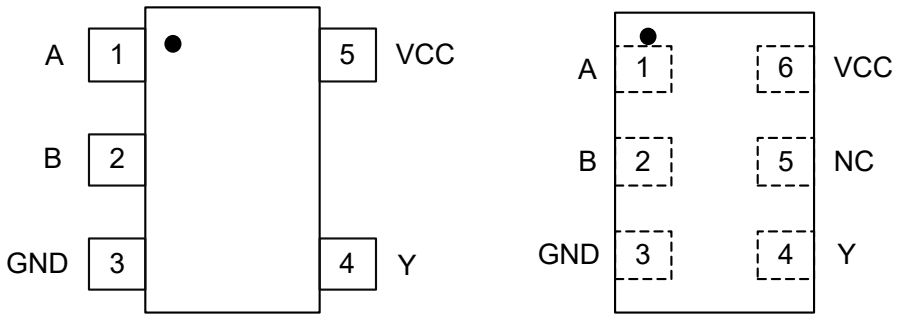
## 1.Description

The 74AUP1G00 is a high performance single 2−input NAND Gate operating from 0.8V to 3.6V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

## 2.Features

- Designed for 0.8V to 3.6V VCC Operation
- Low static power consumption; $I_{CC}$=0.7μA (maximum)
- 4mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially
- Reduces System Power Requirements
- These Devices are Pb−Free and are RoHS Compliant
- Tiny SC70-5, SOT23-5 and DFN6(1.0×1.5) Packages

## 3.Pinning information




**SOT23-5/SC70-5** **DFN6(1*1.5)**

Figure1. Top View

## 4.Pin Function

SC70-5/ SOT23-5

| Pin No. | Pin Name | Function |
|---|---|---|
| 1 | NC | No connect |
| 2 | A | Input |
| 3 | GND | Ground |
| 4 | Y | Output |
| 5 | VCC | Supply Voltage |

DFN6

| Pin No. | Pin Name | Function |
|---|---|---|
| 1 | NC | No connect |
| 2 | A | Input |
| 3 | GND | Ground |
| 4 | Y | Output |
| 5 | NC | No connect |
| 6 | VCC | Supply Voltage |

## 5.Block Diagram

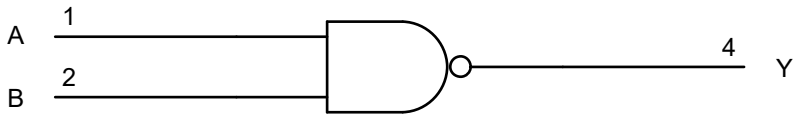



Figure2. Logic Symbol

Function Table

| Input | | Output |
|---|---|---|
| **A** | **B** | **Y** |
| L | L | H |
| L | H | H |
| H | L | H |
| H | H | L |

## 6.Absolute Maximum Ratings

| Parameter | | Symbol | Value | Units |
|---|---|---|---|---|
| DC Supply Voltage | | $V_{CC}$ | −0.5 to 4.6 | V |
| DC Input Voltage (1) | | $V_I$ | $-0.5 \le V_I \le +4.6$ | V |
| DC Output Voltage Output in Higher or Low State (1) | | $V_O$ | −0.5 to 4.6 | V |
| DC Input Diode Current $V_I$<GND | | $I_{IK}$ | -50 | mA |
| DC Output Diode Current $V_O$<GND, $V_O$>$V_{CC}$ | | $I_{OK}$ | ±50 | mA |
| DC Output Sink Current | | $I_O$ | ±20 | mA |
| DC Supply Current per Supply Pin | | $I_{CC}$ | ±50 | mA |
| Storage Temperature Range | | $T_{STG}$ | -65 to 150 | °C |
| Lead Temperature, 1 mm from Case for 10 Seconds | | $T_L$ | 260 | °C |
| Junction Temperature Under Bias | | $T_J$ | 150 | °C |
| ESD Classification | Human Body Model (2) | $V_{ESD}$ | ±4000 | V |
| | Charged Device Model (3) | | ±1000 | V |
| Latch-up Current Above $V_{CC}$ and GND at 125°C (4) | | $I_{LU}$ | ±100 | mA |

## 7.Thermal Characteristics

| Ratings | Package | Symbol | Value | Units |
|---|---|---|---|---|
| Thermal Characteristics, Thermal Resistance, Junction-to-Air | SC70-5 | $R_{\theta JA}$ | 300 | °C/W |
| | SOT23-5 | | 250 | |
| | DFN6(1.0x1.5) | | 440 | |
| Power Dissipation in Still Air at 85°C | SC70-5 | $P_D$ | 215 | mW |
| | SOT23-5 | | 260 | |
| | DFN6(1.0x1.5) | | 150 | |

## 8.Recommended Operating Conditions

| Parameter | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| DC Supply Voltage Operating | | $V_{CC}$ | 0.8 | 3.6 | V |
| DC input Voltage | | $V_{IN}$ | 0 | 3.6 | V |
| DC Output Voltage (High or Low State) | | $V_{OUT}$ | 0 | 3.6 | V |
| Operating Temperature Range | | $T_A$ | -40 | 85 | °C |
| Input Rise and Fall Time | $V_{CC}$=0.8V to 3.6V | $t_r$, $t_f$ | 0 | 20 | ns/V |

Notes:

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied.

## 9.Electrical Characteristics

### DC Electrical Characteristics

| Parameter | Condition | Symbol | $V_{CC}$(V) | $T_A$=25°C | | | −40°C≤$T_A$≤85°C | | Units |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Max | Min | Max | |
| High−Level Input Voltage | | $V_{IH}$ | 0.8V | 0.75$V_{CC}$ | | | 0.75$V_{CC}$ | | V |
| | | | 0.9 to 1.95 | 0.7$V_{CC}$ | | | 0.7$V_{CC}$ | | |
| | | | 2.3 to 2.7 | 1.6 | | | 1.6 | | |
| | | | 3 to 3.6 | 2 | | | 2 | | |
| Low−Level Input Voltage | | $V_{IL}$ | 0.8 | | | 0.25$V_{CC}$ | | 0.25$V_{CC}$ | V |
| | | | 0.9 to 1.95 | | | 0.3$V_{CC}$ | | 0.3$V_{CC}$ | |
| | | | 2.3 to 2.7 | | | 0.7 | | 0.7 | |
| | | | 3.0 to 3.6 | | | 0.9 | | 0.9 | |
| High−Level Output Voltage | $I_{OH}$=−20μA | $V_{OH}$ | 0.8 to 3.6 | $V_{CC}$-0.1 | | | $V_{CC}$-0.1 | | V |
| | $I_{OH}$=−1.1mA | | 1.1 | 0.82 | 1.02 | | 0.77 | | |
| | $I_{OH}$=−1.7μA | | 1.4 | 1.11 | 1.32 | | 1.03 | | |
| | $I_{OH}$=−1.9mA | | 1.65 | 1.32 | 1.58 | | 1.30 | | |
| | $I_{OH}$=−2.3mA | | 2.3 | 2.05 | 2.24 | | 1.97 | | |
| | $I_{OH}$=−3.1mA | | | 1.9 | 2.22 | | 1.85 | | |
| | $I_{OH}$=−2.7mA | | 3 | 2.72 | 2.95 | | 2.67 | | |
| | $I_{OH}$=−4.0mA | | | 2.6 | 2.92 | | 2.55 | | |
| Low−Level Output Voltage | $I_{OL}$=20μA | $V_{OL}$ | 0.8 to 3.6 | | | 0.1 | | 0.1 | V |
| | $I_{OL}$=1.1mA | | 1.1 | | 0.11 | 0.33 | | 0.33 | |
| | $I_{OL}$=1.7mA | | 1.4 | | 0.12 | 0.31 | | 0.37 | |
| | $I_{OL}$=1.9mA | | 1.65 | | 0.11 | 0.31 | | 0.35 | |
| | $I_{OL}$=2.3mA | | 2.3 | | 0.14 | 0.31 | | 0.33 | |
| | $I_{OL}$=3.1mA | | | | 0.19 | 0.44 | | 0.45 | |
| | $I_{OL}$=2.7mA | | 3 | | 0.11 | 0.31 | | 0.33 | |
| | $I_{OL}$=4.0mA | | | | 0.16 | 0.44 | | 0.45 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Input Leakage Current | $V_{IN}$=$V_{CC}$ or GND | $I_{IN}$ | 0 to 3.6 | | | 0.1 | | 0.2 | μA |
| Power Off Leakage Current | $V_{IN}$=3.6V or $V_{OUT}$=3.6V | $I_{OFF}$ | 0 | | | 0.2 | | 0.5 | μA |
| Quiescent Supply Current | $V_{IN}$=3.6V or GND | $I_{CC}$ | 3.6 | | | 0.2 | | 0.7 | μA |

## 10.AC Electrical Characteristics

$t_r = t_f$ = 2.5ns

| Parameter | Condition | Symbol | $V_{CC}$(V) | $T_A$=25°C | | | −40°C≤$T_A$≤85°C | | Units |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Max | Min | Max | |
| Propagation Delay (Figure3 And 4) | $C_L$=5pF (5) | $t_{PHL}$ $t_{PLH}$ | 0.8 | | 16.6 | | | | ns |
| | | | 1 2 | 2.6 | 7 | 13.8 | 2.1 | 17.1 | |
| | | | 1.5 | 2.9 | 5 | 9.2 | 2.9 | 11.1 | |
| | | | 1.8 | 2 | 4 | 7.1 | 2 | 9 | |
| | | | 2.5 | 1.3 | 2.9 | 4.9 | 1.3 | 6.2 | |
| | | | 3.3 | 1 | 2.4 | 3.8 | 1 | 4.8 | |
| | $C_L$=10pF (5) | | 0.8 | | 18.9 | | | | ns |
| | | | 1.2 | 3.2 | 8 | 15.7 | 3.1 | 18.8 | |
| | | | 1.5 | 2.9 | 5.8 | 10.5 | 2.9 | 12.1 | |
| | | | 1.8 | 2 | 4.7 | 8.2 | 2 | 9.8 | |
| | | | 2.5 | 1.3 | 3.4 | 5.7 | 1.3 | 6.8 | |
| | | | 3.3 | 1 | 2.9 | 4.5 | 1 | 5.2 | |
| | $C_L$=15pF (5) | | 0.8 | | 21.3 | | | | ns |
| | | | 1.2 | 3.6 | 9 | 17.3 | 3.1 | 21.5 | |
| | | | 1.5 | 2.9 | 6.5 | 11.6 | 2.9 | 14 | |
| | | | 1.8 | 2 | 5.3 | 9.2 | 2 | 11.4 | |
| | | | 2.5 | 1.3 | 3.9 | 6.4 | 1.3 | 8 | |
| | | | 3.3 | 1 | 3.3 | 5.1 | 1 | 6.4 | |
| | $C_L$=30pF (5) | | 0.8 | | 28.4 | | | | ns |
| | | | 1.2 | 4.9 | 11.9 | 21.9 | 4.4 | 27.1 | |
| | | | 1.5 | 2.9 | 8.6 | 14.7 | 2.9 | 17.7 | |
| | | | 1.8 | 2 | 7.1 | 11.5 | 2 | 14.2 | |
| | | | 2.5 | 1.3 | 5.3 | 8.1 | 1.3 | 10 | |
| | | | 3.3 | 1 | 4.5 | 6.5 | 1 | 8 | |

Notes: (5) $C_L$ includes probe and jig capacitance.

## 11.Capacitance Characteristics

| Parameter | Symbol | Condition | | Typ | Units |
|---|---|---|---|---|---|
| Input Capacitance | $C_{IN}$ | $V_{CC}$=3.6V, $V_I$= 0 V or $V_{CC}$ | | 2 | pF |
| output capacitance | $C_O$ | $V_{CC}$= 0V, $V_{OUT}$=GND | | 3 | pF |
| Power Dissipation Capacitance (6) | $C_{PD}$ | 1MHz, $V_I$=0 V to $V_{CC}$ | $V_{CC}$=0.8V | 7.6 | pF |
| | | | $V_{CC}$=1.2V | 8.1 | |
| | | | $V_{CC}$=1.5V | 8.5 | |
| | | | $V_{CC}$=1.8V | 8.6 | |
| | | | $V_{CC}$=2.5V | 9 | |
| | | | $V_{CC}$=3.3V | 9.6 | |

Notes:

(6) $C_{PD}$ is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: $I_{CC(OPR)}=C_{PD}\times V_{CC}\times f_{in}+I_{CC}\times C_{PD}$ is used to determine the no−load dynamic power consumption; $P_D=C_{PD}\times V_{CC}^2\times f_{in}+I_{CC}\times V_{CC}\times$Fig.

## 12.Waveform and Test Circuit

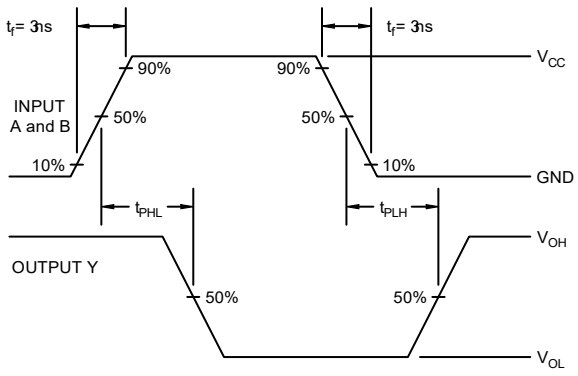



Figure3. Switching Waveform

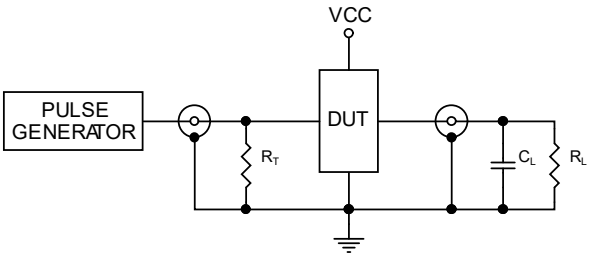
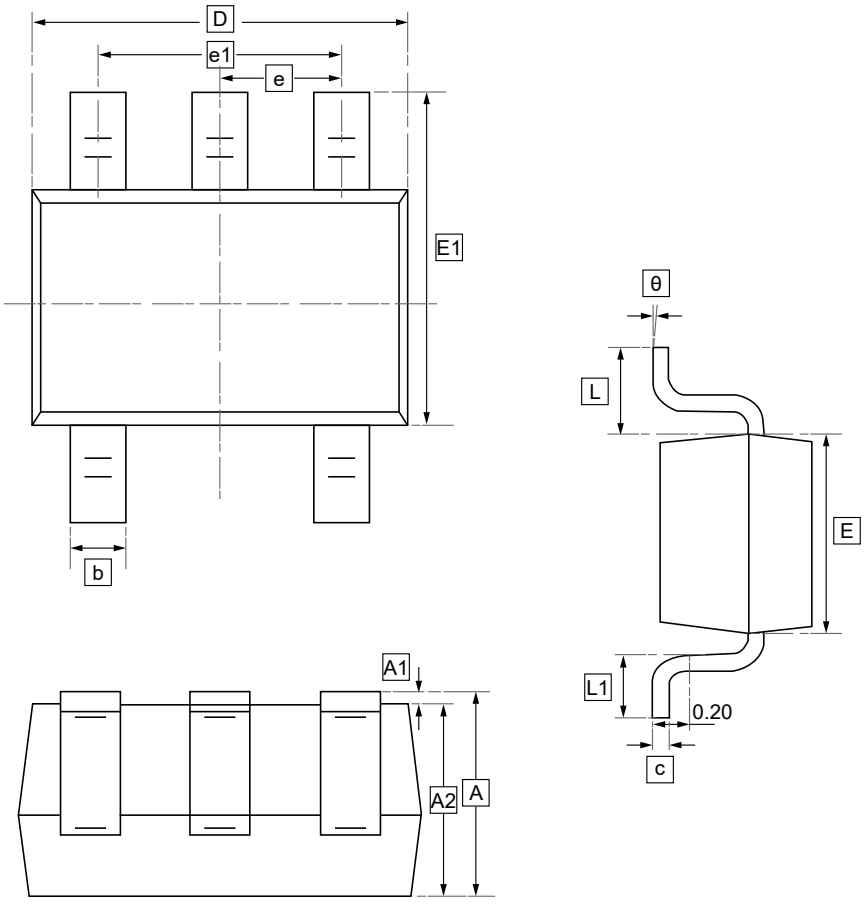



Figure4. Test Circuit

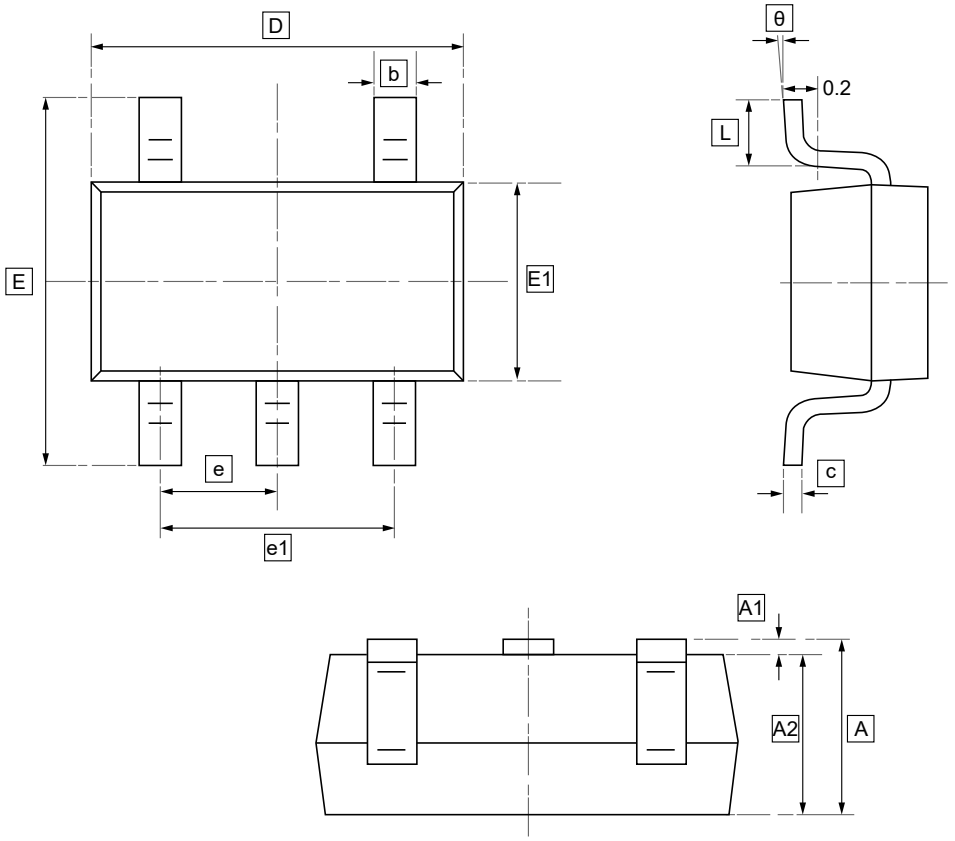
## 13.1SC70-5 Package Outline Dimensions




**DIMENSIONS (mm are the original dimensions)**

| Symbol | A | A1 | A2 | b | c | D | E | E1 | e | e1 | L | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Min** | 0.90 | 0.00 | 0.90 | 0.15 | 0.08 | 2.05 | 1.15 | 2.15 | 0.65 | 1.20 | 0.26 | 7° |
| **Max** | 1.10 | 0.10 | 1.00 | 0.35 | 0.15 | 2.25 | 1.35 | 2.45 | TYP | 1.40 | 0.46 | REF. |

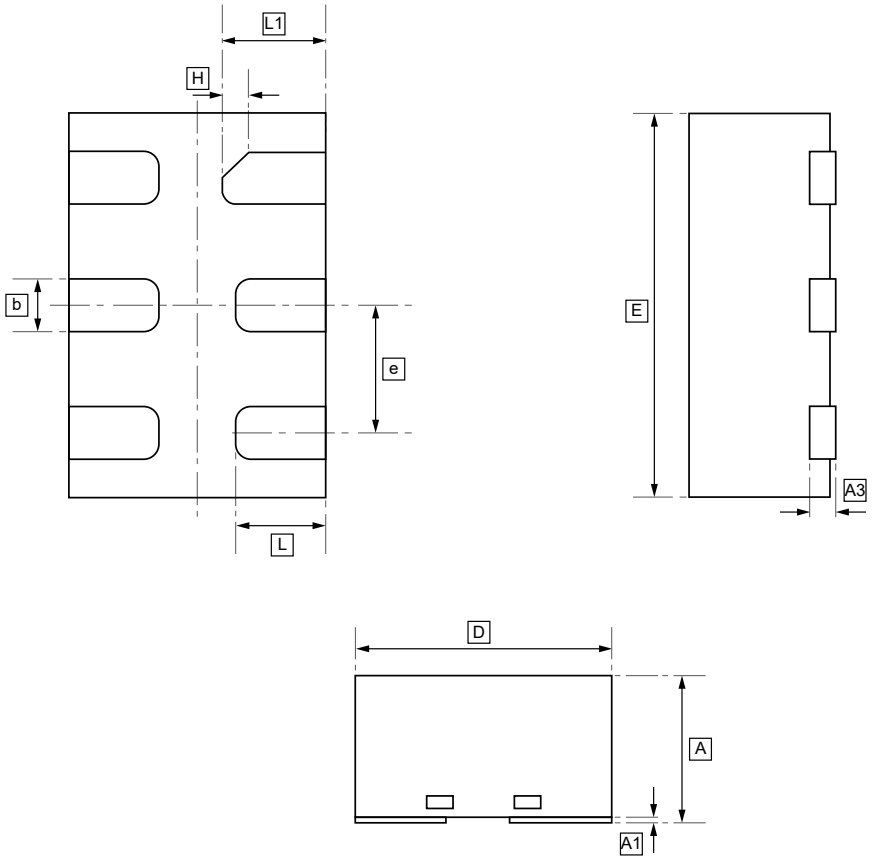
## 13.2SOT-23-5 Package Outline Dimensions




**DIMENSIONS (mm are the original dimensions)**

| Symbol | A | A1 | A2 | b | c | D | E1 | E | e | e1 | L | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Min** | 1.050 | 0.000 | 1.050 | 0.300 | 0.100 | 2.820 | 1.500 | 2.650 | 0.950 | 1.800 | 0.300 | 0° |
| **Max** | 1.250 | 0.100 | 1.150 | 0.500 | 0.200 | 3.020 | 1.700 | 2.950 | BSC | 2.000 | 0.600 | 8° |

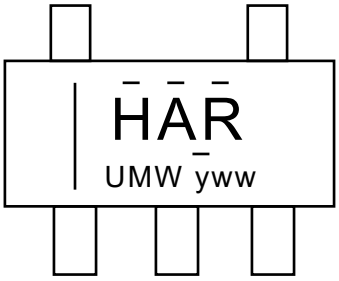
## 13.3DFN6(1*1.5) Package Outline Dimensions




**DIMENSIONS (mm are the original dimensions)**

| Symbol | A | A1 | A3 | b | D | E | e | H | L | L1 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Min** | 0.50 | 0 | 0.10 | 0.15 | 0.90 | 1.40 | 0.40 | 0.10 | 0.30 | 0.35 |
| **Max** | 0.60 | 0.05 | REF | 0.25 | 1.10 | 1.60 | 0.60 | REF | 0.40 | 0.45 |

## 14.Ordering information




yww: Batch Code

| Order Code | Marking | Package | Base QTY | Delivery Mode |
|---|---|---|---|---|
| UMW SN74AUP1G00DCKR | HAR | SC70-5 | 3000 | Tape and reel |
| UMW SN74AUP1G00DBVR | H00R | SOT23-5 | 3000 | Tape and reel |
| UMW SN74AUP1G00DRYR | HA | DFN6(1*1.5) | 5000 | Tape and reel |

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