

Device Modeling Report

COMPONENTS:
DIODE/ GENERAL PURPOSE RECTIFIER/ STANDARD
PART NUMBER: 1SS272
MANUFACTURER: TOSHIBA



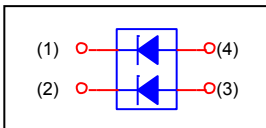
Bee Technologies Inc.

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SPICE MODEL

```
*$  
* PART NUMBER: 1SS272  
* MANUFACTURER: TOSHIBA  
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.SUBCKT 1SS272 1 2 3 4  
D1 4 1 D1SS272  
D2 3 2 D1SS272  
.MODEL D1SS272 D  
+ IS=2.0844E-9  
+ N=1.7361  
+ RS=20.961E-3  
+ IKF=9.9082E-3  
+ CJO=891.56E-15  
+ M=.10662  
+ VJ=9.9900  
+ ISR=0  
+ BV=80  
+ IBV=100.00E-9  
+ TT=10.084E-9  
.ENDS  
*$
```

Circuit Configuration

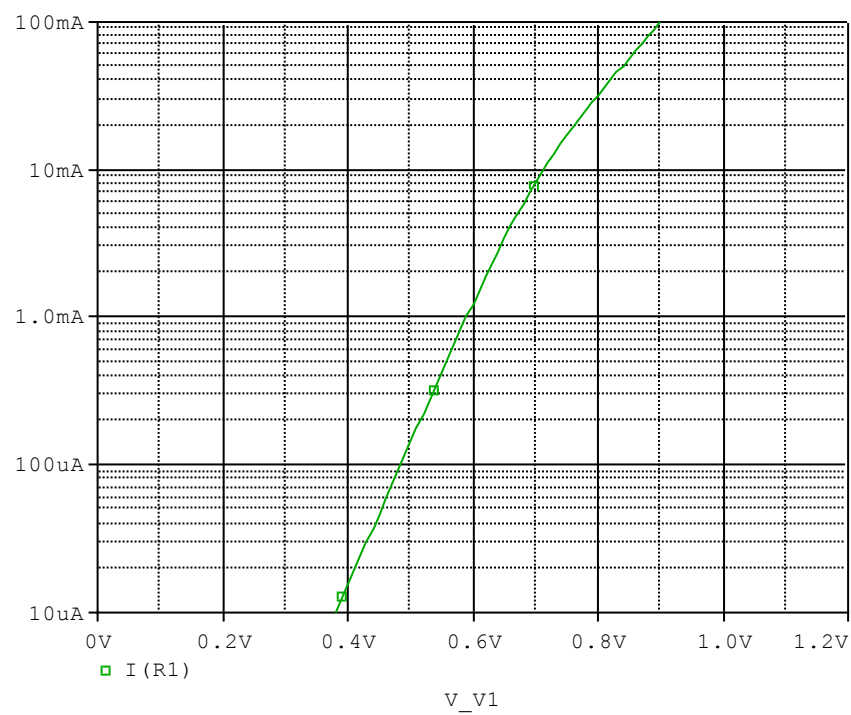


DIODE MODEL PARAMETERS

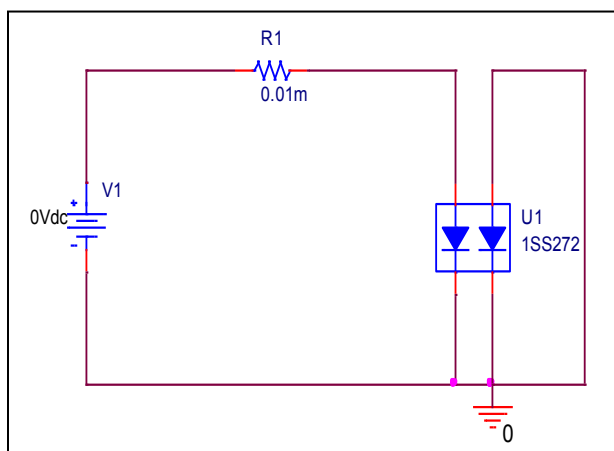
PSpice model parameter	Model description
IS	Saturation Current
N	Emission Coefficient
RS	Series Resistance
IKF	High-injection Knee Current
CJO	Zero-bias Junction Capacitance
M	Junction Grading Coefficient
VJ	Junction Potential
ISR	Recombination Current Saturation Value
BV	Reverse Breakdown Voltage(a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

Forward Current Characteristic

Circuit Simulation Result

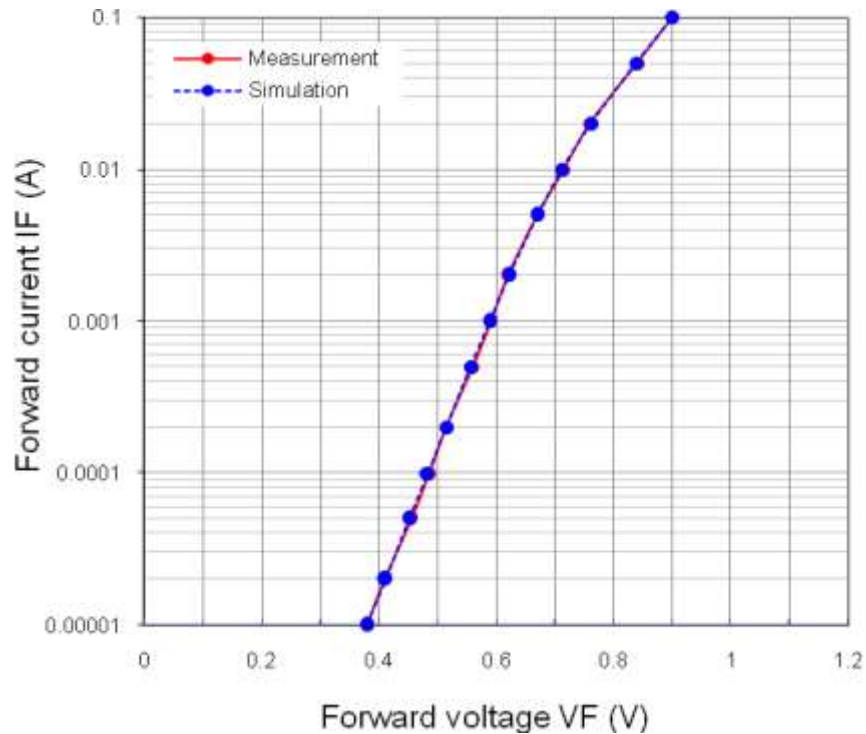


Evaluation Circuit



Comparison Graph

Circuit Simulation Result

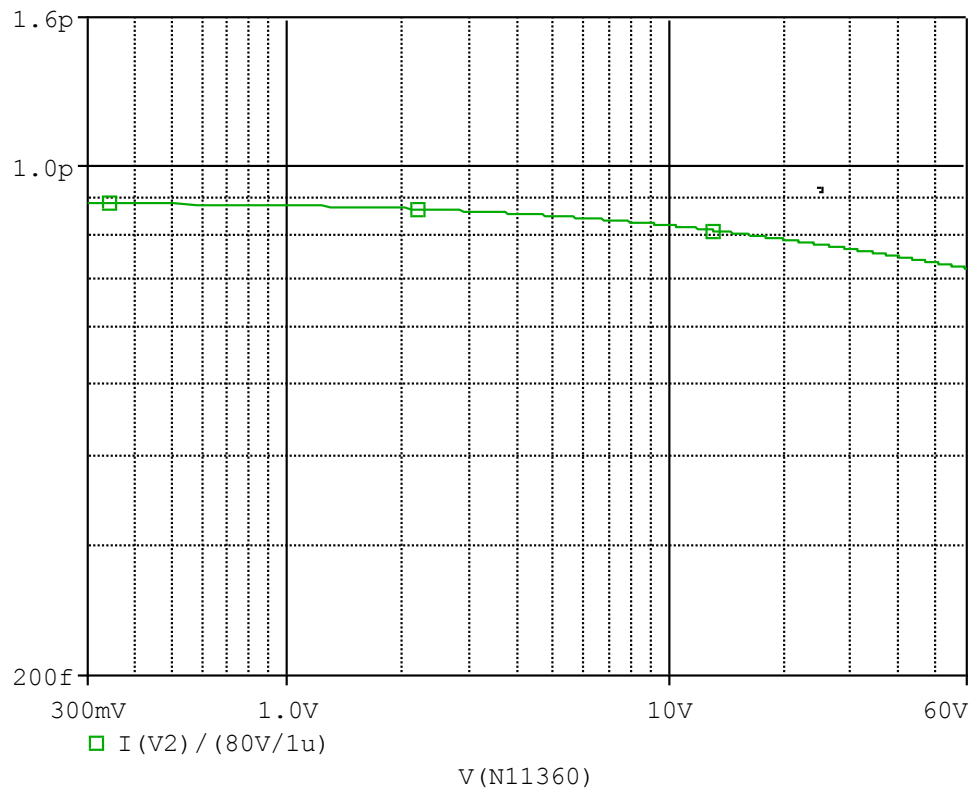


Simulation Result

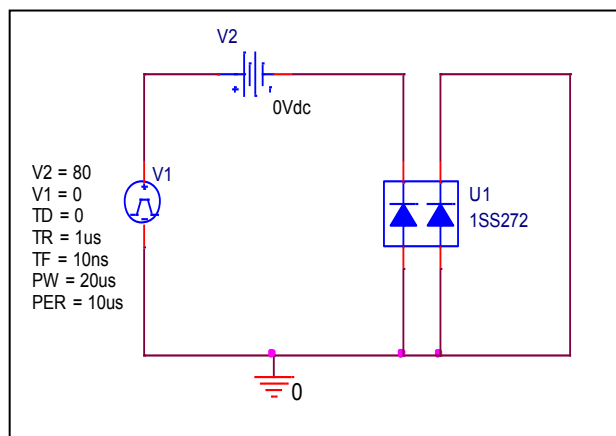
Ifwd (A)	Vfwd (V)		%Error
	Measurement	Simulation	
0.00001	0.380	0.380	0.00
0.00002	0.410	0.411	0.24
0.00005	0.455	0.452	-0.66
0.0001	0.485	0.483	-0.41
0.0002	0.515	0.515	0.00
0.0005	0.560	0.557	-0.54
0.001	0.590	0.589	-0.17
0.002	0.620	0.622	0.32
0.005	0.670	0.670	0.00
0.01	0.715	0.712	-0.42
0.02	0.760	0.762	0.26
0.05	0.840	0.838	-0.24
0.1	0.900	0.900	0.00

Capacitance Characteristic

Circuit Simulation Result

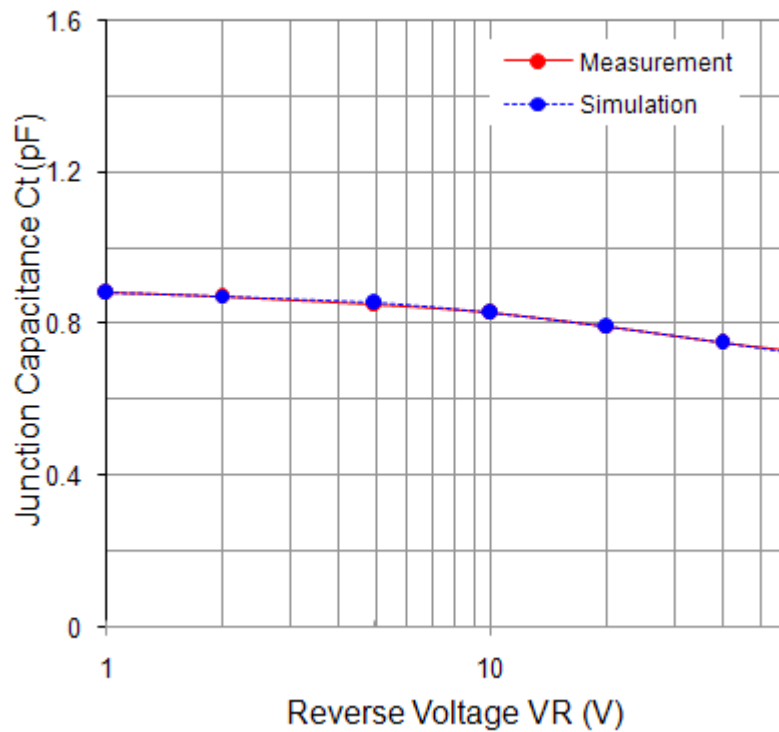


Evaluation Circuit



Comparison Graph

Circuit Simulation Result

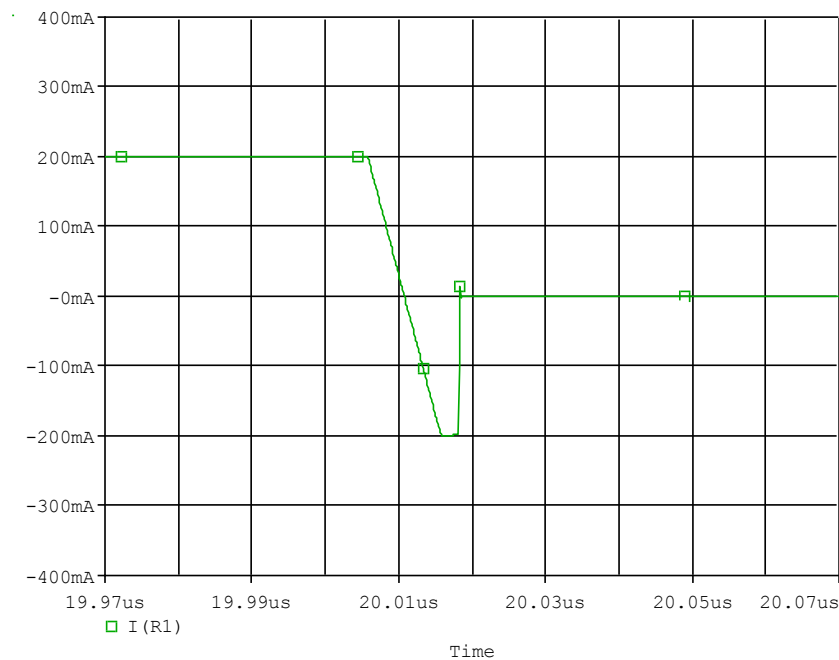


Simulation Result

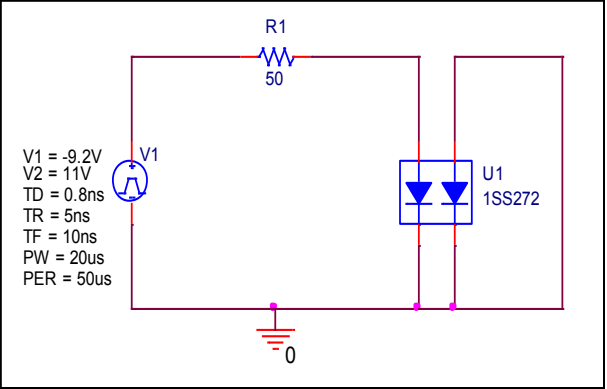
Vrev (V)	Ct (pF)		%Error
	Measurement	Simulation	
0.200	0.889	0.890	0.11
0.500	0.885	0.886	0.11
1.000	0.882	0.883	0.11
2.000	0.870	0.874	0.46
5.000	0.850	0.854	0.47
10.000	0.830	0.828	-0.24
20.000	0.795	0.792	-0.38
40.000	0.750	0.750	0.00
60.000	0.730	0.724	-0.82

Reverse Recovery Characteristic

Circuit Simulation Result



Evaluation Circuit

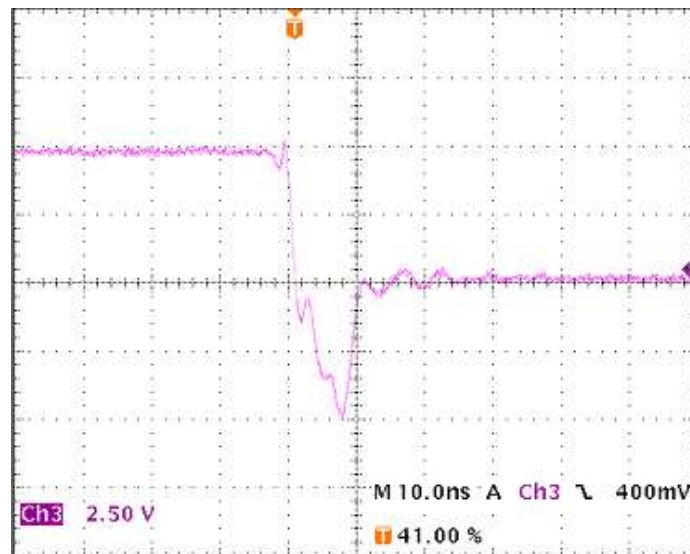


Compare Measurement vs. Simulation

		Measurement	Simulation	%Error
trj	ns	6.800	6.870	1.029

Reverse Recovery Characteristic

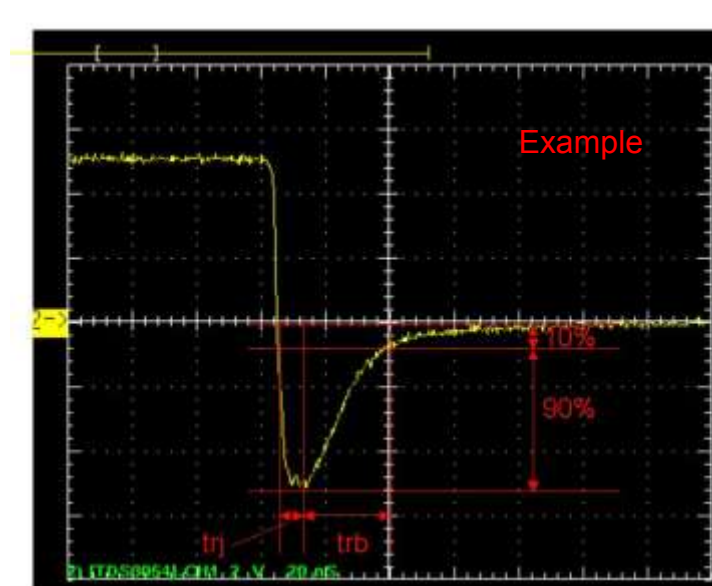
Reference



$T_{rj} = 6.8 \text{ (ns)}$

$T_{rb} = 2.2 \text{ (ns)}$

Conditions: $I_{fwd}=0.2\text{A}$, $I_{rev}=0.2\text{A}$, $R_I=50$



Relation between t_{rj} and t_{rb}