1MBI400U-120

IGBT Module U-Series 1200V / 400A 1 in one-package

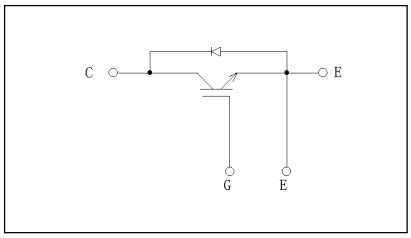
■ Features

· 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 mac

■ Equivalent Circuit Schematic



■ Maximum ratings and characteristics

● Absolute maximum ratings (at Tc=25°C unless otherwise specified)

Item		Symbol	Conditions		Rating	Unit
Collector-Emitter voltage		V_{CES}			1200	V
Gate-Emitter voltage		V_{GES}			±20	V
Collector current		I_C	Continuous	Tc=25°C	600	A
				Tc=80°C	400	
		I_{CP}	1ms	Tc=25°C	1200	
				Tc=80°C	800	
		-I_C			400	
		-I_C pulse	1ms		800	
Collector Power Dissipation		P_C	1 device		2155	W
Junction temperature		T_j			+150	℃
Storage temperature		T_{stg}			-40 to +125	
Isolation voltage	between terminal and copper base *1	V_{iso}	AC:1min.		2500	VAC
Screw Torque	Mounting *2				3.5	N·m
	Terminals *2				4.5	
	Terminals *2				1.7	

*1 : All terminals should be connected together when isolation test will be done.

*2 : Recommendable value : Mounting 2.5 to 3.5N·m(M5 or M6), Terminal 3.5 to 4.5 N·m(M6), 1.3 to 1.7 N·m(M4)

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

Item	Symbols	Conditions		Characteristics Min.	Typ.	Max.	Unit
Zero gate voltage collector current	I_{CES}	V_{GE}=0V, V_{CE}=1200V		–	–	4.0	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		4.5	6.5	8.5	V
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	V_{GE}=15V, I_C=400A	Tj=25°C	–	1.95	2.30	V
			Tj=125°C	–	2.20	–	
	$V_{CE(sat)}$ (chip)		Tj=25°C	–	1.75	2.10	
			Tj=125°C	–	2.00	–	
Input capacitance	C_{ies}	V_{CE}=10V, V_{GE}=0V, f=1MHz		–	45	–	nF
Turn-on time	t_{on}	V_{CC}=600V		–	0.36	1.20	µs
	t_r	I_C=400A		–	0.21	0.60	
	$t_{r(i)}$	V_{GE}=±15V		–	0.03	–	
Turn-off time	t_{off}	R_G=1.5 Ω		–	0.37	1.00	
	t_f			–	0.07	0.30	
Forward on voltage	V_F (terminal)	V_{GE}=0V	Tj=25°C	–	1.80	2.10	V
		I_F=400A	Tj=125°C	–	1.90	–	
	V_F (chip)		Tj=25°C	–	1.60	1.90	
			Tj=125°C	–	1.70	–	
Reverse recovery time	t_{rr}	I_F=400A		–	–	0.35	µs
Lead resistance, terminal-chip*3	R lead			–	0.40	–	mΩ

*3:Biggest internal terminal resistance among arm.

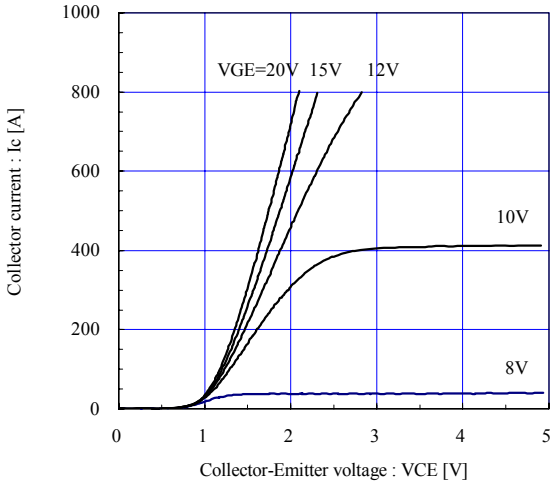
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics Min.	Typ.	Max.	Unit
Thermal resistance	Rth(j-c)	IGBT	–	–	0.058	°C/W
	Rth(j-c)	FWD	–	–	0.100	°C/W
Contact Thermal resistance	Rth(c-f)*4	With thermal compound	–	0.0125	–	°C/W

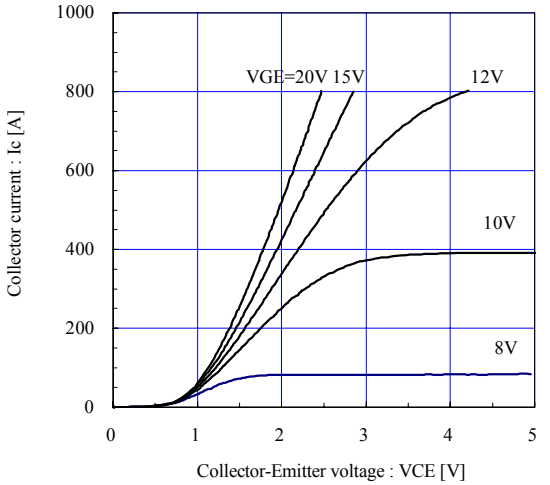
*4 : This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

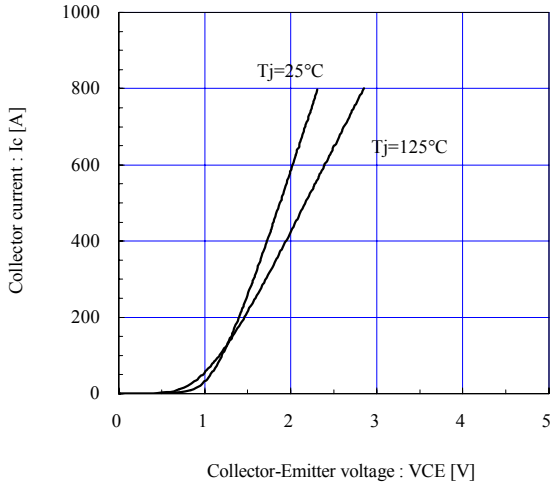
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



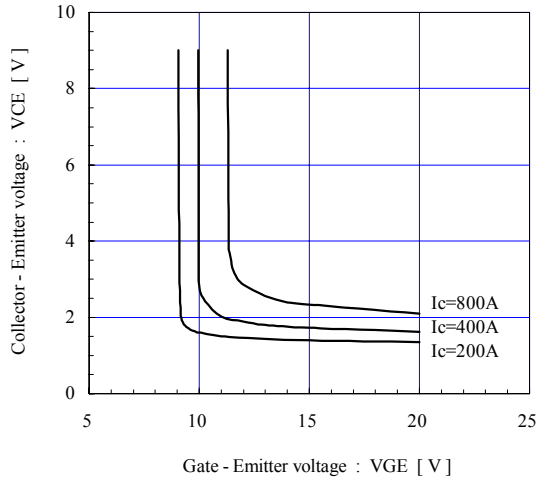
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 125°C / chip



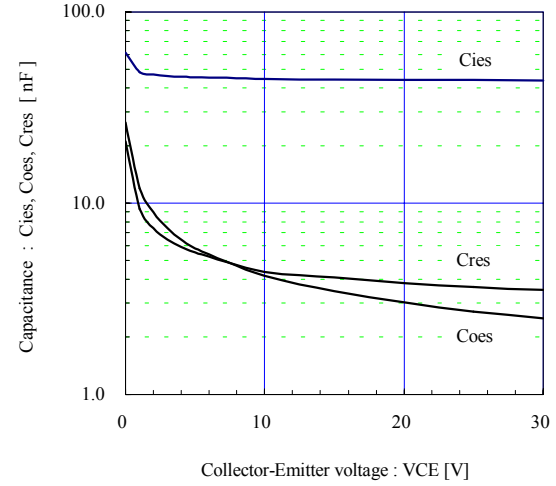
Collector current vs. Collector-Emitter voltage (typ.)
VGE=15V / chip



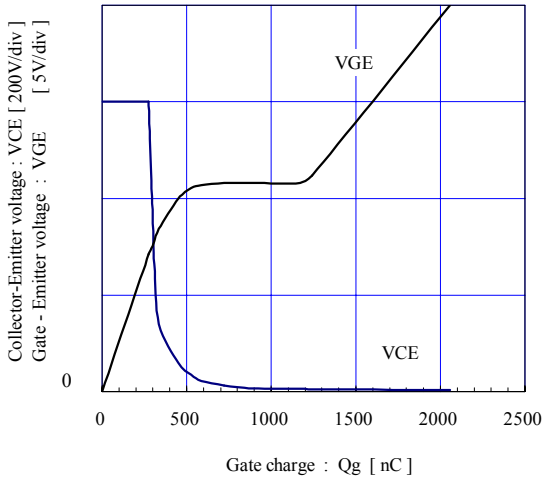
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj=25°C / chip



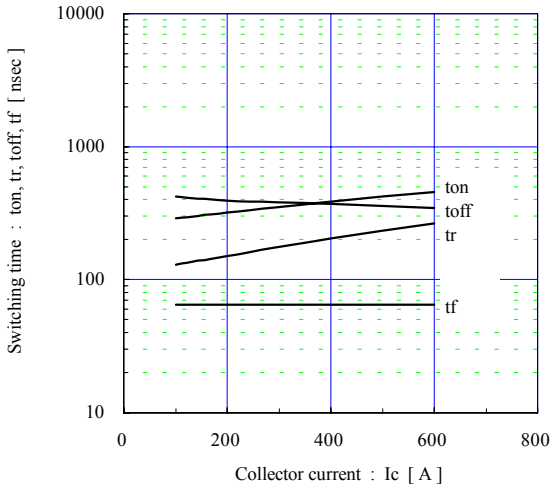
Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25°C



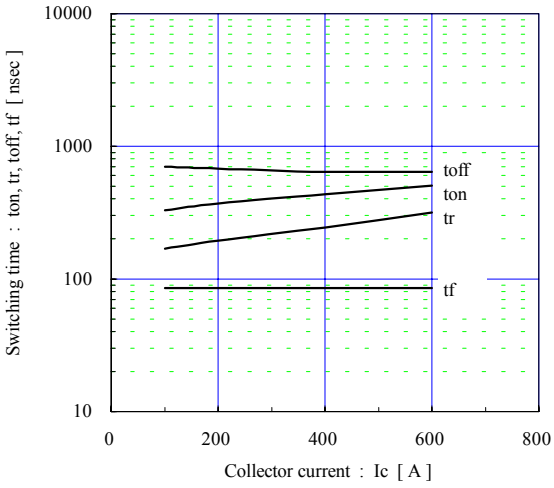
Dynamic Gate charge (typ.)
Vcc=600V, Ic=400A, Tj= 25°C



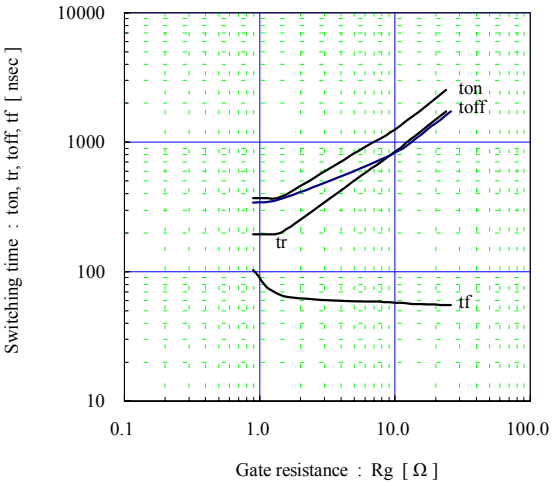
Switching time vs. Collector current (typ.)
Vcc=600V, VGE=±15V, Rg=1.5Ω, Tj= 25°C



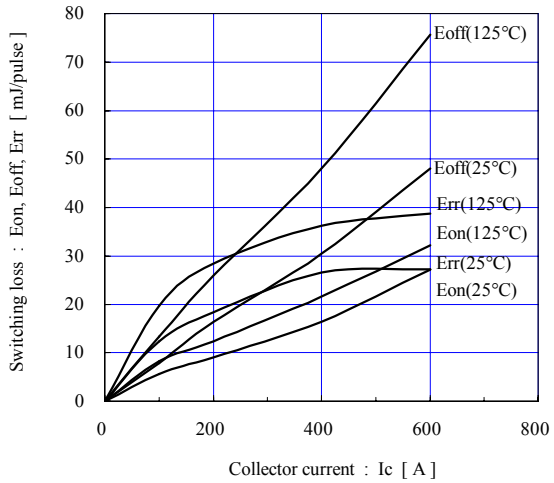
Switching time vs. Collector current (typ.)
Vcc=600V, VGE=±15V, Rg=1.5Ω, Tj=125°C



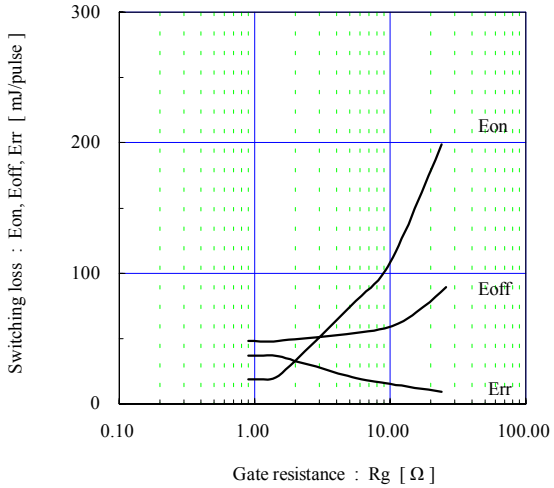
Switching time vs. Gate resistance (typ.)
Vcc=600V, Ic=400A, VGE=±15V, Tj= 25°C



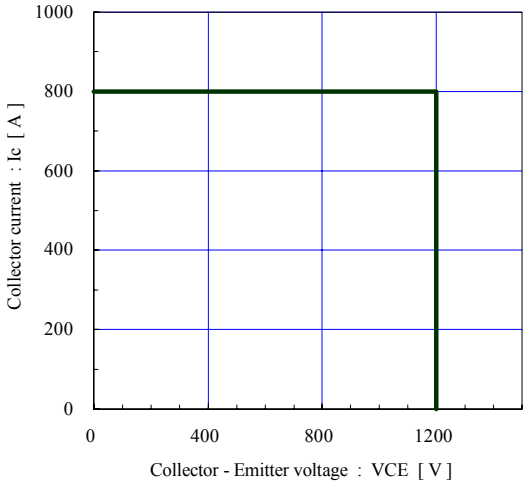
Switching loss vs. Collector current (typ.)
Vcc=600V, VGE=±15V, Rg=1.5Ω



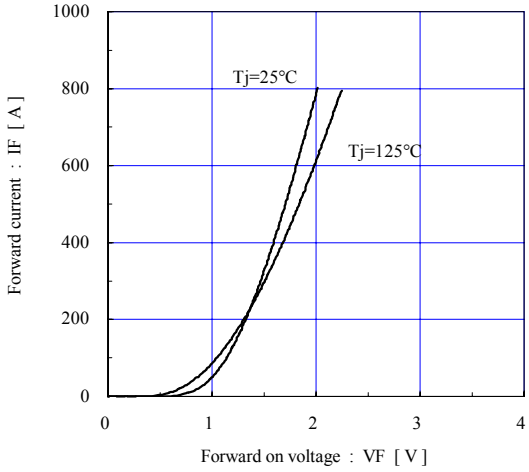
Switching loss vs. Gate resistance (typ.)
Vcc=600V, Ic=400A, VGE=±15V, Tj= 125°C



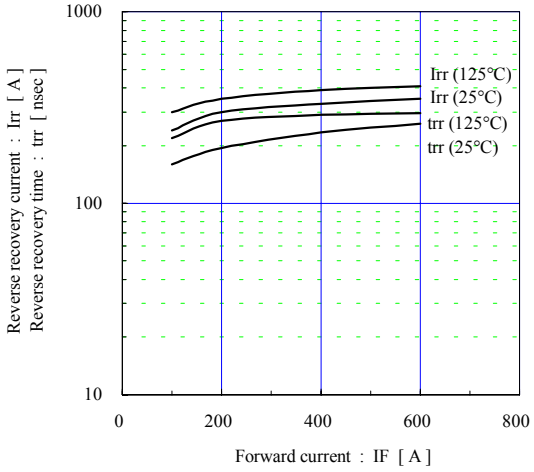
Reverse bias safe operating area (max.)
+VGE=15V,-VGE <= 15V, RG >= 1.5Ω ,Tj <= 125°C



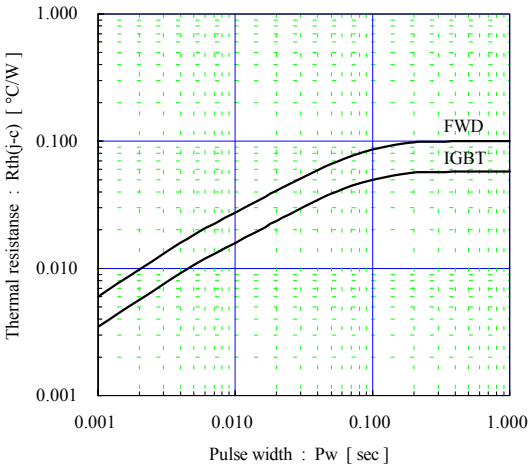
Forward current vs. Forward on voltage (typ.)
chip



Reverse recovery characteristics (typ.)
Vcc=600V, VGE=±15V, Rg=1.5Ω



Transient thermal resistance (max.)



■ Outline Drawings, mm

M127