

# Device Modeling Report

COMPONENTS:

DIODE/ GENERAL PURPOSE RECTIFIER / PROFESSIONAL

PART NUMBER: RHRG50120

MANUFACTURER: INTERSIL

REMARK: TC=110 C

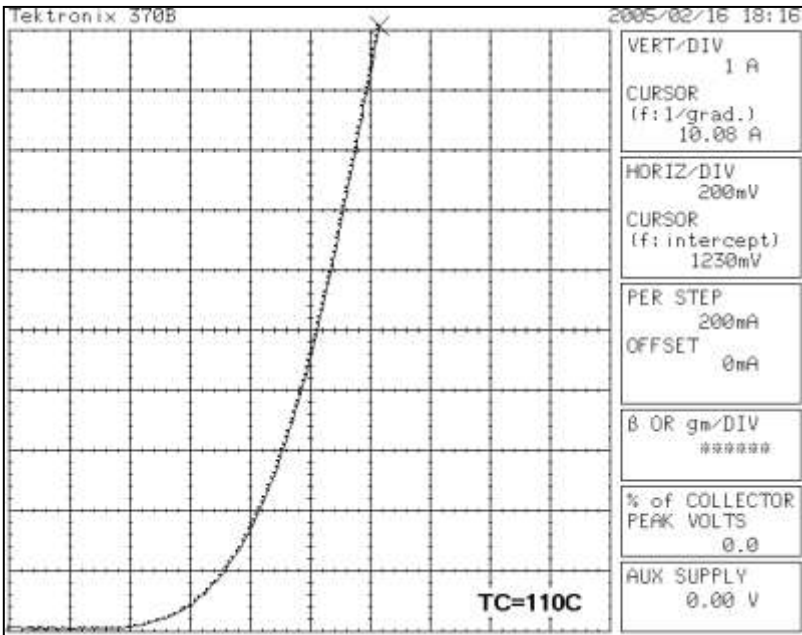


**Bee Technologies Inc.**

| 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                             |

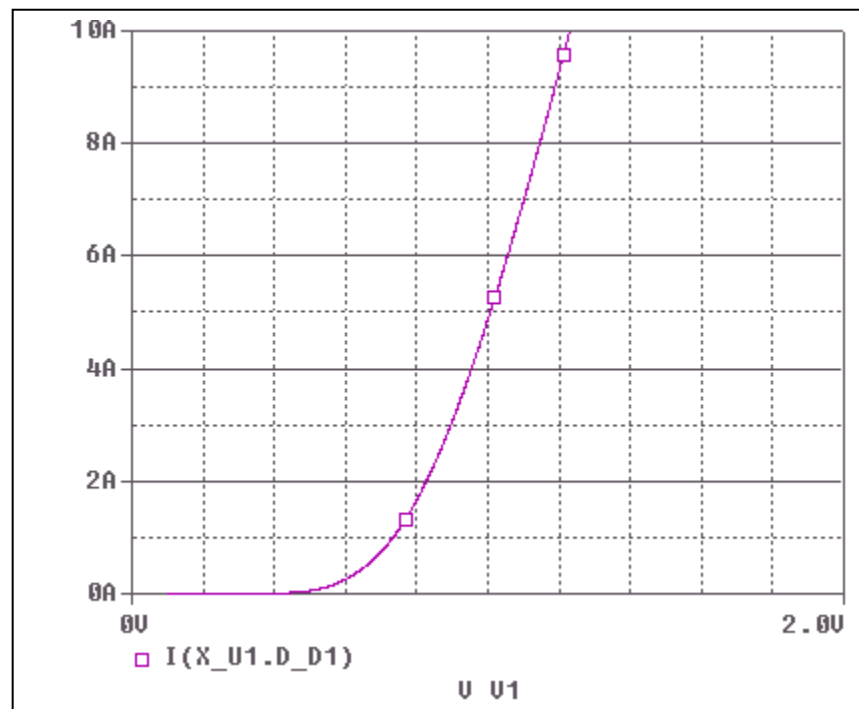
Forward Current Characteristic

Reference

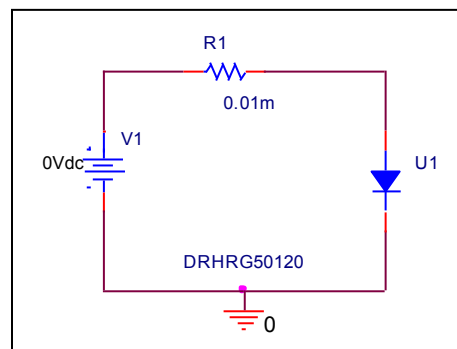


## Forward Current Characteristic

### Circuit Simulation Result

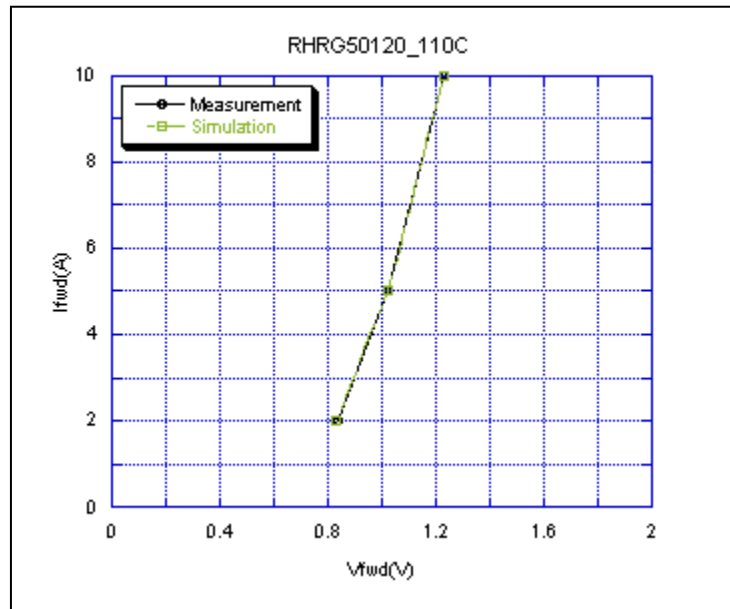


### Evaluation Circuit



## Comparison Graph

### Circuit Simulation Result

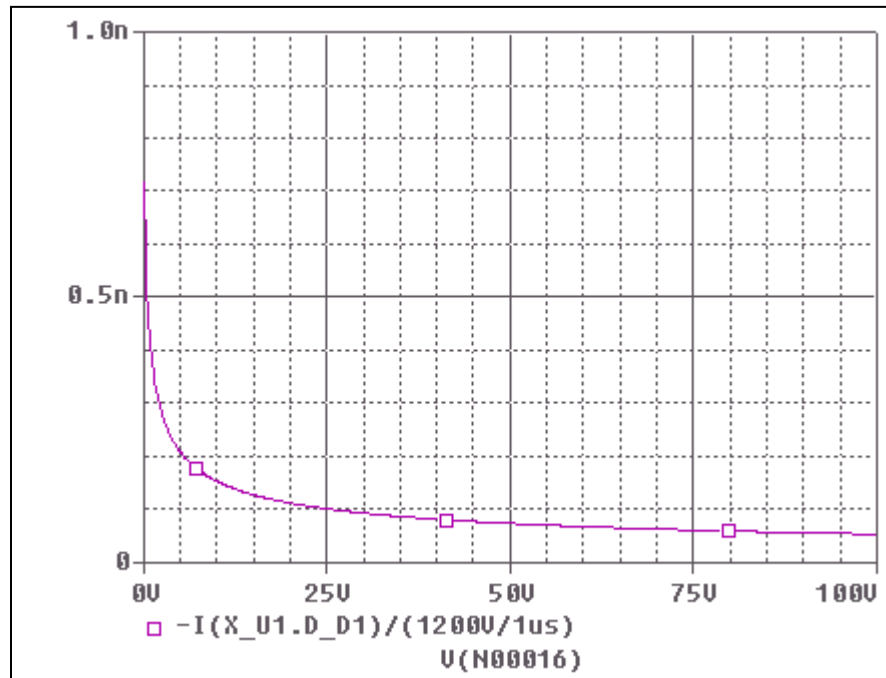


### Simulation Result

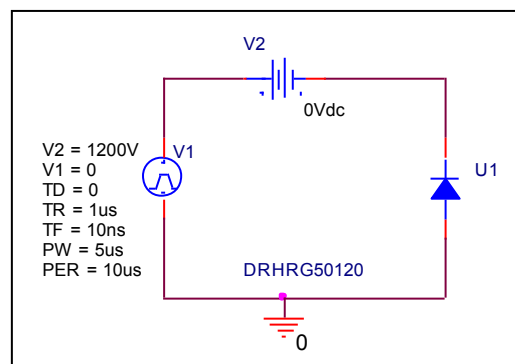
| $I_{fwd}$ (A) | $V_{fwd}$ (V)<br>Measurement | $V_{fwd}$ (V)<br>Simulation | %Error |
|---------------|------------------------------|-----------------------------|--------|
| 1             | 0.718                        | 0.718                       | 0.00   |
| 2             | 0.834                        | 0.832                       | 0.24   |
| 5             | 1.024                        | 1.024                       | 0.00   |
| 10            | 1.230                        | 1.229                       | 0.08   |

## Capacitance Characteristic

### Circuit Simulation Result

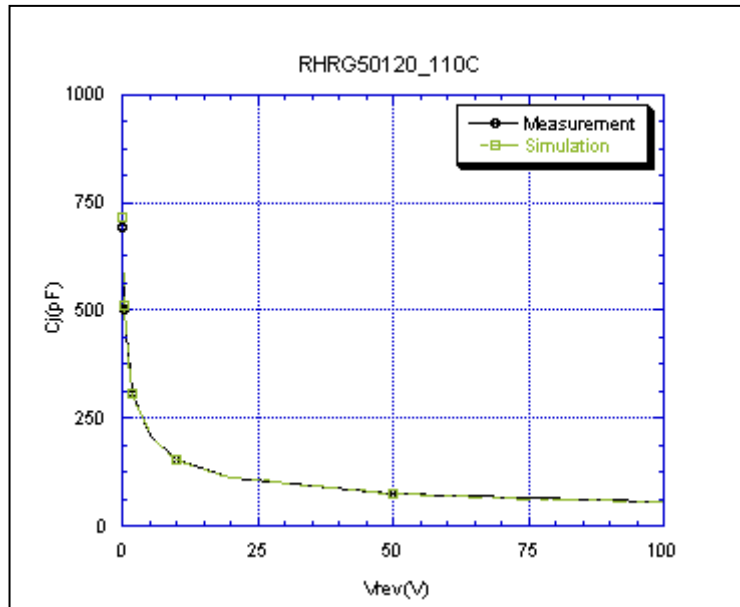


### Evaluation Circuit



## Comparison Graph

### Circuit Simulation Result

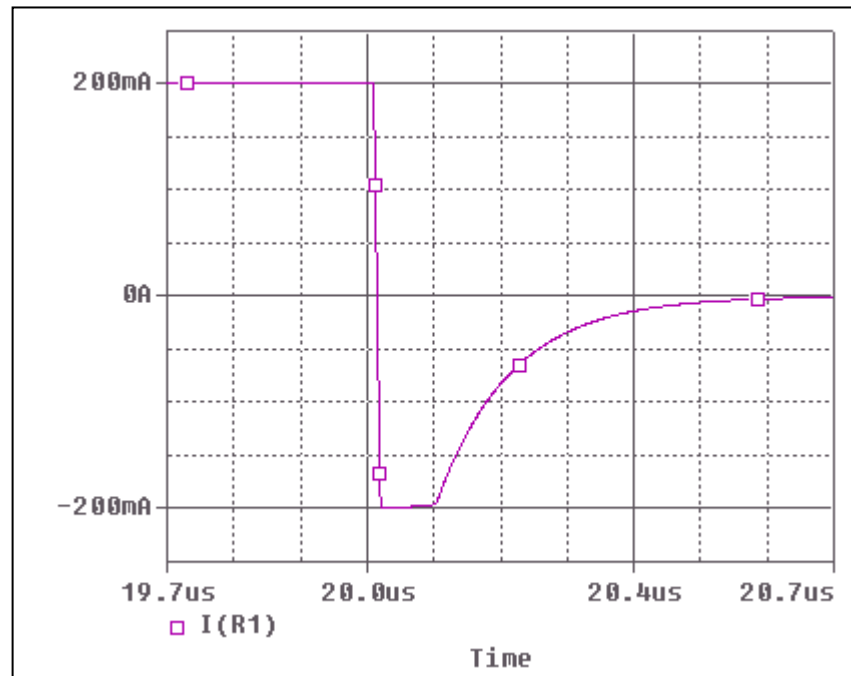


### Simulation Result

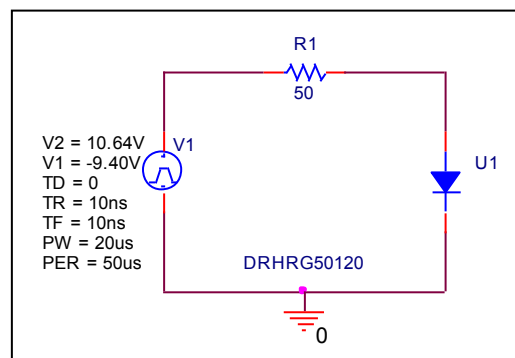
| Vrev(V) | Cj(pF)<br>Measurement | Cj(pF)<br>Simulation | %Error |
|---------|-----------------------|----------------------|--------|
| 0       | 781.778               | 781.778              | 0.00   |
| 0.1     | 690.695               | 715.812              | -3.64  |
| 0.2     | 613.016               | 634.910              | -3.57  |
| 0.5     | 499.991               | 510.211              | -2.04  |
| 1       | 399.767               | 403.830              | -1.02  |
| 2       | 309.406               | 308.602              | 0.26   |
| 5       | 209.334               | 209.200              | 0.06   |
| 10      | 153.530               | 153.801              | -0.18  |
| 20      | 111.860               | 112.603              | -0.66  |
| 50      | 73.206                | 74.081               | -1.19  |
| 100     | 53.061                | 53.820               | -1.43  |

## Reverse Recovery Characteristic

### Circuit Simulation Result



### Evaluation Circuit

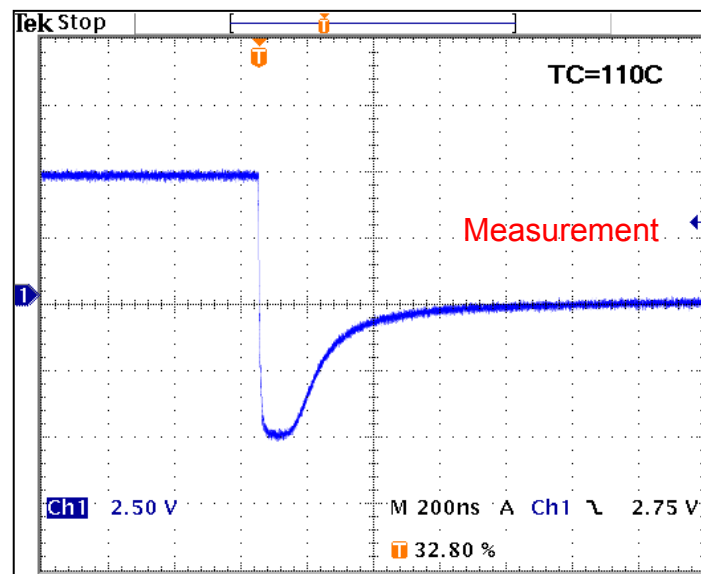


## Compare Measurement vs. Simulation

|     | Measurement |    | Simulation |    | %Error |
|-----|-------------|----|------------|----|--------|
| trj | 88.0        | ns | 87.7       | ns | 0.340  |
| trb | 256.0       | ns | 255.6      | ns | 0.156  |

## Reverse Recovery Characteristic

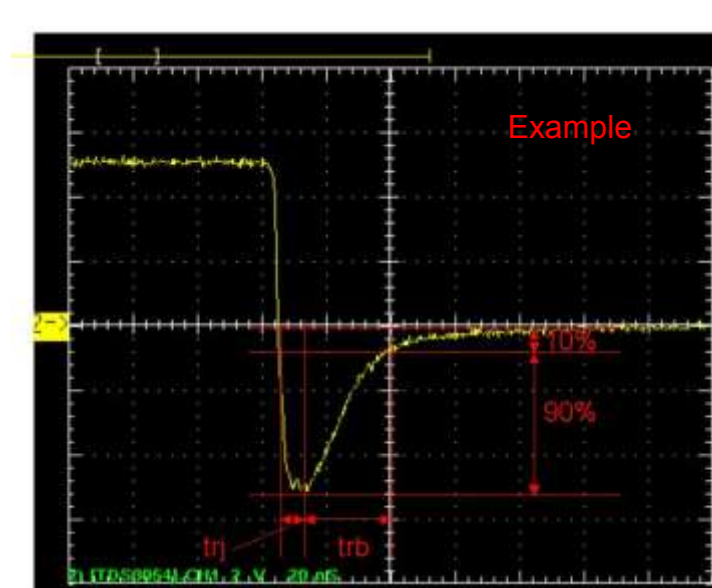
## Reference



$T_{rj} = 88(\text{ns})$

$T_{rb} = 256(\text{ns})$

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



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