Rochester Electronics

Datasheet

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
    - Class Q Military
    - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)

    - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

National Semiconductor

MICROCIRCUIT DATA SHEET

MNCD4060BM-X REV 1A0

Original Creation Date: 10/10/95
Last Update Date: 05/19/98
Last Major Revision Date: 03/05/98

14-STAGE RIPPLE CARRY BINARY COUNTERS

General Description

The CD4060BM are 14-stage ripple carry binary counters. The counters are advanced one count on the negative transition of each clock pulse. The counters are reset to the zero state by a logical "1" at the reset input independent of clock.

Industry Part Number

CD4060BM

NS Part Numbers

CD4060BMJ-MIL
CD4060BMW-MIL

Prime Die

CD4060BM

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	1.0V to 15V
- High noise immunity	0.45Vdd (typ.)
- Low power TTL compatibility	Fan out of 2 driving 74L or 1 driving 74LS
- Medium speed operation	8MHz typ. at Vdd = 10V
- Schmitt trigger clock input	

(Absolute Maximum Ratings)

(Note 1, 2)

Supply Voltage (Vdd)	-0.5V to +18V
Input Voltage (Vin)	-0.5V to Vdd +0.5V
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; they are not meant to imply that the devices should be operated at these limits. The table of "Recommended Operating Conditions" and "Electrical Characteristics" provides conditions for actual device operation.
Note 2: Vss = 0V unless otherwise specified.

Recommended Operating Conditions

Supply Voltage (Vdd)	+3V to +15V
Input Voltage (Vin)	0V to Vdd
Operating Temperature Range (TA)	
CD4060BM	-55 C to +125 C

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: Vss = 0V

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 (all inputs tied)				100	nA	1, 3
						1000	nA	2
Iil	Logical "0" Input Current	Vdd = 15V, Vin = 0V (all inputs tied)				-100	nA	1, 3
						-1000	nA	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)

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: Vss = 0V

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
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
Vih	Logical "1" Input Voltage	Vcc = 5V, Vout = 4.5V (min)	1		3.5		V	1, 2, 3
		Vcc = 10V, Vout = 9V (min)	1		7		V	1, 2, 3
		Vcc = 15V, Vout = 13.5V (min)	1		11		V	1, 2, 3
Vil	Logical "0" Input Voltage	Vcc = 5V, Vout = 0.5V (max)	1			1.5	V	1, 2, 3
		Vcc = 10V, Vout = 1V (max)	1			3	V	1, 2, 3
		Vcc = 15V, Vout = 1.5V (max)	1			4	V	1, 2, 3

Electrical Characteristics

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Cl = 50pF, Rl = 200K, tr=tf=20nS

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPHL	Propagation Delay Time: To Q4	Vdd = 5V	2			1300	nS	9
			2			1820	nS	10
			2			1040	nS	11
		Vdd = 10V	2			525	nS	9
			2			735	nS	10
			2			420	nS	11
		Vdd = 15V	2			400	nS	9
			2			560	nS	10
			2			320	nS	11
tPLH	Propagation Delay Time: To Q4	Vdd = 5V	2			1300	nS	9
			2			1820	nS	10
			2			1040	nS	11
		Vdd = 10V	2			525	nS	9
			2			735	nS	10
			2			420	nS	11
		Vdd = 15V	2			400	nS	9
			2			560	nS	10
			2			320	nS	11
tPHL	Interstage Propagation Delay Time: From Qn to Qn+1	Vdd = 5V	2			330	nS	9
			2			460	nS	10
			2			265	nS	11
		Vdd = 10V	2			125	nS	9
			2			175	nS	10
			2			100	nS	11
		Vdd = 15V	2			90	nS	9
			2			125	nS	10
			2			70	nS	11

Electrical Characteristics

AC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Cl = 50pF, Rl = 200K, tr=tf=20nS

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPLH	Interstage Propagation Delay Time: From Qn to Qn+1	Vdd = 5V	2			330	nS	9
			2			460	nS	10
			2			265	nS	11
		Vdd = 10V	2			125	nS	9
			2			175	nS	10
			2			100	nS	11
		Vdd = 15V	2			90	nS	9
			2			125	nS	10
			2			70	nS	11
tTHL	Transition Time	Vdd = 5V	2			200	nS	9
		Vdd = 10V	2			100	nS	9
		Vdd = 15V	2			80	nS	9
tTLH	Transition Time	Vdd = 5V	2			200	nS	9
		Vdd = 10V	2			100	nS	9
		Vdd = 15V	2			80	nS	9
tWL	Minimum Clock Pulse Width	Vdd = 5V	2			500	nS	9
		Vdd = 10V	2			170	nS	9
		Vdd = 15V	2			125	nS	9
tWH	Minimum Clock Pulse Width	Vdd = 5V	2			500	nS	9
		Vdd = 10V	2			170	nS	9
		Vdd = 15V	2			125	nS	9
fCL	Maximum Clock Frequency	Vdd = 5V	2		1		MHz	9
		Vdd = 10V	2		3		MHz	9
		Vdd = 15V	2		4		MHz	9

Electrical Characteristics

AC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Cl = 50pF, Rl = 200K, tr=tf=20nS

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPHL(R)	Reset Propagation	Vdd = 5V	2			450	nS	9
			2			630	nS	10
			2			360	nS	11
		Vdd = 10V	2			210	nS	9
			2			295	nS	10
			2			170	nS	11
		Vdd = 15V	2			170	nS	9
			2			240	nS	10
			2			135	nS	11
tWH(R)	Minimum Reset Pulse Width	Vdd = 5V	2			450	nS	9
		Vdd = 10V	2			210	nS	9
		Vdd = 15V	2			170	nS	9
Cin	Average Input Capacitance	Any Inputs	2			7.5	pF	9

Note 1: Parameter tested go-no-go only.
Note 2: Guaranteed parameter, not tested.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
1A0	M0000538	05/19/98	Linda Collins	Converted from RETS4060BX rev. 5C to MDS MNCD4060BM-X rev. 1A0. Deleted the Drift values.