



# Low Power Schottky Logic – 54LS86A

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

Rev 1.0  
21/11/17

## Description

The 54LS86A is fabricated using a 2µm 40V Bipolar process. The device contains four independent gates and performs the Boolean functions  $Y = A \oplus B = \bar{A}B + A\bar{B}$  in positive logic. The device is characterized over the full Military Temperature Range.

## Features:

- High speed – 22ns (Typ) propagation delay
- Low Power –  $I_{CC}$  10mA Max
- Full Military Temperature Range.
- Direct drop-in replacement for obsolete components in long term programs.

## Ordering Information

The following part suffixes apply:

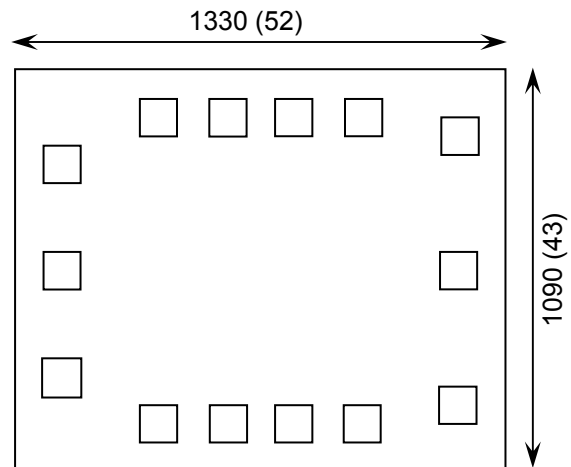
- No suffix - MIL-STD-883 /2010B Visual Inspection
- “H” - MIL-STD-883 /2010B Visual Inspection + MIL-PRF-38534 Class H LAT
- “K” - MIL-STD-883 /2010A Visual Inspection (Space) + MIL-PRF-38534 Class K LAT

LAT = Lot Acceptance Test.

For further information on LAT process flows see below.

[www.siliconsupplies.com/quality/bare-die-lot-qualification](http://www.siliconsupplies.com/quality/bare-die-lot-qualification)

## 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)	1330 x 1090 52 x 43	µm mils
Minimum Bond Pad Size	98 x 98 3.86 x 3.86	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	

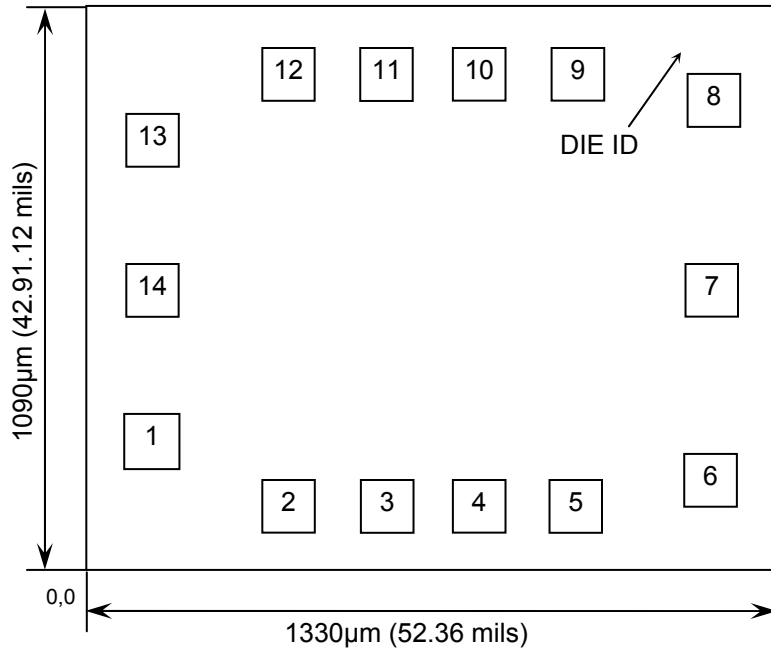




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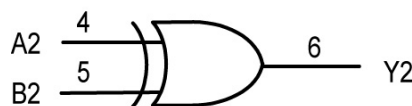
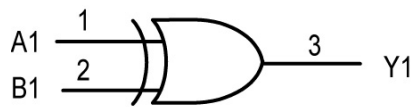
## Pad Layout and Functions



PAD	FUNCTION	COORDINATES (mm)	
		X	Y
1	A1	0.077	0.205
2	B1	0.338	0.079
3	Y1	0.528	0.079
4	A2	0.704	0.079
5	B2	0.894	0.079
6	Y2	1.154	0.129
7	GND	1.154	0.496
8	Y3	1.154	0.863
9	A3	0.894	0.913
10	B3	0.704	0.913
11	Y4	0.528	0.913
12	A4	0.338	0.913
13	B4	0.077	0.787
14	V <sub>CC</sub>	0.077	0.496

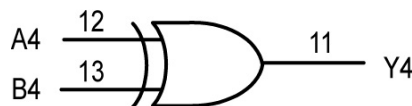
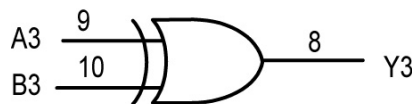
CONNECT CHIP BACK TO GND OR FLOAT

## Logic Diagram



$$Y = A \oplus B$$

$$= \bar{A}B + A\bar{B}$$



Pad 14 = V<sub>CC</sub>  
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<sup>1</sup>

PARAMETER	SYMBOL	VALUE	UNIT
DC Supply Voltage	$V_{CC}$	7.0	V
DC Input Voltage	$V_{IN}$	7.0	V
DC Input Voltage	$V_{OUT}$	5.5	°C
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	$V_{IL}$	-	0.7	V
High-Level Output Current	$I_{OH}$	-	-0.4	mA
Low-Level Output Current	$I_{OL}$	-	4	mA
Operating Temperature Range	$T_J$	-55	+125	°C

## DC Electrical Characteristics<sup>2</sup> $T_J = -55^{\circ}\text{C}$ to $125^{\circ}\text{C}$ 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	$V_{IK}$	$V_{CC} = \text{MIN}$ $I_{IN} = -18\text{mA}$	-	-0.65	-1.5	V
Output Voltage High	$V_{OH}$	$V_{CC} = \text{MIN}, I_{OH} = \text{MAX}$ $V_{IN} = V_{IL}$ or $V_{IH}$ per Function Table	2.5	3.4	-	V
Output Voltage Low	$V_{OL}$	$V_{CC} = \text{MIN}$ $I_{OH} = \text{MAX}$ $V_{IN} = V_{IL}$ or $V_{IH}$ per Truth Table $I_{OL} = 4\text{mA}$	-	0.25	0.4	V
Input High Current	$I_{IH}$	$V_{CC} = \text{MAX}, V_{IN} = 2.7\text{V}$	-	-	40	$\mu\text{A}$
		$V_{CC} = \text{MAX}, V_{IN} = 7.0\text{V}$	-	-	0.2	mA
Input Low Current	$I_{IL}$	$V_{CC} = \text{MAX}, V_{IN} = 0.4\text{V}$	-	-	-0.8	mA
Short Circuit Current <sup>3</sup>	$I_{OS}$	$V_{CC} = \text{MAX}$	-20	-	-100	mA
Power Supply Current (Total)	$I_{CC}$	$V_{CC} = \text{MAX}$	-	6.1	10	mA

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





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## AC Electrical Characteristics<sup>4</sup>

PARAMETER	SYMBOL	CONDITIONS	LIMITS			UNITS
			MIN	TYP	MAX	
Propagation Delay, Other Input Low	$t_{PLH}$	$V_{CC} = 5V, C_L = 15pF$	-	12	23	ns
	$t_{PHL}$			10	17	
Propagation Delay, Other Input High	$t_{PLH}$	$V_{CC} = 5V, C_L = 15pF$	-	20	30	ns
	$t_{PHL}$		-	13	22	

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

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