

6MBI150VX-120-50

IGBT Modules

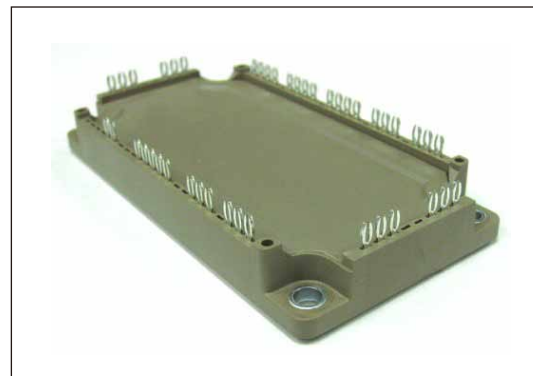
IGBT MODULE (V series) 1200V / 150A / 6 in one package

■ 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 =100°C	150	A
		I _{cp}	1ms	T _c =80°C	300	
		-I _c			150	
		-I _c pulse	1ms	300		
	Collector power dissipation	P _c	1 device	770	W	
Junction temperature		T _j			175	°C
Operating junciton temperature (under switching conditions)		T _{jop}			150	
Case temperature		T _c			125	
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)	-	M5		3.5	N m

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)

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

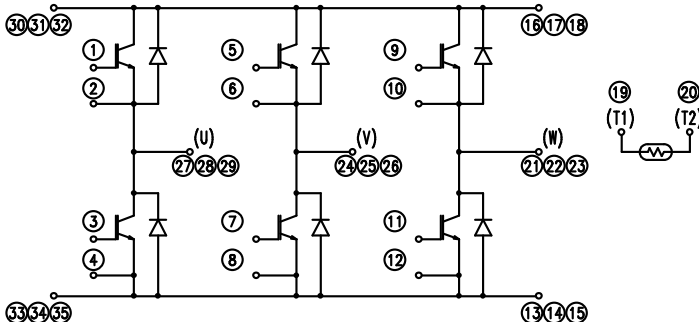
Items		Symbols	Conditions		Characteristics			Units
					min.	typ.	max.	
Inverter	Zero gate voltage collector current	I _{CES}	V _{GE} = 0V, V _{CE} = 1200V		-	-	1.0	mA
	Gate-Emitter leakage current	I _{GES}	V _{GE} = 0V, V _{GE} = ±20V		-	-	200	nA
	Gate-Emitter threshold voltage	V _{GE (th)}	V _{CE} = 20V, I _C = 150mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	V _{CE (sat)} (terminal)	V _{GE} = 15V I _C = 150A	T _j =25°C	-	2.40	2.85	V
				T _j =125°C	-	2.70	-	
				T _j =150°C	-	2.75	-	
		V _{CE (sat)} (chip)	V _{GE} = 15V I _C = 150A	T _j =25°C	-	1.75	2.20	
				T _j =125°C	-	2.05	-	
				T _j =150°C	-	2.10	-	
	Internal gate resistance	R _{g (int)}	-		-	5.0	-	Ω
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz		-	13.7	-	nF
	Turn-on time	t _{on}	V _{CC} = 600V I _C = 150A V _{GE} = +15 / -15V R _g = 1.1Ω		-	0.39	1.20	μs
		t _r			-	0.09	0.60	
		t _{r (i)}			-	0.03	-	
	Turn-off time	t _{off}	-	0.53	1.00			
		t _f	-	0.06	0.30			
	Forward on voltage	V _F (terminal)	I _F = 150A	T _j =25°C	-	2.35	2.80	V
T _j =125°C				-	2.50	-		
T _j =150°C				-	2.45	-		
V _F (chip)		I _F = 150A	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 = 150A		-	-	0.35	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)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.195	$^{\circ}C/W$
		Inverter FWD	-	-	0.34	
Contact thermal resistance (1device) (*4)	$R_{th(c-f)}$	with Thermal Compound	-	0.05	-	

Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

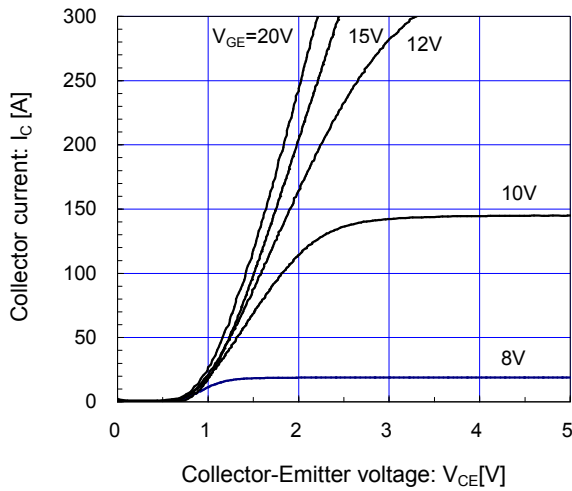
■ Equivalent Circuit Schematic



■ Characteristics (Representative)

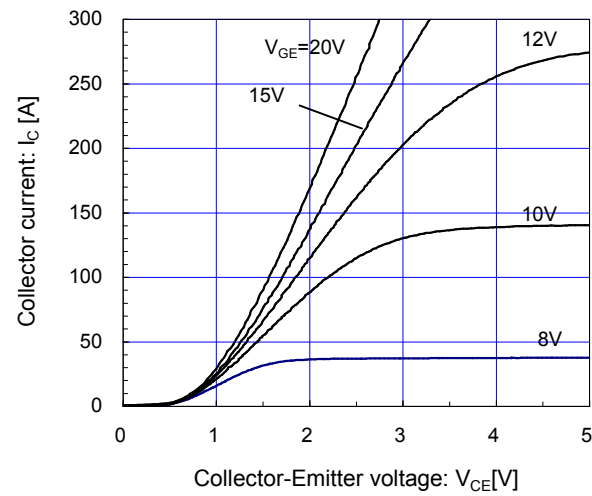
[Inverter]

Collector current vs. Collector-Emittter voltage (typ.)

 $T_j = 25^\circ\text{C}$ / chip

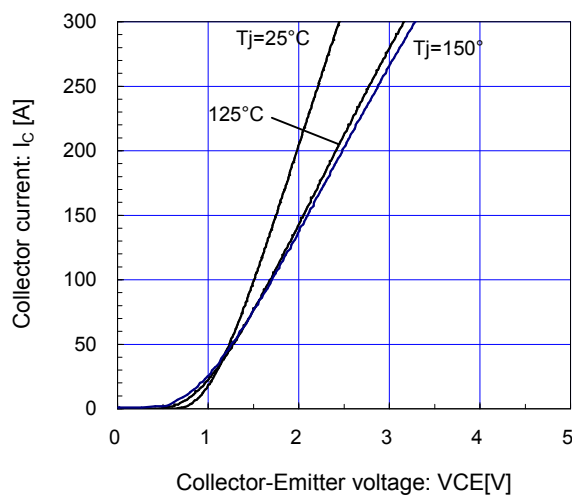
[Inverter]

Collector current vs. Collector-Emittter voltage (typ.)

 $T_j = 150^\circ\text{C}$ / chip

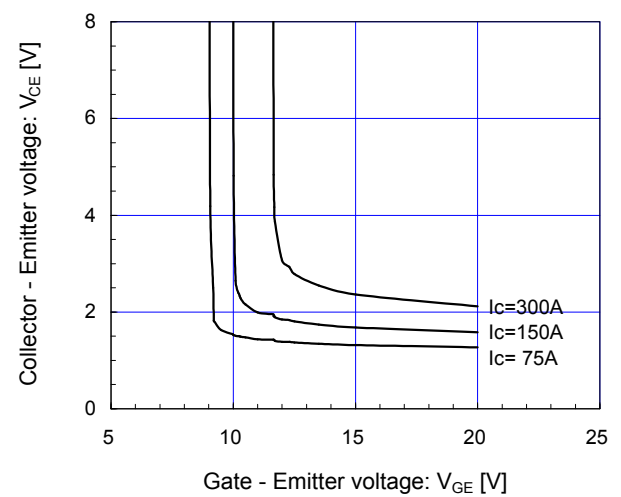
[Inverter]

Collector current vs. Collector-Emittter voltage (typ.)

 $V_{GE} = 15\text{V}$ / chip

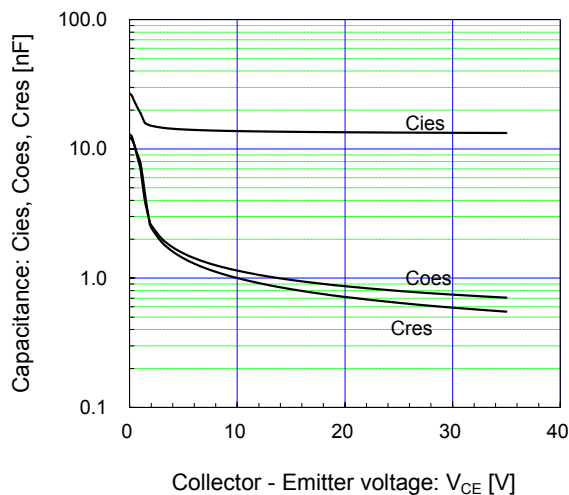
[Inverter]

Collector-Emittter voltage vs. Gate-Emittter voltage (typ.)

 $T_j = 25^\circ\text{C}$ / chip

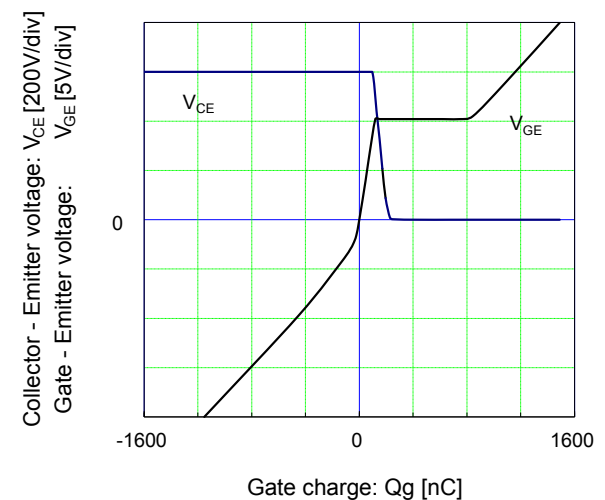
[Inverter]

Capacitance vs. Collector-Emittter voltage (typ.)

 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$ 

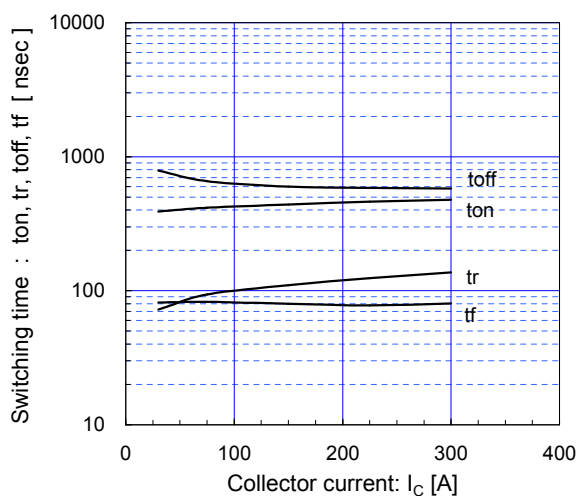
[Inverter]

Dynamic gate charge (typ.)

 $V_{CC} = 600\text{V}$, $I_c = 150\text{A}$, $T_j = 25^\circ\text{C}$ 

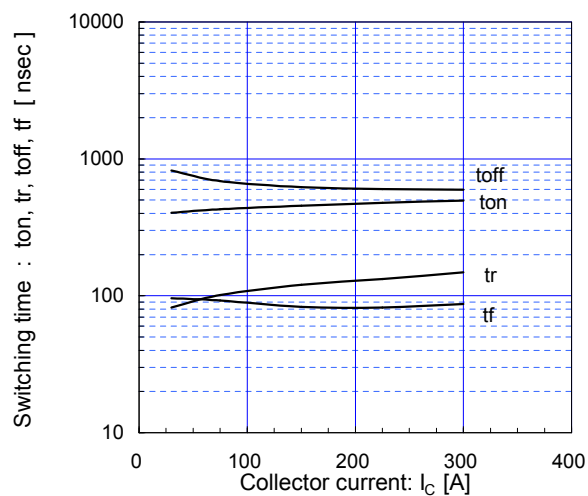
[Inverter]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=1.1\Omega$, $T_j=125^\circ C$



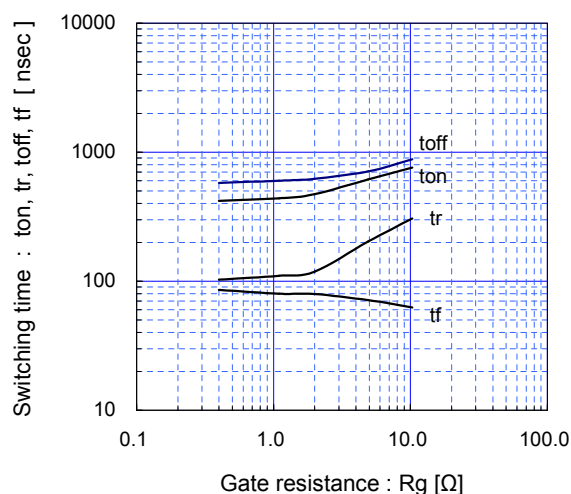
[Inverter]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=1.1\Omega$, $T_j=150^\circ C$



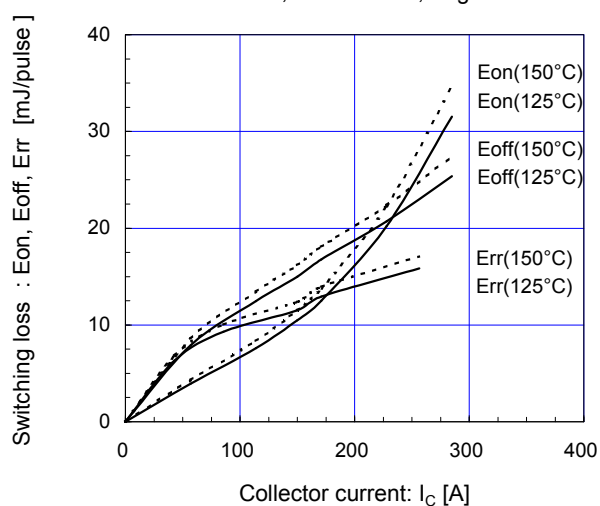
[Inverter]

Switching time vs. gate resistance (typ.)
 $V_{CC}=600V$, $I_C=150A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$



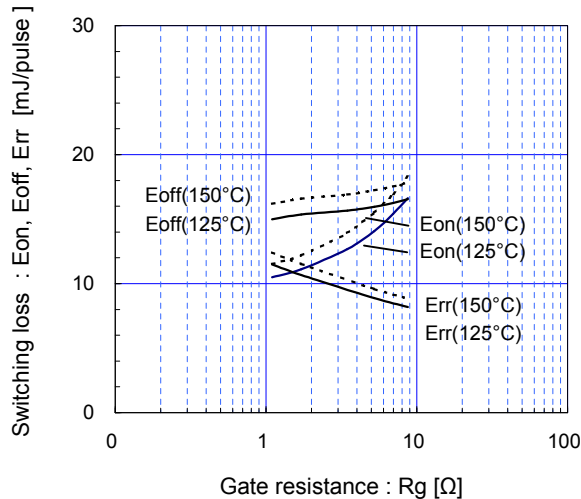
[Inverter]

Switching loss vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=1.1\Omega$



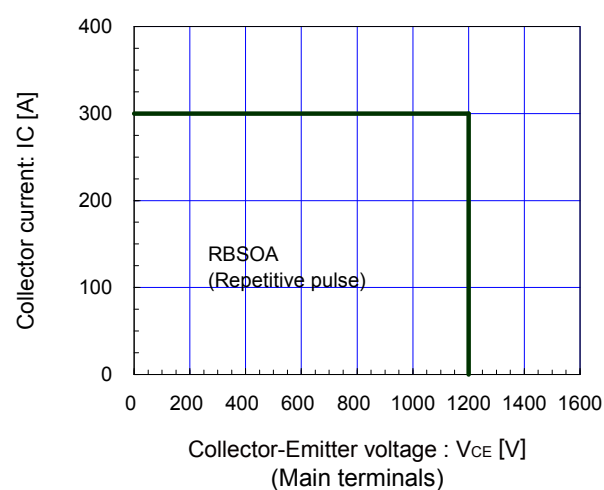
[Inverter]

Switching loss vs. gate resistance (typ.)
 $V_{CC}=600V$, $I_C=150A$, $V_{GE}=\pm 15V$

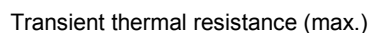
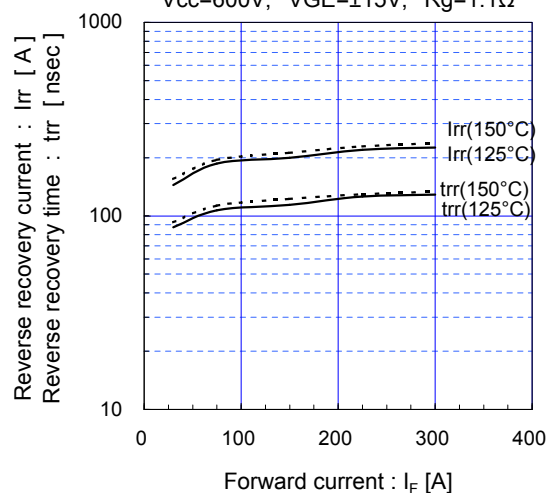


[Inverter]

Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE} \leq 15V$, $R_g \geq 1.1\Omega$, $T_j=150^\circ C$



chip


$$V_{cc}=600V, \quad V_{GE}=\pm 15V, \quad R_g=1.1\Omega$$


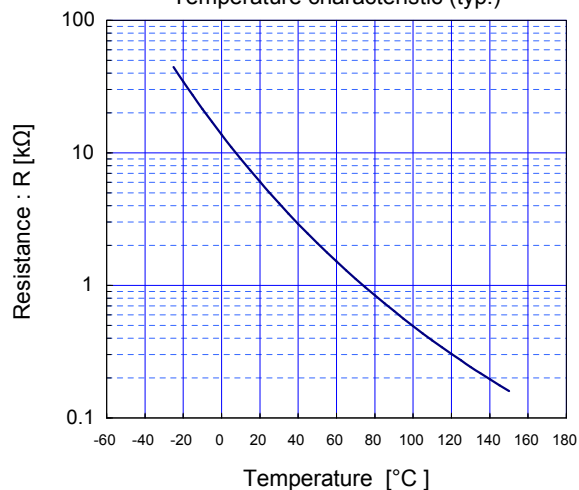
n		1	2	3	4
τ_n	[sec]	0.0023	0.0301	0.0598	0.0708
r_n	IGBT	0.02092	0.05303	0.07491	0.04614
	FWD	0.03647	0.09246	0.13062	0.08045

$$Z_{th} = \sum_{n=1}^4 r_n \cdot \left(1 - e^{-\frac{t}{\tau_n}} \right)$$

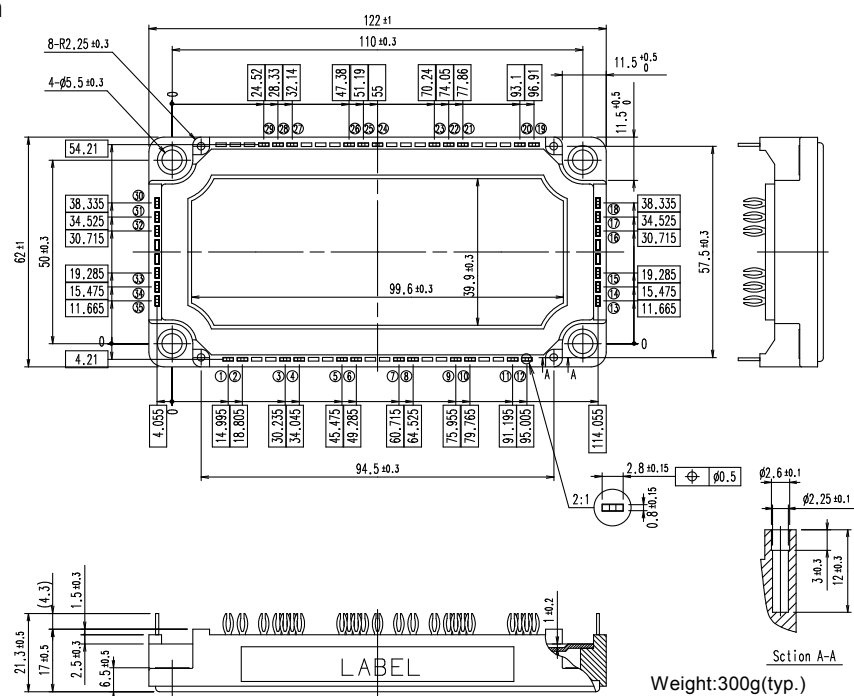
FWD[Inverter]
 IGBT[Inverter]

Pulse width : Pw [sec]

Temperature characteristic (typ.)



■ Outline Drawings, mm



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IGBT Modules

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