

1MBI100U4F-120L-50

IGBT Modules

IGBT MODULE (U series) 1200V / 100A / 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 Tc=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	Tc=25°C	150	A
			Tc=80°C	100	
	I_c pulse	1ms	Tc=25°C	300	
			Tc=80°C	200	
	$-I_c$			50	
$-I_c$ pulse	1ms		100		
Collector power dissipation	P_c	1 device	540	W	
Reverse voltage for FWD	V_R		1200	V	
Forward current for FWD	IF	Continuous	150	A	
		IF pulse	1ms		300
Junction temperature	T_j		+150	°C	
Storage temperature	T_{stg}		-40~+125	°C	
Isolation voltage	Between terminal and copper base (*1) V_{iso}	AC : 1min.	2500	VAC	
Screw torque	Mounting (*2)		3.5	Nm	
	Terminals (*3)				

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

Note *2: Recommendable Value : 2.5 to 3.5 Nm (M5 or M6)

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

● Electrical characteristics (at T_j = 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} = ±20V	-	-	200	nA	
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V, I _c = 100mA	4.5	6.5	8.5	V	
Collector-Emitter saturation voltage	V _{CE(sat)} (terminal)	V _{GE} = 15V I _c = 100A	T _j =25°C	-	2.05	2.20	V
			T _j =125°C	-	2.25	-	
	V _{CE(sat)} (chip)		T _j =25°C	-	1.90	2.05	
			T _j =125°C	-	2.10	-	
Input capacitance	C _{ies}	V _{GE} = 0V, V _{CE} = 10V, f = 1MHz	-	11	-	nF	
Turn-on time	ton	V _{CC} = 600V, I _c = 100A V _{GE} = ±15V, R _G = 5.6Ω	-	0.32	1.20	μs	
	tr		-	0.10	0.60		
	tr(i)		-	0.03	-		
Turn-off time	toff		-	0.41	1.00		
	tf		-	0.07	0.30		
Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 50A	T _j =25°C	-	1.70	2.00	V
			T _j =125°C	-	1.80	-	
	V _F (chip)		T _j =25°C	-	1.60	1.85	
			T _j =125°C	-	1.70	-	
Reverse Current	I _R	V _{CE} = 1200V	-	-	1.0	mA	
Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 150A	T _j =25°C	-	1.85	2.00	V
			T _j =125°C	-	2.00	-	
	V _F (chip)		T _j =25°C	-	1.60	1.75	
			T _j =125°C	-	1.75	-	
Reverse recovery time	trr	I _F = 150A	-	-	0.35	μs	
Lead resistance, terminal-chip(*4)	R lead		-	1.39	-	mΩ	

Note *4: Biggest internal terminal resistance among arm.

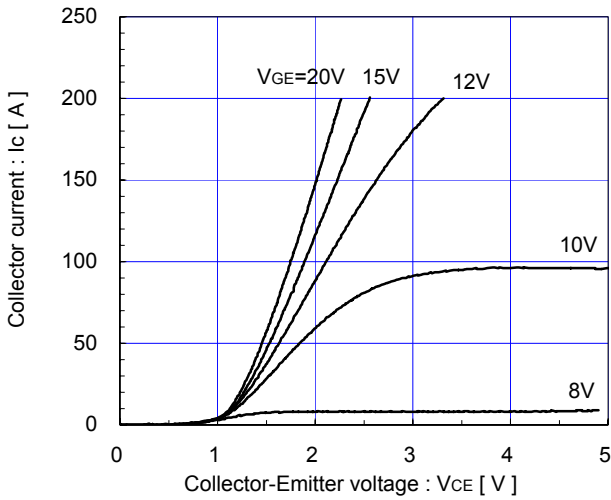
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	IGBT	-	-	0.23	°C/W
		Inverse Diode	-	-	0.73	
		FWD	-	-	0.28	
Contact thermal resistance	R _{th(c-f)}	with Thermal Compound (*5)	-	0.05	-	

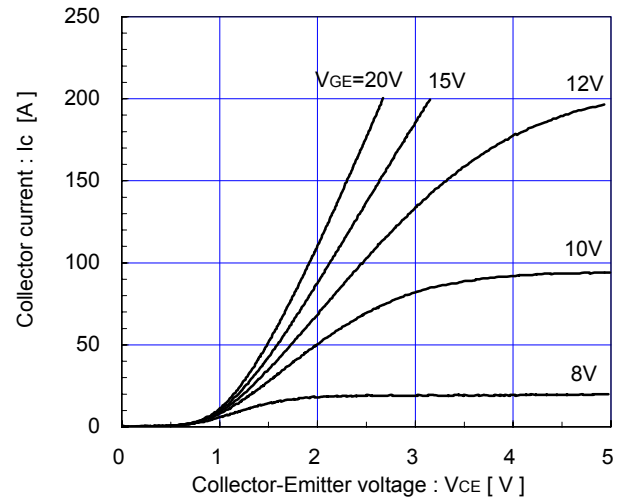
Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

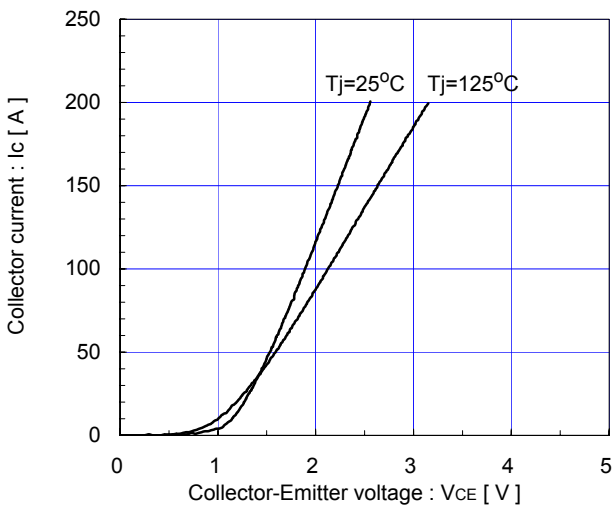
Collector current vs. Collector-Emitter voltage (typ.)
T_j=25°C / chip



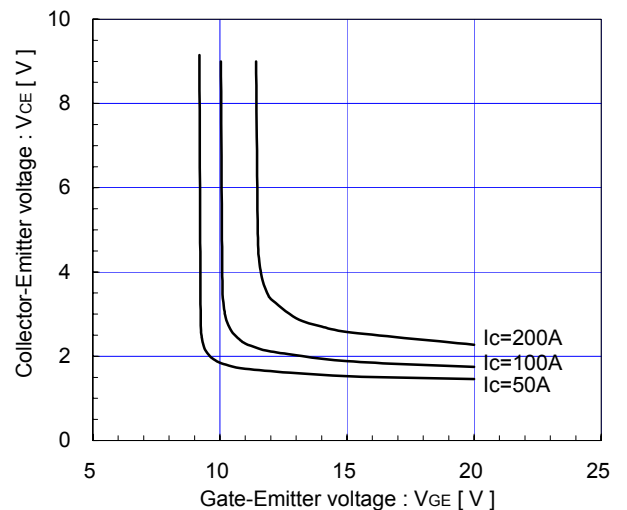
Collector current vs. Collector-Emitter voltage (typ.)
T_j=125°C / chip



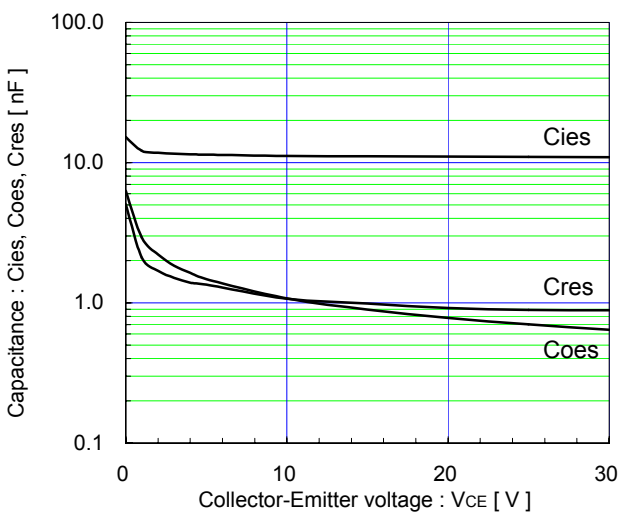
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE}=15V / chip



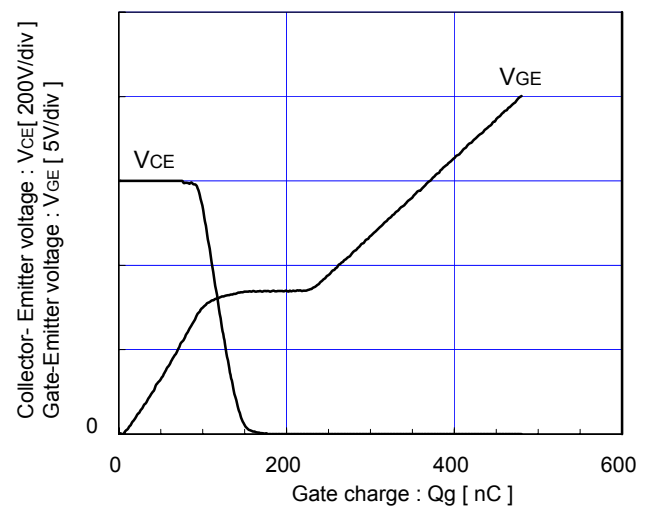
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
T_j=25°C / chip



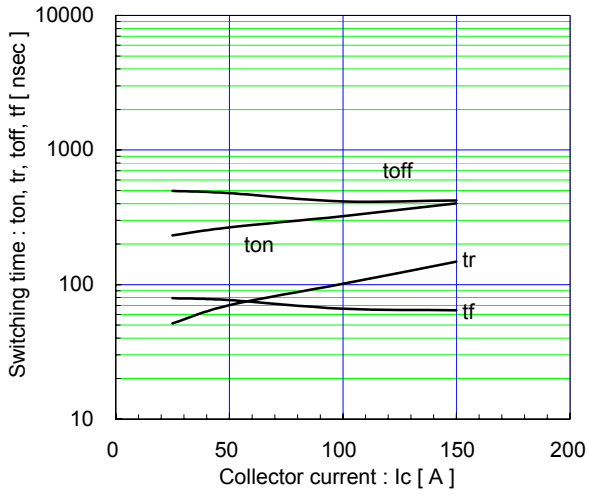
Capacitance vs. Collector-Emitter voltage (typ.)
V_{GE}=0V, f=1MHz, T_j=25°C



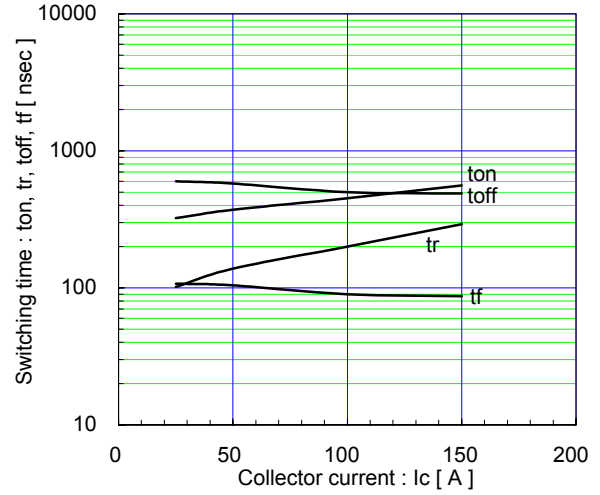
Dynamic Gate charge (typ.)
V_{CC}=600V, I_c=100A, T_j=25°C



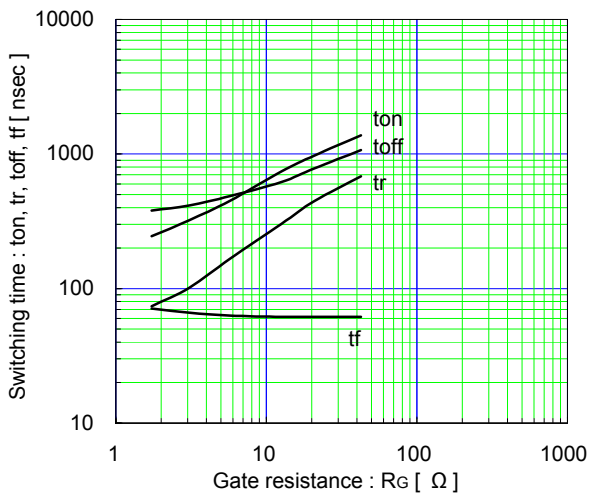
Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=5.6\Omega, T_J=25^\circ C$



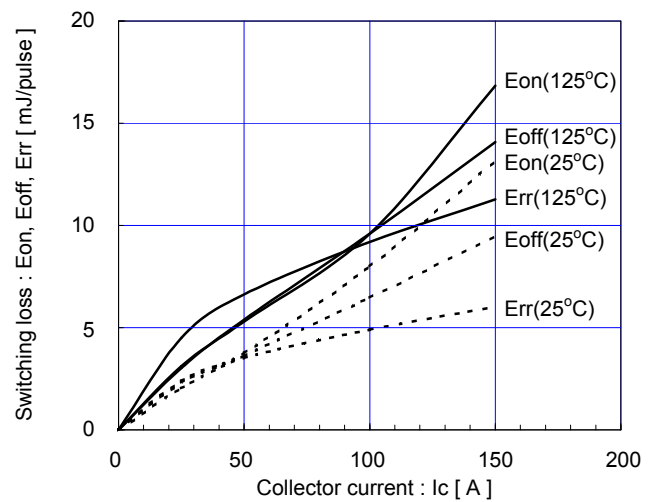
Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=5.6\Omega, T_J=125^\circ C$



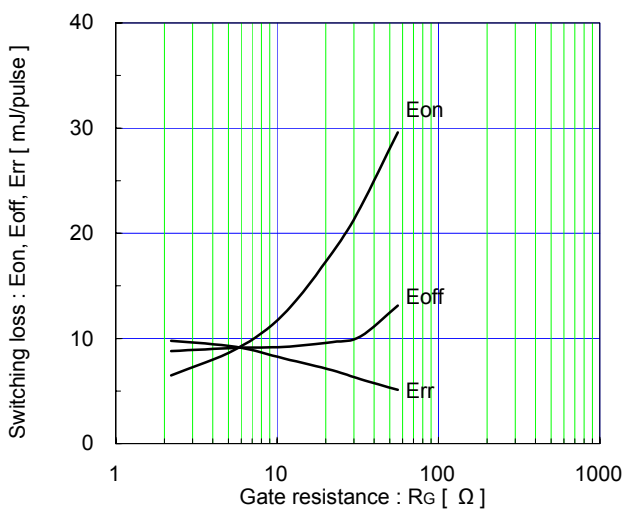
Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V, I_c=100A, V_{GE}=\pm 15V, T_J=25^\circ C$



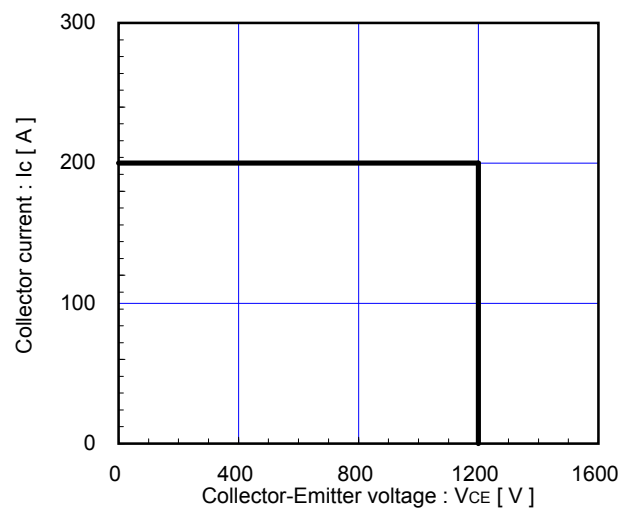
Switching loss vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=5.6\Omega$

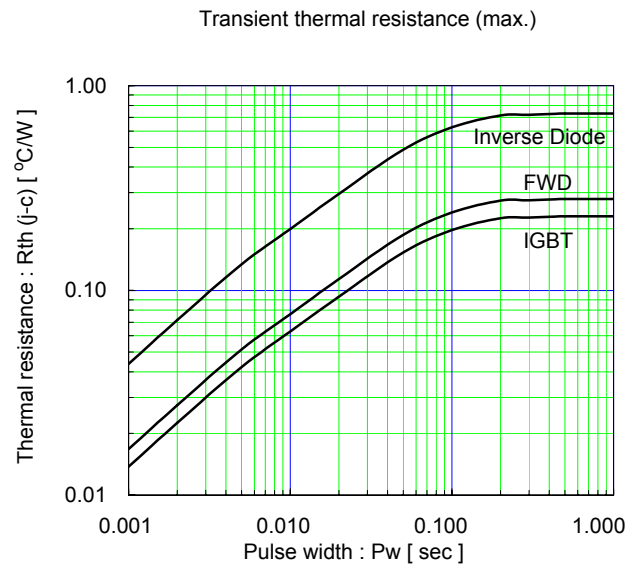
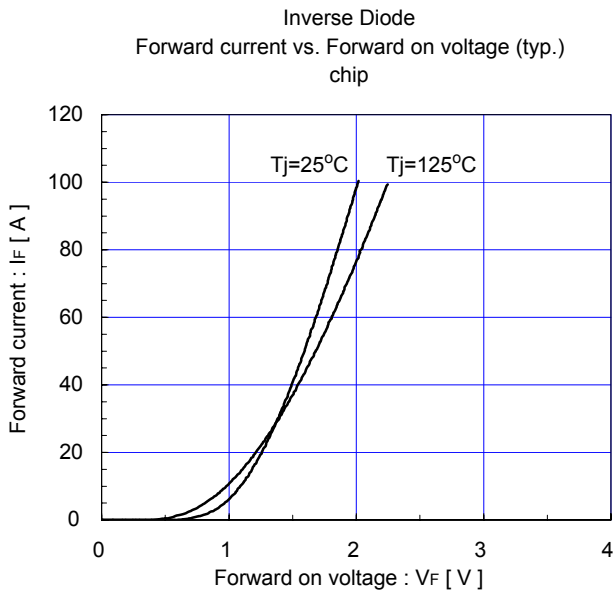
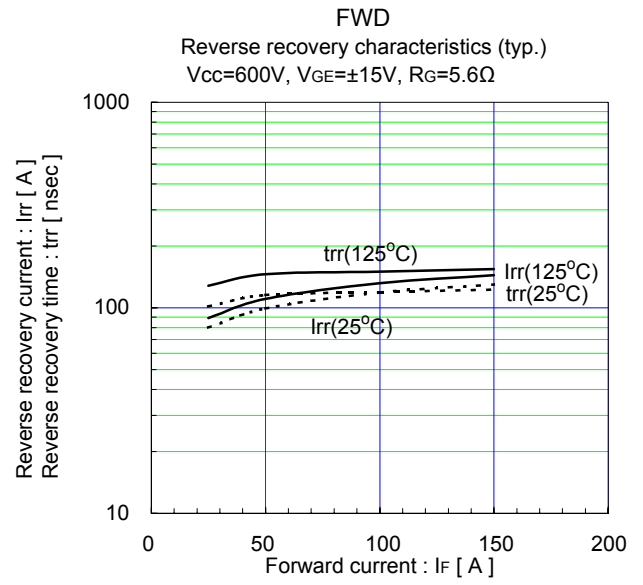
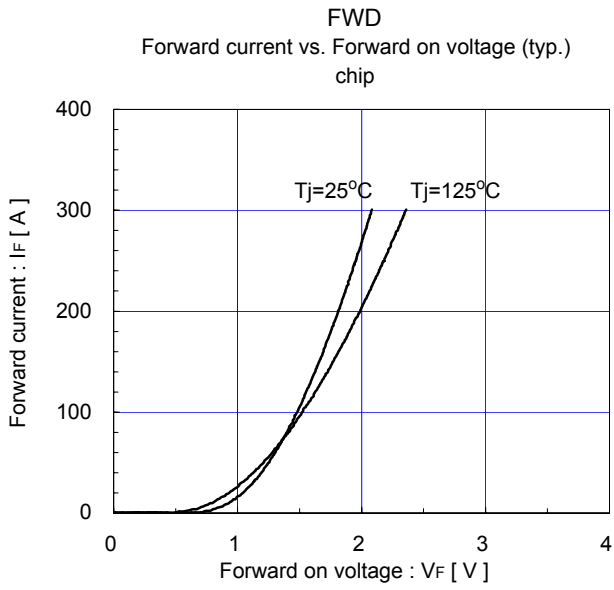


Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V, I_c=100A, V_{GE}=\pm 15V, T_J=125^\circ C$

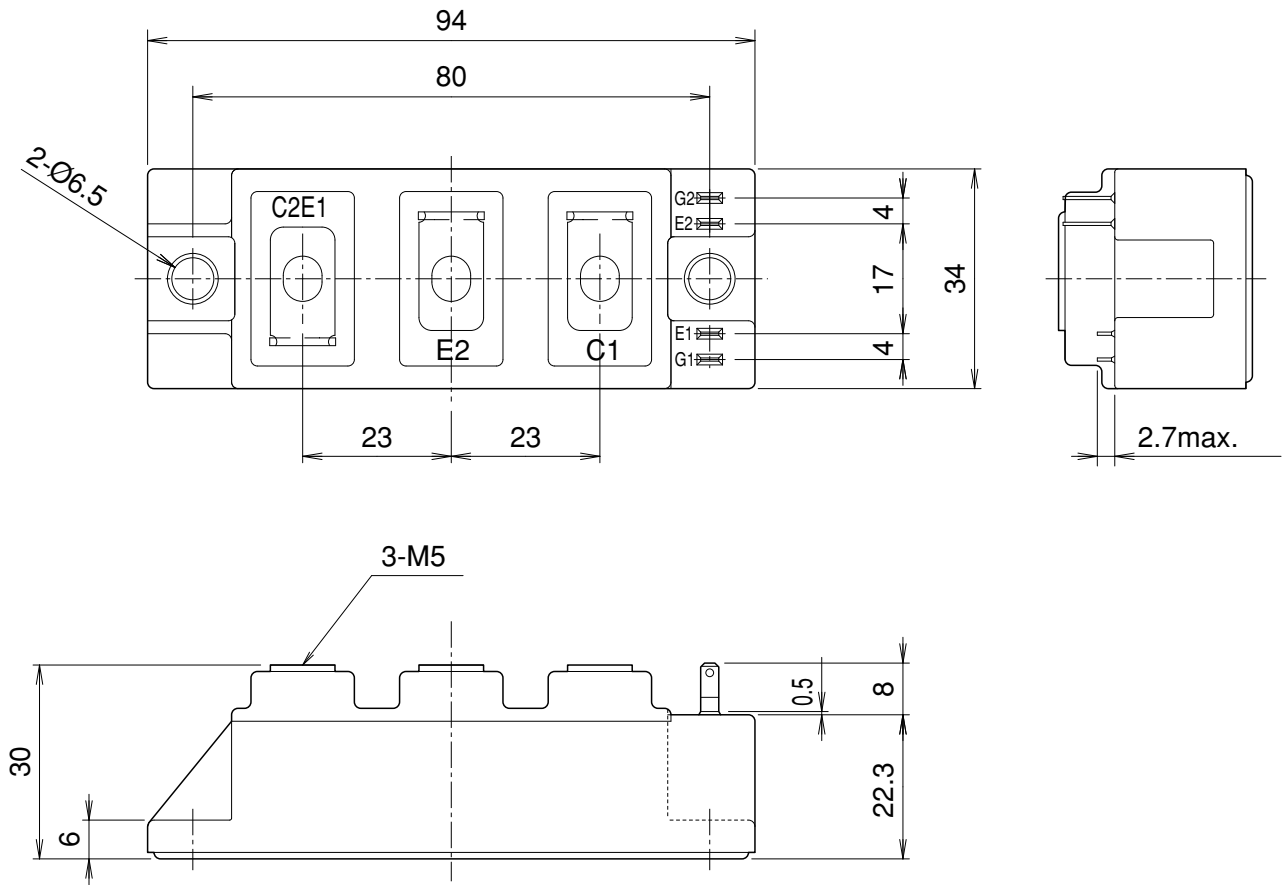


Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE} \leq 15V, R_G \geq 5.6\Omega, T_J \leq 125^\circ C$

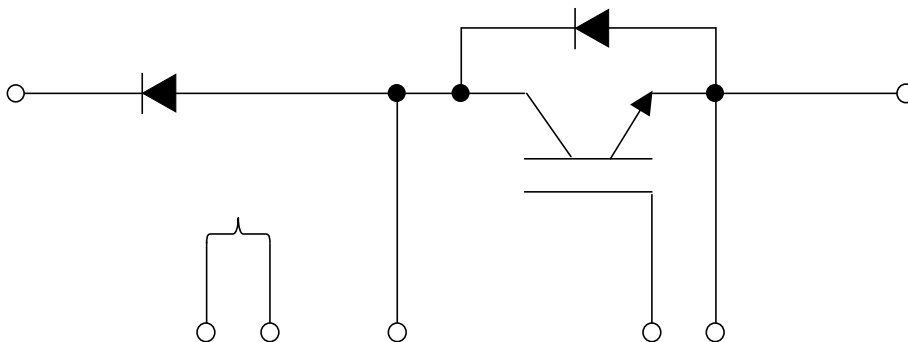




■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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