ANALOG DEVICES

CMOS 8- and 16-Channel Analog Multiplexers

AD7506/AD7507

FEATURES
R_{ON}: 300Ω
Power Dissipation: 1.5mW
TTL/DTL/CMOS Direct Interface
Break-Before-Make Switching
Standard 28-Pin DIPs and 28-Terminal Surface Mount Packages

GENERAL DESCRIPTION

The AD7506 is a monolithic CMOS 16-channel analog multiplexer packaged in a 28-pin DIP or a 28-terminal surface mount package. It switches a common output to one of 16 inputs, depending on the state of four address lines and an "enable." The AD7507 is identical to the AD7506 except it has two outputs switched to two of 16 inputs depending on three binary address states and an "enable."

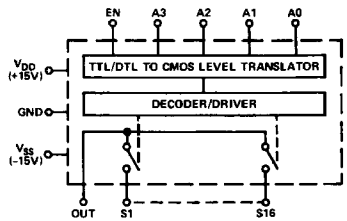
ABSOLUTE MAXIMUM RATINGS*

(T_A = +25°C unless otherwise noted)

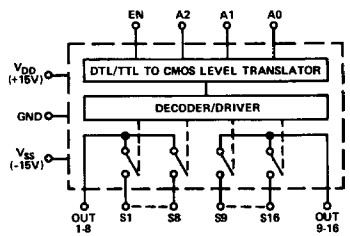
V_{DD} – GND	+17V
V_{SS} – GND	–17V
V Between Any Switch Terminals (see Note 1)	25V
Digital Input Voltage Range	V_{DD} to GND
Overvoltage at V_{OUT} (V_S)	V_{SS}, V_{DD}
Switch Current (I_S, Continuous One Channel)	20mA
Switch Current (I_S, Surge One Channel)	
1ms Duration, 10% Duty Cycle	35mA
Power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

CAUTION:
[1]Do not apply voltage 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. Only one Absolute Maximum Rating may be applied at any one time.

FUNCTIONAL DIAGRAMS



AD7506



AD7507

ORDERING GUIDE

Model[1]	Temperature Range	Package Option[2]
AD7506KN	0°C to +70°C	N-28
AD7506KQ	–25°C to +85°C	Q-28
AD7506TQ	–55°C to +125°C	Q-28
AD7506TE	–55°C to +125°C	E-28A
AD7507KN	0°C to +70°C	N-28
AD7507KQ	–25°C to +85°C	Q-28
AD7507TQ	–55°C to +125°C	Q-28
AD7507TE	–55°C to +125°C	E-28A

NOTES
[1]To order MIL-STD-883, Class B, processed parts, add/883B to part number. See Analog Devices Military Products Databook (1990) for military data sheet.
[2]N = Plastic DIP; Q = Cerdip; E = Leadless Ceramic Chip Carrier (LCCC). For outline information see Package Information section.

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AD7506/AD7507—SPECIFICATIONS (V_{DD} = +15V, V_{SS} = −15V unless otherwise noted.)

Parameter	Version[1]	Switch Condition	@ +25°C	Over Specified Temperature Range	Test Conditions
ANALOG SWITCH					
R_{ON}	K	ON	300Ω typ, 450Ω max	550Ω max	V_S = −10V to +10V, I_S = 1mA
	T	ON	400Ω max	500Ω max	
R_{ON} vs. V_S	All	ON	15% typ		V_S = 0V, I_S = 1mA
R_{ON} vs. Temperature	All	ON	0.5%/°C typ		
ΔR_{ON} Between Switches	All	ON	4% typ		
R_{ON} vs. Temperature Between Switches	All	ON	0.05%/°C typ		
I_S (OFF)	K	OFF	0.05nA typ, 5nA max	50nA max	V_S = −10V, V_{OUT} = +10V and V_S = +10V, V_{OUT} = −10V "Enable" Low
	T	OFF	0.05nA typ, 1nA max	50nA max	
I_{OUT} (OFF) AD7506	K	OFF	0.3nA typ, 20nA max	500nA max	
	T	OFF	0.3nA typ, 10nA max	500nA max	
AD7507	K	OFF	0.3nA typ, 10nA max	250nA max	
	T	OFF	0.3nA typ, 5nA max	250nA max	
I_{OUT}–I_S AD7506 (Any Switch ON)	K	ON	0.3nA typ, 20nA max	500nA max	V_S = 0V
	T	ON	0.3nA typ, 10nA max	500nA max	
AD7507	K	ON	0.3nA typ, 10nA max	250nA max	
	T	ON	0.3nA typ, 5nA max	250nA max	
DIGITAL CONTROL					
V_{INL}	All			0.8V max	
V_{INH}	All			2.4V min	
I_{INL} or I_{INH}	All		10μA max	30μA max	
C_{IN}	All		3pF typ		
DYNAMIC CHARACTERISTICS[2]					
$t_{TRANSITION}$	All		700ns typ, 1000ns max		V_{IN}: 0 to 3.0V
t_{OPEN}	All		100ns typ		
t_{ON} (En)	All		1.5μs max		V_{EN}: 0 to 3.0V
t_{OFF} (En)	All		1μs max		
"OFF" Isolation	All		70dB typ		V_{EN} = 0, R_L = 200Ω, C_L = 3.0pF, V_S = 3.0V rms, f = 50kHz
C_S	All	OFF	5pF typ		
C_{OUT} AD7506	All	OFF	40pF typ		
AD7507	All	OFF	20pF typ		
C_{S-OUT}	All	OFF	0.5pF typ		
C_{SS} Between Any Two Switches	All	OFF	0.5pF typ		
POWER SUPPLY					
I_{DD}	K	OFF	0.05mA typ, 1mA max		All Digital Inputs Low
	T	OFF	0.05mA typ, 1mA max	2mA max	
I_{SS}	K	OFF	0.05mA typ, 1mA max		
	T	OFF	0.05mA typ, 1mA max	2mA max	
I_{DD}	K	ON	0.3mA typ, 1mA max		All Digital Inputs High
	T	ON	0.3mA typ, 1mA max	2mA max	
I_{SS}	K	ON	0.05mA typ, 1mA max		
	T	ON	0.05mA typ, 1mA max	2mA max	

NOTES
[1]KN Version specified for 0 to +70°C; KQ Version for −25°C to +85°C; and TQ, TE Versions for −55°C to +125°C.
[2]Sample tested to ensure compliance.
Specifications subject to change without notice.

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.

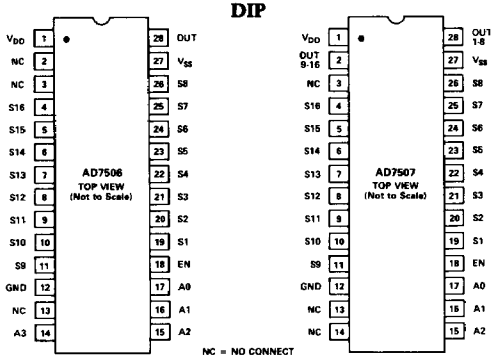
TRUTH TABLES

AD7506					
A_3	A_2	A_1	A_0	E_N	"ON"
0	0	0	0	1	1
0	0	0	1	1	2
0	0	1	0	1	3
0	0	1	1	1	4
0	1	0	0	1	5
0	1	0	1	1	6
0	1	1	0	1	7
0	1	1	1	1	8
1	0	0	0	1	9
1	0	0	1	1	10
1	0	1	0	1	11
1	0	1	1	1	12
1	1	0	0	1	13
1	1	0	1	1	14
1	1	1	0	1	15
1	1	1	1	1	16
X	X	X	X	0	None

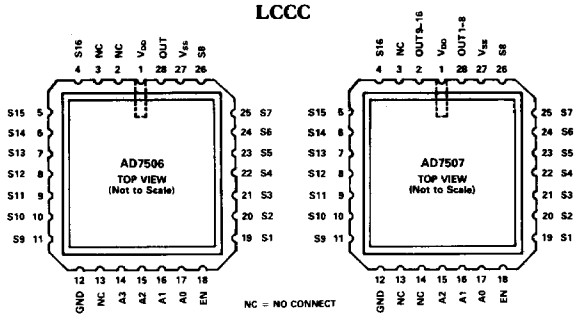
AD7507				
A_2	A_1	A_0	E_N	"ON"
0	0	0	1	1 & 9
0	0	1	1	2 & 10
0	1	0	1	3 & 11
0	1	1	1	4 & 12
1	0	0	1	5 & 13
1	0	1	1	6 & 14
1	1	0	1	7 & 15
1	1	1	1	8 & 16
X	X	X	0	None

PIN CONFIGURATIONS

DIP



LCCC



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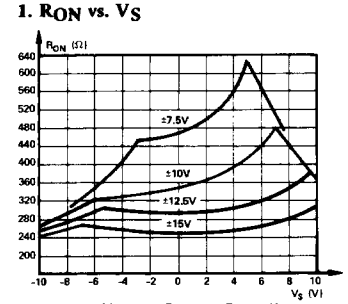
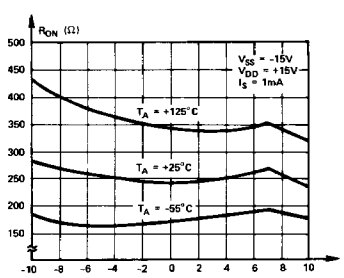
Typical Performance Characteristics

1. R_{ON} vs. V_S

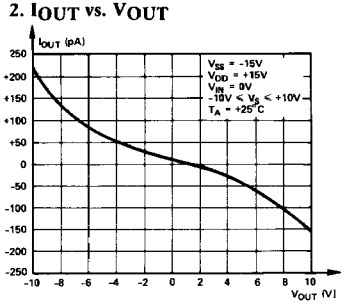


At Different Power Supplies

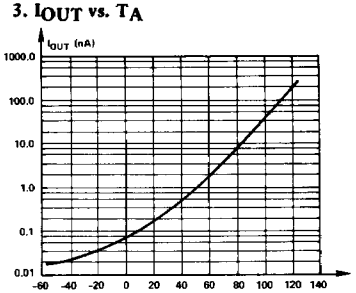


At Different Temperatures

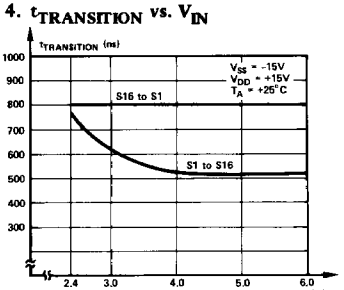
2. I_{OUT} vs. V_{OUT}



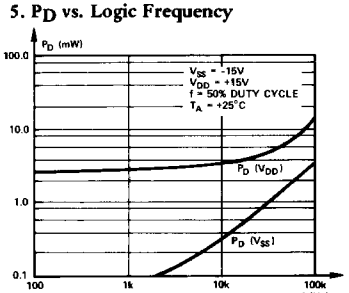
3. I_{OUT} vs. T_A



4. $t_{TRANSITION}$ vs. V_{IN}

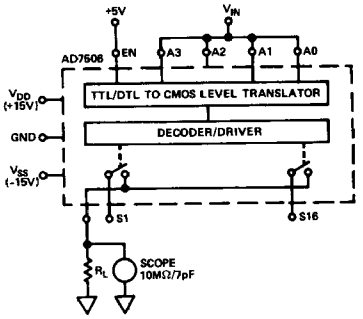


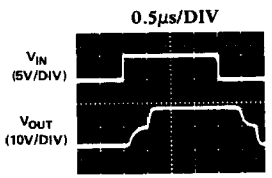
5. P_D vs. Logic Frequency



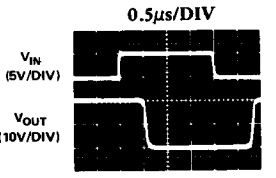
TYPICAL SWITCHING CHARACTERISTICS

TEST CIRCUIT 1



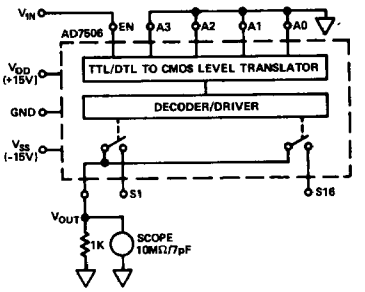


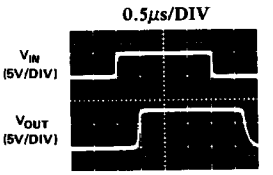
$S_1 = -10V, S_{16} = +10V,$
$S_2 - S_{15} = 0V, R_L = 1K$



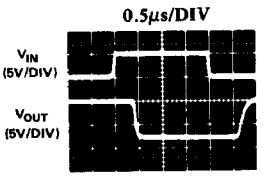
$S_1 = +10V, S_2 = -10V,$
$S_2 - S_{15} = 0V, R_L = \infty$

TEST CIRCUIT 2

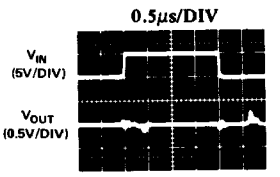




S_1 through $S_{16} = +10V$



S_1 through $S_{16} = -10V$



S_1 through $S_{16} = 0V$