

# CD4529BM/CD4529BC Dual 4-Channel or Single 8-Channel Analog Data Selector

## General Description

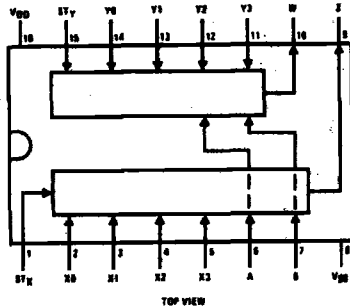
The CD4529B is a dual 4-channel or a single 8-channel analog data selector, implemented with complementary MOS (CMOS) circuits constructed with N- and P-channel enhancement mode transistors. Dual 4-channel or 8-channel mode operation is selected by proper input coding, with outputs Z and W tied together for the single 8-bit mode. The device is suitable for digital as well as analog applications, including various 1-of-4 and 1-of-8 data selector functions. Since the device is analog and bidirectional, it can also be used for dual binary to 1-of-4 or single 1-of-8 decoder applications.

## Features

- Wide supply voltage range 3.0V to 15V
- High noise immunity 0.45 V<sub>DD</sub> (typ.)
- Low quiescent power dissipation 0.005 μW/package (typ.) @ 5.0 V<sub>DC</sub>
- 10 MHz frequency operation (typ.)
- Data paths are bidirectional
- Linear ON resistance [120 Ω (typ.) @15V]
- TRI-STATE® outputs (high impedance disable strobe)
- Plug-in replacement for MC14529B

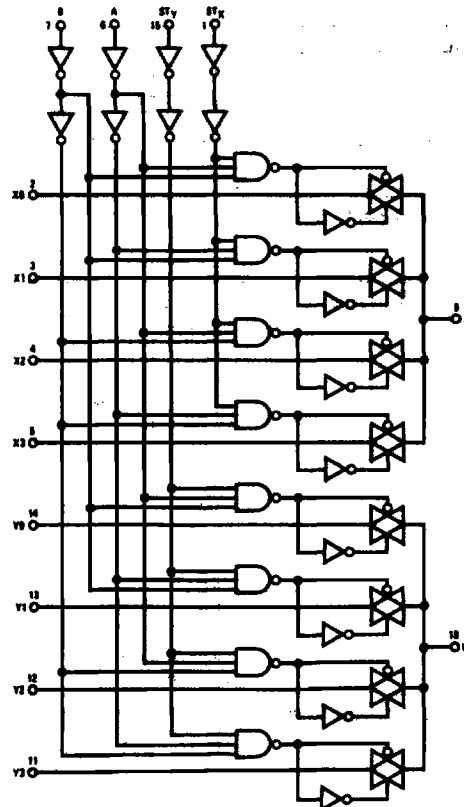
## Connection Diagram

Dual-In-Line Package



Order Number CD4529BCJ, N or CD4529BMJ, N  
See NS Package J16A or N16E

## Logic Diagram



## Truth Table

ST <sub>X</sub>	ST <sub>Y</sub>	B	A	Z	W
1	1	0	0	X0	Y0
1	1	0	1	X1	Y1
1	1	1	0	X2	Y2
1	1	1	1	X3	Y3
1	0	0	0		X0
1	0	0	1		X1
1	0	1	0		X2
1	0	1	1		X3
0	1	0	0		Y0
0	1	0	1		Y1
0	1	1	0		Y2
0	1	1	1		Y3
0	0	X	X		High Impedance (TRI-STATE)

X = Don't care

### Absolute Maximum Ratings

(Notes 1 and 2)

V <sub>DD</sub> DC Supply Voltage	-0.5V to +18V
V <sub>IN</sub> Input Voltage	-0.5V to V <sub>DD</sub> +0.5V
T <sub>S</sub> Storage Temperature Range	-65°C to +150°C
P <sub>D</sub> Package Dissipation	500 mW
T <sub>L</sub> Lead Temp. (Soldering, 10 seconds)	260°C

### Recommended Operating Conditions (Note 2)

V <sub>DD</sub> DC Supply Voltage	3V to 15V
V <sub>IN</sub> Input Voltage	0 to V <sub>DD</sub>
T <sub>A</sub> Operating Temperature Range	-55°C to +125°C
	CD4529BM
	CD4529BC
	-40°C to +85°C

### DC Electrical Characteristics CD4529BM (Note 2)

Symbol	Parameter	Conditions	-55°C		25°C			125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I <sub>DD</sub>	Quiescent Device Current	V <sub>DD</sub> = 5V		1.0		0.001	1.0		60	μA
		V <sub>DD</sub> = 10V		1.0		0.002	1.0		60	μA
		V <sub>DD</sub> = 15V		2.0		0.003	2.0		120	μA
V <sub>OL</sub>	Low Level Output Voltage	V <sub>IL</sub> = 0V, V <sub>IH</sub> = V <sub>DD</sub> ,  I <sub>O</sub>   < 1 μA								
		V <sub>DD</sub> = 5V		0.05		0	0.05		0.05	V
		V <sub>DD</sub> = 10V		0.05		0	0.05		0.05	V
		V <sub>DD</sub> = 15V		0.05		0	0.05		0.05	V
V <sub>OH</sub>	High Level Output Voltage	V <sub>IL</sub> = 0V, V <sub>IH</sub> = V <sub>DD</sub> ,  I <sub>O</sub>   < 1 μA								
		V <sub>DD</sub> = 5V	4.95		4.95	5.0		4.95		V
		V <sub>DD</sub> = 10V	9.95		9.95	10.0		9.95		V
		V <sub>DD</sub> = 15V	14.95		14.95	15.0		14.95		V
V <sub>IL</sub>	Low Level Input Voltage (Note 3)	V <sub>DD</sub> = 5V		1.5		2.25	1.5		1.5	V
		V <sub>DD</sub> = 10V		3.0		4.50	3.0		3.0	V
		V <sub>DD</sub> = 15V		4.0		6.75	4.0		4.0	V
V <sub>IH</sub>	High Level Input Voltage (Note 3)	V <sub>DD</sub> = 5V	3.5		3.5	2.75		3.5		V
		V <sub>DD</sub> = 10V	7.0		7.0	5.50		7.0		V
		V <sub>DD</sub> = 15V	11.0		11.0	8.25		11.0		V
I <sub>IN</sub>	Input Current	V <sub>DD</sub> = 15V								
		V <sub>IN</sub> = 0V		-0.1		-10 <sup>-5</sup>	-0.1		-1.0	μA
		V <sub>IN</sub> = 15V		0.1		10 <sup>-5</sup>	0.1		1.0	μA
R <sub>ON</sub>	ON Resistance	V <sub>DD</sub> = 5V, V <sub>SS</sub> = -5V								
		V <sub>IN</sub> = 5V		400		165	480		640	Ω
		V <sub>IN</sub> = -5V		400		100	480		640	Ω
		V <sub>IN</sub> = ±0.25V		400		155	480		640	Ω
		V <sub>DD</sub> = 7.5V, V <sub>SS</sub> = -7.5V								
		V <sub>IN</sub> = 7.5V		240		135	270		400	Ω
		V <sub>IN</sub> = -7.5V		240		75	270		400	Ω
		V <sub>IN</sub> = ±0.25V		240		100	270		400	Ω
		V <sub>DD</sub> = 10V, V <sub>SS</sub> = 0V								
		V <sub>IN</sub> = 10V		400		165	480		640	Ω
		V <sub>IN</sub> = 0.25V		400		100	480		640	Ω
		V <sub>IN</sub> = 5.6V		400		160	480		640	Ω
		V <sub>DD</sub> = 15V, V <sub>SS</sub> = 0V								
V <sub>IN</sub> = 15V		250		135	270		400	Ω		
V <sub>IN</sub> = 0.25V		250		75	270		400	Ω		
V <sub>IN</sub> = 9.3V		250		110	270		400	Ω		
I <sub>OFF</sub>	Input to Output Leakage Current	V <sub>SS</sub> = -5V, V <sub>DD</sub> = 5V, V <sub>IN</sub> = 5V, V <sub>OUT</sub> = -5V		±125		±0.001	±125		±1250	nA
		V <sub>SS</sub> = -5V, V <sub>DD</sub> = 5V, V <sub>IN</sub> = -5V, V <sub>OUT</sub> = 5V		±125		±0.001	±125		±1250	nA
		V <sub>SS</sub> = -7.5V, V <sub>DD</sub> = 7.5V, V <sub>IN</sub> = 7.5V, V <sub>OUT</sub> = -7.5V		±250		±0.0015	±250		±2500	nA
		V <sub>SS</sub> = -7.5V, V <sub>DD</sub> = 7.5V, V <sub>IN</sub> = -7.5V, V <sub>OUT</sub> = 7.5V		±250		±0.0015	±250		±2500	nA

## DC Electrical Characteristics CD4529BC (Note 2) (Continued)

Symbol	Parameter	Conditions	-40°C		25°C			85°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I <sub>DD</sub>	Quiescent Device Current	V <sub>DD</sub> = 5V		5.0		0.001	5.0		70	μA
		V <sub>DD</sub> = 10V		5.0		0.002	5.0		70	μA
		V <sub>DD</sub> = 15V		10.0		0.003	10.0		140	μA
V <sub>OL</sub>	Low Level Output Voltage	V <sub>IL</sub> = 0V, V <sub>IH</sub> = V <sub>DD</sub> ,  I <sub>O</sub>   < 1 μA								
		V <sub>DD</sub> = 5V		0.05			0.05		0.05	V
		V <sub>DD</sub> = 10V		0.05			0.05		0.05	V
		V <sub>DD</sub> = 15V		0.05			0.05		0.05	V
V <sub>OH</sub>	High Level Output Voltage	V <sub>IL</sub> = 0V, V <sub>IH</sub> = V <sub>DD</sub> ,  I <sub>O</sub>   < 1 μA								
		V <sub>DD</sub> = 5V	4.95		4.95	5.00		4.95		V
		V <sub>DD</sub> = 10V	9.95		9.95	10.00		9.95		V
		V <sub>DD</sub> = 15V	14.95		14.95	15.00		14.95		V
V <sub>IL</sub>	Low Level Input Voltage (Note 3)	V <sub>DD</sub> = 5V		1.5		2.25	1.5		1.5	V
		V <sub>DD</sub> = 10V		3.0		4.50	3.0		3.0	V
		V <sub>DD</sub> = 15V		4.0		6.75	4.0		4.0	V
V <sub>IH</sub>	High Level Input Voltage (Note 3)	V <sub>DD</sub> = 5V	3.5		3.5	2.75		3.5		V
		V <sub>DD</sub> = 10V	7.0		7.0	5.50		7.0		V
		V <sub>DD</sub> = 15V	11.0		11.0	8.25		11.0		V
I <sub>IN</sub>	Input Current	V <sub>DD</sub> = 15V								
		V <sub>IN</sub> = 0V		-0.3		-10 <sup>-5</sup>	-0.3		-1.0	μA
		V <sub>IN</sub> = 15V		0.3		10 <sup>-5</sup>	0.3		1.0	μA
R <sub>ON</sub>	ON Resistance	V <sub>DD</sub> = 5V, V <sub>SS</sub> = -5V								
		V <sub>IN</sub> = 5V		410		165	480		560	Ω
		V <sub>IN</sub> = -5V		410		100	480		560	Ω
		V <sub>IN</sub> = ±0.25V		410		155	480		560	Ω
		V <sub>DD</sub> = 7.5V, V <sub>SS</sub> = -7.5V								
		V <sub>IN</sub> = 7.5V		250		135	270		350	Ω
		V <sub>IN</sub> = -7.5V		250		75	270		350	Ω
		V <sub>IN</sub> = ±0.25V		250		100	270		350	Ω
		V <sub>DD</sub> = 10V, V <sub>SS</sub> = 0V								
		V <sub>IN</sub> = 10V		410		165	480		560	Ω
		V <sub>IN</sub> = 0.25V		410		100	480		560	Ω
		V <sub>IN</sub> = 5.6V		410		160	480		560	Ω
		V <sub>DD</sub> = 15V, V <sub>SS</sub> = 0V								
V <sub>IN</sub> = 15V		250		135	270		350	Ω		
V <sub>IN</sub> = 0.25V		250		75	270		350	Ω		
V <sub>IN</sub> = 9.3V		250		110	270		350	Ω		
I <sub>OFF</sub>	Input-Output Leakage Current	V <sub>SS</sub> = -5V, V <sub>DD</sub> = 5V								
		V <sub>IN</sub> = 5V, V <sub>OUT</sub> = -5V		±125		±0.001	±125		±500	nA
		V <sub>IN</sub> = -5V, V <sub>OUT</sub> = 5V		±125		±0.001	±125		±500	nA
		V <sub>SS</sub> = -7.5V, V <sub>DD</sub> = 7.5V								
		V <sub>IN</sub> = 7.5V, V <sub>OUT</sub> = -7.5V		±250		±0.0015	±250		±1000	nA
		V <sub>IN</sub> = -7.5V, V <sub>OUT</sub> = 7.5V		±250		±0.0015	±250		±1000	nA

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for actual device operation.

Note 2: V<sub>SS</sub> = 0V unless otherwise specified.

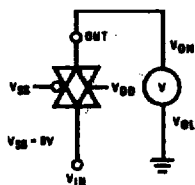
Note 3: Switch OFF is defined as |I<sub>O</sub>| ≤ 10 μA, switch ON as defined by R<sub>ON</sub> specification.

**AC Characteristics** CD4529BM/CD4539BCT<sub>A</sub> = 25°C, R<sub>L</sub> = 1 kΩ, t<sub>r</sub> = t<sub>f</sub> = 20 ns, unless otherwise specified.

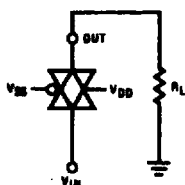
Symbol	Parameter	Conditions	Min	Typ	Max	Units
t <sub>PLH</sub> , t <sub>PHL</sub>	V <sub>IN</sub> to V <sub>OUT</sub> Propagation Delay	V <sub>SS</sub> = 0V, C <sub>L</sub> = 50 pF V <sub>DD</sub> = 5V V <sub>DD</sub> = 10V V <sub>DD</sub> = 15V		20 10 8	40 20 15	ns ns ns
t <sub>PLH</sub> , t <sub>PHL</sub>	Control to Output Propagation Delay	V <sub>IN</sub> = V <sub>DD</sub> or V <sub>SS</sub> , C <sub>L</sub> = 50 pF V <sub>IN</sub> ≤ 10V V <sub>DD</sub> = 5V V <sub>DD</sub> = 10V V <sub>DD</sub> = 15V		200 80 50	400 160 120	ns ns ns
f <sub>MAX</sub>	Maximum Control Input Pulse Frequency	V <sub>SS</sub> = 0V, C <sub>L</sub> = 50 pF V <sub>DD</sub> = 5V V <sub>DD</sub> = 10V V <sub>DD</sub> = 15V		5 10 12		MHz MHz MHz
	Crosstalk, Control to Output	R <sub>OUT</sub> = 10 kΩ, C <sub>L</sub> = 50 pF, V <sub>SS</sub> = 0 V <sub>DD</sub> = 5V V <sub>DD</sub> = 10V V <sub>DD</sub> = 15V		5.0 5.0 5.0		mV mV mV
	Noise Voltage	f = 100 Hz, V <sub>SS</sub> = 0V V <sub>DD</sub> = 5V V <sub>DD</sub> = 10V V <sub>DD</sub> = 15V		24 25 30		nV/√cycle nV/√cycle nV/√cycle
	Sine Wave (Distortion)	f = 100 kHz, V <sub>SS</sub> = 0V V <sub>DD</sub> = 5V V <sub>DD</sub> = 10V V <sub>DD</sub> = 15V V <sub>IN</sub> = 1.77V <sub>rms</sub> Centered at 0V, R <sub>L</sub> = 10 kΩ, f = 1 kHz, V <sub>SS</sub> = -5V, V <sub>DD</sub> = 5V		12 12 15 0.36		nV/√cycle nV/√cycle nV/√cycle %
I <sub>LOSS</sub>	Insertion Loss, $I_{LOSS} = 20 \log_{10} \frac{V_{OUT}}{V_{IN}}$	V <sub>IN</sub> = 177V <sub>rms</sub> Centered at 0V, V <sub>SS</sub> = -5V, V <sub>DD</sub> = 5V R <sub>L</sub> = 1 kΩ R <sub>L</sub> = 10 kΩ R <sub>L</sub> = 100 kΩ R <sub>L</sub> = 1 MΩ		2.0 0.8 0.25 0.01		dB dB dB dB
BW	Bandwidth, -3dB	V <sub>IN</sub> = 177V <sub>rms</sub> Centered at 0 Vdc, V <sub>SS</sub> = -5V, V <sub>DD</sub> = 5V R <sub>L</sub> = 1 kΩ R <sub>L</sub> = 10 kΩ R <sub>L</sub> = 100 kΩ R <sub>L</sub> = 1 MΩ		35 28 27 26		MHz MHz MHz MHz
	Feedthrough and Crosstalk, $20 \log_{10} \frac{V_{OUT}}{V_{IN}} = -50 \text{ db}$	V <sub>SS</sub> = -5V, V <sub>DD</sub> = 5V R <sub>L</sub> = 1 kΩ R <sub>L</sub> = 10 kΩ R <sub>L</sub> = 100 kΩ R <sub>L</sub> = 1 MΩ		850 100 12 1.5		kHz kHz kHz kHz

# Test Circuits and Switching Time Waveforms

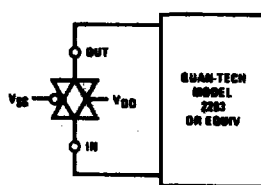
Output Voltage



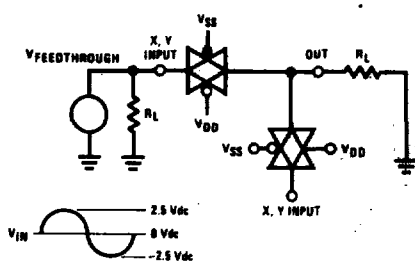
R<sub>ON</sub> Characteristics



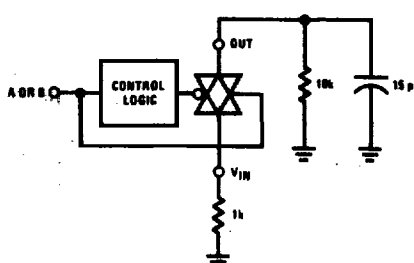
Noise Voltage



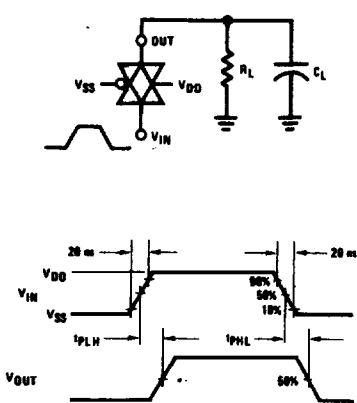
Frequency Response



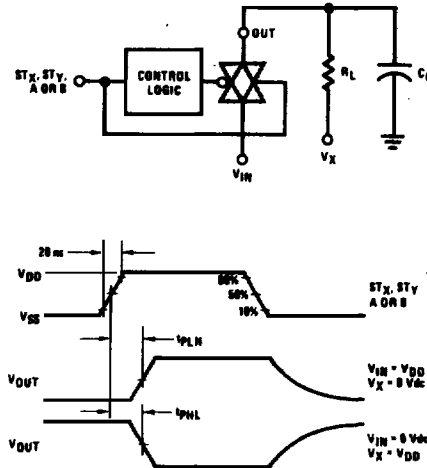
Crosstalk



Propagation Delay

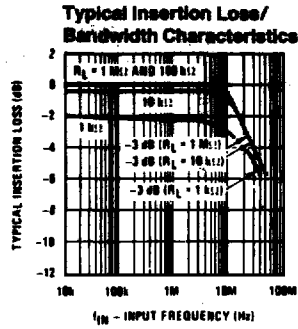
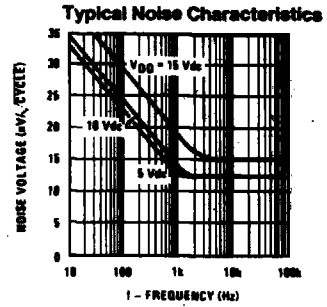
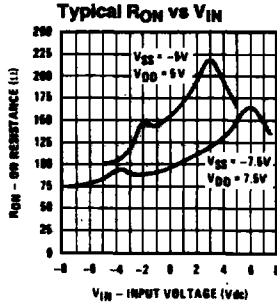


Turn-ON Delay Time



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# Typical Performance Characteristics



TL/F/5696-3