

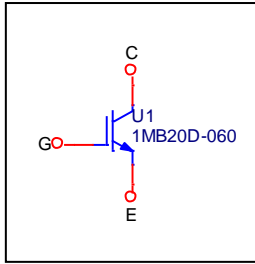
# Device Modeling Report

COMPONENTS: Insulated Gate Bipolar Transistor (IGBT)  
PART NUMBER: 1MB20D-060  
MANUFACTURER: Fuji Electric  
\* REMARK: Free-Wheeling Diode Special Model



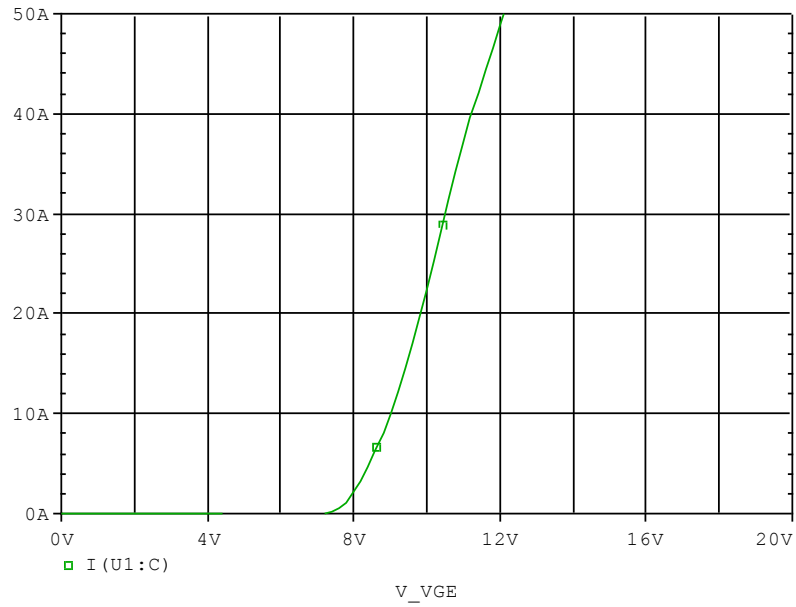
**Bee Technologies Inc.**

## Circuit Configuration

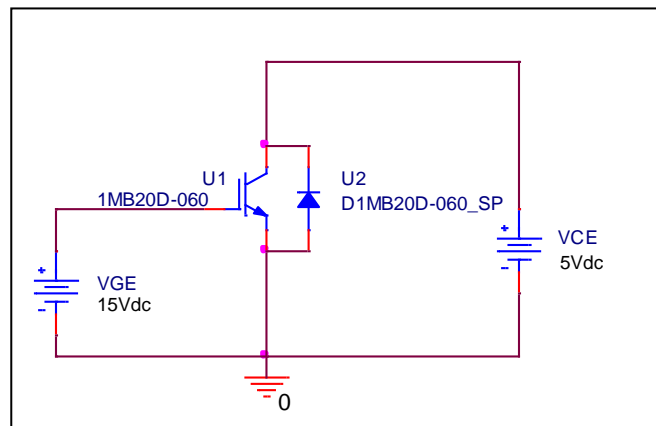


# Transfer Characteristics

## Circuit Simulation result

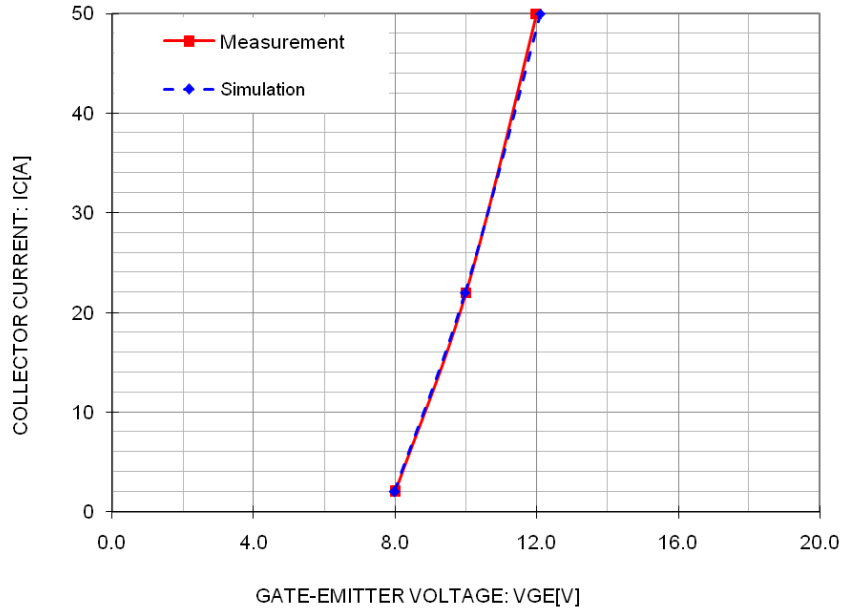


## Evaluation circuit



# Comparison Graph

## Simulation result



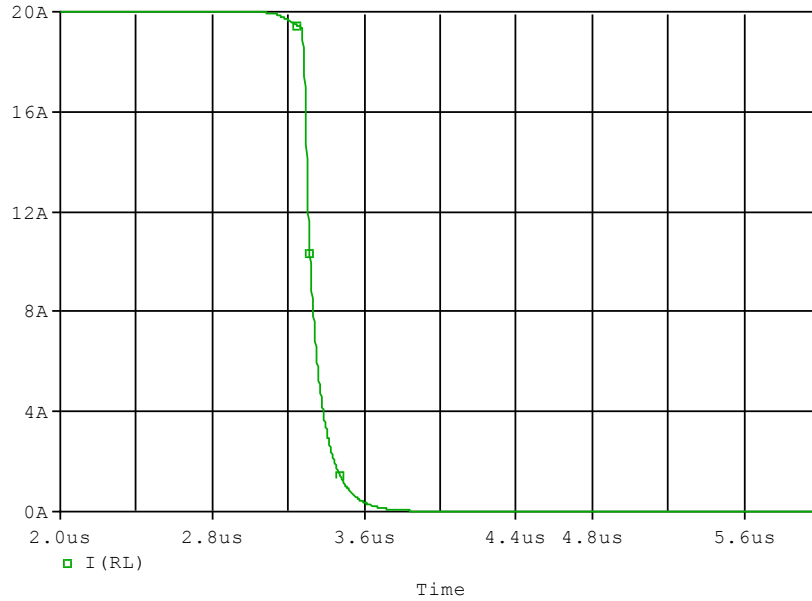
## Comparison table

Test condition:  $V_{CE} = 5 \text{ (V)}$

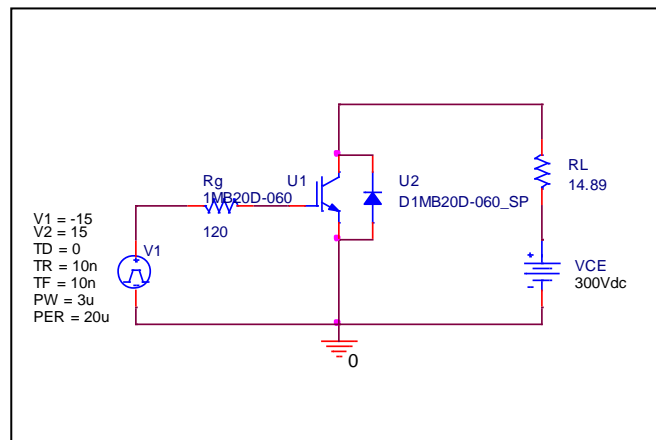
IC (A)	VGE (V)		%Error
	Measurement	Simulation	
2.000	8.000	7.986	-0.17
22.000	10.000	9.972	-0.28
50.000	12.000	12.107	0.89

# Fall Time Characteristics

## Circuit Simulation result



## Evaluation circuit

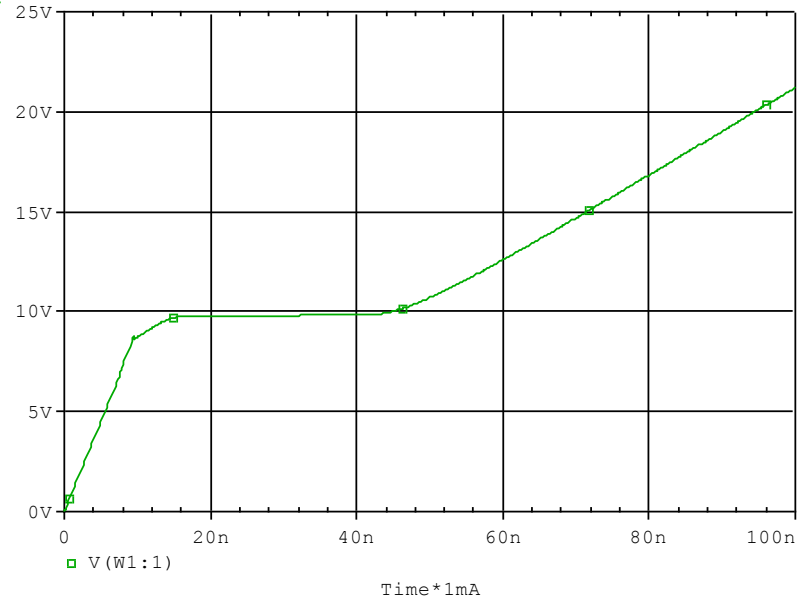


Test condition:  $I_C=20$  (A),  $V_{CC}=300$  (V)

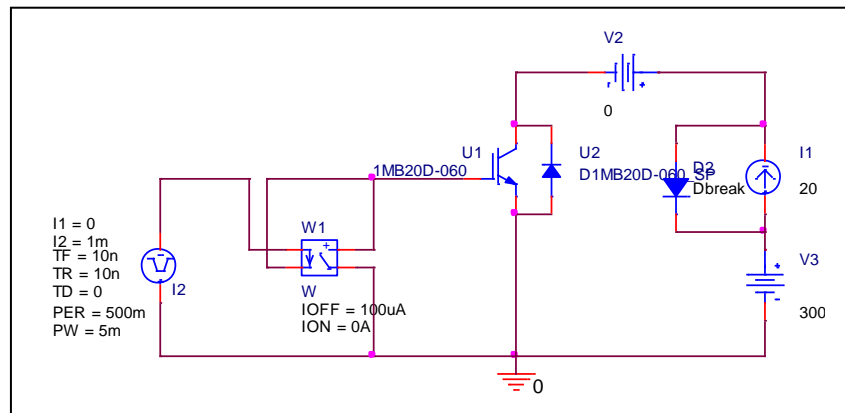
Parameter	Unit	Measurement	Simulation	%Error
tf	us	0.160	0.160	0.072

# Gate Charge Characteristics

## Circuit Simulation result



## Evaluation circuit

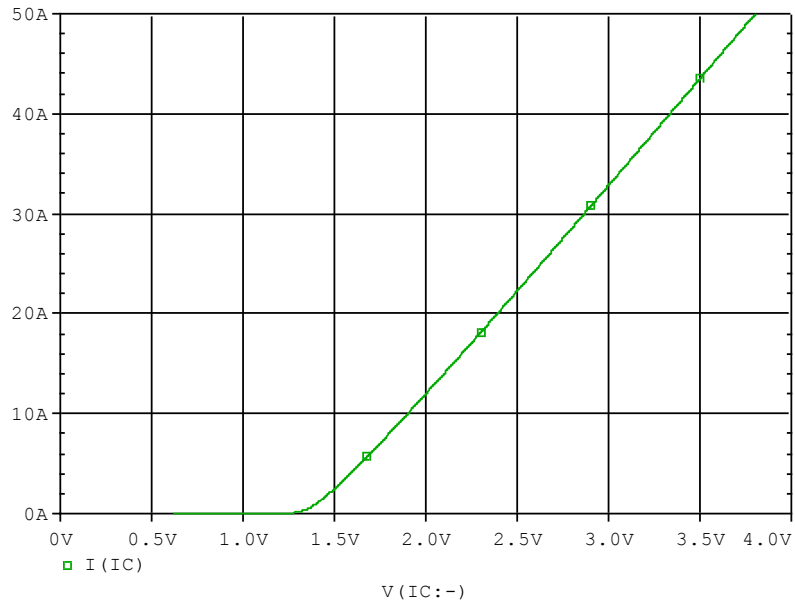


Test condition:  $V_{CC}=300$  (V),  $I_C=20$  (A),  $V_{GE}=15$  (V)

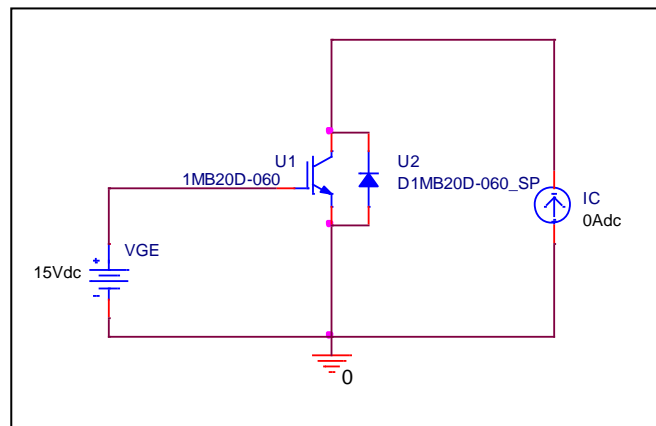
Parameter	Unit	Measurement	Simulation	%Error
<b>Q<sub>ge</sub></b>	<b>nc</b>	<b>12.000</b>	<b>12.000</b>	<b>0.000</b>
<b>Q<sub>gc</sub></b>	<b>nc</b>	<b>34.000</b>	<b>33.913</b>	<b>-0.256</b>
<b>Q<sub>g</sub></b>	<b>nc</b>	<b>70.000</b>	<b>71.598</b>	<b>2.283</b>

# Saturation Characteristics

## Circuit Simulation result

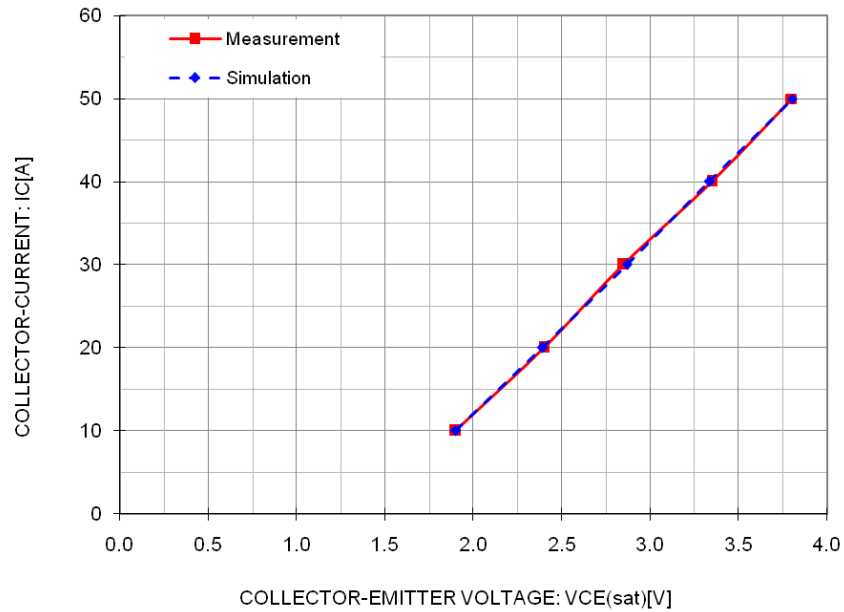


## Evaluation circuit



## Comparison Graph

### Simulation result



### Comparison table

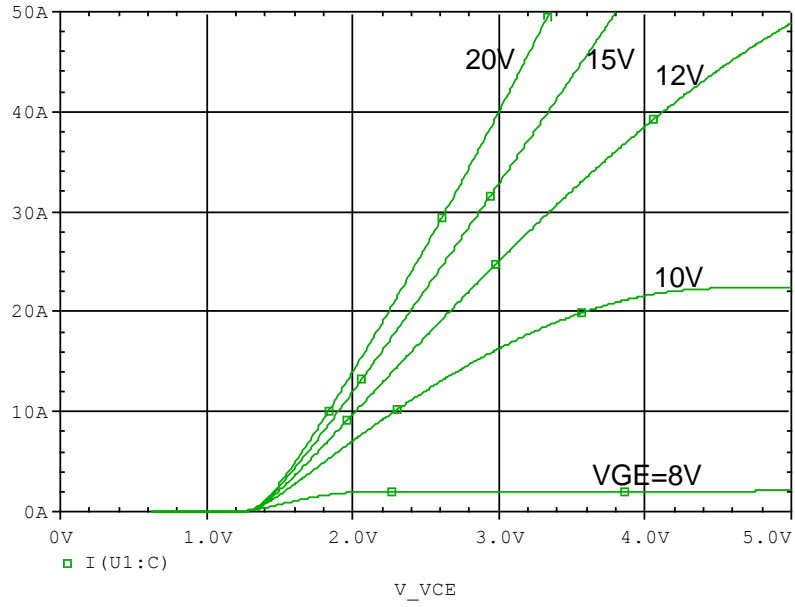
Test condition:  $V_{GE} = 15$  (V)

Ic(A)	VCE (V)		%Error
	Measurement	Simulation	
10.0	1.900	1.901	0.06
20.0	2.400	2.392	-0.35
30.0	2.850	2.868	0.61
40.0	3.350	3.337	-0.40
50.0	3.800	3.804	0.10

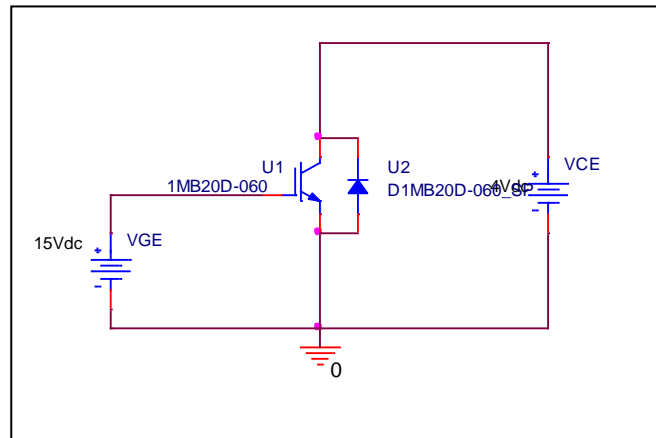


# Output Characteristics

## Circuit Simulation result

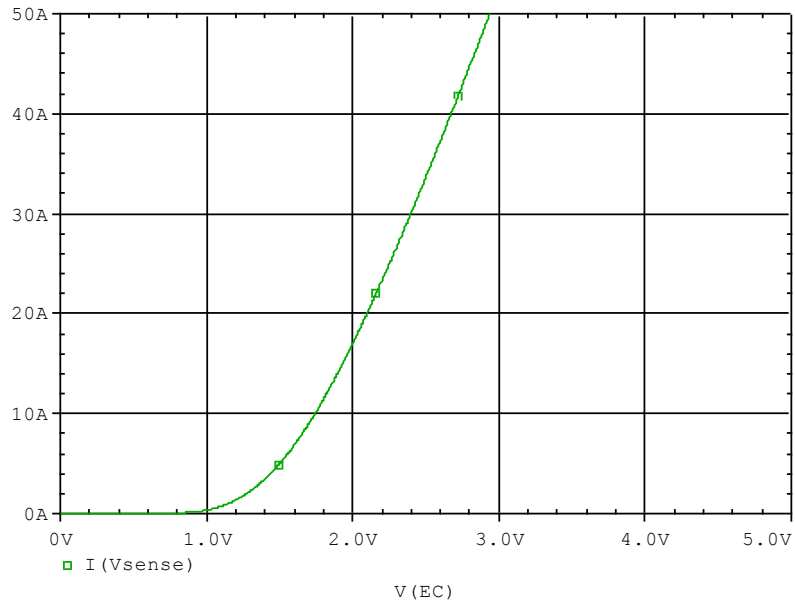


## Evaluation circuit

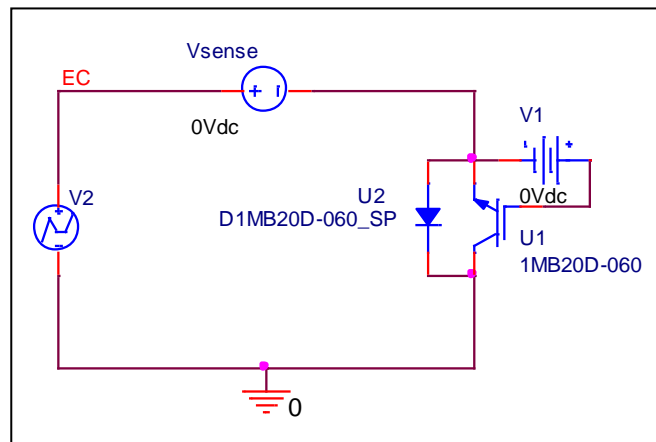


# FWD Forward Current Characteristics

## Circuit Simulation result

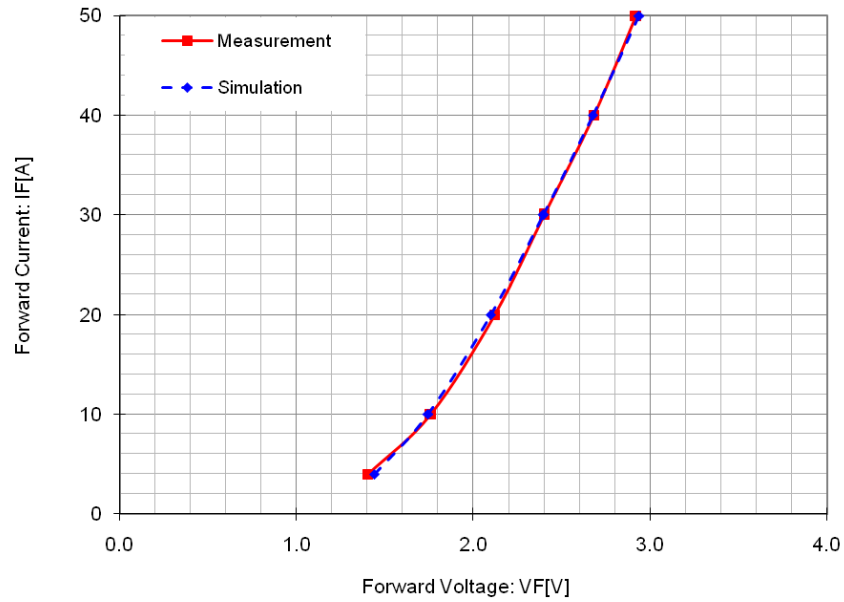


## Evaluation circuit



## Comparison Graph

### Simulation result

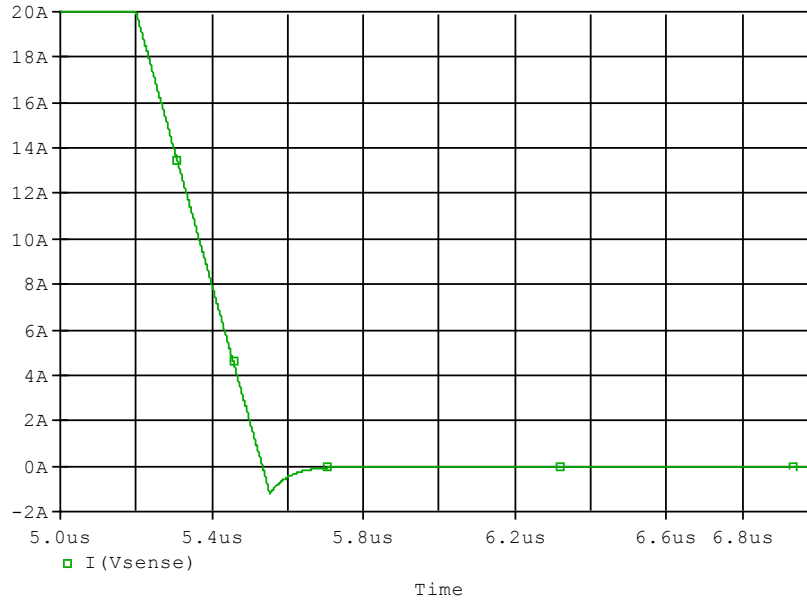


### Comparison table

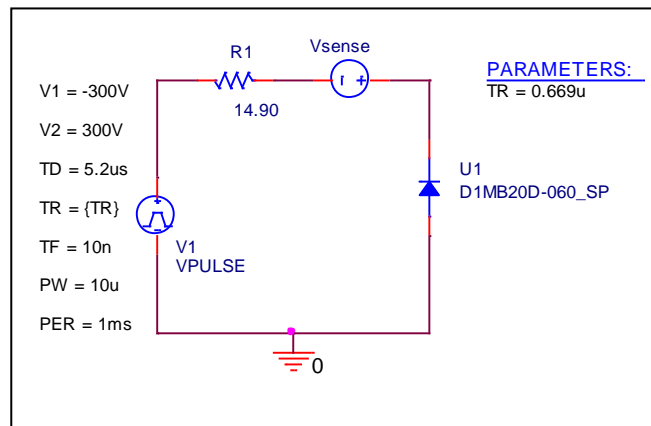
IF(A)	VF (V)		%Error
	Measurement	Simulation	
4	1.400	1.438	2.68
10	1.760	1.743	-0.98
20	2.120	2.098	-1.06
30	2.400	2.397	-0.14
40	2.680	2.673	-0.26
50	2.920	2.937	0.58

# Reverse Recovery Characteristics

## Circuit Simulation result



## Evaluation circuit



Test condition:  $V_{CC}=300$  (V),  $I_C=20$  (A),  $-di/dt=60$  (A/us)

Parameter	Unit	Measurement	Simulation	%Error
<b>trr</b>	<b>nsec</b>	<b>140.000</b>	<b>139.931</b>	<b>-0.05</b>
<b>Irr</b>	<b>A</b>	<b>1.200</b>	<b>1.199</b>	<b>-0.11</b>