



**THE DATASHEET OF
74HC1G08GW,125**



74HC1G08; 74HCT1G08

2-input AND gate

Rev. 5 — 14 March 2018

Product data sheet

1 General description

The 74HC1G08; 74HCT1G08 is a single 2-input AND gate. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC} .

2 Features

- Input levels:
 - For 74HC1G08: CMOS level
 - For 74HCT1G08: TTL level
- Symmetrical output impedance
- High noise immunity
- Low power dissipation
- Balanced propagation delays
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ and $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$

3 Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74HC1G08GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74HCT1G08GW				
74HC1G08GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753
74HCT1G08GV				

4 Marking

Table 2. Marking codes

Type number	Marking
74HC1G08GW	HE
74HCT1G08GW	TE
74HC1G08GV	H08
74HCT1G08GV	T08

5 Functional diagram

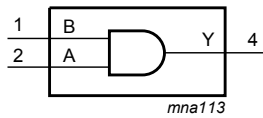


Figure 1. Logic symbol

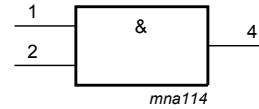


Figure 2. IEC logic symbol

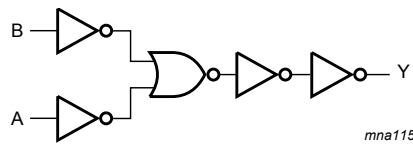


Figure 3. Logic diagram

6 Pinning information

6.1 Pinning

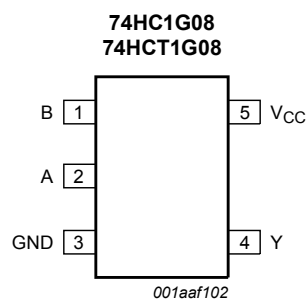


Figure 4. Pin configuration

6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description
B	1	data input
A	2	data input
GND	3	ground (0 V)
Y	4	data output
V _{CC}	5	supply voltage

7 Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level

Input		Output
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

8 Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).^[1]

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		-0.5	+7.0	V
I _{IK}	input clamping current	V _I < -0.5 V or V _I > V _{CC} + 0.5 V	-	±20	mA
I _{OK}	output clamping current	V _O < -0.5 V or V _O > V _{CC} + 0.5 V	-	±20	mA
I _O	output current	-0.5 V < V _O < V _{CC} + 0.5 V	-	±12.5	mA
I _{CC}	supply current		-	25	mA
I _{GND}	ground current		-25	-	mA
T _{stg}	storage temperature		-65	+150	°C
P _{tot}	total power dissipation	T _{amb} = -40 °C to +125 °C ^[2]	-	200	mW

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] Above 55 °C the value of P_{tot} derates linearly with 2.5 mW/K.

9 Recommended operating conditions

Table 6. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	74HC1G08			74HCT1G08			Unit
			Min	Typ	Max	Min	Typ	Max	
V _{CC}	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
V _I	input voltage		0	-	V _{CC}	0	-	V _{CC}	V
V _O	output voltage		0	-	V _{CC}	0	-	V _{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	V _{CC} = 2.0 V	-	-	625	-	-	-	ns/V
		V _{CC} = 4.5 V	-	-	139	-	-	139	ns/V
		V _{CC} = 6.0 V	-	-	83	-	-	-	ns/V

10 Static characteristics

Table 7. Static characteristics

Voltages are referenced to GND (ground = 0 V). All typical values are measured at T_{amb} = 25 °C.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	
74HC1G08								
V _{IH}	HIGH-level input voltage	V _{CC} = 2.0 V	1.5	1.2	-	1.5	-	V
		V _{CC} = 4.5 V	3.15	2.4	-	3.15	-	V
		V _{CC} = 6.0 V	4.2	3.2	-	4.2	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 2.0 V	-	0.8	0.5	-	0.5	V
		V _{CC} = 4.5 V	-	2.1	1.35	-	1.35	V
		V _{CC} = 6.0 V	-	2.8	1.8	-	1.8	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL}						
		I _O = -20 μA; V _{CC} = 2.0 V	1.9	2.0	-	1.9	-	V
		I _O = -20 μA; V _{CC} = 4.5 V	4.4	4.5	-	4.4	-	V
		I _O = -20 μA; V _{CC} = 6.0 V	5.9	6.0	-	5.9	-	V
		I _O = -2.0 mA; V _{CC} = 4.5 V	4.13	4.32	-	3.7	-	V
		I _O = -2.6 mA; V _{CC} = 6.0 V	5.63	5.81	-	5.2	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}						
		I _O = 20 μA; V _{CC} = 2.0 V	-	0	0.1	-	0.1	V
		I _O = 20 μA; V _{CC} = 4.5 V	-	0	0.1	-	0.1	V
		I _O = 20 μA; V _{CC} = 6.0 V	-	0	0.1	-	0.1	V
		I _O = 2.0 mA; V _{CC} = 4.5 V	-	0.15	0.33	-	0.4	V
		I _O = 2.6 mA; V _{CC} = 6.0 V	-	0.16	0.33	-	0.4	V
I _I	input leakage current	V _I = V _{CC} or GND; V _{CC} = 6.0 V	-	-	1.0	-	1.0	μA

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	
I_{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 6.0$ V	-	-	10	-	20	μ A
C_I	input capacitance		-	1.5	-	-	-	pF
74HCT1G08								
V_{IH}	HIGH-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	2.0	1.6	-	2.0	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	-	1.2	0.8	-	0.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}						
		$I_O = -20$ μ A; $V_{CC} = 4.5$ V	4.4	4.5	-	4.4	-	V
		$I_O = -2.0$ mA; $V_{CC} = 4.5$ V	4.13	4.32	-	3.7	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}						
		$I_O = 20$ μ A; $V_{CC} = 4.5$ V	-	0	0.1	-	0.1	V
		$I_O = 2.0$ mA; $V_{CC} = 4.5$ V	-	0.15	0.33	-	0.4	V
I_I	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	1.0	-	1.0	μ A
I_{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	10	-	20	μ A
ΔI_{CC}	additional supply current	per input; $V_{CC} = 4.5$ V to 5.5 V; $V_I = V_{CC} - 2.1$ V; $I_O = 0$ A	-	-	500	-	850	μ A
C_I	input capacitance		-	1.5	-	-	-	pF

11 Dynamic characteristics

Table 8. Dynamic characteristics

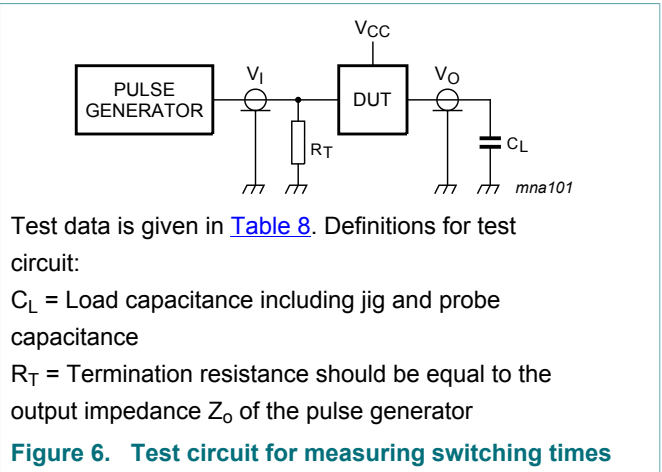
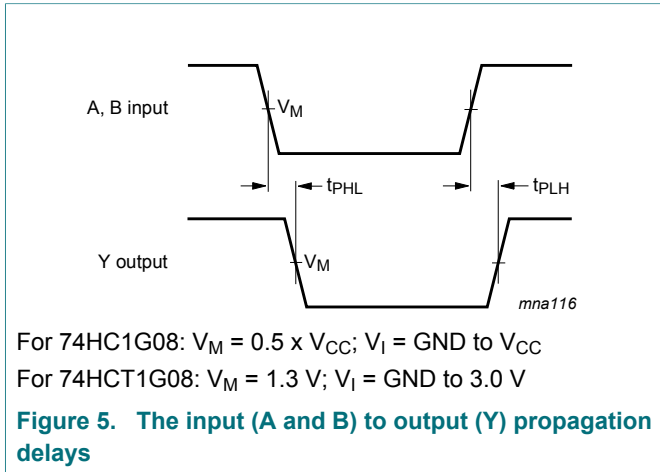
$GND = 0$ V; $t_r = t_f \leq 6.0$ ns; All typical values are measured at $T_{amb} = 25$ °C. For test circuit see [Figure 6](#)

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	
74HC1G08								
t_{pd}	propagation delay	A and B to Y; see Figure 5 ^[1]						
		$V_{CC} = 2.0$ V; $C_L = 50$ pF	-	25	115	-	135	ns
		$V_{CC} = 4.5$ V; $C_L = 50$ pF	-	9	23	-	27	ns
		$V_{CC} = 5.0$ V; $C_L = 15$ pF	-	7	-	-	-	ns
		$V_{CC} = 6.0$ V; $C_L = 50$ pF	-	8	20	-	23	ns
C_{PD}	power dissipation capacitance	$V_I = GND$ to V_{CC} ^[2]	-	19	-	-	-	pF

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	
74HCT1G08								
t _{pd}	propagation delay	A and B to Y; see Figure 5	[1]					
		V _{CC} = 4.5 V; C _L = 50 pF	-	11	23	-	27	ns
		V _{CC} = 5.0 V; C _L = 15 pF	-	11	-	-	-	ns
C _{PD}	power dissipation capacitance	V _I = GND to V _{CC} - 1.5 V	[2]	-	21	-	-	pF

- [1] t_{pd} is the same as t_{PLH} and t_{PHL}.
- [2] C_{PD} is used to determine the dynamic power dissipation P_D (µW).
 $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum(C_L \times V_{CC}^2 \times f_o)$ where:
 f_i = input frequency in MHz
 f_o = output frequency in MHz
 C_L = output load capacitance in pF
 V_{CC} = supply voltage in Volts
 $\sum(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs

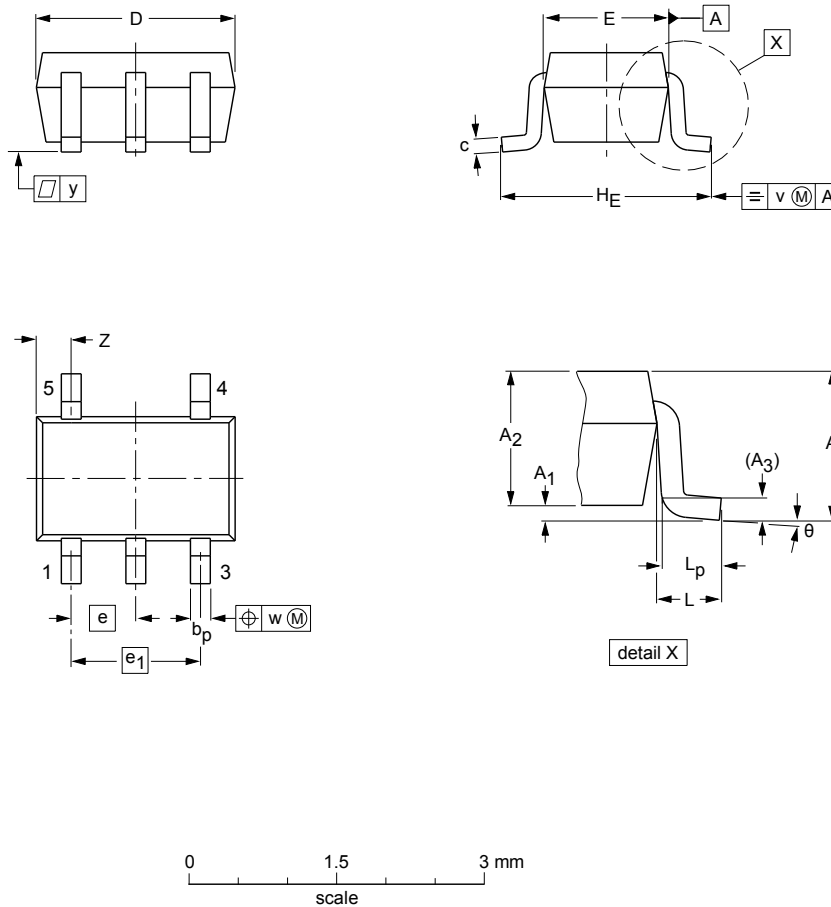
11.1 Waveform and test circuit



12 Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽¹⁾	e	e ₁	H _E	L	L _p	v	w	y	Z ⁽¹⁾	θ
mm	1.1	0.1 0	1.0 0.8	0.15	0.30 0.15	0.25 0.08	2.25 1.85	1.35 1.15	0.65	1.3	2.25 2.0	0.425	0.46 0.21	0.3	0.1	0.1	0.60 0.15	7° 0°

Note

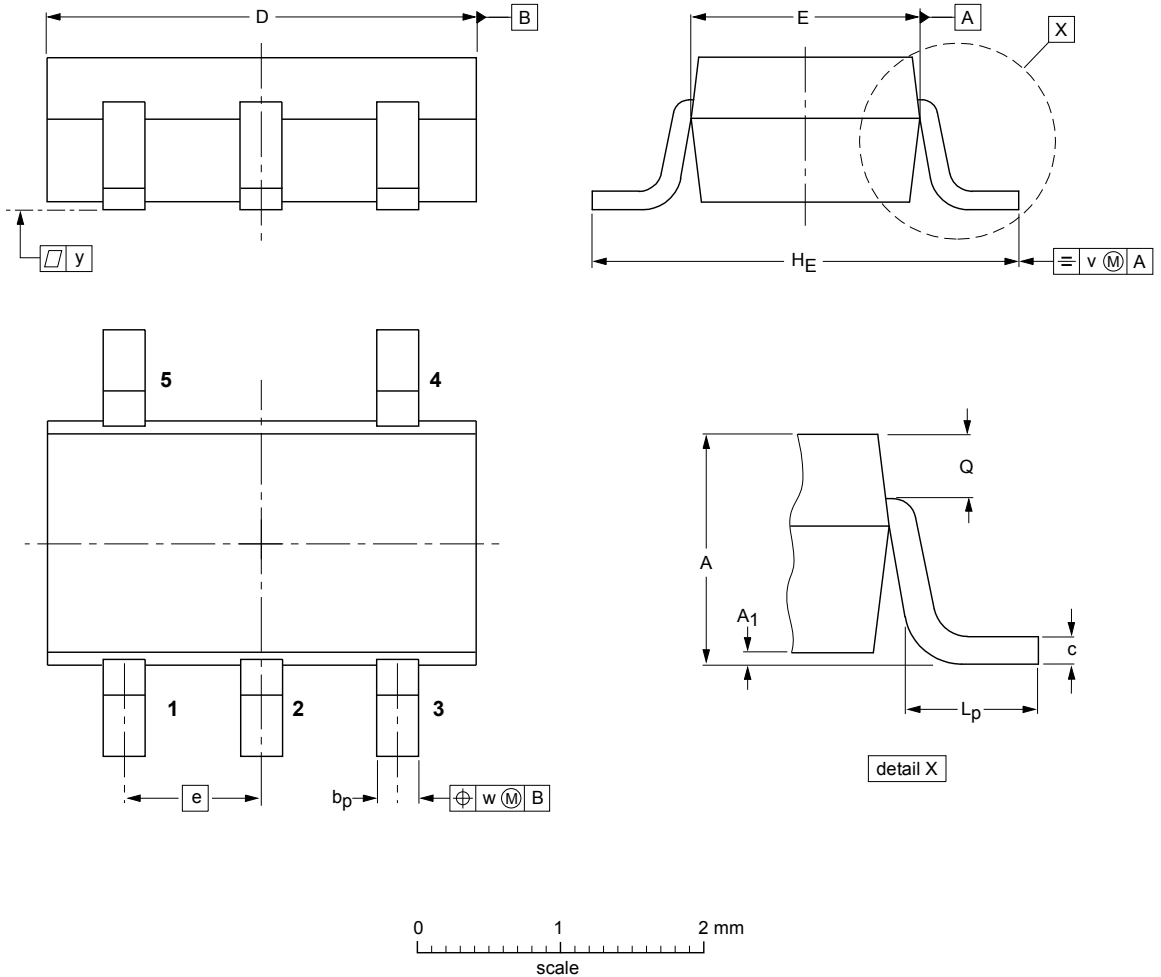
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT353-1		MO-203	SC-88A		00-09-01 03-02-19

Figure 7. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁	b _p	c	D	E	e	H _E	L _p	Q	v	w	y
mm	1.1 0.9	0.100 0.013	0.40 0.25	0.26 0.10	3.1 2.7	1.7 1.3	0.95	3.0 2.5	0.6 0.2	0.33 0.23	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT753			SC-74A			-02-04-16 06-03-16

Figure 8. Package outline SOT753 (SC-74A)

13 Abbreviations

Table 9. Abbreviations

Acronym	Description
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

14 Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT1G08 v.5	20180314	Product data sheet	-	74HC_HCT1G08 v.4
Modifications:	<ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. 			
74HC_HCT1G08 v.4	20070717	Product data sheet	-	74HC_HCT1G08 v.3
Modifications:	<ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. Legal texts have been adapted to the new company name where appropriate. Package SOT353 changed to SOT353-1 in Table 1 and Figure 7. Quick Reference Data and Soldering sections removed. Section 2 "Features" updated. 			
74HC_HCT1G08 v.3	20020517	Product specification	-	74HC_HCT1G08 v.2
74HC_HCT1G08 v.2	20010302	Product specification	-	74HC_HCT1G08 v.1
74HC_HCT1G08 v.1	19981110	Preliminary specification	-	-

15 Legal information

15.1 Data sheet status

Document status ^{[1][2]}	Product status ^[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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