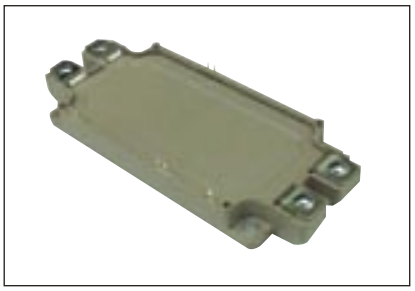
2MBI450U4N-170-50

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		Ic	Continuous	Tc=25°C	600	A
				Tc=80°C	450	
		Icp	1ms	Tc=25°C	1200	
				Tc=80°C	900	
		-Ic			450	
		-Ic pulse	1ms		900	
Collector power dissipation		Pc	1 device		2080	W
Junction temperature		Tj			150	°C
Storage temperature		Tstg			-40 to +125	
Isolation voltage	between terminal and copper base (*1)	V_{iso}	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 Tj= 25°C unless otherwise specified)

Items		Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
Inverter	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	Tj=25°C	-	2.80	3.05	V
				Tj=125°C	-	3.20	-	
		$V_{CE\ (sat)}$ (chip)		Tj=25°C	-	2.25	2.45	
				Tj=125°C	-	2.65	-	
	Input capacitance	Cies	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	42	-	nF
	Turn-on time	ton	V_{CC} = 900V, I_C = 450A, V_{GE} = ±15V, R_G = 1.1Ω		-	0.62	1.20	µs
		tr			-	0.39	0.60	
		tr (i)			-	0.05	-	
	Turn-off time	toff			-	0.55	1.50	
		tf			-	0.09	0.30	
	Forward on voltage	V_F (terminal)	V_{GE} = 0V, I_F = 450A	Tj=25°C	-	2.25	2.55	V
				Tj=125°C	-	2.45	-	
		V_F (chip)		Tj=25°C	-	1.80	1.95	
				Tj=125°C	-	2.00	-	
	Reverse recovery time	trr	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	
	B value	B	T=25/50°C		3305	3375	3450	K

Note *5: Biggest internal terminal resistance among arm.

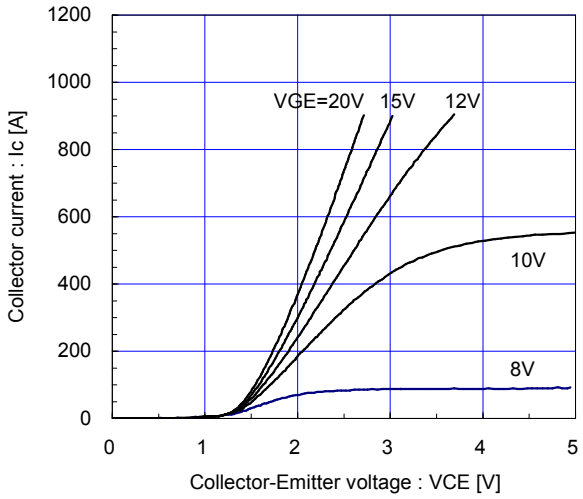
● Thermal resistance characteristics

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

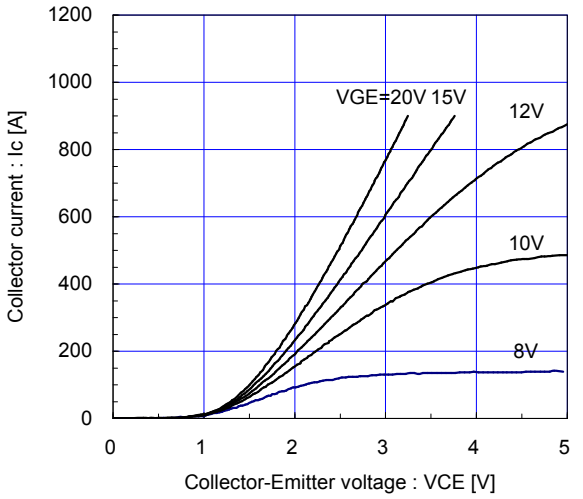
Note *6: This is the value which is defined mounting on the additional cooling fin with thermal compound.

Characteristics (Representative)

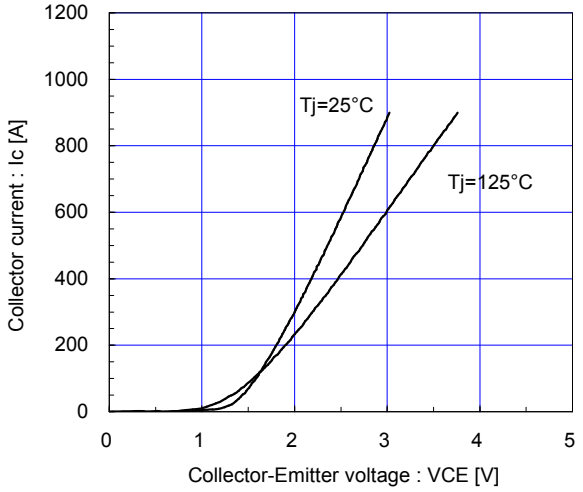
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



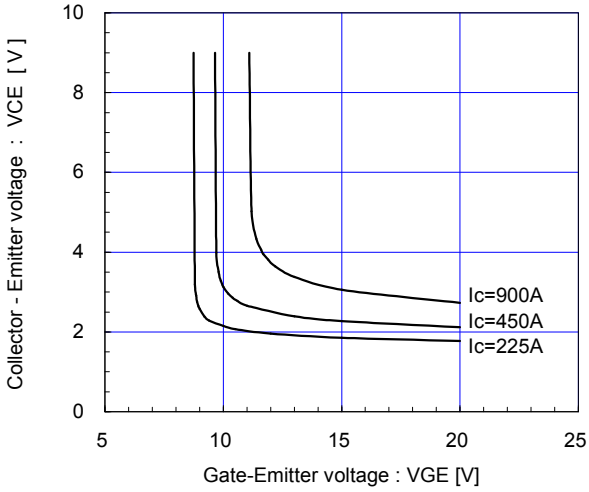
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 125°C/ chip



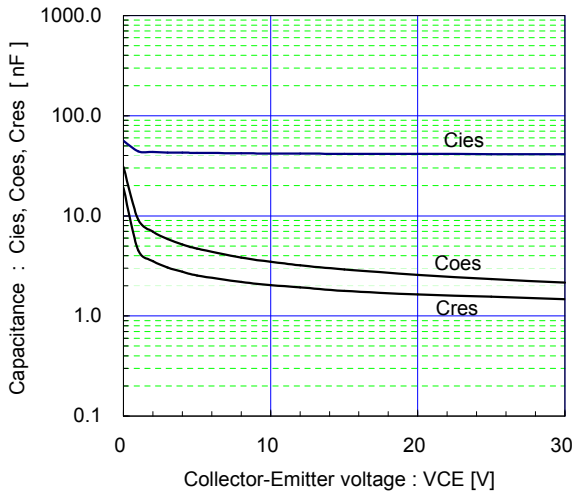
Collector current vs. Collector-Emitter voltage (typ.)
VGE=15V / chip



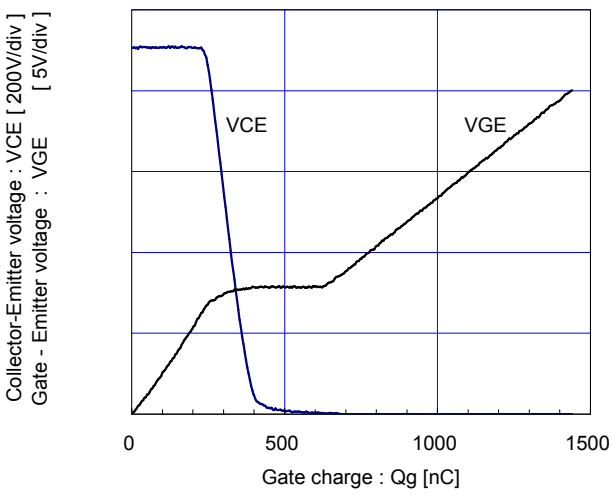
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj=25°C / chip



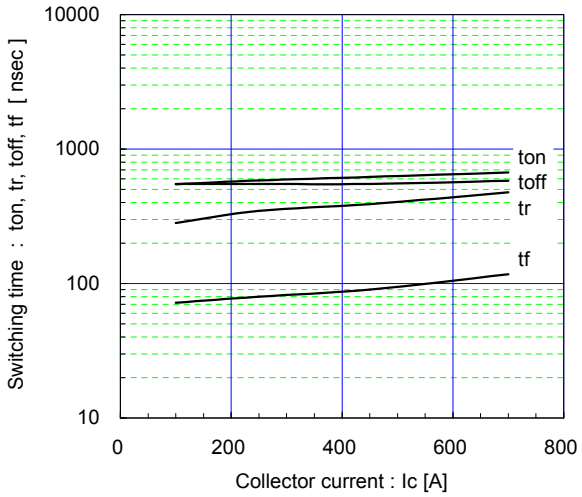
Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25°C



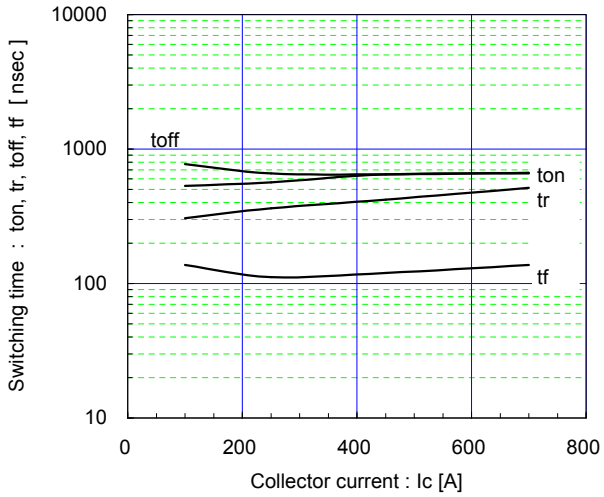
Dynamic Gate charge (typ.)
Vcc=900V, Ic=450A, Tj= 25°C



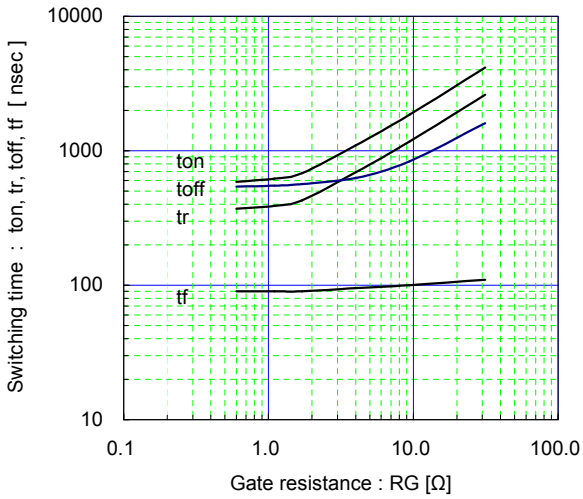
Switching time vs. Collector current (typ.)
Vcc=900V, VGE=±15V, Rg=1.1Ω, Tj= 25°C



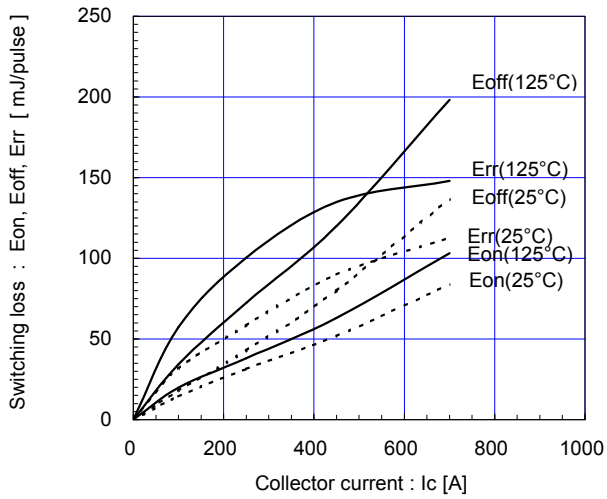
Switching time vs. Collector current (typ.)
Vcc=900V, VGE=±15V, Rg=1.1Ω, Tj=125°C



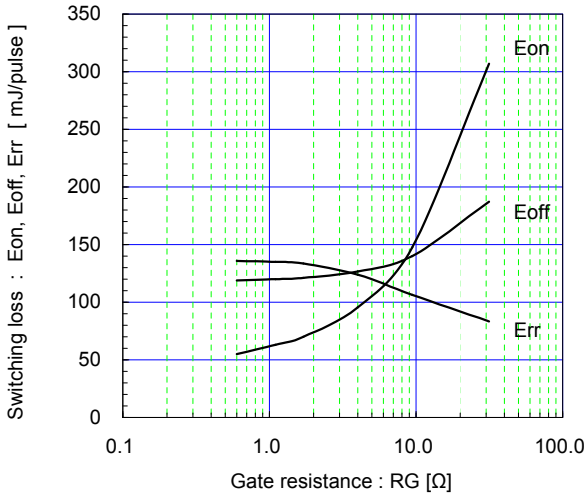
Switching time vs. Gate resistance (typ.)
Vcc=900V, Ic=450A, VGE=±15V, Tj= 25°C



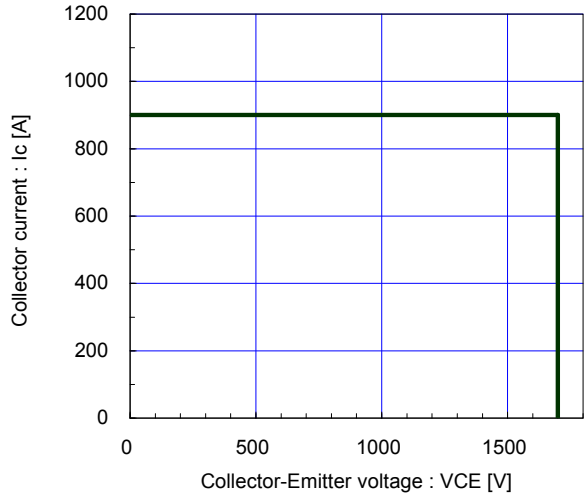
Switching loss vs. Collector current (typ.)
Vcc=900V, VGE=±15V, Rg=1.1Ω



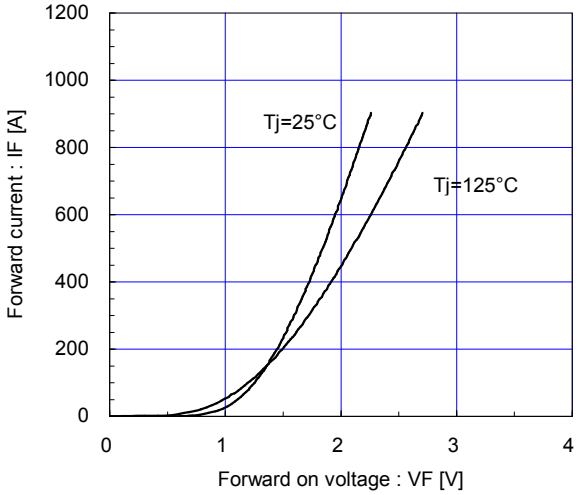
Switching loss vs. Gate resistance (typ.)
Vcc=900V, Ic=450A, VGE=±15V, Tj= 125°C



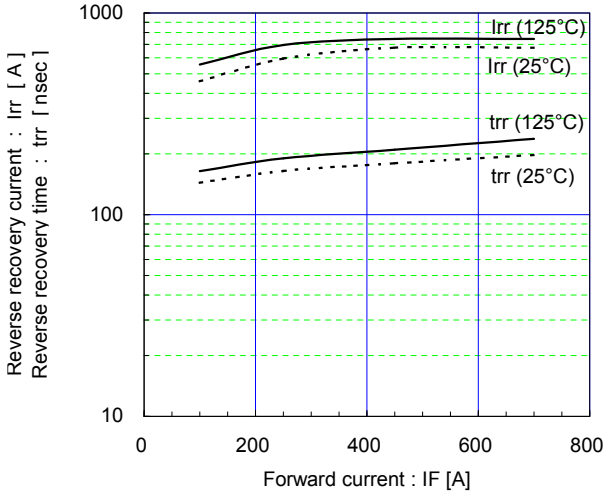
Reverse bias safe operating area (max.)
+VGE=15V,-VGE <= 15V, RG >= 1.1Ω ,Tj <= 125°C
Stray inductance <= 100nH



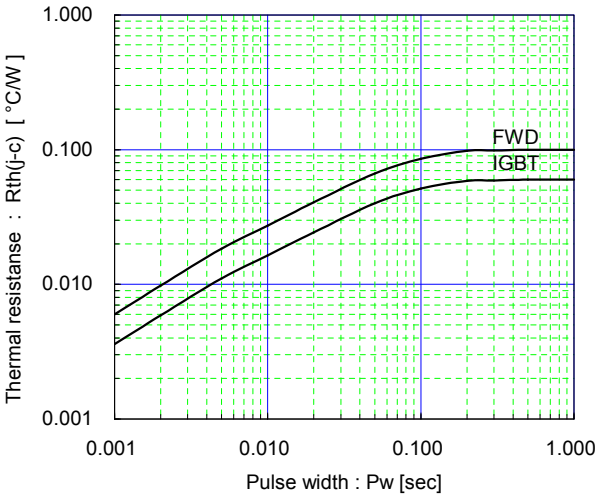
Forward current vs. Forward on voltage (typ.)
chip



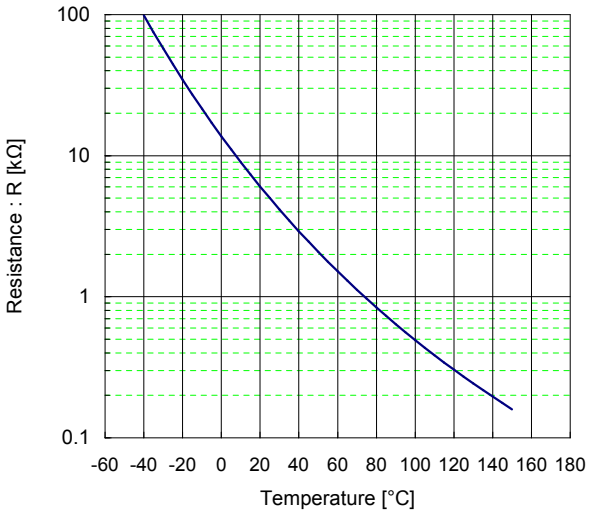
Reverse recovery characteristics (typ.)
Vcc=900V, VGE=±15V, Rg=1.1Ω



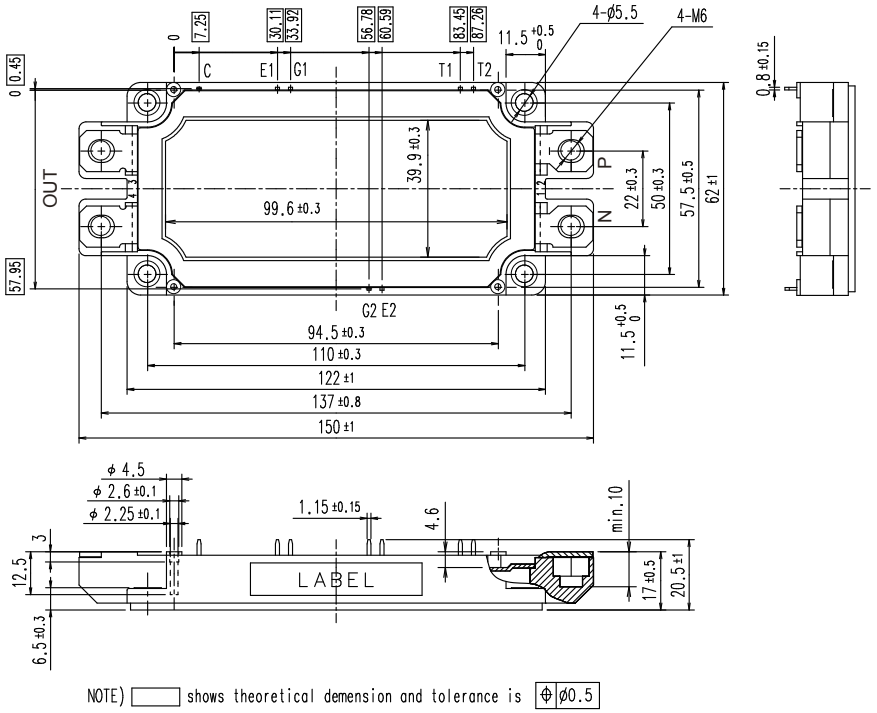
Transient thermal resistance (max.)



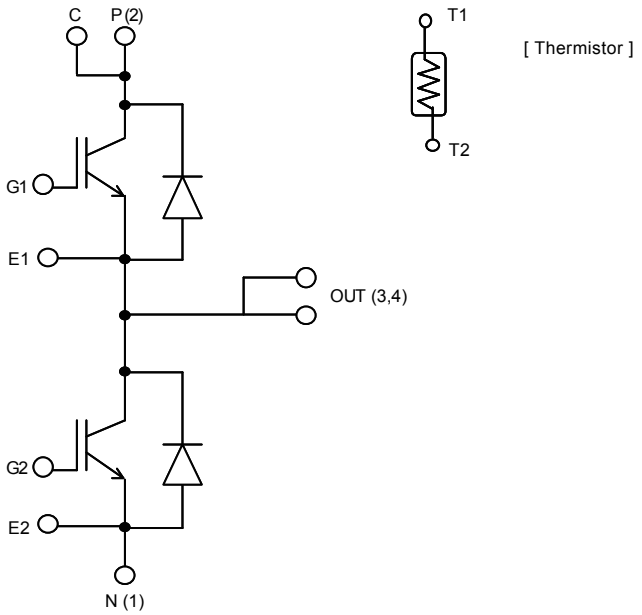
[Thermistor]
Temperature characteristic (typ.)



■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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