PTDM10065NY

PowerCubeSemi, Inc.
Potential · Convergence · Smart

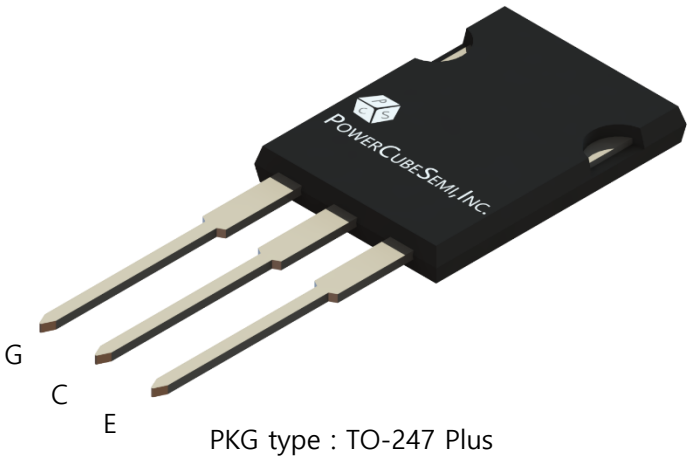
Features

IGBT Discrete

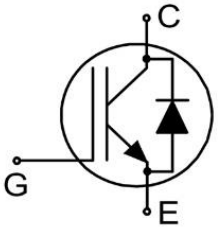
- Rated to 650V at 100Amps @T_C = 100℃
- $V_{CE(sat)}$=1.35V @ I_C=100A
- Positive Temperature Coefficient
- High Ruggedness, Temperature Stable
- Maximum Junction Temperature 175℃
- High speed smooth switching device for hard & soft switching

Application

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



PKG type : TO-247 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℃	160	A
		T_C=100℃	100	
I_{CM}	Pulsed Collector Current		400	A
I_F	Diode Forward Current	T_C=25℃	160	A
		T_C=100℃	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℃	428	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
PTDM10065NY	PTDM10065	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=100A, V_{GE}=15V	T_J=25℃	1.00	1.35	1.70	V
			T_J=125℃	-	1.50	-	
			T_J=150℃	-	1.55	-	
$V_{GE(TH)}$	Gate-Emitter Threshold Voltage	V_{CE}=V_{GE}, I_C=1.20mA		3.25	3.75	4.25	V
I_{CES}	Zero Gate Voltage Collector Current	V_{CE}=650V, 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=100A, V_{GE}=-5 to 15V		-	0.34	-	uC
V_F	Diode Forward Voltage	I_F=100A	T_J=25℃	-	1.40	1.90	V
			T_J=125℃	-	1.35	-	
			T_J=150℃	-	1.30	-	
C_{IES}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f=1MHz		-	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}=-5~15V, V_{CC}=300V, I_C=100A, R_G=10Ω Inductive Load	T_J=25℃	-	19	-	ns
			T_J=125℃	-	22	-	
			T_J=150℃	-	23	-	
t_r	Turn-On Rise Time		T_J=25℃	-	95	-	
			T_J=125℃	-	88	-	
			T_J=150℃	-	84	-	
$t_{d(off)}$	Turn-Off Delay Time		T_J=25℃	-	204	-	
			T_J=125℃	-	220	-	
			T_J=150℃	-	226	-	
t_f	Turn-Off Fall Time		T_J=25℃	-	44	-	
			T_J=125℃	-	55	-	
			T_J=150℃	-	59	-	
E_{on}	Turn-On Switching Energy		T_J=25℃	-	4.0	-	mJ
			T_J=125℃	-	4.1	-	
			T_J=150℃	-	4.2	-	
E_{off}	Turn-Off Switching Energy		T_J=25℃	-	1.1	-	
			T_J=125℃	-	1.4	-	
			T_J=150℃	-	1.6	-	
E_{rec}	Reverse Recovery Energy	I_F=100A, V_R=300V, -dI/dt=550A/μs	T_J=25℃	-	0.16	-	mJ
			T_J=125℃	-	0.47	-	
			T_J=150℃	-	0.61	-	
I_{rr}	Reverse Recovery Current		T_J=25℃	-	23	-	A
			T_J=125℃	-	36	-	
			T_J=150℃	-	41	-	
Q_{rr}	Reverse Recovery Charge		T_J=25℃	-	1.8	-	uC
			T_J=125℃	-	4.2	-	
			T_J=150℃	-	5.7	-	
T_{rr}	Reverse Recovery Time		T_J=25℃	-	116	-	ns
			T_J=125℃	-	158	-	
			T_J=150℃	-	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

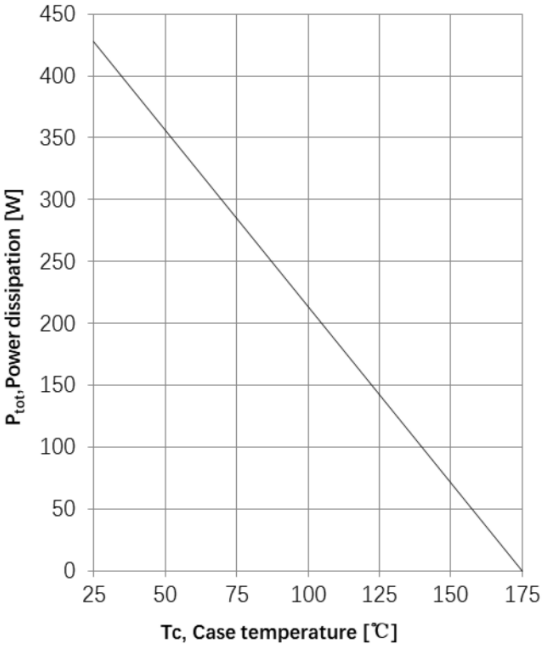


Figure 1. Power dissipation as a function of case temperature ($T_J \leq 175℃$)

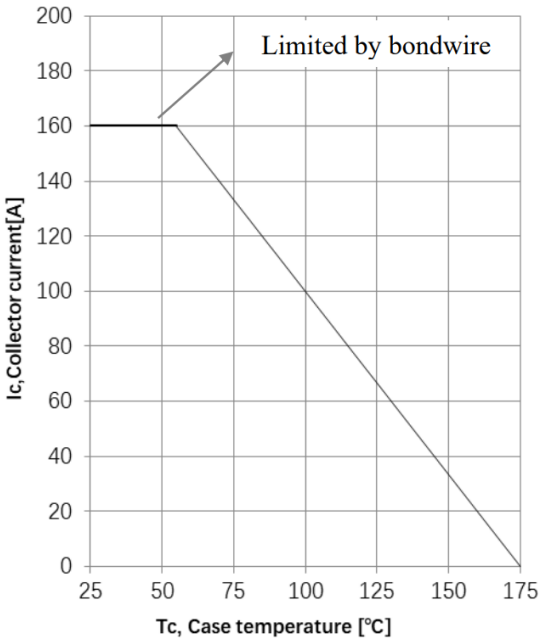


Figure 2. Collector current as a function of case temperature ($V_{GE} \geq 15V$, $T_J \leq 175℃$)

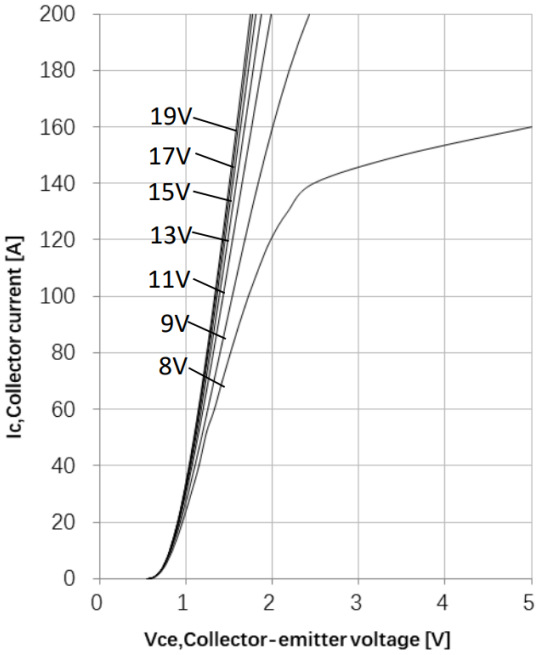


Figure 3. Typical output Characteristics (T_J=25℃)

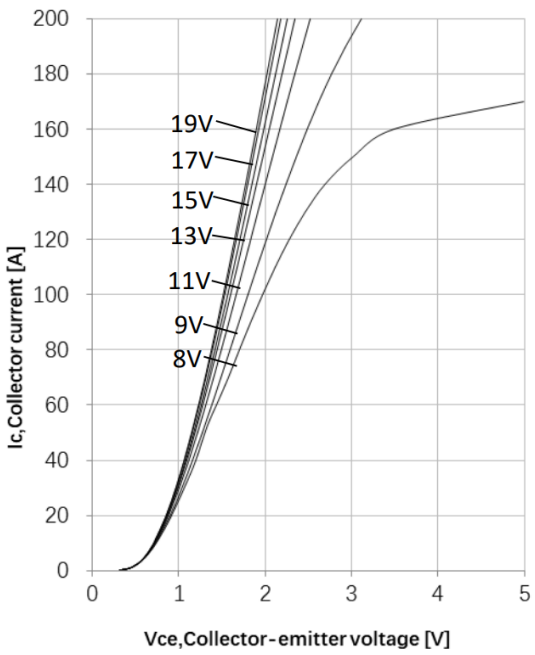


Figure 4. Typical output Characteristics (T_J=150℃)

Typical Characteristics

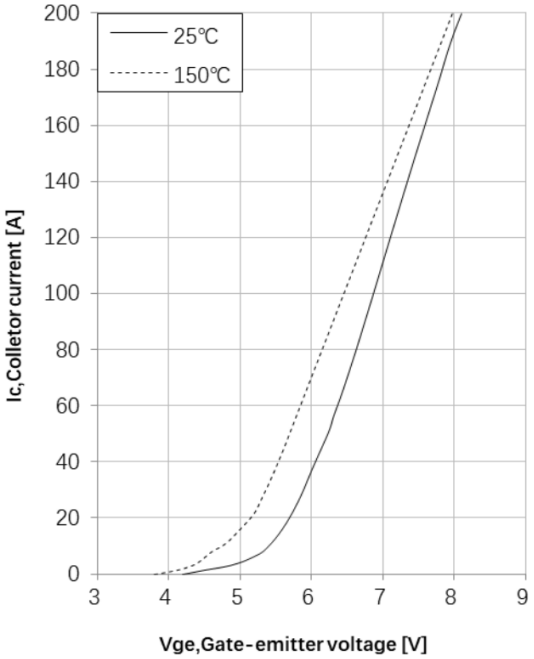


Figure 5. Typical transfer characteristic (V_{CE}=20V)

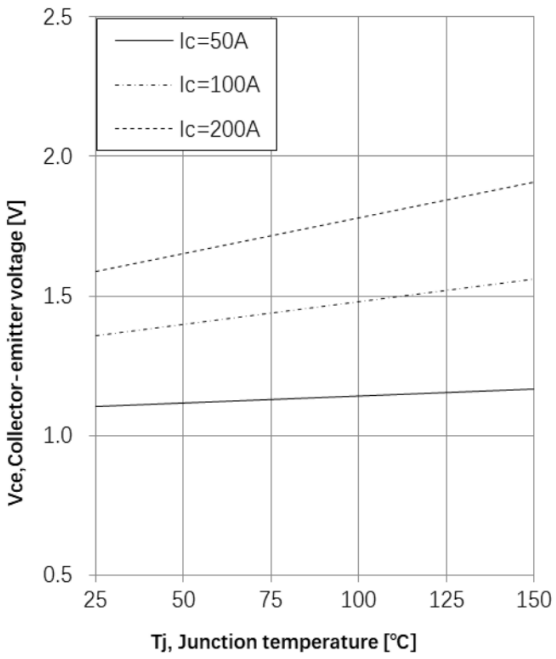


Figure 6. Typical collector-emitter saturation voltage as a function of junction temperature (V_{GE}=15V)

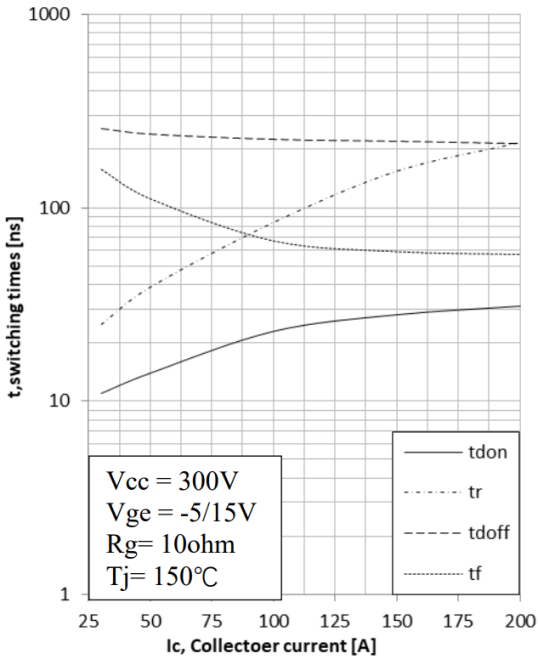


Figure 7. Typical switching time as a function of collect current

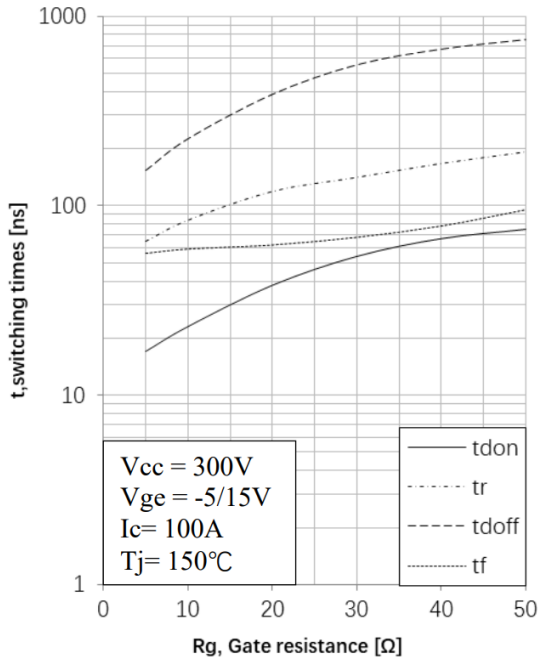


Figure 8. Typical switching times as a function of gate resistance

Typical Characteristics

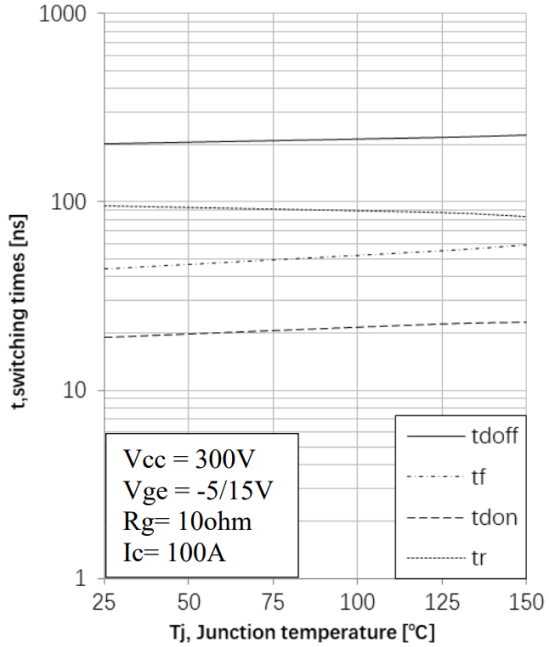


Figure 9. Typical switching times as a function of junction temperature

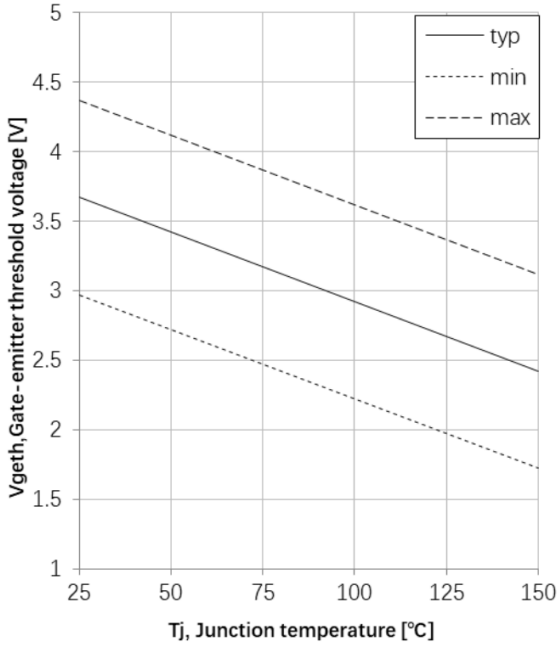


Figure 10. Gate to emitter threshold voltage as a function of junction temperature (I_C=1.2mA)

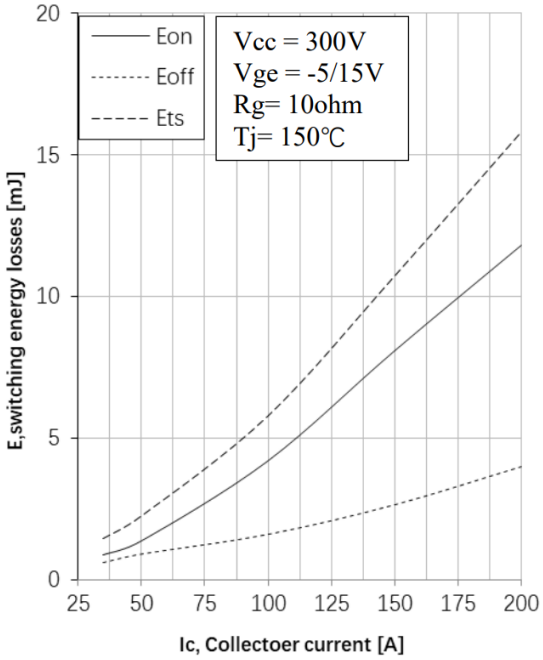


Figure 11. Typical switching energy losses as a function of collect current

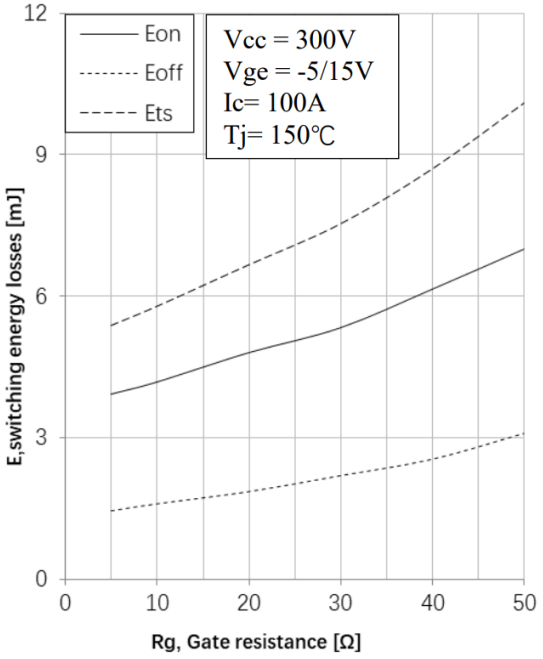


Figure 12. Typical switching energy losses as a function of gate resistance

Typical Characteristics

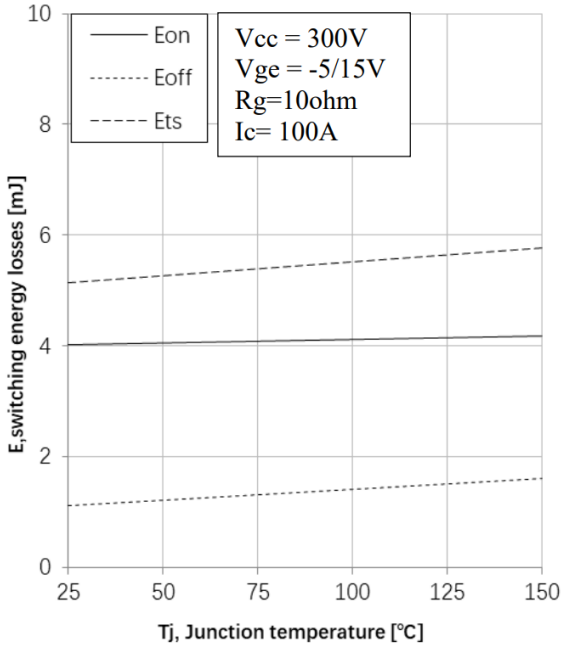


Figure 13. Typical switching energy losses as a function of junction temperature

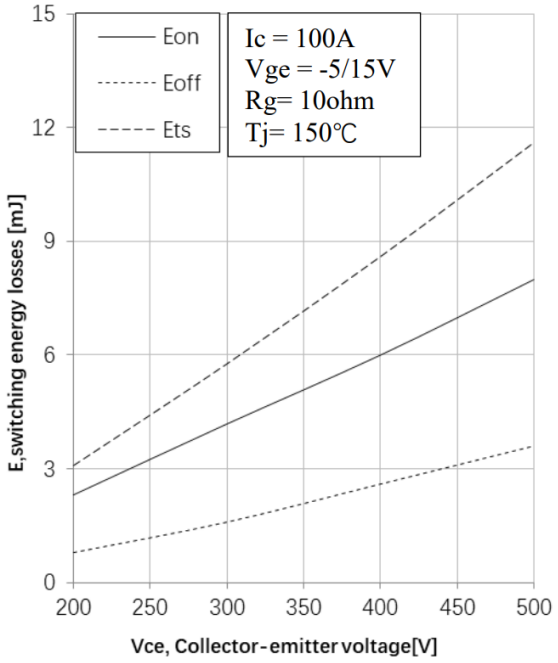


Figure 14. Typical switching energy losses as a function of collector to emitter voltage

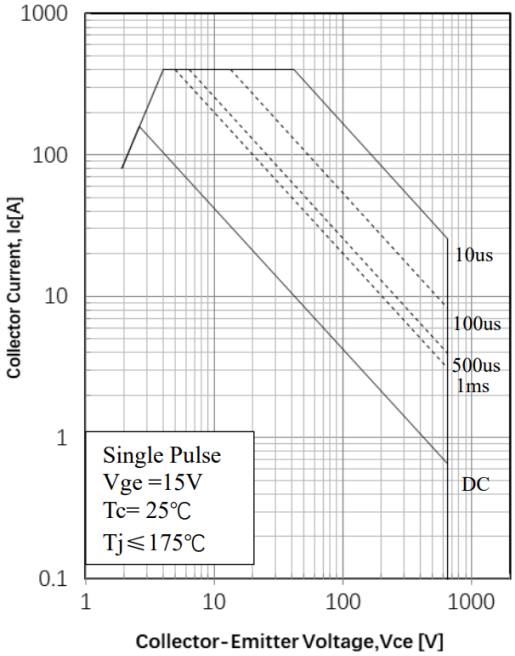


Figure 15. Safe Operating Area

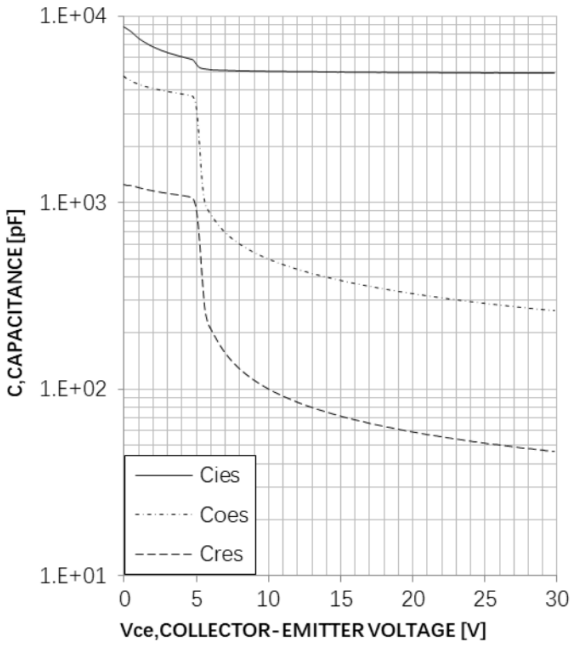


Figure 16. Typical capacitance as a function of collector to emitter voltage

Typical Characteristics

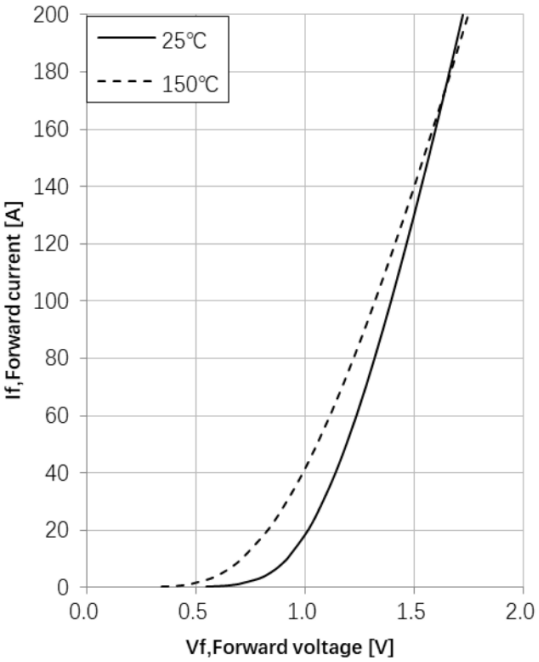


Figure 17. Diode Forward Current as a function of forward Voltage

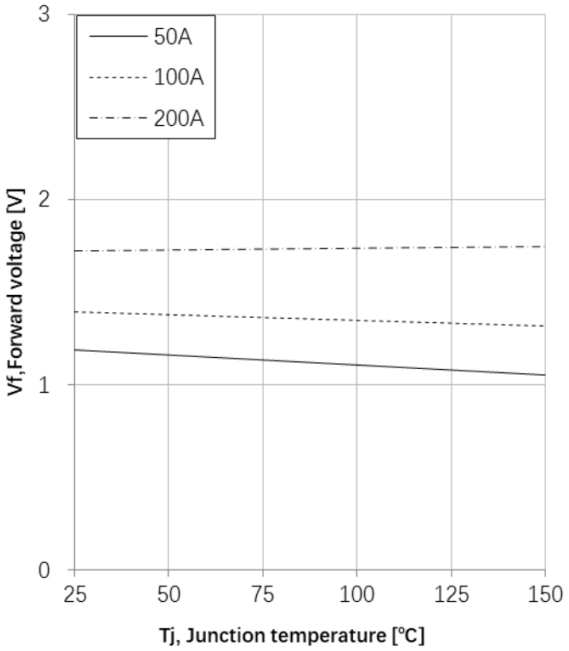
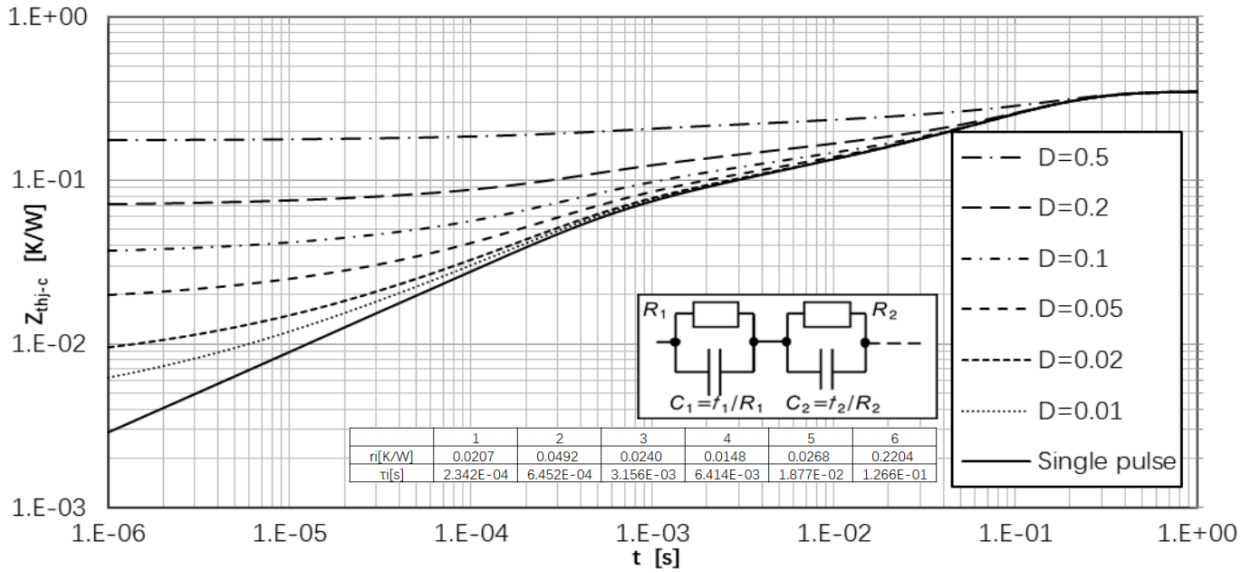


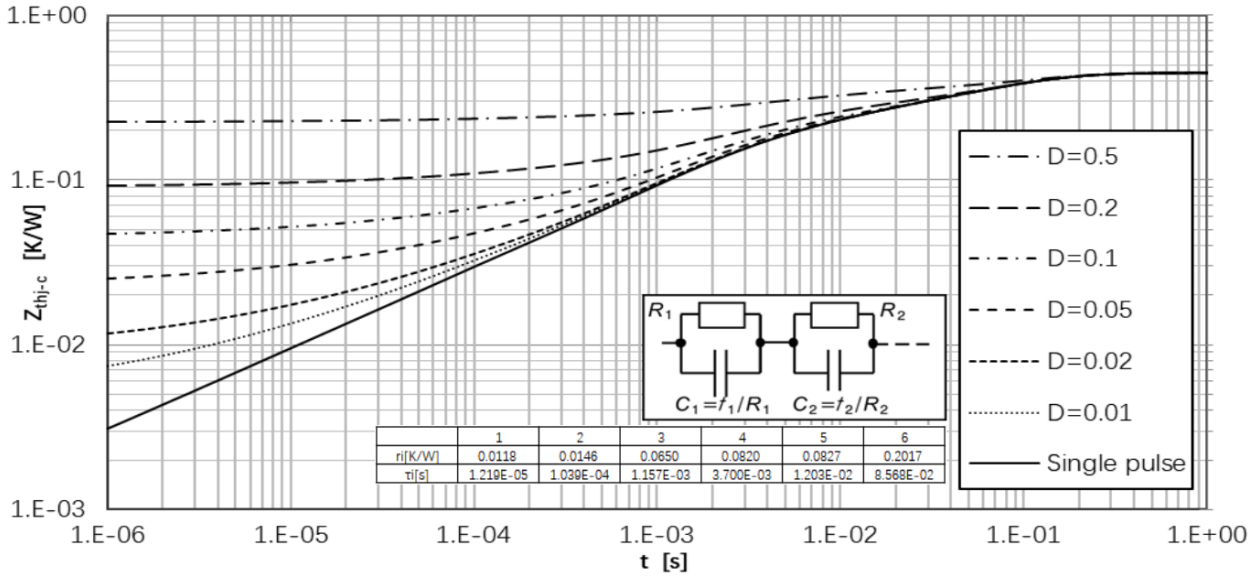
Figure 18. Diode Forward Voltage as a function of Junction Temperature

Typical Characteristics



	1	2	3	4	5	6
ri[K/W]	0.0207	0.0492	0.0240	0.0148	0.0268	0.2204
τi[s]	2.342E-04	6.452E-04	3.156E-03	6.414E-03	1.877E-02	1.266E-01

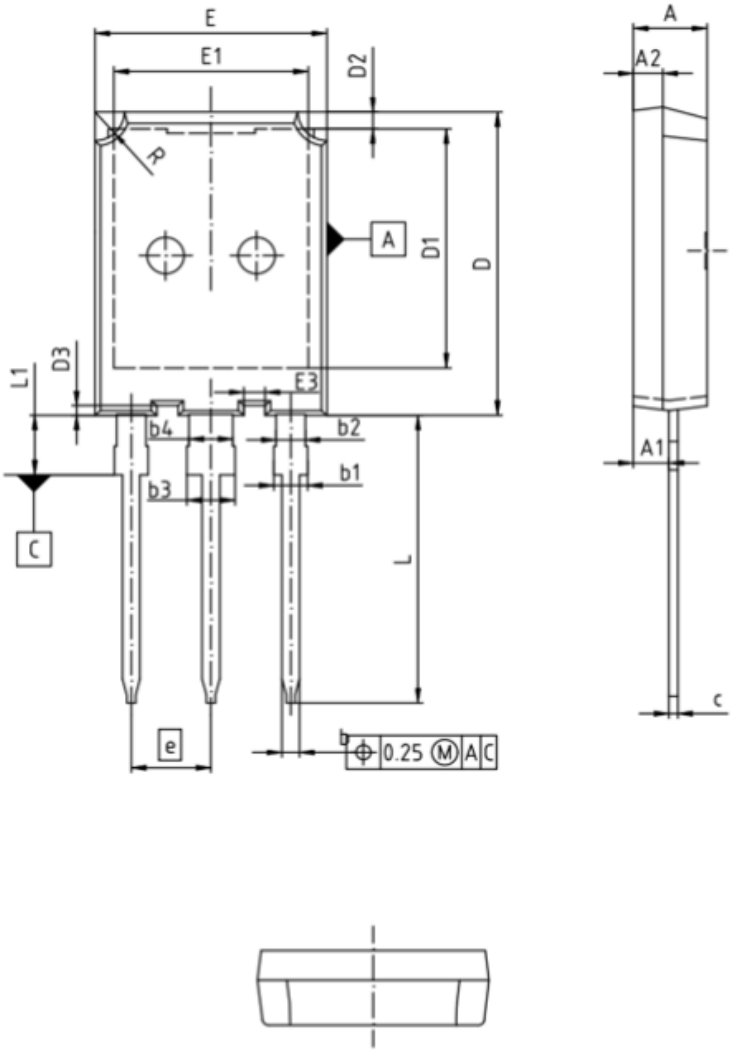
Figure 19. IGBT Transient Thermal Impedance



	1	2	3	4	5	6
ri[K/W]	0.0118	0.0146	0.0650	0.0820	0.0827	0.2017
τi[s]	1.219E-05	1.039E-04	1.157E-03	3.700E-03	1.203E-02	8.568E-02

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