TELEDYNE SP DEVICES
Everywhereyoulook™

# Digitizer Studio

## User Guide

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# 1. Setup

Setup tab in the Digitizer Studio has the functionalities below:

## 1.1. File

### 1.1.1 Open:

Open functionality is used to open a Json (*.json) configuration.

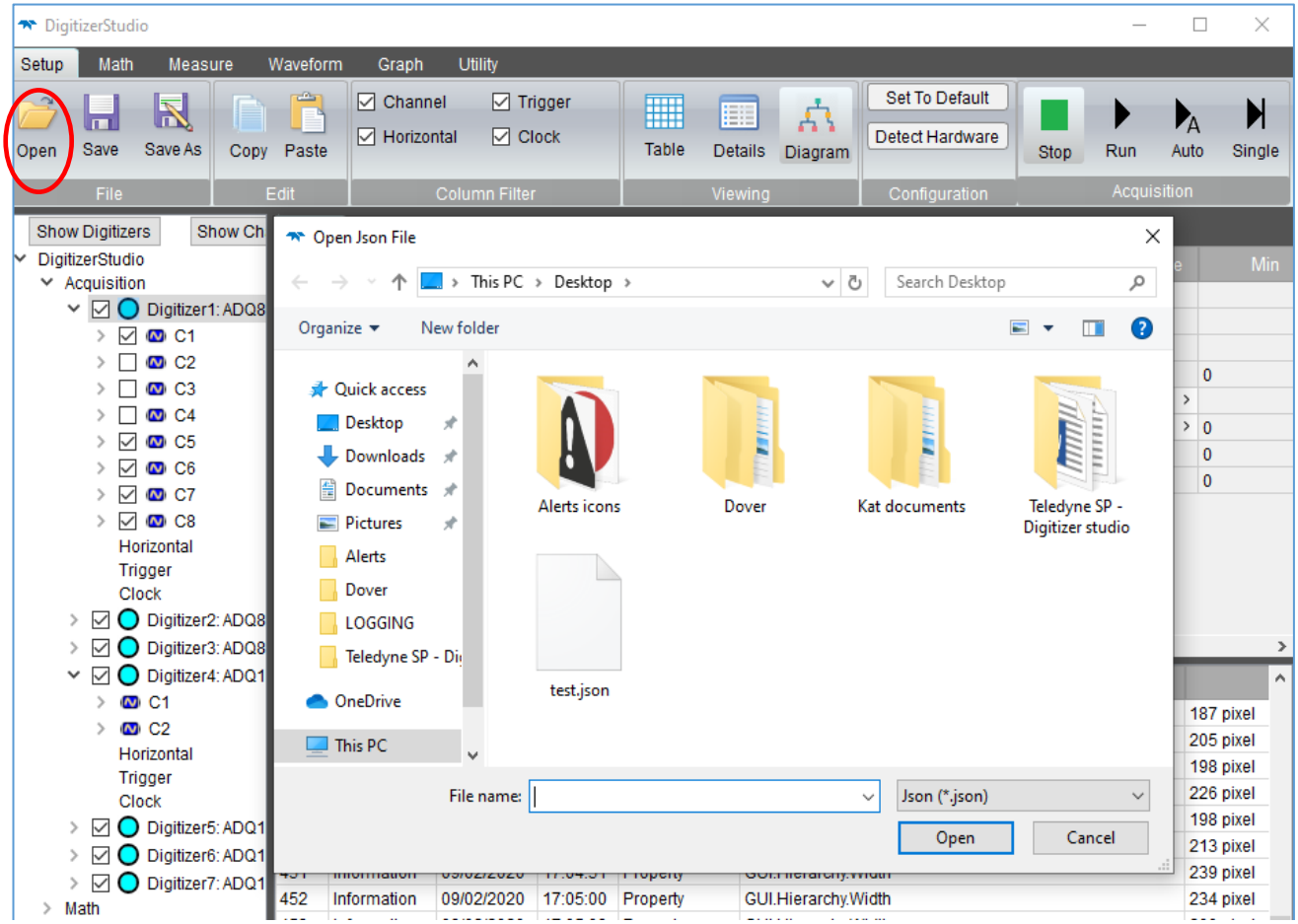


*Figure 1: Setup*

*Figure 1: Open*

### 1.1.2 Save:

The Save functionality is used to save the current configuration. The default location to store the current configuration is: C:\SP Devices\DigitizerStudio\Setup

### 1.1.3 Save As

The Save As functionality is to save the current configuration from the current source location to the destination location.

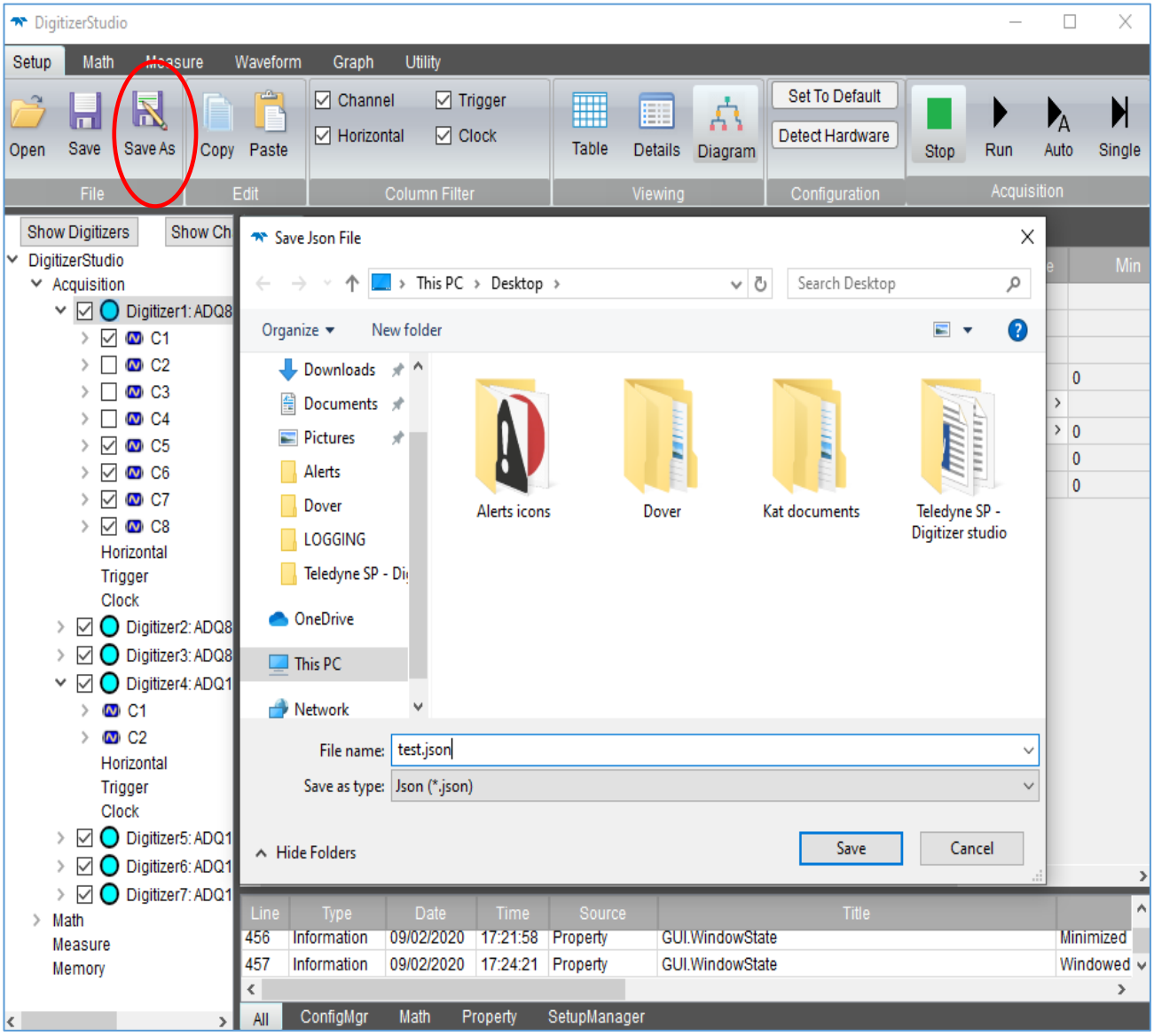


*Figure 2: Save As*

## 1.2 Edit

### 1.2.1 Copy

The Copy functionality is used to select and copy a configuration of selected cells in table. Copy works for the Table mode and Details mode of viewing.

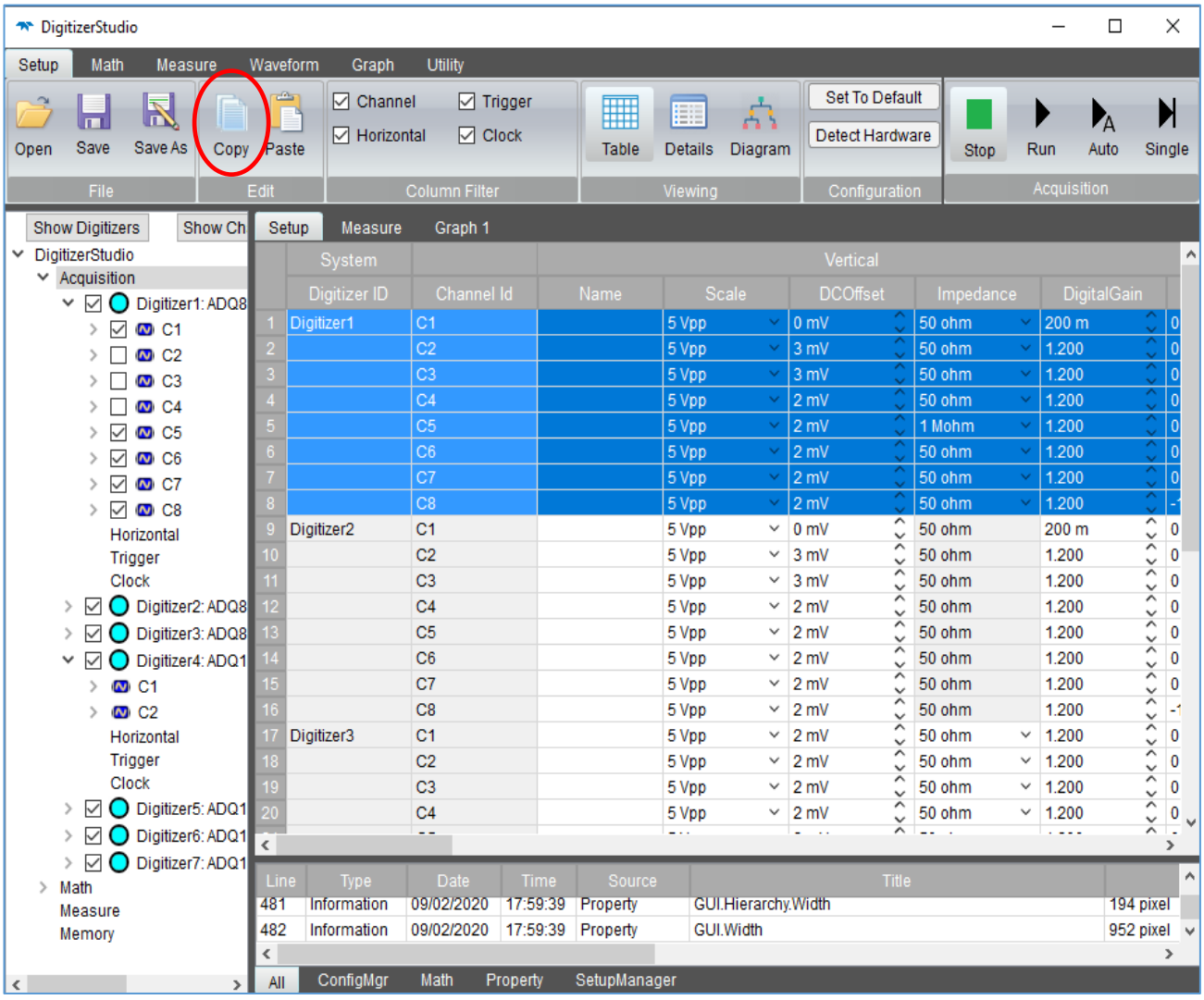


*Figure 3: Copy*

### 1.2.2 Paste

The Paste functionality is used to paste copied text in a table. It pastes data from the current cell of table. However, Copy will not be able to copy Read-only properties. For example: User can select all rows of Digitizer1, copy it and then go to Digitizer2 and press paste. The updated cells after paste will be highlighted.

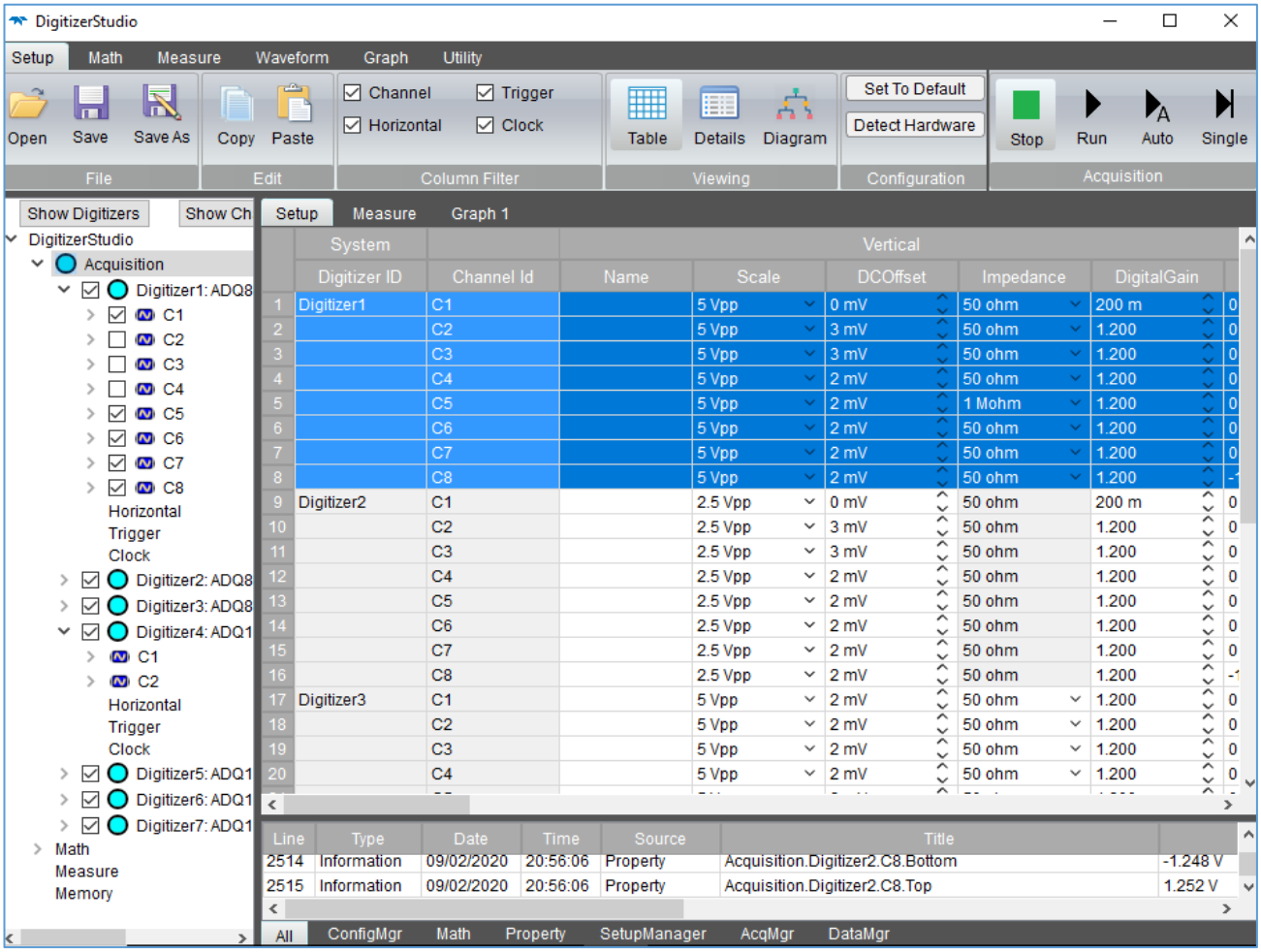


*Figure 4: Copy from Digitizer1*

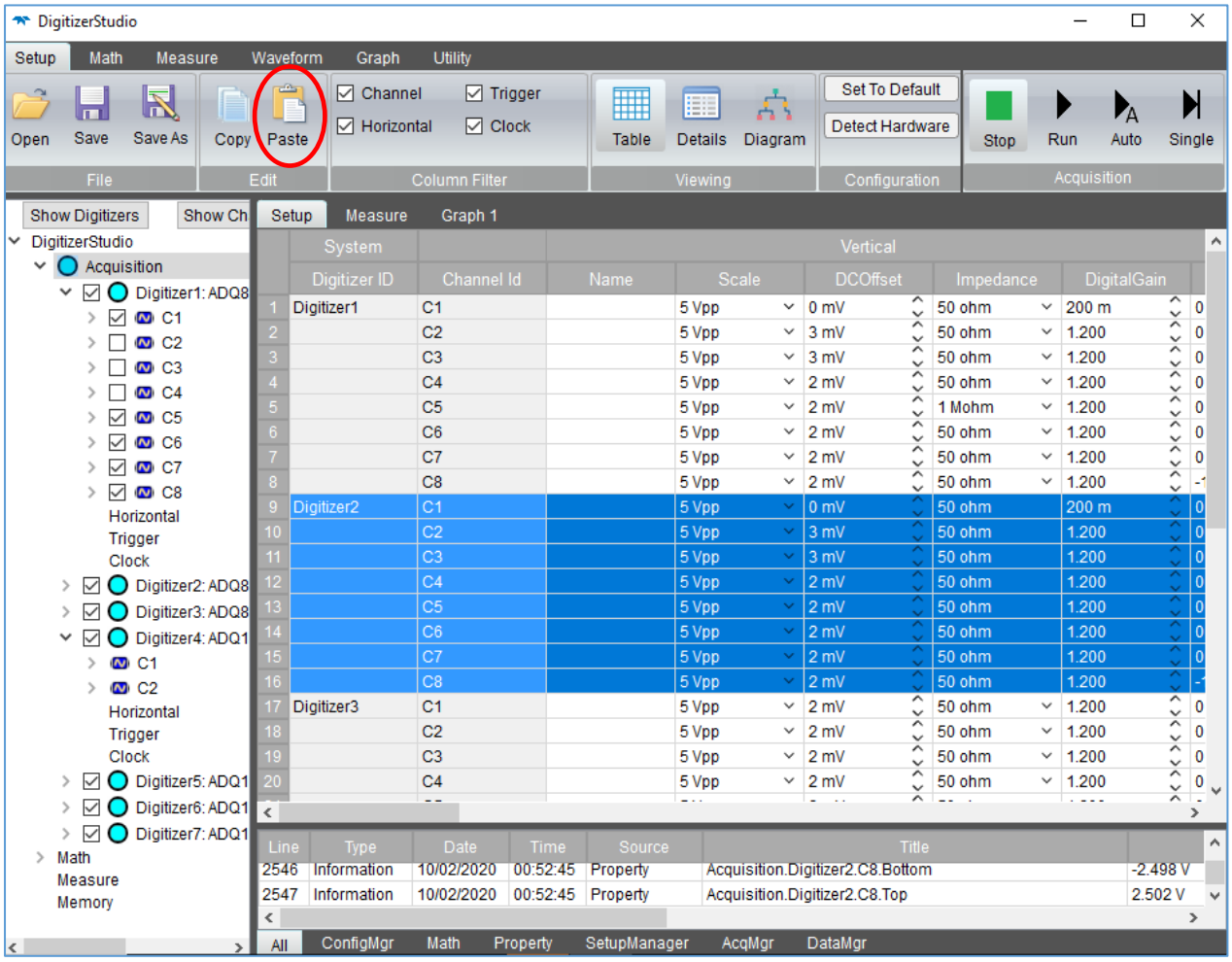


*Figure 5: Paste from Digitizer1 to Digitizer2*

## 1.3 Viewing

### 1.3.1 Table

All properties of all digitizers are shown in this mode. Table mode of viewing is used for Acquisition and their children. It shows properties of selected node and their children from left pane.

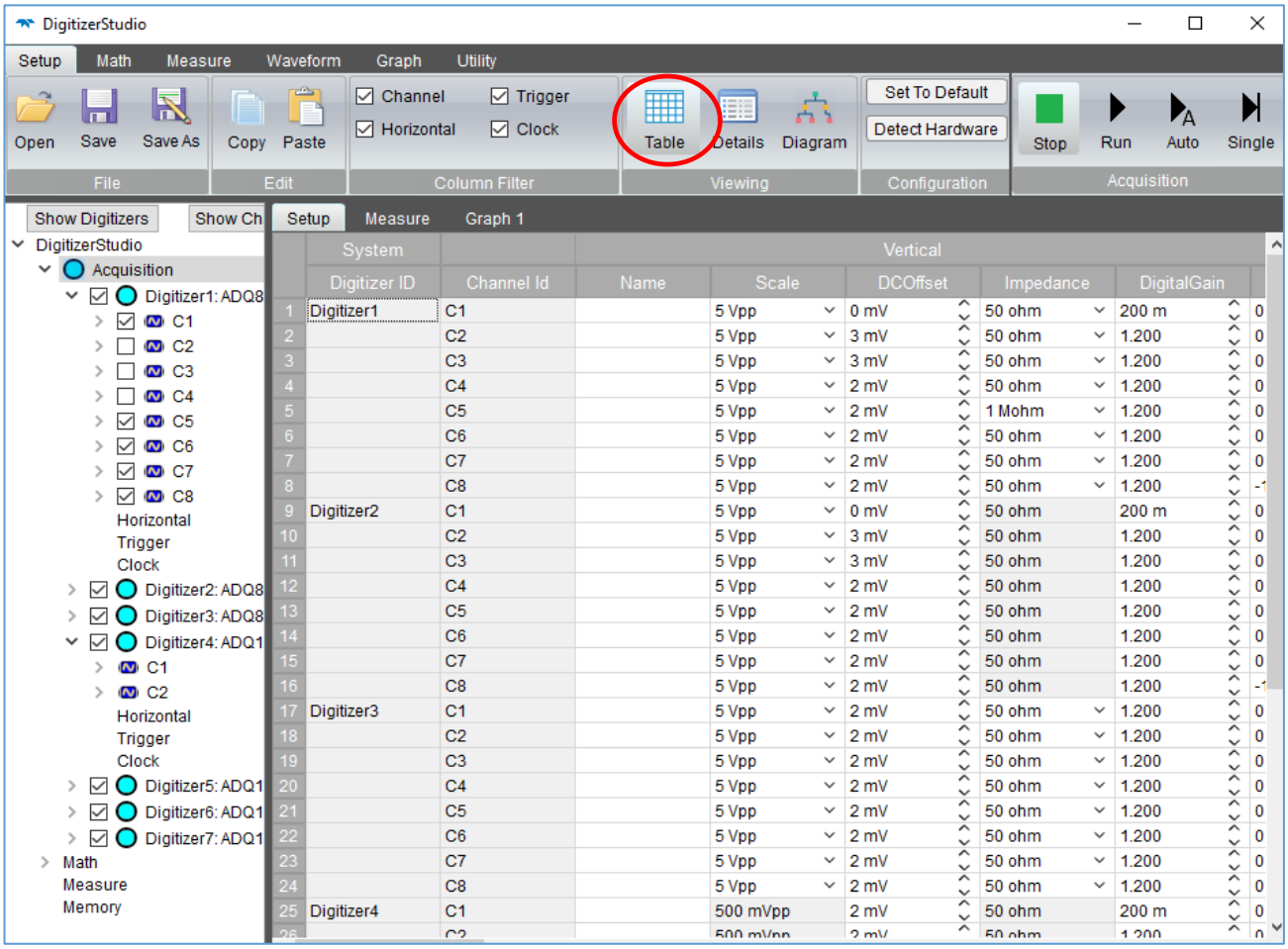


*Figure 6: Viewing - Table*

**<u>Different ways to enter/modify value(s) in Table mode:</u>**

Select a cell and click the Up – Down arrow to modify the values. Up arrow will increment value as per grain where Down arrow will decrement arrow as per grain of the property.

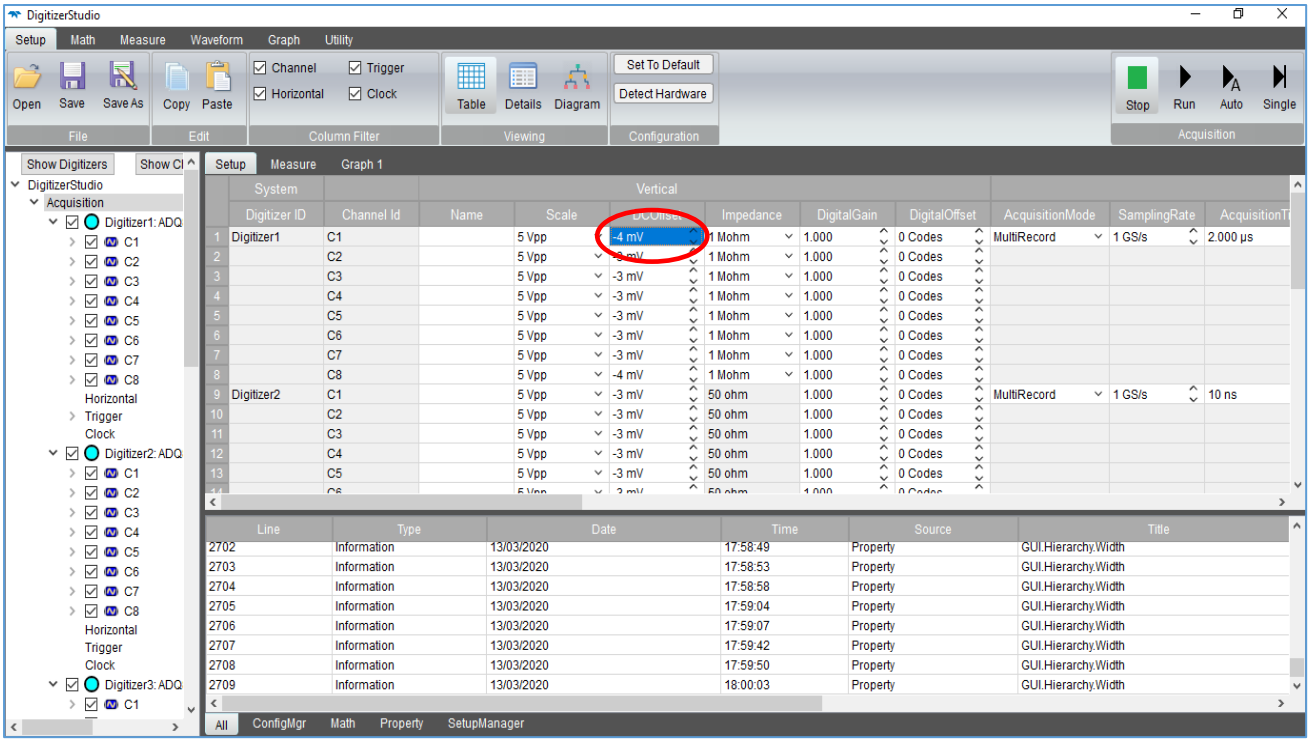


*Figure7: Viewing – Update value using spinbox*

For a particular cell, click on the combo box and select a value from the dropdown list.

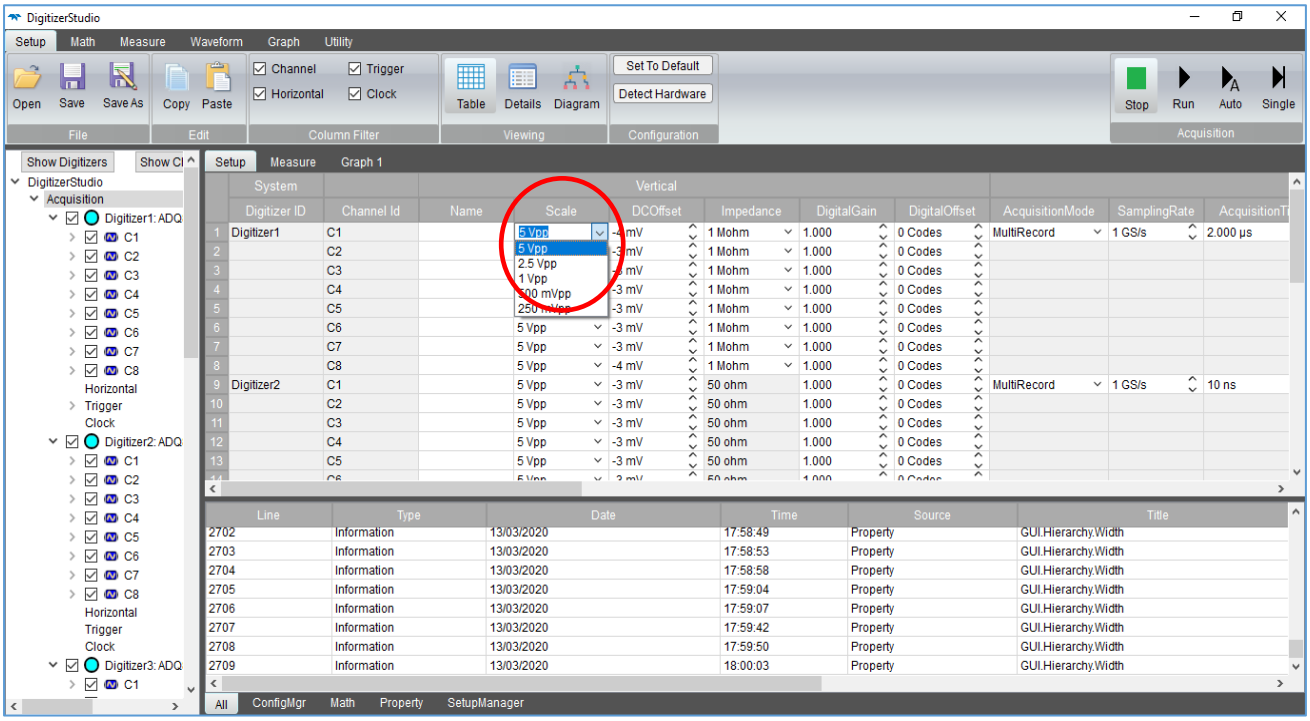


*Figure8: Viewing – Update value using combobox*

User can write values in below different ways in cell:

- 2e-6

- 2u
- 0.000002

All the above format of values are acceptable. There is no need to write unit. Application automatically takes the nearest valid value.

**Multiple Cells Edit:**

Select the cells for Digitizer1 for channels C1 to C8. Click on the up or down arrow. The values for all the selected cells get changed.

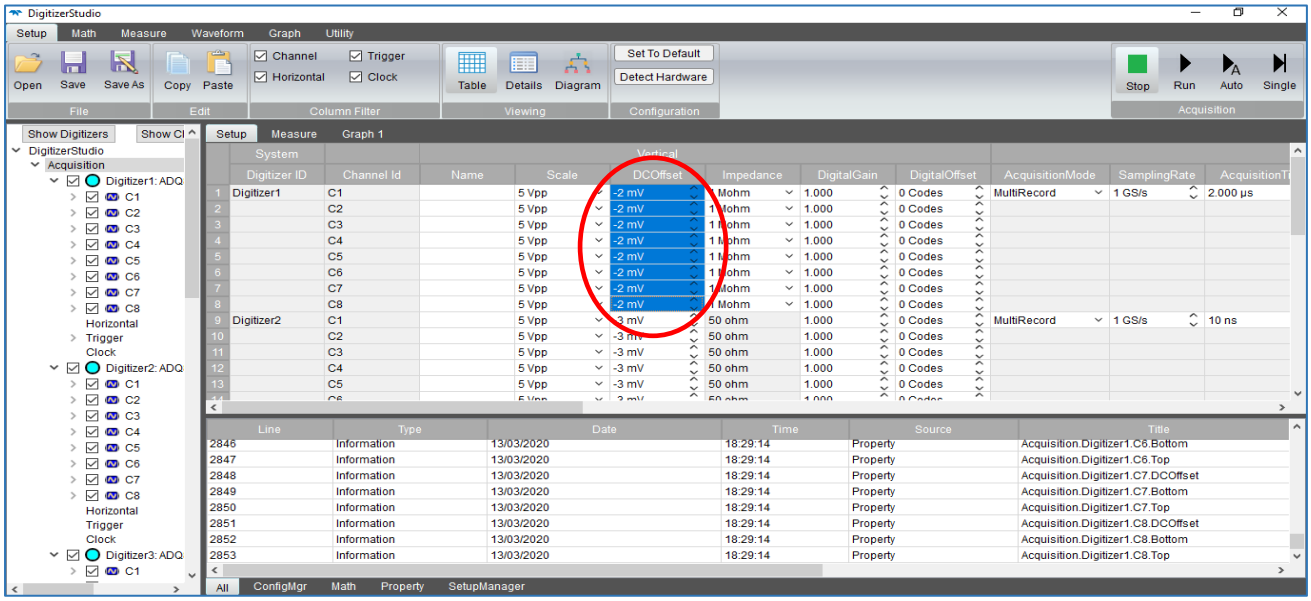


*Figure 9: Multiple cell edit*

Click on the name of the property in horizontal header. Change the value of the first cell and it will update all the cells of that column.

Tree selection and table content:

In the Table viewing, all the properties of selected node from the left tree and it's children's properties are visible in table.

If Acquisition is selected on the left pane, the Digitizers (Digitizer1, Digitizer2) and their children properties are displayed in the right pane.

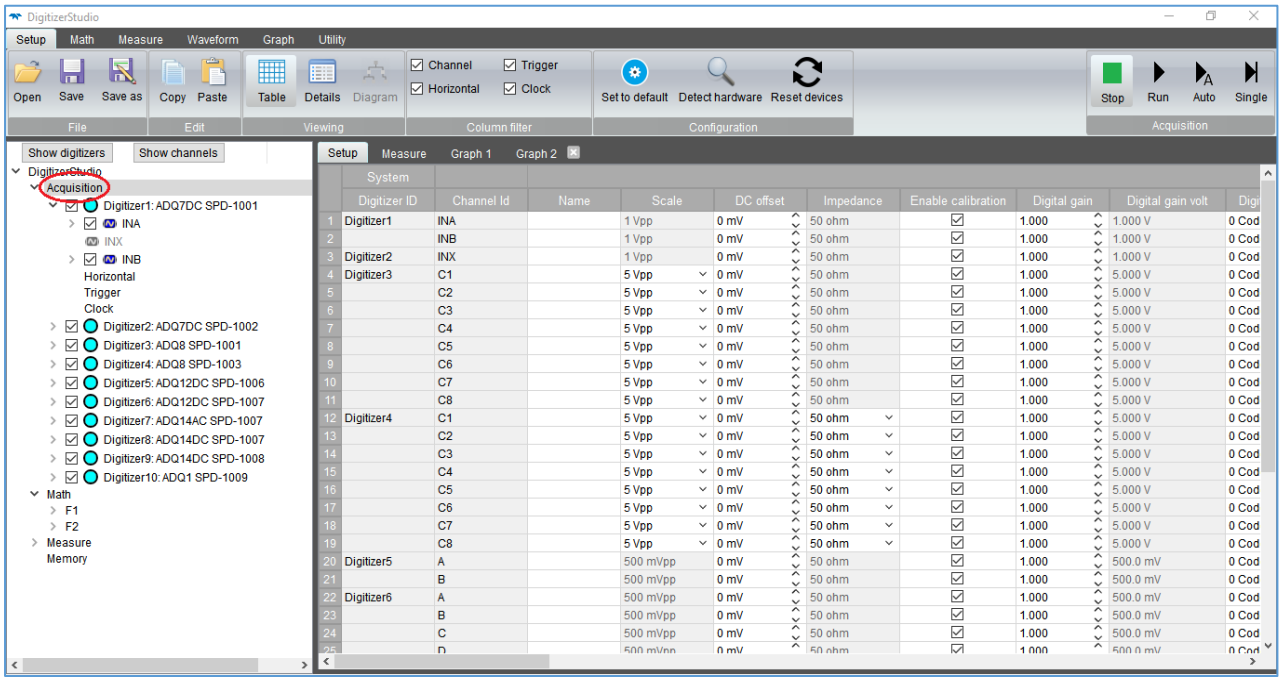


*Figure 10: Table content when Acquisition node is selected*

If Digitizer is selected on the left tree panel, their children's properties (Trigger, Horizontal, channel, clock) properties are displayed in table.

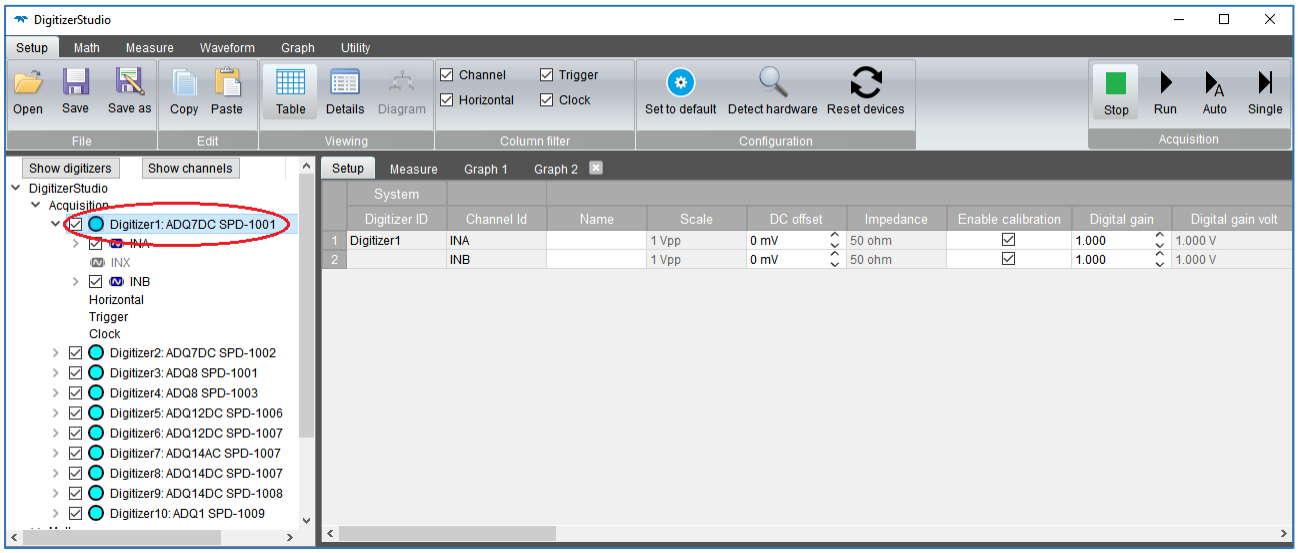


*Figure 11: Table content when Digitizer node is selected*

If the user selects a channel on the left panel, the contents of the right panel are as indicated below.

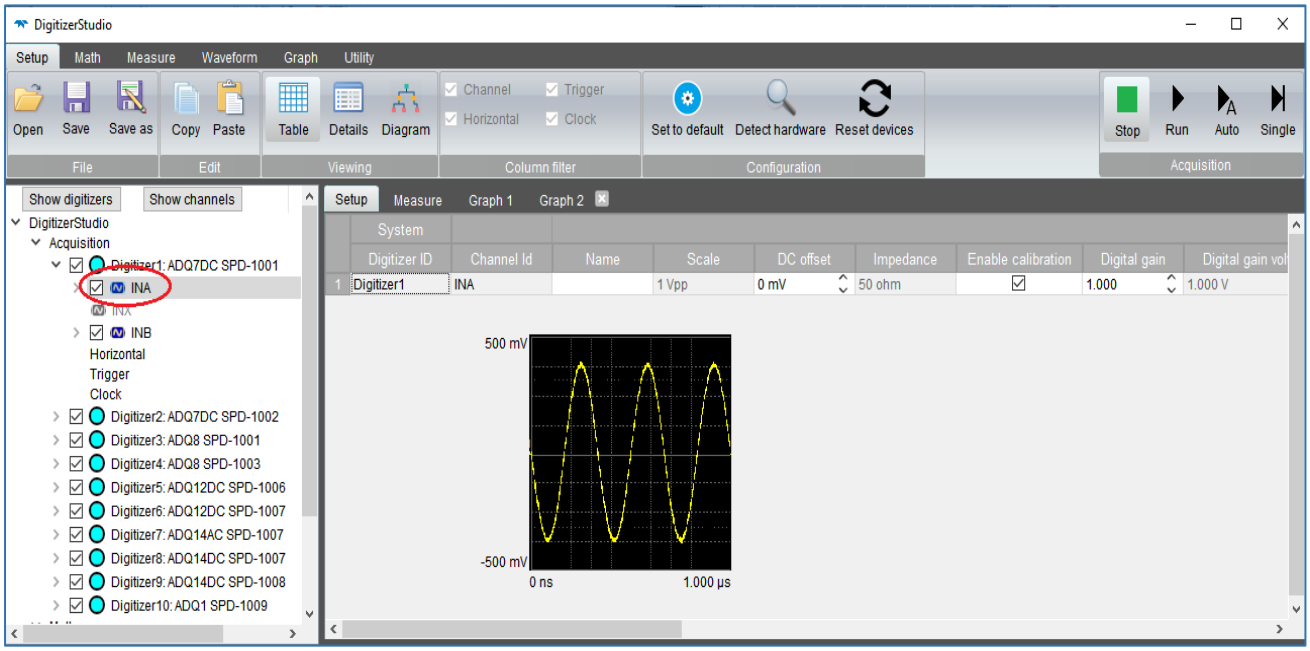


*Figure 13: Table content when channel node is selected*

If Horizontal is selected in the left panel, the Horizontal contents are displayed in the right panel.

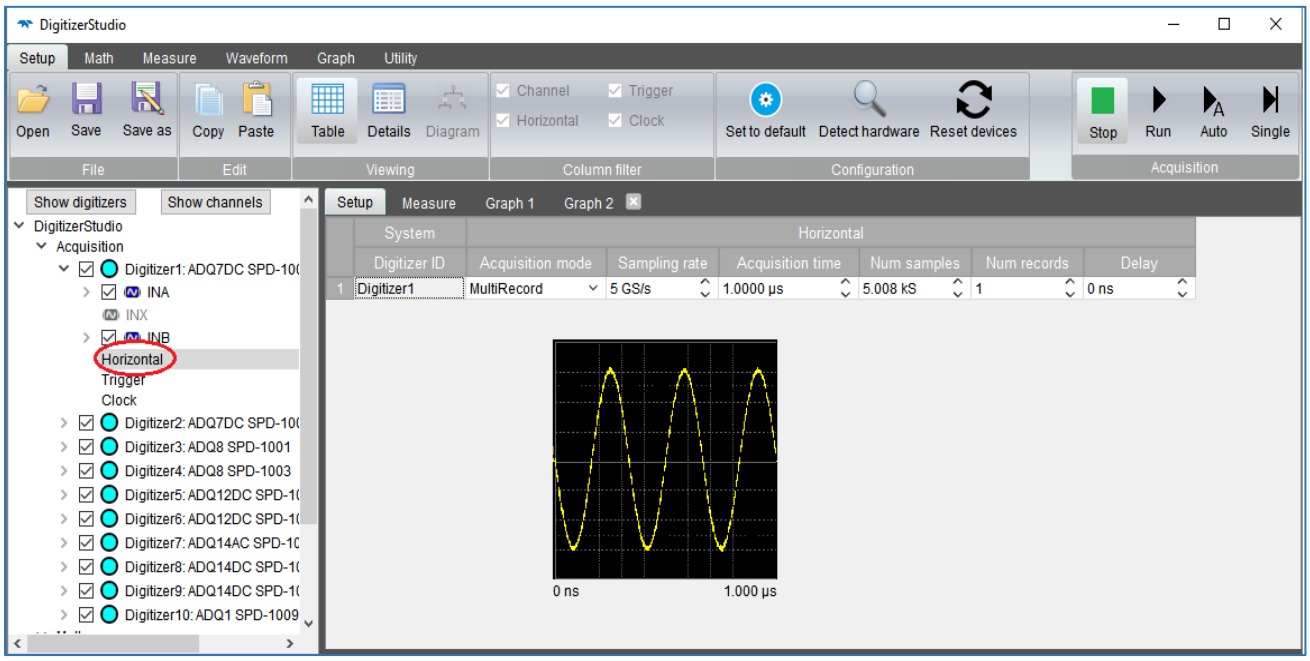


*Figure 14: Table content when Horizontal node is selected*

If Trigger is selected in the left panel, the Trigger contents are displayed in the right panel.

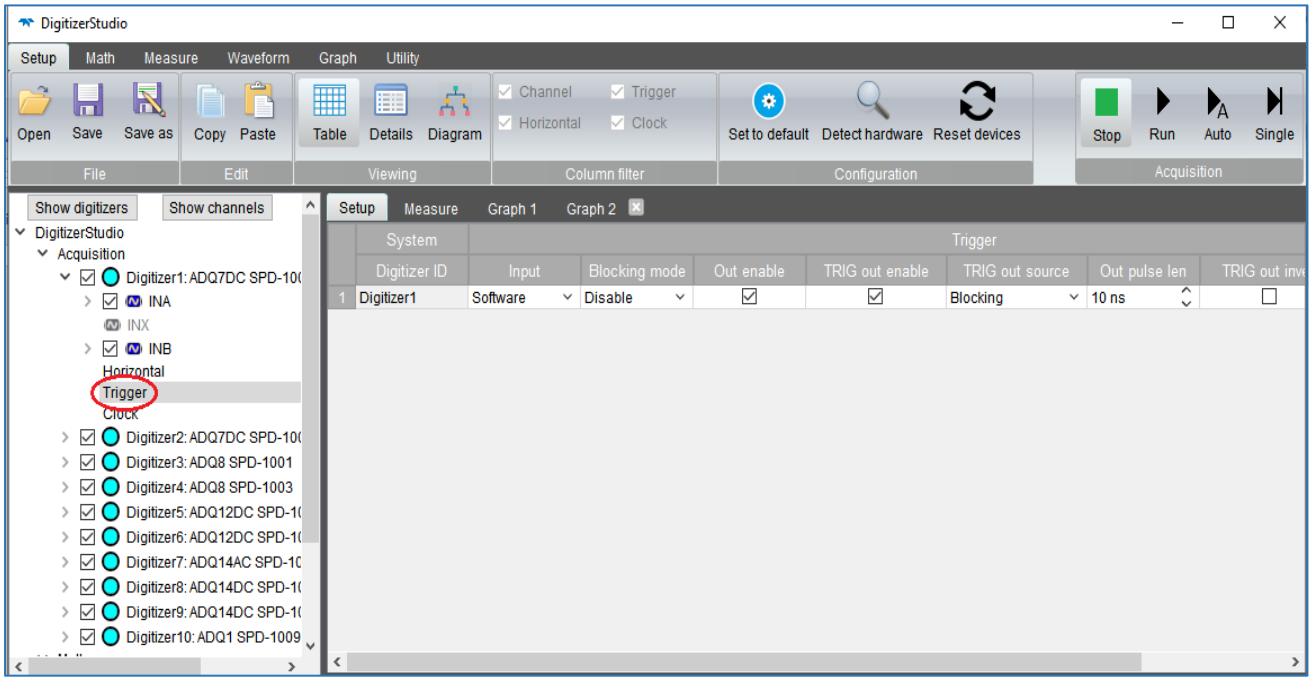


*Figure 15: Table content when Trigger node is selected*

If Clock is selected in the left panel, the Clock contents are displayed in the right panel.

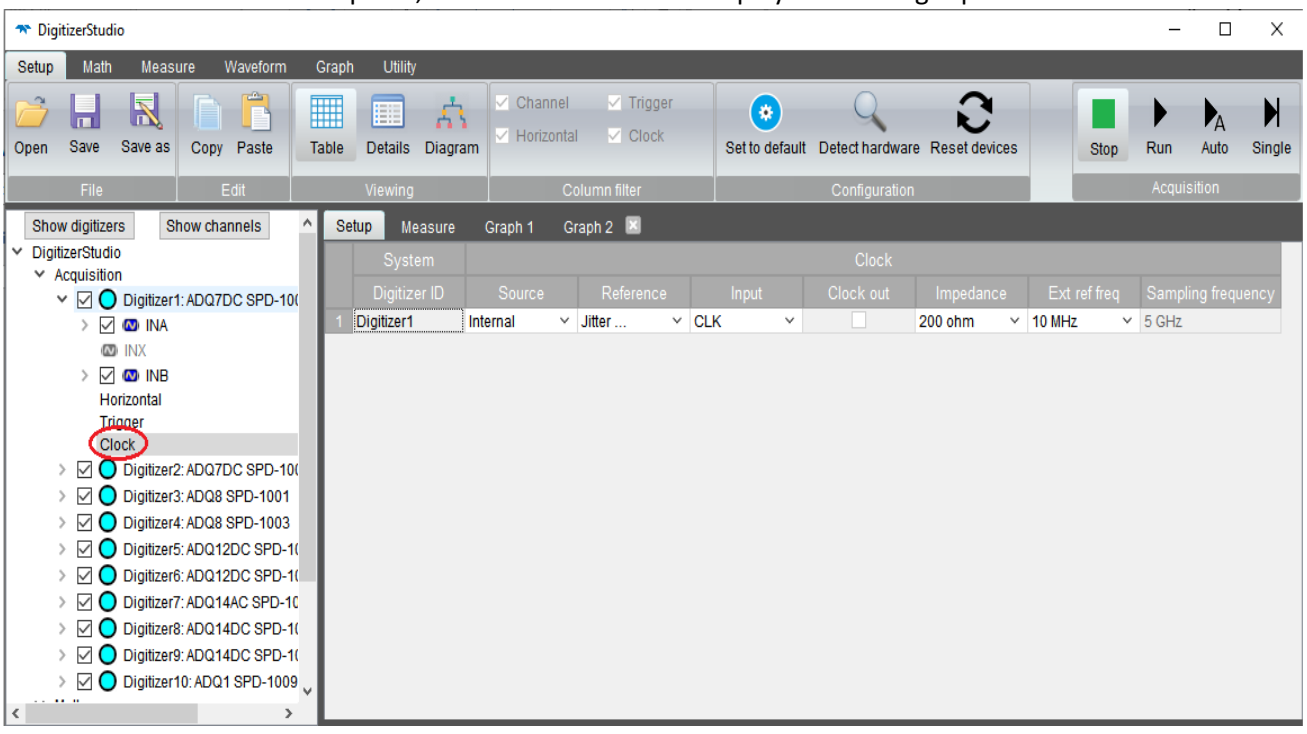


*Figure 16: Table content when Clock node is selected*

### 1.3.2 Details

On selecting a node from the left tree and Details from the top menu, the properties of that node are displayed in details view. Details mode of viewing is for any bag shown in the left hierarchy. Please note: cells in gray are non-editable.

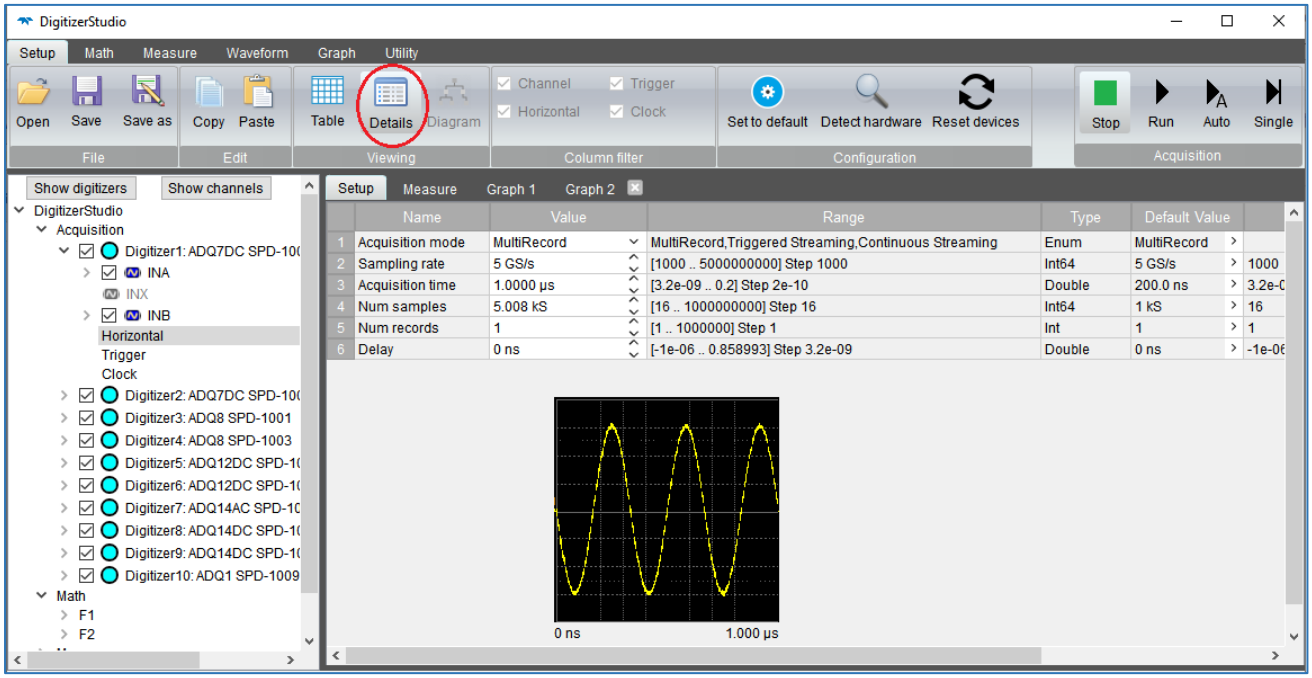


*Figure 17: Viewing - Details*

Description of the fields:

**Name**: Name of the property

**Value**: Value of the property

**Range**: Valid range of the property

**Type**: Type of the property

**Default Value**: default value of the property. On click of the right button of Default Value cell will set the value to default.

**Min**: Minimum value of the property. Not valid for Enum, String and Boolean property. On click of the right button of Min cell will set the value to minimum value.

**Max**: Maximum value of the property. Not valid for Enum, String and Boolean property. On click of the right button of Max cell will set the value to maximum value.

**Grain**: Grain of the property. Not applicable to string and enum property.

**Unit**: unit of the property. Not applicable to string and enum property.

### 1.3.2 Diagram

Diagram view is applicable only for Trigger, clock and channels. User can change the value of property from Diagram mode. To modify the value dropbox, checkbox, textbox or button are available based on the property type. Properties are visible or hidden based on the other property values.

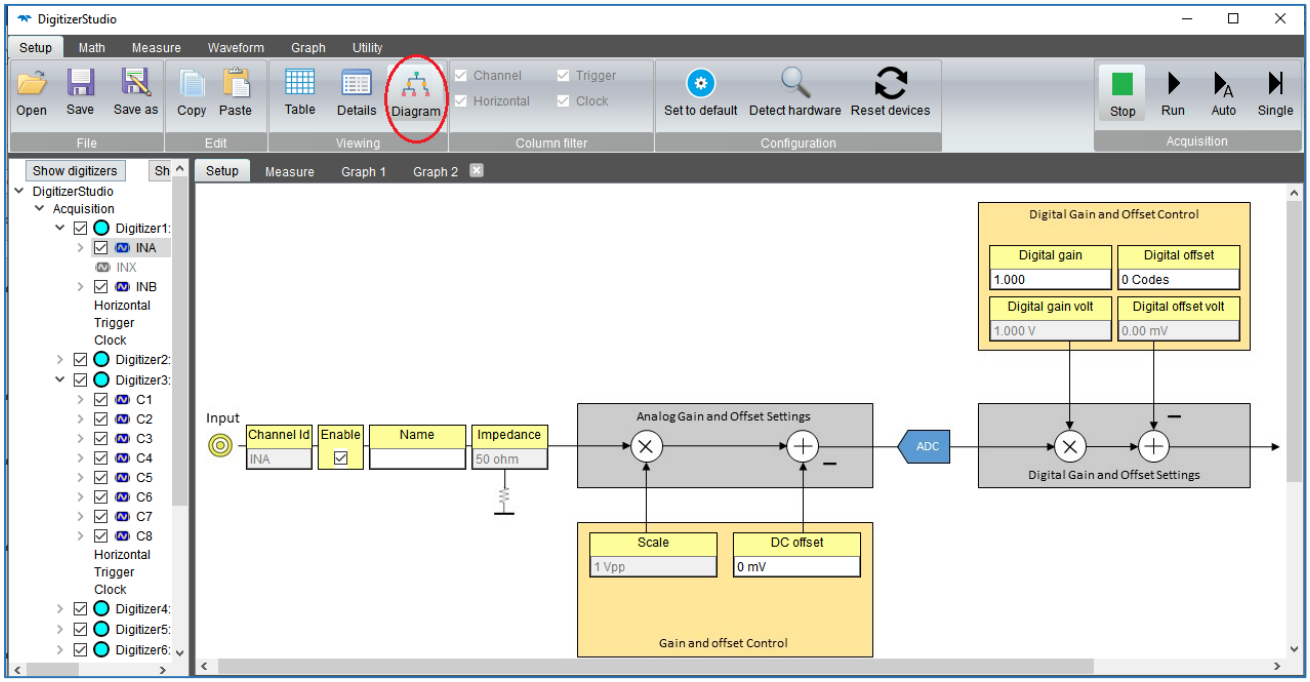


*Figure 18: Viewing - Diagram*

## 1.4 Custom Filter

A configuration can be filtered by Channel, Trigger, Horizontal or Clock. Custom filter can be applied only to the Table mode of Viewing. Customer filter is enabled only when Acquisition or Digitizer is selected from the left hierarchy.

### 1.4.1 Channel

If Channel is selected, all properties of vertical will be displayed.

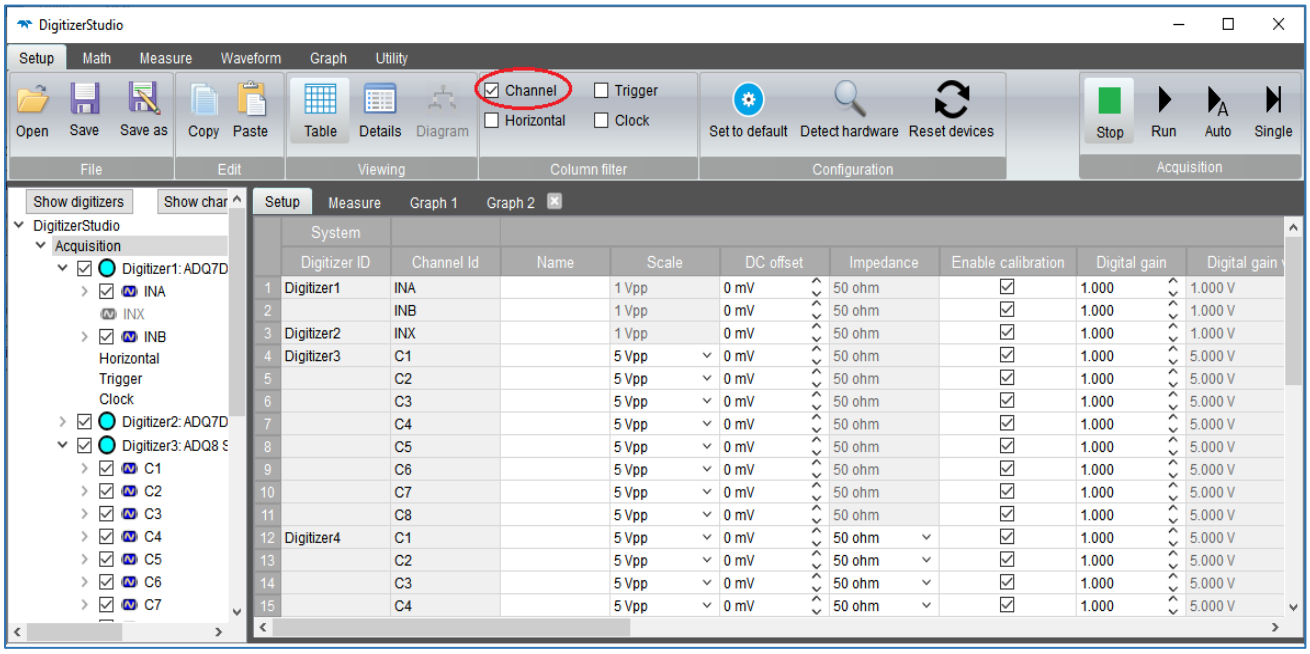


*Figure 19: Channel Filter*

### 1.4.2 Trigger

If Trigger is selected, all properties of Trigger will be displayed.

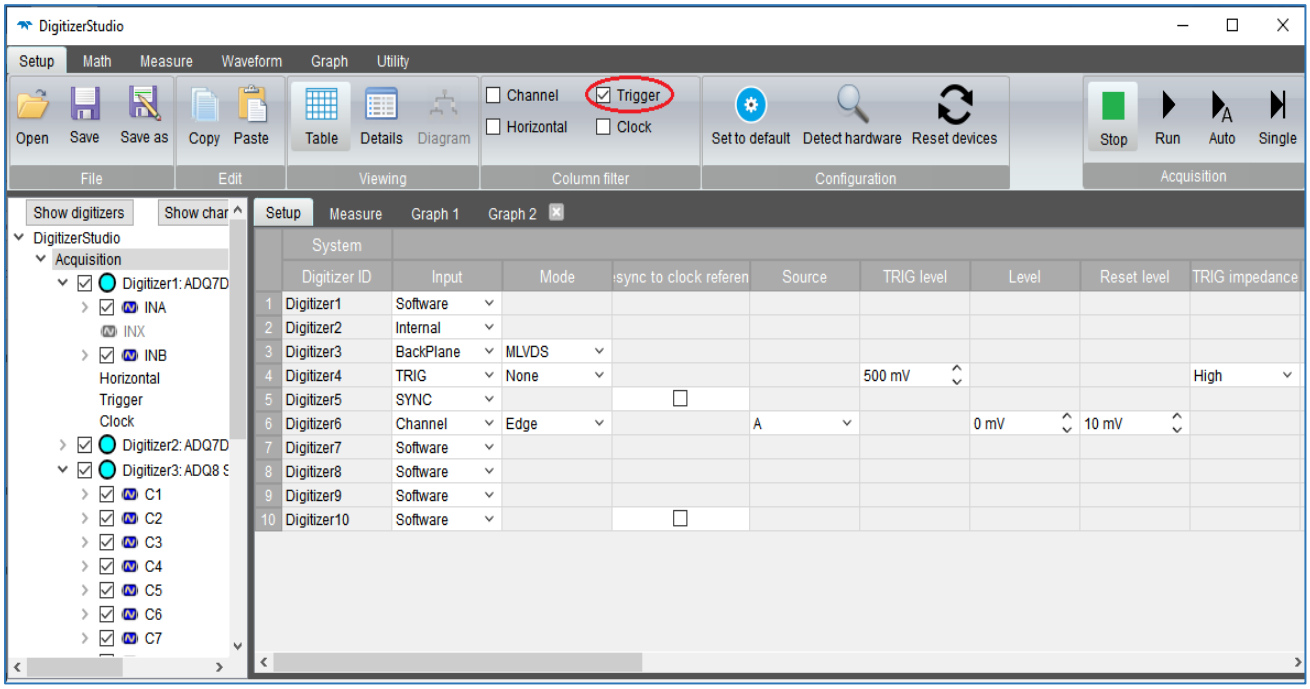


*Figure 20 : Trigger Filter*

### 1.4.3 Horizontal

If Horizontal is selected, all properties under Horizontal will be displayed.

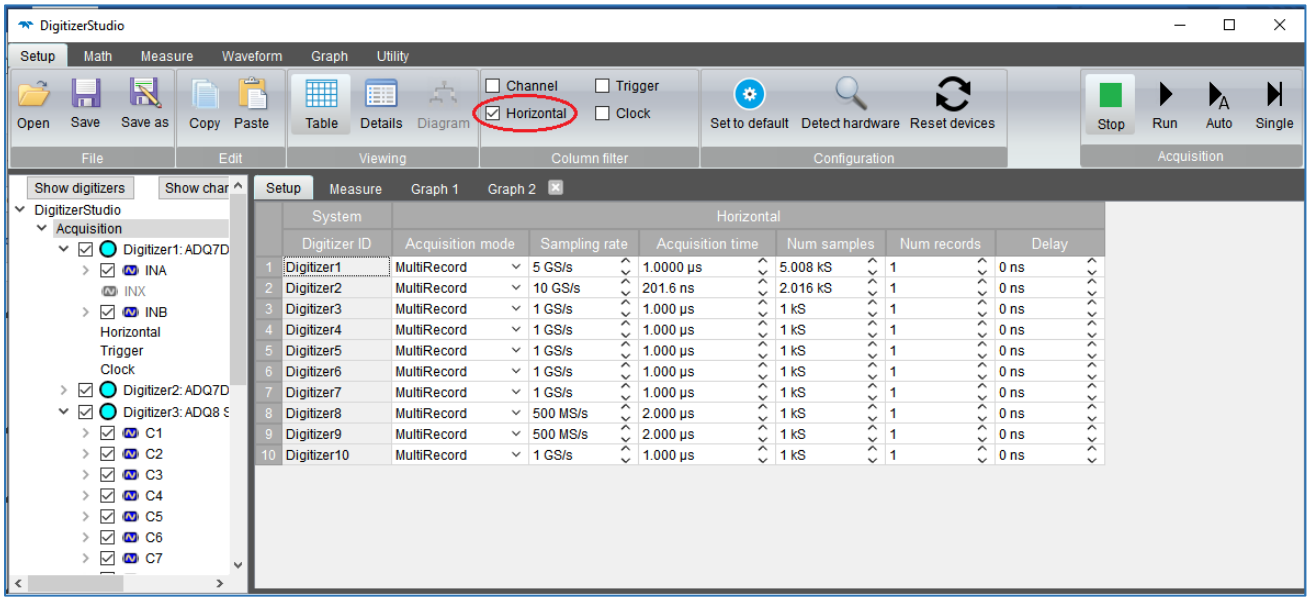


*Figure 21: Horizontal Filter*

### 1.4.4 Clock

If Clock is selected, all properties under Clock will be displayed.

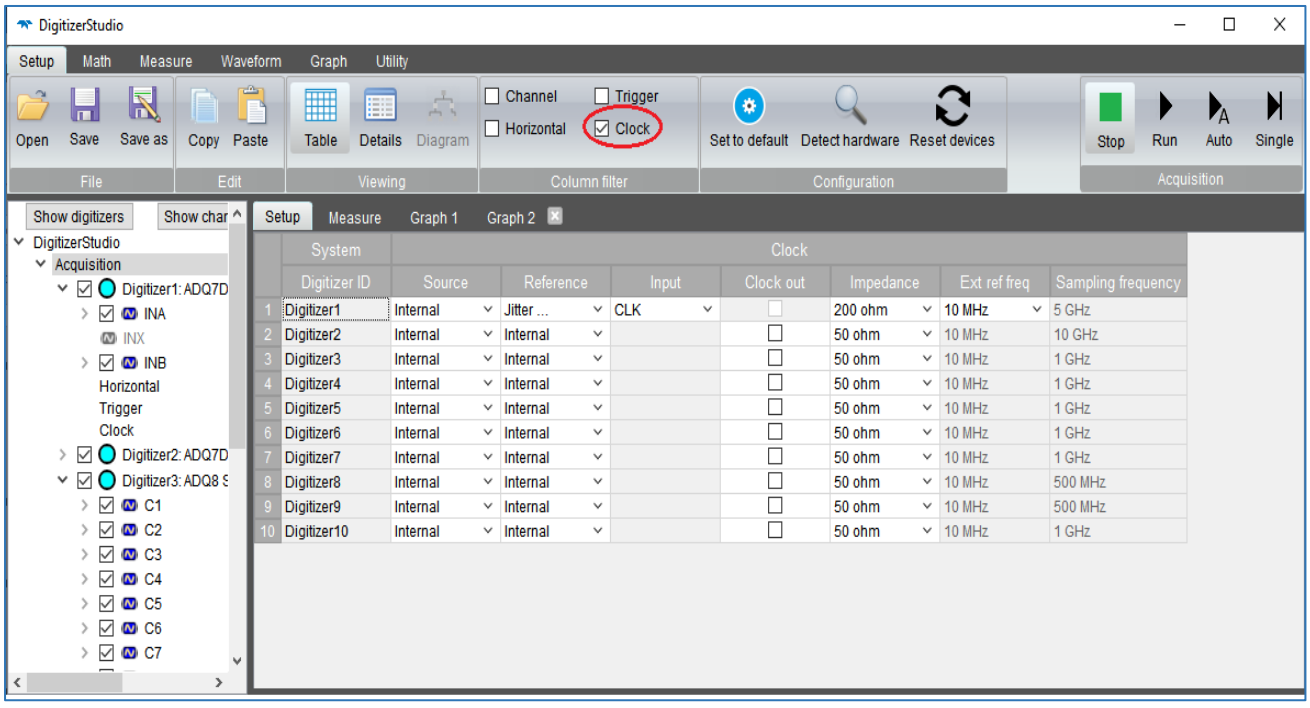


*Figure 22: Clock Filter*

## 1.5 Configuration

### 1.5.1. Set to Default

On click of this button, all properties of the application are set to the default value. It will make the setup same as it was started for the first time.

### 1.5.2. Detect Hardware

This detects a hardware connected to the host and adds or removes it from the tree. For instance, based on the current status of the system, it will add or remove hardware from the system.

### 1.5.3. Reset Devices

On click of this button, all connected devices will reset.

# 2. Math

Math tab in the Digitizer Studio has the functionalities below:

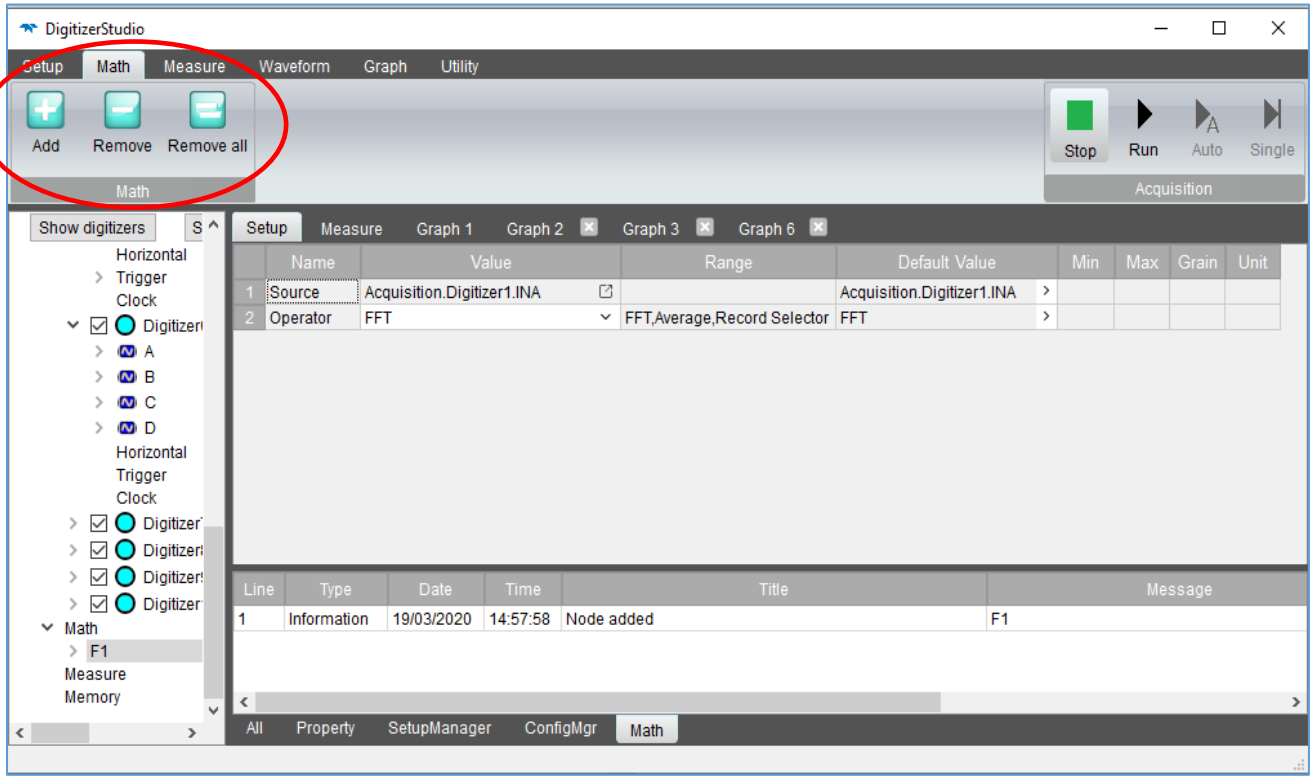


*Figure 23: Math*

### 2.1 Add

There are three Math operations supported – FFT, Average and Record Selector. The Add function is used to add any of the operations on the selected source. Math node (F1, F2, etc) is added to left tree. By default, FFT is added with the first channel of the first digitizer as source. User can choose the Math node(F1) from left tree and from the detail mode can change the source and operator.

### 2.2 Remove

The Remove function is used to remove any of the operations FFT, Average or Record Selector that have been applied to the selected source. The selected node from the left tree will be removed when Remove button is clicked. If the Math node (F1, F2) is not selected from the left tree, the button will not affect anything.

### 2.3 Remove All

The Remove All function is used to remove all the Math nodes (FFT, Average and Record Selector) added in the system.

## 3. Measure

Measure tab in the Digitizer Studio has the functionalities below.

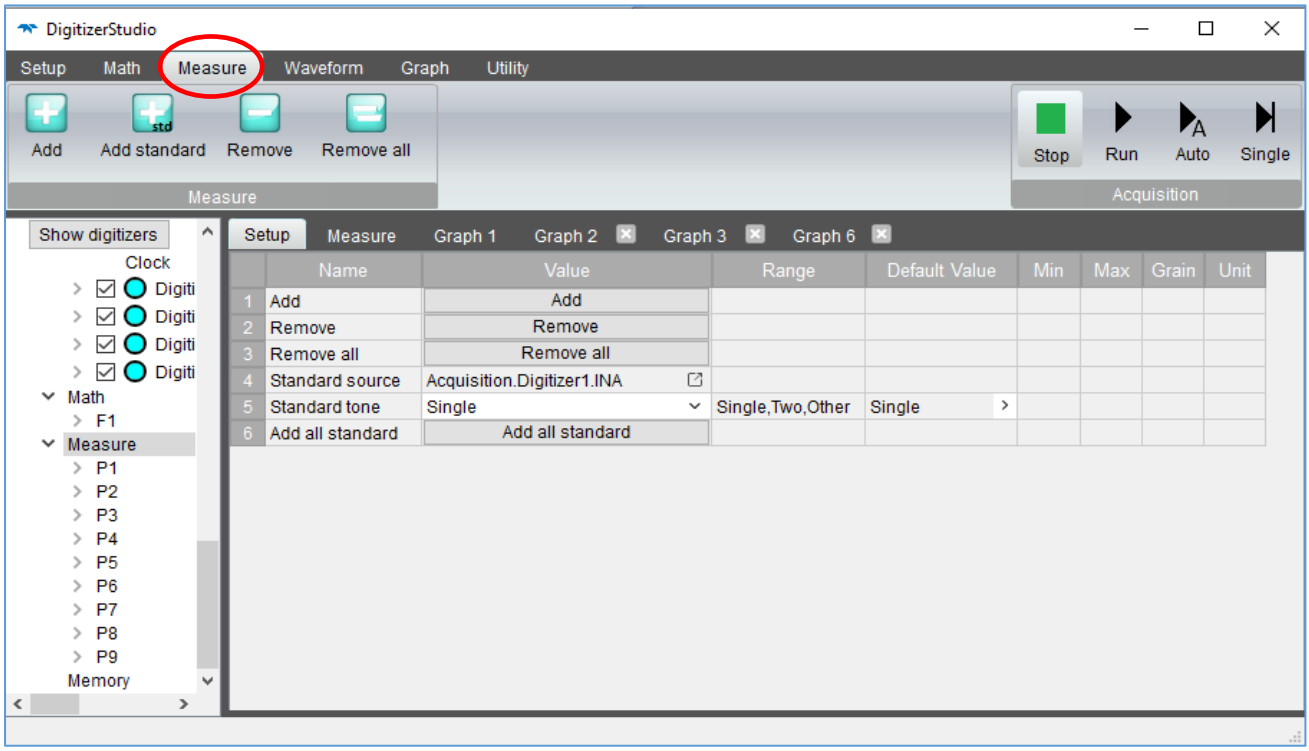


*Figure 24: Measure*

The below three standard tone analysis are supported by the Teledyne Digitizer simulator:

| Analysis Type | Description |
|---|---|
| Single-tone | It supports analysis of codes, DC Power, range, fundamental tone, SFDR, SNDR, THD and SNR. |
| Two-tone | It supports analysis of codes, DC Power, range, fundamental tone1 and 2, SFDR and SNDR |
| Other | It supports analysis of codes, DC Power, range and Power Max. |

### 3.1. Add

This functionality is used to add the measured analyses. By default it adds Codes Measure with the first channel of the first digitizer as source. User can change the measure by changing operator from detail list.

## 2.4 Add Standard

This functionality adds the measures that are supported by the Teledyne Digitizer simulator. These measures are based on the standard tone selection as indicated in the *Table1* above.

### 3.2. Remove

This functionality removes a selected measure from Hierarchy Tree view and measure table. On click of the button it removes measure node which is selected either from left tree or from measure table.

### 3.3. Remove All

This functionality removes all the measures from Hierarchy Tree view and measure table.

### 3.4. Measure Tab

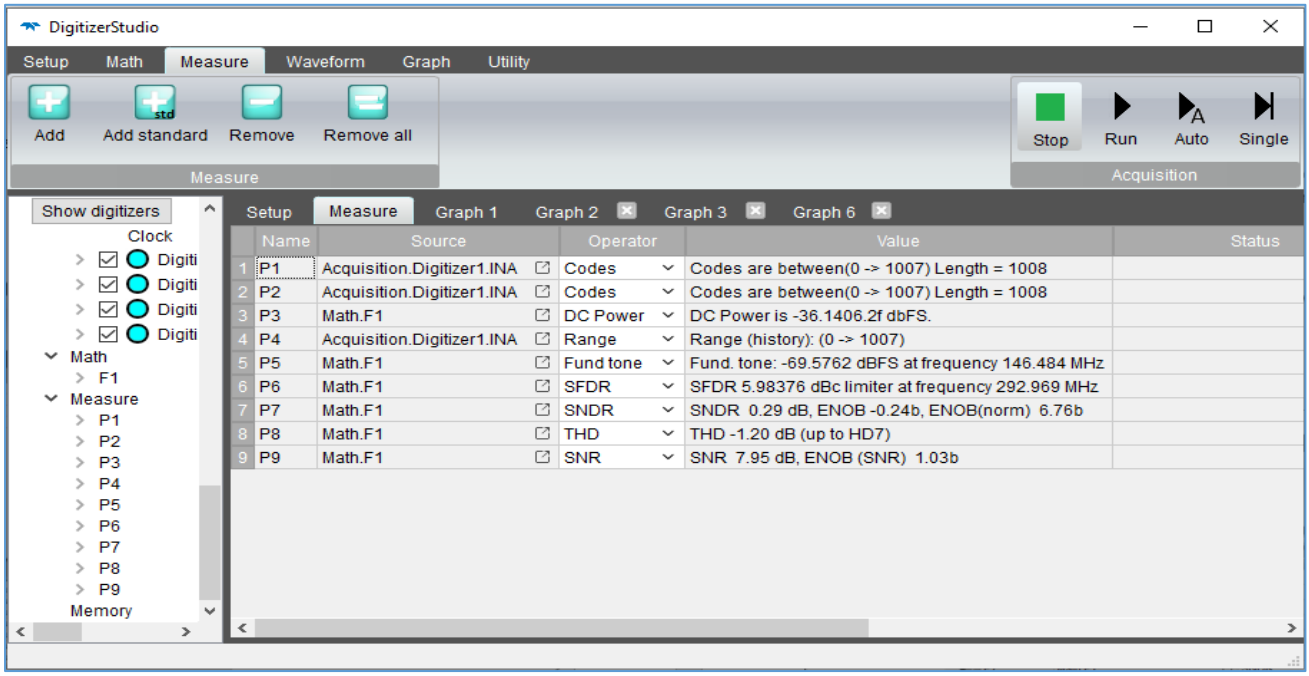


*Figure 25: Measure Tab*

The Measure tab lists out all the measures available. The table has below columns:

1 **Name**:
This displays name of the measure. For instance, in above image *Name* of the measures ae P1, P2, P3.

2 **Source**:
Source displays the source of the measure. User can select the source of a measure by clicking on the right button in a cell.
3 **Operator**:
Operator displays the operator of measure. User can change the operator of the measure.
**4 Value:**
Value displays the value of measure.
5 **Status**:
Status displays the status of a measure in case the values are not calculated.

# 4. Waveform

Waveform tab in the Digitizer Studio has the functionalities below:

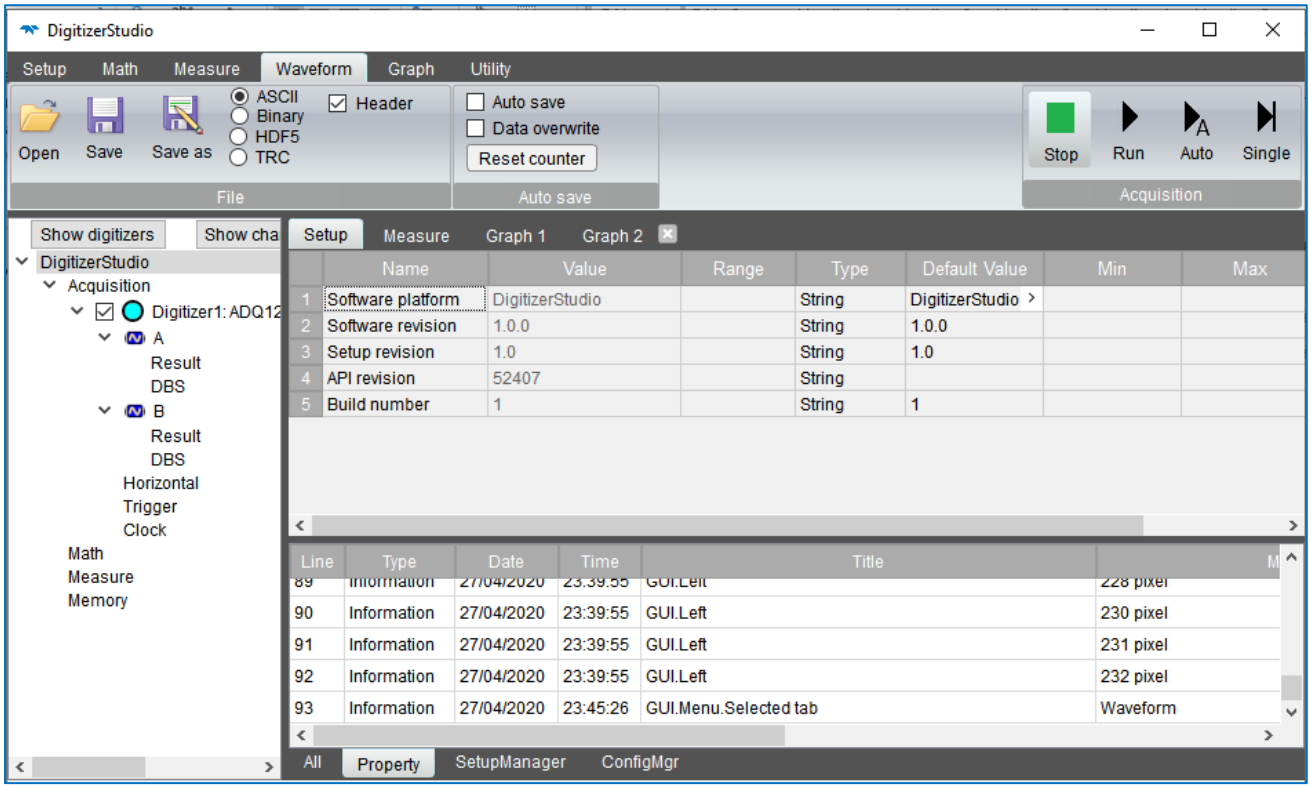


*Figure 26: Waveform*

## 4.1.File

### 4.1.1. Open

Open functionality is used to open any ASCII, Binary, HDF5 or TRC waveform file with or without a header. When file is opened, one memory node creates and appears in left tree view under Memory node. Plot of the memory automatically added in the focused graph. If the focused tab is not Graph, it is added in Graph 1.

#### 4.1.2. Save

Save is used to save all the digitizers waveform data into file. The file type can be chosen from available types described in 1.1.4. The user gets the option to include header or not. The waveform data will save in ASCII with header included by default.

#### 4.1.3. Save As:

Save As is used to save waveform data at desired destination location.

#### 4.1.4. File Types

The File Types that can be used to save the digitizer waveform are:

i. ASCII
ii. Binary
iii. HDF5
iv. TRC

One can include the data with Header or without Header by checking or unchecking the Header checkbox.

### 4.2. Auto Save

#### 4.2.1. Auto Save

If Auto Save has been checked during Acquisition, files for all digitizers gets saved at *C:\SP Devices\DigitizerStudio\Waveform*.

#### 4.2.2. Data Overwrite

If Data Overwrite is selected, the same autosaved file gets overwritten. If the Data Overwrite option is not selected, a new file with an incremental index number will be generated every time.

#### 4.2.3. Reset Counter

The Reset Counter option is used to reset the counter of the file name.

*C:\SP Devices\DigitizerStudio\Waveform\yyyy_mm_dd_hh_mm_ss\Digitizer#* when the Data Overwrite is not enabled. It resets the index of Auto Save.

## 5. Graph

Graph tab in the Digitizer Studio simulator has the functionalities below:

## 5.1. Graph

### 5.1.1. Add

To add a graph, click on the Add button. It adds one more tab – Graph2 to the existing tab Graph1.

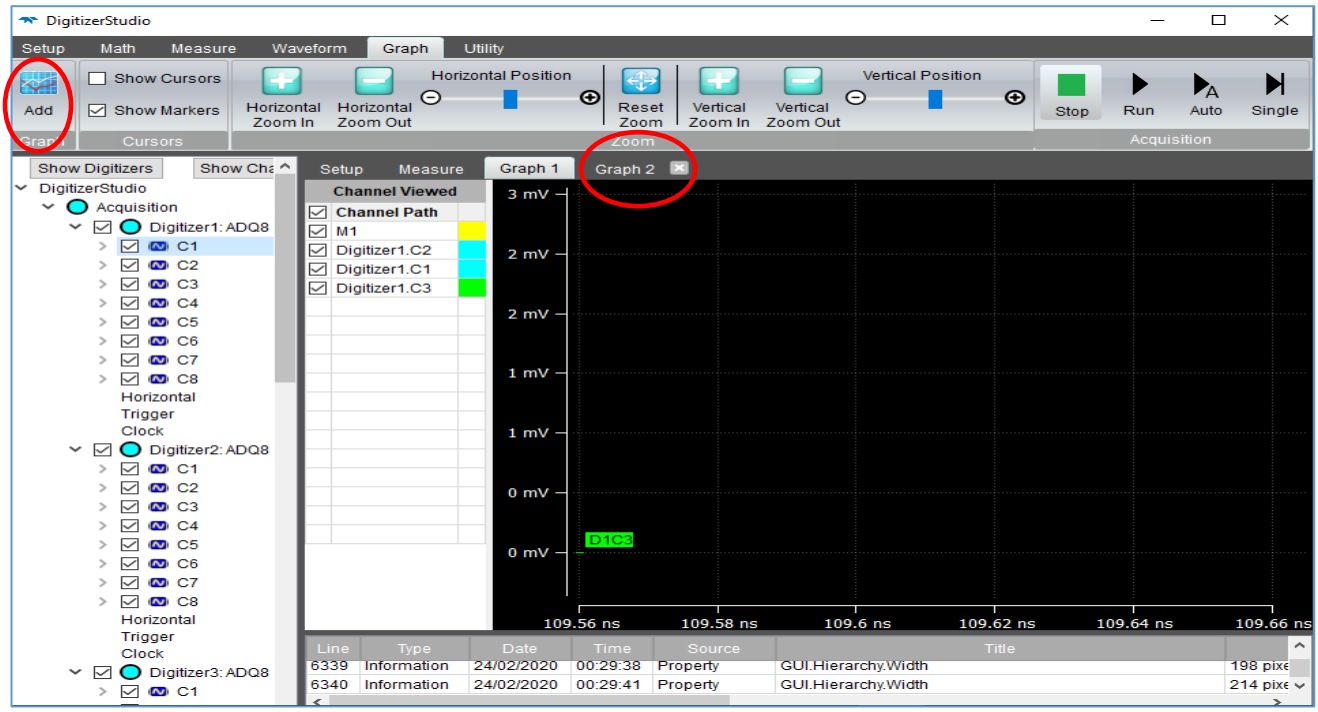


*Figure 27: View multiple graph*

### 5.1.2. Remove

To remove a graph, click on the close button on the right corner of that tab.

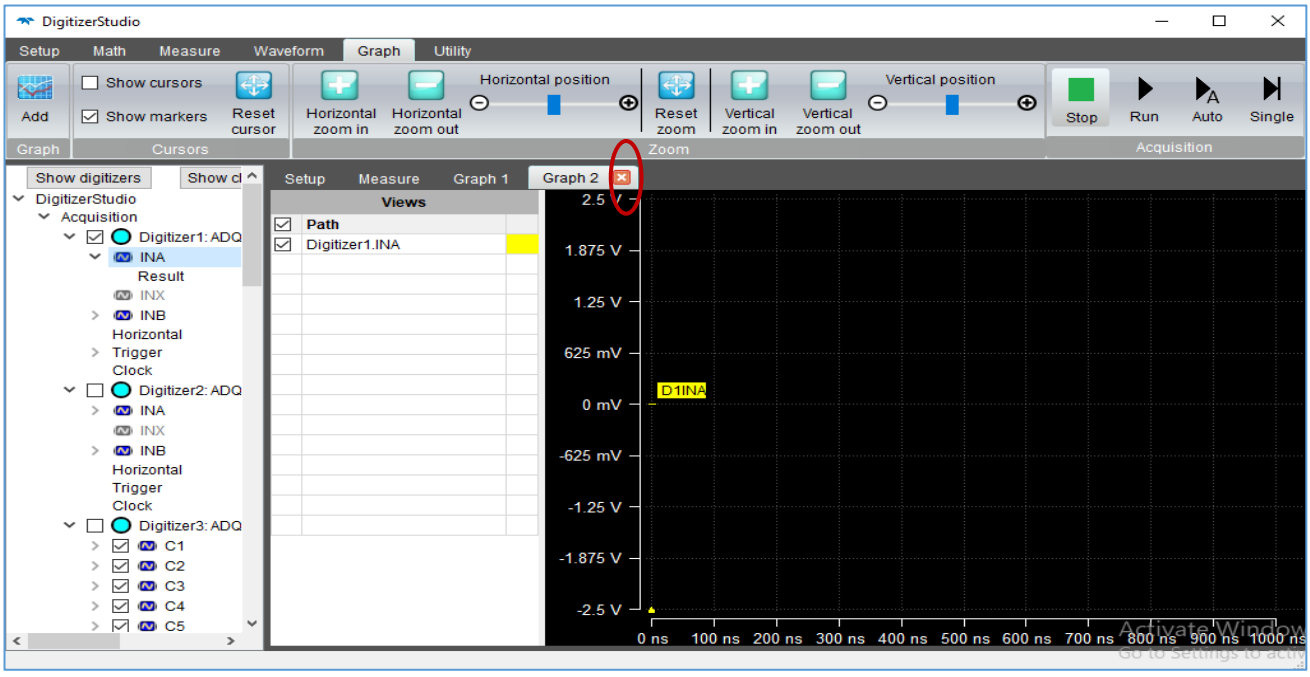


*Figure 28: Remove Graph*

## 5.2. View

### 5.2.1. Add

There are below ways to add channel in Graph for viewing. The pre-requisite to view the graph is acquisition should be done to capture the data.

- Drag and drop channel from the left tree to the middle of the graph tab.
- Right click on channel from left tree and select option – View in Graph. If there is only one graph tab – "Graph 1" exist, it adds channel to Graph-1. If there are multiple Graph tabs are available, it will open dialog for user to choose the Graph as shown in below pictures.

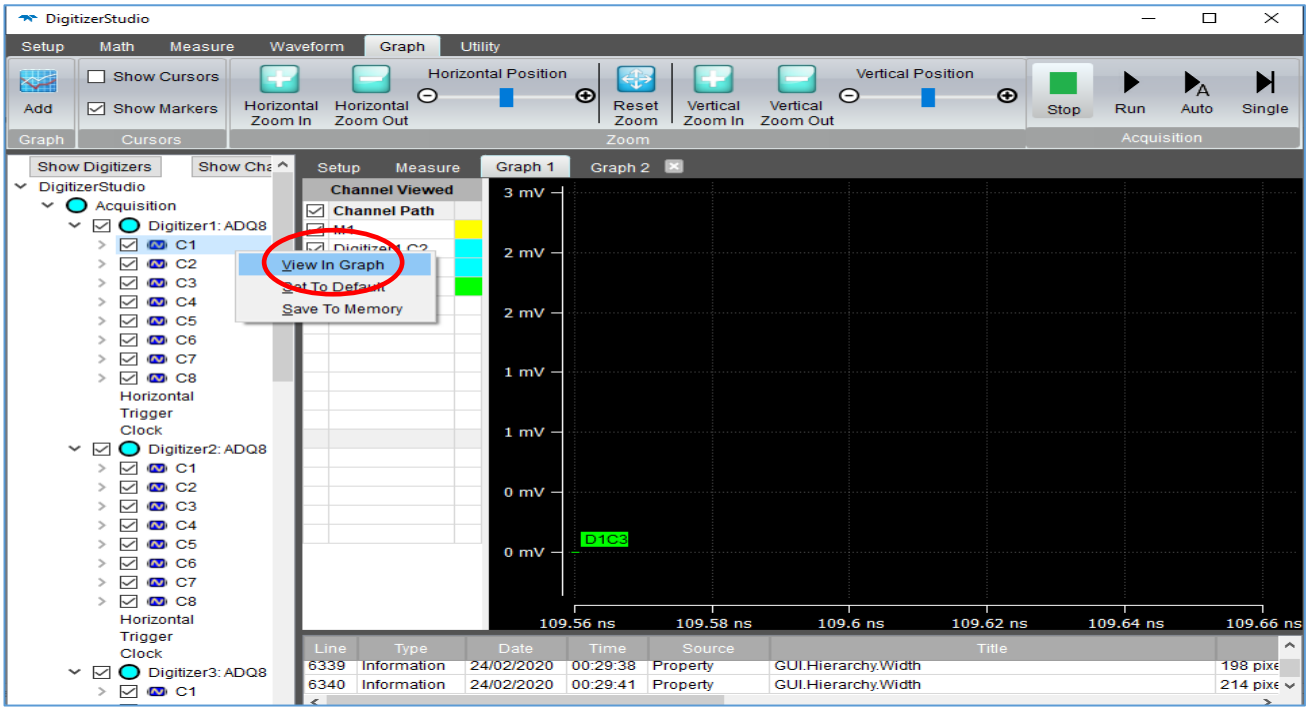


*Figure 29: Add view when only one graph*

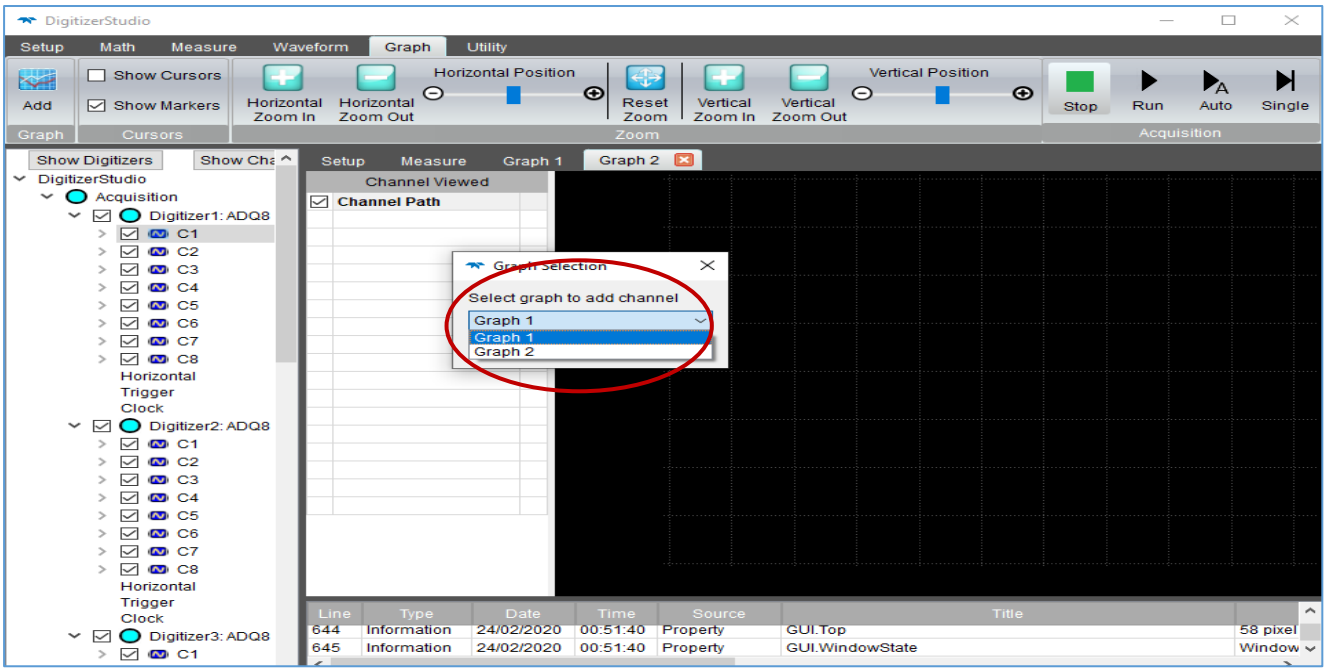


*Figure 30: Graph Selection*

### 5.2.2. Remove

To remove a view, right click on the view/channel and click on View off.

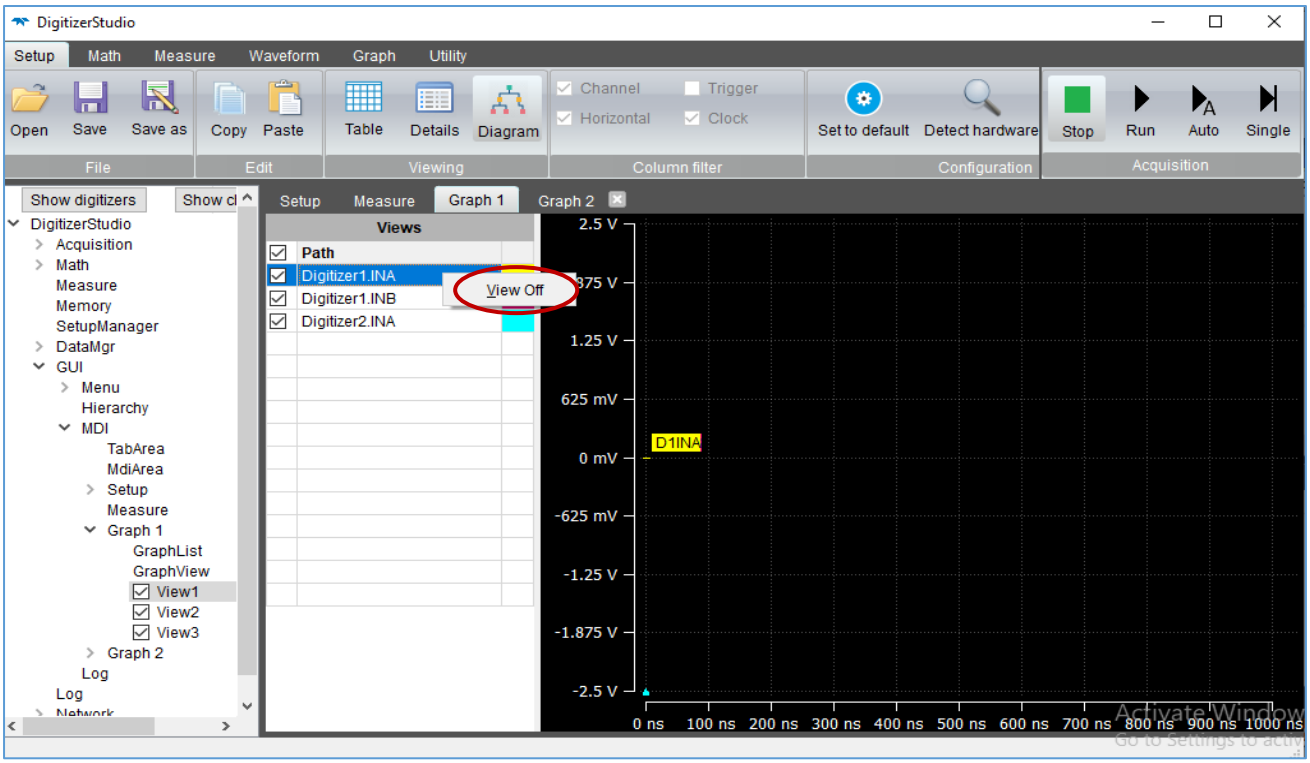


*Figure 31: Remove View*

### 5.2.3. Enable View

Views can be enabled to show the plot in graph using the checkbox before the view path in the graph list.

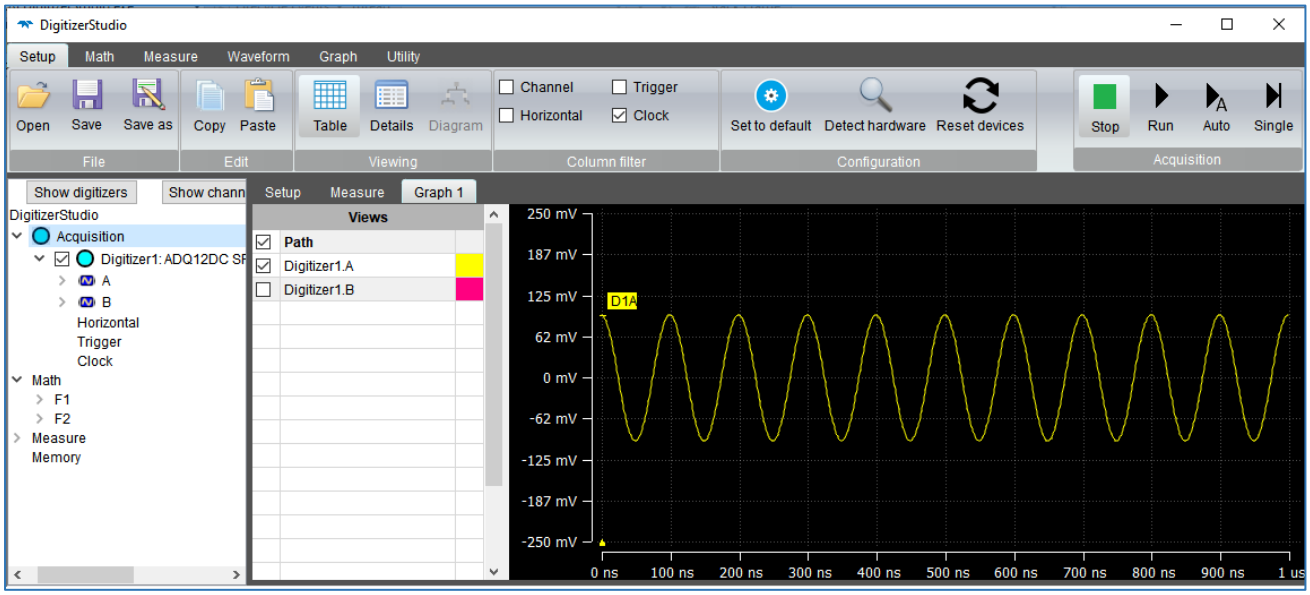


*Figure 32: Enable and Disable View*

### 5.2.4. Disable View

Views can be disabled to hide the plot in graph using the checkbox before the view path in the graph list. In above image the first channel is disabled so it's plot is not visible in Graph.

### 5.2.5. Record Index

When number of record for the channel is more than 1, Record index column appears in the Views. User can change the record index and plot will change according to record index.

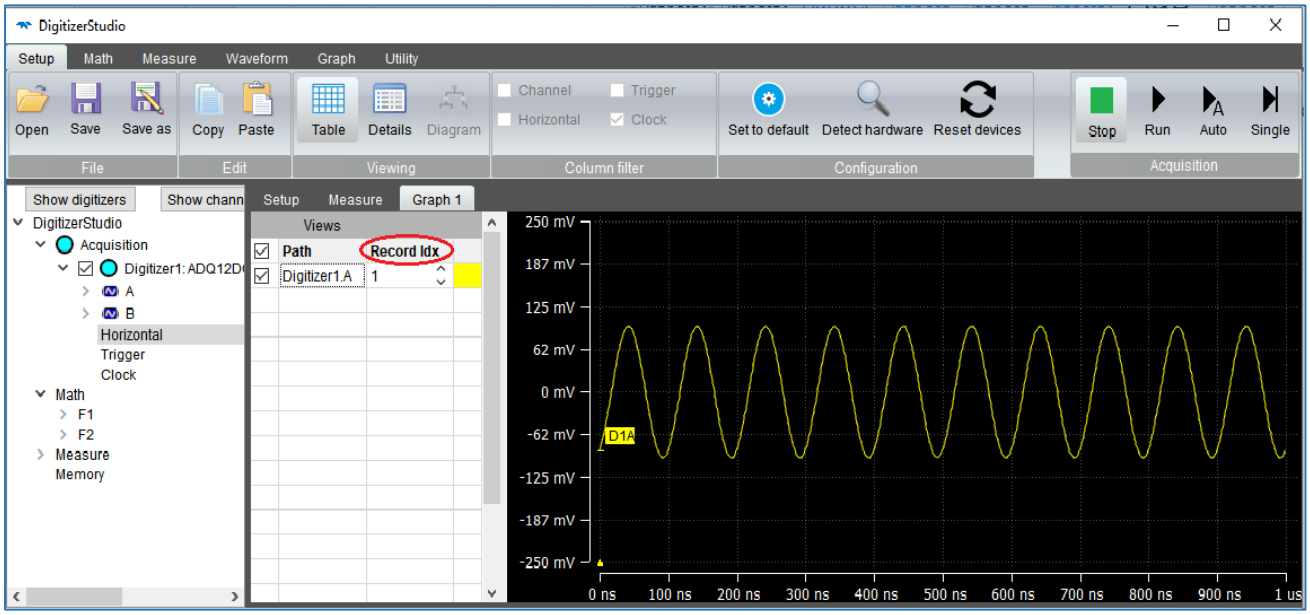


*Figure 33: Channel Record Index*

### 5.2.6. Color

Multiple views in graph list are shown in graph are identified by their color. Color of view can be changed on clicking on the color picker right next to the view name in graph list.

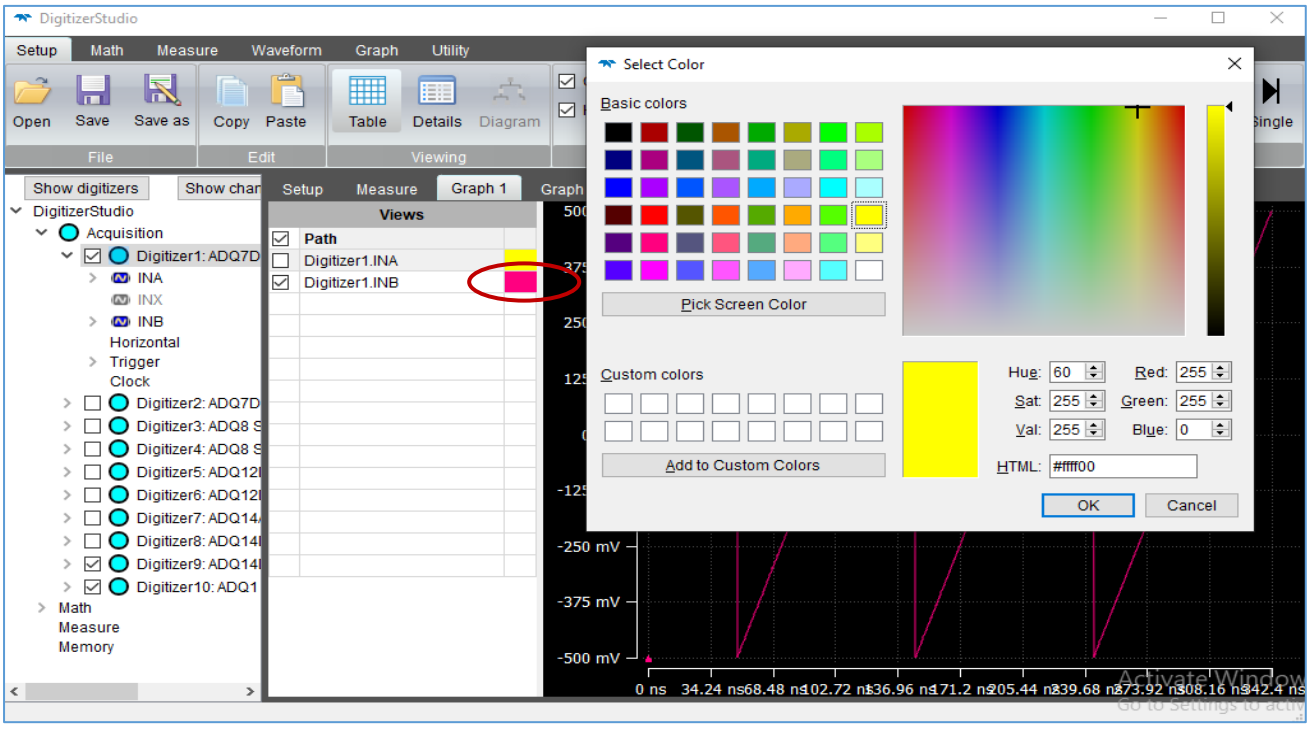


*Figure 34: Color*

## 5.3. Cursors

### 5.3.1. Show Cursors

When Show Cursors is checked, it will display vertical and horizontal cursors on plotted channel as shown in below image. The values on the X and Y axes and cursor information are displayed below the plot. The cursors can be moved to see the values of point on plot and the different cursor values are changed accordingly in bottom panel.

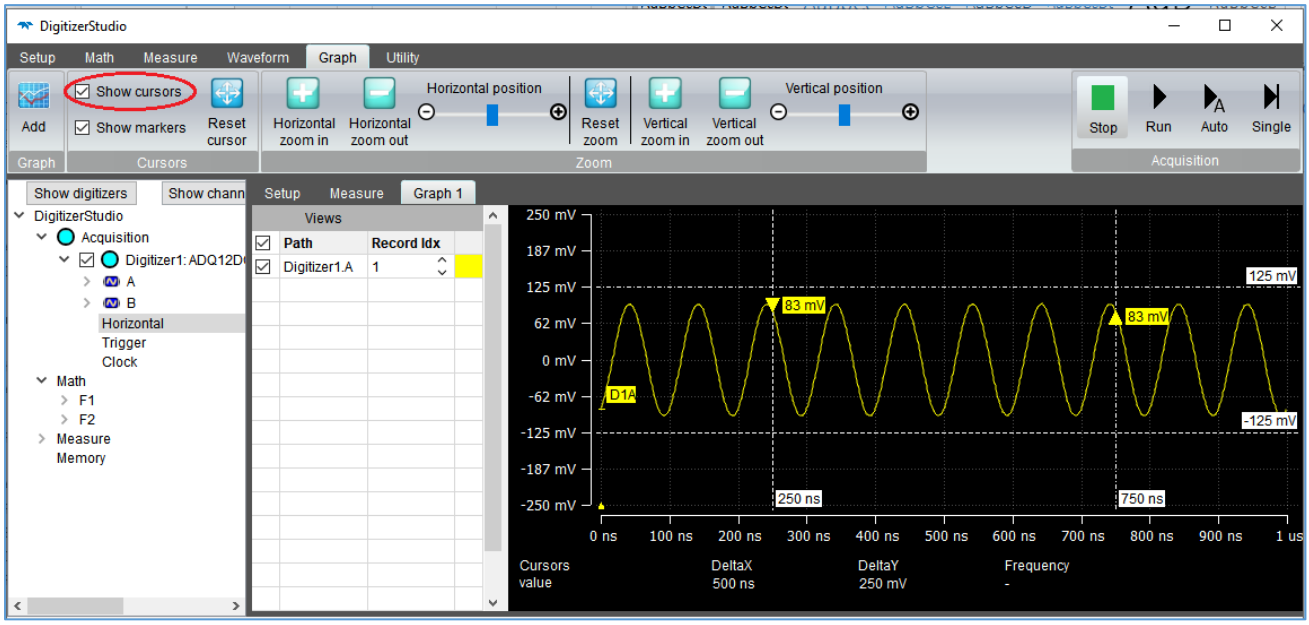


*Figure 35: Show Cursor*

### 5.3.2. Reset Cursors

On click of this button, cursor position will reset default position i.e. 1/4th and 3/4th of graph.

## 5.4. Markers

### 5.4.1. Show Global Markers

Markers are for FFT only. When FFT plot is plotted in Graph, user can enable markers to see harmonics marker, SFDR and Fundamental Tone values calculated on FFT. When enabled, markers for all FFT are shown in graph.

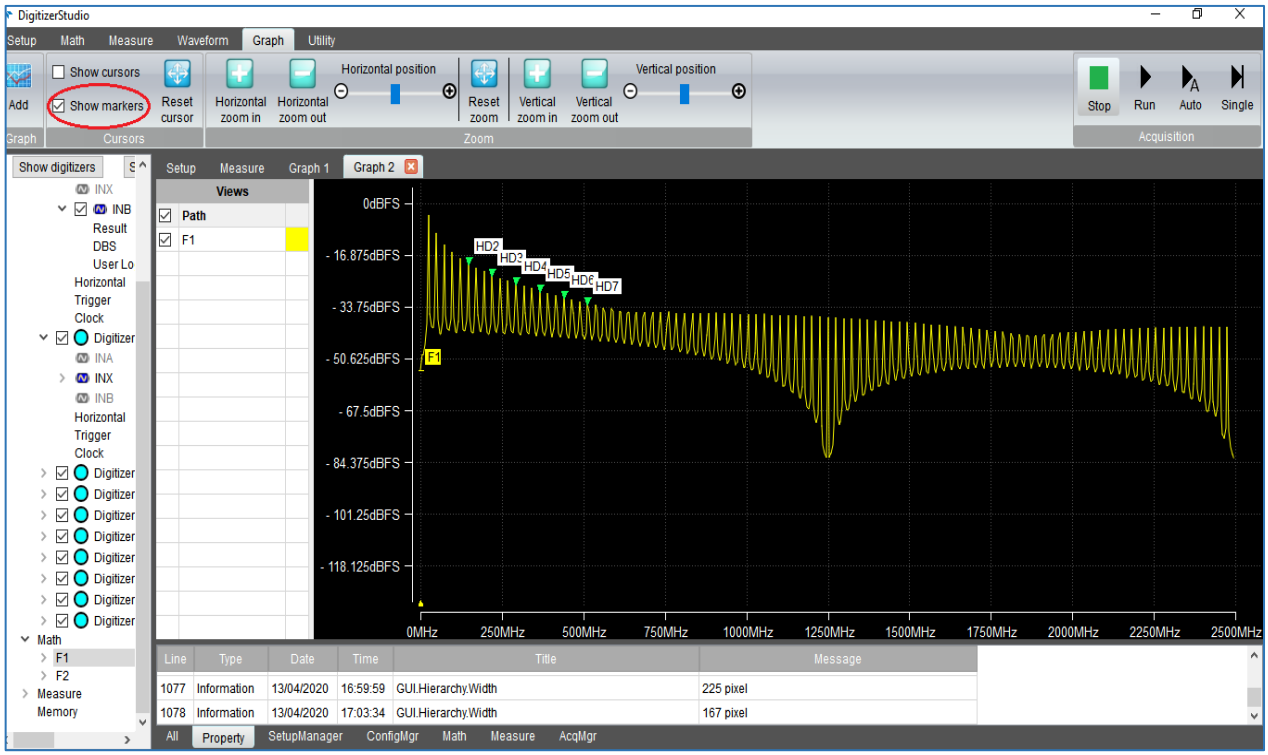


*Figure 36: Show Markers*

### 5.4.2. Local Marker

User can also enable/disable marker for individual FFT from Setup table. When show markers in graph is enabled and marker is disabled for a particular FFT from Setup table, then markers for all FFT are visible in graph except for that particular FFT.

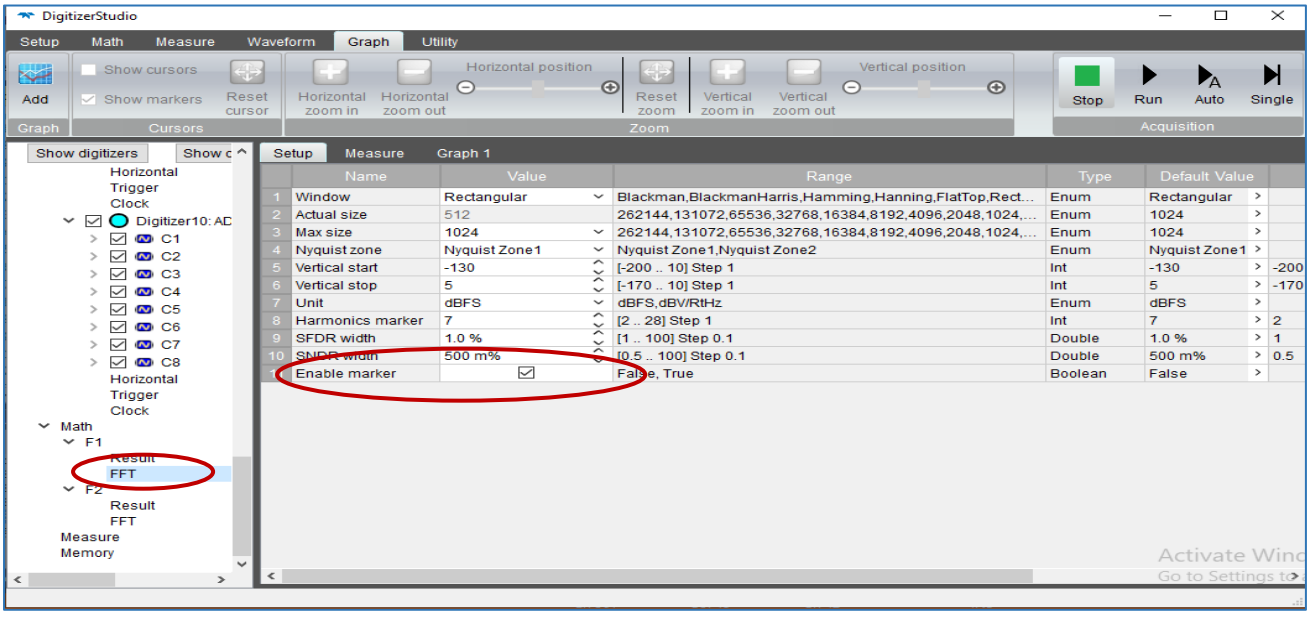


*Figure 37: Enable local Marker settings*

## 5.5. Zoom

### 5.5.1. Horizontal Zoom In

On pressing Horizontal Zoom In, it will zoom in the horizontal scale and hence the plot will be zoomed-in horizontally.

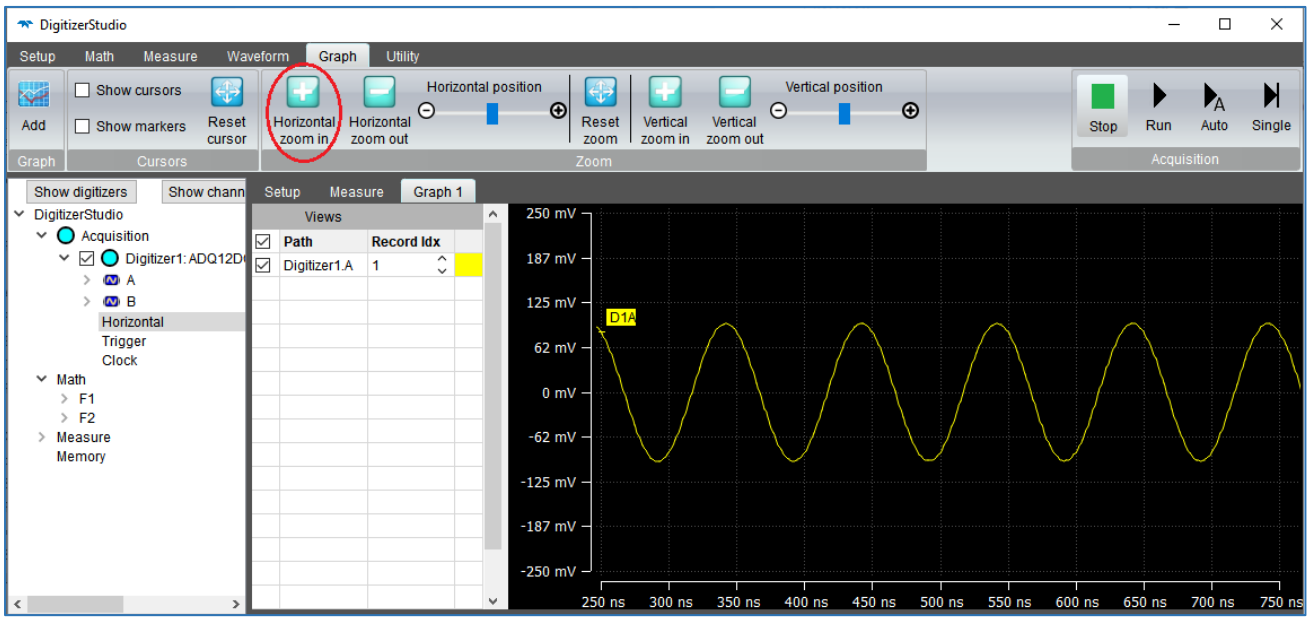


*Figure 38: Horizontal Zoom In*

### 5.5.2. Horizontal Zoom Out

On pressing Horizontal Zoom Out, it will zoom out the horizontal scale and hence the plot will be zoomed-out horizontally.

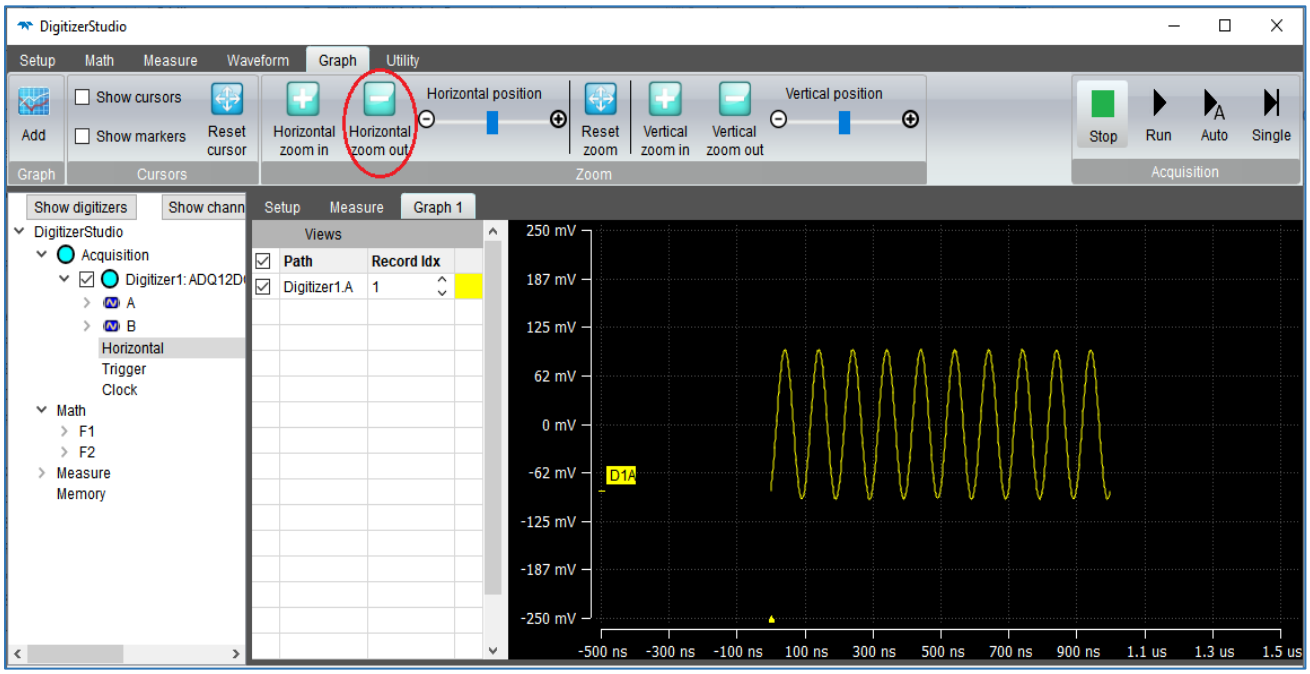


*Figure 39: Horizontal Zoom Out*

### 5.5.3. Horizontal Position

On shifting the slider on the Horizontal Position, it shifts the graph on the X axis.

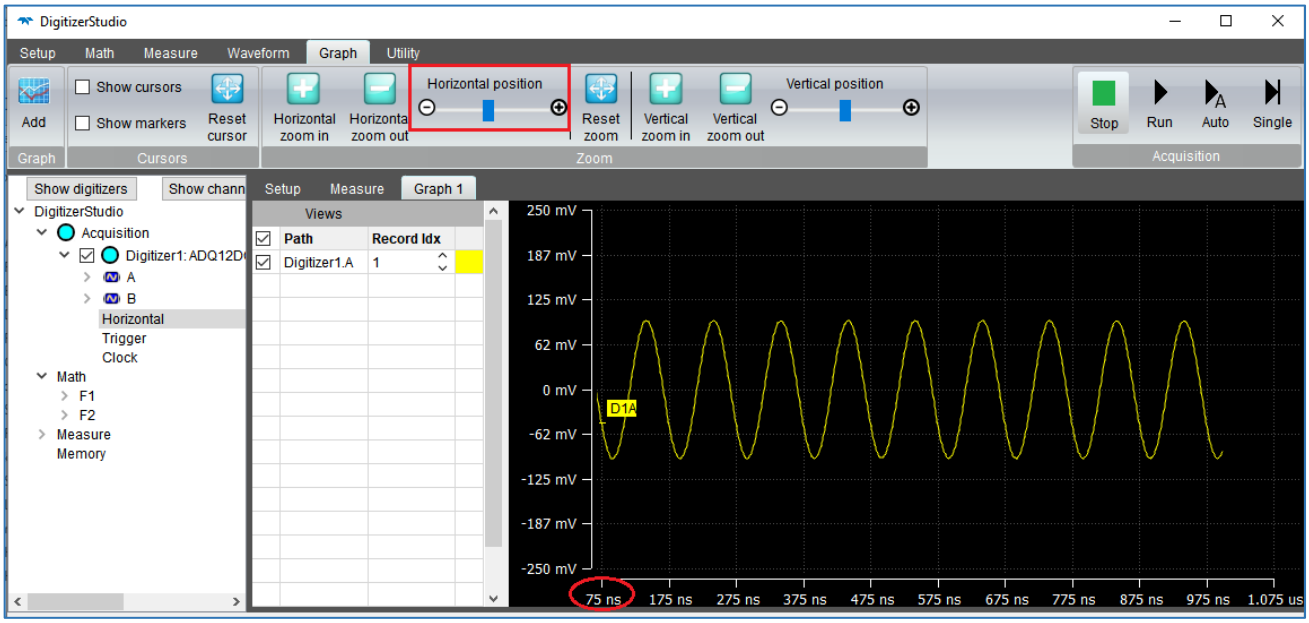


*Figure 40: Horizontal Position*

### 5.5.4. Reset Zoom

Reset Zoom resets the graph scale to the original scale.

### 5.5.5. Vertical Zoom in

On pressing Vertical Zoom In, it will zoom in the vertical scale and hence the plot will be zoomed-in vertically.

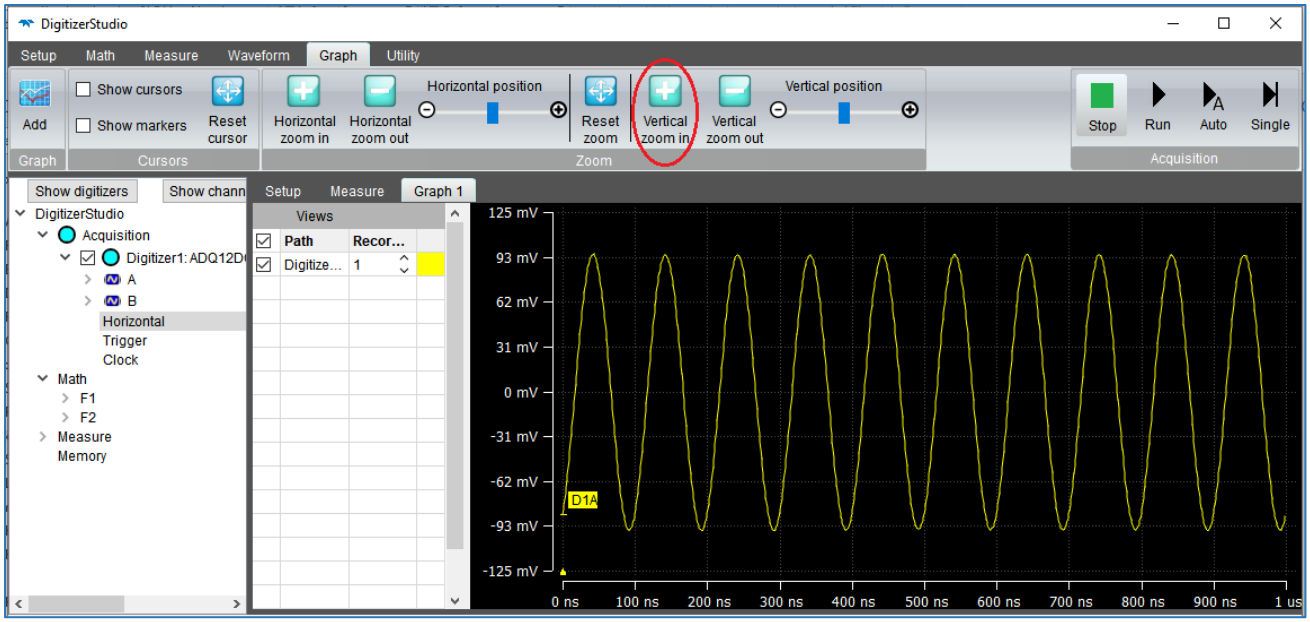


*Figure 41: Vertical Zoom-In*

### 5.5.6. Vertical Zoom Out

On pressing Vertical Zoom Out, it will zoom out the vertical scale and hence the plot will be zoomed-out vertically.

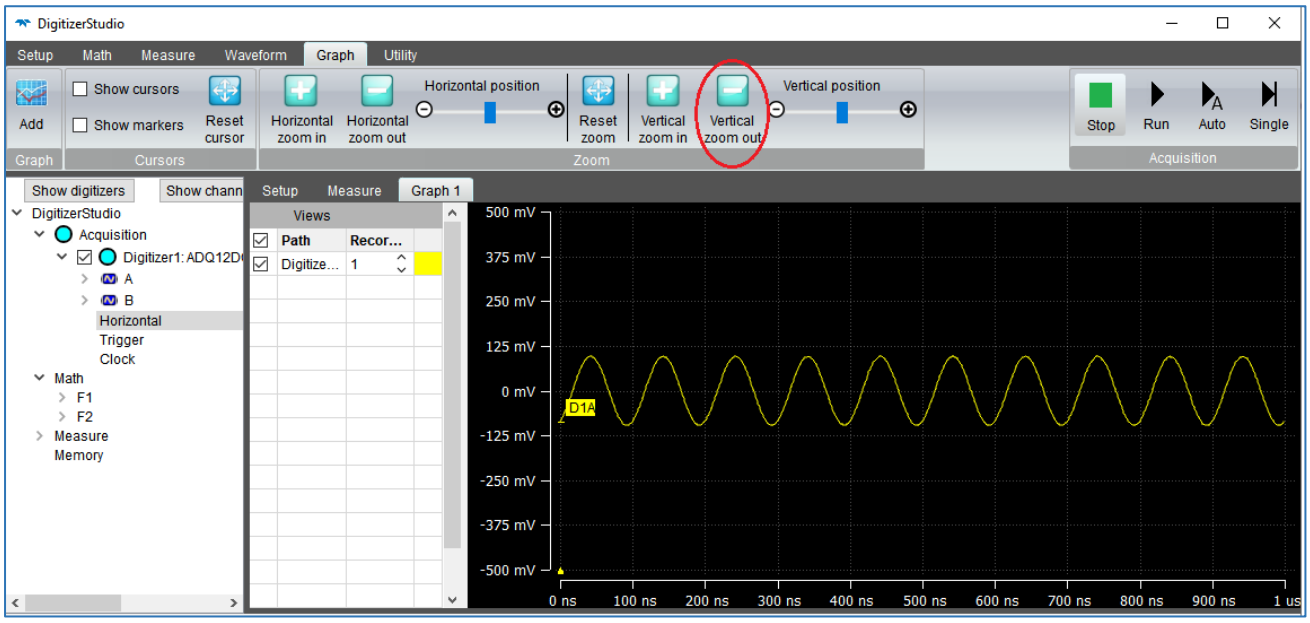


*Figure 42: Vertical Zoom-out*

### 5.5.7. Vertical Position

On shifting the slider on the Vertical Position, it shifts the graph on the Y axis.

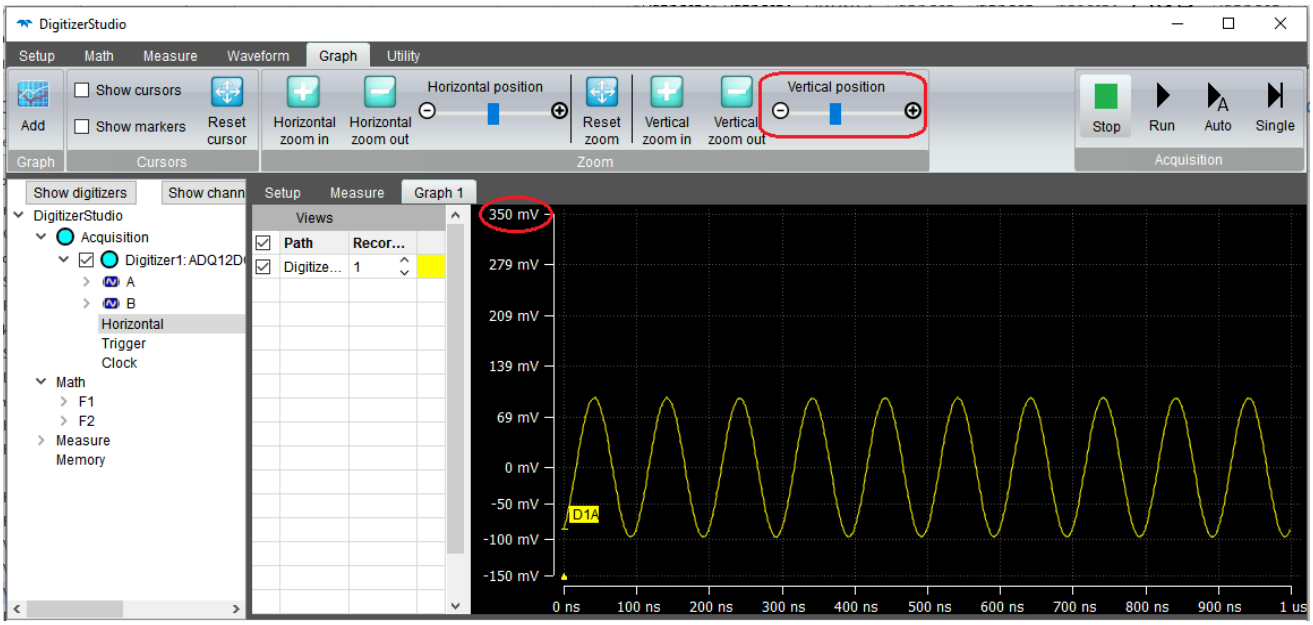


*Figure 43: Vertical Position*

### 5.5.8. Drag Rectangle

User can draw a rectangle on plotted graph by left click and dragging the mouse. The plot under the rectangle will be zoomed in and dots for each point will be displayed if the points are less under the rectangle.

# 6. Utility

Utility tab in the Digitizer Studio has the functionalities below:

## 6.1. Window

### 6.1.1. Tabbed

If the Tabbed option is checked, all the windows will be shown in single window with different tabs as shown in below image. If the Tabbed option is checked, Cascade, Tile Horizontally and Tile Vertically are disabled.

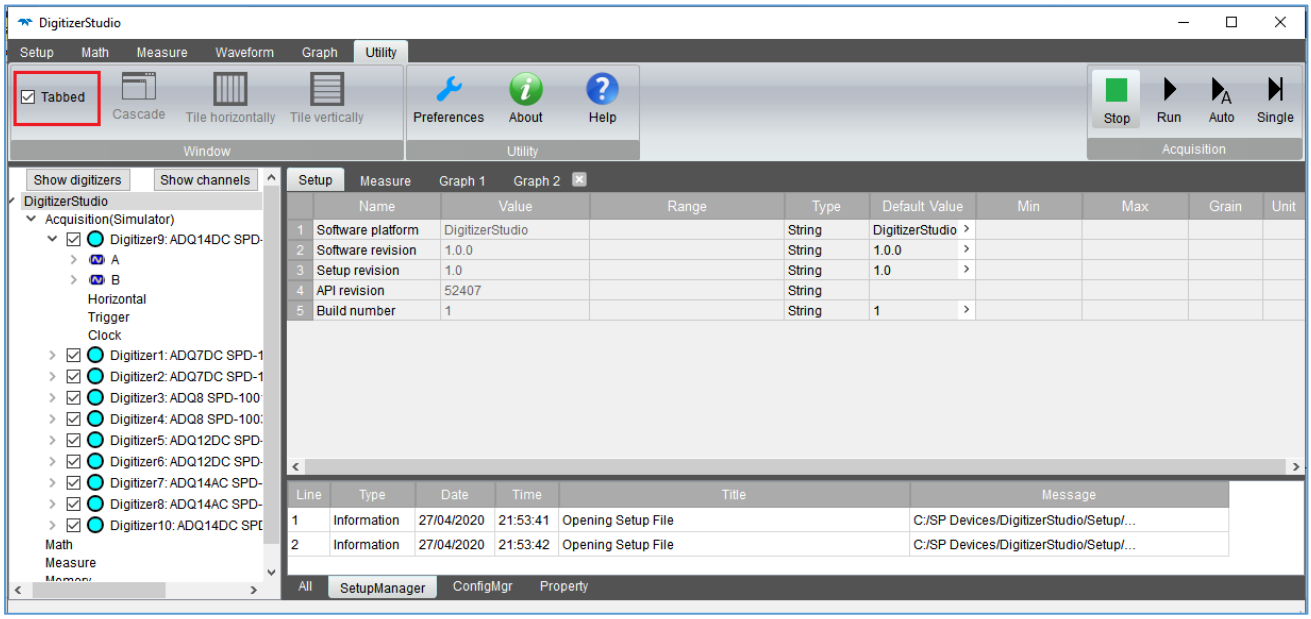


*Figure 44 : Utility - Tabbed*

If the Tabbed option is not checked, setup, measure, Graph1 will be shown in different windows.

### 6.1.2. Cascade

The Cascade utility is used to view the cascaded arrangement of windows in the Digitizer Studio. The 3 windows Setup, Measure and Graph 1 have been cascaded below.

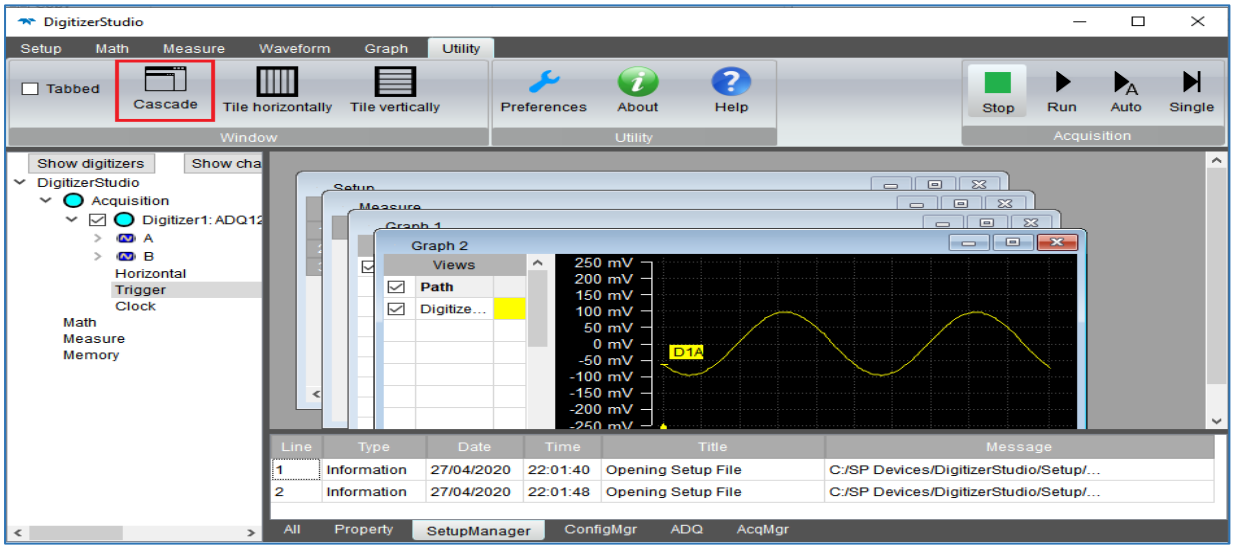


*Figure 45: Utility - Cascade*

### 6.1.3. Tile Horizontally

The Tile Horizontally utility is used to view the horizontal layout of multiple windows in the Digitizer Studio. The 3 windows Setup, Measure and Graph 1 have been displayed in a horizontal layout below

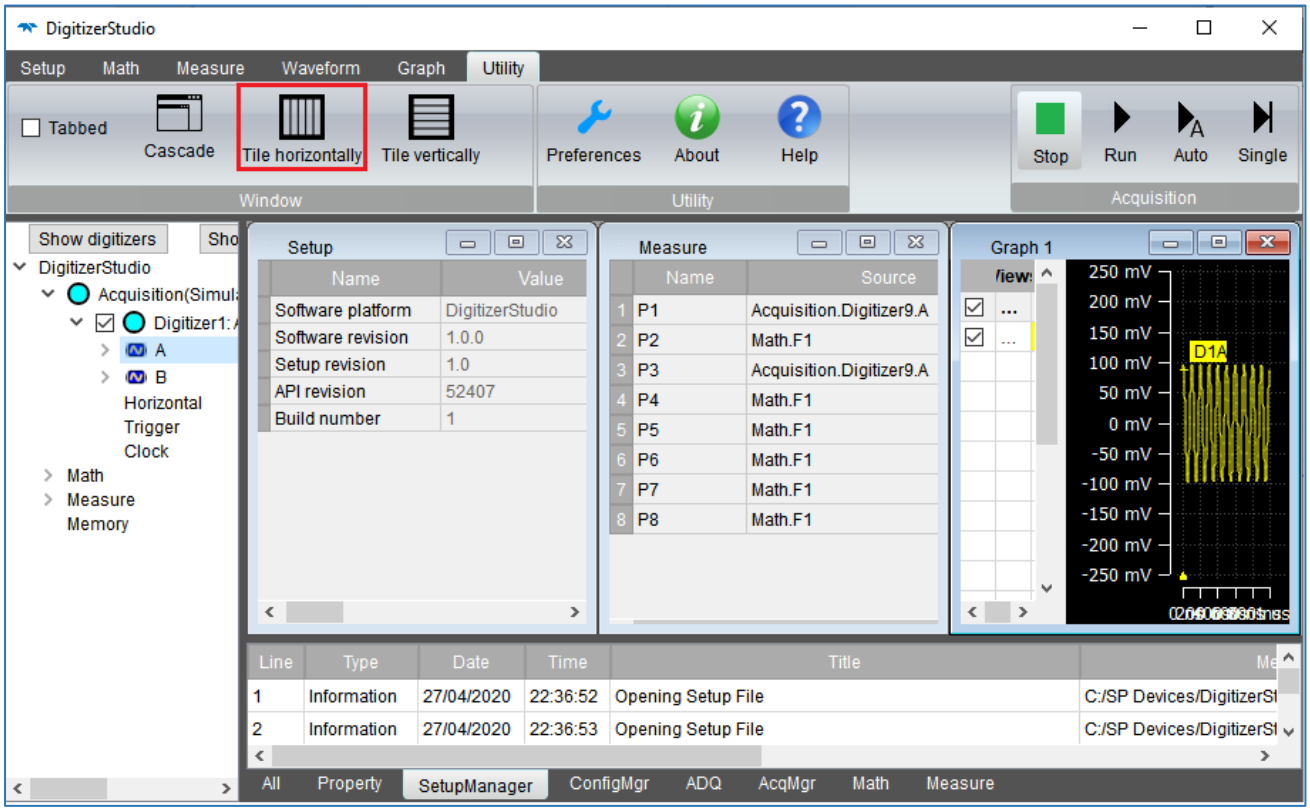


*Figure 46: Utility - Tile Horizontally*

### 6.1.4. Tile Vertically

The Tile Vertically utility is used to view the vertical layout of multiple windows in the Digitizer Studio. The 3 windows Setup, Measure and Graph 1 have been displayed in a vertical layout below

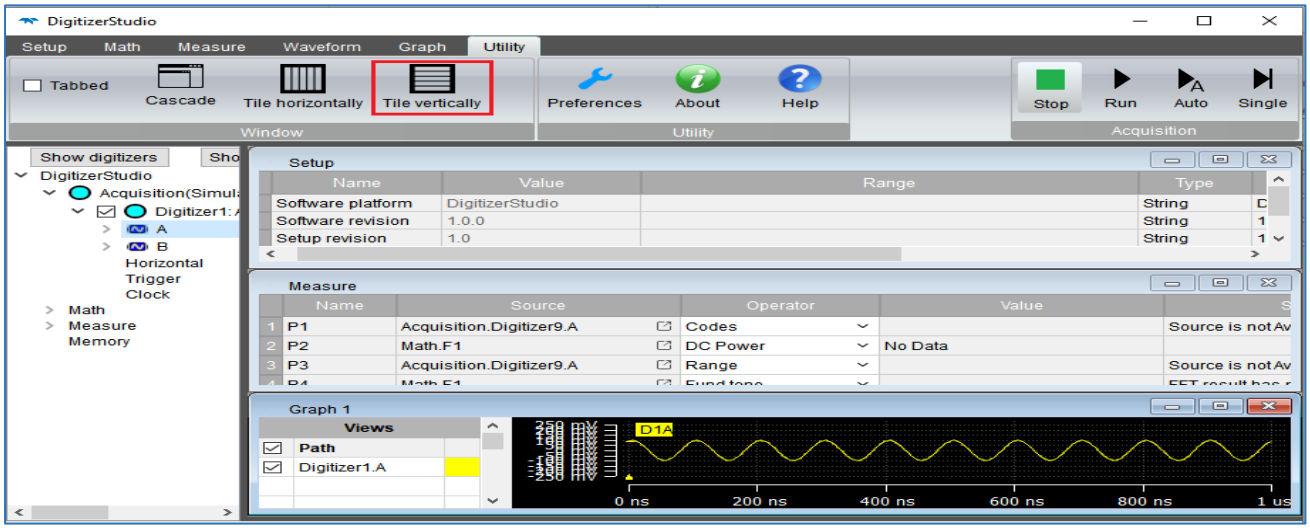


*Figure 47: Utility – Tile Vertically*

## 6.2. Utility

### 6.2.1. Preference

Preference menu opens a new dialogue box.

- Show Property type: In detail setup view, user can hide/show “Type” column using this preference.
- Set fixed scale divisions: Graph can be visible in Fixed division mode using this preference.

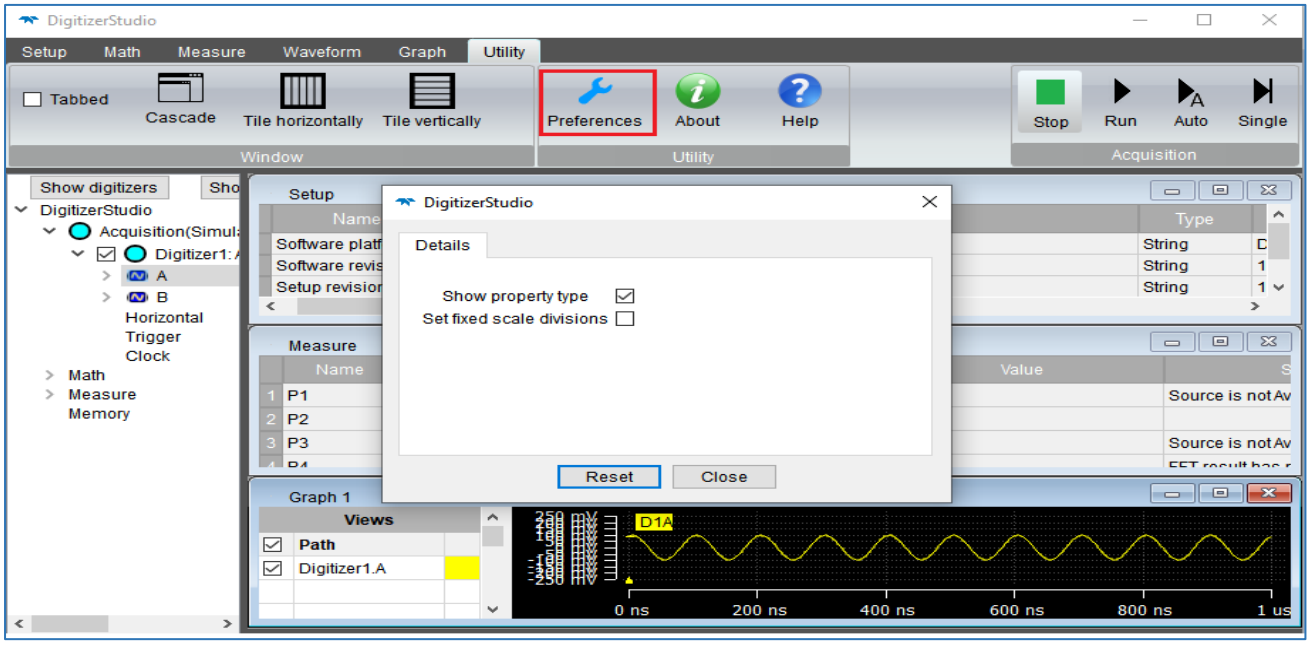


*Figure 48: Utility – Preference*

### 6.2.2. About

About button will provide information of Digitizer studio application.

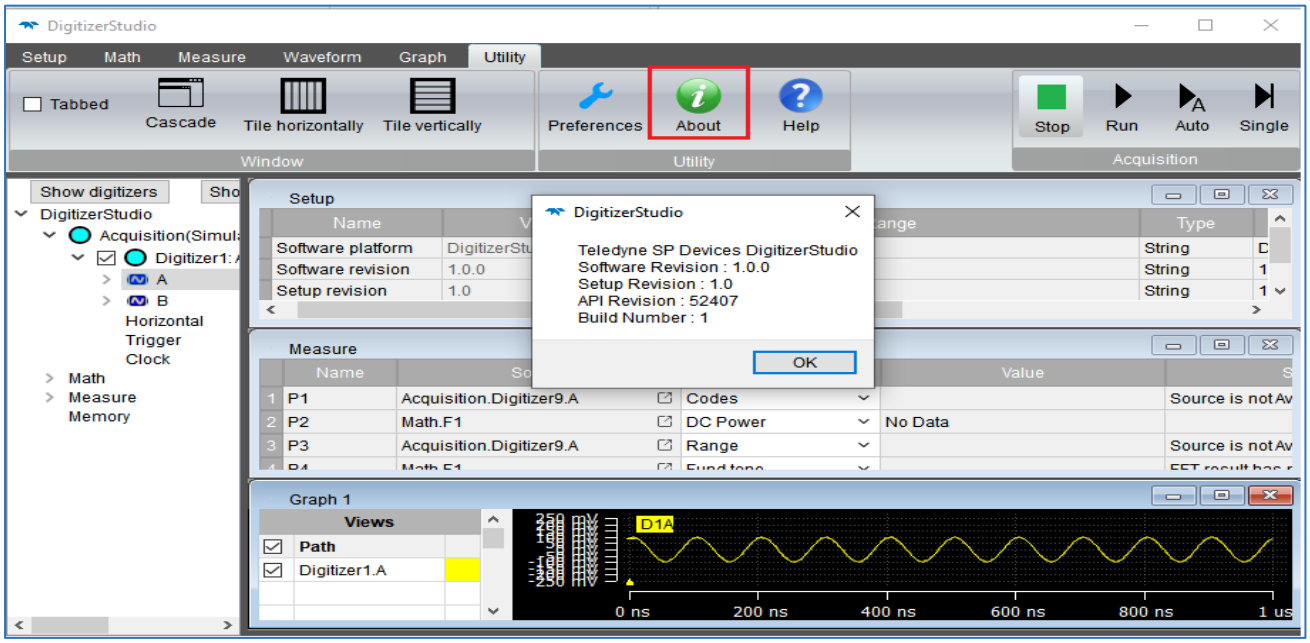


*Figure 50 : Utility - About*

# 7. Acquisition

Acquisition menu in the Digitizer Studio has the functionalities below:

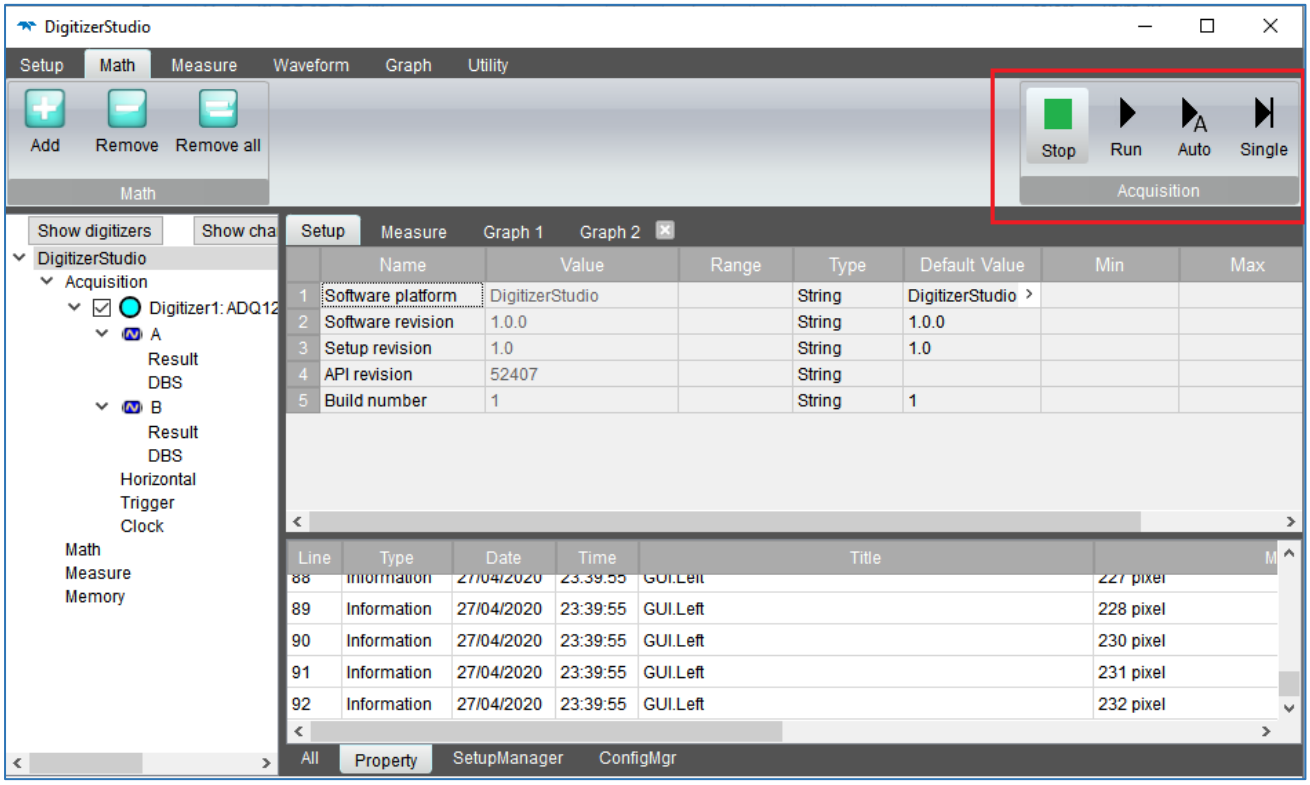


*Figure 51 : Acquisition*

## 7.1. Single

The Single button is used to capture a single batch from the connected and enabled digitizer. If a trigger condition has not occurred and the user presses “Single” again, it will initiate software trigger and capture data.

## 7.2. Run

The Run button is used to capture continuously until the “Stop” button has been pressed. If channels are plotted in graph, plots will be updated continuously as new data arrives from the digitizer.

## 7.3. Auto

The Auto button is used to capture continuously until the “Stop” button has been pressed. The difference between Run and Auto is if a trigger condition doesn’t occur within 200ms, it will initiate software trigger and capture data.

## 7.4. Stop

The Stop button is used to stop the operations of the Run button and the Auto button.

# 8. Context Menu of Hierarchy

## 8.1. Acquisition Context Menu

The context menu for Acquisition has the functionality *Set to Default*. This option allows the user to set the properties of Acquisition and its children to its default value.

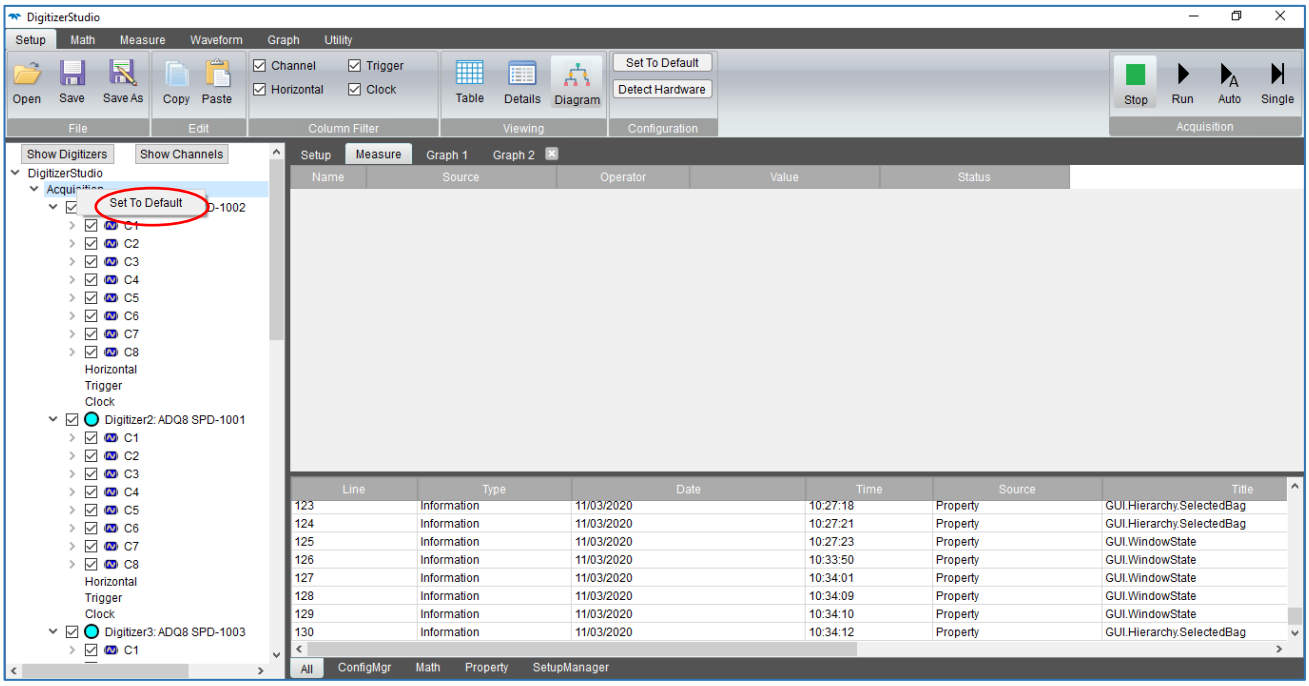


*Figure 52: Acquisition Context Menu*

## 8.2. Digitizer Context Menu

The context menu for Digitizer has the functionality *Set to Default*. This option allows the user to set the properties of the Digitizer and its children to its default value.

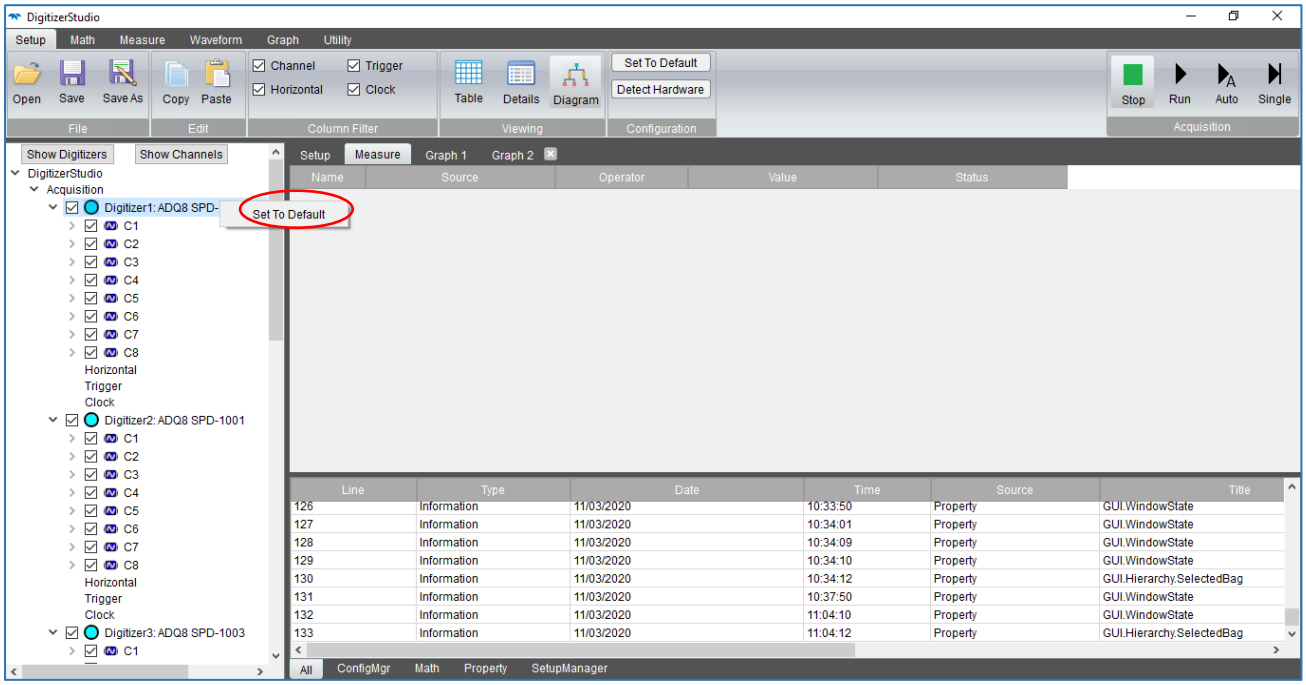


*Figure 53 : Digitizer Context Menu*

## 8.3. Channel Context Menu

The context menu for Channel has following options:

- View in Graph – This functionality is used to view the selected channel in a graph.
- Set to Default – This functionality is used to set the properties of the selected channel and its children to its default value.
- Save To Memory – This functionality is used to save the channel configuration to the memory.

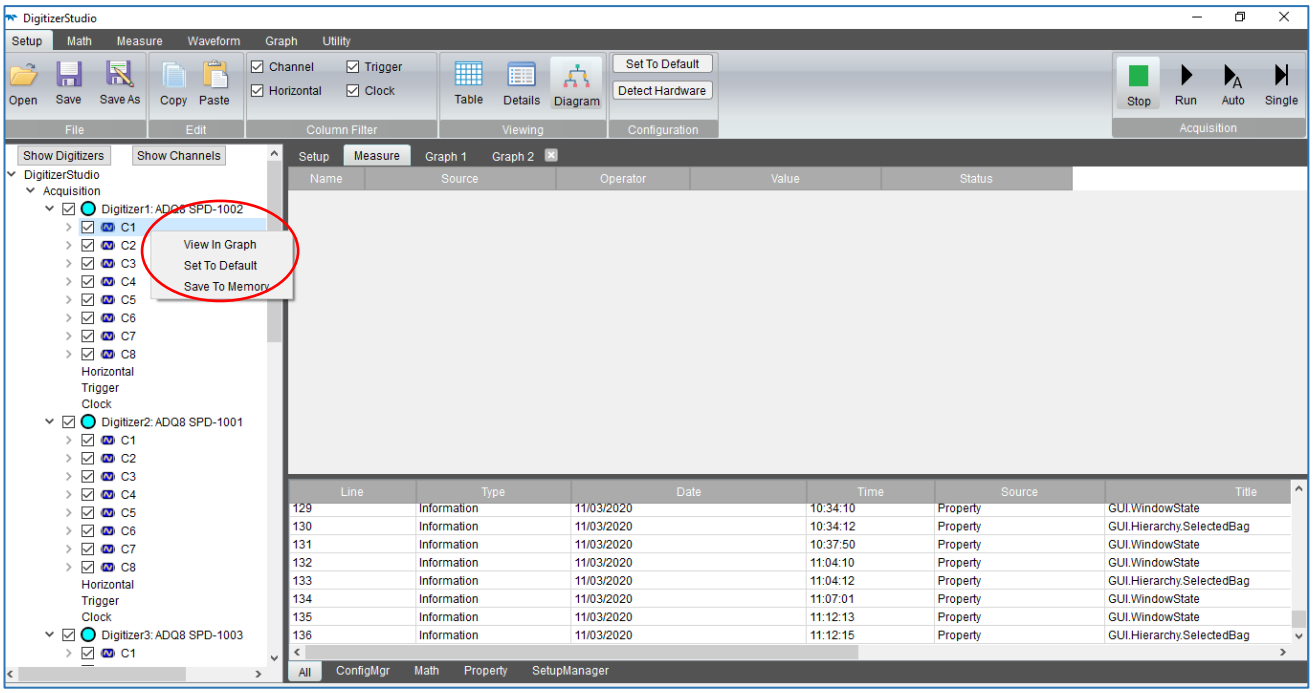


*Figure 54: Channel Context Menu*

# 9. Custom Firmware

## 9.1 ATD Firmware

Properties related to ATD firmware are added in Digitizer as shown in below image.

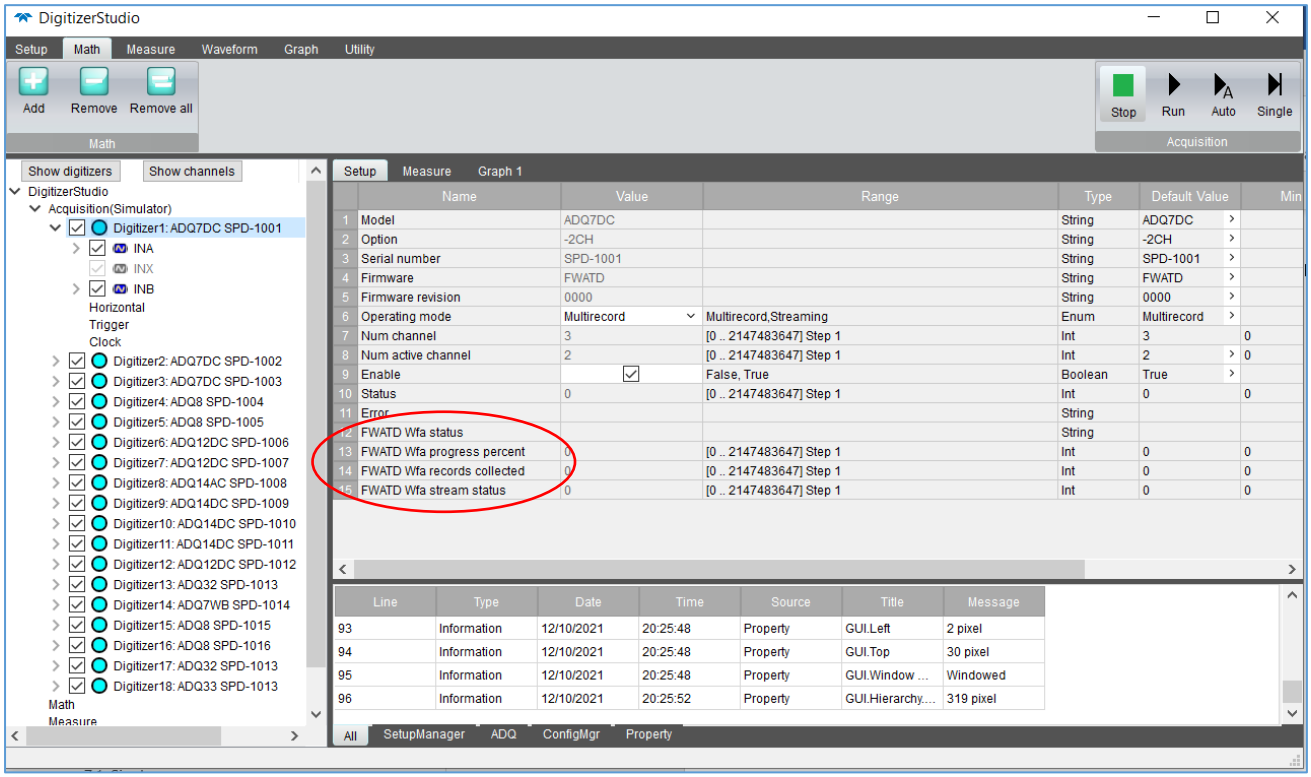


*Figure 55 : ATD Firmware Digitizer Properties*

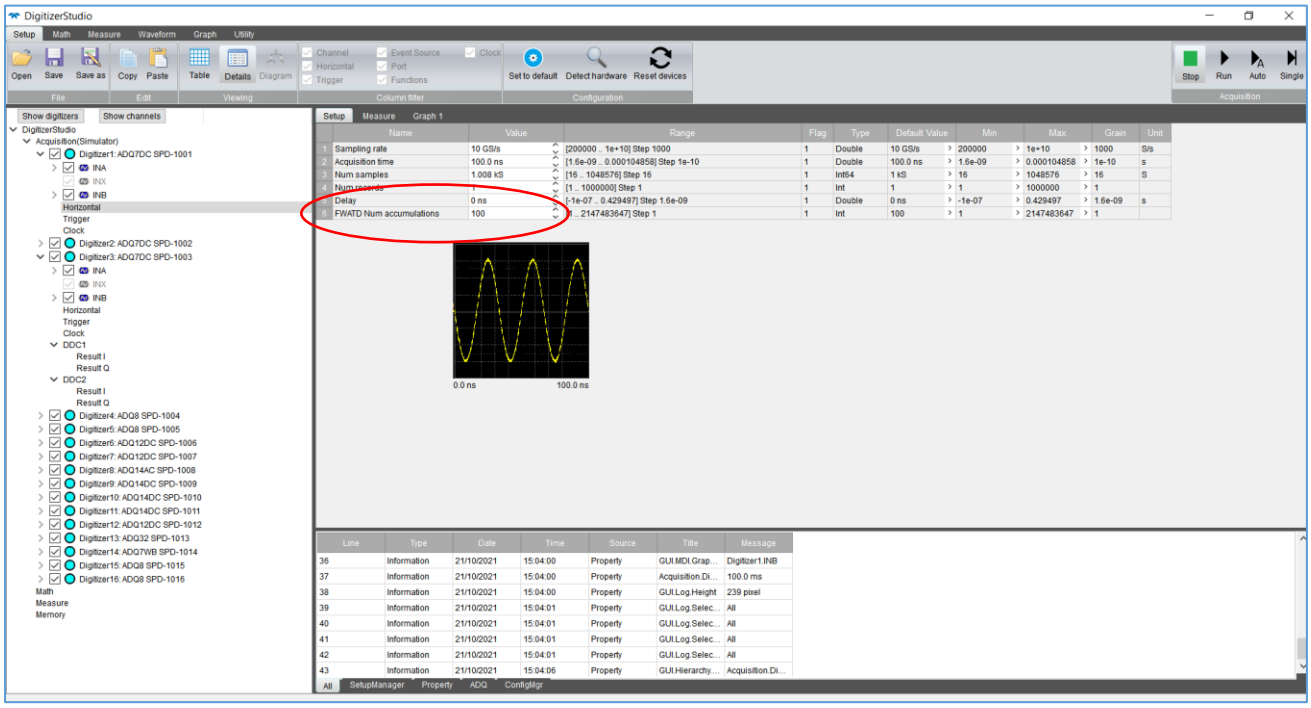


*Figure 56: ATD Firmware Horizontal Property*

## 9.2 DDC Firmware

As shown in below image, DDC class will be added in hierarchy under Digitizer for ADQ7 having DDC firmware.

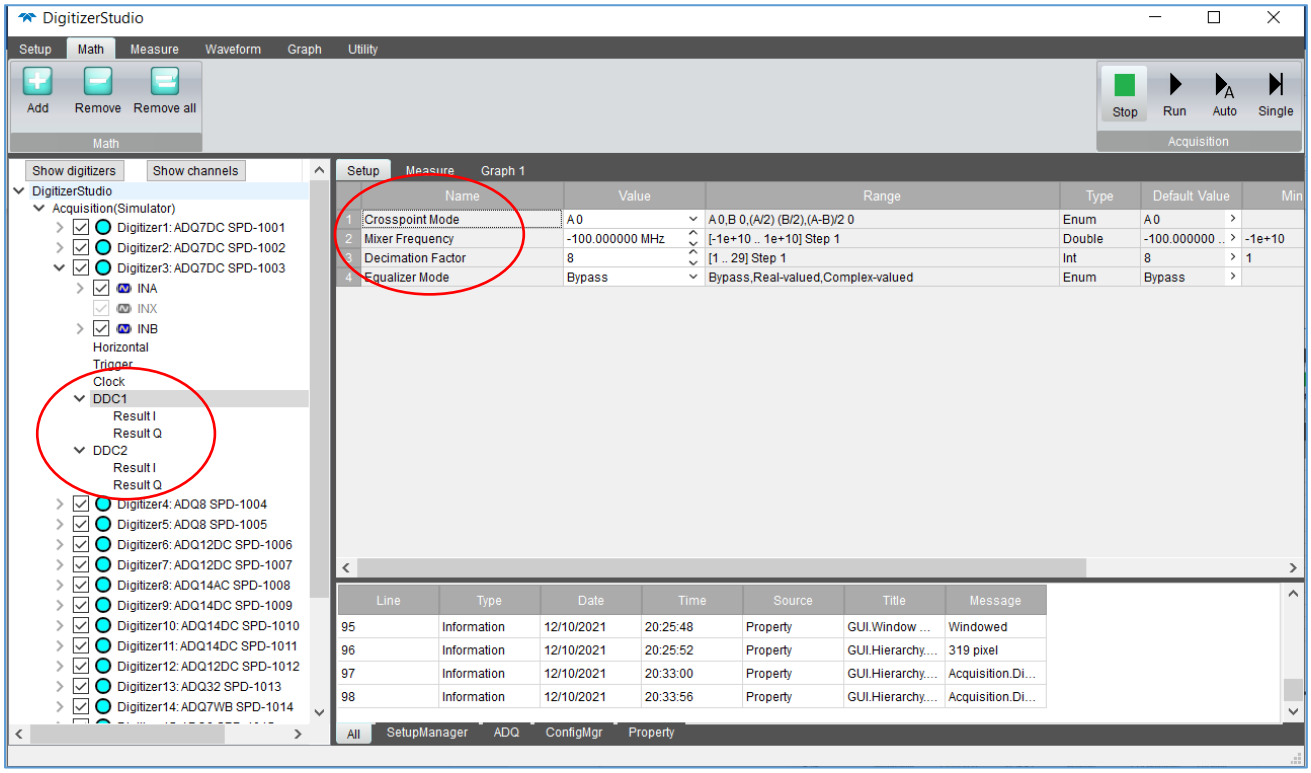


*Figure 57 : DDC Firmware*