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[Fairchild Semiconductor](#)
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December 2001
 Revised March 2005

74ALVC86

Low Voltage Quad 2-Input Exclusive-OR Gate with 3.6V Tolerant Inputs and Outputs

General Description

The ALVC86 contains four 2-input exclusive OR gates. This product is designed for low voltage (1.65V to 3.6V) V_{CC} applications with I/O compatibility up to 3.6V

The 74ALVC86 is fabricated with an advanced CMOS technology to achieve high-speed operation while maintaining low CMOS power dissipation.

Features

- 1.65V to 3.6V V_{CC} supply operation
- 3.6V tolerant inputs and outputs
- t_{PD}
 - 3.5 ns max for 3.0V to 3.6V V_{CC}
 - 4.4 ns max for 2.3V to 2.7V V_{CC}
 - 7.8 ns max for 1.65V to 1.95V V_{CC}
- Power-off high impedance inputs and outputs
- Uses patented Quiet Series™ noise/EMI reduction circuitry
- Latchup conforms to JEDEC JED78
- ESD performance:
 - Human body model > 2000V
 - Machine model > 250V

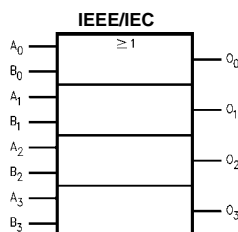
Ordering Code:

Order Number	Package Number	Package Description
74ALVC86M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74ALVC86MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74ALVC86MTCX_NL (Note 1)	MTC14	Pb-Free 14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

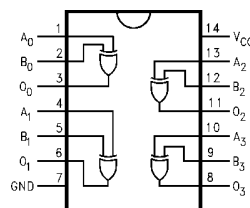
Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Note 1: "_NL" indicates Pb-Free package (per JEDEC J-STD-020B). Device available in Tape and Reel only.

Logic Symbol



Connection Diagram



Pin Descriptions

Pin Names	Description
A_n, B_n	Inputs
O_n	Outputs

Quiet Series™ is a trademark of Fairchild Semiconductor Corporation

74ALVC86

Absolute Maximum Ratings (Note 2)

Supply Voltage (V_{CC})	-0.5V to +4.6V
DC Input Voltage (V_I)	-0.5V to 4.6V
Output Voltage (V_O) (Note 3)	-0.5V to V_{CC} +0.5V
DC Input Diode Current (I_{IK})	
$V_I < 0V$	-50 mA
DC Output Diode Current (I_{OK})	
$V_O < 0V$	-50 mA
DC Output Source/Sink Current (I_{OH}/I_{OL})	±50 mA
DC V_{CC} or GND Current per Supply Pin (I_{CC} or GND)	±100 mA
Storage Temperature Range (T_{STG})	-65°C to +150°C

Recommended Operating Conditions (Note 4)

Power Supply	
Operating	1.65V to 3.6V
Input Voltage (V_I)	0V to V_{CC}
Output Voltage (V_O)	0V to V_{CC}
Free Air Operating Temperature (T_A)	-40°C to +85°C
Minimum Input Edge Rate ($\Delta t/\Delta V$)	
$V_{IN} = 0.8V$ to $2.0V$, $V_{CC} = 3.0V$	10 ns/V

Note 2: The Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the Absolute Maximum Ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Note 3: I_O Absolute Maximum Rating must be observed.

Note 4: Floating or unused inputs must be held HIGH or LOW.

DC Electrical Characteristics

Symbol	Parameter	Conditions	V_{CC} (V)	Min	Max	Units
V_{IH}	HIGH Level Input Voltage		1.65 - 1.95 2.3 - 2.7 2.7 - 3.6	0.65 x V_{CC} 1.7 2.0		V
V_{IL}	LOW Level Input Voltage		1.65 - 1.95 2.3 - 2.7 2.7 - 3.6		0.35 x V_{CC} 0.7 0.8	V
V_{OH}	HIGH Level Output Voltage	$I_{OH} = -100 \mu A$	1.65 - 3.6	$V_{CC} - 0.2$		V
		$I_{OH} = -4 mA$	1.65	1.2		
		$I_{OH} = -6 mA$	2.3	2		
		$I_{OH} = -12 mA$	2.3 2.7 3.0	1.7 2.2 2.4		
		$I_{OH} = -24 mA$	3.0	2		
V_{OL}	LOW Level Output Voltage	$I_{OL} = 100 \mu A$	1.65 - 3.6		0.2	V
		$I_{OL} = 4 mA$	1.65		0.45	
		$I_{OL} = 6 mA$	2.3		0.4	
		$I_{OL} = 12 mA$	2.3 2.7		0.7 0.4	
		$I_{OL} = 24 mA$	3		0.55	
I_I	Input Leakage Current	$0 \leq V_I \leq 3.6V$	3.6		±5.0	μA
I_{OZ}	3-STATE Output Leakage	$0 \leq V_O \leq 3.6V$	3.6		±10	μA
I_{CC}	Quiescent Supply Current	$V_I = V_{CC}$ or GND, $I_O = 0$	3.6		40	μA
ΔI_{CC}	Increase in I_{CC} per Input	$V_{IH} = V_{CC} - 0.6V$	3 - 3.6		750	μA

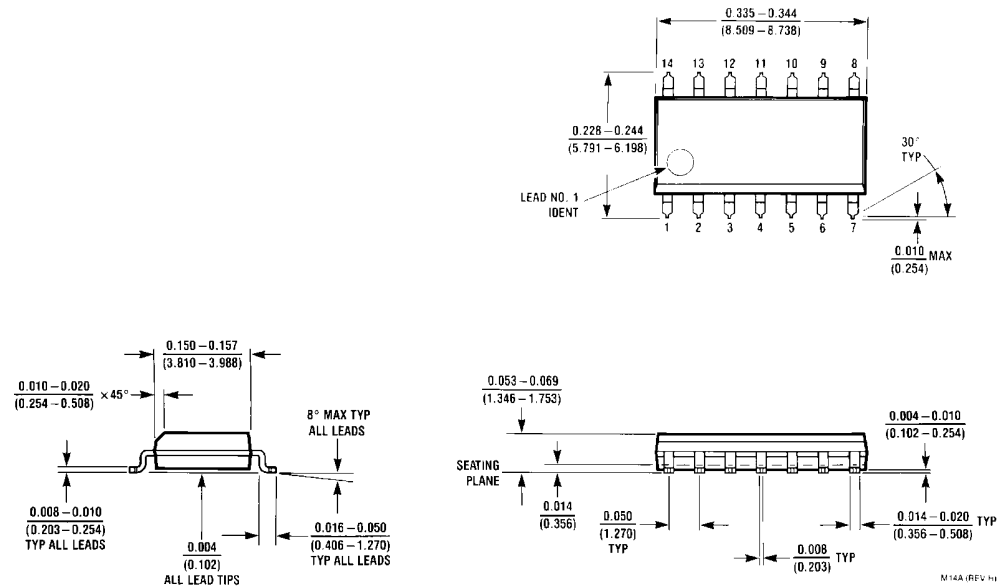
AC Electrical Characteristics										
Symbol	Parameter	T _A = -40°C to +85°C, R _L = 500Ω								Units
		C _L = 50 pF				C _L = 30 pF				
		V _{CC} = 3.3V ± 0.3V		V _{CC} = 2.7V		V _{CC} = 2.5V ± 0.2V		V _{CC} = 1.8V ± 0.15V		
		Min	Max	Min	Max	Min	Max	Min	Max	
t _{PHL} , t _{PLH}	Propagation Delay Bus to Bus	1.1	3.5	1.3	4.4	0.8	3.9	1.0	7.8	ns

Capacitance						
Symbol	Parameter	Conditions	T _A = +25°C		Units	
			V _{CC}	Typical		
C _{IN}	Input Capacitance	V _I = 0V or V _{CC}	3.3	6	pF	
C _{OUT}	Output Capacitance	V _I = 0V or V _{CC}	3.3	7	pF	
C _{PD}	Power Dissipation Capacitance	Outputs Enabled	f = 10 MHz, C _L = 50 pF	3.3	20	pF
				2.5	20	

AC Loading and Waveforms																				
	<p>TABLE 1. Values for Figure 1</p> <table border="1"> <thead> <tr> <th>TEST</th> <th>SWITCH</th> </tr> </thead> <tbody> <tr> <td>t_{PLH}, t_{PHL}</td> <td>Open</td> </tr> </tbody> </table>	TEST	SWITCH	t _{PLH} , t _{PHL}	Open															
TEST	SWITCH																			
t _{PLH} , t _{PHL}	Open																			
<p>FIGURE 1. AC Test Circuit</p>	<p>TABLE 2. Variable Matrix (Input Characteristics: f = 1MHz; t_r = t_f = 2ns; Z₀ = 50Ω)</p> <table border="1"> <thead> <tr> <th rowspan="2">Symbol</th> <th colspan="4">V_{CC}</th> </tr> <tr> <th>3.3V ± 0.3V</th> <th>2.7V</th> <th>2.5V ± 0.2V</th> <th>1.8V ± 0.15V</th> </tr> </thead> <tbody> <tr> <td>V_{mi}</td> <td>1.5V</td> <td>1.5V</td> <td>V_{CC}/2</td> <td>V_{CC}/2</td> </tr> <tr> <td>V_{mo}</td> <td>1.5V</td> <td>1.5V</td> <td>V_{CC}/2</td> <td>V_{CC}/2</td> </tr> </tbody> </table>	Symbol	V _{CC}				3.3V ± 0.3V	2.7V	2.5V ± 0.2V	1.8V ± 0.15V	V _{mi}	1.5V	1.5V	V _{CC} /2	V _{CC} /2	V _{mo}	1.5V	1.5V	V _{CC} /2	V _{CC} /2
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	<p>FIGURE 2. Waveform for Inverting and Non-inverting Functions</p>																			

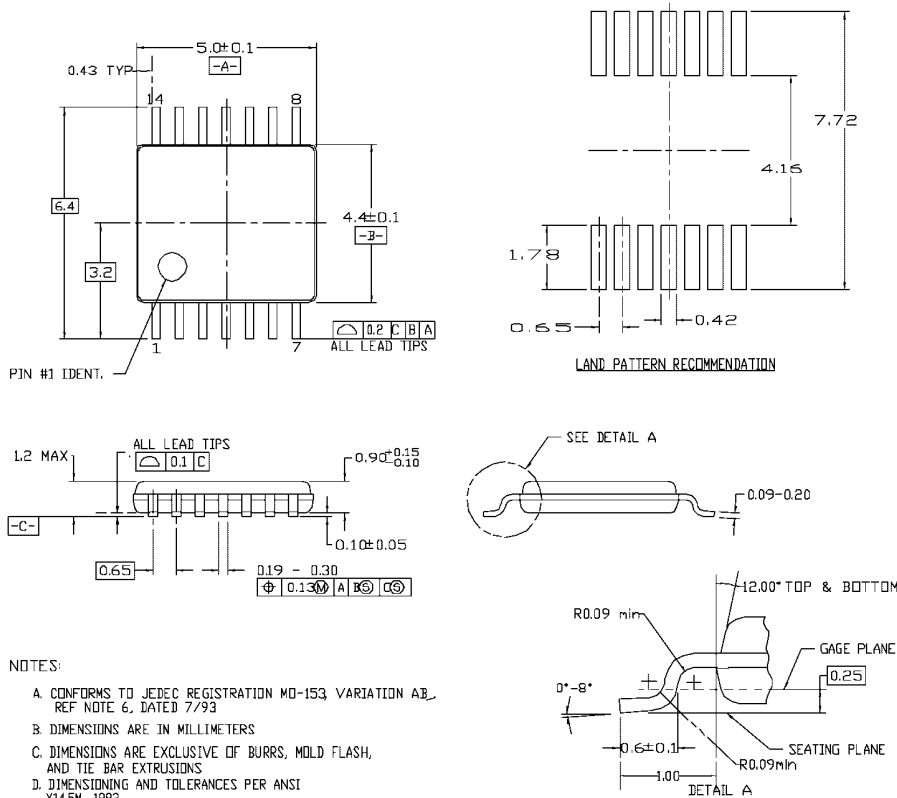
74ALVC86

Physical Dimensions inches (millimeters) unless otherwise noted



14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
 Package Number M14A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



- NOTES:
- A. CONFORMS TO JEDEC REGISTRATION MO-153 VARIATION AB, REF NOTE 6, DATED 7/93
 - B. DIMENSIONS ARE IN MILLIMETERS
 - C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS
 - D. DIMENSIONING AND TOLERANCES PER ANSI Y14.5M, 1982

MTC14revD

14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide Package Number MTC14

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