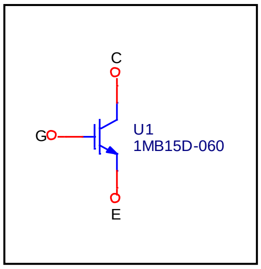
# Device Modeling Report

COMPONENTS: Insulated Gate Bipolar Transistor (IGBT)
PART NUMBER: 1MB15D-060
MANUFACTURER: FUJI ELECTRIC
*REMARK: Free-Wheeling Diode Professional Model

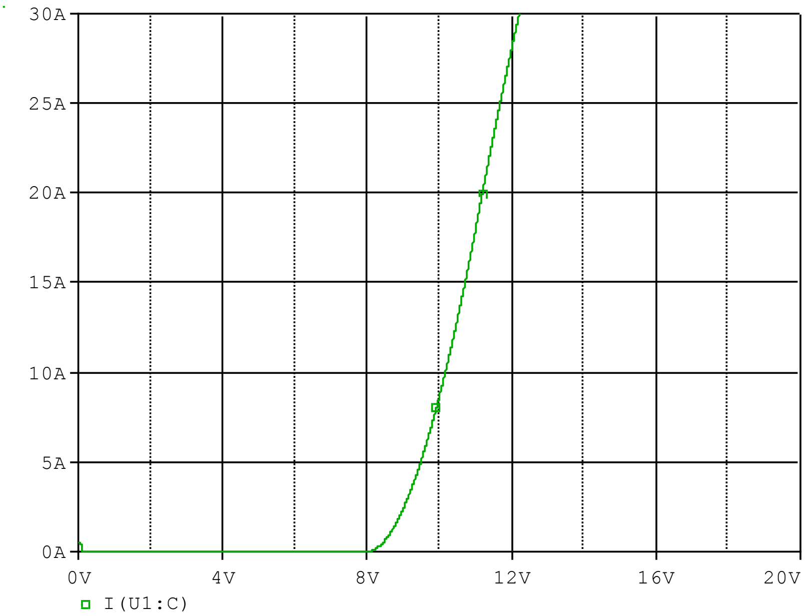
**Bee Technologies Inc.**

## Circuit Configuration

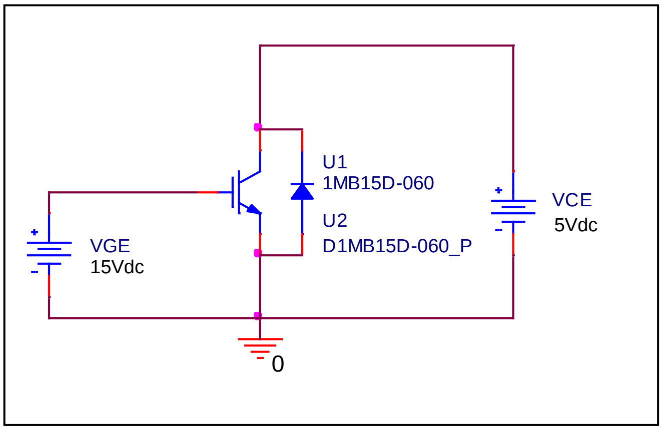


# Transfer Characteristics

## Circuit Simulation result

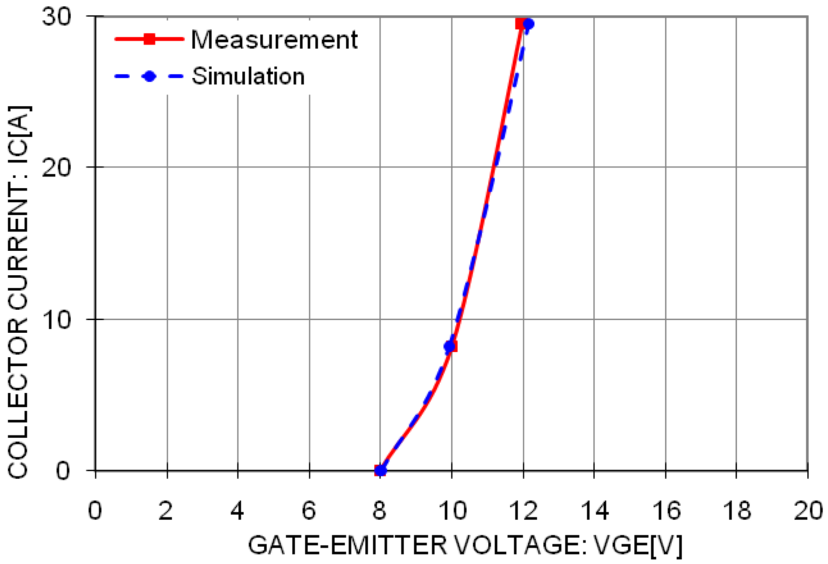


## Evaluation circuit



## Comparison Graph

Simulation result



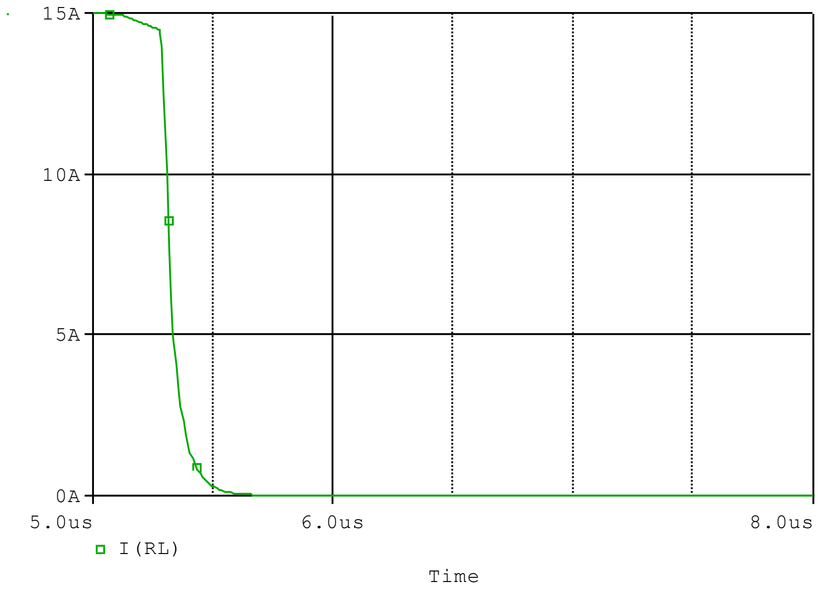
Comparison table

### Test condition: VCE =5 (V)

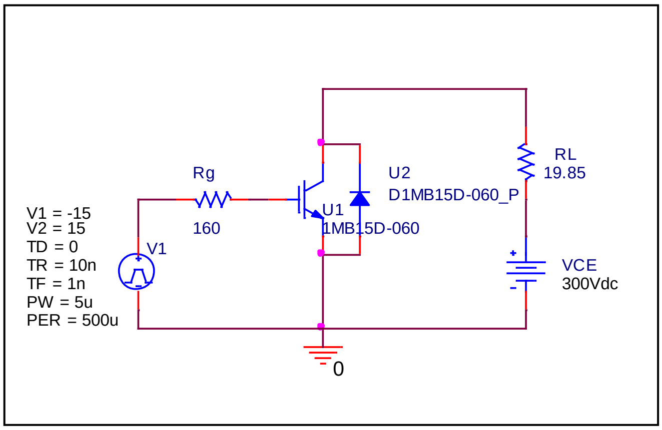
| IC (A) | VGE (V) | | %Error |
|---|---|---|---|
| | Measurement | Simulation | |
| **0.000** | **8.000** | **8.047** | **0.58** |
| **8.200** | **10.000** | **9.941** | **-0.59** |
| **29.500** | **12.000** | **12.157** | **1.31** |

# Fall Time Characteristics

Circuit Simulation result



Evaluation circuit

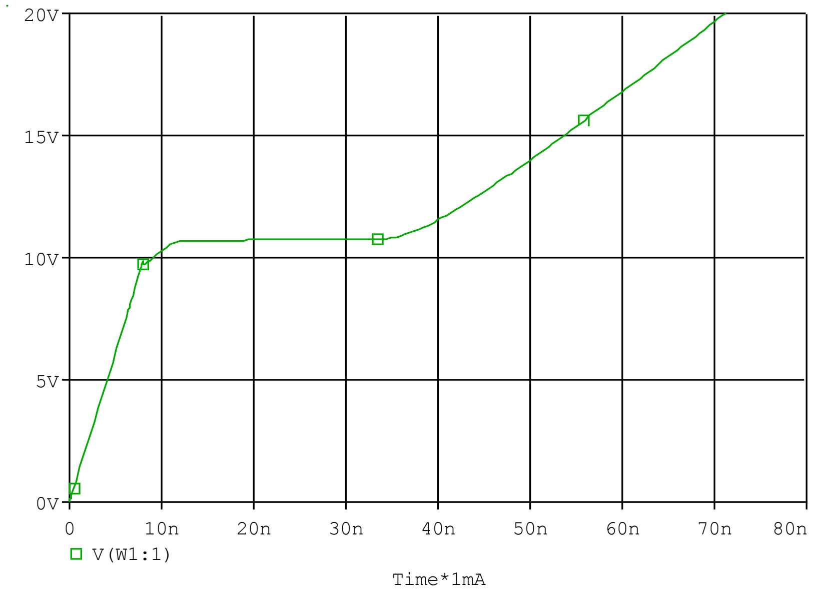


## Test condition: IC=15 (A), VCC=300 (V)

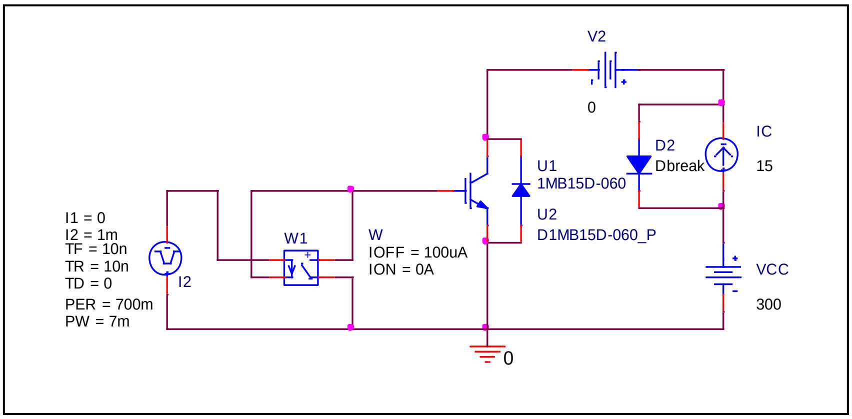
| Parameter | Unit | Measurement | Simulation | %Error |
|---|---|---|---|---|
| tf | us | 0.110 | 0.110 | 0.08 |

## Gate Charge Characteristics

### Circuit Simulation result



### Evaluation circuit

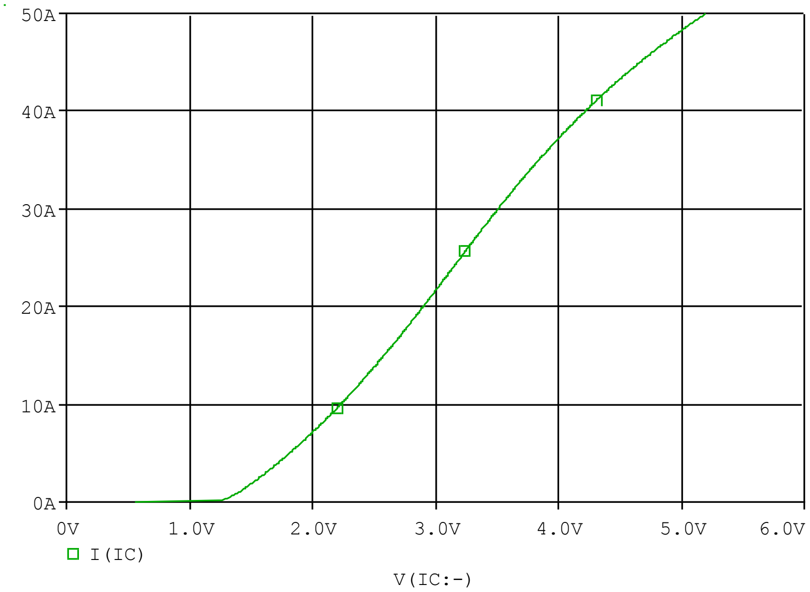


### Test condition: $V_{CC}$=300 (V), $I_C$=15 (A), $V_{GE}$=15 (V)

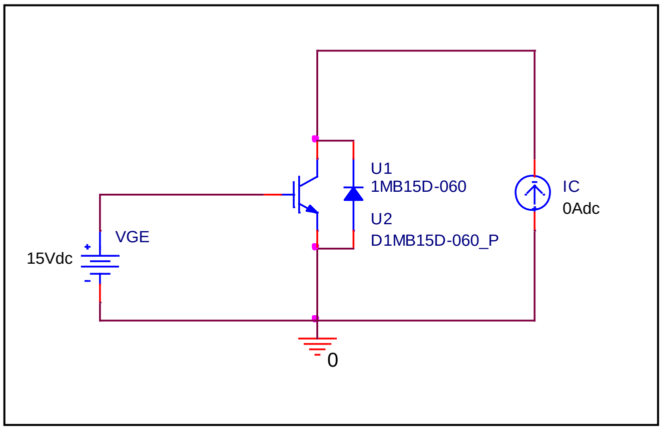
| Parameter | Unit | Measurement | Simulation | %Error |
|---|---|---|---|---|
| Qge | nc | 9.000 | 9.097 | 1.08 |
| Qgc | nc | 26.000 | 26.042 | 0.16 |
| Qg | nc | 53.000 | 53.595 | 1.12 |

# Saturation Characteristics

## Circuit Simulation result

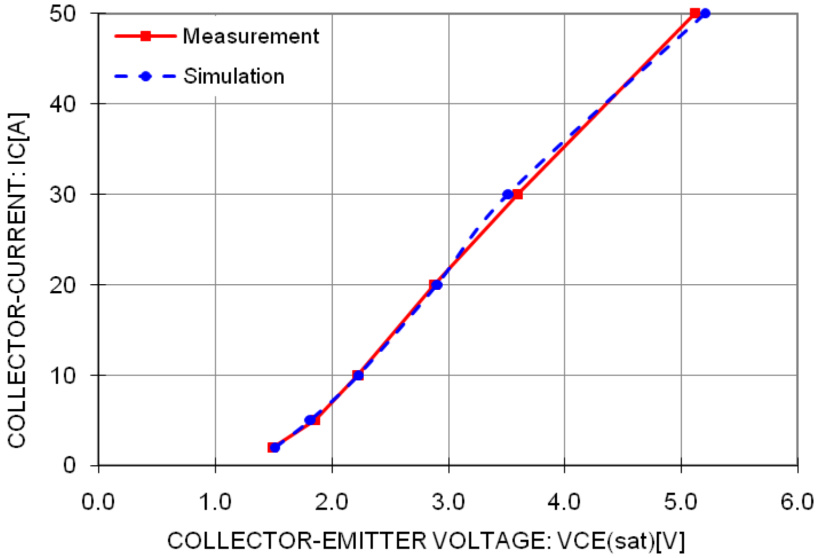


## Evaluation circuit



## Comparison Graph

Simulation result



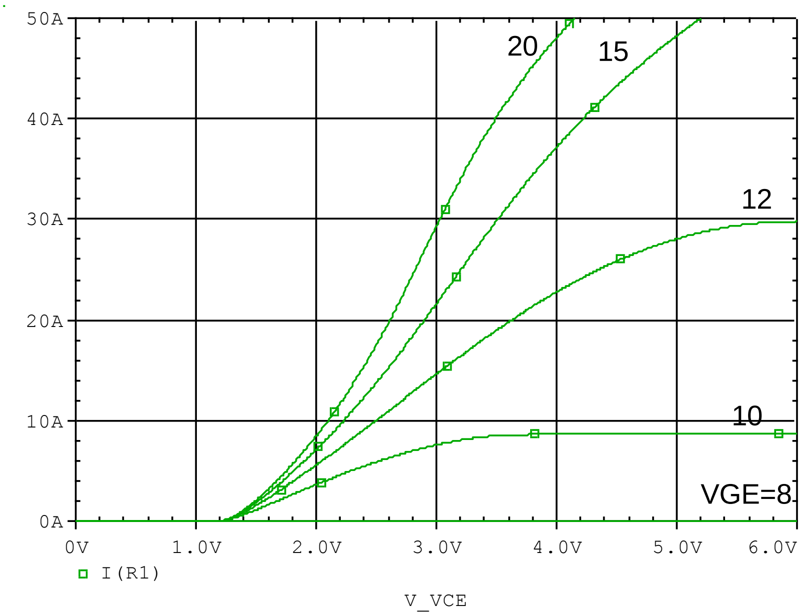
Comparison table

### Test condition: VGE =15 (V)

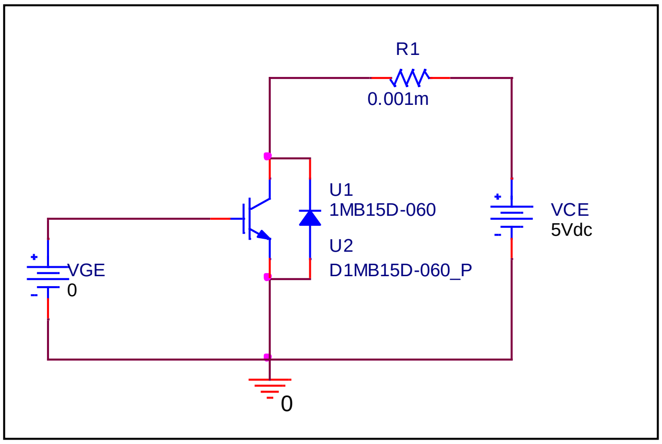
| Ic(A) | VCE (V) | | %Error |
|---|---|---|---|
| | Measurement | Simulation | |
| 2 | 1.500 | 1.517 | 1.15 |
| 5 | 1.860 | 1.815 | -2.44 |
| 10 | 2.230 | 2.230 | 0.00 |
| 20 | 2.887 | 2.902 | 0.52 |
| 30 | 3.590 | 3.511 | -2.21 |
| 50 | 5.120 | 5.201 | 1.59 |

# Output Characteristics

Circuit Simulation result

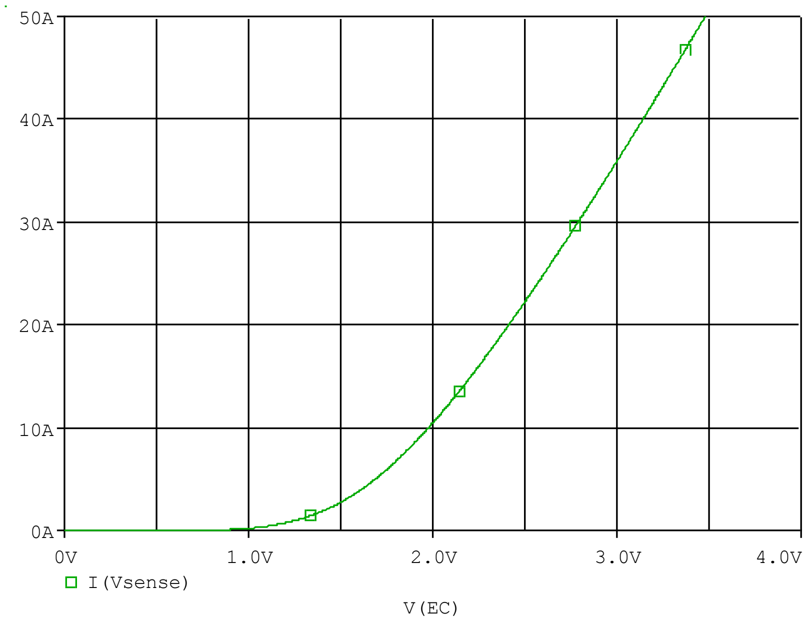


Evaluation circuit

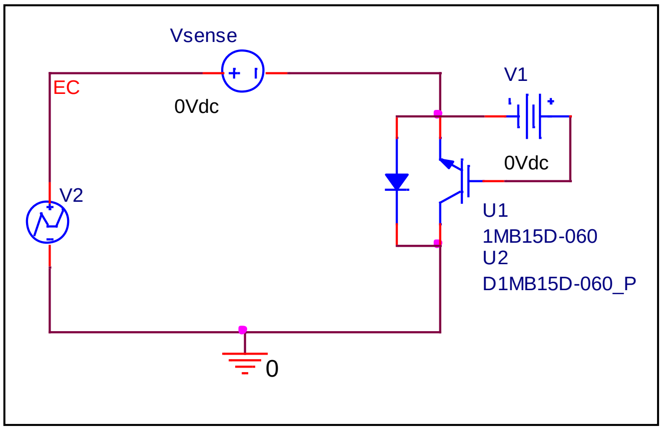


# FWD Forward Current Characteristics

Circuit Simulation result

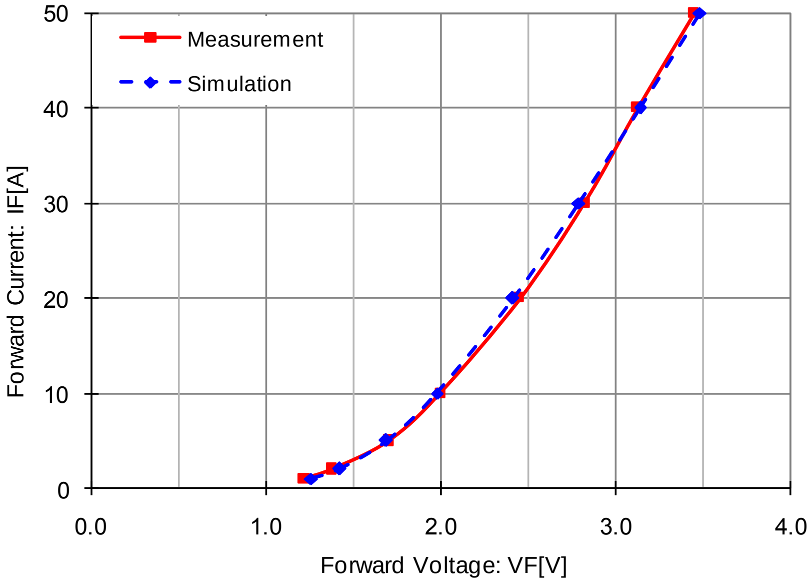


Evaluation circuit



## Comparison Graph

Simulation result

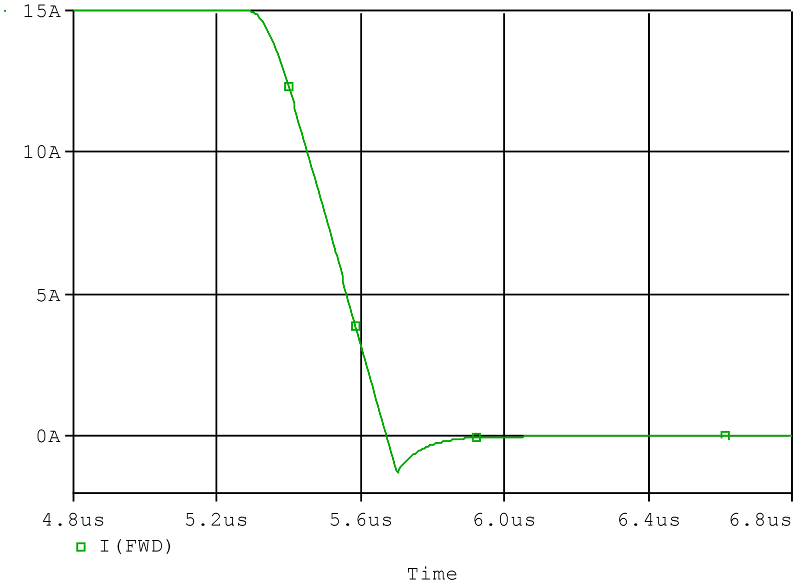


Comparison table

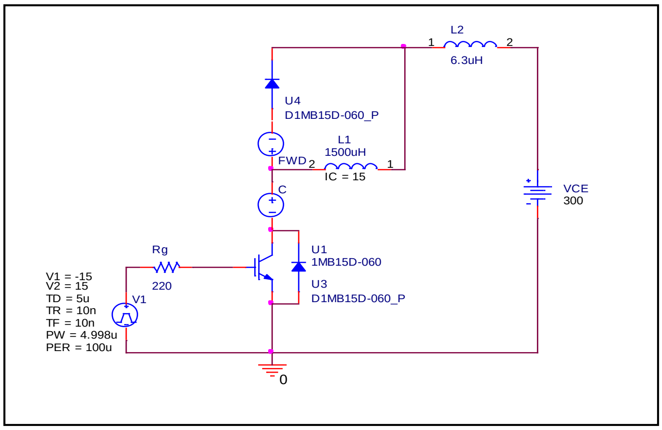
| IF(A) | VF (V) | | %Error |
|---|---|---|---|
| | Measurement | Simulation | |
| 1 | 1.220 | 1.261 | 3.36 |
| 2 | 1.375 | 1.418 | 3.12 |
| 5 | 1.700 | 1.689 | -0.64 |
| 10 | 2.000 | 1.978 | -1.12 |
| 20 | 2.450 | 2.413 | -1.50 |
| 30 | 2.825 | 2.789 | -1.26 |
| 40 | 3.125 | 3.141 | 0.52 |
| 50 | 3.450 | 3.480 | 0.87 |

# Reverse Recovery Characteristics

Circuit Simulation result



Evaluation circuit



### Test condition: VCC=300 (V), IC=15 (A), -di/dt= 45 (A/us)

| Parameter | Unit | Measurement | Simulation | %Error |
|---|---|---|---|---|
| trr | nsec | 180.000 | 180.796 | 0.44 |
| Irr | A | 1.250 | 1.291 | 3.28 |