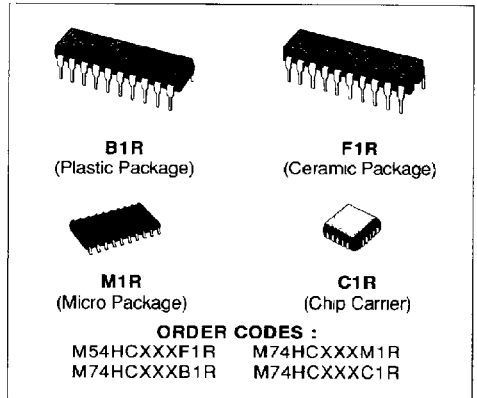


OCTAL BUS BUFFER WITH 3 STATE OUTPUTS
HC540: INVERTED - HC541 NON INVERTED

- **HIGH SPEED**
t_{PD} = 10 ns (TYP.) at V_{CC} = 5V
- **LOW POWER DISSIPATION**
I_{CC} = 4 μA (MAX.) at T_A = 25 °C
- **HIGH NOISE IMMUNITY**
V_{NIH} = V_{NIL} = 28 % V_{CC} (MIN.)
- **OUTPUT DRIVE CAPABILITY**
15 LSTTL LOADS
- **SYMMETRICAL OUTPUT IMPEDANCE**
|I_{OH}| = I_{OL} = 6 mA (MIN)
- **BALANCED PROPAGATION DELAYS**
t_{PLH} = t_{PHL}
- **WIDE OPERATING VOLTAGE RANGE**
V_{CC} (OPR) = 2V to 6V
- **PIN AND FUNCTION COMPATIBLE**
WITH 54/74LS540/541



DESCRIPTION

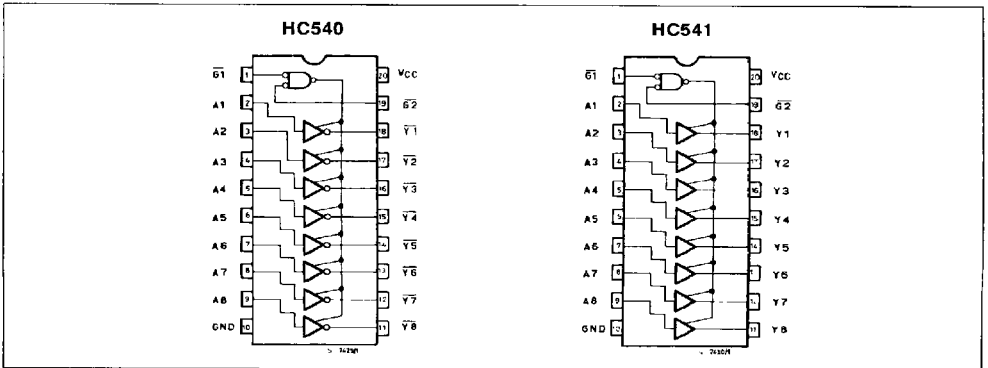
The M54/74HC540 and HC541 are high speed CMOS OCTAL BUS BUFFERS (3-STATE) fabricated in silicon gate C²MOS technology. They have the same high speed performance of LSTTL combined with true CMOS low power consumption. The HC540 is an inverting buffer and HC541 is a non inverting buffer.

The 3 STATE control gate operates as a two input AND such that if either G1 and G2 are high, all eight output are in the high impedance state. In order to

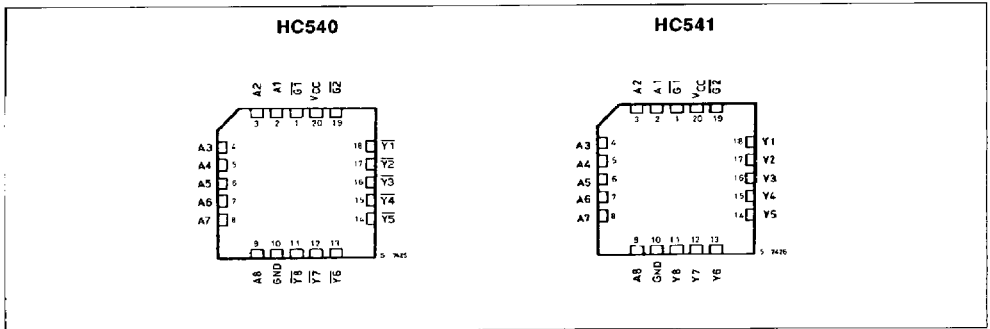
enhance PC board layout, the HC540 and HC541 offers a pinout having inputs and outputs on opposite sides of the package.

All inputs are equipped with protection circuits against static discharge and transient excess voltage.

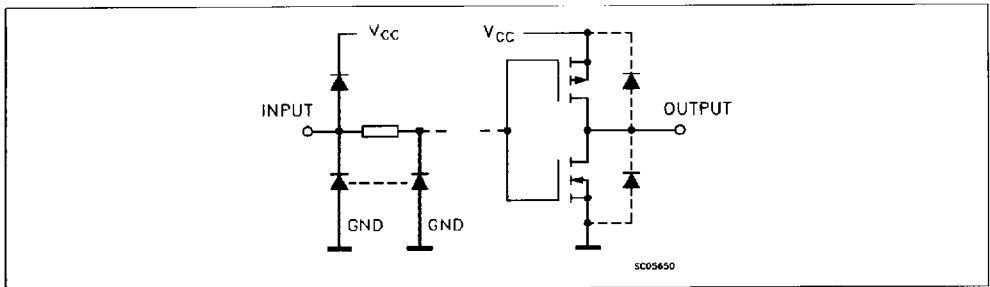
PIN CONNECTION (top view)



CHIP CARRIER



INPUT AND OUTPUT EQUIVALENT CIRCUIT



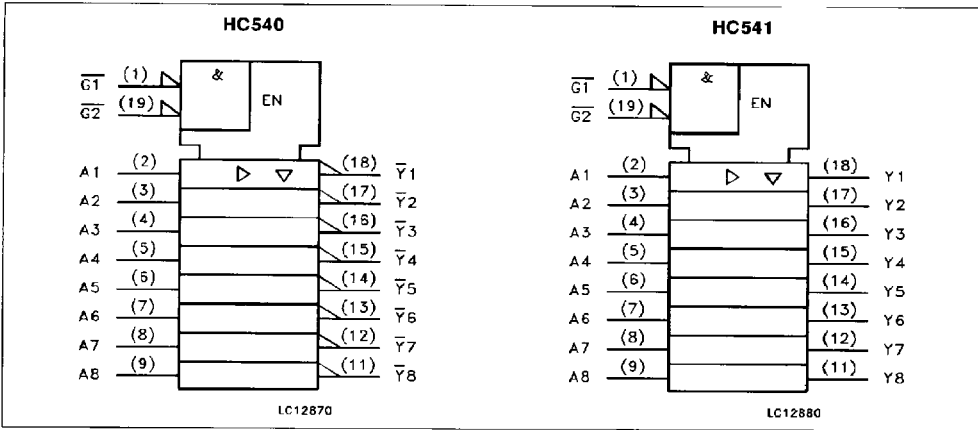
PIN DESCRIPTION (HC540)

PIN No	SYMBOL	NAME AND FUNCTION
1, 19	1G, G2	Output Enable Inputs
2, 3, 4, 5, 6, 7, 8, 9	A1 to A8	Data Inputs
18, 17, 16, 15, 14, 13, 12, 11	Y1 to Y8	Bus Outputs
10	GND	Ground (0V)
20	V _{cc}	Positive Supply Voltage

PIN DESCRIPTION (HC541)

PIN No	SYMBOL	NAME AND FUNCTION
1, 19	1G, G2	Output Enable Inputs
2, 3, 4, 5, 6, 7, 8, 9	A1 to A8	Data Inputs
18, 17, 16, 15, 14, 13, 12, 11	Y1 to Y8	Bus Outputs
10	GND	Ground (0V)
20	V _{cc}	Positive Supply Voltage

IEC LOGIC SYMBOLS

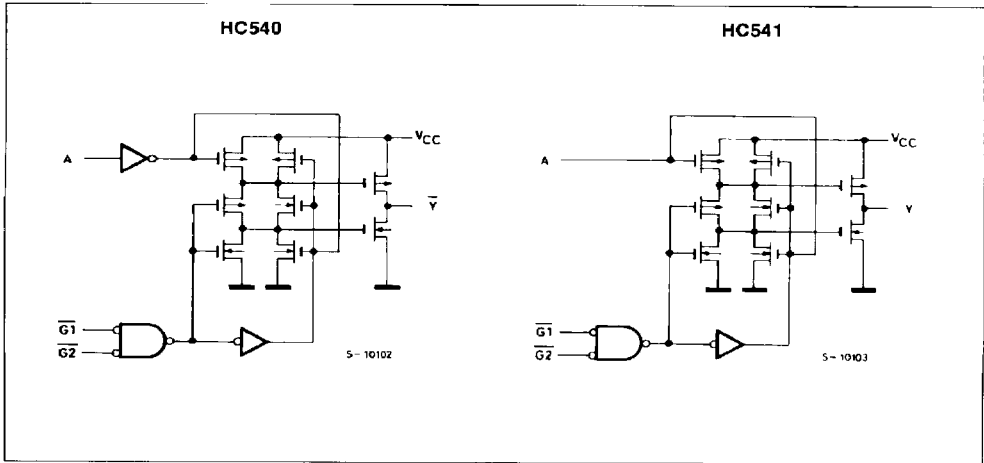


TRUTH TABLE

INPUT			OUTPUT	
G1	G2	An	Yn (HC540)	Yn (HC541)
H	X	X	Z	Z
X	H	X	Z	Z
L	L	H	L	H
L	L	L	H	L

X "H" or "L"
Z: High impedance

CIRCUIT SCHEMATIC (Per Circuit)



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ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CC}	Supply Voltage	-0.5 to +7	V
V _I	DC Input Voltage	-0.5 to V _{CC} + 0.5	V
V _O	DC Output Voltage	-0.5 to V _{CC} + 0.5	V
I _{IK}	DC Input Diode Current	± 20	mA
I _{OK}	DC Output Diode Current	± 20	mA
I _O	DC Output Source Sink Current Per Output Pin	± 35	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current	± 70	mA
P _D	Power Dissipation	500 (*)	mW
T _{stg}	Storage Temperature	-65 to +150	°C
T _L	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.
 (*) 500 mW ≅ 65 °C derate to 300 mW by 10mW/°C 65 °C to 85 °C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit	
V _{CC}	Supply Voltage	2 to 6	V	
V _I	Input Voltage	0 to V _{CC}	V	
V _O	Output Voltage	0 to V _{CC}	V	
T _{op}	Operating Temperature: M54HC Series M74HC Series	-55 to +125 -40 to +85	°C °C	
t _r , t _f	Input Rise and Fall Time	V _{CC} = 2 V V _{CC} = 4.5 V V _{CC} = 6 V	0 to 1000 0 to 500 0 to 400	ns

DC SPECIFICATIONS

Symbol	Parameter	Test Conditions		Value						Unit	
		V _{CC} (V)		T _A = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V _{IH}	High Level Input Voltage	2.0		1.5			1.5		1.5		V
		4.5		3.15			3.15		3.15		
		6.0		4.2			4.2		4.2		
V _{IL}	Low Level Input Voltage	2.0				0.5		0.5		0.5	V
		4.5				1.35		1.35		1.35	
		6.0				1.8		1.8		1.8	
V _{OH}	High Level Output Voltage	2.0	V _I = V _{IH} or V _{IL}	I _O = -20 μA	1.9	2.0		1.9		1.9	V
		4.5			4.4	4.5		4.4		4.4	
		6.0			5.9	6.0		5.9		5.9	
		4.5	I _O = -6.0 mA	4.18	4.31		4.13		4.10		
		6.0		I _O = -7.8 mA	5.68	5.8		5.63		5.60	
V _{OL}	Low Level Output Voltage	2.0	V _I = V _{IH} or V _{IL}	I _O = 20 μA		0.0	0.1		0.1	0.1	V
		4.5				0.0	0.1		0.1	0.1	
		6.0				0.0	0.1		0.1	0.1	
		4.5	I _O = 6.0 mA		0.17	0.26		0.33	0.40		
		6.0		I _O = 7.8 mA		0.18	0.26		0.33	0.40	
I _I	Input Leakage Current	6.0	V _I = V _{CC} or GND			±0.1		±1		±1	μA
I _{OZ}	3 State Output Off State Current	6.0	V _I = V _{IH} or V _{IL} V _O = V _{CC} or GND			+0.5		±5		±10	μA
I _{CC}	Quiescent Supply Current	6.0	V _I = V _{CC} or GND			4		40		80	μA

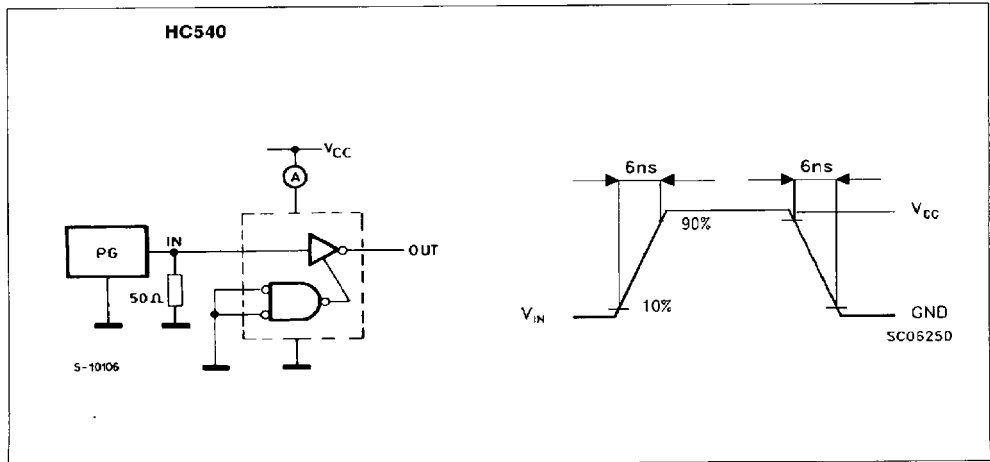
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AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, Input t_r = t_f = 6 ns)

Symbol	Parameter	Test Conditions			Value						Unit			
		V _{CC} (V)	C _L (pF)		T _A = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC				
					Min.	Typ.	Max.	Min.	Max.	Min.		Max.		
t _{TLH} t _{THL}	Output Transition Time	2.0 4.5 6.0	50			25 7 6	60 12 10		75 19 13		90 18 15	ns		
t _{PLH} t _{PHL}	Propagation Delay Time	2.0 4.5 6.0	50			40 10 9	85 17 14		105 21 18		130 26 22	ns		
t _{PZL} t _{PZH}	Output Enable Time	2.0 4.5 6.0	50	R _L = 1KΩ		47 13 11	110 22 19		140 28 24		165 33 28	ns		
		2.0 4.5 6.0			150	R _L = 1KΩ		61 17 14	135 27 23		170 34 29		205 41 35	ns
		2.0 4.5 6.0					50	R _L = 1KΩ		52 15 13	110 22 19		140 28 24	
		C _{IN}	Input Capacitance							5	10		10	
		C _{PD} (*)	Power Dissipation Capacitance			31								

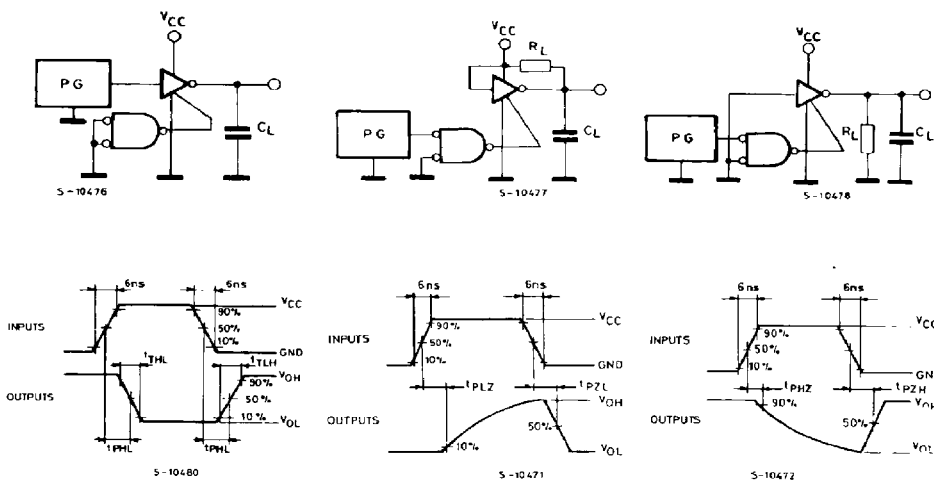
(*) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load (Refer to Test Circuit). Average operating current can be obtained by the following equation: I_{CC(opr)} = C_{PD} · V_{CC} · f_{IN} + I_{CC/8} (per gate)

TEST CIRCUIT I_{CC} (Opr.)

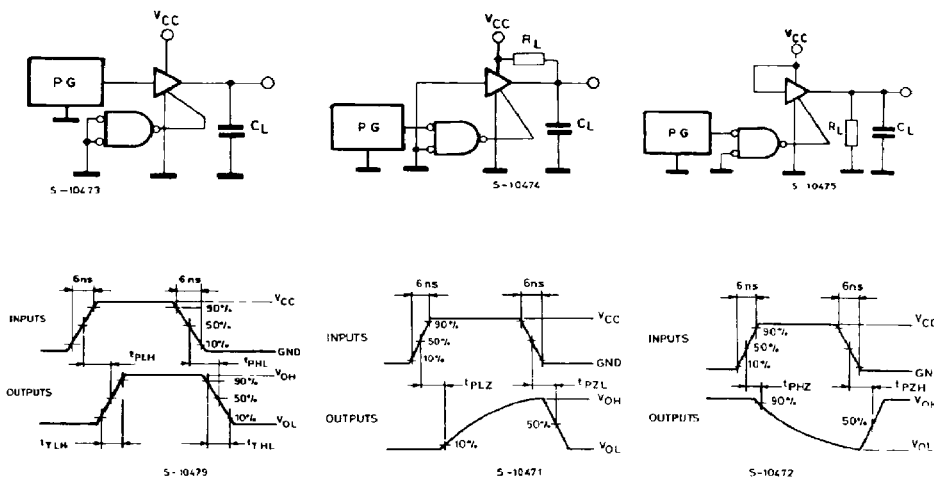


SWITCHING CHARACTERISTICS TEST CIRCUIT

HC540



HC541



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7/7