

1MBI300U2H-060L-50

IGBT Modules

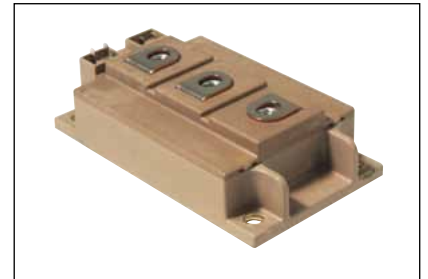
IGBT MODULE (U series) 600V / 300A / 1 in one package

■ Features

- High speed switching
- Voltage drive
- Low Inductance module structure

■ Applications

- Inverter DB for Motor Drive
- AC and DC Servo Drive Amplifier (DB)
- Active PFC
- Industrial machines



■ Maximum Ratings and Characteristics

● Absolute Maximum Ratings (at T_c=25°C unless otherwise specified)

Items	Symbols	Conditions	Maximum ratings	Units	
Collector-Emitter voltage	V _{CEs}		600	V	
Gate-Emitter voltage	V _{GES}		±20	V	
Collector current	I _c	Continuous	T _c =25°C	300	A
			T _c =80°C	270	
	I _{cp}	1ms	T _c =25°C	600	
			T _c =80°C	600	
	-I _c	Continuous	T _c =25°C	300	
T _c =80°C			200		
-I _c pluse	1ms	T _c =25°C	600		
		T _c =80°C	600		
Collector Power Dissipation	P _c	1 device	1000		
Forword current for FWD	I _F	Continuous	T _c =25°C	400	
			T _c =80°C	260	
	I _F pulse	1ms	T _c =25°C	800	
			T _c =80°C	800	
Junction temperature	T _j		150	°C	
Storage temperature	T _{stg}		-40~ +125		
Isolation oltage	between terminal and copper base *1	V _{iso}	AC : 1min.	2500	VAC
Screw Torque	Mounting *2			3.5	Nm
	Terminals *2			4.5	

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

Note *2: Recommendable Value : Mounting 2.5~3.5 Nm (M5)
Terminals 3.5~4.5 Nm (M6)

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

Items	Symbols	Conditions	Characteristics			Units		
			min.	typ.	max.			
Inverter	Zero gate voltage collector current	I _{ces}	V _{GE} = 0V V _{CE} = 600V	-	-	2.00	mA	
	Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V V _{GE} = ±20V	-	-	400	nA	
	Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V I _c = 300mA	6.2	6.7	7.7	V	
	Collector-Emitter saturation voltage	V _{CE(sat)} (terminal)	V _{GE} = 15V I _c = 300A	T _j = 25°C	-	2.05	2.45	V
				T _j = 125°C	-	2.30	-	
		V _{CE(sat)} (chip)		T _j = 25°C	-	1.80	-	
				T _j = 125°C	-	2.05	-	
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	-	23.0	-	nF	
	Turn-on time	t _{on}	V _{CC} = 300V I _c = 300A V _{GE} = ±15V R _G = 9.1 Ω	-	0.40	1.20	μs	
		t _r		-	0.22	0.60		
t _{r(l)}		-		0.16	-			
Turn-off time	t _{off}	R _G = 9.1 Ω	-	0.48	1.20	μs		
	t _r		-	0.07	0.45			
Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 300A	T _j = 25°C	-	1.85	2.30	V	
			T _j = 125°C	-	1.90	-		
	V _F (chip)		T _j = 25°C	-	1.60	-		
			T _j = 125°C	-	1.65	-		
Reverse recovery time	t _{rr}	I _F = 300A	-	-	0.35	μs		
FWD	V _F (terminal)	V _{GE} = 0V I _F = 400A	T _j = 25°C	-	1.85	2.35	V	
			T _j = 125°C	-	1.90	-		
	V _F (chip)		T _j = 25°C	-	1.60	-		
			T _j = 125°C	-	1.65	-		
Reverse recovery time	t _{rr}	I _F = 400A	-	-	0.35	μs		
Lead resistance, terminal-chip *3		R lead	-	0.53	-	mΩ		

Note *3: Biggest internal terminal resistance among arm.

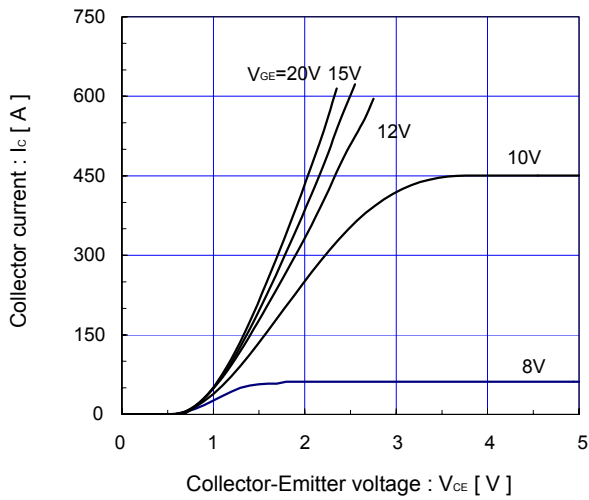
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	IGBT	-	-	0.125	°C/W
		Inverse Diode	-	-	0.23	
		FWD	-	-	0.16	
Contact Thermal resistance (1device) *4	R _{th(c-f)}	with Thermal Compound	-	0.025	-	

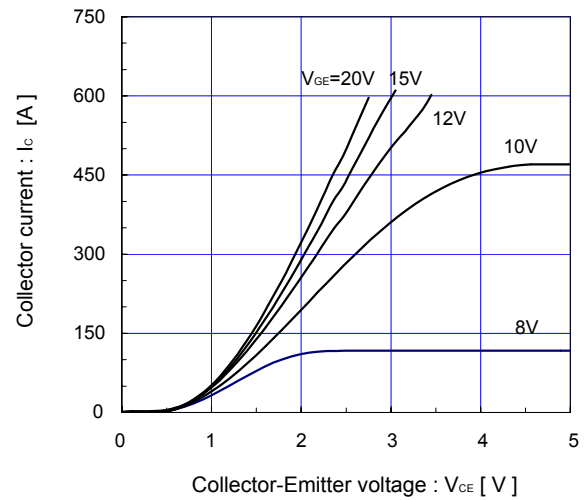
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

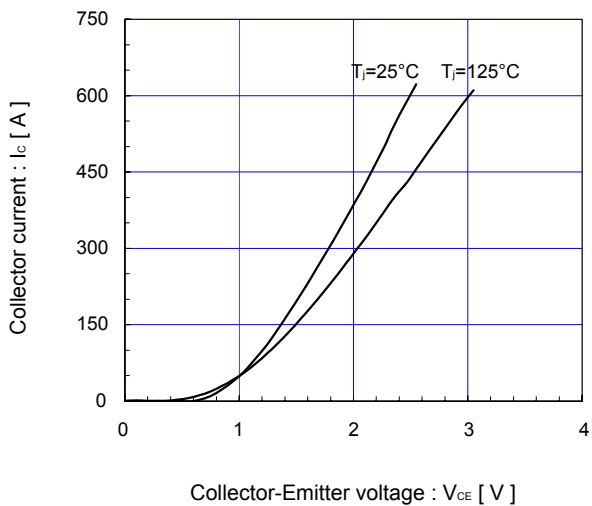
Collector current vs. Collector-Emitter voltage (typ.)
T_J=25°C / chip



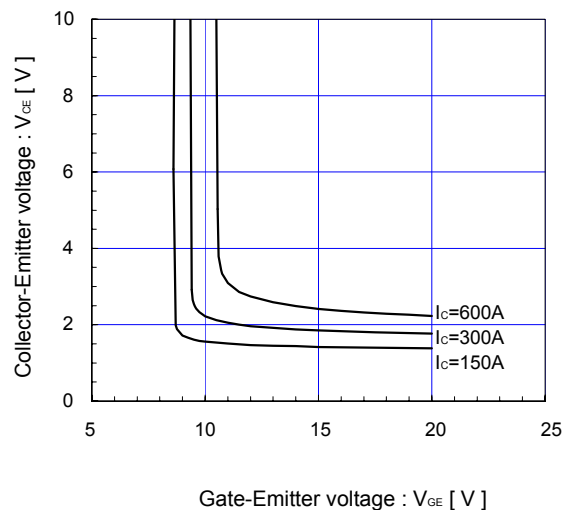
Collector current vs. Collector-Emitter voltage (typ.)
T_J=125°C / chip



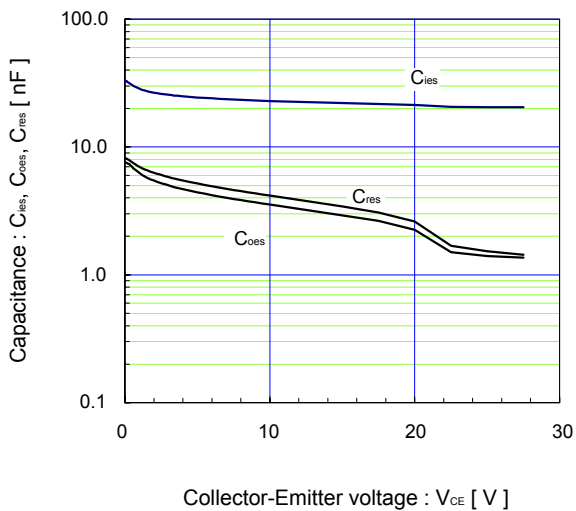
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE}=15V / chip



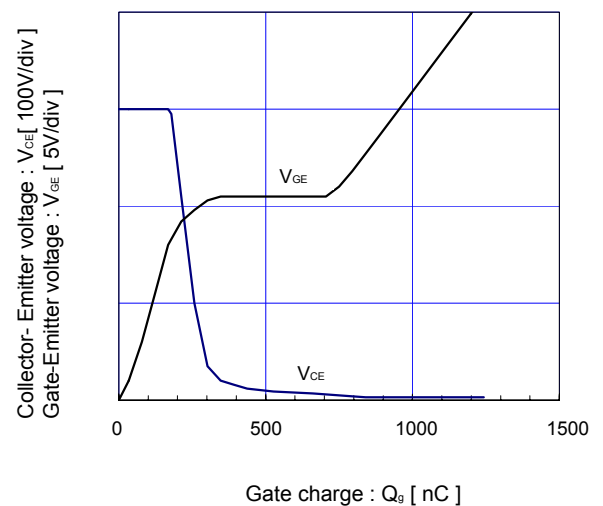
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
T_J=25°C / chip



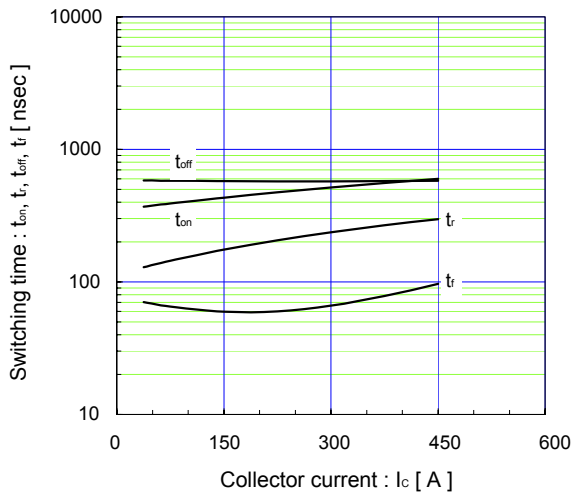
Capacitance vs. Collector-Emitter voltage (typ.)
V_{GE}=0V, f=1MHz, T_J=25°C



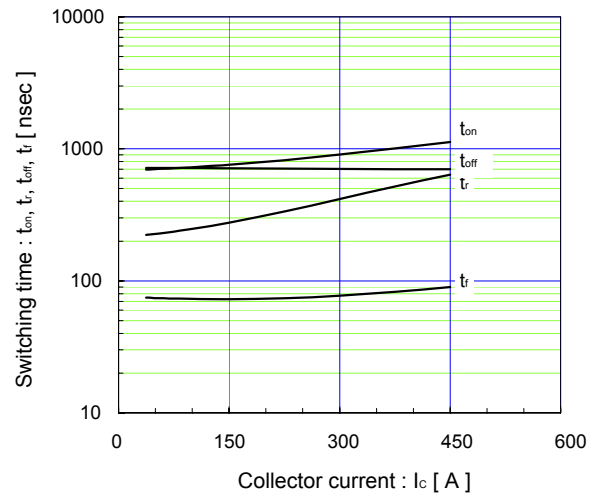
Dynamic Gate charge (typ.)
V_{CC}=300V, I_C=300A, T_J=25°C



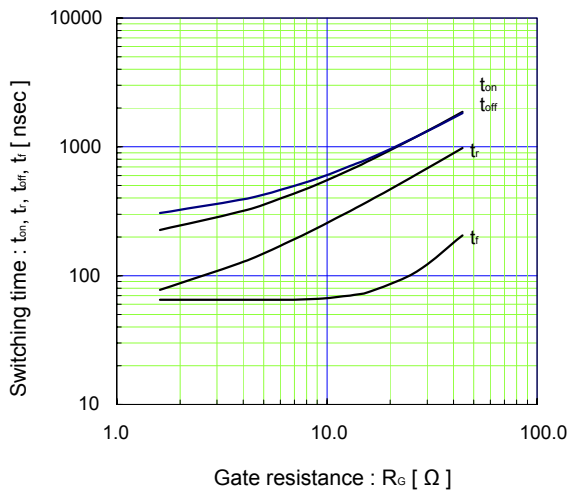
Switching time vs. Collector current (typ.)
 $V_{CC}=300V, V_{GE}=\pm 15V, R_G=9.1\Omega, T_J=25^\circ C$



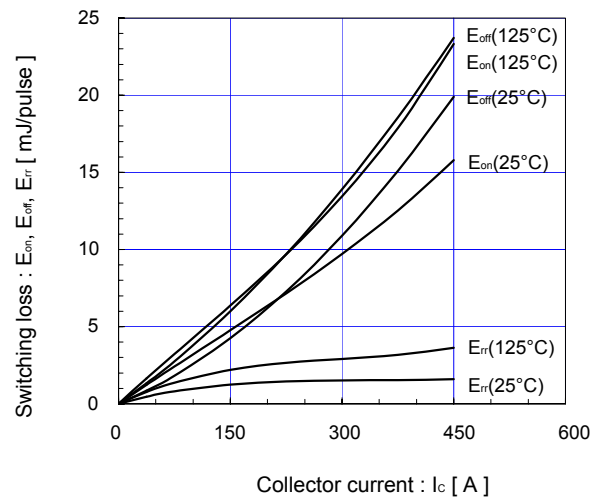
Switching time vs. Collector current (typ.)
 $V_{CC}=300V, V_{GE}=\pm 15V, R_G=9.1\Omega, T_J=125^\circ C$



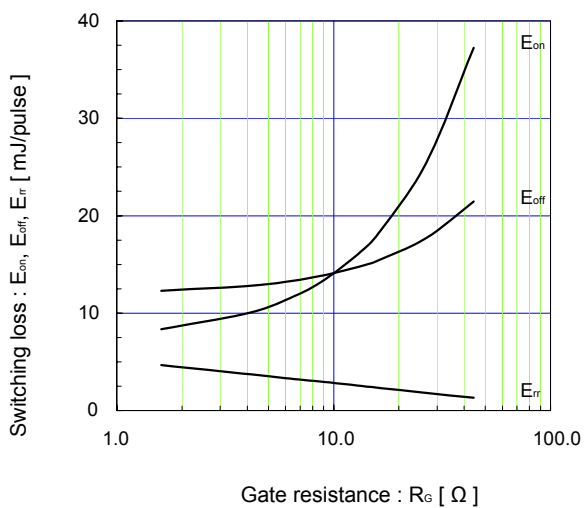
Switching time vs. Gate resistance (typ.)
 $V_{CC}=300V, I_c=300A, V_{GE}=\pm 15V, T_J=25^\circ C$



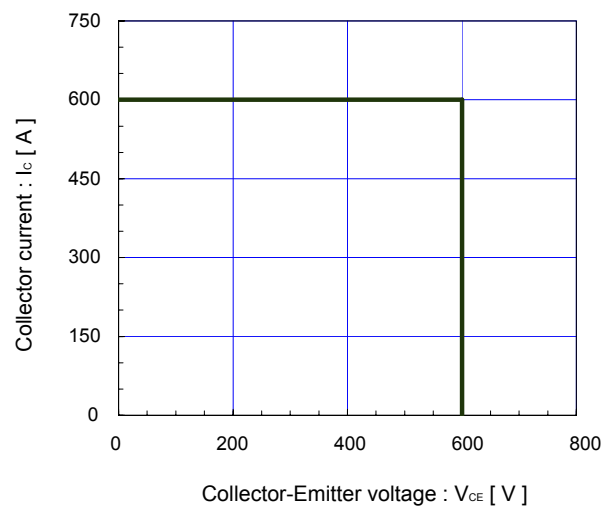
Switching loss vs. Collector current (typ.)
 $V_{CC}=300V, V_{GE}=\pm 15V, R_G=9.1\Omega$



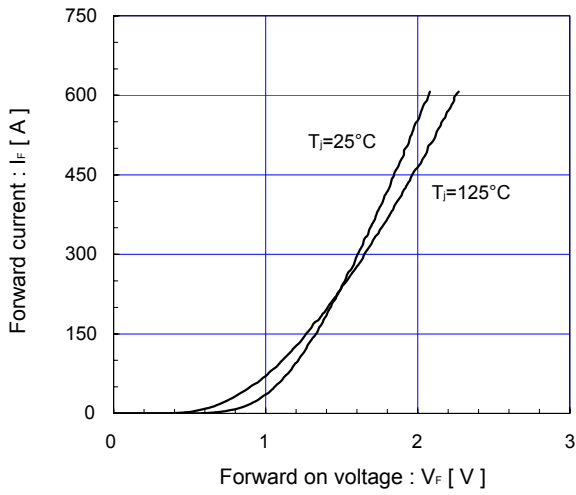
Switching loss vs. Gate resistance (typ.)
 $V_{CC}=300V, I_c=300A, V_{GE}=\pm 15V, T_J=125^\circ C$



Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE} \leq 15V, R_G > 9.1\Omega, T_J \leq 125^\circ C$

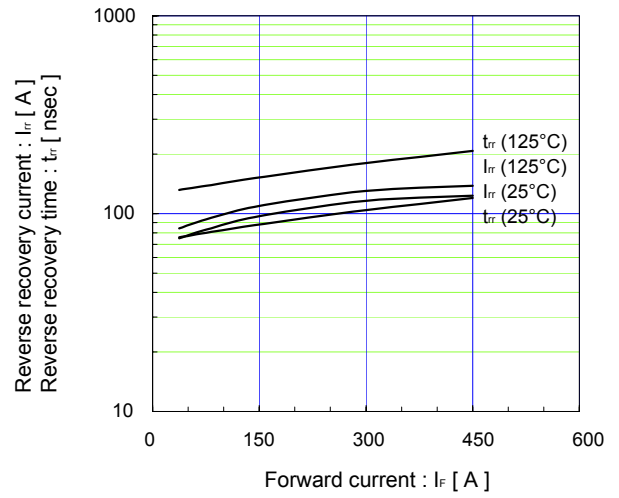


Forward current vs. Forward on voltage for Inverse Diode (typ.) chip

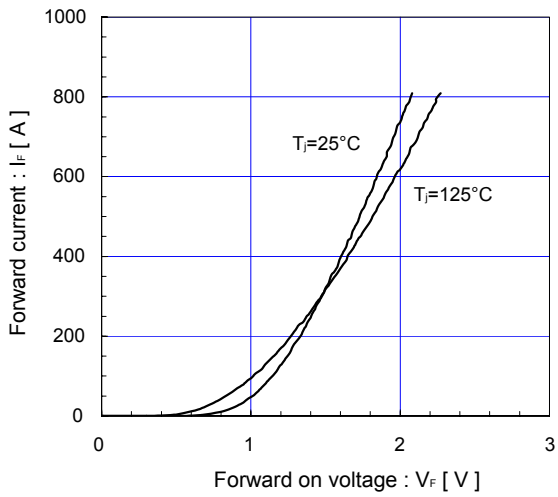


Reverse recovery characteristics (typ.)

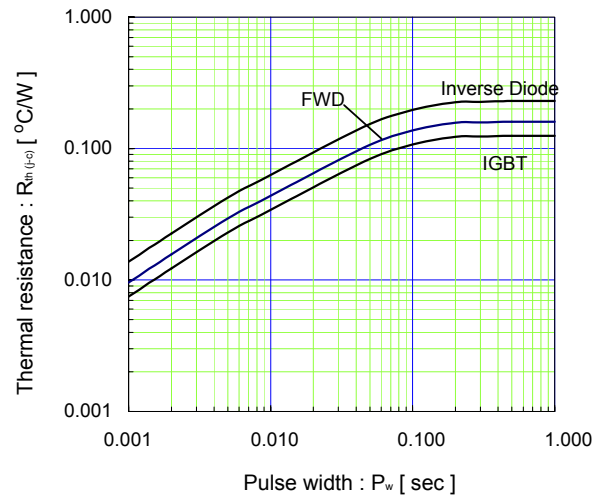
$V_{CC}=300\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=9.1\Omega$



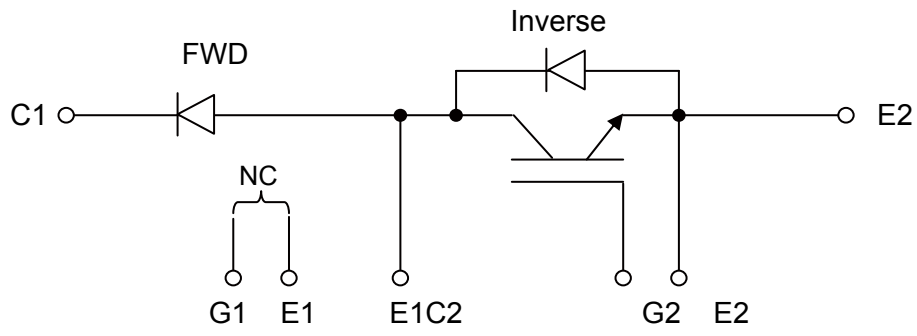
Forward current vs. Forward on voltage for FWD (typ.)



Transient thermal resistance (max.)



■ Equivalent Circuit Schematic



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IGBT Modules

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