

1MBI1200VC-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	2400	
	$-I_c$		1200	
	$-I_{c\ pulse}$	1ms	2400	
Collector power dissipation	P_c	1 device	8820	W
Junction temperature	T_j		175	°C
Operating junction temperature (under switching conditions)	T_{jop}		150	
Storage temperature	T_{stg}		-40 ~ +150	
Isolation voltage	Between terminal and copper base (*1) V_{iso}	AC : 1min.	4000	VAC
Screw torque (*2)	Mounting	M6	5.75	Nm
	Main Terminals	M8	10	
	Sense Terminals	M4	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	-	2.18	-	μs	
	t _r	L _m = 56nH, V _{GE} = ±15V, T _j = 125°C	-	0.76	-		
Turn-off	t _{off}	R _{gon} = 1.2 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	-	1.98	2.36	V
			T _j = 125°C	-	2.18	-	
			T _j = 150°C	-	2.16	-	
	V _F (chip)		T _j = 25°C	-	1.80	2.15	
			T _j = 125°C	-	2.00	-	
			T _j = 150°C	-	1.98	-	
Reverse recovery time	t _{rr}	I _F = 1200A, T _j = 125°C	-	0.37	-	μs	
Lead resistance, terminal-chip	R lead		-	0.146	-	mΩ	

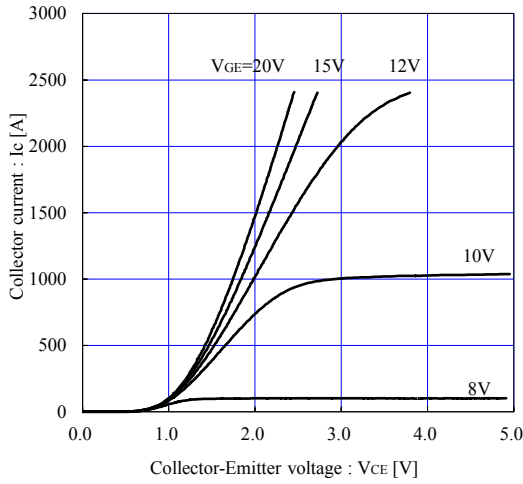
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance	R _{th(j-c)}	IGBT	-	-	0.017	°C/W
		FWD	-	-	0.030	
Contact Thermal resistance (*3)	R _{th(c-f)}	with Thermal Compound	-	0.006	-	

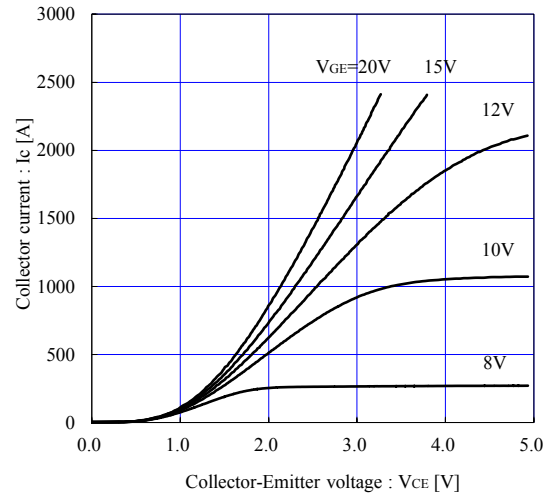
Note *3: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

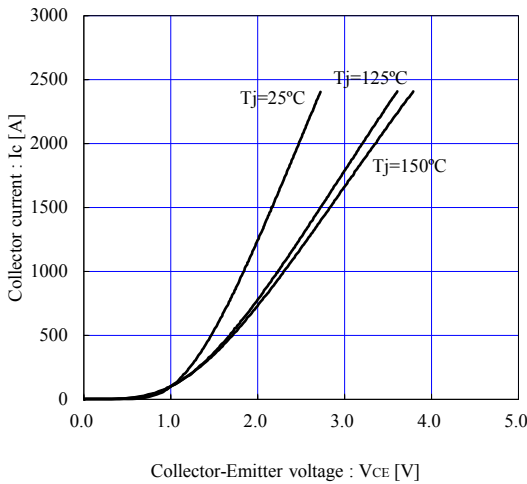
Collector current vs. Collector-Emittor voltage (typ.)
T_j=25°C, chip



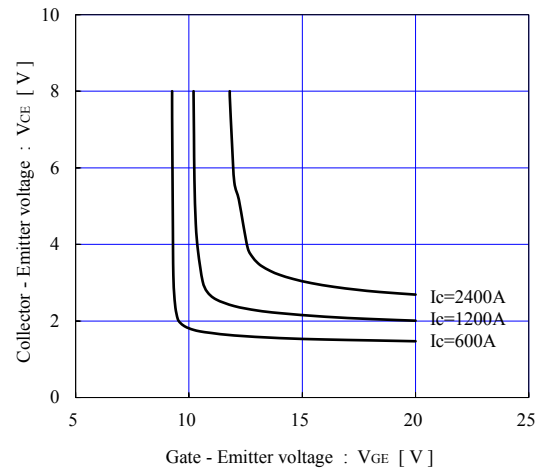
Collector current vs. Collector-Emittor voltage (typ.)
T_j= 150°C, chip



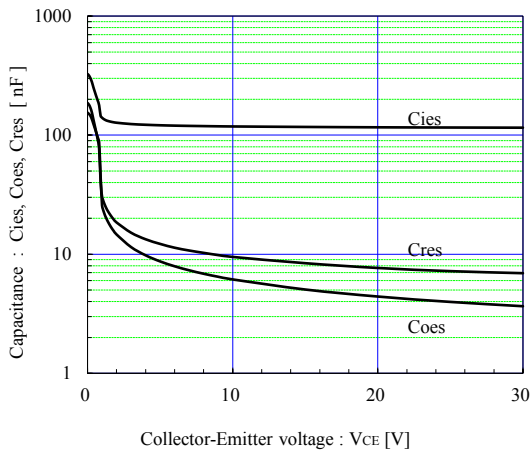
Collector current vs. Collector-Emittor voltage (typ.)
V_{GE}=+15V, chip



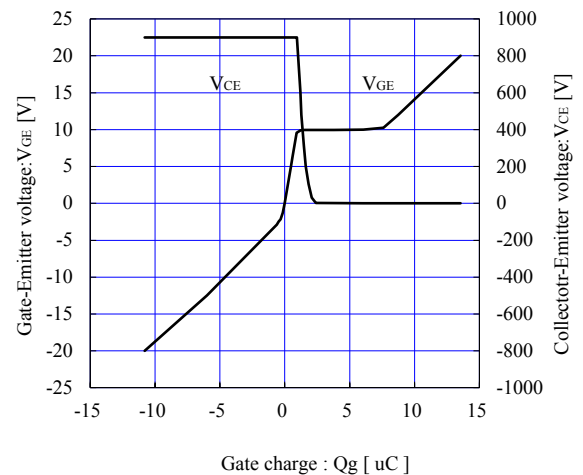
Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)
T_j=25°C, chip



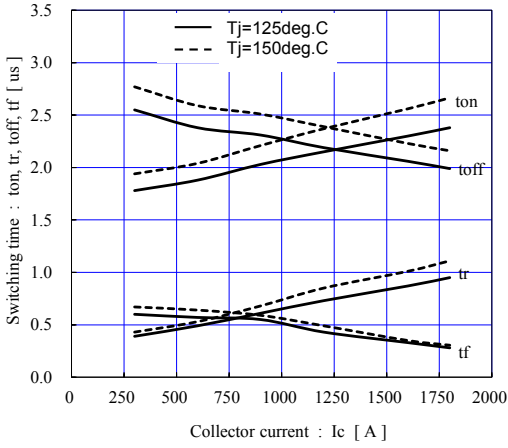
Capacitance vs. Collector-Emittor voltage (typ.)
V_{GE}=0V, f= 1MHz, T_j= 25°C



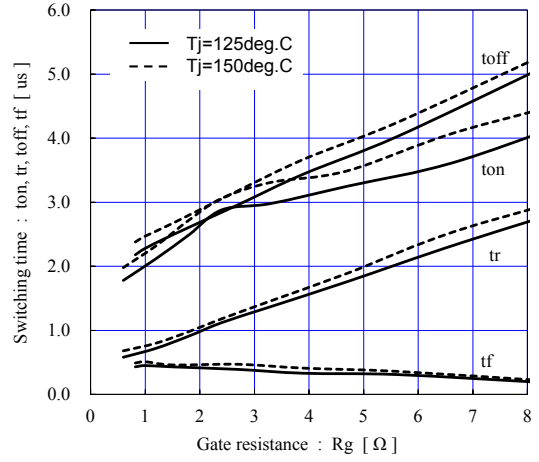
Dynamic Gate charge (typ.)
T_j= 25°C



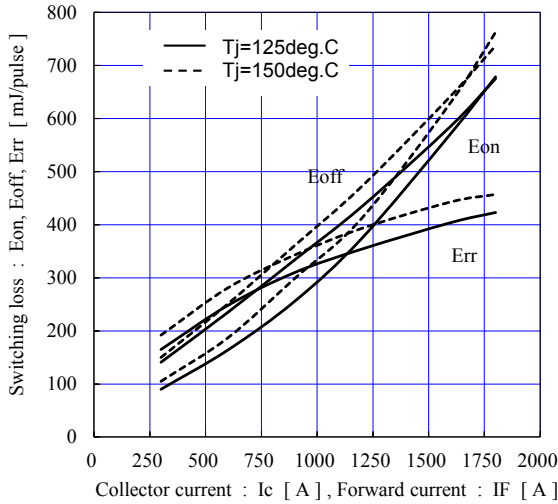
Switching time vs. Collector current (typ.)
 $V_{cc}=900V, V_{GE}=\pm 15V, R_{gon}=1.2\Omega, R_{goff}=0.82\Omega$



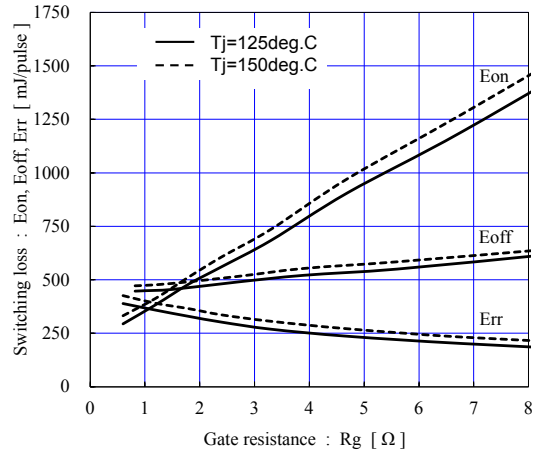
Switching time vs. Gate resistance (typ.)
 $V_{cc}=900V, I_c=1200A, V_{GE}=\pm 15V$



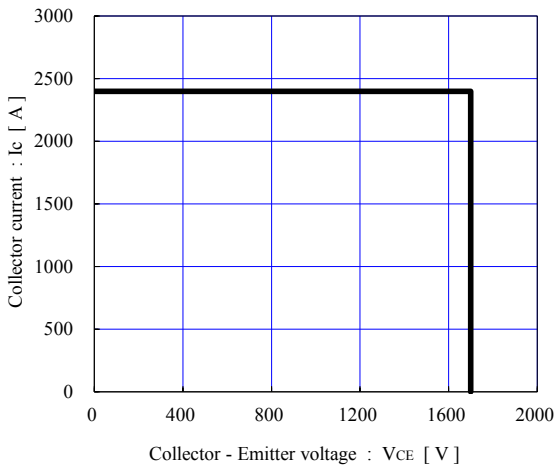
Switching loss vs. Collector current (typ.)
 $V_{cc}=900V, V_{GE}=\pm 15V, R_{gon}=1.2\Omega, R_{goff}=0.82\Omega$



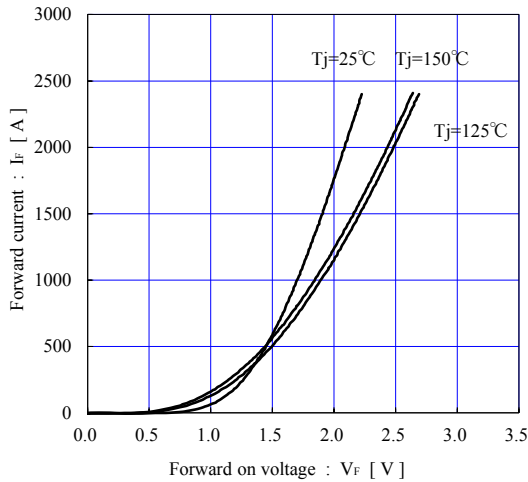
Switching loss vs. Gate resistance (typ.)
 $V_{cc}=900V, I_c=1200A, V_{GE}=\pm 15V$



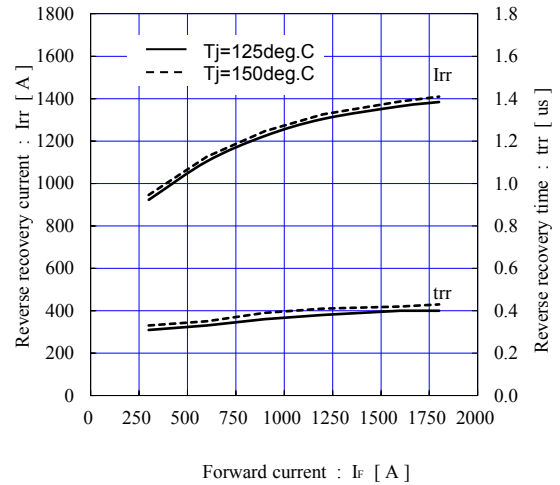
Reverse bias safe operating area (max.)
 $\pm V_{GE}=15V, T_j = 150^\circ\text{C} / \text{chip}$



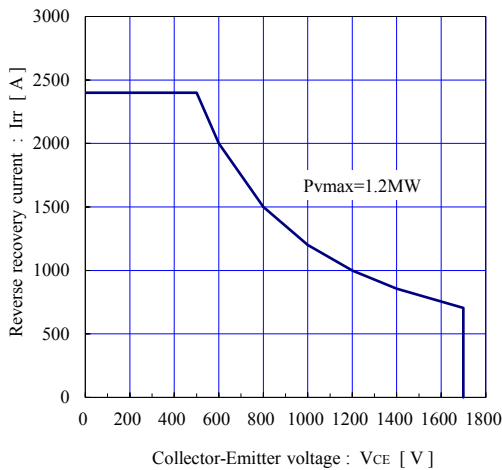
Forward current vs. Forward on voltage (typ.)
chip



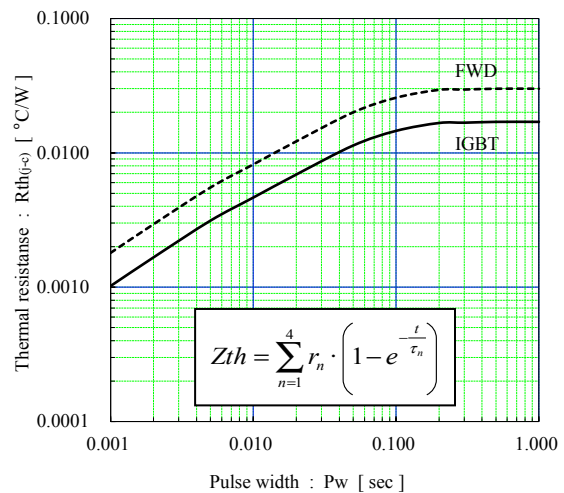
Reverse recovery characteristics (typ.)
Vce=900V, VGE=±15V, Rgon=1.2Ω



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

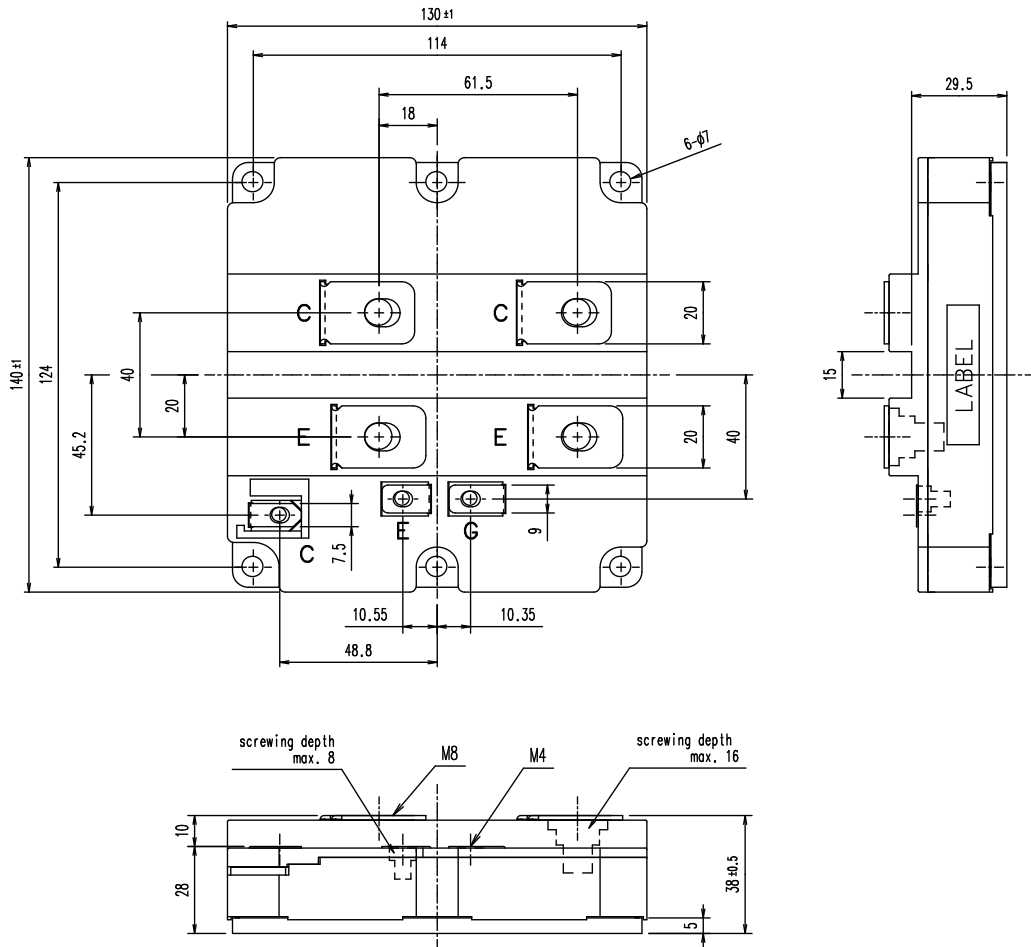


Transient thermal resistance (max.)

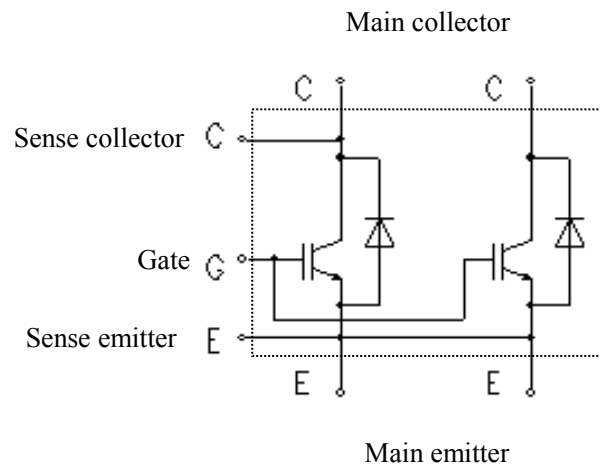


	IGBT	FWD
r1	0.00280	0.00378
r2	0.00587	0.01123
r3	0.00461	0.00832
r4	0.00371	0.00667
τ1	0.0043	0.0028
τ2	0.0468	0.0395
τ3	0.0562	0.0588
τ4	0.0718	0.0743

■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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