

29F52•29F53 8-Bit Registered Transceiver

General Description

The 29F52 and 29F53 are 8-bit registered transceivers. Two 8-bit back to back registers store data flowing in both directions between two bidirectional buses. Separate clock, clock enable and TRI-STATE[®] output enable signals are provided for each register. The A₀-A₇ output pins are guaranteed to sink 24 mA (20 mA mil.) while the B₀-B₇ output pins are designed for 64 mA.

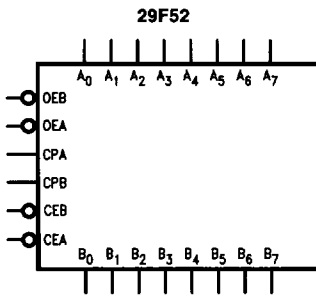
The 29F53 is an inverting option of the 29F52. Both transceivers are AMD Am2952/2953 functional equivalents.

Features

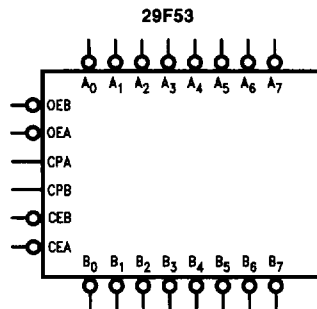
- 8-bit registered transceivers
- Separate clock, clock enable and TRI-STATE output enable provided for each register
- AMD Am2952/2953 functional equivalents
- Both inverting and non-inverting options available
- 24-Pin slimline package

Ordering Code: See Section 5

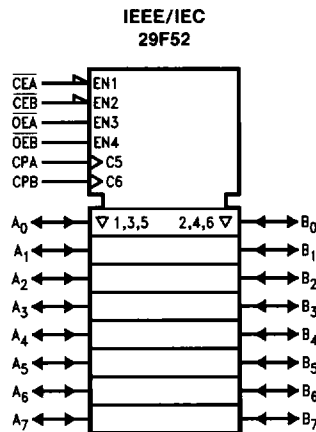
Logic Symbols



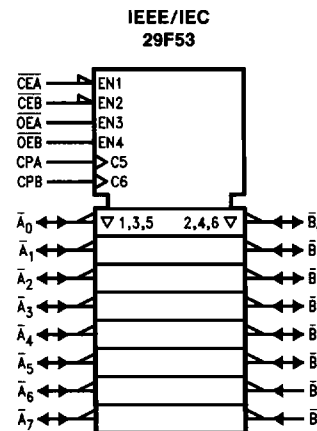
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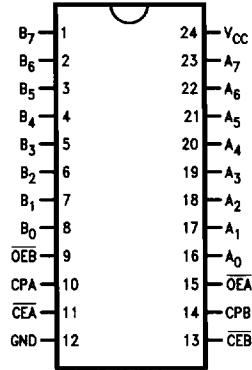
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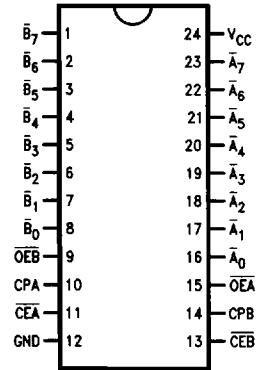
Connection Diagrams (Continued)

**Pin Assignment
for DIP, SOIC and Flatpak
29F52**



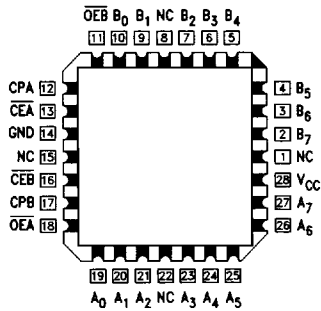
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**Pin Assignment
for DIP, SOIC and Flatpak
29F53**



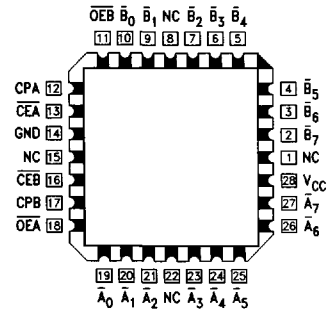
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**Pin Assignment
for LCC and PCC
29F52**



TL/F/9606-3

**Pin Assignment
for LCC and PCC
29F53**

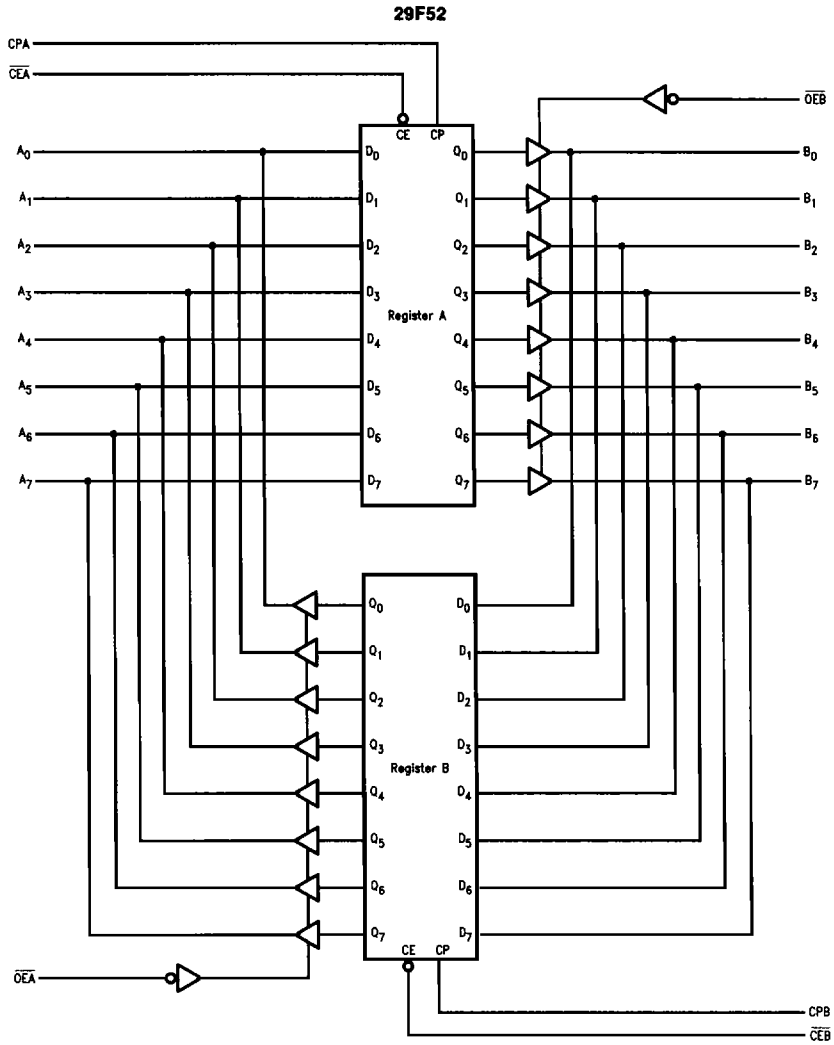


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Unit Loading/Fan Out: See Section 2 for U.L. definitions

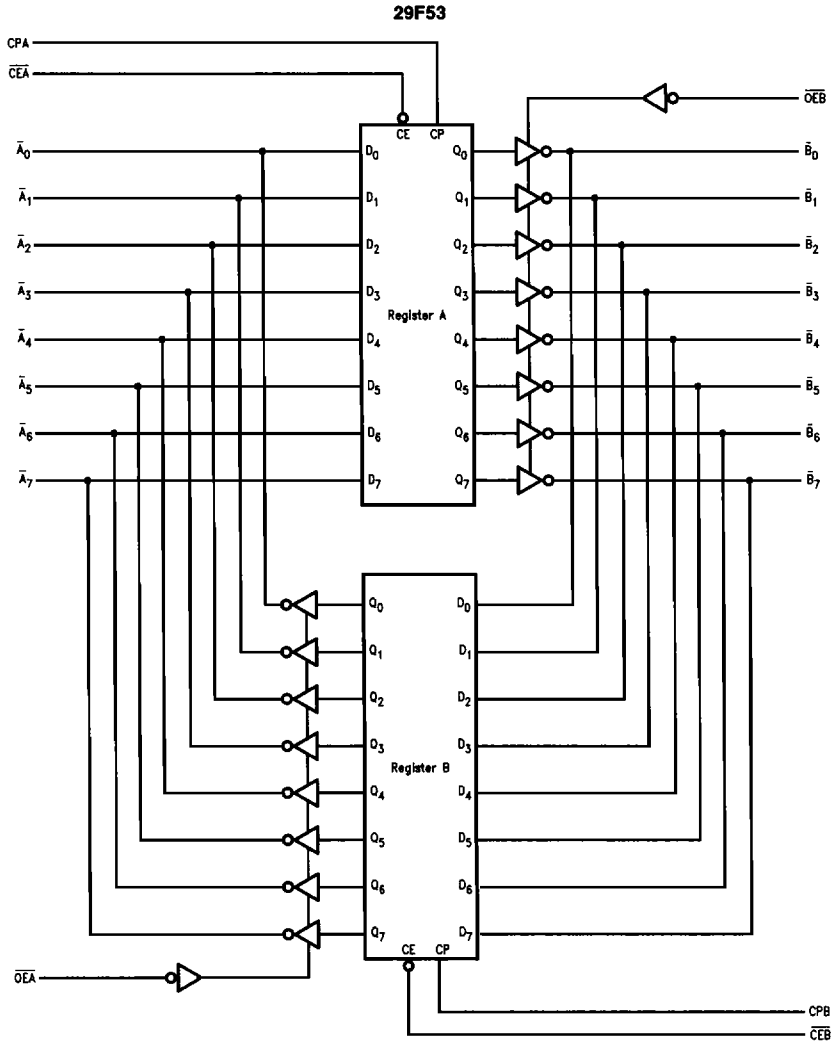
Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
A ₀ -A ₇	A-Register Inputs/ B-Register TRI-STATE Outputs	3.5/1.083	70 μ A/0.65 mA
B ₀ -B ₇	B Register Inputs/ A-Register TRI-STATE Outputs	150/40 (33.3) 3.5/1.083	-3 mA/24 mA (20 mA) 70 μ A/0.65 mA
OEA	Output Enable A-Register	600/106.6 (80)	-12 mA/64 mA (48 mA)
CPA	A-Register Clock	1.0/1.0	20 μ A/-0.6 mA
CEA	A-Register Clock Enable	1.0/1.0	20 μ A/-0.6 mA
OEB	Output Enable B-Register	1.0/1.0	20 μ A/-0.6 mA
CPB	B-Register Clock	1.0/1.0	20 μ A/-0.6 mA
CEB	B-Register Clock Enable	1.0/1.0	20 μ A/-0.6 mA

Block Diagrams



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Block Diagrams (Continued)



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Output Control

OE	Internal Q	Y-Output		Function
		29F52	29F53	
H	X	Z	Z	Disable Outputs
L	L	L	H	Enable Outputs
L	H	H	L	

Register Function Table (Applies to A or B Register)

Inputs			Internal Q	Function
D	CP	CE		
X	X	H	NC	Hold Data
L	↗	L	L	Load Data
H	↘	L	H	

H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial
 Z = HIGH Impedance
 ↗ = LOW-to-HIGH Transition
 ↘ = HIGH-to-LOW Transition
 NC = No Change

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, 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)

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 (Non I/O Pins)
V _{OH}	Output HIGH Voltage	54F 10% V _{CC}	2.5		V	Min	I _{OH} = -1 mA (A _n)
		54F 10% V _{CC}	2.4				I _{OH} = -3 mA (A _n , B _n)
		54F 10% V _{CC}	2.0				I _{OH} = -12 mA (B _n)
		74F 10% V _{CC}	2.5				I _{OH} = -1 mA (A _n)
		74F 10% V _{CC}	2.4				I _{OH} = -3 mA (A _n , B _n)
		74F 10% V _{CC}	2.0				I _{OH} = -12 mA (B _n)
		74F 5% V _{CC}	2.7				I _{OH} = -1 mA (A _n)
		74F 5% V _{CC}	2.7				I _{OH} = -3 mA (A _n , B _n)
	74F 5% V _{CC}	2.0				I _{OH} = -15 mA (B _n)	
V _{OL}	Output LOW Voltage	54F 10% V _{CC}		0.5	V	Min	I _{OL} = 20 mA (A _n)
		54F 10% V _{CC}		0.55			I _{OL} = 48 mA (B _n)
		74F 10% V _{CC}		0.5			I _{OL} = 24 mA (A _n)
		74F 10% V _{CC}		0.55			I _{OL} = 64 mA (B _n)
I _{IH}	Input HIGH Current	20			μA	Max	V _{IN} = 2.7V (Non-I/O Pins)
I _{BVI}	Input HIGH Current Breakdown Test	100			μA	Max	V _{IN} = 7.0V (Non-I/O Pins)
I _{BVIT}	Input HIGH Current Breakdown Test (I/O)	1.0			mA	Max	V _{IN} = 5.5V (A _n , B _n)
I _{IL}	Input LOW Current	-0.6			mA	Max	V _{IN} = 0.5V (Non-I/O Pins)
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)
I _{OS}	Output Short-Circuit Current	-60	-150		mA	Max	V _{OUT} = 0V (A _n)
		-100	-225				V _{OUT} = 0V (B _n)
I _{CEX}	Output HIGH Leakage Current	250			μA	Max	V _{OUT} = V _{CC} (A _n , B _n)
I _{ZZ}	Bus Drainage Test	500			μA	0.0V	V _{OUT} = V _{CC} (A _n , B _n)
I _{CCH}	Power Supply Current	130	190		mA	Max	V _O = HIGH
I _{CCL}	Power Supply Current	190			mA	Max	V _O = LOW
I _{CCZ}	Power Supply Current	190			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} = MII C _L = 50 pF		T _A , V _{CC} = Com C _L = 50 pF			
		Min	Typ	Max	Min	Max	Min	Max		
t _{PLH}	Propagation Delay CPA or CPB to A _n or B _n	3.0	5.5	7.5			2.5	8.5	ns	2-3
t _{PHL}		4.0	7.0	9.0			3.5	10.0		
t _{PZH}	Output Enable Time OE \bar{A} or OE \bar{B} to A _n or B _n	2.5	5.5	7.5			2.0	8.5	ns	2-5
t _{PZL}		3.5	7.0	9.5			3.0	10.5		
t _{PHZ}	Output Disable Time	2.5	6.5	9.0			2.0	10.0	ns	2-5
t _{PLZ}	$\bar{O}E\bar{A}$ or $\bar{O}E\bar{B}$ to A _n or B _n	2.5	5.5	7.5			2.0	8.5		

AC Operating Requirements: See Section 2 for Waveforms

Symbol	Parameter	74F		54F		74F		Units	Fig No
		T _A = +25°C V _{CC} = +5.0V		T _A , V _{CC} = MII		T _A , V _{CC} = Com			
		Min	Max	Min	Max	Min	Max		
t _s (H)	Setup Time, HIGH or LOW	4.0				4.5		ns	2-6
t _s (L)	A _n or B _n to CPA or CPB	4.0				4.5			
t _h (H)	Hold Time, HIGH or LOW	2.0				2.5		ns	2-6
t _h (L)	A _n or B _n to CPA or CPB	2.0				2.5			
t _s (H)	Setup Time, HIGH or LOW	1.0				1.5		ns	2-6
t _s (L)	$\bar{C}E\bar{A}$ or $\bar{C}E\bar{B}$ to CPA or CPB	4.0				4.5			
t _h (H)	Hold Time, HIGH or LOW	2.0				2.5		ns	2-6
t _h (L)	$\bar{C}E\bar{A}$ or $\bar{C}E\bar{B}$ to CPA or CPB	2.0				2.5			
t _w (H)	Pulse Width, HIGH or LOW	3.0				3.5		ns	2-4
t _w (L)	CPA or CPB	3.0				3.5			