



U74LVC640

CMOS IC

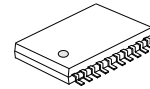
OCTAL BUS TRANSCEIVER WITH 3-STATE INVERTING OUTPUTS

■ DESCRIPTION

The **U74LVC640** is designed for asynchronous communication between data buses and has inverting outputs. While the direction-control(DIR) input is high, data transmits from the A bus to the B bus. In contrast, Data transmits from the B bus to the A bus DIR input is low. The output-enable($\overline{OE}$) will disable the device and isolate from the buses when high voltage is applied on it.

■ FEATURES

- * Supply Voltage Range From 1.2V to 3.6V
- * Input Accept Voltages up to 5.5V
- * Partial-Power-Down Mode Operation
- * Max t_{PD} is 6.3ns at 3.3V



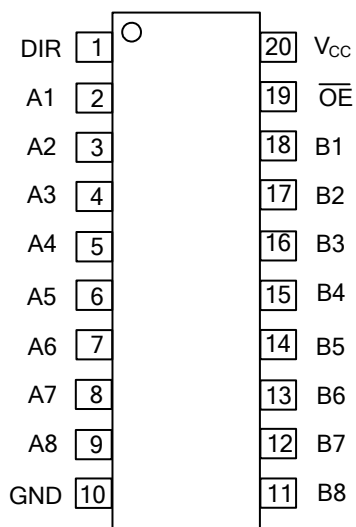
TSSOP-20

■ ORDERING INFORMATION

Ordering Number	Package	Packing
U74LVC640G-P20-R	TSSOP-20	Tape Reel

U74LVC640G-P20-R	(1)Packing Type (2)Package Type (3)Halogen Free	(1) R: Tape Reel, T: Tube (2) P20: TSSOP-20 (3) G: Halogen Free
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PIN CONFIGURATION

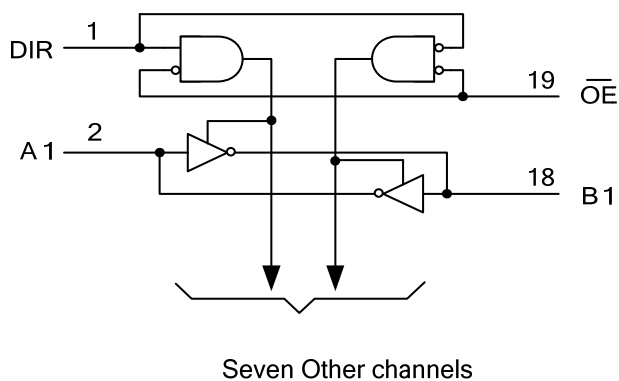


FUNCTION TABLE

INPUT		FUNCTION
$\overline{OE}$	DIR	
H	X	Isolation
L	H	Transmit data from A bus to B bus, B=A
L	L	Transmit data from B bus to A bus, A=B

Note: H: HIGH voltage level L: LOW voltage level X: Don't care

LOGIC DIAGRAM (Negative Logic)



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5~6.5	V
Input Voltage	V_{IN}	-0.5~ 6.5	V
Voltage Applied To Output In High-Impedance Or Power-Off State	V_{OUT}	-0.5~6.5	V
Voltage applied to output in high or low state		-0.5~ $V_{CC}+0.5$	
Input Clamp Current	I_{IK}	-50	mA
Output Clamp Current	I_{OK}	-50	mA
Output Current	I_{OUT}	±50	mA
V_{CC} or GND Current	I_{CC}	±100	mA
Storage Temperature	T_{STG}	-65 ~ +150	°C

Note: 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.

■ OPERATING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	TYP	UNIT
Power Dissipation Capacitance Per Transceiver	C_{PD}	$\overline{OE}=0$ $f=10\text{MHZ}$ $V_{CC}=1.8\text{V}$	42	pF
		$V_{CC}=2.5\text{V}$	43	
		$V_{CC}=3.3\text{V}$	45	
		$\overline{OE}=1$ $f=10\text{MHZ}$ $V_{CC}=1.8\text{V}$	1	
		$V_{CC}=2.5\text{V}$	1	
		$V_{CC}=3.3\text{V}$	2	

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	Min	TYP	Max	UNIT
Supply Voltage	V_{CC}	Operating	1.65		3.6	V
		Data retention only	1.5			
High-Level Input Voltage	V_{IH}	$V_{CC} = 1.65\text{ V} \sim 1.95\text{ V}$	$0.65 \cdot V_{CC}$			V
		$V_{CC} = 2.3\text{ V} \sim 2.7\text{ V}$	1.7			
		$V_{CC} = 2.7\text{ V} \sim 3.6\text{ V}$	2			
Low-Level Input Voltage	V_{IL}	$V_{CC} = 1.65\text{ V} \sim 1.95\text{ V}$			$0.35 \cdot V_{CC}$	V
		$V_{CC} = 2.3\text{ V} \sim 2.7\text{ V}$			0.7	
		$V_{CC} = 2.7\text{ V} \sim 3.6\text{ V}$			0.8	
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Output High Current	I_{OH}	$V_{CC} = 1.65\text{ V}$			-4	mA
		$V_{CC} = 2.3\text{ V}$			-8	
		$V_{CC} = 2.7\text{ V}$			-12	
		$V_{CC} = 3\text{ V}$			-24	
Output Low Current	I_{OL}	$V_{CC} = 1.65\text{ V}$			4	mA
		$V_{CC} = 2.3\text{ V}$			8	
		$V_{CC} = 2.7\text{ V}$			12	
		$V_{CC} = 3\text{ V}$			24	

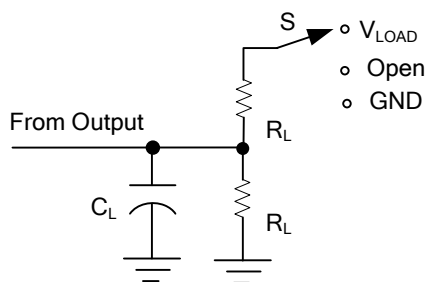
■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	Min	TYP	Max	UNIT
High-Level Output Voltage	V_{OH}	$I_{OH} = -100\mu A, V_{CC}=1.65 V \text{ to } 3.6 V$	$V_{CC}-0.2$			V
		$I_{OH} = -4mA, V_{CC}=1.65V$	1.29			
		$I_{OH} = -8mA, V_{CC}=2.3V$	1.9			
		$I_{OH} = -12mA, V_{CC}=2.7V$	2.2			
		$I_{OH} = -12mA, V_{CC}=3V$	2.4			
		$I_{OH} = -24mA, V_{CC}=3V$	2.3			
Low-Level Output Voltage	V_{OL}	$I_{OH} = 100\mu A, V_{CC}=1.65 V \text{ to } 3.6 V$			0.1	V
		$I_{OH} = 4mA, V_{CC}=1.65V$			0.24	
		$I_{OH} = 8mA, V_{CC}=2.3V$			0.3	
		$I_{OH} = 12mA, V_{CC}=2.7V$			0.4	
		$I_{OH} = 24mA, V_{CC}=3V$			0.55	
Input Current	$I_{I(LEAK)}$	$V_{IN} = 5.5 V \text{ or } GND, V_{CC}=3.6V$			± 1	μA
Power OFF Leakage Current	I_{OFF}	$V_{IN} = 5.5 V \text{ or } GND, V_{CC}=0V$			± 1	μA
Output Off-State Current	I_{OZ}	$V_{OUT} = 0 \text{ to } 5.5 V, V_{CC}=3.6V$			± 1	μA
Quiescent Supply Current	I_Q	$V_{IN}=V_{CC} \text{ or } GND, I_{OUT}=0, V_{CC}=3.6V$			1	μA
		$V_{IN}=3.6\sim 5.5V, I_{OUT}=0, V_{CC}=3.6V$			1	μA
Additional Quiescent Current Per Input Pin	ΔI_Q	$V_{CC}=2.7V \sim 3.6V, V_{IN}= V_{CC} -0.6V, I_{OUT}=0$			500	μA

■ SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	Min	TYP	Max	UNIT
Propagation Delay (From A to B Or From B to A)	t_{PLH} / t_{PHL}	$V_{CC} = 1.8 V \pm 0.15 V$	1	6	12.2	ns
		$V_{CC} = 2.5 V \pm 0.2 V$	1	3.9	7.8	
		$V_{CC} = 2.7 V$	1	4.2	7.1	
		$V_{CC} = 3.3 V \pm 0.3 V$	1.5	3.8	6.1	
3-State Output Enable Time (From $\overline{OE}$ to A or B)	t_{PZH} / t_{PZL}	$V_{CC} = 1.8 V \pm 0.15 V$	1	7	14.8	ns
		$V_{CC} = 2.5 V \pm 0.2 V$	1	4.5	10	
		$V_{CC} = 2.7 V$	1	5.4	9.3	
		$V_{CC} = 3.3 V \pm 0.3 V$	1.5	4.4	8.3	
3-State Output Disable Time (From $\overline{OE}$ A to A or B)	t_{PLZ} / t_{PLH}	$V_{CC} = 1.8 V \pm 0.15 V$	1	7.8	16.5	ns
		$V_{CC} = 2.5 V \pm 0.2 V$	1	4	9	
		$V_{CC} = 2.7 V$	1	4.4	8.3	
		$V_{CC} = 3.3 V \pm 0.3 V$	1.7	4.1	7.3	

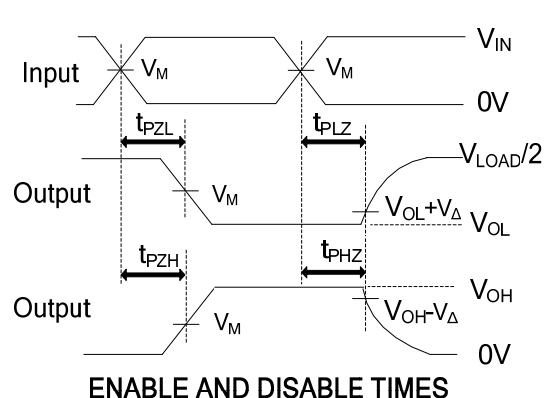
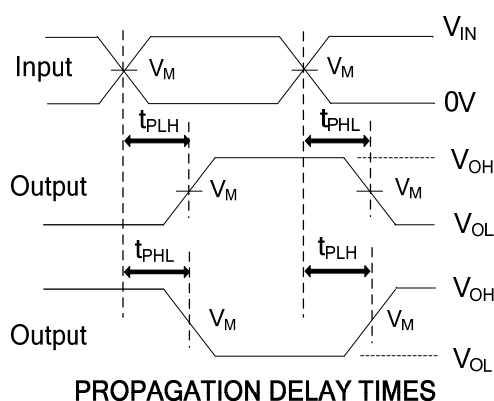
■ TEST CIRCUIT AND WAVEFORMS



TEST	S
t_{PLH}/t_{PHL}	Open
t_{PHZ}/t_{PZH}	GND
t_{PLZ}/t_{PZL}	V_{LOAD}

TEST CIRCUIT

V_{CC}	INPUTS		V_M	V_{Δ}	C_L	R_L	V_{LOAD}
	V_{IN}	t_R/t_F					
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	0.15V	30 pF	1 k Ω	$2 \times V_{CC}$
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	0.15V	30 pF	500 Ω	$2 \times V_{CC}$
2.7 V	2.7 V	$\leq 2.5ns$	1.5V	0.3V	50 pF	500 Ω	6V
$3.3V \pm 0.3V$	2.7 V	$\leq 2.5ns$	1.5V	0.3V	50 pF	500 Ω	6V



Note: C_L includes probe and jig capacitance.

All input pulses are supplied by generators having the following characteristics: PRR $\leq 10MHz$, $Z_o = 50\Omega$.

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