

54FCT245

Octal Bidirectional Transceiver with TRI-STATE® Outputs

General Description

The 54FCT245 contains eight non-inverting bidirectional buffers with TRI-STATE outputs and is intended for bus-oriented applications. Current sinking capability is 48 mA on both the A and B ports. The Transmit/Receive (T/R) input determines the direction of data flow through the bidirectional transceiver. Transmit (active HIGH) enables data from A ports to B ports; Receive (active LOW) enables data from B ports to A ports. The Output Enable input, when HIGH, disables both A and B ports by placing them in a High Z condition.

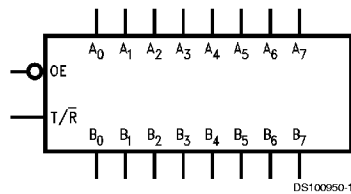
Features

- TTL input and output level compatible
- A and B output sink capability of 48 mA, source capability of 12 mA
- CMOS power consumption
- Standard Microcircuit Drawing (SMD) 5962-8762901

Ordering Code:

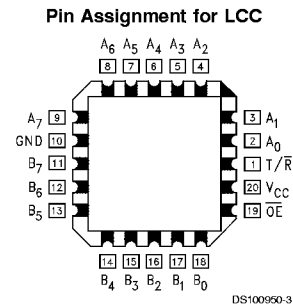
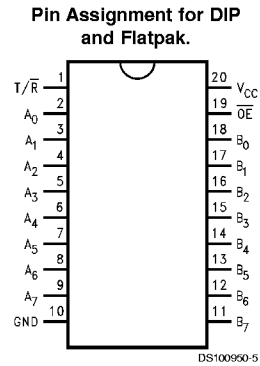
Military	Package Number	Package Description
54FCT245DMQB	J20A	20-Lead Ceramic Dual-In-Line
54FCT245FMQB	W20A	20-Lead Cerpak
54FCT245LMQB	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

Logic Symbol



TRI-STATE® is a registered trademark of National Semiconductor Corporation.

Connection Diagrams



Pin Descriptions

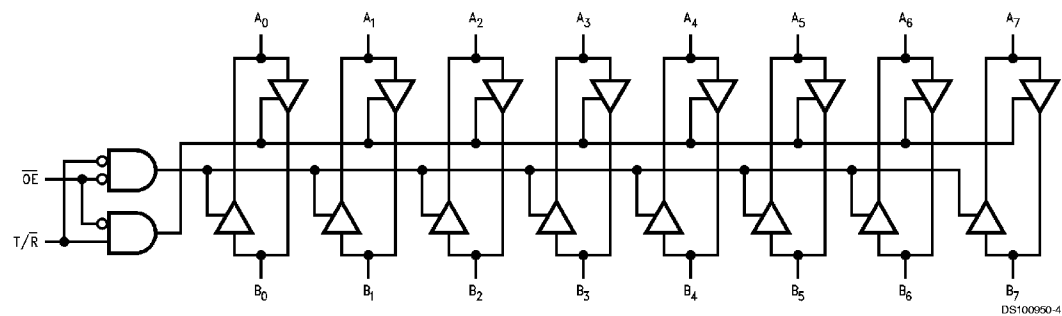
Pin Names	Description
\overline{OE}	Output Enable Input (Active LOW)
T/R	Transmit/Receive Input
A ₀ -A ₇	Side A Inputs or TRI-STATE Outputs
B ₀ -B ₇	Side B Inputs or TRI-STATE Outputs

Truth Table

Inputs		Output
\overline{OE}	T/R	
L	L	Bus B Data to Bus A
L	H	Bus A Data to Bus B
H	X	High Z State

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

Logic Diagram



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 _{CC} 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_{CC}
 Current Applied to Output
 in LOW State (Max) twice the rated I_{OL} (mA)

Recommended Operating Conditions

Free Air Ambient Temperature	
Military	-55°C to +125°C
Supply Voltage	
Military	+4.5V to +5.5V

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.

DC Electrical Characteristics

Symbol	Parameter	FCT245		Units	V _{CC}	Conditions
		Min	Max			
V _{IH}	Input HIGH Voltage	2.0		V		Recognized HIGH Signal
V _{IL}	Input LOW Voltage		0.8	V		Recognized LOW Signal
V _{CD}	Input Clamp Diode Voltage		-1.2	V	Min	I _{IN} = -18 mA (\overline{OE} , T/ \overline{R})
V _{OH}	Output HIGH Voltage	54FCT	4.3	V	Min	I _{OH} = -300 μ A (A _n , B _n)
		54FCT	2.4	V	Min	I _{OH} = -12 mA (A _n , B _n)
V _{OL}	Output LOW Voltage	54FCT	0.2	V	Min	I _{OL} = 300 μ A (A _n , B _n)
		54FCT	0.55	V	Min	I _{OL} = 48 mA (A _n , B _n)
I _{IH}	Input HIGH Current		5	μ A	Max	V _{IN} = 2.7V (\overline{OE} , T/ \overline{R})
			5	μ A	Max	V _{IN} = V _{CC} (\overline{OE} , T/ \overline{R})
I _{BVIT}	Input HIGH Current Breakdown Test (I/O)		20	μ A	Max	V _{IN} = 5.5V (A _n , B _n)
I _{IL}	Input LOW Current		-5	μ A	Max	V _{IN} = 0.0V (\overline{OE} , T/ \overline{R})
I _{OS}	Output Short-Circuit Current		-60	mA	Max	V _{OUT} = 0.0V (A _n , B _n)
I _{CCQ}	Power Supply Current		1.5	mA	Max	V _{IN} = 0.2V or V _{IN} = 5.3V, V _{CC} = 5.5V
Δ I _{CC}	Power Supply Current		2.0	mA	Max	V _{CC} = 5.5V, V _{IN} = 3.4V
I _{CCT}	Total Power Supply Current		6.0	mA		V _{IN} = 3.4V or V _{IN} = GND, \overline{OE} = T/ \overline{R} = GND, V _{CC} = 5.5V, f _i = 10Mhz, outputs open, one bit toggling - 50% duty cycle
			5.5	mA	Max	V _{IN} = 5.3V or V _{IN} = 0.2V, \overline{OE} = T/ \overline{R} = GND, V _{CC} = 5.5V, f _i = 10Mhz, outputs open, one bit toggling - 50% duty cycle
I _{CCD}	Dynamic I _{CC} (Note 3)		0.4	mA/ MHz	Max	Outputs Open, \overline{OE} = GND, T/ \overline{R} = GND or V _{CC} One Bit Toggling, 50% Duty Cycle

Note 3: Guaranteed but not tested.

AC Electrical Characteristics

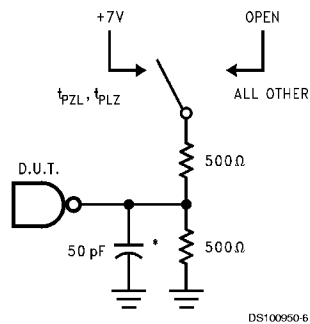
Symbol	Parameter	54FCT		Units	Fig. No.
		$T_A = -55^\circ\text{C to } +125^\circ\text{C}$ $V_{CC} = 4.5\text{V} - 5.5\text{V}$ $C_L = 50\text{ pF}$			
		Min	Max		
t_{PLH}	Propagation Delay	1.5	7.5	ns	Figure 4
t_{PHL}	Data to Outputs	1.5	7.5		
t_{PZH}	Output Enable	1.5	10.0	ns	Figure 5
t_{PZL}	Time	1.5	10.0		
t_{PHZ}	Output Disable	1.5	10.0	ns	Figure 5
t_{PLZ}	Time	1.5	10.0		

Capacitance

Symbol	Parameter	Max	Units	Conditions $T_A = 25^\circ\text{C}$
C_{IN}	Input Capacitance	10.0	pF	$V_{CC} = 0\text{V}$ (\overline{OE} , T/\overline{R})
$C_{I/O}$ (Note 4)	I/O Capacitance	12.0	pF	$V_{CC} = 5.0\text{V}$ (A_n , B_n)

Note 4: $C_{I/O}$ is measured at frequency $f = 1\text{ MHz}$, per MIL-STD-883B, Method 3012.

AC Loading



*Includes jig and probe capacitance

FIGURE 1. Standard AC Test Load

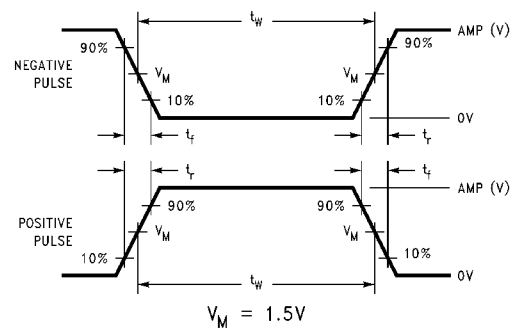


FIGURE 2. Test Input Signal Levels

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

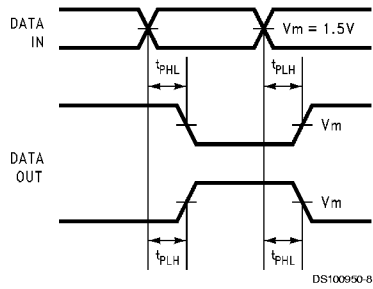


FIGURE 4. Propagation Delay Waveforms for Inverting and Non-Inverting Functions

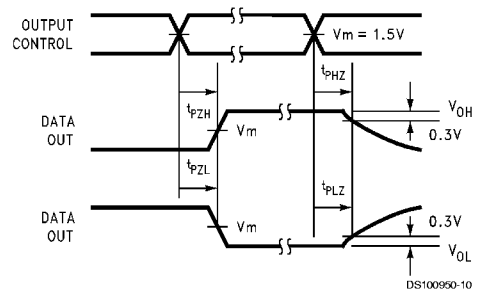
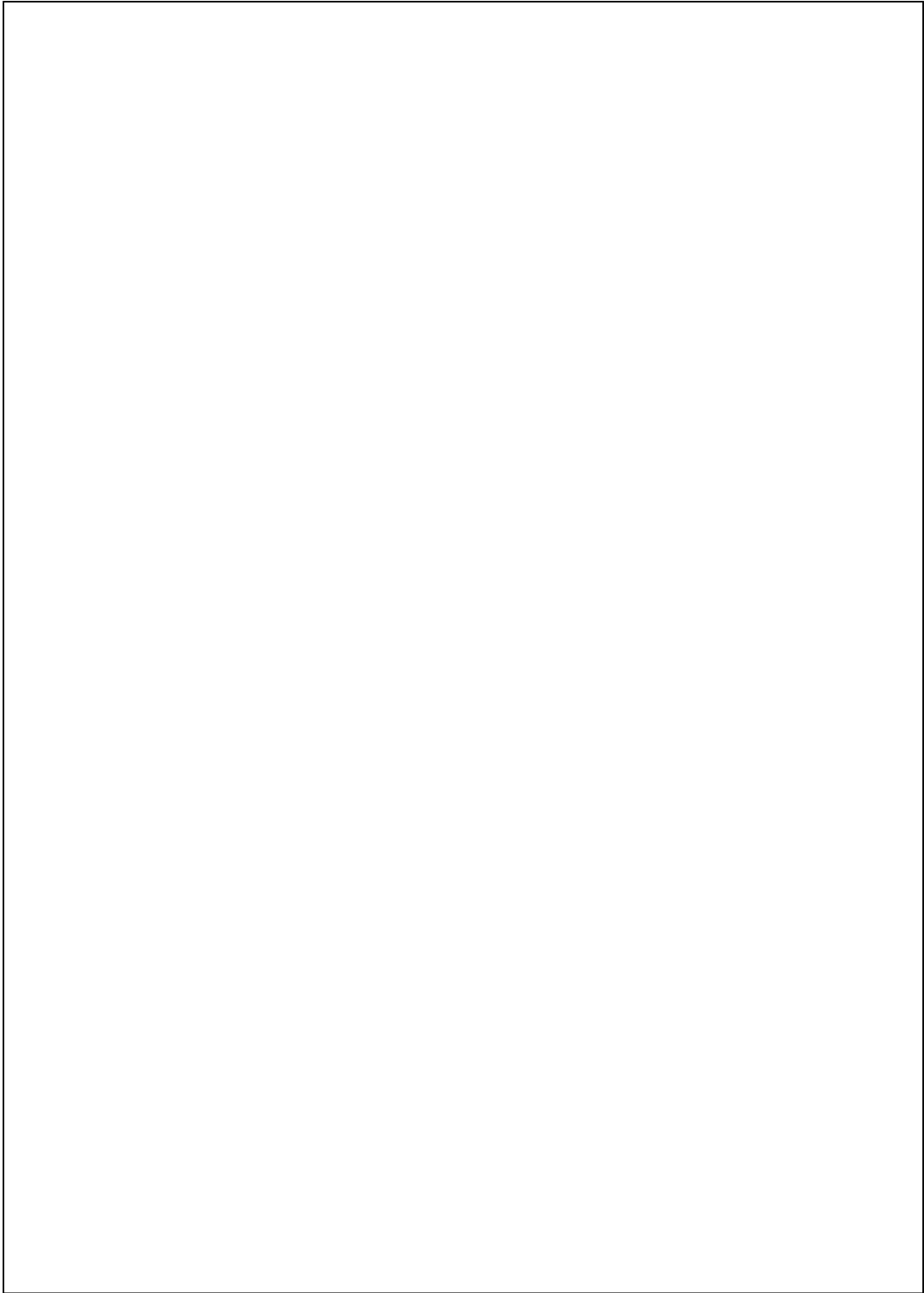
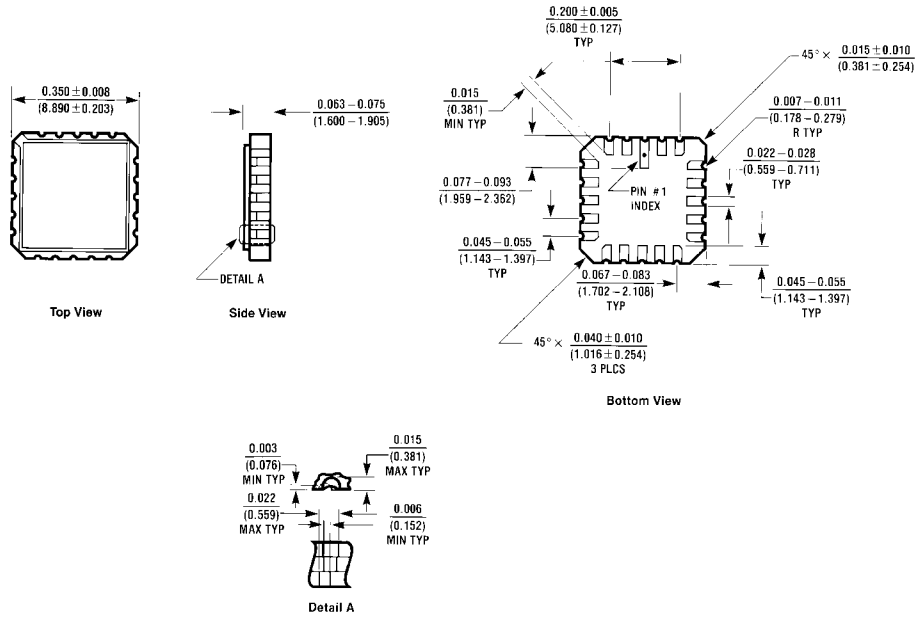


FIGURE 5. TRI-STATE Output HIGH and LOW Enable and Disable Times

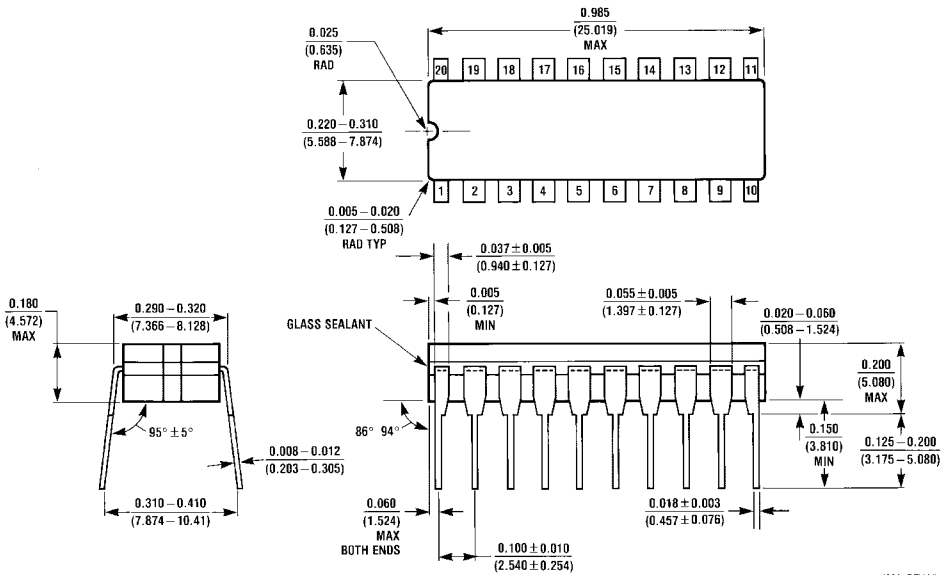


Physical Dimensions inches (millimeters) unless otherwise noted



L20A (REV D)

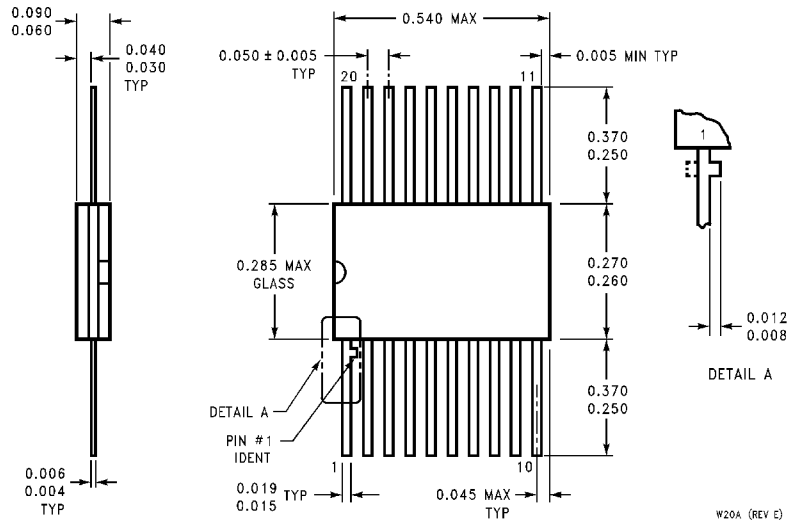
20-Terminal Ceramic Chip Carrier (L)
NS Package Number E20A



J20A (REV M)

20-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J20A

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



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