



54F/74F588

Octal Bidirectional Transceiver with TRI-STATE® Inputs/Outputs and IEEE-488 Termination Resistors

General Description

The 'F588 contains eight non-inverting bidirectional buffers with TRI-STATE outputs and is intended for bus-oriented applications. The B ports have termination resistors as specified in the IEEE-488 specifications. 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/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

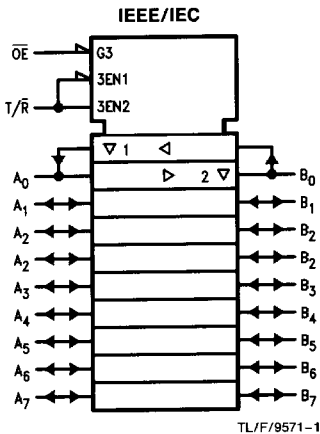
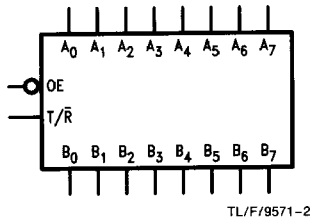
data from B ports to A ports. The Output Enable input, when HIGH, disables both A and B ports by placing them in a high impedance condition.

Features

- Non-inverting buffers
- Bidirectional data path
- B outputs sink 64 mA (48 mA Mil), source 12 mA
- Guaranteed 4000V minimum ESD protection

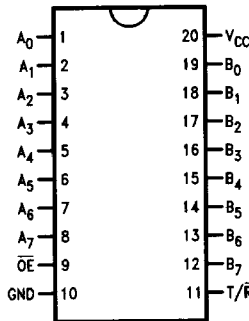
Ordering Code: See Section 5

Logic Symbols

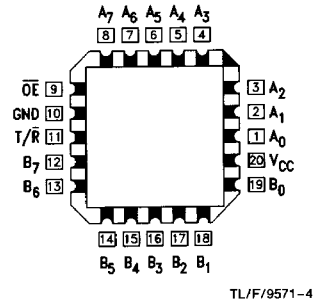


Connection Diagrams

Pin Assignment
for DIP, SOIC and Flatpak



Pin Assignment
for LCC



Unit Loading/Fan Out: See Section 2 for U.L. definitions

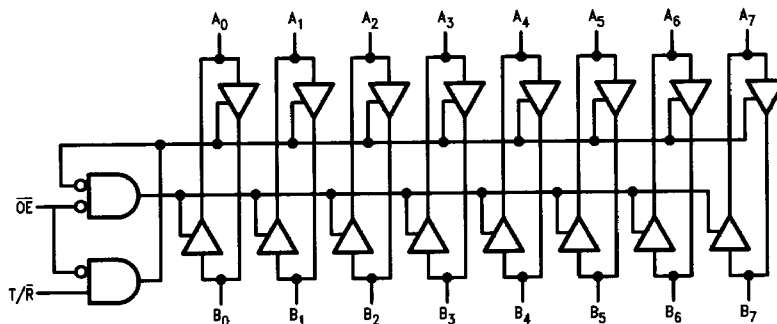
Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
\overline{OE}	Output Enable Input (Active LOW)	1.0/2.0	20 μA / -1.2 mA
T/ \overline{R}	Transmit/Receive Control Input	1.0/2.0	20 μA / -1.2 mA
A ₀ -A ₇	A Port Inputs or TRI-STATE Outputs	3.5/1.083	70 μA / -0.65 mA
B ₀ -B ₇	B Port Inputs or TRI-STATE Outputs	150/40 (33.3) *T/5.33	-3 mA/24 mA (20 mA) *T/3.2 mA
		600/106.6 (80)	-12 mA/64 mA (48 mA)

*T = Resistive Termination per IEEE-488 Standard

Truth 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 Impedance

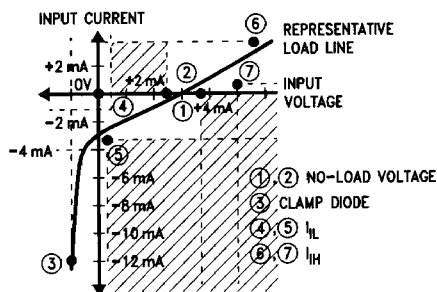
Logic Diagram



TL/F/9571-5

Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

B Port Input Characteristic with T/ \overline{R} LOW



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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
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 (OE, T/ \bar{R})
V _{OH}	Output HIGH Voltage	54F 10% V _{CC} 54F 10% V _{CC} 54F 10% V _{CC} 74F 10% V _{CC} 74F 10% V _{CC} 74F 10% V _{CC} 74F 5% V _{CC} 74F 5% V _{CC}	2.5 2.4 2.0 2.5 2.4 2.0 2.7 2.7		V	Min	I _{OH} = -1 mA (A _n) I _{OH} = -3 mA (A _n , B _n) I _{OH} = -12 mA (B _n) I _{OH} = -1 mA (A _n) I _{OH} = -3 mA (A _n , B _n) I _{OH} = -15 mA (B _n) I _{OH} = -1 mA (A _n) I _{OH} = -3 mA (A _n , B _n)
V _{OL}	Output LOW Voltage	54F 10% V _{CC} 54F 10% V _{CC} 74F 10% V _{CC} 74F 10% V _{CC}		0.5 0.55 0.5 0.55	V	Min	I _{OL} = 20 mA (A _n) I _{OL} = 48 mA (B _n) I _{OL} = 24 mA (A _n) I _{OL} = 64 mA (B _n)
I _{IH}	Input HIGH Current			20	μA	Max	V _{IN} = 2.7V (OE, T/ \bar{R})
I _{IH} + I _{OZH}	I _{IH} IEEE-488		700	2.5	μA mA	4.75 5.25	V _{IN} = 5.0V (B _n) V _{IN} = 5.5V (B _n)
I _{IL} + I _{OZL}	I _{IL} IEEE-488		-1.3	-3.2	mA	4.75 5.25	V _{IN} = 0.4V (B _n) V _{IN} = 0.4V (B _n)
V _{NL}	No Load Voltage		2.5	3.7	V	4.75 5.25	I _{IN} = 0V (B _n) I _{IN} = 0V (B _n)
I _{BVI}	Input HIGH Current Breakdown Test			100	μA	Max	V _{IN} = 7.0V (OE, T/ \bar{R})
I _{BVIT}	Input HIGH Current Breakdown Test (I/O)			1.0	mA	Max	V _{IN} = 5.5V (A _n)

DC Electrical Characteristics (Continued)

Symbol	Parameter	54F/74F			Units	V _{CC}	Conditions
		Min	Typ	Max			
I _{IL}	Input LOW Current			-1.2	mA	Max	V _{IN} = 0.5V (\overline{OE} , T/ \overline{R})
I _{IH} + I _{OZH}	Output Leakage Current			70	μ A	Max	V _{OUT} = 2.7V (A _n)
I _{IL} + I _{OZL}	Output Leakage Current			-650	μ A	Max	V _{OUT} = 0.5V (A _n)
I _{OS}	Output Short-Circuit Current	-60 -100		-150	mA	Max	V _{OUT} = 0V (A _n) V _{OUT} = 0V (B _n)
I _{CEX}	Output HIGH Leakage Current			250	μ A	Max	V _{OUT} = V _{CC} (A _n)
I _{ZZ}	Bus Drainage Test			500	μ A	0.0V	V _{OUT} = 5.25V (A _n , B _n)
I _{CCH}	Power Supply Current		67	100	mA	Max	V _O = HIGH
I _{CCL}	Power Supply Current		90	135	mA	Max	V _O = LOW
I _{CCZ}	Power Supply Current		83	125	mA	Max	V _O = HIGH Z

AC Electrical Characteristics: See Section 2 for Waveforms and Load Configurations

Symbol	Parameter	74F			54F		74F		Units	Fig. No.
		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} t _{PHL}	Propagation Delay A to B or B to A	2.5 2.5	4.5 5.0	6.0 6.5			2.5 2.5	7.0 7.5	ns	2-3
t _{PZH} t _{PZL}	Output Enable Time T/ \overline{R} or \overline{OE} to A or B	2.5 2.5	5.0 7.0	7.0 9.0			2.5 2.5	8.0 10.0	ns	2-5
t _{PHZ} t _{PLZ}	Output Disable Time T/ \overline{R} or \overline{OE} to A or B	2.5 2.5	5.5 5.5	7.0 7.0			2.5 2.5	8.0 8.0		