

2MBI400VB-060-50

IGBT Modules

IGBT MODULE (V series) 600V / 400A / 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_c=25°C unless otherwise specified)

Items	Symbols	Conditions	Maximum ratings	Units
Collector-Emitter voltage	V _{CEs}		600	V
Gate-Emitter voltage	V _{GES}		±20	V
Collector current	I _c	Continuous T _c =80°C	400	
	I _{c pulse}	1ms	800	
	-I _c		400	
	-I _{c pulse}	1ms	800	
Collector power dissipation	P _C	1 device	1970	W
Junction temperature	T _j		175	°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) V _{iso}	AC : 1min.	2500	VAC
Screw torque	Mounting (*2)		3.5	N m
	Terminals (*3)		3.5	

Note *1: All terminals should be connected together during the test.

Note *2: Recommendable Value : 2.5-3.5 Nm (M5 or M6)

Note *3: Recommendable Value : 2.5-3.5 Nm (M5)

● 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} = 600V	-	-	2.0	mA	
Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V	-	-	400	nA	
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V, I _c = 400mA	6.2	6.7	7.2	V	
Collector-Emitter saturation voltage	V _{CE(sat)} (terminal)	V _{GE} = 15V I _c = 400A	T _j =25°C	-	1.90	2.35	V
			T _j =125°C	-	2.20	-	
			T _j =150°C	-	2.30	-	
	V _{CE(sat)} (chip)	V _{GE} = 15V I _c = 400A	T _j =25°C	-	1.60	2.05	
			T _j =125°C	-	1.90	-	
			T _j =150°C	-	2.00	-	
Internal gate resistance	R _{G(int)}	-	-	2.0	-	Ω	
Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	-	25.6	-	nF	
Turn-on time	t _{on}	V _{CC} = 300V L _s = 30nH	-	650	-	nsec	
	t _r	I _c = 400A	-	300	-		
	t _{r(i)}	V _{GE} = ±15V	-	100	-		
	t _{off}	R _θ = 3.3Ω	-	600	-		
Turn-off time	t _r	T _j = 150°C	-	70	-	nsec	
			-	-	-		
	V _F (terminal)	V _{GE} = 0V I _F = 400A	T _j =25°C	-	1.75		2.20
			T _j =125°C	-	1.65		-
			T _j =150°C	-	1.62		-
V _F (chip)	V _{GE} = 0V I _F = 400A	T _j =25°C	-	1.60	2.05		
		T _j =125°C	-	1.50	-		
Reverse recovery time	t _{rr}	I _F = 400A	-	200	-	nsec	

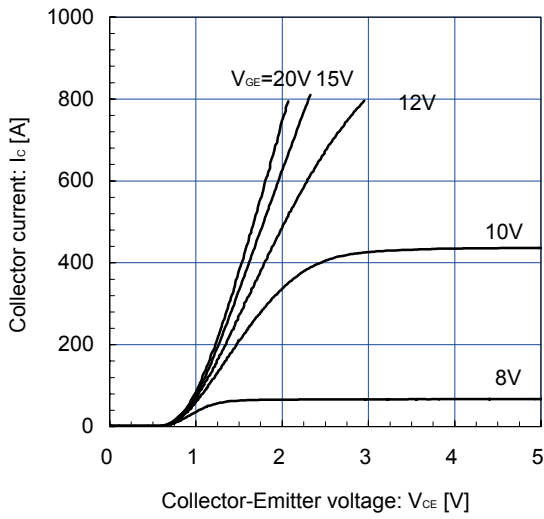
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	IGBT	-	-	0.076	°C/W
		FWD	-	-	0.140	
Contact thermal resistance (1device) (*4)	R _{th(c-f)}	with Thermal Compound	-	0.025	-	

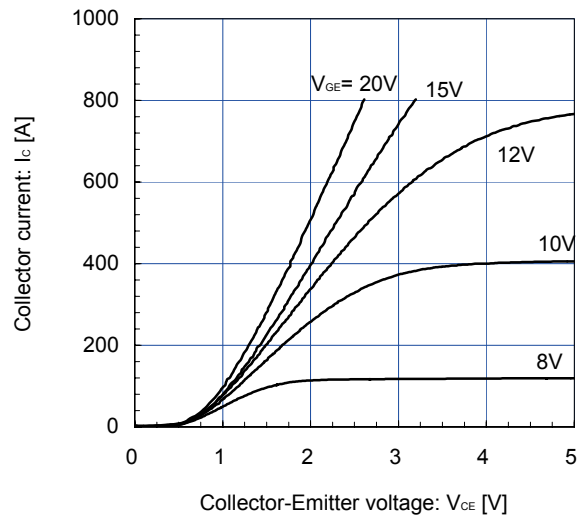
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

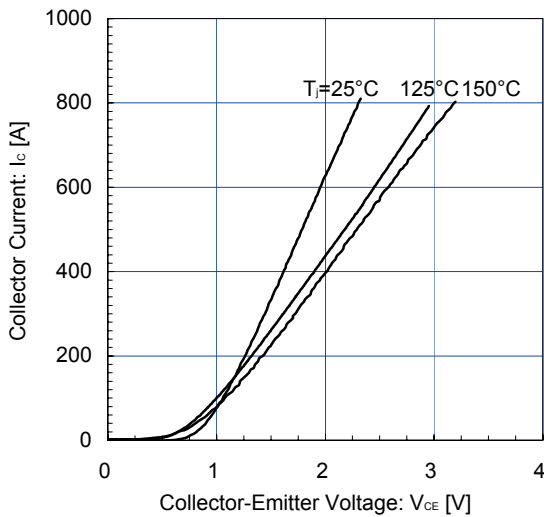
Collector current vs. Collector-Emitter voltage (typ.)
 $T_J = 25^\circ\text{C}$ / chip



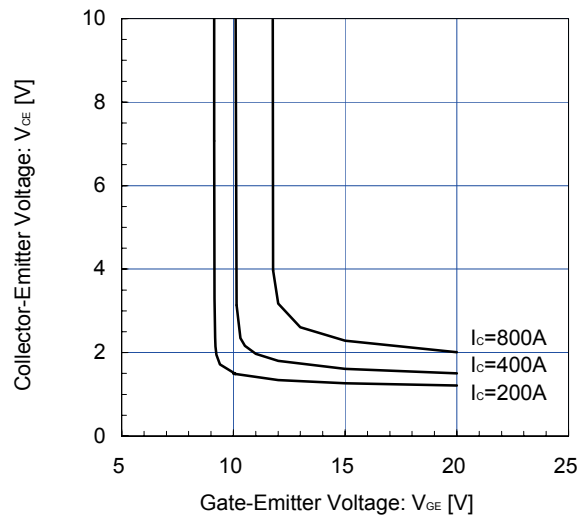
Collector current vs. Collector-Emitter voltage (typ.)
 $T_J = 150^\circ\text{C}$ / chip



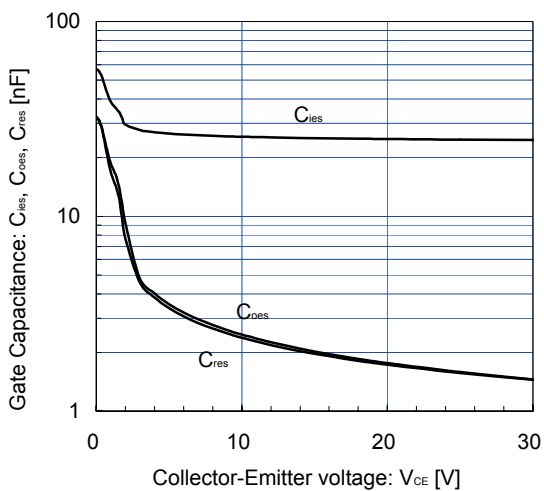
Collector current vs. Collector-Emitter voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



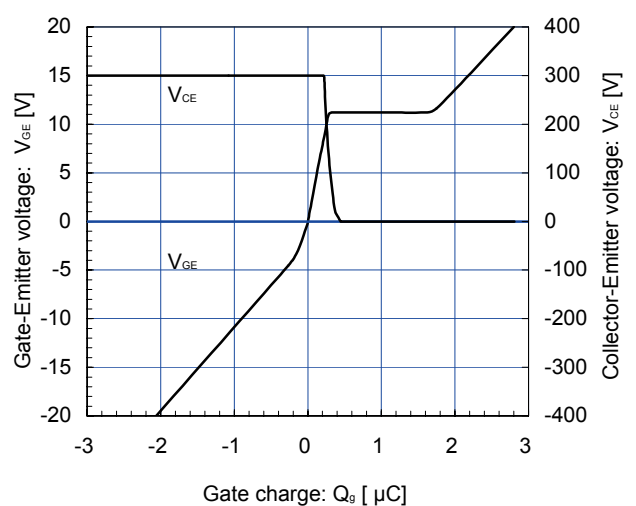
Collector-Emitter voltage vs. Gate-Emitter voltage
 $T_J = 25^\circ\text{C}$ / chip



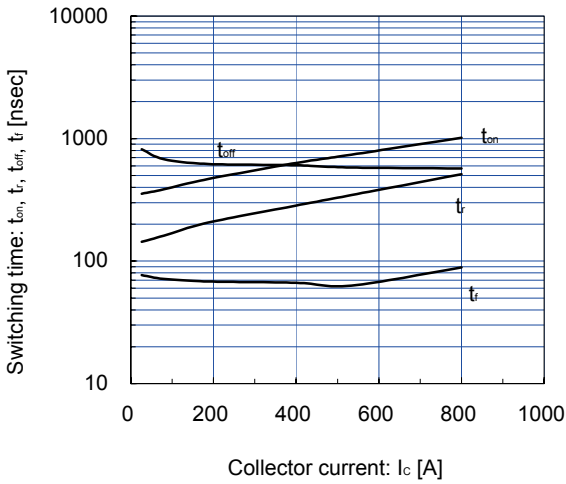
Gate Capacitance vs. Collector-Emitter Voltage
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$



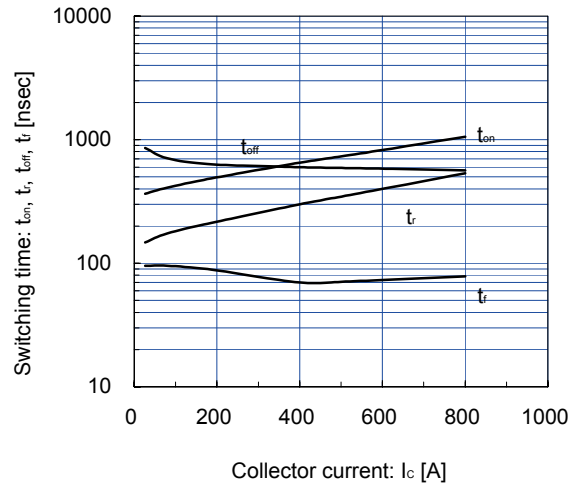
Dynamic Gate Charge (typ.)
 $V_{CC} = 300\text{V}$, $I_C = 400\text{A}$, $T_J = 25^\circ\text{C}$



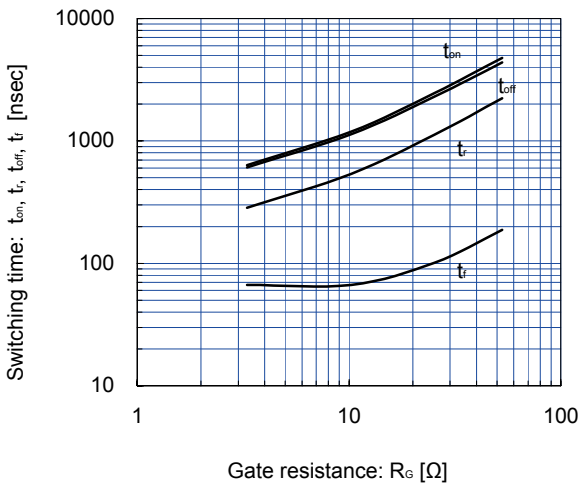
Switching time vs. Collector current (typ.)
 $V_{CC}=300V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=125^\circ C$



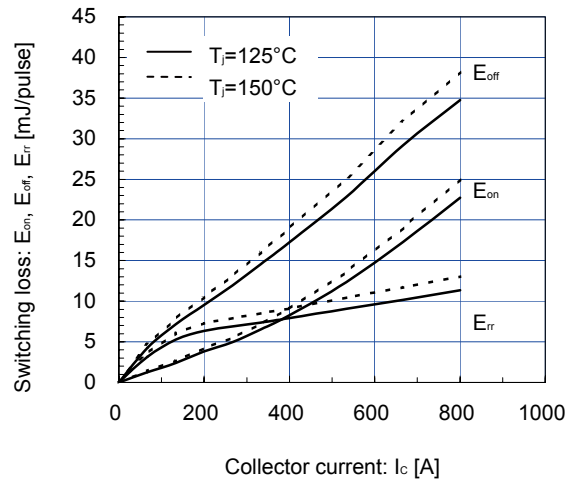
Switching time vs. Collector current (typ.)
 $V_{CC}=300V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=150^\circ C$



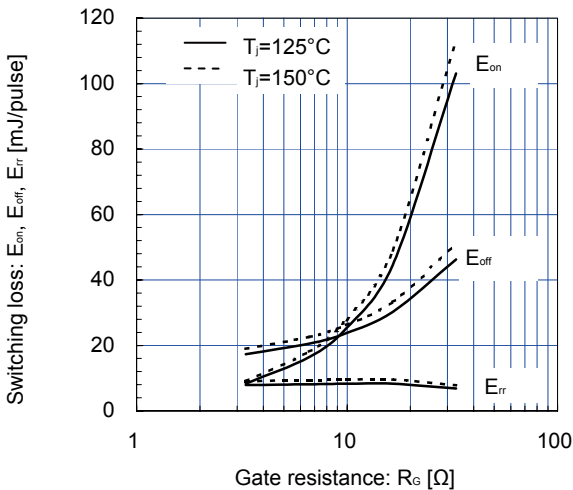
Switching time vs. Gate resistance (typ.)
 $V_{CC}=300V, I_C=400A, V_{GE}=\pm 15V, T_J=125^\circ C$



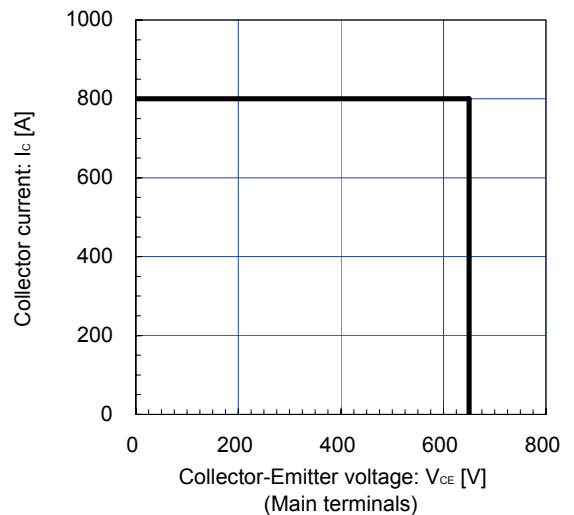
Switching loss vs. Collector current (typ.)
 $V_{CC}=300V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=125, 150^\circ C$



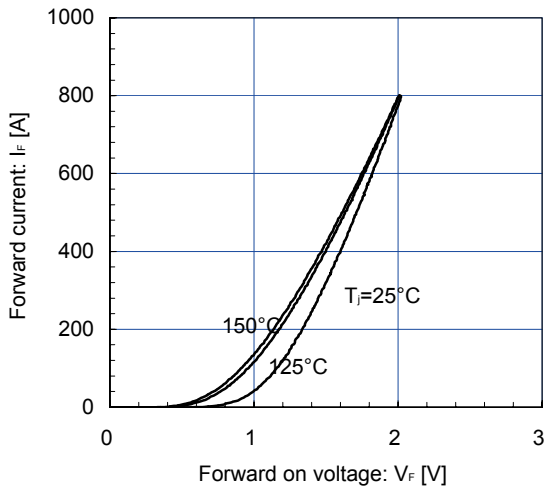
Switching loss vs. Gate resistance (typ.)
 $V_{CC}=300V, I_C=400A, V_{GE}=\pm 15V, T_J=125, 150^\circ C$



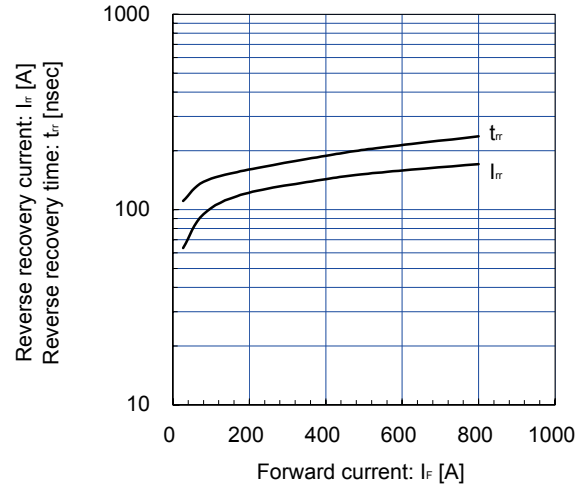
Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE}=15V, R_G=3.3\Omega, T_J=150^\circ C$



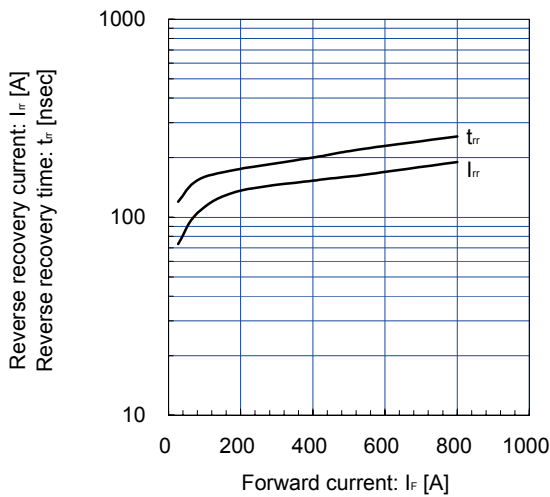
Forward Current vs. Forward Voltage (typ.)
chip



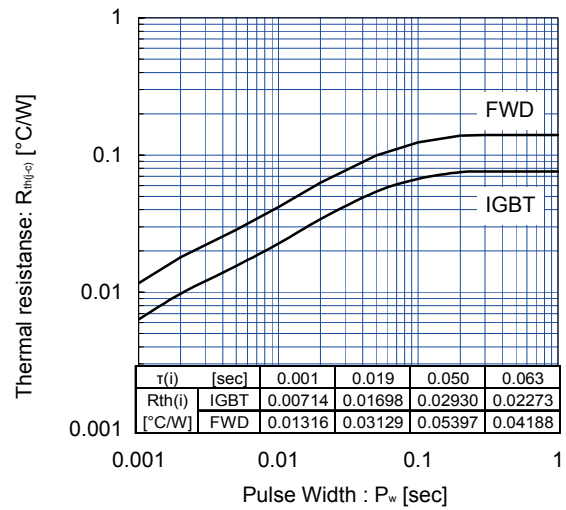
Reverse Recovery Characteristics (typ.)
 $V_{CC}=300V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=125^\circ C$



Reverse Recovery Characteristics (typ.)
 $V_{CC}=300V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=150^\circ C$



Transient Thermal Resistance (max.)



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