DIGITEX
INNOVATIVE SYSTEMS
Distributed System

xWave

DIGITAL ACCELEROMETER

OVERVIEW

xWave® is the flagship digital accelerometer from Digitex Systems, designed as the most critical component of any Structural Health Monitoring (SHM) system. It delivers high-precision vibration measurements, enabling engineers to capture the dynamic characteristics of structures with unmatched accuracy. Whether installed permanently or used as a portable solution, xWave is the core building block for real-time monitoring and advanced modal analysis.

DESCRIPTION

xWave is built on a proprietary embedded platform that integrates high-performance ADCs, low-noise MEMS accelerometers, advanced time synchronization, and robust communications. Depending on the model, it can be equipped with 20-, 24-, or 32-bit ADCs, providing dynamic ranges up to 160 dB. Multiple sensor options are available, from cost-effective to ultra-sensitive accelerometers with sub-µg noise levels.

Each xWave unit can operate as a standalone accelerograph with local SD/eMMC recording or as a node in a multi-sensor daisy-chain SHM network, streaming real-time data directly to the Voyager® central acquisition software hosted on xPlorer or cloud environments. Its embedded web server enables direct configuration, firmware updates, and data downloads, while its rugged IP67 aluminum enclosure ensures reliable operation in any environment – from remote mountain dams to coastal bridges and urban high-rises.

APPLICATIONS

- Bridges – modal analysis, vibration monitoring, fatigue detection
- Dams – seismic event detection, hydrodynamic response
- High-rise buildings – wind and earthquake response characterization
- Tunnels – ground vibration and lining monitoring
- Pipelines – vibration, seismic, and soil-structure interaction
- Industrial plants and mines – machinery vibration and blast monitoring

KEY FEATURES

- **Permanent or Portable Installation:** Available as fixed installation unit or battery-powered portable accelerometer with xPlorer Ambient.
- **Multiple Sensor Options:** Tri-axial ultra-sensitive accelerometers; uni-, bi-, or tri-axial configurations.
- **High-Performance ADCs:** 20-, 24-, or 32-bit converters with up to 160 dB dynamic range.
- **Filtering:** Built-in anti-aliasing filters and optional hardware filters for improved signal fidelity.
- **Flexible Communication:** Ethernet, Wi-Fi, DigiMESH®, optional GSM/4G; simple CAT5e cable or wireless setup.
- **Advanced Data Handling:** Supports Store&Forward® to buffer data during outages, plus data compression in proprietary Digitex format or MiniSEED.
- **Configurable Sampling Rates:** User selectable from 10 sps up to 1000 sps for a wide range of applications.
- **Time Synchronization:** GPS or DigiSync® protocol ensures sub-millisecond accuracy across distributed networks.
- **Local Storage:** Optional SD/eMMC card for standalone operation, storing MiniSEED events with triggers and pre/post buffers.
- **Web Interface:** Embedded web server for configuration, charts, data download, and OTA firmware updates.
- **Triggering:** Supports Leveling, STA/LTA, Absolute thresholds, and voting mechanism with configurable pre/post event times.
- **Rugged Enclosure:** Robust IP67 aluminum housing with leveling plate and bubble level for precise sensor alignment.
- **Autonomy:** Low power consumption; can run for years with solar panel + 12V battery; optional 12h internal battery pack.
- **Status Indicators:** LEDs for power, sync, and streaming status; optional 2.8" display for live sensor status.
- **Easy Integration:** Works seamlessly with Voyager central acquisition, Nexus SeedLink client, Vista data viewer, and Observer OMA analysis suite.

USA Office: 9 Wildwood Trail, Ormond Beach, FL 32174, USA

Europe Office: 23 Prashka, 1000 Skopje, Macedonia

www.digitexsystems.com
+389.72.213.782 | +389.2.3109.262

DIGITEX
INNOVATIVE SYSTEMS
Distributed System

xWave

DIGITAL ACCELEROMETER

SPECIFICATIONS

Sensor

Type: Embedded low noise, low power triaxial capacitive MEMS accelerometer. Orthogonally oriented. (see Accelerometer Options)

Supported Models: D-305 / D-230 / D-225 / D-211 (see Accelerometer Options)

Digitizer

Channels: 3 differential analog channels. SW/HW configurable to uni-axial or bi-axial operation. (model dependent)

Resolution: 20-, 24- or 32-bit Sigma-Delta ADC per channel (model dependent)

Sampling Rates: User-selectable from 50 to 1000 samples per second (SPS)

Anti-alias Filter: Integrated anti-aliasing filters; optional hardware filters for enhanced signal fidelity (model dependent)

Digital Filter: Software-selectable Butterworth and Chebyshev types; per-channel configurable.

Trigger

Modes: STA/LTA, Above Max, Under Min, Over Relative, Over Absolute

Pre-/Post-Event: User configurable

Configuration: Voting logic with user-defined weighting per channel; configurable STA/LTA windows

Synchronization

Time Base: GPS-disciplined oscillator or DigiSync® network synchronization protocol

Accuracy: Sub-microsecond (GPS mode) or sub-millisecond (DigiSync® mode) timing precision across networks

Interface

Connectivity: Ethernet (10/100 Base-T), Wi-Fi, DigiMESH®, GSM/4G (model dependent)

LED interface: Power, Streaming Type, State of Health, Battery Voltage, and Charging Status

Embedded Web server: Integrated HTTP interface for configuration, data retrieval, real-time visualization, and basic frequency analysis. Provides access to device logs, user actions (reboot, backup, restore, and configuration management), and sensor diagnostics.

Communications & Output

Data Modes: Continuous real-time streaming; user-configurable ON/OFF operation in standalone mode

Protocols: Embedded SeedLink protocol for data redundancy via Nexus application

Internal Storage: Optional 32 GB non-volatile SDHC card.

Operation Mode: Ring Buffer and Triggered Event modes; miniSEED format

Stream Compression DigiWLC®, miniSEED STEIM1 or Uncompressed

Data Reliability: Store&Forward® buffering - retains data during communication loss and automatically forwards upon link restoration, ensuring zero data loss

Power

Supply Voltage: 9 – 28 V DC (typ. 12 V) PoE compatible

Power Consumption: ~ 2.5 W (average)

Backup: Optional Li-Ion battery pack (~12 h autonomy)

Protection: Reverse voltage, over/under voltage, surge protection up to 2 kV DC (optional)

Physical

Dimensions: 130 × 120 × 65 mm (5.12 × 4.72 × 2.56 in)

Weight: 0.7 kg

Enclosure: Rugged coated aluminum housing, IP67 rated

Mounting: Horizontal or vertical using mounting plate; single anchor point, three leveling bolts, and integrated bubble level

Environmental

Operating Temp.: -20 °C to +60 °C

Humidity: 0 – 100 % RH (non-condensing)

Certification & Calibration

Standards: CE, RoHS, ISO9001, ISO14001

Calibration: Factory calibrated; individual calibration certificate included

Software Updates

Firmware: Over-the-air (OTA) updates via Voyager® or embedded HTTP server

USA Office: 9 Wildwood Trail, Ormond Beach, FL 32174, USA

Europe Office: 23 Prashka, 1000 Skopje, Macedonia

www.digitexsystems.com
+389.72.213.782 | +389.2.3109.262

DIGITEX
INNOVATIVE SYSTEMS
Distributed System

xWave

DIGITAL ACCELEROMETER

DIGITIZER & ACCELEROMETER OPTIONS

D310 - T

Digitizer: True 24-bit (32-bit word)
Noise (In Band): 0.02μg/√Hz
Dynamic Range (0 to 10Hz): 164 dB
Frequency Range: 0-210 Hz
Full-scale Acceleration: ±10 g
Bias Temperature Error: ±2mg
Calculated RMS Noise (0 to 10Hz): 0.063 μg RMS
Non-linearity (Full Scale): ±0.03%

D230 - U/B/T

Digitizer: 24-bit or 32-bit options
Full-scale Acceleration: ±3g
Noise (In Band): 0.7μg/√Hz
Noise (Integrated over 0.1Hz to 100Hz): 8μg
Dynamic Range (0.1 to 10Hz): 128.7dB
Scale Factor Sensitivity: 900mV/g
Bandwidth (±3dB): 550Hz
Operating Power Consumption: 90mW

D212 - T

Digitizer: 20-bit
Full-scale Acceleration: ±2g, ±4g
Non-linearity (Full Scale): 0.1%
Noise (In Band): 22.5μg/√Hz
Scale Factor Sensitivity: 400mV/g
Cross Axis Sensitivity: 1%
Sensitivity due to Temperature: ±0.01%/°C
Operating Power Consumption: 45mW

D305 - T

Digitizer: True 24-bit (32-bit word)
Full-scale Acceleration: Up to ±15g
Noise (In Band): 0.2μg/√Hz
Dynamic Range (0 to 10Hz): 153.5 dB (typ.)
Frequency Range: 0-460Hz
Non-linearity (Full Scale): 0.1%
Bias Temperature Error: ±2mg
Zero Bias Stability: ±0.2μg

D225 - U/B/T

Digitizer: 24-bit or 32-bit options
Full-scale Acceleration: ±3g
Frequency Range: 0-200Hz
Zero Bias Stability: 0.03mg
Noise (In Band): 1μg/√Hz
Scale Factor Sensitivity: 1200mV/g
Bias Temperature Error: ±0.2mg/°C
Operating Power Consumption: 110mW

D211 - T

Digitizer: 24-bit
Full-scale Acceleration: ±2g, ±4g (option at order)
Non-linearity (Full Scale): 0.1%
Bandwidth: 1500Hz
Noise (In Band): 20μg/√Hz (±2g option)
Scale Factor Sensitivity: 400mV/g (±2g option)
0 g Offset vs. Temperature: ±0.1mg/°C
Cross Axis Sensitivity: 1%

AVAILABLE OPTIONS

SSWiFi: Wi-Fi Communication Module
SSGPS: GPS Module for time and data synchronization
SSGSM: 4G GSM module for streaming and/or SMS alarming
SSPW: Power protection module (2.25KV, 10-36V Input)
SSSDG: SD Memory Module (Non detachable 32GB SD card)
SSHWF: Five (5) user selectable hardware filters (only 32-bit ADC)
SSBAT: Battery option (12h autonomy)
SSDO: Digital Relay Outputs Module with ext. JB (4, NO/NC)
SSDSP: Informational display (2.8 Inch at the top)
SSPOE: Power Supply: 24VDC; 1A; 24W and POE Injector
SSMP: Mounting plate

BENEFITS

- Provides the most critical SHM measurements by accurately capturing vibration response of structures
- Saves cost and effort with flexible installation options (permanent or portable with xPlorer Ambient)
- Increases reliability through fully digital acquisition and GPS/DigiSync® synchronization across networks
- Ensures no data loss with Store&Forward® and local SD/eMMC storage during communication outages
- Enhances usability with embedded web server for configuration, data download, and OTA firmware updates
- Guarantees robustness with IP67 aluminum housing, leveling plate, and optional battery autonomy
- Improves decision-making with seamless integration into Voyager®, Nexus, Vista, and Observer software suites
- Offers long-term value with scalable architecture and compatibility with multiple accelerometer models and sensitivities

USA Office: 9 Wildwood Trail, Ormond Beach, FL 32174, USA
Europe Office: 23 Prashka, 1000 Skopje, Macedonia
www.digitexsystems.com
+389.72.213.782 | +389.2.3109.262

DIGITEX
INNOVATIVE SYSTEMS
Distributed System

xWave

DIGITAL ACCELEROMETER

OVERVIEW

xWave combines synchronized digital acquisition, rugged field deployment, and seamless software integration to deliver reliable structural vibration measurements for monitoring, triggering, and modal analysis.

WHY XWAVE

- Synchronized acquisition with GPS or DigiSync®
- Real-time streaming, ring buffer, and triggered events
- Standalone or distributed deployment
- Seamless integration with Voyager® and Observer®

IDEAL FOR

- Bridges
- Buildings
- Dams
- Ambient Vibration / OMA
- Strong-motion monitoring

WORKFLOW

Measure → Synchronize → Monitor → Analyze

From field measurement to structural insight.

Explore xWave & Digitex SHM
www.digitexsystems.com

08-26

USA Office: 9 Wildwood Trail, Ormond Beach, FL 32174, USA

Europe Office: 23 Prashka, 1000 Skopje, Macedonia

www.digitexsystems.com
+389.72.213.782 | +389.2.3109.262