# VT1433B

## 8-channel 196 kSa/s Digitizer plus DSP

## Features

- On-board DSP greatly improves total system performance
- Built-in signal conditioning simplifies tests and reduces cost
- Anti-alias protection from 0.4 Hz to 88 kHz guarantees reliable data
- Local Bus gives high-speed data capture to VT2216A data disk
- Optional 16/20-bit arbitrary source or dual input tachometer
- VXIplug&play-compatible with Windows and HP-UX drivers
- Multiple breakout box options

## Overview

The VXI Technology VT1433B 8-channel digitizer is a C-size, single-slot, register-based VXI module that includes DSP, transducer signal conditioning, alias protection, digitization, and high-speed measurement computation. You can even add an optional arbitrary source or dual-input tachometer. On-board computation of measurement results, fast data transfer to the host computer, and a dedicated high-speed data bus for module-to-module communication, all combine to provide an outstanding measurement architecture for demanding mechanical, acoustic and electrical test applications. Putting so much capability in a single module decreases system cost while increasing system performance.

The VT1433B 8-channel 196 kSa/s Digitizer plus DSP is a C-size VXI module, and may contain either one or two four-channel input assemblies so that the module may have a total of up to eight inputs.

On-board digital signal processing and 32 MB of RAM maximizes total system performance and flexibility.

## Specifications

### Input

| | |
|---|---|
| **Full Scale Input Ranges: (in volts peak)** | 5 mV to 10 V (1,2,5 steps) |
| **Maximum Input Level:** | 42 Vp |
| **Input Impedance** (dc coupled or ac coupled above 10 Hz) | |
| Differential | 2 MΩ nominal |
| Either side-to-chassis | 1 MΩ nominal |
| **Programmable ac Coupling 3 dB Corner Frequency** (two-pole, 12 dB/octave) | 1 to 100 Hz |
| **Common Mode Rejection Ratio** ac or dc coupled, 10 Hz to 1 kHz | >70 dB |
| Maximum signal, low side to chassis | ±10 Vp |
| Maximum signal, high side to chassis (VT =0) | ±11.5 Vp |
| Maximum signal, high side to chassis | VT ±10 Vp (must be ≤20 V) (VT = transducer offset cancellation voltage setting) |

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**Amplitude Over-Range Detection:**

| | |
|---|---|
| Common mode overload | ±11.5 Vp (typical) |
| Differential mode overload (dc coupled) | 105% of full scale |

**Frequency:**

| | |
|---|---|
| Sample rate | 196,608 to .15 Sa/Sec |
| Bandwidth | 88,320.001 to 0.06 Hz |

**Frequency Accuracy:** ±0.012% (120 ppm)

**Differential Mode Overload (ac coupled):**

| | |
|---|---|
| for cutoff frequency ≤6 Hz | 100% of full scale |
| for cutoff frequency >6 Hz | 50% of full scale, worst case |

**Residual dc** 1% of full scale +2 mV

## Amplitude

**Amplitude Accuracy at 1 kHz:** ±0.5% of reading, ±0.01% of full scale

**Flatness (relative to 1 kHz, at full scale):**

| | |
|---|---|
| <29 kHz | ±1%(±0.09 dB) |
| <88 kHz | ±2% (±0.17 dB) for >100 mV range |
| <88 kHz | ±5% (±0.42 dB) 5 mV to 100 mV range |

**Amplitude Resolution:** 16 bits, less 5.5 dB over-range (typical)

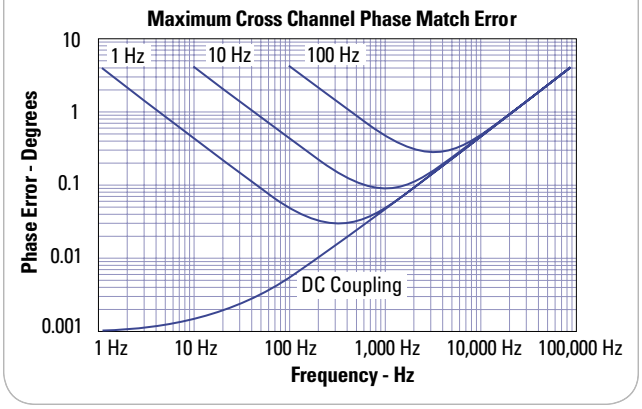
## Cross-channel Matching

(any VT1433B module in the same mainframe)

**Cross-channel Amplitude Match:**

| | |
|---|---|
| up to 29 kHz | ±0.1 dB |
| (freq > 2x ac HPF corner freq when ac coupled) | |
| 29 kHz to 88 kHz | ±0.2 dB |

**Cross-channel Phase Match**
(full-scale signal, input ranges equal)




## Dynamic Range

**Resolution:** 16 bits

**Spurious-Free Dynamic Range*:**
(includes spurs, harmonic distortion, intermodulation distortion, alias products and sidebands >300 Hz)
(source impedance = 50 Ω)

| | |
|---|---|
| 51.2 kSa/s Fs, ≤ 1 Vp | <-90 dBfs (typical) |
| 48 kSa/s to 65.536 Sa/s Fs | <-80 dBfs |
| above 65.536 Sa/s Fs | <-74 dBfs |

**Residual Response with No Input:** <-76 dBfs

* 5 mV range degrades 6 dB.

**Crosstalk:** <-80 dBfs (typical)
(receiving channel source impedance = 50 Ω, low side grounded, full scale, <10 kHz signal on other channels, input ranges within 20 dB)

**Noise (input terminated with 50 Ω, 5 mV range):**

| | |
|---|---|
| Noise density above 100 Hz | <70 nV rms/√Hz |
| Total rms noise, 10 Hz to 10 kHz | <7 µV rms |

## Triggering

**Trigger Detection:** Digital

**Trigger Modes:** Input, external, source, TTL TRG, software, RPM (requires option AYF)

**Maximum Trigger Delay (8 channels active):**

| | |
|---|---|
| Pre-trigger delay | 2 MSa (32 MB RAM) |
| Post-trigger delay | 16 MSa |

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## Option 1D4 Arbitary Source Specifications

### General

**Output Modes:** Sine and pseudo random with burst; arbitrary waveform with continuous output

**Frequency Bands:**

**Sine, Noise Modes**

| | |
|---|---|
| Reconstruction filter bandwidth | 0 kHz to 25.6 kHz |
| DSP data rate (Fs) | 48.00 kHz to 65.536 kHz |
| Data word size | 16 bits |

**Arb Modes**

| | |
|---|---|
| Reconstruction filter bandwidth | 0 kHz to 6.4 kHz |
| Data word size | 20 bits |
| Frequency Accuracy | ±0.012% (120 ppm) |

### Signal Output

**Number of Output Channels:** 1

**Maximum Amplitude:** 10 Vp nominal

**Output Impedance:** <0.5 Ω (typical)

**Maximum Output Current:** 100 mA (typical)

**Maximum Capacitive Load:** 0.01 µF (typical)

**Amplitude Control:**
(signal amplitude = range × scale factor)

**Maximum Amplitude:** 10 Vp nominal

**Amplitude Ranges:** 79 mVp to 10 Vp in 0.375 dB steps

**Amplitude Scale Factor:** 0.0 to 1.0, with 20-bit resolution

**Residual Output Noise Voltage:**

| | |
|---|---|
| (Freq > 500 Hz) | <500 nV/√ Hz |

**Residual dc Offset:**

| | |
|---|---|
| Offset after autozero | ±2 mV |
| Offset after shutdown | ±20 mV |
| Zeroing resolution | 100 µV |

**Output Overload Trip:** >17 V

**Amplitude Ramp-down Time:** 0 s to 30 s (Programmable)

**Shutdown:**

| | |
|---|---|
| Shutdown input | TTL levels |
| Shutdown time | <5 s |
| Shutdown time, ac fail | 4 ms |

### Sine Output Mode

**Sine Frequency (65536 Hz Fs):**

| | |
|---|---|
| Frequency range | 0 Hz to 25.6 kHz |
| Frequency resolution | 244 µHz |

**Amplitude Accuracy:**
(1 kHz sine wave, into ≥200 Ω)

| | |
|---|---|
| 10 Vp to 0.158 Vp ranges | ±0.20 dB (2.3%) |
| 0.152 Vp to 79 mVp ranges | ±0.40 dB (4.7%) |

**Flatness (relative to 1 kHz):** ±0.5 dB

**Harmonic and Aliased-harmonic Distortion ( ≥1 kΩ load):**

| | |
|---|---|
| 1 Vp range, 1.0 scale factor, 0 to 6.4 kHz | <-80 dBc |
| 2 Vp to 10 Vp range, 0.05 to 1.0 scale factor, 0 Hz to 25.6 kHz | <-70 dBc |

**Spurious Responses:** <-60 dB/Vp

### Constant-Level Output

**Output Level at 1 kHz:** 1 Vp (nominal)
(after 1 second settling, amplitude scale factor > 0.001)

**Output Impedance:** 1.2 kΩ (typical)

**Flatness:**

| | |
|---|---|
| 25 Hz to 5 kHz, amplitude scale factor 0.001 to 1.0 | 1.13 Vp to 0.50 Vp (+10, -6.0 dB) (typical) |
| 5 Hz to 20 kHz, amplitude scale factor 0.01 to 1.0 | 1.13 Vp to 0.44 Vp (+10, -7.0 dB) (typical) |
| 5 Hz to 20 kHz, amplitude scale factor 0.1 to 1.0 | 1.13 Vp to 0.88 Vp (±1.0 dB) (typical) |

**Sine Wave Distortion:** -40 dBc (typical)
(at 1 kHz, amplitude scale factor 0.1 to 1.0)

**Residual dc Offset:** <5 mV (typical)

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## Option AYF Tachometer Input Specifications

Option AYF, Tachometer Input, provides two tachometer inputs. When this option is installed, two of the three SMB connectors on the VXI module are used for tachometer inputs. When this option is not installed, these connectors are normally used for "External Sample" and "Trigger." Each tachometer input has a programmable trigger level.

Each tach pulse causes a "Tach Edge Time" to be recorded in a 16384-word FIFO. A "Tach Edge Time" is the instantaneous value of the 32-bit "Tach Counter." A "Decimate" number can be set to ignore a number of tach pulses before recording each Tach Edge Time. A "Holdoff" time can be set to avoid false triggering due to ringing.

One of the tachometer inputs can be programmed for use as a trigger input instead. In this mode, the tachometer option can trigger the system and measure the time between the trigger and the next sample clock edge.

The analog signal from either of the tachometer inputs can be routed to an input channel using the internal calibration path.

### General

**Tach Counter:** 32-bit counter with roll-over detector bit

**Decimate Counter:** 16-bit counter

**Input Signal Trigger Level (typical):**

| | |
|---|---|
| Voltage Range | -25 V to +25 V |
| Resolution, levels <± 5 V | 40 mV |
| Resolution, levels >± 5 V | 200 mV |
| Hysteresis, levels <± 5 V | 0 to 250 mV |
| Hysteresis, levels >± 5 V | 0 to 1.25 mV Slope Programmable, positive or negative |

**Input Signal Timing:**

| | |
|---|---|
| Minimum pulse width | 5 µs |
| Maximum pulse rate | 100 kHz |
| Trigger holdoff | 1 to 65536 clock periods |

**Input Impedance:** 20 kΩ (typical)

## VXI System Level Specifications

### Features

**VXI Standard Information:**
Conforms to VXI Revision 1.4 C-size, single slot, register-based programming, "Slave" Data Transfer Bus functionality, A24 address capability, D32 data capability, Optional Local Bus capability, SUMBUS driver and receiver. Requires two or four TLTRG lines for multi-module synchronization

### Software

**Driver Type:** VXIplug&play C libraries with source code and ME4X ActiveX driver

**Supported Operating Systems:** MS Windows, Linux, HP-UX

**Plug&Play Compliance:** MS Windows, Linux, HP-UX

### Regulatory Compliance

**Safety Standards:** Designed for compliance to: UL 1244, 4th Edition
IEC 348, 2nd Edition,
1978
CSA C22.2, No. 231

**Electrostatic Discharge:** Tested for compliance to the European Economic Area's EMC directive

**Radiated Immunity:** Tested for compliance to the European Economic Area's EMC directive

# 8-channel 196 kSa/s Digitizer plus DSP

## Environmental

**Operating Restrictions:**

| | |
|---|---|
| Ambient Temperature | 0 °C to 50 ˚C |
| Humidity, Non-condensing | 20% RH to 90% RH at 40 °C |
| Maximum Altitude | 4600 meters (15,000 feet) |

**Storage and Transport Restrictions:**

| | |
|---|---|
| Ambient Temperature | -20 °C to 65 °C |
| Humidity, Non-condensing | 20% RH to 90% RH at 40 °C |
| Maximum Altitude | 4600 meters (15,000 feet) |

## Ordering Information

| | |
|---|---|
| **VT1433B** | 8-channel 196 kSa/s Digitizer plus DSP |
| **VT1433B-1D1** | Real time octave measurements |
| **VT1433B-1D4** | Arbitrary source |
| **VT1433B-1DL** | Four input channel configuration |
| **VT1433B-AYF** | Add tachometer input |
| **VT1433B-UGV** | Add local bus interface |
| **VT3240A** | Voltage input breakout box (8 channels) |
| **VT3241A** | IEPE/voltage input breakout box (8 channels) |
| **VT3242A** | Charge/IEPE/voltage input Breakout Box (4 channels) |
| **VT3243A** | Microphone/IEPE/voltage input breakout box (4 channels) |
| **VT3241-AXM** | Dual rackmount kit for VT3240A or VT3241A |
| **VT3241-AXN** | Rack mount kit for 8 VT3240A or VT3241A BoBs |
| **VT3242-AXM** | Dual rackmount kit for VT3242A or VT3243A |