

2MBI600VE-060-50

IGBT Modules

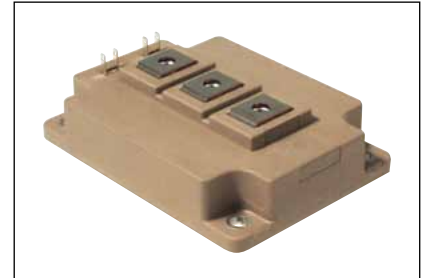
IGBT MODULE (V series) 600V / 600A / 2 in one package

■ 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
Collector-Emitter voltage	V _{CE}		600	V
Gate-Emitter voltage	V _{GE}		±20	V
Inverter	Collector current	Continuous	Tc=80°C	600
			Tc=25°C	780
		Ic pulse	1ms	1200
		-Ic		600
		-Ic pulse	1ms	1200
Collector power dissipation	Pc	1 device	2940	W
Junction temperature	Tj		175	°C
Operating junction temperature (under switching conditions)	Tjop		150	
Case temperature	Tc		125	
Storage temperature	Tstg		-40 ~ +125	
Isolation voltage	between terminal and copper base (*1)		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	ICES	V _{GE} = 0V, V _{CE} = 600V	-	-	2.0	mA
Gate-Emitter leakage current	IGES	V _{CE} = 0V, V _{GE} = ±20V	-	-	800	nA
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V, I _C = 600mA	6.2	6.7	7.2	V
Inverter	Collector-Emitter saturation voltage	V _{GE} = 15V I _C = 600A	Tj=25°C	1.85	2.40	V
			Tj=125°C	2.15	-	
			Tj=150°C	2.35	-	
			Tj=25°C	1.60	1.85	
Inverter	Input capacitance	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	Tj=25°C	39	-	nF
			Tj=125°C	0.40	-	
			Tj=150°C	0.30	-	
			Tj=25°C	0.05	-	
Inverter	Turn-on time	V _{CC} = 300V I _C = 600A V _{GE} = ±15V R _g = 2.2Ω Tj = 150°C	Tj=25°C	0.52	-	μs
			Tj=125°C	0.045	-	
			Tj=150°C	0.045	-	
			Tj=25°C	1.75	2.35	
Inverter	Turn-off time	V _{GE} = 0V I _F = 600A	Tj=25°C	1.65	-	V
			Tj=125°C	1.60	-	
			Tj=150°C	1.60	1.85	
			Tj=25°C	1.50	-	
Inverter	Forward on voltage	V _{GE} = 0V I _F = 600A	Tj=25°C	1.47	-	V
			Tj=125°C	1.50	-	
			Tj=150°C	1.47	-	
			Tj=25°C	0.30	-	
Reverse recovery time	trr	I _F = 600A	-	0.30	-	μs

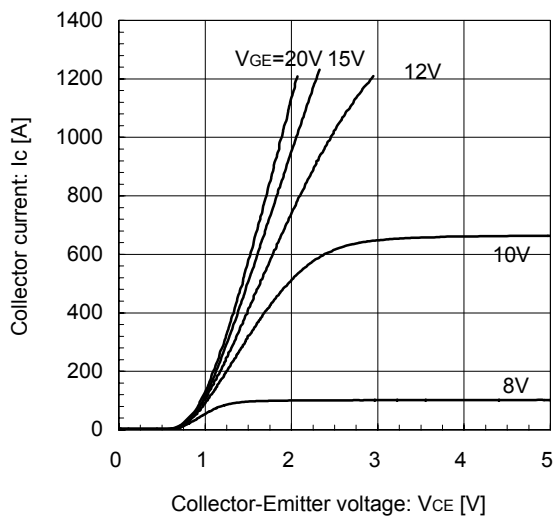
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	Rth(j-c)	IGBT	-	-	0.051	°C/W
		FWD	-	-	0.088	
Contact thermal resistance (1device) (*4)	Rth(c-f)	with Thermal Compound	-	0.0125	-	

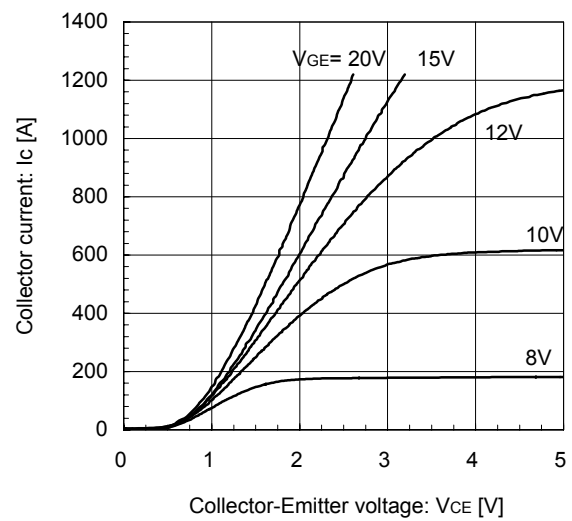
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

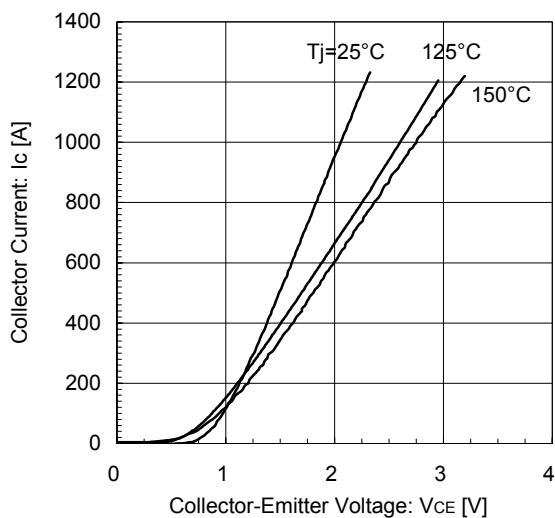
Collector current vs. Collector-Emitter voltage (typ.)
T_j = 25°C / chip



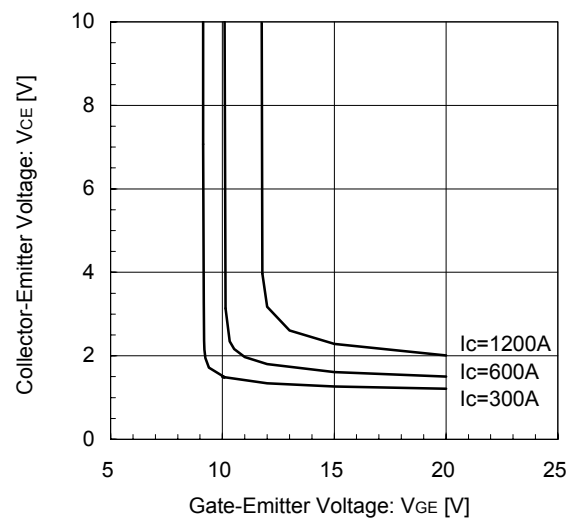
Collector current vs. Collector-Emitter voltage (typ.)
T_j = 150°C / chip



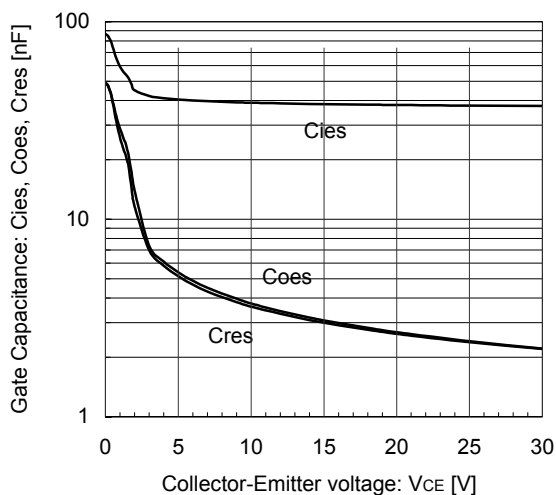
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE} = 15V / chip



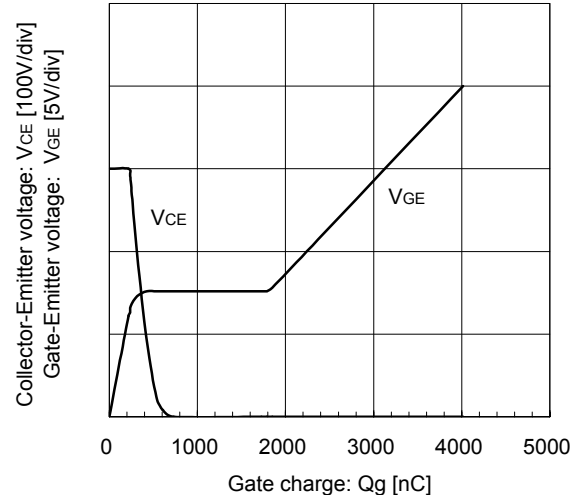
Collector-Emitter voltage vs. Gate-Emitter voltage
T_j = 25°C / chip



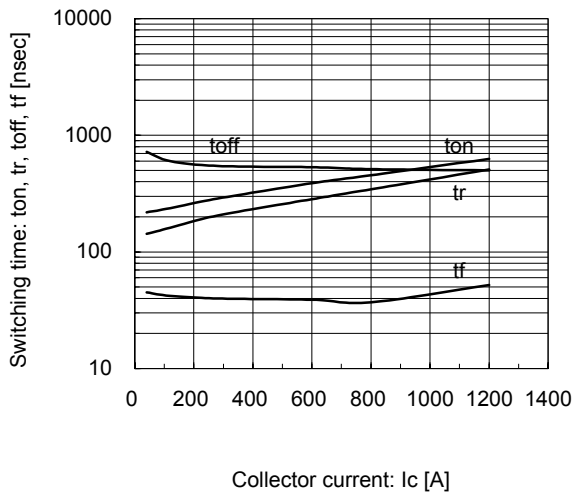
Gate Capacitance vs. Collector-Emitter Voltage
V_{GE} = 0V, f = 1MHz, T_j = 25°C



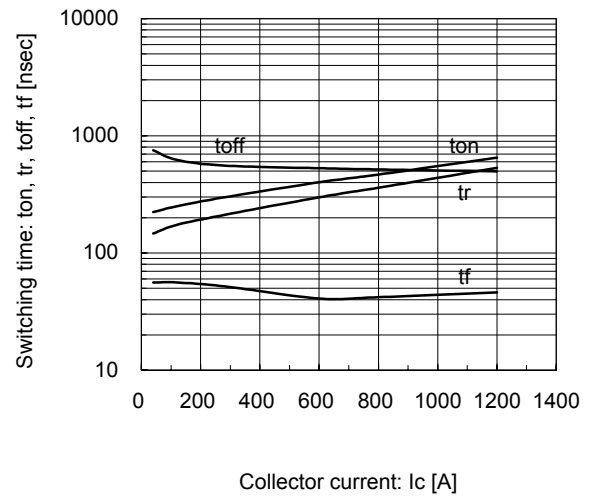
Dynamic Gate Charge (typ.)
V_{CC} = 300V, I_C = 600A, T_j = 25°C



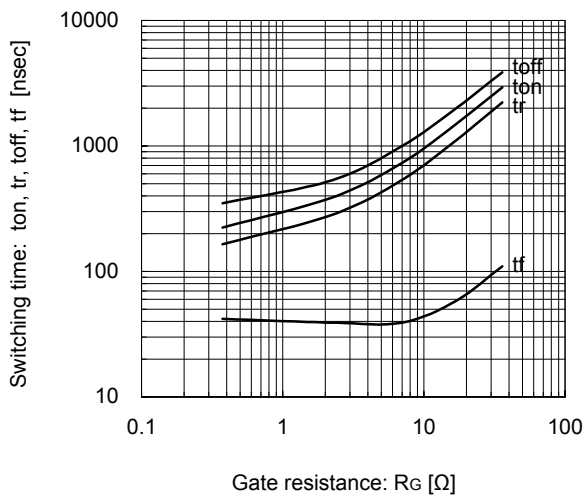
Switching time vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=2.2\Omega$, $T_J=125^\circ C$



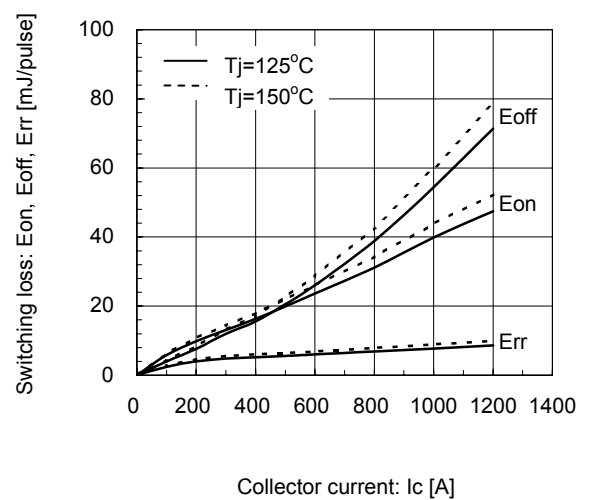
Switching time vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=2.2\Omega$, $T_J=150^\circ C$



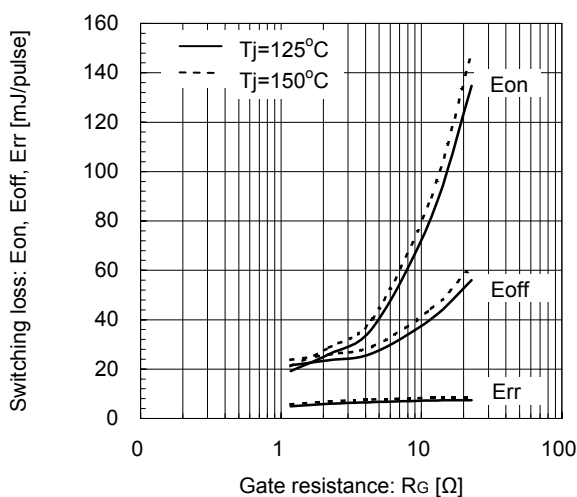
Switching time vs. Gate resistance (typ.)
 $V_{CC}=300V$, $I_C=600A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$



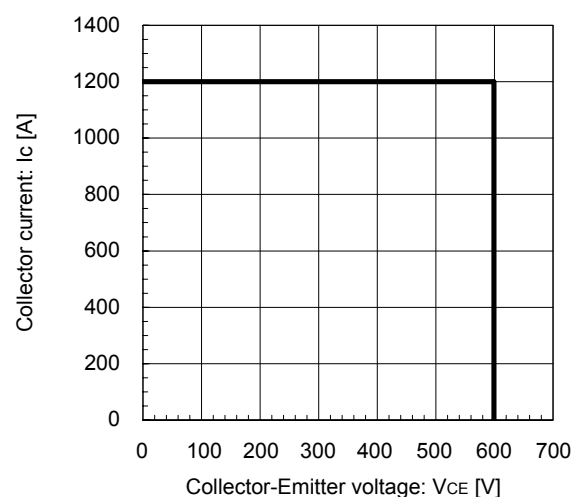
Switching loss vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=2.2\Omega$, $T_J=125^\circ C$, $150^\circ C$



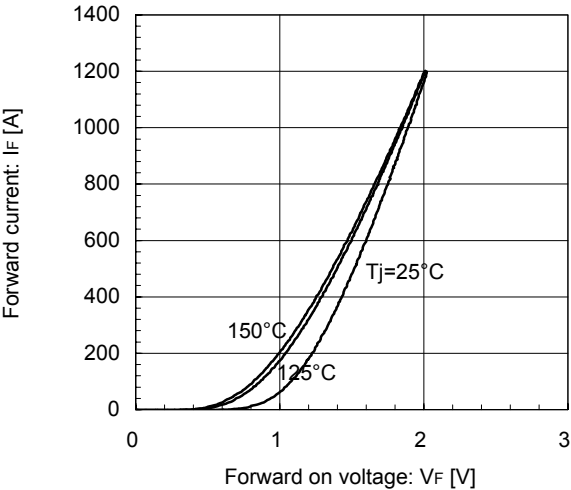
Switching loss vs. Gate resistance (typ.)
 $V_{CC}=300V$, $I_C=600A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$, $150^\circ C$



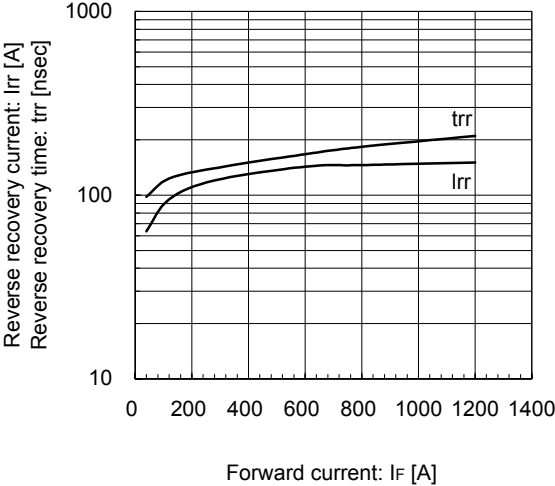
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_G=2.2\Omega$, $T_J=150^\circ C$



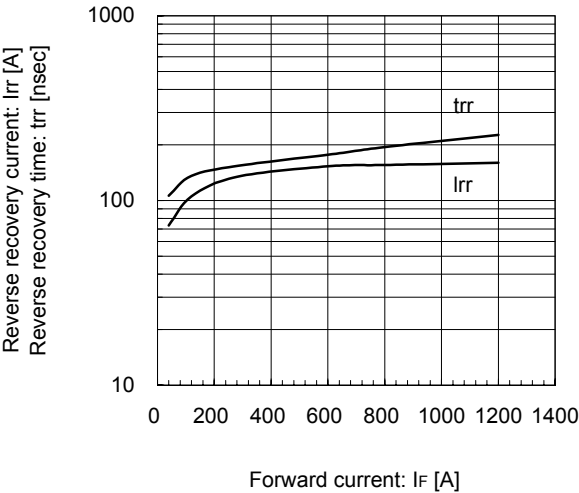
Forward Current vs. Forward Voltage (typ.)
chip



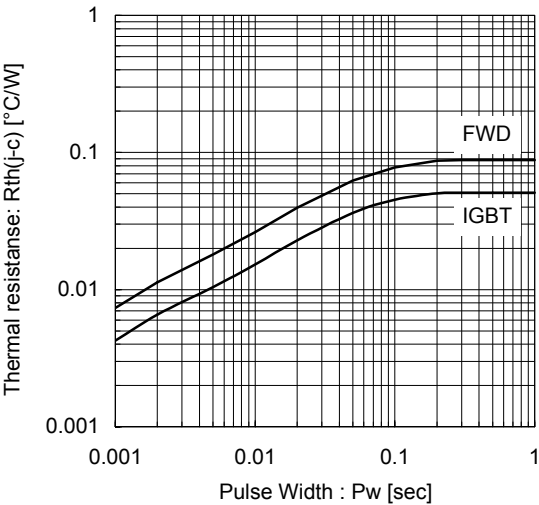
Reverse Recovery Characteristics (typ.)
 $V_{CC}=300\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=2.2\Omega$, $T_J=125^\circ\text{C}$



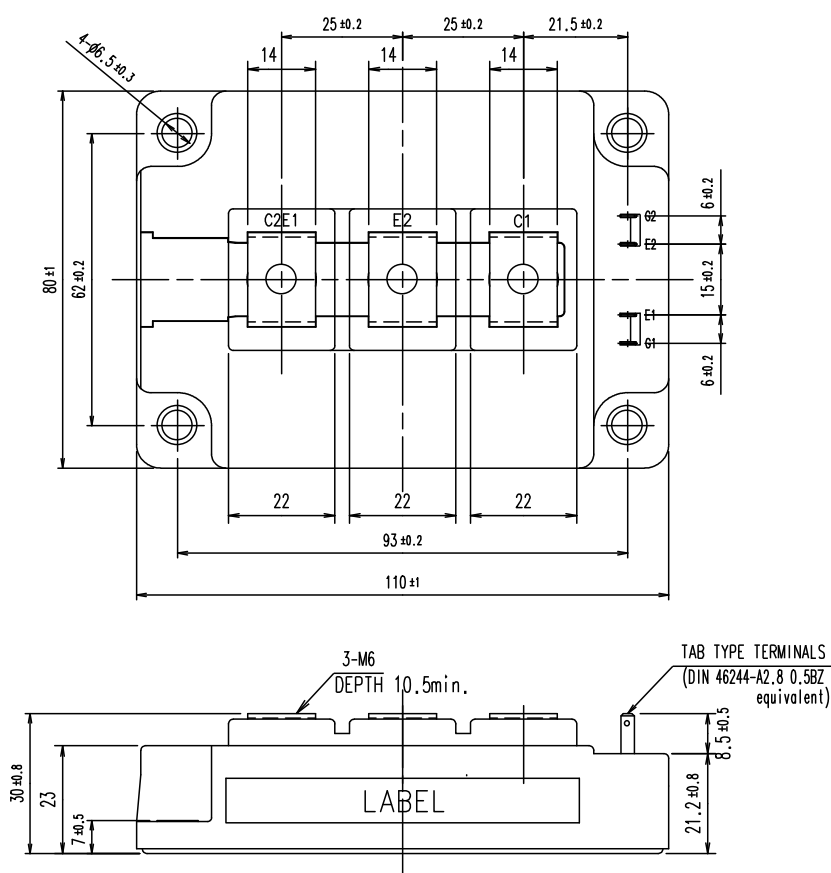
Reverse Recovery Characteristics (typ.)
 $V_{CC}=300\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=2.2\Omega$, $T_J=150^\circ\text{C}$



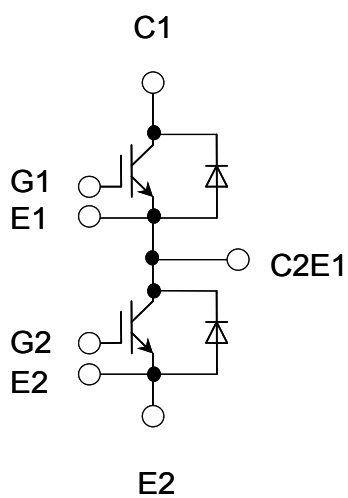
Transient Thermal Resistance (max.)



■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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