

MNCD40193BM-X REV 0AL

 Original Creation Date: 10/09/95
 Last Update Date: 01/17/96
 Last Major Revision Date: 10/09/95

SYNCHRONOUS 4-BIT UP/DOWN BINARY COUNTER
Industry Part Number

CD40193BM

NS Part Numbers

 CD40193BMJ/883
 CD40193BMW/883

Prime Die

CD40193BM

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°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

Electrical Characteristics

DC PARAMETERS

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Iin	Input Leakage Current	Vcc = 15V, Vin = 15V				100	nA	1, 3
						1000	nA	2
		Vcc = 15V, Vin = 0V				-100	nA	1, 3
						-1000	nA	2
Idd	Quiescent Device Current	Vcc = 5V, Vin = Vdd or Vss				5	uA	1, 3
						150	uA	2
		Vcc = 10V, Vin = Vdd or Vss				10	uA	1, 3
						300	uA	2
		Vcc = 15V, Vin = Vdd or Vss	3			20	uA	1, 3
Voh	Logical "1" Output Voltage	Vcc = 5V			4.95		V	1, 2, 3
		Vcc = 10V			9.95		V	1, 2, 3
		Vcc = 15V			14.95		V	1, 2, 3
Vol	Logical "0" Output Voltage	Vcc = 5V				.05	V	1, 2, 3
		Vcc = 10V				.05	V	1, 2, 3
		Vcc = 15V				.05	V	1, 2, 3
Ioh	Logical "1" Output Current	Vcc = 5V, Vout = 4.6V			-.51		mA	1
					-.36		mA	2
					-.64		mA	3
		Vcc = 10V, Vout = 9.5V			-1.3		mA	1
					-.9		mA	2
					-1.6		mA	3
		Vcc = 15V, Vout = 13.5V	3		-3.4		mA	1
			3		-2.4		mA	2
			3		-4.2		mA	3

Electrical Characteristics

DC PARAMETERS (Continued)

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
I _{ol}	Logical "0" Output Current	V _{cc} = 5V, V _{out} = .4V			.51		mA	1
					.36		mA	2
					.64		mA	3
		V _{cc} = 10V, V _{out} = .5V			1.3		mA	1
					.9		mA	2
					1.6		mA	3
		V _{cc} = 15V, V _{out} = 1.5V	3		3.4		mA	1
			3		2.4		mA	2
			3		4.2		mA	3
V _{il}	Logical "0" Input Voltage	V _{cc} = 5V, V _{out} = .5V or 4.5V	1			1.5	V	1, 2, 3
		V _{cc} = 10V, V _{out} = 1V or 9V	1			3	V	1, 2, 3
		V _{cc} = 15V, V _{out} = 1.5V or 13.5V	1			4	V	1, 2, 3
V _{ih}	Logical "1" Input Voltage	V _{cc} = 5V, V _{out} = .5V or 4.5V	1		3.5		V	1, 2, 3
		V _{cc} = 10V, V _{out} = 1V or 9V	1		7		V	1, 2, 3
		V _{cc} = 15V, V _{out} = 1.5V or 13.5V	1		11		V	1, 2, 3
		Continuity Tests	5					1, 2, 3

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: C_l = 50pF, R_l = 200K Ohms, t_r=t_f=20nS or equivalent impedance provided by diode load.

t _{PLH}	Propagation Delay Time: From Count Up or Down Count to Q	V _{cc} = 5V	4			400	nS	9
			4			500	nS	10, 11
		V _{cc} = 10V	2			160	nS	9
			2			200	nS	10, 11
		V _{cc} = 15V	2			130	nS	9
			2			163	nS	10, 11

Electrical Characteristics

AC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: $C_1 = 50\text{pF}$, $R_1 = 200\text{K Ohms}$, $t_r=t_f=20\text{nS}$ or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPHL	Propagation Delay Time: From Count Up or Down Count to Q	Vcc = 5V	4			400	nS	9
			4			500	nS	10, 11
		Vcc = 10V	2			160	nS	9
			2			200	nS	10, 11
		Vcc = 15V	2			130	nS	9
			2			163	nS	10, 11
tPHL	Propagation Delay Time: From Count Up to Carry	Vcc = 5V	4			200	nS	9
			4			250	nS	10, 11
		Vcc = 10V	2			80	nS	9
			2			100	nS	10, 11
		Vcc = 15V	2			65	nS	9
			2			81	nS	10, 11
tPLH	Propagation Delay Time: From Count Up to Carry	Vcc = 5V	4			200	nS	9
			4			250	nS	10, 11
		Vcc = 10V	2			80	nS	9
			2			100	nS	10, 11
		Vcc = 15V	2			65	nS	9
			2			81	nS	10, 11
tPLH	Propagation Delay Time: From Load to Q	Vcc = 5V	4			480	nS	9
			4			600	nS	10, 11
		Vcc = 10V	2			190	nS	9
			2			238	nS	10, 11
		Vcc = 15V	2			150	nS	9
			2			188	nS	10, 11
tPHL	Propagation Delay Time: From Load to Q	Vcc = 5V	4			480	nS	9
			4			600	nS	10, 11
		Vcc = 10V	2			190	nS	9
			2			238	nS	10, 11
		Vcc = 15V	2			150	nS	9
			2			188	nS	10, 11

Electrical Characteristics

AC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: $C_1 = 50\text{pF}$, $R_1 = 200\text{K Ohms}$, $t_r=t_f=20\text{nS}$ or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPHL	Propagation Delay Time: From Clear to Q	Vcc = 5V	4			220	nS	9
			4			275	nS	10, 11
		Vcc = 10V	2			100	nS	9
			2			125	nS	10, 11
		Vcc = 15V	2			80	nS	9
			2			100	nS	10, 11
tPHL	Propagation Delay Time: From Count Down to Borrow	Vcc = 5V	4			200	nS	9
			4			250	nS	10, 11
		Vcc = 10V	2			80	nS	9
			2			100	nS	10, 11
		Vcc = 15V	2			65	nS	9
			2			81	nS	10, 11
tPLH	Propagation Delay Time: From Count Down to Borrow	Vcc = 5V	4			200	nS	9
			4			250	nS	10, 11
		Vcc = 10V	2			80	nS	9
			2			100	nS	10, 11
		Vcc = 15V	2			65	nS	9
			2			81	nS	10, 11
tTLH	Output Transition Time	Vcc = 5V	4			200	nS	9
			4			250	nS	10, 11
		Vcc = 10V	2			100	nS	9
			2			125	nS	10, 11
		Vcc = 15V	2			80	nS	9
			2			100	nS	10, 11
tTHL	Output Transition Time	Vcc = 5V	4			200	nS	9
			4			250	nS	10, 11
		Vcc = 10V	2			100	nS	9
			2			125	nS	10, 11
		Vcc = 15V	2			80	nS	9
			2			100	nS	10, 11

Electrical Characteristics

AC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: $C_1 = 50\text{pF}$, $R_1 = 200\text{K Ohms}$, $t_r=t_f=20\text{nS}$ or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tSU	Time Prior to Load that Data Must be Present	Vcc = 5V	2			160	nS	9
			2			200	nS	10, 11
		Vcc = 10V	2			50	nS	9
			2			63	nS	10, 11
		Vcc = 15V	2			40	nS	9
			2			50	nS	10, 11
fCL	Maximum Count Frequency	Vcc = 5V	2		2.5		MHz	9
			2		3.1		MHz	10, 11
		Vcc = 10V	2		6		MHz	9
			2		8		MHz	10, 11
		Vcc = 15V	2		7.5		MHz	9
			2		9.3		MHz	10, 11
tRCL	Maximum Count Rise Time	Vcc = 5V	2		15		uS	9
			2		19		uS	10, 11
		Vcc = 10V	2		5		uS	9
			2		6		uS	10, 11
		Vcc = 15V	2		1		uS	9
			2		1.2		uS	10, 11
tFCL	Maximum Count Fall Time	Vcc = 5V	2		15		uS	9
			2		19		uS	10, 11
		Vcc = 10V	2		5		uS	9
			2		6		uS	10, 11
		Vcc = 15V	2		1		uS	9
			2		1.2		uS	10, 11
tWH	Minimum Count Pulse Width	Vcc = 5V	2			200	nS	9
			2			250	nS	10, 11
		Vcc = 10V	2			80	nS	9
			2			100	nS	10, 11
		Vcc = 15V	2			65	nS	9
			2			81	nS	10, 11

Electrical Characteristics

AC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
 AC: $C_1 = 50\text{pF}$, $R_1 = 200\text{K Ohms}$, $t_r=t_f=20\text{nS}$ or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tWL	Minimum Count Pulse Width	Vcc = 5V	2			200	nS	9
			2			250	nS	10, 11
		Vcc = 10V	2			80	nS	9
			2			100	nS	10, 11
		Vcc = 15V	2			65	nS	9
			2			81	nS	10, 11
tWH	Minimum Clear Pulse Width	Vcc = 5V	2			480	nS	9
			2			600	nS	10, 11
		Vcc = 10V	2			190	nS	9
			2			238	nS	10, 11
		Vcc = 15V	2			150	nS	9
			2			188	nS	10, 11
tWL	Minimum Load Pulse Width	Vcc = 5V	2			160	nS	9
			2			200	nS	10, 11
		Vcc = 10V	2			65	nS	9
			2			81	nS	10, 11
		Vcc = 15V	2			55	nS	9
			2			69	nS	10, 11
Cin	Average Input Capacitance	Load & Data Inputs (A,B,C,D)	2			7.5	pF	9
			2			9.3	pF	10, 11
		Count Up, Count Down & Clear	2			15	pF	9
			2			19	pF	10, 11
		Continuity Tests	5					9, 10, 11

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

Note 2: Guaranteed parameter not tested.

Note 3: Applies to Class "S" only, except 38510. Drift Limits at 25 C for $I_{dd} = \pm 5\mu\text{A}$, I_{oh} & $I_{ol} = \pm 15\%$. "THIS NOTE IS INVALID AND CURRENTLY BEING UPDATED. CONTACT FACTORY."

Note 4: Tested at 25 C, guaranteed but not tested at +125 C & -55 C.

Note 5: Engineering setup tests, no limits.