Advanced Low Power Schottky Logic – 74ALS86

Quadruple 2-Input Exclusive OR Gate IC in bare die form

Rev 1.0
01/11/22

Description

The 74ALS86 is fabricated using a 1.5µm 40V Bipolar process. The device contains four independent gates and performs the Boolean functions $Y = A \oplus B = \overline{A}B + A\overline{B}$ in positive logic.

Features:

- High speed – 3ns (Min) propagation delay
- Direct drop-in replacement for obsolete components in long term programs.

Ordering Information

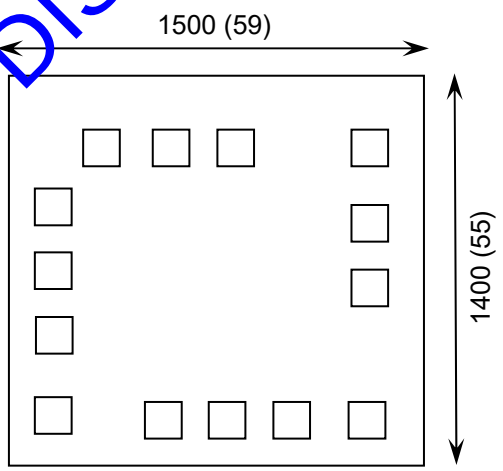
The following part suffixes apply:

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

For High Reliability versions of this product please see

54ALS86

Die Dimensions in µm (mils)



Supply Formats:

- Default – Die in Waffle Pack (100 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)	1500 x 1400 59 x 55	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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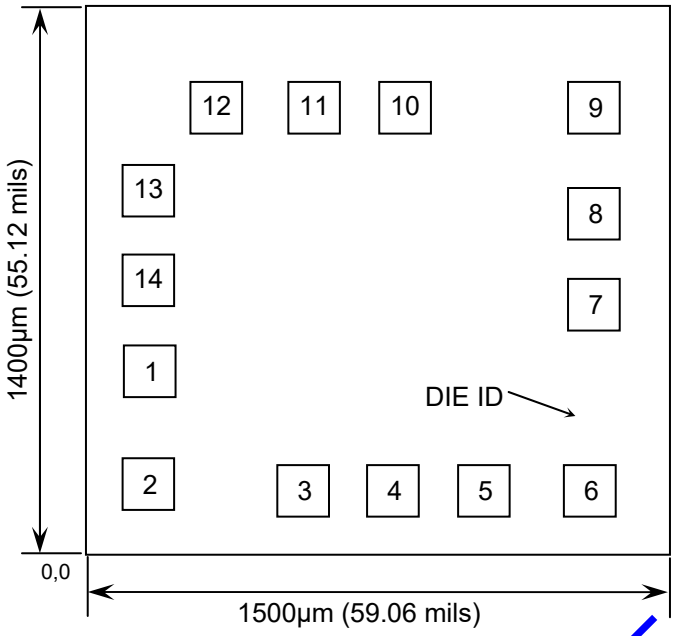
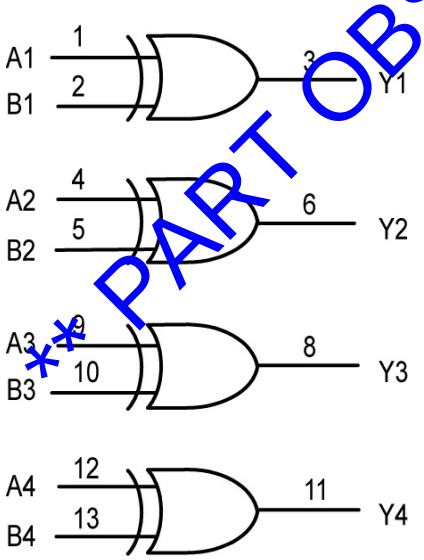
Pad Layout and Functions



PAD	FUNCTION	COORDINATES (mm)	
		X	Y
1	1A	0.100	0.405
2	1B	0.100	0.175
3	1Y	0.495	0.100
4	2A	0.725	0.100
5	2B	0.955	0.100
6	2Y	1.245	0.100
7	GND	1.235	0.575
8	3Y	1.235	0.805
9	3A	1.235	1.075
10	3B	0.753	1.075
11	4Y	0.525	1.075
12	4A	0.270	1.075
13	4B	0.100	0.865
14	V_{CC}	0.100	0.635
CONNECT CHIP BACK TO GND			

Logic Diagram



$Y = A \oplus B$
$= \overline{A}B + A\overline{B}$

Pad 14 = V_{CC}
Pad 7 = GND

Truth Table

INPUTS		OUTPUT
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

H = High level (steady state)
L = Low level (steady state)

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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

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}	-		-	-	0.8	V
Input Clamp Diode Voltage	V_{IK}	V_{CC} = MIN I_{IN} = -18mA		-	-	-1.5	V
Output Voltage High	V_{OH}	V_{CC} = 4.5V to 5.5V, I_{OH} = -0.4mA		V_{CC} -2	-	-	V
Output Voltage Low	V_{OL}	V_{CC} = 4.5V	I_{OL} = 4mA	-	0.25	0.4	V
			I_{OL} = 8mA	-	0.35	0.5	
Input Current	I_{IN}	V_{CC} = 5.5V, V_{IN} = 7V		-	-	0.1	mA
Input High Current	I_{IH}	V_{CC} = 5.5V, V_{IN} = 2.7V		-	-	20	µA
Input Low Current	I_{IL}	V_{CC} = 5.5, V_{IN} = 0.4V		-	-	-0.1	mA
Output Current[3]	I_O	V_{CC} = 5.5, V_{OUT} = 2.25V		-30	-	-112	mA
Power Supply Current	I_{CC}	V_{CC} = 5.5V, V_{IN} = 4.5V (All inputs)		-	3.9	5.9	mA

2. All typical values @ V_{CC} = 5V, T_J = 25°C.

3. Output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}

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AC Electrical Characteristics[4] T_J = -40°C to 85°C unless otherwise specified

PARAMETER	SYMBOL	CONDITIONS	LIMITS			UNITS
			MIN	TYP	MAX	
Propagation Delay, A or B to output Y (other input low)	t_{PLH}	V_{CC} = 4.5 to 5.5V, C_L = 50pF, R_L = 500Ω	3	-	17	ns
	t_{PHL}		2	-	12	
Propagation Delay, A or B to output Y (other input high)	t_{PLH}	V_{CC} = 4.5 to 5.5V, C_L = 50pF, R_L = 500Ω	3	-	17	ns
	t_{PHL}		2	-	10	

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

Switching Waveforms

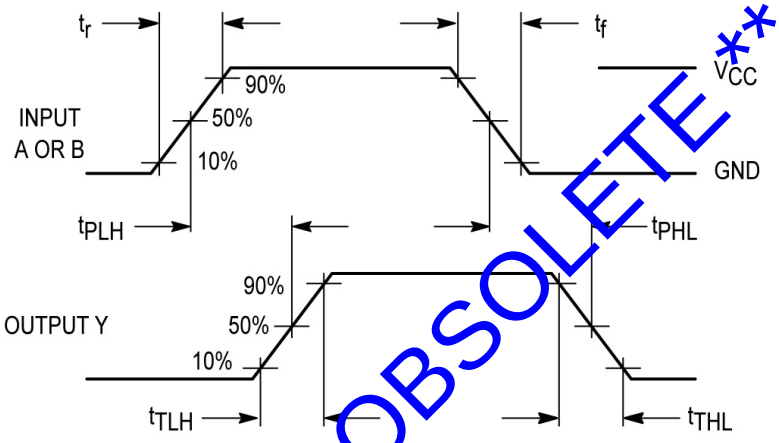

Figure 1 – Propagation Delay & Timing

Test Circuit

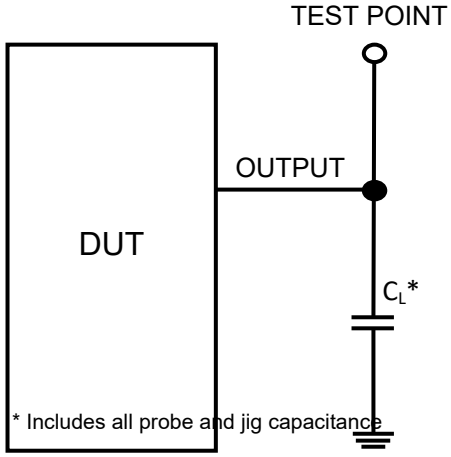

Figure 2