

1MBI400HH-120L-50

IGBT Modules

IGBT MODULE

1200V / 400A / 1 in one package

■ Features

- High speed switching
- Voltage drive
- Low Inductance module structure

■ Applications

- Inverter DB for Motor Drive
- AC and DC Servo Drive Amplifier (DB)
- Active PFC
- Industrial machines



■ Maximum Ratings and Characteristics

● Absolute Maximum Ratings (at T_c=25°C unless otherwise specified)

Items	Symbols	Conditions	Maximum ratings	Units
Collector-Emitter voltage	V _{CES}		1200	V
Gate-Emitter voltage	V _{GES}		±20	V
Collector current	I _c	Continuous	T _c =25°C 600	A
			T _c =80°C 400	
	I _{cp}	1ms	T _c =25°C 1200	
			T _c =80°C 800	
	-I _c		75	
	-I _c pluse	1ms	150	
Collector Power Dissipation	P _c	1 device	2500	W
Reverse voltage for FWD	V _R		1200	V
Forword current for FWD	I _F	Continuous	400	A
	I _F pulse	1ms	800	
Junction temperature	T _J		+150	°C
Storage temperature	T _{stg}		-40 to +125	
Isolation voltage	between terminal and copper base (*1)	V _{iso}	2500	VAC
	between thermistor and others (*2)			
Screw Torque	Mounting (*3)		3.5	Nm
	Terminals (*4)		4.5	

Note *1: All terminals should be connected together when isolation test will be done.

Note *2: Two thermistor terminals should be connected together, each other terminals should be connected together and shorted to base plate when isolation test will be done.

Note *3: Recommendable Value : Mounting 2.5 to 3.5 Nm (M5 or M6)

Note *4: Recommendable Value : Terminals 3.5 to 4.5 Nm (M6)

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

Items	Symbols	Conditions	Characteristics			Units		
			min.	typ.	max.			
IGBT+Inverse Diode	Zero gate voltage collector current	I _{ces}	V _{CE} = 1200V V _{GE} = 0V	-	-	4.0	mA	
	Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V V _{GE} = ±20V	-	-	800	nA	
	Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V I _C = 400mA	5.7	6.2	6.7	V	
	Collector-Emitter saturation voltage	V _{CE(sat)} (terminal)	I _C = 400A V _{GE} = 15V	T _j = 25°C	-	3.30	3.60	V
				T _j = 125°C	-	4.30	-	
		V _{CE(sat)} (chip)		T _j = 25°C	-	3.10	3.40	
				T _j = 125°C	-	4.00	-	
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	-	35	-	nF	
	Turn-on time	t _{on}	V _{CC} = 600V I _C = 400A V _{GE} = ±15V	-	0.20	0.60	μs	
		t _r		-	0.10	0.50		
t _{r(l)}		-		0.30	-			
t _{off}		-		0.40	0.70			
Turn-off time	t _{off}	R _G = 1.6 Ω	-	0.40	0.70	μs		
	t _r	L _S = 20nH	-	0.05	0.20			
Forward on voltage	V _F (terminal)	I _F = 75A V _{GE} = 0V	T _j = 25°C	-	1.80	2.30	V	
			T _j = 125°C	-	1.95	-		
	V _F (chip)		T _j = 25°C	-	1.70	2.15		
			T _j = 125°C	-	1.85	-		
Reverse Current	I _R	V _{CE} = 1200V	-	-	1.0	mA		
FWD	V _F (terminal)	I _F = 400A V _{GE} = 0V	T _j = 25°C	-	8.20	9.80	V	
			T _j = 125°C	-	4.50	-		
	V _F (chip)		T _j = 25°C	-	8.00	9.60		
			T _j = 125°C	-	4.30	-		
Reverse recovery time	t _{rr}	I _F = 400A	-	-	0.20	μs		
Lead resistance, terminal-chip (*5)	R lead		-	0.48	-	mΩ		
Thermistor	Resistance	T = 25°C	-	5000	-	Ω		
		T = 125°C	465	495	520			
	B value	B	T = 25/50°C	3305	3375	3450	K	

Note *5: Biggest internal terminal resistance among arm.

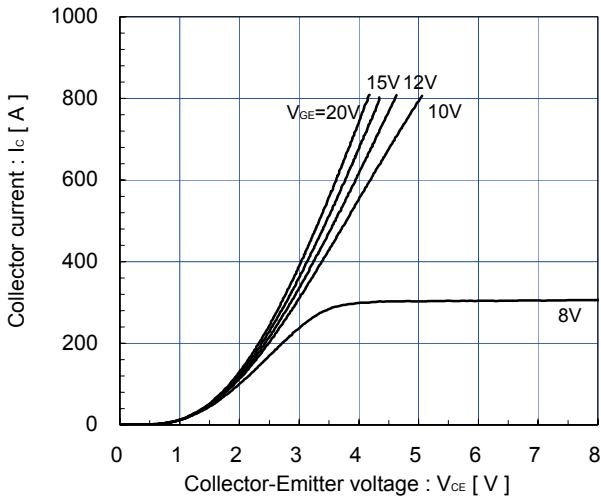
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance(1device)	R _{th(j-c)}	IGBT	-	-	0.036	°C/W
		Inverse Diode	-	-	0.460	
		FWD	-	-	0.084	
Contact Thermal resistance	R _{th(c-f)}	with Thermal Compound (*6)	-	0.0125	-	

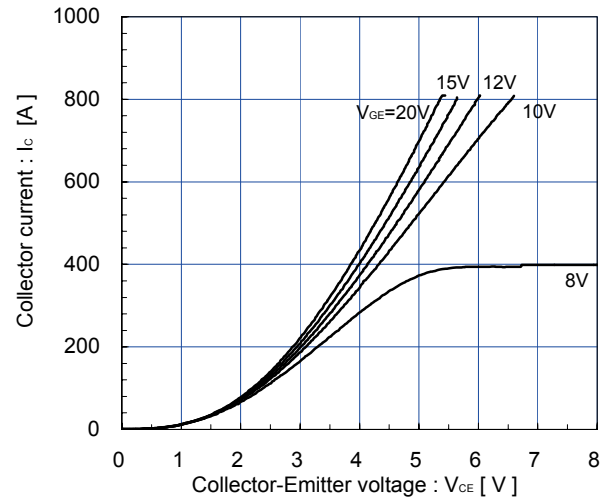
Note *6: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

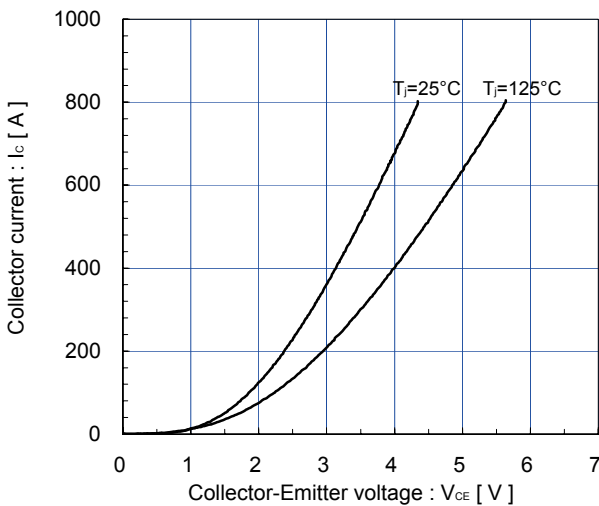
Collector current vs. Collector-Emitter voltage (typ.)
 $T_J=25^\circ\text{C}$ / chip



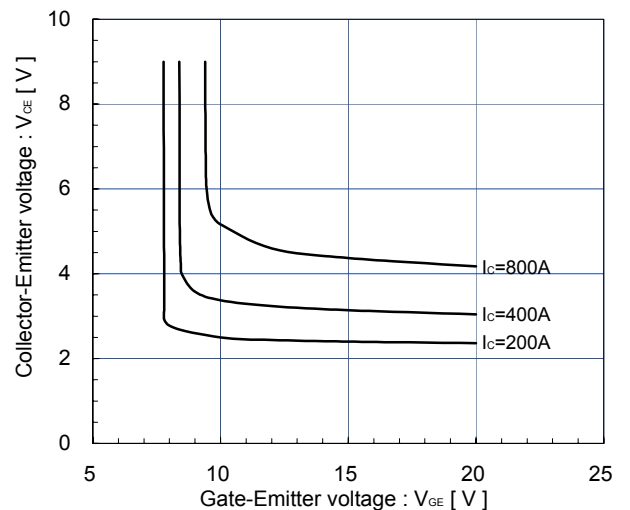
Collector current vs. Collector-Emitter voltage (typ.)
 $T_J=125^\circ\text{C}$ / chip



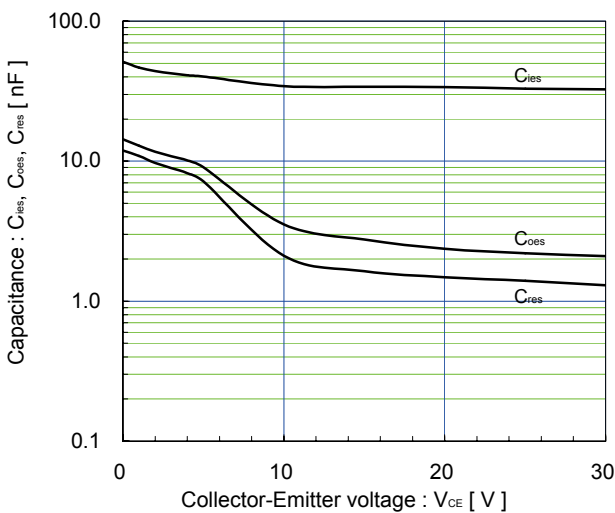
Collector current vs. Collector-Emitter voltage (typ.)
 $V_{GE}=15\text{V}$ / chip



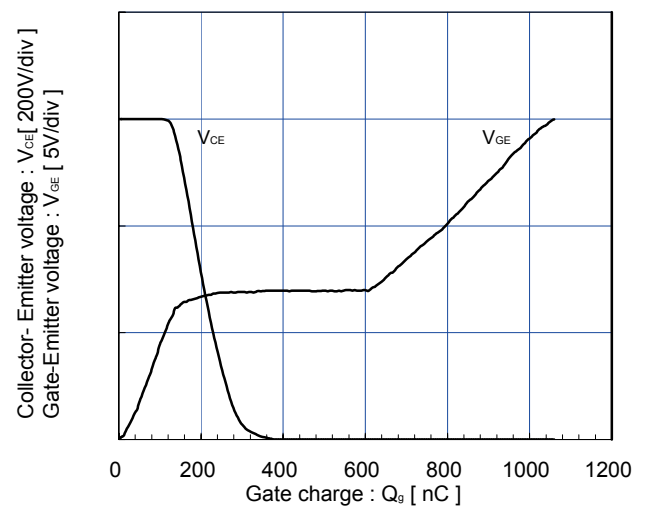
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
 $T_J=25^\circ\text{C}$ / chip



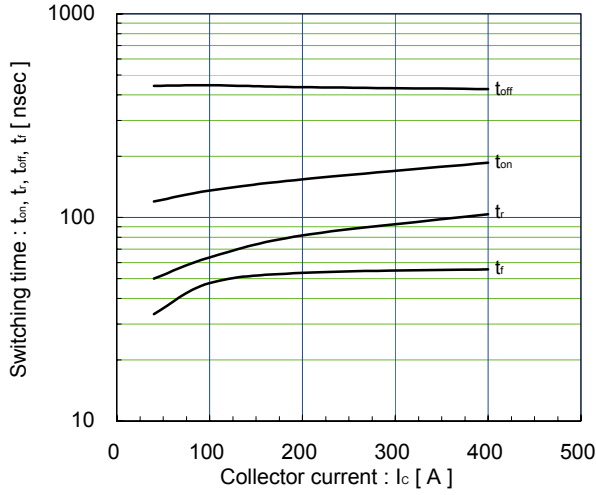
Capacitance vs. Collector-Emitter voltage (typ.)
 $V_{GE}=0\text{V}$, $f=1\text{MHz}$, $T_J=25^\circ\text{C}$



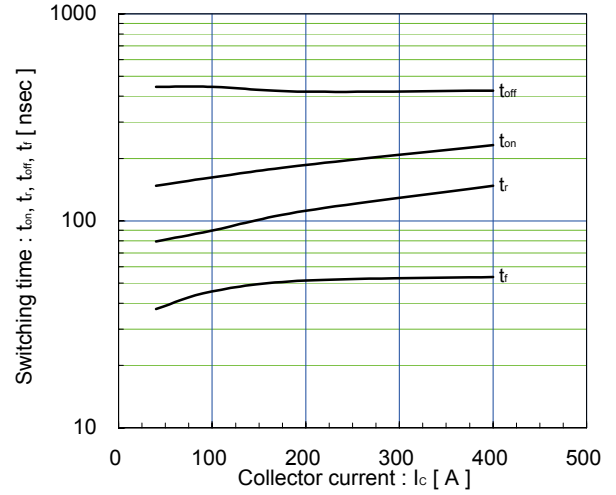
Dynamic Gate charge (typ.)
 $V_{CC}=600\text{V}$, $I_C=400\text{A}$, $T_J=25^\circ\text{C}$



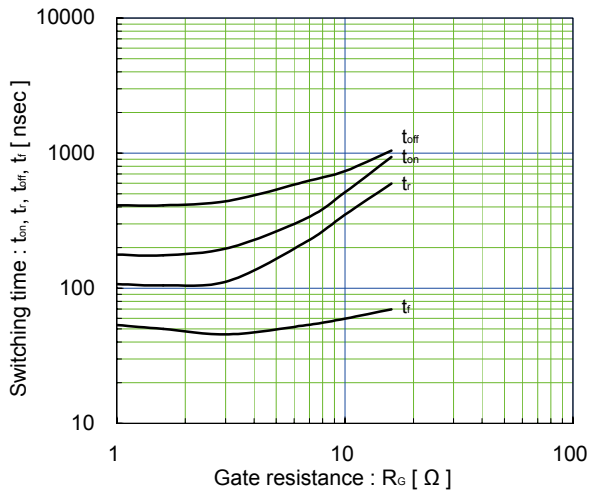
Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.6\Omega, T_J=25^\circ C$



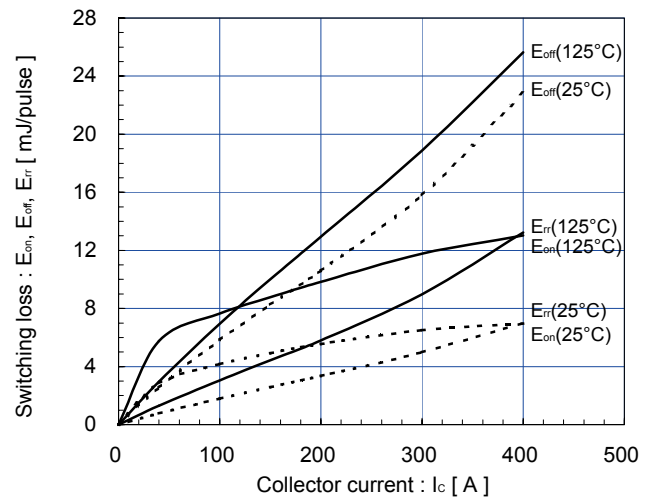
Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.6\Omega, T_J=125^\circ C$



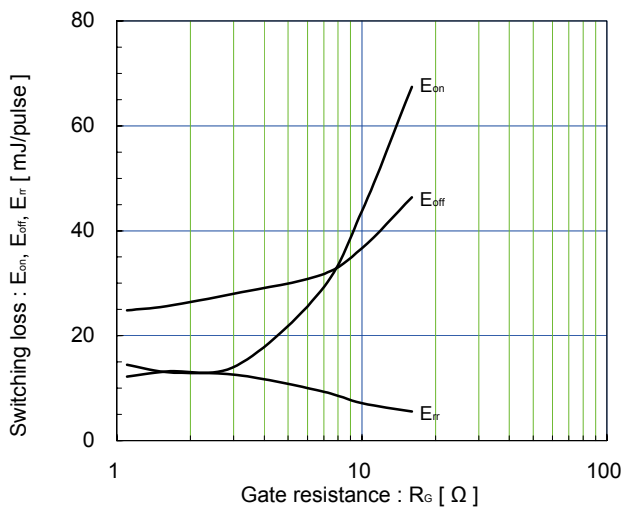
Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V, I_c=400A, V_{GE}=\pm 15V, T_J=25^\circ C$



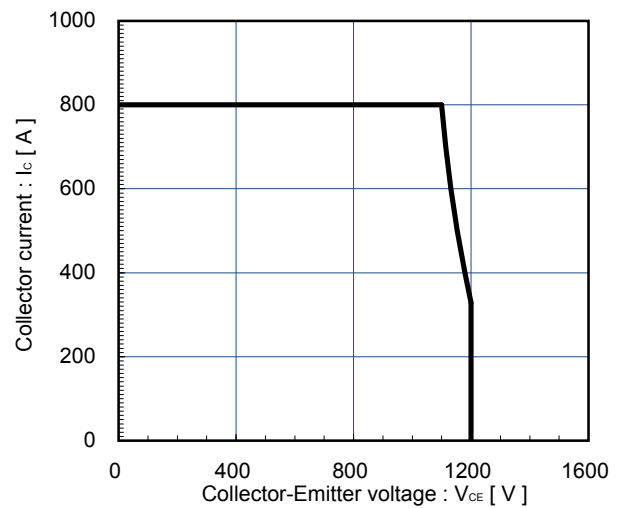
Switching loss vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.6\Omega$

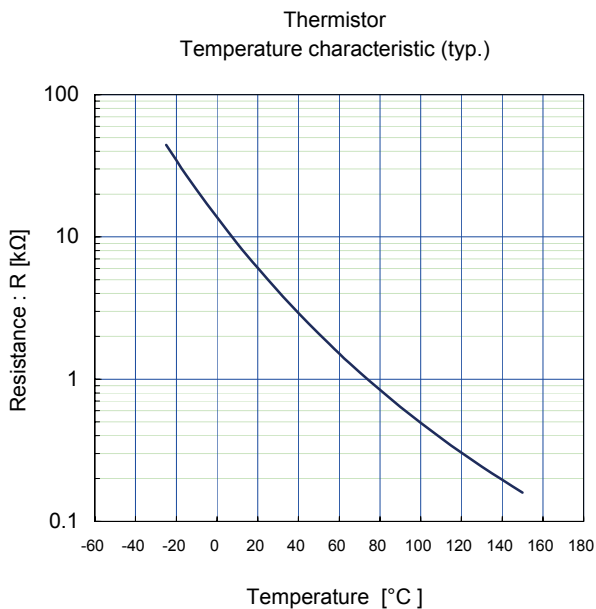
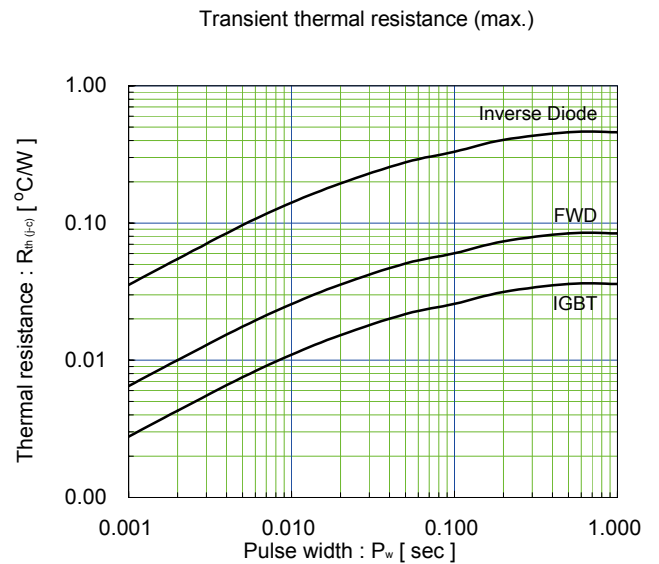
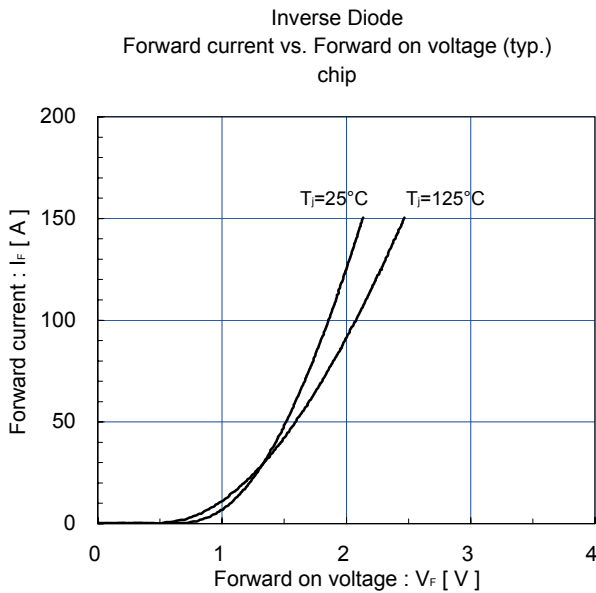
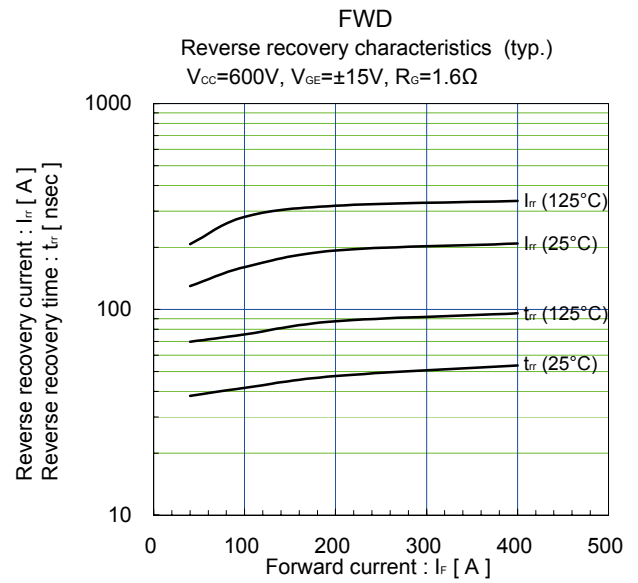
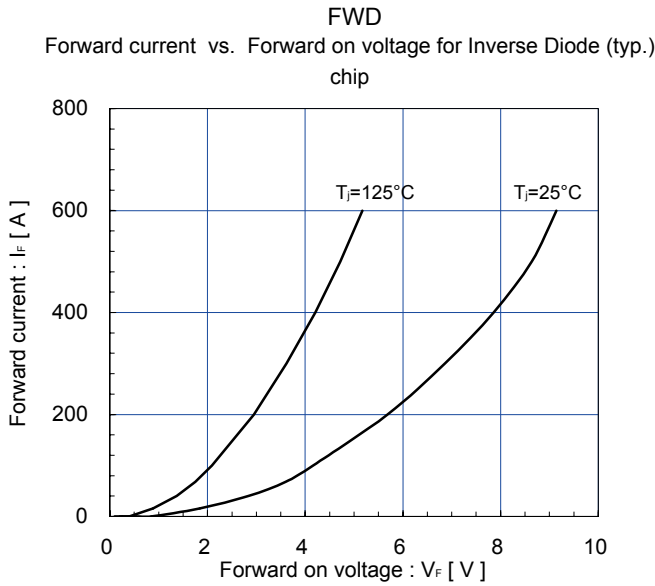


Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V, I_c=400A, V_{GE}=\pm 15V, T_J=125^\circ C$

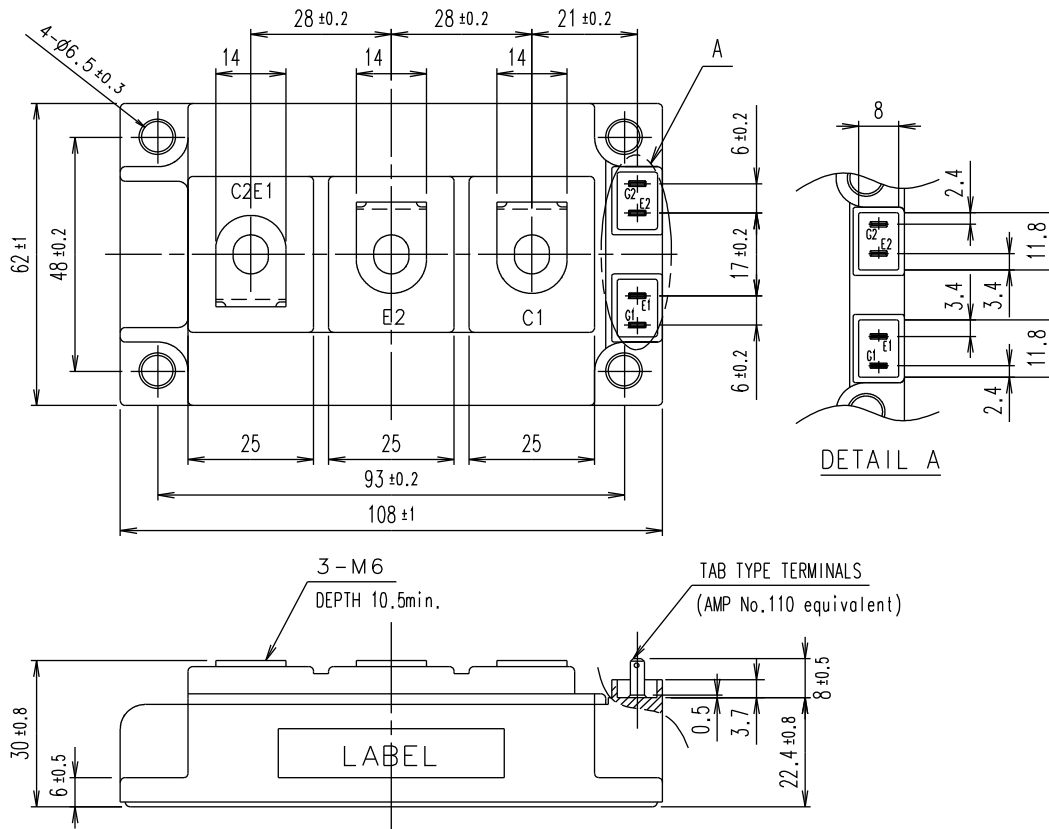


Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE} \le 15V, R_G \ge 1.6\Omega, T_J \le 125^\circ C$

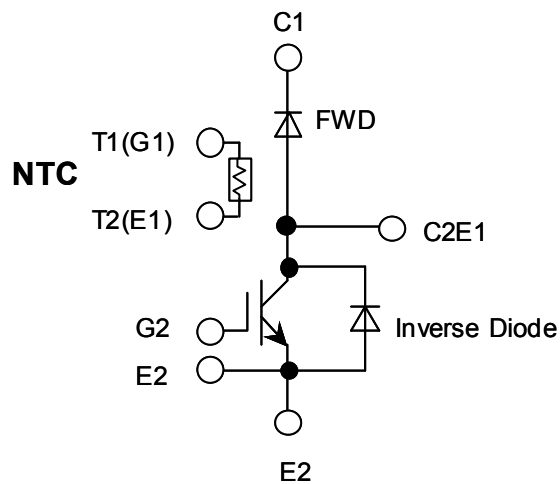




■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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