



MILITARY DATA SHEET

MNCD4013BM-X REV 0AL

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DUAL D FLIP-FLOP

Industry Part Number

CD4013BM

NS Part Numbers

CD4013BMJ/883
CD4013BMW/883

Prime Die

CD4013BM

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
V _{ol}	Logical "0" Output Voltage	V _{dd} = 5V, V _{ih} = 5V, V _{il} = 0V, I _{out} < 1uA				.05	V	1, 2, 3
		V _{dd} = 10V, V _{ih} = 10V, V _{il} = 0V, I _{out} < 1uA				.05	V	1, 2, 3
		V _{dd} = 15V, V _{ih} = 15V, V _{il} = 0V, I _{out} < 1uA				.05	V	1, 2, 3
V _{oh}	Logical "1" Output Voltage	V _{dd} = 5V, V _{ih} = 5V, V _{il} = 0V, I _{out} < 1uA			4.95		V	1, 2, 3
		V _{dd} = 10V, V _{ih} = 10V, V _{il} = 0V, I _{out} < 1uA			9.95		V	1, 2, 3
		V _{dd} = 15V, V _{ih} = 15V, V _{il} = 0V, I _{out} < 1uA			14.95		V	1, 2, 3
I _{ih}	Logical "1" Input Current	V _{dd} = 15V, V _{in} = 15V				100	nA	1, 3
						1000	nA	2
I _{il}	Logical "0" Input Current	V _{dd} = 15V, V _{in} = 0V				-100	nA	1, 3
						-1000	nA	2
I _{oh}	Logical "1" Output Current	V _{dd} = 5V, V _{ih} = 5V, V _{il} = 0V, V _{out} = 4.6V			-.51		mA	1
					-.36		mA	2
					-.64		mA	3
		V _{dd} = 10V, V _{ih} = 10V, V _{il} = 0V, V _{out} = 9.5V			-1.3		mA	1
					-.9		mA	2
					-1.6		mA	3
		V _{dd} = 15V, V _{ih} = 15V, V _{il} = 0V, V _{out} = 13.5V	3		-3.4		mA	1
			3		-2.4		mA	2
			3		-4.2		mA	3
I _{ol}	Logical "0" Output Current	V _{dd} = 5V, V _{ih} = 5V, V _{il} = 0V, V _{out} = .4V			.51		mA	1
					.36		mA	2
					.64		mA	3
		V _{dd} = 10V, V _{ih} = 10V, V _{il} = 0V, V _{out} = .5V			1.3		mA	1
					.9		mA	2
					1.6		mA	3
		V _{dd} = 15V, V _{ih} = 15V, V _{il} = 0V, V _{out} = 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 _{dd}	Power Supply Current	V _{dd} = 5V, V _{ih} = 5V, V _{il} = 0V,			1		μA	1, 3
					30		μA	2
		V _{dd} = 10V, V _{ih} = 10V, V _{il} = 0V,			2		μA	1, 3
					60		μA	2
		V _{dd} = 15V, V _{ih} = 15V, V _{il} = 0V,	5		4		μA	1, 3
			5		120		μA	2
V _{ih}	Logical "1" Input Voltage	V _{dd} = 5V, V _{out} = .5V or 4.5V	1		3.5		V	1, 2, 3
		V _{dd} = 10V, V _{out} = 1V or 9V	1		7		V	1, 2, 3
		V _{dd} = 15V, V _{out} = 1.5V or 13.5V	1		11		V	1, 2, 3
V _{il}	Logical "0" Input Voltage	V _{dd} = 5V, V _{out} = .5V or 4.5V	1			1.5	V	1, 2, 3
		V _{dd} = 10V, V _{out} = 1V or 9V	1			3	V	1, 2, 3
		V _{dd} = 15V, V _{out} = 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_l = 50pF, R_l = 200K Ohms or equivalent impedance provided by diode load.

t _{PHL}	Propagation Delay Time: Clock	V _{dd} = 5V	4		1	350	nS	9
			4		1	437	nS	10, 11
		V _{dd} = 10V	2			160	nS	9
			2			240	nS	10, 11
		V _{dd} = 15V	2			120	nS	9
			2			180	nS	10, 11
t _{PLH}	Propagation Delay Time: Clock	V _{dd} = 5V	4		1	350	nS	9
			4		1	437	nS	10, 11
		V _{dd} = 10V	2			160	nS	9
			2			240	nS	10, 11
		V _{dd} = 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: $C_1 = 50\text{pF}$, $R_1 = 200\text{K Ohms}$ or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
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
		Vdd = 10V	2		80		nS	9
			2		120		nS	10, 11
		Vdd = 15V	2		65		nS	9
			2		97		nS	10, 11
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 Idd = $\pm 1\mu\text{A}$. "THIS NOTE IS INVALID AND CURRENTLY BEING UPDATED. CONTACT FACTORY."