

1MBI400U-120

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

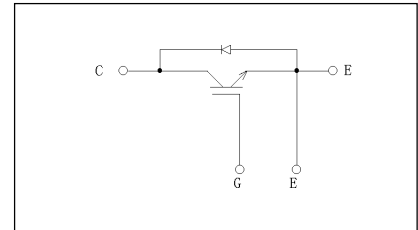
■ Features

- 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	I _{CES}	V _{GE} =0V, V _{CES} =1200V	–	–	4.0	mA	
Gate-Emitter leakage current	I _{GES}	V _{CES} =0V, V _{GE} =±20V	–	–	800	nA	
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CES} =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	T _j =25°C	–	1.95	2.30	V
			T _j =125°C	–	2.20	–	
	V _{CE(sat)} (chip)		T _j =25°C	–	1.75	2.10	
			T _j =125°C	–	2.00	–	
Input capacitance	C _{ies}	V _{CES} =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	μs	
	t _f		–	0.07	0.30		
Forward on voltage	V _F (terminal)	V _{GE} =0V I _F =400A	T _j =25°C	–	1.80	2.10	V
			T _j =125°C	–	1.90	–	
	V _F (chip)		T _j =25°C	–	1.60	1.90	
			T _j =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.

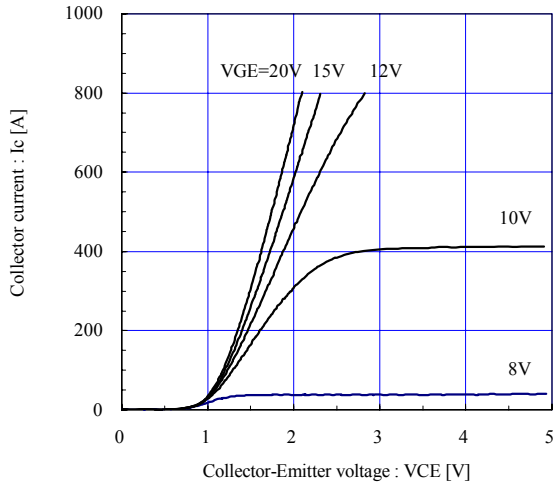
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			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

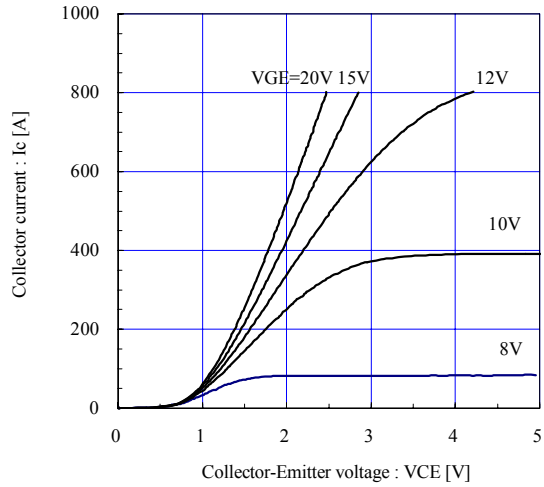
*4 : This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

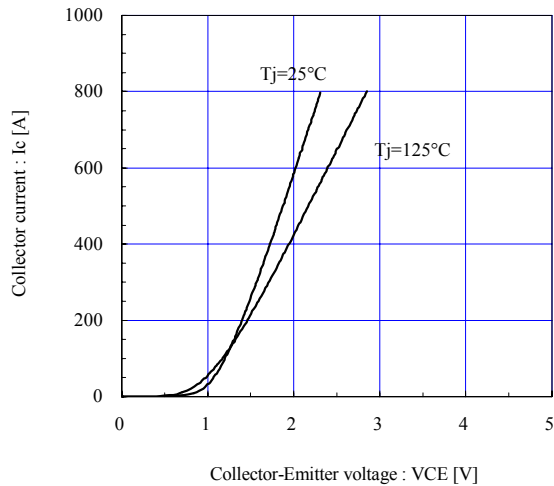
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



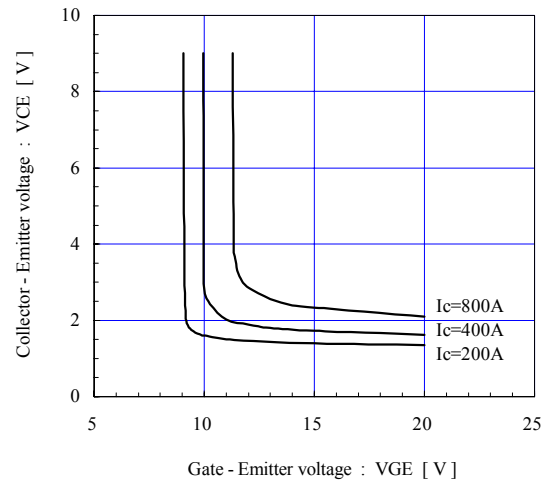
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 125°C / chip



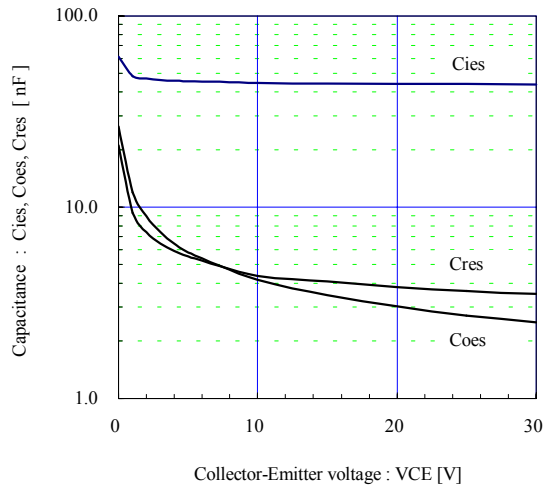
Collector current vs. Collector-Emitter voltage (typ.)
VGE=15V / chip



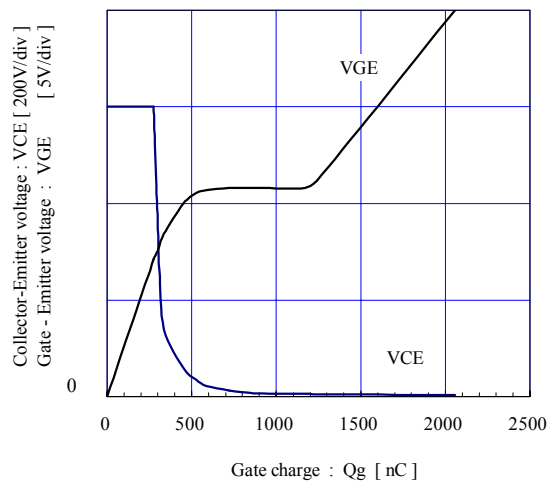
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj=25°C / chip



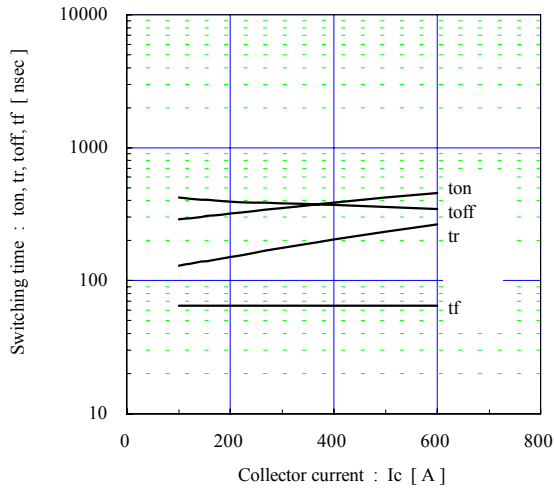
Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25°C



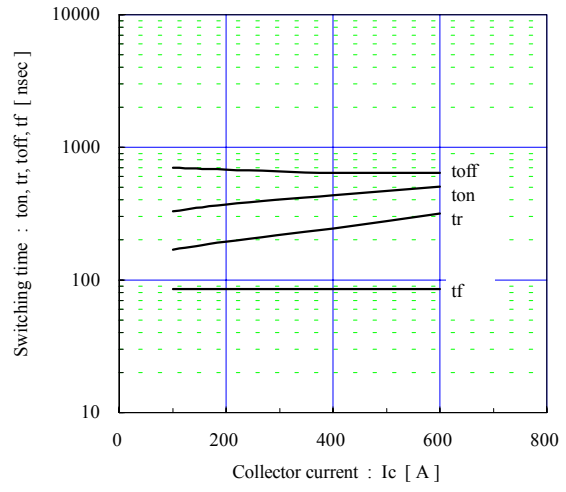
Dynamic Gate charge (typ.)
Vcc=600V, Ic=400A, Tj= 25°C



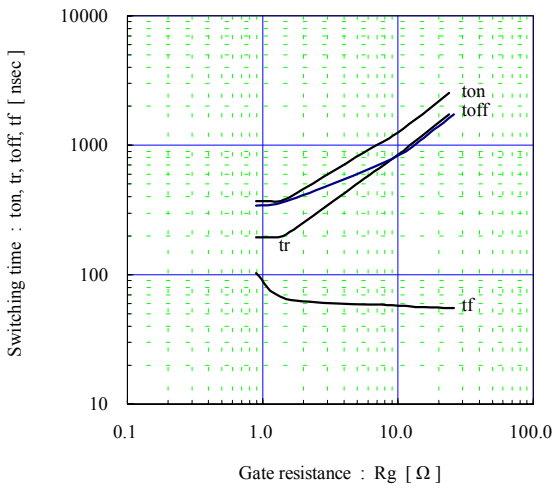
Switching time vs. Collector current (typ.)
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=1.5\Omega, T_j=25^\circ C$



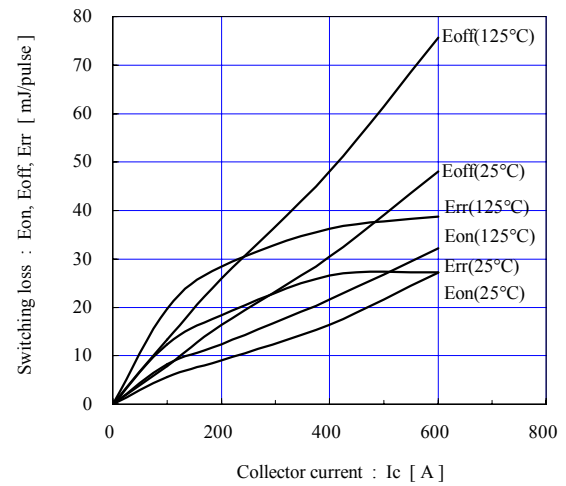
Switching time vs. Collector current (typ.)
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=1.5\Omega, T_j=125^\circ C$



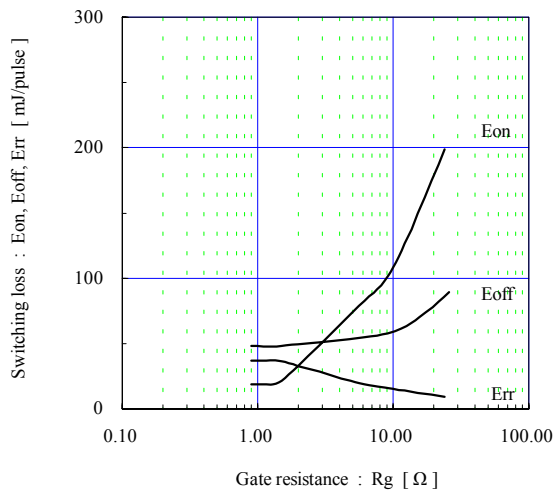
Switching time vs. Gate resistance (typ.)
 $V_{cc}=600V, I_c=400A, V_{GE}=\pm 15V, T_j=25^\circ C$



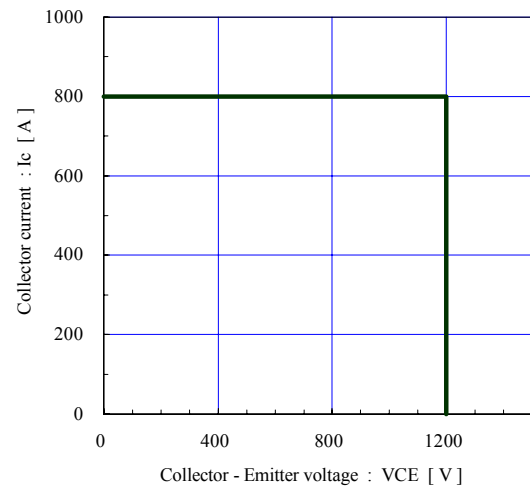
Switching loss vs. Collector current (typ.)
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=1.5\Omega$



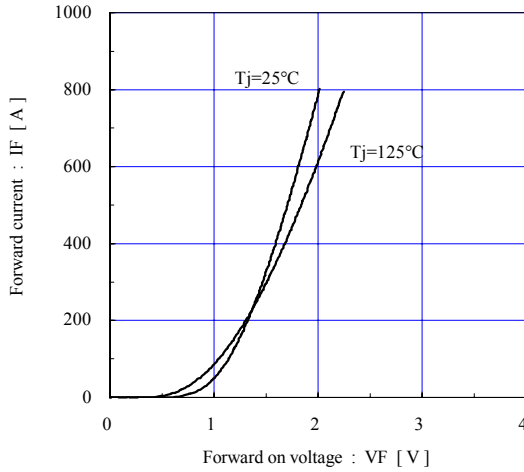
Switching loss vs. Gate resistance (typ.)
 $V_{cc}=600V, I_c=400A, V_{GE}=\pm 15V, T_j=125^\circ C$



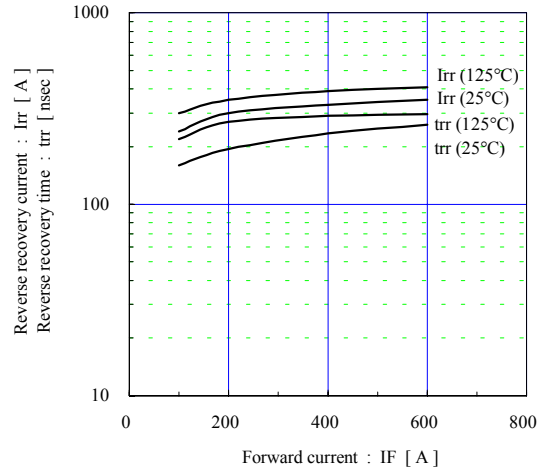
Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE} \le 15V, R_g \ge 1.5\Omega, T_j \le 125^\circ C$



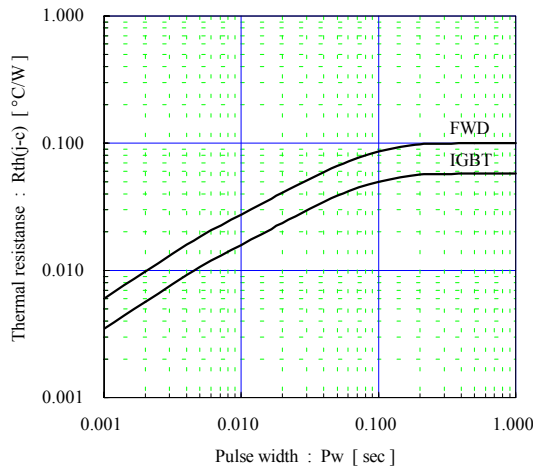
Forward current vs. Forward on voltage (typ.)
chip



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



Transient thermal resistance (max.)



■ Outline Drawings, mm

M127

