

# 6MBI150VX-120-50

**IGBT Modules**

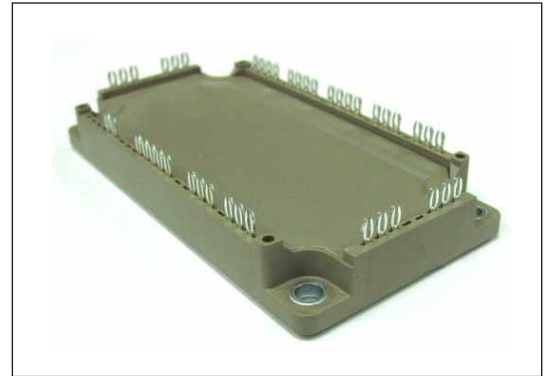
## IGBT MODULE (V series) 1200V / 150A / 6 in one package

### ■ 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	$V_{GES}$			$\pm 20$	V
	Collector current	$I_c$	Continuous	$T_c=100^\circ\text{C}$	150	A
		$I_{cp}$	1ms	$T_c=80^\circ\text{C}$	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 junction 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)

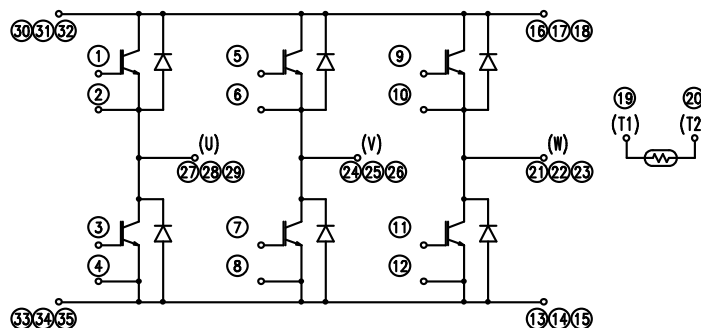
Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage collector current	$I_{CES}$	$V_{GE} = 0V, V_{CE} = 1200V$	-	-	1.0	mA	
Gate-Emitter leakage current	$I_{GES}$	$V_{GE} = 0V, V_{GE} = \pm 20V$	-	-	200	nA	
Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_c = 150mA$	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_c = 150A$	Tj=25°C	-	2.40	2.85	V
			Tj=125°C	-	2.70	-	
			Tj=150°C	-	2.75	-	
	$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_c = 150A$	Tj=25°C	-	1.75	2.20	
			Tj=125°C	-	2.05	-	
			Tj=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	$t_{on}$	$V_{CC} = 600V$ $I_c = 150A$	-	0.39	1.20	μs	
	$t_r$		-	0.09	0.60		
	$t_r(i)$		-	0.03	-		
Turn-off time	$t_{off}$	$V_{GE} = +15 / -15V$ $R_G = 1.1Ω$	-	0.53	1.00	μs	
	$t_f$		-	0.06	0.30		
Forward on voltage	$V_F$ (terminal)	$I_F = 150A$	Tj=25°C	-	2.35	2.80	V
			Tj=125°C	-	2.50	-	
			Tj=150°C	-	2.45	-	
	$V_F$ (chip)	$I_F = 150A$	Tj=25°C	-	1.70	2.15	
			Tj=125°C	-	1.85	-	
			Tj=150°C	-	1.80	-	
Reverse recovery time	$t_{rr}$	$I_F = 150A$	-	-	0.35	μs	
Thermistor	Resistance	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	°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

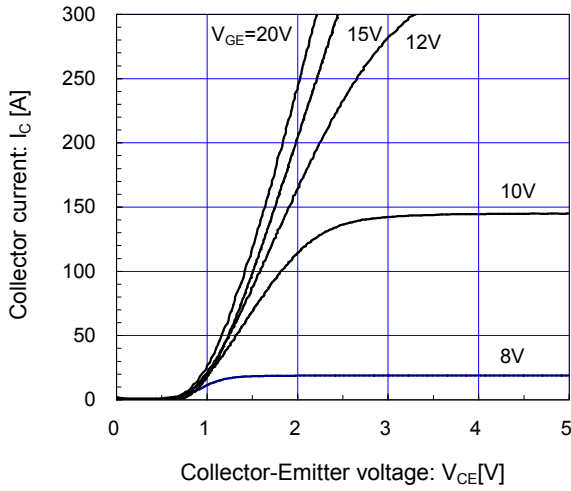


■ Characteristics (Representative)

[ Inverter ]

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

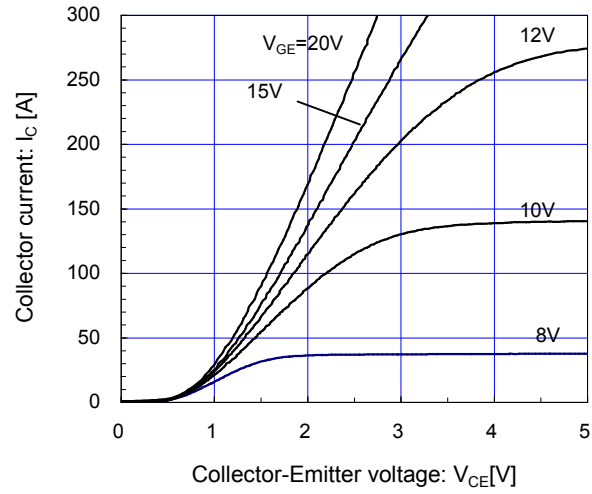
T<sub>j</sub>= 25°C / chip



[ Inverter ]

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

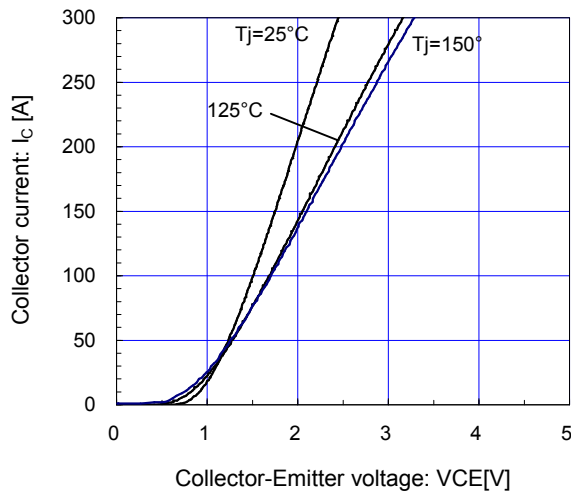
T<sub>j</sub>= 150°C / chip



[ Inverter ]

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

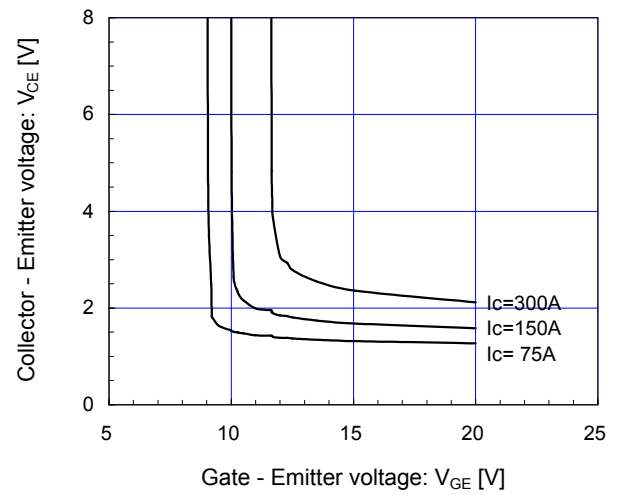
V<sub>GE</sub>=15V / chip



[ Inverter ]

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

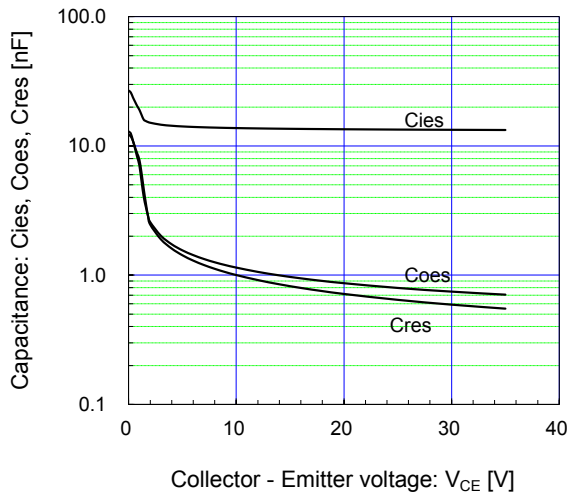
T<sub>j</sub>= 25°C / chip



[ Inverter ]

Capacitance vs. Collector-Emittter voltage (typ.)

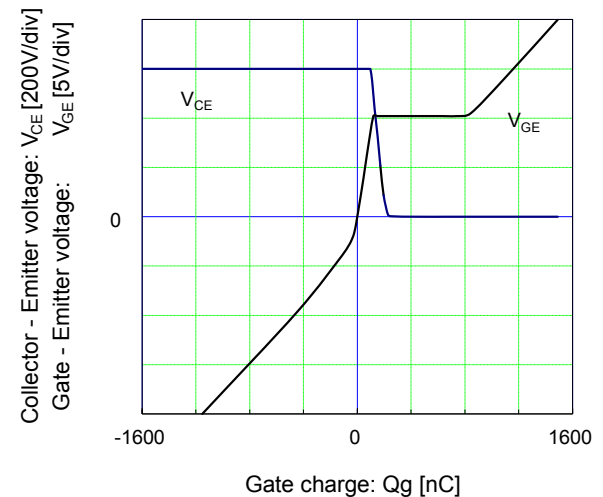
V<sub>GE</sub>=0V, f= 1MHz, T<sub>j</sub>= 25°C



[ Inverter ]

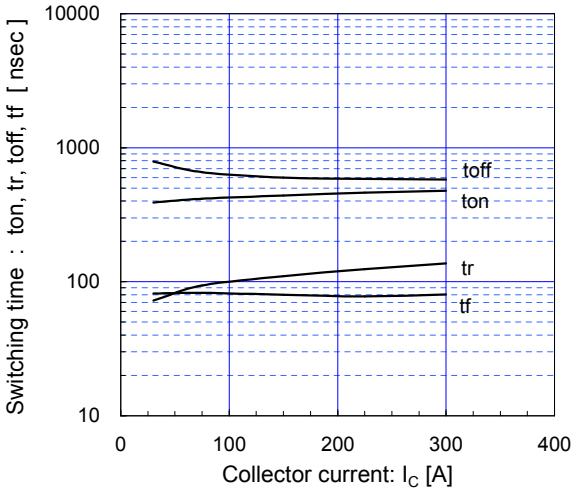
Dynamic gate charge (typ.)

V<sub>CC</sub>=600V, Ic=150A, T<sub>j</sub>= 25°C



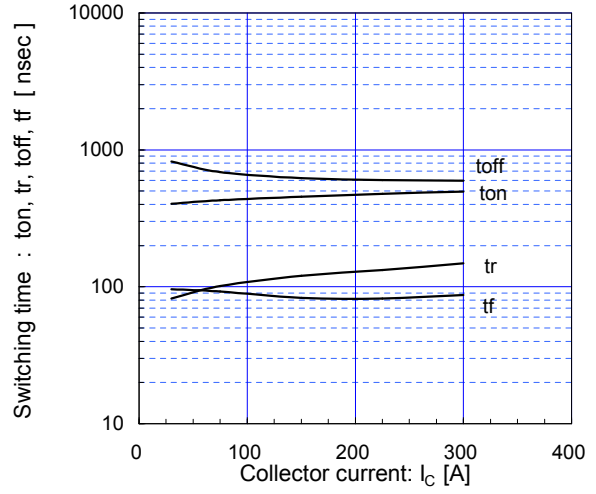
[ Inverter ]

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



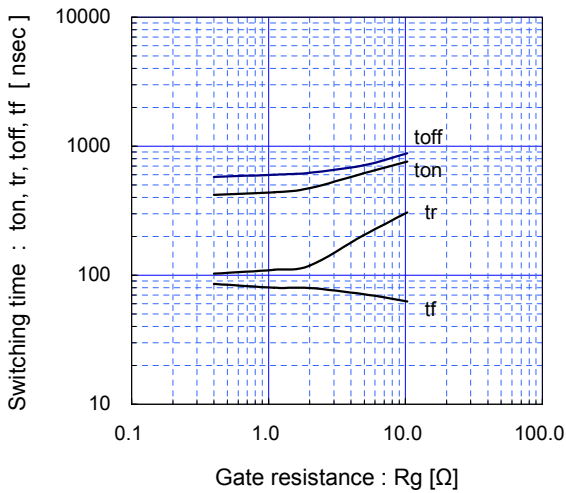
[ Inverter ]

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



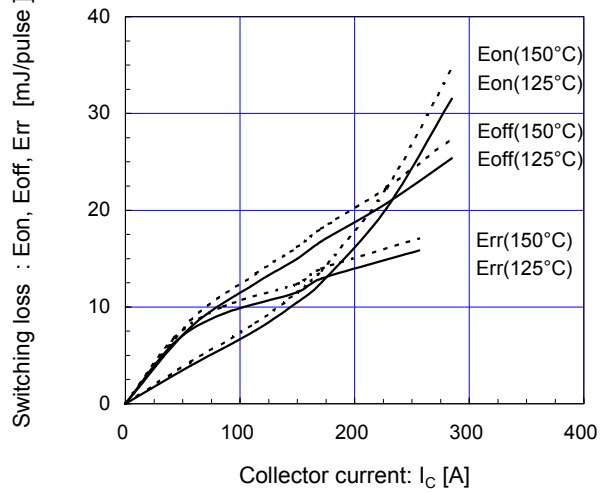
[ Inverter ]

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



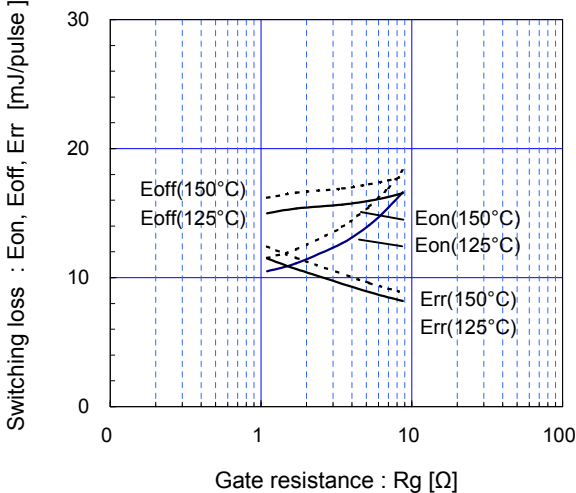
[ Inverter ]

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



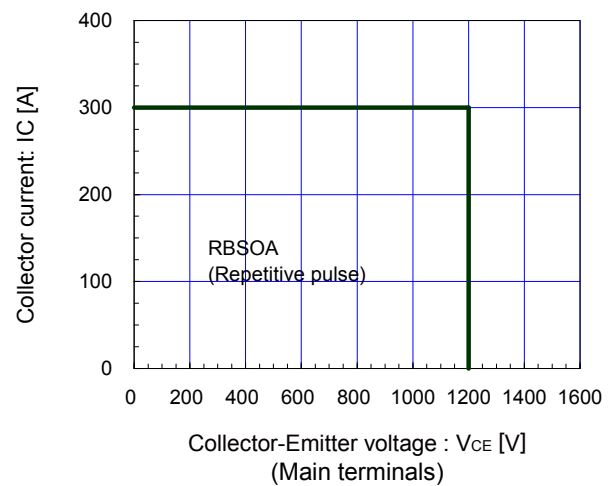
[ Inverter ]

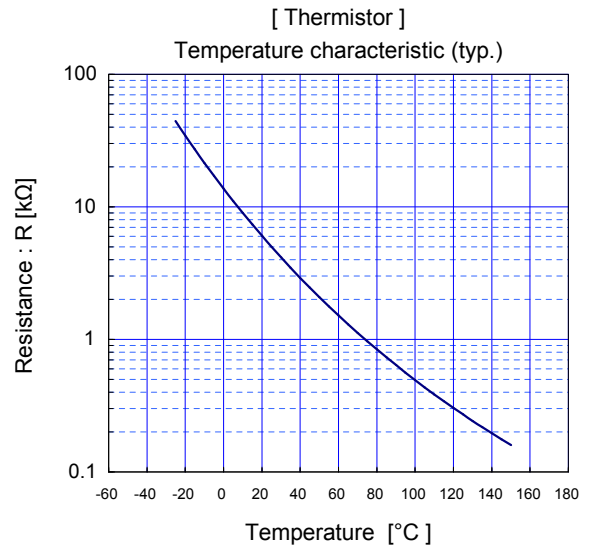
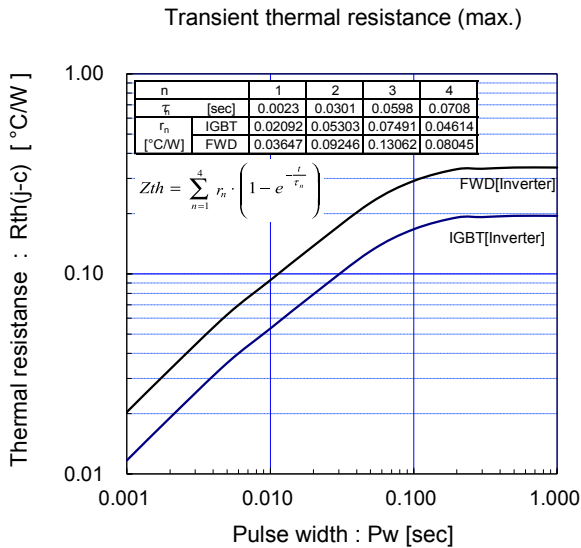
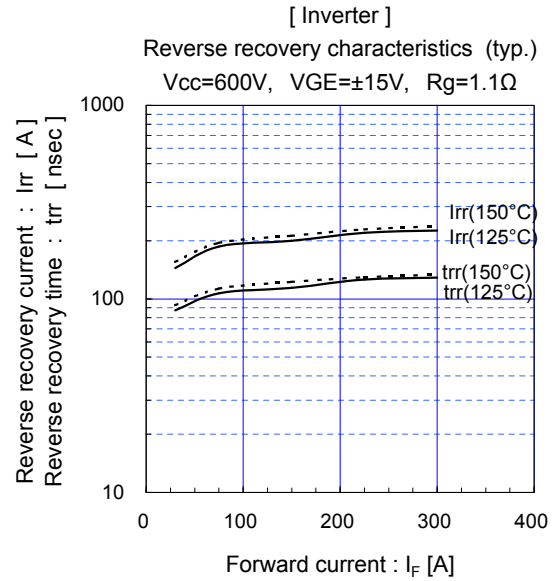
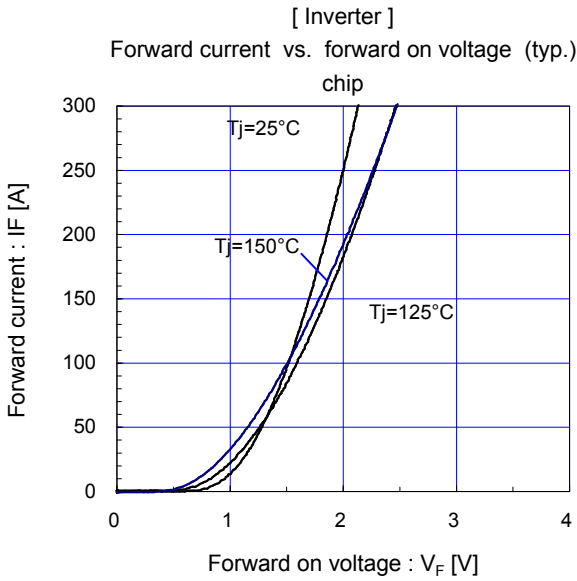
Switching loss vs. gate resistance (typ.)  
 $V_{cc}=600V, I_c=150A, V_{GE}=\pm 15V$



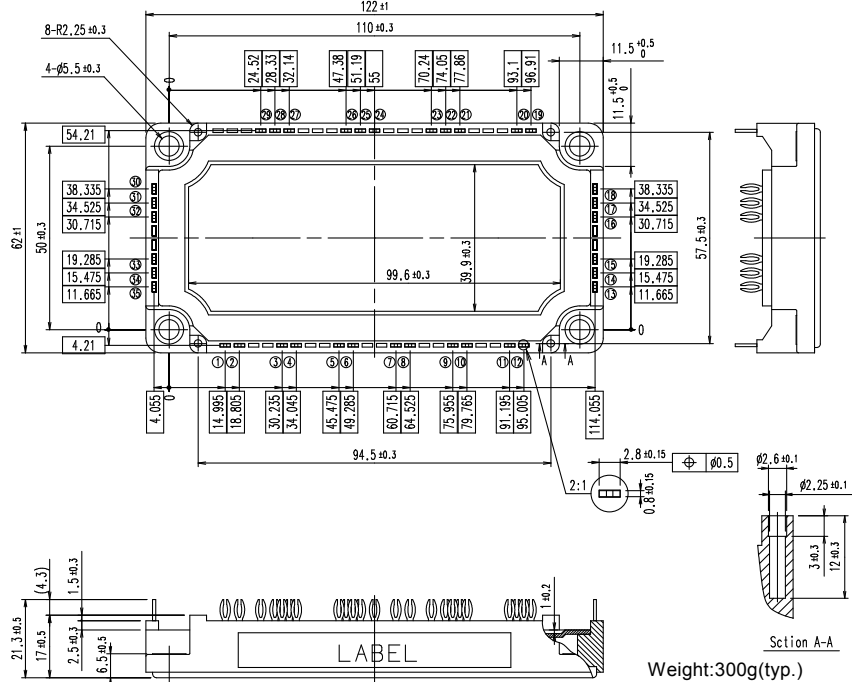
[ Inverter ]

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





■ Outline Drawings, mm



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