

2MBI450U4N-170-50

IGBT Modules

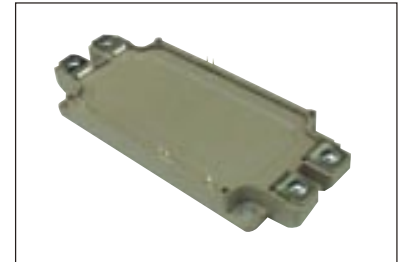
IGBT MODULE (U series) 1700V / 450A / 2 in one package

■ 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 _{CEs}		1700	V	
Gate-Emitter voltage	V _{GES}		±20	V	
Collector current	I _c	Continuous	T _c =25°C	600	A
			T _c =80°C	450	
	I _{cp}	1ms	T _c =25°C	1200	
			T _c =80°C	900	
	-I _c			450	
-I _c pulse	1ms		900		
Collector power dissipation	P _c	1 device	2080	W	
Junction temperature	T _j		150	°C	
Storage temperature	T _{stg}		-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_j = 25°C unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage collector current	I _{CEs}	V _{GE} = 0V, V _{CE} = 1700V	-	-	3.0	mA	
Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V	-	-	600	nA	
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V, I _c = 450mA	4.5	6.5	8.5	V	
Collector-Emitter saturation voltage	V _{CE(sat)} (terminal)	V _{GE} = 15V I _c = 450A	T _j =25°C	-	2.80	3.05	V
			T _j =125°C	-	3.20	-	
	V _{CE(sat)} (chip)	T _j =25°C	-	2.25	2.45		
		T _j =125°C	-	2.65	-		
Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	-	42	-	nF	
Turn-on time	t _{on}	V _{CC} = 900V	-	0.62	1.20	μs	
	t _r	I _c = 450A	-	0.39	0.60		
	t _{r(i)}	V _{GE} = ±15V	-	0.05	-		
Turn-off time	t _{off}	R _G = 1.1Ω	-	0.55	1.50	μs	
	t _f		-	0.09	0.30		
Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 450A	T _j =25°C	-	2.25	2.55	V
			T _j =125°C	-	2.45	-	
	V _F (chip)	T _j =25°C	-	1.80	1.95		
		T _j =125°C	-	2.00	-		
Reverse recovery time	t _{rr}	I _F = 450A	-	0.18	0.6	μs	
Lead resistance, terminal-chip (*5)	R _{lead}		-	1.00	-	mΩ	
Thermistor Resistance	R	T=25°C	-	5000	-	Ω	
		T=100°C	465	495	520		
		T=25/50°C	3305	3375	3450		

Note *5: Biggest internal terminal resistance among arm.

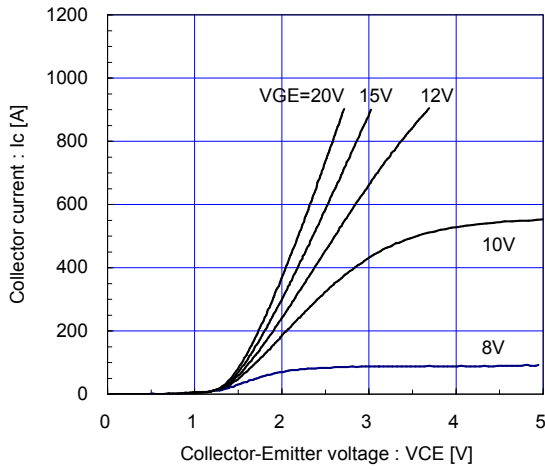
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	IGBT	-	-	0.06	°C/W
		FWD	-	-	0.10	
Contact thermal resistance (1device) (*6)	R _{th(c-f)}	with Thermal Compound	-	0.0167	-	

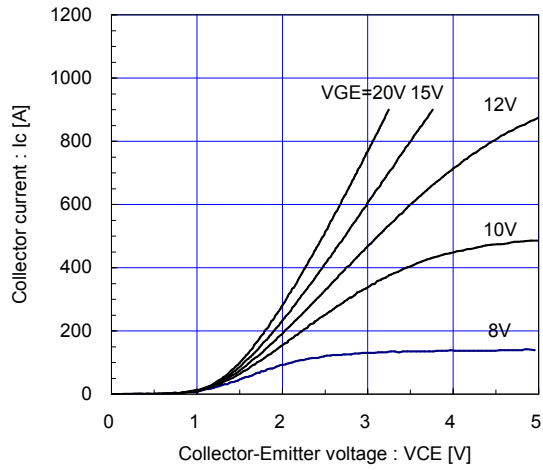
Note *6: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

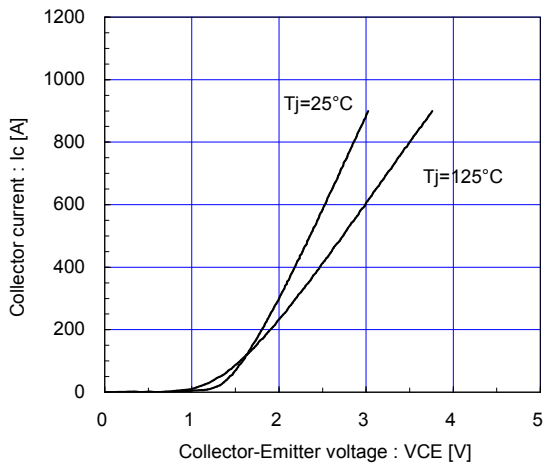
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



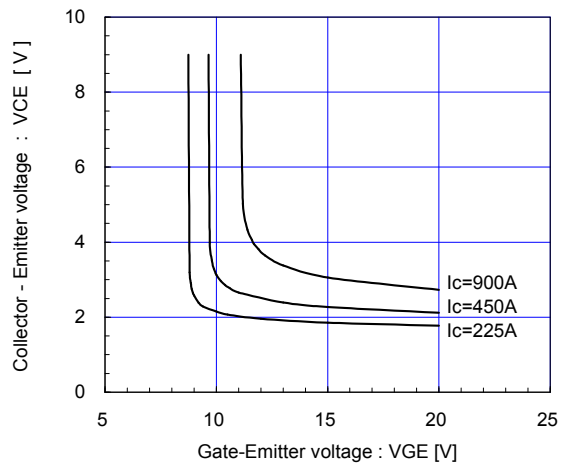
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 125°C / chip



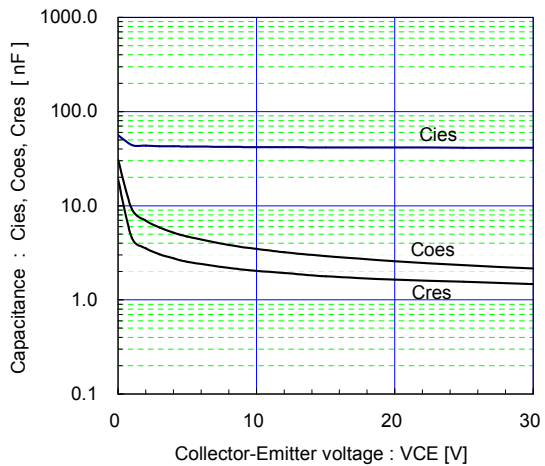
Collector current vs. Collector-Emitter voltage (typ.)
VGE=15V / chip



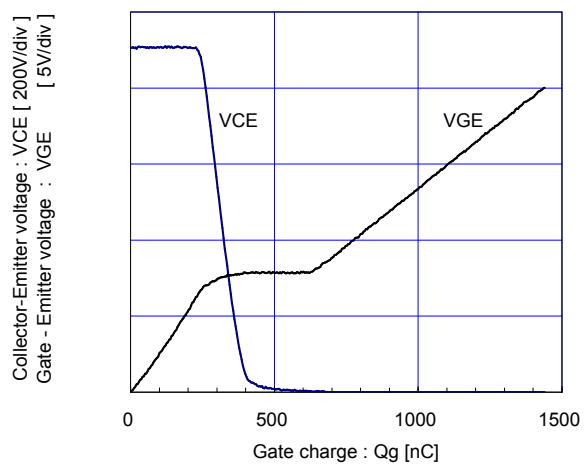
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj=25°C / chip



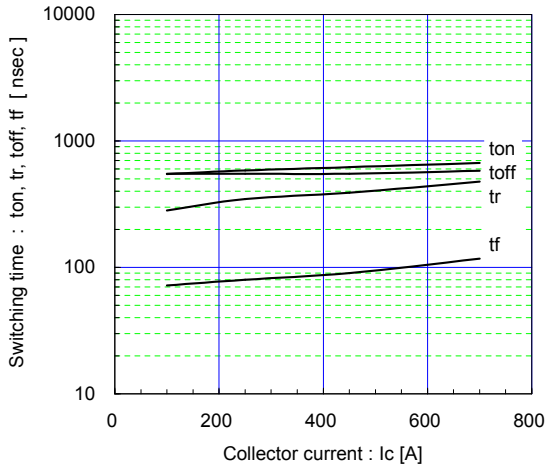
Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25°C



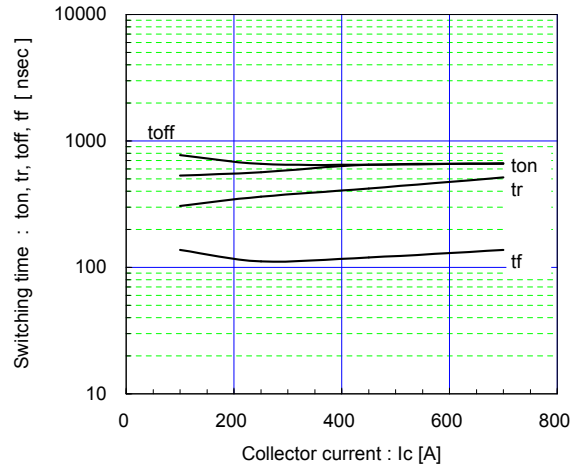
Dynamic Gate charge (typ.)
Vcc=900V, Ic=450A, Tj= 25°C



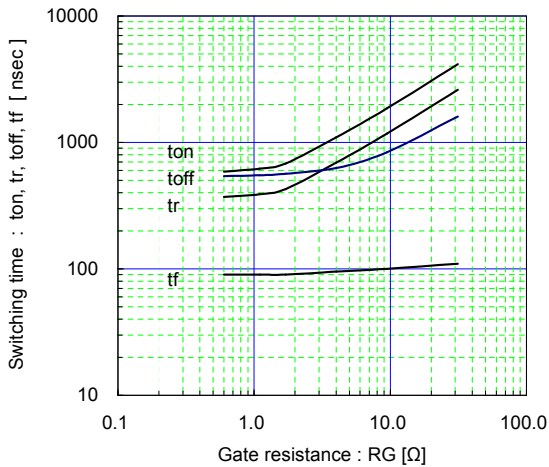
Switching time vs. Collector current (typ.)
 $V_{cc}=900V, V_{GE}=\pm 15V, R_g=1.1\Omega, T_j=25^\circ C$



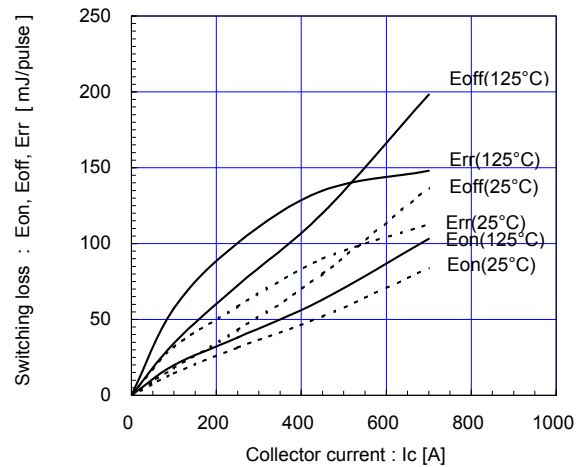
Switching time vs. Collector current (typ.)
 $V_{cc}=900V, V_{GE}=\pm 15V, R_g=1.1\Omega, T_j=125^\circ C$



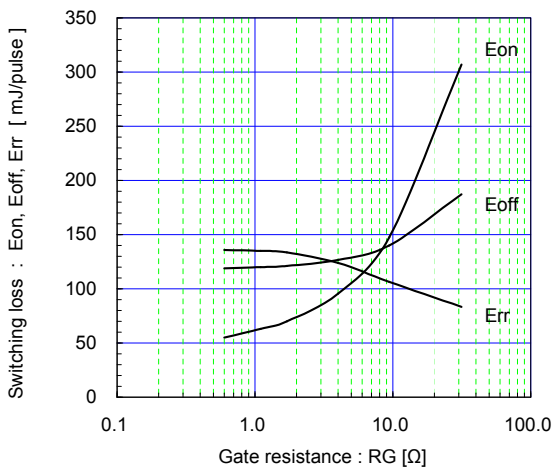
Switching time vs. Gate resistance (typ.)
 $V_{cc}=900V, I_c=450A, V_{GE}=\pm 15V, T_j=25^\circ C$



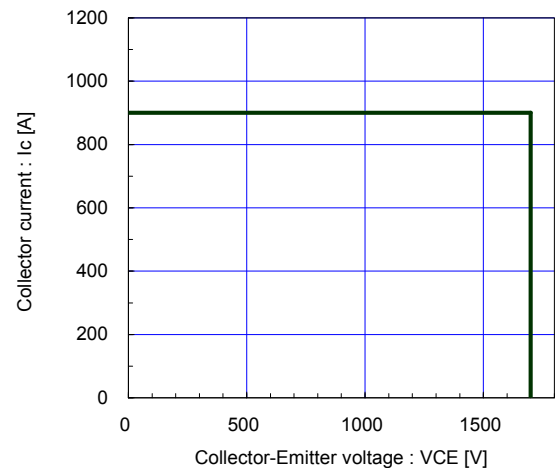
Switching loss vs. Collector current (typ.)
 $V_{cc}=900V, V_{GE}=\pm 15V, R_g=1.1\Omega$



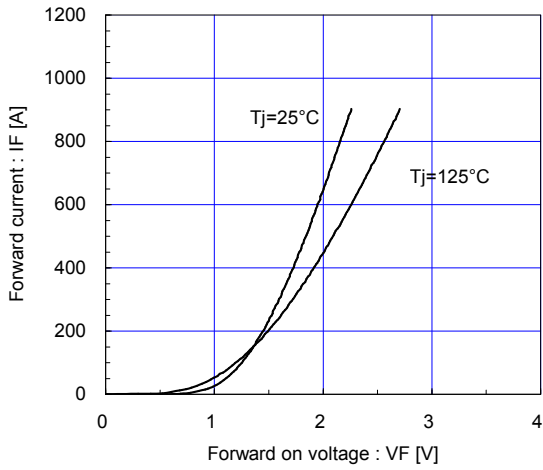
Switching loss vs. Gate resistance (typ.)
 $V_{cc}=900V, I_c=450A, V_{GE}=\pm 15V, T_j=125^\circ C$



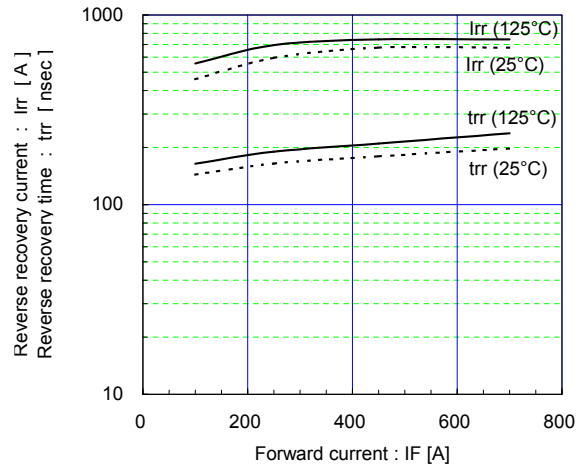
Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE} \le 15V, R_g \ge 1.1\Omega, T_j \le 125^\circ C$
 Stray inductance $\le 100nH$



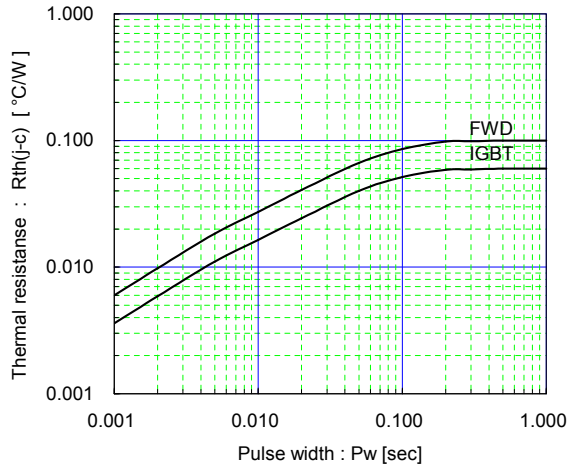
Forward current vs. Forward on voltage (typ.)
chip



Reverse recovery characteristics (typ.)
Vcc=900V, VGE=±15V, Rg=1.1Ω

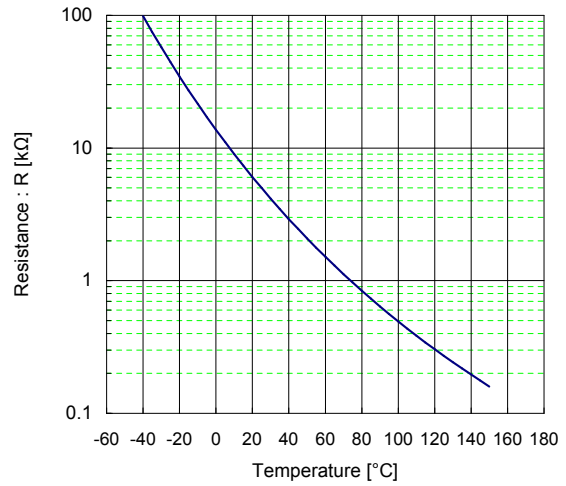


Transient thermal resistance (max.)

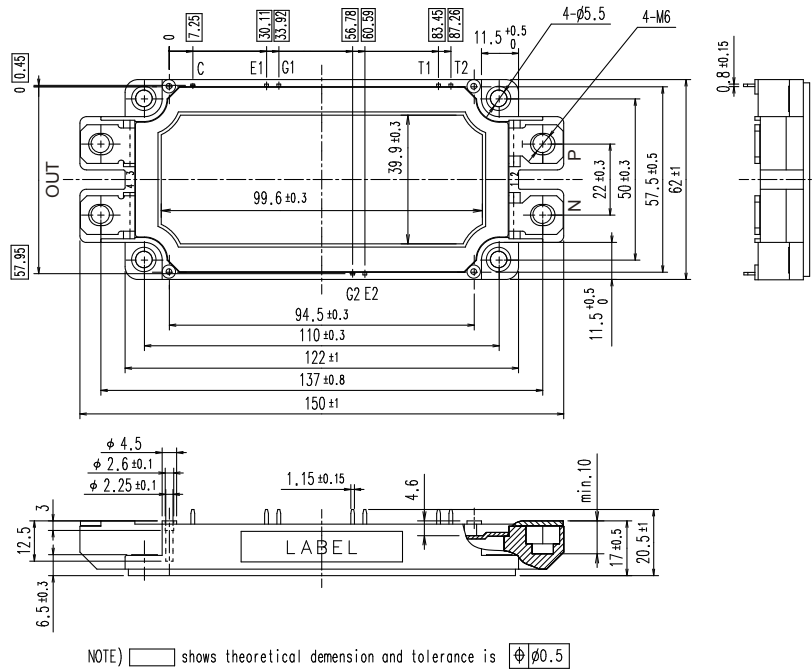


[Thermistor]

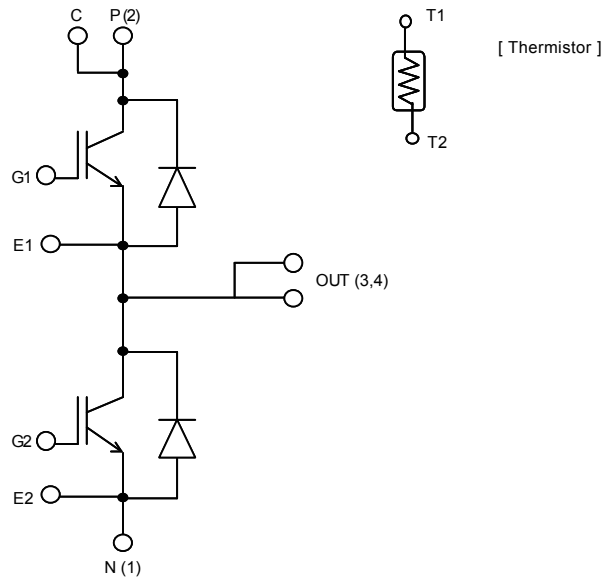
Temperature characteristic (typ.)



Outline Drawings, mm



Equivalent Circuit Schematic



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