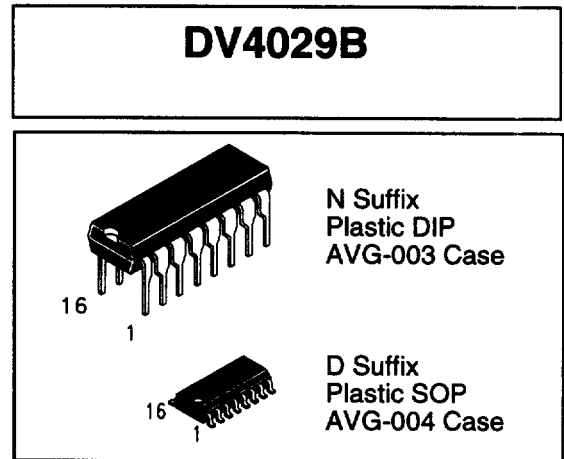


Binary or BCD Decade Counter with Asynchronous Preset

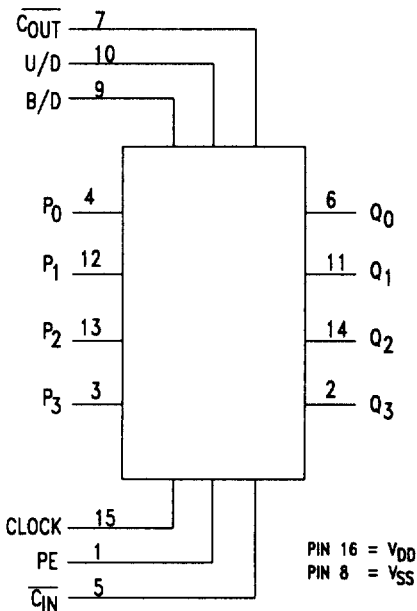
4029B

This device is a binary/decade up/down counter constructed with MOS P-Channel and N-Channel enhancement mode devices in a single monolithic structure. The counter consists of type D flip-flop stages with a gating structure to provide toggle flip-flop capability. The counter can be used in either binary or BCD operation. The DV4029B can be used in up/down and difference counting and frequency synthesizer applications where low power dissipation and/or high noise immunity is needed. It can also be utilized in A/D and D/A conversion and for magnitude and sign generation.

- 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



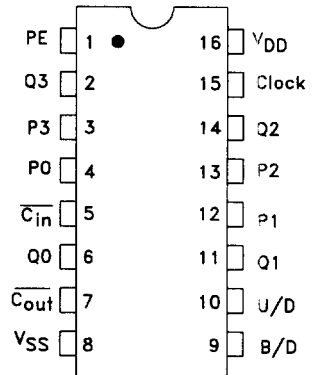
BLOCK DIAGRAM



PIN DEFINITIONS

- U/D** = UP/Down-Logic 1=UP
- B/D** = Binary/Decimal Count-Logic 1=Binary
- C_{out}** = Carry Out-Low for terminal count, 9 if decade, 15 if binary
- PE** = Asynchronously presets the count that appears on P₀-P₃

PIN ASSIGNMENT



TRUTH TABLE

Carry In	Up/Down	Preset Enable	Output State
1	X	0	No Count
0	1	0	Count Up
0	0	0	Count Down
X	X	1	Preset

"Output State" indicates result after Low to High Transition of clock occurs.
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 Vss)

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	Vdc
		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	-	Vdc
		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 Vdc) (V _O =9.0 or 1.0 Vdc) (V _O =13.5 or 1.5 Vdc) "0" Level	5.0	-	1.5	-	2.25	1.5	-	1.5	Vdc
		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 Vdc) (V _O =1.0 or 9.0 Vdc) (V _O =1.5 or 13.5 Vdc) "1" Level	5.0	3.5	-	3.5	2.75	-	3.5	-	Vdc
		10	7.0	-	7.0	5.50	-	7.0	-	
		15	11	-	11	8.25	-	11	-	
I _{OH}	Output Drive Current (V _{OH} = 2.5 Vdc) (V _{OH} = 4.6 Vdc) (V _{OH} = 9.5 Vdc) (V _{OH} = 13.5 Vdc) Source	5.0	-2.5	-	-2.1	-4.2	-	-1.7	-	mAdc
		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 Vdc) (V _{OL} = 0.5 Vdc) (V _{OL} = 1.5 Vdc) Sink	5.0	0.52	-	0.44	0.88	-	0.36	-	mAdc
		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	µAdc
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	µAdc
		10	-	40	-	0.010	40	-	300	
		15	-	80	-	0.015	80	-	600	

4029B

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 Q	5.0	-	200	400	ns
		10	-	100	200	
		15	-	90	180	
	Clock to \bar{C} _{OUT}	5.0	-	250	500	
		10	-	130	260	
		15	-	85	190	
	\bar{C} _{IN} to \bar{C} _{OUT}	5.0	-	175	360	
		10	-	60	120	
		15	-	50	100	
	PE to Q	5.0	-	235	470	
		10	-	100	200	
		15	-	80	160	
PE to \bar{C} _{OUT}	5.0	-	320	640		
	10	-	145	290		
	15	-	105	210		
t _{w(CL)}	Clock Pulse Width	5.0	180	90	-	ns
		10	80	40	-	
		15	60	30	-	
f _{cl}	Clock Pulse Frequency	5.0	-	4.0	2.0	MHz
		10	-	8.0	4.0	
		15	-	10	5.0	

SWITCHING CHARACTERISTICS (Continued)

Symbol	Characteristics	V _{DD}	Min	Typ	Max	Unit
t _{rem}	Preset Removal Time The Preset Signal must be low prior to a positive-going transition of the clock.	5.0	160	80	-	ns
		10	80	40	-	ns
		15	60	30	-	ns
t _{RCL} , t _{FCL}	Clock Rise and Fall Time	5.0	-	-	15	μs
		10	-	-	5	μs
		15	-	-	4	μs
t _{su}	Carry In Setup Time	5.0	150	75	-	ns
		10	60	30	-	ns
		15	40	20	-	ns
	Up/Down Setup Time	5.0	340	170	-	ns
		10	140	70	-	ns
		15	100	50	-	ns
	Binary/Decade Setup Time	5.0	320	160	-	ns
		10	140	70	-	ns
		15	100	50	-	ns
t _w	Preset Enable Pulse Width	5.0	130	65	-	ns
		10	70	35	-	ns
		15	50	25	-	ns

4029B

SWITCHING WAVEFORMS

