

## AD9712B/AD9713B

### FEATURES

- 100 MSPS Update Rate
- ECL/TTL Compatibility
- SFDR @ 1 MHz: 70 dBc
- Low Glitch Impulse: 28 pV-s
- Fast Settling: 27 ns
- Low Power: 725 mW
- 1/2 LSB DNL (B Grade)
- 40 MHz Multiplying Bandwidth

### APPLICATIONS

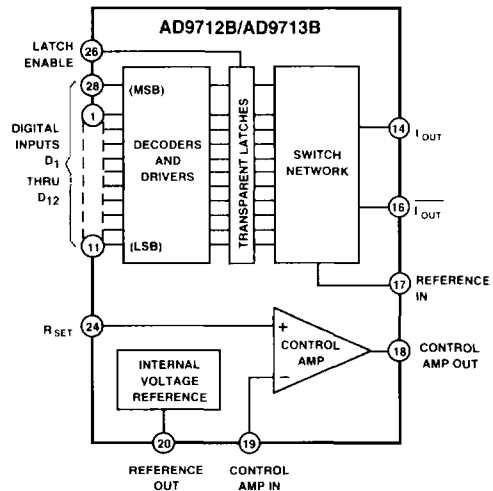
- ATE
- Signal Reconstruction
- Arbitrary Waveform Generators
- Digital Synthesizers
- Signal Generators

### GENERAL DESCRIPTION

The AD9712B and AD9713B D/A converters are replacements for the AD9712 and AD9713 units which offer improved ac and dc performance. Like their predecessors, they are 12-bit, high speed digital-to-analog converters fabricated in an advanced oxide isolated bipolar process. The AD9712B is an ECL-compatible device featuring update rates of 100 MSPS minimum; the TTL-compatible AD9713B will update at 80 MSPS minimum.

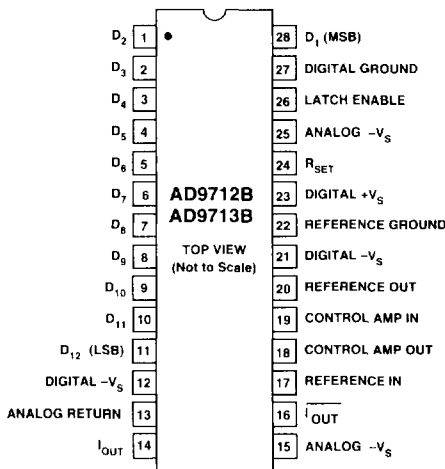
Designed for direct digital synthesis, waveform reconstruction, and high resolution imaging applications, both devices feature low glitch impulse of 28 pV-s and fast settling times of 27 ns. Both units are characterized for dynamic performance and have excellent harmonic suppression.

### FUNCTIONAL BLOCK DIAGRAM



The AD9712B and AD9713B are available in 28-pin plastic DIPs and PLCCs, with an operating temperature range of  $-25^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ . Both are also available for extended temperature ranges of  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  in cerdips and 28-pin LCC packages.

### DIP/PLCC/LCC



### ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option*
AD9712BAN	$-25^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	28-Pin P-DIP	N-28
AD9712BBN	$-25^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	28-Pin P-DIP	N-28
AD9712BAP	$-25^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	28-Pin PLCC	P-28A
AD9712BBP	$-25^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	28-Pin PLCC	P-28A
AD9712BSQ/883B	$55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	28-Pin Cerdip	Q-28
AD9712BSE/883B	$55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	28-Pin LCC	E-28A
AD9712BTQ/883B	$55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	28-Pin Cerdip	Q-28
AD9712BTE/883B	$55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	28-Pin LCC	E-28A
AD9713BAN	$25^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	28-Pin P-DIP	N-28
AD9713BBN	$25^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	28-Pin P-DIP	N-28
AD9713BAP	$-25^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	28-Pin PLCC	P-28A
AD9713BBP	$-25^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	28-Pin PLCC	P-28A
AD9713BSQ/883B	$55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	28-Pin Cerdip	Q-28
AD9713BSE/883B	$55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	28-Pin LCC	E-28A
AD9713BTQ/883B	$55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	28-Pin Cerdip	Q-28
AD9713BTE/883B	$55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	28-Pin LCC	E-28A

\*For outline information see Package Information section.

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>.

REV. B

D/A CONVERTERS 6-113

# AD9712B/AD9713B—SPECIFICATIONS

**ELECTRICAL CHARACTERISTICS**  $[-V_S = -5.2\text{ V}; +V_S = +5\text{ V (AD9713B only)}; \text{Reference Voltage} = -1.2\text{ V}; R_{\text{SET}} = 7.5\text{ k}\Omega; V_{\text{OUT}} = 0\text{ V (virtual ground)}; \text{unless otherwise noted}]$

Parameter (Conditions)	Temp	Test Level	AD9712B/AD9713B AN/AP			AD9712B/AD9713B BN/BP			AD9712B/AD9713B SE/SQ			AD9712B/AD9713B TE/TQ			Units
			Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
RESOLUTION			12			12			12			12			Bits
DC ACCURACY															
Differential Nonlinearity	+25°C	I	1.25	1.0	+1.25	-0.75	0.5	+0.75	-1.5	1.0	+1.5	-1.0	0.5	+1.0	LSB
	Full	VI	2.0	2.0		-1.5	1.5		-2.0	2.0		-1.5	1.5	LSB	
Integral Nonlinearity ("Best Fit" Straight Line)	+25°C	I	1.5	1.0	1.5	1.0	0.75	1.0	-1.75	1.5	1.75	-1.25	1.0	1.25	LSB
	Full	VI	2.0	2.0		1.75	1.75		2.0	2.0		1.75	1.75	LSB	

Specifications subject to change without notice.

Parameter (Conditions)	Temp	Test Level	AD9712B All Grades			AD9713B All Grades			Units
			Min	Typ	Max	Min	Typ	Max	
INITIAL OFFSET ERROR									
Zero-Scale Offset Error	+25°C	I		0.5	2.5		0.5	2.5	$\mu\text{A}$
	Full	VI			5.0			5.0	$\mu\text{A}$
Full-Scale Gain Error	+25°C	I		1.0	5		1.0	5	%
	Full	VI			8			8	%
Offset Drift Coefficient	+25°C	V		0.01			0.01		$\mu\text{A}/^\circ\text{C}$
REFERENCE/CONTROL AMP									
Internal Reference Voltage	+25°C	I	1.14	-1.18	1.22	1.14	-1.18	1.22	V
	Full	VI	1.12		1.24	1.12		1.24	V
Internal Reference Voltage Drift	Full	V		50			50		ppm/ $^\circ\text{C}$
Internal Reference Output Current	Full	IV	50		+500	50		+500	$\mu\text{A}$
Amplifier Input Impedance	+25°C	V		50			50		$\text{k}\Omega$
Amplifier Bandwidth	+25°C	V		300			300		$\text{kHz}$
REFERENCE INPUT									
Reference Input Impedance	+25°C	V		3			3		$\text{k}\Omega$
Reference Multiplying Bandwidth	+25°C	V		40			40		$\text{MHz}$
DYNAMIC PERFORMANCE									
Full-Scale Output Current	+25°C	V		20.48			20.48		$\text{mA}$
Output Compliance Range	+25°C	IV	-1.2		+2	-1.2		+2	V
Output Resistance	+25°C	IV	2.0	2.5	3.0	2.0	2.5	3.0	$\text{k}\Omega$
Output Capacitance	+25°C	V		15			15		$\text{pF}$
Output Update Rate	+25°C	IV	100	110		80	100		MSPS
Output Settling Time ( $t_{s1}$ )	+25°C	V		27			27		ns
Output Propagation Delay ( $t_{p1}$ )	+25°C	V		6			7		ns
Glitch Impulse	+25°C	V		28			28		$\text{pV}\cdot\text{s}$
Output Rise Time	+25°C	V		2			2		ns
Output Fall Time	+25°C	V		2			2		ns
DIGITAL INPUTS									
Logic "1" Voltage	Full	VI	1.0	0.8		2.0			V
Logic "0" Voltage	Full	VI		1.7	1.5				V
Logic "1" Current	Full	VI			20			20	$\mu\text{A}$
Logic "0" Current	Full	VI			10			600	$\mu\text{A}$
Input Capacitance	+25°C	V		3			3		$\text{pF}$
Input Setup Time ( $t_s$ )	+25°C	IV	0.5	0.3		0.5	0.3		ns
	Full	IV	0.8			0.8			ns
Input Hold Time ( $t_H$ )	+25°C	IV	1.8	1.2		1.8	1.2		ns
	Full	IV	2.0			2.0			ns
Latch Pulse Width ( $t_{LPW}$ ) (LOW) (Transparent)	+25°C	IV	2.5	1.7		2.5	1.7		ns
	Full	IV	2.8			2.8			ns
AC LINEARITY									
Spurious-Free Dynamic Range (SFDR) 1.23 MHz; 10 MSPS; 2 MHz Span	+25°C	V		70			70		dB
5.055 MHz; 20 MSPS; 2 MHz Span	+25°C	V		72			72		dB
10.1 MHz; 50 MSPS; 2 MHz Span	+25°C	V		68			68		dB
16 MHz; 40 MSPS; 10 MHz Span	+25°C	V		68			68		dB
POWER SUPPLY									
Positive Supply Current (+5.0 V)	+25°C	I					6	12	$\text{mA}$
	Full	VI						14	$\text{mA}$
Negative Supply Current (-5.2 V)	+25°C	I		140	178		145	184	$\text{mA}$
	Full	VI			183			188	$\text{mA}$
Nominal Power Dissipation	+25°C	V		728			784		$\text{mW}$
Power Supply Rejection Ratio (PSRR)	+25°C	I		30	100		30	100	$\mu\text{A}/\text{V}$

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