



**THE DATASHEET OF
74ALVC16827MTDX**



74ALVC16827

Low Voltage 20-Bit Buffer/Line Driver with 3.6V Tolerant Inputs and Outputs

General Description

The ALVC16827 contains twenty non-inverting buffers with 3-STATE outputs to be employed as a memory and address driver, clock driver, or bus oriented transmitter/receiver carrying parity. The device is byte controlled. Each byte has NOR output enables for maximum control flexibility.

The 74ALVC16827 is designed for low voltage (1.65V to 3.6V) V_{CC} applications with I/O capability up to 3.6V.

The 74ALVC16827 is fabricated with an advanced CMOS technology to achieve high speed operation while maintaining low CMOS power dissipation.

Features

- 1.65V to 3.6V V_{CC} supply operation
- 3.6V tolerant inputs and outputs
- t_{PD}
 - 3.0 ns max for 3.0V to 3.6V V_{CC}
 - 3.5 ns max for 2.3V to 2.7V V_{CC}
 - 6.0 ns max for 1.65V to 1.95V V_{CC}
- Power-off high impedance inputs and outputs
- Supports live insertion and withdrawal (Note 1)
- Uses patented noise/EMI reduction circuitry
- Latchup conforms to JEDEC JED78
- ESD performance:
 - Human body model > 2000V
 - Machine model > 200V

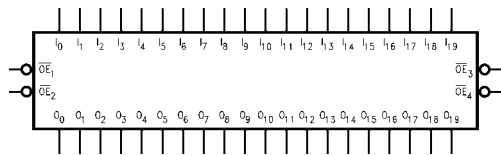
Note 1: To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pull-up resistor; the minimum value of the resistor is determined by the current-sourcing capability of the driver.

Ordering Code:

| Order Number | Package Number | Package Description |
|----------------|----------------|---|
| 74ALVC16827MTD | MTD56 | 56-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Wide |

Devices also available on Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

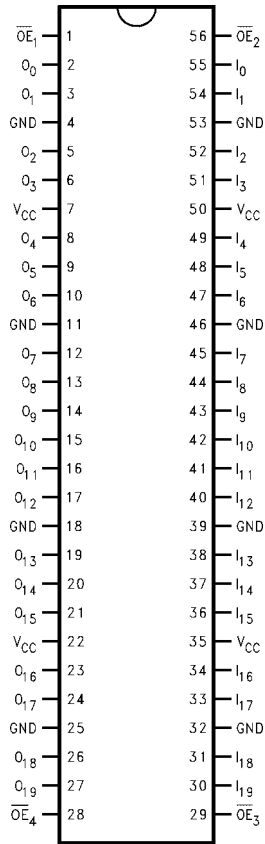
Logic Symbol



Pin Descriptions

| Pin Names | Description |
|-------------------|----------------------------------|
| \overline{OE}_n | Output Enable Input (Active LOW) |
| I_0 – I_9 | Inputs |
| O_0 – O_{19} | Outputs |

Connection Diagram



Truth Tables

| Inputs | | | Outputs |
|-------------------|-------------------|-----------|-----------|
| \overline{OE}_1 | \overline{OE}_2 | I_0-I_9 | O_0-O_9 |
| L | L | L | L |
| L | L | H | H |
| H | X | X | Z |
| X | H | X | Z |

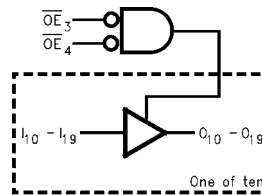
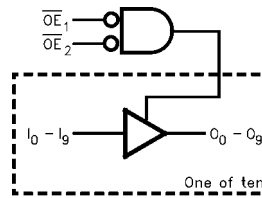
| Inputs | | | Outputs |
|-------------------|-------------------|-----------------|-----------------|
| \overline{OE}_3 | \overline{OE}_4 | $I_{10}-I_{19}$ | $O_{10}-O_{19}$ |
| L | L | L | L |
| L | L | H | H |
| H | X | X | Z |
| X | H | X | Z |

H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial (HIGH or LOW, inputs may not float)
 Z = High Impedance

Functional Description

The 74ALVC16827 contains twenty non-inverting buffers with 3-STATE outputs. The device is byte controlled with each byte functioning identically, but independent of each other. The control pins may be shorted together to obtain full 16-bit operation. The 3-STATE outputs are controlled by Output Enable (\overline{OE}_n) inputs. When \overline{OE}_1 , and \overline{OE}_2 are LOW, O_0-O_{10} are in the 2-state mode. When either \overline{OE}_1 or \overline{OE}_2 are HIGH, the standard outputs are in the high impedance mode but this does not interfere with entering new data into the inputs. The same applies for byte two with \overline{OE}_3 and \overline{OE}_4 .

Logic Diagrams



Absolute Maximum Ratings(Note 2)

| | |
|--|--------------------------|
| Supply Voltage (V_{CC}) | -0.5V to +4.6V |
| DC Input Voltage (V_I) | -0.5V to 4.6V |
| Output Voltage (V_O) (Note 3) | -0.5V to $V_{CC} + 0.5V$ |
| DC Input Diode Current (I_{IK}) | |
| $V_I < 0V$ | -50 mA |
| DC Output Diode Current (I_{OK}) | |
| $V_O < 0V$ | -50 mA |
| DC Output Source/Sink Current (I_{OH}/I_{OL}) | ±50 mA |
| DC V_{CC} or GND Current per Supply Pin (I_{CC} or GND) | ±100 mA |
| Storage Temperature Range (T_{STG}) | -65°C to +150°C |

Recommended Operating Conditions (Note 4)

| | |
|---|----------------|
| Power Supply | |
| Operating | 1.65V to 3.6V |
| Input Voltage (V_I) | 0V to V_{CC} |
| Output Voltage (V_O) | 0V to V_{CC} |
| Free Air Operating Temperature (T_A) | -40°C to +85°C |
| Minimum Input Edge Rate ($\Delta t/\Delta V$) | |
| $V_{IN} = 0.8V$ to 2.0V, $V_{CC} = 3.0V$ | 10 ns/V |

Note 2: The Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the Absolute Maximum Ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Note 3: I_O Absolute Maximum Rating must be observed, limited to 4.6V.

Note 4: Floating or unused control inputs must be held HIGH or LOW.

DC Electrical Characteristics

| Symbol | Parameter | Conditions | V_{CC} (V) | Min | Max | Units |
|-----------------|--------------------------------|----------------------------------|---------------------------------------|------------------------------------|------------------------------------|-------|
| V_{IH} | HIGH Level Input Voltage | | 1.65 - 1.95 2.3 - 2.7 2.7 - 3.6 | $0.65 \times V_{CC}$ 1.7 2.0 | | V |
| V_{IL} | LOW Level Input Voltage | | 1.65 - 1.95 2.3 - 2.7 2.7 - 3.6 | | $0.35 \times V_{CC}$ 0.7 0.8 | V |
| V_{OH} | HIGH Level Output Voltage | $I_{OH} = -100 \mu A$ | 1.65 - 3.6 | $V_{CC} - 0.2$ | | V |
| | | $I_{OH} = -4 \text{ mA}$ | 1.65 | 1.2 | | |
| | | $I_{OH} = -6 \text{ mA}$ | 2.3 | 2.0 | | |
| | | $I_{OH} = -12 \text{ mA}$ | 2.3 2.7 3.0 | 1.7 2.2 2.4 | | |
| | | $I_{OH} = -24 \text{ mA}$ | 3.0 | 2 | | |
| V_{OL} | LOW Level Output Voltage | $I_{OL} = 100 \mu A$ | 1.65 - 3.6 | | 0.2 | V |
| | | $I_{OL} = 4 \text{ mA}$ | 1.65 | | 0.45 | |
| | | $I_{OL} = 6 \text{ mA}$ | 2.3 | | 0.4 | |
| | | $I_{OL} = 12 \text{ mA}$ | 2.3 2.7 | | 0.7 0.4 | |
| | | $I_{OL} = 24 \text{ mA}$ | 3.0 | | 0.55 | |
| I_I | Input Leakage Current | $0 \leq V_I \leq 3.6V$ | 3.6 | | ±5.0 | μA |
| I_{OZ} | 3-STATE Output Leakage | $0 \leq V_O \leq 3.6V$ | 3.6 | | ±10 | μA |
| I_{CC} | Quiescent Supply Current | $V_I = V_{CC}$ or GND, $I_O = 0$ | 3.6 | | 40 | μA |
| ΔI_{CC} | Increase in I_{CC} per Input | $V_{IH} = V_{CC} - 0.6V$ | 3 - 3.6 | | 750 | μA |

| AC Electrical Characteristics | | | | | | | | | | |
|-------------------------------|-------------------------------|--|--|-----------------|-------|--------------------------|-----|---------------------------|-----|-------|
| Symbol | Parameter | $T_A = -40^\circ\text{C to } +85^\circ\text{C}, R_L = 500\Omega$ | | | | | | | | Units |
| | | $C_L = 50\text{ pF}$ | | | | $C_L = 30\text{ pF}$ | | | | |
| | | $V_{CC} = 3.3V \pm 0.3V$ | | $V_{CC} = 2.7V$ | | $V_{CC} = 2.5V \pm 0.2V$ | | $V_{CC} = 1.8V \pm 0.15V$ | | |
| | | Min | Max | Min | Max | Min | Max | Min | Max | |
| t_{PHL}, t_{PLH} | Propagation Delay | 1.3 | 3 | 1.5 | 3.5 | 1.0 | 3.0 | 1.5 | 6.0 | ns |
| t_{PZL}, t_{PZH} | Output Enable Time | 1.3 | 4.3 | 1.5 | 5.4 | 1.0 | 4.9 | 1.5 | 9.8 | ns |
| t_{PLZ}, t_{PHZ} | Output Disable Time | 1.3 | 4.2 | 1.5 | 4.7 | 1.0 | 4.2 | 1.5 | 7.6 | ns |
| Capacitance | | | | | | | | | | |
| Symbol | Parameter | Conditions | $T_A = +25^\circ\text{C}$ | | Units | | | | | |
| | | | V_{CC} | Typical | | | | | | |
| C_{IN} | Input Capacitance | $V_I = 0V \text{ or } V_{CC}$ | 3.3 | 6 | pF | | | | | |
| C_{OUT} | Output Capacitance | $V_I = 0V \text{ or } V_{CC}$ | 3.3 | 7 | pF | | | | | |
| C_{PD} | Power Dissipation Capacitance | Outputs Enabled | $f = 10\text{ MHz}, C_L = 0\text{ pF}$ | 3.3 | 20 | pF | | | | |
| | | | | 2.5 | 20 | | | | | |

AC Loading and Waveforms

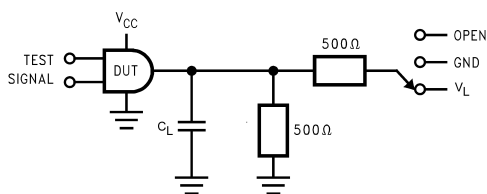


FIGURE 1. AC Test Circuit

TABLE 1. Values for Figure 1

| TEST | SWITCH |
|-----------------------|--------|
| t_{PLH} , t_{PHL} | Open |
| t_{PZL} , t_{PLZ} | V_L |
| t_{PZH} , t_{PHZ} | GND |

TABLE 2. Variable Matrix
(Input Characteristics: $f = 1\text{MHz}$; $t_r = t_f = 2\text{ns}$; $Z_0 = 50\Omega$)

| Symbol | V_{CC} | | | |
|----------|-------------------------------|------------------------|-------------------------------|--------------------------------|
| | $3.3\text{V} \pm 0.3\text{V}$ | 2.7V | $2.5\text{V} \pm 0.2\text{V}$ | $1.8\text{V} \pm 0.15\text{V}$ |
| V_{mi} | 1.5V | 1.5V | $V_{CC}/2$ | $V_{CC}/2$ |
| V_{mo} | 1.5V | 1.5V | $V_{CC}/2$ | $V_{CC}/2$ |
| V_X | $V_{OL} + 0.3\text{V}$ | $V_{OL} + 0.3\text{V}$ | $V_{OL} + 0.15\text{V}$ | $V_{OL} + 0.15\text{V}$ |
| V_Y | $V_{OH} - 0.3\text{V}$ | $V_{OH} - 0.3\text{V}$ | $V_{OH} - 0.15\text{V}$ | $V_{OH} - 0.15\text{V}$ |
| V_L | 6V | 6V | $V_{CC} * 2$ | $V_{CC} * 2$ |

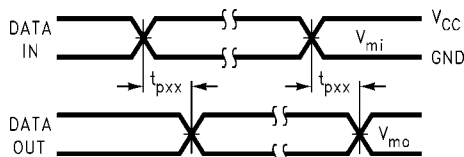


FIGURE 2. Waveform for Inverting and Non-Inverting Functions

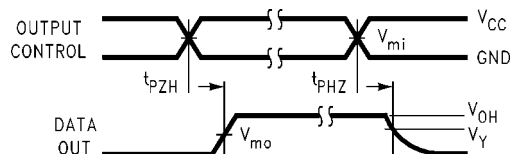


FIGURE 3. 3-STATE Output High Enable and Disable Times for Low Voltage Logic

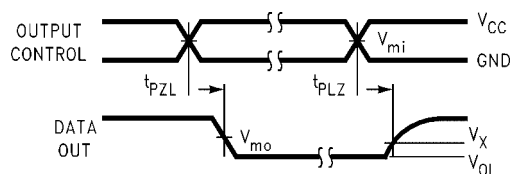
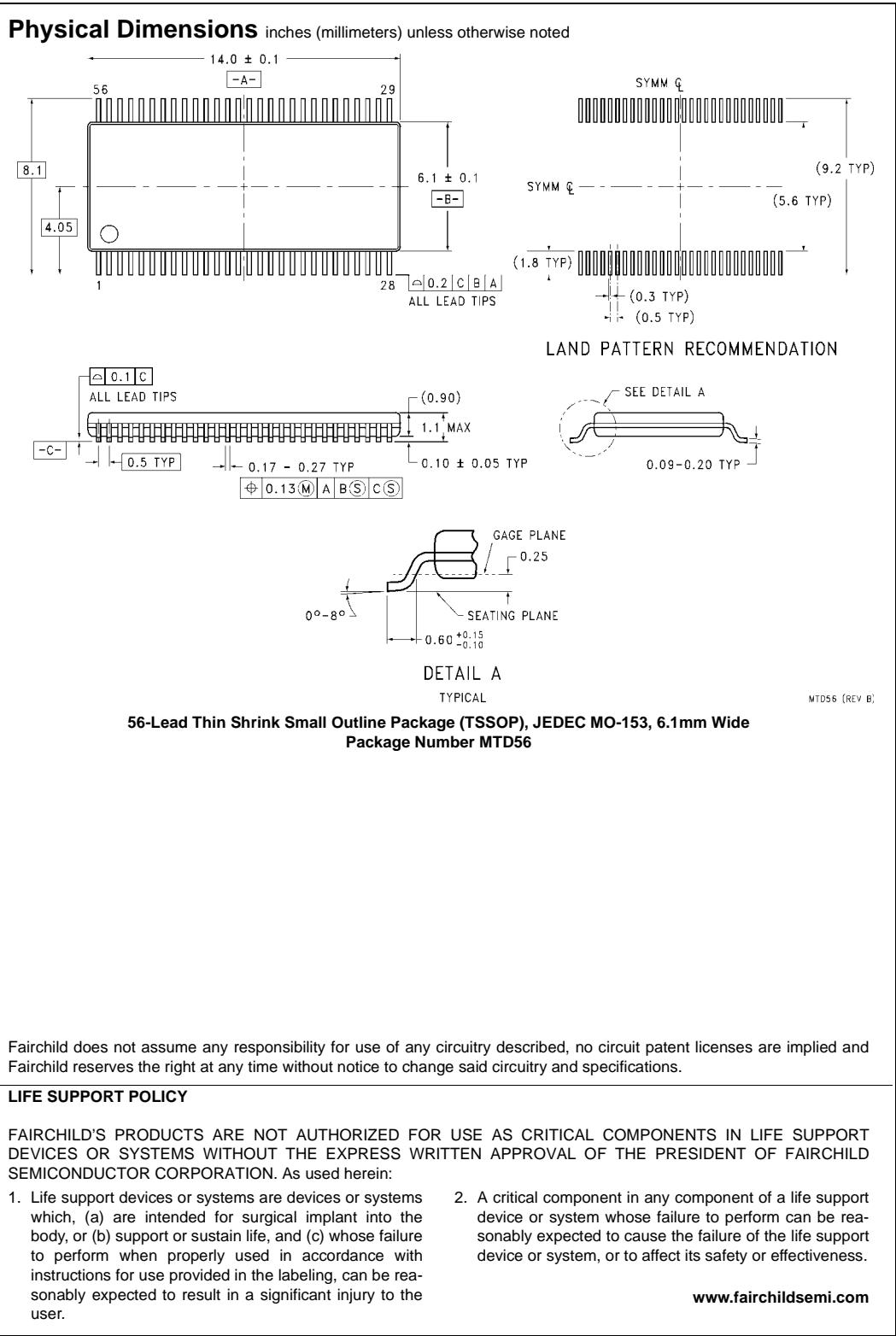


FIGURE 4. 3-STATE Output Low Enable and Disable Times for Low Voltage Logic



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