

# 6MBI180VX-120-50

**IGBT Modules**

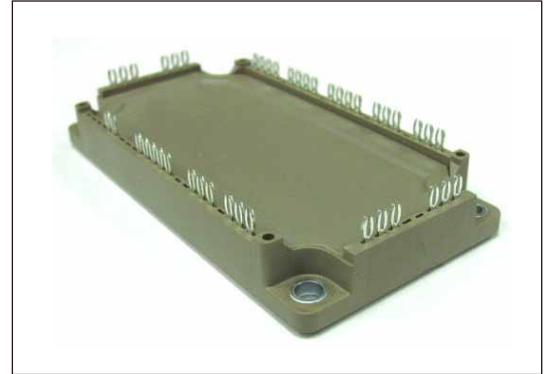
## IGBT MODULE (V series) 1200V / 180A / 6 in one package

### ■ Features

- Compact Package
- P.C.Board Mount
- Low  $V_{CE(sat)}$

### ■ 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 $T_c=25^\circ\text{C}$ unless otherwise specified)

Items		Symbols	Conditions	Maximum ratings	Units	
Inverter	Collector-Emitter voltage	$V_{CES}$		1200	V	
	Gate-Emitter voltage	$V_{GES}$		$\pm 20$	V	
	Collector current	$I_c$	Continuous	$T_c=100^\circ\text{C}$	150	A
		$I_c$ pulse	1ms	$T_c=80^\circ\text{C}$	400	
		$-I_c$			150	
		$-I_c$ pulse	1ms		400	
Collector power dissipation	$P_c$	1 device		835	W	
Junction temperature	$T_j$			175	$^\circ\text{C}$	
Operating junction temperature (under switching conditions)	$T_{jop}$			150		
Case temperature	$T_c$			125		
Storage temperature	$T_{stg}$			-40 ~ +125		
Isolation voltage	Between terminal and copper base (*1) Between thermistor and others (*2)	$V_{iso}$	AC : 1min.	2500	VAC	
Screw torque	Mounting (*3)	-	M5	3.5	N m	

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 : 2.5-3.5 Nm (M5)

● Electrical characteristics (at Tj= 25°C unless otherwise specified)

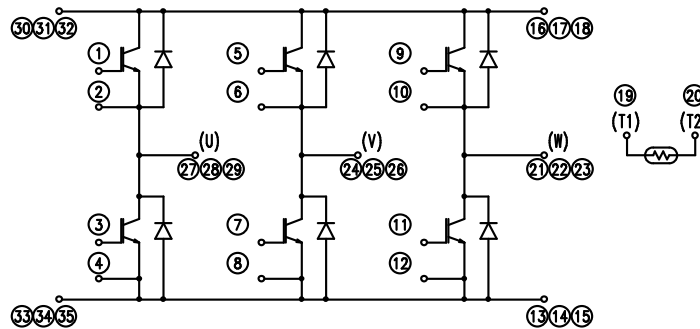
Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage collector current	$I_{CES}$	$V_{GE} = 0V, V_{CE} = 1200V$	-	-	1.0	mA	
Gate-Emitter leakage current	$I_{GES}$	$V_{CE} = 0V, V_{GE} = \pm 20V$	-	-	200	nA	
Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_c = 200mA$	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_c = 200A$	Tj=25°C	-	2.70	3.15	V
			Tj=125°C	-	3.05	-	
			Tj=150°C	-	3.10	-	
	$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_c = 200A$	Tj=25°C	-	1.85	2.30	
			Tj=125°C	-	2.20	-	
			Tj=150°C	-	2.25	-	
Internal gate resistance	$R_g(int)$	-	-	3.8	-	Ω	
Input capacitance	$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	-	16.5	-	nF	
Turn-on time	$t_{on}$	$V_{CC} = 600V$ $I_c = 200A$	-	0.39	1.20	μs	
	$t_r$		-	0.09	0.60		
	$t_r(i)$		-	0.03	-		
Turn-off time	$t_{off}$	$V_{GE} = +15 / -15V$ $R_G = 1.2Ω$	-	0.53	1.00	μs	
	$t_f$		-	0.06	0.30		
Forward on voltage	$V_F$ (terminal)	$I_F = 200A$	Tj=25°C	-	2.55	3.00	V
			Tj=125°C	-	2.70	-	
			Tj=150°C	-	2.65	-	
	$V_F$ (chip)	$I_F = 200A$	Tj=25°C	-	1.70	2.15	
			Tj=125°C	-	1.85	-	
			Tj=150°C	-	1.80	-	
Reverse recovery time	$t_{rr}$	$I_F = 200A$	-	-	0.35	μs	
Resistance	R	T = 25°C	-	5000	-	Ω	
		T = 100°C	465	495	520		
		T = 25 / 50°C	3305	3375	3450		
B value	B	T = 25 / 50°C	3305	3375	3450	K	

● Thermal resistance characteristics

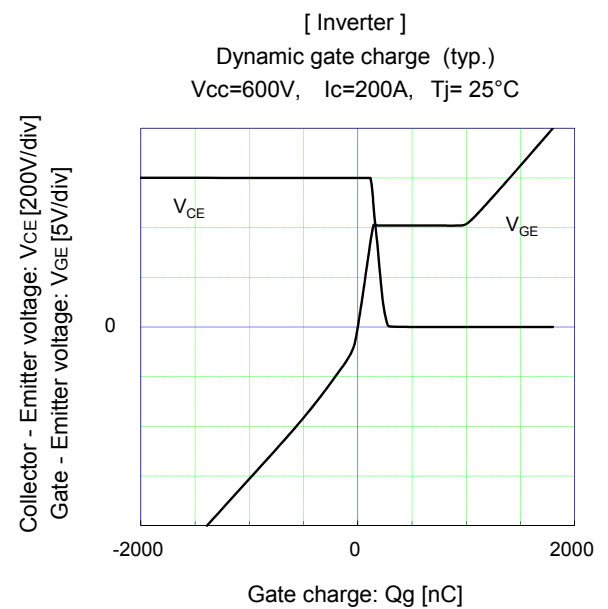
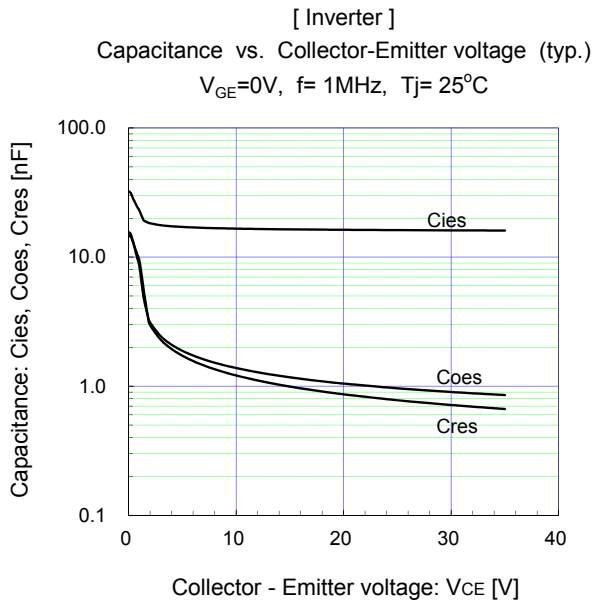
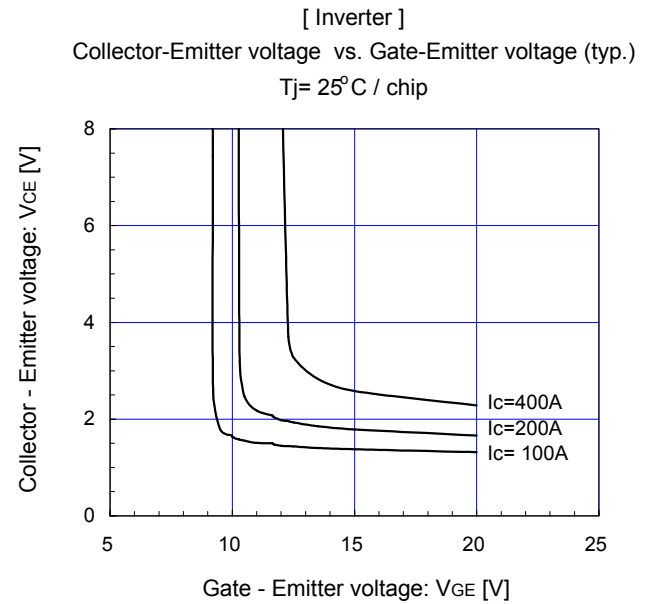
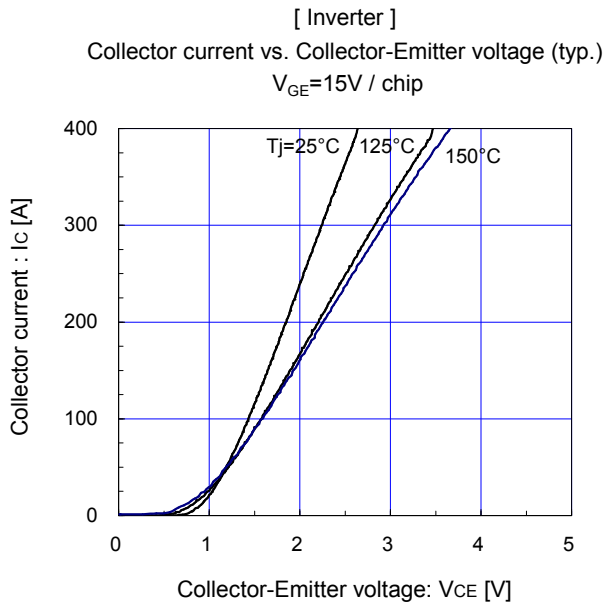
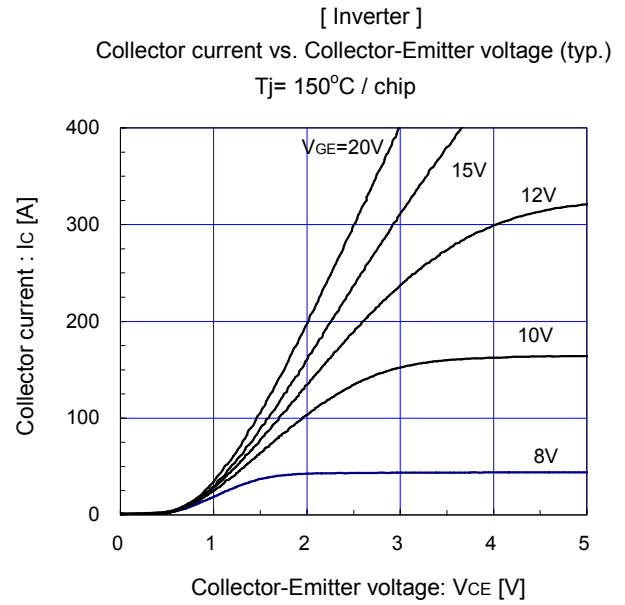
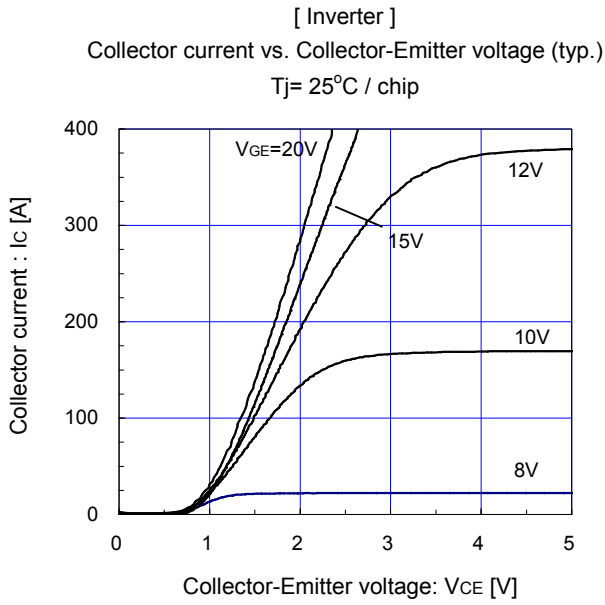
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	Rth(j-c)	Inverter IGBT	-	-	0.18	°C/W
		Inverter FWD	-	-	0.29	
Contact thermal resistance (1device) (*4)	Rth(c-f)	with Thermal Compound	-	0.05	-	

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

■ Equivalent Circuit Schematic

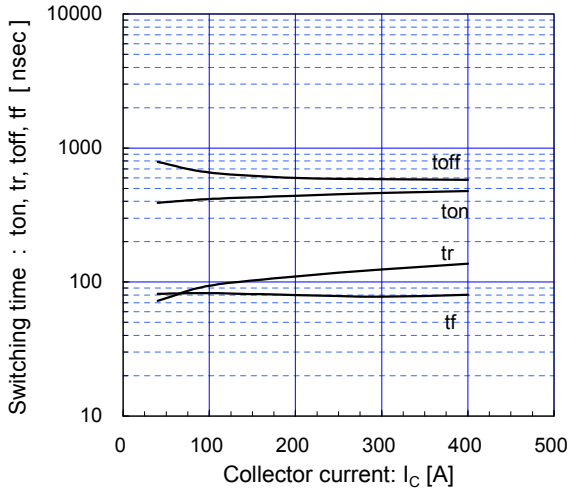


■ Characteristics (Representative)



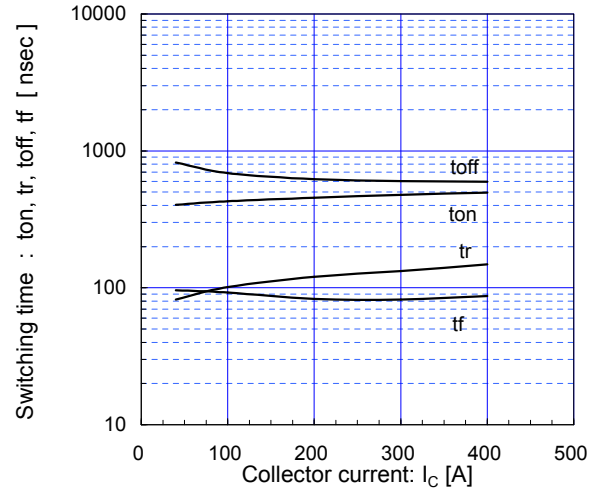
[ Inverter ]

Switching time vs. Collector current (typ.)  
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.2\Omega, T_j=125^\circ C$



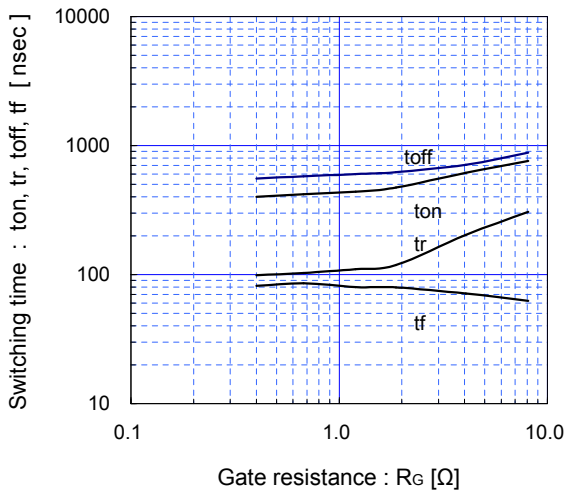
[ Inverter ]

Switching time vs. Collector current (typ.)  
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.2\Omega, T_j=150^\circ C$



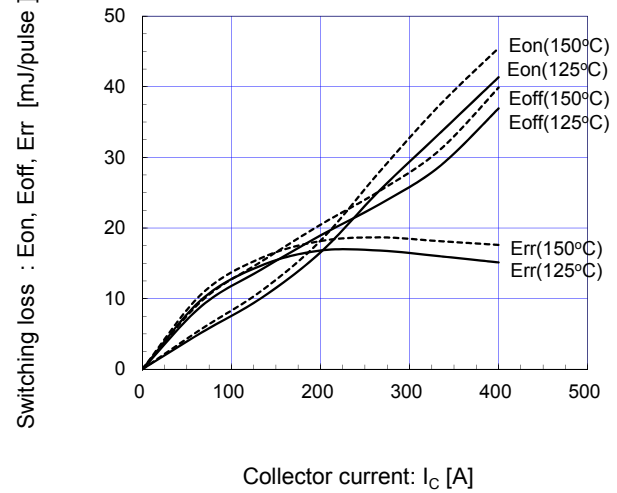
[ Inverter ]

Switching time vs. gate resistance (typ.)  
 $V_{CC}=600V, I_C=200A, V_{GE}=\pm 15V, T_j=125^\circ C$



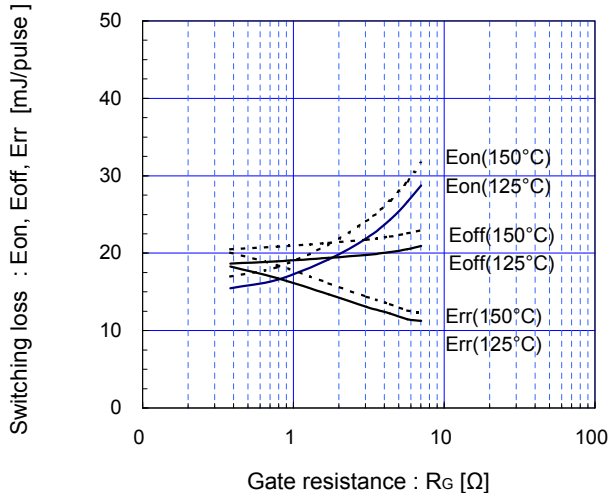
[ Inverter ]

Switching loss vs. Collector current (typ.)  
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.2\Omega$



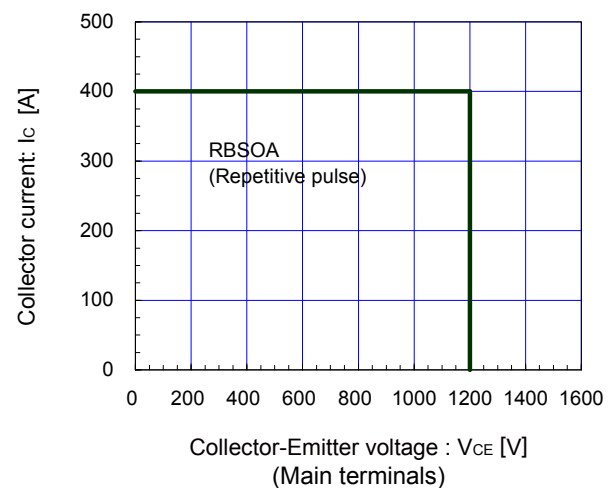
[ Inverter ]

Switching loss vs. gate resistance (typ.)  
 $V_{CC}=600V, I_C=200A, V_{GE}=\pm 15V$



[ Inverter ]

Reverse bias safe operating area (max.)  
 $+V_{GE}=15V, -V_{GE} \leq 15V, R_G \geq 1.2\Omega, T_j=150^\circ C$





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