

# 74HC366; 74HCT366

Hex buffer/line driver; 3-state; inverting

Rev. 4 — 4 September 2012

Product data sheet

## 1. General description

The 74HC366; 74HCT366 is a hex inverter/line driver with 3-state outputs controlled by the output enable inputs ( $\overline{OE1}$ ). A HIGH on  $\overline{OE1}$  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 74HC366; 74HCT366 is functionally identical to:

- 74HC365; 74HCT365, but has inverted outputs

## 2. Features and benefits

- Inverting outputs
- Input levels:
  - ◆ For 74HC366: CMOS level
  - ◆ For 74HC366: TTL level
- Complies with JEDEC standard no. 7A
- ESD protection:
  - ◆ HBM EIA/JESD22-A114-F exceeds 2000 V
  - ◆ MM EIA/JESD22-A115-A exceeds 200 V
- Specified from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  and from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Multiple package options



### 3. Ordering information

Table 1. Ordering information

Type number	Package		Description	Version
	Temperature range	Name		
<b>74HC366</b>				
74HC366D	−40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HC366N	−40 °C to +125 °C	DIP16	plastic dual in-line package; 16 leads (300 mil); long body	SOT38-1
74HC366PW	−40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
<b>74HCT366</b>				
74HCT366D	−40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HCT366DB	−40 °C to +125 °C	SSOP16	plastic shrink small outline package; 16 leads; body width 5.3 mm	SOT338-1
74HCT366N	−40 °C to +125 °C	DIP16	plastic dual in-line package; 16 leads (300 mil); long body	SOT38-1
74HCT366PW	−40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1

### 4. Functional diagram

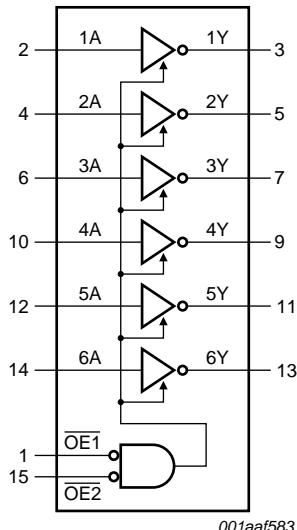


Fig 1. Functional diagram

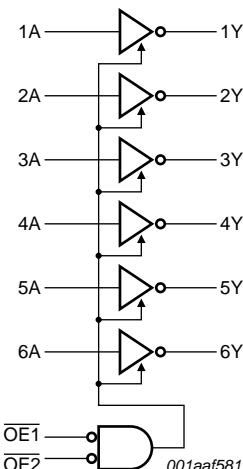


Fig 2. Logic symbol

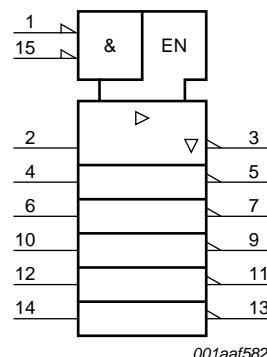


Fig 3. IEC logic symbol

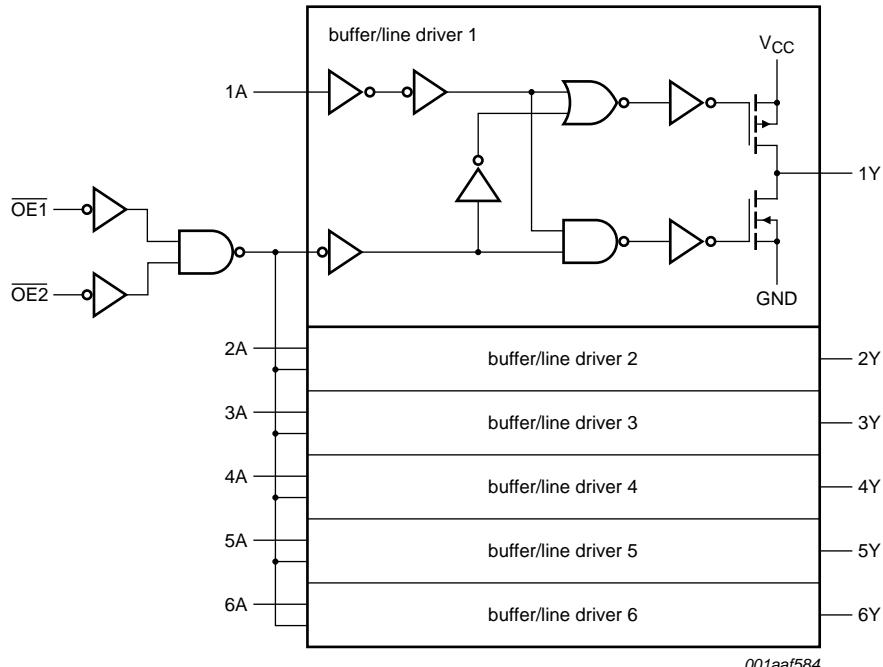


Fig 4. Logic diagram

## 5. Pinning information

### 5.1 Pinning

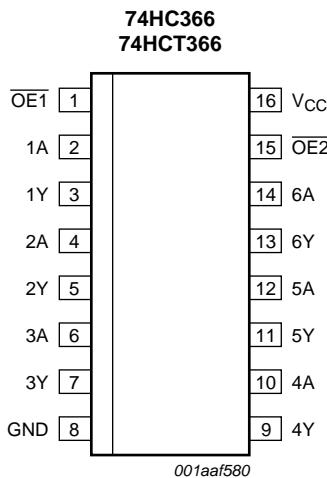


Fig 5. Pin configuration

## 5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
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
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
OE1	OE2	nA	nY
L	L	L	H
L	L	H	L
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	$V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V	-	$\pm 20$	mA	
$I_{OK}$	output clamping current	$V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V	-	$\pm 20$	mA	
$I_O$	output current	$V_O = -0.5$ V to $(V_{CC} + 0.5)$ 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	DIP16 package	[1]	-	750	mW
		SO16 package	[2]	-	500	mW
		SSOP16 package	[3]	-	500	mW
		TSSOP16 package	[3]	-	500	mW

[1] For DIP16 packages:  $P_{tot}$  derates linearly with 12 mW/K above 70 °C.

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

[3] For SSOP16 and 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	74HC366			74HCT366			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	$V_{CC} = 2.0$ 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

## 9. Static characteristics

**Table 6. Static characteristics 74HC366**

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 74HC366 ...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 $\mu$ A; V <sub>CC</sub> = 2.0 V	-	-	0.1	V
		I <sub>O</sub> = 20 $\mu$ A; V <sub>CC</sub> = 4.5 V	-	-	0.1	V
		I <sub>O</sub> = 20 $\mu$ A; 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;	-	-	$\pm$ 1.0	$\mu$ A
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	-	-	$\pm$ 5.0	$\mu$ A
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	$\mu$ A
<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 $\mu$ A; V <sub>CC</sub> = 2.0 V	1.9	-	-	V
		I <sub>O</sub> = -20 $\mu$ A; V <sub>CC</sub> = 4.5 V	4.4	-	-	V
		I <sub>O</sub> = -20 $\mu$ A; 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 $\mu$ A; V <sub>CC</sub> = 2.0 V	-	-	0.1	V
		I <sub>O</sub> = 20 $\mu$ A; V <sub>CC</sub> = 4.5 V	-	-	0.1	V
		I <sub>O</sub> = 20 $\mu$ A; 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	-	-	$\pm$ 1.0	$\mu$ A
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	-	-	$\pm$ 10.0	$\mu$ A
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	$\mu$ A

Table 7. Static characteristics 74HCT366

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 $\mu$ A	4.4	4.5	-	V
		I <sub>O</sub> = -6.0 mA	3.98	4.32	-	V

Table 7. Static characteristics 74HCT366 ...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				
		I <sub>O</sub> = 20 $\mu$ A	-	0	0.1	V
		I <sub>O</sub> = 6.0 mA	-	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> = 5.5 V	-	-	$\pm$ 0.1	$\mu$ A
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	-	-	$\pm$ 0.5	$\mu$ A
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	$\mu$ A
$\Delta$ I <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				
			-	100	360	$\mu$ A
			-	100	360	$\mu$ A
C <sub>I</sub>	input capacitance		-	90	320	$\mu$ A
			-	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 $\mu$ A	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
			-	-	0.33	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	$\pm$ 1.0	$\mu$ A
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			$\pm$ 5.0	$\mu$ A
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	$\mu$ A
$\Delta$ I <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				
			-	-	450	$\mu$ A
			-	-	450	$\mu$ A
			-	-	400	$\mu$ A
<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				
			-	-	0.8	V
			4.4	-	-	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				
			-	-	0.4	V
			-	-	0.7	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	$\pm$ 1.0	$\mu$ A
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	-	-	$\pm$ 10.0	$\mu$ A

**Table 7. Static characteristics 74HCT366 ...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	-	-	490	$\mu$ 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 74HC366**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]		
		$V_{CC} = 2.0$ V	-	33	100	ns
		$V_{CC} = 4.5$ V	-	12	20	ns
		$V_{CC} = 5$ V; $C_L = 15$ pF	-	10	-	ns
		$V_{CC} = 6.0$ V	-	10	17	ns
$t_{en}$	enable time	$\overline{OE}$ to nY; see <a href="#">Figure 7</a>		[2]		
		$V_{CC} = 2.0$ V	-	44	150	ns
		$V_{CC} = 4.5$ V	-	16	30	ns
		$V_{CC} = 6.0$ V	-	13	26	ns
$t_{dis}$	disable time	$\overline{OE}$ to nY; see <a href="#">Figure 7</a>		[3]		
		$V_{CC} = 2.0$ V	-	55	150	ns
		$V_{CC} = 4.5$ V	-	20	30	ns
		$V_{CC} = 6.0$ V	-	16	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; $V_I = \text{GND}$ to $V_{CC}$		[5]	-	pF
<b><math>T_{amb} = -40</math> °C to +85 °C</b>						
$t_{pd}$	propagation delay	nA to nY; see <a href="#">Figure 6</a>		[1]		
		$V_{CC} = 2.0$ V	-	-	125	ns
		$V_{CC} = 4.5$ V	-	-	25	ns
		$V_{CC} = 6.0$ V	-	-	21	ns
$t_{en}$	enable time	$\overline{OE}$ 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 74HC366 ...continued**Voltages are referenced to GND (ground = 0 V);  $C_L = 50 \text{ pF}$  unless otherwise specified; see test circuit [Figure 8](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{dis}$	disable time	$\overline{OE_n}$ to $nY$ ; see <a href="#">Figure 7</a>	[3]			
		$V_{CC} = 2.0 \text{ V}$	-	-	190	ns
		$V_{CC} = 4.5 \text{ V}$	-	-	38	ns
		$V_{CC} = 6.0 \text{ V}$	-	-	33	ns
$t_t$	transition time	see <a href="#">Figure 6</a>	[4]			
		$V_{CC} = 2.0 \text{ V}$	-	-	75	ns
		$V_{CC} = 4.5 \text{ V}$	-	-	15	ns
		$V_{CC} = 6.0 \text{ V}$	-	-	13	ns
$T_{amb} = -40 \text{ }^{\circ}\text{C to } +125 \text{ }^{\circ}\text{C}$						
$t_{pd}$	propagation delay	$nA$ to $nY$ ; see <a href="#">Figure 6</a>	[1]			
		$V_{CC} = 2.0 \text{ V}$	-	-	150	ns
		$V_{CC} = 4.5 \text{ V}$	-	-	30	ns
		$V_{CC} = 6.0 \text{ V}$	-	-	26	ns
$t_{en}$	enable time	$\overline{OE_n}$ to $nY$ ; see <a href="#">Figure 7</a>	[2]			
		$V_{CC} = 2.0 \text{ V}$	-	-	225	ns
		$V_{CC} = 4.5 \text{ V}$	-	-	45	ns
		$V_{CC} = 6.0 \text{ V}$	-	-	38	ns
$t_{dis}$	disable time	$\overline{OE_n}$ to $nY$ ; see <a href="#">Figure 7</a>	[3]			
		$V_{CC} = 2.0 \text{ V}$	-	-	225	ns
		$V_{CC} = 4.5 \text{ V}$	-	-	45	ns
		$V_{CC} = 6.0 \text{ V}$	-	-	38	ns
$t_t$	transition time	see <a href="#">Figure 6</a>	[4]			
		$V_{CC} = 2.0 \text{ V}$	-	-	90	ns
		$V_{CC} = 4.5 \text{ V}$	-	-	18	ns
		$V_{CC} = 6.0 \text{ V}$	-	-	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  $\mu\text{W}$ ).

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

 $f_i$  = 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 74HCT366**Voltages are referenced to GND (ground = 0 V);  $C_L = 50 \text{ pF}$  unless otherwise specified; see test circuit [Figure 8](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
<b><math>T_{amb} = 25^\circ\text{C}</math></b>							
$t_{pd}$	propagation delay	nA to nY; see <a href="#">Figure 6</a>	[1]				
		$V_{CC} = 4.5 \text{ V}$	-	13	24	ns	
		$V_{CC} = 5 \text{ V}; C_L = 15 \text{ pF}$	-	11	-	ns	
$t_{en}$	enable time	$\overline{OEn}$ to nY; $V_{CC} = 4.5 \text{ V}$ ; see <a href="#">Figure 7</a>	[2]	-	16	35	ns
$t_{dis}$	disable time	$\overline{OEn}$ to nY; $V_{CC} = 4.5 \text{ V}$ ; see <a href="#">Figure 7</a>	[3]	-	20	35	ns
$t_t$	transition time	$V_{CC} = 4.5 \text{ V}$ ; see <a href="#">Figure 6</a>	[4]	-	5	12	ns
$C_{PD}$	power dissipation capacitance	per buffer; $V_I = \text{GND}$ to $(V_{CC} - 1.5 \text{ V})$	[5]	-	30	-	pF
<b><math>T_{amb} = -40^\circ\text{C to } +85^\circ\text{C}</math></b>							
$t_{pd}$	propagation delay	nA to nY; $V_{CC} = 4.5 \text{ V}$ ; see <a href="#">Figure 6</a>	[1]	-	-	30	ns
$t_{en}$	enable time	$\overline{OEn}$ to nY; $V_{CC} = 4.5 \text{ V}$ ; see <a href="#">Figure 7</a>	[2]	-	-	44	ns
$t_{dis}$	disable time	$\overline{OEn}$ to nY; $V_{CC} = 4.5 \text{ V}$ ; see <a href="#">Figure 7</a>	[3]	-	-	44	ns
$t_t$	transition time	$V_{CC} = 4.5 \text{ V}$ ; see <a href="#">Figure 6</a>	[4]	-	-	15	ns
<b><math>T_{amb} = -40^\circ\text{C to } +125^\circ\text{C}</math></b>							
$t_{pd}$	propagation delay	nA to nY; $V_{CC} = 4.5 \text{ V}$ ; see <a href="#">Figure 6</a>	[1]	-	-	36	ns
$t_{en}$	enable time	$\overline{OEn}$ to nY; $V_{CC} = 4.5 \text{ V}$ ; see <a href="#">Figure 7</a>	[2]	-	-	53	ns
$t_{dis}$	disable time	$\overline{OEn}$ to nY; $V_{CC} = 4.5 \text{ V}$ ; see <a href="#">Figure 7</a>	[3]	-	-	53	ns
$t_t$	transition time	$V_{CC} = 4.5 \text{ V}$ ; 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  $\mu\text{W}$ ).

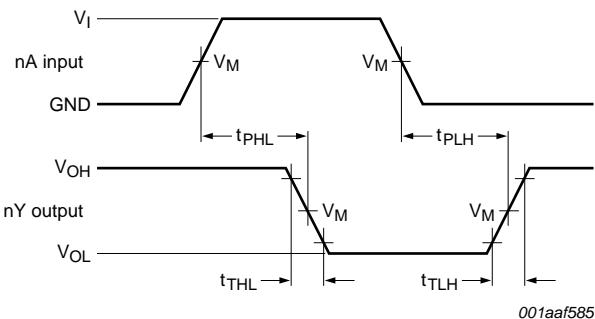
$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

 $f_i$  = 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.

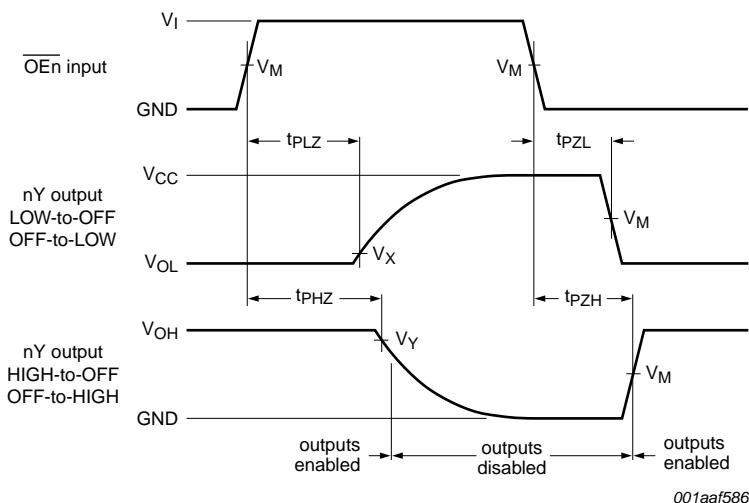
## 11. Waveforms



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**



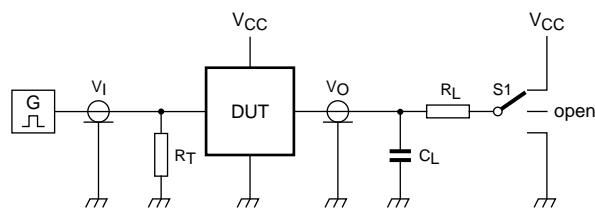
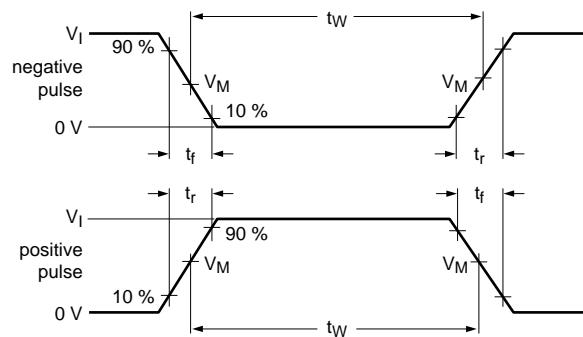
Measurement points are given in [Table 10](#).

$V_{OL}$  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		
		$V_M$	$V_X$	$V_Y$
74HC366	0.5 $V_{CC}$	0.5 $V_{CC}$	0.1 $\times V_{CC}$	0.9 $\times V_{CC}$
74HCT366	1.3 V	1.3 V	0.1 $\times V_{CC}$	0.9 $\times V_{CC}$



001aad983

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

Definitions 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 resistor

$S1$  = Test selection switch

**Fig 8. Load circuitry for measuring switching times**

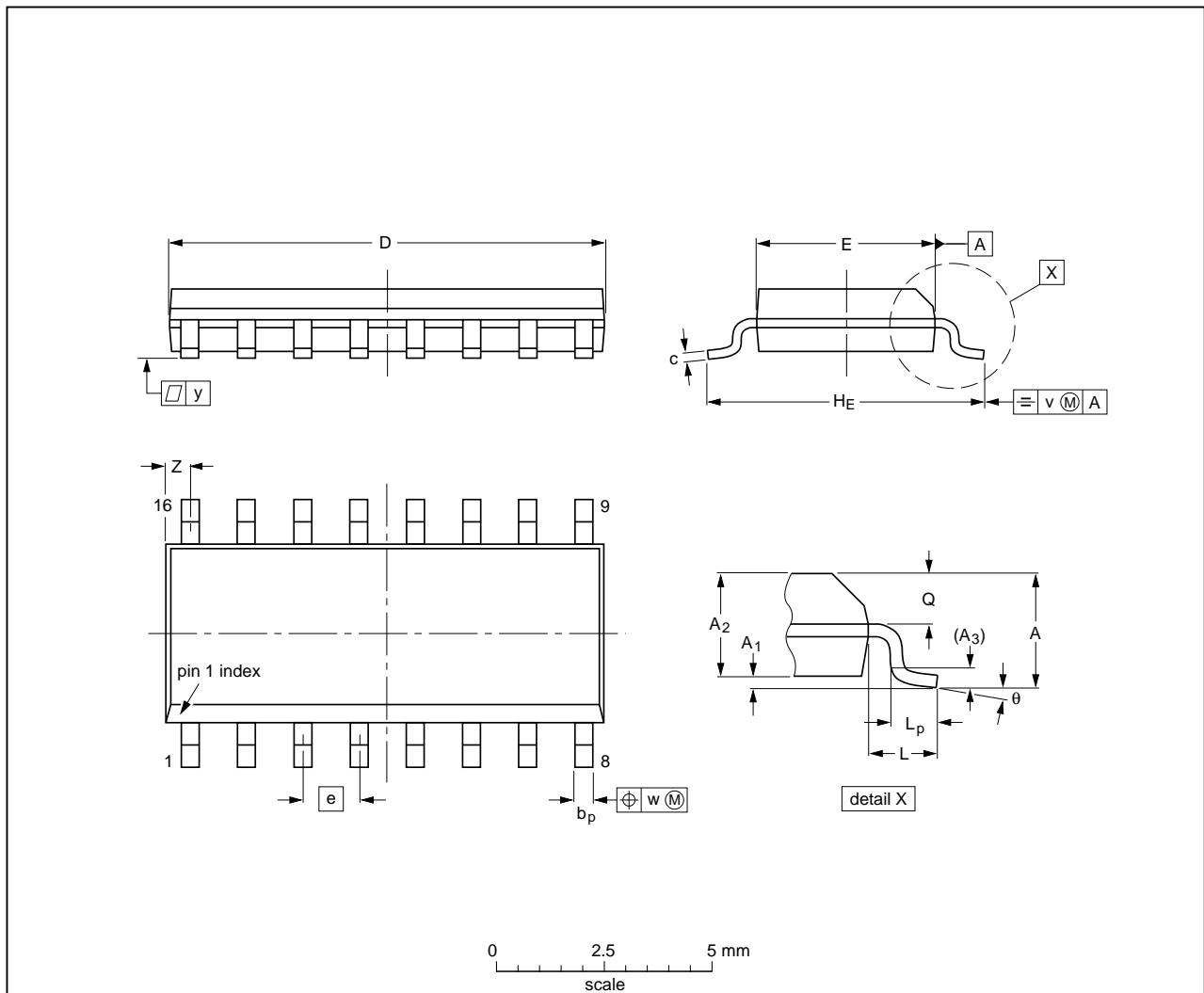
**Table 11. Test data**

Type	Input		Load		S1 position		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
74HC366	$V_{CC}$	6 ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$
74HCT366	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



### DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	θ
mm	1.75 0.10	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	10.0 9.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069 0.004	0.010 0.049	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.39 0.38	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.020	0.01	0.01	0.004	0.028 0.012	0°

### Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT109-1	076E07	MS-012				99-12-27 03-02-19

Fig 9. Package outline SOT109-1 (SO16)

SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm

SOT338-1

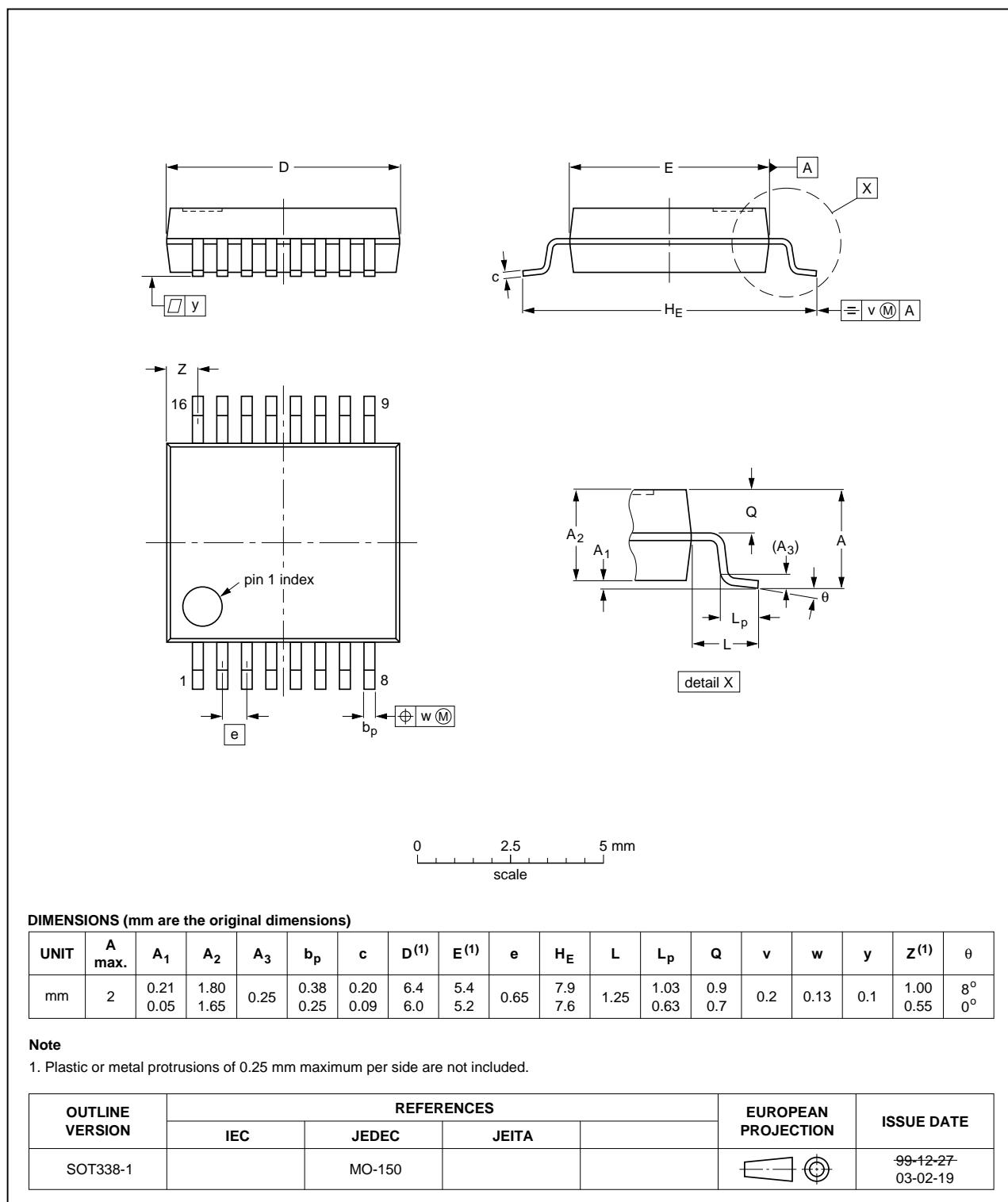
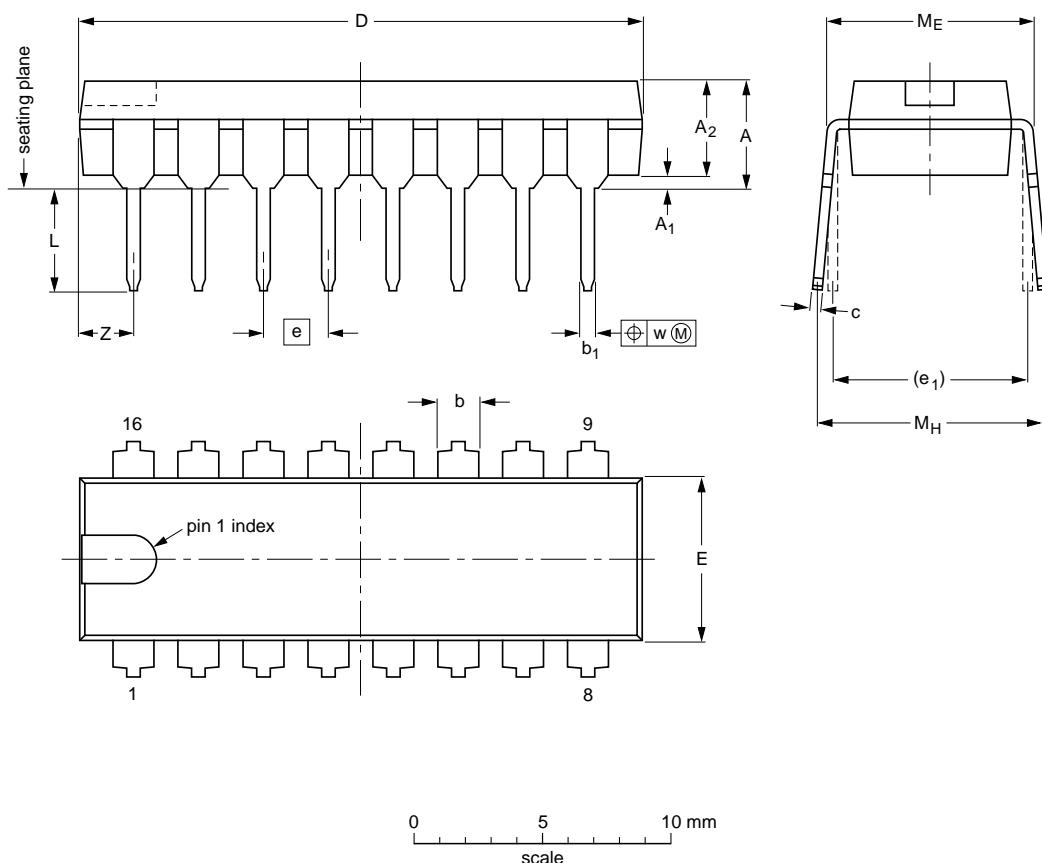


Fig 10. Package outline SOT338-1 (SSOP16)

DIP16: plastic dual in-line package; 16 leads (300 mil); long body

SOT38-1



## DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A <sub>1</sub> min.	A <sub>2</sub> max.	b	b <sub>1</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	e <sub>1</sub>	L	M <sub>E</sub>	M <sub>H</sub>	w	Z <sup>(1)</sup> max.
mm	4.7	0.51	3.7	1.40 1.14	0.53 0.38	0.32 0.23	21.8 21.4	6.48 6.20	2.54	7.62	3.9 3.4	8.25 7.80	9.5 8.3	0.254	2.2
inches	0.19	0.02	0.15	0.055 0.045	0.021 0.015	0.013 0.009	0.86 0.84	0.26 0.24	0.1	0.3	0.15 0.13	0.32 0.31	0.37 0.33	0.01	0.087

## Note

1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT38-1	050G09	MO-001	SC-503-16			99-12-27 03-02-13

Fig 11. Package outline SOT38-1 (DIP16)

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

SOT403-1

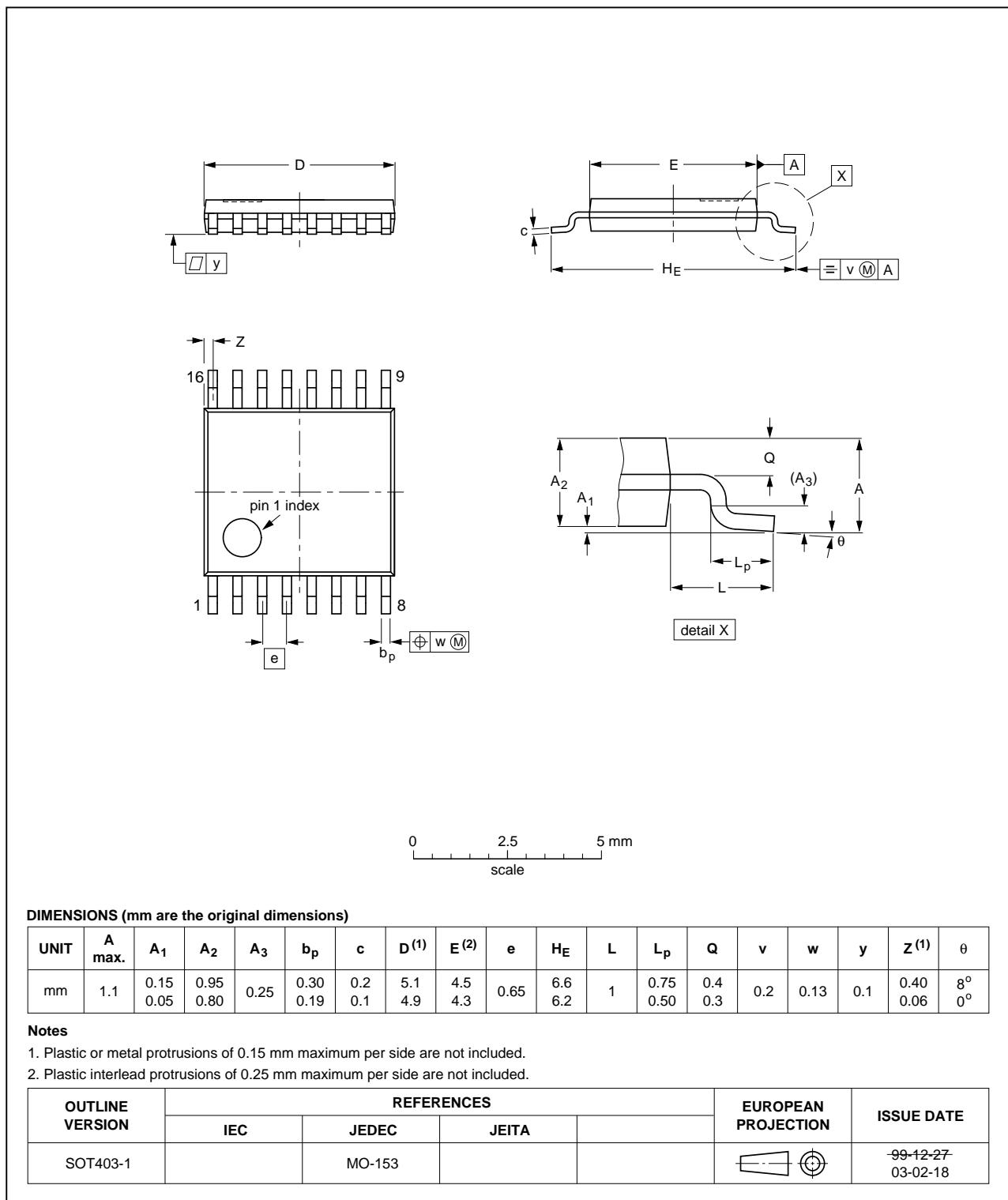


Fig 12. Package outline SOT403-1 (TSSOP16)

## 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

## 14. Revision history

**Table 13. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT366 v.4	20120904	Product data sheet	-	74HC_HCT366 v.3
Modifications:	• Legal pages updated.			
74HC_HCT366 v.3	20061121	Product data sheet	-	74HC_HCT366_CNV v.2
74HC_HCT366_CNV v.2	19901201	Product specification	-	-

## 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.
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.nxp.com>.

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