Device Modeling Report

COMPONENTS: PHOTOCOUPLER
PART NUMBER: PC111LY
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}

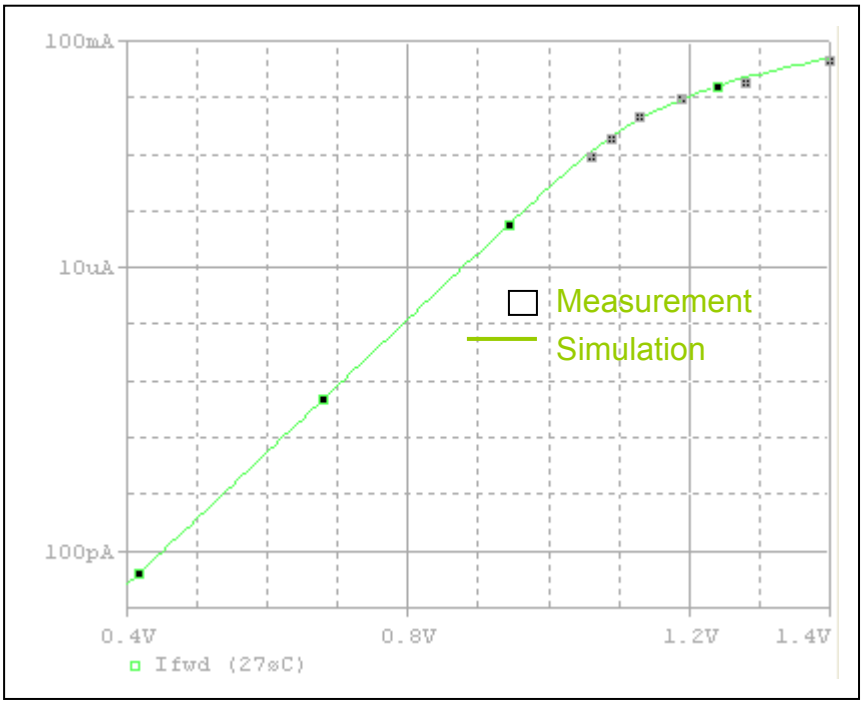
VOLTAGE CONTROLLED CURRENT SOURCE MODEL(VCCS)

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

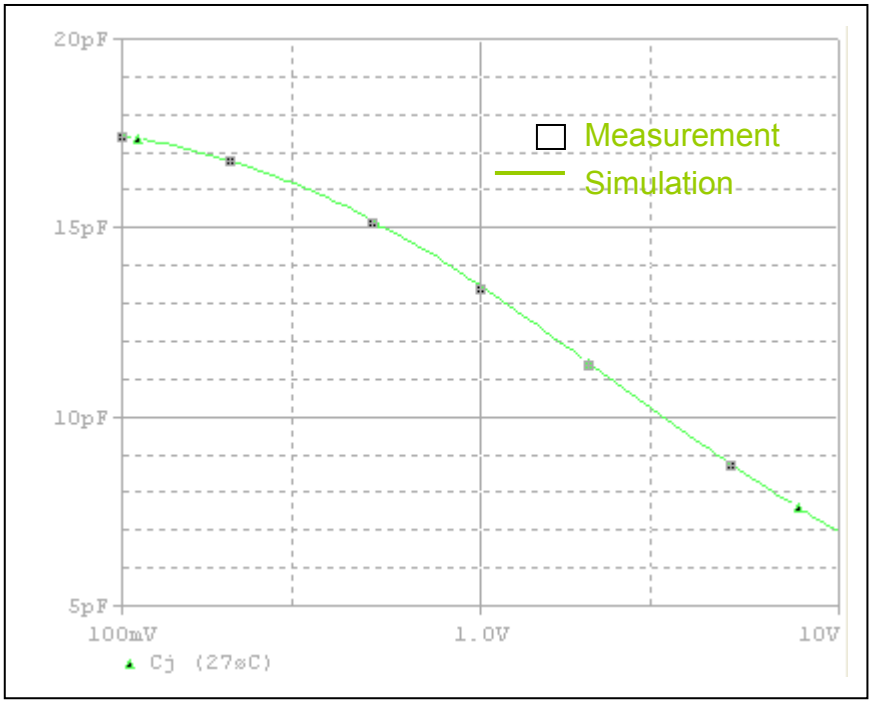
CURRENT CONTROLLED MODEL(W)

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

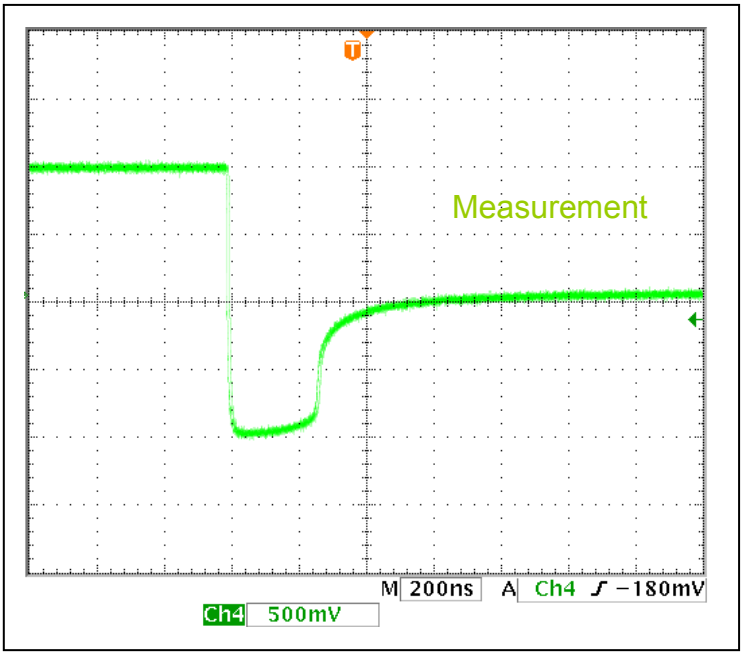
Input Device Forward Current Characteristics



Input Device Junction Capacitance Characteristics



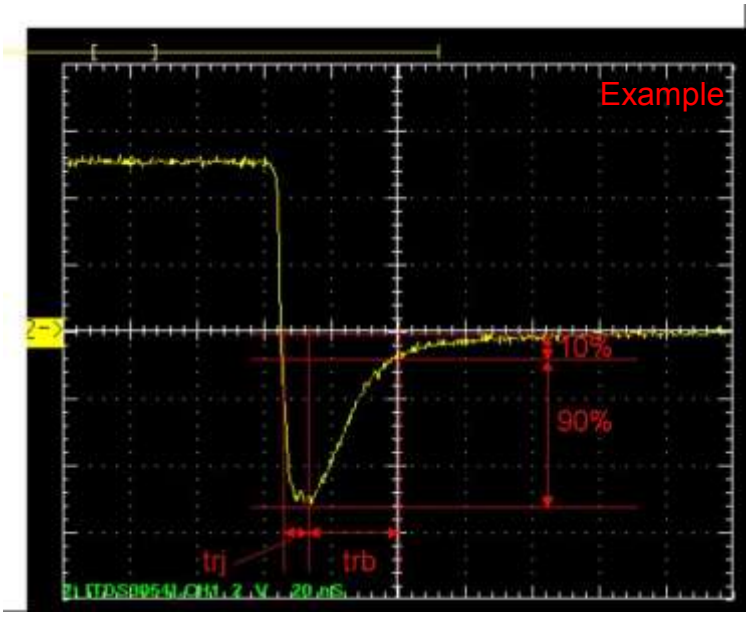
Input Device Reverse Recovery Characteristics



trj= 244 n(s)

trb= 160 n(s)

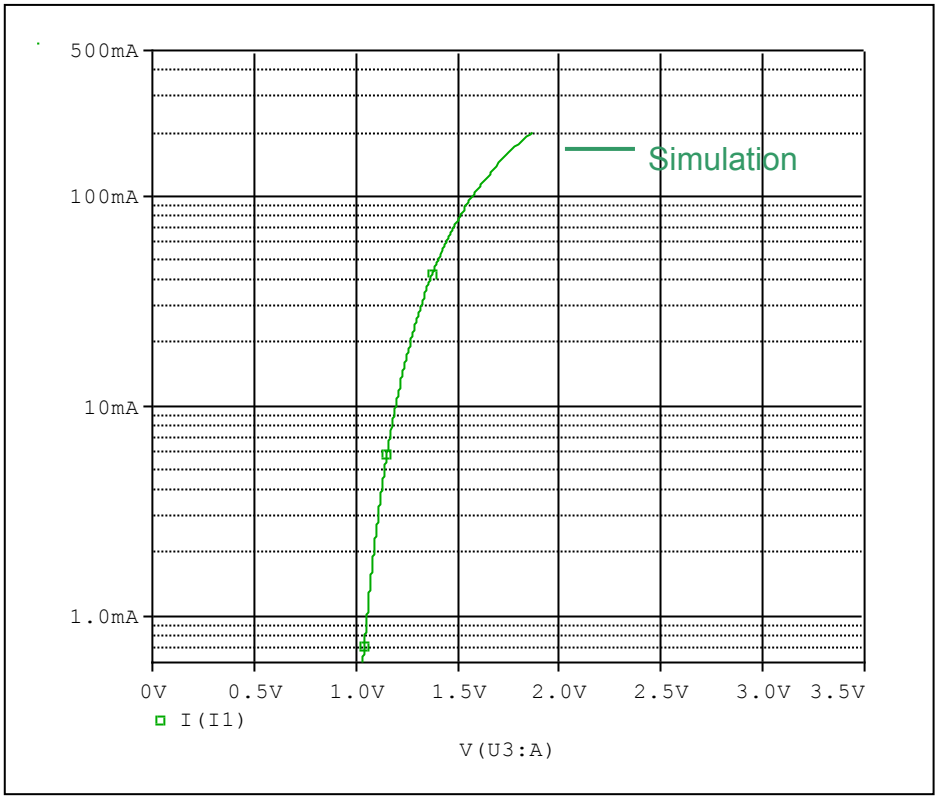
Conditions:Ifwd=Irev=0.04(A),Rl=50



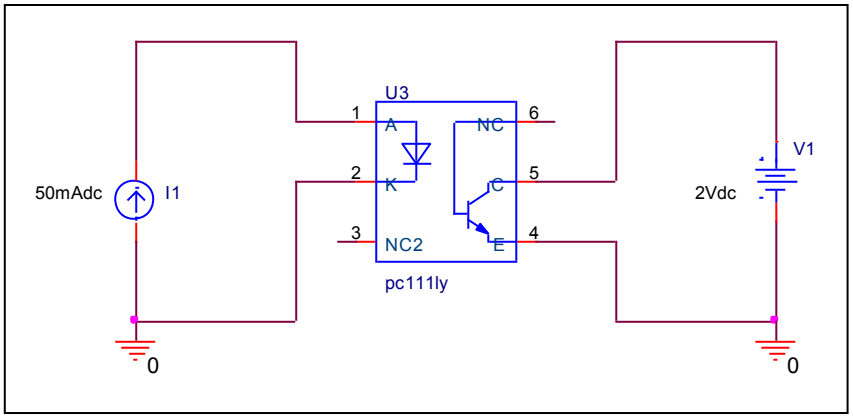
Relation between trj and trb

LED IV Curve Characteristics

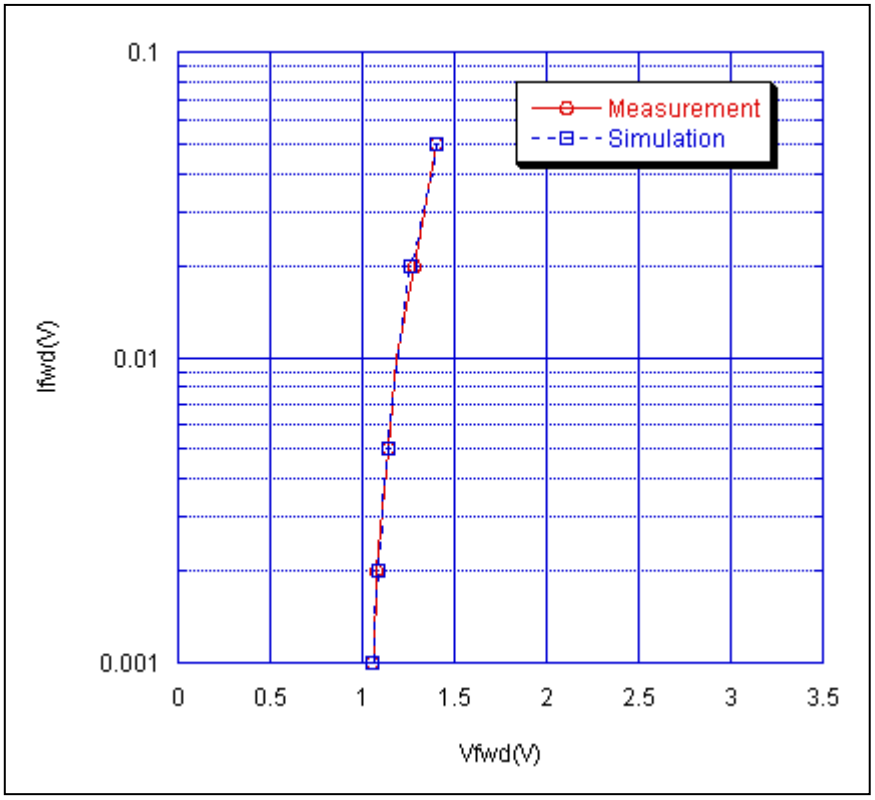
Simulation result



Evaluation Circuit



Comparison Graph

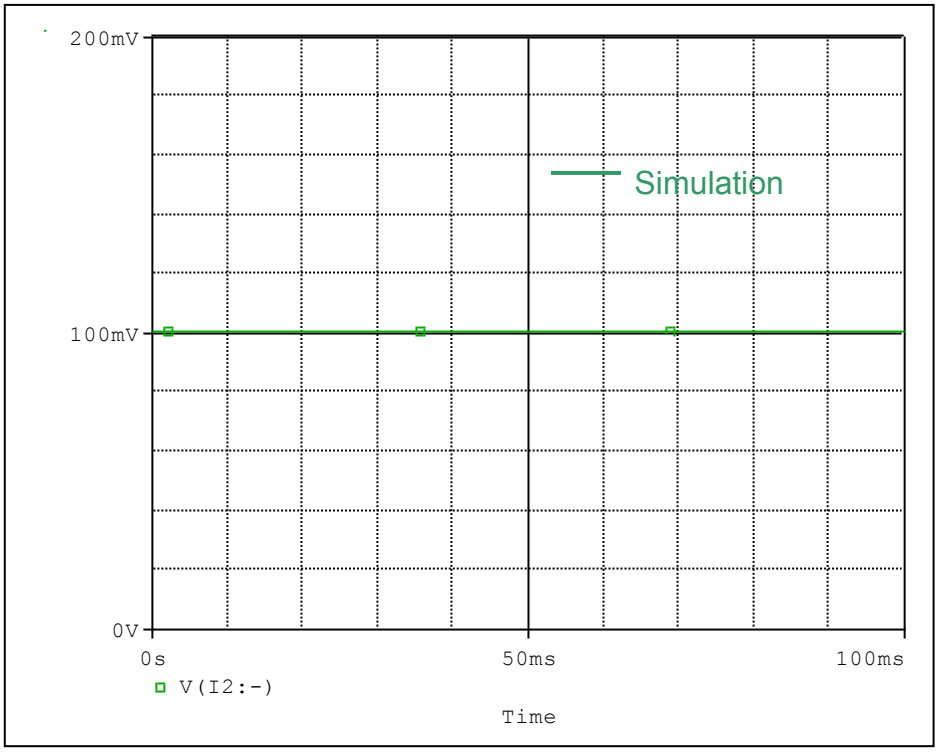


Comparison Table

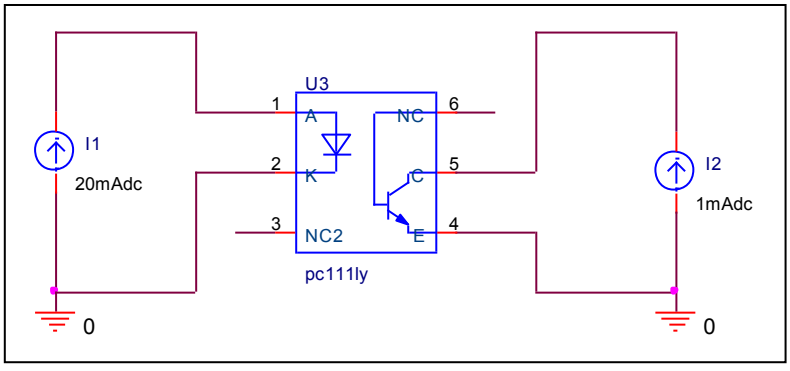
Ifwd(A)	Vfwd(V)		% Error
	Measurement	Simulation	
0.001	1.060	1.056	-0.377
0.002	1.080	1.088	0.741
0.005	1.140	1.140	0.000
0.01	1.190	1.195	0.420
0.02	1.280	1.266	-1.094
0.05	1.400	1.403	0.214

Transistor Saturation Characteristics

Simulation result



Evaluation Circuit

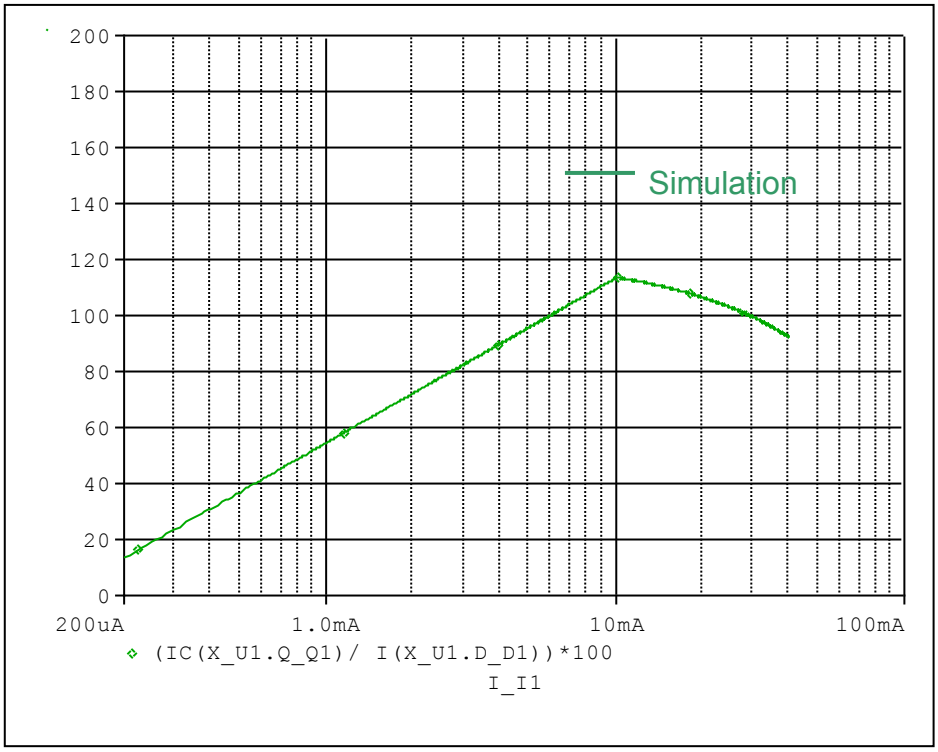


Comparison Table

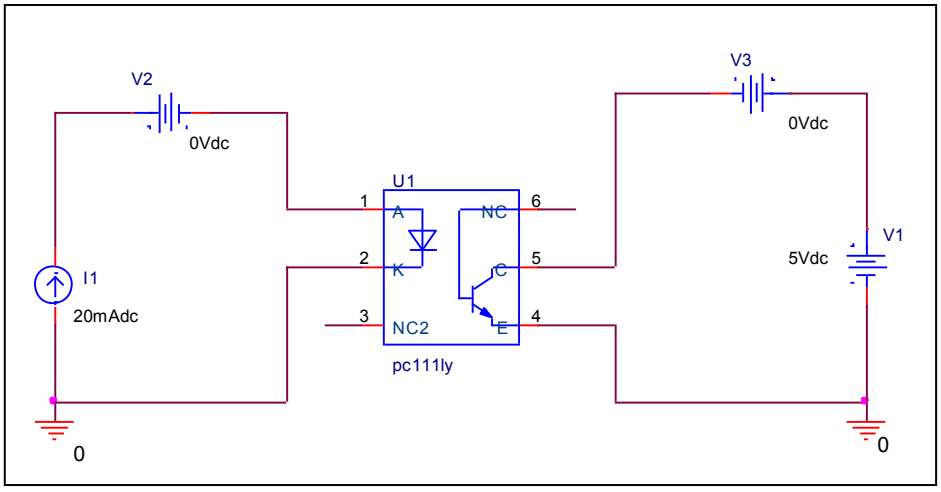
R_{BE}= ∞	Measurement	Simulation	% Error
Vce(sat) (V)	0.100	0.100	0.000

CTR(Current Transfer Ratio) Characteristics

Simulation result



Evaluation Circuit



Rise Curve Table

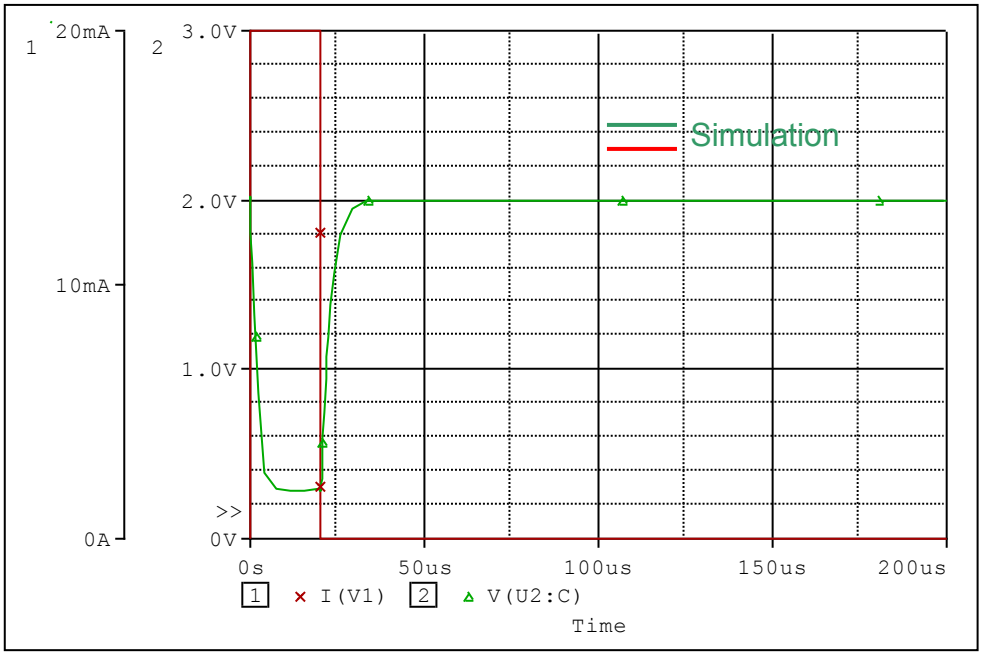
If(mA)	CTR(%)		% Error
	Measurement	Simulation	
0.200	13.000	13.294	2.262
0.500	36.000	36.763	2.119
1.000	56.000	54.560	-2.571
2.000	74.000	72.259	-2.353
8.000	110.000	107.635	-2.150
10.000	113.000	113.812	0.719

Fall Curve Table

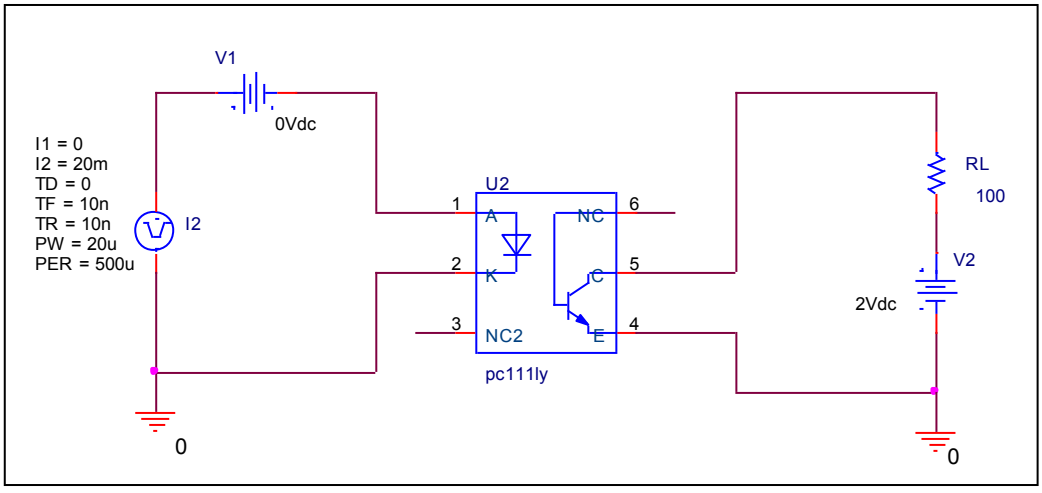
If(mA)	CTR(%)		% Error
	Measurement	Simulation	
10.000	113.00	113.812	0.719
20.000	109.000	106.875	-1.950
30.000	103.000	99.375	-3.519
40.000	95.000	92.642	-2.482

Switching Time Characteristics

Simulation result



Evaluation Circuit



Comparison Table

Vce=2V,RL=100Ω	Measurement	Simulation	% Error
ts (us)	0.600	0.603	0.500
tf (us)	6.000	6.041	0.683