# Device Modeling Report

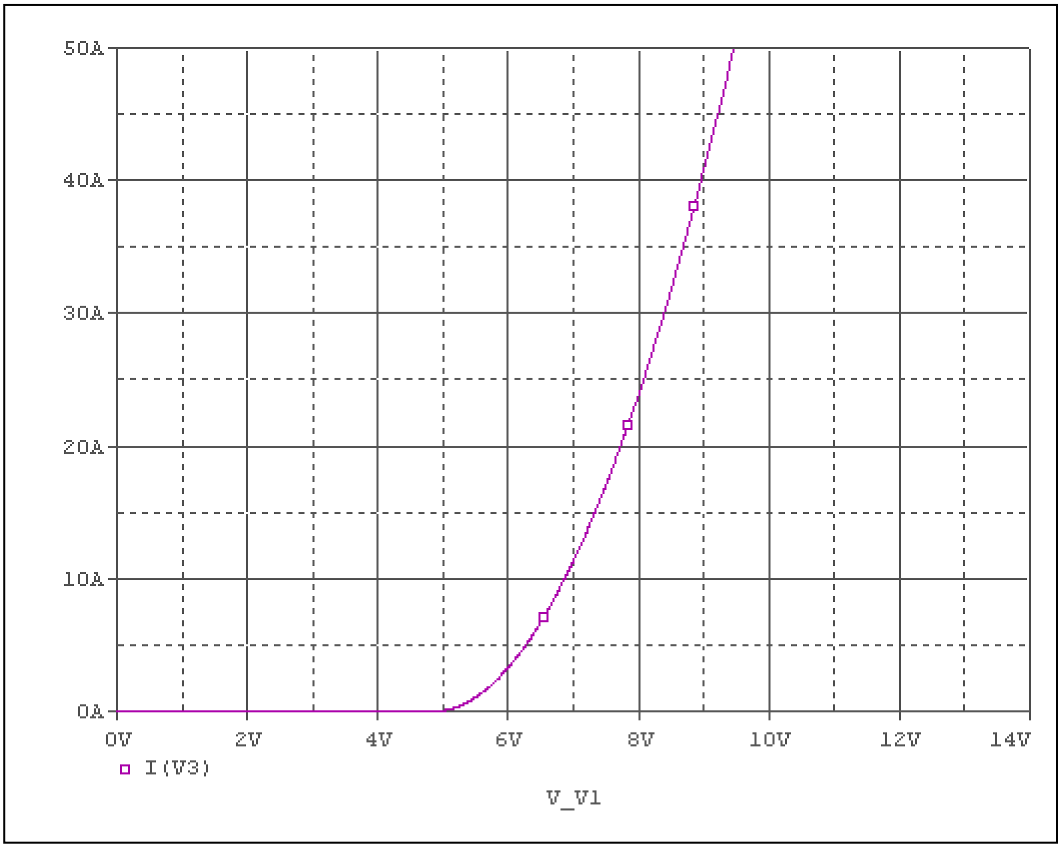
COMPONENTS: Insulated Gate Bipolar Transistor (IGBT)
PART NUMBER: GT25Q101
MANUFACTURER: TOSHIBA

**Bee Technologies Inc.**

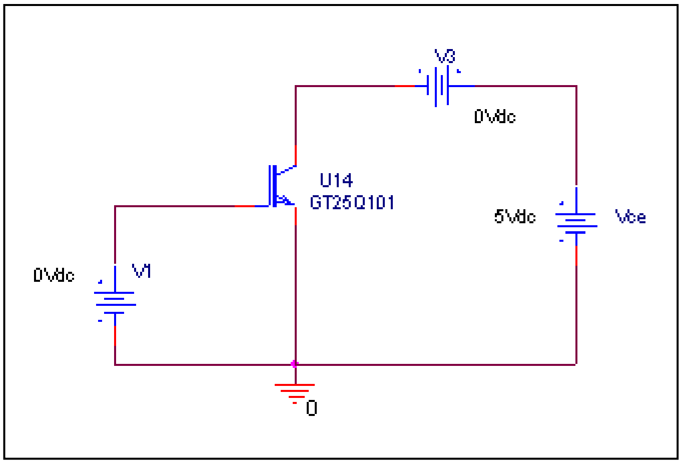
| PSpice model parameter | Model description |
|---|---|
| TAU | Ambipolar Recombination Lifetime |
| KP | MOS Transconductance |
| AREA | Area of the Device |
| AGD | Gate-Drain Overlap Area |
| WB | Metallurgical Base Width |
| VT | Threshold Voltage |
| KF | Triode Region Factor |
| CGS | Gate-Source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

# Transfer Characteristics

## Circuit Simulation result

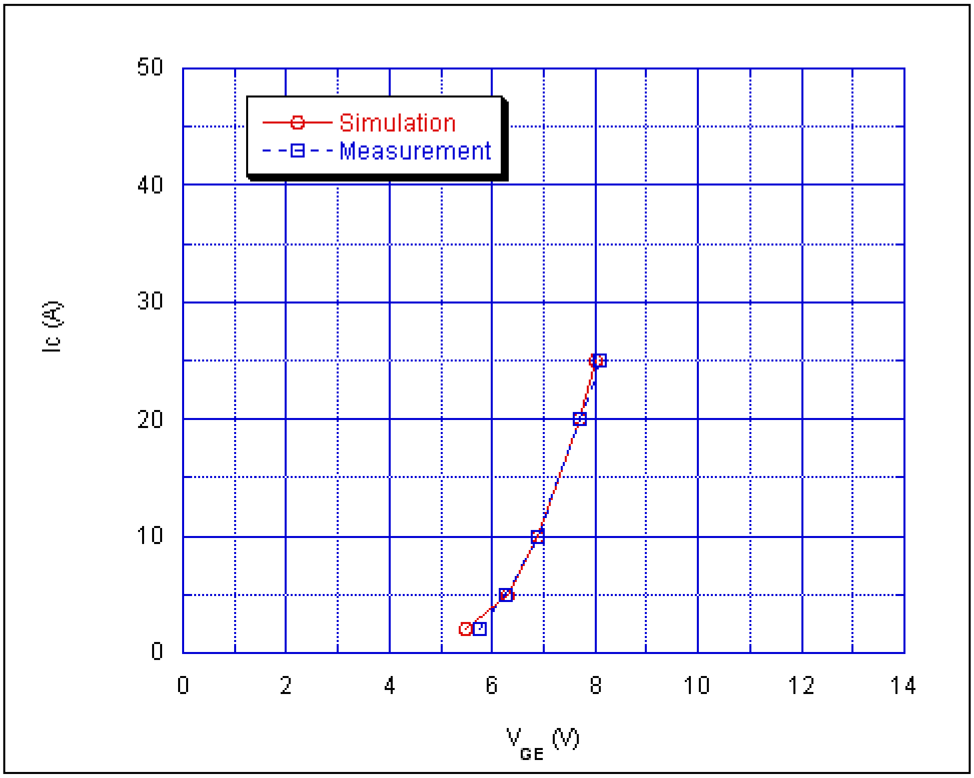


## Evaluation circuit



## Comparison Graph

Circuit Simulation Result



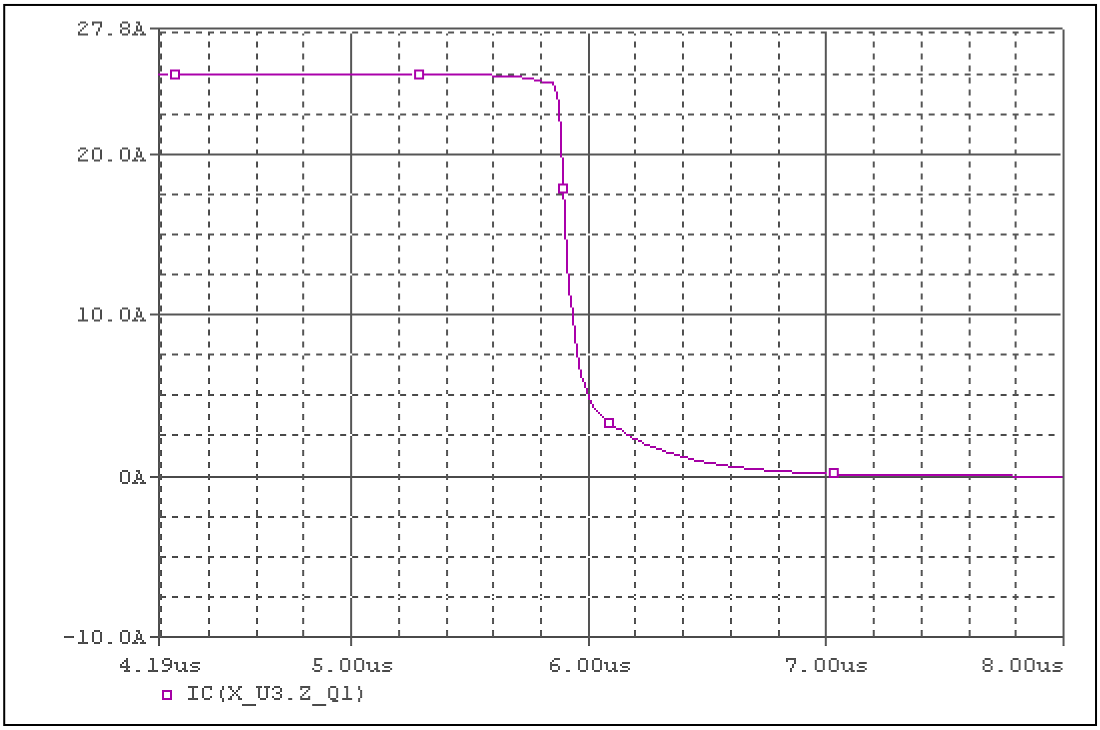
Simulation Result

**Test condition : Vce = 5 V**

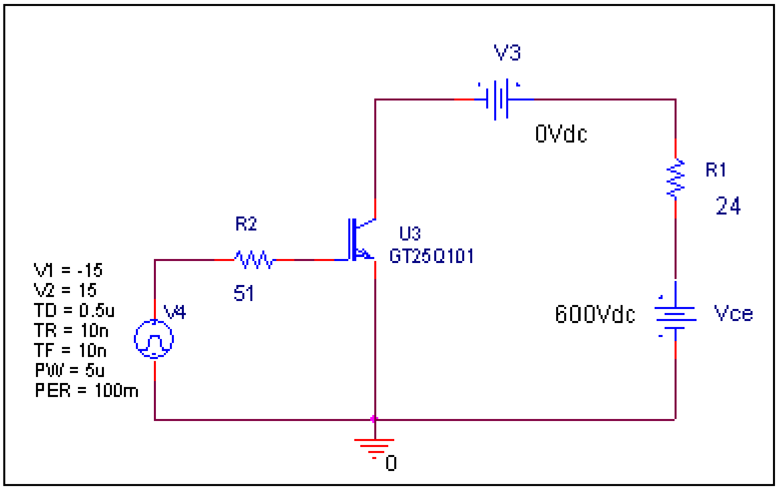
| Ic(A) | Vge(V) | | Error (%) |
|---|---|---|---|
| | Measurement | Simulation | |
| 2 | 5.5 | 5.7480 | 4.50909 |
| 5 | 6.3 | 6.2677 | -0.51270 |
| 10 | 6.9 | 6.8661 | -0.49130 |
| 20 | 7.7 | 7.7165 | 0.21429 |
| 25 | 8 | 8.0787 | 0.98375 |

## Fall Time Characteristics

Circuit Simulation result



Evaluation circuit

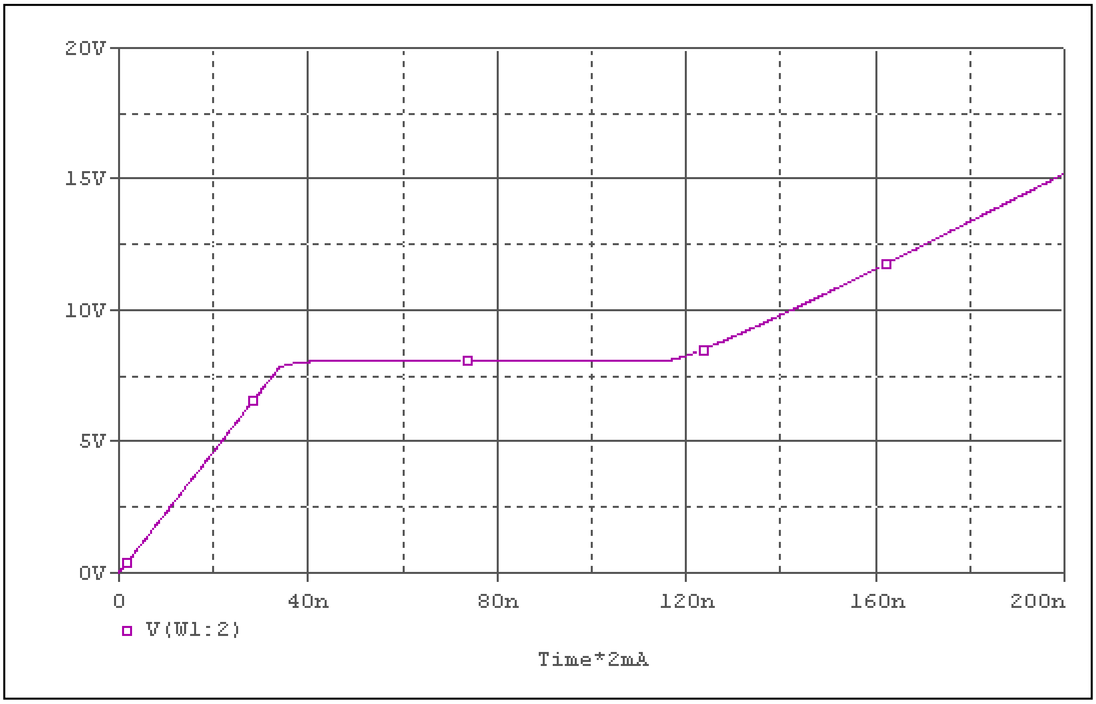


Test condition Ic=25(A) ,Vce=600(V)

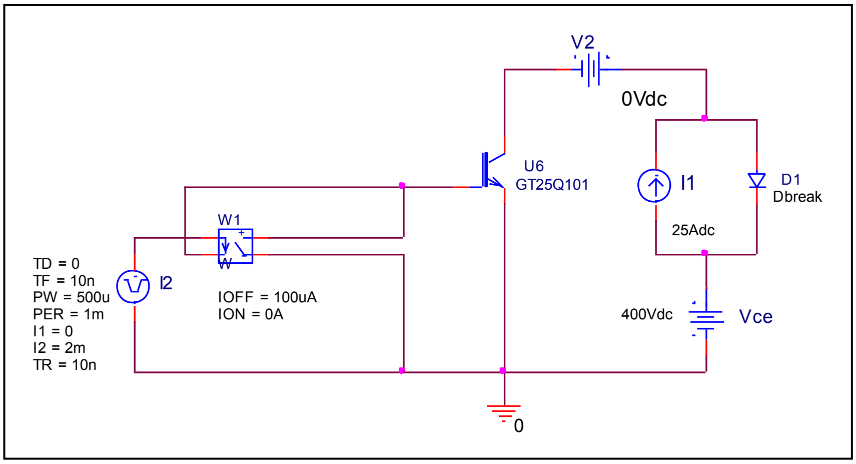
| tf | Measurement | | Simulation | | Error |
|---|---|---|---|---|---|
| | 0.3 | us | 0.301233 | us | 0.4110 |

# Gate Charge Characteristics

## Circuit Simulation result



## Evaluation circuit

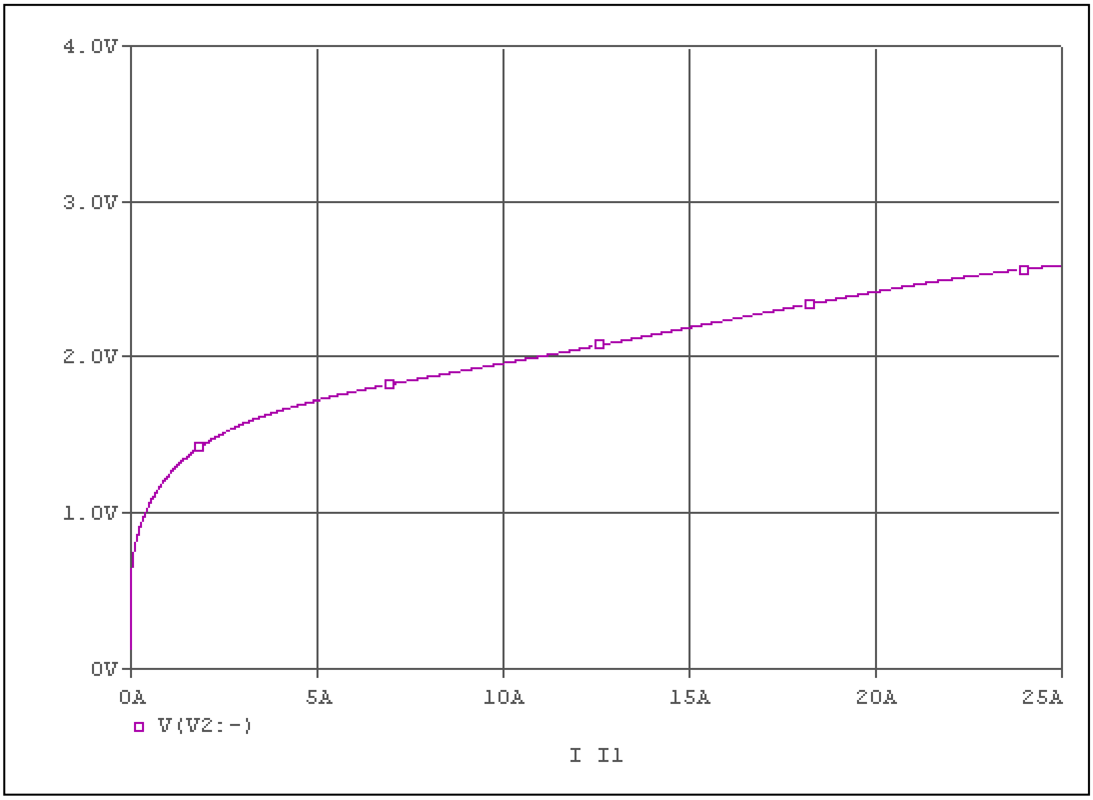


Test condition : Vce=400(V) ,Ic=25(A) ,Vge=12.5(V)

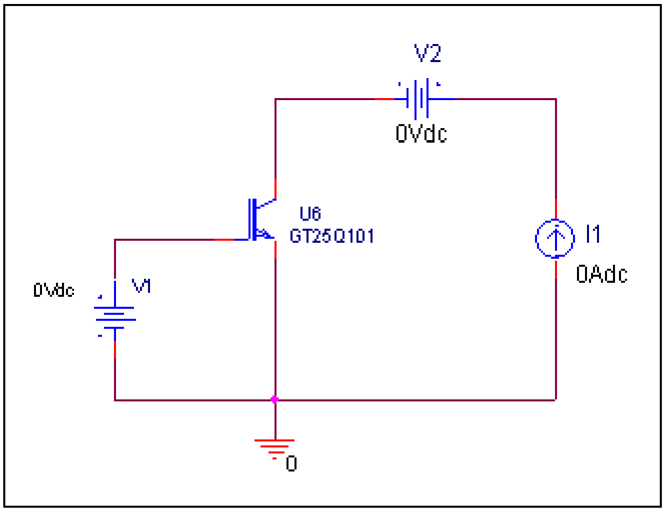
| | **Measurement** | | **Simulation** | | **Error(%)** |
|---|---|---|---|---|---|
| **Qge** | **34** | **nc** | **34.506** | **nc** | **1.48824** |
| **Qgc** | **82** | **nc** | **82.857** | **nc** | **1.04512** |
| **Qg** | **174** | **nc** | **170.550** | **nc** | **-1.98276** |

## Saturation Characteristics

Circuit Simulation result

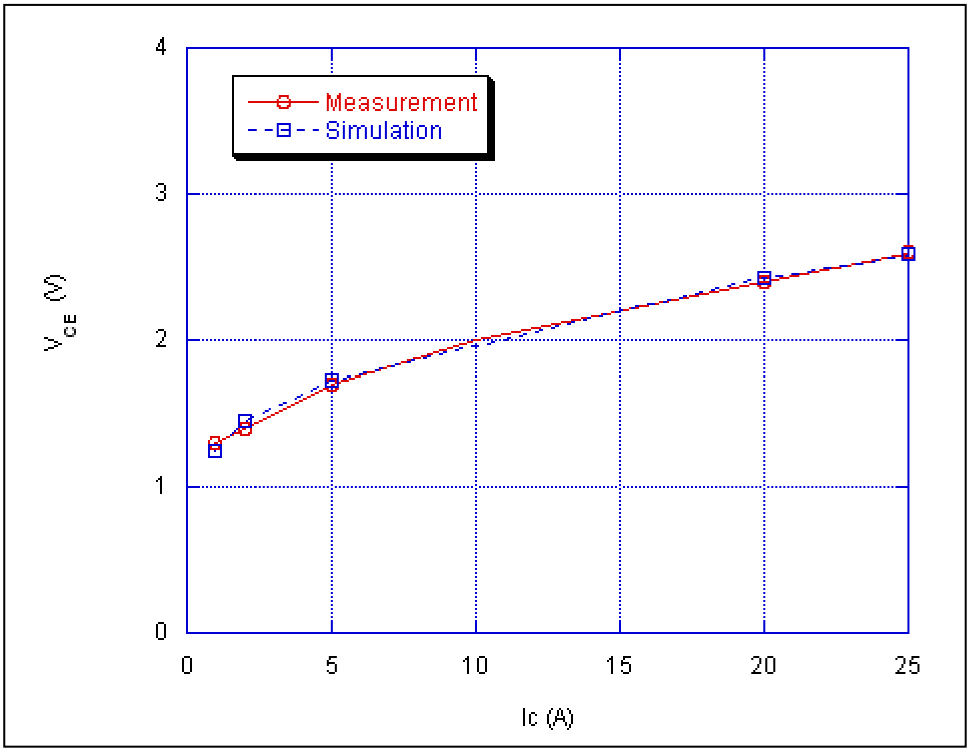


Evaluation circuit



## Comparison Graph

Circuit Simulation Result



Simulation Result

| Ic(A) | Vce(sat)(V) | | Error (%) |
|---|---|---|---|
| | Measurement | Simulation | |
| 1 | 1.3 | 1.2467 | -4.10000 |
| 2 | 1.4 | 1.4488 | 3.48571 |
| 5 | 1.7 | 1.7247 | 1.45294 |
| 10 | 2 | 1.9604 | -1.98000 |
| 20 | 2.4 | 2.4204 | 0.85000 |
| 25 | 2.6 | 2.5920 | -0.30769 |