



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

General Description

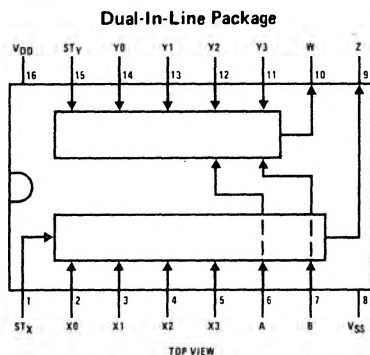
The CD4529B is a dual 4-channel or a single 8-channel analog data selector, implemented with complementary MOS (CMOS) circuits constructed with N- and P-channel enhancement mode transistors. Dual 4-channel or 8-channel mode operation is selected by proper input coding, with outputs Z and W tied together 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 binary to 1-of-8 decoder applications.

TRI-STATE is a registered trademark of National Semiconductor Corp.

Features

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

Connection Diagram



Truth Table

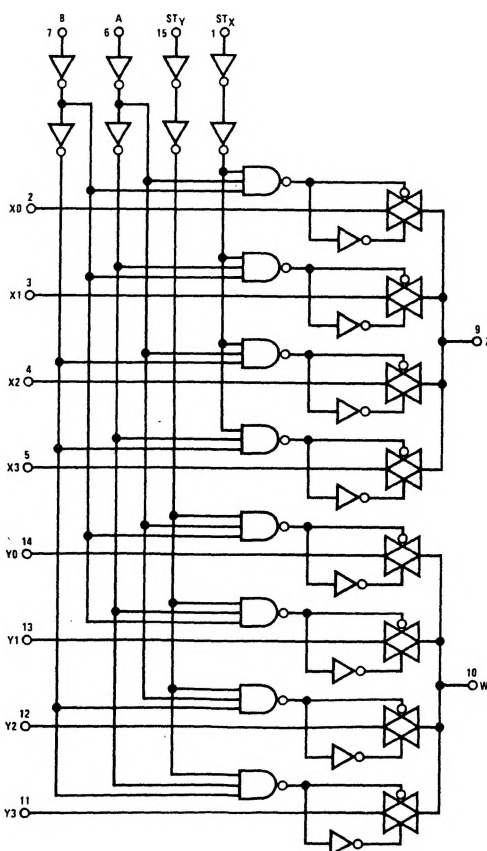
ST _X	ST _Y	B	A	Z	W
1	1	0	0	X0	Y0
1	1	0	1	X1	Y1
1	1	1	0	X2	Y2
1	1	1	1	X3	Y3
1	0	0	0	X0	
1	0	0	1	X1	
1	0	1	0	X2	
1	0	1	1	X3	
0	1	0	0	Y0	
0	1	0	1	Y1	
0	1	1	0	Y2	
0	1	1	1	Y3	
0	0	X	X	High Impedance (TRI-STATE®)	

Dual
4-Channel
Mode
2 Outputs

Single
8-Channel Mode
1 Output
(Z and W
tied together)

X = Don't care

Logic Diagram



Absolute Maximum Ratings

(Notes 1 and 2)

V_{DD} DC Supply Voltage	-0.5V to +18V
V_{IN} Input Voltage	-0.5V to $V_{DD} + 0.5V$
T_S Storage Temperature Range	-65°C to +150°C
P_D Package Dissipation	500 mW
T_L Lead Temperature (Soldering, 10 seconds)	300°C

Recommended Operating Conditions

(Note 2)

V_{DD} DC Supply Voltage	3V to 15V
V_{IN} Input Voltage	0 to V_{DD}
T_A Operating Temperature Range	-55°C to +125°C
CD4529BM	-40°C to +85°C
CD4529BC	

DC Electrical Characteristics CD4529BM (Note 2)

PARAMETER	CONDITIONS	-55°C		25°C			125°C		UNITS
		MIN	MAX	MIN	TYP	MAX	MIN	MAX	
I_{DD} Quiescent Device Current	$V_{DD} = 5V$		1.0		0.001	1.0		60	μA
	$V_{DD} = 10V$		1.0		0.002	1.0		60	μA
	$V_{DD} = 15V$		2.0		0.003	2.0		120	μA
V_{OL} Low Level Output Voltage	$V_{IL} = 0V, V_{IH} = V_{DD}, I_{O1} < 1 \mu A$								
	$V_{DD} = 5V$		0.05		0	0.05		0.05	V
	$V_{DD} = 10V$		0.05		0	0.05		0.05	V
	$V_{DD} = 15V$		0.05		0	0.05		0.05	V
V_{OH} High Level Output Voltage	$V_{IL} = 0V, V_{IH} = V_{DD}, I_{O1} < 1 \mu A$								
	$V_{DD} = 5V$	4.95		4.95	5.0		4.95		V
	$V_{DD} = 10V$	9.95		9.95	10.0		9.95		V
	$V_{DD} = 15V$	14.95		14.95	15.0		14.95		V
V_{IL} Low Level Input Voltage (Note 3)	$V_{DD} = 5V$		1.5		2.25	1.5		1.5	V
	$V_{DD} = 10V$		3.0		4.50	3.0		3.0	V
	$V_{DD} = 15V$		4.0		6.75	4.0		4.0	V
V_{IH} High Level Input Voltage (Note 3)	$V_{DD} = 5V$	3.5		3.5	2.75		3.5		V
	$V_{DD} = 10V$	7.0		7.0	5.50		7.0		V
	$V_{DD} = 15V$	11.0		11.0	8.25		11.0		V
I_{IN} Input Current	$V_{DD} = 15V$								
	$V_{IN} = 0V$		-0.1		-10^{-5}	-0.1		-1.0	μA
	$V_{IN} = 15V$		0.1		10^{-5}	0.1		1.0	μA
R_{ON} ON Resistance	$V_{DD} = 5V, V_{SS} = -5V$								
	$V_{IN} = 5V$		400		165	480		640	Ω
	$V_{IN} = -5V$		400		100	480		640	Ω
	$V_{IN} = \pm 0.25V$		400		155	480		640	Ω
	$V_{DD} = 7.5V, V_{SS} = -7.5V$								
	$V_{IN} = 7.5V$		240		135	270		400	Ω
	$V_{IN} = -7.5V$		240		75	270		400	Ω
	$V_{IN} = \pm 0.25V$		240		100	270		400	Ω
	$V_{DD} = 10V, V_{SS} = 0V$								
	$V_{IN} = 10V$		400		165	480		640	Ω
	$V_{IN} = 0.25V$		400		100	480		640	Ω
	$V_{IN} = 5.6V$		400		160	480		640	Ω
	$V_{DD} = 15V, V_{SS} = 0V$								
	$V_{IN} = 15V$		250		135	270		400	Ω
	$V_{IN} = 0.25V$		250		75	270		400	Ω
	$V_{IN} = 9.3V$		250		110	270		400	Ω
I_{OFF} Input to Output Leakage Current	$V_{SS} = -5V, V_{DD} = 5V, V_{IN} = 5V, V_{OUT} = -5V$	± 125			± 0.001	± 125		± 1250	nA
	$V_{SS} = -5V, V_{DD} = 5V, V_{IN} = -5V, V_{OUT} = 5V$	± 125			± 0.001	± 125		± 1250	nA
	$V_{SS} = -7.5V, V_{DD} = 7.5V, V_{IN} = 7.5V, V_{OUT} = -7.5V$	± 250			± 0.0015	± 250		± 2500	nA
	$V_{SS} = -7.5V, V_{DD} = 7.5V, V_{IN} = -7.5V, V_{OUT} = 7.5V$	± 250			± 0.0015	± 250		± 2500	nA

DC Electrical Characteristics CD4529BC (Note 2)

PARAMETER	CONDITIONS	-40°C		25°C			85°C		UNITS
		MIN	MAX	MIN	TYP	MAX	MIN	MAX	
I _{DD} Quiescent Device Current	V _{DD} = 5V		5.0		0.001	5.0		70	μA
	V _{DD} = 10V		5.0		0.002	5.0		70	μA
	V _{DD} = 15V		10.0		0.003	10.0		140	μA
V _{OL} Low Level Output Voltage	V _{IL} = 0V, V _{IH} = V _{DD} , I _{OI} < 1 μA								
	V _{DD} = 5V		0.05			0.05		0.05	V
	V _{DD} = 10V		0.05			0.05		0.05	V
	V _{DD} = 15V		0.05			0.05		0.05	V
V _{OH} High Level Output Voltage	V _{IL} = 0V, V _{IH} = V _{DD} , I _{OI} < 1 μA								
	V _{DD} = 5V	4.95		4.95	5.00		4.95		V
	V _{DD} = 10V	9.95		9.95	10.00		9.95		V
	V _{DD} = 15V	14.95		14.95	15.00		14.95		V
V _{IL} Low Level Input Voltage (Note 3)	V _{DD} = 5V		1.5		2.25	1.5		1.5	V
	V _{DD} = 10V		3.0		4.50	3.0		3.0	V
	V _{DD} = 15V		4.0		6.75	4.0		4.0	V
V _{IH} High Level Input Voltage (Note 3)	V _{DD} = 5V	3.5		3.5	2.75		3.5		V
	V _{DD} = 10V	7.0		7.0	5.50		7.0		V
	V _{DD} = 15V	11.0		11.0	8.25		11.0		V
I _{IN} Input Current	V _{DD} = 15V								
	V _{IN} = 0V		-0.3		-10 ⁻⁵	-0.3		-1.0	μA
	V _{IN} = 15V		0.3		10 ⁻⁵	0.3		1.0	μA
R _{ON} ON Resistance	V _{DD} = 5V, V _{SS} = -5V								
	V _{IN} = 5V		410		165	480		560	Ω
	V _{IN} = -5V		410		100	480		560	Ω
	V _{IN} = ±0.25V		410		155	480		560	Ω
	V _{DD} = 7.5V, V _{SS} = -7.5V								
	V _{IN} = 7.5V		250		135	270		350	Ω
	V _{IN} = -7.5V		250		75	270		350	Ω
	V _{IN} = ±0.25V		250		100	270		350	Ω
	V _{DD} = 10V, V _{SS} = 0V								
	V _{IN} = 10V		410		165	480		560	Ω
	V _{IN} = 0.25V		410		100	480		560	Ω
	V _{IN} = 5.6V		410		160	480		560	Ω
	V _{DD} = 15V, V _{SS} = 0V								
	V _{IN} = 15V		250		135	270		350	Ω
	V _{IN} = 0.25V		250		75	270		350	Ω
	V _{IN} = 9.3V		250		110	270		350	Ω
I _{OFF} Input-Output Leakage Current	V _{SS} = -5V, V _{DD} = 5V								
	V _{IN} = 5V, V _{OUT} = -5V		±125		±0.001	±125		±500	nA
	V _{IN} = -5V, V _{OUT} = 5V		±125		±0.001	±125		±500	nA
	V _{SS} = -7.5V, V _{DD} = 7.5V								
	V _{IN} = 7.5V, V _{OUT} = -7.5V		±250		±0.0015	±250		±1000	nA
	V _{IN} = -7.5V, V _{OUT} = 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_{SS} = 0V unless otherwise specified.

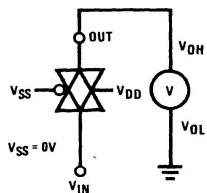
Note 3: Switch OFF is defined as |I_{OI}| ≤ 10 μA, switch ON as defined by R_{ON} specification.

AC Electrical Characteristics CD4529BM/CD4529BC $T_A = 25^\circ\text{C}$, $R_L = 1\text{ k}\Omega$, $t_r = t_f = 20\text{ ns}$, unless otherwise specified.

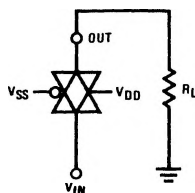
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
t_{PLH} , t_{PHL} V_{IN} to V_{OUT} Propagation Delay	$V_{SS} = 0\text{V}$, $C_L = 50\text{ pF}$ $V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		20 10 8	40 20 15	ns ns ns
t_{PLH} , t_{PHL} Control to Output Propagation Delay	$V_{IN} = V_{DD}$ or V_{SS} , $C_L = 50\text{ pF}$ $V_{IN} \leq 10\text{V}$ $V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		200 80 50	400 160 120	ns ns ns
f_{MAX} Maximum Control Input Pulse Frequency	$V_{SS} = 0\text{V}$, $C_L = 50\text{ pF}$ $V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		5 10 12		MHz MHz MHz
Crosstalk, Control to Output	$R_{OUT} = 10\text{ k}\Omega$, $C_L = 50\text{ pF}$, $V_{SS} = 0$ $V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		5.0 5.0 5.0		mV mV mV
Noise Voltage	$f = 100\text{ Hz}$, $V_{SS} = 0\text{V}$ $V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$ $f = 100\text{ kHz}$, $V_{SS} = 0\text{V}$ $V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$		24 25 30 12 12 15		$\text{nV}/\sqrt{\text{cycle}}$ $\text{nV}/\sqrt{\text{cycle}}$ $\text{nV}/\sqrt{\text{cycle}}$ $\text{nV}/\sqrt{\text{cycle}}$ $\text{nV}/\sqrt{\text{cycle}}$ $\text{nV}/\sqrt{\text{cycle}}$ $\text{nV}/\sqrt{\text{cycle}}$
Sine Wave (Distortion)	$V_{IN} = 1.77\text{V}_{rms}$ Centered at 0V , $R_L = 10\text{ k}\Omega$, $f = 1\text{ kHz}$, $V_{SS} = -5\text{V}$, $V_{DD} = 5\text{V}$		0.36		%
I_{LOSS} Insertion Loss, $I_{LOSS} = 20 \log_{10} \frac{V_{OUT}}{V_{IN}}$	$V_{IN} = 1.77\text{V}_{rms}$ Centered at 0V , $V_{SS} = -5\text{V}$, $V_{DD} = 5\text{V}$ $R_L = 1\text{ k}\Omega$ $R_L = 10\text{ k}\Omega$ $R_L = 100\text{ k}\Omega$ $R_L = 1\text{ M}\Omega$		2.0 0.8 0.25 0.01		dB dB dB dB
BW Bandwidth, -3 dB	$V_{IN} = 1.77\text{V}_{rms}$ Centered at 0 Vdc , $V_{SS} = -5\text{V}$, $V_{DD} = 5\text{V}$ $R_L = 1\text{ k}\Omega$ $R_L = 10\text{ k}\Omega$ $R_L = 100\text{ k}\Omega$ $R_L = 1\text{ M}\Omega$		35 28 27 26		MHz MHz MHz MHz
Feedthrough and Crosstalk, $20 \log_{10} \frac{V_{OUT}}{V_{IN}} = -50\text{ dB}$	$V_{SS} = -5\text{V}$, $V_{DD} = 5\text{V}$ $R_L = 1\text{ k}\Omega$ $R_L = 10\text{ k}\Omega$ $R_L = 100\text{ k}\Omega$ $R_L = 1\text{ M}\Omega$		850 100 12 1.5		kHz kHz kHz kHz

Test Circuits and Switching Time Waveforms

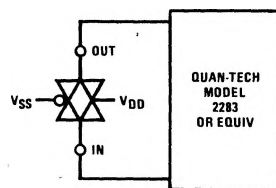
Output Voltage



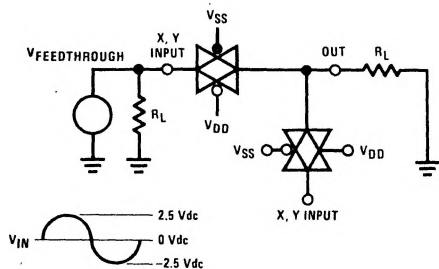
RON Characteristics



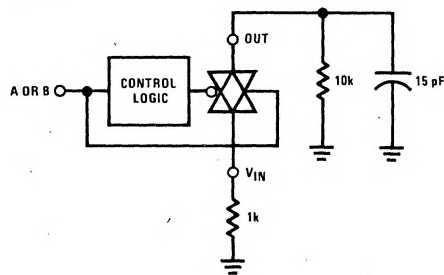
Noise Voltage



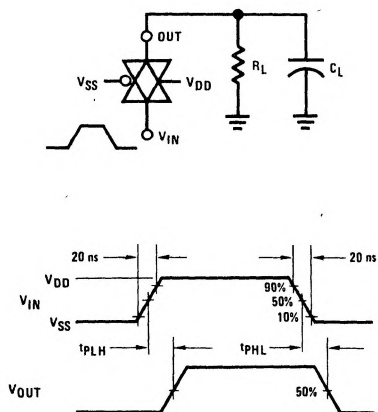
Frequency Response



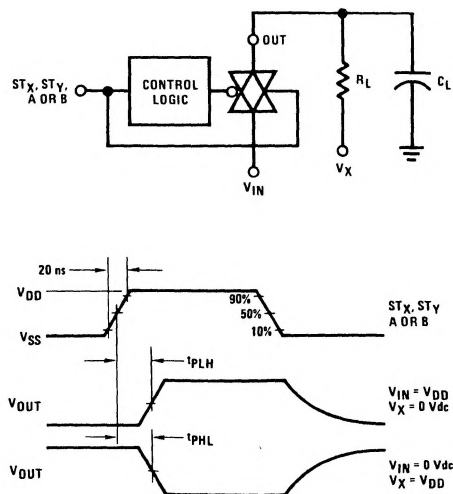
Crosstalk



Propagation Delay

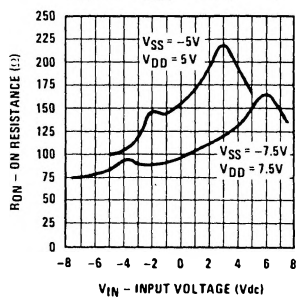


Turn-ON Delay Time

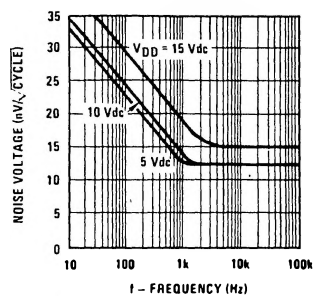


Typical Performance Characteristics

Typical R_{ON} vs V_{IN}



Typical Noise Characteristics



Typical Insertion Loss/ Bandwidth Characteristics

