

PTDC2065AY

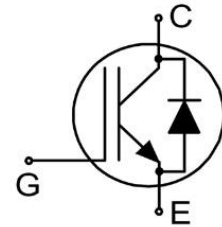
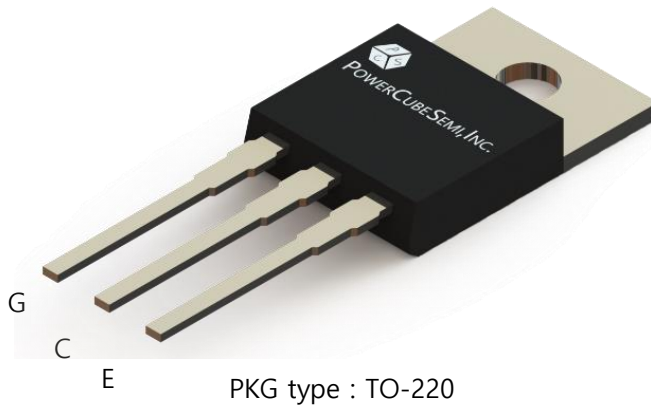
Features

IGBT Discrete

- Rated to 650V at 20Amps @ $T_j = 25^{\circ}\text{C}$
- $V_{CE(sat)}=1.60\text{V}$ @ $I_C=20\text{A}$
- Positive Temperature Coefficient
- High Speed Smooth Switching device for hard& Soft Switching
- High Ruggedness, Temperature Stable
- Maximum Junction Temperature 175°C

Application

- Soft switching applications
- Air Conditioning
- Motor Drive Inverter



Absolute Maximum Ratings

Symbol	Parameter	Value	Unit	
BV_{CES}	Collector-Emitter Breakdown Voltage	650	V	
I_C	DC Collector Current	$T_C=25^{\circ}\text{C}$	40	A
		$T_C=100^{\circ}\text{C}$	20	
I_{CM}	Pulsed Collector Current	60	A	
I_F	Diode Forward Current	$T_C=25^{\circ}\text{C}$	40	A
		$T_C=100^{\circ}\text{C}$	20	
$I_{F, Pulse}$	Diode Pulsed Current	60	A	
V_{GE}	Continuous Gate-Emitter Voltage	± 20	V	
V_{GE}	Transient Gate-Emitter Voltage	± 30		
P_D	Power Dissipation	$T_C=25^{\circ}\text{C}$	120	W
t_{SC}	Short circuit withstand time	5	μs	
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
PTDC2065AY	PTDC2065	TO-220	TUBE	-	50

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	$I_C=20\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	-	1.60	1.95	V
			$T_J=125^{\circ}\text{C}$	-	1.75	-	
			$T_J=150^{\circ}\text{C}$	-	1.80	-	
$V_{GE(TH)}$	Gate-Emitter Threshold Voltage	$V_{CE}=V_{GE}$, $I_C=1\text{mA}$	5.0	5.8	6.5	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
			$T_J=150^{\circ}\text{C}$	-	-	1.00	
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	$V_{CC}=300\text{V}$, $I_C=20\text{A}$, $V_{GE}=15\text{V}$	-	0.085	-	μC	
V_F	Diode Forward Voltage	$I_F=20\text{A}$	$T_J=25^{\circ}\text{C}$	-	2.00	2.50	V
			$T_J=125^{\circ}\text{C}$	-	1.80	-	
			$T_J=150^{\circ}\text{C}$	-	1.70	-	
C_{IES}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$	-	0.90	-	nF	
C_{OES}	Output Capacitance		-	0.04	-		
C_{RES}	Reverse Transfer Capacitance		-	0.01	-		
$I_{C(SC)}$	Short circuit collector current	$V_{GE}=15\text{V}$, $t_{SC}\leq 5\mu\text{s}$, $V_{CC}=400\text{V}$, $T_{J,start}=25^{\circ}\text{C}$	-	115	-	A	



Electrical Characteristics

Switching Characteristics

Symbol	Parameter	Test Condition		Numerical			Unit
				Min	Typ	Max	
$t_{d(on)}$	Turn-On Delay Time	$V_{GE}=-5\sim 15V,$ $V_{CC}=300V,$ $I_C=20A, R_G=51\Omega$	$T_J=25^\circ C$ $T_J=125^\circ C$ $T_J=150^\circ C$	-	12	-	ns
				-	16	-	
				-	18	-	
t_r	Turn-On Rise Time			-	33	-	
				-	41	-	
				-	49	-	
$t_{d(off)}$	Turn-Off Delay Time			-	68	-	
				-	69	-	
				-	69	-	
t_f	Turn-Off Fall Time			-	129	-	
				-	154	-	
				-	173	-	
E_{on}	Turn-On Switching Energy			-	0.41	-	mJ
				-	0.48	-	
				-	0.52	-	
E_{off}	Turn-Off Switching Energy			-	0.22	-	mJ
				-	0.35	-	
				-	0.38	-	
E_{rec}	Reverse Recovery Energy			-	0.07	-	mJ
				-	0.20	-	
				-	0.25	-	
I_{rr}	Reverse Recovery Current	$I_F=20A, V_R=300V,$ $-di/dt=500A/\mu s$	$T_J=25^\circ C$ $T_J=125^\circ C$ $T_J=150^\circ C$	-	11	-	A
				-	14	-	
				-	16	-	
Q_{rr}	Reverse Recovery Charge			-	0.20	-	uC
				-	0.75	-	
				-	0.86	-	

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	1.25	
$R_{\theta(J-C)}$	Thermal Resistance Junction-to-Case for Diode	1.5	

Typical Characteristics

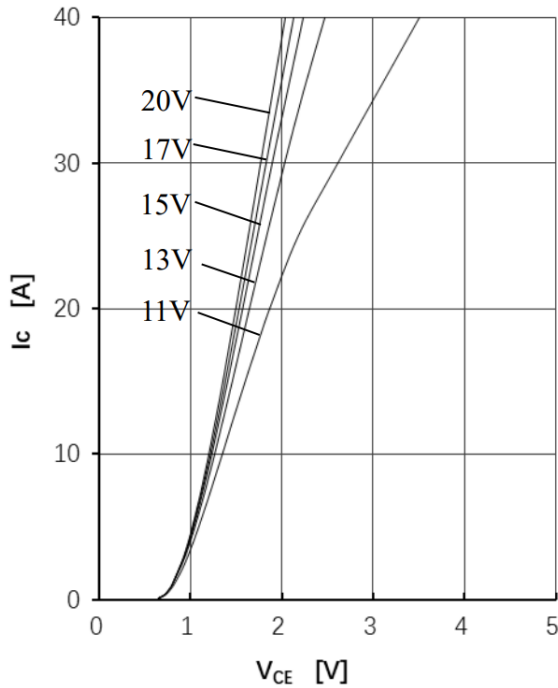


Figure 1. Output Characteristics ($T_j=25^\circ\text{C}$)

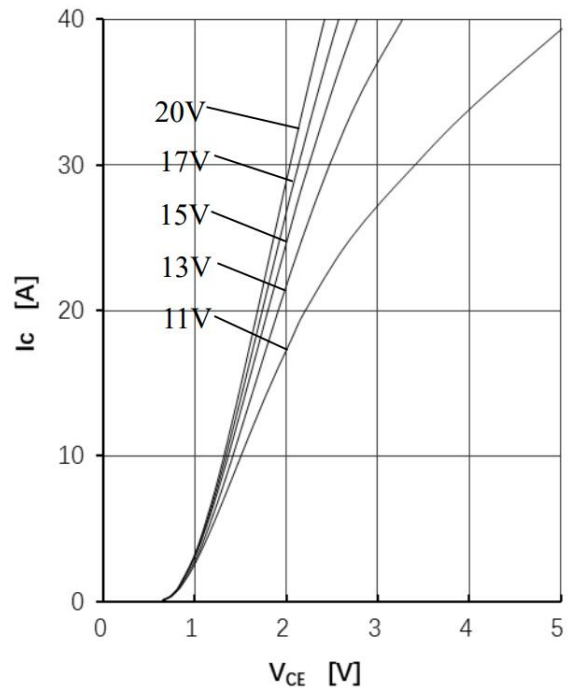


Figure 2. Output Characteristics ($T_j=150^\circ\text{C}$)

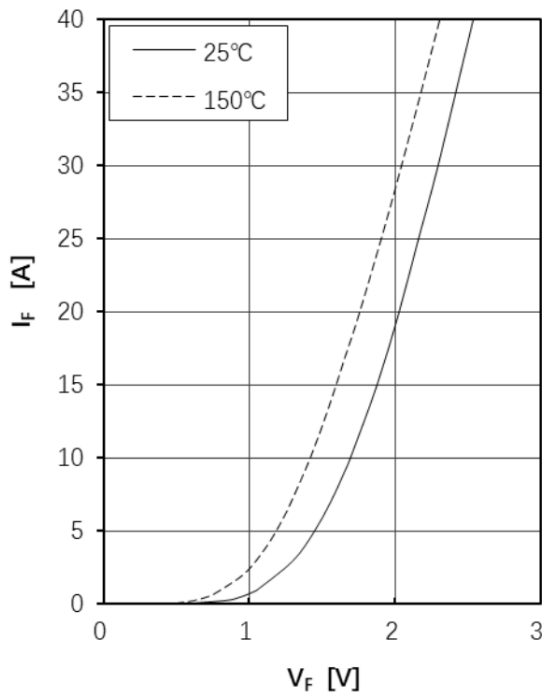


Figure 3. Diode Forward Characteristics

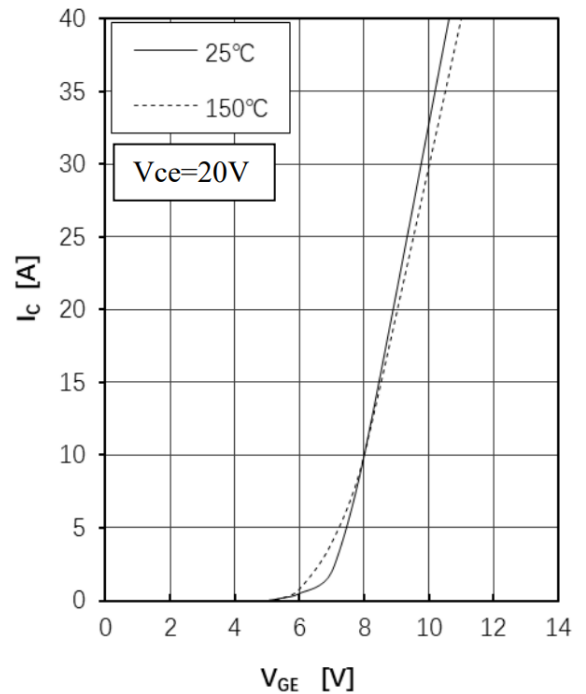


Figure 4. IGBT Transfer Characteristics

Typical Characteristics

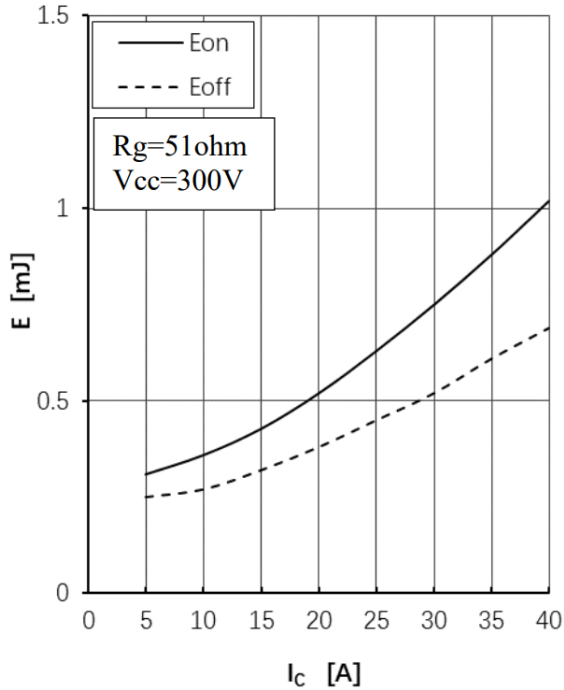


Figure 5. IGBT Switching Loss vs. I_c (150°C)

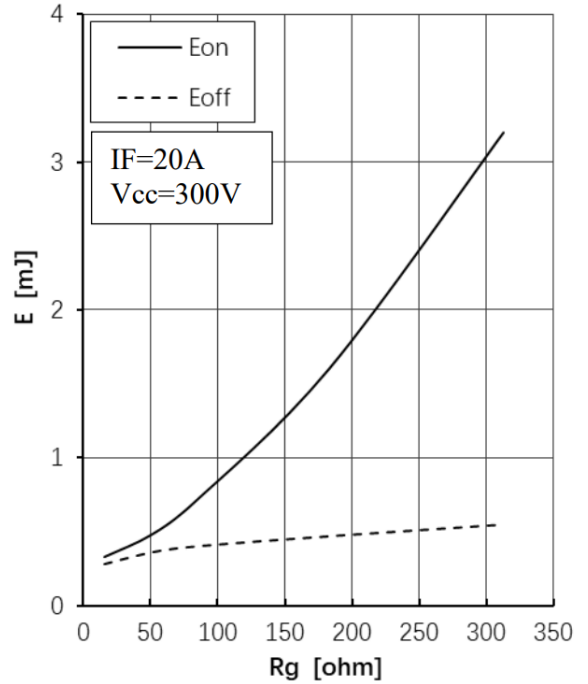


Figure 6. IGBT Switching Loss vs. R_g (150°C)

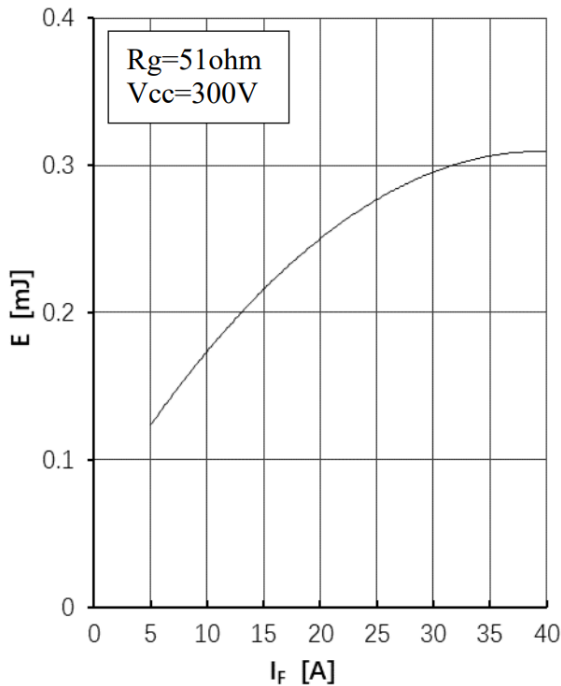


Figure 7. Diode Switching Loss (E_{rec}) vs. I_f (150°C)

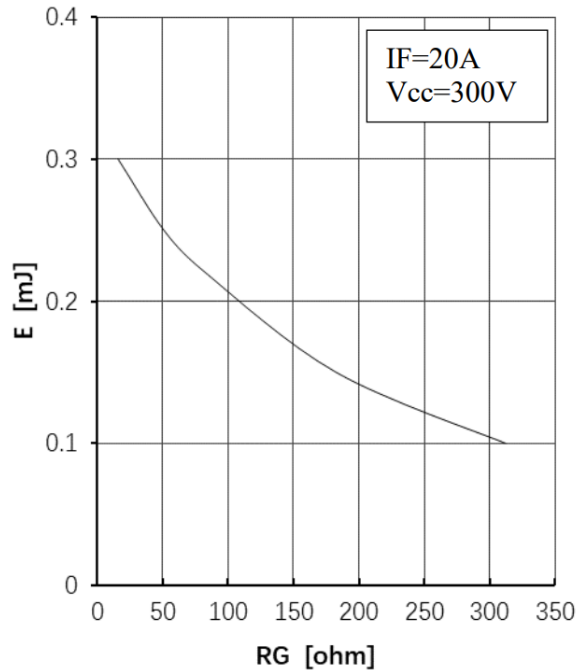


Figure 8. Diode Switching Loss (E_{rec}) vs. R_g (150°C)

Typical Characteristics

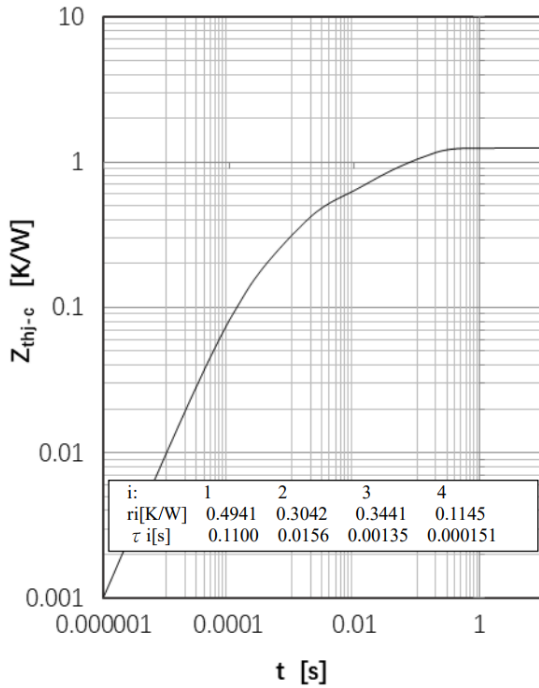


Figure 9. IGBT Transient Thermal Impedance

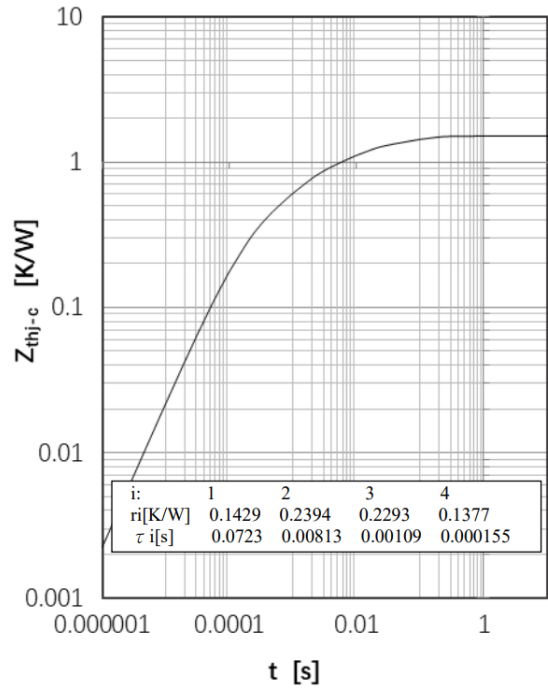
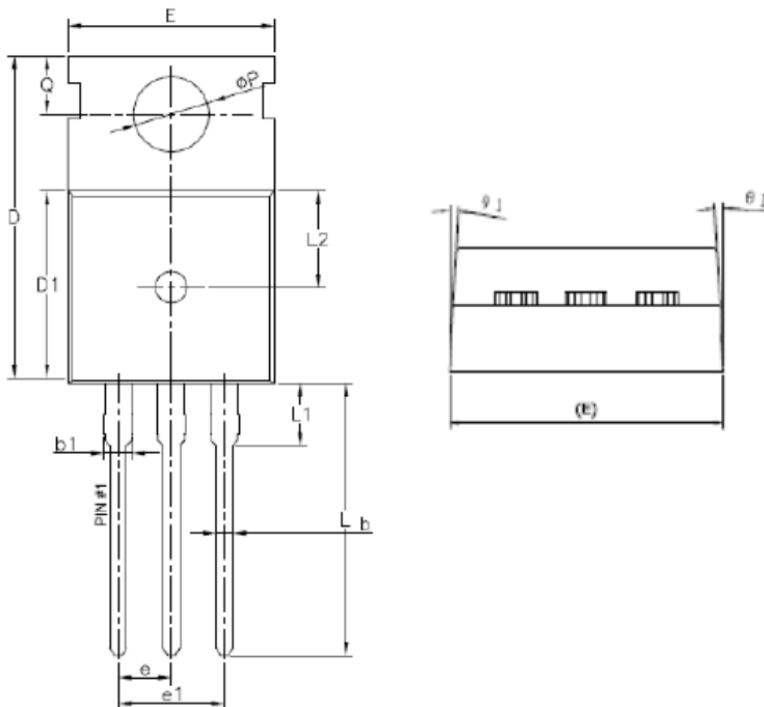
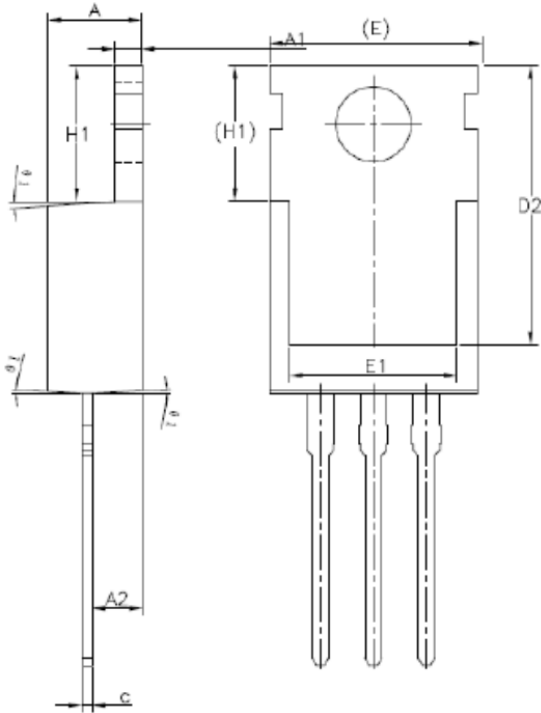


Figure 10. Diode Transient Thermal Impedance

Package Outline

Unit : mm



SYMBOL	DIMENSIONS		
	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	-	0.90
b1	1.27	-	1.40
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	-	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.49	2.54	2.59
e1	5.03	5.08	5.12
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	3.30	-	3.50
L2	4.50	4.60	4.70
phi P	3.55	3.60	3.65
Q	2.73	-	2.87
theta 1	1°	3°	5°