

Device Modeling Report

COMPONENTS : PHOTOCOUPLER
PART NUMBER : TLP421GP
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)

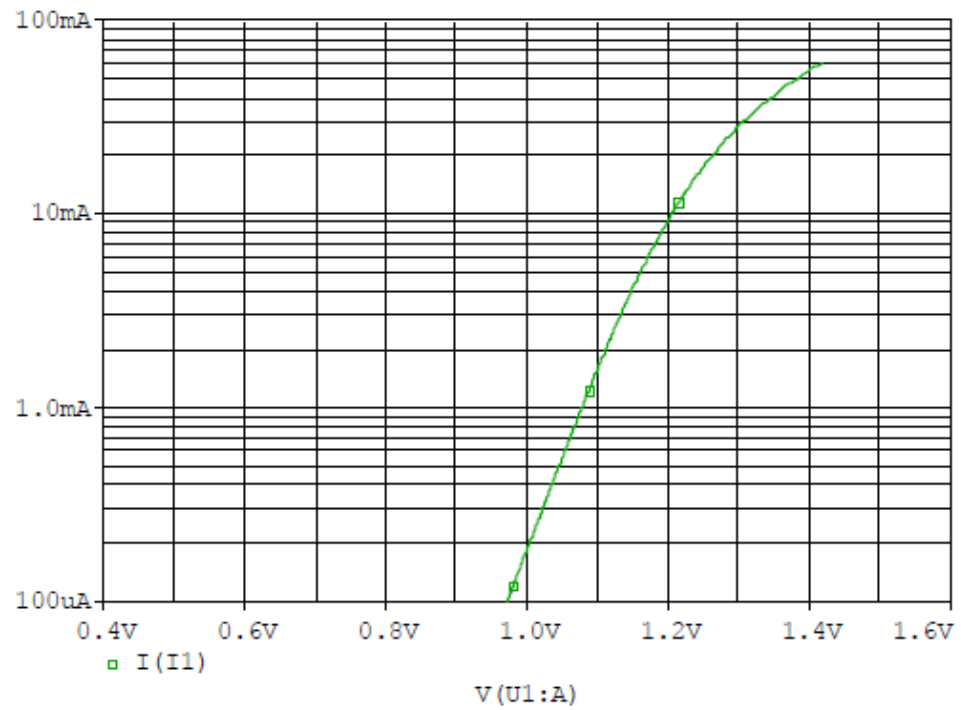
E<Name><(+)Node><(–)Node>VALUE={Expression}

CURRENT CONTROLLED MODEL(W)

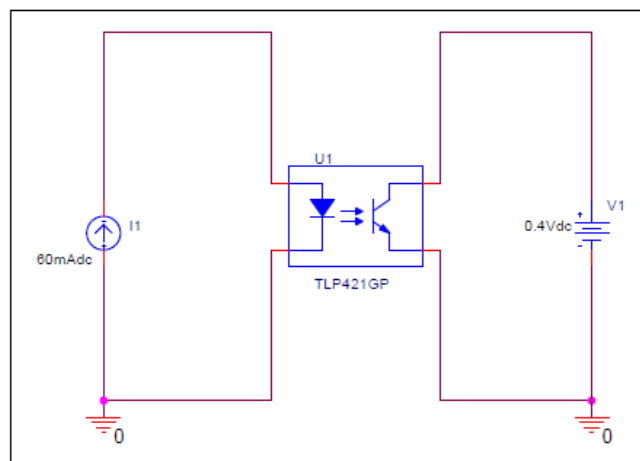
Pspice model parameter	Model description
IOFF	Controlling current to Off state
ION	Controlling current to On state
ROFF	Off Resistance
RON	On Resistance

LED IV Curve Characteristics

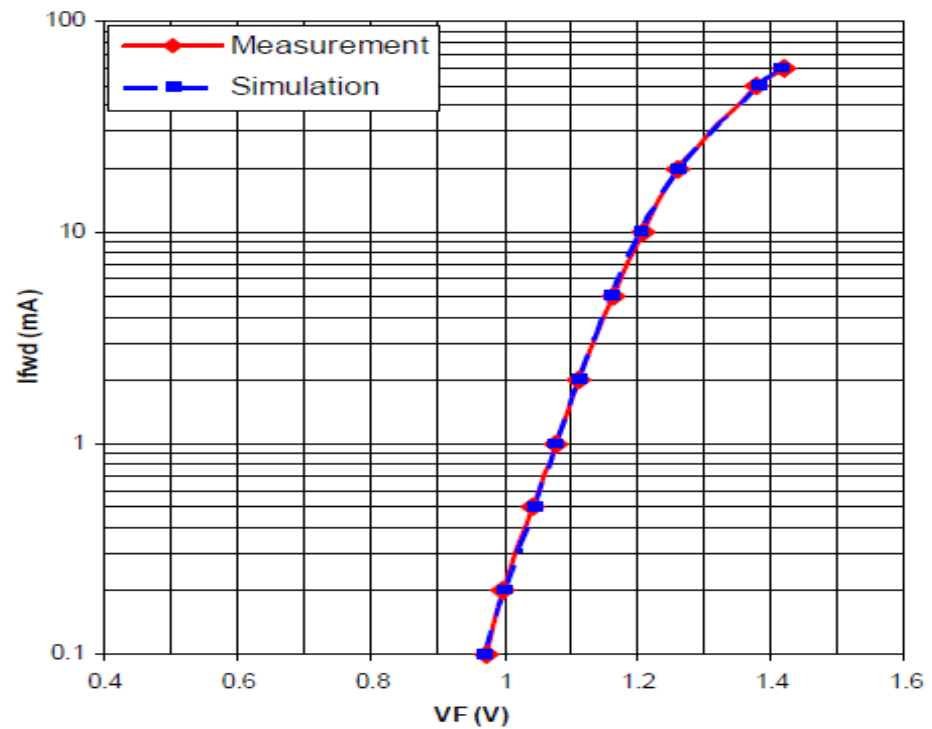
Simulation result



Evaluation Circuit



Comparison Graph

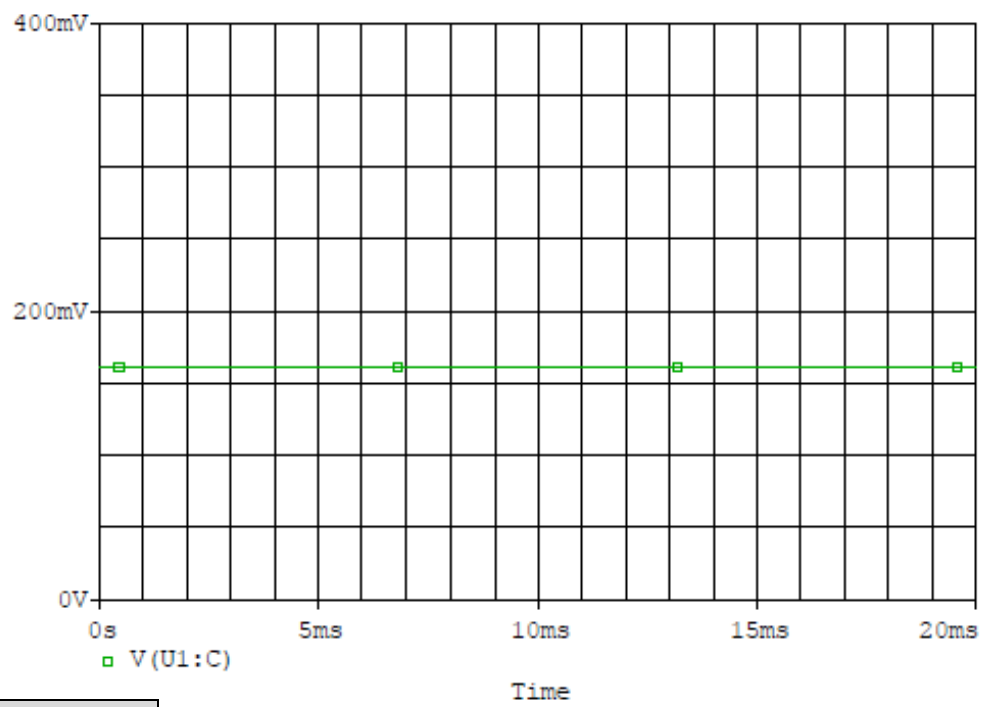


Comparison Table

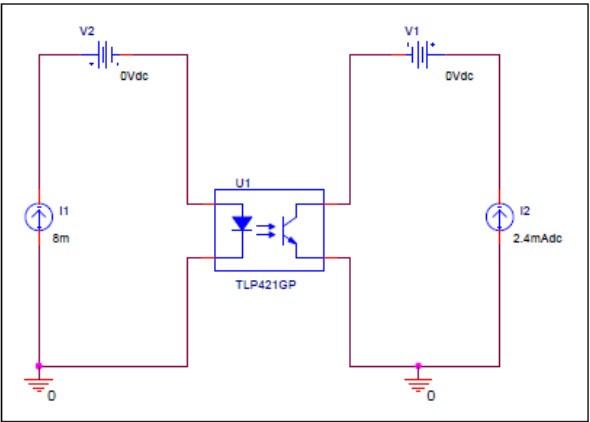
Ifwd (mA)	Vfwd(V)		% Error
	Measurement	Simulation	
0.100	0.975	0.972	-0.308
0.200	1.000	1.003	0.300
0.500	1.043	1.045	0.192
1.000	1.078	1.078	0.000
2.000	1.112	1.111	-0.090
5.000	1.163	1.161	-0.172
10.000	1.210	1.205	-0.413
20.000	1.260	1.262	0.159
50.000	1.380	1.383	0.217
60.000	1.420	1.418	-0.141

Transistor Saturation Characteristics

Simulation result



Evaluation Circuit

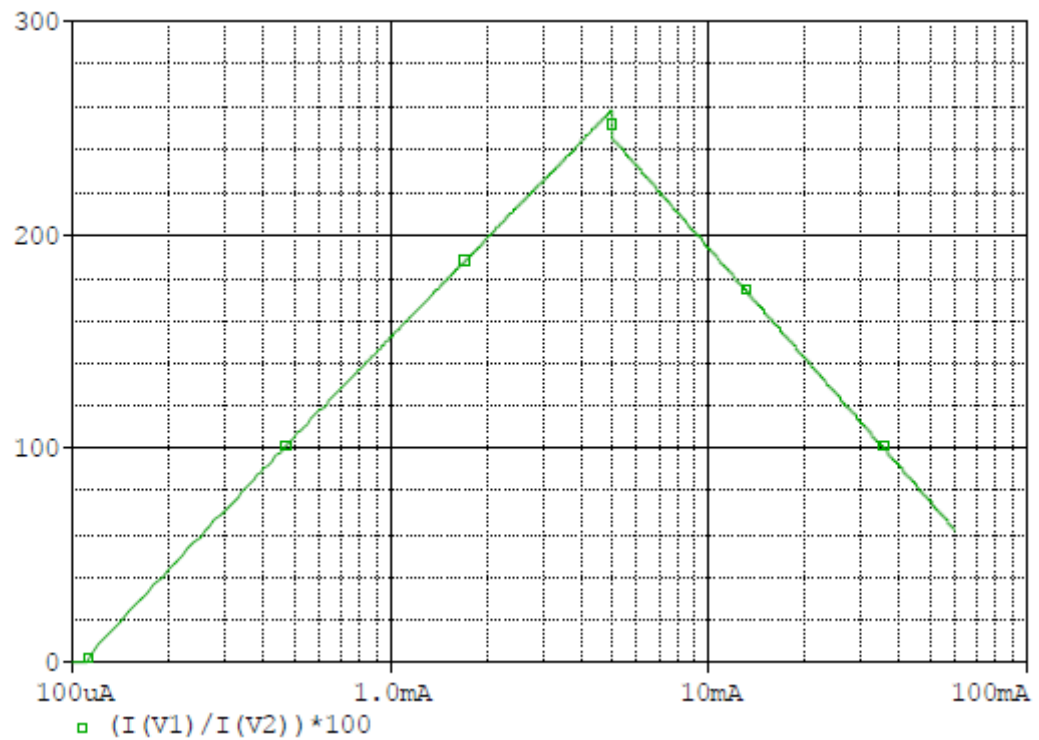


Comparison Table

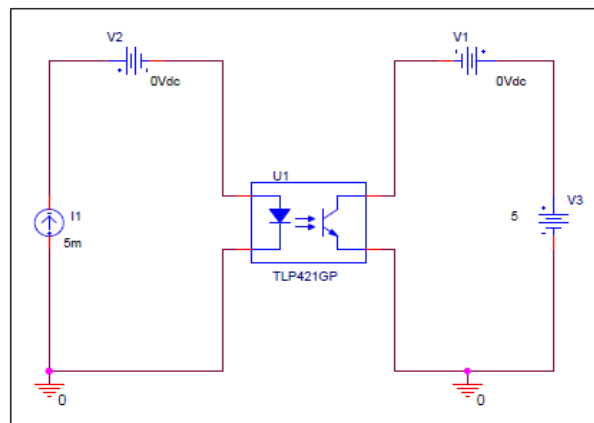
VCE(sat) (V)	Measurement	Simulation	% Error
	0.4	0.16	-

CTR(Current Transfer Ratio) Characteristics

Simulation result



Evaluation Circuit



Rise Curve Table

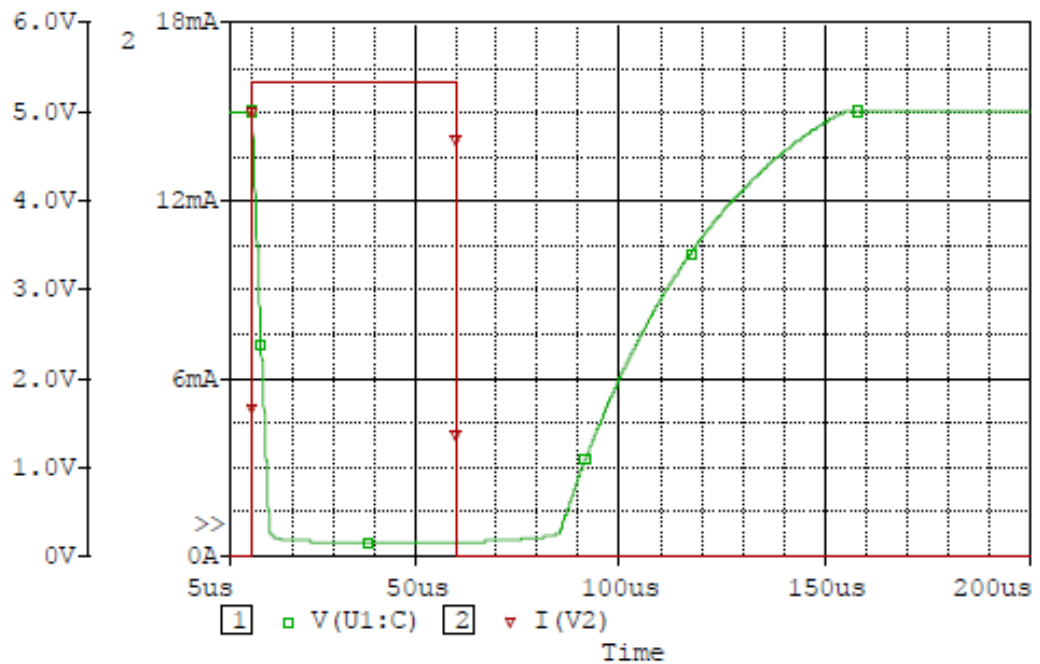
If (mA)	IO/IF		% Error
	Measurement	Simulation	
0.500	105.000	105.790	0.752
1.000	153.000	152.234	-0.501
2.000	208.000	198.331	-4.649
5.000	248.000	258.745	4.333

Fall Curve Table

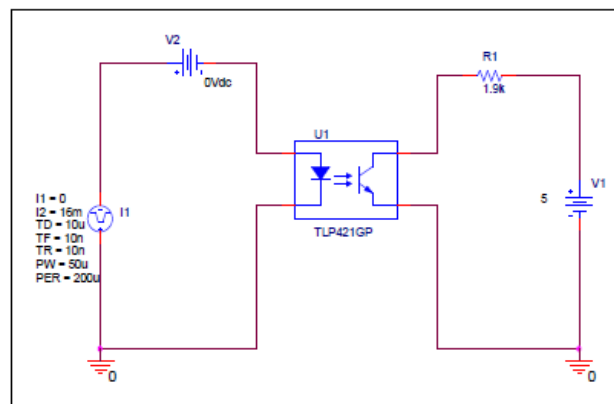
If (mA)	IO/IF		% Error
	Measurement	Simulation	
5.000	248.000	258.745	4.333
10.000	204.000	194.260	-4.775
20.000	150.000	142.766	-4.823
50.000	78.000	75.250	-3.526

Switching Time Characteristics

Simulation result



Evaluation Circuit



Comparison Table

IF=16mA, RL=1.9kΩ	Measurement	Simulation	% Error
ts (μs)	25.00	25.09	0.35
tOFF (μs)	50.00	50.05	0.10