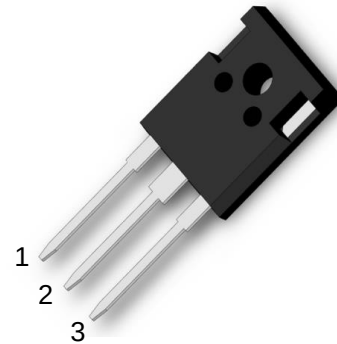


PRODUCT FEATURES

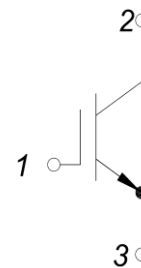
- ☐ 650V IGBT chip in trench FS-technology
- ☐ Low switching losses
- ☐ $V_{CE(sat)}$ with positive temperature coefficient
- ☐ Fast switching and short tail current
- ☐ Free wheeling diodes with fast and soft reverse recovery



APPLICATIONS

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

1.Gate
2.Collector
3.Emitter



Type	V_{CES}	I_C	$V_{CE(sat)}$ $T_J=25^\circ C$	T_{Jmax}	Marking	Package
MM60G3U65B	650V	60A	1.55V	175°C	MM60G3U65B	TO-247

ABSOLUTE MAXIMUM RATINGS($T_C=25^\circ C$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	$T_J=25^\circ C$	650	V
V_{GES}	Gate Emitter Voltage		± 20	
	Transient Gate Emitter Voltage ($t_p \leq 10\mu s, D < 0.01$)		± 30	
I_C	DC Collector Current	$T_C=25^\circ C$	85	A
		$T_C=90^\circ C$	60	
I_{Cpuls}	Pulsed collector current, t_p limited by T_{Jmax}		240	
P_{tot}	Power Dissipation Per IGBT		300	W
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^\circ C$	650	V
$I_{F(AV)}$	Average Forward Current	$T_C=25^\circ C$	60	A
I_{Fpuls}	Diode pulsed current, t_p limited by T_{Jmax}		240	
T_{Jmax}	Max. Junction Temperature		175	°C
T_{Jop}	Operating Temperature		-40~175	
T_{stg}	Storage Temperature		-55~150	
Torque	to heatsink	Recommended (M3)	1.1	Nm
Weight			8	g

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MM60G3U65B

IGBT

ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions			Min.	Typ.	Max.	Unit
V _{GE(th)}	Gate Emitter Threshold Voltage	V _{CE} =V _{GE} , I _C =3.0mA		4.4	5.2	5.9	V
V _{CE(sat)}	Collector Emitter Saturation Voltage	I _C =60A, V _{GE} =15V, T _J =25℃			1.55	2.05	
		I _C =60A, V _{GE} =15V, T _J =125℃			1.8		
		I _C =60A, 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} =±20V, T _J =25℃		-200		200	nA
Q _G	Gate Charge	V _{CE} =400V, I _C =60A , V _{GE} =15V			260		nC
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =1MHz			4.9		nF
C _{res}	Reverse Transfer Capacitance				145		pF
t _{d(on)}	Turn on Delay Time	V _{CC} =400V,I _C =60A R _G =7.5Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		25		ns
			T _J =125℃		30		ns
			T _J =150℃		30		ns
t _r	Rise Time		T _J =25℃		28		ns
			T _J =125℃		28		ns
			T _J =150℃		30		ns
t _{d(off)}	Turn off Delay Time	T _J =25℃		150		ns	
		T _J =125℃		180		ns	
		T _J =150℃		190		ns	
t _f	Fall Time	T _J =25℃		50		ns	
		T _J =125℃		75		ns	
		T _J =150℃		80		ns	
E _{on}	Turn on Energy	V _{CC} =400V,I _C =60A R _G =7.5Ω, V _{GE} =±15V, Inductive Load	T _J =125℃		1.26		mJ
			T _J =150℃		1.45		mJ
E _{off}	Turn off Energy	T _J =125℃		1.1		mJ	
		T _J =150℃		1.14		mJ	
R _{thJC}	Junction to Case Thermal Resistance （ Per IGBT ）					0.5	K /W

Anti-Parallel Diode

ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V _F	Forward Voltage	I _F =60A , V _{GE} =0V, T _J =25℃		1.9	2.4	V
		I _F =60A , V _{GE} =0V, T _J =125℃		1.7		
		I _F =60A , V _{GE} =0V, T _J =150℃		1.65		
t _{rr}	Reverse Recovery Time	I _F =60A , V _R =400V dI _F /dt=-2000A/μs T _J =150℃		130		ns
I _{RRM}	Max. Reverse Recovery Current			51		A
Q _{RR}	Reverse Recovery Charge			3.5		μC
E _{rec}	Reverse Recovery Energy			1.1		mJ
R _{thJCD}	Junction to Case Thermal Resistance （ Per Diode ）				0.76	K /W

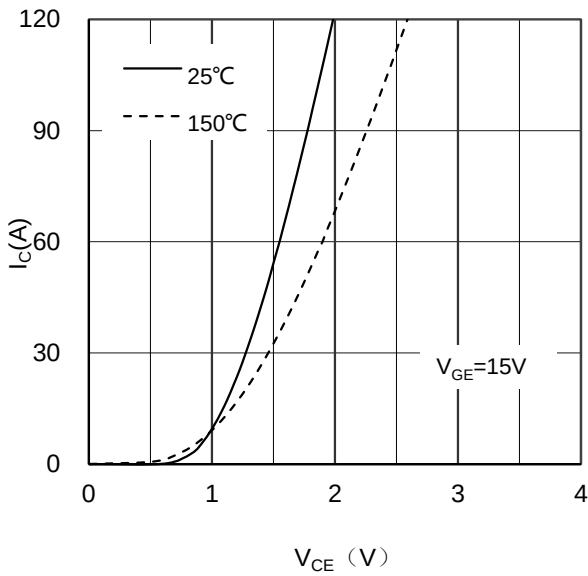


Figure 1. Typical Output Characteristics IGBT

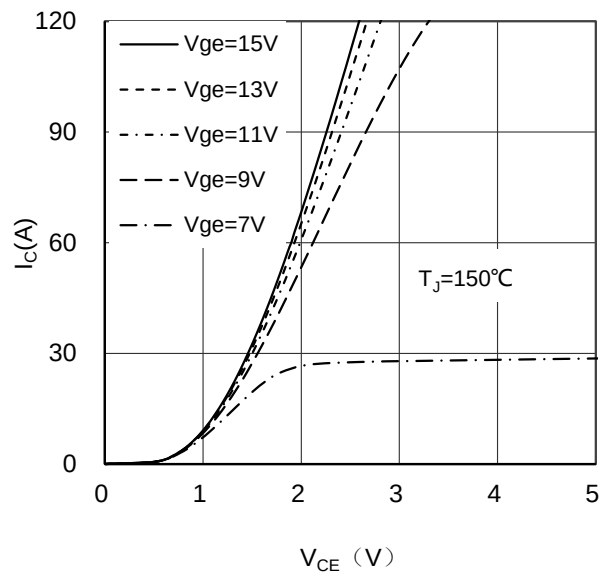


Figure 2. Typical Output Characteristics IGBT

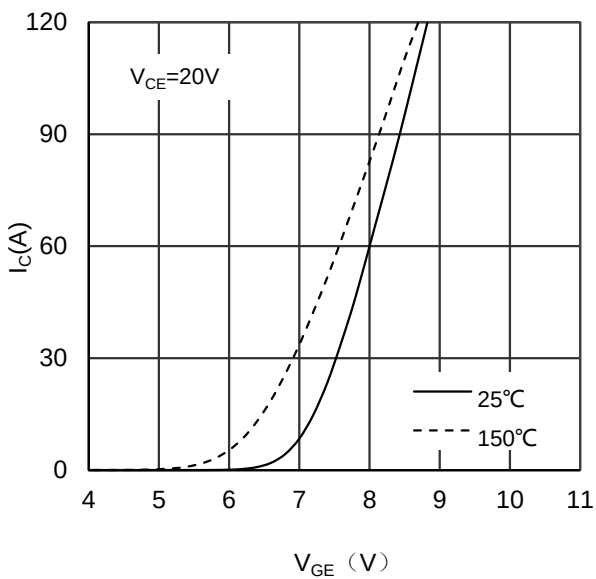


Figure 3. Typical Transfer characteristics IGBT

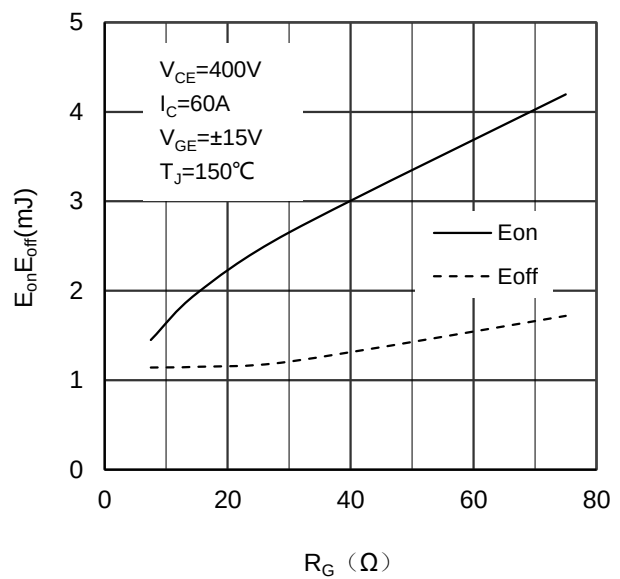


Figure 4. Switching Energy vs Gate Resistor IGBT

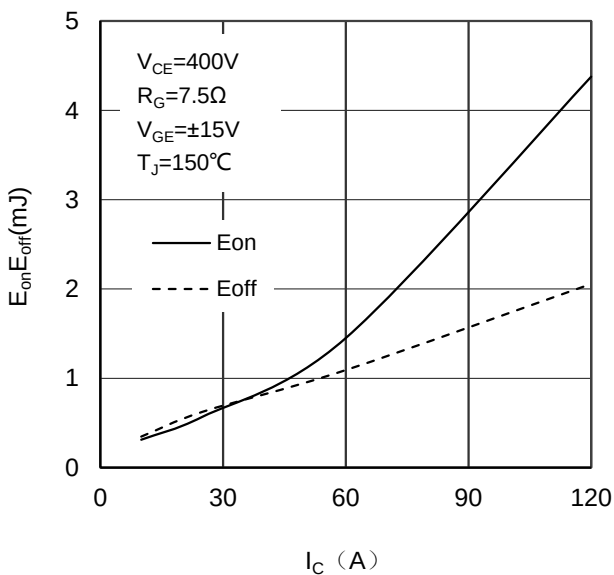


Figure 5. Switching Energy vs Collector Current IGBT

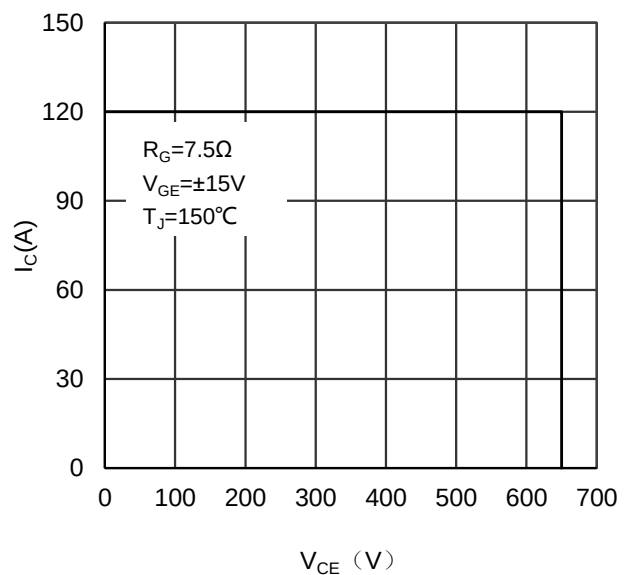


Figure 6. Reverse Biased Safe Operating Area IGBT

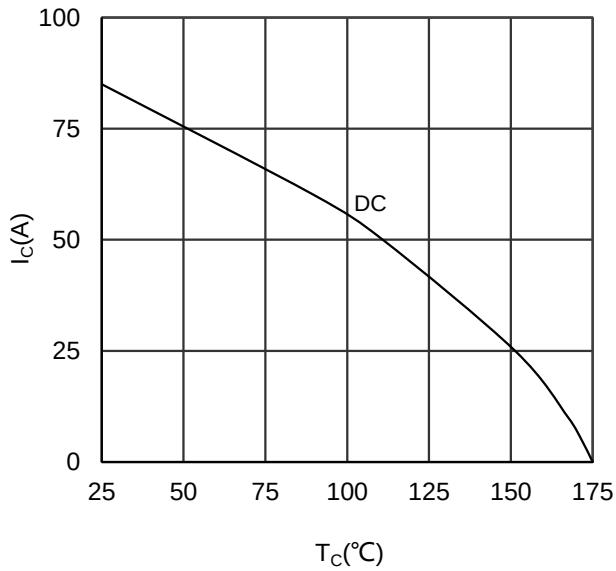


Figure 7. Collector Current vs Case temperature IGBT

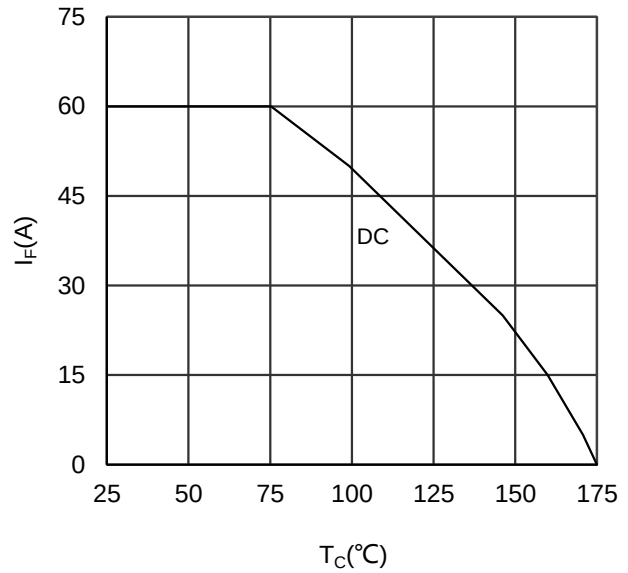


Figure 8. Forward current vs Case temperature Diode

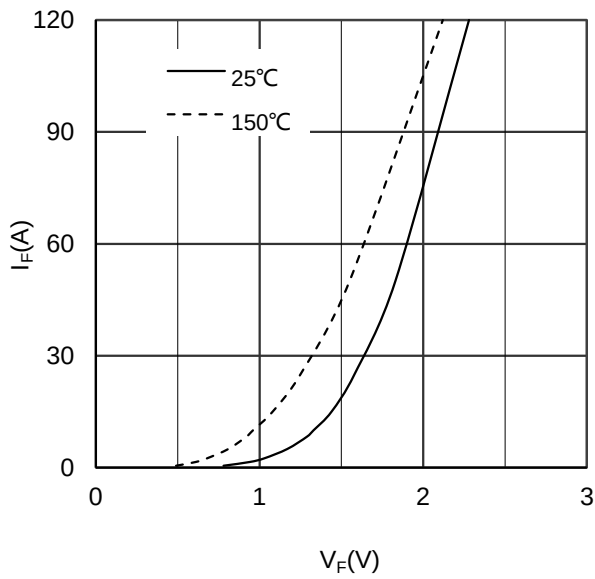


Figure 9. Diode Forward Characteristics Diode

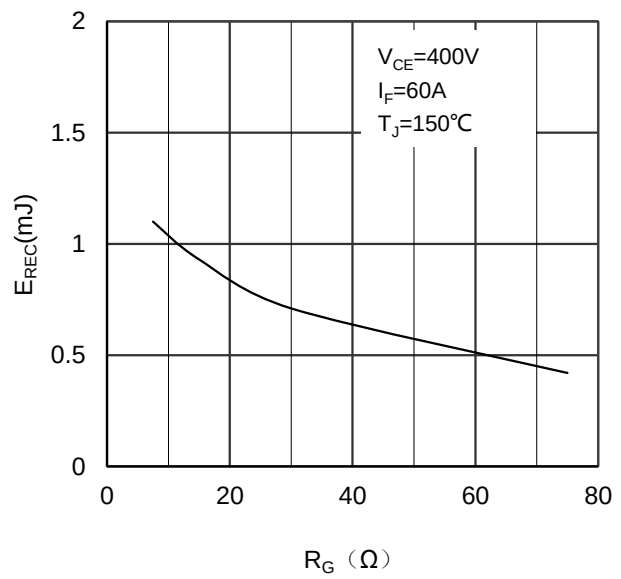


Figure 10. Switching Energy vs Gate Resistor Diode

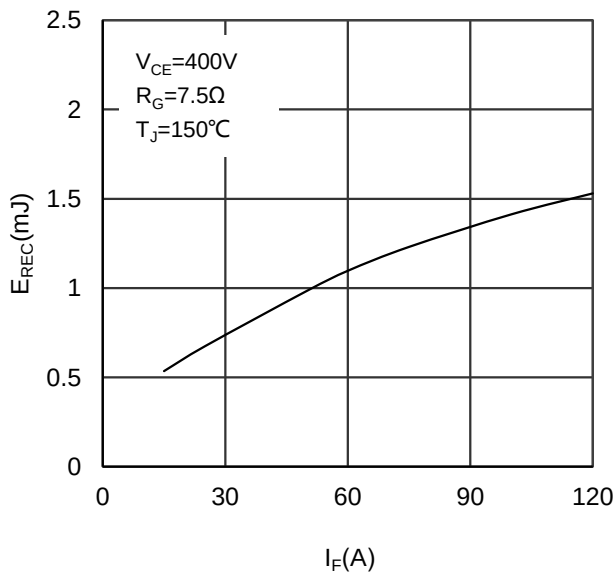
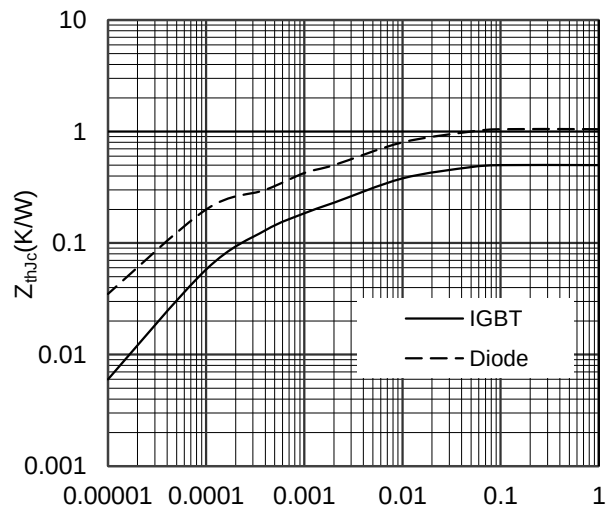
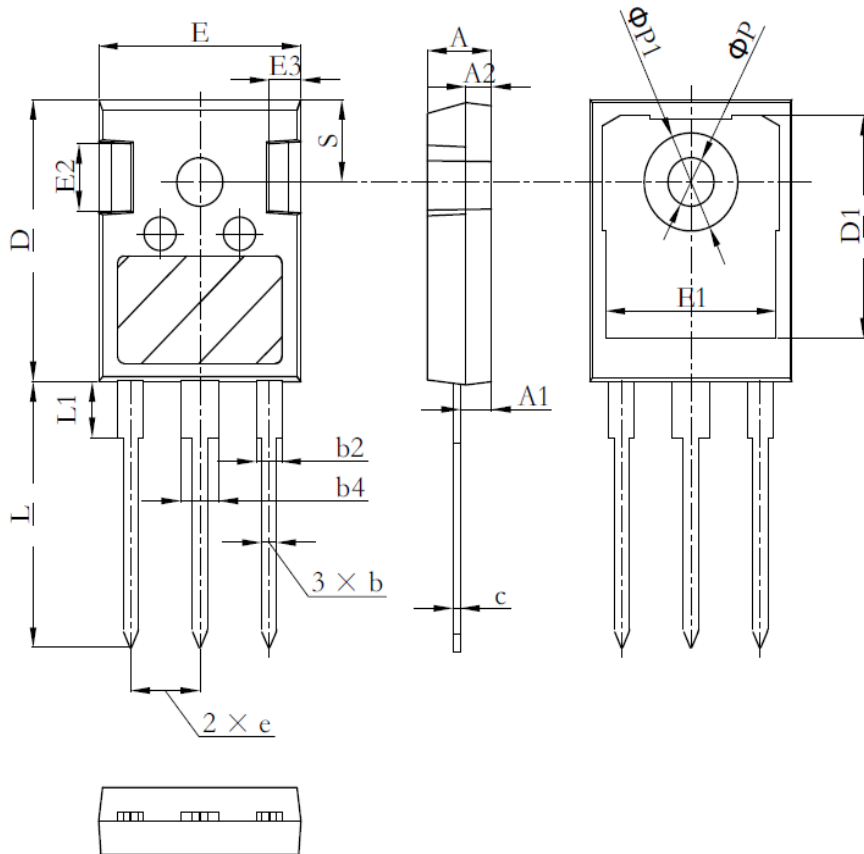


Figure 11. Switching Energy vs Forward Current Diode



(S)Rectangular Pulse Duration
Figure 12. Transient Thermal Impedance of Diode and IGBT



Symbol	Min	Nom	Max
A	4.80	5.00	5.21
A1	2.21	2.41	2.61
A2	1.85	2.00	2.16
b	1.07	1.23	1.36
b2	1.90	2.05	2.41
b4	2.87	3.05	3.38
c	0.50	0.60	0.75
e	5.44BSC		
E	15.50	15.80	16.13
E1	12.38	13.30	13.60
E2	3.68	-	5.20
E3	1.00	-	2.70
D	20.70	21.00	21.30
D1	16.25	-	17.65
L	19.60	19.91	20.32
L1	-	-	4.40
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		

技术要求:

1. 单位: mm
2. 成品需符合RoHS2.0要求.

Dimensions in (mm)
Figure 13. Package Outline