

54F/74F245

Octal Bidirectional Transceiver with TRI-STATE® Outputs

General Description

The 'F245 contains eight non-inverting bidirectional buffers with TRI-STATE outputs and is intended for bus-oriented applications. Current sinking capability is 24 mA (20 mA Mil) at the A ports and 64 mA (48 mA Mil) at the B ports. The Transmit/Receive ($T/\bar{R}$) 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

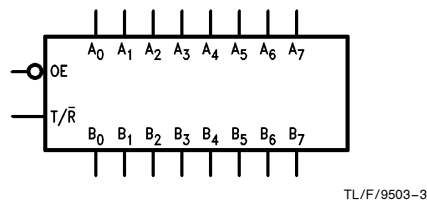
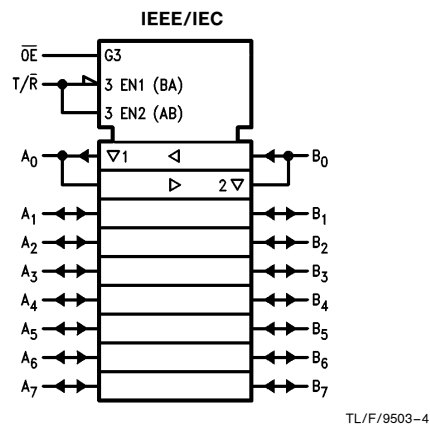
- Non-inverting buffers
- Bidirectional data path
- A outputs sink 24 mA (20 mA Mil)
- B outputs sink 64 mA (48 mA Mil)
- Guaranteed 4000V minimum ESD protection

Commercial	Military	Package Number	Package Description
74F245PC		N20A	20-Lead (0.300" Wide) Molded Dual-In-Line
	54F245DM (Note 2)	J20A	20-Lead Ceramic Dual-In-Line
74F245SC (Note 1)		M20B	20-Lead (0.300" Wide) Molded Small Outline, JEDEC
74F245SJ (Note 1)		M20D	20-Lead (0.300" Wide) Molded Small Outline, EIAJ
74F245MSA (Note 1)		MSA20	20-Lead Molded Shrink Small Outline, EIAJ Type II
	54F245FM (Note 2)	W20A	20-Lead Cerpack
	54F245LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

Note 1: Devices also available in 13" reel. Use suffix = SCX, SJX and MSAX.

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMOB, FMQB and LMOB.

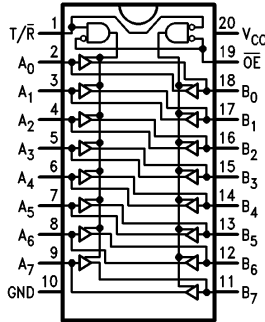
Logic Symbols



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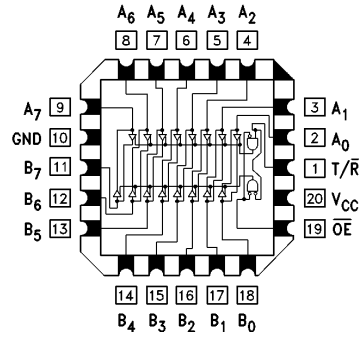
Connection Diagrams

Pin Assignment for
DIP, SOIC, SSOP and Flatpak



TL/F/9503-1

Pin Assignment
for LCC



TL/F/9503-2

Unit Loading/Fan Out

Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
$\overline{OE}$	Output Enable Input (Active LOW)	1.0/2.0	$20 \mu A / -1.2 \text{ mA}$
$T/\overline{R}$	Transmit/Receive Input	1.0/2.0	$20 \mu A / -1.2 \text{ mA}$
A_0-A_7	Side A Inputs or TRI-STATE Outputs	3.5/1.083 150/40(38.3)	$70 \mu A / -0.65 \text{ mA}$ $-3 \text{ mA} / 24 \text{ mA} (20 \text{ mA})$
B_0-B_7	Side B Inputs or TRI-STATE Outputs	3.5/1.083 600/106.6(80)	$70 \mu A / -0.65 \text{ mA}$ $-12 \text{ mA} / 64 \text{ mA} (48 \text{ mA})$

Truth Table

Inputs		Output
$\overline{OE}$	$T/\overline{R}$	
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

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	−55°C to +175°C
Plastic	−55°C to +150°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 Output in HIGH State (with V _{CC} = 0V)	
Standard Output	−0.5V to V _{CC}
TRI-STATE Output	−0.5V to +5.5V

Current Applied to Output in LOW State (Max)

twice the rated I_{OL} (mA)

ESD Last Passing Voltage (Min)

4000V

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.

Recommended Operating Conditions

Free Air Ambient Temperature

Military

−55°C to +125°C

Commercial

0°C to +70°C

Supply Voltage

Military

+4.5V to +5.5V

Commercial

+4.5V to +5.5V

DC Electrical Characteristics

Symbol	Parameter	54F/74F			Units	V _{CC}	Conditions
		Min	Typ	Max			
V _{IH}	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V _{IL}	Input LOW Voltage			0.8	V		Recognized as a LOW Signal
V _{CD}	Input Clamp Diode Voltage			−1.2	V	Min	I _{IN} = −18 mA
V _{OH}	Output HIGH Voltage	54F 10% V _{CC}	2.4		V	Min	I _{OH} = −3 mA (A _N)
		54F 10% V _{CC}	2.0				I _{OH} = −12 mA (B _N)
		74F 10% V _{CC}	2.4				I _{OH} = −3 mA (A _N)
		74F 10% V _{CC}	2.0				I _{OH} = −15 mA (B _N)
		74F 5% V _{CC}	2.7				I _{OH} = −3 mA (A _N)
V _{OL}	Output LOW Voltage	54F 10% V _{CC}		0.5	V	Min	I _{OL} = 20 mA (A _N)
		54F 10% V _{CC}		0.55			I _{OL} = 48 mA (B _N)
		74F 10% V _{CC}		0.5			I _{OL} = 24 mA (A _N)
		74F 10% V _{CC}		0.55			I _{OL} = 64 mA (B _N)
I _{IH}	Input HIGH Current	54F		20.0	μA	Max	V _{IN} = 2.7V
		74F		5.0			
I _{BVI}	Input HIGH Current Breakdown Test	54F		100	μA	Max	V _{IN} = 7.0V ($\overline{OE}$, T/ $\overline{R}$)
		74F		7.0			
I _{BVIT}	Input HIGH Current Breakdown (I/O)	54F		1.0	mA	Max	V _{IN} = 5.5 V (A _N , B _N)
		74F		0.5			
I _{CEX}	Output HIGH Leakage Current	54F		250	μA	Max	V _{OUT} = V _{CC} (A _N , B _N)
		74F		50			
V _{ID}	Input Leakage Test	74F	4.75		V	0.0	I _{ID} = 1.9 μA All Other Pins Grounded
I _{OD}	Output Leakage Circuit Current	74F		3.75	μA	0.0	V _{IOD} = 150 mV All Other Pins Grounded
I _{IL}	Input LOW Current			−1.2	mA	Max	V _{IN} = 0.5V (T/ $\overline{R}$, $\overline{OE}$)
I _{IH} + I _{OZH}	Output Leakage Current			70	μA	Max	V _{OUT} = 2.7V (A _N , B _N)
I _{IL} + I _{OZL}	Output Leakage Current			−650	μA	Max	V _{OUT} = 0.5V (A _N , B _N)

DC Electrical Characteristics (Continued)

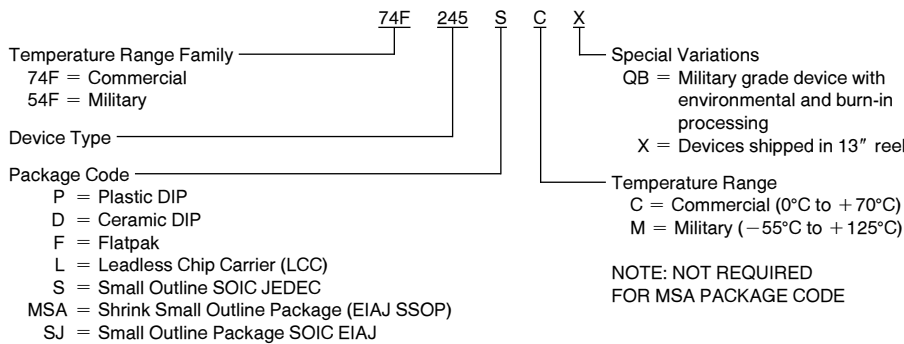
Symbol	Parameter	54F/74F			Units	V _{CC}	Conditions
		Min	Typ	Max			
I _{OS}	Output Short-Circuit Current	−60 −100		−150 −225	mA	Max	V _{OUT} = 0V (A _n) V _{OUT} = 0V (B _n)
I _{ZZ}	Bus Drainage Test			500	μA	0.0V	V _{OUT} = 5.25V(A _n , B _n)
I _{CCH}	Power Supply Current		70	90	mA	Max	V _O = HIGH
I _{CCL}	Power Supply Current		95	120	mA	Max	V _O = LOW
I _{CCZ}	Power Supply Current		85	110	mA	Max	V _O = HIGH Z

AC Electrical Characteristics

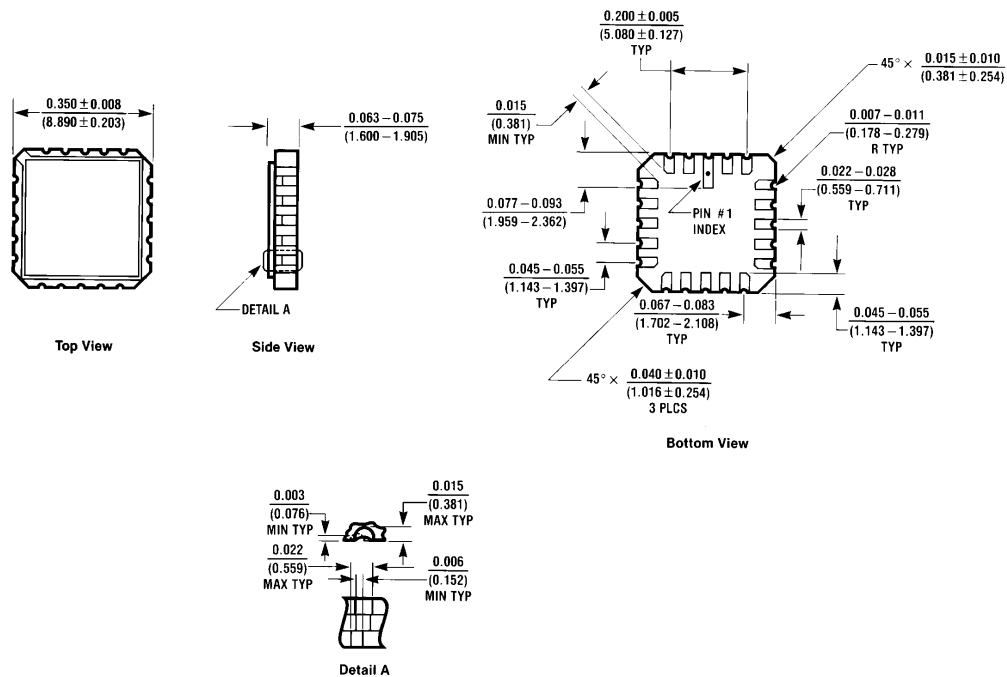
Symbol	Parameter	74F			54F		74F		Units
		T _A = +25°C V _{CC} = +5.0V C _L = 50 pF			T _A , V _{CC} = Mil C _L = 50 pF		T _A , V _{CC} = Com C _L = 50 pF		
		Min	Typ	Max	Min	Max	Min	Max	
t _{PLH}	Propagation Delay	2.5	4.2	6.0	2.0	7.5	2.0	7.0	ns
t _{PHL}	A _n to B _n or B _n to A _n	2.5	4.2	6.0	2.0	7.5	2.0	7.0	
t _{pZH}	Output Enable Time	3.0	5.3	7.0	2.5	9.0	2.5	8.0	ns
t _{pZL}		3.5	6.0	8.0	3.0	10.0	3.0	9.0	
t _{PHZ}	Output Disable Time	2.0	5.0	6.5	2.0	9.0	2.0	7.5	
t _{PLZ}		2.0	5.0	6.5	2.0	10.0	2.0	7.5	

Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:

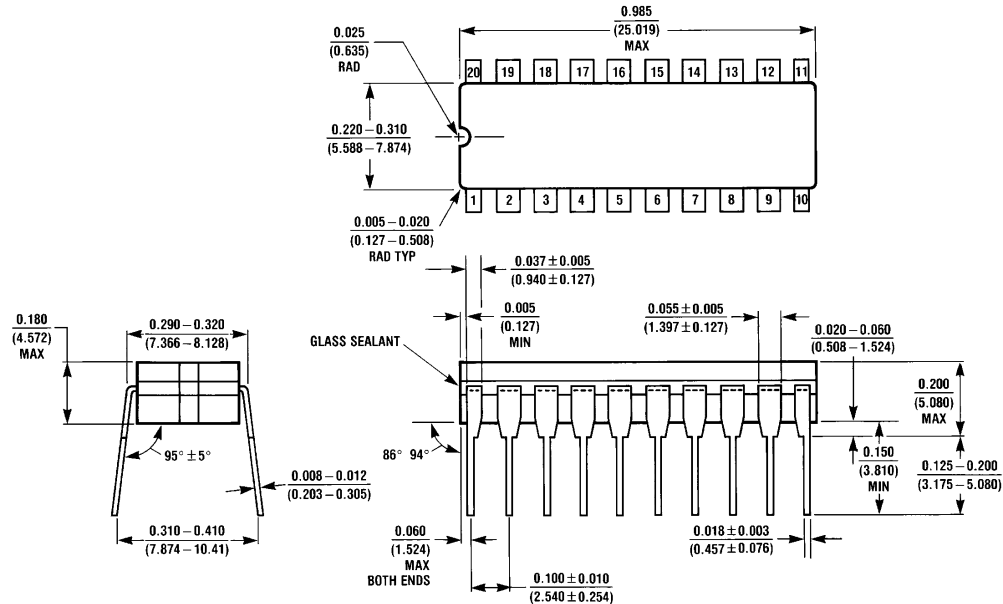


Physical Dimensions inches (millimeters)



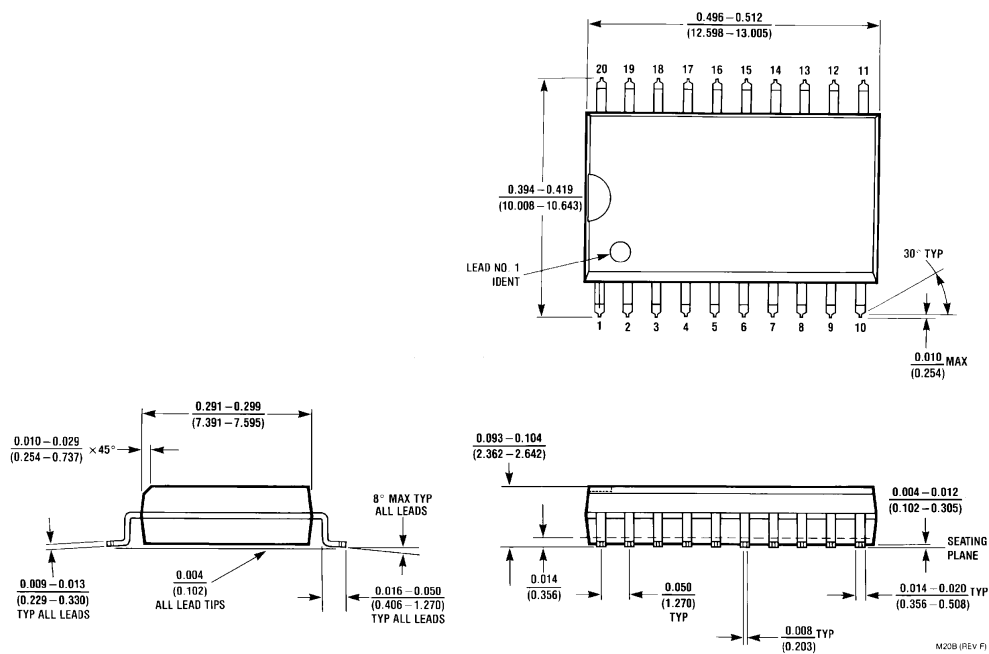
20-Lead Ceramic Leadless Chip Carrier (L)
NS Package Number E20A

E20A (REV D)

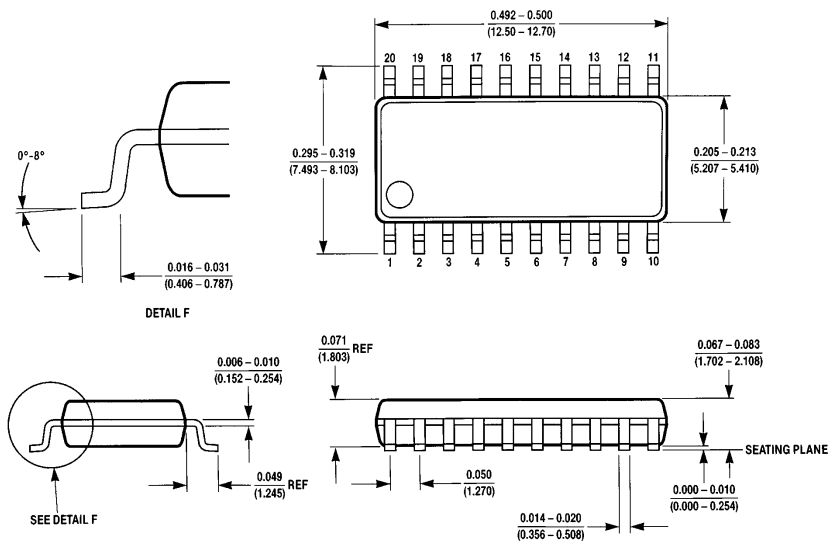


20-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J20A

J20A (REV M)

Physical Dimensions inches (millimeters) (Continued)

**20-Lead (0.300" Wide) Molded Small Outline Package, JEDEC (S)
NS Package Number M20B**



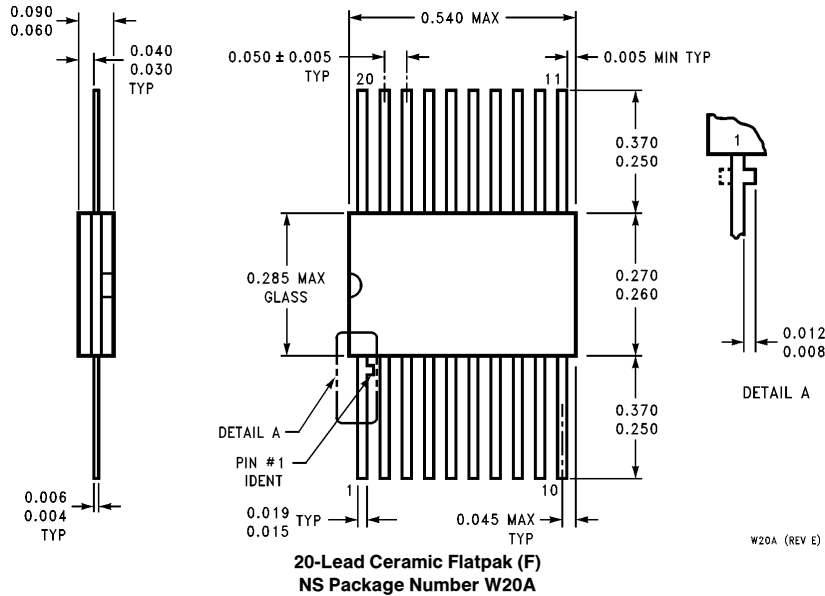
**20-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M20D**

The drawing illustrates the MSA20 package with the following dimensions and features:

- Top View:** Shows a rectangular body with 20 pins (10 on each side). Pin pitch is 2.35. A central hole has a diameter of $\varnothing 1.2$. A mounting hole is located 1.50 from the top edge.
- Side View (A-A):** Shows the package height and pin dimensions. Key dimensions include:
 - Overall width: 7.40 MAX
 - Body width: 7.20 ± 0.05
 - Pin width: 0.68 ± 0.12
 - Pin height: 1.80 ± 0.05
 - Pin thickness: 0.800 ± 0.025
 - Pin spacing: 0.30 ± 0.10 TYP
 - Pin thickness: 0.65 TYP
 - Pin thickness: $0.15^{+0.05}_{-0.10}$ TYP
- Cross-sectional View (B-B):** Shows the package profile and solder joint. Key dimensions include:
 - Overall width: 7.90 ± 0.20
 - Body width: 5.30 ± 0.05
 - Solder joint thickness: 0.20 ± 0.05 L/F THICKNESS
 - Solder joint angle: $4^\circ \pm 3^\circ$ TYP
 - Solder joint width: 0.60 ± 0.15 TYP
- Material and Finish:** Indicated by the code $\Phi 0.12 (M) C A \textcircled{S} B \textcircled{S}$.

N20A (REV G)

Physical Dimensions inches (millimeters) (Continued)



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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



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