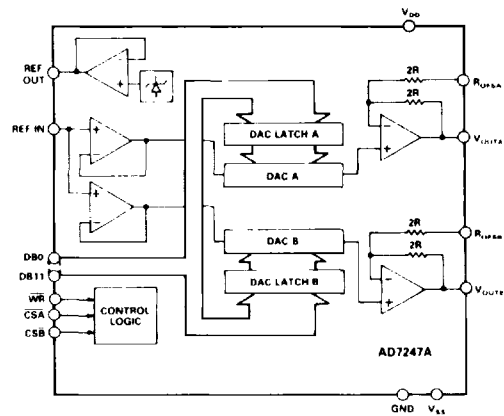
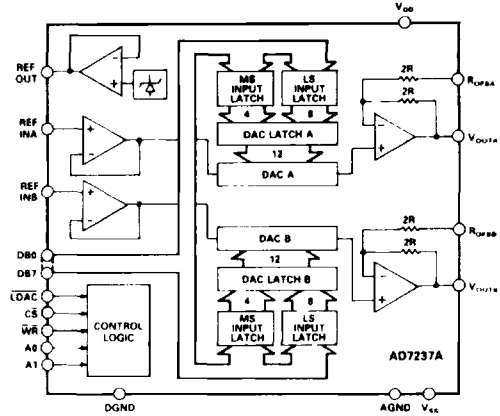


AD7237A/AD7247A
FEATURES

- Complete Dual 12-Bit DAC Comprising**
- Two 12-Bit CMOS DACs**
- On-Chip Voltage Reference**
- Output Amplifiers**
- Reference Buffer Amplifiers**
- Improved AD7237/AD7247:**
- 12 V to 15 V Operation**
- Faster Interface -30 ns typ Data Setup Time**
- Parallel Loading Structure: AD7247A**
- (8+4) Loading Structure: AD7237A**
- Single or Dual Supply Operation**
- Low Power—165 mW typ in Single Supply**

FUNCTIONAL BLOCK DIAGRAMS

GENERAL DESCRIPTION

The AD7237A/AD7247A is an enhanced version of the industry standard AD7237/AD7247. Improvements include operation from 12 V to 15 V supplies, faster interface times and better reference variations with V_{DD} . Additional features include faster settling times.

The AD7237A/AD7247A is a complete, dual, 12-bit, voltage output digital-to-analog converter with output amplifiers and Zener voltage reference on a monolithic CMOS chip. No external user trims are required to achieve full specified performance.

Both parts are microprocessor compatible, with high speed data latches and interface logic. The AD7247A accepts 12-bit parallel data which is loaded into the respective DAC latch using the \overline{WR} input and a separate Chip Select input for each DAC. The AD7237A has a double buffered interface structure and an 8-bit wide data bus with data loaded to the respective input latch in two write operations. An asynchronous \overline{LDAC} signal on the AD7237A updates the DAC latches and analog outputs.

A REF OUT/REF IN function is provided which allows either the on-chip 5 V reference or an external reference to be used as a reference voltage for the part. For single supply operation, two output ranges of 0 V to +5 V and 0 V to +10 V are available, while these two ranges plus an additional ± 5 V range are available with dual supplies. The output amplifiers are capable of developing +10 V across a 2 k Ω load to GND.

The AD7237A/AD7247A is fabricated in Linear Compatible CMOS (LC²MOS), an advanced, mixed technology process that combines precision bipolar circuits with low power CMOS logic. Both parts are available in a 24-pin, 0.3" wide plastic and hermetic dual-in-line package (DIP) and are also packaged in a 24-lead small outline (SOIC) package.

PRODUCT HIGHLIGHTS

1. The AD7237A/AD7247A is a dual 12-bit DACPORT[®] on a single chip. This single chip design and small package size offer considerable space saving and increased reliability over multichip designs.
2. The improved interface times of the parts allow easy, direct interfacing to most modern microprocessors, whether they have 8-bit or 16-bit data bus structures.
3. The AD7237A/AD7247A features a wide power supply range allowing operation from 12 V supplies.

DACPORT is a registered trademark of Analog Devices, Inc.

To obtain the most recent version or complete data sheet, call our fax retrieval system at 1-800-446-6212 or visit our World Wide Web site at <http://www.analog.com>.

AD7237A/AD7247A—SPECIFICATIONS ($V_{DD} = +12\text{ V to } +15\text{ V}$,¹ $V_{SS} = 0\text{ V or } -12\text{ V to } -15\text{ V}$,¹ $AGND = DGND = 0\text{ V [AD7237A]$, $GND = 0\text{ V [AD7247A]$, $REF\ IN = +5\text{ V}$, $R_L = 2\text{ k}\Omega$, $C_L = 100\text{ pF}$. All specifications T_{MIN} to T_{MAX} unless otherwise noted.)

Parameter	A ²	B ²	T ²	Units	Test Conditions/Comments
STATIC PERFORMANCE					
Resolution	12	12	12	Bits	Guaranteed Monotonic $V_{SS} = 0\text{ V or } -12\text{ V to } -15\text{ V}$ ⁴ . DAC Latch Contents All 0s $V_{SS} = -12\text{ V to } -15\text{ V}$ ⁴ . DAC Latch Contents 1000 0000 0000
Relative Accuracy ³	± 1	$\pm 1/2$	$\pm 1/2$	LSB max	
Differential Nonlinearity ³	± 0.9	± 0.9	± 0.9	LSB max	
Unipolar Offset Error ¹	± 3	± 3	± 4	LSB max	
Bipolar Zero Error ¹	± 6	± 4	± 6	LSB max	
Full-Scale Error ^{3,5}	± 5	± 5	± 6	LSB max	
Full-Scale Mismatch ⁵	± 1	± 1	± 1	LSB typ	
REFERENCE OUTPUT					
REF OUT	4.97/5.03	4.97/5.03	4.95/5.05	V min/max	
Reference Temperature Coefficient	± 25	± 25	± 25	ppm/ ^o C typ	
Reference Load Change (ΔREF OUT vs. ΔI)	1	1	-1	mV max	Reference Load Current Change (0-100 μA)
REFERENCE INPUT					
Reference Input Range	4.75/5.25	4.75/5.25	4.75/5.25	V min/max	5 V \pm 5%
Input Current ⁶	± 5	± 5	± 5	μA max	
DIGITAL INPUTS					
Input High Voltage, $V_{I\text{SH}}$	2.4	2.4	2.4	V min	$V_{IN} = 0\text{ V to } V_{DD}$
Input Low Voltage, $V_{I\text{SL}}$	0.8	0.8	0.8	V max	
Input Current					
I_{IK} (Data Inputs)	± 10	± 10	± 10	μA max	
Input Capacitance ⁶	8	8	8	pF max	
ANALOG OUTPUTS					
Output Range Resistors	15/30	15/30	15/30	kΩ min/max	Single Supply; ($V_{SS} = 0\text{ V}$) Dual Supply; ($V_{SS} = -12\text{ V to } -15\text{ V}$)
Output Voltage Ranges ⁷	+5, +10	+5, +10		V	
Output Voltage Ranges ⁷	+5, +10, ± 5	+5, +10, ± 5	+5, +10, ± 5		
DC Output Impedance	0.5	0.5	0.5	Ω typ	
AC CHARACTERISTICS⁶					
Voltage Output Settling Time					Settling Time to Within $\pm 1/2$ LSB of Final Value DAC Latch all 0s to all 1s. Typically 5 μs DAC Latch all 1s to all 0s. Typically 5 μs $V_{SS} = -12\text{ V to } -15\text{ V}$ ⁴ .
Positive Full-Scale Change	8	8	10	μs max	
Negative Full-Scale Change	8	8	10	μs max	
Digital-to-Analog Glitch Impulse ⁴	30	30	30	nV secs typ	DAC Latch Contents Toggled Between all 0s and all 1s
Digital Feedthrough ⁴	10	10	10	nV secs typ	
Digital Crosstalk ⁴	30	30	30	nV secs typ	
POWER REQUIREMENTS					
V_{DD}	+10.8/+16.5	+11.4/+15.75	+11.4/+15.75	V min/max	For Specified Performance Unless Otherwise Stated For Specified Performance Unless Otherwise Stated Output Unloaded. Typically 10 mA Output Unloaded. Typically 3 mA
V_{SS}	10.8/ -16.5	-11.4/-15.75	-11.4/ -15.75	V min/max	
I_{DD}	15	15	15	mA max	
I_{SS} (Dual Supplies)	5	5	5	mA max	

NOTES

¹Power Supply tolerance is $\pm 10\%$ for A version and $\pm 5\%$ for B and T versions.

²Temperature ranges are as follows: A, B Versions, $-40^{\circ}\text{C to } +85^{\circ}\text{C}$; T Version, $-55^{\circ}\text{C to } +125^{\circ}\text{C}$.

³See Terminology.

⁴With appropriate power supply tolerances.

⁵Measured with respect to REF IN and includes unipolar/bipolar offset error.

⁶Sample tested @ $+25^{\circ}\text{C}$ to ensure compliance.

⁷0 V to +10 V range is only available with $V_{DD} \geq 14.25\text{ V}$.

Specifications subject to change without notice.

ORDERING GUIDE

Model ¹	Temperature Range	Relative Accuracy (LSB)	Package Option ²
AD7237AAN	$-40^{\circ}\text{C to } +85^{\circ}\text{C}$	± 1 max	N-24
AD7237ABN	$-40^{\circ}\text{C to } +85^{\circ}\text{C}$	$\pm 1/2$ max	N-24
AD7237AAR	$-40^{\circ}\text{C to } +85^{\circ}\text{C}$	± 1 max	R-24
AD7237ABR	$-40^{\circ}\text{C to } +85^{\circ}\text{C}$	$\pm 1/2$ max	R-24
AD7237ATQ	$-55^{\circ}\text{C to } +125^{\circ}\text{C}$	$\pm 1/2$ max	Q-24
AD7247AAN	$-40^{\circ}\text{C to } +85^{\circ}\text{C}$	± 1 max	N-24
AD7247ABN	$-40^{\circ}\text{C to } +85^{\circ}\text{C}$	$\pm 1/2$ max	N-24
AD7247AAR	$-40^{\circ}\text{C to } +85^{\circ}\text{C}$	± 1 max	R-24
AD7247ABR	$-40^{\circ}\text{C to } +85^{\circ}\text{C}$	$\pm 1/2$ max	R-24
AD7247ATQ	$-55^{\circ}\text{C to } +125^{\circ}\text{C}$	$\pm 1/2$ max	Q-24

NOTES

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

Contact local sales office for military data sheet and availability.

²N = Plastic DIP; Q = Cerdip; R = Small Outline (SOIC).

For outline information see Package Information section.