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FAIRCHILD SEMICONDUCTOR™

October 1987
Revised January 2004

CD4015BC
Dual 4-Bit Static Shift Register

General Description

The CD4015BC contains two identical, 4-stage, serial-input/parallel-output registers with independent "Data", "Clock," and "Reset" inputs. The logic level present at the input of each stage is transferred to the output of that stage at each positive-going clock transition. A logic high on the "Reset" input resets all four stages covered by that input. All inputs are protected from static discharge by a series resistor and diode clamps to V_{DD} and V_{SS}.

Features

- Wide supply voltage range: 3.0V to 18V
- High noise immunity: 0.45 V_{DD} (typ.)
- Low power TTL: Fan out of 2 driving 74L compatibility: or 1 driving 74LS
- Medium speed operation: 8 MHz (typ.) clock rate
- Fully static design: @$V_{DD} - V_{SS}$ = 10V

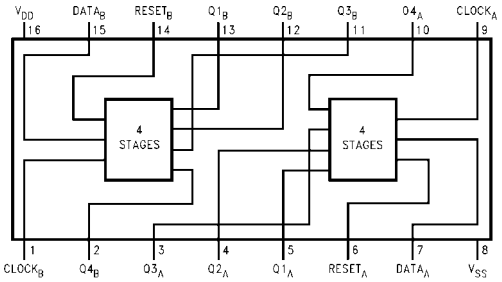
Applications

- Serial-input/parallel-output data queueing
- Serial to parallel data conversion
- General purpose register

Ordering Code:

Order Number	Package Number	Package Description
CD4015BCM	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
CD4015BCN	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Connection Diagram



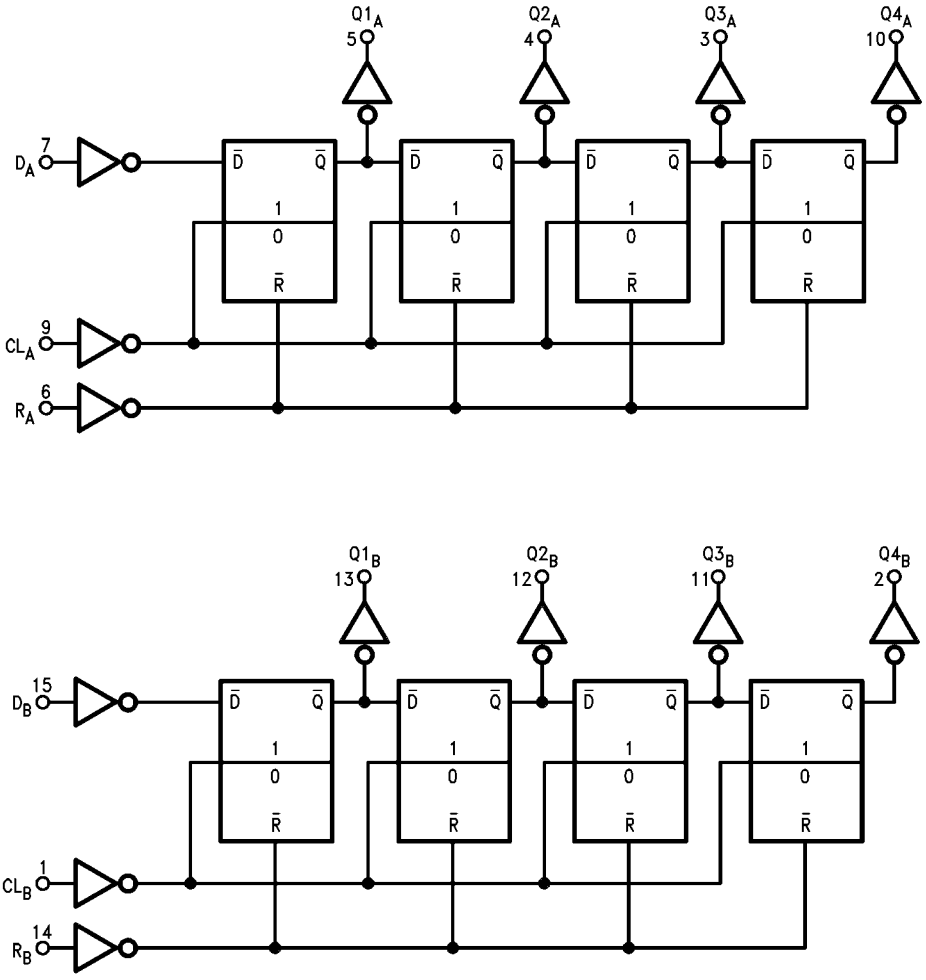
Truth Table

CL (Note 1)	D	R	Q_1	Q_n	
↗	0	0	0	Q_{n-1}	
↗	1	0	1	Q_{n-1}	
↘	X	0	Q_1	Q_n	(No change)
X	X	1	0	0	

X = Don't Care Case

Note 1: Level Change

Logic Diagrams



Terminal No. 16 = V_{DD}

Terminal No. 8 = GND

Absolute Maximum Ratings(Note 2)

(Note 3)

DC 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

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

Note 2: "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 tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for actual device operation.

Note 3: V_{SS} = 0V unless otherwise specified.

DC Electrical Characteristics (Note 3)

Symbol	Parameter	Conditions	−55°C		+25°C			+125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device	V_{DD} = 5V, V_{IN} = V_{DD} or V_{SS}		5		0.005	5		150	
	Current	V_{DD} = 10V, V_{IN} = V_{DD} or V_{SS}		10		0.010	10		300	μA
		V_{DD} = 15V, V_{IN} = V_{DD} or V_{SS}		20		0.015	20		600	
V_{OL}	LOW Level	V_{DD} = 5V		0.05		0	0.05		0.05	
	Output Voltage	V_{DD} = 10V $\quad$ $\lvert I_O \rvert$ < 1 μA		0.05		0	0.05		0.05	V
		V_{DD} = 15V		0.05		0	0.05		0.05	
V_{OH}	HIGH Level	V_{DD} = 5V	4.95		4.95	5		4.95		
	Output Voltage	V_{DD} = 10V $\quad$ $\lvert I_O \rvert$ < 1 μA	9.95		9.95	10		9.95		V
		V_{DD} = 15V	14.95		14.95	15		14.95		
V_{IL}	LOW Level	V_{DD} = 5V, V_O = 0.5V or 4.5V		1.5		2.25	1.5		1.5	
	Input Voltage	V_{DD} = 10V, V_O = 1.0V or 9.0V		3.0		4.50	3.0		3.0	V
		V_{DD} = 15V, V_O = 1.5V or 13.5V		4.0		6.75	4.0		4.0	
V_{IH}	HIGH Level	V_{DD} = 5V, V_O = 0.5V or 4.5V	3.5		3.5	2.75		3.5		
	Input Voltage	V_{DD} = 10V, V_O = 1.0V or 9.0V	7.0		7.0	5.50		7.0		V
		V_{DD} = 15V, V_O = 1.5V or 13.5V	11.0		11.0	8.25		11.0		
I_{OL}	LOW Level Output	V_{DD} = 5V, V_O = 0.4V	0.64		0.51	0.88		0.36		
	Current (Note 4)	V_{DD} = 10V, V_O = 0.5V	1.6		1.3	2.25		0.9		mA
		V_{DD} = 15V, V_O = 1.5V	4.2		3.4	8.8		2.4		
I_{OH}	HIGH Level Output	V_{DD} = 5V, V_O = 4.6V	−0.64		−0.51	−0.88		−0.36		
	Current (Note 4)	V_{DD} = 10V, V_O = 9.5V	−1.6		−1.3	−2.25		−0.9		mA
		V_{DD} = 15V, V_O = 13.5V	−4.2		−3.4	−8.8		−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 4: I_{OH} and I_{OL} are tested one output at a time.

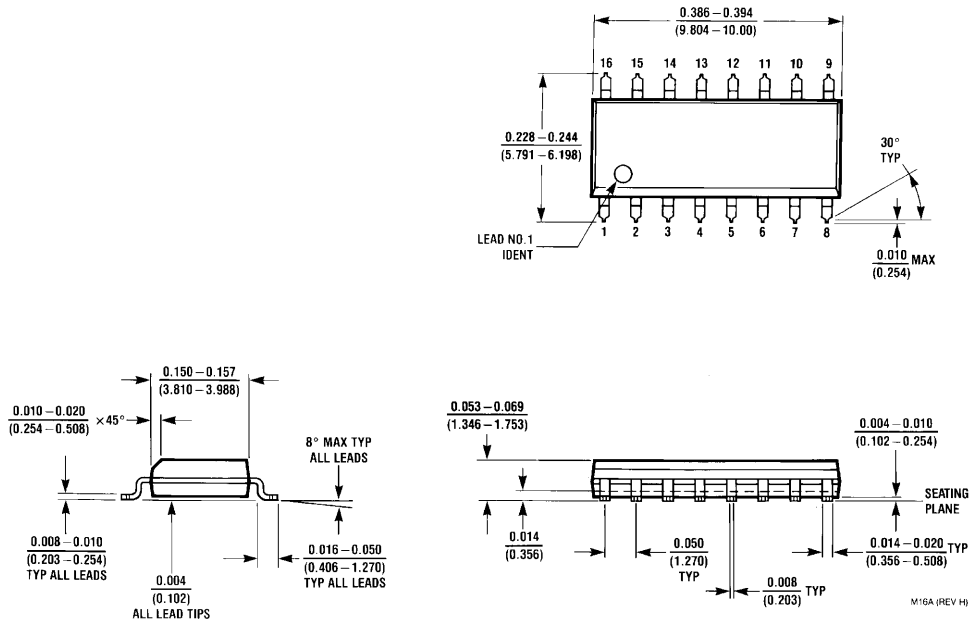
AC Electrical Characteristics (Note 5)

T_A= 25°C, C_L= 50 pF, R_L= 200k, $t_r = t_f$ = 20 ns, unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Units
CLOCK OPERATION						
t_{PHL}, t_{PLH}	Propagation Delay Time	V_{DD} = 5V		230	350	
		V_{DD} = 10V		80	160	ns
		V_{DD} = 15V		60	120	
t_{THL}, t_{TLH}	Transition Time	V_{DD} = 5V		100	200	
		V_{DD} = 10V		50	100	ns
		V_{DD} = 15V		40	80	
t_{WL}, t_{WM}	Minimum Clock	V_{DD} = 5V		160	250	
	Pulse-Width	V_{DD} = 10V		60	110	ns
		V_{DD} = 15V		50	85	
t_{rCL}, t_{fCL}	Clock Rise and	V_{DD} = 5V			15	
	Fall Time	V_{DD} = 10V			15	µs
		V_{DD} = 15V			15	
t_{SU}	Minimum Data	V_{DD} = 5V		50	100	
	Set-Up Time	V_{DD} = 10V		20	40	µs
		V_{DD} = 15V		15	30	
f_{CL}	Maximum Clock	V_{DD} = 5V	2	3.5		
	Frequency	V_{DD} = 10V	4.5	8		MHz
		V_{DD} = 15V	6	11		
C_{IN}	Input Capacitance	Clock Input		7.5	10	pF
		Other Inputs		5	7.5	
RESET OPERATION						
$t_{PHL(R)}$	Propagation Delay Time	V_{DD} = 5V		200	400	
		V_{DD} = 10V		100	200	ns
		V_{DD} = 15V		80	160	
$t_{WH(R)}$	Minimum Reset	V_{DD} = 5V		135	250	
	Pulse Width	V_{DD} = 10V		40	80	ns
		V_{DD} = 15V		30	60	

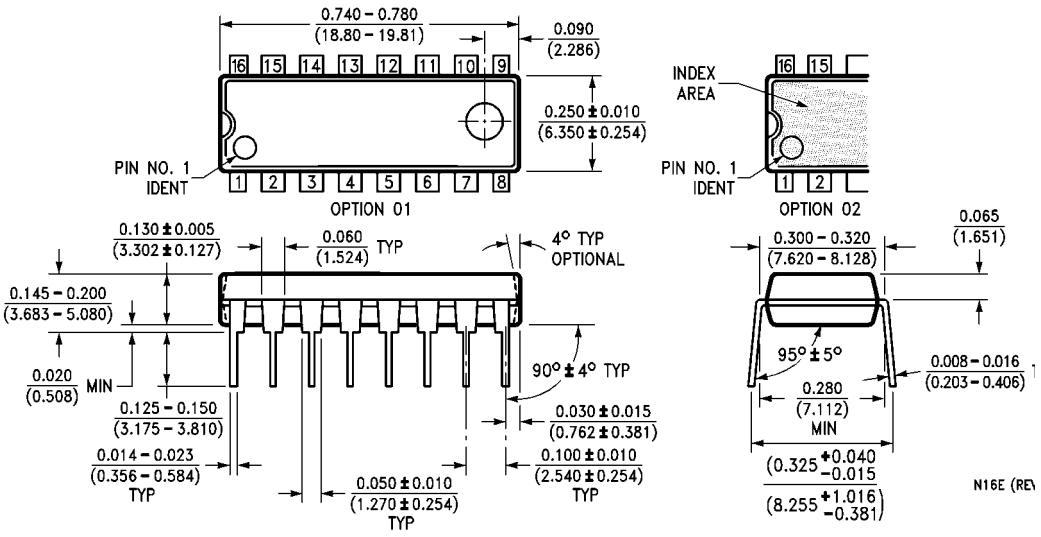
Note 5: AC Parameters are guaranteed by DC correlated testing.

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