

# 2MBI200VA-060-50

IGBT Modules

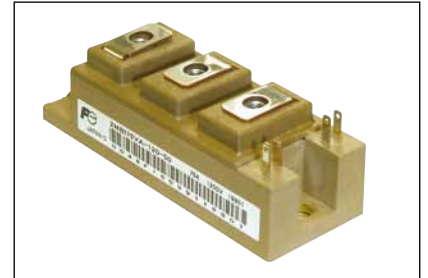
## IGBT MODULE (V series) 600V / 200A / 2 in one package

### ■ 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 $T_c=25^\circ\text{C}$ unless otherwise specified)

Items	Symbols	Conditions	Maximum ratings	Units
Collector-Emitter voltage	$V_{CES}$		600	V
Gate-Emitter voltage	$V_{GES}$		$\pm 20$	V
Collector current	$I_C$	Continuous $T_c=100^\circ\text{C}$	200	A
	$I_{C\text{ pulse}}$	1ms	400	
	$-I_C$		200	
	$-I_{C\text{ pulse}}$	1ms	400	
Collector power dissipation	$P_C$	1 device	650	W
Junction temperature	$T_J$		175	$^\circ\text{C}$
Operating junction temperature (under switching conditions)	$T_{Jop}$		150	
Case temperature	$T_c$		125	
Storage temperature	$T_{stg}$		$-40 \sim 125$	
Isolation voltage	between terminal and copper base (*1) $V_{iso}$	AC : 1min.	2500	VAC
Screw torque	Mounting (*2)		5.0	N m
	Terminals (*3)		5.0	

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

Note \*2: Recommendable Value : 3.0-5.0 Nm (M5 or M6)

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

#### ● Electrical characteristics (at $T_J = 25^\circ\text{C}$ unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Zero gate voltage collector current	$I_{CES}$	$V_{GE} = 0V, V_{CE} = 600V$	-	-	1.0	mA
Gate-Emitter leakage current	$I_{GES}$	$V_{CE} = 0V, V_{GE} = \pm 20V$	-	-	200	nA
Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_C = 200mA$	6.2	6.7	7.2	V
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 200A$	$T_J=25^\circ\text{C}$	1.80	2.25	V
			$T_J=125^\circ\text{C}$	2.10	-	
			$T_J=150^\circ\text{C}$	2.30	-	
	$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_C = 200A$	$T_J=25^\circ\text{C}$	1.60	2.05	
			$T_J=125^\circ\text{C}$	1.90	-	
			$T_J=150^\circ\text{C}$	2.10	-	
Internal gate resistance	$R_{G(int)}$	-	-	4	-	$\Omega$
Input capacitance	$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	-	12.8	-	nF
Turn-on time	$t_{on}$	$V_{CC} = 300V$ $I_C = 200A$ $L_S = 30nH$	-	650	-	nsec
	$t_r$		-	300	-	
	$t_{(f)}$		-	100	-	
Turn-off time	$t_{off}$	$V_{GE} = \pm 15V$ $R_G = 6.8\Omega$ $T_J = 150^\circ\text{C}$	-	600	-	
	$t_r$		-	40	-	
	$t_{tr}$		-	-	-	
Forward on voltage	$V_F$ (terminal)	$V_{GE} = 0V$ $I_F = 200A$	$T_J=25^\circ\text{C}$	1.70	2.15	V
			$T_J=125^\circ\text{C}$	1.60	-	
			$T_J=150^\circ\text{C}$	1.57	-	
	$V_F$ (chip)	$V_{GE} = 0V$ $I_F = 200A$	$T_J=25^\circ\text{C}$	1.60	2.05	
			$T_J=125^\circ\text{C}$	1.50	-	
			$T_J=150^\circ\text{C}$	1.47	-	
Reverse recovery time	$t_{rr}$	$I_F = 200A$	-	200	-	nsec

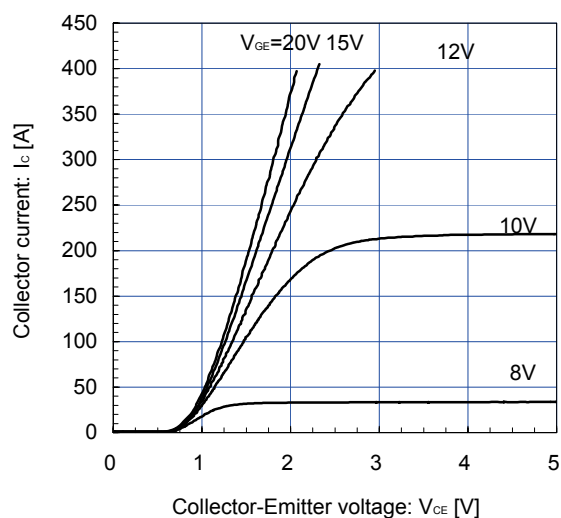
#### ● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	IGBT	-	-	0.23	$^\circ\text{C/W}$
		FWD	-	-	0.41	
Contact thermal resistance (1device) (*4)	$R_{th(c-f)}$	with Thermal Compound	-	0.050	-	

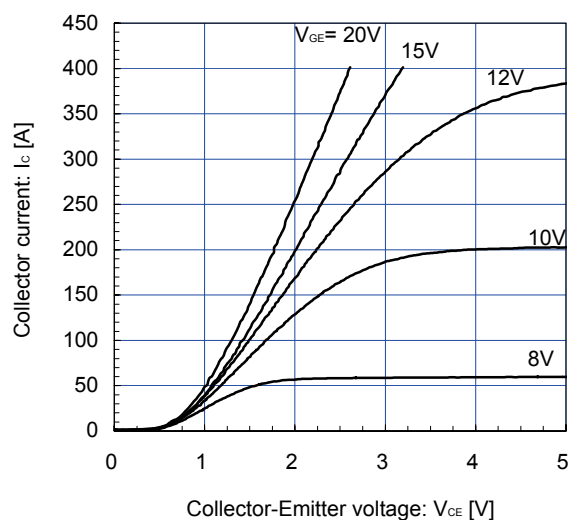
Note \*4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

## ■ Characteristics (Representative)

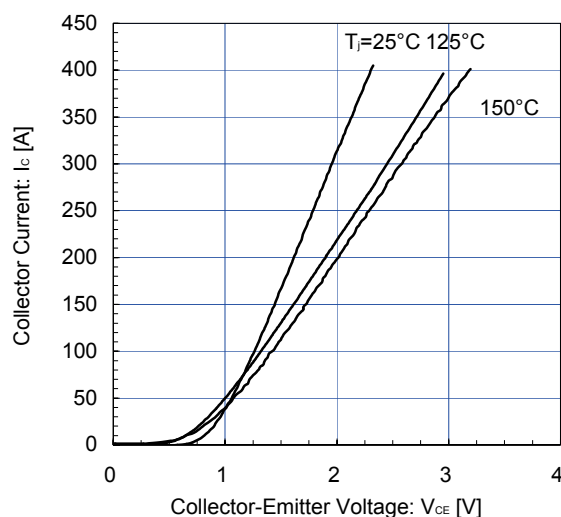
Collector current vs. Collector-Emitter voltage (typ.)  
 $T_J = 25^\circ\text{C}$  / chip



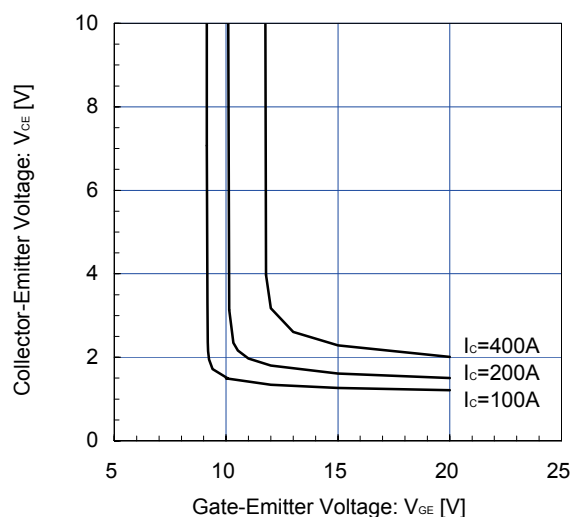
Collector current vs. Collector-Emitter voltage (typ.)  
 $T_J = 150^\circ\text{C}$  / chip



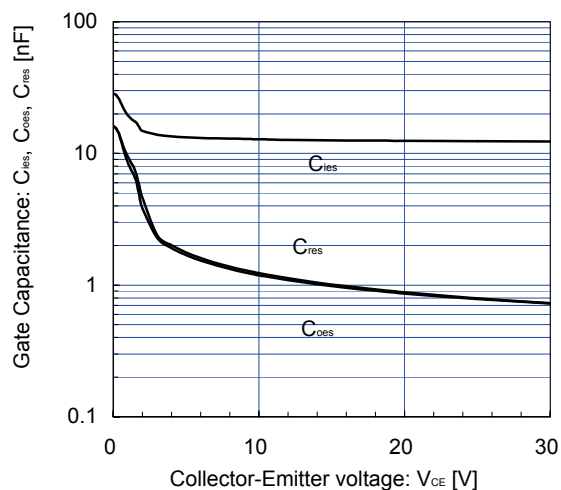
Collector current vs. Collector-Emitter voltage (typ.)  
 $V_{GE} = 15\text{V}$  / chip



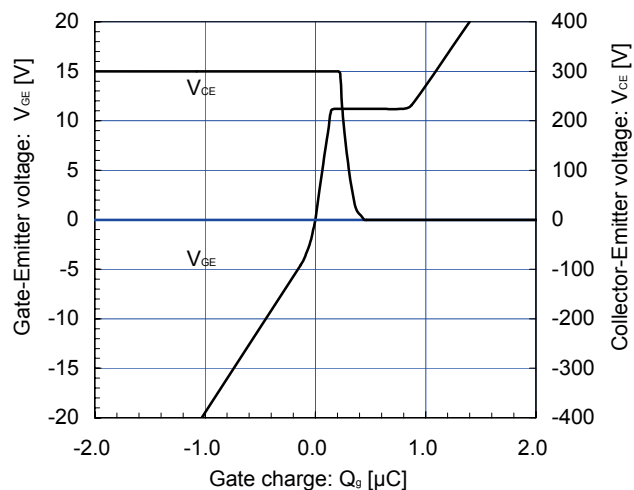
Collector-Emitter voltage vs. Gate-Emitter voltage  
 $T_J = 25^\circ\text{C}$  / chip



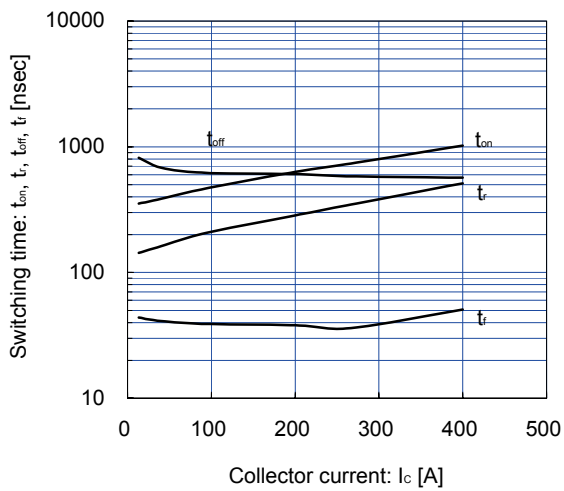
Gate Capacitance vs. Collector-Emitter Voltage  
 $V_{GE} = 0\text{V}$ ,  $f = 1\text{MHz}$ ,  $T_J = 25^\circ\text{C}$



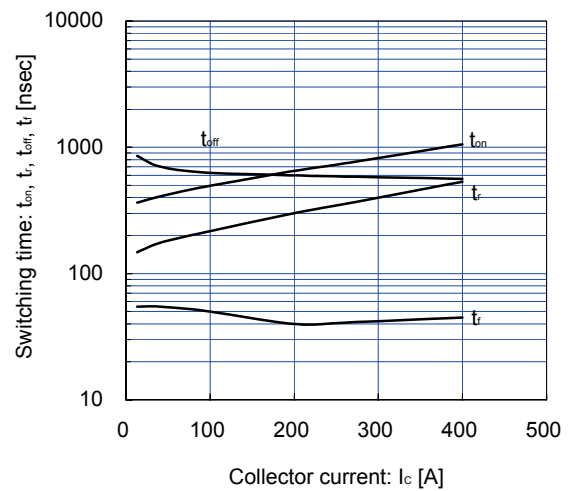
Dynamic Gate Charge (typ.)  
 $V_{CC} = 300\text{V}$ ,  $I_C = 200\text{A}$ ,  $T_J = 25^\circ\text{C}$



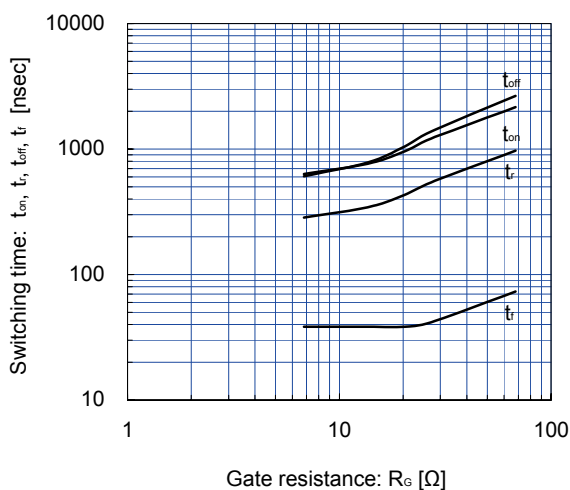
Switching time vs. Collector current (typ.)  
 $V_{CC}=300V$ ,  $V_{GE}=\pm 15V$ ,  $R_G=6.8\Omega$ ,  $T_J=125^\circ C$



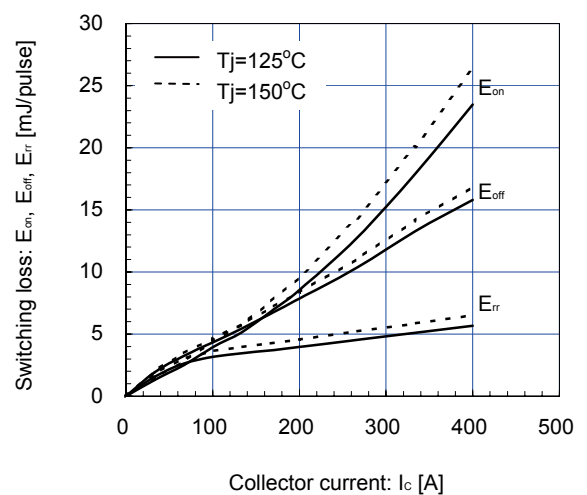
Switching time vs. Collector current (typ.)  
 $V_{CC}=300V$ ,  $V_{GE}=\pm 15V$ ,  $R_G=6.8\Omega$ ,  $T_J=150^\circ C$



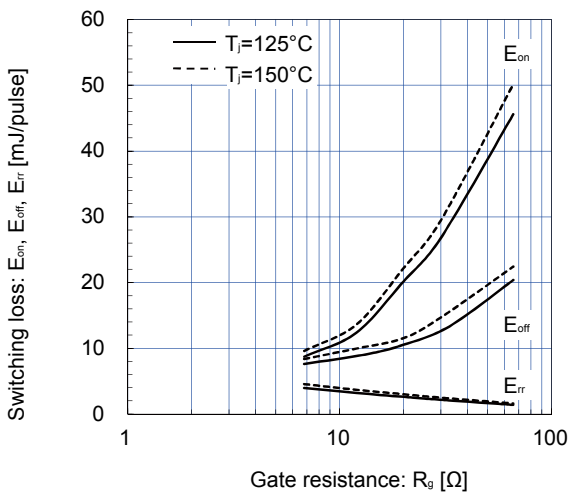
Switching time vs. Gate resistance (typ.)  
 $V_{CC}=300V$ ,  $I_C=200A$ ,  $V_{GE}=\pm 15V$ ,  $T_J=125^\circ C$



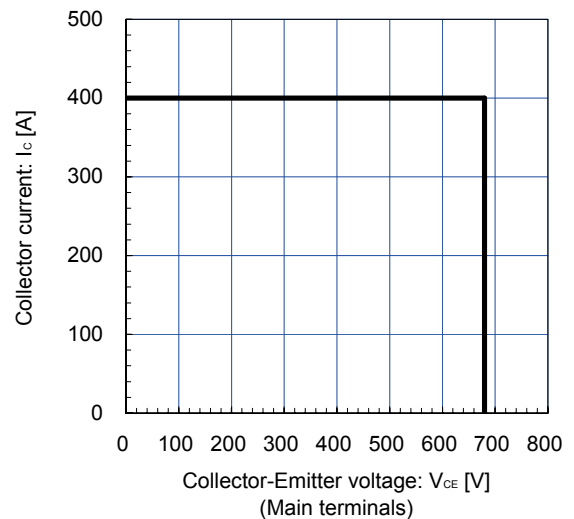
Switching loss vs. Collector current (typ.)  
 $V_{CC}=300V$ ,  $V_{GE}=\pm 15V$ ,  $R_G=6.8\Omega$ ,  $T_J=125, 150^\circ C$



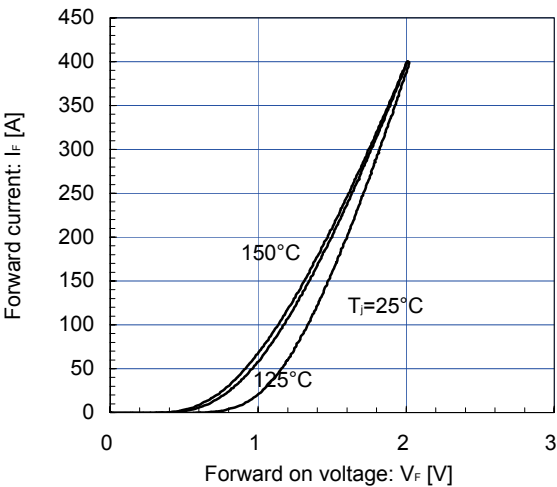
Switching loss vs. Gate resistance (typ.)  
 $V_{CC}=300V$ ,  $I_C=200A$ ,  $V_{GE}=\pm 15V$ ,  $T_J=125, 150^\circ C$



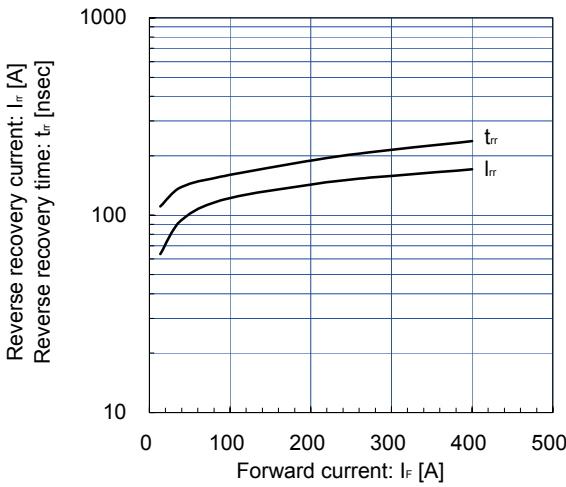
Reverse bias safe operating area (max.)  
 $+V_{GE}=15V$ ,  $-V_{GE}=15V$ ,  $R_G=6.8\Omega$ ,  $T_J=150^\circ C$



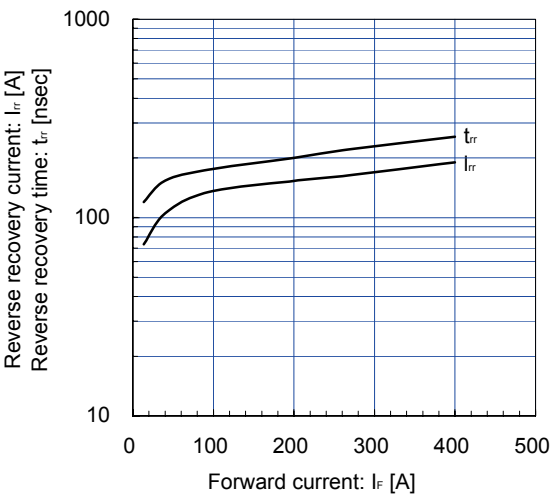
Forward Current vs. Forward Voltage (typ.)  
chip



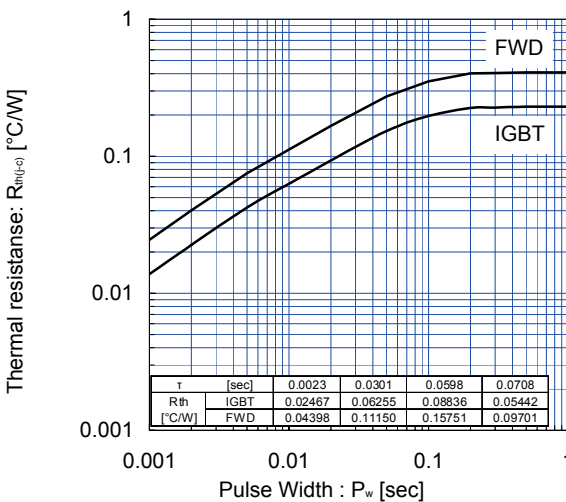
Reverse Recovery Characteristics (typ.)  
V<sub>CC</sub>=300V, V<sub>GE</sub>=±15V, R<sub>G</sub>=6.8Ω, T<sub>J</sub>=125°C



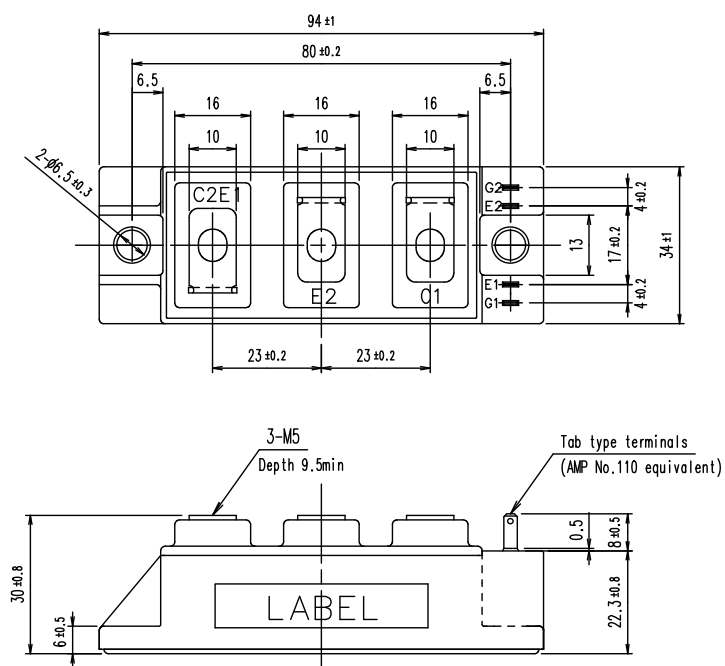
Reverse Recovery Characteristics (typ.)  
V<sub>CC</sub>=300V, V<sub>GE</sub>=±15V, R<sub>G</sub>=6.8Ω, T<sub>J</sub>=150°C



Transient Thermal Resistance (max.)

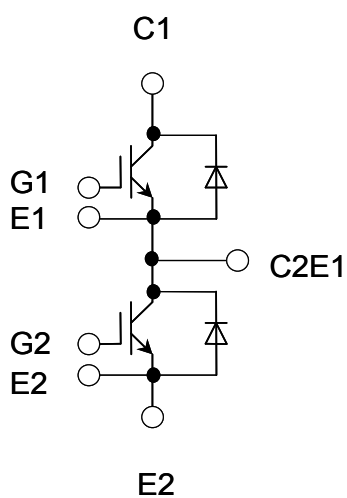


## ■ Outline Drawings, mm



Weight: 180g (typ.)

## ■ Equivalent Circuit Schematic



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