

# 2MBI1200U4G-170

## IGBT MODULE (U series) 1700V / 1200A / 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	
Collector-Emitter voltage	V <sub>CEs</sub>		1700	V	
Gate-Emitter voltage	V <sub>GES</sub>		±20	V	
Collector current	I <sub>c</sub>	Continuous	Tc=25°C Tc=80°C	1600 1200	A
	I <sub>cp</sub>	1ms	Tc=25°C Tc=80°C	3200 2400	
	-I <sub>c</sub>			1200	
	-I <sub>c</sub> pulse	1ms		2400	
	Collector power dissipation	P <sub>c</sub>	1 device	6250	
Junction temperature	T <sub>j</sub>		150	°C	
Storage temperature	T <sub>stg</sub>		-40 to +125		
Isolation voltage   between terminal and copper base (*1)	V <sub>iso</sub>	AC : 1min.	3400	VAC	
Screw torque (*2)	Mounting		5.75	N m	
	Main Terminals		10		
	Sense Terminals		2.5		

Note \*1: All terminals should be connected together when isolation test will be done.

Note \*2: Recommendable value : Mounting : 4.25-5.75 Nm (M6), Main Terminals : 8-10 Nm (M8), Sense Terminals : 1.7-2.5 Nm (M4)

#### ● Electrical characteristics (at Tj= 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> = 1700V	-	-	1.0	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> = 1200mA	5.5	6.5	7.5	V	
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub> (main terminal)	V <sub>GE</sub> = 15V I <sub>c</sub> = 1200A	Tj=25°C	-	2.57	2.76	V
			Tj=125°C	-	2.97	-	
	V <sub>CE(sat)</sub> (chip)		Tj=25°C	-	2.25	2.40	
			Tj=125°C	-	2.65	-	
Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz	-	112	-	nF	
Turn-on time	t <sub>on</sub>	V <sub>CC</sub> = 900V, I <sub>c</sub> = 1200A, V <sub>GE</sub> = ±15V, Tj = 125°C, R <sub>gon</sub> = 4.7Ω, R <sub>goff</sub> = 1.2Ω	-	3.10	-	μs	
	t <sub>r</sub>		-	1.25	-		
Turn-off time	t <sub>off</sub>		-	1.45	-		
	t <sub>f</sub>		-	0.25	-		
Forward on voltage	V <sub>F</sub> (main terminal)	V <sub>GE</sub> = 0V I <sub>F</sub> = 1200A	Tj=25°C	-	2.12	2.51	V
			Tj=125°C	-	2.32	-	
	V <sub>F</sub> (chip)		Tj=25°C	-	1.80	2.15	
			Tj=125°C	-	2.00	-	
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 1200A	-	0.45	-	μs	
Lead resistance, terminal-chip (*3)	R lead		-	0.27	-	mΩ	

Note \*3: Biggest internal terminal resistance among arm.

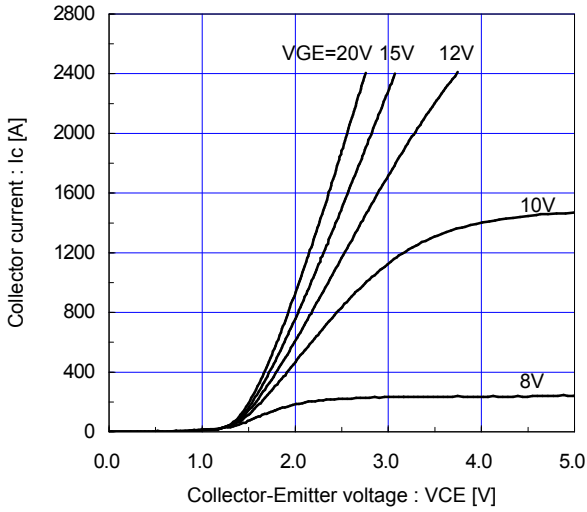
#### ● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R <sub>th(j-c)</sub>	IGBT	-	-	0.020	°C/W
		FWD	-	-	0.033	
Contact thermal resistance (1device)	R <sub>th(c-f)</sub>	with Thermal Compound (*4)	-	0.006	-	

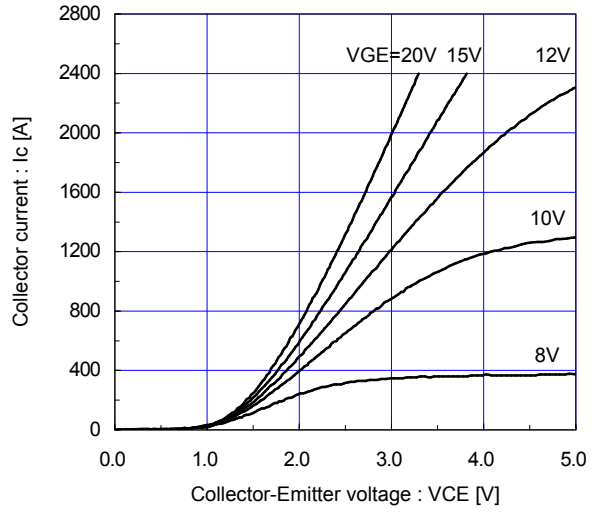
Note \*4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

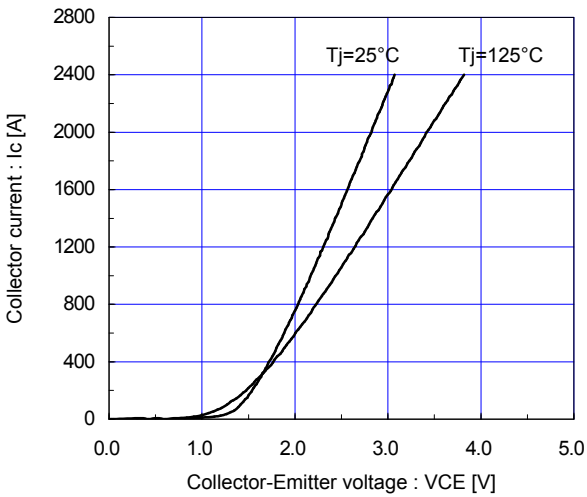
Collector current vs. Collector-Emitter voltage (typ.)  
Tj=25°C, chip



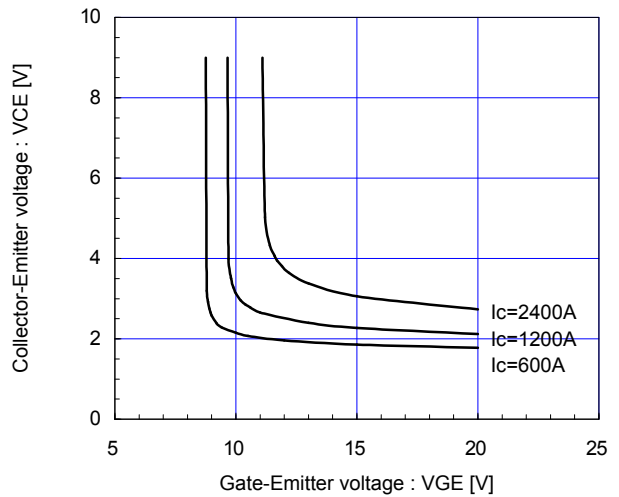
Collector current vs. Collector-Emitter voltage (typ.)  
Tj=125°C, chip



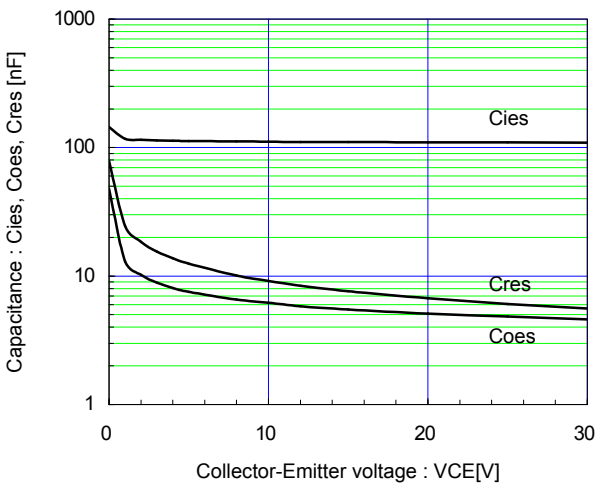
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)  
VGE=+15V, chip



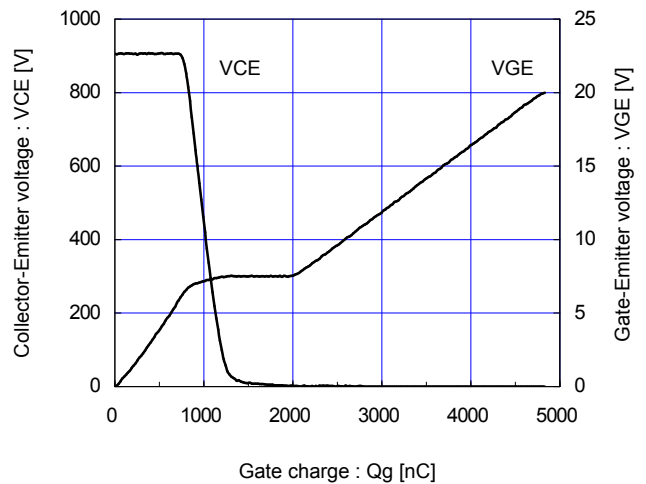
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)  
Tj=25°C, chip



Capacitance vs. Collector-Emitter voltage (typ.)  
VGE=0V, f=1MHz, Tj=25°C

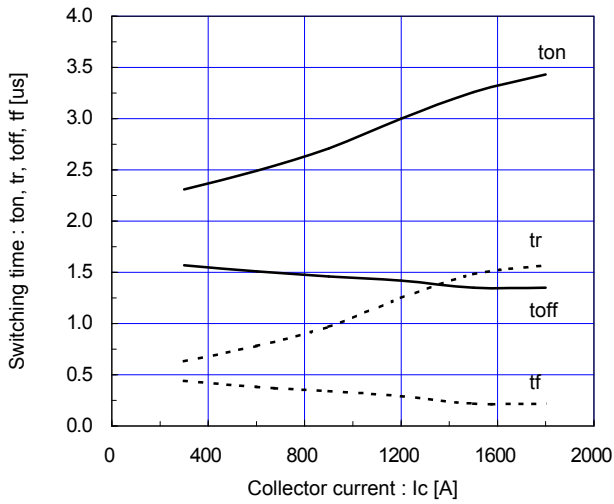


Dynamic Gate charge (typ.)  
Tj=25°C



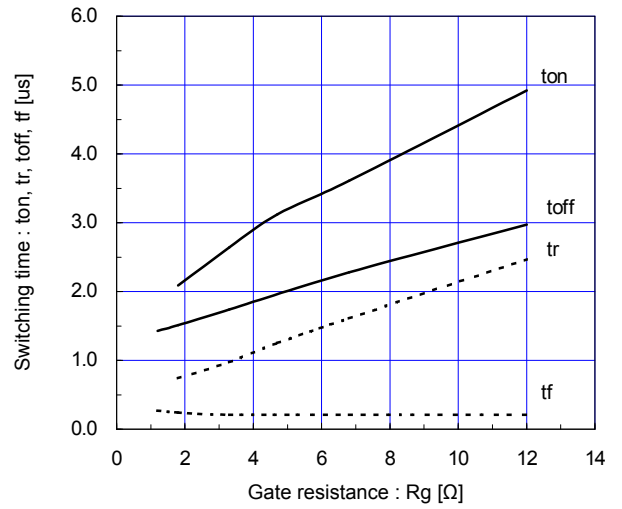
Switching time vs. Collector current (typ.)

V<sub>cc</sub>=900V, V<sub>GE</sub>=±15V, R<sub>gon</sub>=4.7Ω, R<sub>goff</sub>=1.2Ω, T<sub>j</sub>=125°C



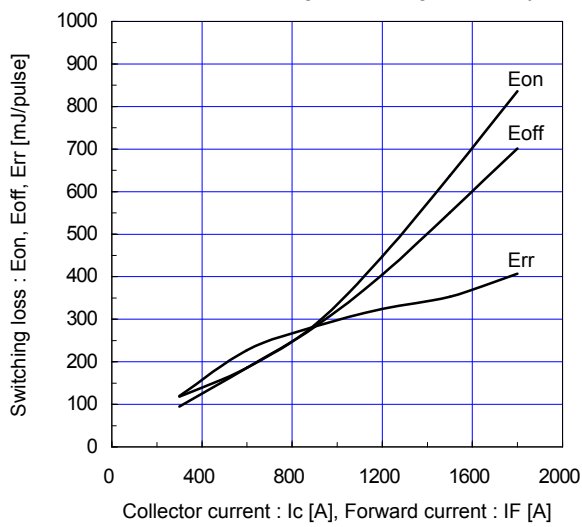
Switching time vs. Gate resistance (typ.)

V<sub>cc</sub>=900V, I<sub>c</sub>=1200A, V<sub>GE</sub>=±15V, T<sub>j</sub>=125°C



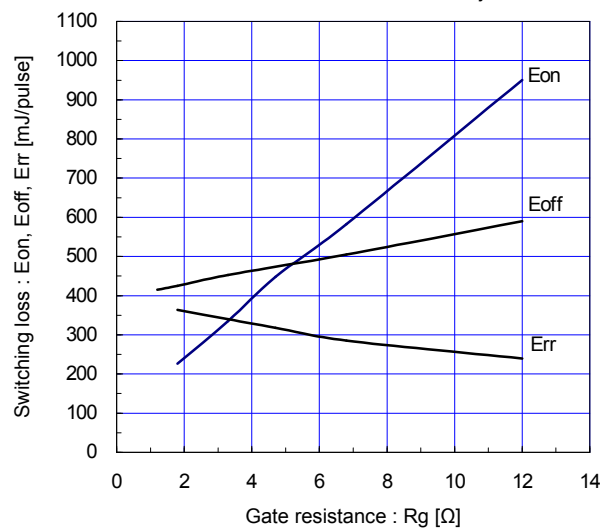
Switching loss vs. Collector current (typ.)

V<sub>cc</sub>=900V, V<sub>GE</sub>=±15V, R<sub>gon</sub>=4.7Ω, R<sub>goff</sub>=1.2Ω, T<sub>j</sub>=125°C



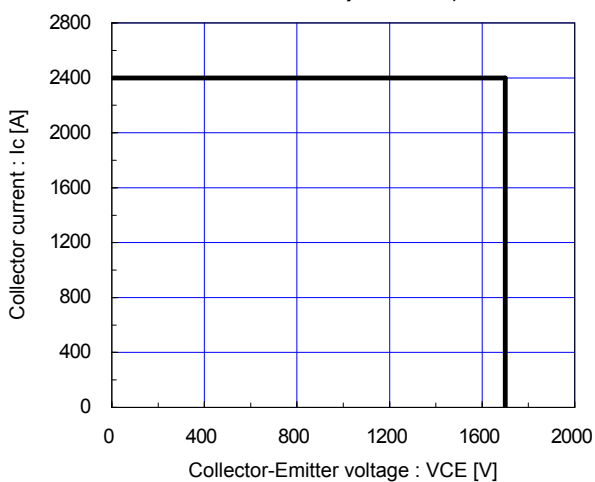
Switching loss vs. Gate resistance (typ.)

V<sub>cc</sub>=900V, I<sub>c</sub>=1200A, V<sub>GE</sub>=±15V, T<sub>j</sub>=125°C

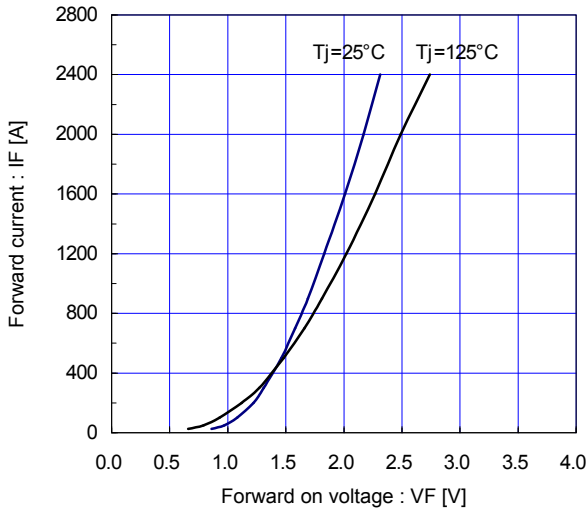


Reverse bias safe operating area (max.)

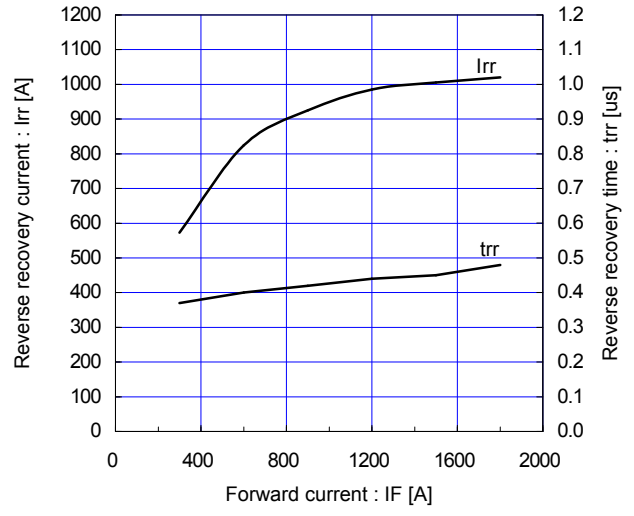
±V<sub>GE</sub>=15V, T<sub>j</sub>=125°C/chip



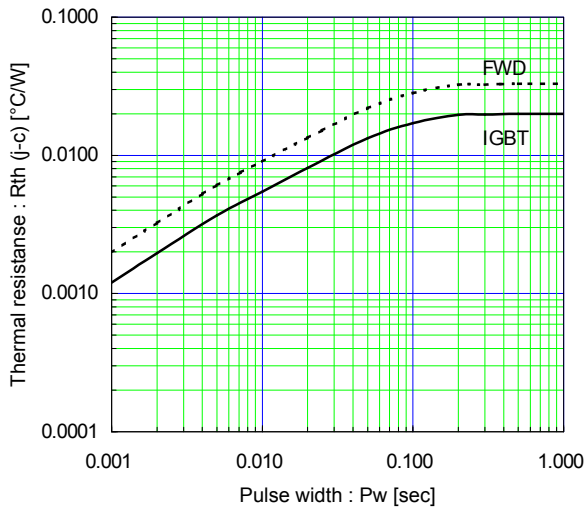
Forward current vs. Forward on voltage (typ.)  
chip



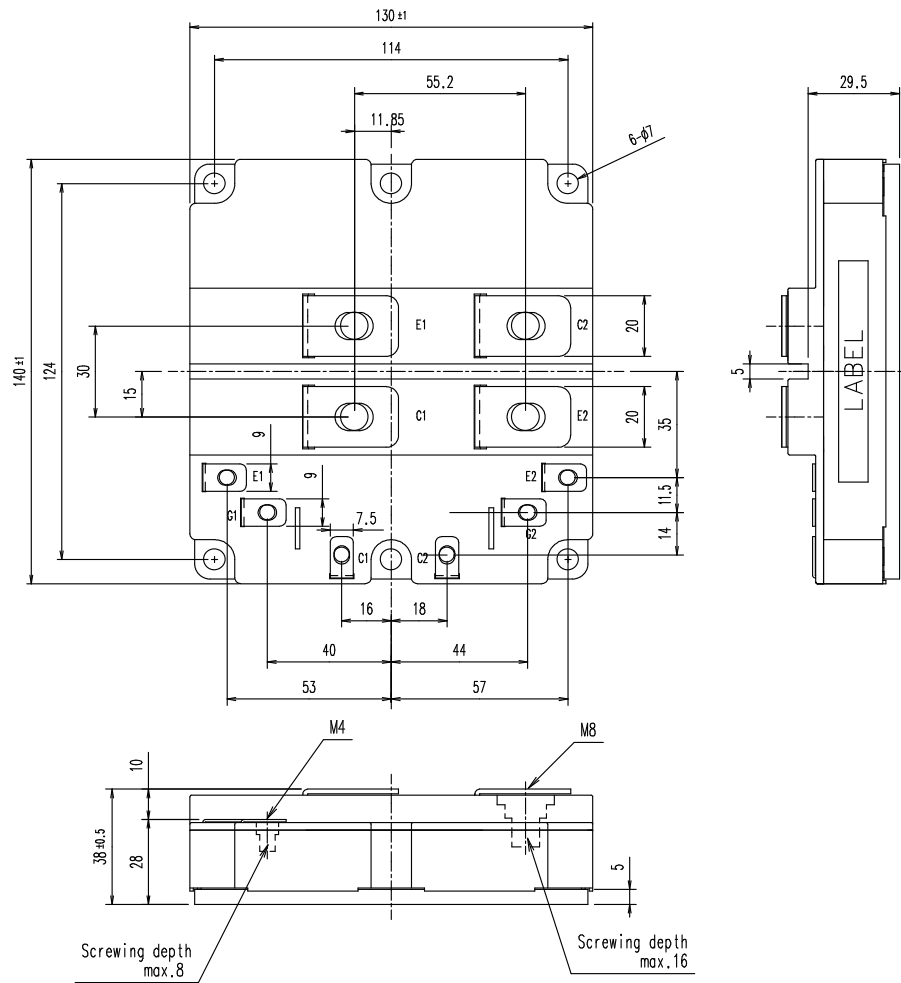
Reverse recovery characteristics (typ.)  
Vcc=900V, VGE=±15V, Rgon=4.7Ω, Tj=125°C



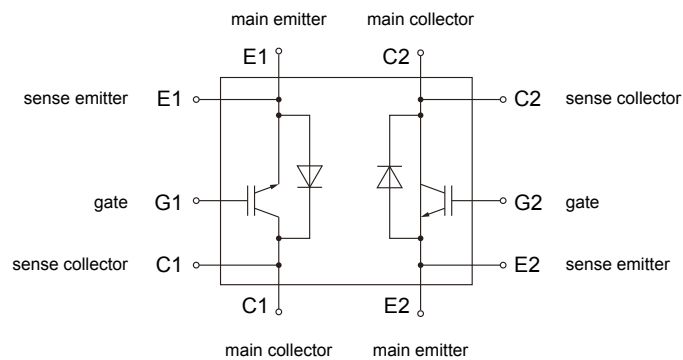
Transient thermal resistance (max.)



■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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