74AC14 • 74ACT14
Hex Inverter with Schmitt Trigger Input

General Description

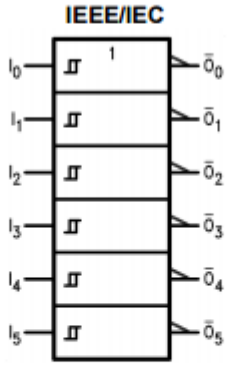
The 74AC14 and 74ACT14 contain six inverter gates each with a Schmitt trigger input. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. In addition, they have a greater noise margin than conventional inverters.

The 74AC14 and 74ACT14 have hysteresis between the positive-going and negative-going input thresholds (typically 1.0V) which is determined internally by transistor ratios and is essentially insensitive to temperature and supply voltage variations.

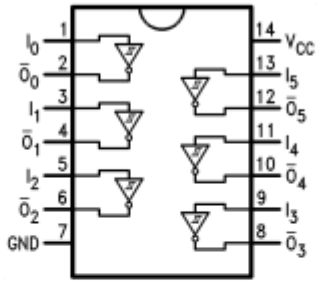
Features

- I_{CC} reduced by 50%
- Outputs source/sink 24 mA
- 74ACT14 has TTL-compatible inputs

Logic Symbol



Connection Diagram



Pin Descriptions

Pin Names	Description
I_n	Inputs
$\overline{O}_n$	Outputs

Function Table

Input	Output
A	**$\overline{O}$**
L	H
H	L

Absolute Maximum Ratings (Note 2)

Supply Voltage (V_{CC})	–0.5V to +7.0V
DC Input Diode Current (I_{IK})	
V_I = –0.5V	–20 mA
V_I = V_{CC} + 0.5V	+20 mA
DC Input Voltage (V_I)	–0.5V to V_{CC} + 0.5V
DC Output Diode Current (I_{OK})	
V_O = –0.5V	–20 mA
V_O = V_{CC} + 0.5V	+20 mA
DC Output Voltage (V_O)	–0.5V to V_{CC} + 0.5V
DC Output Source or Sink Current (I_O)	±50 mA
DC V_{CC} or Ground Current per Output Pin (I_{CC} or I_{GND})	±50 mA
Storage Temperature (T_{STG})	–65°C to +150°C
Junction Temperature (T_J)	
PDIP	140°C

Recommended Operating Conditions

Supply Voltage (V_{CC})	
AC	2.0V to 6.0V
ACT	4.5V to 5.5V
Input Voltage (V_I)	0V to V_{CC}
Output Voltage (V_O)	0V to V_{CC}
Operating Temperature (T_A)	–40°C to +85°C

Note 2: Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation of FACT™ circuits outside databook specifications.

DC Electrical Characteristics for AC

Symbol	Parameter	V_{CC} (V)	T_A = +25°C Typ	T_A = −40°C to +85°C Guaranteed Limits		Units	Conditions
V_{OH}	Minimum HIGH Level Output Voltage	3.0	2.99	2.9	2.9	V	I_{OUT} = −50 μA45
		4.5	4.49	4.4	4.4		
		5.5	5.49	5.4	5.4		
		3.0		2.56	2.46	V	I_{OH} = 12
		4.5		3.86	3.76		I_{OH} = 24 mA
		5.5		4.86	4.76		I_{OH} = 24 mA (Note)
V_{OL}	Maximum LOW Level Output Voltage	3.0	0.002	0.1	0.1	V	I_{OUT} = 50 μA
		4.5	0.001	0.1	0.1		
		5.5	0.001	0.1	0.1		
		3.0		0.36	0.44	V	I_{OL} = 12
		4.5		0.36	0.44		I_{OL} 24 mA
		5.5		0.36	0.44		I_{OL} = 24 mA (Note)
I_{IN} (Note)	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V_I = V_{CC}, GND
V_{I+}	Maximum Positive Threshold	3.0		2.2	2.2	V	T_A = Worst Case
		4.5		3.2	3.2		
		5.5		3.9	3.9		
V_{I-}	Minimum Negative Threshold	3.0		0.5	0.5	V	T_A = Worst Case
		4.5		0.9	0.9		
		5.5		1.1	1.1		
$V_{H(MAX)}$	Maximum Hysteresis	3.0		1.2	1.2	V	T_A = Worst Case
		4.5		1.4	1.4		
		5.5		1.6	1.6		
$V_{H(MIN)}$	Minimum Hysteresis	3.0		0.3	0.3	V	T_A = Worst Case
		4.5		0.4	0.4		
		5.5		0.5	0.5		
I_{OLD}	Minimum Dynamic	5.5			75	mA	V_{OLD} = 1.65V Max
I_{OHD}	Output Current (Note)	5.5			−75	mA	V_{OHD} = 3.85V Min
I_{CC} (Note)	Maximum Quiescent Supply Current	5.5		2.0	20.0	μA	V_{IN} = V_{CC} or GND

Note 3: All outputs loaded; thresholds on input associated with output under test.

Note 4: Maximum test duration 2.0 ms, one output loaded at a time.

Note 5: I_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC}.

AC Electrical Characteristics for AC

Symbol	Parameter	V_{CC} (V) (Note)	T_A = +25°C, C_L = 50 pF Min	Typ	Max	T_A = −40°C to +85°C, C_L = 50 pF Min	Max	Units
t_{PLH}	Propagation Delay	3.3	1.5	9.5	13.5	1.5	15.0	ns
		5.0	1.5	7.0	10.0	1.5	11.0	
t_{PHL}	Propagation Delay	3.3	1.5	7.5	11.5	1.5	13.0	ns
		5.0	1.5	6.0	8.5	1.5	9.5	

Note 6: Voltage Range 3.3 is 3.3V ± 0.3V

Voltage Range 5.0 is 5.0V ± 0.5V

DC Electrical Characteristics for ACT

Symbol	Parameter	V_{CC} (V)	$T_A = +25°C$ Typ	$T_A = -40°C$ to $+85°C$ Guaranteed Limits		Units	Conditions
V_{IH}	Minimum HIGH Level Input Voltage	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V	V_{OUT} = 0.1V or V_{CC} − 0.1V
V_{IL}	Maximum LOW Level Input Voltage	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V	V_{OUT} = 0.1V or V_{CC} − 0.1V
V_{OH}	Minimum HIGH Level Output Voltage	4.5 5.5	4.49 5.49	434 5.4	4.4 5.4	V	I_{OUT} = −50μA
		4.5 5.5		3.86 4.86	3.76 4.76	V	V_{IN} = V_{IL} or V_{IH} I_{OH} = −24 mA I_{OH} = −24 mA (Note 7)
V_{OL}	Maximum LOW Level Output Voltage	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V	I_{OUT} = 50 μA
		4.5 5.5		0.36 0.36	0.44 0.44	V	V_{IN} = V_{IL} or V_{IH} I_{OL} = 24 mA I_{OL} = 24 mA (Note 7)
I_{IN}	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V_I = V_{CC}, GND
$V_{H(MAX)}$	Maximum Hysteresis	4.5 5.5		1.4 1.6	1.4 1.6	V	T_A = Worst Case
$V_{H(MIN)}$	Minimum Hysteresis	4.5 5.5		0.4 0.5	0.4 0.5	V	T_A = Worst Case
V_{I+}	Maximum Positive Threshold	4.5 5.5		2.0 2.0	2.0 2.0	V	T_A = Worst Case
V_{I-}	Minimum Negative Threshold	4.5 5.5		0.8 0.8	0.8 0.8	V	T_A = Worst Case
I_{CCT}	Maximum I_{CC}/Input	5.5	0.6		1.5	mA	V_I = V_{CC} − 2.1V
I_{OLD}	Minimum Dynamic	5.5			75	mA	V_{OLD} = 1.65V Max
I_{OHD}	Output Current (Note 8)	5.5			−75	mA	V_{OHD} = 3.85V Min
I_{CC}	Maximum Quiescent Supply Current	5.5		2.0	20.0	μA	V_{IN} = V_{CC} or GND

Note 7: All outputs loaded; thresholds on input associated with output under test.

Note 8: Maximum test duration 2.0 ms, one output loaded at a time.

AC Electrical Characteristics for ACT

Symbol	Parameter	V_{CC} (V) (Note 9)	$T_A = +25°C$, C_L = 50 pF Min	Typ	Max	$T_A = -40°C$ to $+85°C$, C_L = 50 pF Min	Max	Units
t_{PLH}	Propagation Delay Data to Output	5.0	3.0	8.0	10.0	3.0	11.0	ns
t_{PHL}	Propagation Delay Data to Output	5.0	3.0	8.0	10.0	3.0	11.0	ns

Note 9: Voltage Range 5.0 is 5.0V ± 0.5V

Capacitance

Symbol	Parameter	Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	V_{CC} = OPEN
C_{PD}	Power Dissipation Capacitance for AC for ACT	25.0 80	pF	V_{CC} = 5.0V