

1MBI1200VR-170E

IGBT Modules

IGBT MODULE (V series) 1700V / 1200A / 1 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_{CES}		1700	V
Gate-Emitter voltage	V_{GES}		±20	V
Collector current	I_c	Continuous	$T_c=25^{\circ}\text{C}$ 1600	A
	I_{cp}	1ms	$T_c=100^{\circ}\text{C}$ 1200	
	$-I_c$		2400	
	$-I_{cp}$	1ms	1200	
Collector power dissipation	P_c	1 device	2400	W
Junction temperature	T_j		8570	°C
Operating junction temperature (under switching conditions)	T_{jop}		175	
Storage temperature	T_{slg}		150	
Isolation voltage	Between terminal and copper base (*1) V_{iso}	AC : 1min.	-40 ~ +125	VAC
Screw torque (*2)	Mounting	M6	4000	Nm
	Main Terminals	M8	5.75	
	Sense Terminals	M4	10	
			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_j = 25°C unless otherwise specified)

Items	Symbols	Conditions		Characteristics			Units
				min.	typ.	max.	
Zero gate voltage collector current	I _{CEs}	V _{GE} = 0V, V _{CE} = 1700V		-	-	1.0	mA
Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} =±20V		-	-	2400	nA
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V, I _c = 1200mA		6.0	6.5	7.0	V
Collector-Emitter saturation voltage	V _{CE(sat)} (main terminal)	V _{GE} =15V I _c = 1200A	T _J =25°C	-	2.18	2.46	V
			T _J =125°C	-	2.58	-	
			T _J =150°C	-	2.63	-	
	V _{CE(sat)} (chip)		T _J =25°C	-	2.00	2.25	
			T _J =125°C	-	2.40	-	
			T _J =150°C	-	2.45	-	
Internal gate resistance	Int R _g			-	1.46	-	Ω
Input capacitance	C _{ies}	V _{CE} =10V, V _{GE} =0V, f=1MHz		-	119	-	nF
Turn-on	t _{on}	V _{CC} = 900V, I _c =1200A		-	1.51	-	μs
	t _r	L _m =56nH, V _{GE} =±15V, T _J =125°C		-	0.54	-	
Turn-off	t _{off}	R _{gon} = 0.33 Ω		-	2.20	-	
	t _f	R _{goff} = 0.82 Ω		-	0.45	-	
Forward on voltage	V _F (main terminal)	V _{GE} =0V I _F = 1200A	T _J =25°C	-	1.84	2.18	V
			T _J =125°C	-	2.00	-	
			T _J =150°C	-	1.97	-	
	V _F (chip)		T _J =25°C	-	1.66	1.98	
			T _J =125°C	-	1.82	-	
			T _J =150°C	-	1.79	-	
Reverse recovery time	t _{rr}	I _F = 1200A, T _J =125°C		-	0.37	-	μs
Lead resistance, terminal-chip	R lead			-	0.146	-	mΩ

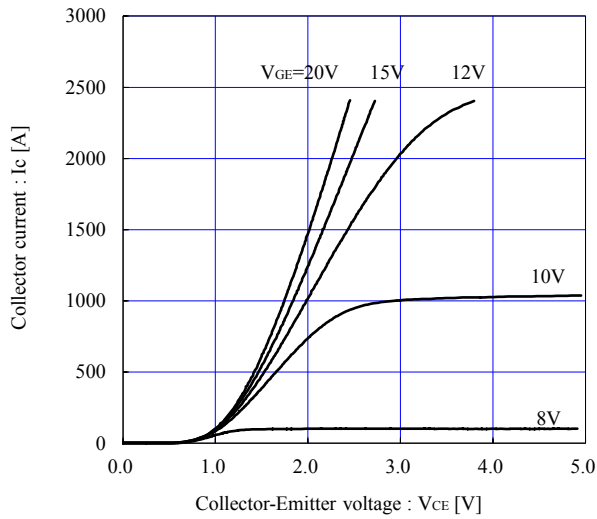
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance	R _{th(j-c)}	IGBT	-	-	0.0175	°C/W
		FWD	-	-	0.0235	
Contact thermal resistance (*3)	R _{th(c-f)}	with Thermal Compound	-	0.0077	-	

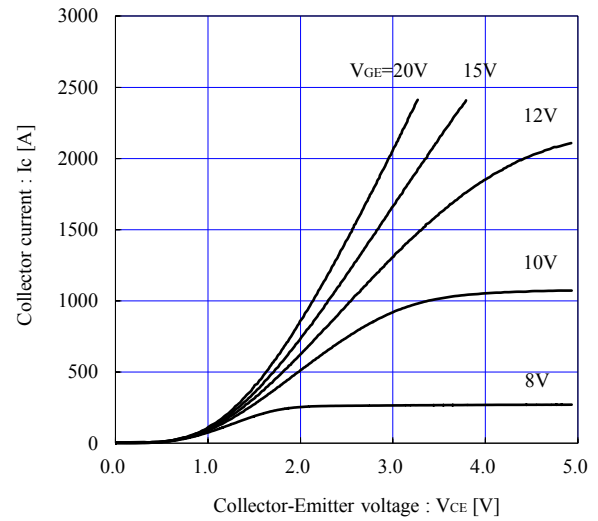
Note *3: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

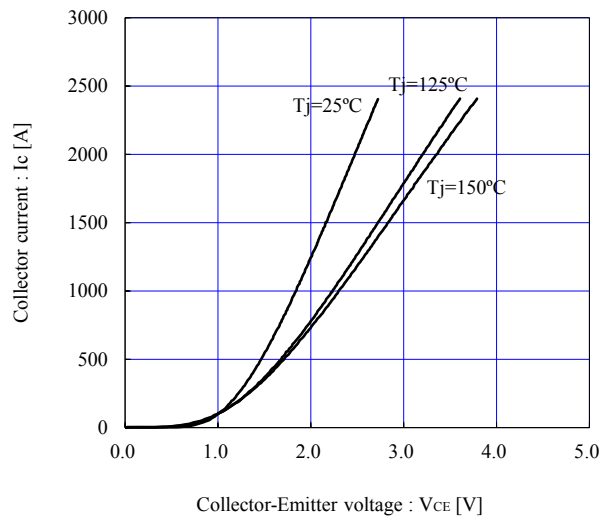
Collector current vs. Collector-Emitter voltage (typ.)
 $T_j = 25^\circ\text{C, chip}$



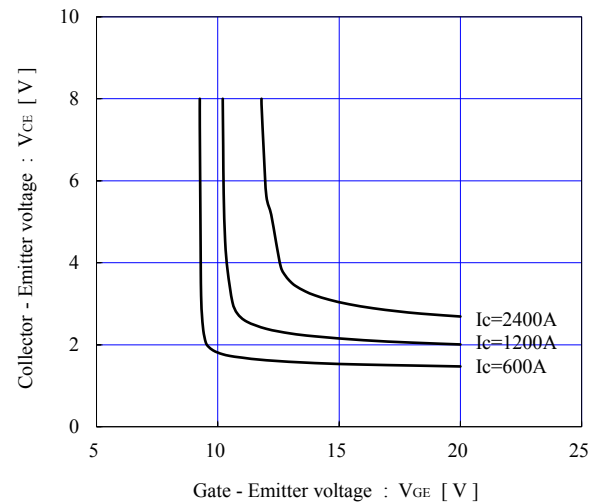
Collector current vs. Collector-Emitter voltage (typ.)
 $T_j = 150^\circ\text{C, chip}$



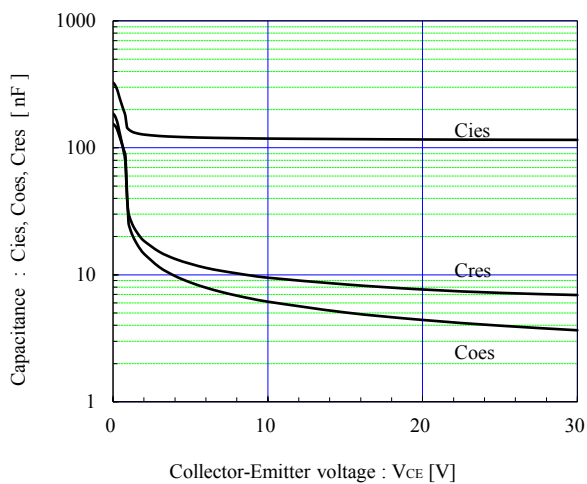
Collector current vs. Collector-Emitter voltage (typ.)
 $V_{GE} = +15\text{V, chip}$



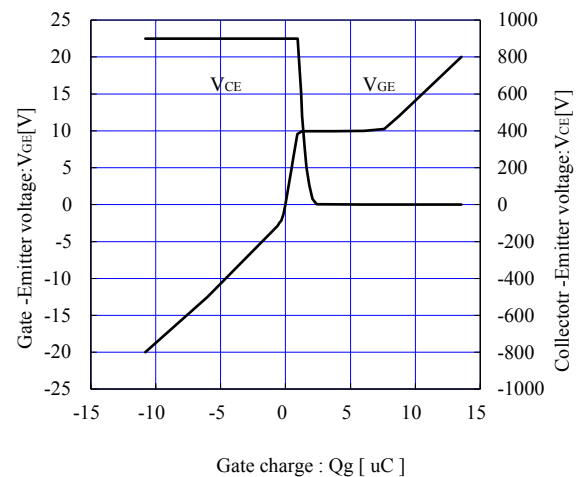
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
 $T_j = 25^\circ\text{C, chip}$



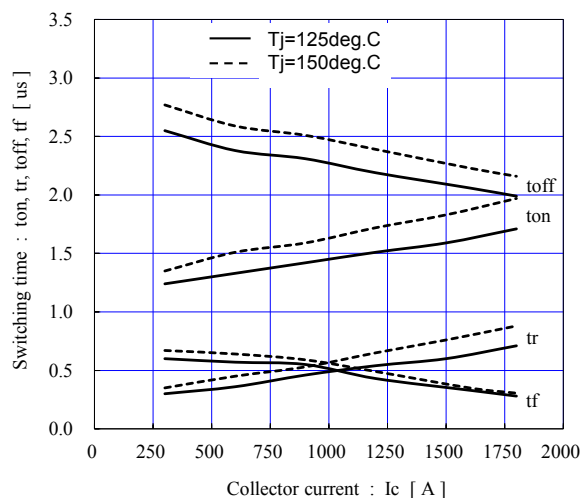
Capacitance vs. Collector-Emitter voltage (typ.)
 $V_{GE} = 0\text{V, } f = 1\text{MHz, } T_j = 25^\circ\text{C}$



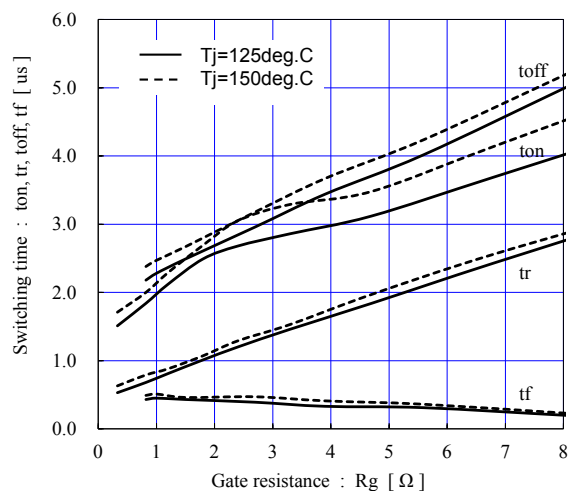
Dynamic Gate charge (typ.)
 $T_j = 25^\circ\text{C}$



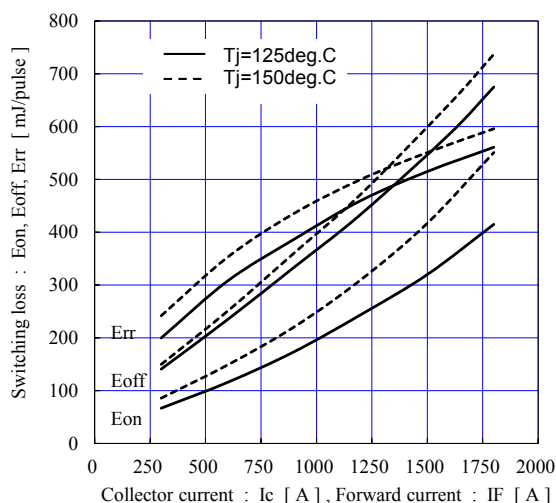
Switching time vs. Collector current (typ.)

 $V_{ce}=900V, V_{GE}=\pm 15V, R_{gon}=0.33\Omega, R_{goff}=0.82\Omega$ 

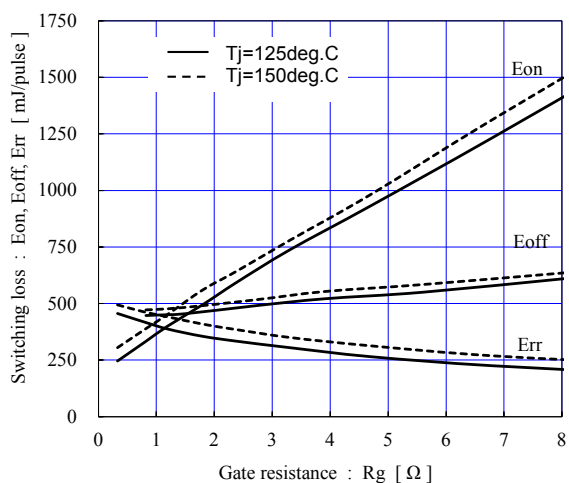
Switching time vs. Gate resistance (typ.)

 $V_{ce}=900V, I_c=1200A, V_{GE}=\pm 15V$ 

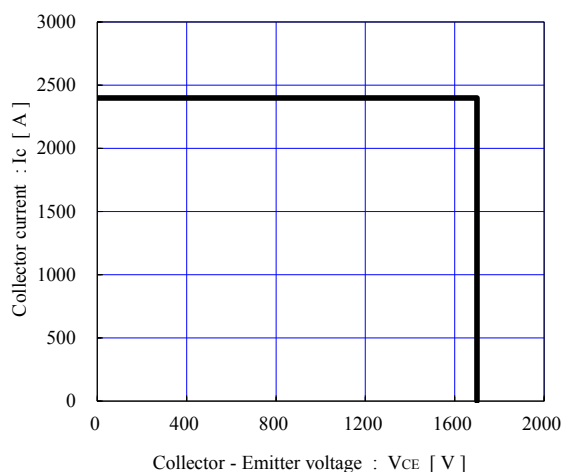
Switching loss vs. Collector current (typ.)

 $V_{ce}=900V, V_{GE}=\pm 15V, R_{gon}=0.33\Omega, R_{goff}=0.82\Omega$ 

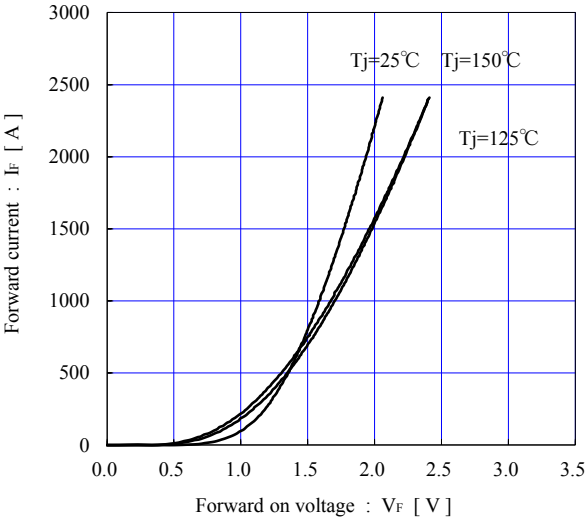
Switching loss vs. Gate resistance (typ.)

 $V_{ce}=900V, I_c=1200A, V_{GE}=\pm 15V$ 

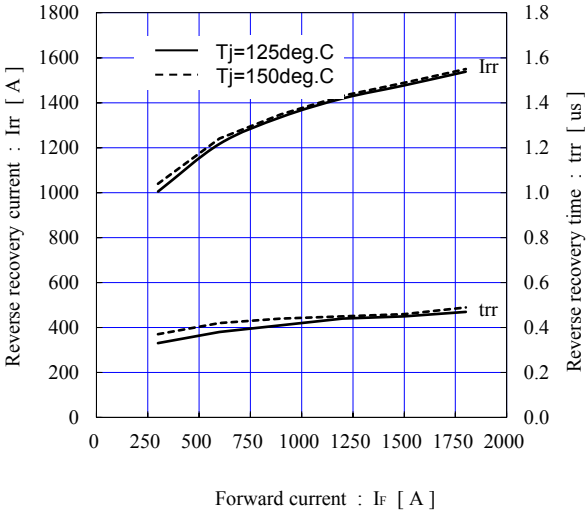
Reverse bias safe operating area (max.)

 $\pm V_{GE}=15V, T_j = 150^{\circ}C / \text{chip}$ 

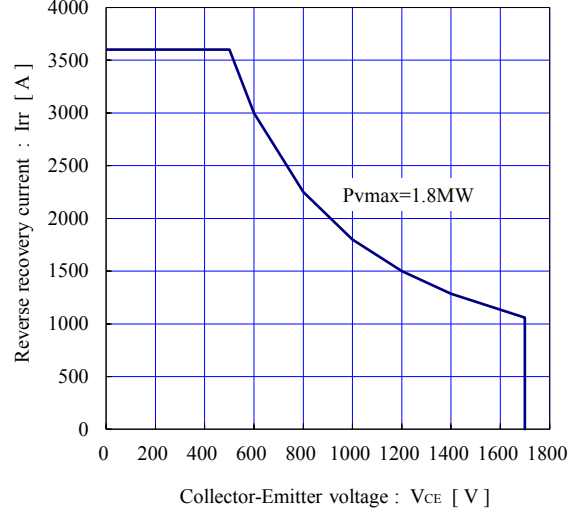
Forward current vs. Forward on voltage (typ.)
chip



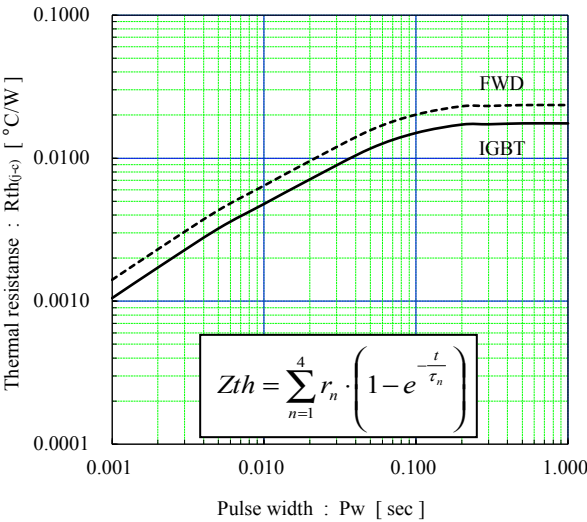
Reverse recovery characteristics (typ.)
Vcc=900V, VGE=±15V, Rgon=0.33Ω



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

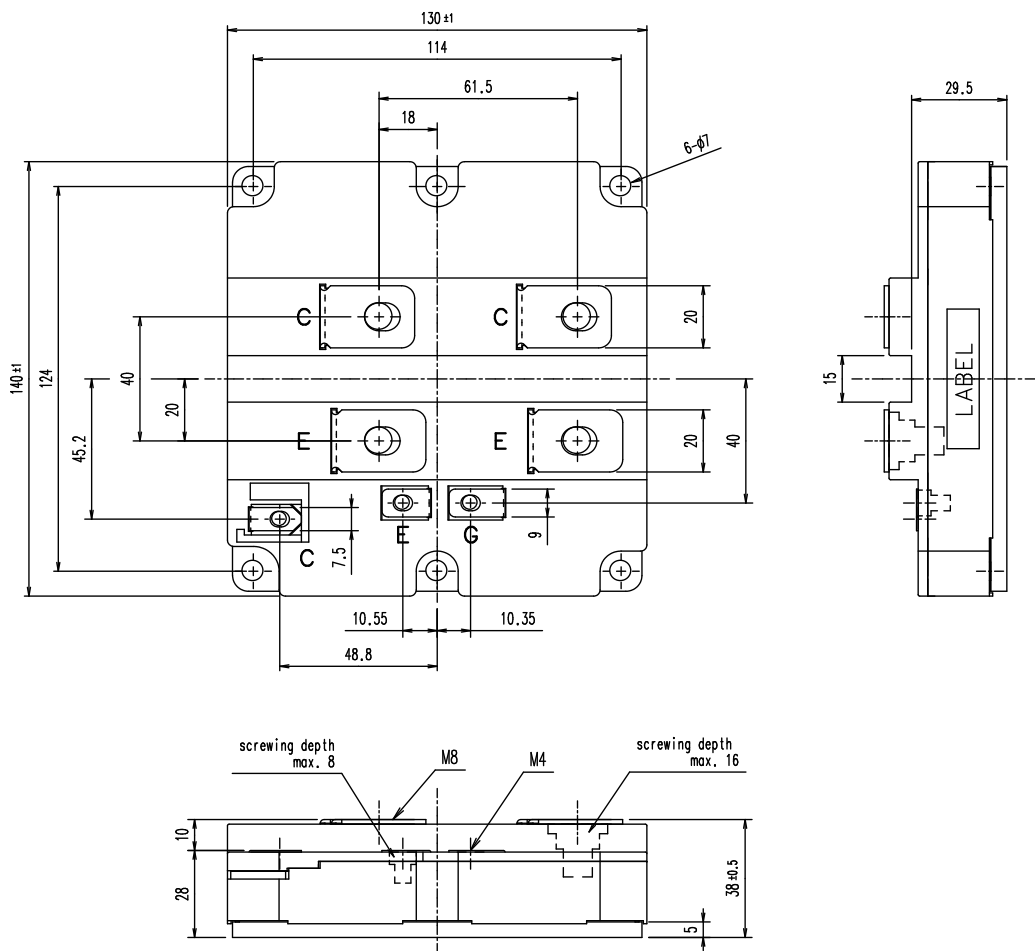


Transient thermal resistance (max.)

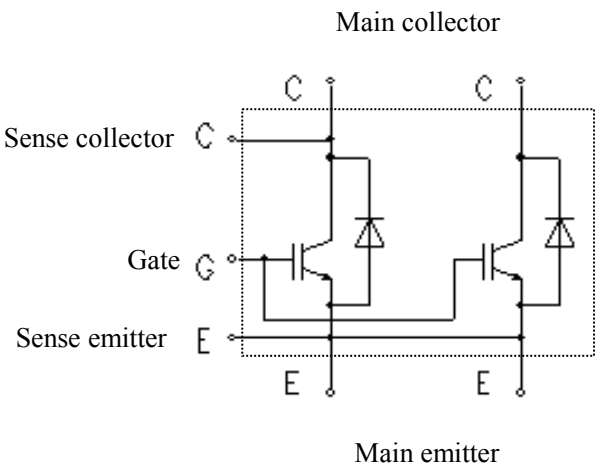


	IGBT	FWD
r1	0.00195	0.00260
r2	0.00676	0.00907
r3	0.00484	0.00649
r4	0.00395	0.00533
τ1	0.0024	0.0024
τ2	0.0356	0.0354
τ3	0.0636	0.0643
τ4	0.0735	0.0728

Outline Drawings, mm



Equivalent Circuit Schematic



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