The World Leader in High Performance Signal Processing Solutions

ADIS16229
(and ADIS16000)
iSensor

Digital MEMs Vibration Sensor
w/ Embedded RF Transceiver
(and internal FFT Analysis and Storage)
ADIS16229/ADIS16000 Wireless Vibration Sensor

The ADIS16229 is:
- A dual-axis wireless vibration monitor, with:
  - FFT Analysis and Storage
  - Programmable Spectral Alarm Bands
  - On-chip data capture
  - User configurable multimode operation
  - And, 862/928MHz RF Link

An Embedded & Autonomous Solution
- Monitor, Detect, Analyze, Capture, and Transmit in a Single Cost-Effective Component

Companion Product: ADIS16000
- Gateway Node
  - RF Transceiver
  - Supports up to Six Remote ADIS16229’s

Easiest & Earliest Detection, Identification, and Isolation
ADIS16229 Makes Vibration Analysis Simple and Accessible

- Factory Equipment Process Monitoring and Condition Based Predictive Maintenance of Industrial Machinery
  - Valuable, but Complex

- Multiple Vibration Sources within equipment combine to form complex time based waveform
  - FFT Analysis can isolate source

- Careers are spent analyzing Vibration Data

- Existing Analysis Tools & Methods Lack Repeatability, Embedded Intelligence, and Reliability

- Inaccessibility and/or lack of wired infrastructure for remote sensors limits deployment
**ADIS16229/ADIS16000 Supports Simple/Rapid Deployment of a Complete Process Monitoring Solution**

- **ADIS16229**: Remote Sensor node
- **ADIS16000**: ‘Gateway’ node, for direct link with end application embedded processor
  - One ADIS16000 supports up to six ADIS16229
ADIS16229 Technology and Feature Advantages Overcome Limitations of Previously Available Vibration Solutions

Challenges of Past Vibration Sensors

1) Repeatability of Measurement
   (shift in vibration ... or in measurement technique)

2) Reliability of Embedded Sensor
   (is it still working, accurate)

3) Non-Directional, Single-Axis Data
   (force need for very low noise, limits understanding)

4) Cost
   (may limit points of observation)

5) Accessing the Data
   (low integration, analog, lose info in transmission)

6) Understanding the Data
   (little or no local processing, analysis)

7) Identifying Shifts/Trends
   (little or no local storage)

8) Scheduling of Checks, Timely Information
   (what if do not check often enough...)

9) Equipment Life Cycle Shifts
   (sensor set-up/filtering at eqpmnt install, vs. end-of-life)

10) Documentation/Traceability
    (when was this data taken, which sensor is it from)

ADIS16229 Benefit

1) Compact, Embeddable

2) Digital Self Test

3) Precision Aligned /Multi-Axis

4) Fraction of Cost

5) Wireless, Fully Integrated

6) Embedded FFT Processing

7) Baseline/Periodic Recordings, Alarms

8) Multi-Mode (Manual, Timer-based)

9) Program/Tune in-system

10) Time Stamp, Serial#
ADIS16229

Improved Noise Performance with Fully Embedded FFT Processing

Frequency Domain Processing isolates source of problem

- **ADIS16229 Processing Features:**
  - 512 point FFT, real valued, dual-axis
  - Programmable FFT Averaging
  - Windowing Options: Rectangular, Hanning, Flat Top
  - Six programmable spectral alarm bands
  - Programmable Alarm 1 (warning) and Alarm 2 (fault) thresholds for each band
  - Storage of 14 records each containing FFT’s on:
    - Each axis
    - Alarm information, Configuration, Time stamp
  - Real Time Sample Mode Option

- **Benefits**
  - Analysis of Full Frequency Spectrum
  - Ability to identify and classify individual sources of vibration
  - Monitor changes over time
  - Real-time reaction to programmable threshold levels.
**ADIS16229/000: Wireless Digital Dual-Axis Vibration Sensor, with FFT Analysis and Storage**

- **Wireless Vibration System, 862-928MHz**
  - Clear Channel Assessment/Packet Collision Avoidance
  - Error Detection and Correction in RF Protocol
  - Programmable RF Output Power
- **Digital acceleration data, +/- 18 g measurement range**
  - Digital range settings: 0-1g, 0-5g, 0-10g, 0-20g
- **Flat Frequency Response up to 5kHz**
  - Sample rate: 20kSPS
  - 11 decimation filter settings
- **Programmable FFT, 512 point, real valued, dual axis**
  - Windowing options: Rectangular, Hanning, Flat Top
- **Storage, 14 FFT records on all three axes (x, y, z)**
  - Storage on Alarm, or always
- **Programmable alarms, 6 spectral bands**
  - Two level settings for warning and fault definition
  - Adjustable response delay to reduce false alarms
- **Trigger modes:**
  - Command, timer, external trigger
- **Multi-record capture for selected filter settings**
- **Operating Modes:**
  - Manual/Automatic FFT, with Spectral Alarm analysis
  - Manual capture mode for time-domain data collection
  - Real Time Data Streaming
- **Internal self-test with status flags**
  - Serial number, Device ID, and User ID

*Programmable Features*

<table>
<thead>
<tr>
<th>Dynamic Range</th>
<th>Sensitivity</th>
<th>Noise</th>
<th>Non-Linearity</th>
<th>Supply</th>
<th>Package</th>
<th>Interface</th>
<th>Temperature</th>
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<td>Up to 18 g</td>
<td>0.3052 mg/LSB</td>
<td>248 ug/√Hz</td>
<td>0.2% of FS</td>
<td>3.0-3.6V</td>
<td>47x37x22mm module</td>
<td>Wireless</td>
<td>-40°C to +85°C</td>
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Applications:
- Vibration analysis
- Condition monitoring
- Machine health
- Instrumentation, diagnostics
- Safety shutoff sensing
Pricing and Availability

- ADIS16229CMLZ: $189.00
- ADIS16000CMLZ: $139.00
- Pricing is per unit in 1K-quantities

Evaluation Support

- ADIS16COM1/PCBZ: $69.00
  - Simple connector from 16000 to EVAL-ADISZ
- EVAL-ADISZ: $469.00

All In Production Now

More information:

- www.analog.com/ADIS16229
- www.analog.com/ADIS16000
ADIS16229
Uniquely Capable of Enabling Embedded Vibration Monitoring

Technology, Design-Features, and Integration Approach
Simplify and Improve Embedded Vibration Sensing

◆ MEMs Technology Value:
  ● MultiAxis: Directional Sensing, for better problem isolation
  ● Digital Self-test: In-system verification, reliability

◆ Wireless Interface Value
  ● Quickly deploy into existing infrastructure. Allow monitoring at difficult-to-reach, remote, dangerous locations.

◆ Design-Feature Value:
  ● Frequency Domain Processing: Better problem isolation
  ● Embedded Filtering/Windowing: noise reduction, signal isolation
  ● Programmable Operation: Tune to application, equipment life-cycle

◆ Integration Value:
  ● Fully Integrated: Eliminate design risk/time
    ◆ Simple detection/analysis out-of-box
  ● Compact: Embed closer to vibration source, detect more and earlier
    ◆ No repeatability (location/coupling) issues, as with handheld monitors
  ● Cost-Effective: Potential to monitor more points in system
Other iSensor Products
ADIsensor Intelligent Sensors
System Ready, Fully Integrated, and Calibrated Inertial Sensors Bring Affordable Motion Sensing to Industrial Control

- Precalibrated
- In-system auto-zero
- Standard Interfaces
- Programmable
- Fully Integrated

iSensor’s Eliminate the need for Customers to do Production Motion Test
## ADI iSensor Intelligent Sensors

System Ready, Fully Integrated, and Calibrated Inertial Sensors

Bring Affordable Motion Sensing to Industrial Control

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<th>Part Number</th>
<th>Acceleration</th>
<th>Rotation</th>
<th>Tilt</th>
<th>Shock</th>
<th>Vibration</th>
<th>IMU/4-DoF</th>
<th>IMU/6-DoF</th>
<th>9DoF w/Magn</th>
<th>10 DoF w/B arom</th>
<th>10 DoF, EKF</th>
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Award-winning solutions for a wide-range of applications

- Shock
- Vibration
- Tilt
- Acceleration
- Rotation
- 10 degrees-of-freedom (10-DoF)
- Dynamic Orientation Sensing

10 degrees-of-freedom (10-DoF)
**iSensor™: Embedded Sensor Processing for Industrial Applications**

- Precalibrated
- In-system auto-zero
- Standard Interfaces
- Programmable
- Fully Integrated