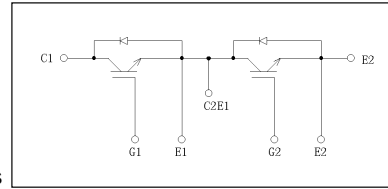


# 2MBI600U2E-060



## IGBT Module U-Series 600V / 600A 2 in one-package

### Equivalent Circuit Schematic



### 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

### 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>		650	V
Gate-Emitter voltage	V <sub>GES</sub>		±20	V
Collector current	I <sub>c</sub>	Continuous	600	A
	I <sub>cp</sub>	1ms	1200	
	-I <sub>c</sub>		600	
	-I <sub>c</sub> pulse		1200	
Collector Power Dissipation	P <sub>c</sub>	1 device	2400	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 3.5N·m(M5 or M6), Terminal 3.5 to 4.5 N·m(M6)

#### Electrical characteristics (at T<sub>j</sub>=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>CE</sub> =600V	-	-	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> =600mA	6.2	6.7	7.7	V	
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub> (terminal)	V <sub>GE</sub> =15V, I <sub>c</sub> =600A	T <sub>j</sub> =25°C	-	2.15	2.45	V
			T <sub>j</sub> =125°C	-	2.40	-	
	V <sub>CE(sat)</sub> (chip)		T <sub>j</sub> =25°C	-	1.85	-	
			T <sub>j</sub> =125°C	-	2.10	-	
Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> =10V, V <sub>GE</sub> =0V, f=1MHz	-	43	-	nF	
Turn-on time	t <sub>on</sub>	V <sub>CC</sub> =300V	-	0.40	1.20	μs	
	t <sub>r</sub>	I <sub>c</sub> =600A	-	0.22	0.60		
	t <sub>r(i)</sub>	V <sub>GE</sub> =±15V	-	0.16	-		
Turn-off time	t <sub>off</sub>	R <sub>G</sub> = 4.7 Ω	-	0.48	1.20	μs	
	t <sub>f</sub>		-	0.07	0.45		
Forward on voltage	V <sub>F</sub> (terminal)	V <sub>GE</sub> =0V I <sub>F</sub> =600A	T <sub>j</sub> =25°C	-	1.90	2.30	V
			T <sub>j</sub> =125°C	-	1.95	-	
	V <sub>F</sub> (chip)		T <sub>j</sub> =25°C	-	1.60	-	
			T <sub>j</sub> =125°C	-	1.65	-	
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> =600A	-	-	0.35	μs	
Lead resistance, terminal-chip*3	R lead		-	0.45	-	mΩ	

\*3:Biggest internal terminal resistance among arm.

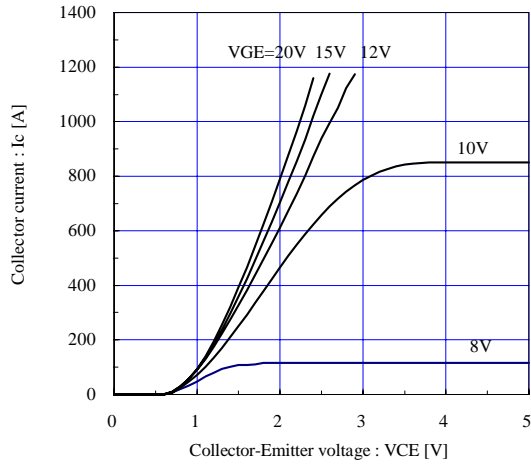
#### Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance	R <sub>th(j-c)</sub>	IGBT	-	-	0.052	°C/W
	R <sub>th(j-c)</sub>	FWD	-	-	0.086	°C/W
Contact Thermal resistance	R <sub>th(c-f)</sub> *4	With thermal compound	-	0.0167	-	°C/W

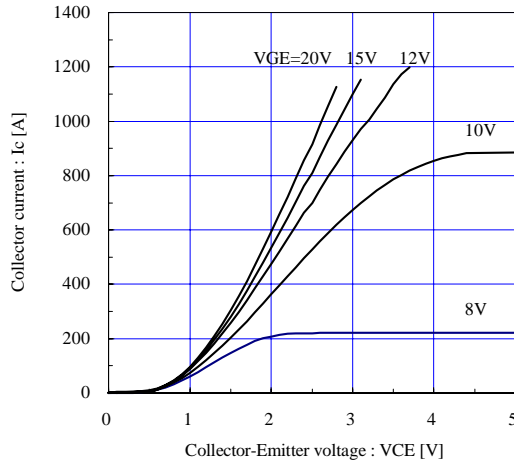
\*4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

Characteristics (Representative)

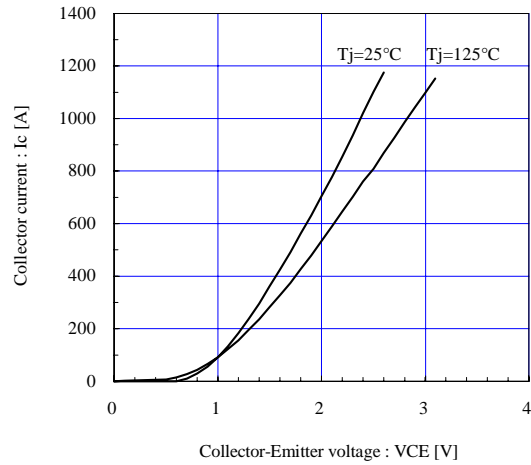
Collector current vs. Collector-Emmitter voltage (typ.)  
Tj= 25°C / chip



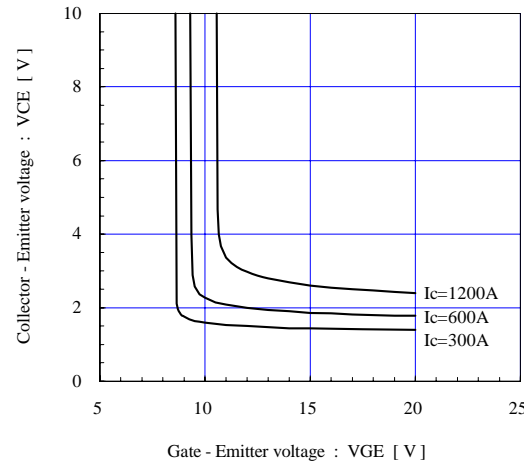
Collector current vs. Collector-Emmitter voltage (typ.)  
Tj= 125°C / chip



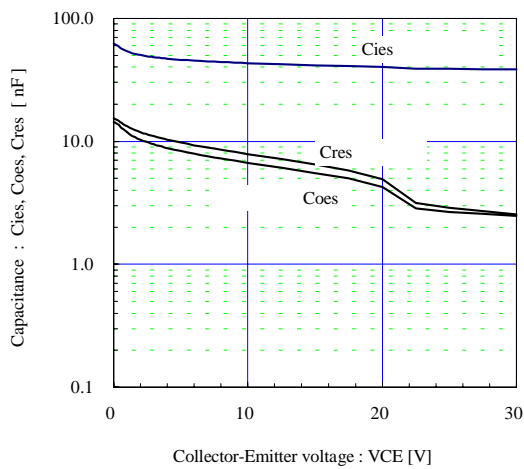
Collector current vs. Collector-Emmitter voltage (typ.)  
VGE=15V / chip



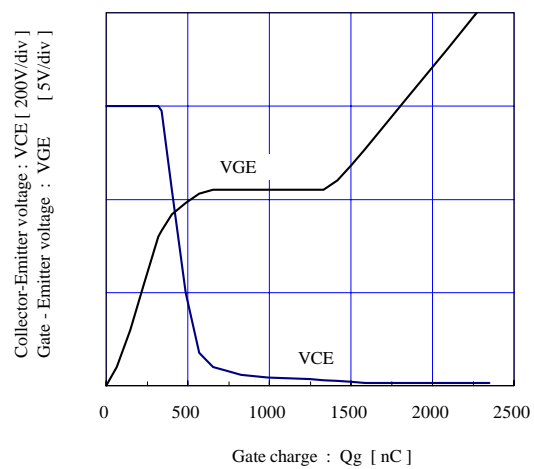
Collector-Emmitter voltage vs. Gate-Emmitter voltage (typ.)  
Tj=25°C / chip



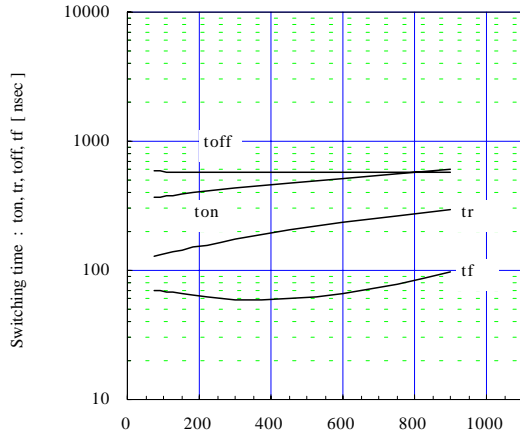
Capacitance vs. Collector-Emmitter voltage (typ.)



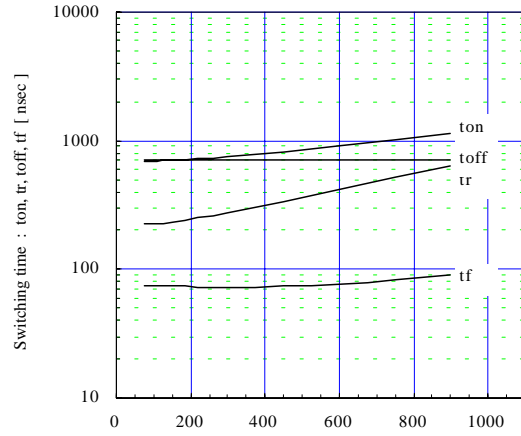
Dynamic Gate charge (typ.)  
Vcc=300V, Ic=600A, Tj= 25°C



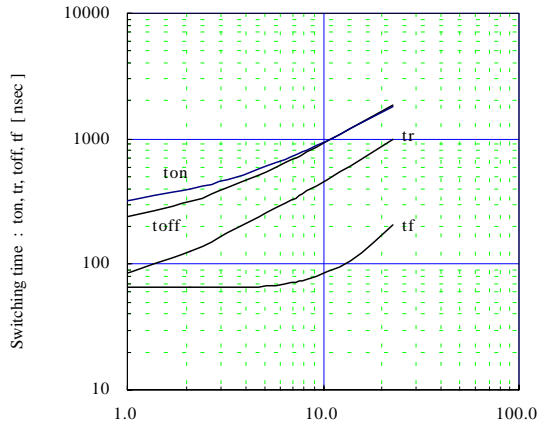
Switching time vs. Collector current (typ.)  
 $V_{cc}=300V, V_{GE}=\pm 15V, R_g=4.7\Omega, T_j=25^\circ C$



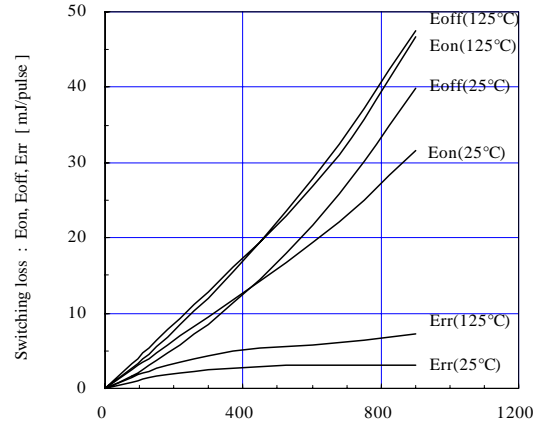
Switching time vs. Collector current (typ.)  
 $V_{cc}=300V, V_{GE}=\pm 15V, R_g=4.7\Omega, T_j=125^\circ C$



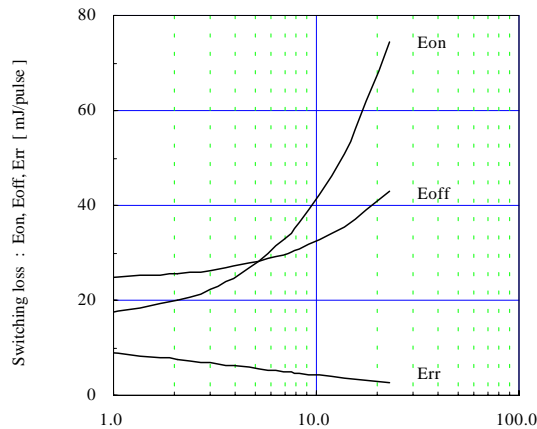
Switching time vs. Gate resistance (typ.)  
 $V_{cc}=300V, I_c=600A, V_{GE}=\pm 15V, T_j=25^\circ C$



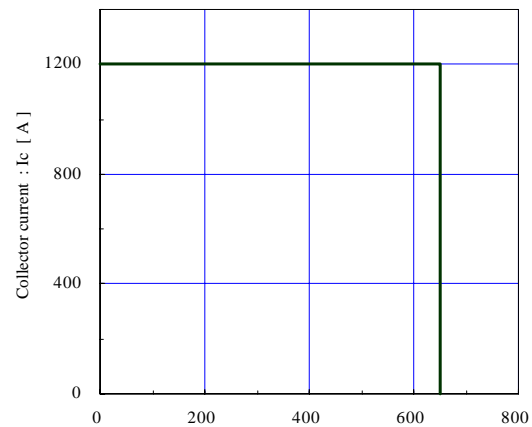
Switching loss vs. Collector current (typ.)  
 $V_{cc}=300V, V_{GE}=\pm 15V, R_g=4.7\Omega$



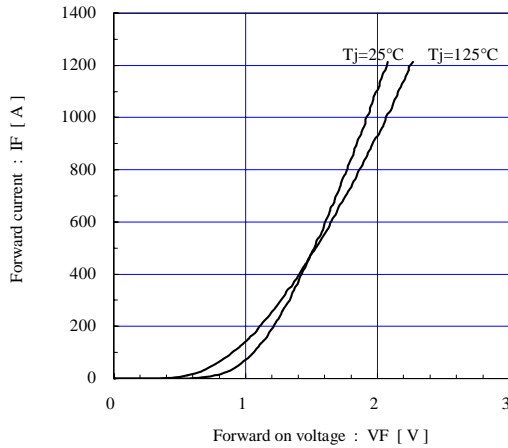
Switching loss vs. Gate resistance (typ.)  
 $V_{cc}=300V, I_c=600A, V_{GE}=\pm 15V, T_j=125^\circ C$



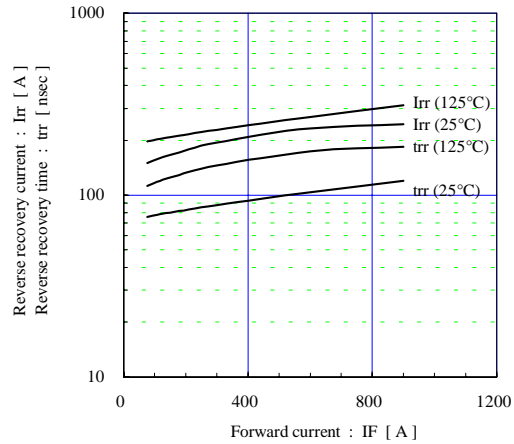
Reverse bias safe operating area (max.)  
 $+V_{GE}=15V, -V_{GE} \le 15V, R_g \ge 4.7\Omega, T_j \le 125^\circ C$



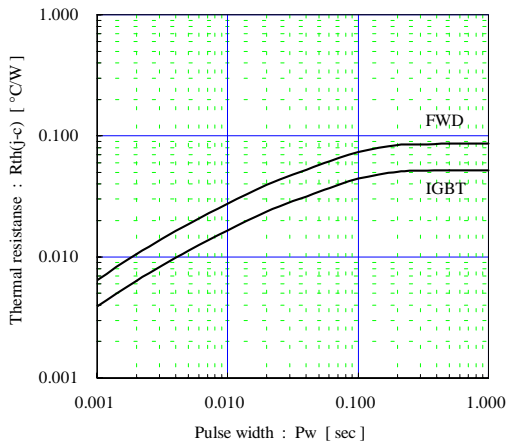
Forward current vs. Forward on voltage (typ.)  
chip



Reverse recovery characteristics (typ.)  
Vcc=300V, VGE=±15V, Rg=4.7Ω



Transient thermal resistance (max.)



■ Outline Drawings, mm

M247

