## General Description

The 74HCT540 is an 8-bit inverting buffer/line driver with 3-state outputs. The device featurestwo output enables ($\overline{OE}1$ and ($\overline{OE}2$). 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 VCC.

Features

➢ Input levels: CMOS level

➢ Inverting outputs

➢ Specified from -40℃ to +105℃

➢ Packaging information: DIP-20/SOP-20/TSSOP-2
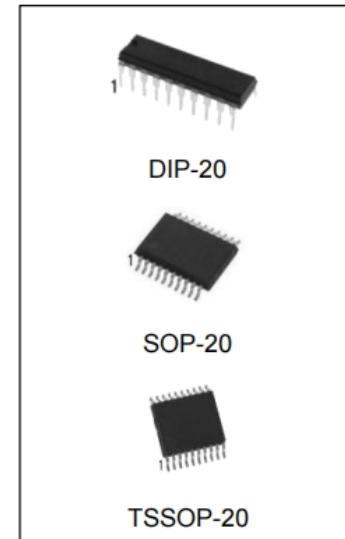
Ordering Information

| Product Model	Package Type	Marking	Packing	Packing Qty
74HC540N	DIP-20	74HC540	TUBE	720pcs/box
74HC540M/TR	SOP-20	74HC540	REEL	2000pcs/reel
74HC540MT/TR	TSSOP-20	HC540	REEL	2500pcs/reel

Block Diagram
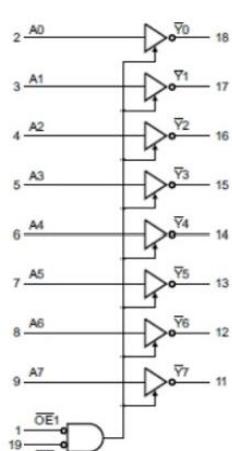
Figure 1.Logic symbol
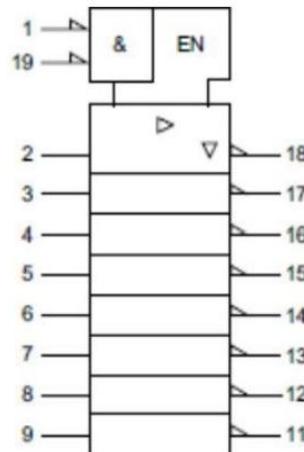
Figure 2.IEC logic symbol
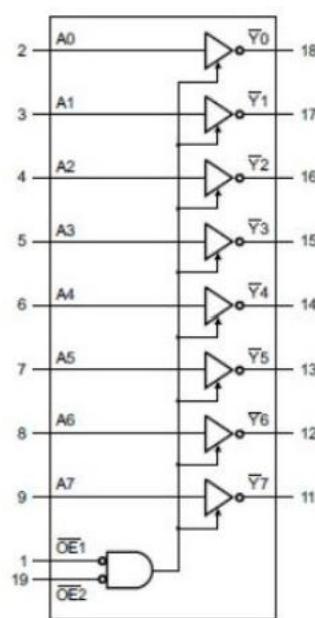
Figure 3.Functional diagram
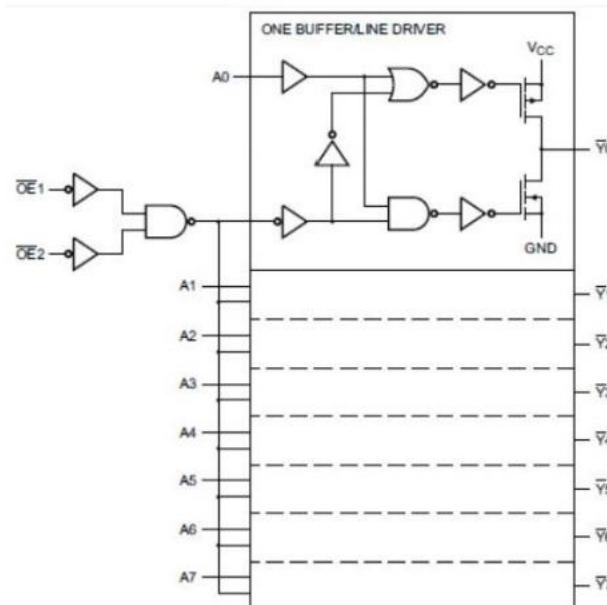
Figure 4.Logic diagram

Pin Configurations
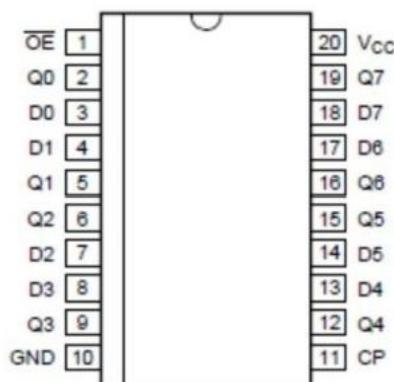
DIP-20/SOP-20/TSSOP-20

Pin Description

Pin No.	Pin Name	Description
1	OE	output enable input (active LOW)
2	Q0	data output
3	D0	data input
4	D1	data input
5	Q1	data output
6	Q2	data output
7	D2	data input
8	D3	data input
9	Q3	data output
10	GND	ground (0V)
11	CP	clock input (LOW-to-HIGH,edge-triggered)
12	Q4	data output
13	D4	data input
14	D5	data input
15	Q5	data output
16	Q6	data output
17	D6	data input
18	D7	data input
19	Q7	data output
20	Vcc	supply voltage

Function Table

Input			Output
OE1	**0E2**	**An**	**Yn**
L	L	L	**H**
L	L	H	**L**
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.

Electrical Parameter

Absolute Maximum Ratings

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

Parameter	Symbol	Conditions		Min	Max	Unit
supply voltage	VCC			-0.5	+7.0	V
input clampingcurrent	IIK	Vi<-0.5V or V_1>Vcc+0.5V			±20	mA
output clampingcurrent	IOK	Vo<-0.5V or Vo>Vcc+0.5V			±20	mA
output current	Io	-0.5V<Vo<Vcc+0.5V			±35	mA
supply current	Icc				70	mA
ground cumen	IGND			-70		mA
storage temperature	Tstg			-65	+150	℃
total powerdissipation	Ptot				500	mW
Soldering temperature	TL	10s	DIP	245		℃
			SOP	245		

Note:1、Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.Operating

   Ratings indicate conditions for which the device is intended to be functional,but specific performance is

   not ensured.

   2、For DIP20 packages:above 70℃ the value of Pot derates linearly with 12mW/K.

   3、For SOP20 packages:above 70℃ the value of Put derates linearly with 8mWIK.

   4、ForTSSOP20 packages:above 60℃ the value of Put derates linearly with 5.5mW/K.

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min	Typ	Max.	Unit
supply voltage	Vcc		2.0	5.0	6.0	V
input voltage	Vi		0	—	Vcc	V
output voltage	Vo		0		Vcc	V
nput transition rise and fall rate	△t△V	Vcc=2.0V			625	nsN
		Vcc=4.5V		1.67	139	nsN
		Vcc=6.0V		—	83	nsN
ambient temperature	Tamb		-40		+105	℃

Electrical Characteristics

DC Characteristics 1

(Tamb=25℃,voltages are referenced to GND(ground=0V),unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	VH	Vcc=2.0V		1.5	1.2		V
		Vcc=4.5V		3.15	2.4		V
		Vcc=6.0V		4.2	3.2		V
LOW-level input voltage	VL	Vcc=2.0V			0.8	0.5	V
		Vcc=4.5V			2.1	1.35	V
		Vcc=6.0V			2.8	1.8	V
HIGH-level output voltage	Voh	Vi=Vh or VL	Io=-20uA;Vcc=2.0V	1.9	2.0		V
			Io=-20uA;Vcc=4.5V	4.4	4.5		V
			Io=-20uA;Vcc=6.0V	5.9	6.0		V
			o=-6.0mA;Vcc=4.5V	3.98	4.32		V
			o=-7.8mA;Vcc=6.0V	5.48	5.81		V
LOWHevel outpuf voltage	Vol	Vi=VH or VL	Io=20uA;Vcc=2.0V		0	0.1	V
			Io=20uA;Vcc=4.5V		0	0.1	V
			Io=20uA;Vcc=6.0V		0	0.1	V
			Io=6.0mA;Vcc=4.5V		0.15	0.26	V
			Io=7.8mA;Vcc=6.0V		0.16	0.26	V
input leakage current	I	Vi=Vcc or GND;Vcc=6.0V				±0.1	uA
OFF-state output current	Ioz	Vi=Vh or VL;Vcc=6.0V; Vo=Vcc or GND				±0.5	uA
supply current	Icc	Vi=Vcc or GND;Io=0A;Vcc=6.0V				8.0	uA
input capacitance	Ci				3.5		pF

DC Characteristics 2

(Tamb=-40℃ to +85℃,voltages are referenced to GND(ground=0V),unless otherwise specified.)

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
HIGH-level input voltage	ViH	Vcc=2.0V		1.5			V
		Vcc=4.5V		3.15			V
		Vcc=6.0V		**4.2**			V
LOW-level input voltage	VL	Vcc=2.0V				0.5	V
		Vcc=4.5V				1.35	V
		Vcc=6.0V				1.8	V
HIGH-level output voltage	VoH	V_1=Vh or VL	Io=-20uA;Vcc=2.0V	1.9			V
			Io=-20uA;Vcc=4.5V	4.4			V
			Io=-20uA;Vcc=6.0V	5.9			V
			Io=-6.0mA;Vcc=4.5V	3.84			V
			Io=-7.8mA;Vcc=6.0V	5.34			V
LOW-level output voltage	Vol	V_1=Vh or VL	Io=20uA;Vcc=2.0V			0.1	V
			Io=20uA;Vcc=4.5V			0.1	V
			Io=20uA;Vcc=6.0V			0.1	V
			Io=6.0mA;Vcc=4.5V			0.33	V
			Io=7.8mA;Vcc=6.0V			0.33	V
nput leakage current	I	V=Vcc or GND;Vcc=6.0V		—		±1.0	uA
OFF-state output current	Ioz	Vi=Vih or VL;Vcc=6.0V Vo=Vcc or GND				±5.0	uA
supply current	Icc	V=Vcc or GND;Io=0A;Vcc=6.0V				80	uA

DC Characteristics 3

(Tamb=40℃ to +105℃,voltages are referenced to GND(ground=0V),unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max	Unit
HIGH-level inpu voltage	VH	Vcc=2.0V		1.5			V
		Vcc=4.5V		3.15			V
		Vcc=6.0V		4.2			V
LOW-level input voltage	VL	Vcc=2.0V				0.5	V
		Vcc=4.5V				1.35	V
		Vcc=6.0V				1.8	V
HIGH-level output voltage	VoH	V_1=Vih or VL	Io=-20uA;Vcc=2.0V	1.9			V
			Io=-20uA;Vcc=4.5V	4.4			V
			Io=-20uA;Vcc=6.0V	5.9			V
			Io=-6.0mA;Vcc=4.5V	3.7			V
			o=-7.8mA;Vcc=6.0V	5.2			V
LOW-level output voltage	Vou	V_1=Vih or VL	Io=20uA;Vcc=2.0V			0.1	V
			Io=20uA;Vcc=4.5V			0.1	V
			Io=20uA;Vcc=6.0V			0.1	V
			Io=6.0mA;Vcc=4.5V			0.4	V
			Io=7.8mA;Vcc=6.0V			0.4	V
nput leakage current	I	V=Vcc or GND;Vcc=6.0V				±1.0	uA
OFF-state output current	Ioz	Vi=Vih or VL;Vcc=6.0V; Vo=Vcc or GND				±10	uA
supply curren	Icc	V=Vcc or GND;Io=0A;Vcc=6.0V		—		160	uA

AC Characteristics 1

(Tamb=25℃,GND=0V,CL=50pF,unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
An to Yn propagation delay	tpd	see Figure 6	Vcc=2.0V	-	30	100	NS
			Vcc=4.5V		11	20	ns
			Vcc=5.0V;CL=15pF		9		nS
			Vcc=6.0V		9	17	nS
OEn to Yn enable time	ten	see Figure 7	Vcc=2.0V		52	160	NS
			Vcc=4.5V		19	32	ns
			Vcc=6.0V		15	27	ns
OEn to Yn disable time	tdis	see Figure 7	Vcc=2.0v		61	160	nS
			Vcc=4.5V		22	32	nS
			Vcc=6.0V		18	27	NS
transition time	t	see Figure 6	Vcc=2.0V		14	60	ns
			Vcc=4.5V		5	12	nS
			Vcc=6.0V		4	10	nS
power dissipation capacitance	CpD	per buffer;Vi=GND to Vcc		-	39		pF

Note

(1)tpd is the same as tpuhand tpHl.

(2)ten is the same as tpzt and tpzh.

(3)tais is the same as trrz and tpHz.

(4)tt is the same as trhland trun.

(5)Cpo is used to determine the dynamic power dissipation (Po in uW).

Po=CPp×Vcc²×f×N+Z(CL×Vcc²×fo)where:

f=input frequency in MHz;

f_o=output frequency in MHz;

C=output load capacitance in pF;

Vcc=supply voltage in V;

N=number of inputs switching;

Z(CL×Vcc²×fo)=sum of outputs.

AC Characteristics 2

(Tamb=40℃ to +85℃,GND=0V,CL=50pF,unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max	Unit
An to Yn propagation delay	tpd	see Figure 6	Vcc=2.0V			125	**ns**
			Vcc=4.5V			25	**NS**
			Vcc=6.0V			21	ns
OEn to Yn enable time	ten	see Figure 7	Vcc=2.0V			200	NS
			Vcc=4.5V			40	NS
			Vcc=6.0V			34	ns
OEn to Yn disable time	tdis	see Figure 7	Vcc=2.0V			200	ns
			Vcc=4.5V			40	**Ns**
			Vcc=6.0V			34	**NS**
transition time	tí	see Figure E	Vcc=2.0V			75	**NS**
			Vcc=4.5V			15	ns
			Vcc=6.0V			13	Ns

Note:

(1)tpd is the same as tpuhand tpHl.

(2)ten is the same as tpzu and tPzH.

(3)tais is the same as tprz and tpHz.

(4)tt is the same as trhr and trLH.

AC Characteristics 3

(Tamb=−40℃ to+105℃,GND=0V,CL=50pF,unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
An to Yn propagation delay	tpd	see Figure E	Vcc=2.0V			150	Ns
			Vcc=4.5V			30	NS
			Vcc=6.0V			26	ns
OEn to Yn enable time	ten	see Figure 7	Vcc=2.0V			240	Ns
			Vcc=4.5V			48	Ns
			Vcc=6.0V			41	NS
OEn toYn disable time	tdis	see Figure 7	Vcc=2.0V			240	ns
			Vcc=4.5V			48	Ns
			Vcc=6.0V			41	Ns
transition time	tt	see Figure E	Vcc=2.0V			**90**	NS
			Vcc=4.5V			18	ns
			Vcc=6.0V			15	NS

Note:

(1)tpd is the same as tpuhand tpHL

(2)ten is the same as trzu and tpzh.

(3)tis is the same as tprzandtphz

(4)t is the same as trh and truh.

Testing Circuit

AC Testing Circuit
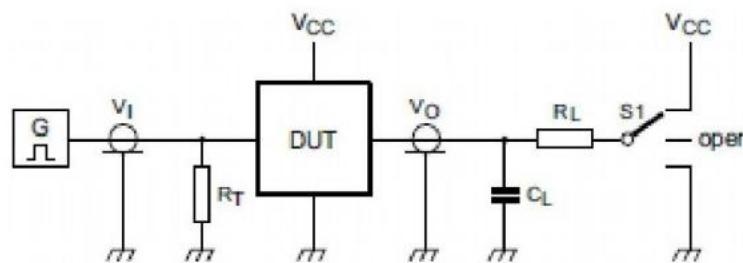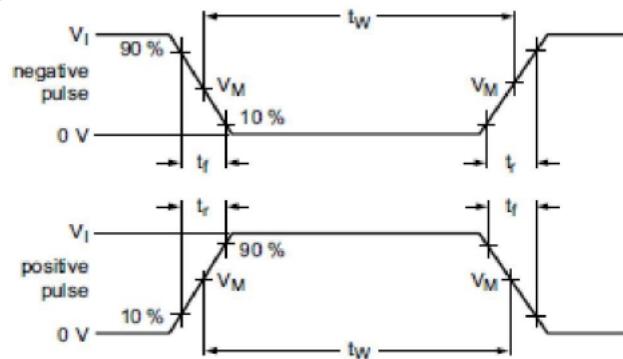
Figure 5. Test circuit for measuring switching times

Definitions for test circuit:

RL=Load resistance.

C_1=Load capacitance including jig and probe capacitance.

R_1=Termination resistance should be equal to the output impedance Z° of the pulse generator.

S1=Test selection switch.

AC Testing Waveforms
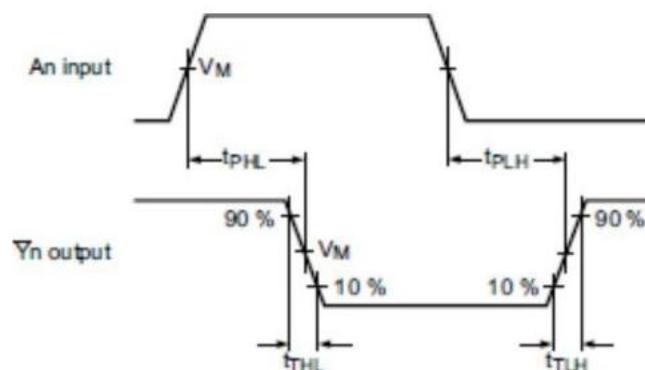
Figure 6. Input to output propagation delays
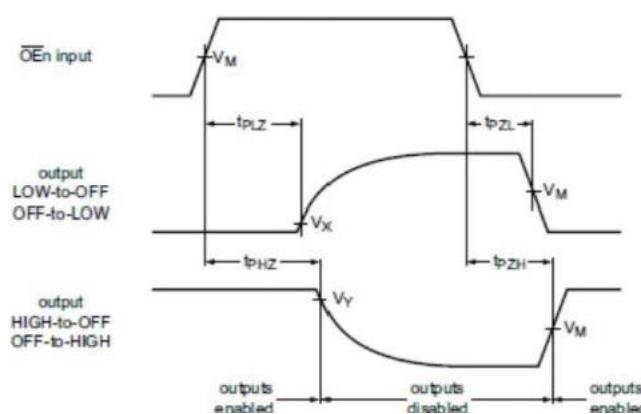
Figure 7.3-state enable and disable times

Measurement Points

Type	Input	Output		
	VM	Vm	Vx	Vγ
74HC540	0.5×Vcc	0.5×Vcc	0.1×Vcc	0.9×Vcc

Test Data

Type	Input		Load		S1 position		
	V₁	tr,tr	CL	RL	tpHL tpLH	tpzH tpHz	tpZL tpLz
74HC540	Vcc	6ns	15pF,50pF	1kQ	open	GND	Vcc

Physical Dimensions

DIP-20
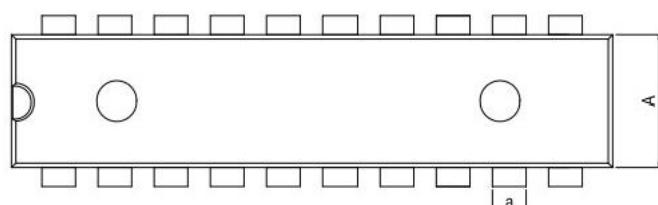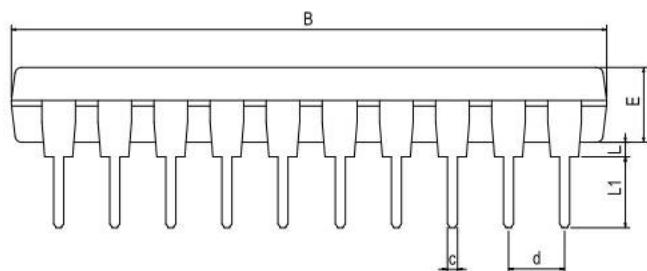
Dimensions In Millimeters(DIP-20)									
Symbol:	A	B	D	D1	E	L	L1	a	C	d
Min:	6.10	24.95	8.10	7.42	3.10	0.50	3.00	1.50	0.40	2.54 BSC
Max:	6.68	26.55	10.9	7.82	3.55	0.70	3.60	1.55	0.50	

SOP-20
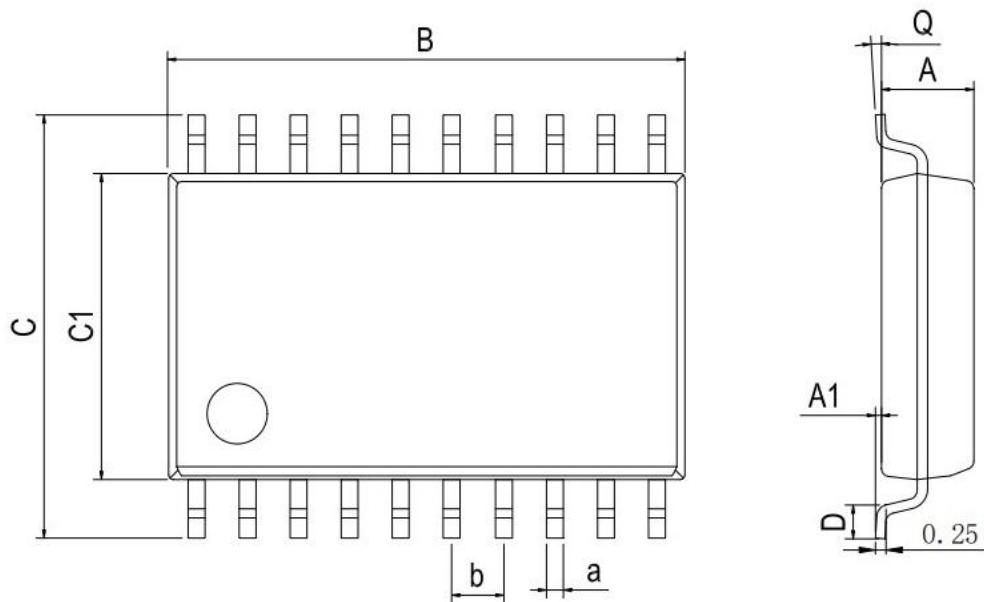
Dimensions In Millimeters(SOP-20)								
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	2.10	0.05	12.50	10.21	7.40	0.45	0°	0.35	1.27 BSC
Max:	2.50	0.25	13.00	10.61	7.60	1.25	8°	0.45	

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Documentation is for reference only; rely on actual application testing
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Physical Dimensions

TSSOP-20
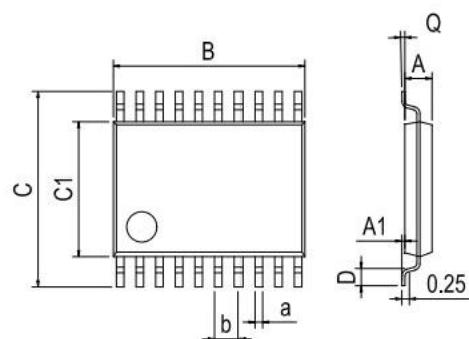
Dimensions In Millimeters(TSSOP-20)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.85	0.05	6.40	6.20	4.30	0.40	0°	0.20	0.65 BSC
Max:	1.05	0.20	6.60	6.60	4.50	0.80	8°	0.25	