National Semiconductor

MICROCIRCUIT DATA SHEET

MNCD40175BM-X REV 1A0

Original Creation Date: 10/06/95
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QUAD D FLIP-FLOP

General Description

The CD40175B consists of four positive-edge triggered D-type flip-flops; both the true and complement outputs from each flip-flop are externally available.

All flip-flops are controlled by a common clock and a common clear. Information at the D inputs meeting the set-up time requirements is transferred to the Q outputs on the positive-going edge of the clock pulse. The clearing operation, enabled by a negative pulse at Clear input, clears all Q outputs to logical "1" and Qs.

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

Industry Part Number

CD40175BM

NS Part Numbers

CD40175BMJ/883
CD40175BMW/883

Prime Die

CD40175BM

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 3.0V to 15V
- High noise immunity 0.45Vdd (typ.)
- Low power TTL compatibility fan out of 2 driving 74L or 1 driving 74LS
- Equivalent to MC14175B
- Equivalent to MM74C175

(Absolute Maximum Ratings)

(Note 1, 2)

DC Supply Voltage (Vdd)	-0.5 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; 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

(Note 1)

DC Supply Voltage (Vdd)	3V to 15Vdc
Input Voltage (Vin)	0 to Vdd Vdc
Operating Temperature Range (TA)	
CD40175BM	-55 C to +125 C

Note 1: Vss = 0V unless otherwise specified.

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
Idd	Quiescent Device Current	Vdd = 5V				1	uA	1, 3
						30	uA	2
		Vdd = 10V				2	uA	1, 3
						60	uA	2
		Vdd = 15V				4	uA	1, 3
						120	uA	2
Vol	Logical "0" Output Voltage	Vdd = 5V, Iout < 1uA				0.05	V	1, 2, 3
		Vdd = 10V, Iout < 1uA				0.05	V	1, 2, 3
		Vdd = 15V, Iout < 1uA				0.05	V	1, 2, 3
Voh	Logical "1" Output Voltage	Vdd = 5V, Iout < 1uA			4.95		V	1, 2, 3
		Vdd = 10V, Iout < 1uA			9.95		V	1, 2, 3
		Vdd = 15V, Iout < 1uA			14.95		V	1, 2, 3
Vil	Logical "0" Input Voltage	Vdd = 5V, Vout = 0.5V or 4.5V	1			1.5	V	1, 2, 3
		Vdd = 10V, Vout = 1V or 9V	1			3	V	1, 2, 3
		Vdd = 15V, Vout = 1.5V or 13.5V	1			4	V	1, 2, 3
Vih	Logical "1" Input Voltage	Vdd = 5V, Vout = 0.5V or 4.5V	1		3.5		V	1, 2, 3
		Vdd = 10V, Vout = 1V or 9V	1		7		V	1, 2, 3
		Vdd = 15V, Vout = 1.5V or 13.5V	1		11		V	1, 2, 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, Vout = 0.4V			0.51		mA	1
					0.36		mA	2
					0.64		mA	3
		Vdd = 10V, Vout = 0.5V			1.3		mA	1
					0.9		mA	2
					1.6		mA	3
		Vdd = 15V, Vout = 1.5V			3.4		mA	1
					2.4		mA	2
					4.2		mA	3
Ioh	Logical "1" Output Current	Vdd = 5V, Vout = 4.6V			-0.51		mA	1
					-0.36		mA	2
					-0.64		mA	3
		Vdd = 10V, Vout = 9.5V			-1.3		mA	1
					-0.9		mA	2
					-1.6		mA	3
		Vdd = 15V, Vout = 13.5V			-3.4		mA	1
					-2.4		mA	2
					-4.2		mA	3
Iil	Input Current	Vdd = 15V, Vin = 0V				-0.1	uA	1, 3
						-1	uA	2
Iih	Input Current	Vdd = 15V, Vin = 15V				0.1	uA	1, 3
						1	uA	2

Electrical Characteristics

AC PARAMETERS

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

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPHL	Propagation Delay Time: Clock to Q or /Q	Vdd = 5V				300	nS	9
						375	nS	10, 11
		Vdd = 10V				110	nS	9
						137	nS	10, 11
		Vdd = 15V	2			90	nS	9
			2			112	nS	10, 11
tPLH	Propagation Delay Time: Clock to Q or /Q	Vdd = 5V				300	nS	9
						375	nS	10, 11
		Vdd = 10V				110	nS	9
						138	nS	10, 11
		Vdd = 15V	2			90	nS	9
			2			112	nS	10, 11
tPHL	Propagation Delay Time: Clear to Q	Vdd = 5V				300	nS	9
						375	nS	10, 11
		Vdd = 10V				110	nS	9
						138	nS	10, 11
		Vdd = 15V	2			90	nS	9
			2			112	nS	10, 11
tPLH	Propagation Delay Time: Clear to /Q	Vdd = 5V				400	nS	9
						500	nS	10, 11
		Vdd = 10V				150	nS	9
						188	nS	10, 11
		Vdd = 15V	2			120	nS	9
			2			150	nS	10, 11
tSU	Time Prior to Clock Pulse that Data Must be Present	Vdd = 5V	1		100		nS	9, 10, 11
		Vdd = 10V	1		40		nS	9, 10, 11
		Vdd = 15V	2		35		nS	9, 10, 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 or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tH	Time After Clock Pulse that Data Must be held	Vdd = 5V	1			0	nS	9, 10, 11
		Vdd = 10V	1			8	nS	9, 10, 11
		Vdd = 15V	2			10	nS	9, 10, 11
tTHL	Transition Time	Vdd = 5V				200	nS	9
						250	nS	10, 11
		Vdd = 10V				100	nS	9
						125	nS	10, 11
		Vdd = 15V	2			80	nS	9
			2			100	nS	10, 11
tTLH	Transition Time	Vdd = 5V				200	nS	9
						250	nS	10, 11
		Vdd = 10V				100	nS	9
						125	nS	10, 11
		Vdd = 15V	2			80	nS	9
			2			100	nS	10, 11
tWH	Minimum Clock Pulse Width	Vdd = 5V	1			250	nS	9, 10, 11
		Vdd = 10V	1			100	nS	9, 10, 11
		Vdd = 15V	2			80	nS	9, 10, 11
tWL	Minimum Clock Pulse Width	Vdd = 5V	1			250	nS	9, 10, 11
		Vdd = 10V	1			100	nS	9, 10, 11
		Vdd = 15V	2			80	nS	9, 10, 11
tWL	Minimum Clear Pulse Width	Vdd = 5V	1			250	nS	9, 10, 11
		Vdd = 10V	1			100	nS	9, 10, 11
		Vdd = 15V	2			80	nS	9, 10, 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 or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tRCL	Maximum Clock Rise Time	Vdd = 5V	2		15		uS	9
		Vdd = 10V	2		5		uS	9
		Vdd = 15V	2		5		uS	9
tFCL	Maximum Clock Fall Time	Vdd = 5V	2		15		uS	9
		Vdd = 10V	2		5		uS	9
		Vdd = 15V	2		5		uS	9
fMAX	Maximum Clock Frequency	Vdd = 5V	1		2		MHz	9
		Vdd = 10V	1		5		MHz	9
		Vdd = 15V	1		6		MHz	9
Cin	Input Capacitance	Clear Input	2			15	pF	9
		Other Input	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	M0000526	05/14/98	Linda Collins	Converted from RETS40175BX rev.4A to MDS MNCD40175BM-X rev. 1A0. Deleted the DC Drift values. Deleted a duplicate TPLH test.