CC4051

Single SPDT Analog Switch

The NLAS4501 is an analog switch manufactured in sub–micron silicon–gate CMOS technology. It achieves very low R_{ON} while maintaining extremely low power dissipation. The device is a bilateral switch suitable for switching either analog or digital signals, which may vary from zero to full supply voltage.

The CC4501 is pin–for–pin compatible with the CC4501. The CC4501 can be used as a direct replacement for the CC4501 in all 2.0 V to 5.5 V applications where a R_{ON} performance improvement is required.

The Enable pin is compatible with standard CMOS outputs when supply voltage is nominal 5.0 Volts. It is also over–voltage tolerant, making it a very useful logic level translator.

- Guaranteed R_{ON} of 32 Ω at 5.5 V
- Low Power Dissipation: I_{CC} = 2 μA
- Provides Voltage translation for many different voltage levels
  - 3.3 to 5.0 Volts, Enable pin may go as high as +5.5 Volts
  - 1.8 to 3.3 Volts
  - 1.8 to 2.5 Volts
- Improved version of MAX4501 (at any voltage between 2 and 5.5 Volts)
- Chip Complexity: FETs 11

上海双岭电子有限公司

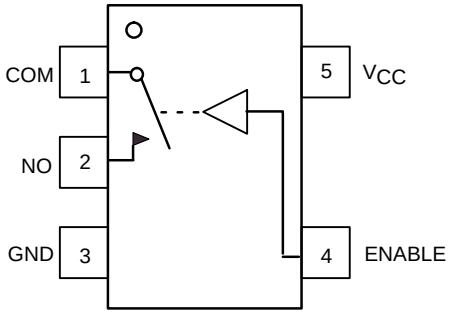

Figure 1. Pinout (Top View)

PIN ASSIGNMENT	
1	COM
2	NO
3	GND
4	ENABLE
5	V_{CC}

FUNCTION TABLE

On/Off Enable Input	State of Analog Switch
L	Off
H	On

ORDERING INFORMATION

See detailed ordering and shipping information on page 315 of this data sheet.

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	Positive DC Supply Voltage		−0.5 to +7.0	V
V_{IN}	Digital Input Voltage (Enable)		−0.5 to +7.0	V
V_{IS}	Analog Output Voltage (V_{NO} or V_{COM})		−0.5 to V_{CC} +0.5	V
I_{IK}	DC Current, Into or Out of Any Pin		±20	mA
T_{STG}	Storage Temperature Range		−65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds		260	°C
T_J	Junction Temperature under Bias		+150	°C
θ_{JA}	Thermal Resistance	SC70–5/SC–88A (Note 1) TSOP–5	350 230	°C/W
P_D	Power Dissipation in Still Air at 85°C	SC70–5/SC–88A TSOP–5	150 200	mW
MSL	Moisture Sensitivity		Level 1	
F_R	Flammability Rating	Oxygen Index: 30% – 35%	UL–94–VO (0.125 in)	
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	> 2000 > 100 N/A	V
$I_{Latch–Up}$	Latch–Up Performance	Above V_{CC} and Below GND at 85°C (Note 5)	±300	mA

Maximum Ratings are those values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation under absolute–maximum–rated conditions is not implied. Functional operation should be restricted to the Recommended Operating Conditions.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm–by–1 inch, 2–ounce copper trace with no air flow.
2. Tested to EIA/JESD22–A114–A.
3. Tested to EIA/JESD22–A115–A.
4. Tested to JESD22–C101–A.
5. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Characteristics		Min	Max	Unit
V_{CC}	Positive DC Supply Voltage		2.0	5.5	V
V_{IN}	Digital Input Voltage (Enable)		GND	5.5	V
V_{IO}	Static or Dynamic Voltage Across an Off Switch		GND	V_{CC}	V
V_{IS}	Analog Input Voltage (NO, COM)		GND	V_{CC}	V
T_A	Operating Temperature Range, All Package Types		–55	+125	°C
t_r, t_f	Input Rise or Fall Time, (Enable Input)	V_{CC} = 3.3 V ± 0.3 V V_{CC} = 5.0 V ± 0.5 V	0 0	100 20	ns/V

DC CHARACTERISTICS – Digital Section (Voltages Referenced to GND)

Symbol	Parameter	Condition	V_{CC}	Guaranteed Max Limit			Unit
				–55 to 25°C	<85°C	<125°C	
V_{IH}	Minimum High–Level Input Voltage, Enable Inputs		2.0 3.0 4.5 5.5	1.5 2.1 3.15 3.85	1.5 2.1 3.15 3.85	1.5 2.1 3.15 3.85	V
V_{IL}	Maximum Low–Level Input Voltage, Enable Inputs		2.0 3.0 4.5 5.5	0.5 0.9 1.35 1.65	0.5 0.9 1.35 1.65	0.5 0.9 1.35 1.65	V
I_{IN}	Maximum Input Leakage Current, Enable Inputs	V_{IN} = 5.5 V or GND	0 V to 5.5 V	±0.1	±1.0	±1.0	μA
I_{CC}	Maximum Quiescent Supply Current (per package)	Enable and VIS = VCC or GND	5.5	1.0	1.0	2.0	μA

DC ELECTRICAL CHARACTERISTICS – Analog Section

Symbol	Parameter	Condition	V_{CC}	Guaranteed Max Limit			Unit
				–55 to 25°C	<85°C	<125°C	
R_{ON}	Maximum ON Resistance (Figures 8 – 12)	$V_{IN} = V_{IH}$ $V_{IS} = V_{CC}$ to GND $\|I_{IS}\| = \leq 10.0$mA	3.0 4.5 5.5	45 30 25	50 35 30	55 40 35	Ω
$R_{FLAT(ON)}$	ON Resistance Flatness	$V_{IN} = V_{IH}$ $\|I_{IS}\| = \leq 10.0$mA V_{IS} = 1V, 2V, 3.5V	4.5	4	4	5	Ω
$I_{NO(OFF)}$	Off Leakage Current, Pin 2 (Figure 3)	$V_{IN} = V_{IL}$ V_{NO} = 1.0 V, V_{COM} = 4.5 V or V_{COM} = 1.0 V and V_{NO} 4.5 V	5.5	1	10	100	nA
$I_{COM(OFF)}$	Off Leakage Current, Pin 1 (Figure 3)	$V_{IN} = V_{IL}$ V_{NO} = 4.5 V or 1.0 V V_{COM} = 1.0 V or 4.5 V	5.5	1	10	100	nA

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f$ = 3.0 ns)

Symbol	Parameter	Test Conditions	V_{CC}	Guaranteed Max Limit									Unit
				–55 to 25°C			<85°C			<125°C			
			(V)	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
t_{ON}	Turn–On Time	R_L = 300 Ω, C_L = 35 pF (Figures 4, 5, and 13)	2.0 3.0 4.5 5.5		7.0 5.0 4.5 4.5	14 10 9 9			16 12 11 11			16 12 11 11	ns
t_{OFF}	Turn–Off Time	R_L = 300 Ω, C_L = 35 pF (Figures 4, 5, and 13)	2.0 3.0 4.5 5.5		11.0 7.0 5.0 5.0	22 14 10 10			24 16 12 12			24 16 12 12	ns

		Typical @ 25, VCC = 5.0 V	
C_{IN}	Maximum Input Capacitance, Select Input	8	pF
C_{NO} or C_{NC}	Analog I/O (switch off)	10	
$C_{COM(OFF)}$	Common I/O (switch off)	10	
$C_{COM(ON)}$	Feedthrough (switch on)	20	