

2MBI450VE-120-50

IGBT Modules

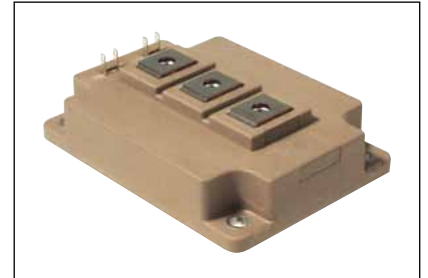
IGBT MODULE (V series) 1200V / 450A / 2 in one package

■ 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 Tc=25°C unless otherwise specified)

Items	Symbols	Conditions	Maximum ratings	Units
Collector-Emitter voltage	V _{CE}		1200	V
Gate-Emitter voltage	V _{GE}		±20	V
Inverter	I _c	Continuous	T _c =100°C	450
			T _c =25°C	520
		1ms		900
				450
				900
Collector power dissipation	P _c	1 device	3350	W
Junction temperature	T _j		175	°C
Operating junction temperature (under switching conditions)	T _{jop}		150	
Case temperature	T _c		125	
Storage temperature	T _{stg}		-40 ~ +125	
Isolation voltage	V _{iso}	AC : 1min.	2500	VAC
Screw torque	Mounting (*2)		6.0	N m
	Terminals (*3)		5.0	

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

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

Note *3: Recommendable Value : 2.5-5.0 Nm (M6)

● Electrical characteristics (at Tj= 25°C unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Zero gate voltage collector current	I _{CE}	V _{GE} = 0V, V _{CE} = 1200V	-	-	2.0	mA
Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V	-	-	800	nA
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V, I _c = 450mA	6.0	6.5	7.0	V
Inverter	V _{CE(sat)} (terminal)	V _{GE} = 15V I _c = 450A	T _j =25°C	2.05	2.60	V
			T _j =125°C	2.40	-	
			T _j =150°C	2.45	-	
			T _j =25°C	1.80	2.15	
			T _j =125°C	2.15	-	
Inverter	V _{CE(sat)} (chip)	V _{GE} = 15V I _c = 450A	T _j =150°C	2.20	-	V
			T _j =25°C	1.80	2.15	
			T _j =125°C	2.15	-	
			T _j =150°C	2.20	-	
			T _j =25°C	1.85	2.50	
Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	-	36	-	nF
Turn-on time	ton	V _{CC} = 600V L _s = 30nH	-	0.60	-	μs
	tr	I _c = 450A	-	0.20	-	
	tr(i)	V _{GE} = ±15V	-	0.05	-	
Turn-off time	toff	R _θ = 1Ω	-	0.80	-	μs
	tf	T _j = 150°C	-	0.08	-	
			-	0.08	-	
Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 450A	T _j =25°C	1.85	2.50	V
			T _j =125°C	2.00	-	
			T _j =150°C	1.95	-	
			T _j =25°C	1.70	2.15	
			T _j =125°C	1.90	-	
Reverse recovery time	trr	I _F = 450A	T _j =150°C	1.85	-	μs
				0.15	-	

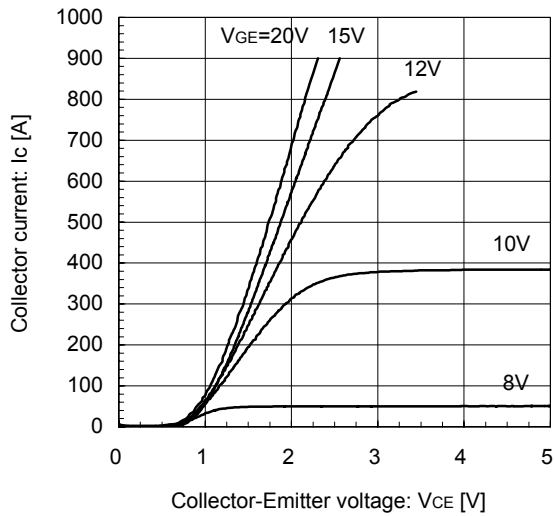
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	IGBT	-	-	0.045	°C/W
		FWD	-	-	0.077	
Contact thermal resistance (1device) (*4)	R _{th(c-f)}	with Thermal Compound	-	0.0125	-	

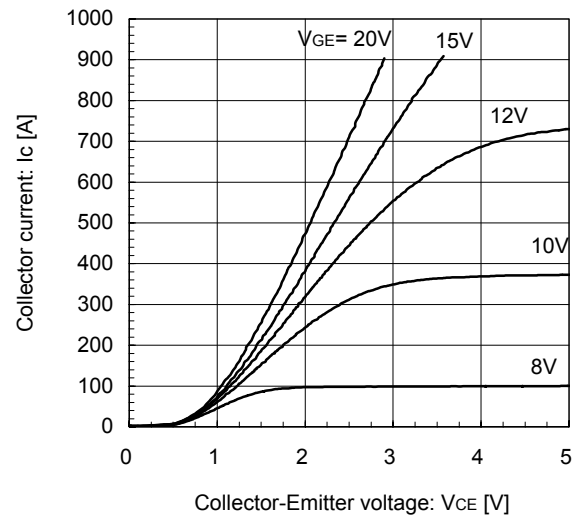
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

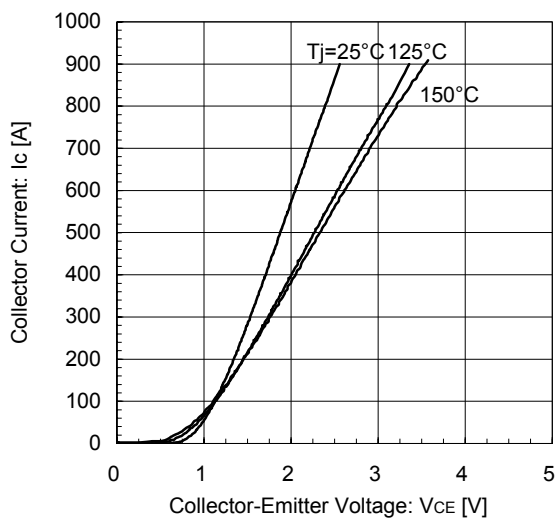
Collector current vs. Collector-Emitter voltage (typ.)
T_j = 25°C / chip



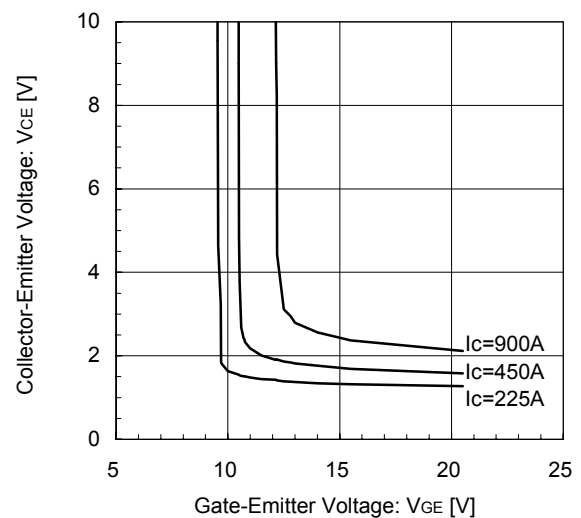
Collector current vs. Collector-Emitter voltage (typ.)
T_j = 150°C / chip



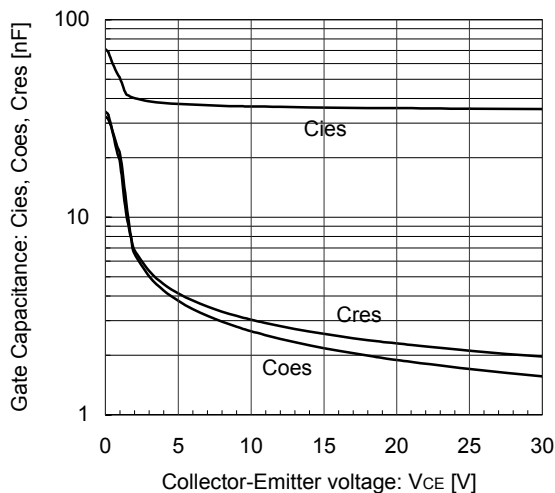
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE} = 15V / chip



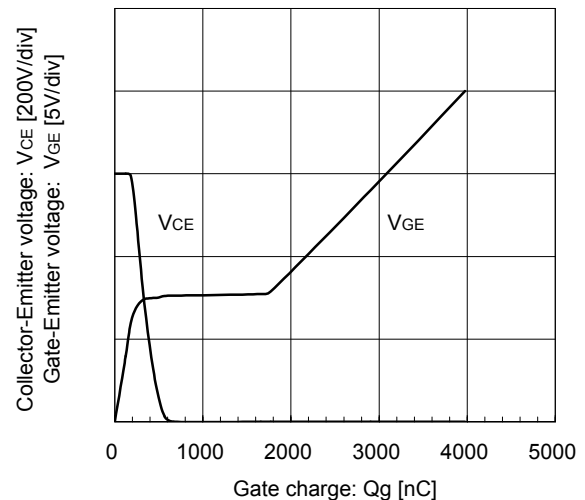
Collector-Emitter voltage vs. Gate-Emitter voltage
T_j = 25°C / chip



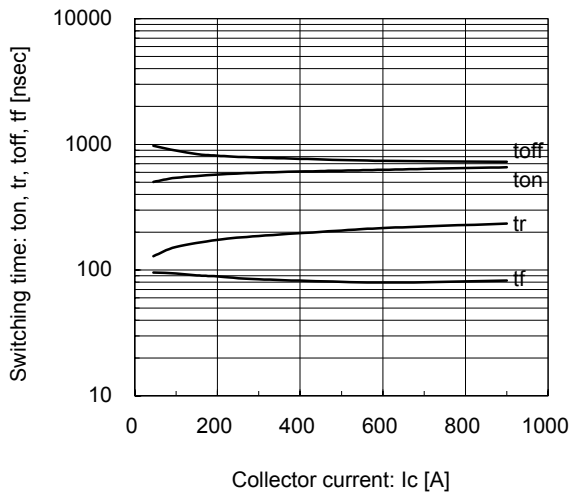
Gate Capacitance vs. Collector-Emitter Voltage
V_{GE} = 0V, f = 1MHz, T_j = 25°C



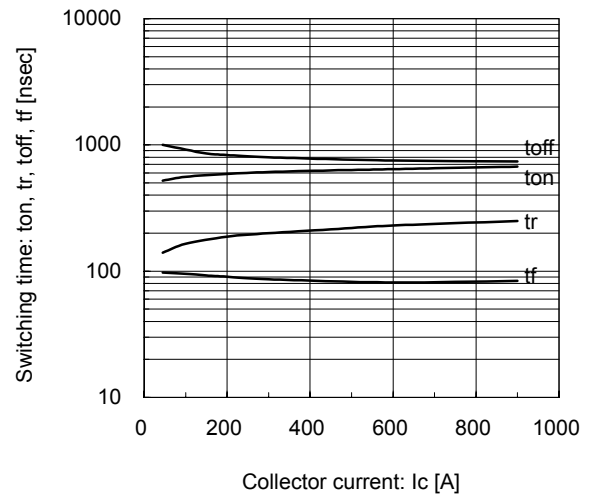
Dynamic Gate Charge (typ.)
V_{CC} = 600V, I_C = 450A, T_j = 25°C



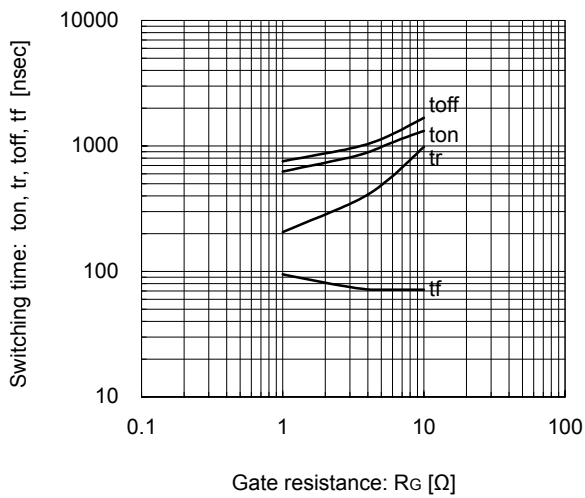
Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=1\Omega$, $T_J=125^\circ C$



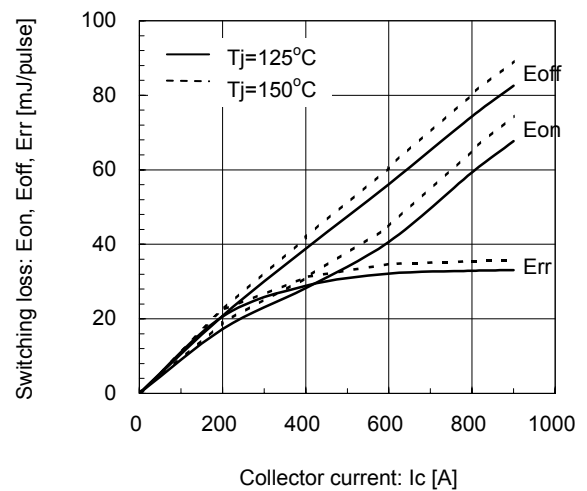
Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=1\Omega$, $T_J=150^\circ C$



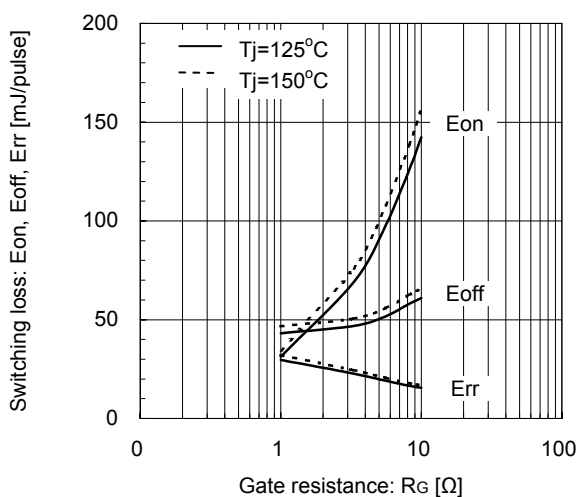
Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_C=450A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$



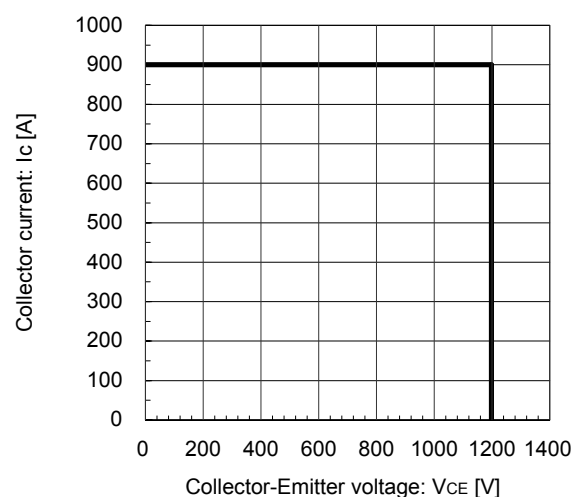
Switching loss vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=1\Omega$, $T_J=125^\circ C, 150^\circ C$

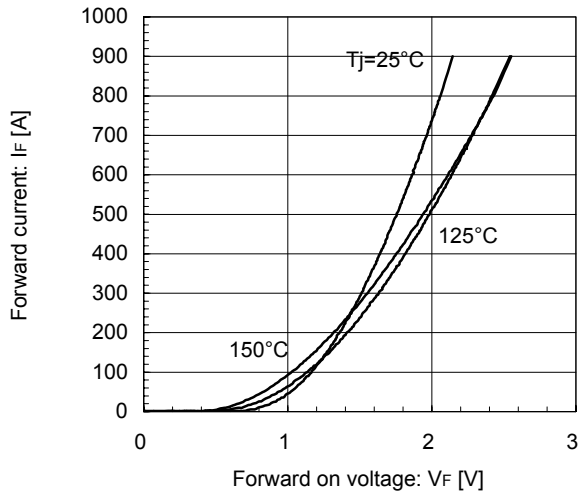
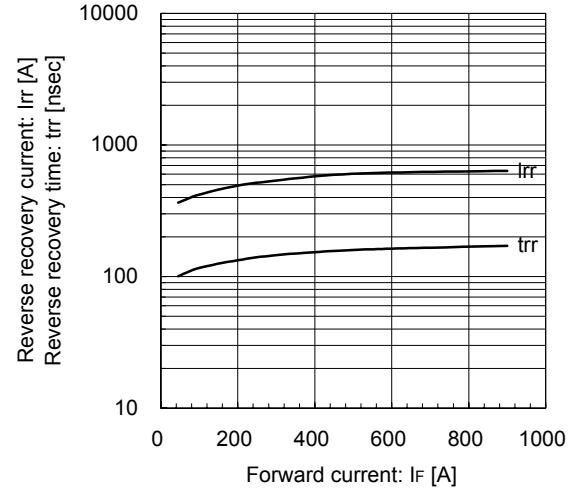
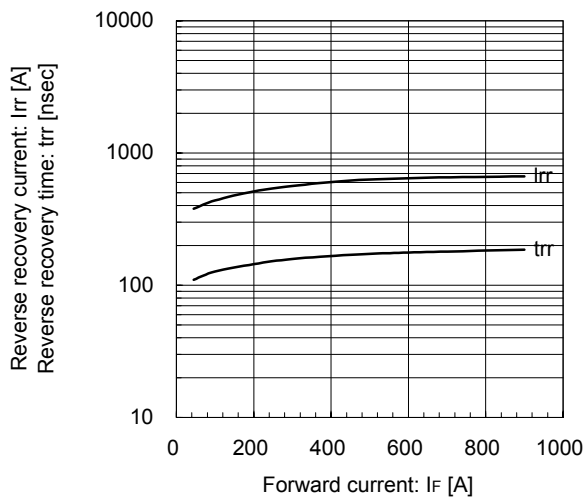


Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_C=450A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C, 150^\circ C$

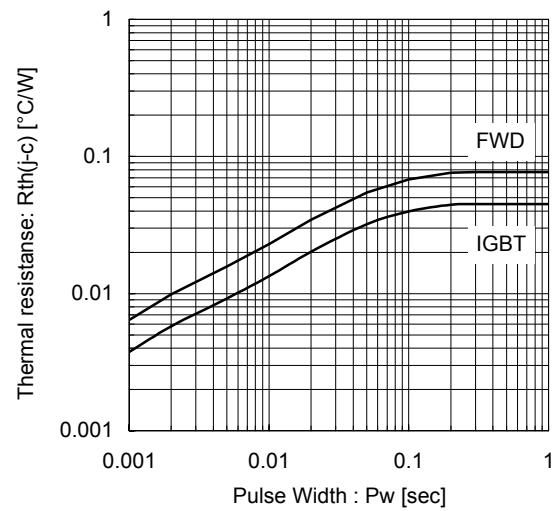
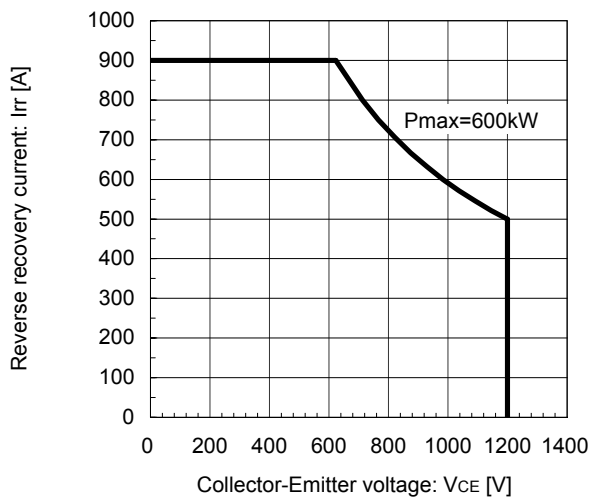


Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_G=1\Omega$, $T_J=150^\circ C$

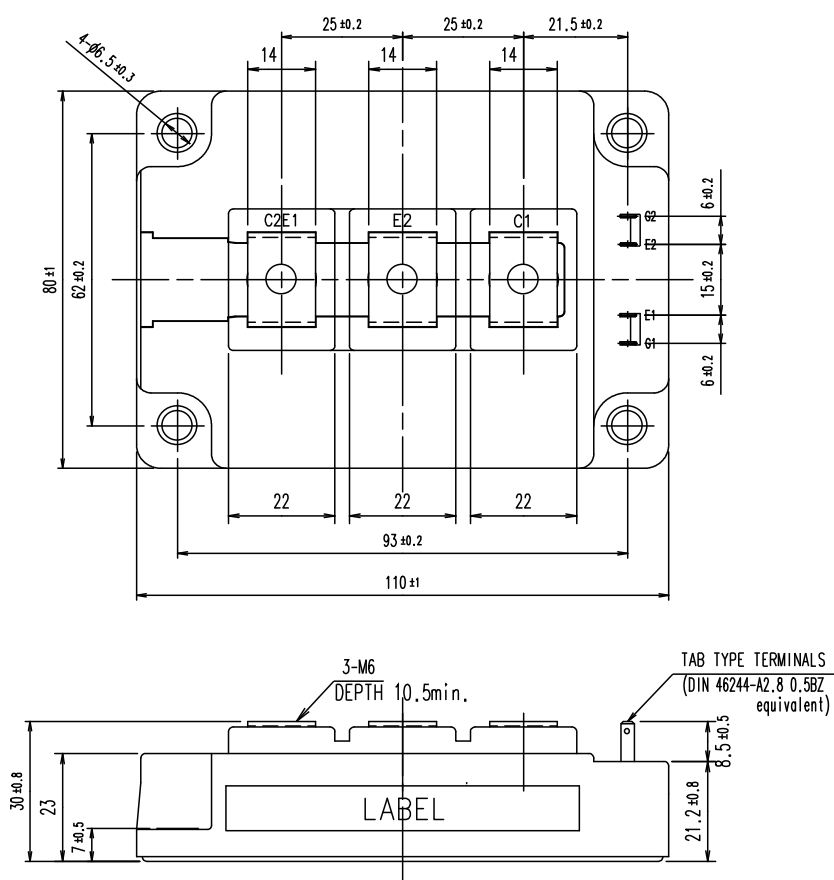


Forward Current vs. Forward Voltage (typ.)
chipReverse Recovery Characteristics (typ.)
 $V_{CC}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=1\Omega$, $T_j=125^\circ\text{C}$ Reverse Recovery Characteristics (typ.)
 $V_{CC}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=1\Omega$, $T_j=150^\circ\text{C}$ 

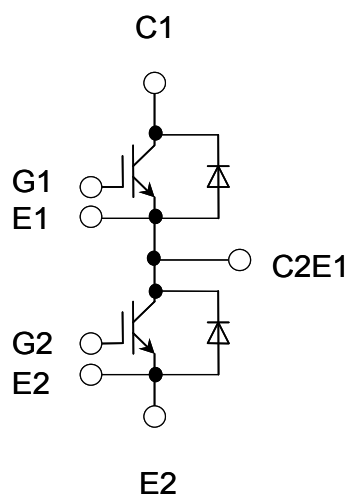
Transient Thermal Resistance (max.)

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

■ Outline Drawings, mm



■ Equivalent Circuit Schematic



WARNING

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