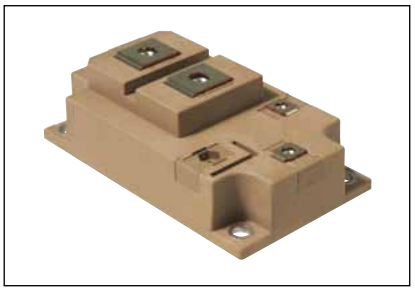
1MBI400V-120-50

IGBT Modules

IGBT MODULE (V series)
1200V / 400A / 1 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_{CES}			1200	V
Gate-Emitter voltage		V_{GES}			±20	V
Collector current		Ic	Continuous	Tc=100°C	400	A
				Tc=25°C	480	
		Ic pulse	1ms		800	
		-Ic			400	
		-Ic pulse	1ms		800	
Collector power dissipation		Pc	1 device		2410	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)	V_{iso}	AC : 1min.		2500	VAC
Screw torque	Mounting (*2)	M5 ro M6			6.0	Nm
	Terminals (*3)	M4			2.0	
		M6			5.0	

Note *1: All terminals should be connected together during the test.
Note *2: Recommendable Value : 3.0-6.0 Nm (M5, M6)
Note *3: Recommendable Value : 1.1-2.0 Nm (M4)
Recommendable Value : 2.5-5.0 Nm (M6)

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

Items	Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
Zero gate voltage collector current	I_{CES}	V_{GE} = 0V, V_{CE} = 1200V		-	-	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		6.0	6.5	7.0	V
Collector-Emitter saturation voltage	$V_{CE\ (sat)}$ (terminal)	V_{GE} = 15V, I_C = 400A	Tj=25°C	-	1.95	2.40	V
			Tj=125°C	-	2.25	-	
			Tj=150°C		2.30		
	$V_{CE\ (sat)}$ (chip)		Tj=25°C	-	1.75	2.15	
			Tj=125°C	-	2.05	-	
			Tj=150°C		2.10		
Input capacitance	Cies	V_{GE} = 0V, V_{CE} = 10V, f = 1MHz		-	36	-	nF
Turn-on time	ton	V_{CC} = 600V, I_C = 400A, V_{GE} = ±15V, R_G = 1.8Ω, Tj=150°C, Ls=35nH		-	0.60	-	μs
	tr			-	0.20	-	
	tr(i)			-	0.08	-	
Turn-off time	toff			-	1.00	-	
	tf			-	0.14	-	
Forward on voltage	V_F (terminal)	V_{GE} = 0V, I_F = 400A	Tj=25°C	-	1.85	2.30	V
			Tj=125°C	-	2.00	-	
	V_F (chip)		Tj=150°C		1.95		
			Tj=25°C	-	1.70	2.15	
			Tj=125°C	-	1.85	-	
			Tj=150°C		1.80		
Reverse recovery time	trr	I_F = 400A		-	0.20	-	μs

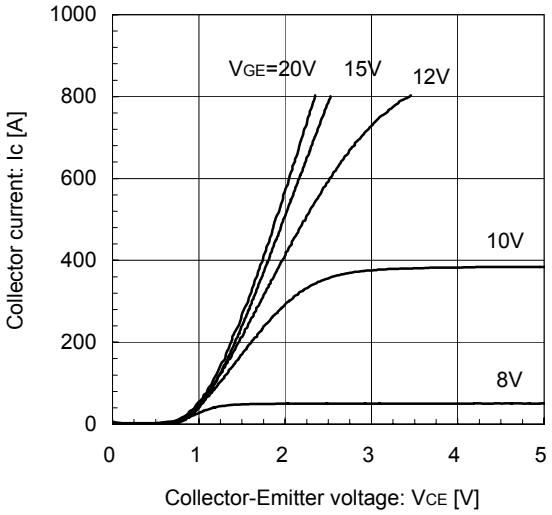
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
Thermal resistance (1device)	Rth(j-c)	IGBT	-	-	0.062	°C/W
		FWD	-	-	0.110	
Contact thermal resistance (*4)	Rth(c-f)	with Thermal Compound	-	0.0125	-	

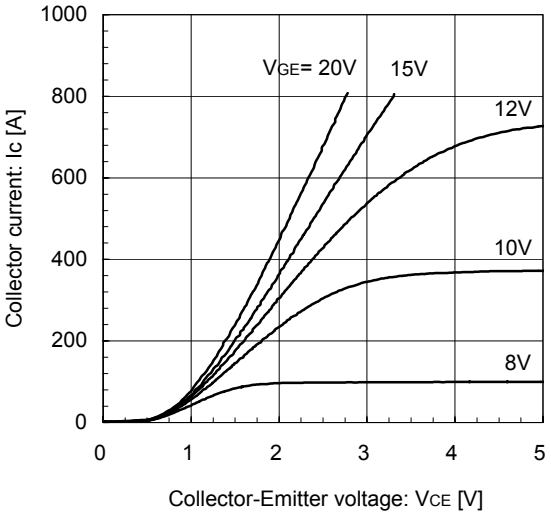
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

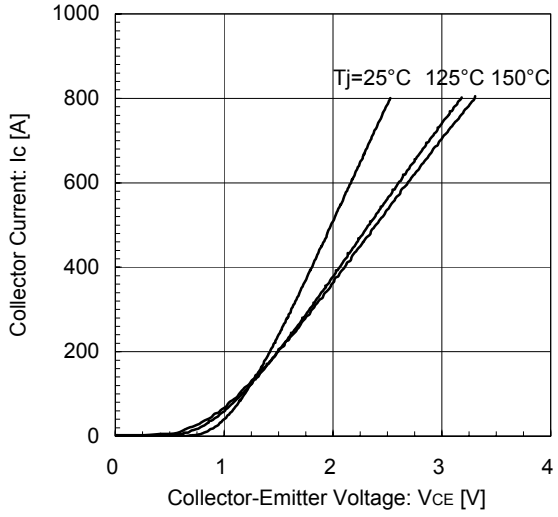
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



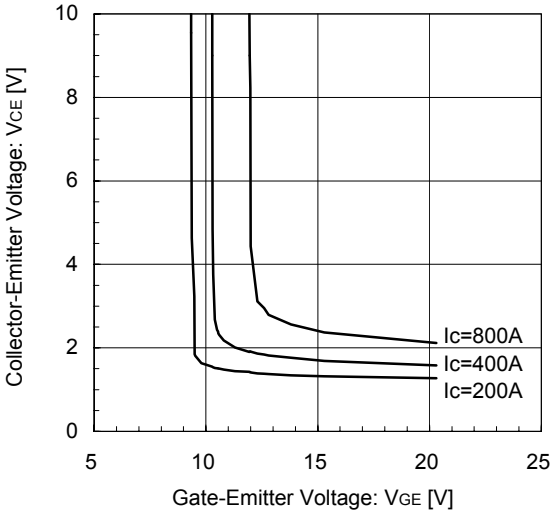
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150°C / chip



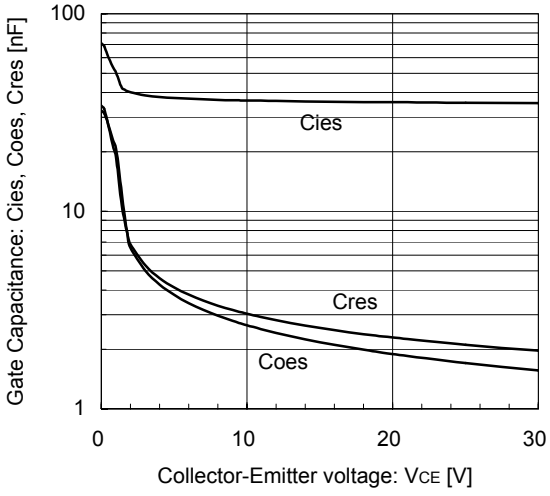
Collector current vs. Collector-Emitter voltage (typ.)
VGE= 15V / chip



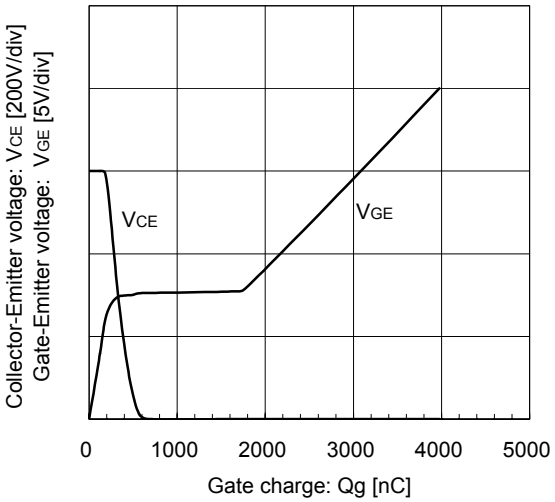
Collector-Emitter voltage vs. Gate-Emitter voltage
Tj= 25°C / chip



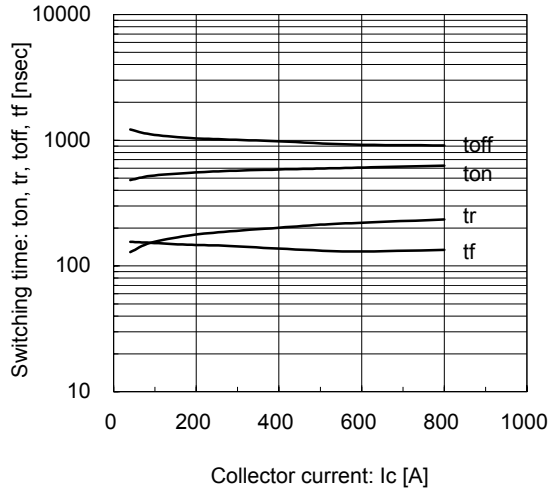
Gate Capacitance vs. Collector-Emitter Voltage
VGE= 0V, *f*= 1MHz, Tj= 25°C



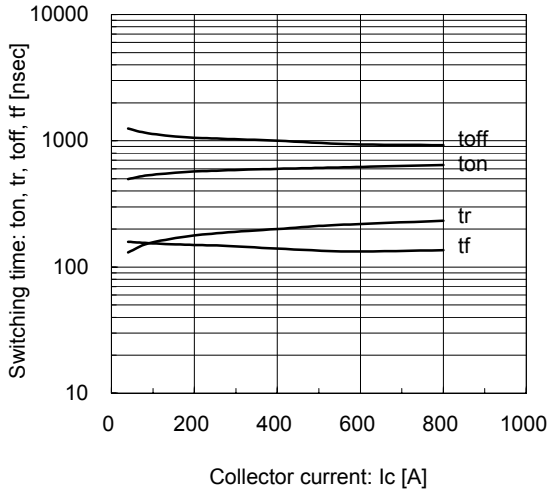
Dynamic Gate Charge (typ.)
Vcc=600V, Ic=400A, Tj= 25°C



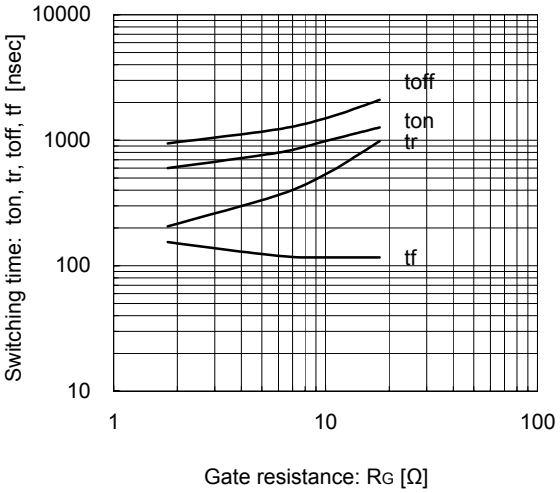
Switching time vs. Collector current (typ.)
Vcc=600V, VGE=±15V, Rg=1.8Ω, Tj=125°C



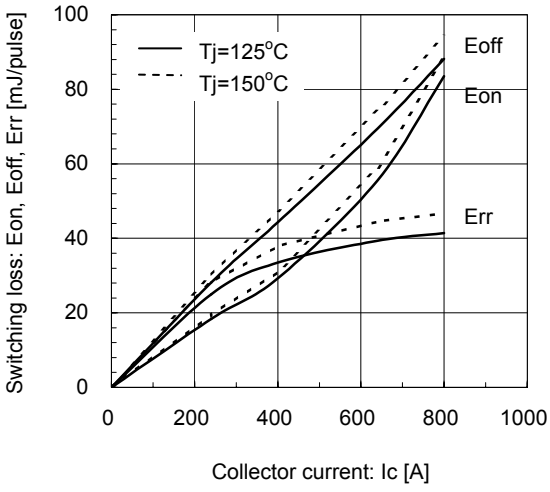
Switching time vs. Collector current (typ.)
Vcc=600V, VGE=±15V, Rg=1.8Ω, Tj=150°C



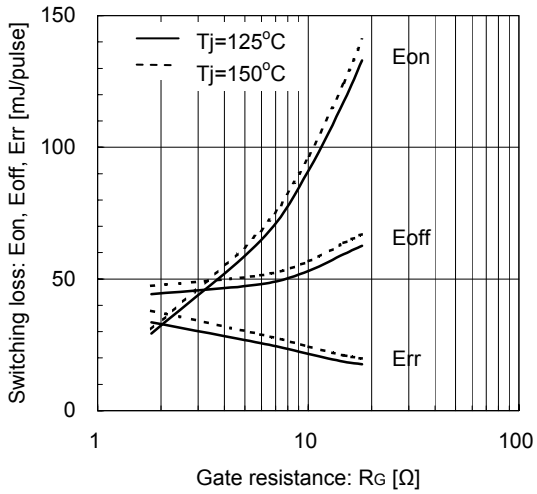
Switching time vs. Gate resistance (typ.)
Vcc=600V, Ic=400A, VGE=±15V, Tj=125°C



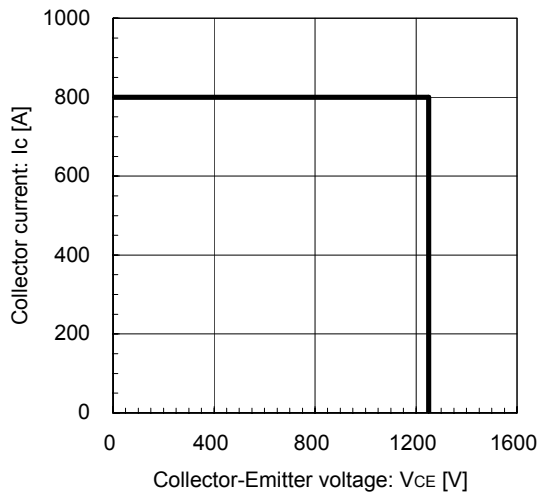
Switching loss vs. Collector current (typ.)
Vcc=600V, VGE=±15V, RG=1.8Ω, Tj=125°C, 150°C



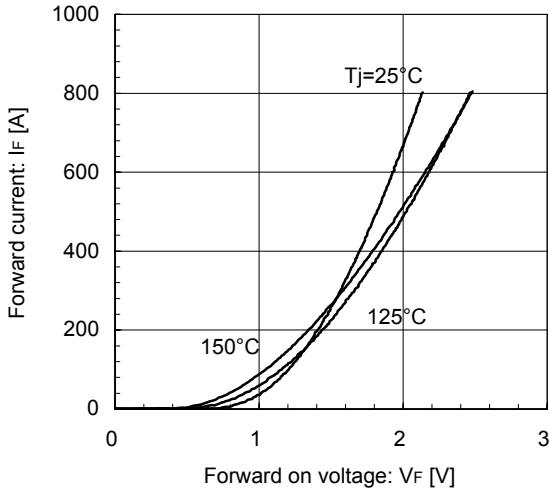
Switching loss vs. Gate resistance (typ.)
Vcc=600V, Ic=400A, VGE=±15V, Tj=125°C, 150°C



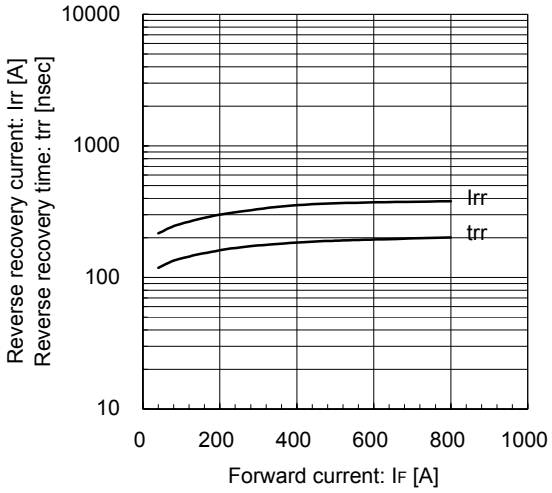
Reverse bias safe operating area (max.)
+VGE=15V, -VGE=15V, RG=1.8Ω, Tj=150°C, Ls=35nH



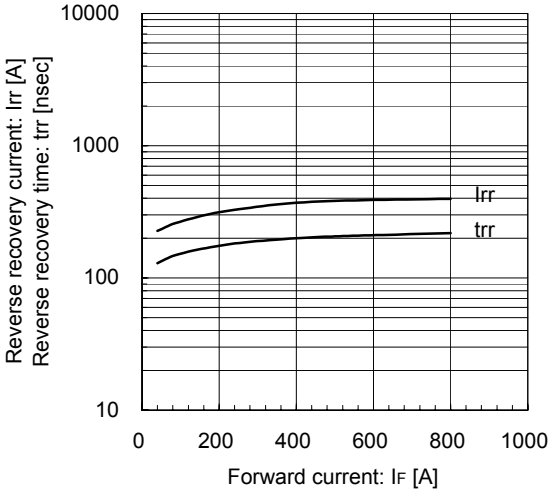
Forward Current vs. Forward Voltage (typ.)
chip



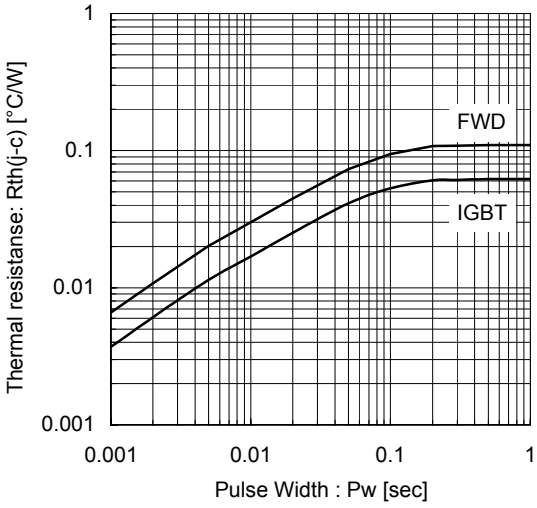
Reverse Recovery Characteristics (typ.)
Vcc=600V, VGE=±15V, RG=1.8Ω, Tj=125°C



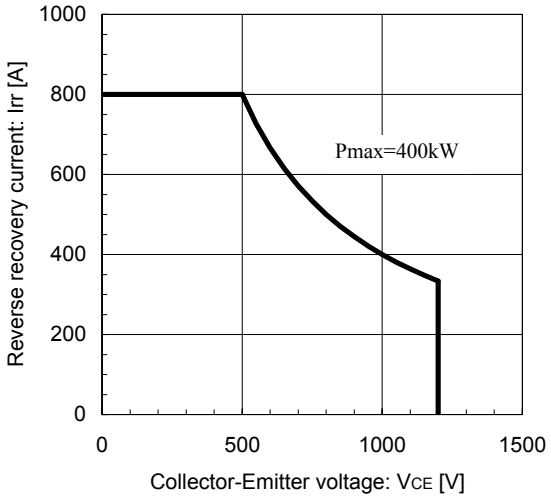
Reverse Recovery Characteristics (typ.)
Vcc=600V, VGE=±15V, RG=1.8Ω, Tj=150°C



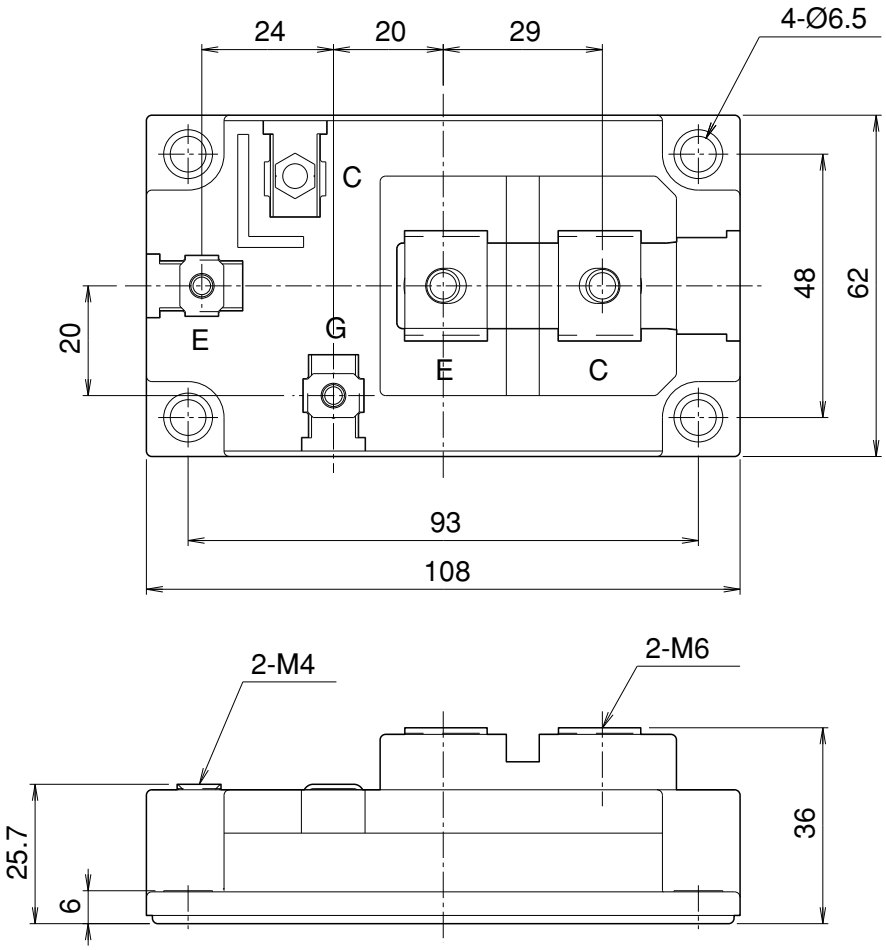
Transient Thermal Resistance (max.)



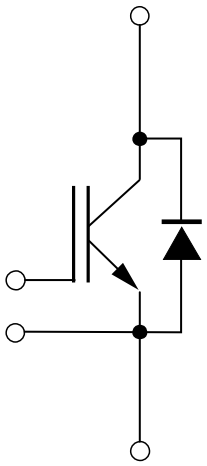
FWD safe operating area (max.)
Tj=150°C



■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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- Measurement equipment
- Machine tools
- Audiovisual equipment
- Electrical home appliances
- Personal equipment
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- Safety devices
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