

# 6MBI50VW-120-50

**IGBT Modules**

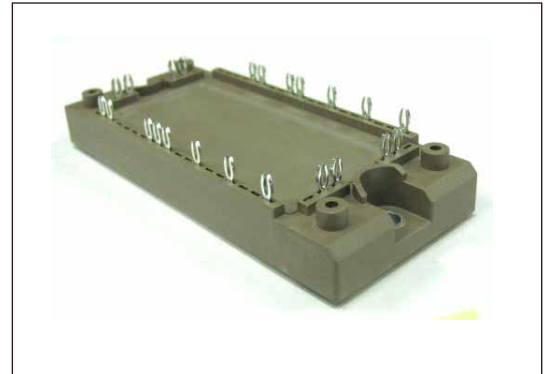
## IGBT MODULE (V series) 1200V / 50A / 6 in one package

### ■ 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	$T_c=100^\circ\text{C}$	50	A
		$I_{cp}$	1ms	$T_c=80^\circ\text{C}$	100	
		$-I_c$			50	
		$-I_c$ pulse	1ms		100	
Collector power dissipation	$P_c$	1 device		280	W	
Maximum junction temperature		$T_{jmax}$			175	$^\circ\text{C}$
Temperature under switching conditions		$T_{jop}$			150	
Case temperature		$T_c$			125	
Storage temperature		$T_{stg}$			$-40 \sim +125$	
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)

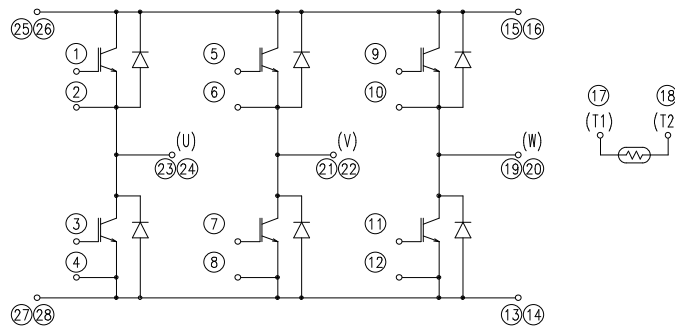
Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
<b>Zero gate voltage collector current</b>	$I_{CES}$	$V_{GE} = 0V, V_{CE} = 1200V$	-	-	1.0	mA	
<b>Gate-Emitter leakage current</b>	$I_{GES}$	$V_{GE} = 0V, V_{GE} = \pm 20V$	-	-	200	nA	
<b>Gate-Emitter threshold voltage</b>	$V_{GE(th)}$	$V_{CE} = 20V, I_c = 50mA$	6.0	6.5	7.0	V	
<b>Collector-Emitter saturation voltage</b>	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_c = 50A$	Tj=25°C	-	2.15	2.60	V
			Tj=125°C	-	2.50	-	
			Tj=150°C	-	2.55	-	
	$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_c = 50A$	Tj=25°C	-	1.85	2.30	
			Tj=125°C	-	2.20	-	
			Tj=150°C	-	2.25	-	
<b>Internal gate resistance</b>	$R_g(int)$	-	-	4	-	Ω	
<b>Input capacitance</b>	$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	-	4.2	-	nF	
<b>Turn-on time</b>	$t_{on}$	$V_{CC} = 600V$ $I_c = 50A$ $V_{GE} = +15 / -15V$ $R_g = 15Ω$	-	0.39	1.20	μs	
	$t_r$		-	0.09	0.60		
	$t_r(i)$		-	0.03	-		
<b>Turn-off time</b>	$t_{off}$	$R_g = 15Ω$	-	0.53	1.00	μs	
	$t_f$		-	0.06	0.30		
<b>Forward on voltage</b>	$V_F$ (terminal)	$I_F = 50A$	Tj=25°C	-	2.00	2.45	V
			Tj=125°C	-	2.15	-	
			Tj=150°C	-	2.10	-	
	$V_F$ (chip)	$I_F = 50A$	Tj=25°C	-	1.70	2.15	
			Tj=125°C	-	1.85	-	
			Tj=150°C	-	1.80	-	
<b>Reverse recovery time</b>	$t_{rr}$	$I_F = 50A$	-	-	0.35	μs	
<b>Resistance</b>	R	T = 25°C	-	5000	-	Ω	
		T = 100°C	465	495	520		
		T = 25 / 50°C	3305	3375	3450		
<b>B value</b>	B	T = 25 / 50°C	3305	3375	3450	K	

● Thermal resistance characteristics

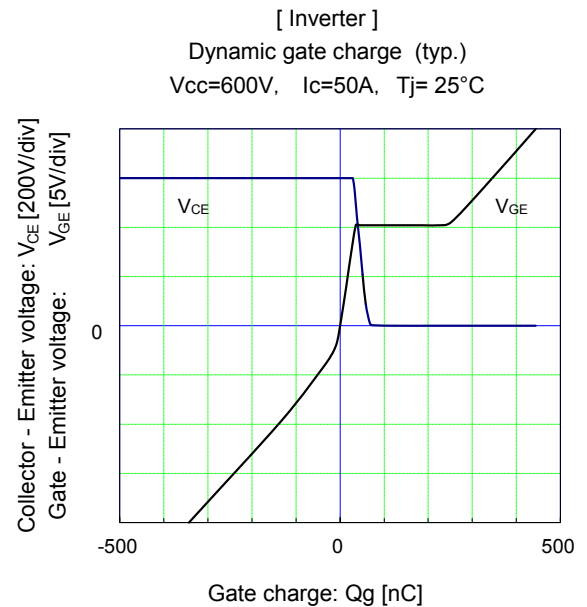
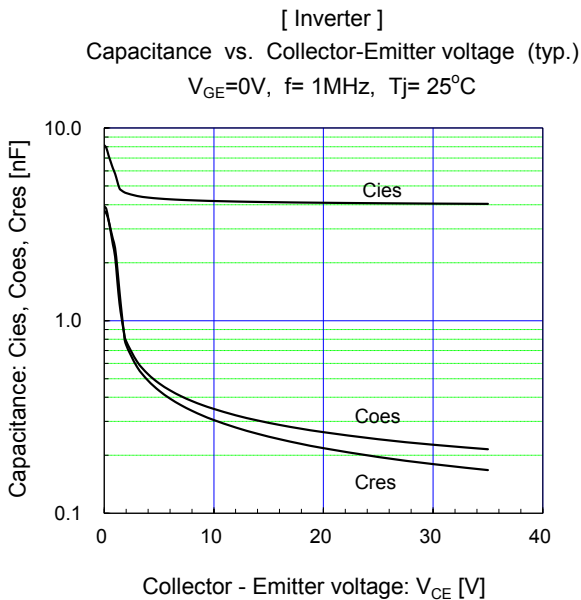
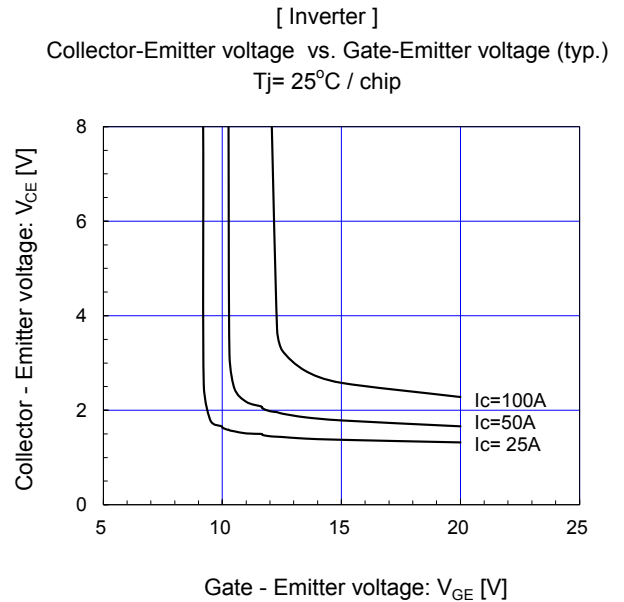
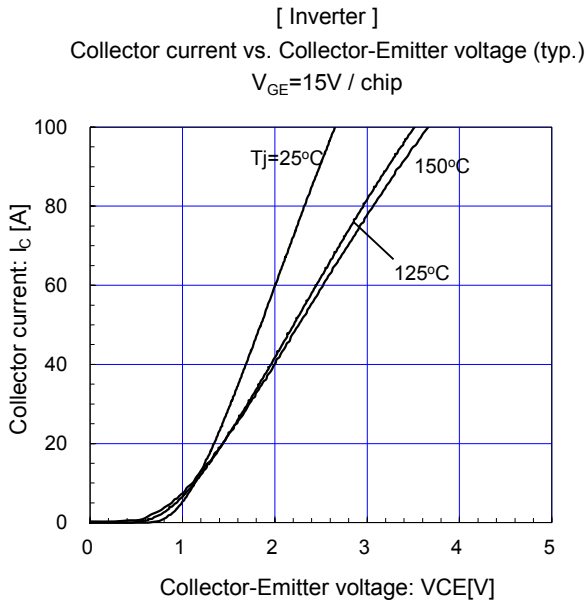
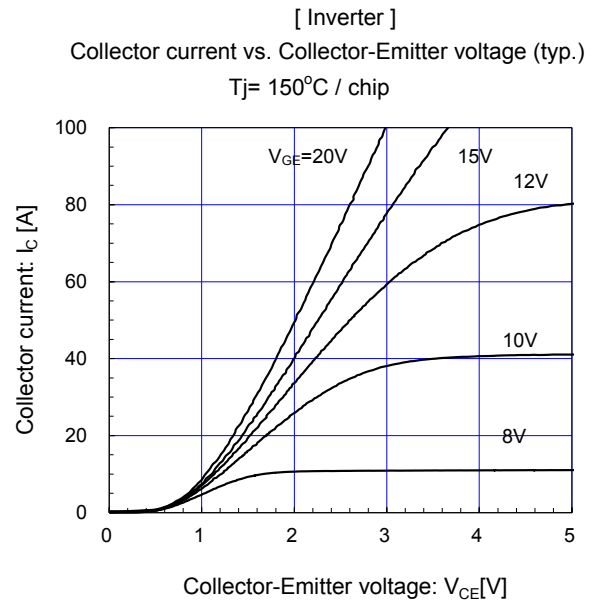
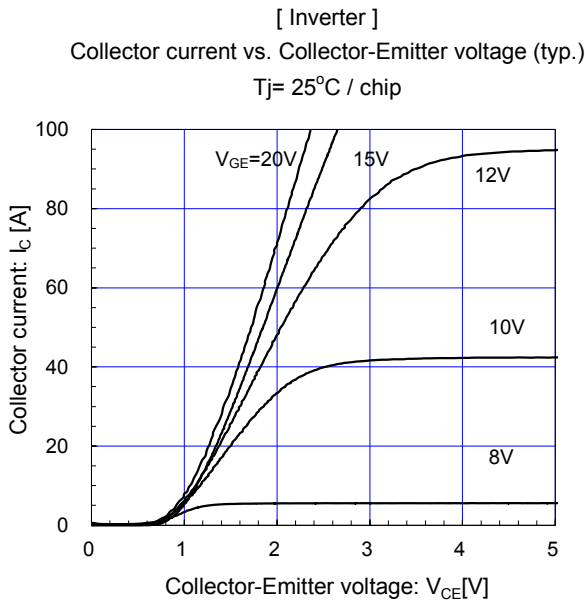
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
<b>Thermal resistance (1device)</b>	Rth(j-c)	Inverter IGBT	-	-	0.54	°C/W
		Inverter FWD	-	-	0.73	
<b>Contact thermal resistance (1device) (*4)</b>	Rth(c-f)	with Thermal Compound	-	0.05	-	

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

■ Equivalent Circuit Schematic

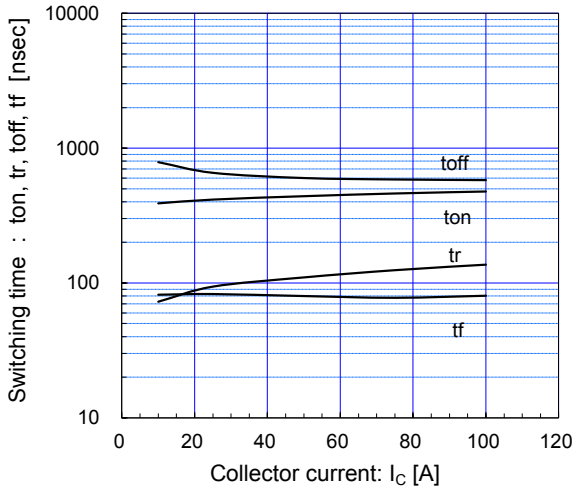


■ Characteristics (Representative)



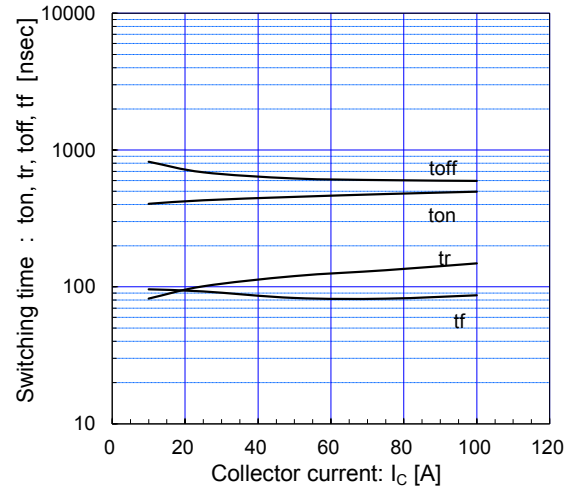
[ Inverter ]

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



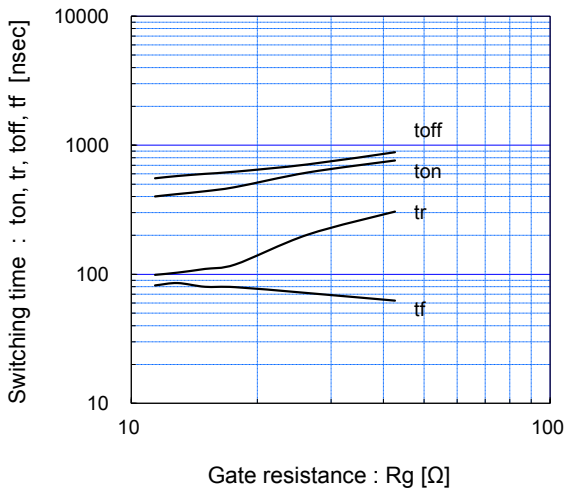
[ Inverter ]

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



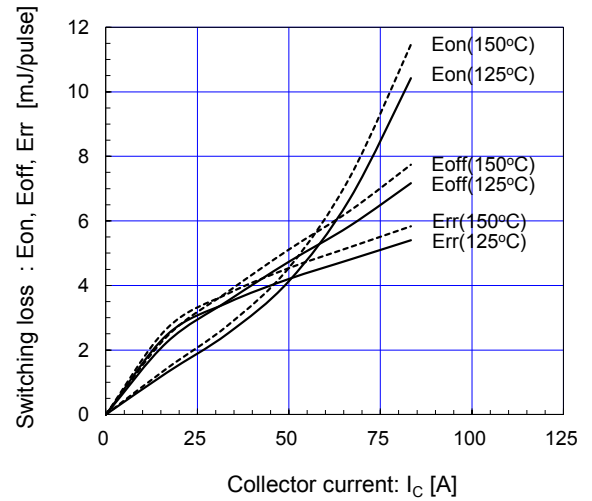
[ Inverter ]

Switching time vs. gate resistance (typ.)  
 $V_{cc}=600V, I_c=50A, V_{GE}=\pm 15V, T_j=125^\circ C$



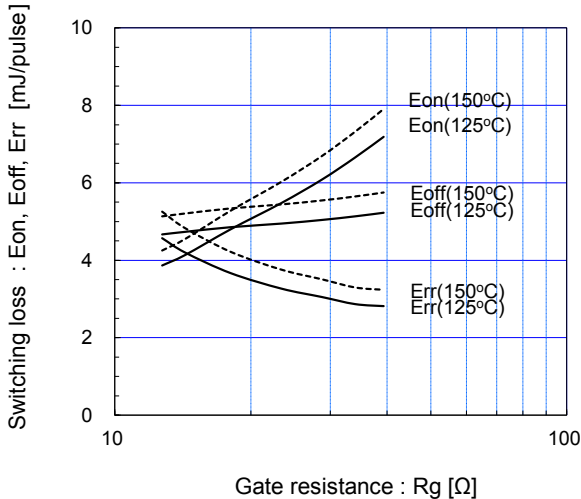
[ Inverter ]

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



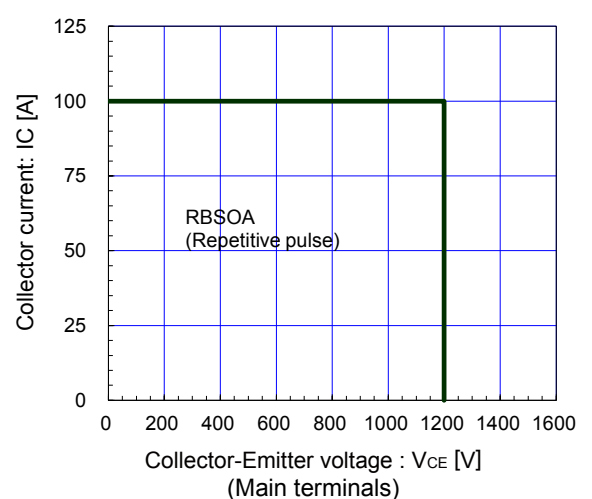
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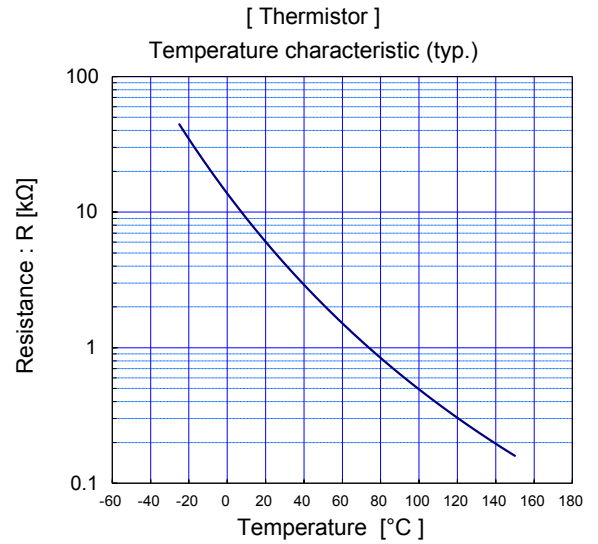
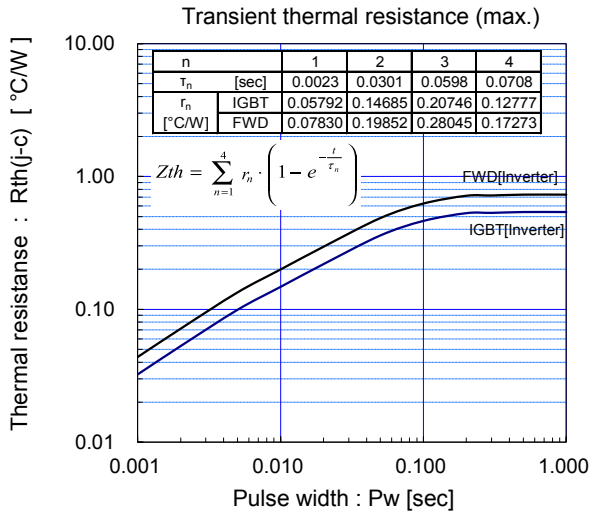
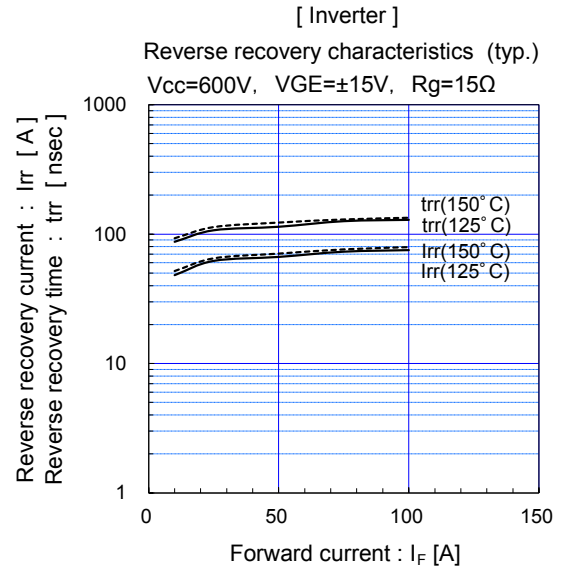
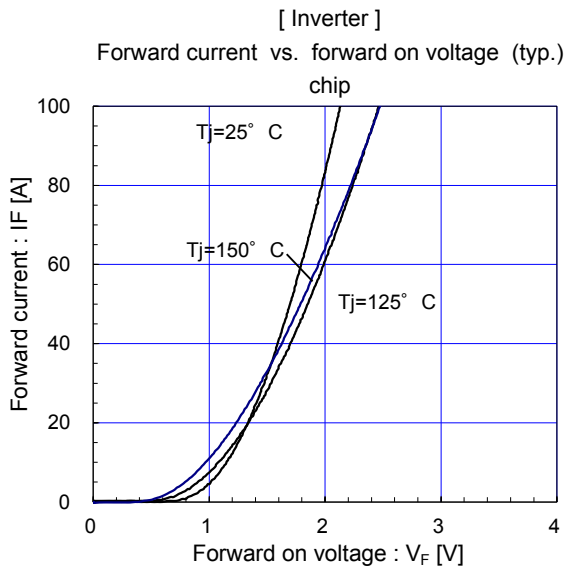
Switching loss vs. gate resistance (typ.)  
 $V_{cc}=600V, I_c=50A, V_{GE}=\pm 15V$



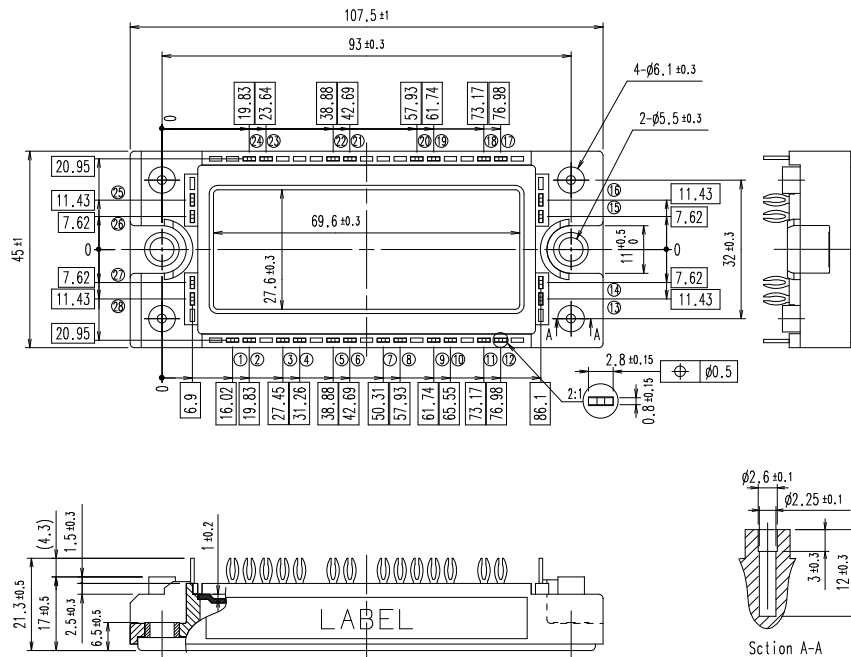
[ Inverter ]

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





■ Outline Drawings, mm



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