



DESCRIPTION

The AL1G00 single 2-input positive-NAND gate is designed for 1.65V to 5.5V Vcc operation.

The AL1G00 performs the Boolean function $Y = \overline{A} * \overline{B}$ or $Y = \overline{A} + \overline{B}$ in positive logic. The AL1G00 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.

AL1G00 operates over an ambient temperature range of -40°C to +125°C.

The AL1G00 is available in SOT25 and SC70-5 packages.

ORDERING INFORMATION

Package Type	Part Number	
SOT-25 SPQ: 3,000pcs/Reel	E5	AL1G00E5R
		AL1G00E5VR
SC70-5 SPQ:3,000pcs/Reel	C5	AL1G00C5R
		AL1G00C5VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

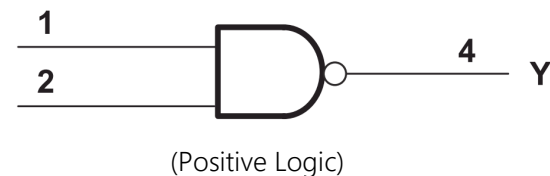
FEATURES

- Operating Range: 1.65V to 5.5V
- Low Power Consumption: 1µA (Max).
- Operating Temperature Range: -40°C to +125°C
- Input Accept Voltage to 5.5V
- High Output Drive: ±24mA at $V_{CC}=3.0V$
- I_{off} Supports Partial-Power-Down Mode Operation.

APPLICATION

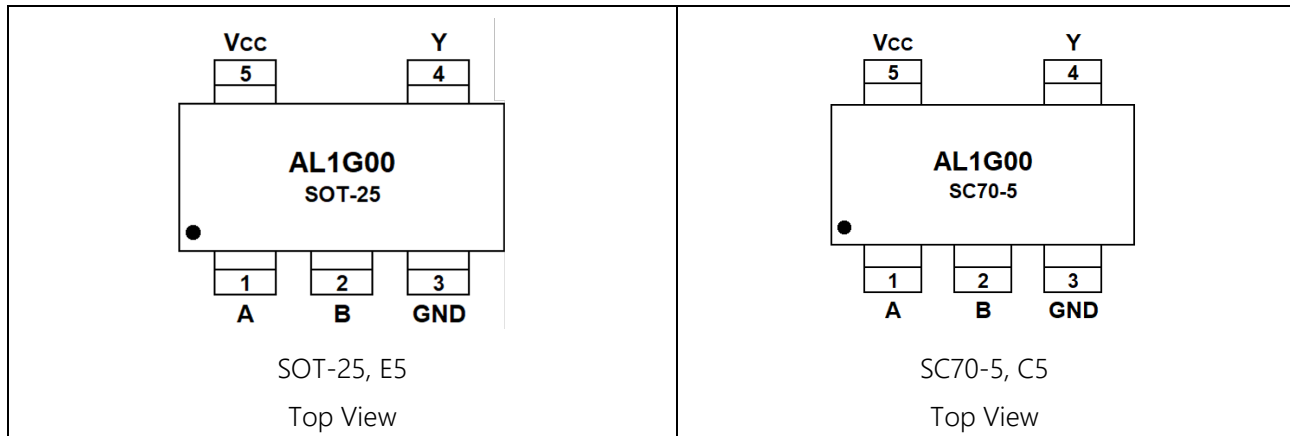
- Enable or disable a digital signal
- Controlling an indicator LED
- Translation between communication modules and system controllers
- Active Noise Elimination
- Bar Code Scanner
- Blood Pressure Monitor
- CPAP Machine
- Fingerprint identification
- Network attached storage (NAS)

LOGIC DIAGRAM





PIN DESCRIPTION



PIN#		Symbol	I/O	Function
SOT-25	SC70-5			
1	1	A	I	Input
2	2	B	I	Input
3	3	GND	P	Ground
4	4	Y	O	Output
5	5	V _{CC}	P	Power Pin

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range (unless otherwise noted)

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
I _O , Continuous Current through V _{CC} or GND	±100mA
T _J , Junction Temperature	-65°C ~ +150°C
T _{STG} , Storage Temperature	-65°C ~ +150°C

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 CONFITIONS

over recommended operating free-air temperature range. Typical values are at $T_A = +25^{\circ}\text{C}$, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Supply Voltage	V_{CC}	Operating	1.65	-	5.50	V
		Data Retention only	1.50	-	-5.50	
High-Level Input Voltage	V_{IH}	$V_{CC} = 1.65\text{ V} \sim 1.95\text{ V}$	$0.65x V_{CC}$	-	-	
		$V_{CC} = 2.3\text{ V} \sim 2.7\text{ V}$	1.70	-	-	
		$V_{CC} = 3\text{ V} \sim 3.6\text{ V}$	2	-	-	
		$V_{CC} = 4.5\text{ V} \sim 5.5\text{ V}$	$0.70x V_{CC}$	-	-	
Low-Level Input Voltage	V_{IL}	$V_{CC} = 1.65\text{ V} \sim 1.95\text{ V}$	-	-	$0.15x V_{CC}$	V
		$V_{CC} = 2.3\text{ V} \sim 2.7\text{ V}$	-	-	0.30	
		$V_{CC} = 3\text{ V} \sim 3.6\text{ V}$	-	-	0.40	
		$V_{CC} = 4.5\text{ V} \sim 5.5\text{ V}$	-	-	$0.15x V_{CC}$	
Input Voltage	V_I	-	0	-	5.50	V
Output Voltage	V_O	-	0	-	V_{CC}	V
Input Transition Rise or Fall	t_r, t_f	$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}, 2.5\text{ V} \pm 0.2\text{ V}$	-	-	20	ns/V
		$V_{CC} = 3.30\text{ V} \pm 0.3\text{ V}$	-	-	10	
		$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$	-	-	5	
Operating Temperature	T_A		-40	-	+125	$^{\circ}\text{C}$
Junction-to-Ambient Thermal Resistance	$R_{\theta JA}$			SOT-25	214.70	$^{\circ}\text{C}/\text{W}$
				SC70-5	273.80	

ESD RATINGS

Parameter	Symbol	Min	Unit
Human-Body Model (HBM)	$V_{(ESD)}$ Electrostatic discharge	± 8000	V
Machine Model (MM)		± 500	

*All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.



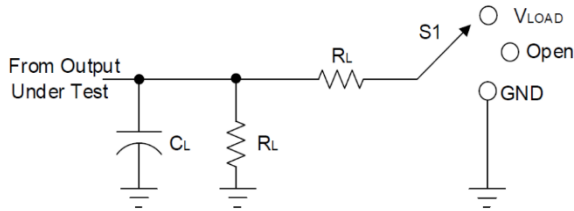
ELECTRICAL CHARACTERISTICS

over recommended operating free-air temperature range. Typical values are at $T_A = +25^\circ\text{C}$, unless otherwise noted.

Parameter		Conditions		Min	Typ.	Max	Unit	
DC CHARACTERISTICS								
V_{OH}	$I_{OH} = -100 \mu\text{A}$, $V_{CC} = 1.65 \sim 5.5\text{V}$		$-40^\circ\text{C} \sim +125^\circ\text{C}$	$V_{CC} \sim 0.1$	-	-	V	
	$I_{OH} = -4\text{mA}$, $V_{CC} = 1.65\text{V}$			1.20	-	-		
	$I_{OH} = -8\text{mA}$, $V_{CC} = 2.3\text{V}$			1.90	-	-		
	$I_{OH} = -16\text{mA}$, $V_{CC} = 3\text{V}$			2.40	-	-		
	$I_{OH} = -24\text{mA}$, $V_{CC} = 3\text{V}$			2.30	-	-		
	$I_{OH} = -32\text{mA}$, $V_{CC} = 4.5\text{V}$			3.80	-	-		
V_{OL}	$I_{OH} = 100 \mu\text{A}$, $V_{CC} = 1.65 \sim 5.5\text{V}$		$-40^\circ\text{C} \sim +125^\circ\text{C}$	-	-	0.10	V	
	$I_{OH} = 4\text{mA}$, $V_{CC} = 1.65\text{V}$			-	-	0.45		
	$I_{OH} = 8\text{mA}$, $V_{CC} = 2.3\text{V}$			-	-	0.30		
	$I_{OH} = 16\text{mA}$, $V_{CC} = 3\text{V}$			-	-	0.40		
	$I_{OH} = 24\text{mA}$, $V_{CC} = 3\text{V}$			-	-	0.55		
	$I_{OH} = 32\text{mA}$, $V_{CC} = 4.5\text{V}$			-	-	0.55		
I_I	A or B Inputs	$V_I = 5.5\text{V}$ or GND, $V_{CC} = 0\text{V} \sim 5.5\text{V}$	$+25^\circ\text{C}$		± 0.10	± 1	μA	
			$-40^\circ\text{C} \sim +125^\circ\text{C}$		-	± 5		
I_{off}		V_I or $V_O = 5.5\text{V}$, $V_{CC} = 0\text{V}$	$+25^\circ\text{C}$	-	± 0.10	± 1	μA	
			$-40^\circ\text{C} \sim +125^\circ\text{C}$	-	-	± 10		
I_{CC}		$V_I = 5.5\text{V}$ or GND, $I_O = 0$, $V_{CC} = 1.65\text{V} \sim 5.5\text{V}$	$+25^\circ\text{C}$	-	0.10	1	μA	
			$-40^\circ\text{C} \sim +125^\circ\text{C}$	-	-	10		
ΔI_{CC}		One input at $V_{CC} - 0.6\text{V}$, Other inputs at V_{CC} or GND, $V_{CC} = 3\text{V} \sim 5.5\text{V}$	$-40^\circ\text{C} \sim +125^\circ\text{C}$	-	-	500	μA	
AC CHARACTERISTICS								
Parameter	Symbol	Conditions		Temp.	Min	Typ.	Max	Unit
Propagation Delay	t_{pd}	$V_{CC} = 1.8\text{V} \pm 0.15\text{V}$	$C_L = 30\text{pF}$, $R_L = 1\text{k}\Omega$	$-40^\circ\text{C} \sim +125^\circ\text{C}$	-	21	-	ns
		$V_{CC} = 2.5\text{V} \pm 0.2\text{V}$	$C_L = 30\text{pF}$, $R_L = 500\Omega$	$-40^\circ\text{C} \sim +125^\circ\text{C}$	-	7.80	-	
		$V_{CC} = 3.3\text{V} \pm 0.3\text{V}$	$C_L = 50\text{pF}$, $R_L = 500\Omega$	$-40^\circ\text{C} \sim +125^\circ\text{C}$	-	5.70	-	
		$V_{CC} = 5\text{V} \pm 0.5\text{V}$	$C_L = 50\text{pF}$, $R_L = 500\Omega$	$-40^\circ\text{C} \sim +125^\circ\text{C}$	-	4.20	-	
Input Capacitance	C_i	$V_{CC} = 3.3\text{V}$	$V_I = V_{CC}$ or GND	$+25^\circ\text{C}$	-	4	-	pF
Power Dissipation Capacitance	C_{pd}	$V_{CC} = 1.8\text{V} \pm 0.15\text{V}$	$f = 10\text{MHz}$	$+25^\circ\text{C}$	-	21	-	pF
		$V_{CC} = 2.5\text{V} \pm 0.2\text{V}$			-	22	-	
		$V_{CC} = 3.3\text{V} \pm 0.3\text{V}$			-	22	-	
		$V_{CC} = 5\text{V} \pm 0.5\text{V}$			-	25	-	



PARAMETER MEASUREMENT INFORMATION



TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PIZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

V_{CC}	Inputs		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_I	t_r/t_f					
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1k Ω	0.15V
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500 Ω	0.15V
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	6V	50pF	500 Ω	0.3V
$5V \pm 0.5V$	V_{CC}	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	50pF	500 Ω	0.3V

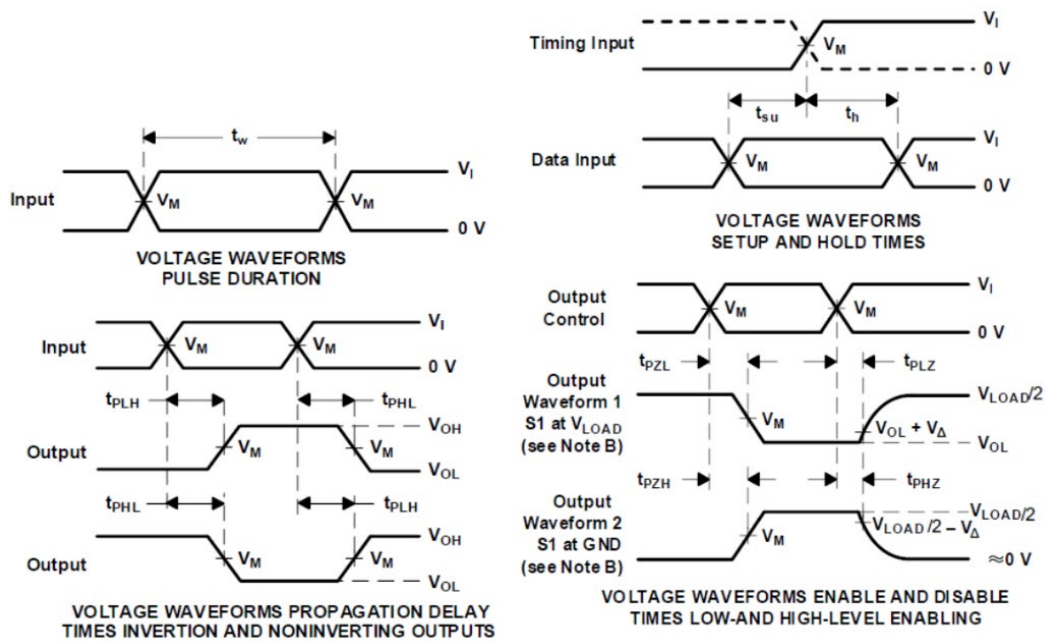


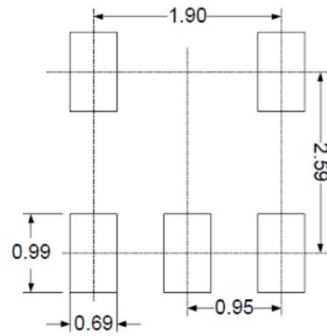
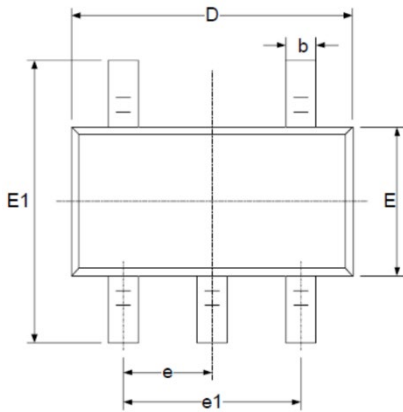
Fig 1. Load Circuit and Voltage Waveforms

- (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: $PRR \leq 10 \text{ MHz}$, $Z_o = 50 \Omega$.
- (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.

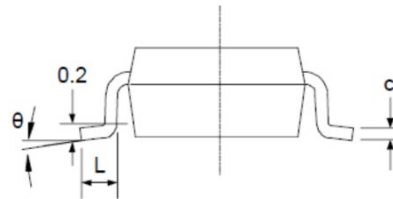
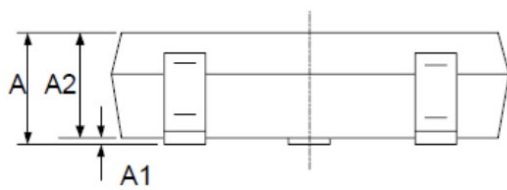


PACKAGE INFORMATION

Dimension in SOT-25 (Unit: mm)



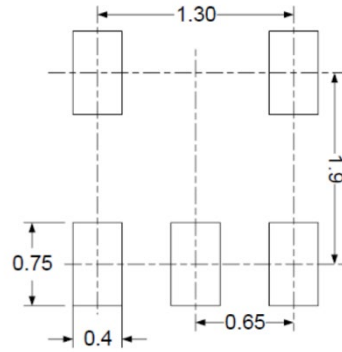
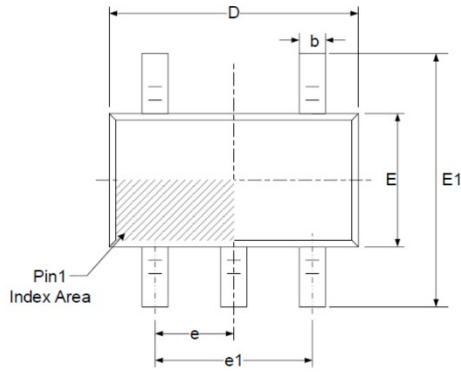
RECOMMENDED LAND PATTERN



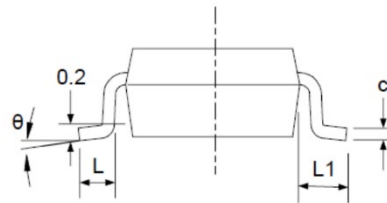
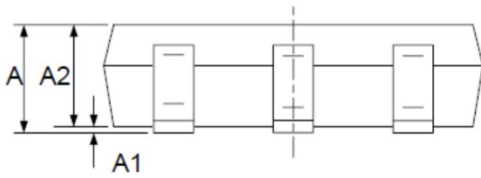
Symbol	Millimeters	
	Min	Max
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950 BSC.	
e1	1.800	2.000
L	0.300	0.600
θ	0°	8°



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	0.6950 BSC.	
e1	1.300 BSC.	
L	0.260	0.460
L1	0.525	
θ	0°	8°



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