

PTDM10065BY

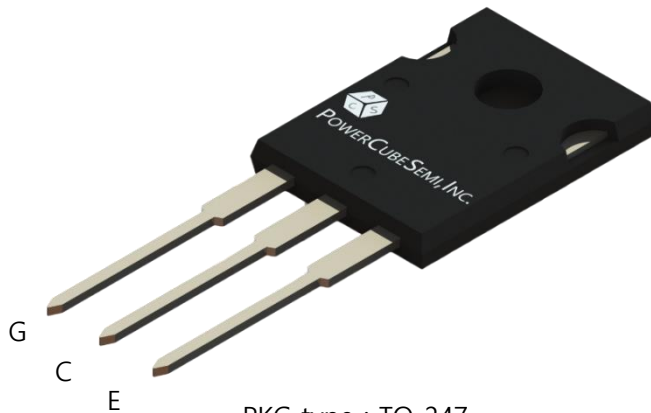
Features

IGBT Discrete

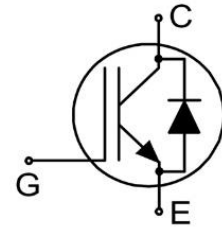
- Rated to 650V at 100Amps @ $T_j = 25^{\circ}\text{C}$
- $V_{CE(sat)}=1.35\text{V}$ @ $I_C=100\text{A}$
- Positive Temperature Coefficient
- High Ruggedness, Temperature Stable
- Maximum Junction Temperature 175°C
- High speed smooth switching device for hard & soft switching

Application

- General purpose inverters
- Motor drives
- Uninterruptible power supply, UPS
- Medium to low switching frequency power converters



PKG type : TO-247



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	± 20	V	
V_{GE}	Transient Gate-Emitter Voltage	± 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
PTDM10065BY	PTDM10065	TO-247	TUBE	-	30

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	$I_C=250\mu\text{A}$, $V_{GE}=0\text{V}$	650	-	-	V	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=100\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.00	1.35	1.70	V
			$T_J=125^{\circ}\text{C}$	-	1.50	-	
			$T_J=150^{\circ}\text{C}$	-	1.55	-	
$V_{GE(TH)}$	Gate-Emitter Threshold Voltage	$V_{CE}=V_{GE}$, $I_C=1.20\text{mA}$	3.25	3.75	4.25	V	
I_{CES}	Zero Gate Voltage Collector Current	$V_{CE}=650\text{V}$, $V_{GE}=0\text{V}$	$T_J=25^{\circ}\text{C}$	-	-	0.25	mA
			$T_J=150^{\circ}\text{C}$	-	-	3.00	
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$	-	-	200	nA	

Dynamic Characteristics

Symbol	Parameter	Test Condition	Numerical			Unit	
			Min	Typ	Max		
Q_G	Total Gate Charge	$V_{CC}=300\text{V}$, $I_C=100\text{A}$, $V_{GE}=-5\sim 15\text{V}$	-	0.34	-	μC	
V_F	Diode Forward Voltage	$I_F=100\text{A}$	$T_J=25^{\circ}\text{C}$	-	1.40	1.90	V
			$T_J=125^{\circ}\text{C}$	-	1.35	-	
			$T_J=150^{\circ}\text{C}$	-	1.30	-	
C_{IES}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$	-	4.96	-	nF	
C_{RES}	Reverse Transfer Capacitance		-	0.05	-		



Electrical Characteristics

Switching Characteristics

Symbol	Parameter	Test Condition		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	$T_J=25^\circ C$ $T_J=125^\circ C$ $T_J=150^\circ C$	-	19	-	ns
				-	22	-	
				-	23	-	
t_r	Turn-On Rise Time			-	95	-	
				-	88	-	
				-	84	-	
$t_{d(off)}$	Turn-Off Delay Time			-	204	-	
				-	220	-	
				-	226	-	
t_f	Turn-Off Fall Time	-	44	-			
		-	55	-			
		-	59	-			
E_{on}	Turn-On Switching Energy	-	4.0	-	mJ		
		-	4.1	-			
		-	4.2	-			
E_{off}	Turn-Off Switching Energy	-	1.1	-			
		-	1.4	-			
		-	1.6	-			
E_{rec}	Reverse Recovery Energy	-	0.16	-	mJ		
		-	0.47	-			
		-	0.61	-			
I_{rr}	Reverse Recovery Current	$I_F=100A,$ $V_R=300V,$ $-di/dt=550A/\mu s$	$T_J=25^\circ C$ $T_J=125^\circ C$ $T_J=150^\circ C$	-	23	-	A
				-	36	-	
				-	41	-	
Q_{rr}	Reverse Recovery Charge			-	1.8	-	uC
				-	4.2	-	
				-	5.7	-	
T_{rr}	Reverse Recovery Time			-	116	-	ns
				-	158	-	
				-	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

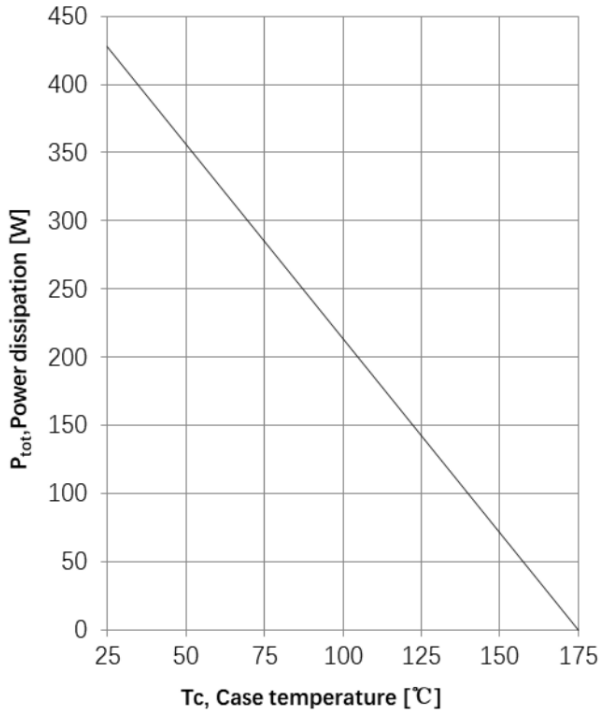


Figure 1. Power dissipation as a function of case temperature ($T_J \leq 175^\circ\text{C}$)

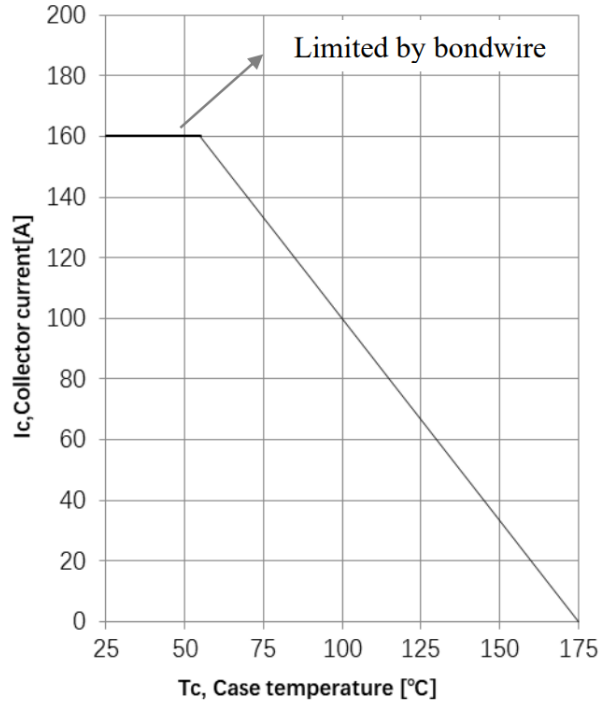


Figure 2. Collector current as a function of case temperature ($V_{GE} \geq 15\text{V}$, $T_J \leq 175^\circ\text{C}$)

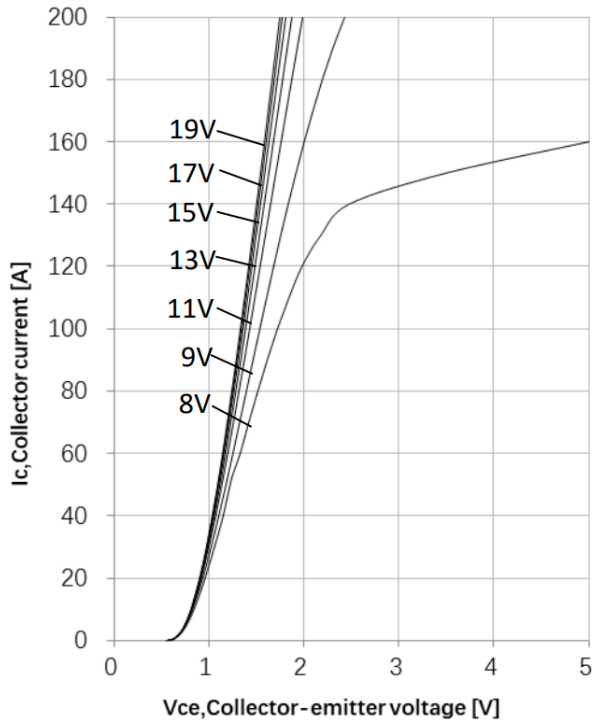


Figure 3. Typical output Characteristics ($T_J = 25^\circ\text{C}$)

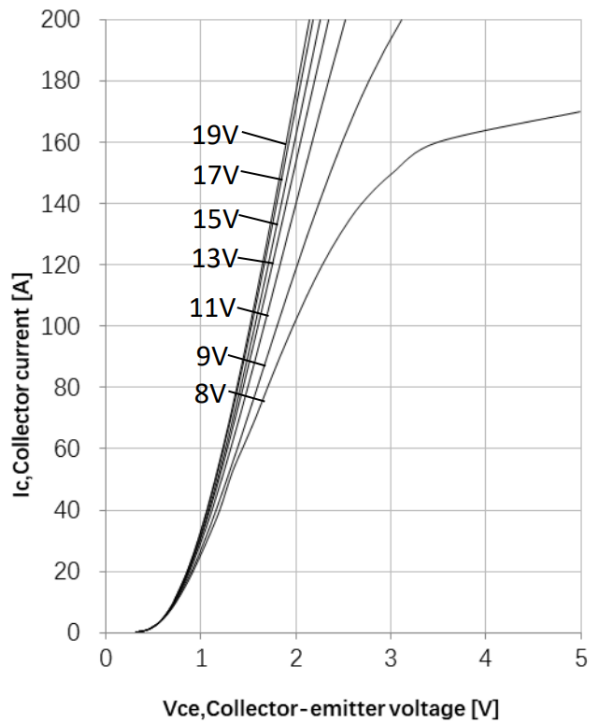


Figure 4. Typical output Characteristics ($T_J = 150^\circ\text{C}$)

Typical Characteristics

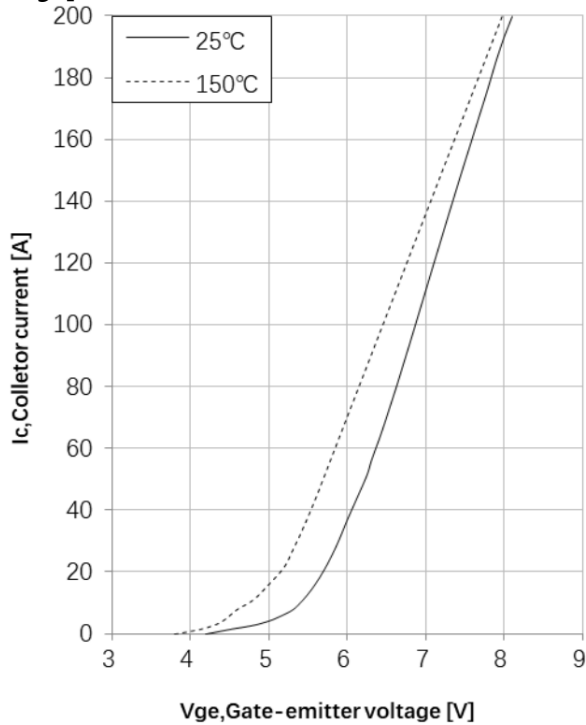


Figure 5. Typical transfer characteristic ($V_{GE}=20V$)

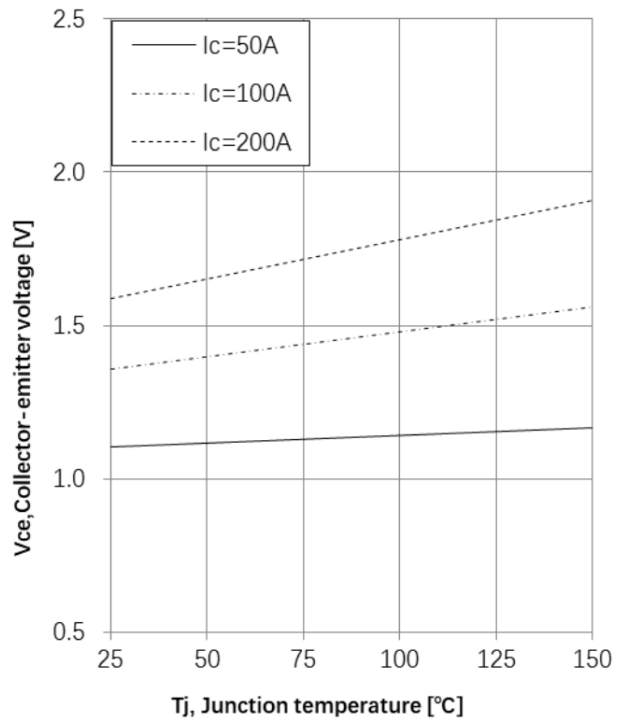


Figure 6. Typical collector-emitter saturation voltage as a function of T_j ($V_{GE}=15V$)

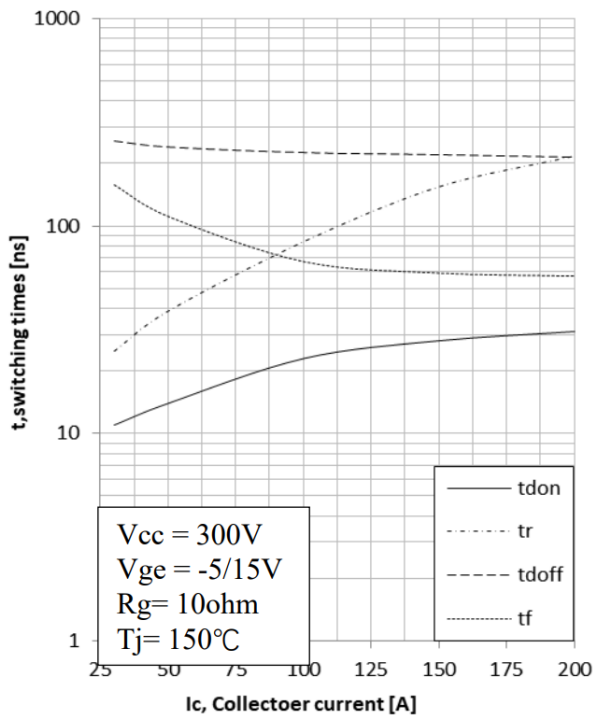


Figure 7. Typical switching time as a function of collector current

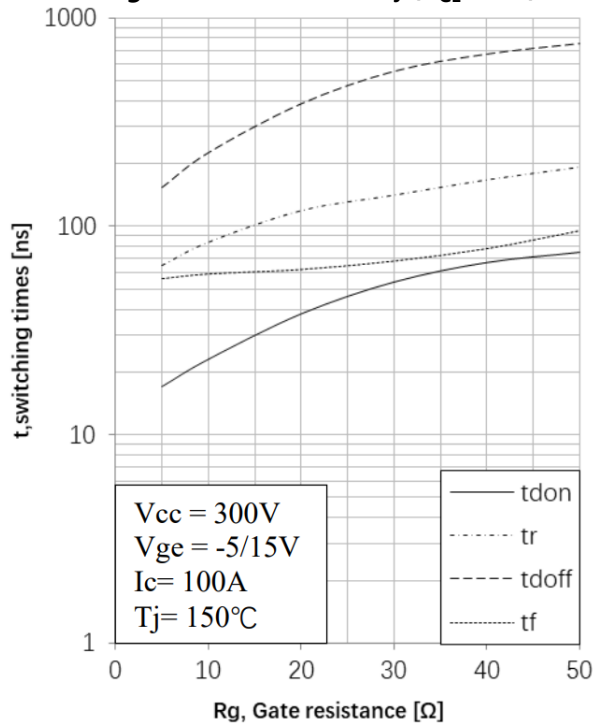


Figure 8. Typical switching times as a function of gate resistance

Typical Characteristics

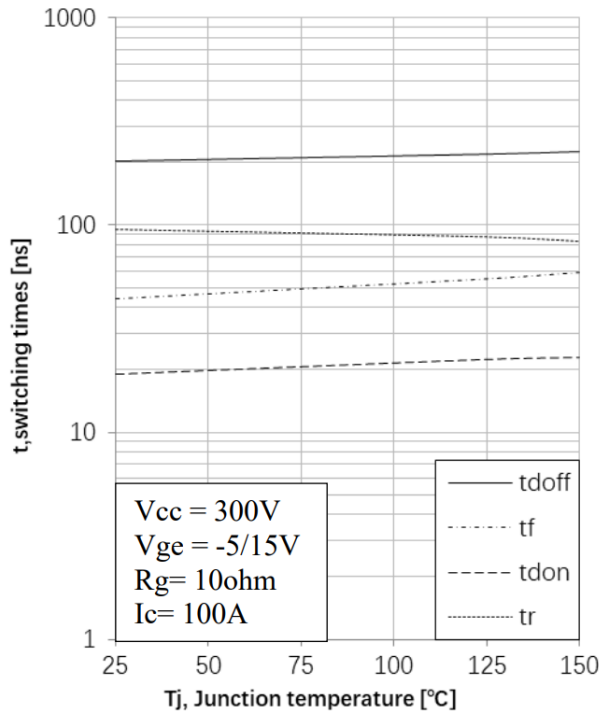


Figure 9. Typical switching times as a function of junction temperature

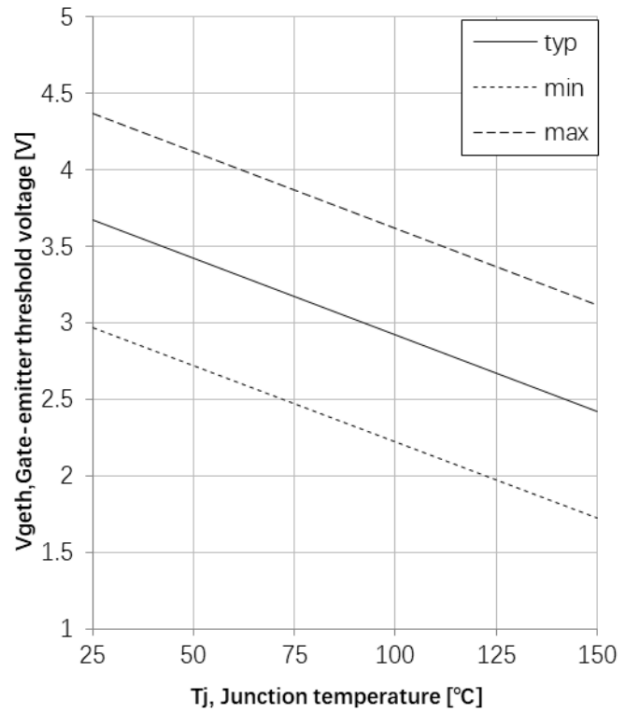


Figure 10. Gate to emitter threshold voltage as a function of junction temperature ($I_c = 1.2mA$)

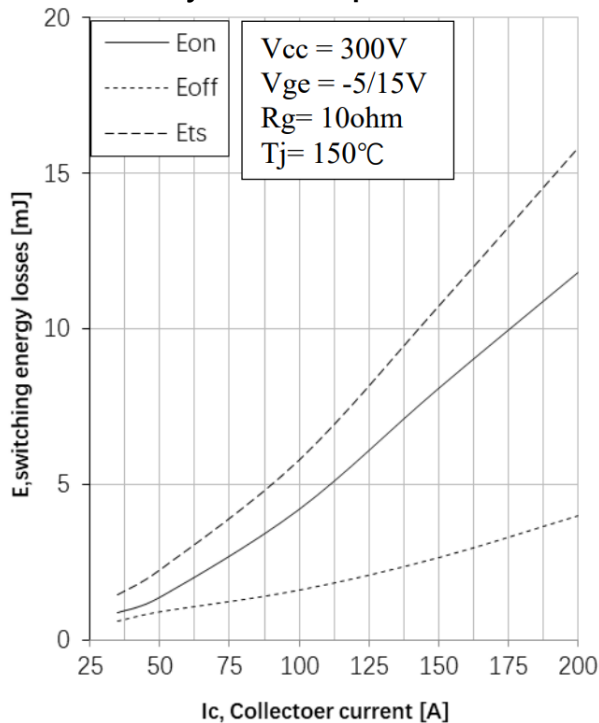


Figure 11. Typical switching energy losses as a function of collector current

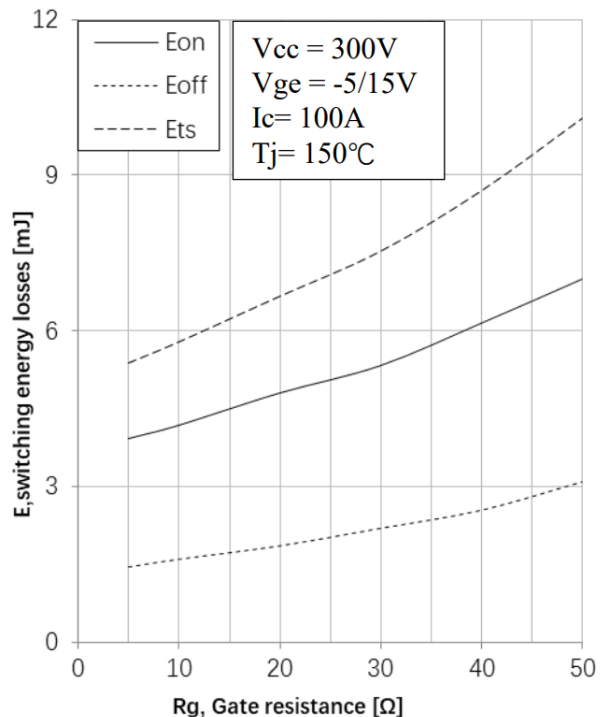


Figure 12. Typical switching energy losses as a function of gate resistance

Typical Characteristics

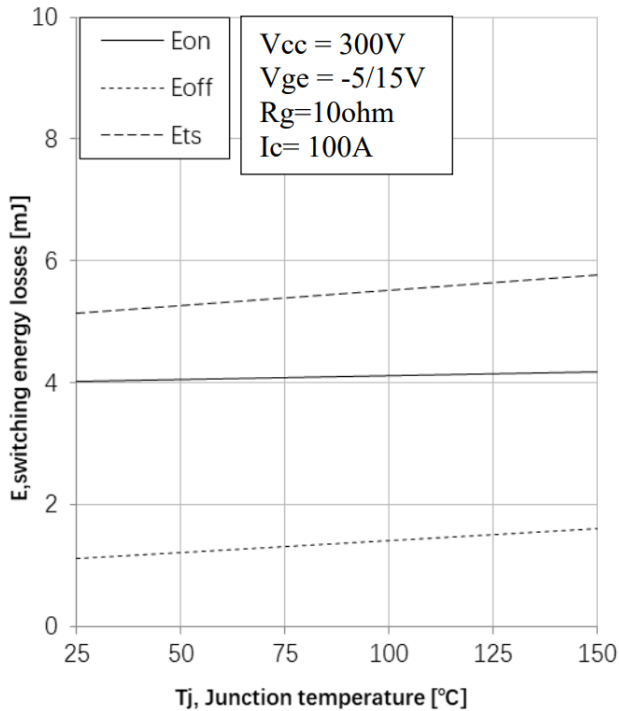


Figure 13. Typical switching energy losses as a function of junction temperature

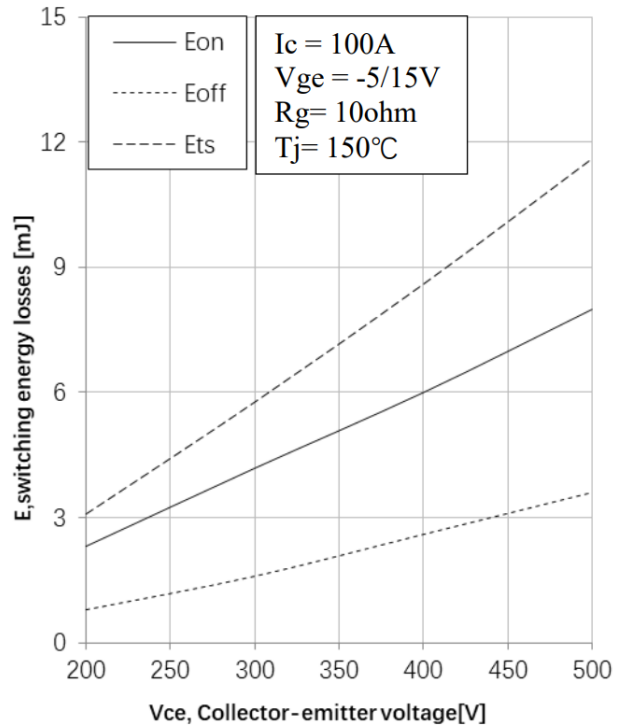


Figure 14. Typical switching energy losses as a function of collector to emitter voltage

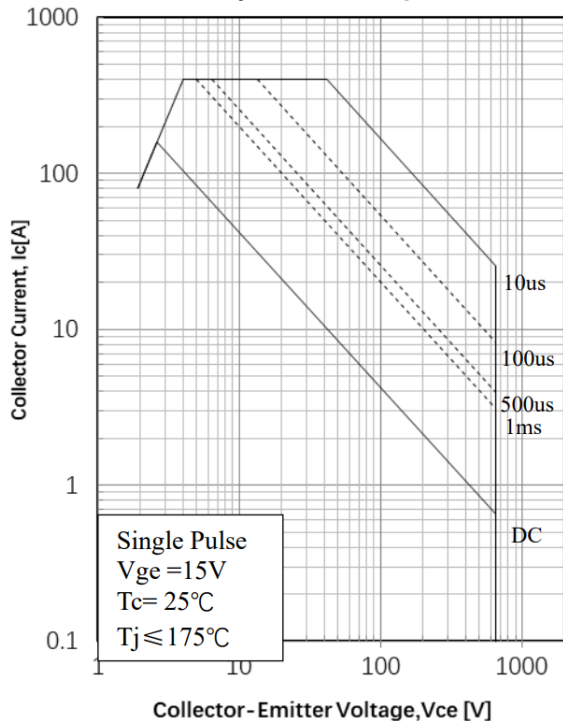


Figure 15. Safe Operating Area

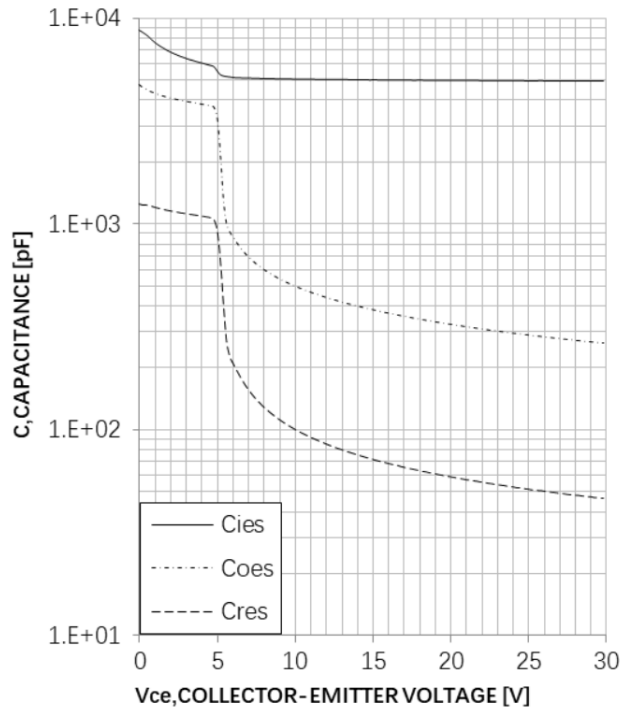


Figure 16. Typical capacitance as a function of collector to emitter voltage

Typical Characteristics

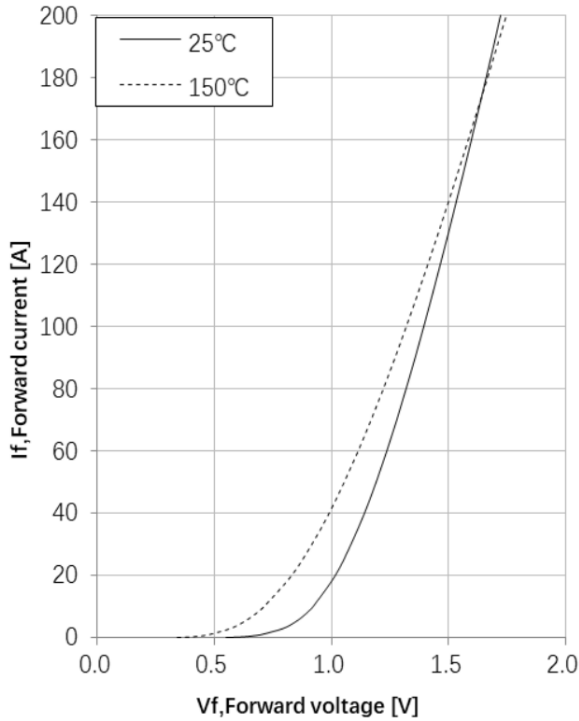


Figure 17. Diode forward current as a function of forward voltage

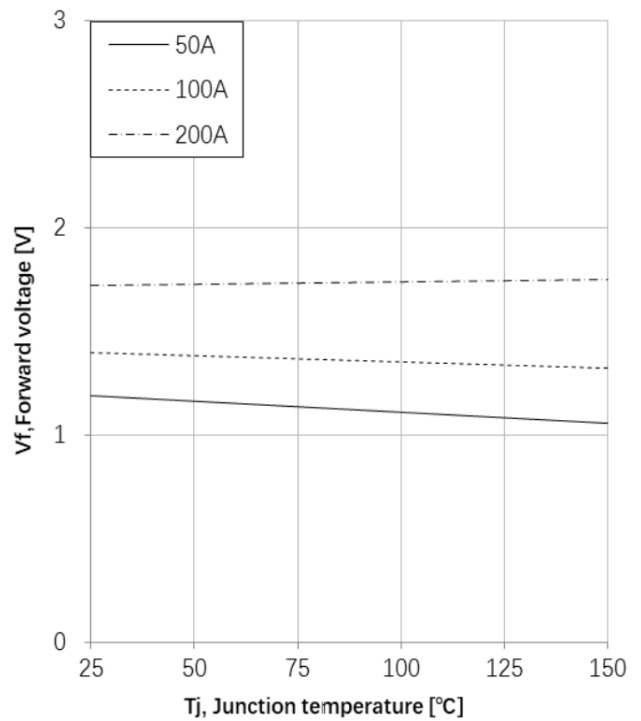


Figure 18. Diode forward voltage as a function of junction temperature

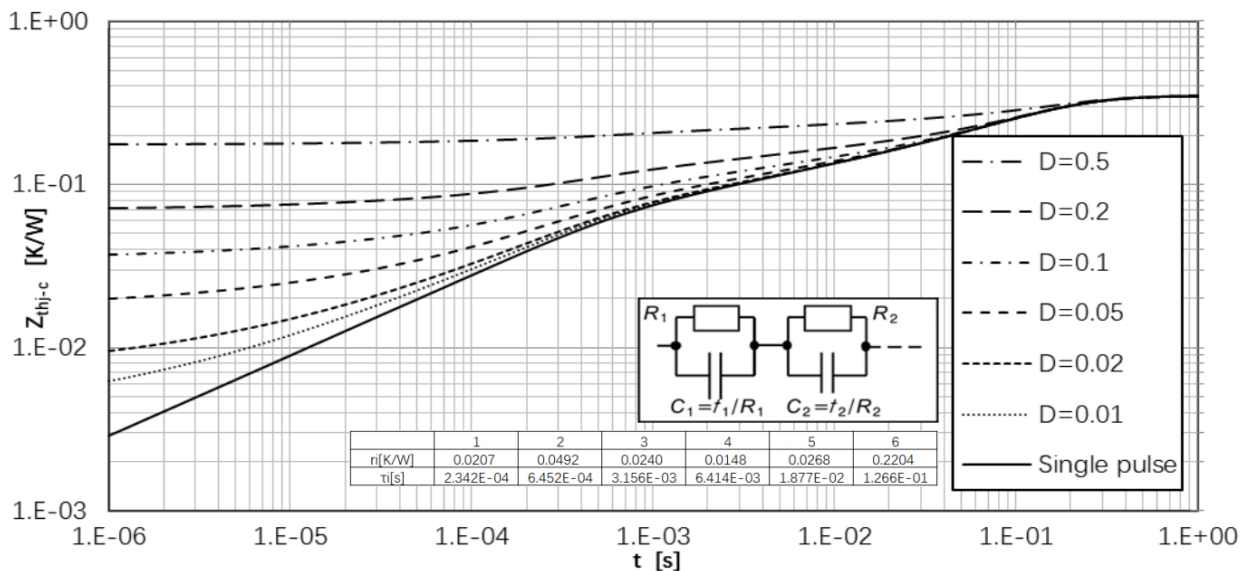


Figure 19. IGBT Transient Thermal Impedance

Typical Characteristics

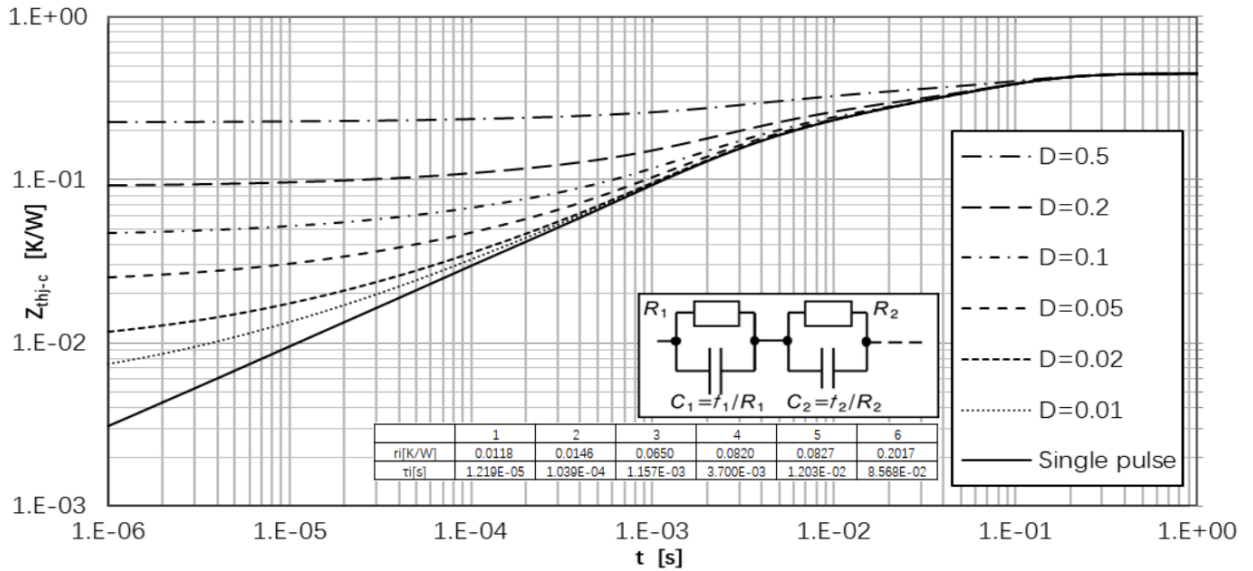
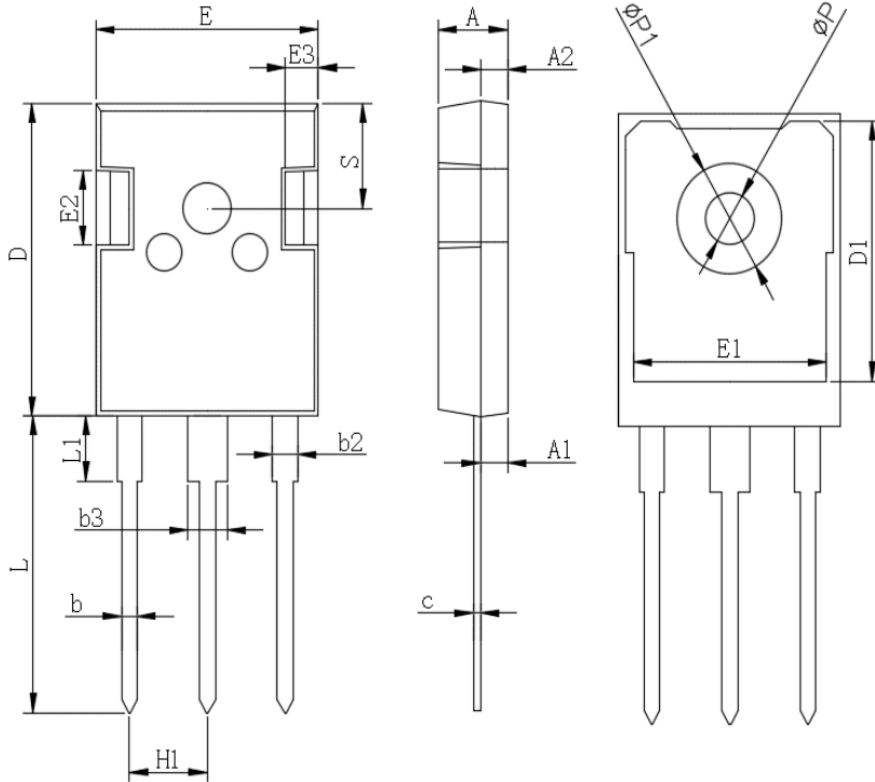


Figure 20. Diode Transient Thermal Impedance



Package Outline

Unit : mm



SYMBOL	DIMENSIONS	
	MIN	MAX
A	4.80	5.20
A1	2.21	2.61
A2	1.85	2.15
b	1.0	1.4
b2	1.91	2.21
C	0.5	0.7
D	20.70	21.30
D1	16.25	16.85
E	15.50	16.10
E1	13.0	13.6
E2	4.80	5.20
E3	2.30	2.70
L	19.62	20.22
L1	-	4.30
ΦP	3.40	3.80
ΦP1	-	7.30
S	6.15 Typ	
H1	5.44 Typ	
b3	2.80	3.20