National Semiconductor

MICROCIRCUIT DATA SHEET

MNCD4029BM-X REV 1A0

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PRESETTABLE BINARY/DECADE UP/DOWN COUNTER

General Description

The CD4029BM is a presettable up/down counter which counts in either binary or decade mode depending on the voltage level applied at binary/decade input. When binary/decade is at logical "1", the counter counts in binary, otherwise it counts in decade. Similarly, the counter counts up when the up/down input is at logical "1" and vice versa.

A Logical "1" preset enable signal allows information at the "jam" inputs to preset the counter to any state asynchronously with the clock. The counter is advanced one count at the positive-going edge of the clock if the carry in and preset enable inputs are at logical "0". Advancement is inhibited when either or both of these two inputs is at logical "1". The carry out signal is normally at logical "1" state and goes to logical "0" state when the counter reaches its maximum count in the "up" mode or the minimum count in the "down" mode provided the carry input is at logical "0" state.

All inputs are protected against static discharge by diode clamps to both Vdd and Vss.

Industry Part Number

CD4029BM

NS Part Numbers

CD4029BMJ/883*
CD4029BMW/883

Prime Die

CD4029BM

Controlling Document

8101601EA*

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (^{O}C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

Features

- Wide supply voltage range 3V to 15V
- High noise immunity 0.45Vdd (typ.)
- Low power TTL compatibility Fan out of 2 driving 74L or 1 driving 74LS
- Standard Military Drawing (SMD)
  - CD4029: 8101601EA*
- Parallel jam inputs
- Binary or BCD decade up/down counting

(Absolute Maximum Ratings)

(Note 1, 2)

DC Supply Voltage (Vdd)	-0.5V to +18Vdc
Input Voltage (Vin)	-0.5V to Vdd +0.5Vdc
Storage Temperature Range (Ts)	-65 C to +150 C
Power Dissipation (Pd)	
Dual-In-Line	700mW
Small Outline	500mW
Lead Temperature (Tl) (Soldering, 10 seconds)	260 C

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.
Note 2: Vss = 0V unless otherwise specified.

Recommended Operating Conditions

(Note 1)

Supply Voltage (Vdd)	3V to 15Vdc
Input Voltage (Vin)	0V to Vdd Vdc
Operating Temperature Range (TA)	
CD4029BM	-55 C to +125 C

Note 1: Vss = 0V unless otherwise specified.

Electrical Characteristics

DC PARAMETERS

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vol	Logical "0" Output Voltage	Vdd = 5V, Vih = 5V, Vil = 0V, Iout = 0uA				0.05	V	1, 2, 3
		Vdd = 10V, Vih = 10V, Vil = 0V, Iout = 0uA				0.05	V	1, 2, 3
		Vdd = 15V, Vih = 15V, Vil = 0V, Iout = 0uA				0.05	V	1, 2, 3
Voh	Logical "1" Output Voltage	Vdd = 5V, Vih = 5V, Vil = 0V, Iout = 0uA			4.95		V	1, 2, 3
		Vdd = 10V, Vih = 10V, Vil = 0V, Iout = 0uA			9.95		V	1, 2, 3
		Vdd = 15V, Vih = 15V, Vil = 0V, Iout = 0uA			14.95		V	1, 2, 3
Iih	Logical "1" Input Current	Vdd = 15V, Vin = 15V				100	nA	1, 3
						1000	nA	2
Iil	Logical "0" Input Current	Vdd = 15V, Vin = 0V				-100	nA	1, 3
						-1000	nA	2
Icc	Power Supply Current	Vdd = 5V, Vih = 5V, Vil = 0V				5	uA	1, 3
						150	uA	2
		Vdd = 10V, Vih = 10V, Vil = 0V				10	uA	1, 3
						300	uA	2
		Vdd = 15V, Vih = 15V, Vil = 0V				20	uA	1, 3
						600	uA	2
Ioh	Logical "1" Output Current	Vdd = 5V, Vih = 5V, Vil = 0V, Vout = 4.6V			-0.51		mA	1
					-0.36		mA	2
					-0.64		mA	3
		Vdd = 10V, Vih = 10V, Vil = 0V, Vout = 9.5V			-1.3		mA	1
					-0.9		mA	2
					-1.6		mA	3
		Vdd = 15V, Vih = 15V, Vil = 0V, Vout = 13.5V			-3.4		mA	1
					-2.4		mA	2
					-4.2		mA	3

Electrical Characteristics

DC PARAMETERS(Continued)

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Iol	Logical "0" Output Current	Vdd = 5V, Vih = 5V, Vil = 0V, Vout = 0.4V			0.51		mA	1
					0.36		mA	2
					0.64		mA	3
		Vdd = 10V, Vih = 10V, Vil = 0V, Vout = 0.5V			1.3		mA	1
					0.9		mA	2
					1.6		mA	3
		Vdd = 15V, Vih = 15V, Vil = 0V, Vout = 1.5V			3.4		mA	1
					2.4		mA	2
					4.2		mA	3
Vih	Logical "1" Input Voltage	Vdd = 5V, Vout = 4.5V (min)	1		3.5		V	1, 2, 3
		Vdd = 10V, Vout = 9V (min)	1		7		V	1, 2, 3
		Vdd = 15V, Vout = 13.5V (min)	1		11		V	1, 2, 3
Vil	Logical "0" Input Voltage	Vdd = 5V, Vout = .5V (max)	1			1.5	V	1, 2, 3
		Vdd = 10V, Vout = 1V (max)	1			3	V	1, 2, 3
		Vdd = 15V, Vout = 1.5V (max)	1			4	V	1, 2, 3

AC PARAMETERS: CLOCKED OPERATION

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Cl = 50pF, trCL=trCH=20nS, Rl = 200K Ohms or equivalent impedance provided by diode load.

tPLH	Propagation Delay Time: To Q Output	Vdd = 5V				400	nS	9
tPHL	Propagation Delay Time: To Q Output	Vdd = 5V				400	nS	9
tPLH	Propagation Delay Time: To Carry Output	Vdd = 5V				640	nS	9
tPHL	Propagation Delay Time: To Carry Output	Vdd = 5V				640	nS	9

Electrical Characteristics

AC PARAMETERS: PRESET ENABLE OPERATION

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Cl = 50pF, trCL=trCH=20nS, Rl = 200K Ohms or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPHL	Propagation Delay Time: To Q Output	Vdd = 5V				570	nS	9
tPLH	Propagation Delay Time: To Carry Output	Vdd = 5V				800	nS	9

AC PARAMETERS: CARRY INPUT OPERATION

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Cl = 50pF, trCL=trCH=20nS, Rl = 200K Ohms or equivalent impedance provided by diode load.

tPHL	Propagation Delay Time: To Carry Output	Vdd = 5V				530	nS	9
tPLH	Propagation Delay Time: To Carry Output	Vdd = 5V				530	nS	9

AC PARAMETERS:

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Cl = 50pF, trCL=trCH=20nS, Rl = 200K Ohms or equivalent impedance provided by diode load.

tTHL	Transition Time: Q Outputs	Vdd = 5V				200	nS	9
tTLH	Transition Time: Q Outputs	Vdd = 5V				200	nS	9
tTHL	Transition Time: Carry Outputs	Vdd = 5V				200	nS	9
tTLH	Transition Time: Carry Outputs	Vdd = 5V				200	nS	9
fCL	Maximum Clock	Vdd = 5V	1		1.5		MHz	9
tWH/tWL	Minimum Clock Pulse	Vdd = 5V	1		320		nS	9
tSU	Minimum Set-Up	Vdd = 5V	1			360	nS	9
tWH	Minimum Enable	Vdd = 5V	1			160	nS	9
tREM	Minimum Preset	Vdd = 5V	1			300	nS	9

Note 1: Parameter tested go-no-go only.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
1A0	M0002793	05/14/98	Linda Collins	New update: MNCD4029BM-X rev. 1A0 Deleted the DC Drift values