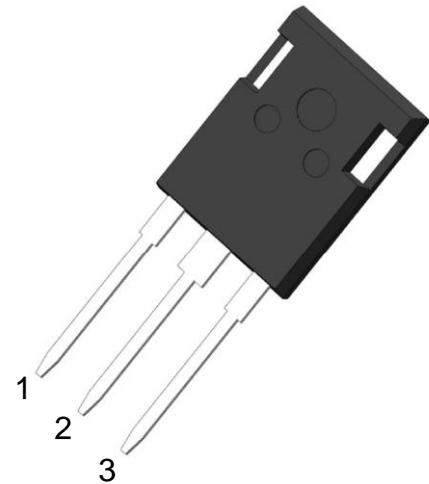


PRODUCT FEATURES

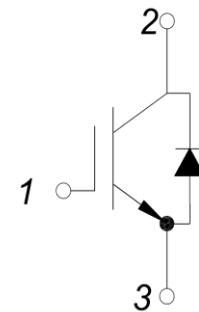
- IGBT chip in trench FS-technology
- Low switching losses
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery



APPLICATIONS

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

1.Gate
2.Collector
3.Emmitter



Type	V_{CES}	I_C	$V_{CE(sat)}$ $T_J=25^\circ C$	T_{Jmax}	Marking	Package
MM50G3U120BMX	1200V	50A	1.95V	175°C	MM50G3U120BMX	TO-247 Plus

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

Symbol	Parameter/Test Conditions	Values	Unit
V_{CES}	Collector Emitter Voltage	$T_J=25^\circ C$	V
V_{GES}	Gate Emitter Voltage		
I_C	DC Collector Current	$T_C=25^\circ C$	A
		$T_C=110^\circ C$	
I_{Cpuls}	Pulsed collector current, tp limited by T_{Jmax}	150	
P_{tot}	Power Dissipation Per IGBT	535	W
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^\circ C$	V
$I_{F(AV)}$	Average Forward Current	$T_C=95^\circ C$	A
I_{Fpuls}	Diode pulsed current, tp limited by T_{Jmax}	150	
T_{Jmax}	Max. Junction Temperature	175	°C
T_{Jop}	Operating Temperature	-40~175	
T_{stg}	Storage Temperature	-55~150	
Weight		8	g

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MM50G3U120BMX

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	$V_{CE}=V_{GE}, I_C=2.0\text{mA}$	5.2	5.8	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$I_C=50\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		1.95	2.4	
		$I_C=50\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		2.35		
		$I_C=50\text{A}, V_{GE}=15\text{V}, T_J=150^\circ\text{C}$		2.45		
I_{CES}	Collector Leakage Current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$			100	μA
		$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$			10	mA
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE}=\pm 20\text{V}, T_J=25^\circ\text{C}$	-400		400	nA
Q_g	Gate Charge	$V_{CE}=600\text{V}, I_C=50\text{A}, V_{GE}=15\text{V}$		0.28		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		3.6		nF
C_{res}	Reverse Transfer Capacitance				160	pF
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=600\text{V}, I_C=50\text{A}$ $R_G=10\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		25	ns
			$T_J=125^\circ\text{C}$		35	ns
			$T_J=150^\circ\text{C}$		35	ns
t_r	Rise Time		$T_J=25^\circ\text{C}$		25	ns
			$T_J=125^\circ\text{C}$		30	ns
			$T_J=150^\circ\text{C}$		30	ns
$t_{d(off)}$	Turn off Delay Time	$T_J=25^\circ\text{C}$		200	ns	
		$T_J=125^\circ\text{C}$		245	ns	
		$T_J=150^\circ\text{C}$		260	ns	
t_f	Fall Time	$T_J=25^\circ\text{C}$		65	ns	
		$T_J=125^\circ\text{C}$		100	ns	
		$T_J=150^\circ\text{C}$		110	ns	
E_{on}	Turn on Energy	$T_J=125^\circ\text{C}$		5.5	mJ	
		$T_J=150^\circ\text{C}$		6.2	mJ	
E_{off}	Turn off Energy	$T_J=125^\circ\text{C}$		2.4	mJ	
		$T_J=150^\circ\text{C}$		2.6	mJ	
I_{SC}	Short Circuit Current	$tpsc \leq 10\mu\text{S}, V_{GE}=15\text{V}$ $T_J=125^\circ\text{C}, V_{CC}=600\text{V}$		320		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.28	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	$I_F=50\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		1.8	2.3	V
		$I_F=50\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		1.55		
		$I_F=50\text{A}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$		1.5		
t_{rr}	Reverse Recovery Time	$I_F=50\text{A}, V_R=600\text{V}$ $di_F/dt=-1300\text{A}/\mu\text{s}$ $T_J=150^\circ\text{C}$		460		ns
I_{RRM}	Max. Reverse Recovery Current			52		A
Q_{RR}	Reverse Recovery Charge			12		μC
E_{rec}	Reverse Recovery Energy			4.7		mJ
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				0.49	K/W

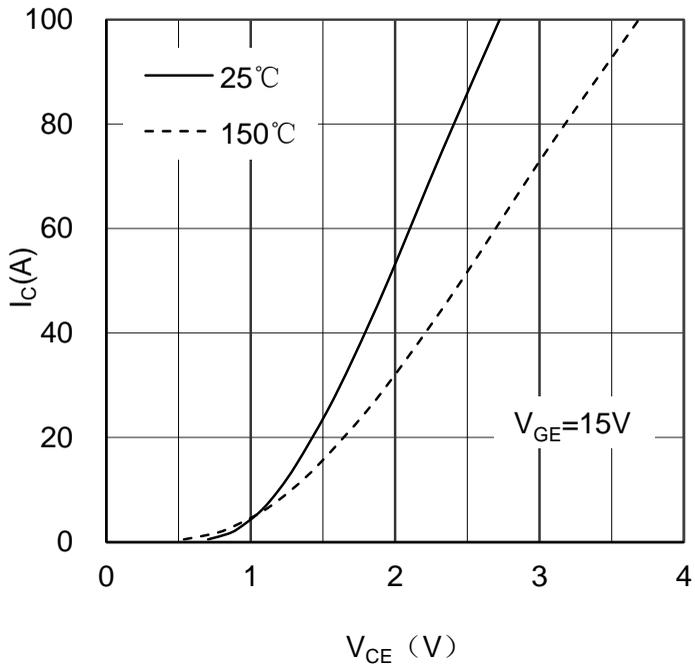


Figure 1. Typical Output Characteristics IGBT

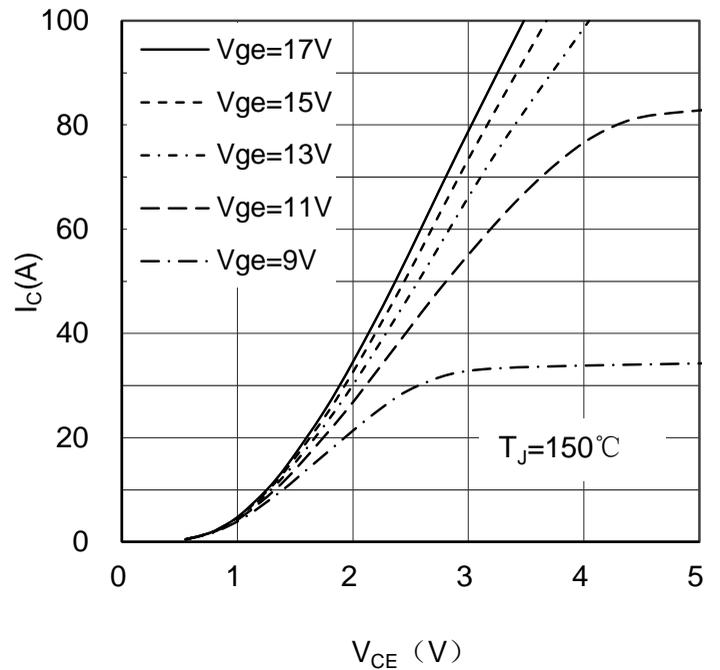


Figure 2. Typical Output Characteristics IGBT

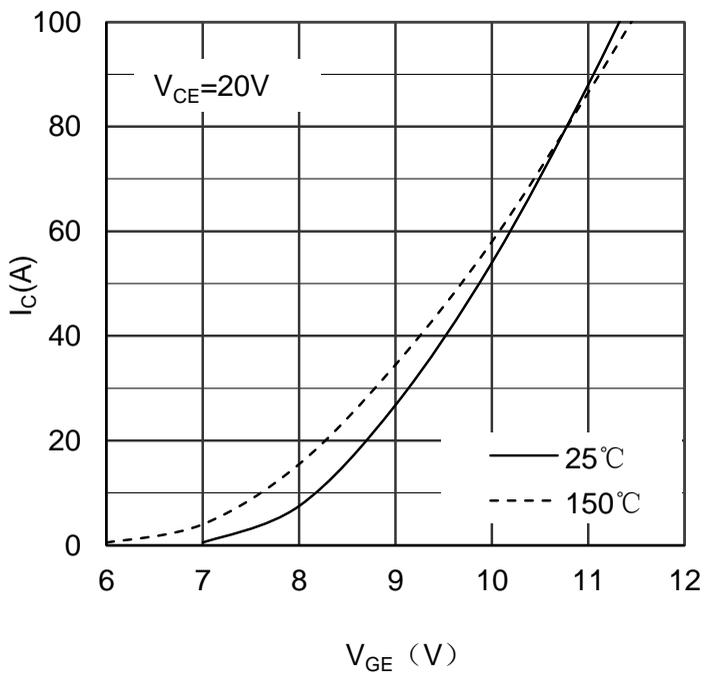


Figure 3. Typical Transfer characteristics IGBT

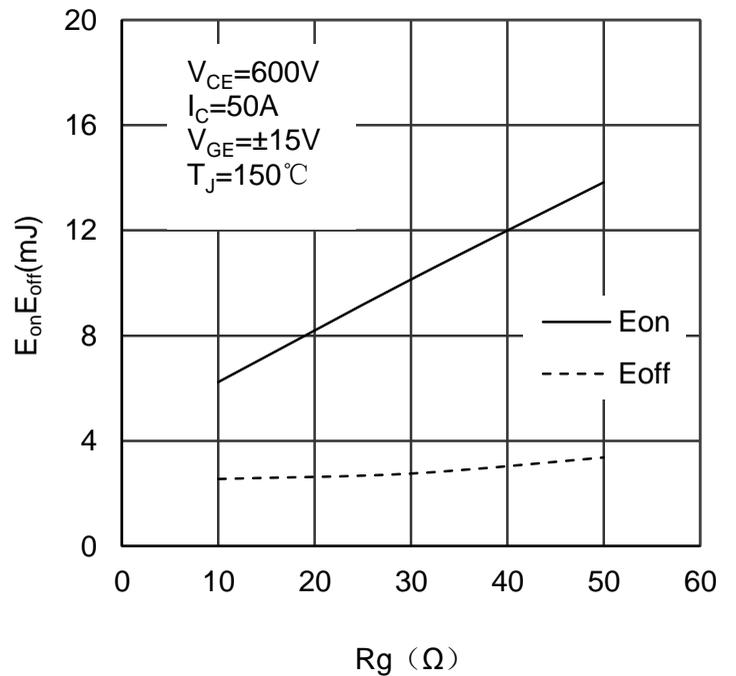


Figure 4. Switching Energy vs Gate Resistor IGBT

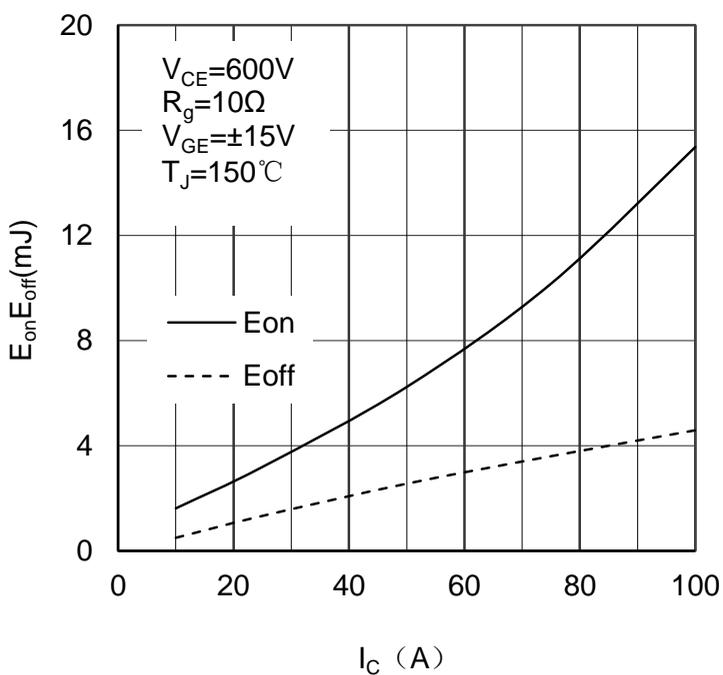


Figure 5. Switching Energy vs Collector Current IGBT

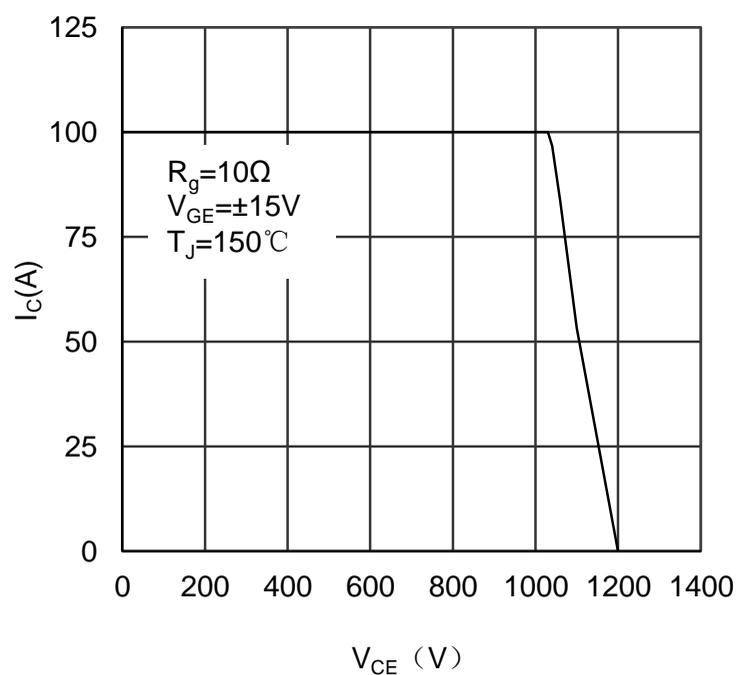


Figure 6. Reverse Biased Safe Operating Area IGBT

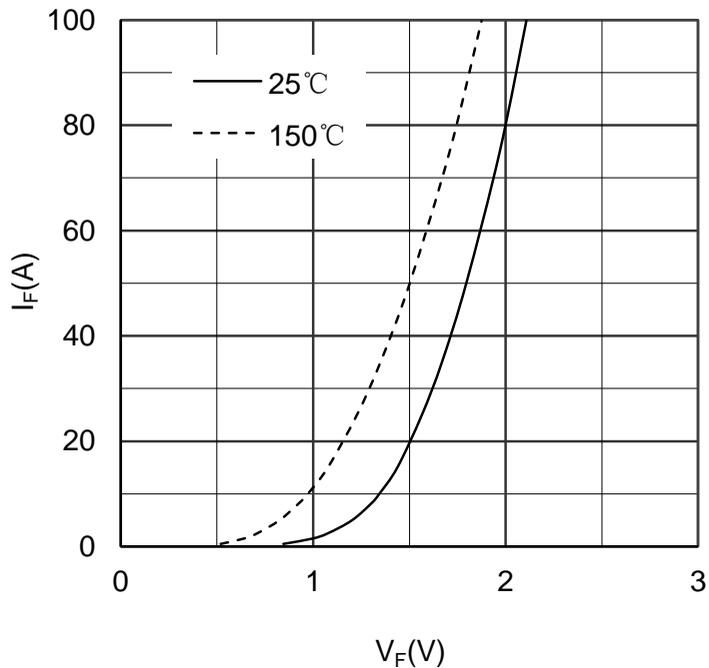


Figure 7. Diode Forward Characteristics Diode

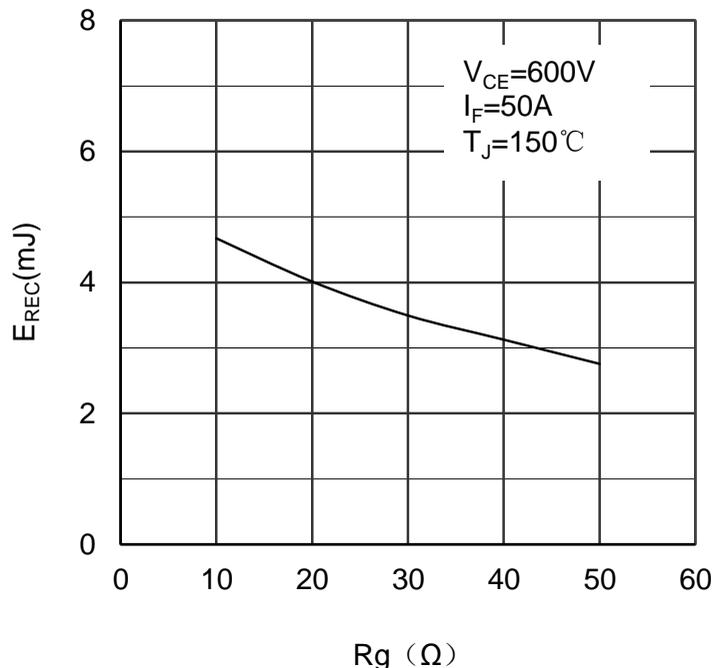


Figure 8. Switching Energy vs Gate Resistor Diode

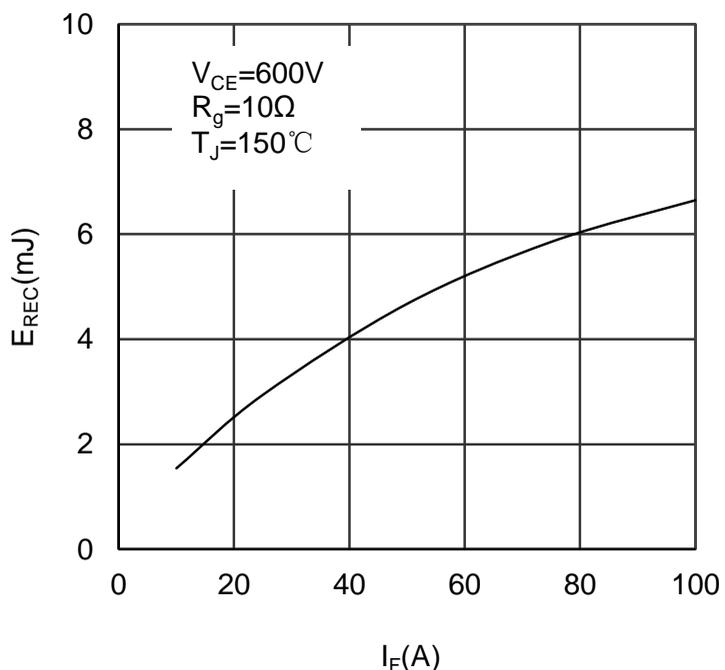


Figure 9. Switching Energy vs Forward Current Diode

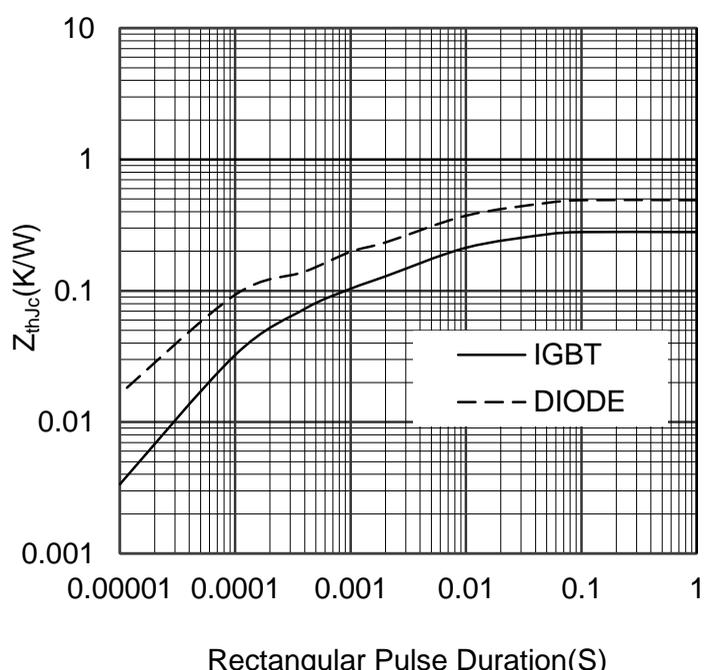
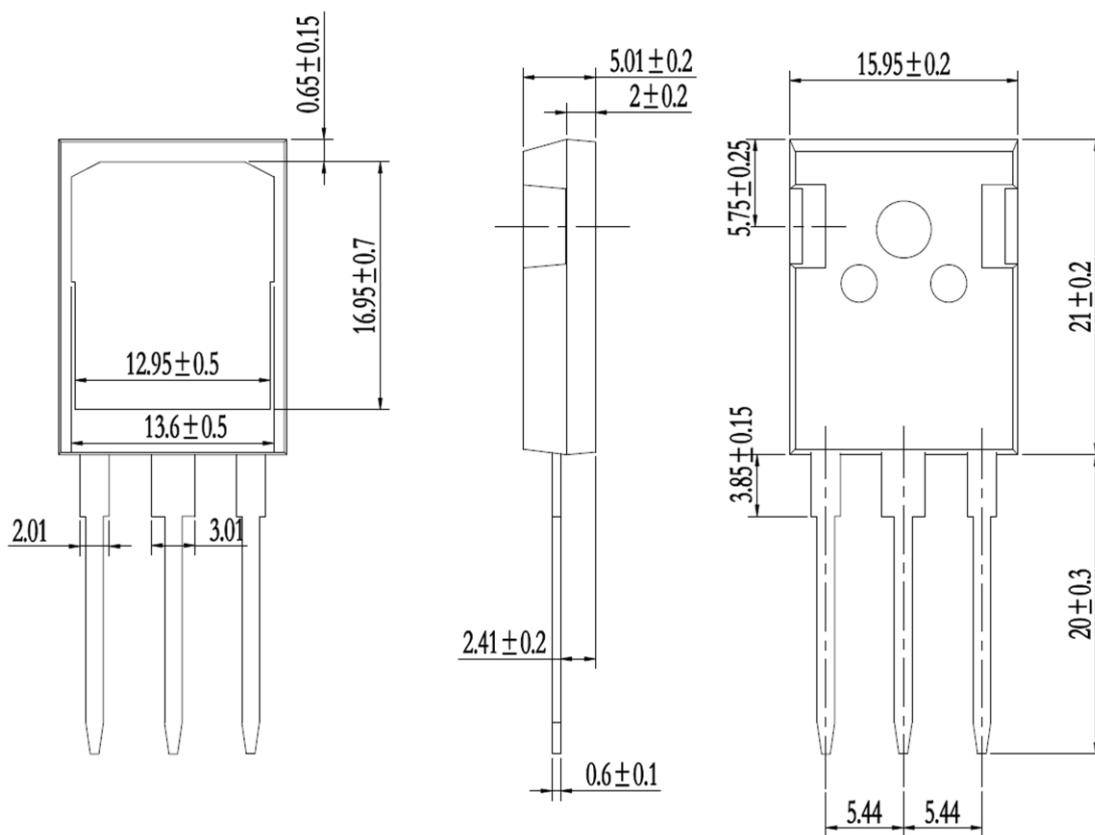


Figure 10. Transient Thermal Impedance of Diode and IGBT



Dimensions in (mm)
Figure 11. Package Outline