

# 2MBI600VN-120-50

## IGBT MODULE (V series) 1200V / 600A / 2 in one package

### ■ Features

- High speed switching
- Voltage drive
- Low Inductance module structure

### ■ 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 Tc=25°C unless otherwise specified)

Items	Symbols	Conditions	Maximum ratings	Units	
Inverter	Collector-Emitter voltage	V <sub>CEs</sub>	1200	V	
	Gate-Emitter voltage	V <sub>GES</sub>	±20	V	
	Collector current	I <sub>c</sub>	Continuous T <sub>c</sub> =80°C	600	A
		I <sub>c</sub> pulse	1ms T <sub>c</sub> =80°C	1200	
		-I <sub>c</sub>		600	
	-I <sub>c</sub> pulse	1ms	1200		
Collector power dissipation	P <sub>c</sub>	1 device	3750	W	
Junction temperature	T <sub>j</sub>		175	°C	
Operating junction temperature (under switching conditions)	T <sub>top</sub>		150		
Case temperature	T <sub>c</sub>		125		
Storage temperature	T <sub>stg</sub>		-40 to +125		
Isolation voltage	V <sub>iso</sub>	AC : 1min.	2500	VAC	
					between terminal and copper base (*1) between thermistor and others (*2)
Screw torque	Mounting (*3)		3.5	N m	
	Terminals (*4)		4.5		

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 : Mounting : 2.5-3.5 Nm (M5) Note \*4: Recommendable value : Terminals : 3.5-4.5 Nm (M6)

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

Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage collector current	I <sub>CEs</sub>	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 1200V	-	-	3.0	mA	
Gate-Emitter leakage current	I <sub>GES</sub>	V <sub>CE</sub> = 0V, V <sub>GE</sub> = ±20V	-	-	600	nA	
Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> = 20V, I <sub>c</sub> = 600mA	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub> (terminal)	V <sub>GE</sub> = 15V I <sub>c</sub> = 600A	T <sub>j</sub> =25°C	-	2.65	3.10	V
			T <sub>j</sub> =125°C	-	3.00	-	
			T <sub>j</sub> =150°C	-	3.05	-	
	V <sub>CE(sat)</sub> (chip)		T <sub>j</sub> =25°C	-	1.85	2.30	
			T <sub>j</sub> =125°C	-	2.20	-	
			T <sub>j</sub> =150°C	-	2.25	-	
Inverter	Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz	-	48	-	nF
	Turn-on time	t <sub>on</sub>	V <sub>CC</sub> = 600V I <sub>c</sub> = 600A V <sub>GE</sub> = ±15V R <sub>G</sub> = 0.62Ω	-	550	1200	nsec
t <sub>r</sub>		-		180	600		
t <sub>r(i)</sub>		-		120	-		
Turn-off time	t <sub>off</sub>	-	1050	2000	nsec		
	t <sub>f</sub>	-	110	350			
Forward on voltage	V <sub>F</sub> (terminal)	V <sub>GE</sub> = 0V I <sub>F</sub> = 600A	T <sub>j</sub> =25°C	-	2.50	3.00	V
			T <sub>j</sub> =125°C	-	2.65	-	
			T <sub>j</sub> =150°C	-	2.60	-	
	V <sub>F</sub> (chip)		T <sub>j</sub> =25°C	-	1.70	2.15	
			T <sub>j</sub> =125°C	-	1.85	-	
			T <sub>j</sub> =150°C	-	1.80	-	
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 600A	-	200	600	nsec	
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

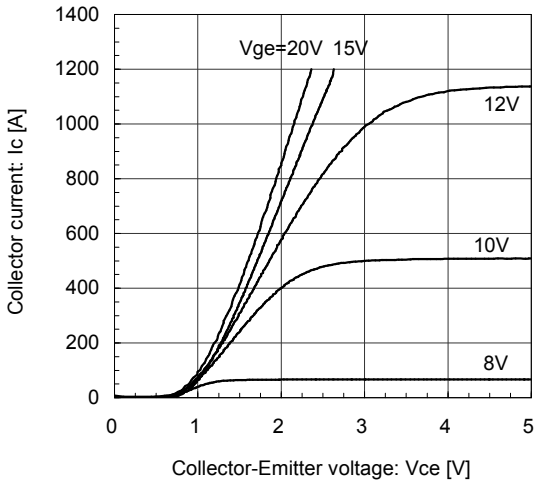
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R <sub>th(j-c)</sub>	Inverter IGBT	-	-	0.04	°C/W
		Inverter FWD	-	-	0.06	
Contact thermal resistance (1device) (*5)	R <sub>th(c-f)</sub>	with Thermal Compound	-	0.0167	-	

Note \*5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

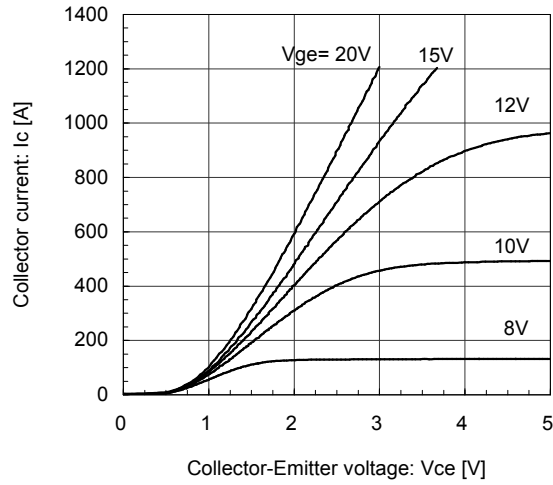
[INVERTER]

Collector current vs. Collector-Emittor voltage (typ.)  
Tj= 25°C / chip



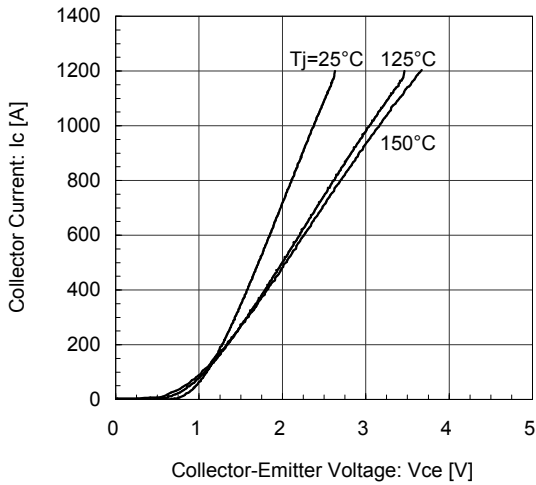
[INVERTER]

Collector current vs. Collector-Emittor voltage (typ.)  
Tj= 150°C / chip



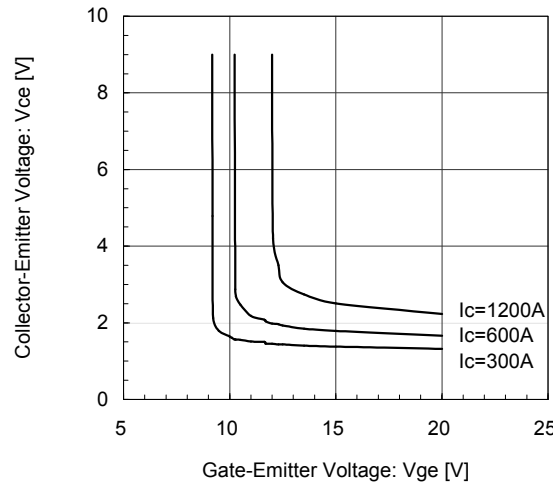
[INVERTER]

Collector current vs. Collector-Emittor voltage (typ.)  
Vge= 15V / chip



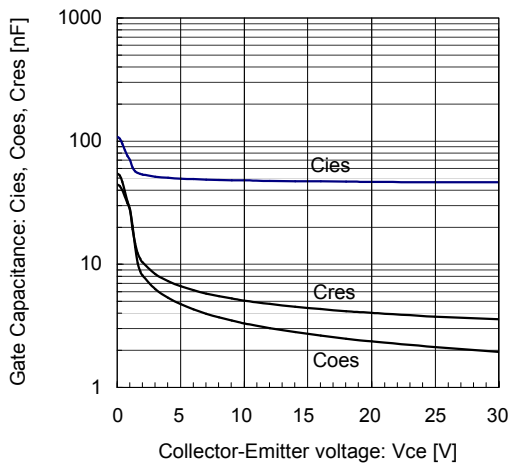
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Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)  
Tj= 25°C / chip



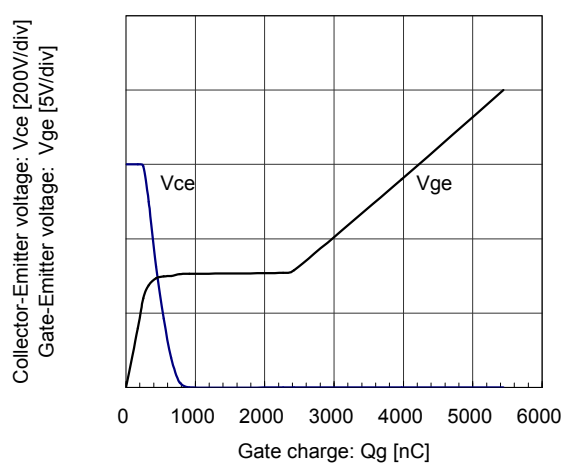
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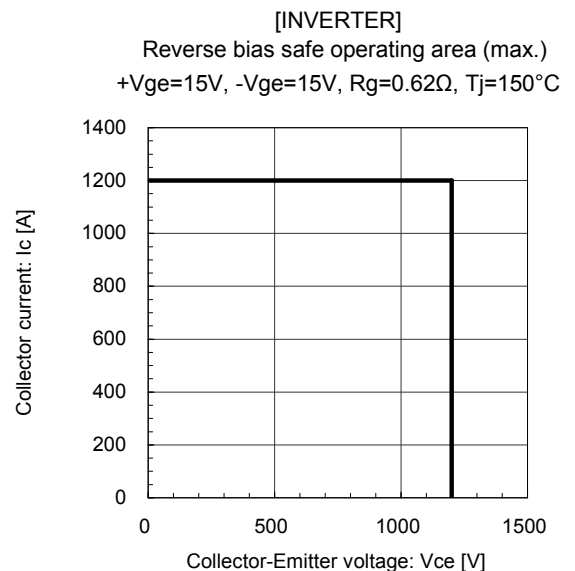
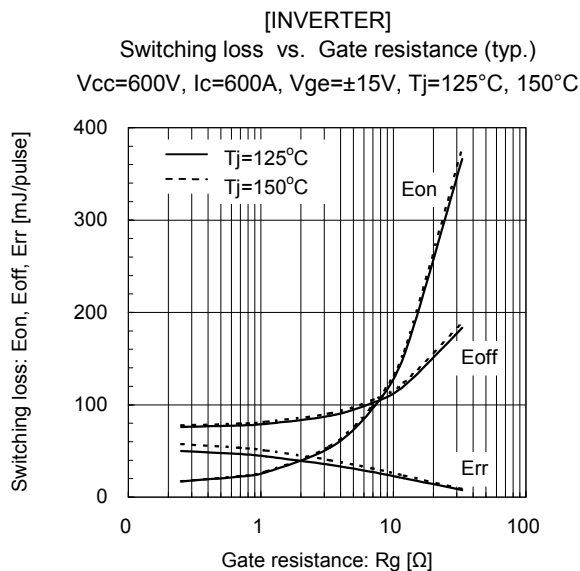
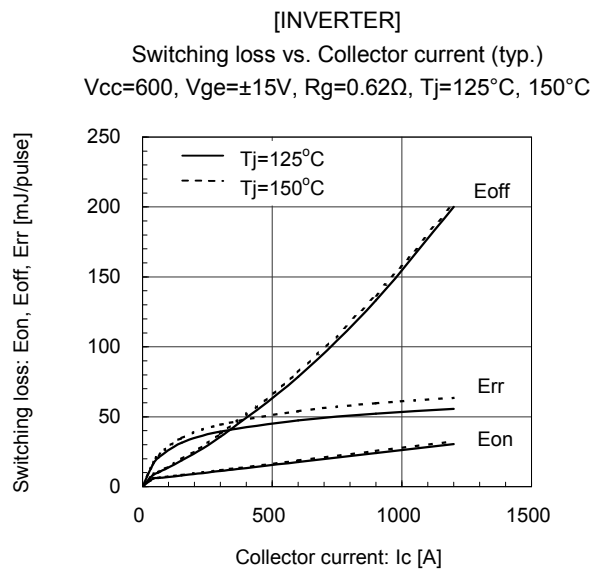
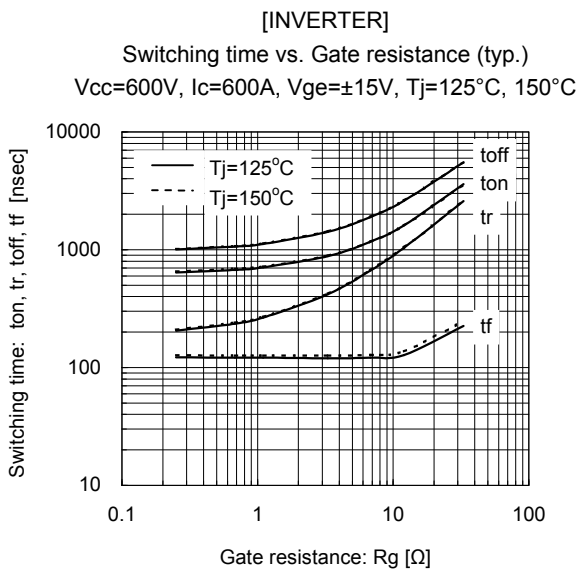
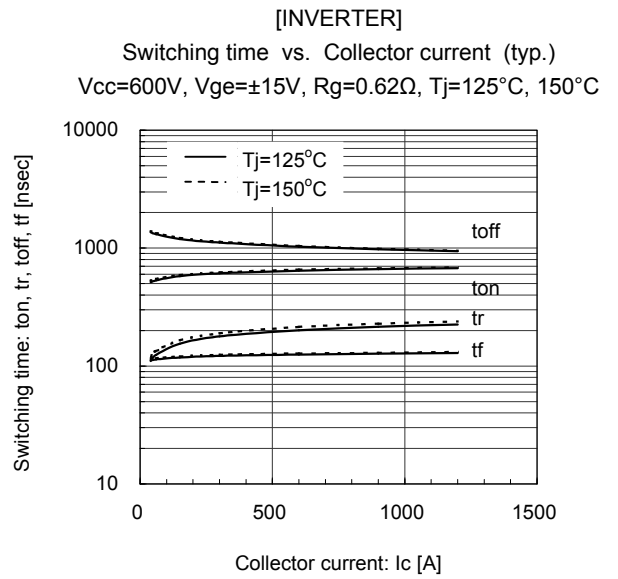
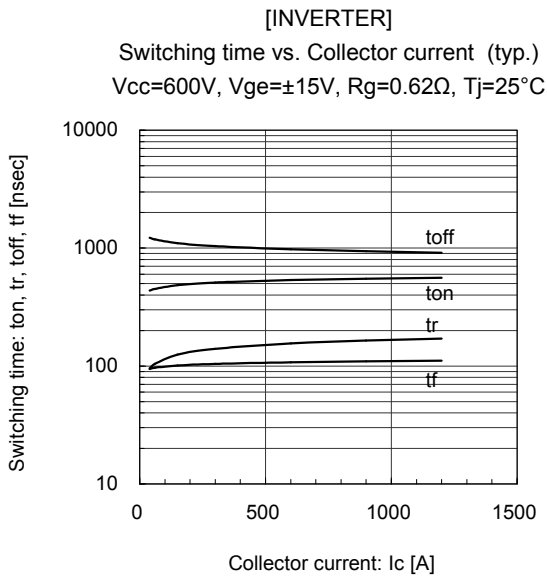
Gate Capacitance vs. Collector-Emittor Voltage (typ.)  
Vge= 0V, f= 1MHz, Tj= 25°C



[INVERTER]

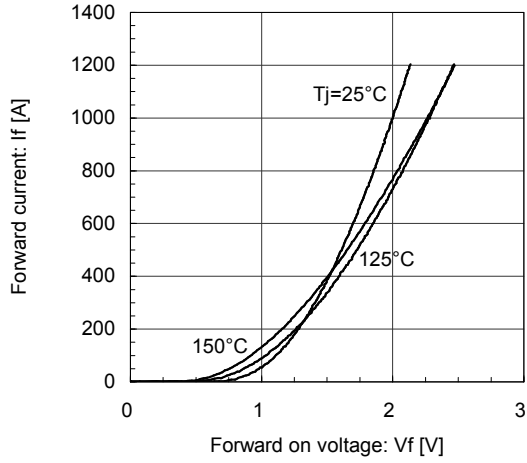
Dynamic Gate Charge (typ.)  
Vcc=600V, Ic=600A, Tj= 25°C





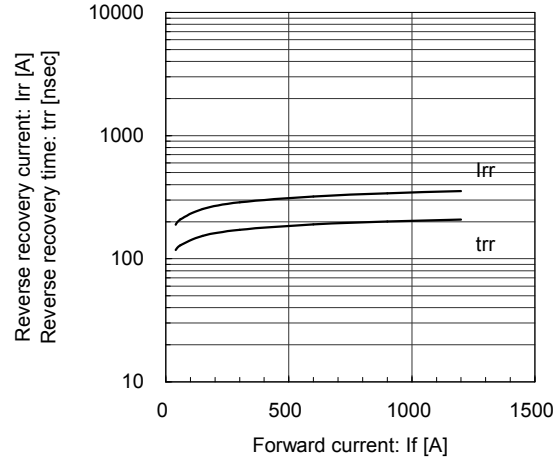
[INVERTER]

Forward Current vs. Forward Voltage (typ.)  
chip



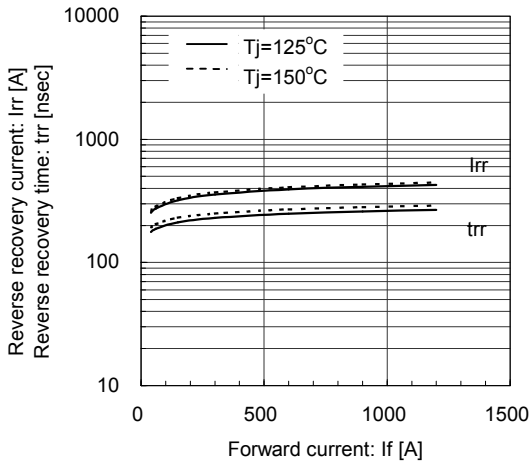
[INVERTER]

Reverse Recovery Characteristics (typ.)  
 $V_{cc}=600\text{V}$ ,  $V_{ge}=\pm 15\text{V}$ ,  $R_g=0.62\Omega$ ,  $T_j=25^\circ\text{C}$

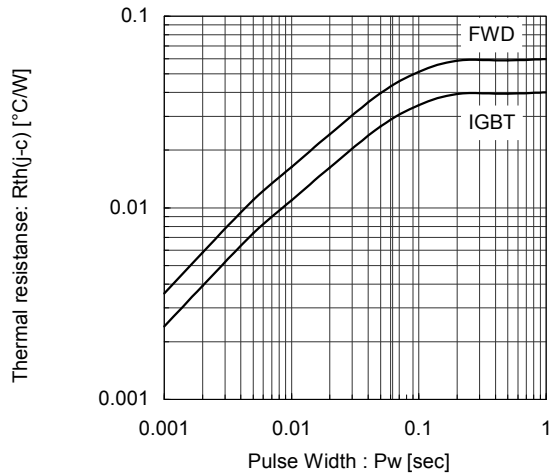


[INVERTER]

Reverse Recovery Characteristics (typ.)  
 $V_{cc}=600\text{V}$ ,  $V_{ge}=\pm 15\text{V}$ ,  $R_g=0.62\Omega$ ,  $T_j=125^\circ\text{C}$ ,  $150^\circ\text{C}$

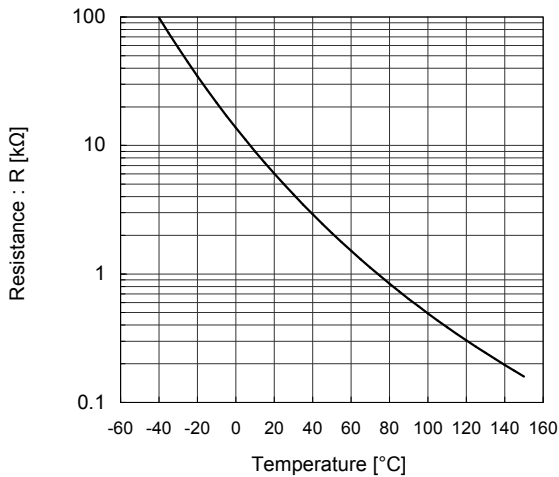


Transient Thermal Resistance (max.)

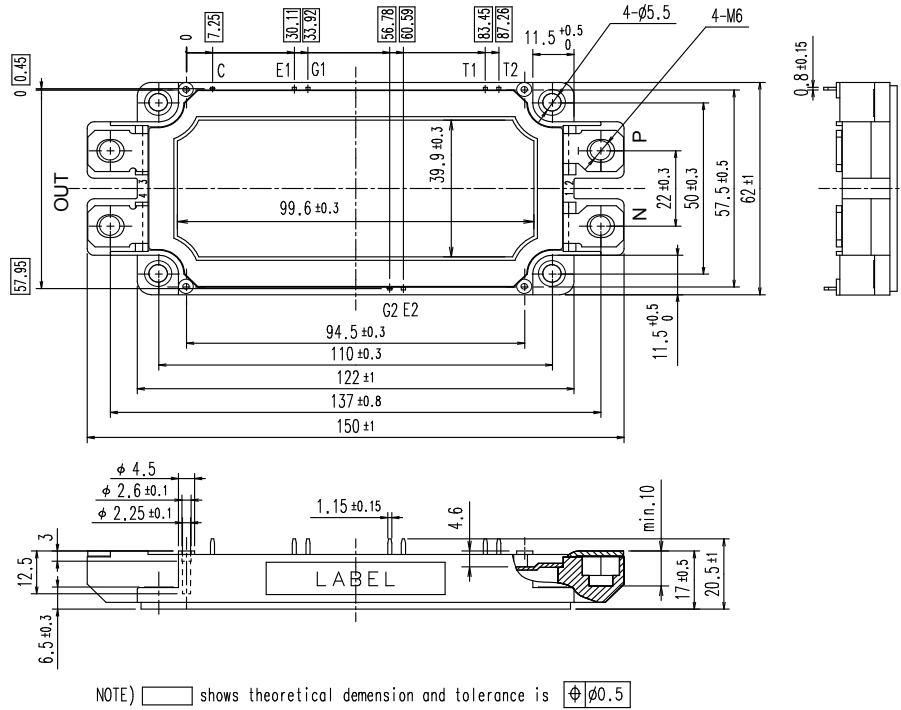


[THERMISTOR]

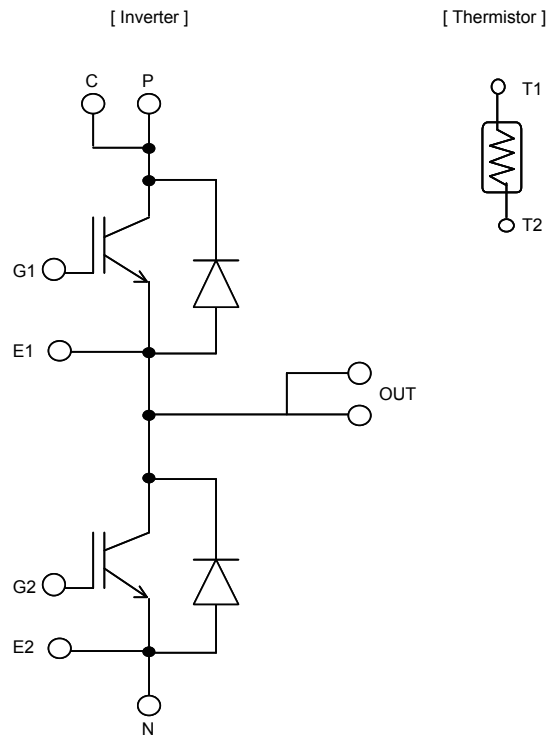
Temperature characteristic (typ.)



Outline Drawings, mm



Equivalent Circuit Schematic



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