

# 2MBI450VN-120-50

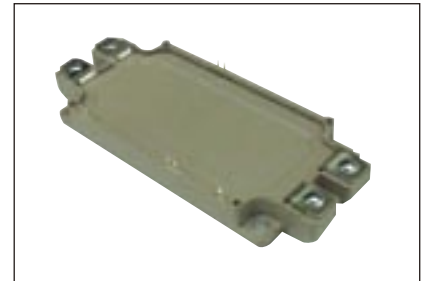
## IGBT MODULE (V series) 1200V / 450A / 2 in one package

### ■ 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	$V_{CES}$	1200	V	
	Gate-Emitter voltage	$V_{GES}$	$\pm 20$	V	
	Collector current	$I_C$	Continuous Tc=80°C	450	A
		$I_C$ pulse	1ms Tc=80°C	900	
		$-I_C$		450	
	$-I_C$ pulse	1ms	900		
Collector power dissipation	$P_C$	1 device	2270	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)			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	$I_{CES}$	$V_{GE} = 0V, V_{CE} = 1200V$	-	-	3.0	mA	
Gate-Emitter leakage current	$I_{GES}$	$V_{CE} = 0V, V_{GE} = \pm 20V$	-	-	600	nA	
Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_C = 450mA$	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 450A$	Tj=25°C	-	2.35	2.80	V
			Tj=125°C	-	2.65	-	
			Tj=150°C	-	2.70	-	
	$V_{CE(sat)}$ (chip)		Tj=25°C	-	1.75	2.20	
			Tj=125°C	-	2.05	-	
			Tj=150°C	-	2.10	-	
Inverter	Input capacitance	$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	-	41	-	nF
	Turn-on time	$t_{on}$	$V_{CC} = 600V$ $I_C = 450A$	-	550	1200	nsec
		$t_r$		-	180	600	
		$t_r(i)$		-	120	-	
Turn-off time	$t_{off}$	$V_{GE} = \pm 15V$	-	1050	2000	nsec	
	$t_f$	$R_G = 0.52\Omega$	-	110	350		
Forward on voltage	$V_F$ (terminal)	$V_{GE} = 0V$ $I_F = 450A$	Tj=25°C	-	2.30	2.75	V
			Tj=125°C	-	2.45	-	
			Tj=150°C	-	2.40	-	
	$V_F$ (chip)		Tj=25°C	-	1.70	2.15	
			Tj=125°C	-	1.85	-	
			Tj=150°C	-	1.80	-	
Reverse recovery time	$t_{rr}$	$I_F = 450A$	-	200	600	nsec	
Thermistor	Resistance	$R$	T=25°C	-	5000	-	Ω
	B value	$B$	T=100°C	465	495	520	K
			T=25/50°C	3305	3375	3450	

#### ● Thermal resistance characteristics

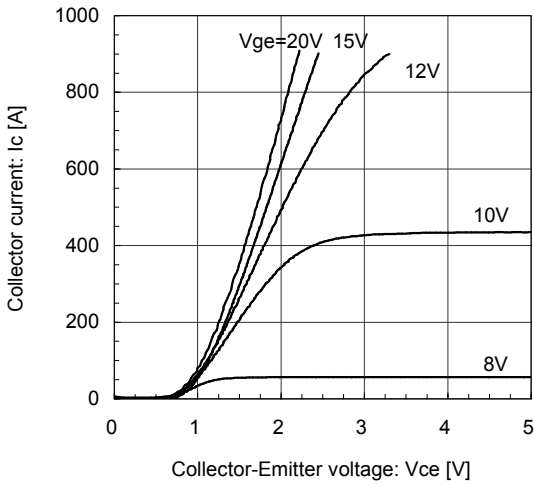
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.066	°C/W
		Inverter FWD	-	-	0.100	
Contact thermal resistance (1device) (*5)	$R_{th(c-f)}$	with Thermal Compound	-	0.0167	-	

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

■ Characteristics (Representative)

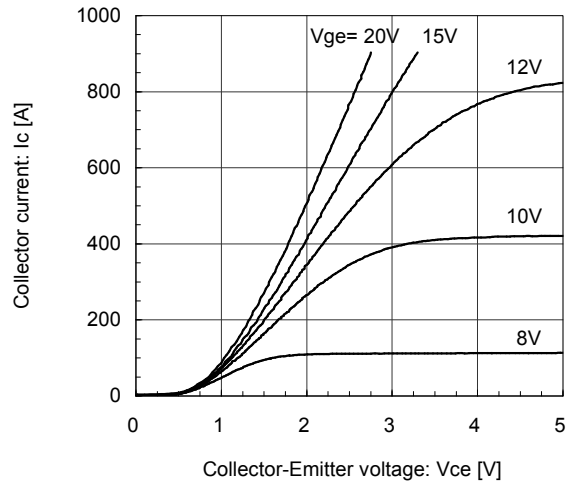
[INVERTER]

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



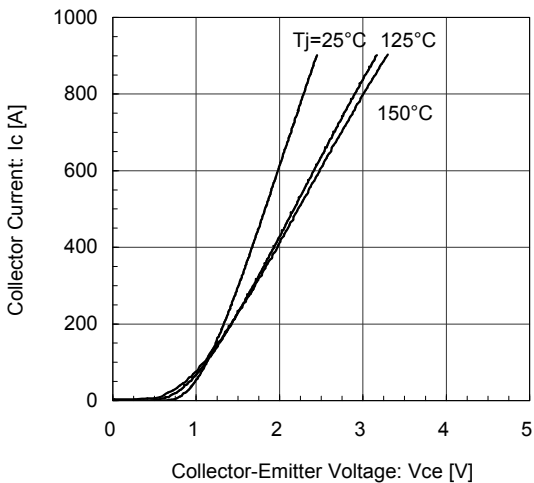
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Collector current vs. Collector-Emittter voltage (typ.)  
Tj= 150°C / chip



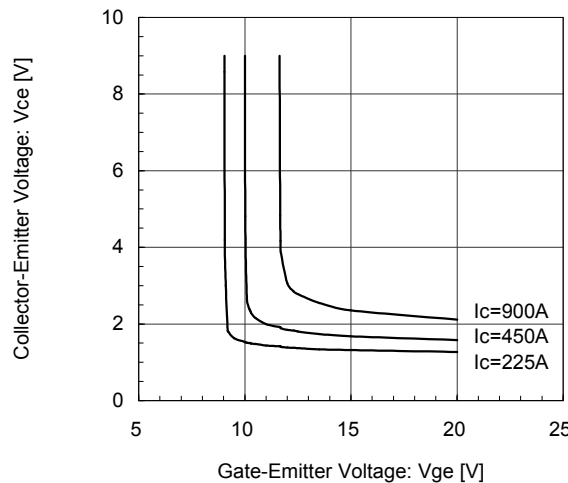
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Collector current vs. Collector-Emittter voltage (typ.)  
Vge= 15V / chip



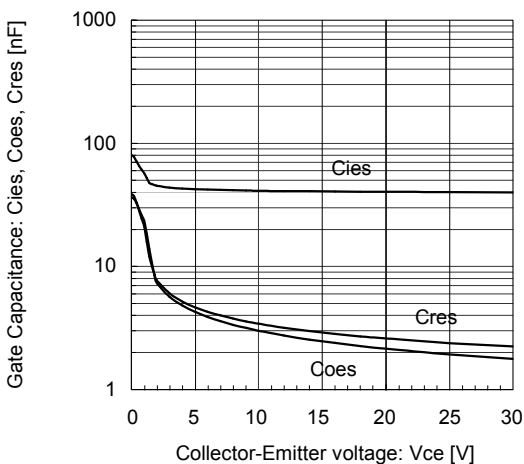
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Collector-Emittter voltage vs. Gate-Emittter voltage (typ.)  
Tj= 25°C / chip



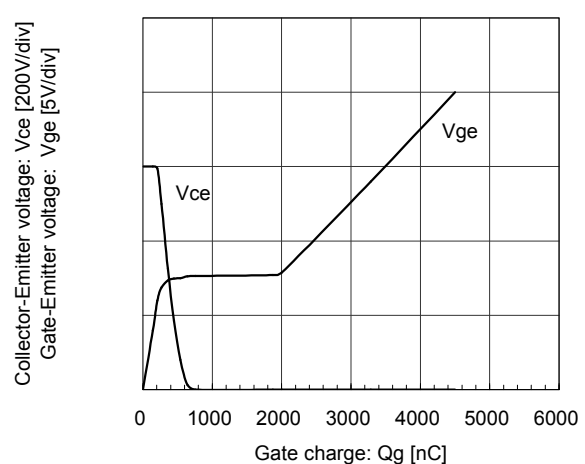
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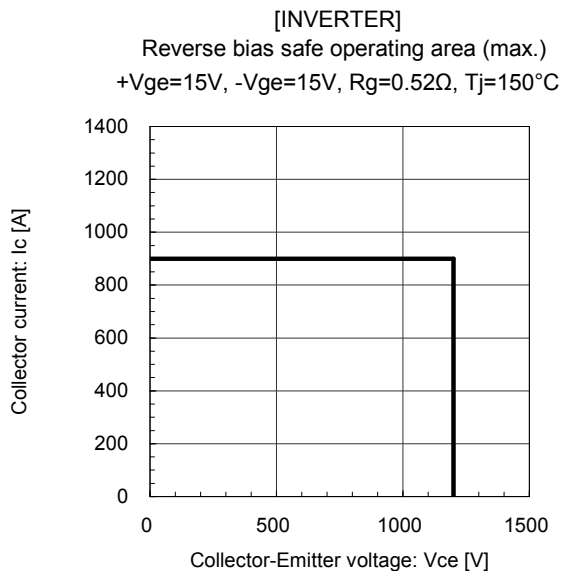
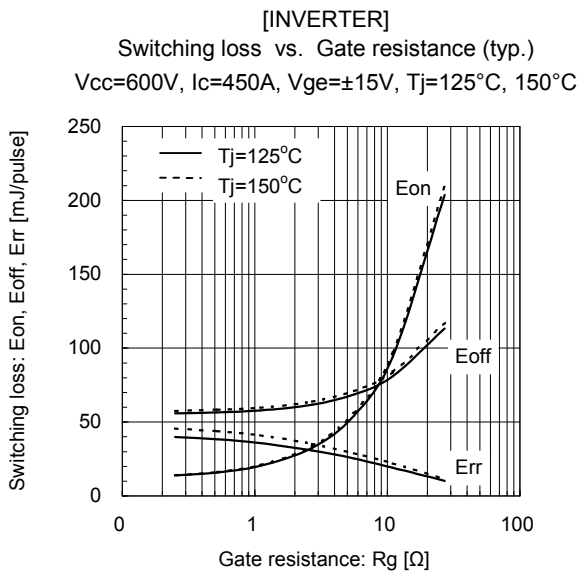
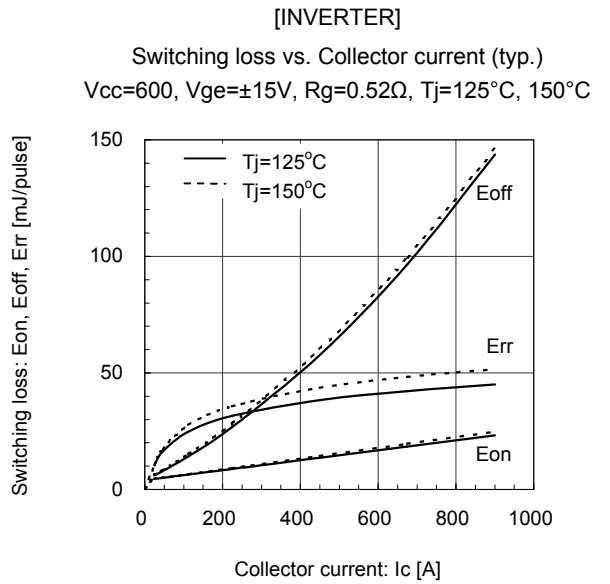
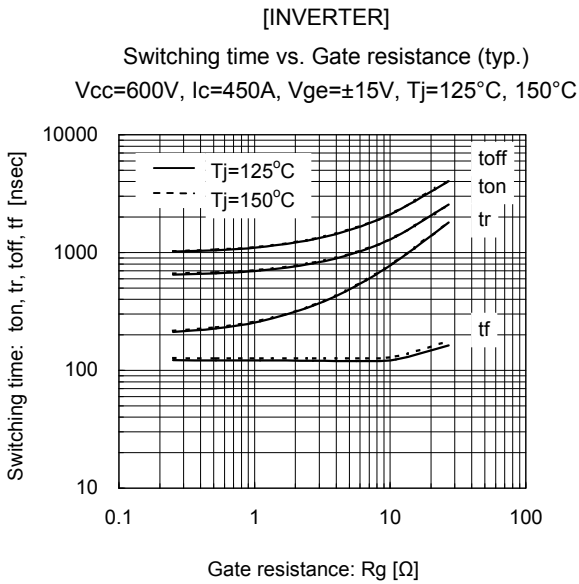
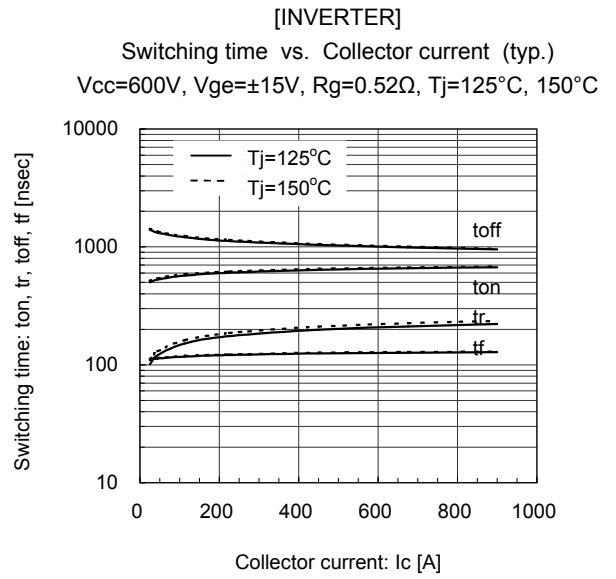
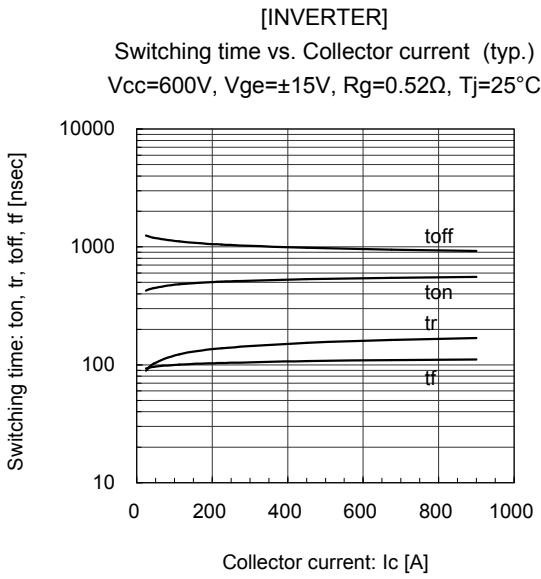
Gate Capacitance vs. Collector-Emittter Voltage (typ.)  
Vge= 0V, f= 1MHz, Tj= 25°C



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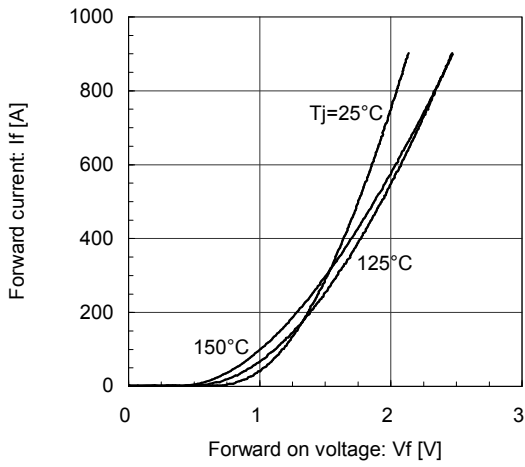
Dynamic Gate Charge (typ.)  
Vcc=600V, Ic=450A, Tj= 25°C





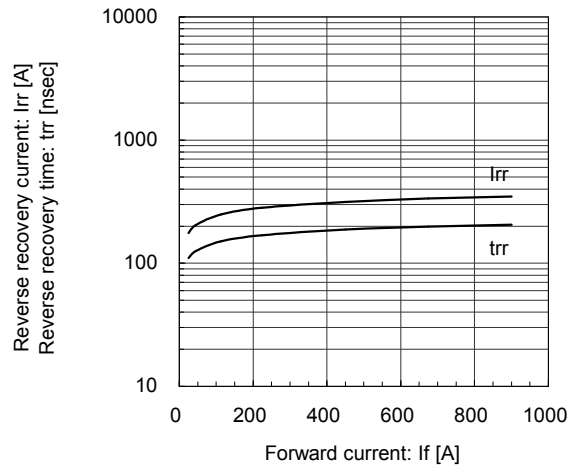
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Forward Current vs. Forward Voltage (typ.)  
chip



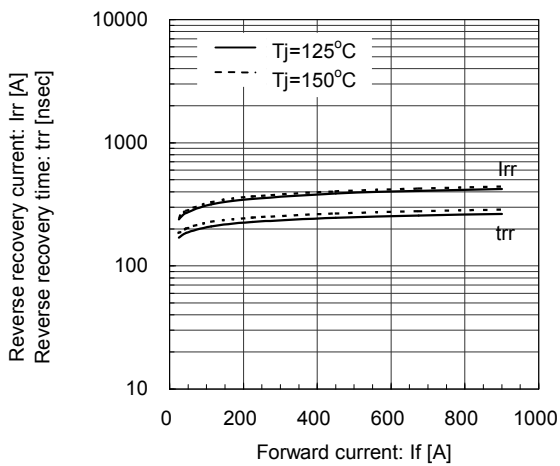
[INVERTER]

Reverse Recovery Characteristics (typ.)  
Vcc=600V, Vge=±15V, Rg=0.52Ω, Tj=25°C

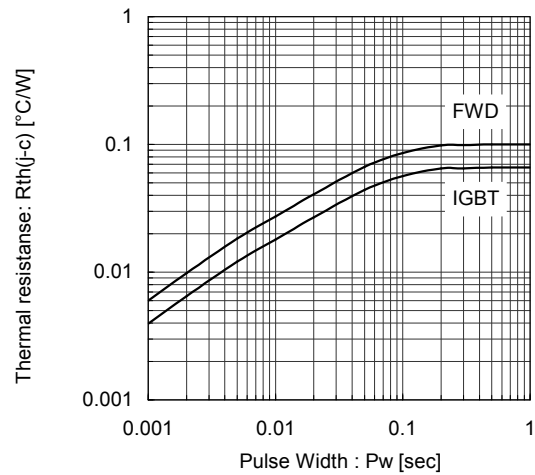


[INVERTER]

Reverse Recovery Characteristics (typ.)  
Vcc=600V, Vge=±15V, Rg=0.52Ω, Tj=125°C, 150°C

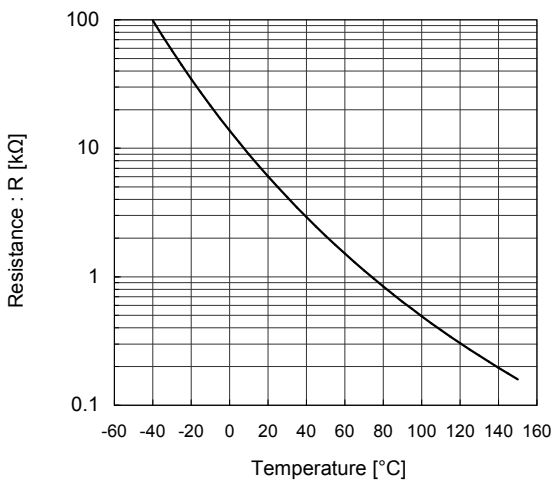


Transient Thermal Resistance (max.)

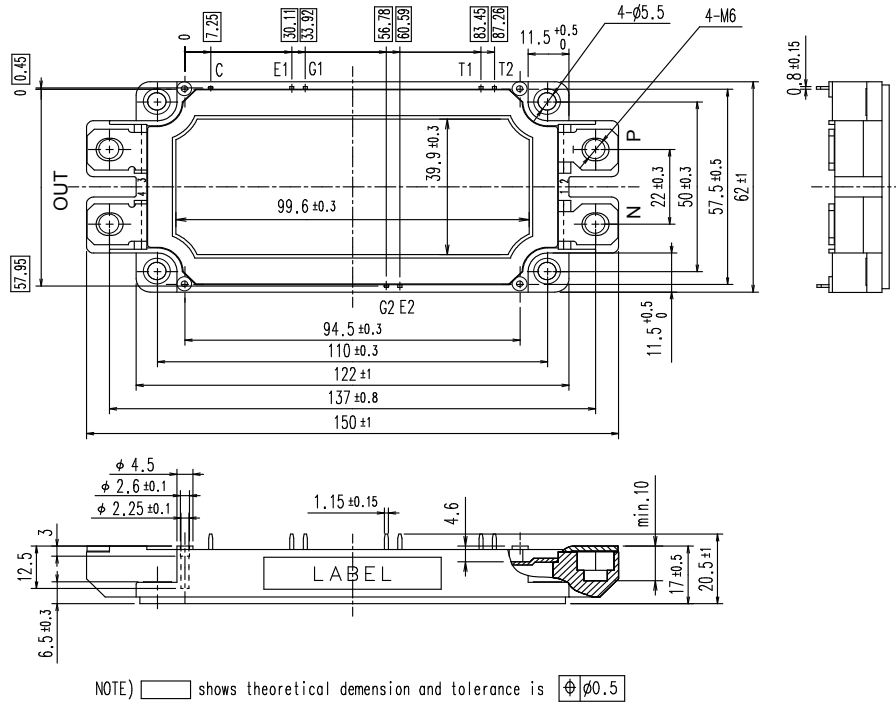


[THERMISTOR]

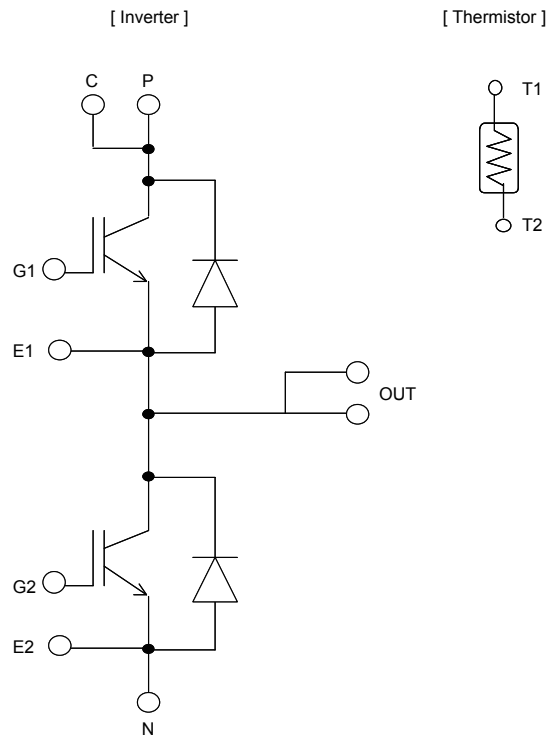
Temperature characteristic (typ.)



Outline Drawings, mm



Equivalent Circuit Schematic



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