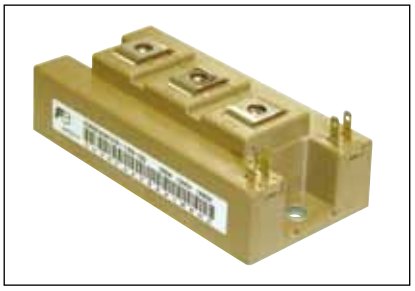
2MBI400VB-060-50

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 min.	Characteristics typ.	Characteristics max.	Units
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, I_C = 400A, V_{GE} = ±15V, R_G = 3.3Ω, T_j = 150°C		-	650	-	nsec
	t_r			-	300	-	
	$t_{r\ (i)}$			-	100	-	
Turn-off time	t_{off}			-	600	-	
	t_f			-	70	-	
Forward on voltage	V_F (terminal)	V_{GE} = 0V, I_F = 400A	T_j=25°C	-	1.75	2.20	V
			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	-	
			T_j=150°C		1.47		
Reverse recovery time	t_{rr}	I_F = 400A		-	200	-	nsec

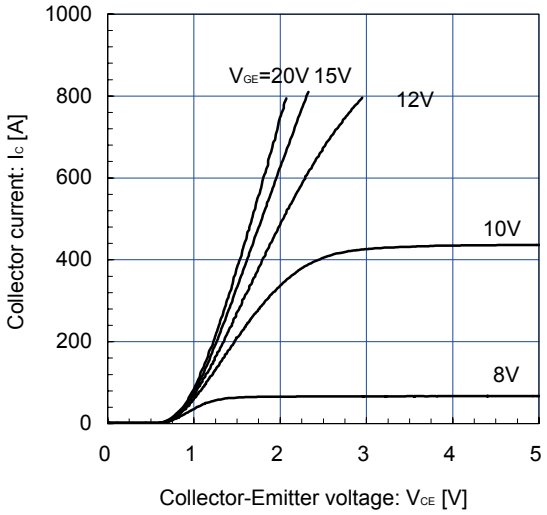
● **Thermal resistance characteristics**

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
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	-	

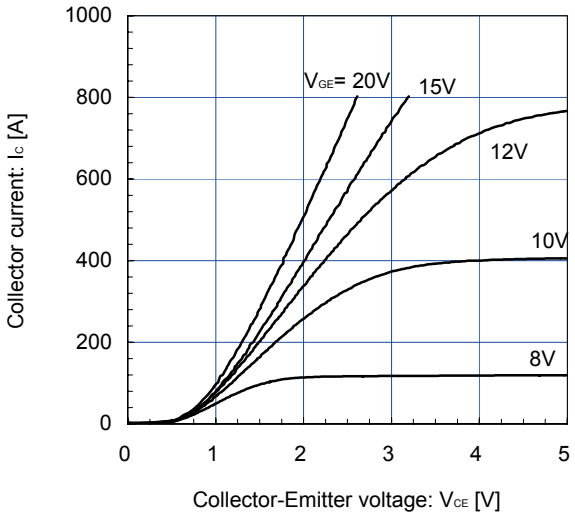
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

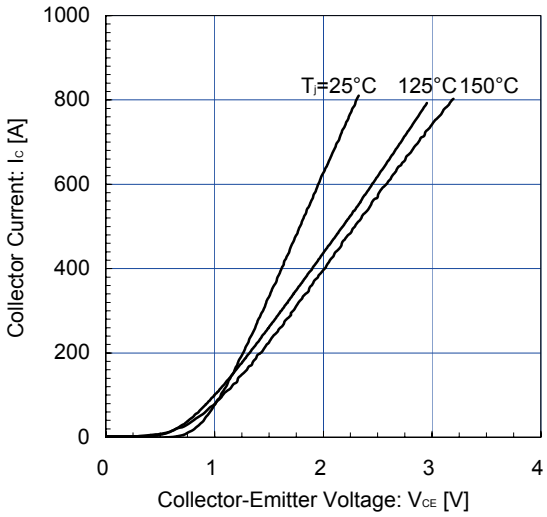
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 25°C / chip



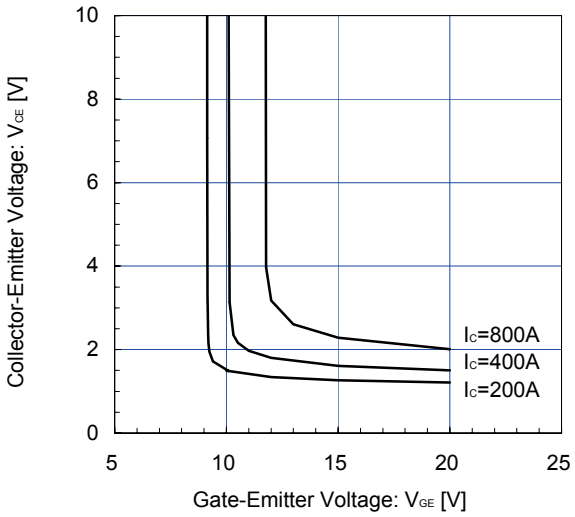
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 150°C / chip



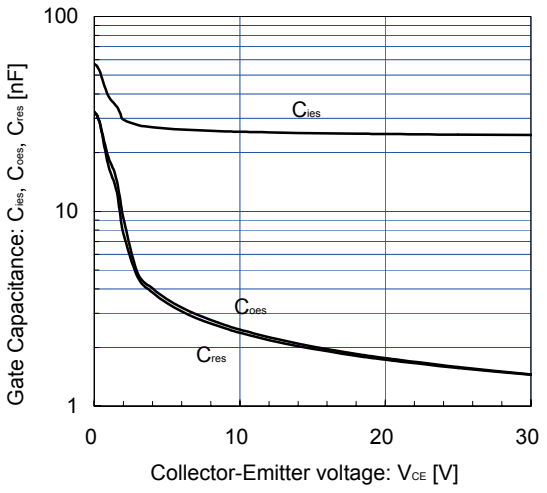
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE}= 15V / chip



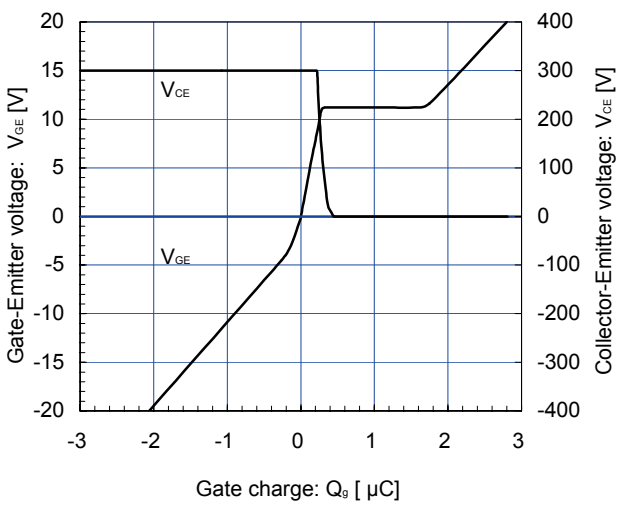
Collector-Emitter voltage vs. Gate-Emitter voltage
T_j= 25°C / chip



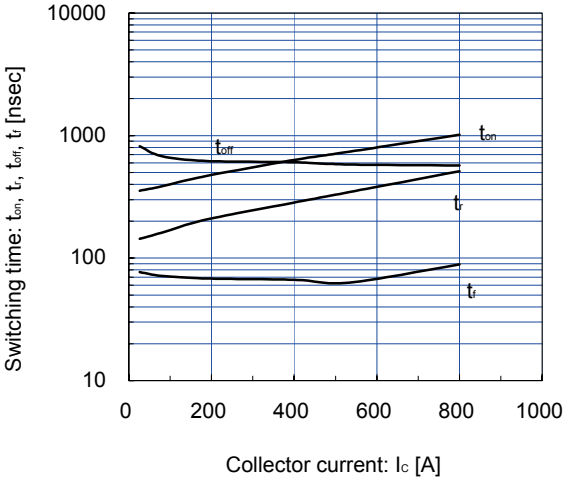
Gate Capacitance vs. Collector-Emitter Voltage
V_{GE}= 0V, f= 1MHz, T_j= 25°C



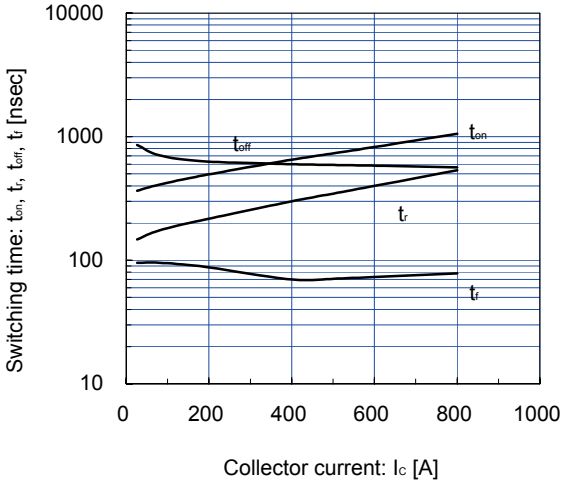
Dynamic Gate Charge (typ.)
V_{CC}=300V, I_C=400A, T_j= 25°C



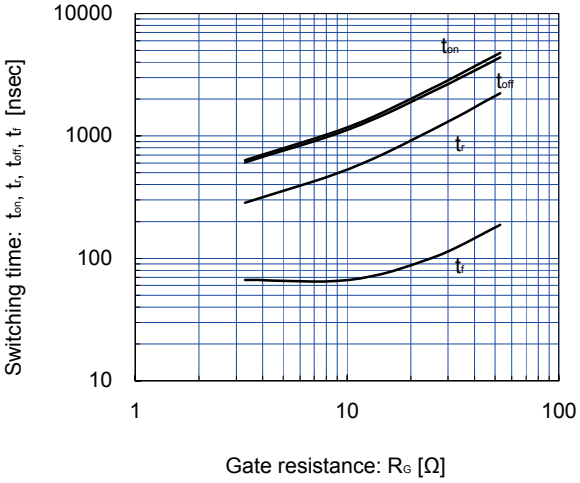
Switching time vs. Collector current (typ.)
V_{CC}=300V, V_{GE}=±15V, R_G=3.3Ω, T_j=125°C



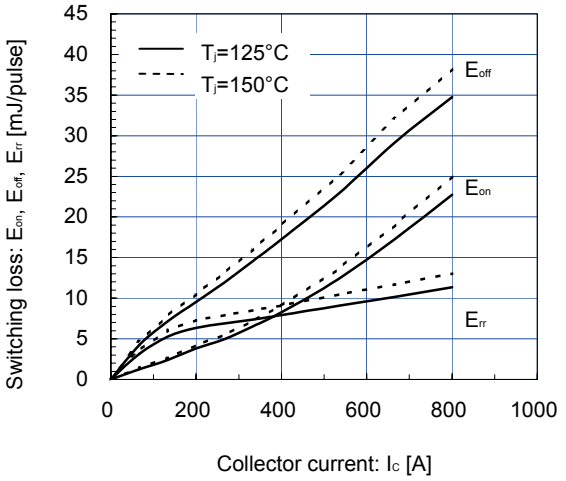
Switching time vs. Collector current (typ.)
V_{CC}=300V, V_{GE}=±15V, R_G=3.3Ω, T_j=150°C



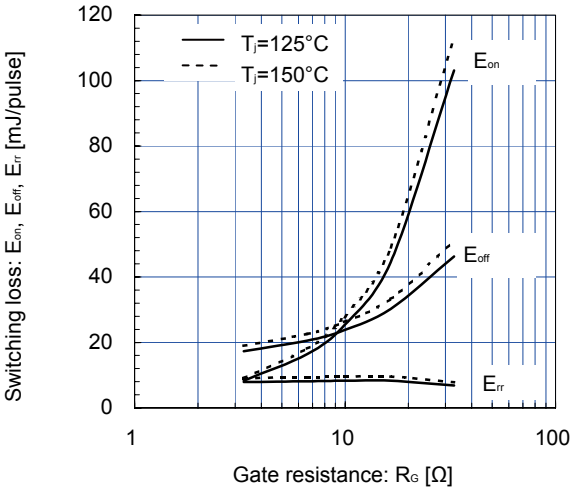
Switching time vs. Gate resistance (typ.)
V_{CC}=300V, I_C=400A, V_{GE}=±15V, T_j=125°C



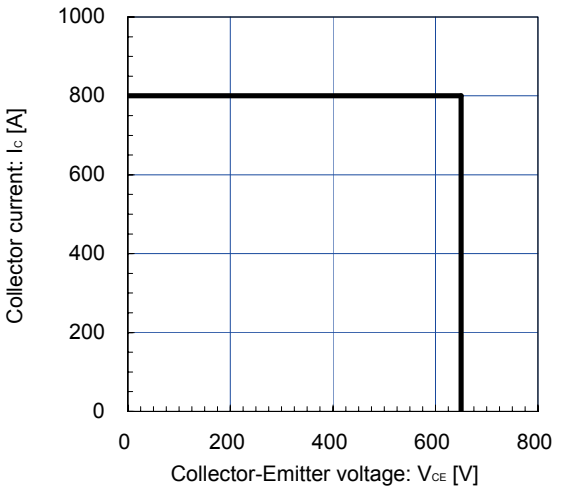
Switching loss vs. Collector current (typ.)
V_{CC}=300V, V_{GE}=±15V, R_G=3.3Ω, T_j=125, 150°C



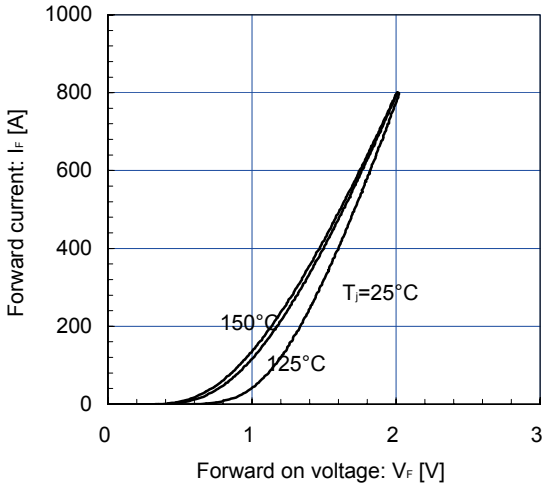
Switching loss vs. Gate resistance (typ.)
V_{CC}=300V, I_C=400A, V_{GE}=±15V, T_j=125, 150°C



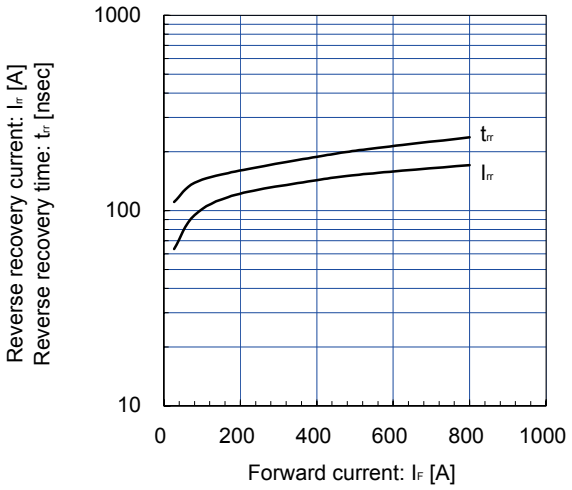
Reverse bias safe operating area (max.)
+V_{GE}=15V, -V_{GE}=15V, R_G=3.3Ω, T_j=150°C



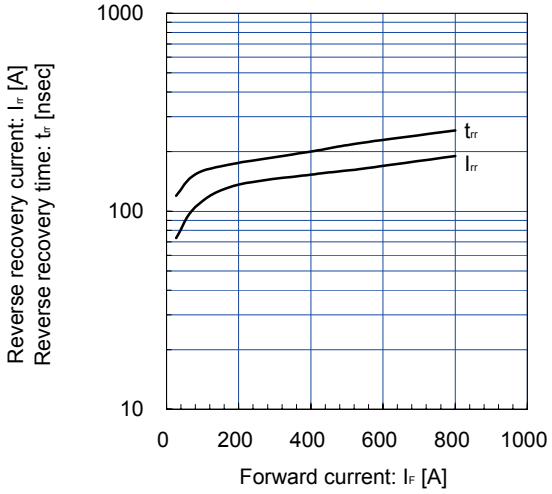
Forward Current vs. Forward Voltage (typ.)
chip



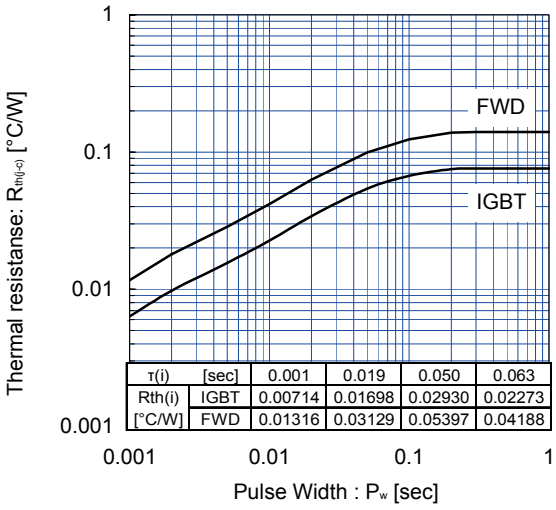
Reverse Recovery Characteristics (typ.)
V_{CC}=300V, V_{GE}=±15V, R_G=3.3Ω, T_j=125°C



Reverse Recovery Characteristics (typ.)
V_{CC}=300V, V_{GE}=±15V, R_G=3.3Ω, T_j=150°C

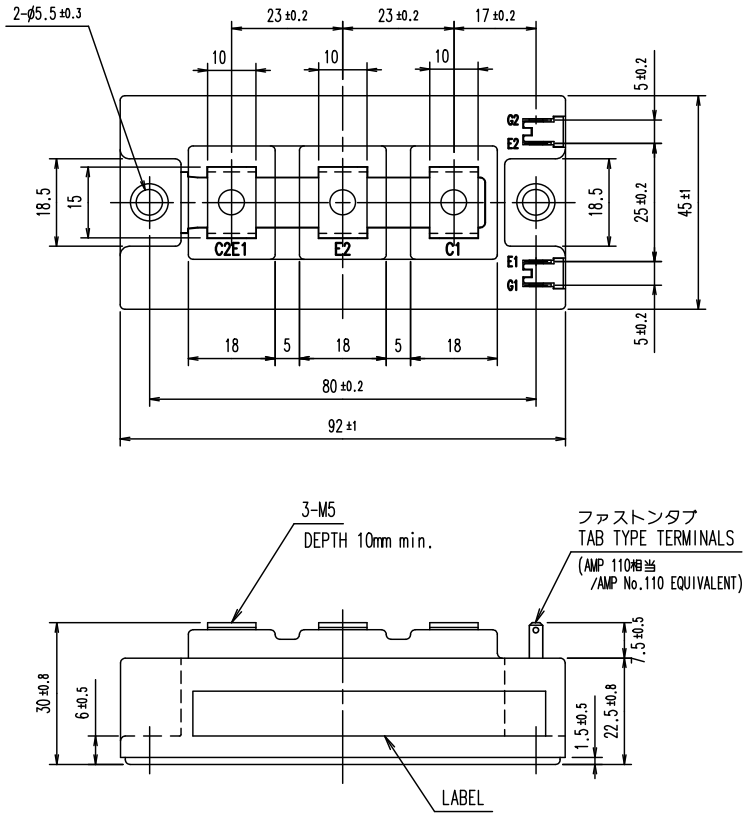


Transient Thermal Resistance (max.)

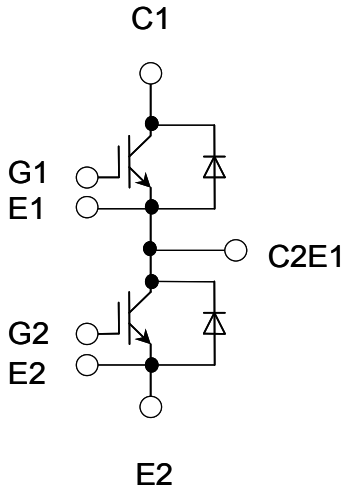


τ(i)	[sec]	0.001	0.019	0.050	0.063
Rth(i)	IGBT	0.00714	0.01698	0.02930	0.02273
[°C/W]	FWD	0.01316	0.03129	0.05397	0.04188

■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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- Electrical home appliances
- Personal equipment
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- Safety devices
- Medical equipment

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