

2MBI400VD-060-50

IGBT Modules

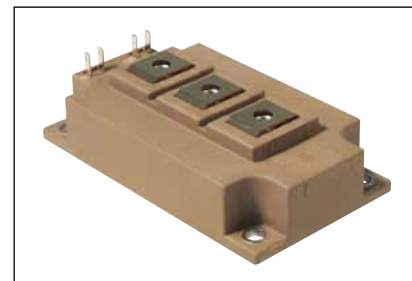
IGBT MODULE (V series) 600V / 400A / 2 in one package

■ 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)

Absolute maximum ratings (at 10-25°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
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}	$V_{CE} = 0V, V_{GE} = \pm 20V$		-	-	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)	$V_{GE} = 15V$ $I_C = 400A$	$T_J = 25^{\circ}C$	-	1.80	2.25	V
					$T_J = 125^{\circ}C$	-	2.10	-	
			$V_{CE(sat)}$ (chip)		$T_J = 150^{\circ}C$	-	2.30	-	
					$T_J = 25^{\circ}C$	-	1.60	2.05	
					$T_J = 125^{\circ}C$	-	1.90	-	
	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}	$V_{CC} = 300V, I_C = 400A$ $V_{GE} = \pm 15V, R_G = 3.3\Omega$ $T_J = 150^{\circ}C, L_s = 30nH$		-	0.65	-	μsec
			t_r			-	0.30	-	
			$t_r(i)$			-	0.10	-	
	Turn-off time		t_{off}			-	0.60	-	
			t_f			-	0.07	-	
Forward on voltage		V_F (terminal)	$V_{GE} = 0V$ $I_F = 400A$	$T_J = 25^{\circ}C$	-	1.75	2.20	V	
				$T_J = 125^{\circ}C$	-	1.65	-		
				$T_J = 150^{\circ}C$	-	1.62	-		
		V_F (chip)		$T_J = 25^{\circ}C$	-	1.60	2.05		
				$T_J = 125^{\circ}C$	-	1.50	-		
Reverse recovery time		t_{rr}	$I_F = 400A$		-	0.20	-	μsec	

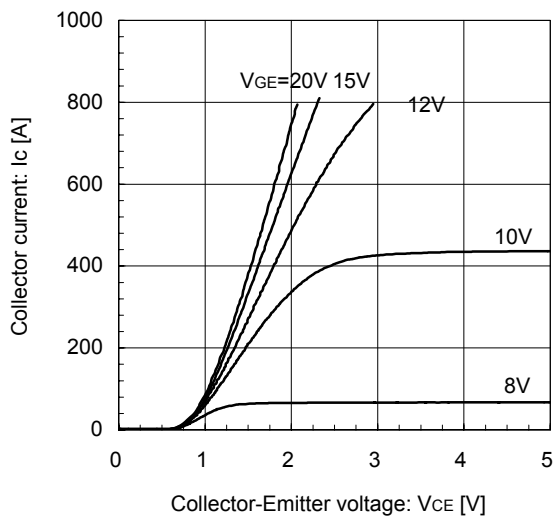
● Thermal resistance characteristics

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	-	

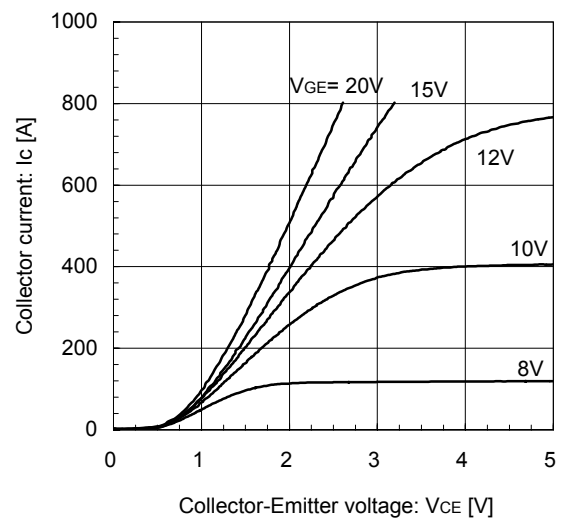
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

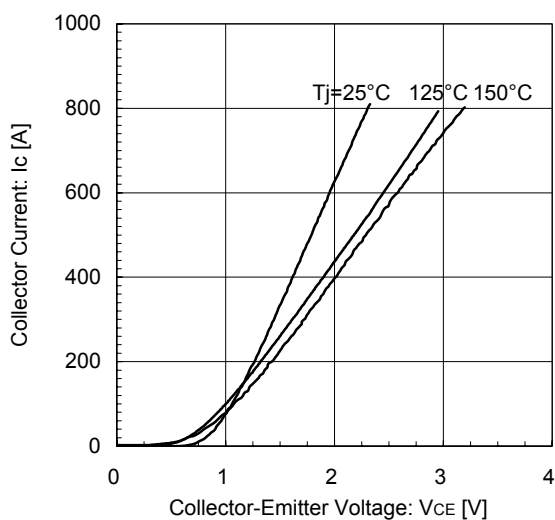
Collector current vs. Collector-Emittter voltage (typ.)
T_j = 25°C / chip



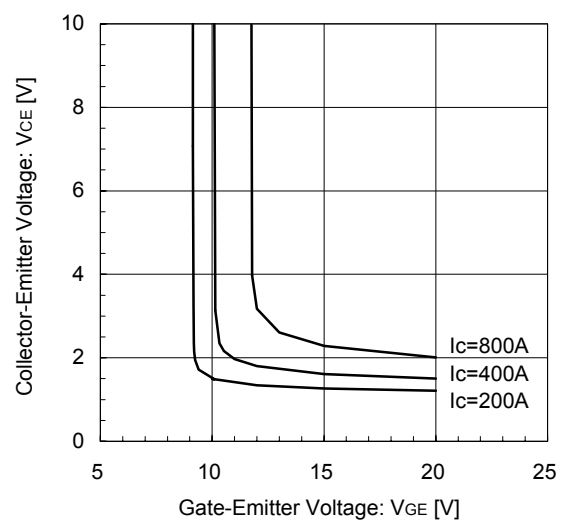
Collector current vs. Collector-Emittter voltage (typ.)
T_j = 150°C / chip



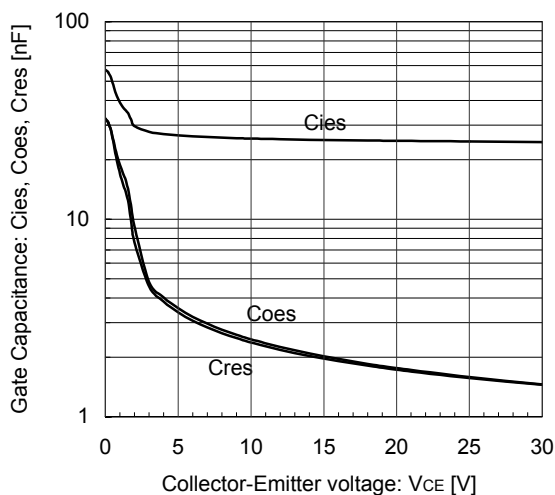
Collector current vs. Collector-Emittter voltage (typ.)
VGE = 15V / chip



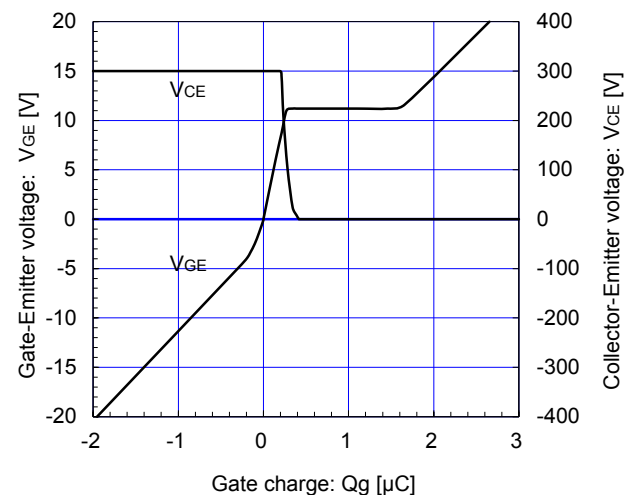
Collector-Emittter voltage vs. Gate-Emittter voltage
T_j = 25°C / chip



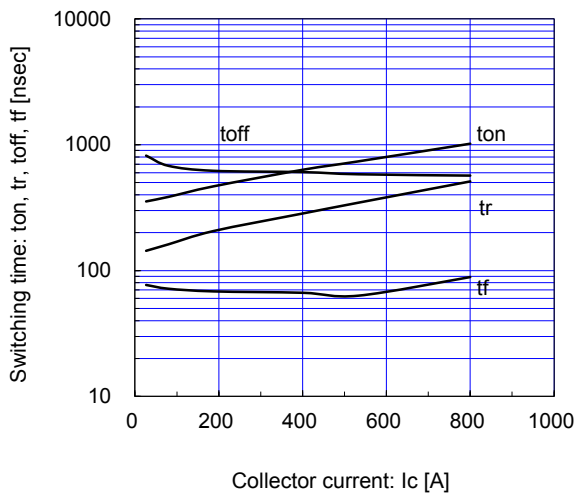
Gate Capacitance vs. Collector-Emittter Voltage
VGE = 0V, f = 1MHz, Tj = 25°C



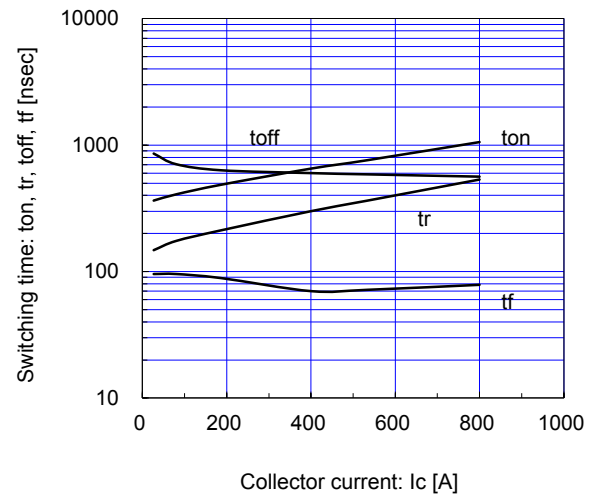
Dynamic Gate Charge (typ.)
Vcc = 300V, Ic = 400A, Tj = 25°C



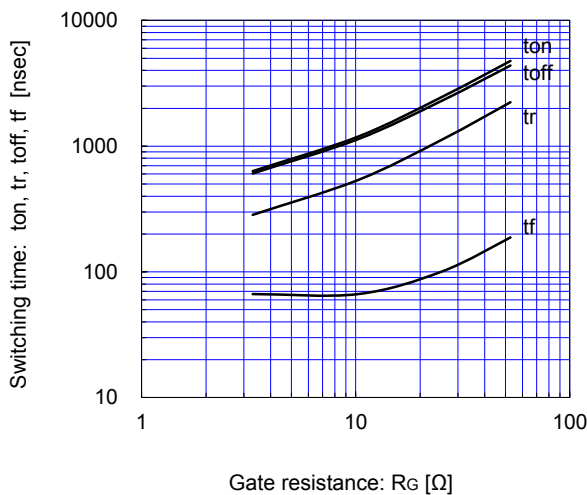
Switching time vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=3.3\Omega$, $T_J=125^\circ C$



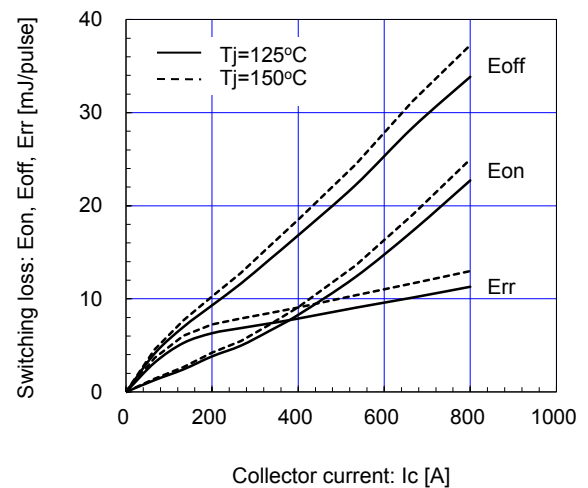
Switching time vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=3.3\Omega$, $T_J=150^\circ C$



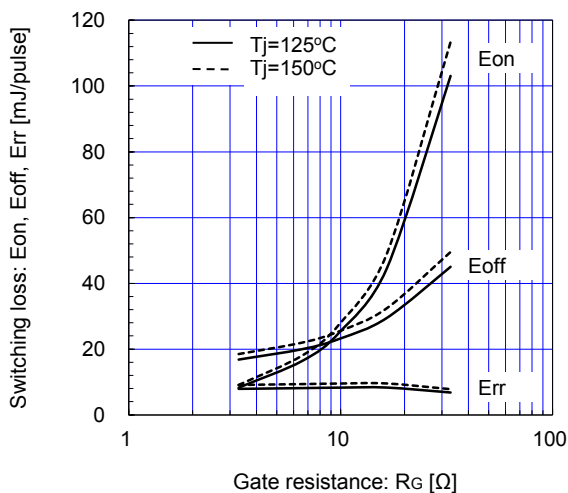
Switching time vs. Gate resistance (typ.)
 $V_{CC}=300V$, $I_C=400A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$



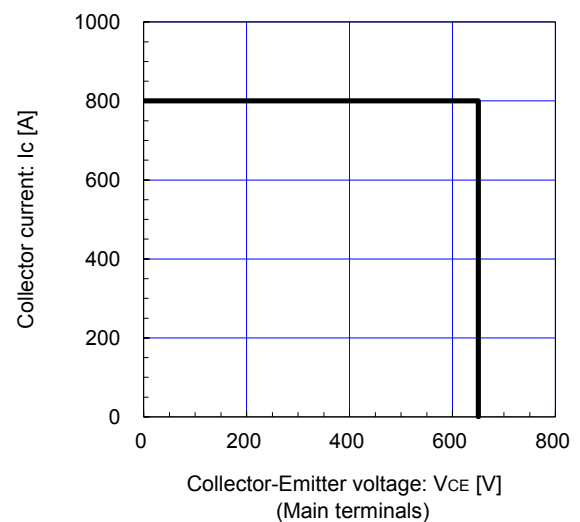
Switching loss vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=3.3\Omega$, $T_J=125^\circ C$, $150^\circ C$



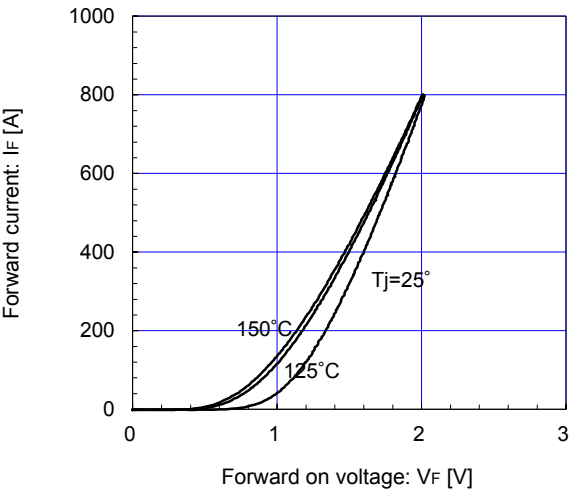
Switching loss vs. Gate resistance (typ.)
 $V_{CC}=300V$, $I_C=400A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$, $150^\circ C$



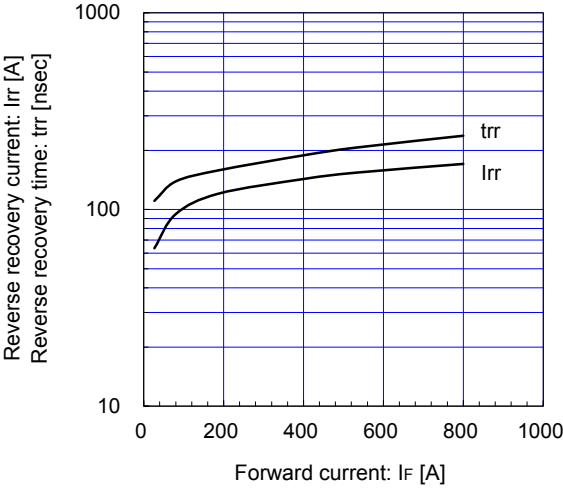
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_G=3.3\Omega$, $T_J=150^\circ C$



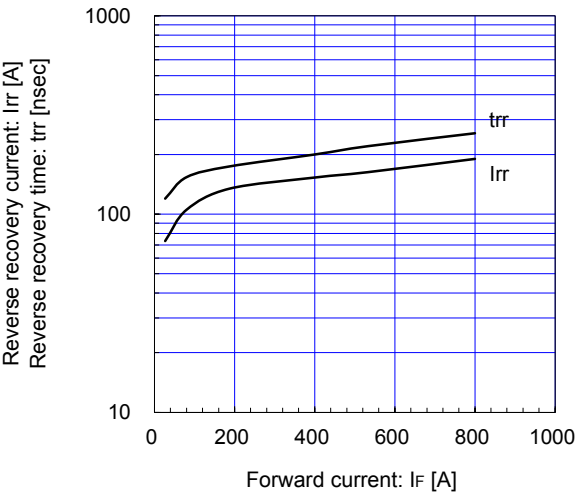
Forward Current vs. Forward Voltage (typ.)
chip



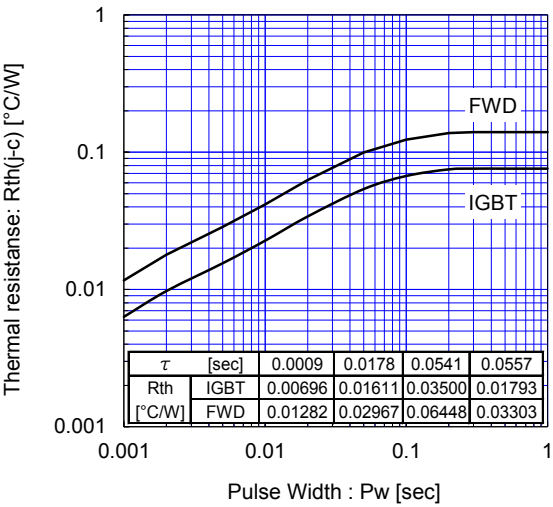
Reverse Recovery Characteristics (typ.)
 $V_{CC}=300\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=3.3\Omega$, $T_j=125^\circ\text{C}$



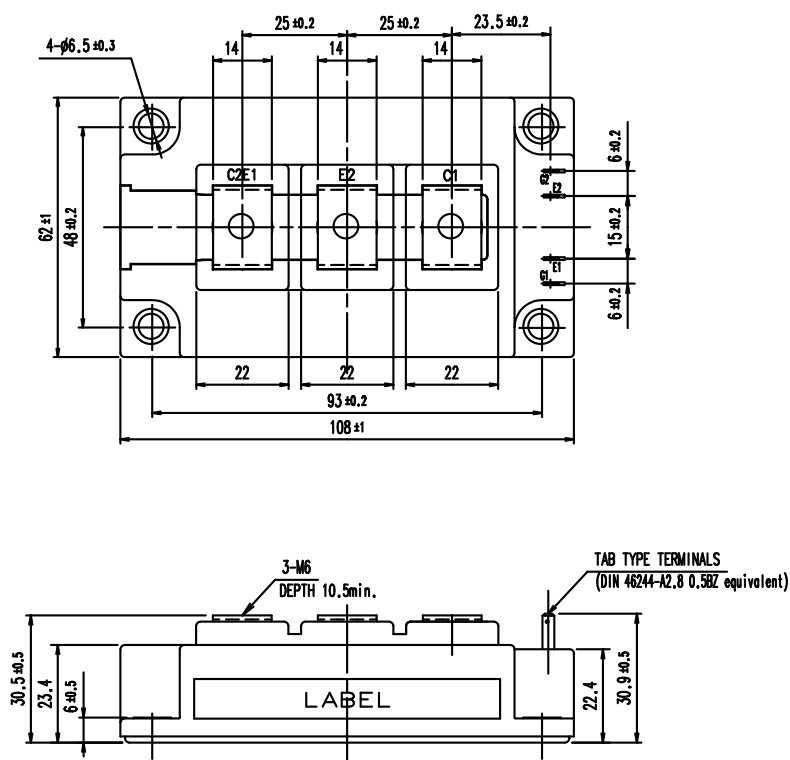
Reverse Recovery Characteristics (typ.)
 $V_{CC}=300\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=3.3\Omega$, $T_j=150^\circ\text{C}$



Transient Thermal Resistance (max.)

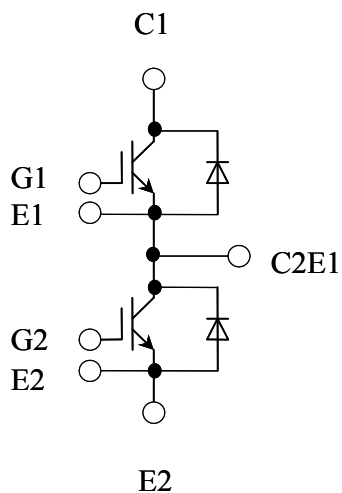


■ Outline Drawings (Unit: mm)



Weight: 370g (typ.)

■ Equivalent Circuit



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IGBT Modules

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