

Features

- Operation voltage range: 1.65~5.5V
- Low power current: $I_{CC}=10\mu A(\text{Max})$
- $\pm 24\text{mA}$ output drive ($V_{CC}=3.3\text{V}$)
- High noise immunity
- Power down protection
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 1000-V Charged-Device Model (C101)
- SOT23-5 Package Available
- SOT353 Package Available

General Description

The 74AHC1G04 is a single inverter gate, it provides the function $Y = \overline{A}$.

This device has power-down protective circuit, preventing device destruction when it is powered down.

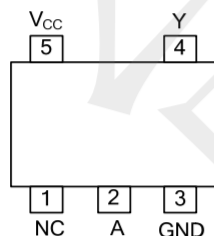
Ordering Information

ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION
74AHC1G04W5-TP	SOT23-5	Tape and Reel,3000
74AHC1G04SE-TP	SOT353	Tape and Reel,3000

Logic Diagram



Pin Configuration



Function Table

INPUT	OUTPUT
A	Y
H	L
L	H

Applications

- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide array of products such as:
 - PCs, Networking, Notebooks, Netbooks, PDAs
 - Tablet Computers, E-readers
 - Computer Peripherals, Hard Drives, CD/DVD ROM
 - TV, DVD, DVR, Set-Top Box
 - Cell Phones, Personal Navigation / GPS
 - MP3 Players, Cameras, Video Recorders

Absolute Maximum Ratings

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CC}	-0.5 ~ 6.5	V
Input Voltage		V_{IN}	-0.5 ~ 6.5	V
Output Voltage(Active Mode)		V_{OUT}	-0.5 ~ $V_{CC}+0.5$	V
Output Voltage(Power-Down Mode)		V_{OUT}	-0.5 ~ 6.5	V
Input Clamp Current($V_{IN}<0$)		I_{IK}	-50	mA
Output Clamp Current($V_{OUT}<0$)		I_{OK}	-50	mA
Output Current		I_{OUT}	±50	mA
V_{CC} or GND Current		I_{CC}	±100	mA
Power Dissipation ($T_A=-40\sim+125^{\circ}\text{C}$)	SOT-23-5	P_D	300	mW
	SOT-353		250	mW
Junction Temperature		T_J	+150	$^{\circ}\text{C}$
Storage Temperature		T_{STG}	-65 ~ +150	$^{\circ}\text{C}$

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

Thermal Data

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Case	SOT-23-5	θ_{JC}	75	$^{\circ}\text{C/W}$
	SOT-353		145	

Recommended Operating Conditions

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	Operating	1.65		5.5	V
		Data retention only	1.5			
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Input Transition Rise or Fall Rate	t_R, t_F	$V_{CC}=1.8\text{V}\pm0.15\text{V}, 2.5\text{V}\pm0.2\text{V}$			20	ns/V
		$V_{CC}=3.3\text{V}\pm0.3\text{V}$			10	ns/V
		$V_{CC}=5\text{V}\pm0.5\text{V}$			5	ns/V
Operating Temperature	T_A		-40		+125	$^{\circ}\text{C}$

Electrical Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS	T _A =25°C			T _A =-40°C~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Input Voltage High-Level	V _{IH}	V _{CC} = 1.65V~1.95V	0.65× V _{CC}			0.65× V _{CC}			V
		V _{CC} = 2.3V~2.7V	1.7			1.7			
		V _{CC} = 2.7V~3.6V	2			2			
		V _{CC} = 4.5V~5.5V	0.7× V _{CC}			0.7× V _{CC}			
Input Voltage Low-Level	V _{IL}	V _{CC} = 1.65V~1.95V			0.35× V _{CC}			0.35× V _{CC}	V
		V _{CC} = 2.3V~2.7V			0.7			0.7	
		V _{CC} = 2.7V~3.6V			0.8			0.8	
		V _{CC} = 4.5V~5.5V			0.3× V _{CC}			0.3× V _{CC}	
Output Voltage High-Level	V _{OH}	V _{CC} = 1.65V~5.5V, I _{OH} =-100μA	V _{CC} -0.1			V _{CC} -0.1			V
		V _{CC} = 1.65V, I _{OH} =-4mA	1.2			0.95			
		V _{CC} = 2.3V, I _{OH} =-8mA	1.9			1.7			
		V _{CC} = 3V, I _{OH} =-16mA	2.2			1.9			
		V _{CC} = 3V, I _{OH} =-24mA	2.3			2.0			
		V _{CC} = 4.5V, I _{OH} =-32mA	3.8			3.4			
Output Voltage Low-Level	V _{OL}	V _{CC} = 1.65V~5.5V, I _{OL} =100μA			0.1			0.1	V
		V _{CC} = 1.65V, I _{OL} =4mA			0.45			0.7	
		V _{CC} = 2.3V, I _{OL} =8mA			0.3			0.45	
		V _{CC} = 3V, I _{OL} =16mA			0.4			0.6	
		V _{CC} = 3V, I _{OL} =24mA			0.55			0.8	
		V _{CC} = 4.5V, I _{OL} =32mA			0.55			0.8	
Input Leakage Current	I _{I(LEAK)}	V _{CC} = 0~5.5V, V _{IN} =5.5V or GND		±0.1	±5			±5	μA
Power OFF Leakage Current	I _{OFF}	V _{CC} = 0V, V _{IN} or V _{OUT} =5.5V		±0.1	±10			±10	μA
Quiescent Supply Current	I _Q	V _{CC} = 1.65V~5.5V, V _{IN} =5.5 or GND, I _{OUT} =0		0.1	10			10	μA
Additional Quiescent Supply Current	Δ I _Q	V _{CC} = 3V~5.5V, One input at V _{CC} - 0.6V, other inputs at V _{CC} or GND		5	500			500	μA

Note: All typical values are measured at V_{CC}=3.3V and T_A=25°C.

Dynamic Characteristics (Input: t_R, t_F≤3ns; P_{RR}≤1MHz)

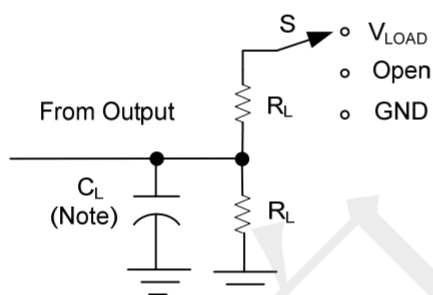
PARAMETER	SYMBOL	TEST CONDITIONS	T _A =25°C			T _A =-40°C~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Propagation Delay From Input (A or B) to Output (Y)	t _{PLH} / t _{PHL}	V _{CC} = 1.8V±0.15V, C _L =15 pF	1.0		11			14	ns
		V _{CC} = 2.5V±0.2V, C _L =15 pF	0.5		8			10.5	ns
		V _{CC} = 3.3V±0.3V, C _L =15 pF	0.5		6			8	ns
		V _{CC} = 5V±0.5V, C _L =15 pF	0.5		5			6	ns
		V _{CC} = 1.8V±0.15V, C _L =30pF	1.0		12			15	ns
		V _{CC} = 2.5V±0.2V, C _L =30pF	0.5		9			11.5	ns
		V _{CC} = 3.3V±0.3V, C _L =50 pF	0.5		7			9	ns
		V _{CC} = 5V±0.5V, C _L =50 pF	0.5		6			7	ns

Operating Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Capacitance	C_{IN}	$V_{CC}=3.3V, V_{IN}=V_{CC}$ or GND		3.5		pF
Power Dissipation Capacitance	C_{PD}	$V_{CC}=1.8V, f=10MHz$		16		pF
		$V_{CC}=2.5V, f=10MHz$		18		pF
		$V_{CC}=3.3V, f=10MHz$		18		pF
		$V_{CC}=5V, f=10MHz$		20		pF

Note: All typical values are measured at $T_A=25^{\circ}C$.

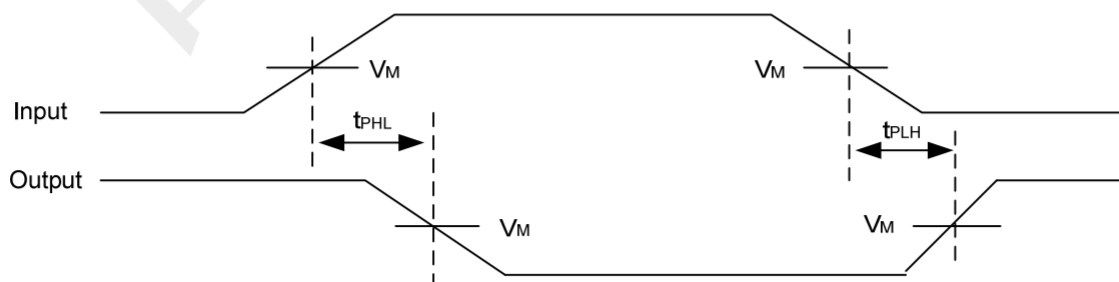
Test Circuit And Waveforms



TEST	S
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

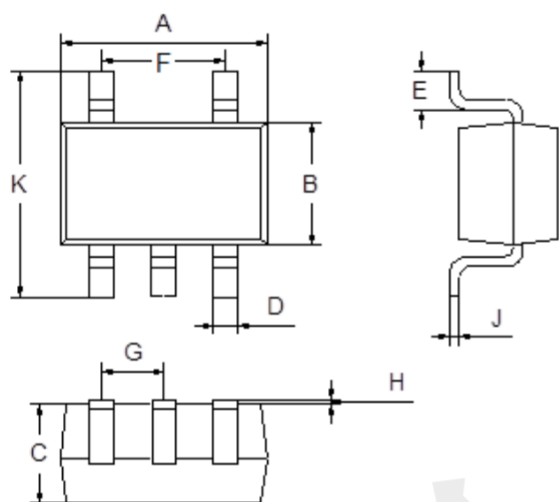
Note: C_L includes probe and jig capacitance.

V_{CC}	V_{IN}	t_R, t_F	V_M	V_{LOAD}	C_L	R_L	V_{Δ}
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	1M Ω	0.15V
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	1M Ω	0.15V
$3.3V \pm 0.3V$	3 V	$\leq 2.5ns$	1.5V	6V	15pF	1M Ω	0.3V
$5V \pm 0.5V$	V_{CC}	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	1M Ω	0.3V
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1k Ω	0.15V
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500 Ω	0.15V
$3.3V \pm 0.3V$	3 V	$\leq 2.5ns$	1.5V	6V	50pF	500 Ω	0.3V
$5V \pm 0.5V$	V_{CC}	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	50pF	500 Ω	0.3V



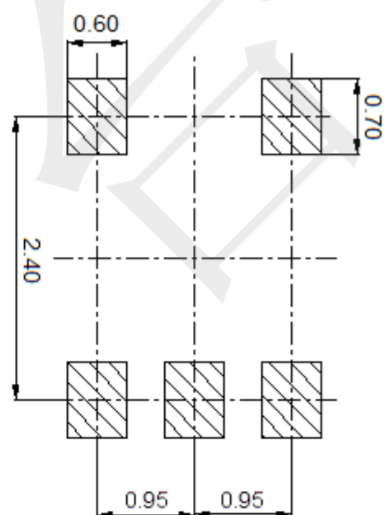
Package Outline Dimensions (Unit: mm)

SOT23-5



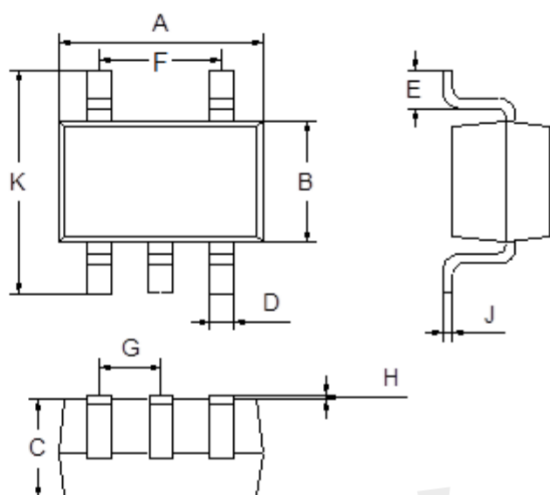
Dimension	Min.	Max.
A	2.80	3.00
B	1.50	1.70
C	1.00	1.20
D	0.35	0.45
E	0.35	0.55
F	1.80	2.00
G	0.90	1.00
H	0.02	0.10
J	0.10	0.20
K	2.60	3.00

Mounting Pad Layout (Unit: mm)



Package Outline Dimensions (Unit: mm)

SOT353



Dimension	Min.	Max.
A	2.00	2.20
B	1.15	1.35
C	0.85	1.05
D	0.15	0.35
E	0.25	0.40
F	1.20	1.40
G	0.60	0.70
H	0.02	0.10
J	0.05	0.15
K	2.20	2.40

Mounting Pad Layout (Unit: mm)

