

# 54FCT541

## Octal Buffer/Line Driver with TRI-STATE® Outputs

### General Description

The 'FCT541 is an octal buffer and line driver with TRI-STATE outputs designed to be employed as a memory and address driver, clock driver, or bus-oriented transmitter/receiver. The 'FCT541 is similar to the 'FCT244 with broad-side pinout.

### Features

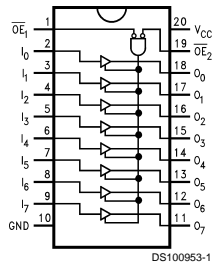
- Non-inverting buffers
- TTL input and output level compatible
- CMOS power consumption
- Output sink capability of 48 mA, source capability of 12 mA
- Flow-through pinout for ease of PC board layout
- Standard Microcircuit Drawing (SMD) 5962-8976601

### Ordering Code

Military	Package Number	Package Description
54FCT541DMQB	J20A	20-Lead Ceramic Dual-In-Line
54FCT541FMQB	W20A	20-Lead Cerpack
54FCT541LMQB	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

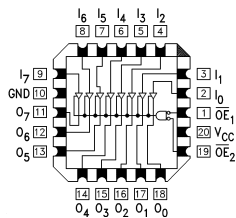
### Connection Diagram

Pin Assignment  
DIP and Cerpack



DS100953-1

Pin Assignment  
LCC



DS100953-30

Pin Names	Description
$\overline{OE}_1, \overline{OE}_2$	Output Enable Input (Active Low)
$I_0-I_7$	Inputs
$O_0-O_7$	Outputs

Inputs			Outputs
$\overline{OE}_1$	$\overline{OE}_2$	I	FCT541
L	L	H	H
H	X	X	Z
X	H	X	Z
L	L	L	L

H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Immaterial  
Z = High Impedance

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**Absolute Maximum Ratings** (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Storage Temperature	-65°C to +150°C
Ambient Temperature under Bias	-55°C to +125°C
Junction Temperature under Bias	
Ceramic	-55°C to +175°C
V <sub>CC</sub> Pin Potential to	
Ground Pin	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30 mA to +5.0 mA
Voltage Applied to Any Output	
in the Disabled or	
Power-Off State	-0.5V to 5.5V

in the HIGH State	-0.5V to V <sub>CC</sub>
Current Applied to Output	
in LOW State (Max)	twice the rated I <sub>OL</sub> (mA)
DC Latchup Source Current	-500 mA

**Recommended Operating Conditions**

Free Air Ambient Temperature	
Military	-55°C to +125°C
Supply Voltage	
Military	+4.5V to +5.5V
Minimum Input Edge Rate	(ΔV/Δt)
Data Input	50 mV/ns
Enable Input	20 mV/ns

**DC Electrical Characteristics**

Symbol	Parameter	FCT541			Units	V <sub>CC</sub>	Conditions
		Min	Typ	Max			
V <sub>IH</sub>	Input HIGH Voltage	2.0			V		Recognized HIGH Signal
V <sub>IL</sub>	Input LOW Voltage				V		Recognized LOW Signal
V <sub>CD</sub>	Input Clamp Diode Voltage				V	Min	I <sub>IN</sub> = -18 mA
V <sub>OH</sub>	Output HIGH Voltage	54FCT	4.3		V	Min	I <sub>OH</sub> = -300 μA
		54FCT	2.4		V	Min	I <sub>OH</sub> = -12 mA
V <sub>OL</sub>	Output LOW Voltage	54FCT		0.2	V	Min	I <sub>OL</sub> = 300 μA
		54FCT		0.55	V	Min	I <sub>OL</sub> = 48 mA
I <sub>IH</sub>	Input HIGH Current	5			μA	Max	V <sub>IN</sub> = V <sub>CC</sub>
I <sub>IL</sub>	Input LOW Current	-5			μA	Max	V <sub>IN</sub> = 0.0V
I <sub>OZH</sub>	Output Leakage Current	10			μA	Max	V <sub>OUT</sub> = 5.5V; $\overline{OE}_n = 2.0V$
I <sub>OZL</sub>	Output Leakage Current	-10			μA	Max	V <sub>OUT</sub> = 0.0V; $\overline{OE}_n = 2.0V$
I <sub>OS</sub>	Output Short-Circuit Current	-60			mA	Max	V <sub>OUT</sub> = 0.0V
I <sub>CCQ</sub>	Quiescent Power Supply Current	1.5			mA	Max	V <sub>IN</sub> < 0.2V or V <sub>IN</sub> 5.3V, V <sub>CC</sub> = 5.5V
ΔI <sub>CC</sub>	Quiescent Power Supply Current	2.0			mA	Max	V <sub>I</sub> = V <sub>CC</sub> - 2.1V
I <sub>CCD</sub>	Dynamic I <sub>CC</sub>	0.4			mA/ MHz	Max	V <sub>CC</sub> = 5.5V, Outputs Open, One Bit Toggling, 50% Duty Cycle, $\overline{OE}_n = GND$
I <sub>CC</sub>	Total Power Supply Current	6.0			mA	Max	V <sub>CC</sub> = 5.5V, Outputs Open, f <sub>I</sub> = 10MHz, $\overline{OE}_n = GND$ , One Bit Toggling, 50% Duty Cycle, $\overline{OE}_n = GND$

**Note 1:** Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

**Note 2:** Either voltage limit or current limit is sufficient to protect inputs.

## AC Electrical Characteristics

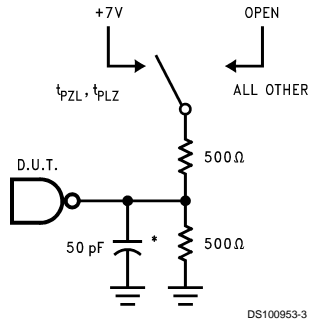
Symbol	Parameter	54FCT		Units	Fig. No.
		T <sub>A</sub> = -55°C to +125°C			
		V <sub>CC</sub> = 4.5V-5.5V C <sub>L</sub> = 50 pF			
Min	Max				
t <sub>PLH</sub>	Propagation Delay	2.0	9.0	ns	Figure 4
t <sub>PHL</sub>	Data to Outputs	2.0	9.0		
t <sub>PZH</sub>	Output Enable Time	2.0	12.5	ns	Figure 5
t <sub>PZL</sub>		2.0	12.5		
t <sub>PHZ</sub>	Output Disable Time	2.0	12.5	ns	Figure 5
t <sub>PLZ</sub>		2.0	12.5		

## Capacitance

Symbol	Parameter	Max	Units	Conditions T <sub>A</sub> = 25°C
C <sub>IN</sub>	Input Capacitance	10.0	pF	V <sub>CC</sub> = 0.0V
C <sub>OUT</sub> (Note 3)	Output Capacitance	12.0	pF	V <sub>CC</sub> = 5.0V

**Note 3:** C<sub>OUT</sub> is measured at frequency of f = 1 MHz, per MIL-STD-883B, Method 3012.

### AC Loading



\*Includes jig and probe capacitance

FIGURE 1. Standard AC Test Load

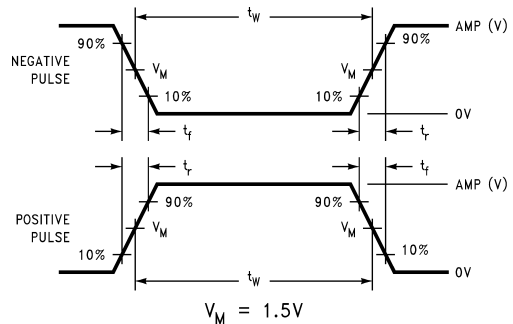


FIGURE 2. Test Input Signal Levels

Amplitude	Rep. Rate	$t_w$	$t_r$	$t_f$
3.0V	1 MHz	500 ns	2.5 ns	2.5 ns

FIGURE 3. Test Input Signal Requirements

### AC Waveforms

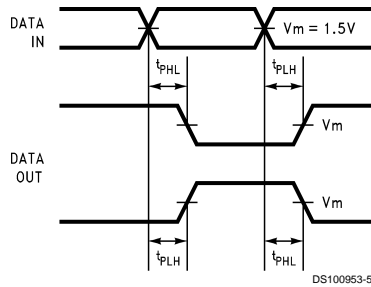


FIGURE 4. Propagation Delay Waveforms for Inverting and Non-Inverting Functions

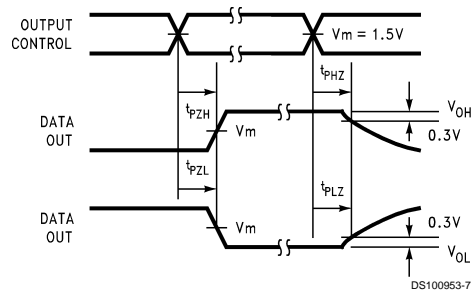
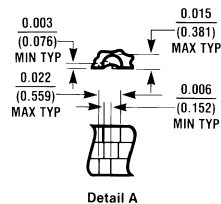
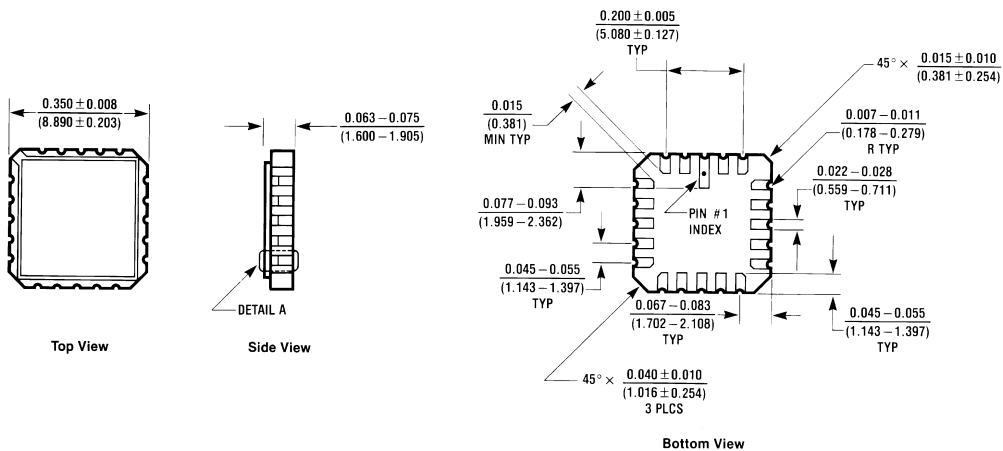


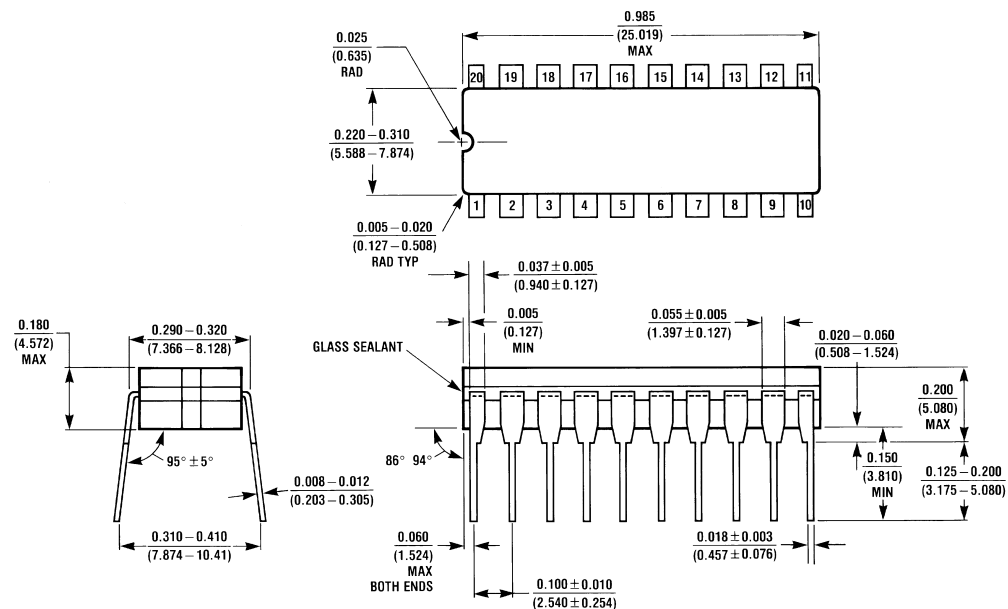
FIGURE 5. TRI-STATE Output HIGH and LOW Enable and Disable Time

**Physical Dimensions** inches (millimeters) unless otherwise noted



**20-Terminal Ceramic Chip Carrier**  
NS Package Number E20A

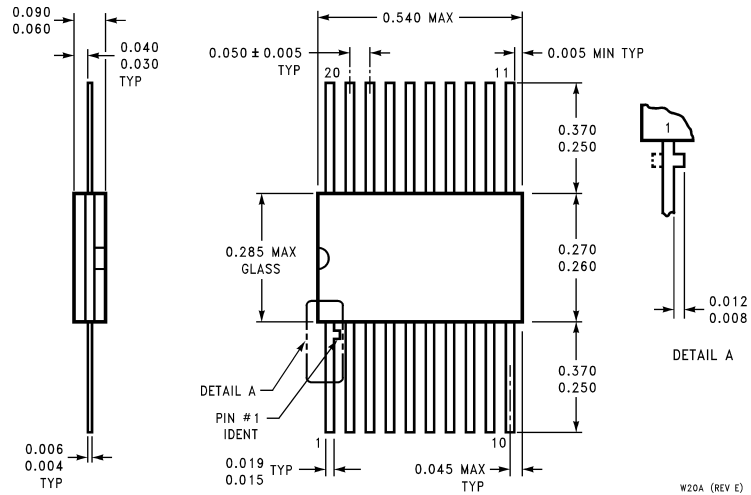
E20A (REV D)



**20-Lead Ceramic Dual-In-Line Package**  
NS Package Number J20A

J20A (REV M)

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)




**20-Lead Ceramic Flatpack  
NS Package Number W20A**

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