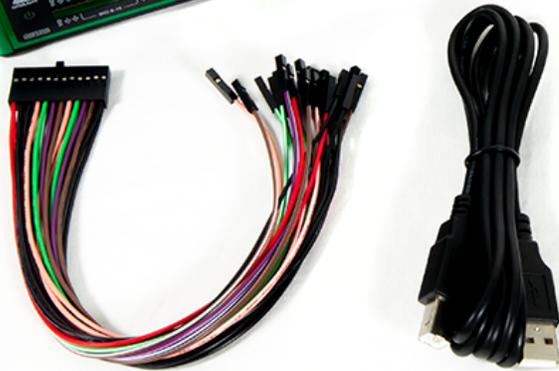


# Analog Discovery Pro (ADP3450/ADP3250) Reference Manual

---







WaveForms (new workspace)

Workspace Control Settings Window Help

Welcome Help Wavegen 1

File Control Edit Window

Stop All Channels No synchronization

Channel 1 (Wavegen Out 1)

Stop Enable Sweep Idle: Offset

Type: Sine

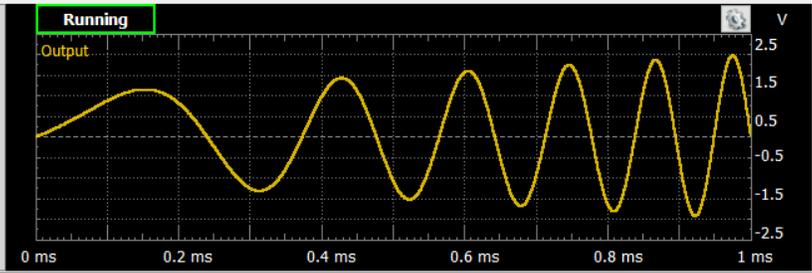
Frequency: 1 kHz Sweep to 10 kHz in 1 ms

Amplitude: 1 V Damp to 2 V in 1 ms

Offset: 0 V

Symmetry: 50 %

Phase: 0 °



Channel 2 (Wavegen Out 2)

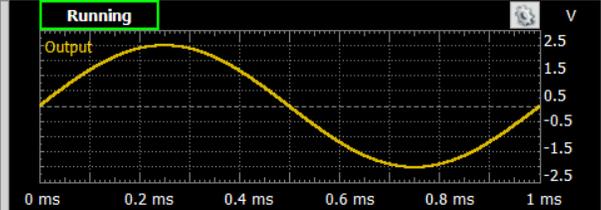
Stop Enable Basic Idle: Offset

Frequency: 1 kHz Max: 31.25 MHz Min: 1 uHz

Amplitude: 2 V Max: 5 V Min: 0 V

Offset: 0 V Max: 5 V Min: -5 V

Symmetry: 50 % Max: 100 % Min: 0 %



Manual Trigger ADP3450 SN:210018AFF318 USB:ST Status: OK

WaveForms (new workspace)

Workspace Control Settings Window Help

Welcome Help Supplies

File Control Window

Digital Voltage

Voltage: 3.3 V 1.2 V 1.5 V 1.8 V 2.5 V 3.3 V

Threshold: 1.3 V 775 mV 850 mV 925 mV 1.1 V 1.3 V

✔ Digital Supply (VIO) is On

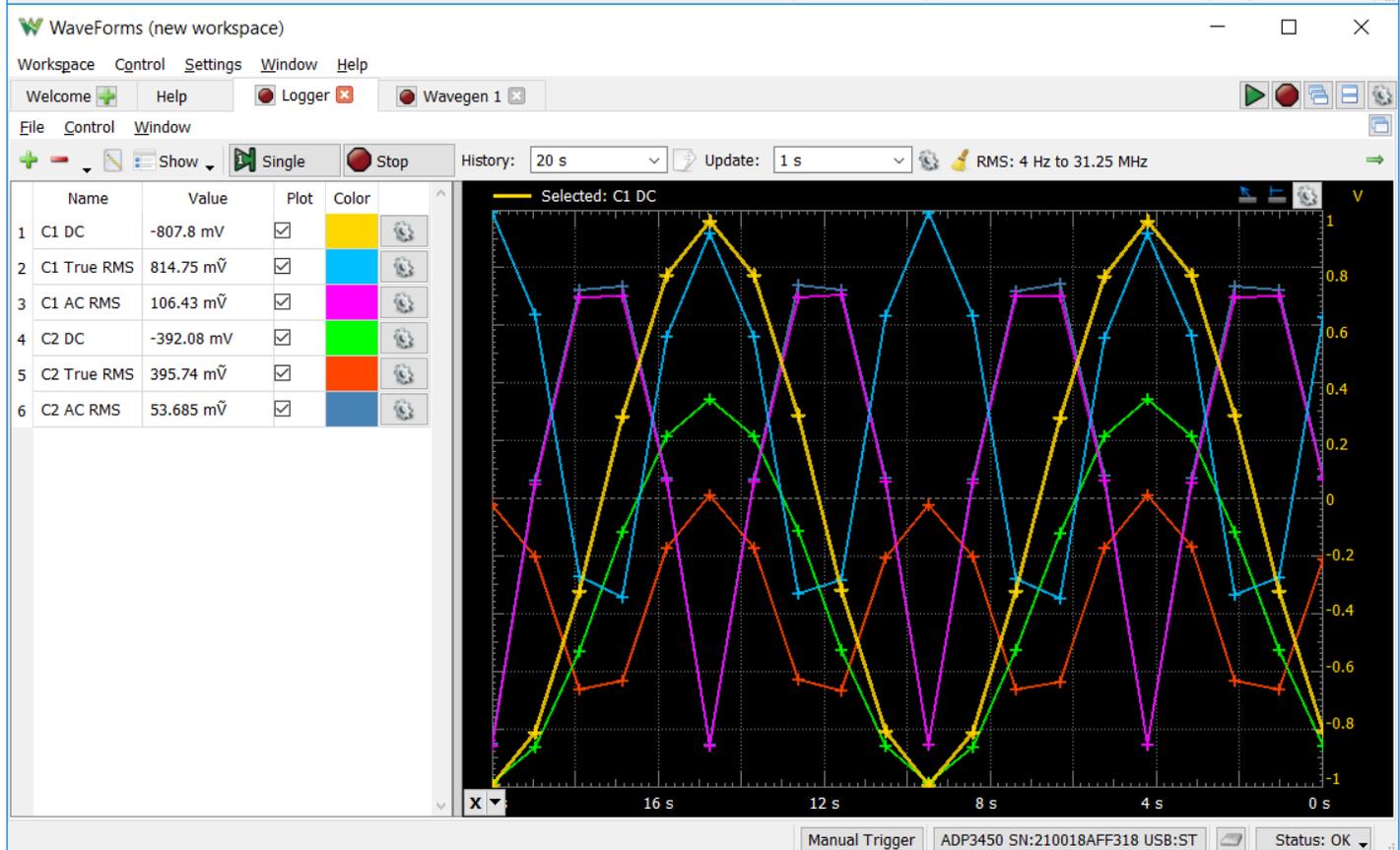
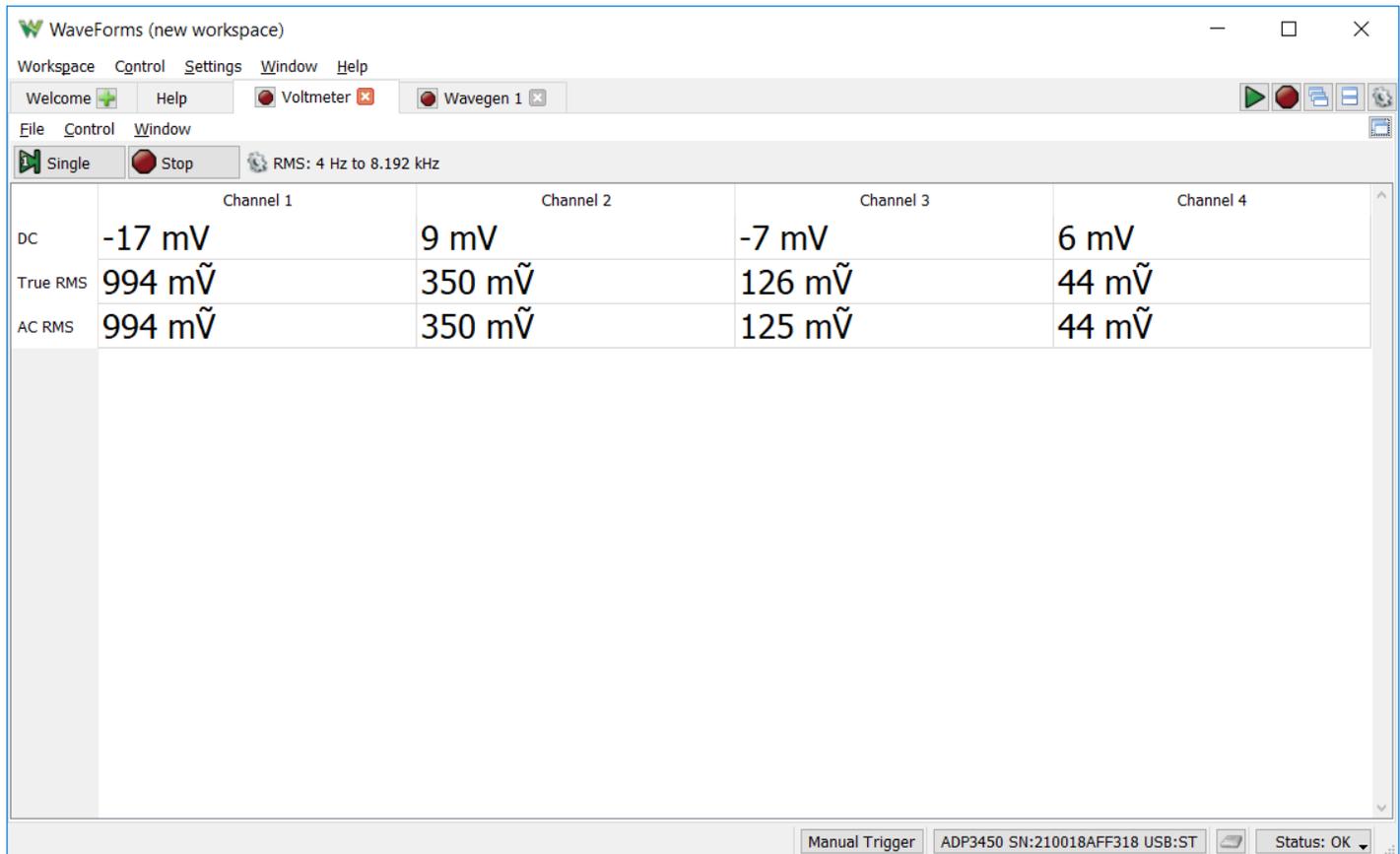
Digital IO pulls

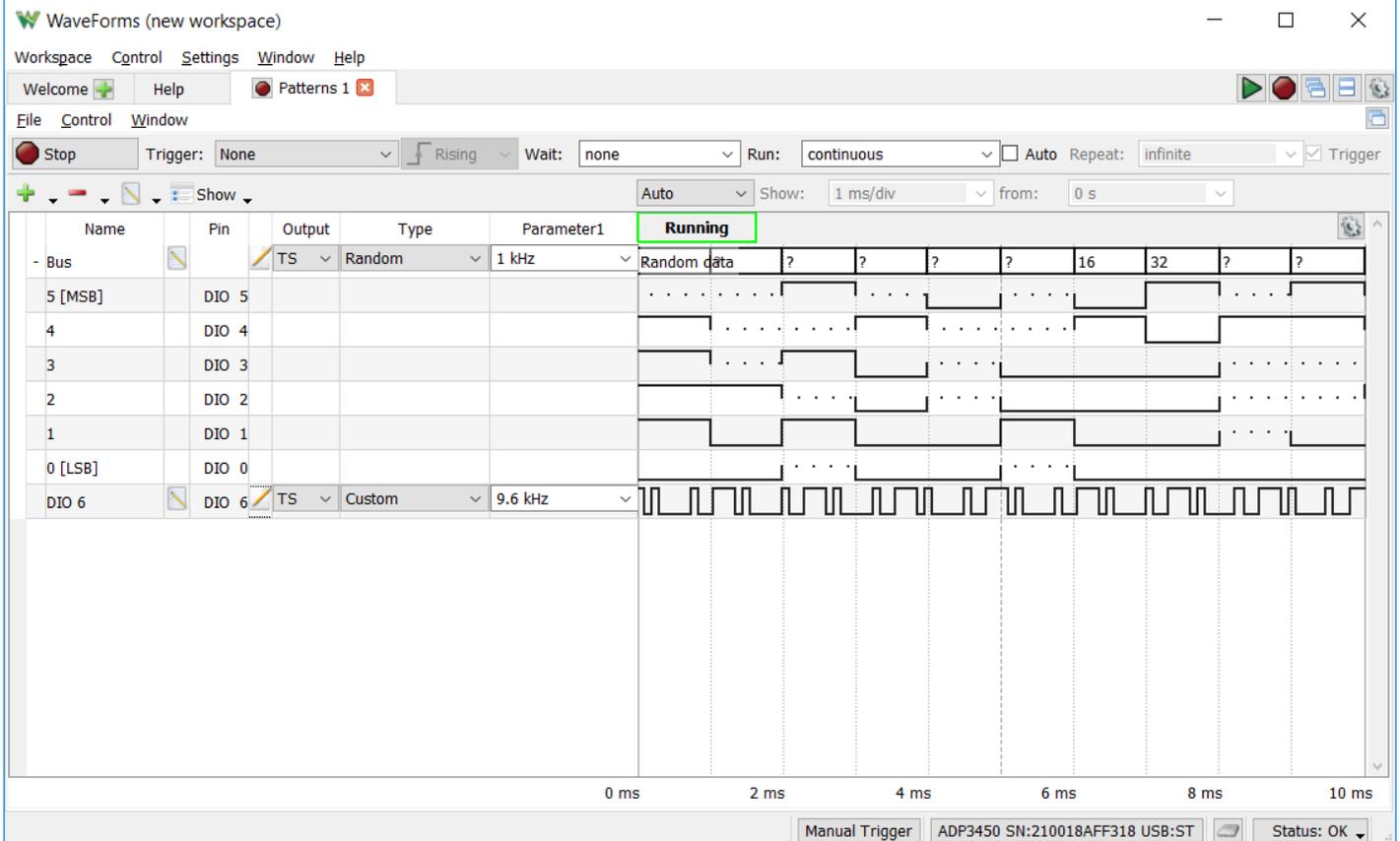
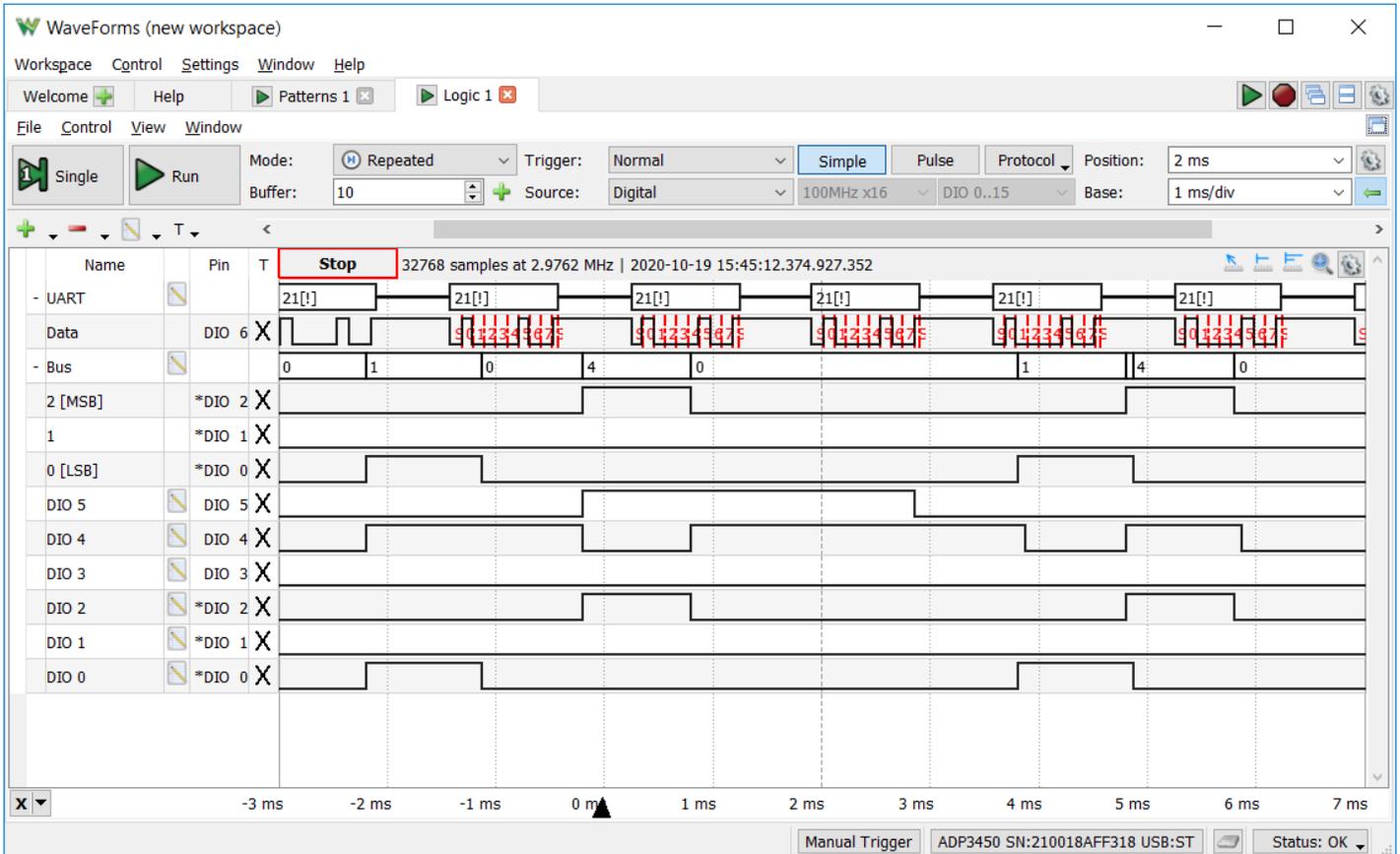
All Up	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
All Float	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
All Down	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
DIO:	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

System Monitor

Script: Supplies.Output.DigitalVoltage.Voltage.text/value

Manual Trigger ADP3450 SN:210018AFF318 USB:ST Status: OK





WaveForms (new workspace)

Workspace Control Settings Window Help

Welcome Help StaticIO

File Control View Window

DIO 15-8

15 14 13 12 11 10 9 8

0/1 0/Z - 1 - Z - 0 - 1 - Z - 0

DIO 7-0

0 5 6 1 4 3 2 7

Script: StaticIO.Channel1.DIO13.value/text

Manual Trigger ADP3450 SN:210018AFF318 USB:ST Status: OK

WaveForms (new workspace)

Workspace Control Settings Window Help

Welcome Help Spectrum 1 Wavegen 1

File Control View Window

Single Stop Freq. Range: Auto Start: 2 kHz Stop: 8 kHz

Running T1 T2 T3 T4 Scope: 16.001 kHz 18.5%

dBV

0 -16 -32 -48 -64 -80 -96 -112 -128 -144 -160

2 kHz 2.6 kHz 3.2 kHz 3.8 kHz 4.4 kHz 5 kHz 5.6 kHz 6.2 kHz 6.8 kHz 7.4 kHz 8 kHz

Trace 1: C1 2.163 Vpk2pk  
Trace 2: C2 2.182 Vpk2pk  
Trace 3: C3 2.174 Vpk2pk  
Trace 4: C4 2.19 Vpk2pk

Magnitude  
Units: dBV  
Top: 0 dBV  
Bottom: -160 dBV  
Reference: 1 V

Range: 2 V

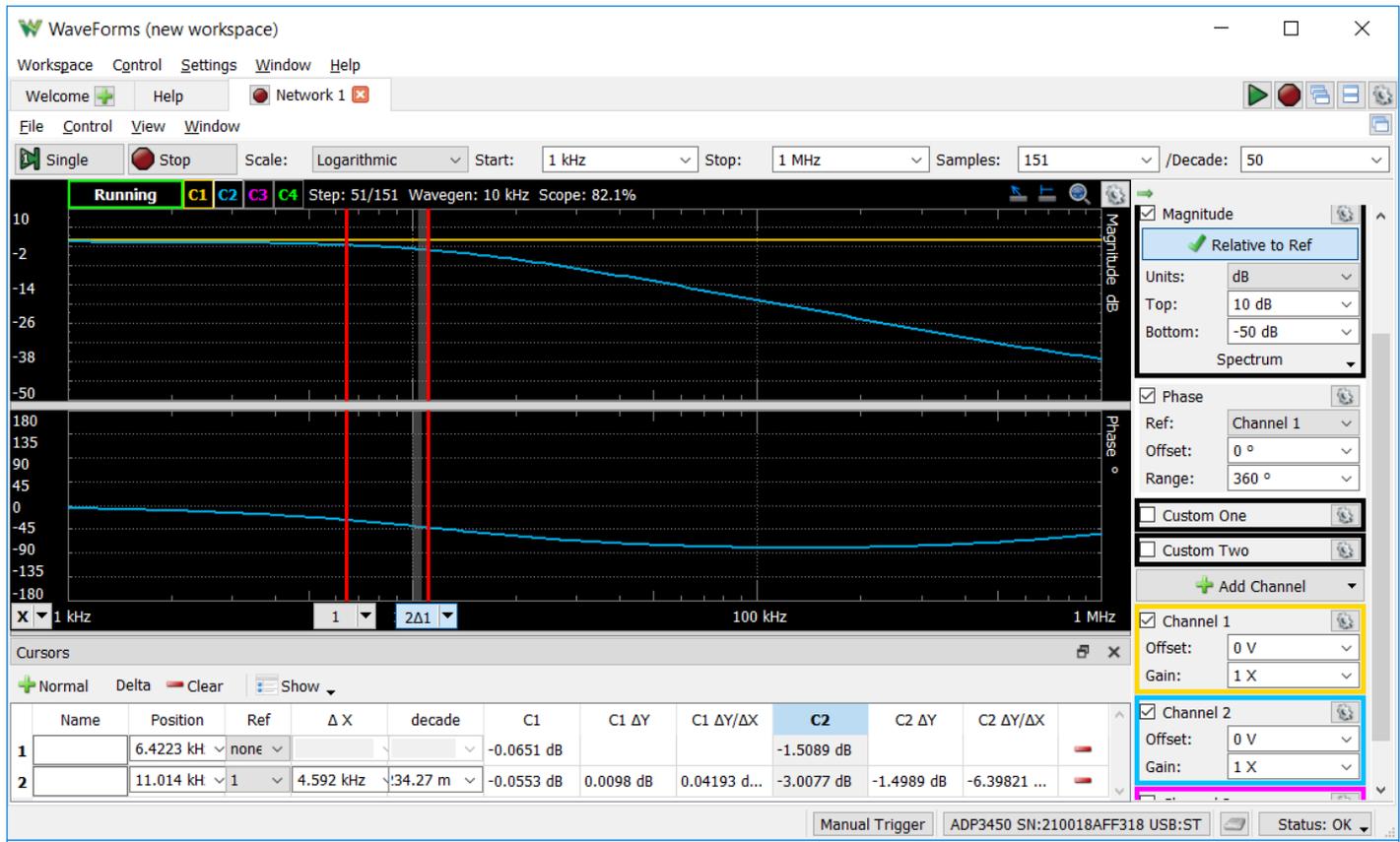
Channel options  
+ Add Trace

Trace 1  
Channel: C1  
Type: Sample  
Count: 100

Trace 2  
Channel: C2  
Type: Sample  
Count: 100

Trace 3  
Channel: C3

Manual Trigger ADP3450 SN:210018AFF318 USB:ST Status: OK



WaveForms (new workspace)

Workspace Control Settings Window Help

Welcome Help Protocol

File Control View Window

UART SPI I2C CAN AVR Logic Analyzer

Settings

Select: DIO 0 Active: Low Frequency: 100 kHz DQ0: DIO 2 DQ2: DIO 4 First bit: MSBit

Clock: DIO 1 Polarity: 0 Phase: 0 DQ1: DIO 3 DQ3: DIO 5 First word: LSWord

Spy Master Custom Sensor

Execute Script Options Example

```
// Pmod SF2 - Flash P5Q - Dual Input Fast Program - Bit-Alterable Write
var cbPage = 64;
var cbSector = 131072;
var cbFlash = 16772216;

Select.Active.value = 0;
Clock.Polarity.value = 0;
Clock.Phase.value = 0;
if(Clock.Frequency.value > 25e6) Clock.Frequency.value = 25e6;

function waitprogress(){
  Start();
  Write(8, 0x05); // Read Status Register
  while(wait()){
    var status = Read(8, 1);
    if((status&1) == 0){ // Write in progress bit?
      break;
    }
  }
  Stop();
}
```

Manual Trigger ADP3450 SN:210018AFF318 USB:ST Status: OK

WaveForms (new workspace)

Workspace Control Settings Window Help

Welcome Help Script

File Edit Control View Window

Debug Run Stop Abort Clear Example

Find: Previous Next Replace Skip Replace All All Files

file 1 file 2

```
if(!('Wavegen' in this)) throw "Please open a Wavegen instrument";

const notes = ["C", "C#", "D", "D#", "E", "F", "F#", "G", "G#", "A", "A#", "B"];
const octaveUp = 2; // how many octaves are reserved upward
const rhythm = 6; // 6 Hz notes/second
const damping = 0.9; // 90 % damping factor during one pause step

// Decodes notes and configures the Wavegen to play the given song using FM/AM (amplitude/frequency modulation).
// Expected signs: CC#DD#.. notes, space pause, vertical line | pauses, plus or minus change octave up or down.
function play(text){
  var rgFM = []; // FM array
  var rgAM = []; // AM array
  var fm = 1; // frequency modulation
  var am = 1; // amplitude modulation, damping
  var octave = -octaveUp; // initial octave
  var pause = 0;
  // process text input to fill AM/FM buffers
  for(var i = 0; i < text.length; i++){

    if(pause>0){ // earlier pause did not expire
      pause--;
      i--;
      am *= damping; // damping by amplitude modulation
    }
  }
}
```

Output

Manual Trigger ADP3450 SN:210018AFF318 USB:ST Status: OK

Oscilloscope



The Analog Discovery Pro (ADP3450/ADP3250) can be used with WaveForms' Oscilloscope instrument to capture analog data via the 4 analog input ("Scope") channels using BNC probes.

Since the Analog Discovery Pro's analog input channels are shared, the Oscilloscope instrument cannot be used at the same time as the Voltmeter, Data Logger, Spectrum Analyzer, Network Analyzer, or Impedance Analyzer instruments.

For more information on the analog input ("Scope") channels, please visit the [Analog Discovery Pro \(ADP3450/ADP3250\) Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>). For a walkthrough of the different features of WaveForms' Oscilloscope instrument, please visit the [Using the Oscilloscope](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-oscilloscope) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-oscilloscope>) guide.

## Features

- Triggering: edge, pulse, transition, hysteresis, and many others
- Cross-triggering with Logic Analyzer, Waveform Generator, Pattern Generator, or external trigger
- Sampling modes: average, decimate, min/max
- Mixed signal visualization (analog and digital signals share same view pane)
- Real-time views: FFTs, XY plots, histograms, spectrograms, and others
- Multiple math channels with complex functions
- Cursors with advanced data measurements
- Captured data files can be exported in standard formats
- Scope configurations can be saved, exported, and imported

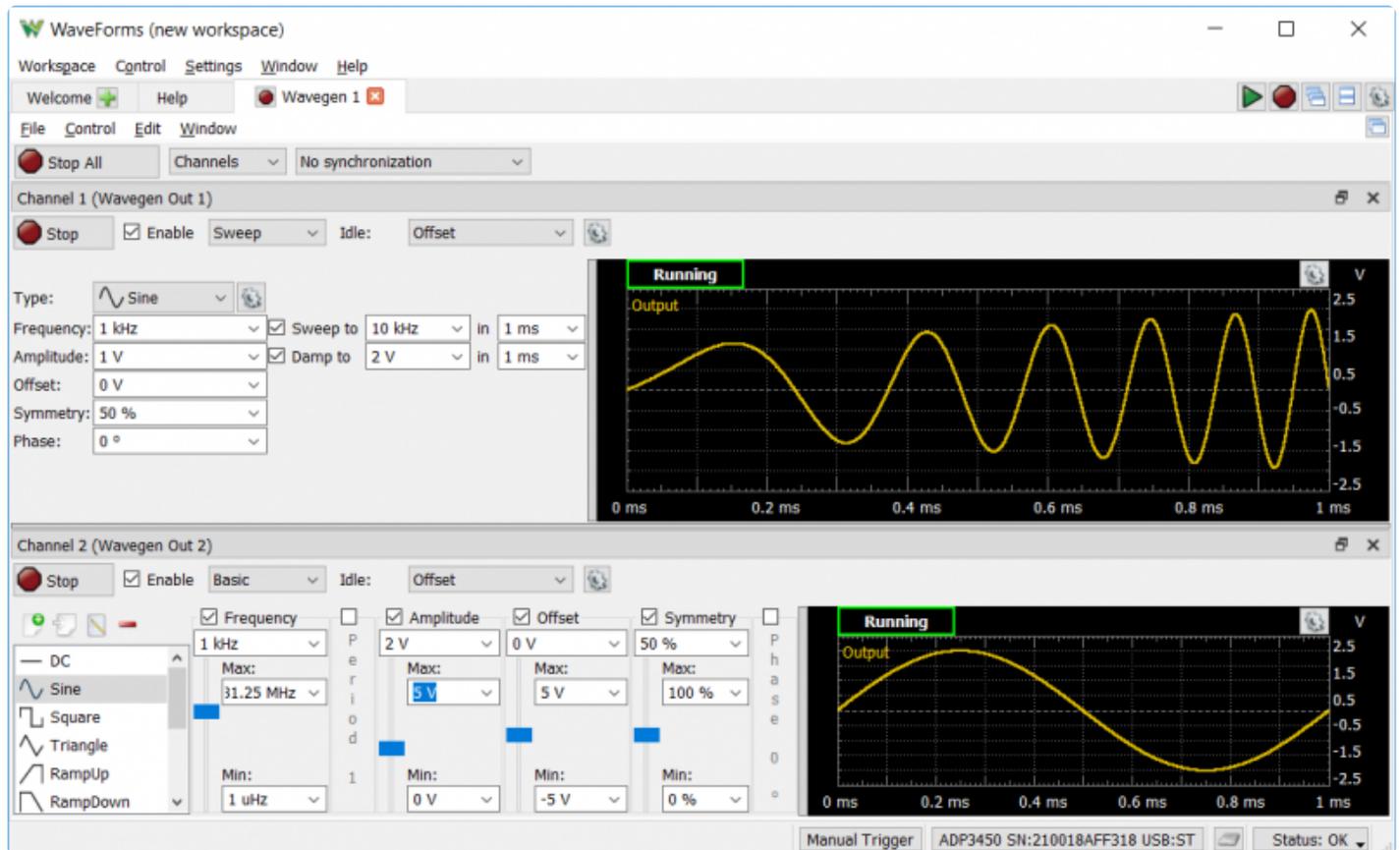
### Important Note: Grounding Circuitry

The Analog Discovery Pro (ADP3450/ADP3250)'s GND reference is connected to the USB GND. Depending on the PC powering scheme, and other PC connections (Ethernet, audio, etc. – which might also be grounded) the Analog Discovery Pro's GND reference might be connected to the whole GND system and ultimately to the power network protection (earth ground). The circuit under test might also be connected to earth or possibly floating.

For safety reasons, it is the user's responsibility to understand the powering and grounding scheme, and to make sure that there is a common GND reference between the Analog Discovery Pro and the circuit under test, and that the common mode and differential voltages do not exceed specifications. Furthermore, for distortion-free measurements, the common

mode and differential voltages need to meet specifications.

## Waveform Generator



The Analog Discovery Pro (ADP3450/ADP3250) can be used with WaveForms' Waveform Generator instrument to output analog voltage waves via BNC cables. The Waveform Generator converts 14-bit digital samples to analog at a rate of up to 100 MS/s on each of the two channels. When the Waveform Generator instrument is used, the Analog Discovery Pro's analog output channels act as an Arbitrary Waveform Generator. The instrument supports everything from simple waveforms like Sine and Triangle waves, up to more complicated functions like AM and FM modulation. Custom sets of samples can be defined by the user in applications like Excel and imported to WaveForms.

Each waveform generator channel is considered a single ended pin, however, a connected circuit must share a ground with the Analog Discovery Pro. Each channel has a bandwidth of >15MHz through the BNC connectors. AC amplitudes of +5V and DC offsets of +5V are supported.

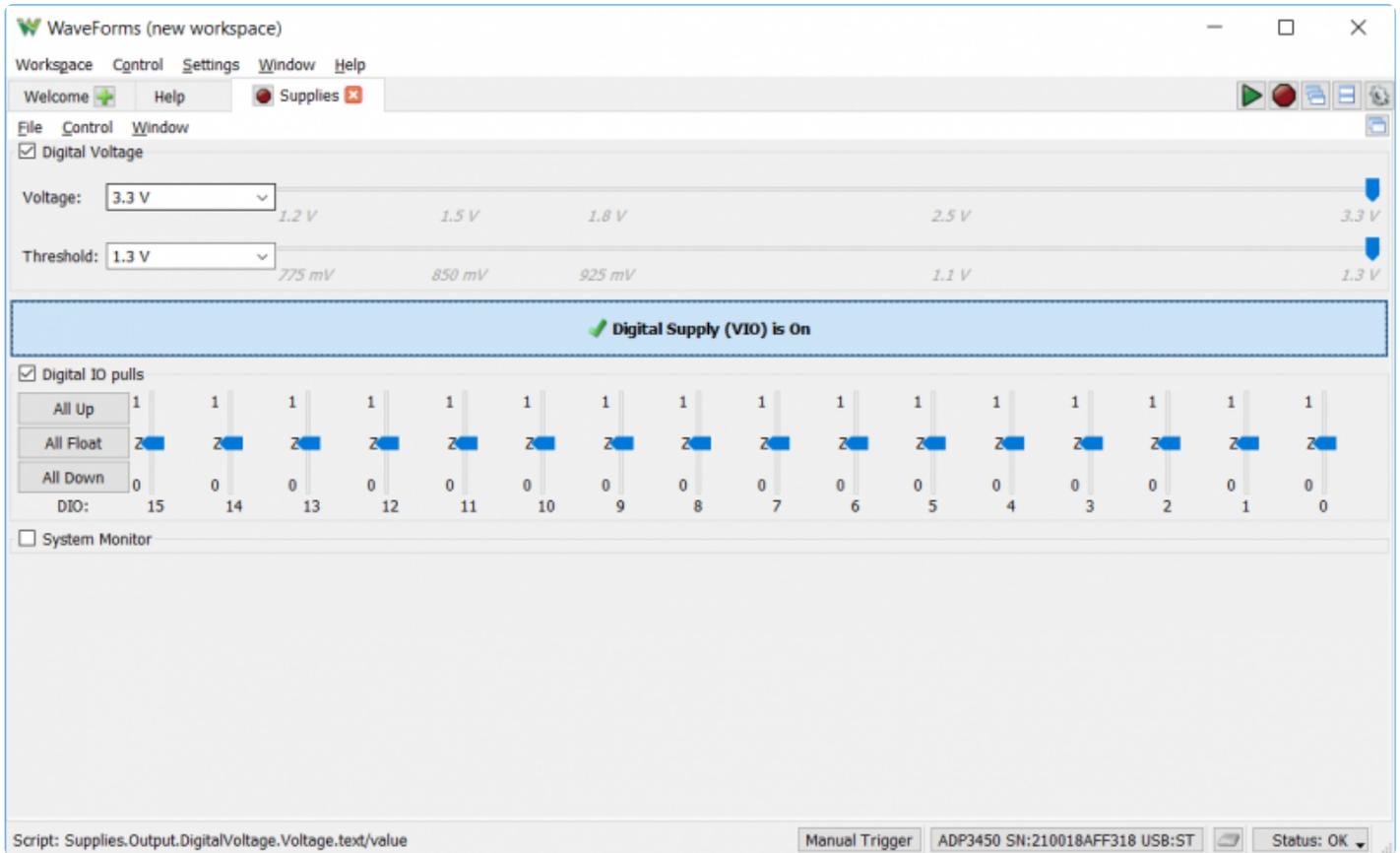
Since the Analog Discovery Pro's analog output channels are shared, the Waveform Generator instrument cannot be used at the same time as the Network Analyzer, or Impedance Analyzer instruments.

For more information on the analog output ("Wavegen") channels, please visit the [Analog Discovery Pro \(ADP3450/ADP3250\) Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>). For a walkthrough of the different features of WaveForms' Waveform Generator instrument, please visit the [Using the Waveform Generator](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-waveform-generator) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-waveform-generator>) guide.

## Features

- Standard waveforms: sine, triangle, sawtooth, noise, and many others
- Advanced waveforms: Sweeps, AM, FM
- User-defined arbitrary waveforms: defined within WaveForms software user interface or using standard tools (e.g. Excel)

# Power Supplies



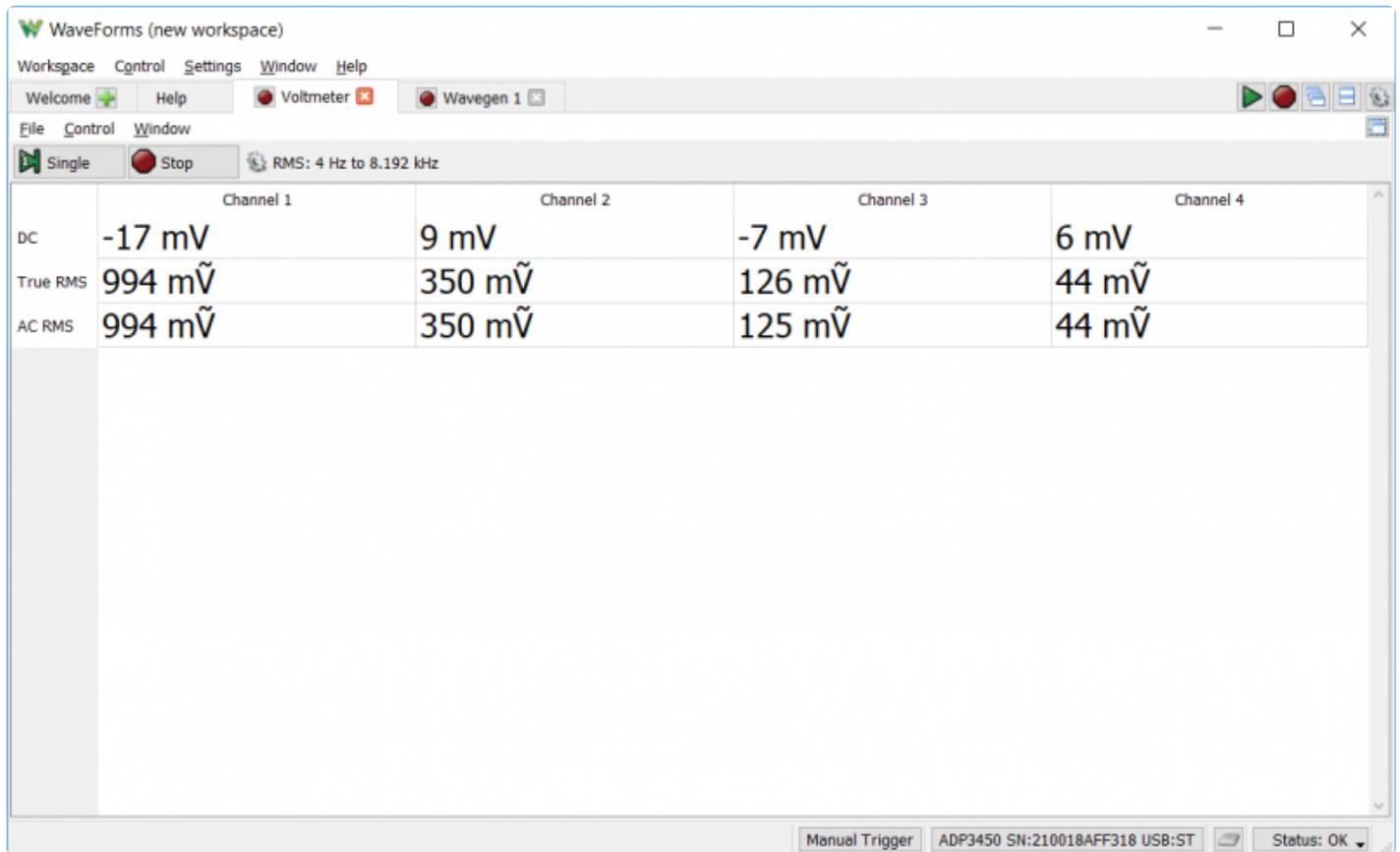
The Analog Discovery Pro (ADP3450/ADP3250) has one programmable Digital Voltage Supply, which can supply between 1.2V and 3.3V, through the Power Supplies (“Supplies”) instrument. The Digital I/O Pulls are also configured through the Power Supply instrument, where each digital I/O channel can be individually set to Up, Float or Down.

For more information on using the programmable power supplies, please visit the [Analog Discovery Pro \(ADP3450/ADP3250\) Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>). For a walkthrough of the different features of WaveForms' Power Supplies instrument, please visit the [Using the Power Supplies](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-supplies) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-supplies>) guide.

## Features

- Programmable power supply (1.2V...3.3V)
- Up to 300mA output current

## Voltmeter



The Analog Discovery Pro (ADP3450/ADP3250)'s analog inputs can be used with WaveForms' Voltmeter instrument to act as a simple 4 channel voltmeter. DC voltages, AC RMS voltages, and True RMS voltages can be viewed for each Scope channel.

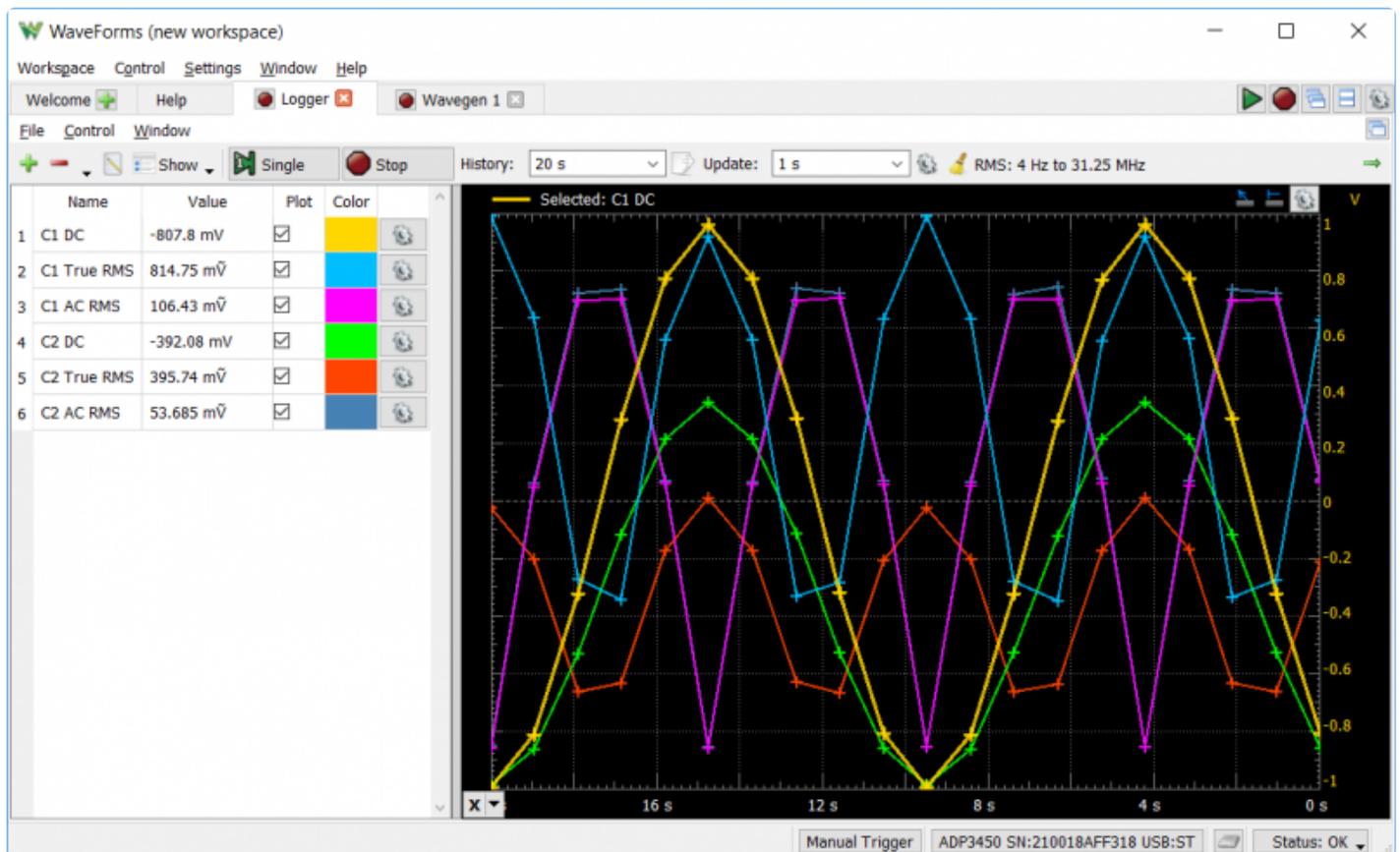
Since the Analog Discovery Pro's analog input channels are shared, the Voltmeter instrument cannot be used at the same time as the Oscilloscope, Data Logger, Spectrum Analyzer, Network Analyzer, or Impedance Analyzer instruments.

For more information on the analog input (“Scope”) channels, please visit the [Analog Discovery Pro \(ADP3450/ADP3250\) Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>). For a walkthrough of the different features of WaveForms' Voltmeter instrument, please visit the [Using the Voltmeter](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-voltmeter) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-voltmeter>) guide.

## Features

- Measurements: DC, AC RMS, True RMS

## Data Logger



The Analog Discovery Pro (ADP3450/ADP3250) can be used with WaveForms' "Logger" instrument in order to capture large buffers of analog input data on the 4 Scope channels.

The Data Logger can capture buffers of data at update rates of up to 10 samples per second. The maximum duration of a log is dependent on the update rate, but at the extreme, can run for over a thousand hours.

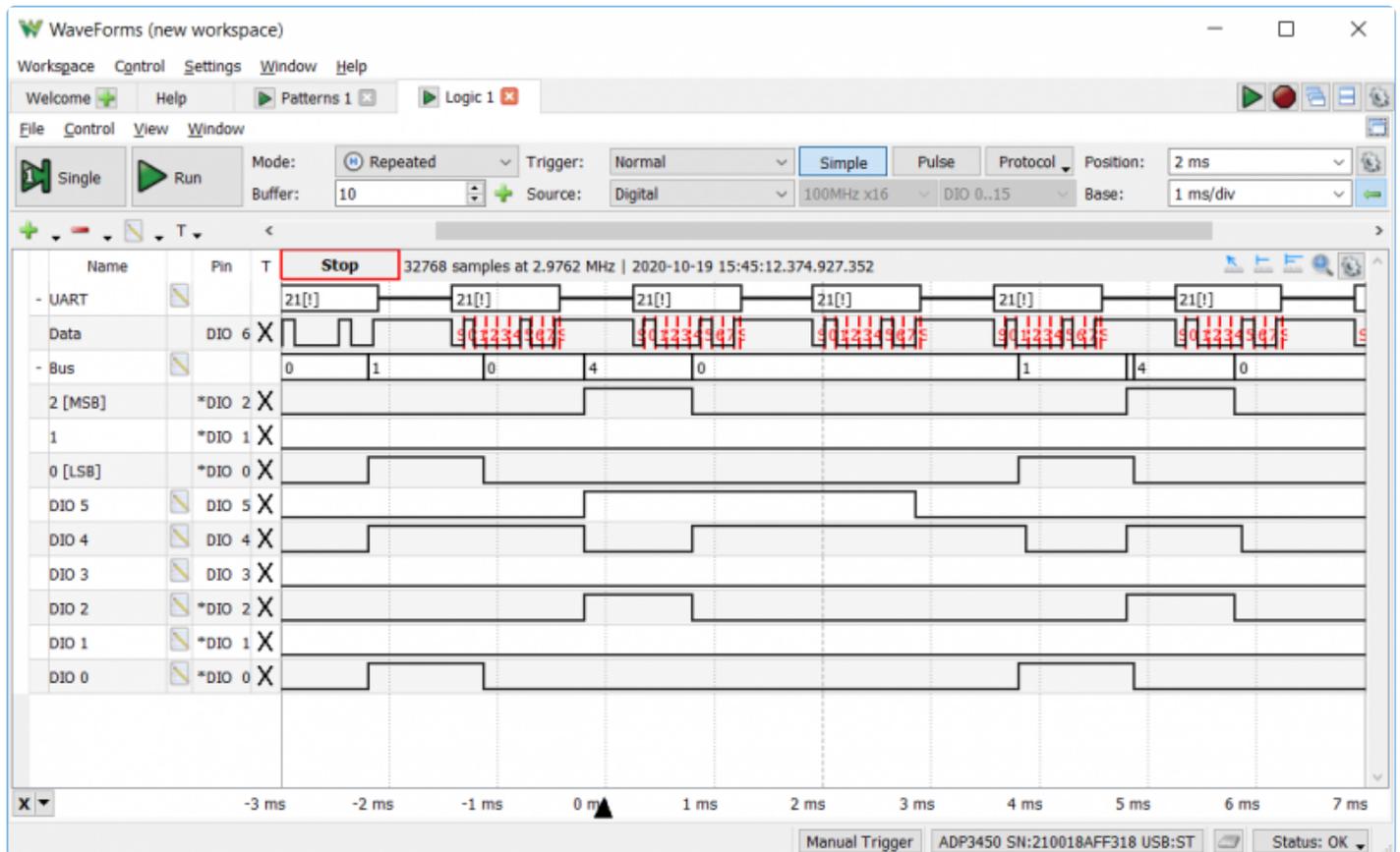
Since the Analog Discovery Pro's analog input channels are shared, the Data Logger instrument cannot be used at the same time as the Oscilloscope, Voltmeter, Spectrum Analyzer, Network Analyzer, or Impedance Analyzer instruments.

For more information on the analog input ("Scope") channels, please visit the [Analog Discovery Pro \(ADP3450/ADP3250\) Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>). For a walkthrough of the different features of WaveForms' Data Logger instrument, please visit the [Using the Data Logger](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-data-logger) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-data-logger>) guide.

## Features

- Measurements: DC, AC RMS, True RMS, with Averages, Minimums, and Maximums
- Up to 24 hours of data logged at a 1Hz sample rate
- Scriptable conversion functions

## Logic Analyzer



The Analog Discovery Pro (ADP3450/ADP3250) can be used with WaveForms' "Logic" instrument to act as a Logic Analyzer. When used this way, the 16 digital input/output channels are configured to capture high/low logic states on connected pins at a sample rate of up to 125 MS/s (). These channels are capable of interfacing with 3.3V and 1.2V logic signals, and when configured as inputs are tolerant of voltages of up to 5V.

Individual input/output channels can be grouped as buses and protocols. Protocol groups can be used to view the decoded contents of packets of many common communications protocols, including SPI, I2C, UART, CAN, and I2S.

Signal states, decoded bus values, and decoded protocols can be used to trigger a Logic Analyzer capture. Protocol triggers include protocol-specific events, like start of transmission, end of transmission, or packet contents matching a value.

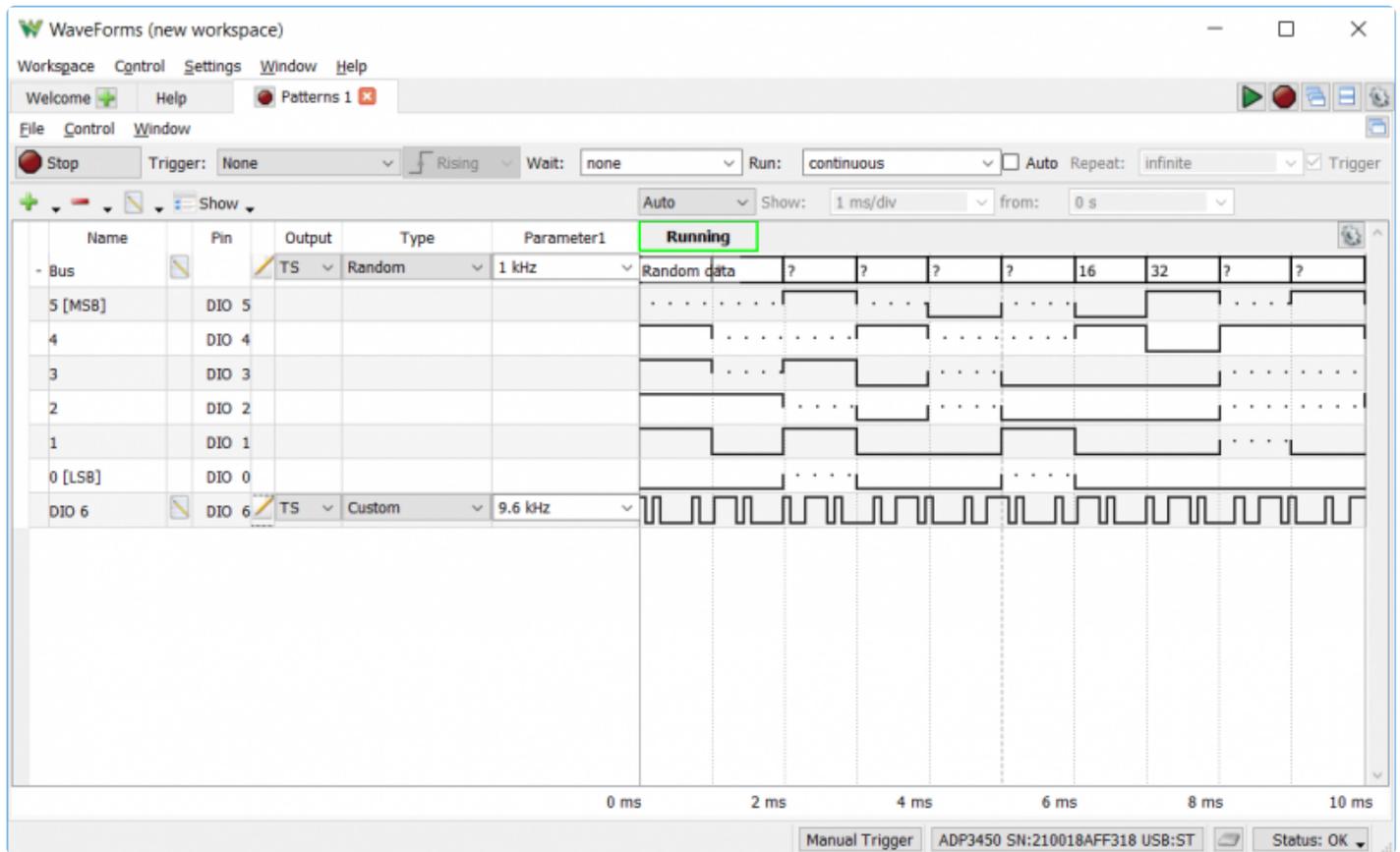
Digital input/output channels used by the Logic Analyzer instrument can still be used by other instruments using the same digital input/output channels.

For more information on the digital input/output channels, please visit the [Analog Discovery Pro \(ADP3450/ADP3250\) Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>). For a walkthrough of the different features of WaveForms' Logic Analyzer instrument, please visit the [Using the Logic Analyzer](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-logic-analyzer) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-logic-analyzer>) guide.

## Features

- Multiple trigger options including pin change, bus pattern, and many others
- Cross-triggering between Analog input channels, Logic Analyzer, Pattern Generator, or external trigger
- Interpreter for SPI, I2C, UART, CAN, I2S, 1-Wire, parallel buses
- Scripted custom protocols
- Data file import/export using standard formats

## Pattern Generator



The Analog Discovery Pro (ADP3450/ADP3250) can be used with WaveForms' "Patterns" instrument to generate logic signal sequences on the digital input/output pins. Each channel can be configured to be push/pull, open drain, open source, or three-state logic and set to generate Clock, pulse, random or custom patterns.

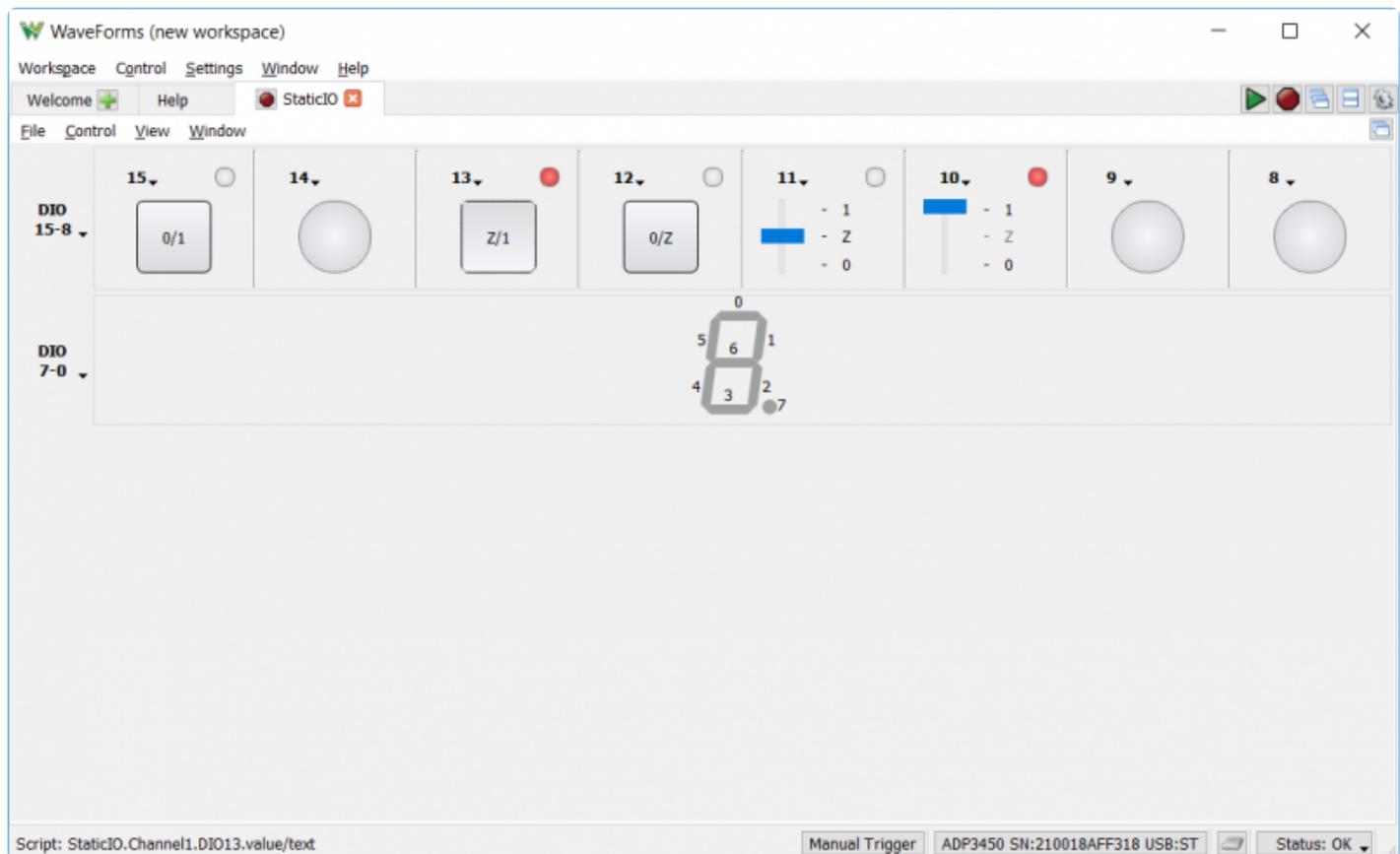
Digital input/output channels used by the Pattern Generator instrument can still be used by other instruments using the same digital input/output channels, however, other instruments can only use these shared channels as inputs.

For more information on the digital input/output channels, please visit the [Analog Discovery Pro \(ADP3450/ADP3250\) Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>). For a walkthrough of the different features of WaveForms' Pattern Generator instrument, please visit the [Using the Pattern Generator](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-pattern-generator) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-pattern-generator>) guide.

## Features

- Customized visualization for signals and buses
- User defined patterns: Truth-table based ROM() logic
- Data file import/export using standard formats

## Static I/O



The Analog Discovery Pro (ADP3450/ADP3250) can be used with WaveForms' Static I/O instrument to emulate a variety of user input/output devices on the digital input/output pins. Virtual LEDs, buttons, switches, sliders, and displays can be assigned to specific digital I/O pins, and interacted with within the WaveForms user interface.

**Important Note:** *To prevent damage to the device, care must be taken not to drive input signals to the digital input/output channels over 5V.*

Digital input/output channels used by the Static I/O instrument can still be used by other instruments using the same digital input/output channels, however, other instruments can only use these shared channels as inputs.

For more information on the digital input/output channels, please visit the [Analog Discovery Pro \(ADP3450/ADP3250\) Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>). For a walkthrough of the different features of WaveForms' Static I/O instrument, please visit the [Using the Static I/O](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-static-io) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-static-io>) guide.

## Features

- Virtual I/O devices (LEDs, buttons, switches & displays)
- Customized visualization options available

## Spectrum Analyzer



The Analog Discovery Pro (ADP3450/ADP3250) can be used with WaveForms' "Spectrum" instrument to view the power of frequency-domain components of analog signals captured on the analog input channels.

Signals with minimum/maximum frequencies between 0 Hz () and 50Mhz can be plotted in units of peak voltage, RMS voltage, and various voltage level ratio units.

Since the Spectrum Analyzer instrument uses the same hardware resources as the Oscilloscope, Network Analyzer, and Impedance Analyzer instruments, it cannot be used at the same time as these other instruments.

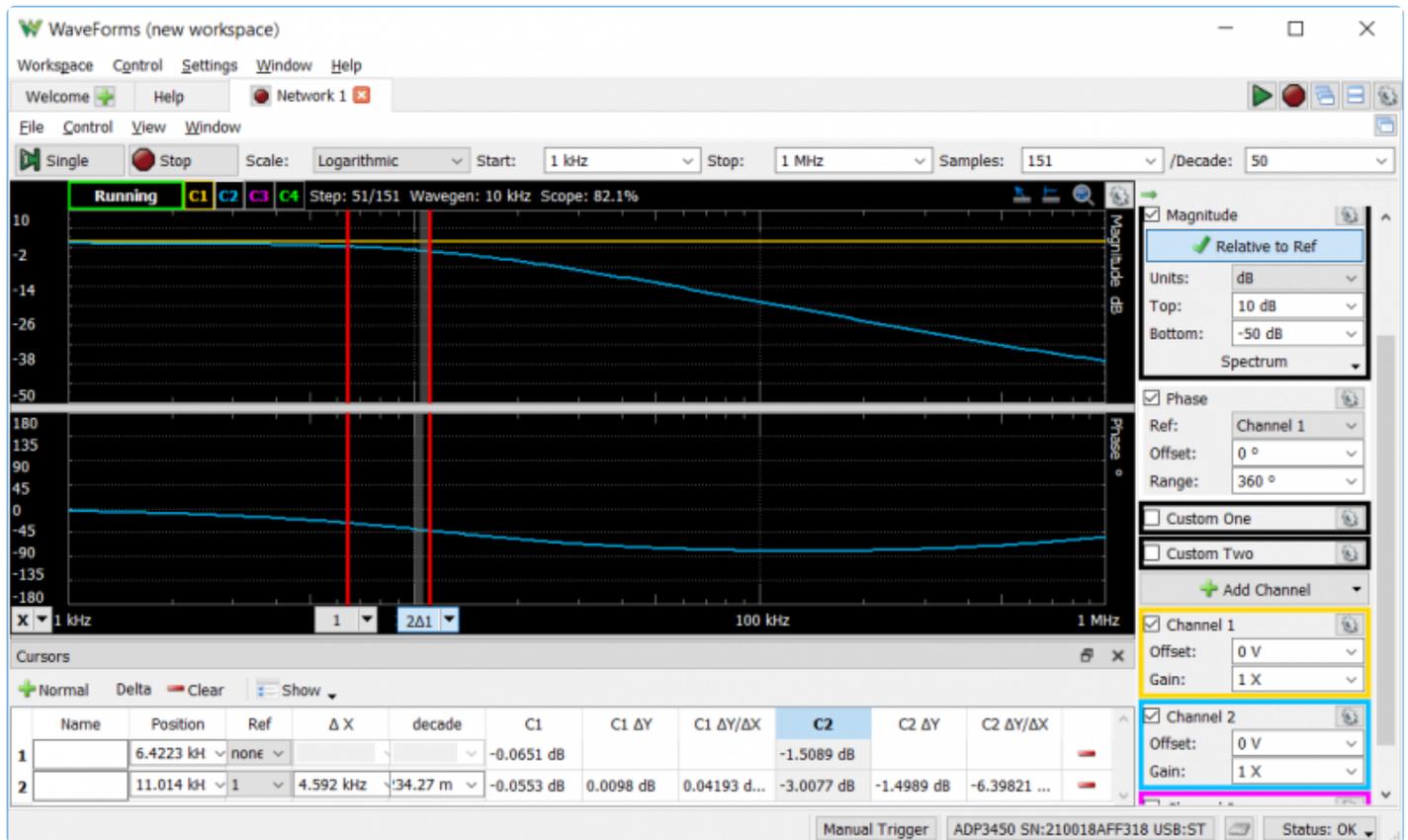
Since the Analog Discovery Pro's analog input channels are shared, the Oscilloscope instrument cannot be used at the same time as the Oscilloscope, Voltmeter, Data Logger, Network Analyzer, or Impedance Analyzer instruments.

For more information on the analog input channels, please visit the [Analog Discovery Pro \(ADP3450/ADP3250\) Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>). For a walkthrough of the different features of WaveForms' Spectrum Analyzer instrument, please visit the [Using the Spectrum Analyzer](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-spectrum-analyzer) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-spectrum-analyzer>) guide.

## Features

- Power spectrum algorithms: FFT, CZT
- Frequency range modes: center/span, start/stop
- Frequency scales: linear, logarithmic
- Vertical axis options: voltage-peak, voltage-RMS, dBV, and dBu
- Windowing: options: rectangular, triangular, hamming, cosine, and many others
- Cursors and automatic measurements: noise floor, SFDR, SNR, THD and many others
- Data file import/export using standard formats

## Network Analyzer



The Analog Discovery Pro (ADP3450/ADP3250) can be used with WaveForms' "Network" instrument to view the amplitude and phase response of a circuit under test. Nichols and Nyquist plots can also be viewed with this instrument.

Frequency sweeps can be performed in ranges between 1 mHz and 10 MHz, with up to 10k samples per decade. The wave used for the sweep can be customized, and uses the same resources as the Waveform Generator instrument.

The Network Analyzer instrument uses the analog output and analog input channels of the Analog Discovery Pro (ADP3450/ADP3250) to probe a test circuit. The Network Analyzer can be configured to use an external signal to provide input to the circuit under test, rather than using the analog output channels.

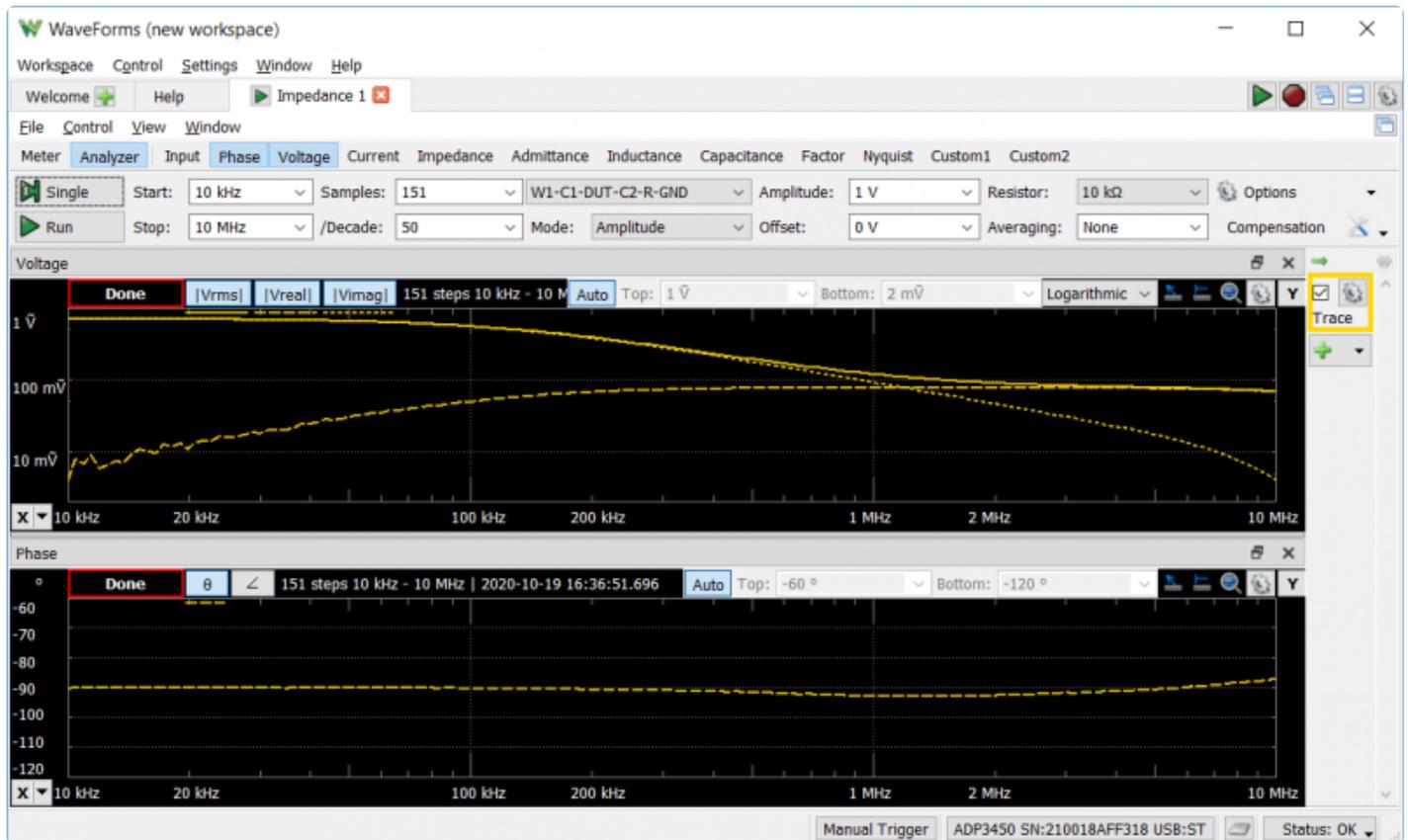
Since the Analog Discovery Pro's analog input and output channels are shared, the Network Analyzer instrument cannot be used at the same time as the Oscilloscope, Waveform Generator, Voltmeter, Data Logger, Spectrum Analyzer, or Impedance Analyzer instruments.

For more information on the analog output and analog input channels, please visit the [Analog Discovery Pro \(ADP3450/ADP3250\) Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>). For a walkthrough of the different features of WaveForms' Network Analyzer instrument, please visit the [Using the Network Analyzer](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-network-analyzer) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-network-analyzer>) guide.

## Features

- Available diagrams: Bode, Nichols, Nyquist, and FFTs
- Settable input amplitude and offset
- Analog input records response at each frequency

## Impedance Analyzer



The Analog Discovery Pro (ADP3450/ADP3250) can be used with WaveForms' "Impedance" instrument to view a wide variety of frequency response characteristics of a circuit under test. Input, Phase, Voltage, Current, Impedance, Admittance, Inductance, Factor, and Nyquist plots are all available. In addition, Custom plots can be used to present the results of a wide variety of different mathematical operations on buffered data.

Frequency sweeps can be performed with in ranges between 100 uHz and 25 MHz(), with as many as 10k samples per decade. The signal used to perform the sweep can be selected from a variety of preset, with configurable amplitude and offset. An external network analyzer reference circuit can be selected from a variety of options.

The Impedance Analyzer instrument uses the Analog Discovery Pro's analog output channels and analog input channels to probe a test circuit.

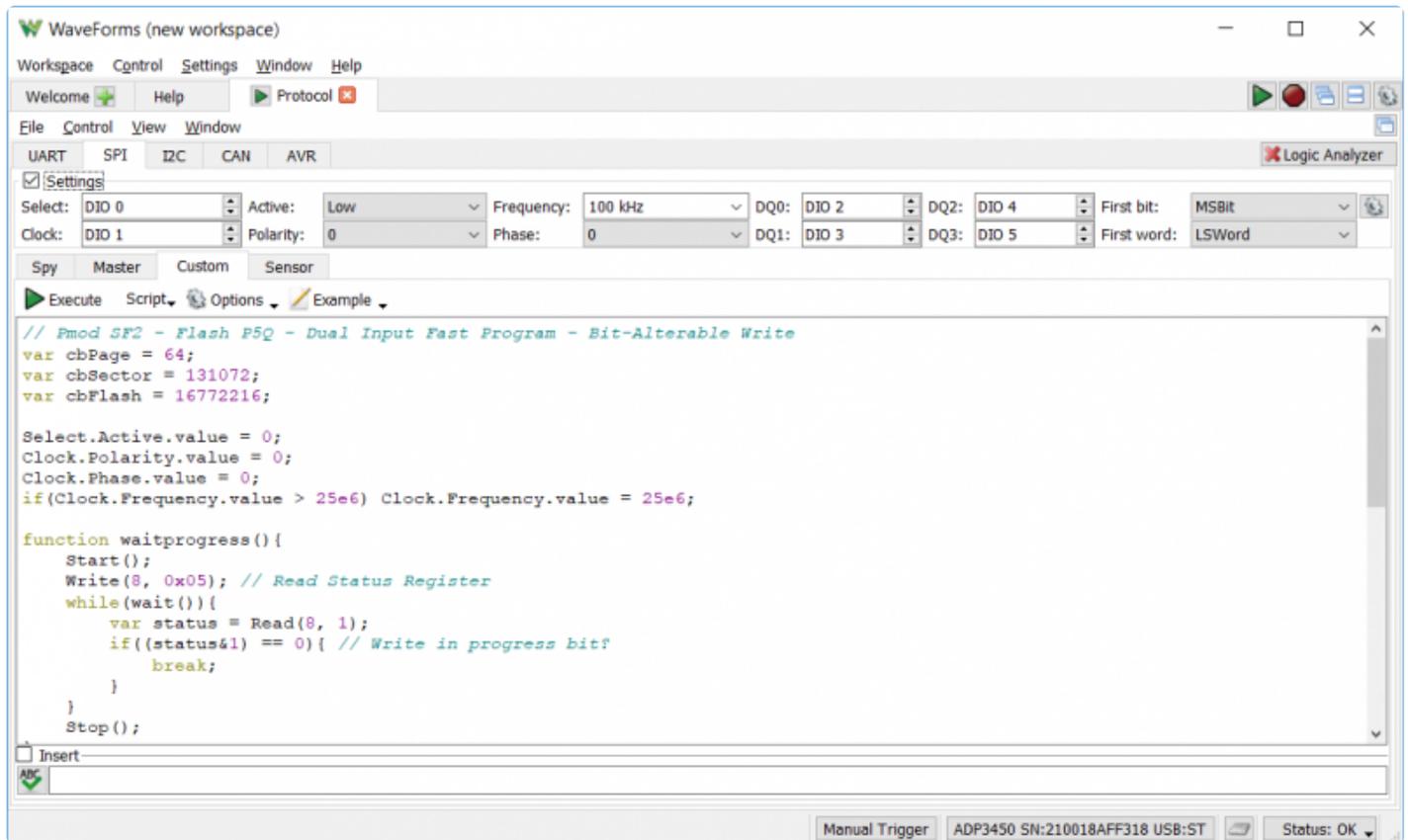
Since the Analog Discovery Pro's analog input and output channels are shared, the Impedance Analyzer instrument cannot be used at the same time as the Oscilloscope, Waveform Generator, Voltmeter, Data Logger, Spectrum Analyzer, or Network Analyzer instruments.

For more information on the analog output and analog input channels, please visit the [Analog Discovery Pro \(ADP3450/ADP3250\) Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>). For a walkthrough of the different features of WaveForms' Impedance Analyzer instrument, please visit the [Using the Impedance Analyzer](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-impedance-analyzer) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-impedance-analyzer>) guide.

## Features

- Chart views for Voltage, Current, Impedance, Admittance, Capacitance, and others
- Alternative simple Meter view
- Selectable external compensation circuit
- Data file export using standard formats

## Protocol Analyzer



The Analog Discovery Pro (ADP3450/ADP3250) can be used with WaveForms' "Protocol" instrument to work with common communications protocols. UART, SPI, I2C, and CAN transactions can be received, transmitted, and/or spied upon by the Analog Discovery Pro using any of the 16 digital input/output channels at a sample rate of 100 MS/s(0). AVR microcontrollers can be programmed through the instrument as well.

Custom scripts can be written within the Protocol Analyzer instrument to generate sequences of SPI or I2C transactions.

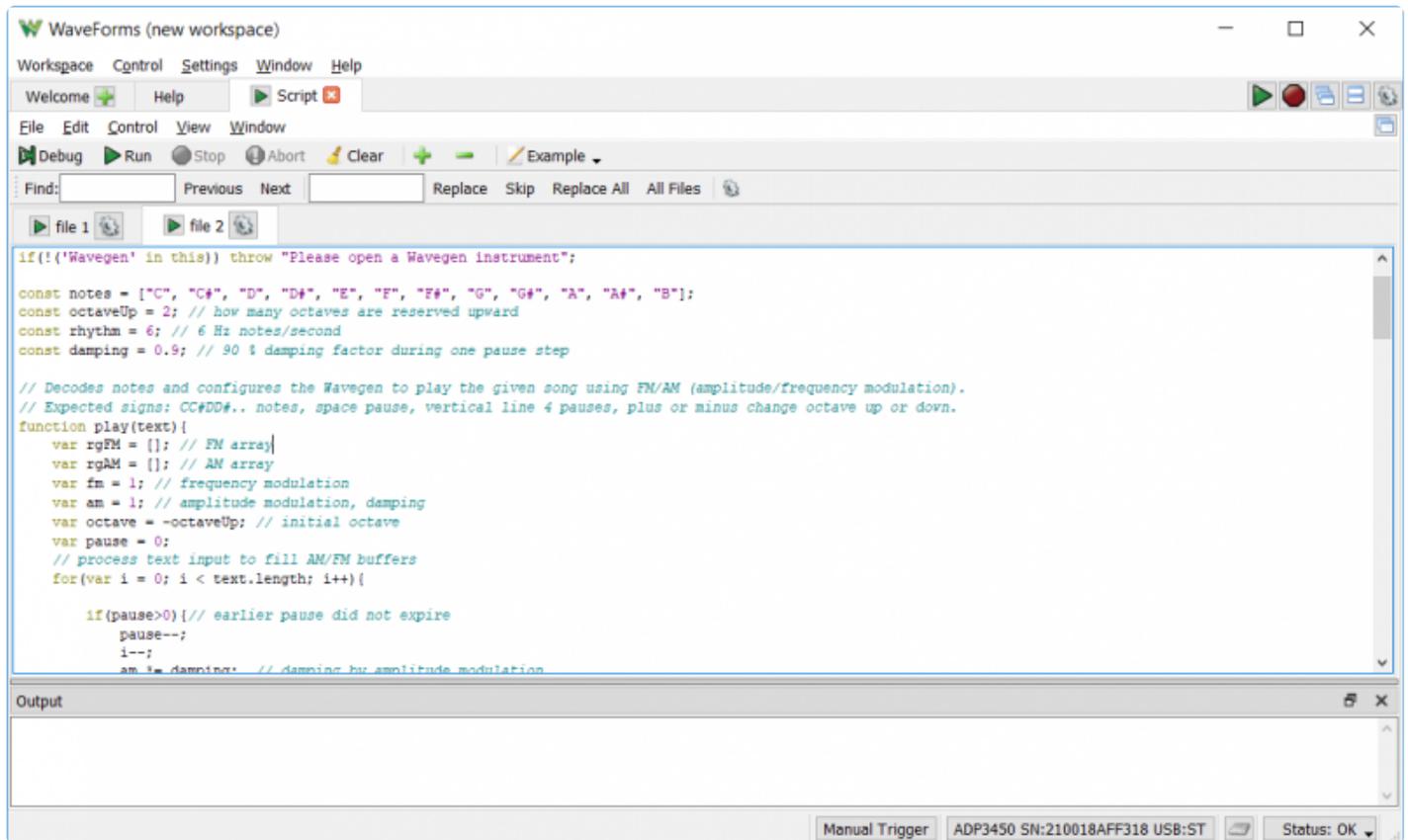
Since it uses the same hardware resources as the Logic Analyzer and Pattern Generator instruments, the Protocol Analyzer cannot be used at the same time as these instruments.

For more information on the digital input/output channels, please visit the [Analog Discovery Pro \(ADP3450/ADP3250\) Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>). For a walkthrough of the different features of WaveForms' Protocol Analyzer instrument, please visit the [Using the Protocol Analyzer](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-protocol-analyzer) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-protocol-analyzer>) guide.

## Features

- Supports UART, SPI, I2C, and CAN protocols
- Program AVR microcontrollers
- Scriptable transaction sequences for SPI and I2C
- Configurable data rates, modes, and others
- Send/receive directly from/to data files

## WaveForms Script Editor



Each of WaveForms' instruments can be controlled through scripts within the WaveForms application itself. WaveForms' "Script" instrument allows the user to write and run JavaScript code that can control the rest of the application through an extensive [API\(\)](#). This allows the user to configure and run many instruments at the same time, in an easily repeatable way.

A variety of code examples are available in the application to aid in learning to write WaveForms scripts. Additional resources for writing scripts can be found on the Scopes and Instruments section of the [Digilent Forum](https://forum.digilentinc.com) (<https://forum.digilentinc.com>).

A plot pane within the Script instrument itself can be used to integrate data from many different instruments, and display it in a highly customizable way.

For a walkthrough of the different features of WaveForms' Script instrument, please visit the [Using Scripts](https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-script-editor) (<https://reference.digilentinc.com/reference/instrumentation/guides/waveforms-script-editor>) guide.

## Features

- Available within the WaveForms application
- Simultaneous control of all instruments through JavaScript
- Automatable [GUI\(\)](#) actions
- Custom data analysis and manipulation functions

## Operation Modes

The Analog Discovery Pro has multiple modes to provide alternative ways to interact with and use the instrumentation device.

Standard mode allows for communication over USB or Ethernet. Standard mode provides slightly a faster transfer rates than Linux mode.

Linux mode, accessible through a serial terminal, provides standalone operation of the ADP3450/ADP3250 and allows the use of the four USB host ports on the back panel of the Analog Discovery Pro. Linux mode supports communication between the device and the host computer over USB, Ethernet, and Wifi and also allows for internet access.

In Linux mode, the 4 USB ports on the back of the device are enabled and can be used to connect different peripherals including WiFi dongles. Any of the USB host ports can host a flash drive that contains a new or updated Linux image. Instructions on updating to the latest Digilent provided images can be found [here](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/recover-linux-mode) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/recover-linux-mode>).

Supported WiFi dongles can also be used in Linux mode. The supported WiFi chipsets are listed in the [ADP3450/ADP3250 Specifications](https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications) (<https://reference.digilentinc.com/reference/instrumentation/analog-discovery-pro-3x50/specifications>).

## WaveForms Software Development Kit (SDK)

WaveForms SDK is a set of software libraries and examples that can be used to develop custom applications that can control Digilent Test and Measurement devices. Supported languages include C, C++, C#, Visual Basic, and Python. Third-party toolkits are available for LabVIEW and MATLAB. Instructions for using WaveForms with LabVIEW are available through our guide [Getting Started with LabVIEW and a Test and Measurement Device](https://reference.digilentinc.com/reference/instrumentation/guides/getting-started-with-labview) (<https://reference.digilentinc.com/reference/instrumentation/guides/getting-started-with-labview>). More information about WaveForms SDK can be found through the [WaveForms SDK Resource Center](https://reference.digilentinc.com/reference/software/waveforms/waveforms-sdk/start) (<https://reference.digilentinc.com/reference/software/waveforms/waveforms-sdk/start>).

### Features

- Downloaded via the WaveForms installer, used independently of the WaveForms application
  - Languages supported: C/C++, C#, MATLAB, Python, Visual Basic
  - Provides control of hardware channels and virtual instruments to custom applications
-