

GD54/74HC540, GD54/74HCT540

OCTAL INVERTING 3-STATE BUFFERS

General Description

These devices are identical in pinout to the 54/74LS540. These eight inverting buffers feature two NORed active-low output enables, inverting 3-state outputs, and inputs and outputs on opposite sides of the package. These octal inverting buffers/line drivers/line receivers are designed to be used with 3-state memory address drivers, clock drivers, and other bus-oriented systems. The HC/HCT 540 are similar in function to the HC/HCT 541 which have noninverting outputs. These devices are characterized for operation over wide temperature ranges to meet industry and military specifications.

Features

- Low Power consumption characteristic of CMOS devices
- Output drive capability: 15 LS TTL Loads Min.
- Operating speed superior to LS TTL
- Wide operating voltage range: for HC 2 to 6 volts
for HCT 4.5 to 5.5 volts
- Low input current: 1 μ A Max.
- Low quiescent current: 80 μ A Max. (74HC)
- High noise immunity characteristic of CMOS
- Diode protection on all inputs

Logic Diagram

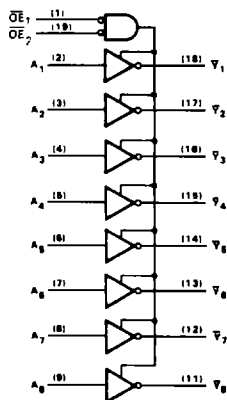
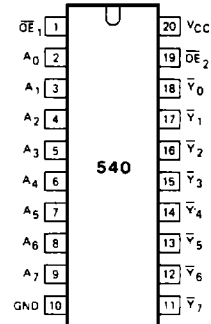


Fig. 1 Logic diagram

Pin Configuration



Suffix-Blank	Plastic Dual In Line Package
Suffix-J	Ceramic Dual In Line Package
Suffix-D	Small Outline Package

Function Table

INPUTS			OUTPUT
\overline{OE}_1	\overline{OE}_2	A_n	\overline{Y}_n
L	L	L	H
L	L	H	L
X	H	X	Z
H	X	X	Z

H = HIGH voltage level
L = LOW voltage level
X = don't care
Z = high impedance OFF state

Absolute Maximum Ratings

SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNIT
V_{CC}	DC Supply voltage		-0.5	+7	V
I_{IK}, I_{OK}	DC input or output diode current	for $V_I < -0.5$ or $V_I > V_{CC} + 0.5V$		20	mA
I_O	DC output source or sink current	for $-0.5V < V_O < V_{CC} + 0.5V$		35	mA
I_{CC}	DC V_{CC} or GND current			70	mA
T_{stg}	Storage temperature range		-65	150	°C
P_D	Power dissipation per package	above +70°C, derate linearly with 8mW/K		500	mW
T_L	Lead temperature	At distance 1/16 ± 1/32 in from case for 60 sec(CERAMIC) 10 sec(PLASTIC)		300 260	°C

Recommended Operating Conditions

CHARACTERISTIC	LIMITS		UNITS
	MIN	MAX.	
Supply-Voltage Range V_{CC} : GD54/74HC Types GD54/74HCT Types	2 4.5	6 5.5	V
DC Input or Output Voltage V_I, V_O	0	V_{CC}	V
Operating Temperature T_A : GD74 Types GD54 Types	-40 -55	+85 +125	°C
Input Rise and Fall times t_r, t_f : GD54/74HC Types at 2V at 4.5V at 6V GD54/74HCT Types at 4.5V		1000 500 400 500	ns

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DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A =25 °C			GD74HC540		GD54HC540		UNIT
				MIN.	TYP	MAX	MIN	MAX	MIN	MAX	
V _{IH}	HIGH level input Voltage		2.0 4.5 6.0	1.5 3.15 4.2			1.5 3.15 4.2		1.5 3.15 4.2		V
V _{IL}	LOW level input voltage		2.0 4.5 6.0			0.3 0.9 1.2		0.3 0.9 1.2		0.3 0.9 1.2	V
V _{OH}	HIGH level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OH} =-20μA I _{OH} =-6mA I _{OH} =-7.8mA	2.0 4.5 6.0	1.9 4.4 5.9	2.0 4.5 6.0		1.9 4.4 5.9		1.9 4.4 5.9	V
				4.5 6.0	3.98 5.48	4.3 5.2		3.84 5.34		3.7 5.2	
V _{OL}	LOW level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OL} =20μA I _{OL} =6mA I _{OL} =7.8mA	2.0 4.5 6.0			0.1 0.1 0.1		0.1 0.1 0.1		V
				4.5 6.0	0.17 0.15	0.26 0.26		0.33 0.33		0.4 0.4	
I _{IN}	Input leakage Current	V _{IN} =V _{CC} or GND	6.0			0.1		1.0		1.0	μA
I _{OZ}	Three-State leakage current	V _{IN} =V _{IH} or V _{IL} V _O =V _{CC} or GND	6.0		0.01	0.5		5.0		10.0	μA
I _{CC}	Quiescent Supply Current	V _{IN} =V _{CC} or GND I _{out} =0μA	6.0			8		80		160	μA

DC Electrical Characteristics for HCT

SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A =25 °C			GD74HCT540		GD54HCT540		UNIT	
				MIN	TYP	MAX	MIN	MAX	MIN	MAX		
V _{IH}	HIGH level input Voltage		4.5 to 5.0	2.0			2.0		2.0		V	
V _{IL}	LOW level input voltage		4.5 to 5.5			0.8		0.8		0.8	V	
V _{OH}	HIGH level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OH} =-20μA I _{OH} =-6mA	4.5	4.4	4.5		4.4		4.4	V	
				4.5	3.98	4.3		3.84		3.7		
V _{OL}	LOW level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OL} =20μA I _{OL} =6mA	4.5			0.1		0.1		0.1	V
				4.5		0.17	0.26		0.33		0.4	
I _{IN}	Input leakage Current	V _{IN} =V _{CC} or GND	5.5			0.1		1.0		1.0	μA	
I _{OZ}	Three-State leakage current	V _{IN} =V _{IH} or V _{IL} V _O =V _{CC} or GND	5.5		0.01	0.5		5.0		10.0	μA	
I _{CC}	Quiescent Supply Current	V _{IN} =V _{CC} or GND I _{out} =0μA	5.5			8		80		160	μA	

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AC Characteristics for HC: $t_r=t_f=6\text{ns}$ $C_L=50\text{ pF}$

SYMBOL	PARAMETER	V _{CC} (V)	T _A =25°C			GD74HC540		GD54HC540		UNIT
			MIN.	TYP	MAX.	MIN.	MAX.	MIN.	MAX.	
t _{PLH} / t _{PHL}	Propagation Delay Time A _n to \bar{Y}_n	2.0		30	100		120		140	ns
		4.5		9	18		24		28	
		6.0		8	16		20		25	
t _{PZH} t _{PZL}	3-state output Enable Time \overline{OE}_n to \bar{Y}_n	2.0		45	140		180		210	ns
		4.5		18	32		40		45	
		6.0		16	28		36		40	
t _{PLZ} / t _{PHZ}	3-state Output Disable Time \overline{OE}_n to \bar{Y}_n	2.0		45	140		180		210	ns
		4.5		18	32		40		48	
		6.0		16	28		36		42	
t _{TLH} / t _{THL}	Output Transition Time	2.0		15	60		75		90	ns
		4.5		6	12		15		18	
		6.0		5	10		13		15	

AC Characteristics for HCT: $t_r=t_f=6\text{ns}$ $C_L=50\text{ pF}$

SYMBOL	PARAMETER	V _{CC} (V)	T _A =25°C			GD74HCT540		GD54HCT540		UNIT
			MIN.	TYP	MAX.	MIN.	MAX.	MIN.	MAX.	
t _{PLH} / t _{PHL}	Propagation Delay Time A _n to \bar{Y}_n	4.5		12	22		26		30	ns
t _{PZH} t _{PZL}	3-state output Enable Time \overline{OE}_n to \bar{Y}_n	4.5		19	34		42		48	ns
t _{PLZ} / t _{PHZ}	3-state Output Disable Time \overline{OE}_n to \bar{Y}_n	4.5		19	34		42		48	ns
t _{TLH} / t _{THL}	Output Transition Time	4.5		7	12		15		18	ns

AC Waveforms

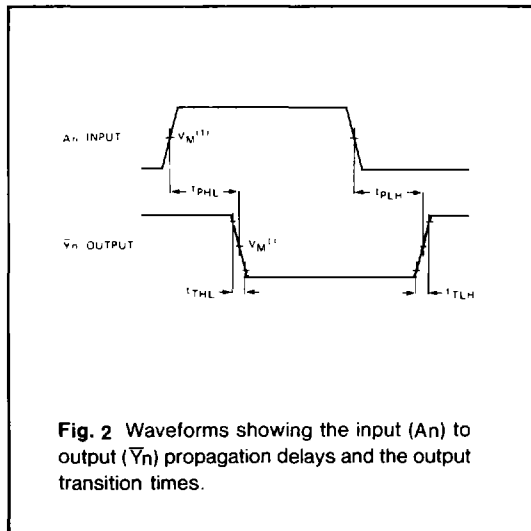


Fig. 2 Waveforms showing the input (A_n) to output (\bar{Y}_n) propagation delays and the output transition times.

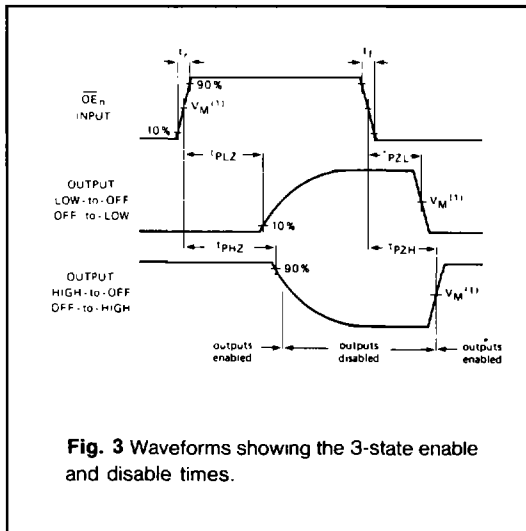


Fig. 3 Waveforms showing the 3-state enable and disable times.

Note to AC waveforms

- (1) HC : $V_M=50\%$; $V_I=GND$ to V_{CC}
- HCT : $V_M=1.3V$; $V_I=GND$ to $3V$.