

2MBI400VD-060-50

IGBT Modules

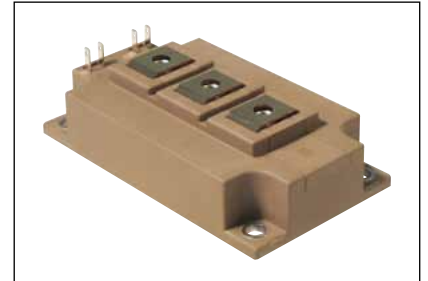
IGBT MODULE (V series) 600V / 400A / 2 in one package

■ 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	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 _{top}		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.		
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	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	-	
Inverter	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	

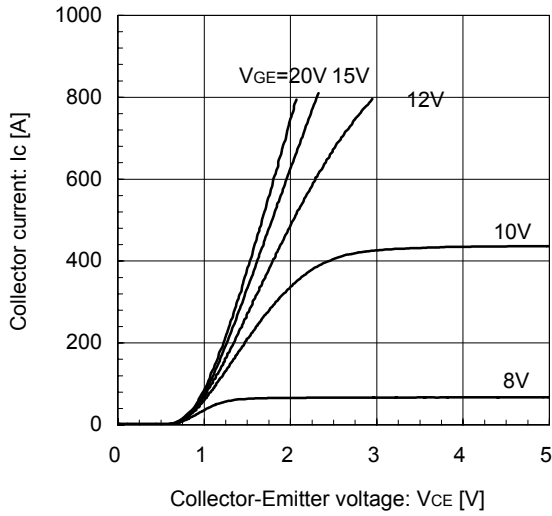
● Thermal resistance characteristics

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	-	

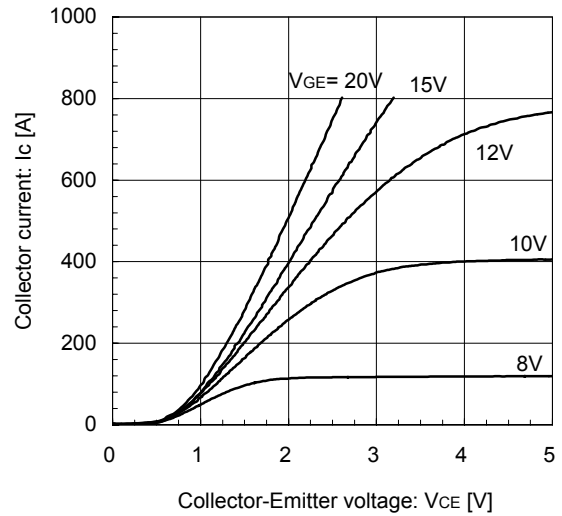
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

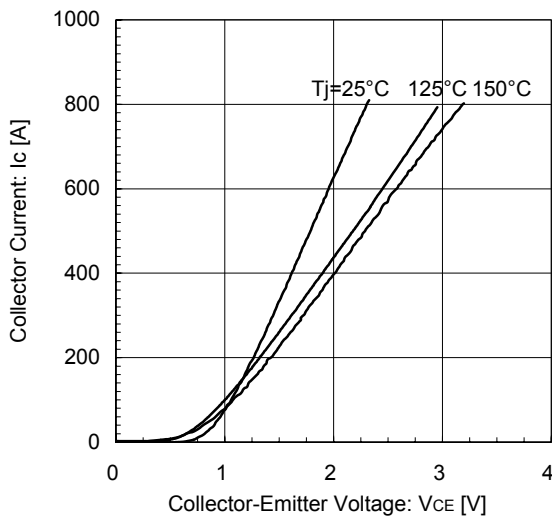
Collector current vs. Collector-Emitter voltage (typ.)
T_j = 25°C / chip



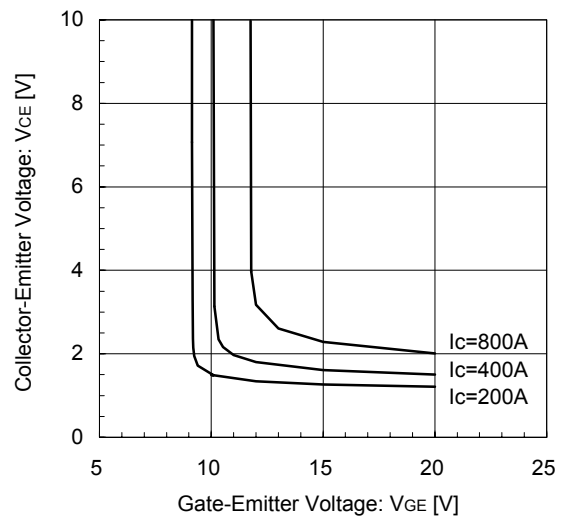
Collector current vs. Collector-Emitter voltage (typ.)
T_j = 150°C / chip



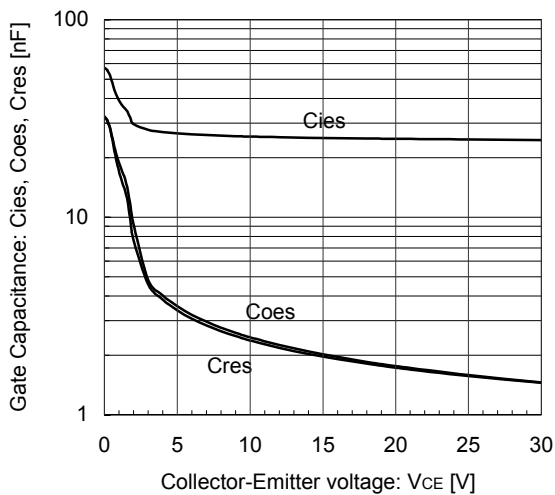
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE} = 15V / chip



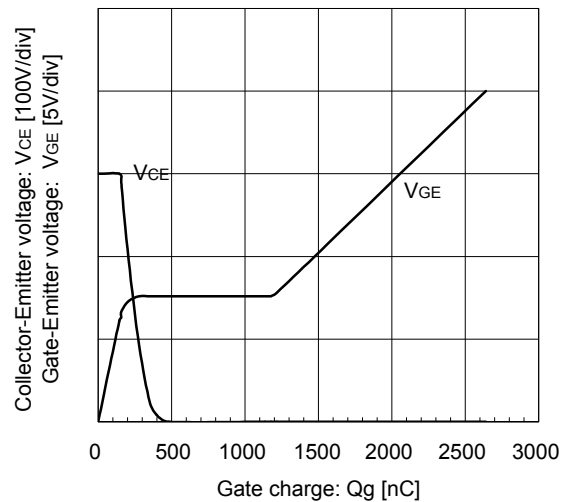
Collector-Emitter voltage vs. Gate-Emitter voltage
T_j = 25°C / chip



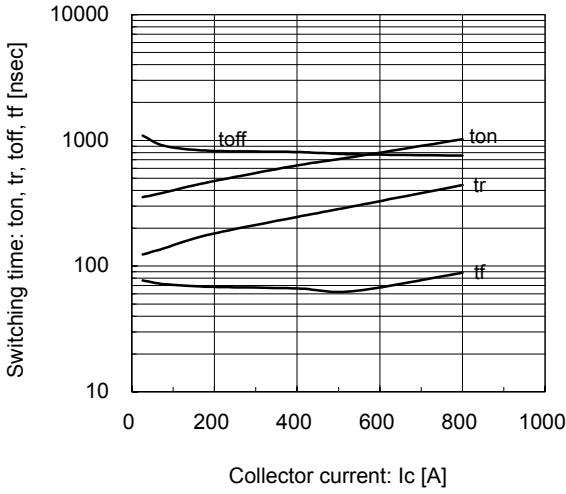
Gate Capacitance vs. Collector-Emitter Voltage
V_{GE} = 0V, f = 1MHz, T_j = 25°C



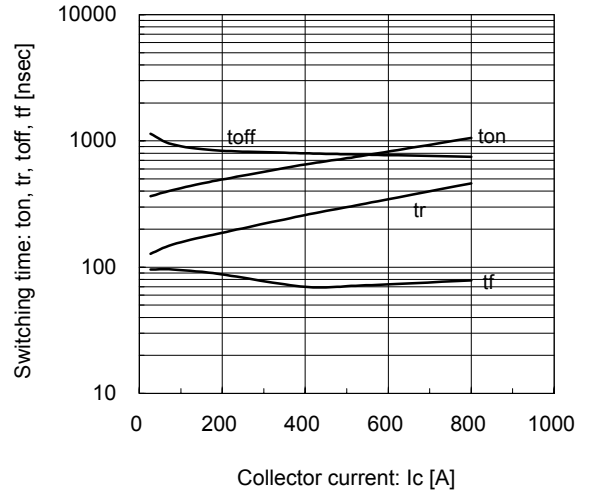
Dynamic Gate Charge (typ.)
V_{CC} = 300V, I_c = 400A, T_j = 25°C



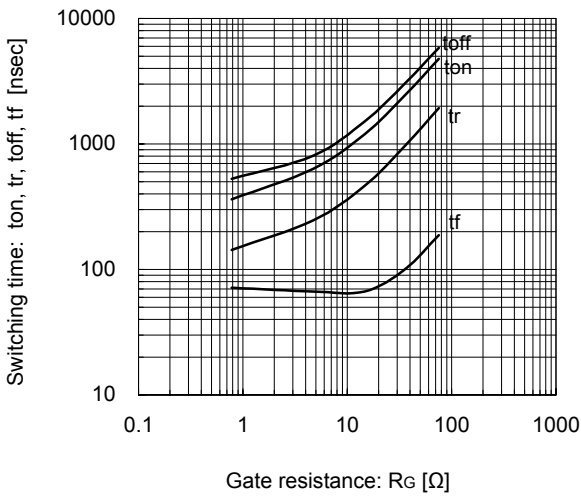
Switching time vs. Collector current (typ.)
 $V_{CC}=300V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_j=125^\circ C$



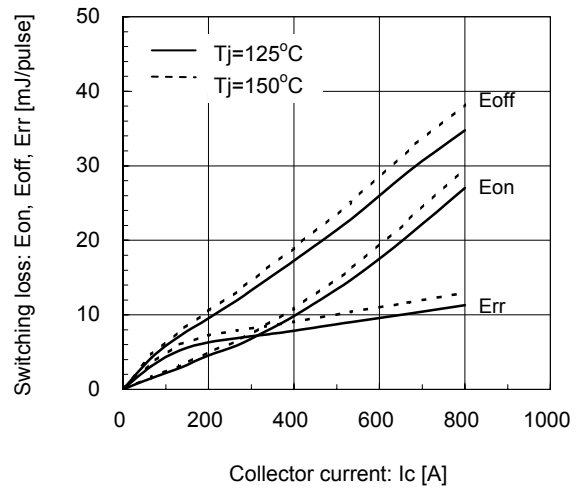
Switching time vs. Collector current (typ.)
 $V_{CC}=300V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_j=150^\circ C$



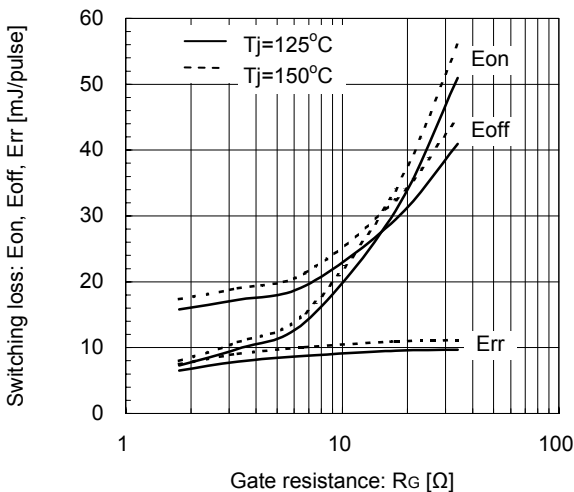
Switching time vs. Gate resistance (typ.)
 $V_{CC}=300V, I_c=400A, V_{GE}=\pm 15V, T_j=125^\circ C$



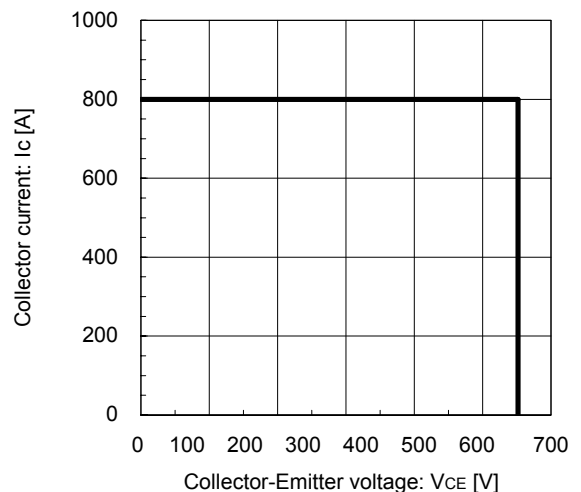
Switching loss vs. Collector current (typ.)
 $V_{CC}=300V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_j=125^\circ C, 150^\circ C$



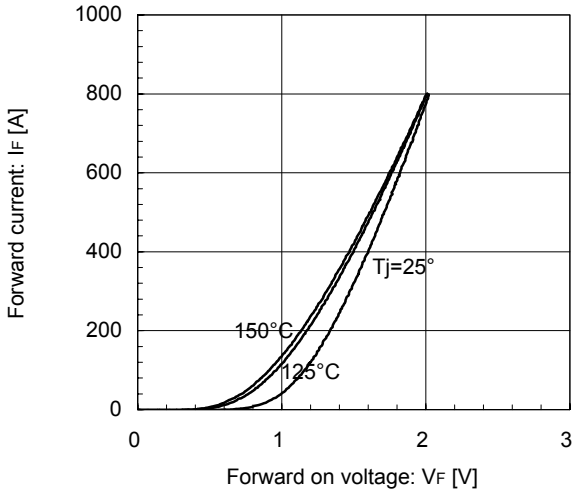
Switching loss vs. Gate resistance (typ.)
 $V_{CC}=300V, I_c=400A, V_{GE}=\pm 15V, T_j=125^\circ C, 150^\circ C$



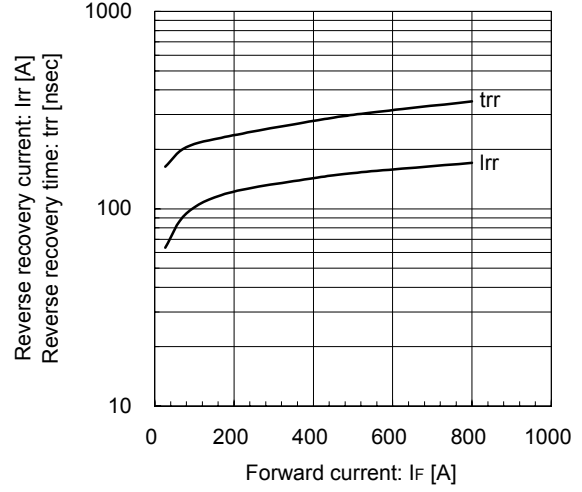
Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE}=15V, R_G=3.3\Omega, T_j=150^\circ C$



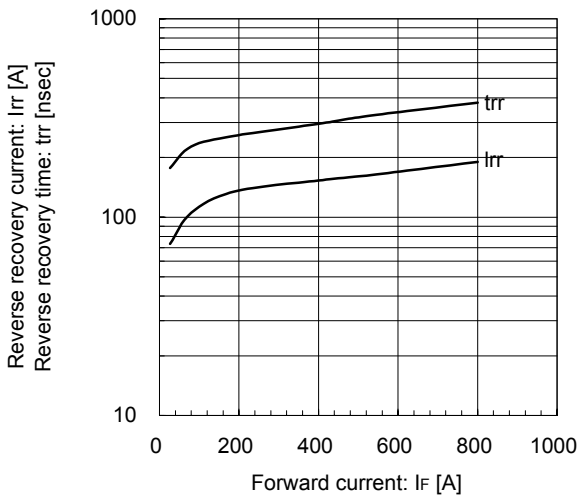
Forward Current vs. Forward Voltage (typ.)
chip



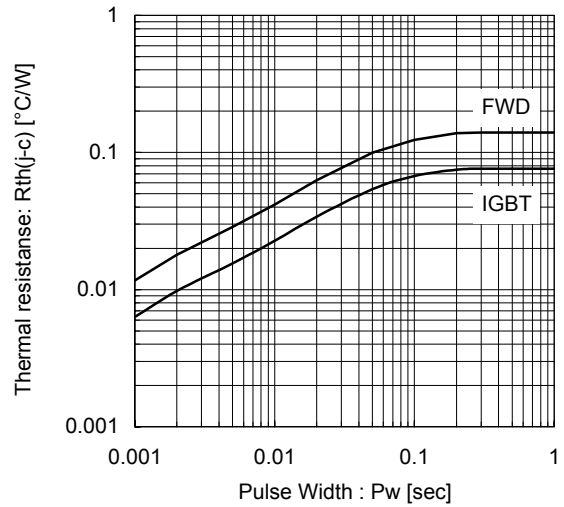
Reverse Recovery Characteristics (typ.)
Vcc=300V, VGE=±15V, RG=3.3Ω, Tj=125°C



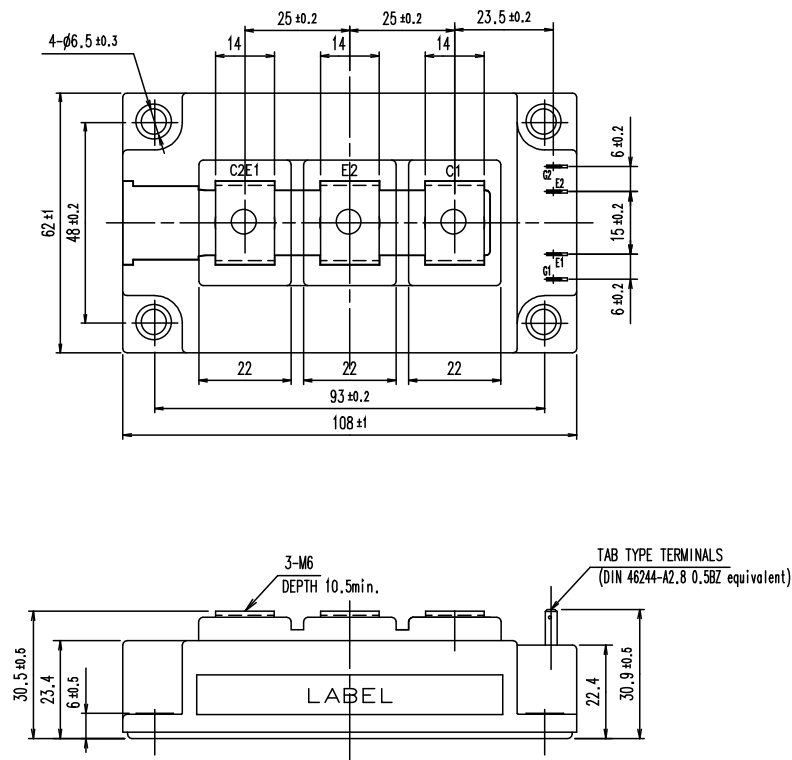
Reverse Recovery Characteristics (typ.)
Vcc=300V, VGE=±15V, RG=3.3Ω, Tj=150°C



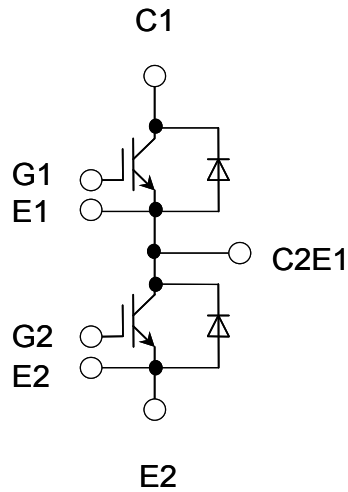
Transient Thermal Resistance (max.)



■ Outline Drawings, mm



■ Equivalent Circuit Schematic



WARNING

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