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74LV1T00 Series

2-input single supply translating NAND gate

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Features

- Operate from 1.6V to 5.5V
- Low Power Current: Icc=10μA (Max.)
- ±8mA Output Drive (VCC=5.0V)
- Power Down Protection
- ESD Protection Exceeds JESD 22
  -2000-V Human-Body Model (A114-A)
  -200-V Machine Model (A115-A)
  -1000-V Charged-Device Model (C101)

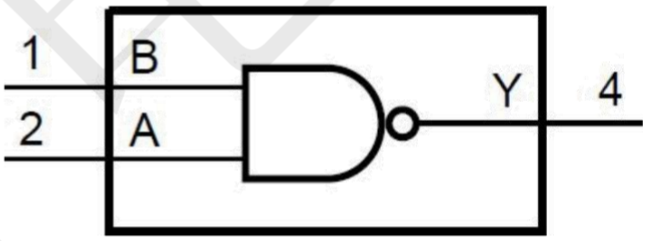
Applications

- AV Receiver
- Audio Dock:Portable
- Blu-ray Player and Home Theater
- Embedded PC
- Personal Digital Assistant(PDA)
- Power:Telecom/Server AC/DC Supply:Single Controller:Analog and Digital
- Solid State Drive(SSD):Client and Enterprise
- Wireless Headset,Keyboard,and Mouse

General Description

The is a single, level translating 2-input NAND gate. The low threshold inputs support1.8 V input logic at VCC = 3.3 V and can be used in 1.8 V to 3.3 V level up translation. In addition,the 5 V tolerant input pins enable level down translation (3.3 V to 2.5 V output at VCC = 2.5 V). The output level is referenced to the supply voltage and supports 1.8 V, 2.5 V, 3.3 V and 5.0 V CMOS levels.

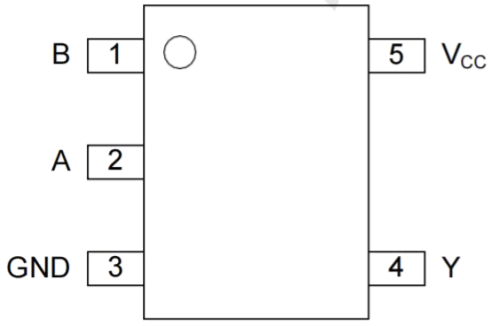
Logic Diagram



Ordering Information

ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION
74LV1T00GV-TP	SOT23-5	Tape and Reel,3000
74LV1T00GW-TP	SOT353	Tape and Reel,3000

Pin Configuratio



SOT23-5 / SOT353

Function Table

Input		Output
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

Note: H: HIGH voltage level; L: LOW voltage level.

Absolute Maximum Ratings

PARAMETER	SYMBOL	TEST CONDITIONS	RATINGS	UNIT
Supply Voltage	V_{CC}		-0.5 ~ 7	V
Input Voltage (Note 2)	V_{IN}		-0.5 ~ 7	V
Output Voltage (Note 2)	V_{OUT}	Output in the high-impedance or power-off state	-0.5 ~ 4.6	V
		Output in the high or low state	-0.5 ~ V_{CC}+0.5	V
Continuous Output Current	I_{OUT}		±25	mA
Continuous current through		V_{CC} or GND	±50	mA
Input Clamp Current	I_{IK}	V_{IN}<0	-20	mA
Output Clamp Current	I_{OK}	V_{OUT}<0 or V_{OUT} >V_{CC}	±20	mA
Storage Temperature Range	T_{STG}		-65 ~ +150	°C

Notes:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2.The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

Recommended Operating Conditions

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	Operating	1.6	--	5.5	V
Input Voltage	V_{IN}		0	--	5.5	V
Output Voltage	V_{OUT}		0	--	V_{CC}	V
Operating Temperature	T_A		-40	--	+125	°C
Input transition rise and fall rate	Δt/ΔV	V_{CC} = 1.8 V to 5.0 V	--	--	20	ns/V

STATIC CHARACTERISTICS (T_A=25°C, unless otherwise specified)

Symbol	Parameter	Conditions	Min	TYP	Max	Unit
V_{IH}	HIGH-level input voltage	V_{CC} = 1.65 V to 1.8 V	0.94	--	--	V
		V_{CC} = 2.0 V	0.99	--	--	V
		V_{CC} = 2.25 V to 2.5 V	1.135	--	--	V
		V_{CC} = 2.75 V	1.21	--	--	V
		V_{CC} = 3.0 V to 3.3 V	1.35	--	--	V
		V_{CC} = 3.6 V	1.47	--	--	V
		V_{CC} = 4.5 V to 5.0 V	2.02	--	--	V
		V_{CC} = 5.5 V	2.25	--	--	V
V_{IL}	LOW-level input voltage	V_{CC} = 1.65 V to 2.0 V	--	--	0.58	V
		V_{CC} = 2.25 V to 2.75 V	--	--	0.75	V
		V_{CC} = 3.0 V to 3.6 V	--	--	0.80	V
		V_{CC} = 4.5 V to 5.5 V	--	--	0.80	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL};				
		V_{CC} = 1.65 V to 5.5 V; I_O = -20 μA	V_{CC}- 0.1	--	--	V
		V_{CC} = 1.65 V; I_O = -2 mA	1.28	--	--	V
		V_{CC} = 1.8 V; I_O = -2 mA	1.5	--	--	V
		V_{CC} = 2.3 V; I_O = -2.3 mA	2.0	--	--	V
		V_{CC} = 2.3 V; I_O = -3 mA	2.0	--	--	V
		V_{CC} = 2.5 V; I_O = -3 mA	2.25	--	--	V
		V_{CC} = 3.0 V; I_O = -3 mA	2.78	--	--	V
		V_{CC} = 3.0 V; I_O = -5.5 mA	2.6	--	--	V
		V_{CC} = 3.3 V; I_O = -5.5 mA	2.9	--	--	V
		V_{CC} = 4.5 V; I_O = -4 mA	4.2	--	--	V
		V_{CC} = 4.5 V; I_O = -8 mA	4.1	--	--	V
		V_{CC} = 5.0 V; I_O = -8 mA	4.6	--	--	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}				
		V_{CC} = 1.65 V to 5.5 V; I_O = 20 μA	--	--	0.1	V
		V_{CC} = 1.65 V; I_O = 2 mA	--	--	0.2	V
		V_{CC} = 2.3 V; I_O = 2.3 mA	--	--	0.1	V
		V_{CC} = 2.3 V; I_O = 3 mA	--	--	0.15	V
		V_{CC} = 3.0 V; I_O = 3 mA	--	--	0.1	V
		V_{CC} = 3.0 V; I_O = 5.5 mA	--	--	0.2	V
		V_{CC} = 4.5 V; I_O = 4 mA	--	--	0.15	V
		V_{CC} = 4.5 V; I_O = 8 mA	--	--	0.3	V

STATIC CHARACTERISTICS (Cont.)

Symbol	Parameter	Conditions	Min	TYP	Max	Unit
I_I	input leakage current	V_I = V_{CC} or GND; V_{CC} = 0 V to 5.5 V	--	--	±0.1	μA
I_{CC}	supply current	V_I = V_{CC} or GND; I_O = 0 A; V_{CC} = 1.8 V, 2.5 V, 3.3 V, 5.0 V	--	--	1	μA
ΔI_{CC}	additional supply current	per input pin; V_{CC} = 1.8 V; V_I = 0.3 V or 1.1 V; I_O = 0 A; other pins at V_{CC} or GND	--	--	10	μA
		per input pin; V_{CC} = 5.5 V; V_I = 0.3 V or 3.4 V; I_O = 0 A; other pins at V_{CC} or GND	--	--	1.35	mA

DYNAMIC CHARACTERISTICS (T_A=25°C, unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{pd}	propagation delay	A, B to Y; see				
		V_{CC} = 1.8 V; C_L = 15 pF	--	6.4	10.2	ns
		V_{CC} = 1.8 V; C_L = 30 pF	--	7.5	12.0	ns
		V_{CC} = 2.5 V; C_L = 15 pF	--	4.5	6.9	ns
		V_{CC} = 2.5 V; C_L = 30 pF	--	5.3	8.0	ns
		V_{CC} = 3.3 V; C_L = 15 pF	--	3.7	5.6	ns
		V_{CC} = 3.3 V; C_L = 30 pF	--	4.3	6.4	ns
		V_{CC} = 5.0 V; C_L = 15 pF	--	3.1	4.2	ns
		V_{CC} = 5.0 V; C_L = 30 pF	--	3.6	4.8	ns
C_I	input capacitance	V_I = V_{CC} or GND; V_{CC} = 3.3 V	--	1.5	10	pF
C_O	output capacitance	V_O = V_{CC} or GND; V_{CC} = 3.3 V	--	2.5	--	pF
C_{PD}	power dissipation capacitance	per buffer; V_I = GND to V_{CC}; C_L = 30 pF; f = 10 MHz				
		V_{CC} = 1.8 V	--	4.0	--	pF
		V_{CC} = 2.5 V	--	5.3	--	pF
		V_{CC} = 3.3 V	--	7.1	--	pF
		V_{CC} = 5.0 V	--	11.2	--	pF

tpd is the same as tPLH and tPHL.

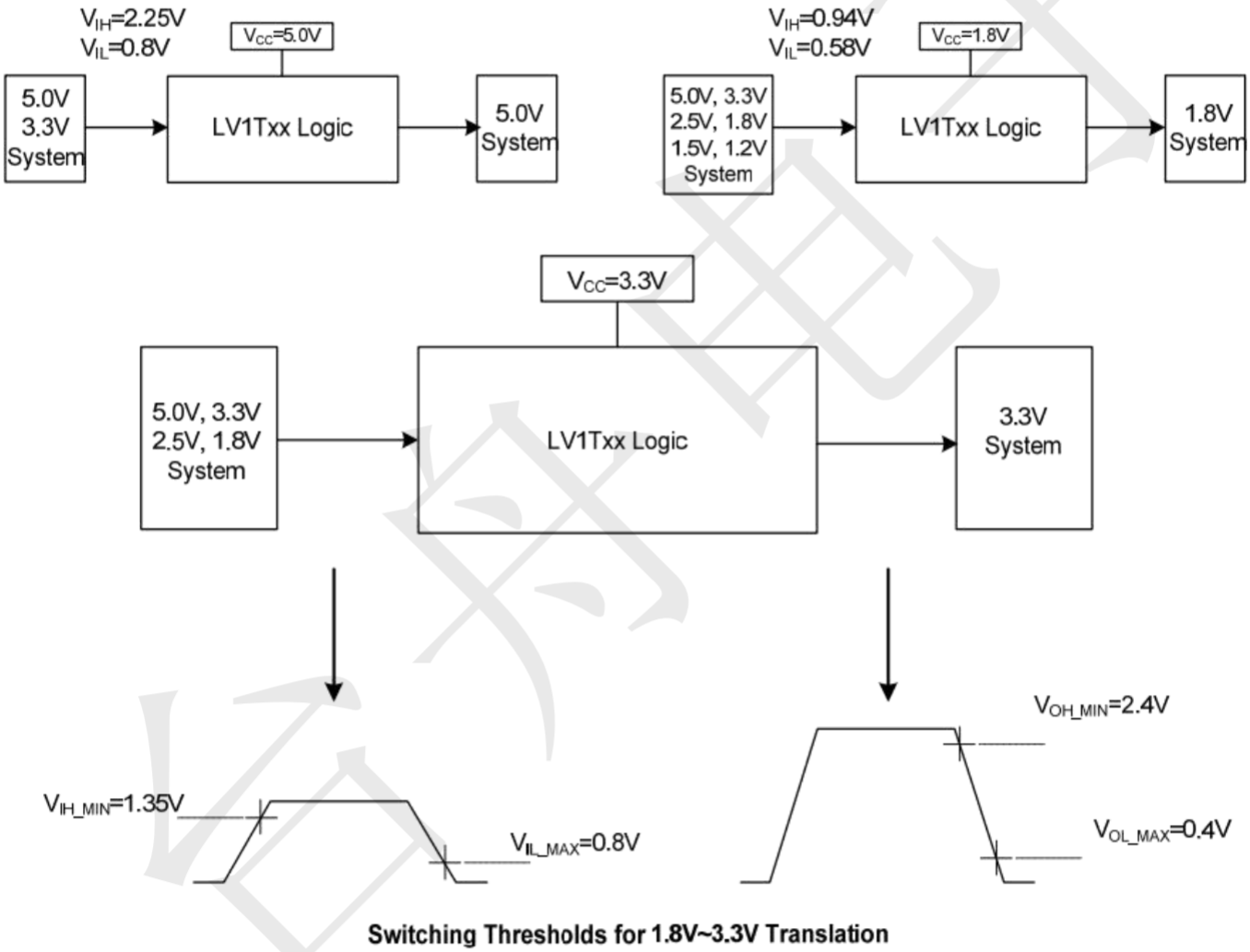
CPD is used to determine the dynamic power dissipation (PD in μW). PD =

fi = input frequency in MHz; fo = output frequency in MHz;

CL = output load capacitance in pF; VCC = supply voltage in V;

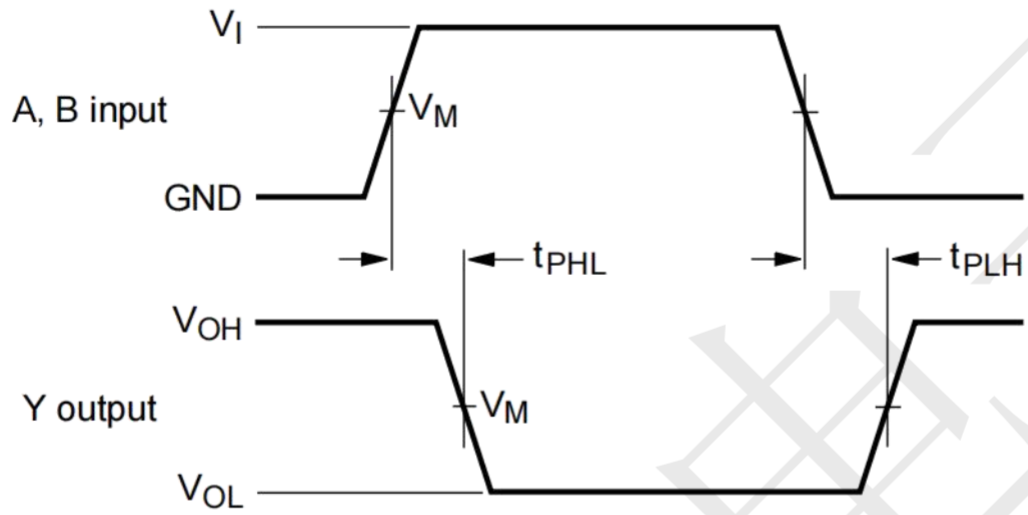
N = number of inputs switching;∑(CL × VCC 2 × fo) = sum of the outputs.

TYPICAL DESIGN EXAMPLES

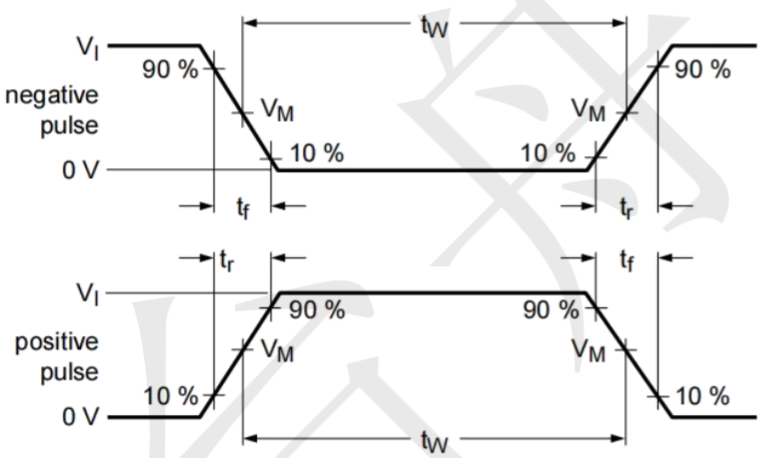


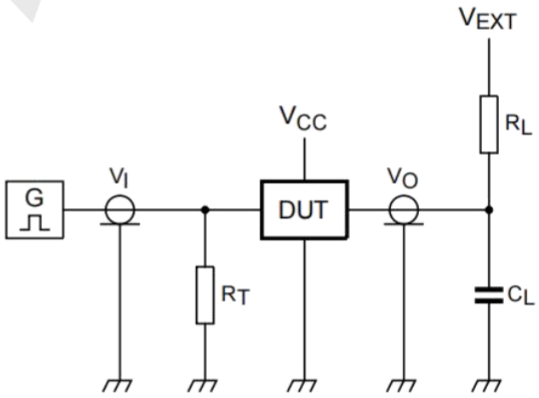
Switching Thresholds for 1.8V~3.3V Translation

TEST CIRCUIT AND WAVEFORMS



V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.



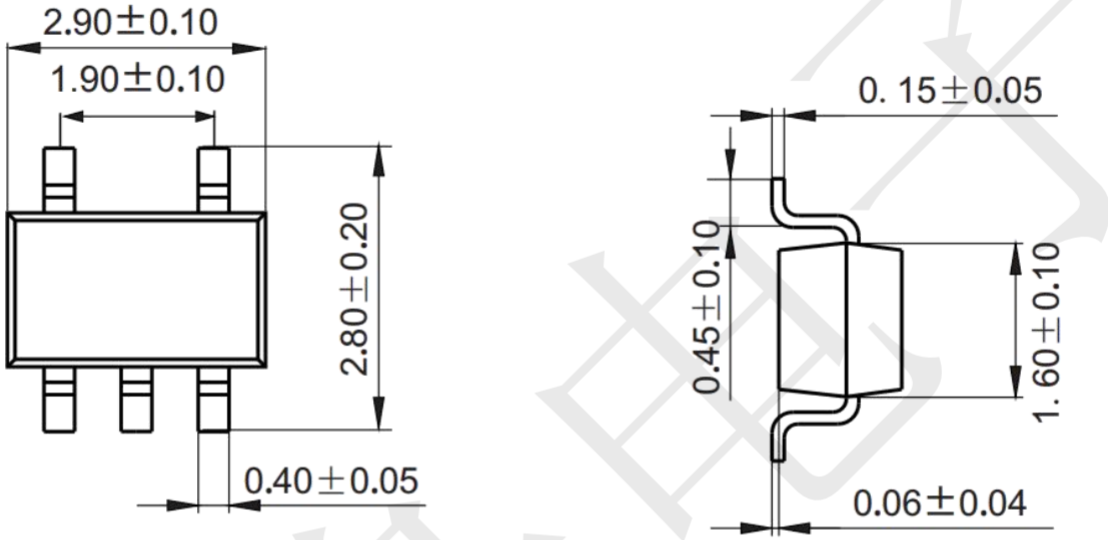


Definitions test circuit:
RT = Termination resistance should be equal to output impedance Zo of the pulse generator; CL = Load capacitance including jig and probe capacitance;
RL = Load resistance;
VEXT = External voltage for measuring switching times.

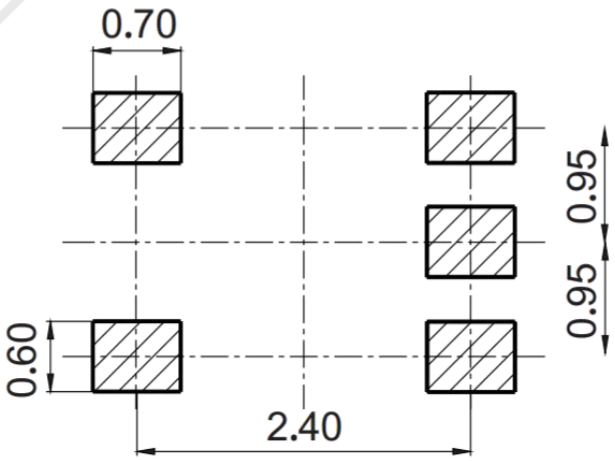
Supply voltage	Input			Load		V_{EXT}		
V_{CC}	V_I	Δt/ΔV	f_{max}	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
1.8 V	V_{CC}	≤ 1.0 ns/V	15 MHz	15 pF, 30 pF	1MΩ	GND	GND	V_{CC}
2.5 V	V_{CC}	≤ 1.0 ns/V	25 MHz	15 pF, 30 pF	1MΩ	GND	GND	V_{CC}
3.3 V	3 V	≤ 1.0 ns/V	50 MHz	15 pF, 30 pF	1MΩ	GND	GND	V_{CC}
5.0 V	3 V	≤ 1.0 ns/V	50 MHz	15 pF, 30 pF	1MΩ	GND	GND	V_{CC}

Package information (Unit: mm)

SOT23-5

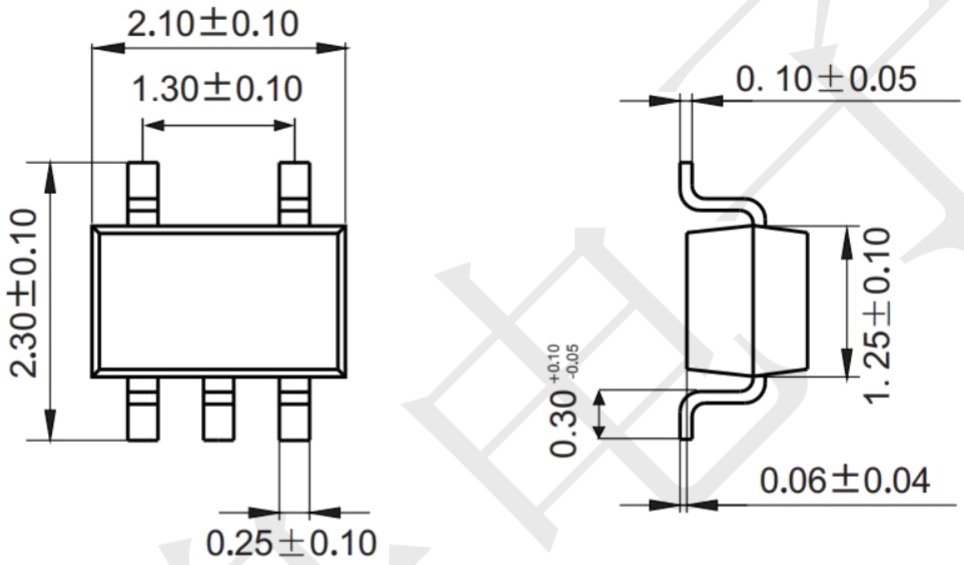


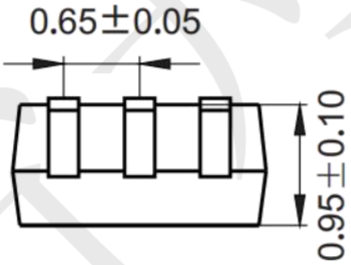
Mounting Pad Layout (unit: mm)



Package information (Unit: mm)

SOT353





Mounting Pad Layout (unit: mm)