

CD4006BM/CD4006BC 18-Stage Static Shift Register

General Description

The CD4006BM/CD4006BC 18-stage static shift register is comprised of four separate shift register sections, two sections of four stages and two sections of five stages. Each section has an independent data input. Outputs are available at the fourth stage and the fifth stage of each section. A common clock signal is used for all stages. Data is shifted to the next stage on the negative-going transition of the clock. Through appropriate connections of inputs and outputs, multiple register sections of 4, 5, 8, and 9 stages, or single register sections of 10, 12, 13, 14, 16, 17, and 18 stages can be implemented using one package.

Features

■ Wide supply voltage range 3.0V to 15V

■ High noise immunity
 ■ Low power TTL
 0.45 V_{DD} (typ.)
 fan out of 2 driving 74L

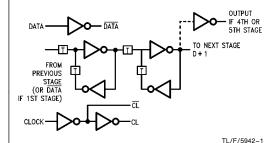
■ Low power TTL fan out of 2 driving 74L compatibility or 1 driving 74LS

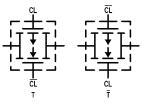
■ Low clock input capacitance 6 pF (typ.)
■ Medium speed 10 MHz (typ.) (with V_{DD} = 10V)

■ Low power

■ Fully static operation

Logic Diagrams

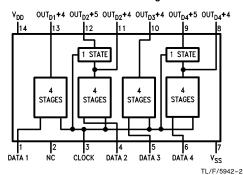




TL/F/5942-3

Connection Diagram

Dual-In-Line Package



Top View
Order Number CD4006B

Truth Table

D	CL△	D+1
0	٦	0
1	┖	1
Х		NC

TL/F/5942-4

X = Don't care $\Delta = Level change$ NC = No change

Absolute Maximum Ratings (Notes 1 and 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

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 $+150^{\circ}$ C

Power Dissipation (PD)

Dual-In-Line 700 mW Small Outline 500 mW

Lead Temperature (T_L) (Soldering, 10 seconds)

Recommended Operating

Conditions (Note 2)

DC Supply Voltage (V_{DD}) +3.0V to +15V Input Voltage (V_{IN}) 0V to V_{DD} V_{DC}

Operating Temperature Range (T_A) CD4006BM CD4006BC

-55°C to +125°C -40°C to +85°C

DC Electrical Characteristics CD4006BM (Note 2)

Symbol	Parameter	Conditions	−55°C		+ 25°C			+ 125°C		Units
Jyllibol			Min	Max	Min	Тур	Max	Min	Max	Omits
I _{DD}	Quiescent Device Current	$V_{DD} = 5.0V, V_{IN} = V_{DD} \text{ or } V_{SS}$ $V_{DD} = 10V, V_{IN} = V_{DD} \text{ or } V_{SS}$ $V_{DD} = 15V, V_{IN} = V_{DD} \text{ or } V_{SS}$		5.0 10 20		0.005 0.010 0.015	5.0 10 20		150 300 600	μΑ μΑ μΑ
V _{OL}	Low Level Output Voltage	$V_{DD} = 5.0V$ $V_{DD} = 10V$ $V_{DD} = 15V$		0.05 0.05 0.05		0 0 0	0.05 0.05 0.05		0.05 0.05 0.05	V V V
V _{OH}	High Level Output Voltage	$V_{DD} = 5.0V$ $V_{DD} = 10V$ $V_{DD} = 15V$	4.95 9.95 14.95		4.95 9.95 14.95	5.0 10 15		4.95 9.95 14.95		V V V
V _{IL}	Low Level Input Voltage	$V_{DD} = 5.0V, V_{O} = 0.5V \text{ or } 4.5V$ $V_{DD} = 10V, V_{O} = 1.0V \text{ or } 9.0V$ $V_{DD} = 15V, V_{O} = 1.5V \text{ or } 13.5V$		1.5 3.0 4.0		2.25 4.50 6.75	1.5 3.0 4.0		1.5 3.0 4.0	V V
V _{IH}	High Level Input Voltage	$V_{DD} = 5.0V, V_{O} = 0.5V \text{ or } 4.5V$ $V_{DD} = 10V, V_{O} = 1.0V \text{ or } 9.0V$ $V_{DD} = 15V, V_{O} = 1.5V \text{ or } 13.5V$	3.5 7.0 11.0		3.5 7.0 11.0	2.75 5.50 8.25		3.5 7.0 11.0		V V V
I _{OL}	Low Level Output Current (Note 3)	$V_{DD} = 5.0V, V_{O} = 0.4V$ $V_{DD} = 10V, V_{O} = 0.5V$ $V_{DD} = 15V, V_{O} = 1.5V$	0.64 1.6 4.2		0.51 1.3 3.4	0.88 2.25 8.8		0.36 0.9 2.4		mA mA mA
I _{OH}	High Level Output Current (Note 3)	$V_{DD} = 5.0V, V_{O} = 4.6V$ $V_{DD} = 10V, V_{O} = 9.5V$ $V_{DD} = 15V, V_{O} = 13.5V$	-0.64 -1.6 -4.2		-0.51 -1.3 -3.4	-0.88 -2.25 -8.8		-0.36 -0.9 -2.4		mA mA mA
I _{IN}	Input Current	$V_{DD} = 15V, V_{IN} = 0V$ $V_{DD} = 15V, V_{IN} = 15V$	-0.1	0.1	-0.1	-10 ⁻⁵	0.1	-1.0	1.0	μA μA

260°C

DC Electrical Characteristics CD4006BC (Note 2)

Symbol	Parameter	Conditions	-40°C		+ 25°C			+ 85°C		Units
Cymbol			Min	Max	Min	Тур	Max	Min	Max	
I _{DD}	Quiescent	$V_{DD} = 5.0V$, $V_{IN} = V_{DD}$ or V_{SS}		20		0.005	20		150	μΑ
	Device Current	$V_{DD} = 10V$, $V_{IN} = V_{DD}$ or V_{SS}		40		0.010	40		300	μΑ
		$V_{DD} = 15V$, $V_{IN} = V_{DD}$ or V_{SS}		80		0.015	80		600	μΑ
V _{OL}	Low Level	$V_{DD} = 5.0V$		0.05		0	0.05		0.05	V
	Output Voltage	$V_{DD} = 10V$		0.05		0	0.05		0.05	V
		$V_{DD} = 15V$		0.05		0	0.05		0.05	V
V _{OH}	High Level	V _{DD} = 5.0V	4.95		4.95	5.0		4.95		V
	Output Voltage	$V_{DD} = 10V$	9.95		9.95	10		9.95		V
		$V_{DD} = 15V$	14.95		14.95	15		14.95		V

DC Electrical Characteristics CD4006BC (Note 2) (Continued)

Symbol	Parameter	Conditions	-40°C		+ 25°C			+ 85°C		Units
			Min	Max	Min	Тур	Max	Min	Max	J
V _{IL}	Low Level Input Voltage	$V_{DD} = 5.0V, V_{O} = 0.5V \text{ or } 4.5V$ $V_{DD} = 10V, V_{O} = 1.0V \text{ or } 9.0V$ $V_{DD} = 15V, V_{O} = 1.5V \text{ or } 13.5V$		1.5 3.0 4.0		2.25 4.5 6.75	1.5 3.0 4.0		1.5 3.0 4.0	V V V
V _{IH}	High Level Input Voltage	$V_{DD} = 5.0V, V_{O} = 0.5V \text{ or } 4.5V$ $V_{DD} = 10V, V_{O} = 1.0V \text{ or } 9.0V$ $V_{DD} = 15V, V_{O} = 1.5V \text{ or } 13.5V$	3.5 7.0 11		3.5 7.0 11	2.75 5.5 8.25		3.5 7.0 11		V V V
I _{OL}	Low Level Output Current (Note 3)	$V_{DD} = 5.0V, V_{O} = 0.4V$ $V_{DD} = 10V, V_{O} = 0.5V$ $V_{DD} = 15V, V_{O} = 1.5V$	0.52 1.3 3.6		0.44 1.1 3.0	0.88 2.25 8.8		0.36 0.9 2.4		mA mA mA
I _{OH}	High Level Output Current (Note 3)	$\begin{aligned} &V_{IL} = 0V, V_{IH} = V_{DD} \\ &V_{DD} = 5.0V, V_{O} = 4.6V \\ &V_{DD} = 10V, V_{O} = 9.5V \\ &V_{DD} = 15V, V_{O} = 13.5V \end{aligned}$	-0.52 -1.3 -3.6		-0.44 -1.1 -3.0	-0.88 -2.25 -8.8		-0.36 -0.9 -2.4		mA mA mA
I _{IN}	Input Current	$V_{DD} = 15V, V_{IN} = 0V$ $V_{DD} = 15V, V_{IN} = 15V$		-0.3 0.3		-10^{-5} 10^{-5}	-0.3 0.3		-1.0 1.0	μA μA

$\textbf{AC Electrical Characteristics*} \ \ \texttt{CD4006BM/CD4006BCT}_{A} = 25^{\circ}\texttt{C}, \ C_{L} = 50 \ \text{pF, unless otherwise noted}$

Symbol	Parameter	Conditions	Min	Тур	Max	Units
t _{PLH} , t _{PHL}	Propagation Delay Time ($t_{PLH} = t_{PHL}$)	$V_{DD} = 5.0V$		200	400	ns
		$V_{DD} = 10V$		100 80	200 150	ns
		$V_{DD} = 15V$				ns
t _{TLH} , t _{THL}	Transition Time ($t_{TLH} = t_{THL}$)	$V_{DD} = 5.0V$		100	200	ns
		$V_{DD} = 10V$		50	100	ns
		$V_{DD} = 15V$		40	80	ns
t _{WL} , t _{WH}	Minimum Clock Pulse Width ($t_{WL} = t_{WH}$)	$V_{DD} = 5.0V$		100	200	ns
		$V_{DD} = 10V$		45	100	ns
		$V_{DD} = 15V$		35	70	ns
t _{RCL} , t _{FCL}	Clock Rise and Fall Time ($t_{RCL} = t_{FCL}$)	$V_{DD} = 5.0V$			15	μs
		$V_{DD} = 10V$			15	μs
		$V_{DD} = 15V$			15	μs
t _{SU}	Minimum Set-Up Time	$V_{DD} = 5.0V$		50	100	ns
		$V_{DD} = 10V$		25	50	ns
		$V_{DD} = 15V$		20	40	ns
t _H	Minimum Hold Time	$V_{DD} = 5.0V$		55	110	ns
		$V_{DD} = 10V$		35	70	ns
		$V_{DD} = 15V$		30	60	ns
f _{CL}	Maximum Clock Frequency	$V_{DD} = 5.0V$	2.5	5.0		MHz
"	·	$V_{DD} = 10V$	5.0	12		MHz
		$V_{DD} = 15V$	7.0	16		MHz
CL	Input Capacitance	Data Input		5.0		pF
_		CLK Input		7.5		pF

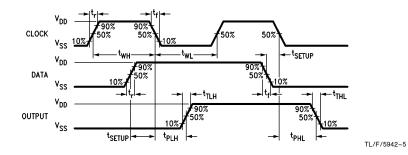
^{*}AC Parameters are guaranteed by DC correlated testing.

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.

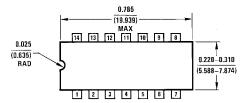
Note 2: $V_{SS} = 0V$ unless otherwise specified.

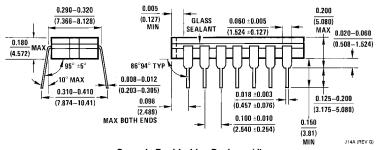
Note 3: $I_{\mbox{\scriptsize OL}}$ and $I_{\mbox{\scriptsize OH}}$ are tested one output at a time.





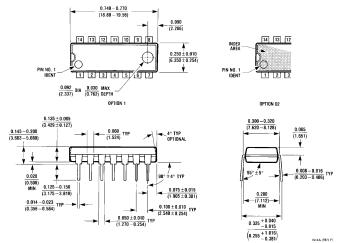






Ceramic Dual-In-Line Package (J) Order Number CD4006BMJ or CD4006BCJ NS Package Number J14A

Physical Dimensions inches (millimeters) (Continued)



Molded Dual-In-Line Package (N)
Order Number CD4006BMN or CD4006BCN
NS Package Number N14A

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