



# 10-Bit, 400 MSPS D/A Converters

ANALOG DEVICES INC

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AD9720/AD9721

### 1.1 Scope.

This specification covers the requirements for 10-bit, high speed digital-to-analog converters (DACs). The AD9720/883B is a 10-bit ECL-compatible DAC that features update rates of 400 Msps; the TTL-compatible AD9721/883B will update at 100 Msps.

### 1.2 Part Number.

The complete part numbers are as follows:

Device	Part Number
-1	AD9720T(X)/883B
-2	AD9721T(X)/883B

### 1.2.3 Case Outline.

See Appendix 1 of General Specification ADI-M-1000: package outline:

(X)	Package	Description
E	E-28A	28-Pin Leadless Chip Carrier
Q	Q-28	28-Pin Cerdip

### 1.3 Absolute Maximum Ratings. ( $T_A = +25^\circ\text{C}$ unless otherwise noted)

Positive Supply Voltage ( $+V_S$ )	+6 V
Negative Supply Voltage ( $-V_S$ )	-7 V
Digital Input Voltages ( $D_1$ - $D_{10}$ , <u>CLOCK</u> , <u>CLOCK</u> )	
AD9720	0 V to $-V_S$
AD9721	-0.5 V to $+V_S$
Internal Reference Output Current	500 $\mu\text{A}$
Control Amplifier Input Voltage Range	0 V to -4.0 V
Control Amplifier Output Current	$\pm 2.5$ mA
Reference Input Voltage ( $V_{REF}$ )	-3.7 V to $-V_S$
Analog Output Current	30 mA
Operating Temperature Range (Case)	
AD9720/AD9721TE/TQ	-55°C to +125°C
Junction Temperature	+175°C
Storage Temperature Range (Case)	-65°C to +150°C
Lead Soldering Temperature (10 sec)	+300°C

### 1.5 Thermal Characteristics.

Maximum junction temperature should not be allowed to exceed +175°C. Typical thermal impedances with parts soldered in place; no air flow:

- 28-pin ceramic DIP:  $\theta_{JA} = 35^\circ\text{C/W}$ ,  $\theta_{JC} = 10^\circ\text{C/W}$ ;
- 28-pin LCC:  $\theta_{JA} = 41^\circ\text{C/W}$ ,  $\theta_{JC} = 13^\circ\text{C/W}$ .

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DIGITAL-TO-ANALOG CONVERTERS

# AD9720/AD9721 — SPECIFICATIONS

Table 1.

Test	Symbol	Device	Design Limits <sup>1</sup>	Sub Group 1	Sub Group 2, 3	Sub Group 4	Sub Group 5, 6	Sub Group 9	Sub Group 10, 11	Test Conditions <sup>2</sup>	Units
Differential Nonlinearity	DNL	All				±1.0	±1.5				LSB
Integral Nonlinearity	INL	All				±1.5	±2.0				LSB
Zero-Scale Offset Error	I <sub>OS</sub>	All		60	75						μA max
Full-Scale Gain Error		All		15	15						% max
Internal Reference Voltage	V <sub>IR</sub>	All		-1.15 -1.35	-1.15 -1.35						V min V max
Internal Reference Output Current	I <sub>IR</sub>	All	-50 +500								μA min μA max
Output Compliance Range	V <sub>OC</sub>	All	-1.5 +3							@ +25°C @ +25°C	V min V max
Output Resistance	R <sub>O</sub>	All	210							@ +25°C	Ω typ
Output Update Rate		-1 -2	400 100								typ
Digital Logic "1" Input Voltage	V <sub>IH</sub>	-1 -2		-0.9 2.0	-0.9 2.0						V min
Digital Logic "0" Input Voltage	V <sub>IL</sub>	-1 -2		-1.6 0.8	-1.6 0.8						V max
Digital Logic "1" Input Current	I <sub>IH</sub>	-1 -2		50 400	50 400						μA max
Digital Logic "0" Input Current	V <sub>IL</sub>	-1 -2		2 700	2 700						μA max
Setup Time <sup>3</sup>	t <sub>S</sub>	-1 -2	1.2 1.2								ns min
Hold Time <sup>4</sup>	t <sub>H</sub>	-1 -2	2.8 2.3								ns min
Clock Pulse Width "LOW"	t <sub>LPW</sub>	-1 -2	1.4 1.3							@ +25°C @ +25°C	ns min
Clock Pulse Width "HIGH"	t <sub>HPW</sub>	-1 -2	1.6 1.5							@ +25°C @ +25°C	ns min
Supply Current	+I <sub>S</sub>	-2		30	30						mA max
-V <sub>S</sub> Supply Current	-I <sub>S</sub>	-1 -2		280 290	290 300						mA max

**NOTES**

<sup>1</sup>Value shown is over full temperature range unless otherwise noted in Test Condition. Numbers in this column indicate specifications are guaranteed but not tested.

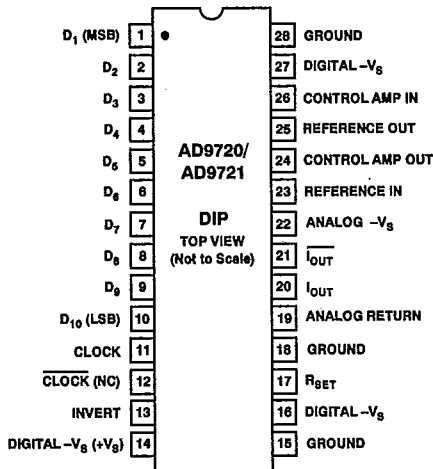
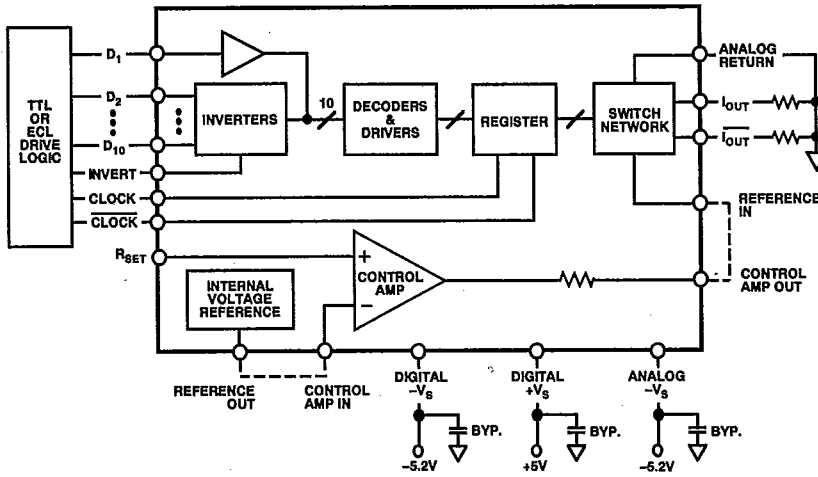
<sup>2</sup>+V<sub>S</sub> = +5 V (AD9721 only); -V<sub>S</sub> = -5.2 V; reference voltage = -1.25 V; R<sub>SET</sub> = 1,960 Ω, unless otherwise indicated.

<sup>3</sup>Data must remain stable for specified time prior to falling edge of CLOCK signal.

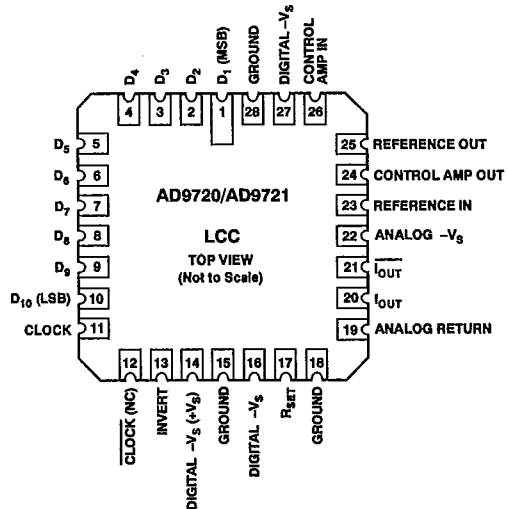
<sup>4</sup>Data must remain stable for specified time after rising edge of CLOCK signal.

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3.2.1 Functional Block Diagram and Terminal Assignments.



AD9720 (AD9721) Pinouts  
(SOIC Pinouts Same as DIP)



LCC AD9720 (AD9721) Pinouts

### 3.2.4 Microcircuit Technology Group.

This microcircuit is covered by technology group (D-56).

### 4.2.1 Life Test/Burn-In Circuit.

Steady state life test is per MIL-STD-883 Method 1005. Burn-in is per MIL-STD-883 Method 1015 test condition (B).

