

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 _{CE}			600	V
	Gate-Emitter voltage	V _{GE}			±20	V
	Collector current	I _C	Continuous	T _C =80°C	400	
		I _C pulse	1ms	T _C =80°C	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)	-			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)

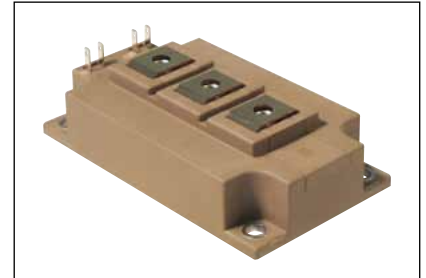
● Electrical characteristics (at Tj= 25°C unless otherwise specified)

Items		Symbols	Conditions		Characteristics			Units
					min.	typ.	max.	
Inverter	Zero gate voltage collector current	I _{CE}	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	T _j =25°C	-	1.80	2.25	V
				T _j =125°C	-	2.10	-	
				T _j =150°C	-	2.30	-	
		V _{CE (sat)} (chip)		T _j =25°C	-	1.60	2.05	
				T _j =125°C	-	1.90	-	
				T _j =150°C	-	2.00	-	
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz		-	25.6	-	nF
	Turn-on time	t _{on}	V _{CC} = 300V		-	0.65	-	μs
		t _r	I _C = 400A		-	0.26	-	
		t _{r (i)}	V _{GE} = ±15V		-	0.12	-	
	Turn-off time	t _{off}	R _G = 3.3Ω		-	0.80	-	μs
		t _f	T _j = 150°C		-	0.07	-	
	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)		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		-	0.30	-	μs	

● Thermal resistance characteristics

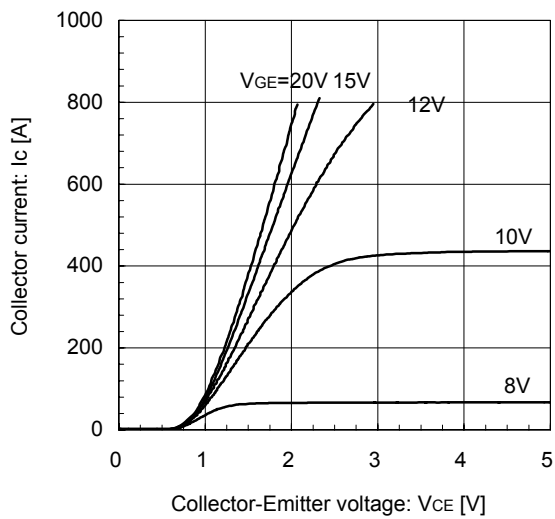
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	IGBT	-	-	0.076	°C/W
		FWD	-	-	0.14	
Contact thermal resistance (1device) (*4)	R _{th(c-f)}	with Thermal Compound	-	0.0125	-	

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

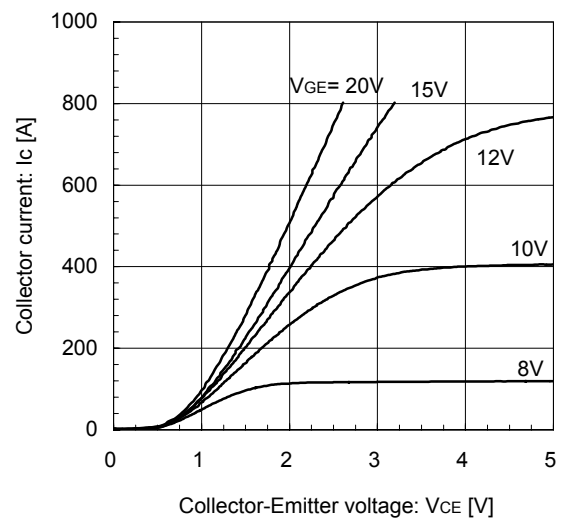


■ Characteristics (Representative)

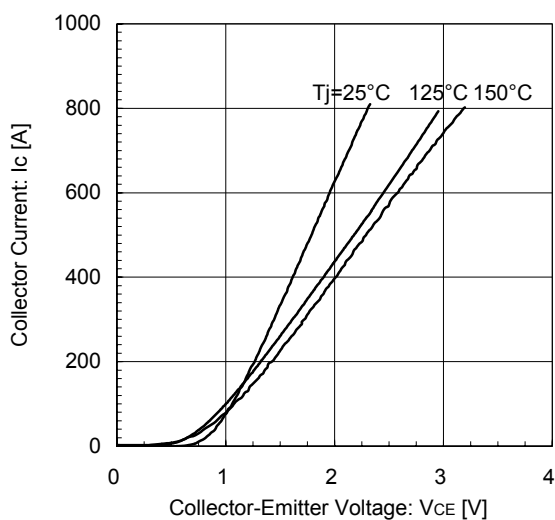
Collector current vs. Collector-Emmitter voltage (typ.)
T_j = 25°C / chip



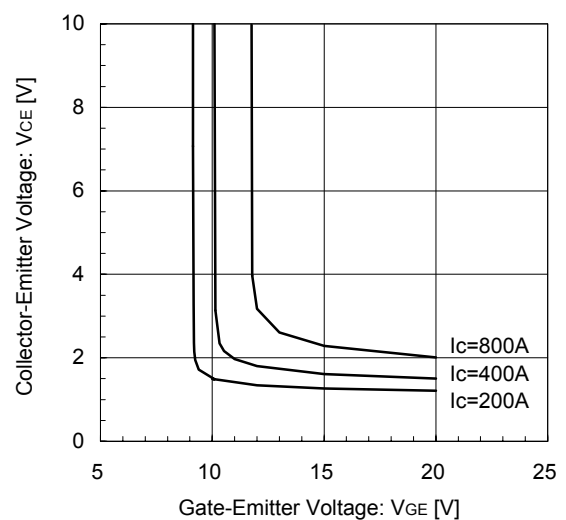
Collector current vs. Collector-Emmitter voltage (typ.)
T_j = 150°C / chip



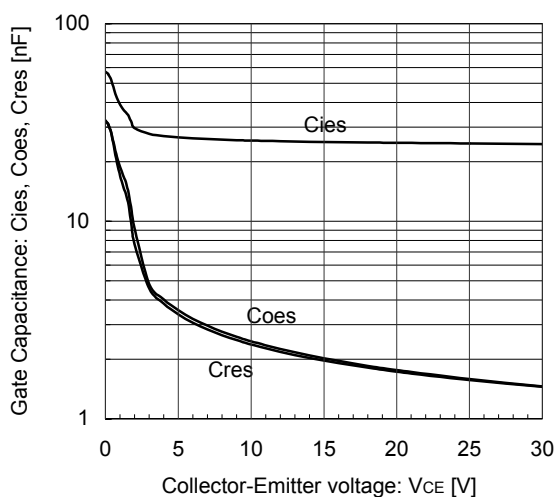
Collector current vs. Collector-Emmitter voltage (typ.)
V_{GE} = 15V / chip



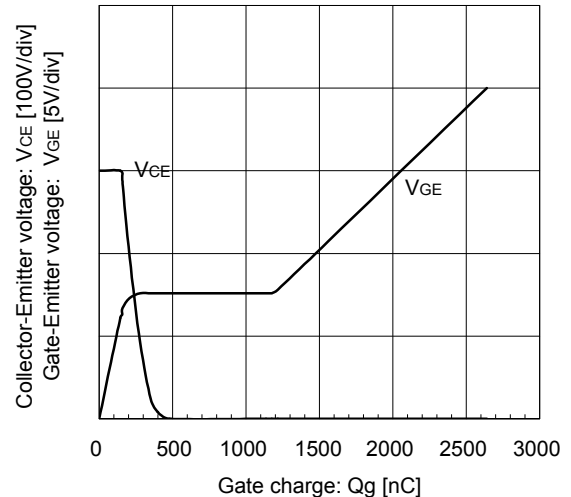
Collector-Emmitter voltage vs. Gate-Emmitter voltage
T_j = 25°C / chip



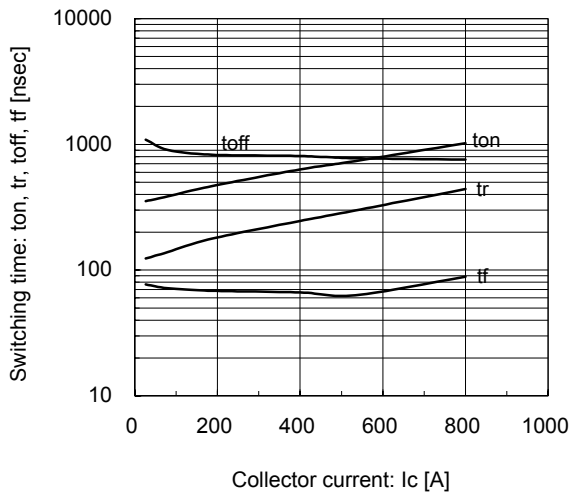
Gate Capacitance vs. Collector-Emmitter Voltage
V_{GE} = 0V, f = 1MHz, T_j = 25°C



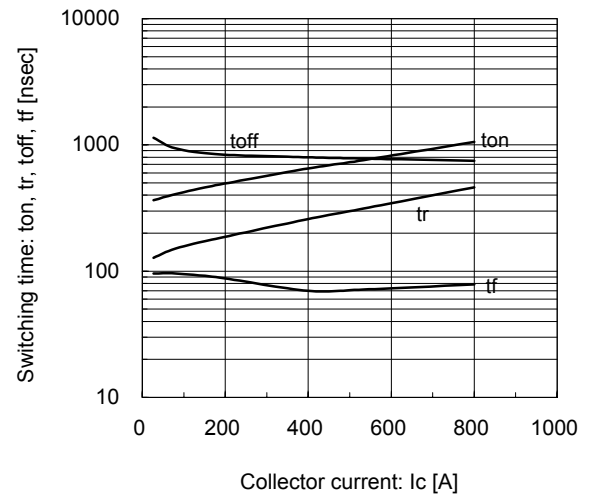
Dynamic Gate Charge (typ.)
V_{CC} = 300V, I_C = 400A, T_j = 25°C



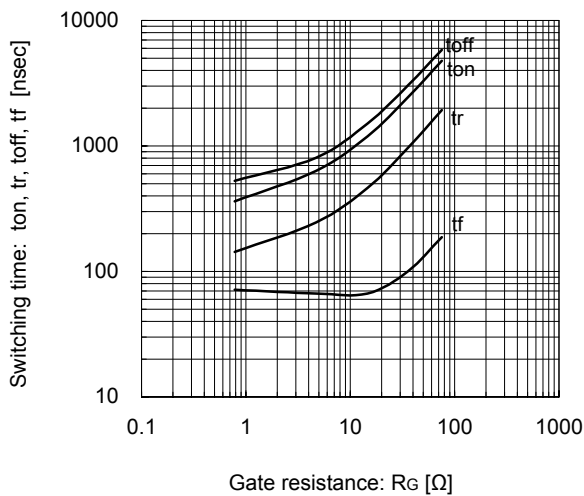
Switching time vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=3.3\Omega$, $T_J=125^\circ C$



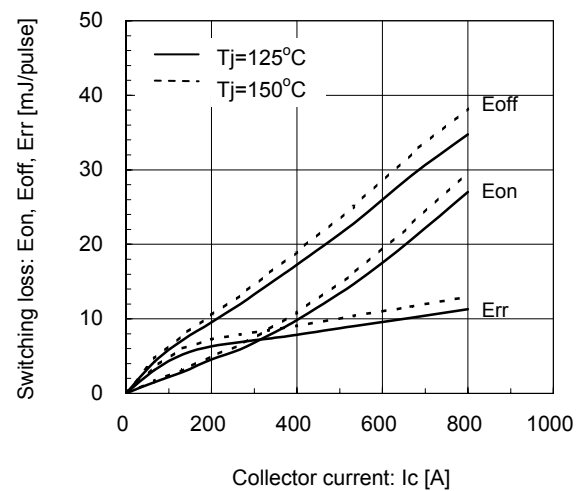
Switching time vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=3.3\Omega$, $T_J=150^\circ C$



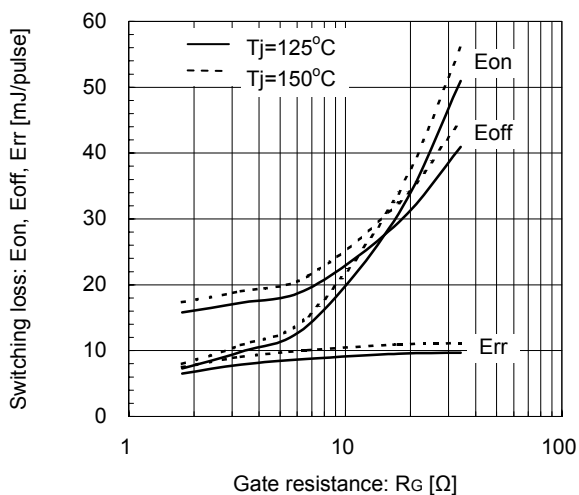
Switching time vs. Gate resistance (typ.)
 $V_{CC}=300V$, $I_C=400A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$



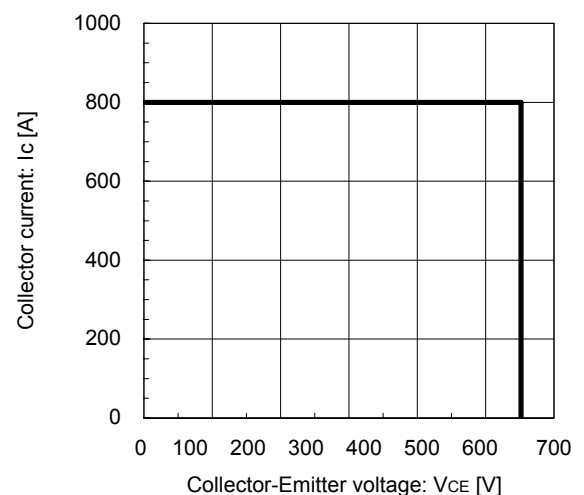
Switching loss vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=3.3\Omega$, $T_J=125^\circ C$, $150^\circ C$



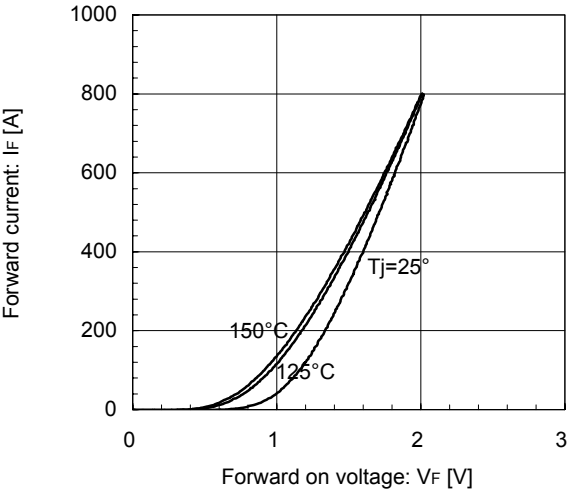
Switching loss vs. Gate resistance (typ.)
 $V_{CC}=300V$, $I_C=400A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$, $150^\circ C$



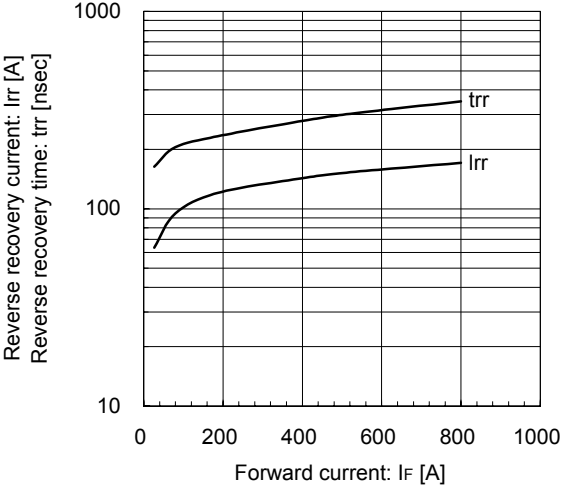
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_G=3.3\Omega$, $T_J=150^\circ C$



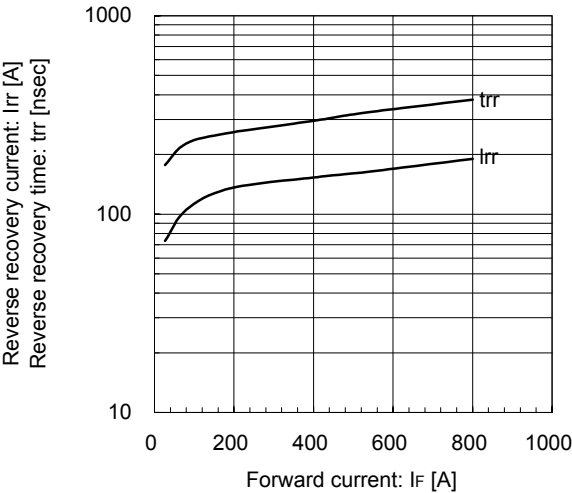
Forward Current vs. Forward Voltage (typ.)
chip



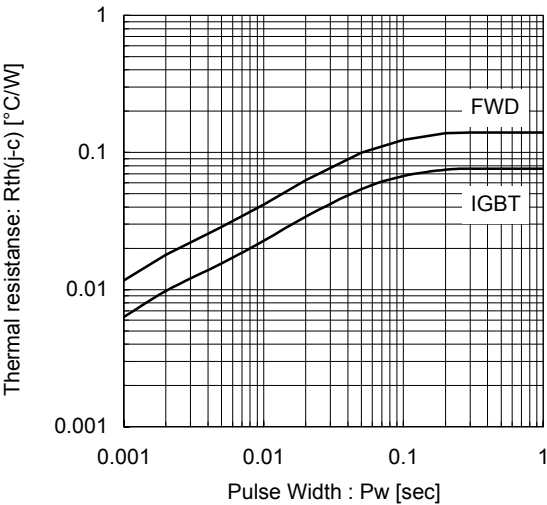
Reverse Recovery Characteristics (typ.)
 $V_{CC}=300\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=3.3\Omega$, $T_J=125^\circ\text{C}$



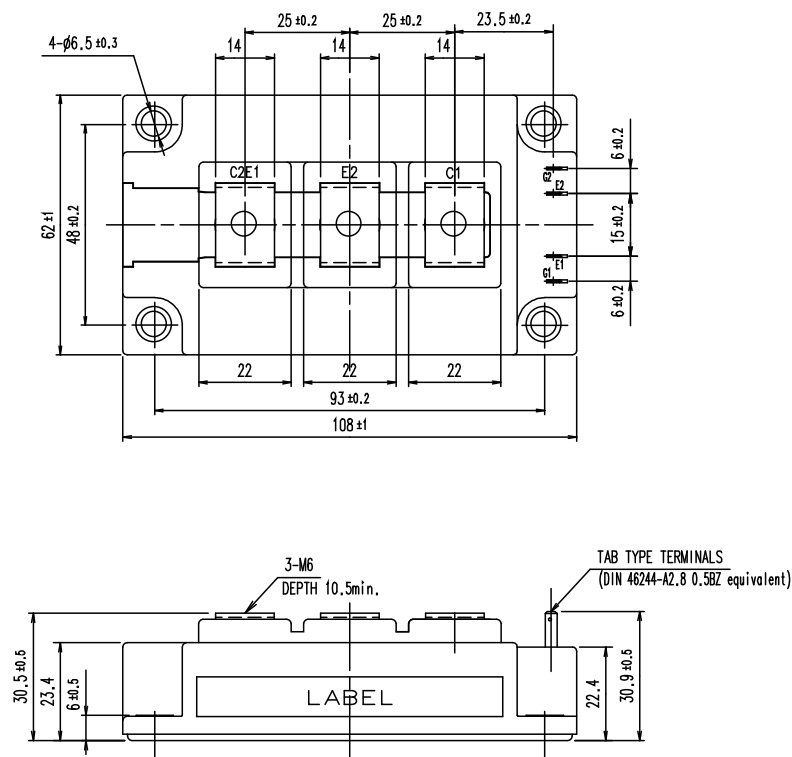
Reverse Recovery Characteristics (typ.)
 $V_{CC}=300\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=3.3\Omega$, $T_J=150^\circ\text{C}$



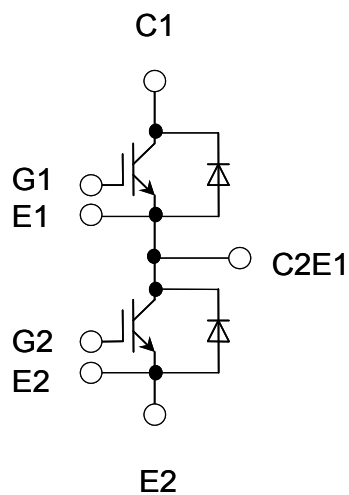
Transient Thermal Resistance (max.)



■ Outline Drawings, mm



■ Equivalent Circuit Schematic



WARNING

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• Machine tools	• Audiovisual equipment	• Electrical home appliances	• Personal equipment
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• Emergency equipment for responding to disasters and anti-burglary devices	• Safety devices
• Medical equipment	
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• Submarine repeater equipment		
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