74HC3G06; 74HCT3G06

Triple inverter with open-drain outputs

Rev. 5 — 1 May 2019

Product data sheet

1. General description

The 74HC3G06; 74HCT3G06 is a triple inverter with open-drain outputs. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of $V_{\rm CC}$.

2. Features and benefits

- Wide supply voltage range from 2.0 V to 6.0 V
- Input levels:
 - For 74HC3G06: CMOS level
 - For 74HCT3G06: TTL level
- · Complies with JEDEC standard no. 7A
- · High noise immunity
- · Low power dissipation
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

3. Ordering information

Table 1. Ordering information

Type number	Package							
	Temperature range	Name	Description	Version				
74HC3G06DC	-40 °C to +125 °C	VSSOP8		SOT765-1				
74HCT3G06DC			8 leads; body width 2.3 mm					

4. Marking

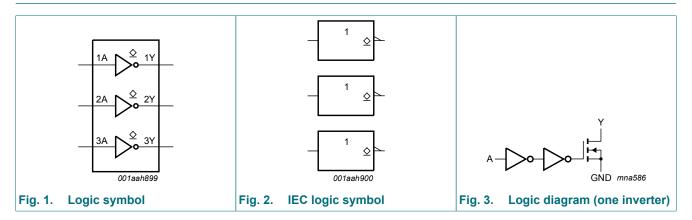
Table 2. Marking code

Type number	Marking code [1]
74HC3G06DC	H06
74HCT3G06DC	Т06

[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

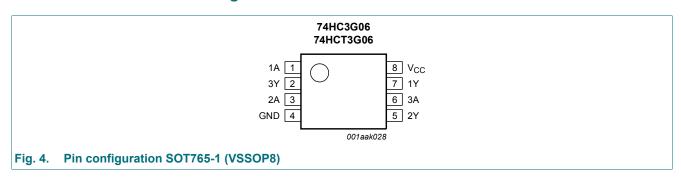


5. Functional diagram



6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
1A, 2A, 3A	1, 3, 6	data input
GND	4	ground (0 V)
1Y, 2Y, 3Y	7, 5, 2	data output
V _{CC}	8	supply voltage

7. Functional description

Table 4. Function table

 $H = HIGH \text{ voltage level}; L = LOW \text{ voltage level}; Z = high-impedance OFF-state.}$

Input nA	Output nY
L	Z
Н	L

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).

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		-0.5	7.0	V
I _{IK}	input clamping current	$V_I < -0.5 \text{ V or } V_I > V_{CC} + 0.5 \text{ V}$ [1]	-	±20	mA
I _{OK}	output clamping current	$V_{O} < -0.5 \text{ V}$ [1]	-20	-	mA
Vo	output voltage	active mode [1]	-0.5	V _{CC} + 0.5	V
		high-impedance mode [1]	-0.5	7.0	V
Io	output current	$V_{\rm O} = -0.5 \text{ V to } 7.0 \text{ V}$ [1]	-	25	mA
I _{CC}	supply current	[1]	-	50	mΑ
I _{GND}	ground current	[1]	-50	-	mA
T _{stg}	storage temperature		-65	+150	°C
P_D	dynamic power dissipation	$T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$ [2]	-	300	mW

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

9. Recommended operating conditions

Table 6. Recommended operating conditions

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

Symbol	Parameter	Conditions	74HC3G06			74HCT3G06			Unit
			Min	Тур	Max	Min	Тур	Max	
V_{CC}	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
VI	input voltage		0	-	6.0	0	-	5.5	V
Vo	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	-	1.67	139	-	1.67	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 [1]	Max	Min	Max		
74HC3G06									
V _{IH} HIGH-level input	•	V _{CC} = 2.0 V	1.5	1.2	-	1.5	-	V	
	voltage	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	V _{CC} = 2.0 V	-	0.8	0.5	-	0.5	V	
ľ	voltage	V _{CC} = 4.5 V	-	2.1	1.35	-	1.35	V	
		V _{CC} = 6.0 V	-	2.8	1.8	-	1.8	V	

^[2] For VSSOP8 package: above 110 °C the value of Ptot derates linearly with 8 mW/K.

0.1 0.1 0.1 0.1 0.4	V
0.1	V
0.1	V
0.1	
	V
0.4	1
	V
0.4	V
±1.0	μΑ
±10	μΑ
20	μΑ
-	pF
-	V
0.8	V
0.1	V
0.4	V
±1.0	μΑ
±10	μΑ
20	μΑ
410	μΑ
1	pF
	±1.0 ±10

^[1] Typical values are measured at T_{amb} = 25 °C.

11. Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); all typical values are measured at T_{amb} = 25 °C; for test circuit see Fig. 6.

Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit	
			Min	Тур	Max	Min	Max	
74HC3G	06							
t _{PZL}	OFF-state to LOW propagation delay	nA to nY; see Fig. 5						
		V _{CC} = 2.0 V	-	22	95	-	125	ns
		V _{CC} = 4.5 V	-	9	18	-	25	ns
		V _{CC} = 6.0 V	-	8	16	-	20	ns

Symbol	Parameter	Conditions		-40 °C to +85 °C			-40 °C to +125 °C		Unit
				Min	Тур	Max	Min	Max	
t_{PLZ}	LOW to OFF-state	nA to nY; see Fig. 5							
	propagation delay	V _{CC} = 2.0 V		-	24	95	-	125	ns
		V _{CC} = 4.5 V		-	11	20	-	27	ns
		V _{CC} = 6.0 V		-	10	19	-	23	ns
t _{THL}	HIGH to LOW output	nY; see Fig. 5							
	transition time	V _{CC} = 2.0 V		-	18	95	-	125	ns
		V _{CC} = 4.5 V		-	6	19	-	25	ns
		V _{CC} = 6.0 V		-	5	16	-	20	ns
C _{PD}	power dissipation capacitance	$V_I = GND \text{ to } V_{CC}$	[1]	-	4	-	-	-	pF
74HCT3	G06				1	'		1	
t _{PZL}	OFF-state to LOW	nA to nY; see Fig. 5							
	propagation delay	V _{CC} = 4.5 V		-	9	24	-	29	ns
t _{PLZ}	LOW to OFF-state	nA to nY; see Fig. 5							
	propagation delay	V _{CC} = 4.5 V		-	12	27	-	32	ns
t _{THL}	HIGH to LOW output transition time	V _{CC} = 4.5 V; see <u>Fig. 5</u>		-	6	19	-	22	ns
C _{PD}	power dissipation capacitance	V_I = GND to V_{CC} - 1.5 V	[1]	-	4		-	-	pF

[1] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma (C_L \times V_{CC}^2 \times f_o)$ where:

f_i = input frequency in MHz;

f_o = output frequency in MHz;

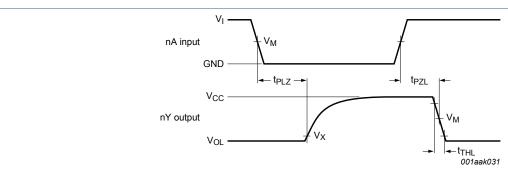
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

 $\Sigma(C_L \times V_{CC}^2 \times f_0)$ = sum of outputs.

11.1. Waveforms and test circuit



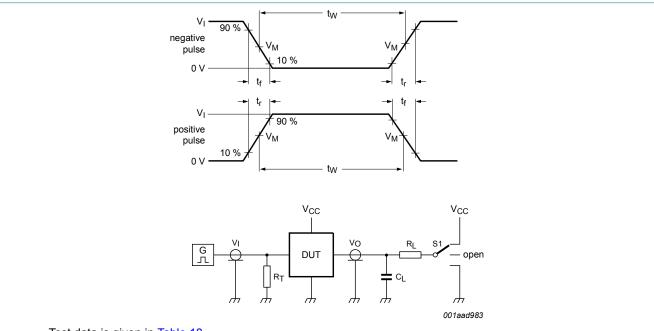
Measurement points are given in Table 9.

 $\ensuremath{V_{\text{OL}}}$ is the typical output voltage level that occurs with the output load.

Fig. 5. The input (nA) to output (nY) propagation delays

Table 9. Measurement points

Туре	Input	Output			
	V _M	V _M	V _X		
74HC3G06	0.5 × V _{CC}	0.5 × V _{CC}	0.1 × V _{CC}		
74HCT3G06	1.3 V	1.3 V	0.1 × V _{CC}		



Test data is given in Table 10.

Definitions for test circuit:

 R_T = Termination resistance should be equal to output impedance Z_0 of the pulse generator.

 C_L = Load capacitance including jig and probe capacitance.

 R_L = Load resistance.

S1 = Test selection switch.

Fig. 6. Test circuit for measuring switching times

Table 10. Test data

Туре	Input		Load	S1 position	
	V _I	t _r , t _f	CL	R_L	t_{PZL}, t_{PLZ}
74HC3G06	GND to V _{CC}	≤ 6 ns	50 pF	1 kΩ	V _{CC}
74HCT3G06	GND to 3 V	≤ 6 ns	50 pF	1 kΩ	V _{CC}

12. Package outline

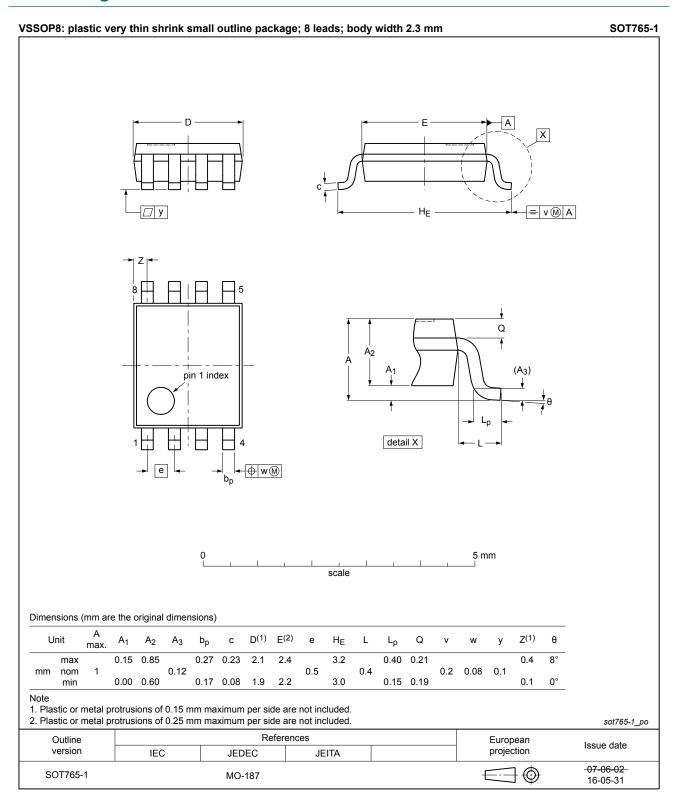


Fig. 7. Package outline SOT765-1 (VSSOP8)

13. Abbreviations

Table 11. Abbreviations

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

14. Revision history

Table 12. Revision history

Description instally						
Document ID	Release date	Data sheet status	Change notice	Supersedes		
74HC_HCT3G06 v.5	20190501	Product data sheet	-	74HC_HCT3G06 v.4		
Modifications:	 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. Type numbers 74HC3G06DP and 74HCT3G06DP (SOT505-2) removed. Type numbers 74HC3G06GD and 74HCT3G06GD (SOT996-2) removed. Package outline drawing SOT765-1 (VSSOP8) updated. 					
74HC_HCT3G06 v.4	20131219	Product data sheet	-	74HC_HCT3G06 v.3		
Modifications:	For type numbers 74HC3G06GD and 74HCT3G06GD XSON8U has changed to XSON8.					
74HC_HCT3G06 v.3	20090511	Product data sheet	-	74HC_HCT3G06 v.2		
74HC_HCT3G06 v.2	20031202	Product specification	-	74HC_HCT3G06 v.1		
74HC_HCT3G06 v.1	20030515	Product specification	-	-		

15. Legal information

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.

- 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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