

Device Modeling Report

COMPONENTS : VOLTAGE COMPARATOR (CMOS)
PART NUMBER : TC75S56FU
MANUFACTURER : TOSHIBA



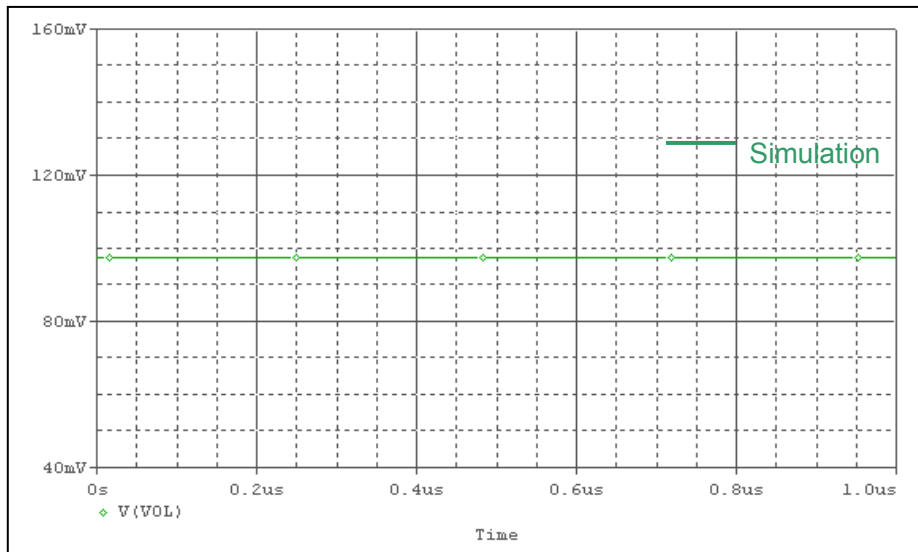
Bee Technologies Inc.

MODEL PARAMETER

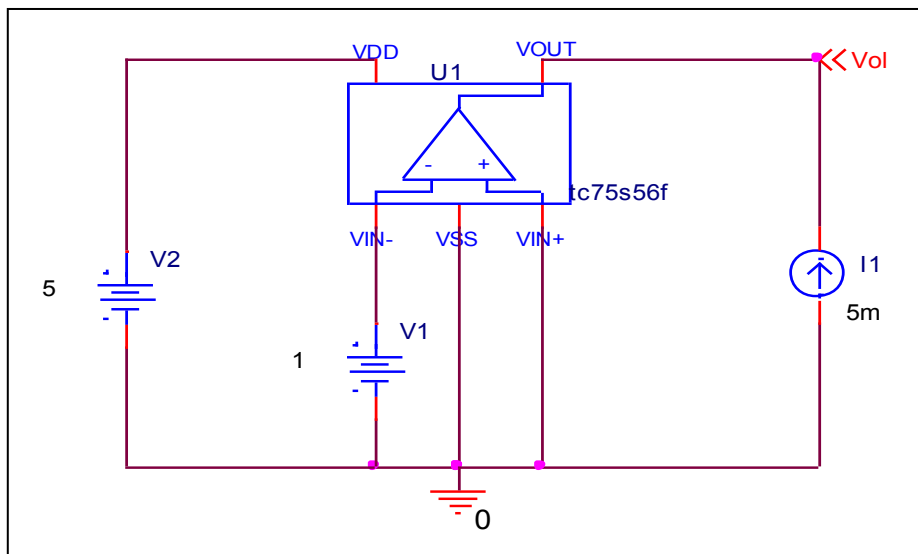
Pspice model parameter	Model description
LEVEL	
L	Channel Length
W	Channel Width
KP	Transconductance
RS	Source Ohmic Resistance
RD	Ohmic Drain Resistance
VTO	Zero-bias Threshold Voltage
RDS	Drain-Source Shunt Resistance
TOX	Gate Oxide Thickness
CGSO	Zero-bias Gate-Source Capacitance
CGDO	Zero-bias Gate-Drain 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

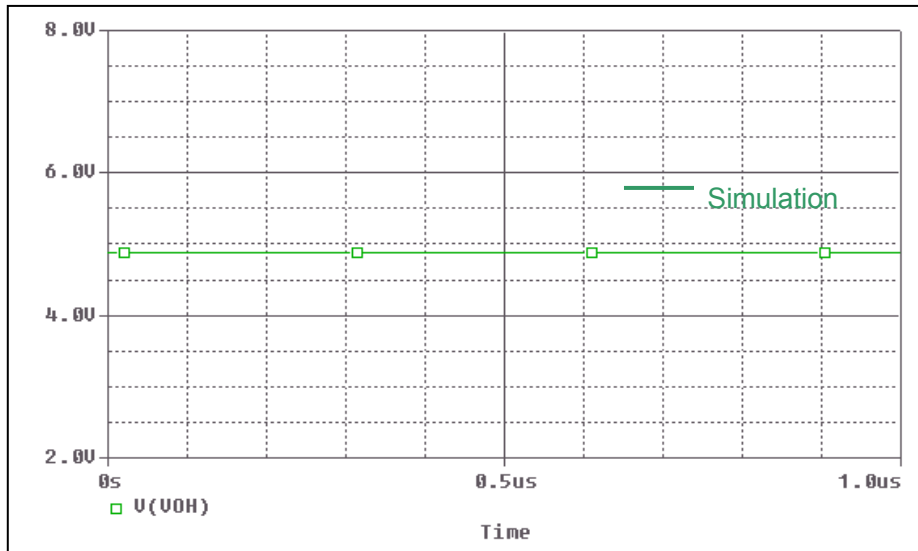


Comparison Table

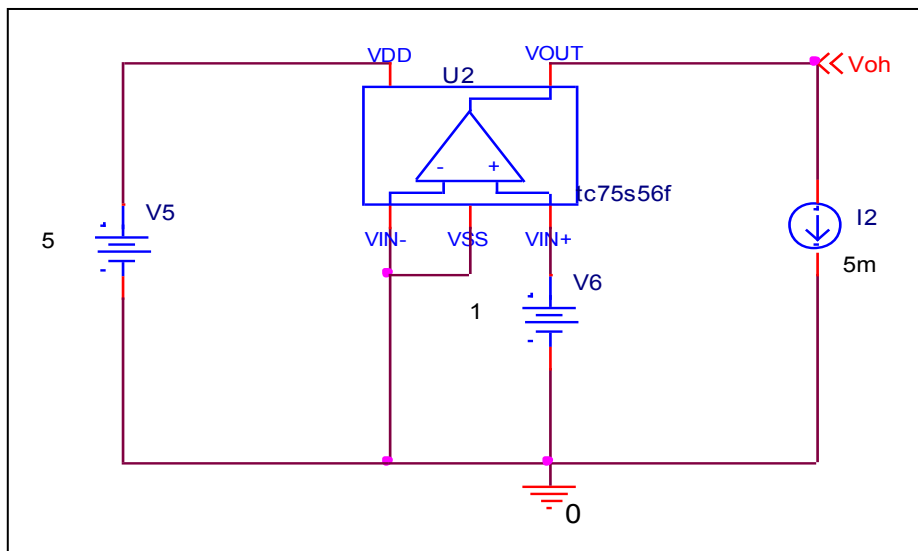
$I_{sink}=5mA$	Measurement	Simulation	%Error
V_{ol} (V)	0.1	0.097569	-2.431

Output high Voltage

Simulation result



Evaluation Circuit

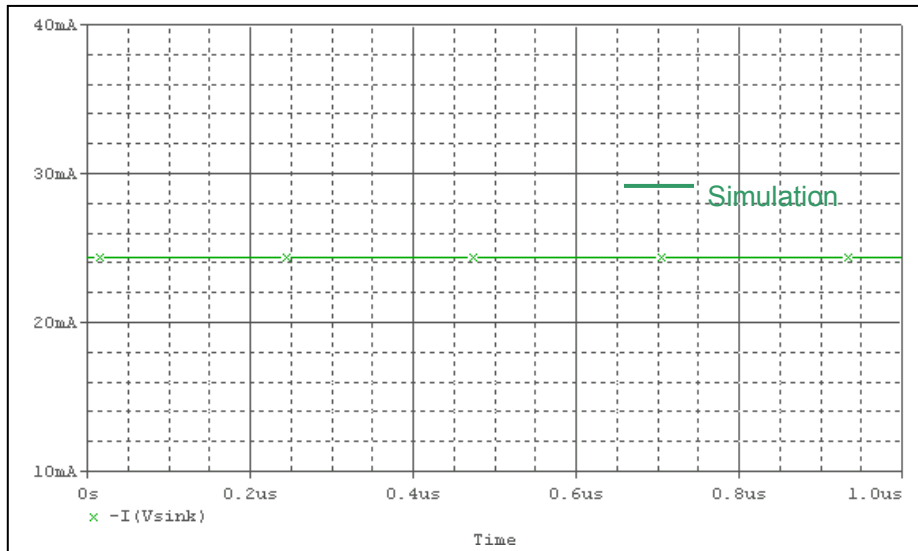


Comparison Table

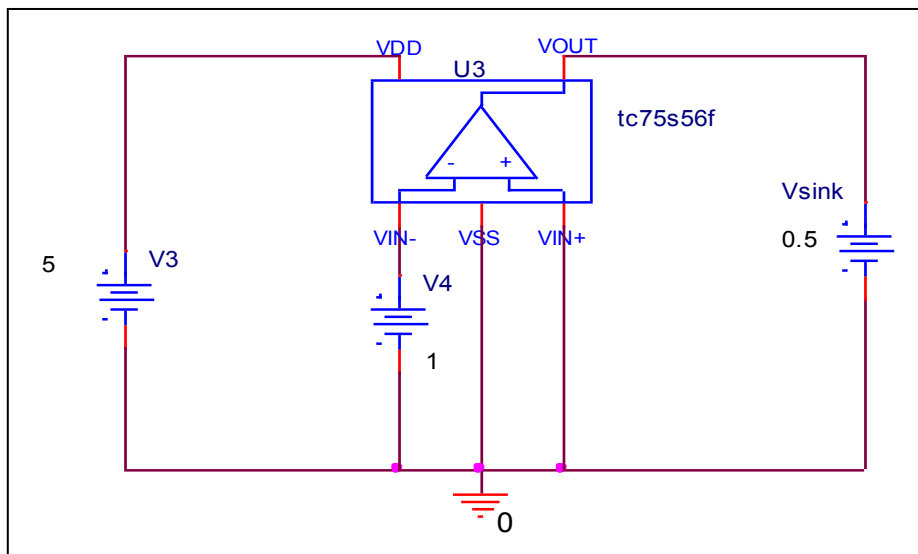
$I_{source} = 5mA$	Measurement	Simulation	%Error
$V_{OH} (V)$	4.9	4.8899	-0.206

Output Sink Current

Simulation result



Evaluation Circuit

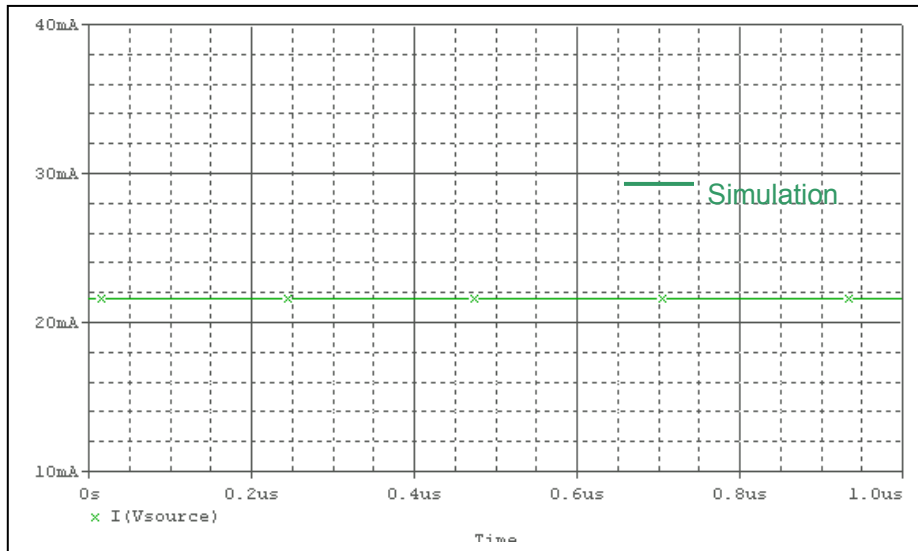


Comparison Table

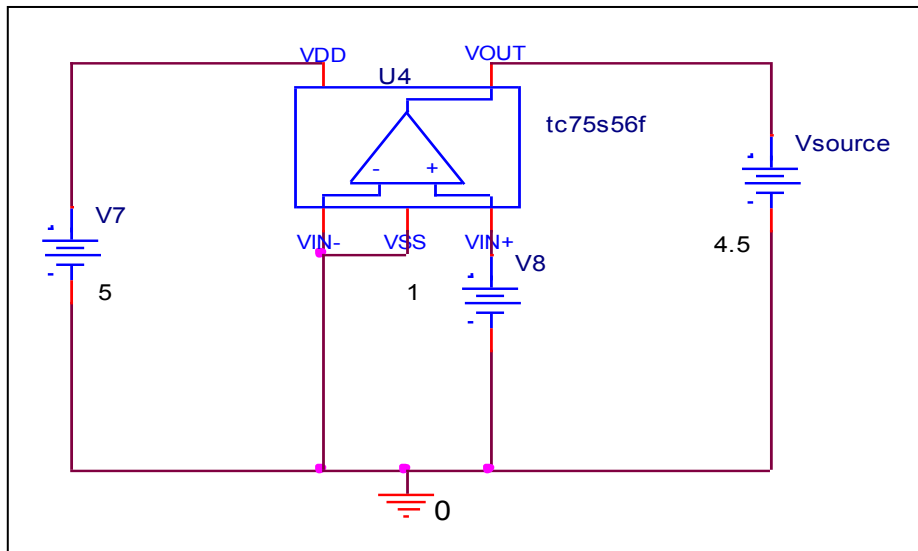
$V_{OL} = 0.5\text{ V}$	Measurement	Simulation	%Error
$I_{\text{sink}}\text{ (mA)}$	25	24.371	-2.516

Output Source Current

Simulation result



Evaluation Circuit

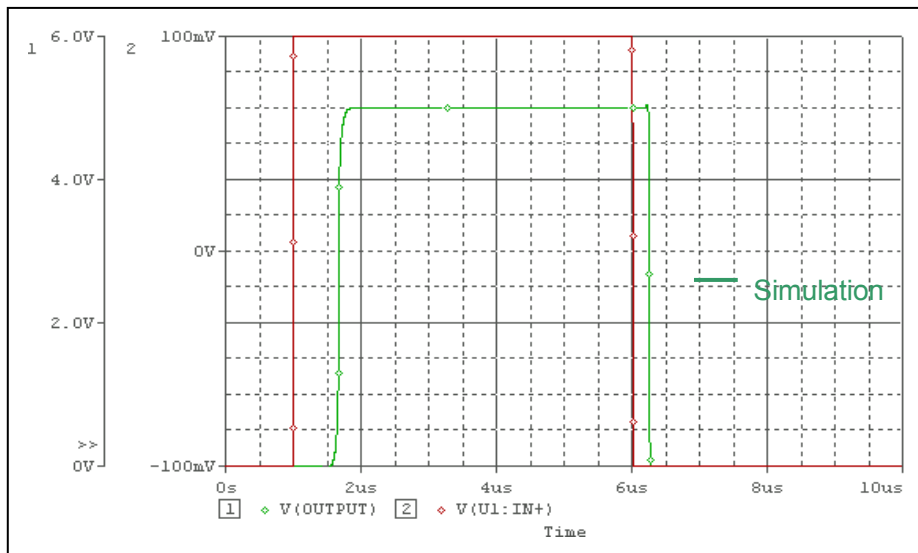


Comparison Table

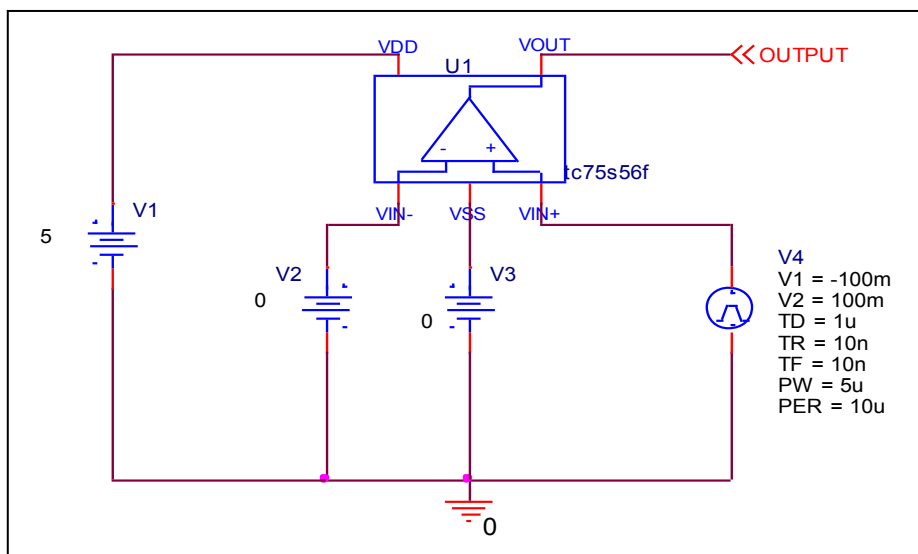
$V_{OH} = 4.5 \text{ V}$	Measurement	Simulation	%Error
$I_{source} \text{ (mA)}$	21	21.625	2.976

Propagation Delay Time and Response Time

Simulation result



Evaluation Circuit

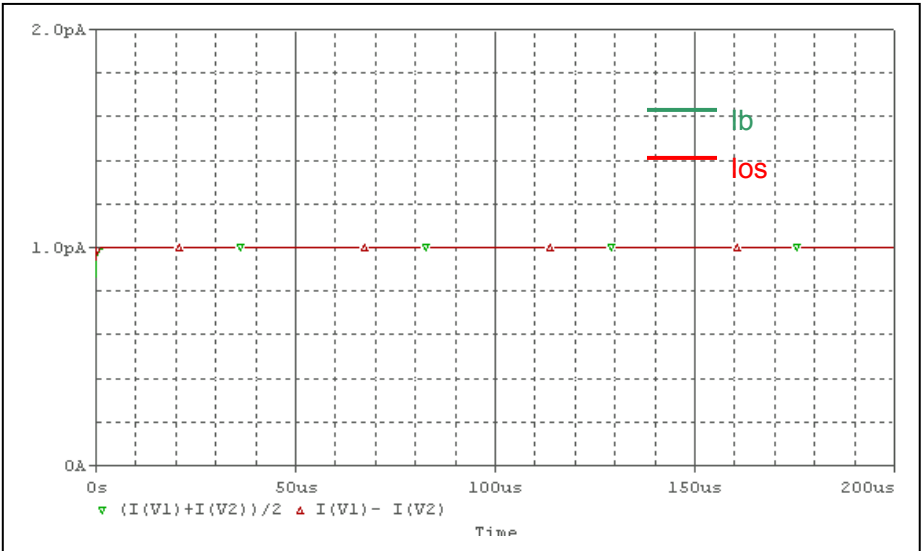


Comparison Table

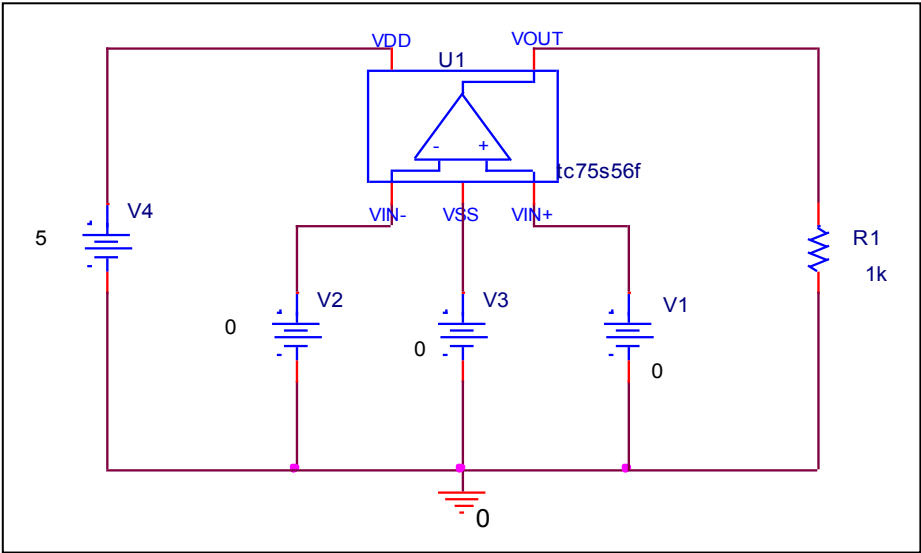
Over drive=100mV	Measurement	Simulation	%Error
t_{PLH} (ns)	680	663.805	-2.382
t_{PHL} (ns)	250	247.4	-1.040
t_r (ns)	60	59.462	-0.897
t_f (ns)	8	7.9819	-0.226

Input Bias Current and Input Offset Current Characteristics

Simulation result



Evaluation Circuit

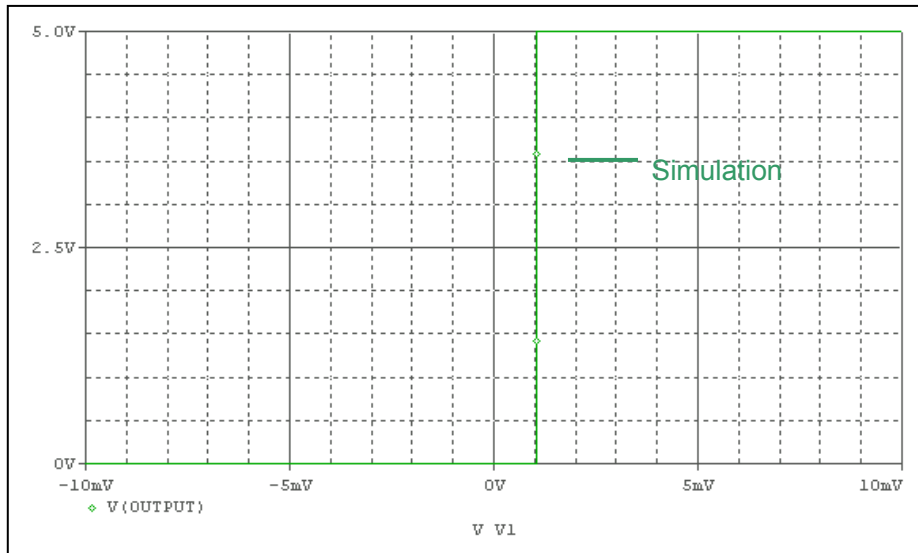


Comparison Table

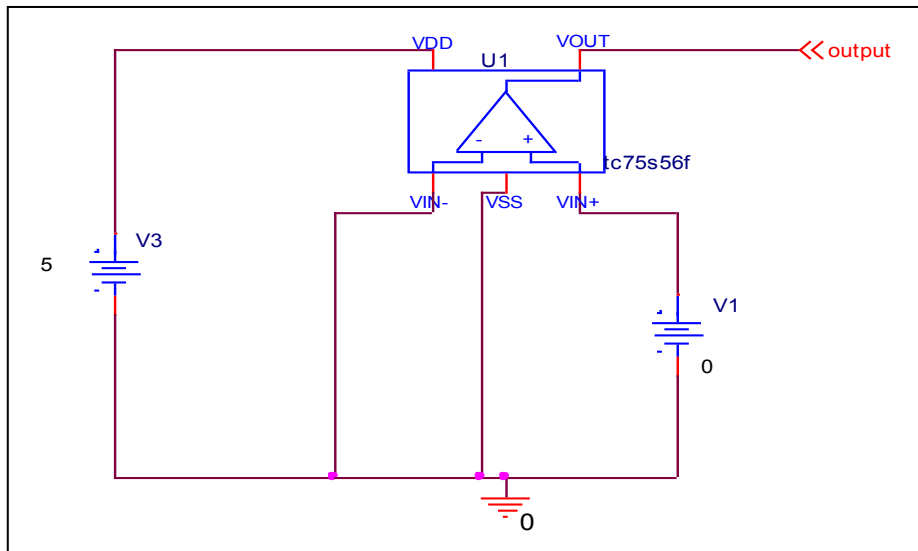
	Measurement	Simulation	%Error
I_b (pA)	1	0.9979	-0.210
I_{os}(pA)	1	0.9980	-0.200

Input Offset Voltage Characteristics

Simulation result



Evaluation Circuit

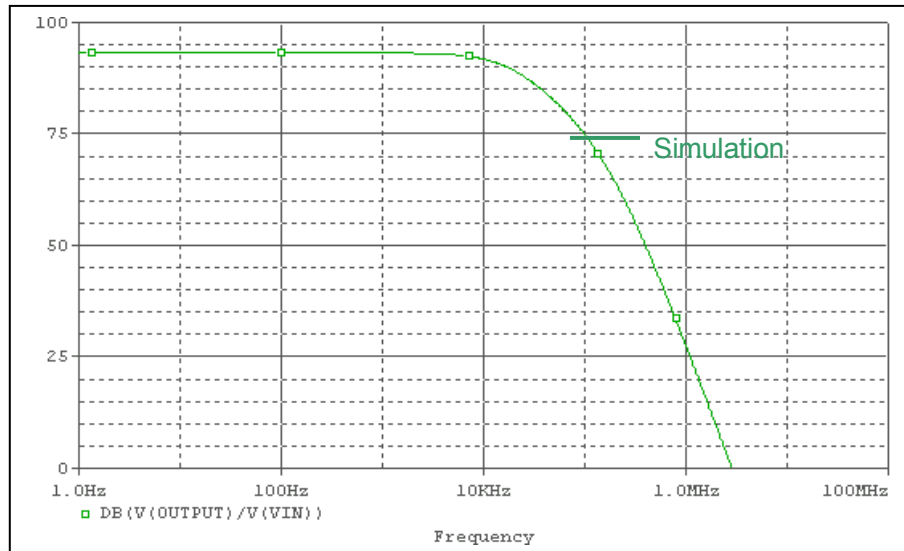


Comparison Table

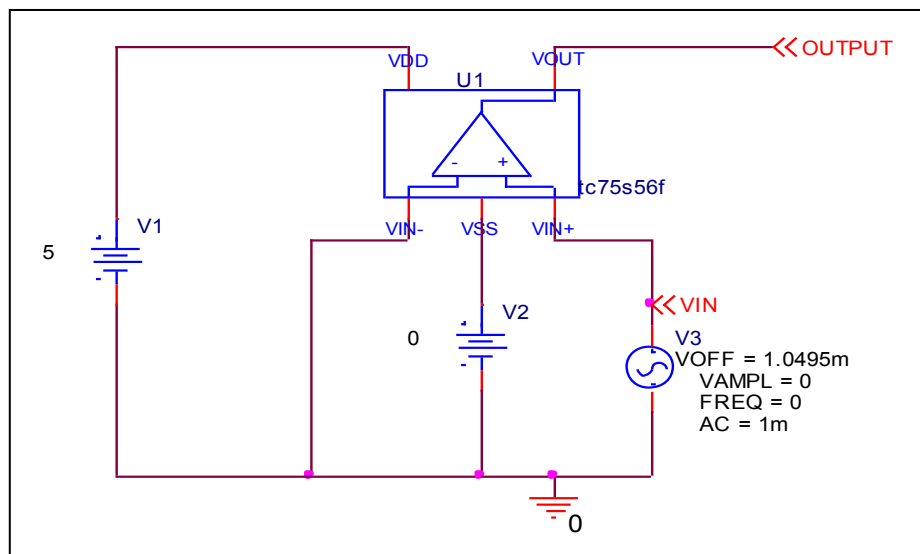
	Measurement	Simulation	%Error
$V_{io}(mV)$	1	1.0495	4.95

Voltage Gain Characteristics

Simulation result



Evaluation Circuit



Comparison Table

	Measurement	Simulation	%Error
Av (dB)	94	93.148	-0.906