PTDM16065NY

PowerCubeSemi, Inc.
Potential · Convergence · Smart

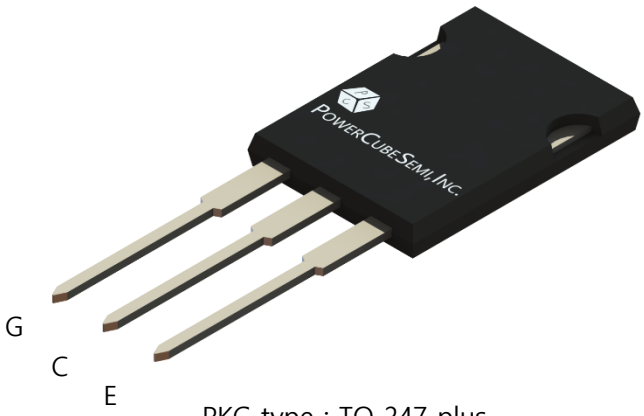
Features

IGBT Discrete

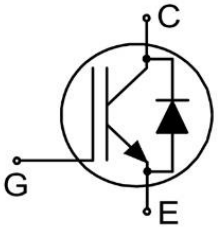
- Rated to 650V at 160Amps @T_J = 25℃
- $V_{CE(sat)}$=1.70V @ I_C=160A
- Positive Temperature Coefficient
- High Ruggedness, Temperature Stable
- Maximum Junction Temperature 175℃
- High speed smooth switching device for hard & soft switching

Application

- Traction Inverter for HEV/EV
- Motor drives
- Auxiliary DC/AC Converter



PKG type : TO-247 plus



Halogen-Free

RoHS

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
BV_{CES}	Collector-Emitter Breakdown Voltage		650	V
I_C	DC Collector Current	T_C=25℃	250	A
		T_C=100℃	160	
I_{CM}	Pulsed Collector Current		480	A
I_F	Diode Forward Current	T_C=25℃	250	A
		T_C=100℃	160	
$I_{F,\ Pulse}$	Diode Pulsed Current		480	A
V_{GE}	Continuous Gate-Emitter Voltage		±20	V
V_{GE}	Transient Gate-Emitter Voltage		±30	
P_D	Power Dissipation	T_C=25℃	882	W
T_{vj}	Operating Junction Temperature Range		-40 to 175	℃
T_{stg}	Storage Temperature Range		-55 to 150	

Package Marking and Ordering Information

Device Marking	Device	Package	Packing Method	Tape width	Quantity
PTDM16065NY	PTDM16065	TO-247 Plus	TUBE	-	30

Electrical Characteristics

T_J=25℃ Unless Otherwise Specified

Static Characteristics

Symbol	Parameter	Test Condition		Numerical			Unit
				Min	Typ	Max	
BV_{CES}	Collector-Emitter Breakdown Voltage	I_C=250uA, V_{GE}=0V		650	-	-	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=160A, V_{GE}=15V	T_J=25℃	1.35	1.70	2.05	V
			T_J=125℃	-	1.95	-	
			T_J=150℃	-	2.05	-	
$V_{GE(TH)}$	Gate-Emitter Threshold Voltage	V_{CE}=V_{GE}, I_C=3mA		5.4	6.0	6.6	V
I_{CES}	Zero Gate Voltage Collector Current	V_{CE}=650 V, V_{GE}=0V	T_J=25℃	-	-	0.25	mA
			T_J=150℃	-	-	3.00	
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=±20V, V_{CE}=0V		-	-	200	nA

Dynamic Characteristics

Symbol	Parameter	Test Condition		Numerical			Unit
				Min	Typ	Max	
Q_G	Total Gate Charge	V_{CC}=300V, I_C=160A, V_{GE}=-5V~15V		-	0.36	-	uC
V_F	Diode Forward Voltage	I_F=160A	T_J=25℃	-	1.55	2.05	V
			T_J=125℃	-	1.50	-	
			T_J=150℃	-	1.45	-	
C_{IES}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f=1MHz		-	9.88	-	nF
C_{RES}	Reverse Transfer Capacitance			-	0.06	-	

Electrical Characteristics

T_J=25℃ Unless Otherwise Specified

Switching Characteristics

Symbol	Parameter	Test Condition		0.86Numerical			Unit
				Min	Typ	Max	
$t_{d(on)}$	Turn-On Delay Time	V_{GE}=-5~15V, V_{CC}=300V, I_C=160A, R_G=10Ω, Inductive Load	T_J=25℃ T_J=125℃ T_J=150℃	- - -	135 139 142	- - -	ns
t_r	Turn-On Rise Time			- - -	282 263 254	- - -	
$t_{d(off)}$	Turn-Off Delay Time			- - -	235 266 272	- - -	
t_f	Turn-Off Fall Time			- - -	97 144 181	- - -	
E_{on}	Turn-On Switching Energy			- - -	12.3 12.6 12.8	- - -	mJ
E_{off}	Turn-Off Switching Energy			- - -	4.4 5.9 6.5	- - -	
E_{rec}	Reverse Recovery Energy	I_F=160A, V_R=300V, -dI/dt=340A/μs	T_J=25℃ T_J=125℃ T_J=150℃	- - -	0.10 0.41 0.46	- - -	mJ
I_{rr}	Reverse Recovery Current			- - -	16 29 38	- - -	A
Q_{rr}	Reverse Recovery Charge			- - -	1.5 4.4 6.1	- - -	uC

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	0.17	
$R_{\theta(J-C)}$	Thermal Resistance Junction-to-Case for Diode	0.25	

Typical Characteristics

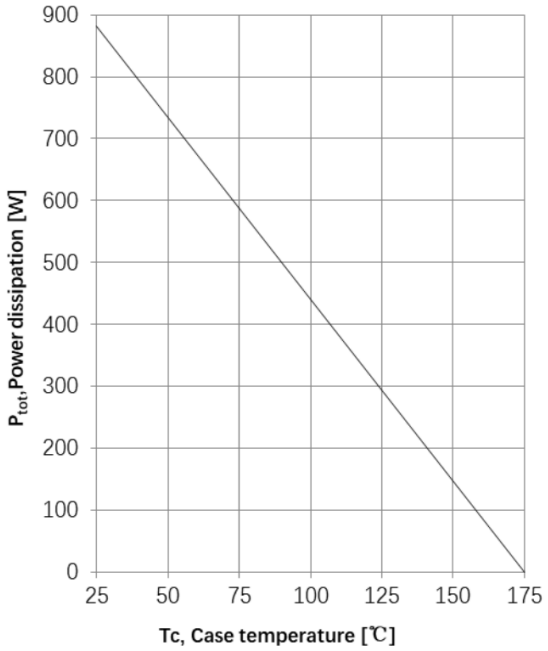


Figure 1. Power dissipation as a function of case temperature (T_J≤175℃)

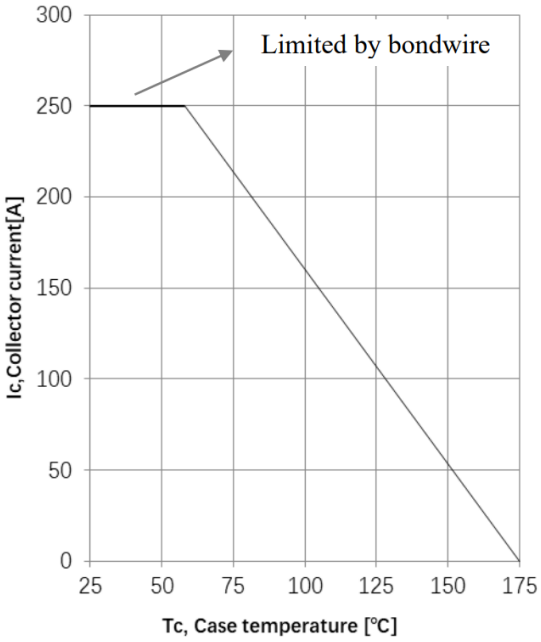


Figure 2. Collector current as a function of case temperature (V_{GE}≥15V, T_J≤175℃)

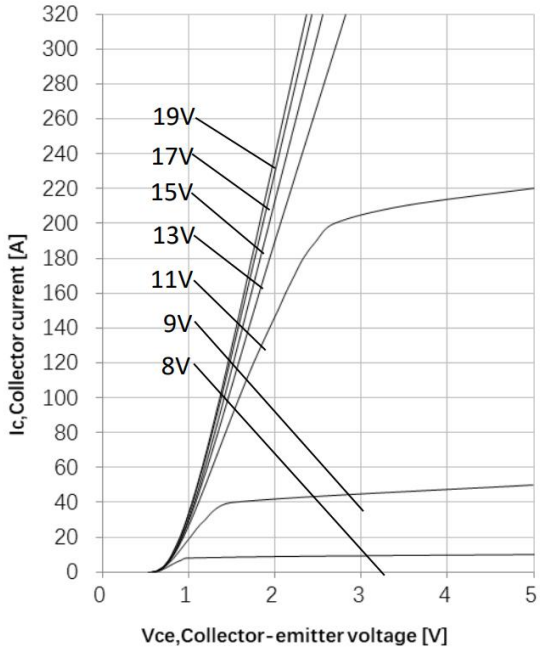


Figure 3. Typical output Characteristics (T_J=25℃)

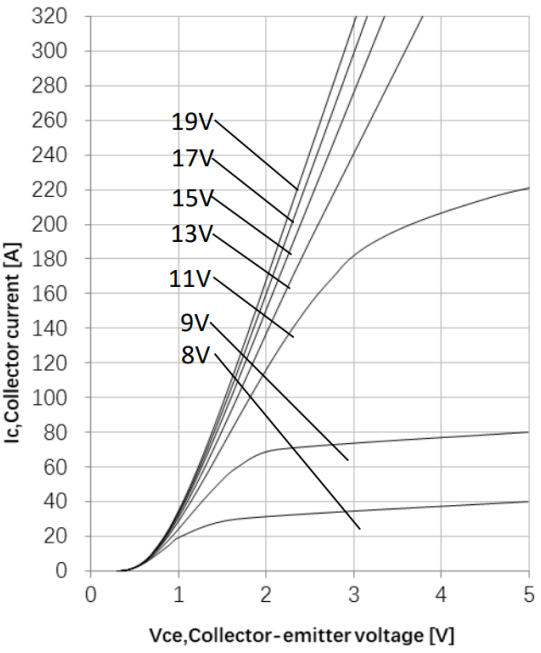


Figure 4. Typical output Characteristics (T_J=150℃)

Typical Characteristics

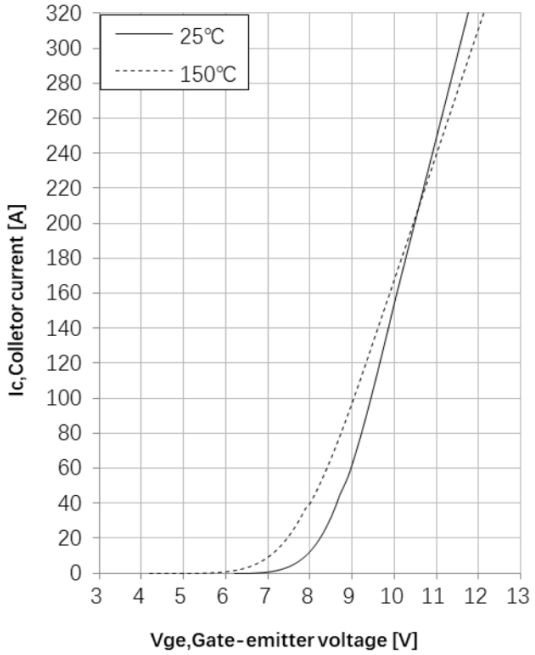


Figure 5. Typical transfer characteristic (V_{GE}=20V)

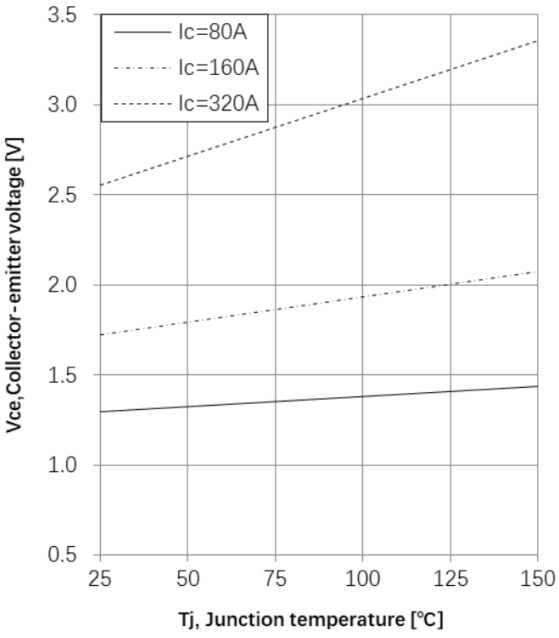


Figure 6. Typical collector-emitter saturation voltage as a function of junction temperature (V_{GE}=15V)

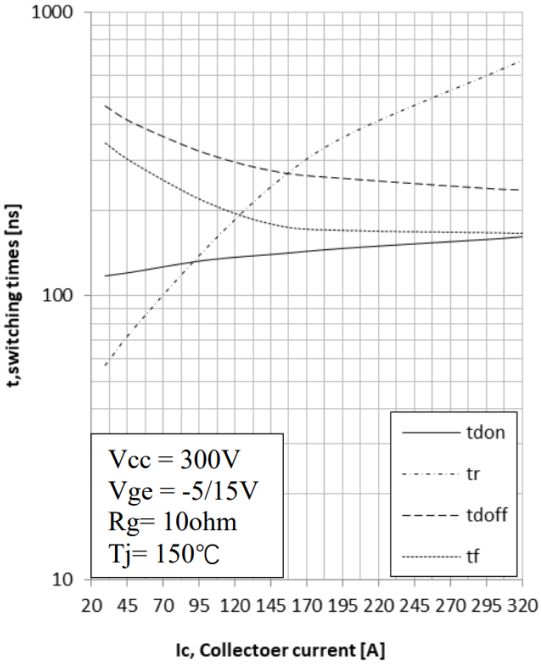


Figure 7. Typical switching time as a function of collect current

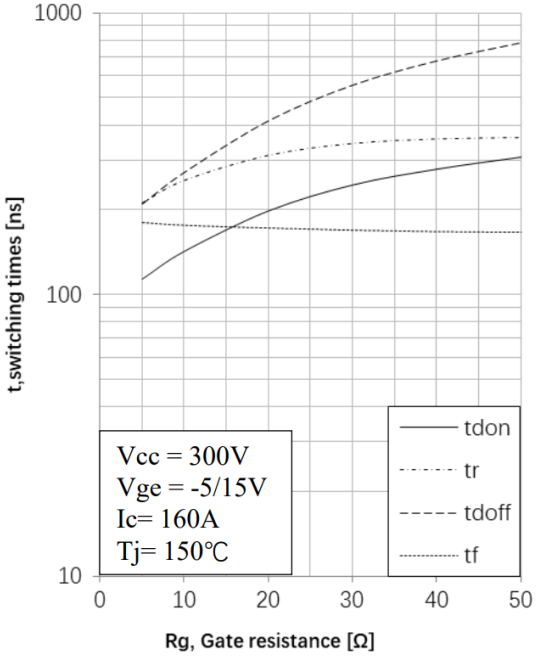


Figure 8. Typical switching times as a function of gate resistance

Typical Characteristics

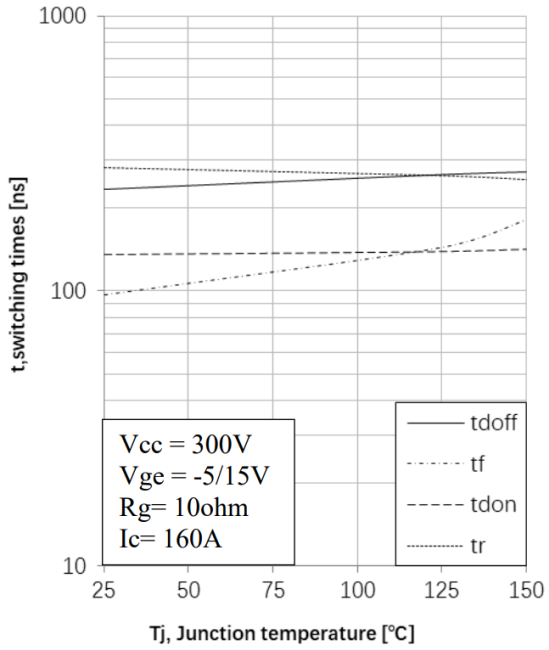


Figure 9. Typical switching times as a function of junction temperature

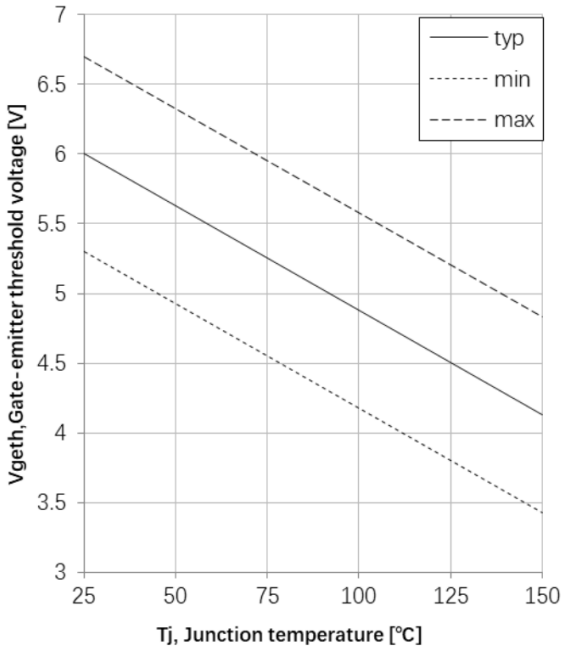


Figure 10. Gate to emitter threshold voltage as a function of junction temperature (I_C=3mA)

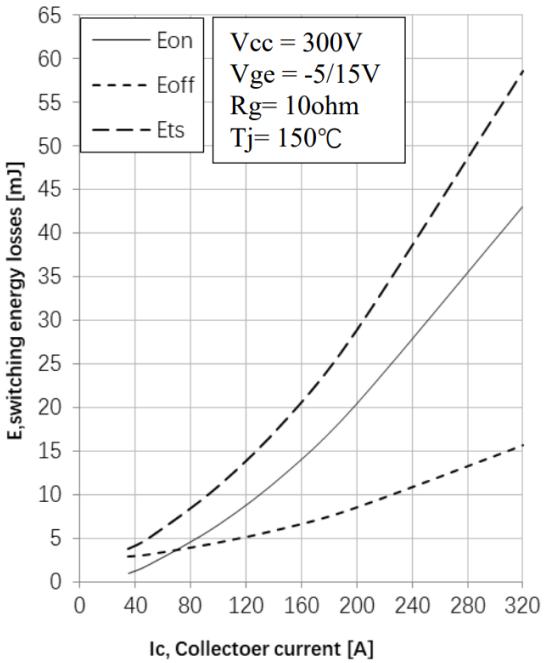


Figure 11. Typical switching energy losses as a function of collect current

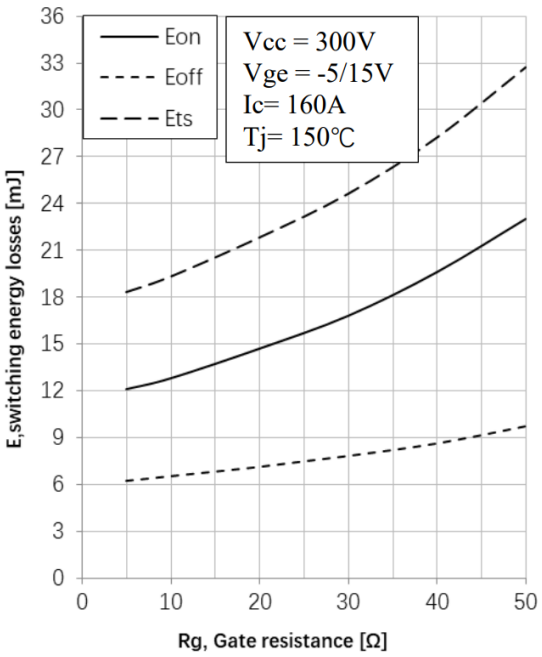


Figure 12. Typical switching energy losses as a function of gate resistance

Typical Characteristics

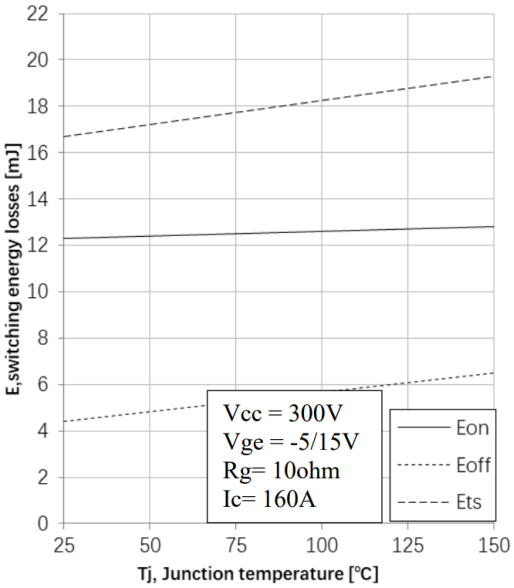


Figure 13. Typical switching energy losses as a function of junction temperature

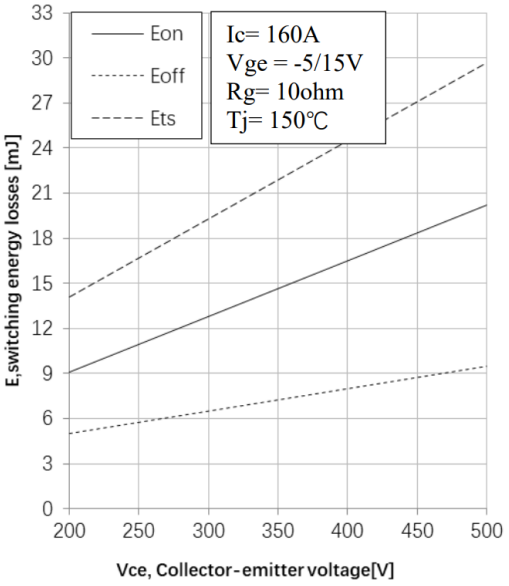


Figure 14. Typical switching energy losses as a function of collector to emitter voltage

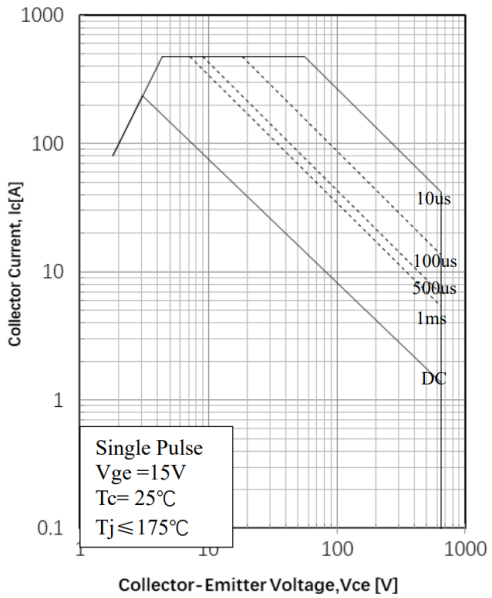


Figure 15. Safe Operating Area

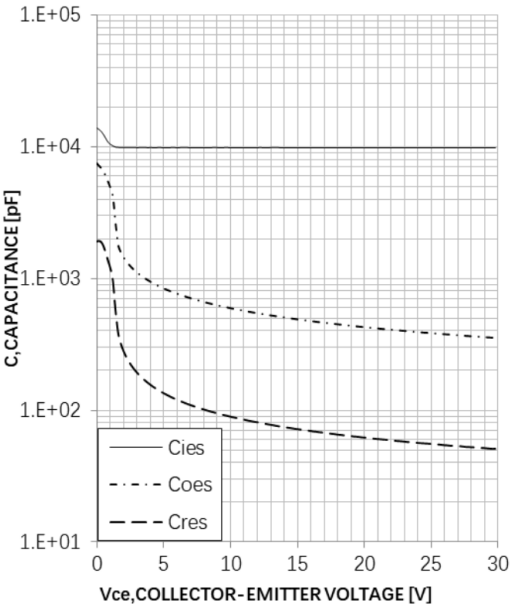


Figure 16. Typical capacitance as a function of collector to emitter voltage

Typical Characteristics

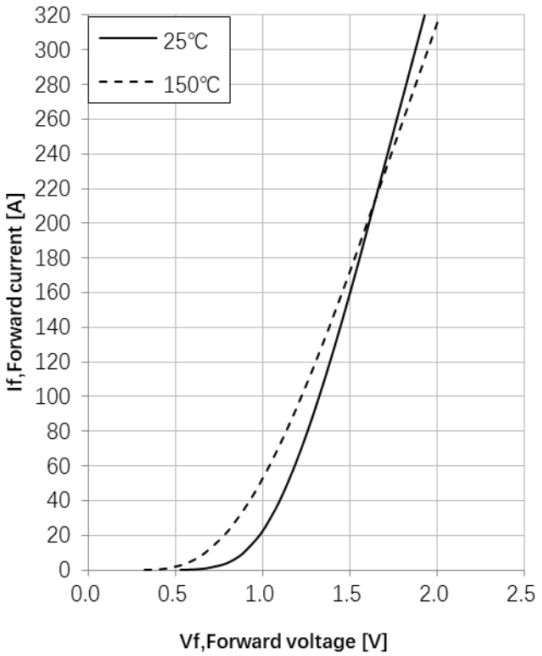


Figure 17. Diode forward current as a function of forward voltage

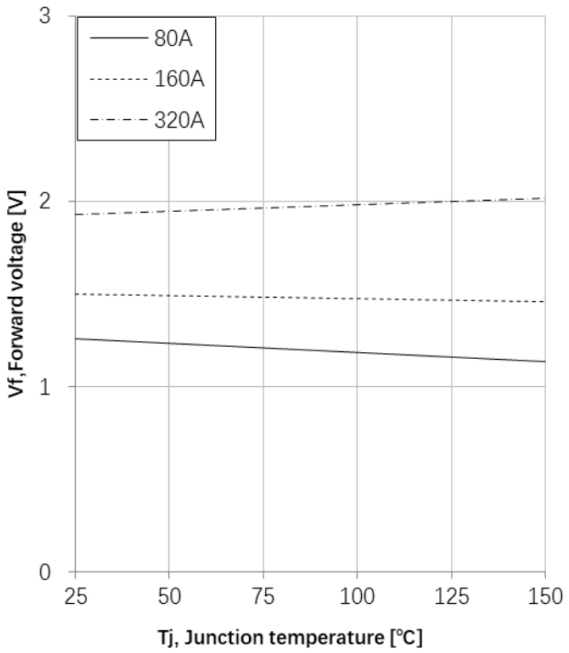


Figure 18. Diode forward voltage as a function of junction temperature

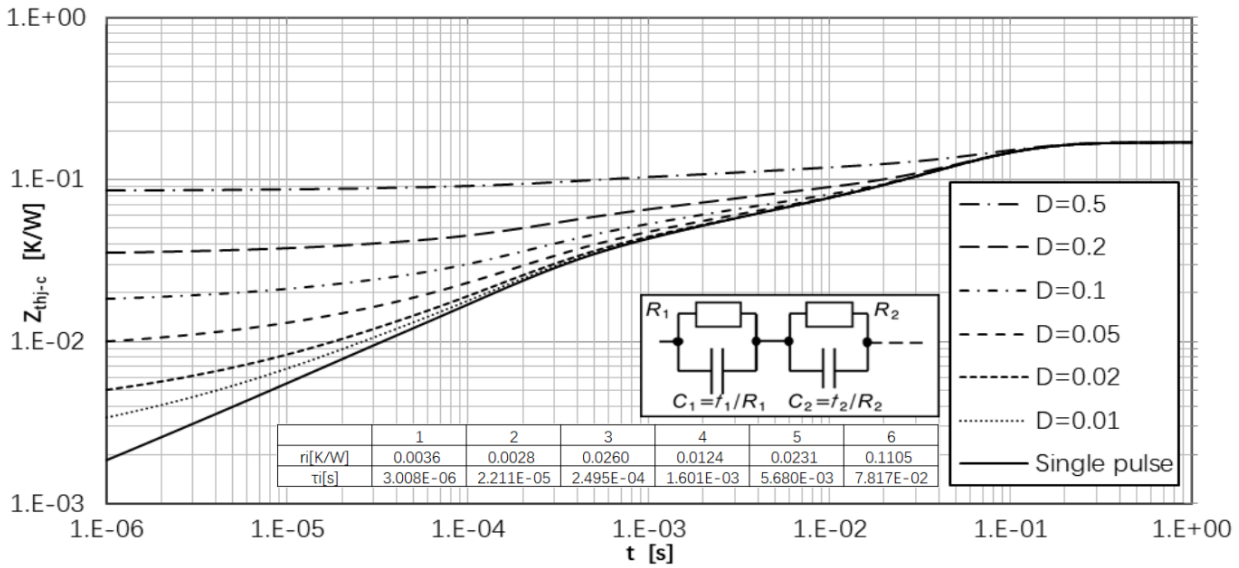
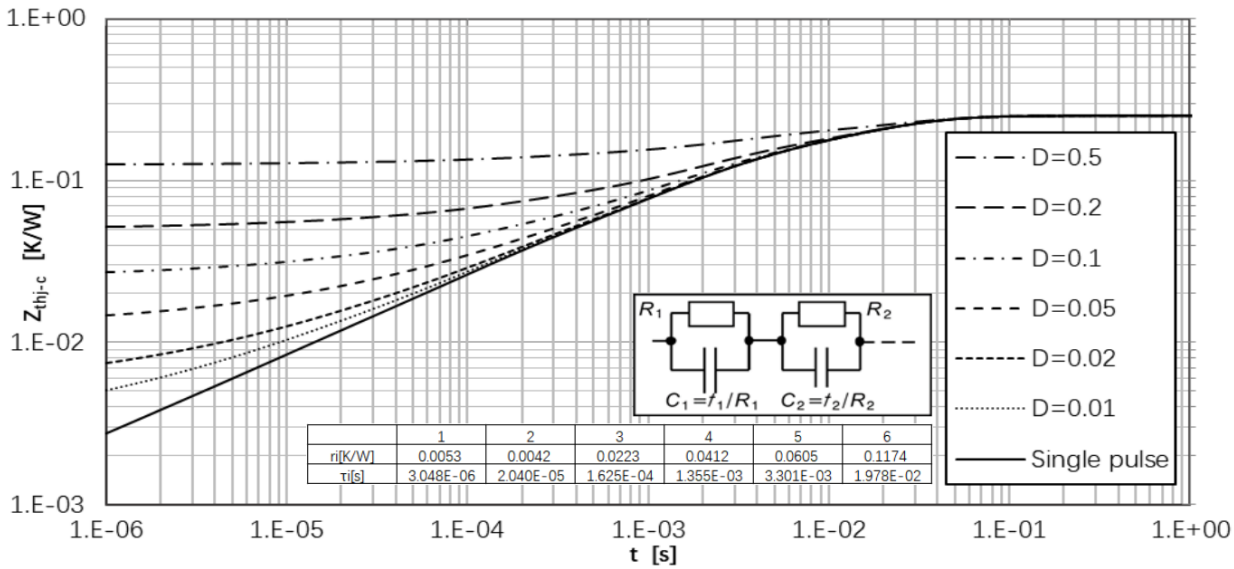


Figure 19. IGBT Transient Thermal Impedance

Typical Characteristics



	1	2	3	4	5	6
ri[K/W]	0.0053	0.0042	0.0223	0.0412	0.0605	0.1174
τi[s]	3.048E-06	2.040E-05	1.625E-04	1.355E-03	3.301E-03	1.978E-02

Figure 20. Diode Transient Thermal Impedance

Package Outline

Unit : mm