SPECIFICATIONS

USB-5132

50 MHz, 50MS/s, 2-Channel, 8-Bit USB Oscilloscope Device

Contents

Definitions

Caution The protection provided by the USB-5132 can be impaired if it is used in a manner not described in this document.

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty. *Warranted* specifications account for measurement uncertainties, temperature drift, and aging. *Warranted* specifications are ensured by design, or verified during production and calibration.

The following characteristic specifications describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty:

- *Typical* specifications describe the performance met by a majority of models.
- *Nominal* specifications describe an attribute that is based on design, conformance testing, or supplemental testing.
- *Measured* specifications describe the measured performance of a representative model.

Specifications in this document are *Typical* unless otherwise noted.

Conditions

Specifications are valid under the following conditions unless otherwise noted:

- Full bandwidth
- The Sample Clock is set to full rate.
- The module is warmed up for 10 minutes at ambient temperature.
- Self-calibration is completed after warm-up period.
- Calibration cycle is maintained.

Vertical

Analog Input

Number of channels	2, simultaneously sampled
Connector	BNC

Impedance and Coupling

Input impedance	1 MΩ ±1% in parallel with a nominal capacitance of 19 pF
Input coupling	AC, DC, GND

Voltage Levels

Table 1. Full Scale (FS) Input Range and Programmable Vertical Offset

Range (V_{pk-pk})	Vertical Offset Range (V)[1]
0.04	±0.4
0.1	±0.4
0.2	±0.4
0.4	±0.4
1.0	±4.0
2.0	±4.0
4.0	±4.0
10	±25.0
20	±20.0
40	±10.0

Maximum input overload	|Peaks| ≤ 30 V

Accuracy

Resolution	8 bits
Accuracy[2]	±(2% of input + 1% FS + 300 µV), warranted
DC drift	±(0.033% of input + 0.06% of FS + 40 µV) per °C, nominal
AC coupling cutoff (-3 dB)	12 Hz

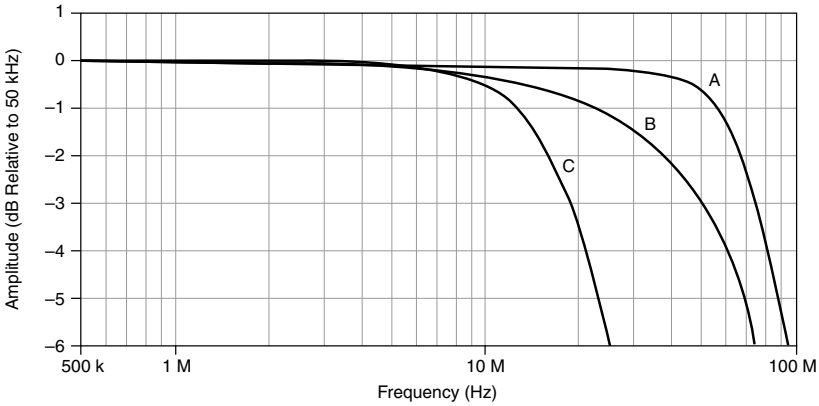
[1] Programmable Vertical Offset Accuracy: ±2 mV on 40 mV range, ±2.5% on all other ranges, warranted

[2] Within 5 °C of self-calibration temperature.

Bandwidth and Transient Response

Bandwidth[3,4] (-3 dB)	
All ranges except 0.04 V_{pk-pk} range	50 MHz, warranted
0.04 V_{pk-pk} range	35 MHz, warranted
Bandwidth limit filter	20 MHz noise filter

Figure 1. Frequency Response, Measured



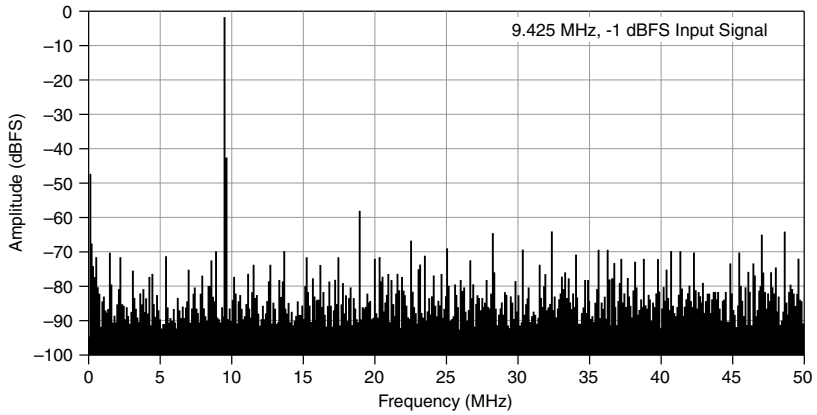
A	Frequency response at full bandwidth, all ranges except 40 mV_{pk-pk} range, measured
B	Frequency response at full bandwidth, 40 mV_{pk-pk} range, measured
C	Frequency response with 20 MHz noise filter, all ranges, measured

Spectral Characteristics

RMS noise	
All ranges except 0.04 V_{pk-pk} range	0.35% FS
0.04 V_{pk-pk} range	0.55% FS

[3] Filter off.
[4] Normalized to 50 kHz

Figure 2. USB-5132 Dynamic Performance, 1 V_{pk-pk} Range, 524,288-Point FFT, Measured



Horizontal

Sample Clock

Onboard Clock

Sample rate range, real-time sampling (single shot)[5]	763 S/s to 50 MS/s
Timebase frequency	50 MHz
Timebase accuracy	±50 ppm, warranted

Related Information

Fore more information about Sample Clock and decimation, refer to the NI High-Speed Digitizers Help.

[5] Divide by *n* decimation used for all rates less than maximum speed.

External Sample Clock[6]

Sources	PFI 1
Frequency range	1 MHz to 50 MHz
Duty cycle tolerance	45% to 55%

Related Information

PFI 1 (Programmable Function Interface) on page 7

Trigger

Reference (Stop) Trigger

Table 2. Trigger Types and Sources[7]

Types	Sources
Edge, window, hysteresis	CH 0, CH 1
Digital	PFI 1
Immediate, software	—

Analog Trigger (Edge, Window, and Hysteresis Trigger Types)

Sources	CH 0 (front panel BNC connector), CH 1 (front panel BNC connector)
Trigger level resolution	8 bits
Trigger level range	Same as input signal

Digital Trigger (Digital Trigger Type)

Sources	PFI 1

[6] Input must meet 3.3 V CMOS Logic requirements.
[7] If a digital trigger is being supplied through the PFI line, an external clock cannot be used.

Start Trigger

Table 3. Trigger Types and Sources[8]

Types	Sources
Digital	PFI 1
Immediate and Software	—

Digital Trigger (Digital Trigger Type)

Sources	PFI 1

PFI 1 (Programmable Function Interface)

Connector	BNC
Direction	Bidirectional

As an Input (Trigger)

Destinations	Start Trigger, Reference Trigger, External Sample Clock
Input impedance	1 MΩ , nominal
V_{IH}	2.4 V
V_{IL}	400 mV
Maximum input overload	-0.5 V to 3.5 V
Minimum pulse width	20 ns

As an Output (Event)

Sources	Ready for Start, Ready for Reference, End of Acquisition (Done)
Output impedance	50 Ω
Logic type	3.3 V CMOS
Maximum drive current	20 mA
Minimum pulse width	100 ns

[8] If a digital trigger is being supplied through the PFI line, an external clock cannot be used.

Waveform Specifications

Onboard memory size	4 MB per channel option or 32 MB per channel option
Minimum record length	1 Sample
Number of pretrigger samples	4 MB – posttrigger samples or 32 MB – posttrigger samples
Number of posttrigger samples	4 MB – pretrigger samples or 32 MB – pretrigger samples

Calibration

Self-calibration	Self-calibration is done on software command. The calibration corrects for offset.
External calibration (factory calibration)	The external calibration calibrates the gain, the 1 MΩ attenuator, and the programmable vertical offset accuracy. Appropriate constants are stored in nonvolatile memory.
Interval for external calibration	2 years
Warm-up time[9]	10 minutes

Power

+5 V DC	230 mA
Total power	1.15 W

Software

Driver Software

Driver support for this device was first available in NI-SCOPE 14.1.

NI-SCOPE is an IVI-compliant driver that allows you to configure, control, and calibrate the USB-5132. NI-SCOPE provides application programming interfaces for many development environments.

[9] Warm-up begins after the NI-SCOPE driver is loaded.

Application Software

NI-SCOPE provides programming interfaces, documentation, and examples for the following application development environments:

- LabVIEW
- LabWindows™/CVI™
- Measurement Studio
- Microsoft Visual C/C++
- .NET (C# and VB.NET)

Related Information

For NI-SCOPE .NET support, visit ni.com.

Interactive Soft Front Panel and Configuration

When you install NI-SCOPE on a 64-bit system, you can monitor, control, and record measurements from the USB-5132 using InstrumentStudio.

InstrumentStudio is a software-based front panel application that allows you to perform interactive measurements on several different device types in a single program.

Note InstrumentStudio is supported only on 64-bit systems. If you are using a 32-bit system, use the NI-SCOPE–specific soft front panel instead of InstrumentStudio.

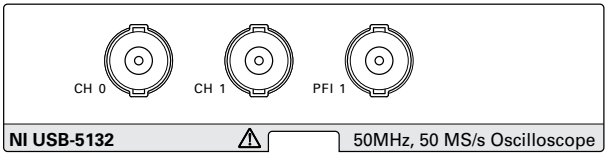
Interactive control of the USB-5132 was first available via InstrumentStudio in NI-SCOPE 18.1 and via the NI-SCOPE SFP in NI-SCOPE 3.5. InstrumentStudio and the NI-SCOPE SFP are included on the NI-SCOPE media.

NI Measurement & Automation Explorer (MAX) also provides interactive configuration and test tools for the USB-5132. MAX is included on the driver media.

Physical

Front Panel

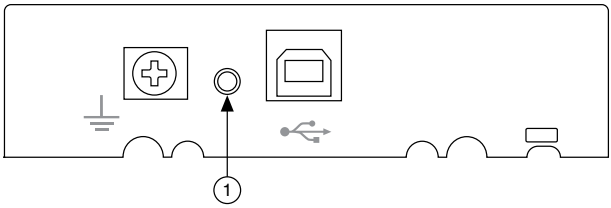
Figure 3. USB-5132 Front Panel



Connector	Function	Connector Type
CH 0	Analog input	BNC female
CH 1	Analog input	BNC female
PFI 1	Digital input/output/clk in	BNC female

Back Panel

Figure 4. USB-5132 Back Panel



Indicator	Function	Indicator Type
1	Indicates that the device has power and has been recognized by the system	LED

Cleaning Statement

Notice Clean the hardware with a soft, nonmetallic brush. Make sure that the hardware is completely dry and free from contaminants before returning it to service.

Notice If the USB-5132 is uninstalled, clean the hardware with a soft, nonmetallic brush. Make sure that the hardware is completely dry and free from contaminants before returning it to service.

Dimensions and Weight

Dimensions	18.49 × 3.38 × 10.29 cm (7.279 × 1.314 × 4.053 in.)
Weight	244 g (8.6 oz)

Environment

Maximum altitude	2,000 m (at 25 °C ambient temperature)
Pollution Degree	2

Indoor use only.

Operating Environment

Ambient temperature range	0 °C to 45 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)
Relative humidity range	10% to 90%, noncondensing (Tested in accordance with IEC 60068-2-56.)

Storage Environment

Ambient temperature range	-20 °C to 70 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)
Relative humidity range	10% to 90%, noncondensing (Tested in accordance with IEC 60068-2-56.)

Compliance and Certifications

Safety Compliance Standards

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1

Note For UL and other safety certifications, refer to the product label or the *Product Certifications and Declarations* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia, and New Zealand (per CISPR 11), Class A equipment is intended for use only in heavy-industrial locations.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

Note For EMC declarations, certifications, and additional information, refer to the *Product Certifications and Declarations* section.

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2011/65/EU; Restriction of Hazardous Substances (RoHS)

Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI products, visit *ni.com/product-certifications*, search by model number, and click the appropriate link.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *Commitment to the Environment* web page at *ni.com/environment*. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit *ni.com/environment/weee*.

电子信息产品污染控制管理办法（中国 RoHS）

中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令(RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 `ni.com/environment/rohs_china`。(For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

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