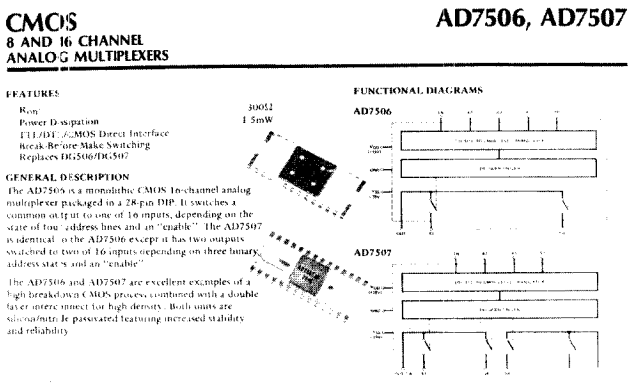
ANALOG DEVICES

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
Replaces DG506/DG507



GENERAL DESCRIPTION

The AD7506 is a monolithic CMOS 16-channel analog multiplexer packaged in a 28-pin DIP. 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)

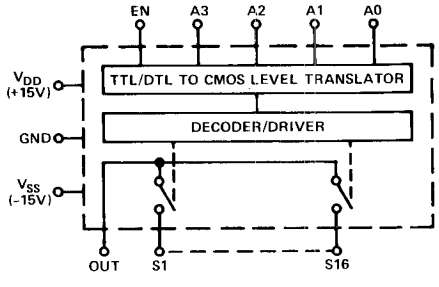
V_{DD} – GND . . . . . +17V
V_{SS} – GND . . . . . -17V
V Between Any Switch Terminals. 25V
Digital Input Voltage Range . . . . . V_{DD} to GND
Switch Current (I_S, Continuous). 20mA
Switch Current (I_S, Surge)
  1ms duration, 10% duty cycle 35mA
Power Dissipation (Package)
28 pin Ceramic DIP
  Up to +50°C. 1000mW
  Derates above +50°C by . . . . . 10mW/°C
28 pin Plastic DIP
  Up to +50°C. 1200mW
  Derates above +50°C by . . . . . 12mW/°C
Operating Temperature
  Plastic (J, K versions). . . . . 0 to +75°C
  Ceramic (J, K versions). . . . . -25°C to +85°C
  Ceramic (S, T versions). . . . . -55°C to +125°C
Storage Temperature . . . . . -65°C to +150°C

CAUTION:

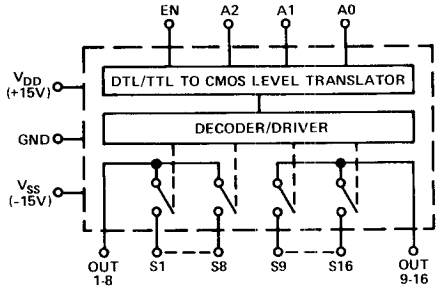
1. Do not apply voltages higher than V_{DD} and V_{SS} to any other terminal, especially when V_{SS} = V_{DD} = 0V all other pins should be at 0V.
2. The digital control inputs are zener protected; however, permanent damage may occur on unconnected units under high energy electrostatic fields. Keep unused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

FUNCTIONAL DIAGRAMS

AD7506

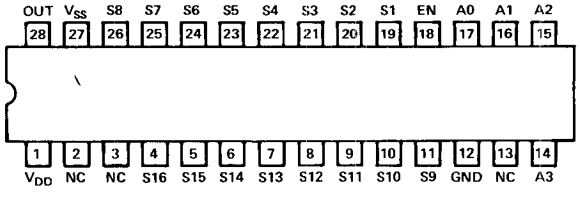


AD7507

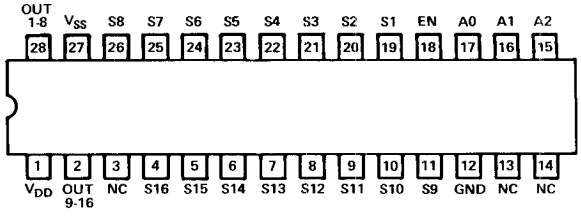


PIN CONFIGURATIONS (Top View)

AD7506



AD7507



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

PARAMETER		VERSION[1]	SWITCH CONDITION	@ +25°C	OVER SPECIFIED TEMP. RANGE	TEST CONDITIONS
ANALOG SWITCH						
R_{ON}		J, K	ON	300Ω typ, 450Ω max	550Ω max	V_S = -10V to +10V, I_S = 1mA
		S, T	ON	400Ω max	500Ω max	
R_{ON} vs. V_S		All	ON	15% typ		
R_{ON} vs. Temperature		All	ON	0.5%/°C typ		V_S = 0V, I_S = 1mA
ΔR_{ON} Between Switches		All	ON	4% typ		
R_{ON} vs. Temperature Between Switches		All	ON	0.05%/°C typ		
I_S		J, K	OFF	0.05nA typ, 5nA max	50nA max	V_S = -10V, V_{OUT} = +10V and V_S = +10V, V_{OUT} = -10V "Enable" Low
		S, T	OFF	0.05nA typ, 1nA max	50nA max	
I_{OUT}	AD7506	J, K	OFF	0.3nA typ, 20nA max	500nA max	
		S, T	OFF	0.3nA typ, 10nA max	500nA max	
	AD7507	J, K	OFF	0.3nA typ, 10nA max	250nA max	
		S, T	OFF	0.3nA typ, 5nA max	250nA max	
$I_{OUT} - I_S$	AD7506	J, K	ON	0.3nA typ, 20nA max	500nA max	V_S = 0
		S, T	ON	0.3nA typ, 10nA max	500nA max	
	AD7507	J, K	ON	0.3nA typ, 10nA max	250nA max	
		S, T	ON	0.3nA typ, 5nA max	250nA max	
DIGITAL CONTROL						
V_{INL}		J, S			0.8V max	Note 2
V_{INH}		K, T			3.0V min 2.4V min	
I_{INL} or I_{INH}		All		10μA max	30μA max	
C_{IN}		All		3pF typ		
DYNAMIC CHARACTERISTICS[3]						
$t_{TRANSITION}$		J, S		700ns typ		V_{IN}: 0 to 3.0V
		K, T		700ns typ, 1000ns max		
t_{OPEN}		All		100ns typ		
t_{ON} (En)		J, S		0.8μs typ		V_{EN}: 0 to 3.0V
		K, T		1.5μs max		
t_{OFF} (En)		J, S		0.8μs typ		
		K, T		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}		J, K	OFF	0.05mA typ, 1mA max		All Digital Inputs Low
		S, T	OFF	0.05mA typ, 1mA max	2mA max	
I_{SS}		J, K	OFF	0.05mA typ, 1mA max		
		S, T	OFF	0.05mA typ, 1mA max	2mA max	
I_{DD}		J, K	ON	0.3mA typ, 1mA max		All Digital Inputs High
		S, T	ON	0.3mA typ, 1mA max	2mA max	
I_{SS}		J, K	ON	0.05mA typ, 1mA max		
		S, T	ON	0.05mA typ, 1mA max	2mA max	

NOTES:
[1] JN, KN versions specified for 0 to +75°C; JD, KD versions for -25°C to +85°C; and SD, TD versions for -55°C to +125°C.
[2] A pullup resistor, typically 1-2kΩ is required to make the J and S versions compatible with TTL/DTL. The maximum value is determined by the output leakage current of the driver gate when in the high state.
[3] AC parameters are sample tested to ensure conformance to specifications.
Specifications subject to change without notice.

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

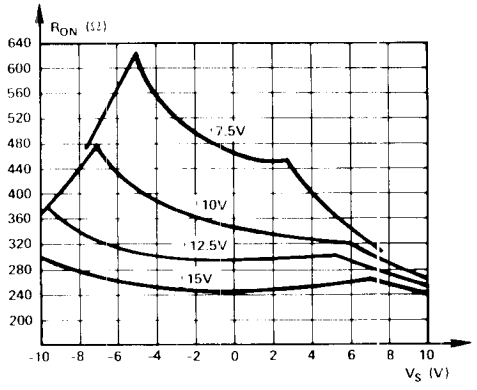
AD7507

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

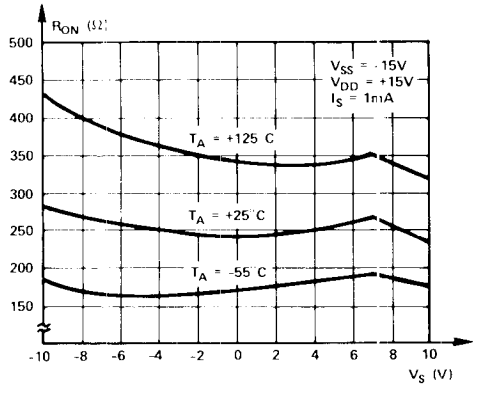
ORDERING INFORMATION

Plastic (Suffix N)	Ceramic (Suffix D)	Operating Temperature Range
AD7506JN AD7506KN AD7507JN AD7507KN		0 to +75°C
	AD7506JD AD7506KD AD7507JD AD7507KD	-25°C to +85°C
	AD7506SD AD7506TD AD7507SD AD7507TD	-55°C to +125°C

1. R_{ON} vs. V_S

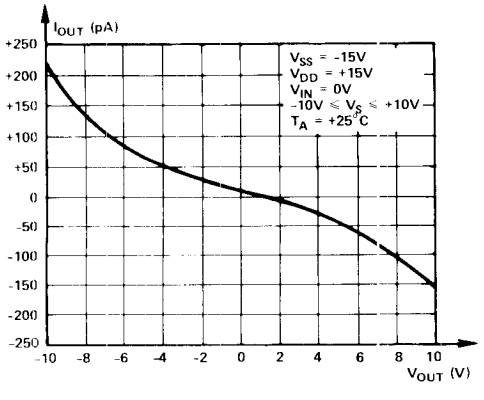


At Different Power Supplies

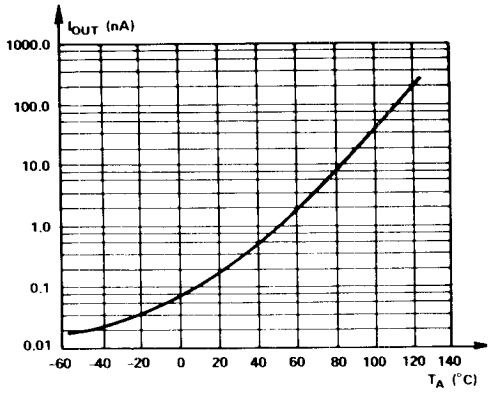


At Different Temperatures

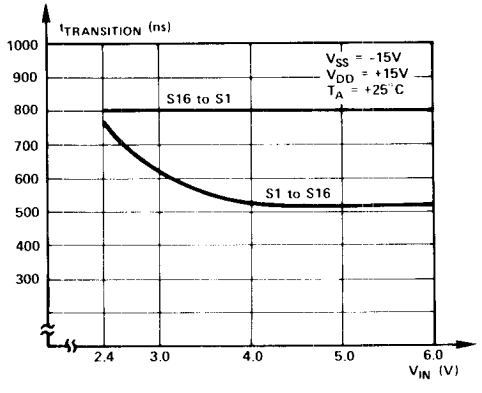
2. I_{OUT} vs. V_{OUT}



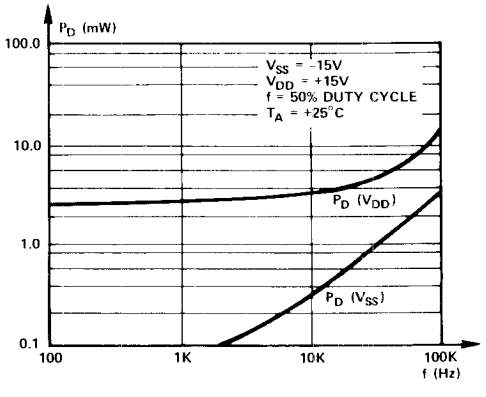
3. I_{OUT} vs. T_A



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

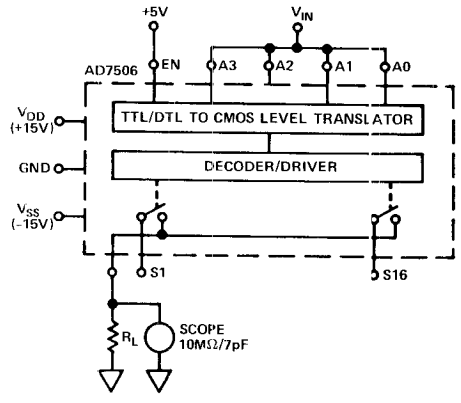


5. P_D vs. Logic Frequency

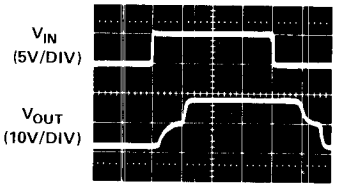


TYPICAL SWITCHING CHARACTERISTICS

TEST CIRCUIT 1

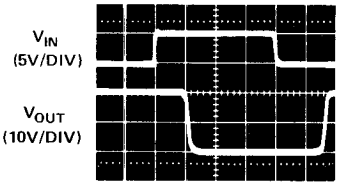


0.5μs/DIV



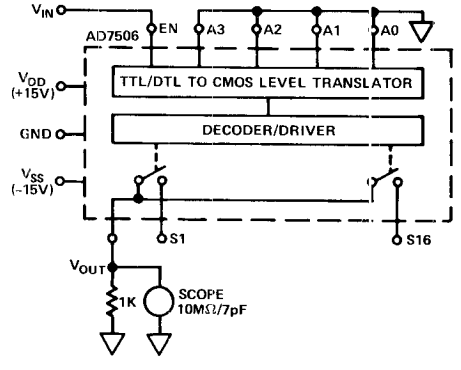
$S_1 = -10V$, $S_{16} = +10V$,
$S_2 - S_{15} = 0V$, $R_L = 1K$

0.5μs/DIV

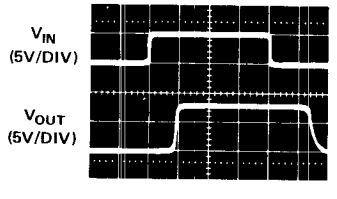


$S_1 = +10V$, $S_2 = -10V$,
$S_2 - S_{15} = 0V$, $R_L = \infty$

TEST CIRCUIT 2

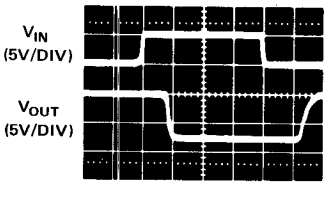


0.5μs/DIV



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

0.5μs/DIV



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

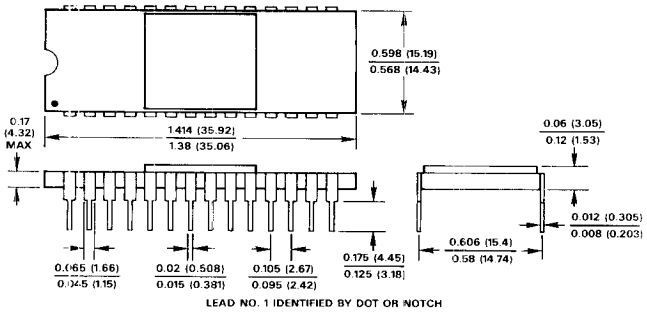
0.5μs/DIV

S_1 through $S_{16} = 0V$

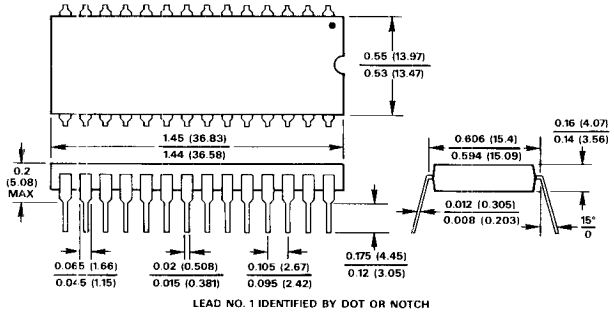
OUTLINE DIMENSIONS

Dimensions shown in inches and (mm).

28-PIN CERAMIC DIP (SUFFIX D)

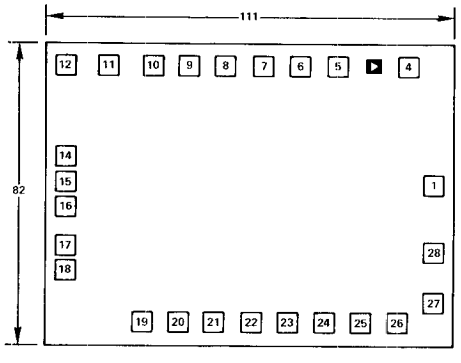


28-PIN PLASTIC DIP (SUFFIX N)

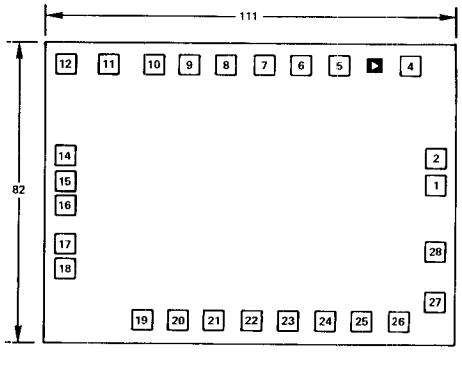


BONDING DIAGRAMS

AD7506



AD7507



All bonding pads are 4 x 4 MIL.
All pad numbers correspond with DIP package pin configuration.