

1MBI100U4F-120L-50

IGBT Modules

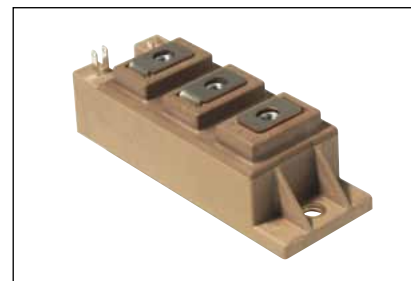
IGBT MODULE (U series) 1200V / 100A / 1 in one package

■ 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 Tc=80°C	150 100
	I_c pulse	1ms	Tc=25°C Tc=80°C	300 200
	- 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	I_F	Continuous		150 A
	I_F 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)			
	Terminals (*3)		3.5	Nm

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	Tj=25°C	-	2.05	2.20	V
	V _{CE (sat)} (chip)		Tj=125°C	-	2.25	-	
			Tj=25°C	-	1.90	2.05	
			Tj=125°C	-	2.10	-	
Input capacitance	Cies	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	Tj=25°C	-	1.70	2.00	V
	V _F (chip)		Tj=125°C	-	1.80	-	
			Tj=25°C	-	1.60	1.85	
			Tj=125°C	-	1.70	-	
Reverse Current	IR	V _{CE} = 1200V		-	-	1.0	mA
Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 150A	Tj=25°C	-	1.85	2.00	V
	V _F (chip)		Tj=125°C	-	2.00	-	
			Tj=25°C	-	1.60	1.75	
			Tj=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.

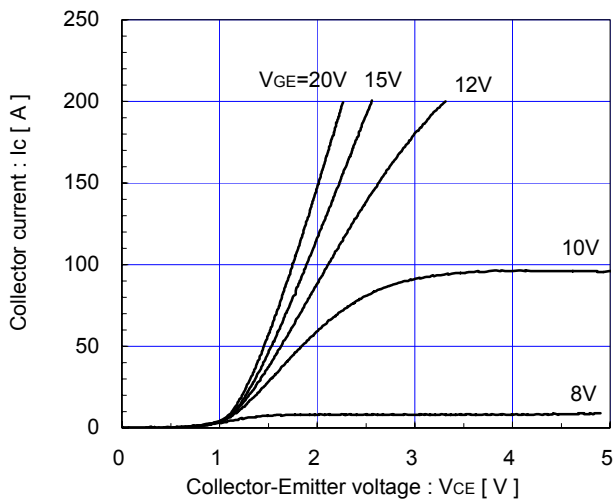
● Thermal resistance characteristics

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	-	

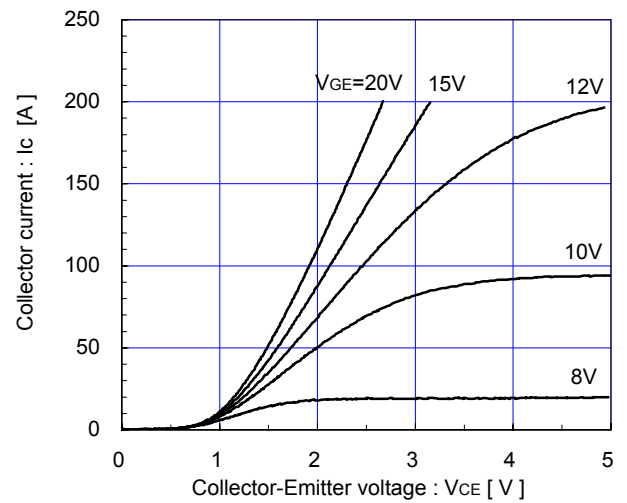
Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

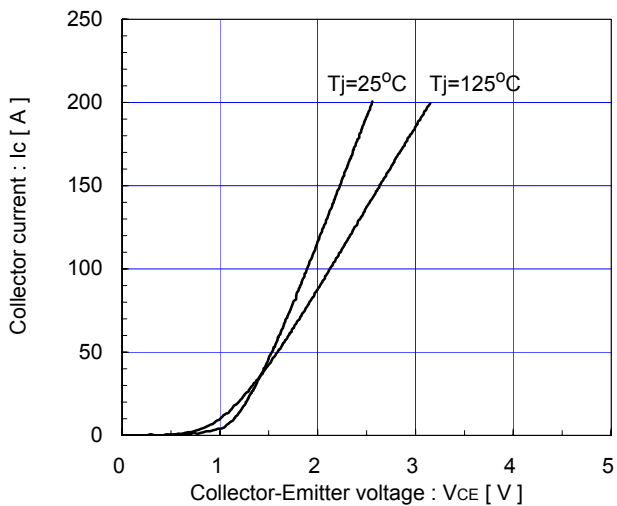
Collector current vs. Collector-Emitter voltage (typ.)
T_j=25°C / chip



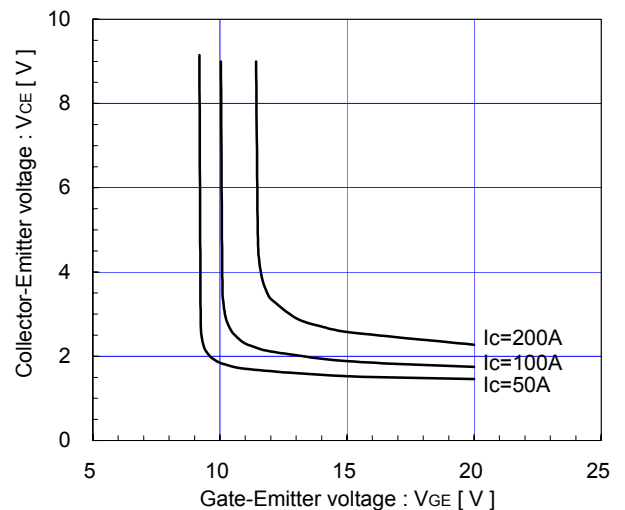
Collector current vs. Collector-Emitter voltage (typ.)
T_j=125°C / chip



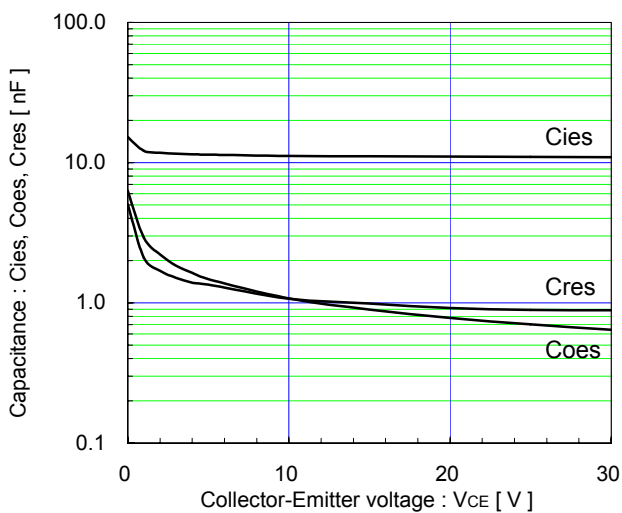
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE}=15V / chip



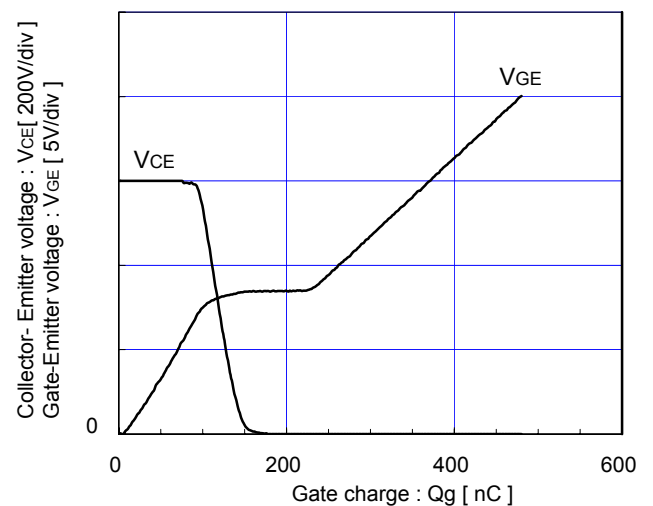
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
T_j=25°C / chip



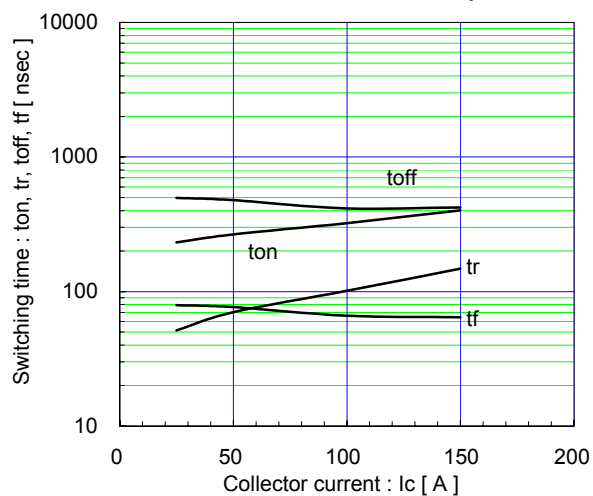
Capacitance vs. Collector-Emitter voltage (typ.)
V_{GE}=0V, f=1MHz, T_j=25°C



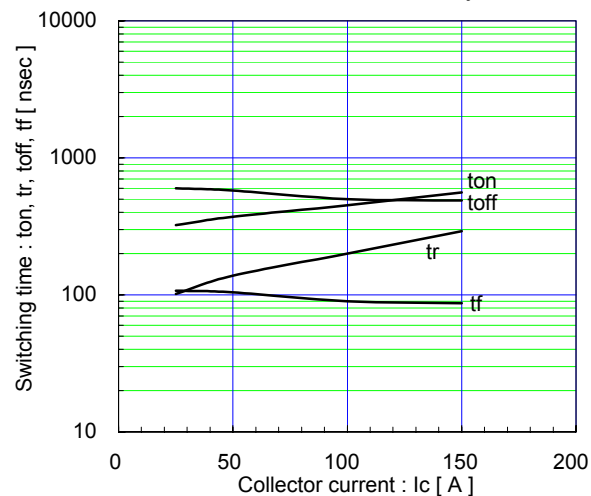
Dynamic Gate charge (typ.)
V_{CC}=600V, I_c=100A, T_j=25°C



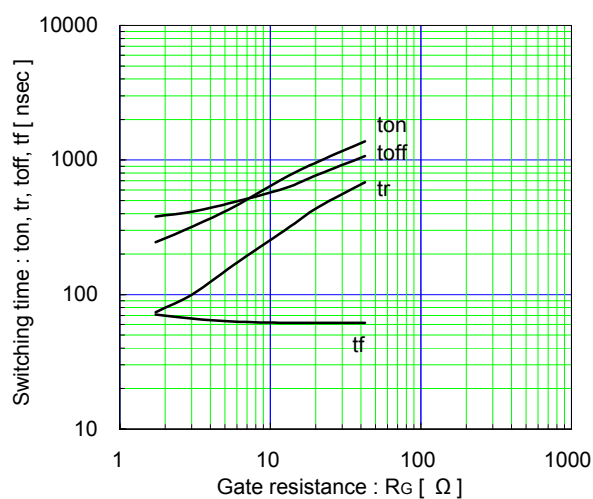
Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=5.6\Omega$, $T_J=25^\circ C$



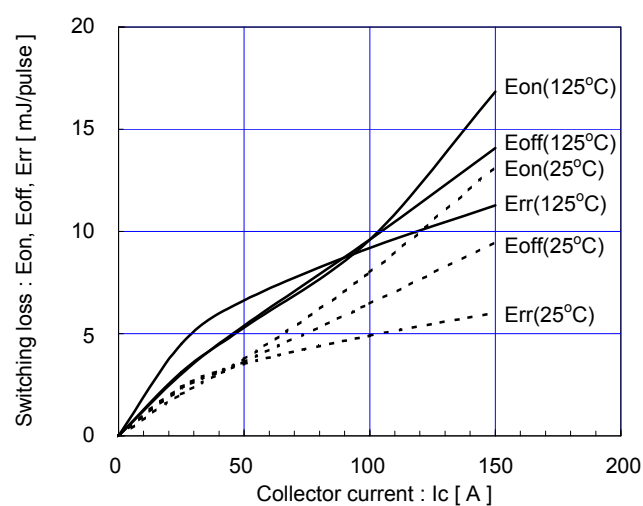
Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=5.6\Omega$, $T_J=125^\circ C$



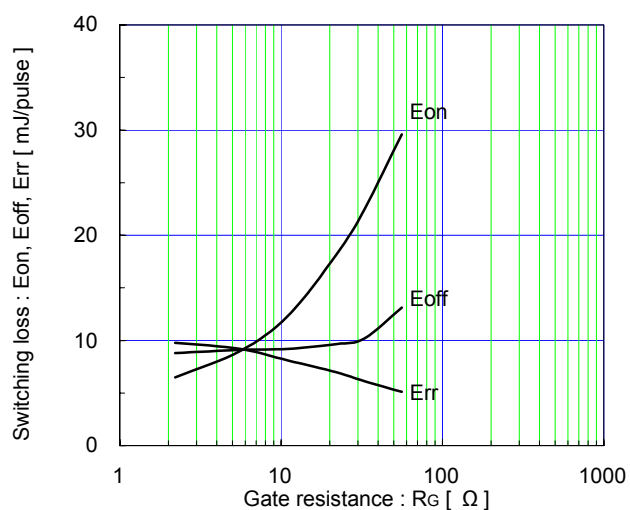
Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_C=100A$, $V_{GE}=\pm 15V$, $T_J=25^\circ C$



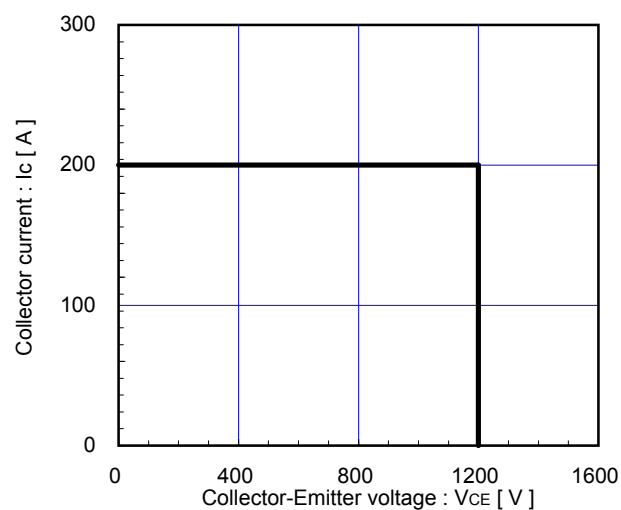
Switching loss vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=5.6\Omega$

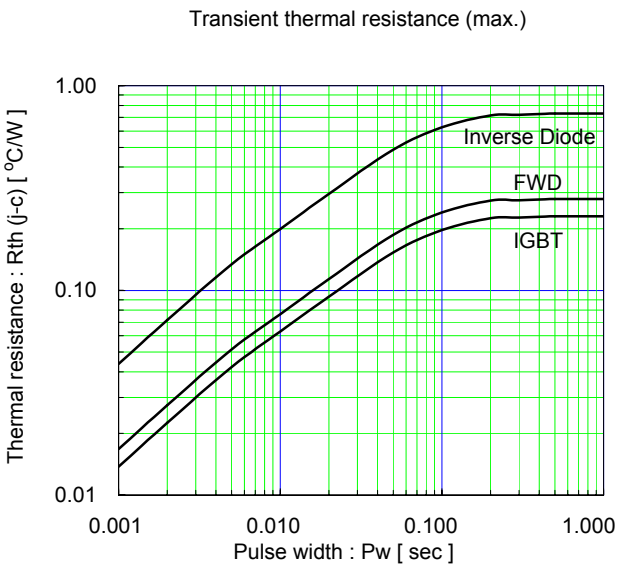
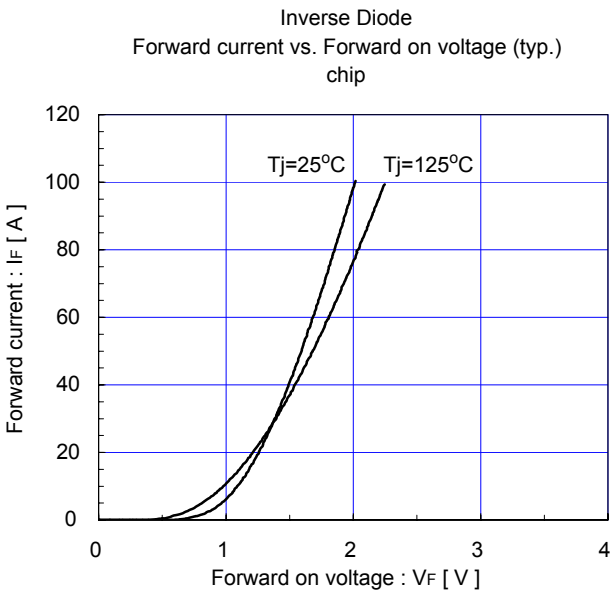
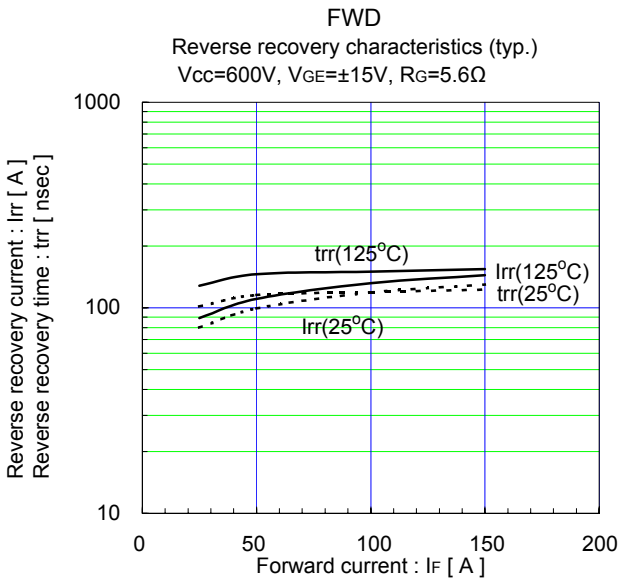
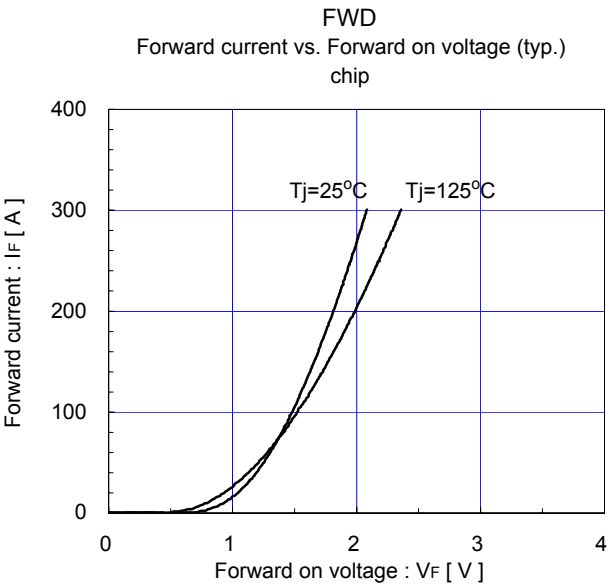


Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_C=100A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$

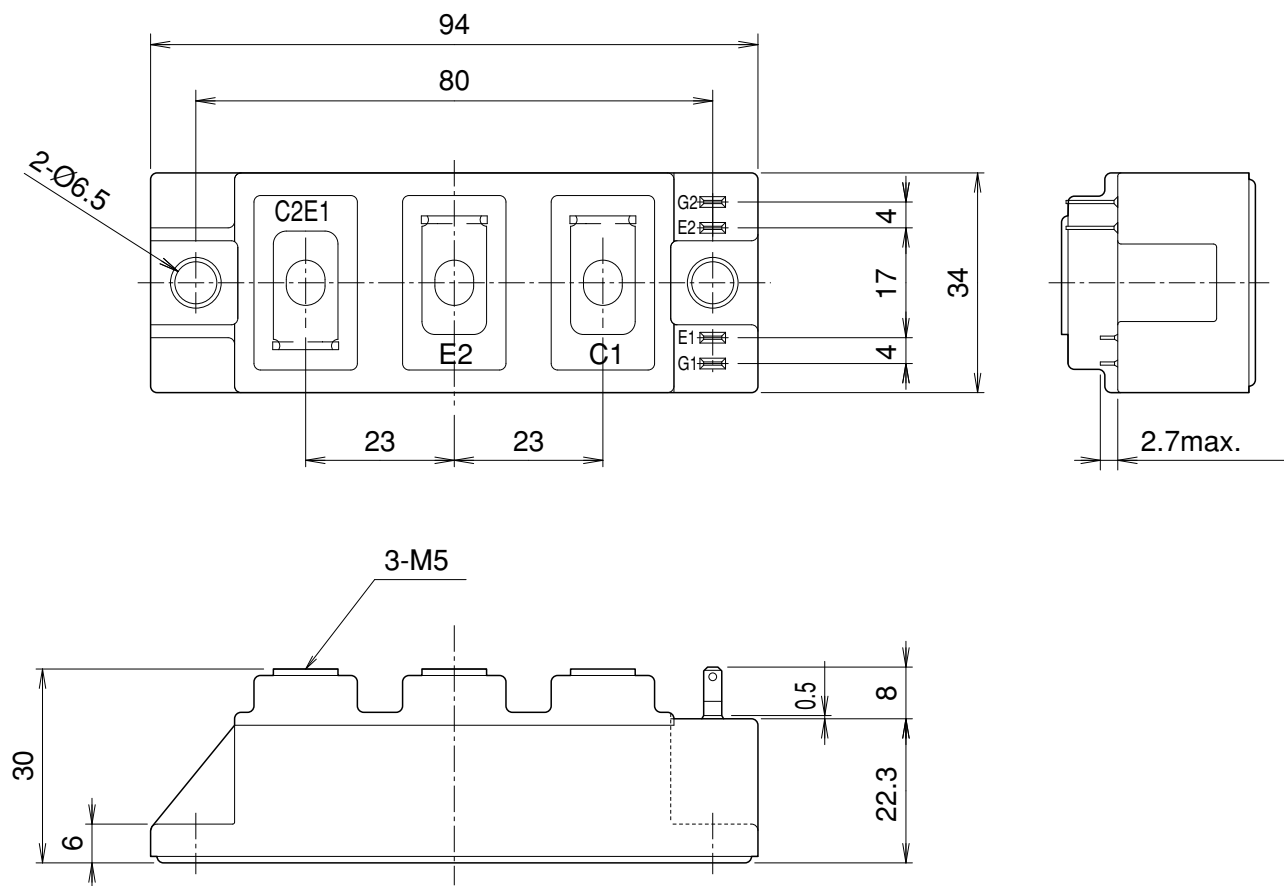


Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE} \leq 15V$, $R_G \geq 5.6\Omega$, $T_J \leq 125^\circ C$

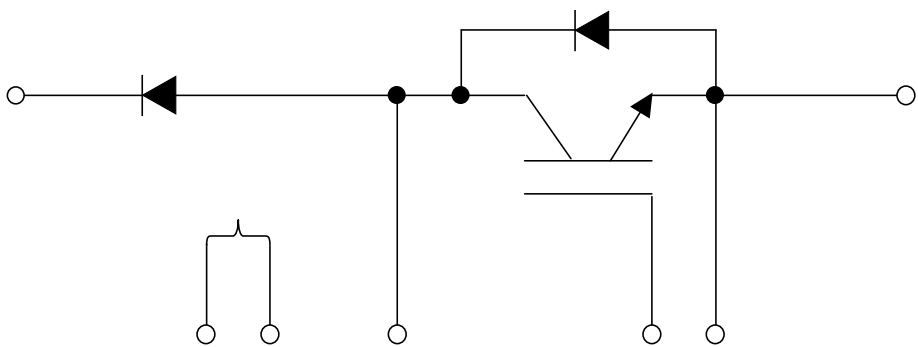




■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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