

2MBI300VN-120-50

IGBT Modules

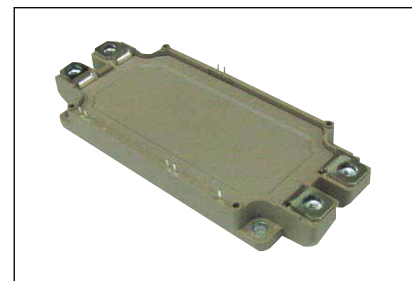
IGBT MODULE (V series) 1200V / 300A / 2 in one package

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}			±20	V
	Collector current	I _c	Continuous	T _c =25°C	450	A
				T _c =100°C	300	
		I _c pulse	1ms		600	
		-I _c			300	
		-I _c pulse	1ms		600	
	Collector power dissipation	P _c	1 device		1595	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.	
Inverter	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} = ±20V		-	-	600	nA
	Gate-Emitter threshold voltage	V _{GE (th)}	V _{CE} = 20V, I _c = 300mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	V _{CE (sat)} (terminal)	V _{GE} = 15V I _c = 300A	T _j =25°C	-	2.20	2.65	V
				T _j =125°C	-	2.50	-	
				T _j =150°C	-	2.55	-	
		V _{CE (sat)} (chip)		T _j =25°C	-	1.75	2.20	
				T _j =125°C	-	2.05	-	
		T _j =150°C	-	2.10	-			
	Internal gate resistance	R _{g(int)}	-		-	2.5	-	Ω
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz		-	27	-	nF
	Turn-on time	t _{on}	V _{CC} = 600V		-	550	-	nsec
		t _r	I _c = 300A		-	180	-	
		t _{r (i)}	V _{GE} = ±15V		-	120	-	
	Turn-off time	t _{off}	R _G = 0.93Ω		-	1050	-	nsec
t _f		L _S = 80nH		-	110	-		
Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 300A	T _j =25°C	-	2.15	2.60	V	
			T _j =125°C	-	2.30	-		
			T _j =150°C	-	2.25	-		
	V _F (chip)		T _j =25°C	-	1.70	2.15		
			T _j =125°C	-	1.85	-		
	T _j =150°C	-	1.80	-				
Reverse recovery time	t _{rr}	I _F = 300A		-	200	-	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

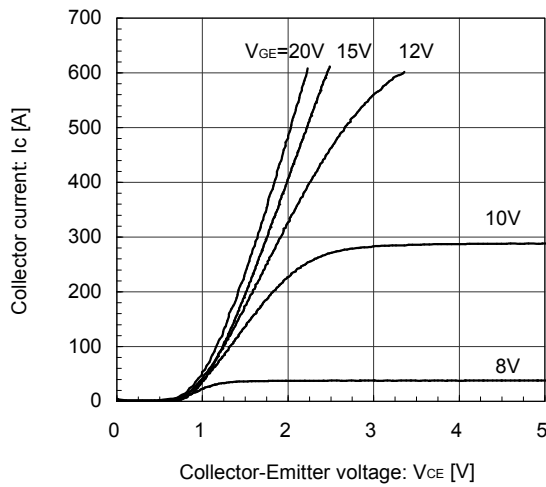
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	Rth(j-c)	Inverter IGBT	-	-	0.094	°C/W
		Inverter FWD	-	-	0.150	
Contact thermal resistance (1device) (*5)	Rth(c-f)	with Thermal Compound	-	0.0167	-	

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

■ Characteristics (Representative)

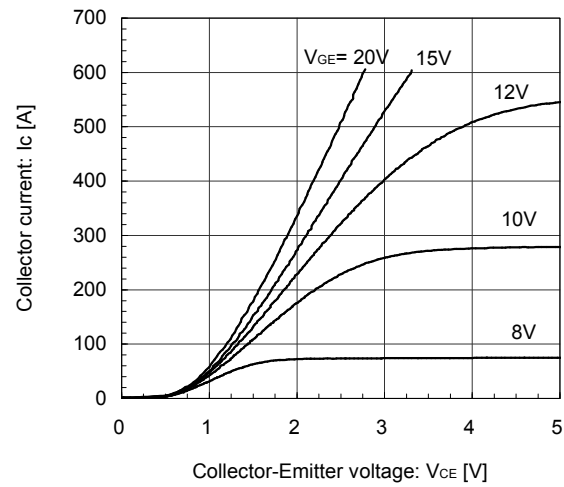
[INVERTER]

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



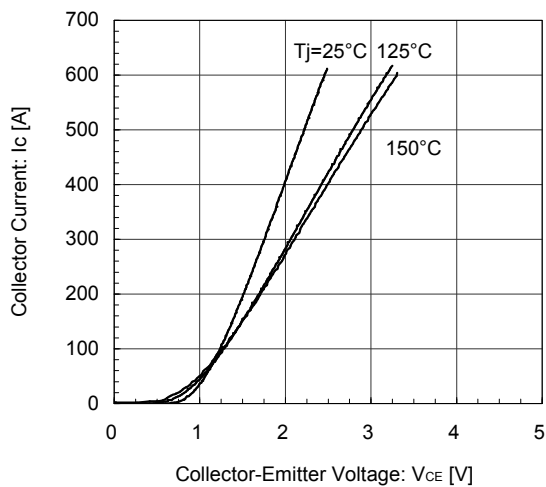
[INVERTER]

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



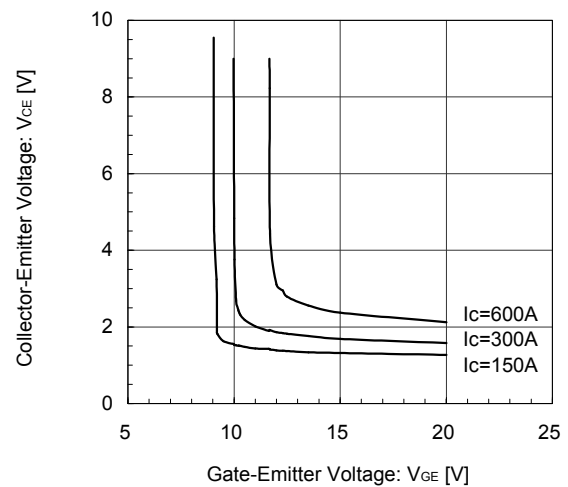
[INVERTER]

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



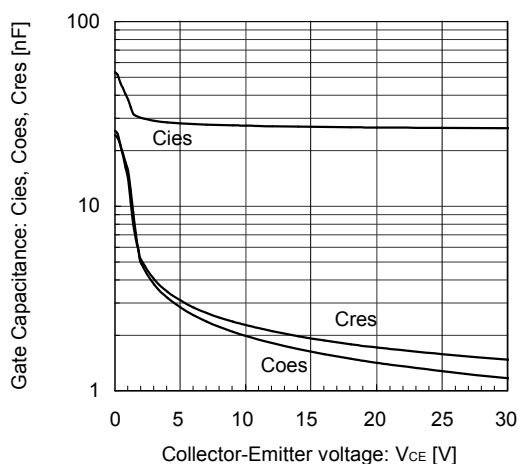
[INVERTER]

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



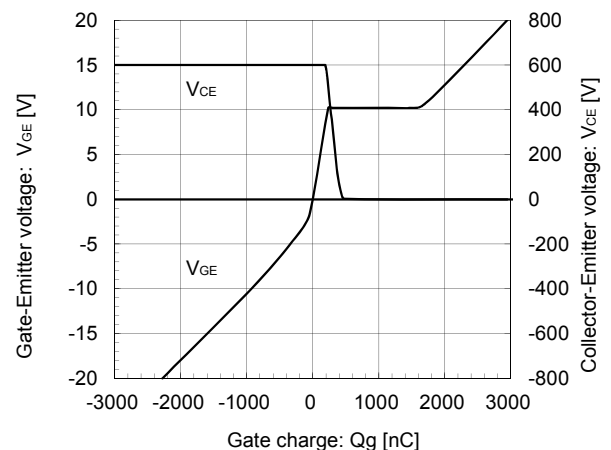
[INVERTER]

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



[INVERTER]

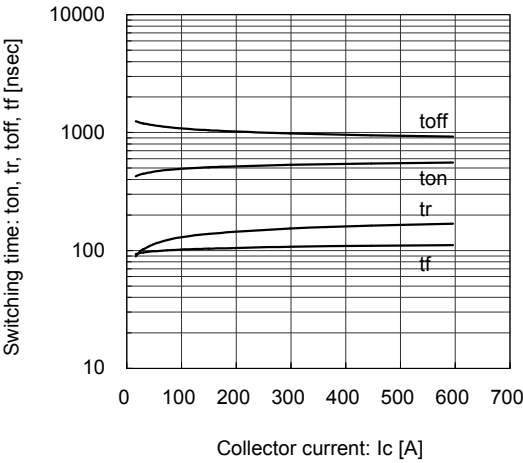
Dynamic Gate Charge (typ.)
 $V_{CC} = 600\text{V}$, $I_C = 300\text{A}$, $T_j = 25^\circ\text{C}$



[INVERTER]

Switching time vs. Collector current (typ.)

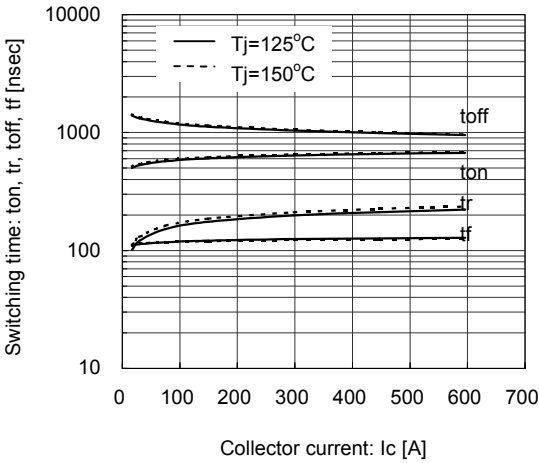
$V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=0.93\Omega$, $T_j=25^\circ C$



[INVERTER]

Switching time vs. Collector current (typ.)

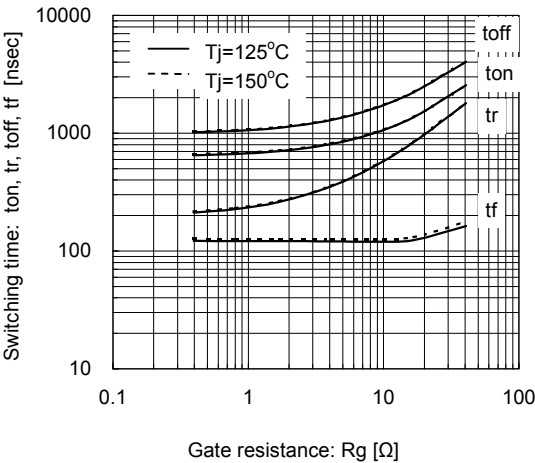
$V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=0.93\Omega$, $T_j=125^\circ C$, $150^\circ C$



[INVERTER]

Switching time vs. Gate resistance (typ.)

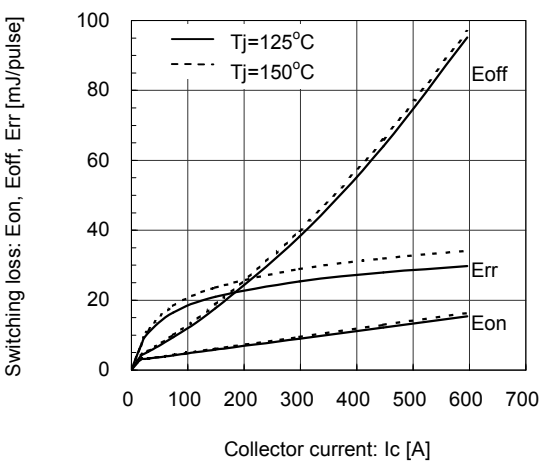
$V_{CC}=600V$, $I_c=300A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$, $150^\circ C$



[INVERTER]

Switching loss vs. Collector current (typ.)

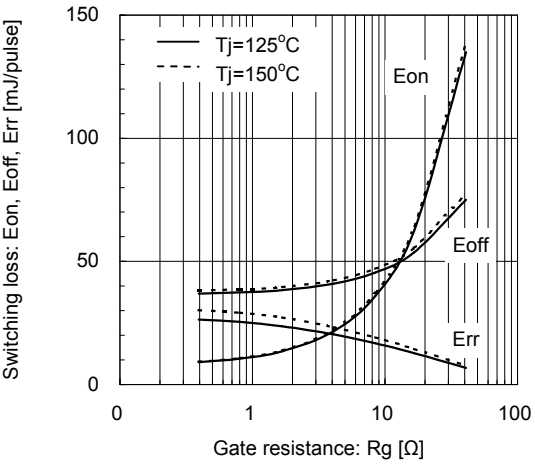
$V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=0.93\Omega$, $T_j=125^\circ C$, $150^\circ C$



[INVERTER]

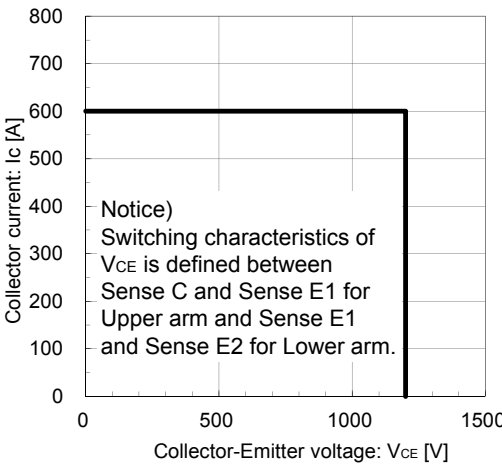
Switching loss vs. Gate resistance (typ.)

$V_{CC}=600V$, $I_c=300A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$, $150^\circ C$

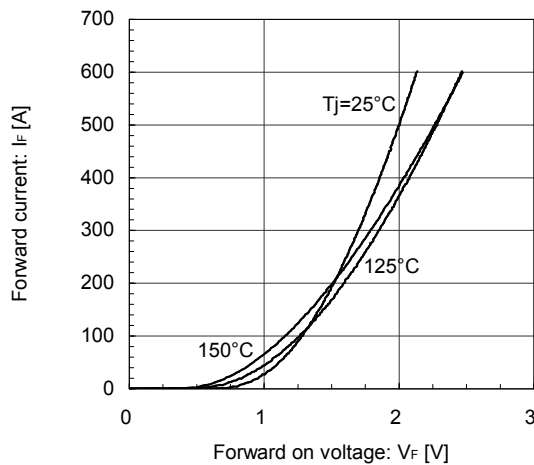


[INVERTER]

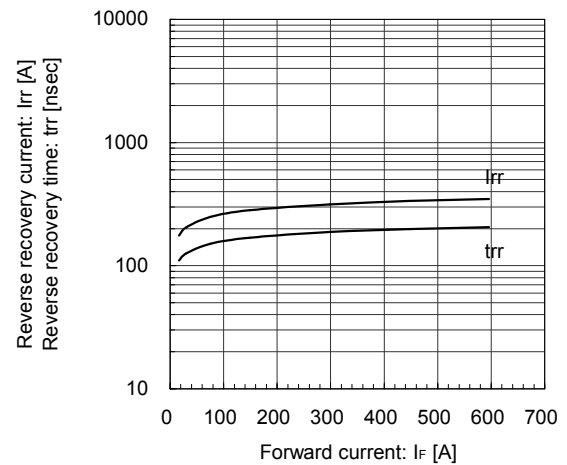
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_g=0.93\Omega$, $T_j=150^\circ C$



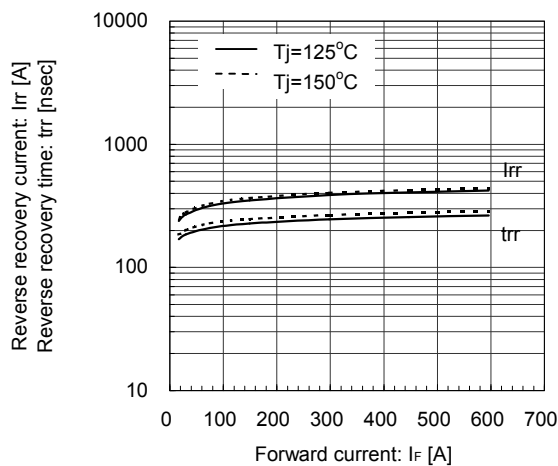
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip

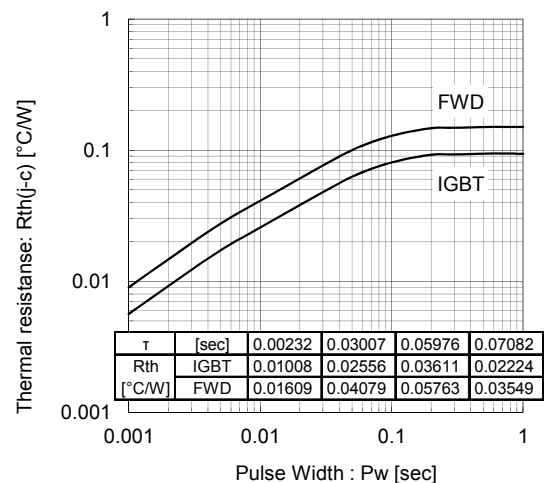
[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=0.93\Omega$, $T_J=25^\circ C$ 

[INVERTER]

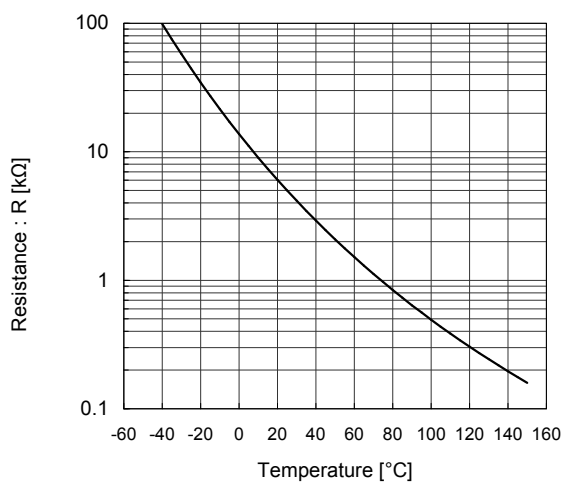
Reverse Recovery Characteristics (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_g=0.93\Omega$, $T_J=125^\circ C$, $150^\circ C$ 

Transient Thermal Resistance (max.)

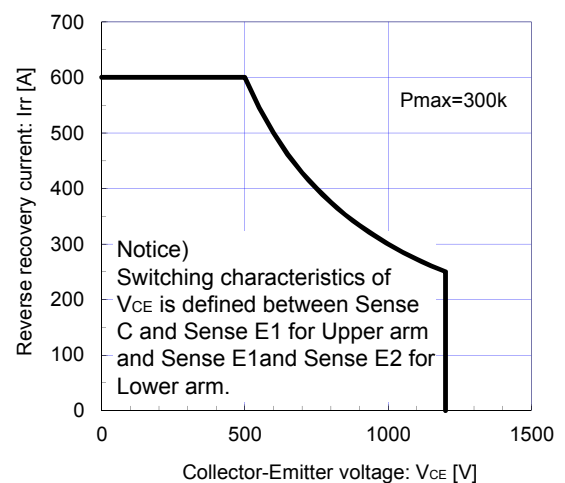


[THERMISTOR]

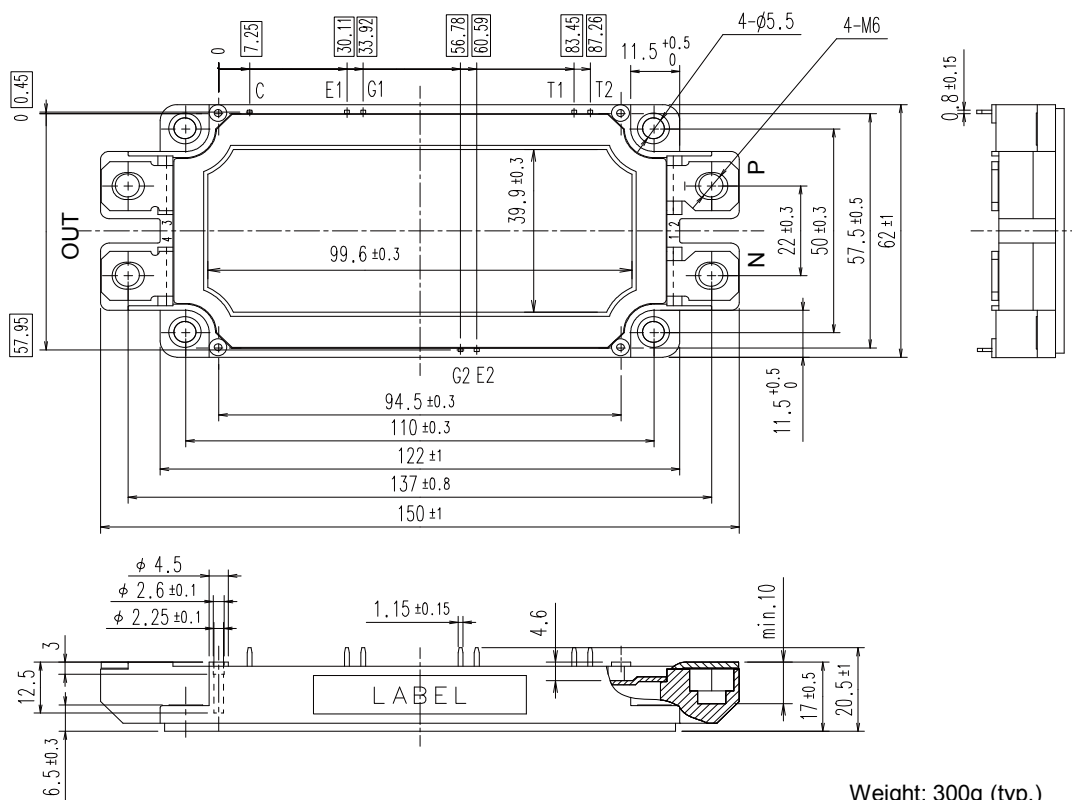
Temperature characteristic (typ.)



FWD safe operating area (max.)

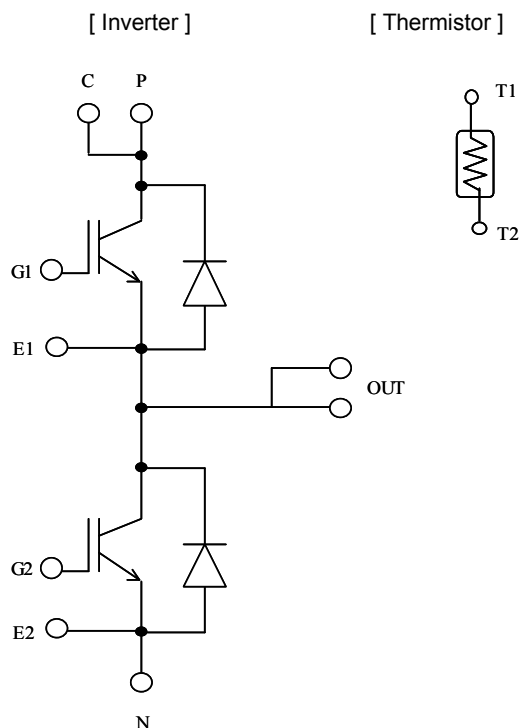
 $T_J=150^\circ C$ 

Outline Drawings (Unit : mm)



NOTE) shows theoretical demension and tolerance is ± 0.5

Equivalent Circuit



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