74HC3G34; 74HCT3G34

Triple buffer gate

Rev. 04 — 9 March 2006 Product data sheet

1. General description

The 74HC3G34; 74HCT3G34 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL. Specified in compliance with JEDEC standard no. 7A.

The 74HC3G34; 74HCT3G34 has three buffers.

2. Features

- Wide supply voltage range from 2.0 V to 6.0 V
- Symmetrical output impedance
- High noise immunity
- Low-power dissipation
- Balanced propagation delays
- Very small 8-pin package
- ESD protection:
  - HBM EIA/JESD22-A114-C exceeds 2000 V
  - MM EIA/JESD22-A115-A exceeds 200 V
- Specified from –40 °C to +85 °C and –40 °C to +125 °C

3. Quick reference data

Table 1. Quick reference data

GND = 0 V; T_{amb} = 25 °C; $t_r = t_f \leq$ 6.0 ns.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
74HC3G34							
t_{PHL}, t_{PLH}	propagation delay nA to nY	V_{CC} = 4.5 V; C_L = 50 pF		-	9	-	ns
C_i	input capacitance			-	1.5	-	pF
C_{PD}	power dissipation capacitance	per gate; V_I = GND to V_{CC}	[1]	-	10	-	pF
74HCT3G34							
t_{PHL}, t_{PLH}	propagation delay nA to nY	V_{CC} = 4.5 V; C_L = 50 pF		-	10	-	ns
C_i	input capacitance			-	1.5	-	pF
C_{PD}	power dissipation capacitance	per gate; V_I = GND to (V_{CC} – 1.5 V)	[1]	-	9	-	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:

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

4. Ordering information

Table 2. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74HC3G34				
74HC3G34DP	–40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm	SOT505-2
74HC3G34DC	–40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74HCT3G34				
74HCT3G34DP	–40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm	SOT505-2
74HCT3G34DC	–40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1

5. Marking

Table 3: Marking

Type number	Marking code
74HC3G34DP	H34
74HC3G34DC	P34
74HCT3G34DP	T34
74HCT3G34DC	U34

6. Functional diagram

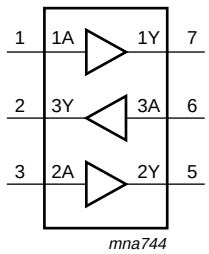


Fig 1. Logic symbol

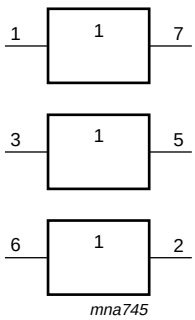


Fig 2. IEC logic symbol

7. Pinning information

7.1 Pinning

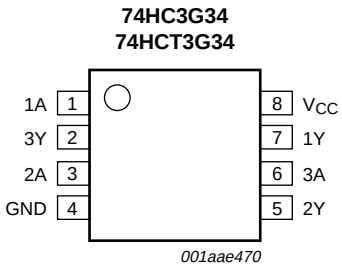


Fig 3. Pin configuration TSSOP8 and VSSOP8

7.2 Pin description

Table 4. Pin description

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

8. Functional description

8.1 Function table

Table 5. Function table [1]

Input	Output
nA	**nY**
L	L
H	H

[1] H = HIGH voltage level;
L = LOW voltage level.

9. Limiting values

Table 6. 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	$V_I < –0.5$ V or $V_I > V_{CC} + 0.5$ V	[1]	-	±20	mA
I_{OK}	output clamping current	$V_O < –0.5$ V or $V_O > V_{CC} + 0.5$ V	[1]	-	±20	mA
I_O	output current	$V_O = –0.5$ V to $(V_{CC} + 0.5$ V)		-	±25	mA
I_{CC}	quiescent supply current			-	50	mA
I_{GND}	ground current			-	–50	mA
T_{stg}	storage temperature			–65	+150	°C
P_{tot}	total power dissipation	$T_{amb} = –40$ °C to +125 °C	[2]	-	300	mW

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

[2] P_{tot} derates linearly at 2.5 mW/K above 55 °C.

10. Recommended operating conditions

Table 7. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
74HC3G34						
V_{CC}	supply voltage		2.0	5.0	6.0	V
V_I	input voltage		0	-	V_{CC}	V
V_O	output voltage		0	-	V_{CC}	V
T_{amb}	ambient temperature		–40	+25	+125	°C
t_r, t_f	input rise and fall time	$V_{CC} = 2.0$ V	-	-	1000	ns
		$V_{CC} = 4.5$ V	-	6.0	500	ns
		$V_{CC} = 6.0$ V	-	-	400	ns
74HCT3G34						
V_{CC}	supply voltage		4.5	5.0	5.5	V
V_I	input voltage		0	-	V_{CC}	V
V_O	output voltage		0	-	V_{CC}	V
T_{amb}	ambient temperature		–40	+25	+125	°C
t_r, t_f	input rise and fall time	$V_{CC} = 4.5$ V	-	6.0	500	ns

11. Static characteristics

Table 8. Static characteristics 74HC3G34

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = −40 °C to +85 °C [1]						
V_{IH}	HIGH-state input voltage	V_{CC} = 2.0 V	1.5	1.2	-	V
		V_{CC} = 4.5 V	3.15	2.4	-	V
		V_{CC} = 6.0 V	4.2	3.2	-	V
V_{IL}	LOW-state input voltage	V_{CC} = 2.0 V	-	0.8	0.5	V
		V_{CC} = 4.5 V	-	2.1	1.35	V
		V_{CC} = 6.0 V	-	2.8	1.8	V
V_{OH}	HIGH-state output voltage	V_I = V_{IH} or V_{IL}				
		I_O = −20 µA; V_{CC} = 2.0 V	1.9	2.0	-	V
		I_O = −20 µA; V_{CC} = 4.5 V	4.4	4.5	-	V
		I_O = −20 µA; V_{CC} = 6.0 V	5.9	6.0	-	V
		I_O = −4.0 mA; V_{CC} = 4.5 V	4.13	4.32	-	V
		I_O = −5.2 mA; V_{CC} = 6.0 V	5.63	5.81	-	V
V_{OL}	LOW-state output voltage	V_I = V_{IH} or V_{IL}				
		I_O = 20 µA; V_{CC} = 2.0 V	-	0	0.1	V
		I_O = 20 µA; V_{CC} = 4.5 V	-	0	0.1	V
		I_O = 20 µA; V_{CC} = 6.0 V	-	0	0.1	V
		I_O = 4.0 mA; V_{CC} = 4.5 V	-	0.15	0.33	V
		I_O = 5.2 mA; V_{CC} = 6.0 V	-	0.16	0.33	V
I_{LI}	input leakage current	V_I = V_{CC} or GND; V_{CC} = 6.0 V	-	-	±1.0	µA
I_{CC}	quiescent supply current	V_I = V_{CC} or GND; I_O = 0 A; V_{CC} = 6.0 V	-	-	10.0	µA
C_i	input capacitance		-	1.5	-	pF
T_{amb} = −40 °C to +125 °C						
V_{IH}	HIGH-state input voltage	V_{CC} = 2.0 V	1.5	-	-	V
		V_{CC} = 4.5 V	3.15	-	-	V
		V_{CC} = 6.0 V	4.2	-	-	V
V_{IL}	LOW-state input voltage	V_{CC} = 2.0 V	-	-	0.5	V
		V_{CC} = 4.5 V	-	-	1.35	V
		V_{CC} = 6.0 V	-	-	1.8	V
V_{OH}	HIGH-state output voltage	V_I = V_{IH} or V_{IL}				
		I_O = −20 µA; V_{CC} = 2.0 V	1.9	-	-	V
		I_O = −20 µA; V_{CC} = 4.5 V	4.4	-	-	V
		I_O = −20 µA; V_{CC} = 6.0 V	5.9	-	-	V
		I_O = −4.0 mA; V_{CC} = 4.5 V	3.7	-	-	V
		I_O = −5.2 mA; V_{CC} = 6.0 V	5.2	-	-	V

Table 8. Static characteristics 74HC3G34 *...continued*

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OL}	LOW-state output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = 20 µA; V_{CC} = 2.0 V	-	-	0.1	V
		I_O = 20 µA; V_{CC} = 4.5 V	-	-	0.1	V
		I_O = 20 µA; V_{CC} = 6.0 V	-	-	0.1	V
		I_O = 4.0 mA; V_{CC} = 4.5 V	-	-	0.4	V
		I_O = 5.2 mA; V_{CC} = 6.0 V	-	-	0.4	V
I_{LI}	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 6.0 V	-	-	±1.0	µA
I_{CC}	quiescent supply current	$V_I = V_{CC}$ or GND; I_O = 0 A; V_{CC} = 6.0 V	-	-	20.0	µA

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

Table 9. Static characteristics 74HCT3G34

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = −40 °C to +85 °C [1]						
V_{IH}	HIGH-state input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	1.6	-	V
V_{IL}	LOW-state input voltage	V_{CC} = 4.5 V to 5.5 V	-	1.2	0.8	V
V_{OH}	HIGH-state output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = −20 µA; V_{CC} = 4.5 V	4.4	4.5	-	V
		I_O = −4.0 mA; V_{CC} = 4.5 V	4.13	4.32	-	V
V_{OL}	LOW-state output voltage	$V_I = V_{IH}$ or V_{IL}				V
		I_O = 20 µA; V_{CC} = 4.5 V	-	0	0.1	V
		I_O = 4.0 mA; V_{CC} = 4.5 V	-	0.15	0.33	V
I_{LI}	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 5.5 V	-	-	±1.0	µA
I_{CC}	quiescent supply current	$V_I = V_{CC}$ or GND; I_O = 0 A; V_{CC} = 5.5 V	-	-	10	µA
ΔI_{CC}	additional quiescent supply current	per input pin; $V_I = V_{CC}$ − 2.1 V; I_O = 0 A; V_{CC} = 4.5 V to 5.5 V	-	-	375	µA
C_i	input capacitance		-	1.5	-	pF
T_{amb} = −40 °C to +125 °C						
V_{IH}	HIGH-state input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	-	-	V
V_{IL}	LOW-state input voltage	V_{CC} = 4.5 V to 5.5 V	-	-	0.8	V
V_{OH}	HIGH-state output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = −20 µA; V_{CC} = 4.5 V	4.4	-	-	V
		I_O = −4.0 mA; V_{CC} = 4.5 V	3.7	-	-	V
V_{OL}	LOW-state output voltage	$V_I = V_{IH}$ or V_{IL}				V
		I_O = 20 µA; V_{CC} = 4.5 V	-	-	0.1	V
		I_O = 4.0 mA; V_{CC} = 4.5 V	-	-	0.4	V

Table 9. Static characteristics 74HCT3G34 *...continued*

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{LI}	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 5.5 V	-	-	±1.0	μA
I_{CC}	quiescent supply current	$V_I = V_{CC}$ or GND; I_O = 0 A; V_{CC} = 5.5 V	-	-	20.0	μA
ΔI_{CC}	additional quiescent supply current	per input pin; $V_I = V_{CC}$ – 2.1 V; I_O = 0 A; V_{CC} = 4.5 V to 5.5 V	-	-	410	μA

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

12. Dynamic characteristics

Table 10. Dynamic characteristics 74HC3G34

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 5.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
T_{amb} = –40 °C to +85 °C [1]							
t_{PHL}, t_{PLH}	propagation delay nA to nY	see Figure 4					
		V_{CC} = 2.0 V		-	29	95	ns
		V_{CC} = 4.5 V		-	9	19	ns
		V_{CC} = 6.0 V		-	8	16	ns
t_{THL}, t_{TLH}	output transition time	see Figure 4					
		V_{CC} = 2.0 V		-	18	95	ns
		V_{CC} = 4.5 V		-	6	19	ns
		V_{CC} = 6.0 V		-	5	16	ns
C_{PD}	power dissipation capacitance	per buffer; V_I = GND to V_{CC}	[2]	-	10	-	pF
T_{amb} = –40 °C to +125 °C							
t_{PHL}, t_{PLH}	propagation delay nA to nY	see Figure 4					
		V_{CC} = 2.0 V		-	-	125	ns
		V_{CC} = 4.5 V		-	-	25	ns
		V_{CC} = 6.0 V		-	-	20	ns
t_{THL}, t_{TLH}	output transition time	see Figure 4					
		V_{CC} = 2.0 V		-	-	125	ns
		V_{CC} = 4.5 V		-	-	25	ns
		V_{CC} = 6.0 V		-	-	20	ns

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

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

Table 11. Dynamic characteristics 74HCT3G34

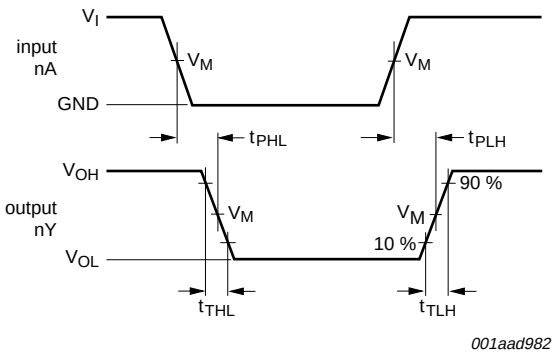
Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 5.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
T_{amb} = −40 °C to +85 °C [1]							
t_{PHL}, t_{PLH}	propagation delay nA to nY	V_{CC} = 4.5 V; see Figure 4		-	10	23	ns
t_{THL}, t_{TLH}	output transition time	V_{CC} = 4.5 V; see Figure 4		-	6	19	ns
T_{amb} = −40 °C to +125 °C							
t_{PHL}, t_{PLH}	propagation delay nA to nY	V_{CC} = 4.5 V; see Figure 4		-	-	29	ns
t_{THL}, t_{TLH}	output transition time	V_{CC} = 4.5 V; see Figure 4		-	-	25	ns
C_{PD}	power dissipation capacitance	per buffer; V_I = GND to (V_{CC} − 1.5 V)	[2]	-	9	-	pF

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

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

13. Waveforms

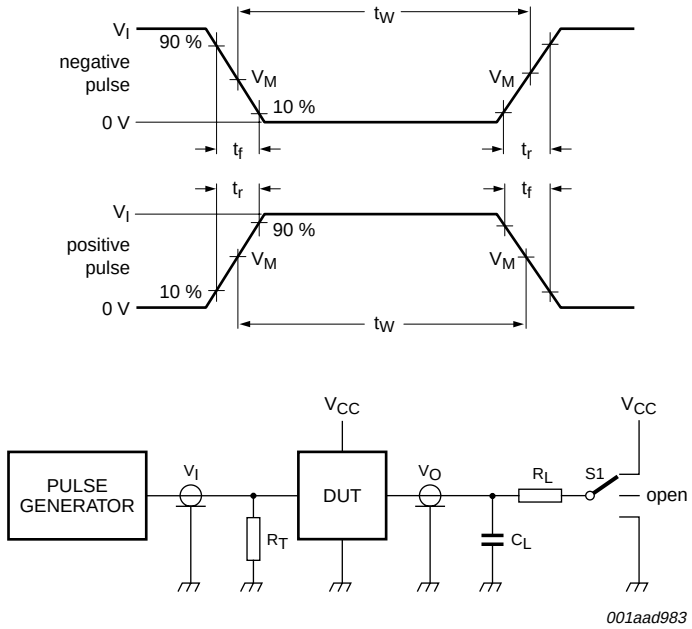


Measurement points are given in Table 12.

Fig 4. Propagation delay data input (nA) to data output (nY) and transition time output (nY)

Table 12. Measurement points

Type	Input	Output
	V_M	V_M
74HC3G34	0.5 × V_{CC}	0.5 × V_{CC}
74HCT3G34	1.3 V	1.3 V



Test data is given in Table 13.

Definitions 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_L = Load resistor

S1 = Test selection switch

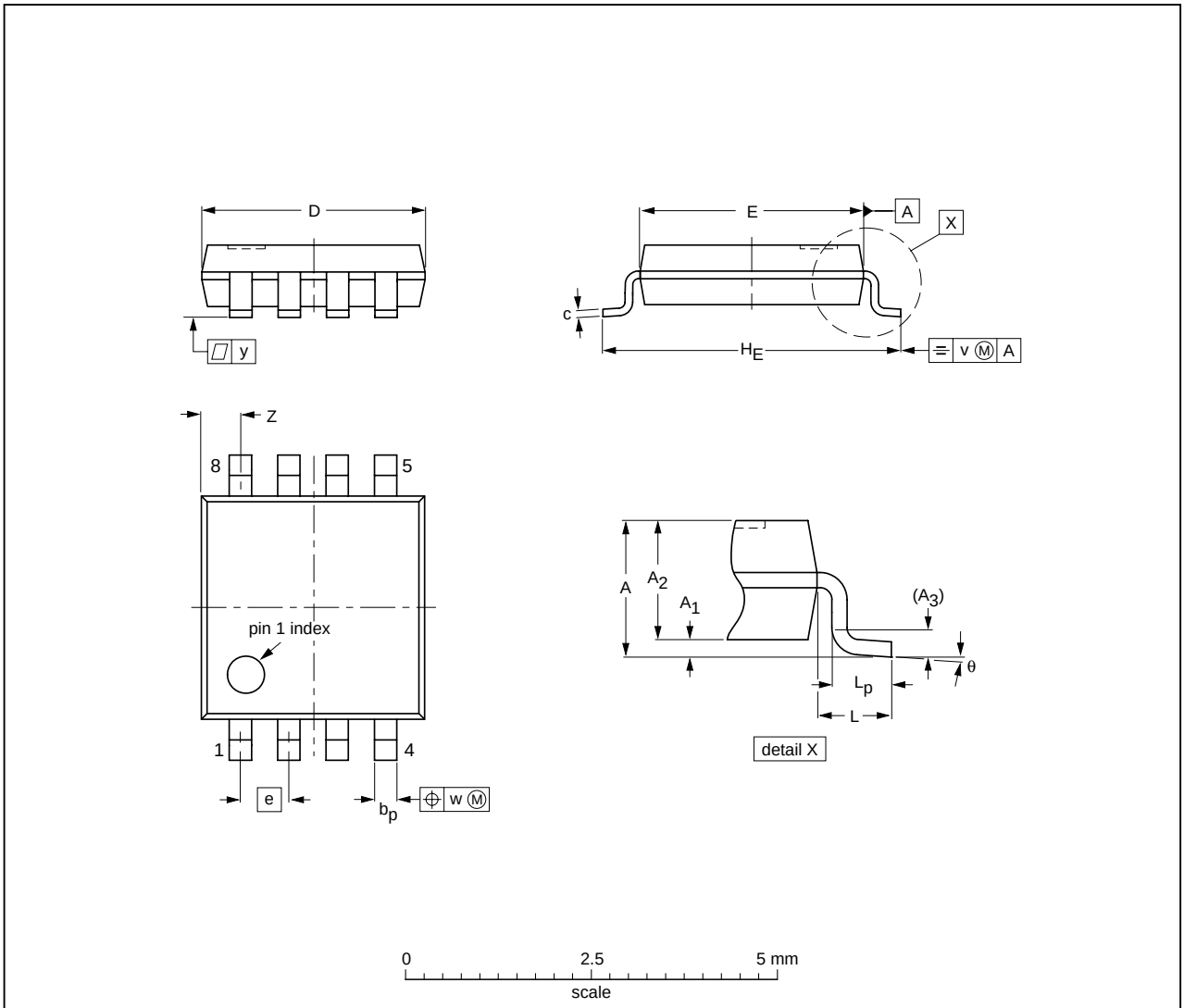
Fig 5. Load circuitry for measuring switching times

Table 13. Test data

Type	Input		Load		S1 position		
	V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
74HC3G34	V_{CC}	6 ns	50 pF	1 kΩ	open	GND	V_{CC}
74HCT3G34	3 V	6 ns	50 pF	1 kΩ	open	GND	V_{CC}

14. Package outline

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



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	v	w	y	$Z^{(1)}$	θ
mm	1.1	0.15 0.00	0.95 0.75	0.25	0.38 0.22	0.18 0.08	3.1 2.9	3.1 2.9	0.65	4.1 3.9	0.5	0.47 0.33	0.2	0.13	0.1	0.70 0.35	8° 0°

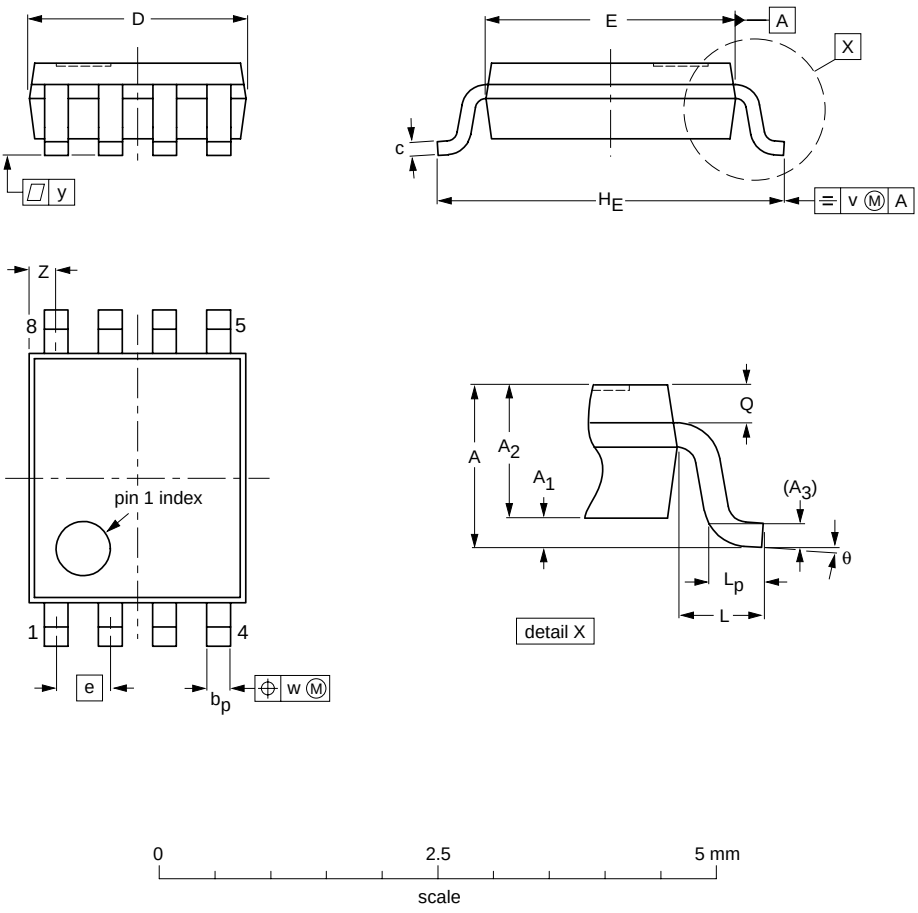
Note

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			
SOT505-2		- - -				02-01-16

Fig 6. Package outline SOT505-2 (TSSOP8)

VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm **SOT765-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(2)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	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°

Notes

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

Fig 7. Package outline SOT765-1 (VSSOP8)

15. Abbreviations

Table 14. Abbreviations

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

16. Revision history

Table 15. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT3G34_4	20060309	Product data sheet	-	74HC_HCT3G34_3
Modifications:	• The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors. • Table 3: Marking of type numbers 74HC3G34DP and 74HCT3G34DP changed.			
74HC_HCT3G34_3	20030519	Product specification	-	74HC_HCT3G34_2
74HC_HCT3G34_2	20030210	Product specification	-	74HC_HCT3G34_1
74HC_HCT3G34_1	20031003	Product specification	-	-

17. Legal information

17.1 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.semiconductors.philips.com.

17.2 Definitions

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