# NL17SZ125DFT2G-TP

## BUS BUFFER/LINE DRIVER 3-STATE



## Features

- Operate from 1.65V to 5.5V
- Inputs Accept Voltages to 5.5V
- High Noise Immunity
- Low Power Dissipation
- ESD Protection Exceeds JESD 22
  -2000-V Human-Body Model (A114-A)
  -200-V Machine Model (A115-A)
  -1000-V Charged-Device Model (C101)

## Applications

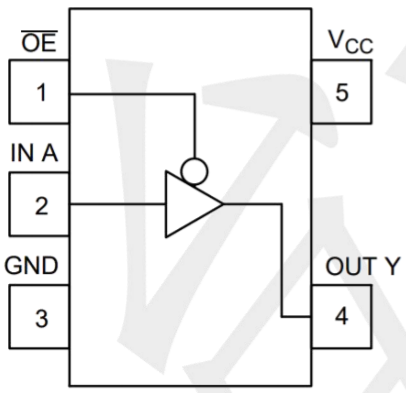
- AV Receiver
- Audio Dock:Portable
- Blu-ray Player and Home Theater
- Embedded PC
- Personal Digital Assistant(PDA)
- Power:Telecom/Server AC/DC Supply:Single Controller:Analog and Digital
- Solid State Drive(SSD):Client and Enterprise
- Wireless Headset,Keyboard,and Mouse

## General Description

The NL17SZ125DFT2G-TP is a single bus buffer/line driver with 3-state output. When the output enable ( $\overline{OE}$ ) is high the output will be disabled. In contrast, when the $\overline{OE}$ is low, true data will pass from A input to the Y output. This device has power-down protective circuit to prevent the device from destruction when it is powered down.

## Logic Diagram


## Pin Configuratio




SOT353

## Function Table

| INPUT( $\overline{OE}$ ) | INPUT(A) | OUTPUT(Y) |
|---|---|---|
| L | L | L |
| L | H | H |
| H | X | Z |

Note: H: HIGH voltage level; L: LOW voltage level; X=don't care; Z=high-impedance OFF-state.

## Absolute Maximum Ratings

| PARAMETER | | SYMBOL | CONDITIONS | RATINGS | UNIT |
|---|---|---|---|---|---|
| Supply Voltage | | $V_{CC}$ | | -0.5 ~ +6.5 | V |
| Input Voltage | | $V_{IN}$ | | -0.5 ~ +6.5 | V |
| Output Voltage | Enable mode | $V_{OUT}$ | | -0.5 ~ $V_{CC}$ + 0.5 | V |
| | Disable mode | | | -0.5 ~ +6.5 | V |
| | Power-down mode | | | -0.5 ~ +6.5 | V |
| VCC or GND Current | | $I_{CC}$ | Output in the Power-off state | ±100 | mA |
| Continuous Output Current | | $I_{OUT}$ | VOUT=0~VCC | ±50 | mA |
| Input Clamp Current | | $I_{IK}$ | VIN<0 | -50 | mA |
| Output Clamp Current | | $I_{OK}$ | VOUT<0 | -50 | mA |
| Storage Temperature Range | | $T_{STG}$ | | -65 ~ +150 | ℃ |
| Junction to Ambient | | $\theta_{JA}$ | SOT353 | 280 | ℃/W |

**Note:** Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## Recommended Operating Conditions

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | Operating | 1.65 | -- | 5.5 | V |
| Input Voltage | $V_{IN}$ | | 0 | -- | 5.5 | V |
| Output Voltage | $V_{OUT}$ | VCC=1.65V ~ 5.5V; Enable mode | 0 | -- | VCC | V |
| | | VCC=1.65V ~ 5.5V; Disable mode | 0 | -- | 5.5 | V |
| | | VCC=0V; Power-down mode | 0 | -- | 5.5 | V |
| Input Transition Rise or Fall Rate | $t_R/t_F$ | VCC=1.65V ~ 2.7V | -- | -- | 20 | ns/V |
| | | VCC=2.7V ~ 5.5V | -- | -- | 10 | ns/V |
| Operating Temperature | $T_A$ | | -40 | -- | 125 | ℃ |

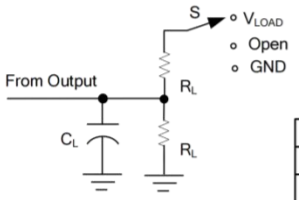
## Electrical Characteristics (unless otherwise specified)

| PARAMETER | SYMBOL | TEST Conditions | TA=25°C | | | TA=-40°C~+125°C | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| High-Level Input Voltage | $V_{IH}$ | $V_{CC}$=1.65V ~ 1.95V | 0.65×$V_{CC}$ | -- | -- | 0.65×$V_{CC}$ | -- | -- | V |
| | | $V_{CC}$=2.3V ~ 2.7V | 1.7 | -- | -- | 1.7 | -- | -- | V |
| | | $V_{CC}$=3V ~ 3.6V | 2 | -- | -- | 2 | -- | -- | V |
| | | $V_{CC}$=4.5V ~ 5.5V | 0.7×$V_{CC}$ | -- | -- | 0.7×$V_{CC}$ | -- | -- | V |
| Low-Level Input Voltage | $V_{IL}$ | $V_{CC}$=1.65V ~ 1.95V | -- | -- | 0.35×$V_{CC}$ | -- | -- | 0.35×$V_{CC}$ | V |
| | | $V_{CC}$=2.3V ~ 2.7V | -- | -- | 0.7 | -- | -- | 0.7 | V |
| | | $V_{CC}$=3V ~ 3.6V | -- | -- | 0.8 | -- | -- | 0.8 | V |
| | | $V_{CC}$=4.5V ~ 5.5V | -- | -- | 0.35×$V_{CC}$ | -- | -- | 0.35×$V_{CC}$ | V |
| High-Level Output Voltage | $V_{OH}$ | $V_{CC}$=1.65 ~ 5.5V, $I_{OH}$=-100μA | $V_{CC}$ -0.1 | -- | -- | $V_{CC}$ -0.1 | -- | -- | V |
| | | $V_{CC}$=1.65V, $I_{OH}$=-4mA | 1.2 | -- | -- | 0.95 | -- | -- | V |
| | | $V_{CC}$=2.3V, $I_{OH}$=-8mA | 1.9 | -- | -- | 1.7 | -- | -- | V |
| | | $V_{CC}$=2.7V, $I_{OH}$=-12mA | 2.2 | -- | -- | 1.9 | -- | -- | V |
| | | $V_{CC}$=3.0V, $I_{OH}$=-24mA | 2.3 | -- | -- | 2 | -- | -- | V |
| | | $V_{CC}$=4.5V, $I_{OH}$=-32mA | 3.8 | -- | -- | 3.4 | -- | -- | V |
| Low-Level Output Voltage | $V_{OL}$ | $V_{CC}$=1.65 ~ 5.5V, $I_{OL}$=100μA | -- | -- | 0.1 | -- | -- | 0.1 | V |
| | | $V_{CC}$=1.65V, $I_{OL}$=4mA | -- | -- | 0.45 | -- | -- | 0.7 | V |
| | | $V_{CC}$=2.3V, $I_{OL}$=8mA | -- | -- | 0.3 | -- | -- | 0.45 | V |
| | | $V_{CC}$=3.0V,$I_{OH}$=16mA | -- | -- | 0.4 | -- | -- | 0.6 | V |
| | | $V_{CC}$=3.0V,$I_{OH}$=24mA | -- | -- | 0.55 | -- | -- | 0.8 | V |
| | | $V_{CC}$=4.5V, $I_{OH}$=32mA | -- | -- | 0.55 | -- | -- | 0.8 | V |
| Input Leakage Current | $I_{I(LEAK)}$ | $V_{CC}$=0 ~ 5.5V, $V_{IN}$=5.5V or GND | -- | ±0.1 | ±5 | -- | -- | ±5 | uA |
| Power OFF Leakage Current | $I_{OFF}$ | $V_{CC}$=0V, $V_{IN}$ or $V_{OUT}$=5.5V | -- | ±0.1 | ±10 | -- | -- | ±10 | uA |
| Quiescent Supply Current | $I_Q$ | $V_{CC}$=1.65 ~ 5.5V, $V_{IN}$=$V_{CC}$ or GND, $I_{OUT}$=0A | -- | ±0.1 | 10 | -- | -- | ±10 | uA |
| Additional Quiescent Supply ent Per Input Pin | $\Delta I_Q$ | $V_{CC}$=3 ~ 5.5V, One input at $V_{CC}$-0.6V, Other inputs at $V_{CC}$ or GND | -- | 5 | 500 | -- | -- | 500 | uA |

## SWITCHING CHARACTERISTICS ( unless otherwise specified)

| PARAMETER | SYMBOL | TEST Conditions | | TA=25°C | | | TA=-40°C~+125°C | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| Propagation Delay From Input A to Output Y | $t_{PLH}$ / $t_{PHL}$ | $C_L$=30pF | $V_{CC}$=1.8±0.15V,$R_L$=1KΩ | 1 | 12 | 19 | -- | -- | 21 | nS |
| | | | $V_{CC}$=2.5±0.2V, $R_L$=500Ω | 0.5 | 8 | 15 | -- | -- | 17 | nS |
| | | CL=50pF RL=500Ω | $V_{CC}$=2.7V | 0.5 | 6 | 12 | -- | -- | 14 | nS |
| | | | $V_{CC}$=3.3±0.3V | 0.5 | 5 | 9 | -- | -- | 11 | nS |
| | | | $V_{CC}$=5±0.5V | 0.5 | 3 | 7 | -- | -- | 9 | nS |
| 3-State Output Enable Time From Input $\overline{OE}$ to Output Y | $t_{PZH}$ / $t_{PZL}$ | $C_L$=30pF | $V_{CC}$=1.8±0.15V,$R_L$=1KΩ | 1 | 10 | 19 | -- | -- | 21 | nS |
| | | | $V_{CC}$=2.5±0.2V, $R_L$=500Ω | 0.5 | 7 | 15 | -- | -- | 17 | nS |
| | | CL=50pF RL=500Ω | $V_{CC}$=2.7V | 0.5 | 6 | 12 | -- | -- | 14 | nS |
| | | | $V_{CC}$=3.3±0.3V | 0.5 | 5 | 9 | -- | -- | 11 | nS |
| | | | $V_{CC}$=5±0.5V | 0.5 | 4 | 7 | -- | -- | 9 | nS |
| 3-State Output Disable Time From Input $\overline{OE}$ to Output Y | $t_{PLZ}$ / $t_{PHZ}$ | $C_L$=30pF | $V_{CC}$=1.8±0.15V,$R_L$=1KΩ | 1 | 5 | 10 | -- | -- | 12 | nS |
| | | | $V_{CC}$=2.5±0.2V, $R_L$=500Ω | 0.5 | 4 | 8 | -- | -- | 10 | nS |
| | | CL=50pF RL=500Ω | $V_{CC}$=2.7V | 0.5 | 4 | 7 | -- | -- | 9 | nS |
| | | | $V_{CC}$=3.3±0.3V | 0.5 | 3 | 6 | -- | -- | 8 | nS |
| | | | $V_{CC}$=5±0.5V | 0.5 | 3 | 5 | -- | -- | 7 | nS |

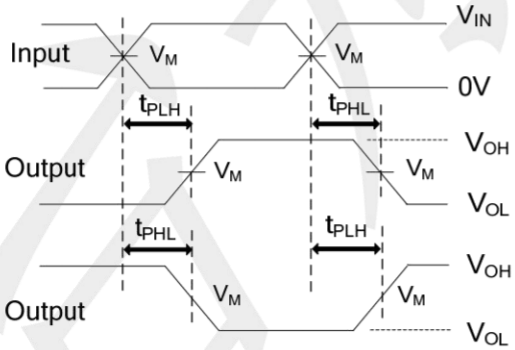
## TEST CIRCUIT AND WAVEFORMS



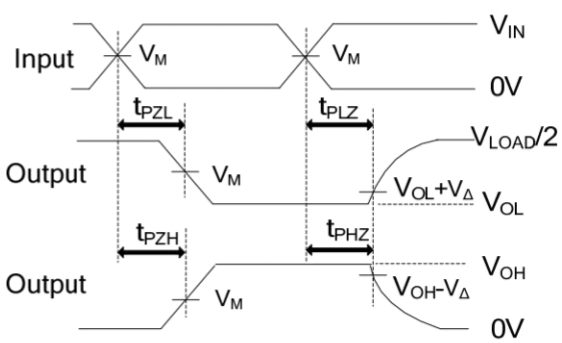

TEST CIRCUIT

| TEST | S |
|---|---|
| $t_{PLH}/t_{PHL}$ | Open |
| $t_{PHZ}/t_{PZH}$ | GND |
| $t_{PLZ}/t_{PZL}$ | $V_{LOAD}$ |

| $V_{CC}$ | INPUTS $V_{IN}$ | INPUTS $t_R$, $t_F$ | $V_M$ | $V_{LOAD}$ | $V_\Delta$ | $C_L$ | $R_L$ |
|---|---|---|---|---|---|---|---|
| 1.8V±0.15V | $V_{CC}$ | ≤2ns | $V_{CC}$/2 | 2 x $V_{CC}$ | 0.15V | 30pF | 1KΩ |
| 2.5V±0.2V | $V_{CC}$ | ≤2ns | $V_{CC}$/2 | 2 x $V_{CC}$ | 0.15V | 30pF | 500Ω |
| 2.7V | 2.7V | ≤2.5ns | 1.5V | 6V | 0.3V | 50pF | 500Ω |
| 3.3V±0.3V | 2.7V | ≤2.5ns | 1.5V | 6V | 0.3V | 50pF | 500Ω |
| 5V±0.5V | $V_{CC}$ | ≤2.5ns | $V_{CC}$/2 | 2 x $V_{CC}$ | 0.3V | 50pF | 500Ω |




PROPAGATION DELAY TIMES

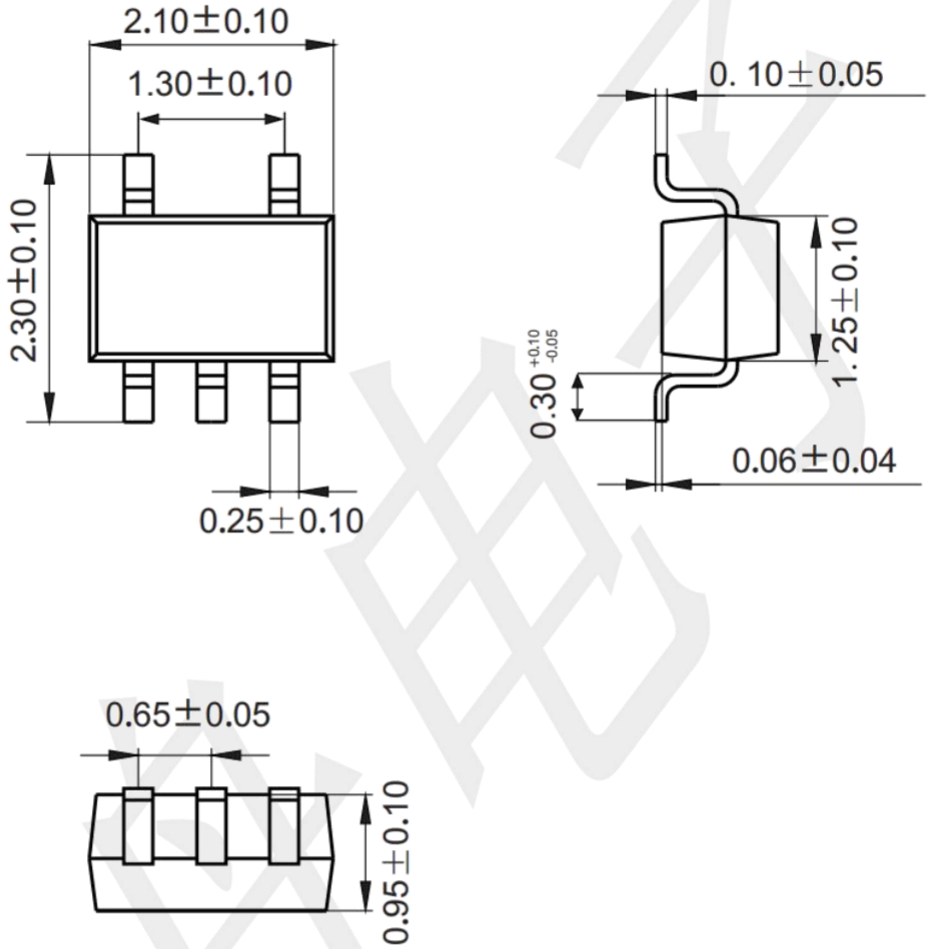



ENABLE AND DISABLE TIMES

Note: $C_L$ includes probe and jig capacitance.
All input pulses are supplied by generators having the following characteristics: $P_{RR}$ ≤10MHz, $Z_O$ = 50Ω.
Notes: 1. $C_L$ includes probe and jig capacitance.
2. All input pulses are supplied by generators having the following characteristics: $P_{RR}$ ≤10MHz, $Z_O$ = 50Ω.

## Package information

**SOT353 (Unit: mm)**




## Mounting Pad Layout (unit: mm)