74AHC1G14

SINGLE SCHMITT-TRIGGER INVERETER

NEW PRODUCT

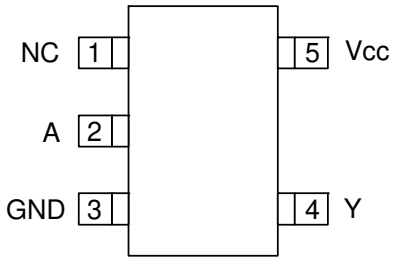
Description

The 74AHC1G14 is a single 1-input Schmitt-trigger inverter gate with a standard push-pull output. The device is designed for operation with a power supply range of 2.0V to 5.5V. The gate performs the positive Boolean function:

$$Y = \overline{A}$$

Pin Assignments

(Top View)



SOT25 / SOT353

Features

- Supply Voltage Range from 2.0V to 5.5V
- ± 8 mA Output Drive at 5.0V
- CMOS low power consumption
- Schmitt Trigger Action at All Inputs Make the Circuit Tolerant for Slower Input Rise and Fall Time.
- ESD Protection per JESD 22
  - Exceeds 200-V Machine Model (A115-A)
  - Exceeds 2000-V Human Body Model (A114-A)
  - Exceeds 1000-V Charged Device Model (C101C)
- Latch-Up Exceeds 100mA per JESD 78, Class II
- SOT25 and SOT353: Assembled with “Green” Molding Compound (no Br, Sb)
- Lead Free Finish / RoHS Compliant (Note 1)

Applications

- General Purpose Logic
- Wide array of products such as:
  - PCs, networking, notebooks, netbooks, PDAs
  - Computer peripherals, hard drives, CD/DVD ROM
  - TV, DVD, DVR, set top box
  - Personal Navigation / GPS
  - MP3 players ,Cameras, Video Recorders

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.

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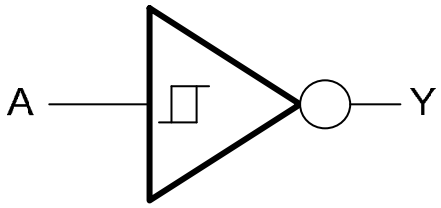
Pin Descriptions

Pin Name	Pin NO.	Description
NC	1	No Connection
A	2	Data Input
GND	3	Ground
Y	4	Data Output
V_{CC}	5	Supply Voltage

Logic Diagram



Function Table

Inputs	Output
A	Y
H	L
L	H

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Absolute Maximum Ratings (Note 2)

Symbol	Description	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	KV
ESD CDM	Charged Device Model ESD Protection	1	KV
ESD MM	Machine Model ESD Protection	200	V
V_{CC}	Supply Voltage Range	-0.5 to 6.5	V
V_I	Input Voltage Range	-0.5 to 6.5	V
V_O	Voltage applied to output in high or low state	-0.5 to V_{CC} +0.5	V
I_{IK}	Input Clamp Current $V_I<0$	-20	mA
I_{OK}	Output Clamp Current ($V_O < 0$ or $V_O > V_{CC}$)	±20	mA
I_O	Continuous output current (V_O = 0 to V_{CC})	±25	mA
I_{CC}	Continuous current through V_{CC}	50	mA
I_{GND}	Continuous current through GND	-50	mA
T_J	Operating Junction Temperature	-40 to 150	°C
T_{STG}	Storage Temperature	-65 to 150	°C

Notes: 2. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.

Recommended Operating Conditions (Note 3)

Symbol	Parameter		Min	Max	Unit
V_{CC}	Operating Voltage		2	5.5	V
V_I	Input Voltage		0	5.5	V
V_O	Output Voltage		0	V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 2V		-50	uA
		V_{CC} = 3.3V ± 0.3V		-4	mA
		V_{CC} = 5V ± 0.5V		-8	
I_{OL}	Low-level output current	V_{CC} = 2V		50	uA
		V_{CC} = 5V ± 0.5V		4	mA
		V_{CC} = 3V		8	
T_A	Operating free-air temperature		-40	125	ºC

Notes: 3. Unused inputs should be held at V_{CC} or Ground.

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Electrical Characteristics

Symbol	Parameter	Test Conditions	V_{CC}	25ºC			-40ºC to 85ºC		-40ºC to 125ºC		Unit
				Min	Typ.	Max	Min	Max	Min	Max	
V_{T+}	Positive-going input threshold voltage		3V			2.2		2.2		2.2	V
			4.5V			3.15		3.15		3.15	V
			5.5V			3.85		3.85		3.85	V
V_{T-}	Negative-going input threshold voltage		3 V	0.9			0.9		0.9		V
			4.5V	1.35			1.35		1.35		V
			5.5V	1.65			1.65		1.65		V
ΔV_T	Hysteresis (V_{T+} - V_{T-})		3V	0.3		1.2	0.3	1.2	0.25	1.2	V
			4.5V	0.4		1.4	0.4	1.4	0.35	1.4	V
			5.5V	0.5		1.6	0.5	1.6	0.45	1.6	
V_{OH}	High Level Output Voltage	I_{OH} = -50µA	2V	1.9	2		1.9		1.9		V
			3V	2.9	3		2.9		2.9		
			4.5V	4.4	4.5		4.4		4.4		
		I_{OH} = -4mA	3V	2.58			2.48		2.40		
		I_{OH} = -8mA	4.5V	3.94			3.8		3.70		
V_{OL}	Low Level Output Voltage	I_{OL} = 50µA	2V			0.1		0.1		0.1	V
			3V			0.1		0.1		0.1	
			4.5V			0.1		0.1		0.1	
		I_{OL} = 4mA	3V			0.36		0.44		0.55	
		I_{OL} = 8mA	4.5V			0.36		0.44		0.55	
I_I	Input Current	V_I = 5.5 V or GND	0 to 5.5V			± 0.1		± 1		± 2	µA
I_{CC}	Supply Current	V_I = 5.5V or GND I_O=0	5.5V			1		10		40	µA
C_I	Input Capacitance	V_I = V_{CC} – or GND	5.5V		2.0	10		10		10	pF
θ_{JA}	Thermal Resistance Junction-to-Ambient	SOT25	(Note 4)		195						°C/W
		SOT353			430						
θ_{JC}	Thermal Resistance Junction-to-Case	SOT25	(Note 4)		58						°C/W
		SOT353			155						

Note: 4. Test conditions for SOT25, and SOT353: Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout

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Switching Characteristics

V_{CC} = 3.3V ± 0.3 (see Figure 1)

Parameter	From (Input)	TO (OUTPUT)		25ºC			-40ºC to 85ºC		-40ºC to 125ºC		Unit
				Min	Typ.	Max	Min	Max	Min	Max	
t_{pd}	A	Y	C_L=15pF	0.6	4.2	12.8	0.6	15.0	0.6	16.5	ns
			C_L=50pF	0.6	6.0	16.3	0.6	18.5	0.6	20.5	ns

V_{CC} = 5V ± 0.5V (see Figure 1)

Parameter	From (Input)	TO (OUTPUT)		25ºC			-40ºC to 85ºC		-40ºC to 125ºC		Unit
				Min	Typ.	Max	Min	Max	Min	Max	
t_{pd}	A	Y	C_L=15pF	0.6	3.2	8.6	0.6	10.0	0.6	11.0	ns
			C_L=50pF	0.6	4.6	10.6	0.6	12.0	0.6	13.5	ns

Operating Characteristics

T_A = 25 ºC

Parameter		Test Conditions	V_{CC} = 5 V	Unit
			Typ.	
C_{pd}	Power dissipation capacitance	f = 1 MHz No Load	10	pF

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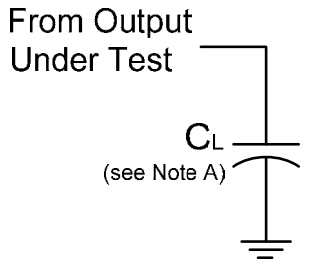
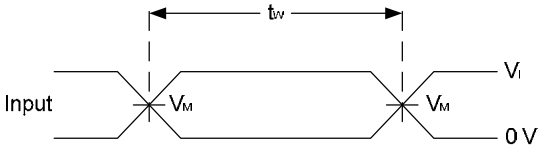
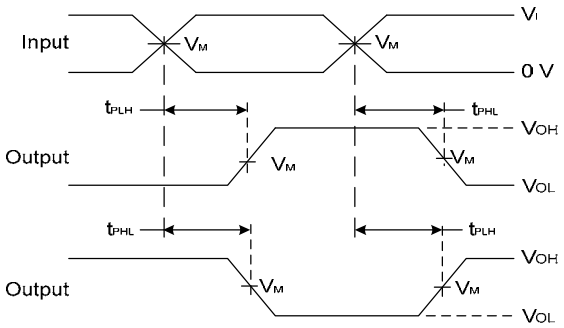
Parameter Measurement Information



V_{CC}	Inputs		V_M	C_L
	V_I	t_r/t_f		
3.3V±0.3V	V_{CC}	≤3ns	$V_{CC}/2$	15pF
5V±0.5V	V_{CC}	≤3ns	$V_{CC}/2$	15pF
3.3V±0.3V	V_{CC}	≤3ns	$V_{CC}/2$	50pF
5V±0.5V	V_{CC}	≤3ns	$V_{CC}/2$	50pF



Voltage Waveform Pulse Duration



Voltage Waveform Propagation Delay Times
Inverting and Non Inverting Outputs

Figure 1. Load Circuit and Voltage Waveforms

Notes: A. Includes test lead and test apparatus capacitance.
B. All pulses are supplied at pulse repetition rate ≤ 1 MHz.
C. Inputs are measured separately one transition per measurement.
D. t_{PLH} and t_{PHL} are the same as t_{PD}.

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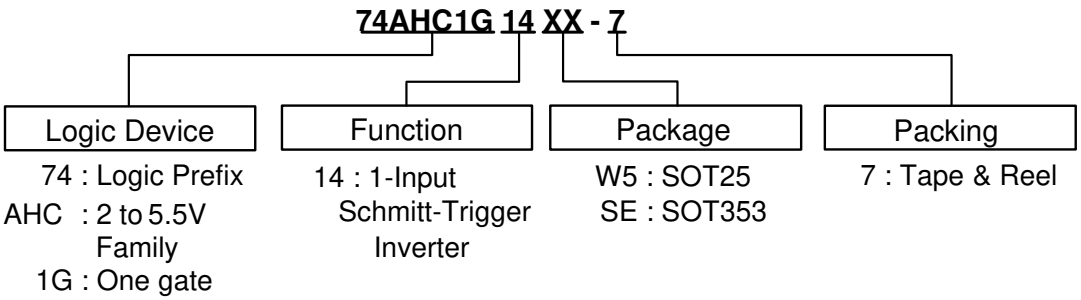
Ordering Information

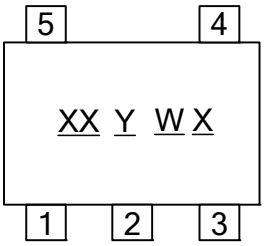


Device	Package Code	Packaging (Note 5)	7" Tape and Reel	
			Quantity	Part Number Suffix
74AHC1G14W5-7	W5	SOT25	3000/Tape & Reel	-7
74AHC1G14SE-7	SE	SOT353	3000/Tape & Reel	-7

Notes: 5. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.

Marking Information

(Top View)



XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week; a~z : 27~52 week; z represents 52 and 53 week
X : A~Z : Internal code

Part Number	Package	Identification Code
74AHC1G14W5	SOT25	YV
74AHC1G14SE	SOT353	YV

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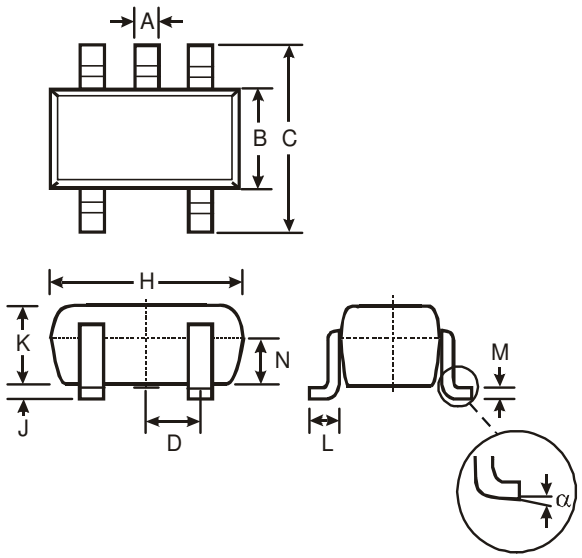
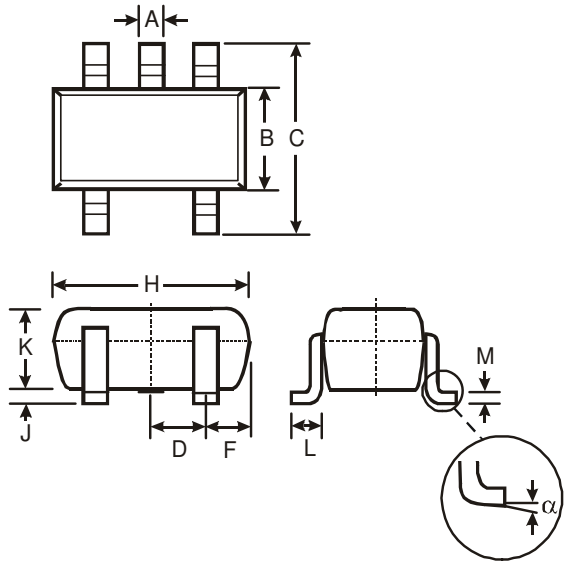
Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SOT25



SOT25			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	—
All Dimensions in mm			

(2) Package Type: SOT353



SOT353		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Typ	
F	0.40	0.45
H	1.80	2.20
J	0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.22
α	0°	8°
All Dimensions in mm		

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