PRODUCT FEATURES

☐ IGBT^3 CHIP(Trench+Field Stop technology)

☐ High short circuit capability,self limiting short circuit current

☐ $V_{CE(sat)}$ with positive temperature coefficient

☐ Fast switching and short tail current

☐ Free wheeling diodes with fast and soft reverse recovery

☐ Low switching losses

APPLICATIONS

☐ High frequency switching application

☐ Medical applications

☐ Motion/servo control

☐ UPS systems

IGBT

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	T_J=25℃	1200	V
V_{GES}	Gate Emitter Voltage		±20	
I_C	DC Collector Current	T_C=25℃,T_{Jmax}=150℃	580	A
		T_C=80℃,T_{Jmax}=150℃	400	
I_{CM}	Repetitive Peak Collector Current	tp=1ms	800	
P_{tot}	Power Dissipation Per IGBT	T_C=25℃,T_{Jmax}=150℃	1925	W

Diode

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	T_J=25℃	1200	V
$I_{F(AV)}$	Average Forward Current		400	A
I_{FRM}	Repetitive Peak Forward Current	tp=1ms	800	
I^2t		T_J=125℃, t=10ms, V_R=0V	30000	A^2S

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Tel.：+86-519-85163708 Fax：+86-519-85162291 Post Code：213022 Website：www.macmicst.com

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=16mA		5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	I_C=400A, V_{GE}=15V, T_J=25℃			1.7	2.15	V
		I_C=400A, V_{GE}=15V, T_J=125℃			1.9		
I_{CES}	Collector Leakage Current	V_{CE}=1200V, V_{GE}=0V, T_J=25℃				1	mA
		V_{CE}=1200V, V_{GE}=0V, T_J=125℃				10	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±15V, T_J=25℃		-400		400	nA
R_{gint}	Integrated Gate Resistor				1.9		Ω
Q_g	Gate Charge	V_{CE}=600V, I_C=400A , V_{GE}=±15V			3.8		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			28		nF
C_{res}	Reverse Transfer Capacitance				1000		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=600V,I_C=400A R_G =1.8Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		160		ns
			T_J=125℃		170		ns
t_r	Rise Time		T_J=25℃		40		ns
			T_J=125℃		45		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=600V,I_C=400A R_G =1.8Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		450		ns
			T_J=125℃		520		ns
t_f	Fall Time		T_J=25℃		100		ns
			T_J=125℃		160		ns
E_{on}	Turn on Energy	V_{CC}=600V,I_C=400A R_G =1.8Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		20		mJ
			T_J=125℃		30		mJ
E_{off}	Turn off Energy		T_J=25℃		33		mJ
			T_J=125℃		50		mJ
I_{SC}	Short Circuit Current	tpsc≤10μS , V_{GE}=15V T_J=125℃,V_{CC}=900V			1550		A
R_{thJC}	Junction to Case Thermal Resistance （Per IGBT）					0.065	K /W

Diode

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=400A , V_{GE}=0V, T_J=25℃		1.65	2.15	V
		I_F=400A , V_{GE}=0V, T_J=125℃		1.65		
t_{rr}	Reverse Recovery Time	I_F=400A , V_R=600V dI_F/dt=-8000A/μs T_J =125℃		360		ns
I_{RRM}	Max. Reverse Recovery Current			450		A
Q_{RR}	Reverse Recovery Charge			75		μC
E_{rec}	Reverse Recovery Energy			35		mJ
R_{thJCD}	Junction to Case Thermal Resistance （Per Diode）				0.12	K /W

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

Symbol	Parameter/Test Conditions		Values	Unit
T_{Jmax}	Max. Junction Temperature		150	℃
T_{Jop}	Operating Temperature		-40~125	
T_{stg}	Storage Temperature		-40~125	
V_{isol}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	3000	V
CTI	Comparative Tracking Index		＞225	
Torque	to heatsink	Recommended（M6）	3~5	Nm
	to terminal	Recommended（M6）	2.5~5	Nm
Weight			300	g

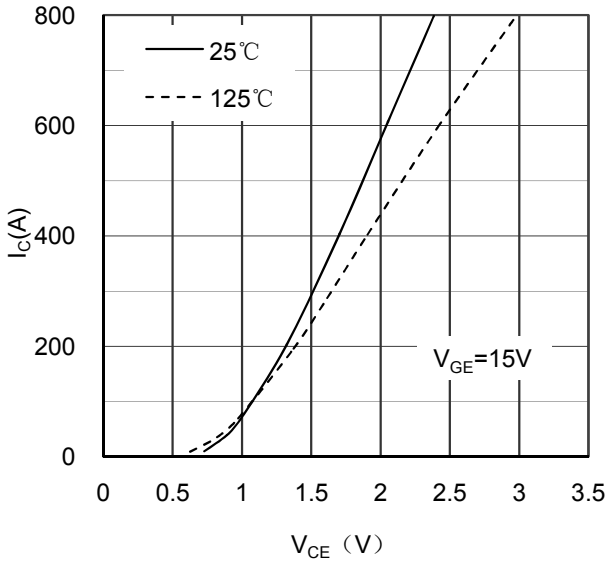


Figure 1. Typical Output Characteristics IGBT

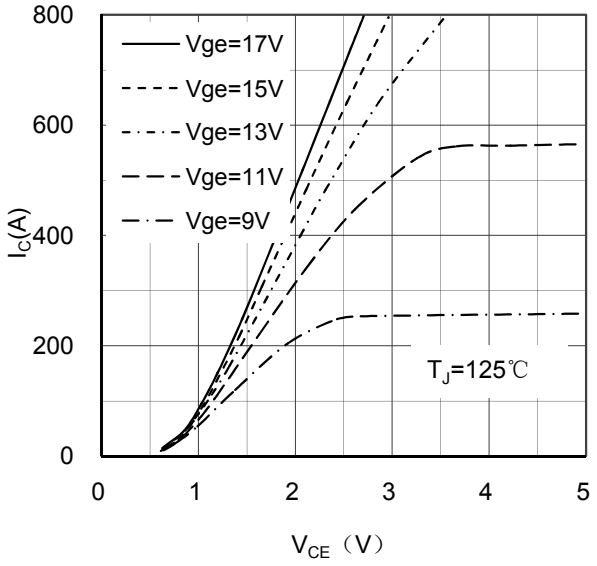


Figure 2. Typical Output Characteristics IGBT

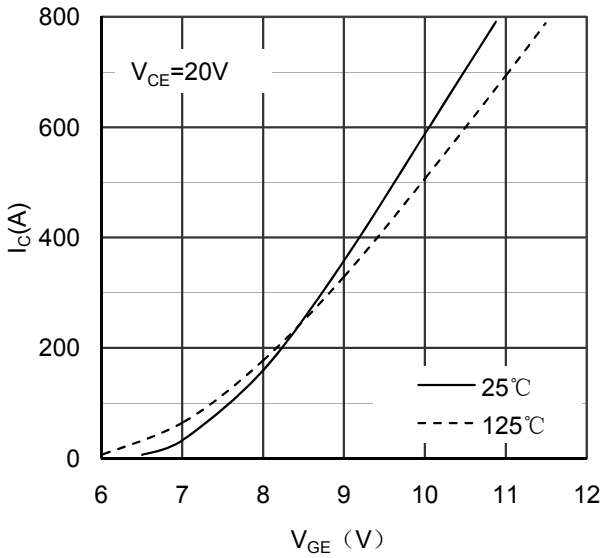


Figure 3. Typical Transfer characteristics IGBT

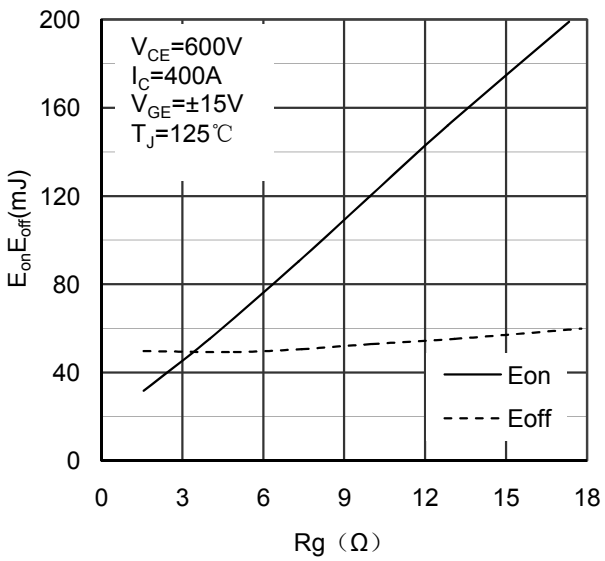


Figure 4. Switching Energy vs Gate Resistor IGBT

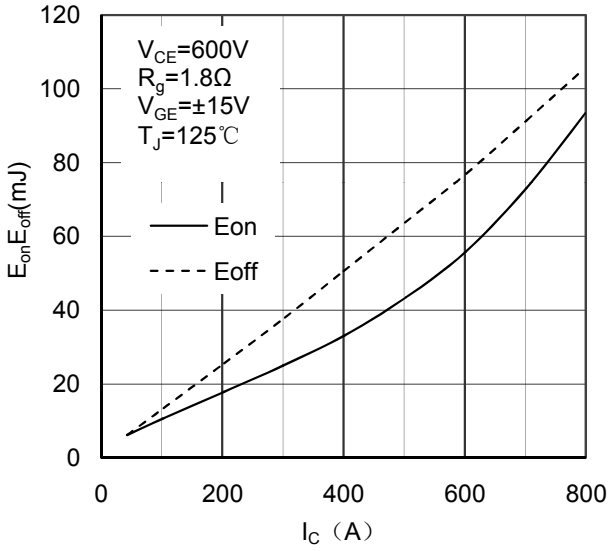


Figure 5. Switching Energy vs Collector Current IGBT

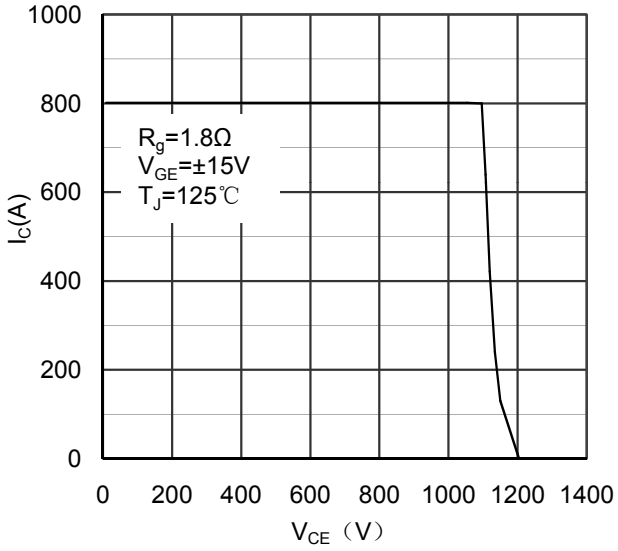


Figure 6. Reverse Biased Safe Operating Area IGBT

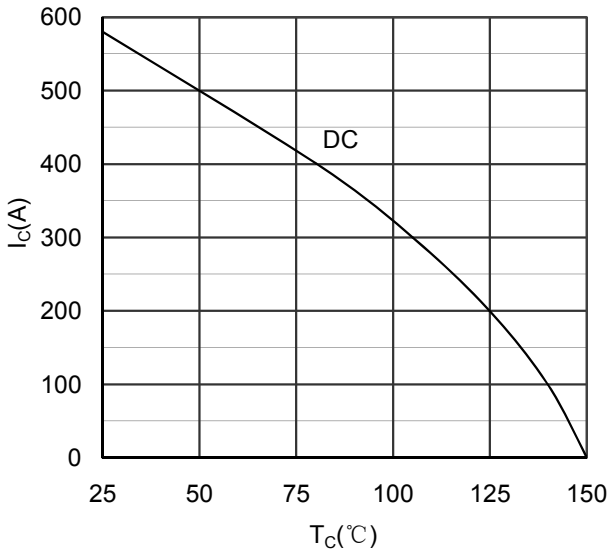


Figure 7. Collector Current vs Case temperature IGBT

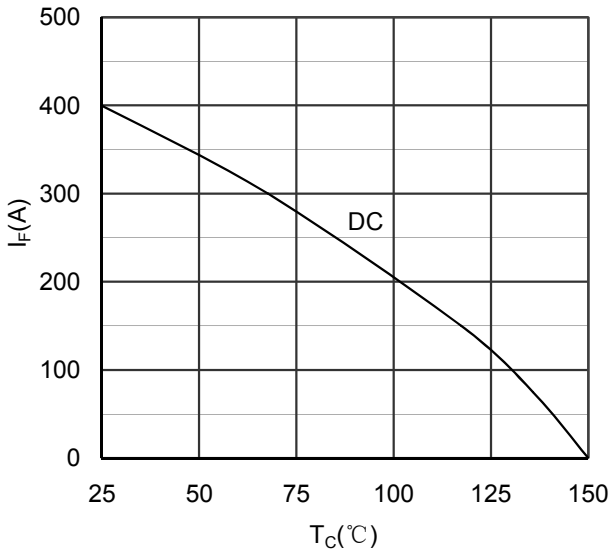


Figure 8. Forward current vs Case temperature Diode

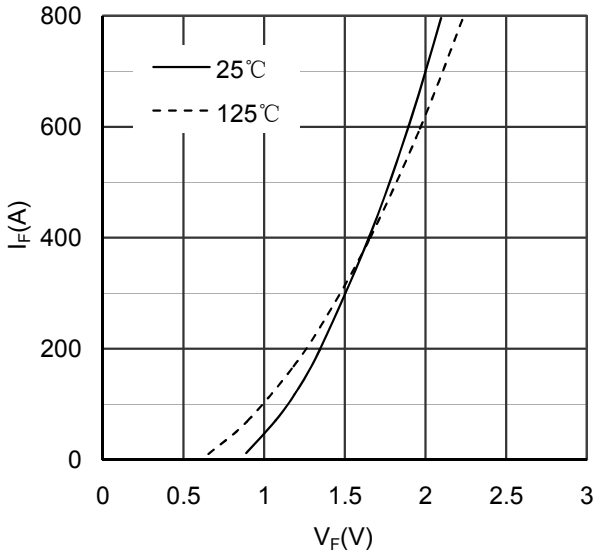


Figure 9. Diode Forward Characteristics Diode

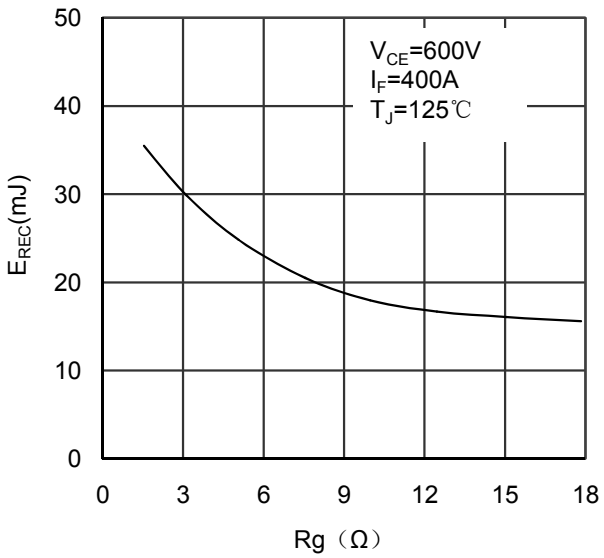


Figure 10. Switching Energy vs Gate Resistor Diode

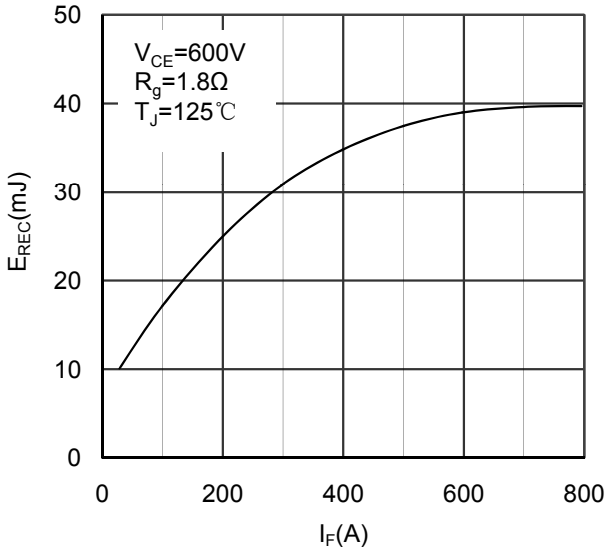


Figure 11. Switching Energy vs Forward Current Diode

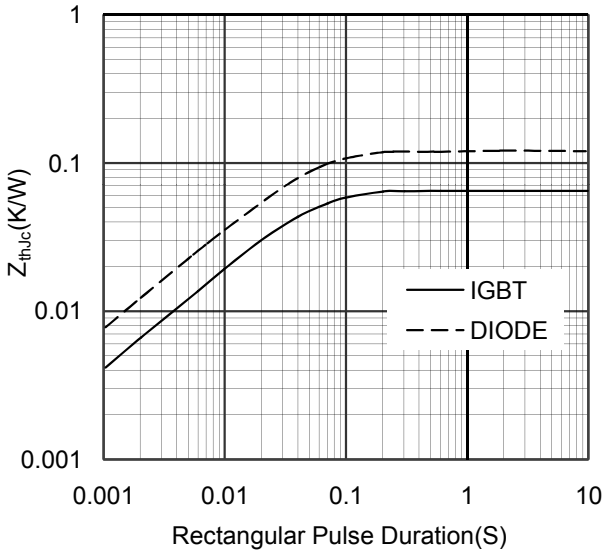


Figure 12. Transient Thermal Impedance of Diode and IGBT

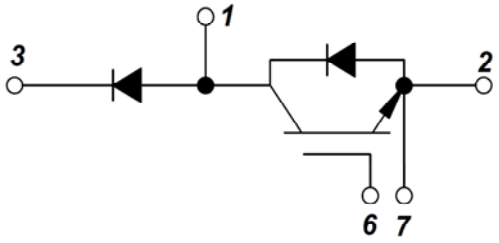
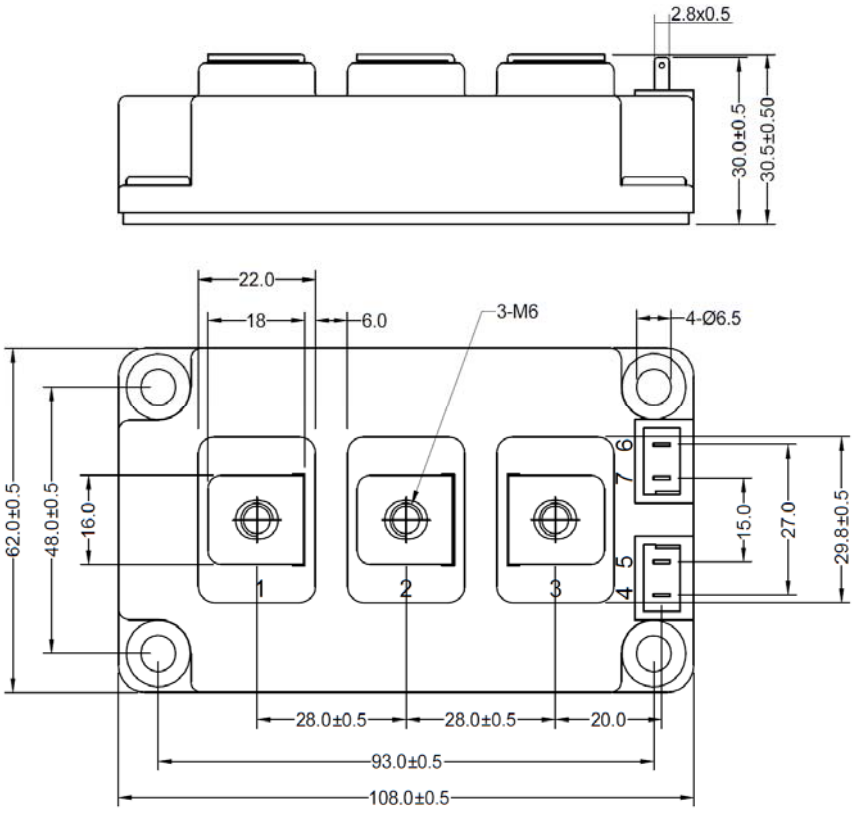


Figure 13. Circuit Diagram



Dimensions in (mm)

Figure 14. Package Outline

江苏宏微科技股份有限公司

MacMic Science & Technology Co.,Ltd.

MMG400D120UA6TN 规格书

文件类别： 产品规格书		文件编号： M-3W-MR-C-019		版本： 1
职责部门	模块事业部	撰写人	审核人	批准人
分发控制	文件控制中心	张若鸿	麻长胜	李小明
机密等级	C级	受控章	受控文件	
生效日期：	2017.3.7			

版本更改记录

更改日期	更改部门	新版本号	更改内容	更改者
2017.02.21	模块研发部	1	新版发行	张若鸿

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		T_C=80℃,T_{Jmax}=150℃	400	
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Diode

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

Symbol	Parameter/Test Conditions		Values	Unit
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		I_C=400A, V_{GE}=15V, T_J=125℃			1.9		
I_{CES}	Collector Leakage Current	V_{CE}=1200V, V_{GE}=0V, T_J=25℃				1	mA
		V_{CE}=1200V, V_{GE}=0V, T_J=125℃				10	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±15V, T_J=25℃		-400		400	nA
R_{gint}	Integrated Gate Resistor				1.9		Ω
Q_g	Gate Charge	V_{CE}=600V, I_C=400A , V_{GE}=±15V			3.8		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			28		nF
C_{res}	Reverse Transfer Capacitance				1000		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=600V,I_C=400A R_G =1.8Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		160		ns
			T_J=125℃		170		ns
t_r	Rise Time		T_J=25℃		40		ns
			T_J=125℃		45		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=600V,I_C=400A R_G =1.8Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		450		ns
			T_J=125℃		520		ns
t_f	Fall Time		T_J=25℃		100		ns
			T_J=125℃		160		ns
E_{on}	Turn on Energy	V_{CC}=600V,I_C=400A R_G =1.8Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		20		mJ
			T_J=125℃		30		mJ
E_{off}	Turn off Energy		T_J=25℃		33		mJ
			T_J=125℃		50		mJ
I_{SC}	Short Circuit Current	tpsc≤10μS , V_{GE}=15V T_J=125℃,V_{CC}=900V			1550		A
R_{thJC}	Junction to Case Thermal Resistance （Per IGBT）					0.065	K /W

Diode

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=400A , V_{GE}=0V, T_J=25℃		1.65	2.15	V
		I_F=400A , V_{GE}=0V, T_J=125℃		1.65		
t_{rr}	Reverse Recovery Time	I_F=400A , V_R=600V dI_F/dt=-8000A/μs T_J =125℃		360		ns
I_{RRM}	Max. Reverse Recovery Current			450		A
Q_{RR}	Reverse Recovery Charge			75		μC
E_{rec}	Reverse Recovery Energy			35		mJ
R_{thJCD}	Junction to Case Thermal Resistance （Per Diode）				0.12	K /W

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

Symbol	Parameter/Test Conditions		Values	Unit
T_{Jmax}	Max. Junction Temperature		150	℃
T_{Jop}	Operating Temperature		-40~125	
T_{stg}	Storage Temperature		-40~125	
V_{isol}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	3000	V
CTI	Comparative Tracking Index		＞225	
Torque	to heatsink	Recommended（M6）	3~5	Nm
	to terminal	Recommended（M6）	2.5~5	Nm
Weight			300	g

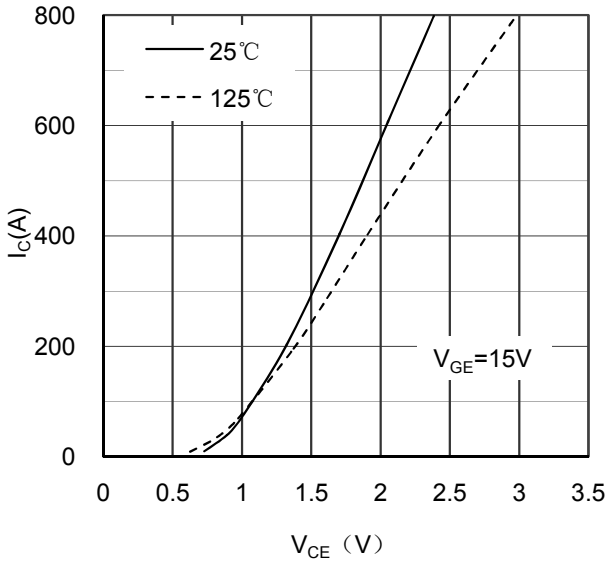


Figure 1. Typical Output Characteristics IGBT

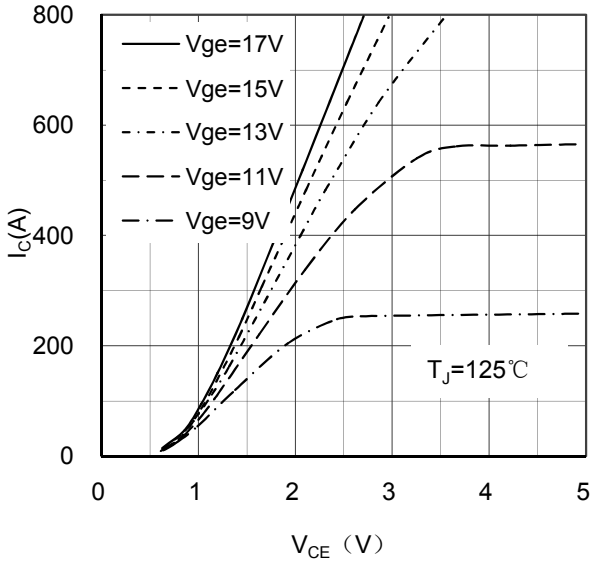


Figure 2. Typical Output Characteristics IGBT

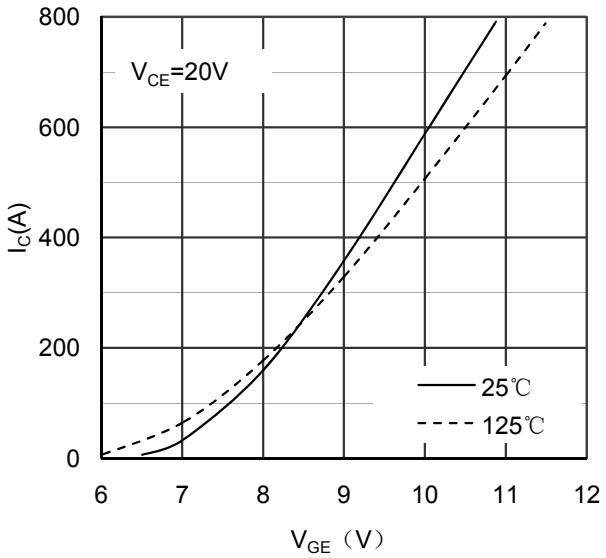


Figure 3. Typical Transfer characteristics IGBT

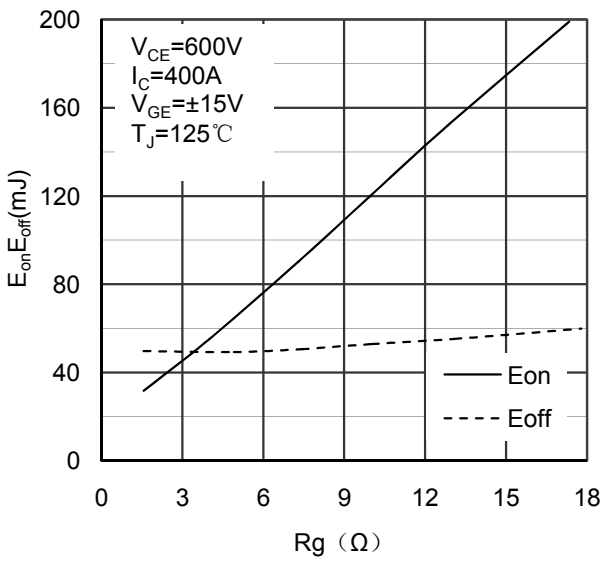


Figure 4. Switching Energy vs Gate Resistor IGBT

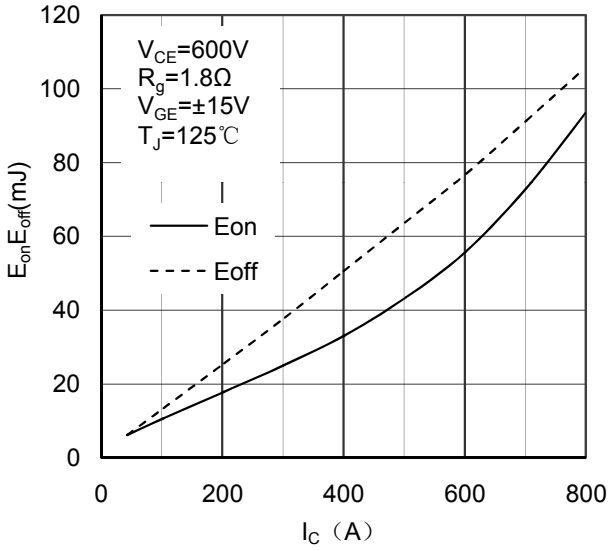


Figure 5. Switching Energy vs Collector Current IGBT

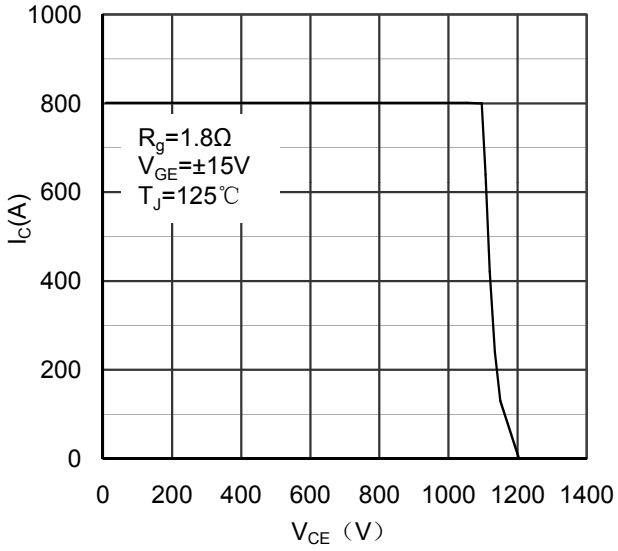


Figure 6. Reverse Biased Safe Operating Area IGBT

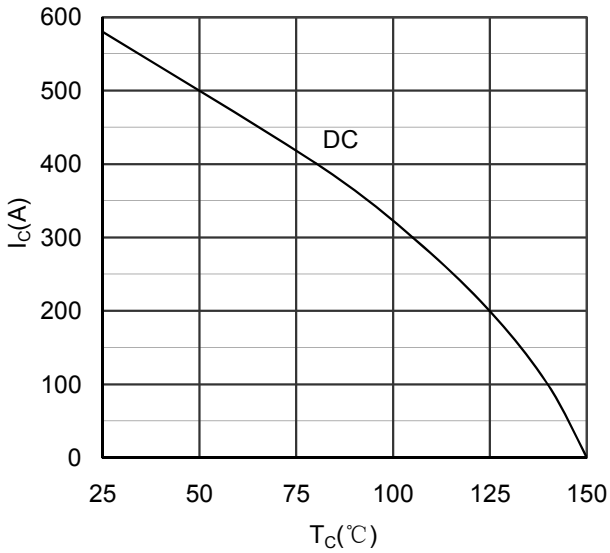


Figure 7. Collector Current vs Case temperature IGBT

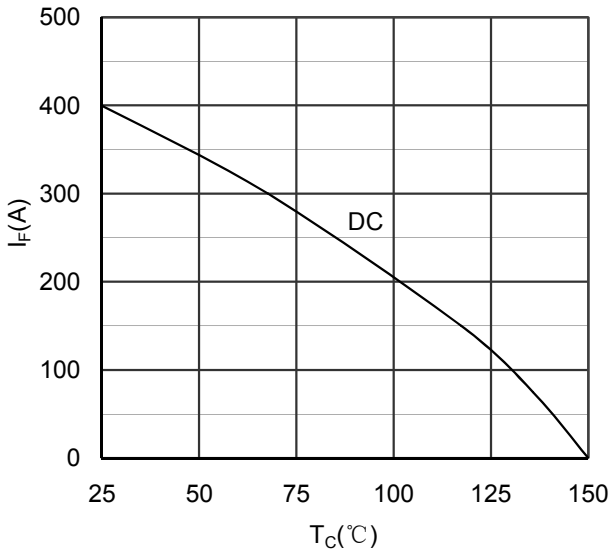


Figure 8. Forward current vs Case temperature Diode

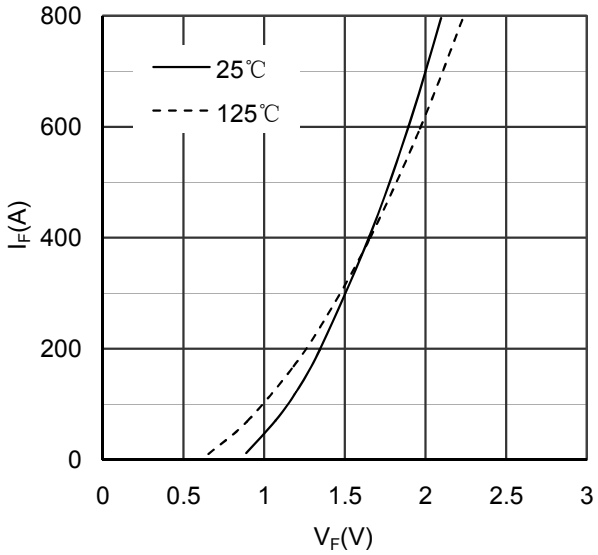


Figure 9. Diode Forward Characteristics Diode

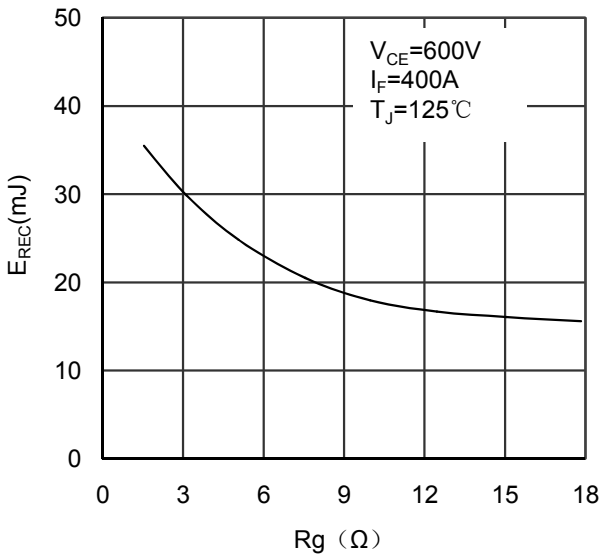


Figure 10. Switching Energy vs Gate Resistor Diode

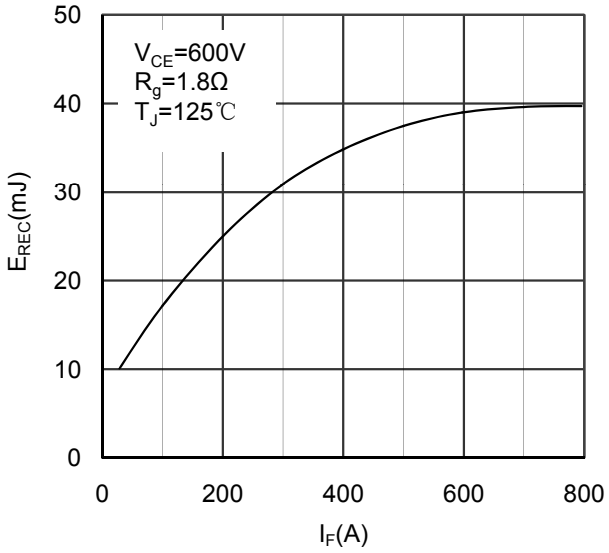
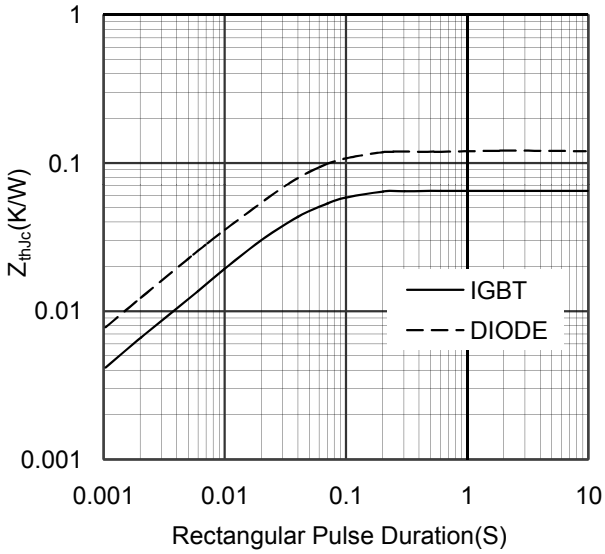


Figure 11. Switching Energy vs Forward Current Diode



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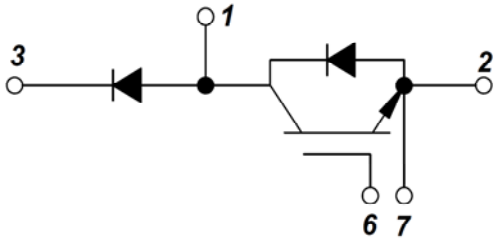

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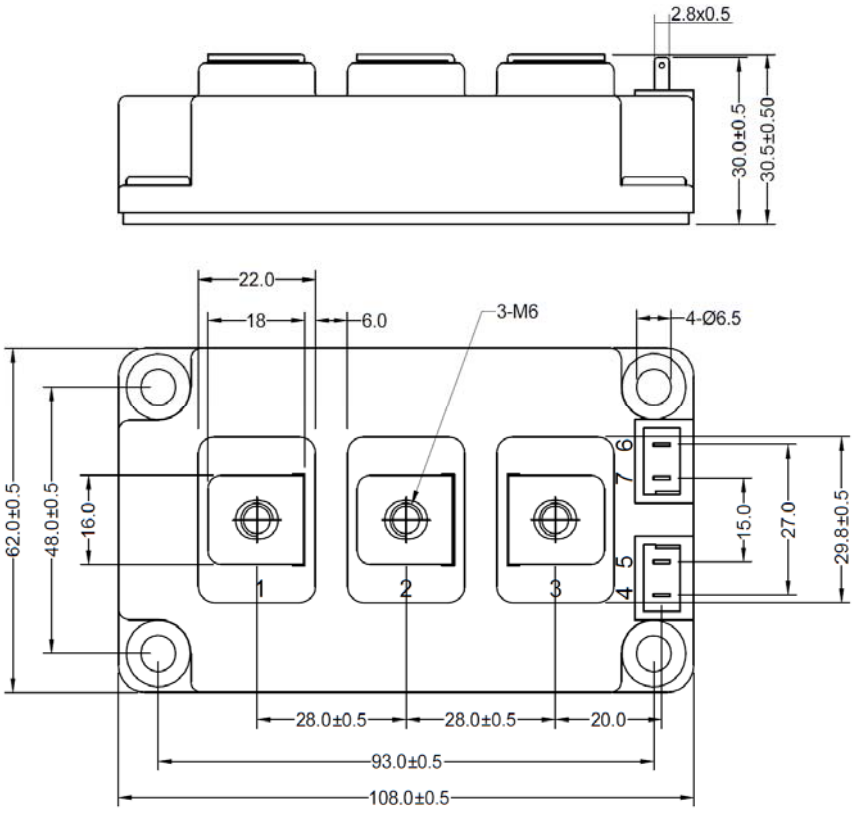

Dimensions in (mm)

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