

AD7506/AD7507

FEATURES

R_{ON} : 300 Ω
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*

($T_A = +25^\circ\text{C}$ unless otherwise noted)
 $V_{DD} - \text{GND}$ +17V
 $V_{SS} - \text{GND}$ -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 $+50^\circ\text{C}$ 1000mW
 Derates above $+50^\circ\text{C}$ by 10mW/ $^\circ\text{C}$
 Operating Temperature
 Commercial (KN Versions) 0 to $+70^\circ\text{C}$
 Industrial (KQ Versions) -25°C to $+85^\circ\text{C}$
 Extended (TQ, TE Versions) -55°C to $+125^\circ\text{C}$
 Storage Temperature -65°C to $+150^\circ\text{C}$
 Lead Temperature (Soldering, 10sec) $+300^\circ\text{C}$

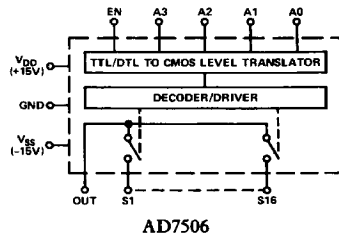
CAUTION:

¹Do not apply voltage higher than V_{DD} and V_{SS} to any other terminal, especially when $V_{SS} = V_{DD} = 0\text{V}$ all other pins should be at 0V.

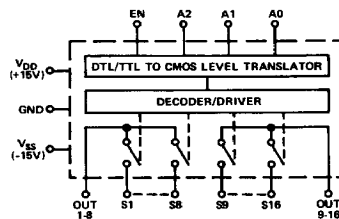
²The digital control inputs are diode protected; however, permanent damage may occur on unconnected units under high energy electrostatic fields. Keep unused units in conductive foam at all times.

*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 $+70^\circ\text{C}$	N-28
AD7506KQ	-25°C to $+85^\circ\text{C}$	Q-28
AD7506TQ	-55°C to $+125^\circ\text{C}$	Q-28
AD7506TE	-55°C to $+125^\circ\text{C}$	E-28A
AD7507KN	0°C to $+70^\circ\text{C}$	N-28
AD7507KQ	-25°C to $+85^\circ\text{C}$	Q-28
AD7507TQ	-55°C to $+125^\circ\text{C}$	Q-28
AD7507TE	-55°C to $+125^\circ\text{C}$	E-28A

NOTES

¹To order MIL-STD-883, Class B, processed parts, add/883B to part number. See Analog Devices Military Products Databook (1990) for military data sheet.

²N = Plastic DIP; Q = Cerdip; E = Leadless Ceramic Chip Carrier (LCCC). For outline information see Package Information section.

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 T	ON ON	300Ω typ, 450Ω max 400Ω max	550Ω max 500Ω max	$V_S = -10V$ to $+10V$, $I_S = 1mA$
R_{ON} vs. V_S R_{ON} vs. Temperature ΔR_{ON} Between Switches R_{ON} vs. Temperature Between Switches	All All All All	ON ON ON ON	15% typ 0.5%/°C typ 4% typ 0.05%/°C typ		$V_S = 0V$, $I_S = 1mA$
I_S (OFF)	K T	OFF OFF	0.05nA typ, 5nA max 0.05nA typ, 1nA max	50nA max 50nA max	$V_S = -10V$, $V_{OUT} = +10V$ and
I_{OUT} (OFF)	AD7506 AD7507	K T K T	OFF OFF OFF OFF	0.3nA typ, 20nA max 0.3nA typ, 10nA max 0.3nA typ, 10nA max 0.3nA typ, 5nA max	500nA max 500nA max 250nA max 250nA max
$I_{OUT} - I_S$ (Any Switch ON)	AD7506 AD7507	K T K T	ON ON ON ON	0.3nA typ, 20nA max 0.3nA typ, 10nA max 0.3nA typ, 10nA max 0.3nA typ, 5nA max	500nA max 500nA max 250nA max 250nA max
DIGITAL CONTROL					
V_{INL} V_{INH}	All All			0.8V max 2.4V min	
I_{INL} or I_{INH}	All		10μA max	30μA max	
C_{IN}	All		3pF typ		
DYNAMIC CHARACTERISTICS²					
$t_{TRANSITION}$	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 AD7507	All All	OFF OFF	40pF typ 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 T	OFF OFF	0.05mA typ, 1mA max 0.05mA typ, 1mA max	2mA max	All Digital Inputs Low
I_{SS}	K T	OFF OFF	0.05mA typ, 1mA max 0.05mA typ, 1mA max	2mA max	
I_{DD}	K T	ON ON	0.3mA typ, 1mA max 0.3mA typ, 1mA max	2mA max	All Digital Inputs High
I_{SS}	K T	ON ON	0.05mA typ, 1mA max 0.05mA typ, 1mA max	2mA max	

NOTES

¹KN 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.

²Sample 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.

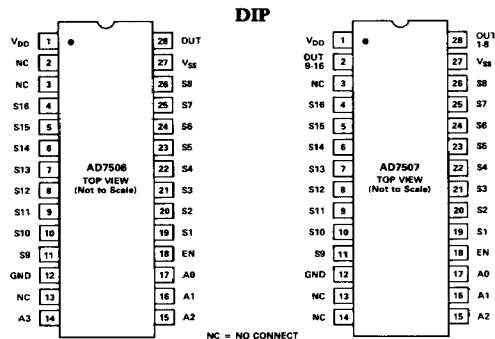


TRUTH TABLES

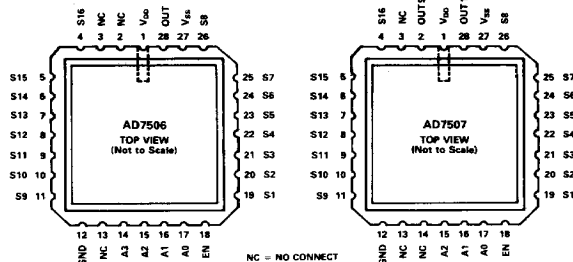
AD7506					
A ₃	A ₂	A ₁	A ₀	E _N	"ON"
0	0	0	0	1	1
0	0	0	1	1	2
0	0	1	0	1	3
0	0	1	1	1	4
0	1	0	0	1	5
0	1	0	1	1	6
0	1	1	0	1	7
0	1	1	1	1	8
1	0	0	0	1	9
1	0	0	1	1	10
1	0	1	0	1	11
1	0	1	1	1	12
1	1	0	0	1	13
1	1	0	1	1	14
1	1	1	0	1	15
1	1	1	1	1	16
X	X	X	X	0	None

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

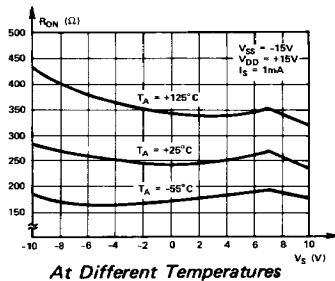
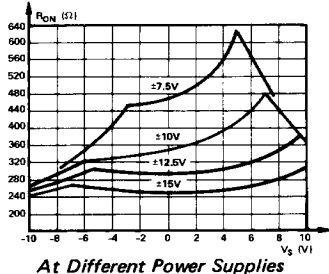


LCCC

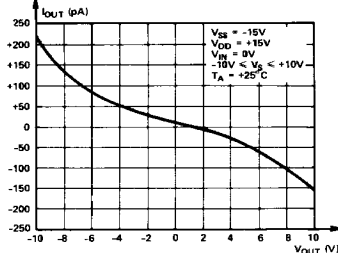


Typical Performance Characteristics

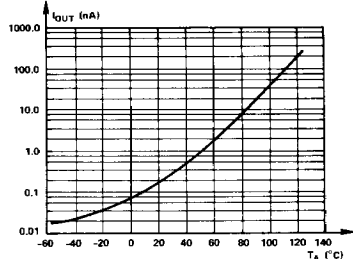
1. R_{ON} vs. V_S



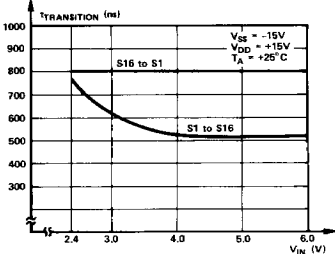
2. I_{OUT} vs. V_{OUT}



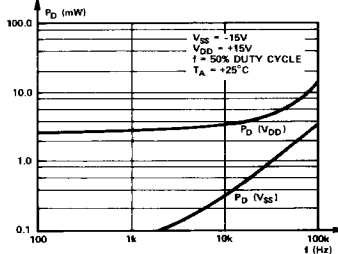
3. I_{OUT} vs. T_A



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



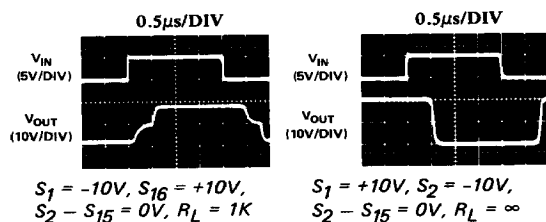
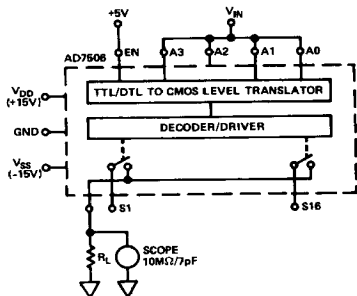
5. P_D vs. Logic Frequency



AD7506/AD7507

TYPICAL SWITCHING CHARACTERISTICS

TEST CIRCUIT 1



TEST CIRCUIT 2

