

6MBI300V-120-50

IGBT Modules

IGBT MODULE (V series) 1200V / 300A / 6 in one package

■ Features

- Compact Package
- P.C.Board Mount
- Low $V_{CE(sat)}$

■ 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 $T_c=25^\circ\text{C}$ unless otherwise specified)

Items		Symbols	Conditions		Maximum ratings	Units
Inverter	Collector-Emitter voltage	V_{CES}			1200	V
	Gate-Emitter voltage	V_{GES}			± 20	V
	Collector current	I_c	Continuous	$T_c=80^\circ\text{C}$	300	A
		I_{cp}	1ms	$T_c=80^\circ\text{C}$	600	
		$-I_c$			300	
		$-I_c$ pulse	1ms		600	
Collector power dissipation	P_c	1 device		1600	W	
Junction temperature		T_j			175	$^\circ\text{C}$
Operation temperature		T_{op}			150	
Storage temperature		T_{stg}			-40 to +125	
Isolation voltage	between terminal and copper base (*1) between thermistor and others (*2)	V_{iso}	AC : 1min.		2500	VAC
Screw torque	Mounting (*3)	-			3.5	N m
	Terminals (*4)	-			4.5	

Note *1: All terminals should be connected together during the test.

Note *2: Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.

Note *3: Recommendable value : 2.5-3.5 Nm (M5)

Note *4: Recommendable value : 3.5-4.5 Nm (M6)

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

Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage collector current	I_{CES}	$V_{GE} = 0V, V_{CE} = 1200V$	-	-	3.0	mA	
Gate-Emitter leakage current	I_{GES}	$V_{GE} = 0V, V_{CE} = \pm 20V$	-	-	600	nA	
Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_c = 300mA$	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_c = 300A$	Tj=25°C	-	2.20	2.65	V
			Tj=125°C	-	2.50	-	
			Tj=150°C	-	2.55	-	
	$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_c = 300A$	Tj=25°C	-	1.75	2.20	
			Tj=125°C	-	2.05	-	
			Tj=150°C	-	2.10	-	
Input capacitance	C_{ies}	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	-	27	-	nF	
Turn-on time	t_{on}	$V_{CC} = 600V$ $I_c = 300A$ $V_{GE} = +15V$ $R_G = 0.93\Omega$	-	550	1200	μs	
	t_r		-	180	600		
	$t_r(i)$		-	120	-		
Turn-off time	t_{off}	$V_{GE} = +15V$ $R_G = 0.93\Omega$	-	1050	2000	μs	
	t_f		-	110	350		
Forward on voltage	V_F (terminal)	$V_{GE} = 0V$ $I_F = 300A$	Tj=25°C	-	2.15	2.60	V
			Tj=125°C	-	2.30	-	
			Tj=150°C	-	2.25	-	
	V_F (chip)	$V_{GE} = 0V$ $I_F = 300A$	Tj=25°C	-	1.70	2.15	
			Tj=125°C	-	1.85	-	
			Tj=150°C	-	1.80	-	
Reverse recovery time	t_{rr}	$I_F = 300A$	-	200	600	μs	
Resistance	R	T = 25°C	-	5000	-	Ω	
		T = 100°C	465	495	520		
B value	B	T = 25 / 50°C	3305	3375	3450	K	

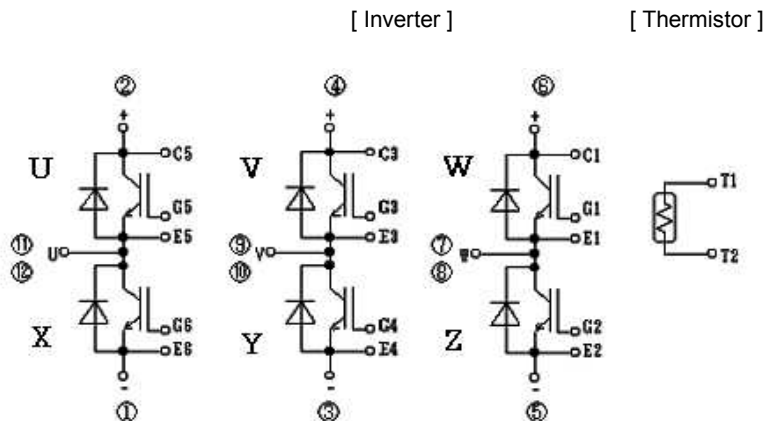
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)(*5)	Rth(j-c)	Inverter IGBT	-	-	0.094	°C/W
		Inverter FWD	-	-	0.150	
Contact thermal resistance (1device) (*6)	Rth(c-f)	with Thermal Compound	-	0.0167	-	

Note *5: This value is including margins. This will be revised in future.

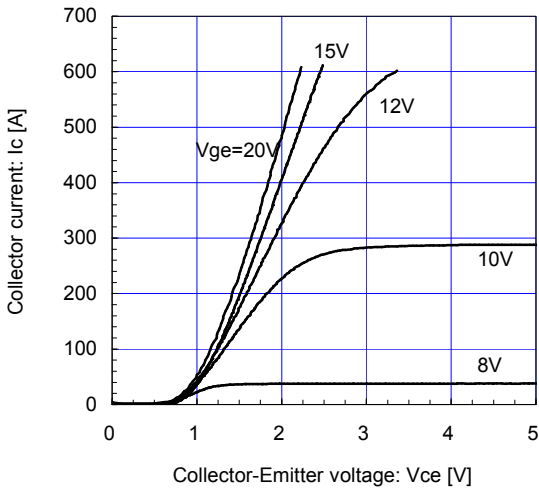
Note *6: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Equivalent Circuit Schematic

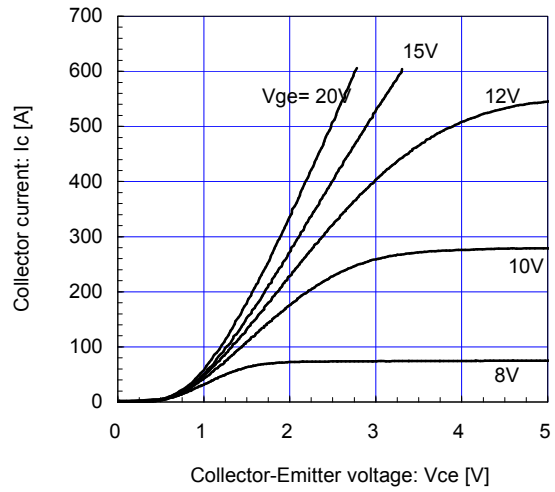


■ Characteristics (Representative)

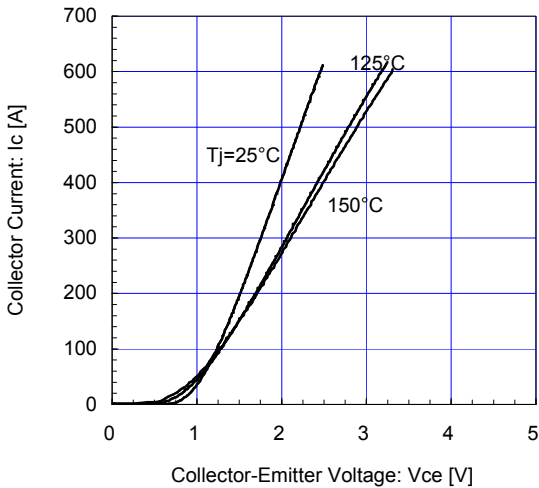
[INVERTER]
Collector current vs. Collector-Emmitter voltage (typ.)
T_j= 25°C / chip



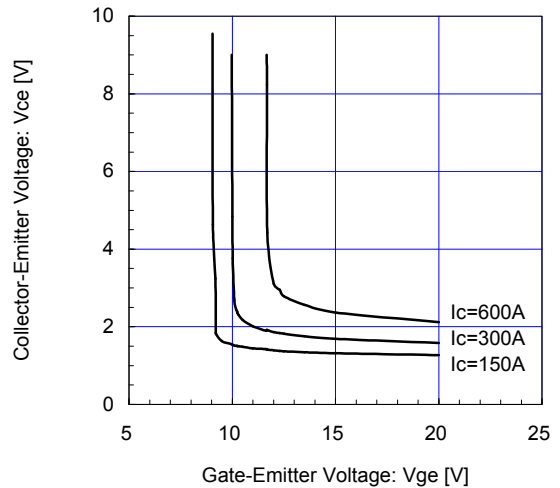
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Collector current vs. Collector-Emmitter voltage (typ.)
T_j= 150°C / chip



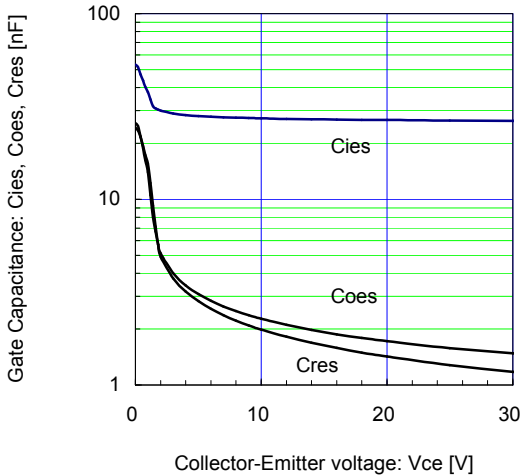
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Collector current vs. Collector-Emmitter voltage (typ.)
V_{ge}= 15V / chip



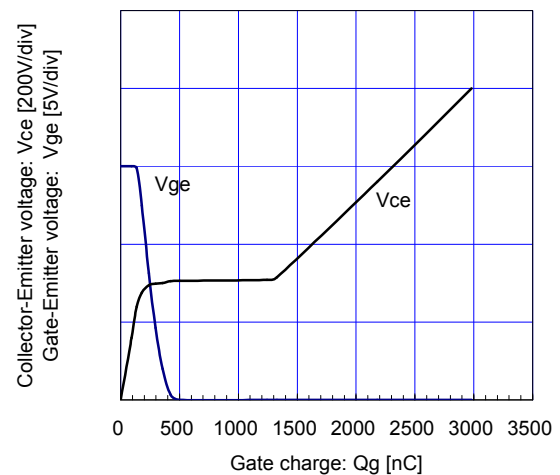
[INVERTER]
Collector-Emmitter voltage vs. Gate-Emmitter voltage (typ.)
T_j= 25°C / chip



[INVERTER]
Gate Capacitance vs. Collector-Emmitter Voltage (typ.)
V_{ge}= 0V, f= 1MHz, T_j= 25°C

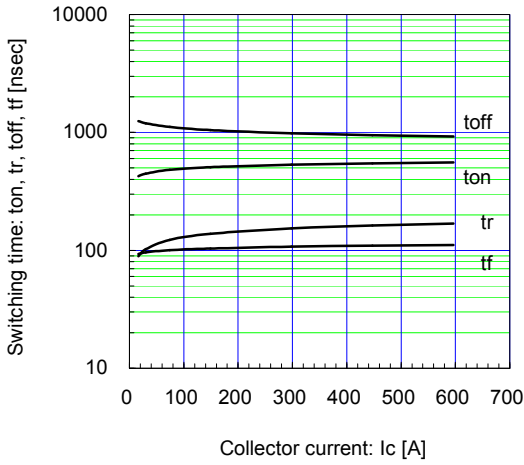


[INVERTER]
Dynamic Gate Charge (typ.)
V_{cc}=600V, I_c=300A, T_j= 25°C



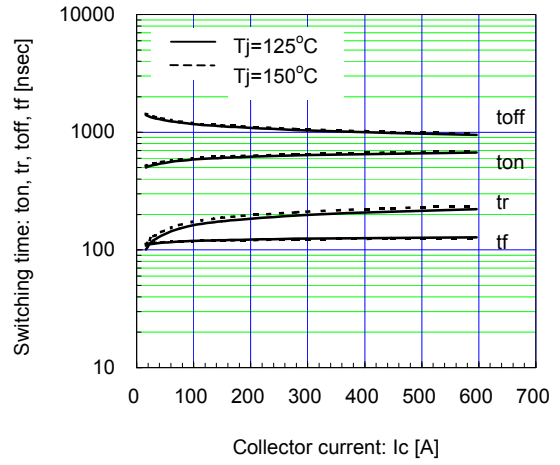
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{cc}=600V, V_{ge}=\pm 15V, R_g=0.93\Omega, T_j=25^\circ C$



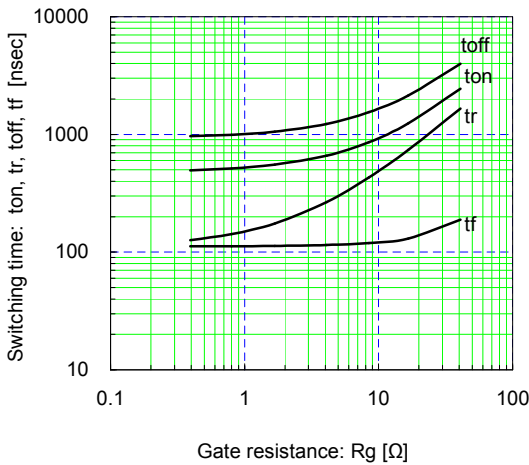
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{cc}=600V, V_{ge}=\pm 15V, R_g=0.93\Omega, T_j=125^\circ C, 150^\circ C$



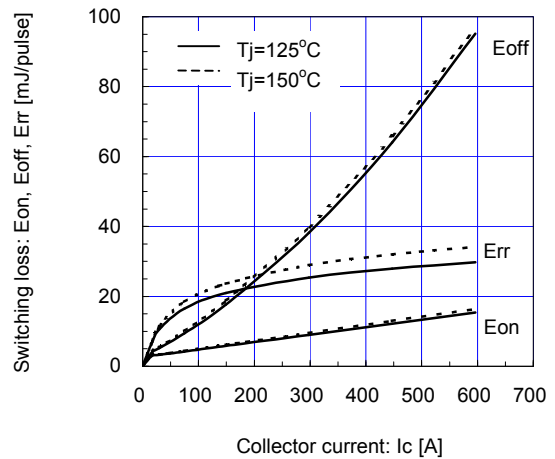
[INVERTER]

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



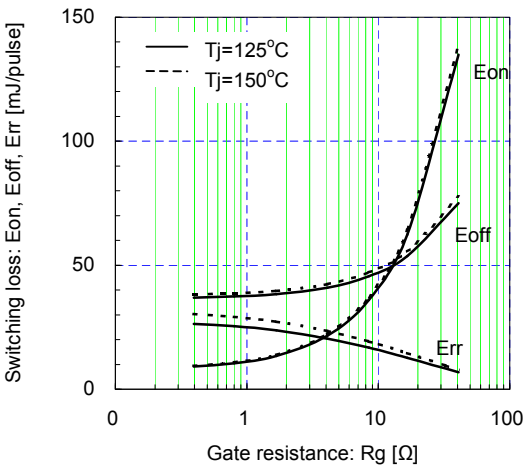
[INVERTER]

Switching loss vs. Collector current (typ.)
 $V_{cc}=600, V_{ge}=\pm 15V, R_g=0.93\Omega, T_j=125^\circ C, 150^\circ C$



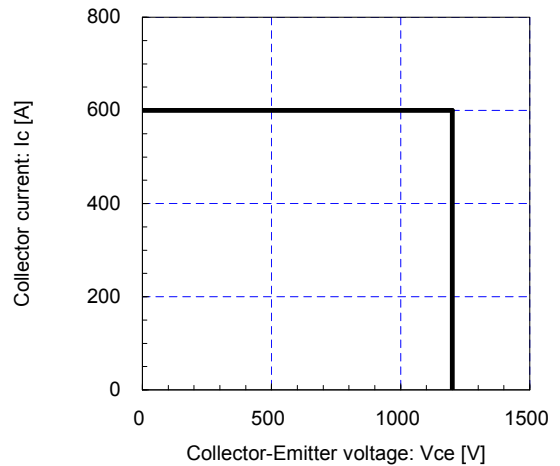
[INVERTER]

Switching loss vs. Gate resistance (typ.)
 $V_{cc}=600V, I_c=300A, V_{ge}=\pm 15V, T_j=125^\circ C, 150^\circ C$



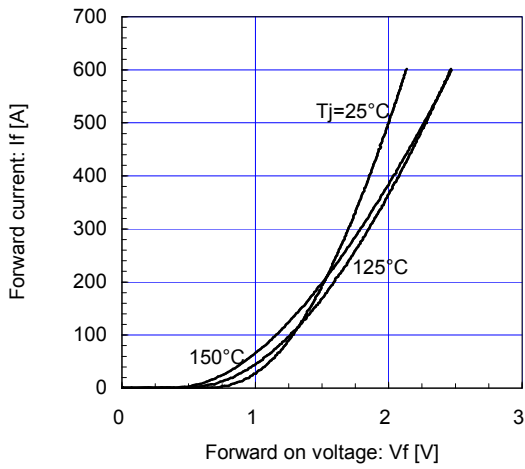
[INVERTER]

Reverse bias safe operating area (max.)
 $+V_{ge}=15V, -V_{ge}\le 15V, R_g\ge 0.93\Omega, T_j=150^\circ C$



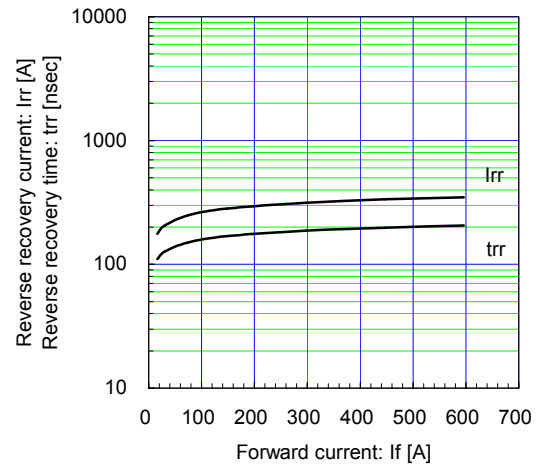
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip



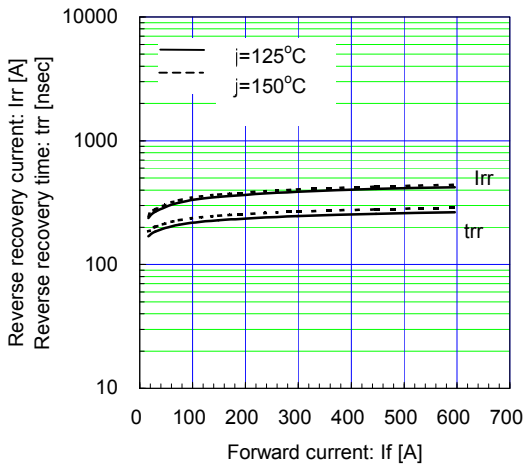
[INVERTER]

Reverse Recovery Characteristics (typ.)
Vcc=600V, Vge=±15V, Rg=0.93Ω, Tj=25°C

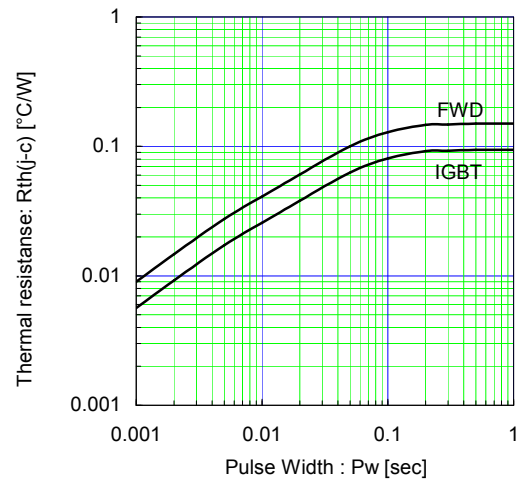


[INVERTER]

Reverse Recovery Characteristics (typ.)
Vcc=600V, Vge=±15V, Rg=0.93Ω, Tj=125°C, 150°C

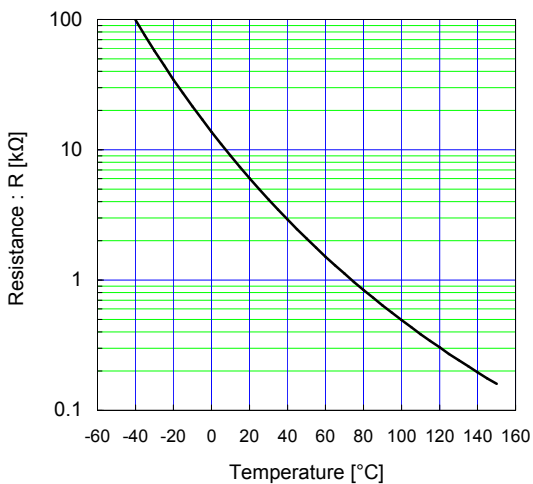


Transient Thermal Resistance (max.)

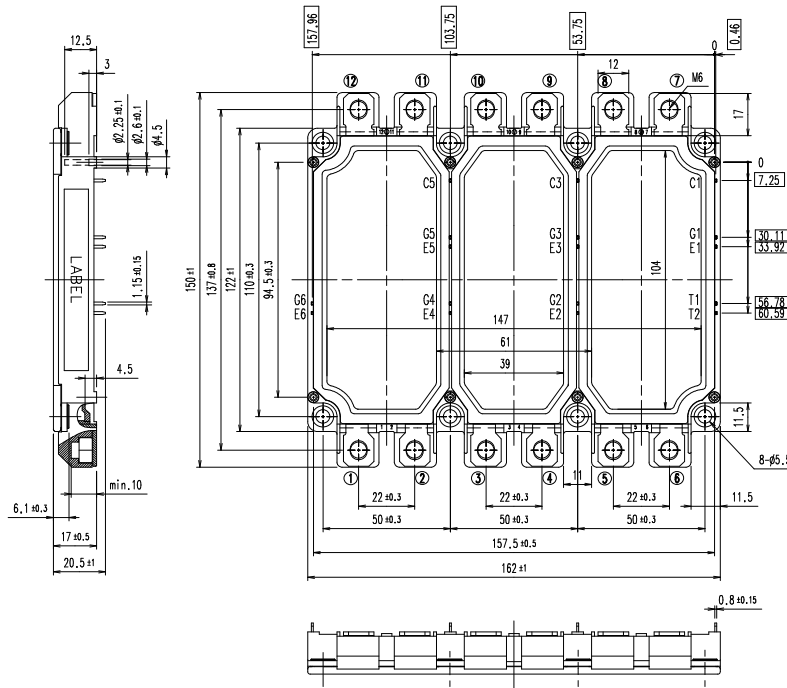


[THERMISTOR]

Temperature characteristic (typ.)



■ Outline Drawings, mm



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