National Semiconductor

November 1994

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

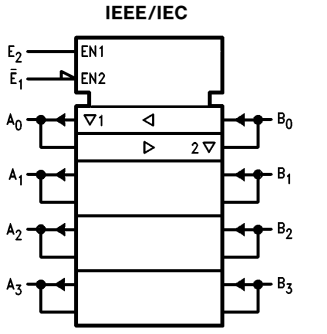
- 2-Way asynchronous data bus communication
- Input clamp diodes limit high-speed termination effects
- Guaranteed 4000V minimum ESD protection

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.

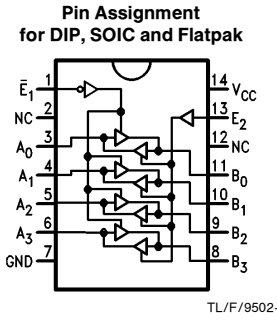
Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMQB, FMQB and LMQB.

Logic Symbol

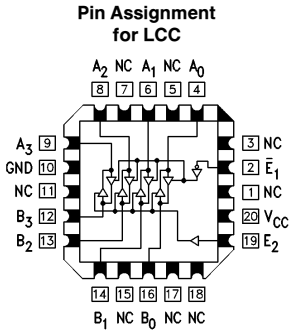


TL/F/9502–3

Connection Diagrams



TL/F/9502–1



TL/F/9502–2

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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}
$\overline{E}_1$	Enable Input (Active LOW)	1.0/1.67	20 μA/ −1 mA
E_2	Enable Input (Active HIGH)	1.0/1.67	20 μA/ −1 mA
A_n, B_n	Inputs	3.5/2.67	70 μA/ −1.6 mA
	Outputs	600/106.6(80)	−12 mA/64 mA(48 mA)

Truth Table

Inputs		Inputs/Outputs	
$\overline{E}_1$	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

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 Min	54F/74F Typ	54F/74F Max	Units	V_{CC}	Conditions
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, B_n)
		54F 10% V_{CC}	2.0					I_{OH} = −12 mA (A_n, B_n)
		74F 10% V_{CC}	2.4					I_{OH} = −3 mA (A_n, B_n)
		74F 10% V_{CC}	2.0					I_{OH} = −15 mA (A_n, B_n)
		74F 5% V_{CC}	2.7					I_{OH} = −3 mA (A_n, B_n)
V_{OL}	Output LOW Voltage	54F 10% V_{CC}			0.55	V	Min	I_{OL} = 48 mA (A_n, B_n)
		74F 10% V_{CC}			0.55			I_{OL} = 64 mA (A_n, 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 ($\overline{E}_1$, E_2)
		74F			7.0			
I_{BVIT}	Input HIGH Current Breakdown (I/O)	54F			1.0	mA	Max	V_{IN} = 5.5V (A_n, B_n)
		74F			0.5			
I_{CEX}	Output HIGH Leakage Current	54F			250	μA	Max	V_{OUT} = V_{CC}
		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				−1.0	mA	Max	V_{IN} = 0.5V ($\overline{E}_1$, E_2)
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				−1.6	mA	Max	V_{OUT} = 0.5V (A_n, B_n)
I_{OS}	Output Short-Circuit Current		−100		−225	mA	Max	V_{OUT} = 0V (A_n, B_n)
I_{CCH}	Power Supply Current			64	80	mA	Max	V_O = HIGH
I_{CCL}	Power Supply Current			64	90	mA	Max	V_O = LOW
I_{CCZ}	Power Supply Current			71	90	mA	Max	V_O = HIGH Z

AC Electrical Characteristics

Symbol	Parameter	74F $T_A = +25°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF			54F $T_A, V_{CC} =$ Mil, $C_L = 50$ pF		74F $T_A, V_{CC} =$ Com, $C_L = 50$ pF		Units
		Min	Typ	Max	Min	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay A_n to B_n, B_n to A_n	2.5 2.5	4.0 4.0	5.2 5.2	2.0 2.0	6.5 8.5	2.0 2.0	6.2 6.5	ns
t_{PZH} t_{PZL}	Output Enable Time $\overline{E}_1$ to B_n, E_2 to A_n	2.0 2.0	4.3 5.8	5.7 7.5	2.0 2.0	8.0 10.5	2.0 2.0	6.7 8.5	ns
t_{PHZ} t_{PLZ}	Output Disable Time $\overline{E}_1$ to B_n, E_2 to A_n	2.0 2.0	4.5 4.5	6.0 6.0	1.5 2.0	7.5 8.5	1.5 2.0	7.0 7.0	

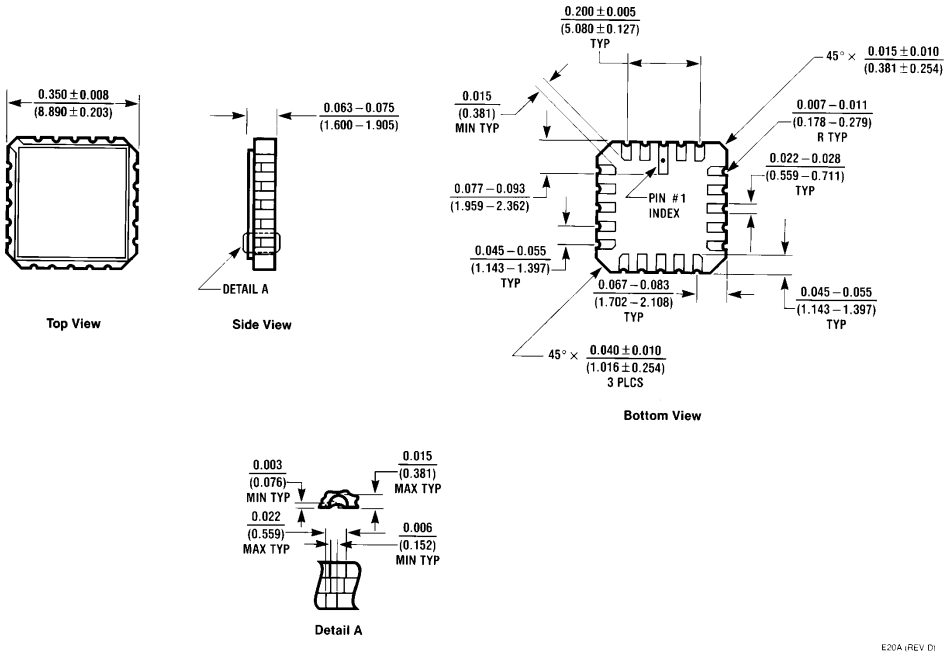
Ordering Information

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

74F 243 S C X

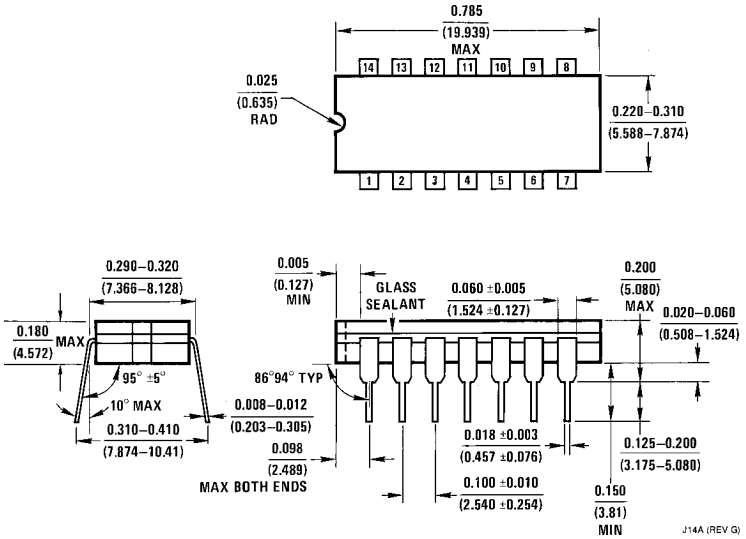
- Temperature Range Family
  - 74F = Commercial
  - 54F = Military
- Device Type
- Package Code
  - D = Ceramic DIP
  - F = Flatpak
  - L = Leadless Chip Carrier (LCC)
  - S = Small Outline SOIC JEDEC
- Temperature Range
  - C = Commercial (0°C to +70°C)
  - M = Military (−55°C to +125°C)
- Special Variations
  - QB = Military grade device with environmental and burn-in processing
  - X = Devices shipped in 13″ reel

Physical Dimensions inches (millimeters)

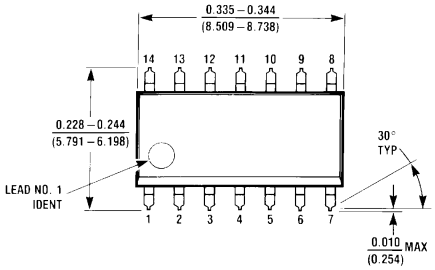


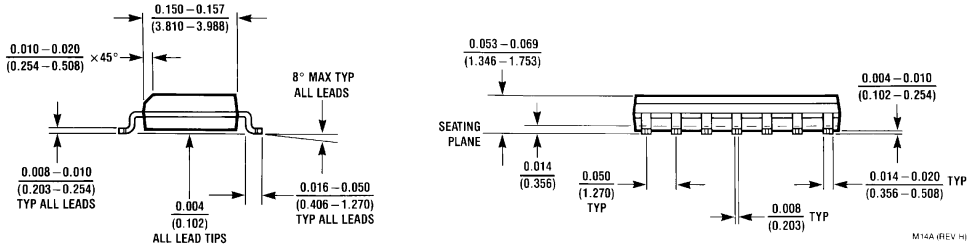
20-Lead Ceramic Leadless Chip Carrier (L)
NS Package Number E20A

Physical Dimensions inches (millimeters) (Continued)



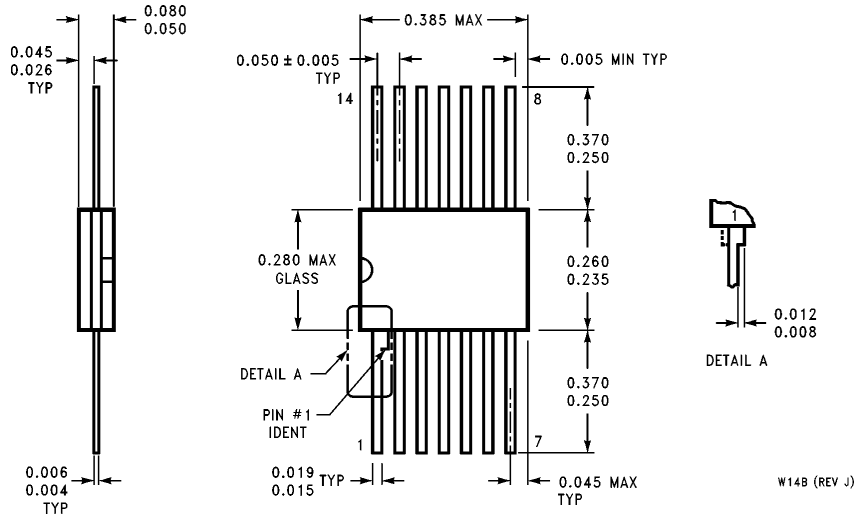
14-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J14A





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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