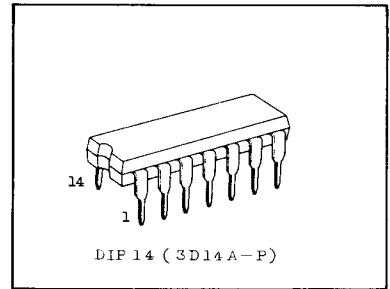


## TC5026BP DECADE COUNTER

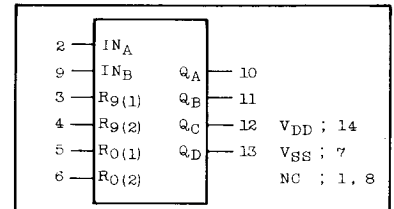
TC5026BP is DECADE UP COUNTER with two reset functions, RESET (9) and RESET (0) and can be used as binary counter, quinary counter or decimal counter. When two inputs of RESET (0) are set to "H", the content of counter is reset to 0 regardless of the clock and when two inputs of RESET (9) are set to "H", it is set to 9. RESET (9) takes precedence over RESET (0). The outputs change their states at the falling edge of count inputs (INA and INB).



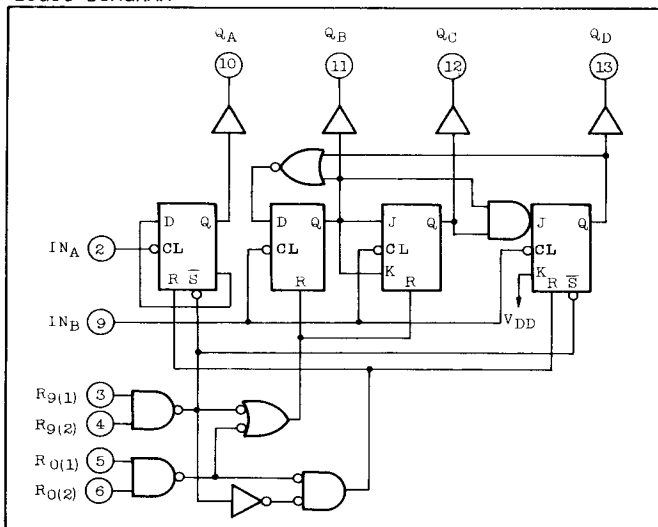
## ABSOLUTE MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V <sub>DD</sub>	V <sub>VSS</sub> -0.5 ~ V <sub>VSS</sub> +20	V
Input Voltage	V <sub>IN</sub>	V <sub>VSS</sub> -0.5 ~ V <sub>DD</sub> +0.5	V
Output Voltage	V <sub>OUT</sub>	V <sub>VSS</sub> -0.5 ~ V <sub>DD</sub> +0.5	V
DC Input Current	I <sub>IN</sub>	±10	mA
Power Dissipation	P <sub>D</sub>	300	mW
Storage Temperature Range	T <sub>stg</sub>	-65 ~ 150	°C
Lead Temp./Time	T <sub>sol</sub>	260°C · 10sec	

## PIN ASSIGNMENT



## LOGIC DIAGRAM



## TRUTH TABLE

RESET / COUNT MODE									
INPUTS						OUTPUTS			
IN <sub>A</sub>	IN <sub>B</sub>	R <sub>0</sub> (1)	R <sub>0</sub> (2)	R <sub>9</sub> (1)	R <sub>9</sub> (2)	Q <sub>D</sub>	Q <sub>C</sub>	Q <sub>B</sub>	Q <sub>A</sub>
*	H	H	L	L	*	L	L	L	L
*	H	H	*	L	L	L	L	L	L
*	*	*	H	H	H	L	L	L	H
$\bar{1}$	*	L	*	L		COUNT			
$\bar{1}$	L	*	L	*		COUNT			
$\bar{1}$	L	*	*	L		COUNT			
$\bar{1}$	*	L	L	*		COUNT			
* Don't care									
COUNT MODE A					COUNT MODE B				
COUNT NO.	OUTPUTS				COUNT NO.	OUTPUTS			
	Q <sub>D</sub>	Q <sub>C</sub>	Q <sub>B</sub>	Q <sub>A</sub>		Q <sub>D</sub>	Q <sub>C</sub>	Q <sub>B</sub>	Q <sub>A</sub>
0	L	L	L	L	0	L	L	L	L
1	L	L	H	L	1	L	L	L	H
2	L	H	L	L	2	L	L	H	L
3	L	H	H	L	3	L	L	H	H
4	H	L	L	L	4	L	H	L	L
					5	L	H	L	H
					6	L	H	H	L
					7	L	H	H	H
					8	H	L	L	L
					9	H	L	L	H
A ; Separate mode.									
B ; IN <sub>B</sub> should be connected to Q <sub>A</sub>									

# TC5026BP

## RECOMMENDED OPERATING CONDITIONS (VSS=0V)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	VDD	3	-	18	V
Input Voltage	VIN	0	-	VDD	V
Operating Temp.	Topr	-40	-	85	°C

## ELECTRICAL CHARACTERISTICS (VSS=0V)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	VDD (V)	-40°C		25°C			85°C		UNIT	
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.		
High Level Output Voltage	VOH	IOUT  < 1μA VIN = VSS, VDD	5	4.95	-	4.95	5.00	-	4.95	-	V	
			10	9.95	-	9.95	10.00	-	9.95	-		
			15	14.95	-	14.95	15.00	-	14.95	-		
Low Level Output Voltage	VOL	IOUT  < 1μA VIN = VSS, VDD	5	-	0.05	-	0.00	0.05	-	0.05	V	
			10	-	0.05	-	0.00	0.05	-	0.05		
			15	-	0.05	-	0.00	0.05	-	0.05		
High Level Output Current	IOH	VOH = 4.6V VOH = 9.5V VOH = 13.5V VIN = VSS, VDD	5	-0.2	-	-0.16	-	-	-0.12	-	mA	
			10	-0.5	-	-0.4	-	-	-0.3	-		
			15	-1.4	-	-1.2	-	-	-1.0	-		
Low Level Output Current	IOL	VOL = 0.4V VOL = 0.5V VOL = 1.5V VIN = VSS, VDD	5	0.52	-	0.44	-	-	0.36	-	mA	
			10	1.3	-	1.1	-	-	0.9	-		
			15	3.6	-	3.0	-	-	2.4	-		
High Level Input Voltage	VIH	VOUT=0.5V, 4.5V VOUT=1.0V, 9.0V VOUT=1.5V, 13.5V  IOUT  < 1μA	5	3.5	-	3.5	2.75	-	3.5	-	V	
			10	7.0	-	7.0	5.5	-	7.0	-		
			15	11.0	-	11.0	8.25	-	11.0	-		
Low Level Input Voltage	VIL	VOUT=0.5V, 4.5V VOUT=1.0V, 9.0V VOUT=1.5V, 13.5V  IOUT  < 1μA	5	-	1.5	-	2.25	1.5	-	1.5	V	
			10	-	3.0	-	4.5	3.0	-	3.0		
			15	-	4.0	-	6.75	4.0	-	4.0		
Input Current	"H" Level	IIH	VIH = 18V	18	-	0.3	-	10 <sup>-5</sup>	0.3	-	1.0	μA
	"L" Level	IIL	VIL = 0V	18	-	-0.3	-	-10 <sup>-5</sup>	-0.3	-	-1.0	
Quiescent Current Consumption	IDD	VIN = VSS, VDD *	5	-	20	-	0.005	20	-	150	μA	
			10	-	40	-	0.010	40	-	300		
			15	-	80	-	0.015	80	-	600		

\* All valid input combinations

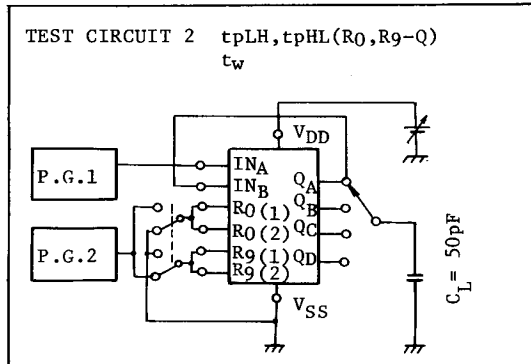
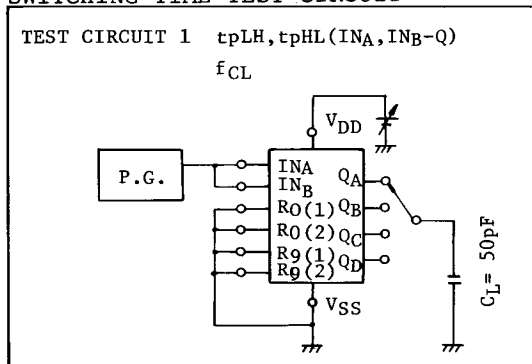
## SWITCHING CHARACTERISTICS (Ta=25°C, VSS=0V, CL=50pF)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	VDD (V)	MIN.	TYP.	MAX.	UNIT
		10	-	65	200		
		15	-	50	160		
Output Fall Time	tTHL		5	-	100	200	ns
			10	-	50	100	
			15	-	40	80	

SWITCHING CHARACTERISTICS (Ta=25°C, VSS=0V, CL=50pF)

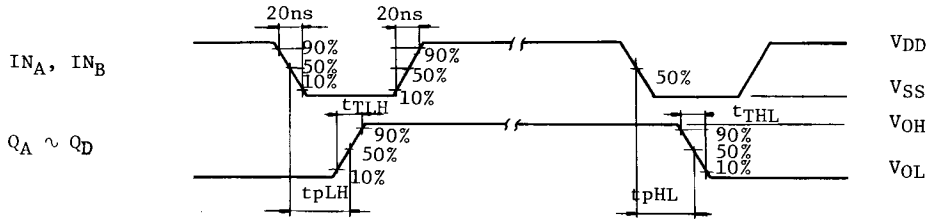
CHARACTERISTIC	SYMBOL	TEST CONDITIONS	VDD (V)	MIN.	TYP.	MAX.	UNIT
(LOW-HIGH) Propagation Delay Time (INA, INB - Q)	tpLH		5	-	340	750	ns
			10	-	160	350	
			15	-	130	280	
(HIGH-LOW) Propagation Delay Time (INA, INB - Q)	tpHL		5	-	310	650	
			10	-	150	330	
			15	-	120	250	
(LOW-HIGH) Propagation Delay Time (R(0), R(9) - Q)	tpLH		5	-	350	700	ns
			10	-	150	300	
			15	-	120	250	
(HIGH-LOW) Propagation Delay Time (R(0), R(9) - Q)	tpHL		5	-	350	700	
			10	-	150	300	
			15	-	120	250	
Max. Clock Rise Time	t <sub>rCL</sub>		5	20	-		μs
Max. Clock Fall Time	t <sub>fCL</sub>		10	2.5	-		
			15	1.0	-		
Max. Clock Frequency (INA, INB)	t <sub>CL</sub>		5	0.8	1.2	-	MHz
			10	1.5	2.5	-	
			15	2.0	3.2	-	
Min. Reset Pulse Width	t <sub>w</sub> (RESET)		5	-	250	500	ns
			10	-	100	200	
			15	-	75	150	
Input Capacity	C <sub>IN</sub>			-	5	7.5	pF

SWITCHING TIME TEST CIRCUIT



SWITCHING TIME TEST WAVEFORMS

WAVEFORM 1.  $t_{pLH}$ ,  $t_{pHL}$  ( $IN_A, IN_B - Q$ ),  $f_{CL}$



WAVEFORM 2.  $t_{pLH}$ ,  $t_{pHL}$  [ $R(0), R(9) - Q$ ],  $t_w$

