

## Features

- Wide supply voltage range from 0.9V to 3.6V
- Inputs accept voltages up to 3.6V
- I<sub>OFF</sub> supports partial-power-down mode
- Low static power consumption; I<sub>CC</sub>=0.5μA (Max.)
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)

## General Description

The is a 2-input AND gate which provides the Function  $Y = A \cdot B$  or  $Y = \overline{\overline{A} + \overline{B}}$  in positive logic.

This device ensures a very low static and dynamic power consumption across the entire V<sub>CC</sub> range from 0.9V to 3.6V.

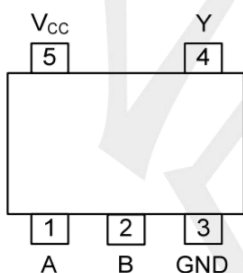
## Applications

- 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

## Logic Diagram



## Pin Configuratio (TOP VIEW)



SOT-353

## Function Table (each gate)

| INPUT |   | OUTPUT |
|-------|---|--------|
| A     | B | Y      |
| L     | L | L      |
| L     | H | L      |
| H     | L | L      |
| H     | H | H      |

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

### Absolute Maximum Ratings

| PARAMETER                 | SYMBOL           | CONDITIONS                          | RATINGS                       | UNIT |
|---------------------------|------------------|-------------------------------------|-------------------------------|------|
| Supply Voltage            | V <sub>CC</sub>  |                                     | -0.5 ~ +4.3                   | V    |
| Input Voltage             | V <sub>IN</sub>  |                                     | -0.5 ~ +4.3                   | V    |
| Output Voltage            | V <sub>OUT</sub> | Output in the high or low state     | -0.5 ~ +V <sub>CC</sub> +0.5V | V    |
|                           |                  | Output in the power-off state       | -0.5 ~ +4.3                   | V    |
| VCC or GND Current        | I <sub>CC</sub>  |                                     | ±50                           | mA   |
| Continuous Output Current | I <sub>OUT</sub> | V <sub>OUT</sub> =0~V <sub>CC</sub> | ±20                           | mA   |
| Input Clamp Current       | I <sub>IK</sub>  | V <sub>IN</sub> <0                  | -50                           | mA   |
| Output Clamp Current      | I <sub>OK</sub>  | V <sub>OUT</sub> <0                 | -50                           | mA   |
| Storage Temperature Range | T <sub>STG</sub> |                                     | -65 ~ +150                    | °C   |
| Junction to Ambient       | θ <sub>JA</sub>  |                                     | 280                           | °C/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 <sub>CC</sub>  | Operating                    | 0.9 | --  | 3.6             | V    |
| Input Voltage                      | V <sub>IN</sub>  |                              | 0   | --  | 3.6             | V    |
| Output Voltage                     | V <sub>OUT</sub> | High or low state            | 0   | --  | V <sub>CC</sub> | V    |
| Input Transition Rise or Fall Rate | Δt/Δv            | V <sub>CC</sub> =0.8V ~ 3.6V | --  | --  | 200             | ns/V |
| Operating Temperature              | T <sub>A</sub>   |                              | -40 | --  | +125            | °C   |

### Electrical Characteristics (T<sub>A</sub>=25°C ,unless otherwise specified)

| PARAMETER                            | SYMBOL               | TEST CONDITIONS   | MIN                     | TYP  | MAX                  | UNIT |   |
|--------------------------------------|----------------------|---|-------------------------|------|----------------------|------|---|
| High-level Input Voltage             | V <sub>IH</sub>      | V <sub>CC</sub> =0.9V   | V <sub>CC</sub>         | --   | --                   | V    |   |
|                                      |                      | V <sub>CC</sub> =1.1V ~ 1.95V   | 0.65×V <sub>CC</sub>    | --   | --                   | V    |   |
|                                      |                      | V <sub>CC</sub> =2.3V ~ 2.7V  | 1.6                     | --   | --                   | V    |   |
|                                      |                      | V <sub>CC</sub> =3V ~ 3.6V  | 2                       | --   | --                   | V    |   |
| Low-level Input Voltage              | V <sub>IL</sub>      | V <sub>CC</sub> =0.9V   | --                      | --   | 0                    | V    |   |
|                                      |                      | V <sub>CC</sub> =1.1V ~ 1.95V   | --                      | --   | 0.35×V <sub>CC</sub> | V    |   |
|                                      |                      | V <sub>CC</sub> =2.3V ~ 2.7V  | --                      | --   | 0.7                  | V    |   |
|                                      |                      | V <sub>CC</sub> =3V ~ 3.6V  | --                      | --   | 0.9                  | V    |   |
| High-Level Output voltage            | V <sub>OH</sub>      | V <sub>CC</sub> =0.9 ~ 3.6V, I <sub>OH</sub> =-20μA                                     | V <sub>CC</sub> -0.1    | --   | --                   | V    |   |
|                                      |                      | V <sub>CC</sub> =1.1V, I <sub>OH</sub> =-1.1mA  | 0.75×V <sub>CC</sub>    | --   | --                   | V    |   |
|                                      |                      | V <sub>CC</sub> =1.4V, I <sub>OH</sub> =-1.7mA  | 1.11                    | --   | --                   | V    |   |
|                                      |                      | V <sub>CC</sub> =1.65V, I <sub>OH</sub> =-1.9mA   | 1.32                    | --   | --                   | V    |   |
|                                      |                      | V <sub>CC</sub> =2.3V   | I <sub>OH</sub> =-2.3mA | 2.05 | --                   | --   | V |
|                                      |                      |   | I <sub>OH</sub> =-3.1mA | 1.9  | --                   | --   | V |
|                                      |                      | V <sub>CC</sub> =3V   | I <sub>OH</sub> =-2.7mA | 2.72 | --                   | --   | V |
|                                      |                      |   | I <sub>OH</sub> =-4mA   | 2.6  | --                   | --   | V |
| Low-Level Output voltage             | V <sub>OL</sub>      | V <sub>CC</sub> =0.9 ~ 3.6V, I <sub>OL</sub> =20μA                                      | --                      | --   | 0.1                  | V    |   |
|                                      |                      | V <sub>CC</sub> =1.1V, I <sub>OL</sub> =1.1mA   | --                      | --   | 0.3×V <sub>CC</sub>  | V    |   |
|                                      |                      | V <sub>CC</sub> =1.4V, I <sub>OL</sub> =1.7mA   | --                      | --   | 0.31                 | V    |   |
|                                      |                      | V <sub>CC</sub> =1.65V, I <sub>OL</sub> =1.9mA  | --                      | --   | 0.31                 | V    |   |
|                                      |                      | V <sub>CC</sub> =2.3V   | I <sub>OL</sub> =2.3mA  | --   | --                   | 0.31 | V |
|                                      |                      |   | I <sub>OL</sub> =3.1mA  | --   | --                   | 0.44 | V |
|                                      |                      | V <sub>CC</sub> =3V   | I <sub>OL</sub> =2.7mA  | --   | --                   | 0.31 | V |
|                                      |                      |   | I <sub>OL</sub> =4mA    | --   | --                   | 0.44 | V |
| Input Leakage Current                | I <sub>I(LEAK)</sub> | V <sub>CC</sub> =0 ~ 3.6V, V <sub>IN</sub> =GND ~ 3.6V                                  | --                      | --   | ±0.1                 | μA   |   |
| Power OFF Leakage Current            | I <sub>OFF</sub>     | V <sub>CC</sub> =0 V, V <sub>IN</sub> or V <sub>OUT</sub> =0 ~ 3.6V                     | --                      | --   | ±0.2                 | μA   |   |
| Additional Power OFF Leakage Current | ΔI <sub>OFF</sub>    | V <sub>CC</sub> =0 V~0.2V,<br>V <sub>IN</sub> or V <sub>OUT</sub> =0 ~ 3.6V             | --                      | --   | ±0.2                 | μA   |   |
| Quiescent Supply Current             | I <sub>CC</sub>      | V <sub>CC</sub> =0.9~3.6V, V <sub>IN</sub> =V <sub>CC</sub> or GND, I <sub>OUT</sub> =0 | --                      | --   | 0.5                  | μA   |   |
| Additional Quiescent Supply Current  | ΔI <sub>CC</sub>     | V <sub>CC</sub> =3.3 V, V <sub>IN</sub> =V <sub>CC</sub> -0.6V, I <sub>OUT</sub> =0     | --                      | --   | 40                   | μA   |   |
| Input Capacitance                    | C <sub>I</sub>       | V <sub>CC</sub> =0V-3.6V, V <sub>IN</sub> =V <sub>CC</sub> or GND                       | --                      | 1.5  | --                   | pF   |   |
| Output Capacitance                   | C <sub>OUT</sub>     | V <sub>CC</sub> =0V, V <sub>OUT</sub> =GND  | --                      | 3    | --                   | pF   |   |

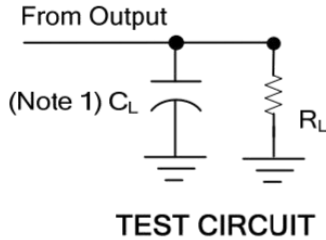
### OPERATING CHARACTERISTICS (f=10MHz, TA =25°C , unless otherwise specified)

| PARAMETER                     | SYMBOL          | TEST CONDITIONS            | MIN | TYP | MAX | UNIT |
|-------------------------------|-----------------|----------------------------|-----|-----|-----|------|
| Power Dissipation Capacitance | C <sub>PD</sub> | V <sub>CC</sub> =0.9V      | --  | 4   | --  | pF   |
|                               |                 | V <sub>CC</sub> =1.2±0.1V  | --  | 4   | --  | pF   |
|                               |                 | V <sub>CC</sub> =1.5±0.1V  | --  | 4   | --  | pF   |
|                               |                 | V <sub>CC</sub> =1.8±0.15V | --  | 4   | --  | pF   |
|                               |                 | V <sub>CC</sub> =2.5±0.2V  | --  | 4.1 | --  | pF   |
|                               |                 | V <sub>CC</sub> =3.3±0.3V  | --  | 4.3 | --  | pF   |

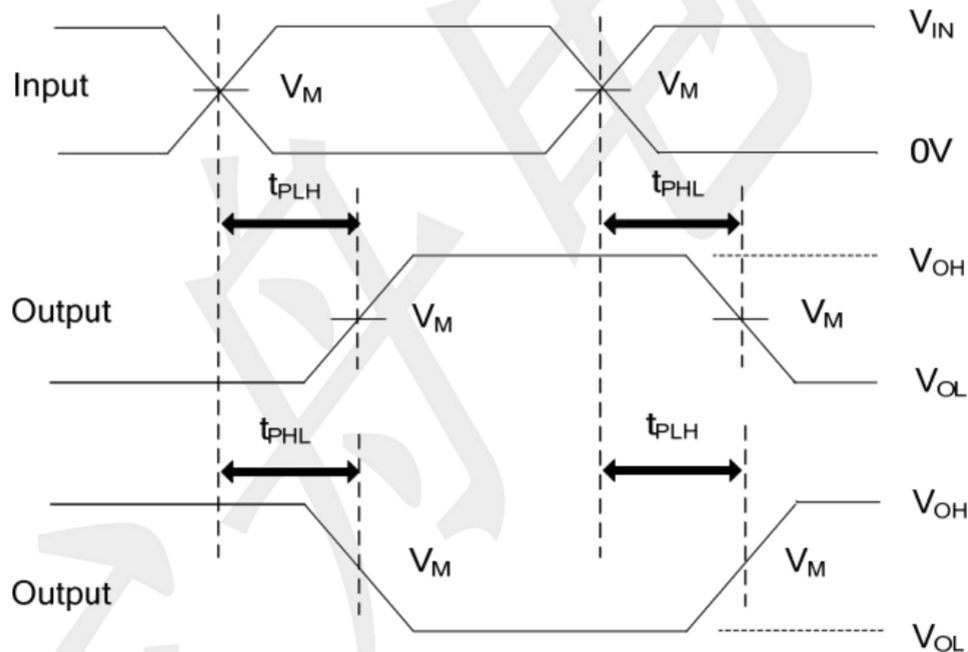
### SWITCHING CHARACTERISTICS (TA =25°C, unless otherwise specified)

| PARAMETER   | SYMBOL          | TEST CONDITIONS | MIN                        | TYP | MAX  | UNIT |    |
|---|-----------------|-----------------|----------------------------|-----|------|------|----|
| Propagation delay from inputs (A or B) to output(Y) | t <sub>PD</sub> | CL=5pF, RL=1MΩ  | V <sub>CC</sub> =0.9V      | --  | 18   | --   | ns |
|   |                 |                 | V <sub>CC</sub> =1.2±0.1V  | 2.6 | 7.3  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =1.5±0.1V  | 1.4 | 5.2  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =1.8±0.15V | 1   | 4.2  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =2.5±0.2V  | 1   | 3    | --   | ns |
|   |                 |                 | V <sub>CC</sub> =3.3±0.3V  | 1   | 2.4  | --   | ns |
|   |                 | CL=10pF, RL=1MΩ | V <sub>CC</sub> =0.9V      | --  | 21   | --   | ns |
|   |                 |                 | V <sub>CC</sub> =1.2±0.1V  | 1.5 | 8.5  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =1.5±0.1V  | 1   | 6.2  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =1.8±0.15V | 1   | 5    | --   | ns |
|   |                 |                 | V <sub>CC</sub> =2.5±0.2V  | 1   | 3.6  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =3.3±0.3V  | 1   | 2.9  | --   | ns |
|   |                 | CL=15pF, RL=1MΩ | V <sub>CC</sub> =0.9V      | --  | 24   | --   | ns |
|   |                 |                 | V <sub>CC</sub> =1.2±0.1V  | 3.6 | 9.9  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =1.5±0.1V  | 2.3 | 7.2  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =1.8±0.15V | 1.6 | 5.8  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =2.5±0.2V  | 1   | 4.3  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =3.3±0.3V  | 1   | 3.4  | --   | ns |
|   |                 | CL=30pF, RL=1MΩ | V <sub>CC</sub> =0.9V      | --  | 32.8 | --   | ns |
|   |                 |                 | V <sub>CC</sub> =1.2±0.1V  | 4.9 | 13.1 | --   | ns |
|   |                 |                 | V <sub>CC</sub> =1.5±0.1V  | 3.4 | 9.5  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =1.8±0.15V | 2.5 | 7.7  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =2.5±0.2V  | 1.8 | 5.7  | --   | ns |
|   |                 |                 | V <sub>CC</sub> =3.3±0.3V  | 1.5 | 4.7  | --   | ns |

## TEST CIRCUIT AND WAVEFORMS



| $V_{CC}$         | $V_{IN}$ | $t_R / t_F$       | $V_M$      | $C_L$           | $R_L$       |
|------------------|----------|-------------------|------------|-----------------|-------------|
| 0.8V             | $V_{CC}$ | $\leq 3\text{ns}$ | $V_{CC}/2$ | 5, 10, 15, 30pF | 1M $\Omega$ |
| 1.2V $\pm$ 0.1V  | $V_{CC}$ | $\leq 3\text{ns}$ | $V_{CC}/2$ | 5, 10, 15, 30pF | 1M $\Omega$ |
| 1.5V $\pm$ 0.1V  | $V_{CC}$ | $\leq 3\text{ns}$ | $V_{CC}/2$ | 5, 10, 15, 30pF | 1M $\Omega$ |
| 1.8V $\pm$ 0.15V | $V_{CC}$ | $\leq 3\text{ns}$ | $V_{CC}/2$ | 5, 10, 15, 30pF | 1M $\Omega$ |
| 2.5V $\pm$ 0.2V  | $V_{CC}$ | $\leq 3\text{ns}$ | $V_{CC}/2$ | 5, 10, 15, 30pF | 1M $\Omega$ |
| 3.3V $\pm$ 0.3V  | $V_{CC}$ | $\leq 3\text{ns}$ | $V_{CC}/2$ | 5, 10, 15, 30pF | 1M $\Omega$ |



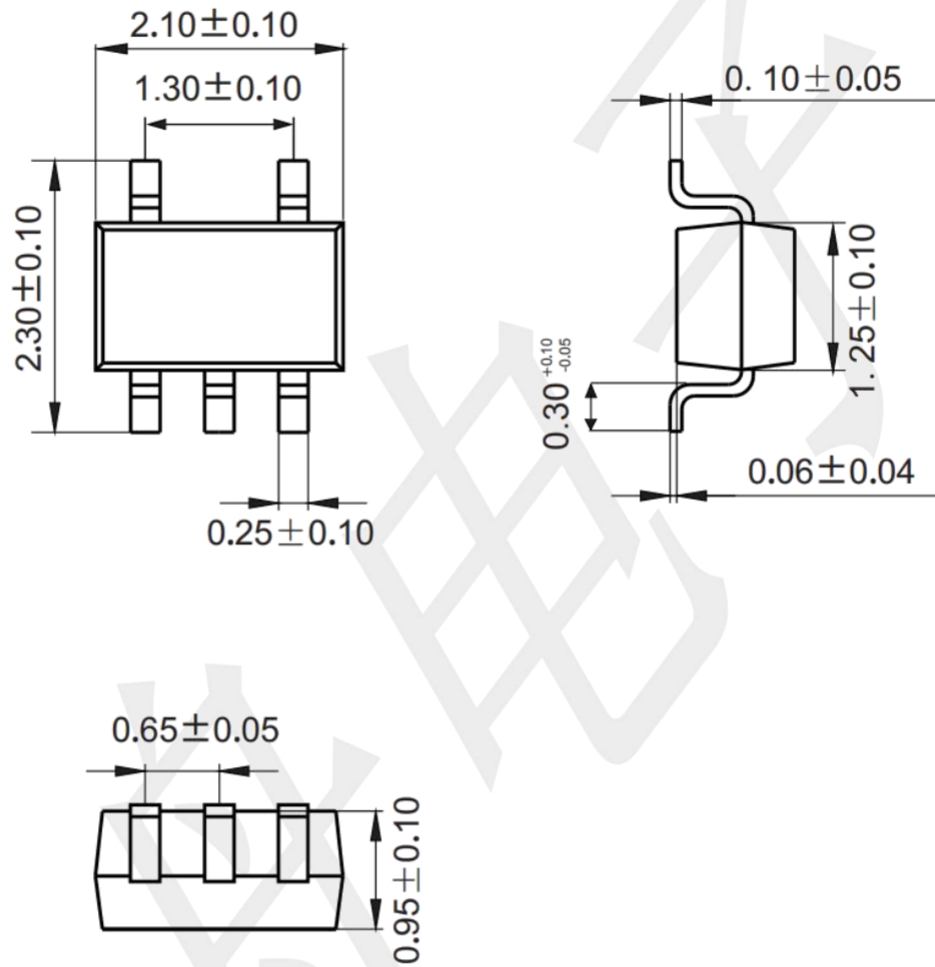
## PROPAGATION DELAY TIMES

### Notes:

1.  $C_L$  includes probe and jig capacitance.
2. All input pulses are supplied by generators having the following characteristics: PRR  $\leq 10\text{MHz}$ ,  $Z_O = 50\Omega$ .

**Package information (Unit: mm)**

SOT353



**Mounting Pad Layout (unit: mm)**

