Advanced Low Power Schottky Logic – 74ALS51

2-wide 3-Input, 2-wide 2-Input AND-OR-Invert Gate IC in bare die form

Rev 1.1
24/01/24

Description

The 74ALS51 is fabricated using a 2µm 40V Bipolar process. The device consists of two independent combinations of gates each performing the logic AND-OR-INVERT function. The IC integrates one 2-wide 3-input gates and one 2-wide 2-input gates each performing Boolean functions $1Y = \overline{(1A \cdot 1B \cdot 1C) + (1D \cdot 1E \cdot 1F)}$ and $2Y = \overline{(2A \cdot 2B) + (2C \cdot 2D)}$ respectively. All inputs are protected against ESD and excess voltage transients.

Features:

- High speed – 14ns (Max) propagation delay
- Industrial Temperature Range
- Direct drop-in replacement for obsolete components in long term programs.

Ordering Information

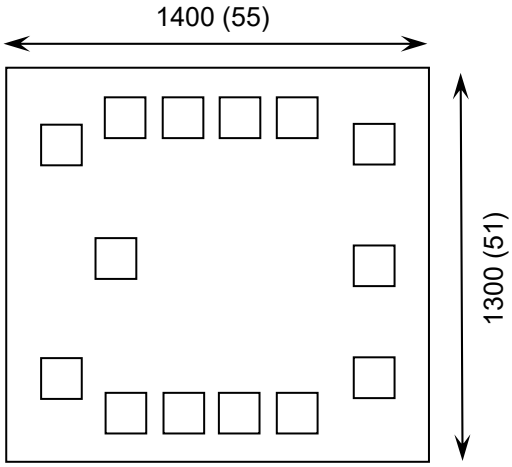
The following part suffixes apply:

- No suffix - MIL-STD-883 /2010B Visual Inspection

For High Reliability versions of this product please see

54ALS51

Die Dimensions in µm (mils)



Supply Formats:

- Default – Die in Waffle Pack (400 per tray capacity)
- Sawn Wafer on Tape – On request
- Unsawn Wafer – On request
- Die Thickness <> 350µm(14 Mils) – On request
- Assembled into Ceramic Package – On request

Mechanical Specification

Die Size (Unsawn)	1400 x1300 55 x 51	µm mils
Minimum Bond Pad Size	130 x 130 5.12 x 5.12	µm mils
Die Thickness	350 (±20) 13.78 (±0.79)	µm mils
Top Metal Composition	Al 1%Si 1.1µm	
Back Metal Composition	N/A – Bare Si	

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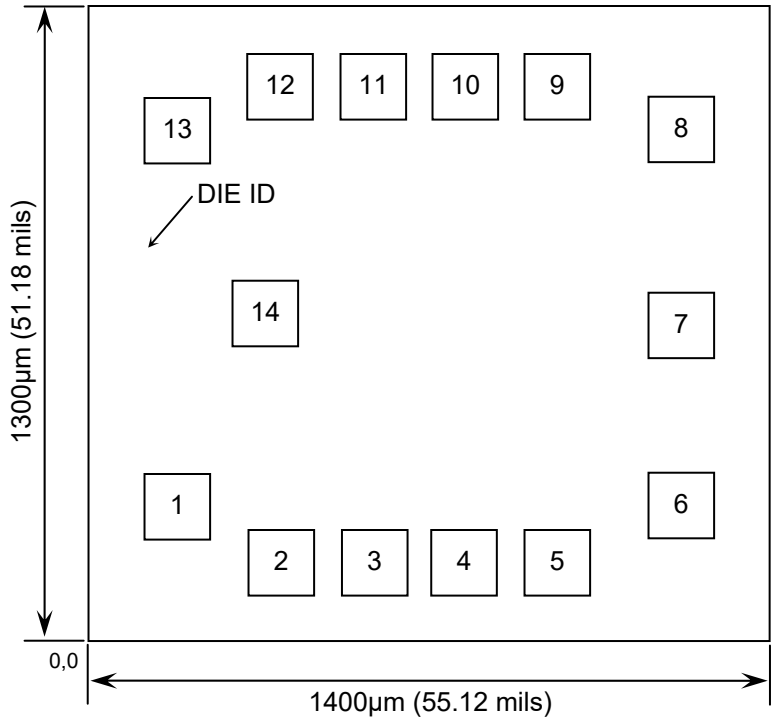
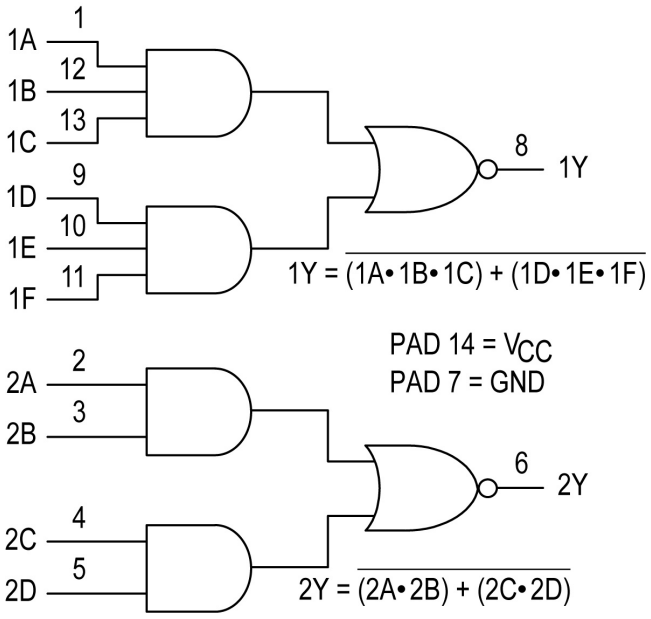
Pad Layout and Functions



PAD	FUNCTION	COORDINATES (mm)	
		X	Y
1	1A	0.110	0.215
2	2A	0.325	0.100
3	2B	0.515	0.100
4	2C	0.705	0.100
5	2D	0.895	0.100
6	2Y	1.150	0.215
7	GND	1.150	0.585
8	1Y	1.150	0.985
9	1D	0.895	1.070
10	1E	0.705	1.070
11	1F	0.515	1.070
12	1B	0.325	1.070
13	1C	0.110	0.985
14	V_{CC}	0.295	0.610
CONNECT CHIP BACK TO GND			

Logic Diagram



Truth Table

INPUTS						OUTPUT
1A	1B	1C	1D	1E	1F	1Y
H	H	H	X	X	X	L
X	X	X	H	H	H	L
All other combinations						H

INPUTS				OUTPUT
2A	2B	2C	2D	2Y
H	H	X	X	L
X	X	H	H	L
All other combinations				H

H = High level (steady state)
L = Low level (steady state)
X = don't care

Absolute Maximum Ratings[1]

PARAMETER	SYMBOL	VALUE	UNIT
DC Supply Voltage	V_{CC}	7.0	V
DC Input Voltage	V_{IN}	7.0	V
Storage Temperature Range	T_{STG}	-65 to 150	°C

1. Operation above the absolute maximum rating may cause device failure. Operation at the absolute maximum ratings, for extended periods, may reduce device reliability.

Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNITS
Supply Voltage	V_{CC}	4.5	5.5	V
High-Level Input Voltage	V_{IH}	2	-	V
Low-Level Input Voltage	V_{IL}	-	0.8	V
High-Level Output Current	I_{OH}	-	-0.4	mA
Low-Level Output Current	I_{OL}	-	8	mA
Operating Temperature Range	T_J	-40	+85	°C

μ

DC Electrical Characteristics[2] T_J = -40°C to 85°C unless otherwise specified

PARAMETER	SYMBOL	CONDITIONS	LIMITS			UNITS
			MIN	TYP	MAX	
Minimum High-Level Input Voltage	V_{IH}	-	2	-	-	V
Maximum Low-Level Input Voltage	V_{IL}	-	-	-	0.7	V
Input Clamp Diode Voltage	V_{IK}	V_{CC} = MIN I_{IN} = -18mA	-	-	-1.5	V
Output Voltage High	V_{OH}	V_{CC} = MIN, I_{OH} = MAX V_{IN} = V_{IL} or V_{IH} per Truth Table	V_{CC}-2	-	-	V
Output Voltage Low	V_{OL}	V_{CC} = V_{CC} MIN I_{OH} = MAX V_{IN} = V_{IL} or V_{IH} per Truth Table I_{OL} = 8mA	-	0.35	0.5	V
Input Current	I_{IN}	V_{CC} = MAX, V_{IN} = 7.0V	-	-	0.1	mA
Input High Current	I_{IH}	V_{CC} = MAX, V_{IN} = 2.7V	-	-	20	μA
Input Low Current	I_{IL}	V_{CC} = MAX, V_{IN} = 0.4V	-	-	-0.1	mA
Short Circuit Current[3]	I_{OS}	V_{CC} = MAX	-30	-	-112	mA
Power Supply Current (Total)	I_{CC}	V_{CC} = MAX ,Output High	-	-	1.2	mA
		V_{CC} = MAX ,Output Low	-	-	1.5	

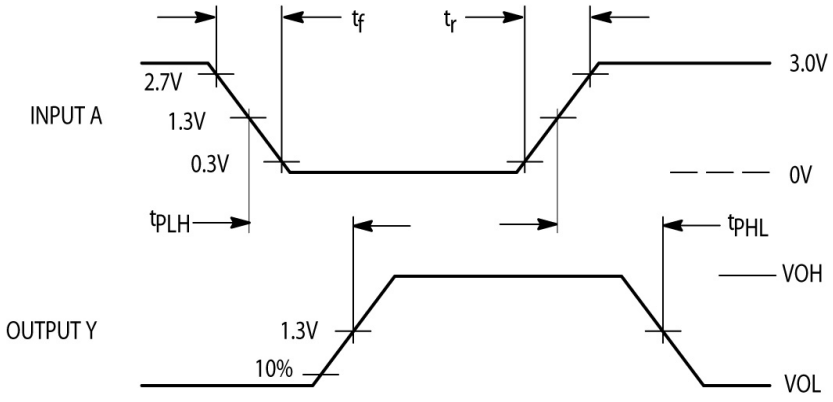
2. All typical values @ V_{CC} = 5V, T_J = 25°C. **3.** Not more than one output should be shorted at a time, nor for more than 1 second.

AC Electrical Characteristics[4]

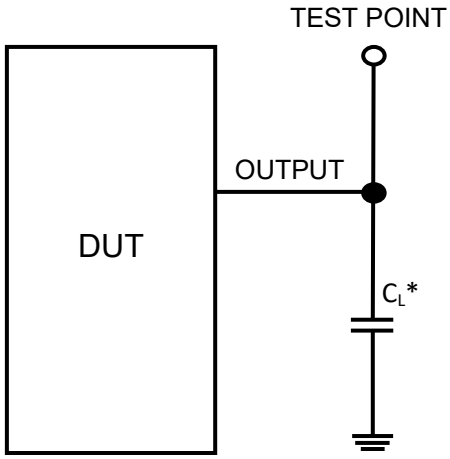
PARAMETER	SYMBOL	CONDITIONS	LIMITS			UNITS
			MIN	TYP	MAX	
Turn-Off Delay, Input to Output	t_{PLH}	V_{CC} = 5V, C_L = 50pF, R_L = 500Ω	2	-	14	ns
Turn-On Delay, Input to Output	t_{PHL}	V_{CC} = 5V, C_L = 50pF, R_L = 500Ω	3	-	12	ns

4. Not production tested in die form, characterized by chip design and tested in package.

Switching Waveform



Test Circuit



* Includes all probe and jig capacitance