DESCRIPTION

The AL1G04 is a single inverter gate designed to operate over a wide supply voltage range from 1.65 V to 5.5 V.

The device performs the Boolean function Y = Ā. Fabricated using CMOS technology, the AL1G04 provides high output drive capability while maintaining low static power dissipation across the entire VCC operating range.

The AL1G04 is specified for operation over an ambient temperature range of −40°C to +125°C.

The AL1G04 is available in SOT25 and SC70-5 packages

ORDERING INFORMATION

Package Type	Part Number	
SOT-25 SPQ: 3,000pcs/Reel	E5	AL1G04E5R
		AL1G04E5VR
SC70-5 SPQ:3,000pcs/Reel	C5	AL1G04C5R
		AL1G04C5VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

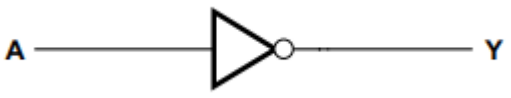
FEATURES

- Operating Voltage Range: 1.65V to 5.5V
- Low Power Consumption: 1μA (Max).
- Operating Temperature Range: -40°C to +125°C
- Input Voltage Tolerance: Up to 5.5V
- High Output Drive capability:
  ±24mA at V_{CC} = 3.0V
- I_{off} Function: Supports Partial Power-Down Mode Operation.
- Available in SOT-25 and SC70-5 Package

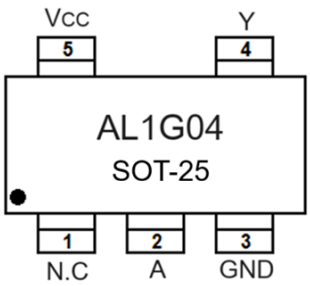
APPLICATION

- Embedded PC
- Server Motherboard and PSU
- TV: High-Definition (HDTV), LCD, and Digital
- Video Communications System
- Wireless Data Access Card, Headset, Keyboard, Mouse, and LAN Card
- Desktops or Notebook PCs
- Digital Video Cameras (DVC)
- Mobile Phones
- Personal Navigation Device (GPS)
- Portable Media Player

SIMPLIFIELD SCHEMATIC

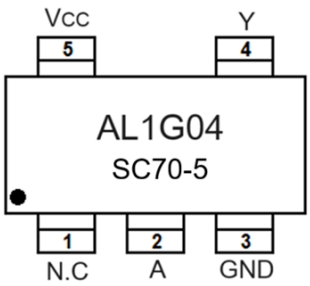


PIN DESCRIPTION



SOT-25, E5

Top View



SC70-5, C5

Top View

PIN#		Symbol	Function
SOT-25	SC70-5		
1	1	N.C.	Not Connected
2	2	A	Input
3	3	GND	Ground
4	4	Y	Output
5	5	V_{CC}	Power Pin

Function Table

Input	Output
A	Y
H	L
L	H

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 (2)		-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 (4)		-65℃ ~ +150℃
T_{STG}, Storage Temperature		-65℃ ~ +150℃

Thermal Information	SOT-25	SC70-5
$R_{\theta JA}$, Junction-to-ambient thermal resistance	273.8 °C/W	214.7 °C/W
$R_{\theta JC(top)}$, Junction-to-case(top) thermal resistance	126.8 °C/W	127.1 °C/W
$R_{\theta JB}$, Junction-to-board thermal resistance	85.9 °C/W	60.0 °C/W
Ψ_{JT}, Junction-to-top characterization parameter	10.9 °C/W	33.4 °C/W
Ψ_{JB}, Junction-to-board characterization parameter	84.9 °C/W	59.8 °C/W

ESD		
$V_{(ESD)}$ Electrostatic discharge	Human-body model (HBM)	±6000V
	Charged-Device Model (CDM)	±1500V
	Machine Model (MM)	±200V

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These ratings are stress ratings only, and functional operation at these or any other conditions beyond those specified under Recommended Operating Conditions is not implied. Extended exposure to absolute maximum conditions may affect device reliability.

1.The input and output negative voltage ratings may be exceeded provided that the input and output current ratings are not exceeded.

2.The VCC value is specified in the Recommended Operating Conditions table.

RECOMMENDED OPERATING CONDITIONS

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} = 1.65 V ~1.95 V	0.65x V_{CC}	-		
		V_{CC} = 2.3V ~2.7 V	1.70	-		
		V_{CC} = 3 V ~3.6 V	2.2	-		
		V_{CC} = 4.5 V ~5.5 V	0.70x V_{CC}	-		
Low-Level Input Voltage	V_{IL}	V_{CC} = 1.65 V ~1.95 V	-	-	0.15x V_{CC}	V
		V_{CC} = 2.3V ~2.7 V	-		0.30	
		V_{CC} = 3 V ~3.6 V	-		0.40	
		V_{CC} = 4.5 V ~5.5 V	-		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} = 1.8 V± 0.15 V, 2.5 V ± 0.2 V	-	-	20	ns/V
		V_{CC} = 3.30 V ± 0.3 V	-		10	
		V_{CC} = 5 V ± 0.5V	-		5	
Operating Temperature	T_A		-40	-	+125	°C

*All currents into the device are positive and all currents out of the device are negative; all voltages are to ground unless otherwise specified.

ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS

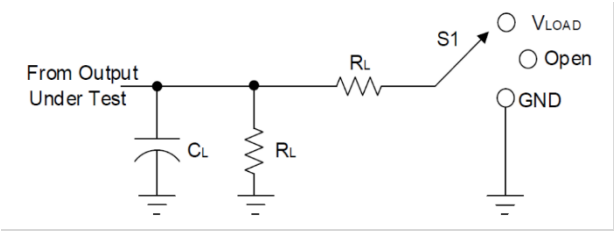
Over the recommended operating free-air temperature range of −40°C to +125°C. Typical values are measured at TA = +25°C, unless otherwise specified.

Parameter		Conditions		Min	Typ.	Max	Unit
V_{OH}		I_{OH} = -100 μA, V_{CC}=1.65~5.5V	-40℃ ~ +125℃	V_{CC}~0.1	-	-	V
		I_{OH} = -4mA, V_{CC}=1.65V		1..20	-	-	
		I_{OH} = -8mA, V_{CC}=2.3V		1.90	-	-	
		I_{OH} = -16mA, V_{CC}=3V		2.40	-	-	
		I_{OH} = -24mA, V_{CC}=3V		2.30	-	-	
		I_{OH} = -32mA, V_{CC}=4.5V		3.80	-	-	
V_{OL}		I_{OH} = 100 μA, V_{CC}=1.65~5.5V	-40℃ ~ +125℃	-	-	0.10	V
		I_{OH} = 4mA, V_{CC}=1.65V		-	-	0.45	
		I_{OH} = 8mA, V_{CC}=2.3V		-	-	0.30	
		I_{OH} = 16mA, V_{CC}=3V		-	-	0.40	
		I_{OH} = 24mA, V_{CC}=3V		-	-	0.55	
		I_{OH} = 32mA, V_{CC}=4.5V		-	-	0.55	
I_I	A Input	V_I = 5.5V or GND, V_{CC}=0V~5.5V			±0.10	±1	μA
					-	±5	
I_{off}		V_I or V_O = 5.5V, V_{CC}=0V	+25℃	-	±0.10	±1	μA
			-40℃ ~ +125℃	-	-	±10	
I_{CC}		V_I = 5.5V or GND, I_O=0, V_{CC}=1.65V~5.5V	+25℃	-	0.10	1	μA
			-40℃ ~ +125℃	-	-	10	
ΔI_{CC}		One input at V_CC-0.6V, Other inputs at V_{CC} or GND, V_{CC}=3V~5.5V	-40℃ ~ +125℃	-	-	500	μA

AC CHARACTERISTICS

Parameter	Symbol	Conditions		Min	Typ.	Max	Unit
Propagation Delay	t_{pd}	V_{CC}=1.8V±0.15V	C_L=30pF, R_L=1KΩ	-	7.5	-	ns
		V_{CC}=2.5V±0.2V	C_L=30pF, R_L=500Ω	-	3.6	-	
		V_{CC}=3.3V±0.3V	C_L=50pF, R_L=500Ω	-	3.1	-	
		V_{CC}=5V±0.5V	C_L=50pF, R_L=500Ω	-	2.7	-	
Power Dissipation Capacitance	C_{pd}	V_{CC}=1.8V±0.15V	f=10MHz	-	20	-	pF
		V_{CC}=2.5V±0.2V		-	21	-	
		V_{CC}=3.3V±0.3V		-	22	-	
		V_{CC}=5V±0.5V		-	25	-	
Input Capacitance	C_i	V_{CC}=3.3V	V_I = V_{CC} or GND		4		pF

PARAMETER MEASUREMENT INFORMATION



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

V_{CC}	Inputs		VM	V_{LOAD}	C_L	R_L	VΔ
	VI	tr/tf					
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	15-30pF	1M-1kΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	15-30pF	1M-500Ω	0.15V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	15-50pF	1M-500Ω	0.3V
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	2 x V_{CC}	15-30pF	1M-500Ω	0.15V

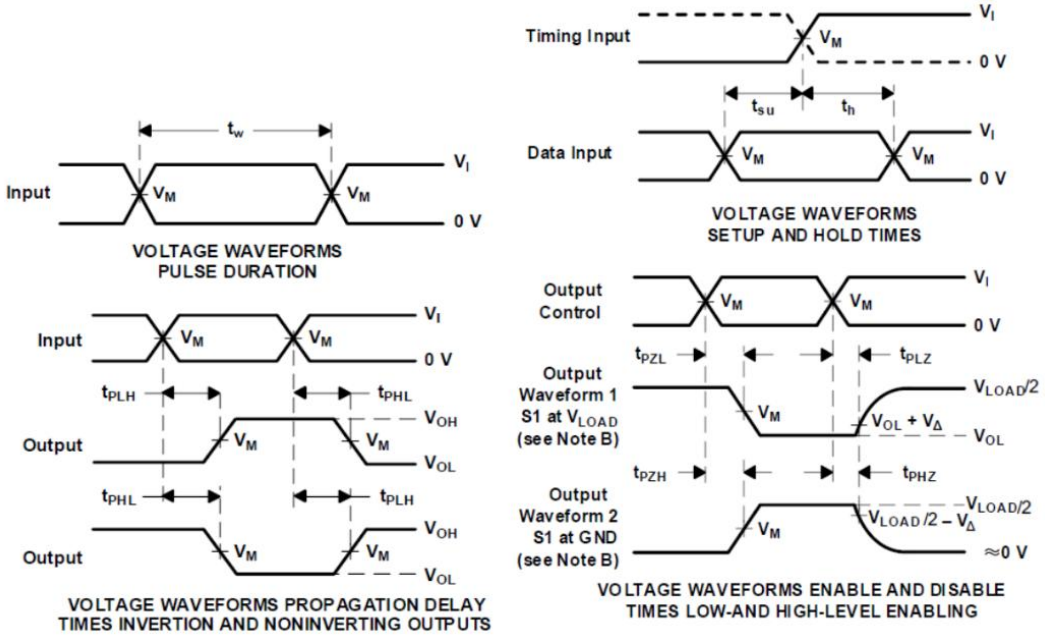
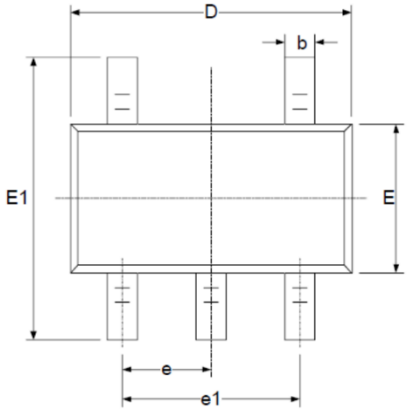


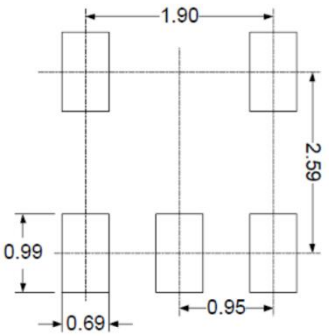
Fig 1. Load Circuit and Voltage Waveforms

(A) C_L includes probe and jig capacitance.
(B) Waveform 1 is for an output with internal conditions such that the output LOW, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output 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) Outputs are measured one at a time, with one transition per measurement.
(E) Since this device has open-drain outputs, t_{PLZ} and t_{PZ}L are equivalent to t_{pd}.
(F) t_{PZL} is measured at V_M.
(G) t_{PLZ} is measured at V_{OL} + $V_Δ$.
(H) Not all parameters and waveforms apply to all devices.

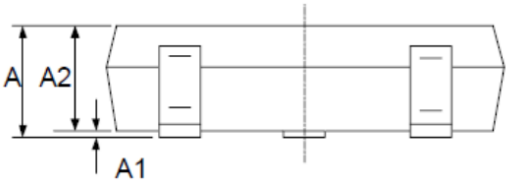
PACKAGE INFORMATION

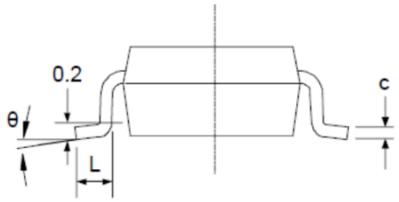
Dimension in SOT-25 (Unit: mm)





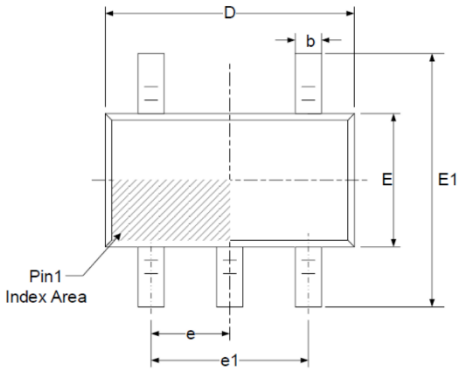
RECOMMENDED LAND PATTERN

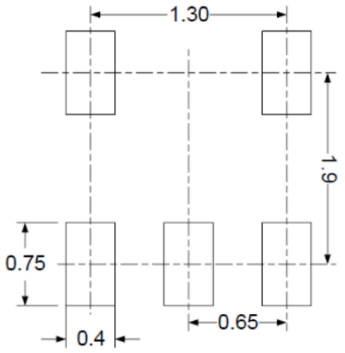




Symbol	Millimeters	
	Min	Max
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950 BSC.	
e1	1.800	2.000
L	0.300	0.600
θ	0°	8°

Dimension in SC70-5 (Unit: mm)





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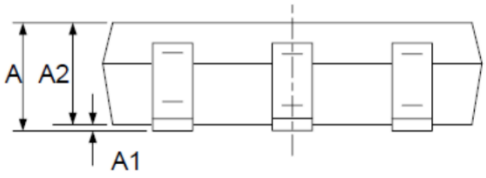

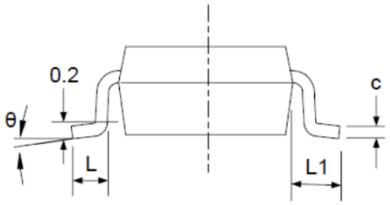

Symbol	Millimeters	
	Min	Max
A	0.900	1.100
A1	0.000	0.100
A2	0.900	1.000
b	0.150	0.350
c	0.080	0.150
D	2.000	2.200
E	1.150	1.350
E1	2.150	2.450
e	0.650 BSC.	
e1	1.300 BSC.	
L	0.260	0.460
L1	0.525	
θ	0°	8°

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