



## F100102

### Quint 2-Input OR/NOR Gate

#### General Description

The F100102 is a monolithic quint 2-input OR/NOR gate with common enable. All inputs have 50 k $\Omega$  pull-down resistors and all outputs are buffered.

Refer to the F100302 datasheet for:

PCC packaging

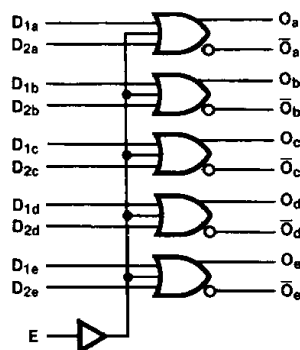
Lower power

Military versions

Extended voltage specs (–4.2V to –5.7V)

**Ordering Code:** See Section 8

#### Logic Symbol



TL/F/9836-3

| Pin Names                        | Description                |
|----------------------------------|----------------------------|
| D <sub>1a</sub> –D <sub>1e</sub> | Data Inputs                |
| E                                | Enable Input               |
| O <sub>a</sub> –O <sub>e</sub>   | Data Outputs               |
| O <sub>a</sub> –O <sub>e</sub>   | Complementary Data Outputs |

TABLE 1. F100102 Truth Table

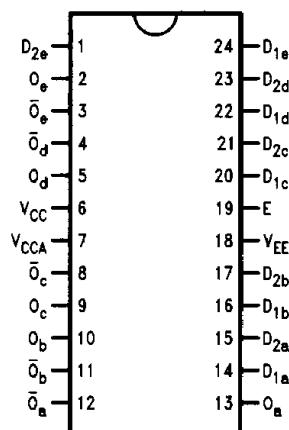
| D <sub>1x</sub> | D <sub>2x</sub> | E | O <sub>x</sub> | O <sub>x</sub> |
|-----------------|-----------------|---|----------------|----------------|
| L               | L               | L | L              | H              |
| L               | L               | H | H              | L              |
| L               | H               | L | H              | L              |
| L               | H               | H | H              | L              |
| H               | L               | L | H              | L              |
| H               | L               | H | H              | L              |
| H               | H               | L | H              | L              |
| H               | H               | H | H              | L              |

H = HIGH Voltage Level

L = LOW Voltage Level

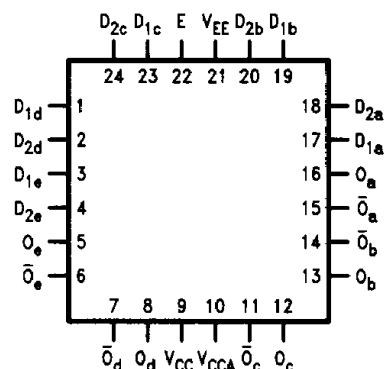
#### Connection Diagrams

24-Pin DIP



TL/F/9836-1

24-Pin Quad Cerpak



TL/F/9836-2

## 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  $-65^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$

Maximum Junction Temperature ( $T_J$ )  $+150^{\circ}\text{C}$

Case Temperature under Bias ( $T_C$ )  $0^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$

$V_{EE}$  Pin Potential to Ground Pin

$-7.0\text{V}$  to  $+0.5\text{V}$

Input Voltage (DC)

$V_{EE}$  to  $+0.5\text{V}$

Output Current (DC Output HIGH)

$-50\text{ mA}$

Operating Range (Note 2)

$-5.7\text{V}$  to  $-4.2\text{V}$

## DC Electrical Characteristics

$V_{EE} = -4.5\text{V}$ ,  $V_{CC} = V_{CCA} = \text{GND}$ ,  $T_C = 0^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  (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(Max)</sub> or V <sub>IL(Min)</sub> | Loading with 50Ω to −2.0V |
| V <sub>OL</sub>  | Output LOW Voltage  | −1810 | −1705 | −1620 | mV    |                                                                |                           |
| V <sub>OHC</sub> | Output HIGH Voltage | −1035 |       |       | mV    | V <sub>IN</sub> = V <sub>IH(Min)</sub> or V <sub>IL(Max)</sub> | Loading with 50Ω to −2.0V |
| V <sub>OLC</sub> | Output LOW Voltage  |       |       | −1610 | mV    |                                                                |                           |
| V <sub>IH</sub>  | Input HIGH Voltage  | −1165 |       | −880  | mV    | Guaranteed HIGH Signal for All Inputs                          |                           |
| V <sub>IL</sub>  | Input LOW Voltage   | −1810 |       | −1475 | mV    | Guaranteed LOW Signal for All Inputs                           |                           |
| I <sub>IL</sub>  | Input LOW Current   | 0.50  |       |       | μA    | V <sub>IN</sub> = V <sub>IL(Min)</sub>                         |                           |

## DC Electrical Characteristics

$V_{EE} = -4.2\text{V}$ ,  $V_{CC} = V_{CCA} = \text{GND}$ ,  $T_C = 0^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  (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(Max)</sub> or V <sub>IL(Min)</sub> | Loading with<br>50Ω to −2.0V |
| V <sub>OL</sub>  | Output LOW Voltage  | −1810 |     | −1605 | mV    |                                                                |                              |
| V <sub>OHC</sub> | Output HIGH Voltage | −1030 |     |       | mV    | V <sub>IN</sub> = V <sub>IH(Min)</sub> or V <sub>IL(Max)</sub> | Loading with<br>50Ω to −2.0V |
| V <sub>OLC</sub> | Output LOW Voltage  |       |     | −1595 | mV    |                                                                |                              |
| V <sub>IH</sub>  | Input HIGH Voltage  | −1150 |     | −870  | mV    | Guaranteed HIGH Signal for All Inputs                          |                              |
| V <sub>IL</sub>  | Input LOW Voltage   | −1810 |     | −1475 | mV    | Guaranteed LOW Signal for All Inputs                           |                              |
| I <sub>IL</sub>  | Input LOW Current   | 0.50  |     |       | μA    | V <sub>IN</sub> = V <sub>IL(Min)</sub>                         |                              |

## DC Electrical Characteristics

$V_{EE} = -4.8\text{V}$ ,  $V_{CC} = V_{CCA} = \text{GND}$ ,  $T_C = 0^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  (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(Max)</sub> or V <sub>IL(Min)</sub> | Loading with<br>50Ω to − 2.0V |
| V <sub>OL</sub>  | Output LOW Voltage  | − 1830 |     | − 1620 | mV    |                                                                |                               |
| V <sub>OHC</sub> | Output HIGH Voltage | − 1045 |     |        | mV    | V <sub>IN</sub> = V <sub>IH(Min)</sub> or V <sub>IL(Max)</sub> | Loading with<br>50Ω to − 2.0V |
| V <sub>OLC</sub> | Output LOW Voltage  |        |     | − 1610 | mV    |                                                                |                               |
| V <sub>IH</sub>  | Input HIGH Voltage  | − 1165 |     | − 880  | mV    | Guaranteed HIGH Signal for All Inputs                          |                               |
| V <sub>IL</sub>  | Input LOW Voltage   | − 1830 |     | − 1490 | mV    | Guaranteed LOW Signal for All Inputs                           |                               |
| I <sub>IL</sub>  | Input LOW Current   | 0.50   |     |        | μA    | V <sub>IN</sub> = V <sub>IL(Min)</sub>                         |                               |

**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  $-4.2\text{V}$  to  $-4.8\text{V}$ .

**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,  $V_{CC} = V_{CCA} = GND$ ,  $T_C = 0^\circ C$  to  $+85^\circ C$

| Symbol   | Parameter                         | Min | Typ | Max        | Units   | Conditions             |
|----------|-----------------------------------|-----|-----|------------|---------|------------------------|
| $I_{IH}$ | Input HIGH Current<br>Data Enable |     |     | 350<br>300 | $\mu A$ | $V_{IN} = V_{IH(Max)}$ |
| $I_{EE}$ | Power Supply Current              | -80 | -55 | -38        | mA      | Inputs Open            |

## Ceramic Dual-In-Line Package AC Characteristics

$V_{EE} = -4.2V$  to  $-4.8V$ ,  $V_{CC} = V_{CCA} = GND$

| 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<br>Data to Output       | 0.45              | 1.35 | 0.45                | 1.15 | 0.45                | 1.40 | ns    | Figures 1 and 2 |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay<br>Enable to Output     | 0.95              | 2.15 | 0.95                | 2.15 | 0.95                | 2.20 | ns    |                 |
| $t_{TLH}$<br>$t_{THL}$ | Transition Time<br>20% to 80%, 80% to 20% | 0.45              | 1.30 | 0.45                | 1.20 | 0.45                | 1.20 | ns    |                 |

## Cerpak AC Characteristics

$V_{EE} = -4.2V$  to  $-4.8V$ ,  $V_{CC} = V_{CCA} = GND$

| 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<br>Data to Output       | 0.45              | 1.15 | 0.45                | 0.95 | 0.45                | 1.20 | ns    | Figures 1 and 2 |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay<br>Enable to Output     | 0.95              | 1.95 | 0.95                | 1.95 | 0.95                | 2.00 | ns    |                 |
| $t_{TLH}$<br>$t_{THL}$ | Transition Time<br>20% to 80%, 80% to 20% | 0.45              | 1.20 | 0.45                | 1.10 | 0.45                | 1.10 | ns    |                 |

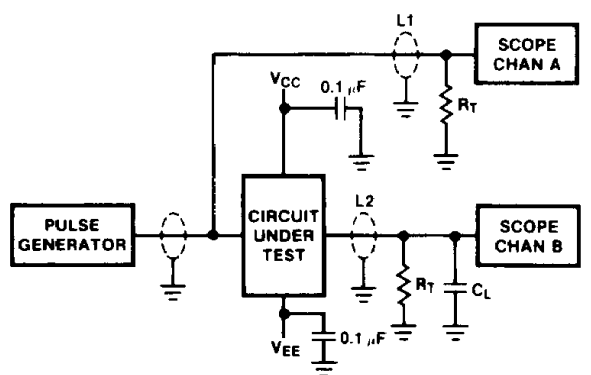


FIGURE 1. AC Test Circuit

TL/F/9836-5

### Notes:

- $V_{CC}, V_{CCA} = +2V$ ,  $V_{EE} = -2.5V$
- $L1$  and  $L2$  = equal length  $50\Omega$  impedance lines
- $R_T = 50\Omega$  terminator internal to scope
- Decoupling  $0.1 \mu F$  from GND to  $V_{CC}$  and  $V_{EE}$
- All unused outputs are loaded with  $50\Omega$  to GND
- $C_L$  = Fixture and stray capacitance  $\leq 3 pF$

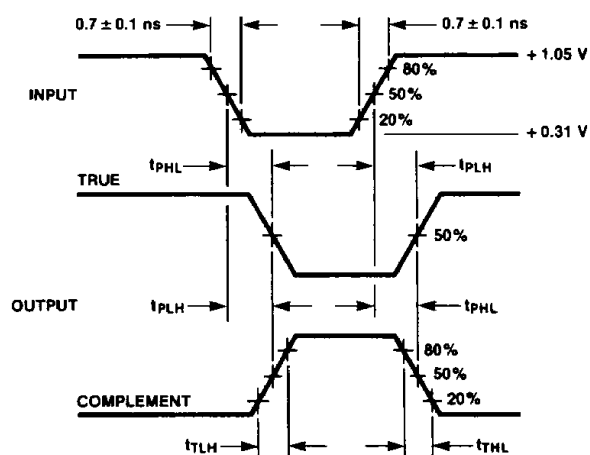


FIGURE 2. Propagation Delay and Transition Times

TL/F/9836-6