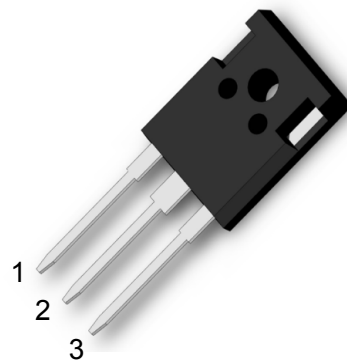


## PRODUCT FEATURES

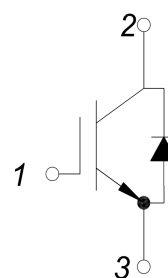
- ☐ 650V IGBT chip in trench FS-technology
- ☐ Low switching losses
- ☐  $V_{CE(sat)}$  with positive temperature coefficient
- ☐ Fast switching and short tail current
- ☐ Free wheeling diodes with fast and soft reverse recovery



## APPLICATIONS

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

1.Gate  
2.Collector  
3.Emitter



Type	$V_{CES}$	$I_C$	$V_{CE(sat)}$ $T_J=25^\circ C$	$T_{Jmax}$	Marking	Package
MM75G5U65BX	650V	75A	1.7V	175°C	MM75G5U65BX	TO-247

MacMic Science & Technology Co., Ltd.

Add: #18, Hua Shan Zhong Lu, New District, Changzhou City, Jiangsu Province, P. R. of China

# MM75G5U65BX

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

Symbol	Parameter/Test Conditions		Values	Unit
$V_{CES}$	Collector Emitter Voltage	$T_J=25^{\circ}\text{C}$	650	V
$V_{GES}$	Gate Emitter Voltage		$\pm 20$	
	Transient Gate Emitter Voltage ( $t_p \leq 10\mu\text{s}, D < 0.01$ )		$\pm 30$	
$I_C$	DC Collector Current	$T_C=25^{\circ}\text{C}$	100	A
		$T_C=100^{\circ}\text{C}$	75	
$I_{Cpuls}$	Pulsed collector current, tp limited by $T_{Jmax}$		300	
$P_{tot}$	Power Dissipation Per IGBT		385	W
$V_{RRM}$	Repetitive Reverse Voltage	$T_J=25^{\circ}\text{C}$	650	V
$I_F$	Forward Current	$T_C=25^{\circ}\text{C}$	100	A
		$T_C=100^{\circ}\text{C}$	75	
$I_{Fpuls}$	Diode pulsed current, tp limited by $T_{Jmax}$		300	
$T_{Jmax}$	Max. Junction Temperature		175	$^{\circ}\text{C}$
$T_{Jop}$	Operating Temperature		-40~175	
$T_{stg}$	Storage Temperature		-55~150	
$T_{SLD}$	Wave Soldering 1.6mm (0.063in.) from case for 10s		260	
Torque	to heatsink	Recommended (M3)	1.1	Nm
Weight			8	g

## THERMAL RESISTANCE( $T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions	Min.	Typ.	Max.	Unit
$R_{thJC}$	Junction to Case Thermal Resistance ( IGBT )			0.39	K /W
$R_{thJCD}$	Junction to Case Thermal Resistance ( Diode )			0.36	
$R_{thJA}$	Junction to Ambient Thermal Resistance			40	

# MM75G5U65BX

## IGBT

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

Symbol	Parameter/Test Conditions			Min.	Typ.	Max.	Unit
V <sub>GE(th)</sub>	Gate Emitter Threshold Voltage	V <sub>CE</sub> =V <sub>GE</sub> , I <sub>C</sub> =3.0mA		3.6	4.1	4.7	V
V <sub>CE(sat)</sub>	Collector Emitter Saturation Voltage	I <sub>C</sub> =75A, V <sub>GE</sub> =15V, T <sub>J</sub> =25℃			1.65	2.1	
		I <sub>C</sub> =75A, V <sub>GE</sub> =15V, T <sub>J</sub> =125℃			1.95		
		I <sub>C</sub> =75A, V <sub>GE</sub> =15V, T <sub>J</sub> =150℃			2.05		
I <sub>CES</sub>	Collector Leakage Current	V <sub>CE</sub> =650V, V <sub>GE</sub> =0V, T <sub>J</sub> =25℃				100	μA
		V <sub>CE</sub> =650V, V <sub>GE</sub> =0V, T <sub>J</sub> =150℃				5	mA
I <sub>GES</sub>	Gate Leakage Current	V <sub>CE</sub> =0V,V <sub>GE</sub> =±20V, T <sub>J</sub> =25℃		-200		200	nA
g <sub>fs</sub>	Transconductance	V <sub>CE</sub> =20V, I <sub>C</sub> =75A, T <sub>J</sub> =25℃			70		S
Q <sub>G</sub>	Gate Charge	V <sub>CE</sub> =400V, I <sub>C</sub> =75A , V <sub>GE</sub> =15V			0.17		μC
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f =1MHz			5400		pF
C <sub>oes</sub>	Output Capacitance				330		
C <sub>res</sub>	Reverse Transfer Capacitance				40		
t <sub>d(on)</sub>	Turn on Delay Time	V <sub>CC</sub> =400V,I <sub>C</sub> =75A R <sub>G</sub> =7.5Ω, V <sub>GE</sub> =15V, Inductive Load	T <sub>J</sub> =25℃		30		ns
			T <sub>J</sub> =125℃		26		ns
			T <sub>J</sub> =150℃		26		ns
t <sub>r</sub>	Rise Time		T <sub>J</sub> =25℃		20		ns
			T <sub>J</sub> =125℃		24		ns
			T <sub>J</sub> =150℃		26		ns
t <sub>d(off)</sub>	Turn off Delay Time		T <sub>J</sub> =25℃		135		ns
			T <sub>J</sub> =125℃		150		ns
			T <sub>J</sub> =150℃		150		ns
t <sub>f</sub>	Fall Time		T <sub>J</sub> =25℃		38		ns
			T <sub>J</sub> =125℃		56		ns
			T <sub>J</sub> =150℃		56		ns
E <sub>on</sub>	Turn on Energy	T <sub>J</sub> =125℃		2.5		mJ	
		T <sub>J</sub> =150℃		2.7		mJ	
E <sub>off</sub>	Turn off Energy	T <sub>J</sub> =125℃		1.15		mJ	
		T <sub>J</sub> =150℃		1.2		mJ	

## 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	$I_F=75\text{A}, V_{GE}=0\text{V}, T_J=25^{\circ}\text{C}$		1.4	1.85	V
		$I_F=75\text{A}, V_{GE}=0\text{V}, T_J=125^{\circ}\text{C}$		1.33		
		$I_F=75\text{A}, V_{GE}=0\text{V}, T_J=150^{\circ}\text{C}$		1.28		
$t_{rr}$	Reverse Recovery Time	$I_F=75\text{A}, V_R=400\text{V}$ $dI_F/dt=-1950\text{A}/\mu\text{s}$ $T_J=150^{\circ}\text{C}$		240		ns
$I_{RRM}$	Max. Reverse Recovery Current			69		A
$Q_{RR}$	Reverse Recovery Charge			10		$\mu\text{C}$
$E_{rec}$	Reverse Recovery Energy			2.78		$\text{mJ}$

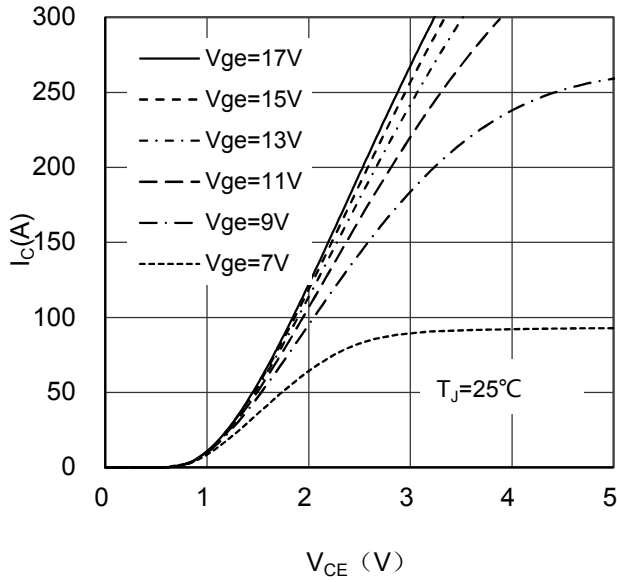


Figure 1. Typical Output Characteristics

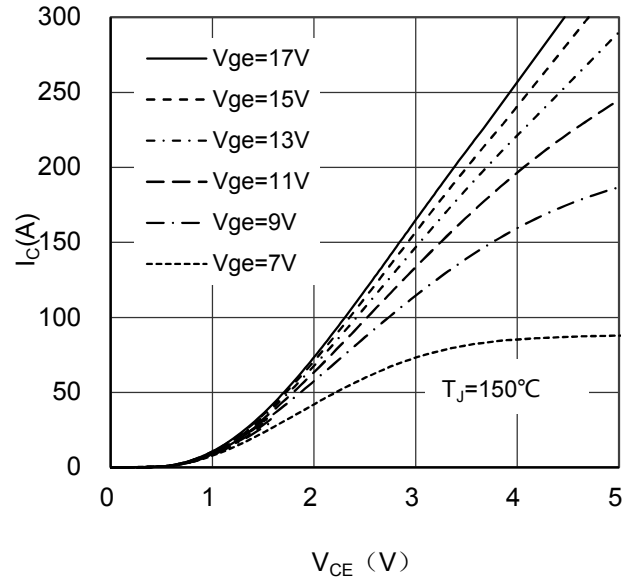


Figure 2. Typical Output Characteristics

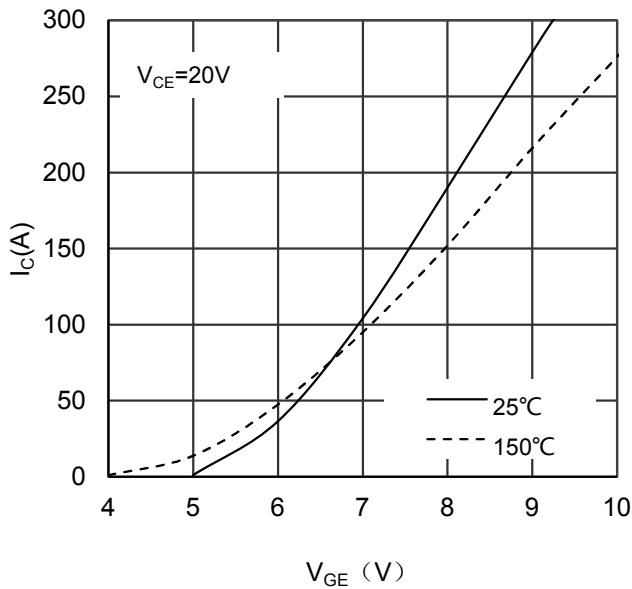


Figure 3. Typical Transfer characteristics

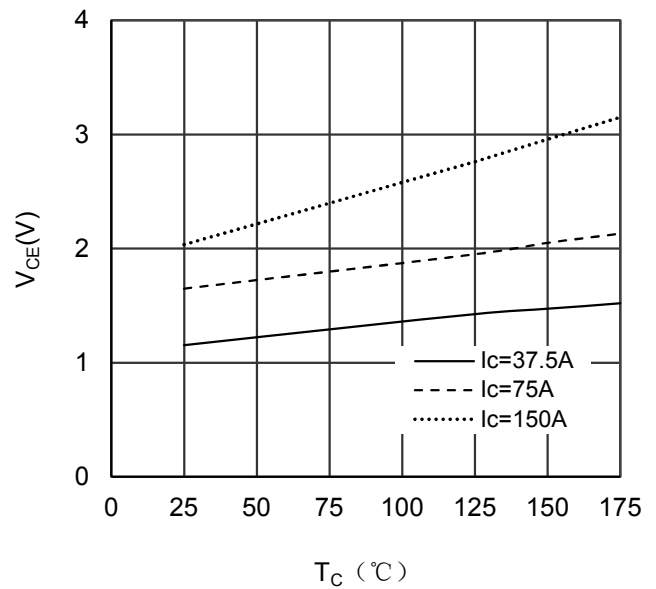


Figure 4. Collector-Emitter Voltage vs Case temperature

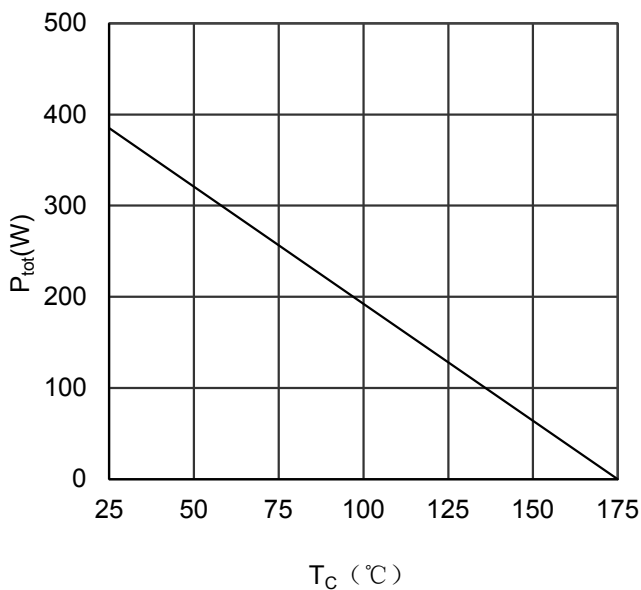


Figure 5. Power Dissipation vs Case temperature

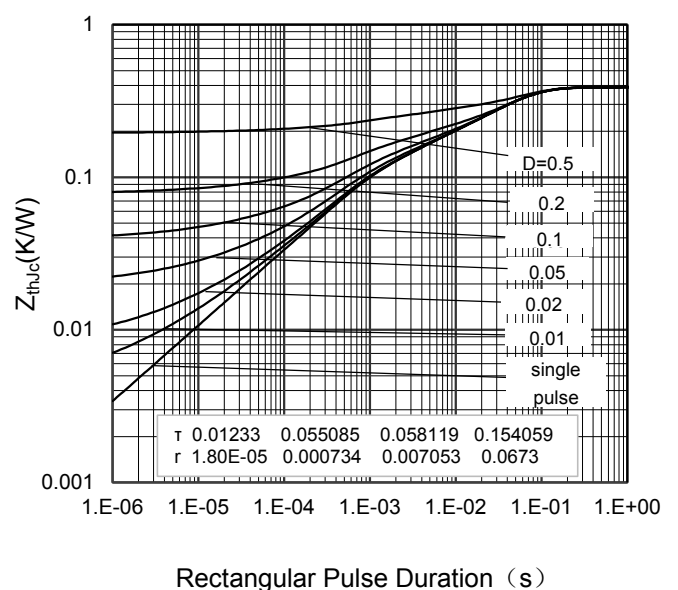


Figure 6. IGBT Transient Thermal Impedance

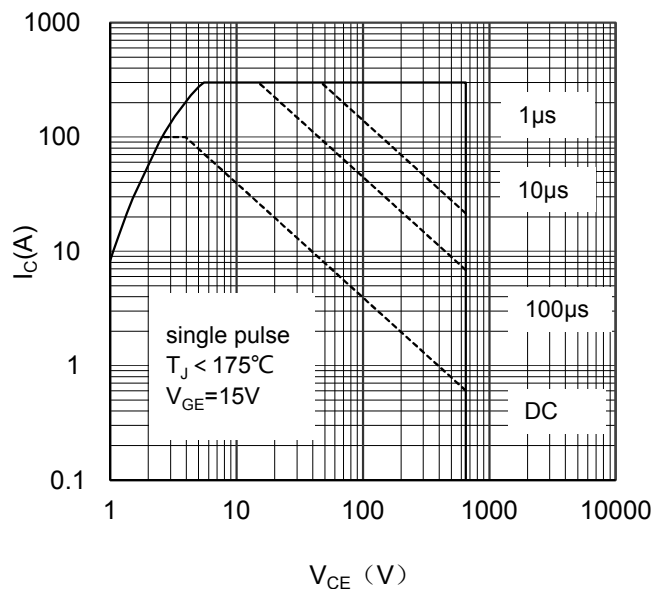


Figure 7. Forward Biased Safe Operating Area

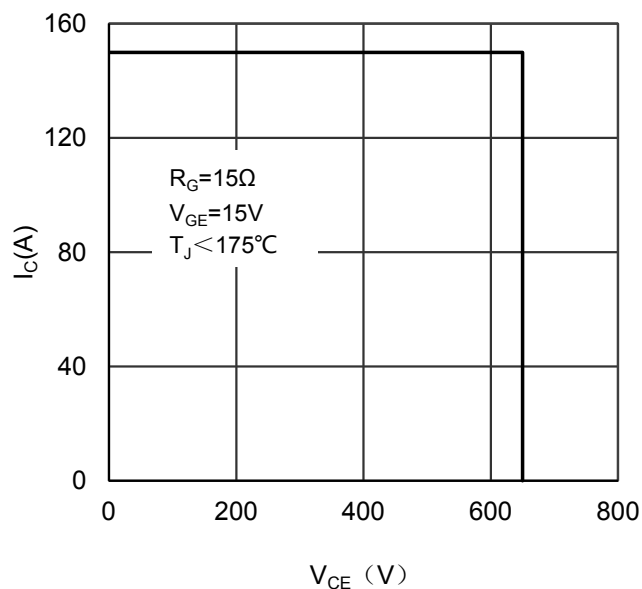


Figure 8. Reverse Biased Safe Operating Area

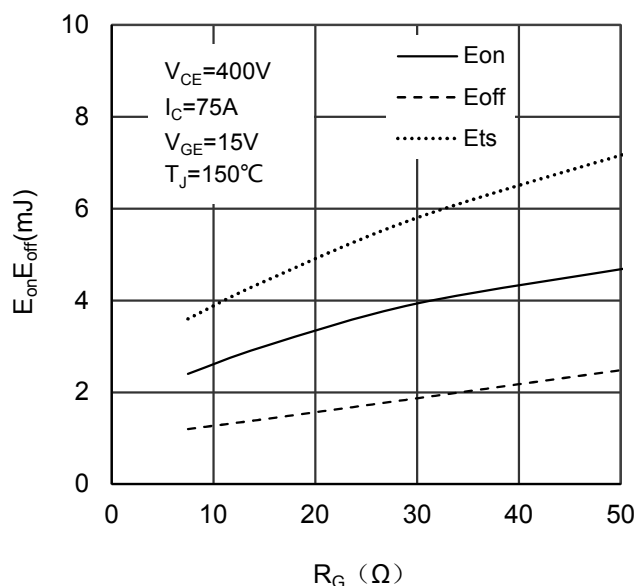


Figure 9. Switching Energy vs Case temperature

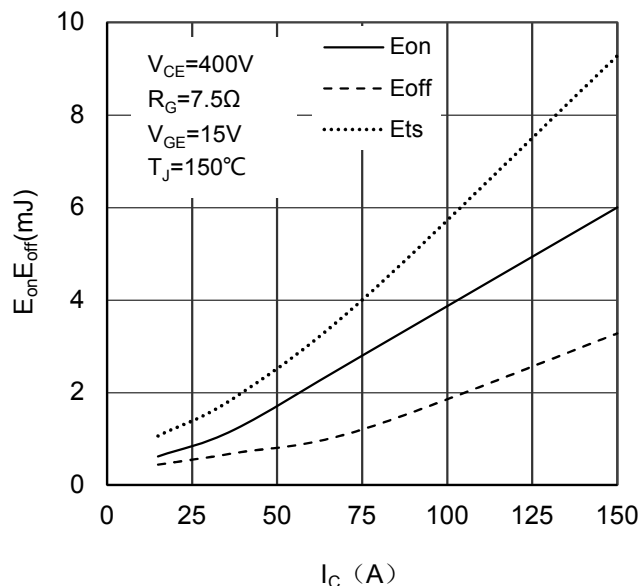


Figure 10. Switching Energy vs Collector Current

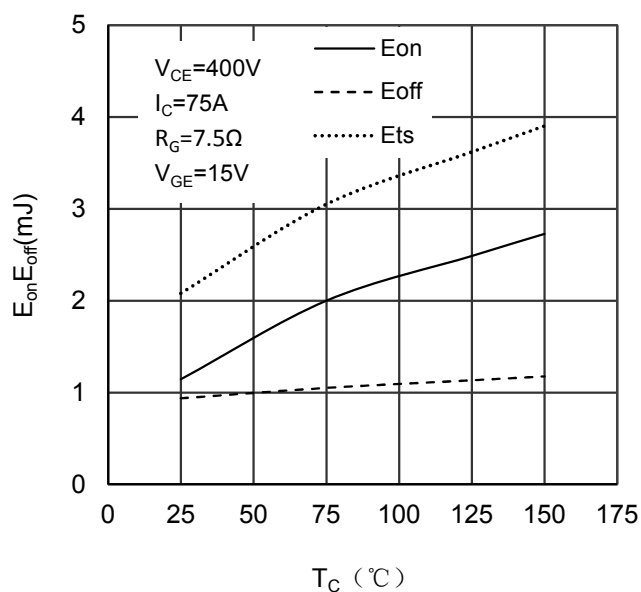


Figure 11. Switching Energy vs Case temperature

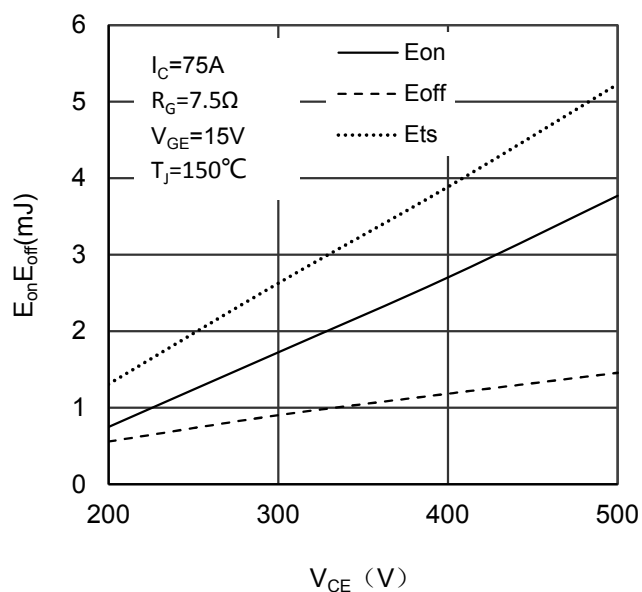


Figure 12. Switching Energy vs Collector-Emitter Voltage

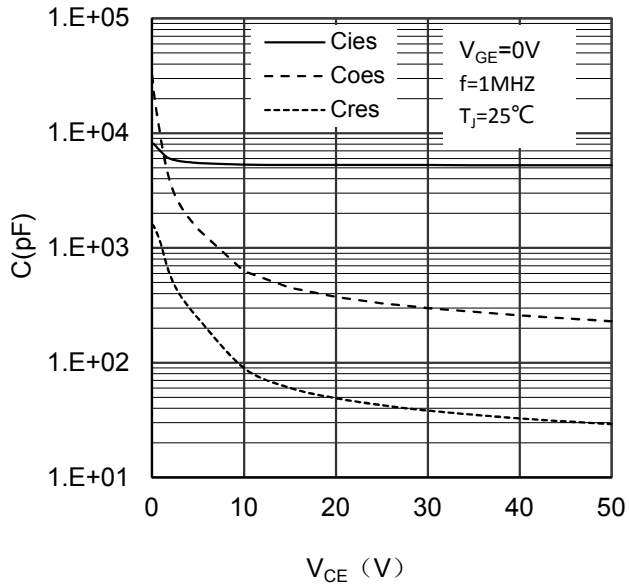


Figure 13. Typical capacitance

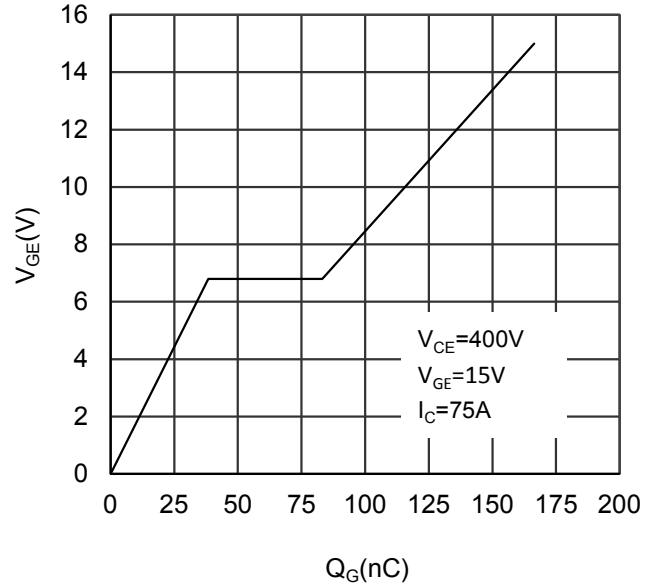


Figure 14. Typical Gate Charge

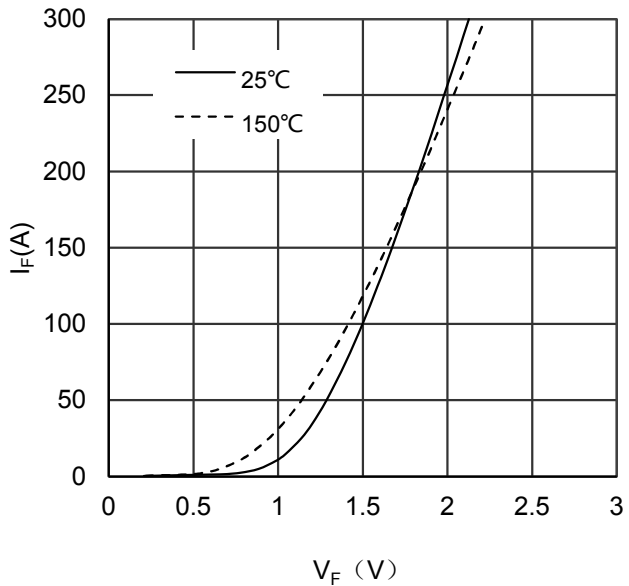


Figure 15. Diode Forward Characteristics

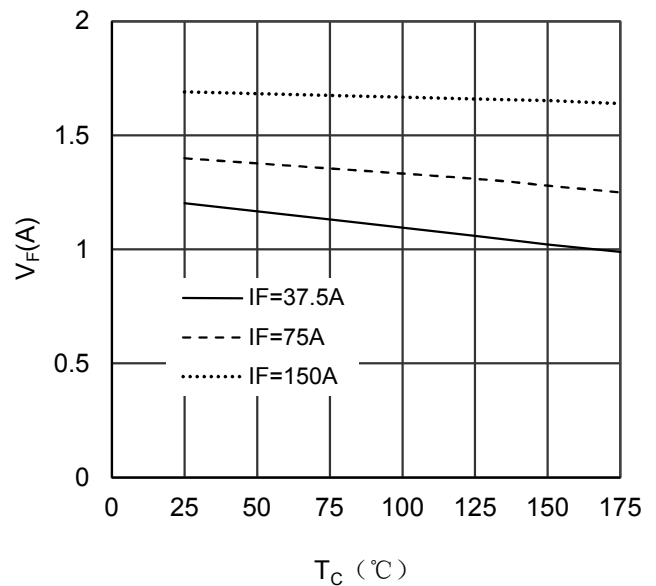


Figure 16. Forward Voltage vs Case temperature

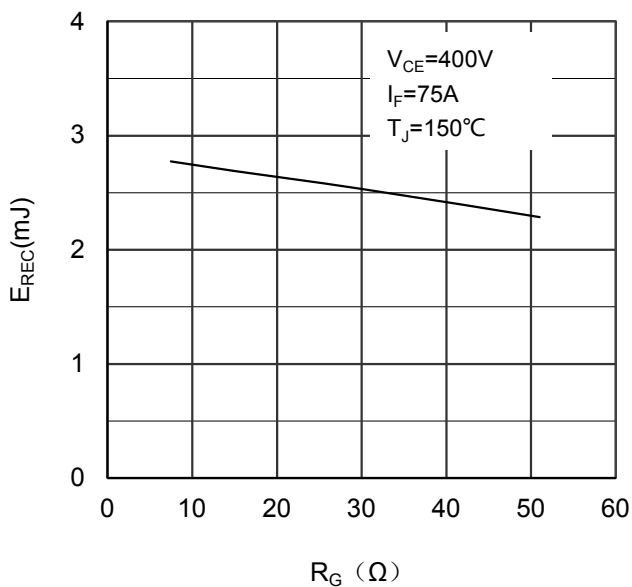


Figure 17. Switching Energy vs Gate Resistor Diode

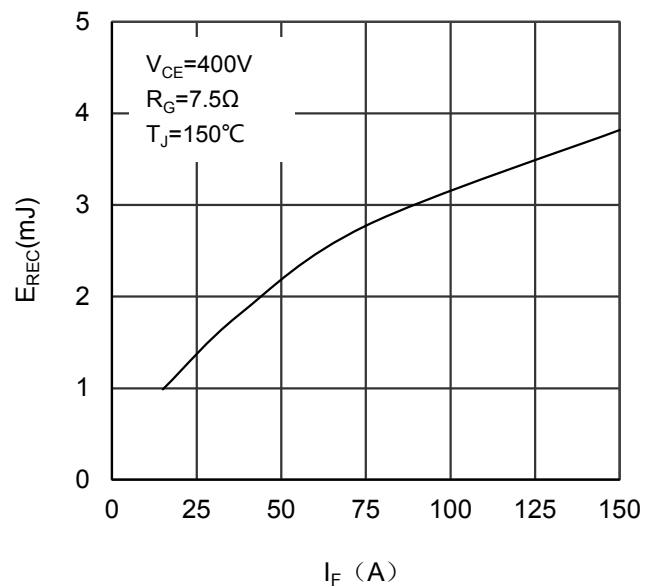


Figure 18. Switching Energy vs Forward Current Diode

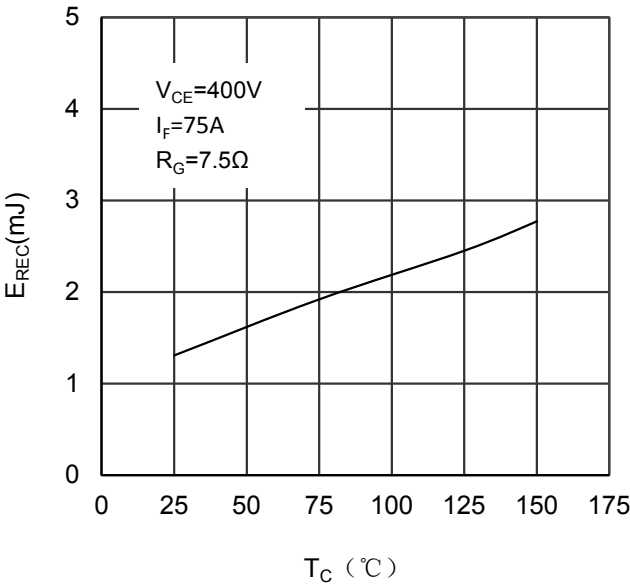


Figure 19. Switching Energy vs Case temperature Diode

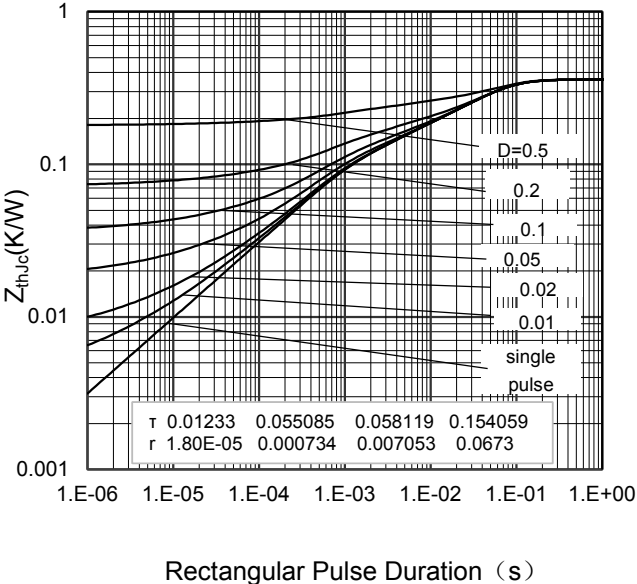
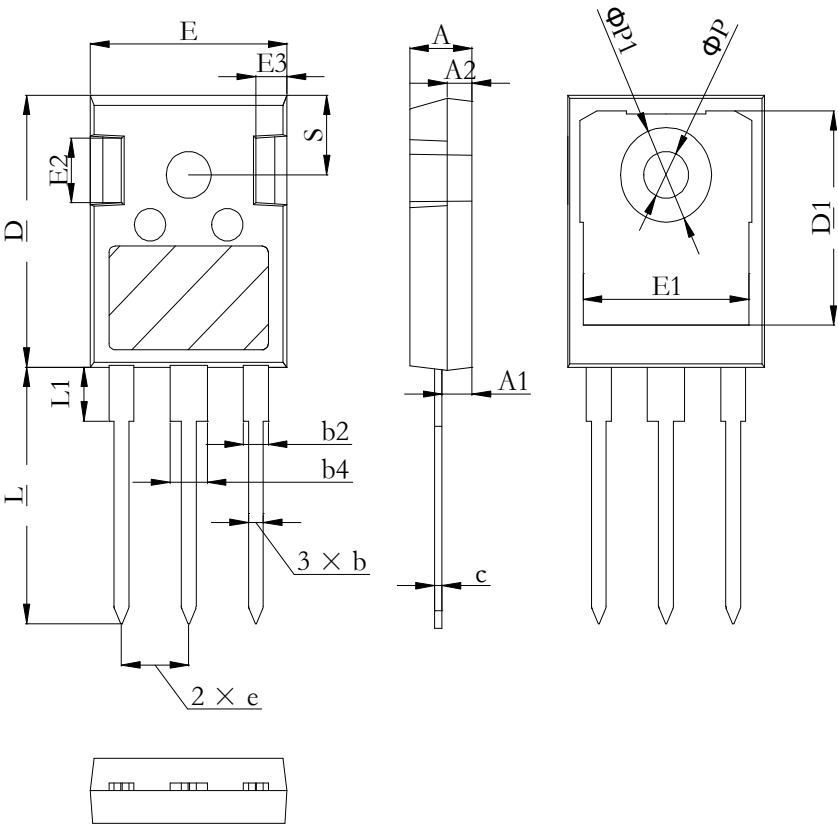


Figure 20. Diode Transient Thermal Impedance Diode



Symbol	Min	Nom	Max
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.85	2.00	2.15
b	1.10	1.23	1.36
b2	1.90	2.05	2.20
b4	2.90	3.05	3.20
c	0.50	0.60	0.75
e	5.44BSC		
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
L	19.60	19.91	20.22
L1	-	-	4.30
$\Phi P$	3.40	3.60	3.80
$\Phi P1$	-	-	7.30
S	6.15BSC		

Dimensions in (mm)  
Figure 21. Package Outline