

2MBI400VD-060-50

IGBT Modules

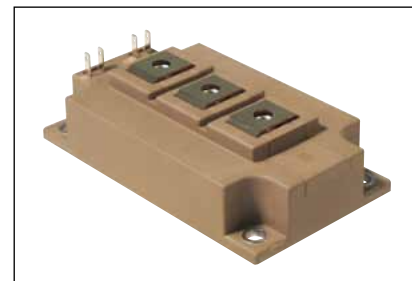
IGBT MODULE (V series) 600V / 400A / 2 in one package

■ 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 _{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 _{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	-	
	Internal gate resistance			R _{g(int)}	-		-	2.3	-	Ω
	Input capacitance			C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz		-	25.6	-	nF
	Turn-on time			t _{on}	V _{CC} = 300V, I _C = 400A V _{GE} = ±15V, R _G = 3.3Ω T _J = 150°C, L _s =30nH		-	0.65	-	μsec
				t _r			-	0.30	-	
	Turn-off time			t _{r(i)}			-	0.10	-	
				t _{off}	-	0.60	-			
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		-	0.20	-	μsec	

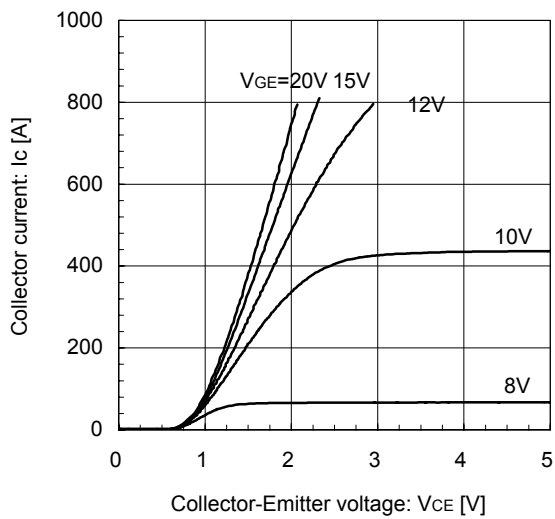
● Thermal resistance characteristics

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	-	

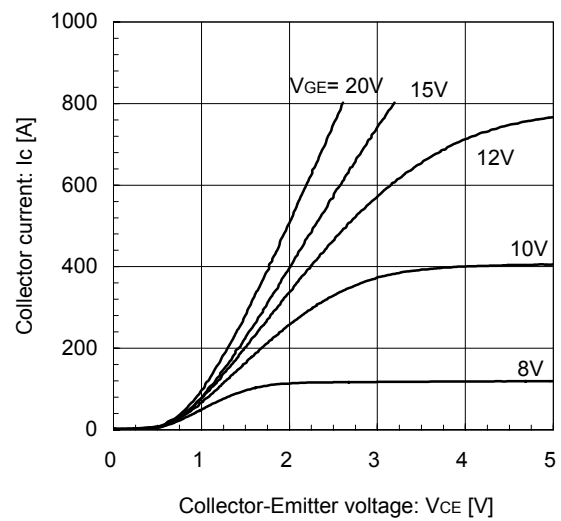
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

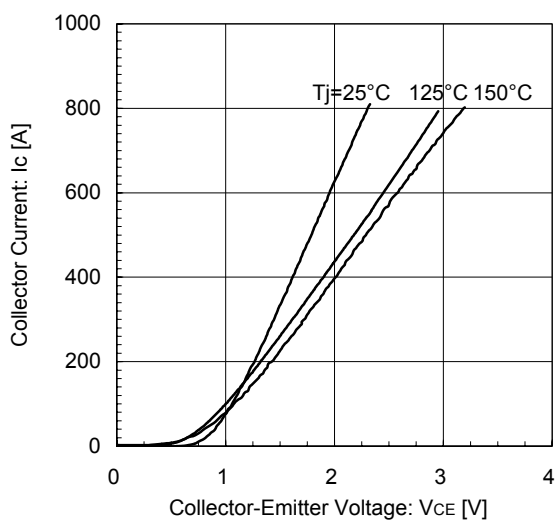
Collector current vs. Collector-Emitter voltage (typ.)
T_j = 25°C / chip



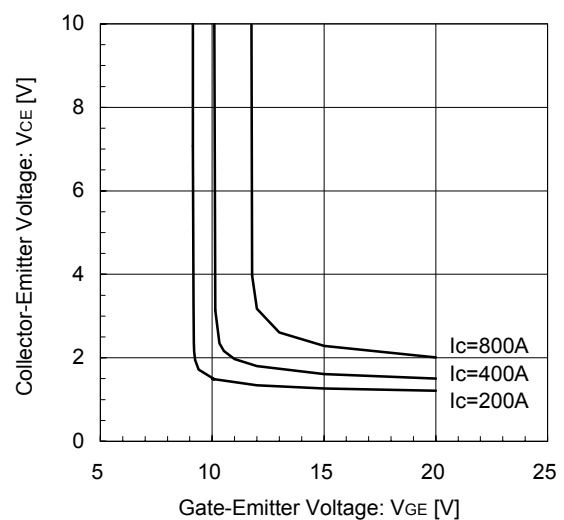
Collector current vs. Collector-Emitter voltage (typ.)
T_j = 150°C / chip



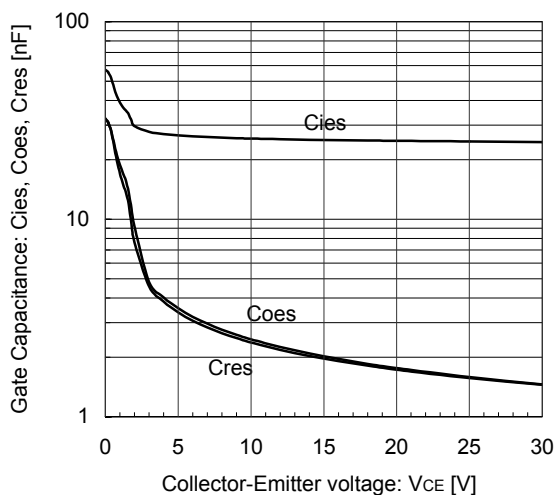
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE} = 15V / chip



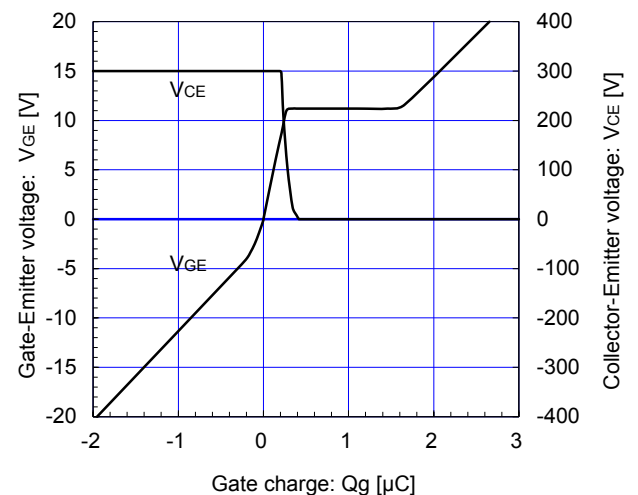
Collector-Emitter voltage vs. Gate-Emitter voltage
T_j = 25°C / chip



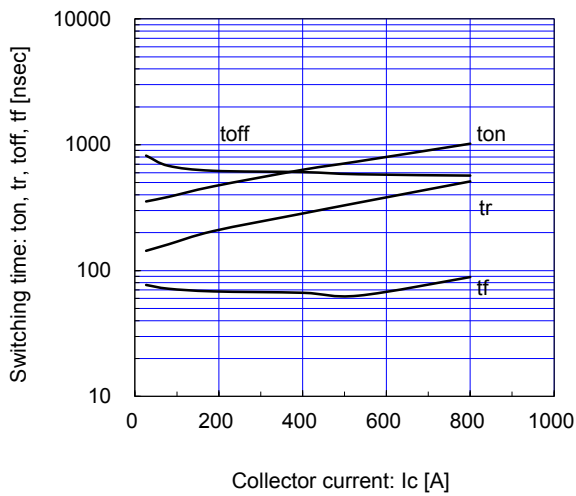
Gate Capacitance vs. Collector-Emitter Voltage
V_{GE} = 0V, f = 1MHz, T_j = 25°C



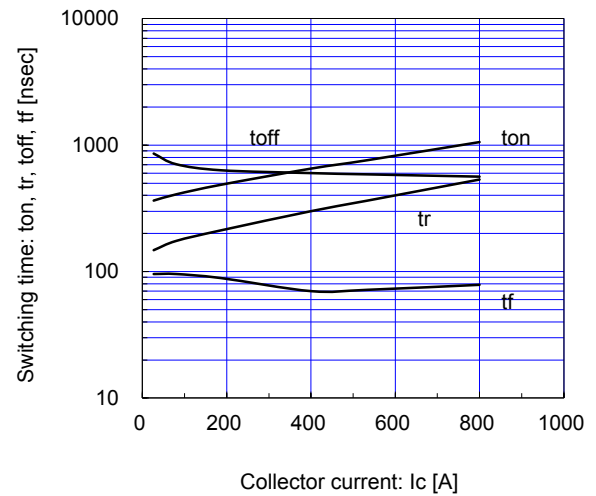
Dynamic Gate Charge (typ.)
V_{CC} = 300V, I_C = 400A, T_j = 25°C



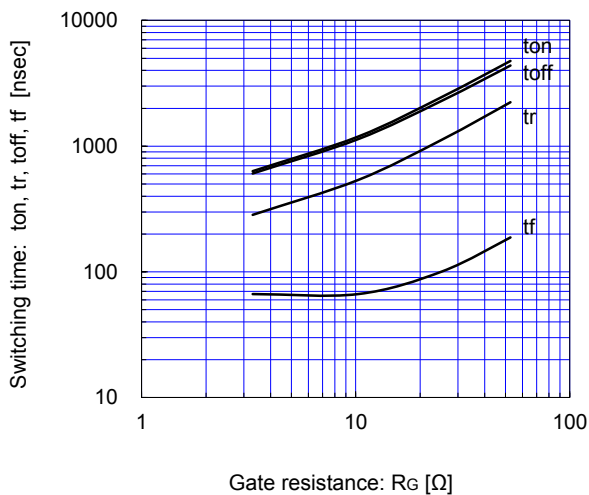
Switching time vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=3.3\Omega$, $T_J=125^\circ C$



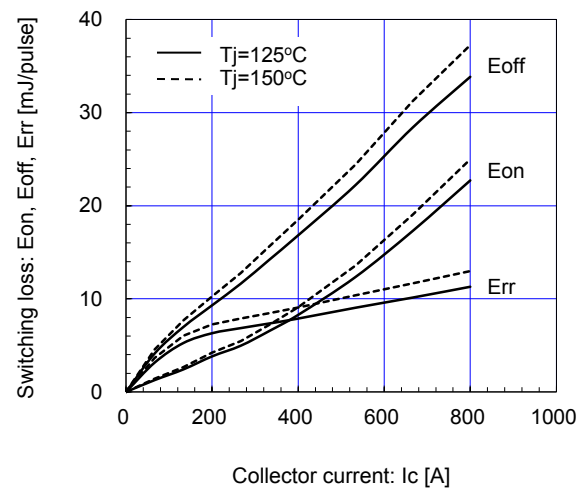
Switching time vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=3.3\Omega$, $T_J=150^\circ C$



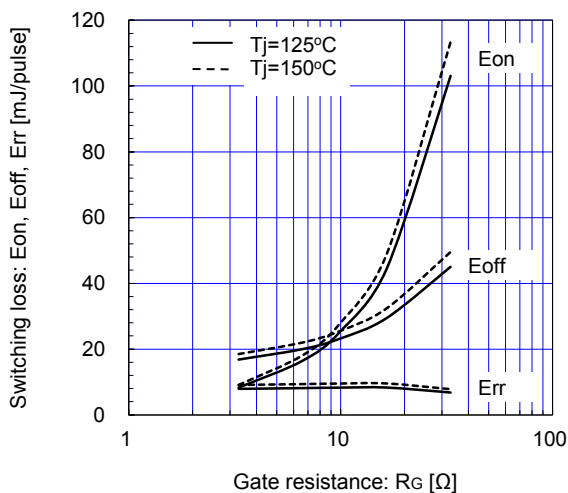
Switching time vs. Gate resistance (typ.)
 $V_{CC}=300V$, $I_C=400A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$



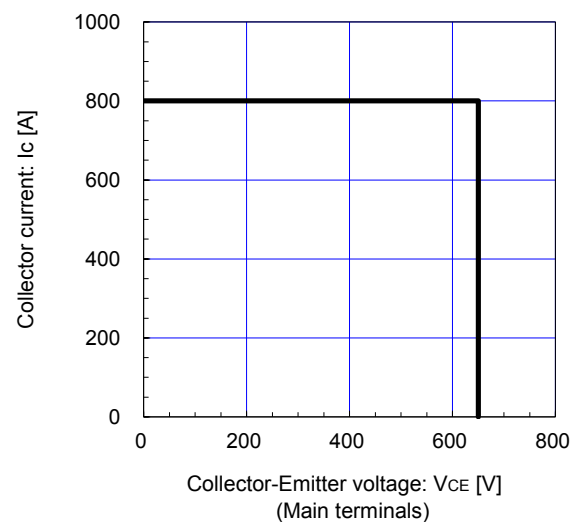
Switching loss vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=3.3\Omega$, $T_J=125^\circ C$, $150^\circ C$



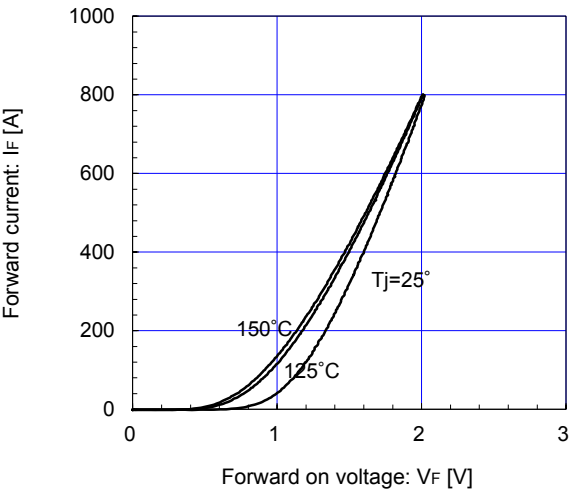
Switching loss vs. Gate resistance (typ.)
 $V_{CC}=300V$, $I_C=400A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$, $150^\circ C$



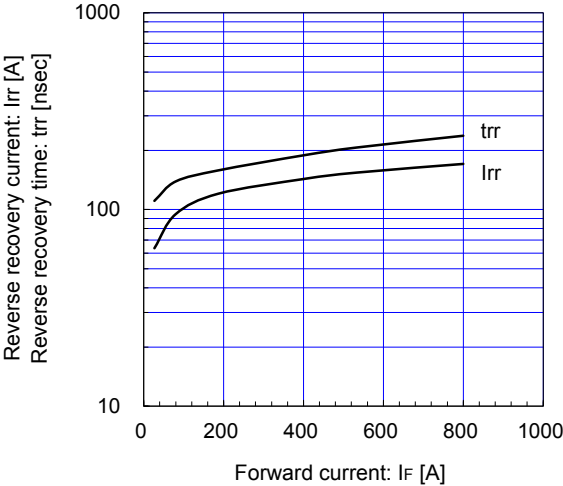
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_G=3.3\Omega$, $T_J=150^\circ C$



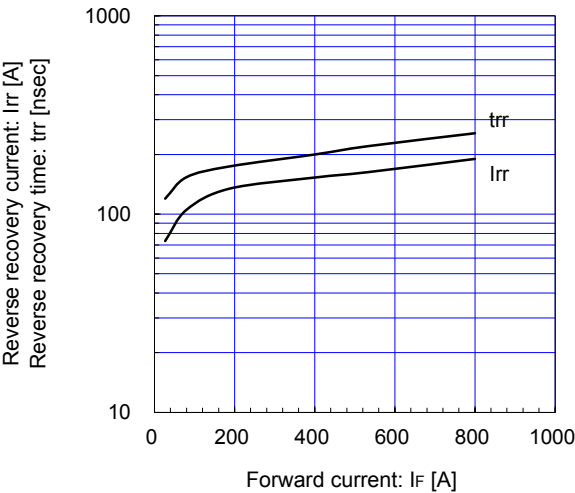
Forward Current vs. Forward Voltage (typ.)
chip



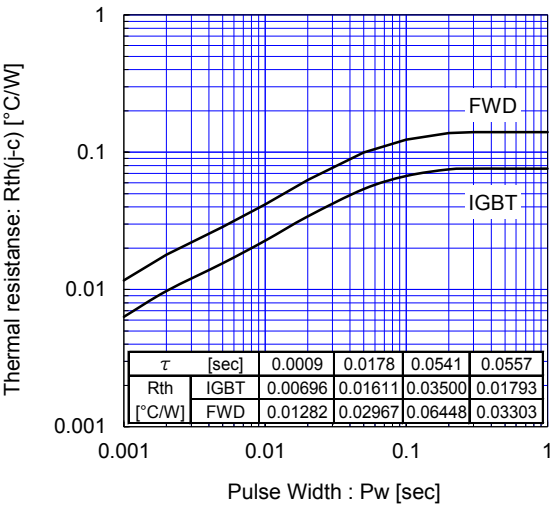
Reverse Recovery Characteristics (typ.)
 $V_{CC}=300\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=3.3\Omega$, $T_j=125^\circ\text{C}$



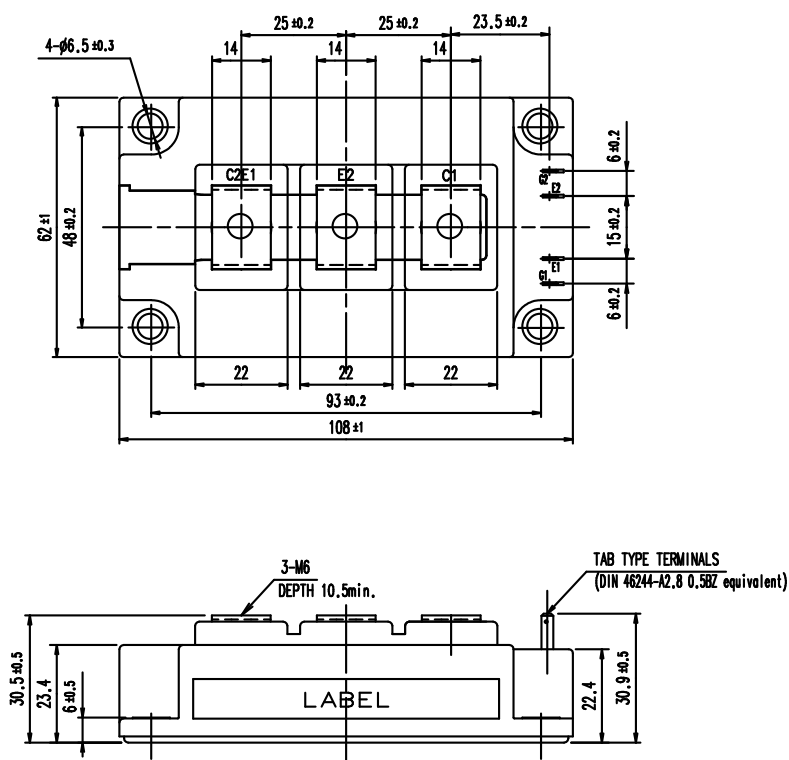
Reverse Recovery Characteristics (typ.)
 $V_{CC}=300\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=3.3\Omega$, $T_j=150^\circ\text{C}$



Transient Thermal Resistance (max.)

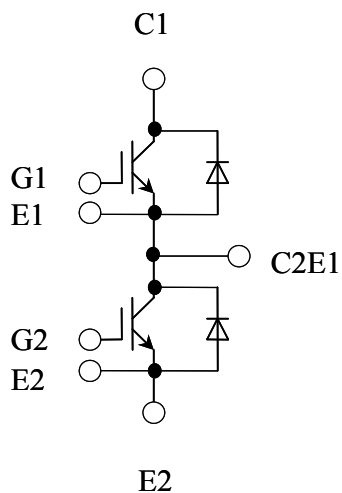


Outline Drawings (Unit: mm)



Weight: 370g (typ.)

Equivalent Circuit



WARNING

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