

# 54F/74F243 Quad Bus Transceiver with TRI-STATE® Outputs

## General Description

The 'F243 is a quad bus transmitter/receiver designed for 4-line asynchronous 2-way data communications between data busses.

## Features

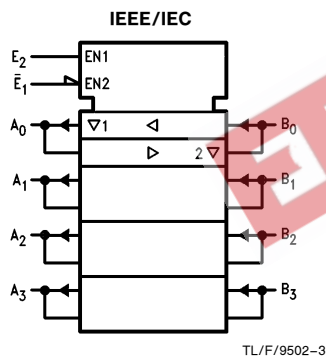
- 2-Way asynchronous data bus communication
- Input clamp diodes limit high-speed termination effects
- Guaranteed 4000V minimum ESD protection

Commercial	Military	Package Number	Package Description
	54F243DM (Note 2)	J14A	14-Lead Ceramic Dual-In-Line
74F243SC (Note 1)		M14A	14-Lead (0.150" Wide) Molded Small Outline, JEDEC
	54F243FM (Note 2)	W14B	14-Lead Cerpack
	54F243LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

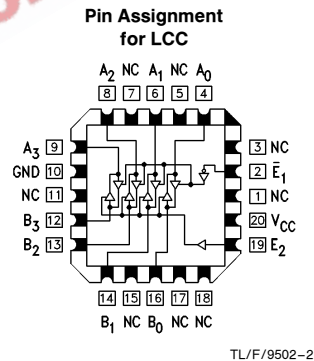
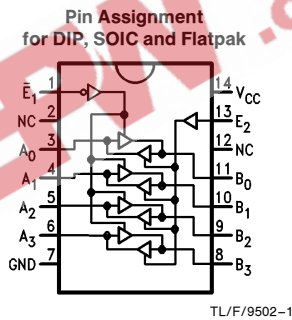
**Note 1:** Devices also available in 13" reel. Use Suffix = SCX.

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

## Logic Symbol



## Connection Diagrams



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## Unit Loading/Fan Out

Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input $I_{IH}/I_{IL}$ Output $I_{OH}/I_{OL}$
$\bar{E}_1$	Enable Input (Active LOW)	1.0/1.67	20 $\mu$ A/ -1 mA
$E_2$	Enable Input (Active HIGH)	1.0/1.67	20 $\mu$ A/ -1 mA
$A_n, B_n$	Inputs	3.5/2.67	70 $\mu$ A/ -1.6 mA
	Outputs	600/106.6(80)	-12 mA/64 mA(48 mA)

## Truth Table

Inputs		Inputs/Outputs	
$\bar{E}_1$	$E_2$	$A_n$	$B_n$
L	L	Input	B = A
L	H	N/A	N/A
H	L	Z	Z
H	H	A = B	Input

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 Z = High Impedance  
 N/A = Not Allowed

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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	-55°C to +175°C
Plastic	-55°C to +150°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 Output in HIGH State (with V <sub>CC</sub> = 0V)	
Standard Output	-0.5V to V <sub>CC</sub>
TRI-STATE Output	-0.5V to +5.5V
Current Applied to Output in LOW State (Max)	twice the rated I <sub>OL</sub> (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

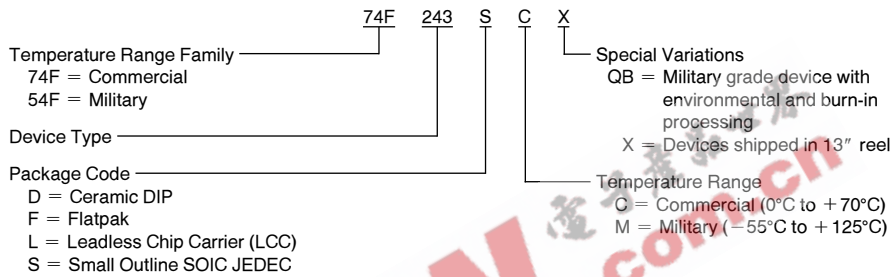
Symbol	Parameter	54F/74F			Units	V <sub>CC</sub>	Conditions
		Min	Typ	Max			
V <sub>IH</sub>	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V <sub>IL</sub>	Input LOW Voltage			0.8	V		Recognized as a LOW Signal
V <sub>CD</sub>	Input Clamp Diode Voltage			-1.2	V	Min	I <sub>IN</sub> = -18 mA
V <sub>OH</sub>	Output HIGH Voltage	54F 10% V <sub>CC</sub> 54F 10% V <sub>CC</sub> 74F 10% V <sub>CC</sub> 74F 10% V <sub>CC</sub> 74F 5% V <sub>CC</sub>	2.4 2.0 2.4 2.0 2.7		V	Min	I <sub>OH</sub> = -3 mA (A <sub>n</sub> , B <sub>n</sub> ) I <sub>OH</sub> = -12 mA (A <sub>n</sub> , B <sub>n</sub> ) I <sub>OH</sub> = -3 mA (A <sub>n</sub> , B <sub>n</sub> ) I <sub>OH</sub> = -15 mA (A <sub>n</sub> , B <sub>n</sub> ) I <sub>OH</sub> = -3 mA (A <sub>n</sub> , B <sub>n</sub> )
V <sub>OL</sub>	Output LOW Voltage	54F 10% V <sub>CC</sub> 74F 10% V <sub>CC</sub>		0.55 0.55	V	Min	I <sub>OL</sub> = 48 mA (A <sub>n</sub> , B <sub>n</sub> ) I <sub>OL</sub> = 64 mA (A <sub>n</sub> , B <sub>n</sub> )
I <sub>IH</sub>	Input HIGH Current	54F 74F		20.0 5.0	μA	Max	V <sub>IN</sub> = 2.7V
I <sub>BVI</sub>	Input HIGH Current Breakdown Test	54F 74F		100 7.0	μA	Max	V <sub>IN</sub> = 7.0V (E <sub>1</sub> , E <sub>2</sub> )
I <sub>BVIT</sub>	Input HIGH Current Breakdown (I/O)	54F 74F		1.0 0.5	mA	Max	V <sub>IN</sub> = 5.5V (A <sub>n</sub> , B <sub>n</sub> )
I <sub>CEX</sub>	Output HIGH Leakage Current	54F 74F		250 50	μA	Max	V <sub>OUT</sub> = V <sub>CC</sub>
V <sub>ID</sub>	Input Leakage Test	74F	4.75		V	0.0	I <sub>ID</sub> = 1.9 μA All Other Pins Grounded
I <sub>OD</sub>	Output Leakage Circuit Current	74F		3.75	μA	0.0	V <sub>IOD</sub> = 150 mV All Other Pins Grounded
I <sub>IL</sub>	Input LOW Current			-1.0	mA	Max	V <sub>IN</sub> = 0.5V (E <sub>1</sub> , E <sub>2</sub> )
I <sub>IH</sub> + I <sub>OZH</sub>	Output Leakage Current			70	μA	Max	V <sub>OUT</sub> = 2.7V (A <sub>n</sub> , B <sub>n</sub> )
I <sub>IL</sub> + I <sub>OZL</sub>	Output Leakage Current			-1.6	mA	Max	V <sub>OUT</sub> = 0.5V (A <sub>n</sub> , B <sub>n</sub> )
I <sub>OS</sub>	Output Short-Circuit Current			-100	mA	Max	V <sub>OUT</sub> = 0V (A <sub>n</sub> , B <sub>n</sub> )
I <sub>CCH</sub>	Power Supply Current		64	80	mA	Max	V <sub>O</sub> = HIGH
I <sub>CCL</sub>	Power Supply Current		64	90	mA	Max	V <sub>O</sub> = LOW
I <sub>CCZ</sub>	Power Supply Current		71	90	mA	Max	V <sub>O</sub> = HIGH Z

## AC Electrical Characteristics

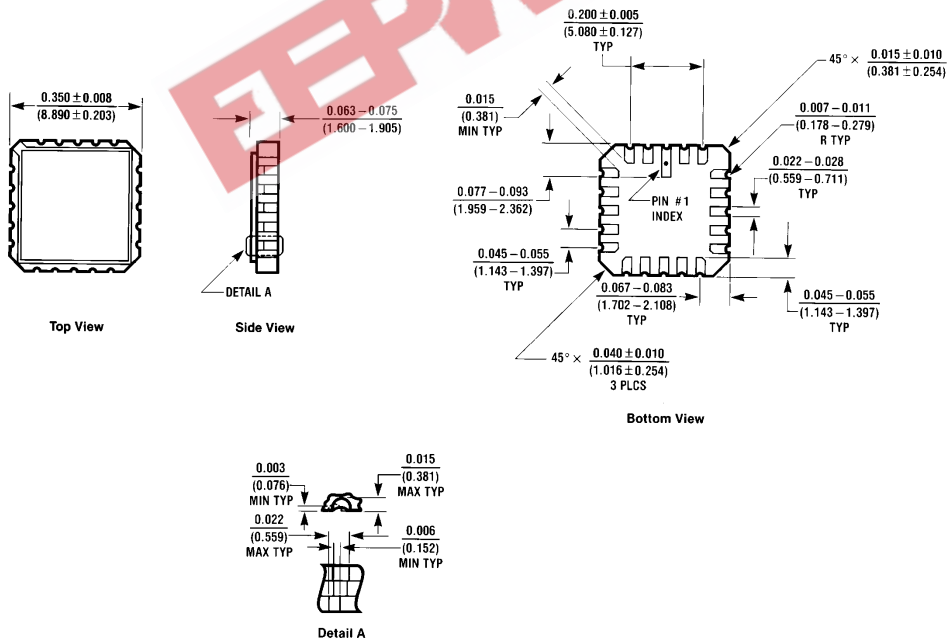
Symbol	Parameter	74F			54F		74F		Units
		T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50 pF			T <sub>A</sub> , V <sub>CC</sub> = Mil C <sub>L</sub> = 50 pF		T <sub>A</sub> , V <sub>CC</sub> = Com C <sub>L</sub> = 50 pF		
		Min	Typ	Max	Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay	2.5	4.0	5.2	2.0	6.5	2.0	6.2	ns
t <sub>PHL</sub>	A <sub>n</sub> to B <sub>n</sub> , B <sub>n</sub> to A <sub>n</sub>	2.5	4.0	5.2	2.0	8.5	2.0	6.5	
t <sub>PZH</sub>	Output Enable Time	2.0	4.3	5.7	2.0	8.0	2.0	6.7	ns
t <sub>PZL</sub>	$\bar{E}_1$ to B <sub>n</sub> , E <sub>2</sub> to A <sub>n</sub>	2.0	5.8	7.5	2.0	10.5	2.0	8.5	
t <sub>PHZ</sub>	Output Disable Time	2.0	4.5	6.0	1.5	7.5	1.5	7.0	
t <sub>PLZ</sub>	$\bar{E}_1$ to B <sub>n</sub> , E <sub>2</sub> to A <sub>n</sub>	2.0	4.5	6.0	2.0	8.5	2.0	7.0	

## 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:



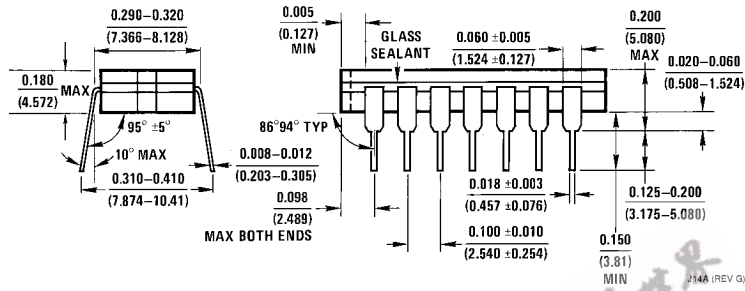
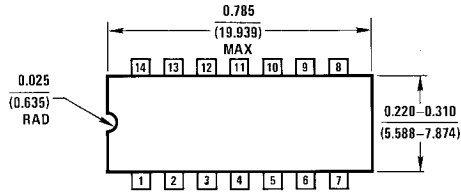
## Physical Dimensions inches (millimeters)



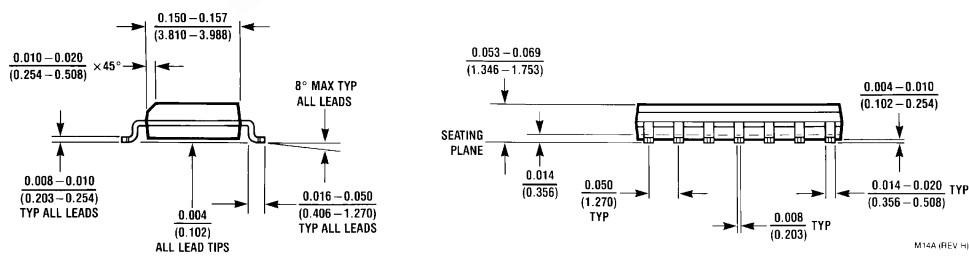
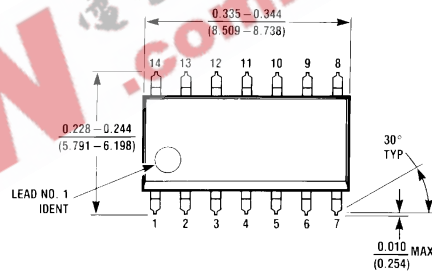
20-Lead Ceramic Leadless Chip Carrier (L)  
NS Package Number E20A

E20A (REV D)

**Physical Dimensions** inches (millimeters) (Continued)

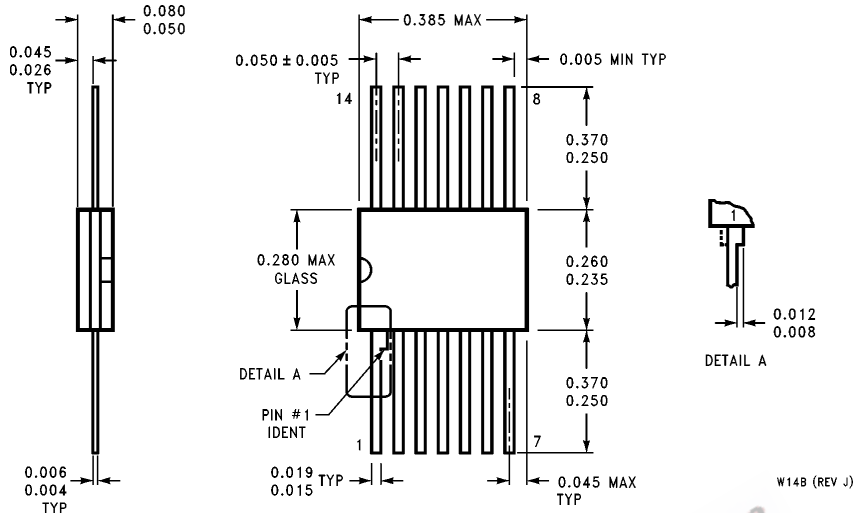


**14-Lead Ceramic Dual-In-Line Package (D)**  
NS Package Number J14A



**14-Lead (0.150" Wide) Molded Small Outline Package, JEDEC (S)**  
NS Package Number M14A

**Physical Dimensions** inches (millimeters) (Continued)



**14-Lead Ceramic Flatpak (F)  
NS Package Number W14B**



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