National Semiconductor



# F100101
# Triple 5-Input OR/NOR Gate

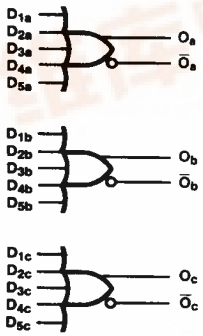
## General Description

The F100101 is a monolithic triple 5-input OR/NOR gate. All inputs have 50 kΩ pull-down resistors and all outputs are buffered.

Refer to the F100301 datasheet for:
- PCC packaging
- Lower power
- Military versions
- Extended voltage specs (−4.2V to −5.7V)

## Ordering Code: See Section 8

## Logic Symbol

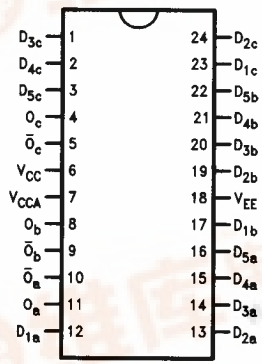



TL/F/9835–3

| Pin Names | Description |
|---|---|
| $D_{na}$, $D_{nb}$, $D_{nc}$ | Data Inputs |
| $O_a$, $O_b$, $O_c$ | Data Outputs |
| $\overline{O}_a$, $\overline{O}_b$, $\overline{O}_c$ | Complementary Data Outputs |

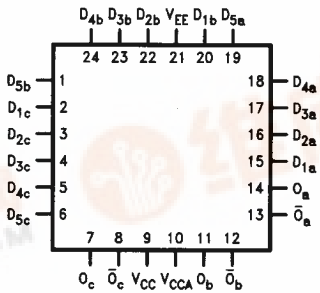
## Connection Diagrams

**24-Pin DIP**




TL/F/9835–1

**24-Pin Quad Cerpak**




TL/F/9835–2

## 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°C to +150°C |
| Maximum Junction Temperature ($T_J$) | +150°C |
| Case Temperature under Bias ($T_C$) | 0°C to +85°C |
| $V_{EE}$ Pin Potential to Ground Pin | −7.0V to +0.5V |
| Input Voltage (DC) | $V_{EE}$ to +0.5V |
| Output Current (DC Output HIGH) | −50 mA |
| Operating Range (Note 2) | −5.7V to −4.2V |

## DC Electrical Characteristics

$V_{EE}$ = −4.5V, $V_{CC}$ = $V_{CCA}$ = GND, $T_C$ = 0°C to +85°C (Note 3)

| Symbol | Parameter | Min | Typ | Max | Units | Conditions (Note 4) | |
|---|---|---|---|---|---|---|---|
| $V_{OH}$ | Output HIGH Voltage | −1025 | −955 | −880 | mV | $V_{IN}$ = $V_{IH}$ (Max) or $V_{IL}$ (Min) | Loading with 50Ω to −2.0V |
| $V_{OL}$ | Output LOW Voltage | −1810 | −1705 | −1620 | | | |
| $V_{OHC}$ | Output HIGH Voltage | −1035 | | | mV | $V_{IN}$ = $V_{IH(Min)}$ or $V_{IL}$ (Max) | Loading with 50Ω to −2.0V |
| $V_{OLC}$ | Output LOW Voltage | | | −1610 | | | |
| $V_{IH}$ | Input HIGH Voltage | −1165 | | −880 | mV | Guaranteed HIGH Signal for All Inputs | |
| $V_{IL}$ | Input LOW Voltage | −1810 | | −1475 | mV | Guaranteed LOW Signal for All Inputs | |
| $I_{IL}$ | Input LOW Current | 0.50 | | | μA | $V_{IN}$ = $V_{IL}$ (Min) | |

## DC Electrical Characteristics

$V_{EE}$ = −4.2V, $V_{CC}$ = $V_{CCA}$ = GND, $T_C$ = 0°C to +85°C (Note 3)

| Symbol | Parameter | Min | Typ | Max | Units | Conditions (Note 4) | |
|---|---|---|---|---|---|---|---|
| $V_{OH}$ | Output HIGH Voltage | −1020 | | −870 | mV | $V_{IN}$ = $V_{IH}$ (Max) or $V_{IL}$ (Min) | Loading with 50Ω to −2.0V |
| $V_{OL}$ | Output LOW Voltage | −1810 | | −1605 | | | |
| $V_{OHC}$ | Output HIGH Voltage | −1030 | | | mV | $V_{IN}$ = $V_{IH}$ (Min) or $V_{IL}$ (Max) | Loading with 50Ω to −2.0V |
| $V_{OLC}$ | Output LOW Voltage | | | −1595 | | | |
| $V_{IH}$ | Input HIGH Voltage | −1150 | | −870 | mV | Guaranteed HIGH Signal for All Inputs | |
| $V_{IL}$ | Input LOW Voltage | −1810 | | −1475 | mV | Guaranteed LOW Signal for All Inputs | |
| $I_{IL}$ | Input LOW Current | 0.50 | | | μA | $V_{IN}$ = $V_{IL}$ (Min) | |

## DC Electrical Characteristics

$V_{EE}$ = −4.8V, $V_{CC}$ = $V_{CCA}$ = GND, $T_C$ = 0°C to +85°C (Note 3)

| Symbol | Parameter | Min | Typ | Max | Units | Conditions (Note 4) | |
|---|---|---|---|---|---|---|---|
| $V_{OH}$ | Output HIGH Voltage | −1035 | | −880 | mV | $V_{IN}$ = $V_{IH}$ (Max) or $V_{IL}$ (Min) | Loading with 50Ω to −2.0V |
| $V_{OL}$ | Output LOW Voltage | −1830 | | −1620 | | | |
| $V_{OHC}$ | Output HIGH Voltage | −1045 | | | mV | $V_{IN}$ = $V_{IH}$ (Min) or $V_{IL}$ (Max) | Loading with 50Ω to −2.0V |
| $V_{OLC}$ | Output LOW Voltage | | | −1610 | | | |
| $V_{IH}$ | Input HIGH Voltage | −1165 | | −880 | mV | Guaranteed HIGH Signal for All Inputs | |
| $V_{IL}$ | Input LOW Voltage | −1830 | | −1490 | mV | Guaranteed LOW Signal for All Inputs | |
| $I_{IL}$ | Input LOW Current | 0.50 | | | μA | $V_{IN}$ = $V_{IL}$ (Min) | |

**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, $T_C$ = 0°C to +85°C

| Symbol | Parameter | Min | Typ | Max | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_{IH}$ | Input HIGH Current | | | 350 | μA | $V_{IN}$ = $V_{IH\ (Max)}$ |
| $I_{EE}$ | Power Supply Current | −38 | −26 | −18 | mA | Inputs Open |



## Ceramic Dual-In-Line Package AC Electrical Characteristics

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

| Symbol | Parameter | $T_C$ = 0°C | | $T_C$ = +25°C | | $T_C$ = +85°C | | Units | Conditions |
|---|---|---|---|---|---|---|---|---|---|
| | | Min | Max | Min | Max | Min | Max | | |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay<br>Data to Output | 0.50 | 1.15 | 0.50 | 1.15 | 0.55 | 1.30 | ns | *Figures 1* and *2* |
| $t_{TLH}$<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 Electrical Characteristics

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

| Symbol | Parameter | $T_C$ = 0°C | | $T_C$ = +25°C | | $T_C$ = +85°C | | Units | Conditions |
|---|---|---|---|---|---|---|---|---|---|
| | | Min | Max | Min | Max | Min | Max | | |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay<br>Data to Output | 0.50 | 0.95 | 0.50 | 0.95 | 0.55 | 1.10 | ns | *Figures 1* and *2* |
| $t_{TLH}$<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 | |

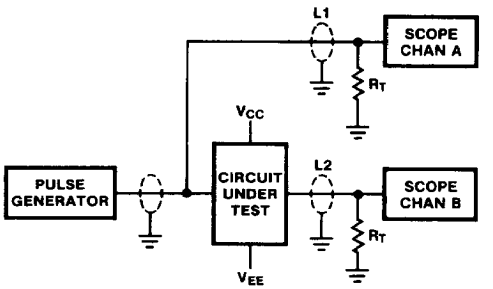



**FIGURE 1. AC Test Circuit**

**Notes:**
$V_{CC}$, $V_{CCA}$ = +2V, $V_{EE}$ = −2.5V
L1 and L2 = equal length 50Ω impedance lines
$R_T$ = 50Ω terminator internal to scope
Decoupling 0.1 μF from GND to $V_{CC}$ and $V_{EE}$
All unused outputs are loaded with 50Ω to GND
$C_L$ = Fixture and stray capacitance ≤ 3 pF

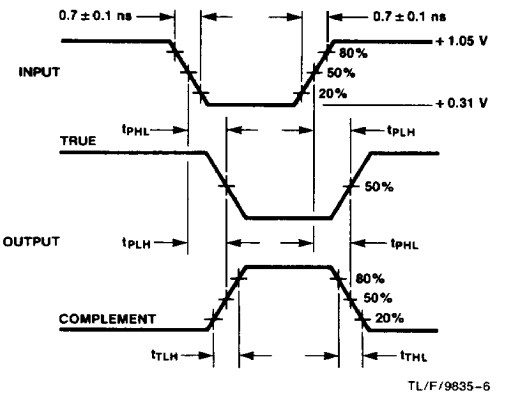



**FIGURE 2. Propagation Delay and Transition Times**