

# Device Modeling Report

COMPONENTS: Insulated Gate Bipolar Transistor (IGBT)  
PART NUMBER: GT15J102  
MANUFACTURER: TOSHIBA

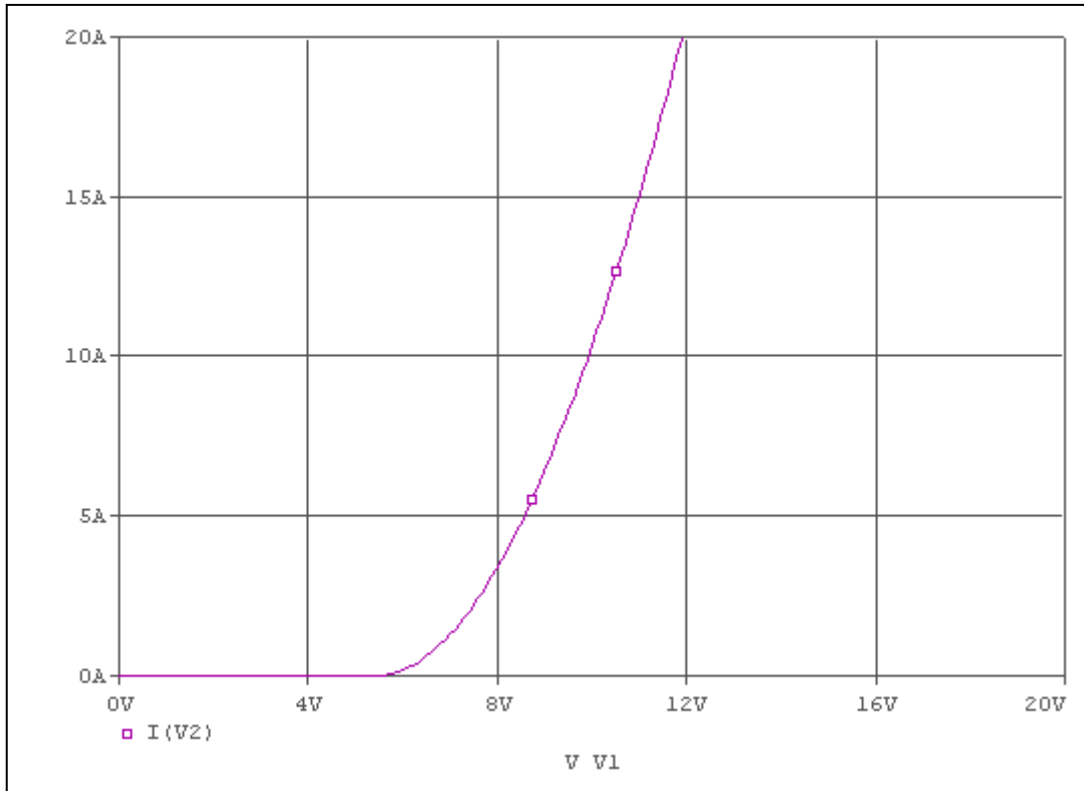


**Bee Technologies Inc.**

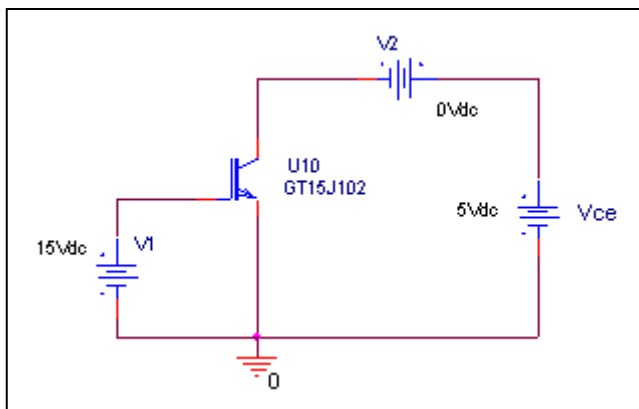
P Spice model parameter	Model description
TAU	Ambipolar Recombination Lifetime
KP	MOS Transconductance
AREA	Area of the Device
AGD	Gate-Drain Overlap Area
WB	Metallurgical Base Width
VT	Threshold Voltage
KF	Triode Region Factor
CGS	Gate-Source Capacitance per Unit Area
COXD	Gate-Drain Oxide Capacitance per Unit Area
VTD	Gate-Drain Overlap Depletion Threshold

# Transfer Characteristics

## Circuit Simulation result

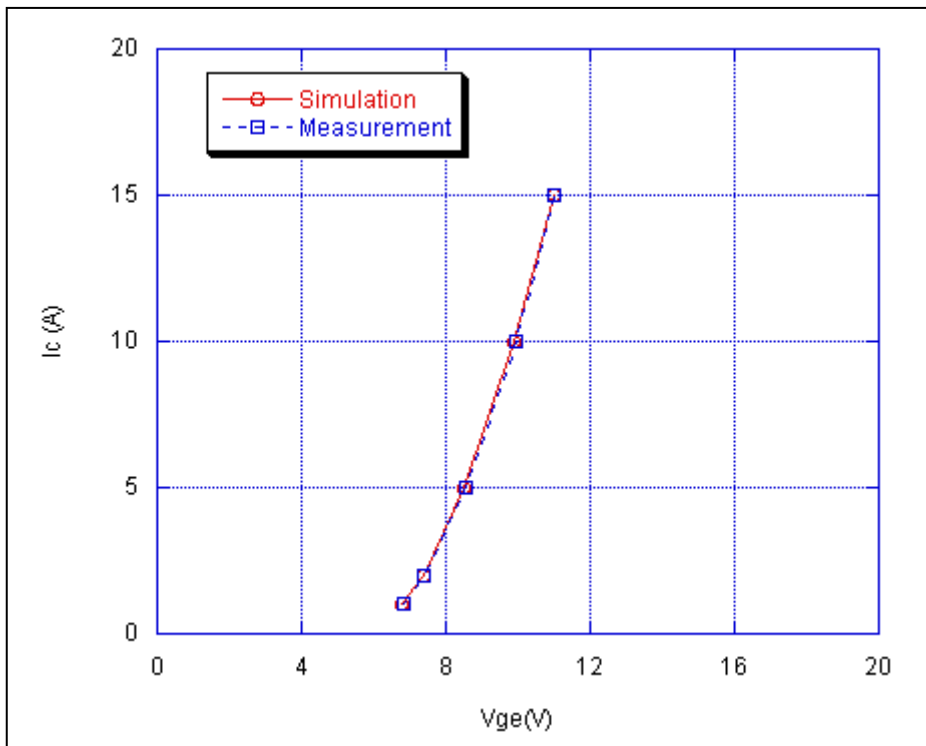


## Evaluation circuit



## Comparison Graph

### Circuit Simulation Result



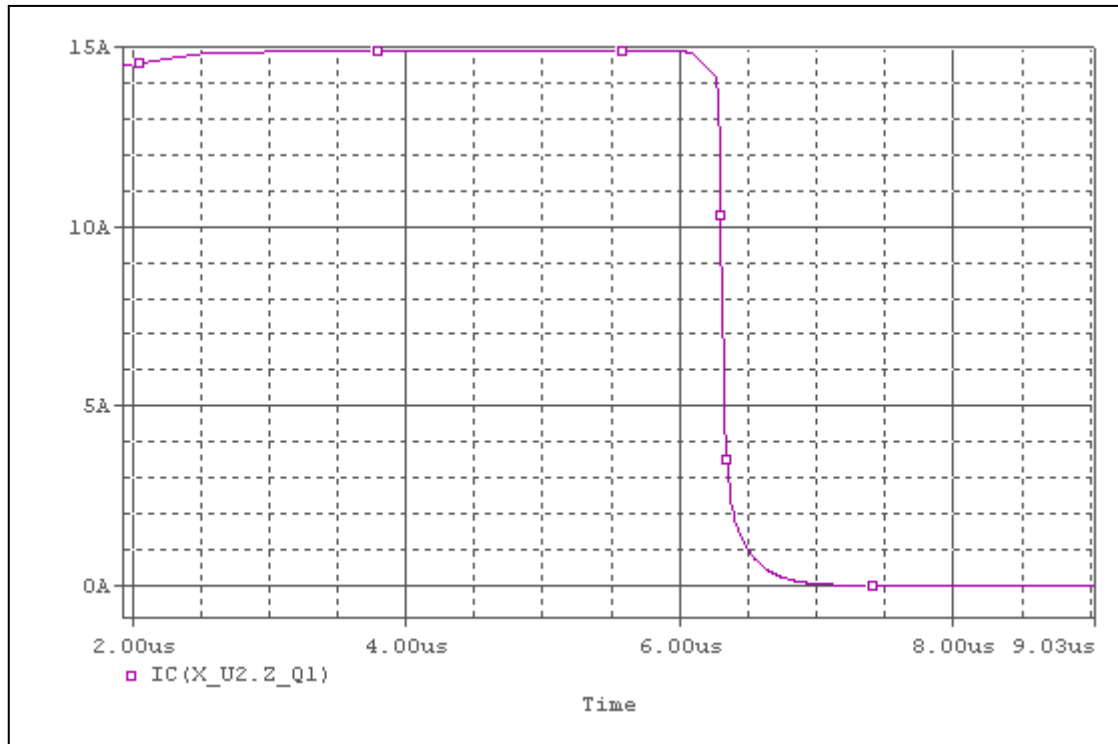
### Simulation Result

Test condition :  $V_{ce} = 5 \text{ V}$

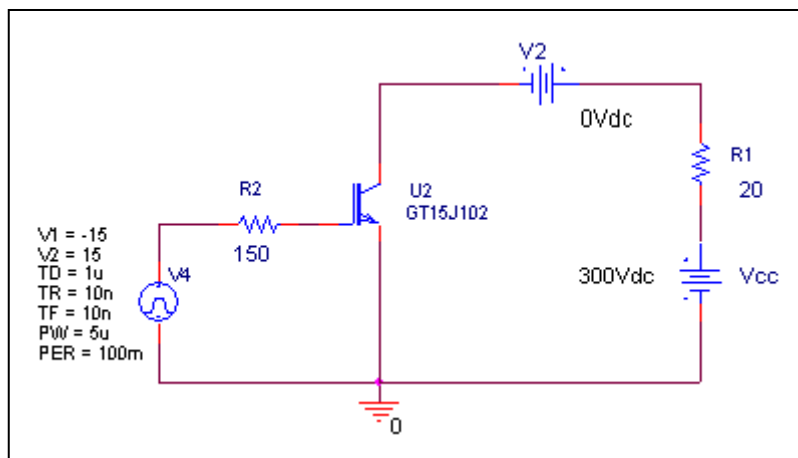
Ic(A)	Vge(V)		Error (%)
	Measurement	Simulation	
1	6.8	6.8090	0.13235
2	7.4	7.3933	-0.09054
5	8.5	8.5843	0.99176
10	9.9	9.925	0.25253
15	11	10.997	-0.02727

## Fall Time Characteristics

### Circuit Simulation result



### Evaluation circuit

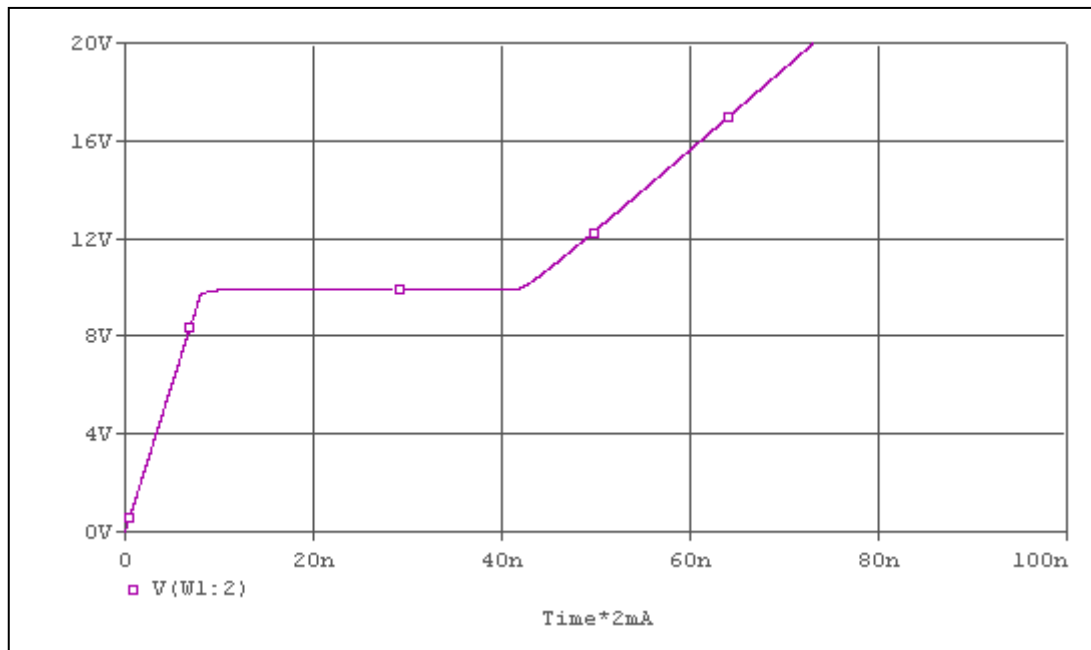


Test condition  $I_c=15(\text{A})$ ,  $V_{cc}=300(\text{V})$

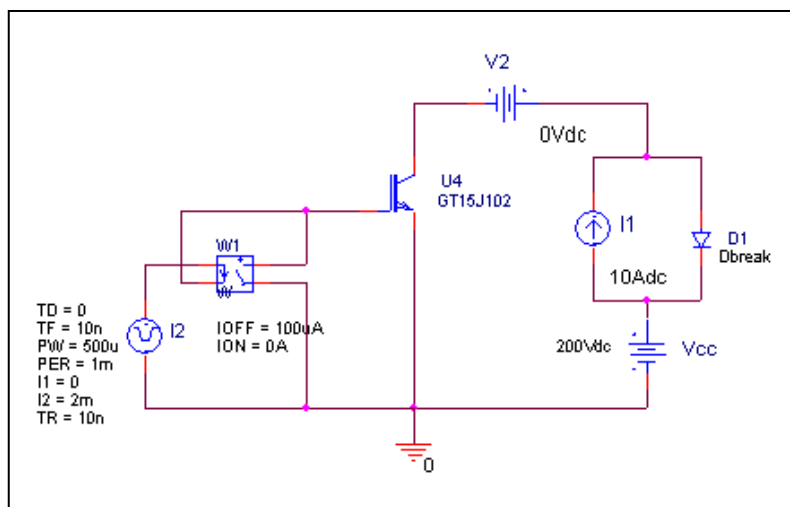
tf	Measurement		Simulation		Error
	150	ns	150.347	ns	

## Gate Charge Characteristics

### Circuit Simulation result



### Evaluation circuit

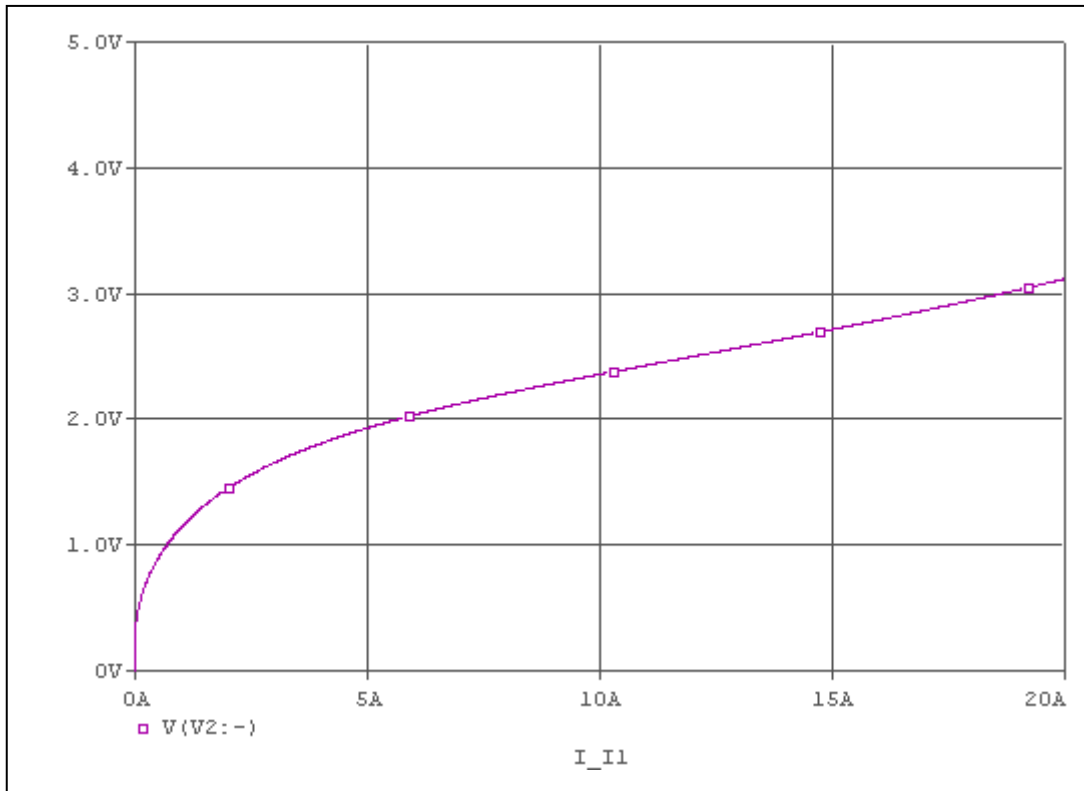


Test condition :  $V_{cc}=200(V)$  ,  $I_c=20(A)$  ,  $V_{ge}=16(V)$

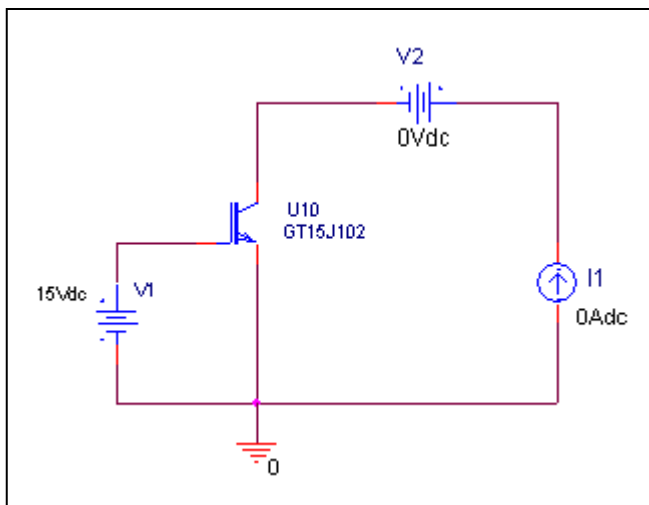
	Measurement		Simulation		Error(%)
<b>Q<sub>ge</sub></b>	<b>8</b>	<b>nc</b>	<b>8.0899</b>	<b>nc</b>	<b>1.12375</b>
<b>Q<sub>gc</sub></b>	<b>32</b>	<b>nc</b>	<b>33.371</b>	<b>nc</b>	<b>4.28438</b>
<b>Q<sub>g</sub></b>	<b>61</b>	<b>nc</b>	<b>61.195</b>	<b>nc</b>	<b>0.31967</b>

## Saturation Characteristics

### Circuit Simulation result

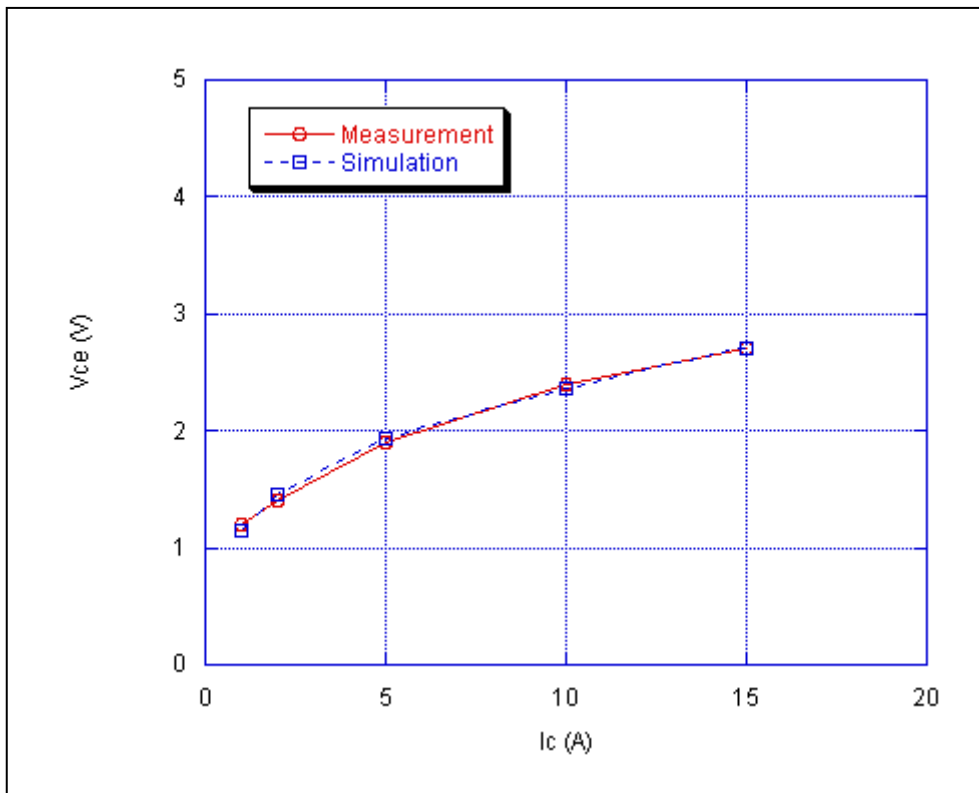


### Evaluation circuit



## Comparison Graph

### Circuit Simulation Result



### Simulation Result

Ic(A)	Vce(sat)(V)		Error (%)
	Measurement	Simulation	
1	1.2	1.1448	-4.60000
2	1.4	1.4522	3.72857
5	1.9	1.9306	1.61053
10	2.4	2.3577	-1.76250
15	2.7	2.7147	0.54444