

6MBI50VA-120-50

IGBT Modules

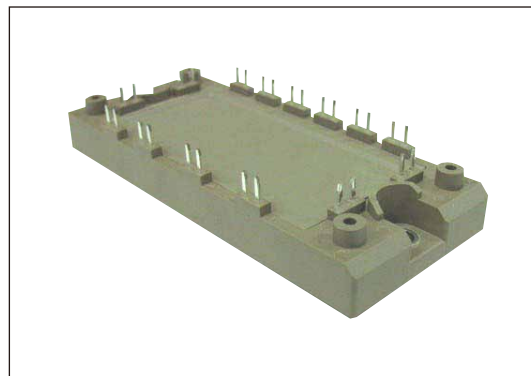
IGBT MODULE (V series) 1200V / 50A / 6 in one package

■ 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}			±20	V
	Collector current	I _c	Continuous	T _c =100°C	50	A
		I _{cp}	1ms	T _c =80°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	°C
Temperature under switching conditions		T _{jop}			150	
Case temperature		T _c			125	
Storage temperature		T _{stg}			-40~+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)

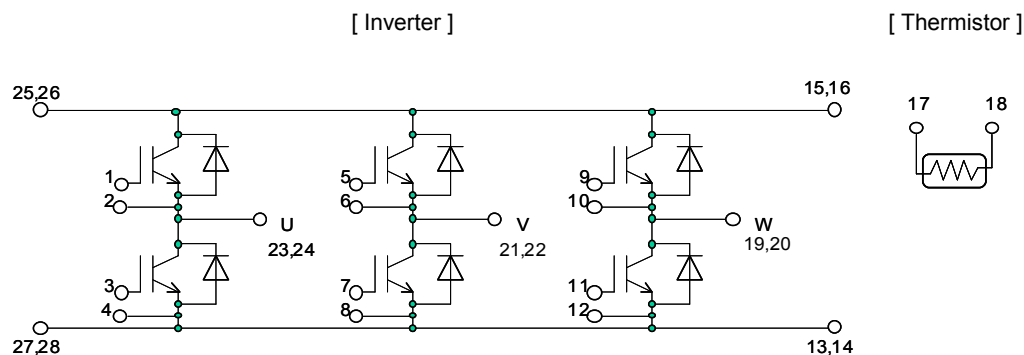
Items		Symbols	Conditions		Characteristics			Units	
					min.	typ.	max.		
Inverter	Zero gate voltage collector current	I _{CES}	V _{GE} = 0V, V _{CE} = 1200V		-	-	1.0	mA	
	Gate-Emitter leakage current	I _{GES}	V _{GE} = 0V, V _{GE} = ±20V		-	-	200	nA	
	Gate-Emitter threshold voltage	V _{GE (th)}	V _{CE} = 20V, I _C = 50mA		6.0	6.5	7.0	V	
	Collector-Emitter saturation voltage	V _{CE (sat)} (terminal)	V _{GE} = 15V I _C = 50A	T _J =25°C	-	2.15	2.60	V	
				T _J =125°C	-	2.50	-		
				T _J =150°C	-	2.55	-		
		V _{CE (sat)} (chip)	V _{GE} = 15V I _C = 50A	T _J =25°C	-	1.85	2.30		
				T _J =125°C	-	2.20	-		
				T _J =150°C	-	2.25	-		
	Internal gate resistance	R _g (int)	-		-	4	-	Ω	
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz		-	4.2	-	nF	
	Turn-on time	ton	V _{CC} = 600V I _C = 50A V _{GE} = +15 / -15V R _G = 15Ω		-	0.39	1.20	μs	
		tr			-	0.09	0.60		
		tr (i)			-	0.03	-		
		Turn-off time			toff	-	0.53		1.00
					tf	-	0.06		0.30
						Forward on voltage	V _F (terminal)		I _F = 50A
T _J =125°C	-	2.15	-						
T _J =150°C	-	2.10	-						
V _F (chip)	I _F = 50A	T _J =25°C	-	1.70	2.15				
		T _J =125°C	-	1.85	-				
		T _J =150°C	-	1.80	-				
Reverse recovery time	trr	I _F = 50A		-	-	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)	Rth(j-c)	Inverter IGBT	-	-	0.54	°C/W
		Inverter FWD	-	-	0.73	
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.

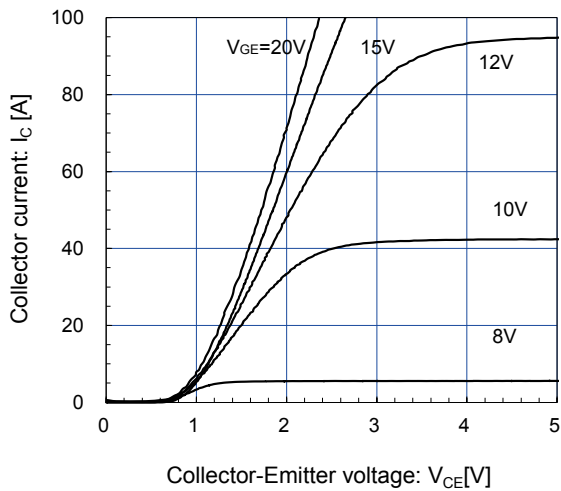
■ Equivalent Circuit Schematic



■ Characteristics (Representative)

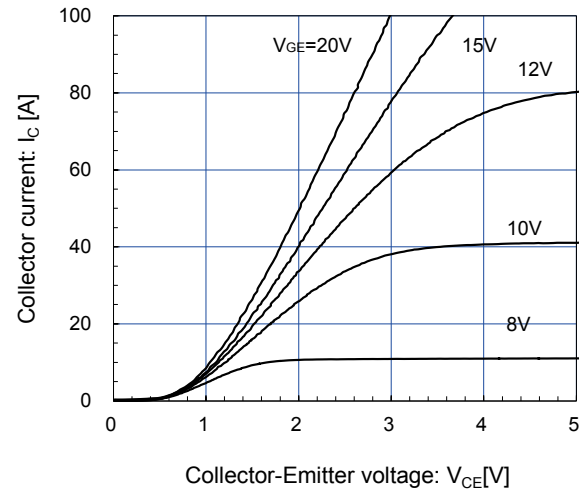
[Inverter]

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

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

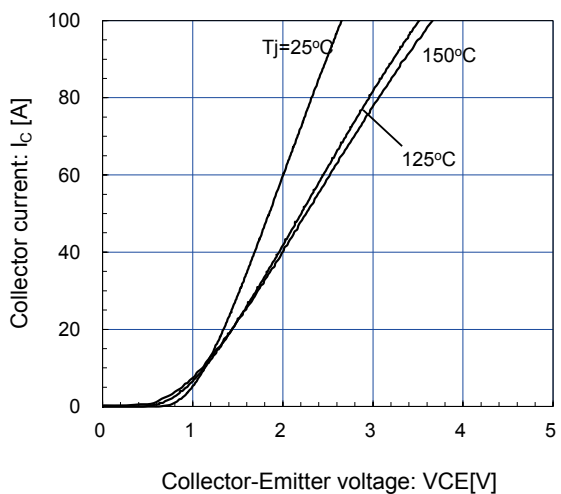
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Collector current vs. Collector-Emittor voltage (typ.)

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

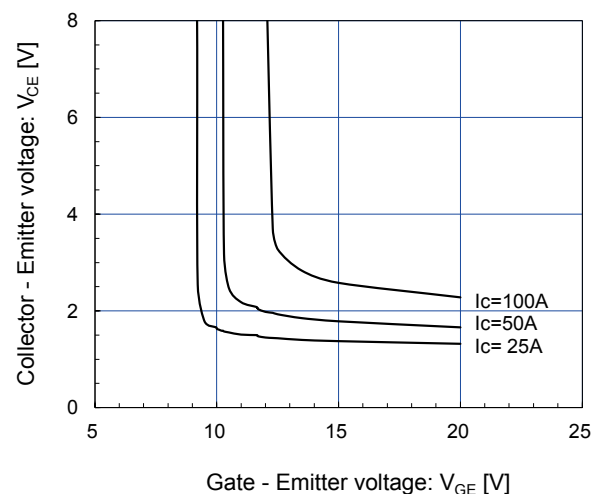
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Collector current vs. Collector-Emittor voltage (typ.)

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

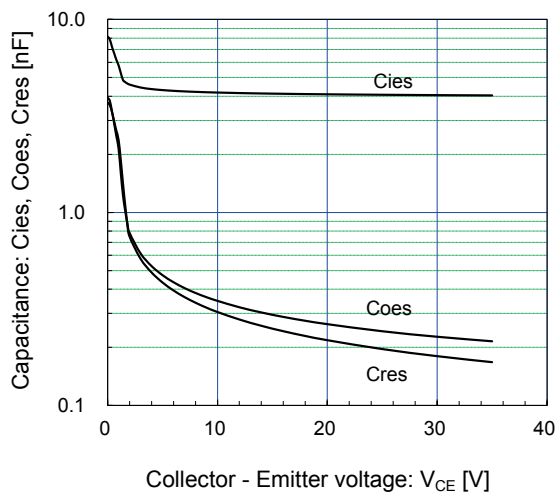
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Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)

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

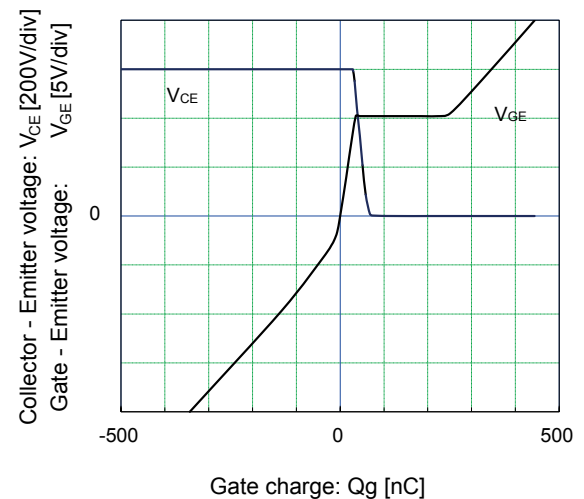
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Capacitance vs. Collector-Emittor voltage (typ.)

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

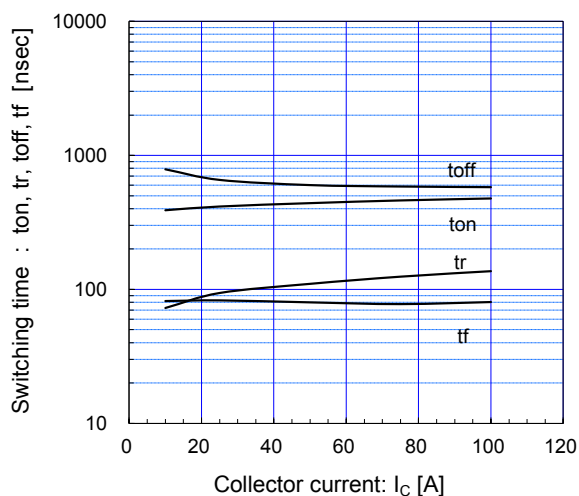
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Dynamic gate charge (typ.)

 $V_{CC} = 600\text{V}$, $I_c = 50\text{A}$, $T_j = 25^\circ\text{C}$ 

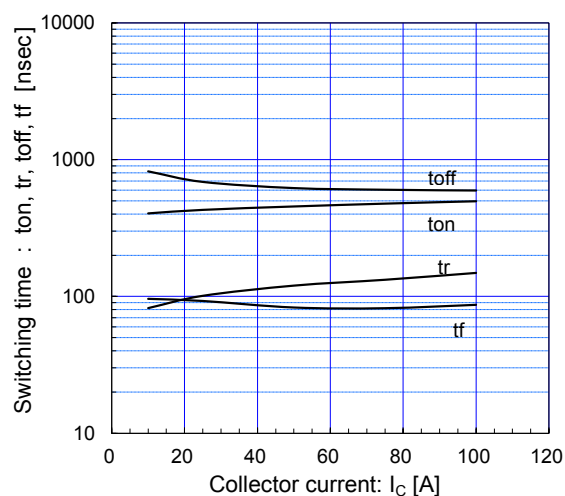
[Inverter]

Switching time vs. Collector current (typ.)

 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=15\Omega$, $T_j=125^\circ C$ 

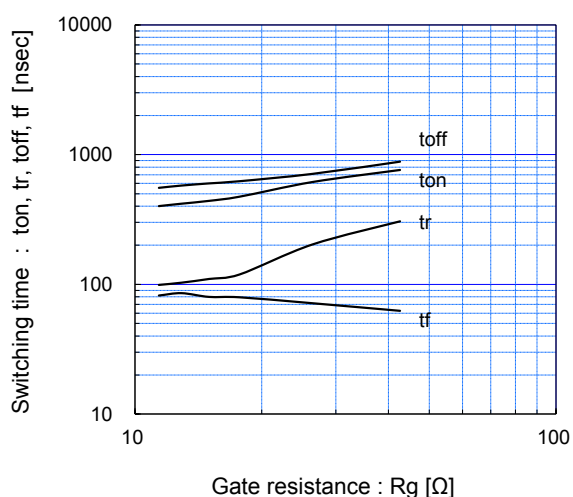
[Inverter]

Switching time vs. Collector current (typ.)

 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=15\Omega$, $T_j=150^\circ C$ 

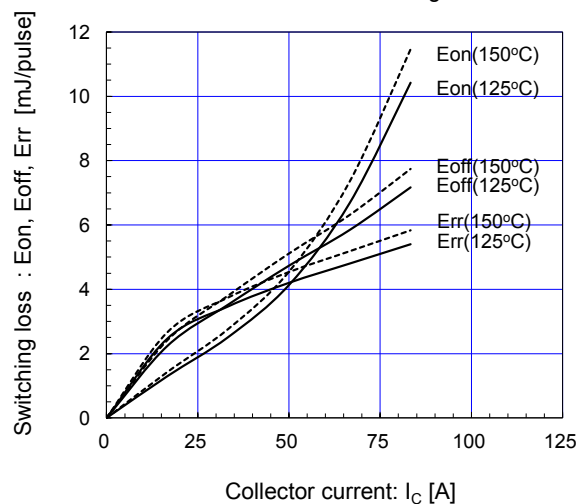
[Inverter]

Switching time vs. gate resistance (typ.)

 $V_{CC}=600V$, $I_C=50A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$ 

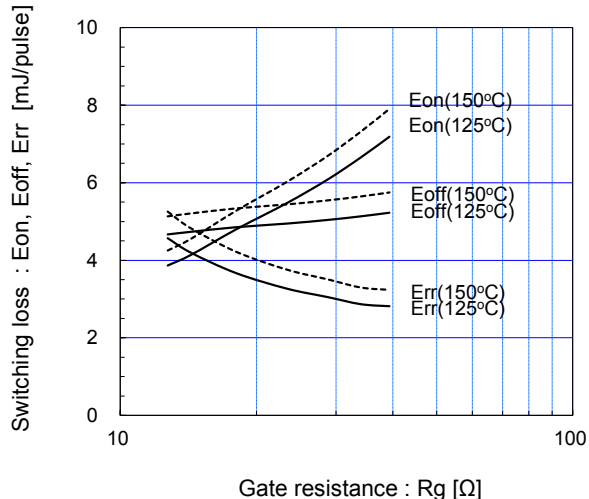
[Inverter]

Switching loss vs. Collector current (typ.)

 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=15\Omega$ 

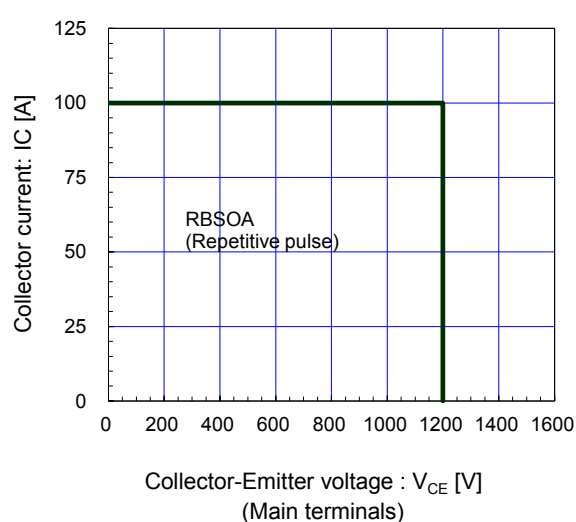
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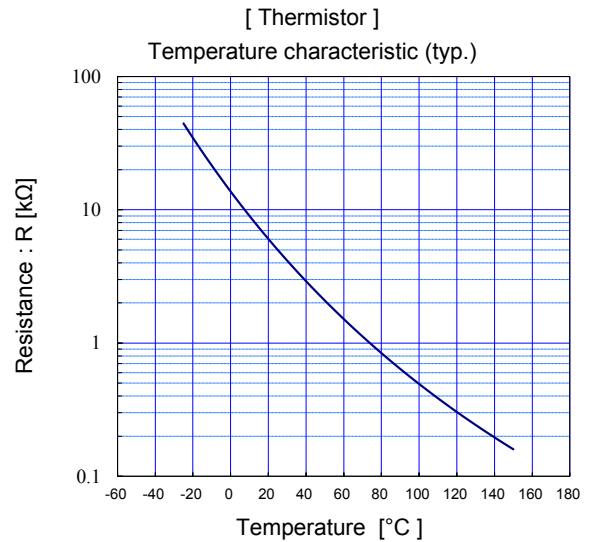
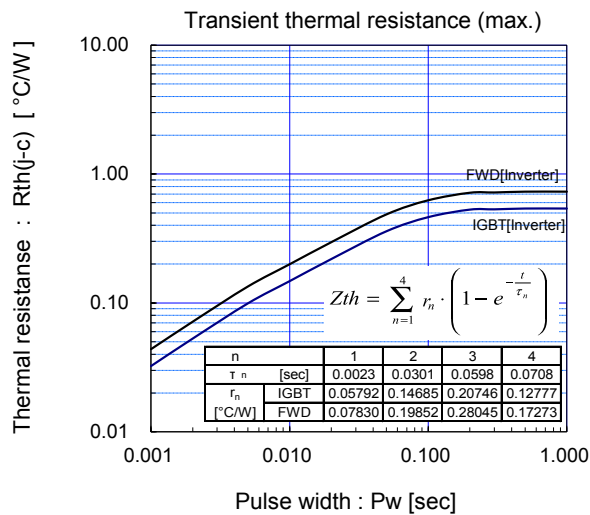
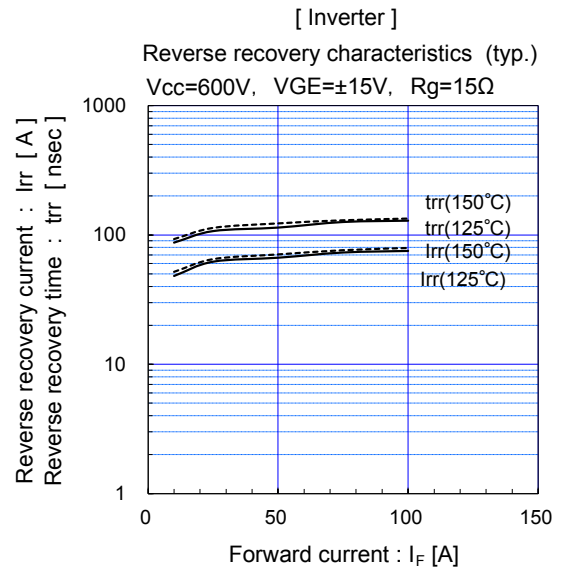
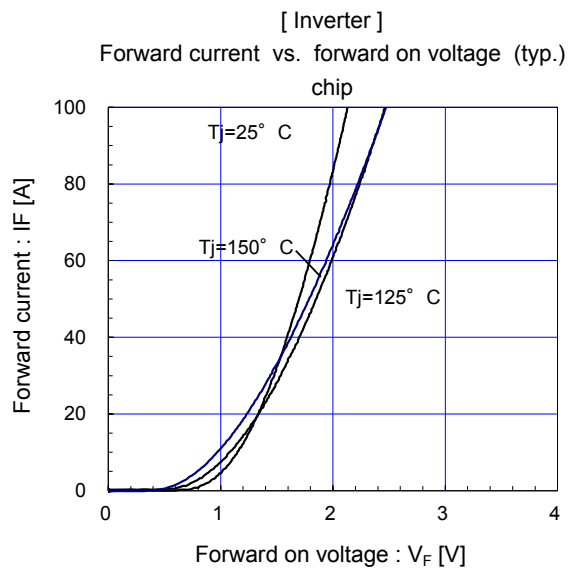
Switching loss vs. gate resistance (typ.)

 $V_{CC}=600V$, $I_C=50A$, $V_{GE}=\pm 15V$ 

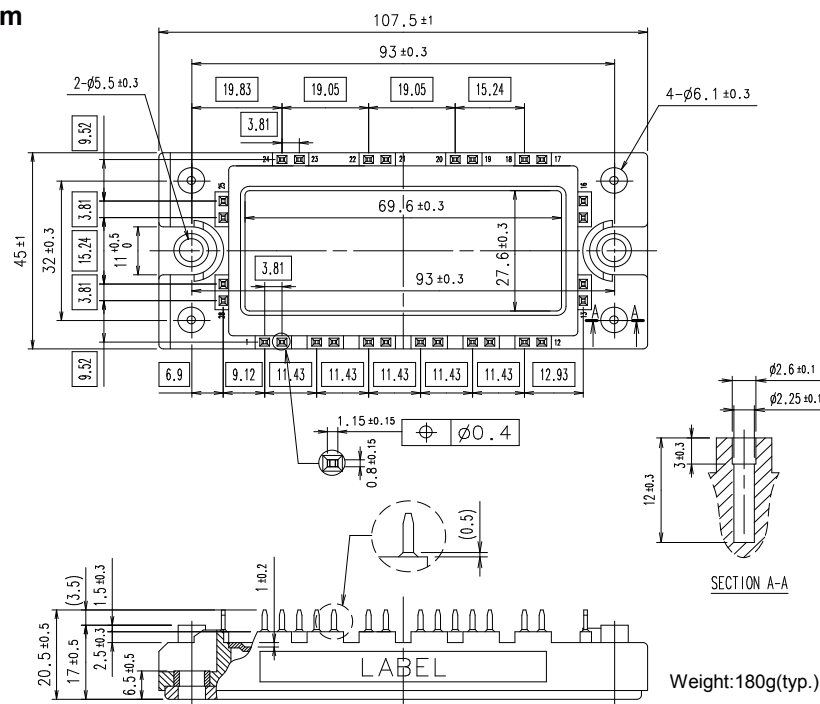
[Inverter]

Reverse bias safe operating area (max.)

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



Outline Drawings, mm



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