KAMAN

Precision Products / Measuring

Digital Differential Impedance Transducer (DDIT)

Designed for Non-Contact Linear Position Displacement Sensing Applications

The DDIT Sensor system utilizes Kaman's custom Sensors, Signal Processing, Analog to Digital Converter and custom Calibration system to deliver a precision Digital DIT system. The system utilizes a common 9 pin connector for reading and writing data.

Kaman Sensors are designed and tuned for specific applications. The DDIT system utilizes two matched sensor pairs for optimum operation for each channel.

The input signals are filtered and scaled to provide optimum operation, remove common mode noise and provide a drive signal. The signal processing also provides digital filtering as part of the signal conditioning to reduce signal noise.

Analog to Digital Convert (ADC) – The maximum sampling rate is 128K with 24 Bits of resolution per channel.

Customers are supplied with a Calibration file that details system performance that includes resolution and linearity.

Kaman's Digital DIT system samples data at 8 times the Data rate. The oversampling provides higher resolution at the defined data rate. The effect of oversampling results in the signal resolution being 8X better than a system sampling at the Nyquist rate.

DDIT Configurations:

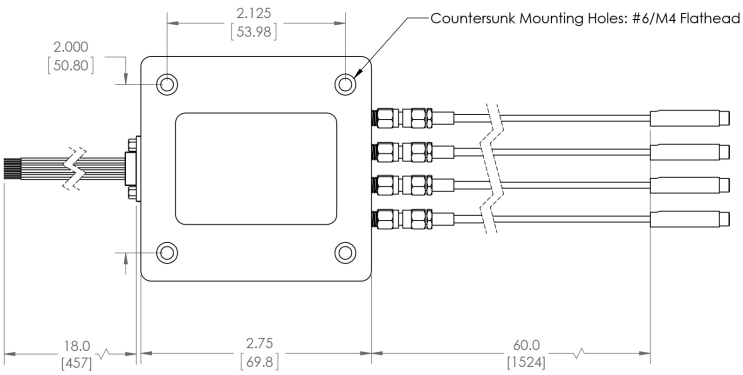
• Digital System – designed to interface directly to an embedded controller with a Master SPI bus. The master can control the DDIT operation by writing commands to the DDIT or just reading data when an interrupt is received from DDIT. The Digital System outputs two 24 bit digital words, one for CHX and one for CHY each time the data is received. The system is calibrated and configured to optimize performance.

• ANA System – The Analog system provides linear analog voltage. The full range output signal is 0-5 VDC with a null position of 2.5 VDC.

• FE System – designed for FPGA interface for high speed operation with data rates as high as 128kHz, 48 bits of data, 60Khz bandwidth and no internal firmware.

Features & Benefits:

• High Resolution	√ Higher Accuracy
• True Digital	√ Easy to use, Improved Communication & Convenience
• High Bandwidth	√ Adjustable up to 60KHz
• Phase Circuit	√ Lower Noise, Higher Resolution
• No Firmware	√ Front End System – High End Users
• SPI Bus	√ High End Communication Bus for Fast Data Transfer
• High Linearity	

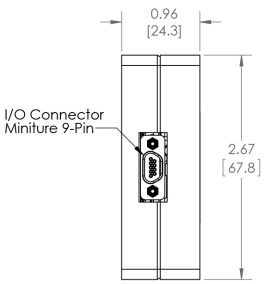


Applications:

- Fast Steering Mirrors
- Magnetic Bearing Active Control
- Shaft Vibration
- Image Stabilization
- Adaptive Optics

Industries:

- Small Satellite
- Semi-Conductors
- Military/Aerospace
- High Precision Metal Working
- UAV/Drones



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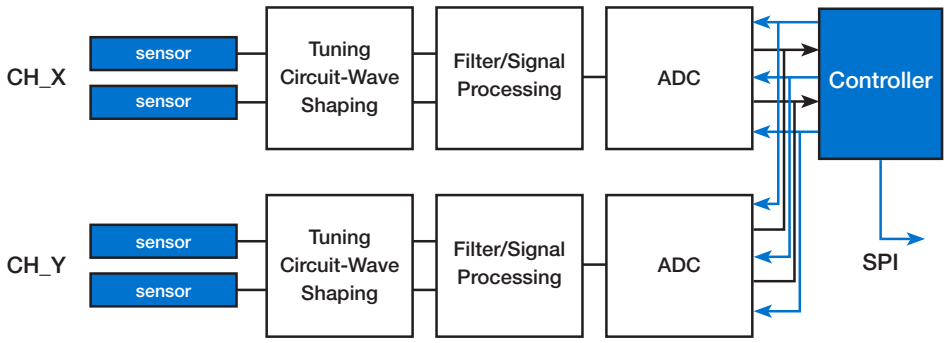
Digital System

DDIT Connection: Access to the digital signals is via a mini 9D connector. Place the DDIT System within 20 inches of the Controller for optimal signal quality. Install the Sensors at the given calibration Null and Offset. Refer to the user manual for pin connections.

INPUT/OUTPUT Signals - FE System:

- Power – 8 to 28V
- Ground
- MCLK – Sampling Speed
- DRDY – Data Read for Read
- SCLK – Serial Clock
- SDO – Serial Data Out
- SYNC – SYNC ADC reads on Power up



Typical Specifications:		
Resolution at 5KHx	RMS %FS	<0.004%
Thermal Sensitivity Electronic	%FS/C %FS/F	0.003 0.002
Thermal Sensitivity Electronic & Sensor	%FS/C %FS/F	0.020 0.010

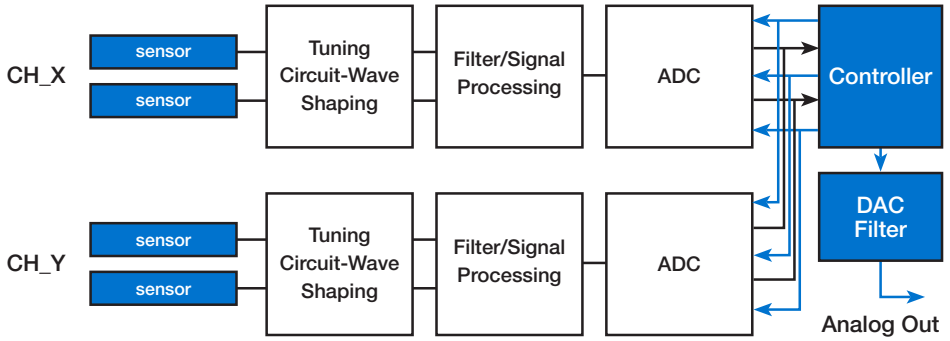
Digital System - CHX and CHY - Data Rate and Linearity				
Linearity Method	Component Tuning	5th Order	1st order Piecewise	2nd order piecewise
Data Type	2's Compliment	Displacement (mills/mm)	Displacement (mills/mm)	Displacement (mills/mm)
Max Sampling Rate - Adjustable	40KHz	11KHz	17KHz	14KHz
Linearity	3.2%	1.37%	0.132%	0.0001%

ANA System

Basic Connection: Access to the Analog signals is via a mini 9D connector. The analog signals are capable of driving loads that are up to 10 feet from the DDIT system. It is recommended to terminate the end of the signal with a 10K resistor.

INPUT/OUTPUT Signals - FE System:

- Power – 8 to 28V
- Ground
- CLK+
- CHX-
- CHY+
- CHY-



Typical Specifications:		
Resolution at 5KHx	RMS %FS	<0.021%
Thermal Sensitivity Electronic	%FS/C %FS/F	0.003 0.002
Thermal Sensitivity Electronic & Sensor	%FS/C %FS/F	0.020 0.010

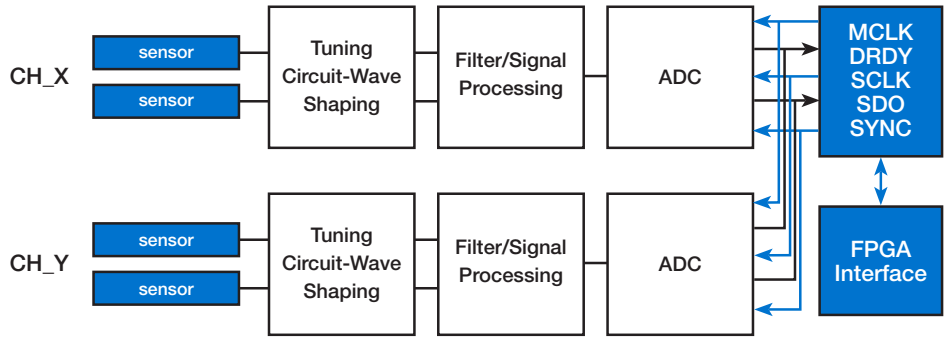
ANA System - CHX and CHY - Data Rate and Linearity		
Linearity Method	1st Order	2nd Order
Data Type	Analog	Analog
Max Sampling Rate - Adjustable	16KHz	14KHz
Linearity	0.132%	0.001%

FE System

DDIT Connection: Access to the digital signals is via a mini 9D connector. Place the DDIT System within 20 inches of the Controller for optimal signal quality. Install the sensors at the given calibration null and offset. Refer to the user manual for pin connections.

INPUT/OUTPUT Signals - FE System:

- Power – 8 to 28V
- Ground
- MCLK - Sampling Speed
- DRDY - Data Read for Read
- SCLK - Serial Clock
- SDO - Serial Data Out
- SYNC - SYNC ADC reads on power up



Typical Specifications:		
Resolution at 5KHx	RMS %FS	<0.003%
Thermal Sensitivity Electronic	%FS/C %FS/F	0.003 0.002
Thermal Sensitivity Electronic & Sensor	%FS/C %FS/F	0.020 0.010

FE System - CHX and CHY - Data Type, Data Rate	
Linearity Method	Component Tuning
Data Type	2's Compliment
Max Sampling Rate - Adjustable	60KHz Adjustable
Linearity	3.2%