



## DESCRIPTION

The AL2G32 dual 2-input positive-OR gate is designed for 1.65V to 5.5V  $V_{CC}$  operation

The AL2G32 performs the Boolean function  $Y=A+B$

or  $Y=\overline{A} \bullet \overline{B}$  in positive logic.

The AL2G32 is fully specified for partial-power-down applications using  $I_{off}$ . The  $I_{off}$  circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

The AL2G32 is available in MSOP8 package.

## ORDERING INFORMATION

| Package Type                   | Part Number                               |             |
|--------------------------------|-------------------------------------------|-------------|
| MSOP8<br>SPQ: 4,000pcs/Reel    | MS8                                       | AL2G32MS8R  |
|                                |                                           | AL2G32MS8VR |
| Note                           | V: Halogen free Package<br>R: Tape & Reel |             |
| AiT provides all RoHS products |                                           |             |

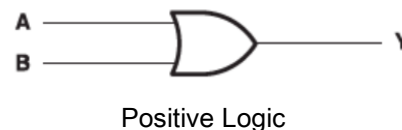
## FEATURES

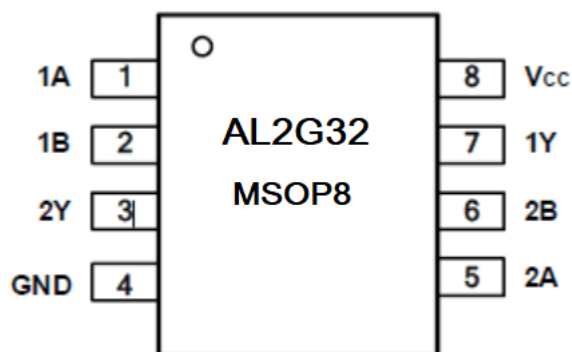
- Supports 5V  $V_{CC}$  Operation
- Inputs Accept Voltages to 5.5V
- Operating Voltage Range: 1.65V to 5.5V
- Low Power Consumption: 1 $\mu$ A (Max)
- High Output Drive:  $\pm 24$ mA at  $V_{CC}=3.0$ V
- $I_{off}$  Supports Partial -Power-Down Mode Operation
- Operating Temperature: -40°C to +125°C

## APPLICATION

- Down Translation
- Logical OR
- AV Receiver
- Blu-Ray Player ad Home Theater
- Digital Photo Frame (DPF)
- High-Speed Data Acquisition and Generation
- Personal Navigation Device (GPS)
- Portable Media Player

## FUNCTIONAL BLOCK DIAGRAM



**PIN DESCRIPTION**

MSOP8, MS8

Top View

| Pin # | Symbol | I/O | Function              |
|-------|--------|-----|-----------------------|
| MSOP8 |        |     |                       |
| 1     | 1A     | I   | Channel 1 Logic Input |
| 2     | 1B     | I   | Channel 2 Logic Input |
| 3     | 2Y     | O   | Logic Level Output 2  |
| 4     | GND    | -   | Ground                |
| 5     | 2A     | I   | Channel 2 Logic Input |
| 6     | 2B     |     | Channel 2 Logic Input |
| 7     | 1Y     | O   | Logic Level Output 1  |
| 8     | Vcc    | -   | Power Supply          |

**FUNCTION TABLE**

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

Y=A+B

H=Hight Voltage Level

L=Low Voltage Level

**ABSOLUTE MAXIMUM RATINGS**over operating free-air temperature range, unless otherwise noted <sup>(1)(2)</sup>

|                                                                                                              |                        |                               |
|--------------------------------------------------------------------------------------------------------------|------------------------|-------------------------------|
| V <sub>CC</sub> , Supply Voltage Range                                                                       |                        | -0.5V ~ 6.5V                  |
| V <sub>I</sub> , Input Voltage Range <sup>(2)</sup>                                                          |                        | -0.5V ~ 6.5V                  |
| V <sub>O</sub> , Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup> |                        | -0.5V ~ 6.5V                  |
| V <sub>O</sub> , Voltage range applied to any output in the high or low state <sup>(2) (3)</sup>             |                        | -0.5V ~ V <sub>CC</sub> +0.5V |
| I <sub>IK</sub> , Input Clamp Current                                                                        | V <sub>I</sub> <0      | -50mA                         |
| I <sub>OK</sub> , Output Clamp Current                                                                       | V <sub>O</sub> <0      | -50mA                         |
| I <sub>O</sub> , Continuous Output Current                                                                   |                        | ±50mA                         |
| Continuous Current Through V <sub>CC</sub> or GND                                                            |                        | ±100mA                        |
| T <sub>J</sub> , Junction Temperature                                                                        |                        | 150°C                         |
| T <sub>STG</sub> , Storage Temperature                                                                       |                        | -65°C ~ 150°C                 |
| <b>ESD Ratings</b>                                                                                           |                        |                               |
| V <sub>(ESD)</sub> , Electrostatic Discharge                                                                 | Human-body Model (HBM) | ±8000V                        |
|                                                                                                              | Machine Model (MM)     | ±500V                         |

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

(3) The value of V<sub>CC</sub> is provided in the Recommended Operating Conditions table.

**RECOMMENDED OPERATING CONDITIONS**over recommended operating free-air temperature range, T<sub>A</sub> = +25°C, unless otherwise noted.

| Parameter                     | Symbol                          | Conditions                             | Min.                 | Max.                 | Unit |
|-------------------------------|---------------------------------|----------------------------------------|----------------------|----------------------|------|
| Supply Voltage                | V <sub>CC</sub>                 | Operating                              | 1.65                 | 5.5                  | V    |
|                               |                                 | Data retention only                    | 1.5                  | 5.5                  |      |
| High-Level Input Voltage      | V <sub>IH</sub>                 | V <sub>CC</sub> =1.65V to 1.95V        | 0.65xV <sub>CC</sub> |                      | V    |
|                               |                                 | V <sub>CC</sub> =2.3V to 2.7V          | 1.7                  |                      |      |
|                               |                                 | V <sub>CC</sub> =3V to 3.6V            | 2.2                  |                      |      |
|                               |                                 | V <sub>CC</sub> =4.5V to 5.5V          | 0.7xV <sub>CC</sub>  |                      |      |
| Low-Level Input Voltage       | V <sub>IL</sub>                 | V <sub>CC</sub> =1.65V to 1.95V        |                      | 0.15xV <sub>CC</sub> | V    |
|                               |                                 | V <sub>CC</sub> =2.3V to 2.7V          |                      | 0.3                  |      |
|                               |                                 | V <sub>CC</sub> =3V to 3.6V            |                      | 0.4                  |      |
|                               |                                 | V <sub>CC</sub> =4.5V to 5.5V          |                      | 0.15xV <sub>CC</sub> |      |
| Input Voltage                 | V <sub>I</sub>                  |                                        | 0                    | 5.5                  | V    |
| Output voltage                | V <sub>O</sub>                  |                                        | 0                    | V <sub>CC</sub>      | V    |
| Input Transition Rise or Fall | t <sub>r</sub> , t <sub>f</sub> | V <sub>CC</sub> =1.8V±0.15V, 2.5V±0.2V |                      | 20                   | ns/V |
|                               |                                 | V <sub>CC</sub> =3.3V±0.3V             |                      | 10                   |      |
|                               |                                 | V <sub>CC</sub> =5V±0.5V               |                      | 5                    |      |
| Operating temperature         | T <sub>A</sub>                  |                                        | -40                  | 125                  | °C   |

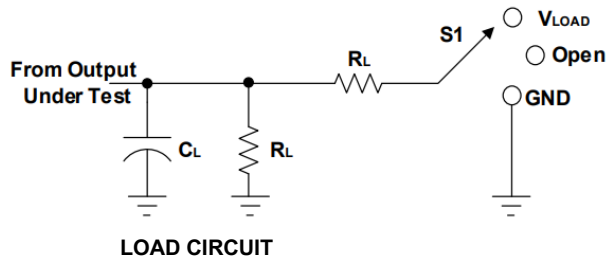
**ELECTRICAL CHARACTERISTICS**T<sub>A</sub> = +25°C, unless otherwise noted.

| Parameter                                     |                   | Conditions                                                                                              | Temp          | Min.                 | Typ. | Max. | Unit |
|-----------------------------------------------|-------------------|---------------------------------------------------------------------------------------------------------|---------------|----------------------|------|------|------|
| DC Characteristics                            |                   |                                                                                                         |               |                      |      |      |      |
| V <sub>OH</sub>                               |                   | I <sub>OH</sub> = -100μA, V <sub>CC</sub> =1.65V to 5.5V                                                | -40°C~~+125°C | V <sub>CC</sub> -0.1 | -    | -    | V    |
|                                               |                   | I <sub>OH</sub> =-4mA, V <sub>CC</sub> =1.65V                                                           |               | 1.2                  | -    | -    |      |
|                                               |                   | I <sub>OH</sub> =-8mA, V <sub>CC</sub> =2.3V                                                            |               | 1.9                  | -    | -    |      |
|                                               |                   | I <sub>OH</sub> =-16mA, V <sub>CC</sub> =3V                                                             |               | 2.4                  | -    | -    |      |
|                                               |                   | I <sub>OH</sub> =-24mA, V <sub>CC</sub> =3V                                                             |               | 2.3                  | -    | -    |      |
|                                               |                   | I <sub>OH</sub> =-32mA, V <sub>CC</sub> =4.5V                                                           |               | 3.8                  | -    | -    |      |
| V <sub>OL</sub>                               |                   | I <sub>OL</sub> =100μA, V <sub>CC</sub> =1.65V to 5.5V                                                  | -40°C~~+125°C | -                    | -    | 0.1  | V    |
|                                               |                   | I <sub>OL</sub> =4mA, V <sub>CC</sub> =1.65V                                                            |               | -                    | -    | 0.45 |      |
|                                               |                   | I <sub>OL</sub> =8mA, V <sub>CC</sub> =2.3V                                                             |               | -                    | -    | 0.3  |      |
|                                               |                   | I <sub>OL</sub> =16mA, V <sub>CC</sub> =3V                                                              |               | -                    | -    | 0.4  |      |
|                                               |                   | I <sub>OL</sub> =24mA, V <sub>CC</sub> =3V                                                              |               | -                    | -    | 0.55 |      |
|                                               |                   | I <sub>OL</sub> =32mA, V <sub>CC</sub> =4.5V                                                            |               | -                    | -    | 0.55 |      |
| I <sub>I</sub>                                | A or B input      | V <sub>I</sub> =5.5V or GND, V <sub>CC</sub> = 0V to 5.5V                                               | +25°C         | -                    | ±0.1 | ±1   | μA   |
|                                               |                   |                                                                                                         | -40°C~~+125°C | -                    | -    | ±5   |      |
| I <sub>off</sub>                              |                   | V <sub>I</sub> or V <sub>O</sub> =5.5V, V <sub>CC</sub> =0V                                             | +25°C         |                      | ±0.1 | ±1   | μA   |
|                                               |                   |                                                                                                         | -40°C~~+125°C |                      |      | ±10  |      |
| I <sub>CC</sub>                               |                   | V <sub>I</sub> =5.5V or GND, I <sub>O</sub> =0, V <sub>CC</sub> =1.65V to 5.5V                          | +25°C         | -                    | 0.1  | 1    | μA   |
|                                               |                   |                                                                                                         | -40°C~~+125°C | -                    | -    | 10   |      |
| ΔI <sub>CC</sub>                              |                   | One input at V <sub>CC</sub> - 0.6V, Other inputs at V <sub>CC</sub> or GND V <sub>CC</sub> =3V to 5.5V | -40°C~~+125°C | -                    | -    | 500  | μA   |
| AC Characteristics                            |                   |                                                                                                         |               |                      |      |      |      |
| t <sub>pd</sub> Propagation Delay             |                   | V <sub>CC</sub> =1.8V±0.15V,C <sub>L</sub> =30pF, R <sub>L</sub> =1kΩ                                   | -40°C~~+125°C |                      | 8.0  |      | ns   |
|                                               |                   | V <sub>CC</sub> =2.5V±0.2V,C <sub>L</sub> =30pF, R <sub>L</sub> =500Ω                                   |               |                      | 3.7  |      |      |
|                                               |                   | V <sub>CC</sub> =3.3V±0.3V,C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω                                   |               |                      | 2.5  |      |      |
|                                               |                   | V <sub>CC</sub> =5V±0.5V,C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω                                     |               |                      | 2.7  |      |      |
| C <sub>i</sub>                                | Input Capacitance | V <sub>CC</sub> =3.3V, V <sub>I</sub> =V <sub>CC</sub> or GND                                           | -40°C~~+125°C |                      | 4    |      | pF   |
| C <sub>pd</sub> Power Dissipation Capacitance |                   | V <sub>CC</sub> =1.8V, f=10MHz                                                                          | +25°C         |                      | 20   |      | pF   |
|                                               |                   | V <sub>CC</sub> =2.5V, f=10MHz                                                                          |               |                      | 21   |      |      |
|                                               |                   | V <sub>CC</sub> =3.3V, f=10MHz                                                                          |               |                      | 22   |      |      |
|                                               |                   | V <sub>CC</sub> =5V, f=10MHz                                                                            |               |                      | 25   |      |      |

All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation.

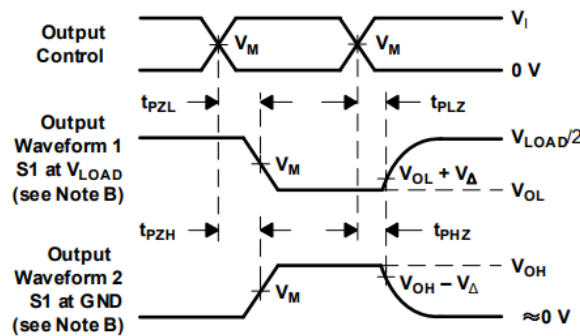
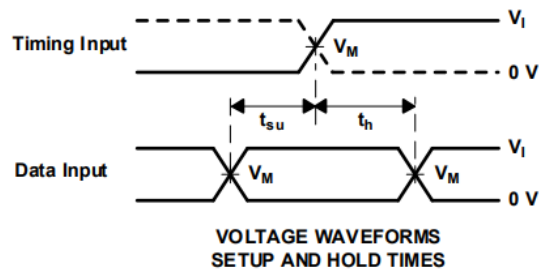
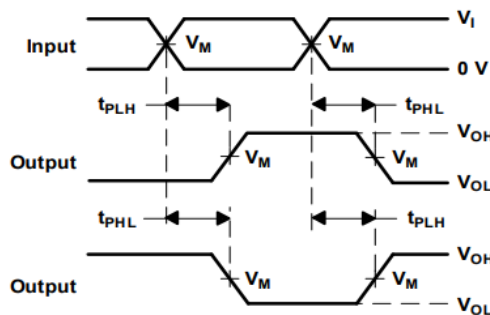
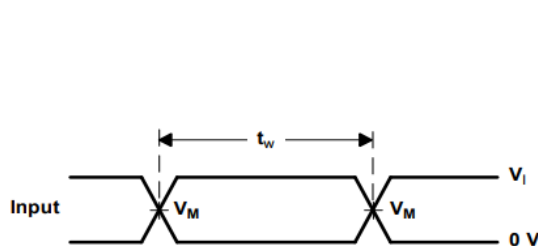


## PARAMETER MEASUREMENT INFORMATION



| TEST                               | S1                |
|------------------------------------|-------------------|
| t <sub>PLH</sub> /t <sub>PHL</sub> | open              |
| t <sub>PLZ</sub> /t <sub>PZL</sub> | V <sub>LOAD</sub> |
| t <sub>PHZ</sub> /t <sub>PZH</sub> | GND               |

| V <sub>CC</sub> | INPUTS          |                                | V <sub>M</sub>     | V <sub>LOAD</sub>   | C <sub>L</sub> | R <sub>L</sub> | V <sub>Δ</sub> |       |
|-----------------|-----------------|--------------------------------|--------------------|---------------------|----------------|----------------|----------------|-------|
|                 | V <sub>I</sub>  | t <sub>r</sub> /t <sub>f</sub> |                    |                     |                |                |                |       |
| 1.8V±0.15V      | V <sub>CC</sub> | ≤2ns                           | V <sub>CC</sub> /2 | 2 x V <sub>CC</sub> | 15pF           | 30pF           | 1MΩ            | 0.15V |
| 2.5V±0.2V       | V <sub>CC</sub> | ≤2ns                           | V <sub>CC</sub> /2 | 2 x V <sub>CC</sub> | 15pF           | 30pF           | 1MΩ            | 0.15V |
| 3.3V±0.3V       | 3V              | ≤2.5ns                         | 1.5V               | 6V                  | 15pF           | 50pF           | 1MΩ            | 0.3V  |
| 5.0V±0.5V       | V <sub>CC</sub> | ≤2.5ns                         | V <sub>CC</sub> /2 | 2 x V <sub>CC</sub> | 15pF           | 50pF           | 1MΩ            | 0.3V  |



NOTE A: C<sub>L</sub> includes probe and jig capacitance.

B: Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control.

Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.

C: All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z<sub>o</sub> = 50Ω.

D: The outputs are measured one at a time, with one transition per measurement.

E: t<sub>PLZ</sub> and t<sub>PHZ</sub> are the same as t<sub>dis</sub>.

F: t<sub>PZL</sub> and t<sub>PZH</sub> are the same as t<sub>en</sub>.

G: t<sub>PLH</sub> and t<sub>PHL</sub> are the same as t<sub>pd</sub>.

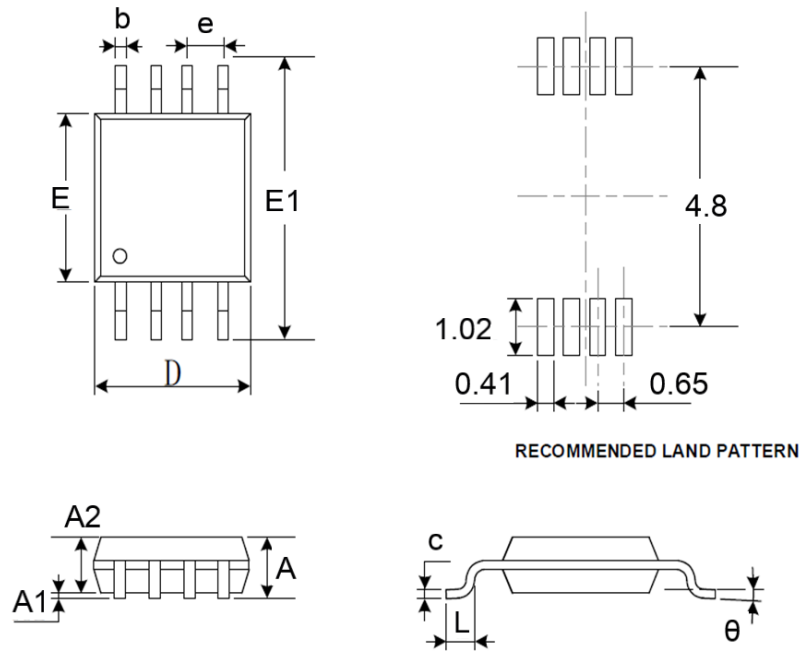
H: All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms



## PACKAGE INFORMATION

Dimension in MSOP8 (Unit: mm)



| Symbol   | Millimeters |       |
|----------|-------------|-------|
|          | Min         | Max   |
| A        | 0.820       | 1.100 |
| A1       | 0.020       | 0.150 |
| A2       | 0.750       | 0.950 |
| b        | 0.250       | 0.380 |
| c        | 0.090       | 0.230 |
| D        | 2.900       | 3.100 |
| e        | 0.650 BSC   |       |
| E        | 2.900       | 3.100 |
| E1       | 4.750       | 5.050 |
| L        | 0.400       | 0.800 |
| $\theta$ | 0°          | 6°    |



## IMPORTANT NOTICE

AiT Semiconductor Inc. (AiT) reserves the right to make changes to any its product, specifications, to discontinue any integrated circuit product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

AiT Semiconductor Inc.'s integrated circuit products are not designed, intended, authorized, or warranted to be suitable for use in life support applications, devices or systems or other critical applications. Use of AiT products in such applications is understood to be fully at the risk of the customer. As used herein may involve potential risks of death, personal injury, or server property, or environmental damage. In order to minimize risks associated with the customer's applications, the customer should provide adequate design and operating safeguards.

AiT Semiconductor Inc. assumes to no liability to customer product design or application support. AiT warrants the performance of its products of the specifications applicable at the time of sale.