

# 2MBI800VT-170E

**IGBT Modules**

## IGBT MODULE (V series) 1700V / 800A / 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
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	T <sub>c</sub> =25°C 1200 T <sub>c</sub> =100°C 800	A
	I <sub>CP</sub>	1ms	1600	
	-I <sub>c</sub>		800	
	-I <sub>c pulse</sub>	1ms	1600	
Collector power dissipation	P <sub>c</sub>	1 device	5370	W
Junction temperature	T <sub>j</sub>		175	°C
Operating junction temperature (under switching conditions)	T <sub>top</sub>		150	
Storage temperature	T <sub>stg</sub>		-40 ~ +125	
Isolation voltage	between terminal and copper base (*1) V <sub>iso</sub>	AC : 1min.	4000	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 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> = 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> = 800mA	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub> (main terminal)	V <sub>GE</sub> = 15V I <sub>c</sub> = 800A	T <sub>j</sub> =25°C	-	2.21	2.49	V
			T <sub>j</sub> =125°C	-	2.61	-	
	T <sub>j</sub> =150°C		-	2.66	-		
	T <sub>j</sub> =25°C		-	2.00	2.25		
	T <sub>j</sub> =125°C		-	2.40	-		
V <sub>CE(sat)</sub> (chip)	T <sub>j</sub> =150°C	-	2.45	-			
Internal gate resistance	I <sub>int</sub> R <sub>G</sub>		-	2.19	-	Ω	
Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz	-	79	-	nF	
Turn-on	t <sub>on</sub>	V <sub>CC</sub> = 900V R <sub>gon</sub> = 1.5Ω	-	2.0	-	μs	
	t <sub>r</sub>	I <sub>c</sub> = 800A R <sub>goff</sub> = 0.82Ω	-	0.67	-		
Turn-off	t <sub>off</sub>	L <sub>m</sub> =75nH	-	2.13	-		
	t <sub>r</sub>	V <sub>GE</sub> = ±15V, T <sub>j</sub> =125°C	-	0.55	-		
Forward on voltage	V <sub>F</sub> (main terminal)	V <sub>GE</sub> = 0V I <sub>F</sub> = 800A	T <sub>j</sub> =25°C	-	1.87	2.22	V
			T <sub>j</sub> =125°C	-	2.03	-	
	T <sub>j</sub> =150°C		-	2.00	-		
	T <sub>j</sub> =25°C		-	1.66	1.98		
	T <sub>j</sub> =125°C		-	1.82	-		
V <sub>F</sub> (chip)	T <sub>j</sub> =150°C	-	1.79	-			
Reverse recovery	t <sub>rr</sub>	I <sub>F</sub> = 800A, T <sub>j</sub> = 125°C	-	0.35	-	μs	
Lead resistance, terminal-chip	R lead		-	0.268	-	mΩ	

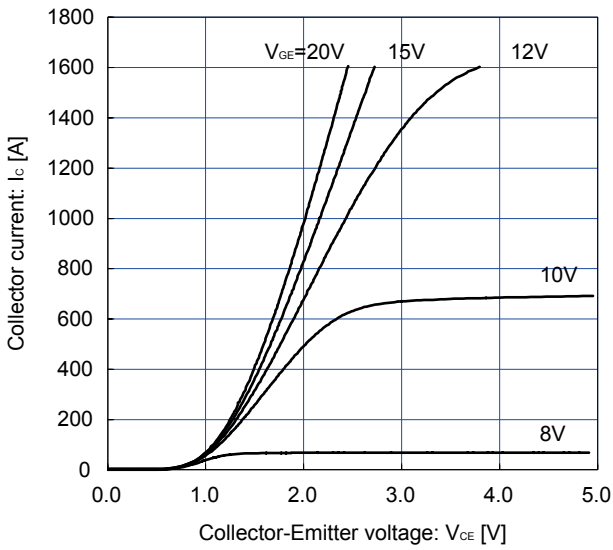
#### ● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance(1device)	R <sub>th(j-c)</sub>	IGBT	-	-	0.0279	°C/W
		FWD	-	-	0.0375	
Contact thermal resistance (1module) (*3)	R <sub>th(c-f)</sub>	with Thermal Compound	-	0.0077	-	

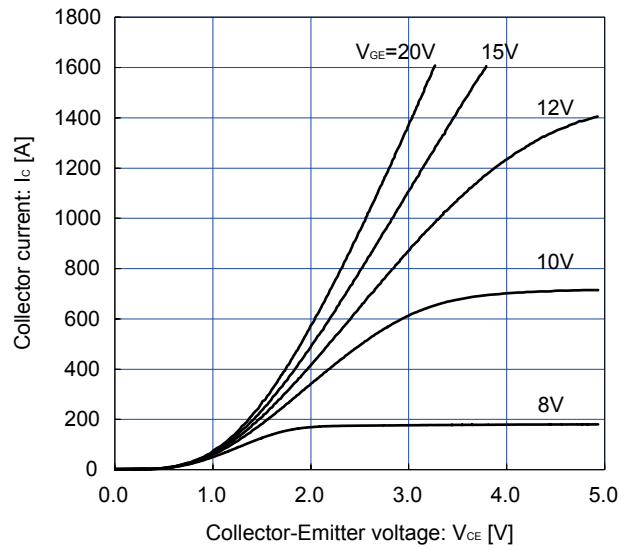
Note \*3: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

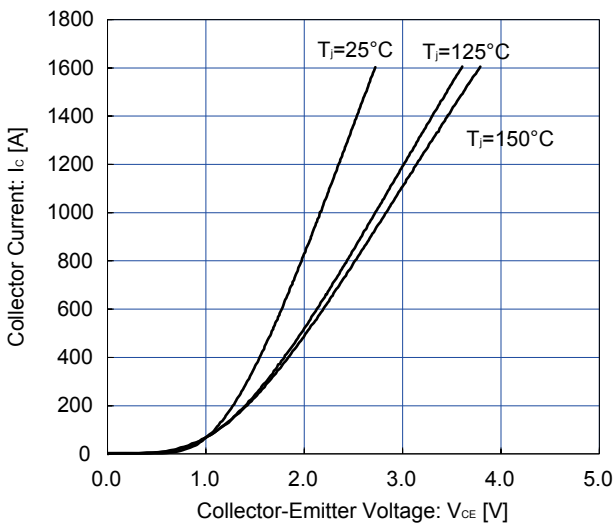
Collector current vs. Collector-Emittor voltage (typ.)  
 $T_J = 25^\circ\text{C}$ , chip



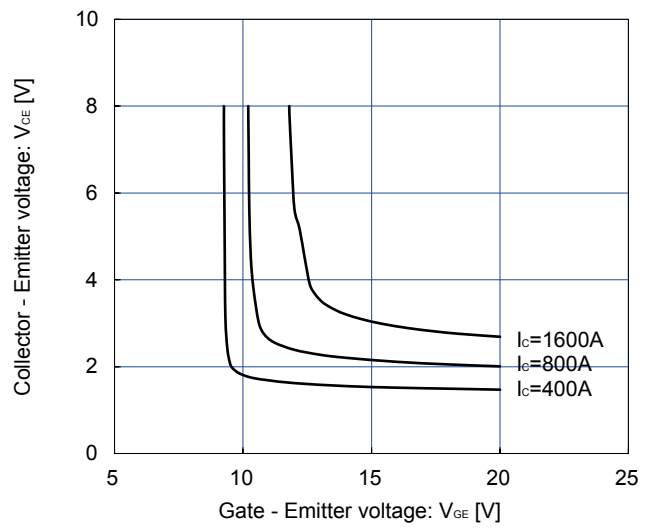
Collector current vs. Collector-Emittor voltage (typ.)  
 $T_J = 150^\circ\text{C}$ , chip



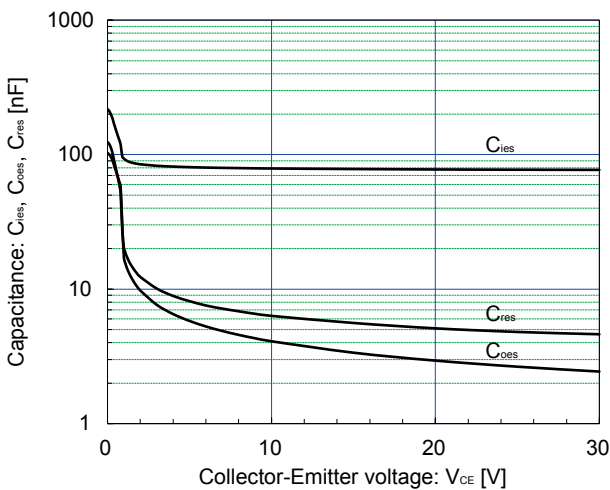
Collector current vs. Collector-Emittor voltage (typ.)  
 $V_{GE} = +15\text{V}$ , chip



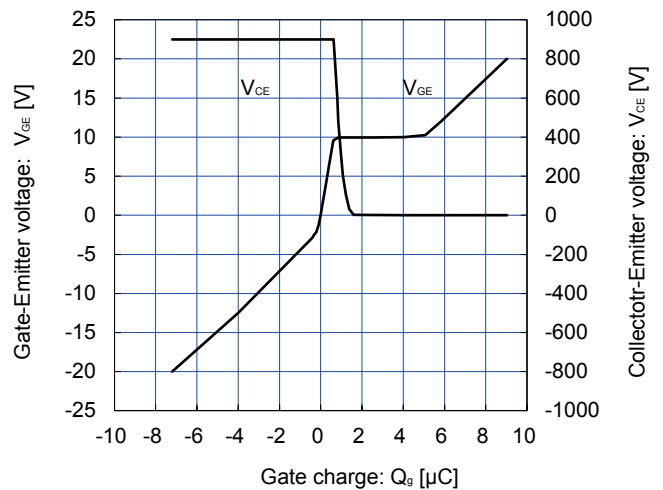
Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)  
 $T_J = 25^\circ\text{C}$ , chip



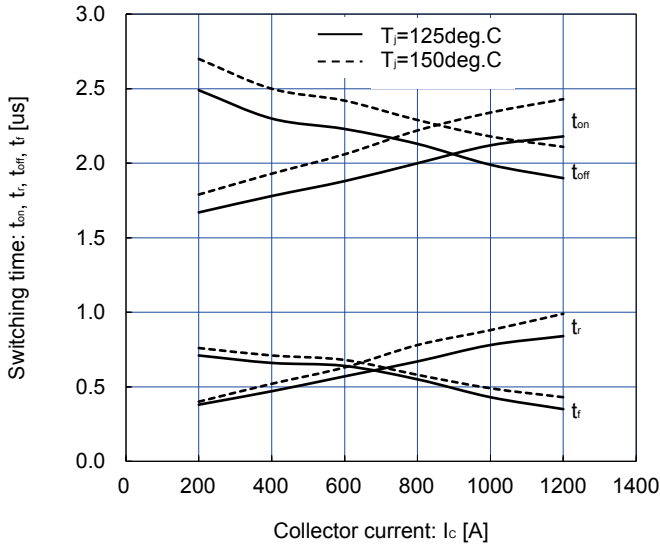
Capacitance vs. Collector-Emittor voltage (typ.)  
 $V_{GE} = 0\text{V}$ ,  $f = 1\text{MHz}$ ,  $T_J = 25^\circ\text{C}$



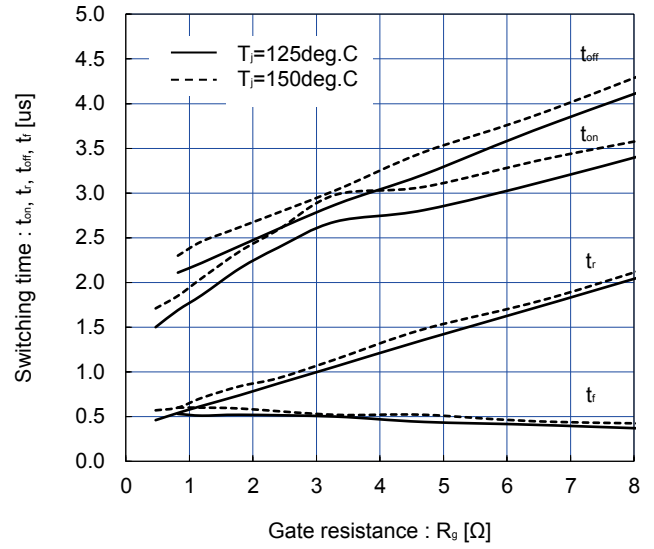
Dynamic Gate charge (typ.)  
 $T_J = 25^\circ\text{C}$



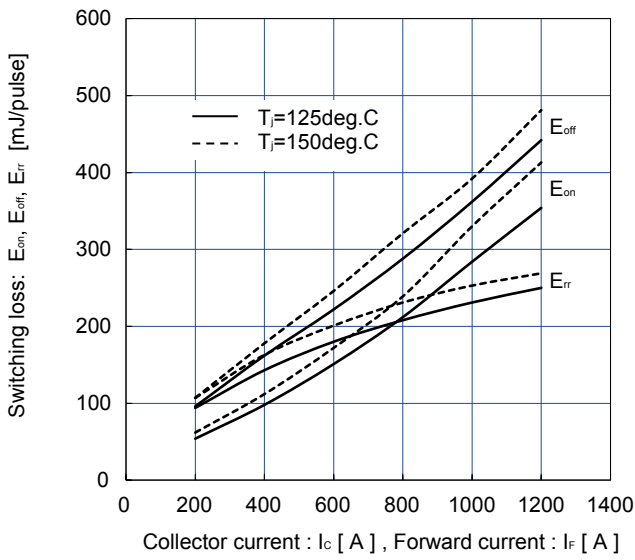
Switching time vs. Collector current (typ.)  
 $V_{CC}=900V, V_{GE}=\pm 15V, R_{gon}=1.5\Omega, R_{goff}=0.82\Omega$



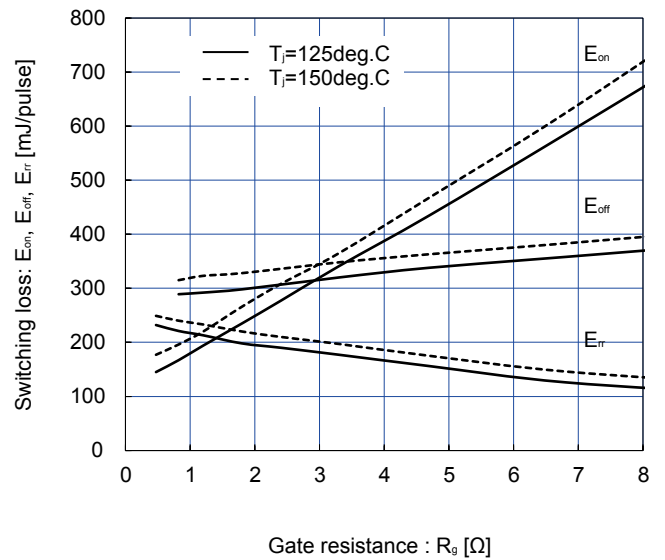
Switching time vs. Gate resistance (typ.)  
 $V_{CC}=900V, V_C=800A, V_{GE}=\pm 15V$



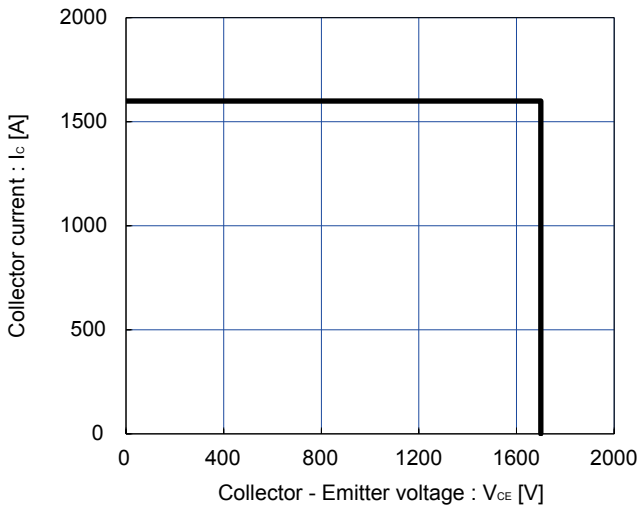
Switching loss vs. Collector current (typ.)  
 $V_{CC}=900V, V_{GE}=\pm 15V, R_{gon}=1.5\Omega, R_{goff}=0.82\Omega$



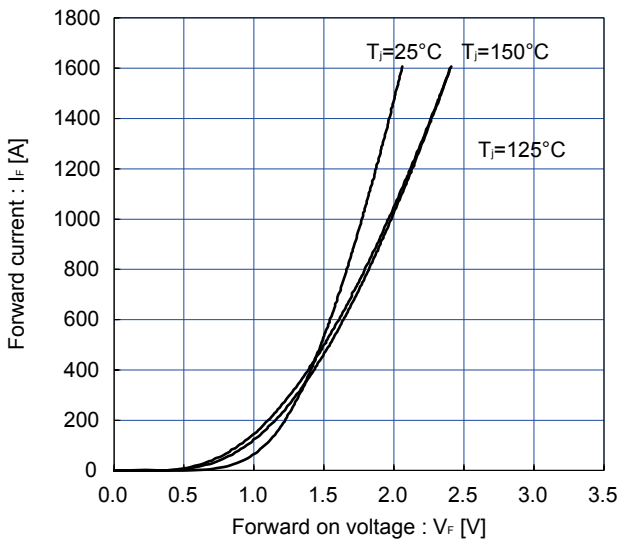
Switching loss vs. Gate resistance (typ.)  
 $V_{CC}=900V, I_C=800A, V_{GE}=\pm 15V$



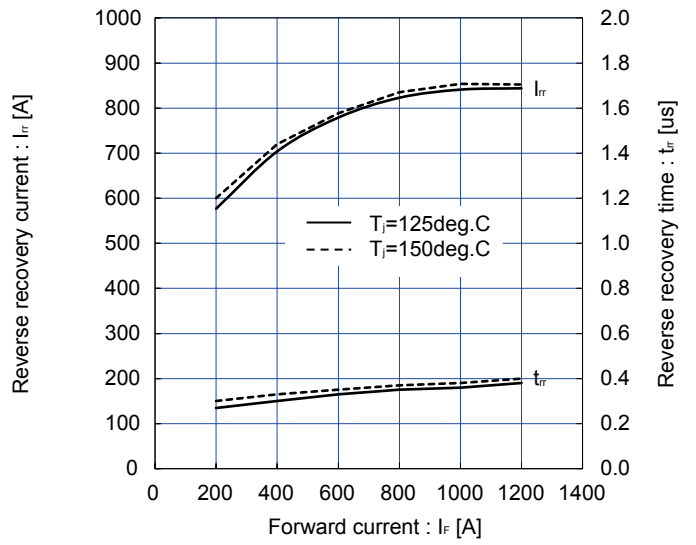
Reverse bias safe operating area (max.)  
 $\pm V_{GE}=15V, T_j=150^\circ C / \text{chip}$



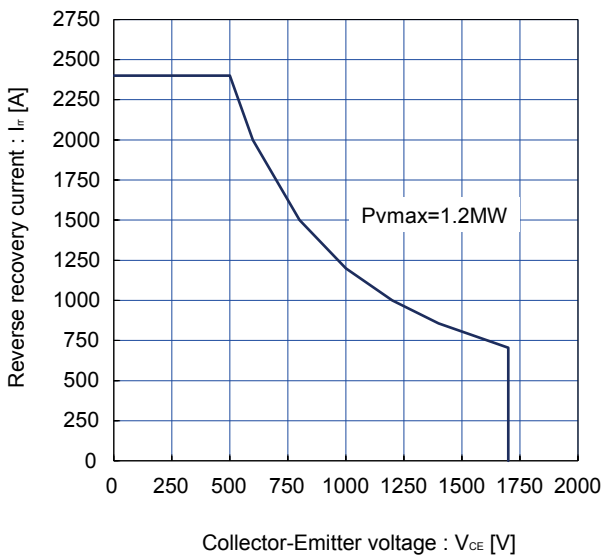
Forward current vs. Forward on voltage (typ.)  
chip



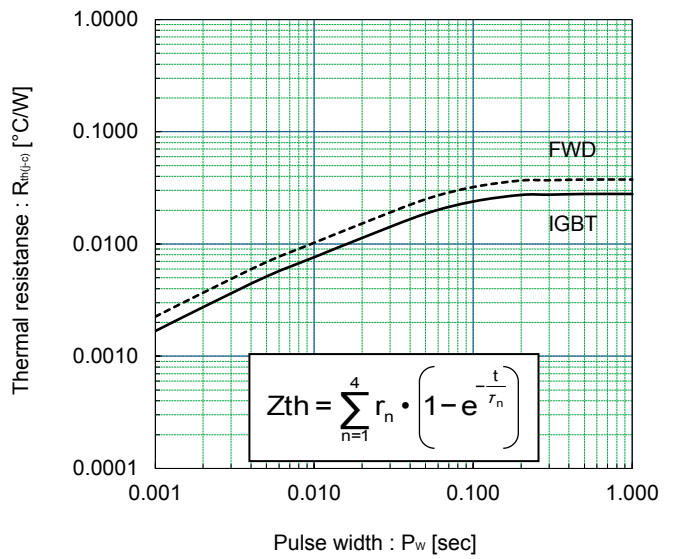
Reverse recovery characteristics (typ.)  
V<sub>CC</sub>=900V, V<sub>GE</sub>=±15V, R<sub>gon</sub>=1.5Ω



FWD safe operating area (max.)  
T<sub>J</sub>=150°C / sence terminals

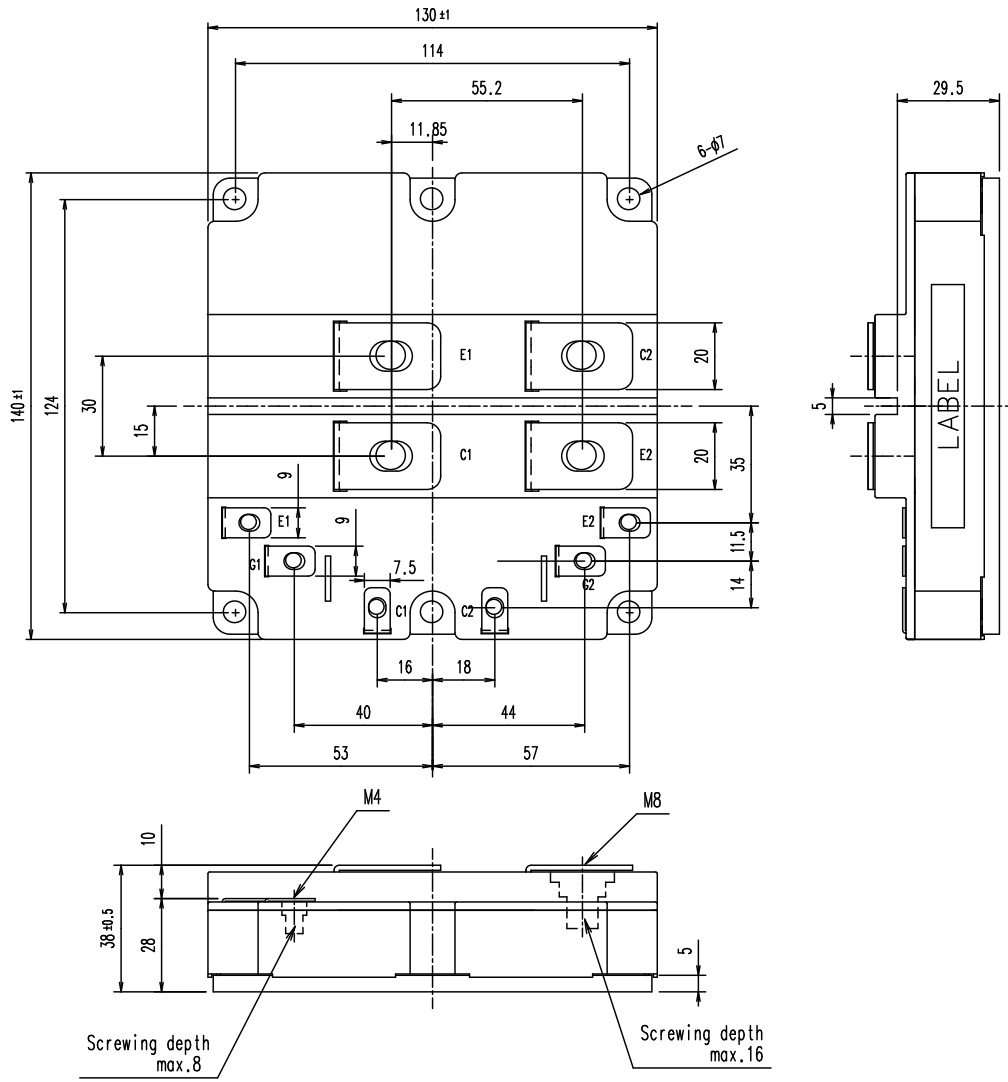


Transient thermal resistance (max.)

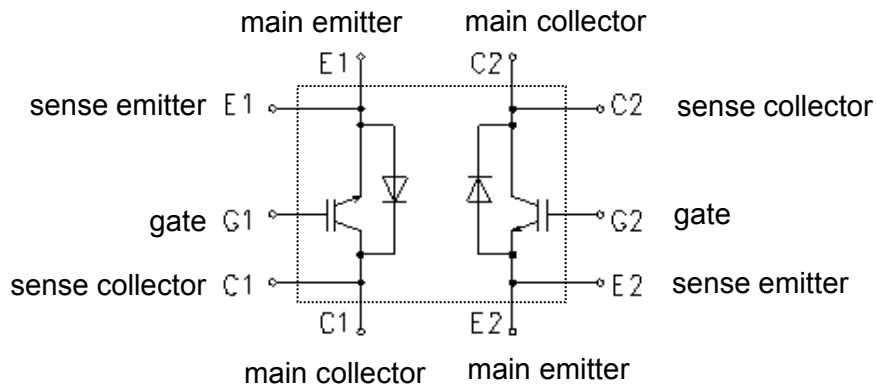


	IGBT	FWD
r1	0.00309	0.00414
r2	0.01076	0.01442
r3	0.00771	0.01034
r4	0.00635	0.00860
τ1	0.0024	0.0023
τ2	0.0353	0.0351
τ3	0.0648	0.0659
τ4	0.0722	0.0708

■ Outline Drawing (Unit : mm)



■ Equivalent circuit



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