FAIRCHILD SEMICONDUCTOR™

October 1987
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CD4512BC
8-Channel Buffered Data Selector

General Description

The CD4512BC buffered 8-channel data selector is a complementary MOS (CMOS) circuit constructed with N- and P-channel enhancement mode transistors. This data selector is primarily used as a digital signal multiplexer selecting 1 of 8 inputs and routing the signal to a 3-STATE output. A high level at the Inhibit input forces a low level at the output. A high level at the Output Enable ($\overline{OE}$) input forces the output into the 3-STATE condition. Low levels at both the Inhibit and ($\overline{OE}$) inputs allow normal operation.

Features

- Wide supply voltage range: 3.0V to 15V
- High noise immunity: 0.45 V_{DD} (typ.)
- 3-STATE output
- Low quiescent power dissipation: 0.25 µW/package (typ.) @ V_{CC} = 5.0V
- Plug-in replacement for Motorola MC14512

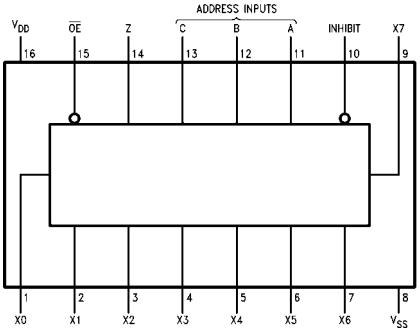
Ordering Code:

Order Number	Package Number	Package Description
CD4512BCM	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150” Narrow Body
CD4512BCN	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300” Wide

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

Connection Diagram

Pin Assignments for SOIC and DIP



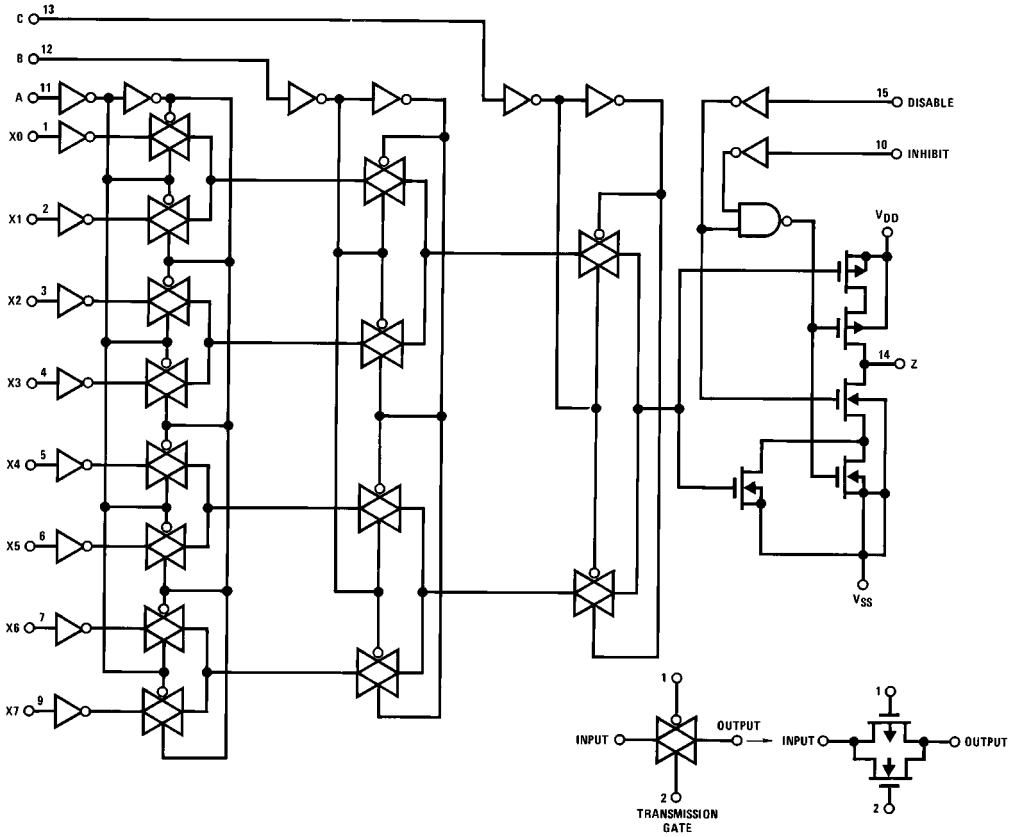
Top View

Truth Table

Address Inputs			Control Inputs		Output
C	B	A	Inhibit	$\overline{OE}$	Z
0	0	0	0	0	X0
0	0	1	0	0	X1
0	1	0	0	0	X2
0	1	1	0	0	X3
1	0	0	0	0	X4
1	0	1	0	0	X5
1	1	0	0	0	X6
1	1	1	0	0	X7
2	1	1	1	0	0
2	2	2	2	1	Hi-Z

2 = Don't care
Hi-Z = 3-STATE condition
Xn = Data at input n

Logic Diagram



Absolute Maximum Ratings (Note 1)

(Note 2)

Supply Voltage (V_{DD})	−0.5 to +18 V_{DC}
Input Voltage (V_{IN})	−0.5 to V_{DD} + 0.5 V_{DC}
Storage Temperature Range (T_S)	−65°C to +150°C
Power Dissipation (P_D)	
Dual-In-Line	700 mW
Small Outline	500 mW
Lead Temperature, (T_L)	
(Soldering, 10 seconds)	260°C

Recommended Operating Conditions (Note 2)

DC Supply Voltage (V_{DD})	3.0 to 15 V_{DC}
Input Voltage (V_{IN})	0 to V_{DD} V_{DC}
Operating Temperature Range (T_A)	−40°C to +85°C

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

Note 2: V_{SS} = 0V unless otherwise specified.

DC Electrical Characteristics (Note 2)

Symbol	Parameter	Conditions	−40°C		+25°C			+85°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device	V_{DD} = 5V, V_{IN} = V_{DD} or V_{SS}		20		0.005	20		150	µA
	Current	V_{DD} = 10V, V_{IN} = V_{DD} or V_{SS}		40		0.010	40		300	µA
		V_{DD} = 15V, V_{IN} = V_{DD} or V_{SS}		80		0.015	80		600	µA
V_{OL}	LOW Level	V_{DD} = 5V		0.05		0	0.05		0.05	V
	Output Voltage	V_{DD} = 10V $\quad \lvert I_{OL} \rvert < 1$ µA		0.05		0	0.05		0.05	V
		V_{DD} = 15V		0.05		0	0.05		0.05	V
V_{OH}	HIGH Level	V_{DD} = 5V	4.95		4.95	5.0		4.95		V
	Output Voltage	V_{DD} = 10V $\quad \lvert I_{OH} \rvert < 1$ µA	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	V_{DD} = 5V, V_O = 0.5V		1.5		2.25	1.5		1.5	V
	Input Voltage	V_{DD} = 10V, V_O = 1.0V		3.0		4.50	3.0		3.0	V
		V_{DD} = 15V, V_O = 1.5V		4.0		6.75	4.0		4.0	V
V_{IH}	HIGH Level	V_{DD} = 5V, V_O = 4.5V	3.5		3.5	2.75		3.5		V
	Input Voltage	V_{DD} = 10V, V_O = 9.0V	7.0		7.0	5.50		7.0		V
		V_{DD} = 15V, V_O = 13.5V	11.0		11.0	8.25		11.0		V
I_{OL}	LOW Level Output	V_{DD} = 5V, V_O = 0.4V	0.52		0.44	0.78		0.36		mA
	Current	V_{DD} = 10V, V_O = 0.5V	1.3		1.1	2.0		0.9		mA
	(Note 3)	V_{DD} = 15V, V_O = 1.5V	3.6		3.4	7.8		2.4		mA
I_{OH}	HIGH Level Output	V_{DD} = 5V, V_O = 4.6V	−0.2		−0.16			−0.12		mA
	Current	V_{DD} = 10V, V_O = 9.5	−0.5		−0.4			−0.3		mA
	(Note 3)	V_{DD} = 15V, V_O = 13.5V	−1.4		−1.2			−1.0		mA
I_{IN}	Input Current	V_{DD} = 15V, V_{IN} = 0V		−0.3		-10^{-5}	−0.3		−1.0	µA
		V_{DD} = 15V, V_{IN} = 15V		0.3		10^{-5}	0.3		1.0	µA
I_{OZ}	3-STATE	V_{DD} = 15V, V_O = 0V		±1.0		$\pm 10^{-5}$	±1.0		±7.5	µA
	Output Current	V_{DD} = 15V, V_O = 15V								

Note 3: I_{OH} and I_{OL} are tested one output at a time.

AC Electrical Characteristics (Note 4)

$T_A = 25°C$, $t_r = t_f = 20$ ns, $C_L = 50$ pF

Symbol	Parameter	Conditions	CD4512BM			CD4512BC			Units
			Min	Typ	Max	Min	Typ	Max	
t_{PHL}	Propagation Delay	$V_{DD} = 5V$		225	500		225	750	ns
	HIGH-to-LOW Level	$V_{DD} = 10V$		75	175		75	200	ns
		$V_{DD} = 15V$		57	130		57	150	ns
t_{PLH}	Propagation Delay	$V_{DD} = 5V$		225	500		225	750	ns
	LOW-to-HIGH Level	$V_{DD} = 10V$		75	175		75	200	ns
		$V_{DD} = 15V$		57	130		57	150	ns
t_{THL}, t_{TLH}	Transition Time	$V_{DD} = 5V$		70	200		70	200	ns
		$V_{DD} = 10V$		35	100		35	100	ns
		$V_{DD} = 15V$		25	80		25	80	ns
t_{PHZ}, t_{PLZ}	Propagation Delay into	$V_{DD} = 5V$		50	125		50	125	ns
	3-STATE from Logic Level	$V_{DD} = 10V$		25	75		25	75	ns
		$V_{DD} = 15V$		19	60		19	60	ns
t_{PZH}, t_{PZL}	Propagation Delay to Logic	$V_{DD} = 5V$		50	125		50	125	ns
	Level from 3-STATE	$V_{DD} = 10V$		25	75		25	75	ns
		$V_{DD} = 15V$		19	60		19	60	ns
C_{IN}	Input Capacitance	(Note 5)		7.5	15		7.5	15	pF
C_{OUT}	3-STATE Output Capacitance	(Note 5)		7.5	15		7.5	15	pF
C_{PD}	Power Dissipation Capacity	(Note 6)		150			150		pF

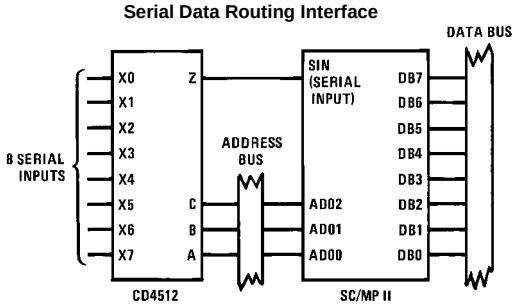
Note 4: AC Parameters are guaranteed by DC correlated testing.

Note 5: Capacitance guaranteed by periodic testing.

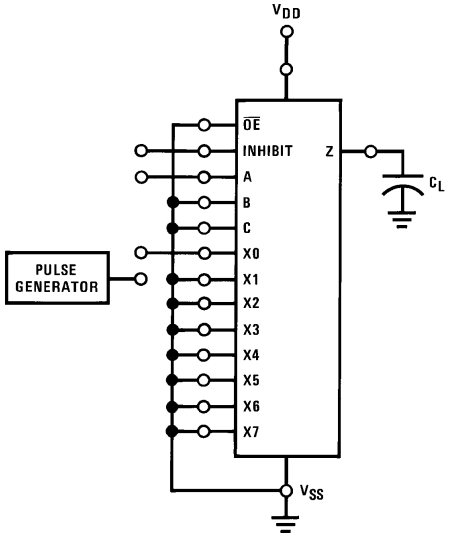
Note 6: C_{PD} determines the no load AC power of any CMOS device. For complete explanation, see Family Characteristics Application Note, AN-90.

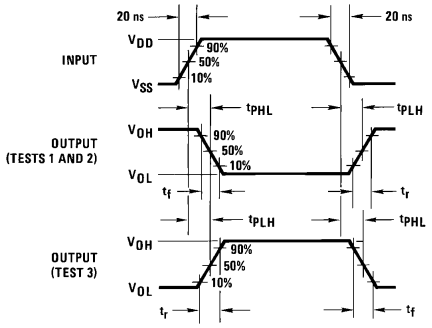
Typical Application

Serial Data Routing Interface



AC Test Circuit and Switching Time Waveforms

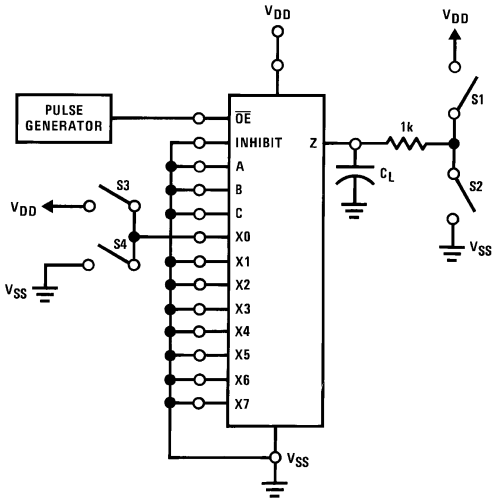


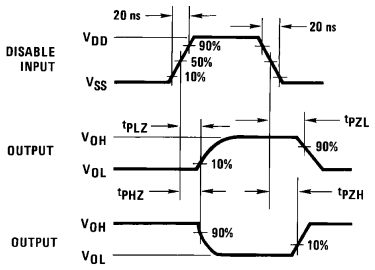


Input Connections for t_r, t_f, t_{PLH}, t_{PHL}

Test	Inhibit	A	X0
1	PG	GND	V_{DD}
2	GND	PG	V_{DD}
3	GND	GND	PG

3-STATE AC Test Circuit and Switching Time Waveforms

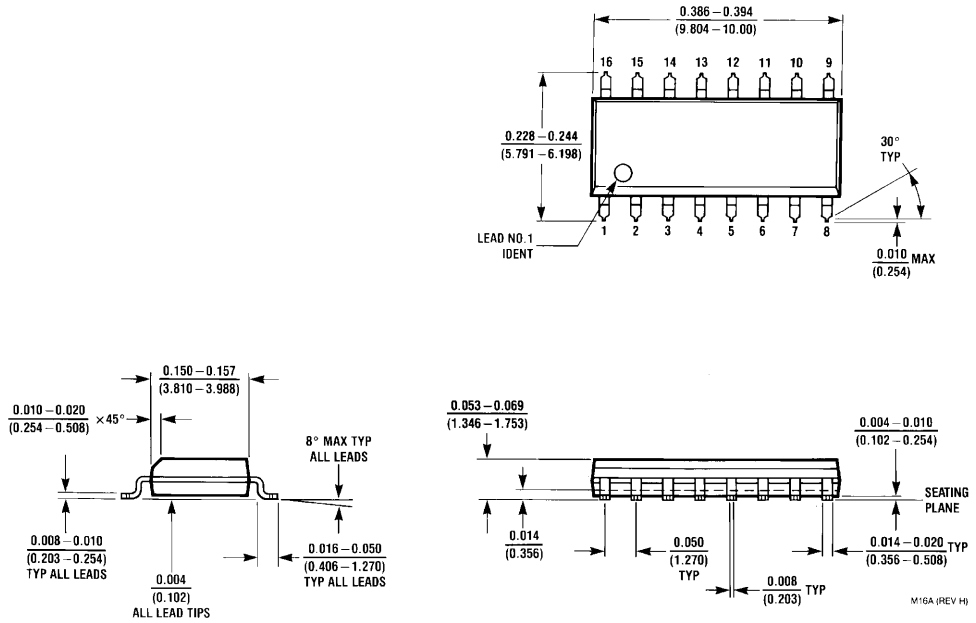




Switch Positions for 3-STATE Test

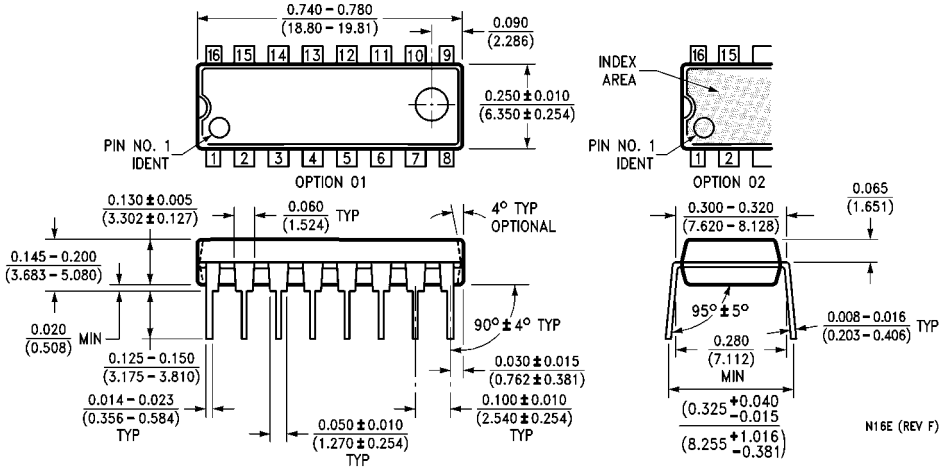
Test	S1	S2	S3	S4
t_{PHZ}	Open	Closed	Closed	Open
t_{PLZ}	Closed	Open	Open	Closed
t_{PZL}	Closed	Open	Open	Closed
t_{PZH}	Open	Closed	Closed	Open

Physical Dimensions inches (millimeters) unless otherwise noted



16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150” Wide
Package Number M16A

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



16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
Package Number N16E