

# Device Modeling Report

COMPONENTS:

DIODE/GENERAL PURPOSE RECTIFIER/ STANDARD

PART NUMBER: YG963S6R

MANUFACTURER: Fuji Electric



**Bee Technologies Inc.**

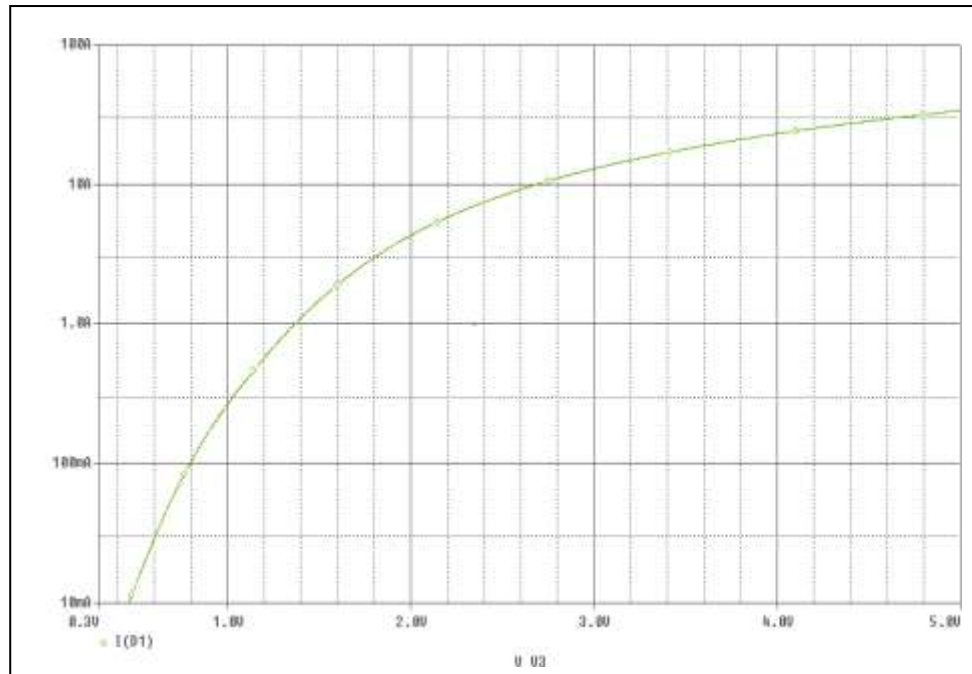
## DIODE SPICE MODEL

```
*$  
* PART NUMBER: YG963S6R  
* MANUFACTURER: Fuji Electric  
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.MODEL YG963S6R D  
+ IS=231.13E-6  
+ N=4.6584  
+ RS=75.085E-3  
+ IKF=.10142  
+ IRS=0  
+ CJO=94.518E-12  
+ M=.38359  
+ VJ=.3905  
+ BV=600  
+ IBV=50  
+ TT=37.100E-9  
*$
```

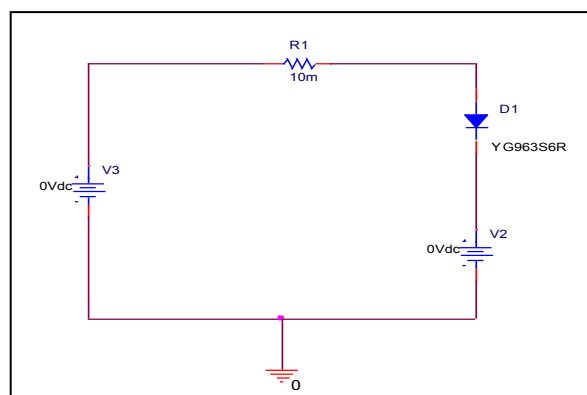
Pspice model parameter	Model description
IS	Saturation Current
N	Emission Coefficient
RS	Series Resistance
IKF	High-injection Knee Current
CJO	Zero-bias Junction Capacitance
M	Junction Grading Coefficient
VJ	Junction Potential
ISR	Recombination Current Saturation Value
BV	Reverse Breakdown Voltage(a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

## Forward Current Characteristic

### Circuit Simulation Result

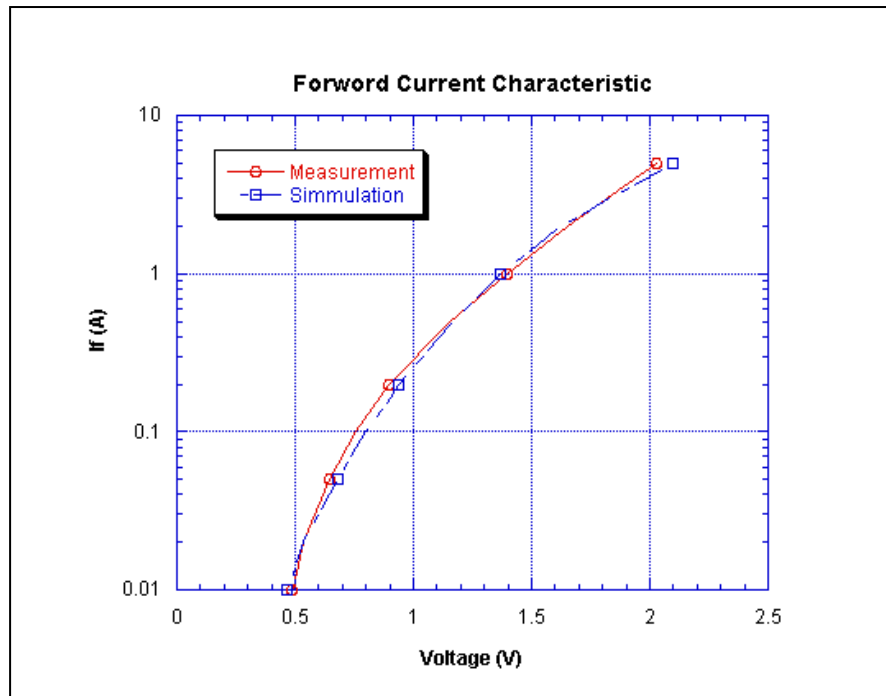


### Evaluation circuit



## Forward Current Characteristic

### Circuit Simulation Result

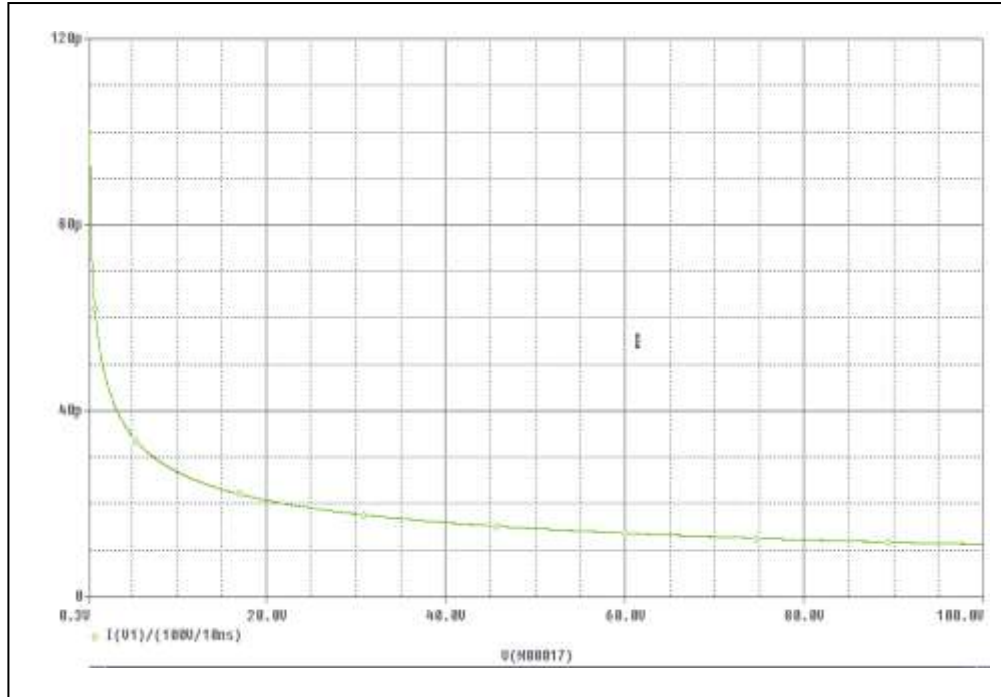


### Simulation Result

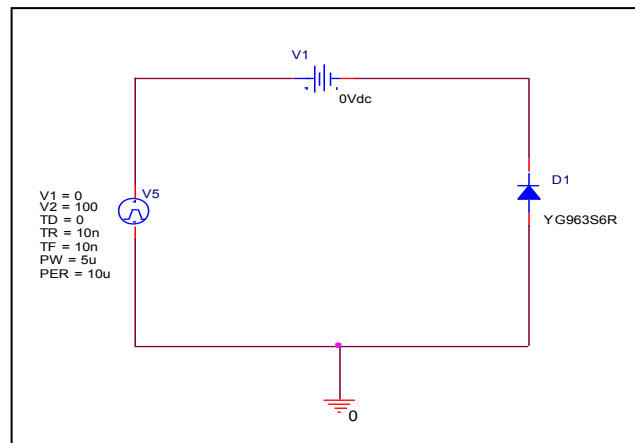
Ifwd (A)	Vfwd(V) Measurement	Vfwd(V) Simulation	%Error
0.01	0.485	0.465	4.124
0.02	0.535	0.533	0.374
0.05	0.645	0.684	-6.047
0.1	0.755	0.796	-5.430
0.2	0.895	0.936	-4.581
0.5	1.155	1.165	-0.883
1	1.395	1.369	1.900
2	1.650	1.621	1.776
5	2.025	2.0946	-3.437

## Junction Capacitance Characteristic

### Circuit Simulation Result

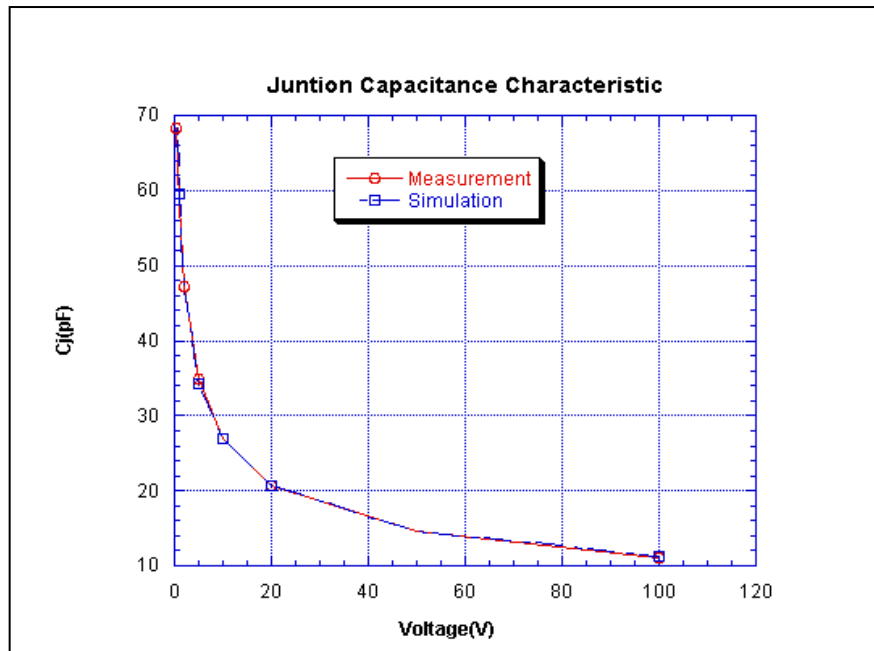


### Evaluation circuit



## Junction Capacitance Characteristic

### Circuit Simulation Result

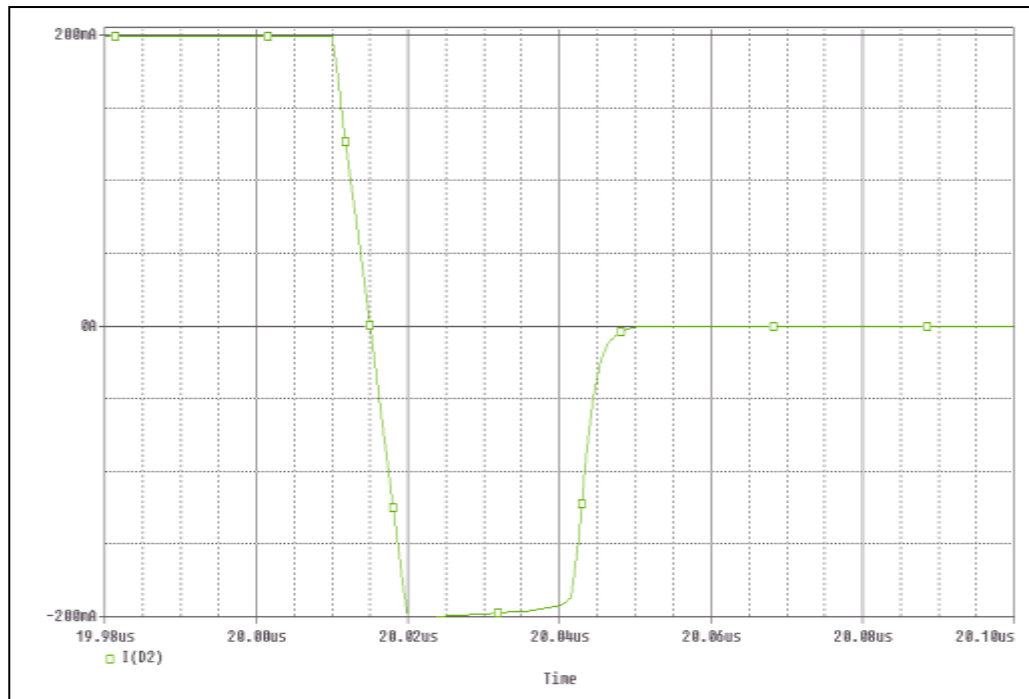


### Simulation Result

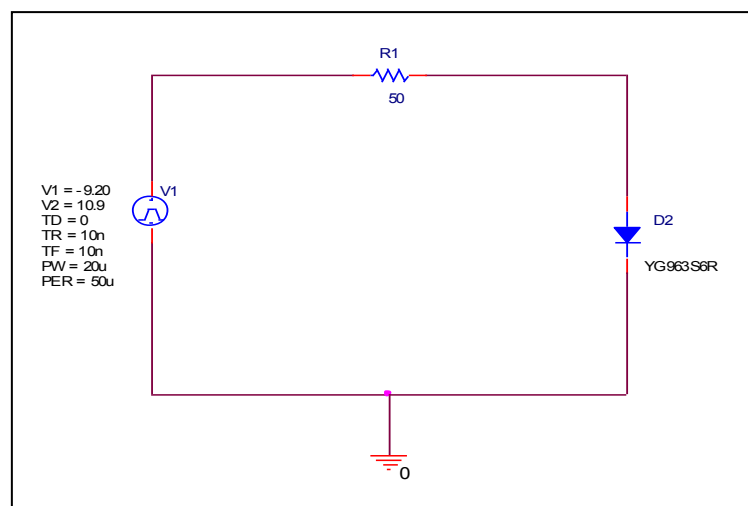
Vrev (V)	Cj(pF) Measurement	Cj(pF) Simulation	%Error
1	58.067	59.599	-2.638
2	47.267	46.928	0.718
5	34.802	34.346	1.309
10	26.985	26.970	0.057
20	20.749	20.753	-0.018
50	14.559	14.680	-0.834
100	11.096	11.275	-1.611

## Reverse Recovery Characteristic

### Evaluation circuit



### Circuit simulation result

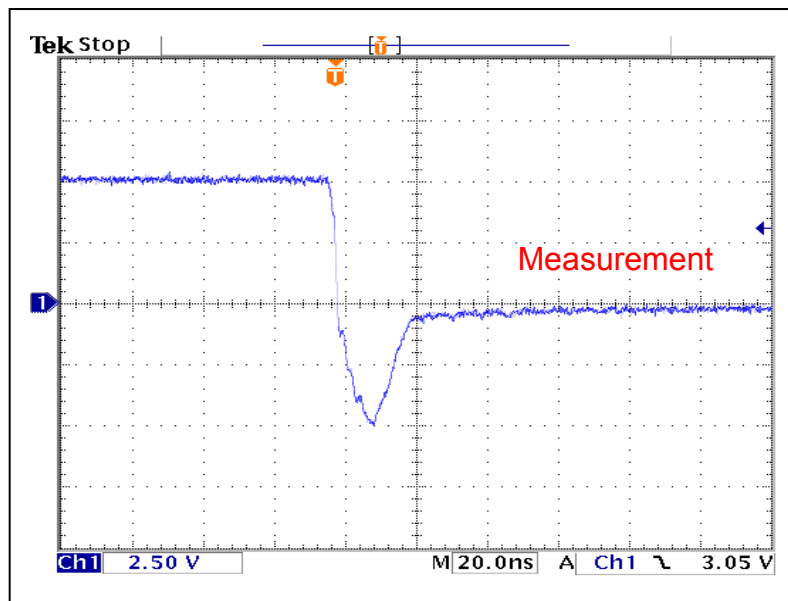


### Compare Measurement vs. Simulation

	Measurement		Simulation		%Error
trr	22.000	ns	21.955	ns	0.205

## Reverse Recovery Characteristic

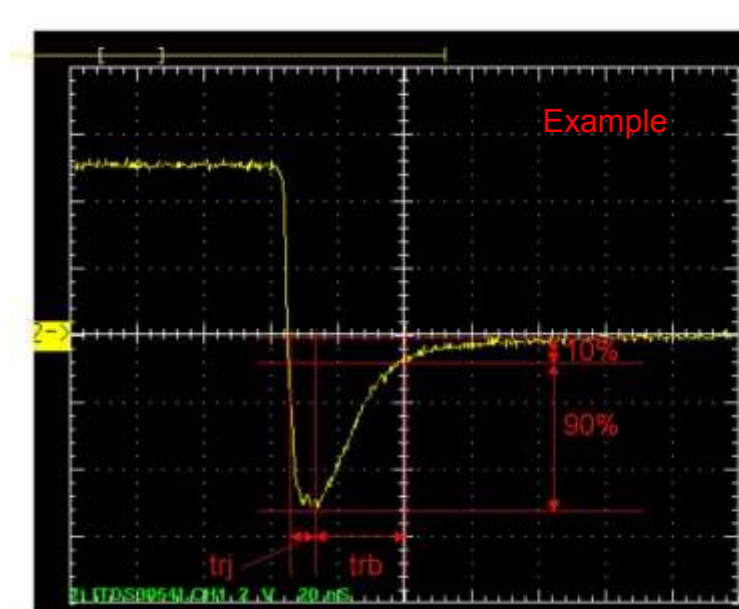
## Reference



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

$t_{rb}=12.4(\mu\text{s})$

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



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