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برای کسب اطلاعات بیشتر بر روی لینک ها کلیک کنید

- 7 سال سابقه آموزش تعمیرات تخصصی دستگاه های جوش اینورتری تک فاز و 3 فاز
- 7 سال سابقه فروش قطعات الکترونیکی دستگاه جوش تک فاز و 3 فاز
- آموزش تخصصی تحلیل دستگاه های جوش اینورتری مختص ابراز فروشان
- آموزش تخصصی ابراز آلات شارژی

National Semiconductor

February 1988

CD4027BM/CD4027BC Dual J-K Master/Slave Flip-Flop with Set and Reset

General Description

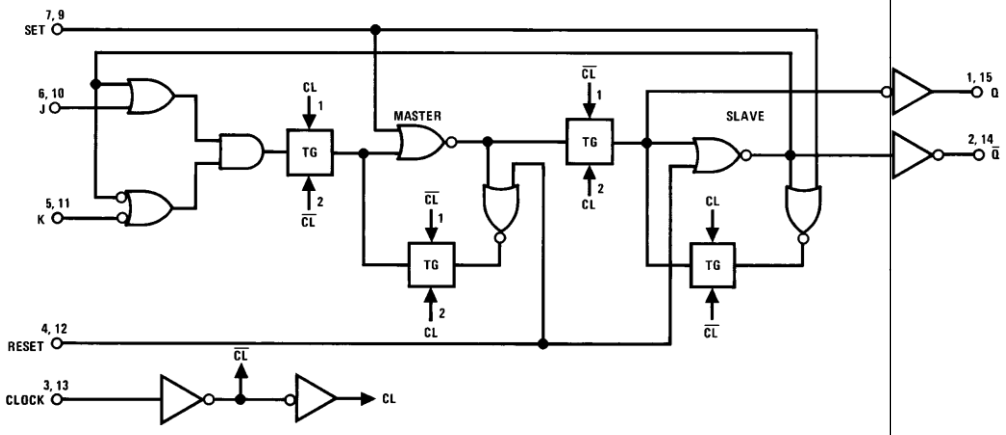
These dual J-K flip-flops are monolithic complementary MOS (CMOS) integrated circuits constructed with N- and P-channel enhancement mode transistors. Each flip-flop has independent J, K, set, reset, and clock inputs and buffered Q and $\overline{Q}$ outputs. These flip-flops are edge sensitive to the clock input and change state on the positive-going transition of the clock pulses. Set or reset is independent of the clock and is accomplished by a high level on the respective input.

All inputs are protected against damage due to static discharge by diode clamps to V_{DD} and V_{SS}.

Features

Y Wide supply voltage range	3.0V to 15V
Y High noise immunity	0.45 V_{DD} (typ.)
Y Low power TTL compatibility	Fan out of 2 driving 74L or 1 driving 74LS
Y Low power	50 nW (typ.)
Y Medium speed operation	12 MHz (typ.) with 10V supply

Schematic and Connection Diagrams



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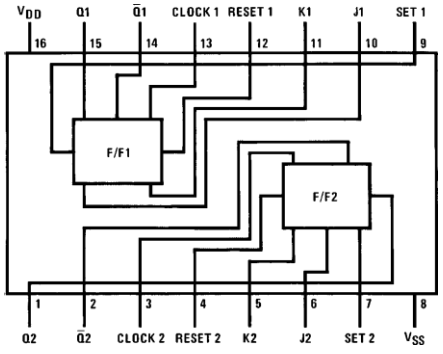
Dual-In-Line Package



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Top View

Order Number CD4027B

  RRD-B30M105/Printed in U. S. A.

Absolute Maximum Ratings (Note 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 V_{DC} to $+18$ V_{DC}
Input Voltage (V_{IN})	-0.5V 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})	3V to 15 V_{DC}
Input Voltage (V_{IN})	0V to V_{DD} V_{DC}
Operating Temperature Range (T_A)	
CD4027BM	-55°C to $+125$°C
CD4027BC	-40°C to $+85$°C

DC Electrical Characteristics CD4027BM (Note 2)

Symbol	Parameter	Conditions	-55°C		$+25$°C			$+125$°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device Current	$V_{DD} = 5V$, $V_{IN} = V_{DD}$ or V_{SS}		1			1		30	mA
		$V_{DD} = 10V$, $V_{IN} = V_{DD}$ or V_{SS}		2			2		60	mA
		$V_{DD} = 15V$, $V_{IN} = V_{DD}$ or V_{SS}		4			4		120	mA
V_{OL}	Low Level Output Voltage	$\|I_O\| < 1$ mA								
		$V_{DD} = 5V$		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	$\|I_O\| < 1$ mA								
		$V_{DD} = 5V$	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			1.5		1.5	V
		$V_{DD} = 10V$, $V_O = 1V$ or $9V$		3.0			3.0		3.0	V
		$V_{DD} = 15V$, $V_O = 1.5V$ or $13.5V$		4.0			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			3.5		V
		$V_{DD} = 10V$, $V_O = 1V$ or $9V$	7.0		7.0			7.0		V
		$V_{DD} = 15V$, $V_O = 1.5V$ or $13.5V$	11.0		11.0			11.0		V
I_{OL}	Low Level Output Current (Note 3)	$V_{DD} = 5V$, $V_O = 0.4V$	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 (Note 3)	$V_{DD} = 5V$, $V_O = 4.6V$	-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	mA
		$V_{DD} = 15V$, $V_{IN} = 15V$		0.1		10^{-5}	0.1		1.0	mA

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 table of "Recommended Operating Conditions" and "Electrical Characteristics" provides conditions for actual device operation.

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

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

DC Electrical Characteristics CD4027BC (Note 2)

Symbol	Parameter	Conditions	−40°C		+25°C			+85°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device Current	V_{DD} = 5V, V_{IN} = V_{DD} or V_{SS}		4			4		30	mA
		V_{DD} = 10V, V_{IN} = V_{DD} or V_{SS}		8			8		60	mA
		V_{DD} = 15V, V_{IN} = V_{DD} or V_{SS}		16			16		120	mA
V_{OL}	Low Level Output Voltage	$\|I_O\| \leq$ 1 mA								
		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	$\|I_O\| \leq$ 1 mA								
		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			1.5		1.5	V
		V_{DD} = 10V, V_O = 1V or 9V		3.0			3.0		3.0	V
		V_{DD} = 15V, V_O = 1.5V or 13.5V		4.0			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			3.5		V
		V_{DD} = 10V, V_O = 1V or 9V	7.0		7.0			7.0		V
		V_{DD} = 15V, V_O = 1.5V or 13.5V	11.0		11.0			11.0		V
I_{OL}	Low Level Output Current (Note 3)	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 (Note 3)	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	mA
		V_{DD} = 15V, V_{IN} = 15V		0.3		10^{-5}	0.3		1.0	mA

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 table of "Recommended Operating Conditions" and "Electrical Characteristics" provides conditions for actual device operation.

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

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

AC Electrical Characteristics* $T_A = 25°C$, $C_L = 50$ pF, $t_{rCL} = t_{fCL} = 20$ ns, unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{PHL} or t_{PLH}	Propagation Delay Time from Clock to Q or $\overline{Q}$	$V_{DD} = 5V$		200	400	ns
		$V_{DD} = 10V$		80	160	ns
		$V_{DD} = 15V$		65	130	ns
t_{PHL} or t_{PLH}	Propagation Delay Time from Set to $\overline{Q}$ or Reset to Q	$V_{DD} = 5V$		170	340	ns
		$V_{DD} = 10V$		70	140	ns
		$V_{DD} = 15V$		55	110	ns
t_{PHL} or t_{PLH}	Propagation Delay Time from Set to Q or Reset to $\overline{Q}$	$V_{DD} = 5V$		110	220	ns
		$V_{DD} = 10V$		50	100	ns
		$V_{DD} = 15V$		40	80	ns
t_S	Minimum Data Setup Time	$V_{DD} = 5V$		135	270	ns
		$V_{DD} = 10V$		55	110	ns
		$V_{DD} = 15V$		45	90	ns
t_{THL} or t_{TLH}	Transition Time	$V_{DD} = 5V$		100	200	ns
		$V_{DD} = 10V$		50	100	ns
		$V_{DD} = 15V$		40	80	ns
f_{CL}	Maximum Clock Frequency (Toggle Mode)	$V_{DD} = 5V$	2.5	5		MHz
		$V_{DD} = 10V$	6.2	12.5		MHz
		$V_{DD} = 15V$	7.6	15.5		MHz
t_{rCL} or t_{fCL}	Maximum Clock Rise and Fall Time	$V_{DD} = 5V$	15			ms
		$V_{DD} = 10V$	10			ms
		$V_{DD} = 15V$	5			ms
t_W	Minimum Clock Pulse Width ($t_{WH} = t_{WL}$)	$V_{DD} = 5V$		100	200	ns
		$V_{DD} = 10V$		40	80	ns
		$V_{DD} = 15V$		32	65	ns
t_{WH}	Minimum Set and Reset Pulse Width	$V_{DD} = 5V$		80	160	ns
		$V_{DD} = 10V$		30	60	ns
		$V_{DD} = 15V$		25	50	ns
C_{IN}	Average Input Capacitance	Any Input		5	7.5	pF
C_{PD}	Power Dissipation Capacity	Per Flip-Flop (Note 4)		35		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 table of "Recommended Operating Conditions" and "Electrical Characteristics" provides conditions for actual device operation.

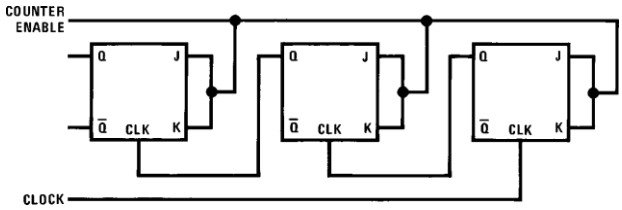
Note 2: $V_{SS} = 0V$ unless otherwise specified.

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

Note 4: C_{PD} determines the no load AC power consumption of any CMOS device. For complete explanation, see 54C/74C Family Characteristics application note, AN-90.

Typical Applications

Ripple Binary Counters



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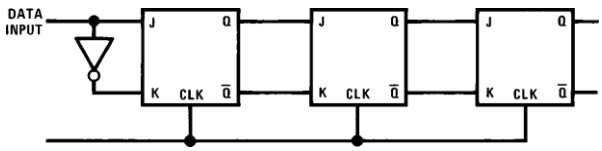
Shift Registers



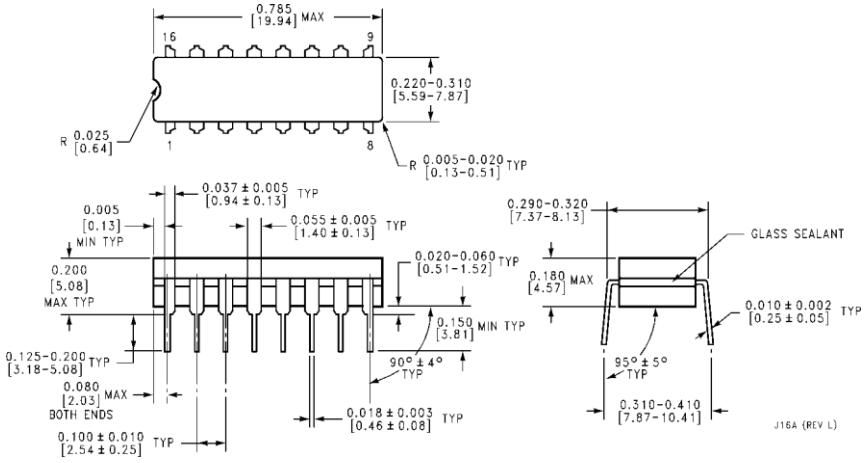
TL/F/5958-4

Truth Table

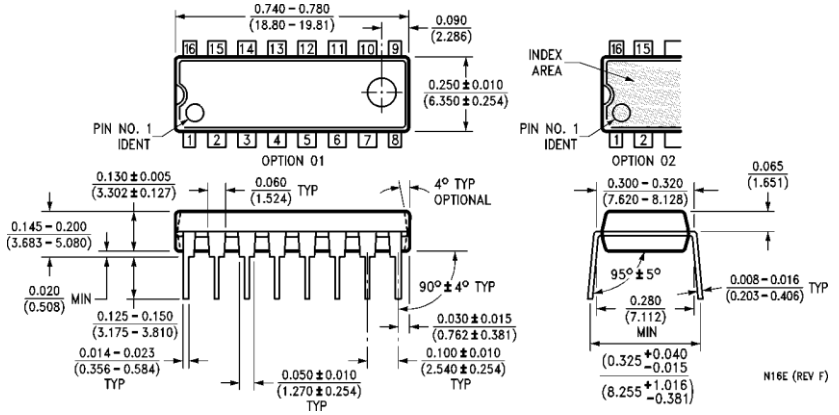
•t_{n-1} Inputs						$^{X}t_n$ Outputs	
CLU	J	K	S	R	Q	Q	$\overline{Q}$
L	I	X	O	O	O	I	O
L	X	O	O	O	I	I	O
L	O	X	O	O	O	O	I
L	X	I	O	O	I	O	I
K	X	X	O	O	X		(No Change)
X	X	X	I	O	X	I	O
X	X	X	O	I	X	O	I
X	X	X	I	I	X	I	I

Where: I = High Level
O = Low Level
U = Level Change
X = Don't Care
• = t_{n-1} refers to the time interval prior to the positive clock pulse transition
X = t_n refers to the time intervals after the positive clock pulse transition

Physical Dimensions inches (millimeters)



Ceramic Dual-In-Line Package (J)
Order Number CD4027BMJ or CD4027BCJ
NS Package Number J16A



Molded Dual-In-Line Package (N)
Order Number CD4027BMN or CD4027BCN
NS Package Number N16E

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