

AD2S99

FEATURES

Sine Wave Oscillator
Two Phase-locked Sine Wave Outputs
Programmable Output Frequency Range 2 kHz–20 kHz
Programmable Output Amplitude
Wide Power Supply Range
"Loss-of-Signal" Indicator
Small 20-Pin PLCC Package
Low Cost

APPLICATIONS

Primary Winding Excitation of
Resolvers
Synchros
LVDTs
RVDTs
Pressure Transducers
Load Cells
Inductosyns*
AC Bridges

GENERAL DESCRIPTION

The AD2S99 is a programmable sine wave oscillator contained in a 20-pin PLCC package, with an operating temperature range of -40°C to $+85^{\circ}\text{C}$.

The main use of the AD2S99 is to provide two signals. An excitation signal is provided for an ac transducer, also, a reference signal, phase locked to the transducer outputs, which can be used to demodulate the transducer outputs. The AD2S99 requires only two external components, one resistor and one capacitor.

The AD2S99 operates on resolver format SINE and COSINE signals. These are dynamically phase compensated by varying the transducer excitation, producing complete alignment between the SINE, COSINE and Reference signal.

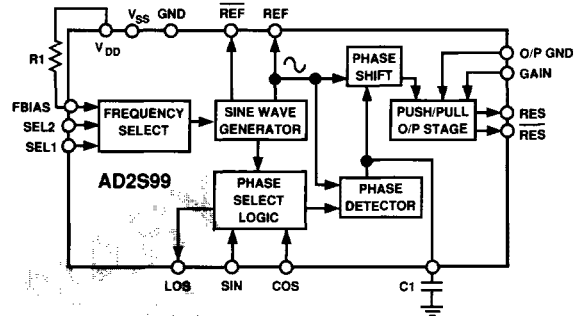
Elimination of the temperature dependent phase shifts found with inductive transducers, and their resultant errors is therefore achieved.

The AD2S99 is manufactured on a LC^2MOS process which combines high density and low power CMOS logic with high accuracy bipolar linear circuitry.

*Inductosyn is a registered trademark of Farrand, Industries, Inc.

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FUNCTIONAL BLOCK DIAGRAM



PRODUCT HIGHLIGHTS

Dynamic Phase Compensation

The AD2S99 dynamically compensates for any phase variation in the transducer by phase locking the outputs of the transducer to the reference output of the AD2S99.

Programmable Frequency

The oscillator frequency is easily programmed to 2 kHz, 5 kHz, 10 kHz or 20 kHz by using the frequency select pins.

Programmable Output Amplitude

Pin programmable to 4 V rms or 7 V rms output amplitudes.

Loss of Signal Pin

The "LOS" output indicates a signal failure if both the sensor outputs feeding back to the AD2S99 are lost.

AD2S99—SPECIFICATIONS ($T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_S = \pm 15\text{ V dc}$, $R_1 = 345\text{K}$ [1%] unless otherwise specified)

Parameter	Min	Typ	Max	Units	Conditions
ANALOG INPUTS SIN, COS ¹ Maximum Amplitude	0.7		2.2	V rms	
FREQUENCY OUTPUT RANGE	1800 4500 9000 18000	2000 5000 10000 20000	2200 5500 11000 22000	Hz Hz Hz Hz	SEL1 SEL2 0 0 0 1 1 0 1 1
ACCURACY Frequency		± 2 ± 6	± 10	% % %	$V_S = \pm 4.75$ to $\pm 15.75\text{ V}$ @ -40°C to $+85^\circ\text{C}$ $V_S = \pm 15\text{ V}$ @ $+25^\circ\text{C}$ $V_S = \pm 15\text{ V}$ @ -40°C to $+85^\circ\text{C}$
OUTPUT DRIVE CAPABILITY EXC, to EXC REF, REF			10 10	mA rms mA rms	Max Capacitive Load (C_L) = 30 pF Max Capacitive Load (C_L) = 30 pF
DIFFERENTIAL OUTPUT EXC, EXC REF, REF EXC, EXC REF, REF	3.88 3.88 6.79 6.79	4 4 7 7	4.12 4.12 7.21 7.21	V rms V rms V rms V rms	GAIN = 0; $R_{LOAD} = 200\ \Omega$ to GND GAIN = 1; $R_{LOAD} = 350\ \Omega$ to GND 7 V rms Obtained Only @ $V_S \geq \pm 8\text{ V}$ (Single Ended Output Gives Half the Voltage Range)
PHASE SENSITIVE DETECTOR Phase Range Detector Threshold	0 0.4		180 0.6	Degrees V rms	
PHASE CONTROL RANGE SIN Input to REF Output	1°		180°		
HARMONIC DISTORTION REF, REF, EXC, EXC			-30	dB	
POWER DISSIPATION		100		mW	
POWER SUPPLIES V_{DD} V_{SS} Quiescent Current	+4.75 -4.75		+15.75 -15.75	V V mA	
TEMPERATURE RANGE	-40 -65		+85 +150	°C °C	Operating Storage
POWER SUPPLY REJECTION RATIO					V_{SS}/V_{DD} to REF, REF, EXC, EXC
SEL1, SEL2 INPUTS Input High Voltage (V_{INH}) Input Low Voltage (V_{INL})	AGND -0.4 $V_{SS}-0.25$		AGND +0.4 $V_{SS}+0.4$	V dc V dc	Logic 1 Logic 0
GAIN INPUTS Input High Voltage (V_{INH}) Input Low Voltage (V_{INL})	$V_{DD}-0.4$ $V_{SS}-0.25$		$V_{DD}+0.25$ $V_{SS}+0.4$	V dc V dc	Logic 1 Logic 0
LOS OUTPUT LOS Output High Voltage (V_{OH}) LOS Output Low Voltage (V_{OL})	$V_{DD}-0.4$ $V_{SS}+0.4$	V_{DD} V_{SS}	$V_{DD}+0.25$ $V_{SS}-0.4$	V dc V	Logic 1 Logic 0

NOTES

¹Either SIN or COS input must not exceed input limits. Worst Case $\sin\theta = \cos\theta$ where $\theta = 45^\circ$.

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RECOMMENDED OPERATING CONDITIONS

Power Supply Voltage (V_{DD} to V_{SS}) . . . ± 4.75 V to ± 15.75 V
 Analog Input Voltage (SIN and COS) 2 V rms $\pm 10\%$
 Frequency Select (SEL1 and SEL2) V_{SS} to AGND
 Operating Temperature Range -40°C to $+85^{\circ}\text{C}$

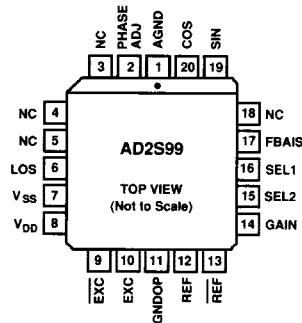
ABSOLUTE MAXIMUM RATINGS*

V_{DD} 0 V to $+16.5$ V
 V_{SS} 0 V to -16.5 V
 Operating Temperature -40°C to $+85^{\circ}\text{C}$
 Storage Temperature -65°C to $+150^{\circ}\text{C}$
 Outputs (EXC, $\overline{\text{EXC}}$, REF, $\overline{\text{REF}}$ and LOS)
 $V_{SS} - 0.4$ V to $V_{DD} + 0.4$ V
 Analog Input Voltages (SIN and COS) ± 5 V rms
 Output Amplitude Control (GAIN)
 $V_{SS} - 0.4$ V to $V_{DD} + 0.4$ V
 Frequency Select (SEL1, SEL2)
 $V_{SS} - 0.4$ V to AGND $+0.4$ V

CAUTION:

*Absolute Maximum Ratings are those values beyond which damage to the device may occur. Reversal of power supplies may damage the device.

PIN CONFIGURATION



NOTE:
 THE AD2S99 WILL BE AVAILABLE
 IN A CERAMIC PACKAGE.

PIN DESCRIPTION

1	AGND	Analog ground pin. Measure SIN and COS inputs with reference to AGND.
2	PHASE ADJ	Input with a voltage range of ± 2 volts with respect to AGND. Phase shifts the EXC output relative to the REF output from 0 to 180 degrees.
3	NC	Not Connected.
4	NC	Not Connected.
5	NC	Not Connected.
6	LOS	LOS signal is a logic output which swings between V_{SS} and V_{DD} . Logic high when both SIN and COS signals are below the input detector threshold of 0.5 ± 0.1 volts.
7	V_{SS}	Negative power supply pin. -4.75 V to -15.75 V dc.
8	V_{DD}	Positive power supply pin. $+4.75$ V to -15.75 V dc.
9	$\overline{\text{EXC}}$	Complement of the signal found on the EXC pin.
10	EXC	Excitation output. Can drive 10 mA with a 30 pF capacitive load, with an output voltage of 2 V or 3.5 V rms.
11	GNDOP	Ground pin for reference outputs EXC, $\overline{\text{EXC}}$, REF, and $\overline{\text{REF}}$. Internally connected to AGND.
12	REF	Converter reference output sine wave can drive 10 mA with a 30 pF load, with an amplitude of 2 V or 3.5 V rms.
13	$\overline{\text{REF}}$	Complement of the signal found on REF pin.
14	GAIN	Controls the output voltages of EXC, $\overline{\text{EXC}}$, REF, $\overline{\text{REF}}$.
15	SEL2	Selects output frequency. Connect to GND or V_{SS} .
16	SEL1	Selects output frequency. Connect to GND or V_{SS} .
17	FBIAIS	Connect to V_{DD} via resistor to trim oscillator frequency.
18	NC	Not Connected.
19	SIN	Input for the SIN signal from the transducer.
20	COS	Input for the COS signal from the transducer.

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