

MC74HC541A

Octal 3-State Noninverting Buffer/Line Driver/Line Receiver

High-Performance Silicon-Gate CMOS

The MC74HC541A is identical in pinout to the LS541. The device inputs are compatible with Standard CMOS outputs. External pull-up resistors make them compatible with LSTTL outputs.

The HC541A is an octal noninverting buffer/line driver/line receiver designed to be used with 3-state memory address drivers, clock drivers, and other bus-oriented systems. This device features inputs and outputs on opposite sides of the package and two ANDED active-low output enables.

The HC541A is similar in function to the HC540A, which has inverting outputs.

Features

- Output Drive Capability: 15 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS and TTL
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1 μ A
- High Noise Immunity Characteristic of CMOS Devices
- In Compliance With the JEDEC Standard No. 7 A Requirements
- Chip Complexity: 134 FETs or 33.5 Equivalent Gates
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

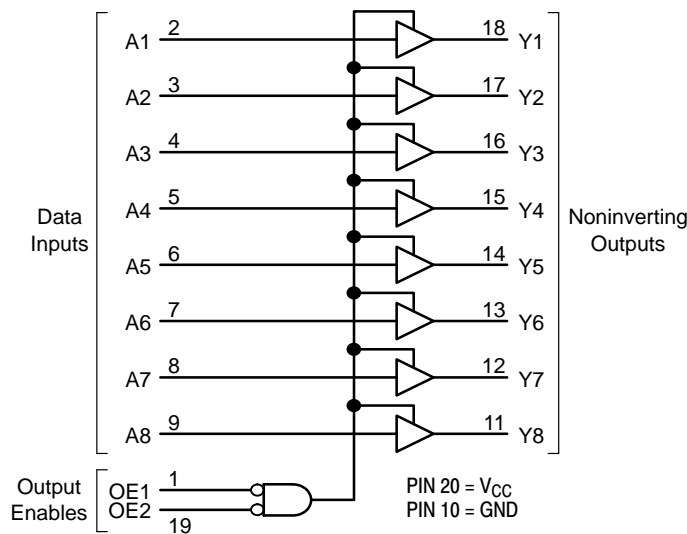
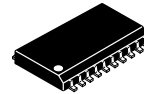


Figure 1. Logic Diagram



ON Semiconductor®

<http://onsemi.com>

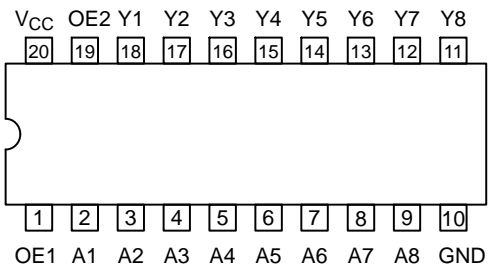


SOIC-20
DW SUFFIX
CASE 751D

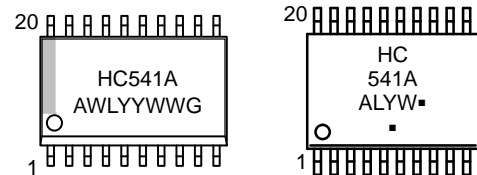


TSSOP-20
DT SUFFIX
CASE 948E

PIN ASSIGNMENT



MARKING DIAGRAMS



SOIC-20 TSSOP-20

- A = Assembly Location
- WL, L = Wafer Lot
- YY, Y = Year
- WW, W = Work Week
- G or ■ = Pb-Free Package

(Note: Microdot may be in either location)

FUNCTION TABLE

Inputs			Output Y
OE1	OE2	A	
L	L	L	L
L	L	H	H
H	X	X	Z
X	H	X	Z

X = Don't Care
Z = High Impedance

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

MC74HC541A

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage	-0.5 to +7.0	V
V_I	DC Input Voltage	$-0.5 \leq V_I \leq V_{CC} + 0.5$	V
V_O	DC Output Voltage (Note 1)	$-0.5 \leq V_O \leq V_{CC} + 0.5$	V
I_{IK}	DC Input Diode Current	± 20	mA
I_{OK}	DC Output Diode Current	± 35	mA
I_O	DC Output Sink Current	± 35	mA
I_{CC}	DC Supply Current per Supply Pin	± 75	mA
I_{GND}	DC Ground Current per Ground Pin	± 75	mA
T_{STG}	Storage Temperature Range	-65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
T_J	Junction Temperature under Bias	+150	°C
θ_{JA}	Thermal Resistance	SOIC TSSOP 96 128	°C/W
P_D	Power Dissipation in Still Air at 85°C	SOIC TSSOP 500 450	mW
MSL	Moisture Sensitivity	Level 1	
F_R	Flammability Rating	Oxygen Index: 30% – 35% UL 94 V-0 @ 0.125 in	
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4) > 4000 > 300 > 1000	V
$I_{Latchup}$	Latchup Performance	Above V_{CC} and Below GND at 85°C (Note 5)	± 300 mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. I_O absolute maximum rating must be observed.
2. Tested to EIA/JESD22-A114-A.
3. Tested to EIA/JESD22-A115-A.
4. Tested to JESD22-C101-A.
5. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	2.0	6.0	V
V_{IN} , V_{OUT}	DC Input Voltage, Output Voltage (Referenced to GND)	0	V_{CC}	V
T_A	Operating Temperature Range, All Package Types	-55	+125	°C
t_r , t_f	Input Rise/Fall Time (Figure 2)	$V_{CC} = 2.0\text{ V}$ $V_{CC} = 4.5\text{ V}$ $V_{CC} = 6.0\text{ V}$	0 0 0	1000 500 400 ns

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

6. Unused inputs may not be left open. All inputs must be tied to a high-logic voltage level or a low-logic input voltage level.

MC74HC541A

DC CHARACTERISTICS (Voltages Referenced to GND)

Symbol	Parameter	Condition	V _{CC} V	Guaranteed Limit			Unit
				-55 to 25°C	≤85°C	≤125°C	
V _{IH}	Minimum High-Level Input Voltage	V _{OUT} = 0.1 V I _{OUT} ≤ 20 μA	2.0	1.50	1.50	1.50	V
			3.0	2.10	2.10	2.10	
			4.5	3.15	3.15	3.15	
			6.0	4.20	4.20	4.20	
V _{IL}	Maximum Low-Level Input Voltage	V _{OUT} = V _{CC} - 0.1 V I _{OUT} ≤ 20 μA	2.0	0.50	0.50	0.50	V
			3.0	0.90	0.90	0.90	
			4.5	1.35	1.35	1.35	
			6.0	1.80	1.80	1.80	
V _{OH}	Minimum High-Level Output Voltage	V _{IN} = V _{IL} I _{OUT} ≤ 20 μA	2.0	1.9	1.9	1.9	V
			4.5	4.4	4.4	4.4	
			6.0	5.9	5.9	5.9	
		V _{IN} = V _{IL} I _{OUT} ≤ 3.6 mA I _{OUT} ≤ 6.0 mA I _{OUT} ≤ 7.8 mA	3.0	2.48	2.34	2.20	
			4.5	3.98	3.84	3.70	
			6.0	5.48	5.34	5.20	
V _{OL}	Maximum Low-Level Output Voltage	V _{IN} = V _{IH} I _{OUT} ≤ 20 μA	2.0	0.1	0.1	0.1	V
			4.5	0.1	0.1	0.1	
			6.0	0.1	0.1	0.1	
		V _{IN} = V _{IH} I _{OUT} ≤ 3.6 mA I _{OUT} ≤ 6.0 mA I _{OUT} ≤ 7.8 mA	3.0	0.26	0.33	0.40	
			4.5	0.26	0.33	0.40	
			6.0	0.26	0.33	0.40	
I _{IN}	Maximum Input Leakage Current	V _{IN} = V _{CC} or GND	6.0	±0.1	±1.0	±1.0	μA
I _{OZ}	Maximum 3-State Leakage Current	Output in High Impedance State V _{IN} = V _{IL} or V _{IH} V _{OUT} = V _{CC} or GND	6.0	±0.5	±5.0	±10.0	μA
I _{CC}	Maximum Quiescent Supply Current (per Package)	V _{IN} = V _{CC} or GND I _{OUT} = 0 μA	6.0	4	40	160	μA

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

Symbol	Parameter	V _{CC} V	Guaranteed Limit			Unit
			-55 to 25°C	≤85°C	≤125°C	
t _{PLH} , t _{PHL}	Maximum Propagation Delay, Input A to Output Y (Figures 2 and 4)	2.0	80	100	120	ns
		3.0	30	40	55	
		4.5	18	23	28	
		6.0	15	20	25	
t _{PLZ} , t _{PHZ}	Maximum Propagation Delay, Output Enable to Output Y (Figures 3 and 5)	2.0	110	140	165	ns
		3.0	45	60	75	
		4.5	25	31	38	
		6.0	21	26	31	
t _{PZL} , t _{PZH}	Maximum Propagation Delay, Output Enable to Output Y (Figures 3 and 5)	2.0	110	140	165	ns
		3.0	45	60	75	
		4.5	25	31	38	
		6.0	21	26	31	
t _{TLH} , t _{THL}	Maximum Output Transition Time, Any Output (Figures 2 and 4)	2.0	60	75	90	ns
		3.0	22	28	34	
		4.5	12	15	18	
		6.0	10	13	15	
C _{IN}	Maximum Input Capacitance		10	10	10	pF
C _{OUT}	Maximum 3-State Output Capacitance (High Impedance State Output)		15	15	15	pF
C _{PD}	Power Dissipation Capacitance (Per Buffer) (Note 7)	Typical @ 25°C, V _{CC} = 5.0 V, V _{EE} = 0 V			pF	
		35				

7. Used to determine the no-load dynamic power consumption: P_D = C_{PD} V_{CC}²f + I_{CC} V_{CC}.

MC74HC541A

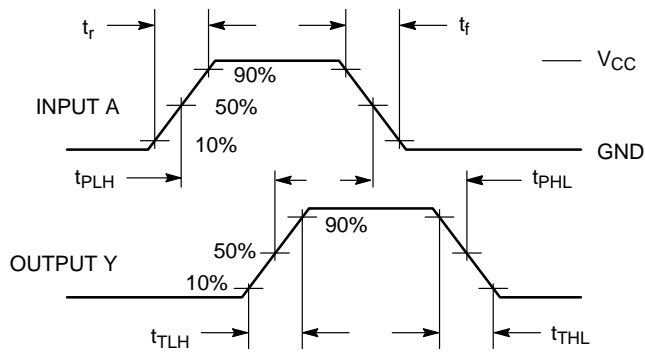


Figure 2. Switching Waveform

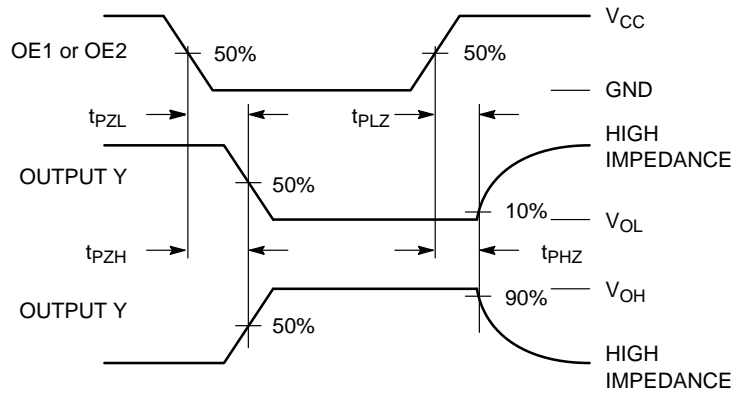
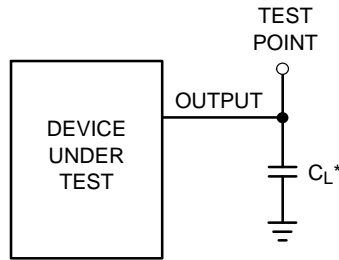
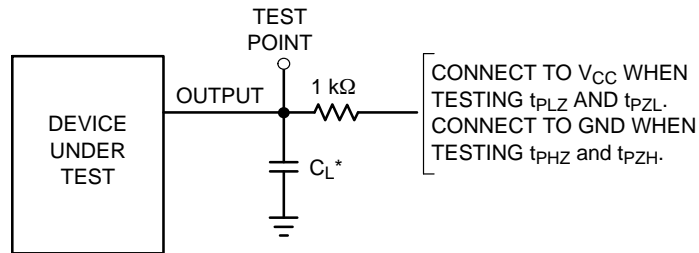


Figure 3. Switching Waveform



*Includes all probe and jig capacitance

Figure 4. Test Circuit



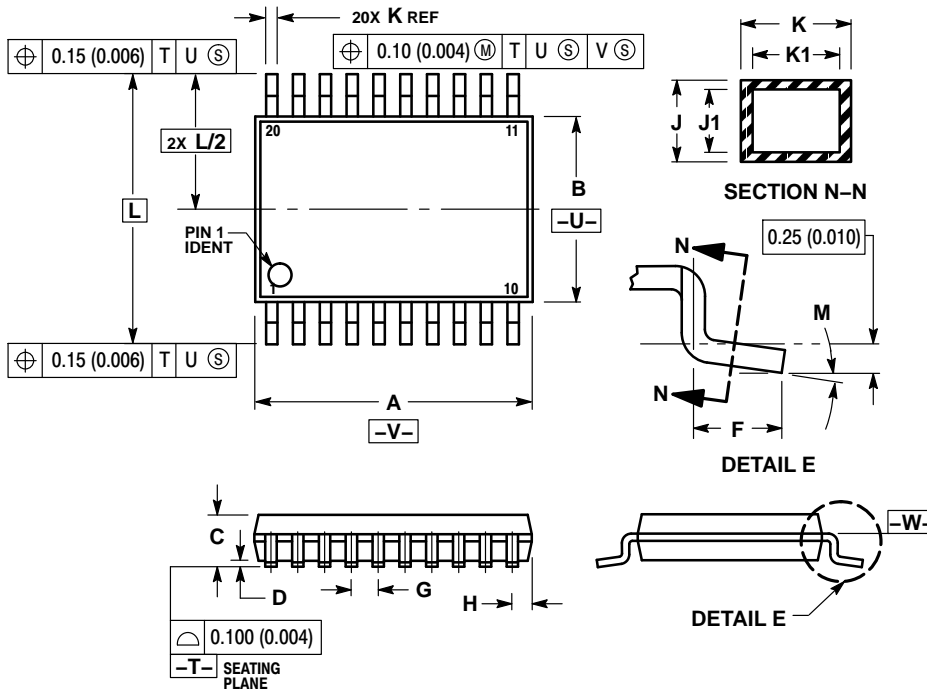
*Includes all probe and jig capacitance

Figure 5. Test Circuit

MC74HC541A

PACKAGE DIMENSIONS

TSSOP-20
DT SUFFIX
CASE 948E-02
ISSUE C

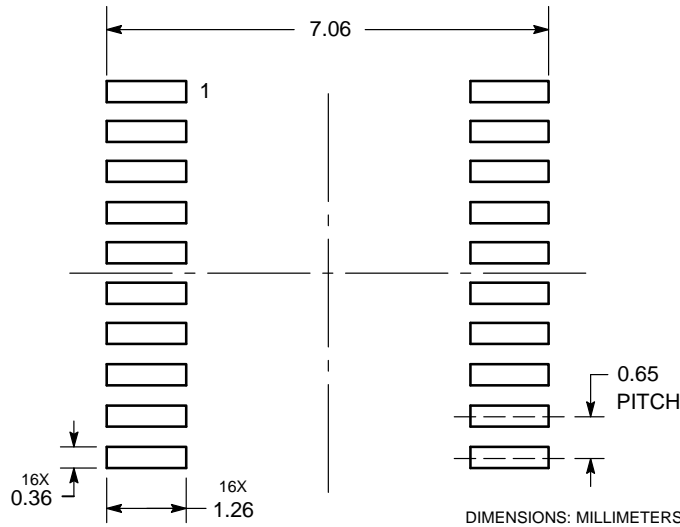


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.40	6.60	0.252	0.260
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.27	0.37	0.011	0.015
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

SOLDERING FOOTPRINT*

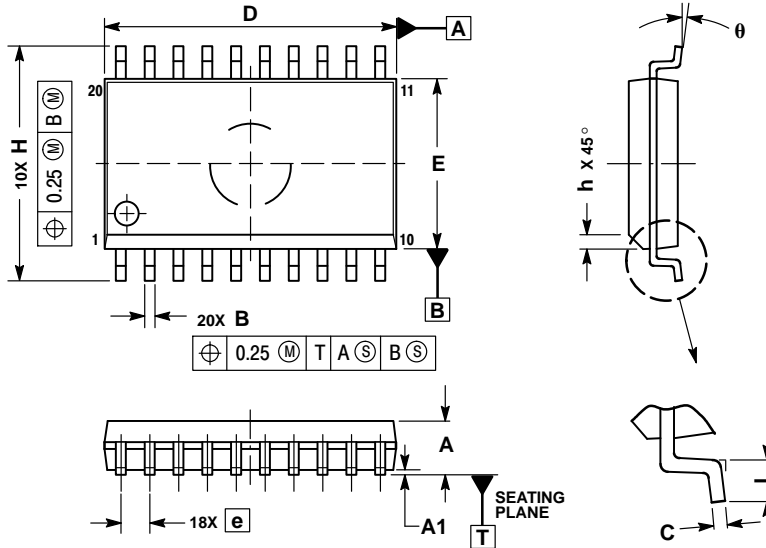


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

MC74HC541A

PACKAGE DIMENSIONS


SOIC-20
DW SUFFIX
CASE 751D-05
ISSUE G



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	2.35	2.65
A1	0.10	0.25
B	0.35	0.49
C	0.23	0.32
D	12.65	12.95
E	7.40	7.60
e	1.27 BSC	
H	10.05	10.55
h	0.25	0.75
L	0.50	0.90
θ	0°	7°

ON Semiconductor and the  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries. SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[ON Semiconductor:](#)

[MC74HC541ADTG](#) [MC74HC541ADTR2G](#) [MC74HC541ADWG](#) [MC74HC541ADWR2G](#)