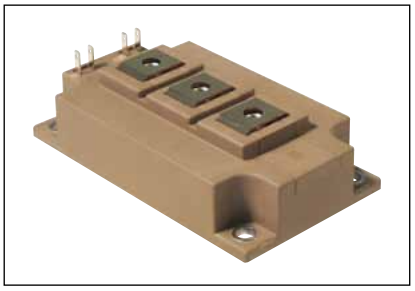
2MBI400VD-060-50

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 Tc=25°C unless otherwise specified)**

Items		Symbols	Conditions		Maximum ratings	Units
Inverter	Collector-Emitter voltage	V_{CES}			600	V
	Gate-Emitter voltage	V_{GES}			±20	V
	Collector current	Ic	Continuous	Tc=80°C	400	
		Ic pulse	1ms	Tc=80°C	800	
		-Ic			400	
		-Ic pulse	1ms		800	
	Collector power dissipation	Pc	1 device		1970	W
Junction temperature		Tj			175	°C
Operating junction temperature (under switching conditions)		T_{jop}			150	
Case temperature		T_C			125	
Storage temperature		Tstg			-40 ~ +125	
Isolation voltage	between terminal and copper base (*1)	V_{iso}	AC : 1min.		2500	VAC
Screw torque	Mounting (*2)	-			6.0	N m
	Terminals (*3)				5.0	

Note *1: All terminals should be connected together during the test.
Note *2: Recommendable Value : 3.0-6.0 Nm (M5 or M6)
Note *3: Recommendable Value : 2.5-5.0 Nm (M6)

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

Items		Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
Inverter	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		-	-	800	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	Tj=25°C	-	1.80	2.25	V
				Tj=125°C	-	2.10	-	
				Tj=150°C	-	2.30	-	
		$V_{CE\ (sat)}$ (chip)		Tj=25°C	-	1.60	2.05	
				Tj=125°C	-	1.90	-	
				Tj=150°C	-	2.00	-	
	Internal gate resistance	$R_{g(int)}$	-		-	2.3	-	Ω
	Input capacitance	Cies	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	25.6	-	nF
	Turn-on time	ton	V_{CC} = 300V, I_C = 400A, V_{GE} = ±15V, R_G = 3.3Ω, Tj = 150°C, Ls =30nH		-	0.65	-	μsec
		tr			-	0.30	-	
		tr (i)			-	0.10	-	
	Turn-off time	toff			-	0.60	-	
		tf			-	0.07	-	
	Forward on voltage	V_F (terminal)	V_{GE} = 0V, I_F = 400A	Tj=25°C	-	1.75	2.20	V
				Tj=125°C	-	1.65	-	
				Tj=150°C	-	1.62	-	
		V_F (chip)		Tj=25°C	-	1.60	2.05	
				Tj=125°C	-	1.50	-	
				Tj=150°C	-	1.47	-	
	Reverse recovery time	trr	I_F = 400A		-	0.20	-	μsec

● **Thermal resistance characteristics**

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
Thermal resistance (1device)	Rth(j-c)	IGBT	-	-	0.076	°C/W
		FWD	-	-	0.14	
Contact thermal resistance (1device) (*4)	Rth(c-f)	with Thermal Compound	-	0.0125	-	

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

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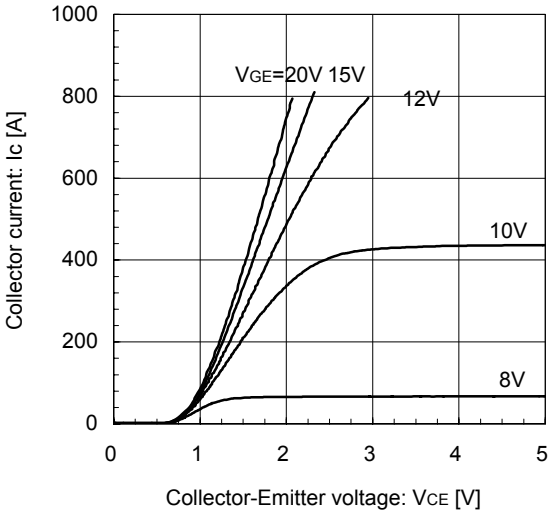
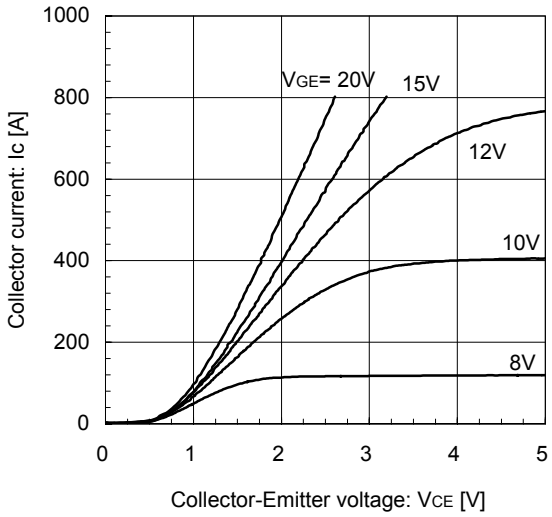
DECEMBER 2014

■ Characteristics (Representative)

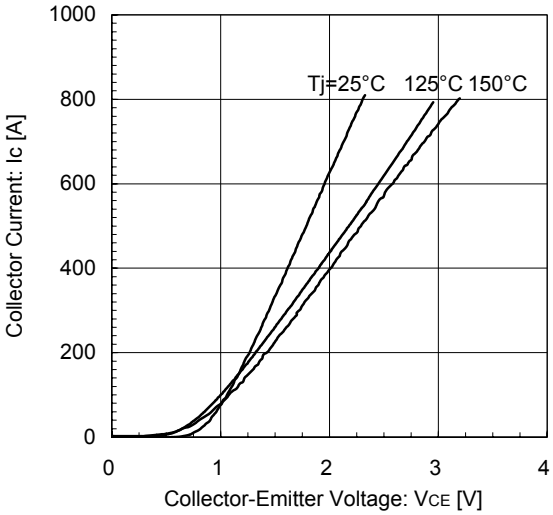
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



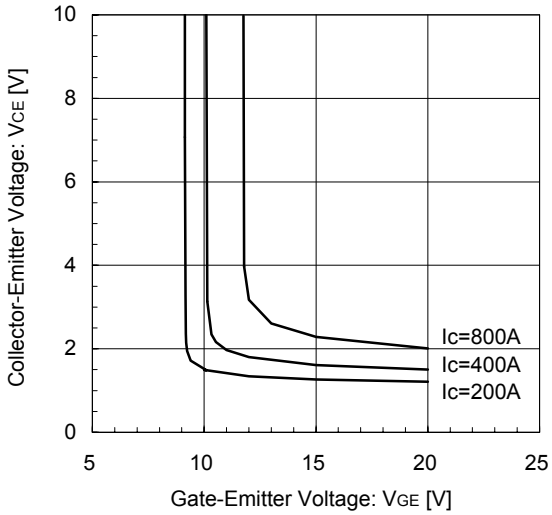
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150°C / chip



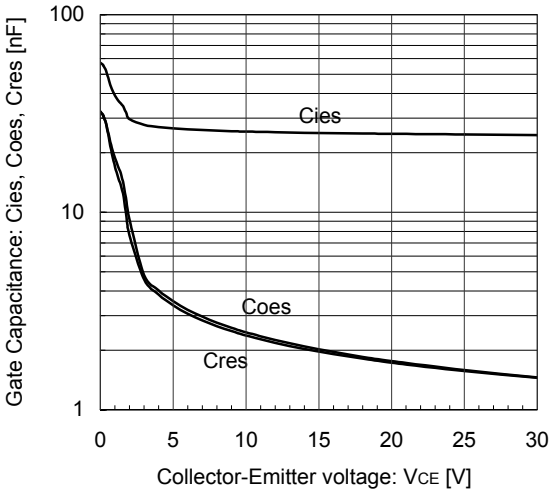
Collector current vs. Collector-Emitter voltage (typ.)
VGE= 15V / chip



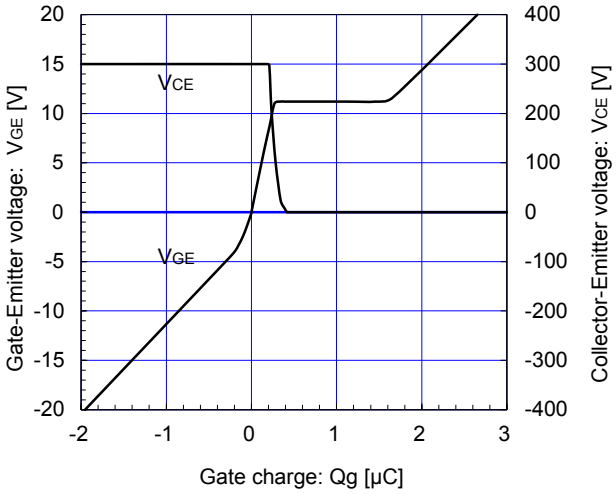
Collector-Emitter voltage vs. Gate-Emitter voltage
Tj= 25°C / chip



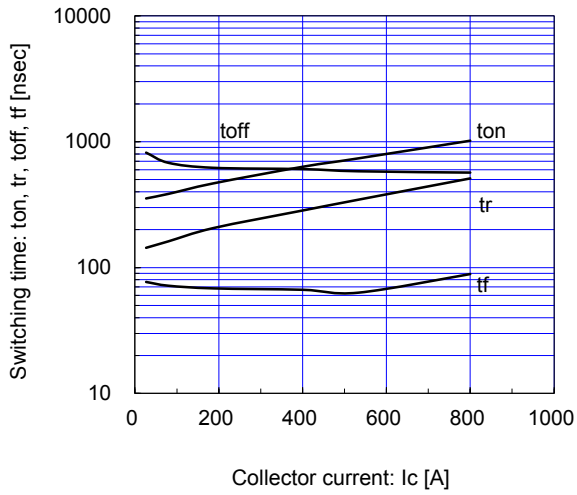
Gate Capacitance vs. Collector-Emitter Voltage
VGE= 0V, *f*= 1MHz, Tj= 25°C



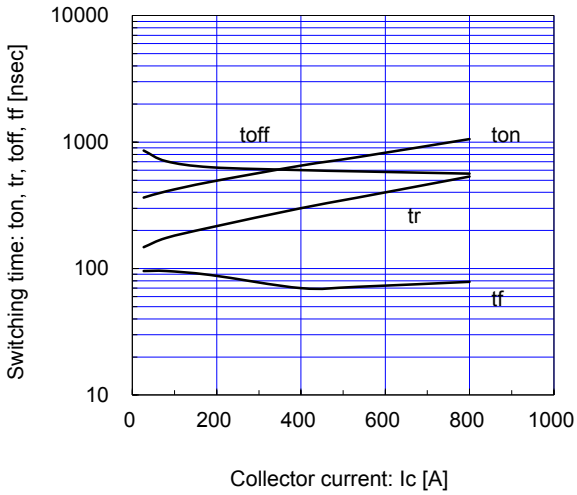
Dynamic Gate Charge (typ.)
Vcc=300V, Ic=400A, Tj= 25°C



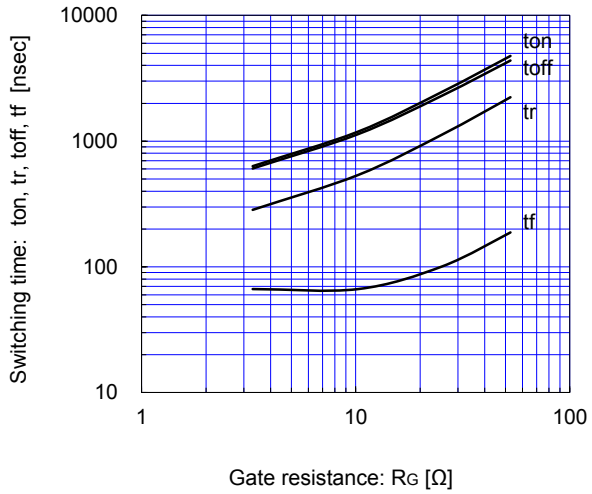
Switching time vs. Collector current (typ.)
Vcc=300V, VGE=±15V, RG=3.3Ω, Tj=125°C



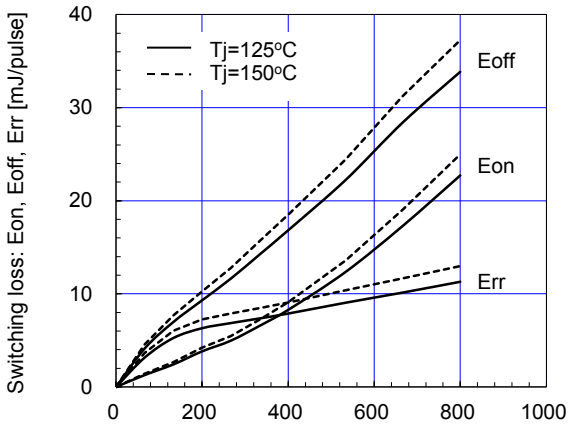
Switching time vs. Collector current (typ.)
Vcc=300V, VGE=±15V, RG=3.3Ω, Tj=150°C



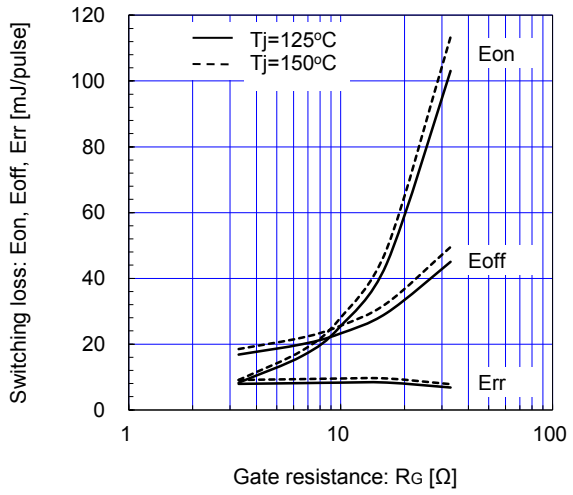
Switching time vs. Gate resistance (typ.)
Vcc=300V, Ic=400A, VGE=±15V, Tj=125°C



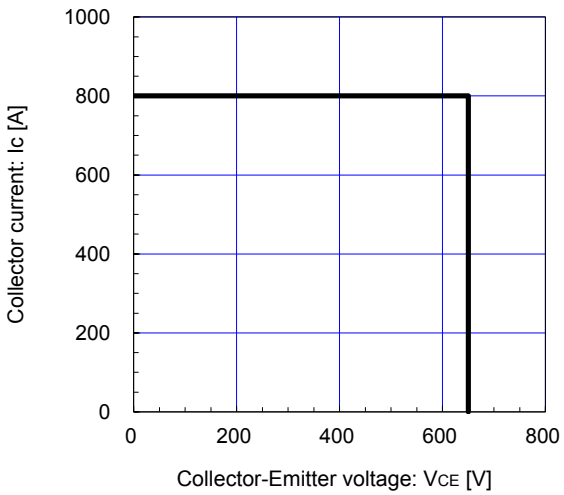
Switching loss vs. Collector current (typ.)
Vcc=300V, VGE=±15V, RG=3.3Ω, Tj=125°C, 150°C



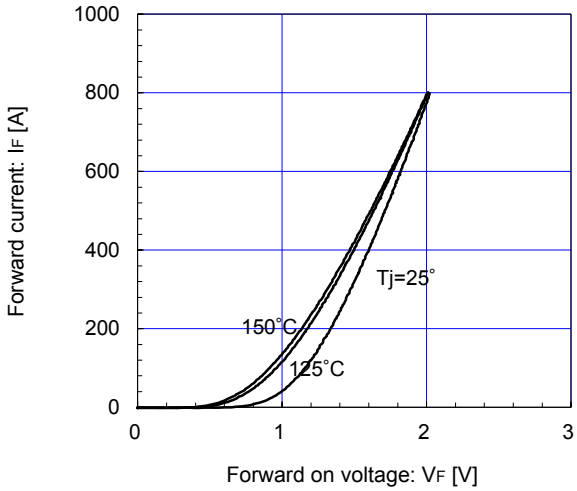
Switching loss vs. Gate resistance (typ.)
Vcc=300V, Ic=400A, VGE=±15V, Tj=125°C, 150°C



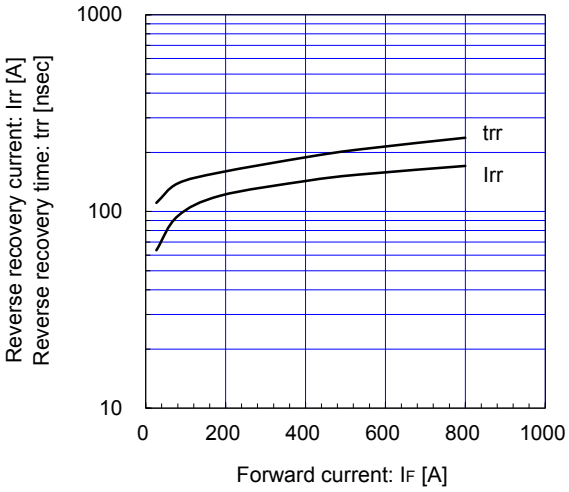
Reverse bias safe operating area (max.)
+VGE=15V, -VGE=15V, RG=3.3Ω, Tj=150°C



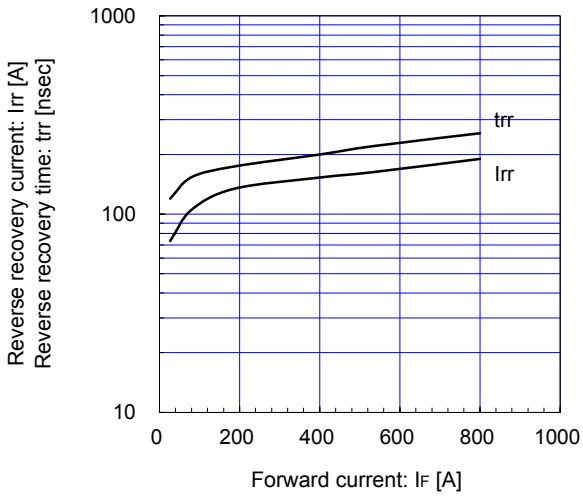
Forward Current vs. Forward Voltage (typ.)
chip



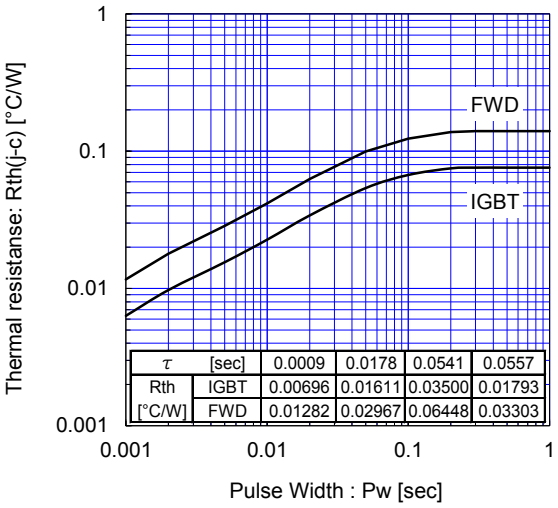
Reverse Recovery Characteristics (typ.)
Vcc=300V, VGE=±15V, RG=3.3Ω, Tj=125°C



Reverse Recovery Characteristics (typ.)
Vcc=300V, VGE=±15V, RG=3.3Ω, Tj=150°C

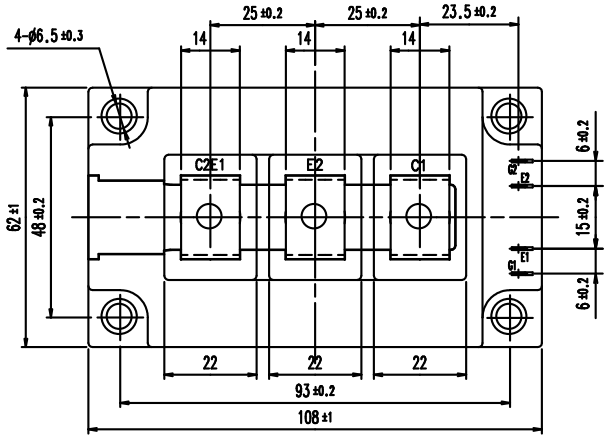


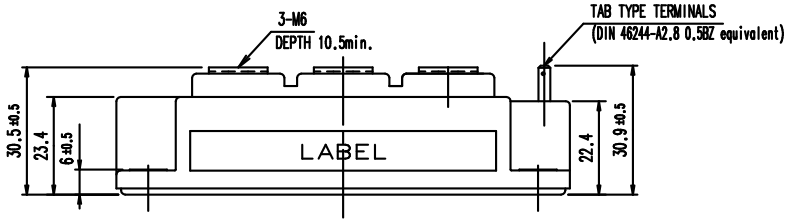
Transient Thermal Resistance (max.)



τ	[sec]	0.0009	0.0178	0.0541	0.0557
Rth	IGBT	0.00696	0.01611	0.03500	0.01793
[°C/W]	FWD	0.01282	0.02967	0.06448	0.03303

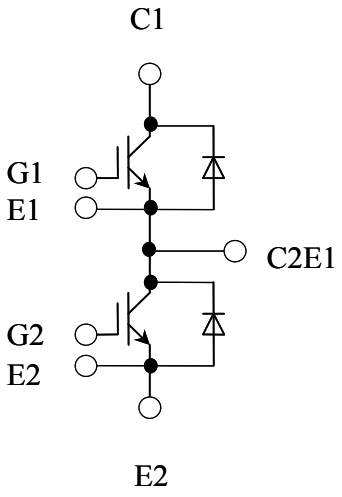
■ Outline Drawings (Unit: mm)





Weight: 370g (typ.)

■ Equivalent Circuit



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- Machine tools
- Audiovisual equipment
- Electrical home appliances
- Personal equipment
- Industrial robots etc.

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- Safety devices
- Medical equipment

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