



U74LV1T126

Preliminary

CMOS IC

SINGLE POWER SUPPLY SINGLE BUFFER GATE WITH 3-STATE OUTPUT CMOS LOGIC LEVEL SHIFTER

DESCRIPTION

The **U74LV1T126** is a single, level translating buffer driver with 3-state output. The 3-state output is controlled by the output enable input (OE). A LOW-level at OE causes the output to assume a high-impedance OFF-state. The output level is referenced to the supply voltage and supports 1.8V, 2.5V, 3.3V and 5.0V CMOS levels. The low threshold inputs support 1.8V input logic at $V_{CC} = 3.3V$ and can be used in 1.8V to 3.3V level up translation. In addition, the 5V tolerant input pins enable down translation (3.3V to 2.5V output at $V_{CC} = 2.5V$). The wide V_{CC} range permits the generation of output levels to connect to controllers or processors.

FEATURES

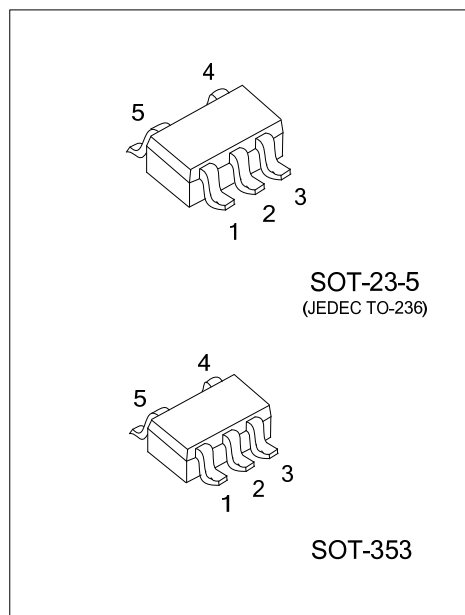
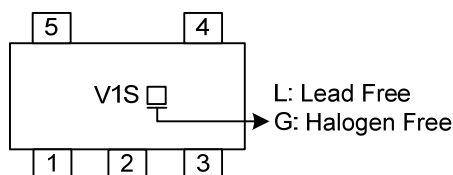
- * Single supply voltage translator at 1.8V, 2.5V, 3.3V and 5.0V
- * Low Power Current 10 μA (Max.)
- * $\pm 8mA$ Output Drive ($V_{CC}=5.0V$)

ORDERING INFORMATION

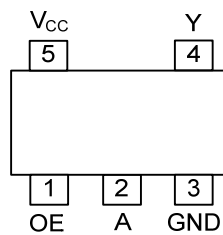
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LV1T126L-AE5-R	U74LV1T126G-AE5-R	SOT-23-5	Tape Reel
U74LV1T126L-AL5-R	U74LV1T126G-AL5-R	SOT-353	Tape Reel

U74LV1T126G-AE5-R	(1)Packing Type	(1) R: Tape Reel
	(2)Package Type	(2) AE5: SOT-23-5, AL5: SOT-353
	(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

MARKING



■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OE	Output enable, active high
2	A	Input A
3	GND	Ground
4	Y	Output Y
5	V _{CC}	Positive supply

Note: I=Input, O=Output, I/O= Input or Output, G=Ground, P=Power

■ FUNCTION TABLE (each gate)

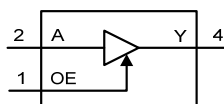
INPUT (Lower Level Input)		OUTPUT (V _{CC} CMOS)
OE (Note 3)	A	Y
H	H	H
H	L	L
L	X	Z

Notes: 1. H = HIGH Voltage Level; L = LOW Voltage Level; X = Do don't care; Z = high-impedance.

2. H = Driving High; L = Driving Low; Z = High-Impedance State.

3. Not recommend to float OE pin for signal oscillation.

■ LOGIC DIAGRAM (positive logic)

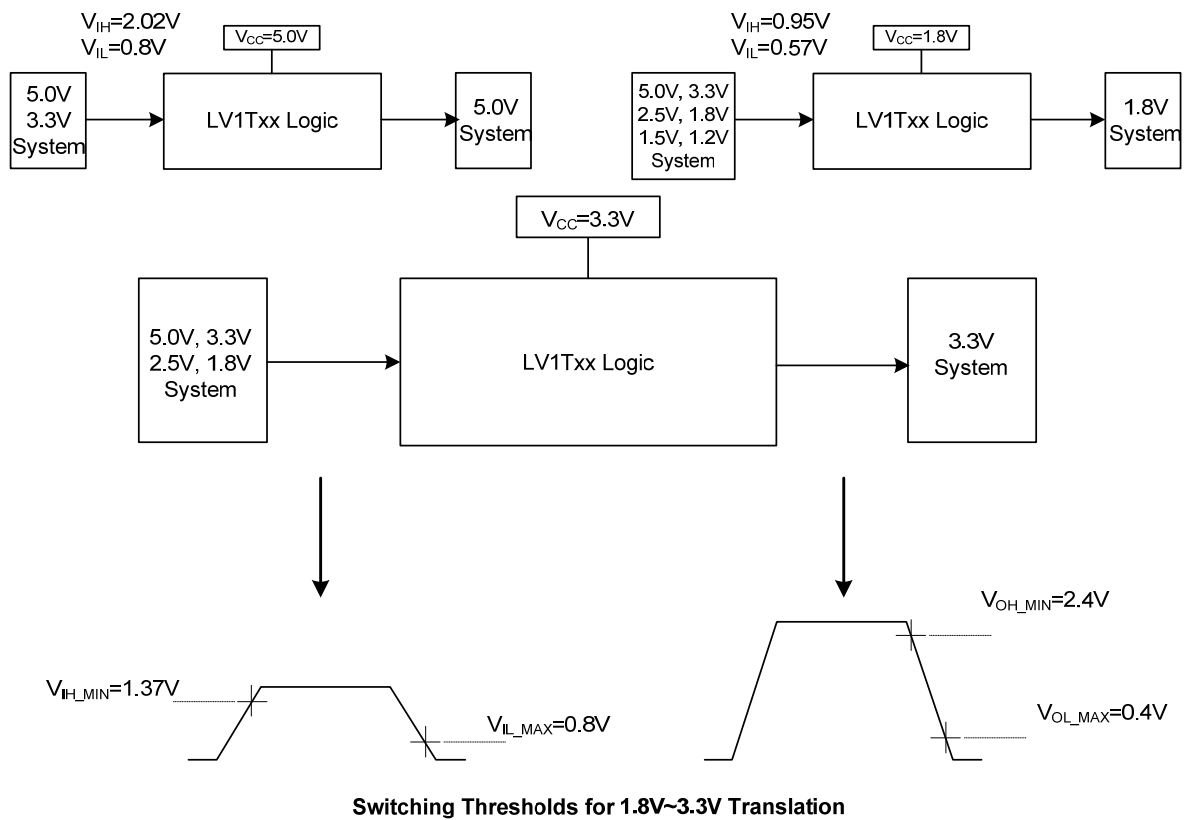


Logic Symbol



IEC Logic Symbol

■ TYPICAL DESIGN EXAMPLES



■ ABSOLUTE MAXIMUM RATING ($T_A=25^{\circ}\text{C}$, unless otherwise specified) (Note 2)

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 HIGH or LOW state	-0.5 ~ $V_{CC}+0.5$	V
		Output in power-off state	-0.5 ~ 4.6	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	$^{\circ}\text{C}$

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
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$	$V_{CC}=1.8\text{V}$			20	ns/V
		$V_{CC}=3.3\text{V}$ or 2.5V			20	ns/V
		$V_{CC}=5\text{V}$			20	ns/V
Operating Temperature	T_A		-40		+125	$^{\circ}\text{C}$

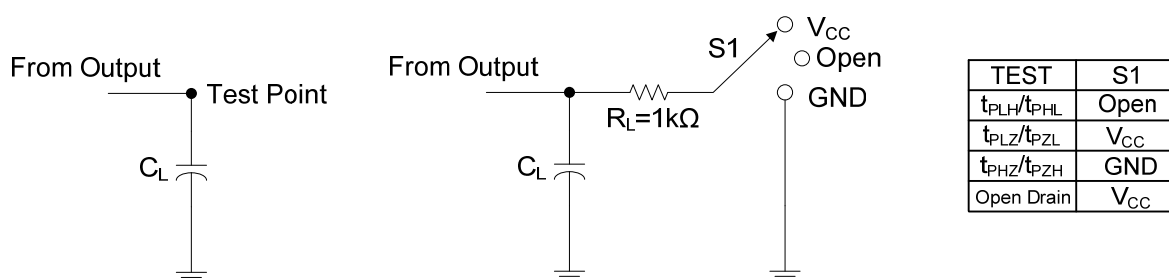
■ STATIC CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Input Voltage	V _{IH}	V _{CC} =1.65V~1.8V	0.95			V
		V _{CC} =2.0V	0.99			V
		V _{CC} =2.25V~2.5V	1.145			V
		V _{CC} =2.75V	1.22			V
		V _{CC} =3V~3.3V	1.37			V
		V _{CC} =3.6V	1.47			V
		V _{CC} =4.5V~5.0V	2.02			V
		V _{CC} =5.5V	2.1			V
Low-Level Input Voltage	V _{IL}	V _{CC} =1.65V~2V			0.57	V
		V _{CC} =2.25V~2.75V			0.75	V
		V _{CC} =3V~3.6V			0.8	V
		V _{CC} =4.5V~5.5V			0.8	V
High-Level Output Voltage	V _{OH}	V _{CC} =1.65V ~ 5.5V, I _{OH} =-20μA	V _{CC} -0.1			V
		V _{CC} =1.65V	1.28			V
		V _{CC} =1.8V	1.5			V
		V _{CC} =2.3V, I _{OH} =-3mA	2			V
		V _{CC} =2.5V, I _{OH} =-3mA	2.25			V
		V _{CC} =3V	2.78			V
		I _{OH} =-3mA	2.6			V
		I _{OH} =-5.5mA	2.9			V
		V _{CC} =3.3V, I _{OH} =-5.5mA	4.2			V
		V _{CC} =4.5V	4.1			V
		I _{OH} =-4mA	4.6			V
		I _{OH} =-8mA				V
Low-Level Output Voltage	V _{OL}	V _{CC} =1.65V ~ 5.5V, I _{OL} =20μA			0.1	V
		V _{CC} =1.65V, I _{OL} =2mA			0.2	V
		V _{CC} =2.3V, I _{OL} =3mA			0.15	V
		V _{CC} =3V			0.11	V
		I _{OL} =3mA			0.21	V
		I _{OL} =5.5mA			0.15	V
		V _{CC} =4.5V			0.3	V
		I _{OL} =4mA				V
		I _{OL} =8mA				V
A Input Leakage Current	I _{I(LEAK)}	A Input V _{CC} =0V, 1.8V, 2.5V, 3.3V, 5.5V, V _{IN} =0V or V _{CC}			0.1	μA
Quiescent Supply Current	I _Q	V _{CC} =1.8V, 2.5V, 3.3V, 5V, V _{IN} =0V or V _{CC} , I _O =0; Open on loading			1	μA
Additional Quiescent Supply Current	ΔI _Q	V _{CC} =5.5V, one input at 0.3V or 3.4V, other inputs at 0 or V _{CC} , I _O =0			1.35	mA
		V _{CC} =1.8V, one input at 0.3V or 1.1V, other inputs at 0 or V _{CC} , I _O =0			10	μA
Input Capacitance	C _{IN}	V _{CC} =3.3V, V _{IN} =V _{CC} or GND		2		pF
Output Capacitance	C _{OUT}	V _{CC} =3.3V, V _{OUT} =V _{CC} or GND		2.5		pF
Power Dissipation Capacitance	C _{PD}	V _{CC} =1.8V±0.15V		14		pF
		V _{CC} =2.5V±0.2V		14		pF
		V _{CC} =3.3V±0.3V		14		pF
		V _{CC} =5V±0.5V		14		pF

■ DYNAMIC CHARACTERISTICS (Unless otherwise specified)

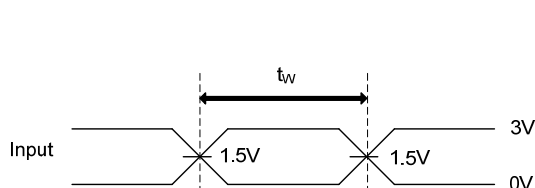
PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Propagation Delay From Input (Any In) to Output (Y)	t_{PLH}/t_{PHL}	$C_L=15\text{pF}$	$V_{CC}=1.8\text{V}$		10.5	13	ns
			$V_{CC}=2.5\text{V}$		5.8	8.5	ns
			$V_{CC}=3.3\text{V}$		4.0	7.0	ns
			$V_{CC}=5\text{V}$		2.7	5.5	ns
		$C_L=30\text{pF}$	$V_{CC}=1.8\text{V}$		12	14.5	ns
			$V_{CC}=2.5\text{V}$		6.5	9.5	ns
			$V_{CC}=3.3\text{V}$		4.9	8.0	ns
			$V_{CC}=5\text{V}$		3.0	6.5	ns
Propagation Delay From Input (OE) to Output (Y)	t_{PZH}/t_{PZL}	$C_L=15\text{pF}$	$V_{CC}=1.8\text{V}$		9.0	12	ns
			$V_{CC}=2.5\text{V}$		5.5	8.0	ns
			$V_{CC}=3.3\text{V}$		4.0	6.5	ns
			$V_{CC}=5\text{V}$		4.3	6.5	ns
		$C_L=30\text{pF}$	$V_{CC}=1.8\text{V}$		12.5	15	ns
			$V_{CC}=2.5\text{V}$		7.0	10	ns
			$V_{CC}=3.3\text{V}$		5.0	8.0	ns
			$V_{CC}=5\text{V}$		4.3	6.5	ns
Propagation Delay From Input (OE) to Output (Y)	t_{PHZ}/t_{PLZ}	$C_L=15\text{pF}$	$V_{CC}=1.8\text{V}$		8.0	10	ns
			$V_{CC}=2.5\text{V}$		5.0	11	ns
			$V_{CC}=3.3\text{V}$		4.5	7.0	ns
			$V_{CC}=5\text{V}$		4.2	6.5	ns
		$C_L=30\text{pF}$	$V_{CC}=1.8\text{V}$		8.5	11	ns
			$V_{CC}=2.5\text{V}$		6.0	9.0	ns
			$V_{CC}=3.3\text{V}$		5.0	8.0	ns
			$V_{CC}=5\text{V}$		4.8	8.0	ns

■ TEST CIRCUIT AND WAVEFORMS

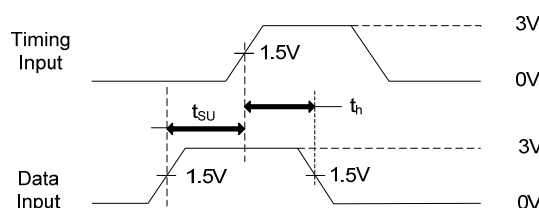


**LOAD CIRCUIT FOR
TOTEM-POLE OUTPUTS**

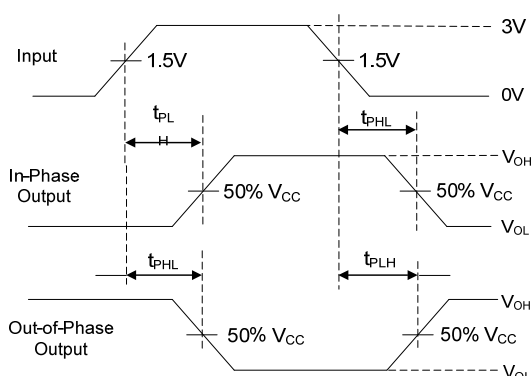
**LOAD CIRCUIT FOR
3-STATE AND OPEN-DRAIN OUTPUTS**



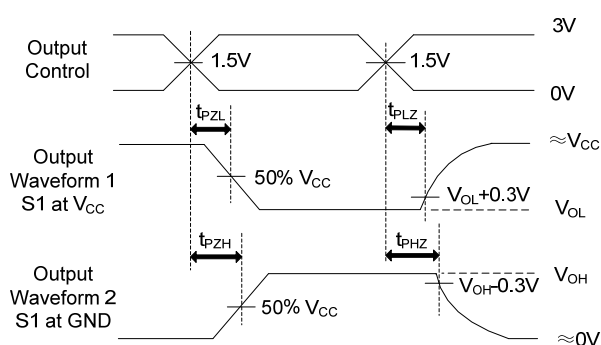
PULSE DURATION



SETUP AND HOLD TIMES



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES

- Notes: 1. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1\text{MHz}$, $Z_O = 50\Omega$, $t_r \leq 3\text{ns}$.
2. The outputs are measured one at a time, with one transition per measurement.

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