NATIONAL INSTRUMENTS VB-8012, VB-8034, and VB-8054 VirtualBench All-in-One Instrument User Manual

NATIONAL INSTRUMENTS VB-8012, VB-8034, and VB-8054 VirtualBench All-in-One Instrument User Manual

Contents

VirtualBench All-in-One Instrument

VB-8012, VB-8034, and VB-8054

- Software: Includes VirtualBench application, API support for LabVIEW and text-based languages, shipping examples, and detailed help files
- Up to 500 MHz mixed-signal oscilloscope with protocol analysis
- Arbitrary waveform generator with up to 40 MHz sine output
- 5 ½ digit DMM with 300 V input range
- Three-channel programmable DC power supply, up to 3 A
- Eight general-purpose digital I/O lines
- USB, Ethernet, and WiFi connectivity to Windows and Apple iPad software applications

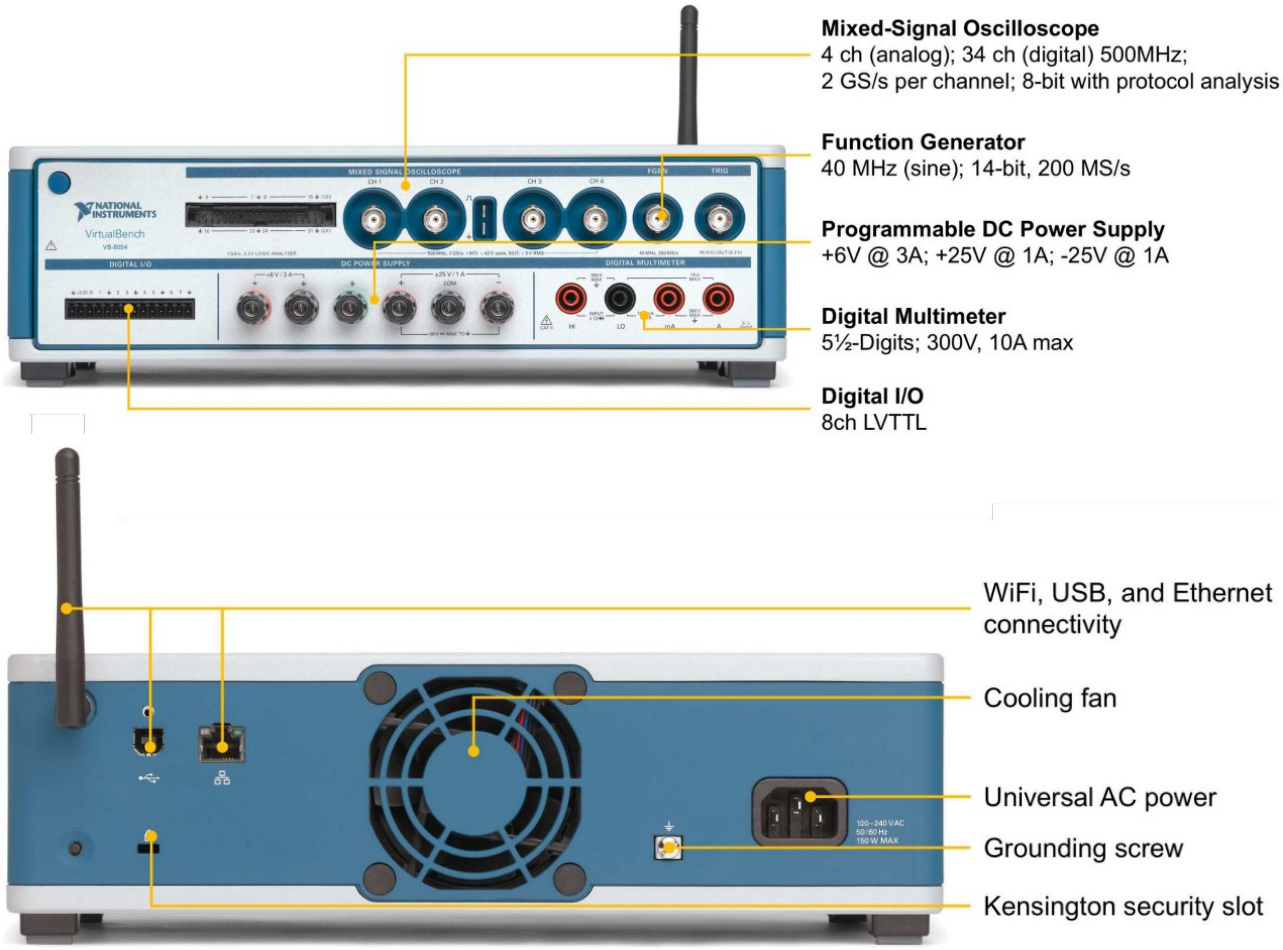
Five Benchtop Instruments. One Unified Interface.
VirtualBench plays a key role in reducing the cost and footprint of test and measurement systems by consolidating five of the most commonly used instruments into one device without compromising the performance of each instrument. Combined with a modern software experience and simple programming interface, VirtualBench creates new efficiencies for engineers interacting with benchtop test equipment or developing low-cost automated test systems.

The VirtualBench hardware family currently consists of three models most easily designated by oscilloscope analog bandwidth: 100, 350, and 500 MHz. These models allow the VirtualBench family to serve a wide range of applications and price points in academic labs, hardware characterization/debug benches, and automated test systems.

Table 1. NI offers VirtualBench models ranging from 100 to 500 MHz of analog bandwidth.

	VB-8012	VB-8034	VB-8054
Mixed-Signal Oscilloscope (MSO) with SPI, I^2C, and Parallel Protocol Analysis			
Bandwidth	100 MHz	350 MHz	500 MHz
2 Analog, BNC		4 Analog, BNCChannels	
	34 Digital	34 Digital	
Sample Rate	1 GS/s	1.5 GS/s/channel	2 GS/s/channel
Digital Multimeter			
Resolution	5 ½ Digits		
Input Range	300 V, Category II Isolation		
Measurement Functions	DC voltage, AC voltage, DC current, AC current, resistance, diode, continuity		
Arbitrary Waveform Generator			
Max Frequency	20 MHz (sine)		40 MHz (sine)
Waveform Types	sine, square, ramp/triangle, DC, arbitrary		
DC Power Supply			
Channel 1	0 to 6 V, up to 1 A	0 to 6 V, up to 3 A	
Channel 2	0 to -25 V, up to 0.5 A	0 to -25 V, up to 1 A	
Channel 3	0 to 25 V, up to 0.5 A	0 to 25 V, up to 1 A	
Digital I/O			
Channels	8 Channels		
Logic Levels	5 V compatible TTL input, 3.3 LVTTL output		
General			
Connectivity	USB and WiFi	USB, WiFi, and Ethernet	
Size	10 in. x 7.5 in. x 2.9 in.	12 in. x 8 in. x 3.7 in.	
Interactive Software	Windows (7 SP1 and later), iPad (iOS 9 or later)		
Programming API	LabVIEW, ANSI C, and Python[1]		

Detailed View of VB-8054



Key Features

Unified Software Interface

The VirtualBench application requires zero installation and can load automatically via Windows Autoplay when connected through USB. The integrated view of all five instruments allows you to import/export instrument configurations for easier replication of test conditions. VirtualBench also includes software capabilities like digital phosphor density maps for displaying multiple acquisitions simultaneously, XY mode for plotting channels against one another, and hands-free smart capture for automatic data capture of repeated stable waveforms. In order to future-proof any VirtualBench investment, free software and firmware updates are provided as new features are released. These features, in addition to the consolidated interface, help engineers streamline their approach for benchtop characterization and validation.

Figure 1: Export screenshots and data using one-click buttons or the hands-free smart capture feature.

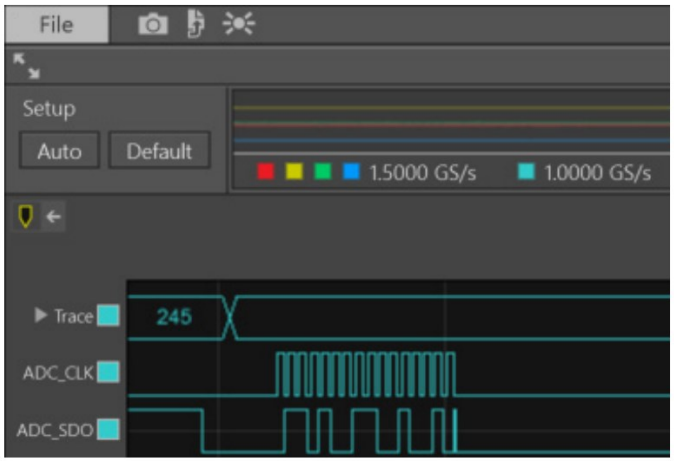


Figure 2: Use measurement indicators to quickly characterize signals like this sine glitch. Choose to display common measurements like amplitude, max/min, RMS, period, and frequency indefinitely beneath the scope

graph.

Figure 3: Simplify your measurements using intuitive configuration menus. The configured pulse width trigger reliably captures the displayed signal glitch.

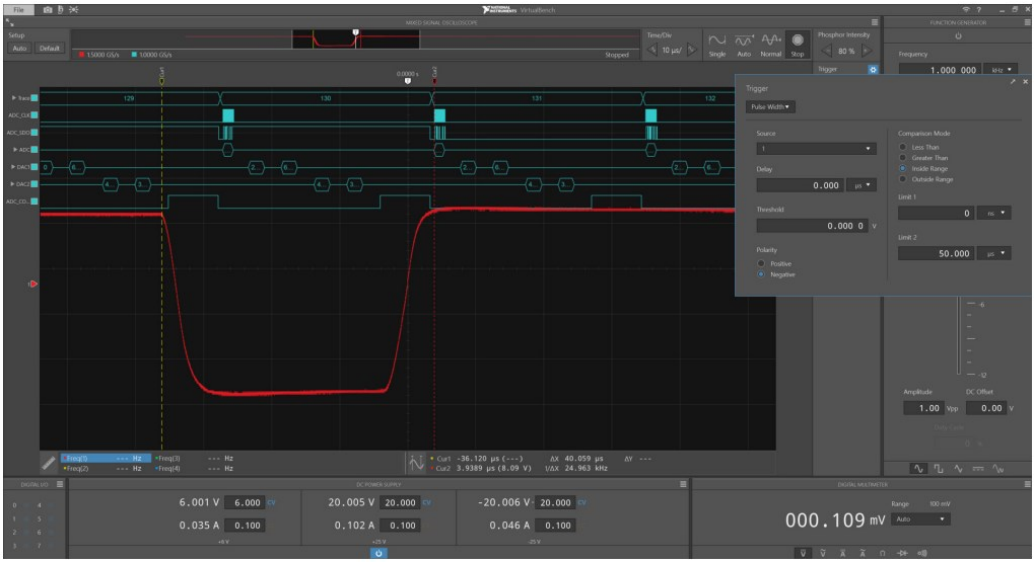
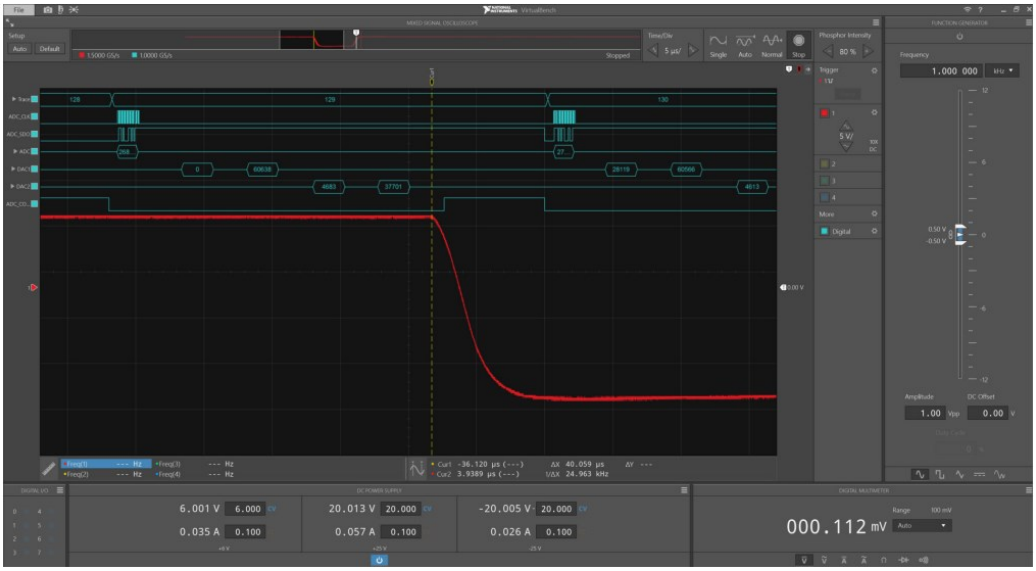


Figure 4: Debug your system more easily by leveraging the built-in protocol decoder alongside the other instruments on the same time scale. The zero registered on the “DAC1” SPI line is likely the culprit of the glitch shown.



VirtualBench Accessories

VirtualBench ships with several accessories to enable common measurements as well as device connection with a PC or iPad.

- Oscilloscopes probes (VB-8012: set of two, VB8034/VB-8054: set of four)
- DMM probes (set of two)
- MSO logic analyzer 40-pin input cable
- Screw-terminal connectors
- NI screwdriver
- Wireless antenna
- USB cable with locking screw (2 m)
- Power cord

Optional Accessories
In addition to the standard, included accessories, NI has several optional accessories available that further extend the capabilities of VirtualBench.

- **Binding Post Adapter (VB-8012 only)**

- **Desktop Mounting Kit (VB-8012 only)**

- **Rack Mount Shelf**

- **DMM Alligator Clips, Spade Connectors, & Spring Hooks (P2 Probe Set)**

- **BNC Cable, 50 Ohm Male to Male (2 m)**

- **Soft Carrying Case**

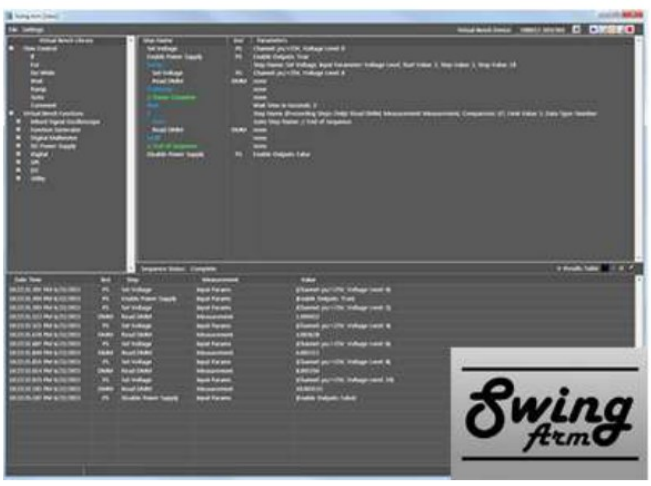
- **Accessory Pouch**

- **Logic Analyzer Grabbers (set of six)**

- **FGEN BNC Male to Micrograbber (87 cm)**

- **USB Cable with Locking Screw (1 or 2 m)**

Third Party Accessories and Software
Additional industrial accessories have been developed for VirtualBench and are available through alliance partners or the LabVIEW Tools Network.

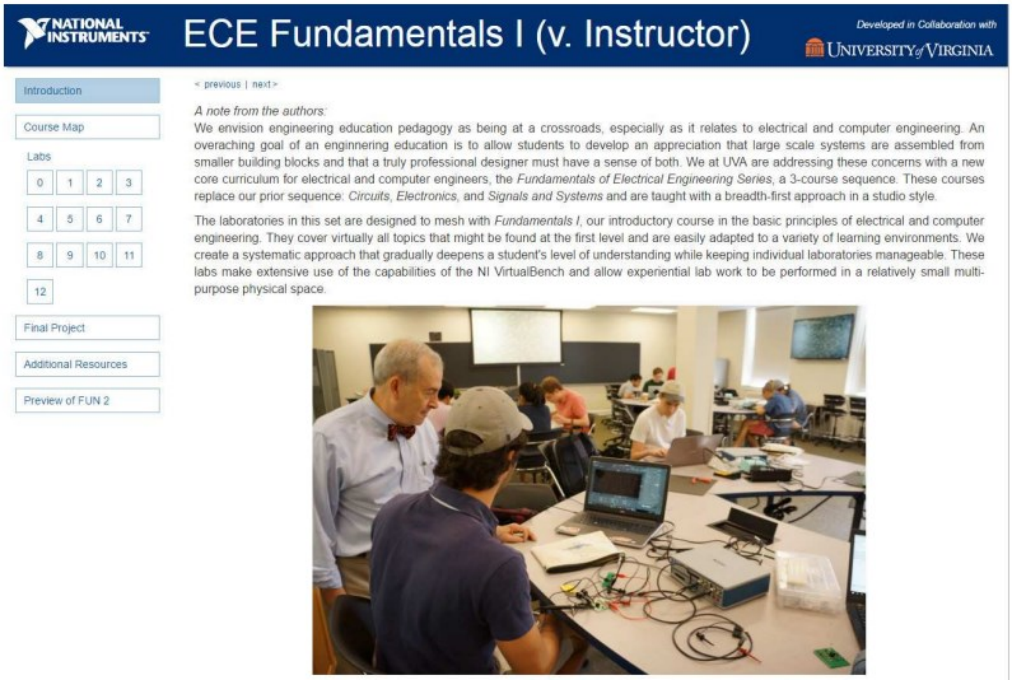


NI Alliance partner 10X Engineering LLC developed an uninterruptible power supply for the VB-8012, further enabling field work with limited resources.

Clustr, Inc's SwingArm software incorporates drag and drop methodology to create sequences of VirtualBench settings and measurements, ideal for design verification testing as well as repetitive measurements.

Academic Curriculum

Developed in collaboration with the University of Virginia, the free downloadable ECE Fundamentals 1 curriculum leverages both VirtualBench and Multisim to simulate, create, and test circuits with specific analysis methods. The course series aims to redefine teaching of core electrical and computer engineering topics with an innovative, breadth-first approach.



Additional laboratories based on VirtualBench have been developed through partners and are available for purchase on LabStore, such as the Electrical Measurements Lab, Fault Detection and Correction Lab, and Electronic Components Characterization Lab.

NI-VirtualBench Application Programming Interface (API)

In addition to the VirtualBench application, the NI-VirtualBench driver includes a best-in-class API that works with a variety of development options such as LabVIEW and C. The driver also provides access to help files, documentation, and online examples you can use as a starting point for your application.

Figure 5: Example LabVIEW code to take a DMM reading on the VirtualBench.

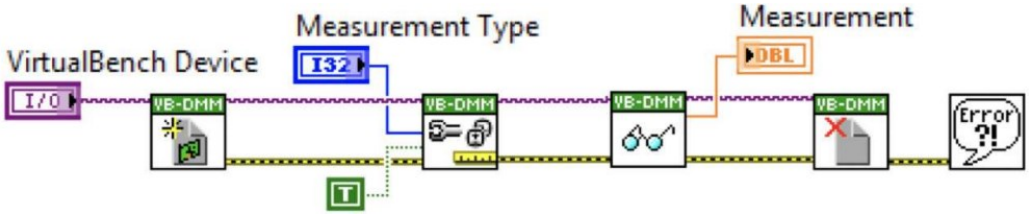
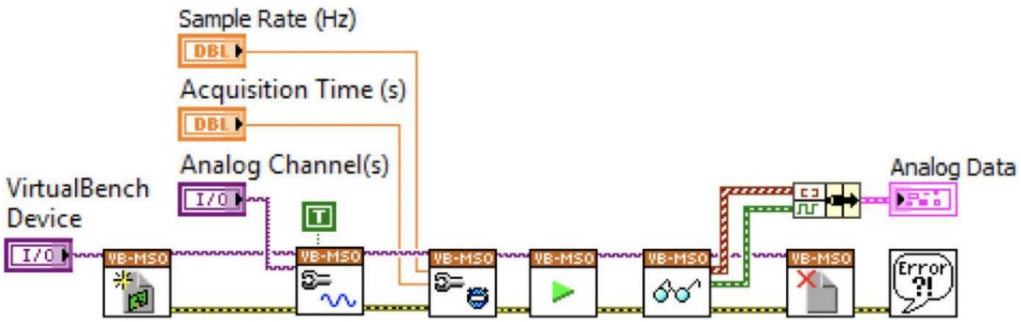
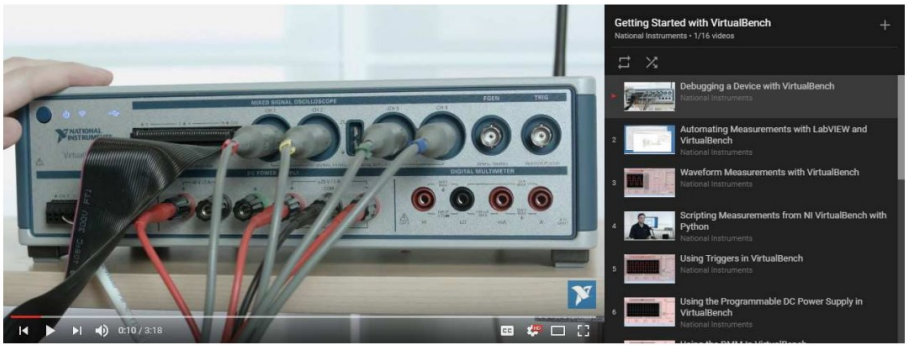


Figure 6: Example LabVIEW code to take an oscilloscope measurement on the VirtualBench.



Learn More About VirtualBench

To learn more about the capabilities of VirtualBench, you can watch the series of instructional videos linked through the image below.



Hardware Services

All NI hardware includes a one-year warranty for basic repair coverage, and calibration in adherence to NI specifications prior to shipment. PXI Systems also include basic assembly and a functional test. NI offers additional entitlements to improve uptime and lower maintenance costs with service programs for hardware. Learn more at ni.com/services/hardware.

	Standard	Premium	Description
Program Duration	3 or 5 years	3 or 5 years	Length of service program
Extended Repair Coverage	●	●	NI restores your device's functionality and includes firmware updates and factory calibration.
System Configuration, Assembly, and Test[1]	●	●	NI technicians assemble, install software in, and test your system per your custom configuration prior to shipment.
Advanced Replacement[2]		●	NI stocks replacement hardware that can be shipped immediately if a repair is needed.
System Return Material Authorization (RMA)[1]		●	NI accepts the delivery of fully assembled systems when performing repair services.
Calibration Plan (Optional)	Standard	Expedited[3]	NI performs the requested level of calibration at the specified calibration interval for the duration of the service program.

1. This option is only available for PXI, CompactRIO, and CompactDAQ systems.

2. This option is not available for all products in all countries. Contact your local NI sales engineer to confirm availability.
3. Expedited calibration only includes traceable levels.

PremiumPlus Service Program
NI can customize the offerings listed above, or offer additional entitlements such as on-site calibration, custom sparing, and life-cycle services through a PremiumPlus Service Program. Contact your NI sales representative to learn more.

Technical Support
Every NI system includes a 30-day trial for phone and e-mail support from NI engineers, which can be extended through a Software Service Program (SSP) membership. NI has more than 400 support engineers available around the globe to provide local support in more than 30 languages. Additionally, take advantage of NI's award winning online resources and communities

Documents / Resources

	NATIONAL INSTRUMENTS VB-8012, VB-8034, and VB-8054 VirtualBench All-in-One Instrument [pdf] User Manual VB-8012, VB-8034, VB-8054, VB-8012 VB-8034 and VB-8054 VirtualBench All-in-One Instrument, VB-8012 VirtualBench All-in-One Instrument, VB-8034 VirtualBench All-in-One Instrument, VB-8054 VirtualBench All-in-One Instrument, VirtualBench All-in-One Instrument, VirtualBench, VirtualBench Instrument, All-in-One Instrument

References

- pyVirtualBench - Controlling Five Instruments from a Single Python Application
- NI VirtualBench™ - labStore
- Electronic Components Characterization Lab based on NI VirtualBench - labStore
- Fault Detection and Correction Lab based on NI VirtualBench - labStore
- Electrical Measurements Lab based on NI VirtualBench - labStore
- Engineer Ambitiously - NI
- Product Documentation - NI
- NI Driver Downloads - NI
- SwingArm for VirtualBench - NI
- Engineer Ambitiously - NI
- NI Community - National Instruments

- VB-8012 - NI
- VB-8034 - NI
- VB-8054 - NI
- Product Documentation - NI
- Hardware Services - NI
- Software Services - NI
- Support - NI
- How-To Automate VirtualBench in LabVIEW - NI
- Getting Started With VirtualBench - NI
- VB-8054 National Instruments VirtualBench All-in-One Instrument | Apex Waves