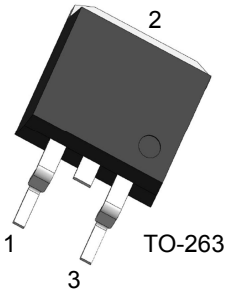
MM15G3T65S

650V 15A IGBT

July 2018 | Preliminary | RoHS Compliant

PRODUCT FEATURES

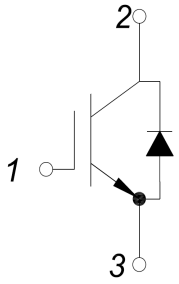
- ☐ 650V IGBT chip in trench FS-technology
- ☐ Low switching losses
- ☐ $V_{CE(sat)}$ with positive temperature coefficient
- ☐ Fast switching and short tail current
- ☐ Free wheeling diodes with fast and soft reverse recovery



APPLICATIONS

- ☐ High frequency switching application
- ☐ Medical applications
- ☐ Motion/servo control
- ☐ UPS systems

1.Gate
2.Collector
3.Emitter



Type	V_{CES}	I_C	$V_{CE(sat)}$ T_J=25°C	T_{Jmax}	Marking	Package
MM15G3T65S	650V	15A	1.65V	175°C	MM15G3T65S	TO-263

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℃	25	A
		T_C=100℃	15	
I_{Cpuls}	Pulsed collector current,tp limited by T_{Jmax}		50	
P_{tot}	Power Dissipation Per IGBT		125	W
V_{RRM}	Repetitive Reverse Voltage	T_J=25℃	650	V
$I_{F(AV)}$	Average Forward Current	T_C=25℃	15	A
I_{Fpuls}	Diode pulsed current,tp limited by T_{Jmax}		30	
T_{Jmax}	Max. Junction Temperature		175	℃
T_{Jop}	Operating Temperature		-40~175	
T_{stg}	Storage Temperature		-55~150	
Weight			2.5	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=0.6mA		4.8	5.6	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	I_C=15A, V_{GE}=15V, T_J=25℃			1.65	2	
		I_C=15A, V_{GE}=15V, T_J=125℃			1.8		
		I_C=15A, V_{GE}=15V, T_J=150℃			1.9		
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℃				10	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±15V, T_J=25℃		-200		200	nA
Q_g	Gate Charge	V_{CE}=300V, I_C=15A , V_{GE}=15V			90		nC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			0.89		nF
C_{res}	Reverse Transfer Capacitance				40		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=400V,I_C=15A R_G =30Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		10		ns
			T_J=125℃		15		ns
			T_J=150℃		15		ns
t_r	Rise Time		T_J=25℃		25		ns
			T_J=125℃		30		ns
			T_J=150℃		30		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=400V,I_C=15A R_G =30Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		90		ns
			T_J=125℃		100		ns
			T_J=150℃		110		ns
t_f	Fall Time		T_J=25℃		40		ns
			T_J=125℃		60		ns
			T_J=150℃		70		ns
E_{on}	Turn on Energy	V_{CC}=400V,I_C=15A R_G =30Ω, V_{GE}=±15V, Inductive Load	T_J=125℃		0.45		mJ
			T_J=150℃		0.55		mJ
E_{off}	Turn off Energy		T_J=125℃		0.2		mJ
			T_J=150℃		0.25		mJ
I_{SC}	Short Circuit Current	tpsc≤10μS , V_{GE}=15V T_J=125℃,V_{CC}=300V			80		A
R_{thJC}	Junction to Case Thermal Resistance （Per IGBT）					1.2	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=15A , V_{GE}=0V, T_J=25℃		1.85	2.25	V
		I_F=15A , V_{GE}=0V, T_J=125℃		1.65		
		I_F=15A , V_{GE}=0V, T_J=150℃		1.55		
t_{rr}	Reverse Recovery Time	I_F=15A , V_R=400V dI_F/dt=-700A/μs T_J =150℃		92		ns
I_{RRM}	Max. Reverse Recovery Current			20		A
Q_{RR}	Reverse Recovery Charge			0.85		μC
E_{rec}	Reverse Recovery Energy			0.19		mJ
R_{thJCD}	Junction to Case Thermal Resistance （Per Diode）				2.5	K /W

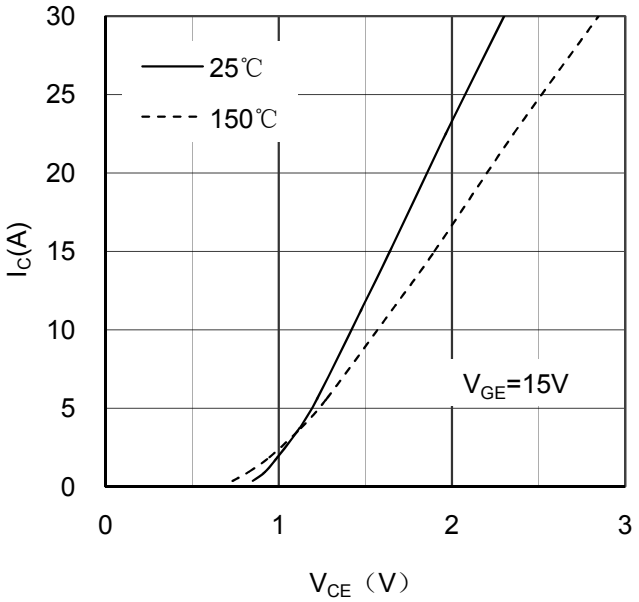


Figure 1. Typical Output Characteristics IGBT

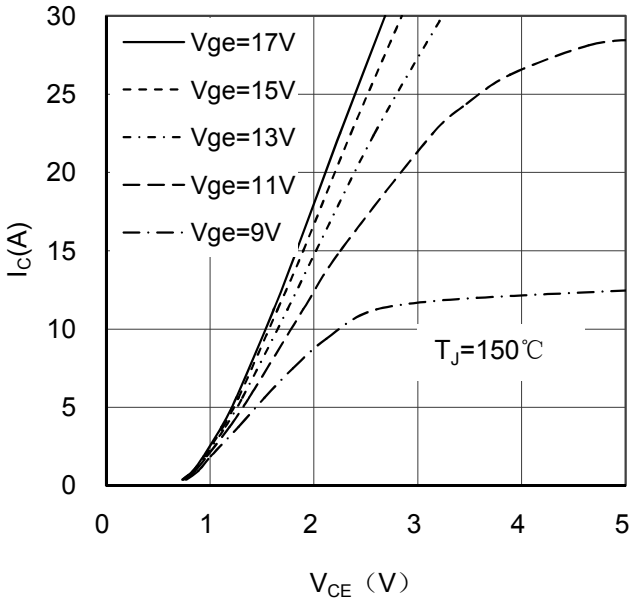


Figure 2. Typical Output Characteristics IGBT

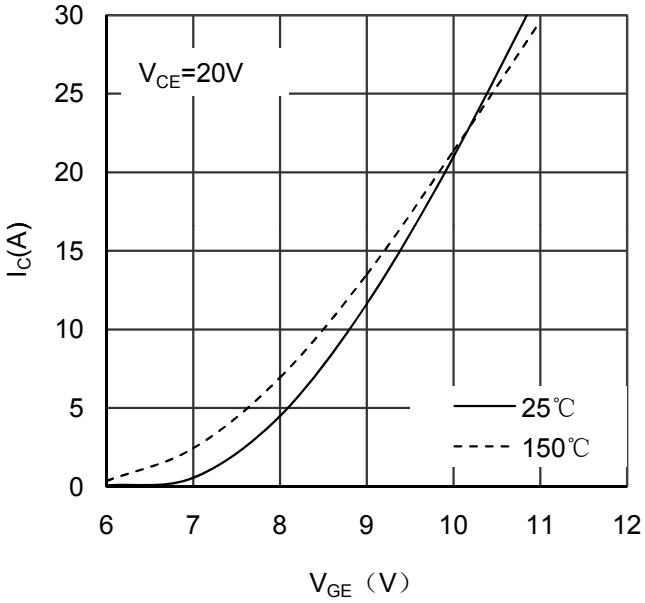


Figure 3. Typical Transfer characteristics IGBT

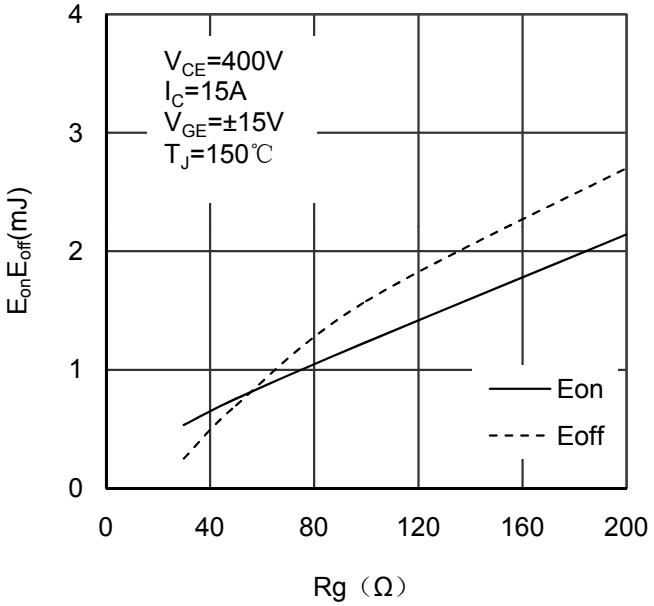


Figure 4. Switching Energy vs Gate Resistor IGBT

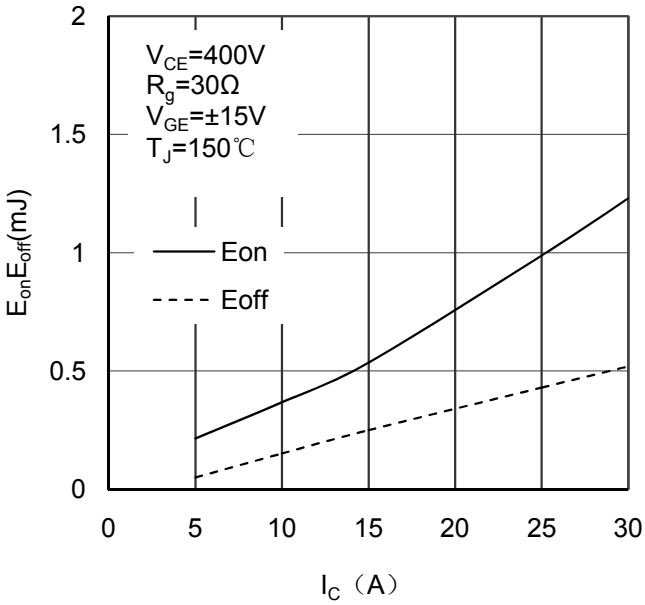


Figure 5. Switching Energy vs Collector Current IGBT

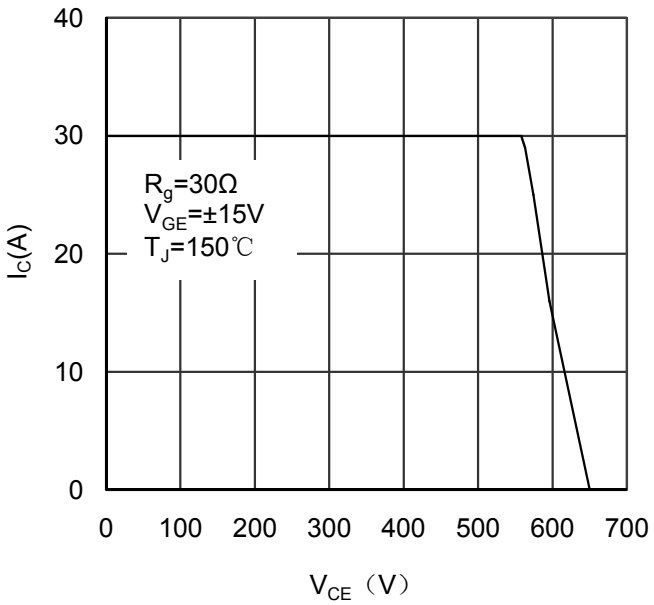


Figure 6. Reverse Biased Safe Operating Area IGBT

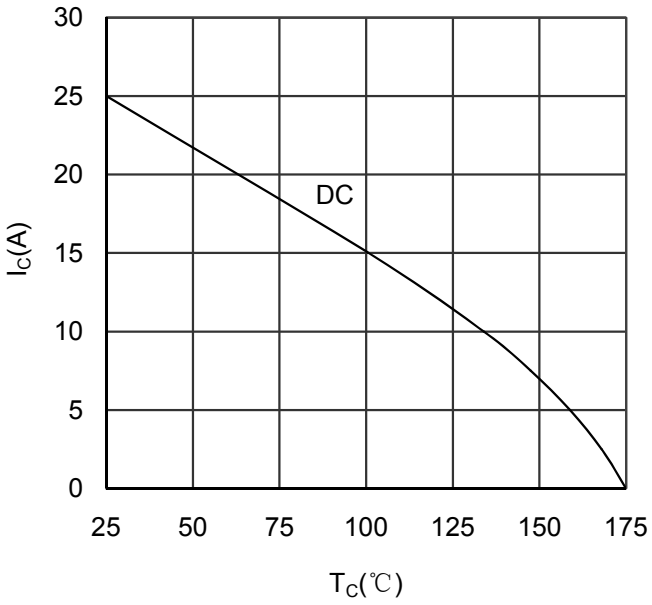


Figure 7. Collector Current vs Case temperature IGBT

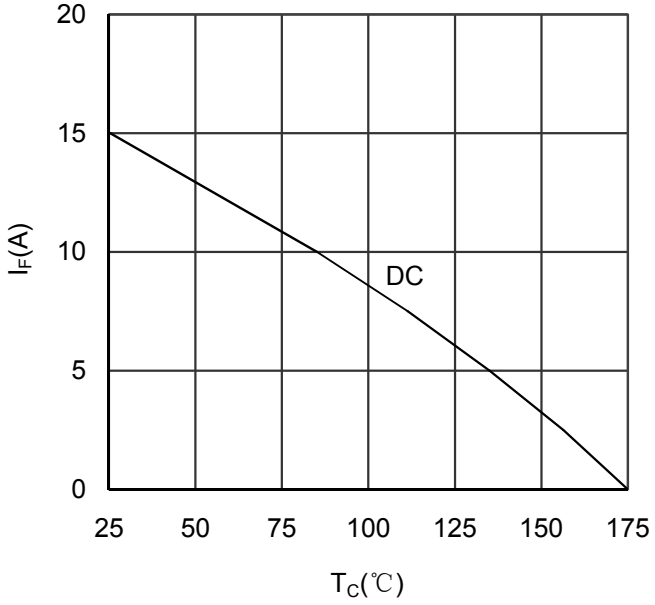


Figure 8. Forward current vs Case temperature Diode

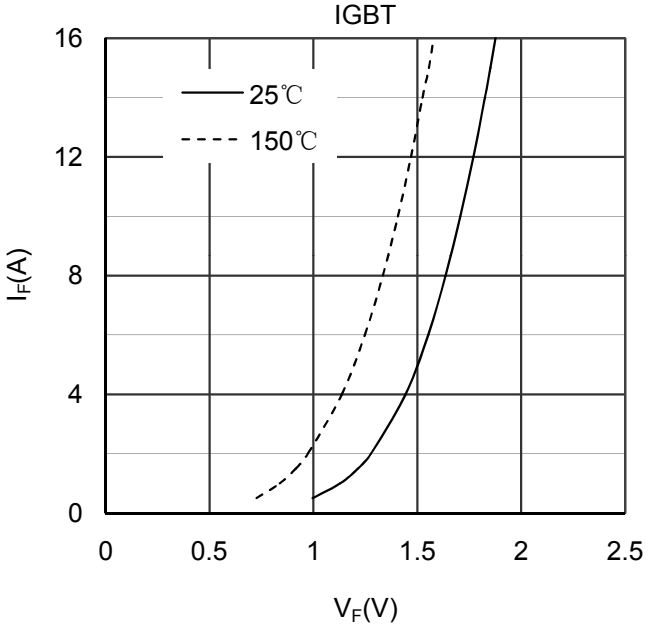


Figure 9. Diode Forward Characteristics Diode

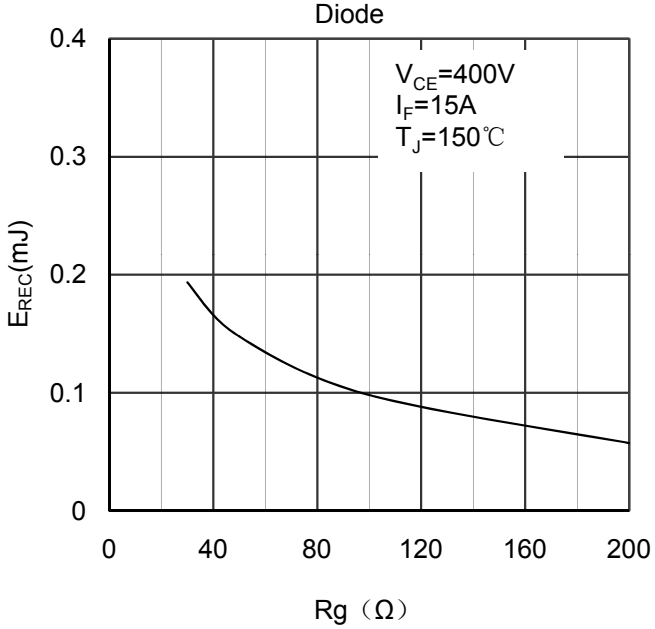


Figure 10. Switching Energy vs Gate Resistor Diode

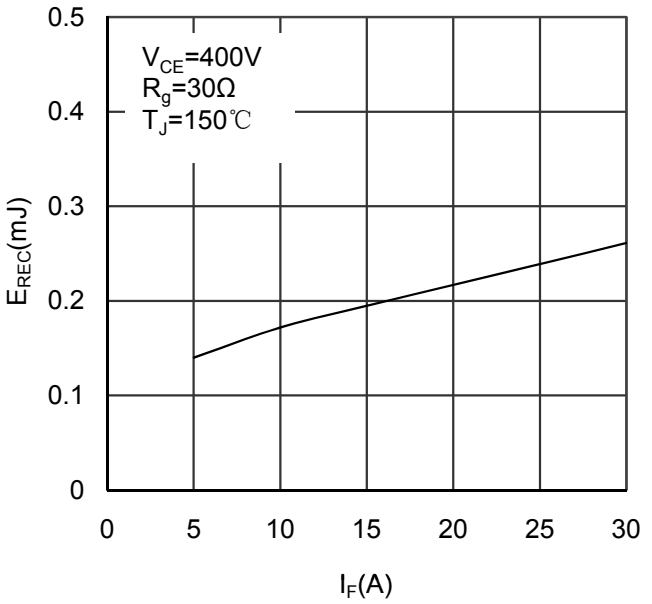


Figure 11. Switching Energy vs Forward Current Diode

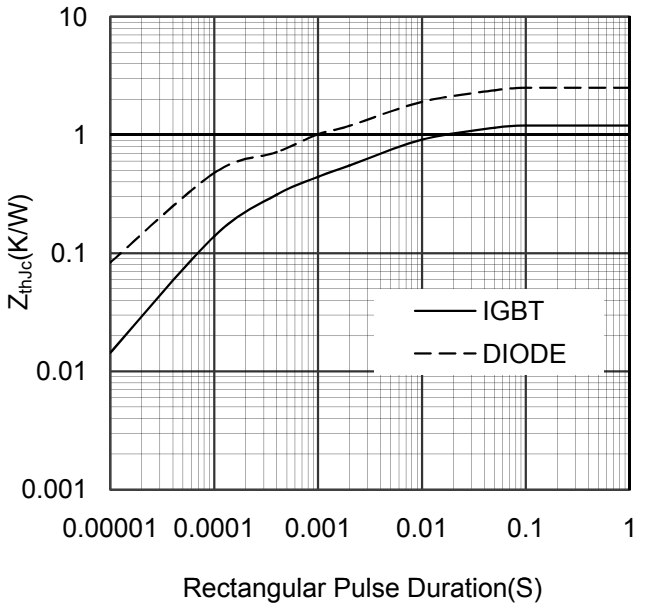
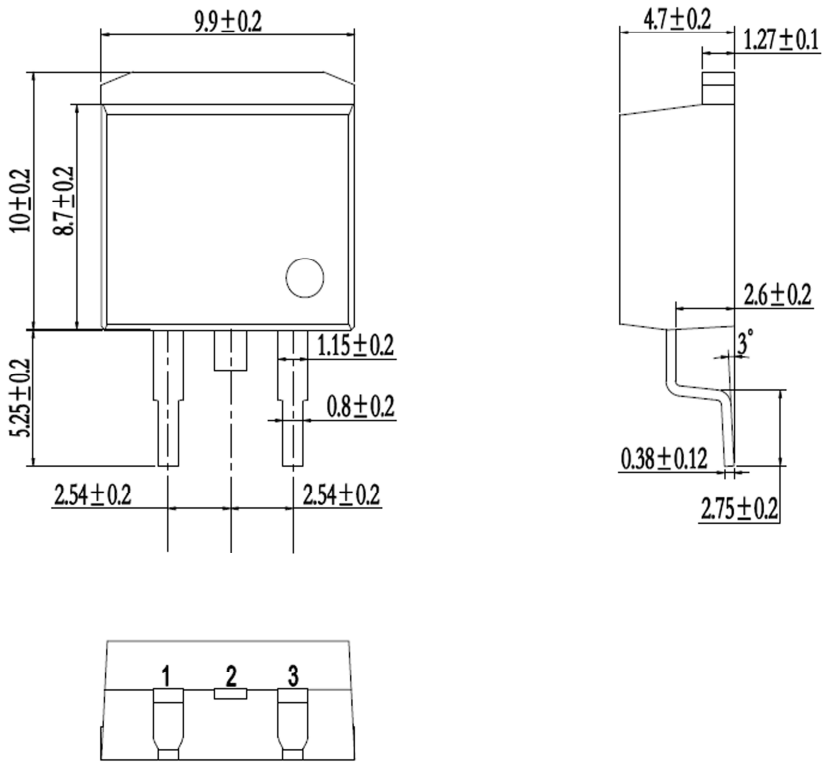


Figure 12. Transient Thermal Impedance of Diode and IGBT



Dimensions in (mm)

Figure 13. Package Outline