

Device Modeling Report

COMPONENTS : VOLTAGE COMPARATOR (CMOS)
PART NUMBER : NJU7104AM
MANUFACTURER : NEW JAPAN RADIO



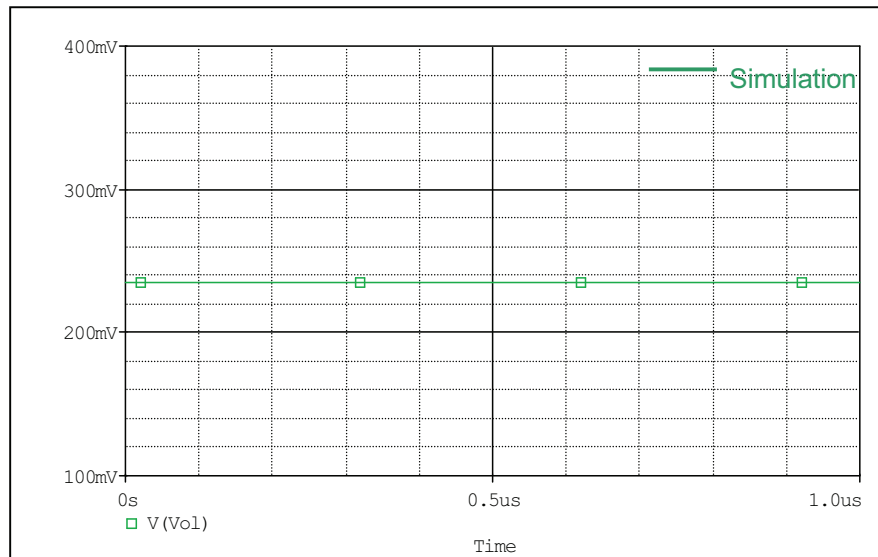
Bee Technologies Inc.

MODEL PARAMETER

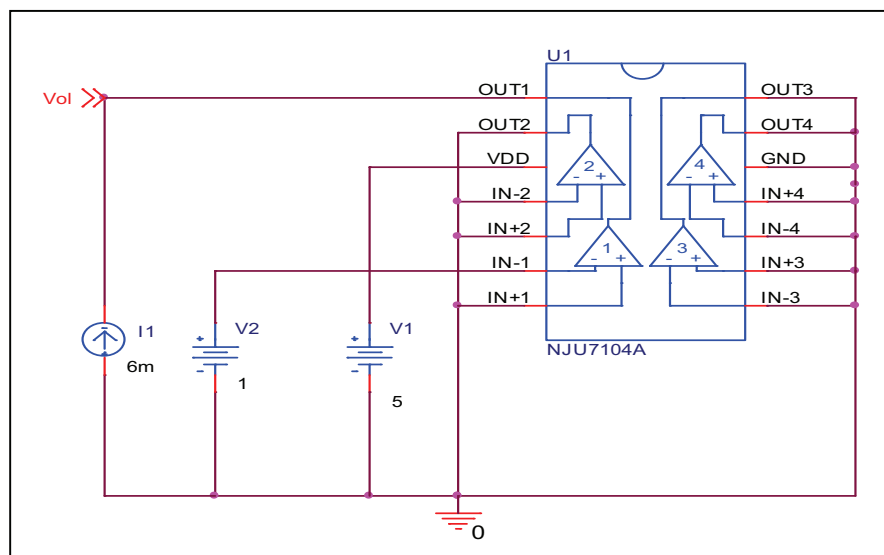
Pspice model parameter	Model description
LEVEL	
L	Channel Length
W	Channel Width
KP	Transconductance
RS	Source Ohmic Resistance
RD	Ohmic Drain Resistance
VTO	Zero-bias Threshold Voltage
RDS	Drain-Source Shunt Resistance
TOX	Gate Oxide Thickness
CGSO	Zero-bias Gate-Source Capacitance
CGDO	Zero-bias Gate-Drain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

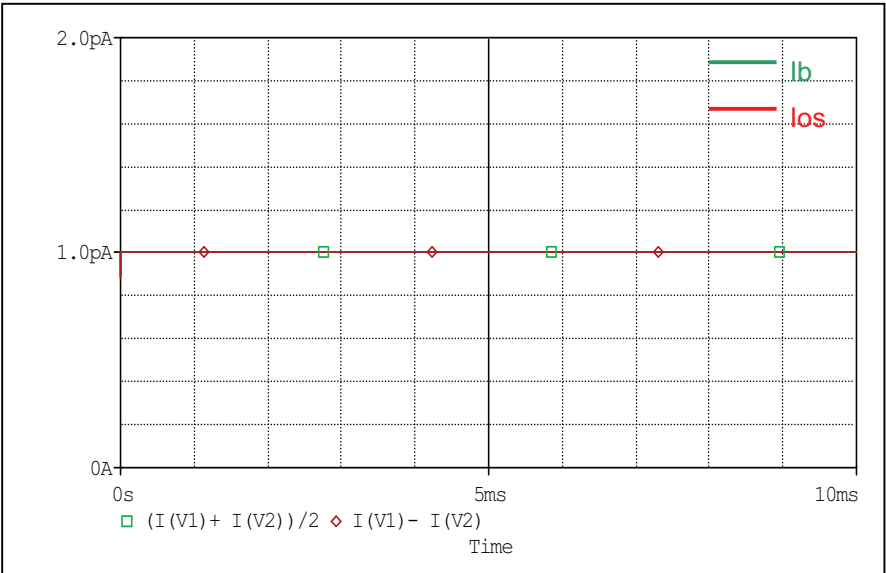


Comparison Table

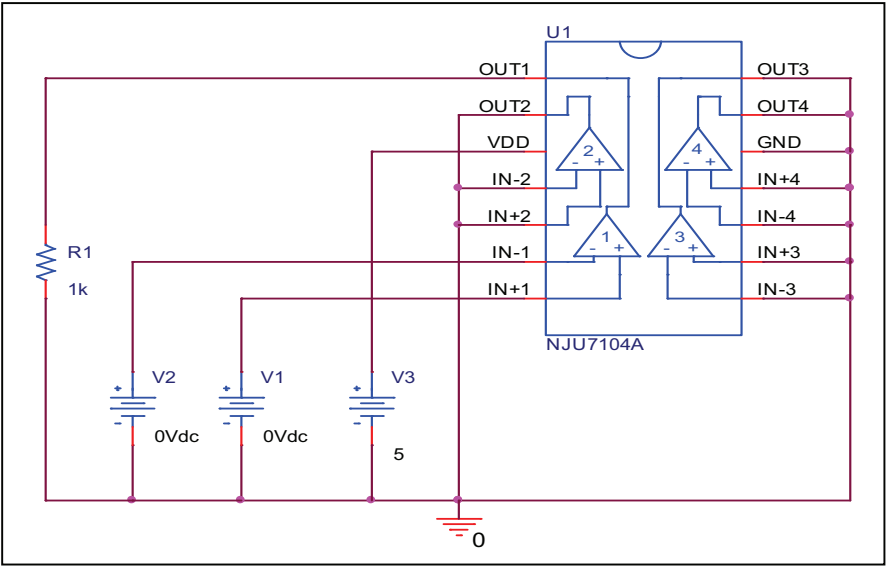
$I_{OL}=+6mA$	Measurement	Simulation	%Error
$V_{OL} (V)$	0.234	0.235	0.427

Input Bias Current and Input Offset Current Characteristics

Simulation result



Evaluation Circuit

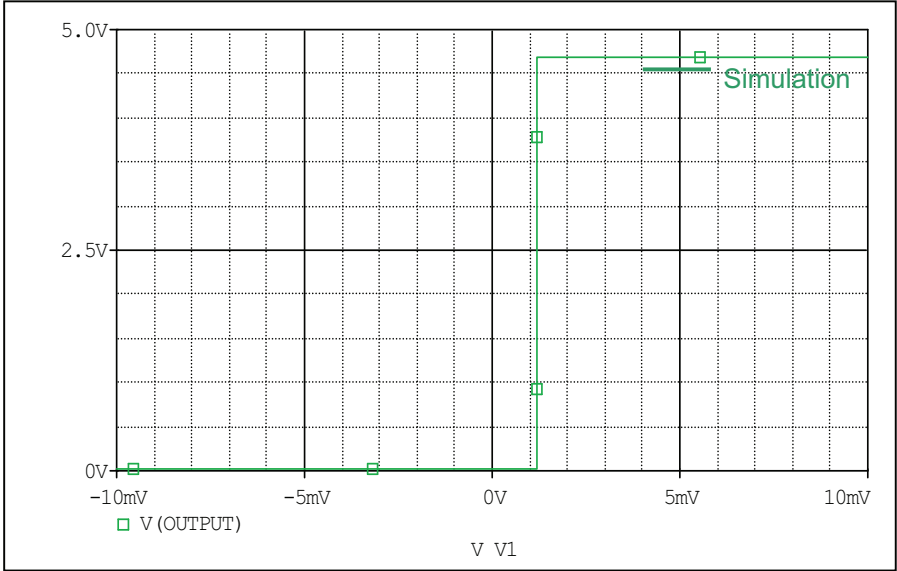


Comparison Table

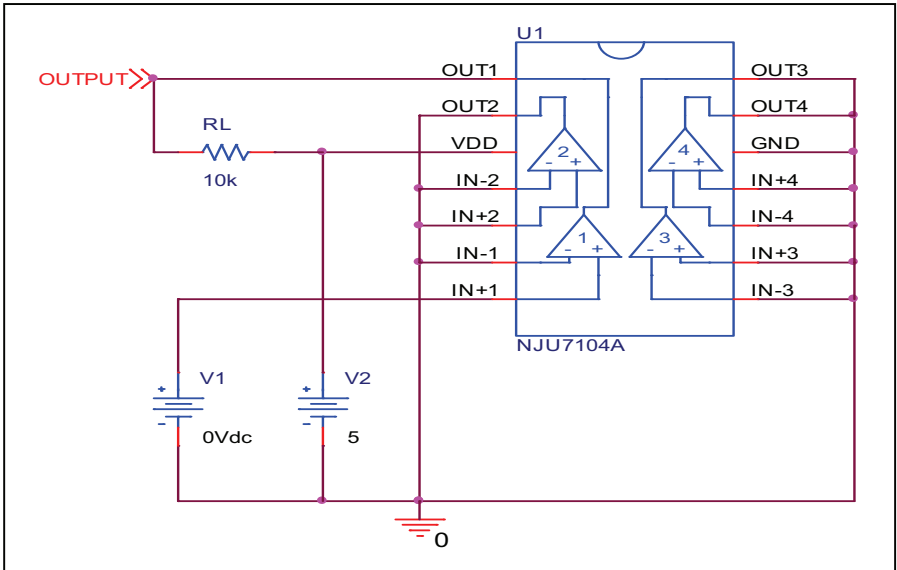
	Measurement	Simulation	%Error
I_b (pA)	1.000	1.000	0.000
I_{os} (pA)	1.000	1.000	0.000

Input Offset Voltage Characteristics

Simulation result



Evaluation Circuit

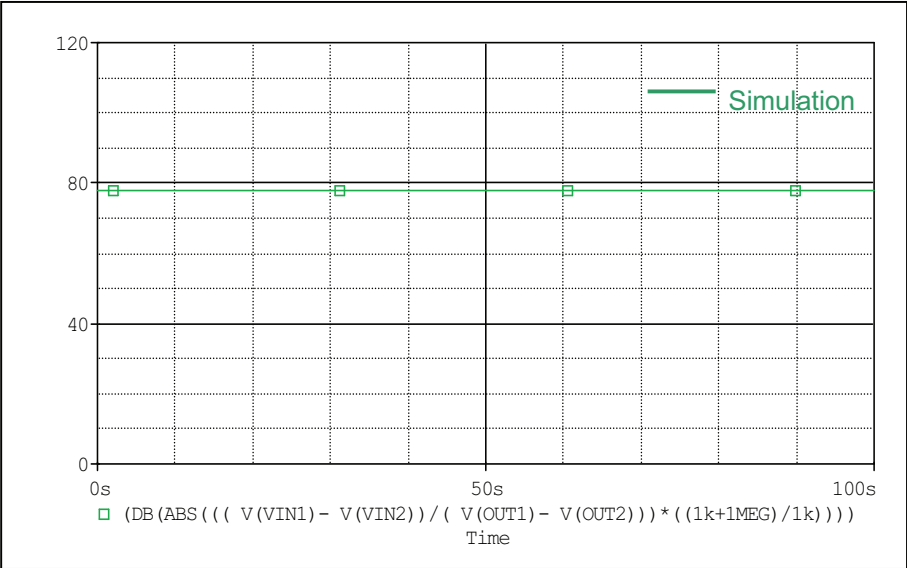


Comparison Table

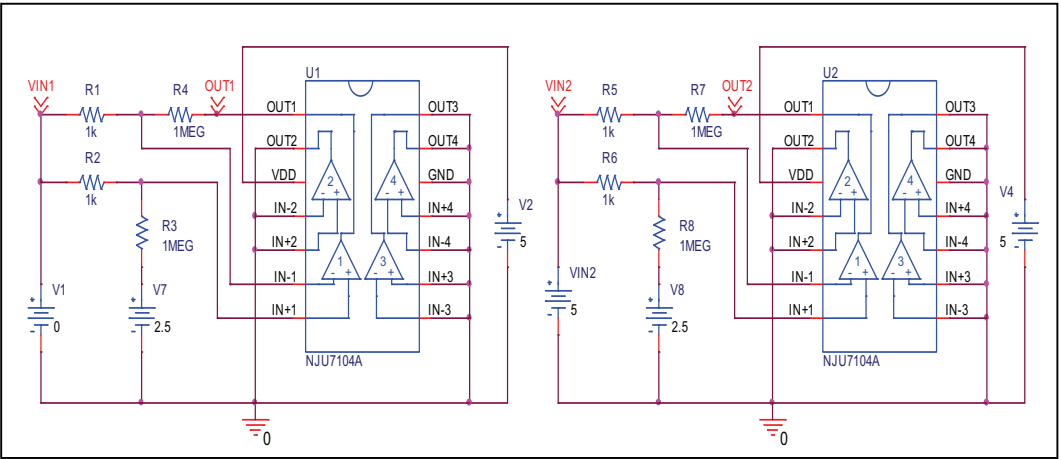
	Measurement	Simulation	%Error
V_{IO} (mV)	1.200	1.205	0.417

Common-Mode Rejection Ratio

Simulation result



Evaluation Circuit



CMRR calculate from

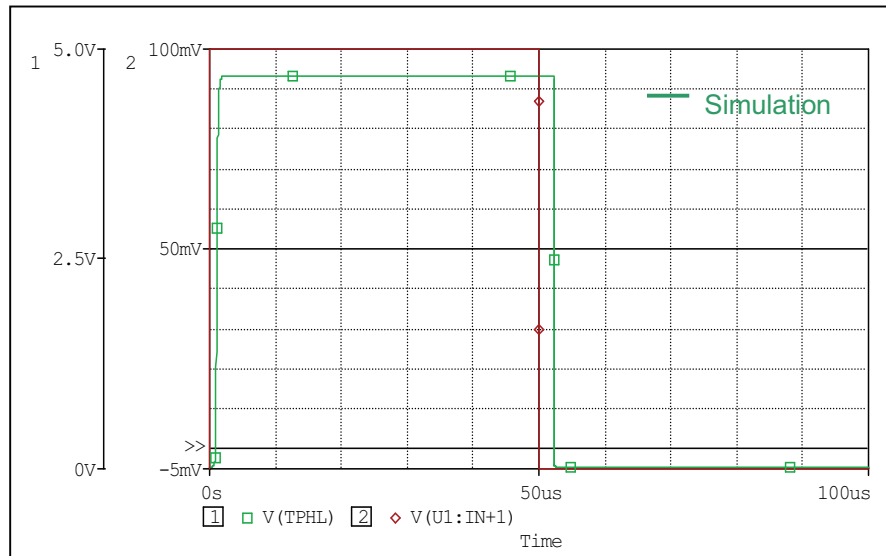
$$CMRR = 20\log \left(\frac{V(VIN1) - V(VIN2)}{V(OUT1) - V(OUT2)} \right) * \left(\frac{R_F + R_S}{R_S} \right)$$

Comparison Table

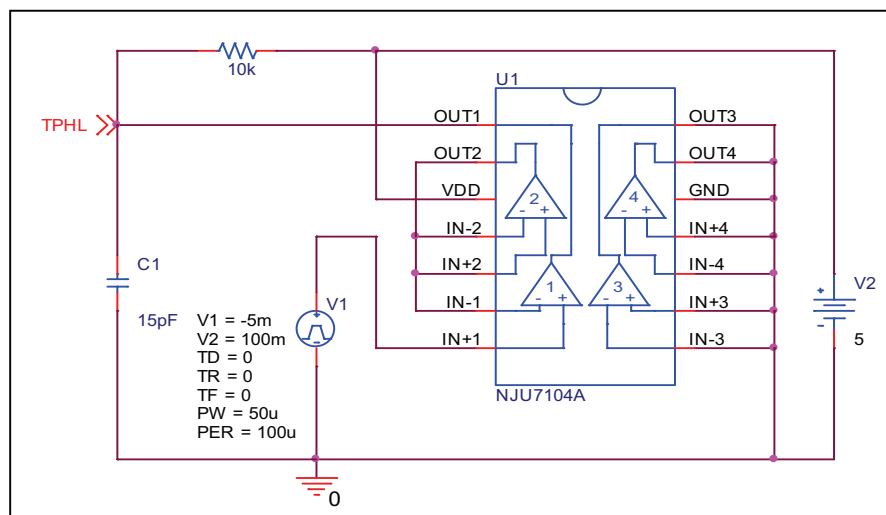
	Measurement	Simulation	%Error
CMRR (dB)	78.000	77.965	-0.045

Propagation Delay Time and Response Time

Simulation result



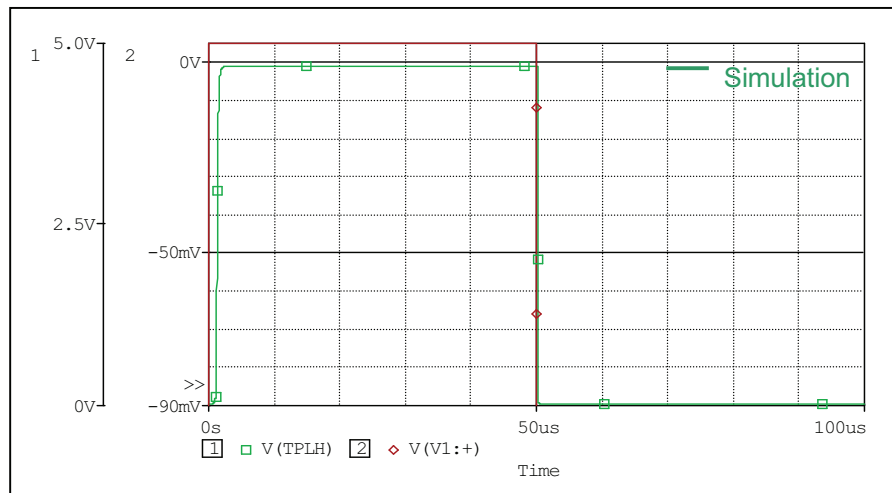
Evaluation Circuit



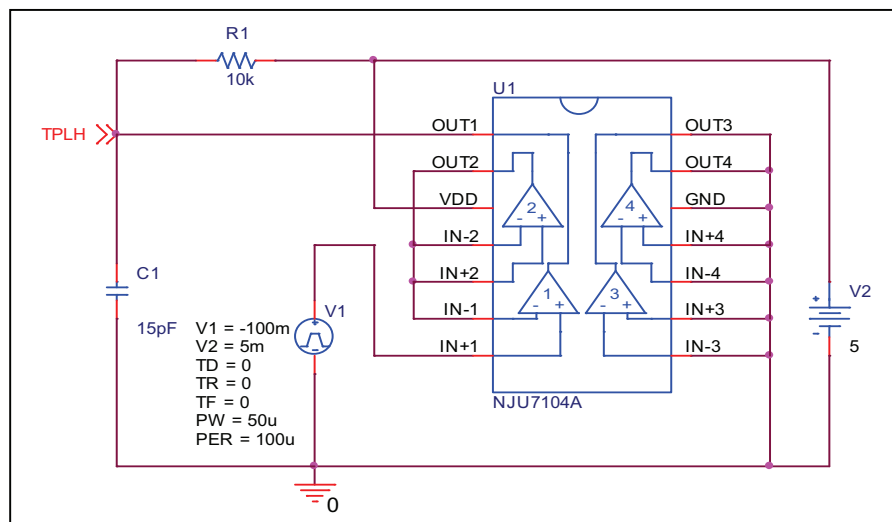
Comparison Table

Over drive=5mV	Measurement	Simulation	%Error
t_{PHL} (us)	2.300	2.329	1.261

Simulation result



Evaluation Circuit



Comparison Table

Over drive=5mV	Measurement	Simulation	%Error
t_{PLH} (us)	1.300	1.302	0.154