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FAIRCHILD SEMICONDUCTOR™

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74F657
Octal Bidirectional Transceiver with 8-Bit Parity Generator/Checker and 3-STATE Outputs

General Description

The 74F657 contains eight non-inverting buffers with 3-STATE outputs and an 8-bit parity generator/checker. It is intended for bus-oriented applications. The buffers have a guaranteed current sinking capability of 24 mA at the A Port and 64 mA at the B Port.

Features

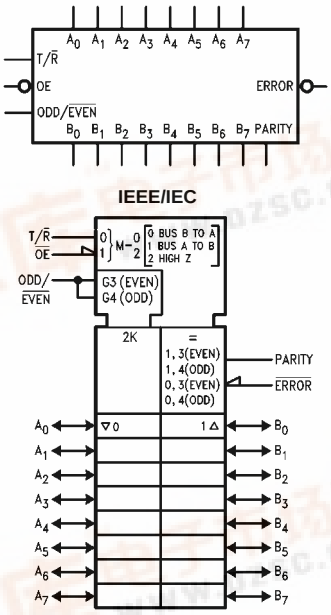
- 300 Mil 24-pin slimline DIP
- Combines 74F245 and 74F280A functions in one package
- 3-STATE outputs
- B Outputs sink 64 mA
- 12 mA source current, B side
- Input diodes for termination effects

Ordering Code:

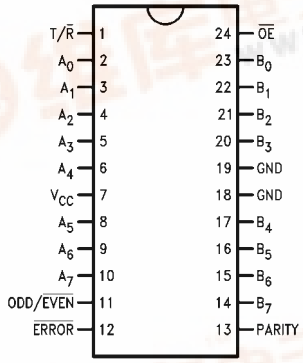
Order Number	Package Number	Package Description
75F657SC	M24B	24-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
74F657SPC	N24C	24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-100, 0.300 Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Logic Symbols



Connection Diagram



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Unit Loading/Fan Out

Pin Names	Description	U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
A_0–A_7	Data Inputs/	4.5/0.15	90 µA/– 90 µA
	3-STATE Outputs	150/40 (33.3)	–3 mA/24 mA (20 mA)
B_0–B_7	Data Inputs/	3.5/0.117	70 µA/–70 µA
	3-STATE Outputs	600/106.6 (80)	–12 mA/64 mA (48 mA)
T/$\overline{R}$	Transmit/Receive Input	2.0/0.067	40 µA/–40 µA
$\overline{OE}$	Enable Input	2.0/0.067	40 µA/–40 µA
PARITY	Parity Input/	3.5/0.117	70 µA/–70µA
	3-STATE Output	600/106.6 (80)	–12 mA/64 mA (48 mA)
ODD/$\overline{EVEN}$	ODD/$\overline{EVEN}$ Parity Input	1.0/0.033	20 µA/–20 µA
$\overline{ERROR}$	Error Output	600/106.6 (80)	–12 mA/64 mA (48 mA)

Functional Description

The Transmit/Receive (T/$\overline{R}$) input determines the direction of the data flow through the bidirectional transceivers. Transmit (active HIGH) enables data from the A Port to the B Port; Receive (active LOW) enables data from the B Port to the A Port.

The Output Enable ($\overline{OE}$) input disables the parity and $\overline{ERROR}$ outputs and both the A and B Ports by placing them in a HIGH-Z condition when the Output Enable input is HIGH.

When transmitting (T/$\overline{R}$ HIGH), the parity generator detects whether an even or odd number of bits on the A Port are HIGH and compares these with the condition of the parity select (ODD/$\overline{EVEN}$). If the Parity Select is HIGH and an even number of A inputs are HIGH, the Parity output is HIGH.

In receiving mode (T/$\overline{R}$ LOW), the parity select and number of HIGH inputs on port B are compared to the condition of the Parity input. If an even number of bits on the B Port are HIGH, the parity select is HIGH, and the PARITY input is HIGH, then $\overline{ERROR}$ will be HIGH to indicate no error. If an odd number of bits on the B Port are HIGH, the parity select is HIGH, and the PARITY input is HIGH, the $\overline{ERROR}$ will be LOW indicating an error.

Function Table

Number of Inputs that are HIGH	Inputs			Input/ Output	Outputs	
	$\overline{OE}$	T/$\overline{R}$	ODD/ $\overline{EVEN}$	Parity	$\overline{ERROR}$	Outputs Mode
0, 2, 4, 6, 8	L	H	H	H	Z	Transmit
	L	H	L	L	Z	Transmit
	L	L	H	H	H	Receive
	L	L	H	L	L	Receive
	L	L	L	H	L	Receive
	L	L	L	L	H	Receive
1, 3, 5, 7	L	H	H	L	Z	Transmit
	L	H	L	H	Z	Transmit
	L	L	H	H	L	Receive
	L	L	H	L	H	Receive
	L	L	L	H	H	Receive
	L	L	L	L	L	Receive
Immaterial	H	X	X	Z	Z	Z

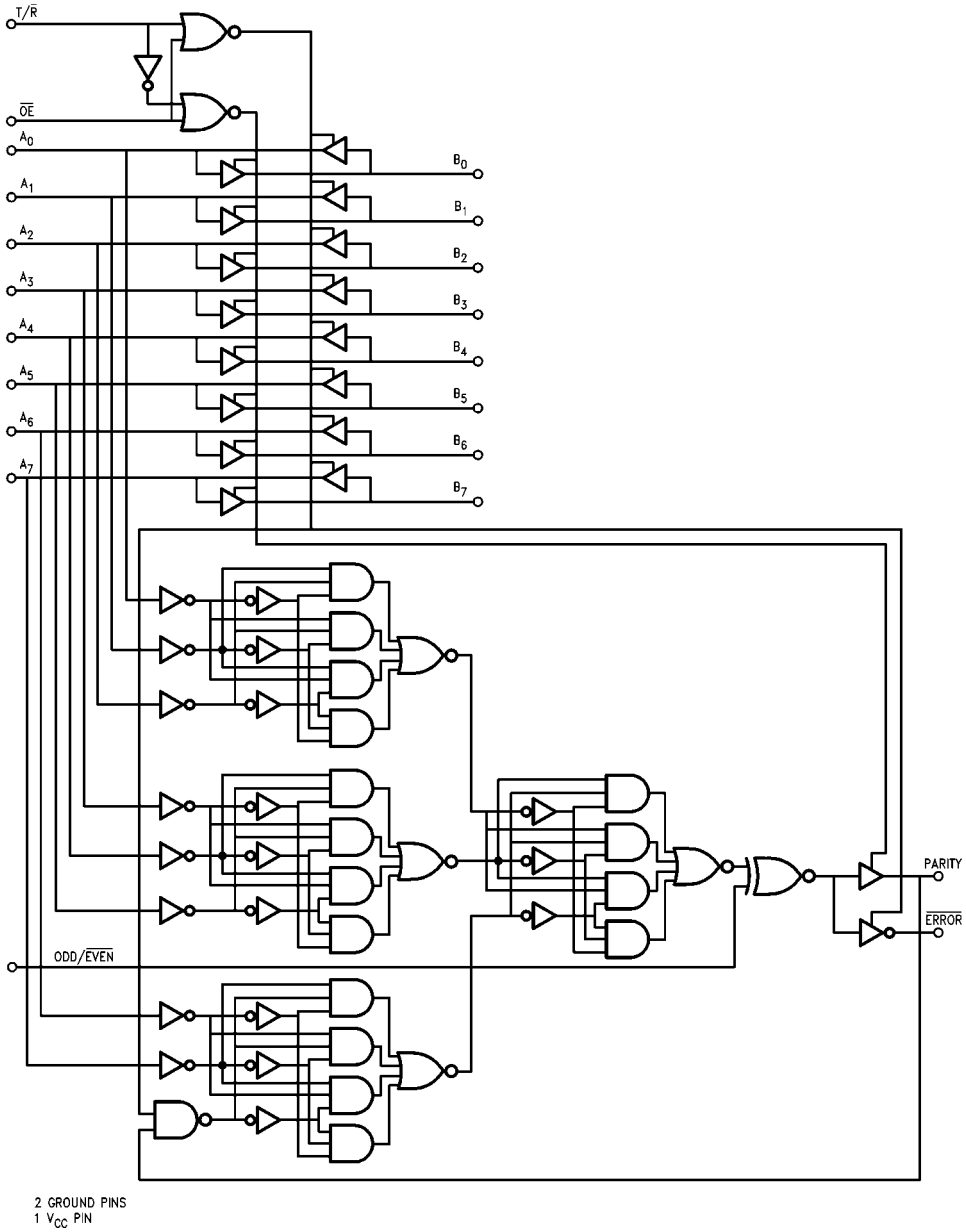
H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = High Impedance

Function Table

Inputs		Outputs
$\overline{OE}$	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

Functional Block Diagram



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	−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}
3-STATE Output	−0.5V to +5.5V
Current Applied to Output	
in LOW State (Max)	twice the rated I_{OL} (mA)

Recommended Operating Conditions

Free Air Ambient Temperature	0°C to +70°C
Supply Voltage	+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

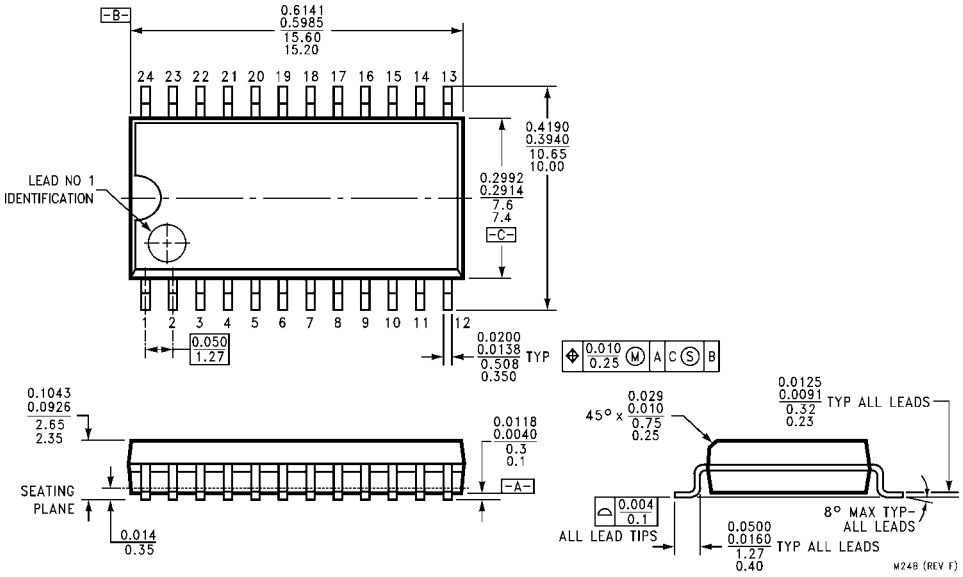
Symbol	Parameter		Min	Typ	Max	Units	V_{CC}	Conditions
V_{IH}	Input HIGH Voltage		2.0			V		Recognized as a HIGH Signal
V_{IL}	Input LOW Voltage				0.8	V		Recognized as a LOW Signal
V_{CD}	Input Clamp Diode Voltage				−1.2	V	Min	I_{IN} = −18 mA
V_{OH}	Output HIGH	10% V_{CC}	2.5					I_{OH} = −1 mA (A_n)
	Voltage	10% V_{CC}	2.4					I_{OH} = −3 mA (A_n B_n, Parity, $\overline{ERROR}$)
		10% V_{CC}	2.0			V	Min	I_{OH} = −15 mA (B_n, Parity, $\overline{ERROR}$)
		5% V_{CC}	2.7					I_{OH} = −1 mA (A_n)
		5% V_{CC}	2.7					I_{OH} = −3 mA (A_n, B_n, Parity, $\overline{ERROR}$)
V_{OL}	Output LOW	10% V_{CC}			0.5	V	Min	I_{OL} = 24 mA (A_n)
	Voltage	10% V_{CC}			0.55			I_{OL} = 64 mA (B_n Parity, $\overline{ERROR}$)
I_{IH}	Input HIGH				20	µA	Max	V_{IN} = 2.7V (ODD/$\overline{EVEN}$)
	Current				40			V_{IN} 2.7V (T/$\overline{R}$, $\overline{OE}$)
I_{BVI}	Input HIGH Current Breakdown Test				100	µA	V_{CC} = 0	V_{IN} = 7.0V (T/$\overline{R}$, $\overline{OE}$, ODD/$\overline{EVEN}$)
I_{BVIT}	Input HIGH Current				1.0	mA	Max	V_{IN} = 5.5V (Parity, B_n)
	Breakdown Test (I/O)				2.0			V_{IN} = 5.5V (A_n)
I_{IL}	Input LOW				−20	µA	Max	V_{IN} = 0.5V (ODD/$\overline{EVEN}$)
	Current				−40			V_{IN} = 0.5V (T/$\overline{R}$, $\overline{OE}$)
I_{OZH}	Output Leakage Current				50	µA	Max	V_{OUT} = 2.7V ($\overline{ERROR}$)
I_{OZL}	Output Leakage Current				−50	µA	Max	V_{OUT} = 0.5V ($\overline{ERROR}$)
I_{IH} + I_{OZH}	Output Leakage				70	µA	Max	$V_{I/O}$ = 2.7V (B_n, Parity)
	Current				90			$V_{I/O}$ = 2.7V (A_n)
I_{IL} + I_{OZL}	Output Leakage				−70	µA	Max	$V_{I/O}$ = 0.5V (B_n, Parity)
	Current				−90			$V_{I/O}$ = 0.5V (A_n)
I_{OS}	Output Short-Circuit		−60		−150	mA	Max	V_{OUT} = 0V (A_n)
	Current		−100		−225			V_{OUT} = 0V (B_n, Parity, $\overline{ERROR}$)
I_{CEX}	Output HIGH Leakage				250	µA	Max	V_{OUT} = V_{CC} ($\overline{ERROR}$)
	Current				1.0	mA	Max	V_{OUT} = V_{CC} (B_n, Parity)
					2.0	mA	Max	V_{OUT} = V_{CC} (A_n)
I_{ZZ}	Bus Drainage Test				500	µA	0.0V	V_{OUT} = 5.25V (A_n, B_n, Parity, $\overline{ERROR}$)
I_{CCH}	Power Supply Current			101	125	mA	Max	V_O = HIGH
I_{CCL}	Power Supply Current			112	150	mA	Max	V_O = LOW
I_{CCZ}	Power Supply Current			109	145	mA	Max	V_O = HIGH Z

AC Electrical Characteristics

Symbol	Parameter	$T_A = +25°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF			$T_A = -55°C$ to $+125°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF		$T_A = 0°C$ to $+70°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF		Units
		Min	Typ	Max	Min	Max	Min	Max	
t_{PLH}	Propagation Delay	2.5	4.5	8.0	2.5	9.5	2.5	9.0	ns
t_{PHL}	A_n to B_n, B_n to A_n	3.0	4.9	7.5	3.0	8.5	3.0	8.0	
t_{PLH}	Propagation Delay	6.5	10.1	14.0	5.5	18.0	6.0	16.0	ns
t_{PHL}	A_n to Parity	7.0	10.9	15.0	5.5	20.5	6.0	16.5	
t_{PLH}	Propagation Delay	4.5	7.8	11.0	4.0	14.0	4.0	13.0	ns
t_{PHL}	ODD/$\overline{\text{EVEN}}$ to PARITY	4.5	8.8	12.0	4.5	16.5	4.5	13.5	
t_{PLH}	Propagation Delay	4.5	7.5	11.0	4.0	14.0	4.0	13.0	ns
t_{PHL}	ODD/$\overline{\text{EVEN}}$ to $\overline{\text{ERROR}}$	4.5	8.2	12.0	4.5	16.5	4.5	13.5	
t_{PLH}	Propagation Delay	8.0	14.0	20.5	7.5	27.0	7.5	23.0	ns
t_{PHL}	B_n to $\overline{\text{ERROR}}$	8.0	15.0	21.5	7.5	28.5	7.5	23.5	
t_{PLH}	Propagation Delay	7.0	10.8	15.5	6.0	20.0	6.0	17.0	ns
t_{PHL}	PARITY to $\overline{\text{ERROR}}$	7.5	11.8	16.5	6.5	22.0	7.5	18.5	
t_{PZH}	Output Enable Time	3.0	5.0	8.0	2.5	11.0	2.5	9.5	ns
t_{PZL}	$\overline{OE}$ to A_n/B_n	4.0	6.5	10.0	3.5	13.5	3.5	11.0	
t_{PHZ}	Output Disable Time	1.0	4.5	8.0	1.0	9.5	1.0	9.0	ns
t_{PLZ}	$\overline{OE}$ to A_n/B_n	1.0	4.9	7.5	1.0	8.5	1.0	8.0	
t_{PZH}	Output Enable Time	3.0	5.0	8.0	2.5	11.0	2.5	9.5	ns
t_{PZL}	$\overline{OE}$ to $\overline{\text{ERROR}}$ (Note 3)	4.0	7.7	10.0	3.5	13.5	3.5	11.0	
t_{PHZ}	Output Disable Time	1.0	4.5	8.0	1.0	9.5	1.0	9.0	ns
t_{PLZ}	$\overline{OE}$ to $\overline{\text{ERROR}}$	1.0	4.9	7.5	1.0	8.5	1.0	8.0	
t_{PZH}	Output Enable Time	3.0	5.0	8.0	2.5	11.0	2.5	9.5	ns
t_{PZL}	$\overline{OE}$ to PARITY	4.0	7.7	10.0	3.5	13.5	3.5	11.0	
t_{PHZ}	Output Disable Time	1.0	4.6	8.0	1.0	9.5	1.0	9.0	ns
t_{PLZ}	$\overline{OE}$ to PARITY	1.0	5.1	7.5	1.0	8.5	1.0	8.0	

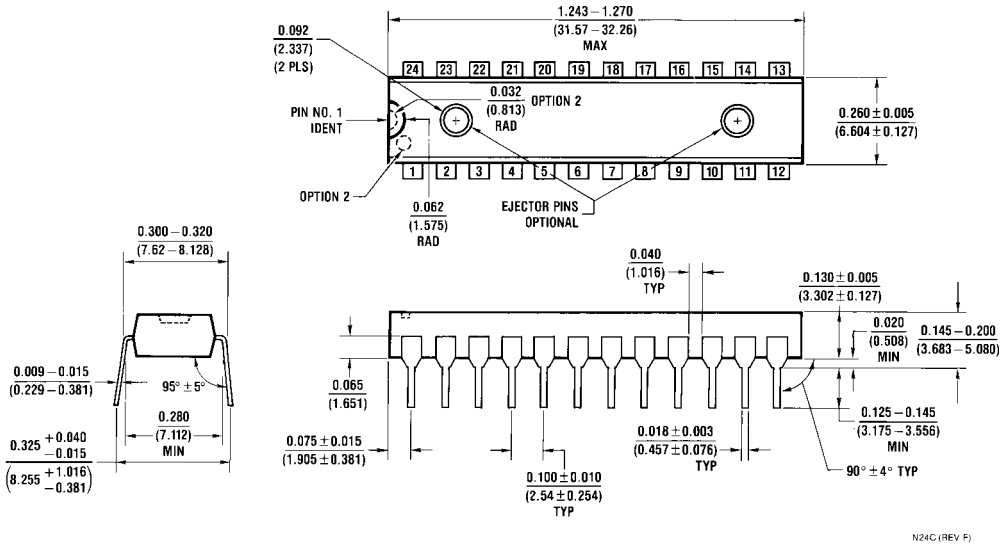
Note 3: These delay times reflect the 3-STATE recovery time only and not the signal time through the buffers or the parity check circuity. To assure VALID information at the $\overline{\text{ERROR}}$ pin, time must be allowed for the signal to propagate through the drivers (B to A), through the parity check circuitry (same as A to PARITY), and to the $\overline{\text{ERROR}}$ output after the $\overline{\text{ERROR}}$ pin has been enabled (Output Enable times). VALID data at the $\overline{\text{ERROR}}$ pin ≥ (A to PARITY) + (Output Enable Time).

Physical Dimensions inches (millimeters) unless otherwise noted



24-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
Package Number M24B

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



24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-100, 0.300 Wide
Package Number N24C

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