# 74HC3G07-Q100; 74HCT3G07-Q100

# Triple buffer with open-drain outputs

Rev. 2 — 11 December 2013

Product data sheet

# 1. General description

The 74HC3G07-Q100; 74HCT3G07-Q100 is a triple buffer with open-drain outputs. Inputs include clamp diodes that enable the use of current limiting resistors to interface inputs to voltages in excess of V<sub>CC</sub>.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

### 2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - ◆ Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Input levels:
  - ◆ For 74HC3G07-Q100: CMOS level
  - ◆ For 74HCT3G07-Q100: TTL level
- Complies with JEDEC standard no. 7 A
- Wide supply voltage range from 2.0 V to 6.0 V
- High noise immunity
- Low power dissipation
- Balanced propagation delays
- ESD protection:
  - ◆ MIL-STD-883, method 3015 exceeds 2000 V
  - HBM JESD22-A114F exceeds 2000 V
  - ♦ MM JESD22-A115-A exceeds 200 V (C = 200 pF, R = 0 Ω)
- Multiple package options

# 3. Ordering information

Table 1. Ordering information

Type number	Package	ackage								
	Temperature range	Name	Description	Version						
74HC3G07DP-Q100	−40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads;	SOT505-2						
74HCT3G07DP-Q100			body width 3 mm; lead length 0.5 mm							
74HC3G07DC-Q100	−40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads;	SOT765-1						
74HCT3G07DC-Q100			body width 2.3 mm							



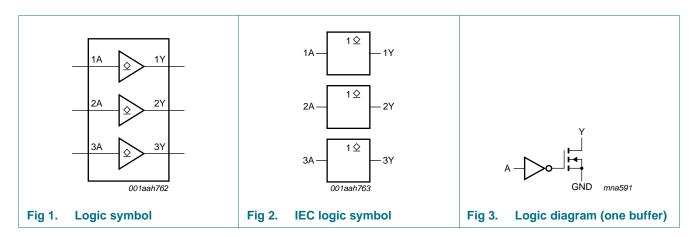
# 4. Marking

Table 2. Marking code

Type number	Marking code <sup>[1]</sup>
74HC3G07DP-Q100	H07
74HCT3G07DP-Q100	T07
74HC3G07DC-Q100	H07
74HCT3G07DC-Q100	T07

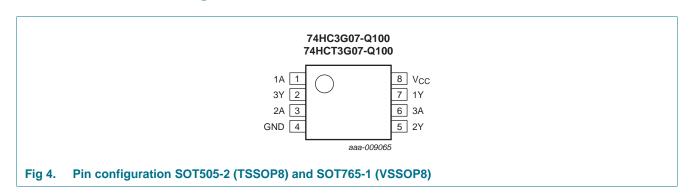
<sup>[1]</sup> The pin 1 indicator is located on the lower left corner of the device, below the marking code.

# 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 <sub>CC</sub>	8	supply voltage

# 7. Functional description

### Table 4. Function table[1]

Input nA	Output nY
L	L
Н	Z

<sup>[1]</sup> H = HIGH voltage level; L = LOW voltage level; Z = high-impedance OFF-state.

# 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 <sub>IK</sub>	input clamping current	$V_I < -0.5 \text{ V or } V_I > V_{CC} + 0.5 \text{ V}$	<u>[1]</u> -	±20	mA
I <sub>OK</sub>	output clamping current	$V_{O} < -0.5 \text{ V}$	<u>[1]</u> –20	-	mA
Vo	output voltage	active mode	<u>[1]</u> –0.5	$V_{CC} + 0.5$	V
		high-impedance mode	<u>[1]</u> –0.5	7.0	V
Io	output current	$V_{O} = -0.5 \text{ V to } 7.0 \text{ V}$	<u>[1]</u> –25	-	mA
I <sub>CC</sub>	supply current		<u>[1]</u> -	50	mA
I <sub>GND</sub>	ground current		<u>[1]</u> –50	-	mA
T <sub>stg</sub>	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

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

<sup>[2]</sup> For TSSOP8 package: above 55 °C the value of  $P_{tot}$  derates linearly with 2.5 mW/K. For VSSOP8 package: above 110 °C the value of  $P_{tot}$  derates linearly with 8 mW/K.

# 9. Recommended operating conditions

Table 6. Recommended operating conditions

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

Symbol	ol Parameter Conditions		74HC3G07-Q100			74HCT3G07-Q100			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 <sub>amb</sub>	ambient temperature		-40	+25	+125	-40	+25	+125	°C
$\Delta t / \Delta V$	input transition rise	$V_{CC} = 2.0 \text{ V}$	-	-	625	-	-	-	ns/V
	and fall rate	$V_{CC} = 4.5 \text{ V}$	-	1.67	139	-	1.67	139	ns/V
		$V_{CC} = 6.0 \text{ V}$	-	-	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 +8	5 °C	–40 °C 1	to +125 °C	Unit
			Min	Typ[1]	Max	Min	Max	
74HC3G	07-Q100							
$V_{IH}$	HIGH-level input	V <sub>CC</sub> = 2.0 V	1.5	1.2	-	1.5	-	V
	voltage	V <sub>CC</sub> = 4.5 V	3.15	2.4	-	3.15	-	V
		V <sub>CC</sub> = 6.0 V	4.2	3.2	-	4.2	-	V
$V_{IL}$	LOW-level input	V <sub>CC</sub> = 2.0 V	-	0.8	0.5	-	0.5	V
	voltage	V <sub>CC</sub> = 4.5 V	-	2.1	1.35	-	1.35	V
		V <sub>CC</sub> = 6.0 V	-	2.8	1.8	-	1.8	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$						
		$I_O = 20 \mu A; V_{CC} = 2.0 V$	-	0	0.1	-	0.1	V
		$I_O = 20 \mu A; V_{CC} = 4.5 V$	-	0	0.1	-	0.1	V
		$I_O = 20 \mu A; V_{CC} = 6.0 \text{ V}$	-	0	0.1	-	0.1	V
		$I_O = 4.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	0.15	0.33	-	0.4	V
		$I_O = 5.2 \text{ mA}; V_{CC} = 6.0 \text{ V}$	-	0.16	0.33	-	0.4	V
I <sub>I</sub>	input leakage current	$V_1 = V_{CC}$ or GND; $V_{CC} = 6.0 \text{ V}$	-	-	±0.1	-	±1.0	μА
I <sub>LO</sub>	output leakage current	$V_I = V_{IH}$ ; $V_O = V_{CC}$ or GND	-	-	±5.0	-	±10	μА
I <sub>CC</sub>	supply current	per input pin; $V_{CC} = 6.0 \text{ V}$ ; $V_I = V_{CC}$ or GND; $I_O = 0 \text{ A}$ ;	-	-	10	-	20	μА
Cı	input capacitance		-	1.5	-	-	-	pF

 Table 7.
 Static characteristics ...continued

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

Symbol	Parameter	Conditions	-40	°C to +8	5 °C	-40 °C 1	to +125 °C	Unit
			Min	Typ[1]	Max	Min	Max	
74HCT30	G07-Q100						'	'
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	2.0	1.6	-	2.0	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	1.2	0.8	-	0.8	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$						
		$I_O = 20 \mu A; V_{CC} = 4.5 V$	-	0	0.1	-	0.1	V
		$I_O = 4.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	0.15	0.33	-	0.4	V
I <sub>I</sub>	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	-	±1.0	-	±1.0	μА
I <sub>LO</sub>	output leakage current	$V_I = V_{IH}$ ; $V_O = V_{CC}$ or GND	-	-	±5.0	-	±10	μА
I <sub>CC</sub>	supply current	per input pin; $V_{CC} = 5.5 \text{ V}$ ; $V_I = V_{CC}$ or GND; $I_O = 0 \text{ A}$ ;	-	-	10	-	20	μА
$\Delta I_{CC}$	additional supply current	per input; $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V};$ $V_I = V_{CC} - 2.1 \text{ V}; I_O = 0 \text{ A}$	-	-	375	-	410	μА
C <sub>I</sub>	input capacitance		-	1.5	-	-	-	pF

<sup>[1]</sup> 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<sub>amb</sub> = 25 °C; for test circuit, see Figure 6.

Symbol	Parameter	Conditions		-40	°C to +85	o °C	–40 °C t	–40 °C to +125 °C	
				Min	Тур	Max	Min	Max	
74HC3G	07-Q100								
t <sub>PZL</sub>	OFF-state to LOW	nA to nY; see Figure 5							
	propagation delay	$V_{CC} = 2.0 \text{ V}$		-	25	95	-	125	ns
		$V_{CC} = 4.5 \text{ V}$		-	9	19	-	25	ns
		V <sub>CC</sub> = 6.0 V		-	7	16	-	20	ns
t <sub>PLZ</sub>	LOW to OFF-state propagation delay	nA to nY; see Figure 5							
		V <sub>CC</sub> = 2.0 V		-	25	95	-	125	ns
		V <sub>CC</sub> = 4.5 V		-	11	23	-	30	ns
		$V_{CC} = 6.0 \text{ V}$		-	10	23	-	26	ns
t <sub>THL</sub>	HIGH to LOW output	nY; see Figure 5							
	transition time	$V_{CC} = 2.0 \text{ V}$		-	18	95	-	125	ns
		$V_{CC} = 4.5 \text{ V}$		-	6	19	-	25	ns
		$V_{CC} = 6.0 \text{ V}$		-	5	16	-	20	ns
$C_{PD}$	power dissipation capacitance	$V_I = GND$ to $V_{CC}$	<u>[1]</u>	-	4	-	-	-	pF

 Table 8.
 Dynamic characteristics ...continued

Voltages are referenced to GND (ground = 0 V); all typical values are measured at T<sub>amb</sub> = 25 °C; for test circuit, see Figure 6.

Symbol	Parameter	Conditions	-40	°C to +85	; °C		°C to +125 °C	
			Min	Тур	Max	Min	Max	
74HCT30	G07-Q100		'		•	•		,
t <sub>PZL</sub>	OFF-state to LOW	nA to nY; see Figure 5						
	propagation delay	V <sub>CC</sub> = 4.5 V	-	11	27	-	32	ns
t <sub>PLZ</sub>	LOW to OFF-state	nA to nY; see Figure 5						
	propagation delay	V <sub>CC</sub> = 4.5 V	-	10	26	-	31	ns
t <sub>THL</sub>	HIGH to LOW output transition time	V <sub>CC</sub> = 4.5 V; see <u>Figure 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  $\mu W$ ).

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

 $f_i$  = input frequency in MHz;

 $f_o$  = output frequency in MHz;

 $C_L$  = output load capacitance in pF;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

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

## 12. Waveforms

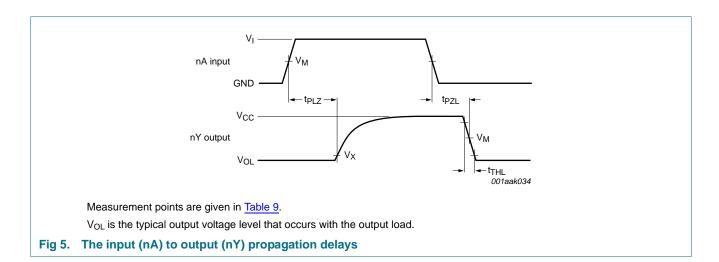
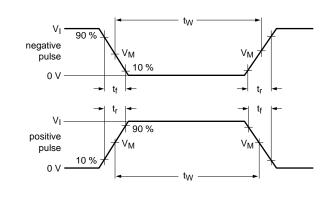
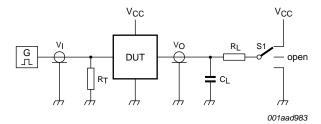


Table 9. Measurement points

Туре	Input	Output				
	V <sub>M</sub>	V <sub>M</sub> V <sub>X</sub>				
74HC3G07-Q100	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$0.1 \times V_{CC}$			
74HCT3G07-Q100	1.3 V	1.3 V	0.1 × V <sub>CC</sub>			





Test data is given in Table 10.

Definitions for test circuit:

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

 $C_L$  = Load capacitance including jig and probe capacitance.

 $R_1$  = Load resistance.

S1 = Test selection switch.

Fig 6. Test circuit for measuring switching times

Table 10. Test data

Туре	Input		Load		S1 position
	V <sub>I</sub>	t <sub>r</sub> , t <sub>f</sub>	C <sub>L</sub>	R <sub>L</sub>	t <sub>PZL</sub> , t <sub>PLZ</sub>
74HC3G07-Q100	GND to V <sub>CC</sub>	≤ 6 ns	50 pF	1 kΩ	V <sub>CC</sub>
74HCT3G07-Q100	GND to 3 V	≤ 6 ns	50 pF	1 kΩ	V <sub>CC</sub>

# 13. Package outline

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm SOT505-2

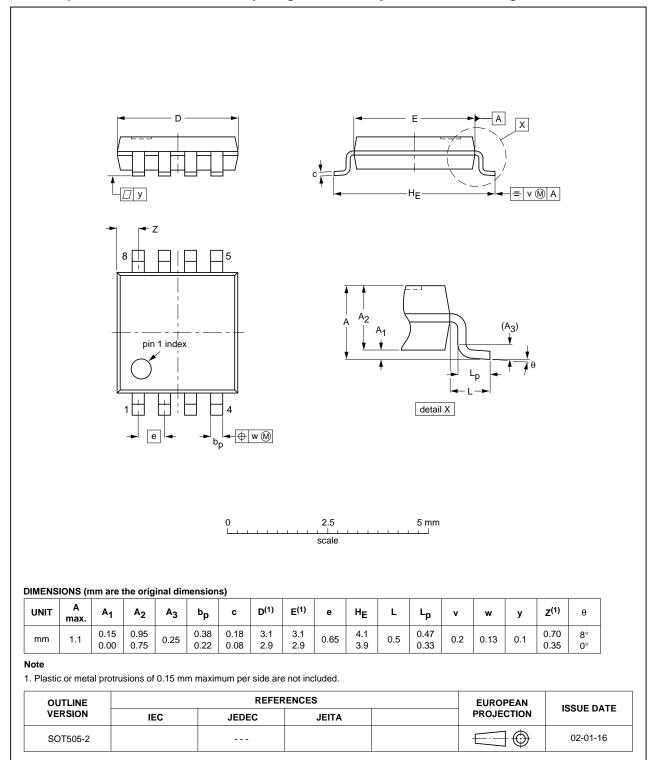
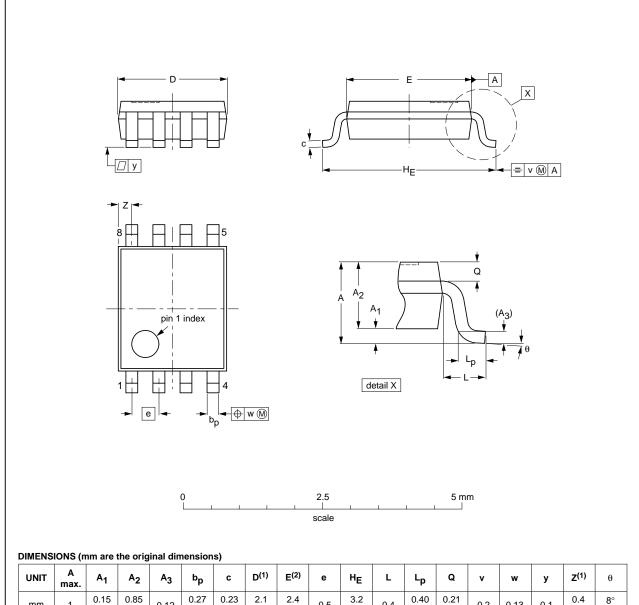


Fig 7. Package outline SOT505-2 (TSSOP8)

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### VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm

SOT765-1



UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	bp	С	D <sup>(1)</sup>	E <sup>(2)</sup>	e	HE	L	Lp	ď	v	w	у	Z <sup>(1)</sup>	θ
mm	1	0.15 0.00	0.85 0.60	0.12	0.27 0.17	0.23 0.08	2.1 1.9	2.4 2.2	0.5	3.2 3.0	0.4	0.40 0.15	0.21 0.19	0.2	0.13	0.1	0.4 0.1	8° 0°

- 1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
- 2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE		REFER	EUROPEAN	ISSUE DATE			
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE	
SOT765-1		MO-187				02-06-07	

Package outline SOT765-1 (VSSOP8) Fig 8.

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# 14. 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
MIL	Military
TTL	Transistor-Transistor Logic

# 15. Revision history

### Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT3G07_Q100 v.2	20131211	Product data sheet	-	74HC_HCT3G07_Q100 v.1
Modifications:	<ul> <li>Features and</li> </ul>	l benefits updated (errata).		
74HC_HCT3G07_Q100 v.1	20130917	Product data sheet	-	-

# 16. Legal information

### 16.1 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.
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Product [short] data sheet	Production	This document contains the product specification.

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- [2] The term 'short data sheet' is explained in section "Definitions"
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В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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