

# 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<sub>c</sub>=25°C unless otherwise specified)

Items	Symbols	Conditions	Maximum ratings	Units	
Inverter	Collector-Emitter voltage	V <sub>CES</sub>	1200	V	
	Gate-Emitter voltage	V <sub>GES</sub>	±20	V	
	Collector current	I <sub>c</sub>	Continuous	T <sub>c</sub> =25°C 1200 T <sub>c</sub> =100°C 900	A
		I <sub>c pulse</sub>	1ms	1800	
		-I <sub>c</sub>		900	
		-I <sub>c pulse</sub>	1ms	1800	
Collector power dissipation	P <sub>c</sub>	1 device	5100	W	
Junction temperature	T <sub>j</sub>		175	°C	
Operating junction temperature (under switching conditions)	T <sub>top</sub>		150		
Case temperature	T <sub>c</sub>		150		
Storage temperature	T <sub>stg</sub>		-40 ~ +150		
Isolation voltage	between terminal and copper base (*1)	V <sub>iso</sub>	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 T<sub>J</sub> = 25°C unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage collector current	I <sub>CEs</sub>	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 1200V	-	-	8.0	mA	
Gate-Emitter leakage current	I <sub>GES</sub>	V <sub>CE</sub> = 0V, V <sub>GE</sub> = ±20V	-	-	1600	nA	
Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> = 20V, I <sub>c</sub> = 900mA	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub> (terminal) (*4)	V <sub>GE</sub> = 15V I <sub>c</sub> = 900A	T <sub>J</sub> = 25°C	-	1.85	2.30	V
			T <sub>J</sub> = 125°C	-	2.15	-	
	T <sub>J</sub> = 150°C		-	2.20	-		
	V <sub>CE(sat)</sub> (chip)		T <sub>J</sub> = 25°C	-	1.75	2.20	
	T <sub>J</sub> = 125°C		-	2.05	-		
Internal gate resistance	R <sub>G(int)</sub>	-	-	1.19	-	Ω	
	C <sub>ies</sub>	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz	-	83	-	nF	
Turn-on time	t <sub>on</sub>	V <sub>CC</sub> = 600V I <sub>c</sub> = 900A	-	1000	-	nsec	
	t <sub>r(l)</sub>	V <sub>GE</sub> = ±15V	-	400	-		
Turn-off time	t <sub>off</sub>	R <sub>G</sub> = 1.6Ω	-	1200	-	nsec	
	t <sub>t</sub>	L <sub>S</sub> = 70nH	-	150	-		
Forward on voltage	V <sub>F</sub> (terminal) (*4)	V <sub>GE</sub> = 0V I <sub>F</sub> = 900A	T <sub>J</sub> = 25°C	-	1.90	2.35	V
			T <sub>J</sub> = 125°C	-	2.05	-	
	T <sub>J</sub> = 150°C		-	2.00	-		
	V <sub>F</sub> (chip)		T <sub>J</sub> = 25°C	-	1.80	2.25	
	T <sub>J</sub> = 125°C		-	1.95	-		
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 900A	-	200	-	nsec	
	Resistance	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<sub>CE</sub> value of terminal by using Sense C1 and Sense C2E1 for Upper arm and Sense C2E1 and Sense E2 for Lower arm.

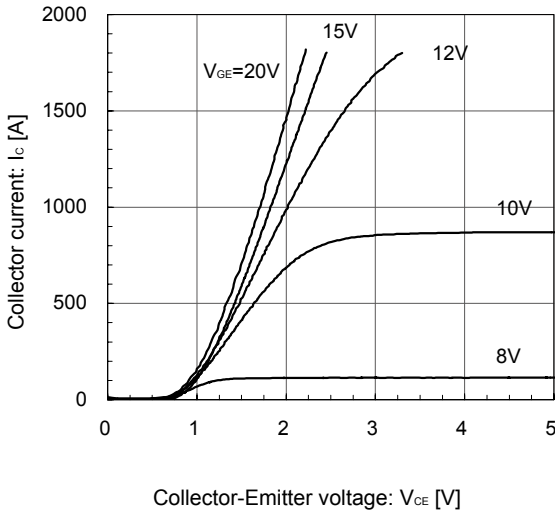
● Thermal resistance characteristics

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

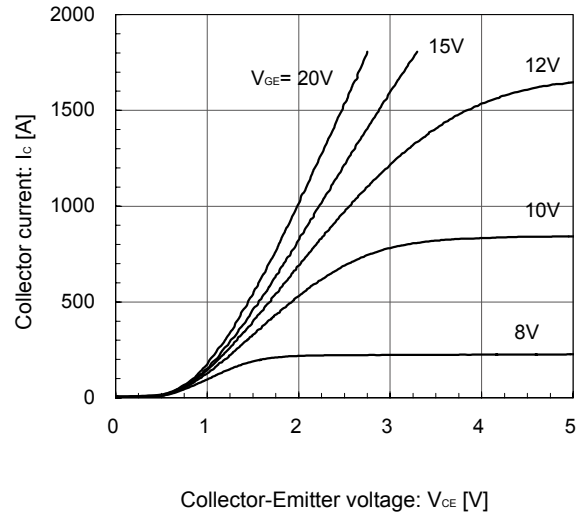
Note \*5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

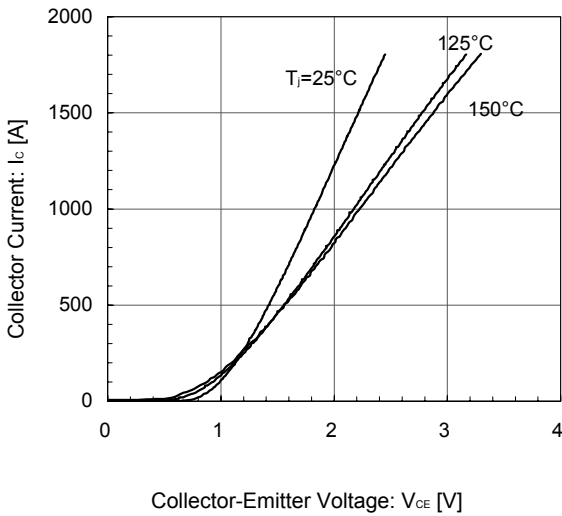
[INVERTER]  
Collector current vs. Collector-Emittter voltage (typ.)  
 $T_j = 25^\circ\text{C}$  / chip



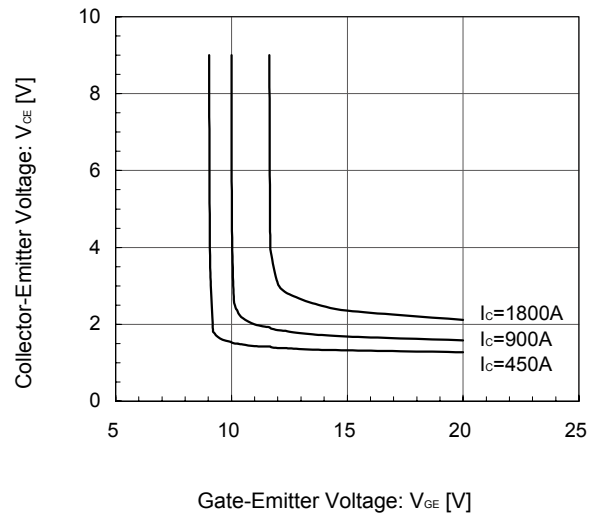
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Collector current vs. Collector-Emittter voltage (typ.)  
 $T_j = 150^\circ\text{C}$  / chip



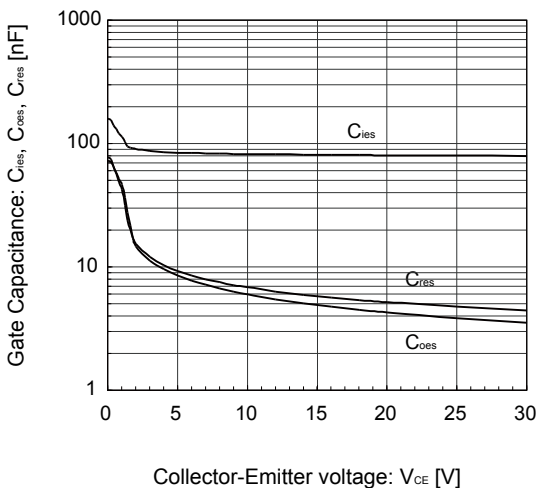
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Collector current vs. Collector-Emittter voltage (typ.)  
 $V_{GE} = 15\text{V}$  / chip



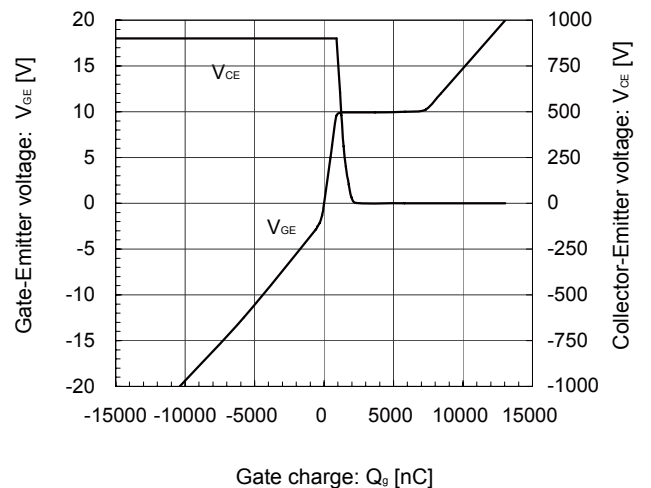
[INVERTER]  
Collector-Emittter voltage vs. Gate-Emittter voltage (typ.)  
 $T_j = 25^\circ\text{C}$  / chip



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

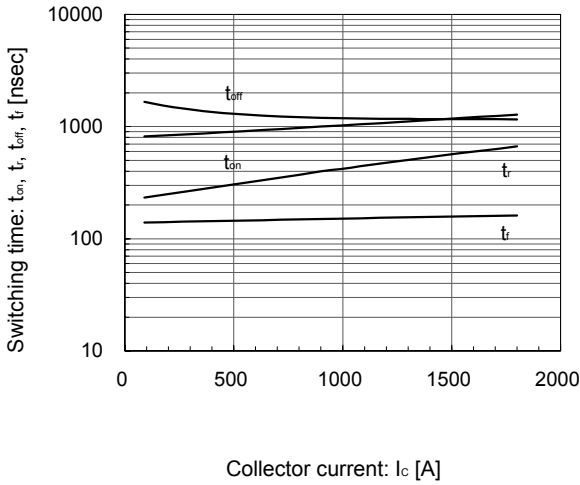


[INVERTER]  
Dynamic Gate Charge (typ.)  
 $V_{CC} = 600\text{V}$ ,  $I_c = 900\text{A}$ ,  $T_j = 25^\circ\text{C}$



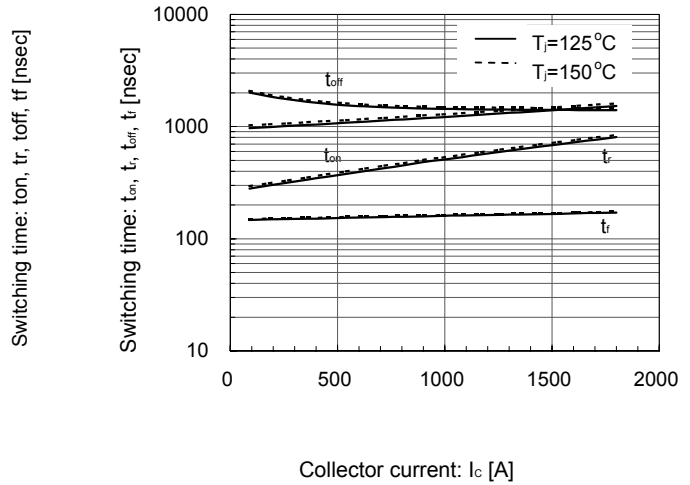
[INVERTER]

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



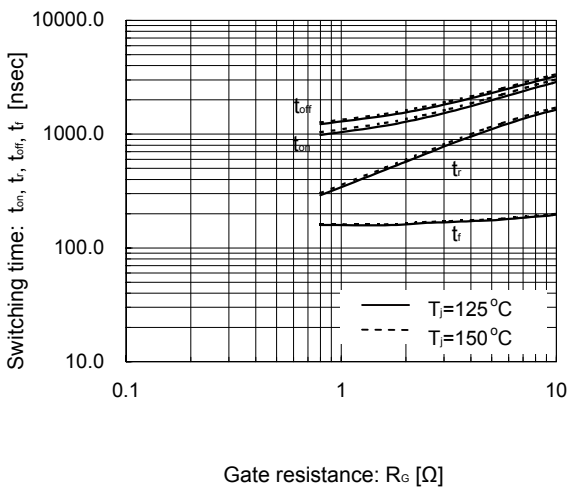
[INVERTER]

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



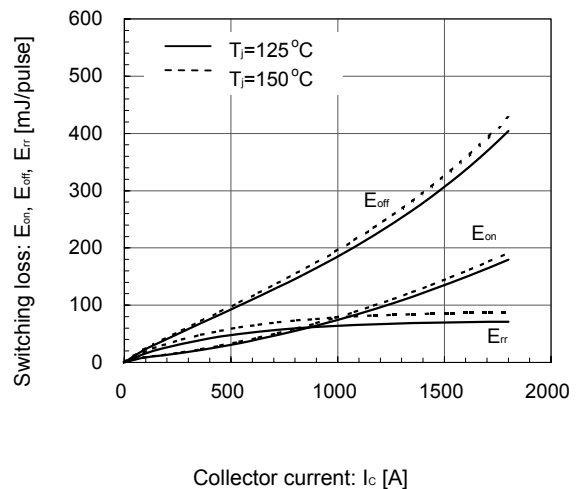
[INVERTER]

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



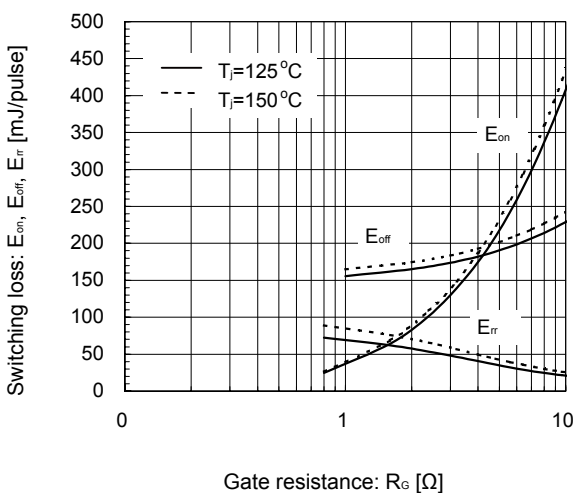
[INVERTER]

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



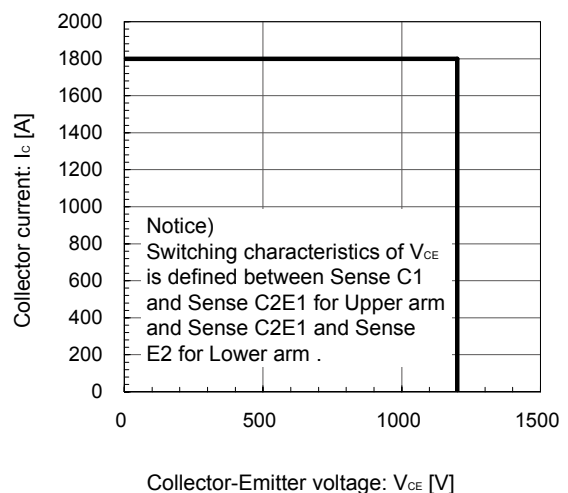
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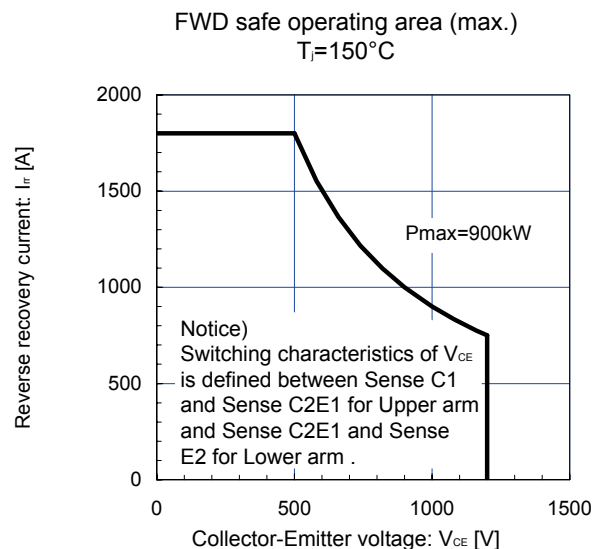
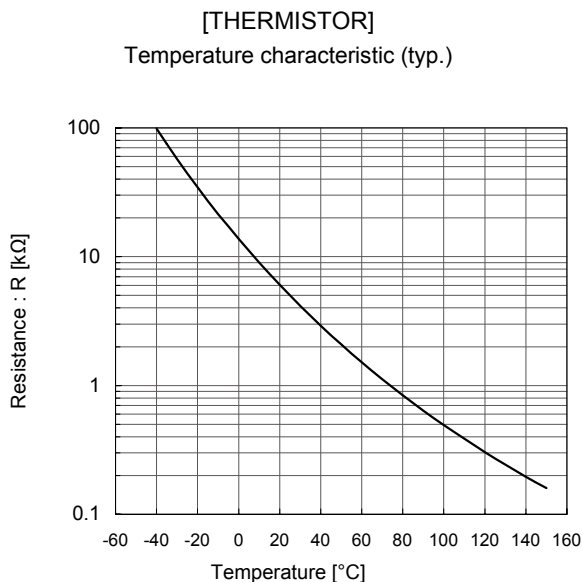
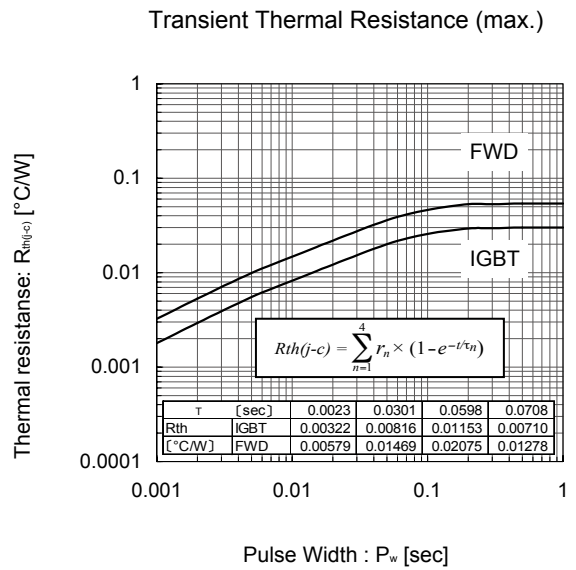
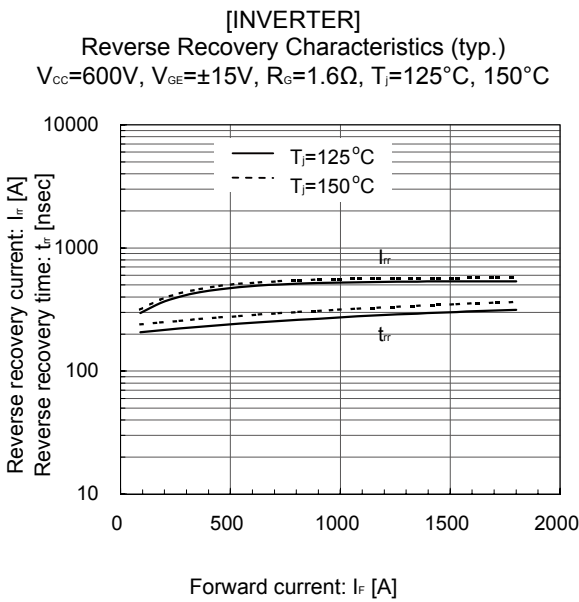
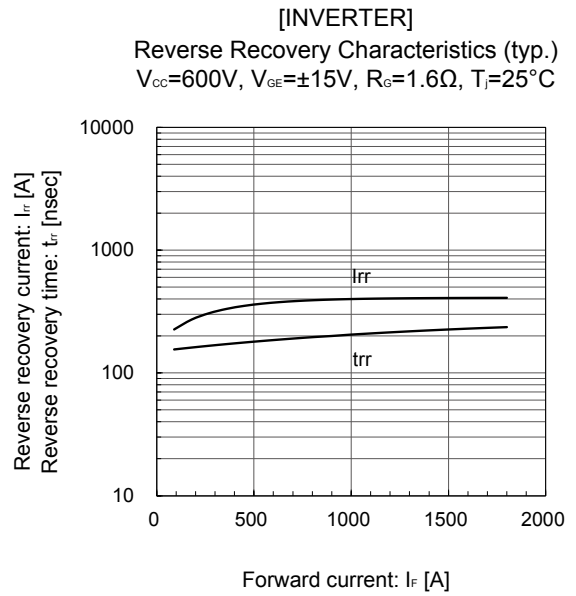
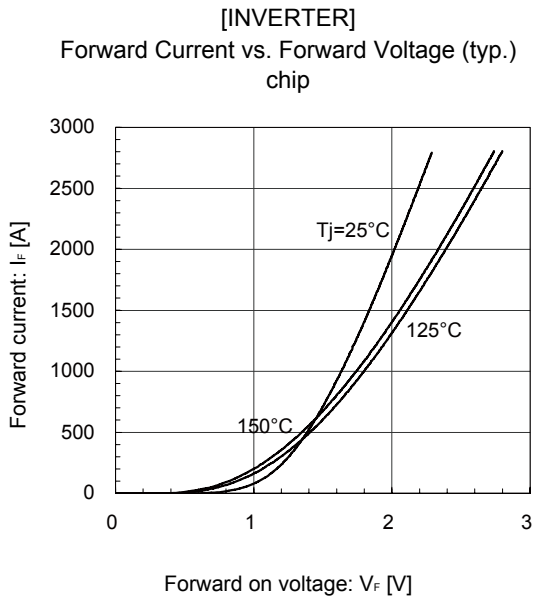
Switching loss vs. Gate resistance (typ.)  
 $V_{CC}=600V, I_c=900A, V_{GE}=\pm 15V, T_J=125^\circ C, 150^\circ C$



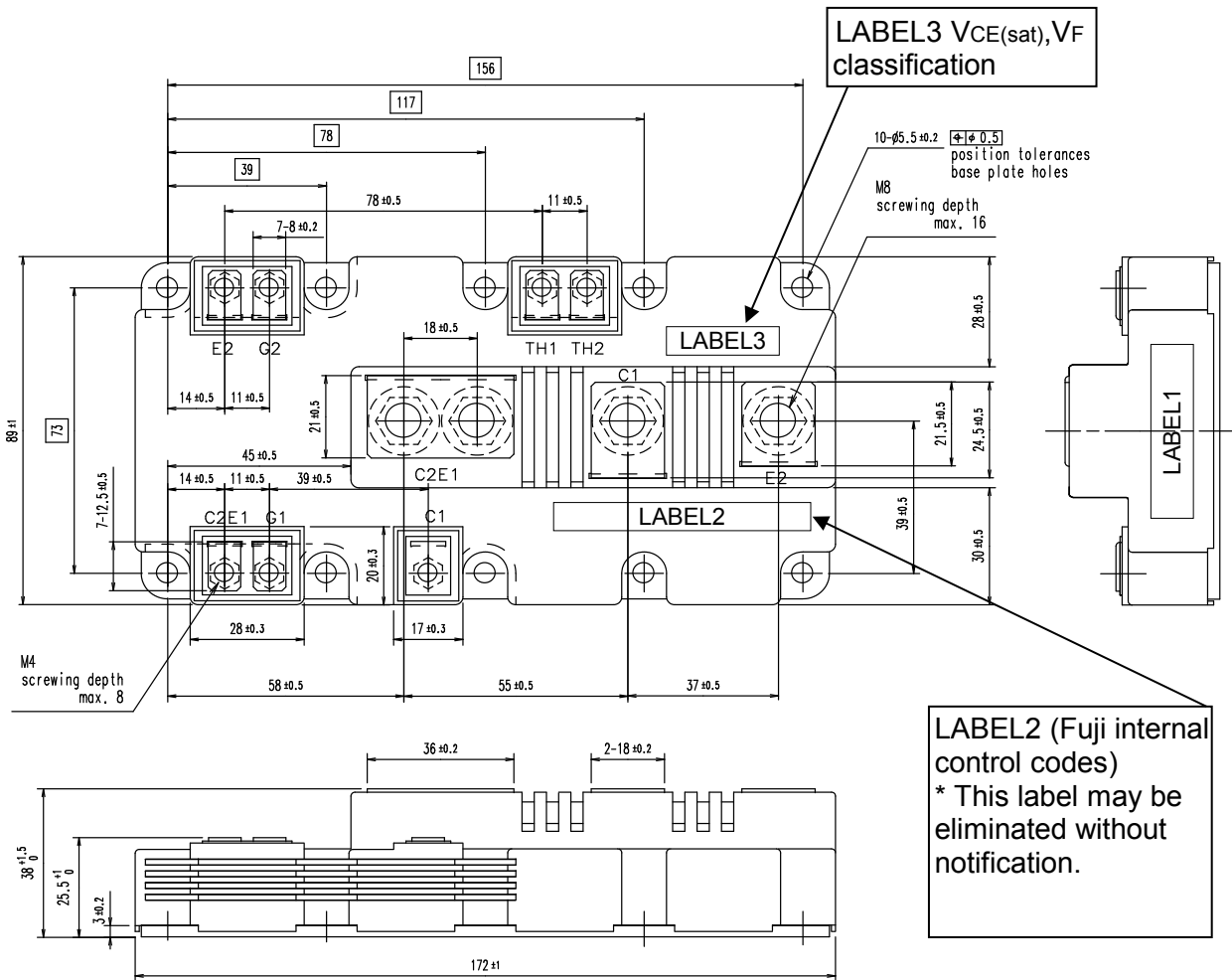
[INVERTER]

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



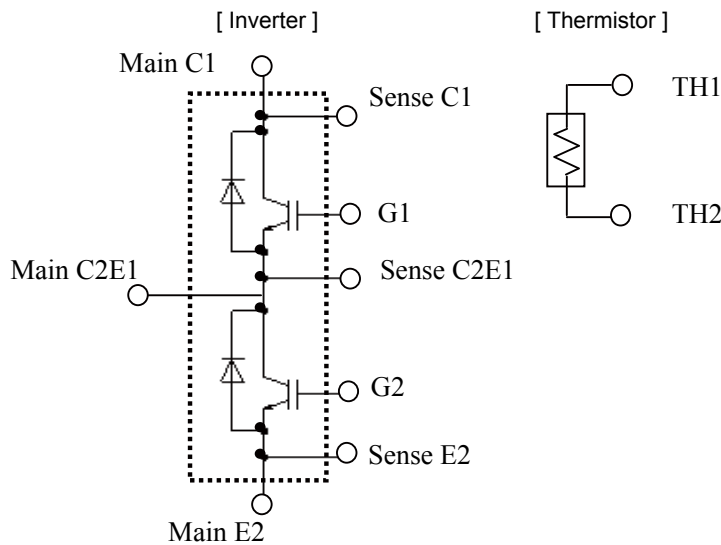


■ Outline Drawings, mm

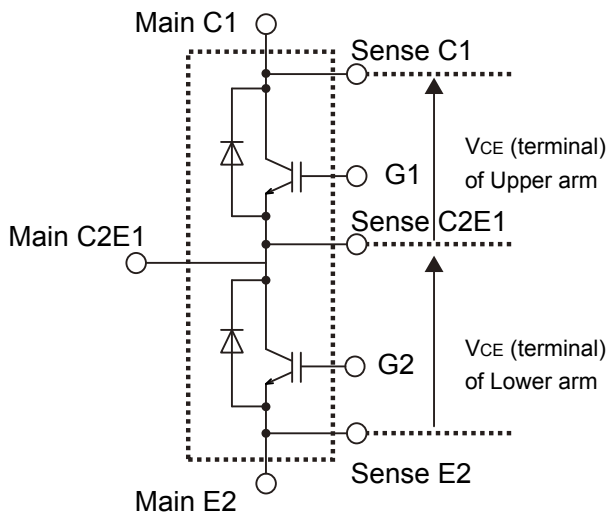


Weight:850g(typ.)

■ Equivalent Circuit Schematic



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



Fuji defined V<sub>CE</sub> 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<sub>CE</sub> 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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