Tektronix®

Clarius Compliance DDR Transmitter

Application Help

Version 2.0.0

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Contents

Welcome

DDR (Dual Data Rate) is a dominant and fast-growing memory technology. It offers the high data transfer rates required for virtually all computing applications, from consumer products to the most powerful servers. The high speed of these signals requires high performance measurement tools.

The Clarius compliance DDR Tx solution uses optimized computing and parallel execution methods which reduces the execution time of measurements. It also provides test data management and test data analytics.

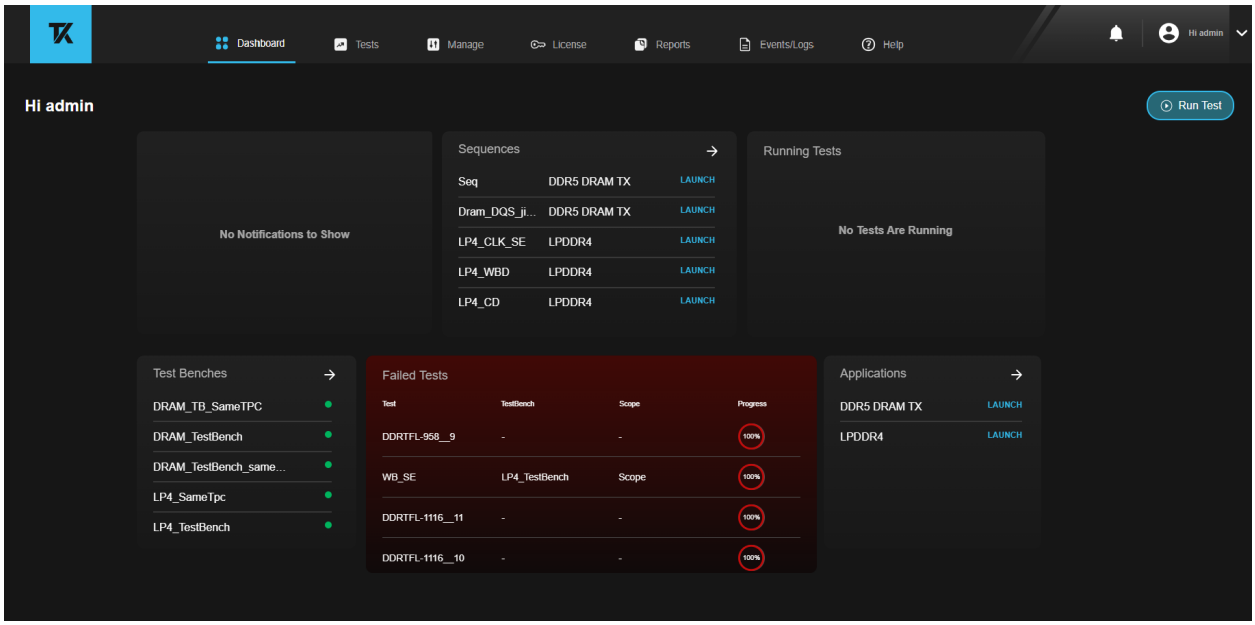


Figure 1: Clarius compliance DDR Tx

Key features of DDR5-DRAM-Tx:

- Supports 37 measurements of DDR5 DRAM Tx Tests as per DDR5 JEDEC specification:
  - Supports 12 Tx DQS Jitter Tests
  - Supports 13 Tx DQ Jitter Tests
  - Supports 12 Tx DQ Stressed Eye Tests
- The user-defined acquisition mode enables users to conduct application measurements by adjusting the oscilloscope settings, such as sample rate, record length, bandwidth, and other parameters according to their preferences and requirements mode for all scenarios.
- Retain Vertical Scale setting supported during acquisition for all scenarios.
- Number of UIs supports for Tx DQ Stressed Eye test scenario.
- Custom BER supports for Tx DQ Stressed Eye test scenario.
- Custom Limit support for all tests.
- Multi-run feature is applicable for all scenarios.
- Supports all the data rate as per JEDEC for all measurements.
- Custom Data Rate support up to 15000 MT/s.
- Signal Validation support for all scenarios.
- De-embedding support for all scenarios.
- DUT Automation support.
- Automatic and manual support of Noise Compensation for Tx DQS and Tx DQ Jitter tests.

- Automatic and manual support of DCA Training.
- Variable DUT Termination voltage support.
- Vref-DQ Mode support for Tx DQ Jitter and Stressed Eye tests using different methods.
  - Widest Eye Opening
  - Peak to Peak
  - Amplitude
  - User Defined
- DUT Power Cycle Utility: Manage power states (ON/OFF) and adjust voltage/current across all channels of a Keithley Power Supply via direct address connectivity.
- Import sequence feature allows for recalling test setups, so users don't have to manually configure each time.
- DUAL Rank DUT support.
- For Live Tests, when DUT automation is enabled, the DUT will be initialized only once for any selected test group/s.
- For the Stressed Eye test group, two distinct analysis methods are available.
  - Use one edge of the UI
  - Use both edges of the UI
- When the Stressed Eye Tests runs across multiple UIs, only the first acquisition waveform set will be saved.
- A Pause feature is now supported before starting waveform acquisition.

Key features of LPDDR4:

- Supports 109 measurements of LPDDR4 System Transmitter Tests as per LPDDR4 JEDEC specification:
  - 18 Clock differential measurements
  - 15 Clock single ended measurements
  - 26 Write burst differential measurements
  - 19 Write burst single ended measurement
  - 19 Read burst differential measurements
  - 12 Address command measurements
- The user-defined acquisition mode enables users to conduct application measurements by adjusting the oscilloscope settings, such as sample rate, record length, bandwidth, and other parameters, according to their preferences and requirements mode for all scenarios.
- Retain Vertical Scale setting supported during acquisition for all scenarios.
- Custom limit support for all tests.
- Supports all the data rate as per JEDEC for all measurements after custom data rate support.
- Custom data rate supports up to 15000 MT/s.
- De-embedding supports for all scenarios.
- Multi-run feature is applicable for all scenarios.
- Time to Test : The user can perform multiple JEDEC measurements on multiple edges, multiple Read or Write bursts with a single acquisition. The user can also provide statistical analysis with a single acquisition.
- Statistical analysis : The LPDDR4 application allows the user to capture long record lengths, identify Read and Write bursts automatically, perform multiple measurements on the entire record length, and perform statistical analysis.
- Zoom to the worst-case region of the waveform for measurements.
- Easy to use measurement configuration allows the adjustment of test parameters for tests by group to save time over configuring each measurement individually.
- Test report to reflect all the statistics of the measurement
- The user can customize the signal selection in the 'Source and Signal' panel, allowing flexible test bench workflows.
- Multiple burst detection methods are supported : Read and Write, Write only, and Read only.

- Support to tDQ2DQ measurement with multiple DQs.
- Support for simultaneous running Write Burst differential and single ended measurements for multi-DQ (up to 32-DQs).
- Support for simultaneous running address command measurements for multi-CA (up to 8-CAs).
- Auto and manual support for calculating Vcent-DQ and Vcent-CA.

Getting help and support

Product documents

Use the product documents for more information about getting started with the Clarius, the application functions, and how to remotely use the application.

Table 1: Clarius automation framework and application documents

To learn about	Use this document
How to install the Clarius	Clarius Automation Framework Getting Started Guide
How to use the application	Clarius Compliance DDR Tx Application Help
How to automate using the API and SDK commands	Clarius Automation Framework (API and SDK) Programming Guide

Conventions

This application help uses the following conventions:

- The terms "Application" and "Software" refer to the Clarius compliance DDR Tx application.
- The term "target system" refers to the Computer/Laptop where the Clarius automation framework and application is installed.
- The acronym “DUT” is an abbreviation for Device Under Test.
- The term “select” refers choosing a screen item (button control or list item) using a mouse.
- A **Note** identifies important information.
- The acronym "Tx" is an abbreviation for Transmitter.

Technical support

Tektronix values your feedback on our products. To help us serve you better, please send us your suggestions, ideas, or comments on your application or oscilloscope. Contact Tektronix through mail, telephone, or website. See *Contacting Tektronix* for more information.

When you contact Tektronix Technical Support, please include the following information (be as specific as possible):

General information

- All instrument model numbers
- Hardware options, if any
- Modules used
- Your name, company, mailing address, phone number, FAX number
- Please indicate if you would like to be contacted by Tektronix about your suggestions or comments.

Application specific information

- Software version number
- Description of the problem
- If possible, save the log file(s) and share it with the Tektronix support person to understand the problem and get it resolved.

System requirements

This section explains the recommended system requirements to install the Clarius automation framework and the application(s).

Requirement	Recommended requirements
Operating system	Windows 10 Enterprise and Pro (version 21H1 and above) or Windows 11 Enterprise and Pro (version 21H1 and above) **Language:** English (United States) only
CPU cores	16
RAM	64 GB
Disk space	300 GB HDD/SSD of free disk space
Network speed	1 Gbps
Browser	Microsoft Edge (default) or Google Chrome
Additional software	Python 3.12.x[1]
Supported Oscilloscope	For DDR5 DRAM Tx • DPO71604SX, DPO72004SX, DPO72304SX, DPO72504SX, and DPO73304SX. • Non-ATI channels of DPO75002SX, DPO75902SX, DPO7702SX, DPS75004SX, DPS75904SX, and DPS77004SX. For LPDDR4 • DPO71304SX, MSO71254DX, DPO71254DX, DPO71604SX, DPO72004SX, DPO72304SX, DPO72504SX, and DPO73304SX. • Non-ATI channels of DPO75002SX, DPO75902SX, DPO7702SX, DPS75004SX, DPS75904SX, and DPS77004SX.
Supported Probes	• TDP7708 Series Tri-mode probe with P77STFLXA solder−in tip with TekFlex connector technology (Qty: 4). • P7700 Series Tri-mode probe with P77STFLXA solder−in tip with TekFlex connector technology (Qty: 4).

[1] Python installation is required for Clarius SDK and DUT control automator.

Recommended deployment models

This section lists the supported deployment models for setting up Clarius automation framework and run the tests.

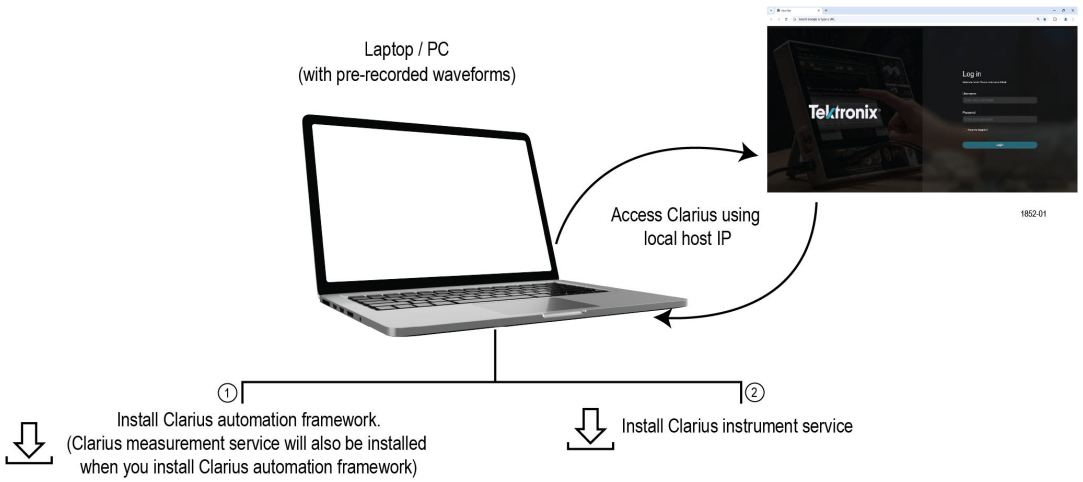


Figure 2: Deployment model 1: Single system deployment

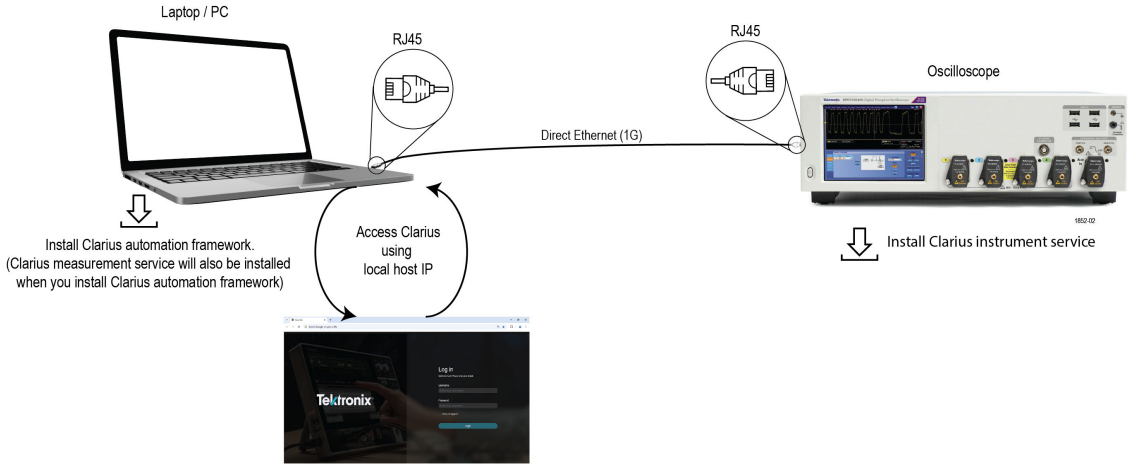


Figure 3: Deployment model 2: Peer to peer connection

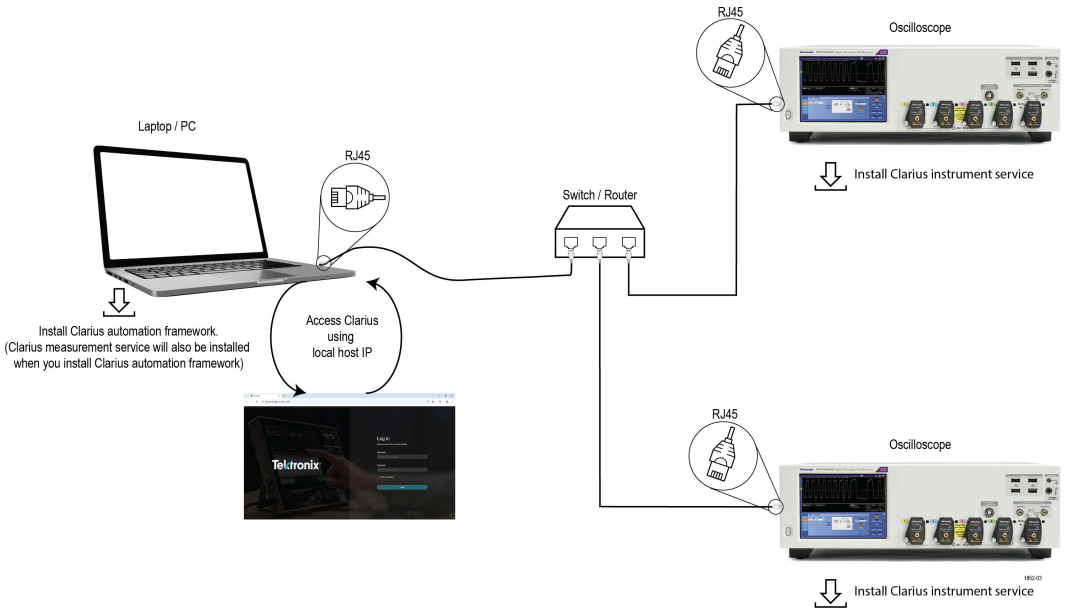


Figure 4: Deployment model 3: Private network setup via standard switch / router / hub

Enable ports to install Clarius automation framework

The installer checks for the first available port within the range incrementally and allocates the port of the services. If no ports are available within the range, installation will prompt user to enter their custom ports.

The following table lists the services and the port ranges.

Port name	Port range
Clarius user interface	4200:4209
Event communication with instruments	5672:5679
Programming interface	8443:8449
SSL certificates download interface	8080:8089
Large objects transfer interface	9001:9009

Dynamic memory and diskspace allocation for the Clarius automation framework virtual machine

Dynamic memory allocation

The minimum RAM required to install the Clarius automation framework is 8 GB.

By default, the installer allocates 12 GB, if the 50% of available RAM is greater than 12 GB. You can also manually allocate RAM from 8 GB up to 50% of total available RAM.

Example

Total RAM available in the target system	64 GB
Minimum RAM required	8 GB
RAM allocated	12 GB (50% of 64 GB = 32 GB, you can choose from 8 GB to 32 GB)

Note: If the 50% of the total available RAM is less than 8 GB, then the installation will fail.

Diskspace allocation

The maximum allocated diskspace for Clarius automation framework installation is 90% of the available diskspace.

Example

Total diskspace available in the target system	300 GB
Minimum diskspace required	20 GB
Maximum diskspace required	90% of available storage

Installing Clarius automation framework

This section describes the instructions for installing the Clarius automation framework in a target system. Follow the steps to complete the installation.

1. *Enable Virtualization technology in BIOS*[2]
2. *Enable ports to install Clarius automation framework*
3. *Dynamic memory and diskspace allocation for the Clarius automation framework virtual machine* on page 13
4. *Enable Hyper-V in the target system*
5. *Install Clarius automation framework in the target system*
6. *Install Clarius instrument service*

Enable Hyper-V on the target system

Hyper-V is a hardware virtualization tool that allows you to create and run a virtual machine on your system without affecting the host operating system. To enable Hyper-V on your computer, follow these steps:

1. Log in to the system with an administrator account.
2. Type **Control Panel** in the search box and press **Enter**.

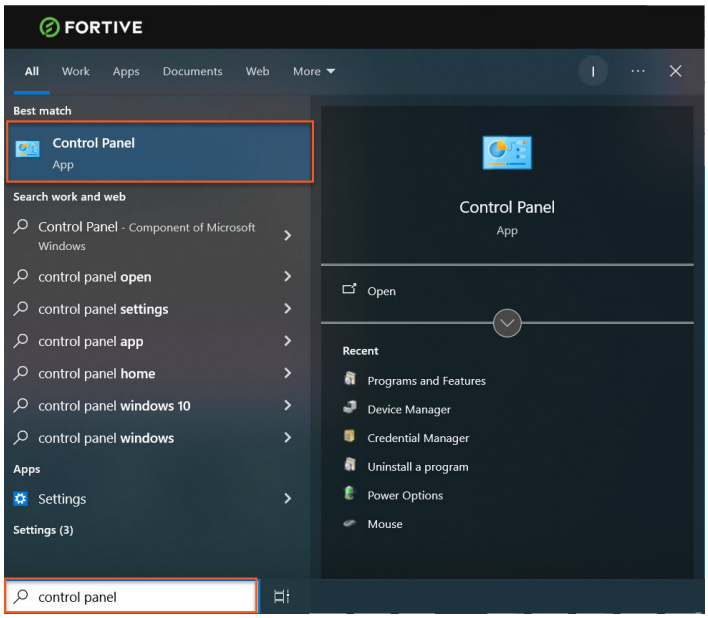


Figure 5: Control Panel

3. Select **Control Panel** > **Programs and Features**.

[2] Contact the IT team of your organization to enable the virtualization technology in your system.

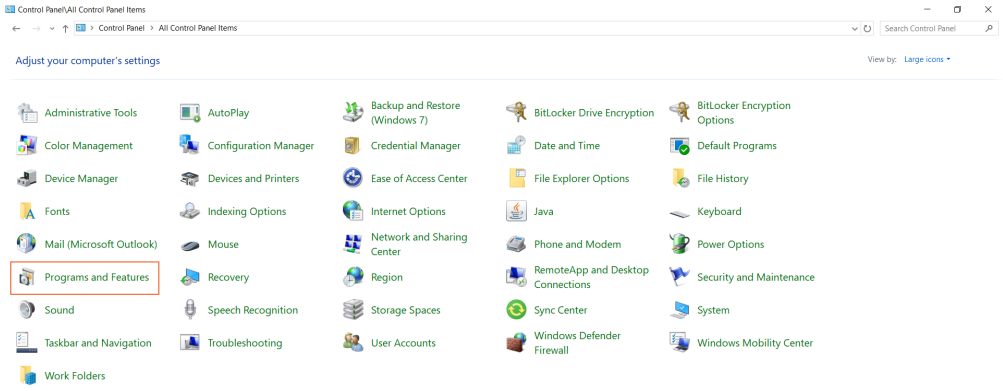


Figure 6: Programs and Features dialog

4. Select **Turn Windows features on or off.**

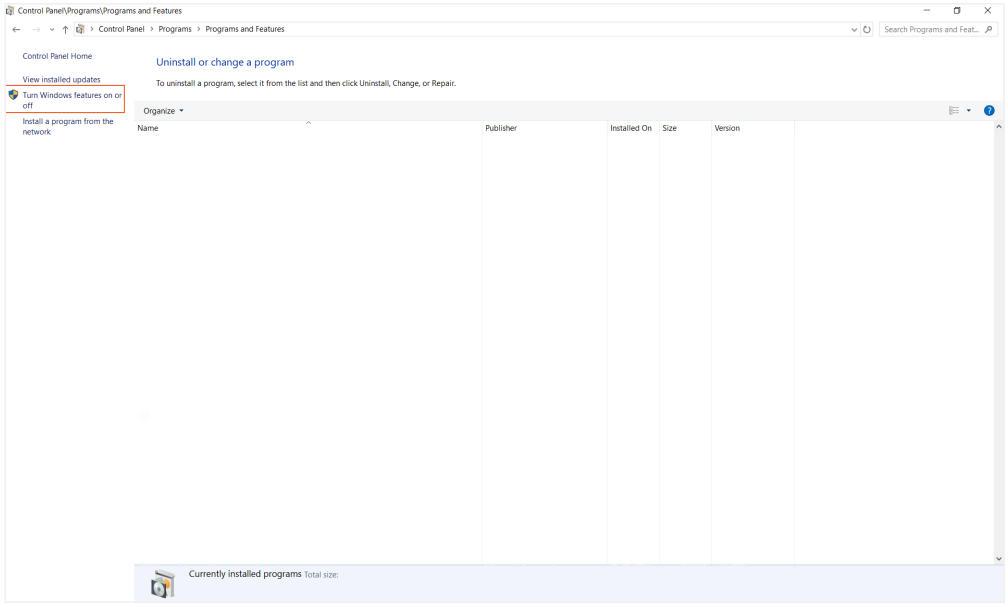


Figure 7: Turn Windows features on or off dialog

5. Select **Hyper-V** and its sub features.

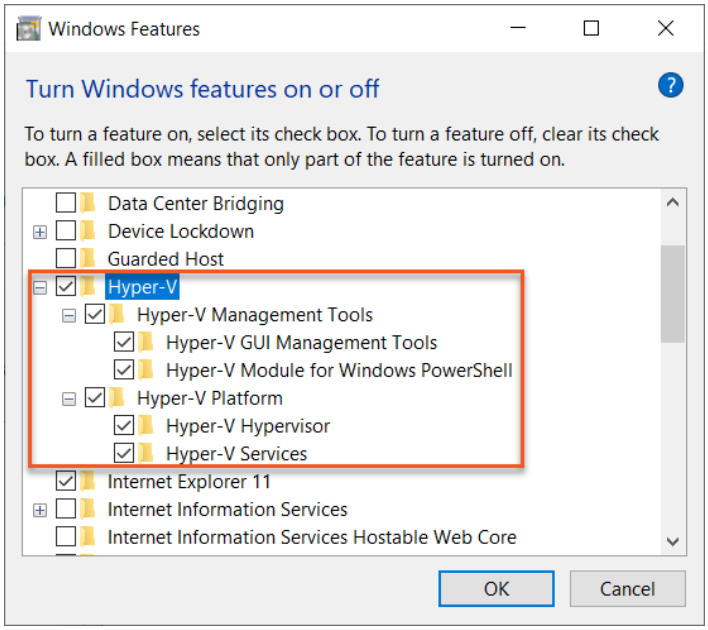


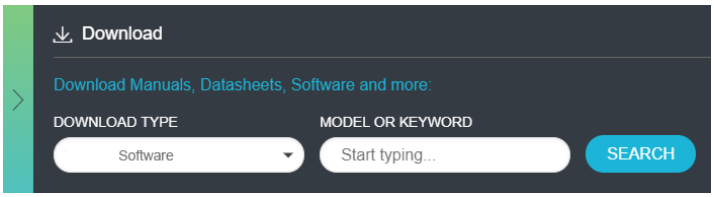
Figure 8: Enabling Hyper-V in the Windows Features dialog box

6. Select **OK** to install. You must restart the system when prompted.

Install Clarius automation framework

To install the Clarius automation framework in the target system, follow these detailed steps.

1. Go to *www.tek.com*.
2. Click **Download**. In the Downloads menu, select DOWNLOAD TYPE as Software and enter the application name in the MODEL OR KEYWORD field and click **SEARCH**.



3. Select the compatible version of Clarius automation framework and follow the instructions to download the software. Copy the installer package (.zip) to the target system[3] and extract the file.

Note:

- Check the Release Notes for the version compatibility details of Clarius automation framework and application.
- To unzip the package, right-click, select **Extract All** and select **Extract**.

4. Double-click the Clarius installer (**clarius-automation-framework-<<version>>.exe**) from the extracted folder and select **Yes** on the User Account Control.

[3] A PC/Laptop/Computer where the Clarius automation framework and application will be installed.

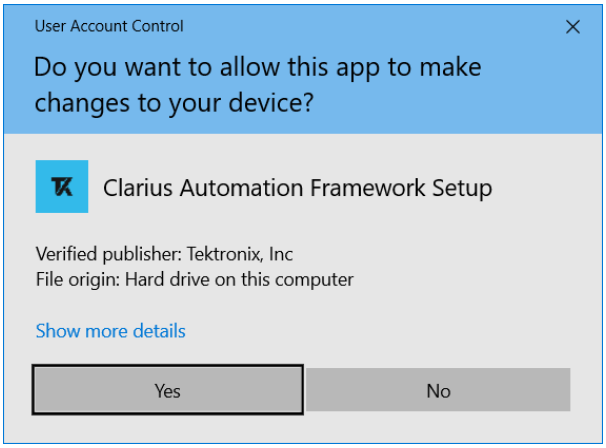


Figure 9: Clarius user account control dialog

5. Read the welcome instructions and select **Next**.

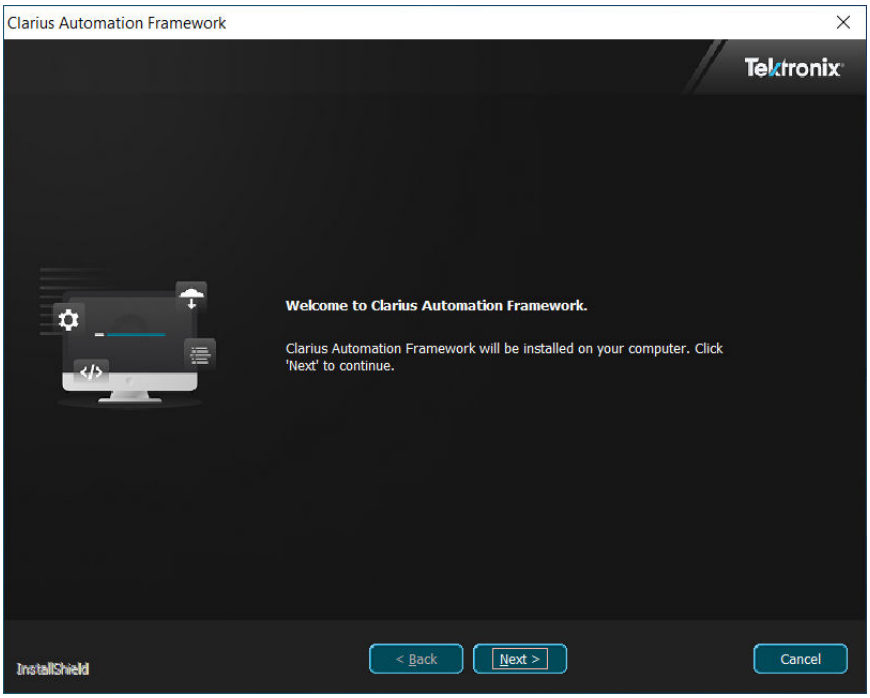


Figure 10: Clarius installer setup

6. Read the license agreement; accept the terms of the license agreement and select **Next**. Please wait until the prerequisites progress check is complete.

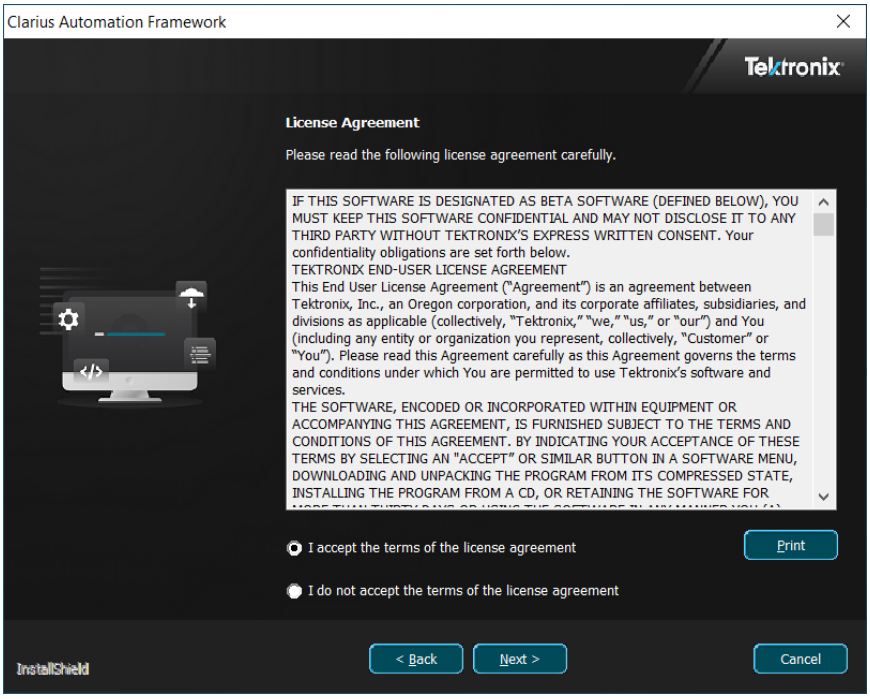


Figure 11: Clarius license agreement

7. Browse to select the install path and select **Next**. The default path is `C:\Program Files\Tektronix\Clarius\`.

   You can select any local disk drive other than a network drive path for installation.

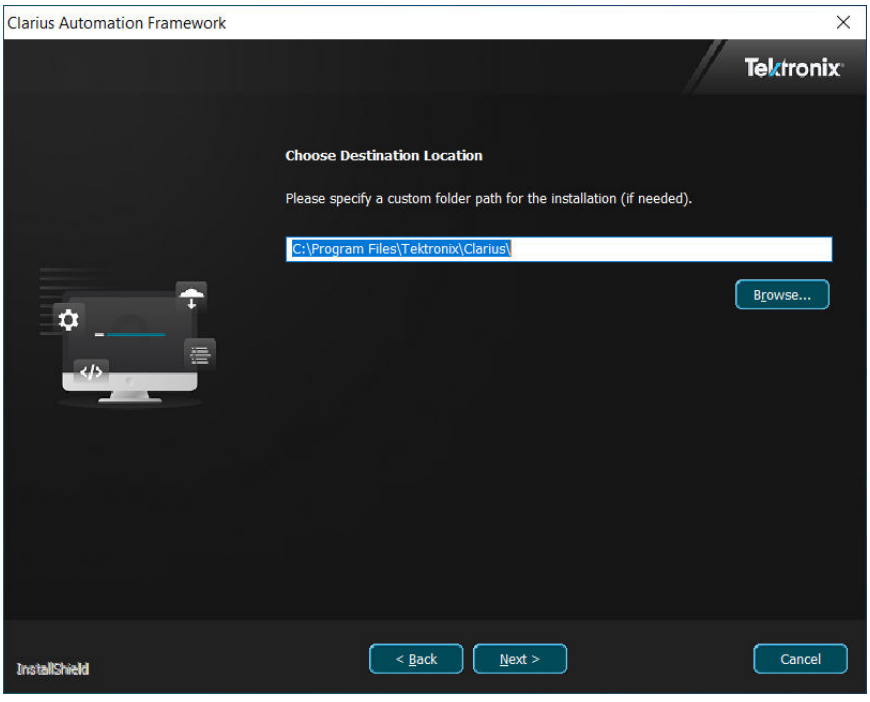


Figure 12: Clarius install path

8. Set the password for the Clarius automation framework matching the criteria and select **Next**.

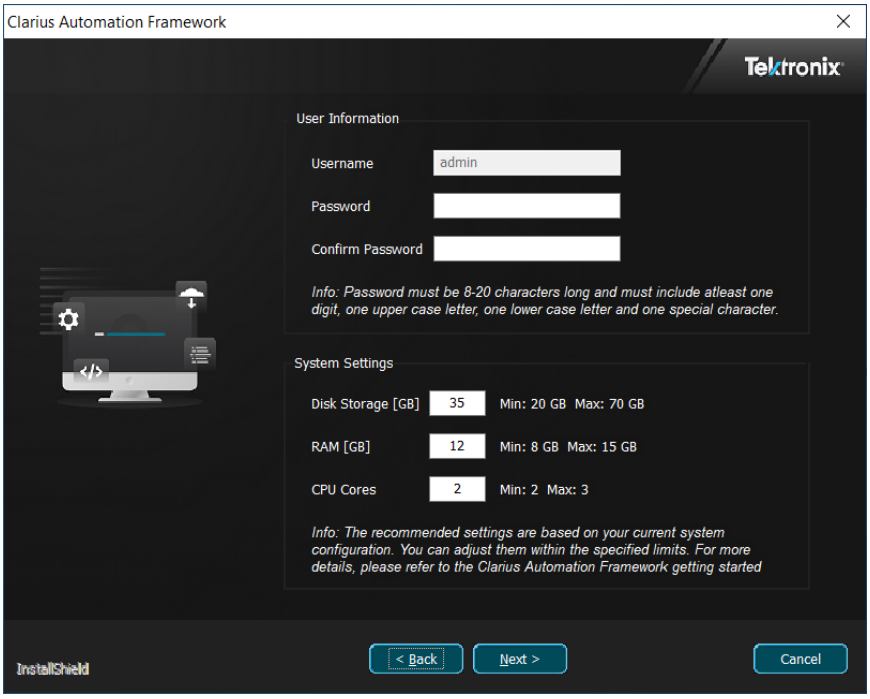


Figure 13: Clarius user information

Note:

- For details on Disk Storage allocation, *click here*.
- For details on RAM allocation, *click here*.
- **CPU cores allocation example:** The minimum logical CPU cores required is 2 and the maximum core is calculated as 75% of total logical CPU cores. By default, a midpoint value between the minimum and maximum cores will be added in the installation wizard field. If the allocated logical CPU cores is in decimal value, then the number after the decimal point will be discarded. For example, value 3.5 will be added as 3.

  For details on recommended CPU cores to install, refer *System requirements* section.

9. Displayed only if the ports required for installation are not available. Refer *Enable ports to install Clarius automation framework* for more information.

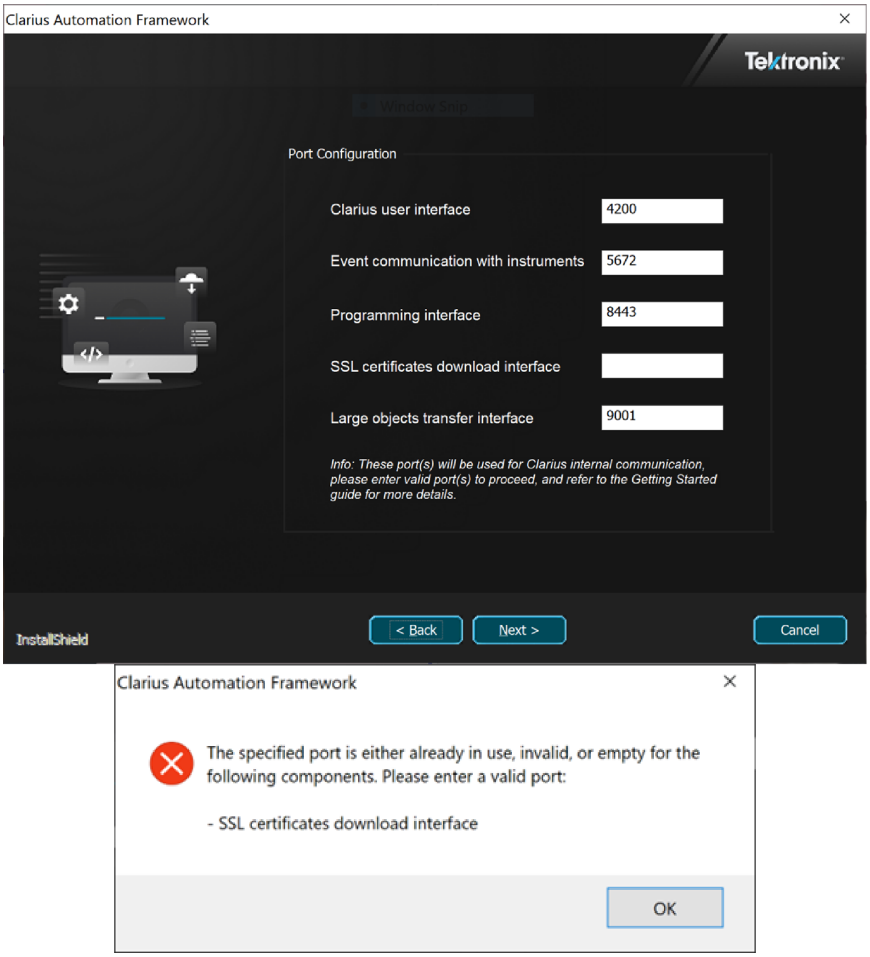


Figure 14: Port configuration

10. Select **Yes** to install the Instrument Service. This will create a local test bench(Clarius_PC) in the target system for pre-recorded waveform analysis.

    Installing instrument service will also install Clarius SDK in an isolated Python environment.

    Tip: If you skip the instrument service installation, you can refer *Install Clarius instrument service* section for the installation steps.

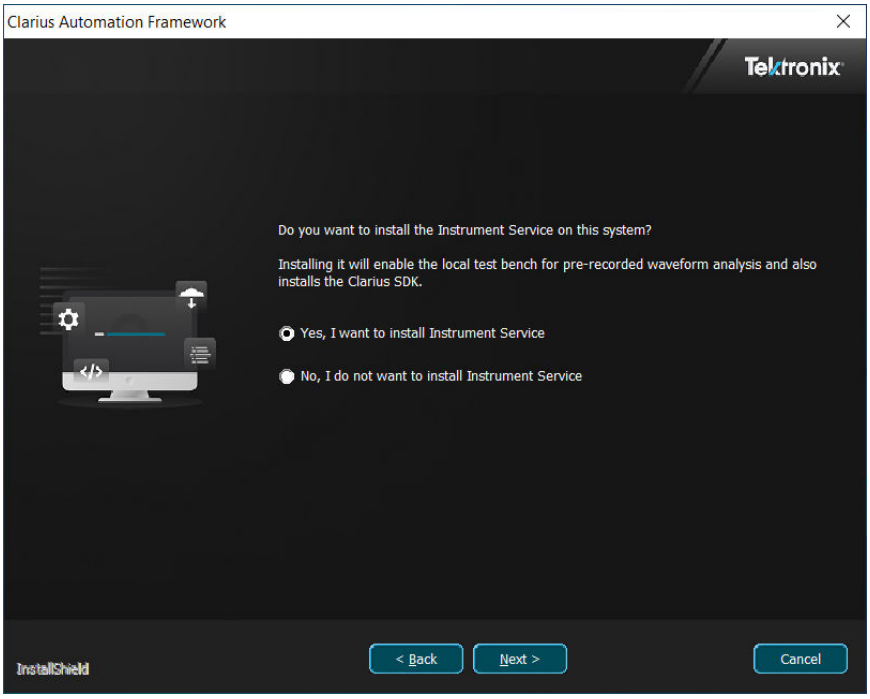


Figure 15: Install instrument service

11. Displayed only if step *10* on page 20 is selected **No**.

Select the Clarius SDK installation option from the installer wizard and select **Next**.

You can install Clarius SDK in the following ways:

- Install Python in a global environment and then install SDK in that environment. If a supported Python version is detected, then select to install the SDK in that environment.
- Install Python in an isolated Python environment and install SDK in that environment.[4]

[4] An isolated Python environment will have its own independent set of Python packages installed in its site directories.

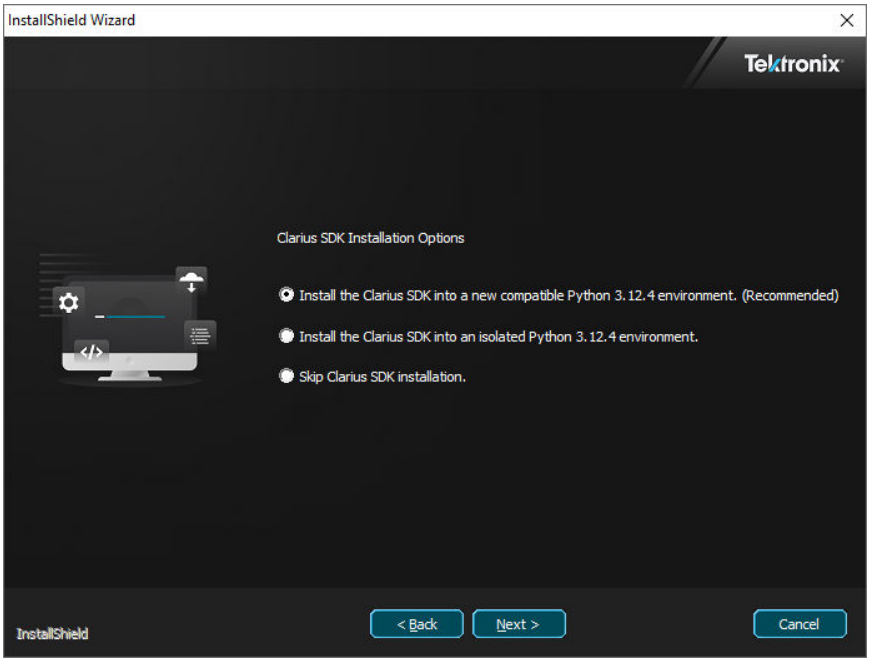


Figure 16: Clarius SDK installation options

Note:

- Clarius SDK requires Python version 3.12.x.
- If you skipped the SDK installation, refer to the *Install Clarius SDK* section to install.

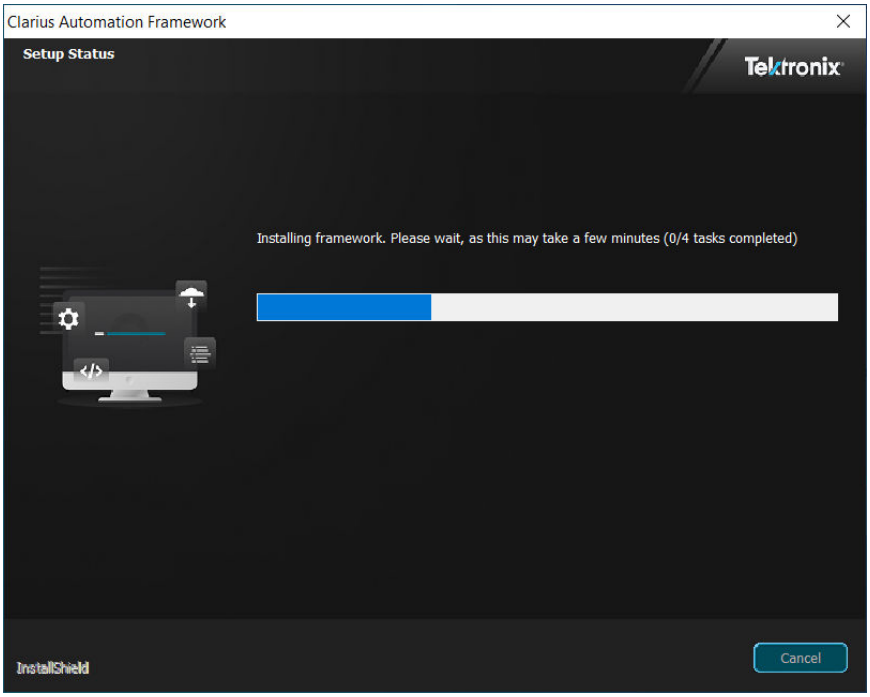


Figure 17: Installing Clarius automation framework

12. Select the Launch Clarius automation framework checkbox once the installation is complete and select **Finish** to exit setup. By default, the Clarius automation framework will be launched in the Microsoft Edge browser.

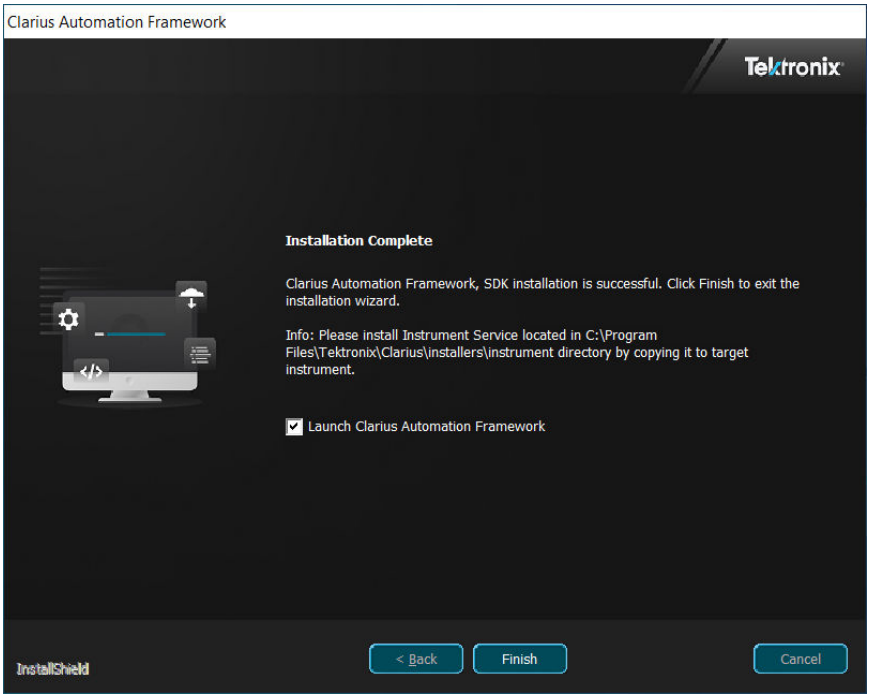


Figure 18: Launch Clarius automation framework

Note: If the installation fails, check the installation logs at `(C:\ProgramData\Tektronix\Clarius\logs)` for more details about the failure or contact a Tektronix field engineer for support.

The ProgramData folder is hidden by default. Enable **Show hidden files, folders, and drives** to view the folder path.

13. (Optional) Launch the Clarius automation framework from the desktop.

Note: You can access the Clarius automation framework from the target system using the local host URL `https://127.0.0.1:4200`[5]. To remotely access the Clarius automation framework, use the host name or IP address of the Clarius automation framework installed system.

Log in to the Clarius automation framework with the following credentials

- **Username:** admin
- **Password:** Enter the user configured password set during installation.

.

[5] The default port allocated is 4200. If this port was not available during the installation, then the first available port within the range of 4200 to 4209 will be checked incrementally and allocated.

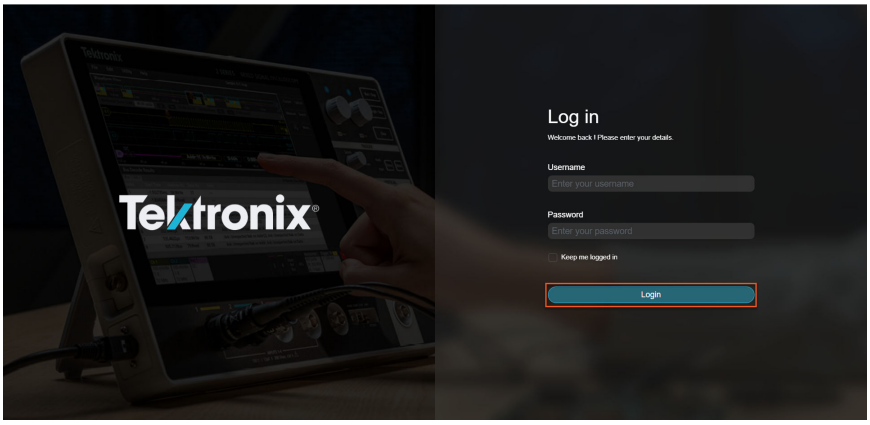


Figure 19: Clarius login page

Note: During installation, if port 4200 was already used, then the first available port within the range of 4200 to 4209 will be checked incrementally and allocated.

By default, no application(s) will be installed and the home screen displays no data. To install the application, refer to *Install DDR Tx application* on page 31.

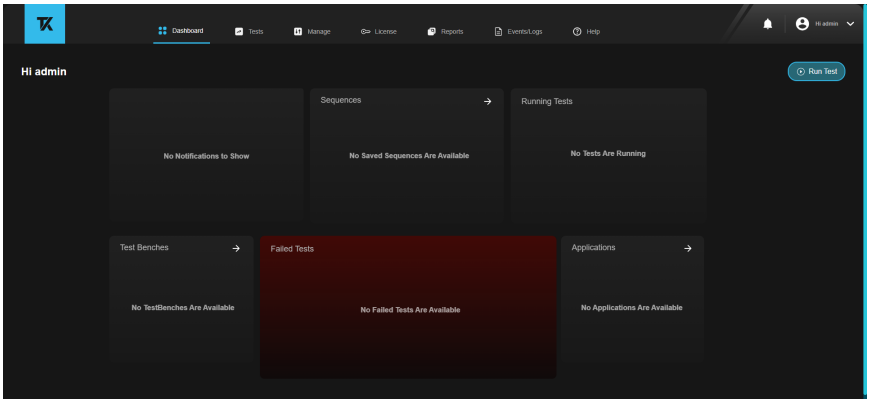


Figure 20: Clarius homepage

Install Clarius instrument service

Clarius instrument service sends the waveforms to the Clarius measurement service[6] for analysis. Refer to *Network topology* diagram for more information on instrument service.

The instrument service can be installed by the following ways:

- Install instrument service in the target system or remote PC where pre-recorded waveforms are located.
- Install instrument service in the oscilloscope to use pre-recorded waveforms or live acquisitions.

Follow these steps to install the Clarius instrument service:

1. Navigate to the Clarius automation framework installation path. The default path is `C:\Program Files\Tektronix\Clarius\installers`.
2. (Optional) Select and copy the Instrument folder and paste in the oscilloscope or computer.
3. Open Instrument folder, double-click **clarius-instrument-service-<<version>>.exe** and follow the steps to complete the installation.

6 Measurement service will be installed in the target system where Clarius automation framework is installed.

Clarius instrument service installation path:

- If Clarius instrument service is installed in a computer or oscilloscope, then the installation path is `C:\Program Files\Tektronix\Clarius\installers\instrument`.
- If Clarius instrument service is installed in the target system, then the installation path will be the same as that of the Clarius automation framework.

Note: Installing instrument service will also install Clarius SDK. If a supported Python version is detected, Clarius SDK will be installed in that environment. Otherwise, Python 3.12.x will be installed in an isolated environment and Clarius SDK will be installed in that environment.

Upgrade Clarius automation framework

This section describes the instructions for upgrading Clarius automation framework.

Table 2: Clarius automation framework version upgrade table

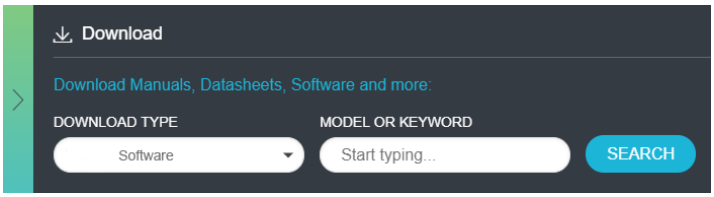
Version	Upgrade Support	Upgradable version(s)
2.0.0	Yes	1.1.0

Prerequisite:

- You must have at least 30 GB of free disk storage available in Clarius virtual machine to upgrade the Clarius automation framework. You can check the available free disk storage from the admin console. Refer to *Admin Console and Monitoring* on page 120 section.

To upgrade the Clarius automation framework in the target system, follow these detailed steps.

1. Go to *www.tek.com*.
2. Click **Download**. In the Downloads menu, select DOWNLOAD TYPE as Software and enter the application name in the MODEL OR KEYWORD field and click **SEARCH**.



3. Select the compatible version of Clarius automation framework and follow the instructions to download the software. Copy the install package (.zip) to the target install system and extract the zip file.
4. Double-click the installer and select **Yes** on the User Account Control.

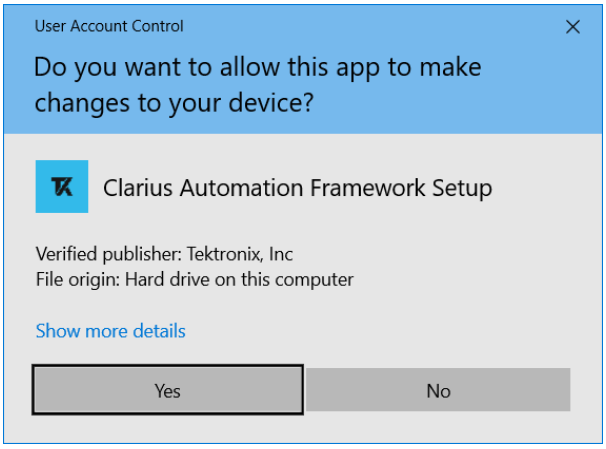


Figure 21: Clarius user account control

5. Displayed only if Clarius automation framework is already installed in the target system.

   Select **Yes** to proceed with upgrade version of the Clarius.

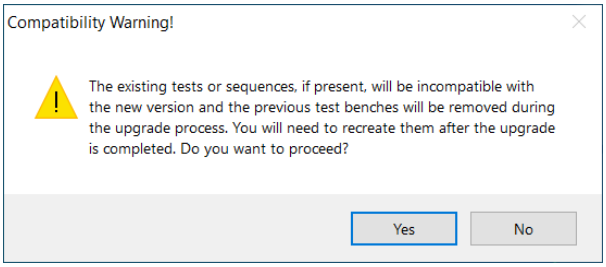


Figure 22: Upgrade pop-up

6. Read the welcome instructions and click **Update**.

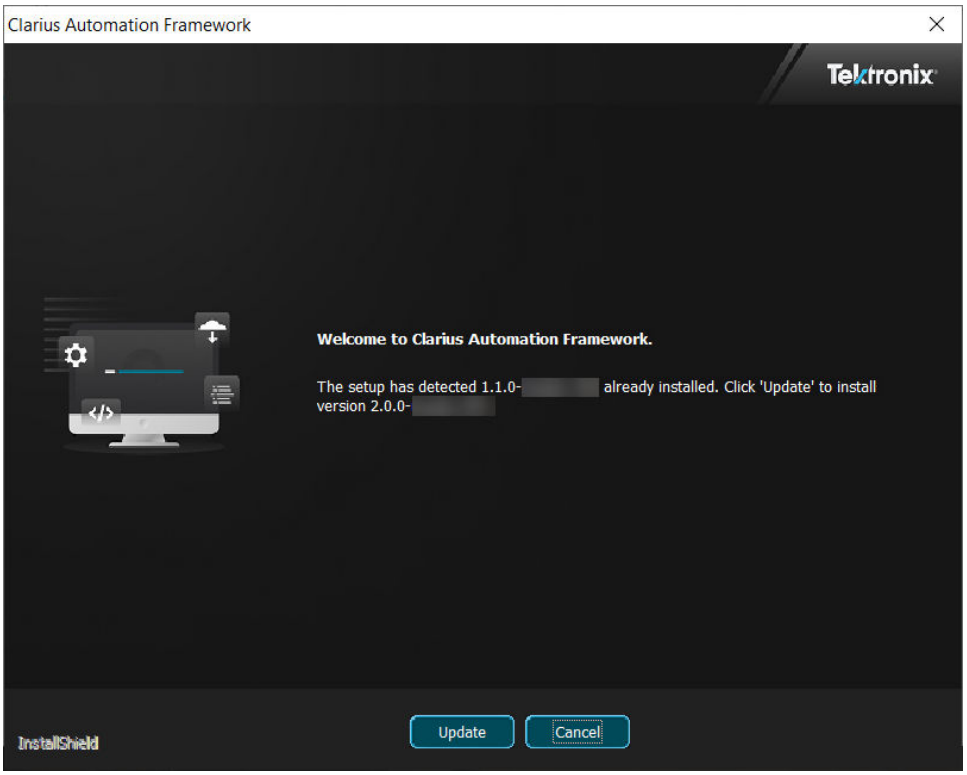


Figure 23: Upgrade Clarius installer setup

7. Accept the terms of the license agreement and click **Next**. Please wait until the upgrade process is complete.

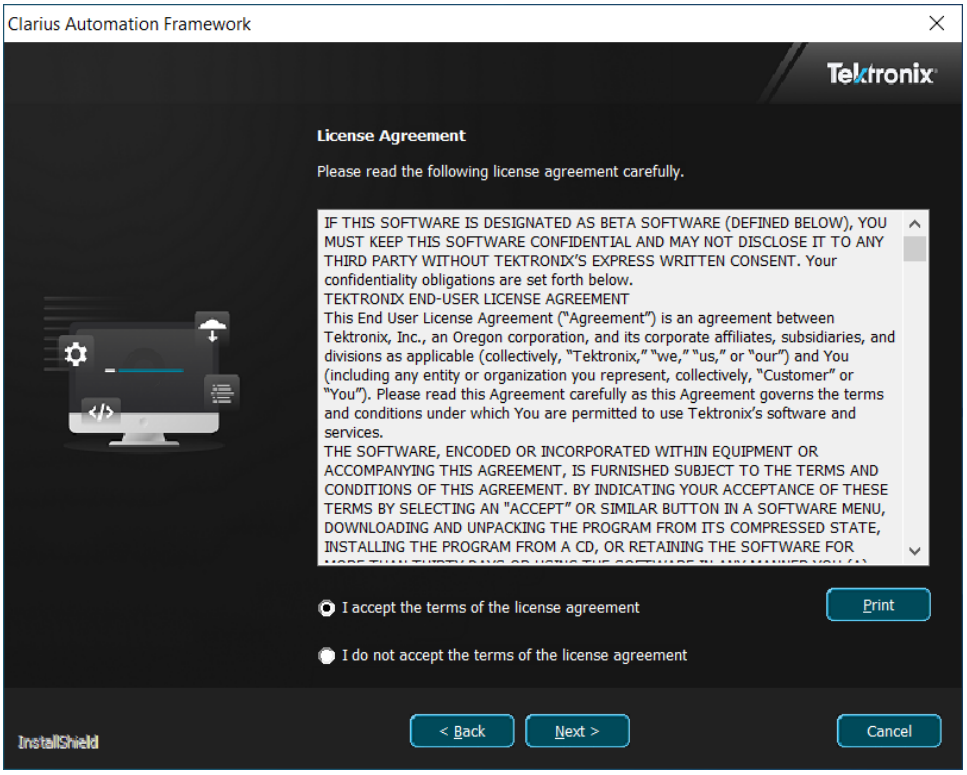


Figure 24: Clarius license agreement

8. Displayed only if Instrument Service is not installed in the previous version.

Select **Yes** to install the Instrument Service. This will create a local test bench in the target system for pre-recorded waveform analysis.

Installing instrument service will also install Clarius SDK in an isolated Python environment.

Tip: If you skip the instrument service installation, you can refer *Install Clarius instrument service* section for the installation steps.

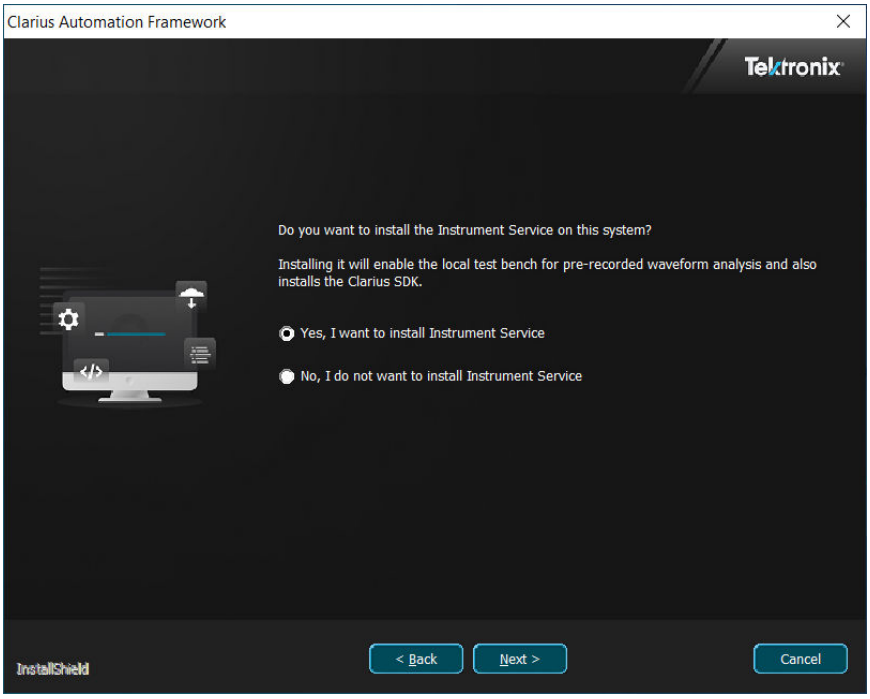


Figure 25: Install instrument service

9. The Clarius upgrade starts, please wait until the tasks and configuration process are complete.

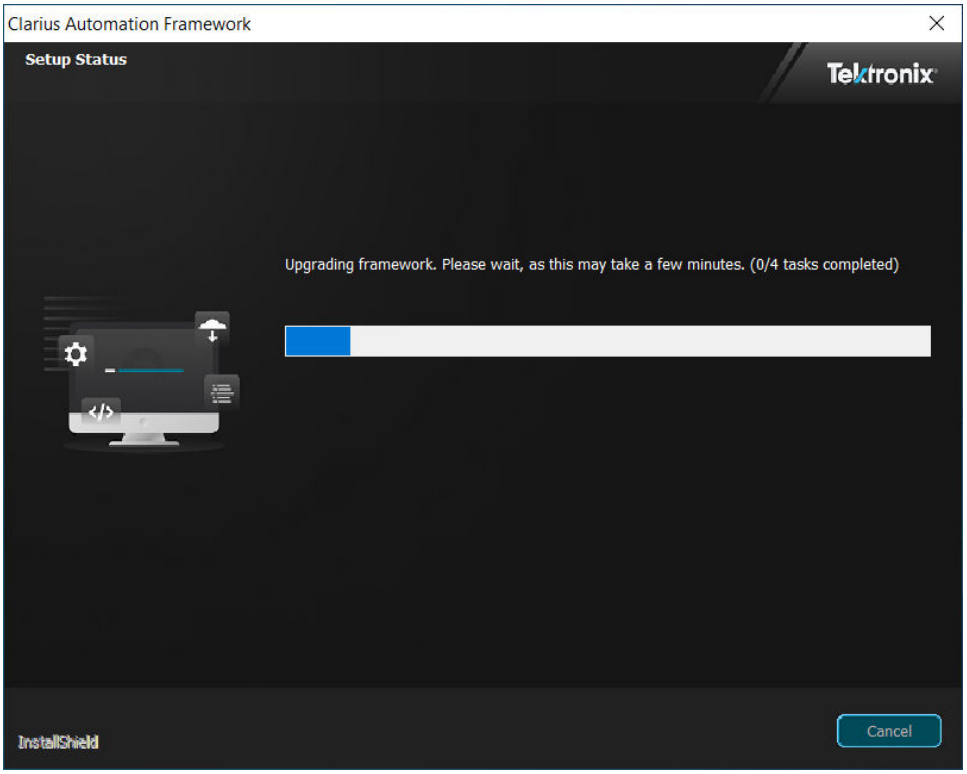


Figure 26: Upgrade

10. The Clarius upgrade is successful. Select the **Launch Clarius** checkbox to launch the Clarius compliance and click **Finish**. By default, the application will be launched in the Microsoft Edge browser.

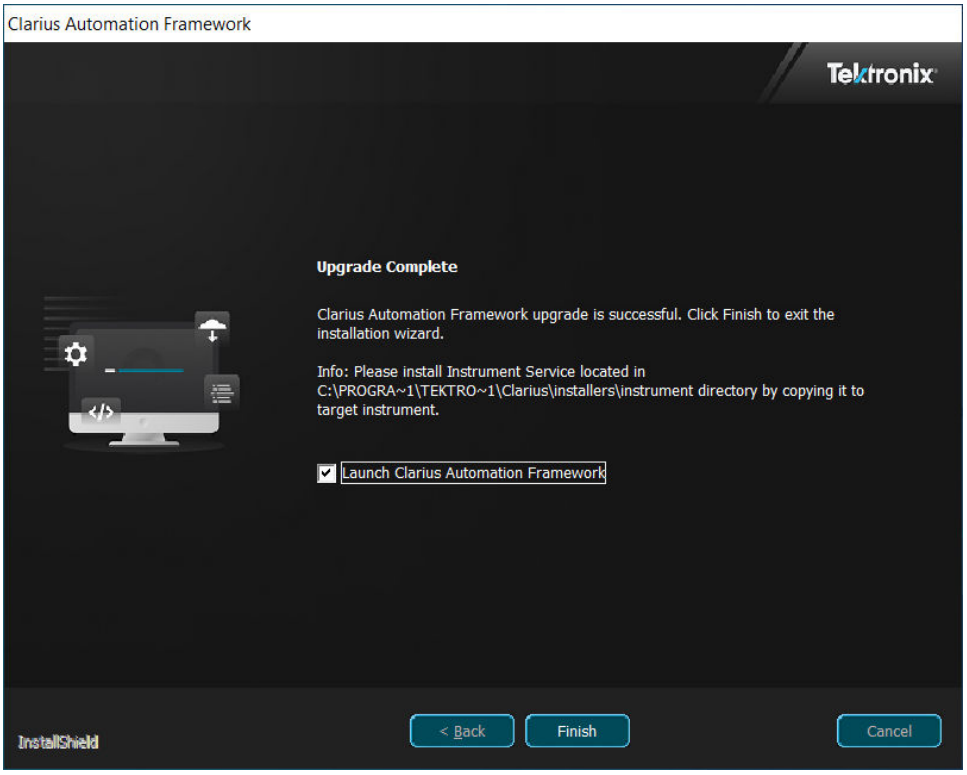


Figure 27: Launch Clarius

11. Log in to the Clarius automation framework with the following credentials.

- **Username:** admin
- **Password:** Enter the user configured password set during installation.

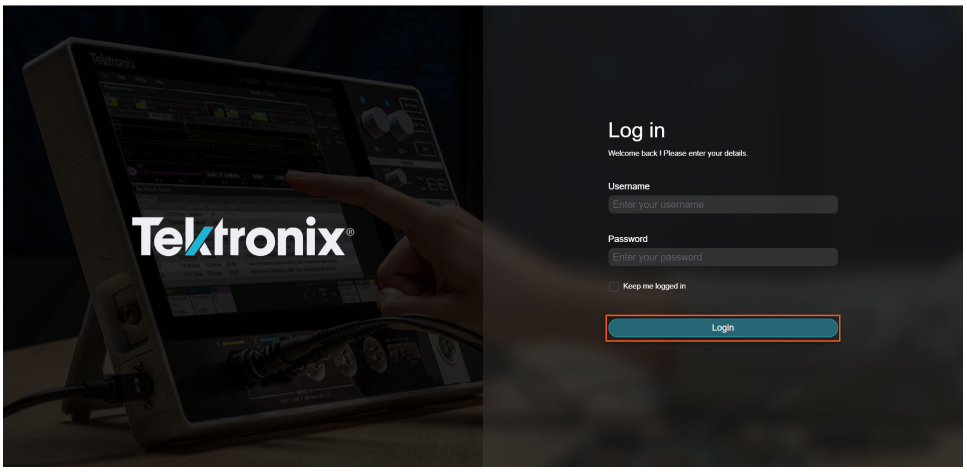


Figure 28: Clarius login page

Note: If the installation fails, please check the installation logs at `(C:\ProgramData\Tektronix\Clarius\logs)` for more details about the failure or contact Tektronix field engineer for support.

Installing application in Clarius automation framework

This section describes the instructions for installing a DDR Tx application in a target system. Follow the steps to complete the installation.

1. *Install Clarius DDR Tx application*
2. *Install instrument service plug-in of DDR Tx*

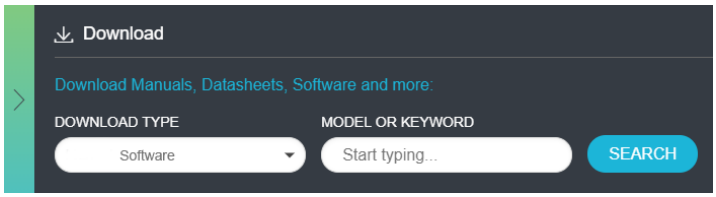
Install DDR Tx application

Prerequisite:

Compatible version of Clarius automation framework must be installed. Check *Install Clarius automation framework* section for installation steps.

To install the DDR Tx application in the target system, follow the steps:

1. Go to *www.tek.com*.
2. Click **Download**. In the Downloads menu, select DOWNLOAD TYPE as Software and enter the application name in the MODEL OR KEYWORD field and click **SEARCH**.



3. Select the latest version of software and follow the instructions to download. Copy the installer package to the target system[7].
4. Double-click the DDR Tx installer and follow the instructions in the installation wizard to complete the installation process.

   By default, the application license will not be activated in Clarius compliance and the home screen displays no data. Refer *Activate application license* on page 34 to activate the license.

Note: If the installation fails, check the installation logs (`C:\ProgramData\Tektronix\Clarius\logs`) for details about the failure or contact a Tektronix field engineer for support.

Install instrument service plug-in of the DDR Tx application

Install the instrument service plug-in of the application in the oscilloscope or the computer, where you have installed the Clarius instrument service. To install the Clarius instrument service, *click here*.

Follow the steps to install the DDR Tx instrument service plug-in:

1. In the target system where the Clarius automation framework is installed, navigate to the installed path. The default path is `C:\Program Files\Tektronix\Clarius\installers`.
2. Select and copy the Instrument folder and paste in the oscilloscope or computer, where you have installed the Clarius instrument service.
3. Open the folder, double-click the **clarius-compliance-DDR-Tx-instrument-service-<<version>>.exe** and install the plug-in.

[7] A PC/Laptop/Computer where the Clarius automation framework is installed.

Clarius SDK

Install Clarius SDK (Software Development Kit) in the target system (where Clarius automation framework is installed) or in the oscilloscope or computer where the Clarius instrument service is installed.

Clarius SDK can be installed in the following ways:

- Install Python in the global environment and then install Clarius SDK in that environment. If a supported Python version is detected, you can select to install the Clarius SDK in that environment.
- Install Python in an isolated Python environment[8] and install Clarius SDK in that environment.

Install Clarius SDK

If you have skipped Clarius SDK installation during the installation of Clarius automation framework, follow the steps to install.

1. In the target system, where the Clarius automation framework is installed, navigate to the installed path. The default path is `C:\Program Files\Tektronix\Clarius\installers\sdk`.
2. Select and copy the **sdk** folder and paste it to the oscilloscope or computer.
3. Open sdk folder, double-click **clarius-sdk-<<version>>.exe** and follow the steps to complete the installation.

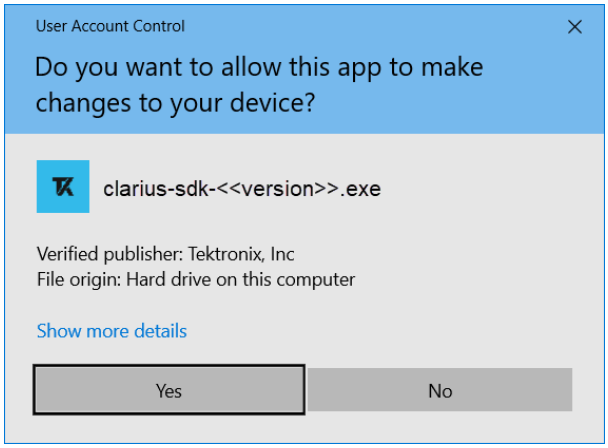


Figure 29: User account control dialog

[8] An isolated Python environment will have its own independent set of Python packages installed in its site directories.

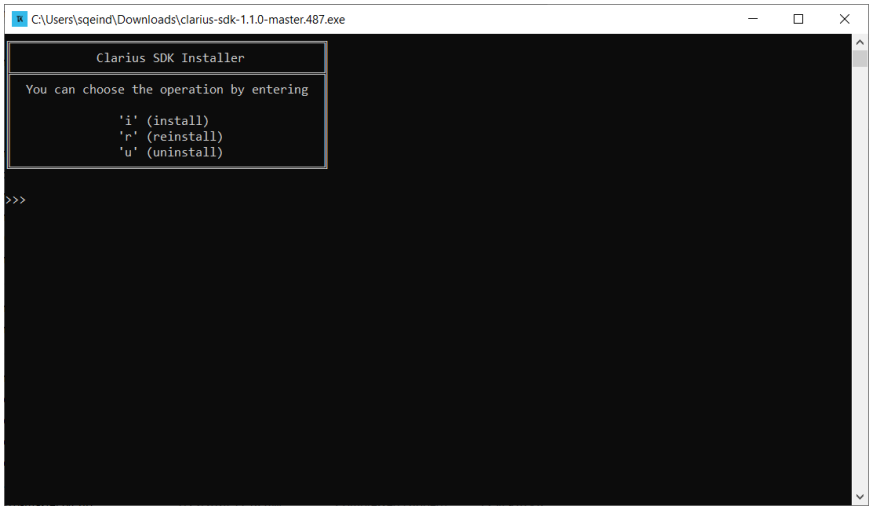


Figure 30: SDK installer setup

Activate application license

1. Double-click the **Clarius** icon from the desktop to launch the Clarius automation framework.
2. Log in using the **Username** as **admin** and the user configured password that was set during the installation.
3. Select the **License** tab and click  to copy the **Host ID**.

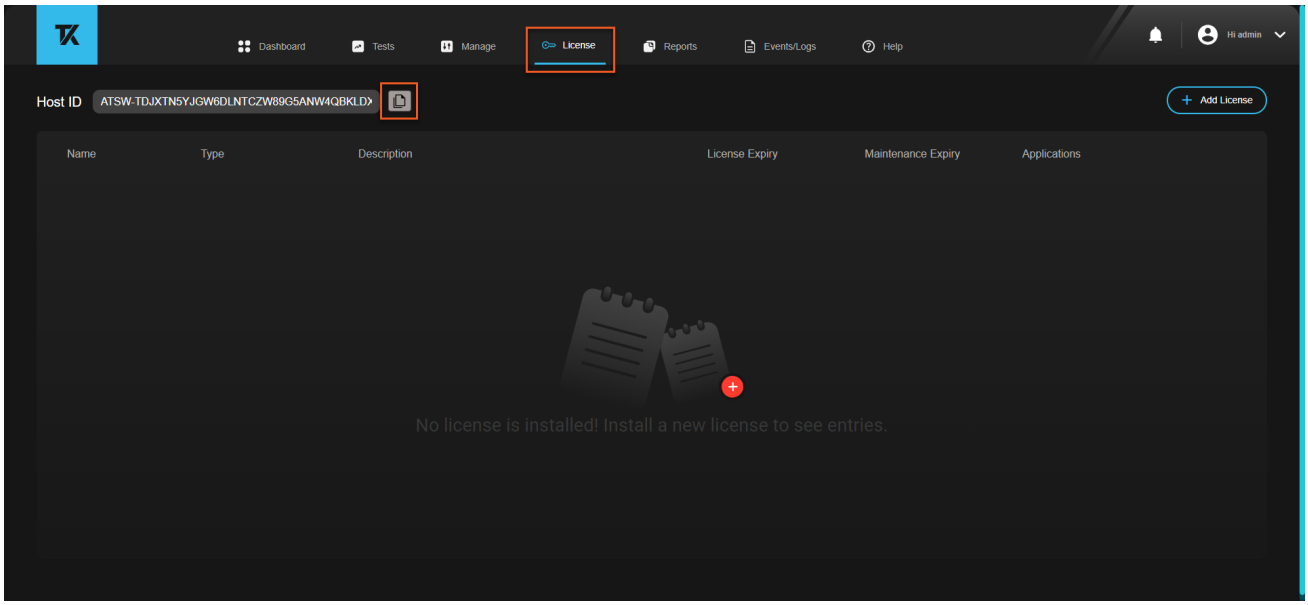


Figure 31: Copy Host ID for license request

4. Send the copied **Host ID** to the Tektronix application engineer and request for license file.
5. In the **License** tab, click **Add License**; browse and select the license file and click **Activate**.

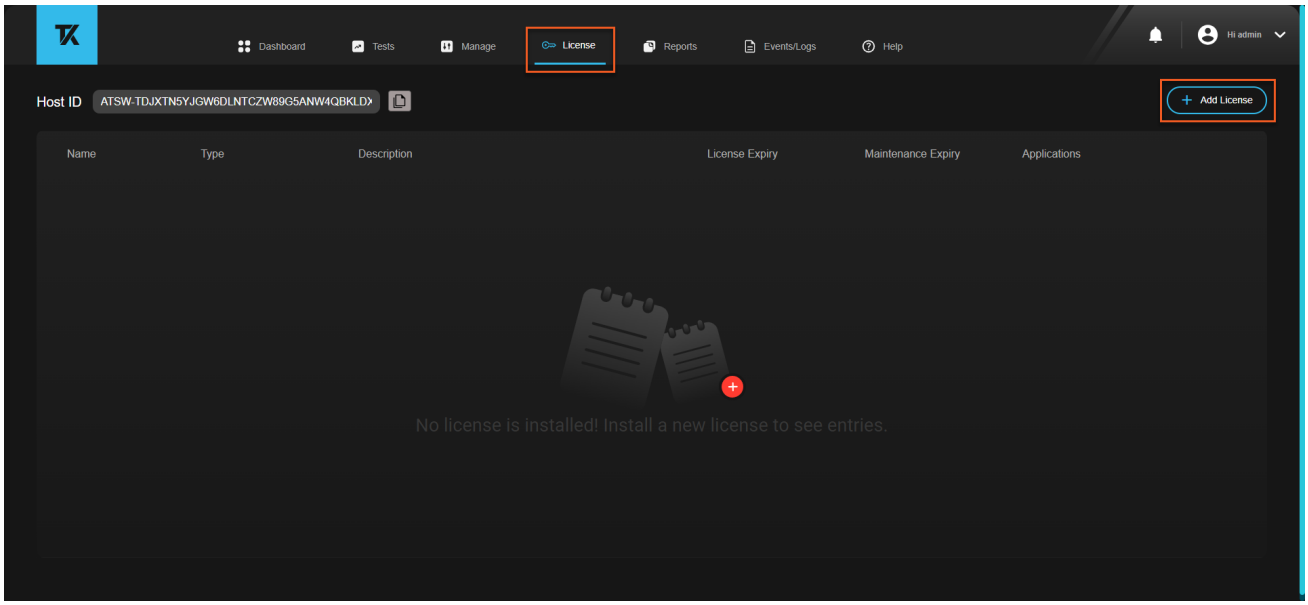


Figure 32: Add License

6. After successful activation, the application license details will be displayed in the license tab.

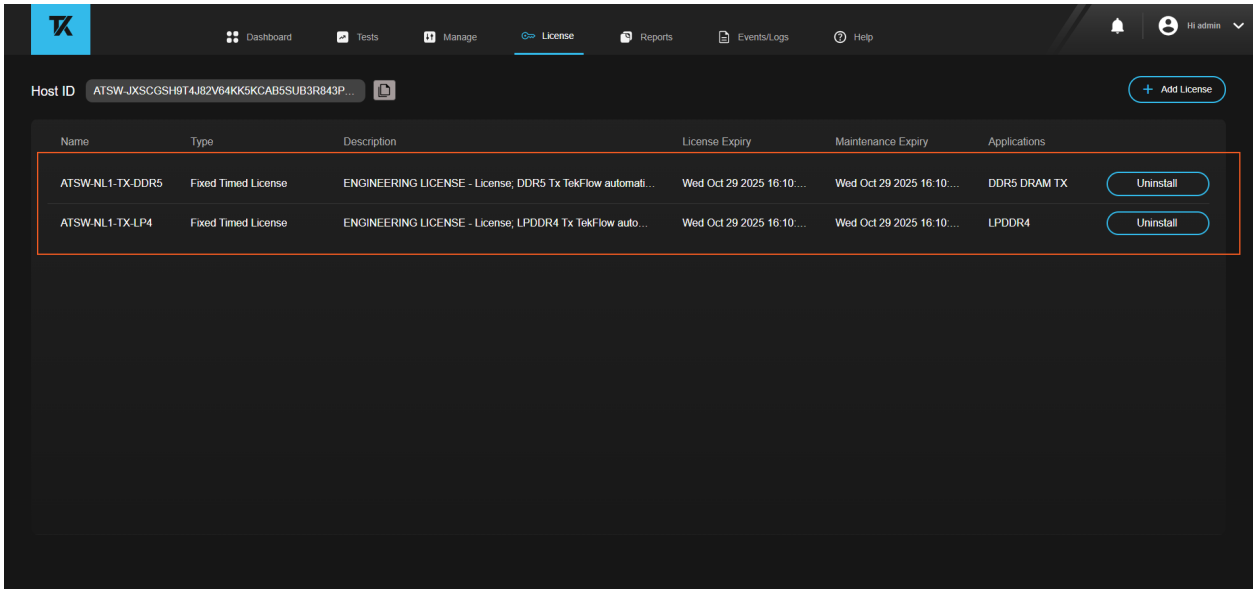


Figure 33: Installed application license in Clarius automation framework

Run the services

This section lists the services to run before performing tests in the Clarius automation framework. To perform testing within the Clarius automation framework, make sure all the installations are complete and all supporting services are running for the following scenarios.

- The *Clarius measurement service* must be up and running in the target system.
- The *Clarius instrument service* must be up and running in the system or oscilloscope from where the analysis of the waveform will be done.

Run Clarius measurement service

If the Clarius measurement service is running in the target system where Clarius automation framework is installed, you must see the Measurement service window. If it is not running then double-click the **MeasurementServiceStart.bat** icon from the desktop to run the Clarius measurement service.

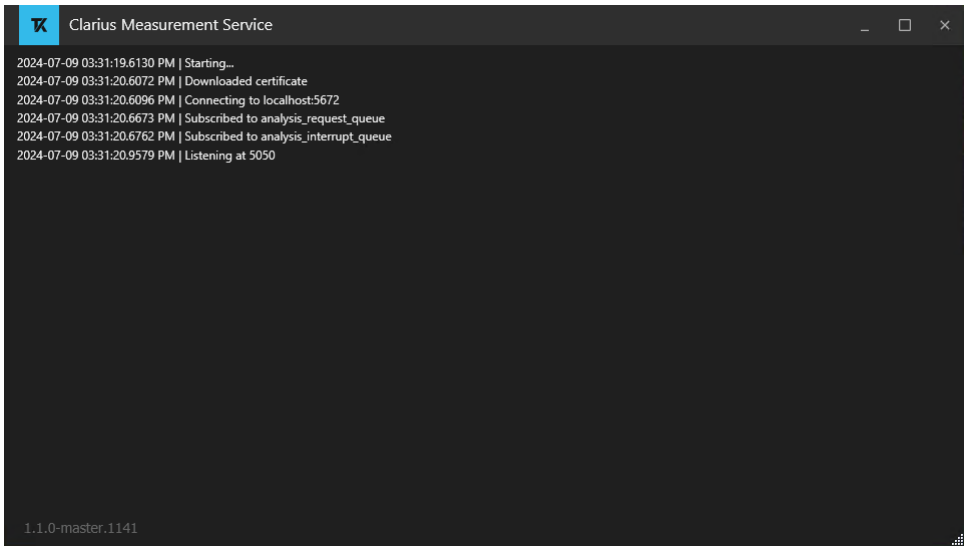


Figure 34: Clarius measurement service window

You can also run the measurement service by navigating to the installation path and double-click the **MeasurementServiceStart.bat**. The default installation path is `C:\Program Files\Tektronix\Clarius\lib\analysis\service`.

Run Clarius instrument service

Clarius instrument service sends the waveform to the measurement service[9] for analysis. To check if the instrument service is running, click the **Show hidden icons** arrow in the task bar of Windows and check for Instrument Service.

If the instrument service is not running, double-click the **InstrumentServiceStart.bat** icon from the desktop and run the instrument service. This will run the instrument service and the automator.

[9] Measurement service will be installed in the target system where Clarius automation framework is installed.

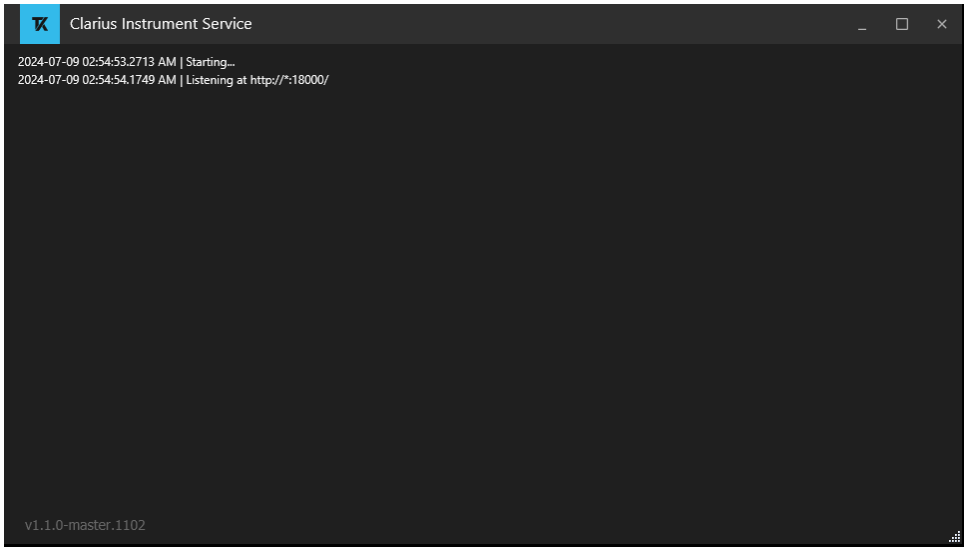


Figure 35: Clarius instrument service window

You can also run the instrument service by navigating to the installation path and double-click the **InstrumentServiceStart.bat**. The default installation path is `C:\Program Files\Tektronix\Clarius\lib\instrument\service`.

Application overview

This section describes the steps to log in to the Clarius automation framework, lists of the application controls, and the list of tabs that are in the navigation panel.

Start and log in to the application

1. Double-click the **Clarius** icon from desktop to launch Clarius automation framework.

   Note: You can access the Clarius automation framework from the target system using the local host URL `https://127.0.0.1:4200`. To remotely access the Clarius automation framework, use the host name or IP address of Clarius automation framework installed system.

2. Log in to the application using the credentials.

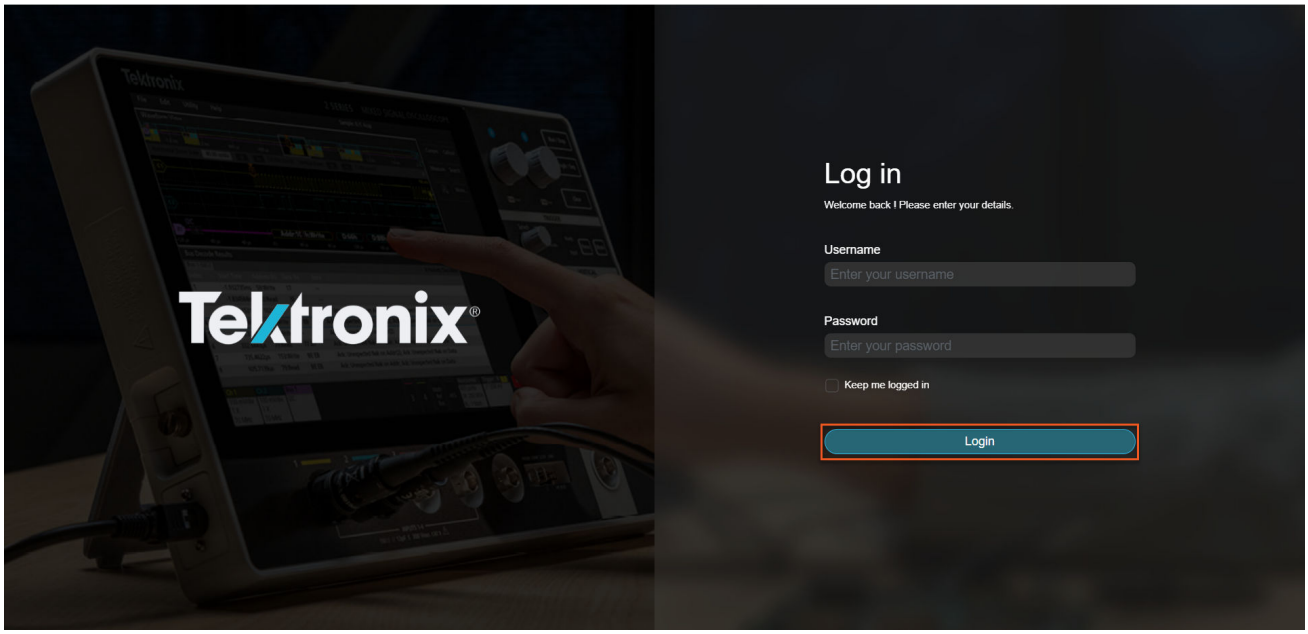


Figure 36: Clarius automation framework login page

After successful log in, you will be navigated to the home page. It displays the activated application(s), saved sequences of the application, test benches status, running tests, failed tests list, and notifications.

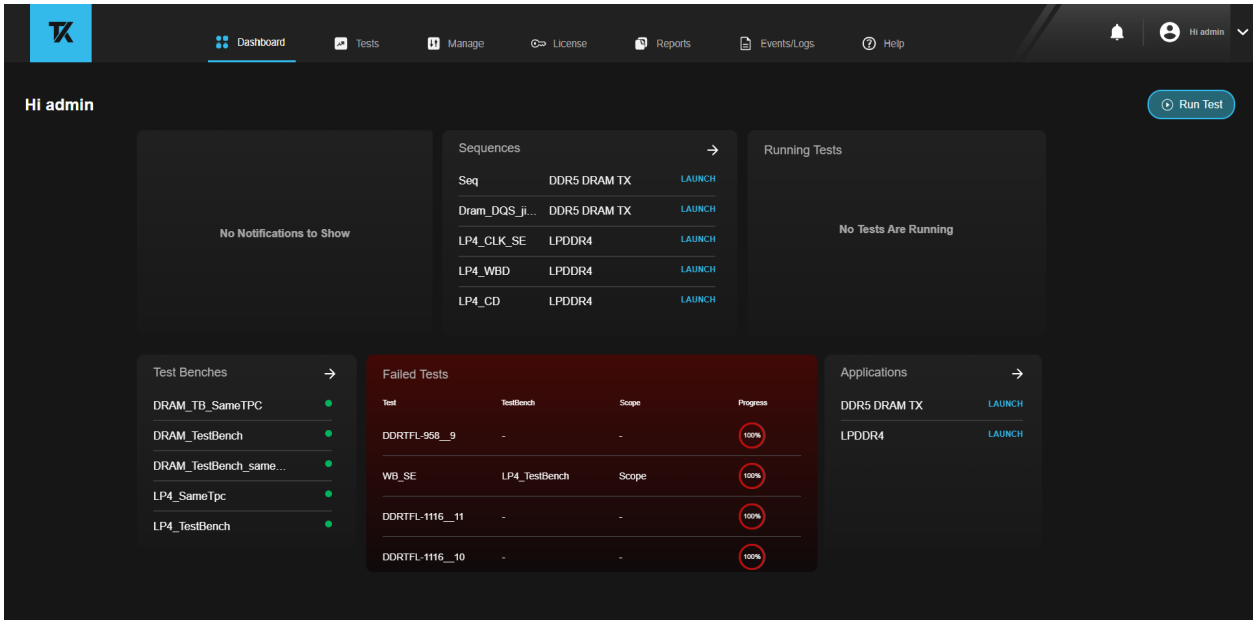


Figure 37: Clarius automation framework home page

Application controls

The Clarius automation framework uses the menus to group the related configurations, test, result, logs, and report settings. Click the respective menu to open the associated details.

A menu may have one or more tabs and frames that lists the selections available in that panel. Controls in a menu can change based on the settings made in that menu or another menu.

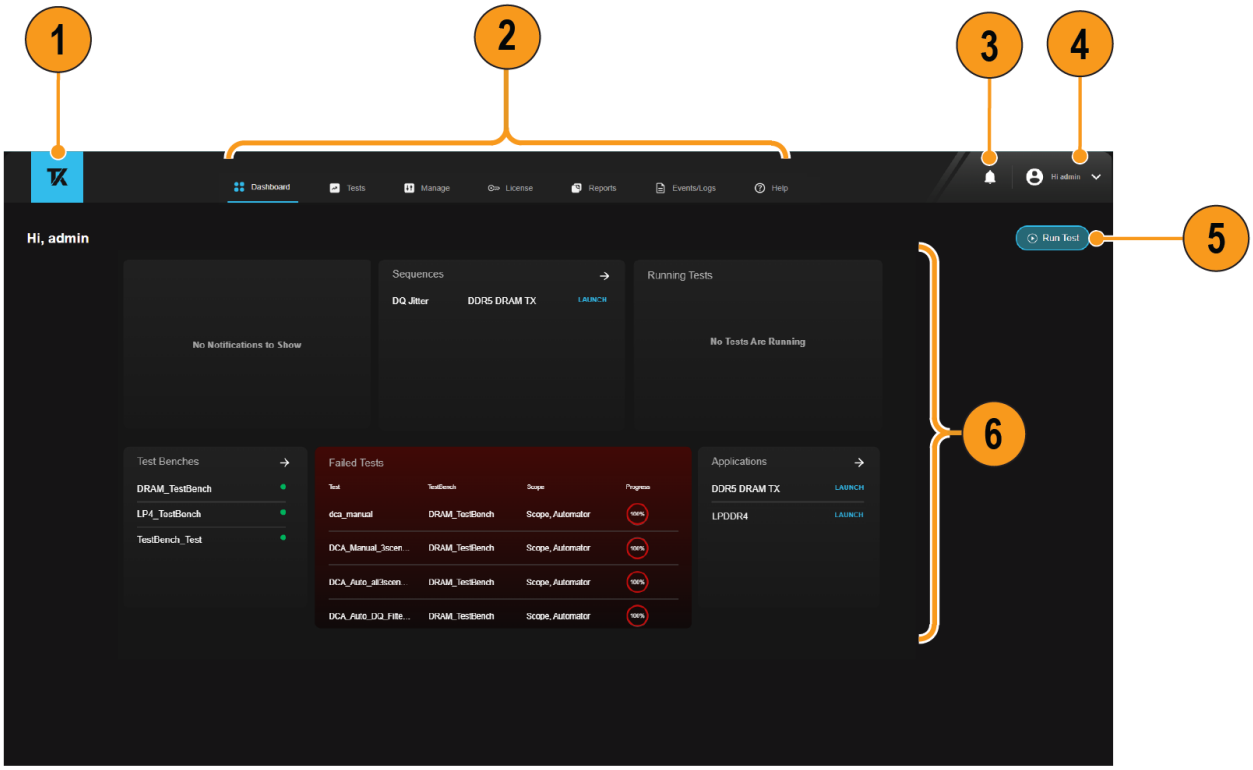


Figure 38: Application controls interface

Table 3: Application controls description

Identifier	Element	Description
1	Navigation panel	The navigation panel contains list of tabs that allows you to select the application, create and configure tests, create and configure test bench, and generate the test report.
2	Notifications	Displays alerts when an event or action occurs in the application.
3	User profile	Displays the profile information and settings details of the account. You can view the version and user license agreement details in **About** menu.
4	Run Test	Click to perform a test by entering the required test information.
5	Widgets	An element of a graphical user interface that displays information or provides a specific details to the user to interact with the application.

Navigation panel

The navigation panel contains a list of tabs that allows you to select the application, create and configure tests, test bench, generate the test report, view the logs of the executed test, and the license information. Click the respective tab to open the associated panel.

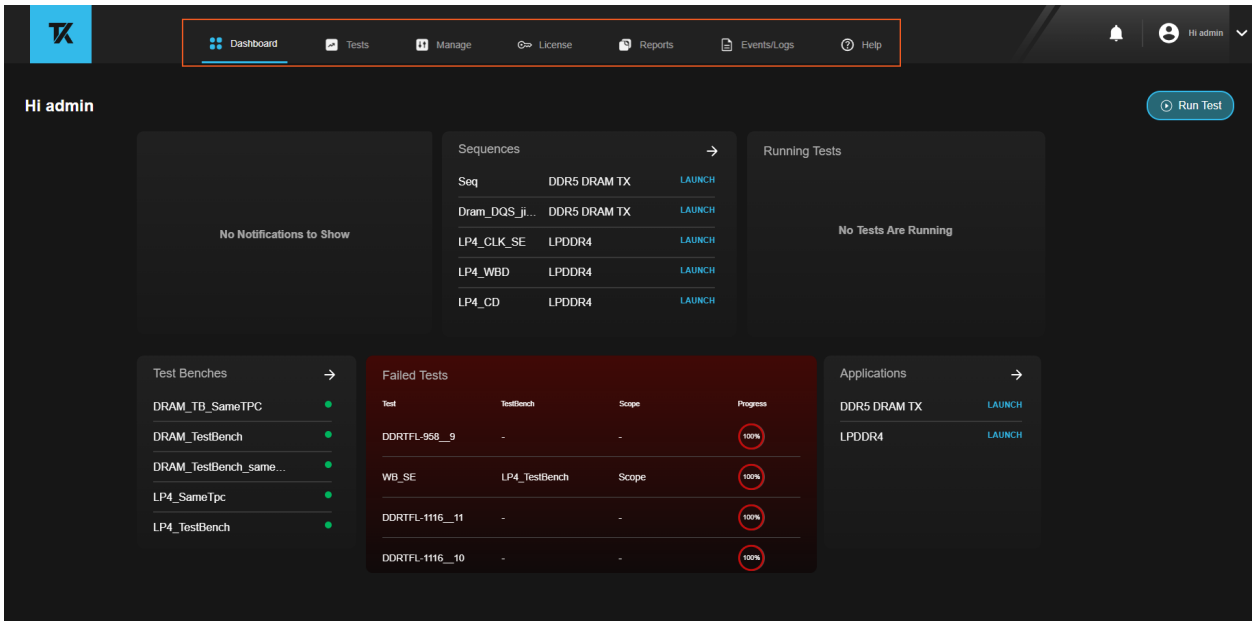


Figure 39: Clarius compliance navigation panel

Table 4: Navigation panel and tabs description

Tabs	Description
Dashboard	Displays the test data and test execution summary. It includes test progress, test notifications to view the status of each test, list of active applications, sequences, and test benches.
Tests	Allows you to create, configure, and run a new test. It also analyzes and displays the details of all executed tests.
Manage	Allows you to manage the application, test bench, and sequences that are created for the test execution.
License	Allows you to add license to the application and also view the licenses that are enabled.
Reports	Allows you to generate a test report and/or export a detailed test report for an executed test(s).
Events and logs	Displays the logs and events for a test.
Help	Allows you to open Help window to browse topics and read Help files.

Power utility

The Tektronix Power Utility allows the user to manage the power status (ON/OFF) and control the voltage and current for all channels of a Keithley Power Supply. By connecting to the power supply using its address, users can configure the desired voltage and current settings for each channel.

Location : `C:\Program Files\Tektronix\Clarius\lib\automator\tools\PowerUtility`

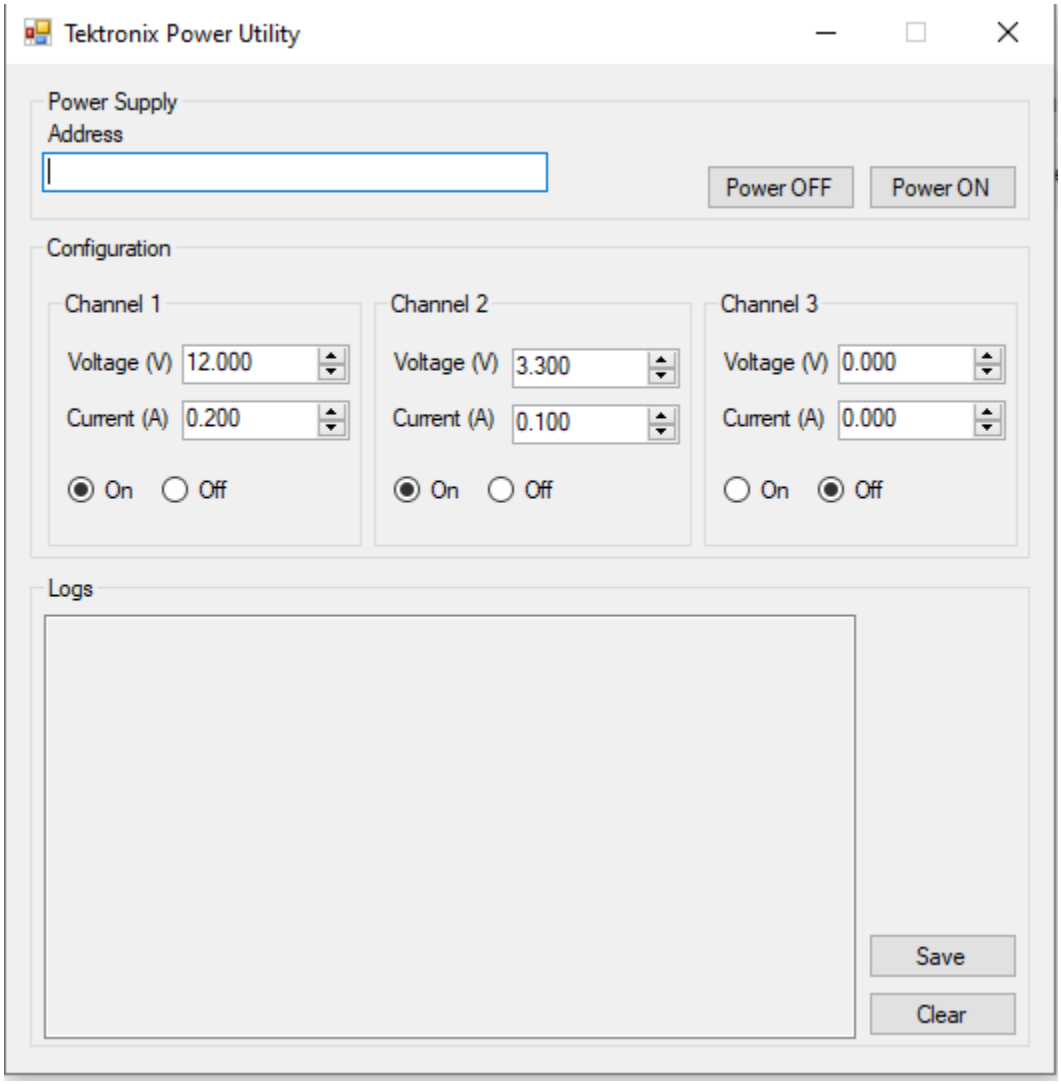


Figure 40: Tektronix Power Utility

Dashboard: View the test execution details, progress, and results

The dashboard allows you to get quick insight about the test execution summary. The widgets in the dashboard displays the test related information such as applications used, available test benches, test notifications, sequences, and more.

The test execution results displayed here depends on the configurations in the other panels.

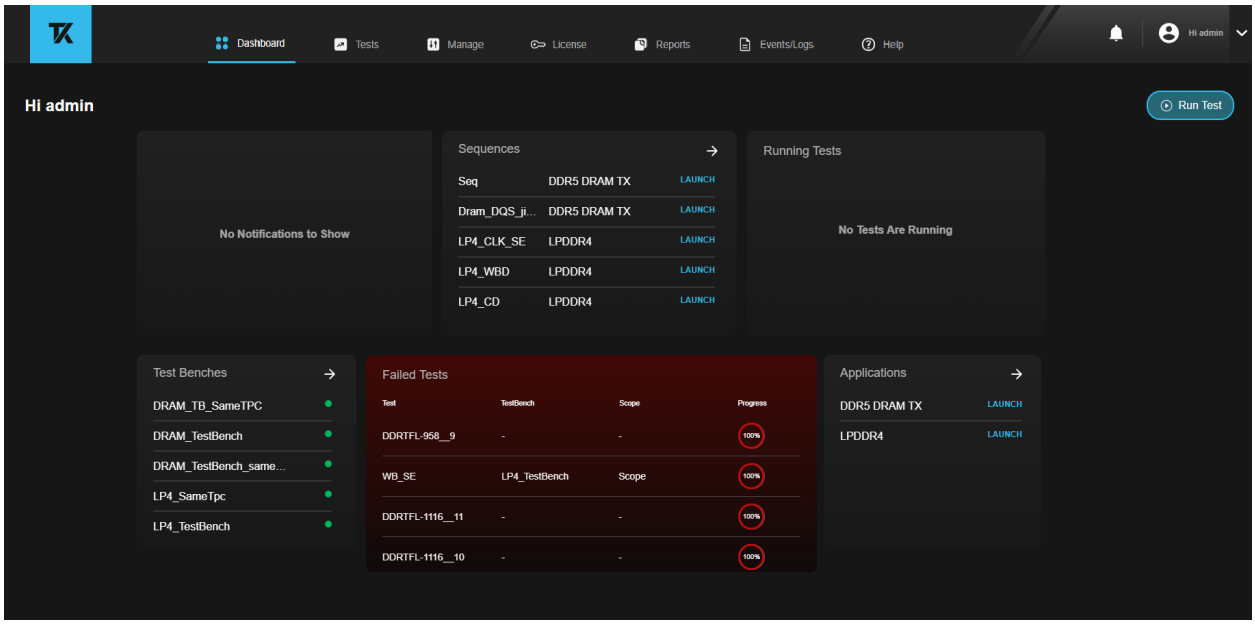


Figure 41: Clarius compliance dashboard view

Perform a test

The **Run Test** allows you to perform a test by entering the fields such as the test name, tags, test description, acquisition mode, test bench, and test sequences.

Widgets

A widget is a part of an interface that allows you to perform a task or access a service on the platform.

Running tests

This widget displays the current test execution status with details such as Test Name, Testbench, and Progress. The progress status displays the test status as Running, Failed, or Complete.

If tests are not performed, then the widget displays **No Tests Are Running** message.

Click the particular test from the **Running Test** widget to view the test details and progress of the currently running test from the **Test** tab.

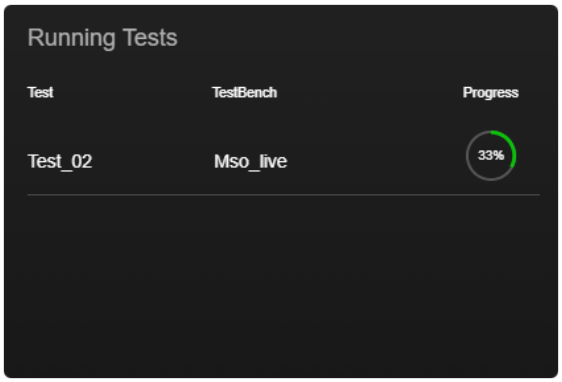


Figure 42: Clarius compliance running tests widget

Test benches

Displays the list of available test benches along with its status. Click → to navigate to the **Test benches** tab.

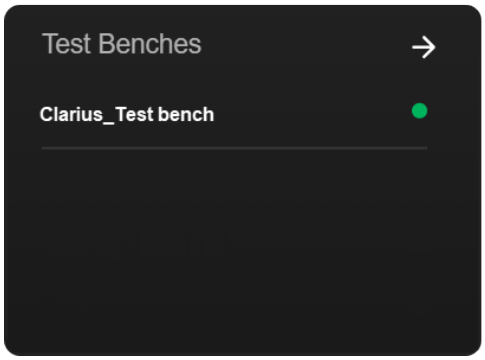


Figure 43: Clarius compliance test benches widget

Applications

Displays the list of activated application(s). Click **LAUNCH** to start the application.

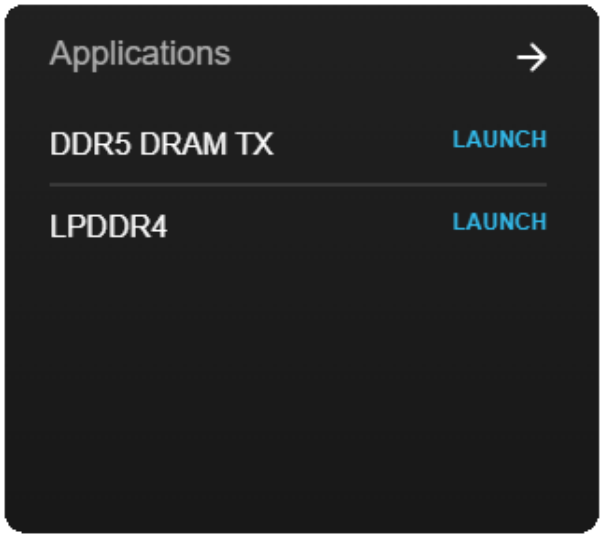


Figure 44: Clarius compliance applications widget

Failed tests

Displays the list of failed tests with details of Test Name, Test bench, Scope, and Progress. Click the particular failed test to navigate to the test details and view the test results from the **Tests** tab.

Figure 45: Clarius compliance failed tests widget

Sequences

Displays the list of available sequence(s). Click **LAUNCH** to run the sequence.

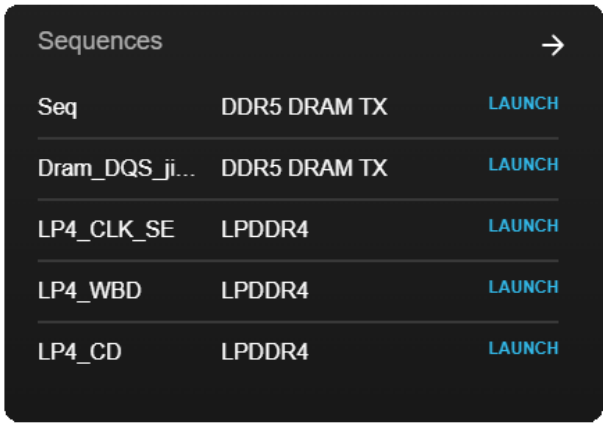


Figure 46: Clarius compliance sequences widget

Notifications

Displays the list of notifications for the active running test. If no tests are performed, the widget displays **No Notification to Show** message.

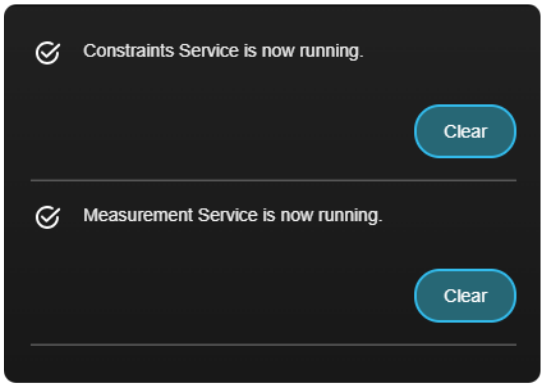


Figure 47: Clarius compliance notifications widget

Tests: Create and run a test, view run statistics and results

The **Tests** tab allows you to create, configure, and run a test. It also displays the name of the test, test mode, application name, execution time stamp, execution duration, and the test execution status. You can delete and view results of the executed test from **Tests** tab.

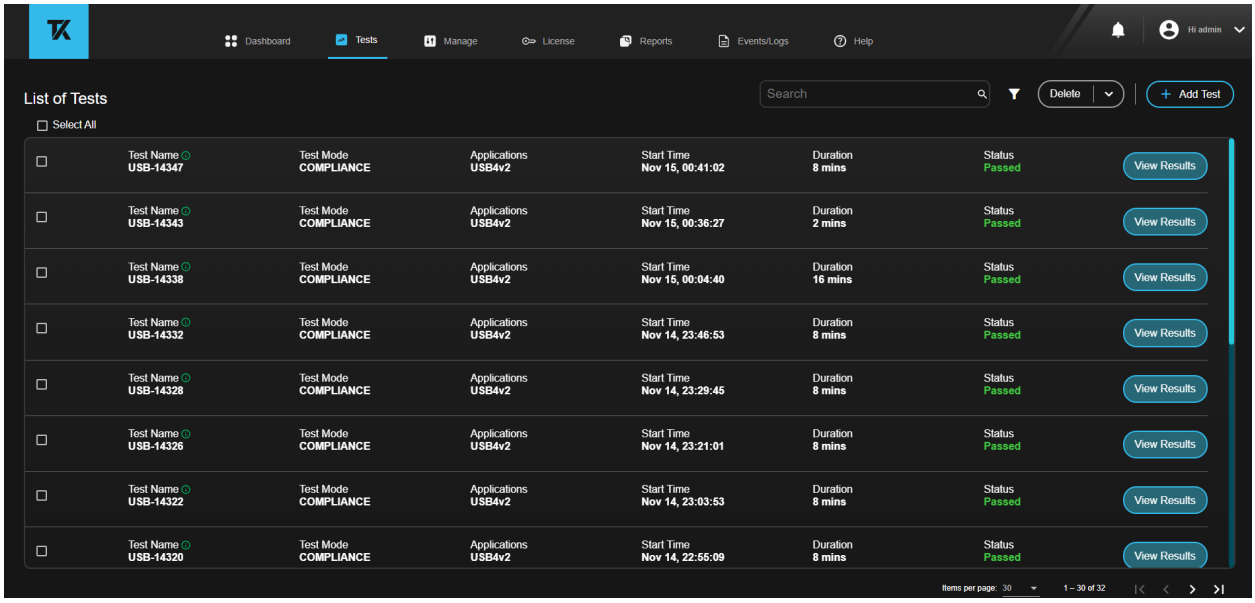


Figure 48: Tests tab in Clarius compliance

Select a test or tests and click **Delete** to delete the test or waveforms from the **Test** tab.

Create and run a test

The **Add Test** button allows you to create and configure a test.

Follow the steps to create a test:

1. In the **Tests** tab, click **Add Test**.

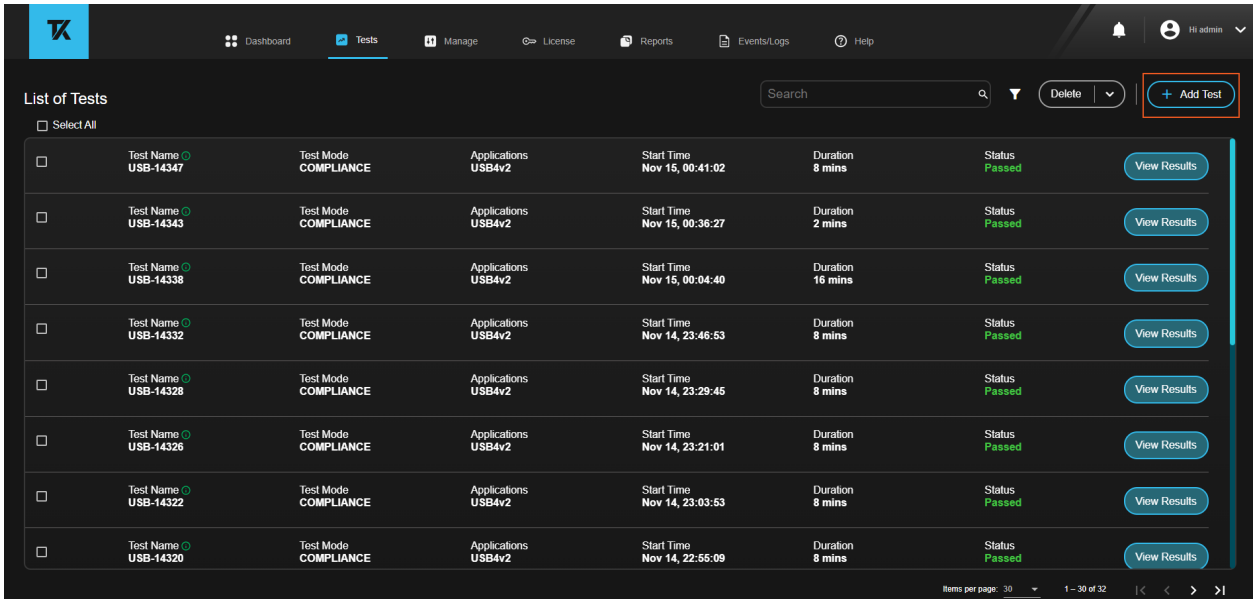


Figure 49: Add Test

2. Enter the test details in the respective fields.

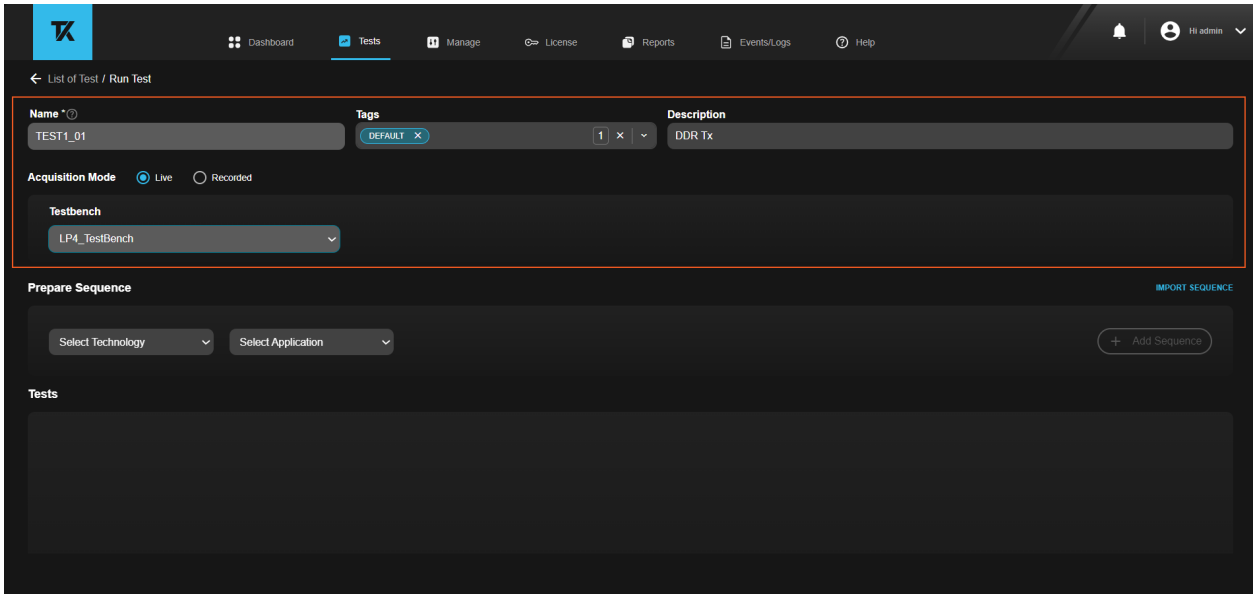


Figure 50: Test Parameters

Menu	Description
Name	Enter a unique test name.

Table continued…

Menu		Description
Tags		Tags are used to group the tests. There is a default tag added. You can add the required tag to the tests and can filter the tests based on the tag value.
Description		Enter the test description.
Acquisition Mode		Select the acquisition mode (Live or Recorded).
	Live	Select **Live** to run a test measurements on live signal. • Select the *testbench* from the drop-down list.
	Recorded	Select **Recorded** to run a test measurements on prerecorded waveforms. • Select the oscilloscope or Clarius installed PC from the drop-down to use recorded waveform files. • Select the *testbench* from the drop-down on the **Recorded** mode. (Enables only when **Remote PC/Oscilloscope** is selected). • Enter waveform folder path from **Remote PC/Oscilloscope** or **Clarius PC**.

3. *Create and prepare a sequence.*
4. *Configure the sources and signals.*
5. *Configure the global settings.*
6. *Instrument connection diagram setup.*
7. *Configure the test scenario.*
8. Click **Run** to run the measurements with the configured settings.

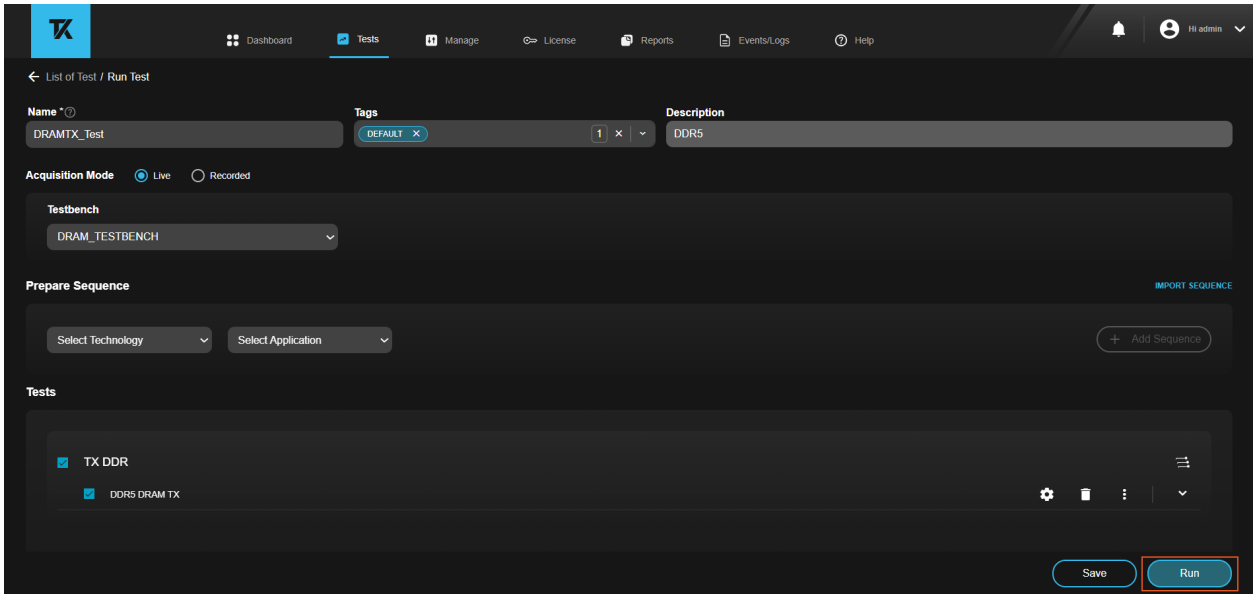


Figure 51: Run a test

Create and prepare a sequence

The create and prepare a sequence settings allows you to add a sequence by setting up the required details.

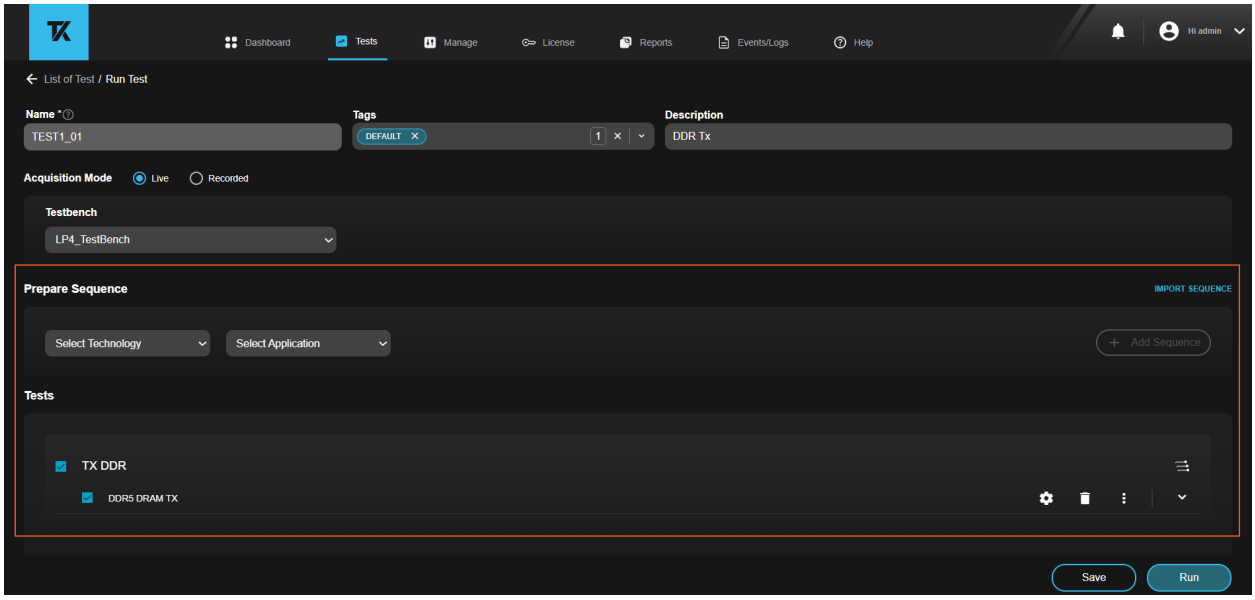


Figure 52: Tests tab: Create and prepare a sequence

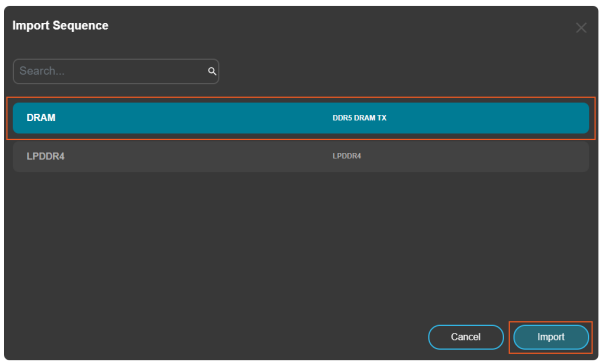
Menu	Description
Import Sequence	It allows to import the sequence that is created as a template. • Click the **IMPORT SEQUENCE** button and select the desired sequence. • Click **Import**. 
Select Technology	Select the technology from the drop-down to prepare a sequence.
Select Application	Select the active application from the drop-down to prepare a sequence.
Add Sequence	It allows to add a new sequence in the current test.
Sources and Signals	Select the required sources and signals to run the test.
Global Settings	Select the required global settings to run the test.
Delete sequence	Deletes the created sequence.
Connection Diagram	Shows the connection between the instruments to make the test setup.
Scenarios	It displays the list of scenarios with their **Names** and **Local Settings** related to the sequence. You can select and unselect a scenario.
Save	Saves all the sequence settings that are added.

Table continued…

Menu	Description
Run	Run the test when all the settings are added.

Configure the sources and signals

The Sources and Signals allows you to select source and assign signals to the channels.

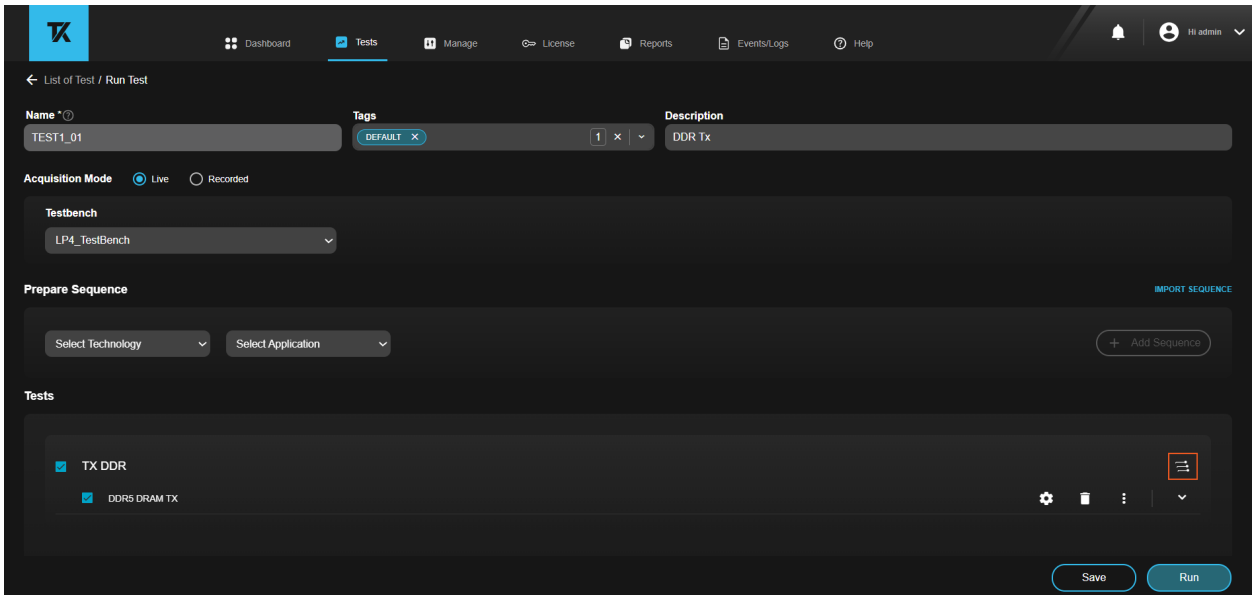


Figure 53: Tests tab: Configure the sources and signals for a test

To add the sources and signals, do the following:

1. Click to assign the sources and signals for the test setup.
2. By default, signals will be added as per the selected technology and application.
3. To add additional signal, click **+ Add Signal**.

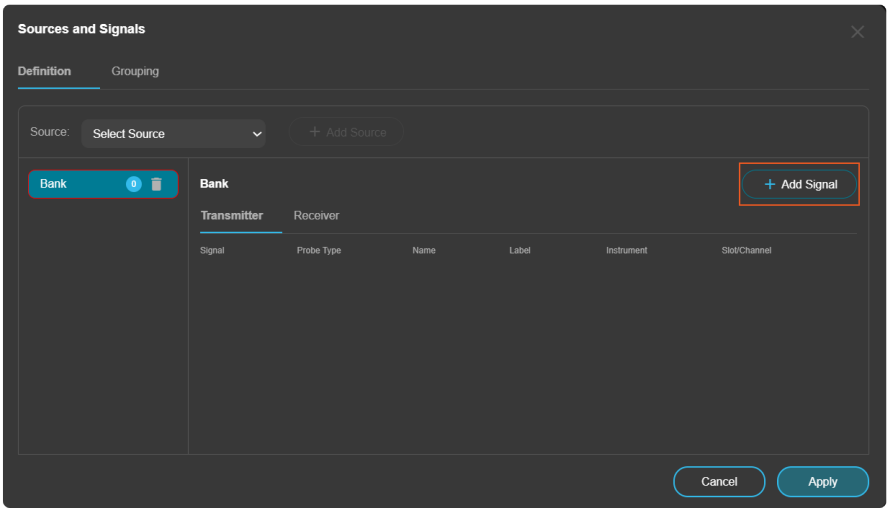


Figure 54: Add Signal for selected source

4. Select or unselect the required sources from the drop-down.
5. Navigate to the **Grouping** tab and click **+ Add Group** to add group of sources.
6. Click **Apply**.

Table 5: Configure the Sources and Signals for DDR Tx

Settings	Description	Options
Source	It displays source selection as Bank.	Bank (**Default**)
Signal	Select the required signal from drop-down.	For DDR5-DRAM-Tx • DQS • DQ For LPDDR4 • CLK • DQS • DQ0 - DQ31 • CA0 - CA7
Probe Type	Select the required probe type from drop-down. The probe type changes according to the signal selected.	For DDR5-DRAM-Tx • SINGLE_ENDED For LPDDR4 • DIFFERENTIAL • SINGLE_ENDED
Name	Enter the name of the source in the text field. Displays the source name based on the probe type selected.	For DDR5-DRAM-Tx • DQS+, DQS-, DQ For LPDDR4 • CLK, CLK+, CLK-, DQS, DQS+, DQS-, DQ0, CA0 **Default: CLK, DQS, DQ0, CA0**
Label	Enter the label of the source in the text field.	For DDR5-DRAM-Tx • DQS+, DQS-, DQ For LPDDR4 • CLK, CLK+, CLK-, DQS, DQS+, DQS-, DQ0, CA0 **Default: CLK, DQS, DQ0, CA0**
Instrument	Select the required instrument from the drop-down.	• Scope (**Default**) • ExtensionScopeB • ExtensionScopeC • ExtensionScopeD

Table continued…

Settings	Description	Options
Slot/Channel	Select the required slot/channel from the drop-down.	For DDR5-DRAM-Tx • CH1, CH2, CH3, CH4 **Default:** • **DQS+: CH1** • **DQS-: CH2** • **DQ: CH3** For LPDDR4 • CH1, CH2, CH3, CH4 **Default:** • **CLK: CH3** • **DQS: CH1** • **DQ0: CH2** • **CA0: CH4**
Delete	Removes the added signal source.	

Configure the global settings

Global settings configured for the application will be applied for all the measurements within the application. These settings are applicable for all the scenarios present in the sequence.

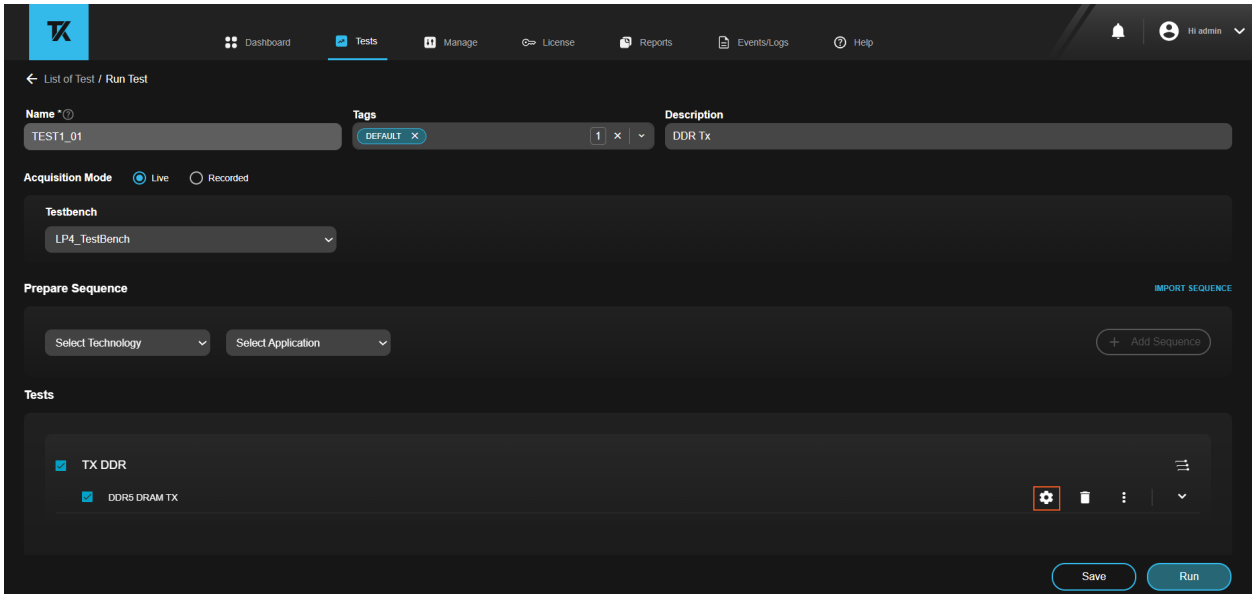


Figure 55: Tests tab: Configure global settings

Follow the steps to add or update the global settings:

1. Click ⚙ from the **Tests** pane.
2. Select or update the respective global settings and click **Apply**.

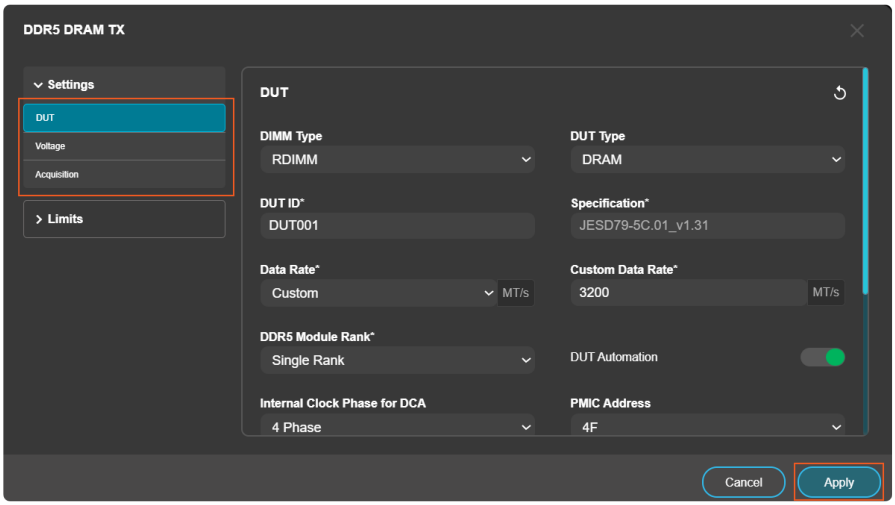


Figure 56: Test tab: Global settings

Table 6: Global settings for DDR Tx

Settings	Description	Options
DUT		
DIMM Type	Select the required DIMM Type **Note:** Applicable for DDR5-DRAM-Tx only.	• RDIMM (**Default**)
DUT Type	Select the DUT type from the drop-down. **Note:** Applicable for DDR5-DRAM-Tx only.	• DRAM (**Default**)
DUT ID	Enter the DUT identifier or name in the custom field to differentiate which DUT test is to be run.	• DUT001 (**Default**)
Specification	Displays the required version of specification to test.	For DDR5-DRAM-Tx • JESD79-5C.01_v1.31 For LPDDR4 • JESD209-4D
Data Rate	Data rate is defined as the transfer rate at which the Device Under Test (DUT) is operating.	For DDR5-DRAM-Tx • 3200, 3600, 4000, 4400, 4800, 5200, 5600, 6000, 6400, 6800, 7200, 7600, 8000, 8400, 8800 Custom in MT/s For LPDDR4 • 533, 1066, 1504, 1600, 2133, 2400, 2667, 3200, 3733, 4266, Custom in MT/s
DDR5 Module Rank	Select the required rank from the drop-down.	• Single Rank (**Default**) • Dual Rank

Table continued…

Settings	Description	Options
	Note: Applicable for DDR5-DRAM-Tx only.	
Custom Data Rate	Users can define and configure the data rate according to their specific requirements, which may not align with standard or default data rates. Enabled when data rate is set to custom.	0 to 15000 MT/s (**Default:** 3200 MT/s)
DUT Automation	User can configure DUT to set the required signals for each scenarios **Note:** Applicable for DDR5-DRAM-Tx only.	• Enable (**Default**) • Disable
Internal Clock Phase for DCA	Select the DCA clock phase support type for the given DUT. Enabled when DUT Automation is turned on. **Note:** Applicable for DDR5-DRAM-Tx only.	• 4 Phase (**Default**)
PMIC Address	Refers to the address location or identifier used to communicate with a Power Management Integrated Circuit (PMIC) Enabled when DUT automation is turned on. **Note:** Applicable for DDR5-DRAM-Tx only.	• 48 • 49 • 4A-4F **Default: 4F**
RCD Address	RCD Address refers to the address or location used for communication and control of the Register Clock Driver (RCD) within the memory subsystem. Enabled when DUT automation is turned on. **Note:** Applicable for DDR5-DRAM-Tx only.	• 58 • 59 • 5A-5F **Default: 5F**
Device Channel	Select the required device channel from the drop-down. Enabled when DUT automation is turned on. **Note:** Applicable for DDR5-DRAM-Tx only.	• A (**Default**) • B
Rank	Select the required rank from the drop-down. Enabled when DUT automation is turned on. **Note:** Applicable for DDR5-DRAM-Tx only.	• 0 (**Default**) • 1
DQ Signal	Enabled when DUT automation is turned on.	• DQL0-DQL7 • DQU0-DQU7

Table continued…

Settings	Description	Options
	Note: Applicable for DDR5-DRAM-Tx only.	**Default: DQL0**
DCA Mode	DCA for DDR5 DRAM TX involves fine-tuning a Data Communication Analyzer to optimize the performance of the memory interface. This process aims to enhance signal integrity and transmission efficiency for improved DDR5 memory system functionality. Enabled when DUT automation is turned on. **Note:** Applicable for DDR5-DRAM-Tx only.	• Auto (**Default**) • Manual
DQS IBCLK	Adjusting the DCA code for DQS IBCLK has specific effects on the clock periods for the DQS signal. When the DCA code for DQS IBCLK is increased, it leads to an increase in the even clock period and a decrease in the odd clock period for the DQS signal. The configuration of the DCA code for DQS IBCLK is done using the OP [6:4] bits of the mode register MR43. This setting is enabled when DUT automation is turned on and DCA mode is selected as manual. **Note:** Applicable for DDR5-DRAM-Tx only. .	-7 to 7 (**Default:** 0)
DQ IBCLK	Adjusting the DCA code for DQ IBCLK has specific effects on the clock periods for the DQ signal. When the DCA code for DQ IBCLK is increased, it leads to an increase in the even clock period and a decrease in the odd clock period for the DQ signal. DCA code settings for DQ IBCLK are done using OP [4:5] bits of any of the following mode registers based on the selected DQ signal: MR133, MR141, MR149, MR157, MR165, MR173, MR181, MR189, MR197, MR205, MR213, MR221, MR 229, MR237, MR245, MR253. This setting is enabled when DUT automation is turned on and DCA mode is selected as manual. **Note:** Applicable for DDR5-DRAM-Tx only. .	-3 to 3 (**Default:** 0)
DQS QCLK	Adjusting the DCA code for DQS QCLK has specific effects on the even duty cycle of the DQS signal. When the DCA code for DQS QCLK is increased, it leads to an increase in the even duty cycle ratio for the DQS signal. The configuration of the DCA code for DQS QCLK is done using the OP [2:0] bits of the mode register MR43.	-7 to 7 (**Default:** 0)

Table continued…

Settings	Description	Options
	This setting is enabled when DUT automation is turned on and DCA mode is selected as manual. **Note:** Applicable for DDR5-DRAM-Tx only.	
DQ QCLK	Adjusting the DCA code for DQ QCLK has specific effects on the even duty cycle of the DQ signal. When the DCA code for DQ QCLK is increased, it leads to an increase in the even duty cycle ratio for the DQ signal. DCA code settings for DQ QCLK are done using OP [1:0] bits of any of the following mode registers based on the selected DQ signal: MR133, MR141, MR149, MR157, MR165, MR173, MR181, MR189, MR197, MR205, MR213, MR221, MR 229, MR237, MR245, MR253. This setting is enabled when DUT automation is turned on and DCA mode is selected as manual. **Note:** Applicable for DDR5-DRAM-Tx only.	-3 to 3 (**Default:** 0)
DQS QBCLK	Adjusting the DCA code for DQS QBCLK has specific effects on the odd duty cycle of the DQS signal. When the DCA code for DQS QBCLK is increased, it leads to an increase in the odd duty cycle ratio for the DQS signal. The configuration of the DCA code for DQS QBCLK is done using the OP [2:0] bits of the mode register MR44. This setting is enabled when DUT automation is turned on and DCA mode is selected as manual. **Note:** Applicable for DDR5-DRAM-Tx only.	-7 to 7 (**Default:** 0)
DQ QBCLK	Adjusting the DCA code for DQ QBCLK has specific effects on the odd duty cycle of the DQ signal. When the DCA code for DQ QBCLK is increased, it leads to an increase in the odd duty cycle ratio for the DQ signal, and vice versa. DCA code settings for DQ QBCLK are done using OP [1:0] bits of any of the following mode registers based on the selected DQ signal: MR134, MR142, MR150, MR158, MR166, MR174, MR182, MR190, MR198, MR206, MR214, MR222, MR 230, MR238, MR246, MR254. This setting is enabled when DUT automation is turned on and DCA mode is selected as manual. **Note:** Applicable for DDR5-DRAM-Tx only.	-3 to 3 (**Default:** 0)
Burst Detection Method	Select the required burst detection method from drop-down.	• Write Only Bursts (**Default**) • Read Only Bursts

Table continued…

Settings	Description	Options
	Note: Applicable for LPDDR4 only.	• Read Write Bursts
Voltage		
VDD	VDD is the supply voltage for each DDR standard. VDD is based on DDR generation.	• 1.1 V (**Default**)
VOH	VOH is the output voltage swing for LPDDR4. **Note:** Applicable for LPDDR4 only.	• VDDQ/3 (**Default**) • VDDQ/2.5
Vref-DQ Mode	Sets the mode for computing Vref_DQ (Vref_DQ is the voltage at which the cumulativeeye of the pin DQx is widest). Select the required Vref DQ mode from the drop-down. **Note:** Applicable for DDR5-DRAM-Tx only.	• Auto (**Default**) • Manual
Vref-DQ Method	Select the required Vref-DQ method from the drop-down. Enabled when Vref-DQ modeode is set to auto from the drop-down. **Note:** Applicable for DDR5-DRAM-Tx only.	• Widest Eye Opening (**Default**) • Peak to Peak • Amplitude
Vref-DQ Value	Enter the required Vref-DQ value in the text field. Enabled when Vref-DQ mode is set to manual from the drop-down. **Note:** Applicable for DDR5-DRAM-Tx only.	0 to 2 V (**Default:** 0.85 V)
Vcent-DQ Mode	Sets the mode for computing Vcent-DQ (Vcent-DQ is the voltage at which the cumulative eye of the pin DQx is widest). **Note:** Applicable for LPDDR4 only.	• Auto (**Default**) • Manual
Vcent-DQ Value	Enter the required Vcent-DQ value in the text field. Enabled when Vcent-DQ mode is set to manual from the drop-down. **Note:** Applicable for LPDDR4 only.	-2 to 2 V (**Default:** 0.2015 V)
Vcent-CA Mode	Sets the mode for computing Vcent-CA (Vcent-CA is the voltage at which the cumulative eye of the pin CAx is widest).	• Auto (**Default**) • Manual

Table continued…

Settings	Description	Options
	Note: Applicable for LPDDR4 only.	
Vcent-CA Value	Enter the required Vcent-CA value in the text field. Enabled when Vcent-CA mode is set to manual from the drop-down. **Note:** Applicable for LPDDR4 only.	-2 to 2 V (**Default:** 0.1915 V)
Acquisition		
User Defined Aquisition	The user-defined acquisition mode enables users to conduct application measurements by adjusting scope settings such as sample rate, record length, bandwidth, and other parameters according to their preferences and requirements.	• Enable • Disable (**Default**)
Iterations	It will run the measurements for number of Iterations	1 to 20 (**Default:** 1)
Retain Vertical Scale	When enabled, retains vertical scale, offset, and position values for the channels as specified by the user before the start of the run.	• Enable • Disable (**Default**)
Record Length	Specifies the number of data points captured for the analysis.	For DDR5 0 to 100 M (**Default:** 20 M) For LPDDR4 0 to 100 M (**Default:** 0.5 M)
Sample rate	Select the required sample rate from the drop-down.	• 50 GS/s (**Default**) • 100 GS/s • 200 GS/s
Bandwidth	Enter the bandwidth value of the oscilloscope.	8 to 70 GHz (**Default:** 20 GHz)
Signal Validation	Signal Validation allows the user to validate the signal with respect to amplitude, frequency, and data rate of signal. **Note:** Applicable for DDR5-DRAM-Tx only.	• Continue On Fail (**Default**) • Off • Retry On Fail • Abort On Fail
Pause before Acquisition	Use the toggle button to enable or disable. **Note:** Applicable for DDR5-DRAM-Tx only.	• Enable • Disable (**Default**)
Write Burst (Applicable only for LPDDR4)		
Postamble Length	Specifies the burst postamble length.	• 0.5 tCK (**Default**) • 1.5 tCK

Table continued…

Settings	Description	Options
Is Write Burst has higher (pk-pk) amplitude	Use the toggle button to enable or disable. Enabled when DUT settings, burst detection method is set to read write bursts from the drop-down.	• Enable • Disable (**Default**)
Write Burst (pk-pk)	Enter the required value in the text field. Enabled when DUT settings, burst detection method is set to read write bursts from the drop-down.	0 to 5 V (**Default:** 0.85 V)
Amplitude Margin	Enter the required value in the text field. Enabled when DUT settings, burst detection method is set to read write bursts from the drop-down.	0 to 100% (**Default:** 3%)
Isolated Burst Length	Select the required isolated burst length value from the drop-down.	• 8 UI • 16 UI (**Default**) • 32 UI • 64 UI
Threshold	Specifies the burst threshold with which the burst's association index will be compared. This parameter measures the similarity between read and write burst preambles.	0 to 100% (**Default:** 80%)
Ref Level Mode	Select the required ref level mode from the drop-down. • Auto: The application calculates these levels for you. It is recommended unless you find that manual levels are necessary for reliable detection. • Manual: Enter both the strobe and data reference levels for the signal (High, Mid, and Low). **Note:** The High/Mid/Low levels used for write burst detection have no relationship to the reference levels used for measurement points.	• Auto (**Default**) • Manual
Margin	Specifies the voltage variance allowed in terms of percentage of peak-peak voltage. Enabled when ref level mode is set to manual from the drop-down.	0 to 100% (**Default:** 20%)
Hysteresis	Sets the threshold margin to the reference level which the voltage must cross to be recognized as changing; the margin is the relative reference level plus or minus half the hysteresis. This is used to filter out spurious events. Enabled when ref level mode is set to manual from the drop-down.	0 to 50% (**Default:** 10%)
Strobe High Level	Sets the high threshold level for the rising edge of the source - write strobe (DQS). This is used in burst detection. Enabled when ref level mode is set to manual from the drop-down.	-40000 to 40000 V (**Default:** 0.15 V)

Table continued…

Settings	Description	Options
Strobe Mid Level	Sets the middle threshold level for the rising edge of the source - write strobe (DQS). This is used in burst detection. Enabled when ref level mode is set to manual from the drop-down.	-40000 to 40000 V (**Default:** 0 V)
Strobe Low Level	Sets the low threshold level for the rising edge of the source - write strobe (DQS). This is used in burst detection. Enabled when ref level mode is set to manual from the drop-down.	-40000 to 40000 V (**Default:** -0.15 V)
Data High Level	Sets the high threshold level for the rising edge of the source - write data (DQS). This is used in burst detection. Enabled when ref level mode is set to manual from the drop-down.	-40000 to 40000 V (**Default:** 0.4 V)
Data Mid Level	Sets the middle threshold level for the rising edge of the source - write data (DQS). This is used in burst detection. Enabled whenr ef level mode is set to manual from the drop-down.	-40000 to 40000 V (**Default:** 0.2 V)
Data Low Level	Sets the low threshold level for the rising edge of the source - write data (DQS). This is used in burst detection. Enabled when ref level mode is set to manual from the drop-down.	-40000 to 40000 V (**Default:** 0 V)
tDQS2DQ Mode	Sets the Mode for computing tDQS2DQ (defined as the time skew between the driving edge of the strobe to the center of the first data eye at Vcent_DQ level).	• Auto (**Default**) • Manual
tDQS2DQ Value	Sets the manual Value for tDQS2DQ (defined as the time skew between the driving edge of the strobe to the center of the first data eye at Vcent_DQ level). Enabled when tDQS2DQ mode is set to manual from the drop-down.	-40000 to 40000 ps (**Default:** 0 ps)
Read Burst (Applicable only for LPDDR4)		
Preamble Type	Specifies the burst preamble type. Select the required read preamble type from the drop-down.	• Static (**Default**) • Toggle
Is Read Burst has higher (pk-pk) amplitude	Use the toggle button to enable or disable. Enabled when DUT settings, burst detection method is set to read write bursts from the drop-down.	• Enable (**Default**) • Disable
Read Burst (pk-pk)	Enter the required value in the text field. Enabled when DUT settings, burst detection method is set to read write bursts from the drop-down.	0 to 5 V (**Default:** 0.85 V)
Amplitude Margin	Enter the required value in the text field.	0 to 100% (**Default:** 3%)

Table continued…

Settings	Description	Options
	Enabled when DUT settings, burst detection method is set to read write bursts from the drop-down.	
Isolated Burst Length	Select the required isolated burst length value from the drop-down.	• 8 UI • 16 UI (**Default**) • 32 UI • 64 UI
Postamble Length	Specifies the burst postamble length.	• 0.5 tCK (**Default**) • 1.5 tCK
Threshold	Specifies the burst threshold with which the burst's association index will be compared. This parameter measures the similarity between read and write burst preambles.	0 to 100% (**Default:** 80%)
Ref Level Mode	Select the required ref level mode from the drop-down. • Auto: The application calculates these levels for you. It is recommended unless you find that manual levels are necessary for reliable detection. • Manual: Enter both the strobe and data reference levels for the signal (High, Mid, and Low). **Note:** The High/Mid/Low levels used for write burst detection have no relationship to the reference levels used for measurement points.	• Auto (**Default**) • Manual
Margin	Specifies the voltage variance allowed in terms of the percentage of peak-peak voltage. Enabled when ref level mode is set to manual from the drop-down.	0 to 100% (**Default:** 20%)
Hysteresis	Sets the threshold margin to the reference level which the voltage must cross to be recognized as changing; the margin is the relative reference level plus or minus half the hysteresis. This is used to filter out spurious events. Enabled when ref level mode is set to manual from the drop-down.	0 to 50% (**Default:** 10%)
Strobe High Level	Sets the high threshold level for the rising edge of the source - read strobe (DQS). This is used in burst detection. Enabled when ref level mode is set to manual from the drop-down.	-40000 to 40000 V (**Default:** 0.15 V)
Strobe Mid Level	Sets the middle threshold level for the rising edge of the source - read strobe (DQS). This is used in burst detection. Enabled when ref level mode is set to manual from the drop-down.	-40000 to 40000 V (**Default:** 0 V)

Table continued…

Settings	Description	Options
Strobe Low Level	Sets the low threshold level for the rising edge of the source - read strobe (DQS). This is used in burst detection. Enabled when ref level mode is set to manual from the drop-down.	-40000 to 40000 V (**Default:** -0.15 V)
Data High Level	Sets the high threshold level for the rising edge of the source - read data (DQS). This is used in burst detection. Enabled when ref level mode is set to manual from the drop-down.	-40000 to 40000 V (**Default:** 0.4 V)
Data Mid Level	Sets the middle threshold level for the rising edge of the source - read data (DQS). This is used in burst detection. Enabled when ref level mode is set to manual from the drop-down.	-40000 to 40000 V (**Default:** 0.2 V)
Data Low Level	Sets the low threshold level for the rising edge of the source - read data (DQS). This is used in burst detection. Enabled when ref level mode is set to manual from the drop-down.	-40000 to 40000 V (**Default:** 0 V)

Limits editor

Displays the lower limit, ideal value, and upper limit for the applicable measurement using different types of comparisons.

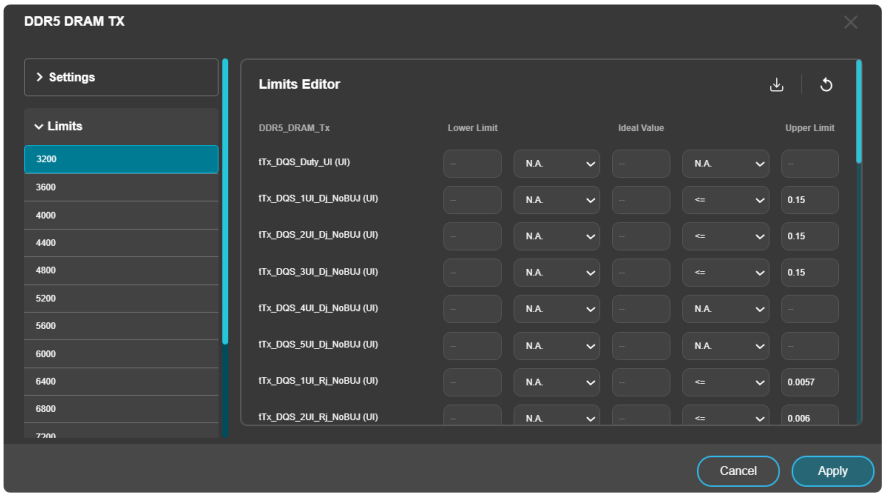


Figure 57: Limits editor

Table 7: Limits Editor for DDR Tx

Limits	Description
Measurements	Shows the list of measurements for the selected group.
Lower limit	Lower limit as defined in the specification.
Ideal Value	Ideal value as defined in the specification.

Table continued…

Limits	Description
Upper Limit	Upper limit as defined in the specification.

Instrument connection diagram setup

The instrument connection diagram setup shows how to connect the DUT to the oscilloscope for the tests.

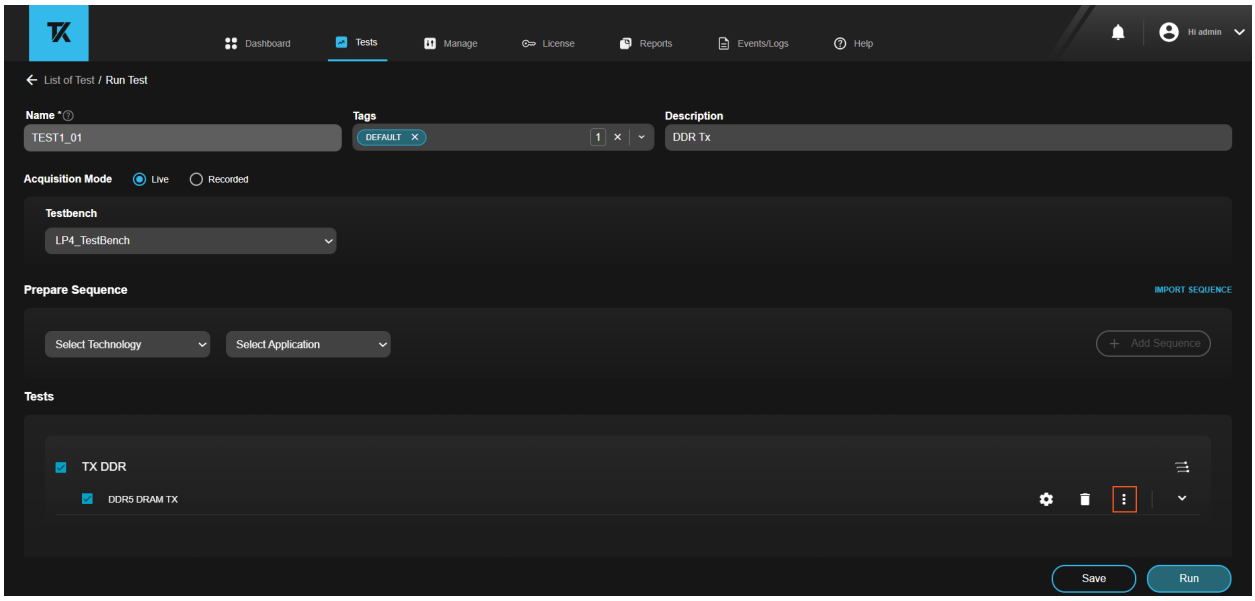


Figure 58: Tests tab: Connection diagram setup

Follow the steps to view the test setup connections between the instruments.

1. Click and then click **Connection Diagram.**
2. Click to view the different connection diagrams that are associated to the test setup.

Configure the test scenarios

The scenarios and their measurements can be configured using the parameters in the scenario frame. Initially the scenarios and measurements are configured to the default values.

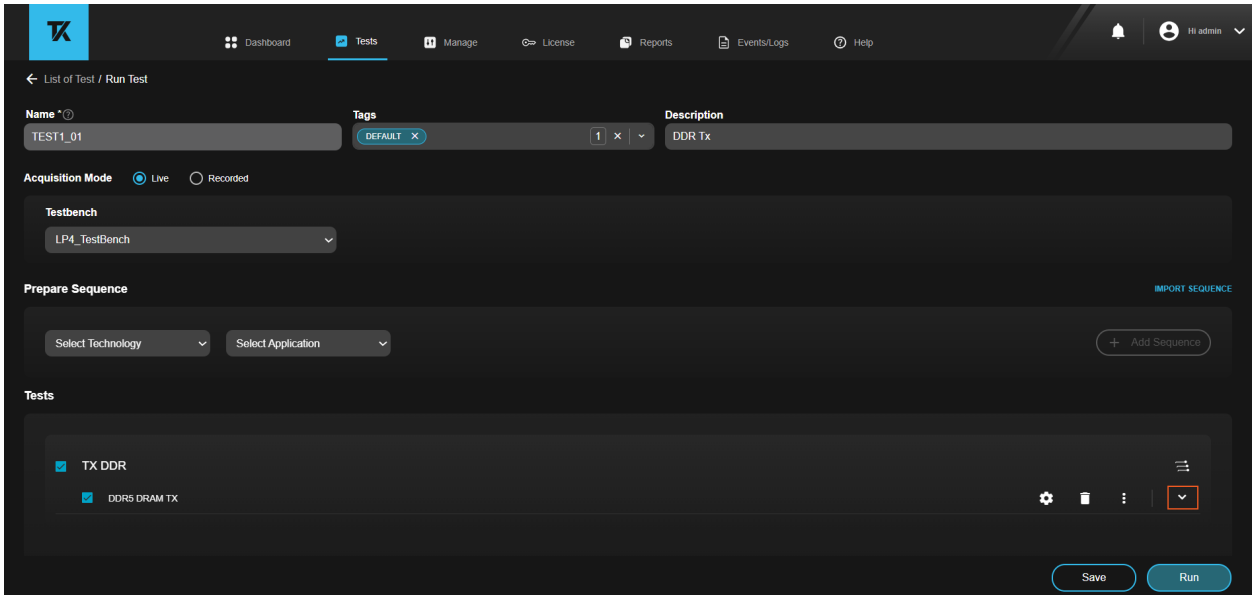


Figure 59: Tests tab: Configure test scenarios

Follow the steps to configure the scenarios:

1. Click ⌄ in the **Tests** frame to view and configure the scenarios settings.

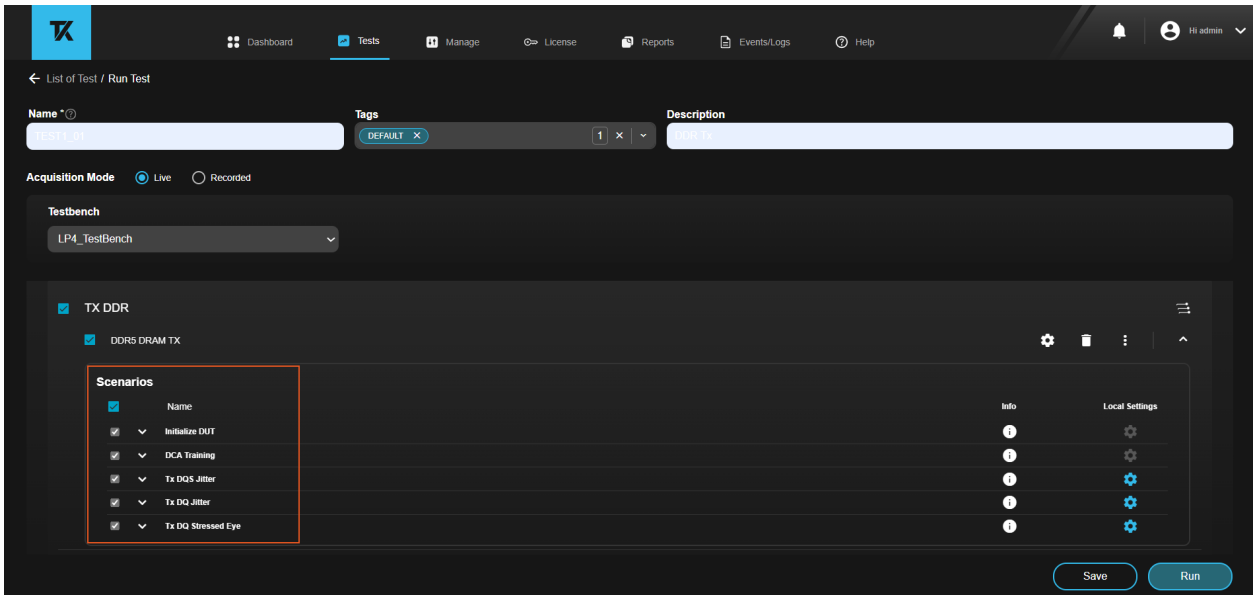


Figure 60: Configure the measurements

2. Click ⚙ from **Local Settings** to configure the respective scenario setting.

Table 8: Configure the test scenarios for DDR5-DRAM-Tx

Item	Description
Reset to default	Click to reset the mentioned values to default value.
General	

Table continued…

Item	Description
DQS Jitter Measurements	Select or unselect the required measurements from the drop-down. List of measurements support for DQS Jitter tests. tTx_DQS_Duty_UI, tTx_DQS_1UI_Dj_NoBUJ, tTx_DQS_2UI_Dj_NoBUJ, tTx_DQS_3UI_Dj_NoBUJ, tTx_DQS_4UI_Dj_NoBUJ, tTx_DQS_5UI_Dj_NoBUJ, tTx_DQS_1UI_Rj_NoBUJ, tTx_DQS_2UI_Rj_NoBUJ, tTx_DQS_3UI_Rj_NoBUJ, tTx_DQS_4UI_Rj_NoBUJ, tTx_DQS_5UI_Rj_NoBUJ By default, all measurements are selected.
DQ Jitter Measurements	Select or unselect the required measurements from the drop-down. List of measurements support for DQ Jitter tests. tTx_DQ_Duty_UI, tTx_DQ_1UI_Dj_NoBUJ, tTx_DQ_2UI_Dj_NoBUJ, tTx_DQ_3UI_Dj_NoBUJ, tTx_DQ_4UI_Dj_NoBUJ, tTx_DQ_5UI_Dj_NoBUJ, tTx_DQ_1UI_Rj_NoBUJ, tTx_DQ_2UI_Rj_NoBUJ, tTx_DQ_3UI_Rj_NoBUJ, tTx_DQ_4UI_Rj_NoBUJ, tTx_DQ_5UI_Rj_NoBUJ, tTx_DQS2DQ By default, all measurements are selected.
DQ Stressed Eye Measurements	Select or unselect the required measurements from the drop-down. List of measurements support for DQ Stressed Eye tests. TxEH_DQ_SES_1UI, TxEH_DQ_SES_2UI, TxEH_DQ_SES_3UI, TxEH_DQ_SES_4UI, TxEH_DQ_SES_5UI, TxEW_DQ_SES_1UI, TxEW_DQ_SES_2UI, TxEW_DQ_SES_3UI, TxEW_DQ_SES_4UI, TxEW_DQ_SES_5UI By default, all measurements are selected.

Table continued…

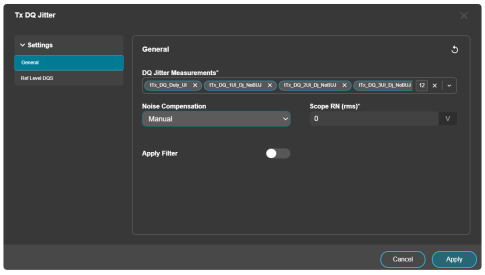
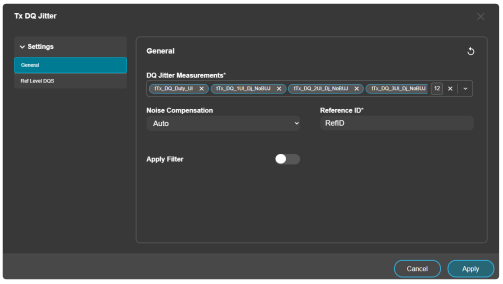
<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td rowspan="3">Noise Compensation</td><td colspan="2">Select the required option from the drop-down:
• AUTO
• MANUAL (Default)
Note: Applicable for DQS Jitter Measurements and DQ Jitter Measurements only.</td></tr>
<tr><td>Scope RN (rms)</td><td>Select the required value from the drop-down.
0 to 50 mV (Default: 0 V)
Note: Applicable for DQS Jitter Measurements and DQ Jitter Measurements only.
  </td></tr>
<tr><td>Reference ID</td><td>Reference ID option is available when the Noise compensation is set to Auto.
Note: Reference ID is available in the database of DPOJET SNC plugin.
  </td></tr>
<tr><td>Target BER</td><td colspan="2">The target BER defines the desired or acceptable probability of bit errors.
Enter the required Target BER value in the text field.
2 to 18 (Default: 16)
Note: Applicable for DQ Stressed Eye Measurements only.</td></tr>
</table>

Table continued…

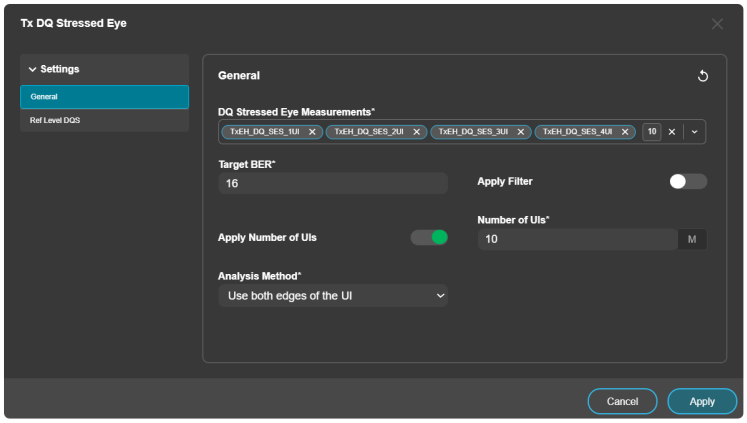
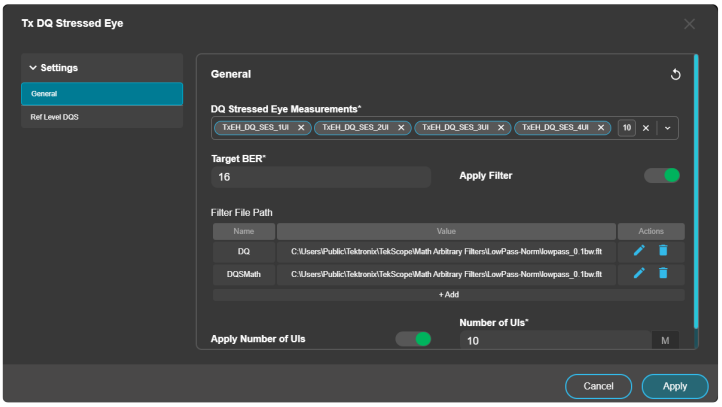
Item	Description
Apply Number of UIs	Use the toggle button to enable or disable. • Enable (**Default**) • Disable **Note:** Applicable for DQ Stressed Eye Measurements only.
Number of UIs	Enable to execute the selected measurements for a specified number of unit intervals. Enter the required number of UIs in the text field. 1 to 200 M (**Default:** 10 M) **Note:** Applicable for DQ Stressed Eye Measurements only and this setting is displayed only when the **Apply Number of UIs** option is enabled.
Analysis Method	Select the required option from the drop-down: • Use both edges of the UI (**Default**) • Use one edge of the UI **Note:** Applicable for DQ Stressed Eye Measurements only.
Apply Filter	Use the toggle button to enable or disable. • Enable • Disable (**Default**) 

Table continued…

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td>Filter File Path</td><td colspan="2">Once enabled, click the modify symbol and enter the Filter File Path Value for respective signals as per your use, DO NOT edit the Name.

Click Update and Apply for the filter to be used on the signal selected. Ensure the filter file is available in the specified path on the oscilloscope.

 
</td></tr>
<tr><td rowspan="6"></td><td>Name</td><td>Name of the filter.

Note: The name of the filter depends on measurements.</td></tr>
<tr><td>Value</td><td>File path of the filter.

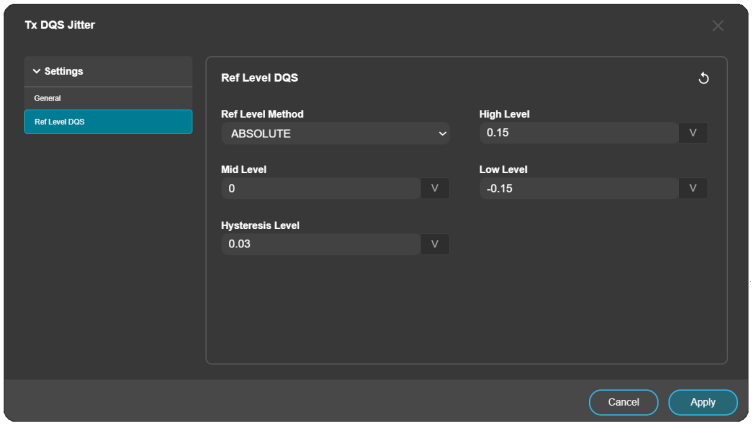
Default: C:\Users\Public\Tektronix\TekScope\Math Arbitrary Filters\LowPass-Norm\lowpass_0.1bw.flt</td></tr>
<tr><td>Actions</td><td>Allow actions to make changes to the current filter file path.</td></tr>
<tr><td>Modify</td><td>Modifies the path.</td></tr>
<tr><td>Delete</td><td>Clears filter path.</td></tr>
<tr><td>Add</td><td>Adds new filter file path.</td></tr>
<tr><td colspan="3">Ref Level DQS
 
</td></tr>
</table>

Table continued…

Item	Description
Ref Level Method	Sets the reference level method for the DQS source. • ABSOLUTE (**Default**) • RELATIVE
High Level	Sets the high threshold level (in volts) for the DQS source. -40000 to 40000 V (**Default:** 0.15 V) **Note:** When the Ref Level Method is set to ABSOLUTE, the value is 0.15 V. When the Ref Level Method is set to RELATIVE, the value is 90%
Mid Level	Sets the middle threshold level (in volts) for the DQS source. -40000 to 40000 V (**Default:** 0 V) **Note:** When the Ref Level Method is set to ABSOLUTE, the value is 0 V. When the Ref Level Method is set to RELATIVE, the value is 50%
Low Level	Sets the low threshold level (in volts) for the DQS source. -40000 to 40000 V (**Default:** -0.15 V) **Note:** When the Ref Level Method is set to ABSOLUTE, the value is -0.15 V. When the Ref Level Method is set to RELATIVE, the value is 10%
Hysteresis Level	Sets the threshold margin (as a percentage of signal voltage) to the reference level for DQS which the voltage must cross to be recognized as changing; the margin is the relative reference level plus or minus half the hysteresis- use to filter out spurious events. -40000 to 40000 V (**Default:** 0.03 V) **Note:** When the Ref Level Method is set to ABSOLUTE, the value is 0.03 V. When the Ref Level Method is set to RELATIVE, the value is 3%
High Low Method	Select the required method from the drop-down: • MINMAX (**Default**) • AUTOMATIC **Note:** High Low Method measurement option is avilable when the Ref Level Method option is set to RELATIVE.

Table 9: Configure the test scenarios for LPDDR4

Item	Description
Reset to default	Click to reset the mentioned values to default value.

Table continued…

Item	Description
General	
Clock Differential Measurements	Select or unselect the required measurements from the drop-down. List of measurements support for Clock Differential tests. Clock Eye Height, Clock Eye Width, tCH(abs), tCH(avg), tCK(abs), tCK(avg), tCL(abs), tCL(avg), tJIT(cc), tJIT(duty), tJIT(per), VIHdiff(AC), VILdiff(AC), Vindiff, Vindiff_High, Vindiff_Low, InputSlew-Diff-Rise(CK), InputSlew-Diff-Fall(CK) By default, all measurements are selected.
Clock Single Ended Measurements	Select or unselect the required measurements from the drop-down. List of measurements support for Clock Single ended tests. Vix_CK_Ratio, Overshoot_Amplitude_CK_t, Overshoot_Area_CK_t, Overshoot_Amplitude_CK_c, Overshoot_Area_CK_c, Undershoot_Amplitude_CK_t, Undershoot_Area_CK_t, Undershoot_Amplitude_CK_c, Undershoot_Area_CK_c, Vinse_CK_t, Vinse_High_CK_t, Vinse_Low_CK_t, Vinse_CK_c, Vinse_High_CK_c, Vinse_Low_CK_c By default, all measurements are selected.
Write Burst Measurements	Select or unselect the required measurements from the drop-down. List of measurements support for Write Burst Differential tests. Data Eye Height, Data Eye Width, Rx Mask, Auto Fit Rx Mask, VihlAc, TdiPW_High, TdiPW_Low, SRIN_dIVW_Rise, SRIN_dIVW_Fall, tDQS2DQ, tDQSH, tDQSL, tDSH_Diff, tDSS_Diff, tDQSS, tWPRE, tWPST, VIHDiff_DQS, VILDiff_DQS, Vindiff_DQS, Vindiff_High_DQS, Vindiff_Low_DQS, SRIdiff_Rise, SRIdiff_Fall By default, all measurements are selected.
Write Burst Single Ended Measurements	Select or unselect the required measurements from the drop-down. List of measurements support for Write Burst Single Ended tests. Vix_DQS_Ratio, Vinse_DQS_t, Vinse_High_DQS_t, Vinse_Low_DQS_t, Vinse_DQS_c, Vinse_High_DQS_c, Vinse_Low_DQS_c, Overshoot_Amplitude_DQS_t, Overshoot_Area_DQS_t, Overshoot_Amplitude_DQS_c, Overshoot_Area_DQS_c, Overshoot_Amplitude_DQ, Overshoot_Area_DQ, Undershoot_Amplitude_DQS_t, Undershoot_Area_DQS_t, Undershoot_Amplitude_DQS_c, Undershoot_Area_DQS_c, Undershoot_Amplitude_DQ, Undershoot_Area_DQ By default, all measurements are selected.
Read Burst Measurements	Select or unselect the required measurements from the drop-down. List of measurements support for Read Burst tests. Data Eye Height, Data Eye Width, tQW Total, tQW Total DBI, tDQSQ-Diff, tDQSQ_DBI, tQH, tQH_DBI, tQSH, tQSH_DBI, tQSL, tQSL_DBI, tRPRE, tRPST, tDQSCK, SRQDiff-Rise(DQS), SRQDiff-Fall(DQS), SRQse-Rise(DQ), SRQse-Fall(DQ) By default, all measurements are selected.

Table continued…

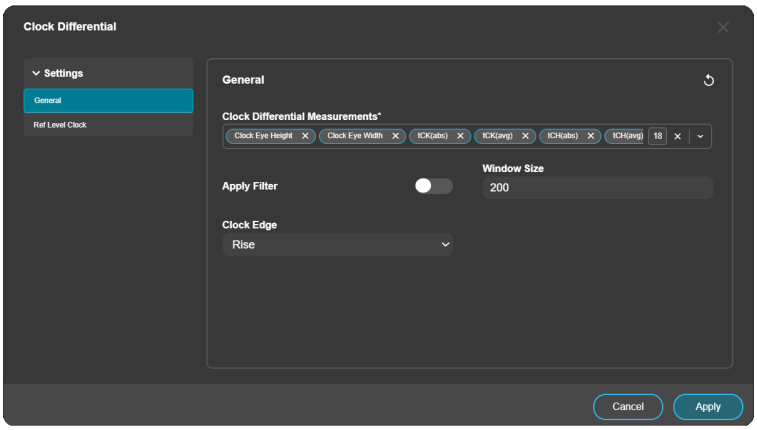
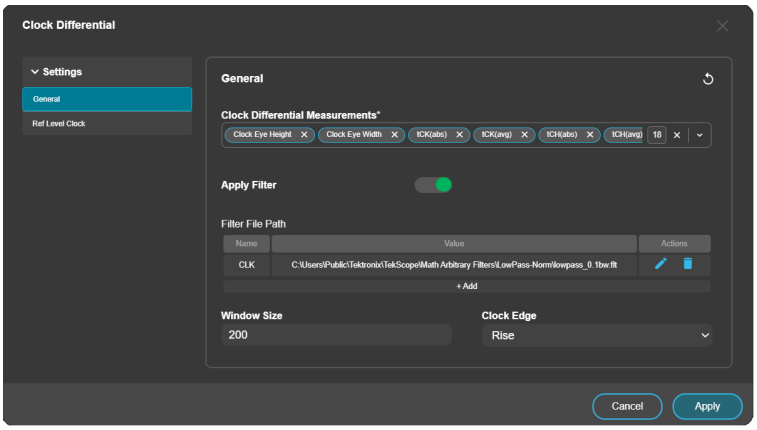
Item	Description
Address Command Measurements	Select or unselect the required measurements from the drop-down. List of measurements support for Address Command tests. Rx Mask, Auto Fit Rx Mask, AC Overshoot, AC Undershoot, AC OvershootArea, AC UndershootArea, VihlAc, TcipwHigh, TcipwLow, SrinCivwRise, SrinCivwFall By default, all measurements are selected.
Apply Filter	Use the toggle button to enable or disable. • Enable • Disable (**Default**) 
Filter File Path	Once enabled, click the modify symbol and enter the **Filter File Path Value** for respective signals as per your use, DO NOT edit the **Name**. Click **Update** and **Apply** for the filter to be used on the signal selected. Ensure the filter file is available in the specified path on the oscilloscope. 

Table continued…

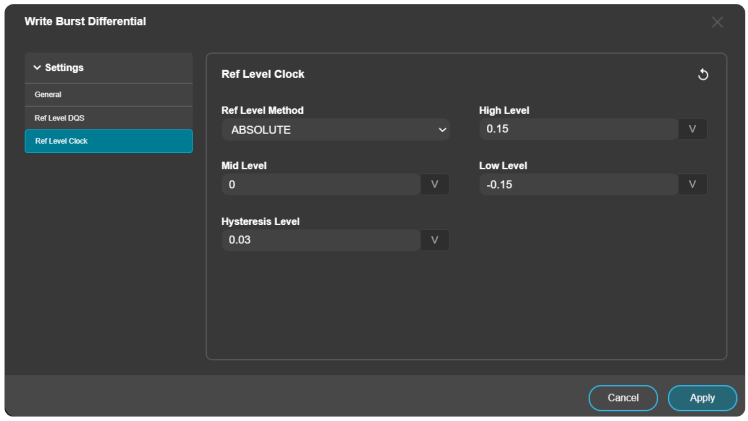
Item	Description	
	Name	Name of the filter. **Note:** The name of the filter depends on measurements.
	Value	File path of the filter. **Default:** `C:\Users\Public\Tektronix\TekScope\Math Arbitrary Filters\LowPass-Norm\lowpass_0.1bw.flt`
	Actions	Allow actions to make changes to the current filter file path.
	Modify	Modifies the path.
	Delete	Clears filter path.
	Add	Adds new filter file path.
Window Size	Sets the number of clock cycles across which clock measurements are computed. 200 to 1 M (**Default:** 200) **Note:** Applicable for Clock Differential Measurements only.	
Clock Edge	Sets the edge of clock (Rising or Falling) to be used for clock measurements. • Rise (**Default**) • Fall **Note:** Applicable for Clock Differential Measurements only.	
Ref Level Clock/Ref Level DQS/Ref Level DQ 		

Table continued…

Item	Description
Ref Level Method	Sets the reference level method for the source. • ABSOLUTE (**Default**) • RELATIVE **Note:** By default for Clock Single Ended, and Write Burst Single Ended is set to RELATIVE.
High Level	Sets the high threshold level (in volts) for the source. • -40000V to 40000V (**Default:** For Clock Differential, Write Burst Differential, Read Burst Differential, and Address Command, value is 0.15 V.) • 1 to 99% (**Default:** For Clock Single Ended, and Write Burst Single Ended value is 90%.) **Note:** When the Ref Level Method is set to ABSOLUTE, the value is 0.15 V. When the Ref Level Method is set to RELATIVE, the value is 90%
Mid Level	Sets the middle threshold level (in volts) for the source. **Default:** • -40000V to 40000V (**Default:** For Clock Differential, Write Burst Differential, Read Burst Differential, and Address Command, value is 0 V.) • 1 to 99% (**Default:** For Clock Single Ended, and Write Burst Single Ended value is 50%.) **Note:** When the Ref Level Method is set to ABSOLUTE, the value is 0 V. When the Ref Level Method is set to RELATIVE, the value is 50%
Low Level	Sets the low threshold level (in volts) for the source. **Default:** • -40000V to 40000V (**Default:** For Clock Differential, Write Burst Differential, Read Burst Differential, and Address Command, value is -0.15 V.) • 1 to 99% (**Default:** For Clock Single Ended, and Write Burst Single Ended value is 10%.) **Note:** When the Ref Level Method is set to ABSOLUTE, the value is -0.15 V. When the Ref Level Method is set to RELATIVE, the value is 10%

Table continued…

Item	Description
Hysteresis Level	Sets the threshold margin (as a percentage of signal voltage) to the reference level for the source which the voltage must cross to be recognized as changing; the margin is the relative reference level plus or minus half the hysteresis- use to filter out spurious events. **Default:** • -40000V to 40000V (**Default:** For Clock Differential, Write Burst Differential, Read Burst Differential, and Address Command, value is 0.03 V.) • 1 to 99% (**Default:** For Clock Single Ended, and Write Burst Single Ended value is 3%.) **Note:** When the Ref Level Method is set to ABSOLUTE, the value is 0.03 V. When the Ref Level Method is set to RELATIVE, the value is 3%
Slew Rate Ref Level	Sets the reference levels between which slew rate is computed for source. • AUTO (**Default**) • MANUAL **Note:** This measurement is applicable only for Clock Differential, Write Burst Differential and Read Burst Differential.
High Low Method	Select the required high low method from the drop-down: • MINMAX (**Default:** It is only for Clock Single Ended, and Write Burst Single Ended.) • AUTOMATIC **Note:** For Clock Differential, Write Burst Differential, Read Burst Differential, and Address Command scenarios, this High Low Method measurement option is available when the Ref Level Method option is set to RELATIVE.

3. Select the required measurements from the drop-down list.
4. Update the parameters with the required values.
5. Click **Apply**.

Run the measurements

Click **Run** to run the measurements with the configured settings.

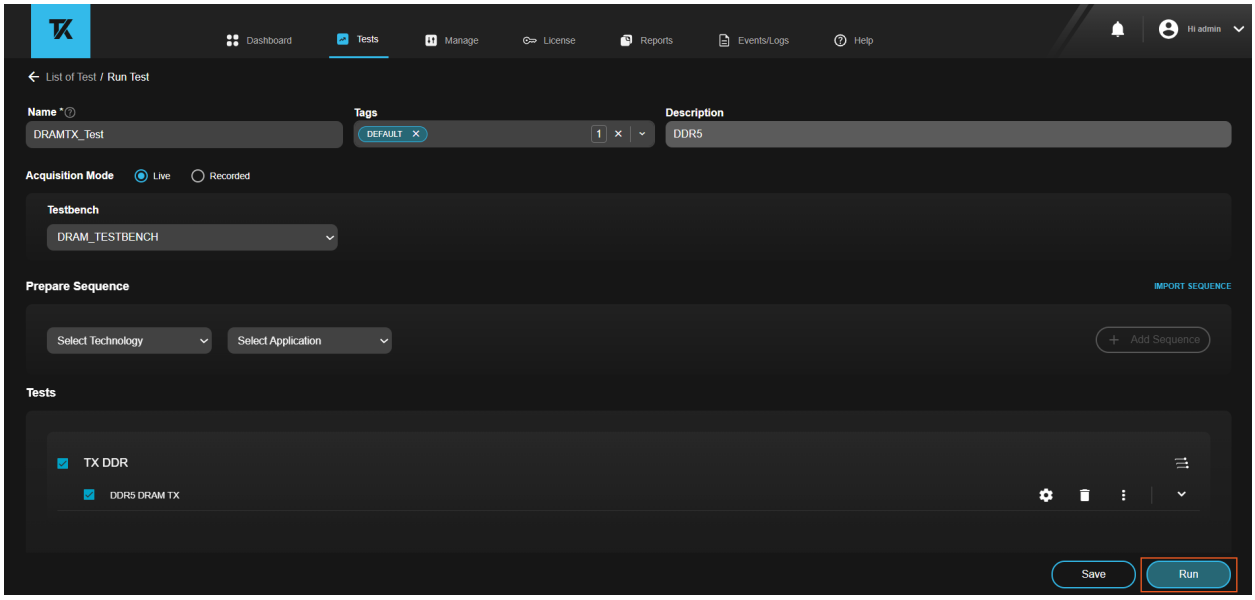


Figure 61: Run a test

Scenarios with the measurement list

The scenarios in DDR Tx application groups the measurements. You can select from the list of measurements in the scenarios to run, configure the measurement settings, and run the test.

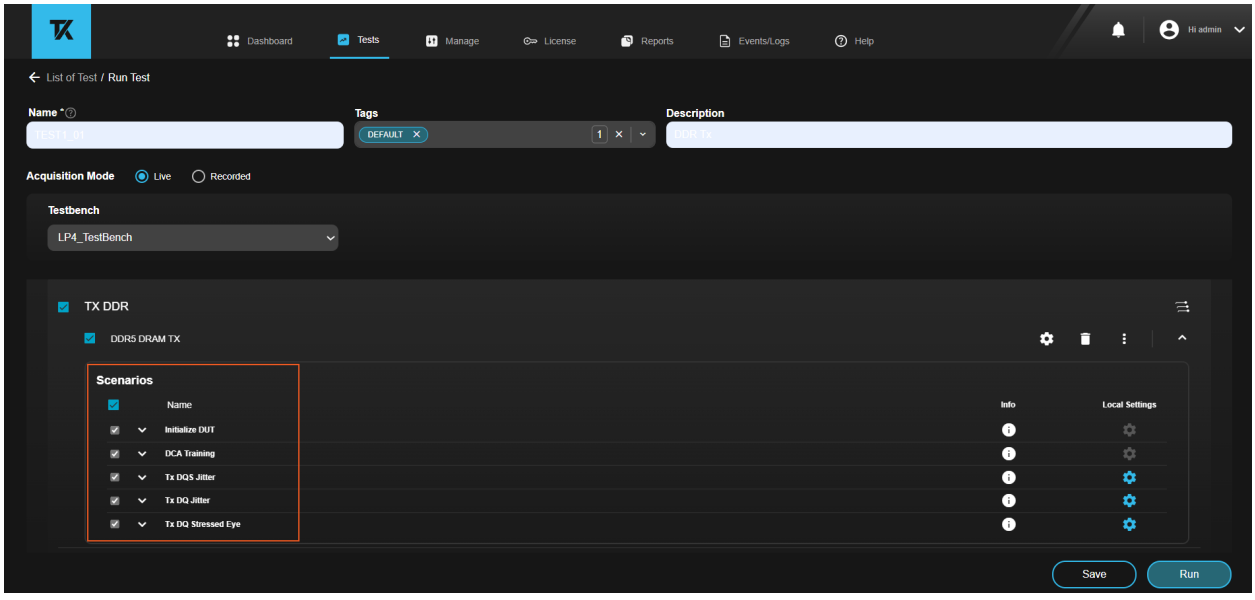


Figure 62: Configure the measurements

Refer *Configuring the test scenarios* section for the steps to configure the measurements.

View test execution status and results

The status and results of each executed test in the **Tests** tab displays the test status and the result details.

1. Go to **Tests** tab and click **View Results** of an executed test.

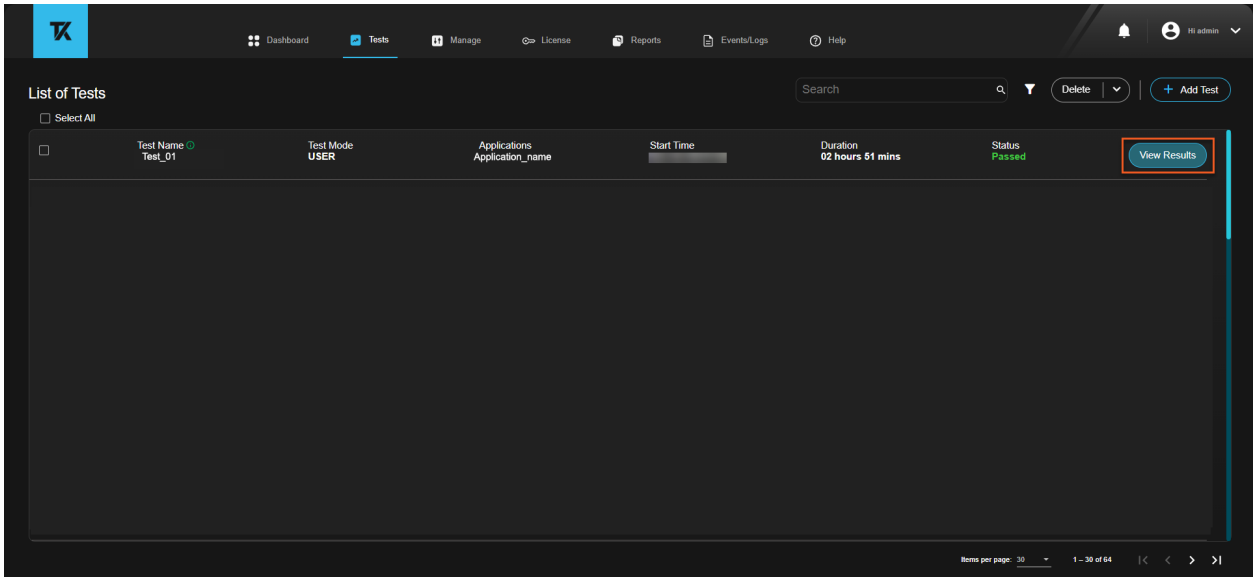


Figure 63: Tests: View results

2. The test execution details with results, plots, and waveforms are summarized as follows.

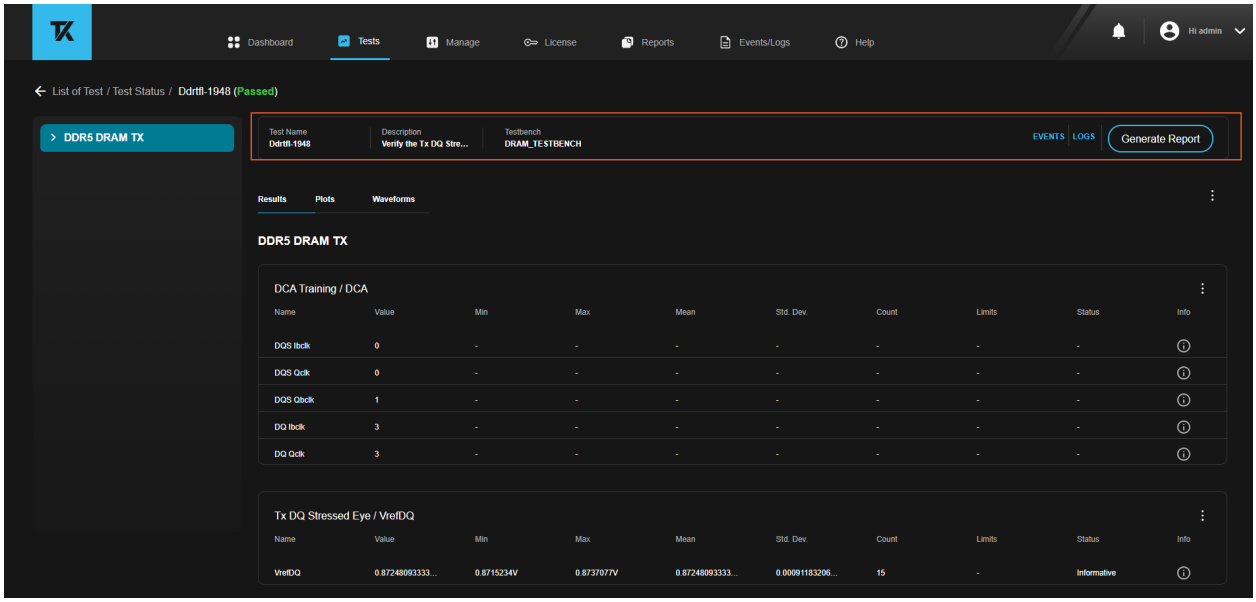


Figure 64: View test execution details

Control	Description
Test Name	Displays the test name that is set.
Description	Displays the test description.

Table continued…

Control	Description
Testbench	Displays the testbench that is used.
Events	View the events of an executed test. Refer *Events* for more information.
Logs	View the logs of an executed test. Refer *Logs* for more information.
Generate Report	Generates the report of an executed test. Refer *Add and Generate New Report* for more information.

Test results

The **Results** tab displays the results of an executed test measurement.

Follow the steps to view the test results:

1. Select the required measurement from the left side bar to view the results. The top level selections displays all the results whereas, the lower level displays results for only that particular parameter.
2. Click the **Results** tab to view the acquisition results.

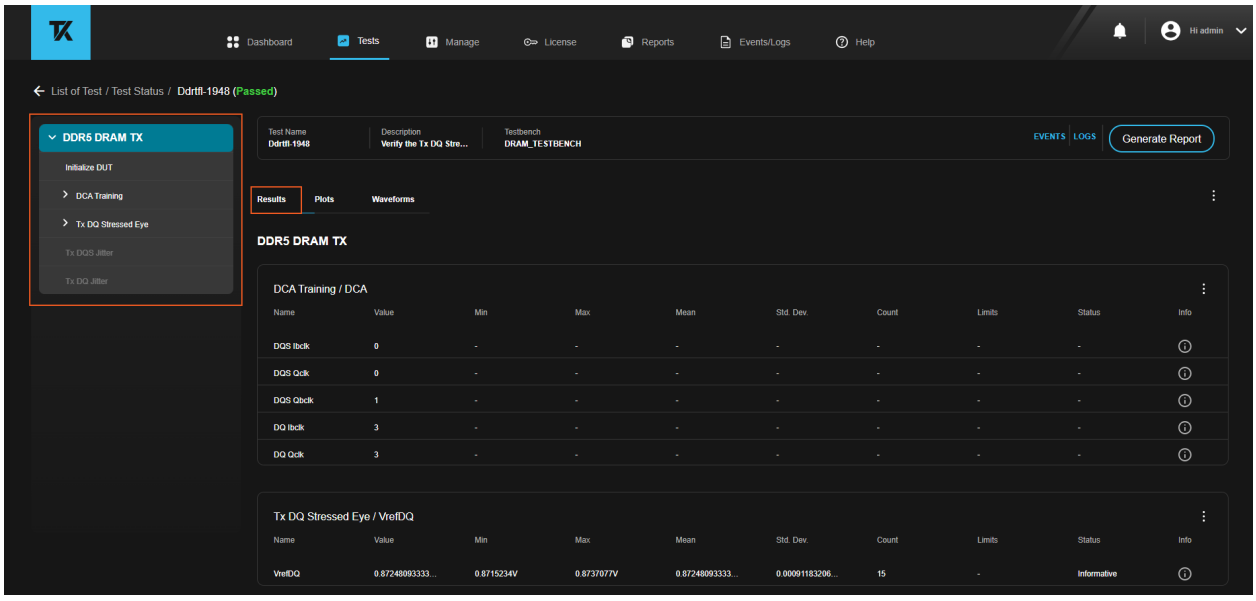


Figure 65: Test results

Menu	Description
Name	Displays the name of the measurement that is executed.
Value	Displays the measured value.
Min	Displays the minimum measured value.
Max	Displays the maximum measured value.
Mean	Displays the mean measured value.
Std.Dev	Displays the standard deviation of the measured value.
Count	Displays the count value for the measurement.

Table continued…

Menu	Description
Lower Margin	Displays the lower margin of the measured value. **Note:** This menu will be displayed only when the required measurement is selected from the left side bar.
Upper Margin	Displays the upper margin of the measured value. **Note:** This menu will be displayed only when the required measurement is selected from the left side bar.
Limits	Displays the measurement limits.
Status	Displays the measurement status.
Info	Displays the additional information of the measurement.

3. Click ⋮ and select the sub-menu to customize the columns to display the respective test results data, and click **Apply**.

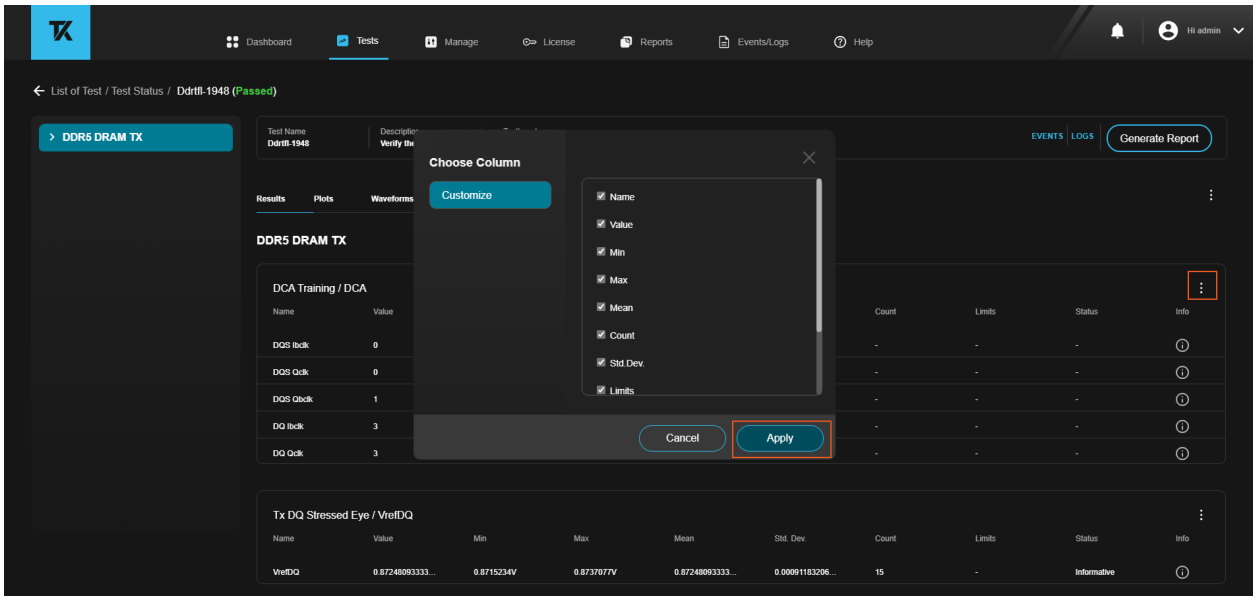


Figure 66: Customize test results columns

4. Click ⋮ and select **Download CSV Result** or **Download waveforms** to download the test results.

Test plots

The **Plots** tab displays the plots of an executed test measurement.

Follow the steps to view the test plots:

1. Select the required measurement from the left side bar to view the plots. The top level selections displays all the plots whereas, the lower level displays results for only that particular parameter.
2. Click the **Plots** tab to view the acquisition plots.

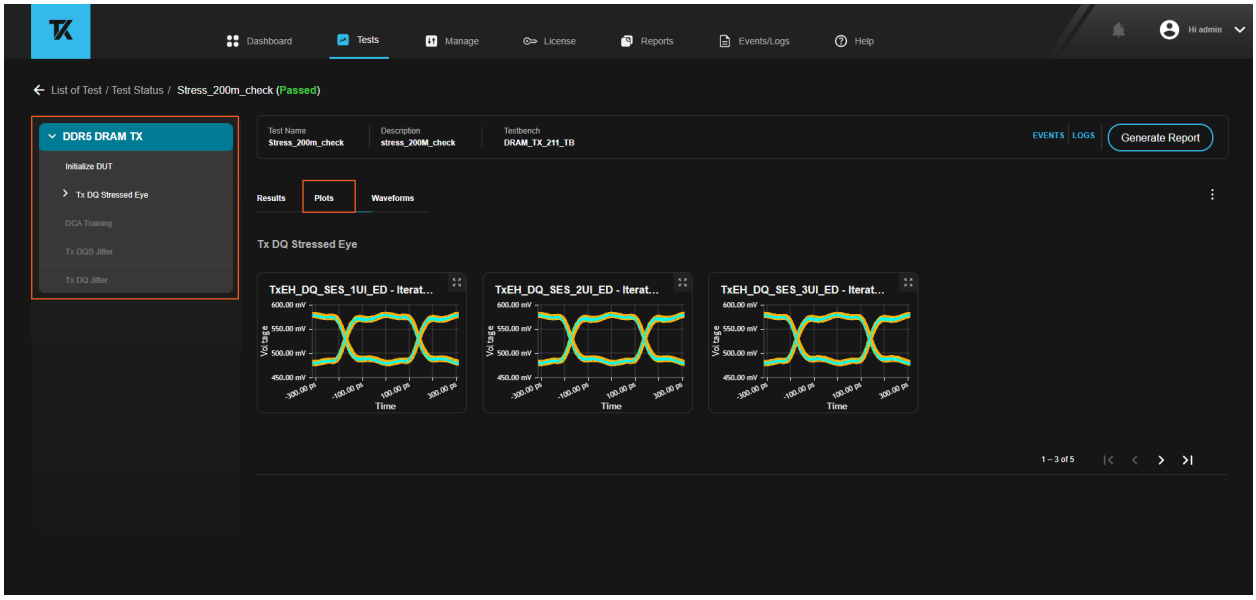


Figure 67: Test plots

3. Click ⋮ and select **Download CSV Result** or **Download waveforms** to download the test plots.

Test waveforms

The **Waveforms** tab displays the waveforms of an executed measurement.

Follow the steps to view the test waveforms:

1. Select the required measurement from the left side bar for which the waveforms to be viewed.
2. Click the **Waveforms** tab.
3. Select the number of iteration and the required waveform name from the drop-down to display the waveform.

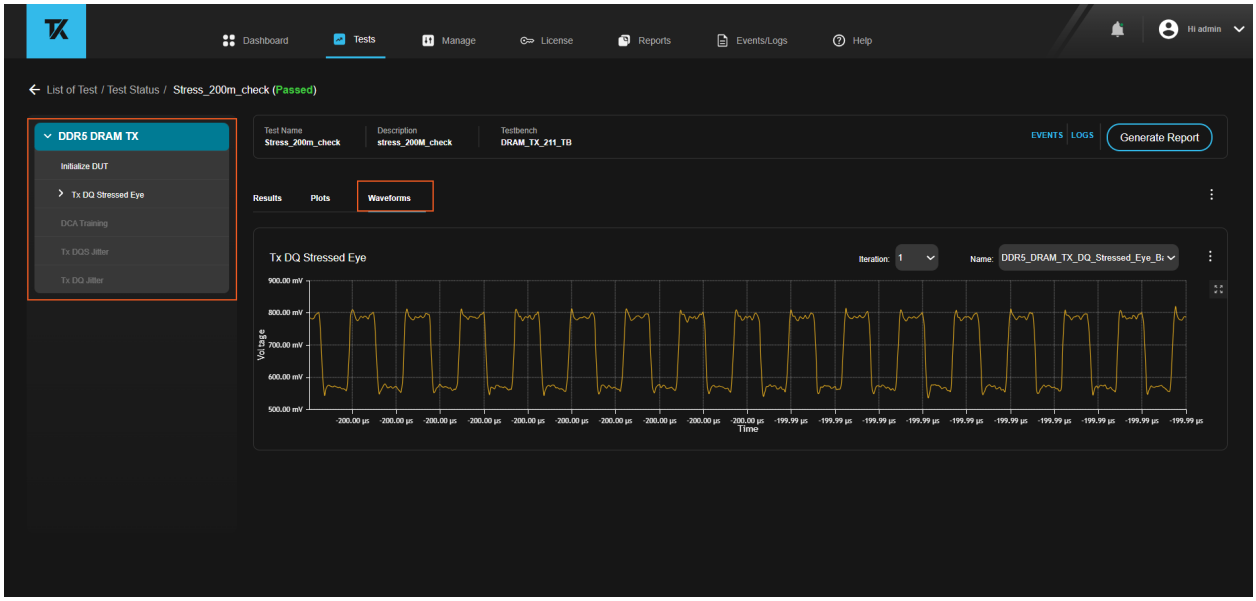
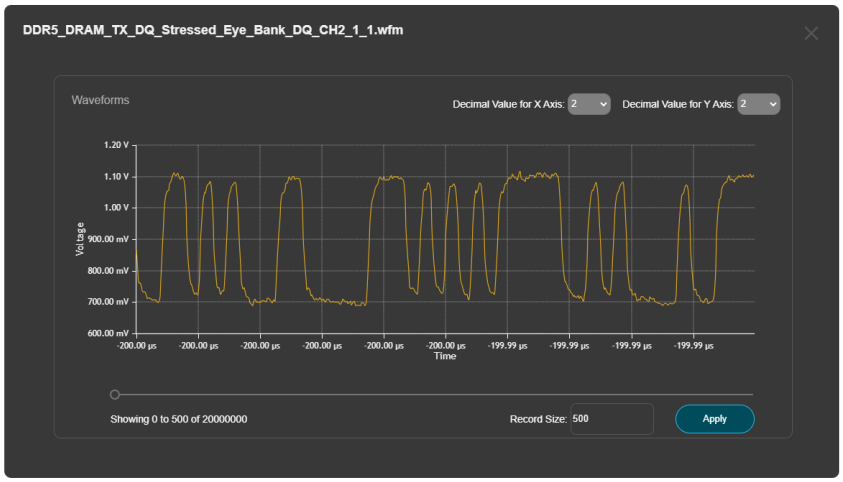


Figure 68: Test waveforms

4. (Optional) Click the icon ⛶ to set the view properties for the waveform and click **Apply**

- **Decimal value for Axis**: Set the decimal value for units of X Axis and Y Axis.
- **Record Size**: Enter the total record length to view in a single screen.
- Waveform scroll bar: Scroll to view the portion of the waveform.

.



5. To download individual test waveforms, click ⋮ of the respective measurement and select **Download waveforms**.
6. Click ⋮ and select **Download CSV Result** or **Download Waveforms** to download all test waveforms.

Filter tests

The filter by option under **Tests** tab allows the user to filter the test based on the criteria, such as: Status, Date Executed, and Applications.

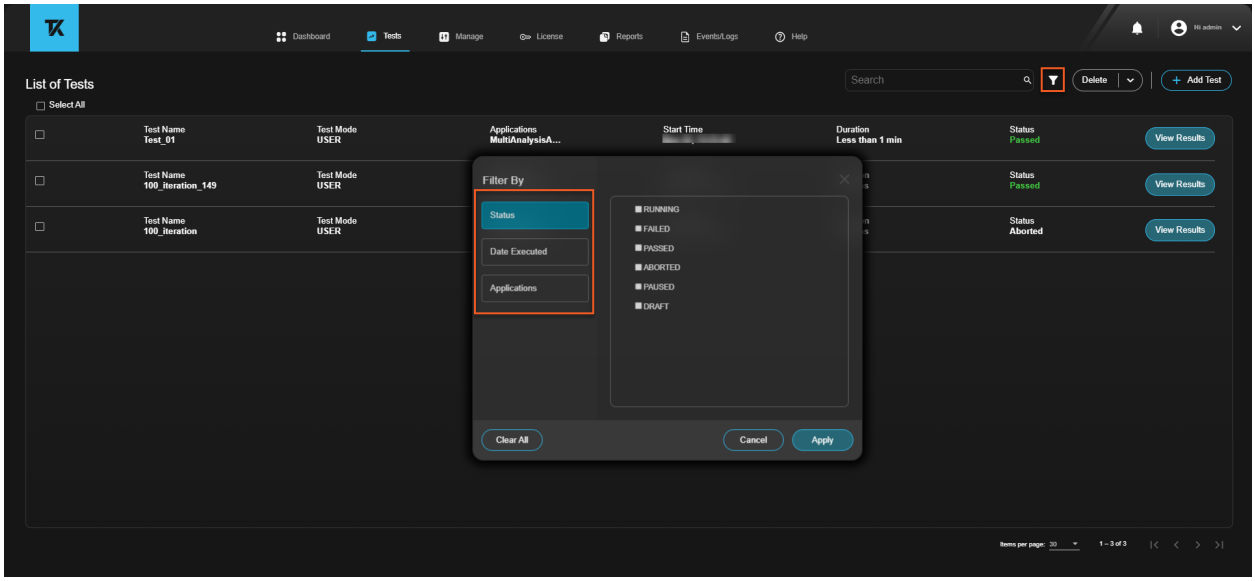


Figure 69: Filter test

Filter By	Description
Status	Displays the test status. • RUNNING • FAILED • PASSED • ABORTED • PAUSED • DRAFT
Date Executed	Select the **From** and **To** date to filter required tests.
Applications	Select the required applications to filter the test.
Clear All	Clear all the filters.
Apply	Applies the filter to a particular test.
Cancel	Click to cancel all the changes.

Manage: Test benches, sequence, and applications

The manage tab allows you to view the list of activated applications, create and configure test benches, and sequences. It also allows you to save the settings for further analysis.

Test Bench: Create and configure the test bench

A test bench is an environment that is used to verify the correctness of a test setup. The **Test Benches** tab allows you to create a test bench or edit an existing test bench for an application. You can also modify and delete the available test bench.

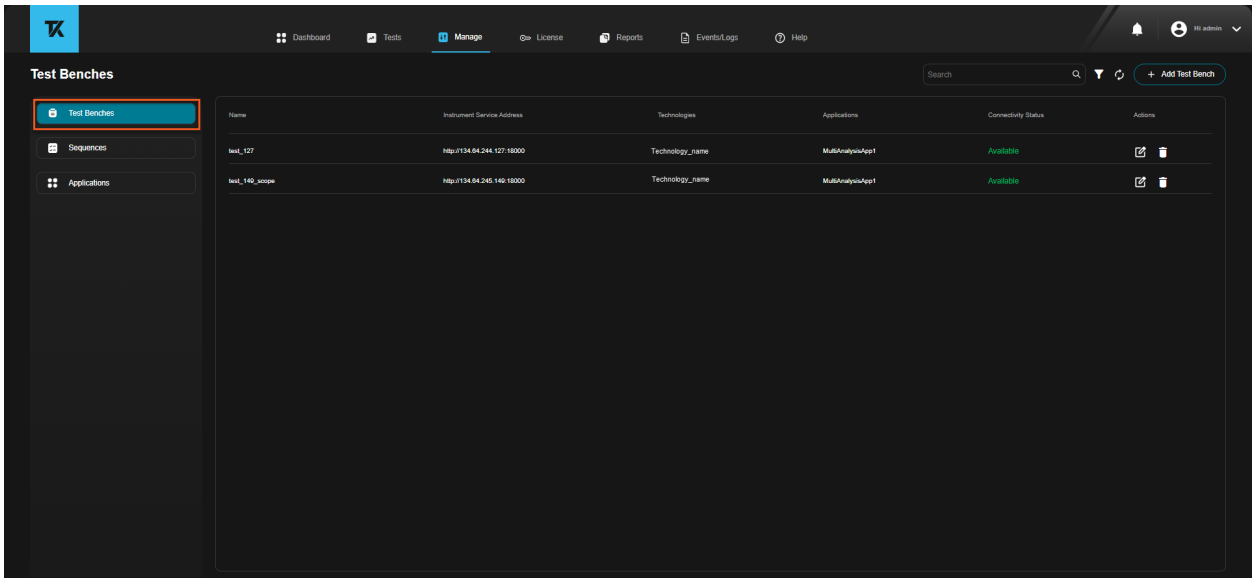


Figure 70: Manage test benches tab

Element	Description
Name	The test bench name.
Instrument Service Address	The instrument service URL. • `http://<<IP address of instrument service>>:18000`
Technologies	Active technology.
Applications	Active application.
Connectivity Status	Shows the testbench availability status. • Available • Unavailable • In Use
Actions	
Modify	Change or modify the existing test bench.
Delete	Delete the test bench.

Table continued…

Element	Description	
Filter By	Technologies	Filter by active technology.
	Applications	Filter by active application.
	Connectivity Status	Filter by active connectivity status. • Available • Unavailable • In use
	Acquisition Mode	Filter by active acquisition mode. • Live • Recorded
Refresh All	Click the **Refresh All** to refresh the testbench details.	

Create a test bench

Follow the steps to create a test bench:

1. Go to **Manage > Test Benches** and click **+ Add Test Bench**.

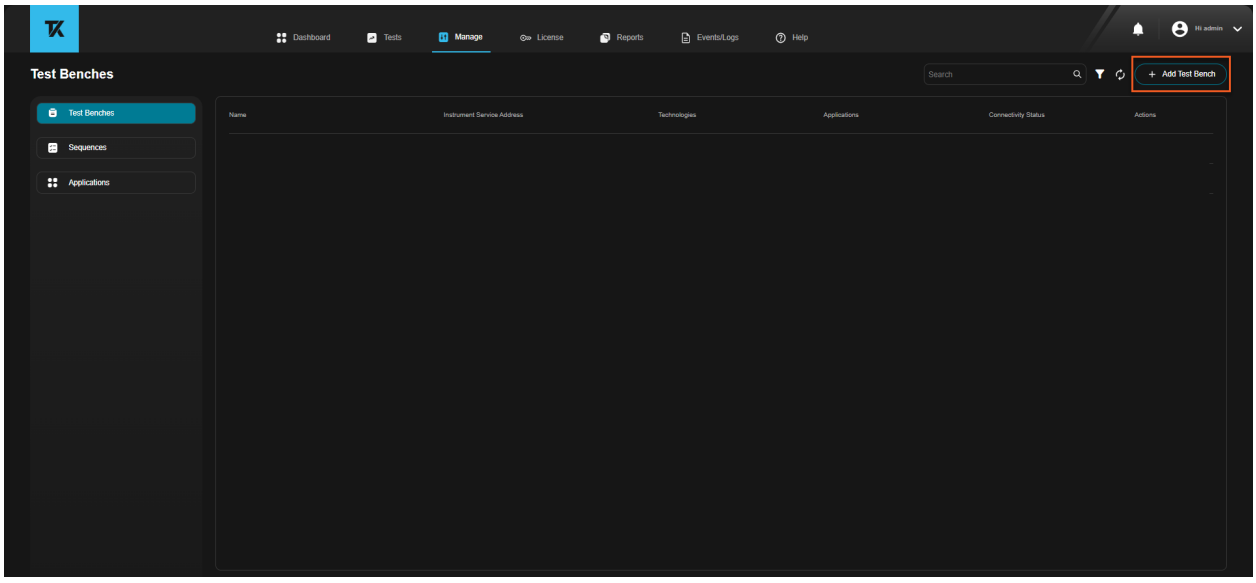


Figure 71: Create a test bench

2. Enter the test bench details in the respective fields.

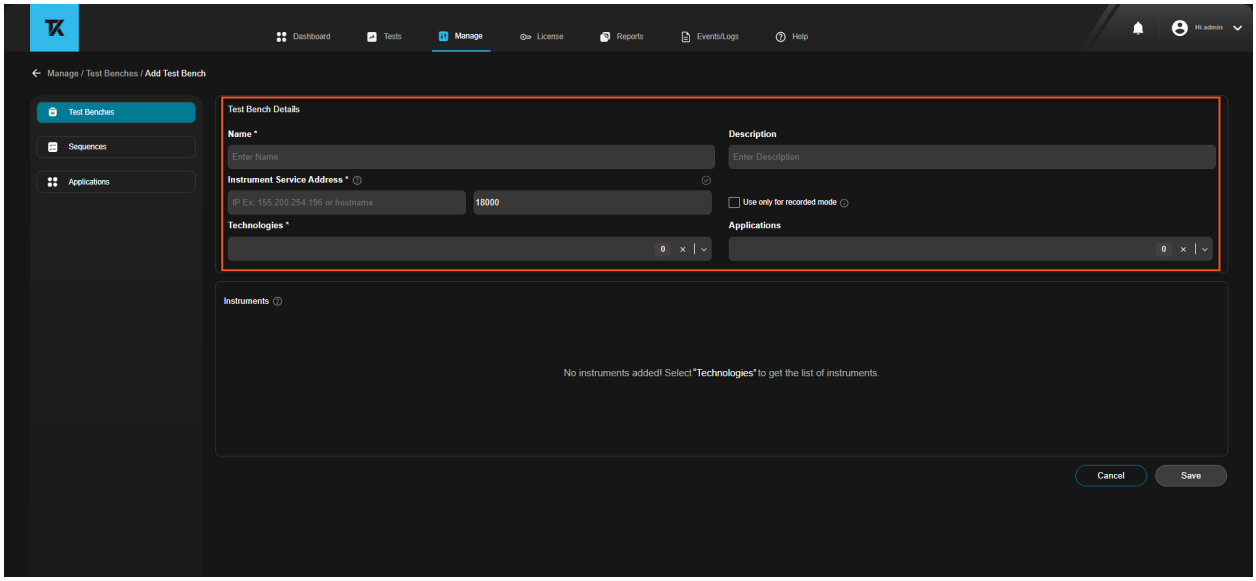


Figure 72: Test bench details

Menu	Description	
Test Bench Details		
Name	Enter the test bench name.	
Description	Enter the test bench description (Optional).	
Instrument Service Address	Enter the instrument service address (IP address/Host id) of the oscilloscope or target system.	
	Check Connection	Enter the instrument address or host name. You can select the to check the status of the instrument. This will be green if the instrument is available and connected.
Use only for recorded mode	Uploads recorded waveforms from the test bench to the data store. This cannot be used for live testing.	
Technologies	Select the technology. The test bench will be created for the selected technologies.	
Applications	Select the application. The test bench will be created for the selected applications. (Optional)	

3. Select the instruments detail.

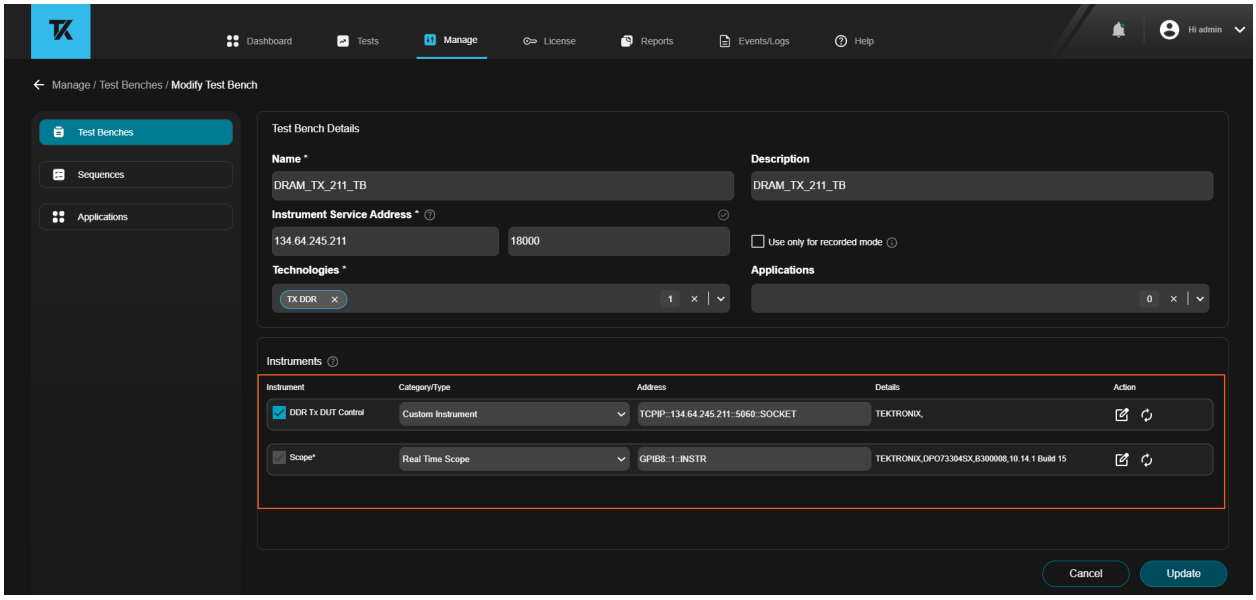


Figure 73: Instrument details

Menu	Description
Instrument	Select the required **Instrument** to create a new test bench.
Category/Type	Select the required instrument category or type with respective to the instrument selected. When instrument selected as **DDR Tx DUT Control** • Custom Instrument When instrument selected as **Scope** • Real Time Scope
Address	Enter the VISA resource address from the instrument service manager of the oscilloscope. Example: • For MSO Scope: GPIB8::1::INSTR • For DPO Scope: TCPIP::127.0.0.1::INSTR • For DUT Control: TCPIP::127.0.0.1::5060::SOCKET **Note:** • The scope addresses must be captured from TekVisa Instrument manager. • IP address in DUT Control must be of the machine where instrument service is running.
Details	Click the from the action panel after entering **Address**. It will displays the scope and properties details retrieving from the oscilloscope.
Action	Allows you to **Edit** and **Refresh** the instrument properties that are added. **Note:** To edit the instrument properties, first you need to add address and select refresh icon.
Scope/DDR Tx DUT Control Details	

Table continued…

Menu	Description	
Category/Type	Select the required instrument type from the drop-down.	
Address	Enter the IP address of the instrument in the field.	
Properties		
Refresh	Click the  icon to refresh the instrument properties.	
Manufacturer	Displays the instrument manufacturer details in the field. By default, the manufacturer will be added as **TEKTRONIX**.	
Model	Displays the model in the field. **Note:** Available only when the instrument selected as **Scope**.	
Bandwidth	Displays the bandwidth of the instrument in the field. **Note:** Available only when the instrument selected as **Scope**.	
Serial Number	Displays the serial number of the instrument in the field. **Note:** Available only when the instrument selected as **Scope**.	
Firmware Version	Displays the firmware version of the instrument in the field. **Note:** Available only when the instrument selected as **Scope**.	
Script Name	Enter the Python script name of the DUT control that you want to use for automation in the field. **Note:** Available only when the instrument selected as **DDR Tx DUT Control**.	
Multi Scope Config	Displays the multi scope configuration of the oscilloscope. **Note:** Available only when the instrument selected as **Scope**.	
Probe Details	Displays probes details. **Note:** Available only when the instrument selected as **Scope**.	
	Channel	Displays the channel name.
	Serial No.	Displays serial number of the probe.
	Probe Type	Displays probe type.
	Tip Type	Displays probe tip model.
	Calibration Status	Displays the status of the calibration.

4. Click **Save** to save the test bench.

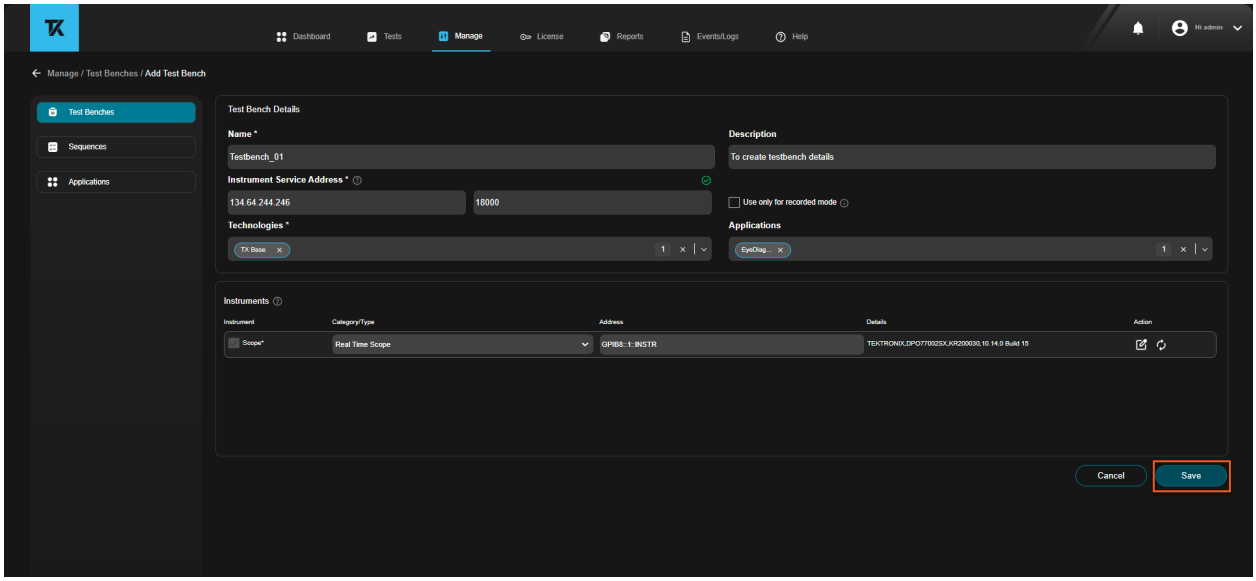


Figure 74: Save test bench details

5. You can view the saved test bench in the **Test Benches** tab. You can also edit or delete the existing test bench.

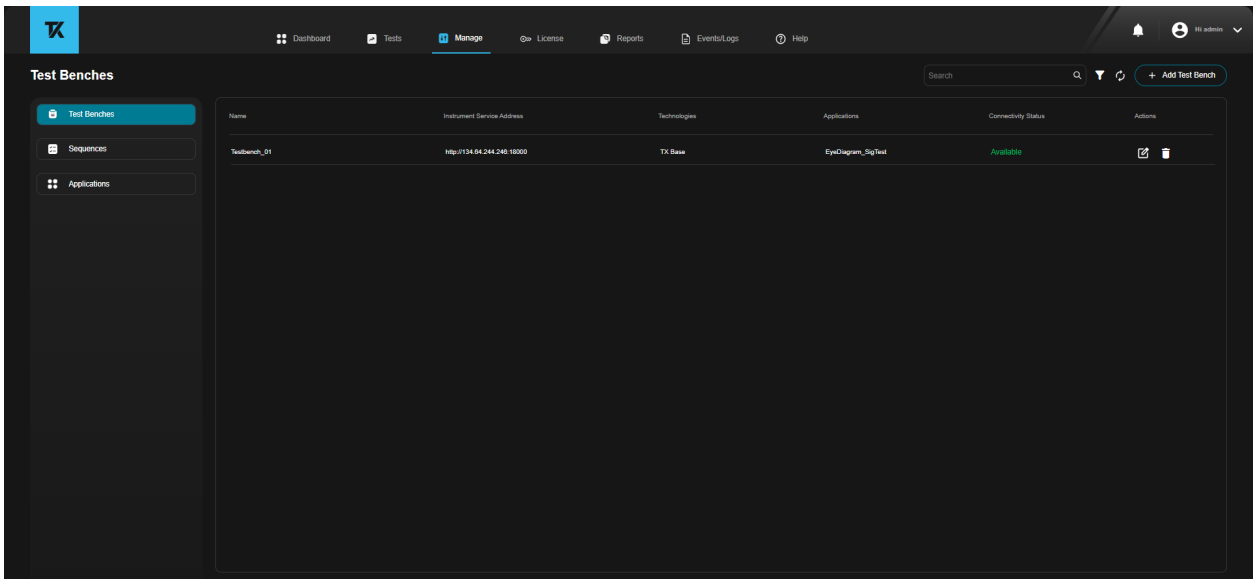


Figure 75: View test bench details

Sequences

The **Sequences** tab displays the list of created sequences along with the application names. This acts as a test template and can be imported while creating a test. You can also modify or delete the existing sequences.

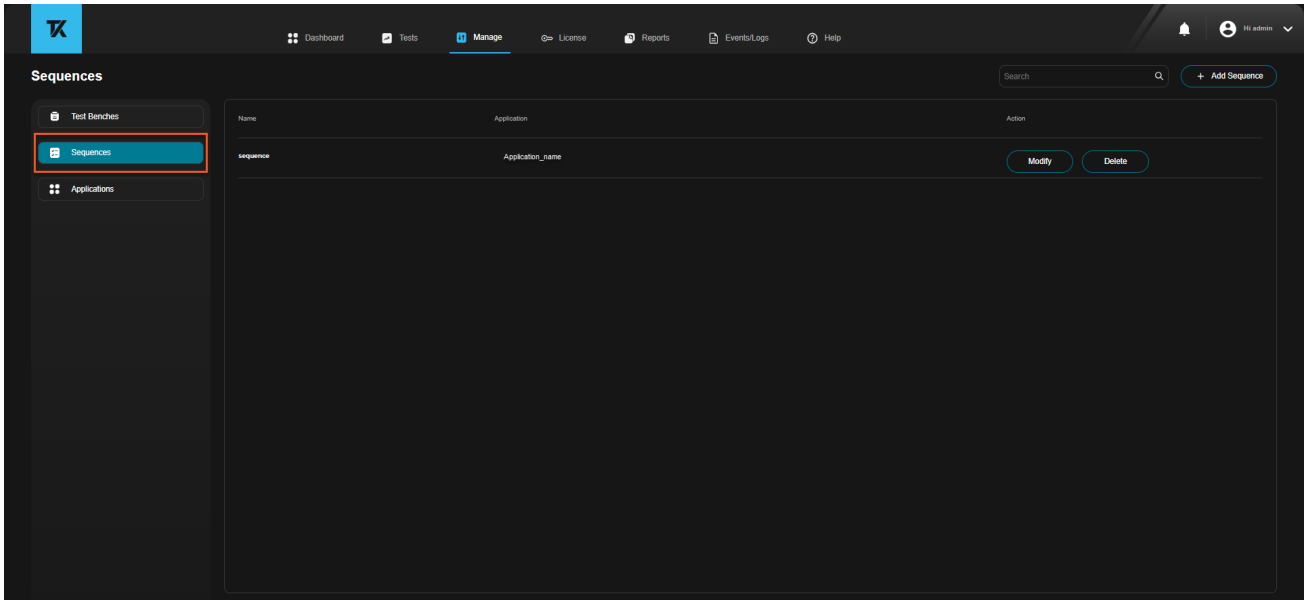


Figure 76: Sequences tab

Add new sequence

Follow the steps to create a sequence:

1. Go to **Manage > Sequences** and click **New Sequence**.

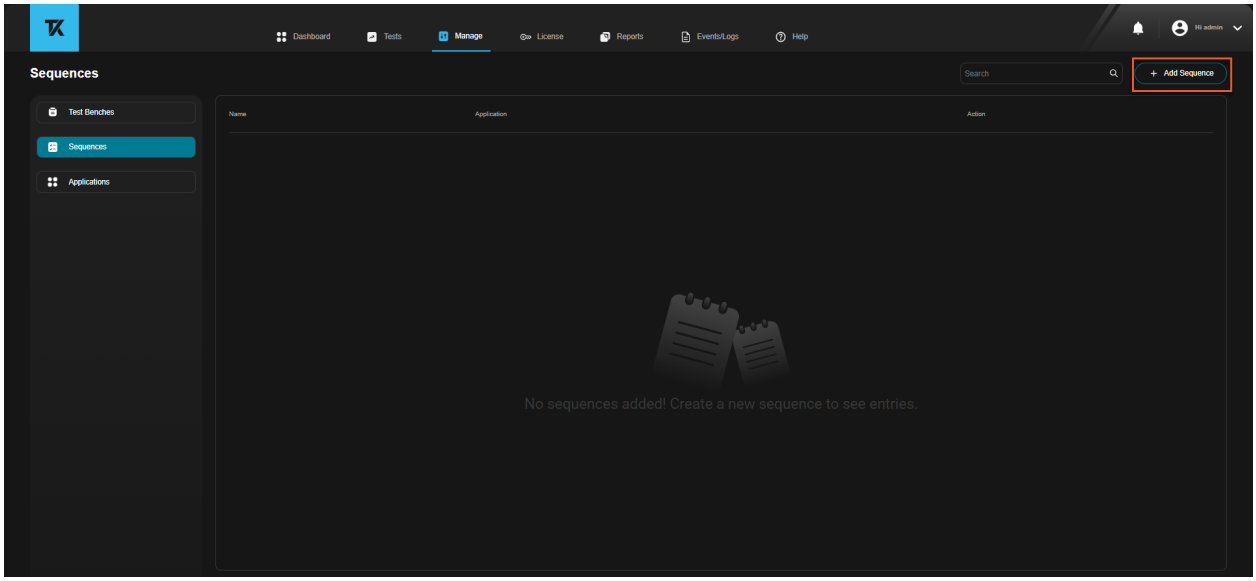


Figure 77: Add new sequence details

2. Enter **Sequence Details** in the respective fields; select the **Technology** and **Application** from prepare sequence pane and click **Add Sequence**.

Sequence Details	Description
Name	Enter the name of the sequence.
Description	Enter the description of the sequence.

Table continued…

Sequence Details	Description
Prepare Sequence	Click **+ Add Sequence** to add a test sequence. Refer *Create and Prepare a Sequence* for more information.

3. Check and update the global settings for the respective fields and click **Apply**.
4. Configure the scenarios and measurements, and click **Apply**.
5. You can view the saved sequence in the **Sequences** tab. You can also modify or delete the existing sequence.
6. Click **Save**.

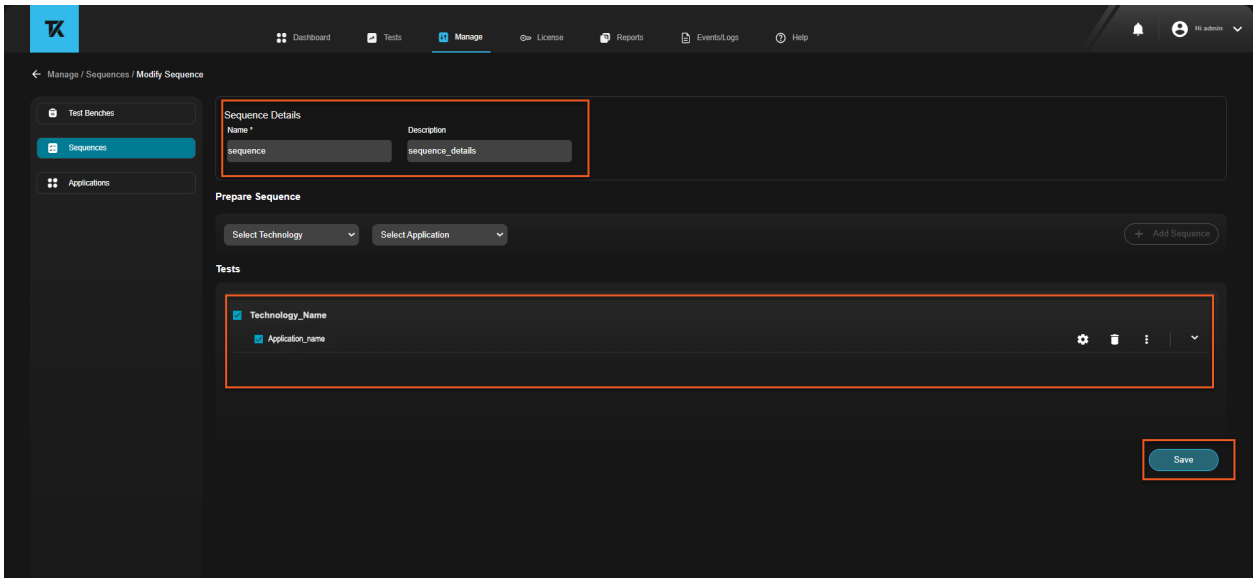


Figure 78: Save sequence details

7. You can view the saved sequence details. You can modify or delete the existing sequence.

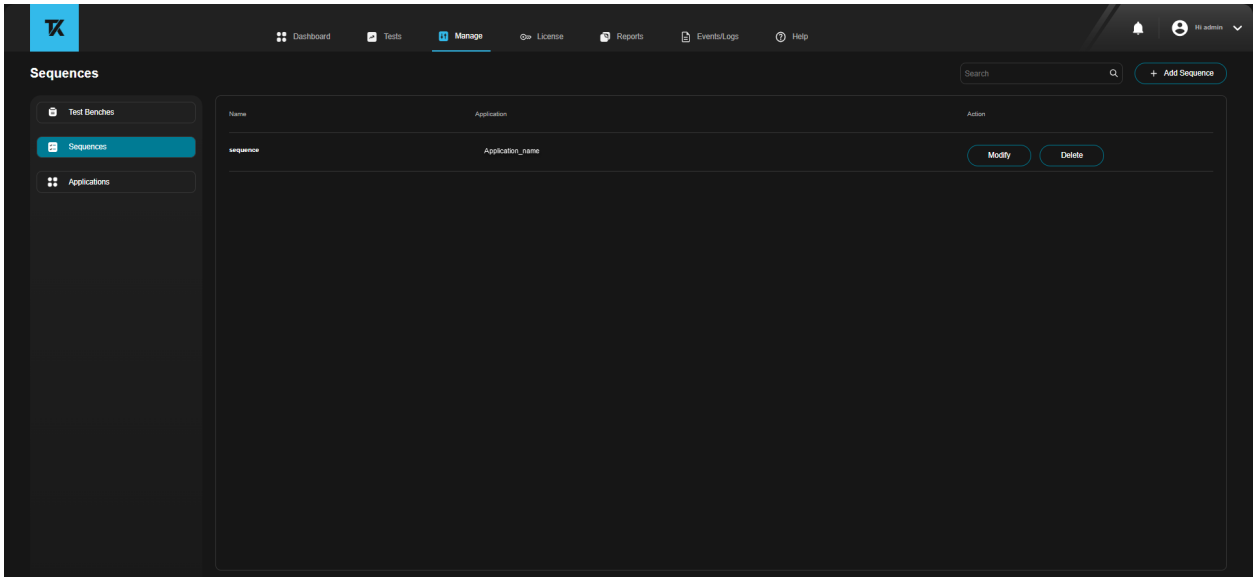


Figure 79: Sequence details

Applications

The **Applications** tab displays the list of activated applications with its name, type, sub-type, and version. You can also filter the applications by selecting the filter options.

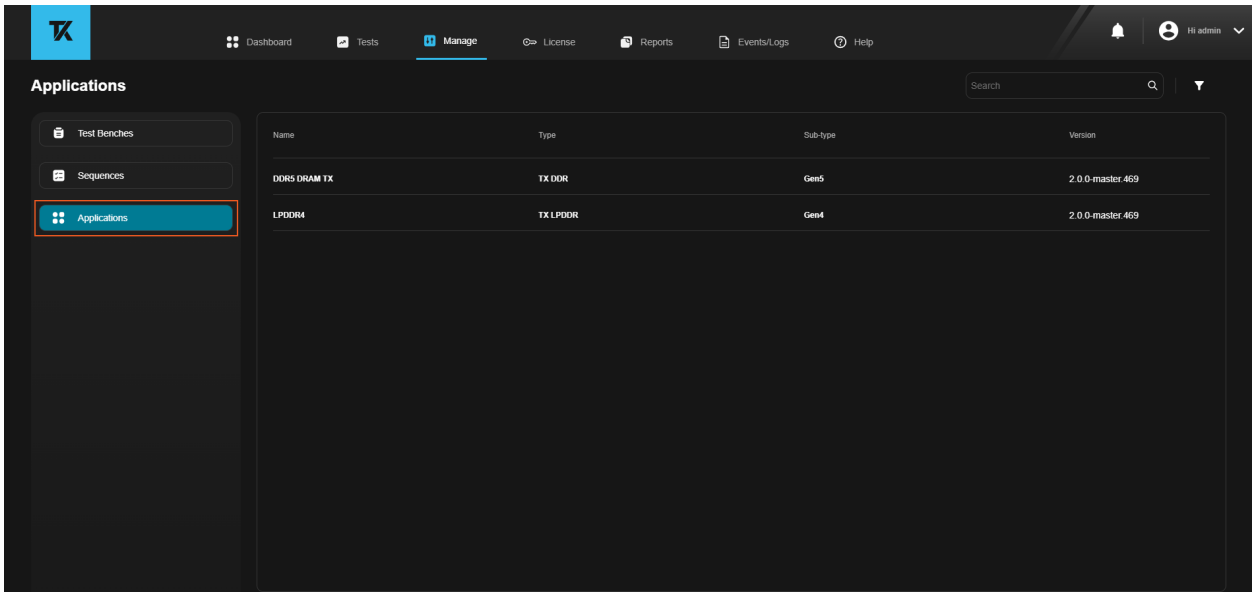


Figure 80: Manage application tab

Reports: View, generate, and export report of a test

The **Reports** tab allows you to generate a report, view the report, and export a detailed test report for all the executed tests. It also allows you to search for a specific report using the search bar.

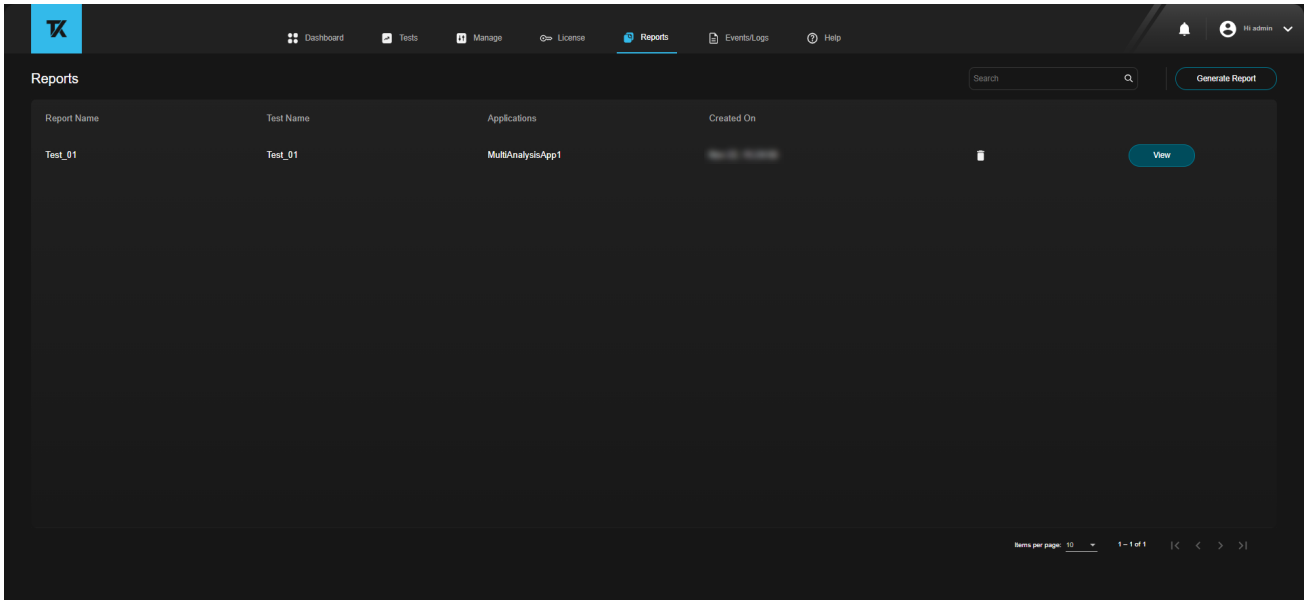


Figure 81: Reports tab

Element	Description
Report Name	Displays the report name.
Test Name	Displays the test name.
Applications	Displays the application name.
Created On	Displays the date and time by when the report is created.
Delete	Click the icon to delete the report.
View	Click to view the report.
Generate Report	You can generate the report of an executed test. Refer *Generate Report* for more information.

Generate report

The **Generate Report** allows you to generate a report of an executed test.

Generate report of a particular test

Follow the steps to generate a report of a particular test:

1. Go to **Tests** tab and click **View Results** of a particular test.

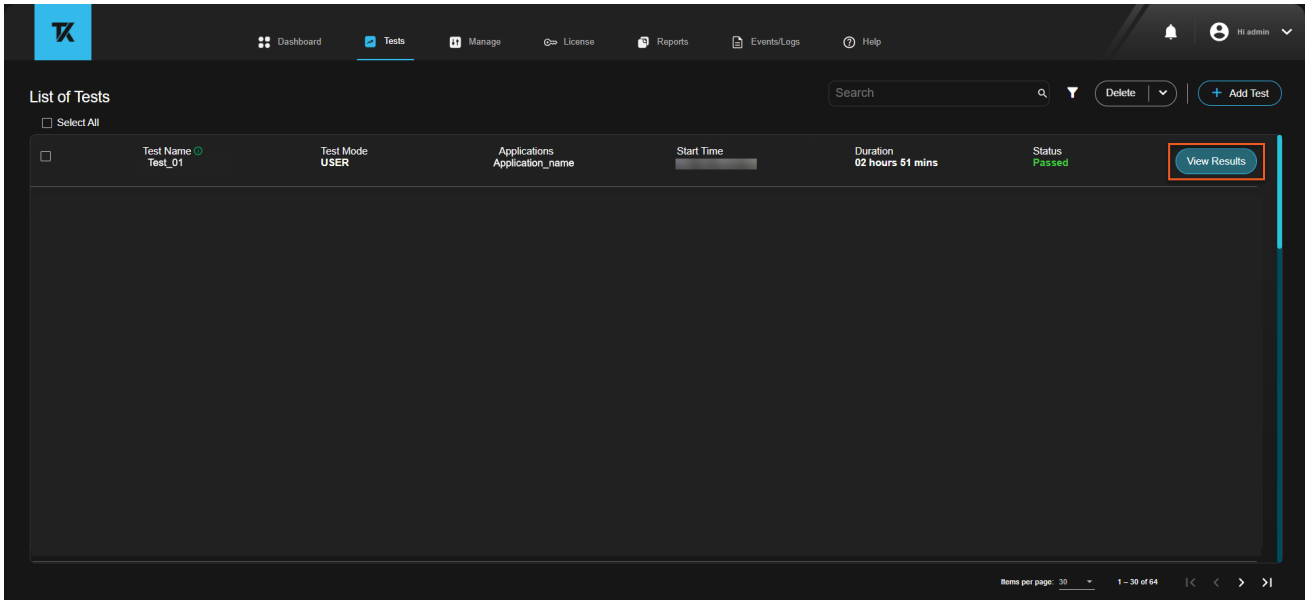


Figure 82: Tests tab: View results

2. Click **Generate Report**.

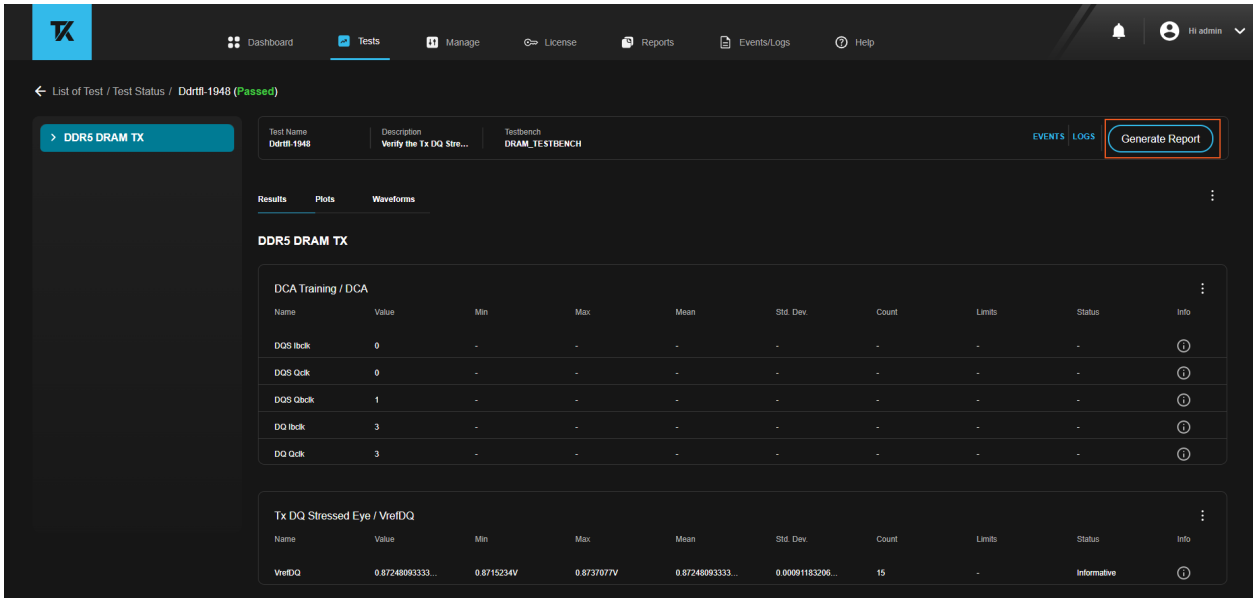


Figure 83: Generate report of a particular test

3. Select the report template from the drop-down.

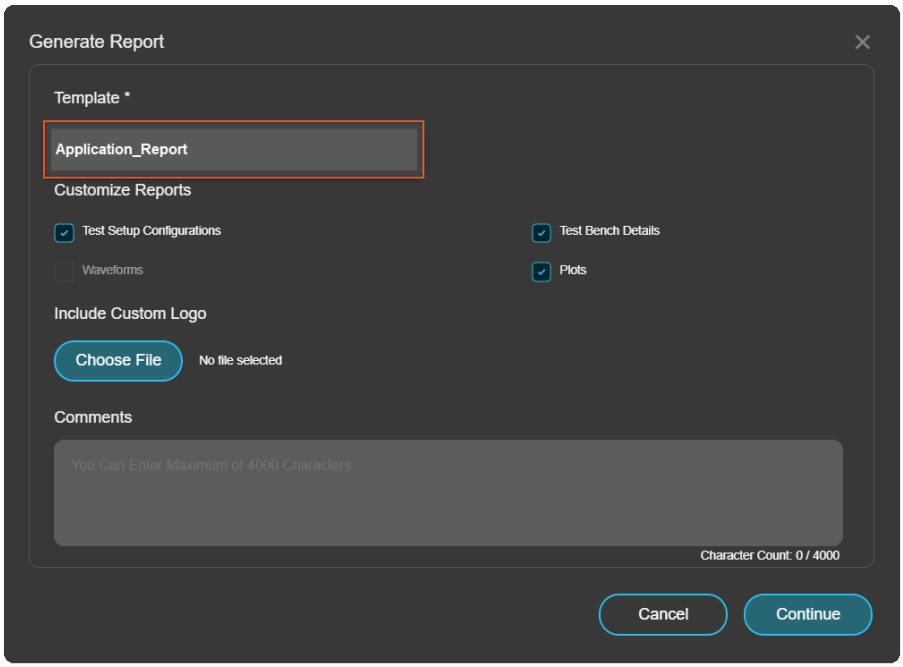


Figure 84: Generate report: Select template

4. Check the options to customize the reports.

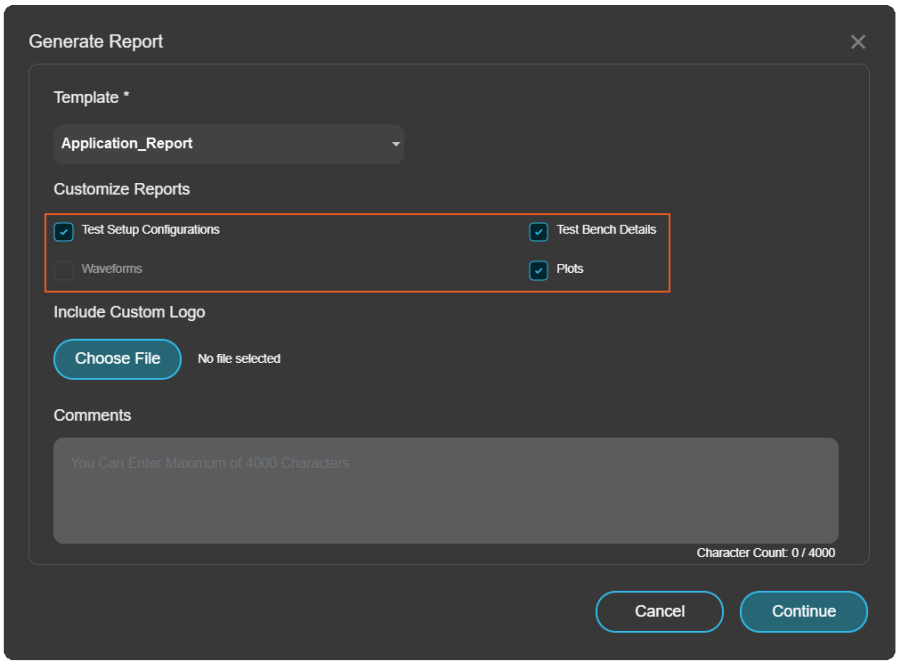


Figure 85: Generate report: Customize report

5. Click **Choose File** and browse to add a custom logo to get printed in the test report.

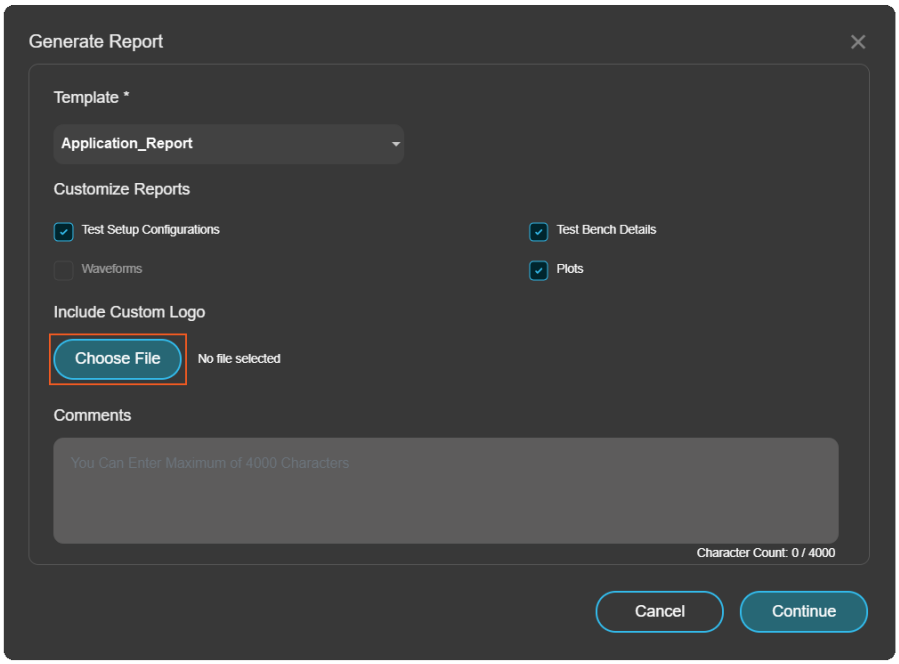


Figure 86: Generate report: Include custom logo

6. Enter additional comments in the field if required and click **Continue**.

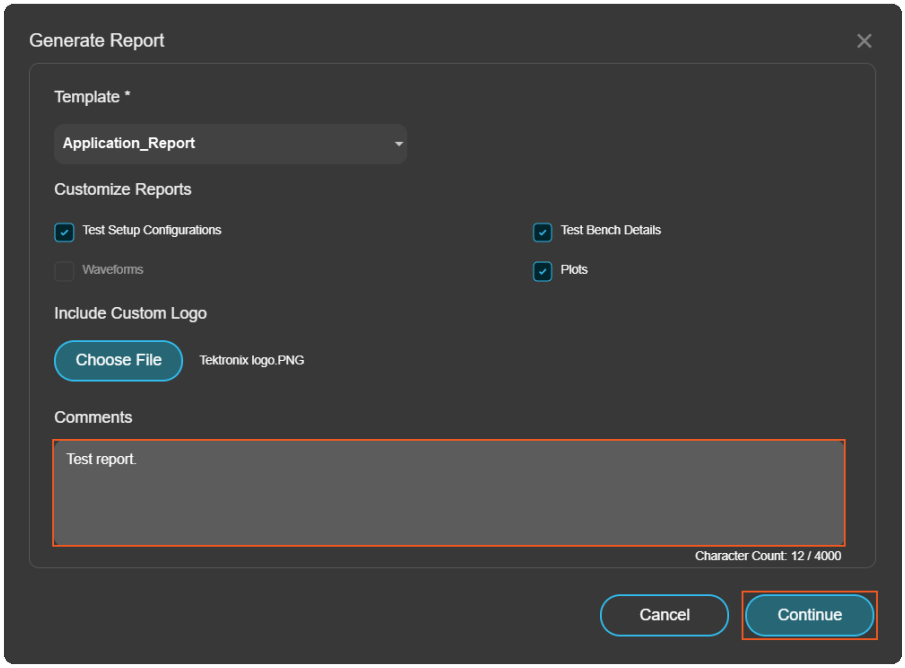


Figure 87: Generate report: Add additional comments in the field

Generate report for a group of test

Follow the steps to generate a report for a group of test:

1. Go to **Reports** tab and click **Generate Report**.

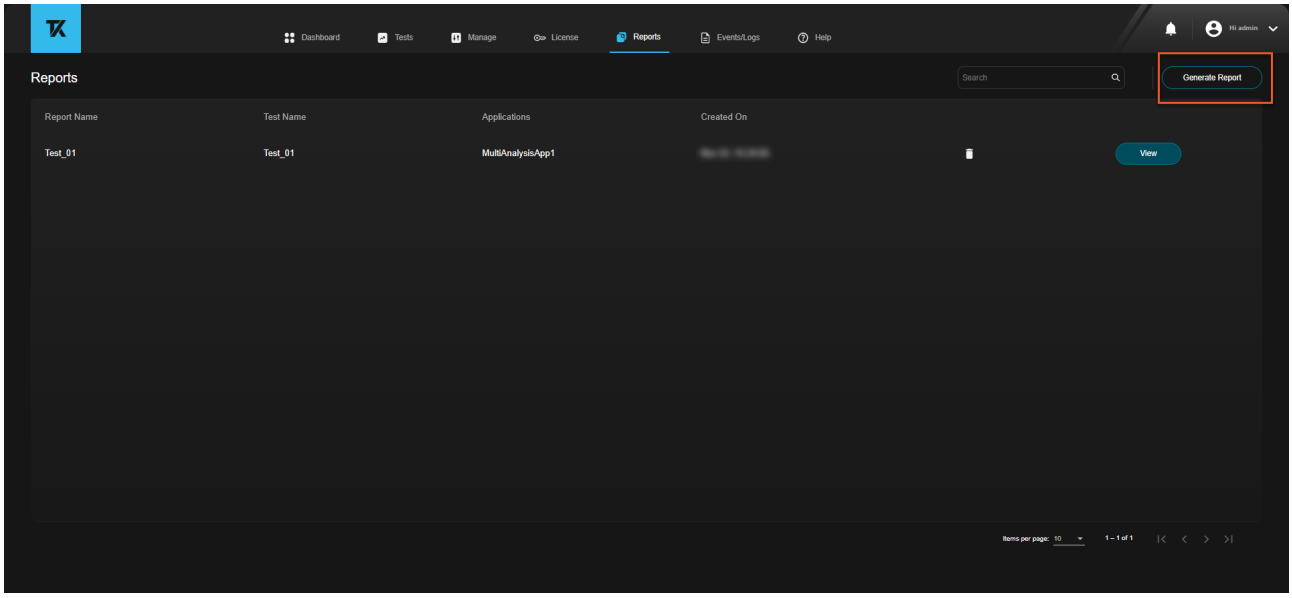


Figure 88: Generate report for a group of test

2. Enter the **Report Name** and click **Select Tests**.

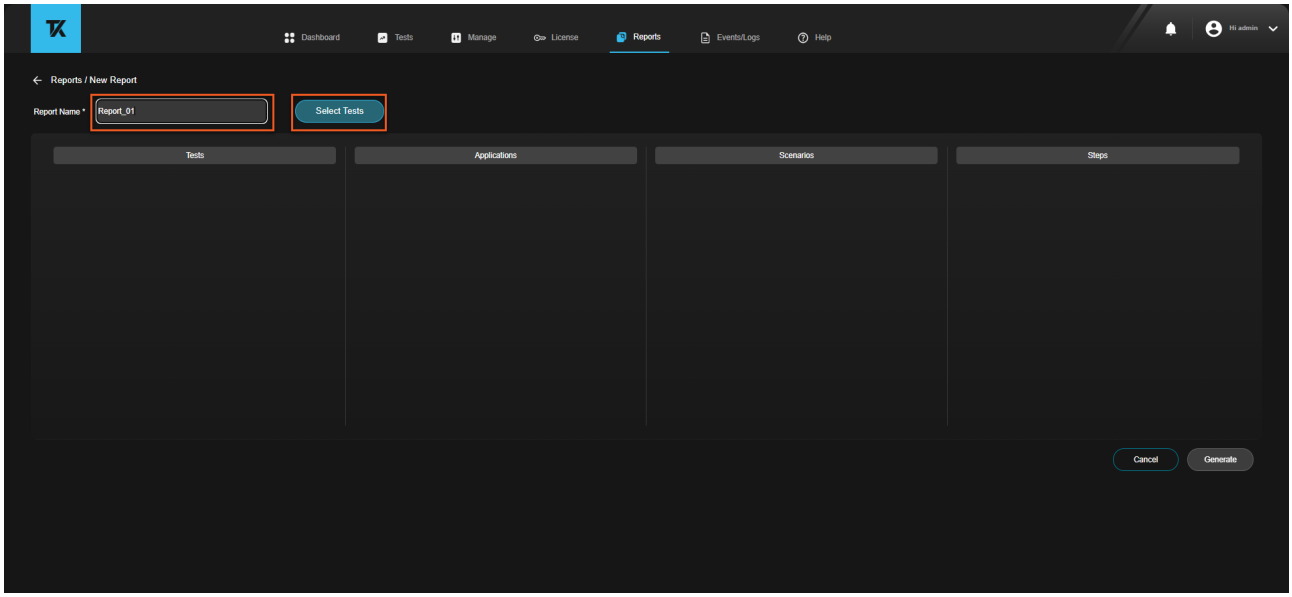


Figure 89: Reports tab: Select tests

3. Select the list of tests that needs to be generated and click **Continue**.

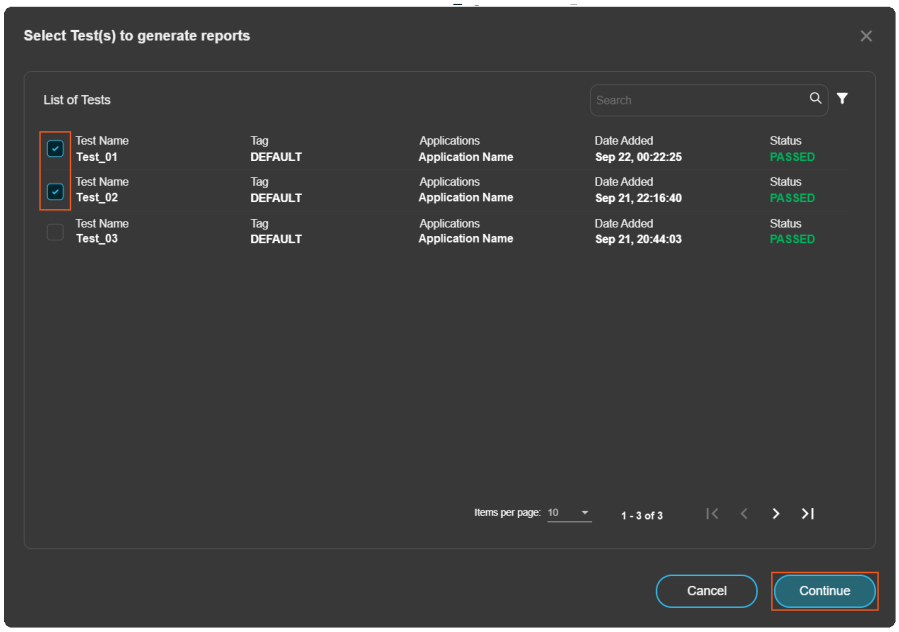


Figure 90: Select list of tests

4. Select the **Tests** and **Applications** from the sub menu.

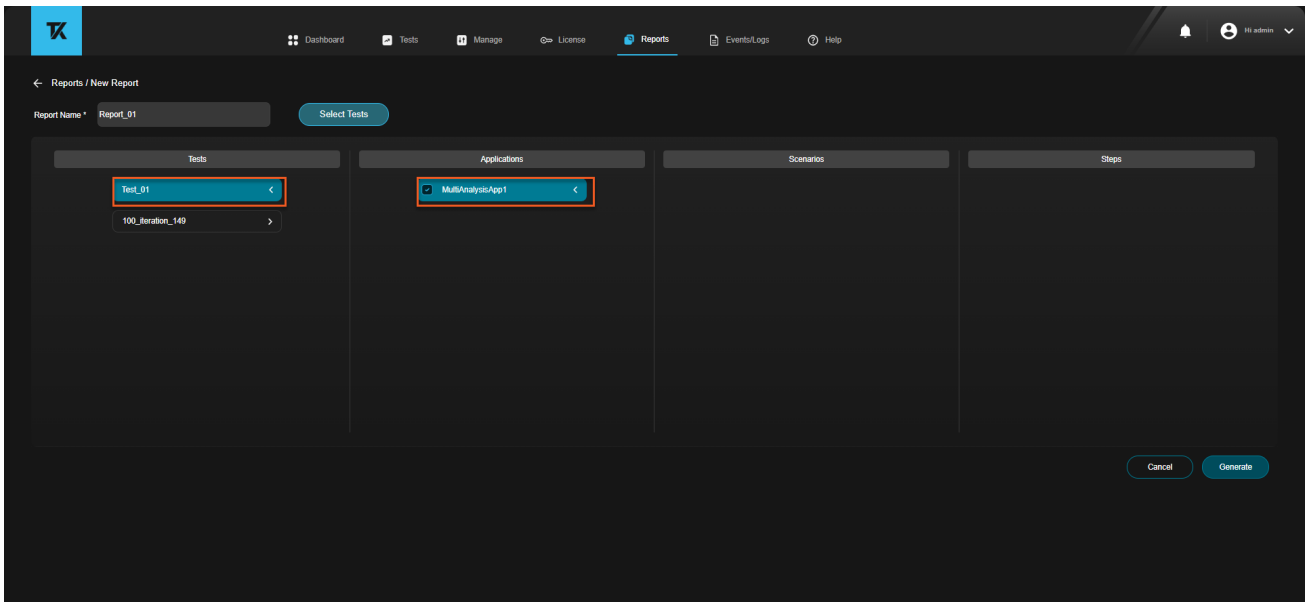


Figure 91: Reports: Select tests and applications

5. Click **Generate**. A dialog window appears to customize the report.

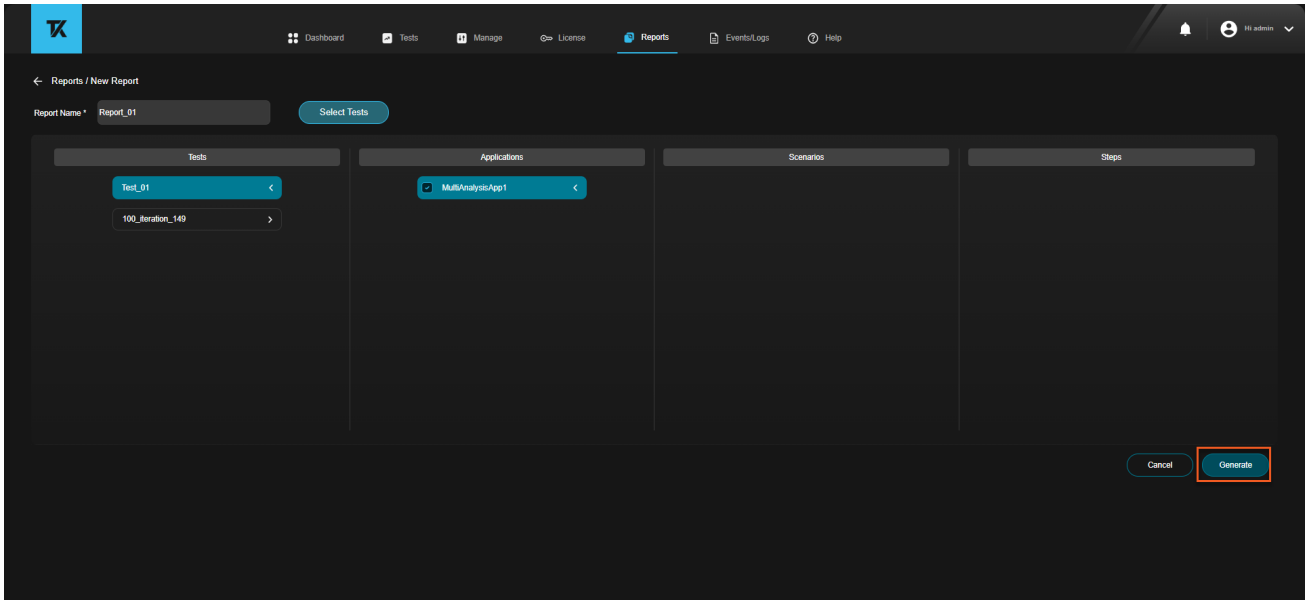


Figure 92: Reports: Generate the report

6. Select the report template from the drop-down.

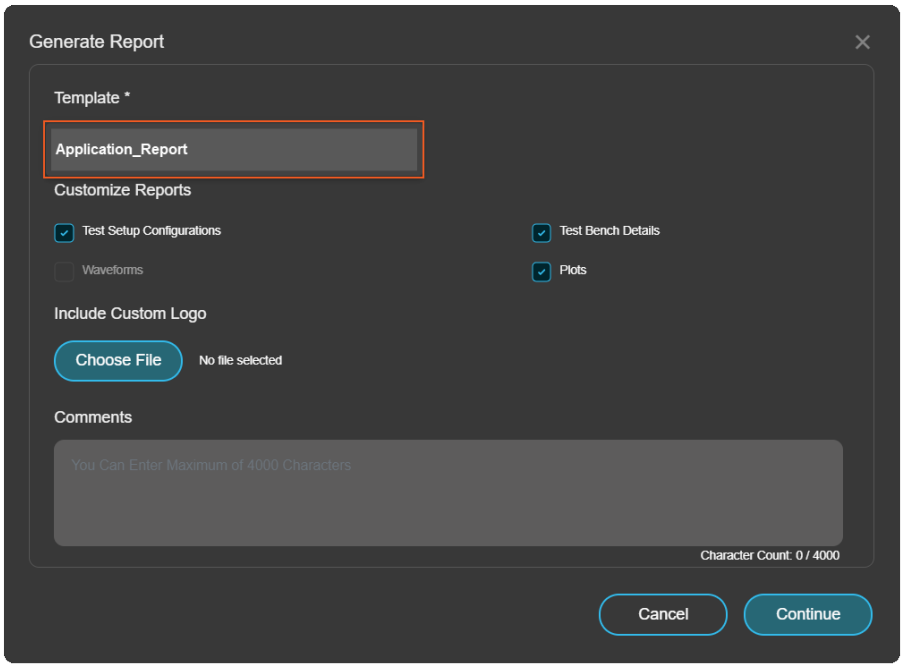


Figure 93: Generate report: Select template

7. Check the options to customize the reports.

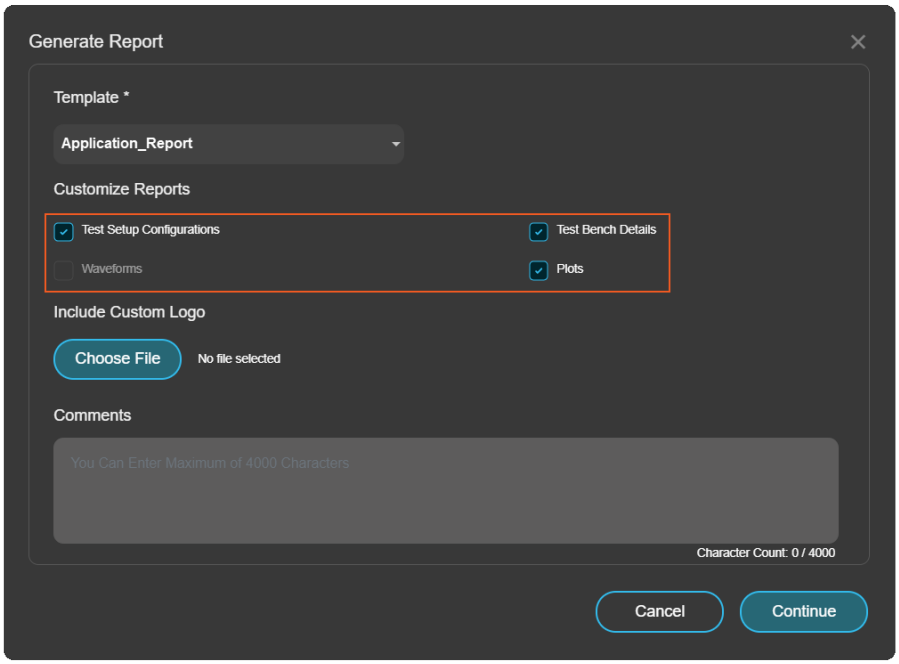


Figure 94: Generate report: Customize report

8. Click **Choose File** and browse to add a custom logo to get printed in the report.

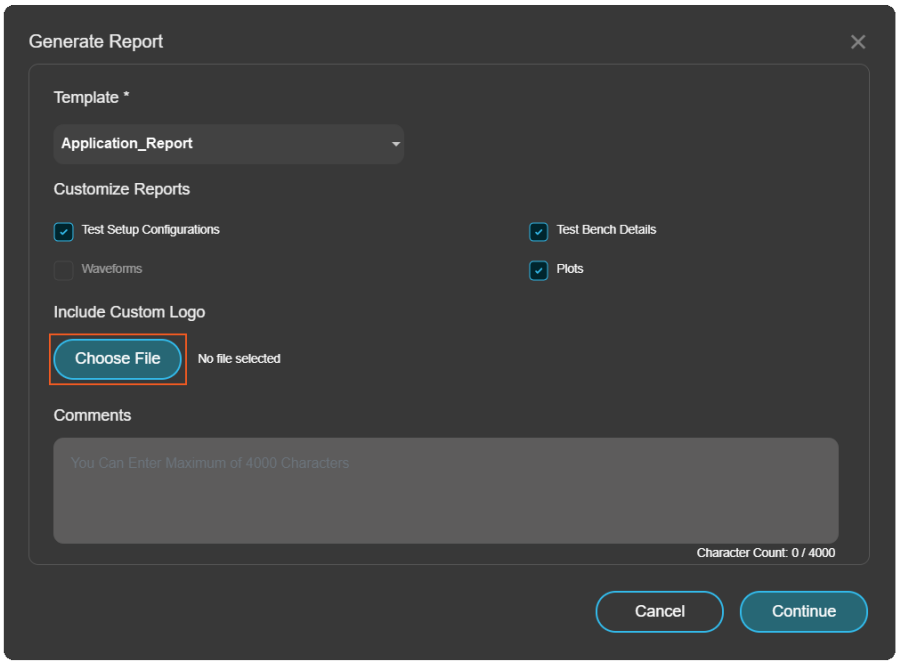


Figure 95: Generate report: Include custom logo

9. Enter additional comments in the field if required and click **Continue**.

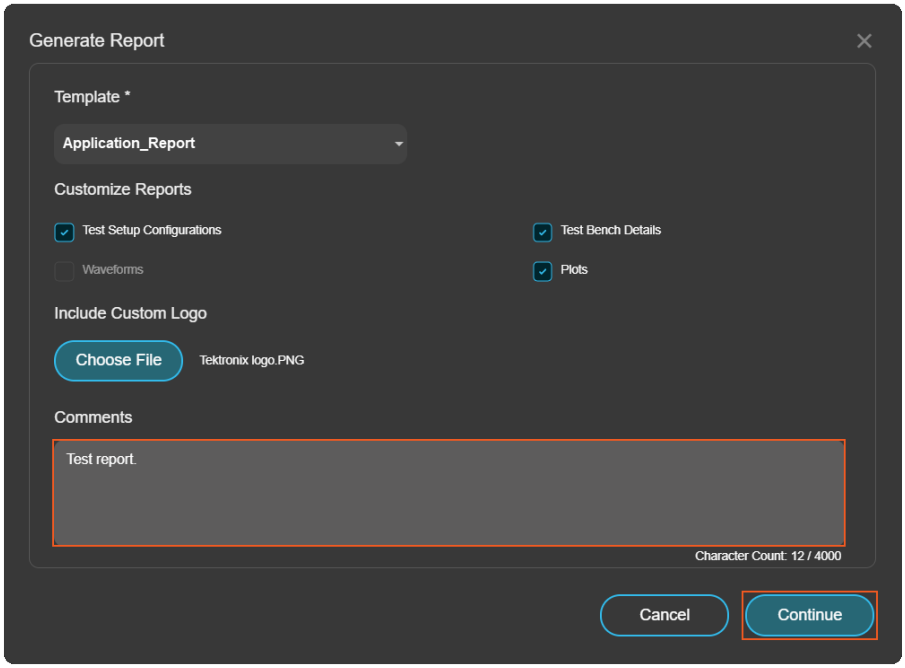


Figure 96: Generate report: Add additional comments in the field

View and export a report

Pre-requisites: Make sure the report is generated after successful execution of a test.

Follow the steps to view and export the generated report:

1. Go to **Reports** tab and click **View** of a particular report.

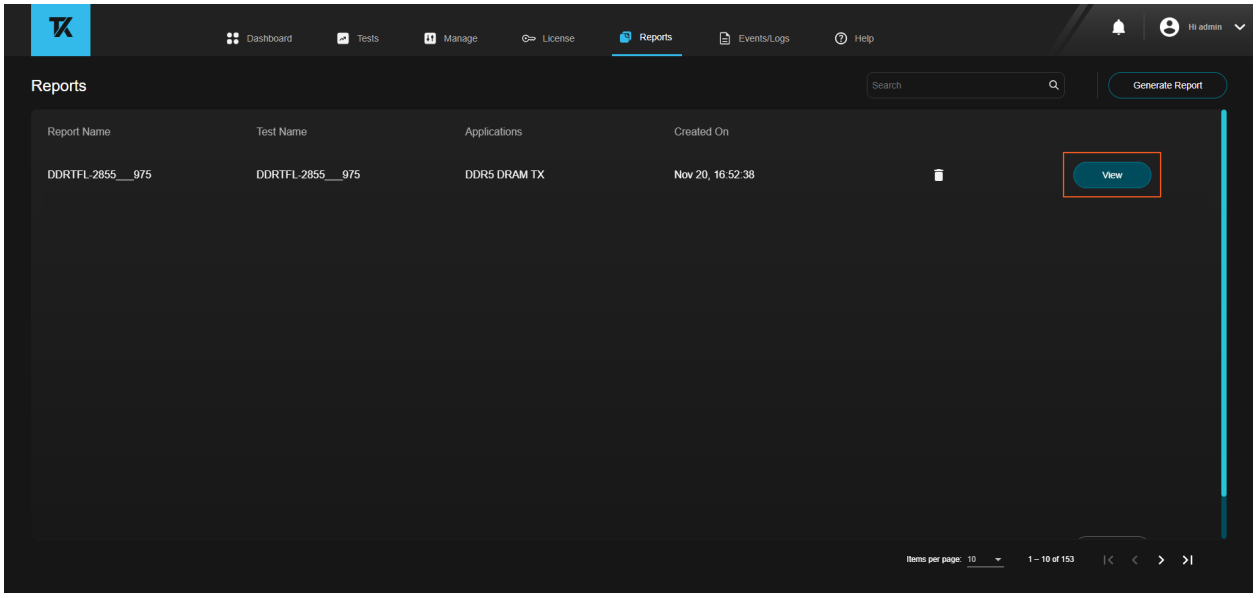


Figure 98: Reports tab: View

2. Enter the title and select the format (PDF) of the report. By default the title will be displayed as the test name.

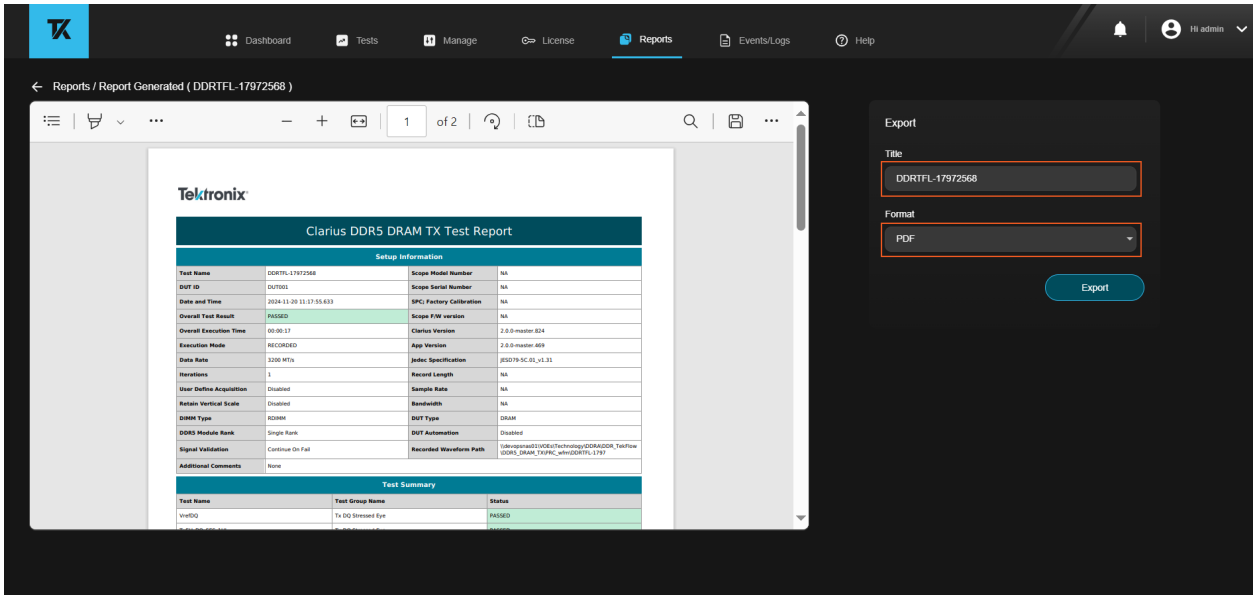


Figure 99: Reports tab: Enter title and format

3. Click **Export**.

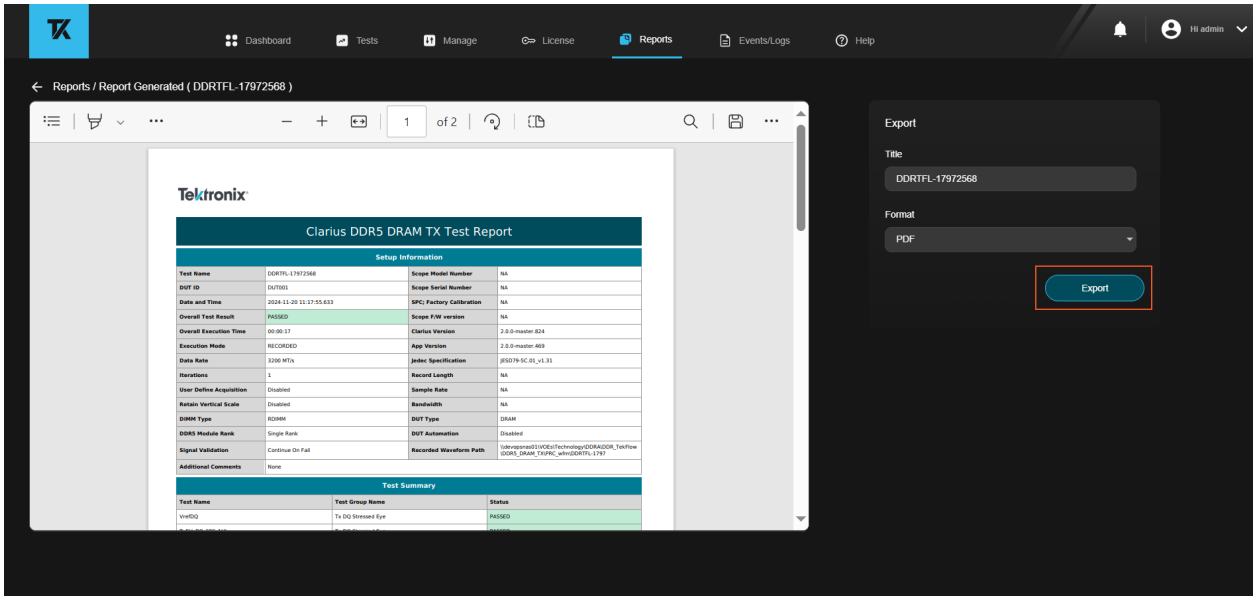


Figure 100: Reports tab: Export the report

Events and logs

The **Events and logs** tab displays the overall record of events and logs captured during a test acquisition and analysis.

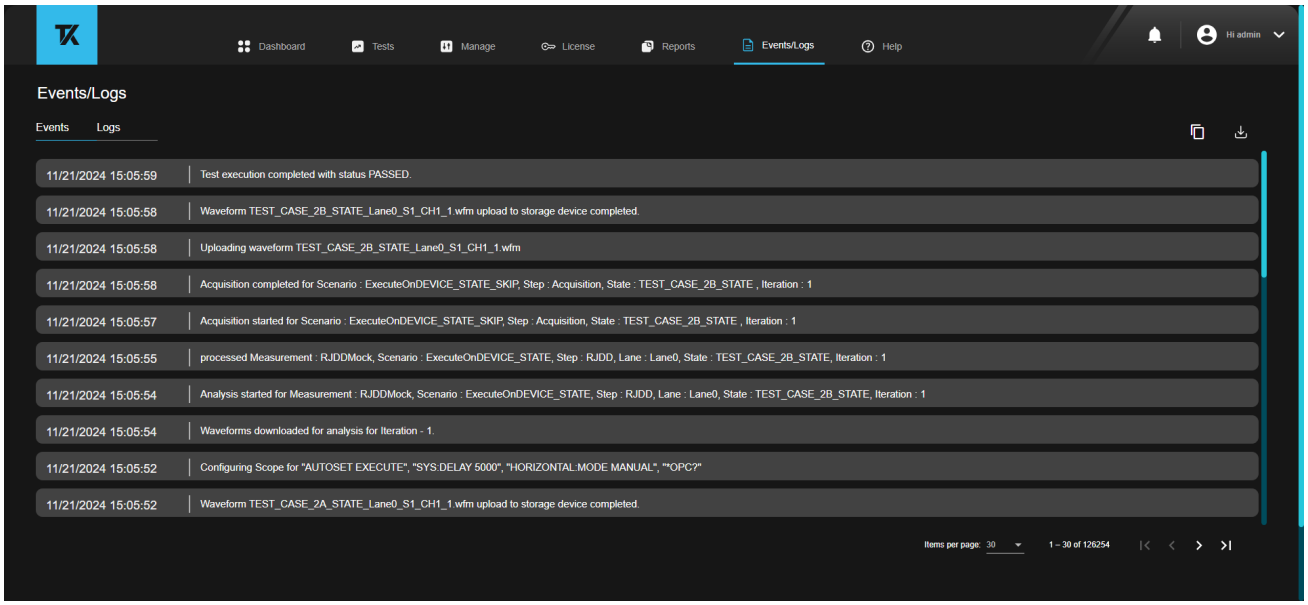


Figure 101: Events tab

Option	Element	Description
	Copy Events	Click to copy the events and paste it in the clipboard for further analysis.
	Download Events	Click to download the events in the target system.

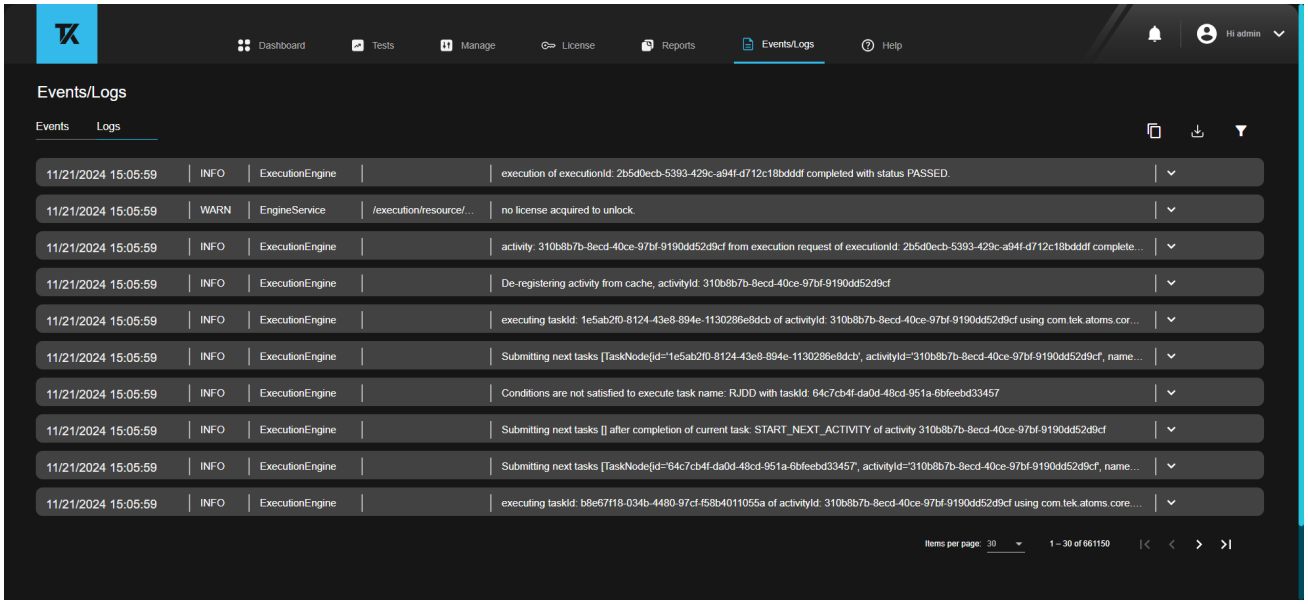


Figure 102: Logs tab

Option	Element	Description
	Copy Logs	Click to copy logs and paste it in the clipboard for further analysis.
	Download Logs	Click to download the logs in the target system.
	Filter	Click to filter the logs.

Filter logs

The **Filter By** option under logs tab allows you to filter the logs based on the criteria such as Component, Data Added, Level, Service, and Transaction Type.

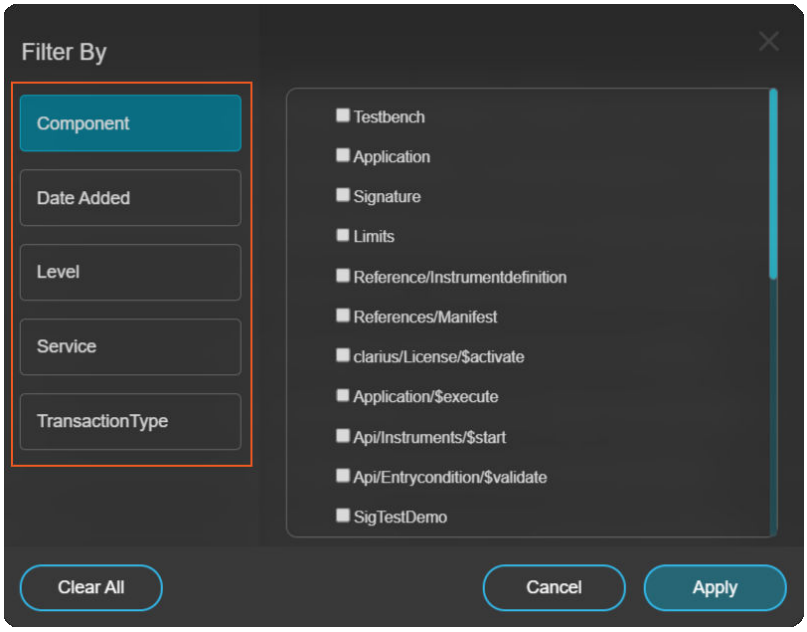


Figure 103: Filter logs

Filter type	Description
Component	Select the required component(s) to filter the logs. • Testbench • Application • Signature • Limits • Reference/Instrumentdefinition • References/Manifest • Clarius/License/$activate • Application/$execute • Api/Instruments/$start • Api/Entrycondition/$validate • SigTestDemo • Build_Catalog • Application/SourceNames • Application/Source • Api/Rules/$validate • Limits/RJ_Mean_Limits • Config/Instrument • RiseTime • Ui • Application/$execute/Status • Sequence • Histogram • SSCFreqDevPlot • TimeTrendPlot • EyePlot • EyeMaskPlot
Date Added	Select the date and time range to filter the logs.
Level	Displays the level of logs. • WARN • ERROR • INFO

Table continued…

Filter type	Description
Service	Select the required service(s) to filter the logs. • Measurement_Service • Instrument_Service • Reporting-Service • License_Service • Gateway-Service • EngineService • Pre-Processor-Service • Constraints_Service • CatalogService • CalibrationService • Infra_Service/Infra-Service • Monitor_Service/Monitor-Service • Plots_Service/Plot-Service • ui_service/ui-service • UserManagement_Service/UserManagement-Service • RequestTransformer • Waveform_Service/Waveform-Service • ExecutiveEngine • Blob_Service
Transaction Type	Select the required transaction type(s) to filter the logs. • TEST • RESOURCE
Clear All	Clear all the filters.
Apply	Applies the filter based on the log criteria selected.
Cancel	Click to cancel all the changes.

Measurements in DDR Tx configuration

The list of scenarios with its steps for DDR Tx technology are detailed in the following tables.

Table 10: Measurements in DDR5-DRAM-Tx configuration

Scenario name	Step name	Description
Initialize DUT	-	Initialization of the DDR5 DRAM Tx DUT.
DCA Training	DCA	DCA training for DDR5 DRAM Tx involves fine-tuning a Data Communication Analyzer to optimize the performance of the memory interface. This process aims to enhance signal integrity and transmission efficiency for improved DDR5 memory system functionality.
Tx DQS Jitter	tTx_DQS_Duty_UI	tTx_DQS_Duty_UI is defined as absolute difference between average extracted UI value with that of average of odd UI, which inmagnitude would equal absolute difference between average extracted UI value with that of average of all even UI.
	tTx_DQS_1UI_Dj_NoBUJ	tTx_DQS_1UI_Dj_NoBUJ measure Deterministic jitter (Dj) without Bounded Uncorrelated Jitter (BUJ) for 1UI DQS jitter train.
	tTx_DQS_2UI_Dj_NoBUJ	tTx_DQS_2UI_Dj_NoBUJ measure deterministic jitter (Dj) without Bounded Uncorrelated Jitter (BUJ) for 2UI DQS jitter train.
	tTx_DQS_3UI_Dj_NoBUJ	tTx_DQS_3UI_Dj_NoBUJ measure Deterministic jitter (Dj) without Bounded Uncorrelated Jitter (BUJ) for 3UI DQS jitter train.
	tTx_DQS_4UI_Dj_NoBUJ	tTx_DQS_4UI_Dj_NoBUJ measure Deterministic jitter (Dj) without Bounded Uncorrelated Jitter (BUJ) for 4UI DQS jitter train.
	tTx_DQS_5UI_Dj_NoBUJ	tTx_DQS_5UI_Dj_NoBUJ measure Deterministic jitter (Dj) without Bounded Uncorrelated Jitter (BUJ) for 5UI DQS jitter train.
	tTx_DQS_1UI_Rj_NoBUJ	tTx_DQS_1UI_Rj_NoBUJ measure Random jitter (Rj) without Bounded Uncorrelated Jitter (BUJ) for 1UI DQS jitter train.
	tTx_DQS_2UI_Rj_NoBUJ	tTx_DQS_2UI_Rj_NoBUJ measure Random jitter (Rj) without Bounded Uncorrelated Jitter (BUJ) for 2UI DQS jitter train.
	tTx_DQS_3UI_Rj_NoBUJ	tTx_DQS_3UI_Rj_NoBUJ measure Random jitter (Rj) without Bounded Uncorrelated Jitter (BUJ) for 3UI DQS jitter train.
	tTx_DQS_4UI_Rj_NoBUJ	tTx_DQS_4UI_Rj_NoBUJ measure Random jitter (Rj) without Bounded Uncorrelated Jitter (BUJ) for 4UI DQS jitter train.
	tTx_DQS_5UI_Rj_NoBUJ	tTx_DQS_5UI_Rj_NoBUJ measure Random jitter (Rj) without Bounded Uncorrelated Jitter (BUJ) for 5UI DQS jitter train.
	Number_of_UI	Number of UIs measures number of unit intervals present in the DQS signal.
Tx DQ Jitter	VrefDQ	VrefDQ is the voltage at which the cumulative eye of the pin DQx is the widest.
	tTx_DQ_Duty_UI	Duty cycle error (tTx_DQ_Duty_UI) is defined as absolute difference between average extracted UI value with that of average of odd UI, which in magnitude would equal absolute difference between average extracted UI value with that of average of all even UI.
	tTx_DQ_1UI_Dj_NoBUJ	tTx_DQ_1UI_Dj_NoBUJ measure Deterministic jitter (Dj) without Bounded Uncorrelated Jitter (BUJ) for 1UI DQ jitter train.

Table continued…

Scenario name	Step name	Description
	tTx_DQ_2UI_Dj_NoBUJ	tTx_DQ_2UI_Dj_NoBUJ measure Deterministic jitter (Dj) without Bounded Uncorrelated Jitter (BUJ) for 2UI DQ jitter train.
	tTx_DQ_3UI_Dj_NoBUJ	tTx_DQ_3UI_Dj_NoBUJ measure Deterministic jitter (Dj) without Bounded Uncorrelated Jitter (BUJ) for 3UI DQ jitter train.
	tTx_DQ_4UI_Dj_NoBUJ	tTx_DQ_4UI_Dj_NoBUJ measure Deterministic jitter (Dj) without Bounded Uncorrelated Jitter (BUJ) for 4UI DQ jitter train.
	tTx_DQ_5UI_Dj_NoBUJ	tTx_DQ_5UI_Dj_NoBUJ measure Deterministic jitter (Dj) without Bounded Uncorrelated Jitter (BUJ) for 5UI DQ jitter train.
	tTx_DQ_1UI_Rj_NoBUJ	tTx_DQ_1UI_Rj_NoBUJ measure Random jitter (Rj) without Bounded Uncorrelated Jitter (BUJ) for 1UI DQ jitter train.
	tTx_DQ_2UI_Rj_NoBUJ	tTx_DQ_2UI_Rj_NoBUJ measure Random jitter (Rj) without Bounded Uncorrelated Jitter (BUJ) for 2UI DQ jitter train.
	tTx_DQ_3UI_Rj_NoBUJ	tTx_DQ_3UI_Rj_NoBUJ measure Random jitter (Rj) without Bounded Uncorrelated Jitter (BUJ) for 3UI DQ jitter train.
	tTx_DQ_4UI_Rj_NoBUJ	tTx_DQ_4UI_Rj_NoBUJ measure Random jitter (Rj) without Bounded Uncorrelated Jitter (BUJ) for 4UI DQ jitter train.
	tTx_DQ_5UI_Rj_NoBUJ	tTx_DQ_5UI_Rj_NoBUJ measure Random jitter (Rj) without Bounded Uncorrelated Jitter (BUJ) for 5UI DQ jitter train.
	tTx_DQS2DQ	tTx_DQS2DQ measure the time difference between the rising edges of DQS and DQ signals.
	Number_of_UI	Number of UIs measures number of unit intervals present in the DQS signal.
Tx DQ Stressed Eye	VrefDQ	VrefDQ is the voltage at which the cumulative eye of the pin DQx is the widest.
	TxEH_DQ_SES_1UI	TxEH_DQ_SES_1UI measure the eye height of DQ signal with a skew of 1UI between DQ and DQS.
	TxEH_DQ_SES_2UI	TxEH_DQ_SES_2UI measure the eye height of DQ signal with a skew of 2UI between DQ and DQS.
	TxEH_DQ_SES_3UI	TxEH_DQ_SES_3UI measure the eye height of DQ signal with a skew of 3UI between DQ and DQS.
	TxEH_DQ_SES_4UI	TxEH_DQ_SES_4UI measure the eye height of DQ signal with a skew of 4UI between DQ and DQS.
	TxEH_DQ_SES_5UI	TxEH_DQ_SES_5UI measure the eye height of DQ signal with a skew of 5UI between DQ and DQS.
	TxEW_DQ_SES_1UI	TxEW_DQ_SES_1UI measure the eye width of DQ signal with a skew of 1UI between DQ and DQS.
	TxEW_DQ_SES_2UI	TxEW_DQ_SES_2UI measure the eye width of DQ signal with a skew of 2UI between DQ and DQS.
	TxEW_DQ_SES_3UI	TxEW_DQ_SES_3UI measure the eye width of DQ signal with a skew of 3UI between DQ and DQS.
	TxEW_DQ_SES_4UI	TxEW_DQ_SES_4UI measure the eye width of DQ signal with a skew of 4UI between DQ and DQS.

Table continued…

Scenario name	Step name	Description
	TxEW_DQ_SES_5UI	TxEW_DQ_SES_5UI measure the eye width of DQ signal with a skew of 5UI between DQ and DQS.
	Number_of_UI	Number of UIs measures number of unit intervals present in the accumulated DQS signal.

Table 11: Measurements in LPDDR4 configuration

Scenario name	Step name	Description
Clock Differential	Clock Eye Height	Clock Eye Height is defined as the minimum vertical eye opening of the Clock Differential signal at the UI center.
	Clock Eye Width	Clock Eye Width is defined as the minimum horizontal eye opening of the data signal at the mid reference level.
	tCH(abs)	tCH(abs) is the high pulse width of the differential clock signal. It is the amount of time the waveform remains above the mid reference voltage level.
	tCH(avg)	tCH(avg) is defined as the average high pulse width calculated across a sliding 200 cycle window of consecutive high pulses.
	tCK(abs)	tCK(abs) is the absolute clock period. It is the elapsed time between consecutive rising crossings of the mid reference CK voltage level.
	tCK(avg)	tCK(avg) is calculated as the average clock period across a sliding 200-cycle window.
	tCL(abs)	tCL(abs) is the low pulse width of the differential clock signal. It is the amount of time the waveform remains below the mid reference voltage level.
	tCL(avg)	tCL(avg) is defined as the average low pulse width calculated across a sliding 200 cycle window of consecutive low pulses.
	tJIT(cc)	tJIT(cc) is defined as the absolute difference in clock period between two consecutive clock cycles.
	tJIT(duty)	tJIT(duty) is the largest elapsed time between the tCH from tCH(avg) or tCL from tCL(avg) for a 200-cycle window. This value represents the maximum of the accumulated value across a 200-cycle moving window.
	tJIT(per)	tJIT(per) is the largest elapsed time between the tCK from tCK(avg) for a 200-cycle sliding window.
	VIHdiff(AC)	VIHdiff(AC) is defined as the AC high voltage level of the differential Clock signal.
	VILdiff(AC)	VILdiff(AC) is defined as the AC Low voltage level of the differential Clock signal.

Table continued…

Scenario name	Step name	Description
	Vindiff	Vindiff is defined as the Differential input Voltage of the Clock signal.
	Vindiff_High	Vindiff_High is defined as the Differential input Voltage High of the Clock signal.
	Vindiff_Low	Vindiff_Low is defined as the Differential input Voltage low of the Clock signal.
	InputSlew-Diff-Rise(CK)	InputSlew-Diff-Rise(CK) is defined as the rate of change of voltage measured on the rising edge of the clock signal from VILdiffmax to VIHdiffmin voltage level.
	InputSlew-Diff-Fall(CK)	InputSlew-Diff-Fall(CK) is defined as the rate of change of voltage measured on the falling edge of the clock signal from VIHdiffmin to VILdiffmax voltage level.
Clock Single Ended	Vix_CK_Ratio	Vix_CK_Ratio is defined as the Clock Differential input crosspoint voltage ratio.
	Overshoot_Amplitude_CK_t	Overshoot_Amplitude_CK_t measures the overshoot amplitude of the Clock Signal CK_t.
	Overshoot_Area_CK_t	Overshoot_Area_CK_t measures the overshoot area of the Clock Signal CK_t.
	Overshoot_Amplitude_CK_c	Overshoot_Amplitude_CK_c measures the overshoot amplitude of the Clock Signal CK_c.
	Overshoot_Area_CK_c	Overshoot_Area_CK_c measures the overshoot area of the Clock Signal CK_c.
	Undershoot_Amplitude_CK_t	Undershoot_Amplitude_CK_t measures the undershoot amplitude of the Clock Signal CK_t.
	Undershoot_Area_CK_t	Undershoot_Area_CK_t measures the undershoot area of the Clock Signal CK_t.
	Undershoot_Amplitude_CK_c	Undershoot_Amplitude_CK_c measures the undershoot amplitude of the Clock Signal CK_c.
	Undershoot_Area_CK_c	Undershoot_Area_CK_c measures the undershoot area of the Clock Signal CK_c.
	Vinse_CK_t	Vinse_CK_t is defined as the Single Ended input Voltage of the Clock Signal (CK_t).
	Vinse_High_CK_t	Vinse_High_CK_t is defined as the Single Ended input Voltage High of the Clock Signal (CK_t).
	Vinse_Low_CK_t	Vinse_Low_CK_t is defined as the Single Ended input Voltage low of the Clock Signal (CK_t).
	Vinse_CK_c	Vinse_CK_c is defined as the Single Ended input Voltage of the Complementary Clock Signal (CK_c).
	Vinse_High_CK_c	Vinse_High_CK_c is defined as the Single Ended input Voltage High of the Complementary Clock Signal (CK_c).
	Vinse_Low_CK_c	Vinse_Low_CK_c is defined as the Single Ended input Voltage low of the Complementary Clock Signal (CK_c).
Write Burst Differential	Data Eye Height	Data Eye Height is defined as the minimum vertical eye opening of the data signal at the UI center.

Table continued…

Scenario name	Step name	Description
	Data Eye Width	Data Eye Width is defined as the minimum horizontal eye opening of the data signal at the mid reference level.
	Rx Mask	Rx Mask is defined as the area that must not be encroached by the input signal in order for the DRAM input receiver to successfully capture the valid write input signal.
	Auto Fit Rx Mask	Auto Fit Rx Mask tries to adjust the mask automatically in the horizontal direction,so that mask hits are minimized.
	Vcent_DQ	Vcent_DQ is the voltage at which the cumulative eye of the pin DQx is widest.
	VihlAc	VihlAc is defined as the input data pulse peak to peak amplitude. This is measured with respect to Vcent_DQ value. **Note:** DQ only input pulse amplitude into the receiver must meet or exceed VIHL_AC(min) at any point over the total UI. Also, VIHLAC(min) does not have to be met when no transitions are occurring.
	TdiPW_High	TdIPW-High / tDIPW-High is defined as the high pulse width of the data signal. This is the amount of time the waveform remains above the Vcent_DQ or Vref voltage level between any two successive edges.
	TdiPW_Low	TdIPW-Low / tDIPW-Low is defined as the low pulse width of the data signal. This is the amount of time the waveform remains below the Vcent_DQ or Vref voltage level between any two successive edges.
	SRIN_dIVW_Rise	SRIN_dIVW_Rise is defined as the rate of change of voltage measured on the rising edge of the input data signal from 0.5*VdIVW_Total below Vcent_DQ to 0.5*VdIVW_Total above Vcent_DQ.
	SRIN_dIVW_Fall	SRIN_dIVW_Fall is defined as the rate of change of voltage measured on the falling edge of the input data signal from 0.5*VdIVW_Total above Vcent_DQ to 0.5*VdIVW_Total below Vcent_DQ.
	tDQS2DQ	tDQS2DQ is defined as the time skew between the driving edge of the strobe to the center of the first data eye at Vcent_DQ level.
	tDQSH	tDQSH is defined as the high pulse width on the differential input strobe signal. This is the amount of time the waveform remains above the mid reference voltage level.
	tDQSL	tDQSL is defined as the low pulse width on the differential input strobe signal. This is the amount of time the waveform remains below the mid reference voltage level.
	tDSH_Diff	tDSH-Diff is defined as the elapsed hold time from the differential strobe falling edge to the differential clock rising edge.

Table continued…

Scenario name	Step name	Description
	tDSS_Diff	tDSS-Diff is defined as the elapsed setup time from the differential strobe falling edge to the differential clock rising edge.
	tDQSS	tDQSS measures the time taken from a WRITE event in DDR bus to the first strobe latching transition.
	tWPRE	tWPRE is defined as the width of Write burst preamble. It is measured from the exit of tristate to the first driving edge of the differential strobe.
	tWPST	tWPST is defined as the width of Write burst postamble. It is measured from the last falling edge crossing mid reference level to the start of an undriven state.
	VIHDiff_DQS	VIHDIFF_DQS is defined as the Differential Input High of the strobe signal (DQS).
	VILDiff_DQS	VILDIFF_DQS is defined as the Differential Input Low of the strobe signal (DQS).
	Vindiff_DQS	VINDIFF_DQS is defined as the Differential input Voltage of the strobe signal (DQS).
	Vindiff_High_DQS	Vindiff_High_DQS is defined as the Differential input Voltage High of the strobe signal (DQS).
	Vindiff_Low_DQS	Vindiff_Low_DQS is defined as the Differential input Voltage Low of the strobe signal (DQS).
	SRIdiff_Rise	SRIdiff_Rise is defined as the rate of change of voltage measured on the rising edge of the strobe signal (DQS) from VILdiff_DQS to VIHdiff_DQS voltage level.
	SRIdiff_Fall	SRIdiff_Fall is defined as the rate of change of voltage measured on the falling edge of the strobe signal (DQS) from VIHdiff_DQS to VILdiff_DQS voltage level.
Write Burst Differential - tDQ2DQ	tDQ2DQ	tDQ2DQ is defined as the time offset between two DQ signals viz., DQx and DQy.
Write Burst Single Ended	Vix_DQS_Ratio	Vix_DQS_Ratio is defined as the Strobe (DQS) Differential input crosspoint voltage ratio.
	Vinse_DQS_t	Vinse_DQS_t is defined as the Peak to Peak voltage measured for single ended strobe signal (DQS_t) across VrefDQ (set from the VcentDQ value).
	Vinse_High_DQS_t	Vinse_High_DQS_t is defined as the voltage measured for single ended strobe signal (DQS_t) between VrefDQ (set from VcentDQ value) to signal maxima.
	Vinse_Low_DQS_t	Vinse_Low_DQS_t is defined as the voltage measured for single ended strobe signal (DQS_t) between VrefDQ (set from VcentDQ value) to signal maxima.

Table continued…

Scenario name	Step name	Description
	Vinse_DQS_c	Vinse_DQS_c is defined as the Peak to Peak voltage measured for single ended complementary strobe signal (DQS_c) across VrefDQ (set from the VcentDQ value).
	Vinse_High_DQS_c	Vinse_High_DQS_c is defined as the voltage measured for single ended complementary strobe signal (DQS_C) between VrefDQ (set from VcentDQ value) and signal maxima.
	Vinse_Low_DQS_c	Vinse_Low_DQS_c is defined as the voltage measured for single ended complementary strobe signal (DQS_C) between VrefDQ (set from VcentDQ value) and signal minima.
	Overshoot_Amplitude_DQS_t	Overshoot_Amplitude_DQS_t is defined as the maximum peak amplitude above the Vdd / VDDQ reference level measured on the single ended strobe signal (DQS_t).
	Overshoot_Area_DQS_t	Overshoot_Area_DQS_t is defined as the total area of the single ended strobe signal (DQS_t) which crosses above specified reference level.
	Overshoot_Amplitude_DQS_c	Overshoot_Amplitude_DQS_c is defined as the maximum peak amplitude above the Vdd / VDDQ reference level measured on the single ended complementary strobe signal (DQS_c).
	Overshoot_Area_DQS_c	Overshoot_Area_DQS_c is defined as the total area of the single ended complementary strobe signal (DQS_c) which crosses above specified reference level.
	Overshoot_Amplitude_DQ	Overshoot_Amplitude_DQ is defined as the maximum peak amplitude above the Vdd / VDDQ reference level measured on the single ended data signal (DQ).
	Overshoot_Area_DQ	Overshoot_Area_DQ is defined as the total area of the single ended data signal (DQ) which crosses above specified reference level.
	Undershoot_Amplitude_DQS_t	Undershoot_Amplitude_DQS_t is defined as the total area of the single ended strobe signal (DQS_t) which crosses below specified reference level.
	Undershoot_Area_DQS_t	Undershoot_Area_DQS_t is defined as the total area of the single ended strobe signal (DQS_t) which crosses below specified reference level.
	Undershoot_Amplitude_DQS_c	Undershoot_Amplitude_DQS_c is defined as the maximum peak amplitude below the Vss reference level measured on the single ended complementary strobe signal (DQS_c).
	Undershoot_Area_DQS_c	Undershoot_Area_DQS_c is defined as the total area of the single ended complementary strobe signal (DQS_C) which crosses below specified reference level.
	Undershoot_Amplitude_DQ	Undershoot_Amplitude_DQ is defined as the maximum peak amplitude below the Vss reference level measured on the single ended data signal (DQ).
	Undershoot_Area_DQ	Undershoot_Area_DQ is defined as the total area of the single ended strobe signal (DQ) which crosses below specified reference level.
Read Burst Differential	Data Eye Height	Data Eye Height is defined as the minimum vertical eye opening of the data signal at the UI center.
	Data Eye Width	Data Eye Width is defined as the minimum horizontal eye opening of the data signal at the mid reference level.

Table continued…

Scenario name	Step name	Description
	tQW Total	tQW Total is defined as the valid window time for the output data over any one DQ pin.
	tQW Total DBI	tQW Total DBI is defined the same as TQW TOTAL bit for Data Bus Inversion (DBI) enabled signals.
	tDQSQ-Diff	tDQSQ-Diff describes the latest valid transition of the associated DQ pins that is tDQSQ-Diff is the skew between differential strobe and the associated DQ signals. The closest data edge to the strobe edge that falls within the range limits is used for the measurement.
	tDQSQ_DBI	tDQSQ_DBI is defined the same as TDQSQ_DIFF but for Data Bus Inversion (DBI) enabled signals.
	tQH	tQH is defined as the output data hold time from differential strobe mid reference level. This describes the earliest invalid transition of the associated DQ pins.
	tQH_DBI	tQH_DBI is defined the same as TQH but for Data Bus Inversion (DBI) enabled signals.
	tQSH	tQSH measures High pulse width of the differential output strobe signal. It is the amount of time the waveform remains above the mid reference voltage level.
	tQSH_DBI	tQSH_DBI is defined the same as TQSH but for Data Bus Inversion (DBI) enabled signals.
	tQSL	tQSL is defined as the differential output negative pulse width measured on DQS.
	tQSL_DBI	tQSL_DBI is defined the same as TQSL but for Data Bus Inversion (DBI) enabled signals.
	tRPRE	tRPRE is defined as the width of the Read burst preamble. This is measured from the exit of tristate to the first driving edge of the differential strobe.
	tRPST	tRPST is defined as the width of Read burst postamble.
	tDQSCK	tDQSCK is defined as the skew between the actual position of a rising output strobe edge relative to differential clock. The closest strobe edge to the clock edge that falls within the range limits is used for the measurement. (For both the signals, the edge locations are determined by the mid-reference voltage levels.)
	SRQDiff-Rise(DQS)	SRQDiff-Rise(DQS) is defined as the rate of change of voltage measured on the rising edge of the output differential strobe signal (DQS) from VOLdiff(AC) to VOHdiff(AC) voltage level.
	SRQDiff-Fall(DQS)	SRQDiff-Fall(DQS) is defined as the rate of change of voltage measured on the falling edge of the output differential strobe signal (DQS) from VOHdiff(AC) to VOLdiff(AC) voltage level.
	SRQse-Rise(DQ)	SRQse-Rise(DQ) is defined as the rate of change of voltage measured on the rising edge of the output data signal (DQ) from VOL(AC)to VOH(AC) voltage level.

Table continued…

Scenario name	Step name	Description
	SRQse-Fall(DQ)	SRQse-Fall(DQ) is defined as the rate of change of voltage measured on the falling edge of the output data signal (DQ) from VOH(AC) to VOL(AC) voltage level.
Address Command	VcentCA	VcentCA is defined as the voltage at which the cumulative eye of the pin CAx is widest.
	Rx Mask	Rx Mask is defined as the area that must not be encroached by the input signal in order for the DRAM input receiver to successfully capture the valid address/command input signal.
	Auto Fit Rx Mask	Auto Fit Rx Mask tries to adjust the mask automatically in the horizontal direction,so that mask hits are minimized.
	AC Overshoot	AC Overshoot is defined as the maximum peak amplitude above the Vdd / VDDQ reference level measured on the address/command signal.
	AC Undershoot	AC Undershoot is defined as the maximum peak amplitude below the Vss reference level measured on the the address/command signal.
	AC OvershootArea	AC OvershootArea is defined as the total area of the address/command signal which crosses above specified reference level.
	AC UndershootArea	AC UndershootArea is defined as the total area of the address/command signal (DQ) which crosses below specified reference level.
	VihlAc	VihlAc defines the address/command signal pulse peak to peak amplitude. This is measured with respect to Vcent_CA value.
	tCIPW High	tCIPW High is defined as the high pulse width of the address/command signal. This is the amount of time the waveform remains above the Vcent_CA voltage level between any two successive edges.
	tCIPW Low	tCIPW Low is defined as the low pulse width of the address/command signal. This is the amount of time the waveform remains below the Vcent_CA voltage level between any two successive edges.
	SrinCivwRise	SrinCivwRise is defined as the rate of change of voltage on the rising edge of the address/command signal. Measured 0.5*VcIVW_Total below Vcent_CA to the last transition through 0.5*VcIVW_Total above Vcent_CA.
	SrinCivwFall	SrinCivwFall is defined as the rate of change of voltage on the falling edge of the address/command signal. Measured from 0.5*VcIVW_Total above Vcent_CA to the last transition through 0.5*VcIVW_Total below Vcent_CA.

User profile

The **User Profile** displays the information about your user account.

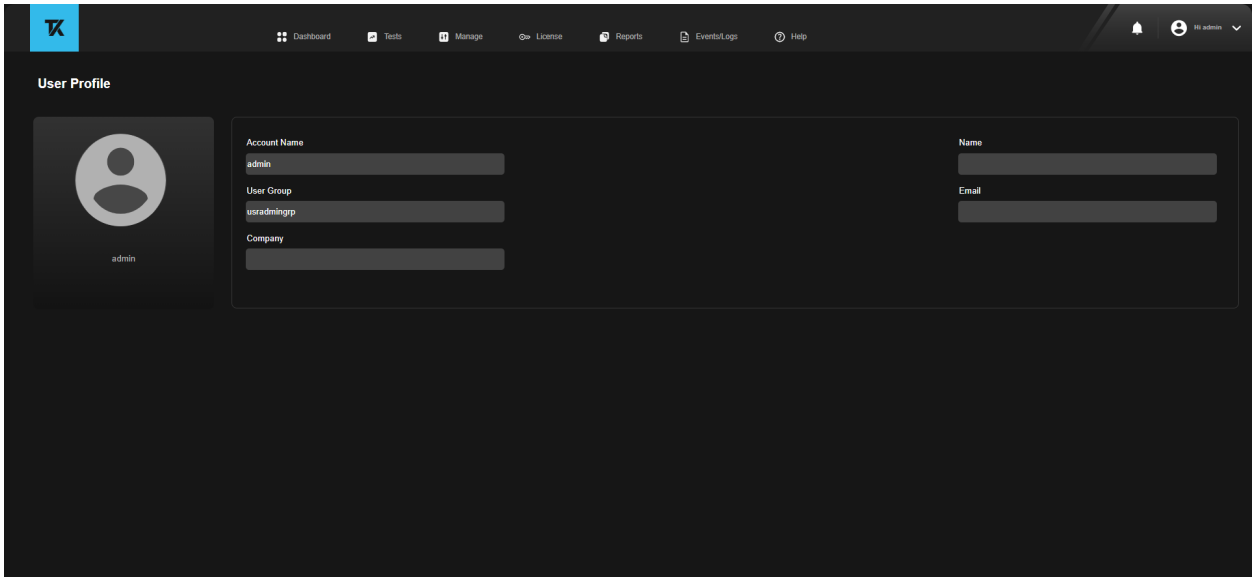


Figure 104: User profile

Manage accounts (admin only)

The **Manage Accounts** allows you to create a user account, update the existing user details, and delete an user account. Click **Manage Accounts** to access the **Manage Users** page.

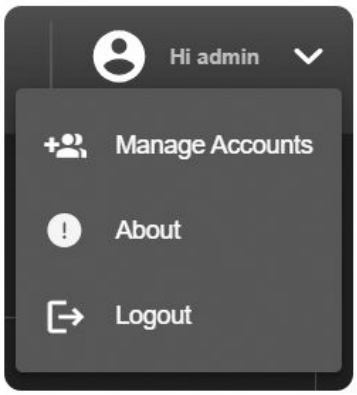


Figure 105: Manage accounts

My profile

My Profile displays information about user account.

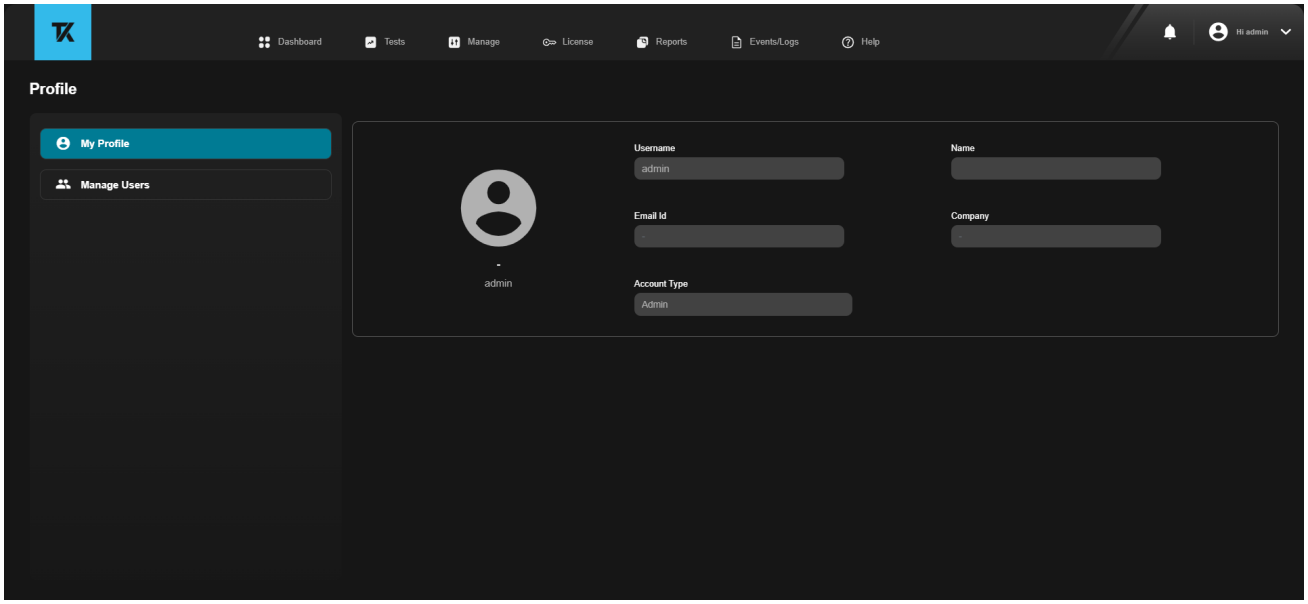


Figure 106: Profile details

Manage users

Manage Users allows you to add, modify, delete, lock, or unlock the user account.

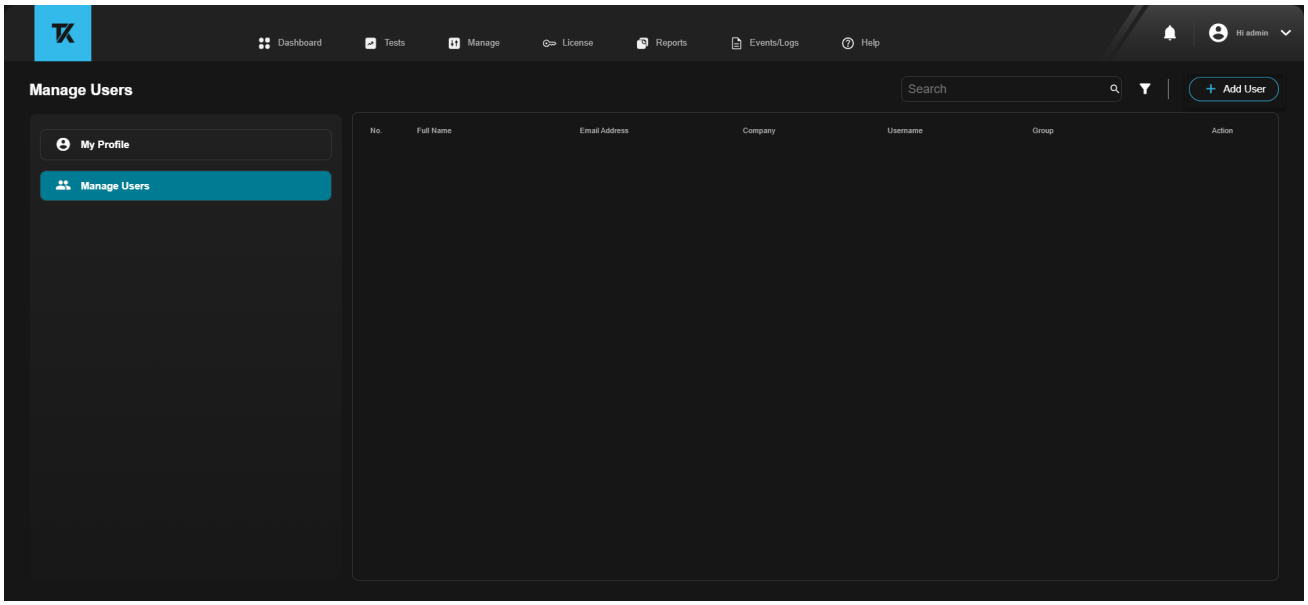


Figure 107: Manage users

Note: In Manage Users, if you reset password for admin (default user), then the password is reset only for Clarius UI login and not for Clarius Virtual machine login. It is recommended to use the *Clarius password reset utility* to reset the admin (default user account) password always.

Add user

The **Add User** allows you to create a new user account.

Follow the steps to add a user account.

- Select **Manage Accounts > Manage Users** and click **Add User**.

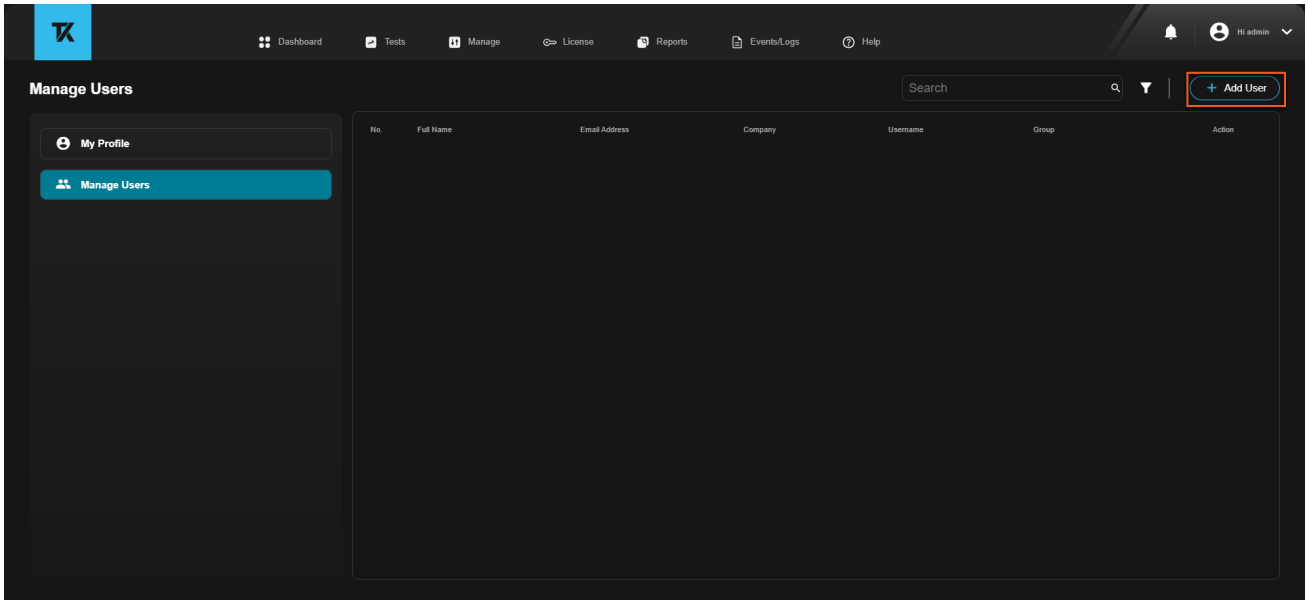


Figure 108: Add user

- Enter the details in the respective fields and click **Submit**.

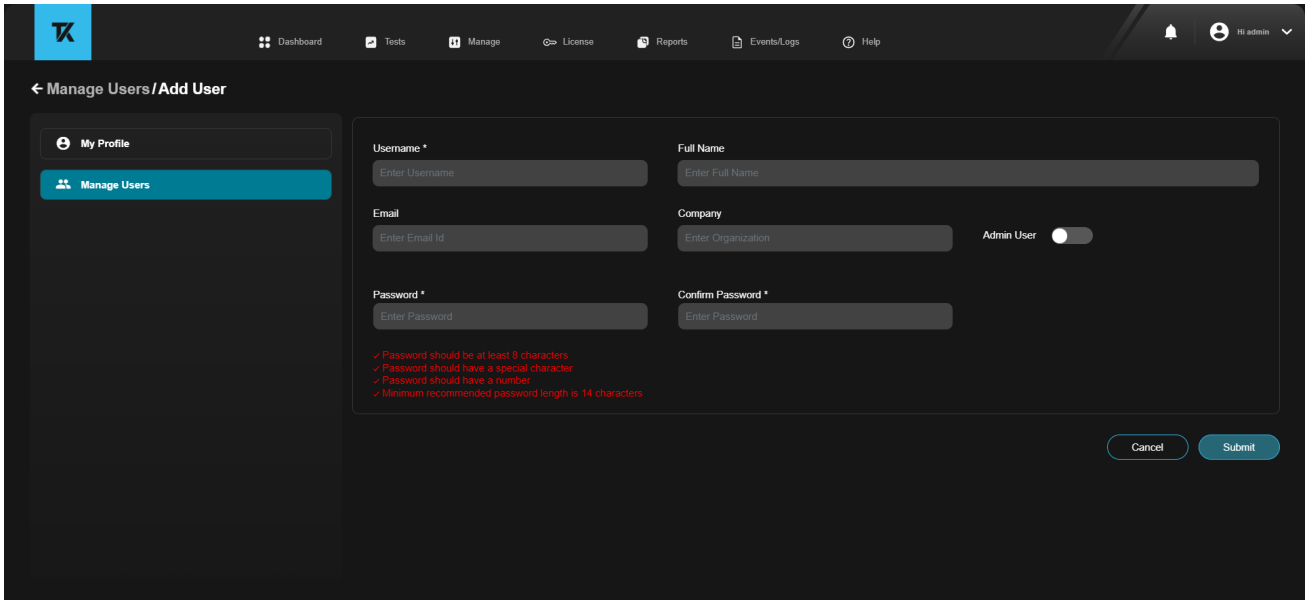


Figure 109: Add user details

Element	Description
Username	Enter the username to login the UI.

Table continued…

Element	Description
Full Name	Enter the full name of the user.
Email	Enter the valid email id of the user.
Company	Enter the organization name of the user.
Admin User	Enable or disable to set the account as admin or non admin account.
Password	Set a password matching the criteria.
Confirm Password	Re-enter the password.
Submit	Click to save the configured details.
Cancel	Click to cancel. All the entered details will be discarded.

Reset admin (default user account) password

This section describes the steps to reset the password of an admin (default user account). A default user is the user account that is created during the installation.

To reset the password, follow the steps:

1. Run the command prompt in **Administrator** mode.
2. Execute the command **clarius resetpwd -p "new password"**.

Note:

- It is recommended to use the Clarius password reset utility to reset the admin (default user account) password always.
- Clarius password reset utility will reset the admin (default user account) password. It will also reset the login password of Clarius virtual machine which can be used for debugging purposes.
- You cannot use this command to reset the password of non-admin/admin user accounts created in Clarius GUI.

Admin Console and Monitoring

The Monitoring and admin console provides a holistic view of the performance of the **Host** (Clarius installed PC) and the Clarius **Platform** (Virtual machine running critical services). This service allows users to monitor CPU load, memory usage, disk and storage status, ensuring optimal performance and facilitates troubleshooting.

Double-click Clarius **Admin Console** from the desktop to open the monitoring service.

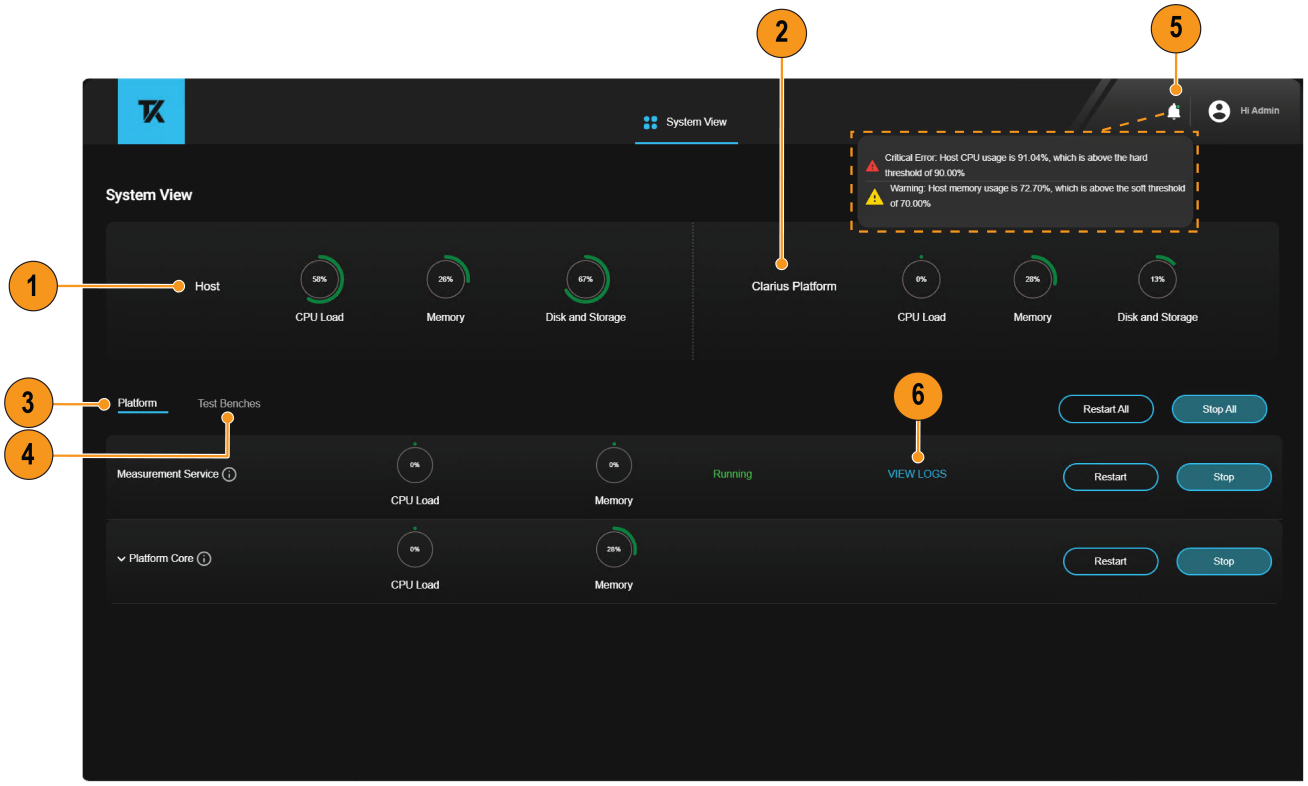


Figure 110: Clarius compliance monitoring service interface

Table 12: Components of monitoring service

Identifier	Element	Description
1	Host	The Host (Clarius installed PC) provides the hardware resources for the Clarius platform. You can view metrics related to CPU load, memory usage, disk and storage status for the host.
2	Clarius Platform	The Clarius platform is a virtual machine created on the host, running critical services essential for system operations. Metrics for the platform include CPU load, memory usage, disk and storage status.
3	Platform	You can view the real-time status of Clarius services, which include CPU load and memory usage. The available status are Running, Not Running, and Exited.
4	Test Benches	Users can view the real-time status of the test benches, which includes CPU load and memory usage. The available status are *Available*, *Occupied*, *Unavailable*, and *Not Reachable*.

Table continued…

Identifier	Element	Description
5	Notifications	Warnings and alerts are displayed in the notification icon and Windows system tray, providing real-time updates on the system status. **Warning Threshold:** An alert is triggered when the metric exceeds the set value (For example, 70%)[10]. **Critical Threshold:** A critical alert is triggered when the metric exceeds the set value (For example, 90%).
6	Logs	The logs screen displays detailed logs for each service. **Note:** If there is any issue with the service, save the log file and share it with the Tektronix support person for troubleshooting.

Test bench status scenarios

The **Test Benches** tab in the monitoring service allows you to view the status of the test bench.

The following table explains the scenarios for using the test bench to perform a test.

Test bench status	Description
Available	If both instrument service and instrument service agent (ClariusISAgent) are running, but no test is executed on the test bench.
	If instrument service is running and instrument service agent (ClariusISAgent) is down; Technical difficulties to Restart or Stop the service.
Occupied	If instrument service and instrument service agent (ClariusISAgent) are running, and a test is being executed on the test bench.
Unavailable	If instrument service is down and instrument service agent (ClariusISAgent) is running; Use Start to bring up the setup.
Not Reachable	If both instrument service and instrument service agent (ClariusISAgent) are not reachable.

Note:

- You can check the status of instrument service agent (ClariusISAgent) from the **Services** window. Click **Start** > **Run** and then type services.msc to launch the Services window.
- Clarius Monitoring and Admin console is only accessible from the target system where the Clarius automation framework is installed.
- File Store Create Buckets service operates as an internal start-up service and will cease its operations post-initialization. It is not essential for the ongoing test procedures, and its absence will not affect the test runs or their outcomes.

[10] If the alert is from hard disk, delete old test data from **Tests** > **List of Tests** to free up the hard disk space.

Tutorial

Steps to execute a test

This section describes the steps to run a test in the Clarius automation framework.

Prerequisite

1. Install Clarius automation framework
2. Install Clarius application in the Clarius automation framework
3. Activate the license for Clarius application
4. Run the services

Steps to execute a test

1. Double-click the **Clarius** icon from desktop to launch Clarius automation framework.

   Note: To remotely access Clarius use the host name or IP address of the Clarius automation framework installed device.
2. After successful login, you will be navigated to the home page. It displays the navigation panel and the widgets in the dashboard.
3. Create Test Bench. A test bench is an environment that is used to verify the correctness of a test setup. *Creating a Test bench*:
   a. Go to **Manage** > **Test Benches** and click **New Test Bench**.
   b. Enter test bench details in the respective fields.
   c. Add the required instruments into the test bench.
   d. Click **Save** and save the test bench
4. Create Test. *Creating a Test*:
   a. Go to **Tests** > **Add Test**.
   b. Enter the test details in the respective fields.
   c. Select the acquisition mode as Live or Recorded and select the Test bench or waveforms respectively.
   d. Select the technology and active application from the drop-down list and click **Add Sequence**. To import an already created sequence, click **Import Sequence**.
   e. Click and configure the **Sources and Signals** for the test setup.
   f. Click and configure the **Global Settings** for the test setup.
   g. Click and to view the **Connection Diagram**.
   h. Click to view the scenarios. Click from Local Settings to configure the settings for the respective scenario or the measurement
5. Select **Run** to run the measurements with the configured settings. You can also save the test and run later.
6. Navigate to the **Tests** tab to view the executed test *status and results*.
7. In **Tests** tab, click **View Results** to view the results of a particular test.
8. In the Reports page, click **Generate Report** to generate the report in PDF. You can view the PDF report and download.

References

File name extensions

The DDR Tx application uses the following file name extensions:

Table 13: File name extension

File name extension	Description
*.py	Python files.
*.xml	Test-specific configuration information (encrypted) files. Application log files
*.csv	Test result reports Plot data
*.mht	Test result reports (default) Test reports can also be saved in HTML format
*.pdf	Test result reports Application help document
*.xslt	Style sheet used to generate reports
*.png	Captured images
*.flt	Filter files

Error messages

The following error messages may be displayed in the Clarius automation framework and description section helps you understand the error messages and the possible solution.

Table 14: Clarius error messages

Error message	Description
Invalid login credentials, Username or Password cannot be blank	Please enter username and password.
Error, Unrecognized client. Please contact Tektronix support	Configuration error. Please contact Tektronix field engineer for support.
Error, Error connecting to the system. Please contact tek support.	Configuration/Connection error. Access Admin console and check if all services are running. Start the services which are not running and check again. If the issue stills exist, please contact Tektronix field engineer for support.
Error, New user creation failed; Username already exists	Username already exists. Please enter a unique username.
Error, Please select a test bench to configure the sources and signals	Select a test bench to configure the sources and signals.

Table continued…

Error message	Description
Failed, <*scenario name*> cannot be unchecked because of the dependent scenarios	Uncheck the dependent configurations and then try again.
Error, Please select the instruments and channels for all the defined signals and then click Apply	Validation Error - Select instruments and channels for all defined signals before you select Apply.
Invalid Grouping, 'Duplicate instrument channels configured in ' <*channels*>	Channels in a group are used to signals in a single acquisition hence multiple occurrence of a channel in a single group is not allowed.
Cannot add new signal, Please select the instruments and channels for all the defined signals before adding new signal.	Please select the instruments and channels for all the defined signals before adding new signal.
Unable to find internal application for technology	Multi-lane grouping is not supported in this technology or the technology is deleted.
Locking application failed, Execution id <*execution id*>	Indicates an error occurred while locking the application, license is already used, try after the completion of the test using license.
Duplicate test name, name <*test name*>	Test name already exists. Please enter a unique test name.
Test Bench not available, <*test bench id*>	Test bench is not available or deleted. Please select an available test bench.
Error, Limits ID already exist	Limits ID already exists. Please enter a unique Limits ID.
Error, Rule catalog already exists	Rule catalog name already exists. Please enter a unique Rule catalog name.
Your account is currently locked. Please login after <*remaining*> of minute(s) or contact the system administrator.	Account is locked due to 5 incorrect login attempts. Please wait for five minutes and then try again.
Account locks after <*remaining*> login attempts	Account is locked due to 5 incorrect login attempts. Please wait for five minutes and then try again.

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