DESCRIPTION

The AL6G04 is a 6-channel inverter designed to operate over a wide supply voltage range from 1.65 V to 5.5 V. Each inverter implements the Boolean function Y = Ā.

The AL6G04 features high output drive capability while maintaining low static power dissipation across the entire VCC operating range.

The AL6G04 is specified for operation over an ambient temperature range of −40°C to +125°C.

The AL6G04 is available in SOP14 and TSSOP14 packages.

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
- Available in SOP14 and TSSOP14 Packages

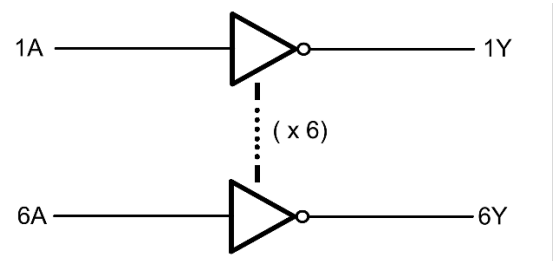
APPLICATION

- AC Receiver
- Blu-ray Players and Home Theaters
- Desktops or Notebook PCs
- Digital Video Cameras (DVC)
- Mobile Phones
- Personal Navigation Device (GPS)
- Portable Media Player

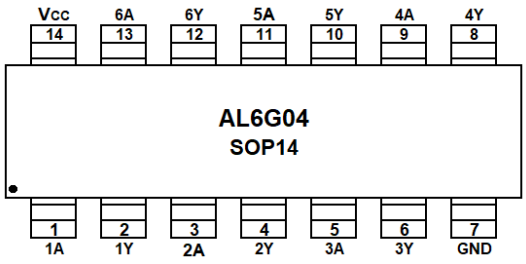
ORDERING INFORMATION

Package Type	Part Number	
SOP14 SPQ: 4,000pcs/Reel	M14	AL6G04M14R
		AL6G04M14VR
TSSOP14 SPQ:4,000pcs/Reel	TMX14	AL6G04TMX14R
		AL6G04TMX14VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

SIMPLIFIED SCHEMATIC

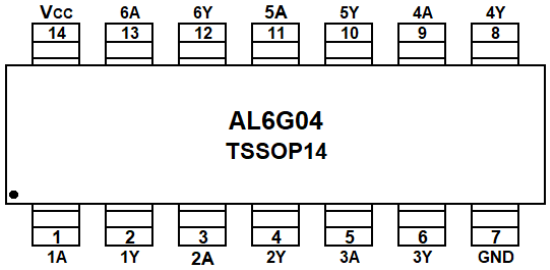


PIN DESCRIPTION



SOP14, M14

Top View



TSSOP14, TMX14

Top View

PIN#		Symbol	I/O	Function
SOP14	TSSOP14			
1	1	1A	I	Input 1
2	2	1Y	O	Output 1
3	3	2A	I	Input 2
4	4	2Y	O	Output 2
5	5	3A	I	Input 3
6	6	3Y	O	Output 3
7	7	GND	P	Ground
8	8	4Y	O	Output 4
9	9	4A	I	Input 4
10	10	5Y	O	Output 5
11	11	5A	I	Input 5
12	12	6Y	O	Output 6
13	13	6A	I	Input 6
14	14	V_{CC}	P	Power Pin

FUNCTION TABLE

INPUTS	OUTPUT
A	Y
H	L
L	H

$Y=\overline{A}$. H=High Voltage Level L=Low Voltage Level

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range (unless otherwise noted) (1) (2)

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 (2)		-0.5V ~ + 6.5V
V_O, Voltage range applied to any output in the high or low state (2) (3)		-0.5 ~ 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)	SOP14	105°C/W
	TSSOP14	90°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)		±400	

(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.*

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	-	5.50	V
Output Voltage	V_O	-	0	-	5.50	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 unused inputs of the device must be held at VCC or GND to ensure proper device operation.

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	f=10MHz	-	16	-	pF
		V_{CC}=2.5V		-	18	-	
		V_{CC}=3.3V		-	18	-	
		V_{CC}=5V		-	20	-	

(1) All unused inputs of the device must be held at VCC or GND to ensure proper device operation.
(2) This parameter is ensured by design and/or characterization and is not tested in production.
(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration.

DC CHARACTERISTICS

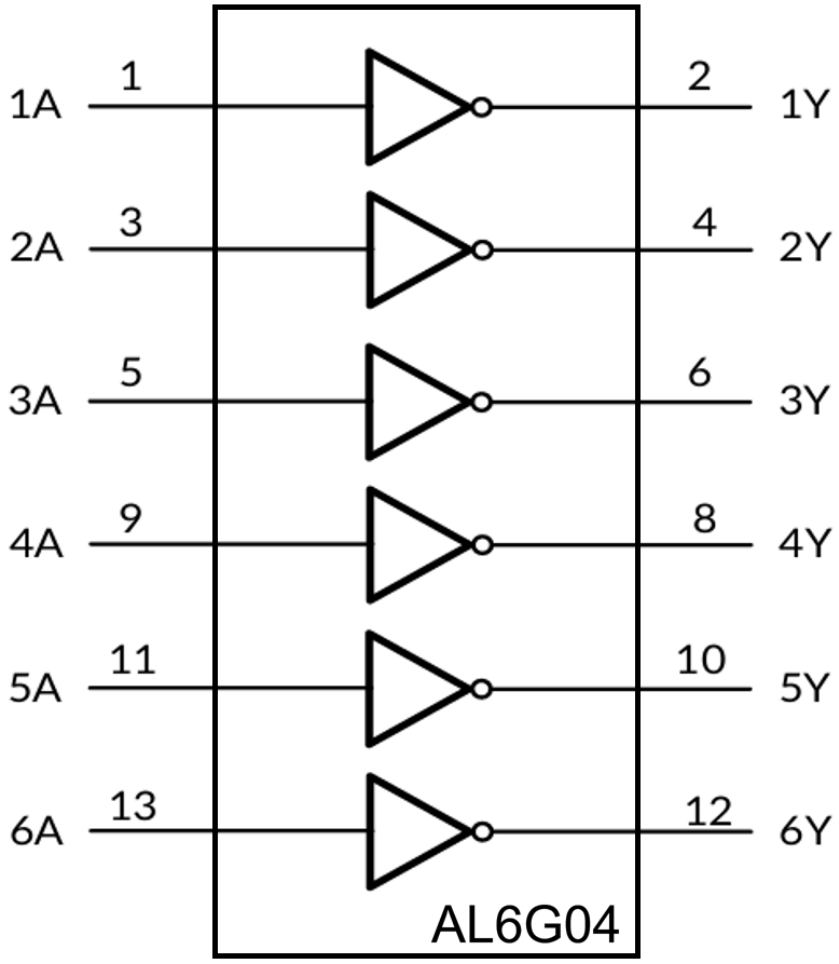
Parameter		Conditions		Min	Typ.	Max	Unit
V_{OH}		I_{OL} = -100 μA, V_{CC}=1.65~5.5V	-40℃ ~ +125℃	V_{CC} -0.1	-	-	V
		I_{OL} = -4mA, V_{CC}=1.65V		1.20	-	-	
		I_{OL} = -8mA, V_{CC}=2.3V		1.90	-	-	
		I_{OL} = -16mA, V_{CC}=3V		2.40	-	-	
		I_{OL} = -24mA, V_{CC}=3V		2.30	-	-	
		I_{OL} = -32mA, V_{CC}=4.5V		3.80	-	-	
V_{OL}		I_{OL} = 100 μA, V_{CC}=1.65~5.5V	-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 or B Inputs	V_I = 5.5V or GND, V_{CC}=0V~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~5.5V	+25℃	-	0.1	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
Ci	Input Capacitance	V_I=V_{CC} or GND, V_{CC}=3V	+25℃	-	4	-	pF

(1) All unused inputs of the device must be held at VCC or GND to ensure proper device operation

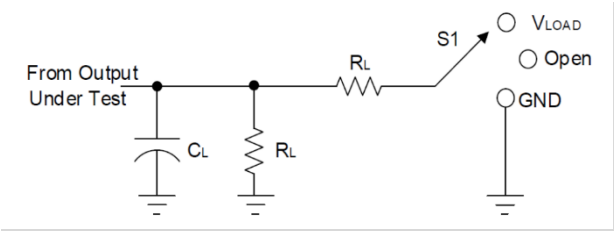
(2) Limits are 100% production tested at 25°C. Limits over the operating temperature range are ensured through correlations using statistical quality control (SQC) method.

(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration.

BLOCK DIAGRAM



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	$V\Delta$
	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}	50pF	500Ω	0.3V

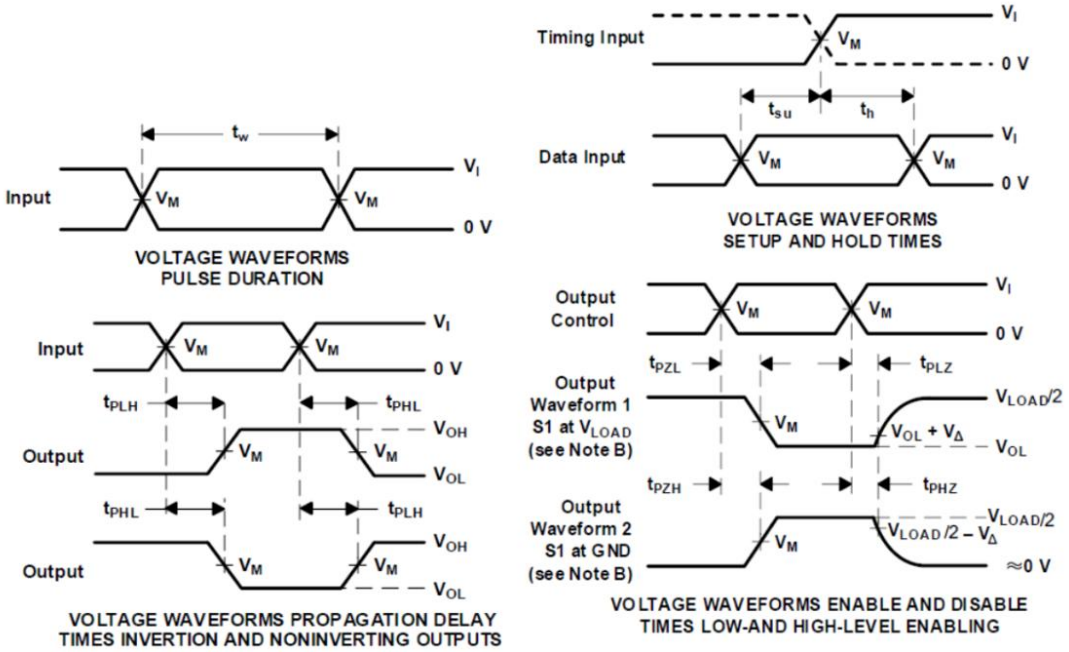


Fig 1. Load Circuit and Voltage Waveforms

(A) C_L includes probe and jig capacitance.

(B) Waveform 1 is for an output with internal conditions such that the output 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) t_{PLZ} and t_{PHZ} are the same as t_{dis}.

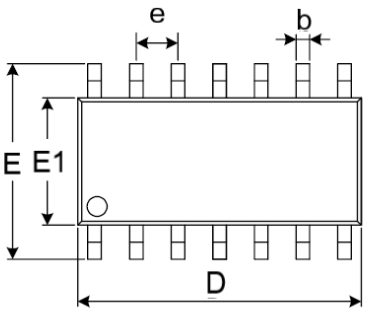
(F) t_{LPZ} and t_{PZH} are the same as t_{en}.

(G) t_{PLH} and t_{PHL} are the same as t_{pd}

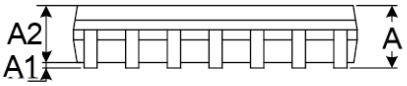
(H) All parameters and waveforms are not applicable to all devices.

PACKAGE INFORMATION

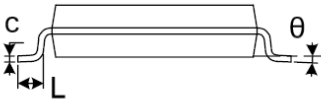
Dimension in SOP14 (Unit: mm)



TOP VIEW

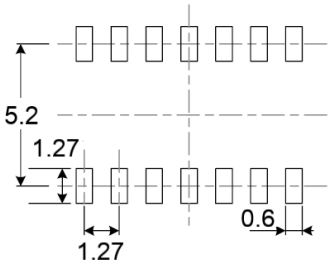


BOTTOM VIEW



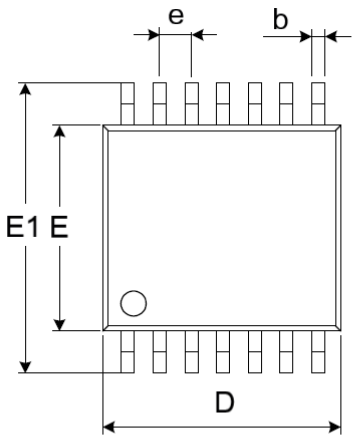
SIDE VIEW

Recommended Land Pattern

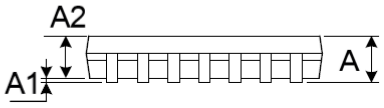


Symbol	Millimeters	
	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.310	0.510
c	0.100	0.250
D	8.450	8.850
e	1.270 BSC	
E	5.800	6.200
E1	3.800	4.000
L	0.400	1.270
θ	0°	8°

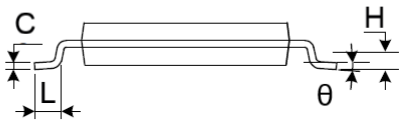
Dimension in TSSOP14 (Unit: mm)



TOP VIEW

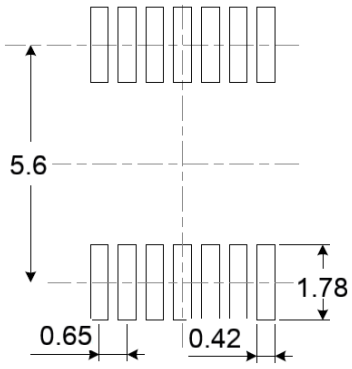


BOTTOM VIEW



SIDE VIEW

Recommended Land Pattern



Symbol	Millimeters	
	Min	Max
A	-	1.200
A1	0.500	0.150
A2	0.800	1.050
b	0.190	0.300
c	0.090	0.200
D	4.860	5.100
E	4.300	4.500
E1	6.250	6.550
e	0.650 BSC	
L	0.500	0.700
H	0.25 TYP	
θ	1°	7°

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