



## F100124 Hex TTL-to-ECL Translator

### General Description

The F100124 is a hex translator, designed to convert TTL logic levels to 100K ECL logic levels. The inputs are compatible with standard or Schottky TTL. A common Enable input (E), when LOW, holds all inverting outputs HIGH and holds all true outputs LOW. The differential outputs allow each circuit to be used as an inverting/non-inverting translator or as a differential line driver. The output levels are voltage compensated.

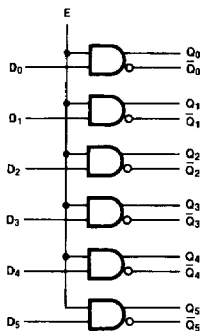
When the circuit is used in the differential mode, the F100124, due to its high common mode rejection, overcomes voltage gradients between the TTL and ECL ground systems. The  $V_{EE}$  and  $V_{TTL}$  power may be applied in either order.

Refer to the F100324 datasheet for:

- PCC packaging
- Lower power
- Military versions
- Extended voltage specs ( $-4.2V$  to  $-5.7V$ )

**Ordering Code:** See Section 8

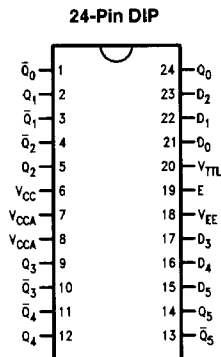
### Logic Symbol



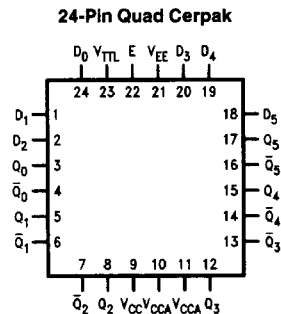
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| Pin Names                 | Description                |
|---------------------------|----------------------------|
| $D_0$ – $D_5$             | Data Inputs                |
| E                         | Enable Input               |
| $Q_0$ – $Q_5$             | Data Outputs               |
| $\bar{Q}_0$ – $\bar{Q}_5$ | Complementary Data Outputs |

### Connection Diagrams



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## Absolute Maximum Ratings

Above which the useful life may be impaired. (Note 1)

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

|  |                 |
|--|-----------------|
| Storage Temperature                            | -65°C to +150°C |
| Maximum Junction Temperature (T <sub>J</sub> ) | +150°C          |
| Case Temperature under Bias (T <sub>C</sub> )  | 0°C to +85°C    |

|  |                           |
|--|---------------------------|
| V <sub>EE</sub> Pin Potential to Ground Pin  | -7.0V to +0.5V            |
| V <sub>TTL</sub> Pin Potential to Ground Pin | +6.0V to -0.5V            |
| Input Voltage (DC)                           | -0.5V to V <sub>TTL</sub> |
| Output Current (DC Output HIGH)              | -50 mA                    |
| Operating Range (V <sub>EE</sub> ) (Note 2)  | -5.7V to -4.2V            |

## DC Electrical Characteristics

V<sub>EE</sub> = -4.5V, V<sub>CC</sub> = V<sub>CCA</sub> = GND, T<sub>C</sub> = 0°C to +85°C (Note 3)

| Symbol            | Parameter           | Min   | Typ   | Max   | Units | Conditions (Note 4)   |                              |
|-------------------|---------------------|-------|-------|-------|-------|---|------------------------------|
| V <sub>OH</sub>   | Output HIGH Voltage | -1025 | -955  | -880  | mV    | V <sub>IN</sub> = V <sub>IH</sub> (Max)<br>or V <sub>IL</sub> (Min) | Loading with<br>50Ω to -2.0V |
| V <sub>OL</sub>   | Output LOW Voltage  | -1810 | -1705 | -1620 |       |   |                              |
| V <sub>OH</sub> C | Output HIGH Voltage | -1035 |       |       | mV    | V <sub>IN</sub> = V <sub>IH</sub> (Min)<br>or V <sub>IL</sub> (Max) | Loading with<br>50Ω to -2.0V |
| V <sub>OL</sub> C | Output LOW Voltage  |       |       | -1610 |       |   |                              |

## DC Electrical Characteristics

V<sub>EE</sub> = -4.2V, V<sub>CC</sub> = V<sub>CCA</sub> = GND, T<sub>C</sub> = 0°C to +85°C (Note 3)

| Symbol            | Parameter           | Min   | Typ | Max   | Units | Conditions (Note 4)   |                              |
|-------------------|---------------------|-------|-----|-------|-------|---|------------------------------|
| V <sub>OH</sub>   | Output HIGH Voltage | -1020 |     | -870  | mV    | V <sub>IN</sub> = V <sub>IH</sub> (Max)<br>or V <sub>IL</sub> (Min) | Loading with<br>50Ω to -2.0V |
| V <sub>OL</sub>   | Output LOW Voltage  | -1810 |     | -1605 |       |   |                              |
| V <sub>OH</sub> C | Output HIGH Voltage | -1030 |     |       | mV    | V <sub>IN</sub> = V <sub>IH</sub> (Min)<br>or V <sub>IL</sub> (Max) | Loading with<br>50Ω to -2.0V |
| V <sub>OL</sub> C | Output LOW Voltage  |       |     | -1595 |       |   |                              |

## DC Electrical Characteristics

V<sub>EE</sub> = -4.8V, V<sub>CC</sub> = V<sub>CCA</sub> = GND, T<sub>C</sub> = 0°C to +85°C (Note 3)

| Symbol            | Parameter           | Min   | Typ | Max   | Units | Conditions (Note 4)   |                              |
|-------------------|---------------------|-------|-----|-------|-------|---|------------------------------|
| V <sub>OH</sub>   | Output HIGH Voltage | -1035 |     | -880  | mV    | V <sub>IN</sub> = V <sub>IH</sub> (Max)<br>or V <sub>IL</sub> (Min) | Loading with<br>50Ω to -2.0V |
| V <sub>OL</sub>   | Output LOW Voltage  | -1830 |     | -1620 |       |   |                              |
| V <sub>OH</sub> C | Output HIGH Voltage | -1045 |     |       | mV    | V <sub>IN</sub> = V <sub>IH</sub> (Min)<br>or V <sub>IL</sub> (Max) | Loading with<br>50Ω to -2.0V |
| V <sub>OL</sub> C | Output LOW Voltage  |       |     | -1610 |       |   |                              |

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

**Note 2:** Parametric values specified at -4.2V to -4.8V.

**Note 3:** The specified limits represent the "worst case" value for the parameter. Since these "worst case" values normally occur at the temperature extremes, additional noise immunity and guard banding can be achieved by decreasing the allowable system operating ranges.

**Note 4:** Conditions for testing shown in the tables are chosen to guarantee operation under "worst case" conditions.

**DC Electrical Characteristics**
 $V_{EE} = -4.2V$  to  $-4.8V$  unless otherwise specified,  $V_{CC} = V_{CCA} = GND$ ,  $V_{TTL} = +4.5V$  to  $+5.5V$ ,  $T_C = 0^\circ C$  to  $+85^\circ C$ 

| Symbol    | Parameter                                     | Min          | Typ | Max       | Units   | Conditions  |
|-----------|---|--------------|-----|-----------|---------|---|
| $V_{IH}$  | Input HIGH Voltage                            | 2.0          |     | 5.0       | V       | Guaranteed HIGH Signal for All Inputs                 |
| $V_{IL}$  | Input LOW Voltage                             | 0            |     | 0.8       | V       | Guaranteed LOW Signal for All Inputs                  |
| $V_{CD}$  | Input Clamp Diode Voltage                     | -1.5         |     |           | V       | $I_{IN} = -10$ mA                                     |
| $I_{IH}$  | Input HIGH Current Data Enable                |              |     | 20<br>120 | $\mu A$ | $V_{IN} = +2.4V$ , All Other Inputs $V_{IN} = GND$    |
|           | Input HIGH Current Breakdown Test, All Inputs |              |     | 1.0       | mA      | $V_{IN} = +5.5V$ , All Other Inputs = GND             |
| $I_{IL}$  | Input LOW Current Data Enable                 | -1.6<br>-9.6 |     |           | mA      | $V_{IN} = +0.4V$ , All Other Inputs $V_{IN} = V_{IH}$ |
|           |   |              |     |           |         |   |
| $I_{EE}$  | $V_{EE}$ Power Supply Current                 | -140         | -96 | -52       | mA      | All Inputs $V_{IN} = +4.0V$                           |
| $I_{TTL}$ | $V_{TTL}$ Power Supply Current                |              | 44  | 75        | mA      | All Inputs $V_{IN} = GND$                             |

**Ceramic Dual-In-Line Package AC Electric Characteristics**
 $V_{EE} = -4.2V$  to  $-4.8V$ ,  $V_{CC} = V_{CCA} = GND$ ,  $V_{TTL} = +4.5V$  to  $+5.5V$ 

| Symbol                 | Parameter                                   | $T_C = 0^\circ C$ |      | $T_C = +25^\circ C$ |      | $T_C = +85^\circ C$ |      | Units | Conditions             |
|------------------------|---|-------------------|------|---------------------|------|---------------------|------|-------|------------------------|
|                        |   | Min               | Max  | Min                 | Max  | Min                 | Max  |       |                        |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay Data and Enable to Output | 0.50              | 3.00 | 0.50                | 2.90 | 0.50                | 3.00 | ns    | <i>Figures 1 and 2</i> |
| $t_{TLH}$<br>$t_{THL}$ | Transition Time 20% to 80%, 80% to 20%      | 0.45              | 1.80 | 0.45                | 1.80 | 0.45                | 1.80 | ns    |                        |

**Cerpak AC Electrical Characteristics**
 $V_{EE} = -4.2V$  to  $-4.8V$ ,  $V_{CC} = V_{CCA} = GND$ ,  $V_{TTL} = +4.5V$  to  $+5.5V$ 

| Symbol                 | Parameter                                   | $T_C = 0^\circ C$ |      | $T_C = +25^\circ C$ |      | $T_C = +85^\circ C$ |      | Units | Conditions             |
|------------------------|---|-------------------|------|---------------------|------|---------------------|------|-------|------------------------|
|                        |   | Min               | Max  | Min                 | Max  | Min                 | Max  |       |                        |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay Data and Enable to Output | 0.50              | 2.80 | 0.50                | 2.70 | 0.50                | 2.80 | ns    | <i>Figures 1 and 2</i> |
| $t_{TLH}$<br>$t_{THL}$ | Transition Time 20% to 80%, 80% to 20%      | 0.45              | 1.70 | 0.45                | 1.70 | 0.45                | 1.70 | ns    |                        |

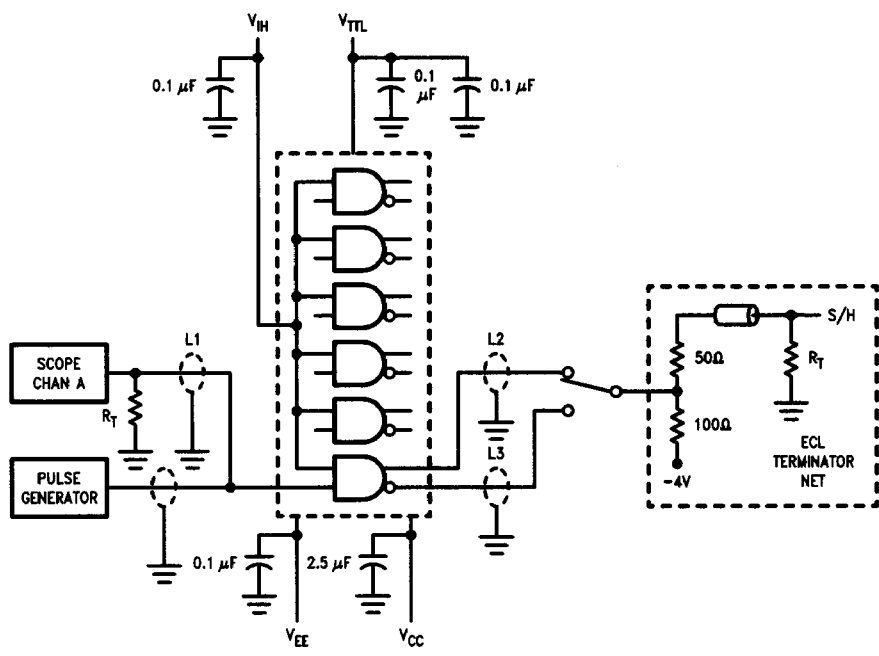


FIGURE 1. AC Test Circuit

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**Notes:**

- V<sub>CC</sub>, V<sub>CCA</sub> = +0V, V<sub>EE</sub> = -4.5V, V<sub>TTL</sub> = +5.0V, V<sub>IH</sub> = +3.0V
- L1, L2 and L3 = equal length 50Ω impedance lines
- R<sub>T</sub> = 50Ω terminator internal to scope
- Decoupling 0.1 μF from GND to V<sub>CC</sub>, V<sub>EE</sub> and V<sub>TTL</sub>
- All unused outputs are loaded with 50Ω to GND
- C<sub>L</sub> = Fixture and stray capacitance ≤ 3 pF

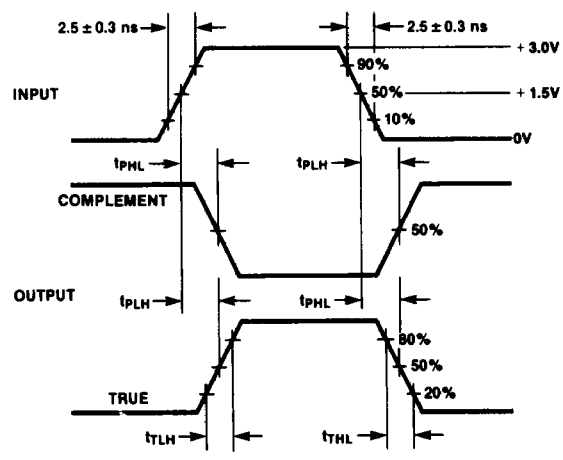


FIGURE 2. Propagation Delay and Transition Times

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