

1MBI400U-120



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

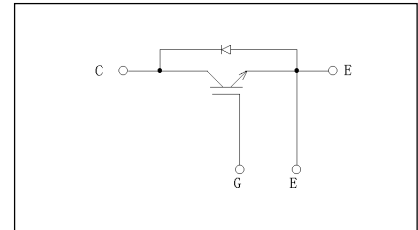
■ Features

- 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	T _C =25°C	600	A	
				T _C =80°C	400		
		I _{CP}	1ms	T _C =25°C	1200		
				T _C =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	°C	
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 T_J=25°C unless otherwise specified)

Item	Symbols	Conditions		Characteristics			Unit
				Min.	Typ.	Max.	
Zero gate voltage collector current	ICES	VGE=0V, VCE=1200V		—	—	4.0	mA
Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V		—	—	800	nA
Gate-Emitter threshold voltage	VGE(th)	VCE=20V, IC=400mA		4.5	6.5	8.5	V
Collector-Emitter saturation voltage	VCE(sat) (terminal)	VGE=15V, IC=400A	TJ=25°C	—	1.95	2.30	V
			TJ=125°C	—	2.20	—	
	VCE(sat) (chip)		TJ=25°C	—	1.75	2.10	
			TJ=125°C	—	2.00	—	
Input capacitance	Cies	VCE=10V, VGE=0V, f=1MHz		—	45	—	nF
Turn-on time	ton	VCC=600V IC=400A VGE=±15V		—	0.36	1.20	μs
	tr			—	0.21	0.60	
	tr(i)			—	0.03	—	
Turn-off time	toff	RG=1.5 Ω		—	0.37	1.00	
	tf			—	0.07	0.30	
Forward on voltage	VF (terminal)	VGE=0V IF=400A	TJ=25°C	—	1.80	2.10	V
			TJ=125°C	—	1.90	—	
	VF (chip)		TJ=25°C	—	1.60	1.90	
			TJ=125°C	—	1.70	—	
Reverse recovery time	trr	IF=400A		—	—	0.35	μs
Lead resistance, terminal-chip*3	R lead			—	0.40	—	mΩ

*3:Biggest internal terminal resistance among arm.

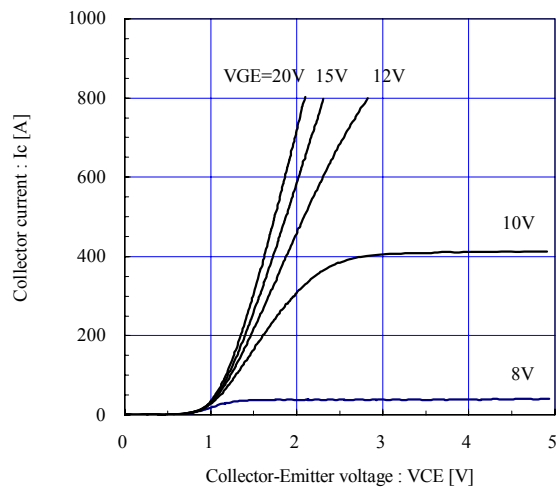
● Thermal resistance characteristics

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

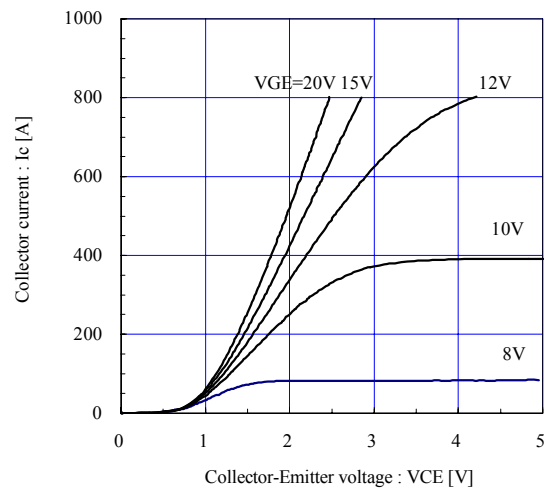
*4 : This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

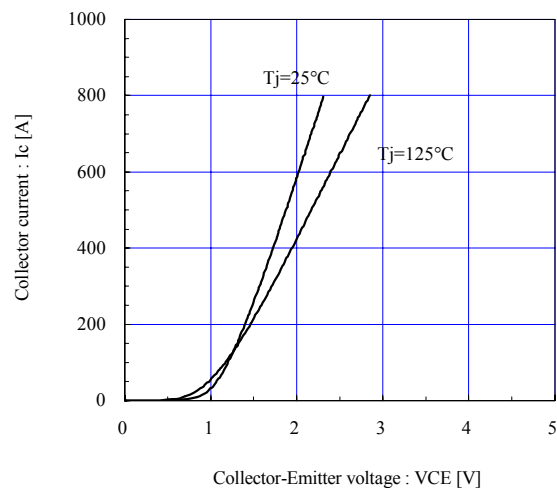
Collector current vs. Collector-Emitter voltage (typ.)
T_j=25°C / chip



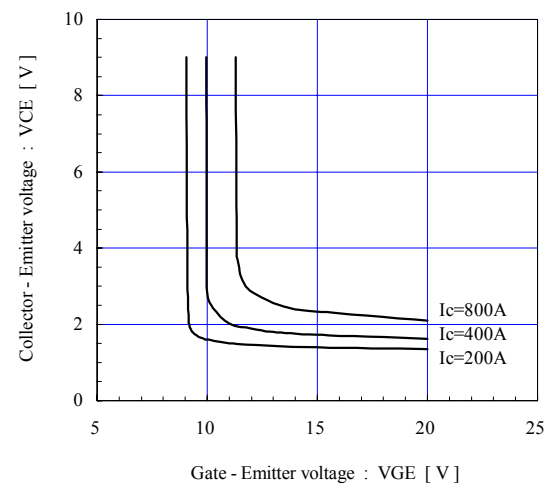
Collector current vs. Collector-Emitter voltage (typ.)
T_j=125°C / chip



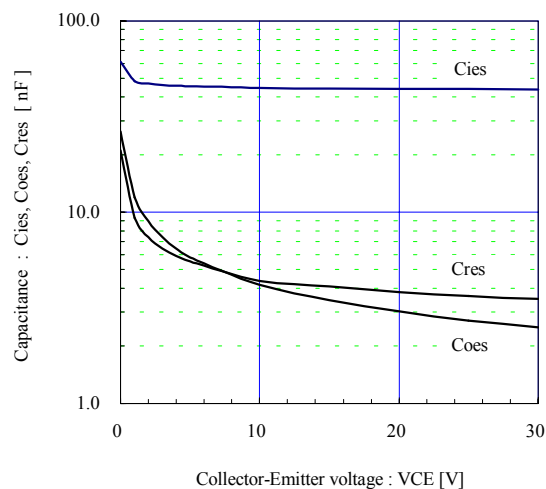
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE}=15V / chip



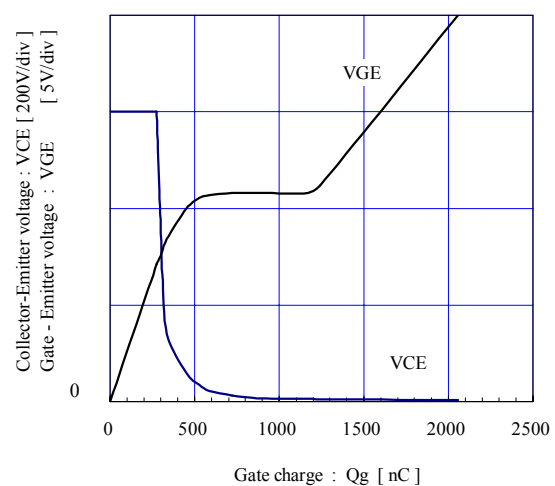
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
T_j=25°C / chip



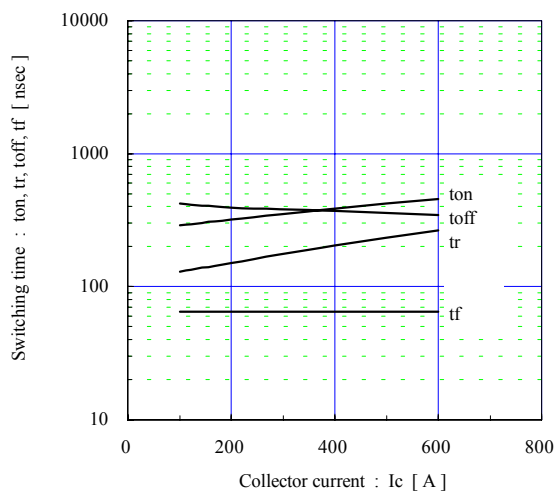
Capacitance vs. Collector-Emitter voltage (typ.)
V_{GE}=0V, f=1MHz, T_j=25°C



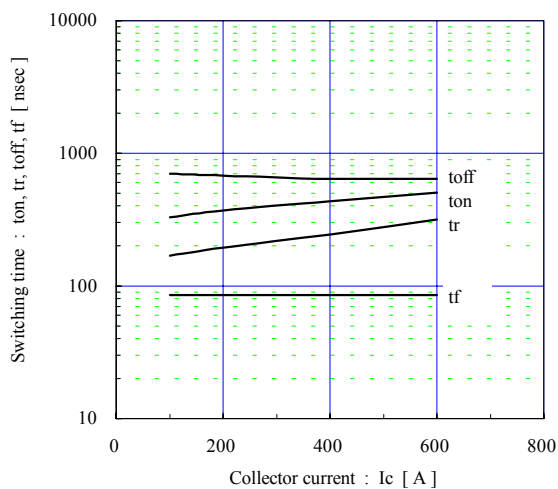
Dynamic Gate charge (typ.)
V_{CC}=600V, I_c=400A, T_j=25°C



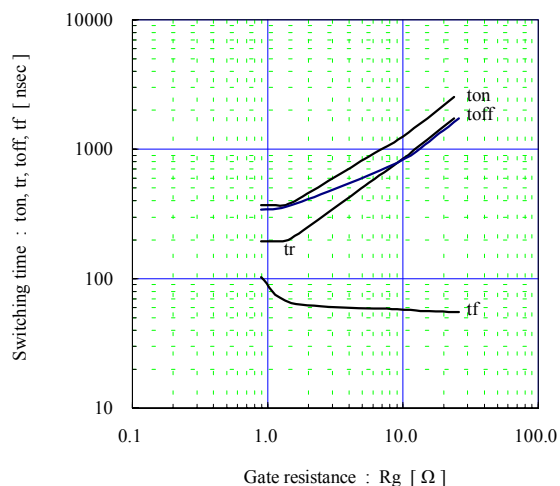
Switching time vs. Collector current (typ.)
 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=1.5\Omega$, $T_j=25^\circ C$



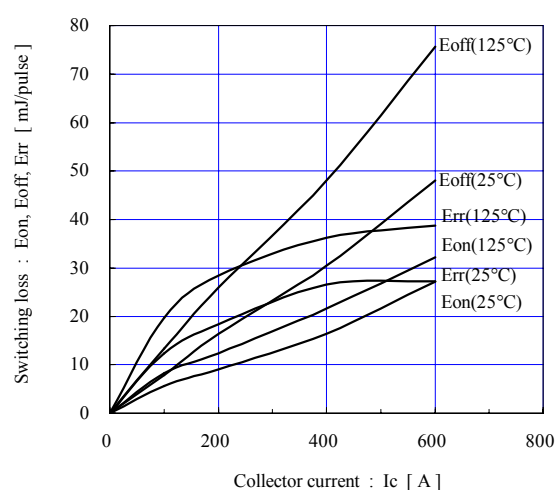
Switching time vs. Collector current (typ.)
 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=1.5\Omega$, $T_j=125^\circ C$



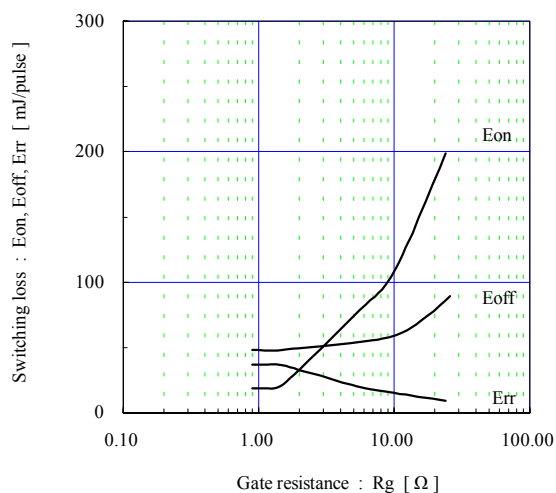
Switching time vs. Gate resistance (typ.)
 $V_{cc}=600V$, $I_c=400A$, $V_{GE}=\pm 15V$, $T_j=25^\circ C$



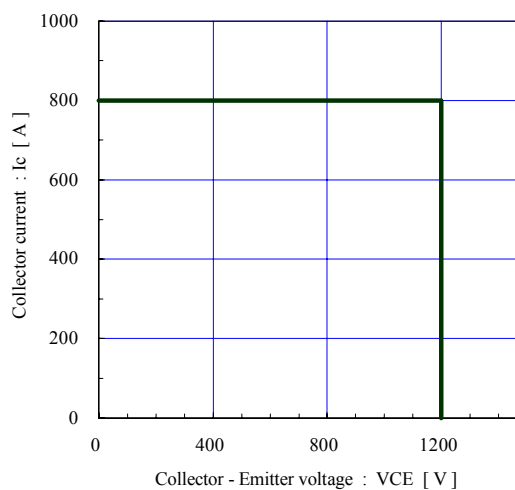
Switching loss vs. Collector current (typ.)
 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=1.5\Omega$

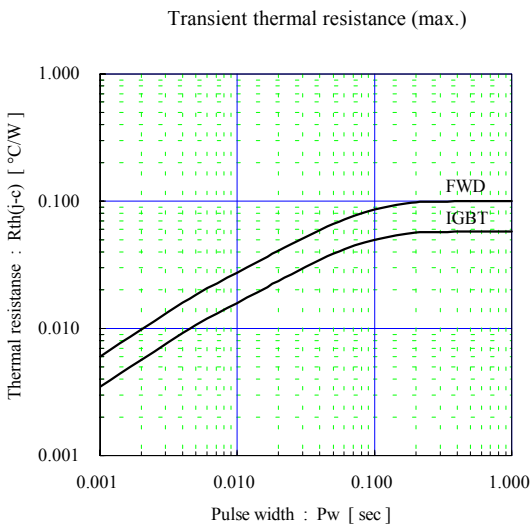
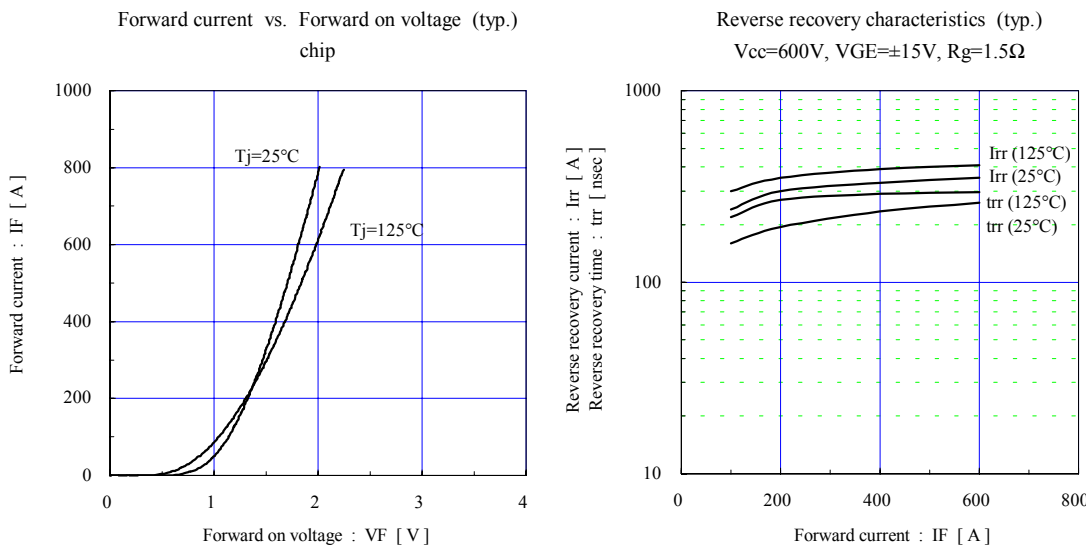


Switching loss vs. Gate resistance (typ.)
 $V_{cc}=600V$, $I_c=400A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$



Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE} \leq 15V$, $R_g \geq 1.5\Omega$, $T_j \leq 125^\circ C$





■ Outline Drawings, mm

M127

