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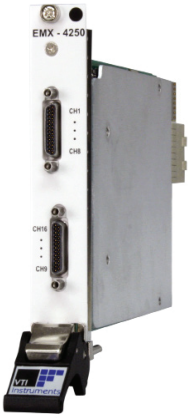
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VTI Instruments

DATA SHEET



EMX-4250/4251

"SMART" HIGH DENSITY DYNAMIC SIGNAL ANALYZERS

APPLICATIONS

Modal Analysis

Ground Vehicle Testing (GVT)

Acoustic Analysis

Order Analysis

Vibration Control / Analysis

High Speed Data Acquisition

FEATURES

System Level Functionality

- Corporate Wide Cloud Data Management / Access
- Comprehensive Runtime Health Monitoring
- Run-time Self-calibration / Embedded NIST Calibration
- Precision Distributed Measurement Synchronization
- Data Streaming at Full Acquisition Rates on All Channels

Analog Performance

- 204.8 k Samples / Second / Channel Data Rates
- 16-Channel/8-Channel 24-Bit ADC's
- Software selectable for Single Ended or Differential Inputs
- -105 dB Spurious Free Dynamic Range
- Cross Channel Phase Matching <0.01°
- Auto-ranging ±100 mV to ±10 V Inputs

Software

- X-Modal III
- EXLab
- SO Analyzer
- Open Source Drivers

AMETEK PROGRAMMABLE POWER

www.vtiinstruments.com

Specifications contained within this document are subject to change without notice

RELIABLE DATA FIRST TIME EVERY TIME

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Analog Performance

The EMX-4250 and EMX-4251 Smart Dynamic Signal Analyzer incorporate best-in-class analog design methodology to deliver industry leading measurement accuracy. These instruments are ideal for a wide range of applications including noise vibration, and harshness (NVH), machine condition monitoring, rotational analysis, acoustic test, modal test, as well as general purpose high speed digitization and signal analysis.

204.8 k samples / second /channel data rates extend the operational capabilities of DSA analyzers to new levels by ensuring sampling and bandwidth performance is capable of accurately capturing all critical frequency domain information, while delivering the flexibility needed for general purpose applications.

- Exceptional anti-alias signal rejection
- Flexible analog and user defined digital filter combinations
- Ideal for DSA and general purpose, high speed parallel acquisition

Aggressive anti-aliasing filter performance (user selectable / definable analog and digital filter combinations) eliminates power spectrum of unwanted signals that contribute to measurement errors delivering confidence.

Differential inputs deliver superior common mode performance far beyond levels capable with other implementation approaches. While the latest 24-bit ADC technology delivers exceptional signal resolution, especially when combined with multiple input ranges.

- Highest quality low noise, low distortion ADC's
- Best-in-class noise immunity
- Exclusive balanced AC coupling implementation

Wide -105 dB spurious free dynamic range (SFDR), a key measure of the superior measurement fidelity provided by this instrument, ensures that the strength ratio of the fundamental signal of interest signal is exceptional.

- Ensures unwanted signal artifacts are greatly attenuated
- Essential performance metric for accurate frequency domain measurements
- Essential for frequency domain performance where distortion typically increases with frequency

Analog Performance

"Intelligent" Signal Conditioning delivers exceptional measurement flexibility with multiple options to support a wide range of transducers and signal types including IEPE and charge transducers.

- Built-in IEPE support for IEPE transducers directly from the EMX-4250/4251
- High performance "intelligent" signal conditioning provides unmatched signal conditioning flexibility
- Intelligent signal conditioning delivers standalone signal conditioning with buffered analog outputs
- LXI Ethernet control of intelligent signal conditioning for stand-alone operation

Cross channel phase matching <0.01° delivers the uncompromised phase response required for accurate single and cross channel measurements common in most DSA applications.

- Exceptional cross channel phase matching <0.01°
- Deterministic channel-to-channel, card-to-card, and chassis-to-chassis phase response
- Ensures phase accuracy of all channels relative to the tachometer, trigger and other channels

Auto-ranging ±100 mV to ±10 V inputs maximize signal resolution by automatically selecting the correct input range for the signal. Software selectable, this function can be used during setup and configuration to identify the most appropriate gain level.

- (7) Different gain ranges
- 10 V input range for high level signals and transducers
- Lowest distortion signal conditioning for maximum signal integrity

System-level Functionality

Industry standard Matlab and Simulink design tools simplify implementation, maximize re-usability, and provide access to hundreds of standard filters and analysis algorithms.

System-level Functionality

Corporate wide cloud data management delivers advanced data access, security and storage services throughout the organization, accessible from web browsers and other applications, on desktop and mobile devices.

- Simplified, next generation user data services
- Corporate wide data access and security
- Dynamically scalable data management services
- Accessible on a wide range of traditional and mobile devices
- Eliminates need for knowledge of the physical location or configuration of the system

Comprehensive runtime health monitoring provides test system confidence and peace of mind by ensuring that the complete instrumentation measurement path is functional and performing the most accurate results possible.

- Ensures runtime instrument performance and accuracy
- Performed without disconnecting external transducer cabling
- Delivers exceptional run-time convenience and measurement confidence
- Instrument performance is verified utilizing precision internal voltage references

Runtime self-calibration ensures that instruments deliver the most accurate results possible by compensating for ambient temperature fluctuations, without the need to disconnect field wiring.

- Maximizes measurement accuracy
- Performed across the entire measurement path
- Precision internal voltage sources validate and adjust coefficients
- Eliminating inaccuracies generated by internal circuitry temperature gradients

Embedded NIST traceable calibration eliminates lengthy test system down-time, simplifies calibration processes, and reduces spare equipment requirements.

- Maximizes facility up-time and utilization
- Completely automated embedded process
- Supports multiple portable calibration standards
- Performed in-place without removing instrumentation

Precision distributed measurement synchronization ensures that all test data is time correlated whether the instrumentation is centrally located in the laboratory or distributed around a test article.

- Enables widely distributed system level performance
- Utilizes embedded IEEE 1588 precision time protocol
- Precise synchronization across multiple instrumentation modules and chassis
- Synchronization achieved over-the-wire (Ethernet), with complete user transparency

Software

Software

Open-source SDRL X-Modal III experimental modal analysis software features intuitive task oriented user interfaces, extensive modal parameter estimation algorithms, parallel display capabilities, flexible data management, and unparalleled channel expandability.

- MATLAB®-based open-source programming environment
- Multiple live parameter estimation windows displayed in parallel
- Task oriented, easy-to-use user interface always "one-click" away
- Simplified "cut & paste" data management and unit's unification tool

EXLab is an easy to use, turn-key, data acquisition solution featuring intelligent configuration capabilities, automatic device discovery, extensive time and frequency domain data visualization, and post-acquisition display and analysis tools.

- Intuitive setup and control
- Remote client monitor and control
- Advanced filtering, analysis, and modeling
- Waterfall, video, images, scatter, 3D model and SRS diagrams

Open Source, industry standard, drivers and programming interfaces provide the flexibility and freedom of choice to select the application programming environment best suited for the application and specific development requirements.

- Support for all major programming environments
- Software interoperability, maintainability, and reusability
- Common development environment and interface across all instrumentation types

General Specifications

NUMBER OF CHANNELS	
EMX-4250	16
EMX-4251	8
INPUT CONNECTOR	25-pin Micro D
AMPLITUDE RESOLUTION	24 bits
INPUT COUPLING	AC or DC
INPUT TYPE	IEPE (psuedo-differential), volts (differential or psuedo-differential)
FREQUENCY SAMPLING RATE	User programmable
	204.8 kHz or 131072 Hz with Decimate by 5 and by 2^n. Lowest Sample rate = 2 Hz
FREQUENCY BANDWIDTH	Maximum 92.2 kHz
SPURIOUS FREE DYNAMIC RANGE	-105 dBfs typical, 10V range, 1 kHz test frequency
THD	< -98 dB typical, 20 Hz to 20 kHz
NOISE	20 nV/ sqrt (Hz) typical, 100 Hz, 0.1V Range
ALIASED RESPONSES	< -90 dB (typical)
ANTI-ALIAS FILTER	3-Pole linear phase
	-3.0 dB at 400 kHz
DIGITAL ANTI-ALIASING FILTER	Programmable
CROSSTALK	-100 dBfs typical at 1kHz
DC OFFSET	< 1 mV DC coupling, < 5 mV AC coupling
AC COUPLING 3 DB CORNER FREQ	0.37Hz Typical for Ranges=0.1V, 0.2V, 0.5V;
	0.25Hz Typical for Ranges=1V, 2V, 5V, 10V
RANGES (V PK)	0.1V, 0.2V, 0.5V, 1 V, 2 V, 5 V, 10 V
	Add 10% to include over-range capability
INPUT IMPEDANCE	Single Ended 2 MΩ
	Differential 4 MΩ
	Either side-to-chassis 2 MΩ, 35 pF nominal
COMMON MODE REJECTION RATIO	-80dB typical at 1kHz
OVER-VOLTAGE PROTECTION	±30 V pk
IEPE EXCITATION CURRENT	4.5mA or 10mA Nominal, programmable
IEPE COMPLIANCE	IEPE compliance voltage (>21 V)
OPEN/SHORT IEPE TRANSDUCER DETECTION	Green/Red LED located on Breakout Box for fault indication
TEDS	IEEE 1451.4
AMPLITUDE ACCURACY AT 1 KHZ	±0.03dB
AMPLITUDE MATCH	0.01 dB Typical
AMPLITUDE FLATNESS	+0.01 dB to 46 kHz
CHANNEL-TO-CHANNEL PHASE MATCH	Applies to any EMX-4250/4251 module in the same mainframe
	±0.01° at 1 kHz
PHASE LINEARITY	±0.05° up to 90 kHz+0.01 dB (full-scale signal)
PHASE ACCURACY (RELATIVE TO TACH)	<0.1° at 1 kHz (typical phase accuracy to EMX-1434)
TRIGGER MODES	Input (level / edge), external (through octopus cable or breakout box),
	PXIe, LXI, software, timer, source, RPM
EMBEDDED HEALTH MONITORING	Internal temperature, open/short IEPE transducer detection
BUILT-IN SELF-TEST (BIST)	Yes
EMBEDDED SELF-CALIBRATION	Yes
EMBEDDED NIST TRACEABLE CALIBRATION	Yes
AUTOMATIC ADC OVER RANGE/OVER FLOW DETECTION	Yes
ONBOARD MEMORY	128 Mb

Mechanical Specifications

IEEE 1588 CLOCK SPECIFICATIONS	
CLOCK OSCILLATOR ACCURACY	±50 ppm
SYNCHRONIZATION ACCURACY	Reports "synchronized" when < ±100 ns of the 1588 master clock
TIMESTAMP ACCURACY	As good as time synchronization down to 50 ns
RESOLUTION	25 ns
IEEE 1588-BASED TRIGGER TIMING	
ALARM	
TRIGGER TIME ACCURACY	As good as time synchronization down to 50 ns
TIME TO TRIGGER DELAY	50 ns
RECEIVE LAN [0-7] EVENT	
TRIGGER TIME ACCURACY	As good as time synchronization down to 50 ns
TIME TO TRIGGER DELAY	
FUTURE TIMESTAMP	50 ns typical
PAST/ZERO TIMESTAMP	1 ms maximum
HARDWARE TRIGGER TIMING	
DIO BUS	
TIME TO TRIGGER DELAY	57 ns typical

Environmental Specifications

TEMPERATURE	
OPERATING	0 °C to +50 °C
STORAGE	-40 °C to +70 °C
RELATIVE HUMIDITY	5% – 95% (non-condensing)
ALTITUDE	3000 m
SHOCK AND VIBRATION	Conforms to MIL-PRF-28800F
RANDOM VIBRATION	10 Min per Axis, MIL-PRF-2880F Class 3
SINUSOIDAL	5 to 55hz Resonance Search per MIL-PRF-2880F Class 3, each Axis
SHOCK	30g/Axis, 11mS half Sine pulse per MIL-PRF-2880F Class 3

Notes:

1) All specifications are typical unless otherwise stated as a minimum or maximum.

2) For current detailed specification please refer to the on-line manual at www.vtiinstruments.com.

3) All specifications subject to change without notice.

4) All specifications assume within 24 hours and 5°C of self-calibration temperature unless otherwise specified.

Ordering Information

	PART NUMBER	
EMX-4250	70-0409-004R	16-Channel, 204.8 kSa/s "Smart" DSA Digitizer
EMX-4251	70-0409-012R	8-Channel, 204.8 kSa/s "Smart" DSA Digitizer
EMX-4008	70-0409-010R	8-Channel Break out box for EMX-4250/4251
EMX-4008CA	70-0583-000R	8-Channel BNC cable for EMX-4250/4251
EMX-4016	70-0409-015R	16-Channel Break out box for EMX-4250/4251
EMX-4016M	70-0409-315R	16-Channel Full Bridge Break out box for EMX-4250/4251
EMX-4032	70-0409-016R	32-Channel Break out box for EMX-4250/4251
SOFTWARE		
X-MODAL III		Modal Analysis Software
EXLAB*		General Purpose DAQ Software
*Multiple configurations available		
RELATED PRODUCTS		
EMX-1434	70-0409-008R	4-Channel, 192k Sa/s Arbitrary Waveform Source
EMX-4350	70-0409-002R	4-Channel, 625k Sa/s DSA Digitizer
EMX-4380	70-0409-011R	4-Channel, 625k Sa/s DSA Digitizer with Charge Input

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