

MNCD4052BM-X REV 1A0

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DUAL 4-CHANNEL ANALOG MULTIPLEXER/DEMULTIPLEXER

General Description

These analog multiplexers/demultiplexers are digitally controlled analog switches having low "ON" impedance and very low "OFF" leakage currents. Control of analog signals up to 15Vp-p can be achieved by digital signal amplitudes of 3-15V. For example, if Vdd = 5V, Vss = 0V, and Vee = -5V, analog signals from -5V to +5V can be controlled by digital inputs of 0-5V. The multiplexer circuits dissipate extremely low quiescent power over the full Vdd-Vss and Vdd-Vee supply voltage ranges, independent of the logic state of the control signals. When a logical "1" is present at the inhibit input terminal all channels are "OFF".

CD4052BM is a differential 4-channel multiplexer having two binary control inputs, A and B, and an inhibit input. The two binary input signals select 1 or 4 pairs of channels to be turned on and connect the differential analog inputs to the differential outputs.

Industry Part Number

CD4052BM

NS Part Numbers

 CD4052BMJ/883
 CD4052BMW/883

Prime Die

CD4052BM

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

Features

- Wide range of digital and analog signal levels: digital 3-15V, analog to 15Vp-p
- Low "ON" resistance: 80 Ohms (typ.) over entire 15Vp-p signal-input range for Vdd-Vee = 15V
- High "OFF" resistance: channel leakage of ± 10 pA (typ.) at Vdd-Vee = 10V
- Logic level conversion for digital addressing signals of 3-15V (Vdd-Vss = 3-15V) to switch analog signals to 15Vp-p (Vdd-Vee = 15V)
- Matched switch characteristics: $\Delta R_{ON} = 5$ Ohms (typ.) for Vdd-Vee = 15V
- Very low quiescent power dissipation under all digital-control input and supply conditions: 1uW (typ.) at Vdd-Vss = Vdd-Vee = 10V
- Binary address decoding on chip

(Absolute Maximum Ratings)

DC Supply Voltage (Vdd)	-0.5Vdc to +18Vdc
Input Voltage (Vin)	-0.5Vdc 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

Recommended Operating Conditions

DC Supply Voltage (Vdd)	+5Vdc to +15Vdc
Input Voltage (Vin)	0V to Vdd Vdc
Operating Temperature Range (TA)	
CD4052BM	-55 C to +125 C

Electrical Characteristics

DC PARAMETERS

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Iih	Logical "1" Input Current	Vcc = 15V, Vin = 15V, Vee = 0V				0.1	uA	1, 3
						1	uA	2
Iil	Logical "0" Input Current	Vcc = 15V, Vin = 0V, Vee = 0V				-0.1	uA	1, 3
						-1	uA	2
Idd	Quiescent Device Current	Vcc = 5V				5	uA	1, 3
						150	uA	2
		Vcc = 10V				10	uA	1, 3
						300	uA	2
		Vcc = 15V				20	uA	1, 3
						600	uA	2
Ioff1	Off Channel Leakage Current	Vcc = +7.5V, Vee = -7.5V, Vin(Inhibit) = 7.5V, Vin(I/O) = 7.5V, Meas. Vout(O/I) = 0V				-200	nA	1, 3
						-2000	nA	2
		Vcc = 7.5V, Vee = -7.5V, Vin(Inhibit) = 7.5V, Vin(I/O) = -7.5V, Meas. Vout(O/I) = 0V				+200	nA	1, 3
						+2000	nA	2
Ioff2	Off Channel Leakage Current	Vcc = 7.5V, Vee = -7.5V, Vin(Inhibit) = 7.5V, Vout(O/I) = 7.5V, Meas. Vin(I/O) = 0V				-50	nA	1, 3
						-500	nA	2
		Vcc = 7.5V, Vee = -7.5V, Vin(Inhibit) = 7.5V, Vout(O/I) = -7.5V, Meas. Vin(I/O) = 0V				+50	nA	1, 3
						+500	nA	2
Ron	"ON" Resistance	Vcc = 2.5V, Vee = -2.5V, Vih = 1.6V, Vil = 1V, Vout(O/I) = 1.6V, Iout = IoutA(min)				2500	Ohms	1
						2000	Ohms	3
		Vcc = 2.5V, Vee = -2.5V, Vih = 1.4V, Vil = 1V, Vout(O/I) = 1.40V, Iout = IoutA(min)				3500	Ohms	2
		Vcc = 5V, Vee = -5V, Vih = 4.6V, Vil = 4V, Vout(O/I) = 4.6V, Iout = IoutB(min)				400	Ohms	1
						310	Ohms	3
		Vcc = 5V, Vee = -5V, Vih = 4.4V, Vil = 4V, Vout(O/I) = 4.40V, Iout = IoutB(min)				580	Ohms	2
		Vcc = 7.5V, Vee = -7.5V, Vih = 6.85V, Vil = 6.25V, Vout(O/I) = 6.85V, Iout = IoutC(min)				280	Ohms	1
						220	Ohms	3
		Vcc = 7.5V, Vee = -7.5V, Vih = 6.65V, Vil = 6.25V, Vout(O/I) = 6.65V, Iout = IoutC(min)				400	Ohms	2

Electrical Characteristics

DC PARAMETERS(Continued)

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IoutA	"ON" Resistance				0.24		mA	1
					0.12		mA	2
					0.30		mA	3
IoutB	"ON" Resistance				1.50		mA	1
					0.69		mA	2
					1.93		mA	3
IoutC	"ON" Resistance				2.14		mA	1
					1.00		mA	2
					2.72		mA	3
Vil	Logical "0" Input Voltage	Vcc = 5V	1			1.5	V	1, 2, 3
		Vcc = 10V	1			3	V	1, 2, 3
		Vcc = 15V	1			4	V	1, 2, 3
Vih	Logical "1" Input Voltage	Vcc = 5V	1		3.5		V	1, 2, 3
		Vcc = 10V	1		7		V	1, 2, 3
		Vcc = 15V	1		11		V	1, 2, 3

AC PARAMETERS

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

AC: tr = tf = 20nS, Cl = 50pF, Vee = Vss = 0V, or equivalent impedance provided by diode load.

tPZL	Propagation Delay Time: From Inhibit to Signal Output (Channel turning On)	Vdd = 5V, Rl = 1K Ohm	3			1200	nS	9
			3			1680	nS	10
			3			960	nS	11
		Vdd = 10V, Rl = 1K Ohm	3			450	nS	9
			3			630	nS	10
			3			360	nS	11
		Vdd = 15V, Rl = 1K Ohm	2			320	nS	9
			2			450	nS	10
			2			260	nS	11

Electrical Characteristics

AC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: $t_r = t_f = 20\text{ns}$, $C_l = 50\text{pF}$, $V_{ee} = V_{ss} = 0\text{V}$, or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPZH	Propagation Delay Time: From Inhibit to Signal Output (Channel Turning On)	Vdd = 5V, Rl = 1K Ohm	3			1200	nS	9
			3			1680	nS	10
			3			960	nS	11
		Vdd = 10V, Rl = 1K Ohm	3			450	nS	9
			3			630	nS	10
			3			360	nS	11
		Vdd = 15V, Rl = 1K Ohm	2			320	nS	9
			2			450	nS	10
			2			260	nS	11
tPLZ	Propagation Delay Time: From Inhibit to Signal Output (Channel Turning Off)	Vdd = 5V, Rl = 1K Ohm	3			420	nS	9
			3			590	nS	10
			3			335	nS	11
		Vdd = 10V, Rl = 1K Ohm	3			200	nS	9
			3			280	nS	10
			3			160	nS	11
		Vdd = 15V	2			150	nS	9
			2			210	nS	10
			2			120	nS	11
tPHZ	Propagation Delay Time: From Inhibit to Signal Output (Channel Turning Off)	Vdd = 5V, Rl = 1K Ohm	3			420	nS	9
			3			590	nS	10
			3			335	nS	11
		Vdd = 10V, Rl = 1K Ohm	3			200	nS	9
			3			280	nS	10
			3			160	nS	11
		Vdd = 15V	2			150	nS	9
			2			210	nS	10
			2			120	nS	11
Cin	Input Capacitance	Control input	2			7.5	pF	9
		Signal Input (In/Out)	2			15	pF	9

Electrical Characteristics

AC PARAMETERS: SIGNAL INPUTS (VIS) & OUTPUTS (VOS):

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: $t_r = t_f = 20\text{nS}$, $C_l = 50\text{pF}$, $V_{ee} = V_{ss} = 0\text{V}$, or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPHL	Propagation Delay Signal Input to Signal Output	Vdd = 5V	3			55	nS	9
			3			80	nS	10
			3			45	nS	11
		Vdd = 10V	3			35	nS	9
			3			50	nS	10
			3			30	nS	11
		Vdd = 15V	2			25	nS	9
			2			35	nS	10
			2			20	nS	11
tPLH	Propagation Delay Signal Input to Signal Output	Vdd = 5V	3			55	nS	9
			3			80	nS	10
			3			45	nS	11
		Vdd = 10V	3			35	nS	9
			3			50	nS	10
			3			30	nS	11
		Vdd = 15V	2			25	nS	9
			2			35	nS	10
			2			20	nS	11

Electrical Characteristics

AC PARAMETERS: CONTROL INPUTS A, B, C AND INHIBIT:

(The following conditions apply to all the following parameters, unless otherwise specified.)
 AC: $t_r = t_f = 20\text{ns}$, $C_l = 50\text{pF}$, $V_{ee} = V_{ss} = 0\text{V}$, or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPHL	Propagation Delay Time from Address to Signal Output (Channels "ON" or "OFF")	Vdd = 5V	3			1000	nS	9
			3			1400	nS	10
			3			800	nS	11
		Vdd = 10V	3			360	nS	9
			3			505	nS	10
			3			290	nS	11
		Vdd = 15V	2			240	nS	9
			2			335	nS	10
			2			190	nS	11
tPLH	Propagation Delay Time from Address to Signal Output (Channels "ON" or "OFF")	Vdd = 5V	3			1000	nS	9
			3			1400	nS	10
			3			800	nS	11
		Vdd = 10V	3			360	nS	9
			3			505	nS	10
			3			290	nS	11
		Vdd = 15V	2			240	nS	9
			2			335	nS	10
			2			190	nS	11

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

Note 2: Guaranteed parameter not tested.

Note 3: Tested at 25 C; guaranteed but not tested at +125 C and -55 C.