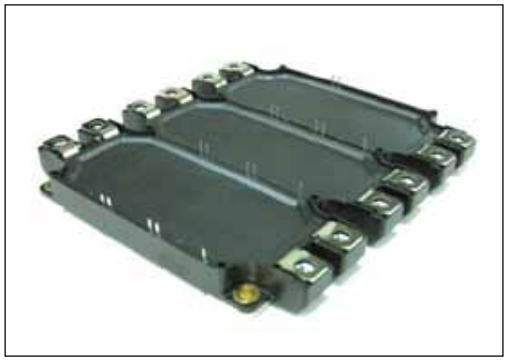
6MBI450V-120-50

IGBT Modules

IGBT MODULE (V series)
1200V / 450A / 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 Tc=25°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	Ic	Continuous	Tc=80°C	450	A
		Icp	1ms	Tc=80°C	900	
		-Ic			450	
		-Ic pulse	1ms		900	
	Collector power dissipation	Pc	1 device		2250	W
Junction temperature		Tj			175	°C
Operation temperature		Top			150	
Storage temperature		Tstg			-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)

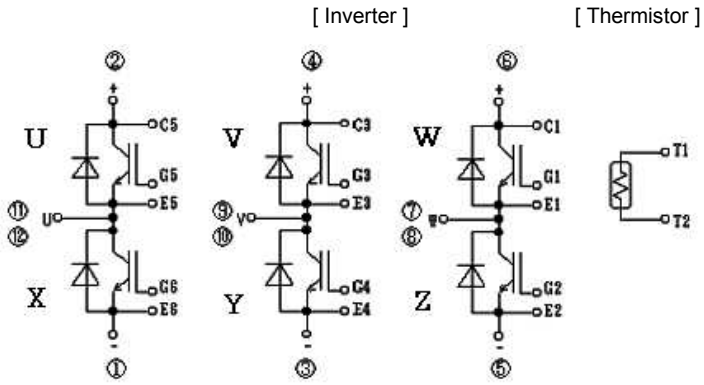
Items		Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
Inverter	Zero gate voltage collector current	I_{CES}	V_{GE} = 0V, V_{CE} = 1200V		-	-	3.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{GE} = 0V, V_{GE} = ±20V		-	-	600	nA
	Gate-Emitter threshold voltage	$V_{GE\ (th)}$	V_{CE} = 20V, I_C = 450mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	$V_{CE\ (sat)}$ (terminal)	V_{GE} = 15V, I_C = 450A	Tj=25°C	-	2.30	2.75	V
				Tj=125°C	-	2.60	-	
				Tj=150°C	-	2.65	-	
		$V_{CE\ (sat)}$ (chip)	V_{GE} = 15V, I_C = 450A	Tj=25°C	-	1.75	2.20	
				Tj=125°C	-	2.05	-	
				Tj=150°C	-	2.10	-	
	Input capacitance	Cies	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	41	-	nF
	Turn-on time	ton	V_{CC} = 600V, I_C = 450A, V_{GE} = +15V, R_G = 0.52Ω		-	550	1200	μs
		tr			-	180	600	
		tr (i)			-	120	-	
	Turn-off time	toff			-	1050	2000	
		tf			-	110	350	
	Forward on voltage	V_F (terminal)	V_{GE} = 0V, I_F = 450A	Tj=25°C	-	2.25	2.70	V
				Tj=125°C	-	2.40	-	
				Tj=150°C	-	2.35	-	
		V_F (chip)	V_{GE} = 0V, I_F = 450A	Tj=25°C	-	1.70	2.15	
				Tj=125°C	-	1.85	-	
				Tj=150°C	-	1.80	-	
	Reverse recovery time	trr	I_F = 450A		-	200	600	μs
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

● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
Thermal resistance (1device)(*5)	Rth(j-c)	Inverter IGBT	-	-	0.066	°C/W
		Inverter FWD	-	-	0.100	
Contact thermal resistance (1device) (*6)	Rth(c-f)	with Thermal Compound	-	0.0167	-	

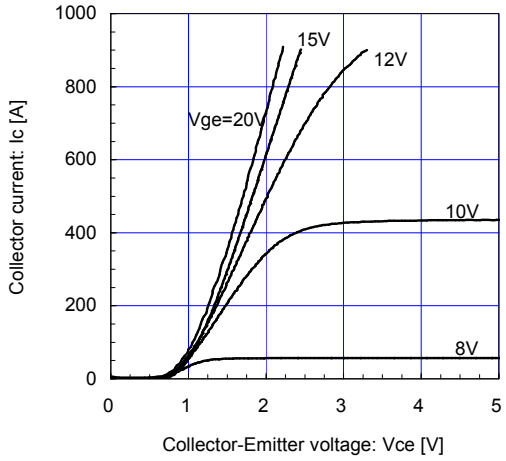
Note *5: This value is including margins. This will be revised in future.
Note *6: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Equivalent Circuit Schematic

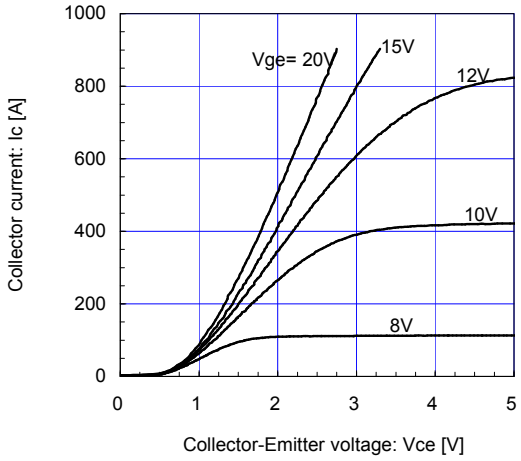


■ Characteristics (Representative)

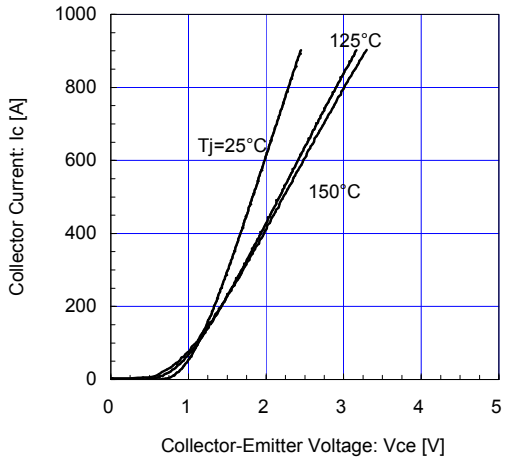
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



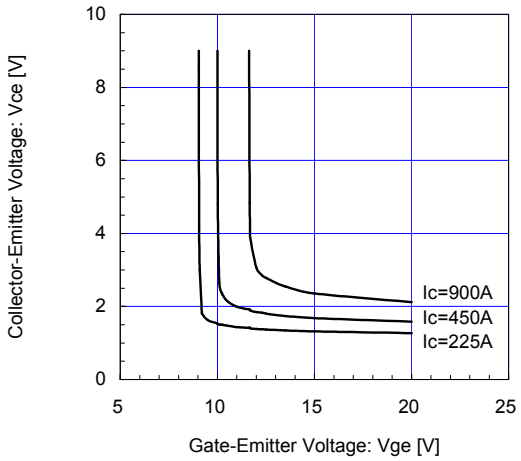
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150°C / chip



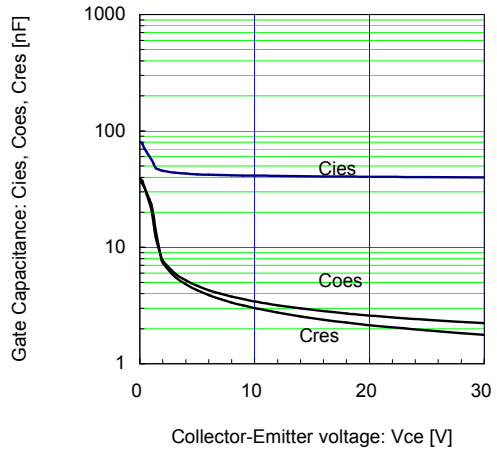
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Vge= 15V / chip



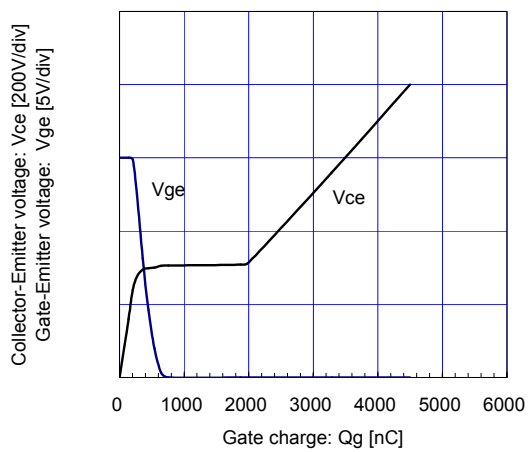
[INVERTER]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj= 25°C / chip



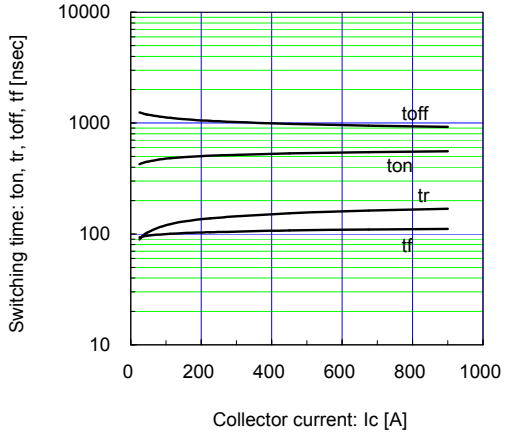
[INVERTER]
Gate Capacitance vs. Collector-Emitter Voltage (typ.)
Vge= 0V, *f*= 1MHz, Tj= 25°C



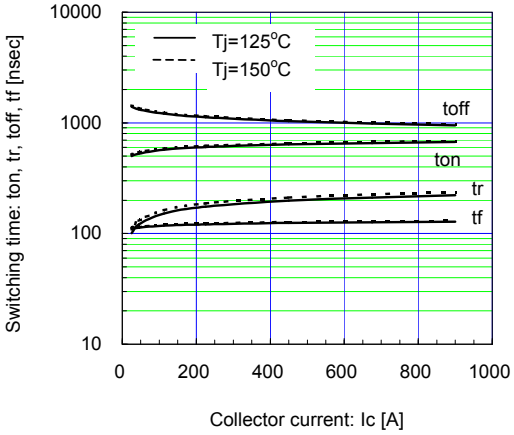
[INVERTER]
Dynamic Gate Charge (typ.)
Vcc=600V, Ic=450A, Tj= 25°C



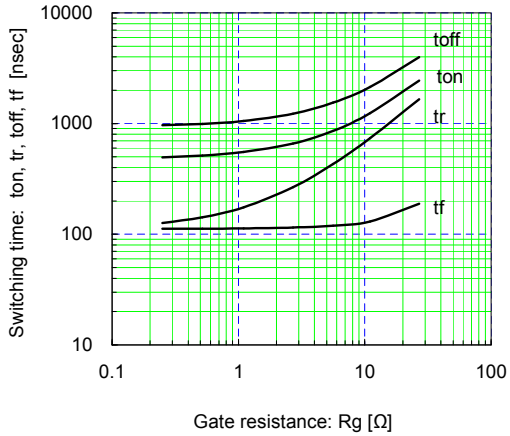
[INVERTER]
Switching time vs. Collector current (typ.)
Vcc=600V, Vge=±15V, Rg=0.52Ω, Tj=25°C



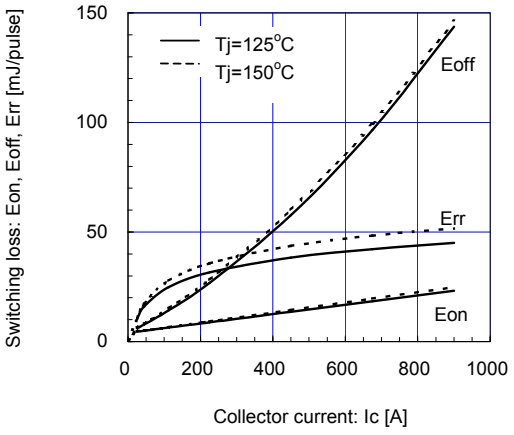
[INVERTER]
Switching time vs. Collector current (typ.)
Vcc=600V, Vge=±15V, Rg=0.52Ω, Tj=125°C, 150°C



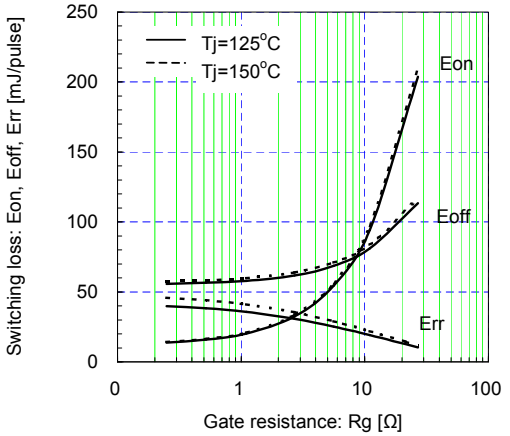
[INVERTER]
Switching time vs. Gate resistance (typ.)
Vcc=600V, Ic=450A, Vge=±15V, Tj=25°C



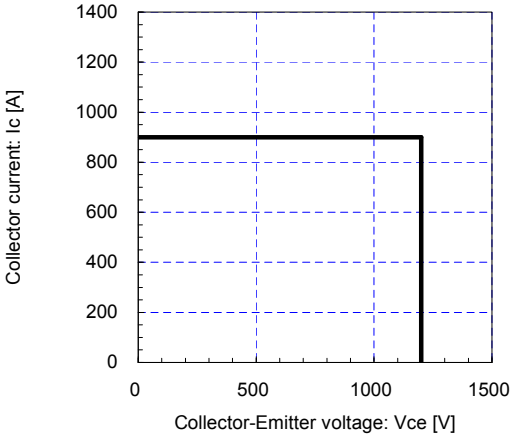
[INVERTER]
Switching loss vs. Collector current (typ.)
Vcc=600, Vge=±15V, Rg=0.52Ω, Tj=125°C, 150°C



[INVERTER]
Switching loss vs. Gate resistance (typ.)
Vcc=600V, Ic=450A, Vge=±15V, Tj=125°C, 150°C

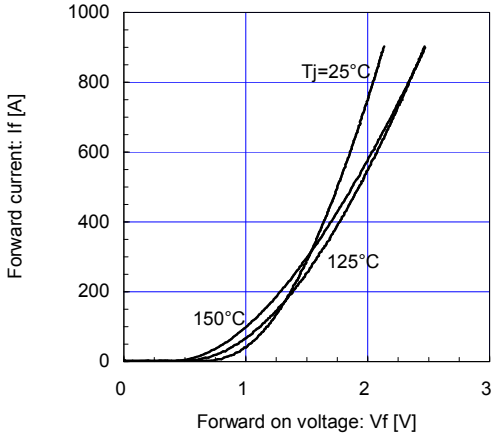


[INVERTER]
Reverse bias safe operating area (max.)
+Vge=15V, -Vge≤15V, Rg≥0.52Ω, Tj=150°C



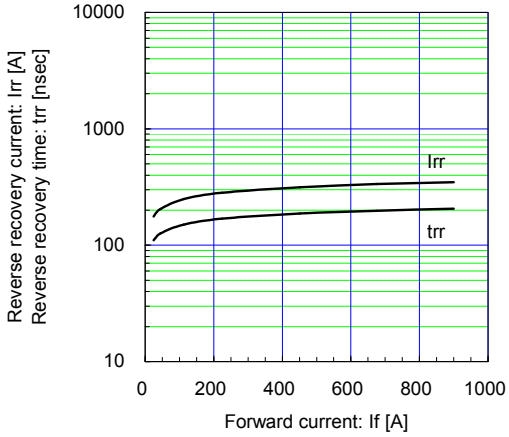
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip



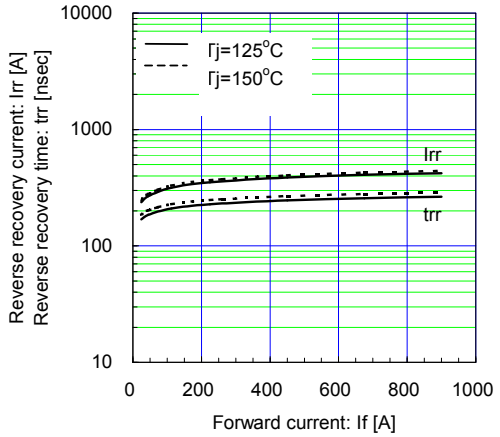
[INVERTER]

Reverse Recovery Characteristics (typ.)
Vcc=600V, Vge=±15V, Rg=0.52Ω, Tj=25°C

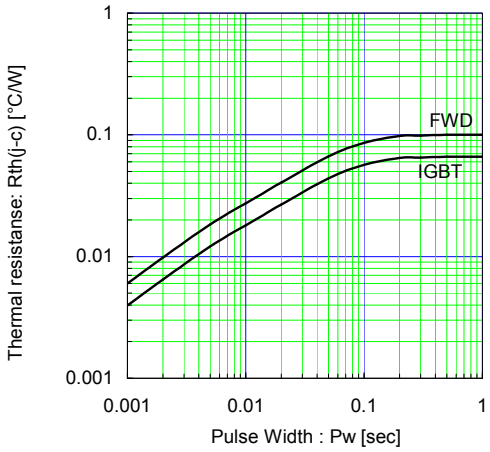


[INVERTER]

Reverse Recovery Characteristics (typ.)
Vcc=600V, Vge=±15V, Rg=0.52Ω, Tj=125°C, 150°C

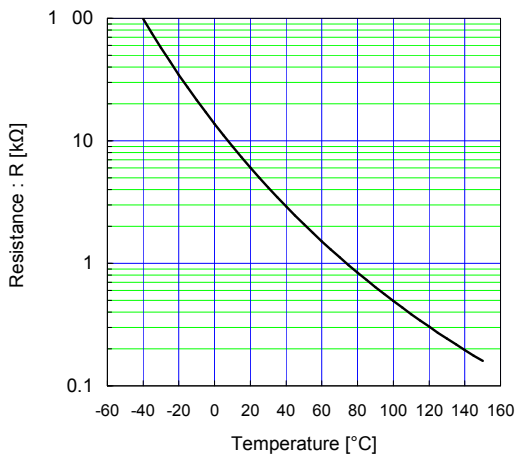


Transient Thermal Resistance (max.)

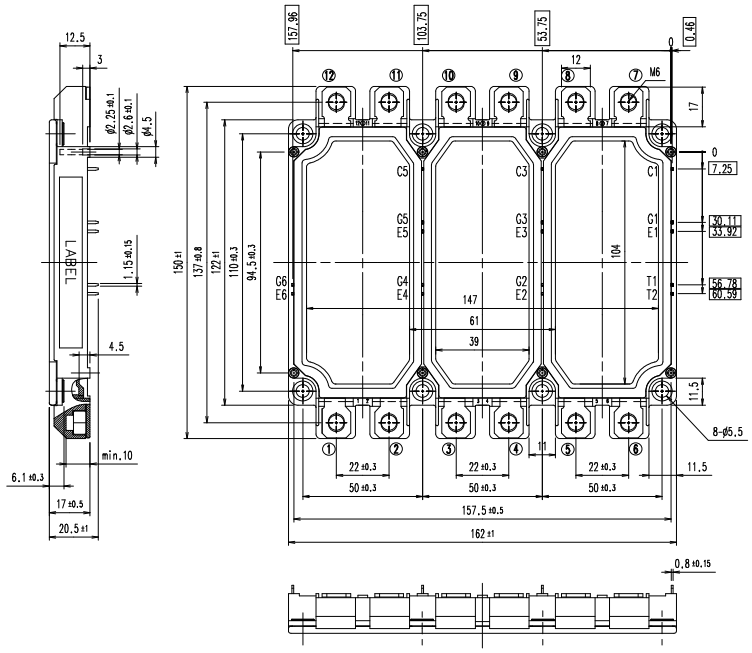


[THERMISTOR]

Temperature characteristic (typ.)



■ Outline Drawings, mm



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