

TENTATIVE

TC74HC4022P OCTAL COUNTER/DIVIDER

GENERAL DESCRIPTION

The TC74HC4022 is a high speed CMOS OCTAL COUNTER/DIVIDER fabricated with silicon gate C²MOS technology.

It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. It contains 4-stage divide-by-8 Johnson counter with 8 decoded output (Q₀ - Q₇) and Carry-out bit.

This counter is advanced on the positive edge of clock signal when CLOCK ENABLE input is held low, or is advanced on the negative edge of clock enable signal when CLOCK input is held high, and the selected one of eight outputs goes high.

Holding high the CLEAR input, this counter is cleared to its zero state without regard to the other input conditions.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.

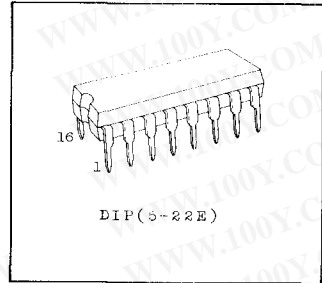
FEATURES:

- High Speed f_{MAX}=42MHz(Typ.) at V_{CC}=5V
- Low Power Dissipation I_{CC}= 4μA(Max.) at Ta=25°C
- High Noise Immunity V_{NIH}=V_{NIL}=28% V_{CC}(Min.)
- Output Drive Capability 10 LSTTL Loads
- Symmetrical Output Impedance |I_{OH}|=I_{OL}=4mA(Min.)
- Balanced Propagation Delays t_{pLH}≅t_{pHL}
- Wide Operating Voltage Range V_{CC}(opr.)=2V ~ 6V
- Pin and Function Compatible with 4022B

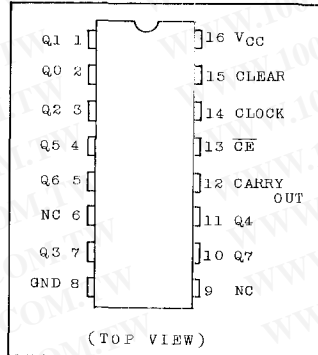
ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V _{CC}	-0.5 ~ 7	V
DC Input Voltage	V _{IN}	-0.5 ~ V _{CC} +0.5	V
DC Output Voltage	V _{OUT}	-0.5 ~ V _{CC} +0.5	V
Input Diode Current	I _{IK}	±20	mA
Output Diode Current	I _{OK}	±20	mA
DC Output Current	I _{OUT}	±25	mA
DC V _{CC} /Ground Current	I _{CC}	±50	mA
Power Dissipation	P _D	500*	mW
Storage Temperature	T _{stg}	-65 ~ 150	°C
Lead Temperature 1Csec	T _L	300	°C

* 500mW in the range of Ta=-40° ~ 65°C and from Ta=65°C up to 85°C derating factor of -10mW/°C shall be applied until 300mW.







PIN ASSIGNMENT



勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

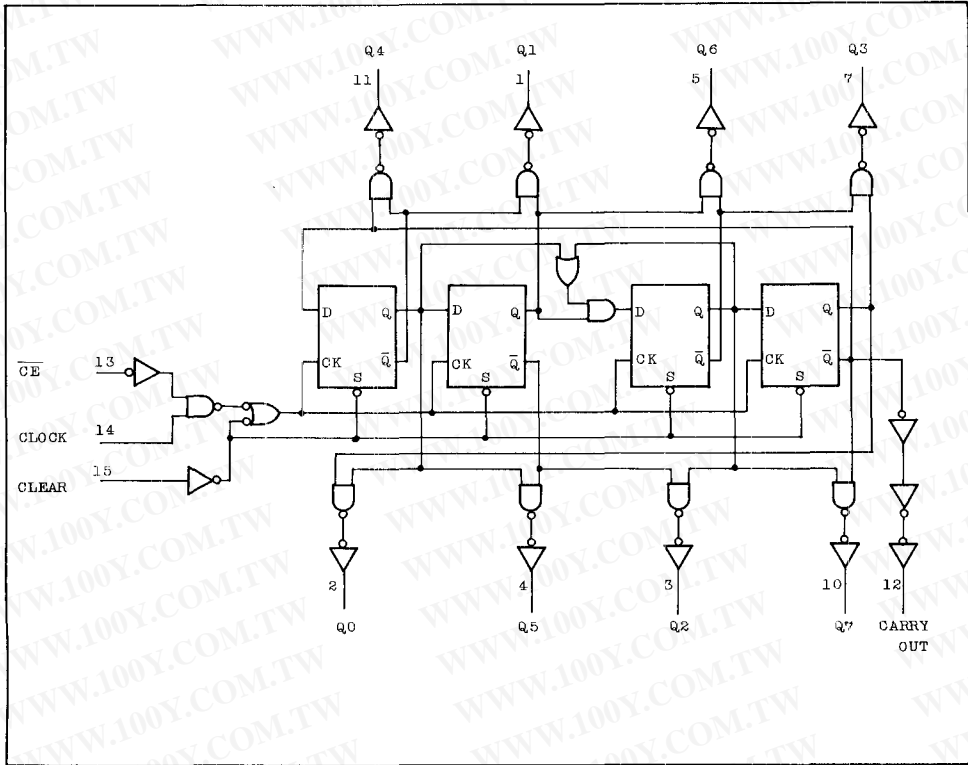
TC74HC4022P

TRUTH TABLE

CLOCK	CE	CLEAR	DECODE OUTPUT (H)
X	X	H	Q0
L	X	L	Qn
X	H	L	Qn
	L	L	Qn+1
	L	L	Qn
H		L	Qn
H		L	Qn+1

X : DON'T CARE
Qn : NO CHANGE

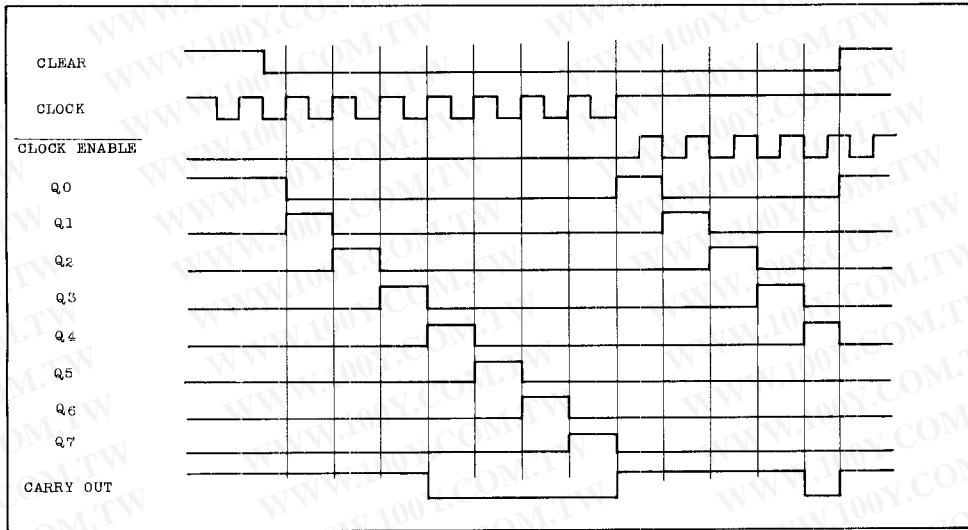
LOGIC DIAGRAM



勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

TC74HC4022P

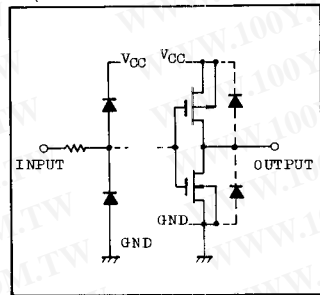
TIMING CHART



RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	LIMIT	UNIT
Supply Voltage	V_{CC}	2 ~ 6	V
Input Voltage	V_{IN}	0 ~ V_{CC}	V
Output Voltage	V_{OUT}	0 ~ V_{CC}	V
Operating Temperature	T_{opr}	-40 ~ 85	°C
Input Rise and Fall Time	t_r, t_f	0 ~ 1000 ($V_{CC}=2.0V$) 0 ~ 500 ($V_{CC}=4.5V$) 0 ~ 400 ($V_{CC}=6.0V$)	ns

INPUT and OUTPUT EQUIVALENT CIRCUIT



勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

TC74HC4022P

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	Ta=25°C				Ta=-40~85°C		UNIT	
			VCC	MIN.	TYP.	MAX.	MIN.	MAX.		
High-Level Input Voltage	V _{IH}		2.0	1.5	-	-	1.5	-	V	
			4.5	3.15	-	-	3.15	-		
			6.0	4.2	-	-	4.2	-		
Low-Level Input Voltage	V _{IL}		2.0	-	-	0.5	-	0.5	V	
			4.5	-	-	1.35	-	1.35		
			6.0	-	-	1.8	-	1.8		
High-Level Output Voltage	V _{OH}	V _{IN} =V _{IH} or V _{IL}	I _{OH} =-20μA	2.0	1.9	2.0	-	1.9	-	V
				4.5	4.4	4.5	-	4.4	-	
				6.0	5.9	6.0	-	5.9	-	
		I _{OH} =-4mA	4.5	4.18	4.31	-	4.13	-		
			6.0	5.68	5.80	-	5.63	-		
		I _{OH} =-5.2mA	6.0	-	-	-	-	-		
Low-Level Output Voltage	V _{OL}	V _{IN} =V _{IH} or V _{IL}	I _{OL} =20μA	2.0	-	0.0	0.1	-	0.1	V
				4.5	-	0.0	0.1	-	0.1	
				6.0	-	0.0	0.1	-	0.1	
		I _{OL} =4mA	4.5	-	0.17	0.32	-	0.37		
			6.0	-	0.18	0.32	-	0.37		
		I _{OL} =5.2mA	6.0	-	-	-	-	-		
Input Leakage Current	I _{IN}	V _{IN} =V _{CC} or GND	6.0	-	-	±0.1	-	±1.0	μA	
Quiescent Supply Current	I _{CC}	V _{IN} =V _{CC} or GND	6.0	-	-	4.0	-	40.0		

AC ELECTRICAL CHARACTERISTICS (C_L=50pF, INPUT t_r=t_f=6ns)

PARAMETER	SYMBOL	TEST CONDITION	25°C				-40 ~ 85°C		UNIT
			VCC	MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	t _{TLH} t _{THL}		2.0	-	30	75	-	90	ns
			4.5	-	9	15	-	18	
			6.0	-	8	13	-	16	
Propagation Delay Time (CLOCK - Q, CARRY)	t _{PLH} t _{PHL}		2.0	-	100	195	-	235	ns
			4.5	-	25	39	-	47	
			6.0	-	22	34	-	40	
Propagation Delay Time (CLEAR - Q, CARRY)	t _{PLH} t _{PHL}		2.0	-	100	195	-	235	ns
			4.5	-	25	39	-	47	
			6.0	-	22	34	-	40	

勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

TC74HC4022P

AC ELECTRICAL CHARACTERISTICS (Continued)

PARAMETER	SYMBOL	TEST CONDITION	25°C				-40 ~ 85°C		UNIT
			V _{CC}	MIN.	TYP.	MAX.	MIN.	MAX.	
Maximum Clock frequency	f _{MAX}		2.0	5	10	-	4	-	MHz
			4.5	25	40	-	20	-	
			6.0	29	45	-	23	-	
Minimum Pulse Width (CLOCK)	t _{w(L)}		2.0	-	30	75	-	90	
			4.5	-	8	15	-	18	
	6.0		-	7	13	-	16		
Minimum Pulse Width (CLEAR)	t _{w(H)}		2.0	-	35	75	-	90	
			4.5	-	9	15	-	18	
			6.0	-	8	13	-	16	
Minimum Set-up Time	t _s		2.0	-	-	0	-	0	ns
			4.5	-	-	0	-	0	
			6.0	-	-	0	-	0	
Minimum Hold Time	t _h		2.0	-	35	75	-	90	
			4.5	-	9	15	-	18	
			6.0	-	8	13	-	16	
Minimum Removal Time	t _{rem}		2.0	-	30	75	-	90	
			4.5	-	8	15	-	18	
			6.0	-	7	13	-	16	
Input Capacitance	C _{IN}		-	5	10	-	10	pF	
Power Dissipation Capacitance	C _{PD(1)}		-	52	-	-	-		

Note(1) C_{PD} is defined as the value of internal equivalent capacitance of IC which is calculated from the operating current consumption without load (refer to Test Circuit). Average operating current can be obtained by the equation hereunder.

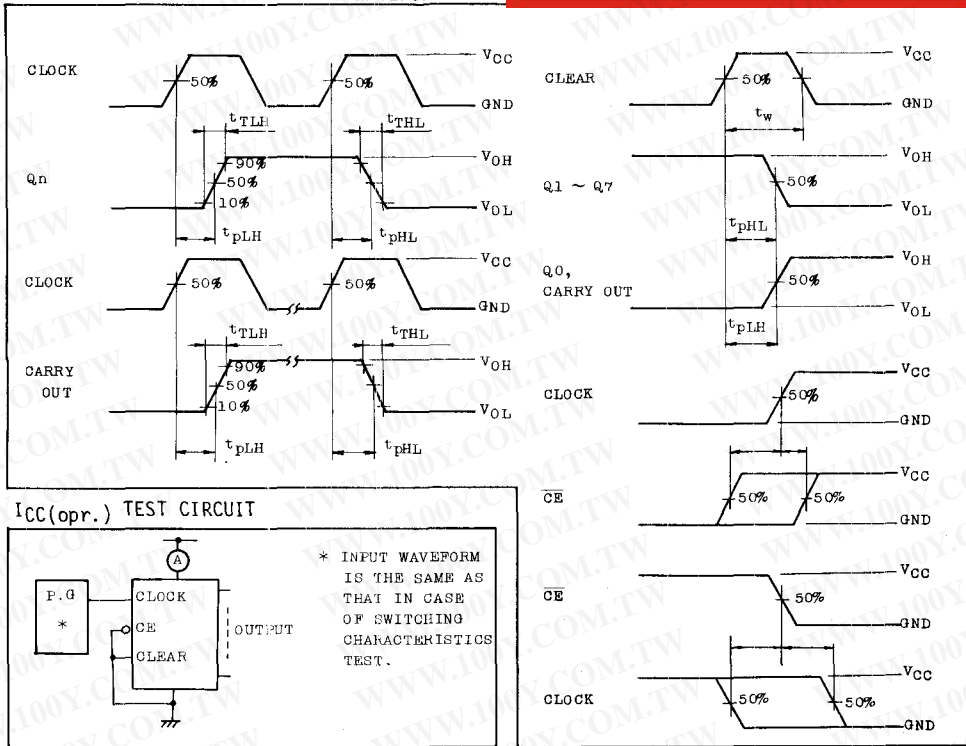
$$I_{CC(opr.)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

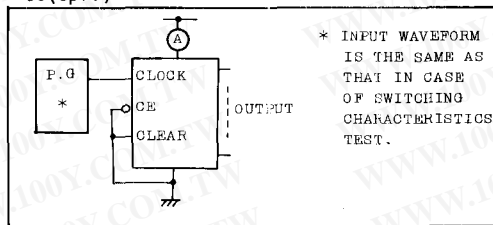
TC74HC4022P

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

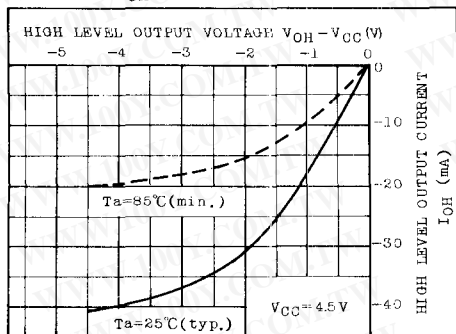
SWITCHING CHARACTERISTICS TEST WAVEFORM



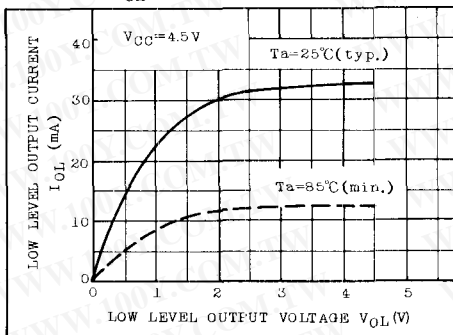
I_{CC}(opr.) TEST CIRCUIT



I_{OH} CHARACTERISTICS

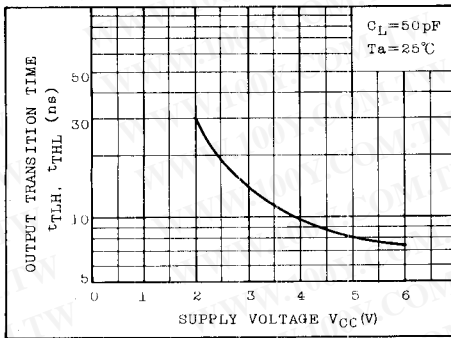


I_{OL} CHARACTERISTICS

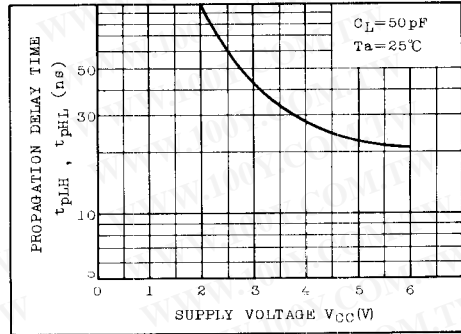


TC74HC4022P

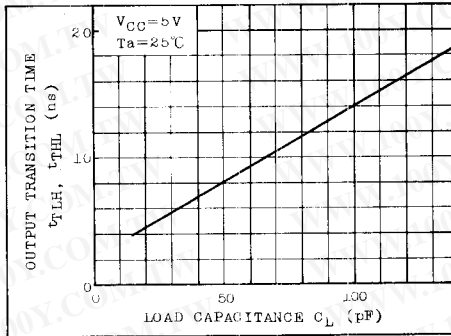
t_{TLH} , t_{THL} - V_{CC} CHARACTERISTICS (TYP.)



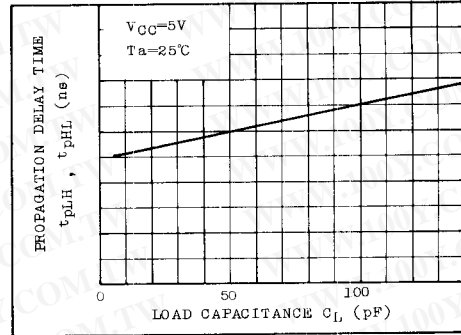
t_{PLH} , t_{PHL} - V_{CC} CHARACTERISTICS (TYP.)



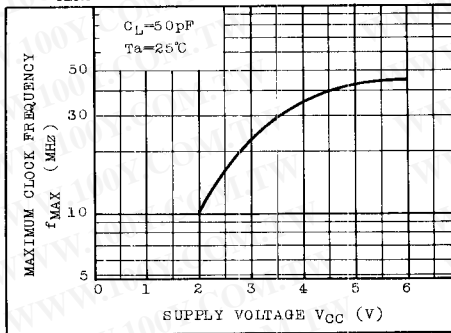
t_{TLH} , t_{THL} - C_L CHARACTERISTICS (TYP.)



t_{PLH} , t_{PHL} - C_L CHARACTERISTICS (TYP.)



f_{MAX} - V_{CC} CHARACTERISTICS (TYP.)



勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)