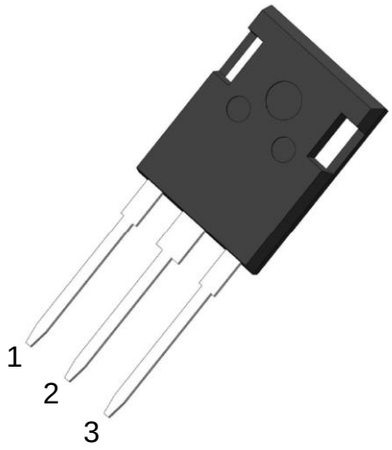
MM120G3T65BM

650V 120A IGBT

June 2020 Version 01 RoHS Compliant

PRODUCT FEATURES

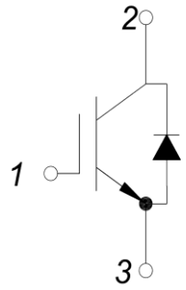
- ☐ 650V IGBT chip in trench FS-technology
- ☐ Low switching losses
- ☐ $V_{CE(sat)}$ with positive temperature coefficient
- ☐ Fast switching and short tail current
- ☐ Free wheeling diodes with fast and soft reverse recovery



APPLICATIONS

- ☐ Motor control
- ☐ UPS/PFC
- ☐ General purpose inverters

1.Gate
2.Collector
3.Emitter



Type	V_{CES}	I_C	$V_{CE(sat)}$ T_J=25°C	T_{Jmax}	Marking	Package
MM120G3T65BM	650V	120A	1.6V	175°C	MM120G3T65BM	TO-247 Plus

ABSOLUTE MAXIMUM RATINGS(T_C *=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	T_J=25℃	650	V
V_{GES}	Gate Emitter Voltage		±20	
I_C	DC Collector Current	T_C=25℃	200	A
		T_C=110℃	120	
I_{Cpuls}	Pulsed collector current,tp limited by T_{Jmax}		360	
P_{tot}	Power Dissipation Per IGBT		750	W
V_{RRM}	Repetitive Reverse Voltage	T_J=25℃	650	V
$I_{F(AV)}$	Average Forward Current	T_C=95℃	120	A
I_{Fpuls}	Diode pulsed current,tp limited by T_{Jmax}		360	
T_{Jmax}	Max. Junction Temperature		175	℃
T_{Jop}	Operating Temperature		-40~175	
T_{stg}	Storage Temperature		-55~150	
Weight			8	g

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IGBT

ELECTRICAL CHARACTERISTICS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions			Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Emitter Threshold Voltage	$V_{CE}=V_{GE}$, I_C=2.0mA		4.3	5.3	6.3	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	I_C=120A, V_{GE}=15V, T_J=25℃			1.6	2	
		I_C=120A, V_{GE}=15V, T_J=125℃			1.9		
		I_C=120A, V_{GE}=15V, T_J=150℃			1.95		
I_{CES}	Collector Leakage Current	V_{CE}=650V, V_{GE}=0V, T_J=25℃				100	μA
		V_{CE}=650V, V_{GE}=0V, T_J=150℃				5	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±20V, T_J=25℃		-200		200	nA
Q_g	Gate Charge	V_{CE}=400V, I_C=120A , V_{GE}=15V			0.55		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			7.2		nF
C_{res}	Reverse Transfer Capacitance				320		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=400V,I_C=120A R_G =5.1Ω, V_{GE}=+15/-8V, Inductive Load	T_J=25℃		60		ns
			T_J=125℃		70		ns
			T_J=150℃		70		ns
t_r	Rise Time		T_J=25℃		60		ns
			T_J=125℃		65		ns
			T_J=150℃		65		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=400V,I_C=120A R_G =5.1Ω, V_{GE}=+15/-8V, Inductive Load	T_J=25℃		190		ns
			T_J=125℃		220		ns
			T_J=150℃		230		ns
t_f	Fall Time		T_J=25℃		80		ns
			T_J=125℃		140		ns
			T_J=150℃		150		ns
E_{on}	Turn on Energy	V_{CC}=400V,I_C=120A R_G =5.1Ω, V_{GE}=+15/-8V, Inductive Load	T_J=125℃		6.6		mJ
			T_J=150℃		7		mJ
E_{off}	Turn off Energy		T_J=125℃		4.7		mJ
			T_J=150℃		5.1		mJ
I_{SC}	Short Circuit Current	tpsc≤6μS , V_{GE}=15V T_J=125℃,V_{CC}=400V			540		A
R_{thJC}	Junction to Case Thermal Resistance （Per IGBT）					0.2	K /W

Anti-Parallel Diode

ELECTRICAL CHARACTERISTICS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=120A , V_{GE}=0V, T_J=25℃		1.8	2.3	V
		I_F=120A , V_{GE}=0V, T_J=125℃		1.6		
		I_F=120A , V_{GE}=0V, T_J=150℃		1.55		
t_{rr}	Reverse Recovery Time	I_F=120A , V_R=400V dI_F/dt=-1300A/μs T_J =150℃		300		ns
I_{RRM}	Max. Reverse Recovery Current			52		A
Q_{RR}	Reverse Recovery Charge			8.1		μC
E_{rec}	Reverse Recovery Energy			2.4		mJ
R_{thJCD}	Junction to Case Thermal Resistance （Per Diode）				0.4	K /W

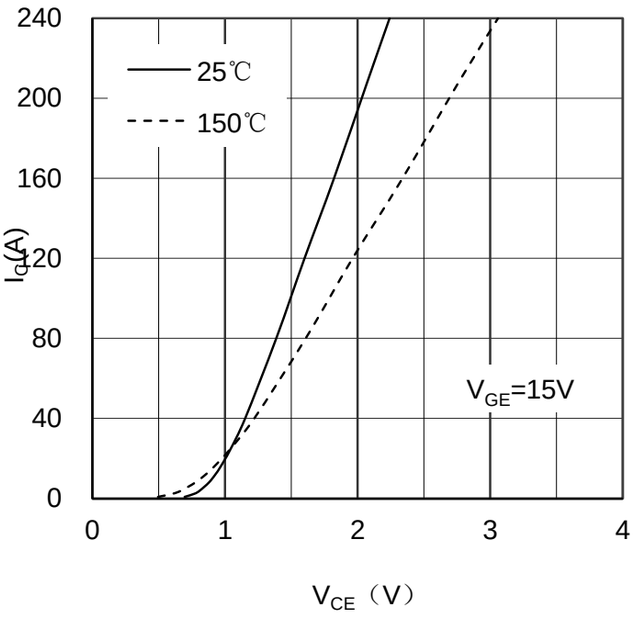


Figure 1. Typical Output Characteristics IGBT

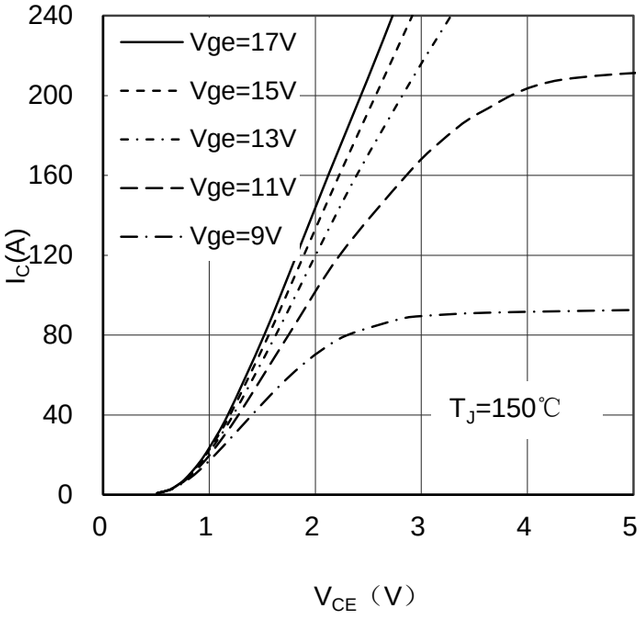


Figure 2. Typical Output Characteristics IGBT

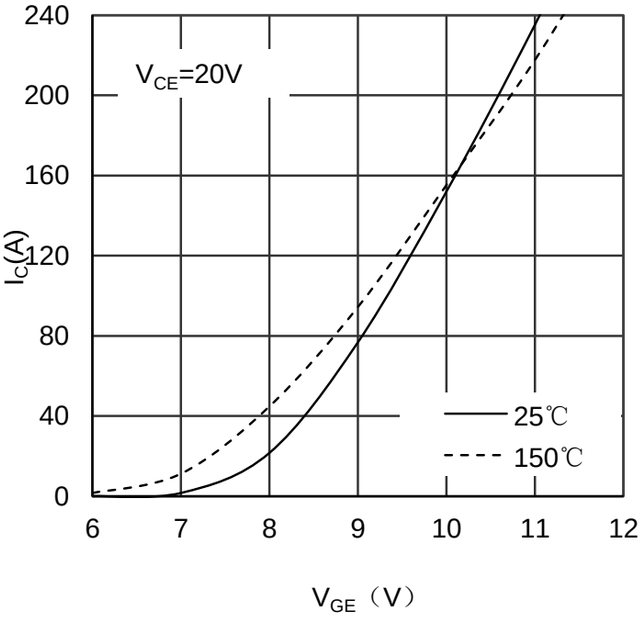


Figure 3. Typical Transfer characteristics IGBT

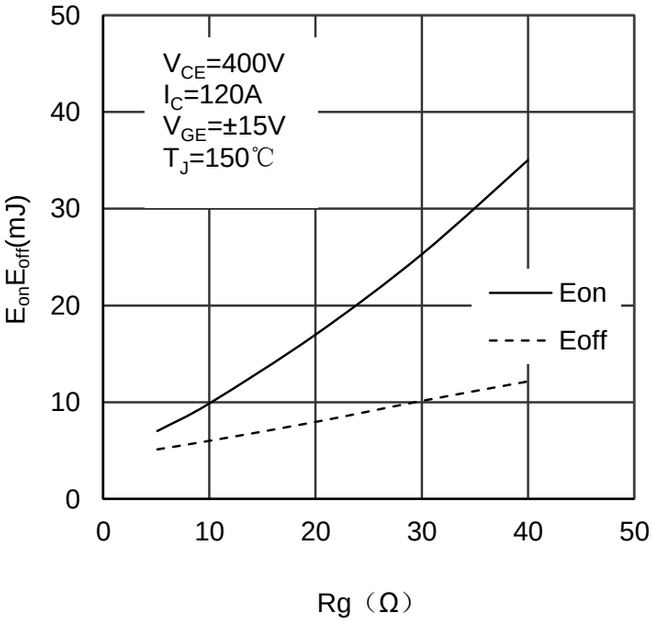


Figure 4. Switching Energy vs Gate Resistor IGBT

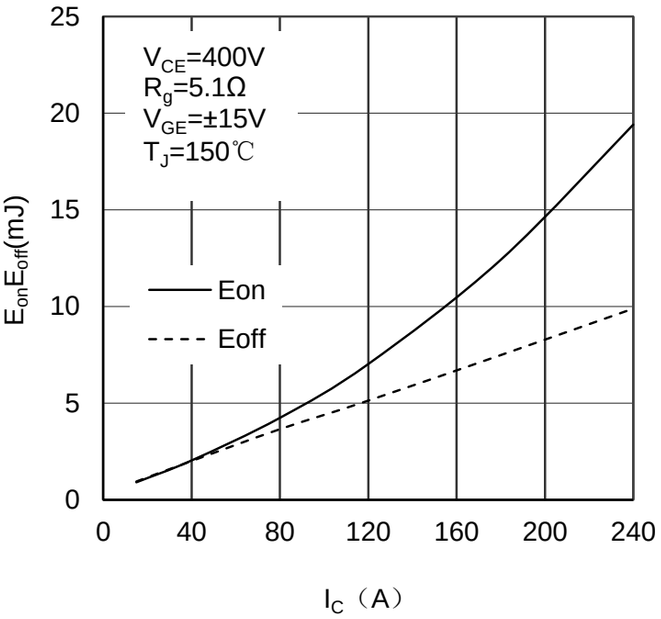


Figure 5. Switching Energy vs Collector Current IGBT

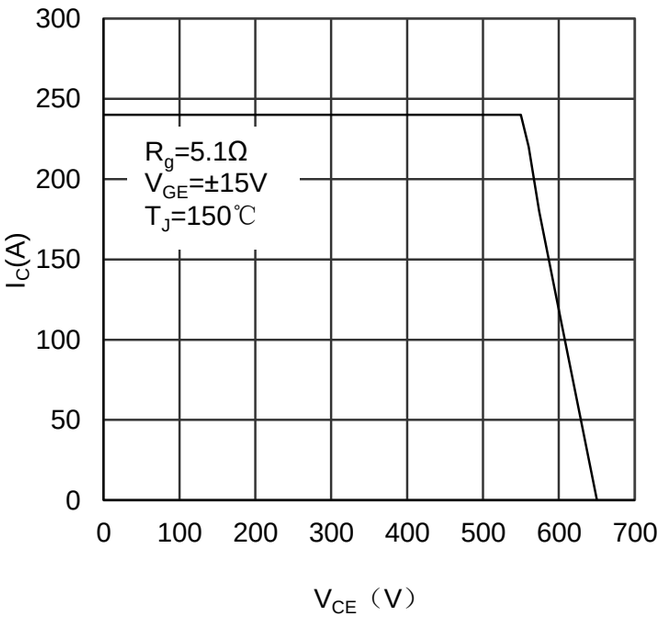


Figure 6. Reverse Biased Safe Operating Area IGBT

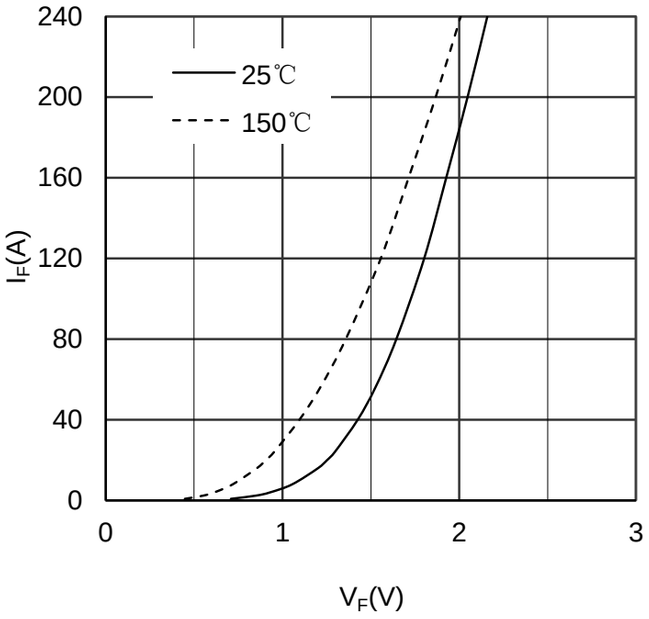


Figure 7. Diode Forward Characteristics Diode

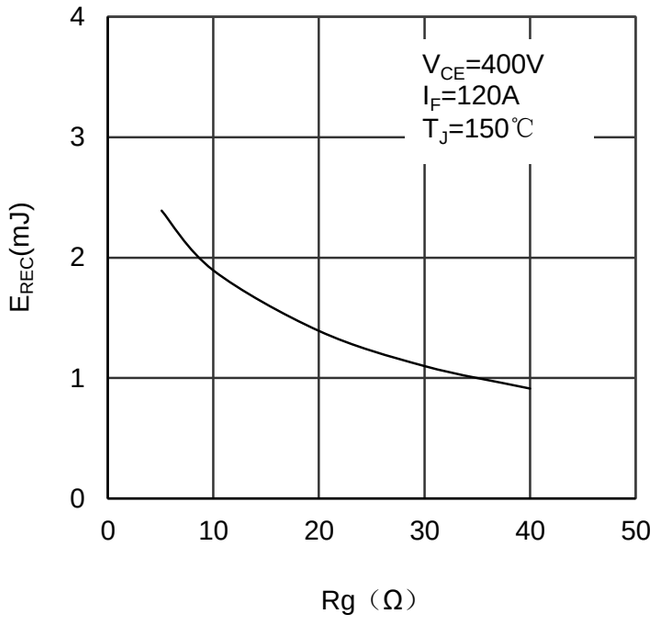


Figure 8. Switching Energy vs Gate Resistor Diode

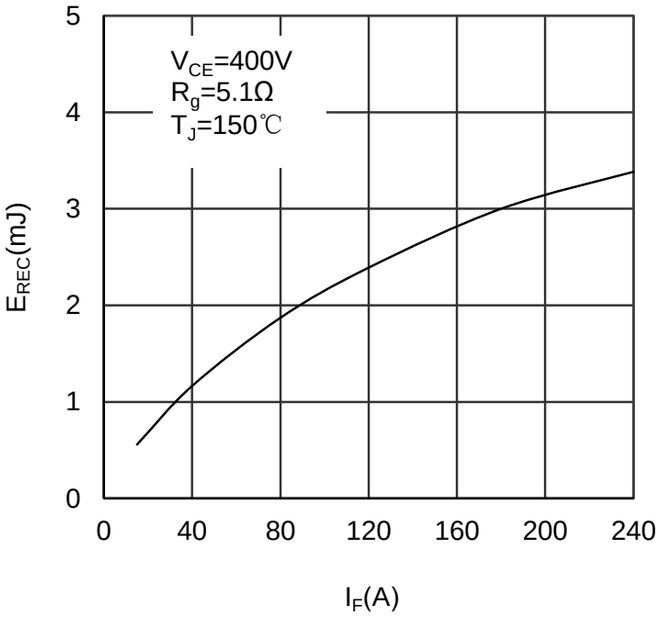


Figure 9. Switching Energy vs Forward Current Diode

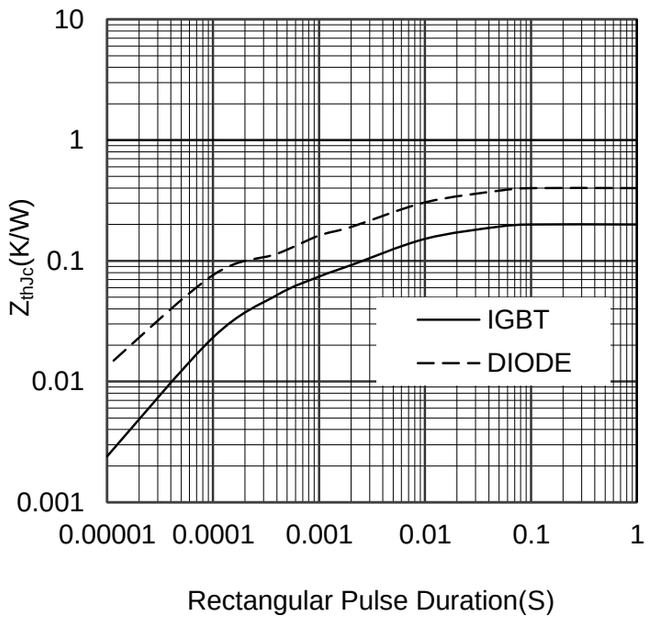
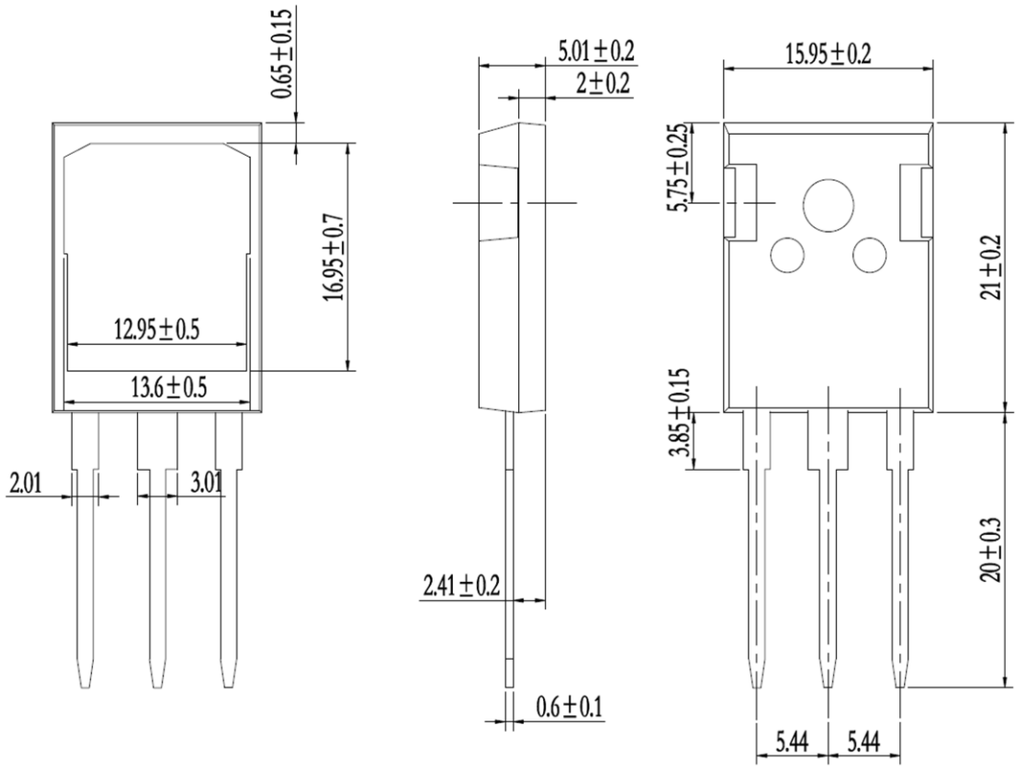


Figure 10. Transient Thermal Impedance of Diode and IGBT



Dimensions in (mm)

Figure 11. Package Outline