



CD4015BM/CD4015BC DUAL 4-BIT Static Shift Register

General Description

The CD4015BM/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

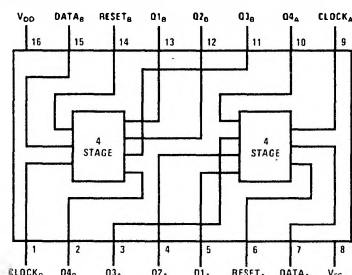
- Wide supply voltage range $3.0V$ to $18V$
- High noise immunity $0.45V_{DD}$ (typ.)

- Low power TTL compatibility fan out of 2 driving 74L or 1 driving 74LS
- Medium speed operation 8 MHz (typ) clock rate
- Fully static design @ $V_{DD} - V_{SS} = 10$ Volts

Applications

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

Connection Diagram and Truth Table



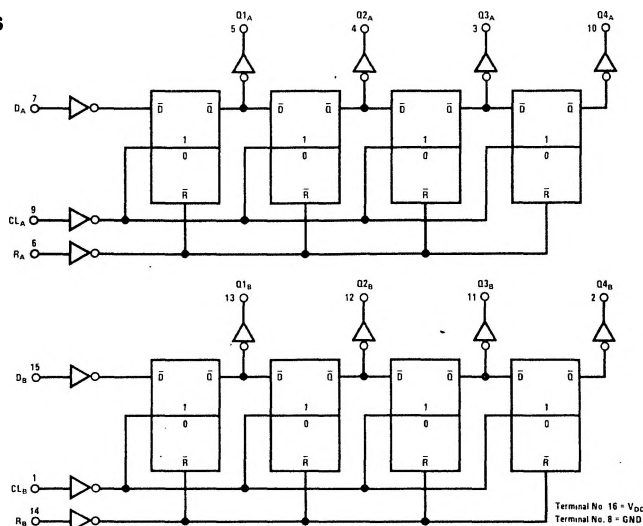
CL [▲]	D	R	Q _i	Q _n
	0	0	0	Q _{n-1}
	1	0	1	Q _{n-1}
	X	0	Q _i	Q _n
X	X	1	0	0

(No change)

▲ Level change

X Don't care case.

Logic Diagrams



Terminal No. 16 = V_{DD}
Terminal No. 8 = GND

Absolute Maximum Ratings (Notes 1 and 2)

V _{DD}	DC Supply Voltage	–0.5 to +18 V _{DC}
V _{IN}	Input Voltage	–0.5 to V _{DD} + 0.5 V _{DC}
T _S	Storage Temperature Range	–65 to +150 °C
P _D	Package Dissipation	500 mW
T _L	Lead Temperature (Soldering, 10 seconds)	300 °C

Recommended Operating Conditions

V _{DD}	DC Supply Voltage	+3 to +15 V _{DC}
V _{IN}	Input Voltage	0 to V _{DD} V _{DC}
T _A	Operating Temperature Range	
	CD4015BM	–55 °C to +125 °C
	CD4015BC	–40 °C to +85 °C

DC Electrical Characteristics (Note 2) — CD4015BM

Parameter		Conditions	–55 °C		25 °C			125 °C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I _{DD}	Quiescent Device Current	V _{DD} = 5V		5		0.005	5		150	μA
		V _{DD} = 10V		10		0.010	10		300	μA
		V _{DD} = 15V		20		0.015	20		600	μA
V _{OL}	Low Level Output Voltage	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 _{DD} = 5V	4.95		4.95	5		4.95		V
		V _{DD} = 10V	9.95		9.95	10		9.95		V
		V _{DD} = 15V	14.95		14.95	15		14.95		V
V _{IL}	Low Level Input Voltage	V _{DD} = 5V, V _O = 0.5V or 4.5V		1.5		2.25	1.5		1.5	V
		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
V _{IH}	High Level Input Voltage	V _{DD} = 5V, V _O = 0.5V; or 4.5V	3.5		3.5	2.75		3.5		V
		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		V
I _{OL}	Low Level Output Current	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	2.25		0.9		mA
		V _{DD} = 15V, V _O = 1.5V	4.2		3.4	8.8		2.4		mA
I _{OH}	High Level Output Current	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	–2.25		–0.9		mA
		V _{DD} = 15V, V _O = 13.5V	–4.2		–3.4	–8.8		–2.4		mA
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	μA

DC Electrical Characteristics (Note 2) — CD4015BC

Parameter		Conditions	-40°C		25°C			85°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I _{DD}	Quiescent Device Current	V _{DD} = 5V		20		0.005	20		150	μA
		V _{DD} = 10V		40		0.010	40		300	μA
		V _{DD} = 15V		80		0.015	80		600	μA
V _{OL}	Low Level Output Voltage	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 _{DD} = 5V	4.95		4.95	5		4.95		V
		V _{DD} = 10V	9.95		9.95	10		9.95		V
		V _{DD} = 15V	14.95		14.95	15		14.95		V
V _{IL}	Low Level Input Voltage	V _{DD} = 5V, V _O = 0.5V or 4.5V		1.5		2.25	1.5		1.5	V
		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
V _{IH}	High Level Input Voltage	V _{DD} = 5V, V _O = 0.5V; or 4.5V	3.5		3.5	2.75		3.5		V
		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		V
I _{OL}	Low Level Output Current	V _{DD} = 5V, V _O = 0.4V	0.52		0.44	0.88		0.36		mA
		V _{DD} = 10V, V _O = 0.5V	1.3		1.1	2.25		0.9		mA
		V _{DD} = 15V, V _O = 1.5V	3.6		3.0	8.8		2.4		mA
I _{OH}	High Level Output Current	V _{DD} = 5V, V _O = 4.6V	-0.52		-0.44	-0.88		-0.36		mA
		V _{DD} = 10V, V _O = 9.5V	-1.3		-1.1	-2.25		-0.9		mA
		V _{DD} = 15V, V _O = 13.5V	-3.6		-3.0	-8.8		-2.4		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

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

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

AC Electrical Characteristics

$T_A = 25^\circ\text{C}$, $C_L = 50\text{ pF}$, $R_L = 200\text{ K}$, $t_r = t_f \approx 20\text{ ns}$,
unless otherwise specified.

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