

1MBI150VA-120L-50

IGBT Modules

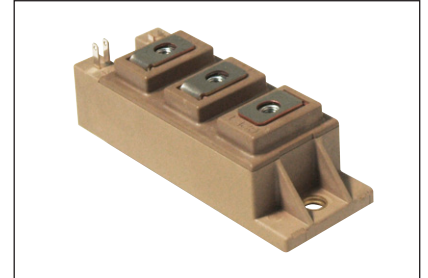
IGBT MODULE (U series) 1200V / 150A / 1 in one package

■ 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 $T_c=25^\circ\text{C}$ 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 $T_c=100^\circ\text{C}$	150	A
	$I_{C\ pulse}$	1ms	300	
	$-I_C$		75	
	$-I_{C\ pulse}$	1ms	150	
Collector power dissipation	P_C	1 device	785	W
Reverse voltage for FWD	V_R		1200	V
Forward current for FWD	I_F		200	A
	$I_{F\ pulse}$	1ms	400	
Junction temperature	T_j		175	$^\circ\text{C}$
Operating junction temperature (under switching conditions)	T_{jop}		150	
Case temperature	T_c		125	
Storage temperature	T_{stg}		-40~125	
Isolation voltage	Between terminal and copper base (*1) Mounting (*2) Terminals (*3)	V_{iso}	AC : 1min.	VAC
Screw torque			5.0	N m

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

Note *2: Recommendable Value : 3.0 to 5.0 N·m (M5 or M6)

Note *3: Recommendable Value : 2.5 to 5.0 N·m (M5)

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

Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage collector current	I_{CES}	$V_{GE} = 0V, V_{CE} = 1200V$	-	-	1.0	mA	
Gate-Emitter leakage current	I_{GES}	$V_{CE} = 0V, V_{GE} = \pm 20V$	-	-	200	nA	
Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_c = 150mA$	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_c = 150A$	$T_j = 25^\circ C$	-	1.95	2.40	V
			$T_j = 125^\circ C$	-	2.30	-	
			$T_j = 150^\circ C$	-	2.35	-	
	$V_{CE(sat)}$ (chip)		$T_j = 25^\circ C$	-	1.85	2.30	
			$T_j = 125^\circ C$	-	2.20	-	
			$T_j = 150^\circ C$	-	2.25	-	
Internal gate resistance	$R_{G(int)}$	-	-	5	-	Ω	
Input capacitance	C_{ies}	$V_{GE} = 0V, V_{CE} = 10V, f = 1MHz$	-	12.6	-	nF	
Turn-on time	t_{on}	$V_{CC} = 600V, I_c = 150A$ $V_{GE} = \pm 15V, R_G = 1.1\Omega$ $T_j = 150^\circ C, R_s = 30nH$	-	600	-	nsec	
	t_r		-	200	-		
	$t_{r(0)}$		-	50	-		
Turn-off time	t_{off}		-	600	-		
	t_f		-	40	-		
	t_r		-	40	-		
Forward on voltage	V_F (terminal)	$V_{GE} = 0V$ $I_F = 75A$	$T_j = 25^\circ C$	-	1.80	2.25	V
			$T_j = 125^\circ C$	-	1.95	-	
			$T_j = 150^\circ C$	-	1.90	-	
	V_F (chip)		$T_j = 25^\circ C$	-	1.70	2.15	
			$T_j = 125^\circ C$	-	1.85	-	
			$T_j = 150^\circ C$	-	1.80	-	
Reverse Current	I_R	$V_{CE} = 1200V$	-	-	1.0	mA	
Forward on voltage	V_F (terminal)	$V_{GE} = 0V$ $I_F = 200A$	$T_j = 25^\circ C$	-	1.85	2.30	V
			$T_j = 125^\circ C$	-	2.00	-	
			$T_j = 150^\circ C$	-	1.95	-	
	V_F (chip)		$T_j = 25^\circ C$	-	1.70	2.15	
			$T_j = 125^\circ C$	-	1.85	-	
			$T_j = 150^\circ C$	-	1.80	-	
Reverse recovery time	t_{rr}	$I_F = 200A$	-	-	0.35	μs	

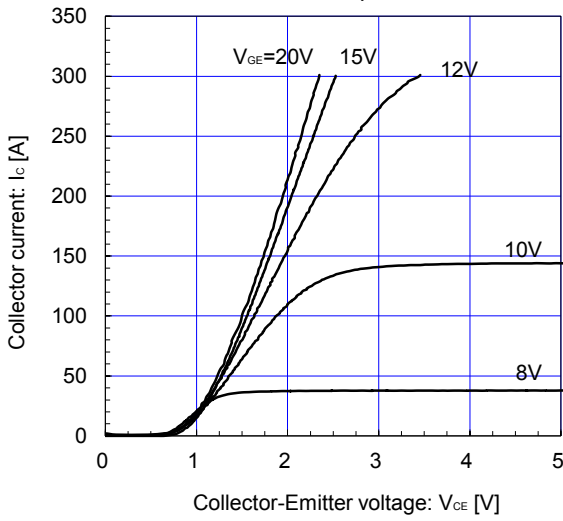
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	IGBT	-	-	0.19	$^\circ C/W$
		Inverse Diode	-	-	0.58	
		FWD	-	-	0.24	
Contact thermal resistance (1device) (*4)	$R_{th(c-f)}$	with Thermal Compound	-	0.050	-	

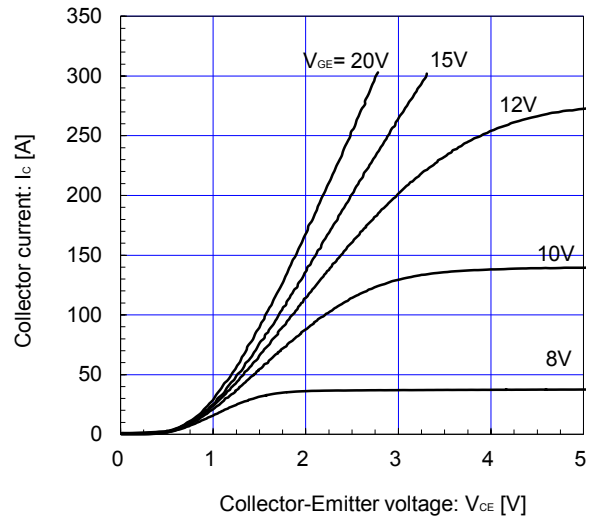
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

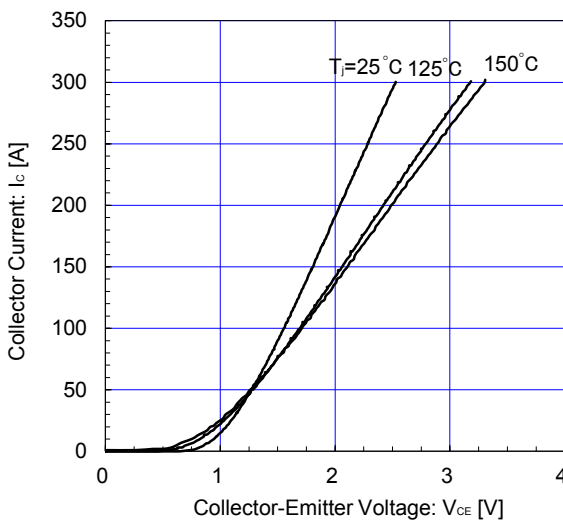
Collector current vs. Collector-Emitter voltage (typ.)
 $T_j = 25^\circ\text{C} / \text{chip}$



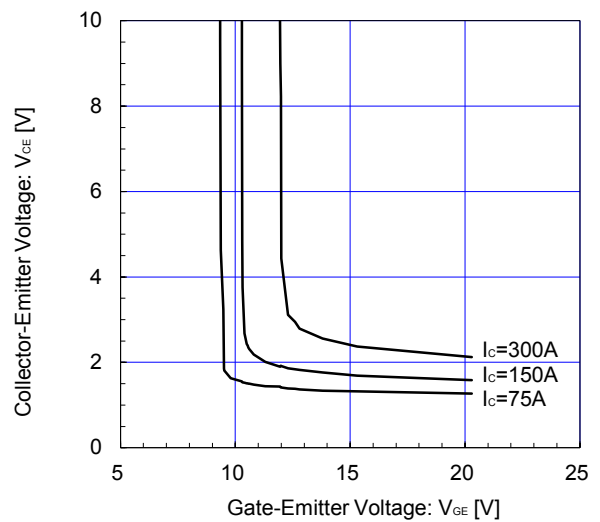
Collector current vs. Collector-Emitter voltage (typ.)
 $T_j = 150^\circ\text{C} / \text{chip}$



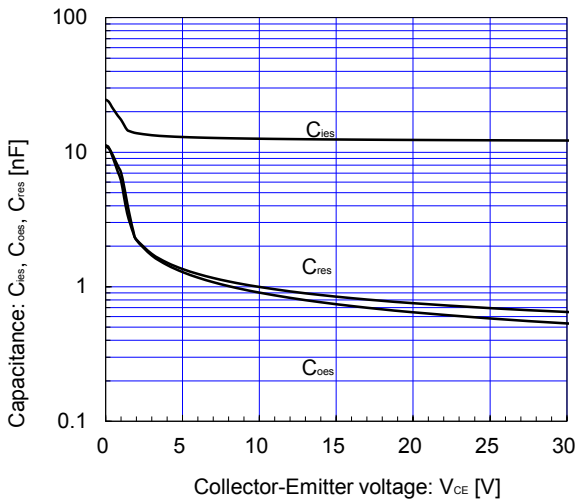
Collector current vs. Collector-Emitter voltage (typ.)
 $V_{GE} = 15\text{V} / \text{chip}$



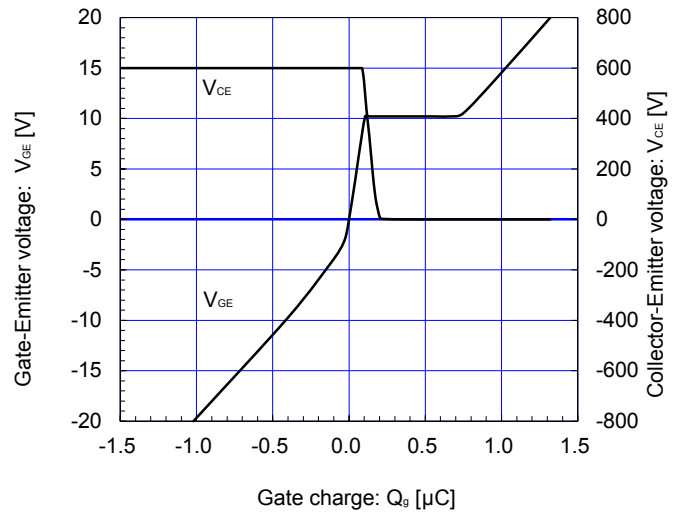
Collector-Emitter voltage vs. Gate-Emitter voltage
 $T_j = 25^\circ\text{C} / \text{chip}$



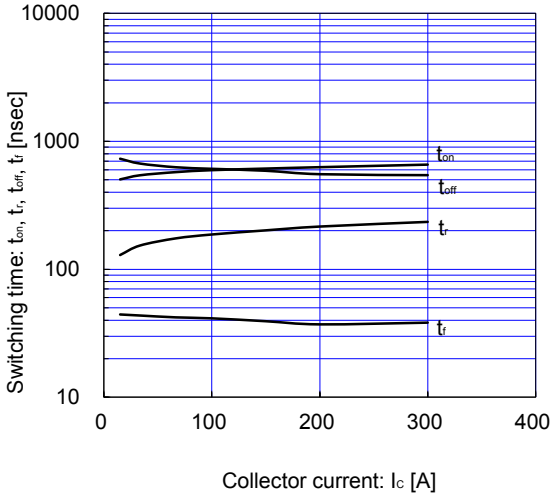
Capacitance vs. Collector-Emitter Voltage (typ.)
 $V_{GE} = 0\text{V}, f = 1\text{MHz}, T_j = 25^\circ\text{C}$



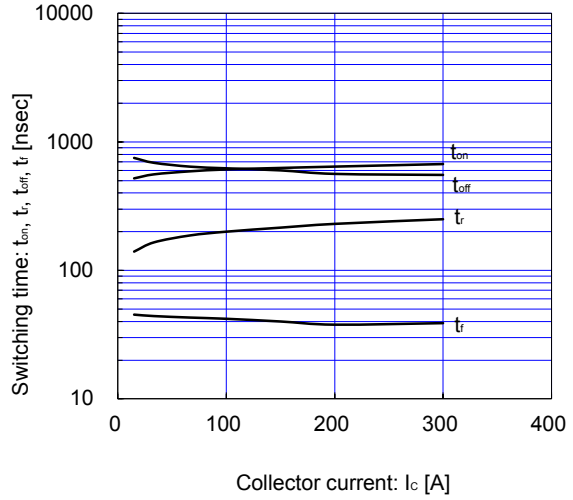
Dynamic Gate Charge (typ.)
 $V_{CC} = 600\text{V}, I_c = 200\text{A}, T_j = 25^\circ\text{C}$



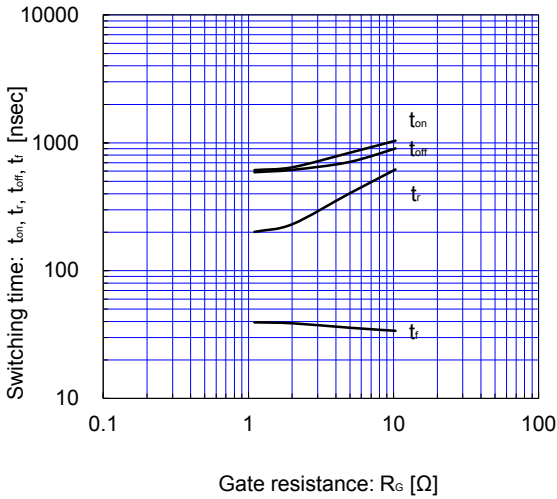
Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.1\Omega, T_J=125^\circ C$



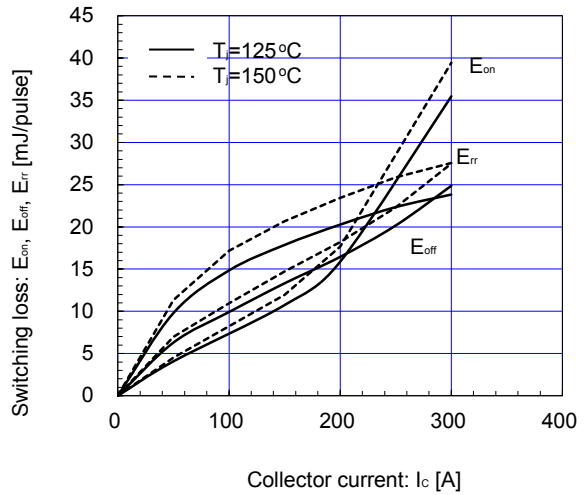
Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.1\Omega, T_J=150^\circ C$



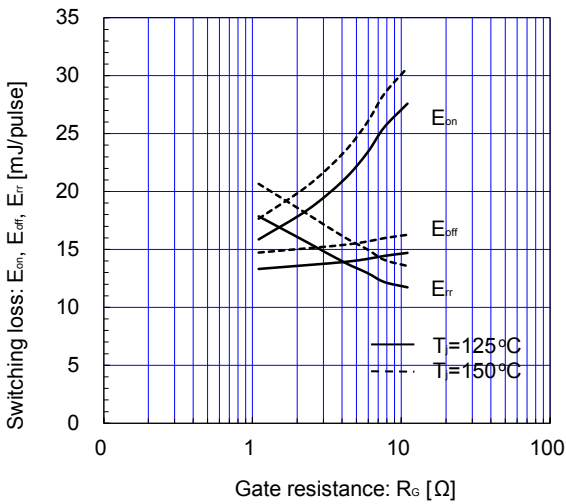
Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V, I_c=150A, V_{GE}=\pm 15V, T_J=125^\circ C$



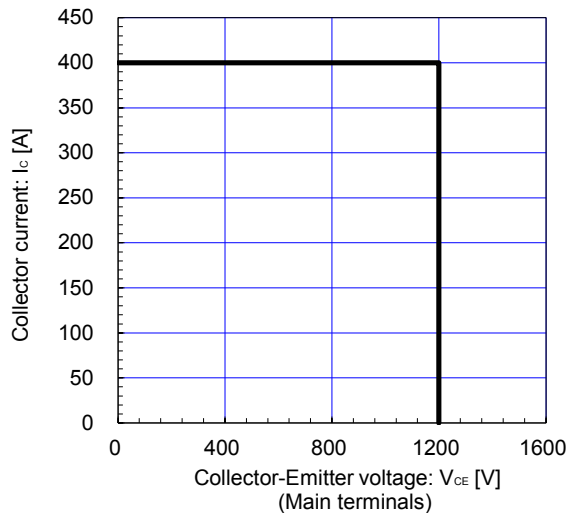
Switching loss vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=1.1\Omega, T_J=125, 150^\circ C$

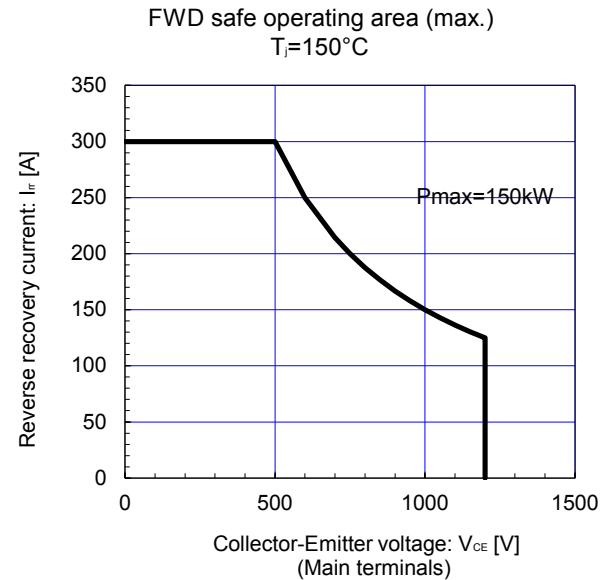
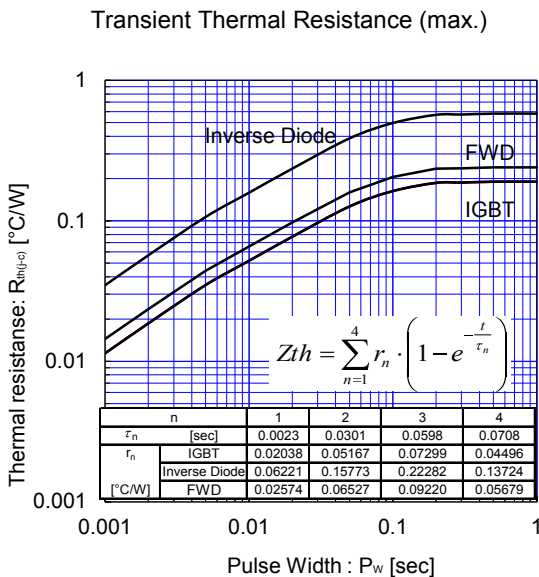
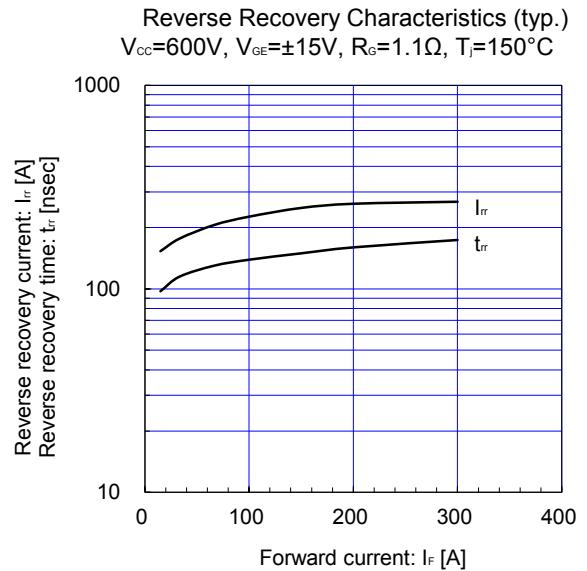
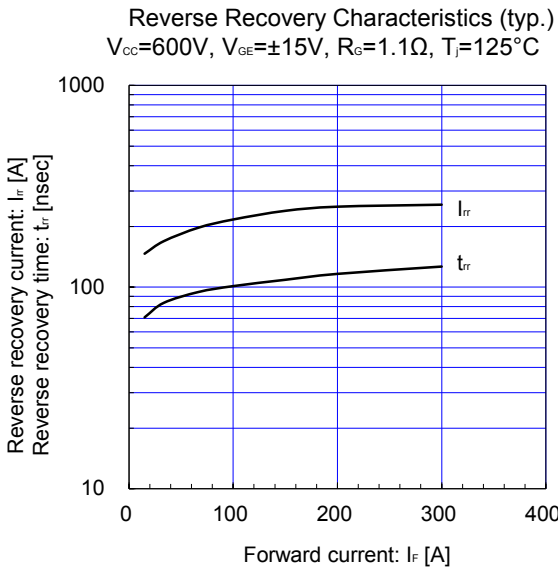
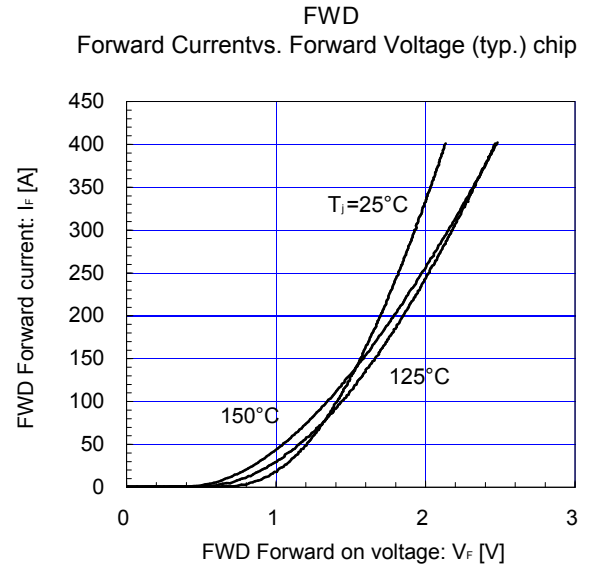
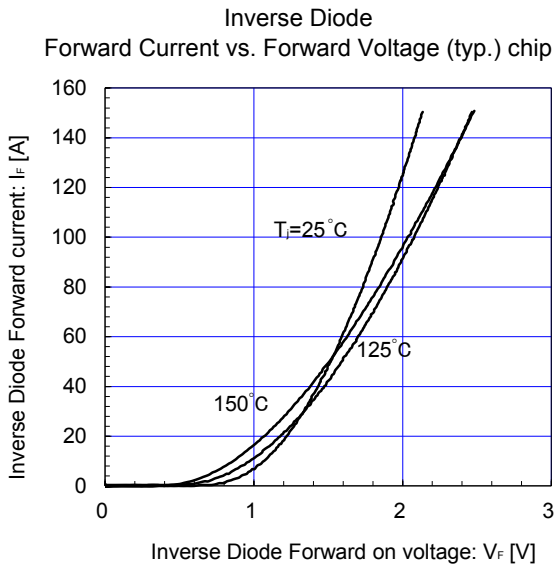


Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V, I_c=150A, V_{GE}=\pm 15V, T_J=125, 150^\circ C$

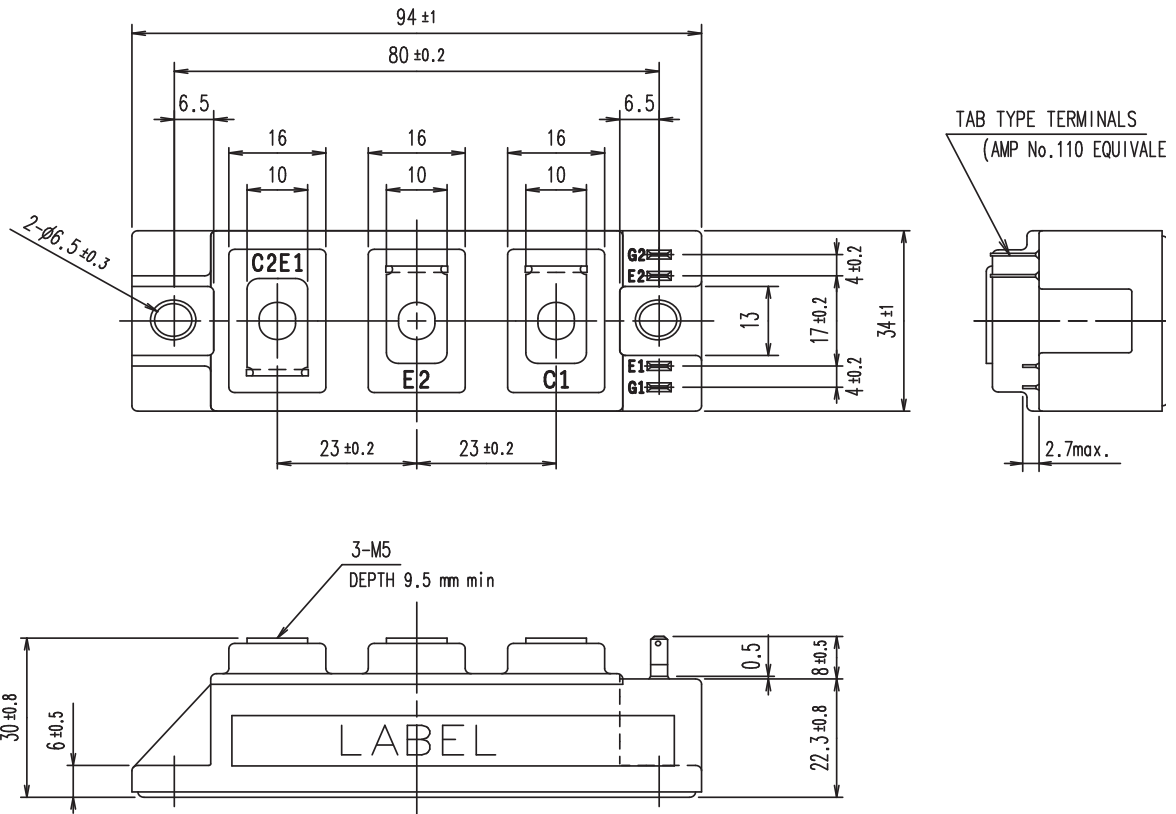


Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE}=15V, R_G=1.1\Omega, T_J=150^\circ C$

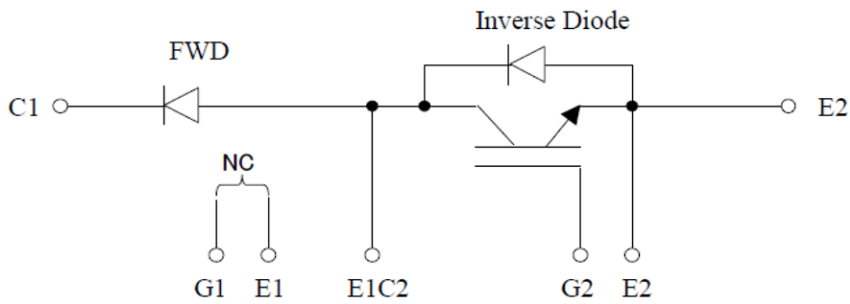




■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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