芯伯乐®
XINBOLE

# Product Specification

## XBLW SN74LS01

Quad 2-Input Nand Gate

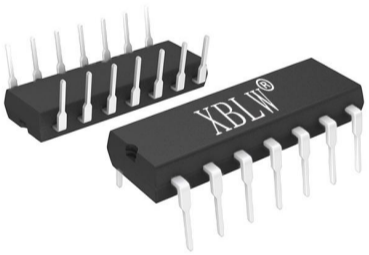
WEB | www.xinboleic.com

## Description

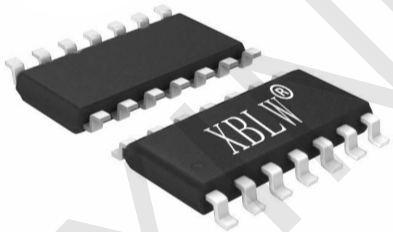
The SN74LS01 contains four independent 2-input NAND Gates with open-drain outputs.

## Features

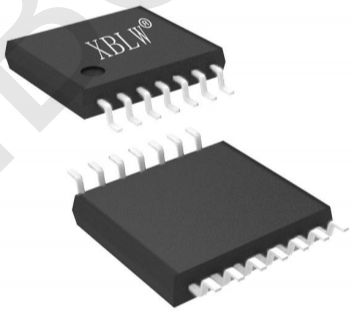
- High Speed Operation: $t_{pd}$ = 9 ns typ ($C_L$ = 50 pF)
- Low Input Current: 1 μA max
- Low Quiescent Supply Current: $I_{CC}$ (static) = 10 μA max
- Wide Operating Voltage: $V_{CC}$ = 2 to 6 V
- Temperature range:-20℃ to +85℃
- Packaging information: DIP14/SOP14/TSSOP14




DIP-14




SOP-14




TSSOP-14

## Ordering Information

| Product Model | Package Type | Marking | Packing | Packing Qty |
|---|---|---|---|---|
| XBLW SN74LS01N | DIP-14 | 74LS01N | Tupe | 1000Pcs/Box |
| XBLW SN74LS01DTR | SOP-14 | 74LS01 | Tape | 2500Pcs/Reel |
| XBLW SN74LS01TDTR | TSSOP-14 | 74LS01 | Tape | 5000Pcs/Reel |

**Block Diagram**

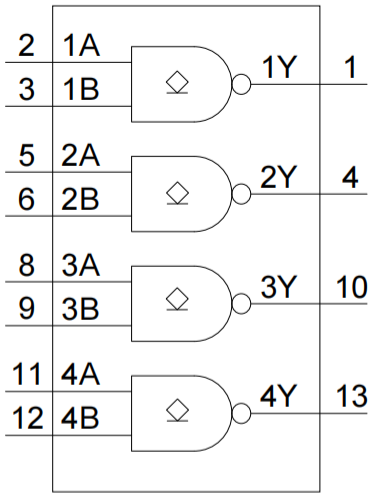



Figure 1. Logic symbol

## Pin Configurations

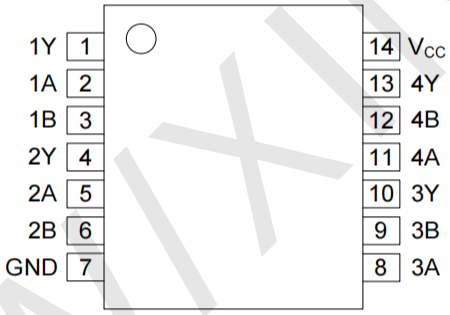



Figure 2. Pin Configurations

## Pin Description

| Pin No. | Pin Name | Description |
|---|---|---|
| 1 | 1Y | data output |
| 2 | 1A | data input |
| 3 | 1B | data input |
| 4 | 2Y | data output |
| 5 | 2A | data input |
| 6 | 2B | data input |
| 7 | GND | ground (0V) |
| 8 | 3A | data input |
| 9 | 3B | data input |
| 10 | 3Y | data output |
| 11 | 4A | data input |
| 12 | 4B | data input |
| 13 | 4Y | data output |
| 14 | $V_{CC}$ | supply voltage |

## Function Table

| Input | | Output |
|---|---|---|
| nA | nB | nY |
| L | L | Z |
| L | H | Z |
| H | L | Z |
| H | H | L |

Note: L=LOW voltage level; Z=high-impedance OFF-state.

## 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 | V |
| supply current | $I_{CC}$ | - | | - | 50 | mA |
| ground current | $I_{GND}$ | - | | -50 | - | mA |
| 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 | $I_O$ | $-0.5V < V_O < V_{CC}+0.5V$ | | - | ±25 | mA |
| storage temperature | $T_{stg}$ | - | | -65 | +150 | ℃ |
| soldering temperature | $T_L$ | 10s | DIP | 245 | | ℃ |
| | | | SOP/TSSOP | 260 | | |

**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 |
| ambient temperature | $T_{amb}$ | - | -20 | - | +85 | ℃ |

## Electrical Characteristics

### DC Characteristics

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

| Parameter | Symbol | $V_{CC}$ | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| HIGH-level input voltage | $V_{IH}$ | 2.0V | - | 1.5 | 1.2 | - | V |
| | | 4.5V | - | 3.15 | 2.4 | - | V |
| | | 6.0V | - | 4.2 | 3.2 | - | V |
| LOW-level input voltage | $V_{IL}$ | 2.0V | - | - | 0.8 | 0.5 | V |
| | | 4.5V | - | - | 2.1 | 1.35 | V |
| | | 6.0V | - | - | 2.8 | 1.8 | V |
| LOW-level output voltage | $V_{OL}$ | 2.0V | $I_O$=20uA | - | 0 | 0.1 | V |
| | | 4.5V | $I_O$=20uA | - | 0 | 0.1 | V |
| | | 6.0V | $I_O$=20uA | - | 0 | 0.1 | V |
| | | 4.5V | $I_O$=4.0mA | - | 0.15 | 0.33 | V |
| | | 6.0V | $I_O$=5.2mA | - | 0.16 | 0.33 | V |
| input leakage current | $I_I$ | 6.0V | $V_I$=$V_{CC}$ or GND | - | - | ±1 | uA |
| OFF-state output current | $I_{OZ}$ | 6.0V | $V_I$=$V_{IH}$ or $V_{IL}$; $V_O$=$V_{CC}$ or GND | - | - | ±5 | uA |
| supply current | $I_{CC}$ | 6.0V | $V_I$=$V_{CC}$ or GND;$I_O$=0A | - | - | 10 | uA |

### AC Characteristics

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

| Parameter | Symbol | $V_{CC}$ | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|---|
| propagation delay | $t_{PLZ}$, $t_{PZL}$ | 2.0V | $C_L$=50pF | see Figure 4 | - | 41 | 155 | ns |
| | | 4.5V | $C_L$=50pF | | - | 15 | 23 | ns |
| | | 5.0V | $C_L$=15pF | | - | 12 | - | ns |
| | | 6.0V | $C_L$=50pF | | - | 12 | 20 | ns |
| transition time | $t_{THL}$ | 2.0V | $C_L$=50pF | see Figure 4 | - | 19 | 95 | ns |
| | | 4.5V | $C_L$=50pF | | - | 7 | 19 | ns |
| | | 6.0V | $C_L$=50pF | | - | 6 | 16 | ns |

## Testing Circuit

**AC Testing Circuit**

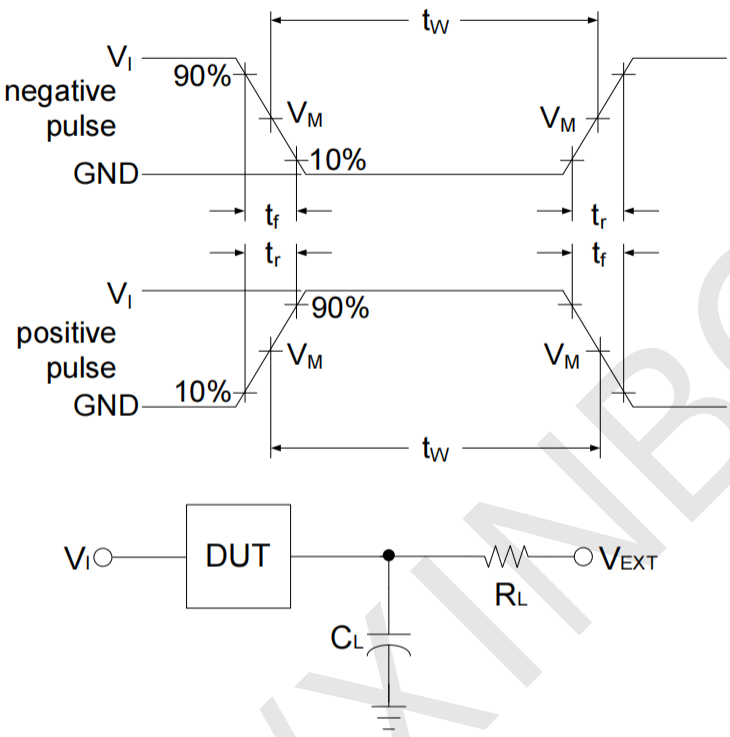



Figure 3. Test circuit for measuring switching times

Note: $C_L$ includes the probe and jig capacitance.

**Test Data**

| Type | Input | | Load | | $V_{EXT}$ | | |
|---|---|---|---|---|---|---|---|
| | $V_I$ | $t_r = t_f$ | $C_L$ | $R_L$ | $t_{PLH}/t_{PHL}$ | $t_{PLZ}/t_{PZL}$ | $t_{PHZ}/t_{PZH}$ |
| SN74LS01 | $V_{CC}$ | 3.0ns | 15pF, 50pF | 1KΩ | Open | $V_{CC}$ | GND |

**AC Testing Waveforms**

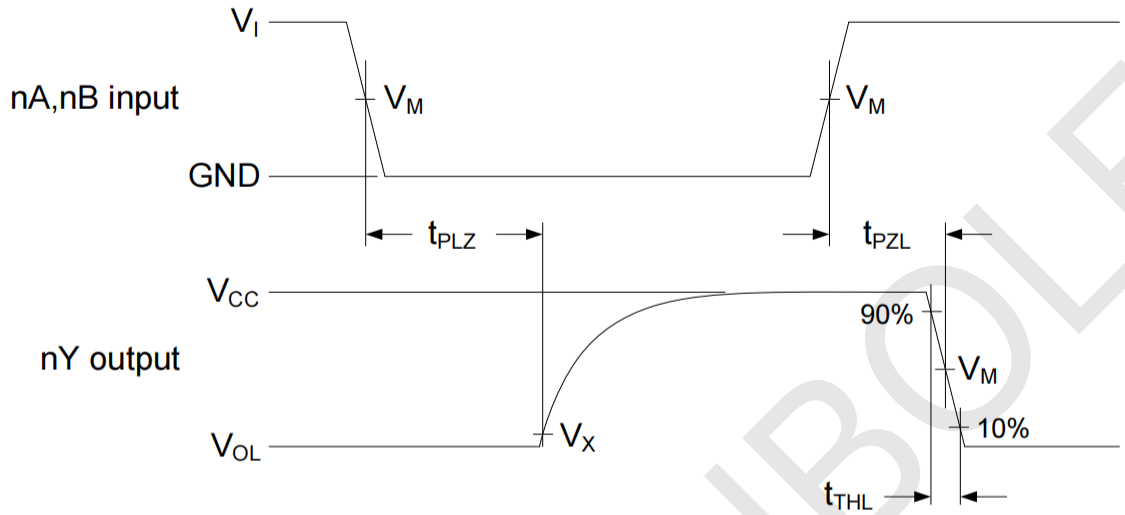



Figure 4. Input to output propagation delays

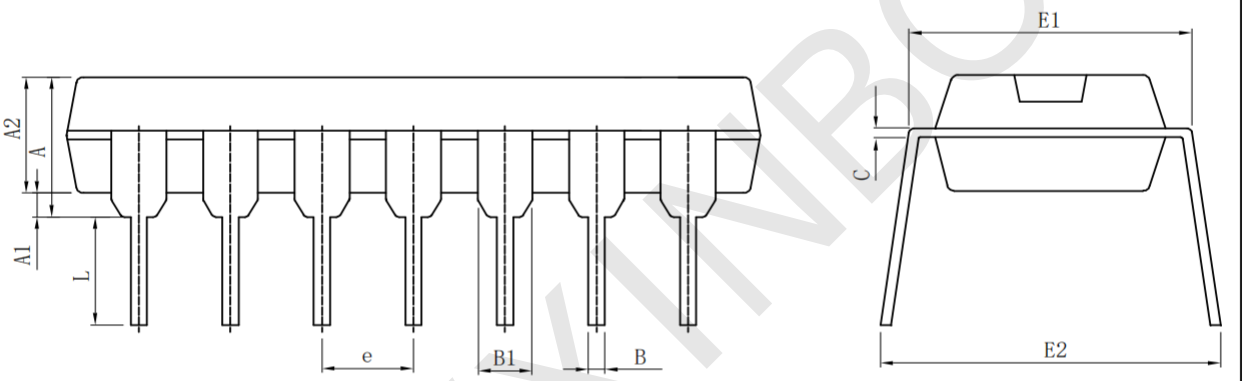
**Measurement Points**

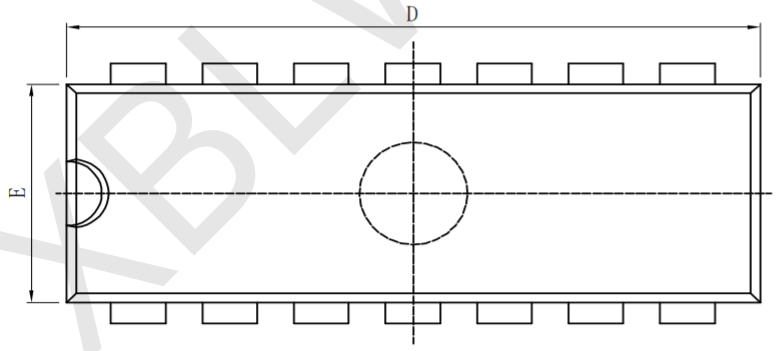
| Type | Input | Output | |
|---|---|---|---|
| | $V_M$ | $V_M$ | $V_X$ |
| SN74LS01 | $0.5\times V_{CC}$ | $0.5\times V_{CC}$ | $0.1\times V_{CC}$ |

## Package Information

· DIP-14

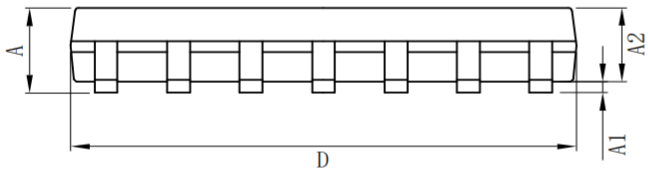
| Size / Symbol | Dimensions In Millimeters | | Size / Symbol | Dimensions In Inches | |
|---|---|---|---|---|---|
| | Min(mm) | Max(mm) | | Min(in) | Max(in) |
| A | 3.710 | 4.310 | A | 0.146 | 0.170 |
| A1 | 0.510 | | A1 | 0.020 | |
| A2 | 3.200 | 3.600 | A2 | 0.126 | 0.142 |
| B | 0.380 | 0.570 | B | 0.015 | 0.022 |
| B1 | 1.524(BSC) | | B1 | 0.060(BSC) | |
| C | 0.204 | 0.360 | C | 0.008 | 0.014 |
| D | 18.800 | 19.200 | 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 |

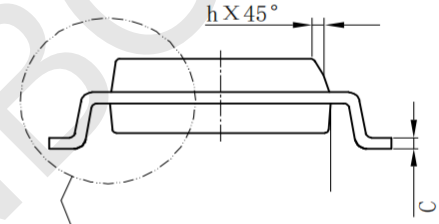


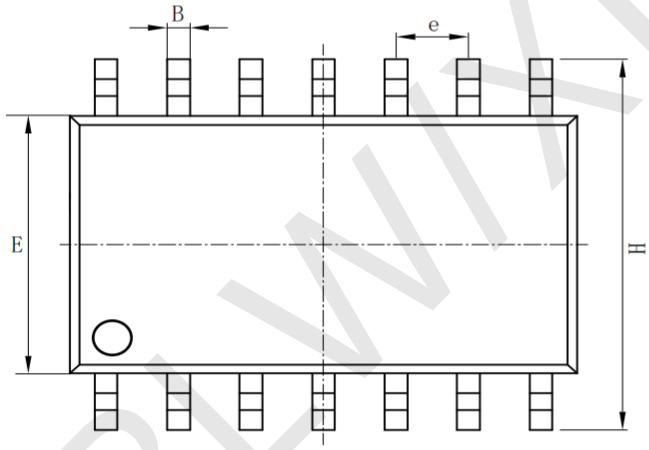



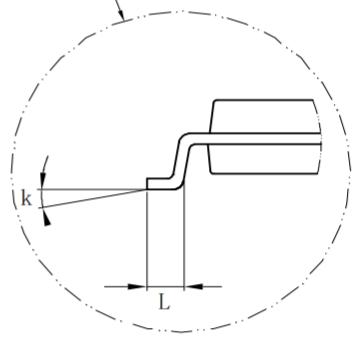
· SOP-14

| Size / Symbol | Dimensions In Millimeters | | Size / Symbol | Dimensions In Inches | |
|---|---|---|---|---|---|
| | Min(mm) | Max(mm) | | Min(in) | Max(in) |
| A | 1.350 | 1.750 | A | 0.050 | 0.068 |
| A1 | 0.100 | 0.250 | A1 | 0.004 | 0.009 |
| A2 | 1.100 | 1.650 | A2 | 0.040 | 0.060 |
| B | 0.330 | 0.510 | B | 0.010 | 0.020 |
| C | 0.190 | 0.250 | C | 0.007 | 0.009 |
| D | 8.550 | 8.750 | D | 0.330 | 0.340 |
| E | 3.800 | 4.000 | E | 0.150 | 0.150 |
| e | 1.27 | | e | 0.05 | |
| H | 5.800 | 6.200 | H | 0.220 | 0.240 |
| h | 0.250 | 0.500 | h | 0.009 | 0.020 |
| L | 0.400 | 1.270 | L | 0.015 | 0.050 |
| k | 8° (max) | | k | 8° (max) | |



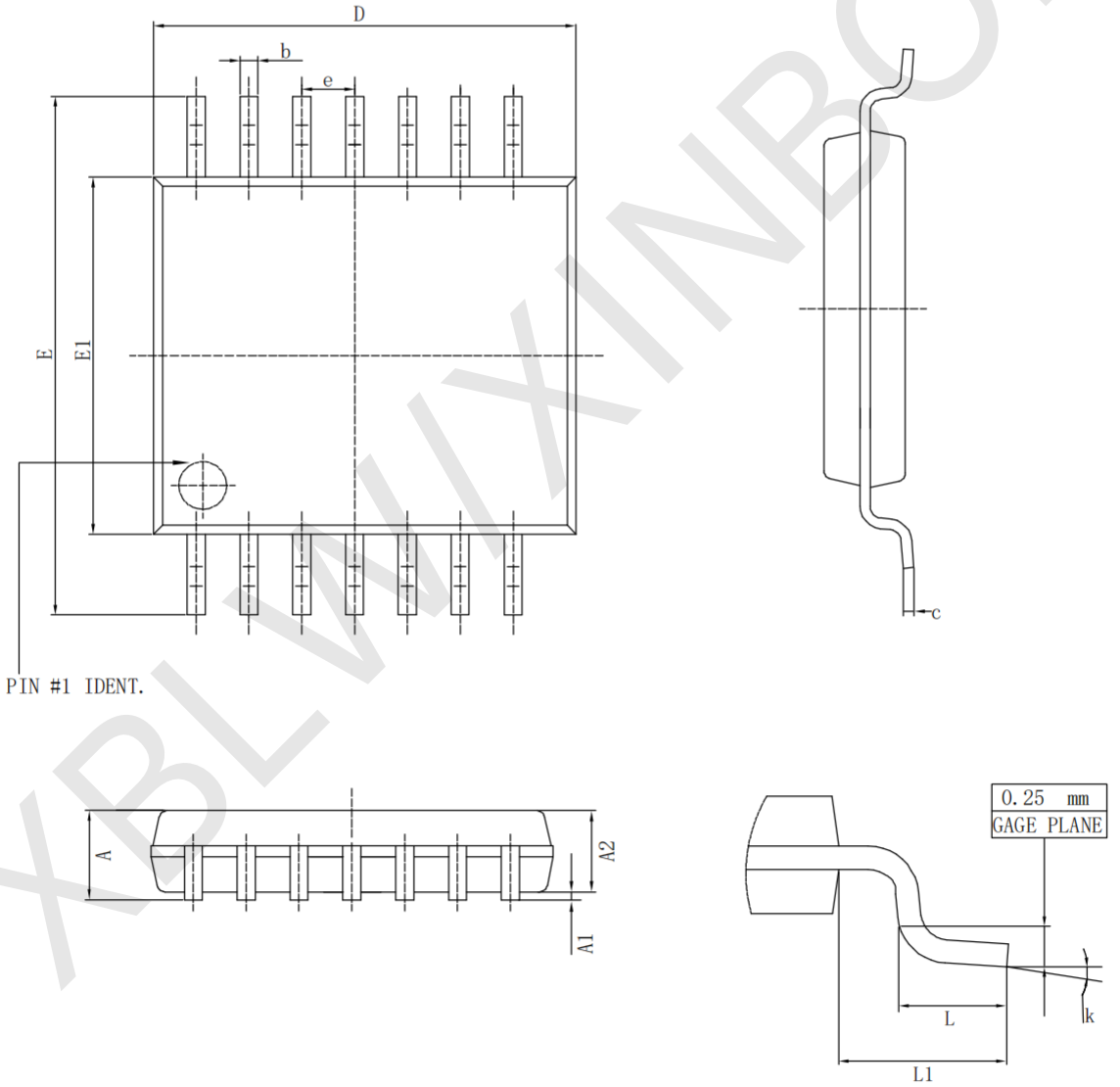



## · TSSOP-14

| 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 | 4.500 | E1 | 0.169 | 0.176 |
| e | 0.65 | | e | 0.0256 | |
| L | 0.450 | 0.750 | L | 0.018 | 0.030 |
| L1 | 1.00 | | L1 | 0.039 | |
| k | 0° | 8° | k | 0° | 8° |



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