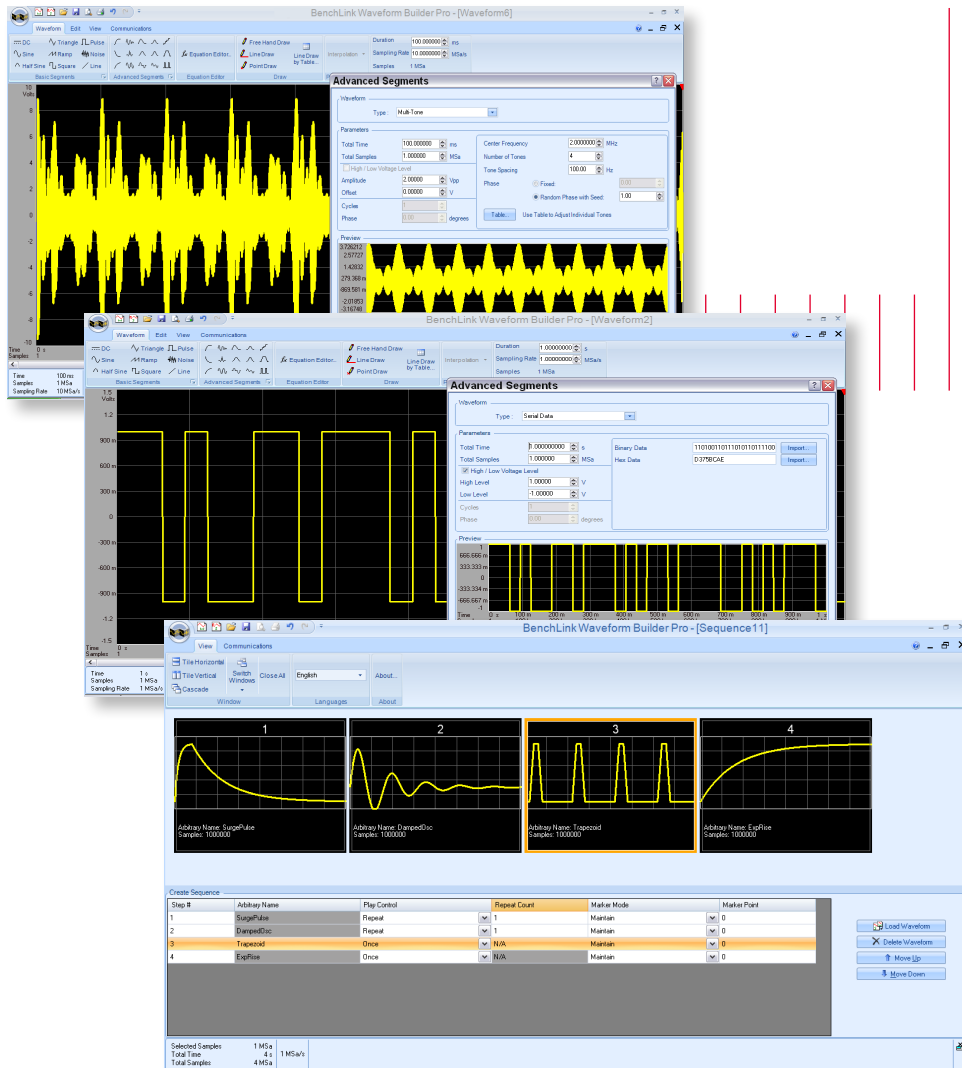


# Keysight 33503A

## BenchLink Waveform Builder Pro and Basic Software

For Keysight Function/Arbitrary/Pulse Waveform Generators  
and InfiniiVision Oscilloscopes



Data Sheet

# Create Custom Waveforms Faster

## Fast and easy analysis tools for more insight

- Standard waveform library provides quick access to common signals (DC, half-sine, noise, sine, square, triangle, ramp, pulse, exponential)
- Comprehensive library of built-in signals provides fast, easy access to complex signals
- Free-hand, point and line-draw modes to create custom shapes
- Equation editor enables creation of waveforms with exact polynomials
- Advanced math functions provide additional flexibility for more complex signals
- Sequencing editor to build and arrange composite waveforms for design optimization
- Filtering and windowing functions allow smooth transitions between waveforms
- Fast Fourier Transform (FFT) capability enables viewing of signal frequency characteristics
- Complimentary Cumulative Distribution Function (CCDF) curves enables viewing of signal power characteristics

## Fast, Efficient Custom Waveform Creation

The Keysight 33503A BenchLink Waveform Builder Pro is the first full-featured waveform creation software for waveform generators. The software enables engineers to take full advantage of Keysight signal generation capabilities and makes custom waveform creation fast and simple. It is ideal for R&D engineers characterizing new designs and test system engineers validating production units.

BenchLink Waveform Builder Pro is a Microsoft Windows-based program that provides easy-to-use creation tools, such as an equation editor, waveform math and drawing tools, which can be used to create custom signals. It features a standard function library, waveform sequencer; as well as filters and windowing functions that allow you to easily modify and further refine your waveform. A library of built-in signals supports fast creation of more complex waveforms such as multi-tone, serial data, trapezoid and Gaussian.

With BenchLink Waveform Builder Pro, you gain access to advanced signal creation and editing capabilities, without requiring hours of programming. The result is quicker, easier creation of custom waveforms, coupled with deeper analysis insight into your signals.

### Download Keysight's free 30-day trial version and create custom waveforms faster

The free 30-day demo version of the BenchLink Waveform Builder Pro Software is the fully functional Pro version. After the 30-day trial period the full version of the software will revert to the basic free version. If you choose to continue to utilize the full Pro version, you may purchase a license to retain the Pro version's full functionality and benefits.

For more information and to download your free copy today visit:  
[www.keysight.com/find/33503](http://www.keysight.com/find/33503)

### Key applications

- Electronic controls, baseband wire less communications
- Linear amplifiers, DC brushless motors, switching power supplies
- Medical devices, digital audio
- Clock signals, modulation source

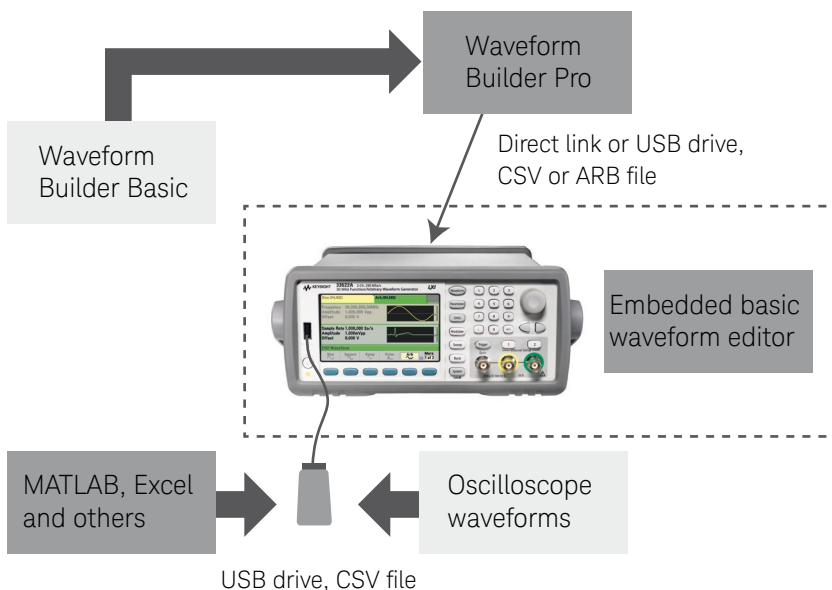


Figure 1. Multiple methods to create and import waveforms into the new 33500B and 33600A Series Trueform waveform generators.

## Exceptional Functionality

The BenchLink Waveform Builder Pro software features a range of functionality designed to make common and custom waveform creation a fast and simple process. This functionality is summarized in Table 1.

Table 1. 33503A BenchLink Waveform Builder Pro and Basic version functionality.

| Category              | Description                          |
|-----------------------|--------------------------------------|
| <b>Waveform types</b> |                                      |
| Basic waveforms       | DC                                   |
|                       | Sine                                 |
|                       | Triangle                             |
|                       | Square (with transition)             |
|                       | Pulse (with transition)              |
|                       | Ramp                                 |
|                       | Noise                                |
|                       | Half-sine                            |
|                       | Line                                 |
|                       | Advance waveforms (Pro version only) |
| Exponential fall      |                                      |
| Noise                 |                                      |
| Sinc                  |                                      |
| Sweep                 |                                      |
| Multi-tone            |                                      |
| Lorentz               |                                      |
| Stair step            |                                      |
| Haversine             |                                      |
| Gaussian              |                                      |
| Logarithmic           |                                      |
| Trapezoid             |                                      |
| Serial data           |                                      |
| Damped oscillation    |                                      |
| Distorted sine        |                                      |
| Surge pulse           |                                      |

### Single-channel waveform

|                      |  |
|----------------------|--|
| View                 | Segment markers  |
|                      | X and Y cursors  |
|                      | Pin cursors  |
| Edit                 | Multi-level undo/redo for all basic waveform editing operations            |
|                      | Paste options such as at beginning, end, cursor, or replacement selection  |
|                      | Copy/paste options with excel sheet  |
|                      | Copy/paste options with text file  |
|                      | Insert options such as at beginning, end, cursor, or replacement selection |
| Math                 | Edit/add/remove waveform points via table                                  |
|                      | Addition   |
|                      | Subtraction  |
|                      | Multiplication   |
|                      | Math operation with waveform library                                       |
|                      | Math operation with constants  |
|                      | Math operation with clipboard  |
| Division by constant |  |

### Dual-channel waveforms (Pro version only)

|      |  |
|------|--|
| View | Segment markers  |
|      | X and Y cursors  |
|      | Pin cursors  |
|      | Blinking cursor  |
| Edit | Multi-level undo/redo for all basic waveform editing operations            |
|      | Paste options such as at beginning, end, cursor, or replacement selection  |
|      | Copy/paste options with Excel sheet  |
|      | Copy/paste options with text file  |
|      | Insert options such as at beginning, end, cursor, or replacement selection |
|      | Edit/add/remove waveform points via table                                  |
| Math | Synchronize and un-synchronize editing of dual-channel waveform            |
|      | Addition   |
|      | Subtraction  |
|      | Multiplication   |
|      | Math operation with waveform library                                       |
|      | Math operation with constants  |
|      | Math operation with clipboard  |

### Sequencing (Pro version only)

|   |                               |
|---|-------------------------------|
| Waveform generators that support sequencing | Drag/drop sequence thumbnails |
|   | Sequence editing via grid     |
|   | Simple undo/redo support      |
|   | Samples information           |
|   | Time duration                 |
|   | Scrolling                     |
|   | Repeat                        |
|   | Create and save sequence      |
| Send and play sequence                      |                               |

## Common math operations (Single and dual-channel)

|                              |  |
|------------------------------|--|
| Math                         | Clip   |
|                              | Absolute   |
|                              | Invert   |
|                              | Mirror   |
|                              | Resize   |
|                              | Shift/rotate -> horizontal   |
|                              | Normalize waveform   |
|                              | Trim   |
|                              | Scale  |
|                              | Re-sampling of waveform (sinc, linear, add points with zero amplitude) |
|                              | Filters (Pro version only)   |
|                              | High pass (F)  |
|                              | Band pass (F,F)  |
|                              | Low pass (second order) (F)  |
|                              | Raised cosine  |
|                              | Root-raised cosine   |
|                              | Butterworth  |
|                              | Chebyshev  |
|                              | Bessel   |
|                              | Elliptical   |
|                              | User FIR (16 coefficients)   |
| Windowing (Pro version only) | Hann   |
|                              | Hamming  |
|                              | Rectangular (uniform)  |
|                              | Triangular   |
|                              | Smooth (circular)  |
|                              | Gaussian   |
|                              | Blackman   |
|                              | Flat top   |

## Equation editor

|                      |   |
|----------------------|---|
|                      | Build equations to create more advanced waveforms   |
| Arithmetic operators | + , - , * , / , x <sup>y</sup> , ( , )  |
| Function library     | ABS, ARCTAN, COS, EXP, FACT, LN, NOISE (uniform), NOISE (normal), POINT, SIN, SQRT, STEP, TAN |

## View operations

|         |  |
|---------|--|
| View    | View individual data points/connect dots                     |
|         | Panoramic view   |
|         | Time scale   |
|         | Scrolling  |
|         | Flexibility in editing the application display properties    |
|         | View FFT of waveform   |
|         | View CCDF of waveform  |
|         | View constellation (X vs. Y) of waveform                     |
| Edit    | Set total samples/total time duration/sampling rate          |
|         | Freehand draw  |
|         | Line draw  |
| Zooming | Point draw (with interpolation as linear, smooth, staircase) |
|         | Horizontal zoom  |
|         | Vertical zoom  |
|         | Area zoom  |
|         | Zoom out   |
|         | Zoom with mouse wheel  |

# Waveform Creation Examples

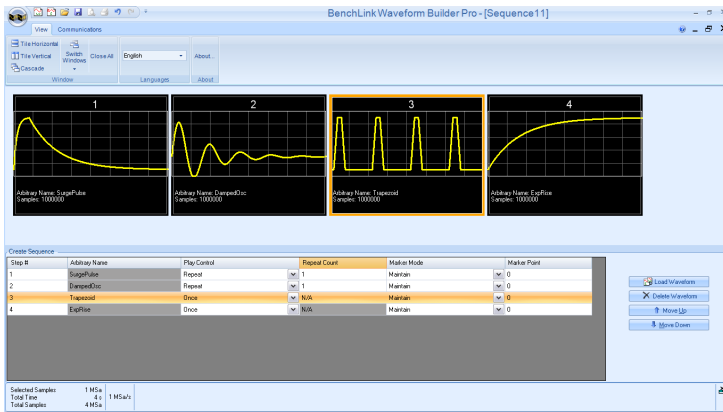


Figure 2.  
**Arbitrary Waveform Sequences:** Use the Waveform Sequence Tool to create longer custom waveforms by linking multiple waveforms together.

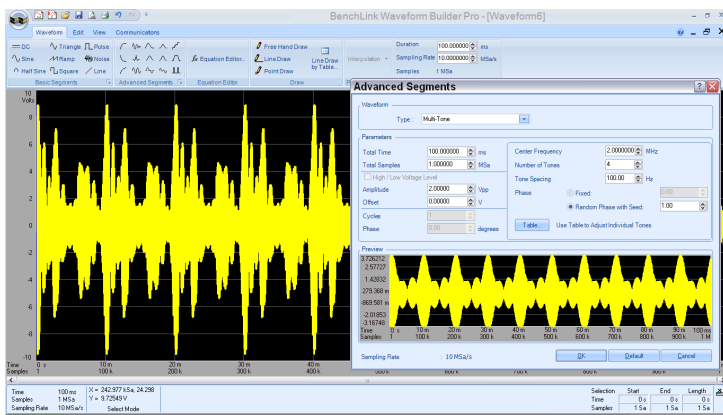


Figure 3.  
**Multi-tone Signals:** Use the Multi-tone Segment Tool to create a multi-tone signal, up to 64 tones, to analyze a communications device.

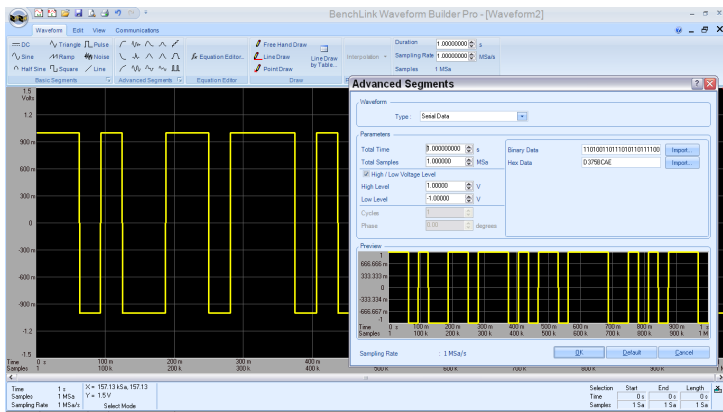


Figure 4.  
**Serial Data Stream:** Use the Serial Data Segment Tool to create a digital bit stream to simulate the data flow of a serial link in your device.

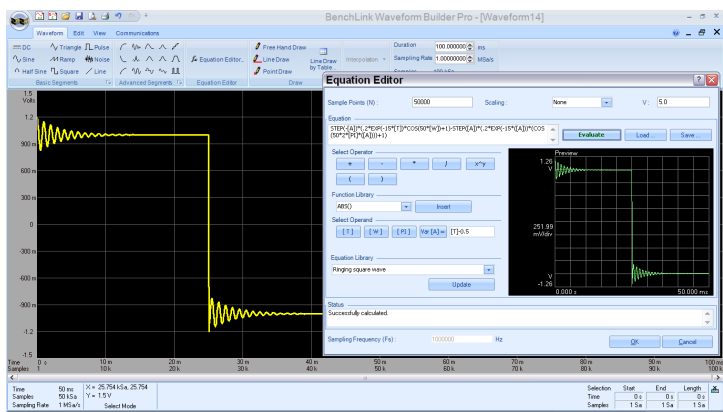


Figure 5.  
**Equation Editor:** Use the Equation Editor Tool to create more advanced waveforms by writing equations that simulate your specific applications.

## Comparing BenchLink Waveform Builder Basic and Waveform Builder Pro

Table 2. Functionality comparison between BenchLink Waveform Builder Pro versus Basic

| Features                             | Waveform Builder Basic | Waveform Builder Pro |
|--------------------------------------|------------------------|----------------------|
| Basic waveform library               | √                      | √                    |
| Cut, copy, paste with Excel          | √                      | √                    |
| Waveform math                        | √                      | √                    |
| Free hand                            | √                      | √                    |
| Line draw                            | √                      | √                    |
| Advanced waveform library            |                        | √                    |
| Equation editor                      |                        | √                    |
| Point draw                           |                        | √                    |
| FFT, CCDF, and constellation diagram |                        | √                    |
| Filters                              |                        | √                    |
| Windowing functions                  |                        | √                    |
| Dual-channel operation               |                        | √                    |

### Supported waveform generators and oscilloscopes

The BenchLink Waveform Builder Pro software supports the following Keysight waveform generators:

- 33210A, 33220A, 33250A function/arbitrary waveform generators
- 33500 Series, 33600 Series waveform generators
- 81150A, 81160A, 81180A pulse/function/arbitrary noise generators
- M8190A arbitrary waveform generator
- 2000 X-Series
- DSO/MSO-X InfiniiVision 3000, 4000 X-Series oscilloscopes
- 3000 T-Series
- U2761A USB modular function generator

### Compatible software

Keysight's BenchVue software can be used with Waveform Builder Pro software. Create signals using Waveform Builder Pro, then use BenchVue to control the waveform generator signal outputs, modulation, and other parameters. These two software tools are built to work together for a more complete solution for controlling your waveform generator <sup>1</sup>.

1. BenchVue has different supported instrument models than Waveform Builder Pro. Please see [www.keysight.com/find/BenchVueInstruments](http://www.keysight.com/find/BenchVueInstruments) for the latest list of BenchVue supported instruments.



# Comparing BenchLink Waveform Builder Basic and Waveform Builder Pro (Continued)

## Instrument connectivity

- Keysight I/O support
- National instruments I/O support

## Supported interfaces

- USB
- LAN
- GPIB

## File operations for signal and dual channel waveforms (both open and save files)

File format:

- IntuiLink (.wvf)
- CSV (.csv)
- Binary
- Text (.txt)
- 33500 Series ASCII (.arb)
- 33500 Series binary (.barb)
- 33500 Series sequence (.seq)
- 33600 Series ASCII (.arb)
- 33600 Series binary (.barb)
- 33600 Series sequence (.seq)
- 81100 Series sequence (.dseq)
- Dual-channel operation

## System and Ordering Information

### System and installation requirements

| System  | Installation requirements  |
|---|--|
| Operating system  | Windows 7 Pro, Windows Vista (64- and 32-bit)  |
| Processor   | Recommend Intel CORE™, Minimum Pentium 5   |
| RAM   | Recommend 3 GB or greater  |
| Disk space  | Recommend 300 MB, min 200 MB   |
| Display   | 1024 x 768 resolution, 256 colors  |
| PC administrator access   | Must login PC with a user password or have administrative access (soft-ware does not run in "guest mode")  |
| Keysight IO Libraries version 17.2 or later installed on your machine | The IO libraries are included with instrument on CD or can be downloaded from the ADN web site: <a href="http://www.keysight.com/find/adn">www.keysight.com/find/adn</a> |
| 33521A, 33522A models   | Firmware revision 1.12 or greater  |

### Ordering options and licensing information

| Model number | Product name                            |
|--------------|---|
| 33503A       | BenchLink Waveform Builder Pro software |

1. Order the software and download directly from the Keysight web site for immediate use.
2. Order CD containing the software from the Keysight web site and it will be shipped to you.

To order your copy or download a free 30-day trial version and start gaining insights into your measurements today, visit [www.keysight.com/find/33503](http://www.keysight.com/find/33503).

The free 30-day demo version of the BenchLink Waveform Builder Pro Software is the fully functional Pro version. After the 30-day trial period the full version of the software will revert to the basic free version. If you choose to continue to utilize the full Pro version, you may purchase a license and retain the Pro version's full functionality and benefits.

Ihr Spezialist für  
Mess- und Prüfgeräte



# MESSBAR MEHR AUSWAHL.

MIT AKTUELLEN PREISEN, PRODUKTHIGHLIGHTS UND ZUBEHÖR.  
DER B2B-ONLINESHOP.



**STARKE MARKEN. HÖCHSTE PRODUKTVIELFALT. BESTE QUALITÄT.**

Schnell und bequem online bestellen – bei dataTec ist das möglich. Bei uns finden Sie die perfekte Lösung für ihre vielfältigen Anforderungen.

Wir bieten eine **unschlagbare Auswahl** an Mess- und Prüfgeräten namhafter Hersteller. Diese reicht von Arbiträr-Funktionsgeneratoren über Logikanalysatoren bis hin zu Stromversorgungen und Stromzangen oder **Oszilloskopen bis 90 GHz Bandbreite**. Hohe Lagerkapazität und kurze Wege sorgen dafür, dass die gewünschte Ware ganz schnell bei Ihnen ist. Bundesweit meist innerhalb eines Tages.

**Mehr Klicks, mehr Vorteile:**

- Mehrere tausend Mess- und Prüfgeräte
- Tagesaktuelle Preise und Promotions
- Warenkorbrabatt bei Onlinebestellung
- Versandkostenfrei (ab € 80,-)
- Datenblatt-Download
- uvm.

Angebotsanfrage oder Bestellung unter:

**[www.datatec.de](http://www.datatec.de)**



Ihr Spezialist für  
Mess- und Prüfgeräte



# MESSBAR MEHR BERATUNG.

**KOSTENLOS UND UNVERBINDLICH, AM TELEFON ODER VOR ORT.  
DIE TECHNISCHEN EXPERTEN.**



## **KOMPETENTE BERATUNG VOR UND NACH DEM KAUF.**

Haben Sie eine technische Frage zu den Geräten, zum Handling und Bedienung eines Gerätes, zur passenden Software und / oder bei der Auswahl des richtigen Equipments für Ihre Messaufgabe?

Bei uns kümmern sich echte Diplom-Ingenieure, Elektronik- und Elektrotechniker mit **langjähriger Praxiserfahrung** und hoher Kompetenz um Ihr Anliegen. **Kostenlos** berät Sie unser praxiserfahrener und herstellertestifizierter Außendienst direkt **bei Ihnen vor Ort** und / oder führt Ihnen live das gewünschte Mess- und Prüfgerät vor.

### **Die technischen Experten für:**

- Oszilloskope
- Spektrum- / Netzwerkanalysatoren
- Netzgeräte / Stromversorgungen
- Thermografie / Temperatur
- Prüfgeräte VDE / Netzanalyse
- uvm.

Technische Frage oder Termin vereinbaren unter:

# 07121 / 51 50 50

