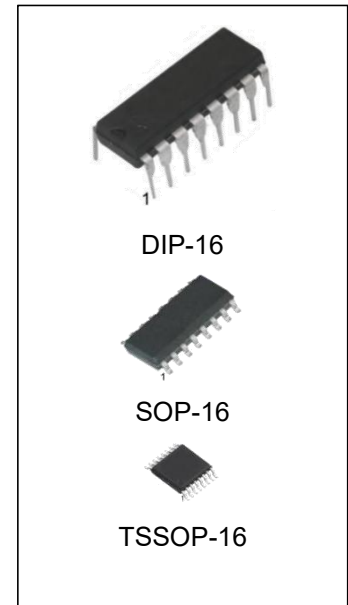


## Hex Buffer/Line Driver; 3-state

### Features:

- Input levels:CMOS level
- 3-state outputs
- Specified from -40°C to +125°C
- Packaging information: DIP16/SOP16/TSSOP16



### Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
74HC365N/HG	DIP-16	74HC365	TUBE	1000pcs/box
74HC365M/TR-HG	SOP-16	74HC365	REEL	2500pcs/reel
74HC365MT/TR-HG	TSSOP-16	HC365	REEL	2500pcs/reel

## General Description

The 74HC365 is a hex buffer/line driver with 3-state outputs controlled by the output enable inputs ( $\overline{OE}n$ ). A HIGH on  $\overline{OE}n$  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  $V_{CC}$ .

## Block Diagram

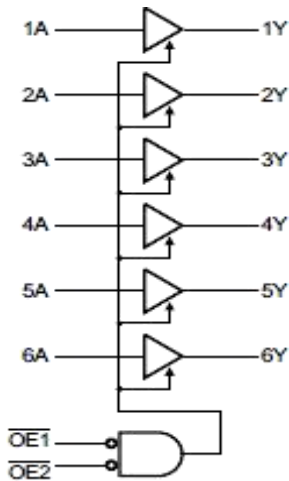


Figure 1. Logic symbol

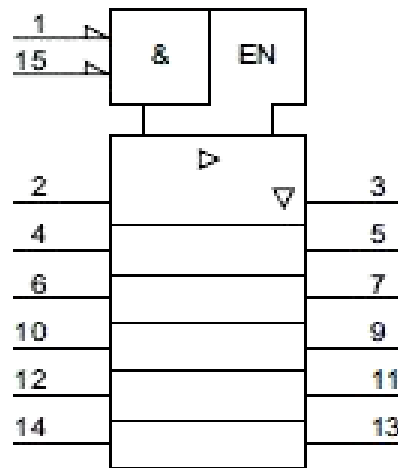


Figure 2. IEC logic symbol

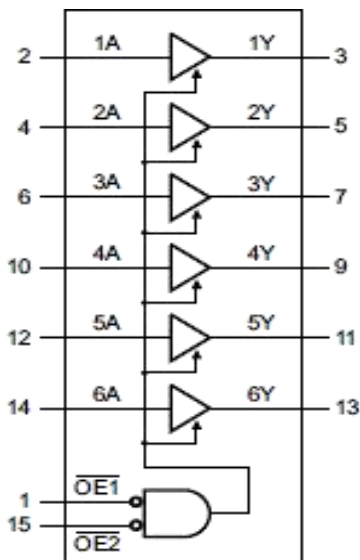


Figure 3. Functional diagram

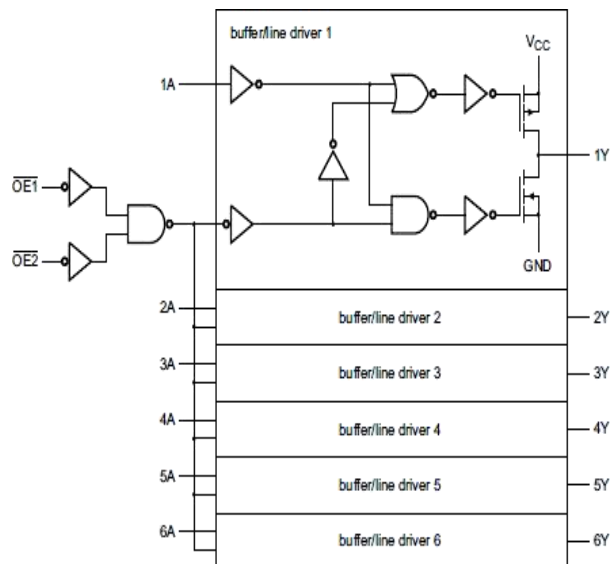
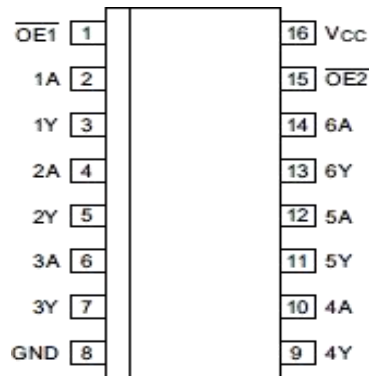


Figure 4. Logic diagram

## Pin Configurations



DIP-16/SOP-16/TSSOP16

## Pin Description

Pin No.	Pin Name	Description
1	$\overline{OE1}$	output enable input 1 (active LOW)
2	1A	data input 1
3	1Y	data output 1
4	2A	data input 2
5	2Y	data output 2
6	3A	data input 3
7	3Y	data output 3
8	GND	ground (0V)
9	4Y	data output 4
10	4A	data input 4
11	5Y	data output 5
12	5A	data input 5
13	6Y	data output 6
14	6A	data input 6
15	$\overline{OE2}$	output enable input 2 (active LOW)
16	V <sub>CC</sub>	supply voltage

## Function Table

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

**Note:** H=HIGH voltage level; L=LOW voltage level; X=don't care; Z=high-impedance OFF-state.

## Absolute Maximum Ratings

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Max.	Unit
Supply Voltage	$V_{CC}$	-	-0.5	+7.0	V
Input Clamping Current	$I_{IK}$	$V_I < -0.5V$ or $V_I > V_{CC}+0.5V$	-	$\pm 20$	mA
Output Clamping Current	$I_{OK}$	$V_O < -0.5V$ or $V_O > V_{CC}+0.5V$	-	$\pm 20$	mA
Output Current	$I_O$	$-0.5V < V_O < V_{CC}+0.5V$	-	$\pm 35$	mA
Supply Current	$I_{CC}$	-	-	70	mA
Ground Current	$I_{GND}$	-	-70	-	mA
Storage Temperature	$T_{stg}$	-	-65	+150	°C
Total Power Dissipation	$P_{tot}$	-	-	500	mW
Soldering Temperature	$T_L$	10s		260	°C

**Note:** Stress greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions outside those indicated in the operational sections of this specification are not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability

## Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	$V_{CC}$	-	2.0	5.0	6.0	V
Input Voltage	$V_I$	-	0	-	$V_{CC}$	V
Output Voltage	$V_O$	-	0	-	$V_{CC}$	V
Input Transition Rise And Fall Rate	$\Delta t/\Delta V$	$V_{CC}=2.0V$	-	-	625	ns/V
		$V_{CC}=4.5V$	-	1.67	139	ns/V
		$V_{CC}=6.0V$	-	-	83	ns/V
Operating temperature range <sup>(1)</sup>	$T_{amb}$	-	-40	-	+125	°C

**Note:**(1) Operating temperature range: -40°C to +125°C. This product is designed for industrial grade applications. For automotive grade versions compliant with AEC-Q100, please conduct internal screening per the standard or contact our sales team for availability.

## Electrical Characteristics

### DC Characteristics 1

( $T_{amb}=25^{\circ}C$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
HIGH-level input voltage	$V_{IH}$	$V_{CC}=2.0V$	1.5	1.2	-	V	
		$V_{CC}=4.5V$	3.15	2.4	-	V	
		$V_{CC}=6.0V$	4.2	3.2	-	V	
LOW-level input voltage	$V_{IL}$	$V_{CC}=2.0V$	-	0.8	0.5	V	
		$V_{CC}=4.5V$	-	2.1	1.35	V	
		$V_{CC}=6.0V$	-	2.8	1.8	V	
HIGH-level output voltage	$V_{OH}$	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=-20\mu A; V_{CC}=2.0V$	1.9	2.0	-	V
			$I_O=-20\mu A; V_{CC}=4.5V$	4.4	4.5	-	V
			$I_O=-20\mu A; V_{CC}=6.0V$	5.9	6.0	-	V
			$I_O=-6.0mA; V_{CC}=4.5V$	3.98	4.32	-	V
			$I_O=-7.8mA; V_{CC}=6.0V$	5.48	5.81	-	V
LOW-level output voltage	$V_{OL}$	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=20\mu A; V_{CC}=2.0V$	-	0	0.1	V
			$I_O=20\mu A; V_{CC}=4.5V$	-	0	0.1	V
			$I_O=20\mu A; V_{CC}=6.0V$	-	0	0.1	V
			$I_O=6.0mA; V_{CC}=4.5V$	-	0.15	0.26	V
			$I_O=7.8mA; V_{CC}=6.0V$	-	0.16	0.26	V
input leakage current	$I_I$	$V_I=V_{CC} \text{ or } GND; V_{CC}=6.0V$	-	-	$\pm 1.0$	$\mu A$	
OFF-state output current	$I_{OZ}$	$V_I=V_{IH} \text{ or } V_{IL}; V_{CC}=6.0V; V_O=V_{CC} \text{ or } GND$	-	-	$\pm 1.0$	$\mu A$	
supply current	$I_{CC}$	$V_I=V_{CC} \text{ or } GND; I_O=0A; V_{CC}=6.0V$	-	-	8.0	$\mu A$	
Input capacitance	$C_I$	-	-	3.5	-	pF	

**DC Characteristics 2**

 (T<sub>amb</sub>=-40°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
HIGH-level input voltage	V <sub>IH</sub>	V <sub>CC</sub> =2.0V	1.5	-	-	V	
		V <sub>CC</sub> =4.5V	3.15	-	-	V	
		V <sub>CC</sub> =6.0V	4.2	-	-	V	
LOW-level input voltage	V <sub>IL</sub>	V <sub>CC</sub> =2.0V	-	-	0.5	V	
		V <sub>CC</sub> =4.5V	-	-	1.35	V	
		V <sub>CC</sub> =6.0V	-	-	1.8	V	
HIGH-level output voltage	V <sub>OH</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>O</sub> =-20uA; V <sub>CC</sub> =2.0V	1.9	-	-	V
			I <sub>O</sub> =-20uA; V <sub>CC</sub> =4.5V	4.4	-	-	V
			I <sub>O</sub> =-20uA; V <sub>CC</sub> =6.0V	5.9	-	-	V
			I <sub>O</sub> =-6.0mA; V <sub>CC</sub> =4.5V	3.84	-	-	V
			I <sub>O</sub> =-7.8mA; V <sub>CC</sub> =6.0V	5.34	-	-	V
LOW-level output voltage	V <sub>OL</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>O</sub> =20uA; V <sub>CC</sub> =2.0V	-	-	0.1	V
			I <sub>O</sub> =20uA; V <sub>CC</sub> =4.5V	-	-	0.1	V
			I <sub>O</sub> =20uA; V <sub>CC</sub> =6.0V	-	-	0.1	V
			I <sub>O</sub> =6.0mA; V <sub>CC</sub> =4.5V	-	-	0.33	V
			I <sub>O</sub> =7.8mA; V <sub>CC</sub> =6.0V	-	-	0.33	V
input leakage current	I <sub>I</sub>	V <sub>I</sub> =V <sub>CC</sub> or GND; V <sub>CC</sub> =6.0V	-	-	±1.0	uA	
OFF-state output current	I <sub>OZ</sub>	V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> =6.0V; V <sub>O</sub> =V <sub>CC</sub> or GND	-	-	±5.0	uA	
supply current	I <sub>CC</sub>	V <sub>I</sub> =V <sub>CC</sub> or GND; I <sub>O</sub> =0A; V <sub>CC</sub> =6.0V	-	-	80	uA	

### DC Characteristics 3

( $T_{amb} = -40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
HIGH-level input voltage	$V_{IH}$	$V_{CC}=2.0V$	1.5	-	-	V	
		$V_{CC}=4.5V$	3.15	-	-	V	
		$V_{CC}=6.0V$	4.2	-	-	V	
LOW-level input voltage	$V_{IL}$	$V_{CC}=2.0V$	-	-	0.5	V	
		$V_{CC}=4.5V$	-	-	1.35	V	
		$V_{CC}=6.0V$	-	-	1.8	V	
HIGH-level output voltage	$V_{OH}$	$V_I = V_{IH} \text{ or } V_{IL}$	$I_o = -20\mu A; V_{CC} = 2.0V$	1.9	-	-	V
			$I_o = -20\mu A; V_{CC} = 4.5V$	4.4	-	-	V
			$I_o = -20\mu A; V_{CC} = 6.0V$	5.9	-	-	V
			$I_o = -6.0mA; V_{CC} = 4.5V$	3.7	-	-	V
			$I_o = -7.8mA; V_{CC} = 6.0V$	5.2	-	-	V
LOW-level output voltage	$V_{OL}$	$V_I = V_{IH} \text{ or } V_{IL}$	$I_o = 20\mu A; V_{CC} = 2.0V$	-	-	0.1	V
			$I_o = 20\mu A; V_{CC} = 4.5V$	-	-	0.1	V
			$I_o = 20\mu A; V_{CC} = 6.0V$	-	-	0.1	V
			$I_o = 6.0mA; V_{CC} = 4.5V$	-	-	0.4	V
			$I_o = 7.8mA; V_{CC} = 6.0V$	-	-	0.4	V
input leakage current	$I_I$	$V_I = V_{CC} \text{ or } GND; V_{CC} = 6.0V$	-	-	$\pm 1.0$	$\mu A$	
OFF-state output current	$I_{OZ}$	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 6.0V;$ $V_O = V_{CC} \text{ or } GND$	-	-	$\pm 10$	$\mu A$	
supply current	$I_{CC}$	$V_I = V_{CC} \text{ or } GND; I_o = 0A; V_{CC} = 6.0V$	-	-	160	$\mu A$	

**AC Characteristics 1**

 (T<sub>amb</sub>=25°C, GND =0V, C<sub>L</sub>=50pF, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
nA to nY -propagation delay	t <sub>pd</sub>	see Figure 6	V <sub>CC</sub> =2.0V	-	30	95	ns
			V <sub>CC</sub> =4.5V	-	11	19	ns
			V <sub>CC</sub> =5.0V; C <sub>L</sub> =15pF	-	9	-	ns
			V <sub>CC</sub> =6.0V	-	9	16	ns
$\overline{0E}n$ to nY enable time	t <sub>en</sub>	see Figure 7	V <sub>CC</sub> =2.0V	-	47	150	ns
			V <sub>CC</sub> =4.5V	-	17	30	ns
			V <sub>CC</sub> =6.0V	-	14	26	ns
$\overline{0E}n$ to nY disable time	t <sub>dis</sub>	see Figure 7	V <sub>CC</sub> =2.0V	-	61	150	ns
			V <sub>CC</sub> =4.5V	-	22	30	ns
			V <sub>CC</sub> =6.0V	-	18	26	ns
transition time	t <sub>t</sub>	see Figure 6	V <sub>CC</sub> =2.0V	-	14	60	ns
			V <sub>CC</sub> =4.5V	-	5	12	ns
			V <sub>CC</sub> =6.0V	-	4	10	ns
power dissipation capacitance	C <sub>PD</sub>	per buffer; V <sub>I</sub> =GND to V <sub>CC</sub>	-	40	-	pF	

**Note:**

 [1] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

 [2] t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.

 [3] t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.

 [4] t<sub>t</sub> is the same as t<sub>THL</sub> and t<sub>TLH</sub>.

 [5] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in uW).

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

 f<sub>i</sub>=input frequency in MHz;

 f<sub>o</sub>=output frequency in MHz;

 C<sub>L</sub>=output load capacitance in pF;

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

N=number of inputs switching;

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

**AC Characteristics 2**

 (T<sub>amb</sub>=-40°C to +85°C, GND=0V, C<sub>L</sub>=50pF, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
nA to nY propagation delay	t <sub>pd</sub>	see Figure 6	V <sub>CC</sub> =2.0V	-	-	120	ns
			V <sub>CC</sub> =4.5V	-	-	24	ns
			V <sub>CC</sub> =6.0V	-	-	20	ns
$\overline{0}En$ to nY enable time	t <sub>en</sub>	see Figure 7	V <sub>CC</sub> =2.0V	-	-	190	ns
			V <sub>CC</sub> =4.5V	-	-	38	ns
			V <sub>CC</sub> =6.0V	-	-	33	ns
$\overline{0}En$ to nY disable time	t <sub>dis</sub>	see Figure 7	V <sub>CC</sub> =2.0V	-	-	190	ns
			V <sub>CC</sub> =4.5V	-	-	38	ns
			V <sub>CC</sub> =6.0V	-	-	33	ns
transition time	t <sub>t</sub>	see Figure 6	V <sub>CC</sub> =2.0V	-	-	75	ns
			V <sub>CC</sub> =4.5V	-	-	15	ns
			V <sub>CC</sub> =6.0V	-	-	13	ns

**Note:**

- [1] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.
- [2] t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.
- [3] t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.
- [4] t<sub>t</sub> is the same as t<sub>THL</sub> and t<sub>TLH</sub>.

**AC Characteristics 3**

 (T<sub>amb</sub>=-40°C to +125°C, GND=0V, C<sub>L</sub>=50pF, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
nA to nY propagation delay	t <sub>pd</sub>	see Figure 6	V <sub>CC</sub> =2.0V	-	-	145	ns
			V <sub>CC</sub> =4.5V	-	-	29	ns
			V <sub>CC</sub> =6.0V	-	-	25	ns
0En to nY enable time	t <sub>en</sub>	see Figure 7	V <sub>CC</sub> =2.0V	-	-	225	ns
			V <sub>CC</sub> =4.5V	-	-	45	ns
			V <sub>CC</sub> =6.0V	-	-	38	ns
0En to nY disable time	t <sub>dis</sub>	see Figure 7	V <sub>CC</sub> =2.0V	-	-	225	ns
			V <sub>CC</sub> =4.5V	-	-	45	ns
			V <sub>CC</sub> =6.0V	-	-	38	ns
transition time	t <sub>t</sub>	see Figure 6	V <sub>CC</sub> =2.0V	-	-	90	ns
			V <sub>CC</sub> =4.5V	-	-	18	ns
			V <sub>CC</sub> =6.0V	-	-	15	ns

Note:

 [1] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

 [2] t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.

 [3] t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.

 [4] t<sub>t</sub> is the same as t<sub>THL</sub> and t<sub>TLH</sub>.

## Testing Circuit

### AC Testing Circuit

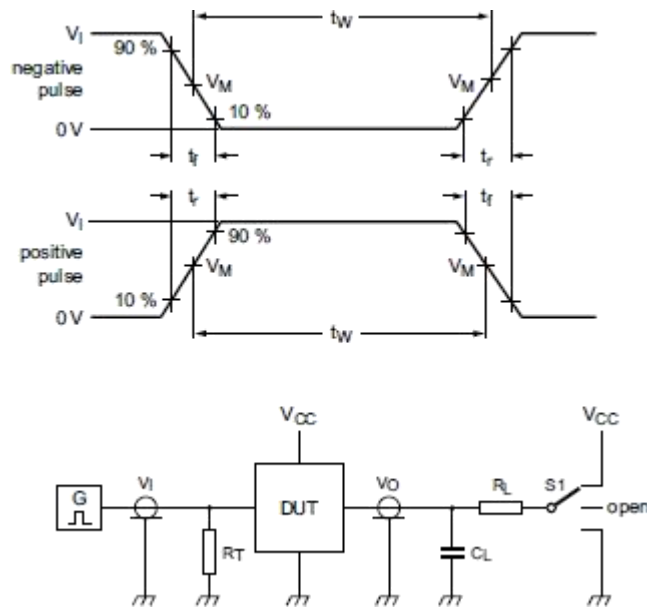


Figure 5. Test circuit for measuring switching times

Definitions for test circuit:

$R_L$ =Load resistance.

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

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

$S1$ =Test selection switch.

### AC Testing Waveforms

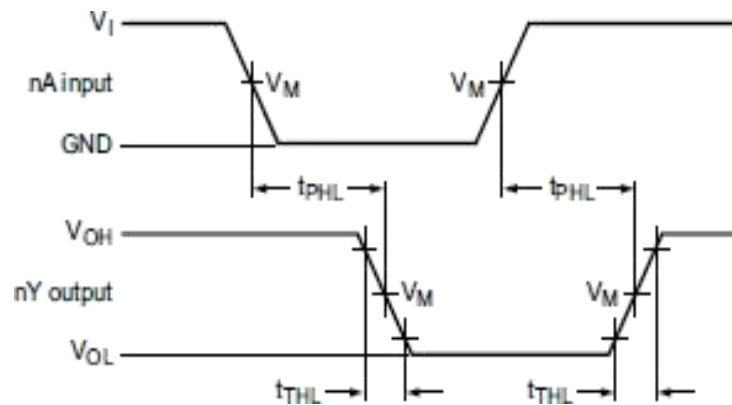
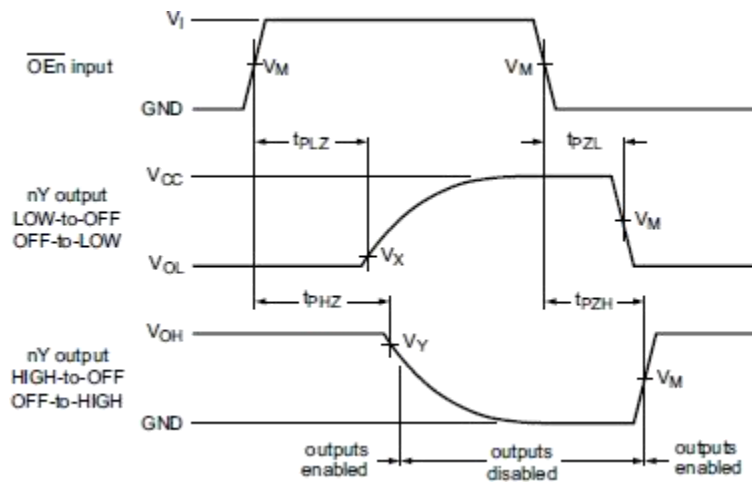


Figure 6. Input (nA) to output (nY) propagation delays and output transition times


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

### Measurement Points

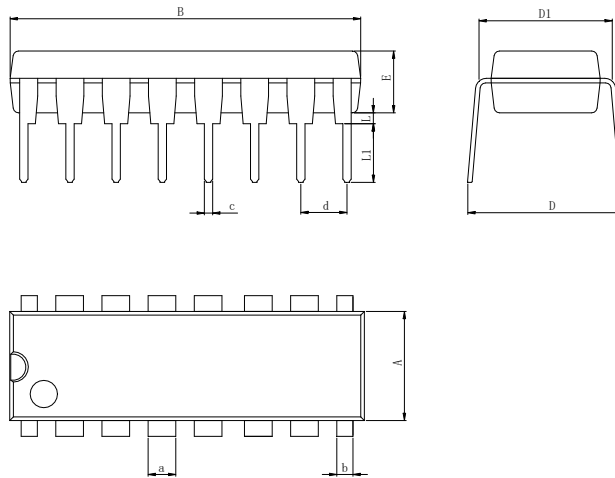
Type	Input		Output	
	$V_M$	$V_M$	$V_X$	$V_Y$
74HC365	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$

### 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	$V_{CC}$	6ns	15pF, 50pF	1k $\Omega$	open	GND	$V_{CC}$

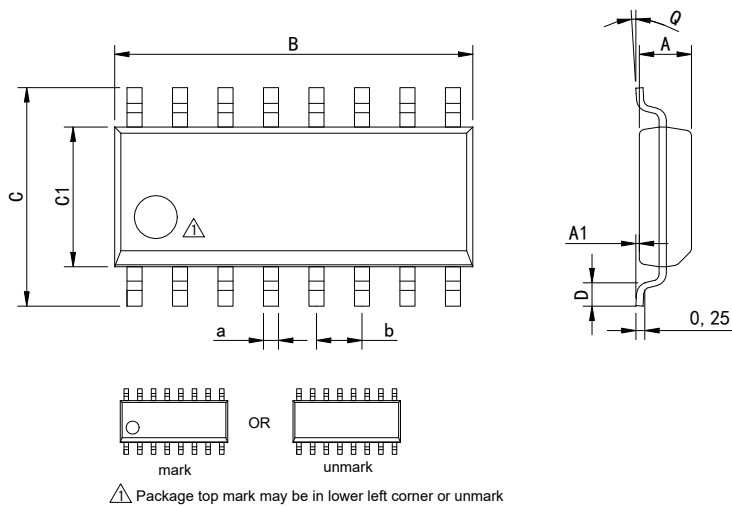
## Physical Dimensions

### DIP-16



Dimensions In Millimeters(DIP-16)											
Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	18.94	8.10	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	19.56	10.9	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

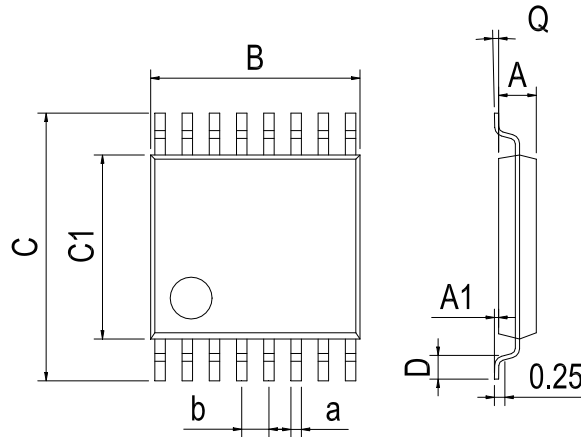
### SOP-16



Dimensions In Millimeters(SOP-16)										
Symbol:	A	A1	B	C	C1	D	Q	a	b	
Min:	1.35	0.05	9.80	5.80	3.80	0.40	0°	0.35	1.27 BSC	
Max:	1.55	0.20	10.0	6.20	4.00	0.80	8°	0.45		

## Physical Dimensions

TSSOP-16



Dimensions In Millimeters(TSSOP-16)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.85	0.05	4.90	6.20	4.30	0.40	0°	0.20	0.65 BSC
Max:	0.95	0.20	5.10	6.60	4.50	0.80	8°	0.25	

## Revision History

REVISION NUMBER	DATE	REVISION	PAGE
V1.0	2016-9	New	1-12
V1.1	2025-11	Document Reformatting	1-16

**IMPORTANT STATEMENT:**

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