

PTDC2065HY

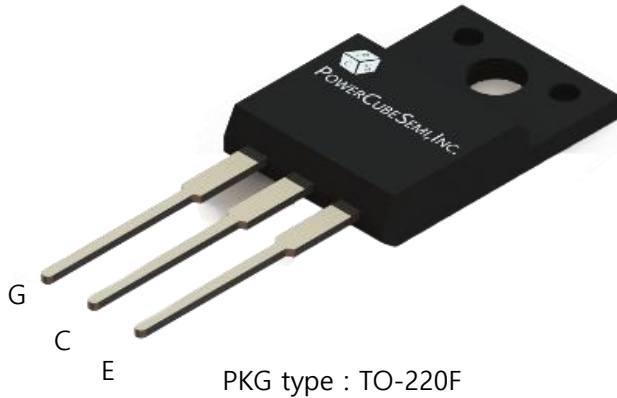
Features

IGBT Discrete

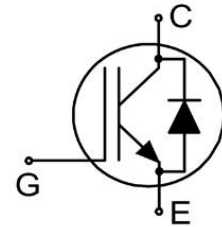
- Rated to 650V at 20Amps @ $T_j = 25^{\circ}\text{C}$
- $V_{CE(sat)} = 1.60\text{V}$ @ $I_C = 20\text{A}$
- Positive Temperature Coefficient
- High Speed Smooth Switching device for hard& Soft Switching
- High Ruggedness, Temperature Stable
- Maximum Junction Temperature 175°C

Application

- Soft switching applications
- Air Conditioning
- Motor Drive Inverter



PKG type : TO-220F



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
PTDC2065HY	PTDC2065	TO-220F	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		0.86 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	4.0	
$R_{\theta(J-C)}$	Thermal Resistance Junction-to-Case for Diode	4.8	

Typical Characteristics

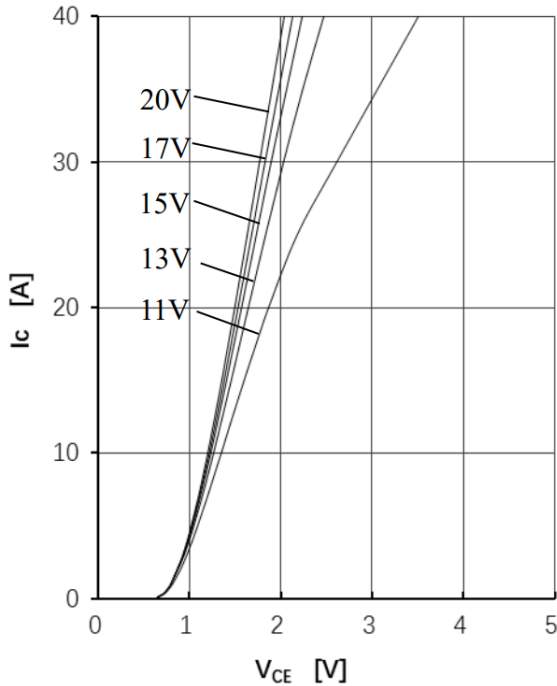


Figure 1. Output Characteristics ($T_J=25^\circ\text{C}$)

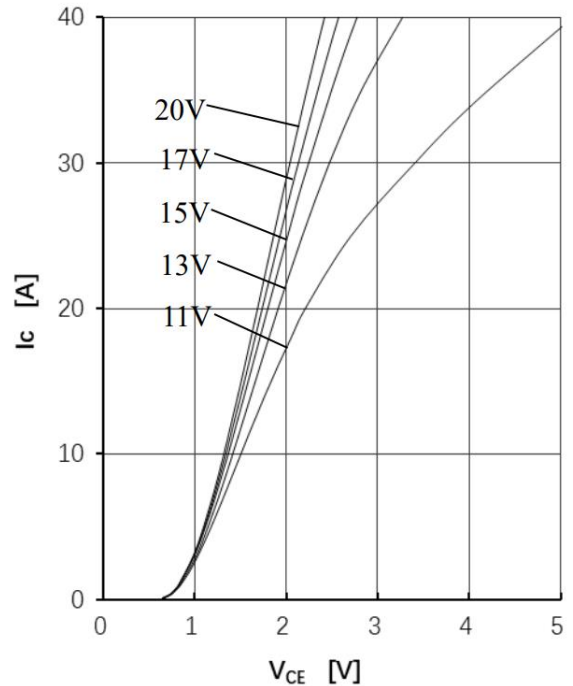


Figure 2. Output Characteristics ($T_J=150^\circ\text{C}$)

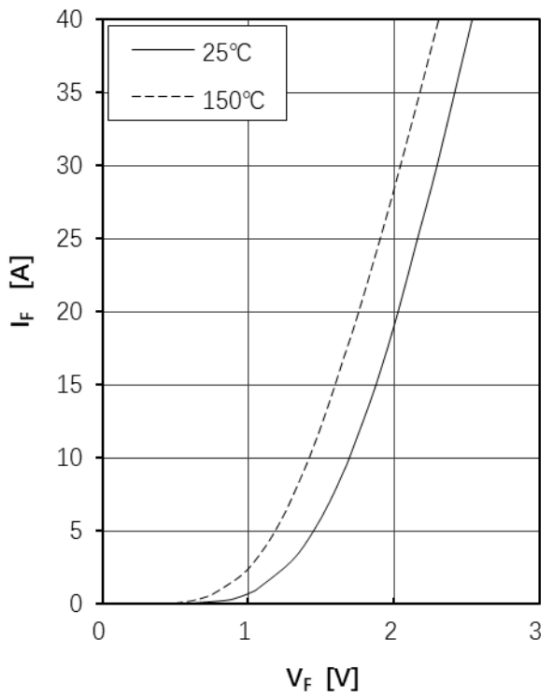


Figure 3. Diode Forward Characteristics

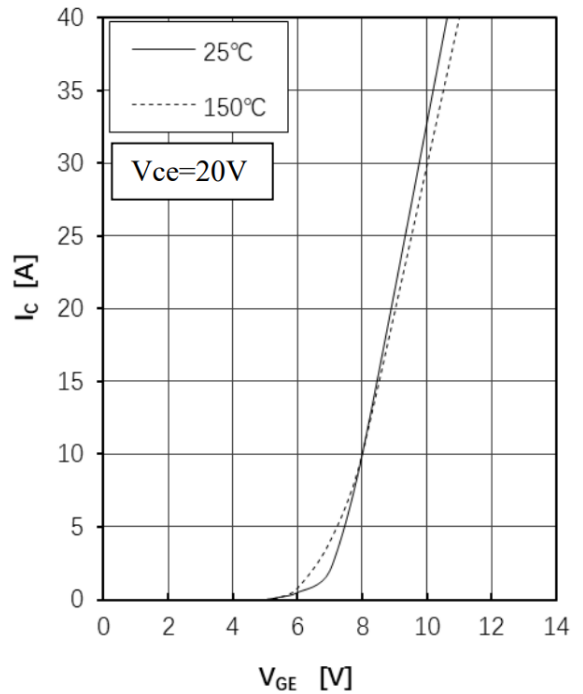


Figure 4. IGBT Transfer Characteristics

Typical Characteristics

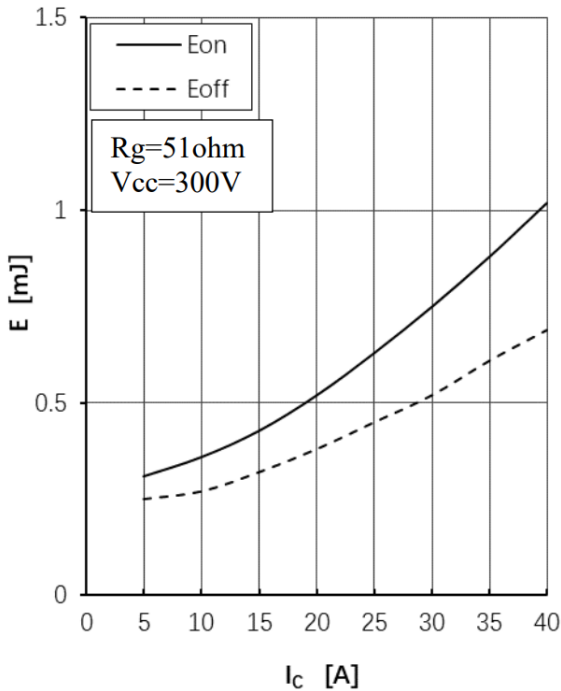


Figure 5. IGBT Switching Loss vs. I_c (150°C)

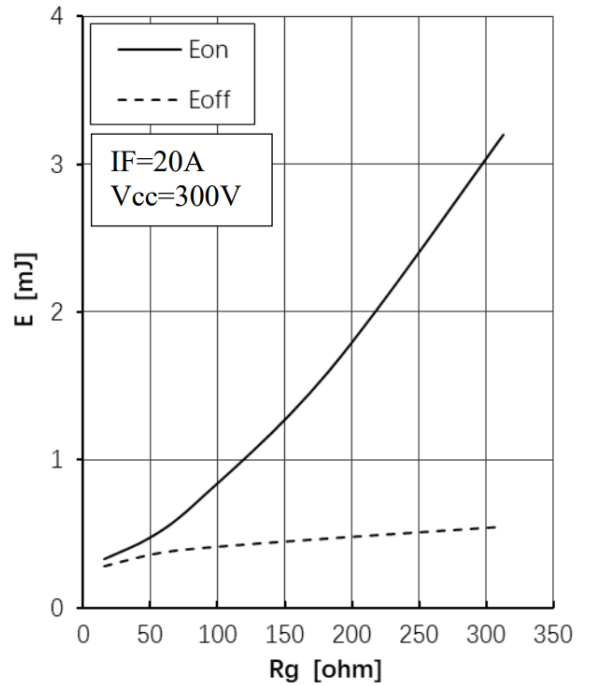


Figure 6. IGBT Switching Loss vs. R_G (150°C)

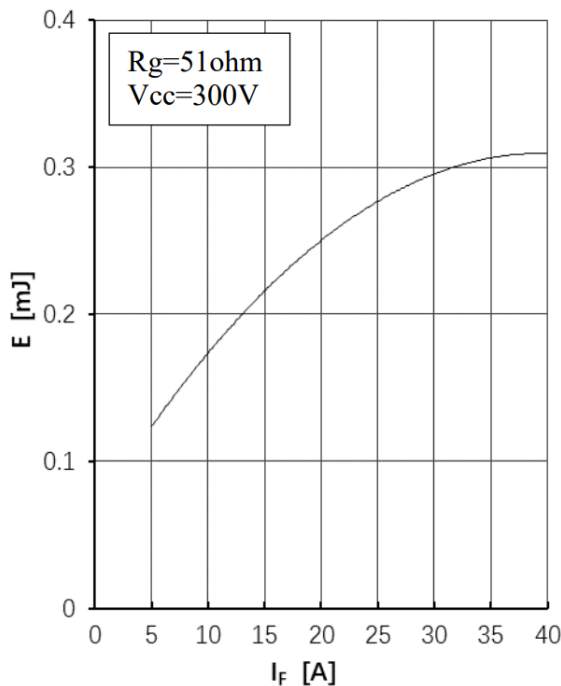


Figure 7. Diode Switching Loss (E_{rec}) vs. I_F (150°C)

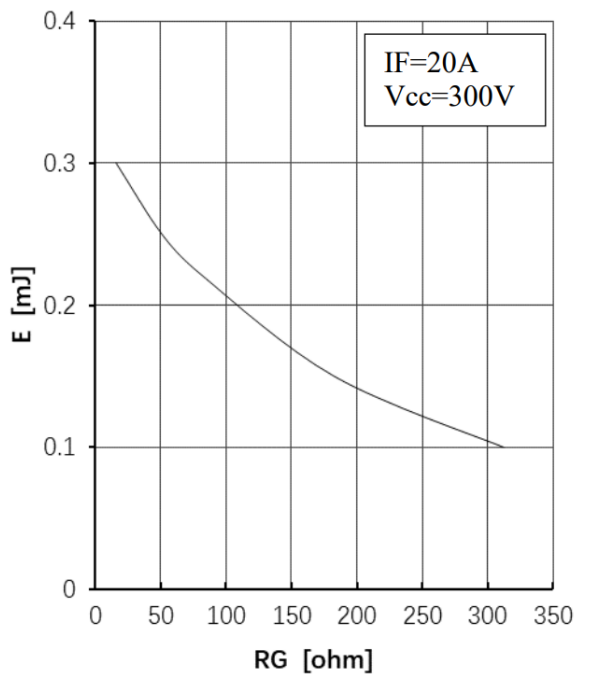


Figure 8. Diode Switching Loss (E_{rec}) vs. R_G (150°C)

Typical Characteristics

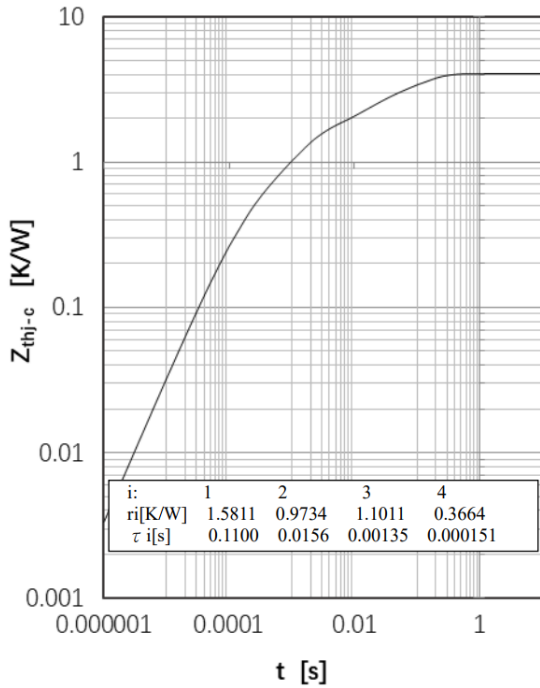


Figure 9. IGBT Transient Thermal Impedance

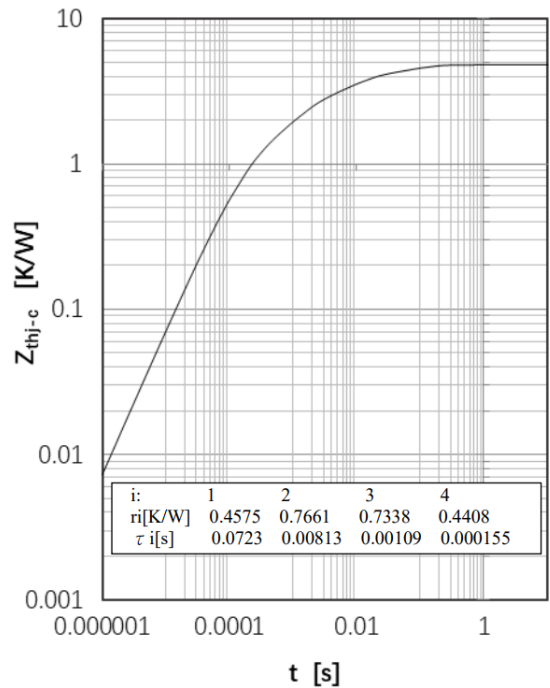
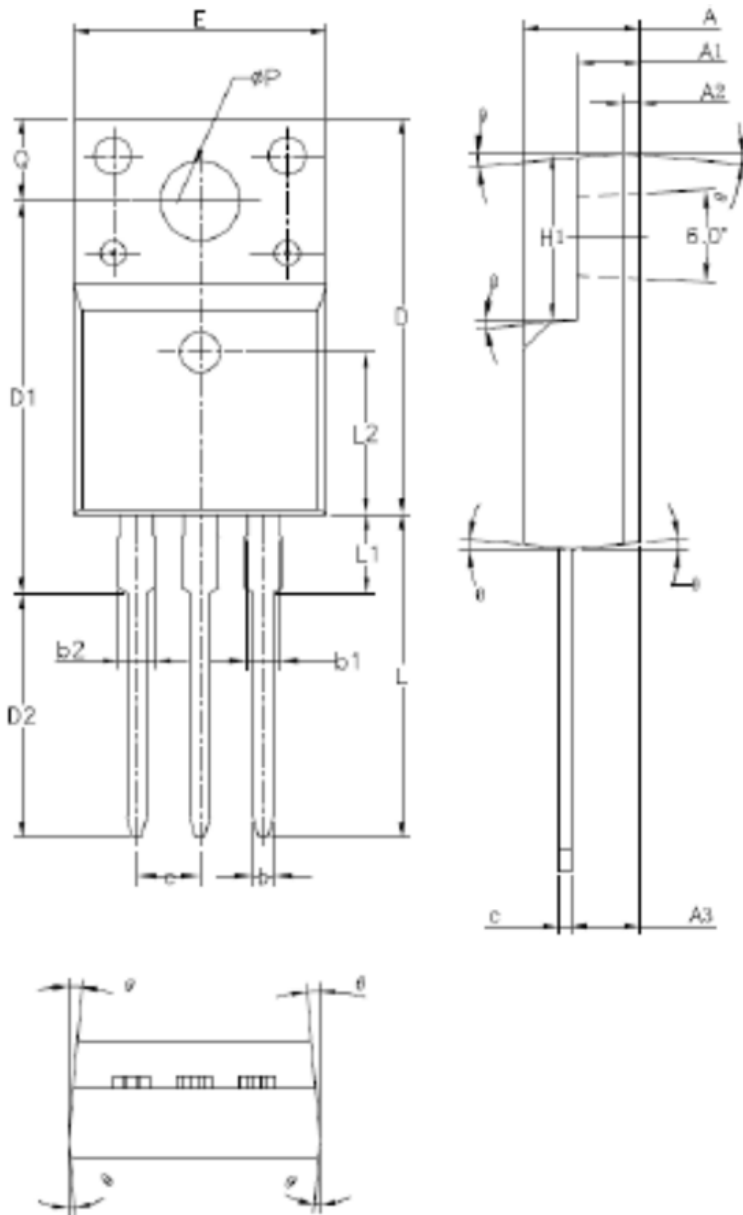


Figure 10. Diode Transient Thermal Impedance

Package Outline

Unit : mm



SYMBOL	DIMENSIONS		
	MIN	NOM	MAX
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2	0.70 REF		
A3	2.56	2.76	2.93
b	0.70	-	0.90
b1	1.18	-	1.38
b2	-	-	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
D2	9.60	9.80	10.0
E	9.96	10.16	10.36
e	2.54 BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	-	-	3.50
L2	6.50 REF		
ΦP	3.08	3.18	3.28
Q	3.20	-	3.40
$\theta 1$	1°	3°	5°