

# 4727B

## 7-STAGE COUNTER

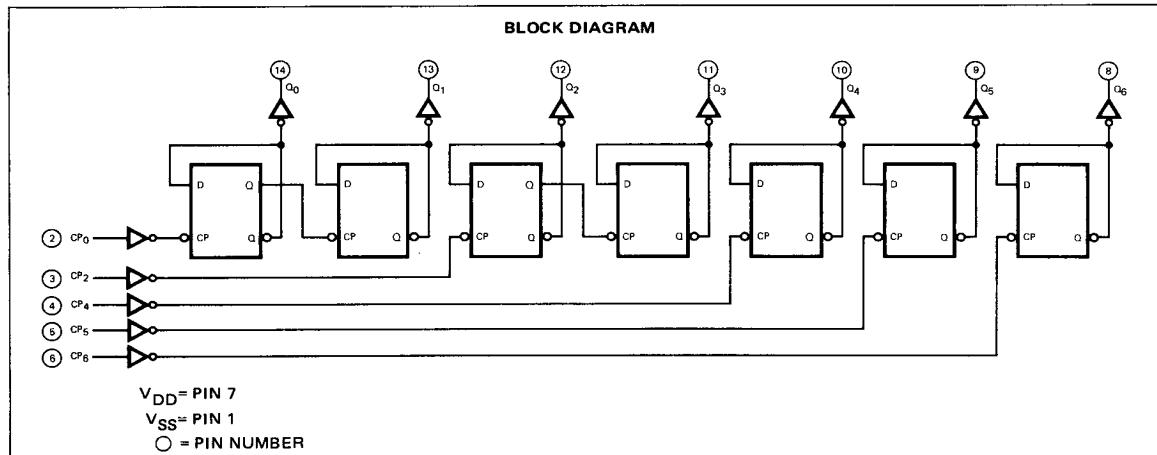
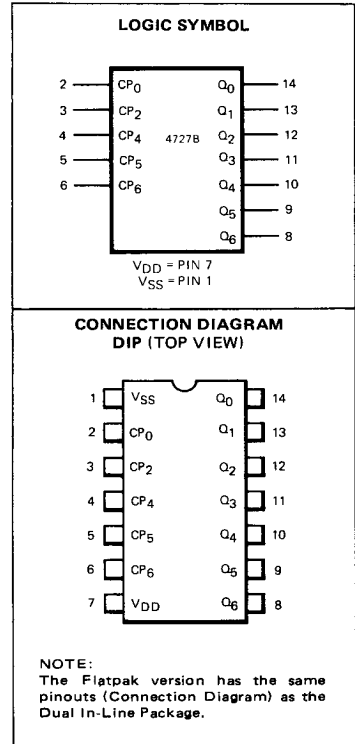
**DESCRIPTION** — The 4727B is a 7-Stage Frequency Counter especially useful for frequency synthesis in musical applications. The device is designed to generate, from a primary chromatic scale, each of the twelve flats, sharps, and naturals comprising each chromatic scale of the seven additional octaves in the musical spectrum. Twelve 4727B devices are required to generate the entire musical spectrum from a primary scale.

The 4727B consists of a pair of 2-Bit Counters, with Clock Inputs (CP<sub>0</sub> and CP<sub>2</sub>) and Parallel Outputs (Q<sub>0</sub> and Q<sub>1</sub>, Q<sub>2</sub> and Q<sub>3</sub>), available, and three 1-bit counters, also with Clock Inputs (CP<sub>4</sub>, CP<sub>5</sub>, and CP<sub>6</sub>) and Parallel Outputs (Q<sub>4</sub>, Q<sub>5</sub>, and Q<sub>6</sub>) available. Each counter advances on a LOW-to-HIGH transition at the appropriate Clock Input.

- REPEATS A PRIMARY MUSICAL NOTE OR HALF NOTE IN SEVEN OCTAVES
- CLOCK INPUT EDGE — TRIGGERED ON THE LOW-TO-HIGH TRANSITION
- BUFFERED OUTPUTS AVAILABLE FROM ALL SEVEN STAGES

**PIN NAMES**

CP<sub>0</sub>-CP<sub>6</sub>                      CLOCK INPUTS (L→H TRIGGERED)  
 Q<sub>0</sub>-Q<sub>6</sub>                         PARALLEL OUTPUTS



**DC CHARACTERISTICS:**  $V_{DD}$  as shown,  $V_{SS} = 0$  V (See Note 1)

SYMBOL	PARAMETER	LIMITS									UNITS	TEMP	TEST CONDITIONS	
		$V_{DD} = 5$ V			$V_{DD} = 10$ V			$V_{DD} = 15$ V						
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX				
$I_{OH}$	Output High Current	-0.3			-0.84			-1.8			mA	MIN 25°C MAX	$V_{OUT} = 4.5$ V For $V_{DD} = 5$ V. $V_{OUT} = 9.5$ V For $V_{DD} = 10$ V. $V_{OUT} = 13.5$ V For $V_{DD} = 15$ V.	Inputs at $V_{SS}$ or $V_{DD}$
		-0.25			-0.7			-1.5						
$I_{OL}$	Output Low Current	0.64			1.6			4.2			mA	MIN 25°C MAX	$V_{OUT} = 0.4$ V for $V_{DD} = 5$ V $V_{OUT} = 0.5$ V for $V_{DD} = 10$ V $V_{OUT} = 1.5$ V for $V_{CC} = 15$ V	Per the Logic Function or Truth Table
		0.51			1.3			3.4						
$I_{DD}$	Quiescent Power Supply Current	XC		20			40			80	$\mu$ A	MIN, 25°C MAX	All Inputs at $V_{DD}$ or $V_{SS}$	
				150			300		600					
		XM		5			10			20	$\mu$ A	MIN, 25°C MAX		
				150			300		600					

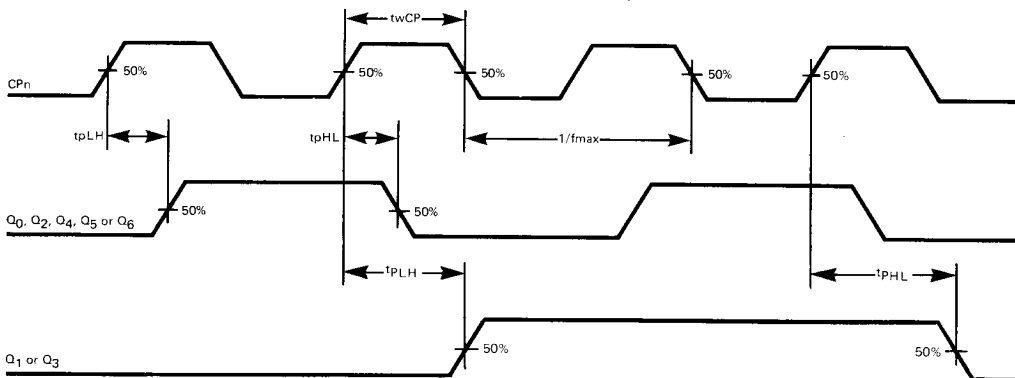
**AC CHARACTERISTICS AND SET-UP REQUIREMENTS:**  $V_{DD}$  as shown,  $V_{SS} = 0$  V,  $T_A = 25^\circ$  C (See Note 2)

SYMBOL	PARAMETER	LIMITS									UNITS	TEST CONDITIONS
		$V_{DD} = 5$ V			$V_{DD} = 10$ V			$V_{DD} = 15$ V				
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX		
$t_{PLH}$	Propagation Delay, $CP_n$ to $Q_0, Q_2, Q_4, Q_5$ or $Q_6$		225	500		90	250		75	200	ns	$C_L = 50$ pF $R_L = 200$ k $\Omega$ Input Transition Times $\leq 20$ ns
$t_{PHL}$	Propagation Delay, $CP_n$ to $Q_1$ or $Q_3$		365	1000		130	500		100	400		
$t_{TLH}$	Output Transition Times		70	500		40	250		30	200		
$t_{THL}$	Output Transition Times		70	500		40	250		30	200		
$T_{wCP}$	Min Clock Pulse Width	250	125		125	65		100	50		ns	
$f_{MAX}$	Input Count Frequency (Note 3)	2	4		4	8		5	10		MHz	

**NOTES:**

- Additional DC characteristics are listed in this section under "4000B Series CMOS Family Characteristics."
- Propagation Delays and Output Transition Times are graphically described in this section under "4000B Series CMOS Family Characteristics."
- For  $f_{MAX}$  input rise and fall times are greater than or equal to 5 ns and less than or equal to 20 ns.

**SWITCHING WAVEFORMS**



**PROPAGATION DELAY, CP to  $Q_n$ , MINIMUM CLOCK PULSE WIDTH AND MAXIMUM FREQUENCY**