2MBI600VXA-120E-54

IGBT Modules

IGBT MODULE (V series)
1200V / 600A / 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}			1200	V
	Gate-Emitter voltage		V_{GES}			±20	V
	Collector current		I_c	Continuous	Tc=25°C	800	A
					Tc=100°C	600	
			$I_{c\ pulse}$	1ms		1200	
			$-I_c$			600	
			$-I_{c\ pulse}$	1ms		1200	
	Collector power dissipation		Pc	1 device		3350	W
Junction temperature			T_j			175	°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		-	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.	typ.	max.	Units
Inverter	Zero gate voltage collector current	I_{CES}	V_{GE} = 0V, V_{CE} = 1200V		-	-	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 = 600mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	$V_{CE (sat)}$ (terminal) (*4)	V_{GE} = 15V, I_C = 600A	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	$Rg_{(int)}$	-		-	1.75	-	Ω
	Input capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	55	-	nF
	Turn-on time	t_{on}	V_{CC} = 600V, I_C = 600A, V_{GE} = ±15V, R_G = 2.4Ω, Ls = 70nH		-	1000	-	nsec
		t_r			-	400	-	
		$t_{r (i)}$			-	150	-	
	Turn-off time	t_{off}			-	1200	-	
		t_f			-	150	-	
	Forward on voltage	V_F (terminal) (*4)	V_{GE} = 0V, I_F = 600A	T_j=25°C	-	1.80	2.25	V
				T_j=125°C	-	1.95	-	
				T_j=150°C	-	1.90	-	
		V_F (chip)		T_j=25°C	-	1.70	2.15	
				T_j=125°C	-	1.85	-	
				T_j=150°C	-	1.80	-	
	Reverse recovery time	t_{rr}	I_F = 600A		-	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: Please refer to page 6 , there is definition of on-state voltage at terminal.

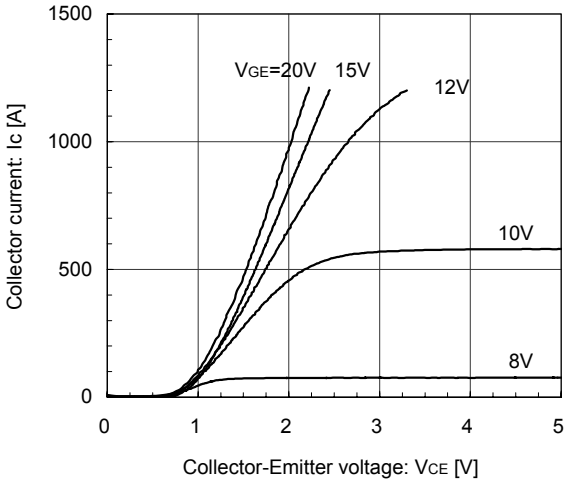
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics min.	typ.	max.	Units
Thermal resistance (1device)	Rth(j-c)	Inverter IGBT	-	-	0.045	°C/W
		Inverter FWD	-	-	0.075	
Contact thermal resistance (1device) (*5)	Rth(c-f)	with Thermal Compound	-	0.0125	-	

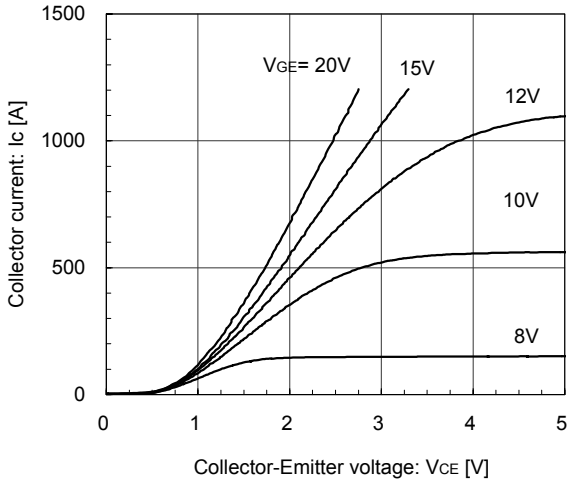
Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

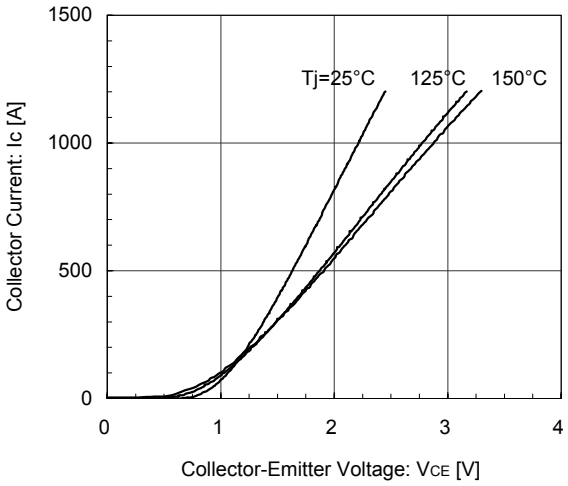
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



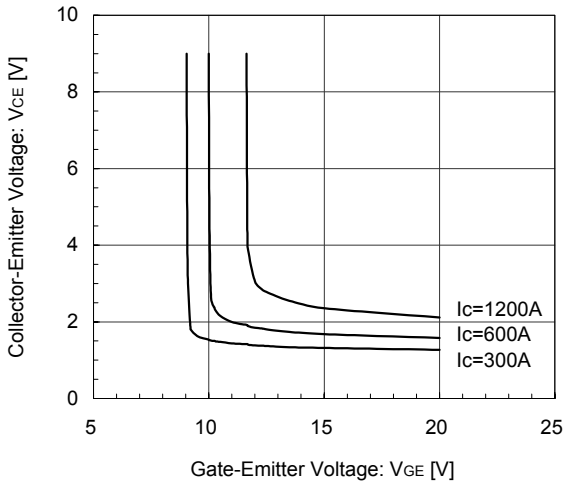
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150°C / chip



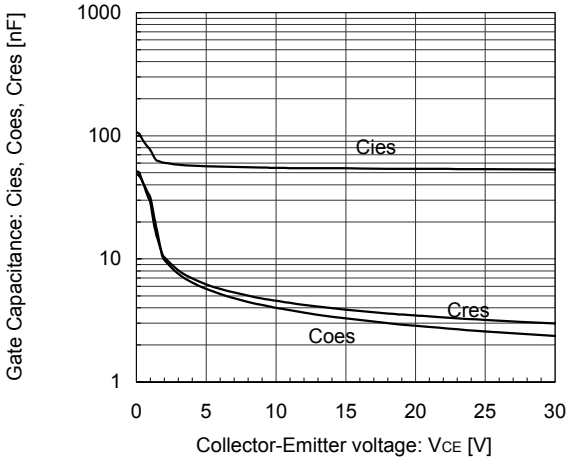
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
VGE= 15V / chip



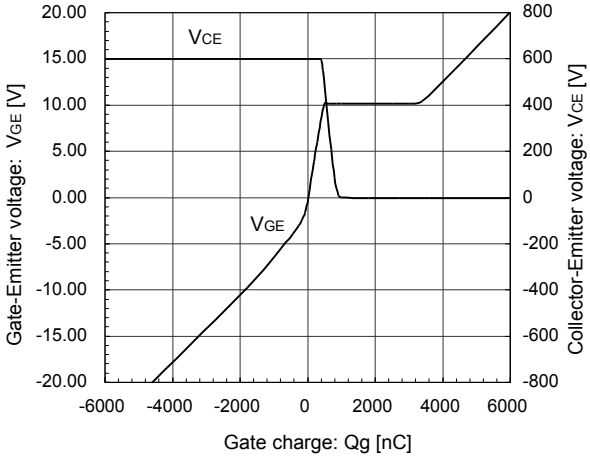
[INVERTER]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj= 25°C / chip



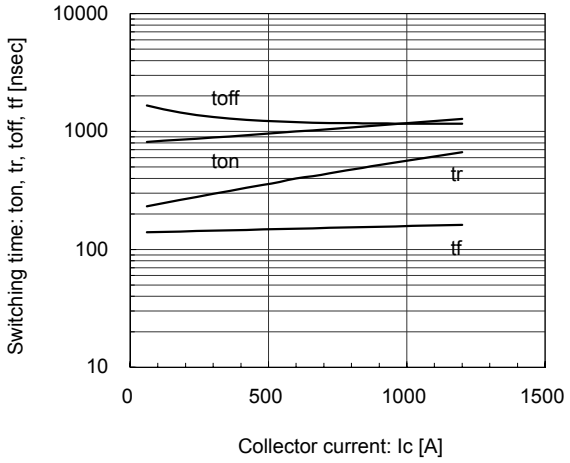
[INVERTER]
Gate Capacitance vs. Collector-Emitter Voltage (typ.)
VGE= 0V, *f*= 1MHz, Tj= 25°C



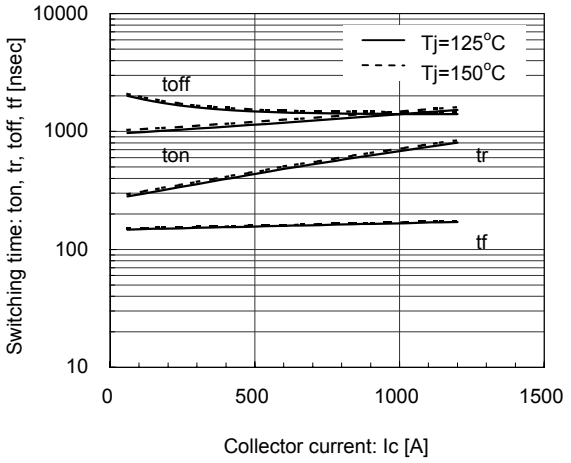
[INVERTER]
Dynamic Gate Charge (typ.)
Vcc=600V, Ic=600A, Tj= 25°C



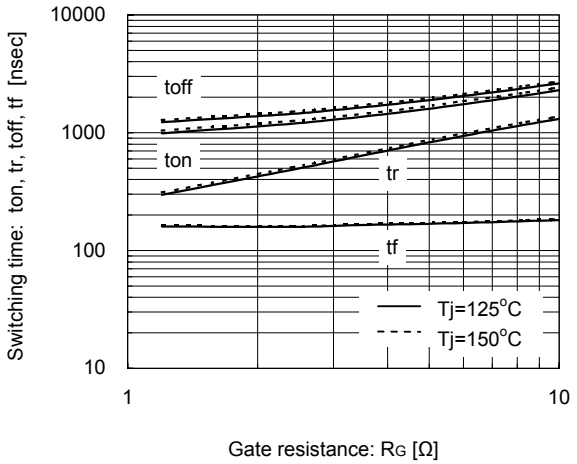
[INVERTER]
Switching time vs. Collector current (typ.)
Vcc=600V, V_{GE}=±15V, R_G=2.4Ω, Tj=25°C



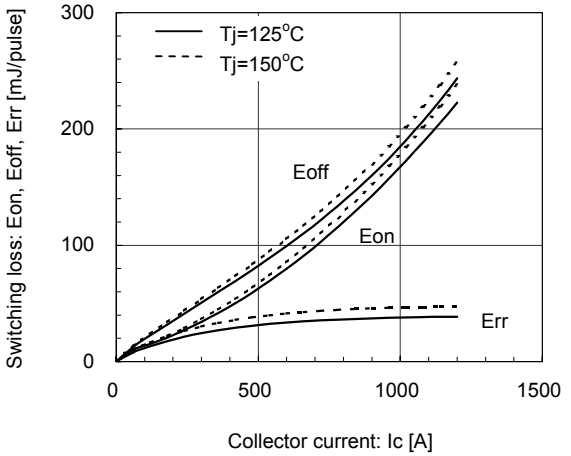
[INVERTER]
Switching time vs. Collector current (typ.)
Vcc=600V, V_{GE}=±15V, R_G=2.4Ω, Tj=125°C, 150°C



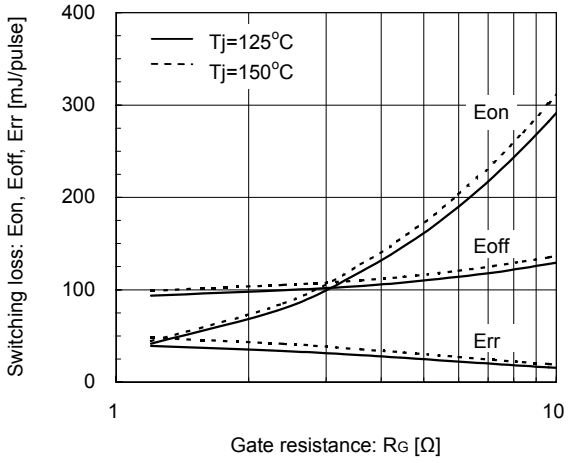
[INVERTER]
Switching time vs. Gate resistance (typ.)
Vcc=600V, Ic=600A, V_{GE}=±15V, Tj=125°C, 150°C



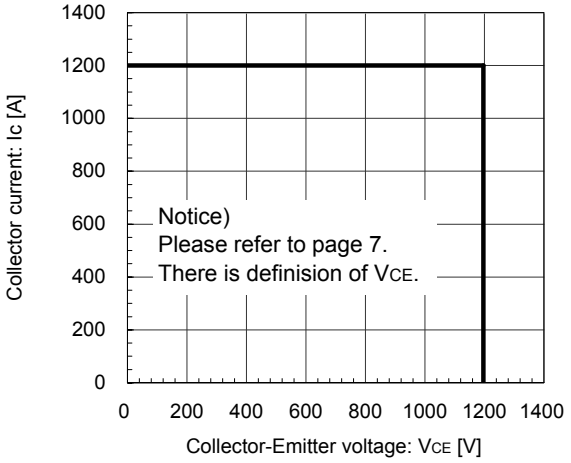
[INVERTER]
Switching loss vs. Collector current (typ.)
Vcc=600V , V_{GE}=±15V, R_G=2.4Ω, Tj=125°C, 150°C



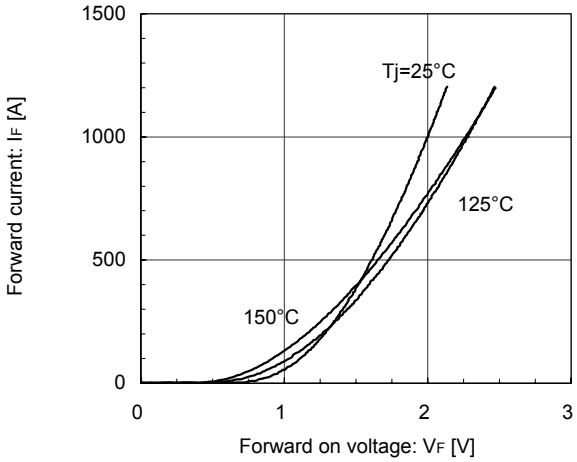
[INVERTER]
Switching loss vs. Gate resistance (typ.)
Vcc=600V, Ic=600A, V_{GE}=±15V, Tj=125°C, 150°C



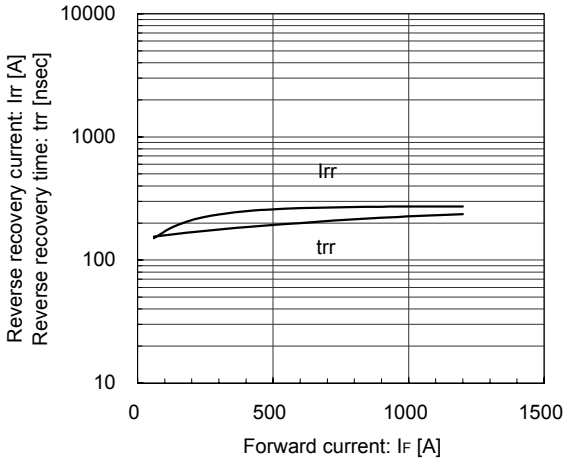
[INVERTER]
Reverse bias safe operating area (max.)
+V_{GE}=15V, -V_{GE}=15V, R_G=2.4Ω, Tj=150°C



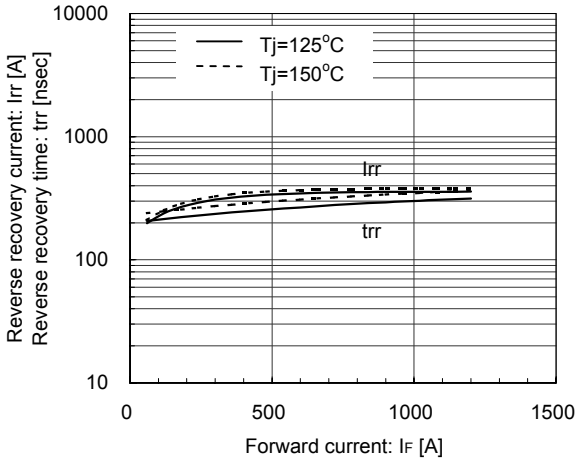
[INVERTER]
Forward Current vs. Forward Voltage (typ.)
chip



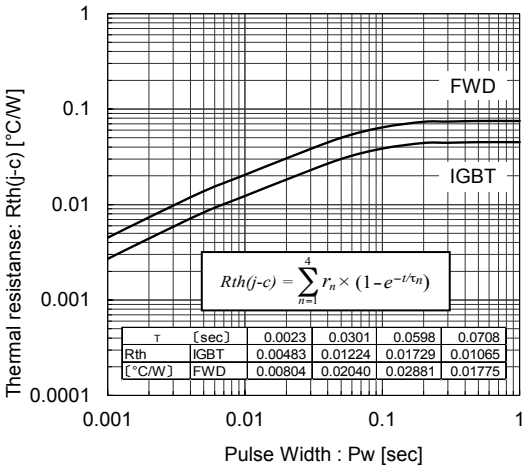
[INVERTER]
Reverse Recovery Characteristics (typ.)
Vcc=600V, VGE=±15V, RG=2.4Ω, Tj=25°C



[INVERTER]
Reverse Recovery Characteristics (typ.)
Vcc=600V, VGE=±15V, RG=2.4Ω, Tj=125°C, 150°C

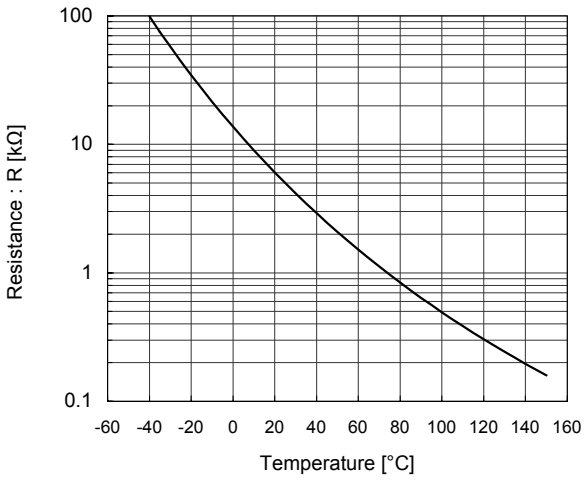


Transient Thermal Resistance (max.)

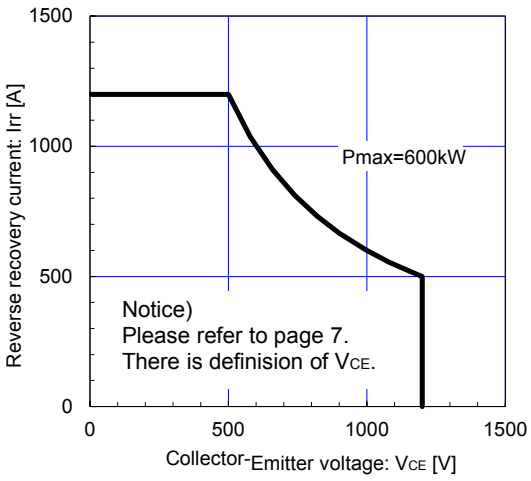


T	〔sec〕	0.0023	0.0301	0.0598	0.0708
Rth	IGBT	0.00483	0.01224	0.01729	0.01065
〔°C/W〕	FWD	0.00804	0.02040	0.02881	0.01775

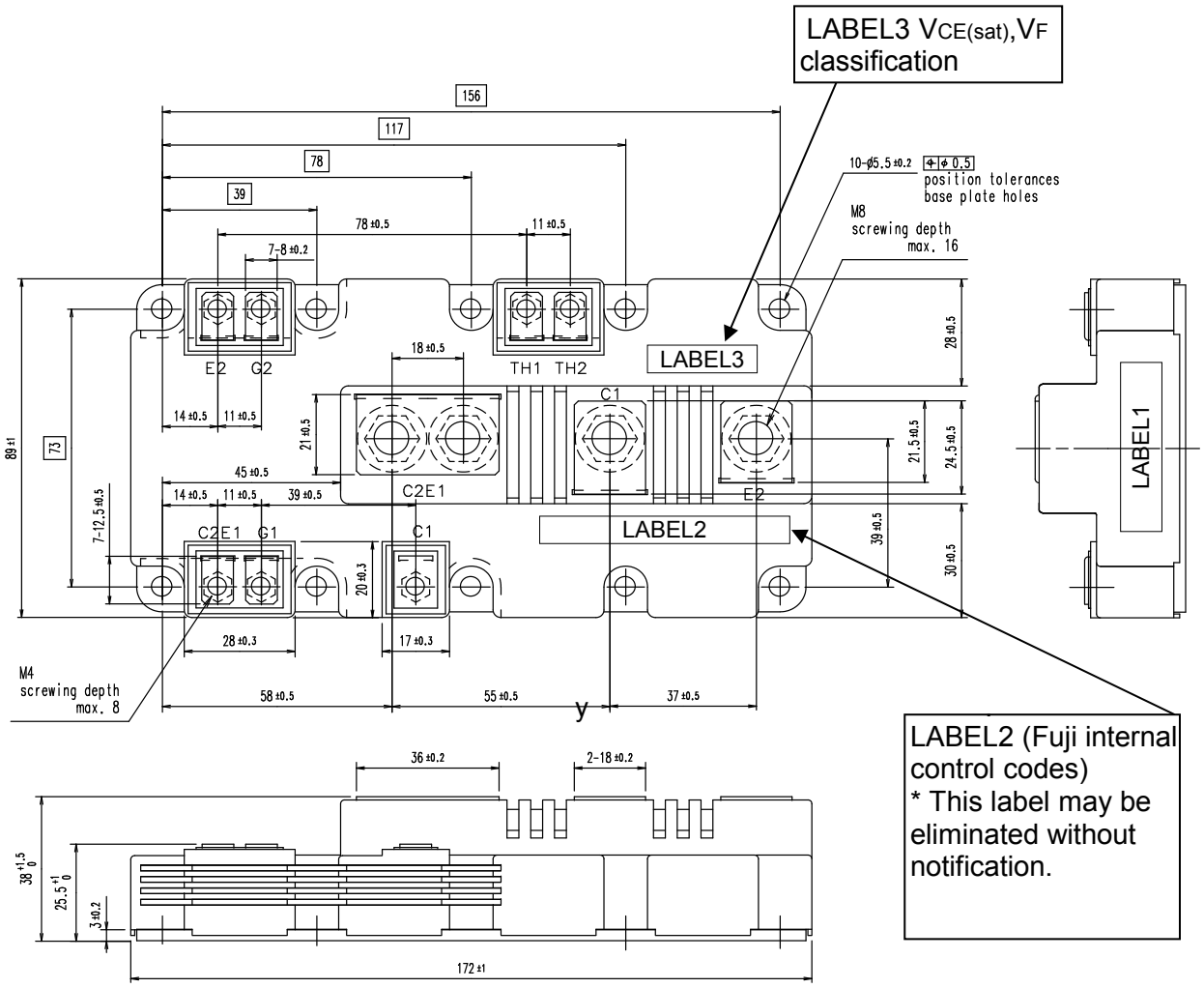
[THERMISTOR]
Temperature characteristic (typ.)



FWD safe operating area (max.)
Tj=150°C

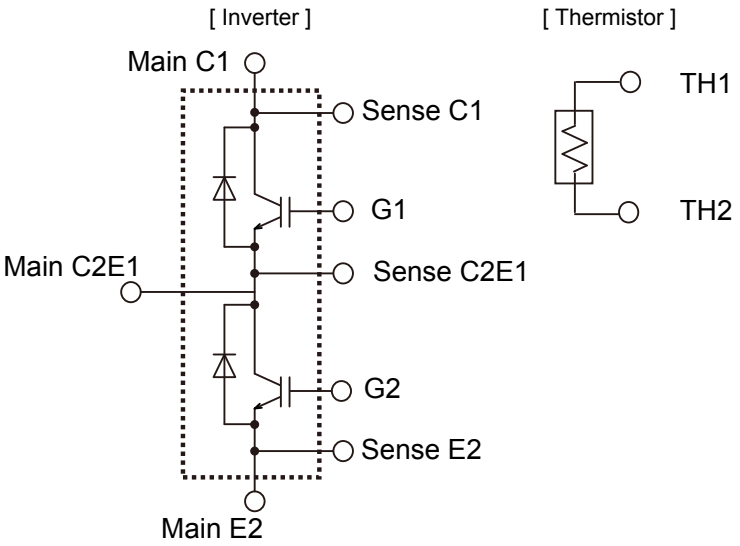


■ Outline Drawings, mm

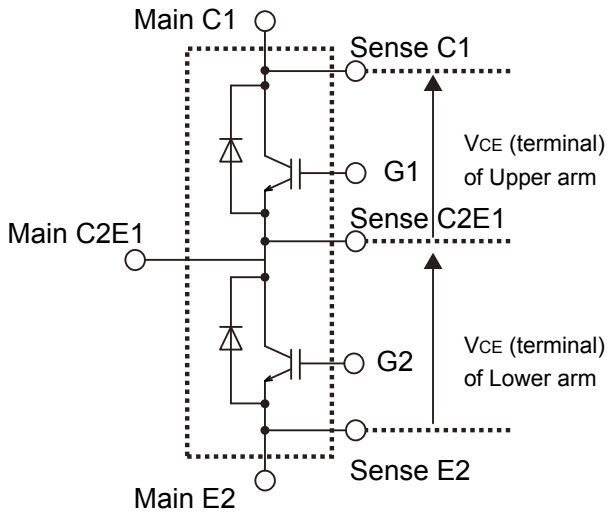


Weight:850g(typ.)

■ 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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• 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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