

# 2MBI300UE-120

## IGBT Module U-Series 1200V / 300A 2 in one-package

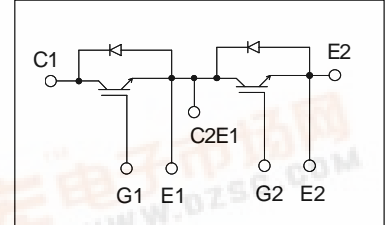
### ■ Features

- 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 <sub>CES</sub>		1200	V	
Gate-Emitter voltage	V <sub>GES</sub>		±20	V	
Collector current	I <sub>c</sub>	Continuous	T <sub>c</sub> =25°C	450	A
			T <sub>c</sub> =80°C	300	
	I <sub>cp</sub>	1ms	T <sub>c</sub> =25°C	900	
			T <sub>c</sub> =80°C	600	
			-I <sub>c</sub>	300	
-I <sub>c</sub> pulse			600		
Collector Power Dissipation	P <sub>c</sub>	1 device	1660	W	
Junction temperature	T <sub>j</sub>		+150	°C	
Storage temperature	T <sub>stg</sub>		-40 to +125		
Isolation voltage   between terminal and copper base *1	V <sub>iso</sub>	AC:1min.	2500	VAC	
Screw Torque	Mounting *2		3.5	N·m	
	Terminals *2		4.5		

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

\*2: Recommendable value : Mounting 2.5 to 3.5 N·m(M5 or M6), Terminals 3.5 to 4.5N·m(M6)

### ● Electrical characteristics (at Tj=25°C unless otherwise specified)

Item	Symbols	Conditions	Characteristics			Unit	
			Min.	Typ.	Max.		
Zero gate voltage collector current	I <sub>CES</sub>	V <sub>GE</sub> =0V, V <sub>CES</sub> =1200V	-	-	3.0	mA	
Gate-Emitter leakage current	I <sub>GES</sub>	V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V	-	-	600	nA	
Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> =20V, I <sub>c</sub> =300mA	4.5	6.5	8.5	V	
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub> (terminal)	V <sub>GE</sub> =15V, I <sub>c</sub> =300A	T <sub>j</sub> =25°C	-	1.95	2.30	V
			T <sub>j</sub> =125°C	-	2.20	-	
	V <sub>CE(sat)</sub> (chip)		T <sub>j</sub> =25°C	-	1.75	2.10	
			T <sub>j</sub> =125°C	-	2.00	-	
Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> =10V, V <sub>GE</sub> =0V, f=1MHz	-	34	-	nF	
Turn-on time	t <sub>on</sub>	V <sub>CC</sub> =600V	-	0.36	1.20	μs	
	t <sub>r</sub>	I <sub>c</sub> =300A	-	0.21	0.60		
	t <sub>r(j)</sub>	V <sub>GE</sub> =±15V	-	0.03	-		
Turn-off time	t <sub>off</sub>	R <sub>G</sub> =2.0 Ω	-	0.37	1.00	μs	
	t <sub>f</sub>		-	0.07	0.30		
Forward on voltage	V <sub>F</sub> (terminal)	V <sub>GE</sub> =0V I <sub>F</sub> =300A	T <sub>j</sub> =25°C	-	1.75	2.05	V
			T <sub>j</sub> =125°C	-	1.85	-	
	V <sub>F</sub> (chip)		T <sub>j</sub> =25°C	-	1.60	1.90	
			T <sub>j</sub> =125°C	-	1.70	-	
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> =300A	-	-	0.35	μs	
Lead resistance, terminal-chip*3	R lead		-	0.45	-	mΩ	

\*3:Biggest internal terminal resistance among arm.

### ● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance	R <sub>th(j-c)</sub>	IGBT	-	-	0.075	°C/W
	R <sub>th(j-c)</sub>	FWD	-	-	0.12	°C/W
Contact Thermal resistance	R <sub>th(c-f)</sub> *4	With thermal compound	-	0.0167	-	°C/W

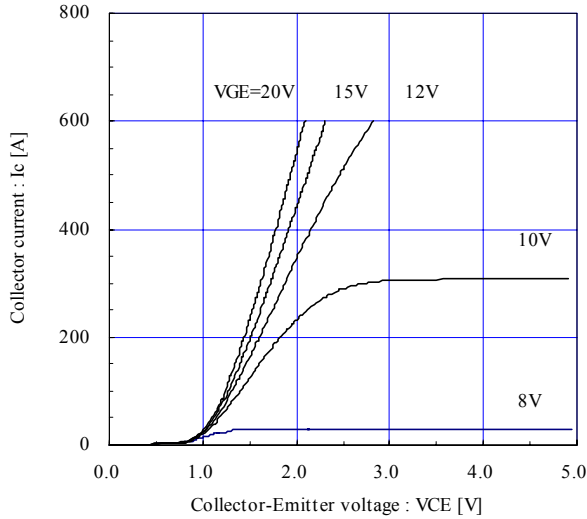
\*4: This is the value which is defined mounting on the additional cooling fin with thermal compound.



■ Characteristics (Representative)

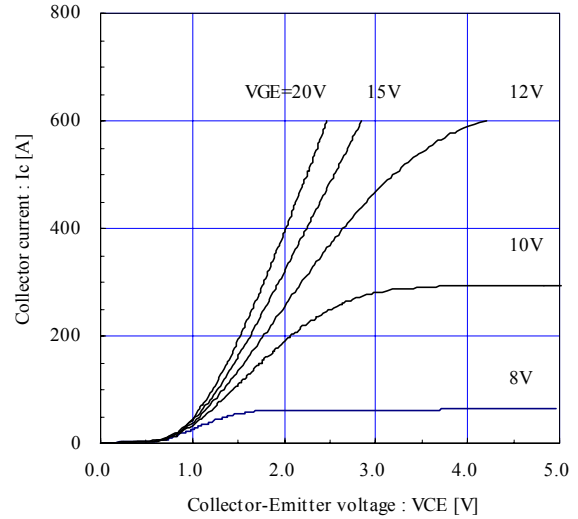
Collector current vs. Collector-Emitter voltage (typ.)

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



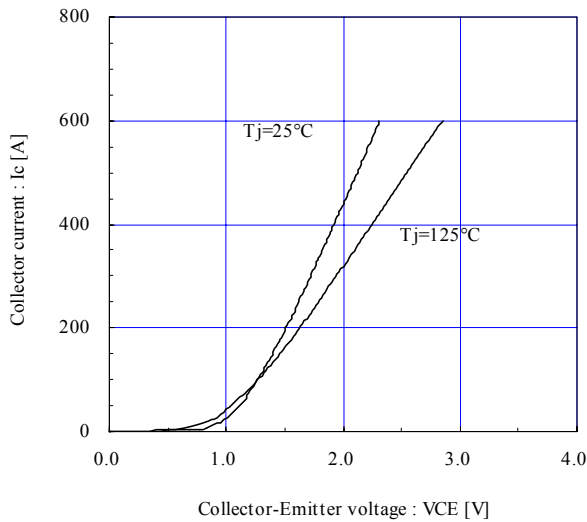
Collector current vs. Collector-Emitter voltage (typ.)

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



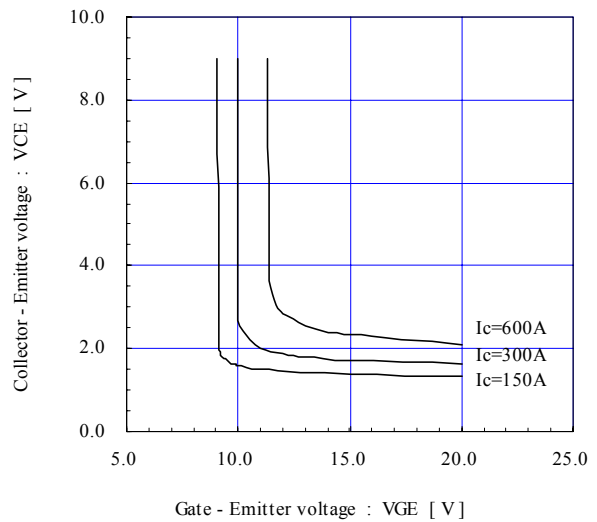
Collector current vs. Collector-Emitter voltage (typ.)

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



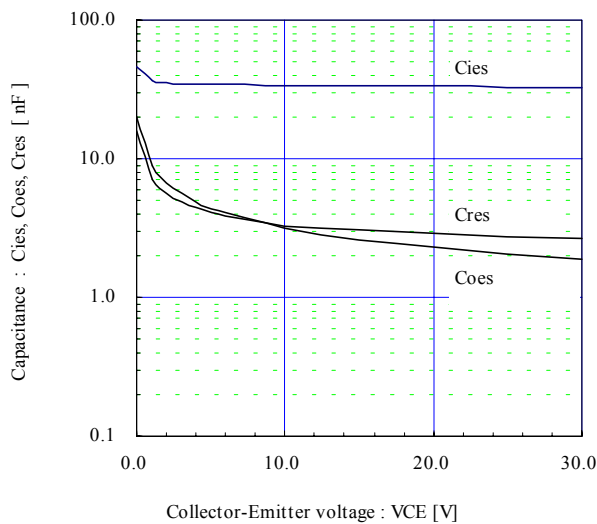
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)

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



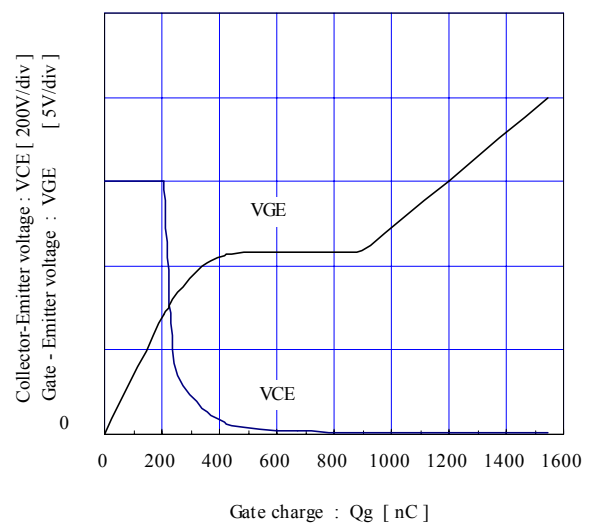
Capacitance vs. Collector-Emitter voltage (typ.)

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



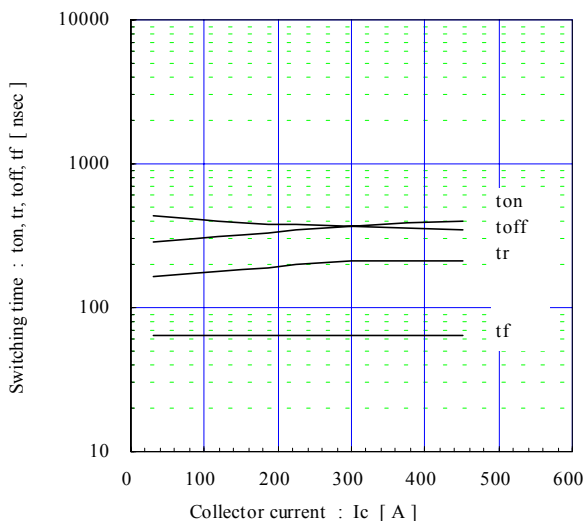
Dynamic Gate charge (typ.)

$V_{CC} = 600\text{V}, I_c = 300\text{A}, T_j = 25^\circ\text{C}$



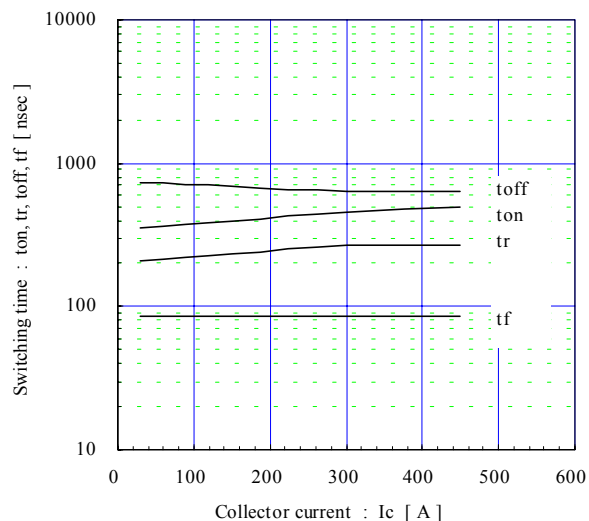
Switching time vs. Collector current (typ.)

V<sub>cc</sub>=600V, V<sub>GE</sub>=±15V, R<sub>g</sub>=2Ω, T<sub>j</sub>= 25°C



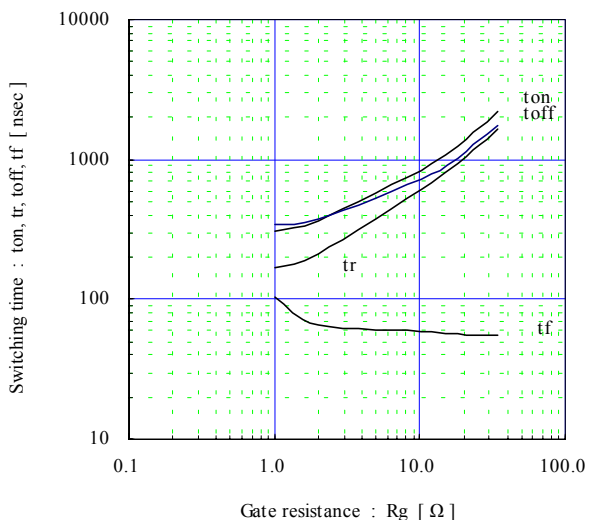
Switching time vs. Collector current (typ.)

V<sub>cc</sub>=600V, V<sub>GE</sub>=±15V, R<sub>g</sub>=2Ω, T<sub>j</sub>=125°C



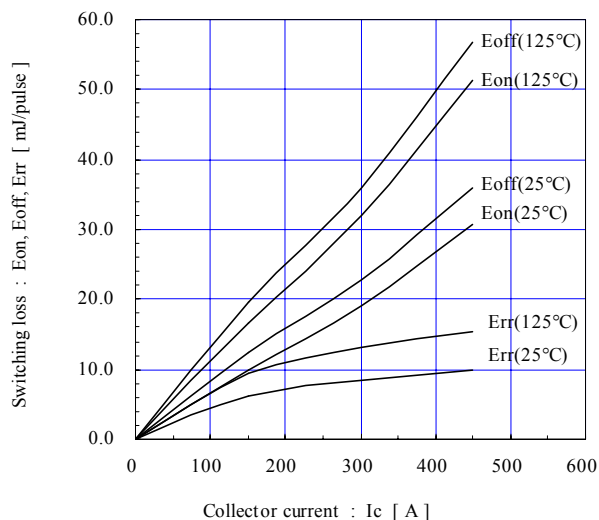
Switching time vs. Gate resistance (typ.)

V<sub>cc</sub>=600V, Ic=300A, V<sub>GE</sub>=±15V, T<sub>j</sub>= 25°C



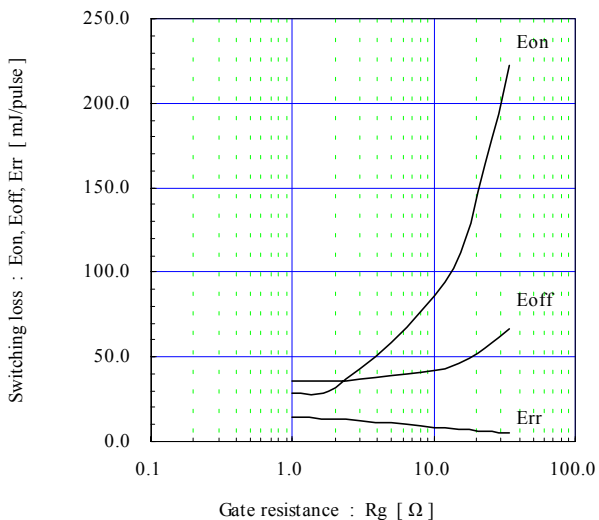
Switching loss vs. Collector current (typ.)

V<sub>cc</sub>=600V, V<sub>GE</sub>=±15V, R<sub>g</sub>=2Ω



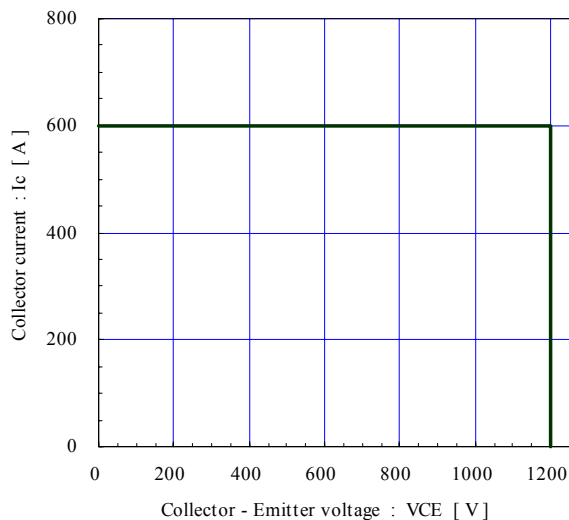
Switching loss vs. Gate resistance (typ.)

V<sub>cc</sub>=600V, Ic=300A, V<sub>GE</sub>=±15V, T<sub>j</sub>= 125°C

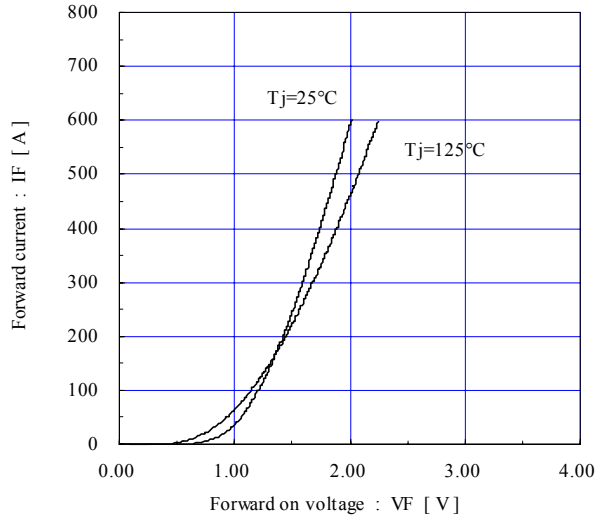


Reverse bias safe operating area (max.)

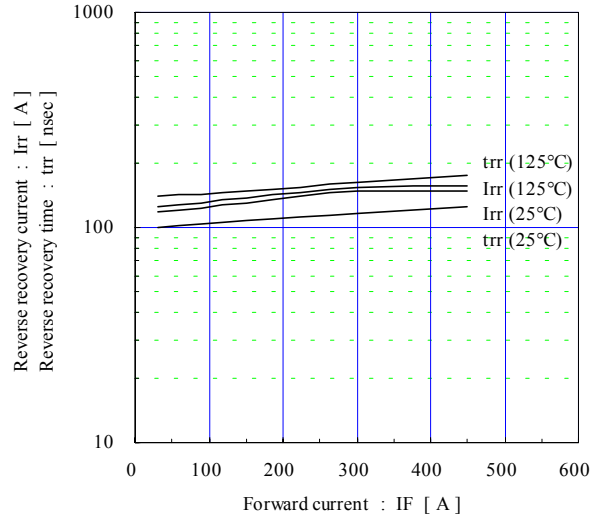
+V<sub>GE</sub>=15V, -V<sub>GE</sub> ≤ 15V, R<sub>G</sub> ≥ 2Ω, T<sub>j</sub> ≤ 125°C



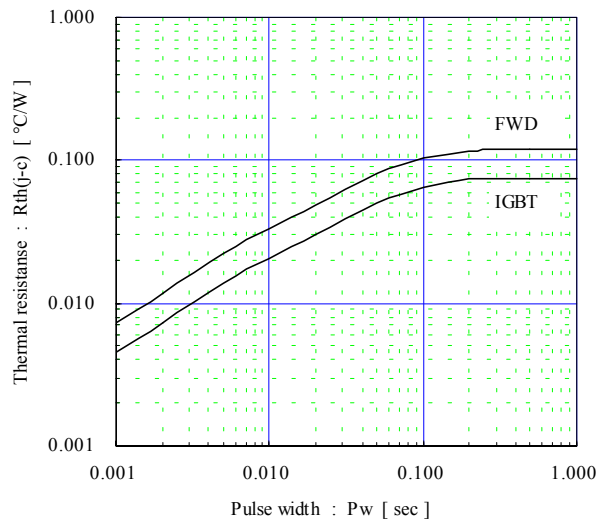
Forward current vs. Forward on voltage (typ.)  
chip



Reverse recovery characteristics (typ.)  
Vce=V, VGE=±15V, Rg=2Ω



Transient thermal resistance (max.)



■ Outline Drawings, mm

