

DESCRIPTION

The CD4053BM96-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 CD4053BM96-CN is available in a SOP16 package.

FEATURES

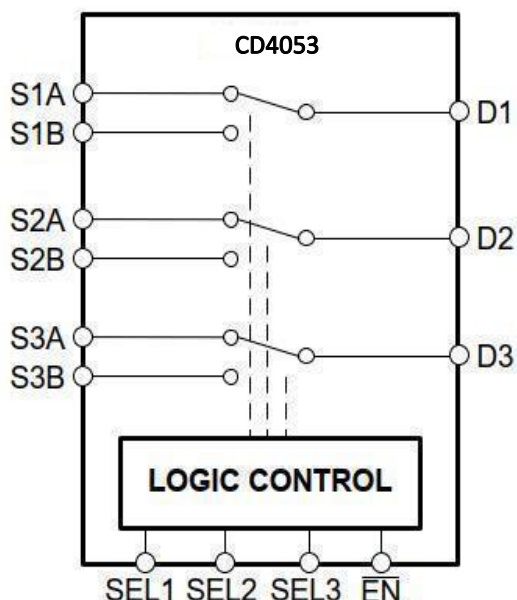
- Wide Supply voltage Range from 3V to 15V
- Break-before-make switching

- Low on-state resistance:
 $R_{ON}=45\Omega(VDD-VSS=15V)$
- 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

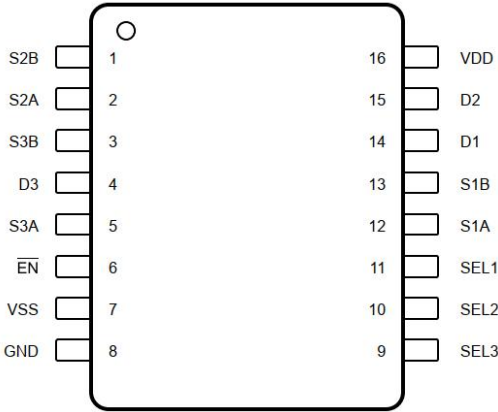


Function Table

INPUT				Channel ON
$\overline{EN}$	SEL1	SEL2	SEL3	
0	0	X	X	S1A to D1
0	1	X	X	S1B to D1
0	X	0	X	S2A to D2
0	X	1	X	S2B to D2
0	X	X	0	S3A to D3
0	X	X	1	S3B to D3
1	X	X	X	None

Note: X= Don't care

Pin Configuration

Pin No	Pin name	Description	Pin Diagram
1	S2B	independent input or output	
2	S2A	independent input or output	
3	S3B	independent input or output	
4	D3	common output or input	
5	S3A	independent input or output	
6	$\overline{\text{EN}}$	enable input(active low)	
7	VSS	supply voltage	
8	GND	ground	
9	SEL3	select input	
10	SEL2	select input	
11	SEL1	select input	
12	S1A	independent input or output	
13	S1B	independent input or output	
14	D1	common output or input	
15	D2	common output or input	
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	-	5	μA
		$V_{DD}=10\text{V}$		0	-	10	
		$V_{DD}=15\text{V}$		0	-	20	
ON resistance	R_{ON}	$V_{DD}=2.5\text{V}$, $V_{SS}=-2.5\text{V}$, or $V_{DD}=5\text{V}$, $V_{SS}=0\text{V}$		-	110	1050	Ω
		$V_{DD}=5\text{V}$, $V_{SS}=-5\text{V}$, or $V_{DD}=10\text{V}$, $V_{SS}=0\text{V}$		-	60	400	
		$V_{DD}=7.5\text{V}$, $V_{SS}=-7.5\text{V}$, or $V_{DD}=15\text{V}$, $V_{SS}=0\text{V}$		-	45	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		$\overline{EN}=7.5\text{V}$		-	± 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}	-	$V_{DD}=10V$	-	8	-	pF
Bypass Capacitors	C_{IOS}	-	$V_{DD}=10V$	-	0.2	-	pF
Power Dissipation Capacitors	C_{PO}	-	$V_{DD}=10V$	-	70	-	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

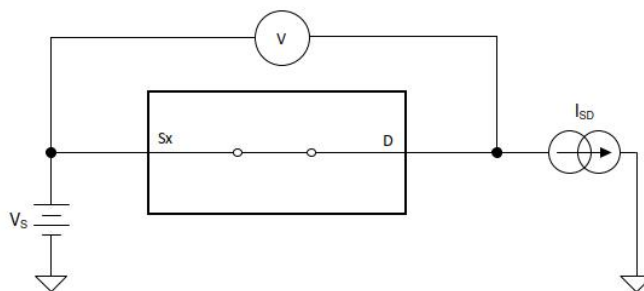


Figure 1. On-Resistance Measurement Setup

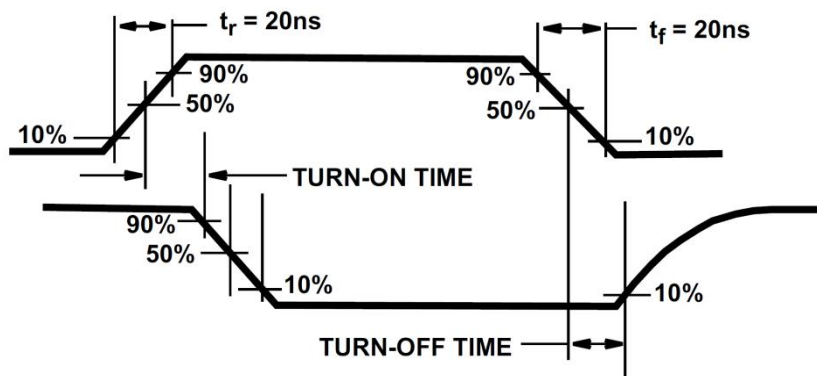


Figure 2. Waveforms, Channel Being Turned ON($R_L = 1 k\Omega$)

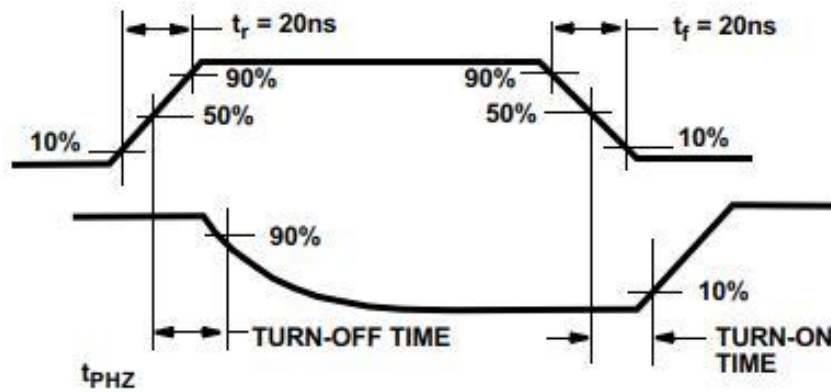


Figure 3. Waveforms, Channel Being Turned OFF($R_L = 1\text{ k}\Omega$)

Typical Application

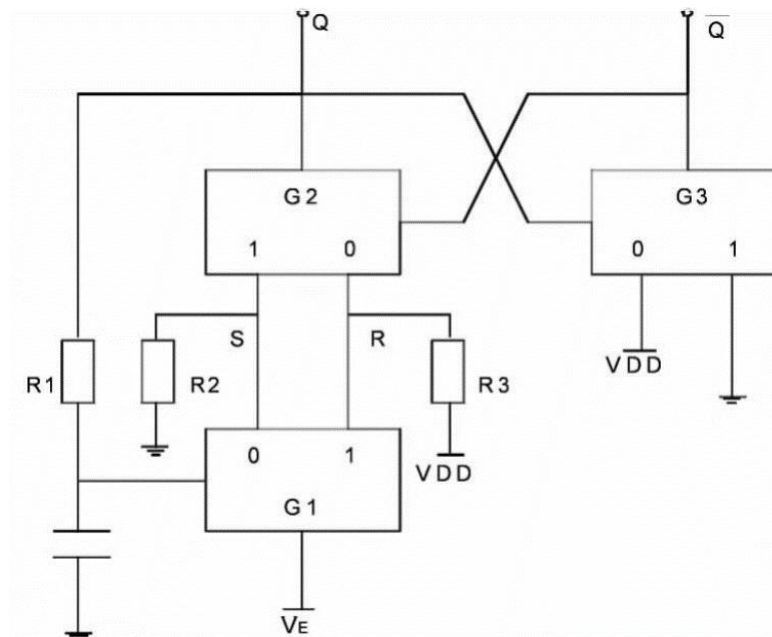
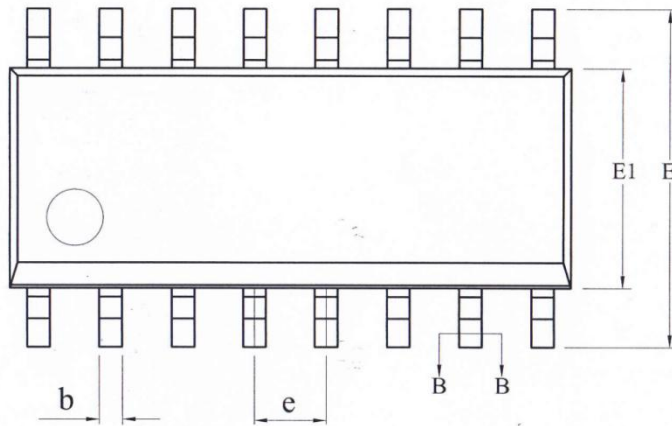
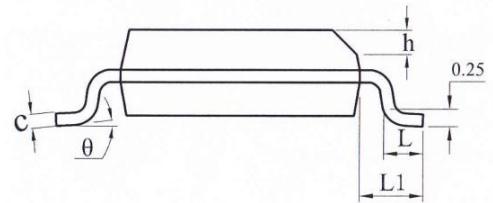
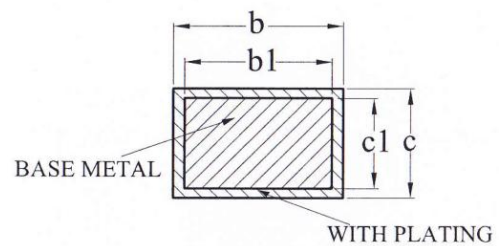
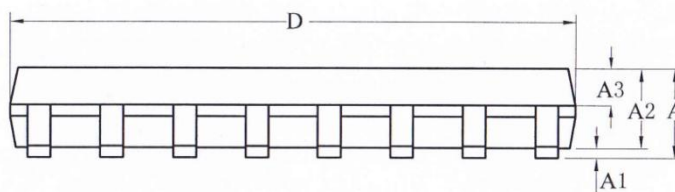


Figure 4. Anti-dithering circuit implemented in CD4053BM96-CN

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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