芯伯乐®
XINBOLE

# Product Specification

## XBLW SN74LS259

8-bit addressable latch

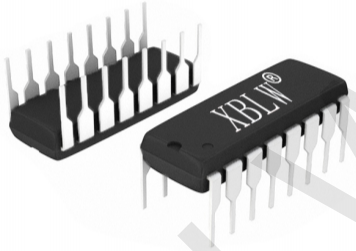
WEB | www.xinboleic.com

## Description

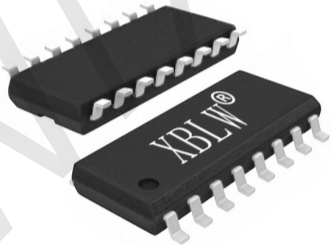
The SN74LS259 is an 8-bit addressable latch. The device features four modes of operation. In the addressable latch mode, data on the D input is written into the latch addressed by the inputs A0 to A3. The addressed latch will follow the data input, non-addressed latches will retain their previous states. In memory mode, all latches retain their previous states and are unaffected by the data or address inputs. In the 3-to-8 decoding or demultiplexing mode, the addressed output follows the D input and all other outputs are LOW. In the reset mode, all outputs are forced LOW and unaffected by the data or address inputs. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of $V_{CC}$.

## Features

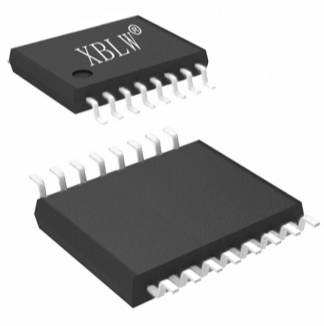
- Combined demultiplexer and 8-bit latch
- Serial-to-parallel capability
- Output from each storage bit available
- Random (addressable) data entry
- Easily expandable
- Common reset input
- Useful as a 3-to-8 active HIGH decoder
- Specified from -20°C to +85°C
- Packaging information: DIP-16/SOP-16/TSSOP-16



DIP-16



SOP-16



TSSOP-16

## Ordering Information

| Product Model | Package Type | Marking | Packing | Packing Qty |
|---|---|---|---|---|
| XBLW SN74LS259N | DIP-16 | 74LS259N | Tube | 1000Pcs/Box |
| XBLW SN74LS259DTR | SOP-16 | 74LS259 | Tape | 2500Pcs/Reel |
| XBLW SN74LS259TDTR | TSSOP-16 | 74LS259 | Tape | 3000Pcs/Reel |

## Block Diagram

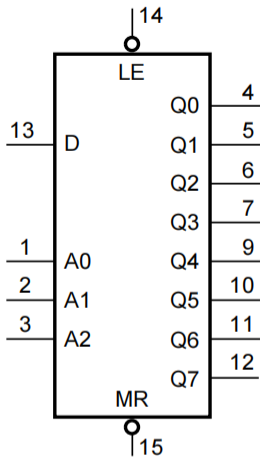



Figure 1. Logic symbol

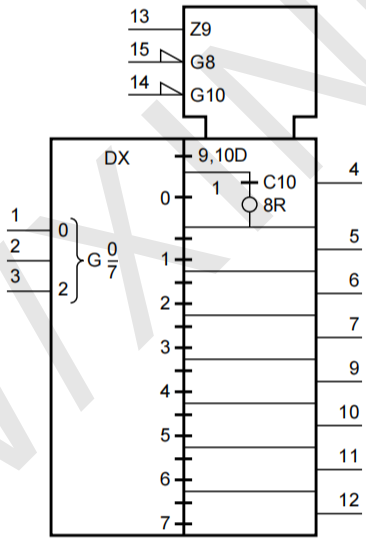



Figure 2. Functional diagram

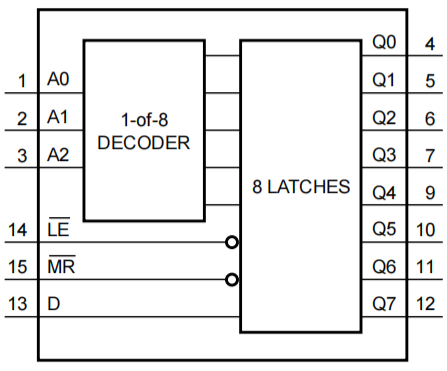
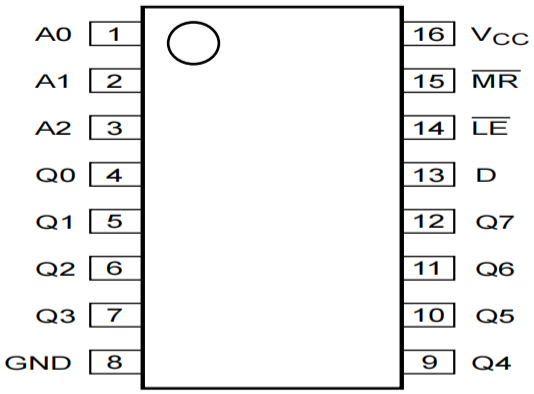



Figure 3. Functional diagram

## Pin Configurations




## Pin Description

| Pin No. | Pin Name | Description |
|---|---|---|
| 1 | A0 | address input |
| 2 | A1 | address input |
| 3 | A2 | address input |
| 4 | Q0 | latch output |
| 5 | Q1 | latch output |
| 6 | Q2 | latch output |
| 7 | Q3 | latch output |
| 8 | GND | ground (0V) |
| 9 | Q4 | latch output |
| 10 | Q5 | latch output |
| 11 | Q6 | latch output |
| 12 | Q7 | latch output |
| 13 | D | data input |
| 14 | $\overline{LE}$ | latch enable input (active LOW) |
| 15 | $\overline{MR}$ | conditional reset input (active LOW) |
| 16 | $V_{CC}$ | supply voltage |

## Function Table

| Operating mode | Input | | | | | | Output | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $\overline{MR}$ | $\overline{LE}$ | D | A0 | A1 | A2 | Q0 | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 |
| Reset (clear) | L | H | X | X | X | X | L | L | L | L | L | L | L | L |
| Demultiplexer (active HIGH 8-channel) decoder (when D=H) | L | L | d | L | L | L | Q=d | L | L | L | L | L | L | L |
| | L | L | d | H | L | L | L | Q=d | L | L | L | L | L | L |
| | L | L | d | L | H | L | L | L | Q=d | L | L | L | L | L |
| | L | L | d | H | H | L | L | L | L | Q=d | L | L | L | L |
| | L | L | d | L | L | H | L | L | L | L | Q=d | L | L | L |
| | L | L | d | H | L | H | L | L | L | L | L | Q=d | L | L |
| | L | L | d | L | H | H | L | L | L | L | L | L | Q=d | L |
| | L | L | d | H | H | H | L | L | L | L | L | L | L | Q=d |
| Memory (no action) | H | H | X | X | X | X | $q_0$ | $q_1$ | $q_2$ | $q_3$ | $q_4$ | $q_5$ | $q_6$ | $q_7$ |
| Addressable latch | H | L | d | L | L | L | Q=d | $q_1$ | $q_2$ | $q_3$ | $q_4$ | $q_5$ | $q_6$ | $q_7$ |
| | H | L | d | H | L | L | $q_0$ | Q=d | $q_2$ | $q_3$ | $q_4$ | $q_5$ | $q_6$ | $q_7$ |
| | H | L | d | L | H | L | $q_0$ | $q_1$ | Q=d | $q_3$ | $q_4$ | $q_5$ | $q_6$ | $q_7$ |
| | H | L | d | H | H | L | $q_0$ | $q_1$ | $q_2$ | Q=d | $q_4$ | $q_5$ | $q_6$ | $q_7$ |
| | H | L | d | L | L | H | $q_0$ | $q_1$ | $q_2$ | $q_3$ | Q=d | $q_5$ | $q_6$ | $q_7$ |
| | H | L | d | H | L | H | $q_0$ | $q_1$ | $q_2$ | $q_3$ | $q_4$ | Q=d | $q_6$ | $q_7$ |
| | H | L | d | L | H | H | $q_0$ | $q_1$ | $q_2$ | $q_3$ | $q_4$ | $q_5$ | Q=d | $q_7$ |
| | H | L | d | H | H | H | $q_0$ | $q_1$ | $q_2$ | $q_3$ | $q_4$ | $q_5$ | $q_6$ | Q=d |

Note:
[1] H=HIGH voltage level; L=LOW voltage level; X=don't care.
[2] d=HIGH or LOW data one set-up time prior to the LOW-to-HIGH $\overline{LE}$ transition.
[3] q=lower case letter indicates the state of the referenced input one set-up time prior to the LOW-to-HIGH transition.

**Operating Mode Select Table**

| $\overline{LE}$ | $\overline{MR}$ | Mode |
|---|---|---|
| L | H | Addressable latch mode |
| H | H | Memory mode |
| L | L | Demultiplexer mode |
| H | L | Reset mode |

Note: H=HIGH voltage level; L=LOW voltage level.

## Electrical Parameter

### Absolute Maximum Ratings

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Max. | Unit |
|---|---|---|---|---|---|---|
| supply voltage | $V_{CC}$ | - | | -0.5 | +7.0 | V |
| input clamping current | $I_{IK}$ | $V_I$ < -0.5V or $V_I$ > $V_{CC}$+0.5V | | - | ±20 | mA |
| output clamping current | $I_{OK}$ | $V_O$ < -0.5V or $V_O$ > $V_{CC}$+0.5V | | - | ±20 | mA |
| output current | $I_O$ | $V_O$= -0.5V to ($V_{CC}$+0.5V) | | - | ±25 | mA |
| supply current | $I_{CC}$ | - | | - | +70 | mA |
| ground current | $I_{GND}$ | - | | -70 | - | mA |
| storage temperature | $T_{stg}$ | - | | -65 | +150 | °C |
| total power dissipation | $P_{tot}$ | - | | - | 500 | mW |
| Soldering temperature | $T_L$ | 10s | DIP | 245 | | °C |
| | | | SOP/TSSOP | 260 | | °C |

### Recommended Operating Conditions

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| supply voltage | $V_{CC}$ | - | 2.0 | 5.0 | 6.0 | V |
| input voltage | $V_I$ | - | 0 | - | $V_{CC}$ | V |
| output voltage | $V_O$ | - | 0 | - | $V_{CC}$ | V |
| input transition rise and fall rate | △t/△V | $V_{CC}$=2.0V | - | - | 625 | ns/V |
| | | $V_{CC}$=4.5V | - | 1.67 | 139 | ns/V |
| | | $V_{CC}$=6.0V | - | - | 83 | ns/V |
| ambient temperature | $T_{amb}$ | - | -20 | - | +85 | °C |

## Electrical Characteristics

### DC Characteristics 1

($T_{amb}$=25°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| HIGH-level input voltage | $V_{IH}$ | $V_{CC}$=2.0V | | 1.5 | 1.2 | - | V |
| | | $V_{CC}$=4.5V | | 3.15 | 2.4 | - | V |
| | | $V_{CC}$=6.0V | | 4.2 | 3.2 | - | V |
| LOW-level input voltage | $V_{IL}$ | $V_{CC}$=2.0V | | - | 0.8 | 0.5 | V |
| | | $V_{CC}$=4.5V | | - | 2.1 | 1.35 | V |
| | | $V_{CC}$=6.0V | | - | 2.8 | 1.8 | V |
| HIGH-level output voltage | $V_{OH}$ | $V_I$ = $V_{IH}$ or $V_{IL}$ | $I_O$=-20uA; $V_{CC}$=2.0V | 1.9 | 2.0 | - | V |
| | | | $I_O$=-20uA; $V_{CC}$=4.5V | 4.4 | 4.5 | - | V |
| | | | $I_O$=-20uA; $V_{CC}$=6.0V | 5.9 | 6.0 | - | V |
| | | | $I_O$=-4.0mA; $V_{CC}$=4.5V | 3.98 | 4.32 | - | V |
| | | | $I_O$=-5.2mA; $V_{CC}$=6.0V | 5.48 | 5.81 | - | V |
| LOW-level output voltage | $V_{OL}$ | $V_I$ = $V_{IH}$ or $V_{IL}$ | $I_O$=20uA; $V_{CC}$=2.0V | - | 0 | 0.1 | V |
| | | | $I_O$=20uA; $V_{CC}$=4.5V | - | 0 | 0.1 | V |
| | | | $I_O$=20uA; $V_{CC}$=6.0V | - | 0 | 0.1 | V |
| | | | $I_O$=4.0mA; $V_{CC}$=4.5V | - | 0.15 | 0.26 | V |
| | | | $I_O$=5.2mA; $V_{CC}$=6.0V | - | 0.16 | 0.26 | V |
| input leakage current | $I_I$ | $V_I$=$V_{CC}$ or GND; $V_{CC}$=6.0V | | - | - | ±1.0 | uA |
| supply current | $I_{CC}$ | $V_I$=$V_{CC}$ or GND; $I_O$=0A; $V_{CC}$=6.0V | | - | - | 8.0 | uA |
| Input capacitance | $C_I$ | - | | - | 3.5 | - | pF |

**DC Characteristics 2**

($T_{amb}$=-20°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| HIGH-level input voltage | $V_{IH}$ | $V_{CC}$=2.0V | | 1.5 | - | - | V |
| | | $V_{CC}$=4.5V | | 3.15 | - | - | V |
| | | $V_{CC}$=6.0V | | 4.2 | - | - | V |
| LOW-level input voltage | $V_{IL}$ | $V_{CC}$=2.0V | | - | - | 0.5 | V |
| | | $V_{CC}$=4.5V | | - | - | 1.35 | V |
| | | $V_{CC}$=6.0V | | - | - | 1.8 | V |
| HIGH-level output voltage | $V_{OH}$ | $V_I$ = $V_{IH}$ or $V_{IL}$ | $I_O$=-20uA; $V_{CC}$=2.0V | 1.9 | - | - | V |
| | | | $I_O$=-20uA; $V_{CC}$=4.5V | 4.4 | - | - | V |
| | | | $I_O$=-20uA; $V_{CC}$=6.0V | 5.9 | - | - | V |
| | | | $I_O$=-4.0mA; $V_{CC}$=4.5V | 3.84 | - | - | V |
| | | | $I_O$=-5.2mA; $V_{CC}$=6.0V | 5.34 | - | - | V |
| LOW-level output voltage | $V_{OL}$ | $V_I$ = $V_{IH}$ or $V_{IL}$ | $I_O$=20uA; $V_{CC}$=2.0V | - | - | 0.1 | V |
| | | | $I_O$=20uA; $V_{CC}$=4.5V | - | - | 0.1 | V |
| | | | $I_O$=20uA; $V_{CC}$=6.0V | - | - | 0.1 | V |
| | | | $I_O$=4.0mA; $V_{CC}$=4.5V | - | - | 0.33 | V |
| | | | $I_O$=5.2mA; $V_{CC}$=6.0V | - | - | 0.33 | V |
| input leakage current | $I_I$ | $V_I$=$V_{CC}$ or GND; $V_{CC}$=6.0V | | - | - | ±1.0 | uA |
| supply current | $I_{CC}$ | $V_I$=$V_{CC}$ or GND; $I_O$=0A; $V_{CC}$=6.0V | | - | - | 80 | uA |
| input capacitance | $C_I$ | - | | - | - | - | pF |

**AC Characteristics 1**

($T_{amb}$=25°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| propagation delay | $t_{pd}$ | D to Qn; see Figure 5 | $V_{CC}$=2.0V | - | 58 | 185 | ns |
| | | | $V_{CC}$=4.5V | - | 21 | 37 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | 18 | - | ns |
| | | | $V_{CC}$=6.0V | - | 17 | 31 | ns |
| | | An to Qn; see Figure 6 | $V_{CC}$=2.0V | - | 58 | 185 | ns |
| | | | $V_{CC}$=4.5V | - | 21 | 37 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | 17 | - | ns |
| | | | $V_{CC}$=6.0V | - | 17 | 31 | ns |
| | | $\overline{LE}$ to Qn; see Figure 7 | $V_{CC}$=2.0V | - | 55 | 170 | ns |
| | | | $V_{CC}$=4.5V | - | 20 | 34 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | 17 | - | ns |
| | | | $V_{CC}$=6.0V | - | 16 | 29 | ns |
| HIGH to LOW propagation delay | $t_{PHL}$ | $\overline{MR}$ to Qn; see Figure 8 | $V_{CC}$=2.0V | - | 50 | 155 | ns |
| | | | $V_{CC}$=4.5V | - | 18 | 31 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | 15 | - | ns |
| | | | $V_{CC}$=6.0V | - | 14 | 26 | ns |
| transition time | $t_t$ | see Figure 7 | $V_{CC}$=2.0V | - | 19 | 75 | ns |
| | | | $V_{CC}$=4.5V | - | 7 | 15 | ns |
| | | | $V_{CC}$=6.0V | - | 6 | 13 | ns |
| pulse width | $t_W$ | $\overline{LE}$ HIGH or LOW; see Figure 7 | $V_{CC}$=2.0V | 70 | 17 | - | ns |
| | | | $V_{CC}$=4.5V | 14 | 6 | - | ns |
| | | | $V_{CC}$=6.0V | 12 | 5 | - | ns |
| | | $\overline{MR}$ LOW; see Figure 8 | $V_{CC}$=2.0V | 70 | 17 | - | ns |
| | | | $V_{CC}$=4.5V | 14 | 6 | - | ns |
| | | | $V_{CC}$=6.0V | 12 | 5 | - | ns |
| set-up time | $t_{su}$ | D, An to $\overline{LE}$; see Figure 9 and Figure 10 | $V_{CC}$=2.0V | 80 | 19 | - | ns |
| | | | $V_{CC}$=4.5V | 16 | 7 | - | ns |
| | | | $V_{CC}$=6.0V | 14 | 6 | - | ns |
| hold time | $t_h$ | D to $\overline{LE}$; see Figure 9 and Figure 10 | $V_{CC}$=2.0V | 0 | -19 | - | ns |
| | | | $V_{CC}$=4.5V | 0 | -6 | - | ns |
| | | | $V_{CC}$=6.0V | 0 | -5 | - | ns |
| | | An to $\overline{LE}$; see Figure 9 and Figure 10 | $V_{CC}$=2.0V | 2 | -11 | - | ns |
| | | | $V_{CC}$=4.5V | 2 | -4 | - | ns |
| | | | $V_{CC}$=6.0V | 2 | -3 | - | ns |
| power dissipation capacitance | $C_{PD}$ | $f_i$=1MHz; $V_I$=GND to $V_{CC}$ | - | 19 | - | pF | |

Note:

[1] Typical values are measured at nominal supply voltage ($V_{CC}$=3.3V and $V_{CC}$=5.0V).

[2] $t_{pd}$ is the same as $t_{PLH}$ and $t_{PHL}$.

[3] $t_t$ is the same as $t_{THL}$ and $t_{TLH}$.

[4] $C_{PD}$ isused to determine the dynamic power dissipation ($P_D$ in uW).

$P_D=C_{PD}\times V_{CC}^2\times f_i\times N+\Sigma(C_L\times V_{CC}^2\times f_o)$ where:

$f_i$=input frequency in MHz; $f_o$=output frequency in MHz;

$C_L$=output load capacitance in pF; $V_{CC}$=supply voltage in V;

N=number of inputs switching; $\Sigma(C_L\times V_{CC}^2\times f_o)$=sum of outputs.

**AC Characteristics 2**

($T_{amb}$=-20°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| propagation delay | $t_{pd}$ | D to Qn; see Figure 5 | $V_{CC}$=2.0V | - | - | 230 | ns |
| | | | $V_{CC}$=4.5V | - | - | 46 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | - | - | ns |
| | | | $V_{CC}$=6.0V | - | - | 39 | ns |
| | | An to Qn; see Figure 6 | $V_{CC}$=2.0V | - | - | 230 | ns |
| | | | $V_{CC}$=4.5V | - | - | 46 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | - | - | ns |
| | | | $V_{CC}$=6.0V | - | - | 39 | ns |
| | | $\overline{LE}$ to Qn; see Figure 7 | $V_{CC}$=2.0V | - | - | 215 | ns |
| | | | $V_{CC}$=4.5V | - | - | 43 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | - | - | ns |
| | | | $V_{CC}$=6.0V | - | - | 37 | ns |
| HIGH to LOW propagation delay | $t_{PHL}$ | $\overline{MR}$ to Qn; see Figure 8 | $V_{CC}$=2.0V | - | - | 195 | ns |
| | | | $V_{CC}$=4.5V | - | - | 39 | ns |
| | | | $V_{CC}$=5.0V; $C_L$=15pF | - | - | - | ns |
| | | | $V_{CC}$=6.0V | - | - | 33 | ns |
| transition time | $t_t$ | see Figure 7 | $V_{CC}$=2.0V | - | - | 95 | ns |
| | | | $V_{CC}$=4.5V | - | - | 19 | ns |
| | | | $V_{CC}$=6.0V | - | - | 16 | ns |
| pulse width | $t_W$ | $\overline{LE}$ HIGH or LOW; see Figure 7 | $V_{CC}$=2.0V | 90 | - | - | ns |
| | | | $V_{CC}$=4.5V | 18 | - | - | ns |
| | | | $V_{CC}$=6.0V | 15 | - | - | ns |
| | | $\overline{MR}$ LOW; see Figure 8 | $V_{CC}$=2.0V | 90 | - | - | ns |
| | | | $V_{CC}$=4.5V | 18 | - | - | ns |
| | | | $V_{CC}$=6.0V | 15 | - | - | ns |
| set-up time | $t_{su}$ | D, An to $\overline{LE}$; see Figure 9 and Figure 10 | $V_{CC}$=2.0V | 100 | - | - | ns |
| | | | $V_{CC}$=4.5V | 20 | - | - | ns |
| | | | $V_{CC}$=6.0V | 17 | - | - | ns |
| hold time | $t_h$ | D to $\overline{LE}$; see Figure 9 and Figure 10 | $V_{CC}$=2.0V | 0 | - | - | ns |
| | | | $V_{CC}$=4.5V | 0 | - | - | ns |
| | | | $V_{CC}$=6.0V | 0 | - | - | ns |
| | | An to $\overline{LE}$; see Figure 9 and Figure 10 | $V_{CC}$=2.0V | 2 | - | - | ns |
| | | | $V_{CC}$=4.5V | 2 | - | - | ns |
| | | | $V_{CC}$=6.0V | 2 | - | - | ns |
| power dissipation capacitance | $C_{PD}$ | $f_i$=1MHz; $V_I$=GND to $V_{CC}$ | | - | - | - | pF |

Note:

[1] Typical values are measured at nominal supply voltage ($V_{CC}$=3.3V and $V_{CC}$=5.0V).

[2] $t_{pd}$ is the same as $t_{PLH}$ and $t_{PHL}$.

[3] $t_t$ is the same as $t_{THL}$ and $t_{TLH}$.

[4] $C_{PD}$ isused to determine the dynamic power dissipation ($P_D$ in uW).

$P_D=C_{PD}\times V_{CC}^2\times f_i\times N+\Sigma(C_L\times V_{CC}^2\times f_o)$ where:

$f_i$=input frequency in MHz;

$f_o$=output frequency in MHz;

$C_L$=output load capacitance in pF; $V_{CC}$=supply voltage in V;

N=number of inputs switching; $\Sigma(C_L\times V_{CC}^2\times f_o)$=sum of outputs.

## Testing Circuit

### AC Testing Circuit

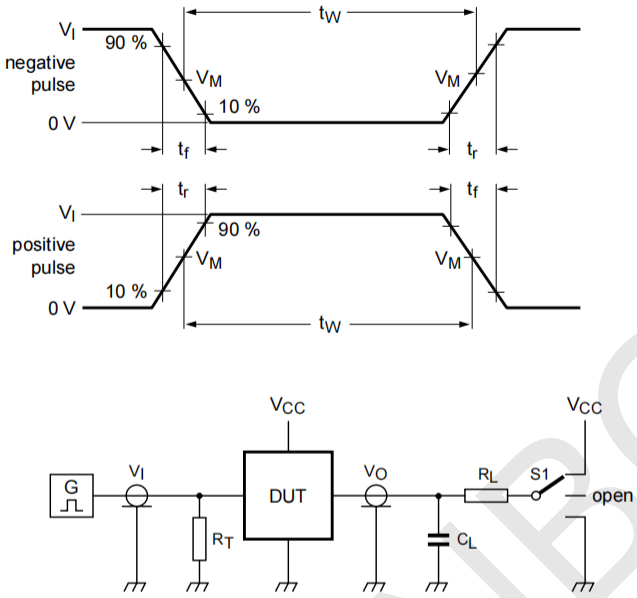



Figure 4. Test circuit for measuring switching times

Definitions for test circuit:
$C_L$=Load capacitance including jig and probe capacitance.
$R_T$=Termination resistance should be equal to the output impedance $Z_o$ of the pulse generator.
$R_L$=Load resistance.
S1=Test selection switch.

### AC Testing Waveforms

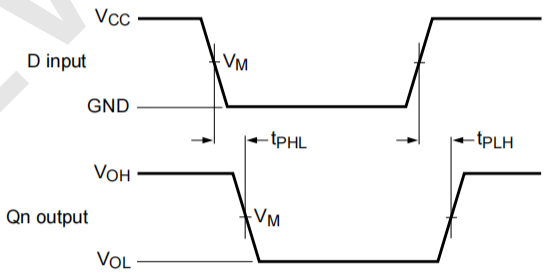



Figure 5. Data input to output propagation delays

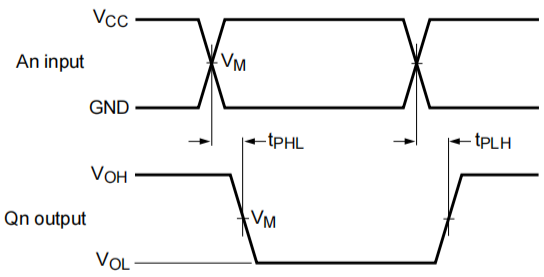



Figure 6. Address input to output propagation delays

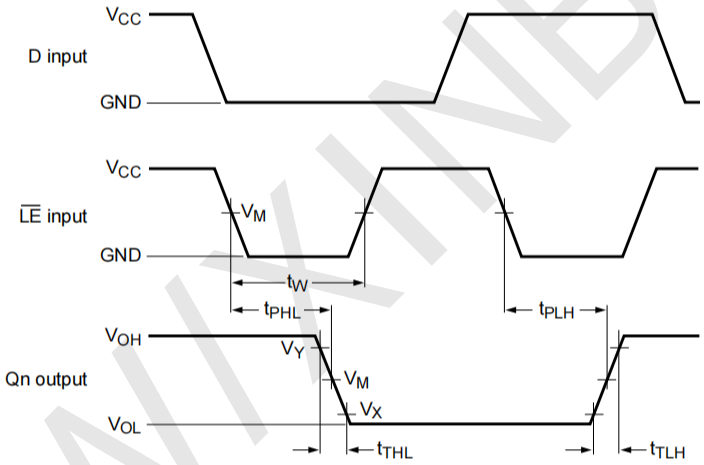



Figure 7. Enable input to output propagation delays and pulse width

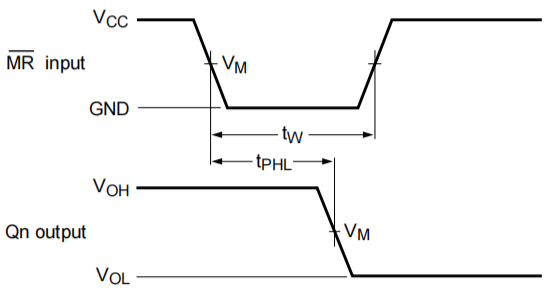



Figure 8. Master reset input to output propagation delay

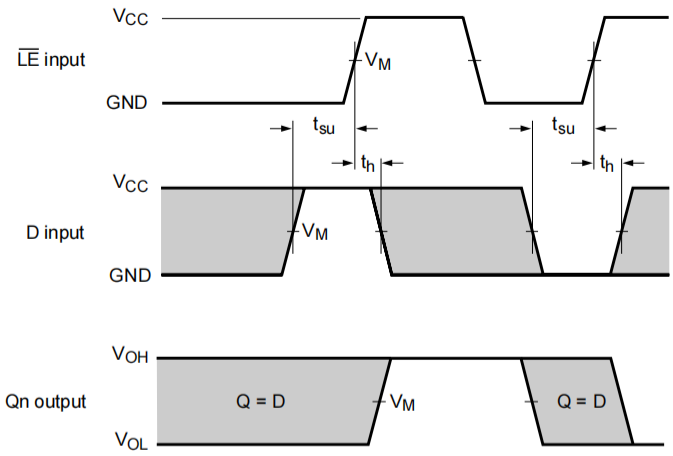



Figure 9. Data input to latch enable input set-up and hold times

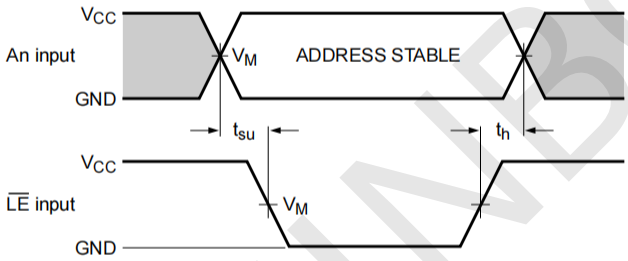



Figure 10. Address input to latch enable input set-up and hold times

**Measurement Points**

| Type | Input | Output | | |
|---|---|---|---|---|
| | $V_M$ | $V_M$ | $V_X$ | $V_Y$ |
| SN74LS259 | $0.5\times V_{CC}$ | $0.5\times V_{CC}$ | $0.1\times V_{CC}$ | $0.9\times V_{CC}$ |

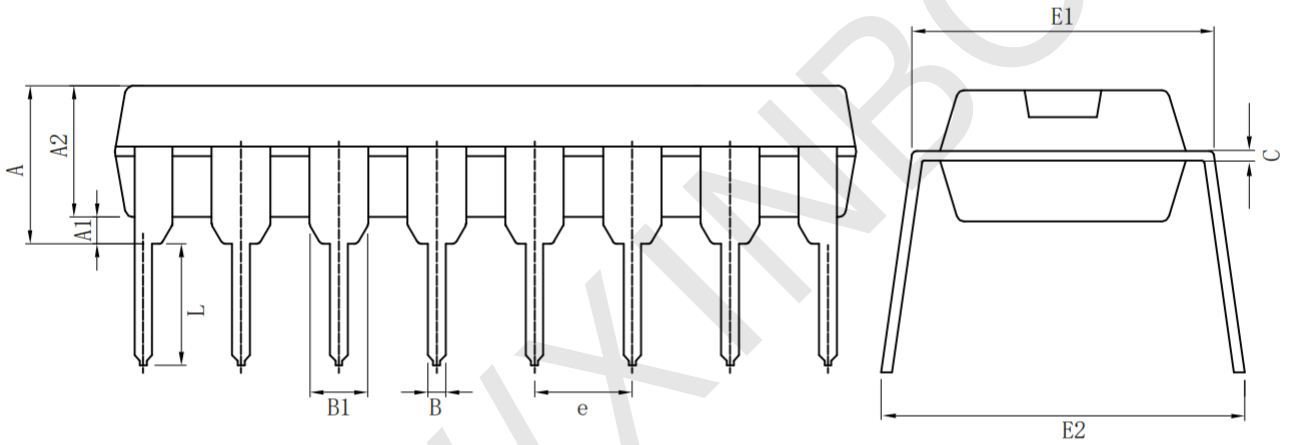
**Test Data**

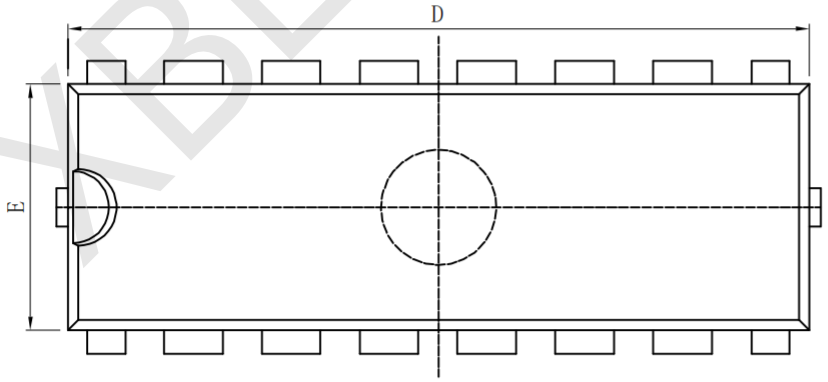
| Type | Input | | Load | | S1 position |
|---|---|---|---|---|---|
| | $V_I$ | $t_r$ ,$t_f$ | $C_L$ | $R_L$ | $t_{PHL}$, $t_{PLH}$ |
| SN74LS259 | $V_{CC}$ | 6ns | 15pF, 50pF | 1kΩ | open |

## Package Information

· DIP-16

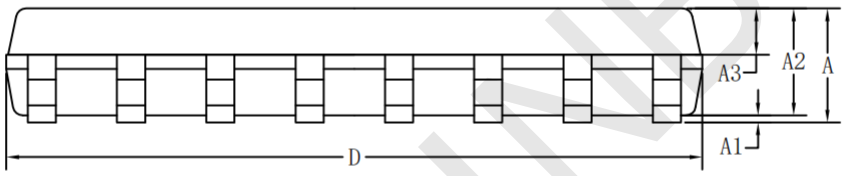
| Size / Symbol | Dimensions In Millimeters | | Size / Symbol | Dimensions In Inches | |
|---|---|---|---|---|---|
| | Min( mm) | Max( mm) | | Min( in) | Max( in) |
| A | 3.710 | 4.310 | A | 0.146 | 0.170 |
| A1 | 0.510 | | A1 | 0.020 | |
| A2 | 3.200 | 3.600 | A2 | 0.126 | 0.142 |
| B | 0.380 | 0.570 | B | 0.015 | 0.022 |
| B1 | 1.524(BSC) | | B1 | 0.060(BSC) | |
| C | 0.204 | 0.360 | C | 0.008 | 0.014 |
| D | 18.80 | 19.20 | D | 0.740 | 0.756 |
| E | 6.200 | 6.600 | E | 0.244 | 0.260 |
| E1 | 7.320 | 7.920 | E1 | 0.288 | 0.312 |
| e | 2.540(BSC) | | e | 0.100(BSC) | |
| L | 3.000 | 3.600 | L | 0.118 | 0.142 |
| E2 | 8.400 | 9.000 | E2 | 0.331 | 0.354 |

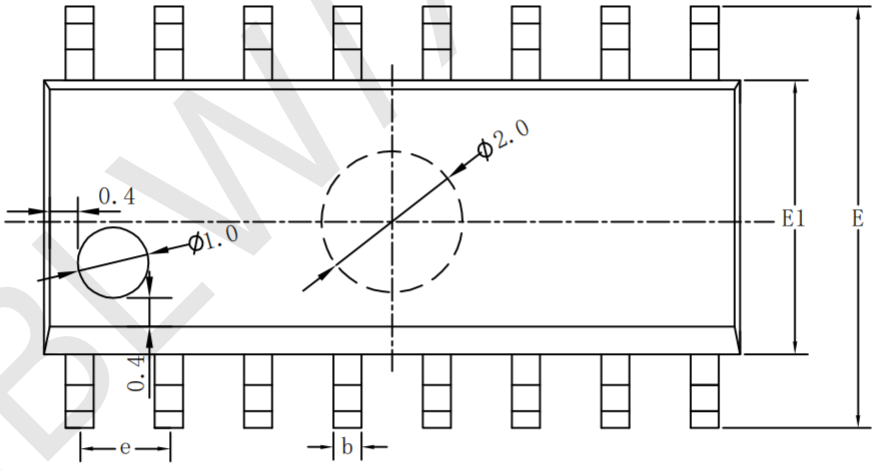


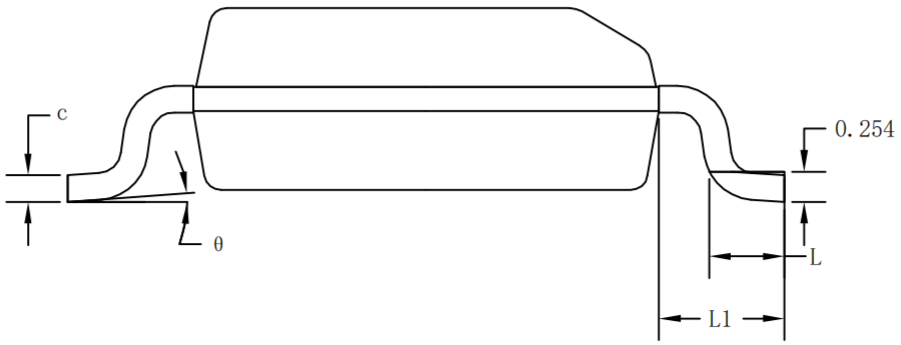



· SOP-16

| Size / Symbol | Dimensions In Millimeters | | | Size / Symbol | Dimensions In Inches | | |
|---|---|---|---|---|---|---|---|
| | Min(mm) | Nom(mm) | Max(mm) | | Min(in) | Nom(in) | Max(in) |
| A | 1.500 | 1.600 | 1.700 | A | 0.059 | 0.063 | 0.067 |
| A1 | 0.100 | 0.150 | 0.250 | A1 | 0.004 | 0.006 | 0.010 |
| A2 | 1.400 | 1.450 | 1.500 | A2 | 0.055 | 0.057 | 0.059 |
| A3 | 0.600 | 0.650 | 0.700 | A3 | 0.024 | 0.026 | 0.028 |
| b | 0.300 | 0.400 | 0.500 | b | 0.012 | 0.016 | 0.020 |
| c | 0.150 | 0.200 | 0.250 | c | 0.006 | 0.008 | 0.010 |
| D | 9.800 | 9.900 | 10.00 | D | 0.386 | 0.390 | 0.394 |
| E | 5.800 | 6.000 | 6.200 | E | 0.228 | 0.236 | 0.244 |
| E1 | 3.850 | 3.900 | 3.950 | E1 | 0.152 | 0.154 | 0.156 |
| e | 1.27(BSC) | | | e | 0.050(BSC) | | |
| L | 0.500 | 0.600 | 0.700 | L | 0.020 | 0.024 | 0.028 |
| L1 | 1.05(BSC) | | | L1 | 0.041(BSC) | | |
| θ | 0° | 4° | 8° | θ | 0° | 4° | 8° |

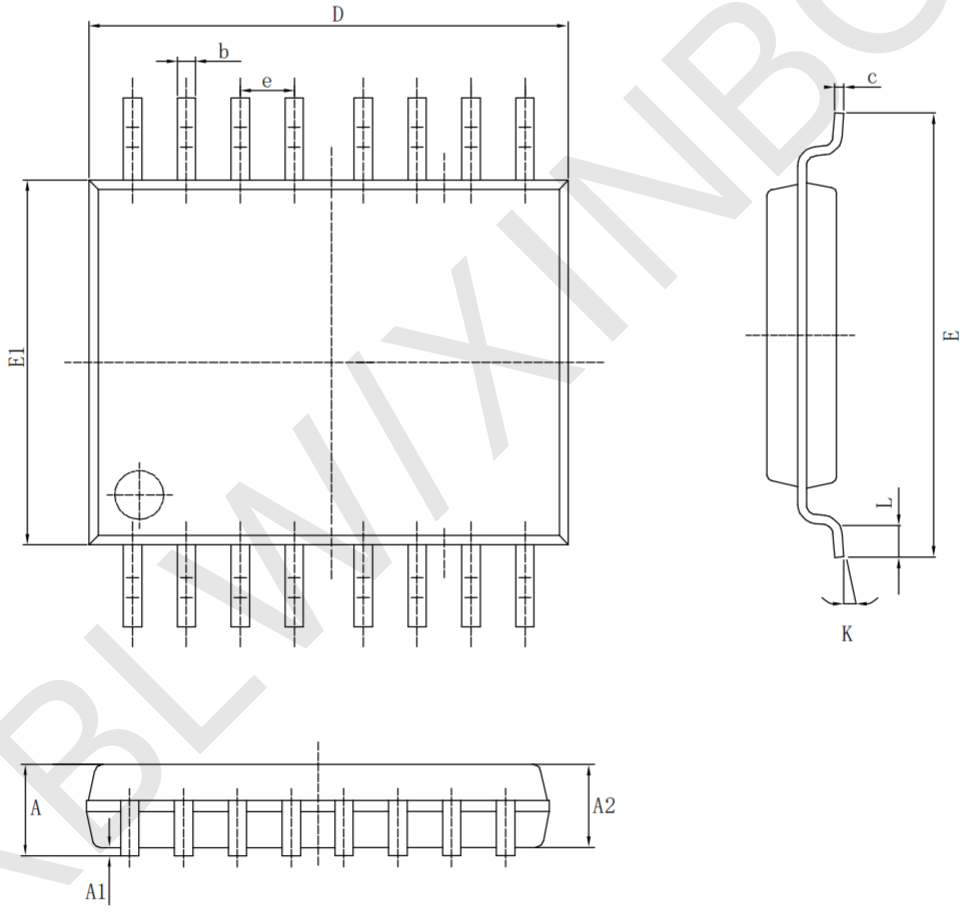


· TSSOP-16

| Size / Symbol | Dimensions In Millimeters | | Size / Symbol | Dimensions In Inches | |
|---|---|---|---|---|---|
| | Min(mm) | Max(mm) | | Min(in) | Max(in) |
| A | | 1.200 | A | | 0.047 |
| A1 | 0.050 | 0.150 | A1 | 0.002 | 0.006 |
| A2 | 0.800 | 1.050 | A2 | 0.031 | 0.041 |
| b | 0.190 | 0.300 | b | 0.007 | 0.012 |
| c | 0.090 | 0.200 | c | 0.004 | 0.0089 |
| D | 4.900 | 5.100 | D | 0.193 | 0.201 |
| E | 6.200 | 6.600 | E | 0.244 | 0.260 |
| E1 | 4.300 | 4.480 | E1 | 0.169 | 0.176 |
| e | 0.65(BSC) | | e | 0.0256(BSC) | |
| K | 0° | 8° | K | 0° | 8° |
| L | 0.450 | 0.750 | L | 0.018 | 0.030 |



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