

DESCRIPTION

The CD4051BM96-CN analog multiplexers and demultiplexers are digitally-controlled analog switches having low ON impedance and very low OFF leakage current. These multiplexer circuits dissipate extremely low quiescent power over the full VDD-VSS and VDD-GND supply-voltage ranges, independent of the logic state of the control signals.

The CD4051BM96-CN is available in a SOP16 package.

FEATURES

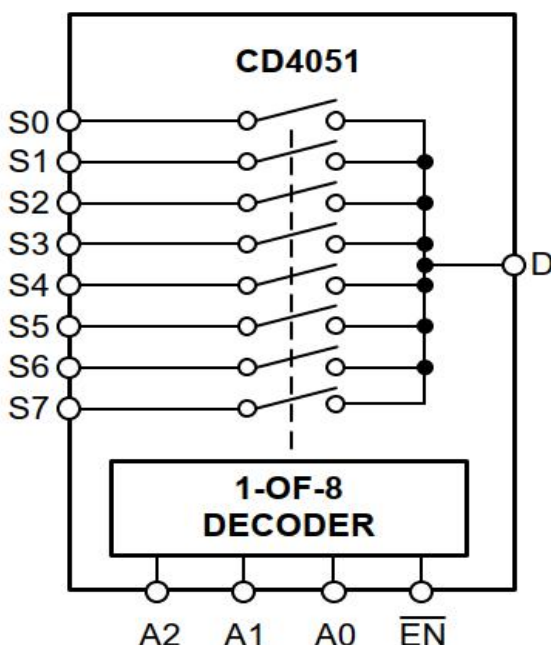
- Wide Supply voltage Range from 3V to 15V
- Break-before-make switching

- Low on-state resistance: 55Ω (VDD-VSS=15V)
- Very low static power consumption and high off-state resistance
- Analogue switch on-resistance difference: $\Delta R_{ON}=5\Omega$ (VDD-VSS=15V)
- Built-in analogue switches control address decoder and level shifter

APPLICATIONS

- Analog multiplexing and demultiplexing
- Digital multiplexing and demultiplexing
- Factory automation and control
- Appliances
- Building automation

Simplified Schematic

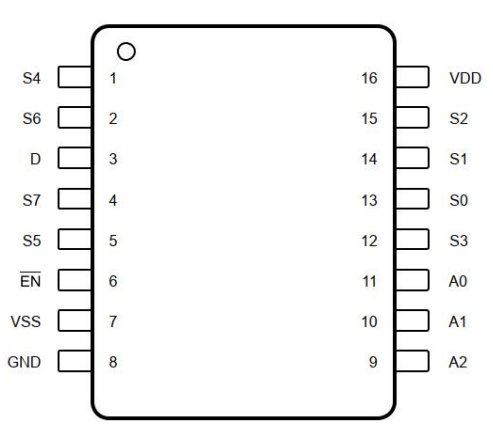


Function Table

INPUT				Channel ON
$\overline{EN}$	A2	A1	A0	
0	0	0	0	S0 to D
0	0	0	1	S1 to D
0	0	1	0	S2 to D
0	0	1	1	S3 to D
0	1	0	0	S4 to D
0	1	0	1	S5 to D
0	1	1	0	S6 to D
0	1	1	1	S7 to D
1	X	X	X	None

Note: X= Don't care

Pin Configuration

Pin No	Pin name	Description	Pin Diagram
1	S4	independent input or output	
2	S6	independent input or output	
3	D	common output or input	
4	S7	independent input or output	
5	S5	independent input or output	
6	$\overline{\text{EN}}$	enable input(active low)	
7	VSS	supply voltage	
8	GND	ground	
9	A2	select input	
10	A1	select input	
11	A0	select input	
12	S3	independent input or output	
13	S0	independent input or output	
14	S1	independent input or output	
15	S2	independent input or output	
16	VDD	supply voltage	

Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted)

PARAMETER	MIN	MAX	UNIT
Supply Voltage		18	V
Input voltage		$V_{DD}+0.5$	V
Input current		± 10	mA
Maximum Junction Temperature		+150	°C
Storage Temperature Range	-65	+150	°C
Lead Temperature(soldering, 10sec)		+260	°C

Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

PARAMETER	MIN	TYP	MAX	UNIT
Supply Voltage	3		15	V
Input voltage	0		V_{DD}	V
Operating Temperature Range	-20	+25	+85	°C

Electrical Characteristics

(At $T_A=+25^{\circ}\text{C}$, $V_{SS}=0\text{V}$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
Supply Current	I_{DD}	$V_{DD}=5\text{V}$		0	-	20	μA
		$V_{DD}=10\text{V}$		0	-	40	
		$V_{DD}=15\text{V}$		0	-	80	
ON resistance	R_{ON}	$V_{DD}=2.5\text{V}$, $V_{SS}=-2.5\text{V}$, or $V_{DD}=5\text{V}$, $V_{SS}=0\text{V}$		-	180	1050	Ω
		$V_{DD}=5\text{V}$, $V_{SS}=-5\text{V}$, or $V_{DD}=10\text{V}$, $V_{SS}=0\text{V}$		-	70	400	
		$V_{DD}=7.5\text{V}$, $V_{SS}=-7.5\text{V}$, or $V_{DD}=15\text{V}$, $V_{SS}=0\text{V}$		-	55	240	
ON resistance mismatch between channels	ΔR_{on}	$V_{DD}=2.5\text{V}$, $V_{SS}=-2.5\text{V}$, or $V_{DD}=5\text{V}$, $V_{SS}=0\text{V}$		-	10	-	Ω
		$V_{DD}=5\text{V}$, $V_{SS}=-5\text{V}$, or $V_{DD}=10\text{V}$, $V_{SS}=0\text{V}$		-	10	-	
		$V_{DD}=7.5\text{V}$, $V_{SS}=-7.5\text{V}$, or $V_{DD}=15\text{V}$, $V_{SS}=0\text{V}$		-	5	-	
OFF Channel Leakage Current Any Channel OFF	I_{OFF}	$V_{DD}=7.5\text{V}$, $V_{SS}=-7.5\text{V}$, $O/I=\pm 7.5\text{V}$, $I/O=0\text{V}$		-	± 0.01	± 50	nA
OFF Channel Leakage Current ALL Channels OFF		$\overline{\text{EN}}=7.5\text{V}$		-	± 0.04	± 200	nA
Input Low Voltage	V_{IL}	$ I_O < 1\mu\text{A}$	$V_{DD}=5\text{V}$	-	-	1.5	V
			$V_{DD}=10\text{V}$	-	-	3.0	
			$V_{DD}=15\text{V}$	-	-	4.0	
Input High Voltage	V_{IH}	$ I_O < 1\mu\text{A}$	$V_{DD}=5\text{V}$	3.5	-	-	V
			$V_{DD}=10\text{V}$	7	-	-	
			$V_{DD}=15\text{V}$	11	-	-	
Input current	I_{IN}	$V_{IN}=0\text{V}$	$V_{DD}=15\text{V}$	-	-10^{-5}	-0.3	μA
		$V_{IN}=15\text{V}$		-	10^{-5}	0.3	

AC Performance Characteristics

(At $T_A=+25^{\circ}\text{C}$, $V_{SS}=0\text{V}$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
Propagation Delay Time (open channel)	t_{PZH} t_{PZL}	$R_L=1\text{K}\Omega$, $C_L=50\text{pF}$	$V_{DD}=5\text{V}$	-	-	1200	ns
			$V_{DD}=10\text{V}$	-	-	450	
			$V_{DD}=15\text{V}$	-	-	320	
Propagation Delay Time (off channel)	t_{PHZ} t_{PLZ}	$R_L=1\text{K}\Omega$, $C_L=50\text{pF}$	$V_{DD}=5\text{V}$	-	-	420	ns
			$V_{DD}=10\text{V}$	-	-	200	
			$V_{DD}=15\text{V}$	-	-	150	

Input capacitance	C_{IN}	-	$V_{DD}=10V$	-	-	7.5	pF
Output capacitance	C_{out}	-	$V_{DD}=10V$	-	15	-	pF
Bypass Capacitors	C_{IOS}	-	$V_{DD}=10V$	-	0.2	-	pF
Power Dissipation Capacitors	C_{PO}	-	$V_{DD}=10V$	-	140	-	pF
Sine Wave Distortion		$R_L=10K\Omega$, $f_{IS}=1KHz$, $V_{IS}=5V_{pp}$, $V_{SI}=0V$	$V_{DD}=10V$	-	0.04	-	%
Sine Wave Frequency Response		$R_L=1K\Omega$, $V_{IS}=5V_{pp}$, $20\log_{10}(V_{OS}/V_{IS})=-40dB$	$V_{DD}=10V$	-	40	-	MHz
Off-state Crosstalk Frequency		$R_L=1K\Omega$, $V_{IS}=5V_{pp}$, $20\log_{10}(V_{OS}/V_{IS})=-40dB$	$V_{DD}=10V$	-	10	-	MHz
Signal Crosstalk Frequency		$R_L=1K\Omega$, $V_{IS}=5V_{pp}$, $20\log_{10}(V_{OS}/V_{IS})=-40dB$	$V_{DD}=10V$	-	3	-	MHz
Signal input to output Propagation Delay	t_{PHL} t_{PLH}	$C_L=50pF$	$V_{DD}=5V$	-	25	55	ns
			$V_{DD}=10V$	-	15	35	
			$V_{DD}=15V$	-	10	25	
Control input to signal response		$R_L=10K\Omega$	$V_{DD}=10V$	-	65	-	ns
Propagation delay time From addressing to signal output Channel is on or off	t_{PHL} t_{PLH}	$C_L=50pF$	$V_{DD}=5V$	-	300	1000	ns
			$V_{DD}=10V$	-	100	350	
			$V_{DD}=15V$	-	70	240	

Parameter Measurement Information

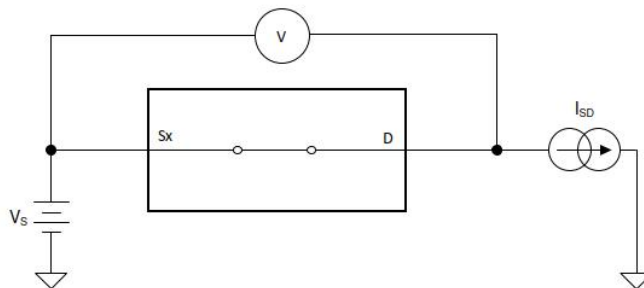


Figure 1. On-Resistance Measurement Setup

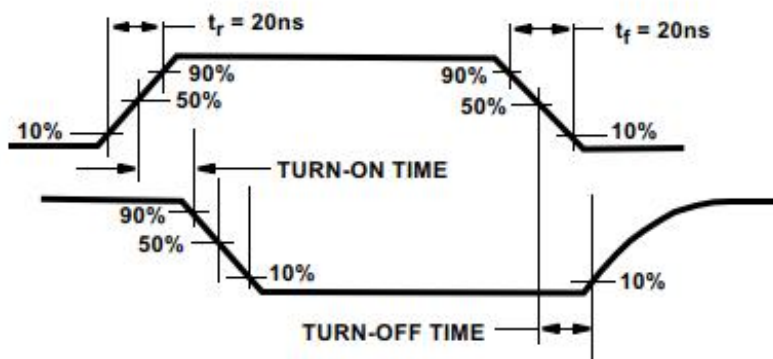


Figure 2. Waveforms, Channel Being Turned ON($R_L = 1 k\Omega$)

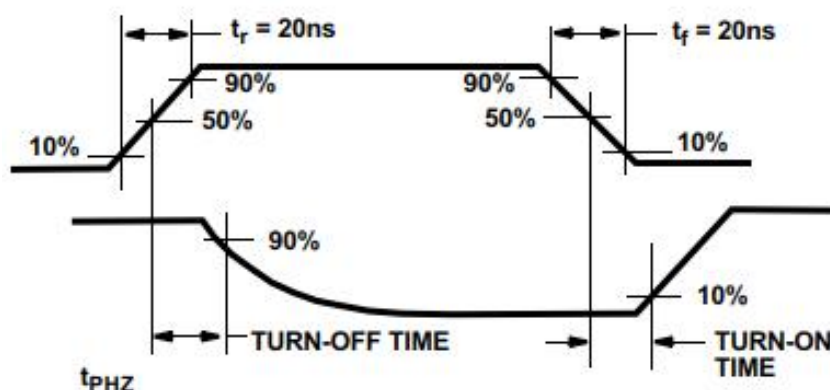


Figure 3. Waveforms, Channel Being Turned OFF(RL = 1 kΩ)

Typical Application

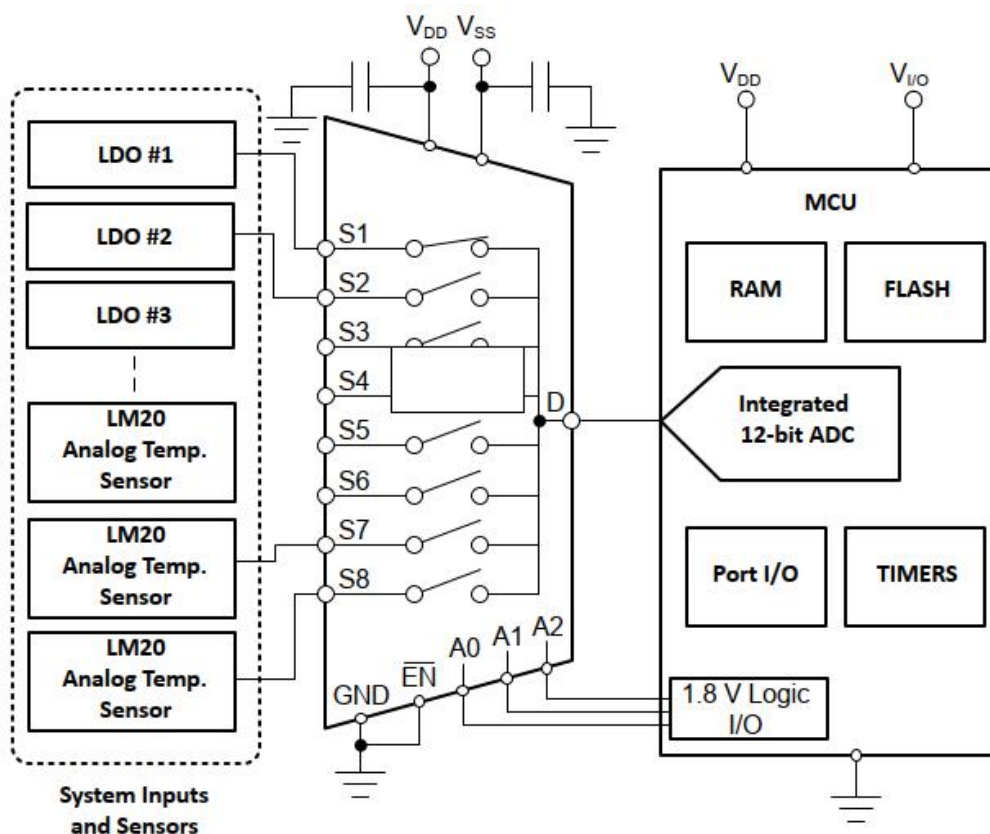
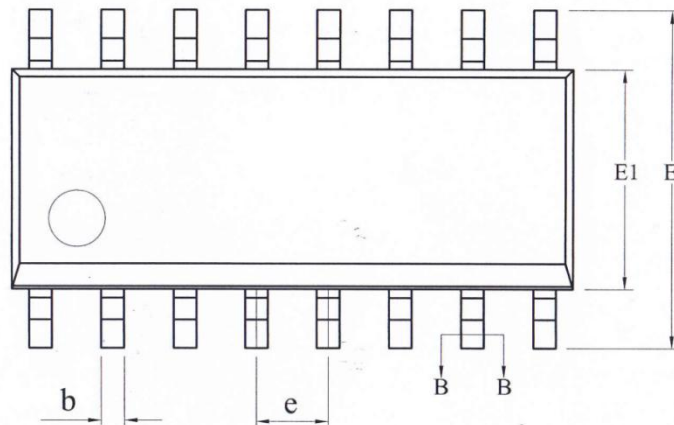
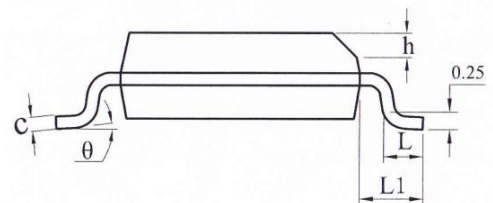
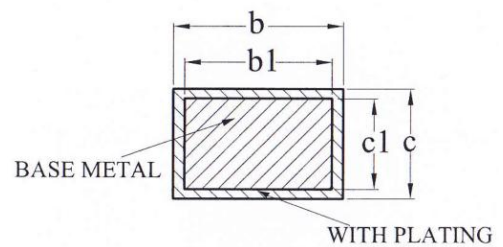
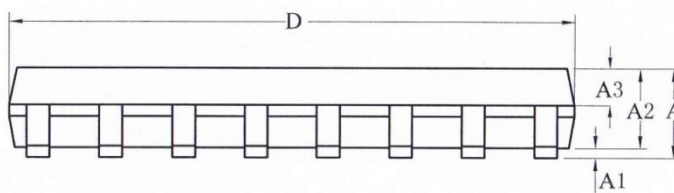


Figure 4. Multiplexing Signals to an Integrated ADC with CD4051

PACKAGE OUTLINE DIMENSIONS
SOP16
TOP VIEW

SIDE VIEW

SIDE VIEW


SYMBOL	MILLIMETER			SYMBOL	MILLIMETER		
	MIN	MIN	MIN		MIN	NOM	MAX
A	-	-	1.75	D	9.80	9.90	10.00
A1	0.10	-	0.225	E	5.80	6.00	6.20
A2	1.30	1.45	1.50	E1	3.80	3.90	4.00
A3	0.60	0.65	0.70	e	1.27 (BSC)		
b	0.39	-	0.47	H	0.25	-	0.50
b1	0.38	0.41	0.44	L	0.50	-	0.80
c	0.20	-	0.24	L1	1.05 (REF)		
c1	0.19	0.20	0.21	θ	0°	-	8°

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