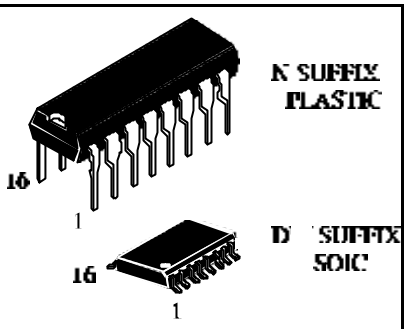
Analog Multiplexer Demultiplexer
High-Performance Silicon-Gate CMOS

The SL4052B analog multiplexer/demultiplexer is digitally controlled analog switches having low ON impedance and very low OFF leakage current. Control of analog signals up to 20V peak-to-peak can be achieved by digital signal amplitudes of 4.5 to 20V (if V_{CC} - GND = 3V, a V_{CC} - V_{EE} of up to 13 V can be controlled; for V_{CC} - V_{EE} level differences above 13V a V_{CC} - GND of at least 4.5V is required).

These multiplexer circuits dissipate extremely low quiescent power over the full V_{CC} -GND and V_{CC} - V_{EE} supply-voltage ranges, independent of the logic state of the control signals. When a logic "1"is present at the ENABLE input terminal all channels are off.

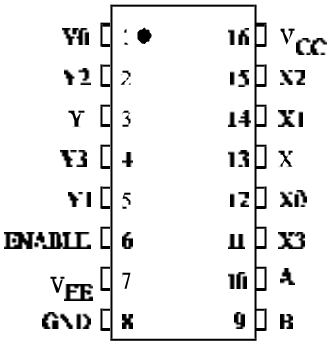
The SL4052 is a differential 4-channel multiplexer having two binary control inputs. A and B, and an enable input. The two binary input signals select 1 of 4 pairs of channels to turned on and connect the analog inputs to the outputs.

- Operating Voltage Range: 3.0 to 18 V
- Maximum input current of 1 μA at 18 V over full package-temperature range; 100 nA at 18 V and 25°C
- Noise margin (over full package temperature range):
  1.0 V min @ 5.0 V supply
  2.0 V min @ 10.0 V supply
  2.5 V min @ 15.0 V supply



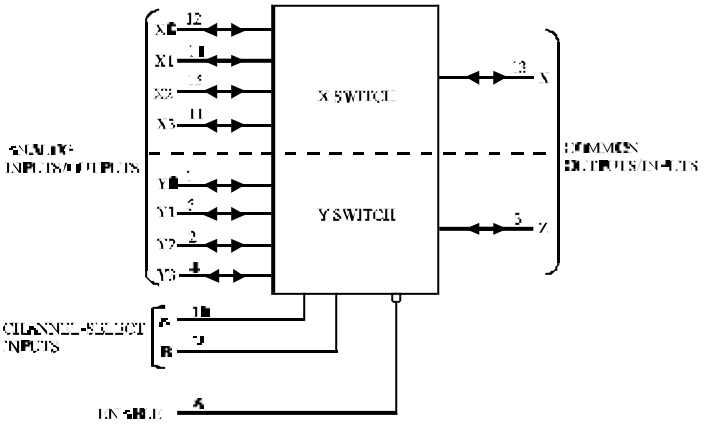
ORDERING INFORMATION
SL4052BN Plastic
SL4052BD SOIC
T_A = -55° to 125° C for all packages

PIN ASSIGNMENT



LOGIC DIAGRAM

Double-Pole, 4-Position
Plus Common Off



PIN 16 =V_{CC}
PIN 7 = V_{EE}
PIN 8 = GND

FUNCTION TABLE

Control Inputs			ON Channels	
Enable	Select			
	B	A		
L	L	L	Y0	X0
L	L	H	Y1	X1
L	H	L	Y2	X2
L	H	H	Y3	X3
H	X	X	None	

X = don' t care

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +20	V
V_{IN}	DC Input Voltage (Referenced to GND)	-0.5 to V_{CC} +0.5	V
V_{OUT}	DC Output Voltage (Referenced to GND)	-0.5 to V_{CC} +0.5	V
I_{IN}	DC Input Current, per Pin	±10	mA
P_D	Power Dissipation in Still Air, Plastic DIP+ SOIC Package+	750 500	mW
P_D	Power Dissipation per Output Transistor	100	mW
Tstg	Storage Temperature	-65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds (Plastic DIP or SOIC Package)	260	°C

*Maximum Ratings are those values beyond which damage to the device may occur.
Functional operation should be restricted to the Recommended Operating Conditions.
+Derating - Plastic DIP: - 10 mW/°C from 65° to 125°C
SOIC Package: : - 7 mW/°C from 65° to 125°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	3.0	18	V
V_{IN}, V_{OUT}	DC Input Voltage, Output Voltage (Referenced to GND)	0	V_{CC}	V
T_A	Operating Temperature, All Package Types	-55	+125	°C
I	Multiplexer Switch Input Current Capability*	-	25	mA
R_{OH}	Output Load Resistance	100	-	Ω

* In certain applications, the external load-resistor current may include both V_{CC} and signal-line components.

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{IN} and V_{OUT} should be constrained to the range GND≤(V_{IN} or V_{OUT})≤V_{CC}.

Unused digital pins must be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused Analog I/O pins may be left open or terminated.

DC ELECTRICAL CHARACTERISTICS Digital Section

Symbol	Parameter	Test Conditions	V_{CC} V	Guaranteed Limit ≥ -55 °C	Guaranteed Limit ≤ 25 °C	Guaranteed Limit ≤ 125 °C	Unit
V_{IH}	Minimum High-Level Input Voltage, Channel-Select or Enable Inputs	$V_{IS}=V_{CC}$ thru 1kΩ V_{EE}=GND I_{IS}<2μA on all OFF Chanels R_L=1kΩ to GND	5 10 15	3.5 7 11	3.5 7 11	3.5 7 12	V
V_{IL}	Maximum Low -Level Input Voltage, Channel-Select or Enable Inputs	$V_{IS}=V_{CC}$ thru 1kΩ V_{EE}=GND I_{IS}<2μA on all OFF Chanels R_L=1kΩ to GND	5 10 15	1.5 3 4	1.5 3 4	1.4 3 4	V
I_{IN}	Maximum Input Leakage Current, Channel-Select or Enable Inputs	$V_{IN}=V_{CC}$ or GND	18	±0.1	±0.1	±1.0	μA
I_{CC}	Maximum Quiescent Supply Current (per Package)	Channel Select = V_{CC} or GND	5 10 15 20	5 10 20 100	5 10 20 100	150 300 600 3000	μA

DC ELECTRICAL CHARACTERISTICS Analog Section

Symbol	Parameter	Test Conditions	V_{CC} V	Guaranteed Limit ≥ -55 °C	Guaranteed Limit ≤ 25 °C	Guaranteed Limit ≤ 125 °C	Unit
R_{ON}	Maximum "ON" Resistance	V_{EE}=GND=0 V_{IS} = GND to V_{CC}	5 10 15	800 310 200	1050 400 240	1300 550 320	Ω
ΔR_{ON}	Maximum Difference in "ON" Resistance Between Any Two Channels in the Same Package	V_{EE}=GND=0	5 10 15	- - -	10 15 5	- - -	Ω
I_{OFF}	Maximum Off- Channel Leakage Current, Any One Channel	V_{EE}=GND=0	18	±100	±100	±1000	nA
	Maximum Off- Channel Leakage Current, Common Channel	V_{EE}=GND=0	18	±100	±100	±1000	

AC ELECTRICAL CHARACTERISTICS (C_L=50pF,Input t_r=t_f=20.0 ns)

Symbol	Parameter	V_{CC} V	Guaranteed Limit ≥ -55 °C	Guaranteed Limit ≤ 25 °C	Guaranteed Limit ≤ 125 °C	Unit
t_{PLH}, t_{PHL}	Maximum Propagation Delay , Analog Input to Analog Output (Figure 1) R_L=200kΩ	5 10 15	60 30 20	60 30 20	120 60 40	ns
t_{PLZ}, t_{PHZ}	Maximum Propagation Delay , Address to Analog Output (Figure 2) R_L=10kΩ V_{EE}=GND=0	5 10 15	720 320 240	720 320 240	1440 640 480	ns
	V_{EE}=-5V	5	450	450	900	
t_{PLZ}, t_{PZL}	Maximum Propagation Delay, Enable to Analog Output (Figure 2) R_L=10kΩ V_{EE}=GND=0	5 10 15	720 320 240	720 320 240	1440 640 480	ns
	V_{EE}=-10V	5	400	400	800	
t_{PHZ}, t_{PZH}	Maximum Propagation Delay, Enable to Analog Output (Figure 2) R_L=10kΩ V_{EE}=GND=0	5 10 15	450 210 160	450 210 160	900 420 320	ns
	V_{EE}=-10V	5	300	300	600	
C_{IN}	Maximum Input Capacitance, Channel-Select or Enable Inputs	-	7.5	7.5	7.5	pF
$C_{I/O}$	Maximum Capacitance V_{EE}=GND=-5V C_{IS}	5	-	5	-	pF
	C_{OS}	5	-	18	-	
	Feedthrough C_{IOS}	5	-	0.2	-	

ADDITIONAL APPLICATION CHARACTERISTICS

Symbol	Parameter	Test Conditions	V_{CC} V	V_{IS} V	Limit* 25 °C	Unit
BW	Maximum On-Channel Bandwidth or Minimum Frequency Response (-3db)	V_{EE}=GND R_L=1kΩ 20 log(V_{OS}/V_{IS})=-3db V_{OS} at Common OUT/IN	10	5*	25	MHz
		V_{OS} at Any Channel	10	5*	60	
	(-40db) Feedthrough Frequency (All Channels OFF)	V_{EE}=GND R_L=1kΩ 20 log(V_{OS}/V_{IS})=-40db V_{OS} at Common OUT/IN	10	5*	10	
		V_{OS} at Any Channel	10	5*	8	
	(-40db) Signal Crosstalk Frequency	V_{EE}=GND R_L=1kΩ 20 log(V_{OS}/V_{IS})=-40db Between Sections : Measured on Common Measured on Any Chanel			 6 10	
THD	Total Harmonic Distortion	V_{EE}=GND f_{IS}=1kHz sine wave	5 10 15	2* 3* 5*	0.3 0.2 012	%
-	Address-or Enable to Signal Crosstalk	V_{EE}=GND R_L=10kΩ** t_r,t_f=20ns Square Wave	10	-	65	mv (peak)

* Peak-to-peak voltage symmetrical about (V_{DD}-V_{EE})/2

** Both ends of channel

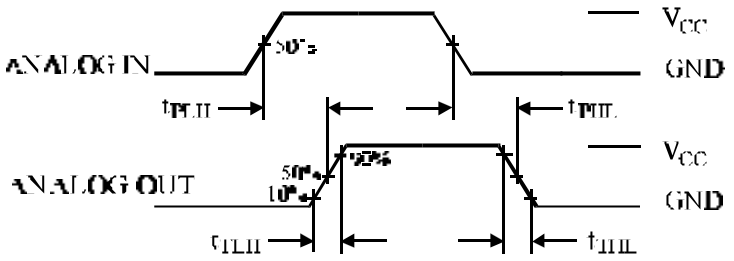


Figure 1. Switching Waveforms

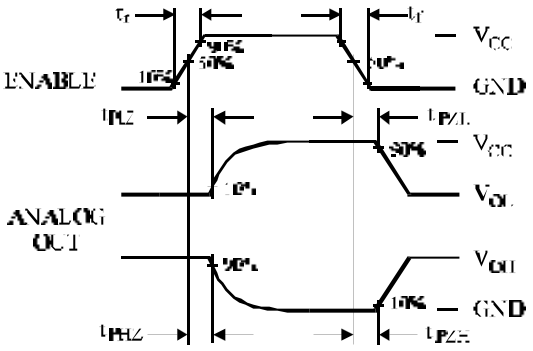


Figure 2. Switching Waveforms

EXPANDED LOGIC DIAGRAM