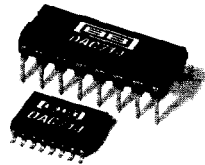


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DAC714

www.burr-brown.com/databook/DAC714.html

16-Bit DIGITAL-TO-ANALOG CONVERTER With Serial Data Interface

FEATURES:

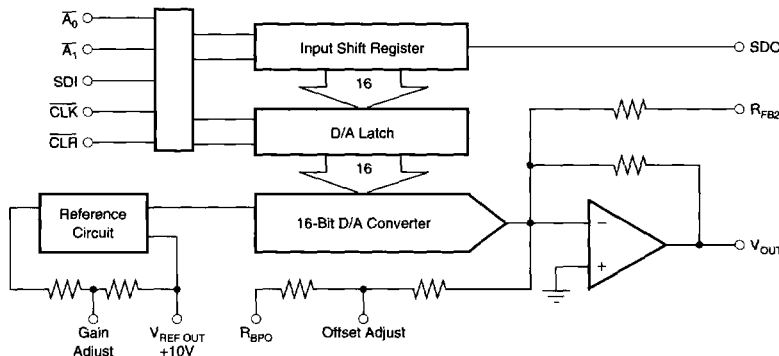
- SERIAL DIGITAL INTERFACE
- VOLTAGE OUTPUT: $\pm 10V$, $\pm 5V$, 0 to $+10V$
- ± 1 LSB INTEGRAL LINEARITY
- 16-BIT MONOTONIC OVER TEMPERATURE
- PRECISION INTERNAL REFERENCE
- LOW NOISE: $120nV/\sqrt{Hz}$ Including Reference
- 16-LEAD PLASTIC AND CERAMIC SKINNY DIP AND PLASTIC SOIC PACKAGES

DESCRIPTION

The DAC714 is a complete monolithic digital-to-analog converter including a $+10V$ temperature compensated reference, current-to-voltage amplifier, a high-speed synchronous serial interface, a serial output which allows cascading multiple converters, and an asynchronous clear function which immediately sets the output voltage to midscale.

The output voltage range is $\pm 10V$, $\pm 5V$, or 0 to $+10V$ while operating from $\pm 12V$ or $\pm 15V$ supplies. The gain and bipolar offset adjustments are designed so that they can be set via external potentiometers or external D/A converters. The output amplifier is protected against short circuit to ground.

The 16-pin DAC714 is available in a plastic 0.3" DIP, ceramic 0.3" Cerdip, and wide-body plastic SOIC package. The DAC714P, U, HB, and HC are specified over the $-40^{\circ}C$ to $+85^{\circ}C$ temperature range while the DAC714HL is specified over the $0^{\circ}C$ to $+70^{\circ}C$ range.



International Airport Industrial Park • Mailing Address: PO Box 11400, Tucson, AZ 85734 • Street Address: 6730 S. Tucson Blvd., Tucson, AZ 85706 • Tel: (520) 746-1111 • Twx: 910-962-1111
Internet: <http://www.burr-brown.com/> • FAXLine: (800) 548-6133 (US/Canada Only) • Cable: BBRCORP • Telex: 066-6481 • FAX: (520) 889-1510 • Immediate Product Info: (800) 548-6132



PDS-1252D

3.29

DAC714
DIGITAL-TO-ANALOG CONVERTERS

For Immediate Assistance, Contact Your Local Salesperson

SPECIFICATIONS

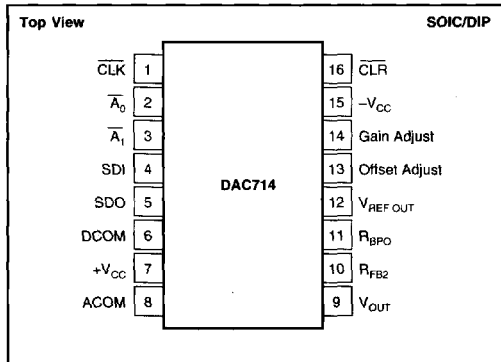
At $T_A = +25^\circ\text{C}$, $+V_{CC} = +12\text{V}$ and $+15\text{V}$, $-V_{CC} = -12\text{V}$, and -15V , unless otherwise noted.

	DAC714P, U			DAC714HB			DAC714HC			DAC714HL			
PARAMETER	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	UNITS
TRANSFER CHARACTERISTICS													
ACCURACY													
Linearity Error			±4			±2			±1			±1	LSB
T _{MIN} to T _{MAX}			±8			±4			±2			±2	LSB
Differential Linearity Error			±4			±2			±1			±1	LSB
T _{MIN} to T _{MAX}			±8			±4			±2			±1	LSB
Monotonicity	14			15			16			16			Bits
Monotonicity Over Spec Temp Range	13			14			15			16			Bits
Gain Error ⁽³⁾			±0.1			±0.1			±0.1			±0.1	%
T _{MIN} to T _{MAX}			±0.25			±0.25			±0.25			±0.25	%
Unipolar/Bipolar Zero Error ⁽³⁾			±0.1			±0.1			±0.1			±0.1	% of FSR ⁽²⁾
T _{MIN} to T _{MAX}			±0.2			±0.2			±0.2			±0.2	% of FSR
Power Supply Sensitivity of Gain			±0.003			±0.003			±0.003			±0.003	%FSR/%V _{CC}
			±30			±30			±30			±30	ppm FSR/%V _{CC}
DYNAMIC PERFORMANCE													
Settling Time (to ±0.003%FSR, 5kΩ 500pF Load) ⁽⁴⁾													
20V Output Step		6	10		6	10		6	10		6	10	μs
1LSB Output Step ⁽⁵⁾		4			4			4			4		μs
Output Slew Rate		10			10			10			10		V/μs
Total Harmonic Distortion													
0dB, 1001Hz, I _S = 100kHz		0.005			0.005			0.005			0.005		%
-20dB, 1001Hz, I _S = 100kHz		0.03			0.03			0.03			0.03		%
-60dB, 1001Hz, I _S = 100kHz		3.0			3.0			3.0			3.0		%
SINAD: 1001Hz, I _S = 100kHz		87			87			87			87		dB
Digital Feedthrough ⁽⁵⁾		2			2			2			2		nV-s
Digital-to-Analog Glitch Impulse ⁽⁵⁾		15			15			15			15		nV-s
Output Noise Voltage (includes reference)		120			120			120			120		nV/√Hz
ANALOG OUTPUT													
Output Voltage Range													V
+V _{CC} , -V _{CC} ≈ ±11.4V	±10			±10			±10			±10			
Output Current	±5			±5			±5			±5			mA
Output Impedance		0.1			0.1			0.1			0.1		Ω
Short Circuit to ACOM Duration		Indefinite			Indefinite			Indefinite			Indefinite		
REFERENCE VOLTAGE													
Voltage	+9.975	+10.000	+10.025	+9.975	+10.000	+10.025	+9.975	+10.000	+10.025	+9.975	+10.000	+10.025	V
T _{MIN} to T _{MAX}	+9.960		+10.040	+9.960		+10.040	+9.960		+10.040	+9.960		+10.040	V
Output Resistance		1			1			1			1		Ω
Source Current	2			2			2			2			mA
Short Circuit to ACOM Duration		Indefinite			Indefinite			Indefinite			Indefinite		
INTERFACE													
RESOLUTION													
DIGITAL INPUTS		16			16			16			16		Bits
Serial Data Input Code													
Logic Levels ⁽¹⁾													
V _{IH}	+2.0		(V _{CC} -1.4)	+2.0		(V _{CC} -1.4)	+2.0		(V _{CC} -1.4)	+2.0		(V _{CC} -1.4)	V
V _{IL}	0		+0.8	0		+0.8	0		+0.8	0		+0.8	V
I _{IH} (V _I = +2.7V)			±10			±10			±10			±10	μA
I _{IL} (V _I = +0.4V)			±10			±10			±10			±10	μA
DIGITAL OUTPUT													
Serial Data													
V _{OL} (I _{SINK} = 1.6mA)	0		+0.4	0		+0.4	0		+0.4	0		+0.4	V
V _{OH} (I _{SOURCE} = 500μA), T _{MIN} to T _{MAX}	+2.4		+5	+2.4		+5	+2.4		+5	+2.4		+5	V
POWER SUPPLY REQUIREMENTS													
Voltage													
+V _{CC}	+11.4	+15	+16.5	+11.4	+15	+16.5	+11.4	+15	+16.5	+11.4	+15	+16.5	V
-V _{CC}	-11.4	-15	-16.5	-11.4	-15	-16.5	-11.4	-15	-16.5	-11.4	-15	-16.5	V
Current (No Load, ±15V Supplies) ⁽⁶⁾													
+V _{CC}		13	16		13	16		13	16		13	16	mA
-V _{CC}		22	26		22	26		22	26		22	26	mA
Power Dissipation ⁽⁷⁾			625			625			625			625	mW
TEMPERATURE RANGES													
Specification													
All Grades	-40		+85	-40		+85	-40		+85	0		+70	°C
Storage	-60		+150	-60		+150	-60		+150	-60		+150	°C
Thermal Coefficient, θ _{JA}		75			75			75			75		°C/W

NOTES: (1) Digital inputs are TTL and +5V CMOS compatible over the specification temperature range. (2) FSR means Full Scale Range. For example, for $\pm 10\text{V}$ output, FSR = 20V. (3) Errors externally adjustable to zero. (4) Maximum represents the 3 σ limit. Not 100% tested for this parameter. (5) For the worst-case Binary Two's Complement code changes: FFFF_H to 0000_H, and 0000_H to FFFF_H. (6) During power supply turn on, the transient supply current may approach 3x the maximum quiescent specification. (7) Typical (i.e. rated) supply voltages times maximum currents.

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PIN CONFIGURATION



PIN DESCRIPTIONS

PIN	LABEL	DESCRIPTION
1	CLK	Serial Data Clock
2	$\overline{A_0}$	Enable for Input Register (Active Low)
3	$\overline{A_1}$	Enable for D/A Latch (Active Low)
4	SDI	Serial Data Input
5	SDO	Serial Data Output
6	DCOM	Digital Ground
7	+V _{CC}	Positive Power Supply
8	ACOM	Analog Ground
9	V _{OUT}	D/A Output
10	R _{FB2}	±10V Range Feedback Output
11	R _{BPO}	Bipolar Offset
12	V _{REF OUT}	Voltage Reference Output
13	Offset Adjust	Offset Adjust
14	Gain Adjust	Gain Adjust
15	-V _{CC}	Negative Power Supply
16	CLR	Clear



ELECTROSTATIC DISCHARGE SENSITIVITY

Electrostatic discharge can cause damage ranging from performance degradation to complete device failure. Burr-Brown Corporation recommends that all integrated circuits be handled and stored using appropriate ESD protection methods.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet published specifications.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

+V _{CC} to Common	0V to +17V
-V _{CC} to Common	0V to -17V
+V _{CC} to -V _{CC}	34V
ACOM to DCOM	±0.5V
Digital Inputs to Common	-1V to (V _{CC} - 0.7V)
External Voltage Applied to BPO and Range Resistors	±V _{CC}
V _{REF OUT}	Indefinite Short to Common
V _{OUT}	Indefinite Short to Common
SDO	Indefinite Short to Common
Power Dissipation	750mW
Storage Temperature	-60°C to +150°C
Lead Temperature (soldering, 10s)	+300°C

NOTE: (1) Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. Exposure to absolute maximum conditions for extended periods may affect device reliability.

ORDERING INFORMATION

PRODUCT	PACKAGE	LINEARITY ERROR max at +25°C	TEMPERATURE RANGE
DAC714P	Plastic DIP	±4 LSB	-40°C to +85°C
DAC714U	Plastic SOIC	±4 LSB	-40°C to +85°C
DAC714HB	Ceramic DIP	±2 LSB	-40°C to +85°C
DAC714HC	Ceramic DIP	±1 LSB	-40°C to +85°C
DAC714HL	Ceramic DIP	±1 LSB	0°C to +70°C

PACKAGE INFORMATION

PRODUCT	PACKAGE	PACKAGE DRAWING NUMBER ⁽¹⁾
DAC714P	Plastic DIP	180
DAC714U	Plastic SOIC	211
DAC714H	Ceramic DIP	129

NOTE: (1) For detailed drawing and dimension table, please see end of data sheet, or Appendix C of Burr-Brown IC Data Book.

DAC714

DIGITAL-TO-ANALOG CONVERTERS

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