## DESCRIPTION

The AL1G07 Single buffer and driver is designed for 1.65V to 5.5V $V_{CC}$ operation.

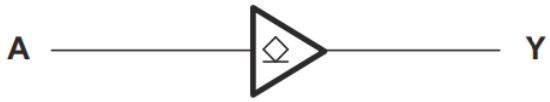
The AL1G07 is open drain and can be connected to other open-drain outputs to implement active-low wired-OR or active-high wired-AND functions. The AL1G07 is fully specified for partialpower- down applications using $I_{off}$. The $I_{off}$ circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

The AL1G07 is available in Green SOT-25 and SC70-5 packages and operates over an ambient temperature range of -40°C to +125°C.

## ORDERING INFORMATION

| Package Type | Part Number | |
|---|---|---|
| SOT-25<br>SPQ: 3,000pcs/Reel | E5 | AL1G07E5R |
| | | AL1G07E5VR |
| SC70-5<br>SPQ: 3,000pcs/Reel | C5 | AL1G07C5R |
| | | AL1G07C5VR |
| Note | V: Halogen free Package<br>R: Tape & Reel | |
| AiT provides all RoHS products | | |

## FUNCTIONAL BLOCK DIAGRAM



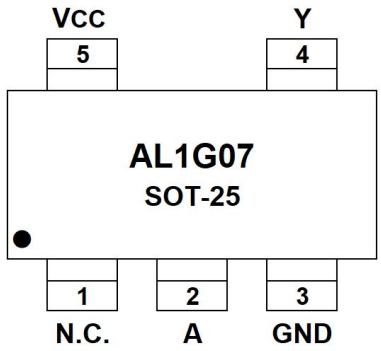

## FEATURES

- Operating Voltage Range:1.65V to 5.5V
- Low Power Consumption:1μA (Max)
- Operating Temperature Range: -40°C to +125°C
- Input and Open-Drain Output accept Voltage to 5.5V
- High Output Drive: ±24mA at $V_{CC}$=3.0V

## APPLICATION

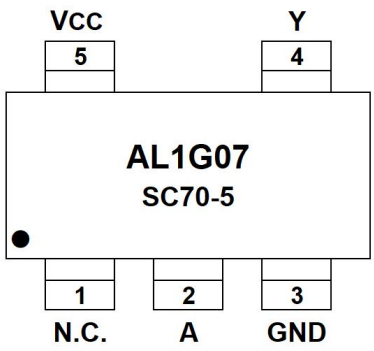
- AV Receiver
- Blu-ray Player and Home Theater
- DVD Recorder and Player
- Desktop or Notebook PC
- Digital Video Cameras (DVC)
- Embedded PC
- GPS: Personal Navigation Device
- Mobile Internet Device
- Network Projector Front End
- Portable Media Player
- Pro Audio Mixer
- Smoke Detector
- Solid State Drive (SSD): Enterprise
- High-Definition (HDTV)
- Table: Enterprise
- Audio Dock: Portable
- DLP Front Projection System
- DVR and DVS
- Digital Picture Frame (DPF)
- Digital Still Camera
- Personal Navigation Device (GPS)

## PIN DESCIPTION




SOT-25, E5

Top View




SC70-5, C5

Top View

| Pin # | | Symbol | I/O | Function |
|---|---|---|---|---|
| SOT-25 | SC70-5 | | | |
| 1 | 1 | N.C. | - | Not connected |
| 2 | 2 | A | I | Input |
| 3 | 2 | GND | P | Ground |
| 4 | 4 | Y | O | Output |
| 5 | 5 | $V_{CC}$ | P | Power Pin |

## FUNCTION TABLE

| Input | Output |
|---|---|
| A | Y |
| L | L |
| H | Z |

H=High Voltage Level

L=Low Voltage Level

Z=High-impedance OFF-state

## ABSOLUTE MAXIMUM RATINGS

$T_A$ = +25°C, unless otherwise noted. (1)

| | | |
|---|---|---|
| $V_{CC}$, Supply Voltage Range | | -0.5V ~ +6.5V |
| $V_I$, Input Voltage Range (1) | | -0.5V ~ +6.5V |
| $V_O$, Voltage range applied to any output in the high-impedance or power-off state (1) | | -0.5V ~ +6.5V |
| $V_O$, Voltage range applied to any output in the high or low state (1)(2) | | -0.5V ~ $V_{CC}$+0.5V |
| $I_{IK}$, Input Clamp Current | $V_I$<0 | -50mA |
| $I_{OK}$, Output Clamp Current | $V_O$<0 | -50mA |
| $I_O$, Continuous Output Current | | ±50mA |
| Continuous Current Through $V_{CC}$ or GND | | ±100mA |
| $T_J$, Junction Temperature | | +150℃ |
| $T_{STG}$, Storage Temperature | | -65℃ ~ +150℃ |
| **ESD Ratings** | | |
| $V_{(ESD)}$, Electrostatic Discharge | Human-Body Model (HBM) | ±8000V |
| | Machine Model (MM) | ±500V |
| **Thermal Information** | | |
| $R_{\theta JA}$, Junction-to-Ambient | SOT-25 | 273.8℃/W |
| | SC70-5 | 214.7℃/W |
| $R_{\theta JC(top)}$,Junction-to-Case | SOT-25 | 126.8℃/W |
| | SC70-5 | 127.1℃/W |

Stresses above 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 in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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

(2) The value of $V_{CC}$ is provided in the Recommended Operating Conditions table.

## RECOMMENDED OPERATING CONDITIONS

At $T_A$ = +25°C, unless otherwise noted.

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | Operating | 1.65 | - | 5.5 | V |
| | | Data retention only | 1.50 | - | - | |
| High-Level Input Voltage | $V_{IH}$ | $V_{CC}$=1.65V to 1.95V | 0.65x$V_{CC}$ | - | - | V |
| | | $V_{CC}$=2.3V to 2.7V | 1.70 | - | - | |
| | | $V_{CC}$=3V to 3.6V | 2.20 | - | - | |
| | | $V_{CC}$=4.5V to 5.5V | 0.70x$V_{CC}$ | - | - | |
| Low-level input voltage | $V_{IL}$ | $V_{CC}$=1.65V to 1.95V | - | - | 0.15x$V_{CC}$ | V |
| | | $V_{CC}$=2.3V to 2.7V | - | - | 0.30 | |
| | | $V_{CC}$=3V to 3.6V | - | - | 0.40 | |
| | | $V_{CC}$=4.5V to 5.5V | - | - | 0.15x$V_{CC}$ | |
| Input Voltage | $V_I$ | | 0 | - | 5.5 | V |
| Output Voltage | $V_O$ | | 0 | - | 5.5 | V |
| Input transition rise or fall | Δt/Δv | $V_{CC}$=1.8V± 0.15V,2.5V ± 0.2V | - | - | 20 | ns/V |
| | | $V_{CC}$=3.3V± 0.3V | - | - | 10 | |
| | | $V_{CC}$=5V± 0.5V | - | - | 5 | |
| Operating Temperature | $T_A$ | | -40 | - | +125 | ℃ |

## AC ELECTRICAL CHARACTERISTICS

At $T_A$ = +25°C, unless otherwise noted.

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Propagation Delay | $t_{pd}$ | $V_{CC}$=1.8V±0.15V | $C_L$=30pF, $R_L$=1kΩ<br>-40℃ ~ +125℃ | - | 6.4 | - | ns |
| | | $V_{CC}$=2.5V±0.2V | $C_L$=30pF, $R_L$=500Ω<br>-40℃ ~ +125℃ | - | 4.5 | - | |
| | | $V_{CC}$=3.3V±0.3V | $C_L$=50pF, $R_L$=500Ω<br>-40℃ ~ +125℃ | - | 4.2 | - | |
| | | $V_{CC}$=5V±0.5V | $C_L$=50pF, $R_L$=500Ω | - | 3.7 | - | |
| Input Capacitance | $C_i$ | $V_{CC}$=3.3V | $V_I$=$V_{CC}$ or GND | - | 4.0 | - | pF |
| Power Dissipation Capacitance | $C_{pd}$ | $V_{CC}$=1.8V | f=10MHz | - | 3.0 | - | pF |
| | | $V_{CC}$=2.5V | | - | 3.0 | - | |
| | | $V_{CC}$=3.3V | | - | 4.0 | - | |
| | | $V_{CC}$=5V | | - | 6.0 | - | |

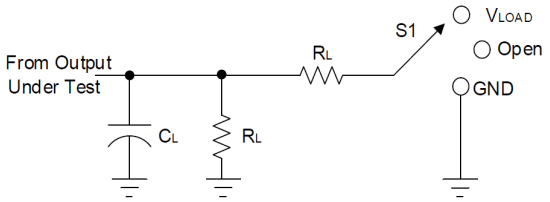
## DC ELECTRICAL CHARACTERISTICS

At $T_A$ = +25°C, unless otherwise noted.

| Parameter | | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{OL}$ | | $I_{OL}$ = 100μA, $V_{CC}$=1.65V to 5.5V | -40℃ ~ +125℃ | - | - | 0.10 | V |
| | | $I_{OL}$=4mA, $V_{CC}$=1.65V | | - | - | 0.45 | |
| | | $I_{OL}$=8mA, $V_{CC}$=2.3V | | - | - | 0.30 | |
| | | $I_{OL}$=16mA, $V_{CC}$=3V | | - | - | 0.40 | |
| | | $I_{OL}$=24mA, $V_{CC}$=3V | | - | - | 0.55 | |
| | | $I_{OL}$=32mA, $V_{CC}$=4.5V | | - | - | 0.55 | |
| $I_I$ | A input | $V_I$=5.5V or GND, $V_{CC}$= 0V to 5.5V | +25℃ | - | ±0.1 | ±1 | μA |
| | | | -40℃ ~ +125℃ | - | - | ±5 | |
| $I_{off}$ | | $V_I$ or $V_O$=5.5V, $V_{CC}$=0V | +25℃ | - | ±0.1 | ±1 | μA |
| | | | -40℃ ~ +125℃ | - | | ±10 | |
| $I_{CC}$ | | $V_I$=5.5V or GND, $I_O$=0, $V_{CC}$=1.65V to 5.5V | +25℃ | - | 0.1 | 1 | μA |
| | | | -40℃ ~ +125℃ | - | - | 10 | |
| $\Delta I_{CC}$ | | One input at $V_{CC}$-0.6V, Other inputs at $V_{CC}$ or GND $V_{CC}$=3V to 5.5V | -40℃ ~ +125℃ | - | - | 500 | μA |

# DETAILED INFORMATION

## Parameter Measurement Information




| TEST | S1 |
|---|---|
| $t_{PZL}$(see Notes E and F) | $V_{LOAD}$ |
| $t_{PLZ}$(see Notes E and G) | $V_{LOAD}$ |
| $t_{PHZ}$ / $t_{PZH}$ | $V_{LOAD}$ |

| $V_{CC}$ | Inputs $V_I$ | $t_r/t_f$ | $V_M$ | $V_{LOAD}$ | $C_L$ | $R_L$ | $V_\Delta$ |
|---|---|---|---|---|---|---|---|
| 1.8V±0.15V | $V_{CC}$ | ≤2ns | $V_{CC}/2$ | 2 x $V_{CC}$ | 30pF | 1kΩ | 0.15V |
| 2.5V±0.2V | $V_{CC}$ | ≤2ns | $V_{CC}/2$ | 2 x $V_{CC}$ | 30pF | 500Ω | 0.15V |
| 3.3V±0.3V | 3V | ≤2.5ns | 1.5V | 6V | 50pF | 500Ω | 0.3V |
| 5V±0.5V | $V_{CC}$ | ≤2.5ns | $V_{CC}/2$ | 2 x $V_{CC}$ | 50pF | 500Ω | 0.3V |

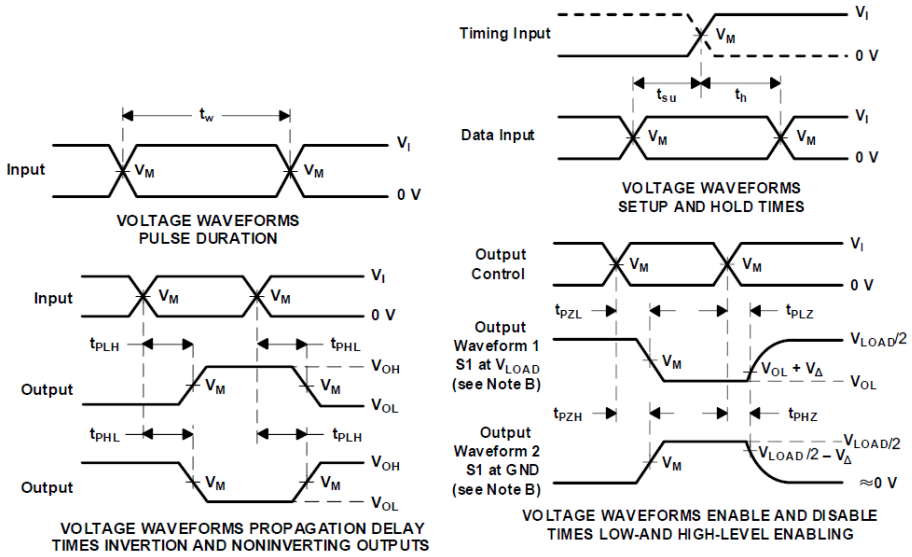
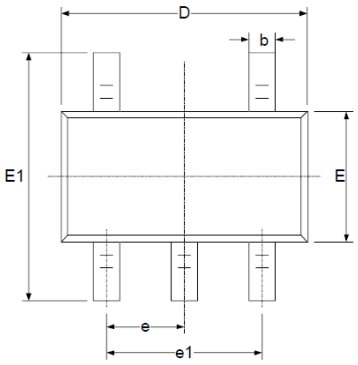


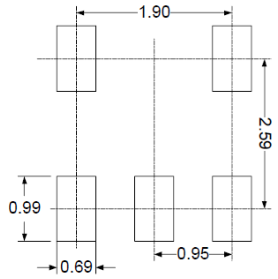

**Figure 1. Load Circuit and Voltage Waveforms**

(A) $C_L$ 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, $Z_O$ = 50 Ω.
(D) The outputs are measured one at a time, with one transition per measurement.
(E) Since this device has open-drain outputs, $t_{PLZ}$ and $t_{PZL}$ are the same as $t_{pd}$.
(F) $t_{PZL}$ is measured at $V_M$.
(G) $t_{PLZ}$ is measured at $V_{OL}$ + $V_\Delta$.
(H) All parameters and waveforms are not applicable to all devices.

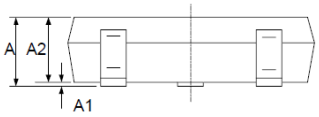
## PACKAGE INFORMATION

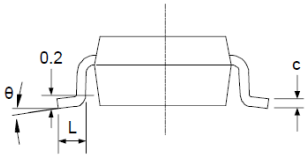
Dimension in SOT-25 (Unit: mm)



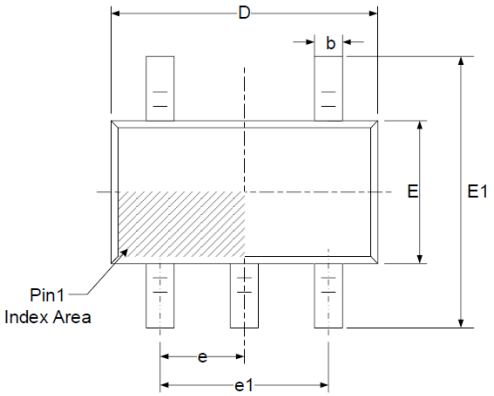

RECOMMENDED LAND PATTERN

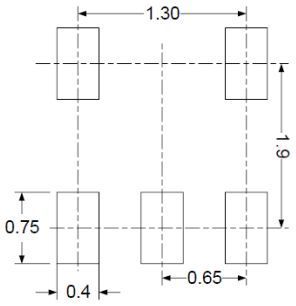


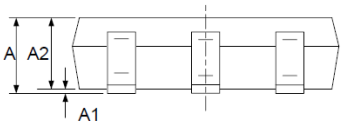

| Symbol | Millimeters | |
|---|---|---|
| | Min | Max |
| A | 1.050 | 1.250 |
| A1 | 0.000 | 0.100 |
| A2 | 1.050 | 1.150 |
| b | 0.300 | 0.500 |
| c | 0.100 | 0.200 |
| D | 2.820 | 3.020 |
| E | 1.500 | 1.700 |
| E1 | 2.650 | 2.950 |
| e | 0.950 BSC | |
| e1 | 1.800 | 2.000 |
| L | 0.300 | 0.600 |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

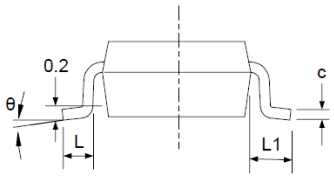
Dimension in SC70-5 (Unit: mm)




**RECOMMENDED LAND PATTERN**




| Symbol | Millimeters | |
|---|---|---|
| | Min | Max |
| A | 0.900 | 1.100 |
| A1 | 0.000 | 0.100 |
| A2 | 0.900 | 1.000 |
| b | 0.150 | 0.350 |
| c | 0.080 | 0.150 |
| D | 2.000 | 2.200 |
| E | 1.150 | 1.350 |
| E1 | 2.150 | 2.450 |
| e | 0.650 BSC | |
| e1 | 1.300 BSC | |
| L | 0.260 | 0.460 |
| L1 | 0.525 | |
| θ | 0° | 8° |

# IMPORTANT NOTICE

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