

54F/74F841 10-Bit Transparent Latch

General Description

The 'F841 bus interface latch is designed to eliminate the extra packages required to buffer existing latches and provide extra data width for wider address/data paths or buses carrying parity. The 'F841 is a 10-bit transparent latch, a 10-bit version of the 'F373.

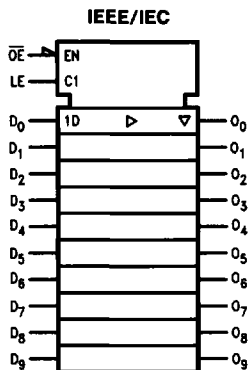
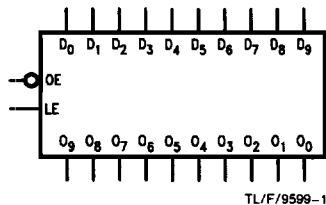
The 'F841 is functionally and pin compatible to AMD's Am29841.

Features

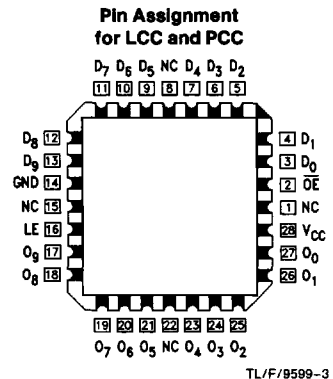
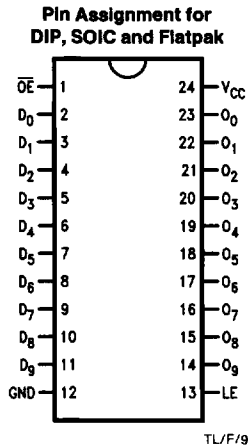
- TRI-STATE® output
- Direct replacement for AMD's Am29841

Ordering Code: See Section 5

Logic Symbols



Connection Diagrams



Unit Loading/Fan Out: See Section 2 for U.L. definitions

| Pin Names | Description | 54F/74F | |
|--------------------------------|---------------------|------------------|---|
| | | U.L. HIGH/LOW | Input I_{IH}/I_{IL} Output I_{OH}/I_{OL} |
| D ₀ -D ₉ | Data Inputs | 1.0/1.0 | 20 μ A/ -0.6 mA |
| O ₀ -O ₉ | TRI-STATE Outputs | 150/40 (33.3) | -3 mA/24 mA (20 mA) |
| OE | Output Enable Input | 1.0/1.0 | 20 μ A/ -0.6 mA |
| LE | Latch Enable | 1.0/1.0 | 20 μ A/ -0.6 mA |

Functional Description

The 'F841 device consists of ten D-type latches with TRI-STATE outputs. The flip-flops appear transparent to the data when Latch Enable (LE) is HIGH. This allows asynchronous operation, as the output transition follows the data in transition.

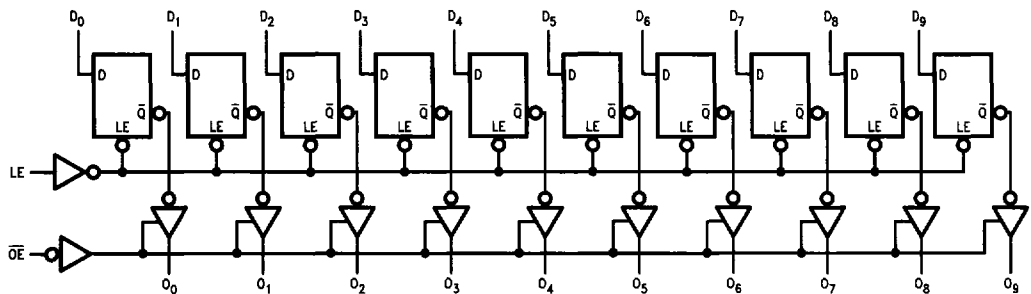
On the LE HIGH-to-LOW transition, the data that meets the setup and hold time is latched. Data appears on the bus when the Output Enable (\overline{OE}) is LOW. When \overline{OE} is HIGH the bus output is in the high impedance state.

Function Table

| Inputs | | | Internal | Output | Function |
|-----------------|----|---|----------|--------|-------------|
| \overline{OE} | LE | D | Q | O | |
| X | X | X | X | Z | High Z |
| H | H | L | L | Z | High Z |
| H | H | H | H | Z | High Z |
| H | L | X | NC | Z | Latched |
| L | H | L | L | L | Transparent |
| L | H | H | H | H | Transparent |
| L | L | X | NC | NC | Latched |
| L | X | X | H | H | Preset |
| L | X | X | L | L | Clear |
| L | X | X | H | H | Preset |
| H | L | X | L | Z | Latched |
| H | L | X | H | Z | Latched |

H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial
 Z = HIGH Impedance
 NC = No Change

Logic Diagram



TL/F/9599-4

Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, contact the National Semiconductor Sales Office/Distributors for availability and specifications.

| | |
|---|--------------------------|
| Storage Temperature | -65°C to +150°C |
| Ambient Temperature under Bias | -55°C to +125°C |
| Junction Temperature under Bias | -55°C to +175°C |
| V _{CC} Pin Potential to Ground Pin | -0.5V to +7.0V |
| Input Voltage (Note 2) | -0.5V to +7.0V |
| Input Current (Note 2) | -30 mA to +5.0 mA |
| Voltage Applied to Output in HIGH State (with V _{CC} = 0V) | |
| Standard Output | -0.5V to V _{CC} |
| TRI-STATE Output | -0.5V to +5.5V |

Current Applied to Output in LOW State (Max) twice the rated I_{OL} (mA)

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

Recommended Operating Conditions

Free Air Ambient Temperature

| | |
|----------------|-----------------|
| Military | -55°C to +125°C |
| Commercial | 0°C to +70°C |
| Supply Voltage | |
| Military | +4.5V to +5.5V |
| Commercial | +4.5V to +5.5V |

DC Electrical Characteristics

| Symbol | Parameter | 54F/74F | | | Units | V _{CC} | Conditions |
|------------------|-----------------------------------|--|--|------------|-------|-----------------|--|
| | | Min | Typ | Max | | | |
| V _{IH} | Input HIGH Voltage | 2.0 | | | V | | Recognized as a HIGH Signal |
| V _{IL} | Input LOW Voltage | | | 0.8 | V | | Recognized as a LOW Signal |
| V _{CD} | Input Clamp Diode Voltage | | | -1.2 | V | Min | I _{IN} = -18 mA |
| V _{OH} | Output HIGH Voltage | 54F 10% V _{CC} 54F 10% V _{CC} 74F 10% V _{CC} 74F 10% V _{CC} 74F 5% V _{CC} 74F 5% V _{CC} | 2.5 2.4 2.5 2.4 2.7 2.7 | | V | Min | I _{OH} = -1 mA I _{OH} = -3 mA I _{OH} = -1 mA I _{OH} = -3 mA I _{OH} = -1 mA I _{OH} = -3 mA |
| V _{OL} | Output LOW Voltage | 54F 10% V _{CC} 74F 10% V _{CC} | | 0.5 0.5 | V | Min | I _{OL} = 20 mA I _{OL} = 24 mA |
| I _{IH} | Input HIGH Current | | | 20 | μA | Max | V _{IN} = 2.7V |
| I _{BVI} | Input HIGH Current Breakdown Test | | | 100 | μA | Max | V _{IN} = 7.0V |
| I _{IL} | Input LOW Current | | | -0.6 | mA | Max | V _{IN} = 0.5V |
| I _{OZH} | Output Leakage Current | | | 50 | μA | Max | V _{OUT} = 2.7V |
| I _{OZL} | Output Leakage Current | | | -50 | μA | Max | V _{OUT} = 0.5V |
| I _{OS} | Output Short-Circuit Current | | | -60 | mA | Max | V _{OUT} = 0V |
| I _{CEX} | Output HIGH Leakage Current | | | 250 | μA | Max | V _{OUT} = V _{CC} |
| I _{ZZ} | Bus Drainage Test | | | 500 | μA | 0.0V | V _{OUT} = V _{CC} |
| I _{CCZ} | Power Supply Current | | 69 | 92 | mA | Max | V _O = HIGH Z |

AC Electrical Characteristics: See Section 2 for Waveforms and Load Configurations

| Symbol | Parameter | 74F | | | 54F | | 74F | | Units | Fig No |
|--------------------------------------|---|---|-----|------|--|-----|--|------|-------|--------|
| | | T _A = +25°C V _{CC} = +5.0V C _L = 50 pF | | | T _A , V _{CC} = MII C _L = 50 pF | | T _A , V _{CC} = Com C _L = 50 pF | | | |
| | | Min | Typ | Max | Min | Max | Min | Max | | |
| t _{PLH} t _{PHL} | Propagation Delay D _n to O _n | 2.5 | | 8.0 | | | 2.0 | 9.0 | ns | 2-3 |
| | | 1.5 | | 6.5 | | | 1.5 | 7.0 | | |
| t _{PLH} t _{PHL} | Propagation Delay LE to O _n | 5.0 | | 12.0 | | | 4.5 | 13.5 | ns | 2-3 |
| | | 2.0 | | 7.5 | | | 2.0 | 8.0 | | |
| t _{pZH} t _{pZL} | Output Enable Time OE to O _n | 2.5 | | 8.5 | | | 2.0 | 9.5 | ns | 2-5 |
| | | 2.5 | | 9.0 | | | 2.0 | 10.0 | | |
| t _{PHZ} t _{PLZ} | Output Disable Time OE to O _n | 1.0 | | 6.5 | | | 1.0 | 7.5 | ns | 2-5 |
| | | 1.0 | | 6.5 | | | 1.0 | 7.5 | | |

AC Operating Requirements: See Section 2 for Waveforms

| Symbol | Parameter | 74F | | 54F | | 74F | | Units | Fig No |
|--|---|---|-----|--|-----|--|-----|-------|--------|
| | | T _A = +25°C V _{CC} = +5.0V | | T _A , V _{CC} = MII | | T _A , V _{CC} = Com | | | |
| | | Min | Max | Min | Max | Min | Max | | |
| t _s (H) t _s (L) | Setup Time, HIGH or LOW D _n to LE | 2.0 | | | | 2.5 | | ns | 2-6 |
| | | 2.0 | | | | 2.5 | | | |
| t _h (H) t _h (L) | Hold Time, HIGH or LOW D _n to LE | 2.5 | | | | 3.0 | | ns | 2-4 |
| | | 3.0 | | | | 3.5 | | | |
| t _w (H) | LE Pulse Width, HIGH | 4.0 | | | | 4.0 | | ns | 2-4 |