

1MBI600UB-120



IGBT Module U-Series 1200V / 600A 1 in one-package

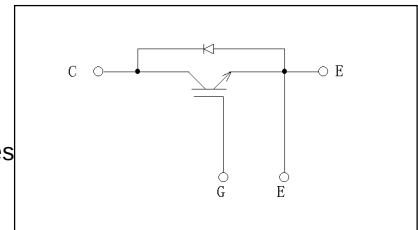
■ Features

- 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

■ 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	800	A
					T _C =80°C	600	
			I _{CP}	1ms	T _C =25°C	1600	
					T _C =80°C	1200	
			-I _C		600		
			-I _C pulse	1ms	1200		
Collector Power Dissipation			P _C	1 device	3570	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			4.5	N·m	
		Terminals *2			11.0		
		Terminals *2			1.7		

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

*2 : Recommendable value : Mounting 3.5 to 4.5N·m(M6), Terminal 10.0 to 11.0 N·m(M8), 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		—	—	8.0	mA
Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V		—	—	1600	nA
Gate-Emitter threshold voltage	VGE(th)	VCE=20V, IC=600mA		4.5	6.5	8.5	V
Collector-Emitter saturation voltage	VCE(sat) (terminal)	VGE=15V, IC=600A	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		—	67	—	nF
Turn-on time	ton	VCC=600V IC=600A VGE=±15V		—	0.36	1.20	μs
	tr			—	0.21	0.60	
	tr(i)			—	0.03	—	
Turn-off time	toff	RG= 1.1 Ω		—	0.37	1.00	
	tf			—	0.07	0.30	
Forward on voltage	VF (terminal)	VGE=0V IF=600A	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=600A		—	—	0.35	μs
Lead resistance, terminal-chip*3	R lead			—	0.30	—	mΩ

*3:Biggest internal terminal resistance among arm.

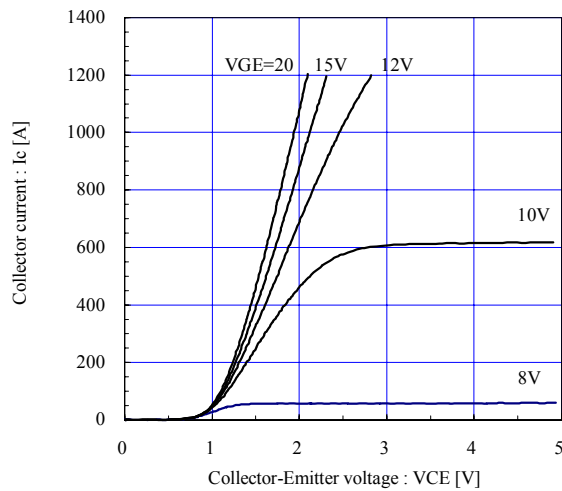
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance	R _{th(j-c)}	IGBT	—	—	0.035	°C/W
	R _{th(j-c)}	FWD	—	—	0.054	°C/W
Contact Thermal resistance	R _{th(c-f)} *4	With thermal compound	—	0.0063	—	°C/W

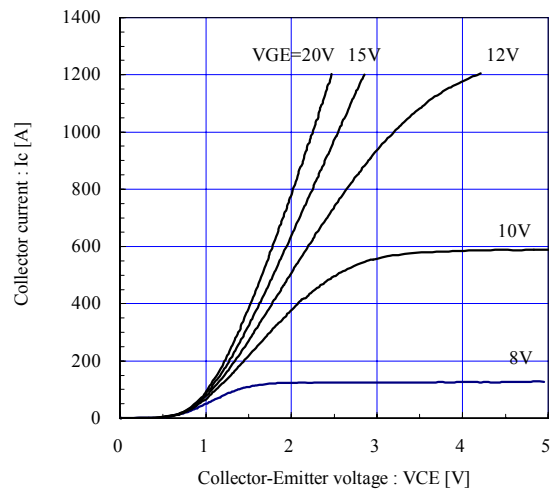
*4 : This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

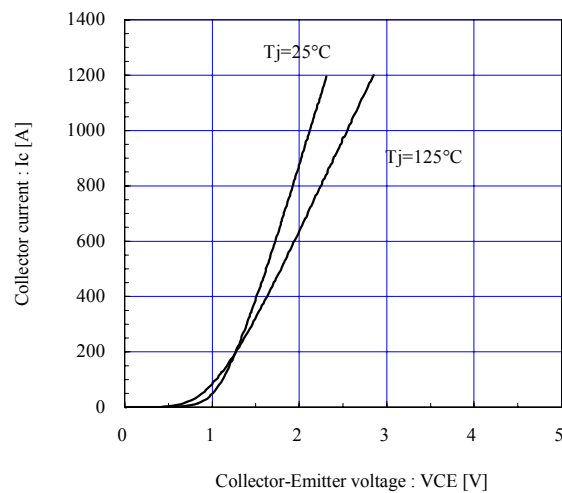
Collector current vs. Collector-Emitter voltage (typ.)

 $T_j = 25^\circ\text{C}$ / chip

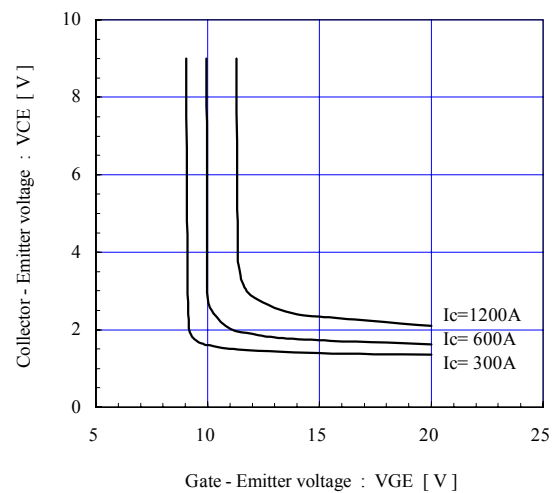
Collector current vs. Collector-Emitter voltage (typ.)

 $T_j = 125^\circ\text{C}$ / chip

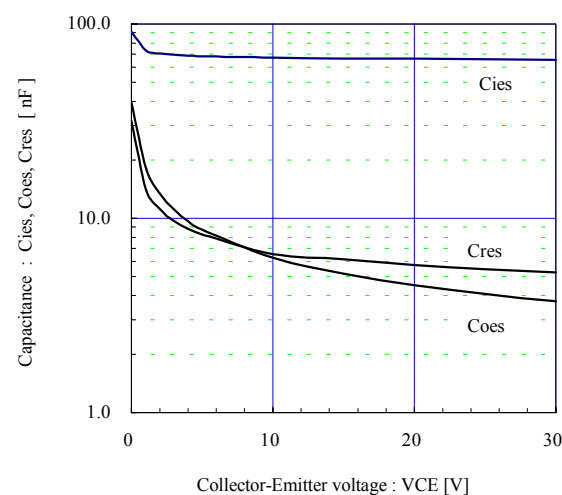
Collector current vs. Collector-Emitter voltage (typ.)

 $V_{GE} = 15\text{V}$ / chip

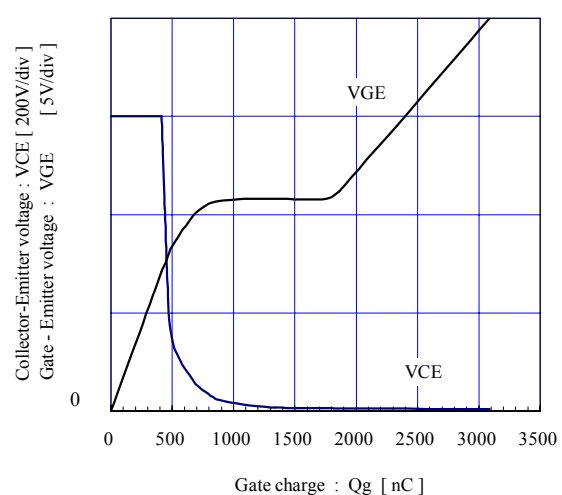
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)

 $T_j = 25^\circ\text{C}$ / chip

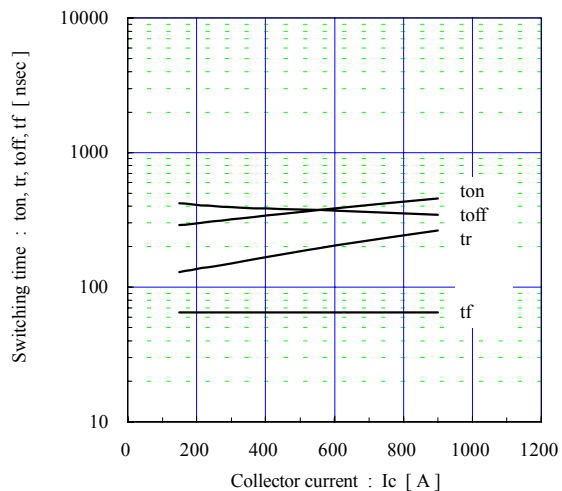
Capacitance vs. Collector-Emitter voltage (typ.)

 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$ 

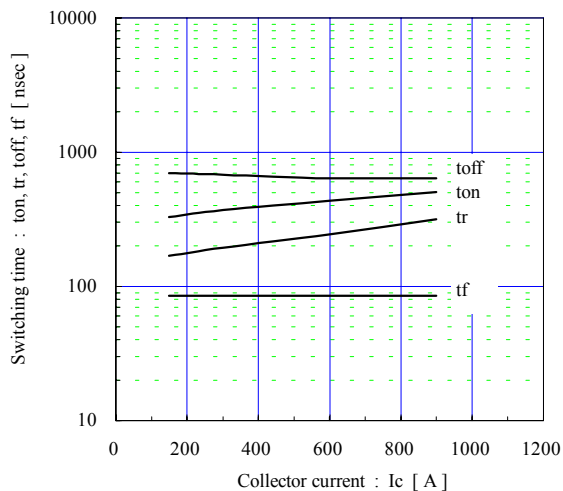
Dynamic Gate charge (typ.)

 $V_{CC} = 600\text{V}$, $I_C = 600\text{A}$, $T_j = 25^\circ\text{C}$ 

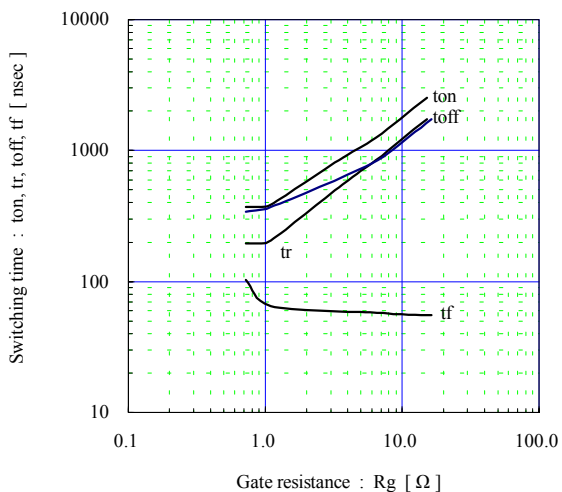
Switching time vs. Collector current (typ.)
 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=1.1\Omega$, $T_j=25^\circ C$



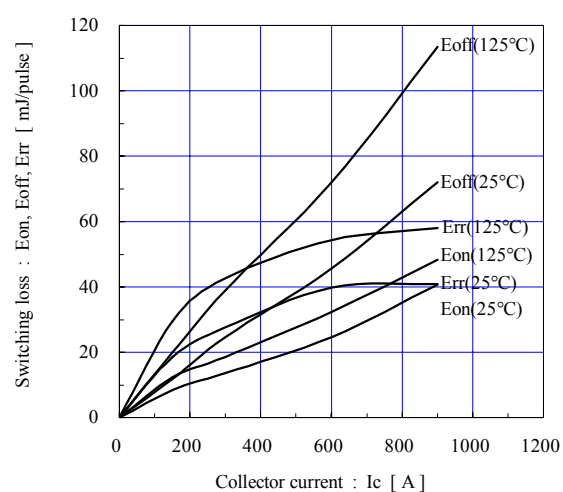
Switching time vs. Collector current (typ.)
 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=1.1\Omega$, $T_j=125^\circ C$



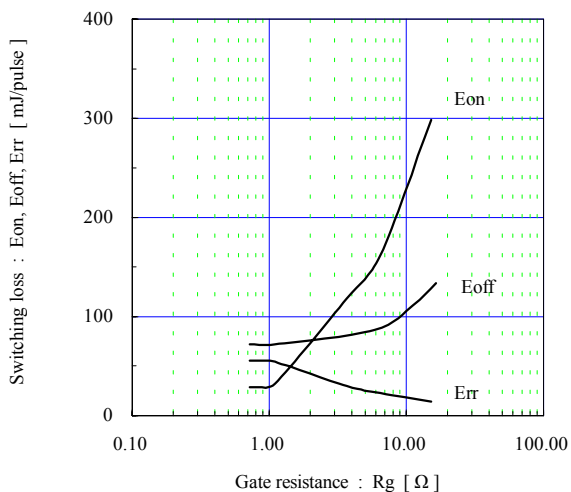
Switching time vs. Gate resistance (typ.)
 $V_{cc}=600V$, $I_c=600A$, $V_{GE}=\pm 15V$, $T_j=25^\circ C$



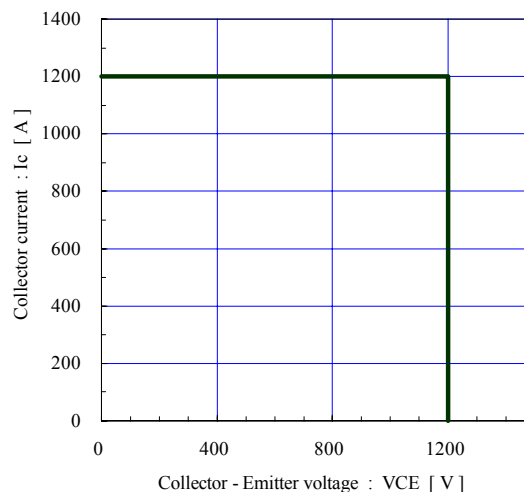
Switching loss vs. Collector current (typ.)
 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=1.1\Omega$

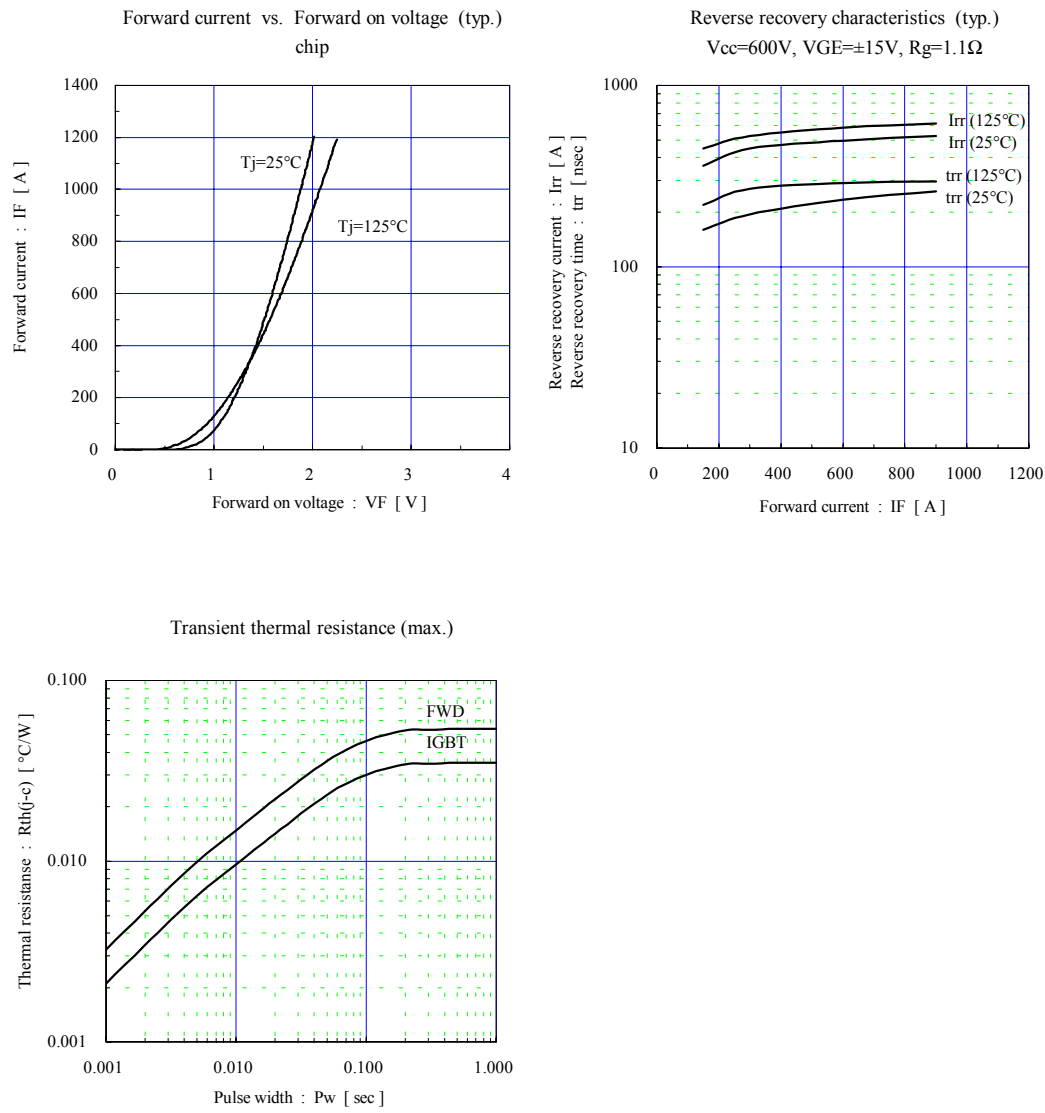


Switching loss vs. Gate resistance (typ.)
 $V_{cc}=600V$, $I_c=600A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$



Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE} \leq 15V$, $R_g \geq 1.1\Omega$, $T_j \leq 125^\circ C$





■ Outline Drawings, mm

M138

