

# PTDL10065NY

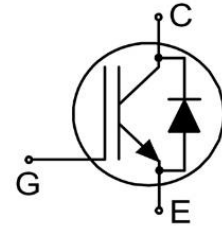
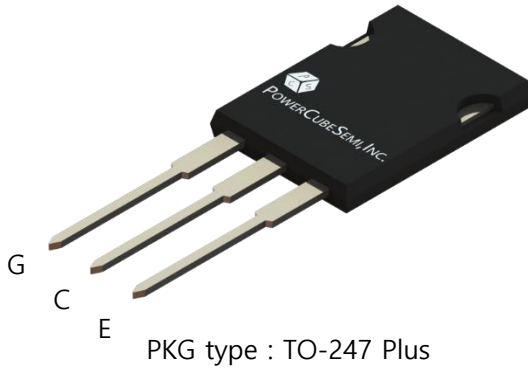
## Features

### IGBT Discrete

- Rated to 650V at 100Amps @ $T_j = 25^\circ\text{C}$
- $V_{CE(sat)}=1.25\text{V}$  @  $I_C=100\text{A}$
- Positive Temperature Coefficient
- High Ruggedness, Temperature Stable
- Maximum Junction Temperature  $175^\circ\text{C}$
- High speed smooth switching device for hard & soft switching

## Application

- General purpose inverters
- Motor drives
- Uninterruptible power supply, UPS



## Absolute Maximum Ratings

Symbol	Parameter	Value	Unit	
$BV_{CES}$	Collector-Emitter Breakdown Voltage	650	V	
$I_C$	DC Collector Current	$T_C=25^\circ\text{C}$	160	A
		$T_C=100^\circ\text{C}$	100	
$I_{CM}$	Pulsed Collector Current	400	A	
$I_F$	Diode Forward Current	$T_C=25^\circ\text{C}$	160	A
		$T_C=100^\circ\text{C}$	100	
$I_{F, Pulse}$	Diode Pulsed Current	400	A	
$V_{GE}$	Continuous Gate-Emitter Voltage	$\pm 20$	V	
$V_{GE}$	Transient Gate-Emitter Voltage	$\pm 30$		
$P_D$	Power Dissipation	$T_C=25^\circ\text{C}$	428	W
$T_{vj}$	Operating Junction Temperature Range	-40 to 175	$^\circ\text{C}$	
$T_{stg}$	Storage Temperature Range	-55 to 150		

## Package Marking and Ordering Information

Device Marking	Device	Package	Packing Method	Tape width	Quantity
PTDL10065NY	PTDL10065	TO-247	TUBE	-	30

## Electrical Characteristics T<sub>j</sub>=25°C Unless Otherwise Specified

### Static Characteristics

Symbol	Parameter	Test Condition	Numerical			Unit	
			Min	Typ	Max		
BV <sub>CES</sub>	Collector-Emitter Breakdown Voltage	I <sub>C</sub> =250uA, V <sub>GE</sub> =0V	650	-	-	V	
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> =100A, V <sub>GE</sub> =15V	T <sub>J</sub> =25°C	0.90	1.25	1.60	V
			T <sub>J</sub> =125°C	-	1.35	-	
			T <sub>J</sub> =150°C	-	1.40	-	
V <sub>GE(TH)</sub>	Gate-Emitter Threshold Voltage	V <sub>CE</sub> =V <sub>GE</sub> , I <sub>C</sub> =1.20mA	4.25	4.75	5.25	V	
I <sub>CES</sub>	Zero Gate Voltage Collector Current	V <sub>CE</sub> =650V, V <sub>GE</sub> =0V	T <sub>J</sub> =25°C	-	-	0.25	mA
			T <sub>J</sub> =150°C	-	-	3.00	
I <sub>GES</sub>	Gate-Emitter Leakage Current	V <sub>GE</sub> =±20V, V <sub>CE</sub> =0V	-	-	200	nA	

### Dynamic Characteristics

Symbol	Parameter	Test Condition	Numerical			Unit	
			Min	Typ	Max		
Q <sub>G</sub>	Total Gate Charge	V <sub>CC</sub> =300V, I <sub>C</sub> =100A, V <sub>GE</sub> =-5~15V	-	0.26	-	uC	
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> =100A	T <sub>J</sub> =25°C	-	1.40	1.90	V
			T <sub>J</sub> =125°C	-	1.35	-	
			T <sub>J</sub> =150°C	-	1.30	-	
C <sub>IES</sub>	Input Capacitance	V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f=1MHz	-	5.13	-	nF	
C <sub>RES</sub>	Reverse Transfer Capacitance		-	0.05	-		



## Electrical Characteristics

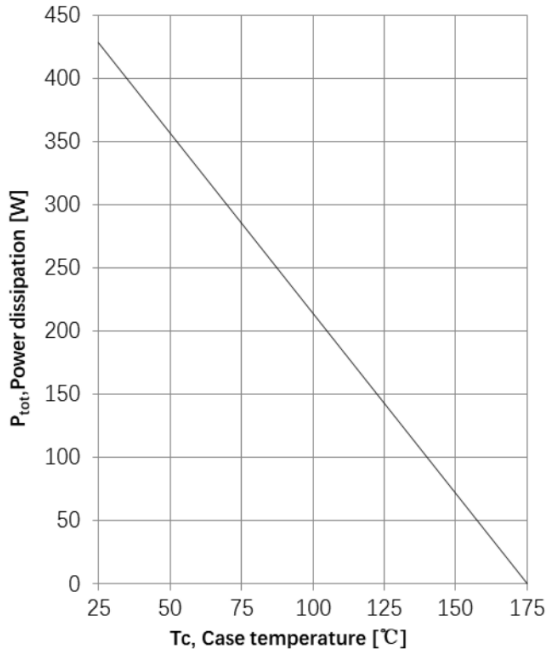
### Switching Characteristics

Symbol	Parameter	Test Condition	0.86 Numerical			Unit
			Min	Typ	Max	
$t_{d(on)}$	Turn-On Delay Time	$V_{GE} = -5 \sim 15V,$ $V_{CC} = 300V,$ $I_C = 100A, R_G = 10\Omega$ Inductive Load	-	26	-	ns
			-	27	-	
			-	27	-	
$t_r$	Turn-On Rise Time		-	110	-	
			-	97	-	mJ
			-	90	-	
$t_{d(off)}$	Turn-Off Delay Time		-	204	-	
		-	232	-	mJ	
		-	240	-		
$t_f$	Turn-Off Fall Time	-	100	-		
		-	138	-	mJ	
		-	153	-		
$E_{on}$	Turn-On Switching Energy	-	4.0	-		
		-	4.1	-	mJ	
		-	4.2	-		
$E_{off}$	Turn-Off Switching Energy	-	2.4	-		
		-	3.1	-	mJ	
		-	3.4	-		
$E_{rec}$	Reverse Recovery Energy	-	0.16	-		
		-	0.47	-	mJ	
		-	0.61	-		
$I_{rr}$	Reverse Recovery Current	-	23	-		
		-	36	-	A	
		-	41	-		
$Q_{rr}$	Reverse Recovery Charge	-	1.8	-		
		-	4.2	-	uC	
		-	5.7	-		
$T_{rr}$	Reverse Recovery Time	-	116	-		
		-	158	-	ns	
		-	197	-		

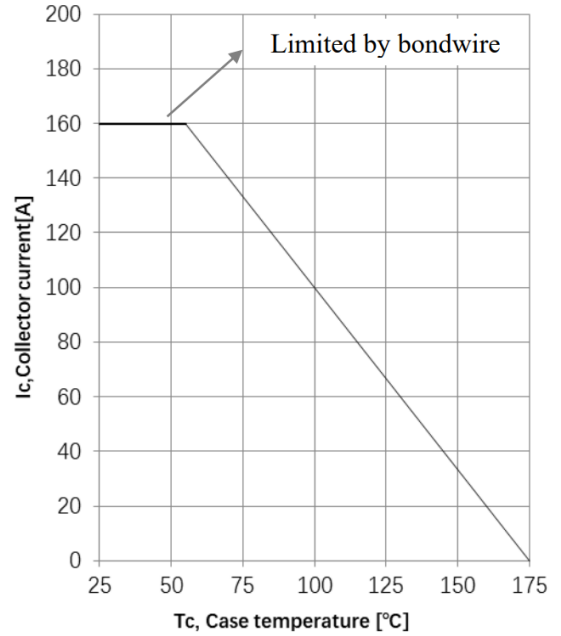
### Thermal Characteristics

Symbol	Parameter	Numerical	Unit
$R_{\theta(J-A)}$	Thermal Resistance Junction-to-Ambient	40	K/W
$R_{\theta(J-C)}$	Thermal Resistance Junction-to-Case for IGBT	0.35	
$R_{\theta(J-C)}$	Thermal Resistance Junction-to-Case for Diode	0.45	

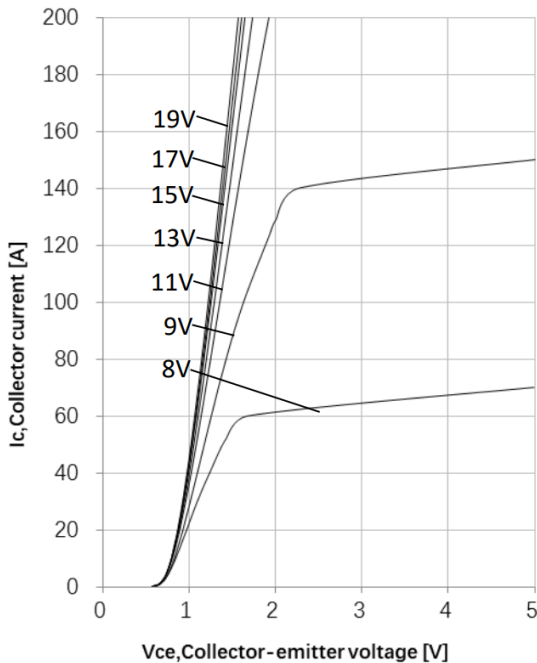
# Typical Characteristics



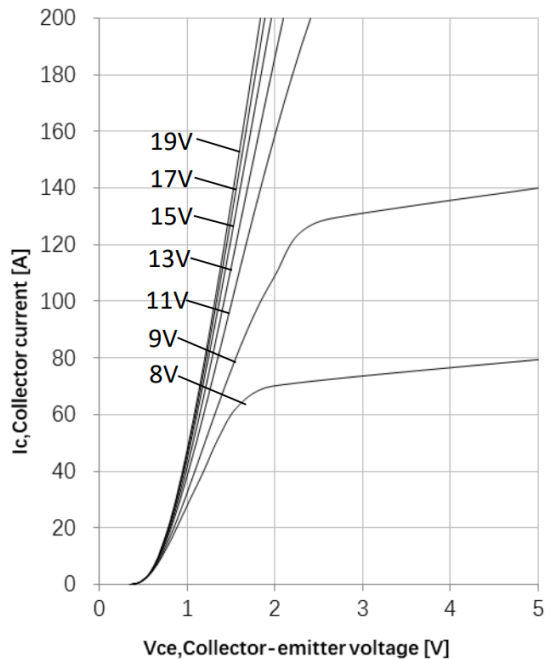
**Figure 1.** Power dissipation as a function of case temperature ( $T_J \leq 175^\circ\text{C}$ )



**Figure 2.** Collector current as a function of case temperature ( $V_{GE} \geq 15\text{V}$ ,  $T_J \leq 175^\circ\text{C}$ )

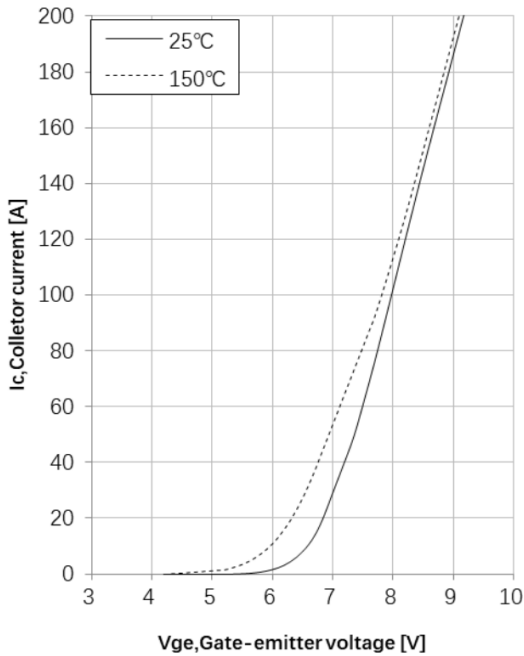


**Figure 3.** Typical output Characteristics ( $T_J = 25^\circ\text{C}$ )

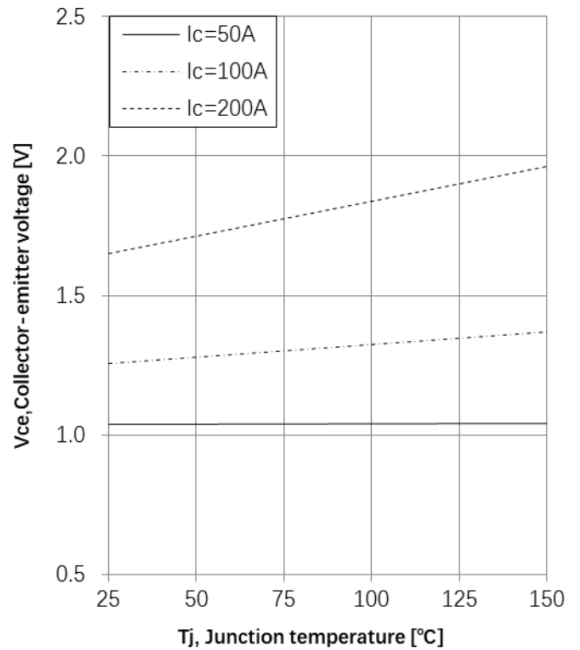


**Figure 4.** Typical output Characteristics ( $T_J = 150^\circ\text{C}$ )

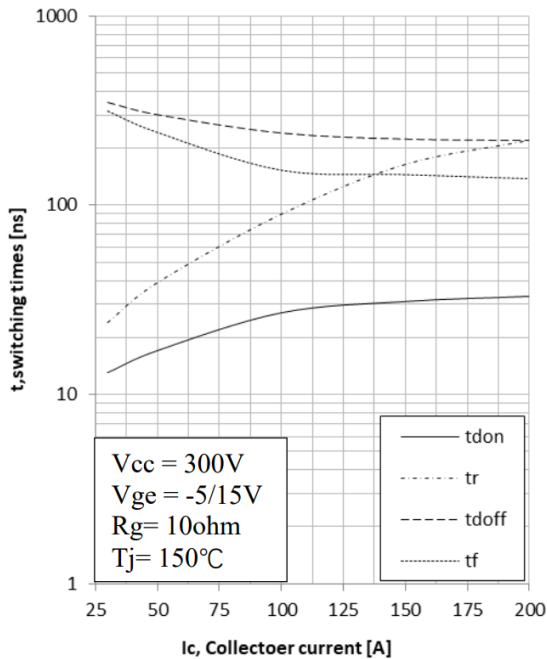
# Typical Characteristics



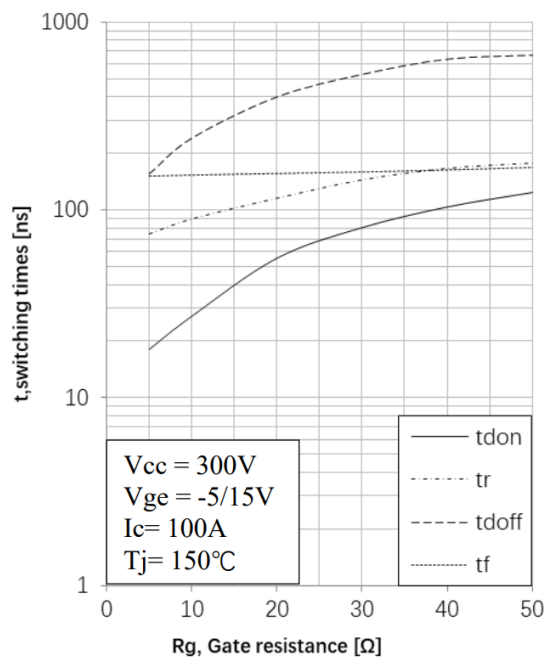
**Figure 5. Typical transfer characteristic ( $V_{GE}=20V$ )**



**Figure 6. Typical collector-emitter saturation voltage as a function of  $T_j$  ( $V_{GE}=15V$ )**

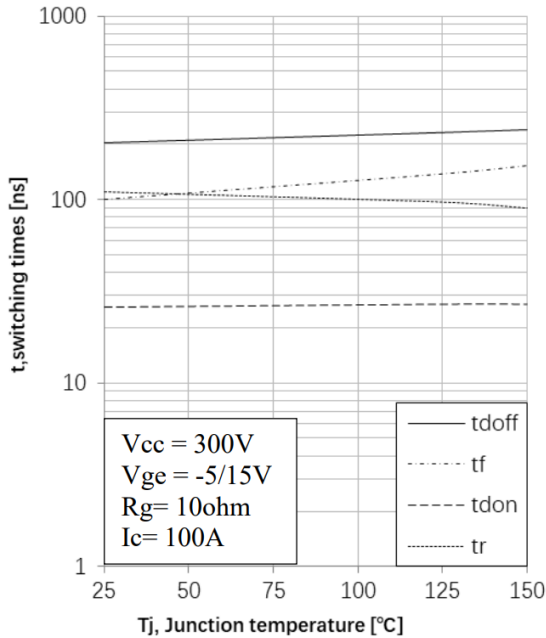


**Figure 7. Typical switching time as a function of collector current**

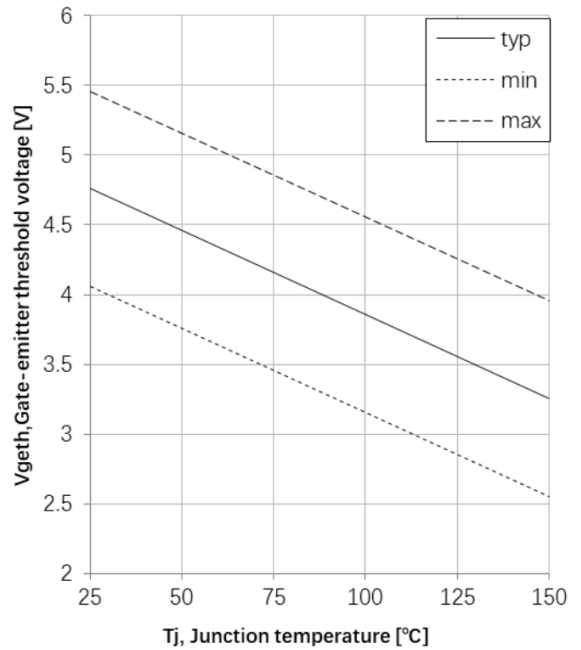


**Figure 8. Typical switching times as a function of gate resistance**

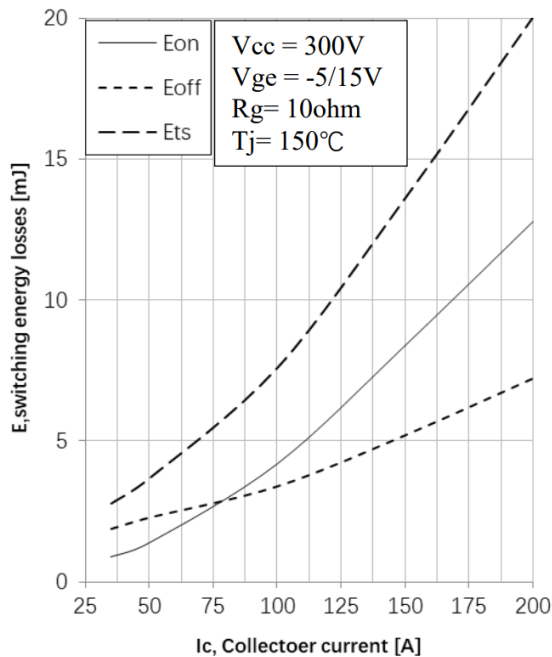
# Typical Characteristics



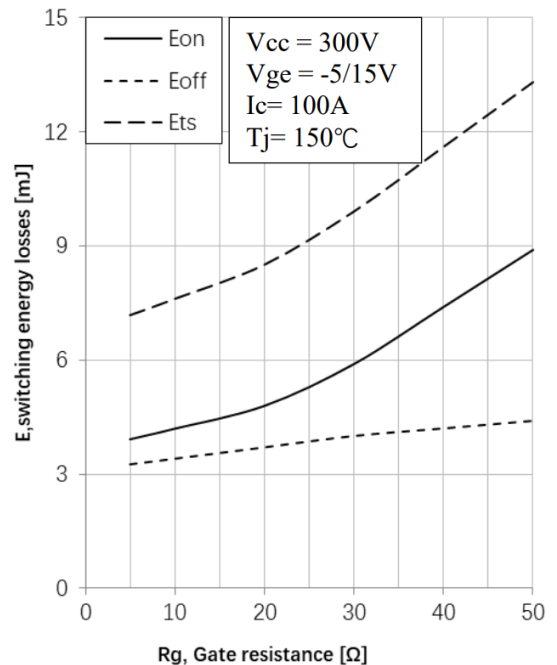
**Figure 9. Typical switching times as a function of junction temperature**



**Figure 10. Gate to emitter threshold voltage as a function of junction temperature ( $I_c = 0.75mA$ )**



**Figure 11. Typical switching energy losses as a function of collector current**



**Figure 12. Typical switching energy losses as a function of gate resistance**

# Typical Characteristics

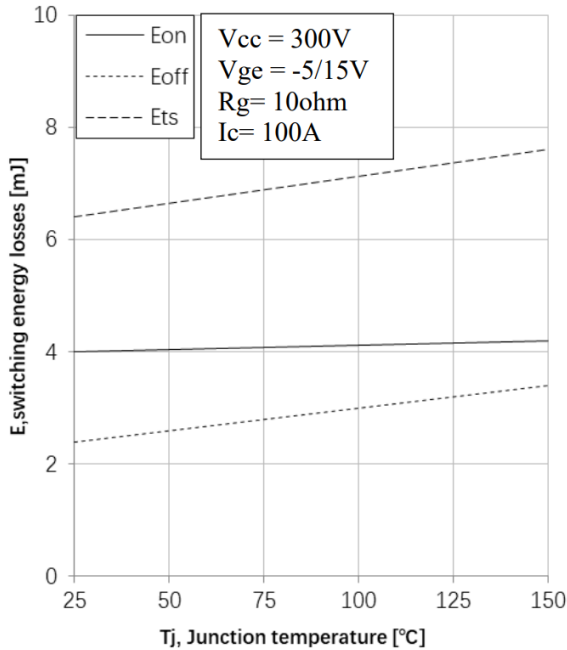


Figure 13. Typical switching energy losses as a function of junction temperature

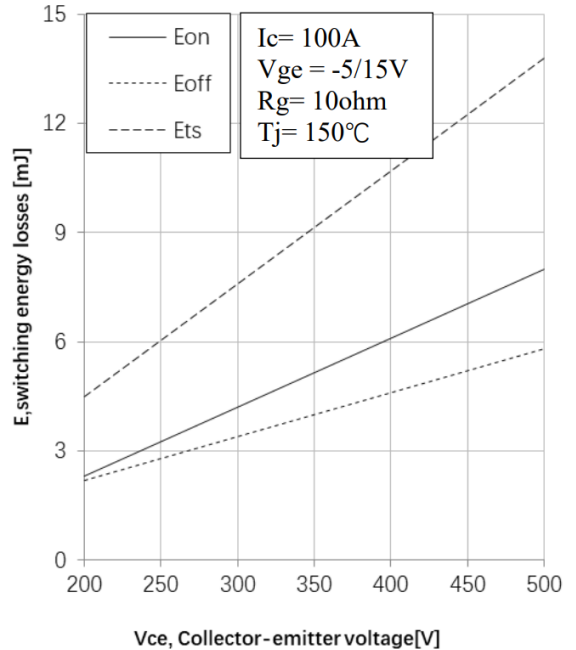


Figure 14. Typical switching energy losses as a function of collector to emitter voltage

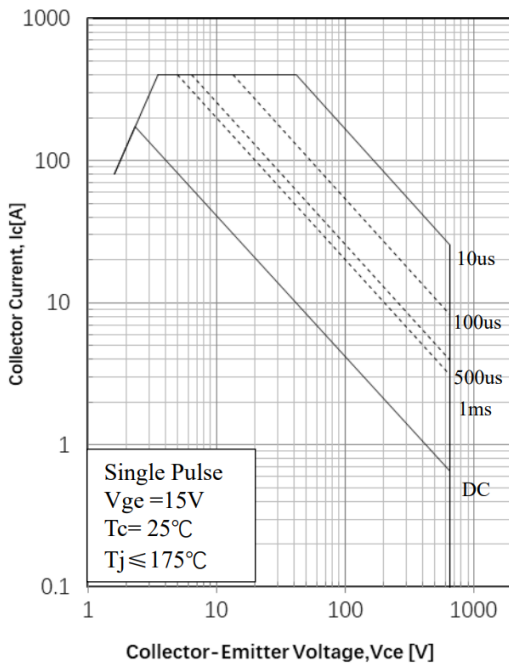


Figure 15. Safe Operating Area

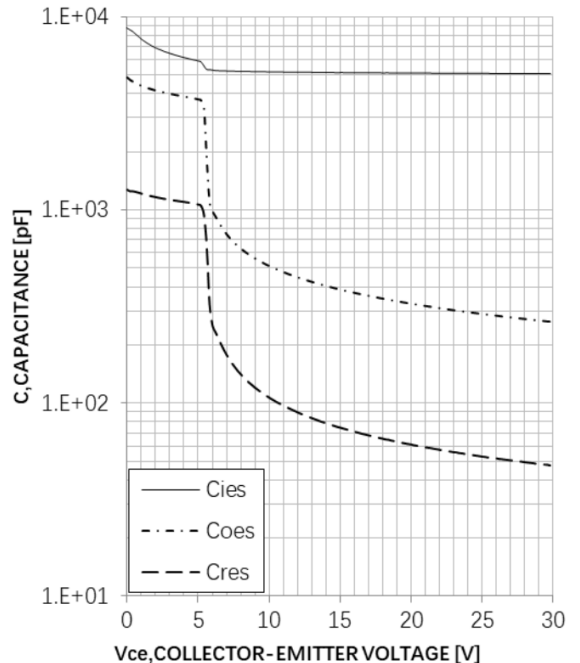


Figure 16. Typical capacitance as a function of collector to emitter voltage

# Typical Characteristics

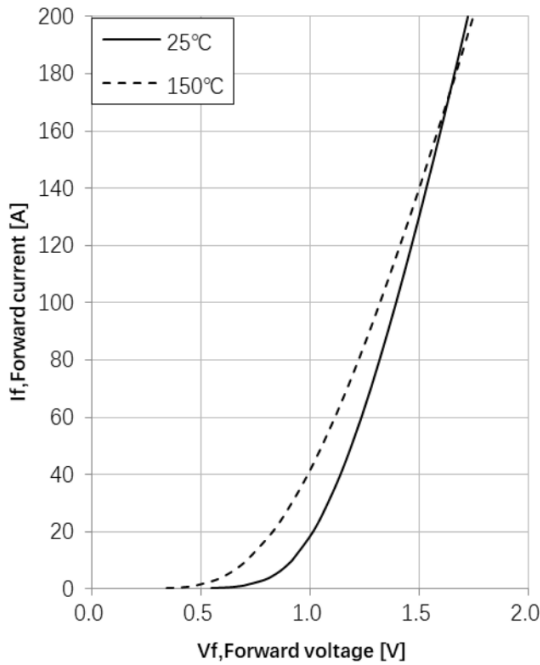


Figure 17. Diode forward current as a function of forward voltage

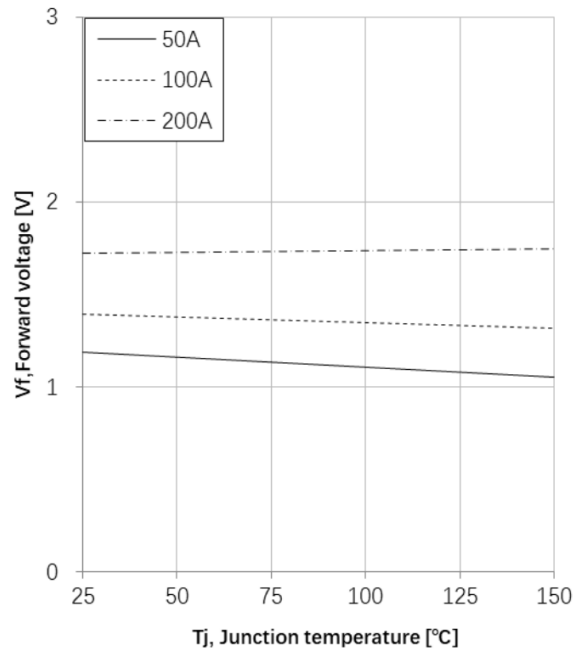


Figure 18. Diode forward current as a function of Junction temperature

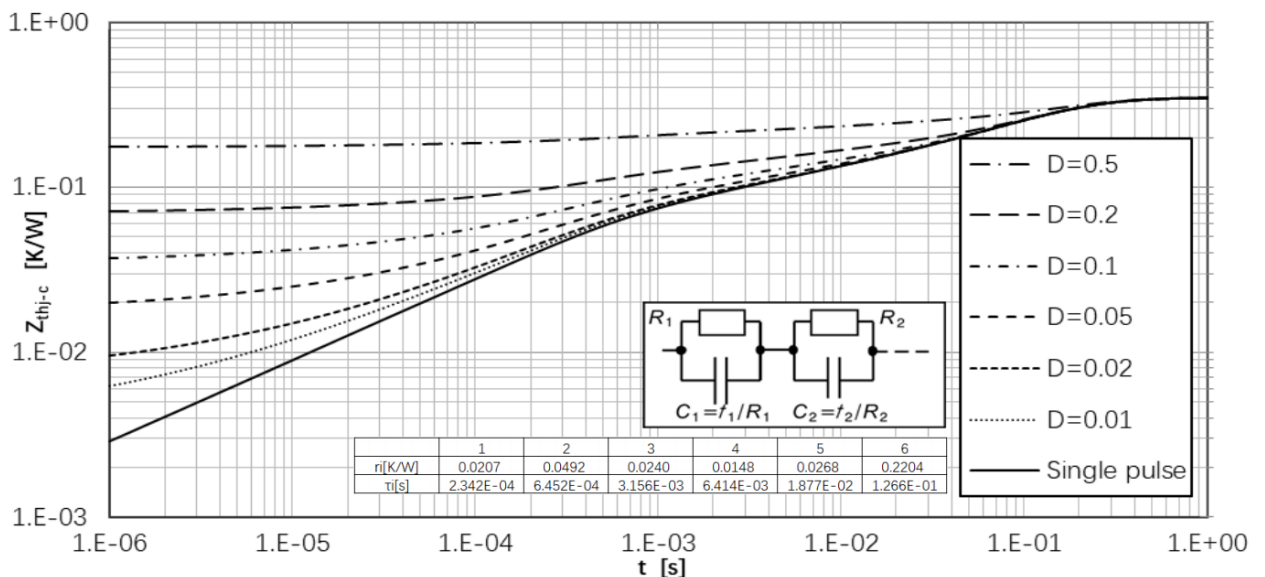
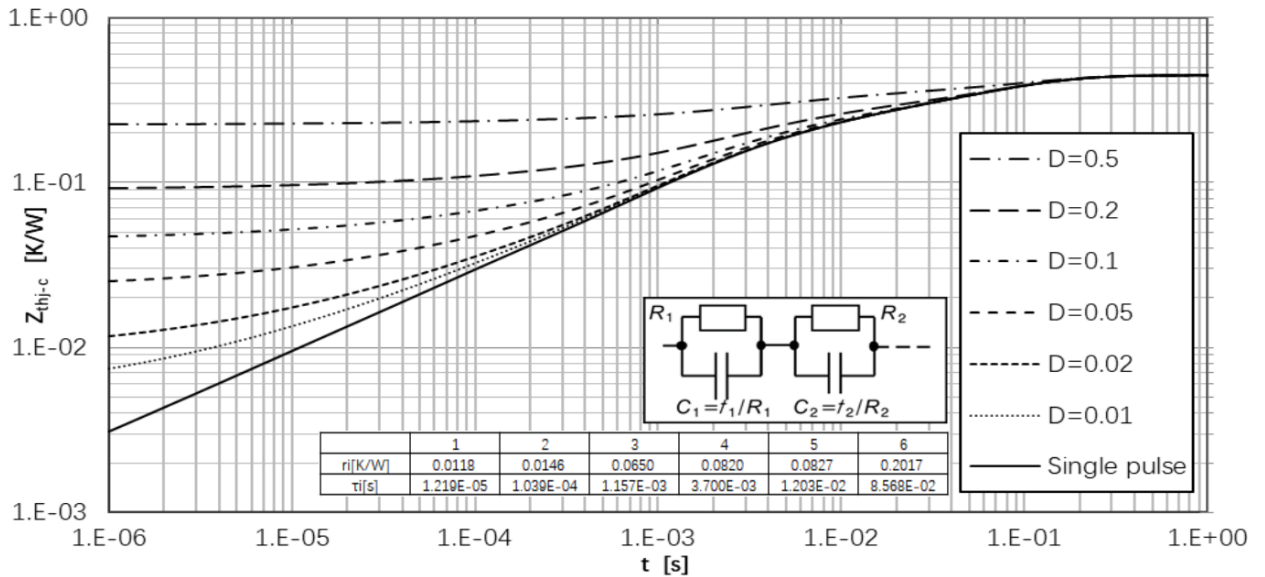


Figure 19. IGBT Transient thermal Impedance



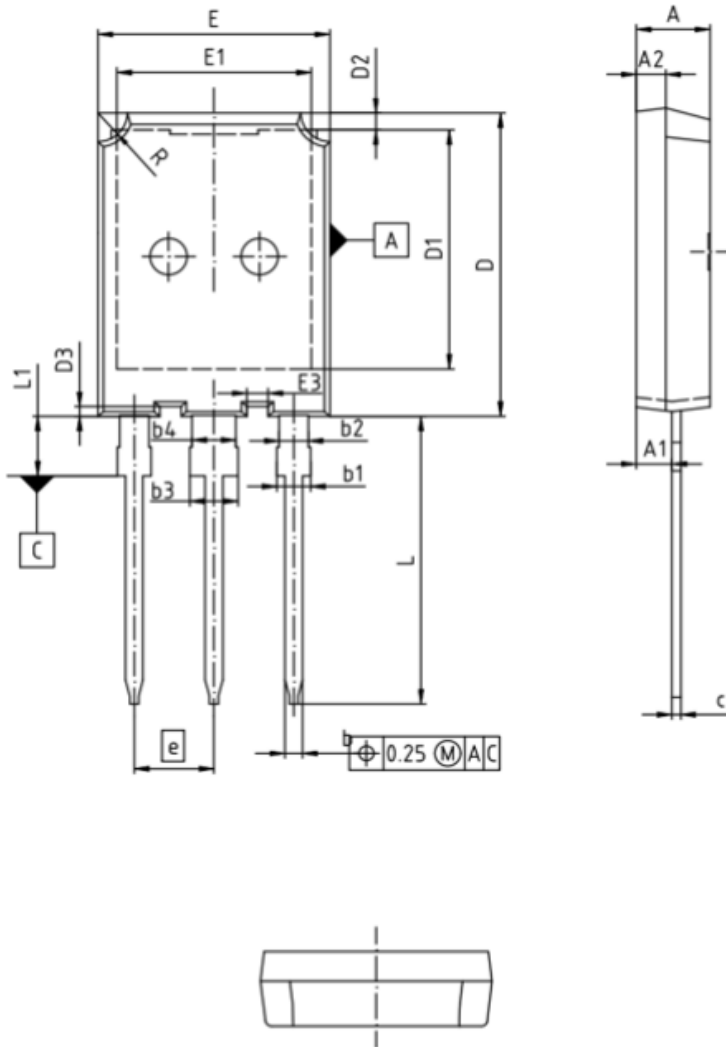
# Typical Characteristics



**Figure 20. Diode Transient thermal Impedance**

## Package Outline

Unit : mm



SYMBOL	DIMENSIONS	
	MIN	MAX
A	4.90	5.10
A1	2.31	2.51
A2	1.90	2.10
b	1.16	1.26
b1	1.86	2.16
b2	1.96	2.06
c	0.58	0.64
D	20.90	21.10
D1	16.25	16.85
D2	1.05	1.35
D3	0.58	0.78
E	15.70	15.90
E1	13.10	13.50
E3	1.35	1.55
e	5.44 BSC	
L	19.78	20.08
L1	4.03	4.23
R	1.90	2.10