

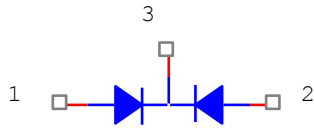
# Device Modeling Report

COMPONENTS:  
DIODE/ GENERAL PURPOSE RECTIFIER/ STANDARD  
PART NUMBER: 10DL2CZ47A  
MANUFACTURER: TOSHIBA



**Bee Technologies Inc.**

## SPICE MODEL

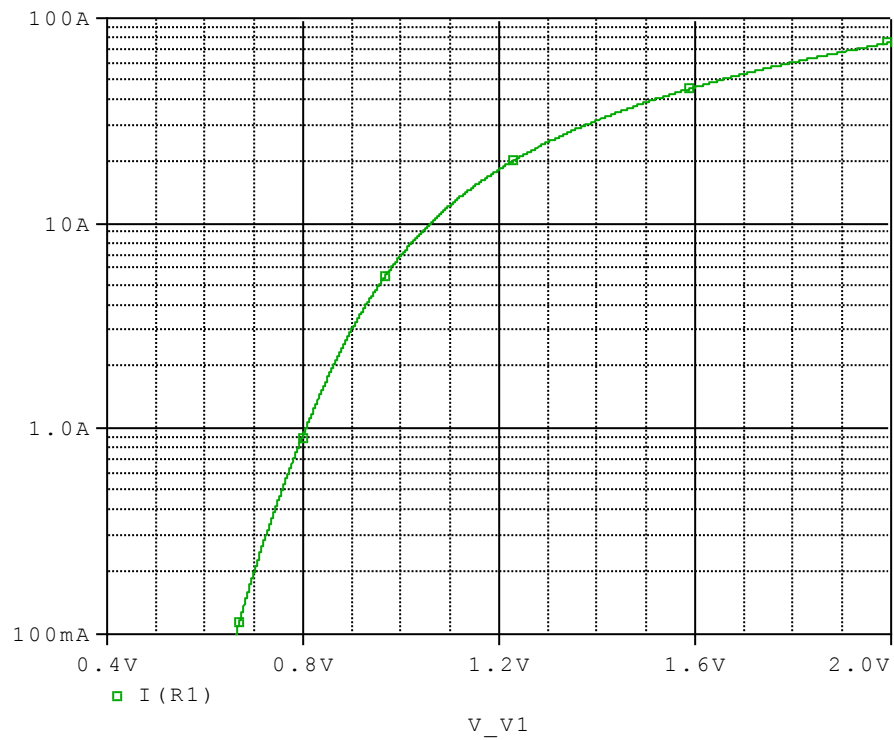


```
*$  
* PARTNUMBER: 10DL2CZ47A  
* MANUFACTURER: TOSHIBA  
* All Rights Reserved Copyright (C) Bee Technologies Inc. 2006  
.SUBCKT D10DL2CZ47A_s 1 2 3  
D1 1 3 D10DL2CZ47A  
D2 2 3 D10DL2CZ47A  
.MODEL D10DL2CZ47A D  
+ IS=100.00E-12  
+ N=1.2035  
+ RS=12.323E-3  
+ IKF=87.289E-3  
+ CJO=127.59E-12  
+ M=.38789  
+ VJ=.42745  
+ BV=200  
+ IBV=10.000E-6  
+ ISR=0  
+ TT=25.825E-9  
.ENDS  
*$
```

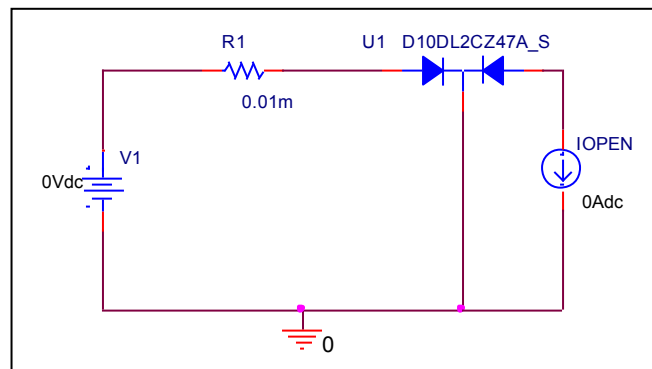
PSpice model parameter	Model description
IS	Saturation Current
N	Emission Coefficient
RS	Series Resistance
IKF	High-injection Knee Current
CJO	Zero-bias Junction Capacitance
M	Junction Grading Coefficient
VJ	Junction Potential
ISR	Recombination Current Saturation Value
BV	Reverse Breakdown Voltage(a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

# Forward Current Characteristic

## Circuit Simulation Result

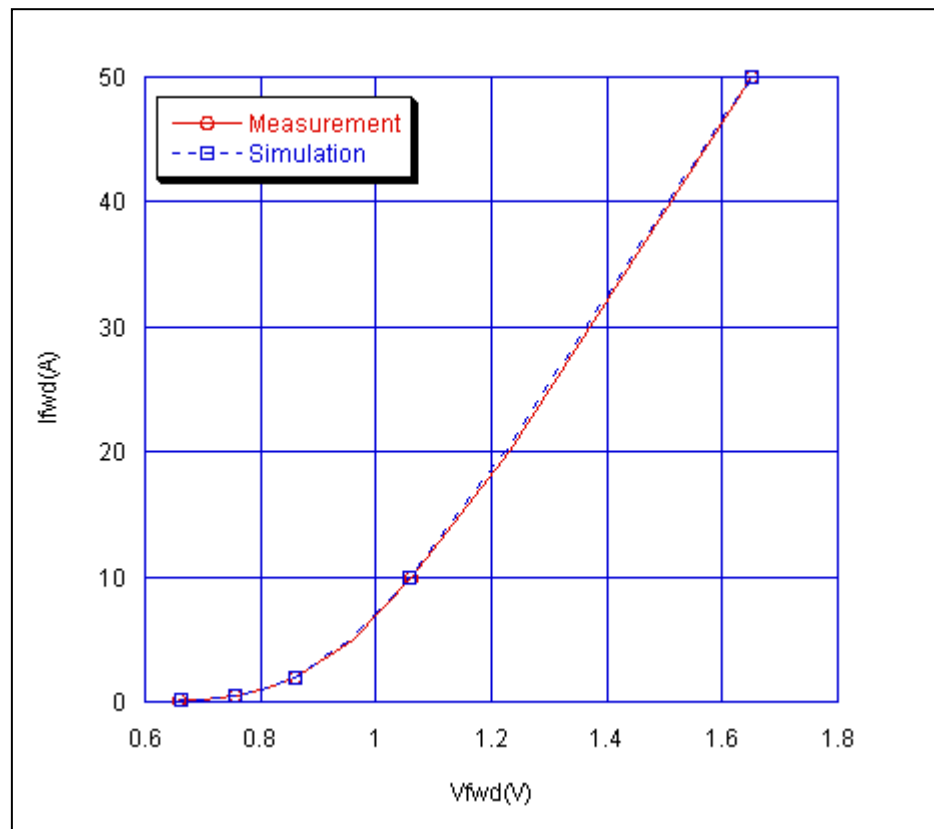


## Evaluation Circuit



## Comparison Graph

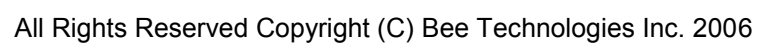
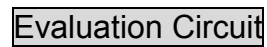
### Circuit Simulation Result



### Simulation Result

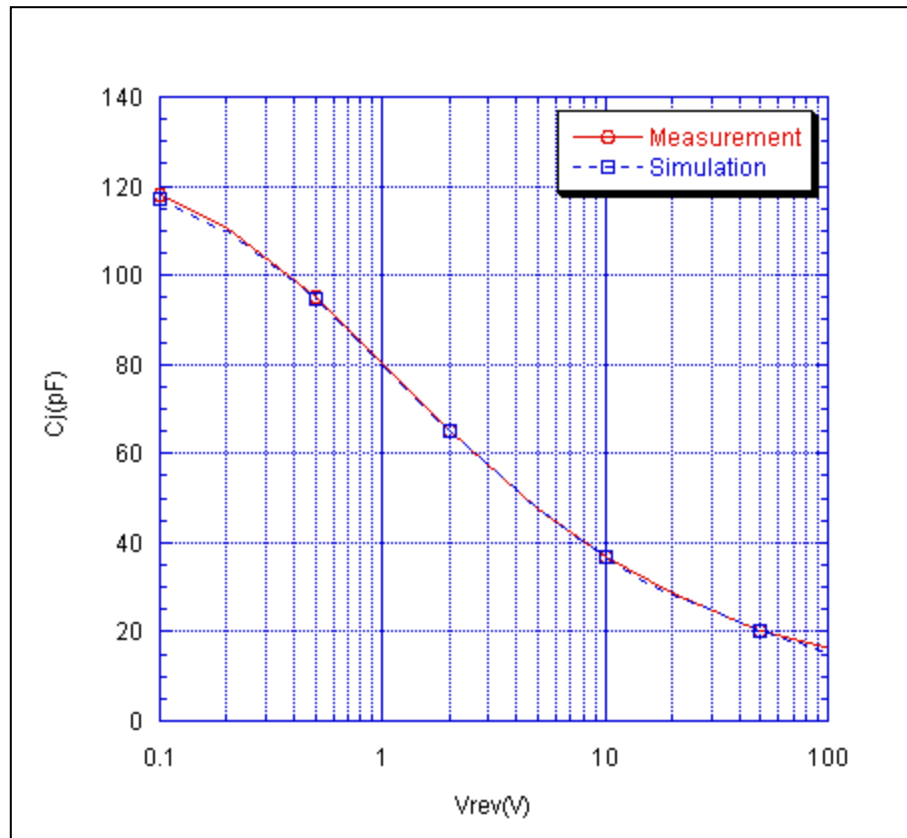
Ifwd(A)	Vfwd(V)		%Error
	Measurement	Simulation	
0.1	0.660	0.663	-0.455
0.2	0.700	0.699	0.143
0.5	0.755	0.756	-0.132
1	0.800	0.805	-0.625
2	0.860	0.858	0.233
5	0.960	0.954	0.625
10	1.060	1.059	0.094
20	1.230	1.226	0.325
50	1.650	1.652	-0.121

### Circuit Simulation Result



## Comparison Graph

### Circuit Simulation Result

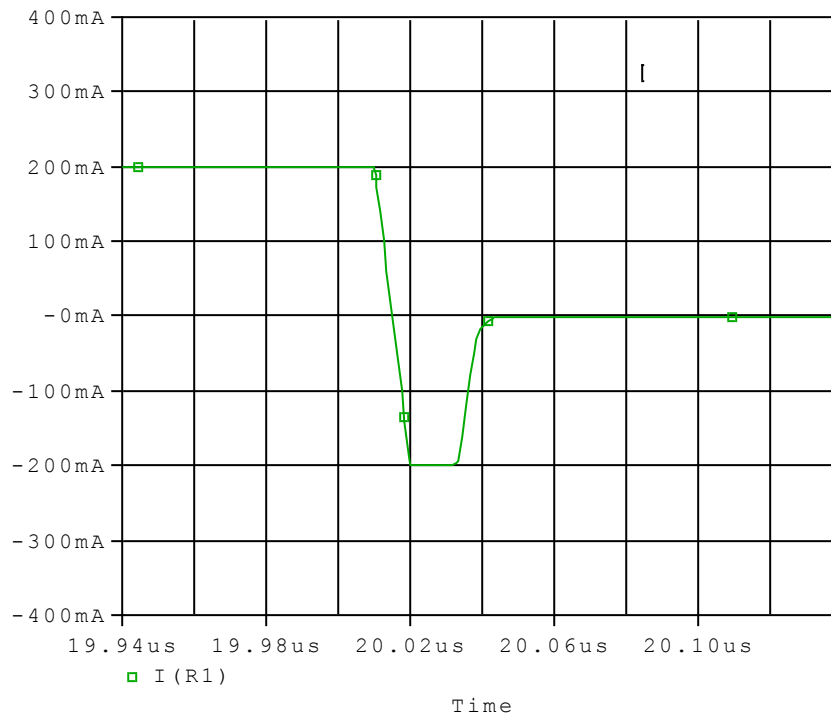


### Simulation Result

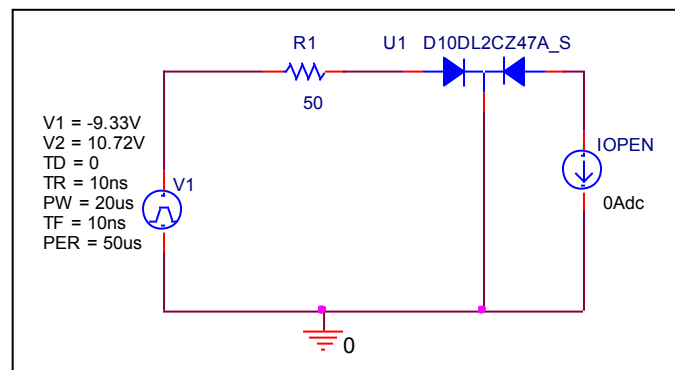
Vrev(V)	Cj(pF)		%Error
	Measurement	Simulation	
0	127.130	127.130	0.000
0.1	118.000	117.116	0.749
0.2	110.800	109.963	0.755
0.5	94.950	94.570	0.400
1	80.530	79.899	0.784
2	65.250	64.988	0.402
5	47.620	47.583	0.078
10	36.910	36.940	-0.081
20	28.567	28.497	0.245
50	20.055	20.060	-0.025
100	16.081	15.336	4.633

## Reverse Recovery Characteristic

### Circuit Simulation Result



### Evaluation Circuit



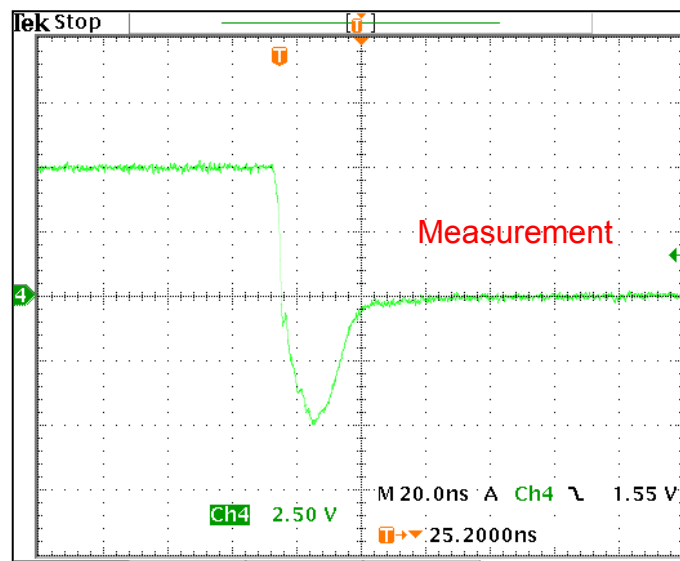
## Compare Measurement vs. Simulation

	Measurement		Simulation		%Error
trr	24.00	ns	23.84	ns	0.667



## Reverse Recovery Characteristic

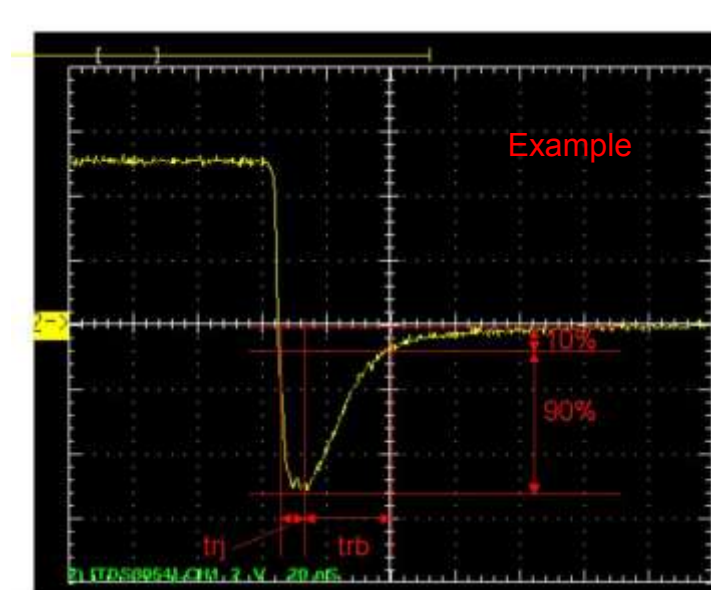
## Reference



$T_{rj} = 9.6(\text{ns})$

$T_{rb} = 14.4(\text{ns})$

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



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