Device Modeling Report

COMPONENTS:PHOTOCOUPLER
PART NUMBER:TLP629
MANUFACTURER: TOSHIBA

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}

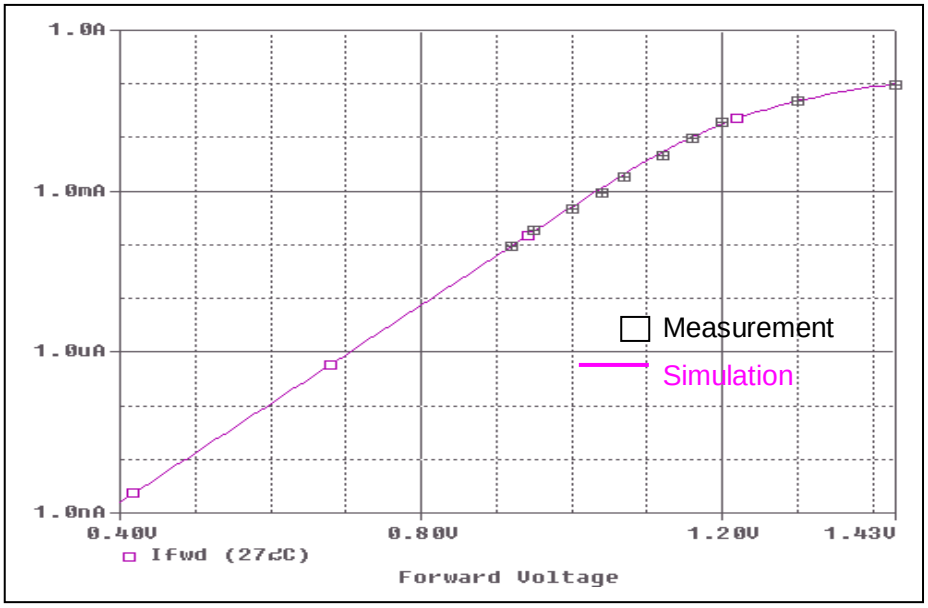
VOLTAGE CONTROLLED CURRENT SOURCE MODEL(VCCS)

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

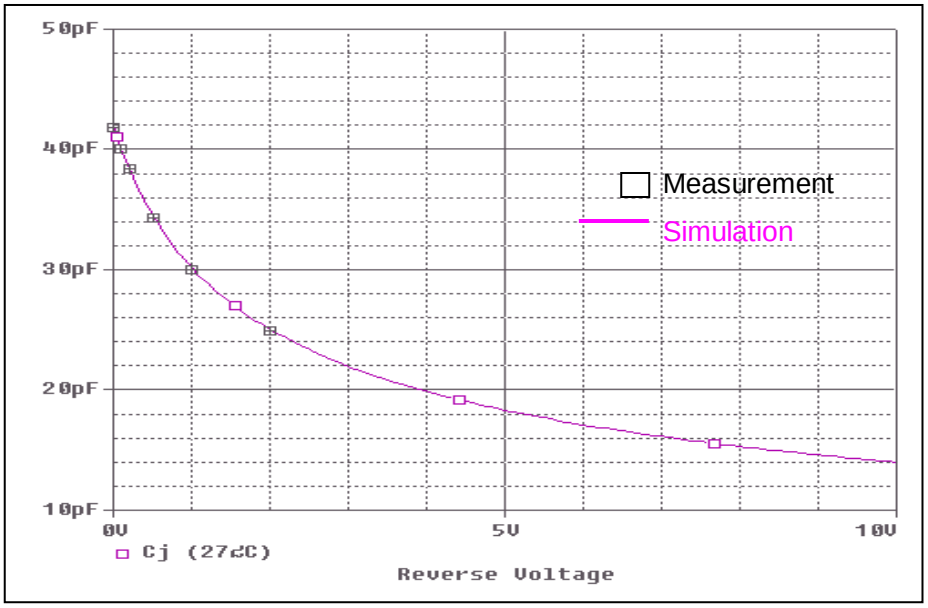
CURRENT CONTROLLED MODEL(W)

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

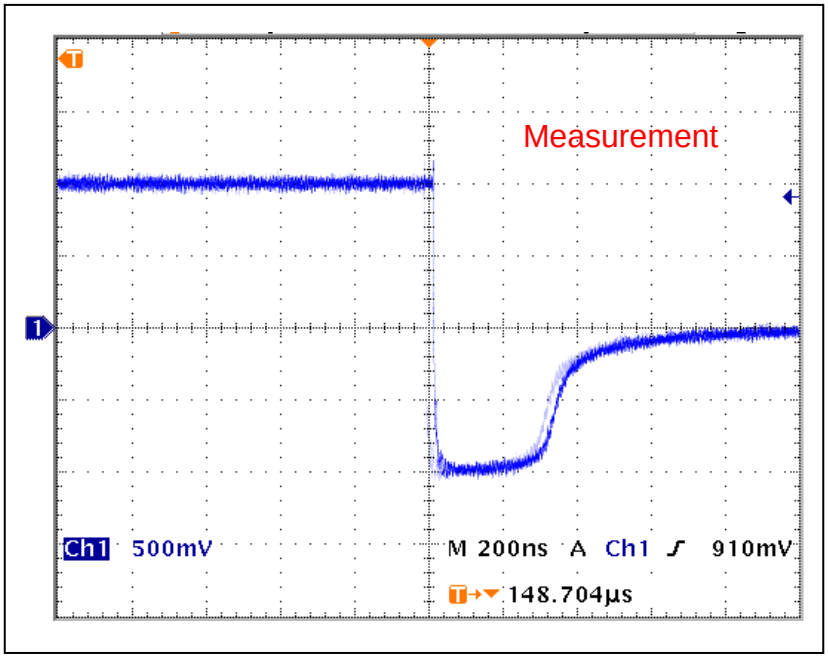
Input Device Forward Current Characteristics



Input Device Junction Capacitance Characteristics



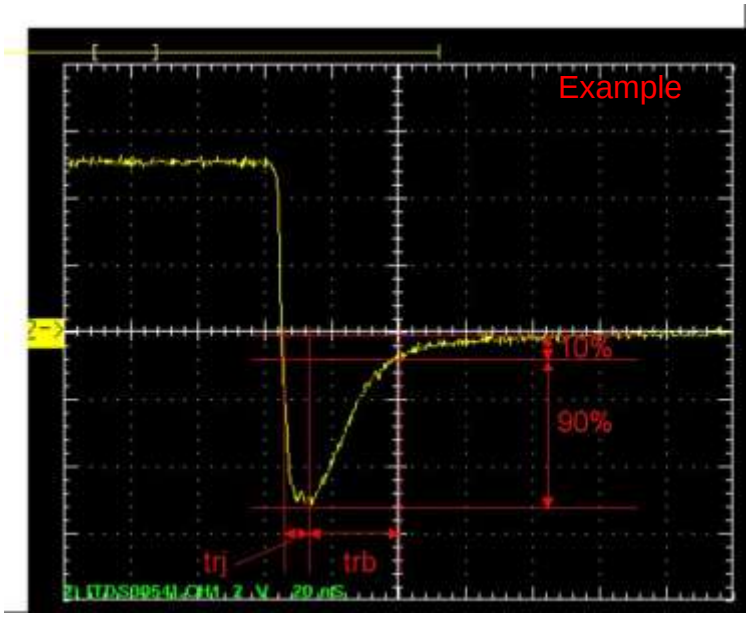
Input Device Reverse Recovery Characteristics



trj=208n(s)

trb=324n(s)

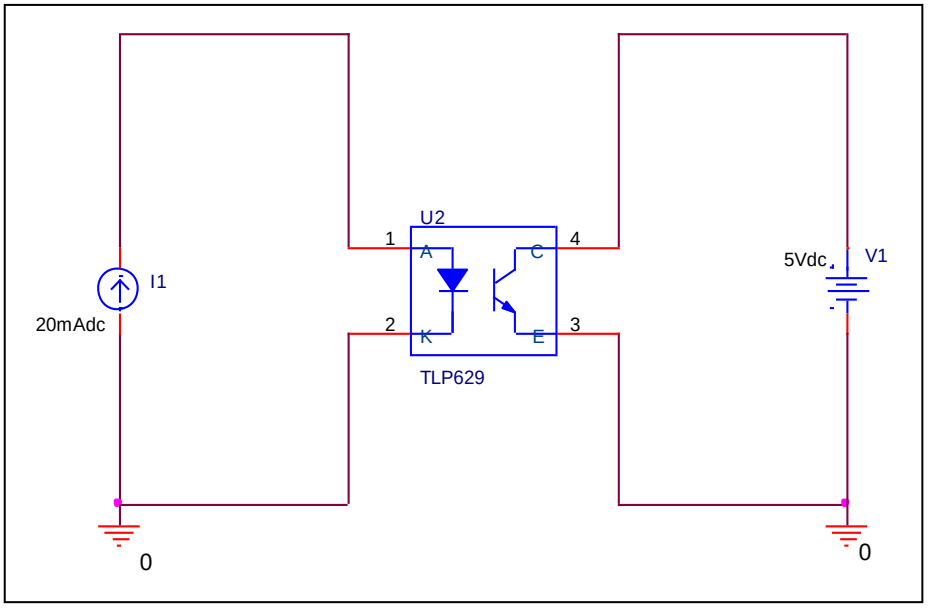
Conditions:Ifwd=Irev=0.04(A),Rl=50



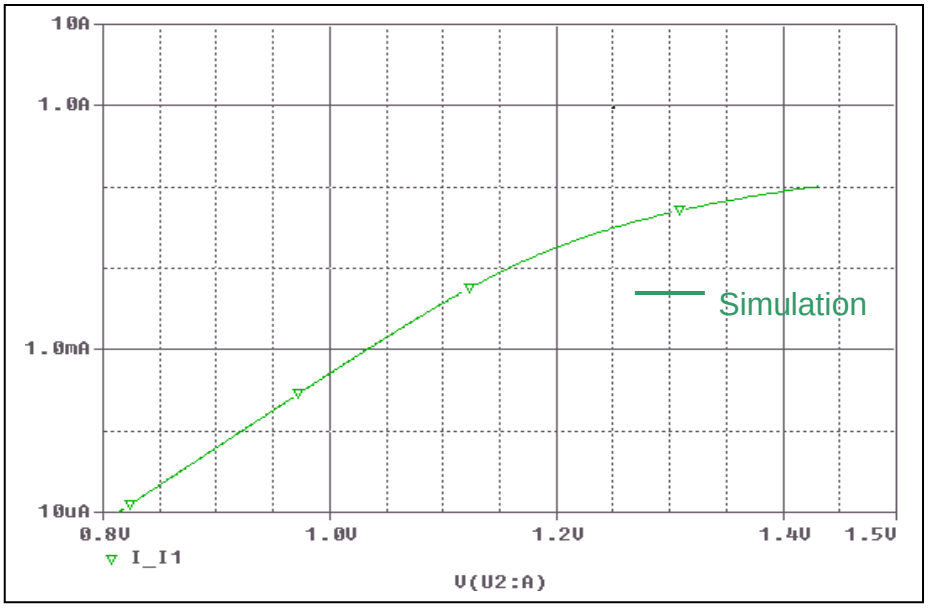
Relation between trj and trb

LED IV Curve Characteristics

Evaluation Circuit



Simulation result

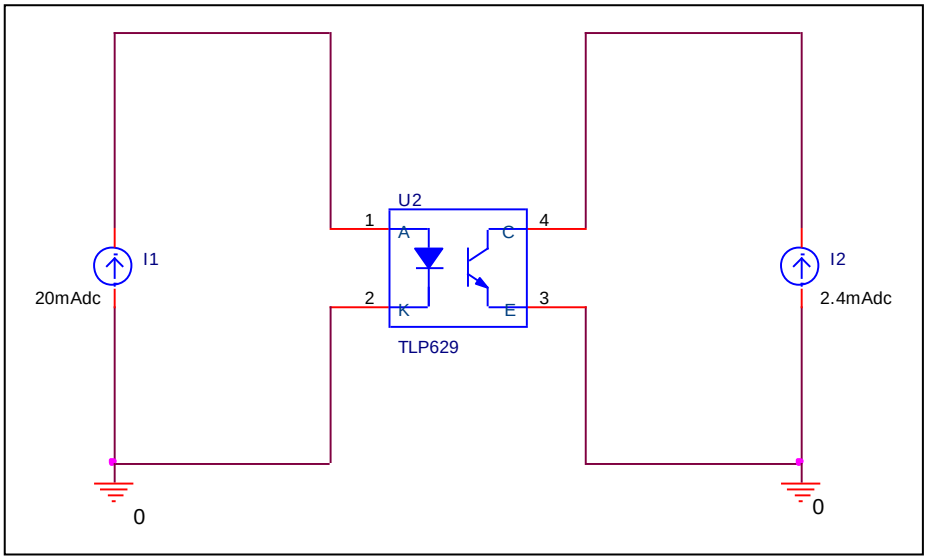


Comparison Table

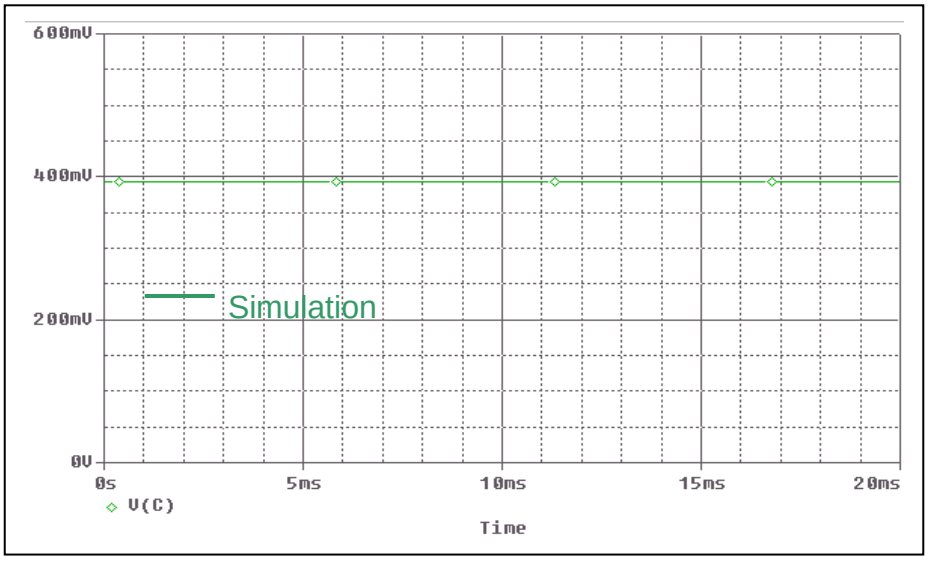
Ifwd(A)	Vfwd(V)		% Error
	Measurement	Simulation	
0.0001	0.92	0.922	0.217
0.0002	0.95	0.955	0.526
0.0005	1	0.9992	-0.080
0.001	1.04	1.0328	-0.692
0.002	1.07	1.0673	-0.252
0.005	1.12	1.116	-0.357
0.01	1.16	1.1576	-0.207
0.02	1.2	1.2082	0.683
0.05	1.3	1.3048	0.369
0.1	1.43	1.4265	-0.245

Transistor Saturation Characteristics

Evaluation Circuit



Simulation result

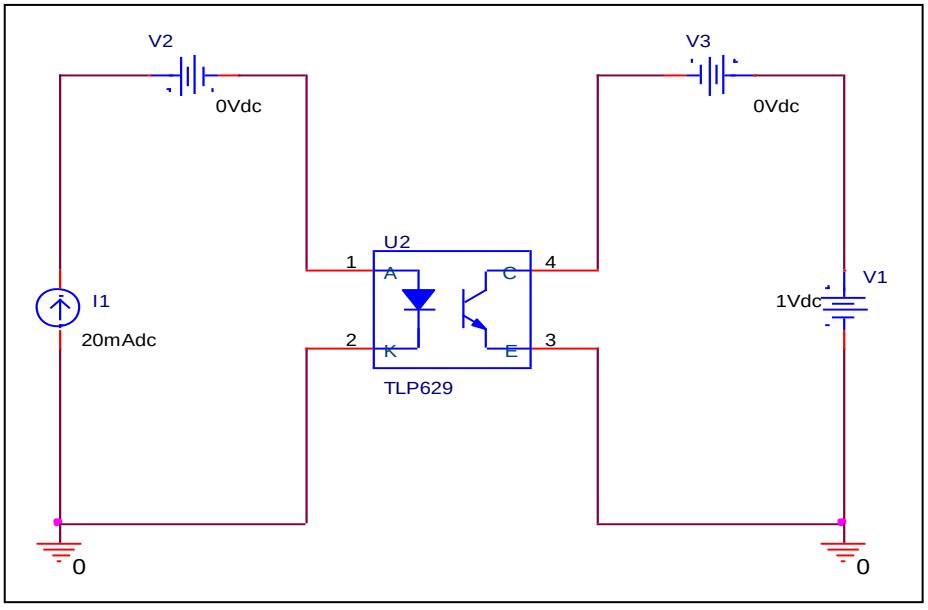


Comparison Table

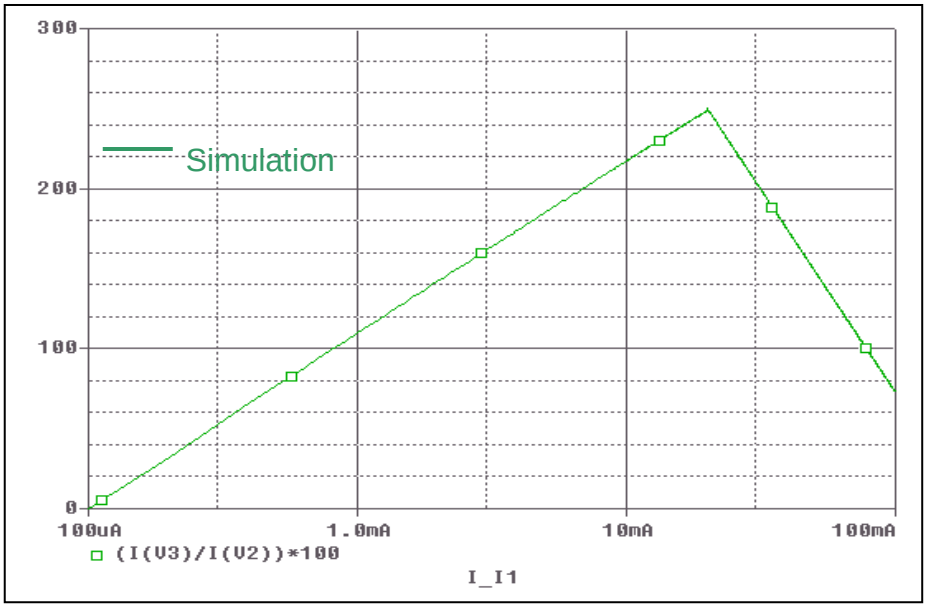
	Measurement	Simulation	% Error
Vce(sat) (V)	0.4	0.393	-1.75

CTR(Current Transfer Ratio) Characteristics

Evaluation Circuit



Simulation result



Rise Curve Table

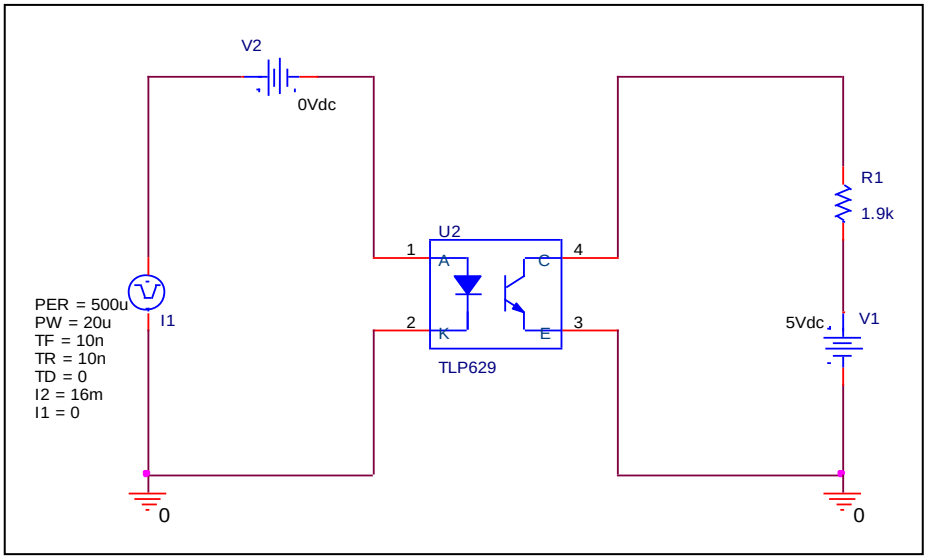
If(mA)	CTR(%)		% Error
	Measurement	Simulation	
0.3	52	52.220	0.423
0.4	65	66.15	1.769
0.5	78	76.874	-1.444
1	110	109.854	-0.133
2	145	142.495	-1.728
5	180	185.288	2.938
10	210	217.352	3.501
20	250	249.925	-0.030

Fall Curve Table

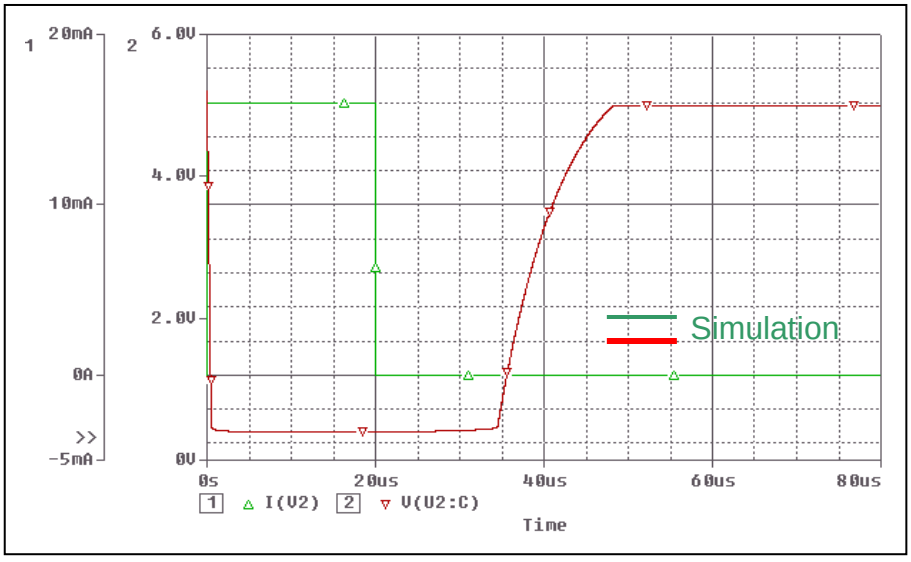
If(mA)	CTR(%)		% Error
	Measurement	Simulation	
20	250	249.925	-0.030
30	200	205.089	2.545
40	170	173.349	1.970
50	150	148.781	-0.813
60	130	128.743	-0.967
70	110	111.827	1.661
80	95	97.190	2.305
90	85	84.290	-0.835

Switching Time Characteristics

Evaluation Circuit



Simulation result



Comparison Table

Vcc=5V,IC=16mA,RL=1.9kΩ	Measurement	Simulation	% Error
Ts (us)	15	15.056	0.373
Tf (us)	25	25.006	0.024