# Device Modeling Report

COMPONENTS:
DIODE/ GENERAL PURPOSE RECTIFIER/ STANDARD
PART NUMBER: 20DL2CZ47A
MANUFACTURER: TOSHIBA

**Bee Technologies Inc.**

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| 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 |

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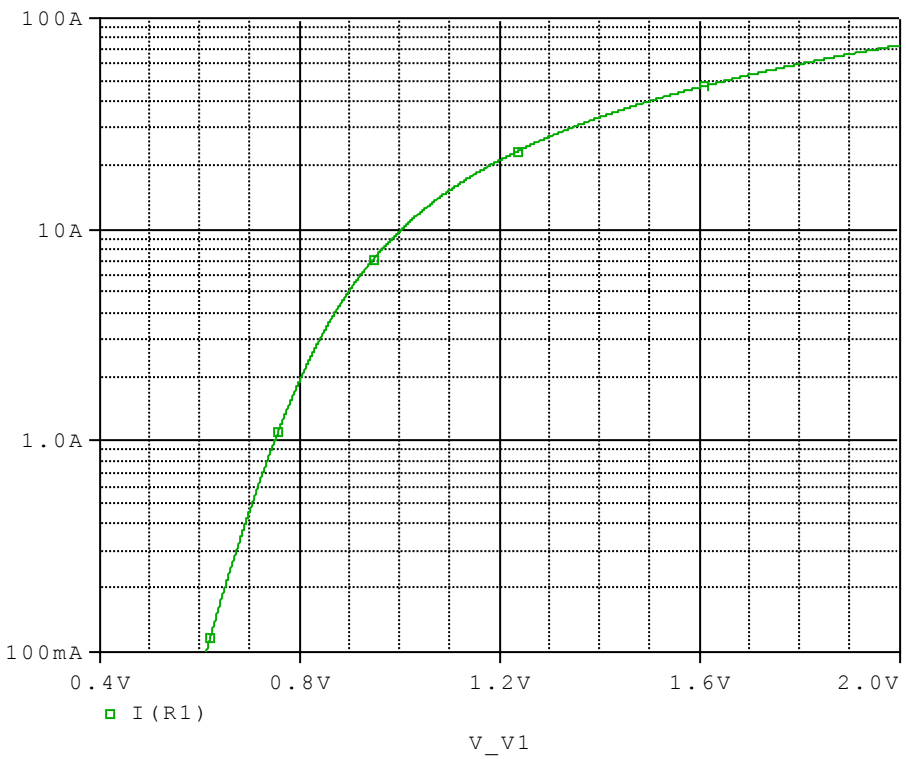
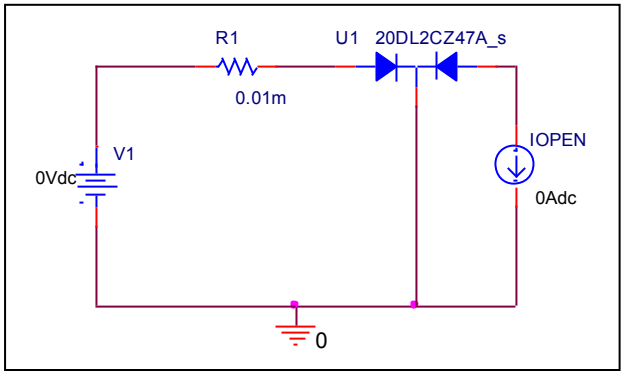
## Forward Current Characteristic

Circuit Simulation Result




Evaluation Circuit

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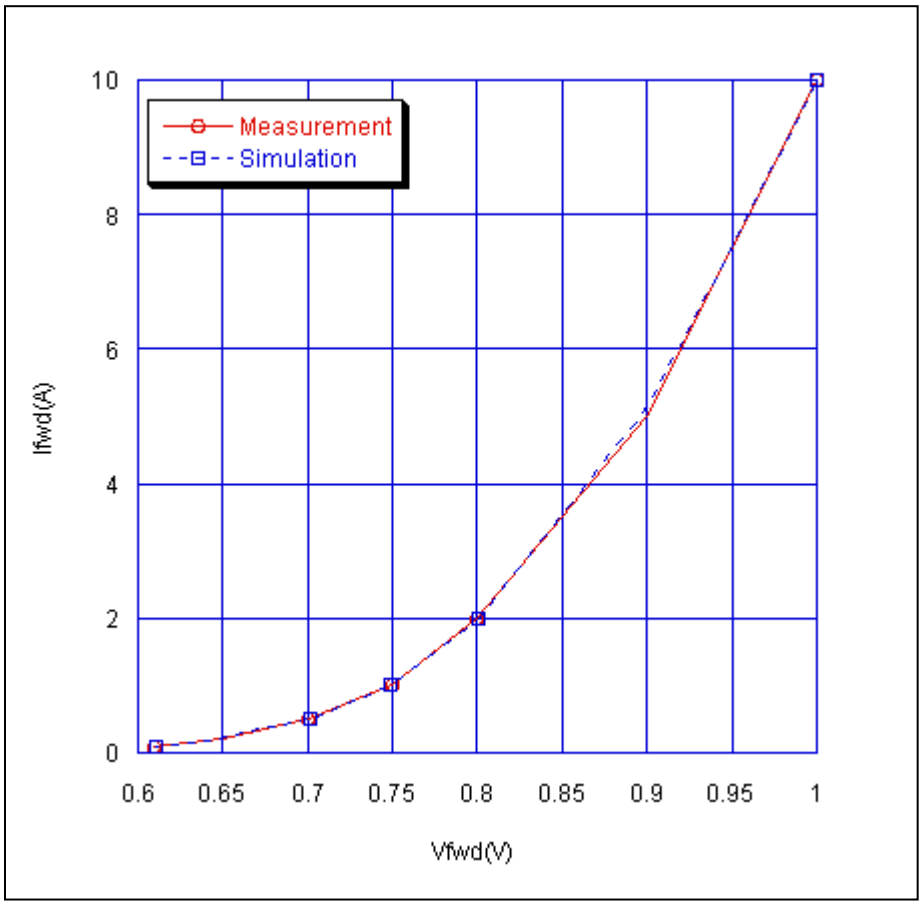
## Comparison Graph

Circuit Simulation Result




Simulation Result

| Ifwd(A) | Vfwd(V) | | %Error |
|---|---|---|---|
| | Measurement | Simulation | |
| 0.1 | 0.610 | 0.611 | -0.164 |
| 0.2 | 0.650 | 0.648 | 0.308 |
| 0.5 | 0.700 | 0.702 | -0.286 |
| 1 | 0.750 | 0.749 | 0.133 |
| 2 | 0.800 | 0.801 | -0.125 |
| 5 | 0.900 | 0.896 | 0.444 |
| 10 | 1.000 | 0.980 | 2.000 |

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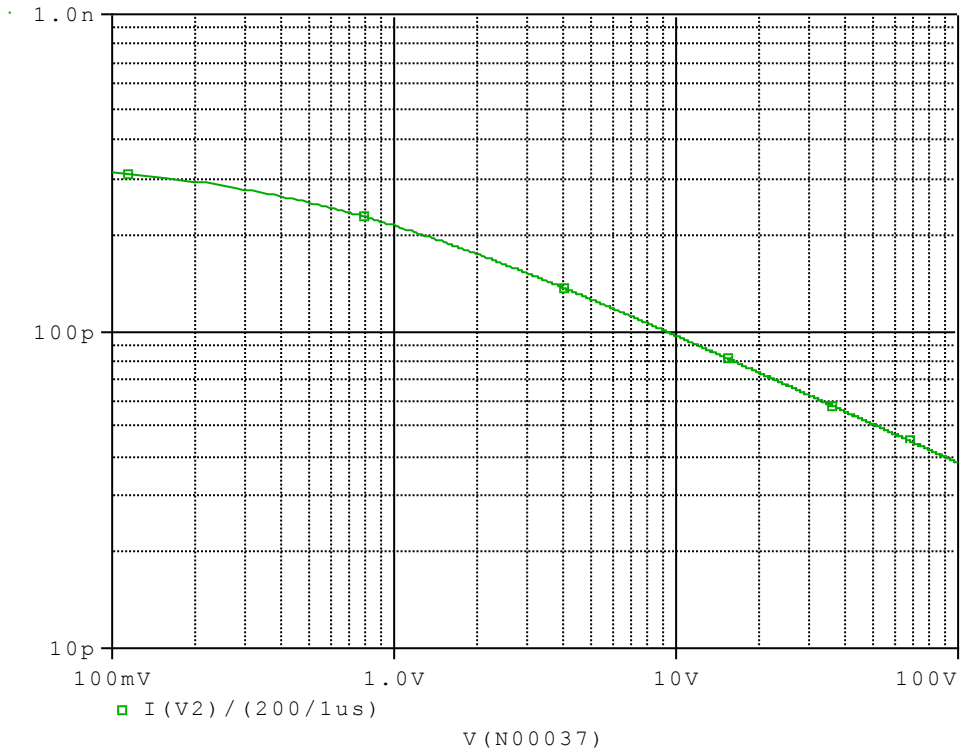
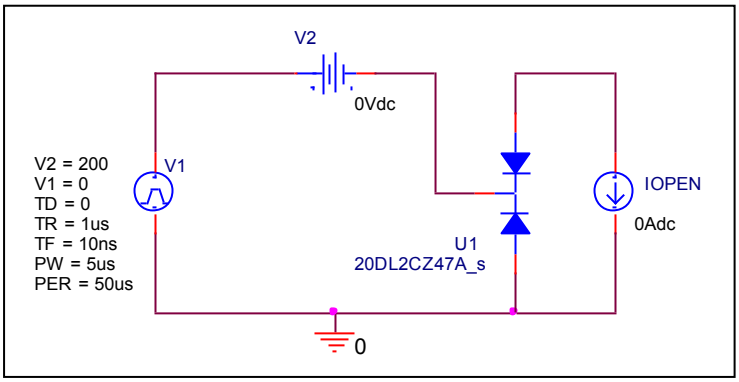
## Capacitance Characteristic

### Circuit Simulation Result




### Evaluation Circuit

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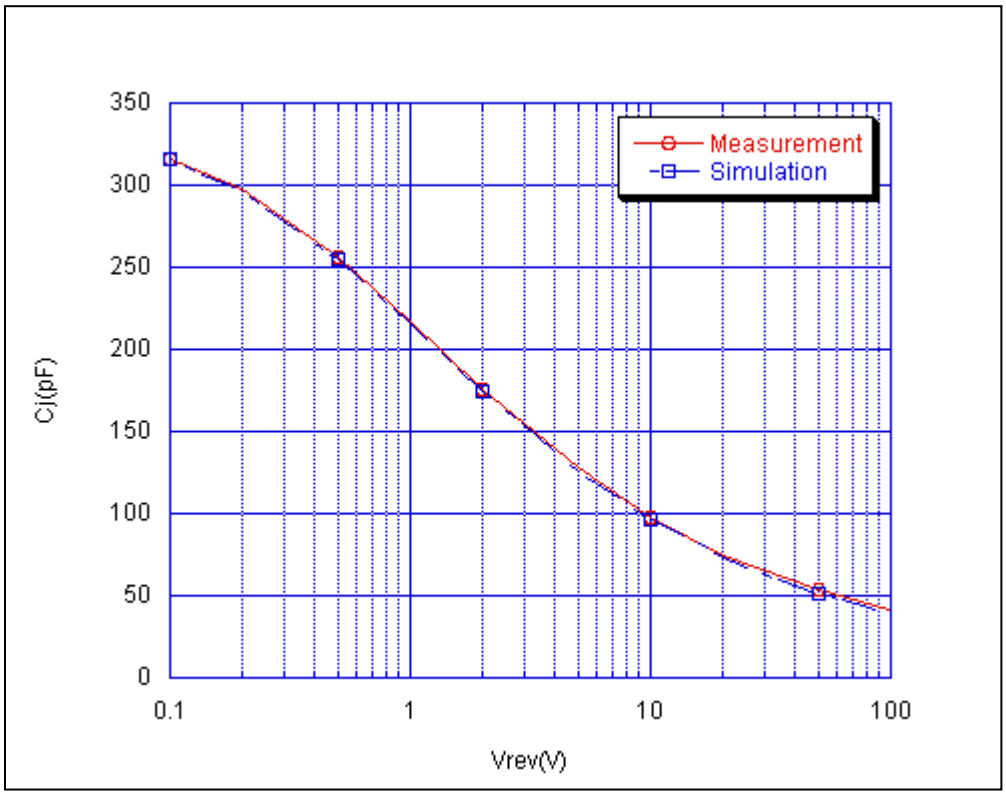
## Comparison Graph

Circuit Simulation Result




Simulation Result

| Vrev(V) | Cj(pF) | | %Error |
|---|---|---|---|
| | Measurement | Simulation | |
| 0 | 339.500 | 339.500 | 0.000 |
| 0.1 | 316.500 | 315.969 | 0.168 |
| 0.2 | 298.100 | 296.100 | 0.671 |
| 0.5 | 256.200 | 254.820 | 0.539 |
| 1 | 217.500 | 215.856 | 0.756 |
| 2 | 175.700 | 174.388 | 0.747 |
| 5 | 127.500 | 126.169 | 1.044 |
| 10 | 97.900 | 96.977 | 0.943 |
| 20 | 74.039 | 73.608 | 0.582 |
| 50 | 53.930 | 51.500 | 4.506 |
| 100 | 40.770 | 38.755 | 4.942 |

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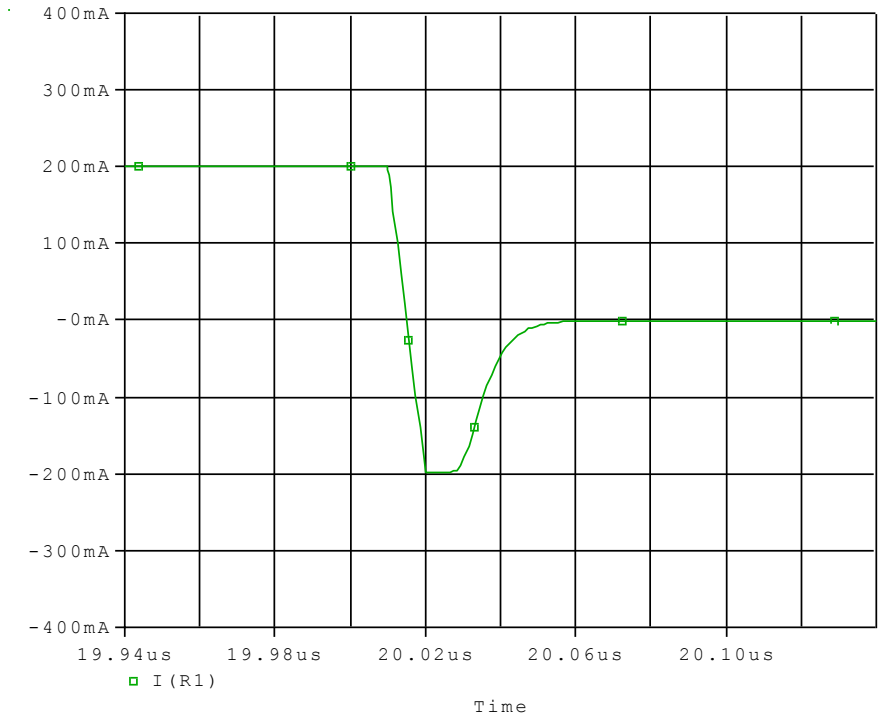
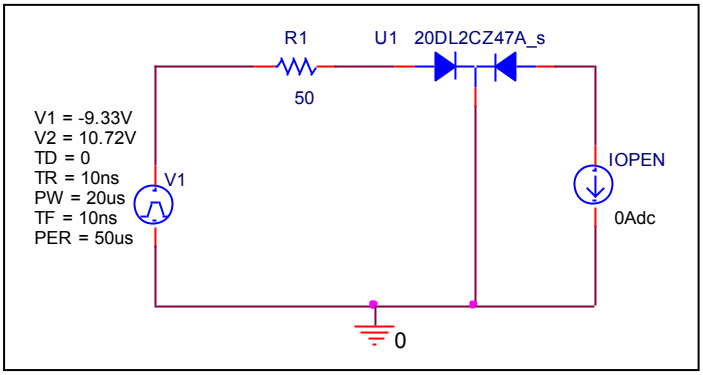
## Reverse Recovery Characteristic

### Circuit Simulation Result




### Evaluation Circuit




## Compare Measurement vs. Simulation

| | Measurement | | Simulation | | %Error |
|---|---|---|---|---|---|
| **trr** | **29.200** | **ns** | **29.160** | **ns** | **- 0.137** |

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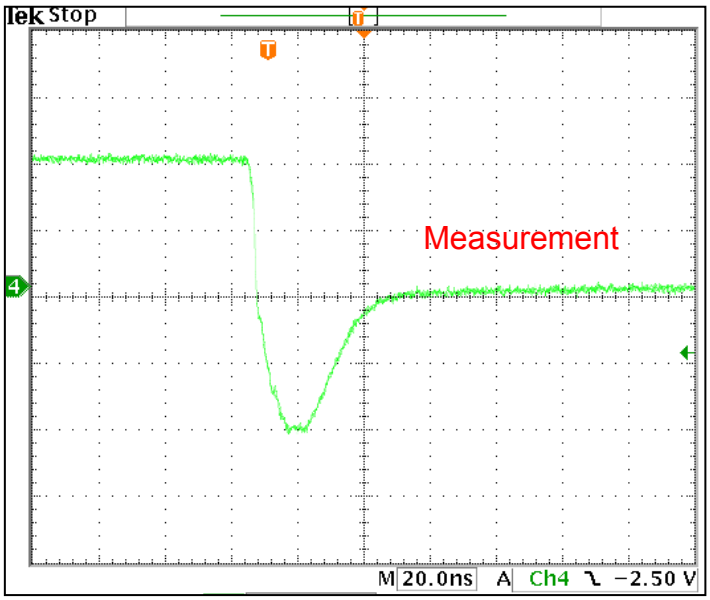
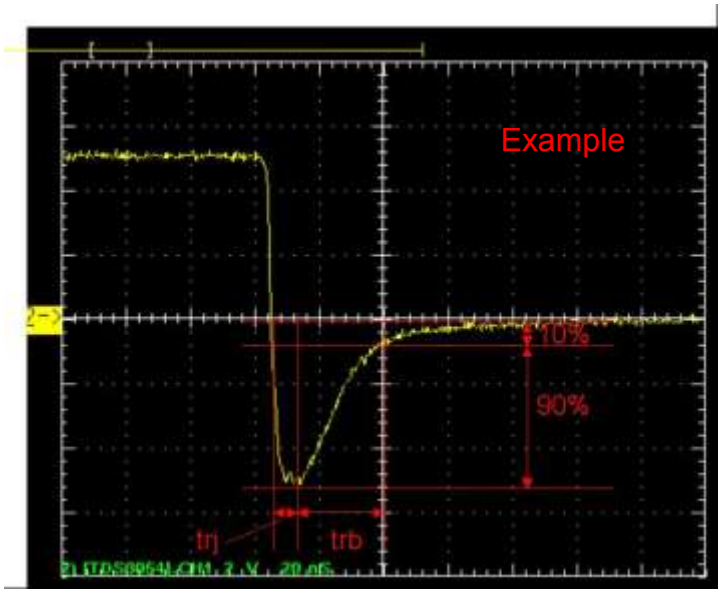
## Reverse Recovery Characteristic Reference




**Trj =8.4(ns)**
**Trb=20.8(ns)**
**Conditions: Ifwd=Irev=0.2(A), Rl=50**




Relation between trj and trb

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