Device Modeling Report

COMPONENTS: PHOTOCOUPLER
PART NUMBER: PC817X
MANUFACTURER: SHARP

Bee Technologies Inc.

DIODE MODEL

Pspice model Parameter	Model description
IS	Saturation Current
N	Emission Coefficient
RS	Series Resistance
IKF	High-injection Knee Current
CJO	Zero-bias Junction Capacitance
M	Junction Grading Coefficient
VJ	Junction Potential
ISR	Recombination Current Saturation Value
BV	Reverse Breakdown Voltage(a positive value)
IBV	Reverse Breakdown Current(a positive value)
TT	Transit Time

BIPOLAR JUNCTION TRANSISTOR MODEL

Pspice model parameter	Model description
NR	Reverse Emission Coefficient
RB	Base Resistance
RC	Series Collector Resistance
CJE	Zero-bias Emitter-Base Junction Capacitance
CJC	Zero-bias Collector-Base Junction Capacitance
TF	Forward Transit Time
TR	Reverse Transit Time

VOLTAGE CONTROLLED VOLTAGE SOURCE MODEL(VCVS)

E<Name><(+)Node><($-$)Node>VALUE={Expression}

E<Name><(+)Node><($-$)Node>TABLE={Expression}

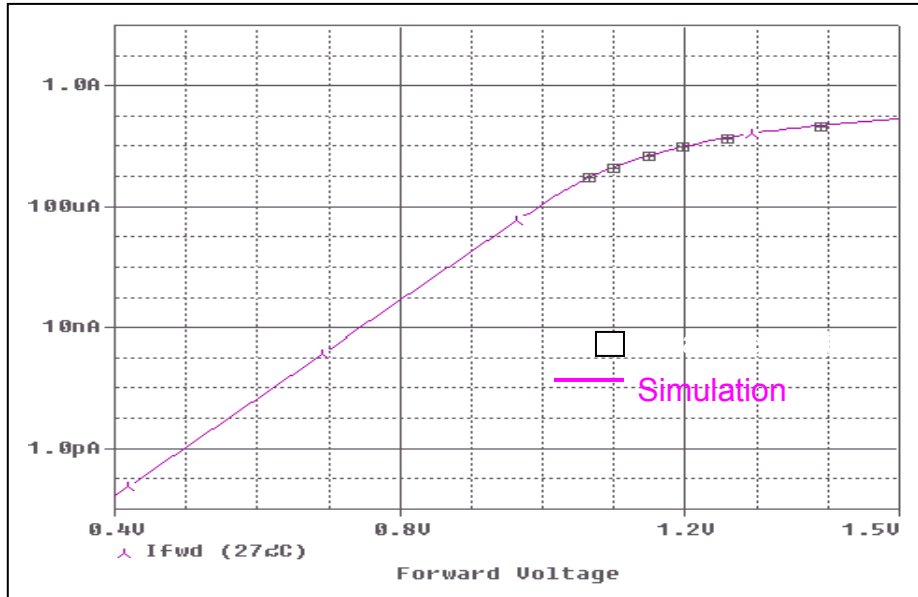## VOLTAGE CONTROLLED CURRENT SOURCE MODEL(VCCS)
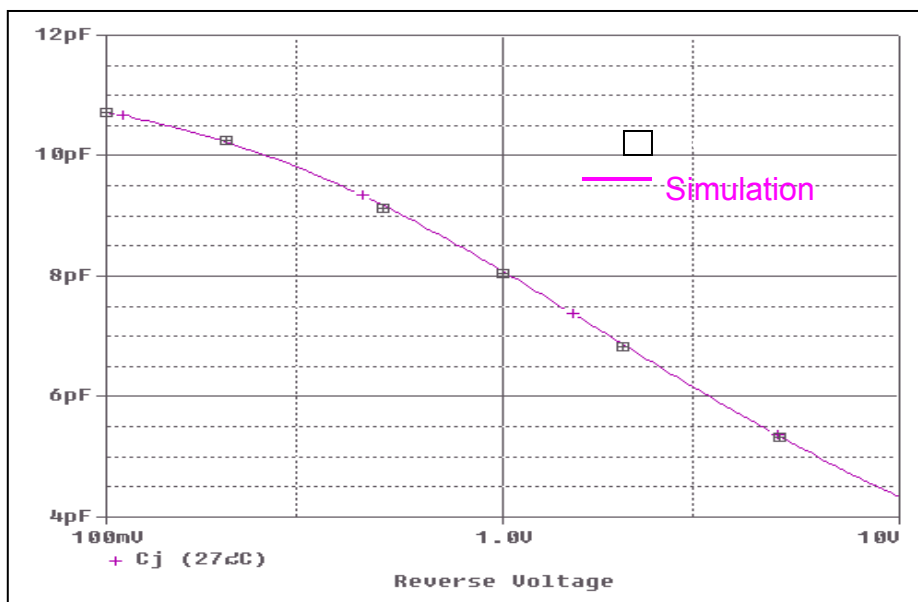
E<Name><(+)Node><(−)Node>VALUE={Expression}

CURRENT CONTROLLED MODEL(W)

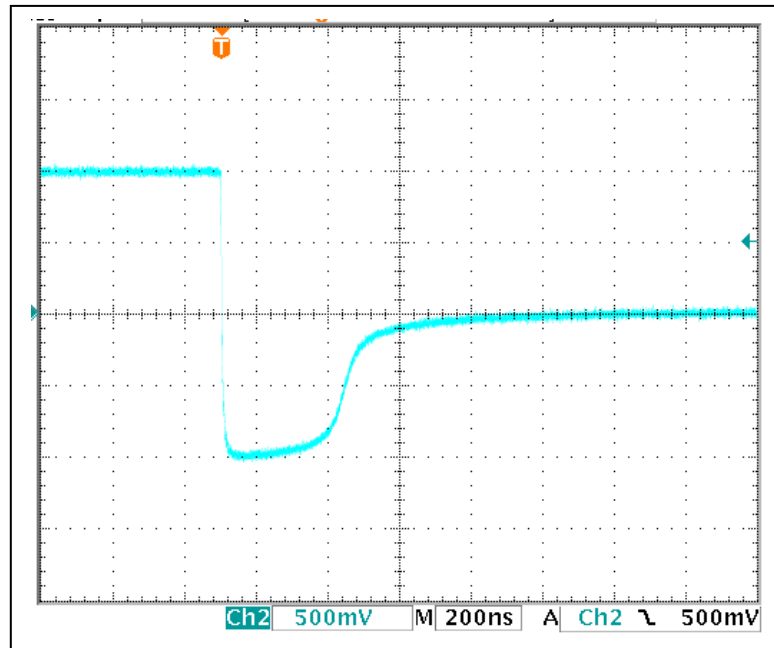| Pspice model parameter	Model description
IOFF	Controlling current to Off state
ION	Controlling current to On state
ROFF	Off Resistance
RON	On Resistance

Input Device Forward Current Characteristics
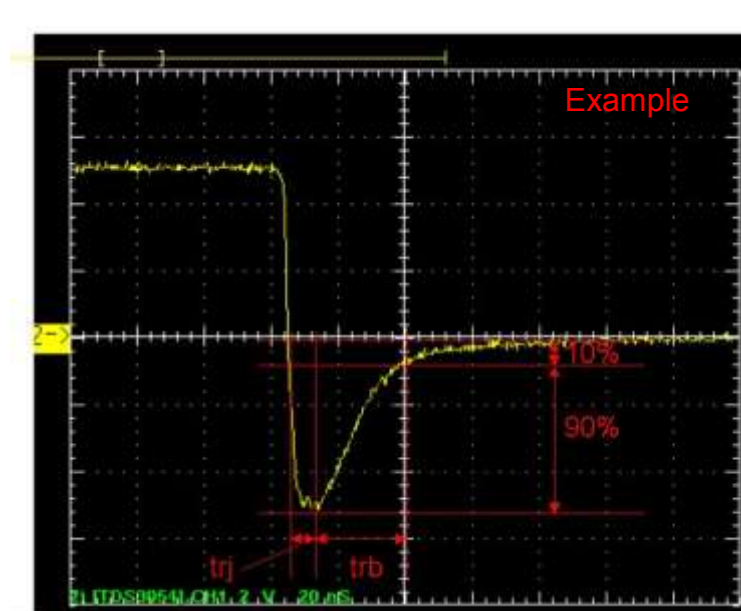

Input Device Junction Capacitance Characteristics

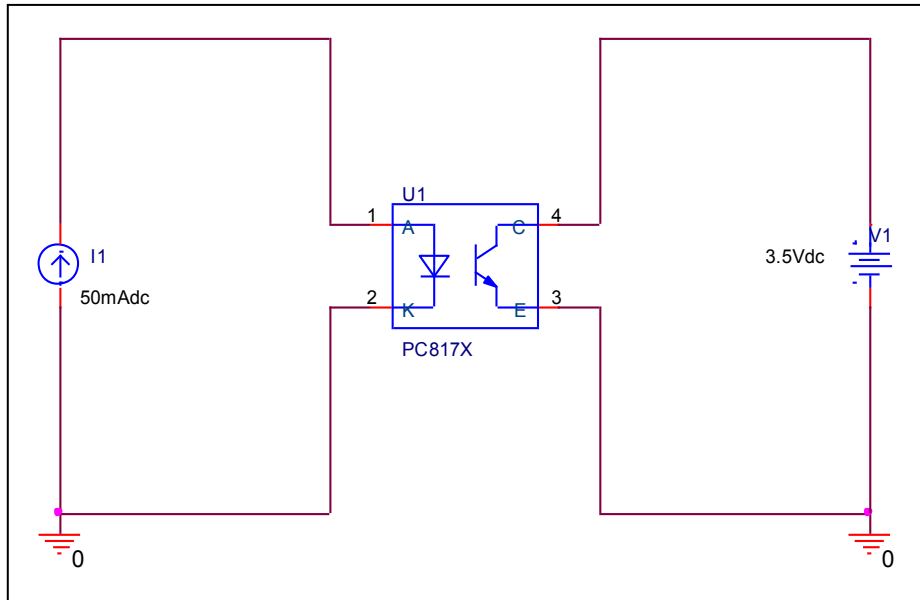# Input Device Reverse Recovery Characteristics

trj=224n(s)

trb=262n(s)

Conditions:Ifwd=Irev=0.04(A),Rl=50

Relation between trj and trb

LED IV Curve Characteristics

Evaluation Circuit

U1

1 A   C 4

I1

50mAdc   2 K   E 3

PC817X

3.5Vdc   V1

0   0

Simulation result

1.0A

10mA

Simulation

100uA
0.8V   1.0V   1.2V   1.4V   1.6V
◇ I_I1
V(U2:A)
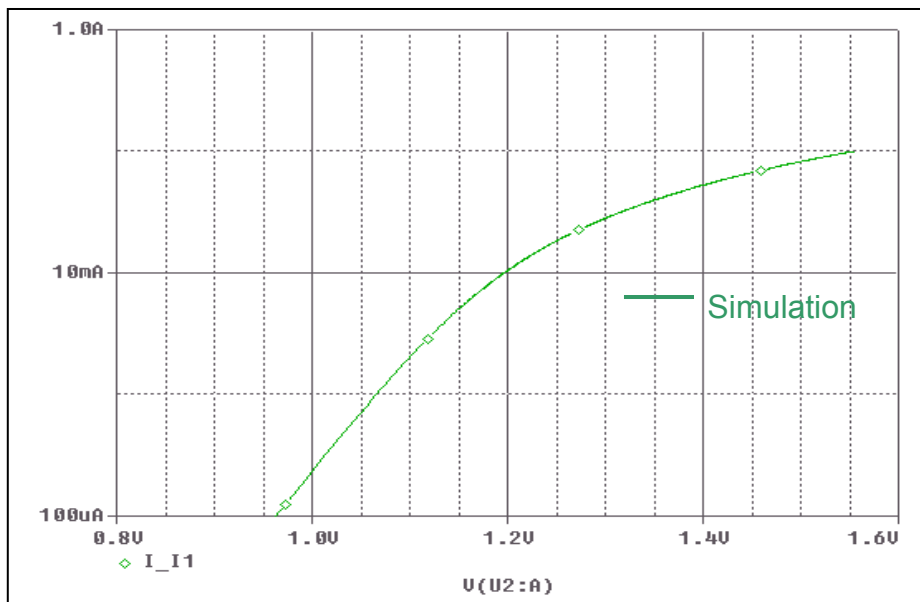
Comparison Table

Ifwd(A)	Vfwd(V)		% Error
	Measurement	Simulation	
0.001	1.065	1.0656	0.056
0.002	1.1	1.0992	-0.073
0.005	1.15	1.1494	-0.052
0.01	1.195	1.1964	0.117
0.02	1.26	1.2594	-0.048
0.05	1.39	1.39	0

Transistor Saturation Characteristics

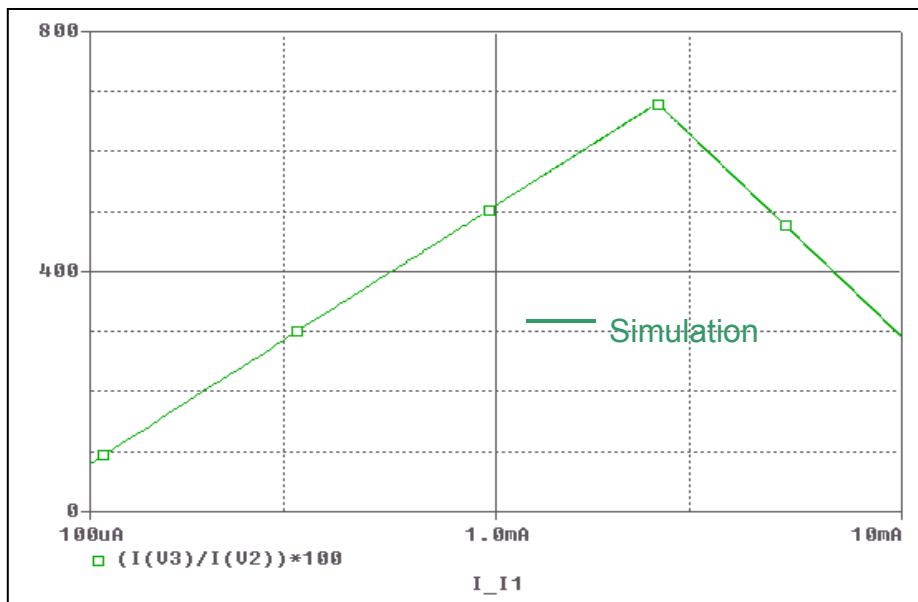Evaluation Circuit
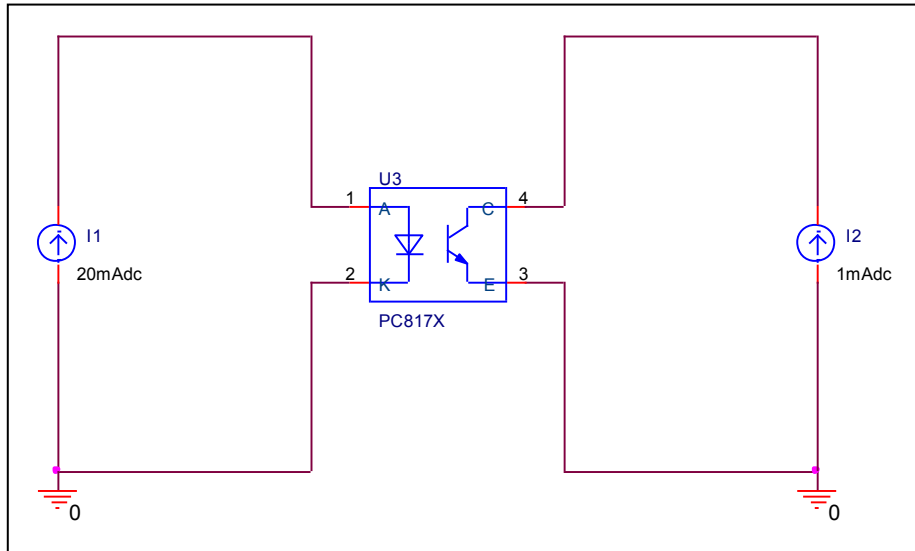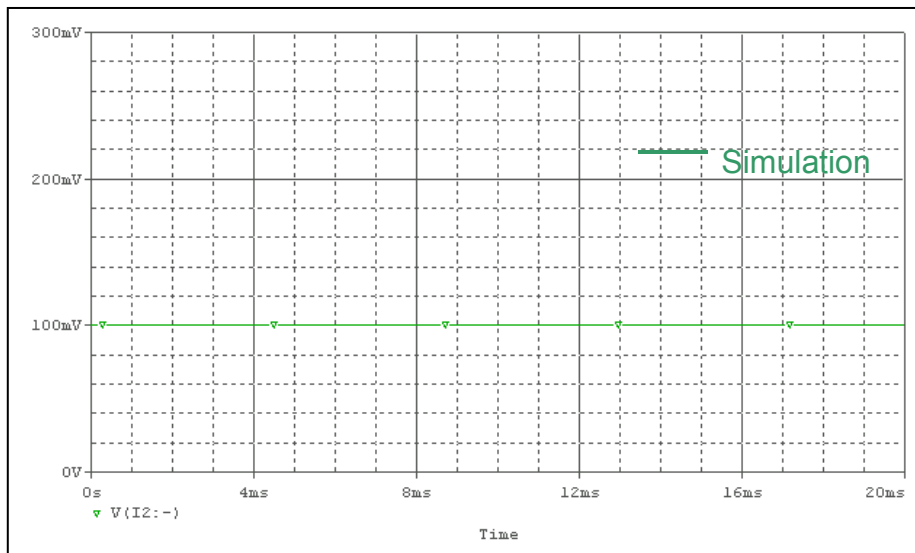
Simulation result

Comparison Table

	Measurement	Simulation	% Error
Vce(sat) (V)	0.1	0.100291	0.291

CTR(Current Transfer Ratio) Characteristics

Evaluation Circuit
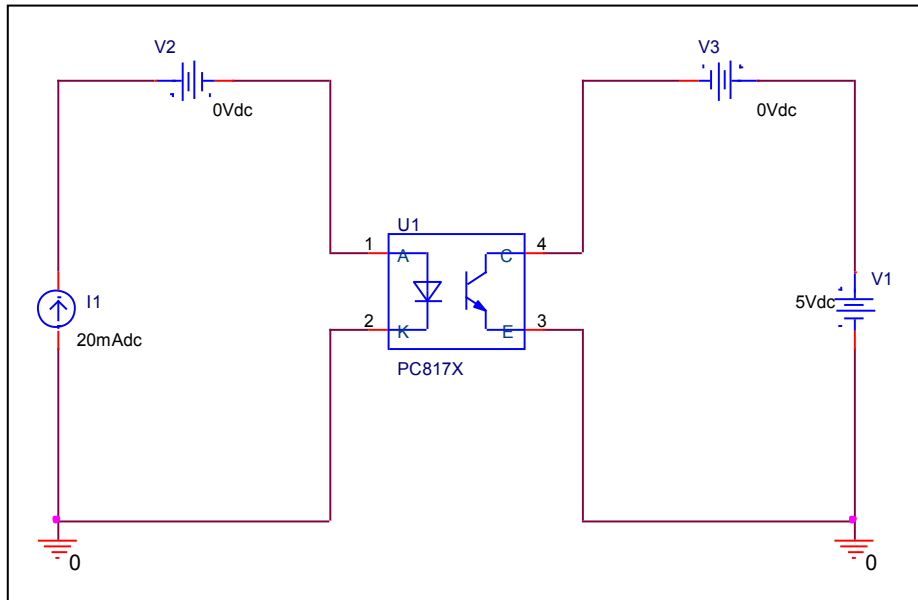
Simulation result

Rise Curve　Table

If(mA)	CTR(%)		% Error
	Measurement	Simulation	
0.4	330	338.212	2.488
0.5	370	379.967	2.694
0.6	420	414.034	-1.420
0.7	450	442.804	-1.599
0.8	465	467.705	0.582
1.5	590	584.783	-0.884
2	650	638.245	-1.808
2.5	680	679.629	-0.055

Fall Curve Table

If(mA)	CTR(%)		% Error
	Measurement	Simulation	
2.5	680	679.629	-0.055
3	650	625.668	-3.743
5	470	483.085	2.784
7	375	389.149	3.773
9	310	318.984	2.898
10	290	289.565	-0.150

Switching Time Characteristics

Evaluation Circuit
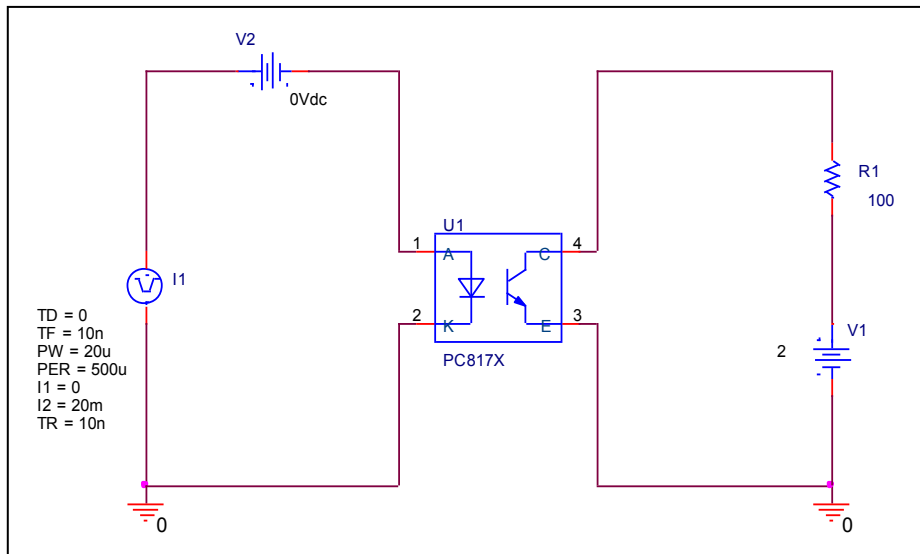
Simulation result
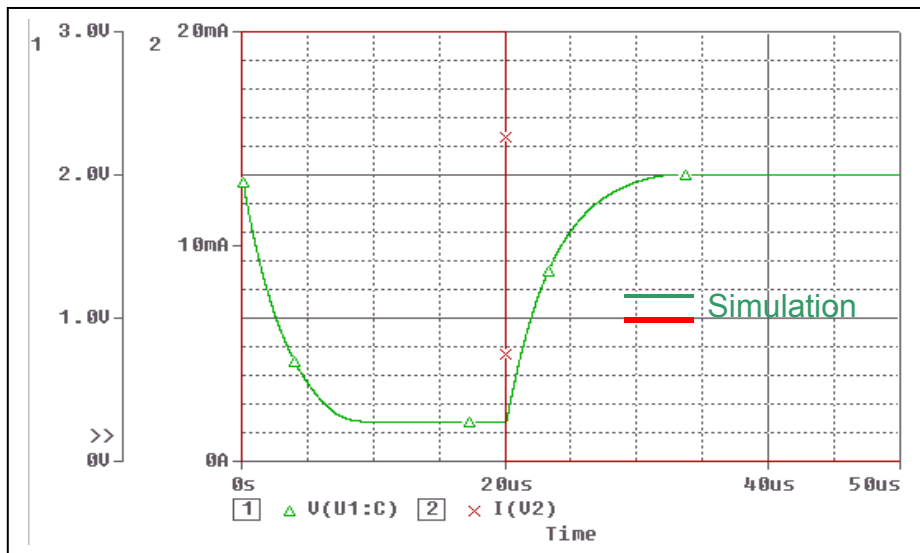
Comparison Table

Vce=2V,RL=100Ω	Measurement	Simulation	% Error
ts (us)	0.48	0.479116	-0.184
tf (us)	6.8	6.8535	0.787