

AD7501/AD7502/AD7503

FEATURES

DTL/TTL/CMOS Direct Interface

Power Dissipation: 30 μ W

R_{ON}: 170 Ω

Standard 16-Pin DIPs and 20-Terminal

Surface Mount Packages

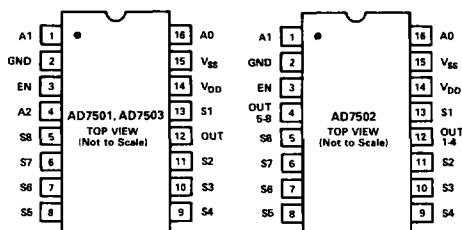
GENERAL DESCRIPTION

The AD7501 and AD7503 are monolithic CMOS, 8-channel analog multiplexers which switches one of 8 inputs to a common output depending on the state of three binary address lines and an "enable" input. The AD7503 is identical to the AD7501 except its "enable" logic is inverted. All digital inputs are TTL/DTL and CMOS logic compatible.

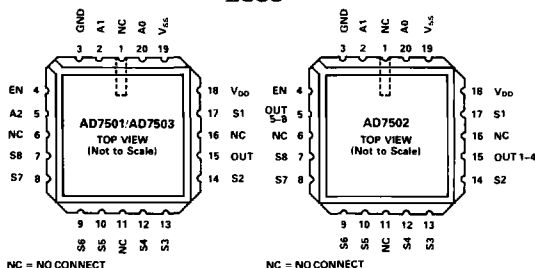
The AD7502 is a monolithic CMOS dual 4-channel analog multiplexer. Depending on the state of 2 binary address inputs and an "enable", it switches two output buses to two of 8 inputs.

PIN CONFIGURATIONS

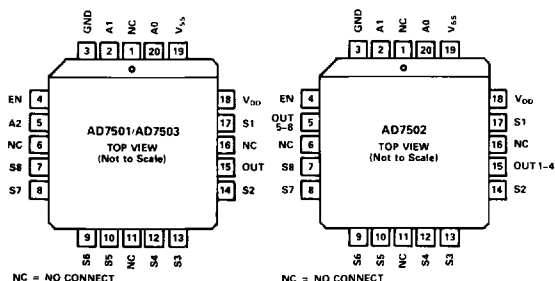
DIP



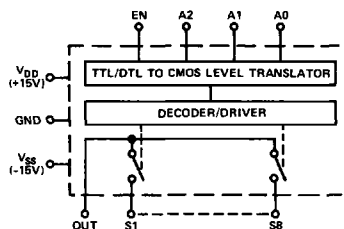
LCCC



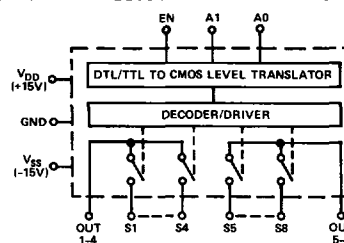
PLCC



AD7501/AD7503 FUNCTIONAL BLOCK DIAGRAM



AD7502 FUNCTIONAL BLOCK DIAGRAM



ORDERING INFORMATION¹

Temperature Range and Package Options²

0 to +70°C	-25°C to +85°C	-55°C to +125°C
Plastic DIP (N-16)	Hermetic (Q-16)	Hermetic (Q-16)
AD7501JN AD7501KN AD7502JN AD7502KN AD7503JN AD7503KN	AD7501JQ AD7501KQ AD7502JQ AD7502KQ AD7503JQ AD7503KQ	AD7501SQ AD7502SQ AD7503SQ
PLCC ³ (P-20A)		LCCC ⁴ (E-20A)
AD7501JP AD7501KP AD7502JP AD7502KP AD7503JP AD7503KP		AD7501SE AD7502SE AD7503SE

NOTES

¹To order MIL-STD-883, Class B processed parts, add 883B to part number.

See Analog Devices' 1987 Military Databook for military data sheet.

²See Section 14 for package outline information.

³PLCC: Plastic Leaded Chip Carrier.

⁴LCCC: Leadless Ceramic Chip Carrier.

TRUTH TABLES

AD7501					
A ₂	A ₁	A ₀	E _N	"ON"	
0	0	0	1	1	
0	0	1	1	2	
0	1	0	1	3	
0	1	1	1	4	
1	0	0	1	5	
1	0	1	1	6	
1	1	0	1	7	
1	1	1	1	8	
X	X	X	0	None	

AD7502				
A ₁	A ₀	E _N	"ON"	
0	0	1	1 & 5	
0	1	1	2 & 6	
1	0	1	3 & 7	
1	1	1	4 & 8	
X	X	0	None	

AD7503				
A ₂	A ₁	A ₀	E _N	"ON"
0	0	0	0	1
0	0	1	0	2
0	1	0	0	3
0	1	1	0	4
1	0	0	0	5
1	0	1	0	6
1	1	0	0	7
1	1	1	0	8
X	X	X	1	None

SPECIFICATIONS ($V_{DD} = +15V$, $V_{SS} = -15V$ unless otherwise noted)

PARAMETER	VERSION ¹	SWITCH CONDITION	@25 °C		OVER SPECIFIED TEMP. RANGE		TEST CONDITIONS
			AD7501, AD7503	AD7502	AD7501, AD7503	AD7502	
ANALOG SWITCH							
R_{ON}	All	ON	170 Ω typ, 300 Ω max	*			$-10V \leq V_S \leq +10V$
R_{ON} vs. V_S	All	ON	20% typ	*			$I_S = 1.0mA$
R_{ON} vs. Temperature	All	ON	0.5%/°C typ	*			$V_S = 0V$, $I_S = 1.0mA$
ΔR_{ON} Between Switches	All	ON	4% typ	*			
R_{ON} vs. Temperature Between Switches	All	ON	$\pm 0.01\%/^{\circ}C$	*			
I_S	J, K	OFF	0.2nA typ, 2nA max	*	50nA max	*	$V_S = -10V$, $V_{OUT} = +10V$ and
	S	OFF	0.5nA max	*	50nA max	*	$V_S = +10V$, $V_{OUT} = -10V$
I_{OUT}	J, K	OFF	1nA typ, 10nA max	0.6nA typ, 5nA max	250nA max	125nA max	$V_S = -10V$, $V_{OUT} = +10V$ and
	S	OFF	5nA max	3nA max	250nA max	125nA max	$V_S = +10V$, $V_{OUT} = -10V$
							AD7501/02: Enable LOW AD7503: Enable HIGH
I_{OUT} I_S	J, K	ON	12nA max	7nA max	300nA max	175nA max	$V_S = 0$
	S	ON	5.5nA max	3.5nA max	300nA max	175nA max	
DIGITAL CONTROL							
V_{INL}	All				0.8V max	*	
V_{INH}	J				3.0V min	*	Note 2
	K, S				2.4V min	*	
I_{INL} or I_{INH}	All		10nA typ	*			
C_{IN}	All		3pF typ	*			
DYNAMIC CHARACTERISTICS							
t_{ON}	All		0.8 μ s typ	*			$V_{IN} = 0$ to $-5.0V$
t_{OFF}	All		0.8 μ s typ	*			(See Test Circuit 2)
C_S	All	OFF	5pF typ	*			
C_{OUT}	All	OFF	30pF typ	15pF typ			
C_{SOUT}	All	OFF	0.5pF typ	*			
C_{SS} Between Any Two Switches	All	OFF	0.5pF typ	*			
POWER SUPPLY							
I_{DD}	All		500 μ A max	*	500 μ A max	*	All Digital Inputs Low
I_{SS}	All		500 μ A max	*	500 μ A max	*	
I_{DD}	All		800 μ A max	*	800 μ A max	*	All Digital Inputs High
I_{SS}	All		800 μ A max	*	800 μ A max	*	

NOTES

¹Name specifications as AD7501 and AD7503.

J, K, KN, JP, KP versions specified for 0 to +70°C, JQ, KQ versions for -25°C to +85°C, and SQ, SE versions for -55°C to +125°C.

²A pullup resistor, typically 1-2k Ω , is required to make the AD7501J, AD7502J compatible with TTL/DTL levels. The maximum value is determined by the output leakage current of the driver gate when in the high state.

Specifications subject to change without notice.

ABSOLUTE MAXIMUM RATINGS*

($T_A = +25^{\circ}C$ unless otherwise noted)

V_{DD} to GND	+17V
V_{SS} to GND	-17V
V Between Any Switch Terminals (see Note 1)	25V
Digital Input Voltage Range	V_{DD} to GND
Overvoltage at V_{OUT} (V_S)	V_{SS} , V_{DD}
Switch Current (I_S , Continuous One Channel)	20mA
Switch Current (I_S , Surge One Channel)	
1ms Duration, 10% Duty Cycle	35mA
Power Dissipation (Any Package)	
Up to +50°C	1000mW
Derates above +50°C by	10mW/°C
Operating Temperature	
Commercial (JN, KN, JP, KP Versions)	0 to +70°C
Industrial (JQ, KQ Versions)	-25°C to +85°C
Extended (SQ, SE Versions)	-55°C to +125°C
Storage Temperature	-65°C to +150°C
Lead Temperature (Soldering, 10sec)	+300°C

CAUTION

ESD (electrostatic discharge) sensitive device. The digital control inputs are diode protected; however, permanent damage may occur on unconnected devices subject to high energy electrostatic fields. Unused devices must be stored in conductive foam or shunts. The protective foam should be discharged to the destination socket before devices are removed.

CAUTION

1. Do not apply voltages higher than V_{DD} and V_{SS} to any other terminal, especially when $V_{SS} = V_{DD} = 0V$ all other pins should be at 0V.
2. The digital control inputs are diode protected; however, permanent damage may occur on unconnected units under high energy electrostatic fields. Keep unused units in conductive foam at all times.

*Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

