

# PTECQ80120RY

1200V 80A Si IGBT Discrete

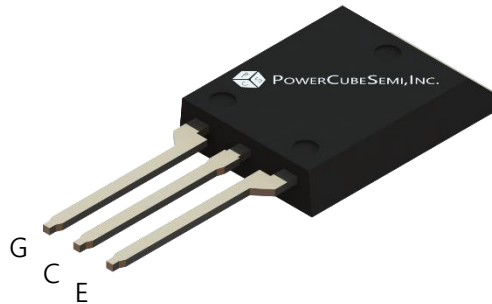
## Features

### Si IGBT Discrete

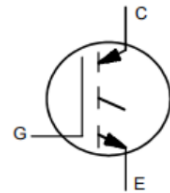
- Rated to 1200V at 80Amps @ $T_C = 100^\circ\text{C}$
- $V_{CE(sat)} = 1.75\text{V}$  @  $I_C = 80\text{A}$
- High breakdown voltage to 1200V for improved reliability
- Maximum Junction Temperature  $150^\circ\text{C}$
- Positive temperature coefficient

## Application

- PTC Heater



PKG type : STO-220



## Absolute Maximum Ratings

Symbol	Parameter	Value	Unit	
$BV_{CES}$	Collector-Emitter Breakdown Voltage	1200	V	
$I_C$	DC Collector Current	$T_C = 25^\circ\text{C}$	145	
		$T_C = 100^\circ\text{C}$	80	
$I_{C, Pulse}$	Pulsed Collector Current	240	A	
$V_{GE}$	Continuous Gate-Emitter Voltage	$\pm 20$	V	
$V_{GE}$	Transient Gate-Emitter Voltage	$\pm 30$		
$P_D$	Power Dissipation	$T_C = 25^\circ\text{C}$	735	W
$T_{vj}$	Operating Junction Temperature Range	-40 to 150	$^\circ\text{C}$	
$T_{stg}$	Storage Temperature Range	-55 to 150		

## Package Marking and Ordering Information

Device Marking	Device	Package	Packing Method	Tape width	Quantity
PTECQ80120RY	PTECQ80120	STO-220	-	-	-

## Electrical Characteristics

$T_j=25^\circ\text{C}$  Unless Otherwise Specified

### Static Characteristics

Symbol	Parameter	Test Condition	Numerical			Unit	
			Min	Typ	Max		
$BV_{CES}$	Collector-Emitter Breakdown Voltage	$I_C=250\mu\text{A}$ , $V_{GE}=0\text{V}$	1200	-	-	V	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=80\text{A}$ , $V_{GE}=15\text{V}$	$T_j=25^\circ\text{C}$	-	1.75	2.30	V
			$T_j=125^\circ\text{C}$	-	2.15	-	
			$T_j=150^\circ\text{C}$	-	2.25	-	
$V_{GE(TH)}$	Gate-Emitter Threshold Voltage	$V_{CE}=V_{GE}$ , $I_C=2.6\text{mA}$	5.5	6.0	6.7	V	
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{CE}=1200\text{V}$ , $V_{GE}=0\text{V}$	$T_j=25^\circ\text{C}$	-	-	0.25	mA
			$T_j=150^\circ\text{C}$	-	-	1.00	
$I_{GES}$	Gate-Emitter Leakage Current	$V_{GE}=\pm 20\text{V}$ , $V_{CE}=0\text{V}$	-	-	100	nA	

### Dynamic Characteristics

Symbol	Parameter	Test Condition	Numerical			Unit
			Min	Typ	Max	
$Q_G$	Total Gate Charge	$V_{CC}=960\text{V}$ , $I_C=80\text{A}$ , $V_{GE}=15\text{V}$	-	0.65	-	$\mu\text{C}$
$C_{IES}$	Input Capacitance	$V_{CE}=25\text{V}$ , $V_{GE}=0\text{V}$ , $f=1\text{MHz}$	-	7.94	-	nF
$C_{RES}$	Reverse Transfer Capacitance		-	0.19	-	



## Electrical Characteristics

T<sub>J</sub>=25°C Unless Otherwise Specified

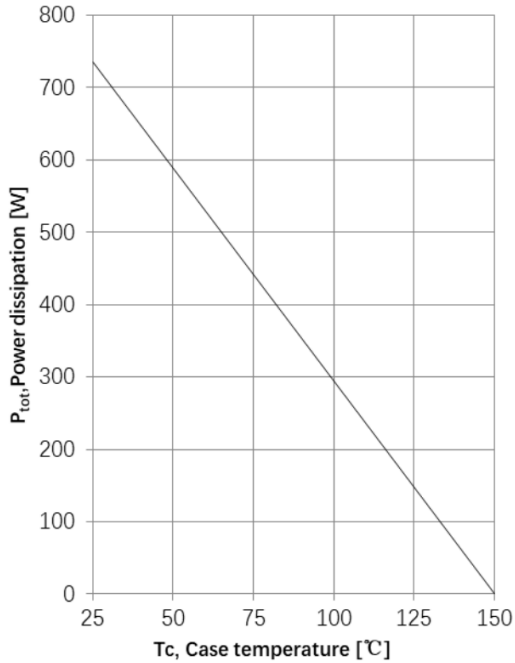
### Switching Characteristics

Symbol	Parameter	Test Condition		Numerical			Unit
				Min	Typ	Max	
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>GE</sub> =-5~15V, V <sub>CC</sub> =600V, I <sub>C</sub> =80A, R <sub>G</sub> =10Ω	T <sub>J</sub> =25°C T <sub>J</sub> =125°C T <sub>J</sub> =150°C	-	33	-	ns
				-	30	-	
				-	28	-	
t <sub>r</sub>	Turn-On Rise Time			-	85	-	
				-	79	-	
				-	74	-	
t <sub>d(off)</sub>	Turn-Off Delay Time			-	231	-	
				-	243	-	
				-	252	-	
t <sub>f</sub>	Turn-Off Fall Time	-	174	-			
		-	263	-			
		-	325	-			
E <sub>on</sub>	Turn-On Switching Energy	-	7.5	-	mJ		
		-	7.8	-			
		-	8.0	-			
E <sub>off</sub>	Turn-Off Switching Energy	-	4.6	-			
		-	5.5	-			
		-	6.2	-			

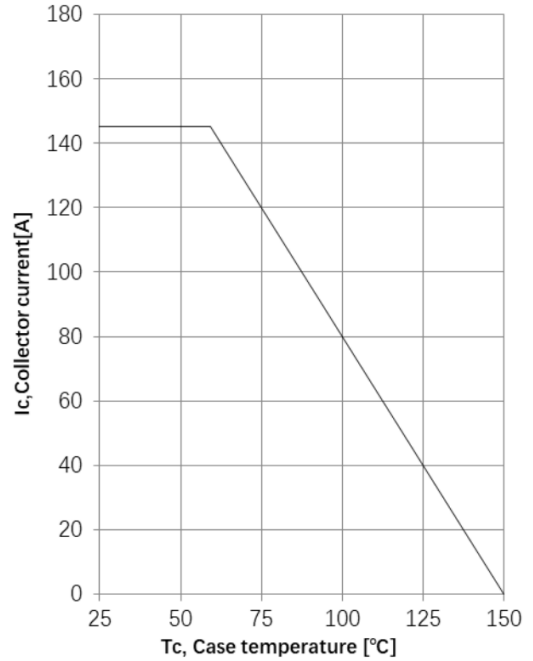
### Thermal Characteristics

Symbol	Parameter	Numerical	Unit
R <sub>θ(J-A)</sub>	Thermal Resistance Junction-to-Ambient	62	K/W
R <sub>θ(J-C)</sub>	Thermal Resistance Junction-to-Case for IGBT	0.17	

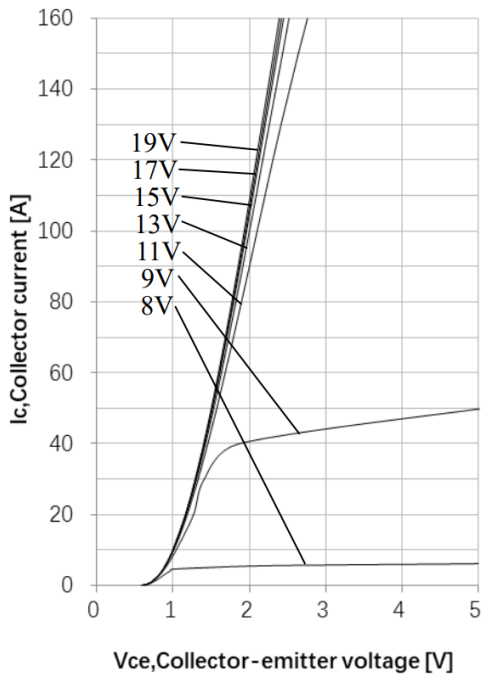
# Typical Characteristics



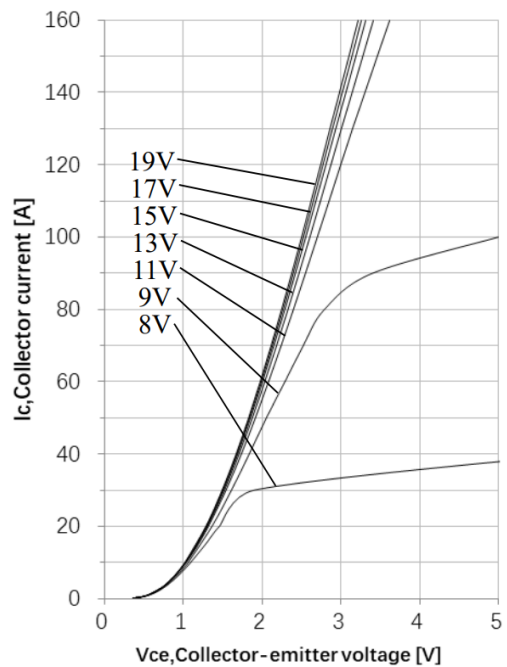
**Figure 1. Power dissipation as a function of case temperature ( $T_J \leq 150^\circ\text{C}$ )**



**Figure 2. Collector current as a function of case temperature ( $V_{GE} \geq 15\text{V}$ ,  $T_J \leq 150^\circ\text{C}$ )**

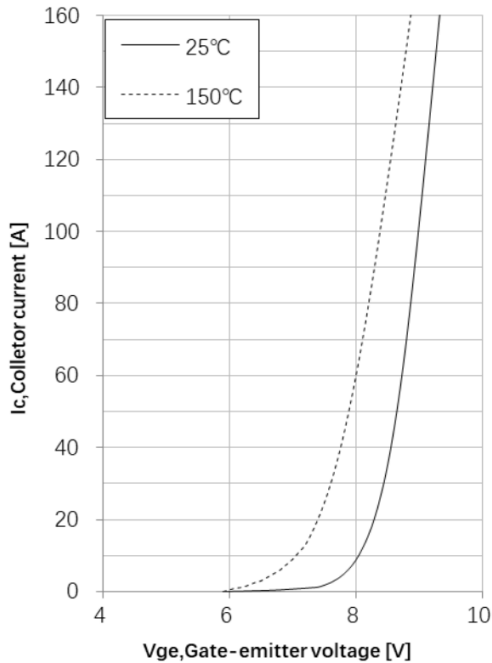


**Figure 3. Output Characteristics ( $T_J = 25^\circ\text{C}$ )**

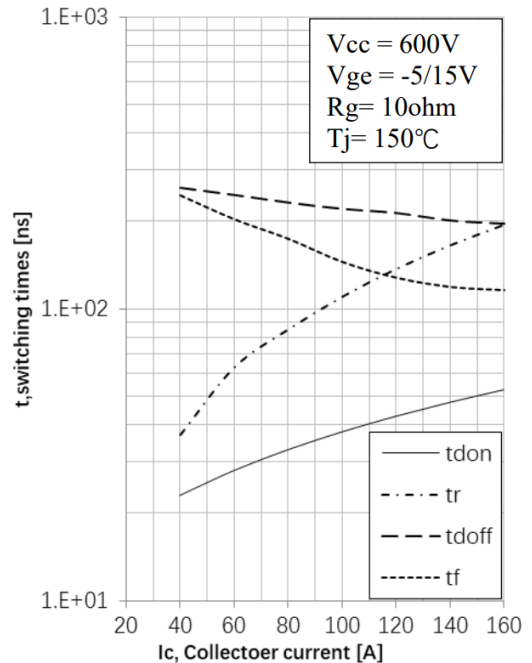


**Figure 4. Output Characteristics ( $T_J = 150^\circ\text{C}$ )**

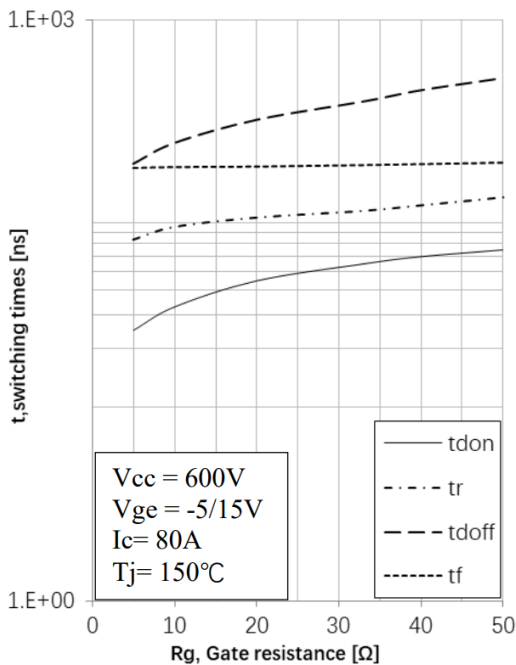
# Typical Characteristics



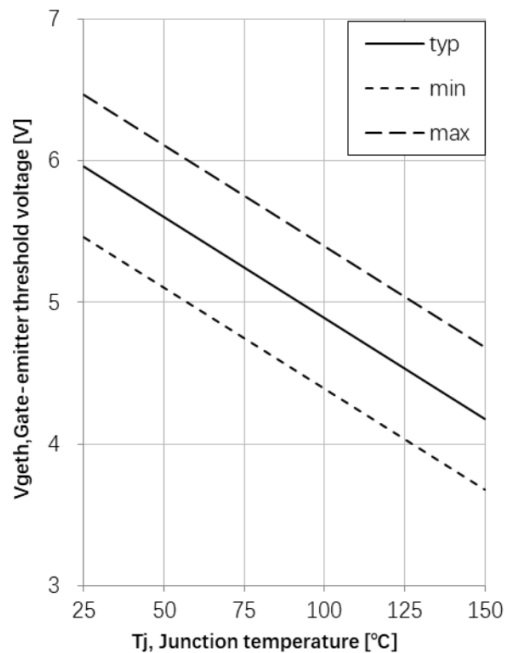
**Figure 5. Typical transfer characteristic ( $V_{CE}=20V$ )**



**Figure 6. Typical Switching time as a function of collector current**

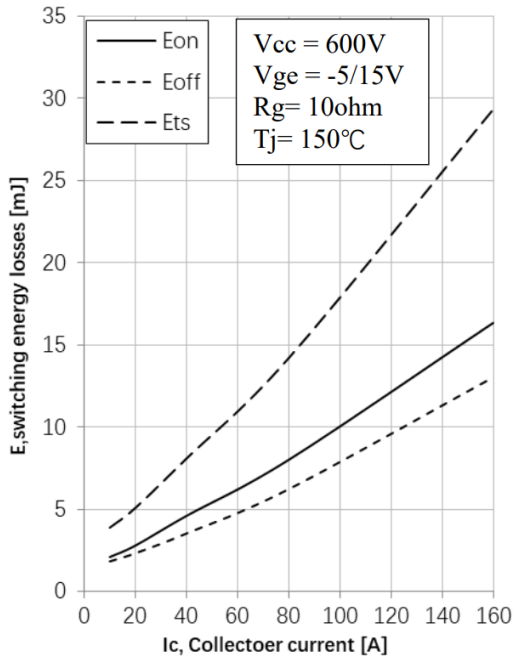


**Figure 7. Typical Switching times as a function of gate resistance**

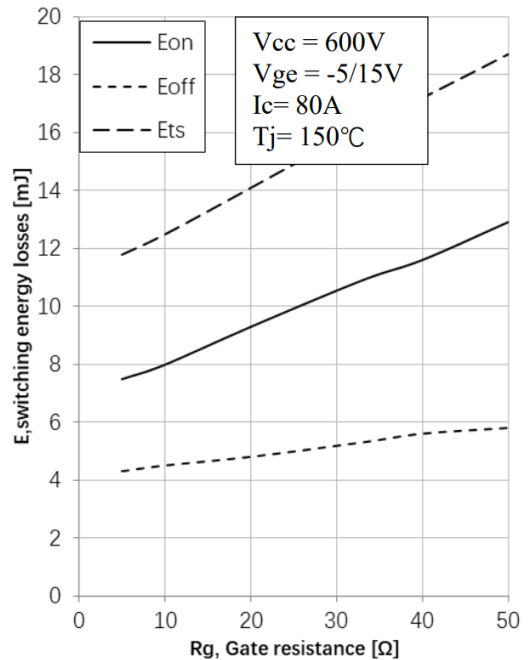


**Figure 8. Gate-Emitter threshold voltage as a function of junction temperature ( $I_C=2.6mA$ )**

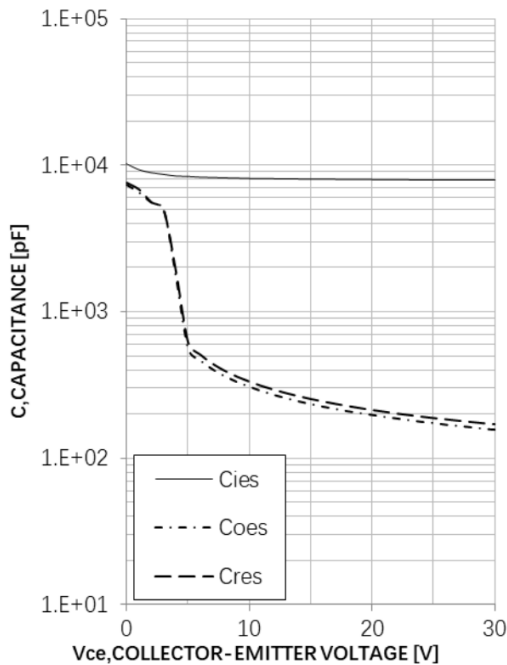
# Typical Characteristics



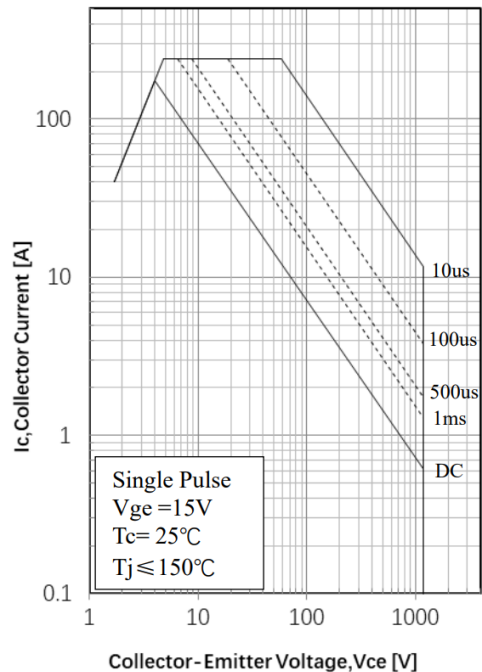
**Figure 9. Typical Switching energy losses as a function of collector current**



**Figure 10. Typical Switching energy losses as a function of gate resistance**



**Figure 11. Typical capacitance as a function of collector-emitter voltage**



**Figure 12. Safe operating area**

# Typical Characteristics

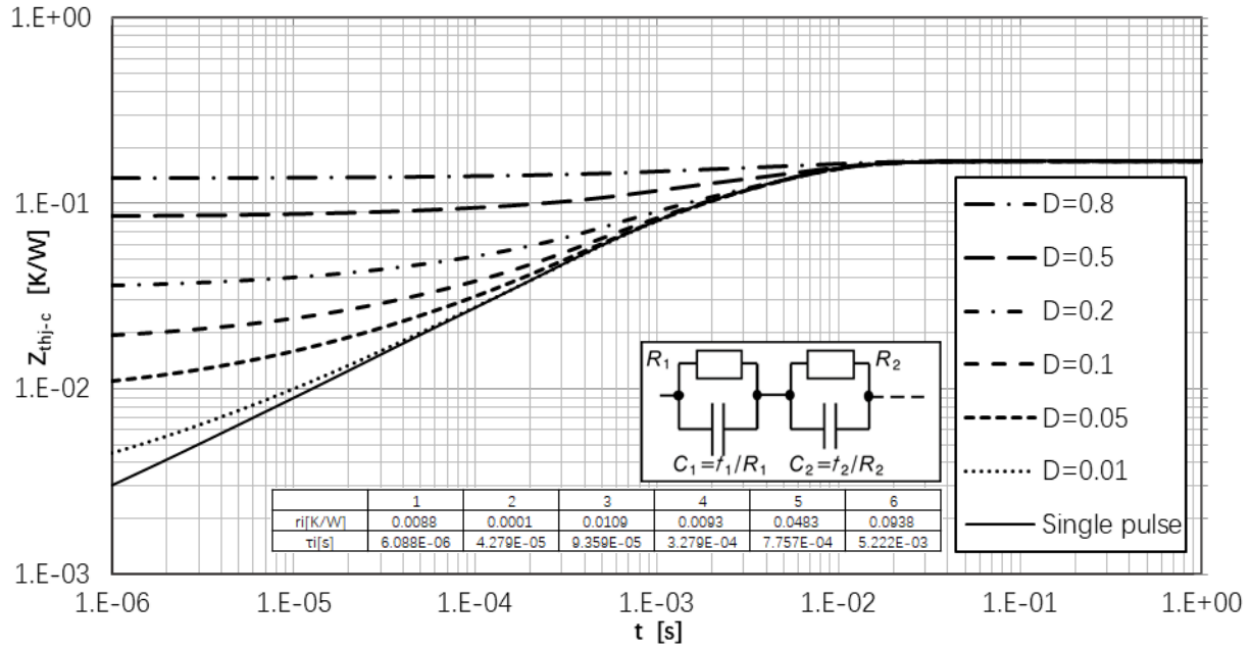
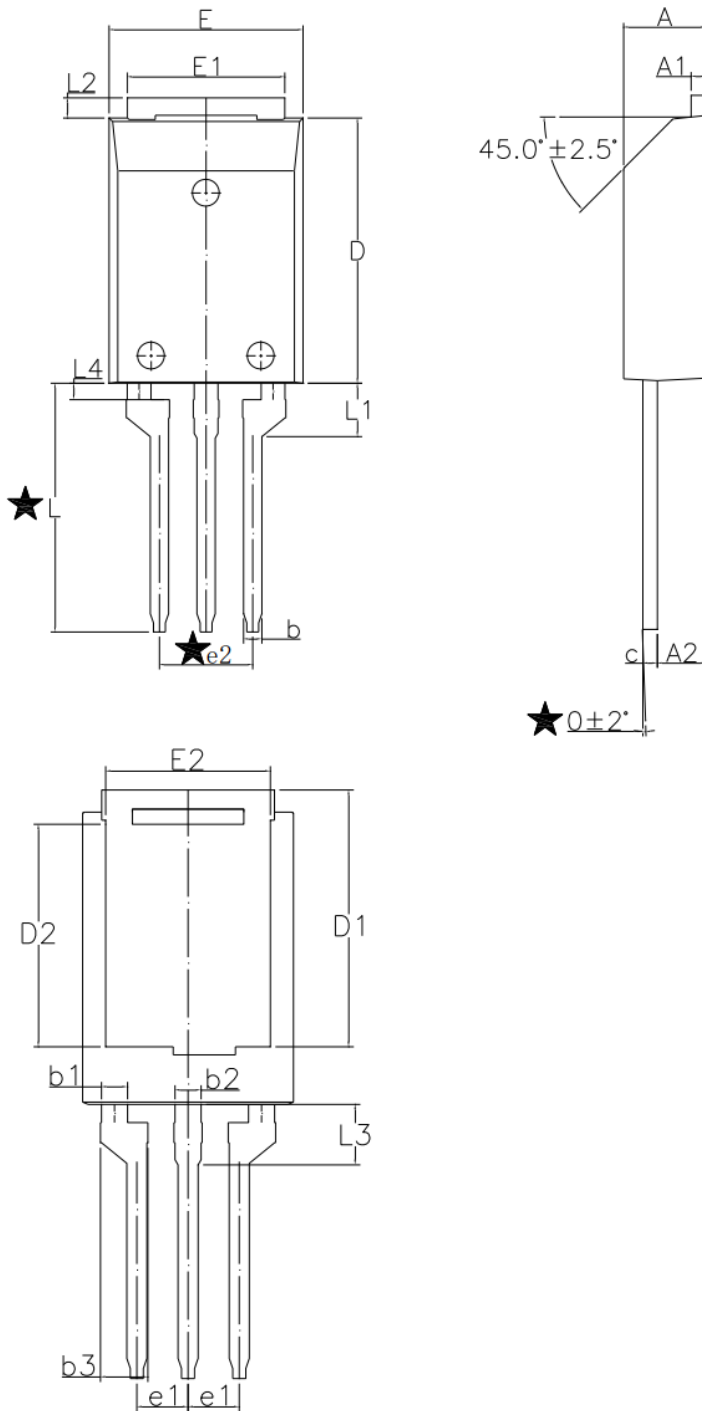


Figure 13. IGBT Transient Thermal Impedance



**Package Outline**

Unit : mm



SYMBOL	DIMENSIONS	
	MIN	MAX
<b>A</b>	4.34	4.74
<b>A1</b>	0.70	1.00
<b>A2</b>	2.50	3.00
<b>b</b>	0.70	1.30
<b>b1</b>	1.25	1.65
<b>b2</b>	1.25	1.65
<b>b3</b>	2.16	2.36
<b>c</b>	0.70	1.00
<b>D</b>	14.00	15.00
<b>D1</b>	12.50	13.50
<b>D2</b>	10.54	11.54
<b>E</b>	10.00	11.00
<b>E1</b>	8.00	9.00
<b>E2</b>	7.70	8.70
<b>e1</b>	2.55 BSC	
<b>e2</b>	4.90	5.30
<b>L</b>	13.00	14.50
<b>L1</b>	2.65	3.15
<b>L2</b>	0.50	1.50
<b>L3</b>	2.75	3.25
<b>L4</b>	-	1.50