

# Device Modeling Report

COMPONENTS: DIODE/ GENERAL PURPOSE  
RECTIFIER/ STANDARD MODEL  
PART NUMBER: D3SB80  
MANUFACTURER: Shindengen

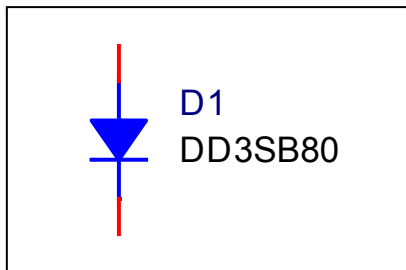


**Bee Technologies Inc.**

## SPICE MODEL

```
*$  
* PART NUMBER: D3SB80  
* MANUFACTURER: SHINDENGEN  
* VRRM=800V, IF=4A  
* All Rights Reserved Copyright (C) Bee Technologies Inc. 2011  
.MODEL D3SB80 D  
+ IS=19.021E-12  
+ N=1.2905  
+ RS=14.401E-3  
+ IKF=38.420  
+ CJO=95.481E-12  
+ M=.28658  
+ VJ=.40995  
+ ISR=0  
+ BV=840  
+ IBV=10.000E-6  
+ TT=11.00E-6  
*$
```

## Circuit Configuration

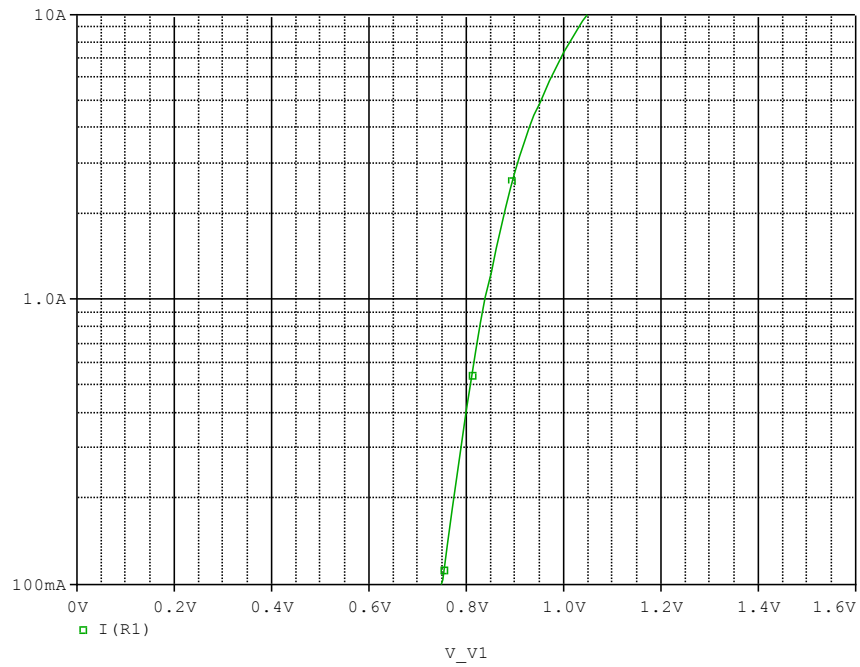


## DIODE MODEL PARAMETERS

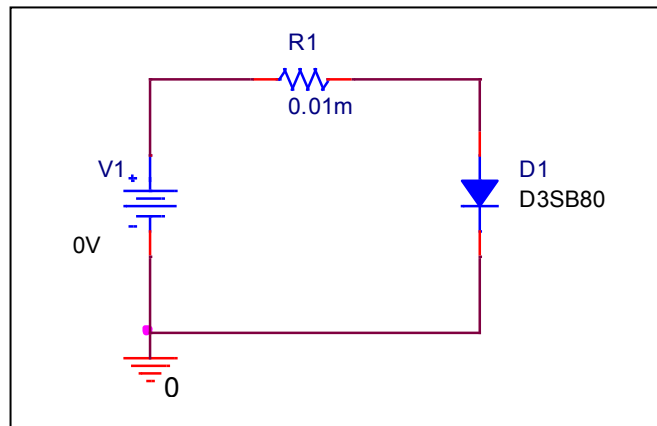
<b>PSpice model parameter</b>	<b>Model description</b>
IS	Saturation Current
N	Emission Coefficient
RS	Series Resistance
IKF	High-injection Knee Current
CJO	Zero-bias Junction Capacitance
M	Junction Grading Coefficient
VJ	Junction Potential
ISR	Recombination Current Saturation Value
BV	Reverse Breakdown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

## Forward Current Characteristics

### Circuit Simulation result

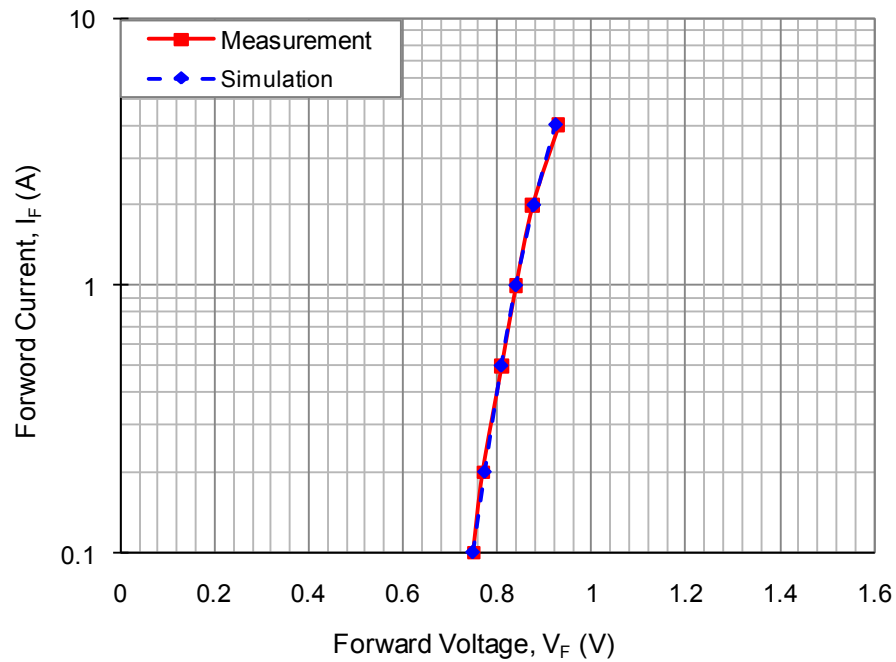


### Evaluation circuit



## Comparison Graph

Circuit Simulation result

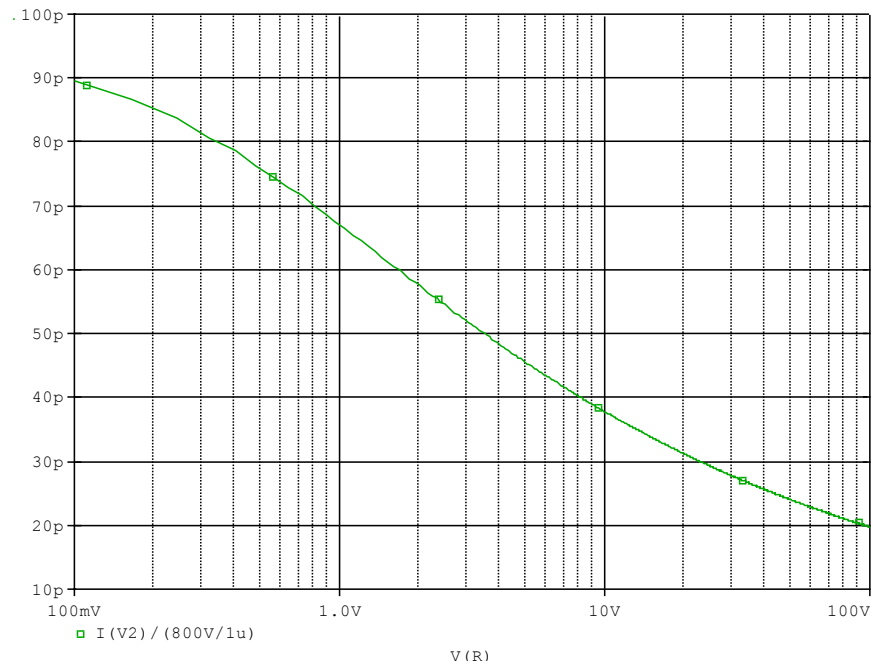


Comparison table

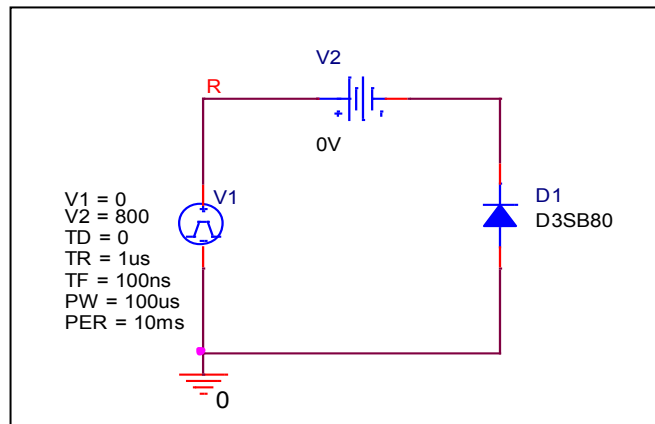
$I_F$ (A)	$V_F$ (V)		%Error
	Measurement	Simulation	
0.1	0.750	0.748	-0.27
0.2	0.770	0.773	0.39
0.5	0.810	0.808	-0.25
1	0.840	0.839	-0.12
2	0.875	0.877	0.23
4	0.930	0.923	-0.75

# Junction Capacitance Characteristic

## Circuit Simulation result

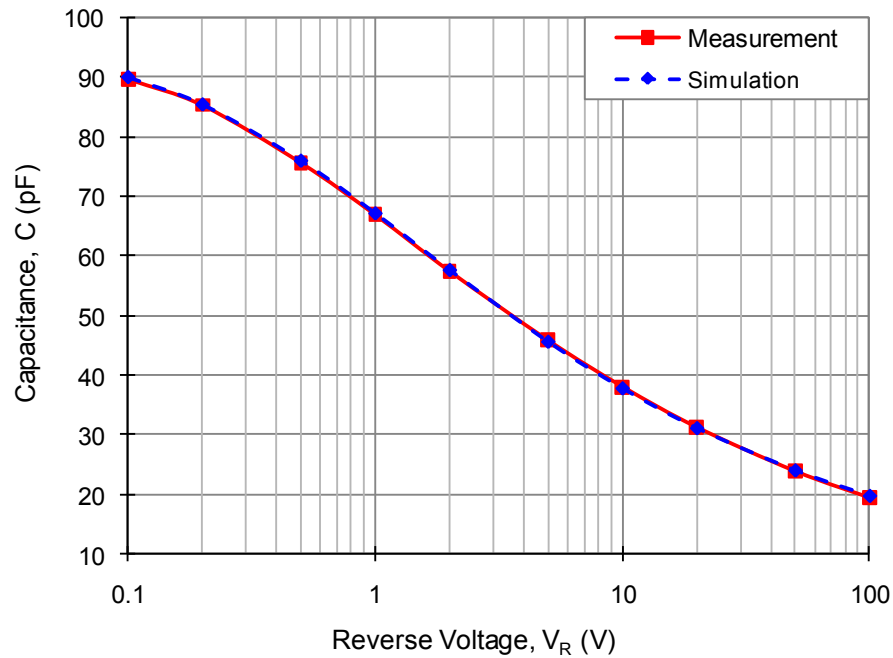


## Evaluation circuit



## Comparison Graph

Circuit Simulation result

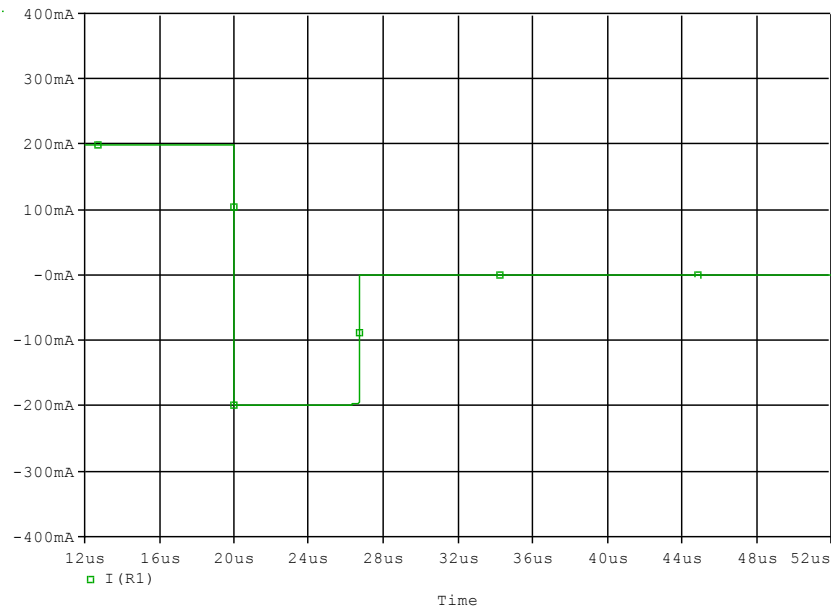


Comparison table

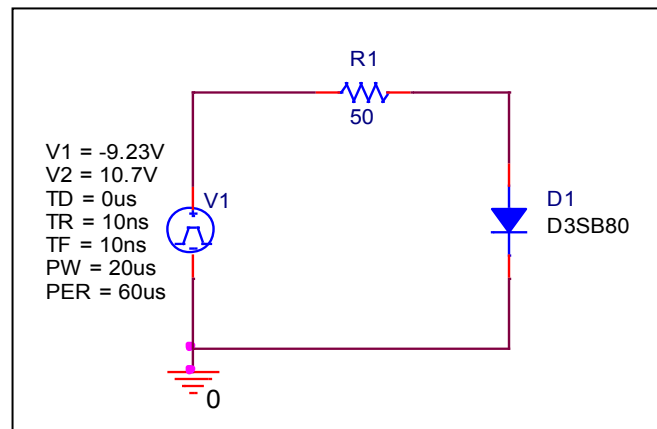
$V_R$ (V)	C (pF)		%Error
	Measurement	Simulation	
0.1	89.748	89.900	0.17
0.2	85.335	85.317	-0.02
0.5	75.662	75.900	0.31
1	66.916	67.088	0.26
2	57.441	57.600	0.28
5	45.863	45.600	-0.57
10	38.075	37.800	-0.72
20	31.252	31.135	-0.37
50	23.868	24.063	0.82
100	19.424	19.800	1.94

# Reverse Recovery Characteristics

## Circuit Simulation result



## Evaluation circuit



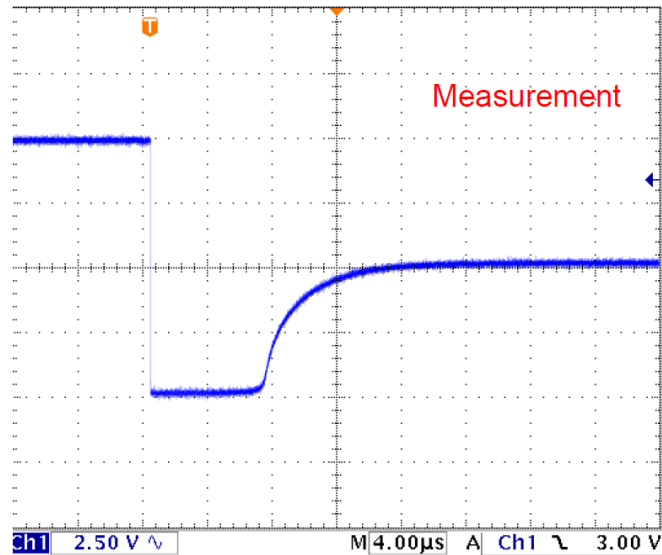
## Comparison Measurement vs. Simulation

Parameter	Unit	Measurement	Simulation	%Error
trj	us	6.56	6.51	-0.76



## Reverse Recovery Characteristics

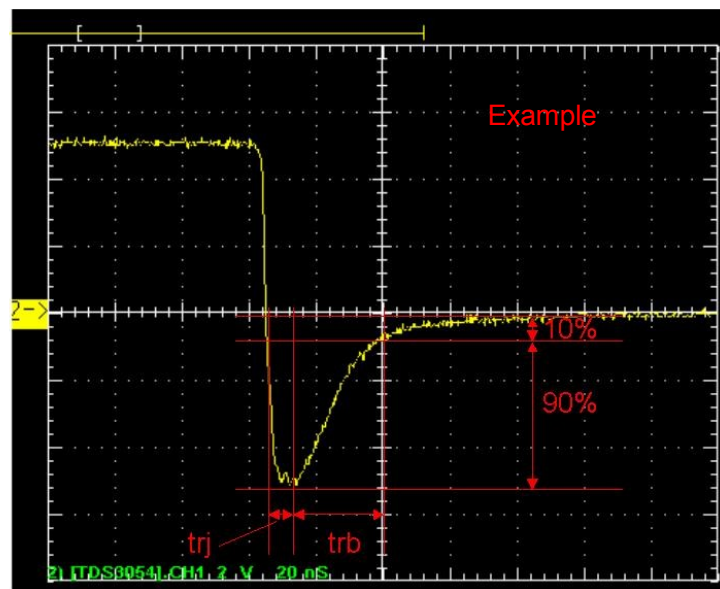
## Reference



$T_{rj} = 6.56 \text{ (}\mu\text{s)}$

$T_{rb} = 4.96 \text{ (}\mu\text{s)}$

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



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