

1MBI600UB-120



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

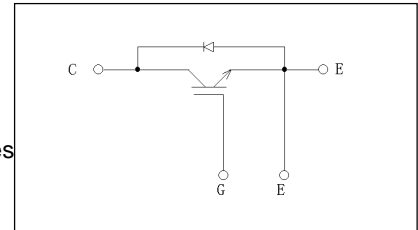
■ Features

- 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 $T_c=25^\circ\text{C}$ 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	$T_c=25^\circ\text{C}$	800	A
			$T_c=80^\circ\text{C}$	600	
	I_{cp}	1ms	$T_c=25^\circ\text{C}$	1600	
			$T_c=80^\circ\text{C}$	1200	
	$-I_c$			600	
$-I_c$ pulse	1ms		1200		
Collector Power Dissipation	P_c	1 device	3570	W	
Junction temperature	T_j		+150	$^\circ\text{C}$	
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 $T_j=25^\circ\text{C}$ unless otherwise specified)

Item	Symbols	Conditions	Characteristics			Unit	
			Min.	Typ.	Max.		
Zero gate voltage collector current	I_{CES}	$V_{GE}=0V, V_{CE}=1200V$	–	–	8.0	mA	
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$	–	–	1600	nA	
Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=20V, I_c=600mA$	4.5	6.5	8.5	V	
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE}=15V, I_c=600A$	$T_j=25^\circ\text{C}$	–	1.95	2.30	V
			$T_j=125^\circ\text{C}$	–	2.20	–	
	$V_{CE(sat)}$ (chip)		$T_j=25^\circ\text{C}$	–	1.75	2.10	
			$T_j=125^\circ\text{C}$	–	2.00	–	
Input capacitance	C_{ies}	$V_{CE}=10V, V_{GE}=0V, f=1MHz$	–	67	–	nF	
Turn-on time	t_{on}	$V_{CC}=600V$	–	0.36	1.20	μs	
	t_r	$I_c=600A$	–	0.21	0.60		
	$t_{r(i)}$	$V_{GE}=\pm 15V$	–	0.03	–		
Turn-off time	t_{off}	$R_G=1.1\ \Omega$	–	0.37	1.00	μs	
	t_f		–	0.07	0.30		
Forward on voltage	V_F (terminal)	$V_{GE}=0V$ $I_F=600A$	$T_j=25^\circ\text{C}$	–	1.80	2.10	V
			$T_j=125^\circ\text{C}$	–	1.90	–	
	V_F (chip)		$T_j=25^\circ\text{C}$	–	1.60	1.90	
			$T_j=125^\circ\text{C}$	–	1.70	–	
Reverse recovery time	t_{rr}	$I_F=600A$	–	–	0.35	μs	
Lead resistance, terminal-chip*3	R lead		–	0.30	–	m Ω	

*3:Biggest internal terminal resistance among arm.

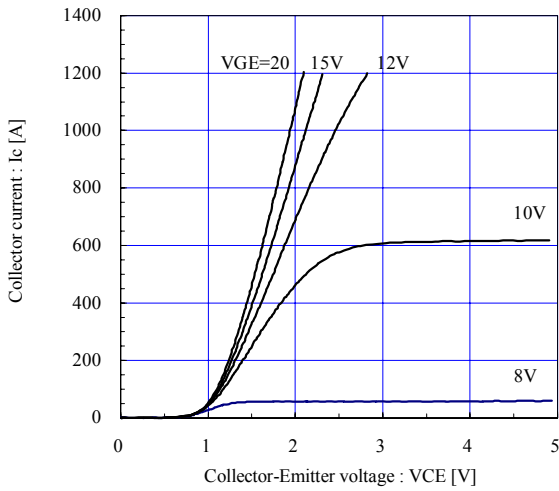
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	IGBT	–	–	0.035	$^\circ\text{C/W}$
	$R_{th(j-c)}$	FWD	–	–	0.054	$^\circ\text{C/W}$
Contact Thermal resistance	$R_{th(c-f)}$ *4	With thermal compound	–	0.0063	–	$^\circ\text{C/W}$

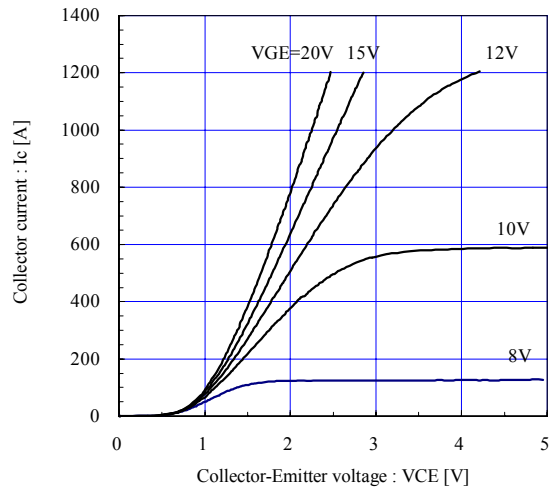
*4 : This is the value which is defined mounting on the additional cooling fin with thermal compound.

Characteristics (Representative)

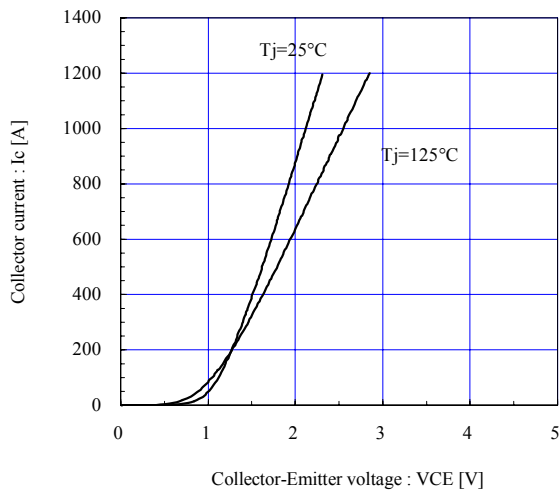
Collector current vs. Collector-Emitter voltage (typ.)
Tj=25°C / chip



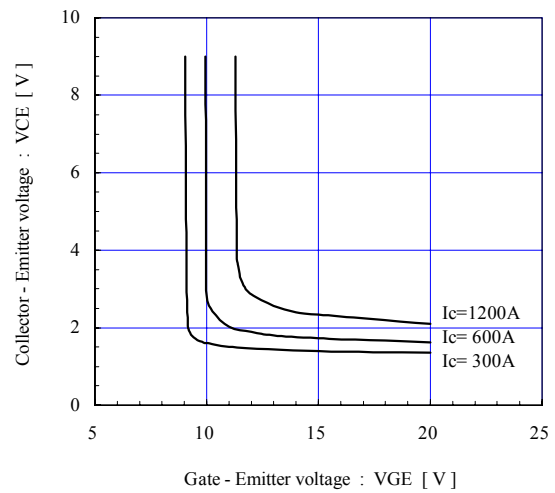
Collector current vs. Collector-Emitter voltage (typ.)
Tj=125°C / chip



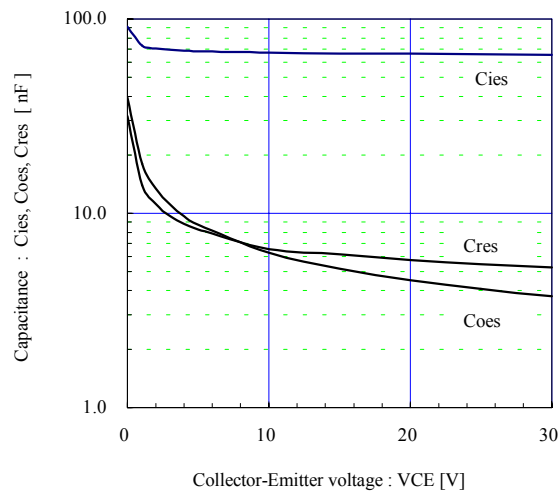
Collector current vs. Collector-Emitter voltage (typ.)
VGE=15V / chip



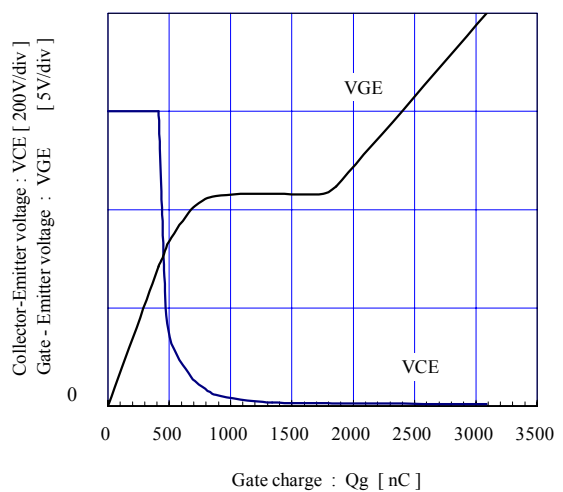
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj=25°C / chip



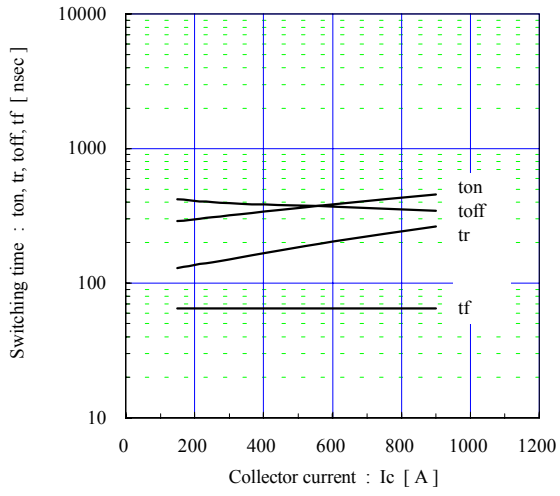
Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f=1MHz, Tj=25°C



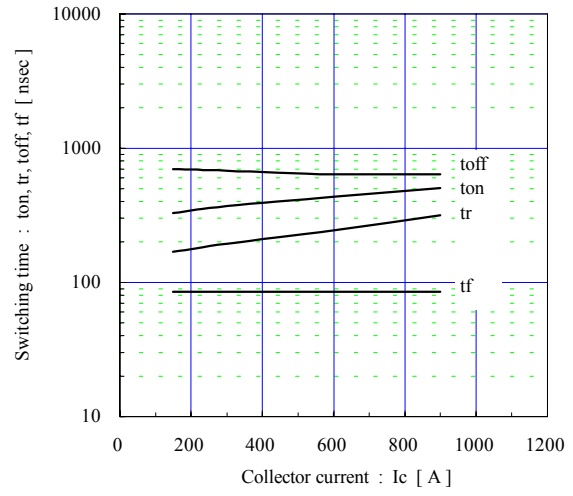
Dynamic Gate charge (typ.)
Vcc=600V, Ic=600A, Tj=25°C



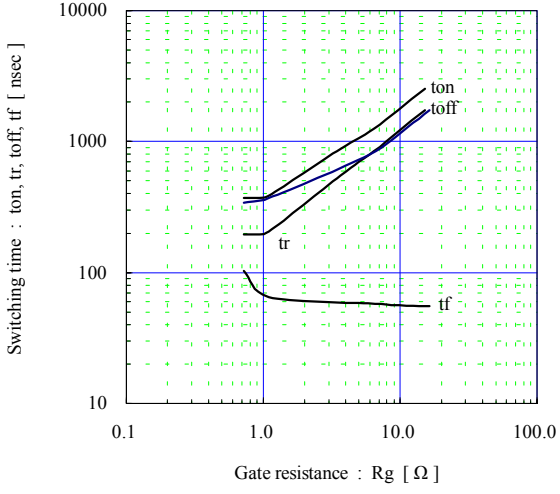
Switching time vs. Collector current (typ.)
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=1.1\Omega, T_j=25^\circ C$



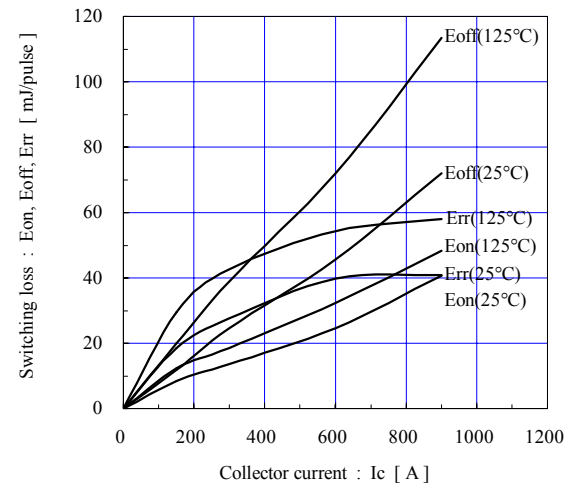
Switching time vs. Collector current (typ.)
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=1.1\Omega, T_j=125^\circ C$



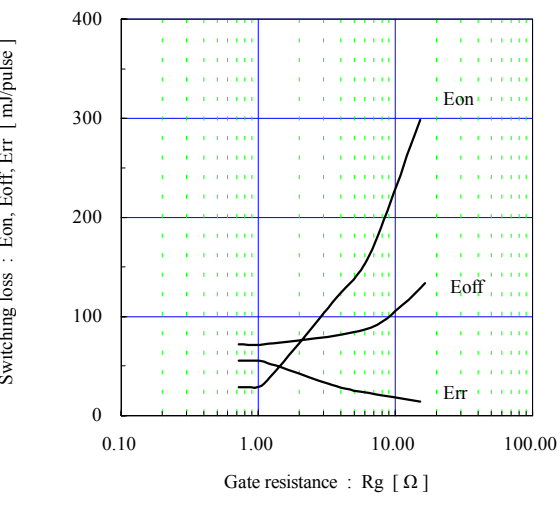
Switching time vs. Gate resistance (typ.)
 $V_{cc}=600V, I_c=600A, V_{GE}=\pm 15V, T_j=25^\circ C$



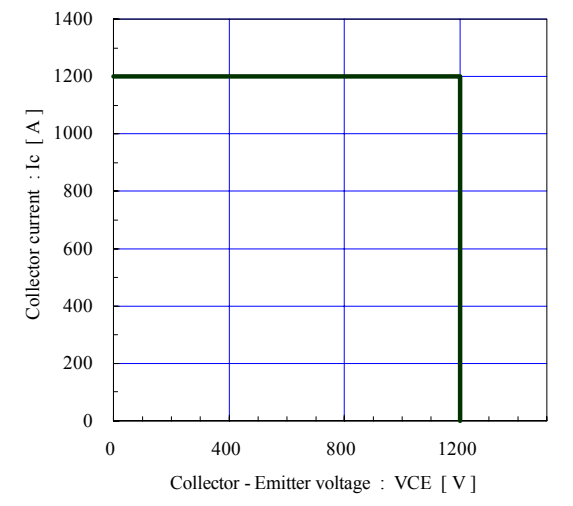
Switching loss vs. Collector current (typ.)
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=1.1\Omega$



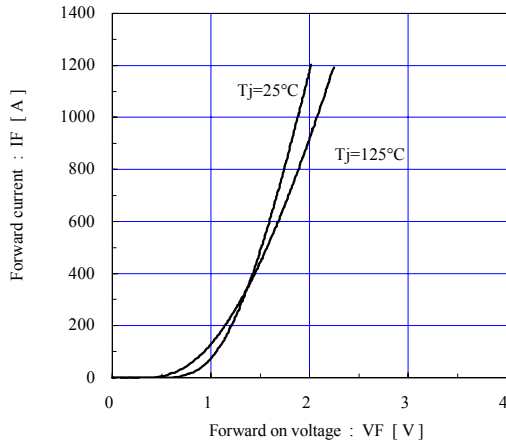
Switching loss vs. Gate resistance (typ.)
 $V_{cc}=600V, I_c=600A, V_{GE}=\pm 15V, T_j=125^\circ C$



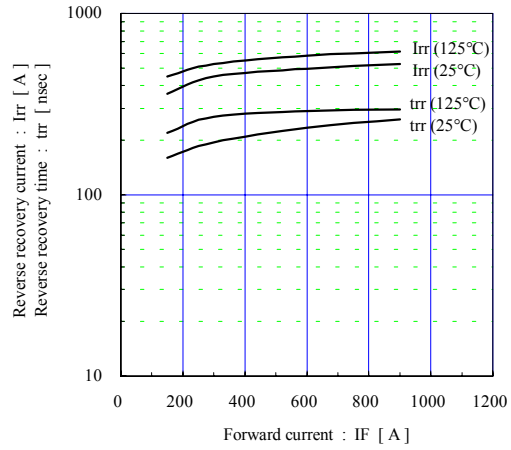
Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE} \le 15V, R_g \ge 1.1\Omega, T_j \le 125^\circ C$



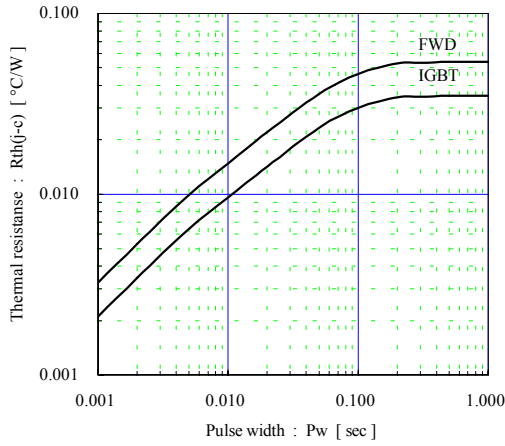
Forward current vs. Forward on voltage (typ.)
chip



Reverse recovery characteristics (typ.)
 $V_{ce}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_g=1.1\Omega$



Transient thermal resistance (max.)



■ Outline Drawings, mm

M138

