SINGLE 2 INPUT POSITIVE AND GATE WITH OPEN DRAIN OUTPUT

NEW PRODUCT

Description

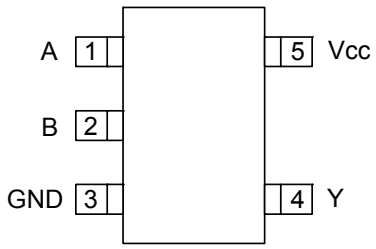
The 74AHC1G09 is a single 2-input positive AND gate with an open drain output. The device is designed for operation with a power supply range of 2.0V to 5.5V. The open-drain output can be connected to other open drain outputs to implement active-low wired-OR or active-high wired-AND functions. The gate performs the positive Boolean function:

$$Y = A \bullet B \text{ or } Y = \overline{\overline{A} + \overline{B}}$$

A pull-up resistor is required to achieve a high output state.

Pin Assignments

(Top View)



SOT25 / SOT353

Features

- Supply Voltage Range from 2.0V to 5.5V
- 8mA sink current at 5.0 V
- 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)
  - **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
  - **Halogen and Antimony Free. “Green” Device (Note 3)**

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

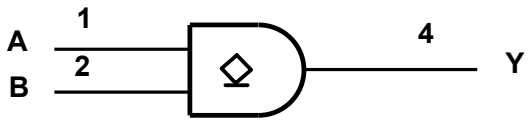
Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated’s definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Pin Descriptions

Pin Name	Pin NO.	Function
A	1	Data Input
B	2	Data Input
GND	3	Ground
Y	4	Data Output
V_{CC}	5	Supply Voltage

NEW PRODUCT

Logic Diagram



Functional Table

Inputs		Output
A	**B**	**Y**
H	H	Z
L	X	L
X	L	L

Absolute Maximum Ratings (Note 4) (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	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

Note: 4. 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.

NEW PRODUCT

Recommended Operating Conditions (Note 5) (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter		Min	Max	Unit
V_{CC}	Operating Voltage		2.0	5.5	V
V_{IH}	High-Level Input Voltage	V_{CC} = 2V	1.5		V
		V_{CC} = 3V	2.1		
		V_{CC} = 5.5V	3.85		
V_{IL}	Low-Level input Voltage	V_{CC} = 2V		0.5	V
		V_{CC} = 3V		0.9	
		V_{CC} = 5.5V		1.65	
V_I	Input Voltage		0	5.5	V
V_O	Output Voltage		0	5.5	V
I_{OL}	Low-Level Output Current	V_{CC} = 2V		50	uA
		V_{CC} = 5V ± 0.5V		4	mA
		V_{CC} = 3V		8	
Δt/ΔV	Input transition rise or fall rate	V_{CC} = 3.3V ± 0.3V		100	ns/V
		V_{CC} = 5V ± 0.5V		20	
T_A	Operating free-air temperature		-40	+125	°C

Note: 5. Unused inputs should be held at V_{CC} or Ground.

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Test Conditions	V_{CC}	+25°C			-40°C to +85°C		-40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V_{OL}	High-level Input 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 = 5.5V or GND	0 to 5.5V			±0.1		±1		±2	μA
Ioz	Z-state Output Current	V_I = 5.5V or GND	0 to 5.5V			±0.25		±2.5		±10	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 6)		204						°C/W
		SOT353			371						
θ_{JC}	Thermal Resistance Junction-to-Case	SOT25	(Note 6)		52						°C/W
		SOT353			143						

Note: 6. Test conditions for SOT25, and SOT353: Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

NEW PRODUCT

Switching Characteristics

V_{CC} = 3.3V ±0.3 (see Figure 1)

Parameter	From (Input)	TO (OUTPUT)		+25°C			-40°C to +85°C		-40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t_{pd}	A or B	Y	C_L = 15pF	0.6	4.6	7.5	0.6	8.5	0.6	9.0	ns
			C_L = 50pF	0.6	6.5	11.0	0.6	12.0	0.6	12.5	ns

V_{CC} = 5V ±0.5V (see Figure 1)

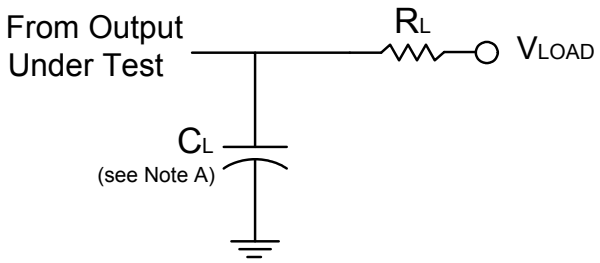
Parameter	From (Input)	TO (OUTPUT)		+25°C			-40°C to +85°C		-40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t_{pd}	A or B	Y	C_L = 15pF	0.6	3.2	5.5	0.6	6.5	0.6	7.0	ns
			C_L = 50pF	0.6	4.6	7.5	0.6	8.0	0.6	8.5	ns

Operating Characteristics

T_A = +25°C

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

Parameter Measurement Information



TEST	Condition
t_{PLZ} (see Notes D and E)	V_{LOAD}
t_{PZL} (see Notes D and F)	V_{LOAD}

V_{CC}	Inputs		V_M	V_{LOAD}	C_L	R_L	$V\Delta$
	V_I	t_r/t_f					
3.3V ±0.3V	V_{CC}	≤3ns	$V_{CC}/2$	V_{CC}	15pF	1KΩ	0.3V
3.3V ±0.3V	V_{CC}	≤3ns	$V_{CC}/2$	V_{CC}	50pF	1KΩ	0.3V
5V ±0.5V	V_{CC}	≤3ns	$V_{CC}/2$	V_{CC}	15pF	1KΩ	0.3V
5V ±0.5V	V_{CC}	≤3ns	$V_{CC}/2$	V_{CC}	50pF	1KΩ	0.3V

NEW PRODUCT

Parameter Measurement Information (cont.)

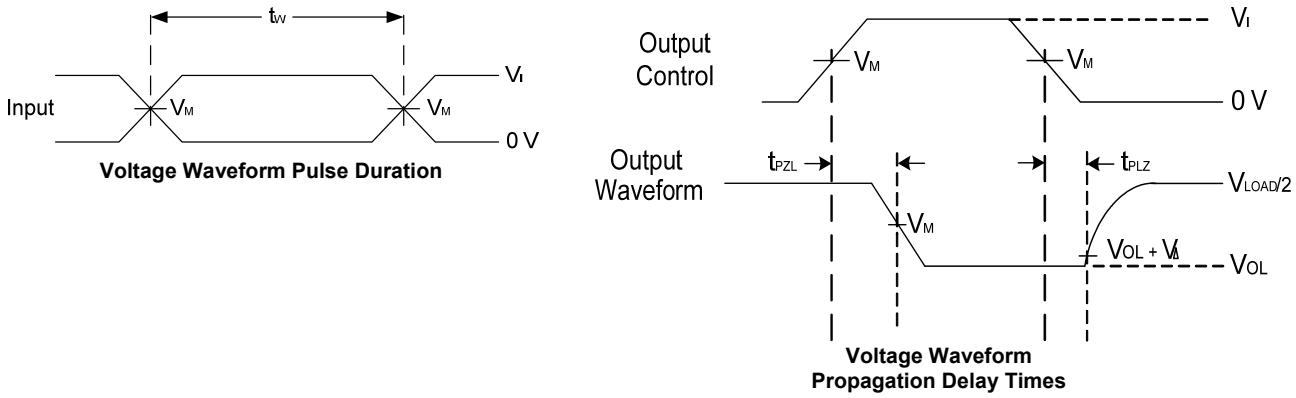
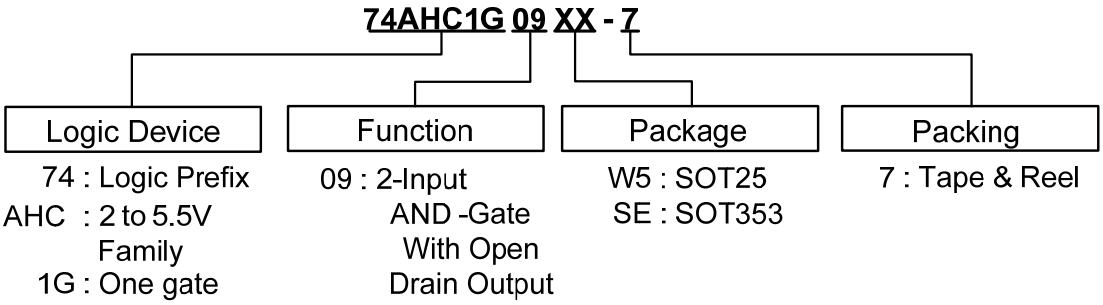


Figure 1 Load Circuit and Voltage Waveforms

Notes:
A. Includes test lead and test apparatus capacitance.
B. All pulses are supplied at pulse repetition rate ≤ 1 MHz.
C. The inputs are measured one at a time with one transition per measurement.
D. For the open drain device t_{PLZ} and t_{PZL} are the same as t_{PD}.
E. t_{PZL} is measured at V_M.
F. t_{PLZ} is measured at $V_{OL} + V_\Delta$

NEW PRODUCT

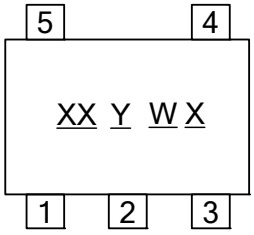
Ordering Information



Part Number	Package Code	Packaging	7" Tape and Reel	
			Quantity	Part Number Suffix
74AHC1G09W5-7	W5	SOT25	3000/Tape & Reel	-7
74AHC1G09SE-7	SE	SOT353	3000/Tape & Reel	-7

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

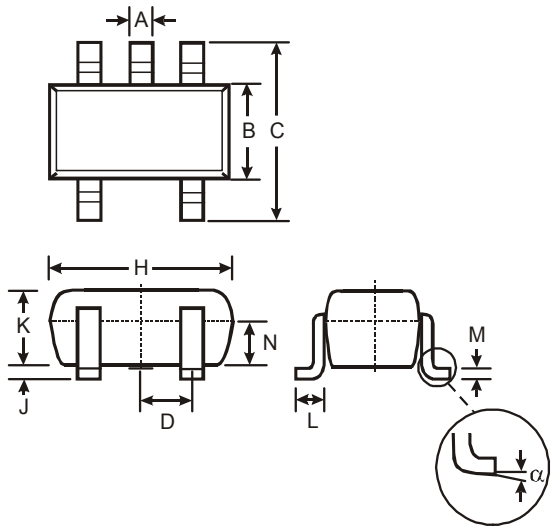
Part Number	Package	Identification Code
74AHC1G09W5	SOT25	YN
74AHC1G09SE	SOT353	YN

NEW PRODUCT

Package Outline Dimensions (All dimensions in mm.)

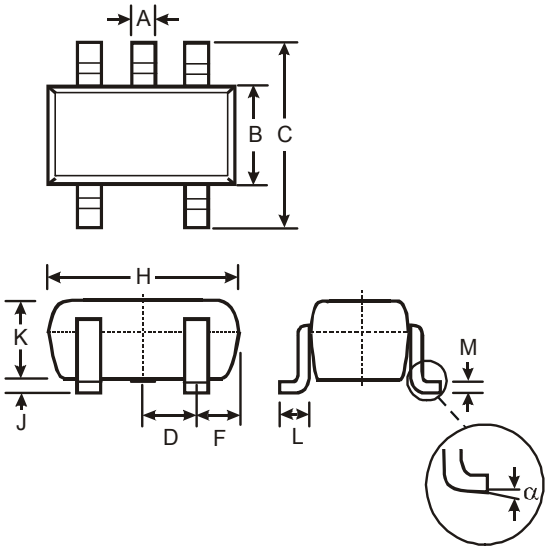
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

(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



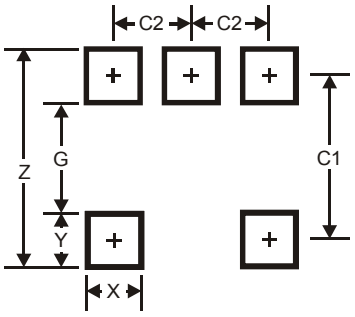
SOT353		
Dim	**Min**	**Max**
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Typ	
F	0.40	0.45
H	1.80	2.20
J	0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.22
α	0°	8°
All Dimensions in mm		

NEW PRODUCT

Suggested Pad Layout

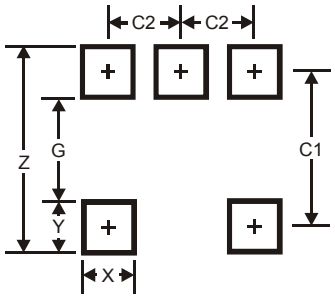
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

(1) Package Type: SOT25



Dimensions	Value (in mm)
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

(2) Package Type: SOT353



Dimensions	Value (in mm)
Z	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

NEW PRODUCT

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