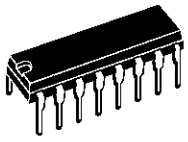
OCTAL COUNTER WITH 8 DECODED OUTPUTS

- MEDIUM SPEED OPERATION : 10 MHz (Typ.) at V_{DD} = 10V
- FULLY STATIC OPERATION
- STANDARDIZED SYMMETRICAL OUTPUT CHARACTERISTICS
- QUIESCENT CURRENT SPECIFIED UP TO 20V
- 5V, 10V AND 15V PARAMETRIC RATINGS
- INPUT LEAKAGE CURRENT I_I = 100nA (MAX) AT V_{DD} = 18V T_A = 25°C
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC JESD13B " STANDARD SPECIFICATIONS FOR DESCRIPTION OF B SERIES CMOS DEVICES"



DIP

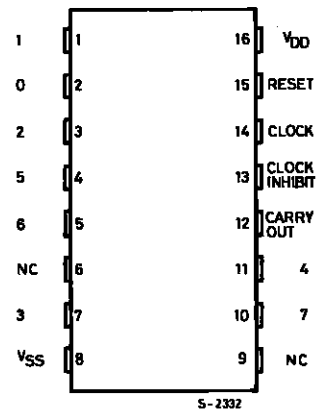
ORDER CODES

PACKAGE	TUBE	T & R
DIP	CC4022	

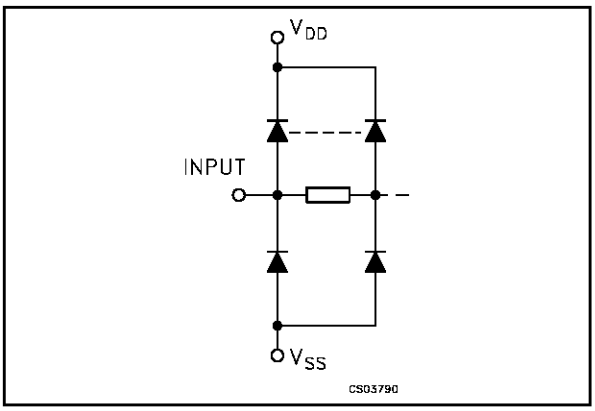
DESCRIPTION

The CC4022 is a monolithic integrated circuit fabricated in Metal Oxide Semiconductor technology available in DIP and SOP packages. The CC4022 is 4-stage Johnson counter having 8 decoded outputs. Inputs include a CLOCK, a RESET, and a CLOCK INHIBIT signal. Schmitt trigger action in the clock input circuit provides pulse shaping that allows unlimited clock input pulse rise and fall times. This counter is advanced one count at the positive clock signal transition if the CLOCK INHIBIT signal is low. Counter advanced via the clock line is inhibited when the CLOCK INHIBIT signal is high. A high RESET signal clears the counter to its zero count. Use of the Johnson decade-counter configuration permits high speed operation, 2-input decimal decode gating and spike-free decoded outputs. Anti-lock gating is provided, thus assuring proper counting sequence. The decoded outputs are normally low and go high only at their respective decoded time slot. Each decoded output remains high for one full clock cycle. A CARRY - OUT signal completes one cycle every 8 clock input cycles and is used to ripple-clock the succeeding device in a multi-device counting chain.

PIN CONNECTION



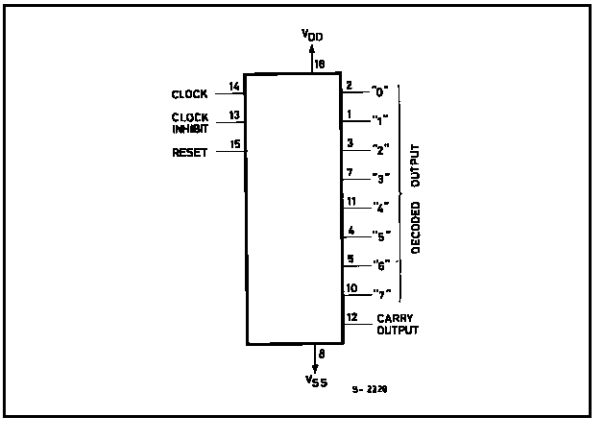
INPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
2, 1, 3, 7, 11, 4, 5, 10	0 to 7	Decoded Output
6, 9	NC	Not Connected
14	CLOCK	Clock Input
13	CLOCK INHIBIT	Clock Inhibit Input
15	RESET	Reset Input
12	CARRY OUT	Carry Output
8	V_{SS}	Negative Supply Voltage

FUNCTIONAL DIAGRAM

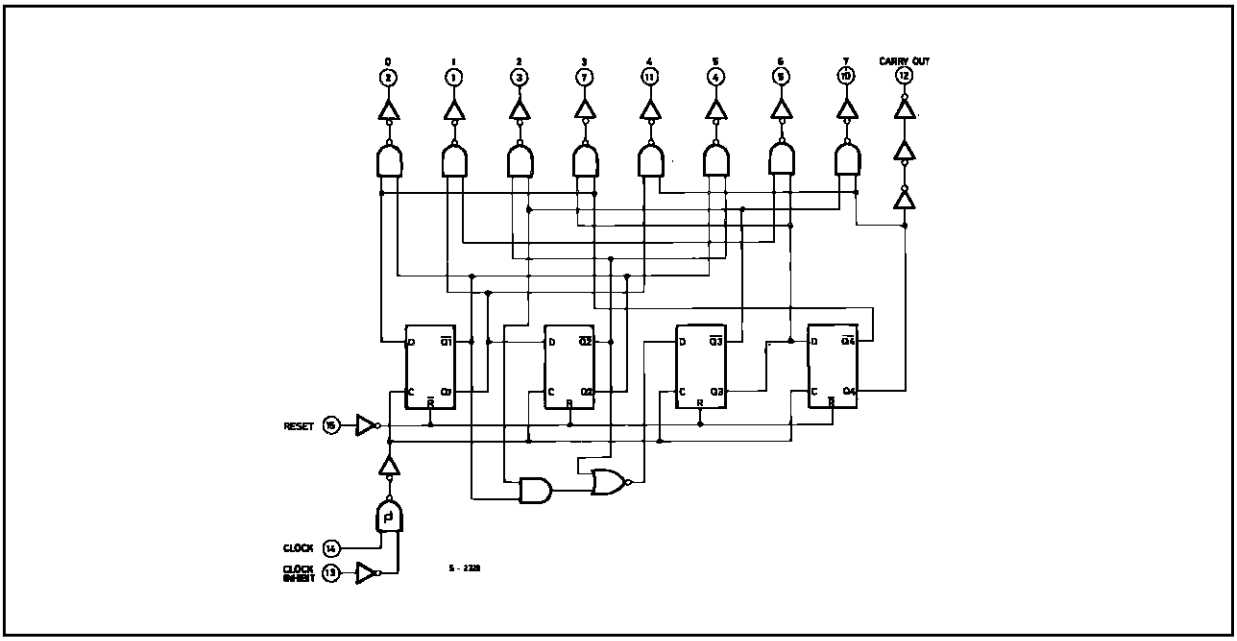


TRUTH TABLE

CLOCK	CLOCK INHIBIT	RESET	DECODED OUTPUT
X	X	H	Q_0
L	X	L	Q_n
X	H	L	Q_n
⌐	L	L	Q_{n+1}
¬	L	L	Q_n
H	⌐	L	Q_n
H	¬	L	Q_{n+1}

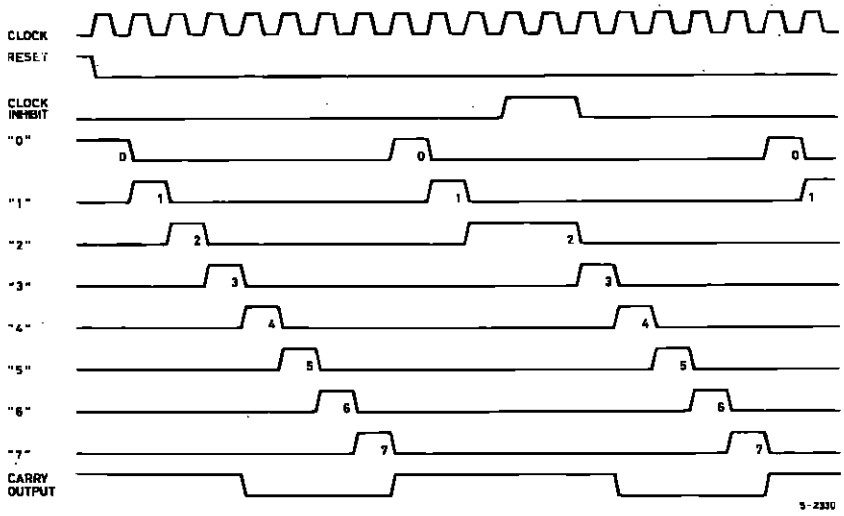
X : Don't Care
Qn : No Change

LOGIC DIAGRAM



This logic diagram has not be used to estimate propagation delays

TIMING CHART



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	-0.5 to +20	V
V_I	DC Input Voltage	-0.5 to V_{DD} + 0.5	V
I_I	DC Input Current	± 10	mA
P_D	Power Dissipation per Package	200	mW
	Power Dissipation per Output Transistor	100	mW
T_{op}	Operating Temperature	-55 to +125	°C
T_{stg}	Storage Temperature	-65 to +150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.
All voltage values are referred to V_{SS} pin voltage.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	3 to 1 8	V
V_I	Input Voltage	0 to V_{DD}	V
T_{op}	Operating Temperature	-55 to 125	°C

DC SPECIFICATIONS

Symbol	Parameter	Test Condition				Value							Unit
		V_I (V)	V_O (V)	$\|I_O\|$ (μA)	V_{DD} (V)	T_A = 25°C			-40 to 85°C		-55 to 125°C		
						Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
I_L	Quiescent Current	0/5			5		0.04	5		150		150	μA
		0/10			10		0.04	10		300		300	
		0/15			15		0.04	20		600		600	
		0/18			18		0.08	100		3000		3000	
V_{OH}	High Level Output Voltage	0/5		<1	5	4.95			4.95		4.95		V
		0/10		<1	10	9.95			9.95		9.95		
		0/15		<1	15	14.95			14.95		14.95		
V_{OL}	Low Level Output Voltage	5/0		<1	5		0.05			0.05		0.05	V
		10/0		<1	10		0.05			0.05		0.05	
		15/0		<1	15		0.05			0.05		0.05	
V_{IH}	High Level Input Voltage		0.5/4.5	<1	5	3.5			3.5		3.5		V
			1/9	<1	10	7			7		7		
			1.5/13.5	<1	15	11			11		11		
V_{IL}	Low Level Input Voltage		4.5/0.5	<1	5			1.5		1.5		1.5	V
			9/1	<1	10			3		3		3	
			13.5/1.5	<1	15			4		4		4	
I_{OH}	Output Drive Current	0/5	2.5	<1	5	-1.36	-3.2		-1.1		-1.1		mA
		0/5	4.6	<1	5	-0.44	-1		-0.36		-0.36		
		0/10	9.5	<1	10	-1.1	-2.6		-0.9		-0.9		
		0/15	13.5	<1	15	-3.0	-6.8		-2.4		-2.4		
I_{OL}	Output Sink Current	0/5	0.4	<1	5	0.44	1		0.36		0.36		mA
		0/10	0.5	<1	10	1.1	2.6		0.9		0.9		
		0/15	1.5	<1	15	3.0	6.8		2.4		2.4		
I_I	Input Leakage Current	0/18	Any Input		18		$\pm 10^{-5}$	±0.1		±1		±1	μA
C_I	Input Capacitance		Any Input				5	7.5					pF

The Noise Margin for both "1" and "0" level is: 1V min. with V_{DD}=5V, 2V min. with V_{DD}=10V, 2.5V min. with V_{DD}=15V

DYNAMIC ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C, C_L = 50pF, R_L = 200KΩ, $t_r = t_f$ = 20 ns)

Symbol	Parameter	Test Condition		Value (*)			Unit
		V_{DD} (V)		Min.	Typ.	Max.	
CLOCKED OPERATION							
t_{PLH} t_{PHL}	Propagation Delay Time (decode out)	5			325	650	ns
		10			135	270	
		15			85	170	
	Propagation Delay Time (carry out)	5			300	600	ns
		10			125	250	
		15			80	160	
t_{THL} t_{TLH}	Transition Time (carry out or decoded out lines)	5			100	200	ns
		10			50	100	
		15			40	80	
f_{CL} (1)	Maximum Clock Input Frequency	5		2.5	5	5	MHz
		10		5	10		
		15		5.5	11		
t_W	Minimum Clock Pulse Width	5			100	200	ns
		10			45	90	
		15			30	60	
t_r , t_f	Clock Input Rise or Fall Time	5		unlimited			µs
		10					
		15					
t_{setup}	Data Setup Time Minimum Clock Inhibit	5			115	230	ns
		10			50	100	
		15			35	75	
RESET OPERATION							
t_{PLH}, t_{PHL}	Propagation Delay Time (carry out or decoded out lines)	5			265	530	ns
		10			115	230	
		15			85	170	
t_W	Minimum Reset Pulse Width	5			130	260	ns
		10			55	110	
		15			30	60	
t_{REM}	Minimum Reset Removal Time	5			200	400	ns
		10			140	280	
		15			75	150	

(*) Typical temperature coefficient for all V_{DD} value is 0.3 %/°C.
(1) Measured with respect to carry out line.