National Semiconductor

November 1996

74F2245
Octal Bidirectional Transceiver with TRI-STATE® Outputs

General Description

The 'F2245 contains eight non-inverting bidirectional buffers with TRI-STATE outputs and is intended for bus-oriented applications. Current sinking capability is 24 mA at the A ports and 12 mA at the B ports. The Transmit/Receive ($T/\overline{R}$) 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.

The 25Ω series resistors in the outputs reduce ringing and eliminate the need for external resistors.

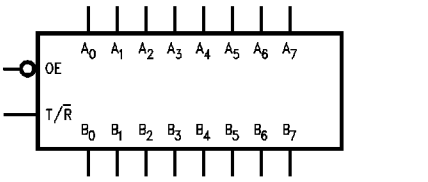
Features

- Non-inverting buffers
- Bidirectional data path
- A outputs sink 24 mA
- B outputs sink 12 mA
- 25Ω series resistors in B outputs eliminate the need for external resistors
- Guaranteed 2000V minimum ESD protection

Commercial	Package Number	Package Description
74F2245SC (Note 1)	M20B	20-Lead (0.300″ Wide) Molded Small Outline, JEDEC

Note 1: Devices also available in 13″ reel. Use suffix = SCX.

Logic Symbols



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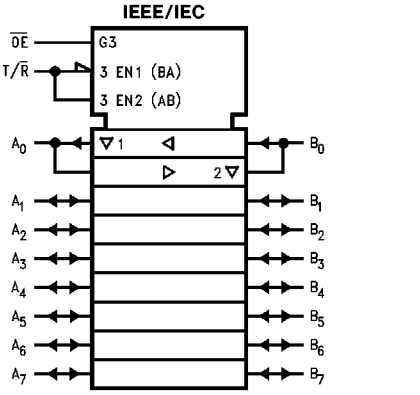

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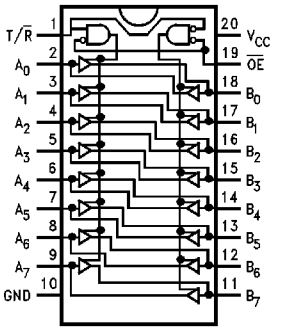
Connection Diagram

Pin Assignment for DIP, SOIC and SSOP



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Unit Loading/Fan Out

Pin Names	Description	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 μA/ −1.2 mA
T/$\overline{R}$	Transmit/Receive Input	1.0/2.0	20 μA/ −1.2 mA
A_0–A_7	Side A Inputs or	3.5/1.083	70 μA/ −0.65 mA
	TRI-STATE Outputs	150/40(38.3)	−3 mA/24 mA
B_0–B_7	Side B Inputs or	3.5/1.083	70 μA/ −0.65 mA
	TRI-STATE Outputs	750/20	−15 mA/12 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)

Storage Temperature	−65°C to +150°C
Ambient Temperature under Bias	−55°C to +125°C
Junction Temperature under Bias	
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	
Commercial	0°C to +70°C
Supply Voltage	
Commercial	+4.5V to +5.5V

DC Electrical Characteristics

Symbol	Parameter		74F Min	74F Typ	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	10% V_{CC}	2.4			V	Min	I_{OH} = −3 mA (A_n)
		10% V_{CC}	2.0					I_{OH} = −15 mA (B_n)
		5% V_{CC}	2.7					I_{OH} = −3 mA (A_n)
V_{OL}	Output LOW Voltage	10% V_{CC}			0.5	V	Min	I_{OL} = 24 mA (A_n)
		10% V_{CC}			0.5			I_{OL} = 1 mA (B_n)
		10% V_{CC}			0.75			I_{OL} = 12 mA (B_n)
I_{IH}	Input HIGH Current				5.0	μA	Max	V_{IN} = 2.7V
I_{BVI}	Input HIGH Current Breakdown Test				7.0	μA	Max	V_{IN} = 7.0V ($\overline{OE}$, T/$\overline{R}$)
I_{BVIT}	Input HIGH Current Breakdown (I/O)				0.5	mA	Max	V_{IN} = 5.5 V (A_n, B_n)
I_{CEX}	Output HIGH Leakage Current				50	μA	Max	V_{OUT} = V_{CC} (A_n, B_n)
V_{ID}	Input Leakage Test		4.75			V	0.0	I_{ID} = 1.9 μA All Other Pins Grounded
I_{OD}	Output Leakage Circuit Current				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)

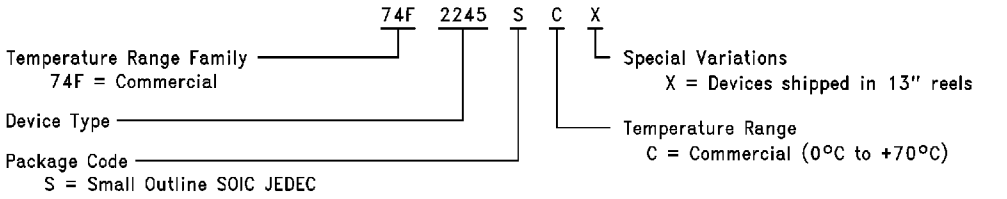
Symbol	Parameter	74F			Units	V_{CC}	Conditions
		Min	Typ	Max			
I_{OS}	Output Short-Circuit Current	−60 −100		−150 −225	mA	Max	V_{OUT} = 0V (A_n) V_{OUT} = 0V (B_n)
I_{ZZ}	Bus Drainage Test			500	μA	0.0V	V_{OUT} = 5.25V(A_n, B_n)
I_{CCH}	Power Supply Current		70	90	mA	Max	V_O = HIGH
I_{CCL}	Power Supply 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 T_A = +25°C V_{CC} = +5.0V C_L = 50 pF			74F T_A, V_{CC} = Com C_L = 50 pF		Units
		Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay A_n to B_n or B_n to A_n	2.5 2.5	4.2 4.2	6.5 7.5	2.0 2.0	7.5 8.5	ns
t_{PZH} t_{PZL}	Output Enable Time	3.0 3.5	5.3 6.0	8.0 10.0	2.5 3.0	9.0 11.0	ns
t_{PHZ} t_{PLZ}	Output Disable Time	2.0 2.0	5.0 5.0	6.5 6.5	2.0 2.0	7.5 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:



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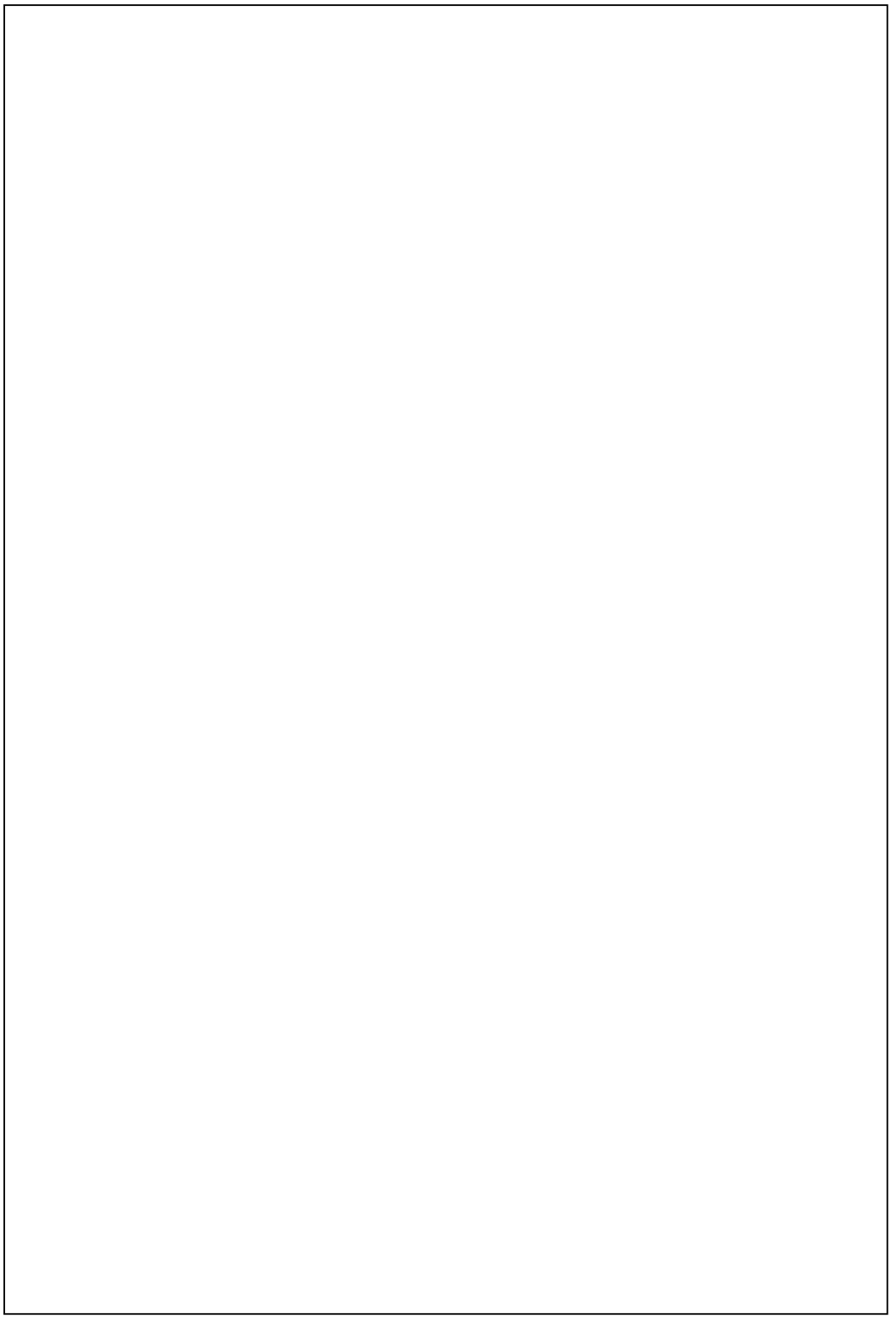
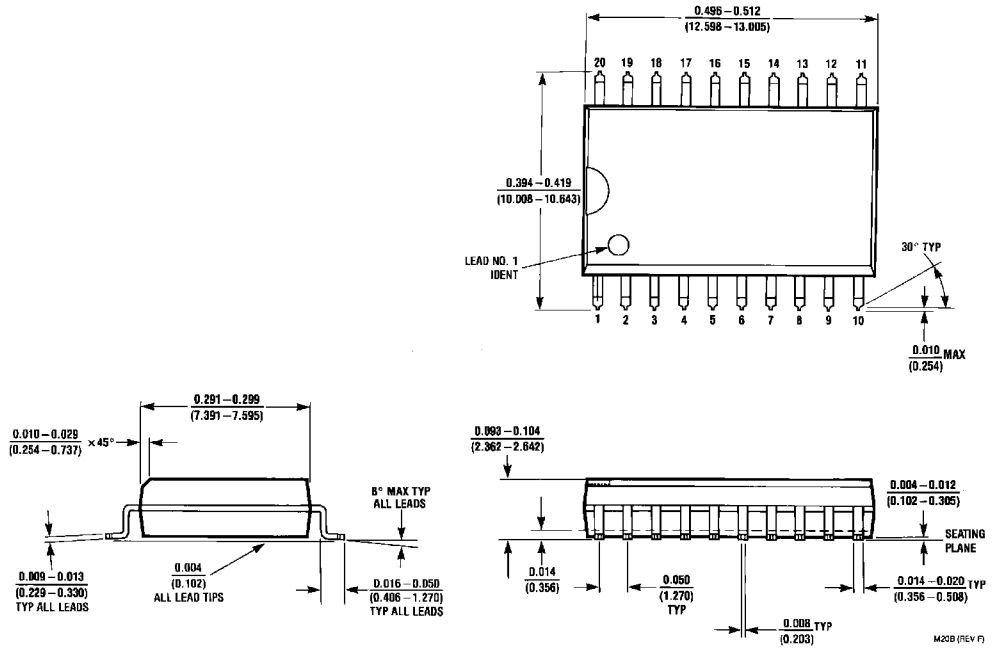


Physical Dimensions inches (millimeters) unless otherwise noted



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

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