

# 2MBI300U4N-170-50

IGBT Modules

## IGBT MODULE (U series) 1700V / 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



### ■ Maximum Ratings and Characteristics

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

Items	Symbols	Conditions	Maximum ratings	Units	
Collector-Emitter voltage	V <sub>CEs</sub>		1700	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	1ms		600		
Collector power dissipation	P <sub>c</sub>	1 device	1385	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)	AC : 1min.	3400	VAC	
	between thermistor and others (*2)				
Screw torque	Mounting (*3)		3.5	N m	
	Terminals (*4)		4.5		

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

Note \*2: Two thermistor terminals should be connected together, each other terminals should be connected together and shorted to base plate when isolation test will be done.

Note \*3: Recommendable value : Mounting : 2.5-3.5 Nm (M5) Note \*4: Recommendable value : Terminals : 3.5-4.5 Nm (M6)

#### ● Electrical characteristics (at T<sub>j</sub> = 25°C unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage collector current	I <sub>CEs</sub>	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 1700V	-	-	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	-	2.70	2.90	V
			T <sub>j</sub> =125°C	-	3.10	-	
	V <sub>CE(sat)</sub> (chip)		T <sub>j</sub> =25°C	-	2.30	2.45	
			T <sub>j</sub> =125°C	-	2.65	-	
Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz	-	28	-	nF	
Turn-on time	t <sub>on</sub>	V <sub>CC</sub> = 900V	-	0.62	1.20	μs	
	t <sub>r</sub>	I <sub>c</sub> = 300A	-	0.39	0.60		
	t <sub>r(i)</sub>	V <sub>GE</sub> = ±15V	-	0.05	-		
Turn-off time	t <sub>off</sub>	R <sub>G</sub> = 1.5Ω	-	0.55	1.50	μs	
	t <sub>f</sub>		-	0.09	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	-	2.10	2.40	V
			T <sub>j</sub> =125°C	-	2.30	-	
	V <sub>F</sub> (chip)		T <sub>j</sub> =25°C	-	1.80	1.95	
			T <sub>j</sub> =125°C	-	2.00	-	
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 300A	-	0.18	0.6	μs	
Lead resistance, terminal-chip (*5)	R <sub>lead</sub>		-	1.00	-	mΩ	
Thermistor Resistance	R	T=25°C	-	5000	-	Ω	
		T=100°C	465	495	520		
		T=25/50°C	3305	3375	3450		
B value	B					K	

Note \*5: Biggest internal terminal resistance among arm.

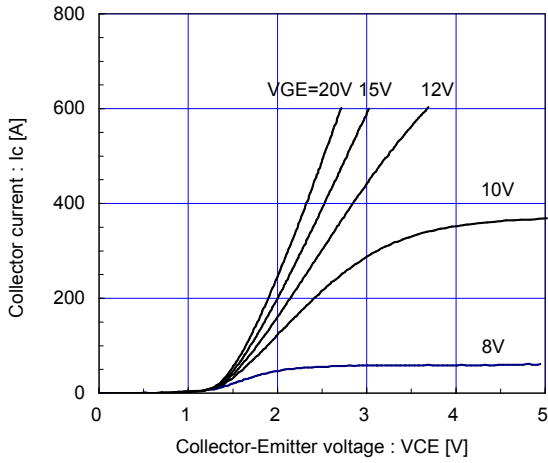
#### ● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R <sub>th(j-c)</sub>	IGBT	-	-	0.09	°C/W
		FWD	-	-	0.15	
Contact thermal resistance (1device) (*6)	R <sub>th(c-f)</sub>	with Thermal Compound	-	0.0167	-	

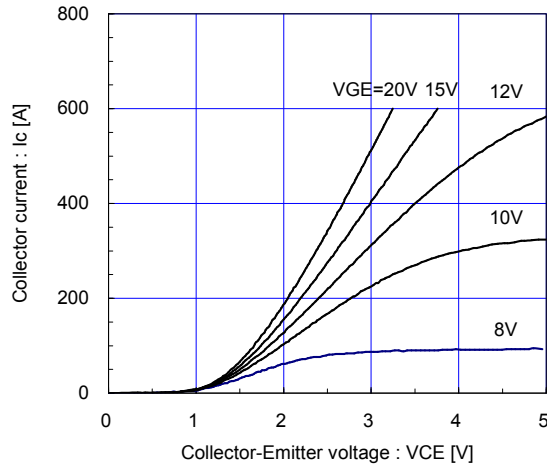
Note \*6: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

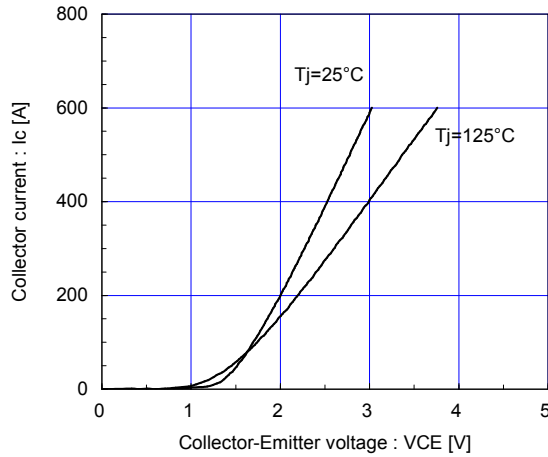
Collector current vs. Collector-Emittor voltage (typ.)  
Tj= 25°C / chip



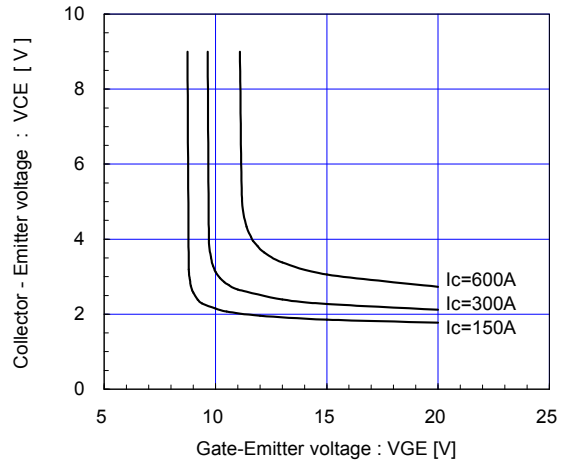
Collector current vs. Collector-Emittor voltage (typ.)  
Tj= 125°C / chip



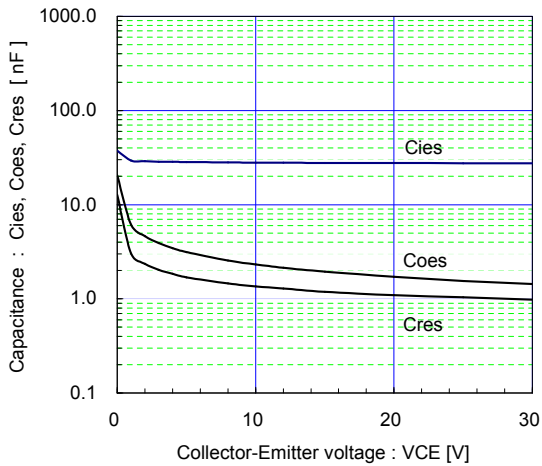
Collector current vs. Collector-Emittor voltage (typ.)  
VGE=15V / chip



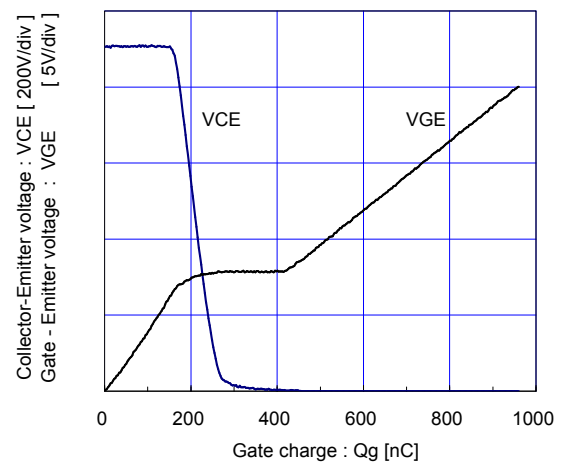
Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)  
Tj=25°C / chip



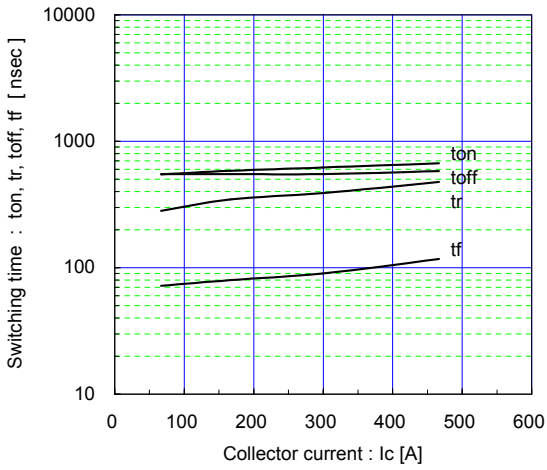
Capacitance vs. Collector-Emittor voltage (typ.)  
VGE=0V, f= 1MHz, Tj= 25°C



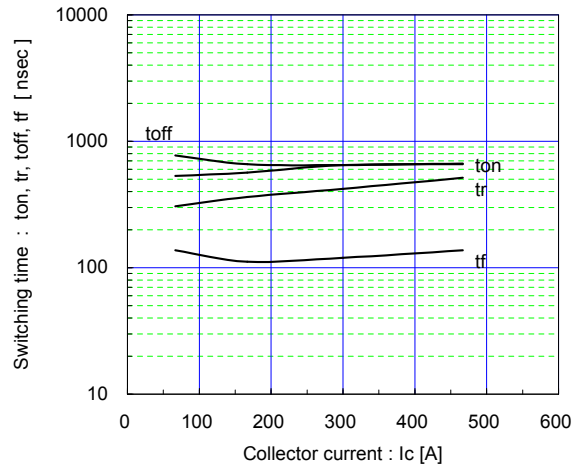
Dynamic Gate charge (typ.)  
Vcc=900V, Ic=300A, Tj= 25°C



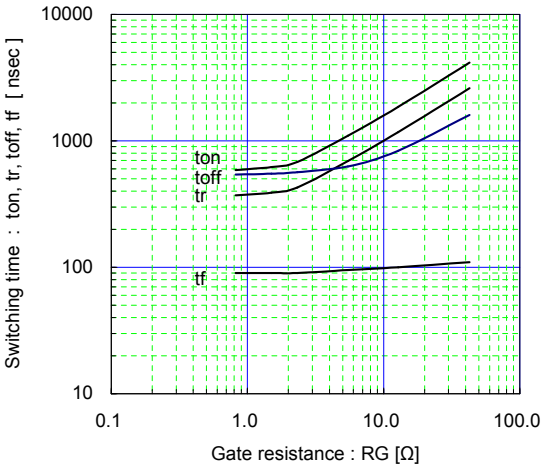
Switching time vs. Collector current (typ.)  
 $V_{cc}=900V, V_{GE}=\pm 15V, R_g=1.5\Omega, T_j=25^\circ C$



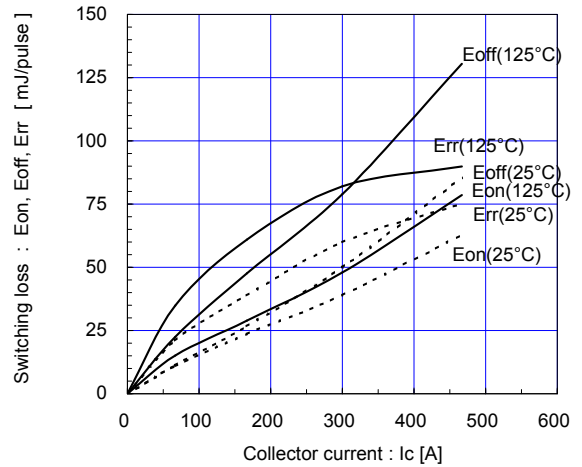
Switching time vs. Collector current (typ.)  
 $V_{cc}=900V, V_{GE}=\pm 15V, R_g=1.5\Omega, T_j=125^\circ C$



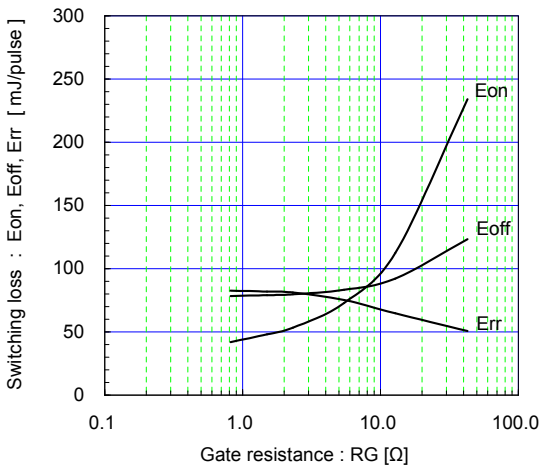
Switching time vs. Gate resistance (typ.)  
 $V_{cc}=900V, I_c=300A, V_{GE}=\pm 15V, T_j=25^\circ C$



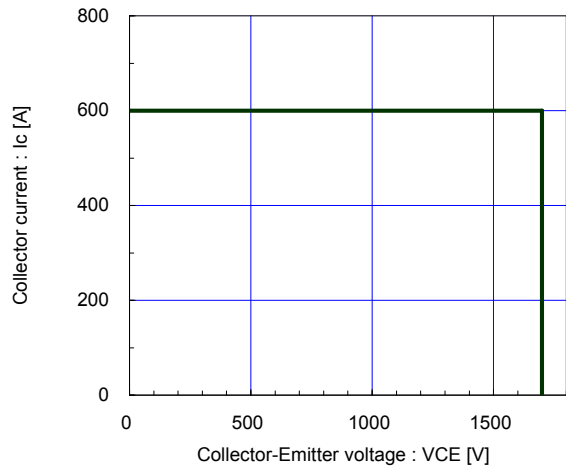
Switching loss vs. Collector current (typ.)  
 $V_{cc}=900V, V_{GE}=\pm 15V, R_g=1.5\Omega$



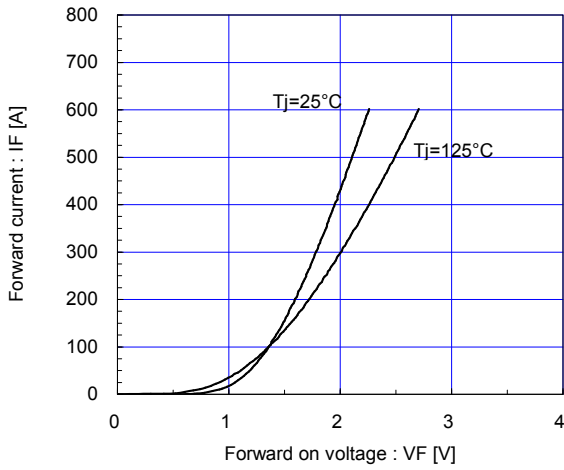
Switching loss vs. Gate resistance (typ.)  
 $V_{cc}=900V, I_c=300A, V_{GE}=\pm 15V, T_j=125^\circ C$



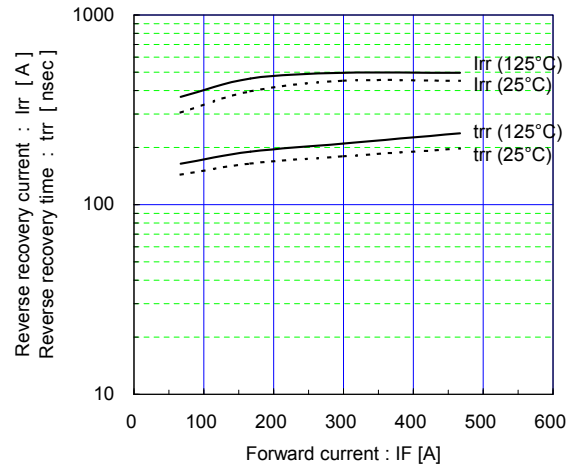
Reverse bias safe operating area (max.)  
 $+V_{GE}=15V, -V_{GE} \le 15V, R_g \ge 1.5\Omega, T_j \le 125^\circ C$   
 Stray inductance  $\le 100nH$



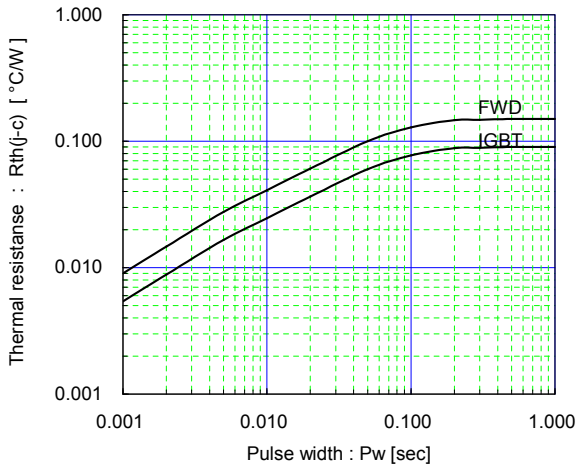
Forward current vs. Forward on voltage (typ.)  
chip



Reverse recovery characteristics (typ.)  
Vcc=900V, VGE=±15V, Rg=1.5Ω

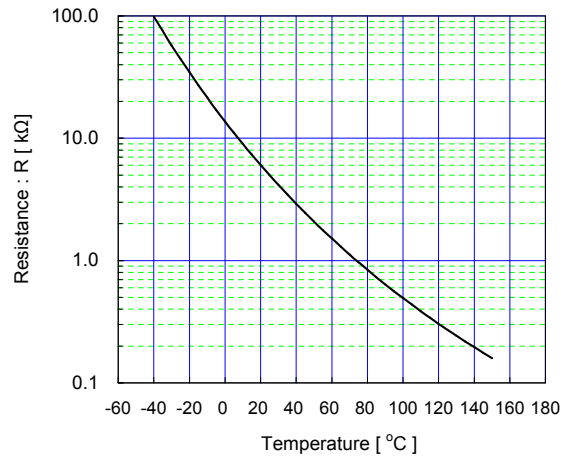


Transient thermal resistance (max.)

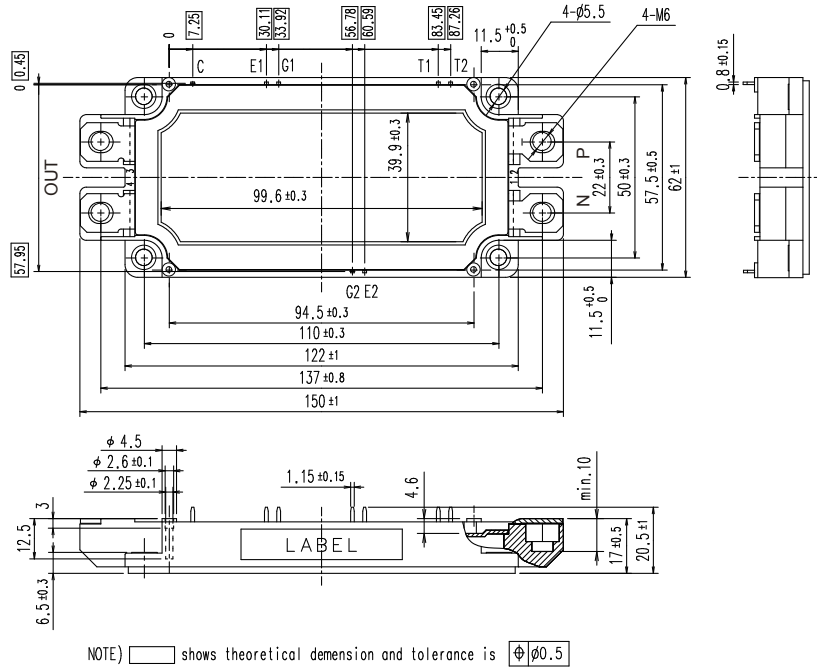


[ Thermistor ]

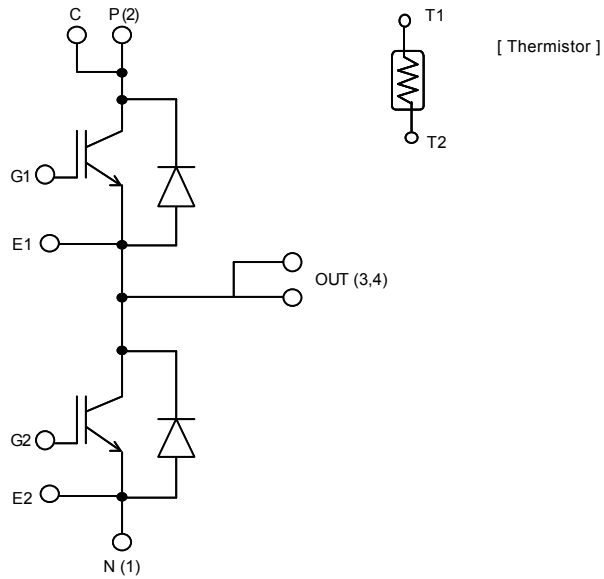
Temperature characteristic (typ.)



Outline Drawings, mm



Equivalent Circuit Schematic



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