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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 T _c =100°C	600 450	A
		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 _{top}		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			Units		
			min.	typ.	max.			
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	-	900	-	nsec	
		t _r	I _c = 450A	-	400	-		
		t _{r(i)}	V _{GE} = ±15V	-	100	-		
		t _{off}	R _G = 3.3Ω	-	1300	-		
Turn-off time	t _r	L _s = 80nH	-	100	-	nsec		
	t _r		-	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 _r	I _F = 450A	-	250	-	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

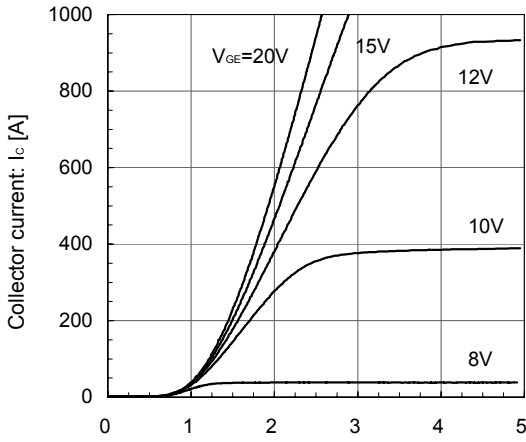
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance(1device)	R _{th(j-c)}	Inverter IGBT Inverter FWD	-	-	0.06	°C/W
Contact thermal resistance (1device) (*5)	R _{th(c-f)}	with Thermal Compound	-	0.0167	-	

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

■ Characteristics (Representative)

[INVERTER]

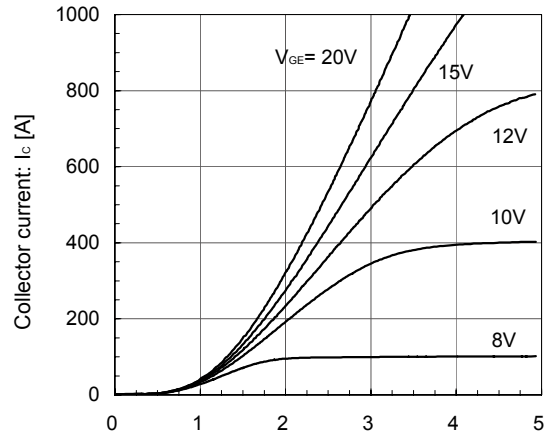
Collector current vs. Collector-Emittor voltage (typ.)
 $T_J = 25^\circ\text{C}$ / chip



Collector-Emittor voltage: V_{CE} [V]

[INVERTER]

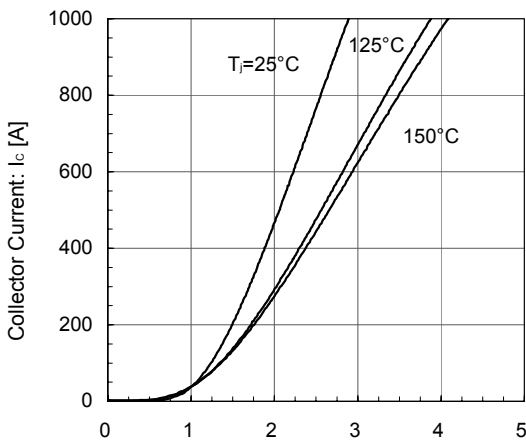
Collector current vs. Collector-Emittor voltage (typ.)
 $T_J = 150^\circ\text{C}$ / chip



Collector-Emittor voltage: V_{CE} [V]

[INVERTER]

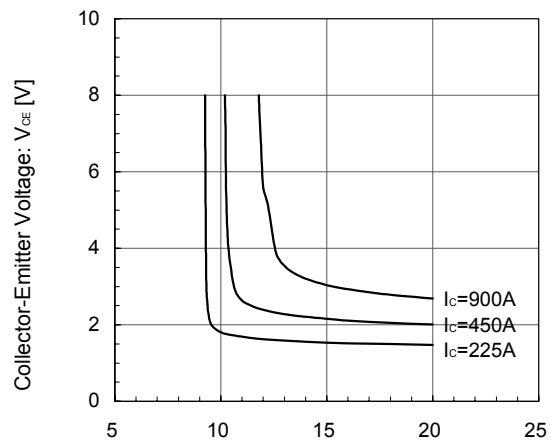
Collector current vs. Collector-Emittor voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



Collector-Emittor Voltage: V_{CE} [V]

[INVERTER]

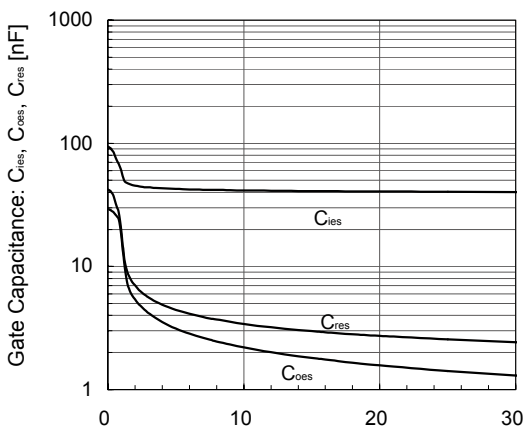
Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)
 $T_J = 25^\circ\text{C}$ / chip



Gate-Emittor Voltage: V_{GE} [V]

[INVERTER]

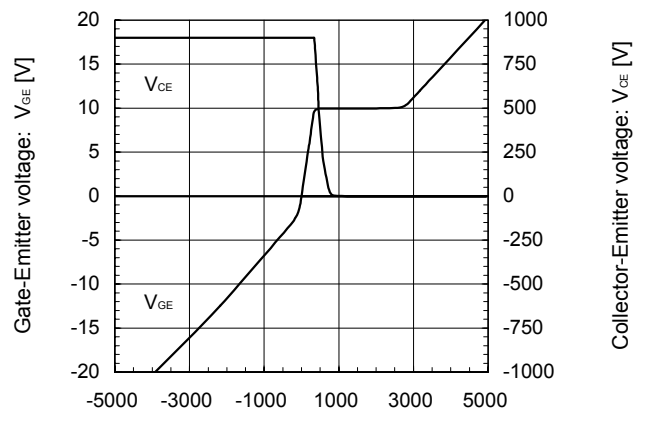
Gate Capacitance vs. Collector-Emittor Voltage (typ.)
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$



Collector-Emittor voltage: V_{CE} [V]

[INVERTER]

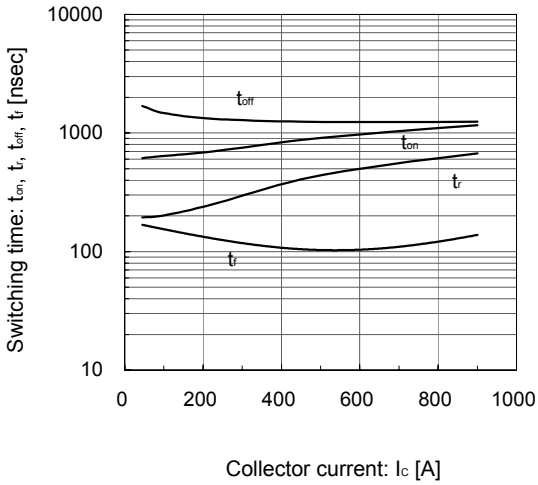
Dynamic Gate Charge (typ.)
 $V_{CC} = 900\text{V}$, $I_c = 450\text{A}$, $T_J = 25^\circ\text{C}$



Gate charge: Q_s [μC]

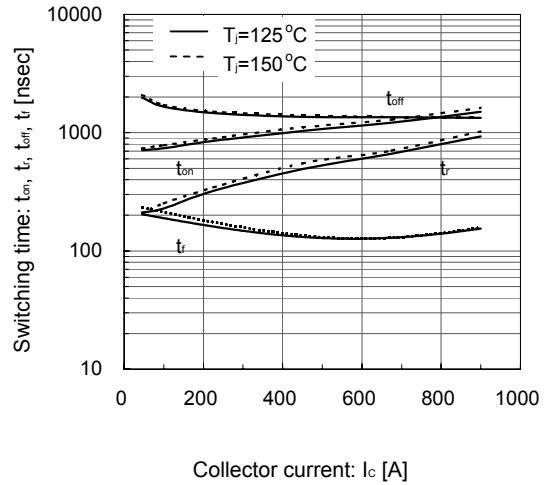
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=900V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=25^\circ C$



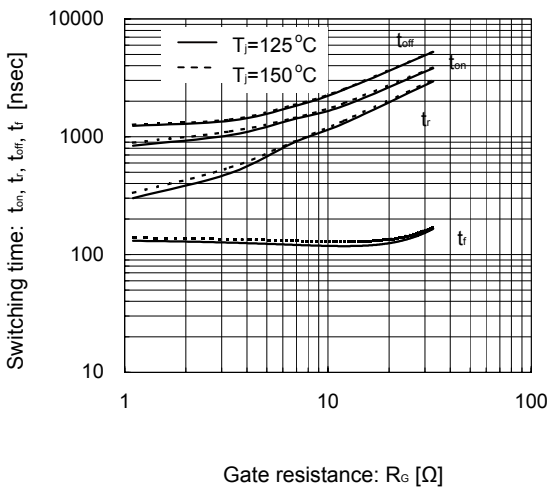
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=900V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=125^\circ C, 150^\circ C$



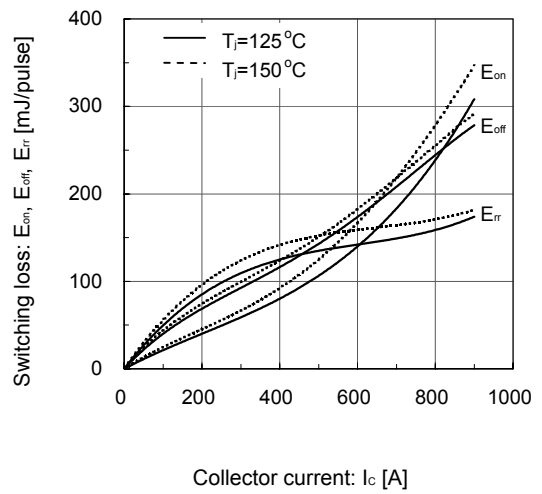
[INVERTER]

Switching time vs. Gate resistance (typ.)
 $V_{CC}=900V, I_c=450A, V_{GE}=\pm 15V, T_J=125^\circ C, 150^\circ C$



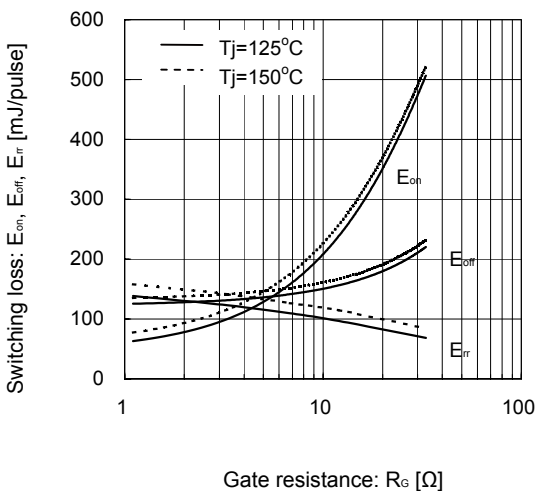
[INVERTER]

Switching loss vs. Collector current (typ.)
 $V_{CC}=900V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=125^\circ C, 150^\circ C$



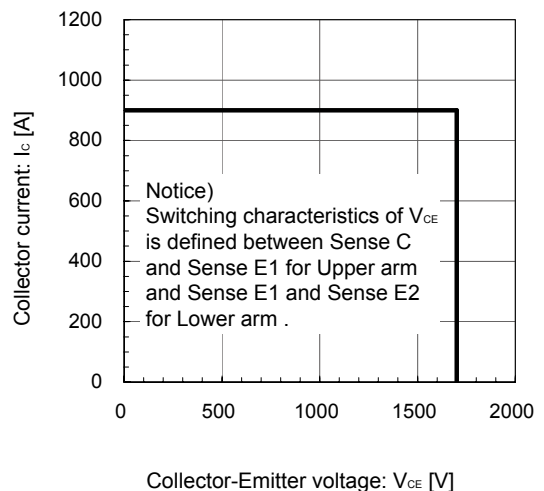
[INVERTER]

Switching loss vs. Gate resistance (typ.)
 $V_{CC}=900V, I_c=450A, V_{GE}=\pm 15V, T_J=125^\circ C, 150^\circ C$



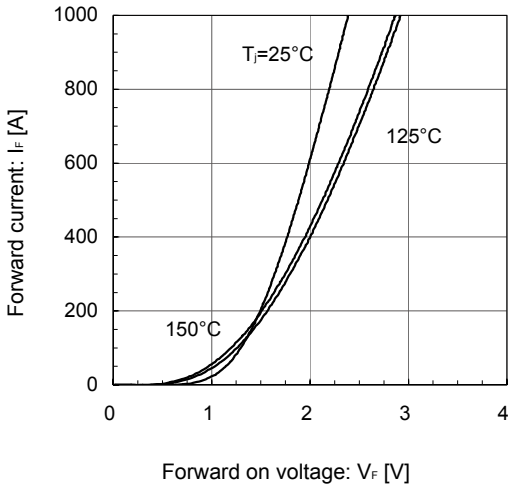
[INVERTER]

Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE}=15V, R_G=3.3\Omega, T_J=150^\circ C$



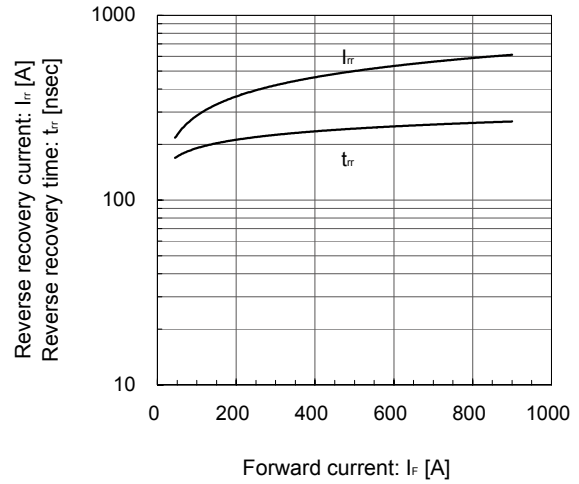
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip



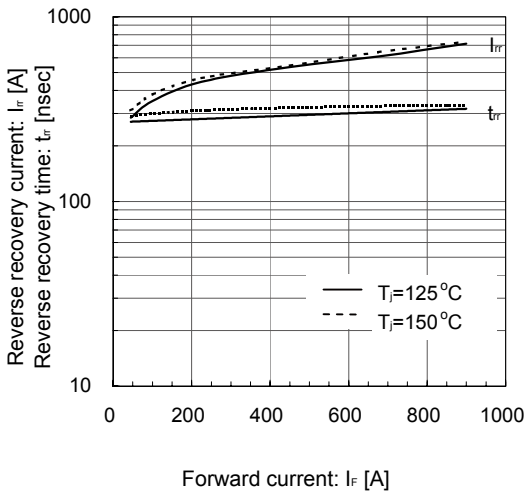
[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{CC}=900V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=25^\circ C$

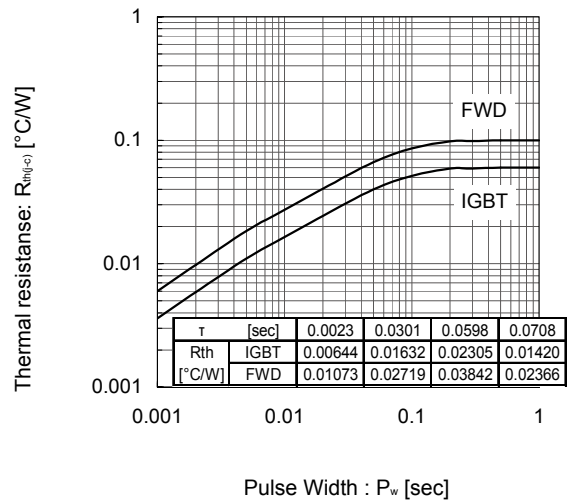


[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{CC}=900V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=125^\circ C, 150^\circ C$

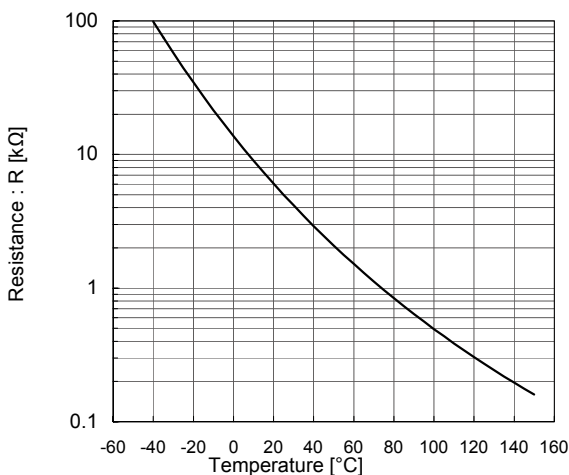


Transient Thermal Resistance (max.)

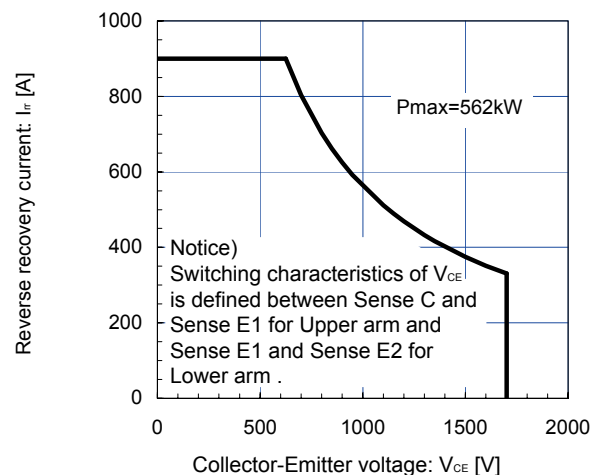


[THERMISTOR]

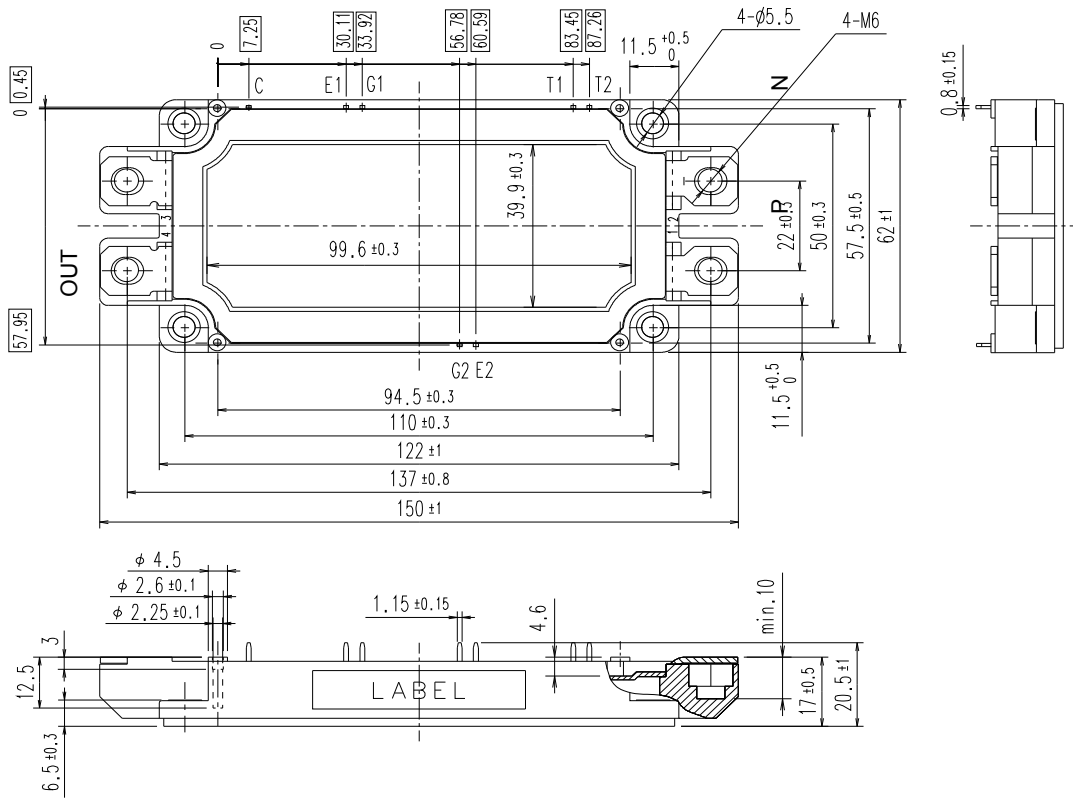
Temperature characteristic (typ.)



FWD safe operating area (max.)
 $T_J=150^\circ C$



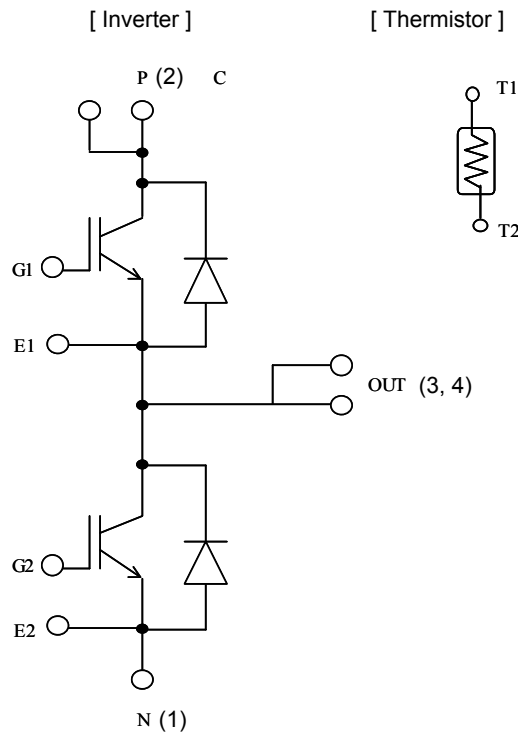
■ Outline Drawings, mm



NOTE) shows theoretical dimension and tolerance is $\pm \phi 0.5$

Weight: 300g (typ.)

■ Equivalent Circuit Schematic



WARNING

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 - Electrical home appliances
 - Personal equipment
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