DESCRIPTION

The AL4G32 Quadruple 2-input positive-OR gate is designed for 1.65V to 5.5V V_{CC} operation.

The AL4G32 device performs the Boolean function Y=A + B or $Y=\overline{\overline{A} \times \overline{B}}$ in positive logic. The device 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.

The AL4G32 is operate over an ambient temperature range of -40°C to +125°C.

The AL4G32 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

● Inputs Accept Voltage to 5.5V

● High Output Drive: ±24mA at V_{CC} = 3.0V

● Available in SOP14 and TSSOP14 Packages

APPLICATION

● Combine Active-Low Enable Signals

● User Fewer Inputs to Monitor Error Signal

● AV Receiver

● Blu-ray Player and Home Theater

● Digital Picture Frame (DPF)

● High-Speed Data Acquisition and Generation

● Personal Navigation Device (GPS)

● Portable Media Player

ORDERING INFORMATION

Package Type	Part Number	
SOP14 SPQ: 4,000pcs/Reel	M14	AL4G32M14R
		AL4G32M14VR
TSSOP14 SPQ:4,000pcs/Reel	TMX14	AL4G32TMX14R
		AL4G32TMX14VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

LOGIC SYMBOL

FUNCTION TABLE

Inputs		Output
A	**B**	**Y**
H	H	H
L	H	H
H	L	H
L	L	L

Y=A+B
H=High Voltage Level
L=Low Voltage Level

PIN DESCRIPTION

V_CC 14	4B 13	4A 12	4Y 11	3B 10	3A 9	3Y 8	

AL4G32
SOP14

| 1A 1 | 1B 2 | 1Y 3 | 2A 4 | 2B 5 | 2Y 6 | GND 7 |

SOP14, M14

Top View

V_CC 14	4B 13	4A 12	4Y 11	3B 10	3A 9	3Y 8	

AL4G32
TSSOP14

| 1A 1 | 1B 2 | 1Y 3 | 2A 4 | 2B 5 | 2Y 6 | GND 7 |

TSSOP14, TMX14

Top View
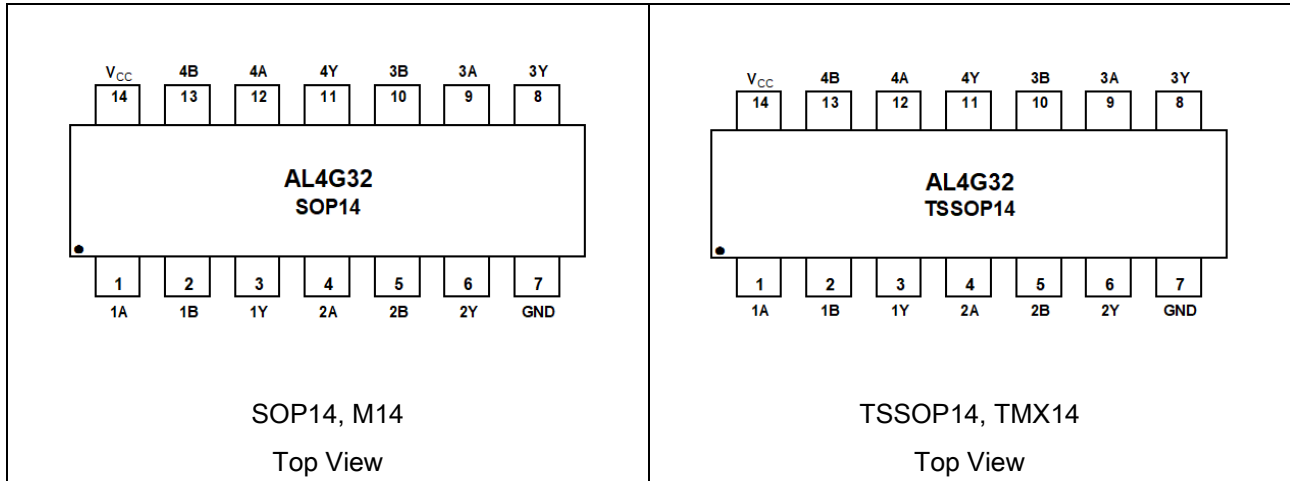
PIN#		Symbol	I/O	Function
SOP14	TSSOP14			
1	1	1A	I	Channel 1 Logic Input
2	2	1B	I	Channel 1 Logic Input
3	3	1Y	O	Logic Level Output 1
4	4	2A	I	Channel 2 Logic Input
5	5	2B	I	Channel 2 Logic Input
6	6	2Y	O	Logic Level Output 2
7	7	GND	-	Ground
8	8	3Y	O	Logic Level Output 3
9	9	3A	I	Channel 3 Logic Input
10	10	3B	I	Channel 3 Logic Input
11	11	4Y	O	Logic Level Output 4
12	12	4A	I	Channel 4 Logic Input
13	13	4B	I	Channel 4 Logic Input
14	14	V_CC	-	Power Supply

I=Input, O=Output, P=Power

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 to any output in the high-impedance or power -off state [1]		-0.5V ~ + 6.5V
V_O, Voltage Range 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
$R_{\theta JA}$, Junction-to-Ambient Thermal Resistance	SOP14	122.2°C/W
	TSSOP14	141.2°C/W
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.

ESD RATINGS

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

RECOMMENDED OPERATING CONDITIONS

T_A=25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Max	Unit
Supply Voltage	V_{CC}	Operating	1.65	5.5	V
		Data Retention only	1.5	5.5	
High-Level Input Voltage	V_{IH}	V_{CC} = 1.65V ~ 1.95V	0.65x V_{CC}	-	V
		V_{CC} = 2.3V ~ 2.7V	1.7	-	
		V_{CC} = 3V ~ 3.6V	2.2	-	
		V_{CC} = 4.5V ~ 5.5V	0.70x V_{CC}	-	
Low-Level Input Voltage	V_{IL}	V_{CC} = 1.65V ~1.95V	-	0.15x V_{CC}	V
		V_{CC} = 2.3V ~ 2.7V	-	0.3	
		V_{CC} = 3V ~ 3.6V	-	0.4	
		V_{CC} = 4.5V ~ 5.5V	-	0.15x V_{CC}	
Input Voltage	V_I	-	0	5.5	V
Output Voltage	V_O	-	0	V_{CC}	V
Input Transition Rise or Fall	t_r, t_f	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	°C

*All unused inputs of the device must be held at VCC or GND to ensure proper device operation.

ELECTRICAL CHARACTERISTICS

T_A=25°C, unless otherwise noted.

DC CHARACTERISTICS

Parameter		Conditions		Min	Typ.	Max	Unit
V_{OH}		I_{OH} = -100 µA, V_{CC} = 1.65V ~ 5.5V	-40°C ~ +125°C	V_{CC}~0.1	-	-	V
		I_{OH} = -4mA, V_{CC} = 1.65V		1.2	-	-	
		I_{OH} = -8mA, V_{CC} = 2.3V		1.9	-	-	
		I_{OH} = -16mA, V_{CC} = 3V		2.4	-	-	
		I_{OH} = -24mA, V_{CC} = 3V		2.3	-	-	
		I_{OH} = -32mA, V_{CC} = 4.5V		3.8	-	-	
V_{OL}		I_{OL} = -100 µA, V_{CC} = 1.65~5.5V	-40°C ~ +125°C	-	-	0.1	V
		I_{OL} = 4mA, V_{CC} = 1.65V		-	-	0.45	
		I_{OL} = 8mA, V_{CC} = 2.3V		-	-	0.3	
		I_{OL} = 16mA, V_{CC} = 3V		-	-	0.4	
		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°C		±0.1	±1	µA
			-40°C ~ +125°C		-	±5	
I_{off}		V_I or V_O = 5.5V, V_{CC} = 0	+25°C	-	±0.1	±1	µA
			-40°C ~ +125°C	-	-	±10	
I_{CC}		V_I = 5.5V or GND, I_O = 0, V_{CC} = 1.65V~5.5V	+25°C	-	0.1	1	µA
			-40°C ~ +125°C	-	-	10	
ΔI_{CC}		One input at V_{CC}-0.6V, Other inputs at V_{CC} or GND, V_{CC} = 3V~5.5V	-40°C ~ +125°C	-	-	500	µA

AC CHARACTERISTICS

Parameter	Symbol	Conditions			Typ.	Unit
Input Capacitance	C_i	V_{CC} = 3.3V	V_I = V_{CC} or GND	+25°C	4	ns
Propagation Delay	t_{pd}	V_{CC} = 1.8V±0.15V	C_L = 30pF, R_L = 1KΩ	-40°C ~ +125°C	8	ns
		V_{CC} = 2.5V±0.2V	C_L = 30pF, R_L = 500Ω	-40°C ~ +125°C	3.7	
		V_{CC} = 3.3V±0.3V	C_L = 50pF, R_L = 500Ω	-40°C ~ +125°C	2.5	
		V_{CC} = 5V±0.5V	C_L = 50pF, R_L = 500Ω	-40°C ~ +125°C	2.7	
Power Dissipation Capacitance	C_{pd}	V_{CC} = 1.8V±0.15V	f = 10MHz	+25°C	20	pF
		V_{CC} = 2.5V±0.2V		+25°C	21	
		V_{CC} = 3.3V±0.3V		+25°C	22	
		V_{CC} = 5V±0.5V		+25°C	25	

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

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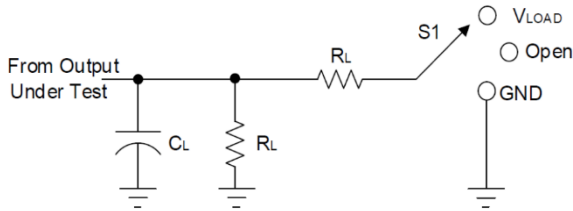
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PIZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

| 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}	15pF	30pF	1MΩ	1kΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	15pF	30pF	1MΩ	500Ω	0.15V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	15pF	30pF	1MΩ	500Ω	0.3V
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	2 x V_{CC}	15pF	30pF	1MΩ	500Ω	0.3V
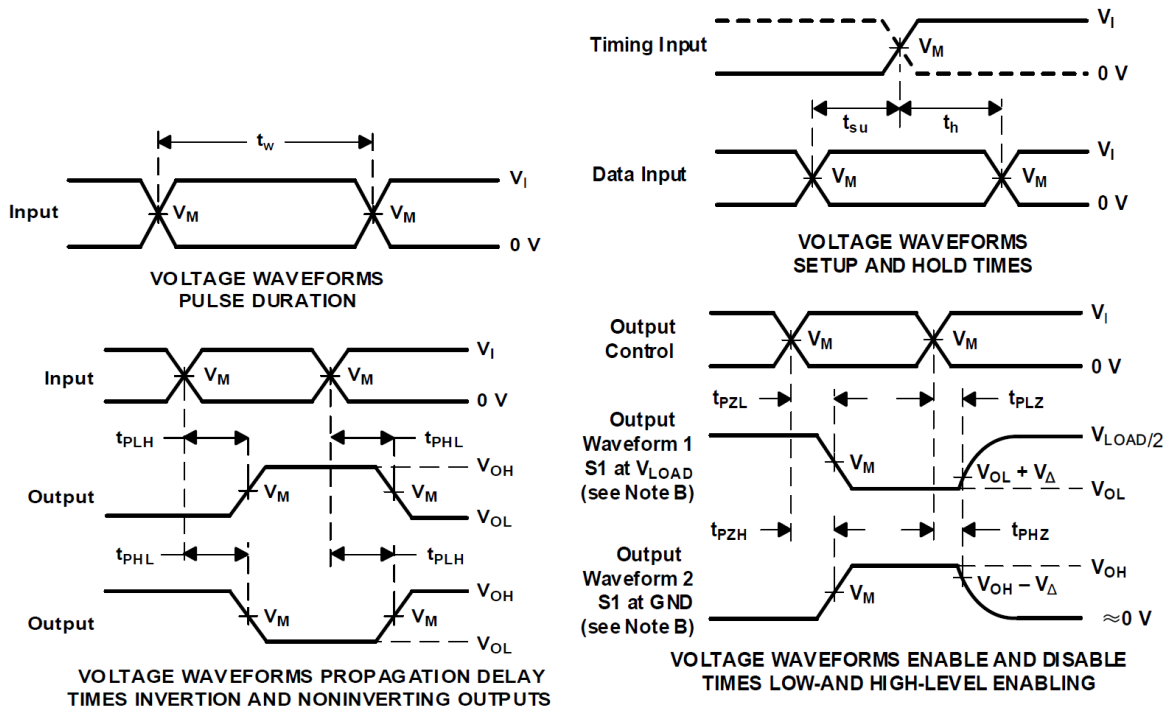
Fig 1. Load Circuit and Voltage Waveforms

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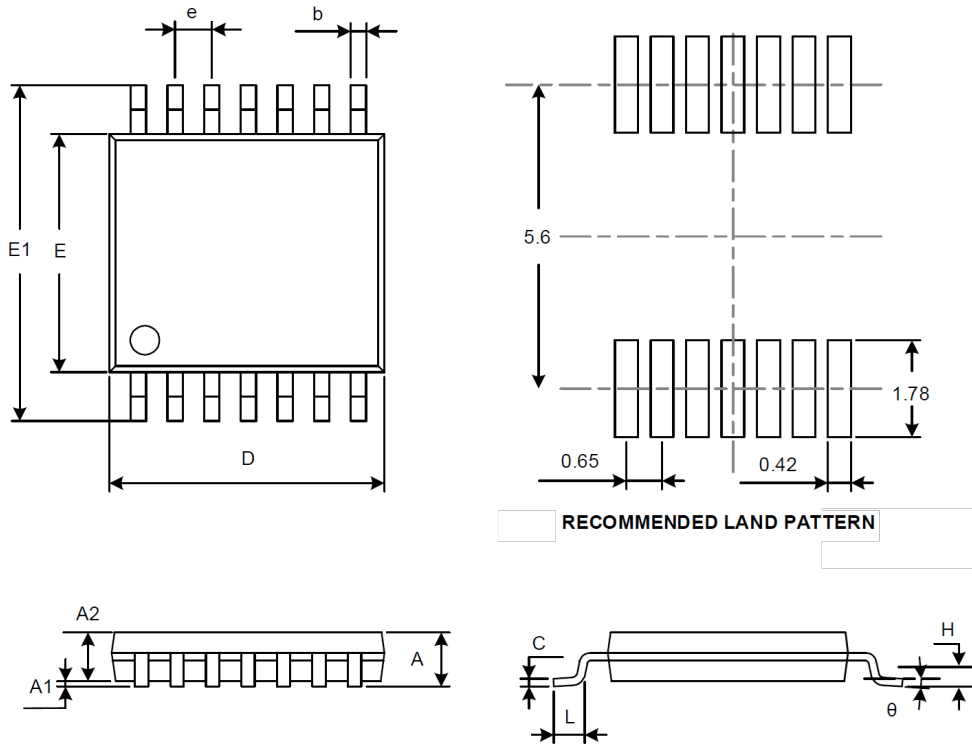
PACKAGE INFORMATION

Dimension in SOP14 (Unit: mm)

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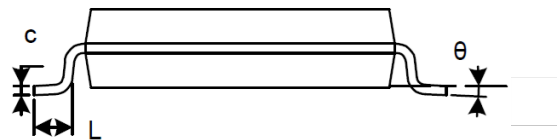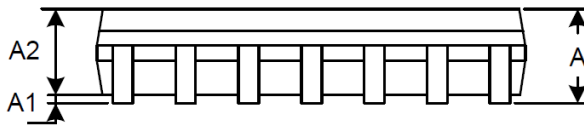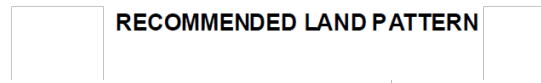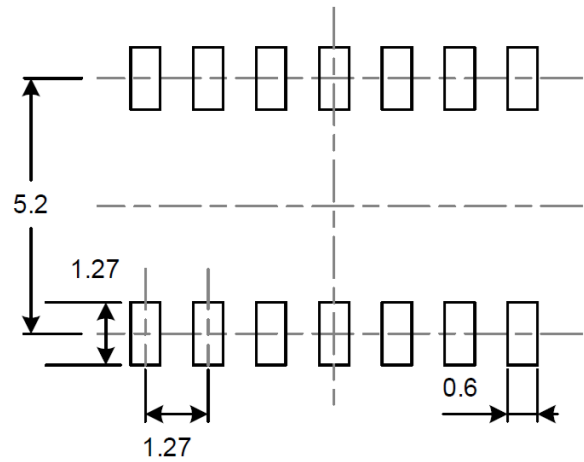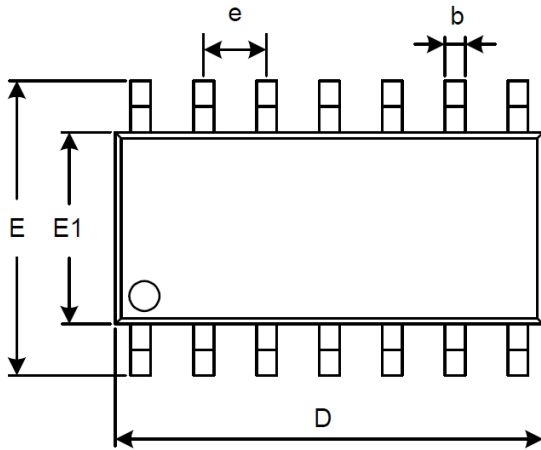
Symbol	Millimeters	
	Min	**Max**
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.310	0.510
c	0.100	0.250
D	8.450	8.850
e	1.270 BSC	
E	5.800	6.200
E1	3.800	4.000
L	0.400	1.270
θ	0°	8°

Dimension in TSSOP14 (Unit: mm)

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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