

1MBI75U4F-120L-50

IGBT Modules

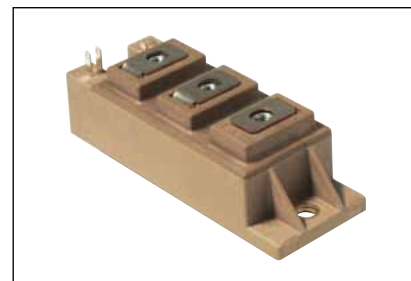
IGBT MODULE (U series) 1200V / 75A / 1 in one package

■ 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	100 75
	I_{cp}	1ms	Tc=25°C Tc=80°C	200 150
	- I_c			35
	- I_c pulse	1ms		70
Collector power dissipation	P_c	1 device		400 W
Reverse voltage for FWD	V_R		1200	V
Forward current for FWD	I_F	Continuous		100 A
	I_F pulse	1ms		200
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 = 75mA		4.5	6.5	8.5	V
Collector-Emitter saturation voltage	V _{CE (sat)} (terminal)	V _{GE} = 15V I _C = 75A	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		-	8	-	nF
Turn-on time	t _{on}	V _{CC} = 600V, I _C = 75A V _{GE} = ±15V, R _G = 9.1Ω		-	0.32	1.20	μs
	t _r			-	0.10	0.60	
	t _{r(i)}			-	0.03	-	
Turn-off time	t _{off}			-	0.41	1.00	
	t _f			-	0.07	0.30	
Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 35A	T _J =25°C	-	1.65	2.00	V
	T _J =125°C		-	1.75	-		
	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 = 100A	T _J =25°C	-	1.75	1.90	V
	T _J =125°C		-	1.90	-		
	V _F (chip)		T _J =25°C	-	1.60	1.75	
	T _J =125°C		-	1.75	-		
Reverse recovery time	t _{rr}	I _F = 100A		-	-	0.35	μs
Lead resistance, terminal-chip(*4)	R lead			-	1.39	-	mΩ

Note *4: Biggest internal terminal resistance among arm.

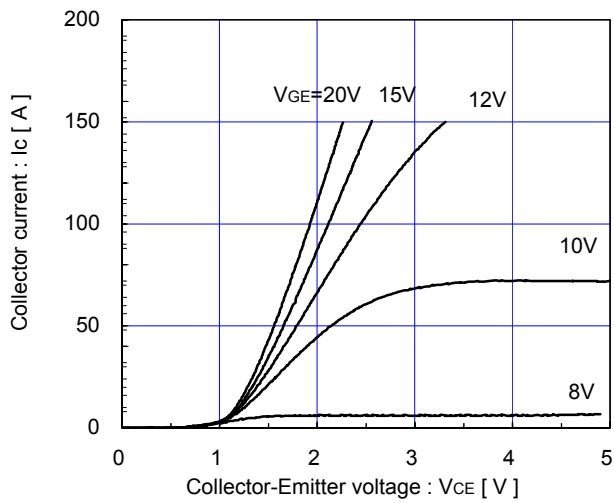
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	IGBT	-	-	0.31	°C/W
		Inverse Diode	-	-	0.88	
		FWD	-	-	0.40	
Contact thermal resistance	R _{th(c-f)}	with Thermal Compound (*5)	-	0.05	-	

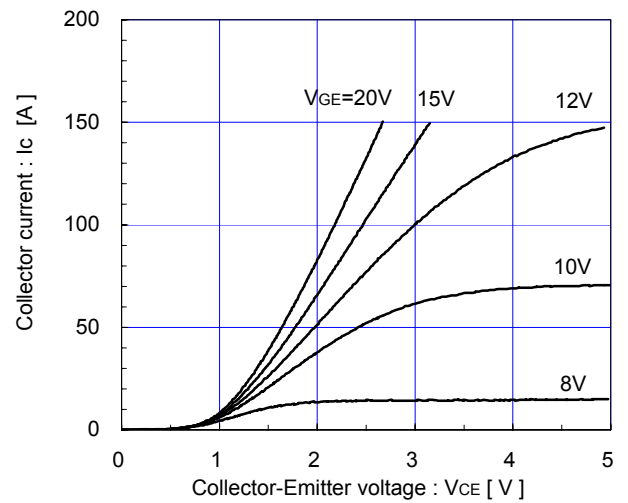
Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

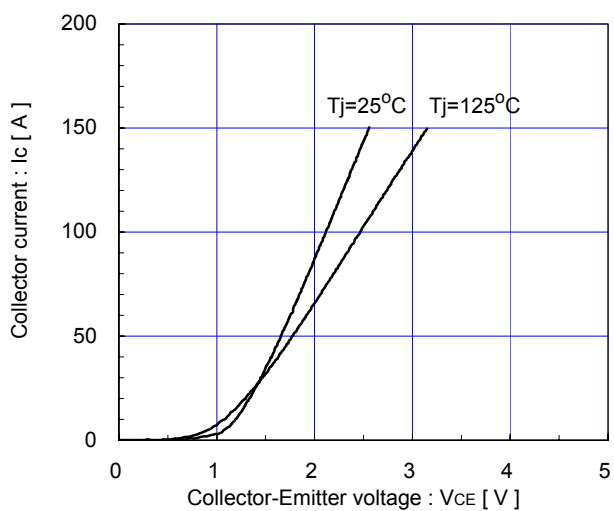
Collector current vs. Collector-Emittter voltage (typ.)
T_j=25°C / chip



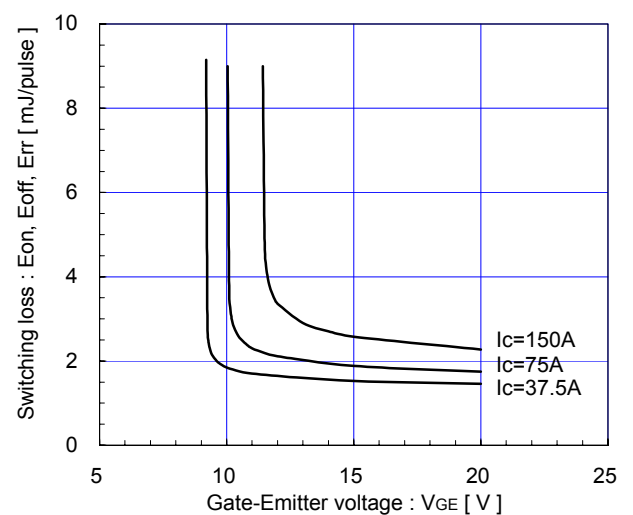
Collector current vs. Collector-Emittter voltage (typ.)
T_j=125°C / chip



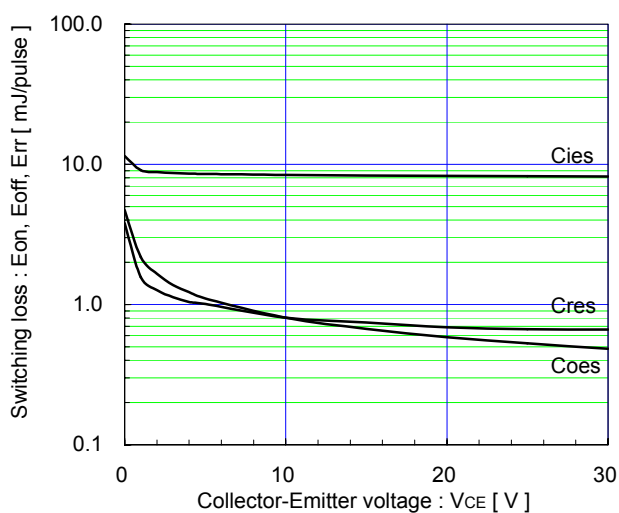
Collector current vs. Collector-Emittter voltage (typ.)
VGE=15V / chip



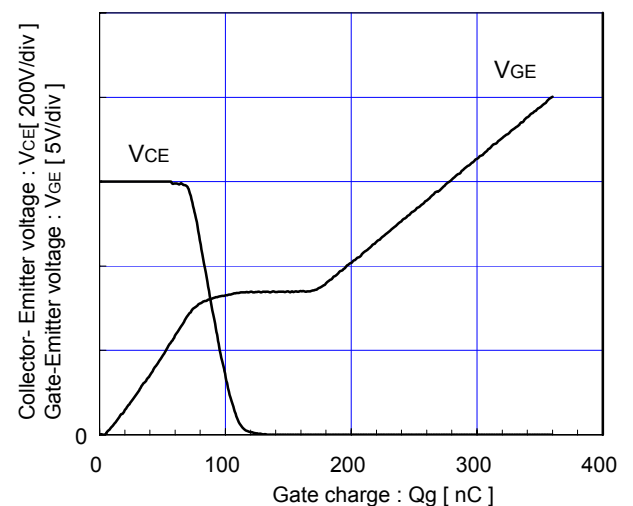
Collector-Emittter voltage vs. Gate-Emittter voltage (typ.)
T_j=25°C / chip



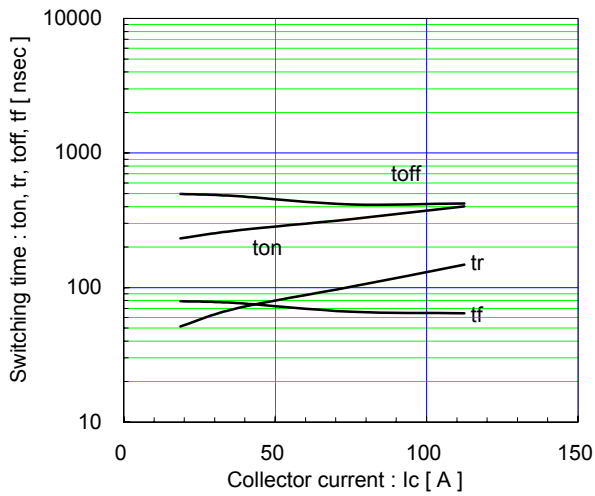
Capacitance vs. Collector-Emittter voltage (typ.)
VGE=0V, f=1MHz, Tj=25°C



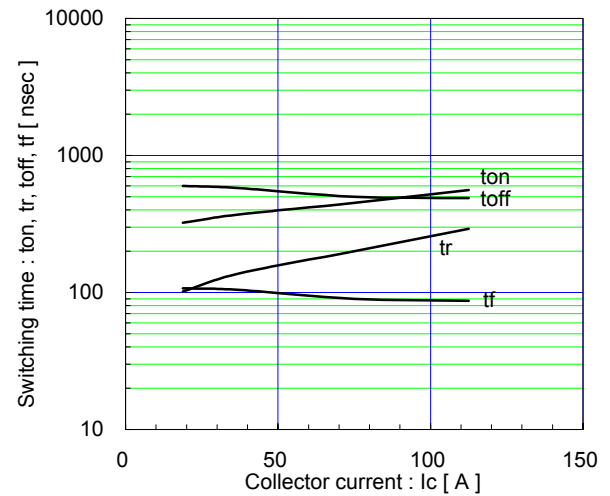
Dynamic Gate charge (typ.)
Vcc=600V, Ic=75A, Tj=25°C



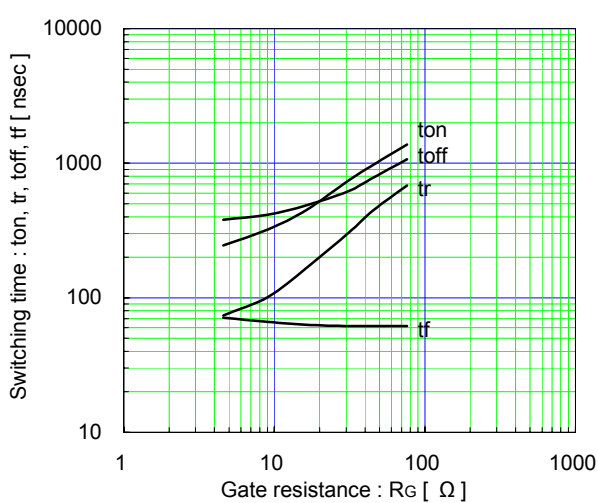
Switching time vs. Collector current (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=9.1Ω, T_J=25°C



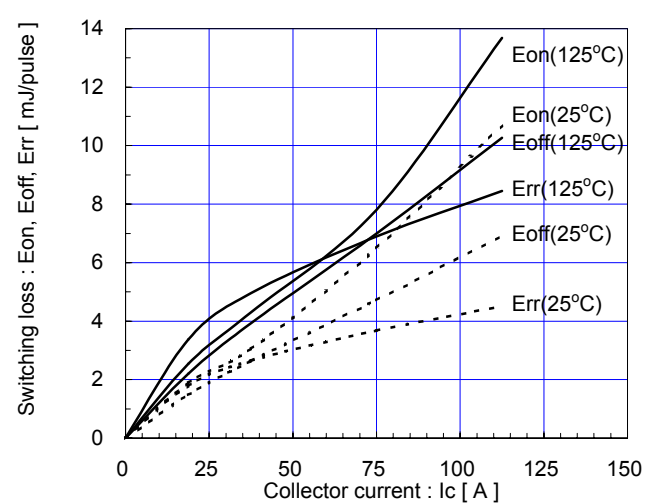
Switching time vs. Collector current (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=9.1Ω, T_J=125°C



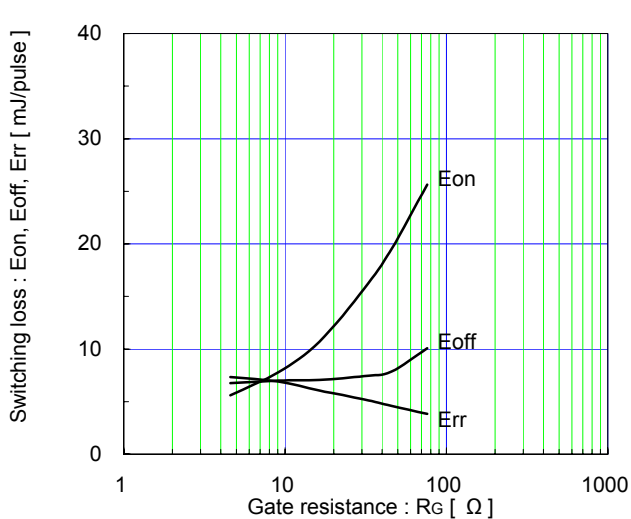
Switching time vs. Gate resistance (typ.)
V_{CC}=600V, I_c=75A, V_{GE}=±15V, T_J=25°C



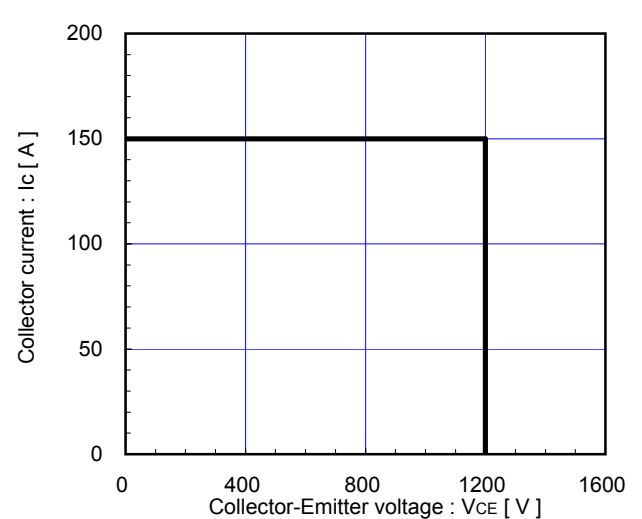
Switching loss vs. Collector current (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=9.1Ω

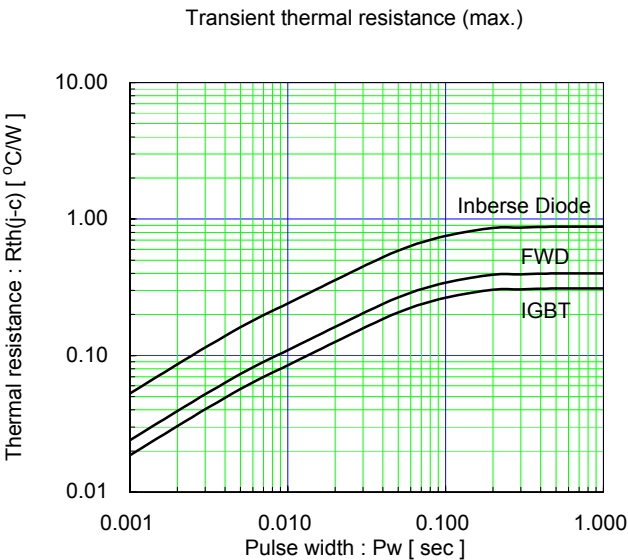
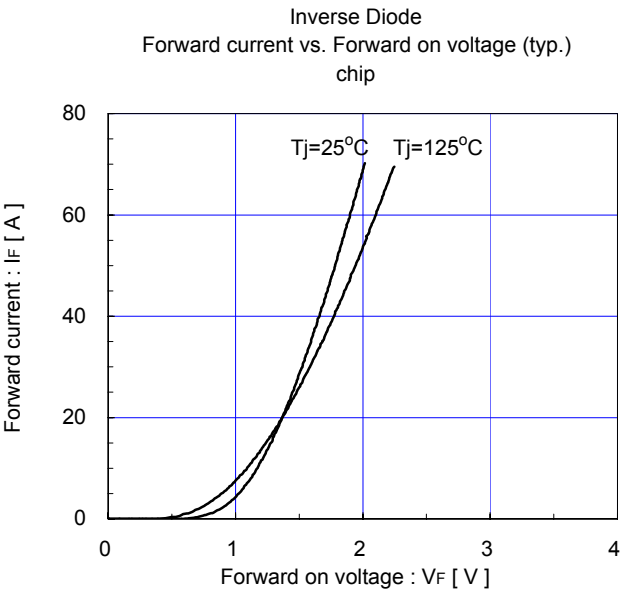
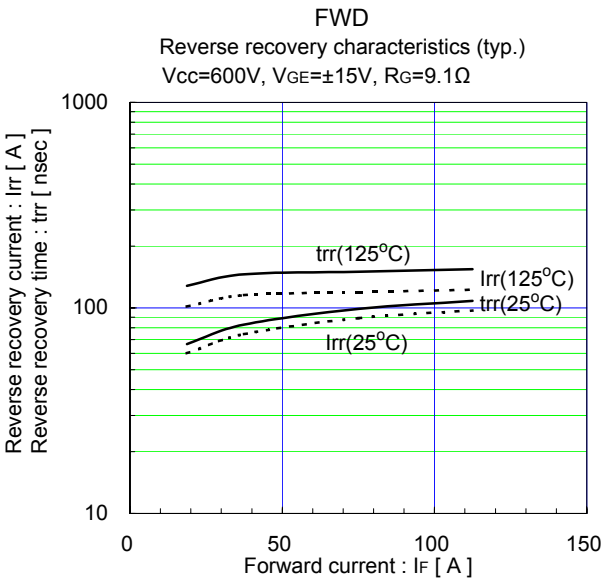
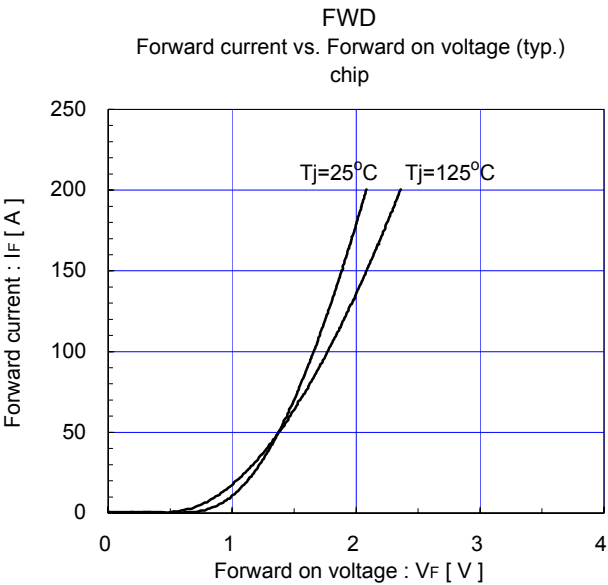


Switching loss vs. Gate resistance (typ.)
V_{CC}=600V, I_c=75A, V_{GE}=±15V, T_J=125°C

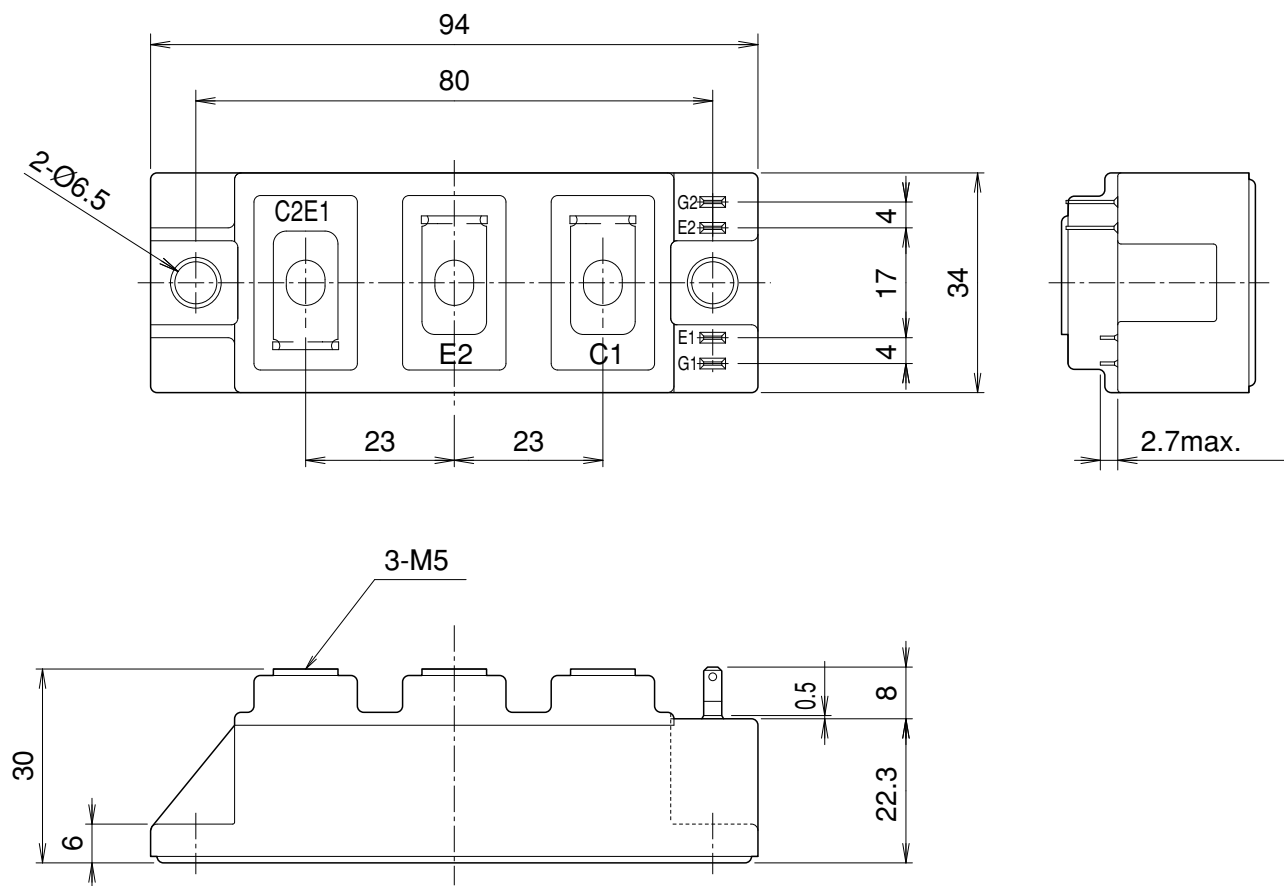


Reverse bias safe operating area (max.)
+V_{GE}=15V, -V_{GE} ≤ 15V, R_G ≥ 9.1Ω, T_J ≤ 125°C

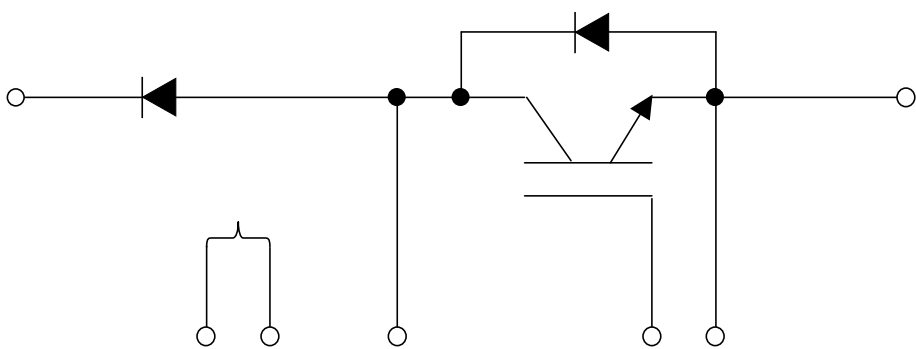




■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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