

1MBI400V-120-50

IGBT Modules

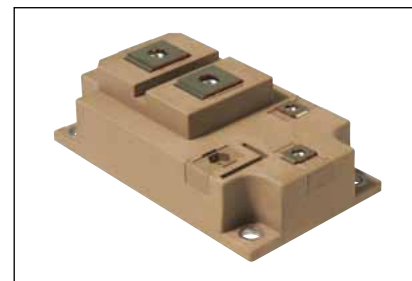
IGBT MODULE (V series) 1200V / 400A / 1 in one package

■ Features

- High speed switching
- Voltage drive
- Low Inductance module structure

■ Applications

- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply
- Industrial machines, such as Welding 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=100°C 400	A
	I_c pulse	1ms	Tc=25°C 480	
	- I_c		800	
	- I_c pulse	1ms	400	
Collector power dissipation	P_c	1 device	800	W
Junction temperature	T_j		2410	°C
Operating junction temperature (under switching conditions)	T_{jop}		175	
Case temperature	T_c		150	
Storage temperature	T_{stg}		125	
Isolation voltage	Between terminal and copper base (*1)	V_{iso}	-40~+125	VAC
Screw torque	Mounting (*2)	M5 ro M6	2500	
	Terminals (*3)	M4	6.0	Nm
		M6	2.0	
			5.0	

Note *1: All terminals should be connected together during the test.

Note *2: Recommendable Value : 3.0-6.0 Nm (M5, M6)

Note *3: Recommendable Value : 1.1-2.0 Nm (M4)

Recommendable Value : 2.5-5.0 Nm (M6)

● 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		-	-	4.0	mA
Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V		-	-	400	nA
Gate-Emitter threshold voltage	V _{GE (th)}	V _{CE} = 20V, I _C = 400mA		6.0	6.5	7.0	V
Collector-Emitter saturation voltage	V _{CE (sat)} (terminal)	V _{GE} = 15V I _C = 400A	T _J =25°C	-	1.95	2.40	V
			T _J =125°C	-	2.25	-	
			T _J =150°C		2.30		
	V _{CE (sat)} (chip)		T _J =25°C	-	1.75	2.15	
			T _J =125°C	-	2.05	-	
			T _J =150°C		2.10		
Internal gate resistance	R _{g(int)}	-		-	1.9	-	Ω
Input capacitance	C _{ies}	V _{GE} = 0V, V _{CE} = 10V, f = 1MHz		-	36	-	nF
Turn-on time	t _{on}	V _{CC} = 600V, I _C = 400A V _{GE} = ±15V, R _G = 1.8Ω T _J =150°C, L _s =35nH		-	0.60	-	μs
	t _r			-	0.20	-	
	t _{r(i)}			-	0.08	-	
Turn-off time	t _{off}			-	1.00	-	
	t _f			-	0.14	-	
Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 400A	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 = 400A		-	0.20	-	μs

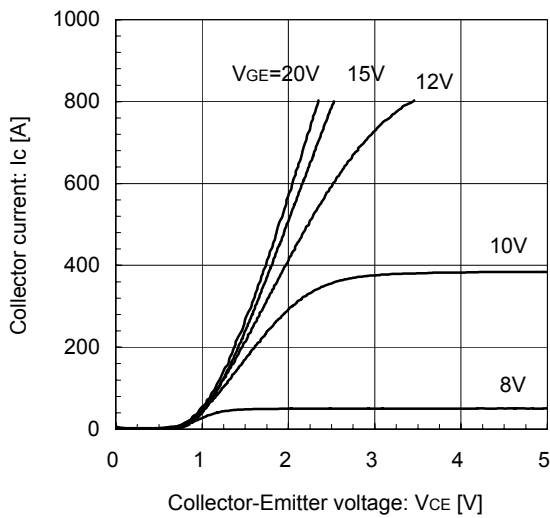
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	IGBT FWD	-	-	0.062 0.110	°C/W
Contact thermal resistance (*4)	R _{th(c-f)}	with Thermal Compound	-	0.0125	-	

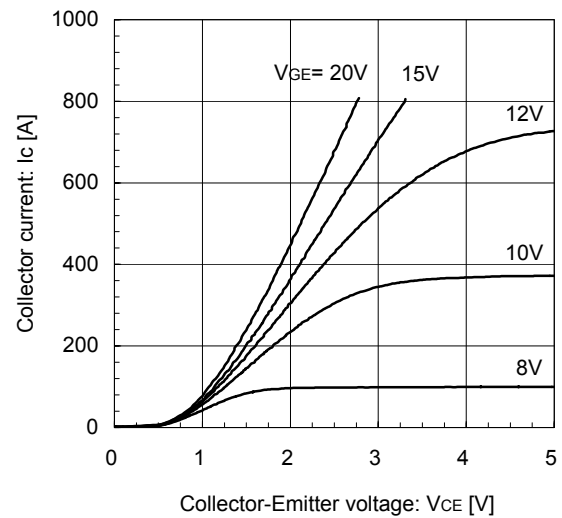
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

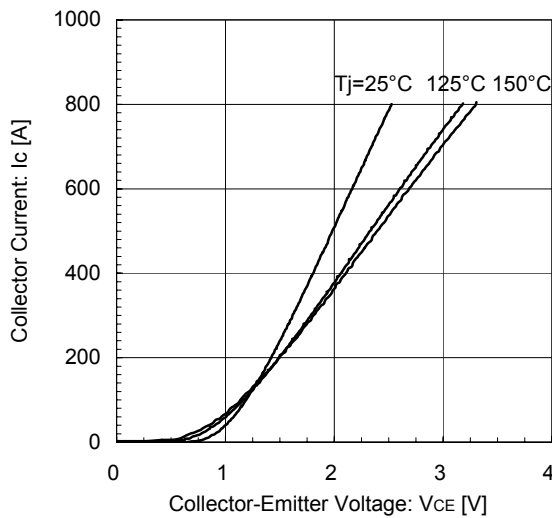
Collector current vs. Collector-Emittter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



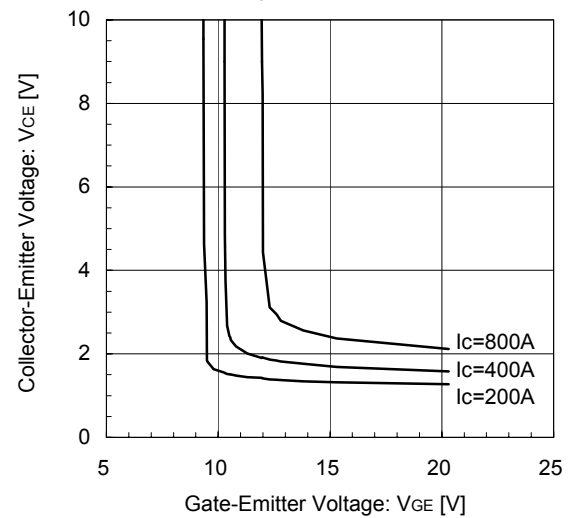
Collector current vs. Collector-Emittter voltage (typ.)
 $T_j = 150^\circ\text{C}$ / chip



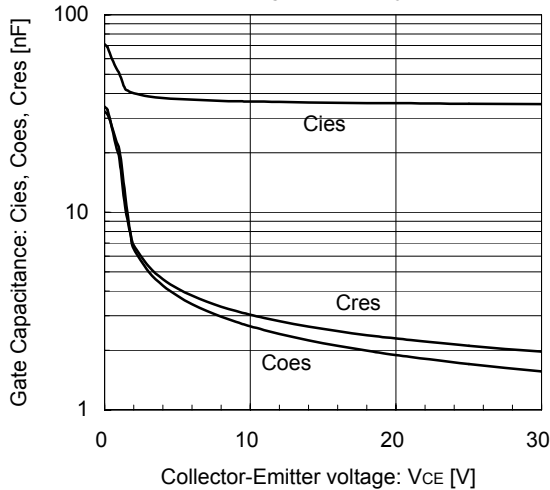
Collector current vs. Collector-Emittter voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



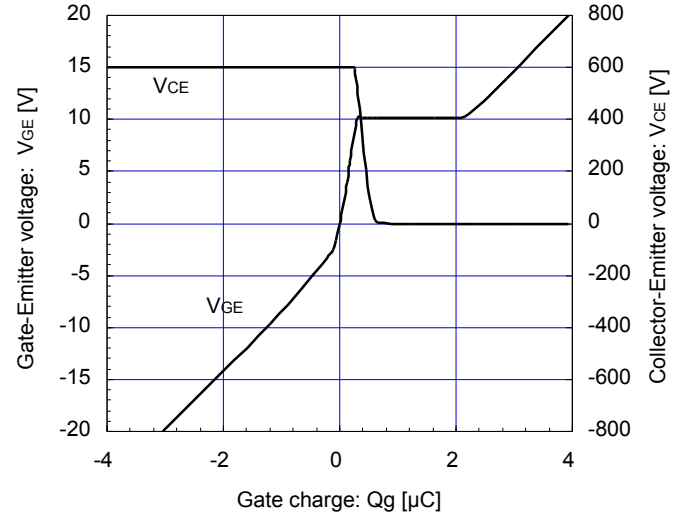
Collector-Emittter voltage vs. Gate-Emittter voltage
 $T_j = 25^\circ\text{C}$ / chip



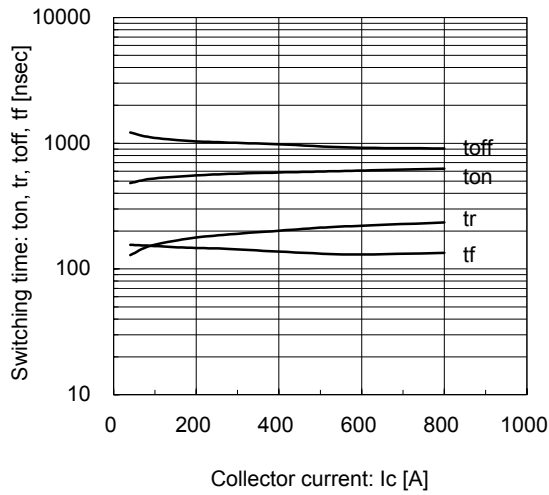
Gate Capacitance vs. Collector-Emittter Voltage
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$



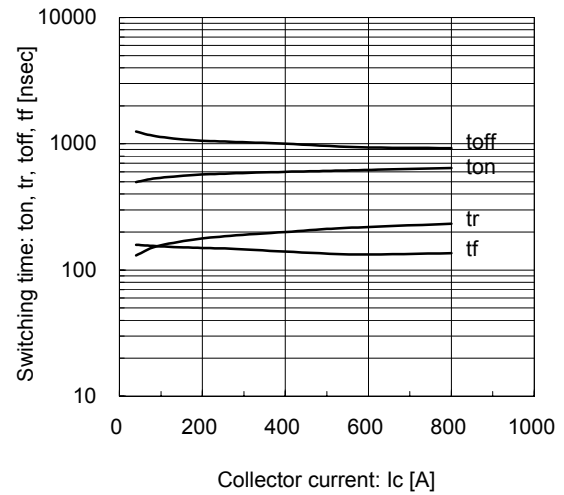
Dynamic Gate Charge (typ.)
 $V_{CC} = 600\text{V}$, $I_c = 400\text{A}$, $T_j = 25^\circ\text{C}$



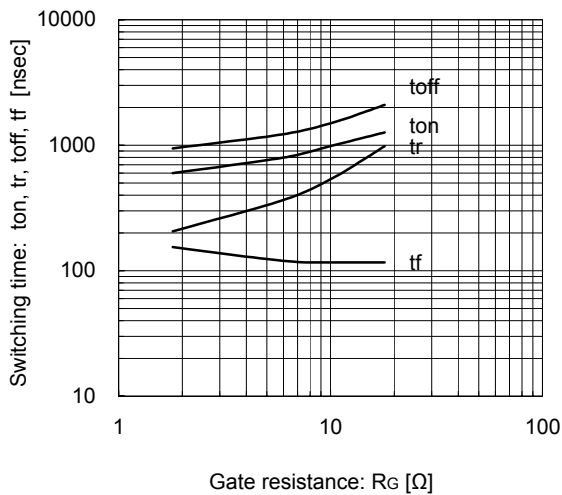
Switching time vs. Collector current (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=1.8Ω, T_J=125°C



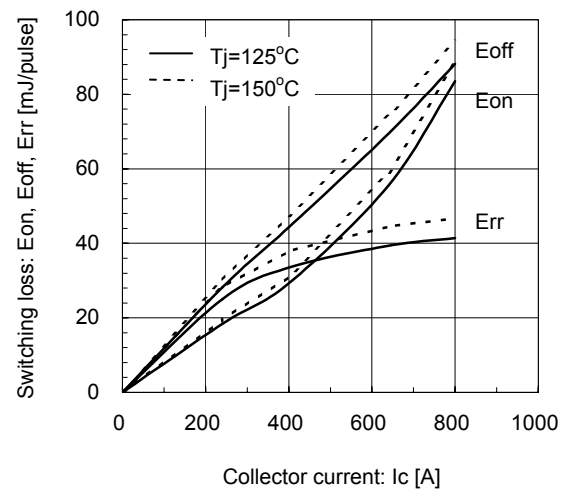
Switching time vs. Collector current (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=1.8Ω, T_J=150°C



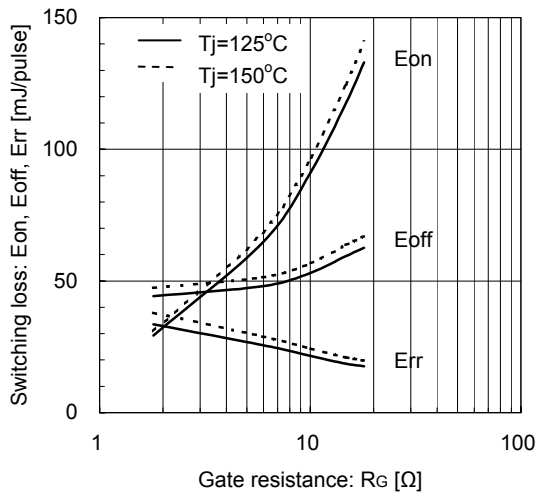
Switching time vs. Gate resistance (typ.)
V_{CC}=600V, Ic=400A, V_{GE}=±15V, T_J=125°C



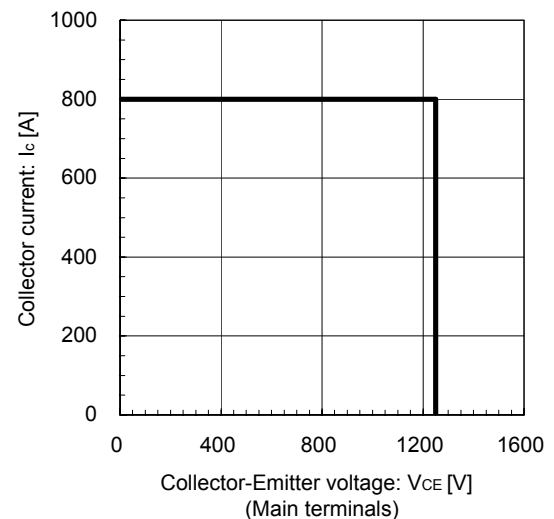
Switching loss vs. Collector current (typ.)
V_{CC}=600V, V_{GE}=±15V, R_G=1.8Ω, T_J=125°C, 150°C



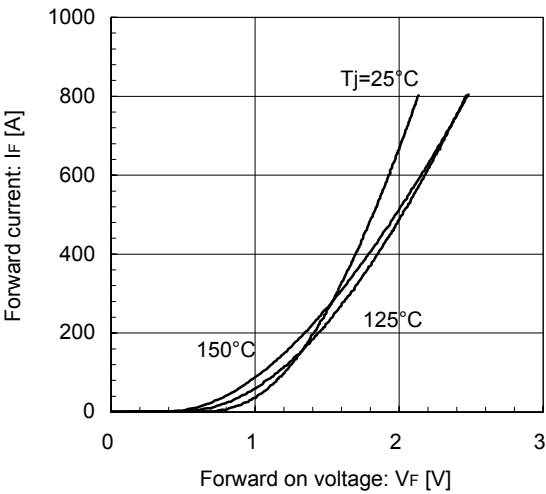
Switching loss vs. Gate resistance (typ.)
V_{CC}=600V, Ic=400A, V_{GE}=±15V, T_J=125°C, 150°C



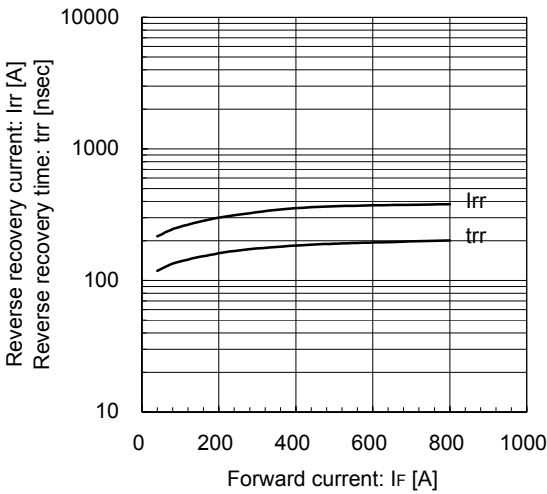
Reverse bias safe operating area (max.)
V_{GE}=±15V, R_G=1.8 Ω, T_J=150°C



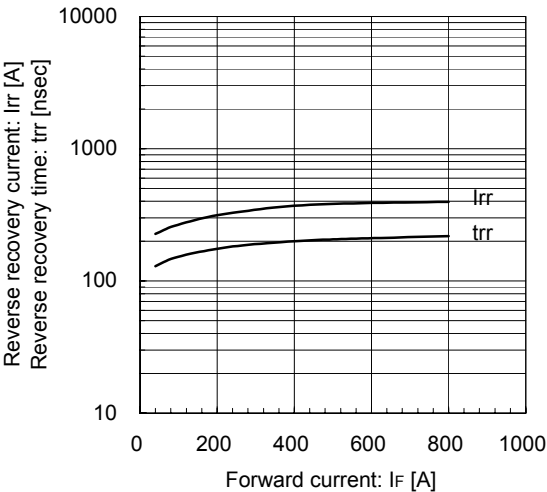
Forward Current vs. Forward Voltage (typ.)
chip



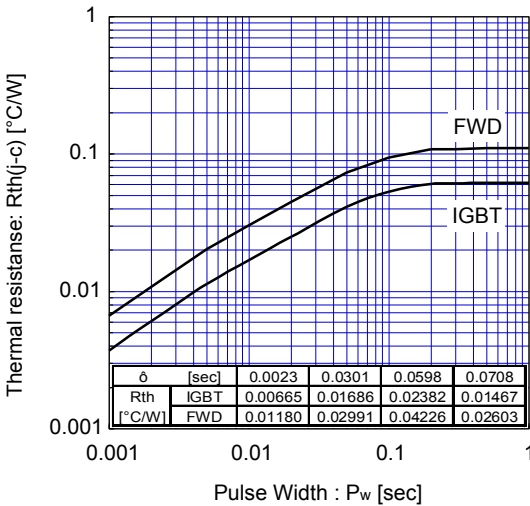
Reverse Recovery Characteristics (typ.)
 $V_{CC}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=1.8\Omega$, $T_j=125^\circ\text{C}$



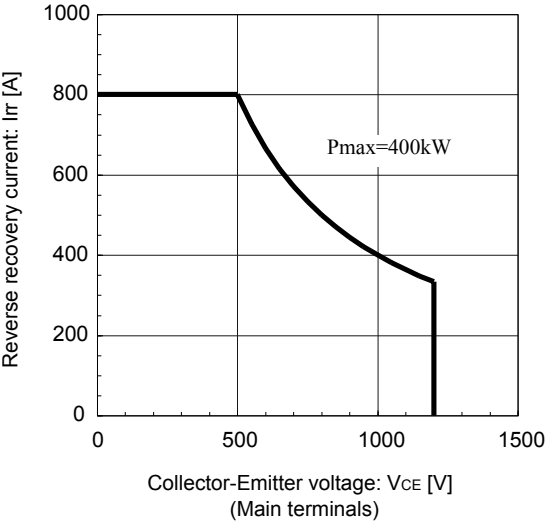
Reverse Recovery Characteristics (typ.)
 $V_{CC}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=1.8\Omega$, $T_j=150^\circ\text{C}$



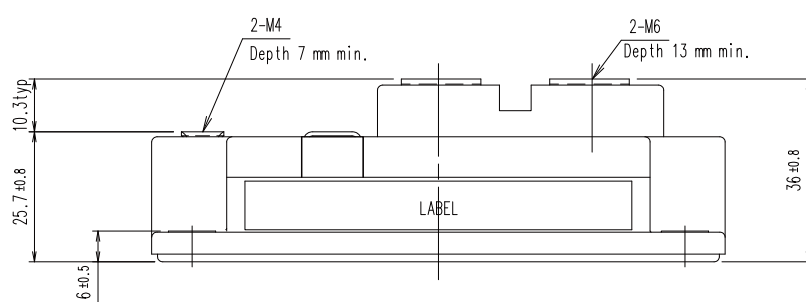
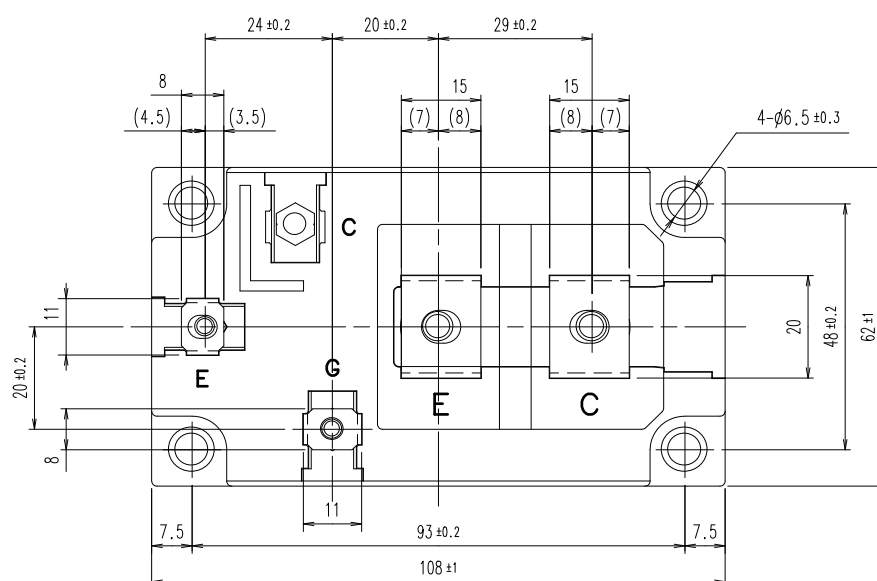
Transient Thermal Resistance (max.)



FWD safe operating area (max.)
 $T_j=150^\circ\text{C}$

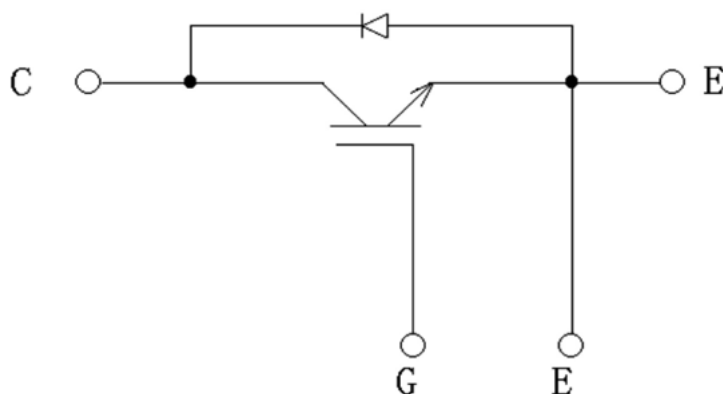


■ Outline Drawings(Unit:mm)



Weight: 370g (typ.)

■ Equivalent Circuit



WARNING

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• Medical equipment	
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• Submarine repeater equipment		
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