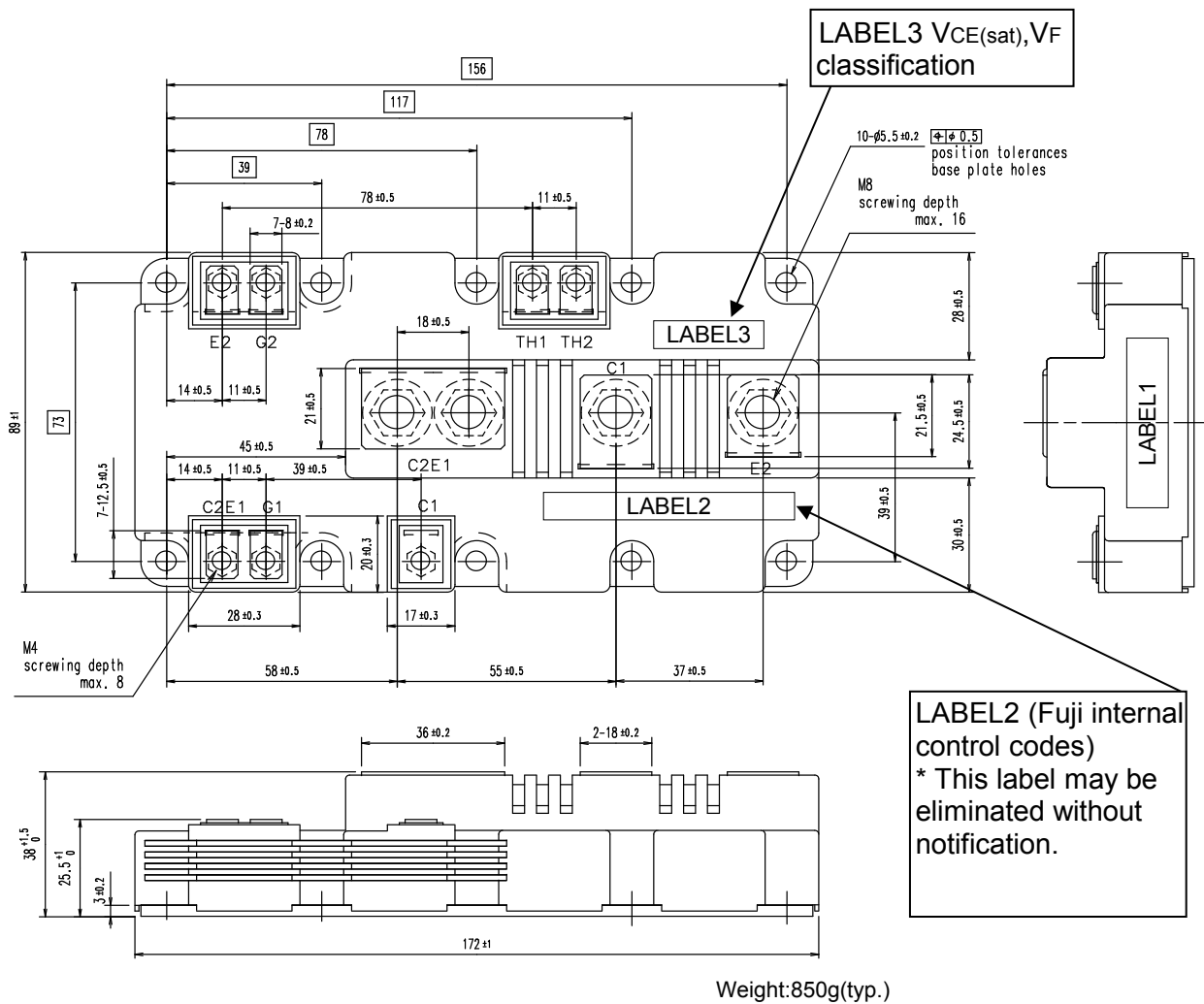


[THERMISTOR]

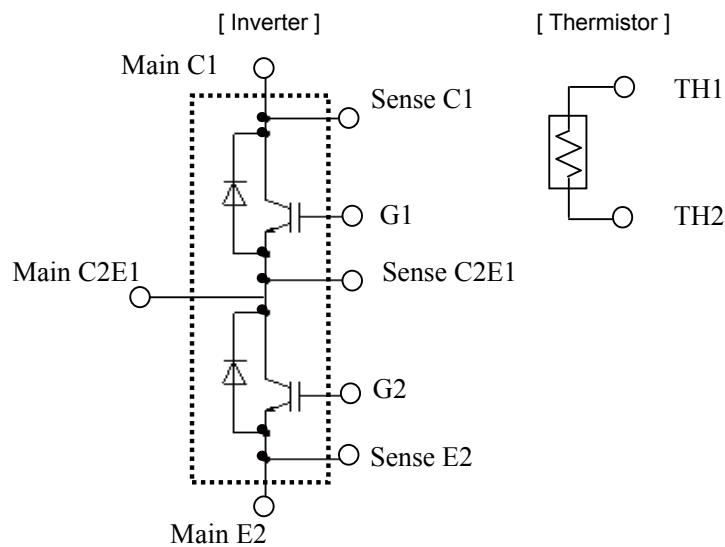
Temperature characteristic (typ.)

FWD safe operating area (max.)
 $T_J=150^\circ C$ 

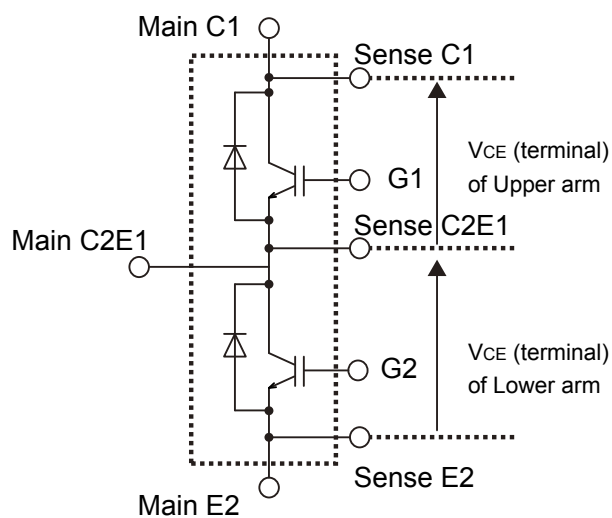
Outline Drawings, mm



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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