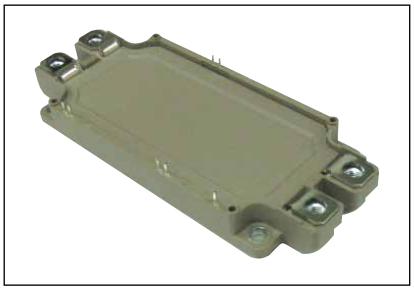
2MBI450VN-170-50

IGBT Modules

IGBT MODULE (V series)
1700V / 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 T_c=25°C unless otherwise specified)**

Items		Symbols	Conditions		Maximum ratings	Units
Inverter	Collector-Emitter voltage	V_{CES}			1700	V
	Gate-Emitter voltage	V_{GES}			±20	V
	Collector current	I_C	Continuous	T_C=25°C	600	A
				T_C=100°C	450	
		$I_{C\ pulse}$	1ms		900	
		$-I_C$			450	
		$-I_{C\ pulse}$	1ms		900	
	Collector power dissipation	P_C	1 device		2500	W
Junction temperature		T_j			175	°C
Operating junction temperature (under switching conditions)		T_{jop}			150	
Storage temperature		T_{stg}			-40 ~ 125	
Isolation voltage	between terminal and copper base (*1)	V_{iso}	AC : 1min.		3400	VAC
	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 : 2.5-3.5 Nm (M5)
Note *4: Recommendable Value : 3.5-4.5 Nm (M6)

● **Electrical characteristics (at T_j= 25°C unless otherwise specified)**

Items		Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
Inverter	Zero gate voltage collector current	I_{CES}	V_{GE} = 0V, V_{CE} = 1700V		-	-	3.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{CE} = 0V, V_{GE} = ±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	T_j=25°C	-	2.65	3.10	V
				T_j=125°C	-	3.10	-	
				T_j=150°C	-	3.15	-	
		$V_{CE\ (sat)}$ (chip)		T_j=25°C	-	2.00	2.45	
				T_j=125°C	-	2.45	-	
				T_j=150°C	-	2.50	-	
	Internal gate resistance	$R_{G\ (int)}$	-		-	1.67	-	Ω
	Input capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	40	-	nF
	Turn-on time	t_{on}	V_{CC} = 900V, I_C = 450A, V_{GE} = ±15V, R_G = 3.3Ω, L_S = 80nH		-	900	-	nsec
		t_r			-	400	-	
		$t_{r\ (i)}$			-	100	-	
	Turn-off time	t_{off}			-	1300	-	
		t_f			-	100	-	
	Forward on voltage	V_F (terminal)	V_{GE} = 0V, I_F = 450A	T_j=25°C	-	2.45	2.90	V
				T_j=125°C	-	2.75	-	
				T_j=150°C	-	2.70	-	
		V_F (chip)		T_j=25°C	-	1.80	2.25	
				T_j=125°C	-	2.10	-	
				T_j=150°C	-	2.05	-	
	Reverse recovery time	t_{rr}	I_F = 450A		-	250	-	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

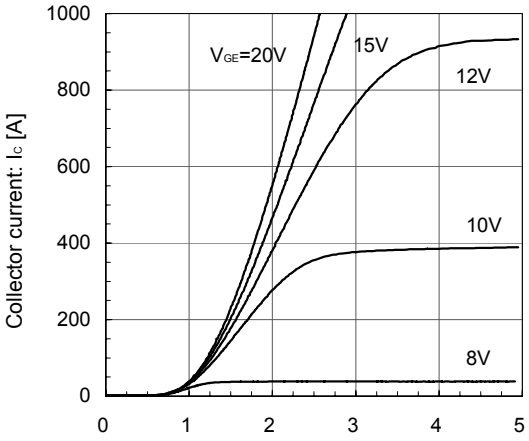
● **Thermal resistance characteristics**

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
Thermal resistance(1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.06	°C/W
		Inverter FWD	-	-	0.10	
Contact thermal resistance (1device) (*5)	$R_{th(c-f)}$	with Thermal Compound	-	0.0167	-	

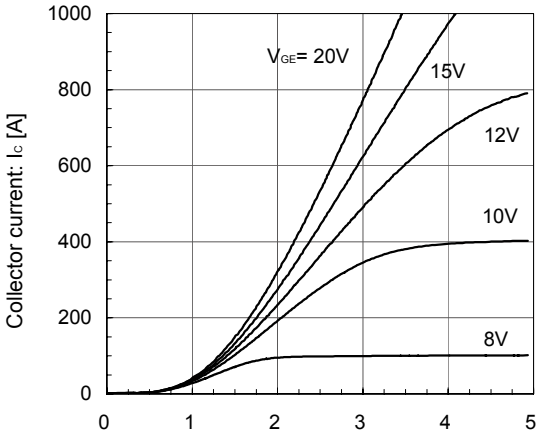
Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

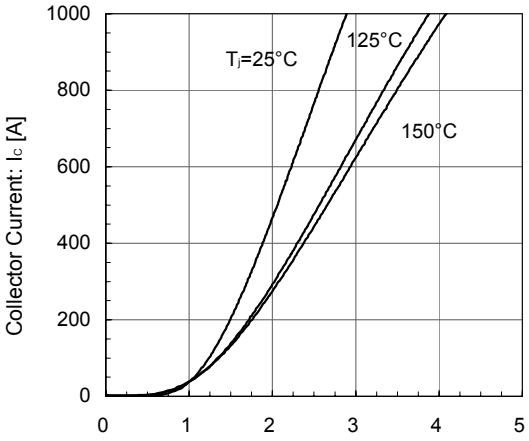
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 25°C / chip



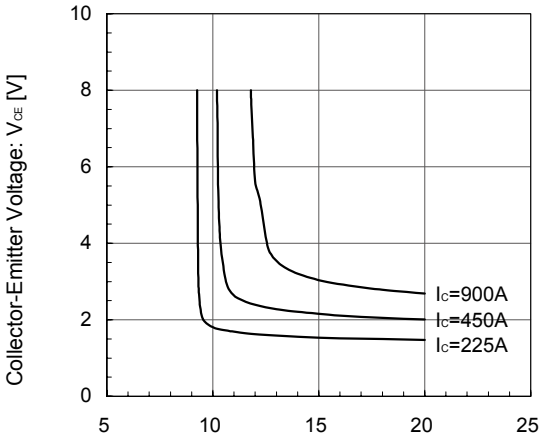
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 150°C / chip



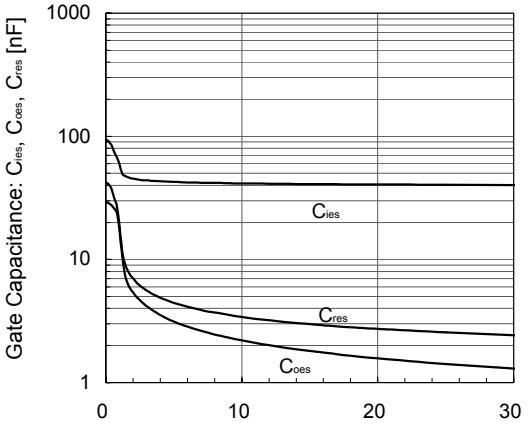
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE}= 15V / chip



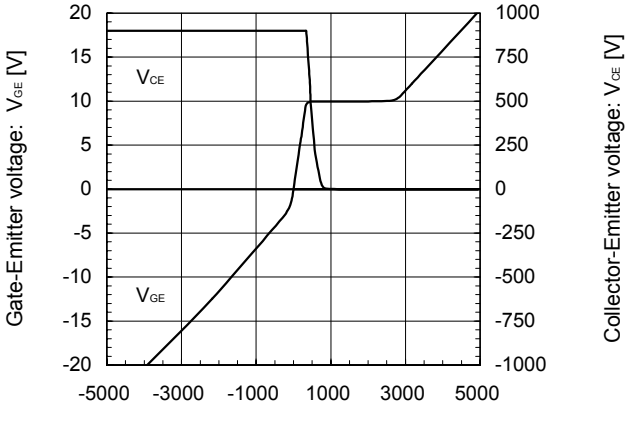
[INVERTER]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
T_j= 25°C / chip



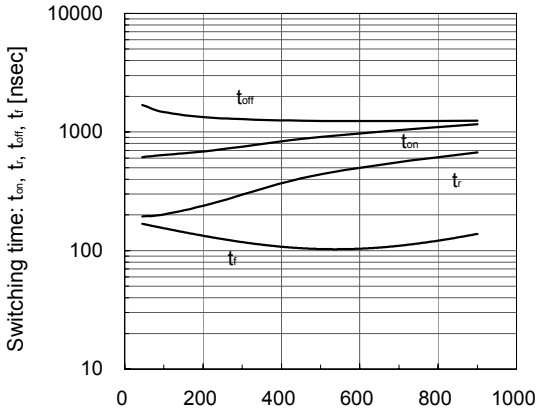
[INVERTER]
Gate Capacitance vs. Collector-Emitter Voltage (typ.)
V_{GE}= 0V, f= 1MHz, T_j= 25°C



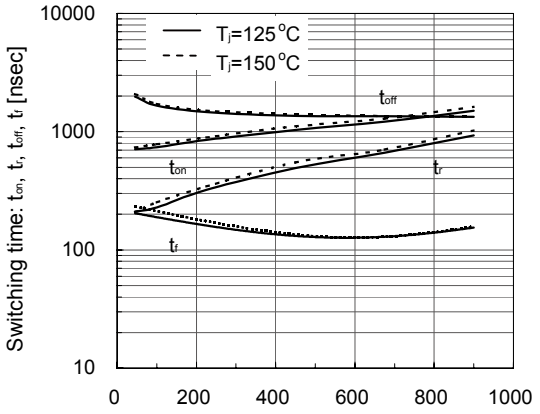
[INVERTER]
Dynamic Gate Charge (typ.)
V_{CC}=900V, I_C=450A, T_j= 25°C



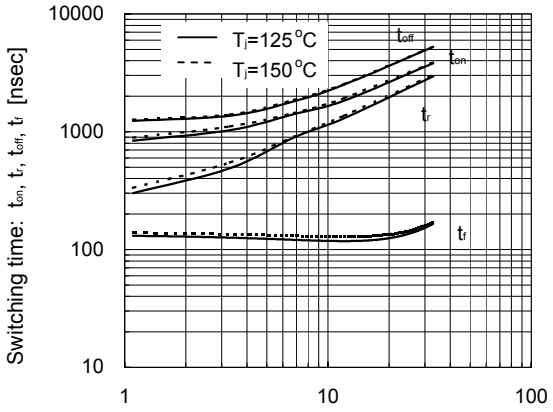
[INVERTER]
Switching time vs. Collector current (typ.)
V_{CC}=900V, V_{GE}=±15V, R_G=3.3Ω, T_j=25°C



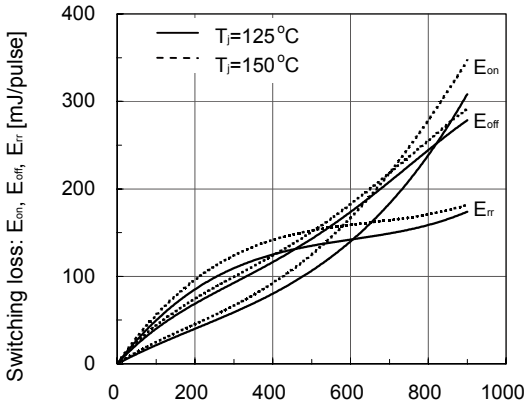
[INVERTER]
Switching time vs. Collector current (typ.)
V_{CC}=900V, V_{GE}=±15V, R_G=3.3Ω, T_j=125°C, 150°C



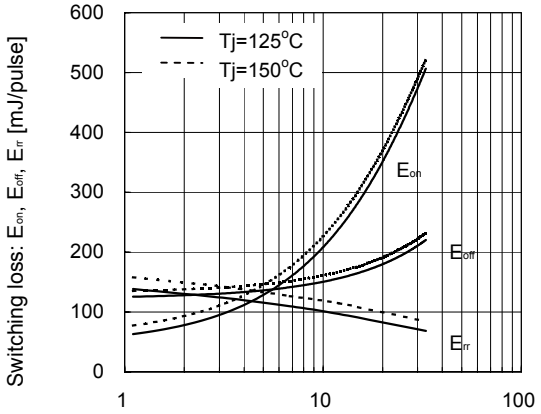
[INVERTER]
Switching time vs. Gate resistance (typ.)
V_{CC}=900V, I_C=450A, V_{GE}=±15V, T_j=125°C, 150°C



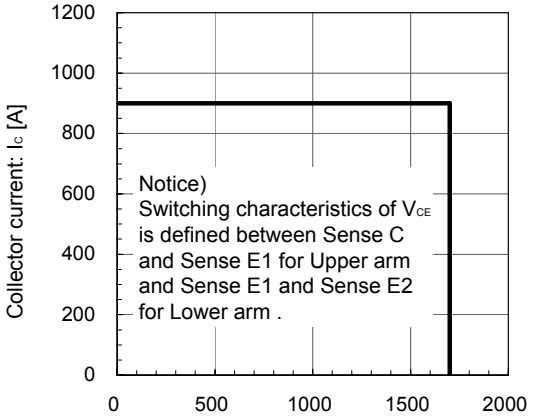
[INVERTER]
Switching loss vs. Collector current (typ.)
V_{CC}=900V, V_{GE}=±15V, R_G=3.3Ω, T_j=125°C, 150°C



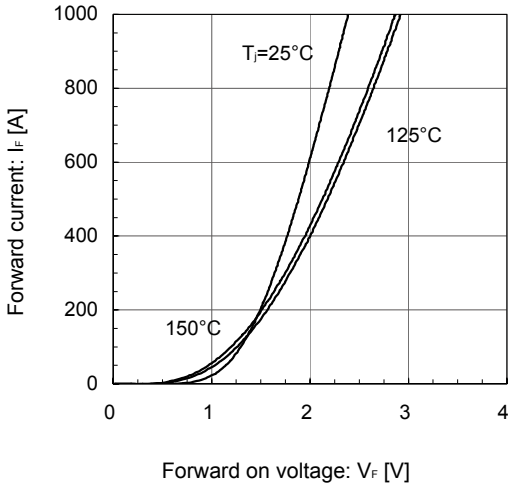
[INVERTER]
Switching loss vs. Gate resistance (typ.)
V_{CC}=900V, I_C=450A, V_{GE}=±15V, T_j=125, 150°C



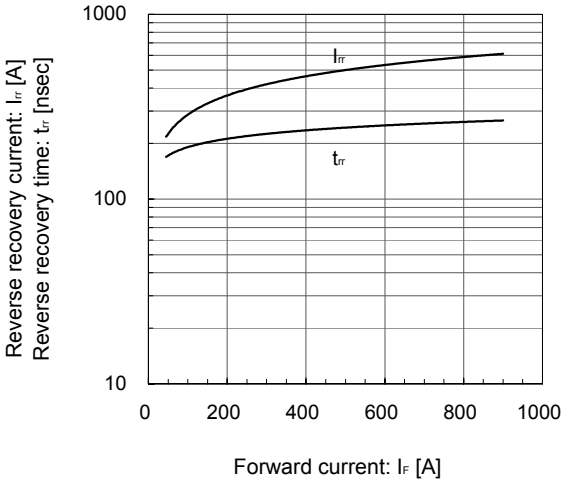
[INVERTER]
Reverse bias safe operating area (max.)
+V_{GE}=15V, -V_{GE}=15V, R_G=3.3Ω, T_j=150°C



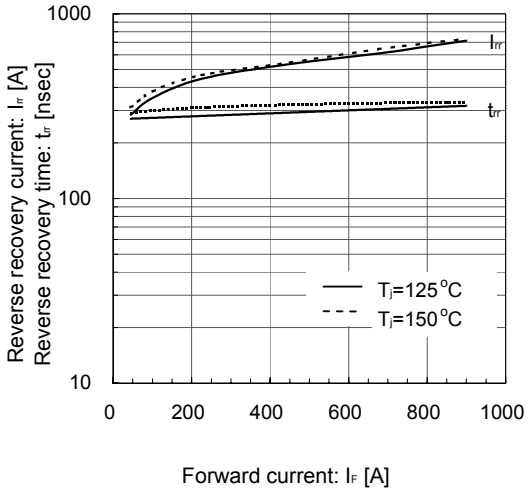
[INVERTER]
Forward Current vs. Forward Voltage (typ.)
chip



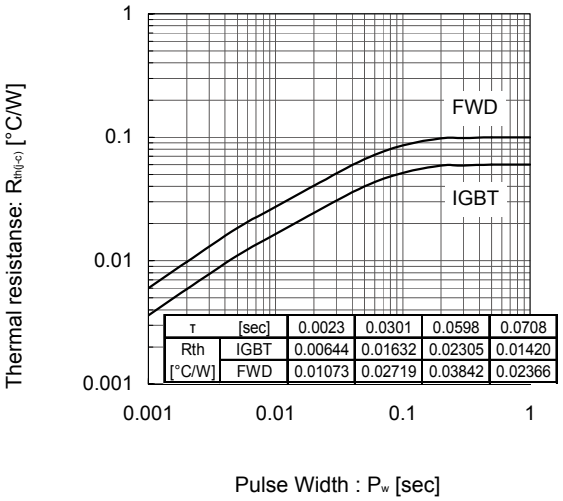
[INVERTER]
Reverse Recovery Characteristics (typ.)
V_{CC}=900V, V_{GE}=±15V, R_G=3.3Ω, T_j=25°C



[INVERTER]
Reverse Recovery Characteristics (typ.)
V_{CC}=900V, V_{GE}=±15V, R_G=3.3Ω, T_j=125°C, 150°C

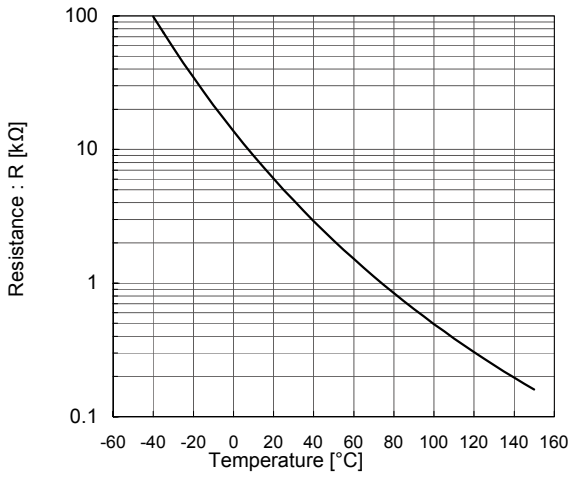


Transient Thermal Resistance (max.)

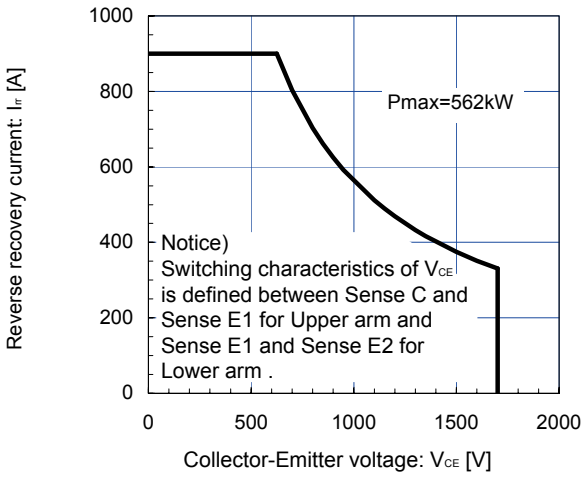


τ	[sec]	0.0023	0.0301	0.0598	0.0708
Rth	IGBT	0.00644	0.01632	0.02305	0.01420
[°C/W]	FWD	0.01073	0.02719	0.03842	0.02366

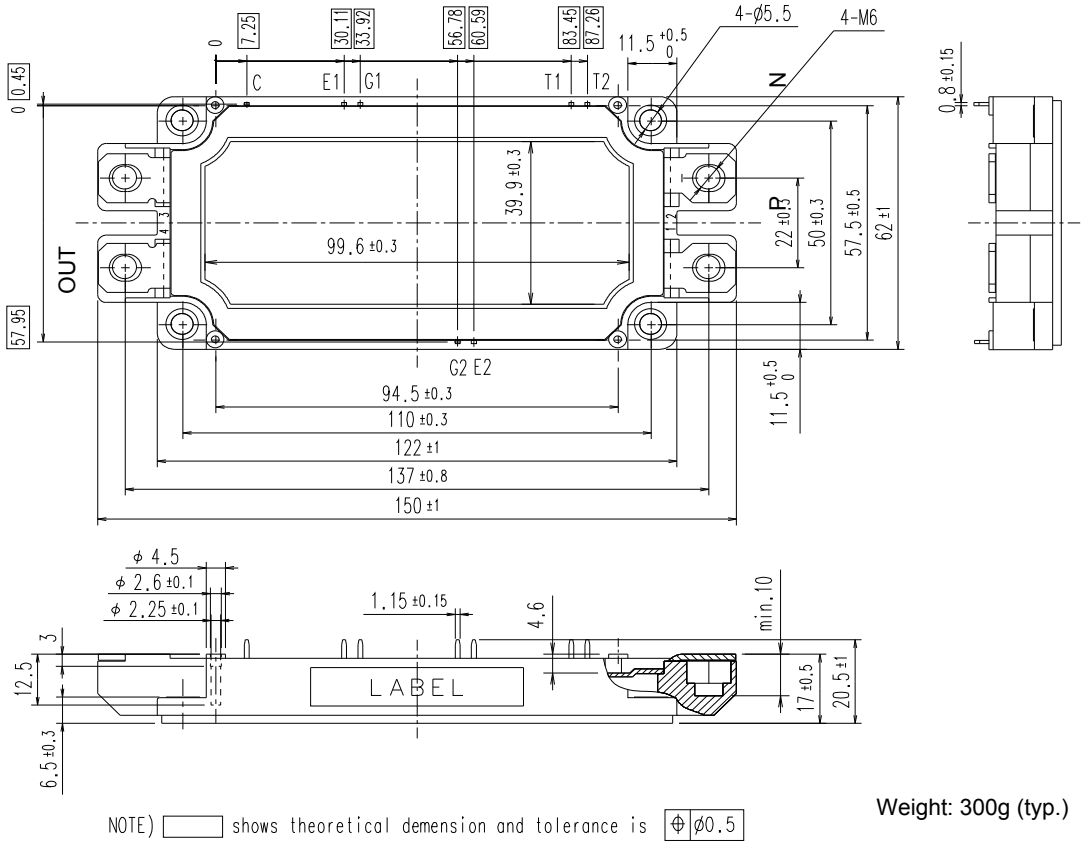
[THERMISTOR]
Temperature characteristic (typ.)



FWD safe operating area (max.)
T_j=150°C

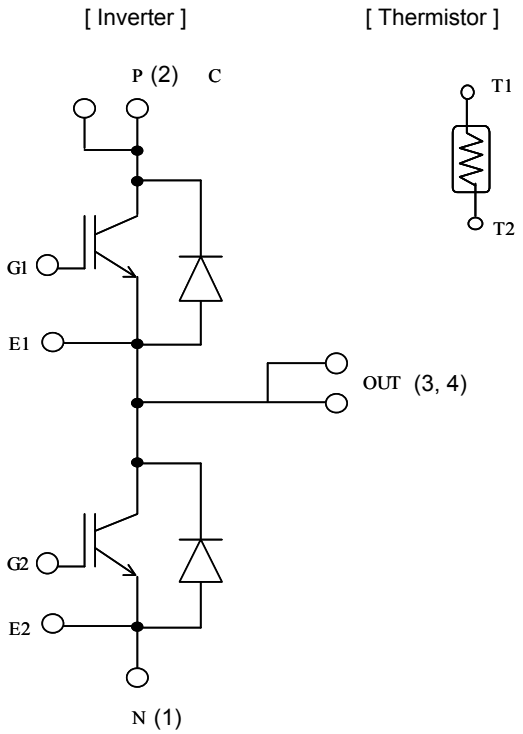


■ Outline Drawings, mm



Weight: 300g (typ.)

■ Equivalent Circuit Schematic



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- Measurement equipment
- Machine tools
- Audiovisual equipment
- Electrical home appliances
- Personal equipment
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- Safety devices
- Medical equipment

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