

Device Modeling Report

COMPONENTS : PHOTOCOUPLER
PART NUMBER : TLP620
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)

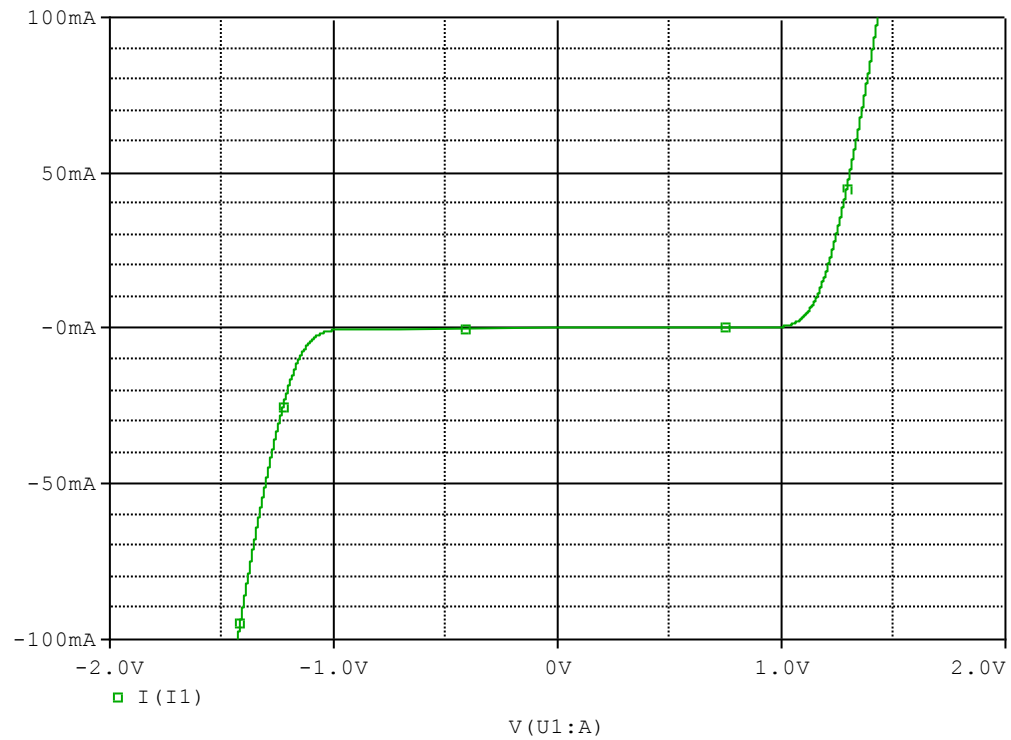
E<Name><(+)Node><(–)Node>VALUE={Expression}

CURRENT CONTROLLED MODEL(W)

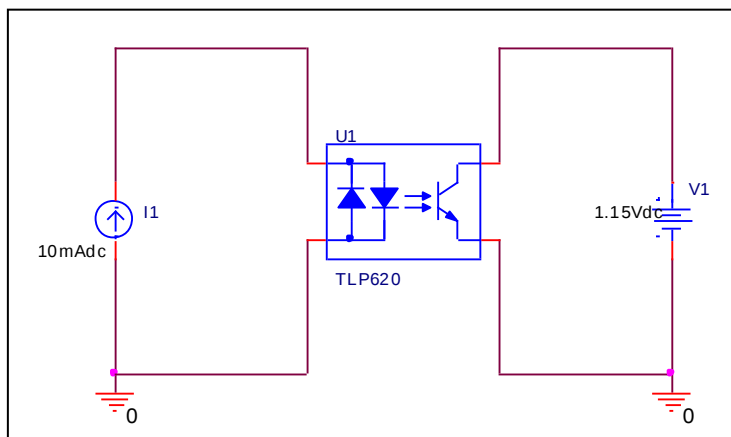
Pspice model parameter	Model description
IOFF	Controlling current to Off state
ION	Controlling current to On state
ROFF	Off Resistance
RON	On Resistance

LED IV Curve Characteristics

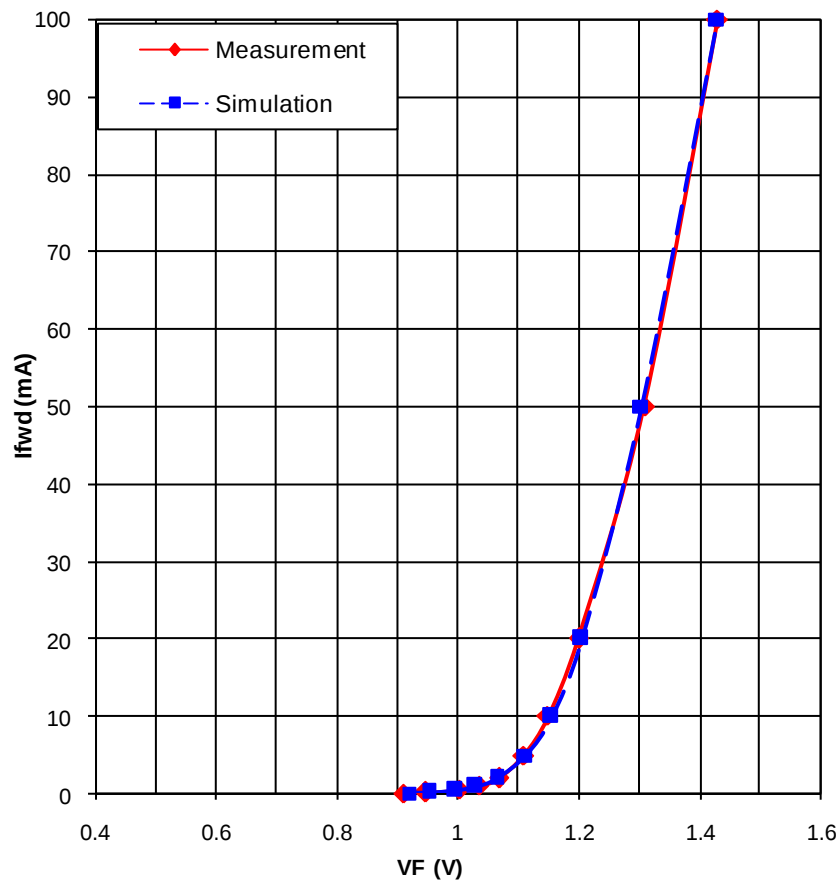
Simulation result



Evaluation Circuit



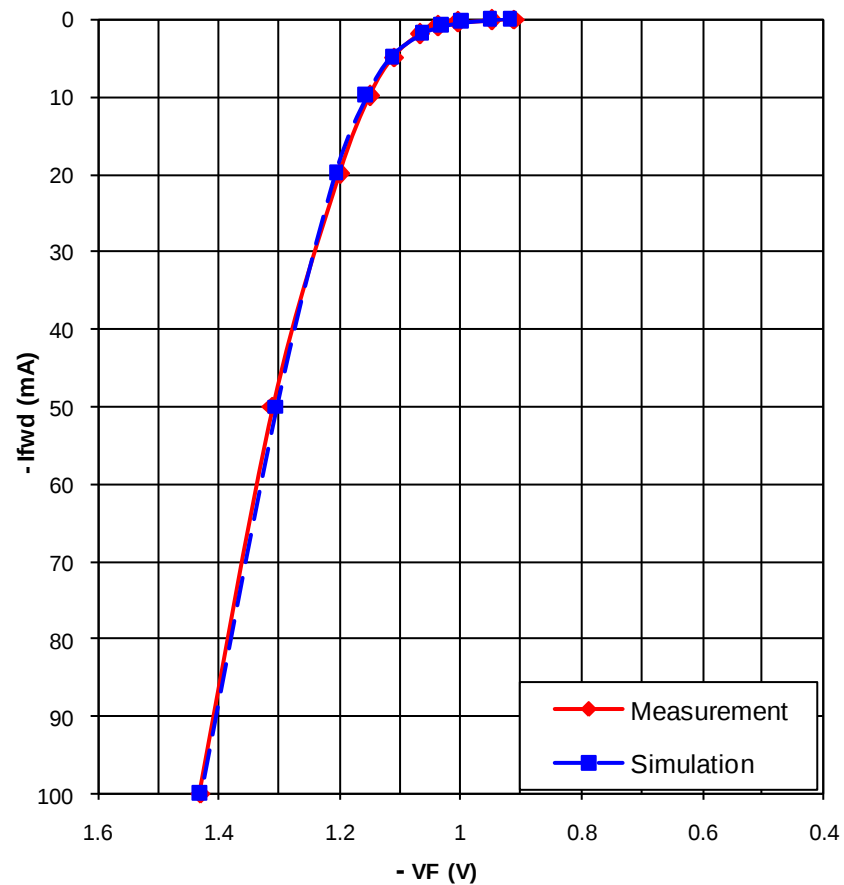
Comparison Graph



Comparison Table

Ifwd (mA)	Vfwd(V)		% Error
	Measurement	Simulation	
0.100	0.910	0.919	0.989
0.200	0.948	0.952	0.422
0.500	1.002	0.996	-0.569
1.000	1.035	1.030	-0.502
2.000	1.068	1.065	-0.309
5.000	1.110	1.113	0.306
10.000	1.150	1.155	0.461
20.000	1.200	1.206	0.500
50.000	1.310	1.304	-0.435
100.000	1.430	1.430	-0.014

Comparison Graph

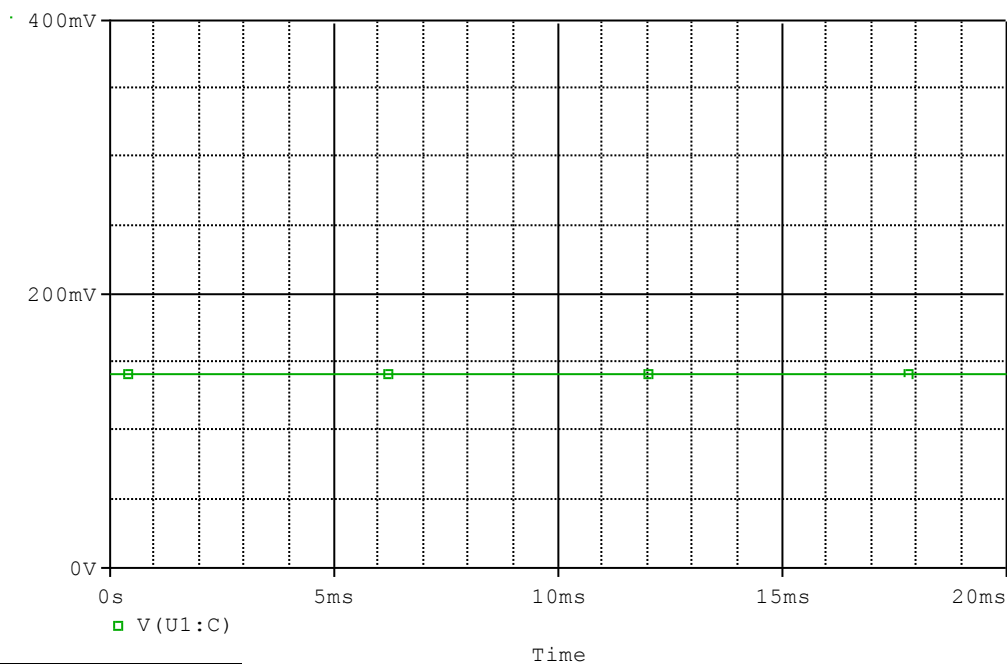


Comparison Table

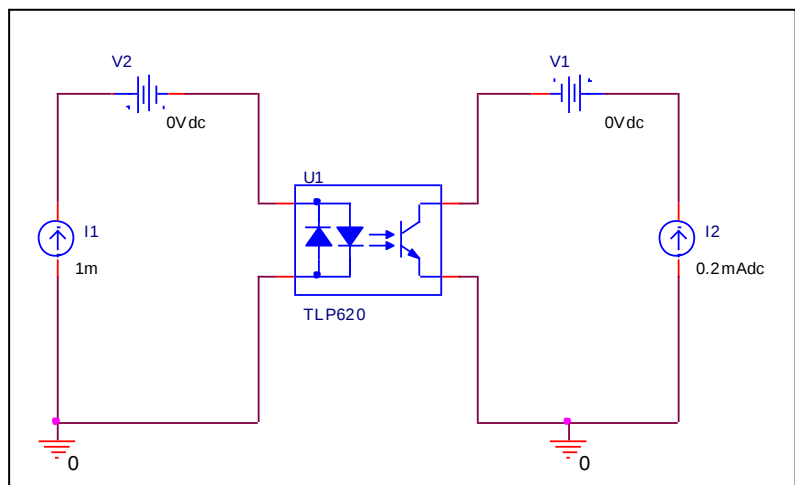
Ifwd (mA)	Vfwd(V)		% Error
	Measurement	Simulation	
-100.000	-1.430	-1.430	-0.014
-50.000	-1.310	-1.304	-0.435
-20.000	-1.200	-1.206	0.500
-10.000	-1.150	-1.155	0.461
-5.000	-1.110	-1.113	0.306
-2.000	-1.068	-1.065	-0.309
-1.000	-1.035	-1.030	-0.502
-0.500	-1.002	-0.996	-0.569
-0.200	-0.948	-0.952	0.422
-0.100	-0.910	-0.919	0.989

Transistor Saturation Characteristics

Simulation result



Evaluation Circuit

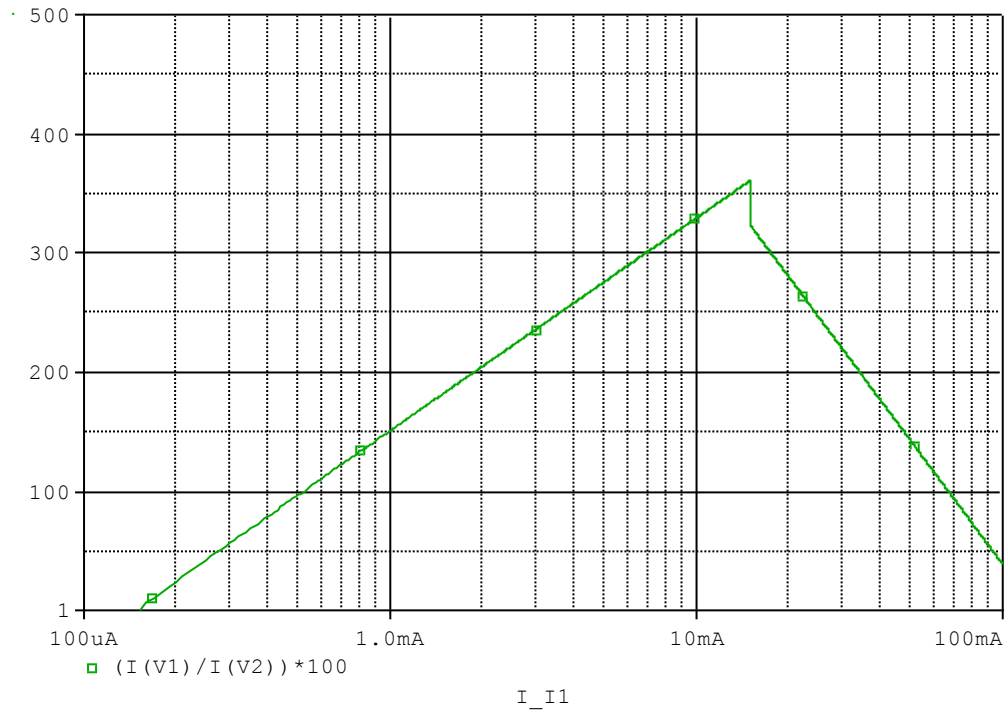


Comparison Table

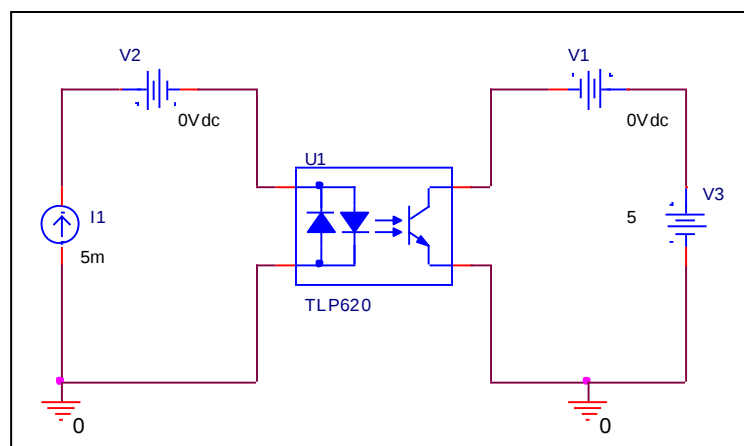
	Measurement	Simulation	% Error
$V_{CE(sat)}$ (V)	0.4 (Max)	0.141	-

CTR(Current Transfer Ratio) Characteristics

Simulation result



Evaluation Circuit



Rise Curve Table

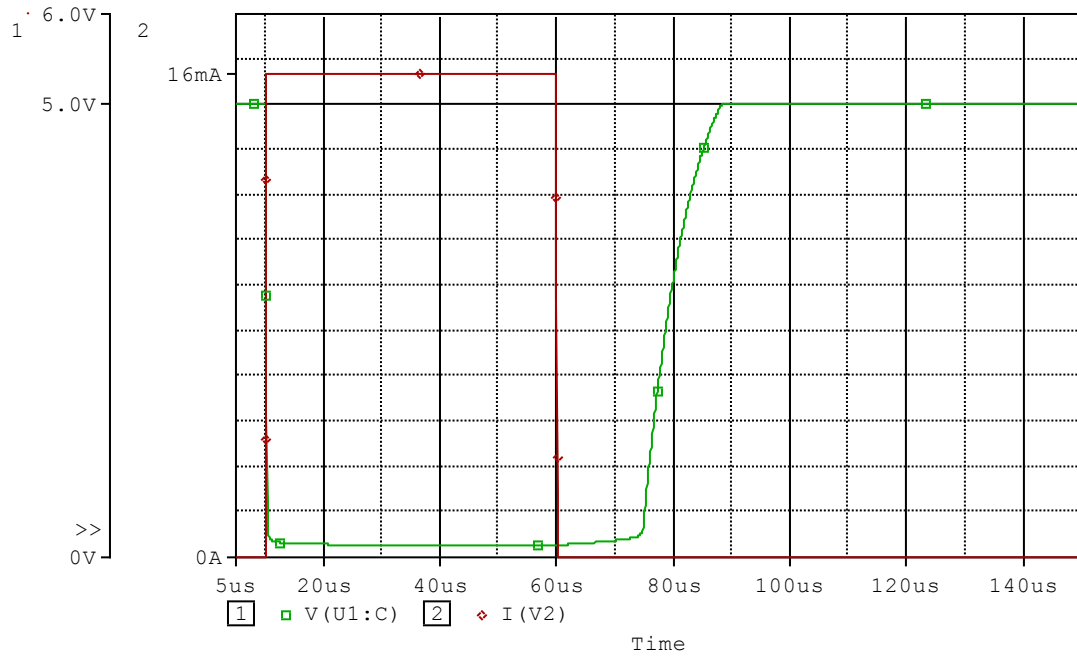
If (mA)	IO/IF		% Error
	Measurement	Simulation	
0.300	59.000	56.973	-3.436
0.500	93.000	97.376	4.705
1.000	150.000	151.527	1.018
2.000	210.000	205.335	-2.221
5.000	290.000	276.193	-4.761
10.000	332.000	329.861	-0.644
15.000	333.500	350.133	4.987

Fall Curve Table

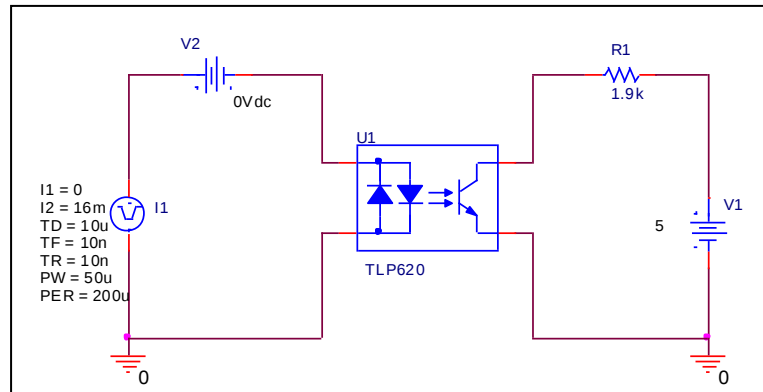
If(mA)	IO/IF		% Error
	Measurement	Simulation	
15.000	333.500	350.133	4.987
20.000	290.000	280.538	-3.263
50.000	140.000	143.361	2.401
60.000	120.000	116.540	-2.883

Switching Time Characteristics

Simulation result



Evaluation Circuit



Comparison Table

$I_F=16\text{mA}$, $R_L=1.9\text{k}\Omega$	Measurement	Simulation	% Error
t_S (us)	15.000	15.024	0.160
t_{OFF} (us)	25.000	25.022	0.088