

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 $T_c=25^{\circ}\text{C}$ 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°C	450	A
		I _{cp}	1ms	T _c =80°C	900	
		-I _c			450	
		-I _c pulse	1ms	900		
Collector power dissipation	P _c	1 device		2250	W	
Junction temperature		T _j			175	°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)

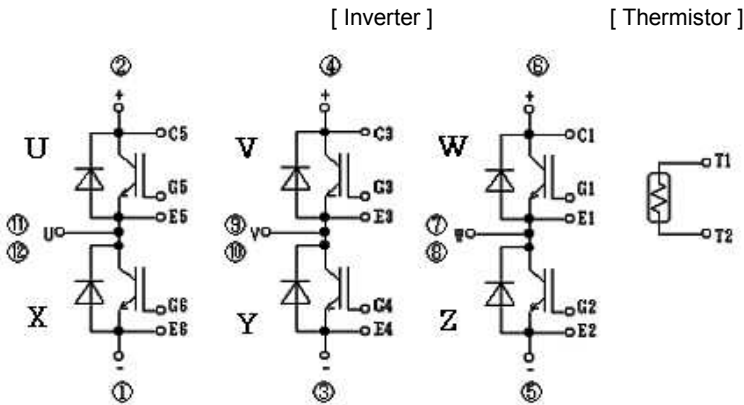
Items		Symbols	Conditions		Characteristics			Units
					min.	typ.	max.	
Inverter	Zero gate voltage collector current	I _{CES}	V _{GE} = 0V, V _{CE} = 1200V		-	-	3.0	mA
	Gate-Emitter leakage current	I _{GES}	V _{GE} = 0V, V _{GE} = ±20V		-	-	600	nA
	Gate-Emitter threshold voltage	V _{GE (th)}	V _{CE} = 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	T _j =25°C	-	2.30	2.75	V
				T _j =125°C	-	2.60	-	
				T _j =150°C	-	2.65	-	
		V _{CE (sat)} (chip)	V _{GE} = 15V I _C = 450A	T _j =25°C	-	1.75	2.20	
				T _j =125°C	-	2.05	-	
				T _j =150°C	-	2.10	-	
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz		-	41	-	nF
	Turn-on time	t _{on}	V _{CC} = 600V I _C = 450A V _{GE} = +15V R _G = 0.52Ω		-	550	1200	μs
		t _r			-	180	600	
		t _{r (i)}			-	120	-	
	Turn-off time	t _{off}	R _G = 0.52Ω		-	1050	2000	μs
		t _f			-	110	350	
Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 450A	T _j =25°C	-	2.25	2.70	V	
			T _j =125°C	-	2.40	-		
			T _j =150°C	-	2.35	-		
	V _F (chip)	V _{GE} = 0V I _F = 450A	T _j =25°C	-	1.70	2.15		
			T _j =125°C	-	1.85	-		
			T _j =150°C	-	1.80	-		
Reverse recovery time	t _{rr}	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			Units
			min.	typ.	max.	
Thermal resistance (1device)(*5)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.066	$^{\circ}C/W$
		Inverter FWD	-	-	0.100	
Contact thermal resistance (1device) (*6)	$R_{th(c-f)}$	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.

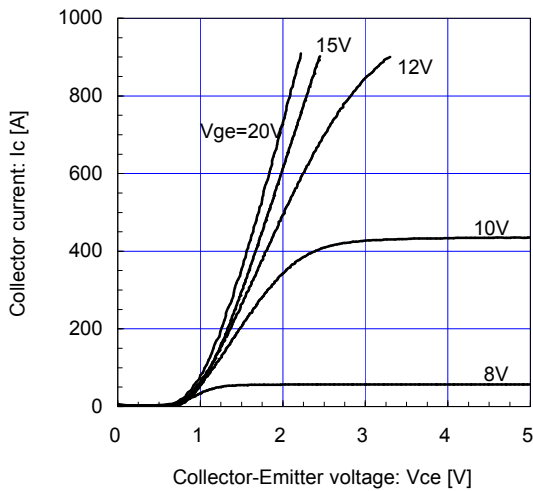
■ Equivalent Circuit Schematic



■ Characteristics (Representative)

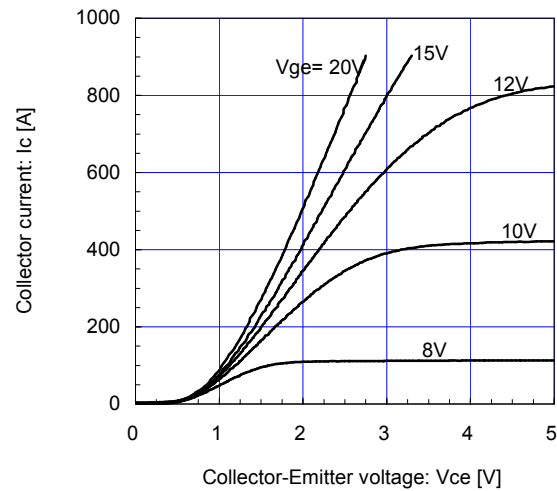
[INVERTER]

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



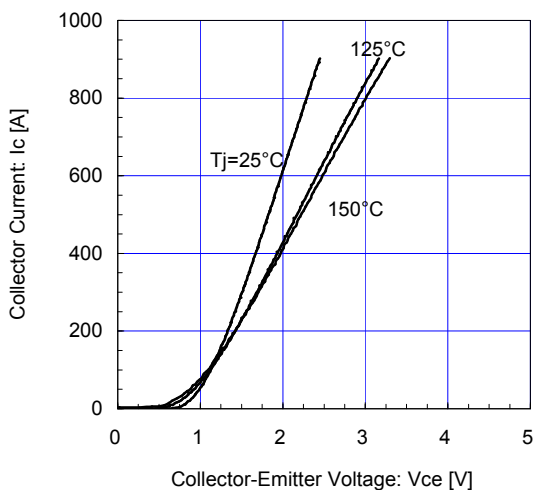
[INVERTER]

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



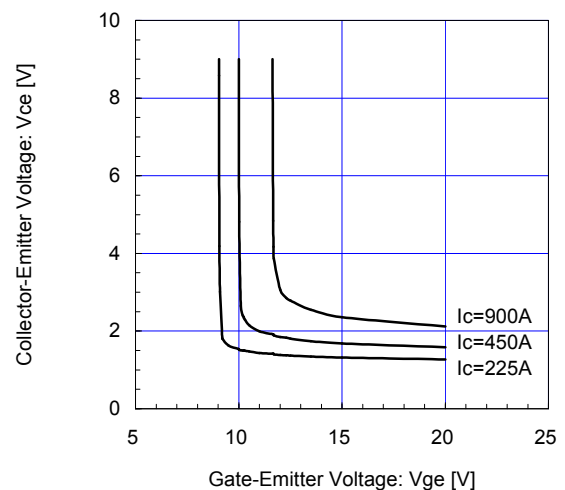
[INVERTER]

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



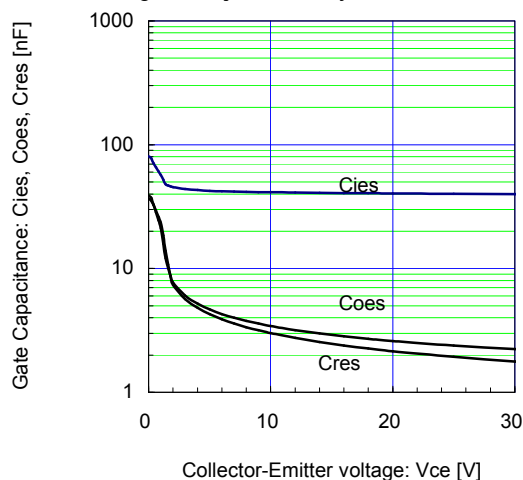
[INVERTER]

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



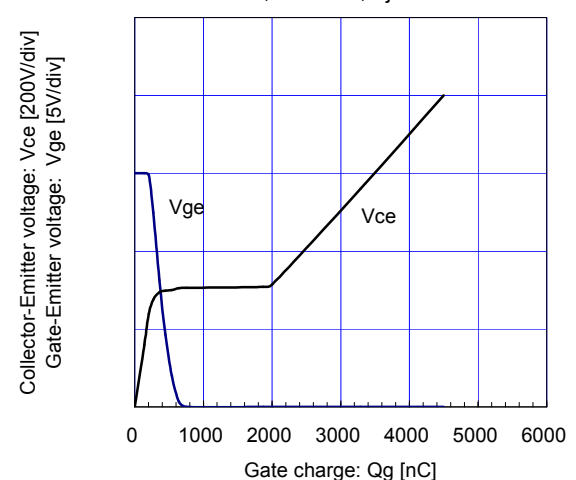
[INVERTER]

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



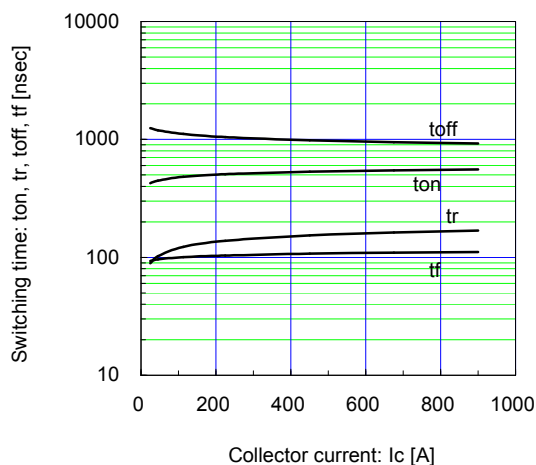
[INVERTER]

Dynamic Gate Charge (typ.)
V_{cc} = 600V, I_c = 450A, T_j = 25°C



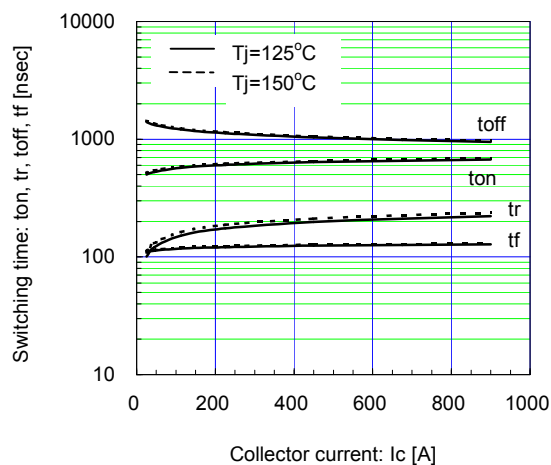
[INVERTER]

Switching time vs. Collector current (typ.)

 $V_{cc}=600V$, $V_{ge}=\pm 15V$, $R_g=0.52\Omega$, $T_j=25^\circ C$ 

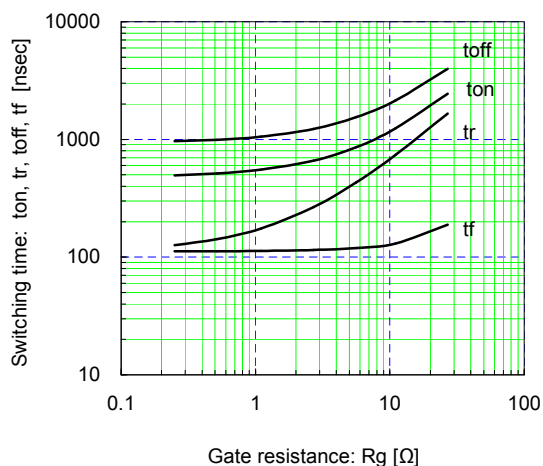
[INVERTER]

Switching time vs. Collector current (typ.)

 $V_{cc}=600V$, $V_{ge}=\pm 15V$, $R_g=0.52\Omega$, $T_j=125^\circ C, 150^\circ C$ 

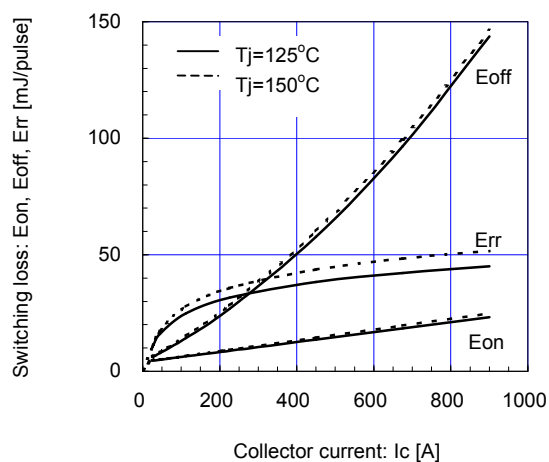
[INVERTER]

Switching time vs. Gate resistance (typ.)

 $V_{cc}=600V$, $I_c=450A$, $V_{ge}=\pm 15V$, $T_j=25^\circ C$ 

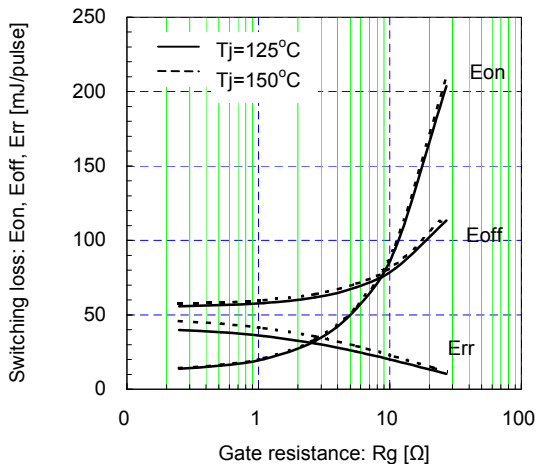
[INVERTER]

Switching loss vs. Collector current (typ.)

 $V_{cc}=600V$, $V_{ge}=\pm 15V$, $R_g=0.52\Omega$, $T_j=125^\circ C, 150^\circ C$ 

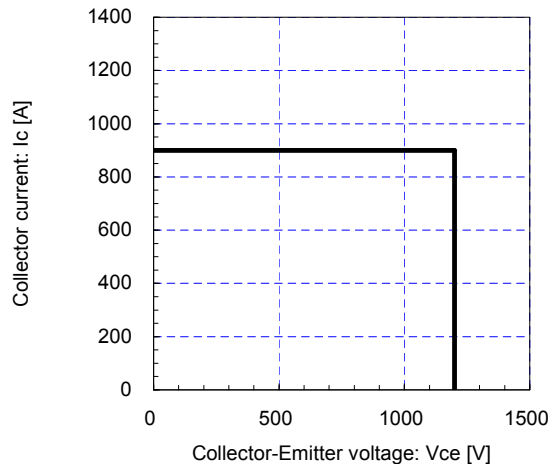
[INVERTER]

Switching loss vs. Gate resistance (typ.)

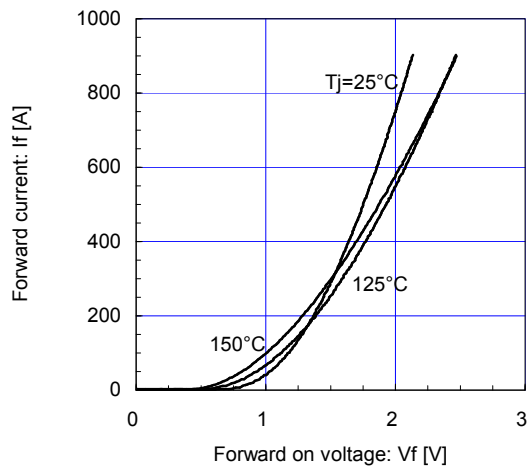
 $V_{cc}=600V$, $I_c=450A$, $V_{ge}=\pm 15V$, $T_j=125^\circ C, 150^\circ C$ 

[INVERTER]

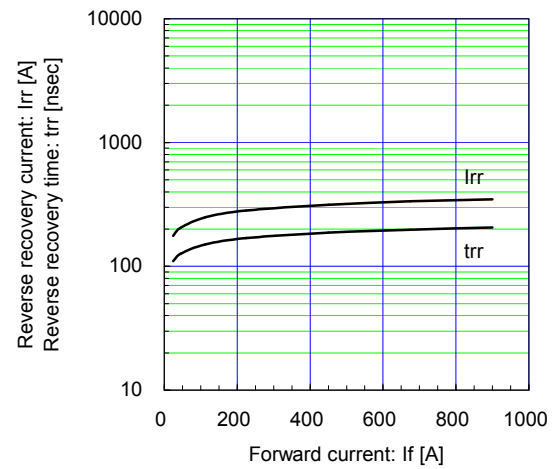
Reverse bias safe operating area (max.)

 $+V_{ge}=15V$, $-V_{ge}\leq 15V$, $R_g\geq 0.52\Omega$, $T_j=150^\circ C$ 

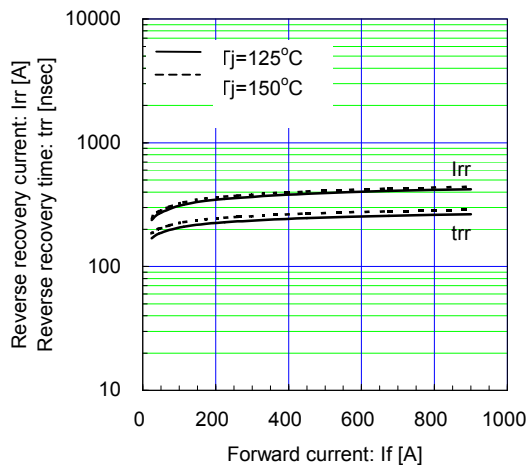
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip

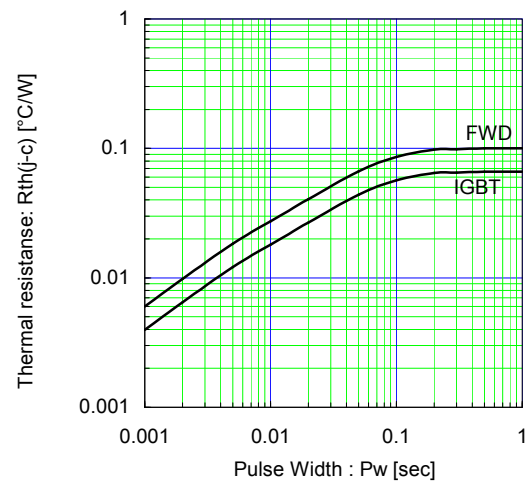
[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{cc}=600\text{V}$, $V_{ge}=\pm 15\text{V}$, $R_g=0.52\Omega$, $T_j=25^\circ\text{C}$ 

[INVERTER]

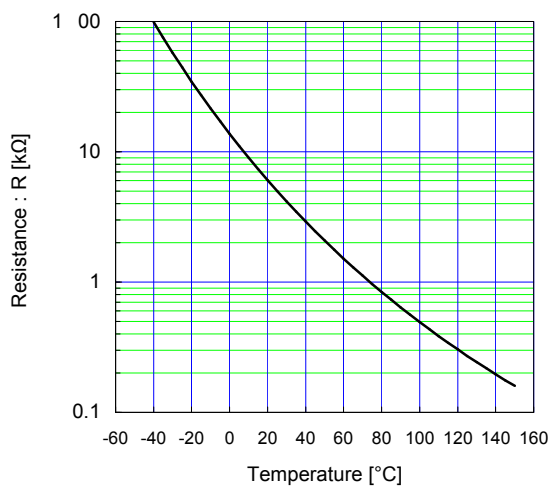
Reverse Recovery Characteristics (typ.)
 $V_{cc}=600\text{V}$, $V_{ge}=\pm 15\text{V}$, $R_g=0.52\Omega$, $T_j=125^\circ\text{C}$, 150°C 

Transient Thermal Resistance (max.)

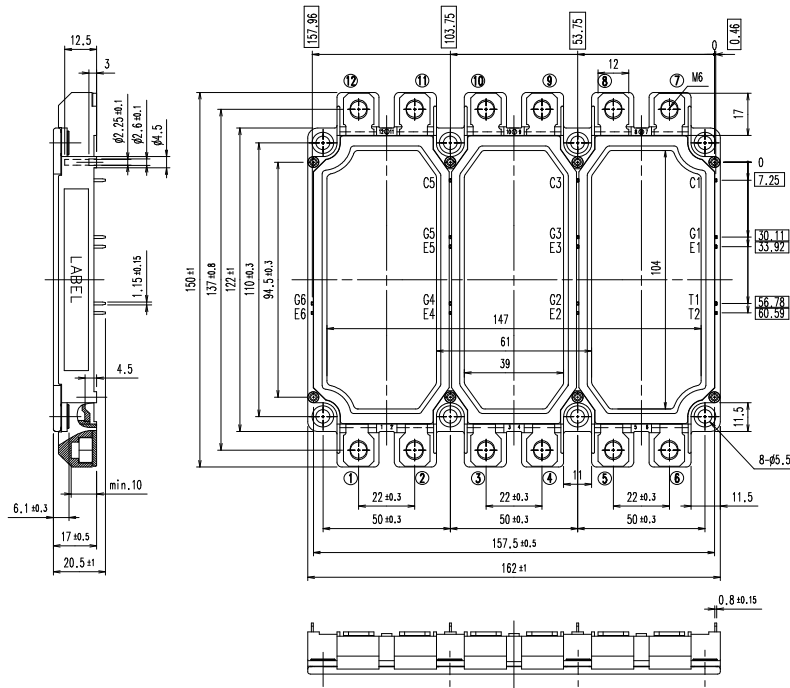


[THERMISTOR]

Temperature characteristic (typ.)



■ Outline Drawings, mm



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