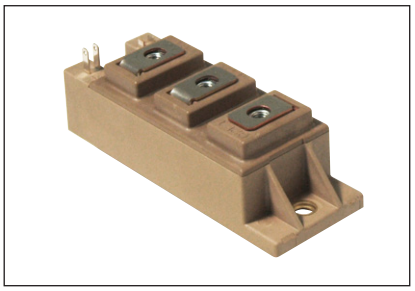
1MBI150VA-120L-50

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°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°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
Forword current for FWD		I_F			200	A
		$I_{F\ pulse}$	1ms		400	
Junction temperature		T_j			175	°C
Operating junction temperature (under switching conditions)		T_{jop}			150	
Case temperature		T_C			125	
Storage temperature		T_{stg}			-40~125	
Isolation voltage	Between terminal and copper base (*1)	V_{iso}	AC : 1min.		2500	VAC
Screw torque	Mounting (*2)	-			5.0	N m
	Terminals (*3)					

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)

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JUNE 2015

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

Items	Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
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} = ±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°C	-	1.95	2.40	V
			T_j=125°C	-	2.30	-	
			T_j=150°C		2.35		
	$V_{CE\ (sat)}$ (chip)		T_j=25°C	-	1.85	2.30	
			T_j=125°C	-	2.20	-	
			T_j=150°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} = ±15V, R_G = 1.1Ω, T_j = 150°C, R_S = 30nH		-	600	-	nsec
	t_r			-	200	-	
	$t_{r(i)}$			-	50	-	
Turn-off time	t_{off}			-	600	-	
	t_f			-	40	-	
Forward on voltage	V_F (terminal)	V_{GE} = 0V, I_F = 75A	T_j=25°C	-	1.80	2.25	V
			T_j=125°C	-	1.95	-	
			T_j=150°C		1.90		
	V_F (chip)		T_j=25°C	-	1.70	2.15	
			T_j=125°C	-	1.85	-	
			T_j=150°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°C	-	1.85	2.30	V
			T_j=125°C	-	2.00	-	
			T_j=150°C	-	1.95	-	
	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 = 200A		-	-	0.35	μs

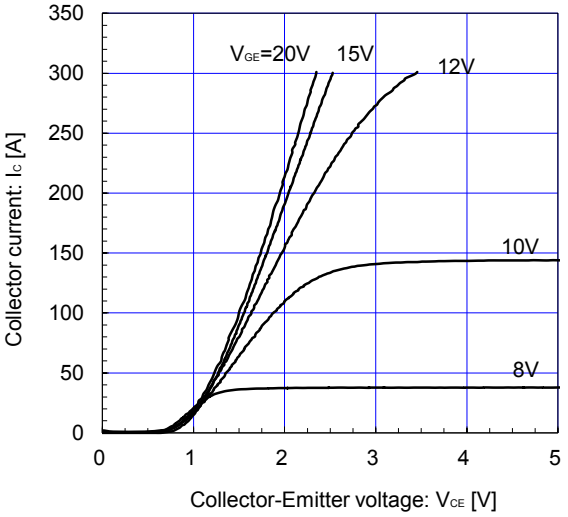
● Thermal resistance characteristics

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

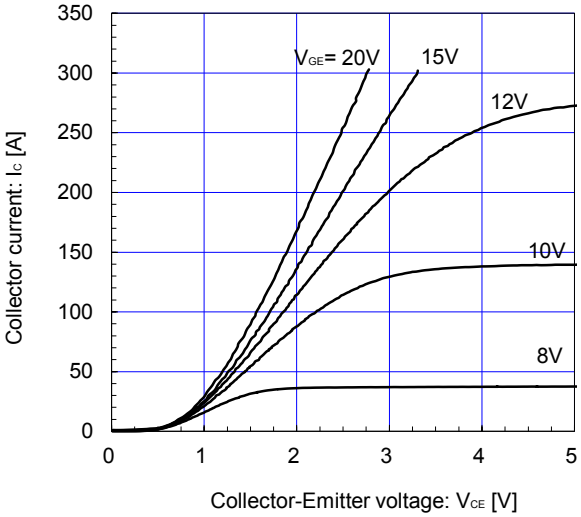
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

Characteristics (Representative)

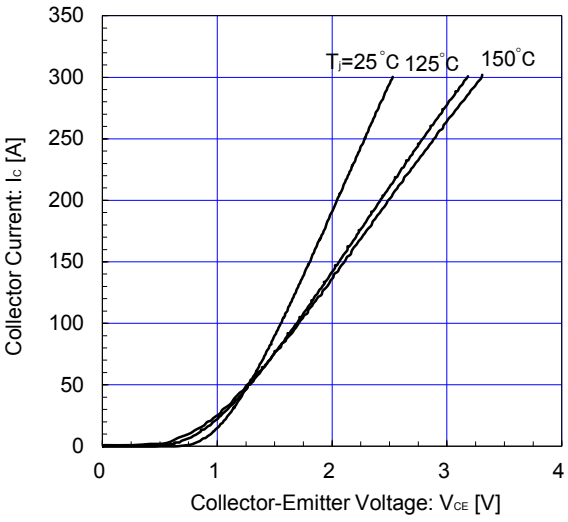
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 25°C / chip



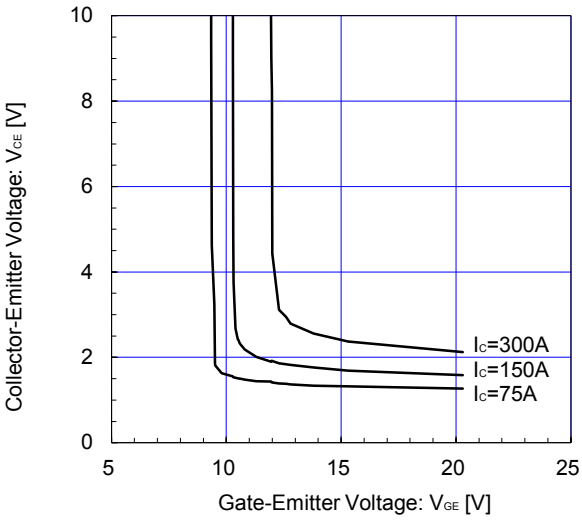
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 150°C / chip



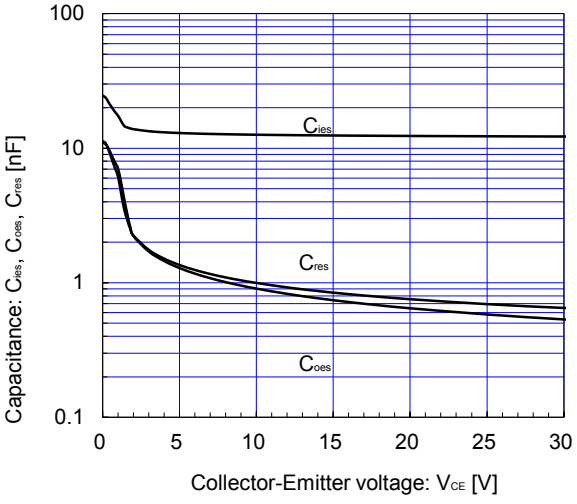
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE}= 15V / chip



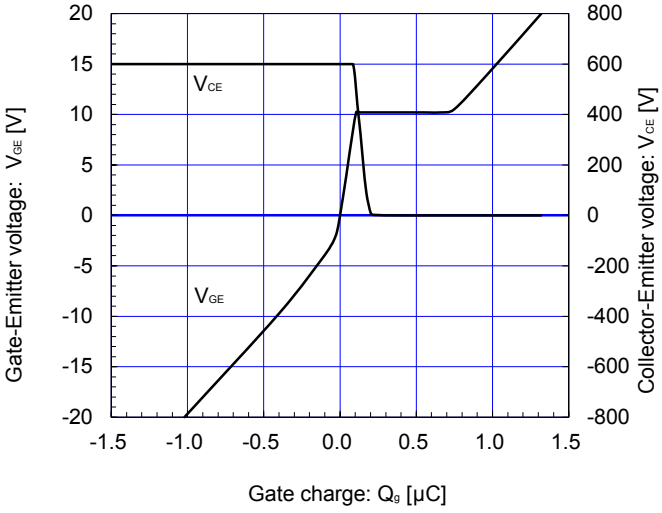
Collector-Emitter voltage vs. Gate-Emitter voltage
T_j= 25°C / chip



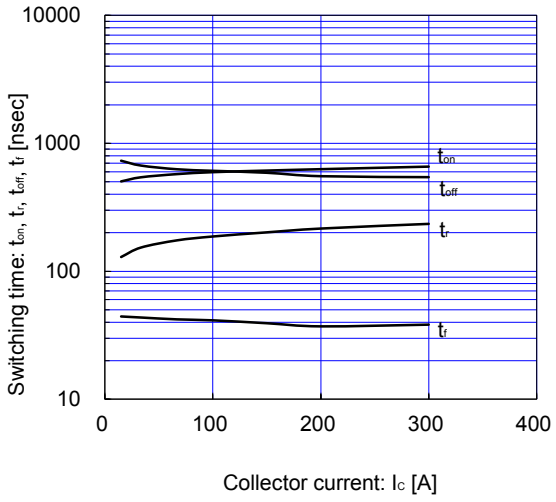
Capacitance vs. Collector-Emitter Voltage (typ.)
V_{GE}= 0V, f= 1MHz, T_j= 25°C



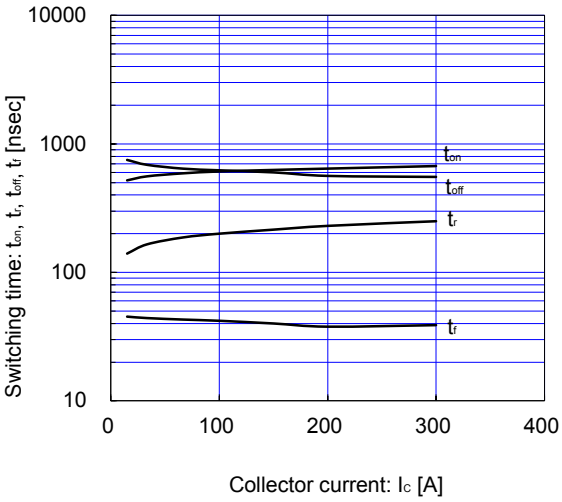
Dynamic Gate Charge (typ.)
V_{CC}=600V, I_C=200A, T_j= 25°C



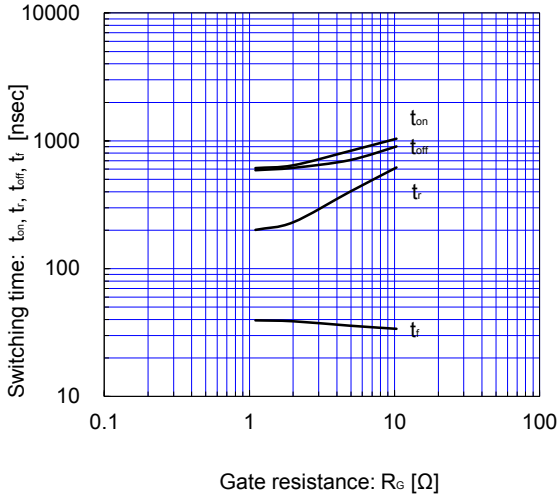
Switching time vs. Collector current (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=1.1Ω, T_j=125°C



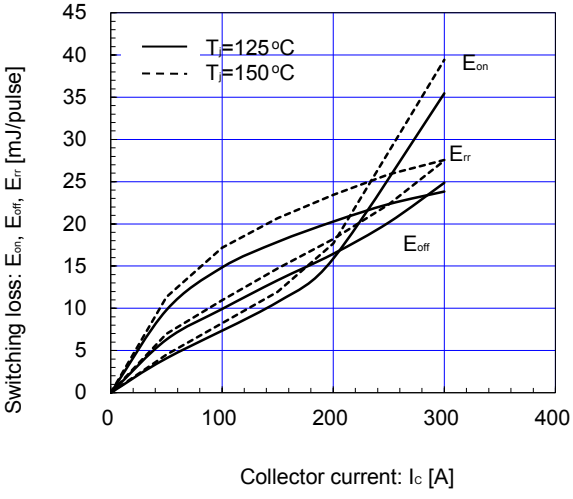
Switching time vs. Collector current (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=1.1Ω, T_j=150°C



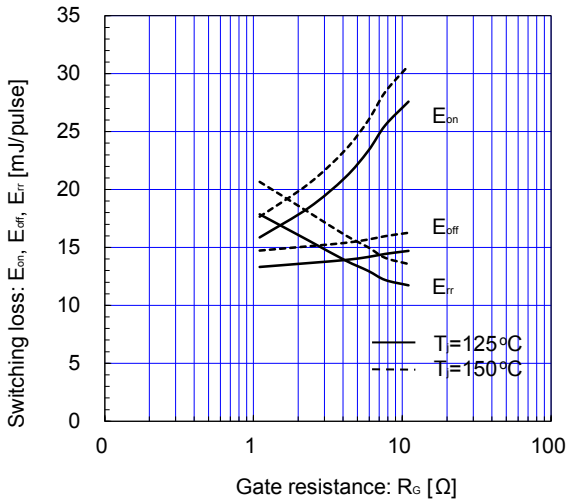
Switching time vs. Gate resistance (typ.)
V_{CC}=600V, I_C=150A, V_{GE}=±15V, T_j=125°C



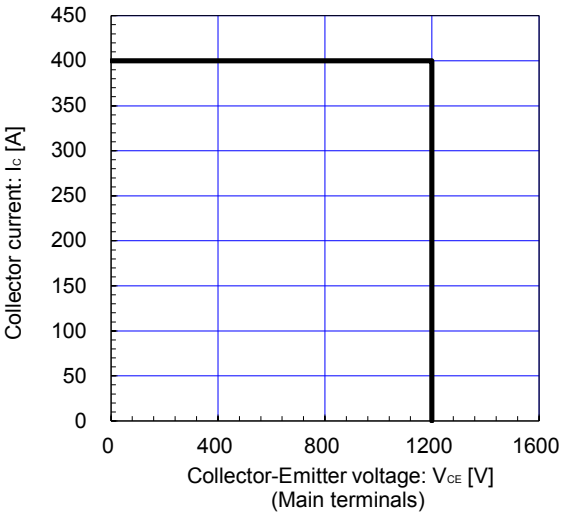
Switching loss vs. Collector current (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=1.1Ω, T_j=125, 150°C



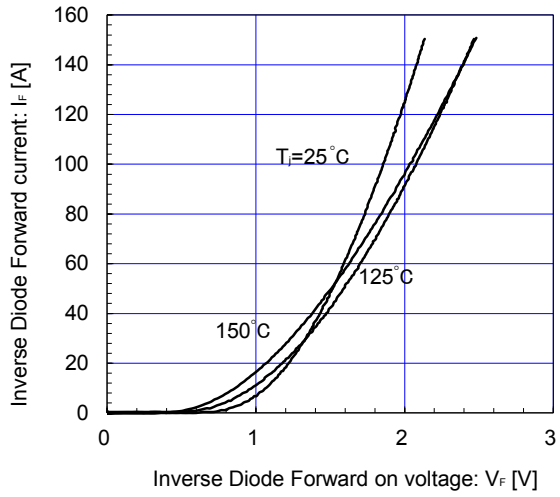
Switching loss vs. Gate resistance (typ.)
V_{CC}=600V, I_C=150A, V_{GE}=±15V, T_j=125, 150°C



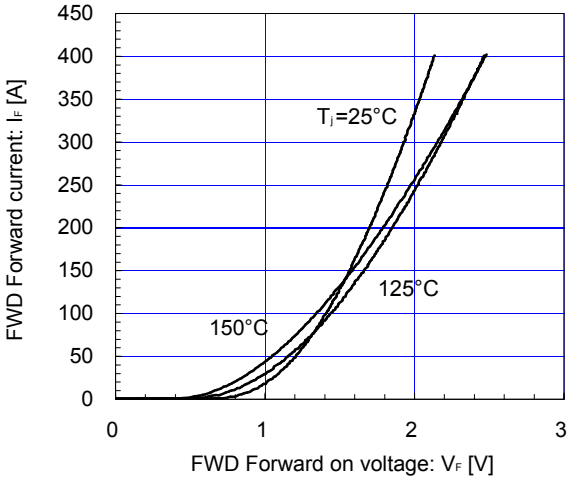
Reverse bias safe operating area (max.)
+V_{GE}=15V, -V_{GE}=15V, R_G=1.1Ω, T_j=150°C



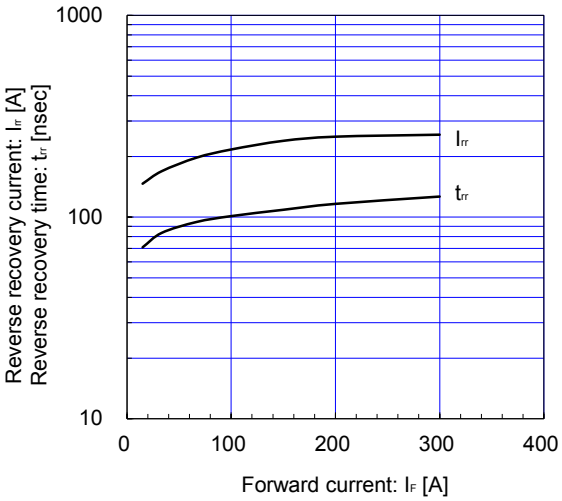
Inverse Diode
Forward Current vs. Forward Voltage (typ.) chip



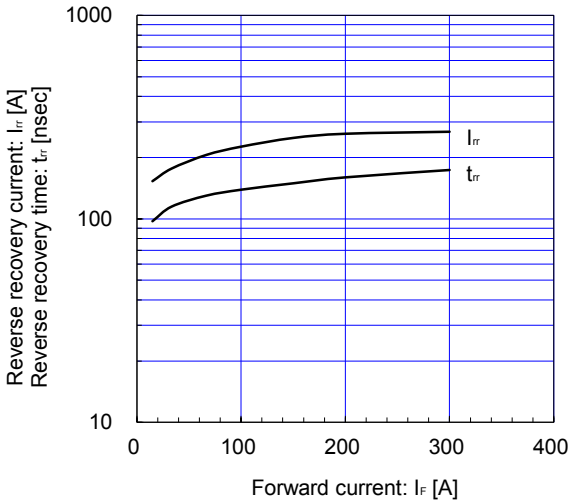
FWD
Forward Currentvs. Forward Voltage (typ.) chip



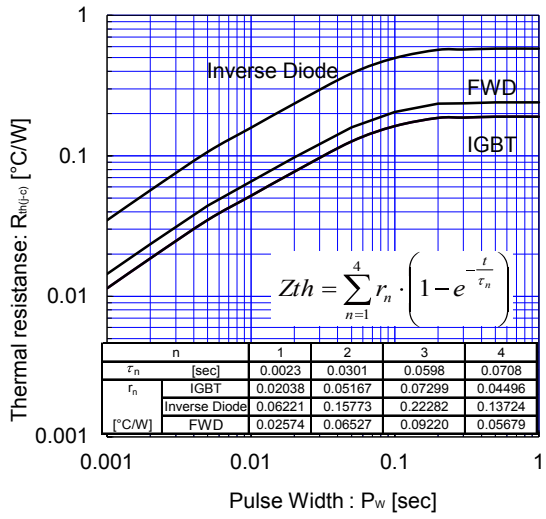
Reverse Recovery Characteristics (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=1.1Ω, T_j=125°C



Reverse Recovery Characteristics (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=1.1Ω, T_j=150°C



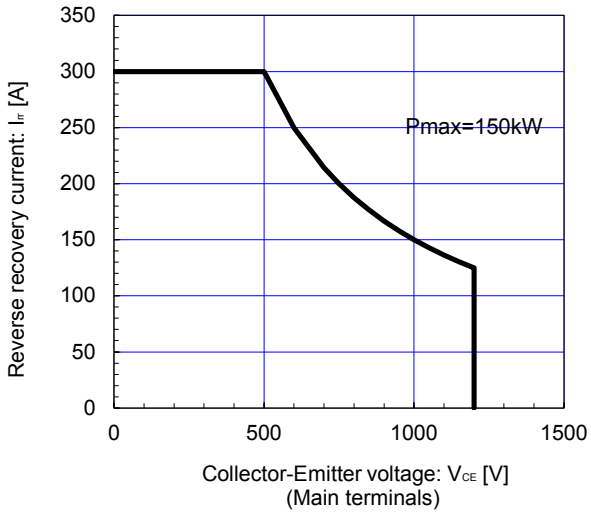
Transient Thermal Resistance (max.)



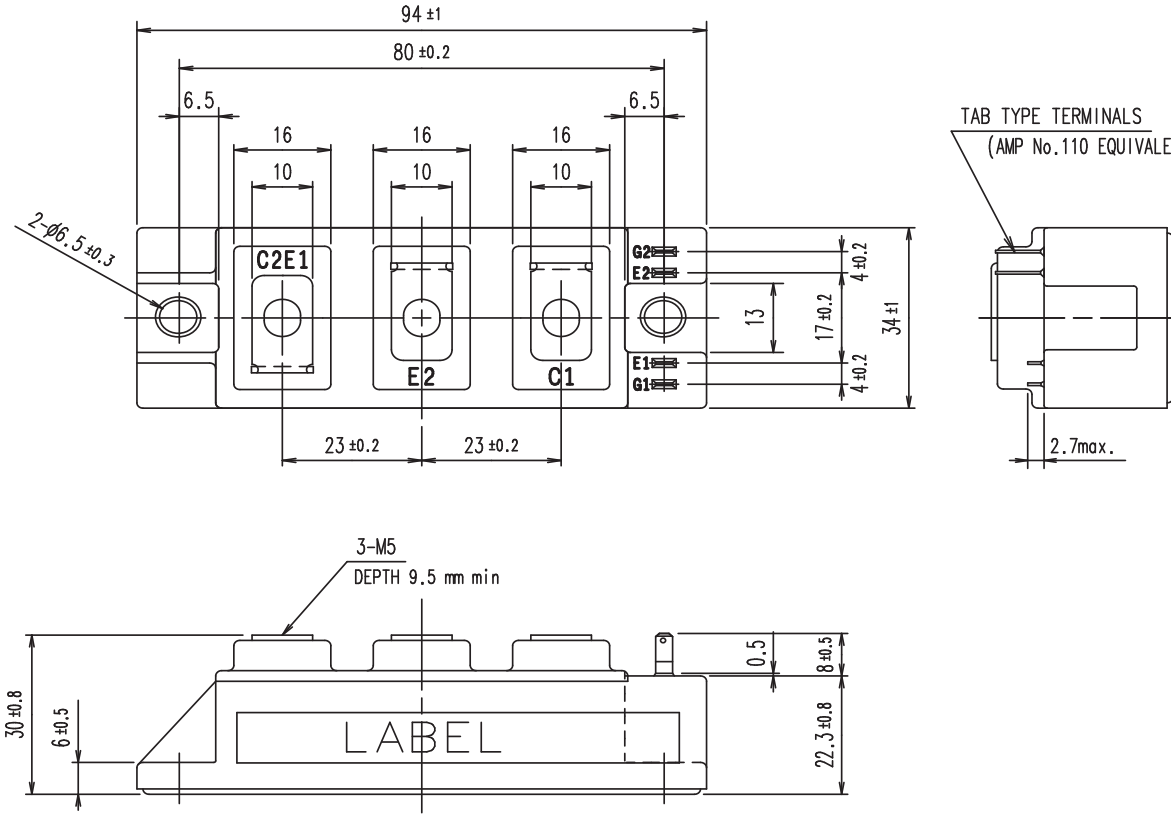
$$Zth = \sum_{n=1}^{4} r_n \cdot \left(1 - e^{-\frac{t}{\tau_n}}\right)$$

n		1	2	3	4
τ_n	[sec]	0.0023	0.0301	0.0598	0.0708
r_n	IGBT	0.02038	0.05167	0.07299	0.04496
	Inverse Diode	0.06221	0.15773	0.22282	0.13724
[°C/W]	FWD	0.02574	0.06527	0.09220	0.05679

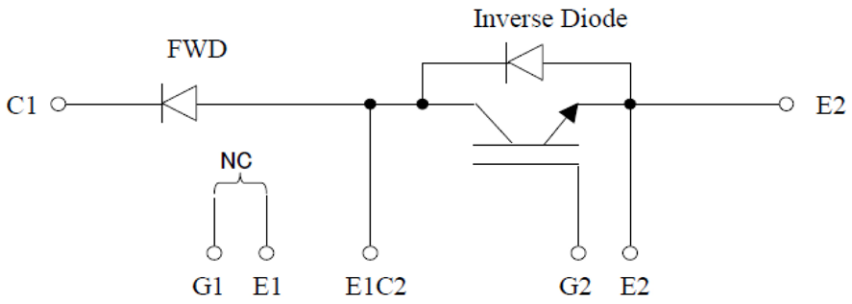
FWD safe operating area (max.)
T_j=150°C



■ Outline Drawings, mm



■ Equivalent Circuit Schematic



WARNING

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- Machine tools
- Audiovisual equipment
- Electrical home appliances
- Personal equipment
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- Emergency equipment for responding to disasters and anti-burglary devices
- Safety devices
- Medical equipment

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富士電機

Innovating Energy Technology

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IGBT Modules

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