

2MBI450VN-120-50

IGBT Modules

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}	± 20	V	
	Collector current	I_c	Continuous	Tc=25°C	600
				Tc=100°C	450
		I_c pulse	1ms	900	A
		-Ic		450	
	-Ic 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)	V_{iso}	AC : 1min.	2500	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 : 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	-	
Internal gate resistance	$R_g(int)$	-	-	1.67	-	Ω	
Input capacitance	C_{ies}	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	-	41	-	nF	
Turn-on time	t_{on}	$V_{CC} = 600V$	-	550	-	nsec	
	t_r	$I_c = 450A$	-	180	-		
	$t_r(i)$	$V_{GE} = \pm 15V$	-	120	-		
	t_{off}	$R_g = 0.52\Omega$	-	1050	-		
Turn-off time	t_{off}	$L_s = 80nH$	-	110	-	nsec	
	t_f		-	110	-		
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	-	nsec	
Thermistor	Resistance	R	T=25°C	-	5000	-	Ω
			T=100°C	465	495	520	
			T=25/50°C	3305	3375	3450	
B value	B	T=25/50°C				K	

● Thermal resistance characteristics

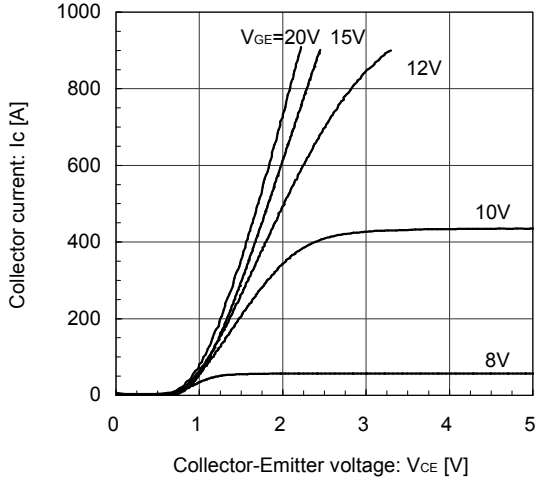
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	Rth(j-c)	Inverter IGBT	-	-	0.066	°C/W
		Inverter FWD	-	-	0.100	
Contact thermal resistance (1device) (*5)	Rth(c-f)	with Thermal Compound	-	0.0167	-	

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

■ Characteristics (Representative)

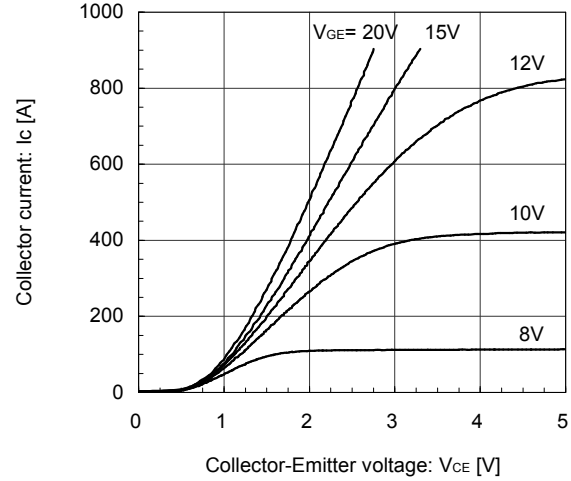
[INVERTER]

Collector current vs. Collector-Emmitter voltage (typ.)
T_j= 25°C / chip



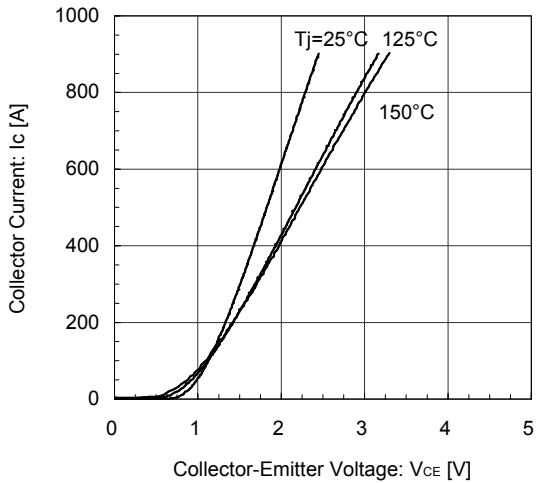
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Collector current vs. Collector-Emmitter voltage (typ.)
T_j= 150°C / chip



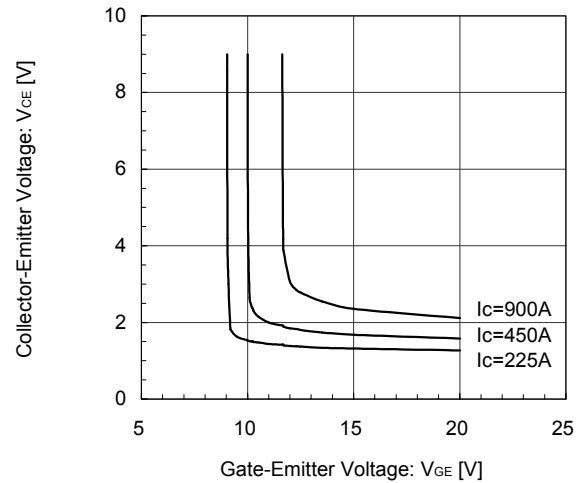
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Collector current vs. Collector-Emmitter voltage (typ.)
V_{GE}= 15V / chip



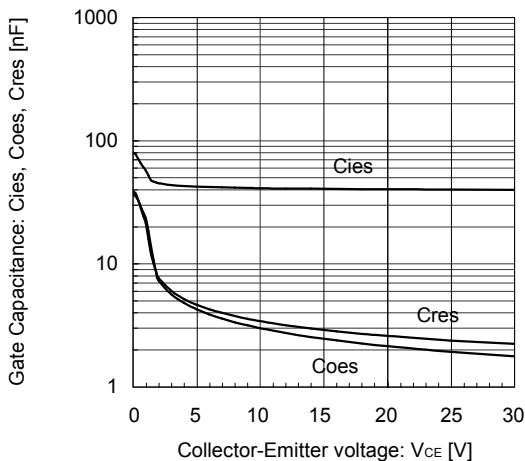
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Collector-Emmitter voltage vs. Gate-Emmitter voltage (typ.)
T_j= 25°C / chip



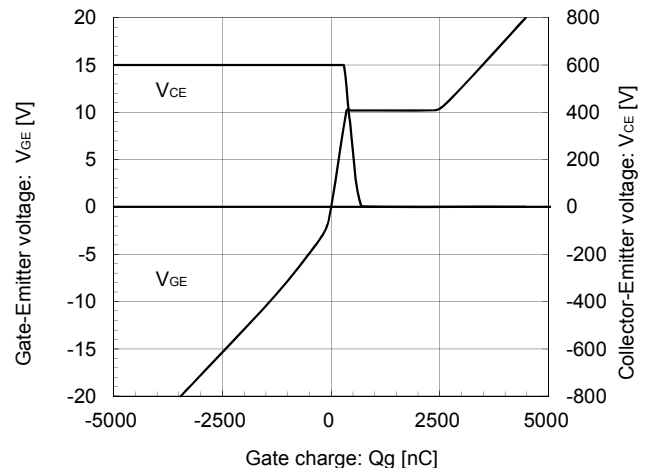
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Gate Capacitance vs. Collector-Emmitter Voltage (typ.)
V_{GE}= 0V, f= 1MHz, T_j= 25°C



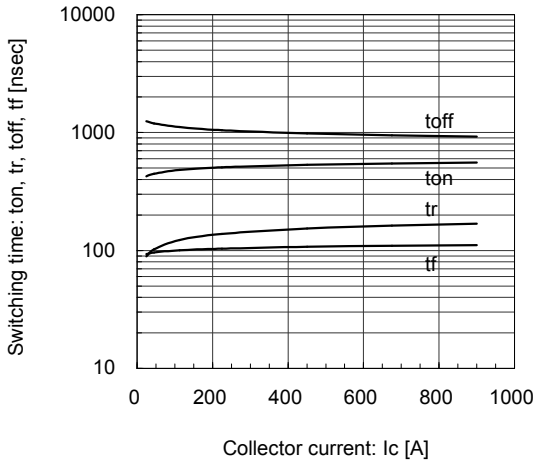
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Dynamic Gate Charge (typ.)
V_{CC}=600V, Ic=450A, T_j= 25°C



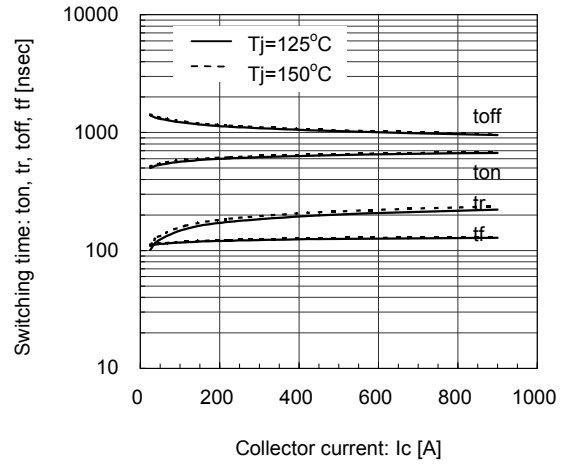
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_g=0.52\Omega, T_j=25^\circ C$



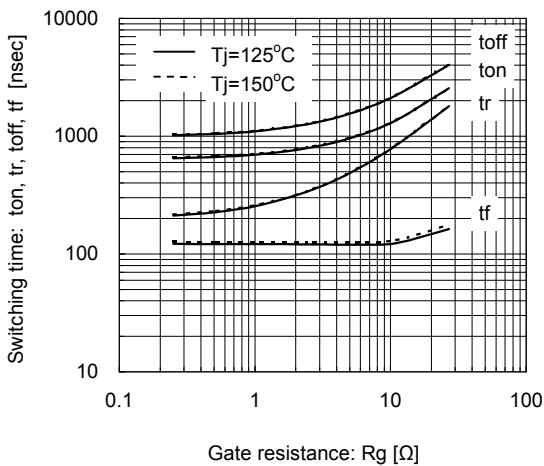
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_g=0.52\Omega, T_j=125^\circ C, 150^\circ C$



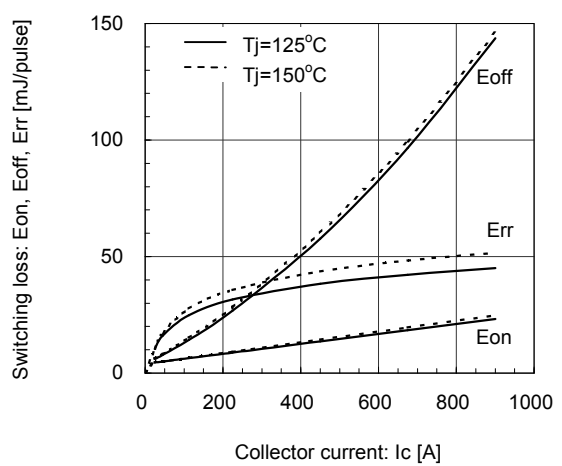
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Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V, I_c=450A, V_{GE}=\pm 15V, T_j=125^\circ C, 150^\circ C$



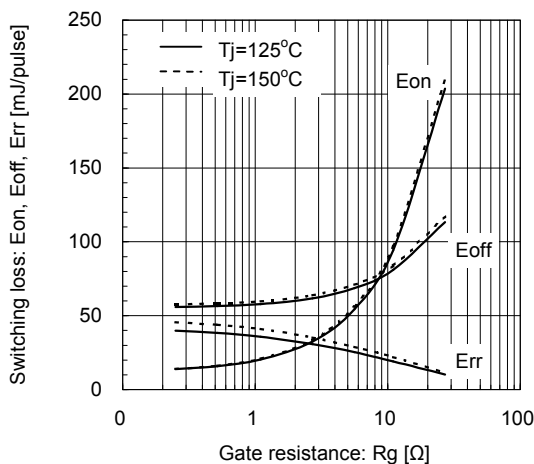
[INVERTER]

Switching loss vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_g=0.52\Omega, T_j=125^\circ C, 150^\circ C$



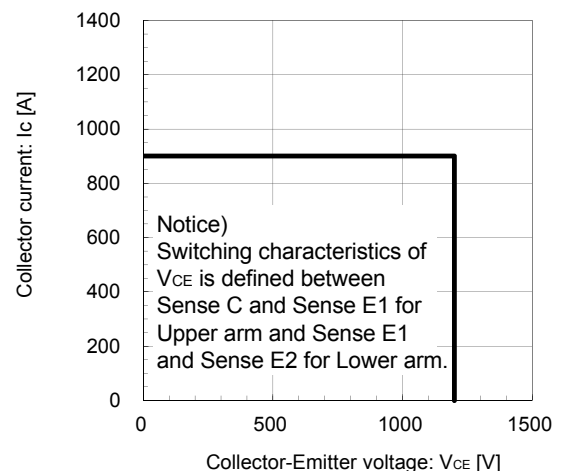
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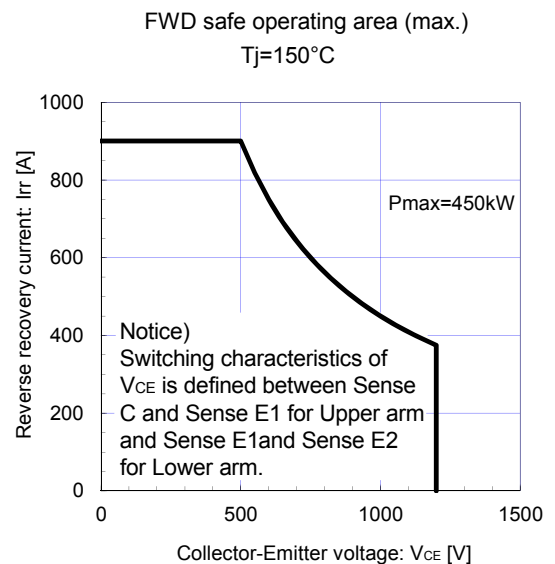
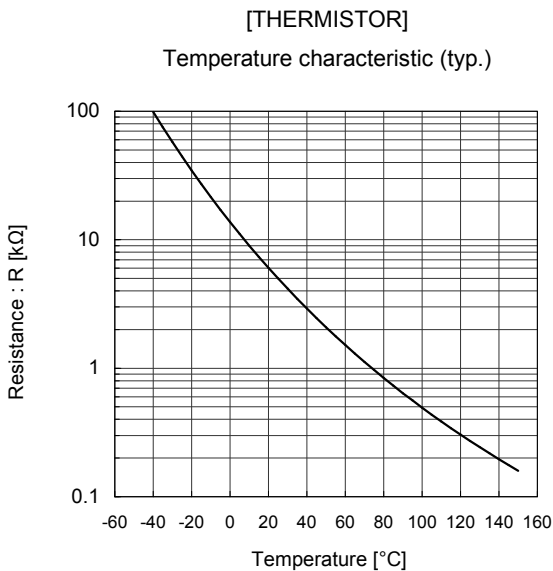
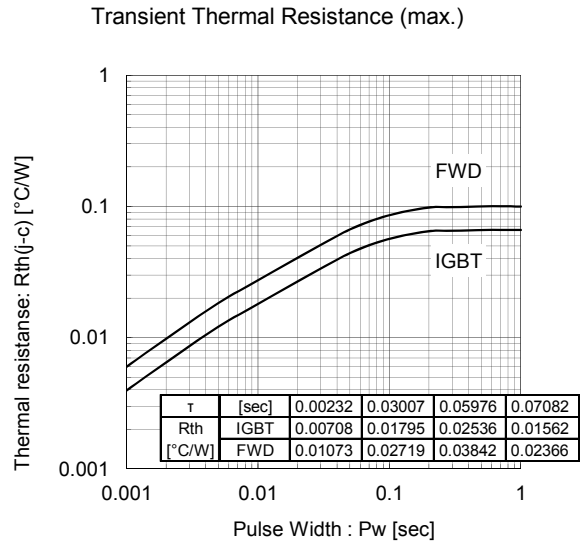
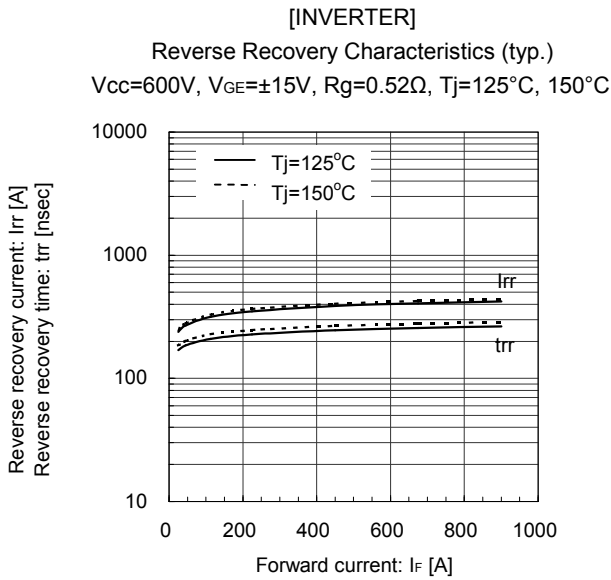
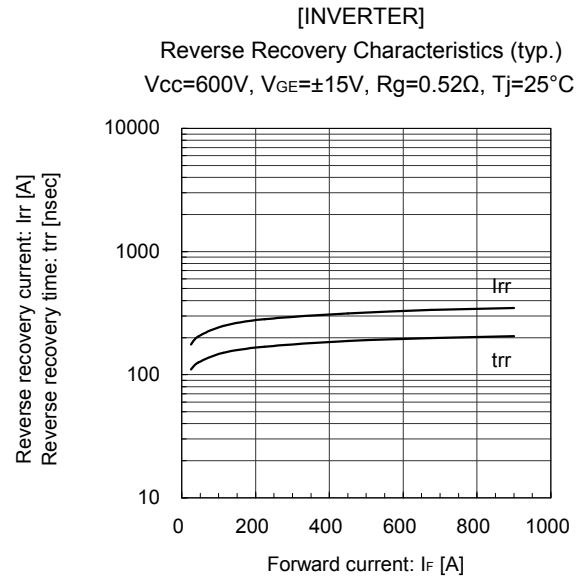
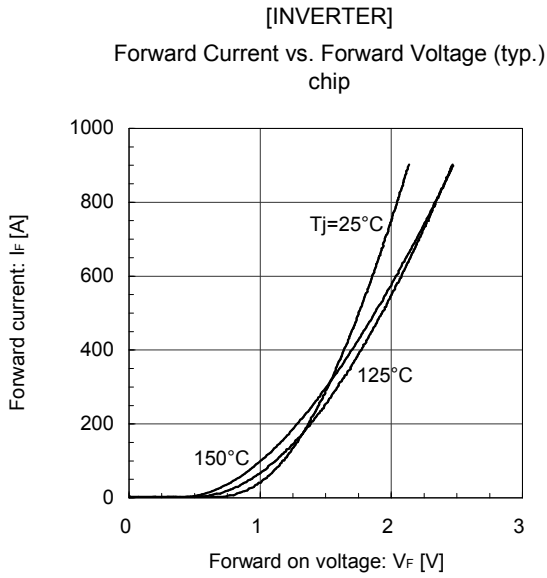
Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V, I_c=450A, V_{GE}=\pm 15V, T_j=125^\circ C, 150^\circ C$



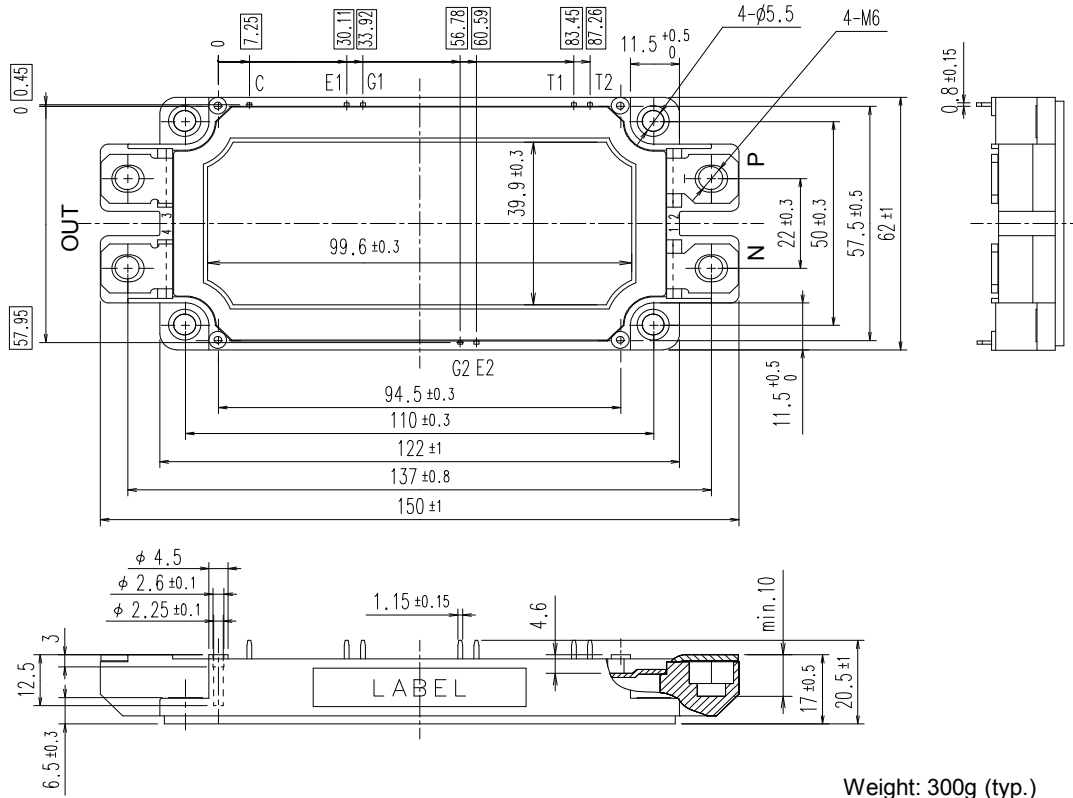
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Reverse bias safe operating area (max.)
 $+V_{ge}=15V, -V_{ge}=15V, R_g=0.52\Omega, T_j=150^\circ C$





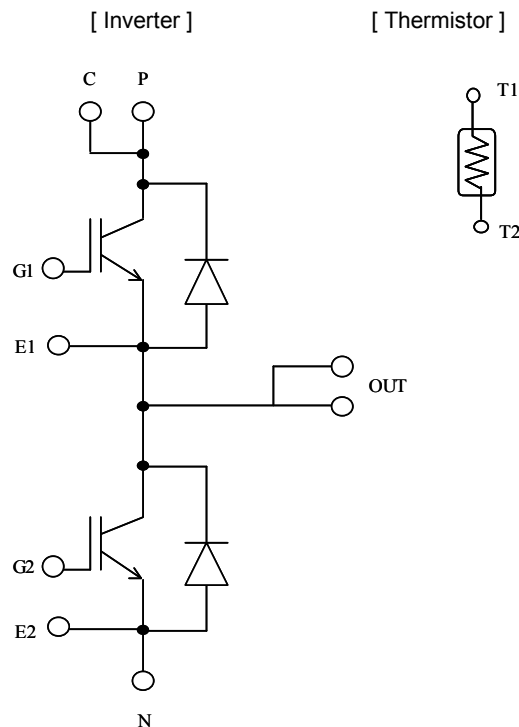
■ Outline Drawings (Unit : mm)



Weight: 300g (typ.)

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

■ Equivalent Circuit



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