

## General Description

The 74HC/HCT240 is an 8-bit inverting buffer/line driver with 3-state outputs. The device can be used as two 4-bit buffers or one 8-bit buffer. The device features two output enables ( $1O\bar{E}$  and  $2O\bar{E}$ ), each controlling four of the 3-state outputs. A HIGH on  $nO\bar{E}$  causes the outputs to assume a high-impedance OFF-state. Inputs include clamp diodes that enable the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

## Features

- Input levels:  
For 74HC240: CMOS level  
For 74HCT240: TTL level
- Inverting 3-state outputs
- Specified from  $-40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$
- Packaging information: DIP20/SOP20/TSSOP20

## ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing QTY
SN74HC240N	DIP-20	74HC240N	Tube	720/Box
SN74HC240DTR	SOP-20	74HC240	Tape	2000/Reel
SN74HCT240DTR	SOP-20	74HCT240	Tape	2000/Reel
SN74HCT240TDTR	TSSOP-20	74HCT240	Tape	2000/Reel

**Block Diagram And Pin Description**

**Block Diagram**

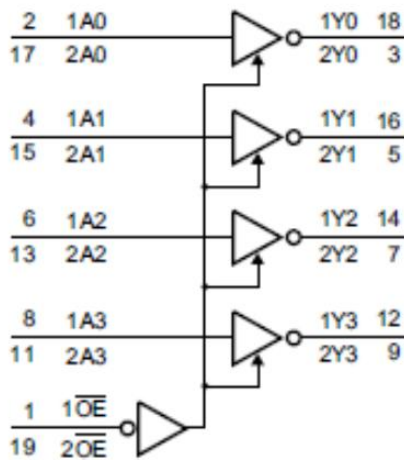


Figure 1. Logic symbol

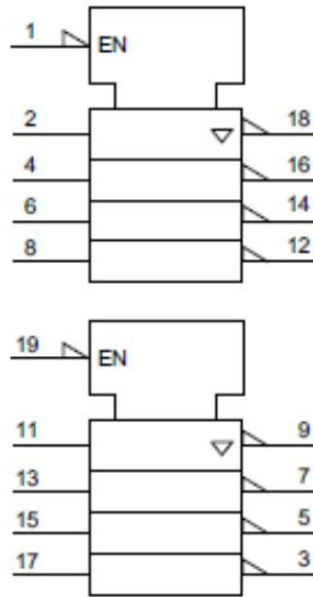


Figure 2. IEC Logic symbol

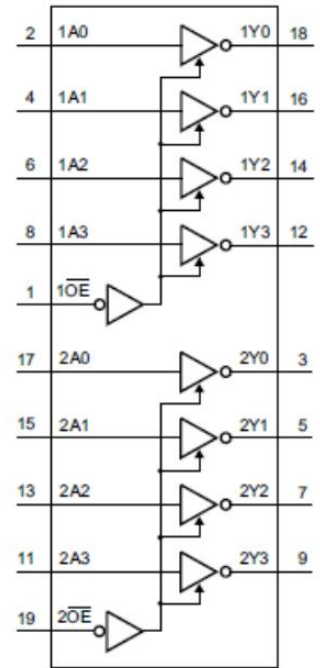
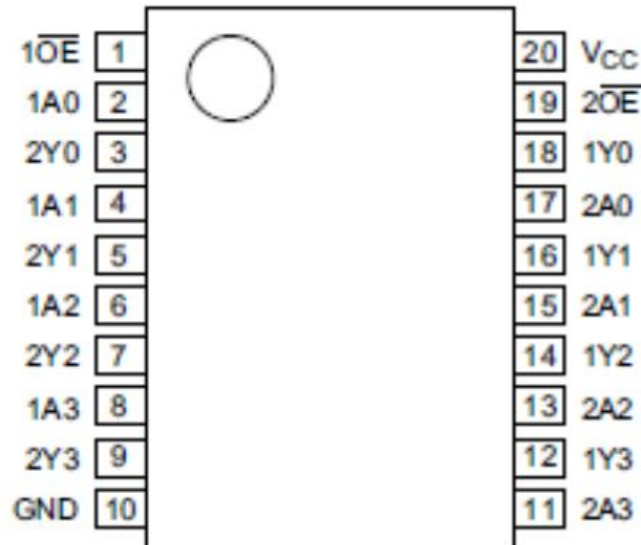


Figure 3. Functional diagram

**Pin Configurations**



**Pin Description**

Pin No.	Pin Name	Description
1	1OE	output enable input(active LOW)
2	1A0	data input
3	2Y0	bus output
4	1A1	data input
5	2Y1	bus output
6	1A2	data input
7	2Y2	bus output
8	1A3	data input
9	2Y3	bus output
10	GND	ground(0V)
11	2A3	data input
12	1Y3	bus output
13	2A2	data input
14	1Y2	bus output
15	2A1	data input
16	1Y1	bus output
17	2A0	data input
18	1Y0	bus output
19	2OE	output enable input(active LOW)
20	V <sub>cc</sub>	supply voltage

**Function Table**

Input		Output
nOE	nAn	nYn
L	L	H
L	H	L
H	X	Z

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

## Electrical Parameter

**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	DIP	245	°C
			SOP	250	

Note:

[1] For DIP20 packages: above 70°C the value of  $P_{tot}$  derates linearly with 12mW/K.

[2] For SOP20 packages: above 70°C the value of  $P_{tot}$  derates linearly with 8mW/K.

[3] For (T)SSOP20 packages: above 60°C the value of  $P_{tot}$  derates linearly with 5.5mW/K.

## Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>74HC240</b>							
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
ambient temperature	$T_{amb}$	-	-40	-	+105	°C	
<b>74HCT240</b>							
supply voltage	$V_{CC}$	-	4.5	5.0	5.5	V	
input voltage	$V_I$	-	0	-	$V_{CC}$	V	
output voltage	$V_O$	-	0	-	$V_{CC}$	V	
input transition rise and fall rate	$\Delta t/\Delta V$	$V_{CC}=4.5V$	-	1.67	139	ns/V	
ambient temperature	$T_{amb}$	-	-40	-	+105	°C	

## Electrical Characteristics

DC Characteristics 1 (Tamb=25°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>74HC240</b>							
HIGH-level input voltage	V <sub>IH</sub>	V <sub>CC</sub> =2.0V	1.5	1.2	-	V	
		V <sub>CC</sub> =4.5V	3.15	2.4	-	V	
		V <sub>CC</sub> =6.0V	4.2	3.2	-	V	
LOW-level input voltage	V <sub>IL</sub>	V <sub>CC</sub> =2.0V	-	0.8	0.5	V	
		V <sub>CC</sub> =4.5V	-	2.1	1.35	V	
		V <sub>CC</sub> =6.0V	-	2.8	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	2.0	-	V
			I <sub>O</sub> =-20uA; V <sub>CC</sub> =4.5V	4.4	4.5	-	V
			I <sub>O</sub> =-20uA; V <sub>CC</sub> =6.0V	5.9	6.0	-	V
			I <sub>O</sub> =-6.0mA; V <sub>CC</sub> =4.5V	3.98	4.32	-	V
			I <sub>O</sub> =-7.8mA; V <sub>CC</sub> =6.0V	5.48	5.81	-	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	0.1	V
			I <sub>O</sub> =20uA; V <sub>CC</sub> =4.5V	-	0	0.1	V
			I <sub>O</sub> =20uA; V <sub>CC</sub> =6.0V	-	0	0.1	V
			I <sub>O</sub> =6.0mA; V <sub>CC</sub> =4.5V	-	0.15	0.26	V
			I <sub>O</sub> =7.8mA; V <sub>CC</sub> =6.0V	-	0.16	0.26	V
input leakage current	I <sub>I</sub>	V <sub>I</sub> =V <sub>CC</sub> or GND; V <sub>CC</sub> =6.0V	-	-	±0.1	μA	
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	-	-	±0.5	μA	
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	-	-	8.0	μA	
input apacitance	C <sub>I</sub>	-	-	3.5	-	pF	
<b>74HCT240</b>							
HIGH-level input voltage	V <sub>IH</sub>	V <sub>CC</sub> =4.5V to 5.5V	2.0	1.6	-	V	
LOW-level input voltage	V <sub>IL</sub>	V <sub>CC</sub> =4.5V to 5.5V	-	1.2	0.8	V	
HIGH-level output voltage	V <sub>OH</sub>	V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub> V <sub>CC</sub> =4.5V	I <sub>O</sub> =-20uA	4.4	4.5	-	V
			I <sub>O</sub> =-6.0uA	3.98	4.32	-	V
LOW-level output voltage	V <sub>OL</sub>	V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub> V <sub>CC</sub> =4.5V	I <sub>O</sub> =20uA	-	0	0.1	V
			I <sub>O</sub> =6.0uA	-	0.16	0.26	V
input leakage current	I <sub>I</sub>	V <sub>I</sub> =V <sub>CC</sub> or GND; V <sub>CC</sub> =5.5V	-	-	±0.1	μA	
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> =5.5V; V <sub>O</sub> =V <sub>CC</sub> or GND	-	-	±0.5	μA	
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> =5.5V	-	-	8.0	μA	

Additional Supply current	$\Delta I_{CC}$	per input pin; $V_I=V_{CC}-2.1V$ ; other inputs at $V_{CC}$ or GND; $I_O=0V$ ; $V_{CC}=4.5V$ to $5.5V$	nAn or inputs	-	150	540	$\mu A$
			nO $\bar{E}$ input	-	70	252	$\mu A$
input apacitance	$C_I$	-	-	3.5	-	pF	

## DC Characteristics 2

( $T_{amb}=-40^{\circ}C$  to  $+85^{\circ}C$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>74HC240</b>							
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	$V_{OH}$	$V_I=V_{IH}$ 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
			$I_O=-6.0mA; V_{CC}=4.5V$	3.84	-	-	V
			$I_O=-7.8mA; V_{CC}=6.0V$	5.34	-	-	V
LOW-level output voltage	$V_{OL}$	$V_I=V_{IH}$ 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
			$I_O=6.0mA; V_{CC}=4.5V$	-	-	0.33	V
			$I_O=7.8mA; V_{CC}=6.0V$	-	-	0.33	V
input leakage current	$I_I$	$V_I=V_{CC}$ or GND; $V_{CC}=6.0V$	-	-	$\pm 1.0$	$\mu A$	
OFF-state output current	$I_{OZ}$	$V_I=V_{IH}$ or $V_{IL}; V_{CC}=6.0V$ ; $V_O=V_{CC}$ or GND	-	-	$\pm 5.0$	$\mu A$	
supply current	$I_{CC}$	$V_I=V_{CC}$ or GND; $I_O=0A; V_{CC}=6.0V$	-	-	80	$\mu A$	
<b>74HCT240</b>							
HIGH-level input voltage	$V_{IH}$	$V_{CC}=4.5V$ to $5.5V$	2.0	-	-	V	
LOW-level input voltage	$V_{IL}$	$V_{CC}=4.5V$ to $5.5V$	-	-	0.8	V	
HIGH-level output voltage	$V_{OH}$	$V_I=V_{IH}$ or $V_{IL}$ $V_{CC}=4.5V$	$I_O=-20\mu A$	4.4	-	-	V
			$I_O=-6.0\mu A$	3.84	-	-	V
LOW-level output voltage	$V_{OL}$	$V_I=V_{IH}$ or $V_{IL}$ $V_{CC}=4.5V$	$I_O=20\mu A$	-	-	0.1	V
			$I_O=6.0\mu A$	-	-	0.33	V
input leakage	$I_I$	$V_I=V_{CC}$ or GND; $V_{CC}=5.5V$	-	-	$\pm 1.0$	$\mu A$	



current							
OFF-state output current	$I_{OZ}$	$V_I=V_{IH}$ or $V_{IL}; V_{CC}=5.5V;$ $V_O=V_{CC}$ or $GND$	-	-	$\pm 5.0$	$\mu A$	
supply current	$I_{CC}$	$V_I=V_{CC}$ or $GND; I_O=0A; V_{CC}=5.5V$	-	-	80	$\mu A$	
Additional Supply current	$\Delta I_{CC}$	per input pin; $V_I=V_{CC}-2.1V;$ other inputs at $V_{CC}$ or $GND; I_O=0V;$ $V_{CC}=4.5V$ to $5.5V$	nAn or inputs	-	-	675	$\mu A$
			nOE input	-	-	315	$\mu A$

### DC Characteristics 3

( $T_{amb}=-40^{\circ}C$  to  $+105^{\circ}C$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>74HC240</b>							
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	$V_{OH}$	$V_I=V_{IH}$ 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	$V_{OL}$	$V_I=V_{IH}$ 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	$I_I$	$V_I=V_{CC}$ or $GND; V_{CC}=6.0V$	-	-	$\pm 1.0$	$\mu A$	
OFF-state output current	$I_{OZ}$	$V_I=V_{IH}$ or $V_{IL}; V_{CC}=6.0V;$ $V_O=V_{CC}$ or $GND$	-	-	$\pm 10$	$\mu A$	
supply current	$I_{CC}$	$V_I=V_{CC}$ or $GND; I_O=0A; V_{CC}=6.0V$	-	-	160	$\mu A$	
<b>74HCT240</b>							
HIGH-level input voltage	$V_{IH}$	$V_{CC}=4.5V$ to $5.5V$	2.0	-	-	V	
LOW-level input voltage	$V_{IL}$	$V_{CC}=4.5V$ to $5.5V$	-	-	0.8	V	
HIGH-level output voltage	$V_{OH}$	$V_I=V_{IH}$ or $V_{IL}$ $V_{CC}=4.5V$	$I_O=-20\mu A$	4.4	-	-	V
			$I_O=-6.0\mu A$	3.7	-	-	V

LOW-level output voltage	$V_{OL}$	$V_I=V_{IH}$ or $V_{IL}$ $V_{CC}=4.5V$	$I_O=20\mu A$	-	-	0.1	V
			$I_O=6.0\mu A$	-	-	0.4	V
input leakage current	$I_I$	$V_I=V_{CC}$ or GND; $V_{CC}=5.5V$		-	-	$\pm 1.0$	$\mu A$
OFF-state output current	$I_{OZ}$	$V_I=V_{IH}$ or $V_{IL};V_{CC}=5.5V;$ $V_O=V_{CC}$ or GND		-	-	$\pm 10$	$\mu A$
supply current	$I_{CC}$	$V_I=V_{CC}$ or GND; $I_O=0A;V_{CC}=5.5V$		-	-	16	$\mu A$
Additional Supply current	$\Delta I_{CC}$	per input pin; $V_I=V_{CC}-2.1V;$ other inputs at $V_{CC}$ or GND; $I_O=0V;$ $V_{CC}=4.5V$ to $5.5V$	nAn or inputs	-	-	735	$\mu A$
			nOE input	-	-	343	$\mu A$

AC Characteristics 1 (Tamb=25°C, voltages are referenced to GND(ground=0V),unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>74HC240</b>							
nAn to nYn propagation delay	$t_{pd}$	see Figure5	$V_{CC}=2.0V$	-	30	100	ns
			$V_{CC}=4.5V$	-	11	20	ns
			$V_{CC}=5.0V;C_L=15pF$	-	9	-	ns
			$V_{CC}=6.0V$	-	9	17	ns
nOE to nYn enable time	$t_{en}$	see Figure6	$V_{CC}=2.0V$	-	39	150	ns
			$V_{CC}=4.5V$	-	14	30	ns
			$V_{CC}=6.0V$	-	11	26	ns
nOE to nYn disable time	$t_{dis}$	see Figure6	$V_{CC}=2.0V$	-	41	150	ns
			$V_{CC}=4.5V$	-	15	30	ns
			$V_{CC}=6.0V$	-	12	26	ns
transition time	$t_t$	see Figure5	$V_{CC}=2.0V$	-	14	60	ns
			$V_{CC}=4.5V$	-	5	12	ns
			$V_{CC}=6.0V$	-	4	10	ns
power dissipation capacitance	$C_{PD}$	per buffer; $V_I=GND$ to $V_{CC}$	-	30	-	pF	
<b>74HCT240</b>							
nAn to nYn propagation delay	$t_{pd}$	see Figure5	$V_{CC}=4.5V$	-	11	20	ns
			$V_{CC}=5.0V;C_L=15pF$	-	9	-	ns
nOE to nYn enable time	$t_{en}$	$V_{CC}=4.5V;$ see Figure6	-	13	30	ns	
nOE to nYn disable time	$t_{dis}$	$V_{CC}=4.5V;$ see Figure6	-	13	25	ns	
transition time	$t_t$	$V_{CC}=4.5V;$ see Figure5	-	5	12	ns	
power dissipation capacitance	$C_{PD}$	per buffer; $V_I=GND$ to $V_{CC}-1.5V$	-	30	-	pF	



Note:

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

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

[3]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in uW).

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

$f_i$ =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;

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

### AC Characteristics 2

( $T_{amb}=40^\circ\text{C}$  to  $85^\circ\text{C}$ , voltages are referenced to GND(ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>74HC240</b>							
nAn to nYn propagation delay	$t_{pd}$	see Figure5	$V_{CC}=2.0V$	-	-	125	ns
			$V_{CC}=4.5V$	-	-	25	ns
			$V_{CC}=6.0V$	-	-	21	ns
nO $\bar{E}$ to nYn enable time	$t_{en}$	see Figure6	$V_{CC}=2.0V$	-	-	190	ns
			$V_{CC}=4.5V$	-	-	38	ns
			$V_{CC}=6.0V$	-	-	33	ns
nO $\bar{E}$ to nYn disable time	$t_{dis}$	see Figure6	$V_{CC}=2.0V$	-	-	190	ns
			$V_{CC}=4.5V$	-	-	38	ns
			$V_{CC}=6.0V$	-	-	33	ns
transition time	$t_t$	see Figure5	$V_{CC}=2.0V$	-	-	75	ns
			$V_{CC}=4.5V$	-	-	15	ns
			$V_{CC}=6.0V$	-	-	13	ns
<b>74HCT240</b>							
nAn to nYn propagation delay	$t_{pd}$	see Figure5	$V_{CC}=4.5V$	-	-	25	ns
nO $\bar{E}$ to nYn enable time	$t_{en}$	$V_{CC}=4.5V$ ; see Figure6		-	-	38	ns
nO $\bar{E}$ to nYn disable time	$t_{dis}$	$V_{CC}=4.5V$ ; see Figure6		-	-	31	ns
transition time	$t_t$	$V_{CC}=4.5V$ ; see Figure5		-	-	15	ns

Note:

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

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

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

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

### AC Characteristics 2

( $T_{amb}=40^{\circ}C$  to  $105^{\circ}C$ , voltages are referenced to GND(ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>74HC240</b>							
nAn to nYn propagation delay	$t_{pd}$	see Figure5	$V_{CC}=2.0V$	-	-	150	ns
			$V_{CC}=4.5V$	-	-	30	ns
			$V_{CC}=6.0V$	-	-	26	ns
nO $\bar{E}$ to nYn enable time	$t_{en}$	see Figure6	$V_{CC}=2.0V$	-	-	225	ns
			$V_{CC}=4.5V$	-	-	45	ns
			$V_{CC}=6.0V$	-	-	38	ns
nO $\bar{E}$ to nYn disable time	$t_{dis}$	see Figure6	$V_{CC}=2.0V$	-	-	225	ns
			$V_{CC}=4.5V$	-	-	45	ns
			$V_{CC}=6.0V$	-	-	38	ns
transition time	$t_t$	see Figure5	$V_{CC}=2.0V$	-	-	90	ns
			$V_{CC}=4.5V$	-	-	18	ns
			$V_{CC}=6.0V$	-	-	15	ns
<b>74HCT240</b>							
nAn to nYn propagation delay	$t_{pd}$	see Figure5	$V_{CC}=4.5V$	-	-	30	ns
nO $\bar{E}$ to nYn enable time	$t_{en}$	$V_{CC}=4.5V$ ; see Figure6		-	-	45	ns
nO $\bar{E}$ to nYn disable time	$t_{dis}$	$V_{CC}=4.5V$ ; see Figure6		-	-	38	ns
transition time	$t_t$	$V_{CC}=4.5V$ ; see Figure5		-	-	18	ns

Note:

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

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

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

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

## Testing Circuit

### AC Testing Circuit

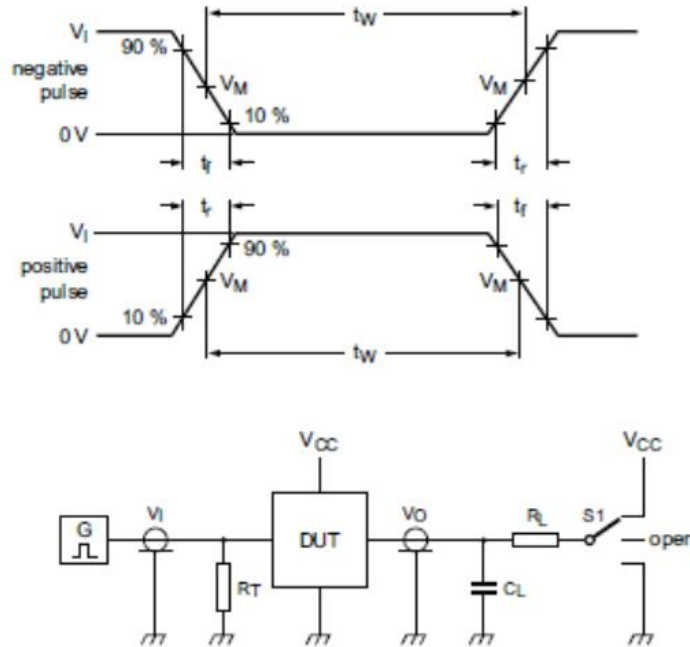


Figure 4. Test circuit for measuring switching times

Definitions for test circuit:

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

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

$R_L$ =Load resistance

S1=Test selection switch

### AC Testing Waveforms

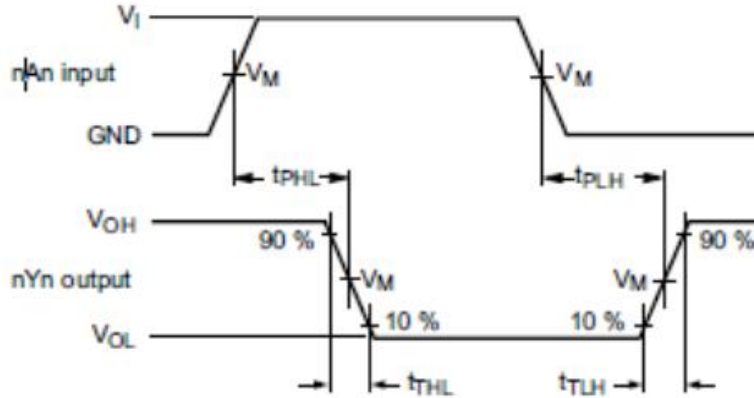


Figure 5. Input (nAn) to output (nYn) propagation delays and output transition times

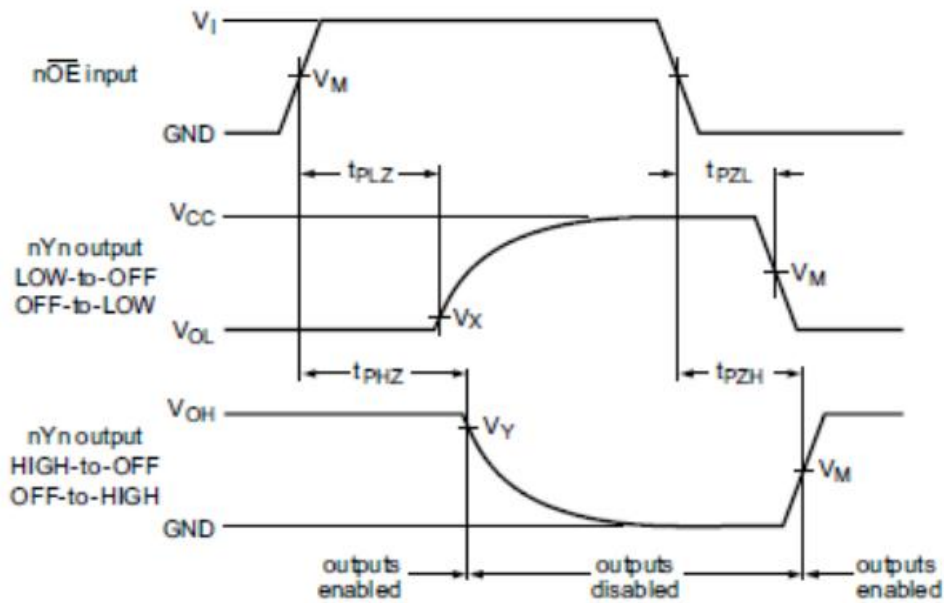


Figure 6. 3-state enable and disable times

### Measurement Points

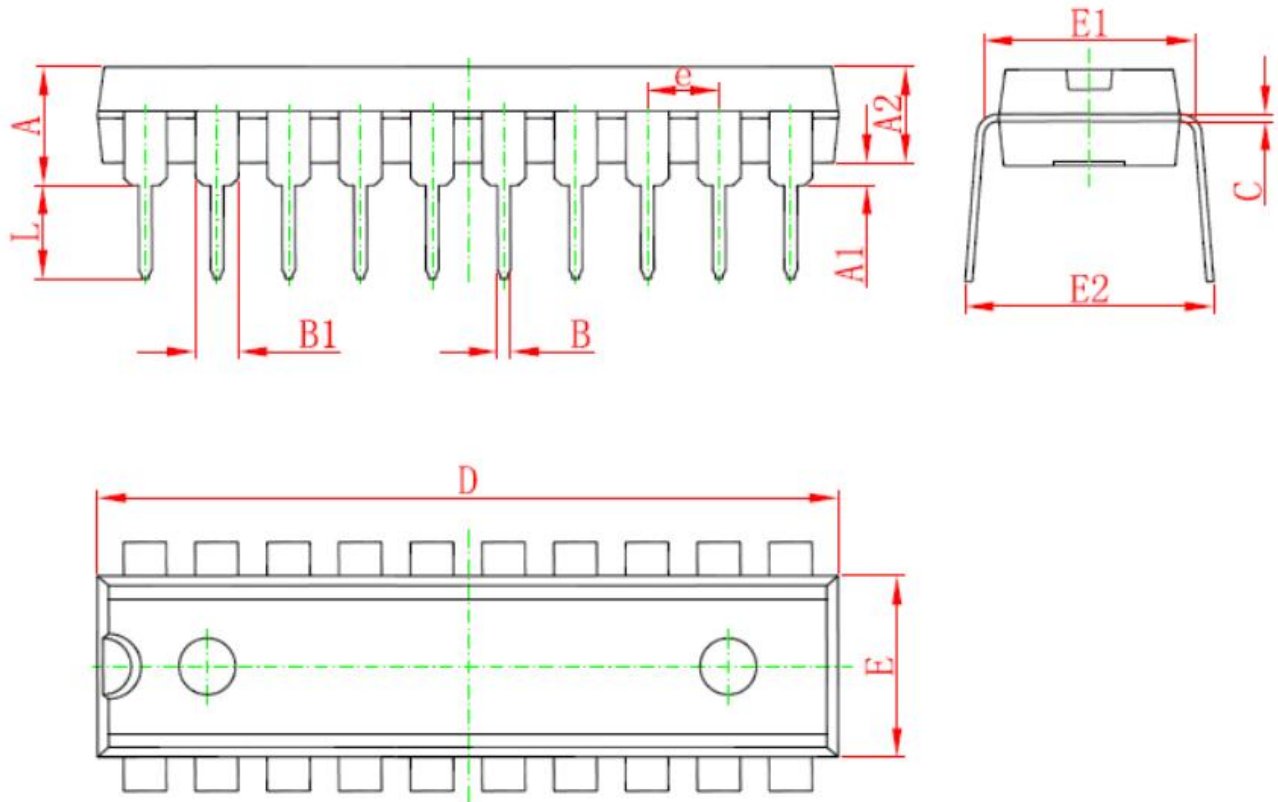
Type	Input	Output		
	$V_M$	$V_M$	$V_M$	$V_Y$
74HC240	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$
74HCT240	1.3V	1.3V	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$

### Test Data

Type	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>PHL</sub> ,t <sub>PLH</sub>	t <sub>PZH</sub> ,t <sub>PHZ</sub>	t <sub>PZL</sub> ,t <sub>PLZ</sub>
74HC240	V <sub>CC</sub>	6.0ns	15pF,50pF	1KΩ	open	GND	V <sub>CC</sub>
74HCT240	3.0V	6.0ns	15pF,50pF	1KΩ	open	GND	V <sub>CC</sub>

## Package Information

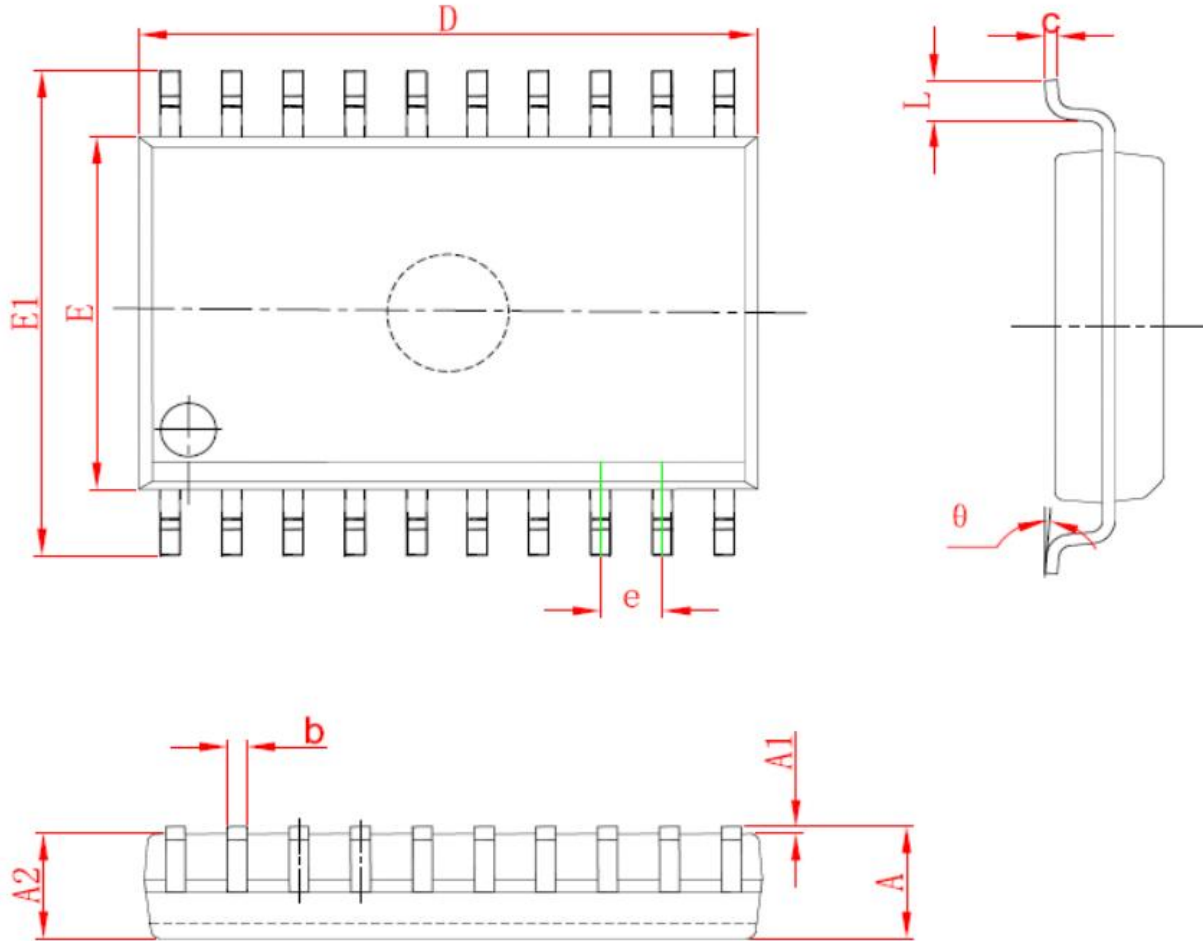
DIP20



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142

B	0.380	0.570	0.015	0.022
B1	1.524(BSC)		0.060(BSC)	
C	0.204	0.360	0.008	0.014
D	18.800	19.200	0.740	0.756
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540(BSC)		0.100(BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354

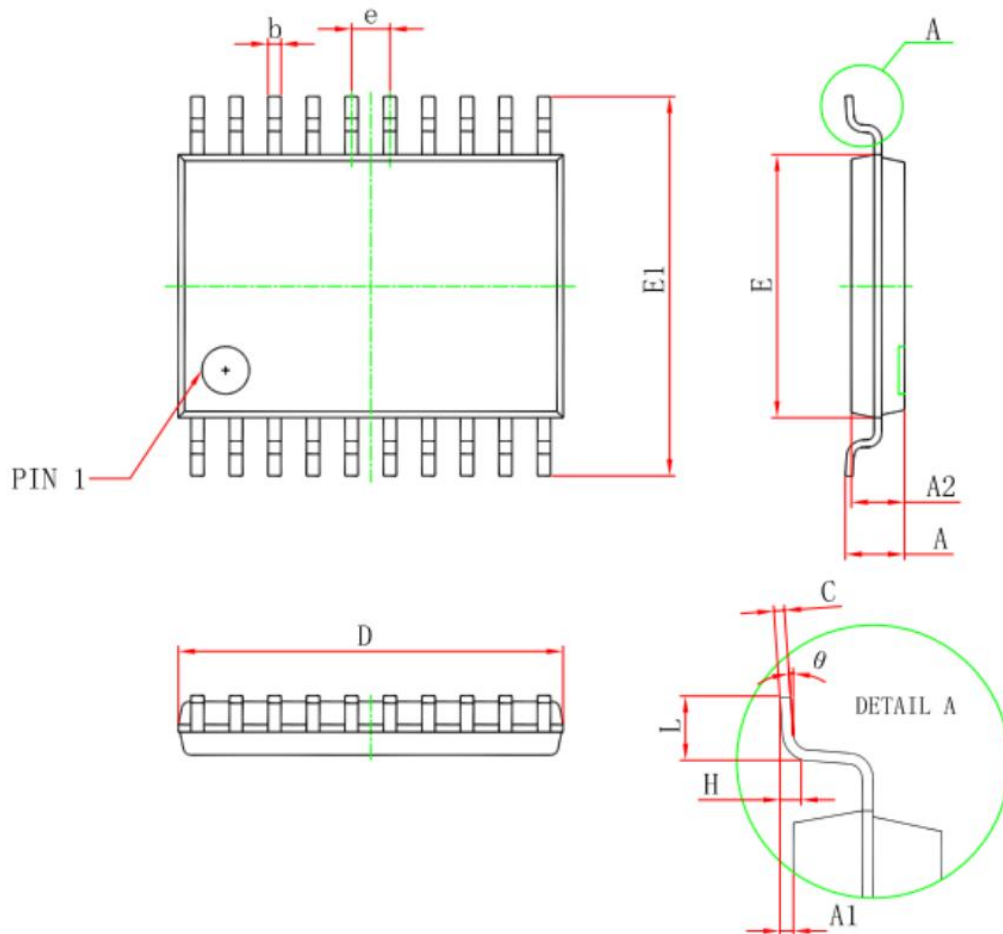
SOP20



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max

A	2.350	2.650	0.093	0.104
A1	0.100	0.300	0.004	0.012
A2	2.100	2.500	0.083	0.098
b	0.330	0.510	0.013	0.020
C	0.204	0.330	0.008	0.013
D	12.520	13.000	0.493	0.512
E	7.400	7.600	0.291	0.299
E1	10.210	10.610	0.402	0.418
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
$\theta$	0°	8°	0°	8°

TSSOP20



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max



D	6.400	6.600	0.252	0.259
E	4.300	4.500	0.169	0.177
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
E1	6.250	6.550	0.246	0.258
A		1.200		0.047
A2	0.800	1.000	0.031	0.039
A1	0.050	0.150	0.002	0.006
e	0.65(BSC)		0.026(BSC)	
L	0.500	0.700	0.020	0.028
H	0.25(TYP)		0.01(TYP)	
θ	1°	7°	1°	7°

### Statements And Notes

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butyl benzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements									

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