

Device Modeling Report

COMPONENTS : VOLTAGE COMPARATOR (CMOS)
PART NUMBER : TC75S57F
MANUFACTURER : TOSHIBA



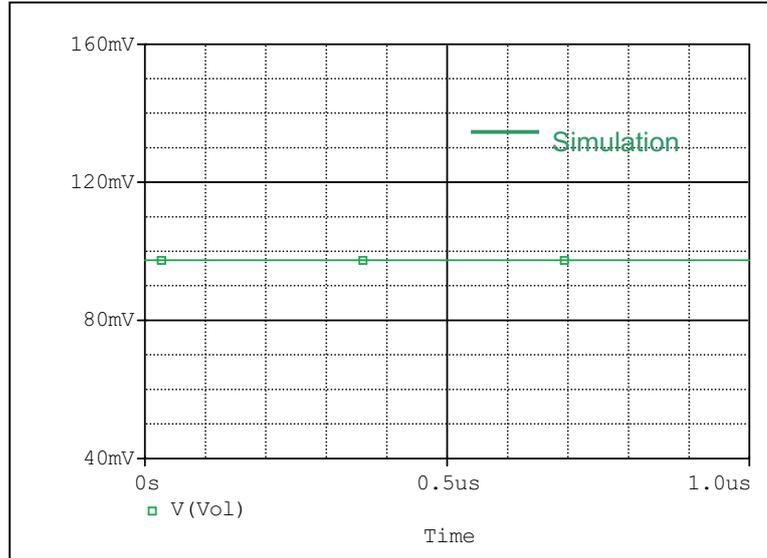
Bee Technologies Inc.

MODEL PARAMETER

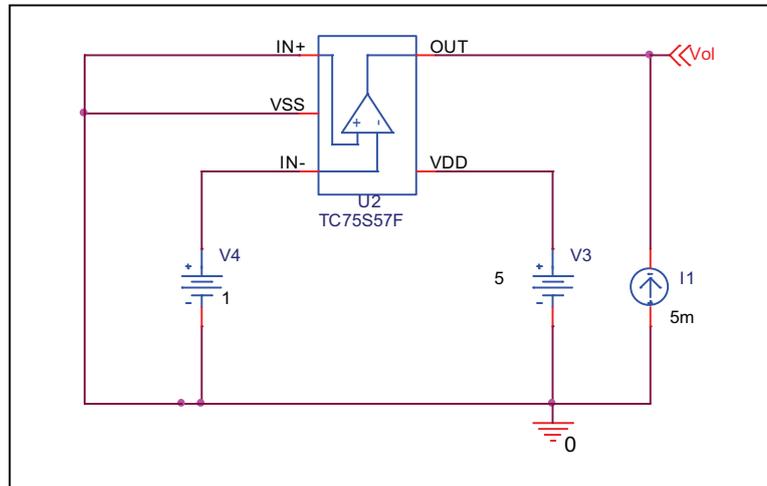
| Pspice model parameter | Model description |
|------------------------|--|
| LEVEL | |
| L | Channel Length |
| W | Channel Width |
| KP | Transconductance |
| RS | Source Ohmic Resistance |
| RD | Ohmic Drain Resistance |
| VTO | Zero-bias Threshold Voltage |
| RDS | Drain-Source Shunt Resistance |
| TOX | Gate Oxide Thickness |
| CGSO | Zero-bias Gate-Source Capacitance |
| CGDO | Zero-bias Gate-Drain Capacitance |
| CBD | Zero-bias Bulk-Drain Junction Capacitance |
| MJ | Bulk Junction Grading Coefficient |
| PB | Bulk Junction Potential |
| FC | Bulk Junction Forward-bias Capacitance Coefficient |
| RG | Gate Ohmic Resistance |
| IS | Bulk Junction Saturation Current |
| N | Bulk Junction Emission Coefficient |
| RB | Bulk Series Resistance |
| PHI | Surface Inversion Potential |
| GAMMA | Body-effect Parameter |
| DELTA | Width effect on Threshold Voltage |
| ETA | Static Feedback on Threshold Voltage |
| THETA | Modility Modulation |
| KAPPA | Saturation Field Factor |
| VMAX | Maximum Drift Velocity of Carriers |
| XJ | Metallurgical Junction Depth |
| UO | Surface Mobility |

Output Low Voltage

Simulation result



Evaluation Circuit

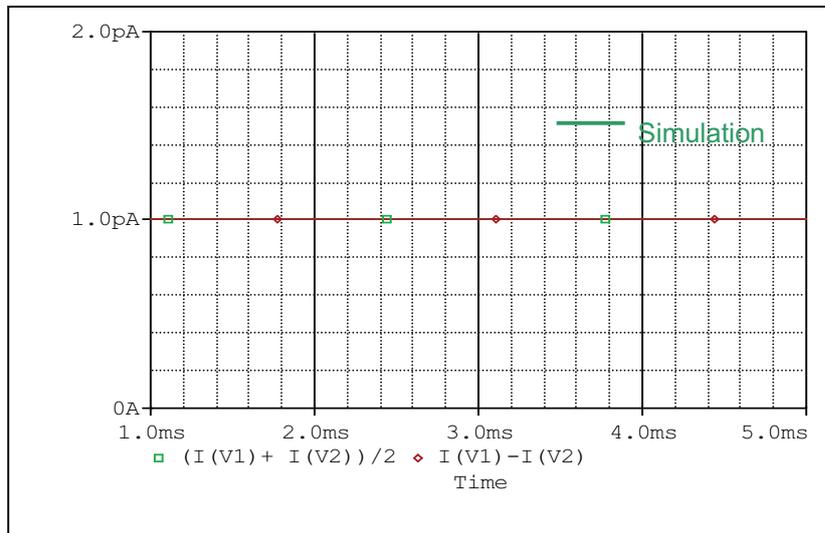


Comparison Table

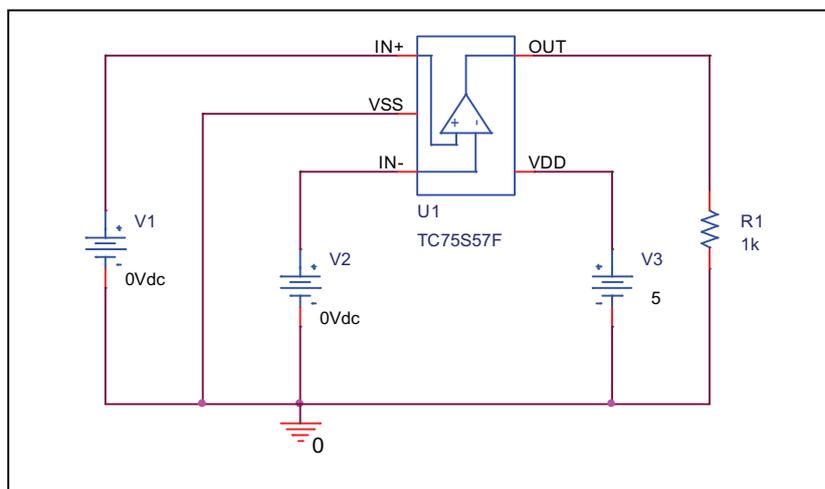
| $I_{\text{sink}}=5\text{mA}$ | Measurement | Simulation | %Error |
|------------------------------|-------------|------------|--------|
| $V_{\text{ol}} \text{ (V)}$ | 1.000 | 0.974 | -2.600 |

Input current : I_{os} , I_b

Simulation result



Evaluation Circuit

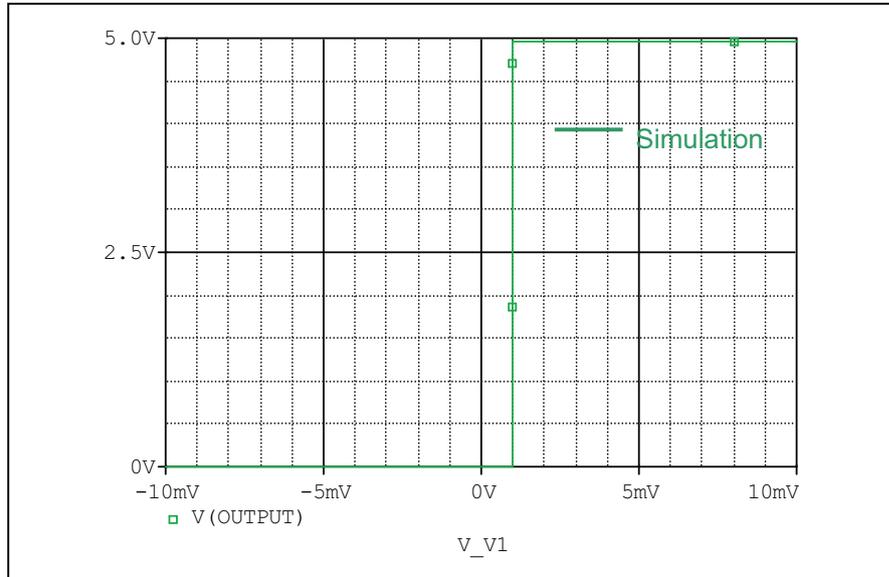


Comparison Table

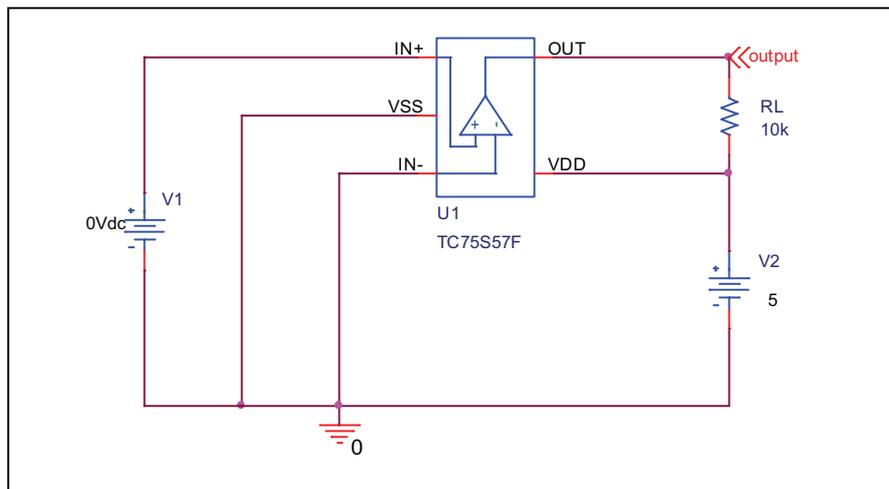
| | Measurement | Simulation | %Error |
|---------------|-------------|------------|--------|
| I_b (pA) | 1.000 | 1.000 | 0.000 |
| I_{os} (pA) | 1.000 | 1.000 | 0.000 |

Input Offset Voltage Characteristics

Simulation result



Evaluation Circuit

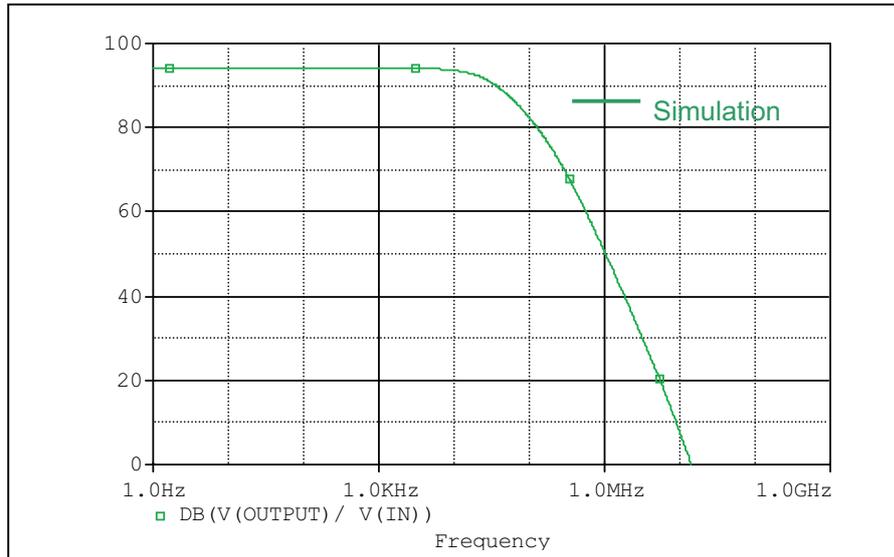


Comparison Table

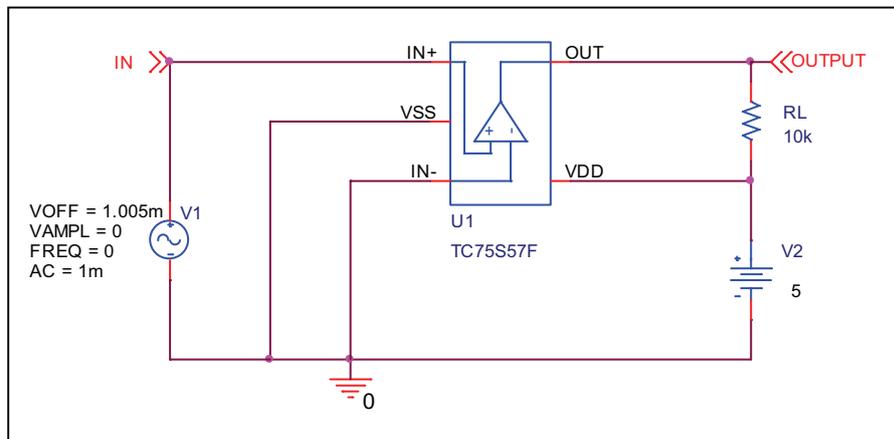
| | Measurement | Simulation | %Error |
|--------------|-------------|------------|--------|
| $V_{io}(mV)$ | 1.000 | 1.005 | 0.500 |

Voltage Gain Characteristics

Simulation result



Evaluation Circuit

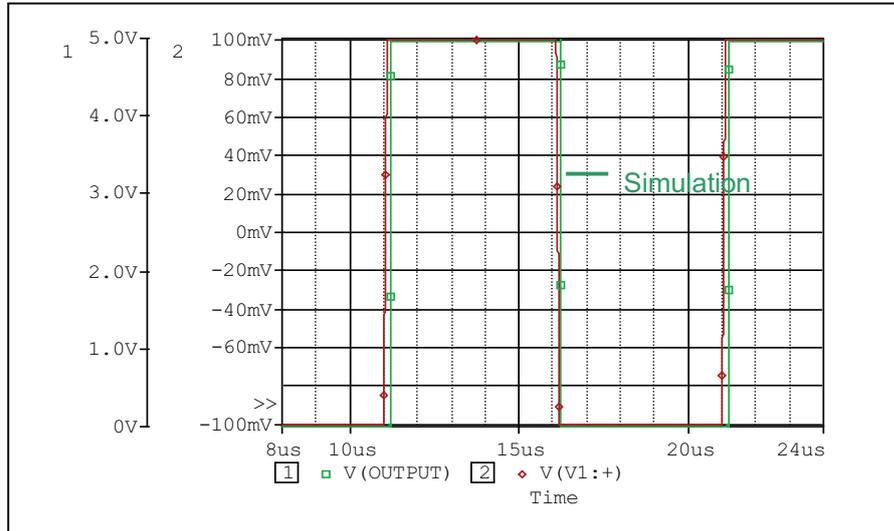


Comparison Table

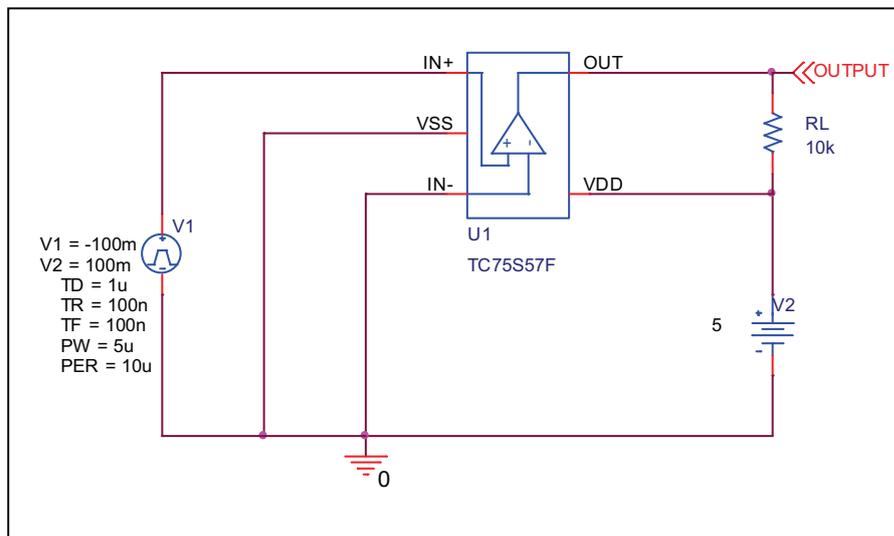
| | Measurement | Simulation | %Error |
|---------|-------------|------------|--------|
| Av (dB) | 94.000 | 94.069 | 0.073 |

Propagation Delay Time and Response Time

Simulation result



Evaluation Circuit



Comparison Table

| Over drive=100mV | Measurement | Simulation | %Error |
|------------------|-------------|------------|--------|
| t_{PLH} (ns) | 140.000 | 146.579 | 4.699 |
| t_{PHL} (ns) | 90.000 | 89.796 | -0.227 |