

3MBI150UC-120



IGBT Module U-Series 1200V / 150A 3 in one-package

■ Features

- High speed switching
- Voltage drive
- Low inductance module structure
- With shunt resistors

■ Applications

- Inverter for Motor drive
- AC and DC Servo drive amplifier
- Uninterruptible power supply
- Industrial machines, such as Welding machines

■ 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	200	A
				T _C =80°C	150	
		I _{CP}	1ms	T _C =25°C	400	
				T _C =80°C	300	
		-I _C			150	
		-I _C pulse			300	
Collector Power Dissipation		P _C	1 device		735	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

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

*2 : Recommendable value : 2.5 to 3.5 N·m(M5)

● 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 _{CE} =1200V	—	—	1.0	mA
Gate-Emitter leakage current	I _{GES}	V _{CE} =0V, V _{GE} =±20V	—	—	200	nA
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} =20V, I _C =150mA	4.5	6.5	8.5	V
Collector-Emitter saturation voltage	V _{CE(sat)} (chip)	V _{GE} =15V, I _C =150A	T _J =25°C	1.75	2.10	V
			T _J =125°C	2.00	—	
Input capacitance	C _{ies}	V _{CE} =10V, V _{GE} =0V, f=1MHz	—	17	—	nF
Turn-on time	t _{on}	V _{CC} =600V I _C =150A V _{GE} =±15V R _G =2.2 Ω	—	0.36	1.20	μs
	t _r		—	0.21	0.60	
	t _{r(i)}		—	0.03	—	
Turn-off time	t _{off}		—	0.37	1.00	
	t _f		—	0.07	0.30	
Forward on voltage	V _F	V _{GE} =0V I _F =150A	T _J =25°C	1.60	1.90	V
	(chip)		T _J =125°C	1.70	—	
Reverse recovery time	t _{rr}	I _F =150A	—	—	0.35	μs
Lead resistance, terminal-chip*3	R _{lead}	Without shunt resistance	—	5.1	—	mΩ
Shunt resistance	R _{shunt}	Resistance of R1 to R6 *4	—	2.4	—	

*3: Biggest internal terminal resistance among arm.

*4 R1 to R2 is shown in equivalent circuit (p5)

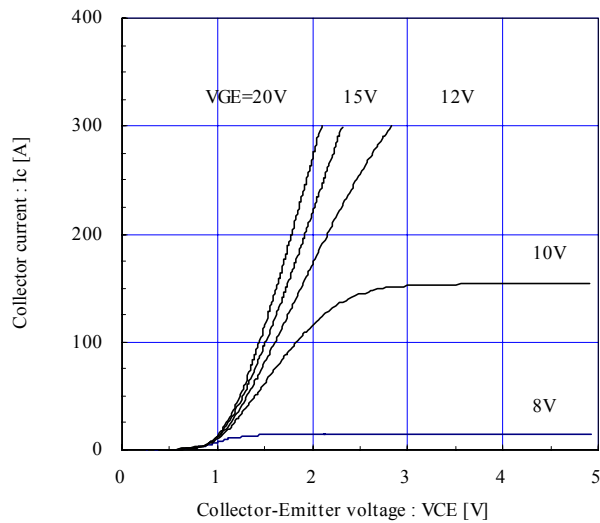
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance	R _{th(j-c)}	IGBT	—	—	0.17	°C/W
	R _{th(j-c)}	FWD	—	—	0.28	°C/W
Contact Thermal resistance	R _{th(c-f)*5}	With thermal compound	—	0.05	—	°C/W

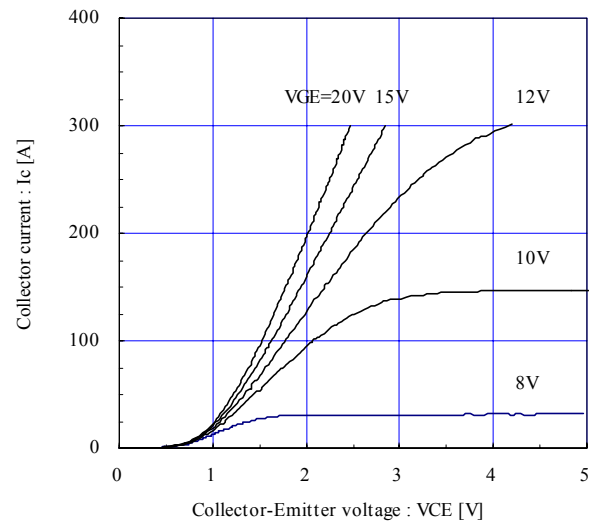
*5 : This is the value which is defined mounting on the additional cooling fin with thermal compound.

Characteristics (Representative)

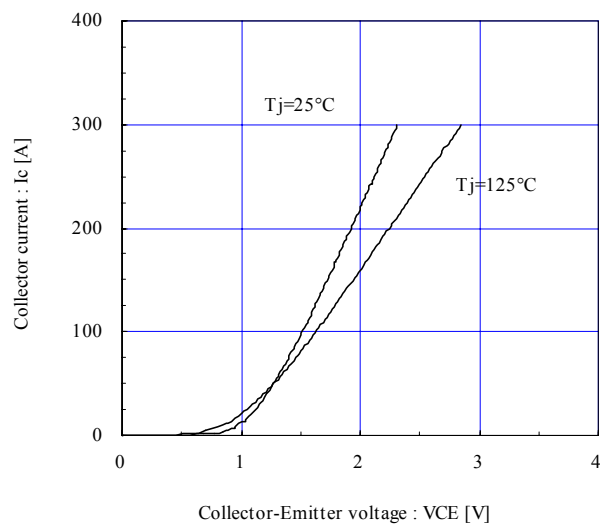
Collector current vs. Collector-Emitter voltage (typ.)

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

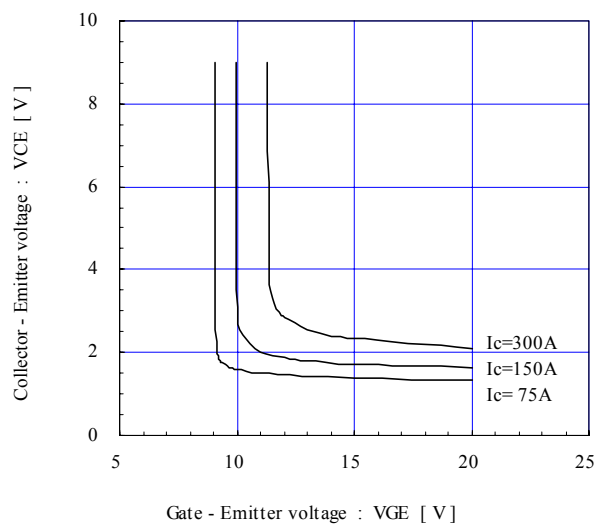
Collector current vs. Collector-Emitter voltage (typ.)

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

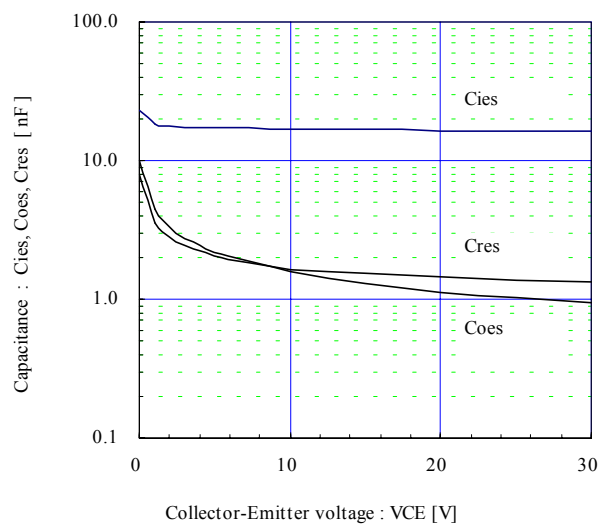
Collector current vs. Collector-Emitter voltage (typ.)

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

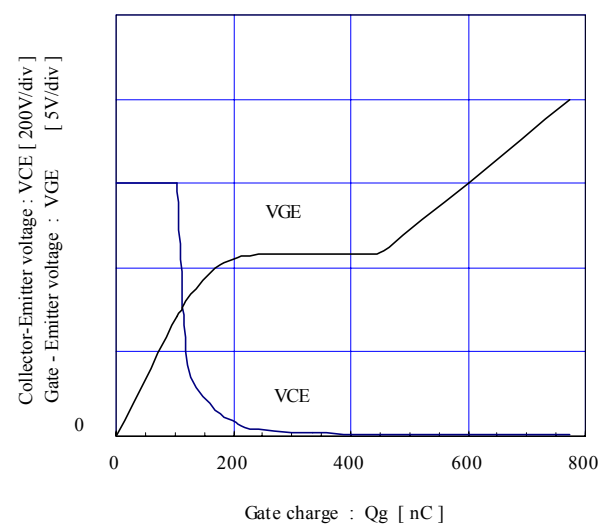
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)

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

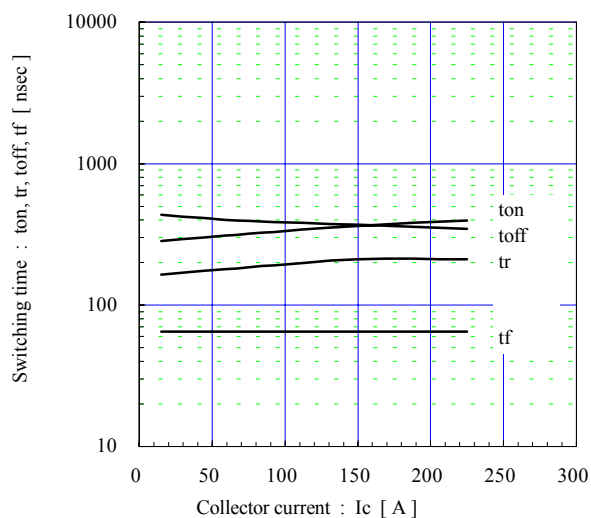
Capacitance vs. Collector-Emitter voltage (typ.)

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

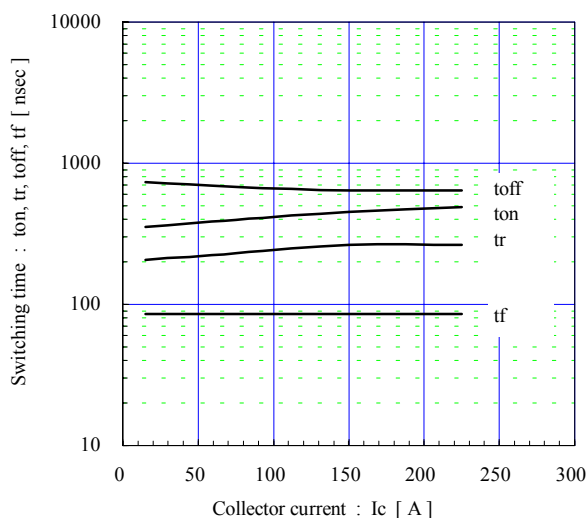
Dynamic Gate charge (typ.)

 $V_{cc} = 600\text{V}$, $I_c = 150\text{A}$, $T_j = 25^\circ\text{C}$ 

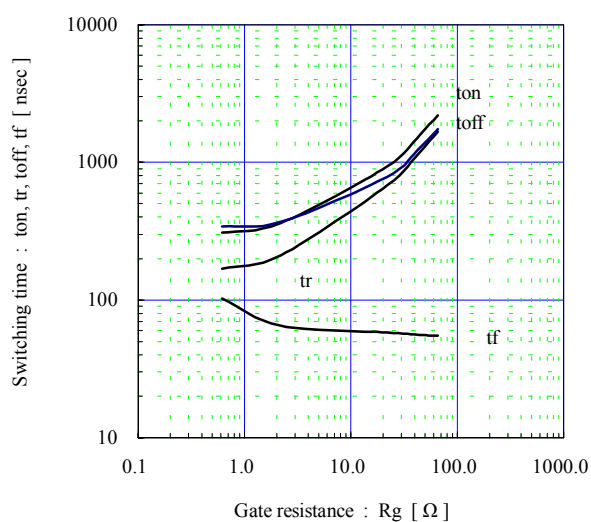
Switching time vs. Collector current (typ.)
 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=2.2\Omega$, $T_j=25^\circ C$



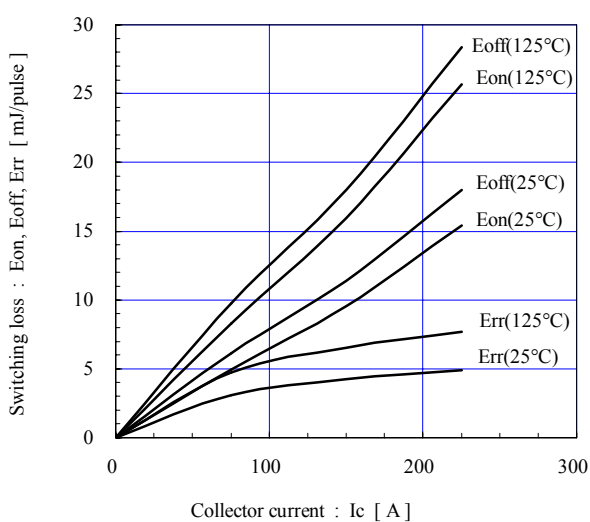
Switching time vs. Collector current (typ.)
 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=2.2\Omega$, $T_j=125^\circ C$



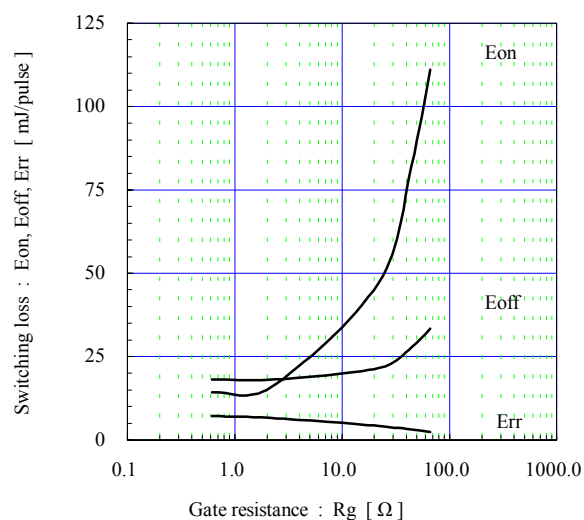
Switching time vs. Gate resistance (typ.)
 $V_{cc}=600V$, $I_c=150A$, $V_{GE}=\pm 15V$, $T_j=25^\circ C$



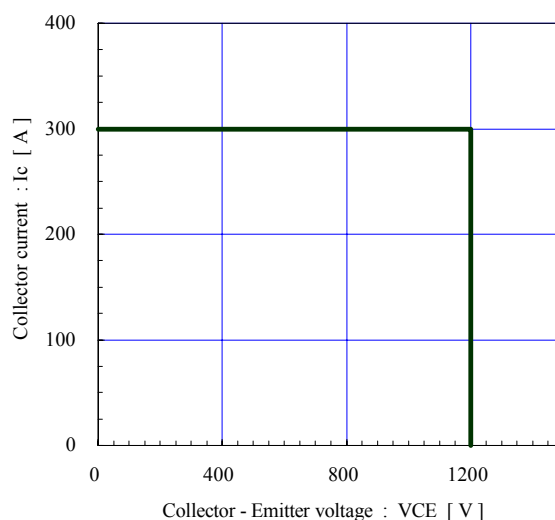
Switching loss vs. Collector current (typ.)
 $V_{cc}=600V$, $V_{GE}=\pm 15V$, $R_g=2.2\Omega$



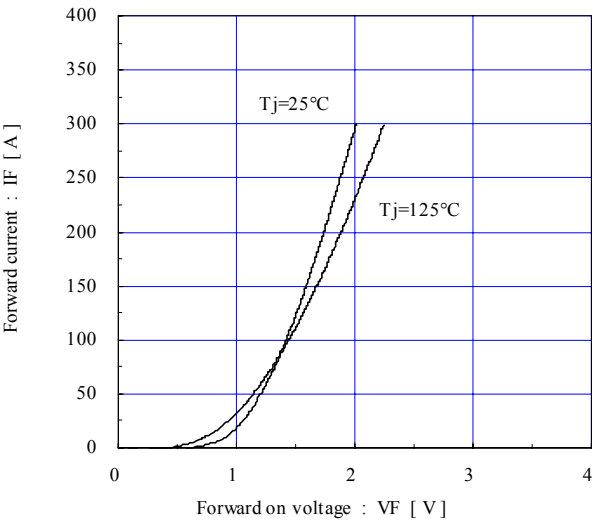
Switching loss vs. Gate resistance (typ.)
 $V_{cc}=600V$, $I_c=150A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$



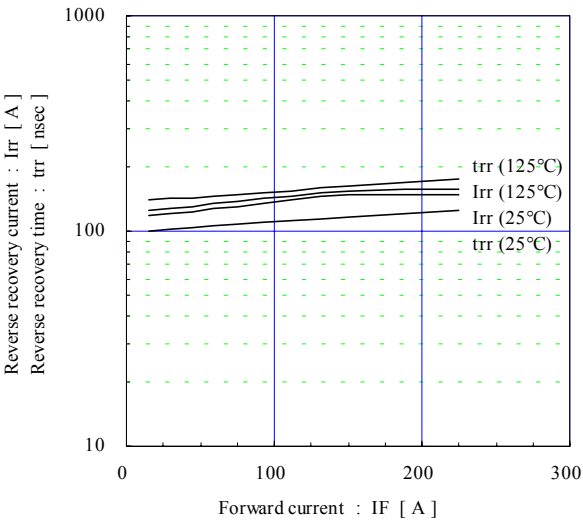
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE} \leq 15V$, $R_g \geq 2.2\Omega$, $T_j \leq 125^\circ C$



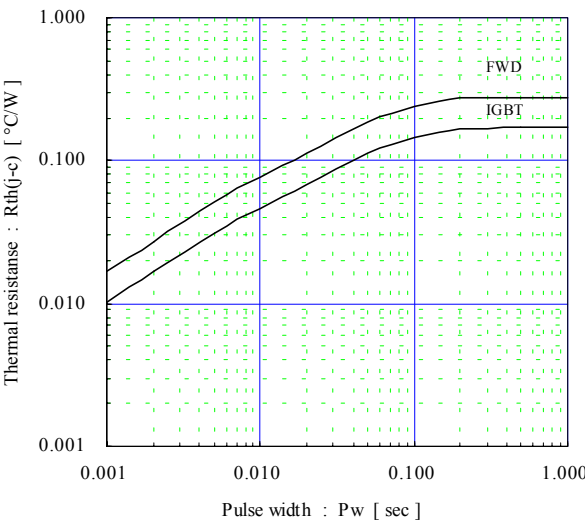
Forward current vs. Forward on voltage (typ.)
chip



Reverse recovery characteristics (typ.)
 $V_{cc}=600\text{V}$, $V_{GE}=+15\text{V}$, $R_g=22\text{ ohm}$



Transient thermal resistance (max.)



[illegible]

■ Equivalent Circuit Schematic

