

1MBI400V-120-50

IGBT Modules

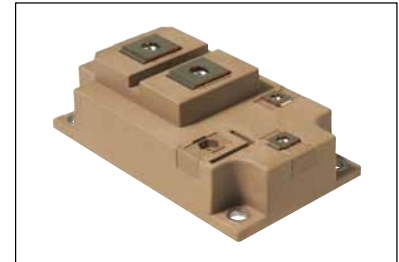
IGBT MODULE (V series) 1200V / 400A / 1 in one package

■ 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	I _c	Continuous	T _c =100°C	400	A
			T _c =25°C	480	
	I _c pulse	1ms	800		
	-I _c		400		
	-I _c pulse	1ms	800		
Collector power dissipation	P _c	1 device	2410	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)	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 T_j = 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} = 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	T _j = 25°C	-	1.95	2.40	V
			T _j = 125°C	-	2.25	-	
			T _j = 150°C	-	2.30	-	
	T _j = 25°C		-	1.75	2.15		
	T _j = 125°C		-	2.05	-		
	T _j = 150°C		-	2.10	-		
Input capacitance	C _{ies}	V _{GE} = 0V, V _{CE} = 10V, f = 1MHz	-	36	-	nF	
			ton	-	0.60	-	μs
Turn-on time	tr	V _{CC} = 600V, I _c = 400A V _{GE} = ±15V, R _G = 1.8Ω T _j = 150°C, L _s = 35nH	-	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	T _j = 25°C	-	1.85	2.30	V
			T _j = 125°C	-	2.00	-	
			T _j = 150°C	-	1.95	-	
	T _j = 25°C		-	1.70	2.15		
	T _j = 125°C		-	1.85	-		
	T _j = 150°C		-	1.80	-		
Reverse recovery time	t _{rr}	I _F = 400A	-	0.20	-	μs	

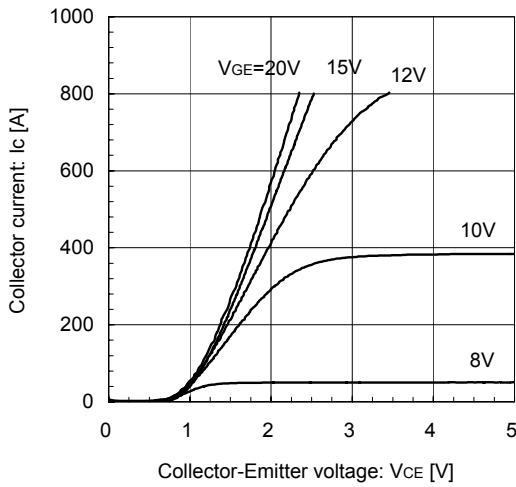
● Thermal resistance characteristics

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

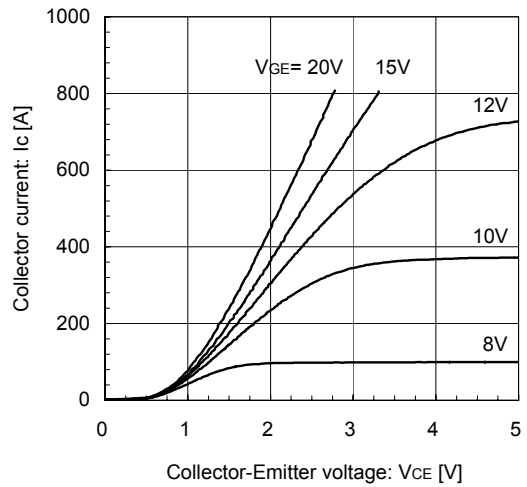
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

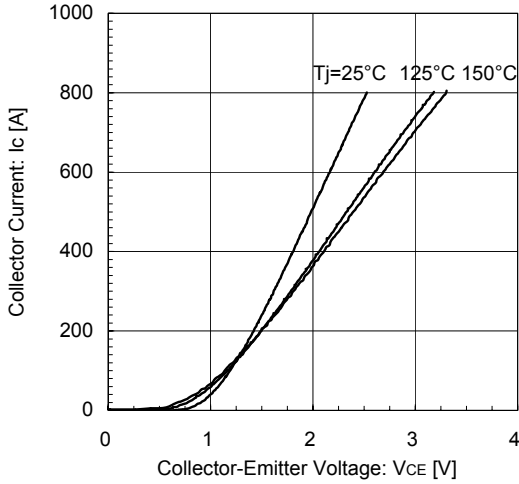
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



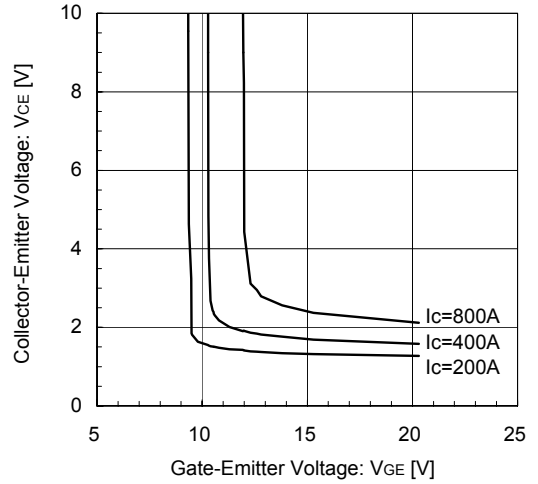
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150°C / chip



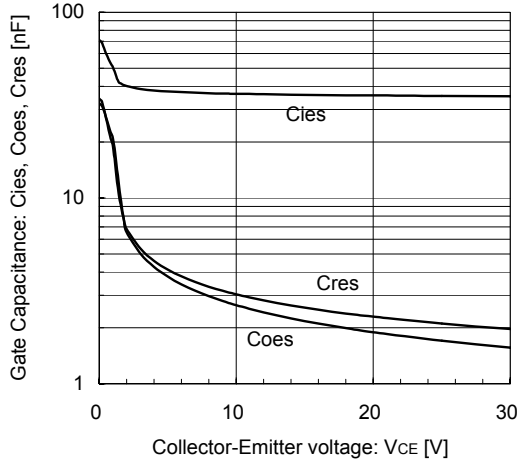
Collector current vs. Collector-Emitter voltage (typ.)
VGE= 15V / chip



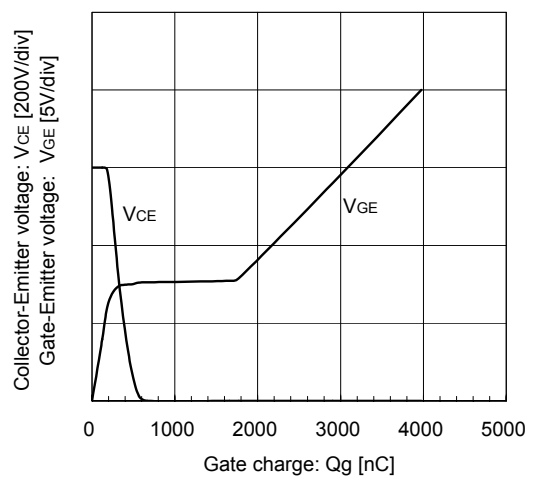
Collector-Emitter voltage vs. Gate-Emitter voltage
Tj= 25°C / chip



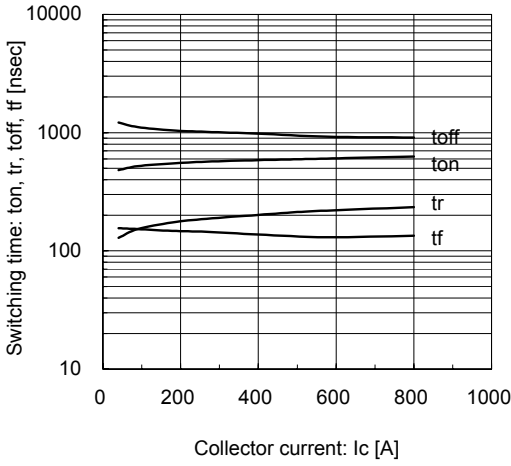
Gate Capacitance vs. Collector-Emitter Voltage
VGE= 0V, f= 1MHz, Tj= 25°C



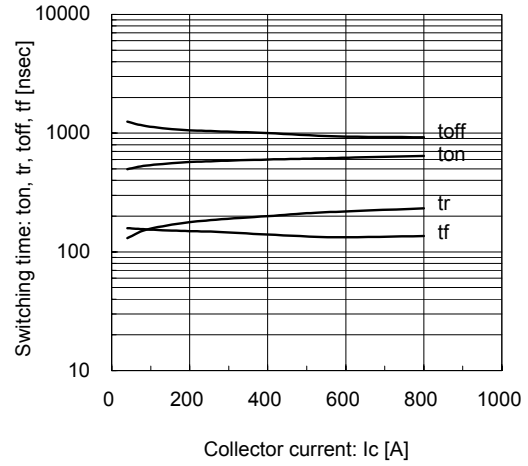
Dynamic Gate Charge (typ.)
Vcc=600V, Ic=400A, Tj= 25°C



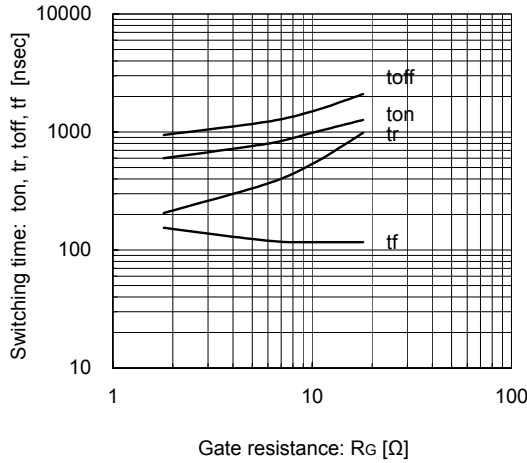
Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.8\Omega, T_J=125^\circ C$



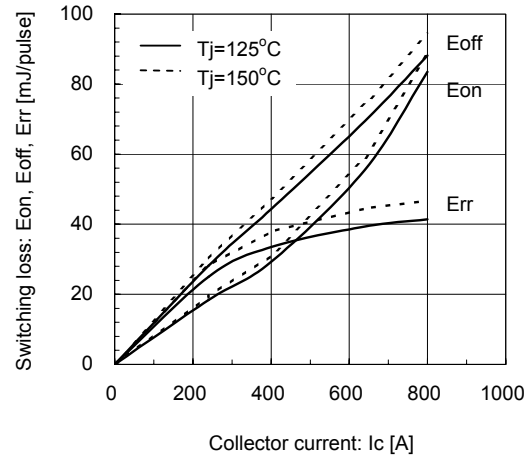
Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.8\Omega, T_J=150^\circ C$



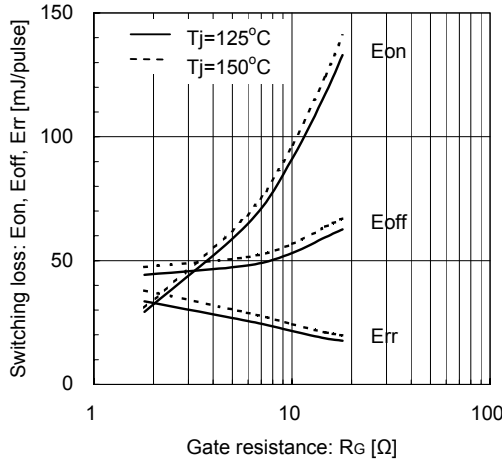
Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V, I_c=400A, V_{GE}=\pm 15V, T_J=125^\circ C$



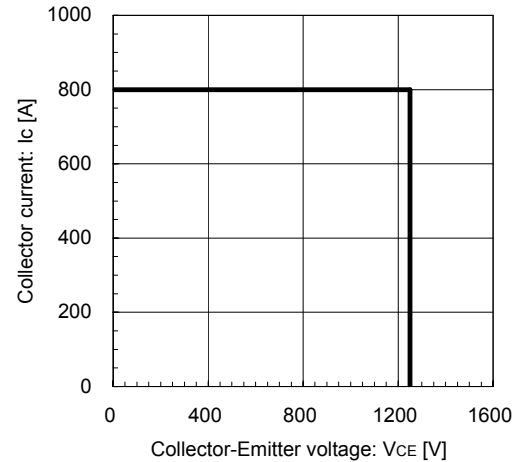
Switching loss vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.8\Omega, T_J=125^\circ C, 150^\circ C$



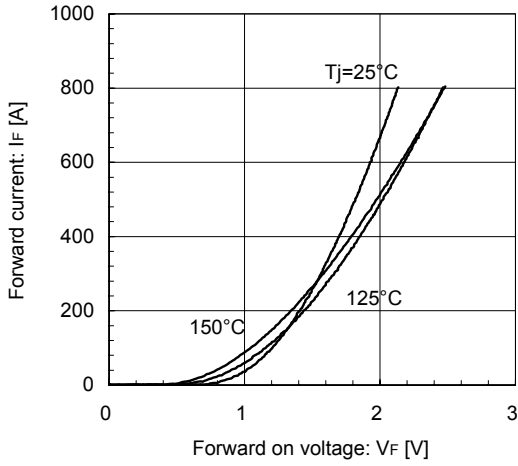
Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V, I_c=400A, V_{GE}=\pm 15V, T_J=125^\circ C, 150^\circ C$



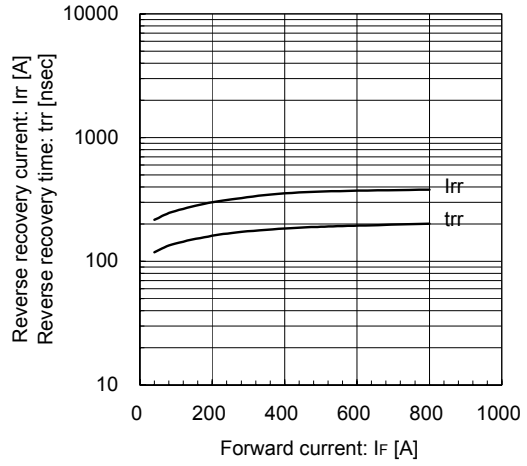
Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE}=15V, R_G=1.8\Omega, T_J=150^\circ C, L_s=35nH$



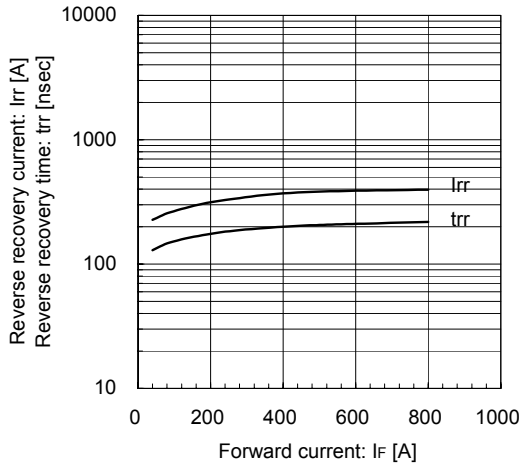
Forward Current vs. Forward Voltage (typ.)
chip



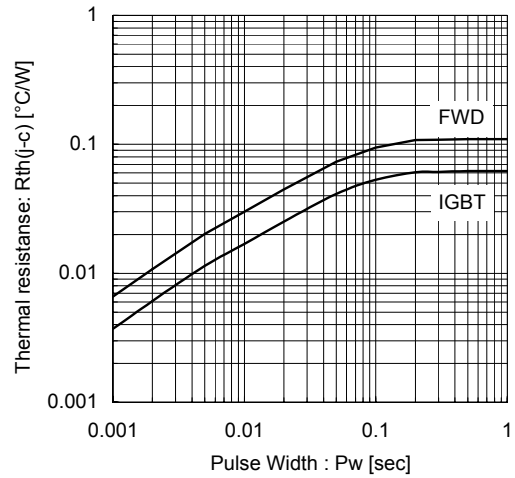
Reverse Recovery Characteristics (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=1.8Ω, T_J=125°C



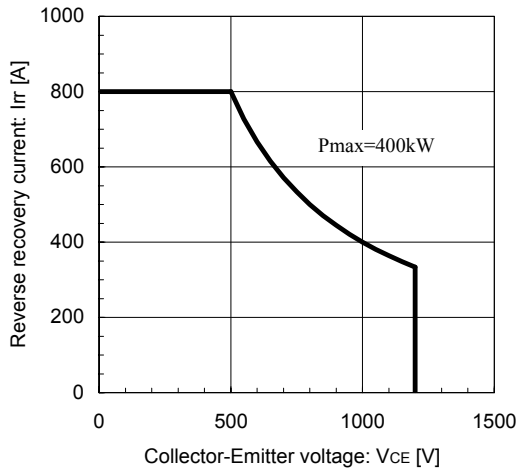
Reverse Recovery Characteristics (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=1.8Ω, T_J=150°C



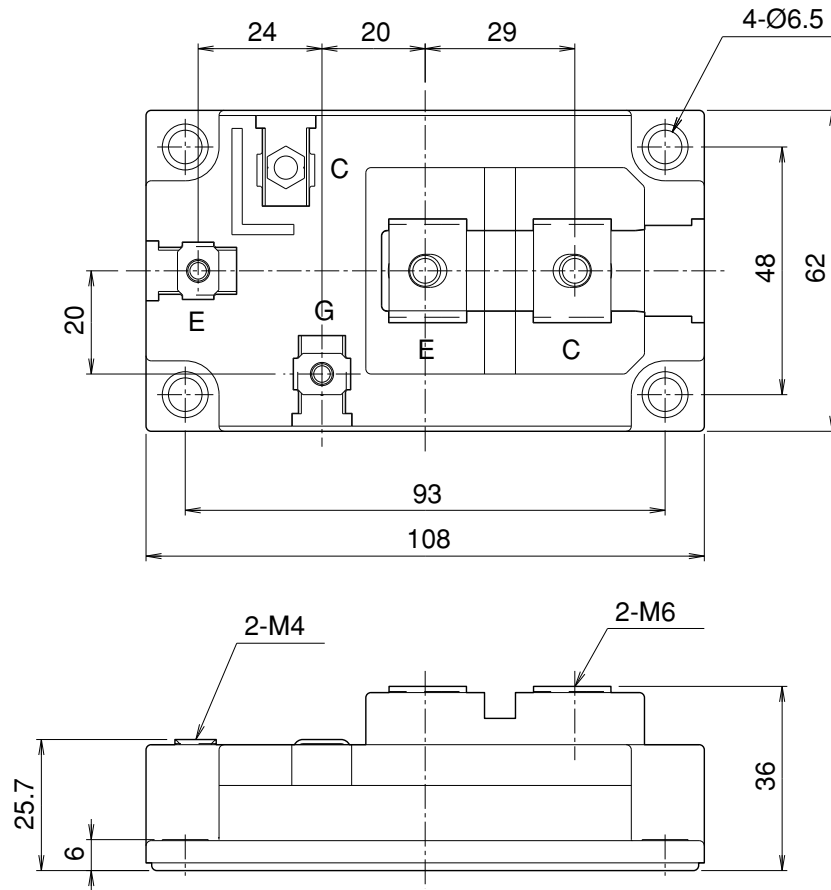
Transient Thermal Resistance (max.)



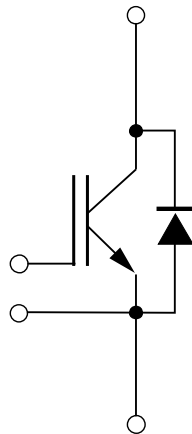
FWD safe operating area (max.)
T_J=150°C



■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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