

# Device Modeling Report

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



**Bee Technologies Inc.**

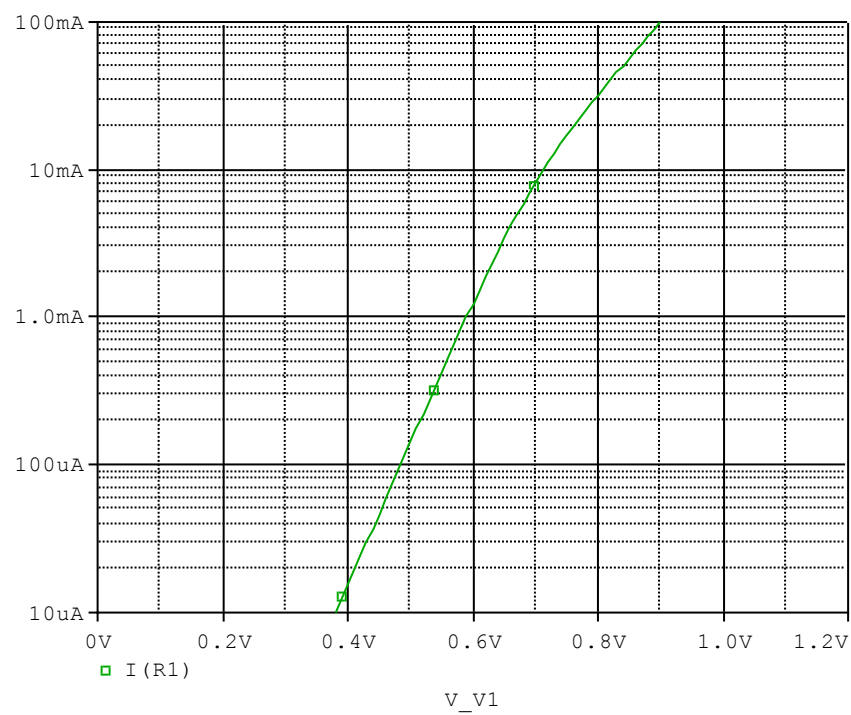
All Rights Reserved Copyright (C) Bee Technologies Inc. 2008

## DIODE MODEL PARAMETERS

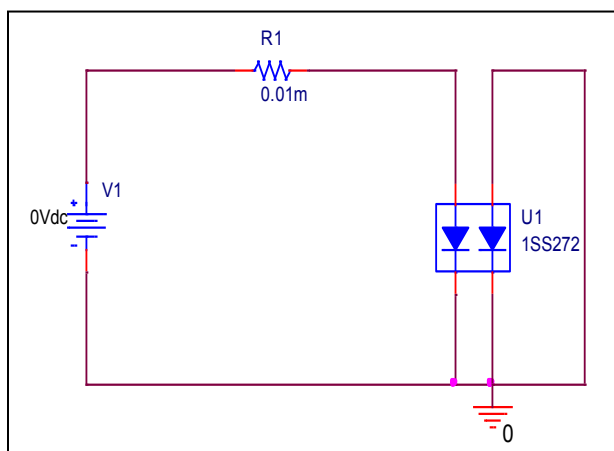
| PSpice model parameter | Model description                           |
|------------------------|---------------------------------------------|
| IS                     | Saturation Current                          |
| N                      | Emission Coefficient                        |
| RS                     | 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

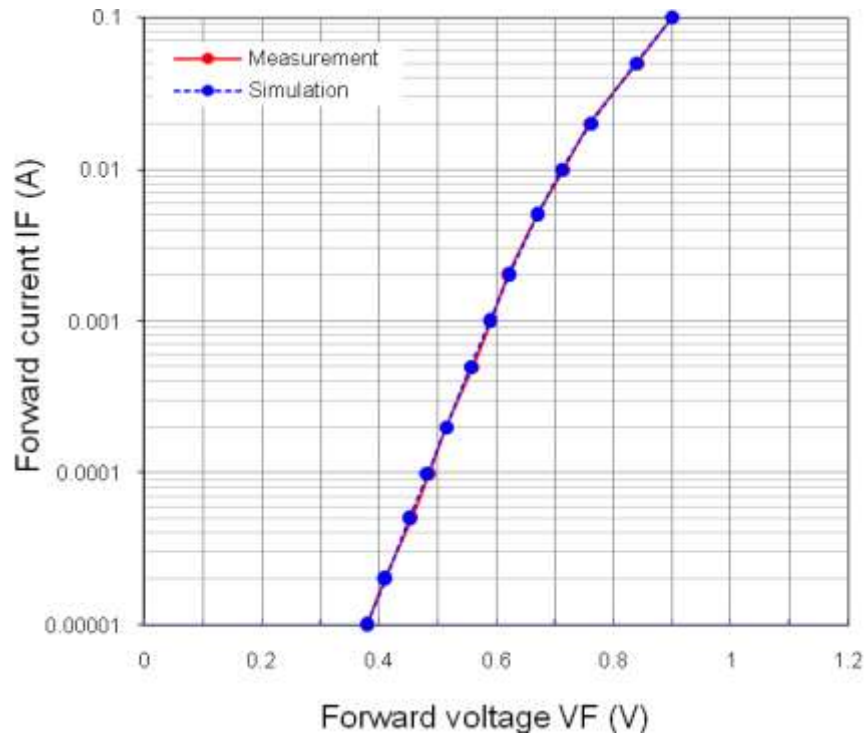


### Evaluation Circuit



## Comparison Graph

### Circuit Simulation Result

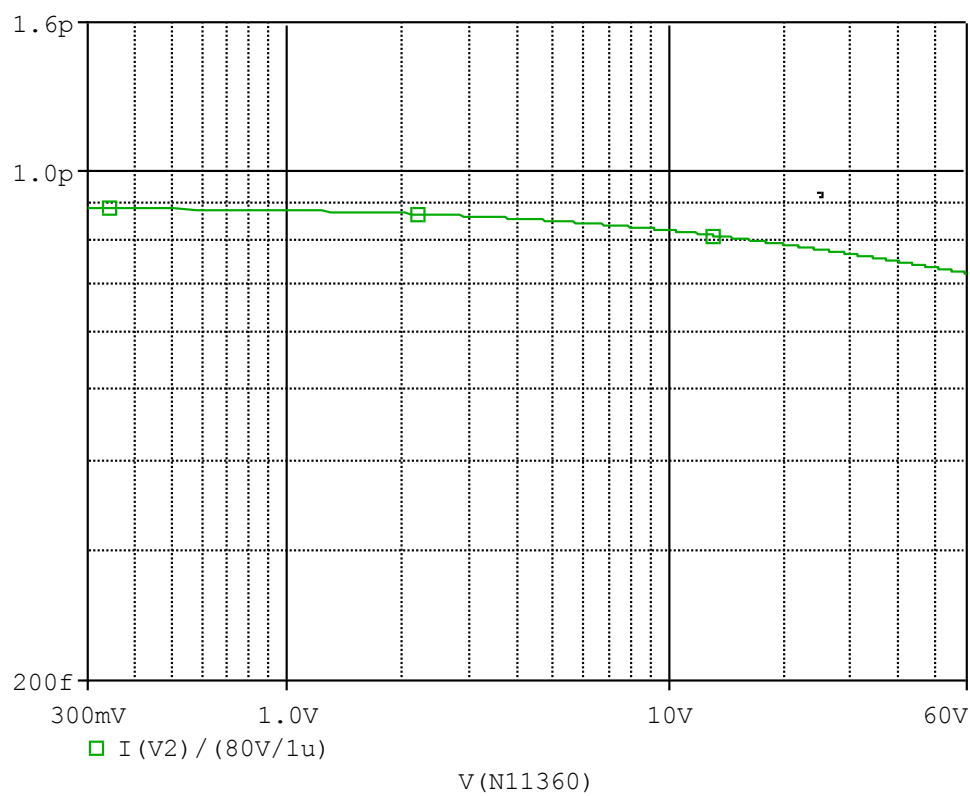


### Simulation Result

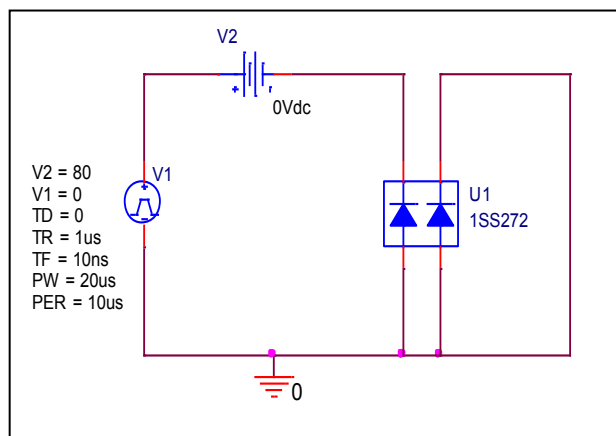
| Ifwd (A) | Vfwd (V)    |            | %Error |
|----------|-------------|------------|--------|
|          | Measurement | Simulation |        |
| 0.00001  | 0.380       | 0.380      | 0.00   |
| 0.00002  | 0.410       | 0.411      | 0.24   |
| 0.00005  | 0.455       | 0.452      | -0.66  |
| 0.0001   | 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

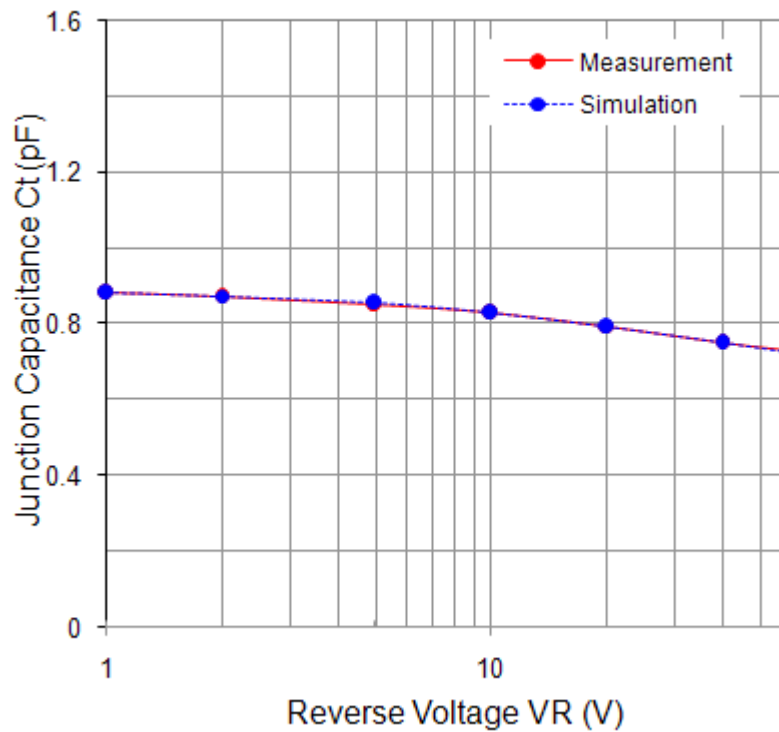


## Evaluation Circuit



## Comparison Graph

### Circuit Simulation Result

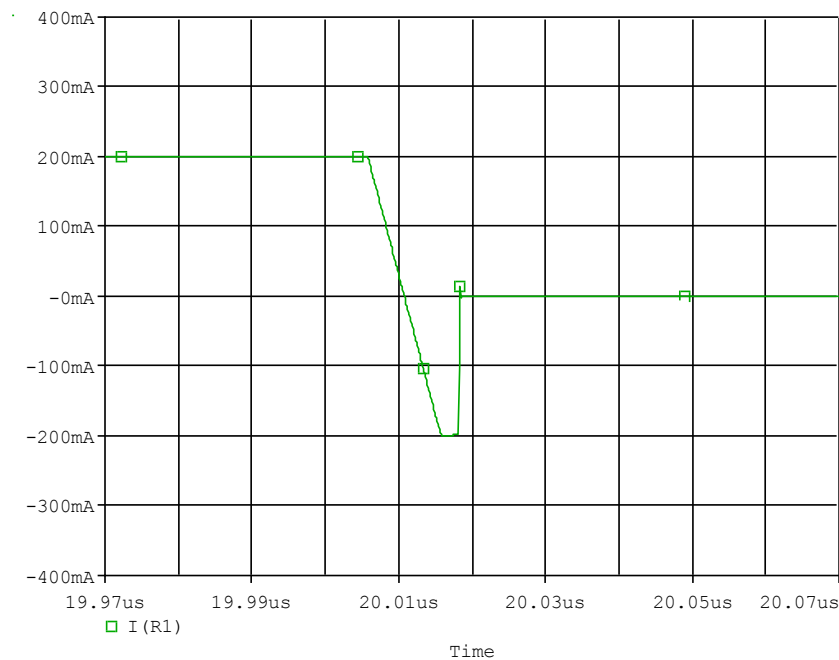


### Simulation Result

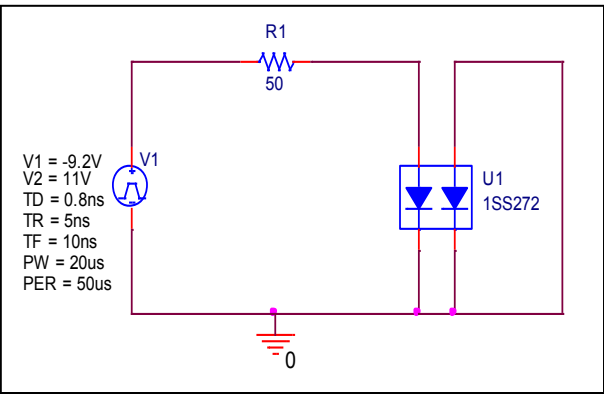
| Vrev (V) | Ct (pF)     |            | %Error |
|----------|-------------|------------|--------|
|          | Measurement | Simulation |        |
| 0.200    | 0.889       | 0.890      | 0.11   |
| 0.500    | 0.885       | 0.886      | 0.11   |
| 1.000    | 0.882       | 0.883      | 0.11   |
| 2.000    | 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

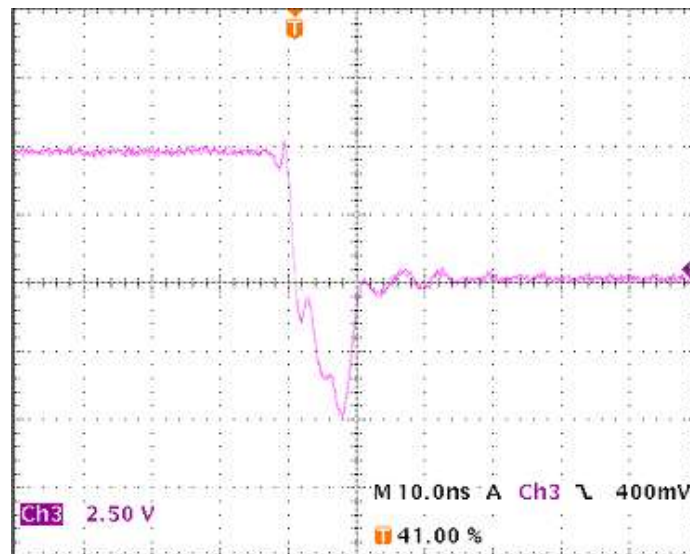


## Compare Measurement vs. Simulation

|     |    | Measurement | Simulation | %Error |
|-----|----|-------------|------------|--------|
| trj | ns | 6.800       | 6.870      | 1.029  |

## Reverse Recovery Characteristic

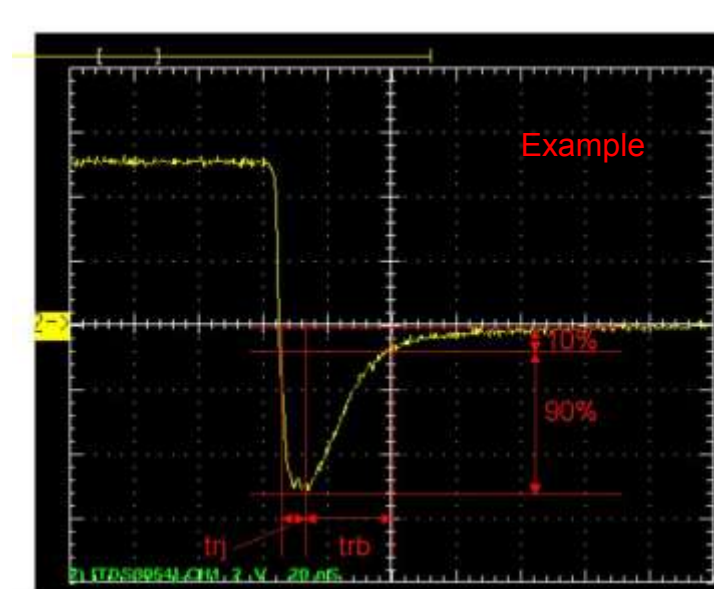
## Reference



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

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

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



Relation between  $t_{rj}$  and  $t_{rb}$