PathWave Instrument RPA

Keysight PathWave Instrument RPA enables no-code automation of bench setups, instruments and circuits or devices under test (DUTs). R&D engineers and technicians debugging and verifying circuits can now leverage automation without the knowledge, complexity and effort required to develop custom scripts using SCPI or device-specific driver commands.

Product Summary

Keysight PathWave Instrument RPA is PC and instrument-based software which enables R&D engineers and technicians to control instruments and measurement setups without having to pre-define their measurement sequence or compose test automation scripts. The software automates their interactions with the instrument making replaying configurations and measurements seamless, granting them the flexibility of direct interaction while gaining the productivity of automation. The software increases efficiency by not only automating but orchestrating repetitive tasks in their workflow by configuring and parameterizing recordings and replaying these newly created workflows.

- Automate away complexity and repetition via no-code, one-button record and playback operation
- Remotely access, orchestrate and control your measurement setup anywhere in the world [1]
- Automate and parameterize UI interactions with your instruments and DUTs
- Collaborate and share learnings

1. BV7002A, BV7003A, BV7004A, BV7005A is required for multi-instrument orchestration.

PathWave Instrument RPA Use Models

PathWave Instrument RPA is designed to leverage its simple functionality as a companion utility to serve many of today's design engineering workflows.

- Accelerate Debugging, Sleuthing, and Validating

  - PathWave Instrument RPA provides a simple and intuitive user interface to record and playback users' mouse and keyboard operations (Figure 1)
  - Intuitively automate your interactive measurement operations with on-demand flexible no-code automation.

- Configure and Build Complex Workflow via Parameterization

  - Changing test parameters on instrument front panels is more easily accomplished by using PathWave Instrument RPA. In most use cases, tests need to be performed using different sets of parameters that require several test variables to be changed several times, even though the operational procedures are the same for each test. This function obviates the need for manual scripting to change test parameters and enables repetitive tests to be performed in a simple and easy way compared to traditional approaches.

- Reduce Time to Insights and Results with no-code Visual Script Editor

  - For editing Workflows, PathWave Instrument RPA provides a simple Visual Script Editor (Figure 2). Workflow parameters can be edited directly and re-configured via dragging-and-dropping blocks.
  - Maintain full flexibility and control, incorporating automation as needed in your instrument use workflow.

- Remotely Access Your Instruments and DUTs

  - PathWave Instrument RPA connects to instruments remotely through

    - Windows Remote Desktop (RDP)
    - Virtual Network Control (VNC)
    - Built-in Web Interface via web browser
    - Target instrument use and automation applications such as Keysight PathWave BenchVue [2].

  - Access to the Device Under Test (DUT) is through the same remote access mechanisms described above.

- Orchestrate and Automate Instruments and Devices Across Your Measurement Setup

  - Test orchestration is available in the advanced option of PathWave Instrument RPA [1]. Multiple Instrument / DUT Connections in any combination can be controlled sequentially with a single instance of PathWave Instrument RPA software.

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2. PathWave Instrument RPA connects with instrument control and automation apps running on a PC or an instrument as a companion utility for recording and playback. It does not provide User Interface (UI) or software integration.

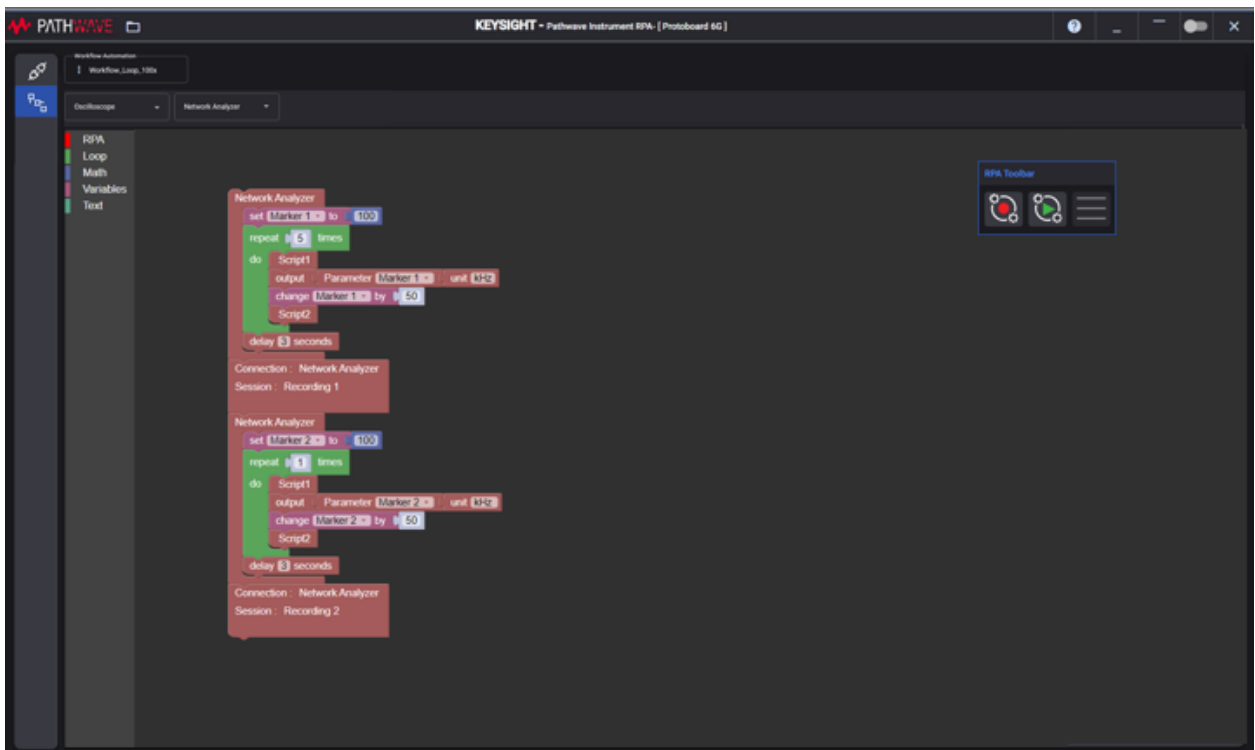Figure 1: PathWave Instrument RPA User Interface

Figure 2: PathWave Instrument RPA Visual Script Editor

Functional Overview

PathWave Instrument RPA uses a hierarchial visual architecture designed to follow a hardware design engineer's typical instrument use workflow. It has four principal elements: Connection, Session, Workflow, and Project (Figure 3).
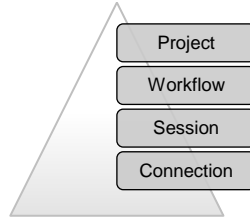

Figure 3: Hierarchical Principal Elements of PathWave Instrument RPA

Connections

A Connection is defined as a remote connection to an instrument or a Device Under Test (DUT) that the user wants to control. Connections are the basic building blocks to build Sessions.

Connections are created by connecting to an instrument or DUT control remotely through RDP, VNC, Web Interface or Measurement Applications such as Keysight PathWave BenchVue. Connections are saved automatically on exiting PathWave Instrument RPA.

A Connection supports the following operations:

- Add Connection
- Edit Connection

Sessions

A Session is defined as a short recording of instrument use interactions while on a Connection with PathWave Instrument RPA (Figure 4). Sessions are the basic building blocks to build Workflows.

Sessions are created by recording user interactions with either the instrument or device. Through its remote, UI-driven interface, PathWave Instrument RPA does not need SCPI, or device-specific driver commands to drive measurement setups. Instead PathWave Instrument RPA uses an intelligent and configurable software core for developing Sessions using its record and playback functionality.

A Connection may have multiple Sessions associated with it. Sessions are saved automatically on exiting PathWave Instrument RPA.

Session supports the following operations:

- Record new Session
- Load Session
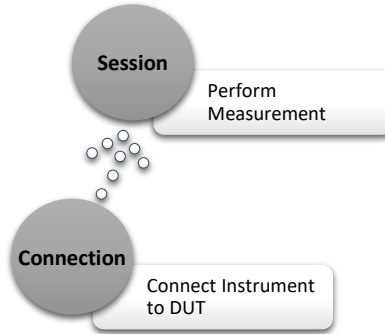- Playback Session
- Parameterization of variables

Figure 4: A Session is a short recording of instrument use interaction while on a Connection with PathWave Instrument RPA

Workflow

Workflow is a user modified or augmented version of Sessions (Figure 5). Workflows are created by stitching together Sessions, configuring parameters of variables, and combining with other session flow controls such as delays and loops.

Parameters can be edited directly and re-configured via dragging-and-dropping blocks using PathWave Instrument RPA's Visual Script Editor. No coding is required.

A Workflow supports the following operations:

- Create new Workflow in Visual Script Editor
- Edit Workflow in Visual Script Editor
- Load existing Workflow
- Playback Workflow
- Concatenate Sessions
- Adjust pre-established parameters from Sessions
- Adjust the number of iterations
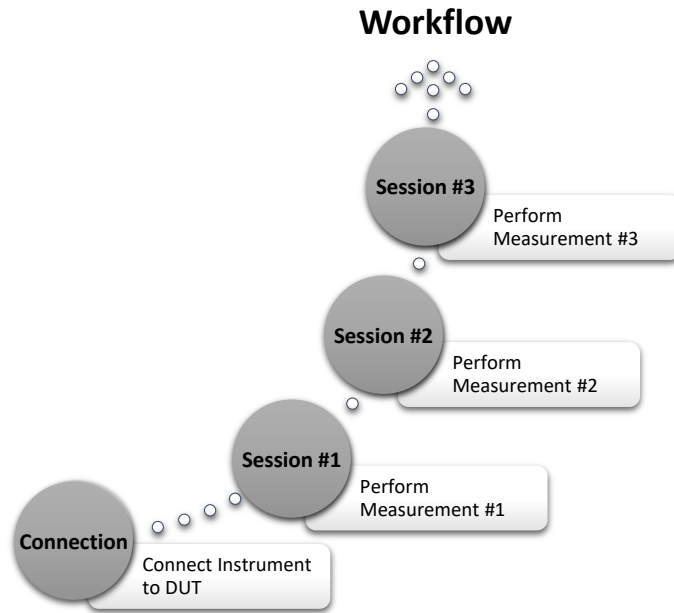- Insert pauses or delays into the Workflow
- Delete Workflow

Workflow

Figure 5: A Workflow is created from stitching and/or augmenting one or more Sessions

Projects

A Project is an RPA virtual workbench consisting of Connections, Sessions and Automations serving a common theme in order to achieve a particular hardware development goal (Figure 5). An active project in PathWave Instrument RPA is saved automatically whenever a Connection is added or deleted or if any change is detected to Sessions or a Workflow.

Projects can be shared with team members to strengthen collaboration and help each other to complete complex tasks or for training to reduce learning curves on how to perform complex measurements.

The following operations are supported:

- Create new Project
- Load existing Project
- Delete Project
- Rename Project
- Duplicate or Clone Project to allow to make changes without altering the original
- Share with other colleagues

PathWave Instrument RPA Example

PathWave Instrument RPA enables hardware development engineers to stay connected while driving up productivity and collaboration through intelligent workflow automation.

The first step is the creation of a project, which occurs immediately when PathWave Instrument RPA is first launched. In Figure 6, we named our project "Project Alpha".

Project Alpha is using 2 instruments (i.e. 2 Connections), an "Oscilloscope" and a "Power Analyzer".

The Oscilloscope connection has 2 recordings (i.e. 2 Sessions), "Session Voltage" and "Session EyeDiagram". Session Voltage can be a recording of your interactions with the oscilloscope to set-up and measure voltage on a signal line while Session EyeDiagram set-ups and captures eye diagram on the same signal line.

By using Visual Script Editor, you can create a Workflow to concatenate Session Voltage and Session EyeDiagram and loop it as many times as you need. This is the "Workflow Signal" in Figure 6.

Each time you load Project Alpha, you may elect to run previously created Sessions or Workflows depending on your unique needs, or you can decide to create new Sessions and Workflows. You may also share Project Alpha with your team members to show how the measurements were performed, for collaboration/learning.
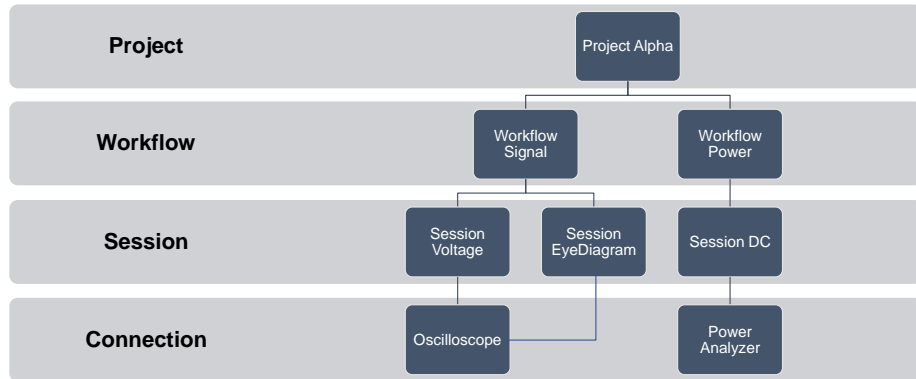

Figure 6: PathWave Instrument RPA's Project Organization Example

Software Workflow

The PathWave Instrument RPA workflow is designed to work within and support the R&D engineers' workflow to accelerate debugging, sleuthing, and verifying circuits with on-demand flexible no-code automation. R&D engineers debugging or sleuthing circuits can continue to have full flexibility and control in their workflow, while incorporating automation on-the-fly with PathWave Instrument RPA .

You can cancel or stop playback by pressing ESC key during playback.

No	R&D Engineer's Workflow	PathWave Instrument RPA Workflow
1	Prepare workbench for a new project.	Create new project. Note: Projects together with their Connections, Sessions, Workflows are saved automatically upon exit.
2	Place an instrument on a workbench and connect to it.	Connect to an instrument.
3	Interact with the instrument to make measurements.	Record interactions with the instrument. (Optional) Outline parameters for use in Workflow. Note: Each recording is a Session.
4	Repeat step 3.	Playback the saved recording. Note: Essentially, playback the desired Session.
5	Interact with the instrument to capture a different set of measurements. Repeat Step 4 multiple times with different parameter settings.	(Optional) Use Visual Script Editor to create Workflow. (Optional) Add delays and other script primitives (Optional) Concatenate and/or loop scripts (Optional) Playback your Workflow

		Note: A Workflow is a user modified or augmented version of Session(s), which could add delays, parameters, and loops. You can choose to playback either a Workflow or a Session, depending on your needs and unique requirements.
6	You return to your workbench the next day to continue with your work.	Load previously saved project.

Engineered to Work Within Your Workflow

R&D engineers know debugging and the process leading to "first-measurement" are very fluid workflows, often requiring real-time critical thinking and complete interactive control of the setup – a workflow not easily or flexibly automated with existing tools.

Working within your existing workflows, not interrupting how you get things done is the goal of PathWave Instrument RPA. The software provides the flexibility to automate when needed all within your existing flow.

Download your Free Trial and try PathWave Instrument RPA today

Visit us at https://www.keysight.com/find/rpa

System and Installation Requirement

Recommended Minimum PC Configuration

- Microsoft Windows 10 Home, Professional, Enterprise or Educational, 64-bit
- Minimum 5 GB free hard disk space
- Minimum Intel Core i5 CPU with 8 GB RAM
- Recommended screen resolution is 1920 by 1080 with scaling set to 100%

Prerequisite Drivers and Software – Packaged along with Installer

- Microsoft .NET version 2017 or later (Only re-distributable package)
- Keysight PathWave License Manager version 2.4.1 or later
- Node.js version 14.18.0 or later
- Python version 3.9.6 or later
- Mosquitto Broker version 1.20 or later

Ordering Information

Software Licensing

Keysight PathWave Instrument RPA is licensed based on the model purchased.

Model	Function	License Term and Condition	Key Capabilities
BV7001A	Standard	1 year subscription, Node-locked license, 1 seat, Available for direct purchase keysight.com/find/rpa	No-Code Single Click Record & Playback
			Unlimited Recordings & Playback
			Automation Workflow editing via Visual Script Editor
			Supports single Instrument / DUT Connection
BV7002A	Advanced	1 year subscription, Node-locked license, 1 seat, Available for direct purchase keysight.com/find/rpa	No-Code Single Click Record & Playback
			Unlimited Recordings & Playback
			Automation Workflow editing via Visual Script Editor
			Supports up to 5 Instrument / DUT Connections
BV7003A	Standard to Advanced Upgrade	1 year subscription, Node-locked license, 1 seat	No-Code Single Click Record & Playback
			Unlimited Recordings & Playback
			Automation Workflow editing via Visual Script Editor
			Supports up to 5 Instrument / DUT Connections
BV7004A	Enterprise	1 year subscription, Floating license, 100 seats pack	No-Code Single Click Record & Playback
			Unlimited Recordings & Playback
			Automation Workflow editing via Visual Script Editor
			Supports up to 8 Instrument / DUT Connections
BV7005A	Enterprise	1 year subscription, Floating license, 10 seats pack	No-Code Single Click Record & Playback
			Unlimited Recordings & Playback
			Automation Workflow editing via Visual Script Editor
			Supports up to 8 Instrument / DUT Connections

Contact Keysight for other licensing options.

More Information

For additional details regarding Keysight PathWave Instrument RPA, please visit
https://www.keysight.com/find/rpa

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications, or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

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