DESCRIPTION

The AL1G04 is a single inverter gate performs the Boolean function $Y=\overline{A}$.

The AL1G04 is designed for 1.65V to 5.5V V_{CC} operation.

AL1G04 operates over an ambient temperature range of -40°C to +125°C.

The AL1G04 is available in SOT25, SC70-5 and DFN6(1x1) packages. I

ORDERING INFORMATION

Package Type	Part Number	
SOT-25 SPQ: 3,000pcs/Reel	E5	AL1G04E5R
		AL1G04E5VR
SC70-5 SPQ:3,000pcs/Reel	C5	AL1G04C5R
		AL1G04C5VR
DFN6(1x1) SPQ:5,000pcs/Reel	J6C	AL1G04J6CR
		AL1G04J6CVR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

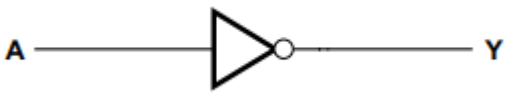
FEATURES

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

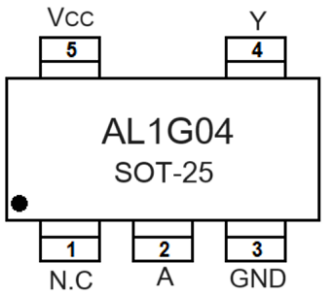
APPLICATION

- ATCA Solutions
- Active Noise Cancellation (ANC)
- Barcode Scanner
- Blood Pressure Monitor
- CPAP Machine
- Cable Solutions
- DLP 3D Machine Vision, Hyperspectral Imaging, Optical Networking, and Spectroscopy
- E-Book
- Embedded PC
- Field Transmitter: Temperature or Pressure Sensor
- Fingerprint Biometrics
- HVAC: Heating, Ventilating, and air Conditioning
- Network-Attached Storage (NAS)
- Server Motherboard and PSU
- Software Defined Radio (SDR)
- TV: High-Definition (HDTV), LCD, and Digital
- Video Communications System
- Wireless Data Access Card, Headset, Keyboard, Mouse, and LAN Card
- X-ray: Baggage, Scanner, Medical, and Dental
- Isolate RS-485 Communication
- Factory Automation
- Photovoltaic Inverter
- Motor Driver

SIMPLIFIELD SCHEMATIC

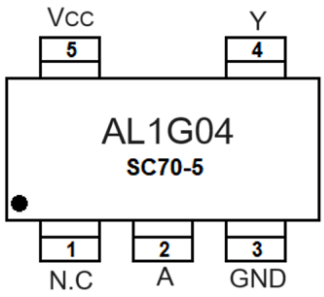


PIN DESCRIPTION



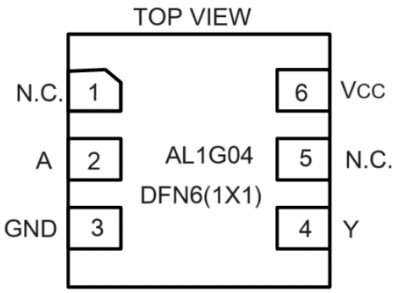
SOT-25, E5

Top View



SC70-5, C5

Top View



DFN6(1x1), J6C

Top View

PIN#			Symbol	Function
SOT-25	SC70-5	DFN6(1x1)		
1	1	1	N.C.	Not Connected
2	2	2	A	Input
3	3	3	GND	Ground
4	4	4	Y	Output
-	-	5	N.C.	Not Connected
5	5	6	V_{CC}	Power Pin

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range (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
I_O, Continuous Current through V_{CC} or GND		±100mA
θ_{JA}, Package Thermal Impedance (3)	SOT-25	230°C/W
	SC70-5	380°C/W
	DFN6(1x1)	438°C/W
T_J, Junction Temperature (4)		-65℃ ~ +150℃
T_{STG}, Storage Temperature		-65℃ ~ +150℃

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.

(3) The package thermal impedance is calculated in accordance with JESD-51.

(4) The maximum power dissipation is a function of TJ(MAX), $R_{\theta JA}$, and T_A. The maximum allowable power dissipation at any ambient temperature is $P_D = (T_{J(MAX)} - T_A) / R_{\theta JA}$. All numbers apply for packages soldered directly onto a PCB.

ESD RATINGS

Parameter	Symbol	Min	Unit
Human-Body Model (HBM), per ANSI/ESDA/JEDEC JS-001 (1)	$V_{(ESD)}$ Electrostatic discharge	±4000	V
Charged-Device Model (CDM), per ANSI/ESDA/JEDEC JS-002 (2)		±1500	
Machine Model (MM)		±200	

(1) JEDEC document JEP155 states that 500 V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250 V CDM allows safe manufacturing with a standard ESD control process.

RECOMMENDED OPERATING CONFITIONS

T_A=25°C, unless otherwise noted. (1)

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	-		
		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	-	-	0.35x V_{CC}	V
		V_{CC} = 2.3V ~2.7 V	-		0.70	
		V_{CC} = 3 V ~3.6 V	-		0.80	
		V_{CC} = 4.5 V ~5.5 V	-		0.30x 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

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

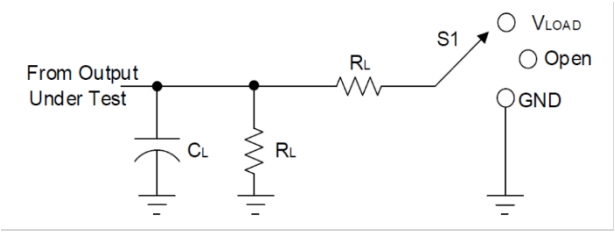
DC CHARACTERISTICS

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
C_i, Input Capacitance		V_I = V_{CC} or GND, V_{CC}=3.3V	+25℃	-	4		pF

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	-	13	-	ns
		V_{CC}=2.5V±0.2V	C_L=30pF, R_L=500Ω	-	5.1	-	
		V_{CC}=3.3V±0.3V	C_L=50pF, R_L=500Ω	-	4.2	-	
		V_{CC}=5V±0.5V	C_L=50pF, R_L=500Ω	-	3.3	-	
Power Dissipation Capacitance	C_{pd}	V_{CC}=1.8V±0.15V	f=10MHz	-	16	-	pF
		V_{CC}=2.5V±0.2V		-	18	-	
		V_{CC}=3.3V±0.3V		-	18	-	
		V_{CC}=5V±0.5V		-	20	-	

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}	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}	30pF	500Ω	0.15V

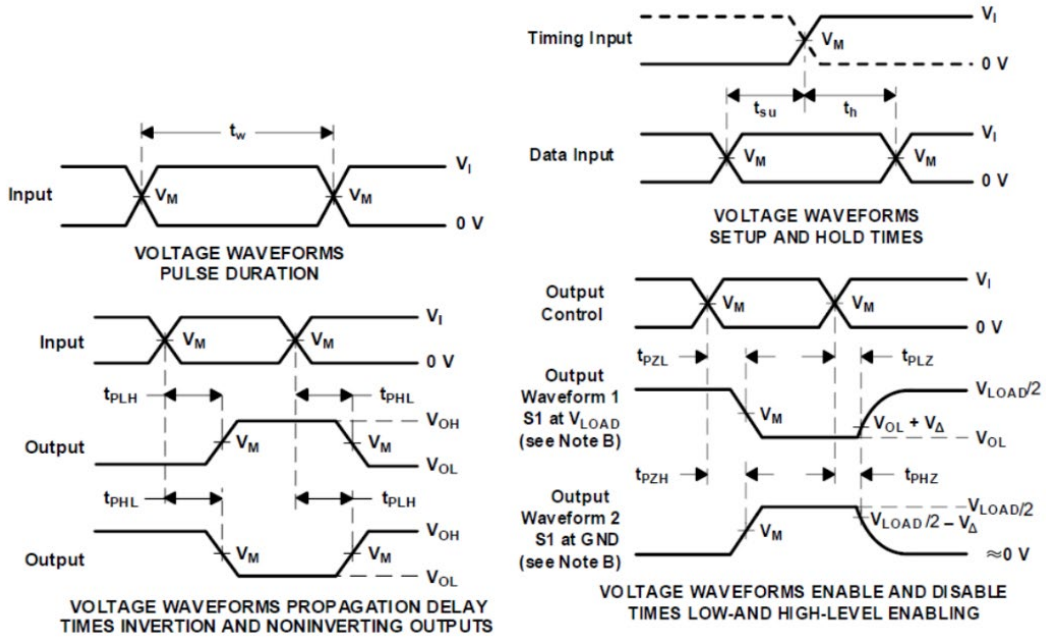
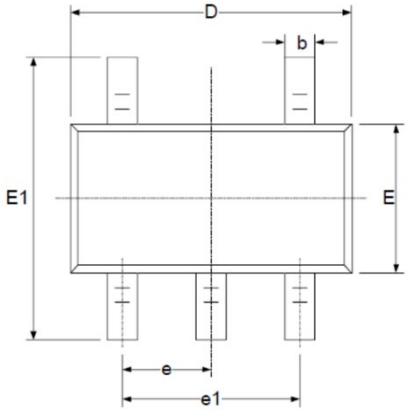


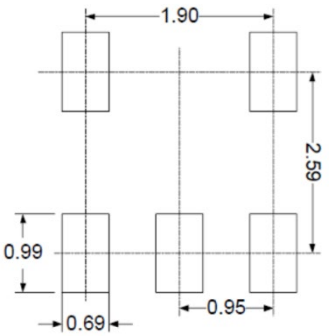
Fig 1. Load Circuit and Voltage Waveforms

(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 ≤ 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_{PZ}L are the same as t_{pd}.
(F) t_{PZL} is measured at V_M.
(G) t_{PLZ} is measured at V_{OL} + $V_Δ$.
(H) All parameters and waveforms are not applicable to all devices.

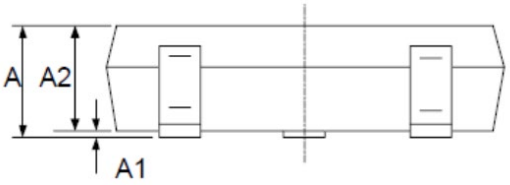
PACKAGE INFORMATION

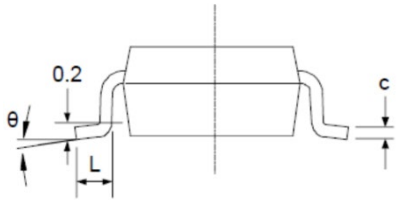
Dimension in SOT-25 (Unit: mm)





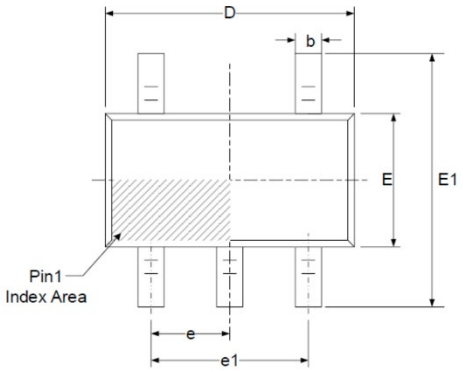
RECOMMENDED LAND PATTERN

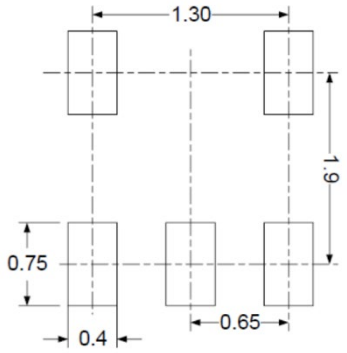




Symbol	Millimeters	
	Min	Max
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950 BSC.	
e1	1.800	2.000
L	0.300	0.600
θ	0°	8°

Dimension in SC70-5 (Unit: mm)





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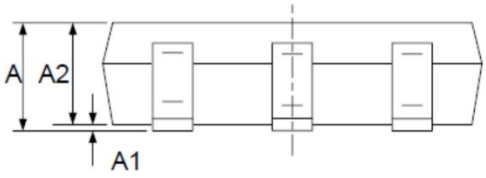
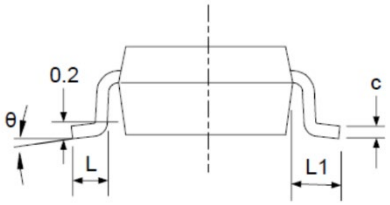
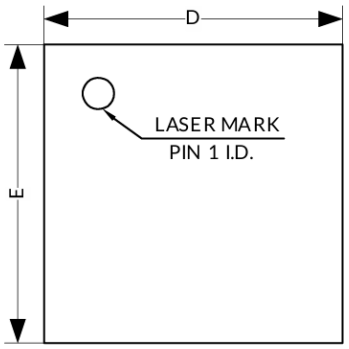
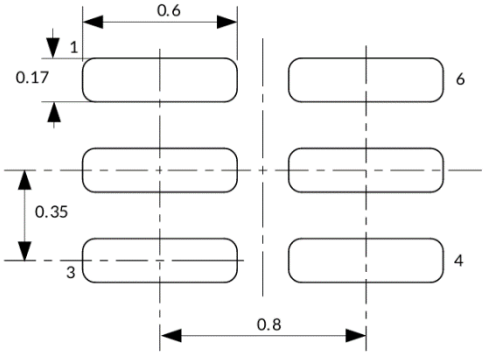




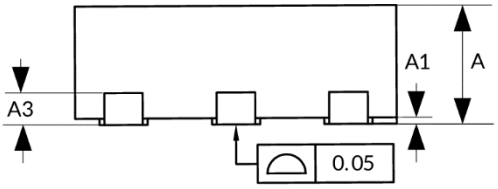
Symbol	Millimeters	
	Min	Max
A	0.900	1.100
A1	0.000	0.100
A2	0.900	1.000
b	0.150	0.350
c	0.080	0.150
D	2.000	2.200
E	1.150	1.350
E1	2.150	2.450
e	0.6950 BSC.	
e1	1.300 BSC.	
L	0.260	0.460
L1	0.525	
θ	0°	8°

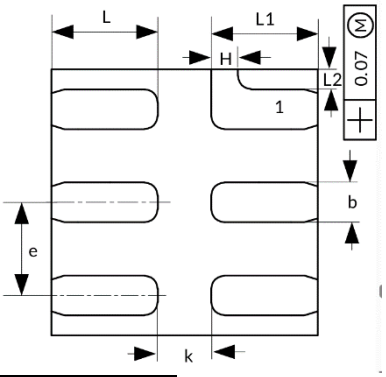
Dimension in DFN6(1x1) (Unit: mm)





RECOMMENDED LAND PATTERN





Symbol	Millimeters	
	Min	Max
A	0.340	0.400
A1	0.000	0.050
A3	0.100 REF.	
b	0.100	0.200
D	0.950	1.050
E	0.950	1.050
e	0.300	0.400
H	0.100 BSC.	
K	0.150	-
L	0.350	0.450
L1	0.350	0.450
L2	0.075 REF.	

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