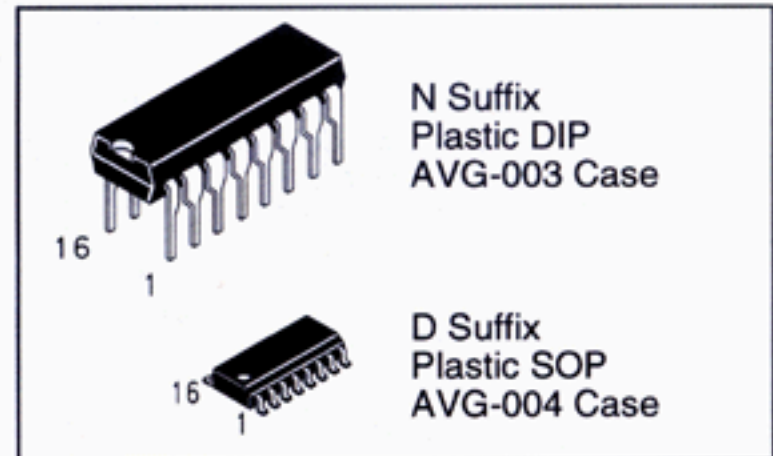


Decade Counter

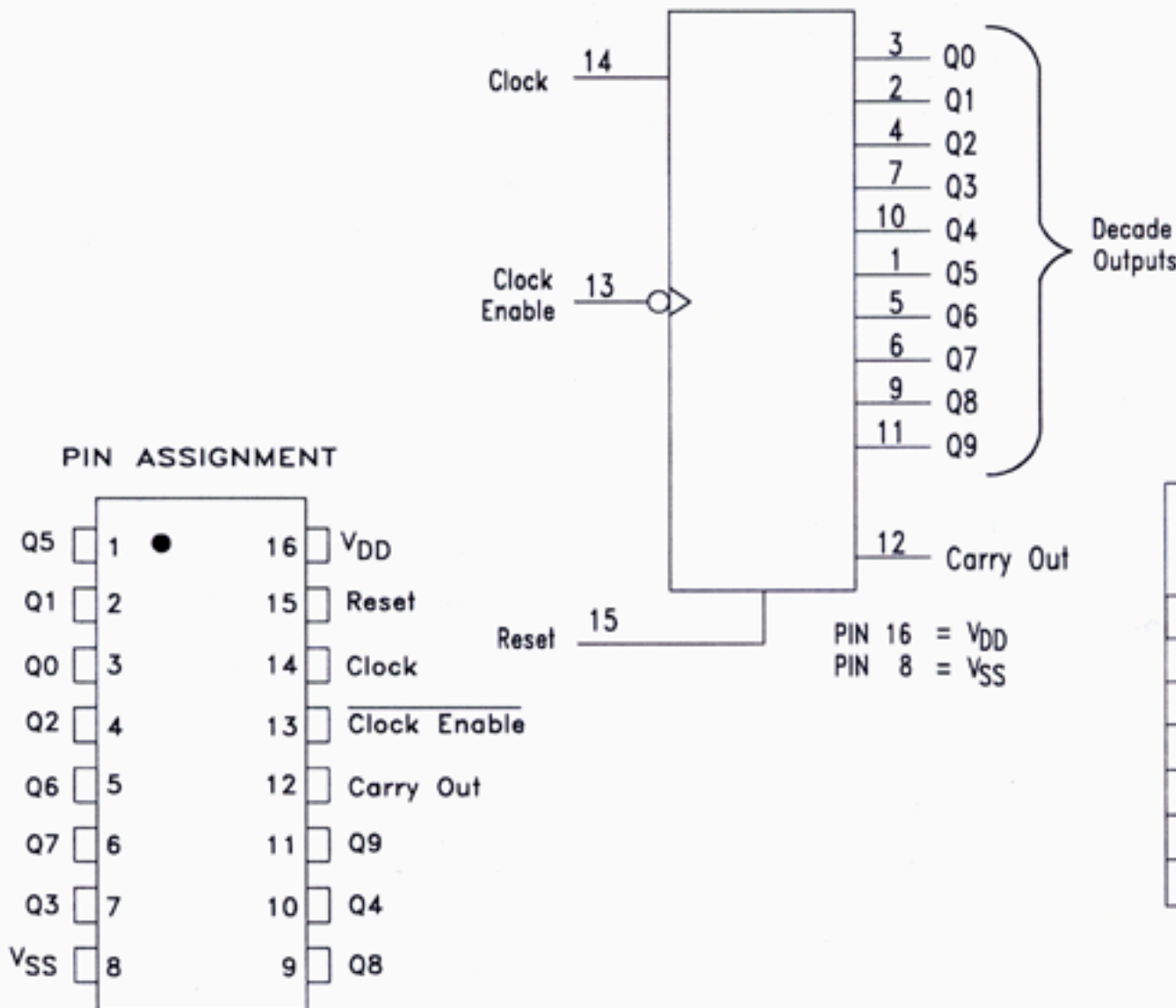
This device is a five-stage decade counter with built-in code converter. High speed operation and spike-free outputs are obtained from this design. The ten decoded outputs are normally low, and go high only at their appropriate decimal time period. The output changes occur on the positive-going edge of the clock pulse.

- Supply voltage range = 3.0 Vdc to 18 Vdc
- All outputs buffered
- Capable of driving 4 Low Power TTL loads or one LS TTL load over the rated temperature range
- Diode protection on all inputs
- Highest noise immunity at 12V supply

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TRUTH TABLE
Positive Logic

Clock	Clock Enable	Reset	Decade Output = n
0	X	0	n
X	1	0	n
X	X	1	Q ₀
↑	0	0	n+1
↓	X	0	n
X	↑	0	n
1	↓	0	n+1

If n>5, Carry = "1", Otherwise = "0"
 ↑ = Low to High Transition
 ↓ = High to low Transition
 X=Don't Care

ABSOLUTE MAXIMUM RATINGS

Maximum ratings are those values beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
V _{DD}	Supply Voltage (Referenced to V _{SS})	-0.5 to +18.0	V
V _{IN} , V _{OUT}	Input or Output Voltage	-0.5 to V _{DD} +0.5	V
I _{IN} , I _{OUT}	DC Current Into or Out of Any Pin	± 10	mA
P _D	Power Dissipation in Still Air, Derating: -12 mW/°C from 65° to 85°C	500	mW
T _{STG}	Storage Temperature Range	-65 to +150	°C
TL	Lead Temperature, (8 Second Soldering)	260	°C

ELECTRICAL CHARACTERISTICS (Voltages Referenced to V_{SS})

Symbol	Parameter	V _{DD}	Guaranteed Limits								Unit
			-40°C		25°C			85°C			
			Min	Max	Min	Typ	Max	Min	Max		
V _{OL}	Output Voltage V _{IN} =V _{DD} or 0 "0" Level	5.0	-	0.05	-	0	0.05	-	0.05	V _{dC}	
		10	-	0.05	-	0	0.05	-	0.05		
		15	-	0.05	-	0	0.05	-	0.05		
V _{OH}	V _{IN} = 0 or V _{DD} "1" Level	5.0	4.95	-	4.95	5.0	-	4.95	-	V _{dC}	
		10	9.95	-	9.95	10	-	9.95	-		
		15	14.95	-	14.95	15	-	14.95	-		
V _{IL}	Input Voltage (V _O =4.5 or 0.5 V _{dC}) (V _O =9.0 or 1.0 V _{dC}) (V _O =13.5 or 1.5 V _{dC}) "0" Level	5.0	-	1.5	-	2.25	1.5	-	1.5	V _{dC}	
		10	-	3.0	-	4.50	3.0	-	3.0		
		15	-	4.0	-	6.75	4.0	-	4.0		
V _{IH}	(V _O =0.5 or 4.5 V _{dC}) (V _O =1.0 or 9.0 V _{dC}) (V _O =1.5 or 13.5 V _{dC}) "1" Level	5.0	3.5	-	3.5	2.75	-	3.5	-	V _{dC}	
		10	7.0	-	7.0	5.50	-	7.0	-		
		15	11	-	11	8.25	-	11	-		
I _{OH}	Output Drive Current (V _{OH} = 2.5 V _{dC}) (V _{OH} = 4.6 V _{dC}) (V _{OH} = 9.5 V _{dC}) (V _{OH} = 13.5 V _{dC}) Source	5.0	-3.0	-	-2.4	-4.2	-	-1.7	-	mA _{dC}	
		5.0	-0.52	-	-0.44	-0.88	-	-0.36	-		
		10	-1.3	-	-1.1	-2.25	-	-0.9	-		
		15	-3.6	-	-3.0	-8.8	-	-2.4	-		
I _{OL}	(V _{OL} = 0.4 V _{dC}) (V _{OL} = 0.5 V _{dC}) (V _{OL} = 1.5 V _{dC}) Sink	5.0	0.52	-	0.44	0.88	-	0.36	-	mA _{dC}	
		10	1.3	-	1.1	2.25	-	0.9	-		
		15	3.6	-	3.0	8.8	-	2.4	-		
I _{IN}	Input Current	15	-	±0.3	-	±0.00001	±0.3	-	±1.0	μA _{dC}	
C _{IN}	Input Capacitance V _{IN} =0	-	-	-	-	5.0	7.5	-	-	pF	
I _{DD}	Quiescent Current (Per Package)	5.0	-	20	-	0.005	20	-	150	μA _{dC}	
		10	-	40	-	0.010	40	-	300		
		15	-	80	-	0.015	80	-	600		

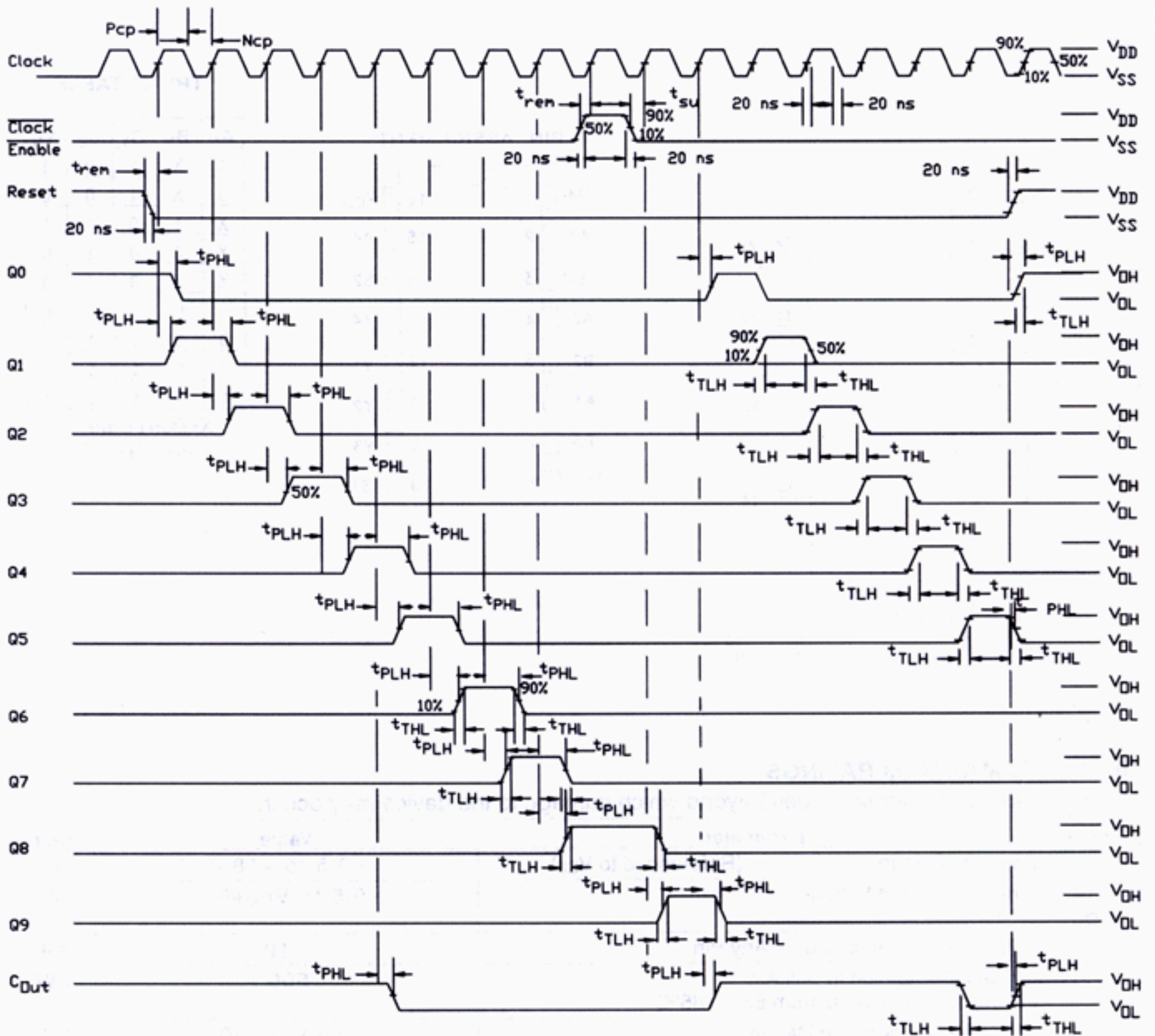
SWITCHING CHARACTERISTICS (C_L=50 pF, T_A=25°C)

Symbol	Characteristics	V _{DD}	Min	Typ	Max	Unit
t _{TLH} , t _{THL}	Output Rise and Fall Time	5.0	-	100	200	ns
		10	-	50	100	
		15	-	40	80	
t _{PLH} , t _{PHL}	Propagation Delay Time: Clock to Decade Output Reset to Decade Output	5.0	-	500	1000	ns
		10	-	230	460	
		15	-	175	350	
	Clock to C _{OUT}	5.0	-	400	800	
		10	-	175	350	
		15	-	125	250	
t _{PLH}	Turn-Off Delay Time Reset to C _{OUT}	5.0	-	400	800	
		10	-	175	350	
		15	-	125	250	
t _{WH}	Clock Pulse Width	5.0	250	125	-	ns
		10	100	50	-	
		15	75	35	-	
f _{cl}	Clock Frequency	5.0	-	5.0	2.0	MHz
		10	-	12	5.0	
		15	-	16	6.7	
t _{WH}	Reset Width	5.0	500	250	-	ns
		10	250	125	-	
		15	190	95	-	

SWITCHING CHARACTERISTICS (Continued)

Symbol	Characteristics	V _{DD}	Min	Typ	Max	Unit
t _{rem}	Reset Removal Time	5.0	750	375	-	ns
		10	275	135	-	
		15	210	105	-	
t _{TLH} , t _{THL}	Clock Input Rise and Fall Time	5.0	No Limit			
		10				
		15				
t _{su}	Clock Enable Setup Time	5.0	350	175	-	ns
		10	150	75	-	
		15	115	52	-	
t _{rem}	Clock Enable Removal Time	5.0	420	260	-	ns
		10	200	100	-	
		15	140	70	-	

SWITCHING WAVEFORMS



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