PTDC1565DY

PowerCubeSemi, Inc.
Potential · Convergence · Smart

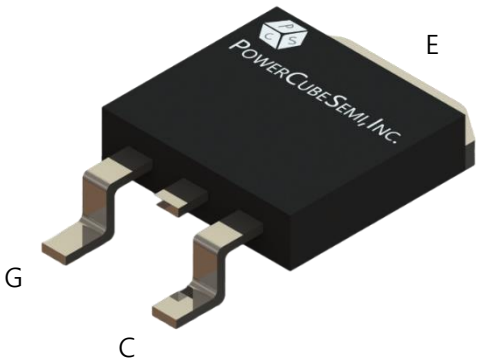
Features

IGBT Discrete

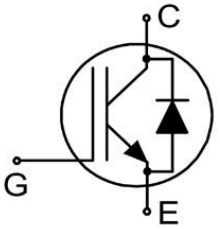
- Rated to 650V at 15Amps @T_J = 25℃
- $V_{CE(sat)}$=1.60V @ I_C=15A
- Positive Temperature Coefficient
- High Speed Smooth Switching device for hard& Soft Switching
- High Ruggedness, Temperature Stable
- Maximum Junction Temperature 175℃

Application

- Soft switching applications
- Air Conditioning
- Motor Drive Inverter



PKG type : TO-263 (D2PAK)



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℃	30	A
		T_C=100℃	15	
I_{CM}	Pulsed Collector Current		45	A
I_F	Diode Forward Current	T_C=25℃	30	A
		T_C=100℃	15	
$I_{F,\ Pulse}$	Diode Pulsed Current		45	A
V_{GE}	Continuous Gate-Emitter Voltage		±20	V
V_{GE}	Transient Gate-Emitter Voltage		±30	
P_D	Power Dissipation	T_C=25℃	110	W
t_{SC}	Short circuit withstand time		5	μs
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
PTDC1565DY	PTDC1565	TO-263	REEL	-	-

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=15A, V_{GE}=15V	T_j=25℃	-	1.40	1.70	V
			T_j=125℃	-	1.55	-	
			T_j=150℃	-	1.60	-	
$V_{GE(TH)}$	Gate-Emitter Threshold Voltage	V_{CE}=V_{GE}, I_C=1mA		5.0	5.8	6.5	V
I_{CES}	Zero Gate Voltage Collector Current	V_{CE}=650V, V_{GE}=0V	Tj=25℃	-	-	0.25	mA
			Tj=150℃	-	-	1.00	
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=15A, V_{GE}=15V		-	0.069	-	uC
V_F	Diode Forward Voltage	I_F=15A	Tj=25℃	-	1.90	2.40	V
			Tj=125℃	-	1.70	-	
			Tj=150℃	-	1.60	-	
C_{IES}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f=1MHz		-	0.88	-	nF
C_{OES}	Output Capacitance			-	0.04	-	
C_{RES}	Reverse Transfer Capacitance			-	0.01	-	
$I_{C\ (SC)}$	Short circuit collector current	V_{GE}=15V, t_{SC}≤5μs, V_{CC}=400V, $T_{j,\ start}$=25℃		-	110	-	A

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=15A, R_G=51Ω	T_J=25℃	-	10	-	ns
			T_J=125℃	-	14	-	
			T_J=150℃	-	16	-	
t_r	Turn-On Rise Time		T_J=25℃	-	28	-	
			T_J=125℃	-	36	-	
			T_J=150℃	-	43	-	
$t_{d(off)}$	Turn-Off Delay Time		T_J=25℃	-	68	-	
			T_J=125℃	-	69	-	
			T_J=150℃	-	69	-	
t_f	Turn-Off Fall Time		T_J=25℃	-	138	-	
			T_J=125℃	-	161	-	
			T_J=150℃	-	182	-	
E_{on}	Turn-On Switching Energy		T_J=25℃	-	0.33	-	mJ
			T_J=125℃	-	0.38	-	
			T_J=150℃	-	0.43	-	
E_{off}	Turn-Off Switching Energy		T_J=25℃	-	0.16	-	
			T_J=125℃	-	0.27	-	
			T_J=150℃	-	0.32	-	
E_{rec}	Reverse Recovery Energy	I_F=15A, V_R=300V, -dI/dt=460A/μs	T_J=25℃	-	0.05	-	mJ
			T_J=125℃	-	0.22	-	
			T_J=150℃	-	0.25	-	
I_{rr}	Reverse Recovery Current		T_J=25℃	-	9	-	A
			T_J=125℃	-	12	-	
			T_J=150℃	-	14	-	
Q_{rr}	Reverse Recovery Charge		T_J=25℃	-	0.17	-	uC
			T_J=125℃	-	0.65	-	
			T_J=150℃	-	0.82	-	

Thermal Characteristics

Symbol	Parameter	Numerical	Unit
$R_{\theta(J-A)}$	Thermal Resistance Junction-to-Ambient	60	K/W
$R_{\theta(J-C)}$	Thermal Resistance Junction-to-Case for IGBT	1.35	
$R_{\theta(J-C)}$	Thermal Resistance Junction-to-Case for Diode	1.5	

Typical Characteristics

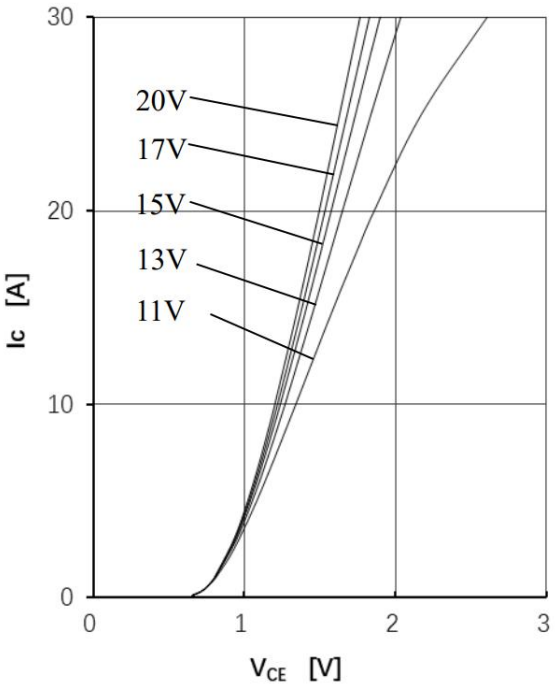


Figure 1. Output Characteristics (T_J=25℃)

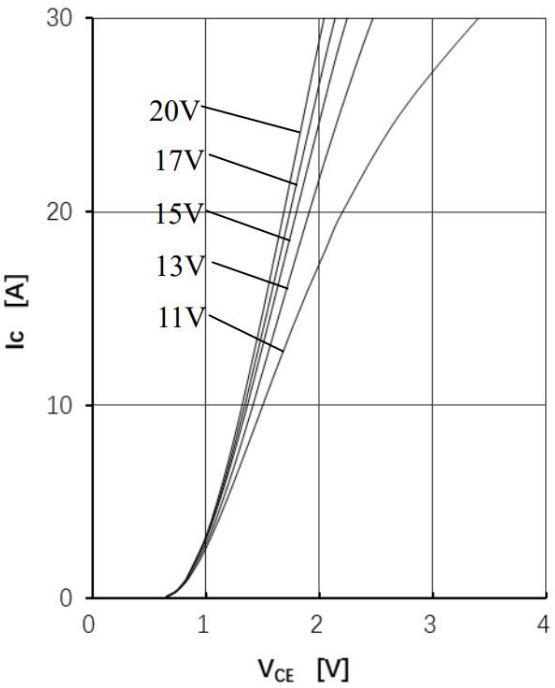


Figure 2. Output Characteristics (T_J=150℃)

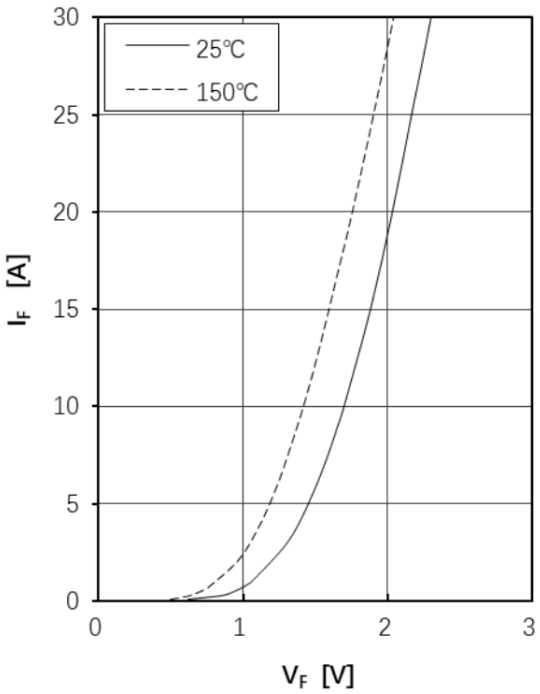


Figure 3. Diode Forward Characteristics

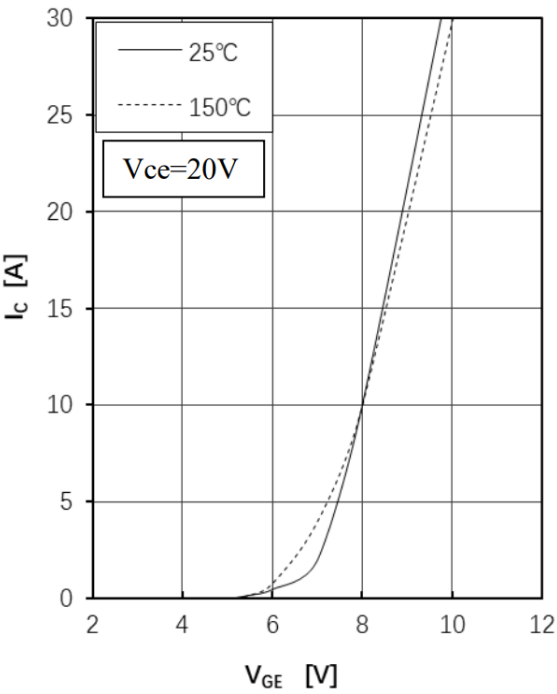


Figure 4. IGBT Transfer Characteristics

Typical Characteristics

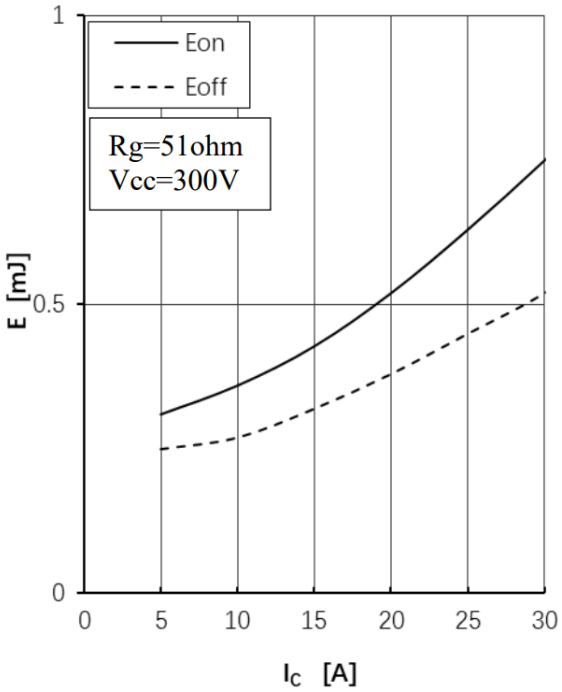


Figure 5. IGBT Switching Loss vs. I_C (150℃)

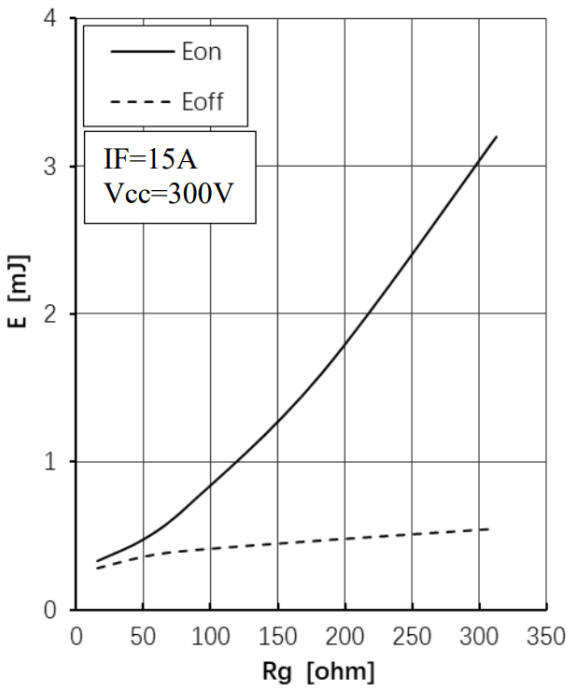


Figure 6. IGBT Switching Loss vs. R_G (150℃)

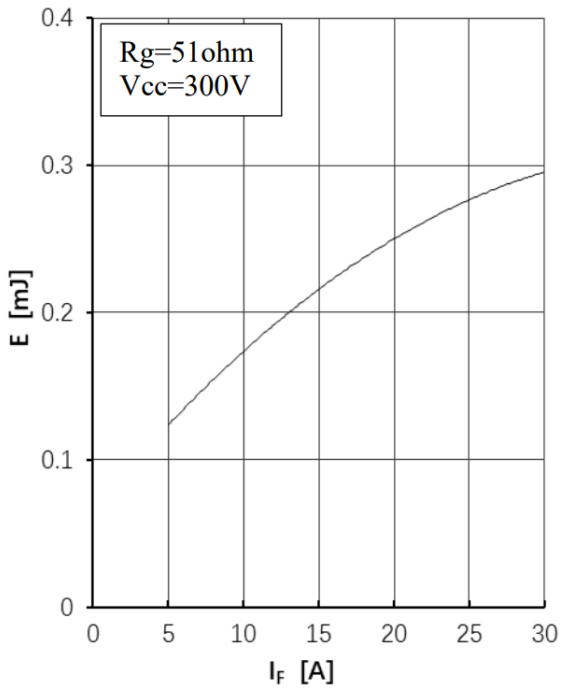


Figure 7. Diode Switching Loss (Erec) vs. I_F (150℃)

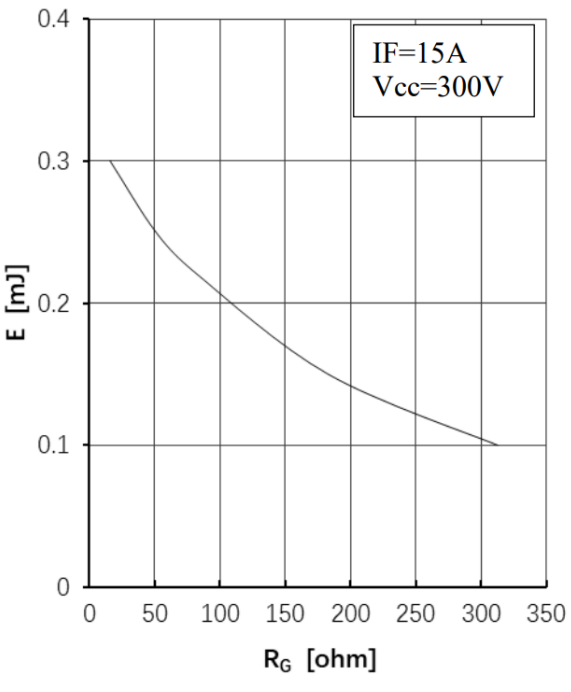


Figure 8. Diode Switching Loss (Erec) vs. R_G (150℃)

Typical Characteristics

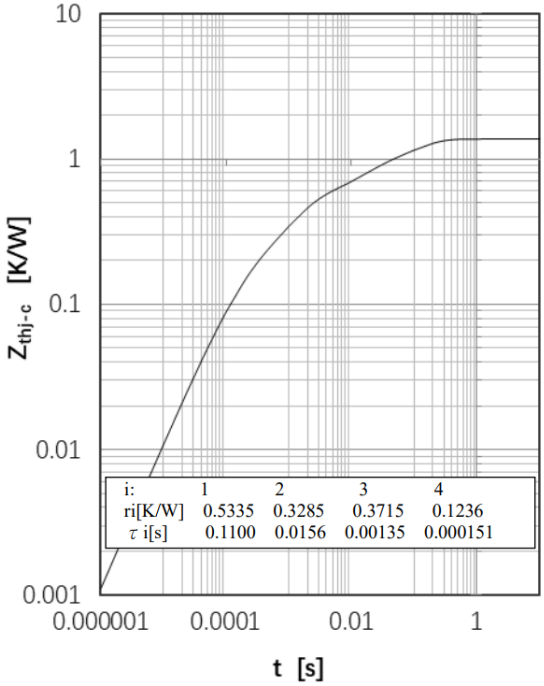


Figure 9. IGBT Transient Thermal Impedance

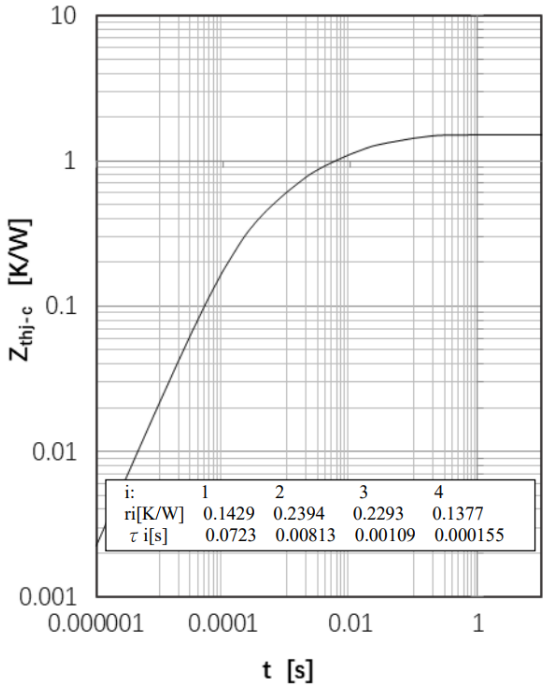
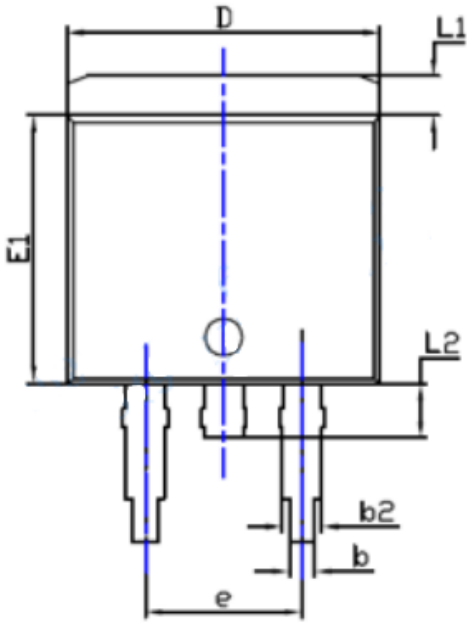


Figure 10. Diode Transient Thermal Impedance

Package Outline

Unit : mm



SYMBOL	DIMENSIONS		
	MIN	NOM	MAX
A1	0.00	-	0.250
A2	4.43	4.58	4.73
b	0.72	0.82	0.92
b2	1.18	1.28	1.38
c	0.33	0.39	0.45
c2	1.22	1.28	1.34
D	10.00	10.15	10.30
D1	7.50	7.80	8.10
D2	7.70	8.00	8.30
E	14.50	15.00	15.50
E1	8.55	8.70	8.85
E2	7.00	7.30	7.60
e	5.08 BSC		
L	1.79	-	2.79
L1	1.12	-	1.42
L2	0.77	-	1.77
L3	5.00 REF		
θ	0°	-	8°