



U74LVC640

CMOS IC

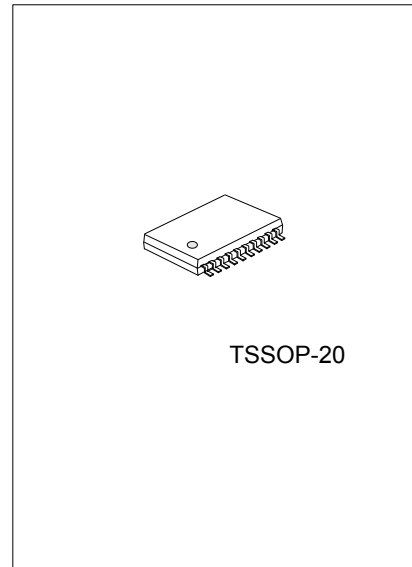
OCTAL BUS TRANSCEIVER WITH 3-STATE INVERTING OUTPUTS

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

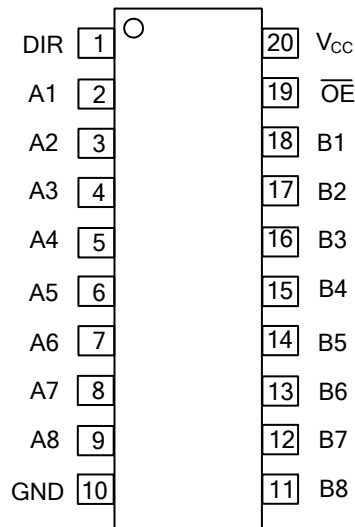


ORDERING INFORMATION

| 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 |
|----------------------|--|---|

■ PIN CONFIGURATION

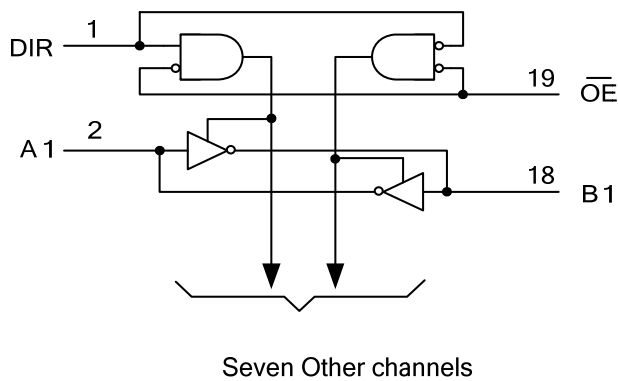


■ FUNCTION TABLE

| 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=10MHZ | $V_{CC} = 1.8V$ | 42 | pF |
| | | | $V_{CC} = 2.5V$ | 43 | |
| | | | $V_{CC} = 3.3V$ | 45 | |
| | | $\overline{OE} = 1$ f=10MHZ | $V_{CC} = 1.8V$ | 1 | |
| | | | $V_{CC} = 2.5V$ | 1 | |
| | | | $V_{CC} = 3.3V$ | 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} | $V_{CC} = 1.65 V \sim 1.95 V$ | 0.65* V_{CC} | | | V |
| | | $V_{CC} = 2.3 V \sim 2.7 V$ | 1.7 | | | |
| | | $V_{CC} = 2.7 V \sim 3.6 V$ | 2 | | | |
| Low-Level Input Voltage | V_{IL} | $V_{CC} = 1.65 V \sim 1.95 V$ | | | 0.35* V_{CC} | V |
| | | $V_{CC} = 2.3 V \sim 2.7 V$ | | | 0.7 | |
| | | $V_{CC} = 2.7 V \sim 3.6 V$ | | | 0.8 | |
| Input Voltage | V_{IN} | | 0 | | 5.5 | V |
| Output Voltage | V_{OUT} | | 0 | | V_{CC} | V |
| Output High Current | I_{OH} | $V_{CC} = 1.65 V$ | | | -4 | mA |
| | | $V_{CC} = 2.3 V$ | | | -8 | |
| | | $V_{CC} = 2.7 V$ | | | -12 | |
| | | $V_{CC} = 3 V$ | | | -24 | |
| Output Low Current | I_{OL} | $V_{CC} = 1.65 V$ | | | 4 | mA |
| | | $V_{CC} = 2.3 V$ | | | 8 | |
| | | $V_{CC} = 2.7 V$ | | | 12 | |
| | | $V_{CC} = 3 V$ | | | 24 | |

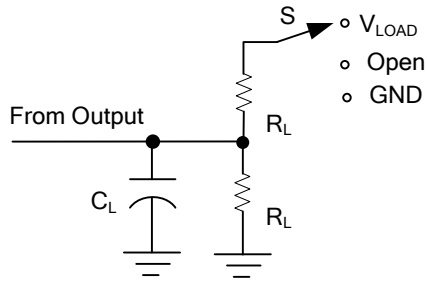
■ ELECTRICAL CHARACTERISTICS

| PARAMETER | SYMBOL | TEST CONDITIONS | Min | TYP | Max | UNIT |
|--|----------------------|--|----------------------|-----|------|------|
| High-Level Output Voltage | V _{OH} | I _{OH} = -100μA, V _{CC} =1.65 V 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} = 100μA, V _{CC} =1.65 V 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 or GND, V _{CC} =3.6V | | | ±1 | μA |
| Power OFF Leakage Current | I _{OFF} | V _{IN} = 5.5 V or GND, V _{CC} =0V | | | ±1 | μA |
| Output Off-State Current | I _{OZ} | V _{OUT} = 0 to 5.5 V, V _{CC} =3.6V | | | ±1 | μA |
| Quiescent Supply Current | I _Q | V _{IN} =V _{CC} or GND, I _{OUT} =0, V _{CC} =3.6V | | | 1 | μA |
| | | V _{IN} =3.6~5.5V, I _{OUT} =0, V _{CC} =3.6V | | | 1 | μA |
| Additional Quiescent Current Per Input Pin | ΔI _Q | V _{CC} =2.7V ~ 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 ± 0.15 V | 1 | 6 | 12.2 | ns |
| | | V _{CC} =2.5 V ± 0.2 V | 1 | 3.9 | 7.8 | |
| | | V _{CC} =2.7 V | 1 | 4.2 | 7.1 | |
| | | V _{CC} =3.3 V ± 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 ± 0.15 V | 1 | 7 | 14.8 | ns |
| | | V _{CC} =2.5 V ± 0.2 V | 1 | 4.5 | 10 | |
| | | V _{CC} =2.7 V | 1 | 5.4 | 9.3 | |
| | | V _{CC} =3.3 V ± 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 ± 0.15 V | 1 | 7.8 | 16.5 | ns |
| | | V _{CC} =2.5 V ± 0.2 V | 1 | 4 | 9 | |
| | | V _{CC} =2.7 V | 1 | 4.4 | 8.3 | |
| | | V _{CC} =3.3 V ± 0.3 V | 1.7 | 4.1 | 7.3 | |

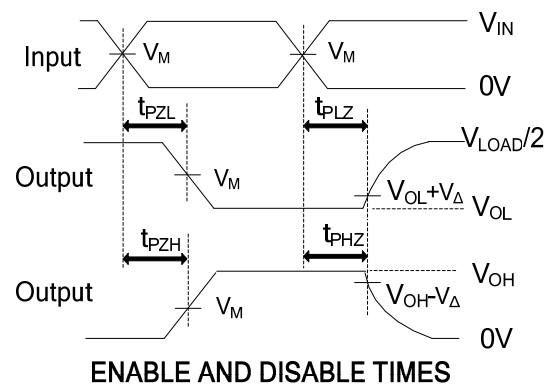
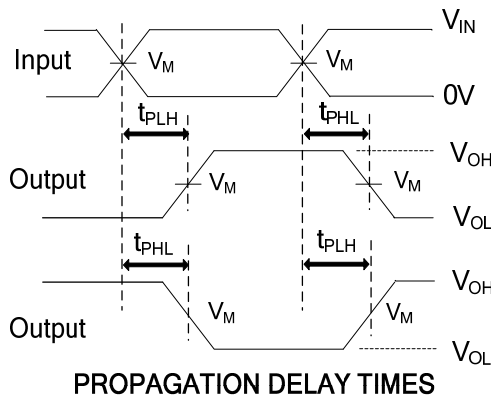
■ TEST CIRCUIT AND WAVEFORMS



| 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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