



**MILITARY DATA SHEET**

**MNCD4013BM-X REV 0AL**

Original Creation Date: 10/05/95  
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**DUAL D FLIP-FLOP**

**Industry Part Number**

CD4013BM

**NS Part Numbers**

CD4013BMJ/883  
CD4013BMW/883

**Prime Die**

CD4013BM

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**Processing**

MIL-STD-883, Method 5004

**Quality Conformance Inspection**

MIL-STD-883, Method 5005

<b>Subgrp</b>	<b>Description</b>	<b>Temp (°C)</b>
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
Vol	Logical "0" Output Voltage	Vdd = 5V, Vih = 5V, Vil = 0V, Iout < 1uA			.05		V	1, 2, 3
		Vdd = 10V, Vih = 10V, Vil = 0V, Iout < 1uA			.05		V	1, 2, 3
		Vdd = 15V, Vih = 15V, Vil = 0V, Iout < 1uA			.05		V	1, 2, 3
Voh	Logical "1" Output Voltage	Vdd = 5V, Vih = 5V, Vil = 0V, Iout < 1uA			4.95		V	1, 2, 3
		Vdd = 10V, Vih = 10V, Vil = 0V, Iout < 1uA			9.95		V	1, 2, 3
		Vdd = 15V, Vih = 15V, Vil = 0V, Iout < 1uA			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
Ioh	Logical "1" Output Current	Vdd = 5V, Vih = 5V, Vil = 0V, Vout = 4.6V				-.51	mA	1
						-.36	mA	2
						-.64	mA	3
		Vdd = 10V, Vih = 10V, Vil = 0V, Vout = 9.5V				-1.3	mA	1
						-.9	mA	2
						-1.6	mA	3
		Vdd = 15V, Vih = 15V, Vil = 0V, Vout = 13.5V	3			-3.4	mA	1
			3			-2.4	mA	2
			3			-4.2	mA	3
Iol	Logical "0" Output Current	Vdd = 5V, Vih = 5V, Vil = 0V, Vout = .4V				.51	mA	1
						.36	mA	2
						.64	mA	3
		Vdd = 10V, Vih = 10V, Vil = 0V, Vout = .5V				1.3	mA	1
						.9	mA	2
						1.6	mA	3
		Vdd = 15V, Vih = 15V, Vil = 0V, Vout = 1.5V	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 <sub>dd</sub>	Power Supply Current	V <sub>dd</sub> = 5V, V <sub>ih</sub> = 5V, V <sub>il</sub> = 0V,			1		μA	1, 3
					30		μA	2
		V <sub>dd</sub> = 10V, V <sub>ih</sub> = 10V, V <sub>il</sub> = 0V,			2		μA	1, 3
					60		μA	2
		V <sub>dd</sub> = 15V, V <sub>ih</sub> = 15V, V <sub>il</sub> = 0V,	5		4		μA	1, 3
5			120		μA	2		
V <sub>ih</sub>	Logical "1" Input Voltage	V <sub>dd</sub> = 5V, V <sub>out</sub> = .5V or 4.5V	1		3.5		V	1, 2, 3
		V <sub>dd</sub> = 10V, V <sub>out</sub> = 1V or 9V	1		7		V	1, 2, 3
		V <sub>dd</sub> = 15V, V <sub>out</sub> = 1.5V or 13.5V	1		11		V	1, 2, 3
V <sub>il</sub>	Logical "0" Input Voltage	V <sub>dd</sub> = 5V, V <sub>out</sub> = .5V or 4.5V	1			1.5	V	1, 2, 3
		V <sub>dd</sub> = 10V, V <sub>out</sub> = 1V or 9V	1			3	V	1, 2, 3
		V <sub>dd</sub> = 15V, V <sub>out</sub> = 1.5V or 13.5V	1			4	V	1, 2, 3

### AC PARAMETERS

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

AC: C<sub>l</sub> = 50pF, R<sub>l</sub> = 200K Ohms or equivalent impedance provided by diode load.

t <sub>PHL</sub>	Propagation Delay Time: Clock	V <sub>dd</sub> = 5V	4		1	350	nS	9
			4		1	437	nS	10, 11
		V <sub>dd</sub> = 10V	2			160	nS	9
			2			240	nS	10, 11
		V <sub>dd</sub> = 15V	2			120	nS	9
			2			180	nS	10, 11
t <sub>PLH</sub>	Propagation Delay Time: Clock	V <sub>dd</sub> = 5V	4		1	350	nS	9
			4		1	437	nS	10, 11
		V <sub>dd</sub> = 10V	2			160	nS	9
			2			240	nS	10, 11
		V <sub>dd</sub> = 15V	2			120	nS	9
			2			180	nS	10, 11

## Electrical Characteristics

### AC PARAMETERS (Continued)

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

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPHL	Propagation Delay Time: Set & Reset	Vdd = 5V	4		1	300	nS	9
			4		1	375	nS	10, 11
		Vdd = 10V	2			130	nS	9
			2			195	nS	10, 11
		Vdd = 15V	2			90	nS	9
			2			135	nS	10, 11
tPLH	Propagation Delay Time: Set & Reset	Vdd = 5V	4		1	300	nS	9
			4		1	375	nS	10, 11
		Vdd = 10V	2			130	nS	9
			2			195	nS	10, 11
		Vdd = 15V	2			90	nS	9
			2			135	nS	10, 11
tTHL	Transition Time	Vdd = 5V	4		1	200	nS	9
			4		1	250	nS	10, 11
tTLH	Transition Time	Vdd = 5V	4		1	200	nS	9
			4		1	250	nS	10, 11
tPW	Minimum Clock Pulse	Vdd = 5V	4		200		nS	9, 10, 11
			2		80		nS	9
		Vdd = 10V	2		120		nS	10, 11
			2		65		nS	9
tW	Min Set And Reset Pulse Width	Vdd = 5V	4		180		nS	9
			4		270		nS	10, 11
		Vdd = 10V	2		80		nS	9
			2		120		nS	10, 11
Vdd = 15V	2		50		nS	9		
	2		75		nS	10, 11		

## Electrical Characteristics

### AC PARAMETERS (Continued)

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

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tSETUP	Setup Time (Clock)	Vdd = 5V	4		40		nS	9, 10, 11
		Vdd = 10V	2		30		nS	9
			2		45		nS	10, 11
		Vdd = 15V	2		25		nS	9
			2		37		nS	10, 11
fMAX	Maximum Clock	Vdd = 5V	4		3.5		MHz	9
			4		2.5		MHz	10, 11
		Vdd = 10V	2		8.0		MHz	9
			2		3.1		MHz	10, 11
		Vdd = 15V	2		12.0		MHz	9
2			3.8		MHz	10, 11		
tr,tf	CP Rise and Fall Time	Vdd = 5V	2			15	uS	9
		Vdd = 10V	2			10	uS	9
		Vdd = 15V	2			5	uS	9

- Note 1: Parameter tested go-no-go only.
- Note 2: Guaranteed parameter not tested.
- Note 3:  $\pm 15\%$  of the reading, and also Applies to Class "S" only, except 38510.
- Note 4: Tested at 25 C; guaranteed but not tested at +125 C and -55 C.
- Note 5: Applies to Class "S" only, except 38510. Drift Limits at 25 C for  $I_{dd} = \pm 1\mu\text{A}$ . "THIS NOTE IS INVALID AND CURRENTLY BEING UPDATED. CONTACT FACTORY."