

# 74HC365-Q100; 74HCT365-Q100

Hex buffer/line driver; 3-state

Rev. 1 — 2 August 2012

Product data sheet

## 1. General description

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The 74HC365-Q100; 74HCT365-Q100 is a hex buffer/line driver with 3-state outputs controlled by the output enable inputs ( $\overline{OEn}$ ). A HIGH on  $\overline{OEn}$  causes the outputs to assume a high impedance OFF-state. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

The 74HC365-Q100; 74HCT365-Q100 is functionally identical to:

- 74HC366-Q100; 74HCT366-Q100, but has non-inverting outputs

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

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- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - ◆ Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$
- Inverting outputs
- Input levels:
  - ◆ For 74HC365-Q100: CMOS level
  - ◆ For 74HCT365-Q100: TTL level
- Complies with JEDEC standard no. 7A
- ESD protection:
  - ◆ MIL-STD-883, method 3015 exceeds 2000 V
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V ( $C = 200\text{ pF}$ ,  $R = 0\ \Omega$ )
- Multiple package options

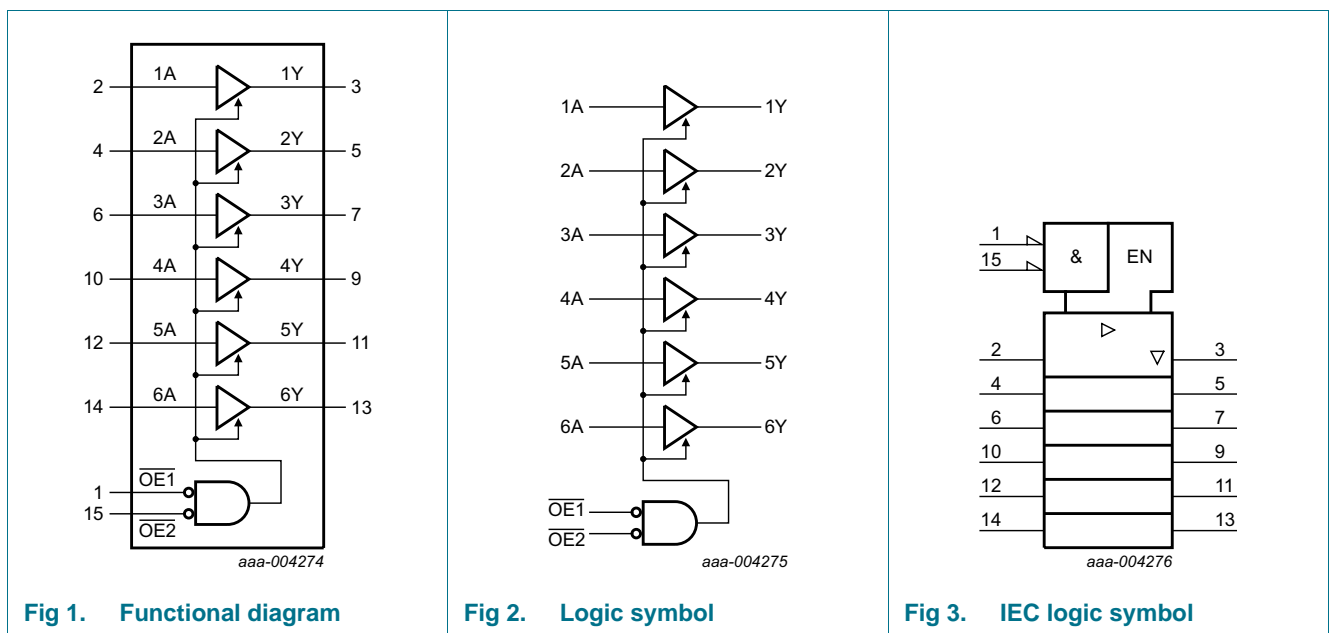


## 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
<b>74HC365-Q100</b>				
74HC365D-Q100	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HC365PW-Q100	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
<b>74HCT365-Q100</b>				
74HCT365D-Q100	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HCT365PW-Q100	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1

## 4. Functional diagram



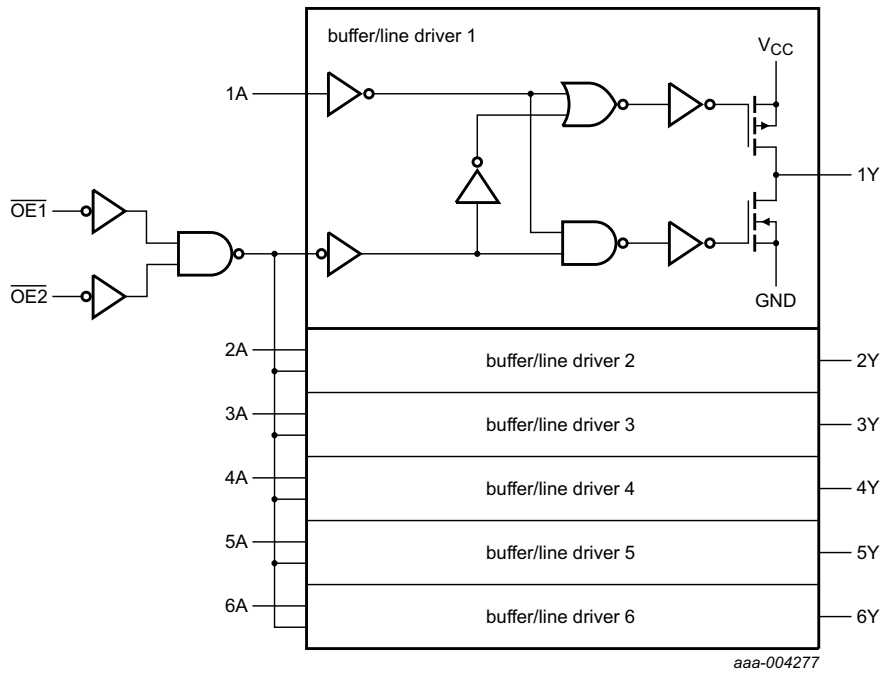


Fig 4. Logic diagram

## 5. Pinning information

### 5.1 Pinning

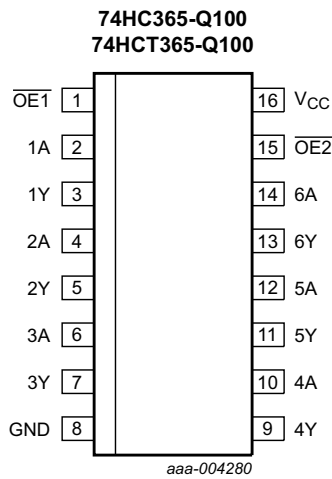


Fig 5. Pin configuration

## 5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
$\overline{OE1}$	1	output enable input 1 (active LOW)
1A	2	data input 1
1Y	3	data output 1
2A	4	data input 2
2Y	5	data output 2
3A	6	data input 3
3Y	7	data output 3
GND	8	ground (0 V)
4Y	9	data output 4
4A	10	data input 4
5Y	11	data output 5
5A	12	data input 5
6Y	13	data output 6
6A	14	data input 6
$\overline{OE2}$	15	output enable input 2 (active LOW)
V <sub>CC</sub>	16	supply voltage

## 6. Functional description

Table 3. Function table<sup>[1]</sup>

Control		Input	Output
$\overline{OE1}$	$\overline{OE2}$	nA	nY
L	L	L	L
L	L	H	H
X	H	X	Z
H	X	X	Z

- [1] H = HIGH voltage level;  
 L = LOW voltage level;  
 X = don't care;  
 Z = high-impedance OFF-state.

## 7. Limiting values

**Table 4. 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	V	
$I_{IK}$	input clamping current	$V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$	-	$\pm 20$	mA	
$I_{OK}$	output clamping current	$V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$	-	$\pm 20$	mA	
$I_O$	output current	$V_O = -0.5\text{ V}$ to $(V_{CC} + 0.5\text{ V})$	-	$\pm 35$	mA	
$I_{CC}$	supply current		-	70	mA	
$I_{GND}$	ground current		-	-70	mA	
$T_{stg}$	storage temperature		-65	+150	°C	
$P_{tot}$	total power dissipation	SO16 package	[1]	-	500	mW
		TSSOP16 package	[2]	-	500	mW

[1] For SO16 packages:  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.

[2] For TSSOP16 packages:  $P_{tot}$  derates linearly with 5.5 mW/K above 60 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Voltages are referenced to GND (ground = 0 V)

Symbol	Parameter	Conditions	74HC365-Q100			74HCT365-Q100			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
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 2.0\text{ V}$	-	-	625	-	-	-	ns/V
		$V_{CC} = 4.5\text{ V}$	-	1.67	139	-	1.67	139	ns/V
		$V_{CC} = 6.0\text{ V}$	-	-	83	-	-	-	ns/V

## 9. Static characteristics

**Table 6. Static characteristics 74HC365-Q100**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = 25 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	1.2	-	V
		V <sub>CC</sub> = 4.5 V	3.15	2.4	-	V
		V <sub>CC</sub> = 6.0 V	4.2	3.2	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	0.8	0.5	V
		V <sub>CC</sub> = 4.5 V	-	2.1	1.35	V
		V <sub>CC</sub> = 6.0 V	-	2.8	1.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	-	-	-	
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 2.0 V	1.9	2.0	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 4.5 V	4.4	4.5	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 6.0 V	5.9	6.0	-	V
		I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V	3.98	4.32	-	V
		I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V	5.48	5.81	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 2.0 V	-	0	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V	-	0	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V	-	0	0.1	V
		I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V	-	0.15	0.26	V
		I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V	-	0.16	0.26	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±0.1	μA
I <sub>OZ</sub>	OFF-state output current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±0.5	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 6.0 V	-	-	8.0	μA
C <sub>I</sub>	input capacitance		-	3.5	-	pF
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	-	-	V
		V <sub>CC</sub> = 4.5 V	3.15	-	-	V
		V <sub>CC</sub> = 6.0 V	4.2	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.5	V
		V <sub>CC</sub> = 4.5 V	-	-	1.35	V
		V <sub>CC</sub> = 6.0 V	-	-	1.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 2.0 V	1.9	-	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 4.5 V	4.4	-	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 6.0 V	5.9	-	-	V
		I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V	3.84	-	-	V
		I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V	5.34	-	-	V

**Table 6. Static characteristics 74HC365-Q100 ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 2.0 V	-	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V	-	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V	-	-	0.1	V
		I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V	-	-	0.33	V
		I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V	-	-	0.33	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V;	-	-	±1.0	μA
I <sub>OZ</sub>	OFF-state output current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±5.0	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 6.0 V	-	-	80	μA
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	-	-	V
		V <sub>CC</sub> = 4.5 V	3.15	-	-	V
		V <sub>CC</sub> = 6.0 V	4.2	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.5	V
		V <sub>CC</sub> = 4.5 V	-	-	1.35	V
		V <sub>CC</sub> = 6.0 V	-	-	1.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 2.0 V	1.9	-	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 4.5 V	4.4	-	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 6.0 V	5.9	-	-	V
		I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V	3.7	-	-	V
		I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V	5.2	-	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 2.0 V	-	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V	-	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V	-	-	0.1	V
		I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V	-	-	0.4	V
		I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V	-	-	0.4	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±1.0	μA
I <sub>OZ</sub>	OFF-state output current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±10.0	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 6.0 V	-	-	160	μA

**Table 7. Static characteristics 74HCT365-Q100**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = 25 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	1.6	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	-	1.2	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V				
		I <sub>O</sub> = -20 μA	4.4	4.5	-	V
		I <sub>O</sub> = -6.0 mA	3.98	4.32	-	V

**Table 7. Static characteristics 74HCT365-Q100 ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V	-	0	0.1	V
		I <sub>O</sub> = 20 μA	-	0.16	0.26	V
		I <sub>O</sub> = 6.0 mA	-	-	-	-
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	±0.1	μA
I <sub>OZ</sub>	OFF-state output current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND per input pin; other inputs at GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V	-	-	±0.5	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V	-	-	8.0	μA
ΔI <sub>CC</sub>	additional supply current	V <sub>I</sub> = V <sub>CC</sub> - 2.1 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A	-	-	-	-
		pins nA	-	100	360	μA
		pin $\overline{OE1}$	-	100	360	μA
		pin $\overline{OE2}$	-	90	324	μA
C <sub>I</sub>	input capacitance		-	3.5	-	pF
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V	-	-	-	-
		I <sub>O</sub> = -20 μA	4.4	-	-	V
		I <sub>O</sub> = -6.0 mA	3.84	-	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V	-	-	0.1	V
		I <sub>O</sub> = 20 μA	-	-	0.33	V
		I <sub>O</sub> = 6.0 mA	-	-	-	-
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	±1.0	μA
I <sub>OZ</sub>	OFF-state output current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND per input pin; other inputs at GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V	-	-	±5.0	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V	-	-	80	μA
ΔI <sub>CC</sub>	additional supply current	V <sub>I</sub> = V <sub>CC</sub> - 2.1 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A	-	-	-	-
		pins nA	-	-	450	μA
		pin $\overline{OE1}$	-	-	450	μA
		pin $\overline{OE2}$	-	-	405	μA
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V	-	-	-	-
		I <sub>O</sub> = -20 μA	4.4	-	-	V
		I <sub>O</sub> = -6.0 mA	3.7	-	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V	-	-	0.1	V
		I <sub>O</sub> = 20 μA	-	-	0.4	V
		I <sub>O</sub> = 6.0 mA	-	-	-	-
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	±1.0	μA
I <sub>OZ</sub>	OFF-state output current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND per input pin; other inputs at GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V	-	-	±10.0	μA



**Table 7.** Static characteristics 74HCT365-Q100 ...continued

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	160	$\mu$ A
$\Delta I_{CC}$	additional supply current	$V_I = V_{CC} - 2.1$ V; other inputs at $V_{CC}$ or GND; $I_O = 0$ A				
		pins nA	-	-	490	$\mu$ A
		pin $\overline{OE1}$	-	-	490	$\mu$ A
		pin $\overline{OE2}$	-	-	441	$\mu$ A

## 10. Dynamic characteristics

**Table 8.** Dynamic characteristics 74HC365-Q100Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; see test circuit [Figure 8](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = 25</math> °C</b>						
$t_{pd}$	propagation delay	nA to nY; see <a href="#">Figure 6</a>	[1]			
		$V_{CC} = 2.0$ V	-	30	95	ns
		$V_{CC} = 4.5$ V	-	11	19	ns
		$V_{CC} = 5$ V; $C_L = 15$ pF	-	9	-	ns
		$V_{CC} = 6.0$ V	-	9	16	ns
$t_{en}$	enable time	$\overline{OE}n$ to nY; see <a href="#">Figure 7</a>	[2]			
		$V_{CC} = 2.0$ V	-	47	150	ns
		$V_{CC} = 4.5$ V	-	17	30	ns
		$V_{CC} = 6.0$ V	-	14	26	ns
$t_{dis}$	disable time	$\overline{OE}n$ to nY; see <a href="#">Figure 7</a>	[3]			
		$V_{CC} = 2.0$ V	-	61	150	ns
		$V_{CC} = 4.5$ V	-	22	30	ns
		$V_{CC} = 6.0$ V	-	18	26	ns
$t_t$	transition time	see <a href="#">Figure 6</a>	[4]			
		$V_{CC} = 2.0$ V	-	14	60	ns
		$V_{CC} = 4.5$ V	-	5	12	ns
		$V_{CC} = 6.0$ V	-	4	10	ns
$C_{PD}$	power dissipation capacitance	per buffer; $V_I =$ GND to $V_{CC}$	[5]	40	-	pF
<b><math>T_{amb} = -40</math> °C to <math>+85</math> °C</b>						
$t_{pd}$	propagation delay	nA to nY; see <a href="#">Figure 6</a>	[1]			
		$V_{CC} = 2.0$ V	-	-	120	ns
		$V_{CC} = 4.5$ V	-	-	24	ns
		$V_{CC} = 6.0$ V	-	-	20	ns
$t_{en}$	enable time	$\overline{OE}n$ to nY; see <a href="#">Figure 7</a>	[2]			
		$V_{CC} = 2.0$ V	-	-	190	ns
		$V_{CC} = 4.5$ V	-	-	38	ns
		$V_{CC} = 6.0$ V	-	-	33	ns

**Table 8. Dynamic characteristics 74HC365-Q100 ...continued**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; see test circuit [Figure 8](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{dis}$	disable time	$\overline{OEn}$ to nY; see <a href="#">Figure 7</a>	[3]			
		$V_{CC} = 2.0$ V	-	-	190	ns
		$V_{CC} = 4.5$ V	-	-	38	ns
		$V_{CC} = 6.0$ V	-	-	33	ns
$t_t$	transition time	see <a href="#">Figure 6</a>	[4]			
		$V_{CC} = 2.0$ V	-	-	75	ns
		$V_{CC} = 4.5$ V	-	-	15	ns
		$V_{CC} = 6.0$ V	-	-	13	ns
<b><math>T_{amb} = -40</math> °C to <math>+125</math> °C</b>						
$t_{pd}$	propagation delay	nA to nY; see <a href="#">Figure 6</a>	[1]			
		$V_{CC} = 2.0$ V	-	-	145	ns
		$V_{CC} = 4.5$ V	-	-	29	ns
		$V_{CC} = 6.0$ V	-	-	25	ns
$t_{en}$	enable time	$\overline{OEn}$ to nY; see <a href="#">Figure 7</a>	[2]			
		$V_{CC} = 2.0$ V	-	-	225	ns
		$V_{CC} = 4.5$ V	-	-	45	ns
		$V_{CC} = 6.0$ V	-	-	38	ns
$t_{dis}$	disable time	$\overline{OEn}$ to nY; see <a href="#">Figure 7</a>	[3]			
		$V_{CC} = 2.0$ V	-	-	225	ns
		$V_{CC} = 4.5$ V	-	-	45	ns
		$V_{CC} = 6.0$ V	-	-	38	ns
$t_t$	transition time	see <a href="#">Figure 6</a>	[4]			
		$V_{CC} = 2.0$ V	-	-	90	ns
		$V_{CC} = 4.5$ V	-	-	18	ns
		$V_{CC} = 6.0$ V	-	-	15	ns

[1]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .

[2]  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

[3]  $t_{dis}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .

[4]  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .

[5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ W).

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

$C_L$  = output load capacitance in pF;

$V_{CC}$  = supply voltage in V;

$N$  = number of inputs switching;

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

**Table 9. Dynamic characteristics 74HCT365-Q100**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; see test circuit [Figure 8](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
<b><math>T_{amb} = 25</math> °C</b>							
$t_{pd}$	propagation delay	nA to nY; see <a href="#">Figure 6</a>	[1]				
		$V_{CC} = 4.5$ V	-	14	25	ns	
		$V_{CC} = 5$ V; $C_L = 15$ pF	-	11	-	ns	
$t_{en}$	enable time	$\overline{OEn}$ to nY; $V_{CC} = 4.5$ V; see <a href="#">Figure 7</a>	[2]	-	18	35	ns
$t_{dis}$	disable time	$\overline{OEn}$ to nY; $V_{CC} = 4.5$ V; see <a href="#">Figure 7</a>	[3]	-	23	35	ns
$t_t$	transition time	$V_{CC} = 4.5$ V; see <a href="#">Figure 6</a>	[4]	-	5	12	ns
$C_{PD}$	power dissipation capacitance	per buffer; $V_I = GND$ to $(V_{CC} - 1.5)$ V	[5]	-	40	-	pF
<b><math>T_{amb} = -40</math> °C to <math>+85</math> °C</b>							
$t_{pd}$	propagation delay	nA to nY; $V_{CC} = 4.5$ V; see <a href="#">Figure 6</a>	[1]	-	-	31	ns
$t_{en}$	enable time	$\overline{OEn}$ to nY; $V_{CC} = 4.5$ V; see <a href="#">Figure 7</a>	[2]	-	-	44	ns
$t_{dis}$	disable time	$\overline{OEn}$ to nY; $V_{CC} = 4.5$ V; see <a href="#">Figure 7</a>	[3]	-	-	44	ns
$t_t$	transition time	$V_{CC} = 4.5$ V; see <a href="#">Figure 6</a>	[4]	-	-	15	ns
<b><math>T_{amb} = -40</math> °C to <math>+125</math> °C</b>							
$t_{pd}$	propagation delay	nA to nY; $V_{CC} = 4.5$ V; see <a href="#">Figure 6</a>	[1]	-	-	38	ns
$t_{en}$	enable time	$\overline{OEn}$ to nY; $V_{CC} = 4.5$ V; see <a href="#">Figure 7</a>	[2]	-	-	53	ns
$t_{dis}$	disable time	$\overline{OEn}$ to nY; $V_{CC} = 4.5$ V; see <a href="#">Figure 7</a>	[3]	-	-	53	ns
$t_t$	transition time	$V_{CC} = 4.5$ V; see <a href="#">Figure 6</a>	[4]	-	-	18	ns

[1]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .

[2]  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

[3]  $t_{dis}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .

[4]  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .

[5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ W).

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

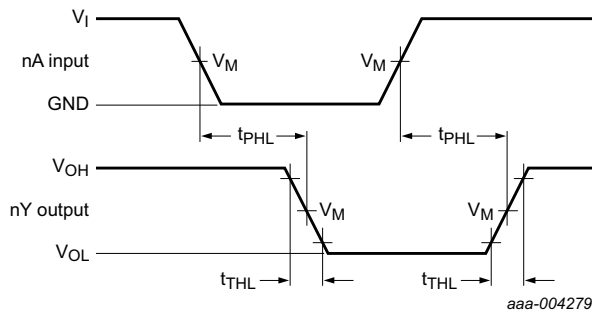
$C_L$  = output load capacitance in pF;

$V_{CC}$  = supply voltage in V;

$N$  = number of inputs switching;

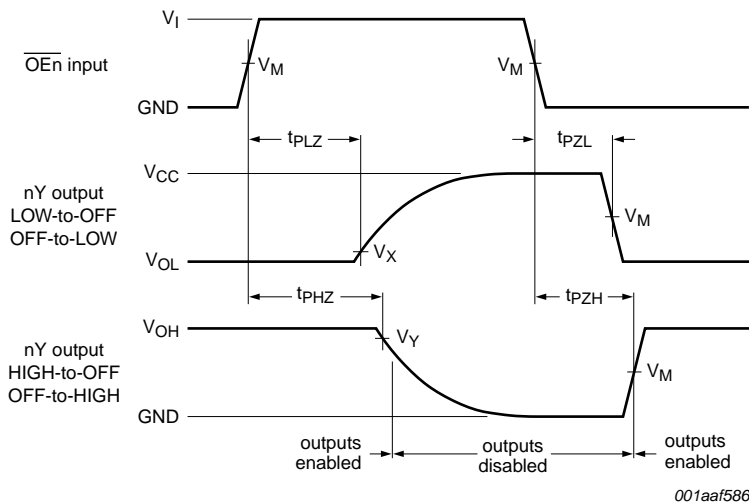
$\sum(C_L \times V_{CC}^2 \times f_o)$  = sum of outputs.

## 11. Waveforms



Measurement points are given in [Table 10](#).  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig 6. Propagation delay data input (nA) to output (nY) and output transition time**

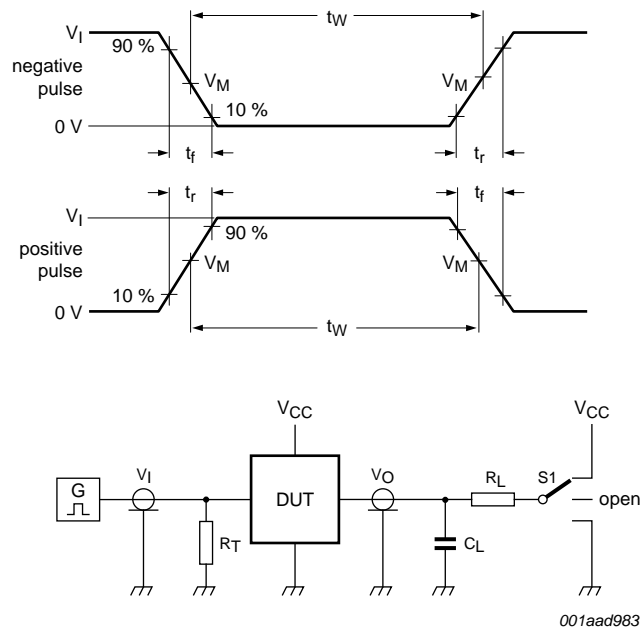


Measurement points are given in [Table 10](#).  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig 7. 3-state enable and disable times**

**Table 10. Measurement points**

Type	Input	Output		
	$V_M$	$V_M$	$V_X$	$V_Y$
74HC365-Q100	$0.5V_{CC}$	$0.5V_{CC}$	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$
74HCT365-Q100	1.3 V	1.3 V	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$



Test data is given in [Table 11](#).

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 8. Load circuitry for measuring switching times**

**Table 11. Test data**

Type	Input		Load		S1 position		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
74HC365-Q100	$V_{CC}$	6 ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$
74HCT365-Q100	3 V	6 ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$

12. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1

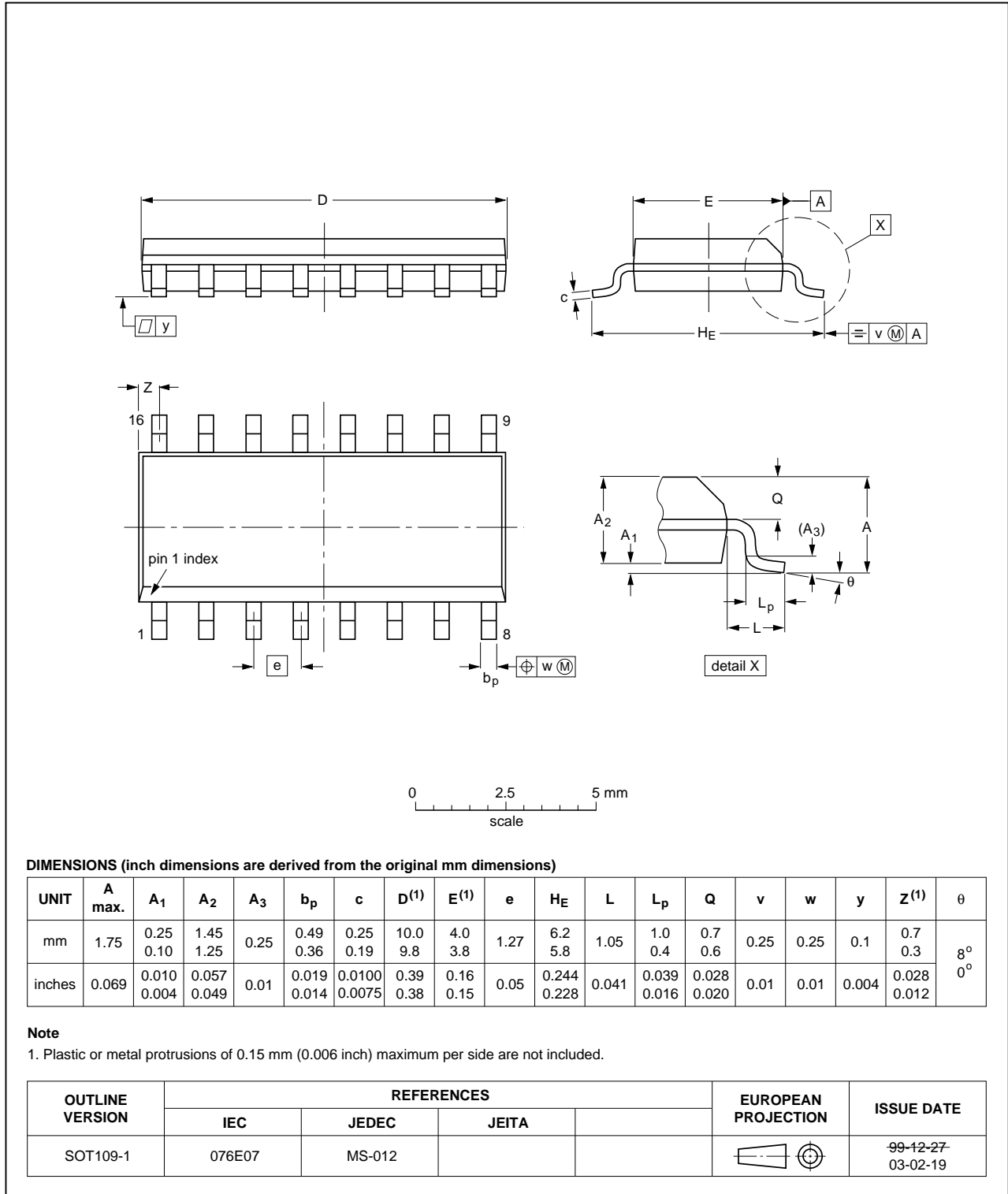


Fig 9. Package outline SOT109-1 (SO16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1

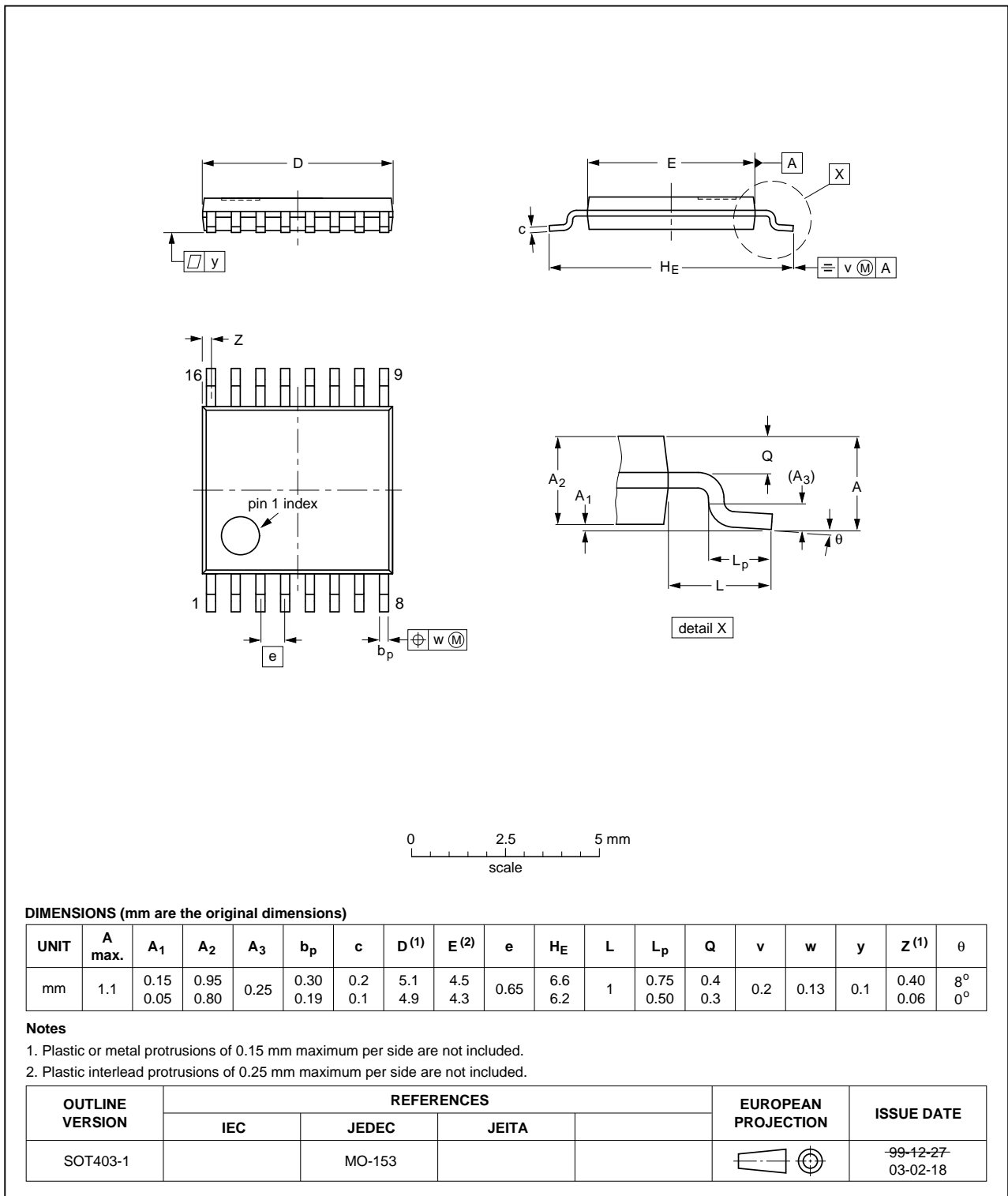


Fig 10. Package outline SOT403-1 (TSSOP16)

## 13. Abbreviations

Table 12. 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
MIL	Military

## 14. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT365_Q100 v.1	20120802	Product data sheet	-	-



## 15. Legal information

### 15.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.
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[2] The term 'short data sheet' is explained in section "Definitions".

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