



Is Now Part of



ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at
www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

CD4021BC 8-Stage Static Shift Register

General Description

The CD4021BC is an 8-stage parallel input/serial output shift register. A parallel/serial control input enables individual JAM inputs to each of 8 stages. Q outputs are available from the sixth, seventh, and eighth stages. All outputs have equal source and sink current capabilities and conform to standard "B" series output drive.

When the parallel/serial control input is in the logical "0" state, data is serially shifted into the register synchronously with the positive transition of the clock. When the parallel/serial control is in the logical "1" state, data is jammed into each stage of the register asynchronously with the clock.

All inputs are protected against static discharge with diodes to V_{DD} and V_{SS} .

Features

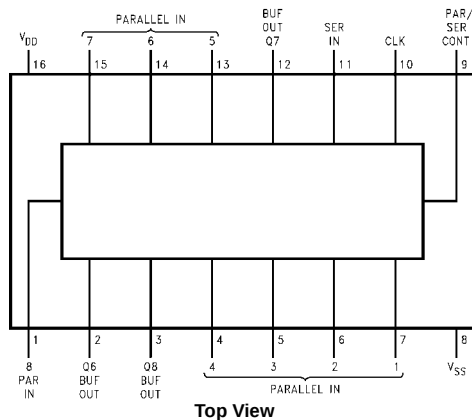
- Wide supply voltage range: 3.0V to 15V
- High noise immunity: 0.45 V_{DD} (typ.)
- Low power TTL compatibility:
Fan out of 2 driving 74L or 1 driving 74LS
- 5V–10V–15V parametric ratings
- Symmetrical output characteristics
- Maximum input leakage 1 μA at 15V over full temperature range

Ordering Code:

Order Number	Order Code	Package Description
CD4021BCM	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
CD4021BCN	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 the suffix letter "X" to the ordering code.

Connection Diagram



Truth Table

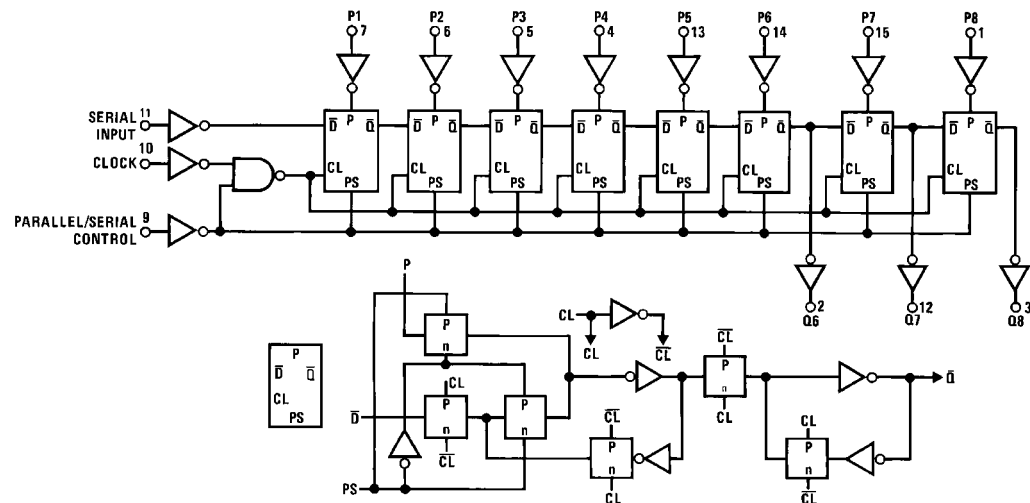
C_L (Note 1)	Serial Input	Parallel/ Serial Control	PI 1	PI n	Q1 (Internal)	Q_n (Note 2)
X	X	1	0	0	0	0
X	X	1	0	1	0	1
X	X	1	1	0	1	0
X	X	1	1	1	1	1
↗	0	0	X	X	0	Q_{n-1}
↗	1	0	X	X	1	Q_{n-1}
↘	X	0	X	X	Q_1	Q_n

X = Don't care case

Note 1: Level change

Note 2: No change

Logic Diagram



Absolute Maximum Ratings(Note 3)

(Note 4)

Supply Voltage (V_{DD})	−0.5V to +18V
Input Voltage (V_{IN})	−0.5V to $V_{DD} + 0.5V$
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 4)

Supply Voltage (V_{DD})	3V to 15V
Input Voltage (V_{IN})	0 to V_{DD}
Operating Temperature Range (T_A)	
CD4021BCN	−55°C to +125°C

Note 3: "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 table of "Electrical Characteristics" provides conditions for actual device operation.

Note 4: $V_{SS} = 0V$ unless otherwise specified.

DC Electrical Characteristics (Note 4)

Symbol	Parameter	Conditions	−55°C		+25°C			+125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device Current	$V_{DD} = 5V, V_{IN} = V_{DD} \text{ or } V_{SS}$		5		0.1	5		150	μA
		$V_{DD} = 10V, V_{IN} = V_{DD} \text{ or } V_{SS}$		10		0.2	10		300	
		$V_{DD} = 15V, V_{IN} = V_{DD} \text{ or } V_{SS}$		20		0.3	20		600	
V_{OL}	LOW Level Output Voltage	$V_{DD} = 5V$		0.05		0	0.05		0.05	V
		$V_{DD} = 10V, I_O < 1 \mu A$		0.05		0	0.05		0.05	
		$V_{DD} = 15V$		0.05		0	0.05		0.05	
V_{OH}	HIGH Level Output Voltage	$V_{DD} = 5V$	4.95		4.95	5		4.95		V
		$V_{DD} = 10V, I_O < 1 \mu A$	9.95		9.95	10		9.95		
		$V_{DD} = 15V$	14.95		14.95	15		14.95		
V_{IL}	LOW Level Input Voltage	$V_{DD} = 5V, V_O = 0.5V \text{ or } 4.5V$		1.5		2	1.5		1.5	V
		$V_{DD} = 10V, V_O = 1.0V \text{ or } 9.0V$		3.0		4	3.0		3.0	
		$V_{DD} = 15V, V_O = 1.5V \text{ or } 13.5V$		4.0		6	4.0		4.0	
V_{IH}	HIGH Level Input Voltage	$V_{DD} = 5V, V_O = 0.5V \text{ or } 4.5V$	3.5		3.5	3		3.5		V
		$V_{DD} = 10V, V_O = 1.0V \text{ or } 9.0V$	7.0		7.0	6		7.0		
		$V_{DD} = 15V, V_O = 1.5V \text{ or } 13.5V$	11.0		11.0	9		11.0		
I_{OL}	LOW Level Output Current (Note 5)	$V_{DD} = 5V, V_O = 0.4V$	0.64		0.51	0.88		0.36		mA
		$V_{DD} = 10V, V_O = 0.5V$	1.6		1.3	2.2		0.90		
		$V_{DD} = 15V, V_O = 1.5V$	4.2		3.4	8		2.4		
I_{OH}	HIGH Level Output Current (Note 5)	$V_{DD} = 5V, V_O = 4.6V$	−0.64		−0.51	−0.88		−0.36		mA
		$V_{DD} = 10V, V_O = 9.5V$	−1.6		−1.3	−2.2		−0.90		
		$V_{DD} = 15V, V_O = 13.5V$	−4.2		−3.4	−8		−2.4		
I_{IN}	Input Current	$V_{DD} = 15V, V_{IN} = 0V$		−0.1		-10^{-5}	−0.1		−1.0	μA
		$V_{DD} = 15V, V_{IN} = 15V$		0.1		10^{-5}	0.1		1.0	

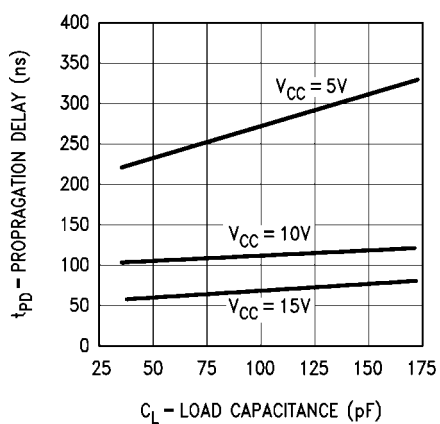
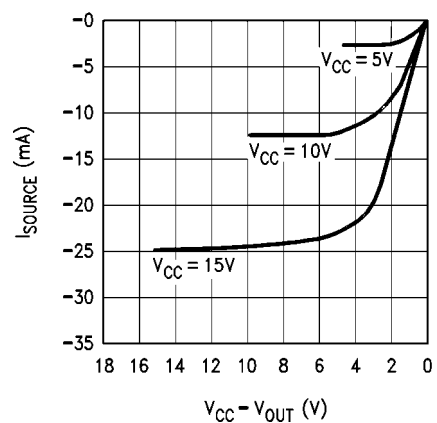
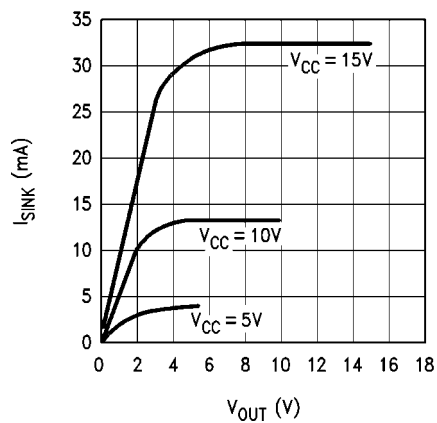
Note 5: I_{OH} and I_{OL} are tested one output at a time.

AC Electrical Characteristics (Note 6) $T_A = 25^\circ\text{C}$, input $t_r, t_f = 20\text{ ns}$, $C_L = 50\text{ pF}$, $R_L = 200\text{ k}\Omega$

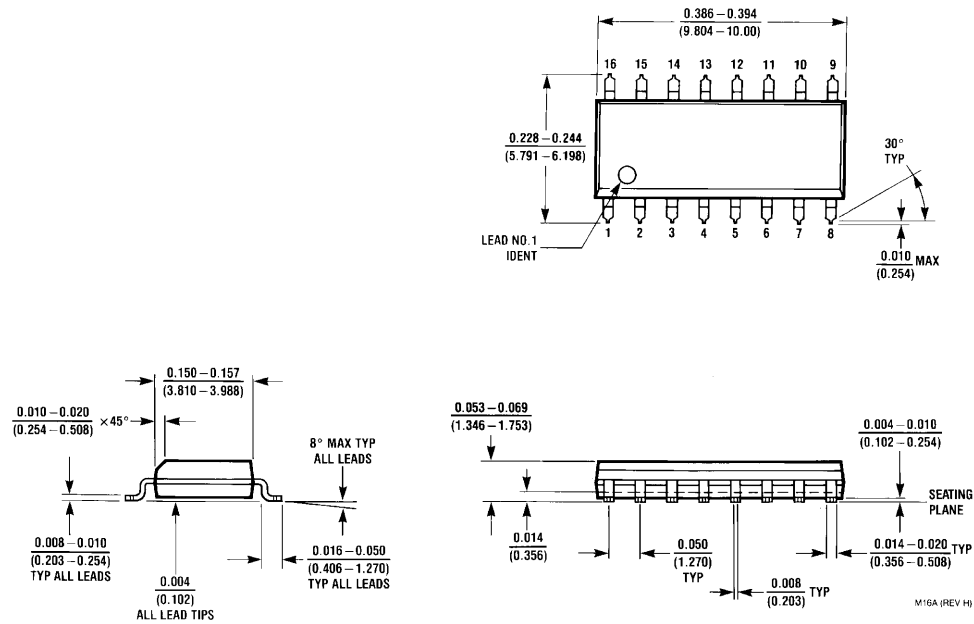
Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{PLH}, t_{PHL}	Propagation Delay Time	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$		240 100 70	350 175 140	ns
t_{THL}, t_{TLH}	Transition Time	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$		100 50 40	200 100 80	ns
f_{CL}	Maximum Clock Input Frequency	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$	2.5 5 8	3.5 10 16		MHz
t_W	Minimum Clock Pulse Width	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$		100 50 40	200 100 80	ns
t_{rCL}, t_{fCL}	Clock Rise and Fall Time (Note 6)	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$			15 15 15	μs
t_s	Minimum Set-Up Time					
	Serial Input $t_H \geq 200\text{ ns}$ (Ref. to CL)	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$		60 40 30	120 80 60	ns
	Parallel Inputs $t_H \geq 200\text{ ns}$ (Ref. to P/S)	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$		25 15 10	50 30 20	ns
t_H	Minimum Hold Time	$V_{DD} = 5V$			0	
	Serial In, Parallel In, $t_s \geq 400\text{ ns}$	$V_{DD} = 10V$			10	ns
	Parallel/Serial Control	$V_{DD} = 15V$			15	
t_{WH}	Minimum P/S Pulse Width	$V_{DD} = 5V$		150	250	
		$V_{DD} = 10V$		75	125	ns
		$V_{DD} = 15V$		50	100	
t_{REM}	Minimum P/S Removal Time (Ref. to CL)	$V_{DD} = 5V$		100	200	
		$V_{DD} = 10V$		50	100	ns
		$V_{DD} = 15V$		40	80	
C_I	Average Input Capacitance	Any Input		5	7.5	pF
C_{PD}	Power Dissipation Capacitance (Note 8)			100		pF

Note 6: AC Parameters are guaranteed by DC correlated testing.**Note 7:** If more than one unit is cascaded t_{rCL} should be made less than or equal to the fixed propagation delay of the output of the driving stage for the estimated capacitive load.**Note 8:** C_{PD} determines the no load AC power consumption of any CMOS device. For complete explanation, see 74C family characteristics application note AN-90.

Typical Performance Characteristics

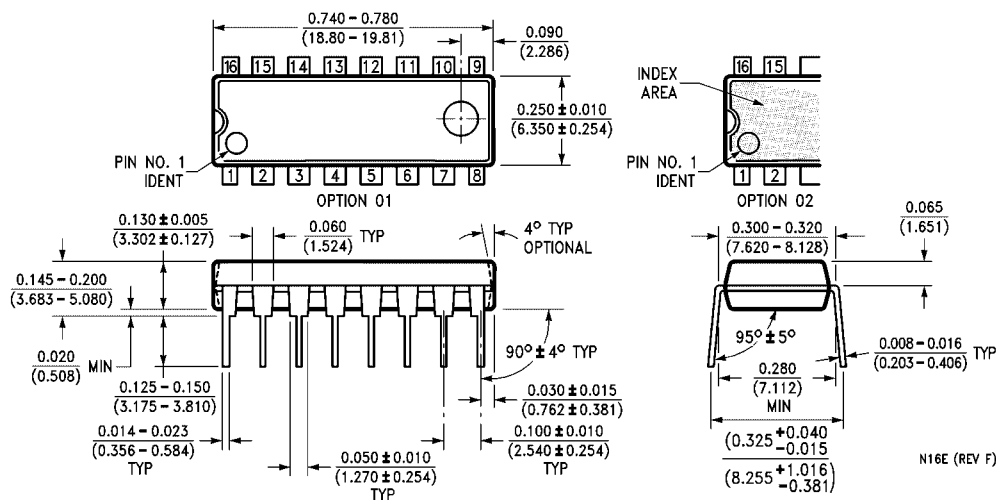


Physical Dimensions inches (millimeters) unless otherwise noted



16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
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**

Fairchild does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and Fairchild reserves the right at any time without notice to change said circuitry and specifications.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

www.fairchildsemi.com

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada

Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910

Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local
Sales Representative