

# 6MBI150VX-060-50

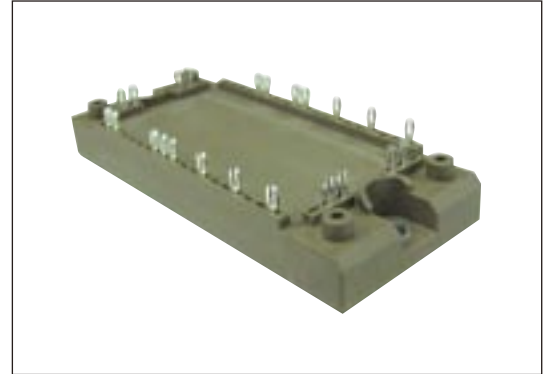
## IGBT MODULE (V series) 600V / 150A / 6 in one package

### ■ 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	$V_{CES}$			600	V	
	Gate-Emitter voltage	$V_{GES}$			$\pm 20$	V	
	Collector current	$I_c$	Continuous	$T_c=80^\circ\text{C}$		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		485	W		
Junction temperature	$T_j$			175	$^\circ\text{C}$		
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)

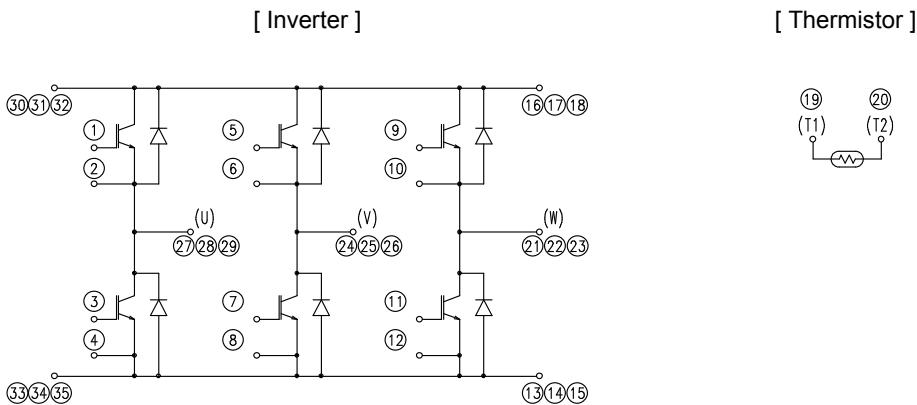
Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage collector current	$I_{CES}$	$V_{GE} = 0V, V_{CE} = 600V$	-	-	1.0	mA	
Gate-Emitter leakage current	$I_{GES}$	$V_{GE} = 0V, V_{GE} = \pm 20V$	-	-	200	nA	
Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_c = 150mA$	6.2	6.7	7.2	V	
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_c = 100A$	Tj=25°C	-	2.40	2.85	V
			Tj=125°C	-	2.70	-	
			Tj=150°C	-	2.90	-	
	$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_c = 150A$	Tj=25°C	-	1.60	2.05	
			Tj=125°C	-	1.90	-	
			Tj=150°C	-	2.10	-	
Input capacitance	$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	-	9.7	-	nF	
Turn-on time	$t_{on}$	$V_{CC} = 300V$ $I_c = 150A$ $V_{GE} = +15 / -15V$ $R_G = 9\Omega$	-	0.39	1.20	$\mu s$	
	$t_r$		-	0.09	0.60		
	$t_r(i)$		-	0.03	-		
Turn-off time	$t_{off}$	$R_G = 9\Omega$	-	0.53	1.00	$\mu s$	
	$t_f$		-	0.06	0.30		
Forward on voltage	$V_F$ (terminal)	$I_F = 150A$	Tj=25°C	-	2.40	2.85	V
			Tj=125°C	-	2.30	-	
			Tj=150°C	-	2.30	-	
	$V_F$ (chip)	$I_F = 150A$	Tj=25°C	-	1.60	2.05	
			Tj=125°C	-	1.50	-	
			Tj=150°C	-	1.47	-	
Reverse recovery time	$t_{rr}$	$I_F = \pm 20$	-	-	0.35	$\mu s$	
Resistance	R	T = 25°C	-	5000	-	$\Omega$	
		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)	Rth(j-c)	Inverter IGBT	-	-	0.31	°C/W
		Inverter FWD	-	-	0.60	
Contact thermal resistance (1device) (*4)	Rth(c-f)	with Thermal Compound	-	0.05	-	

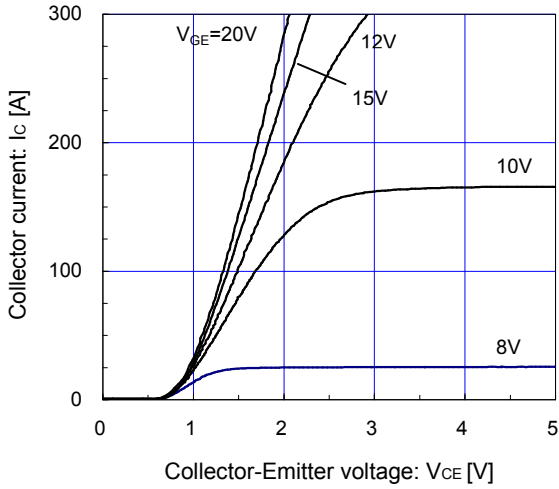
Note \*4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Equivalent Circuit Schematic

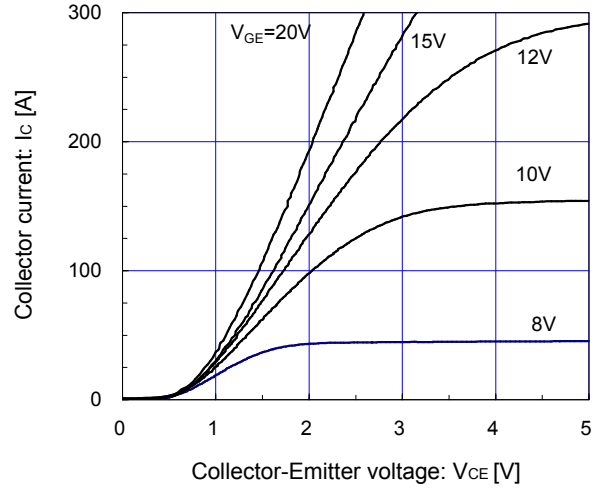


■ Characteristics (Representative)

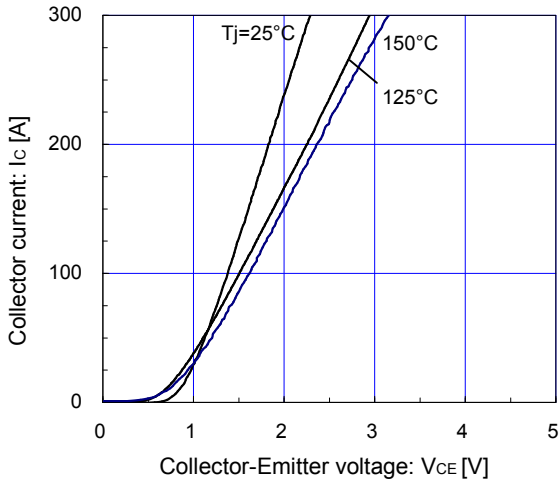
[ Inverter ]  
 Collector current vs. Collector-Emmitter voltage (typ.)  
 $T_j = 25^\circ\text{C}$  / chip



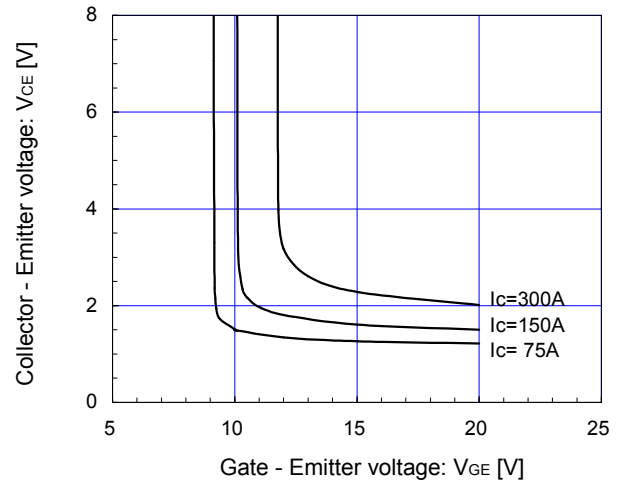
[ Inverter ]  
 Collector current vs. Collector-Emmitter voltage (typ.)  
 $T_j = 150^\circ\text{C}$  / chip



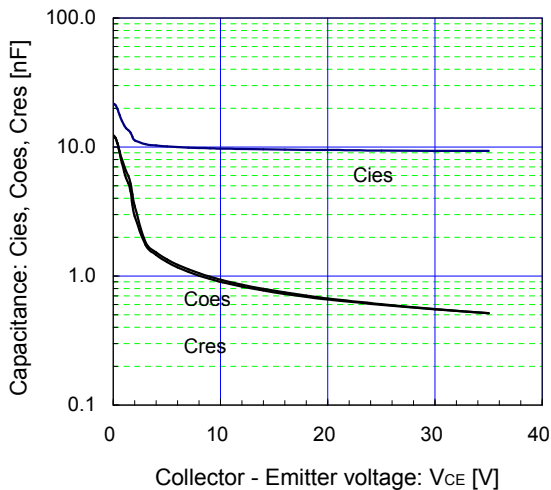
[ Inverter ]  
 Collector current vs. Collector-Emmitter voltage (typ.)  
 $V_{GE} = 15\text{V}$  / chip



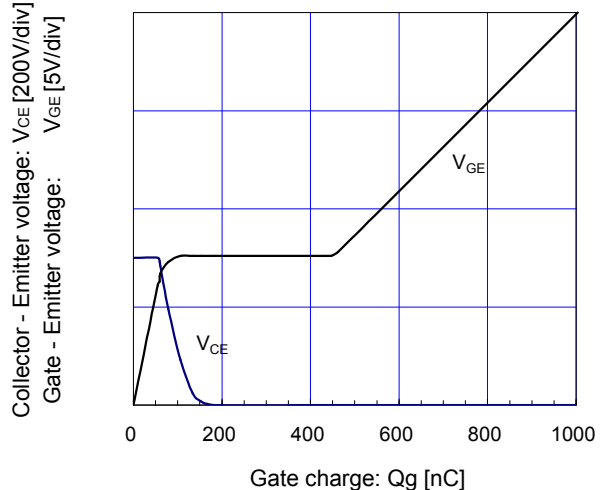
[ Inverter ]  
 Collector-Emmitter voltage vs. Gate-Emmitter voltage (typ.)  
 $T_j = 25^\circ\text{C}$  / chip



[ Inverter ]  
 Capacitance vs. Collector-Emmitter voltage (typ.)  
 $V_{GE} = 0\text{V}$ ,  $f = 1\text{MHz}$ ,  $T_j = 25^\circ\text{C}$

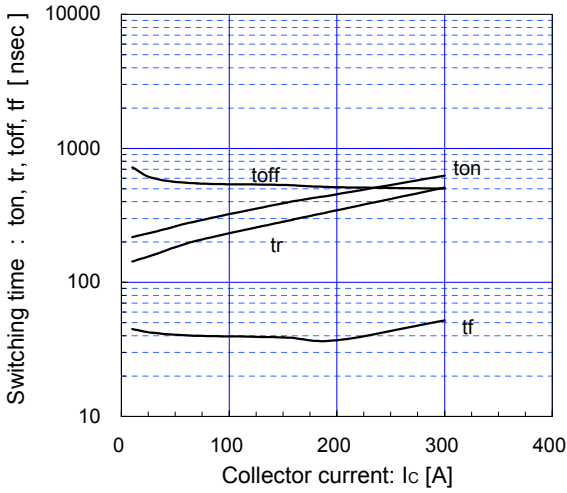


[ Inverter ]  
 Dynamic gate charge (typ.)  
 $V_{CC} = 300\text{V}$ ,  $I_C = 150\text{A}$ ,  $T_j = 25^\circ\text{C}$



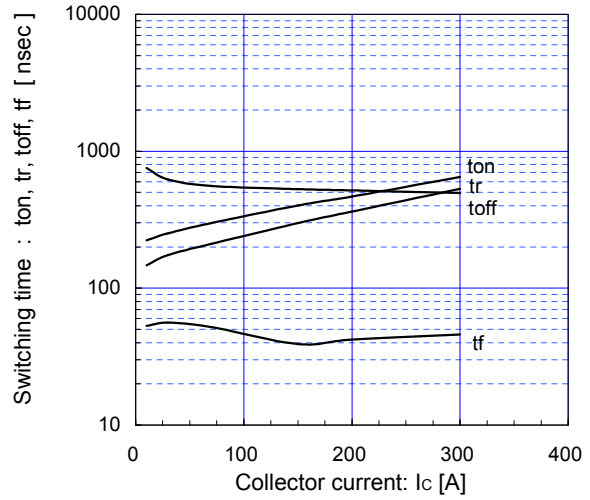
[ Inverter ]

Switching time vs. Collector current (typ.)  
 $V_{cc}=300V, V_{GE}=\pm 15V, R_g=9\Omega, T_j=125^\circ C$



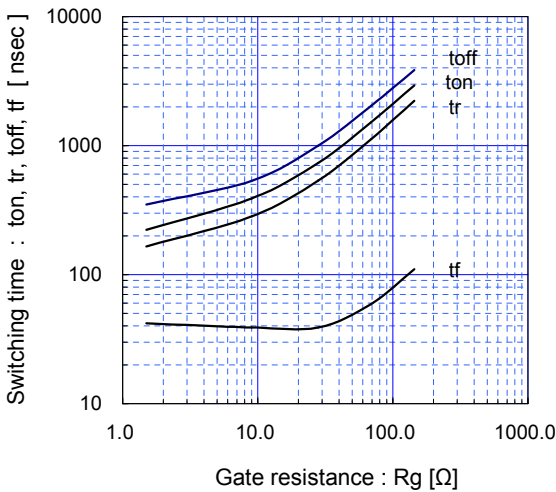
[ Inverter ]

Switching time vs. Collector current (typ.)  
 $V_{cc}=300V, V_{GE}=\pm 15V, R_g=9\Omega, T_j=150^\circ C$



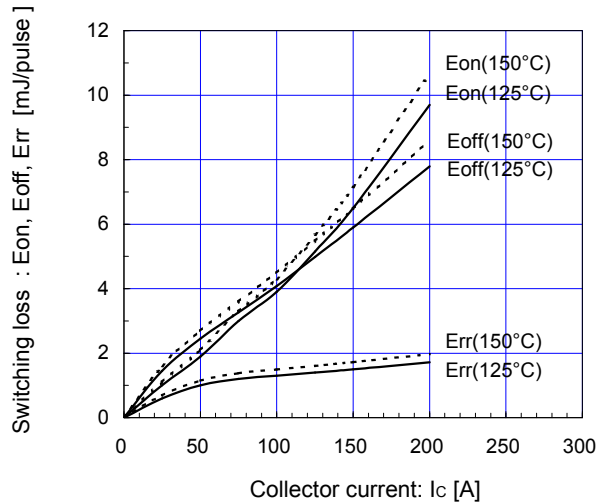
[ Inverter ]

Switching time vs. gate resistance (typ.)  
 $V_{cc}=300V, I_c=150A, V_{GE}=\pm 15V, T_j=125^\circ C$



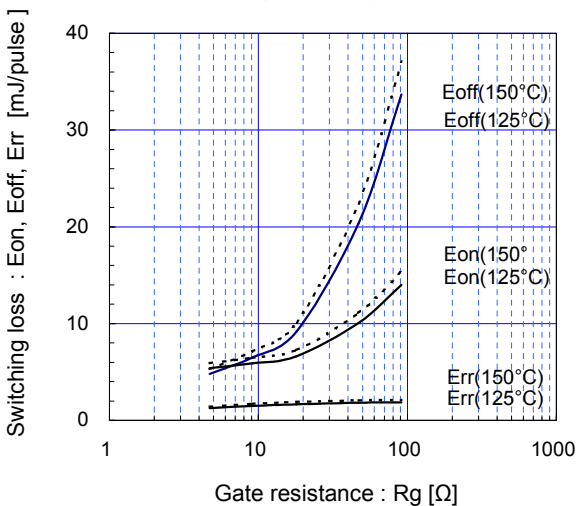
[ Inverter ]

Switching loss vs. Collector current (typ.)  
 $V_{cc}=300V, V_{GE}=\pm 15V, R_g=9\Omega$



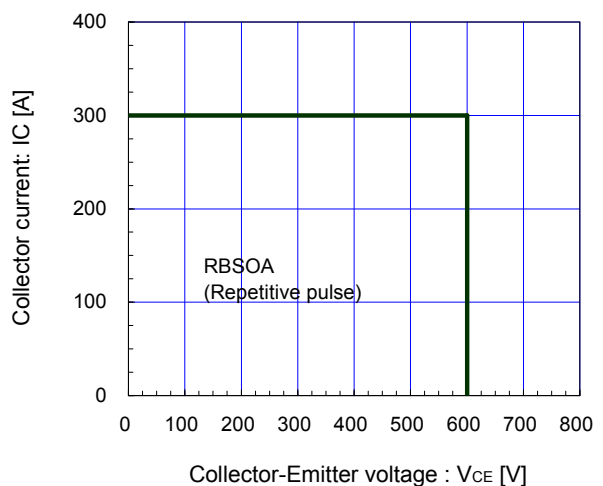
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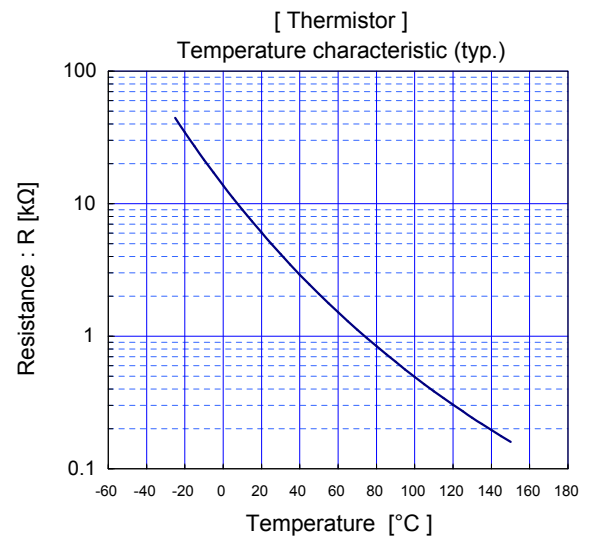
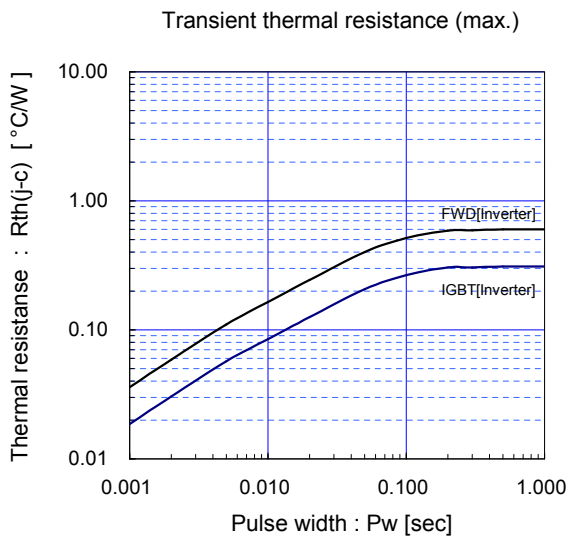
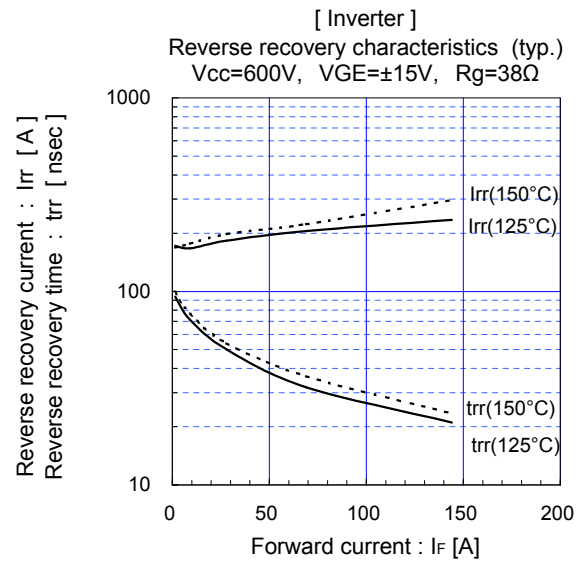
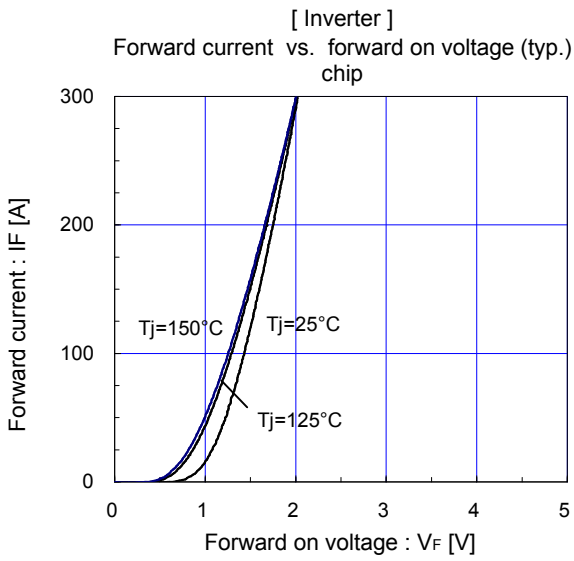
Switching loss vs. gate resistance (typ.)  
 $V_{cc}=300V, I_c=150A, V_{GE}=\pm 15V$



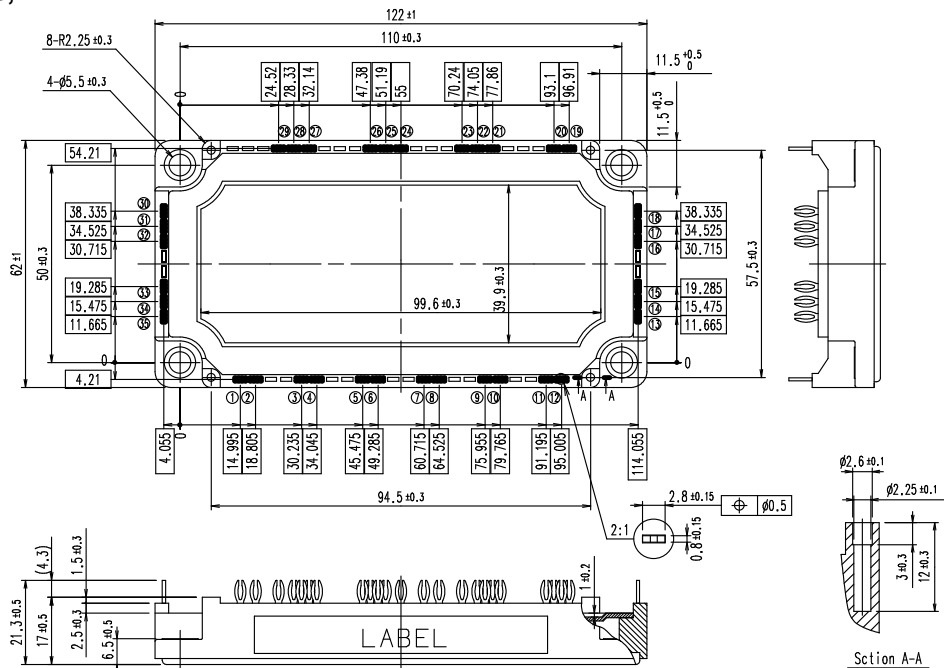
[ Inverter ]

Reverse bias safe operating area (max.)  
 $+V_{GE}=15V, -V_{GE} \leq 15V, R_g \geq 9\Omega, T_j \leq 125^\circ C$





■ Outline Drawings, mm



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