

# D9350LDDC LPDDR5 Tx Compliance Test Software

Keysight's D9350LDDC LPDDR5 compliance test application software provides a fast and easy way to test, debug and characterize your LPDDR5/LPDDR5X designs. LPDDR5 technology offers high data rate of up to 6.4GT/s which enables higher bandwidth for data transfer with lower power. LPDDR5X technology is an extension to LPDDR5 which offers high data rate of 8.5GT/s. The D9350LDDC offers full test coverage to enable testing of transmitter physical layer of the LPDDR5/LPDDR5X DRAM, data buffer and register chips.

## Features

The D9350LDDC compliance test application offers several key features to simplify the validation of your designs.

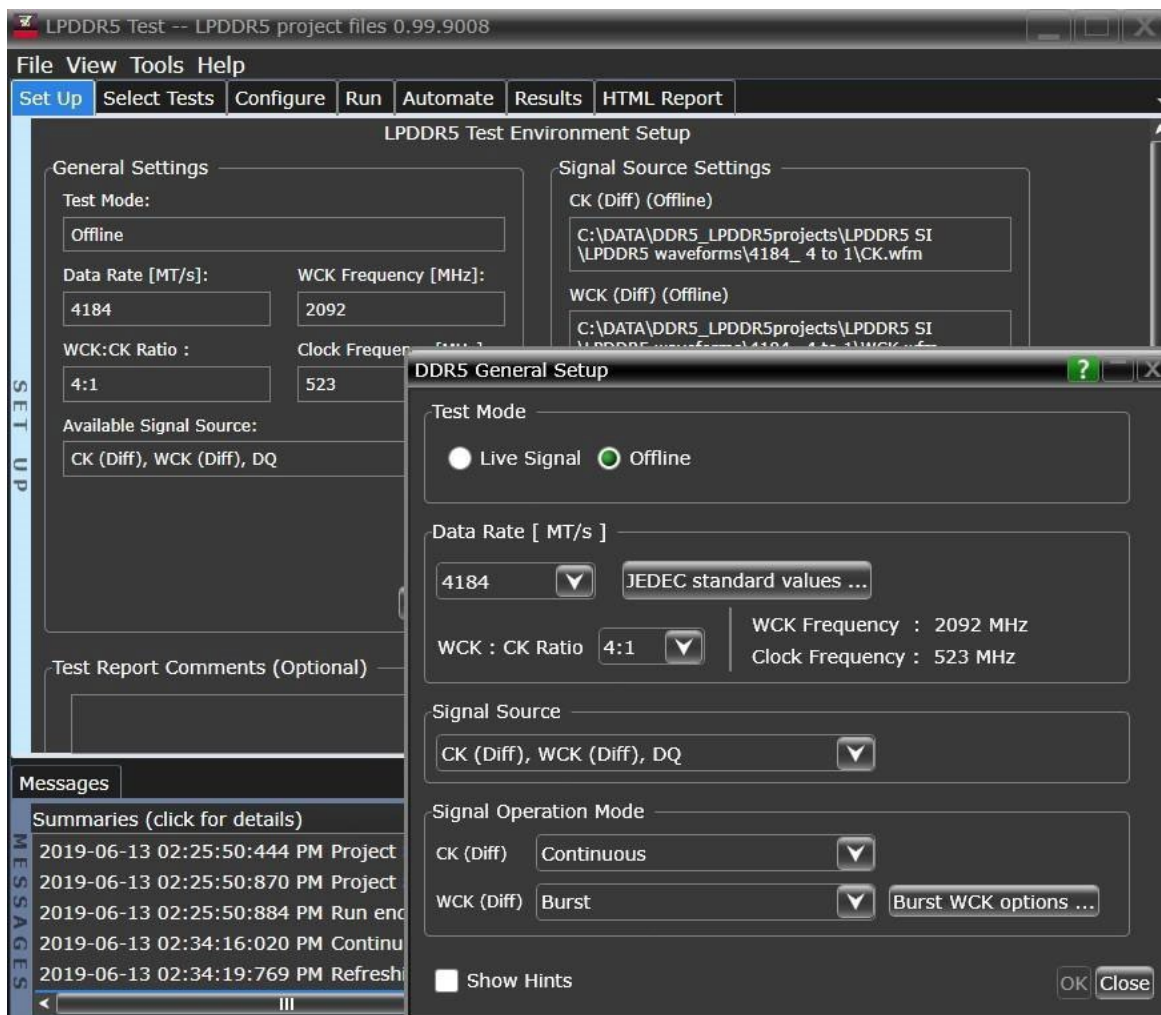
- Intuitive setup wizard for quick test setup, configuration, and test.
- Comprehensive test coverage of the LPDDR5/LPDDR5X electrical, timing, eye diagram and jitter tests.
- Offline testing capability with waveform files for completeness of simulation to validation workflow.
- Supports D9310AGGC Compliance Test Measurement Server

## Comprehensive Test Coverage

The D9350LDDC compliance test application allows you to use the oscilloscope to perform automated testing and margin analysis on your LPDDR5/LPDDR5X design. The application automatically configures the oscilloscope for each test and provides informative test result. It includes margin analysis indicating how close your device comes to passing or failing each test parameter. The D9350LDDC compliance test application automates the measurement as specified in the specification, which helps save test time and design cost.

# Easy Test Definition

The D9350LDDC compliance test application enhances the usability of Keysight Infiniium oscilloscopes for testing LPDDR5/LPDDR5X DRAM. The Keysight automated test framework guides you quickly through the steps required to define the setup, perform the tests and view the test results. You can select a category of tests or select an individual test. The user interface is designed to minimize unnecessary reconnections, which will help save test time and minimize potential operator error. You can save the tests and configurations as project files and recall them for quick testing and review previous results. You can also run the compliance test with saved waveform files from the oscilloscope on your PC, using Offline mode, freeing the oscilloscope for other data acquisition purposes. Offline mode supports waveform files in wfm or .h5 format.

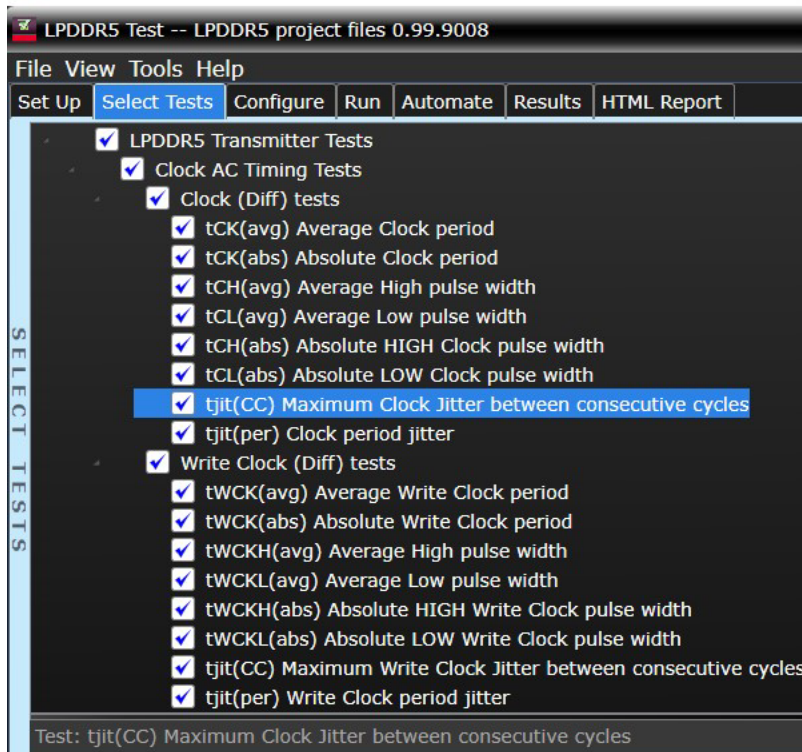


**Figure 1.** D9350LDDC application test setup screen. Select the speed grade of your device, Live Signal or Off-line, and signal sources.

# Configurability and Guided Connection

The D9350LDDC compliance test application provides flexibility in your test setup. The application lets you define controls for critical test parameters such as voltage threshold values, number of waveforms used for analysis and customizable violation settings. Once you have configured the tests, the connection page will display the connection diagram for the test you have selected.

You can also specify the number of test trials and only stop running selected tests when the stop condition is met. The application will save the worst-case test result to help you track down the anomalies in your signals.



**Figure 2.** The Select Tab lists all the tests available in your setup. You can easily setup the individual test or groups of tests.

## Comprehensive Result Analysis

In addition to providing you with measurement results, the D9350LDDC compliance test application reports how close your test results are to the specified test limit. You can specify the level at which warnings are to be issued. You are provided a full array of statistics for each measurement.

Pass	# Failed	# Trials	Test Name	Actual Value	Margin	Pass Limits
✓	0	1	Vindiff_CK	1.745 V	398.6 %	VALUE >= Vindiff_CK_Limit_Min V
✓	0	1	Vindiff_CK/2HighPulse	894 mV	410.9 %	VALUE >= Vindiff_CK_Limit_Min V
✓	0	1	Vindiff_CK/2LowPulse	829 mV	373.7 %	VALUE >= Vindiff_CK_Limit_Min V
✓	0	1	VIHdiff_CK	728 mV	402.1 %	VALUE >= VIHdiff_CK_Limit_Min V
✓	0	1	VILdiff_CK	-785 mV	441.4 %	VALUE <= VILdiff_CK_Limit_Max V
✓	0	1	SRldiffR_CK	4.814 V/ns	23.5 %	SR_Limit_Min V/ns <= VALUE <= SR_Limit_Max V/ns
✓	0	1	SRldiffF_CK	2.211 V/ns	1.8 %	SR_Limit_Min V/ns <= VALUE <= SR_Limit_Max V/ns
✓	0	1	tCK(avg) Average Clock period	3.639 ns	0.6 %	tCK_avg_Limit_Min s <= VALUE <= tCK_avg_Limit_Max s
ℹ		1	tCK(abs) Absolute Clock period	3.017 ns		Information Only
✓	0	1	tCH(abs) Absolute HIGH Clock pulse width	517.166290123 mtCK (avg)	37.7 %	tCHL_abs_Limit_Min tCK(avg) <= VALUE <= tCHL_abs_Limit_Max tCK(avg)
✓	0	1	tCH(avg) Average High pulse width	496.692500000 mtCK (avg)	45.9 %	tCHL_avg_Limit_Min tCK(avg) <= VALUE <= tCHL_avg_Limit_Max tCK(avg)
✗	1	1	tCL(abs) Absolute LOW Clock pulse width	338.559219496 mtCK (avg)	-65.3 %	tCHL_abs_Limit_Min tCK(avg) <= VALUE <= tCHL_abs_Limit_Max tCK(avg)

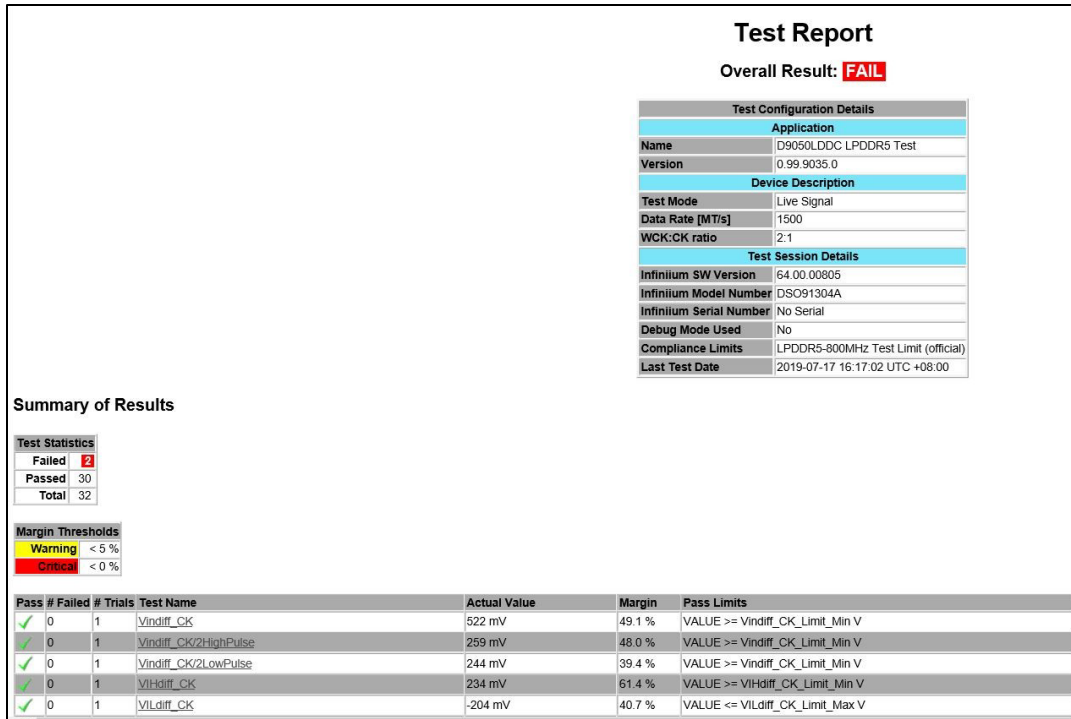
**Figure 3.** The D9350LDDC test application documents your test parameters, pass or fail status, test limits, measured values, and margin.

## Compliance Test Measurement Server

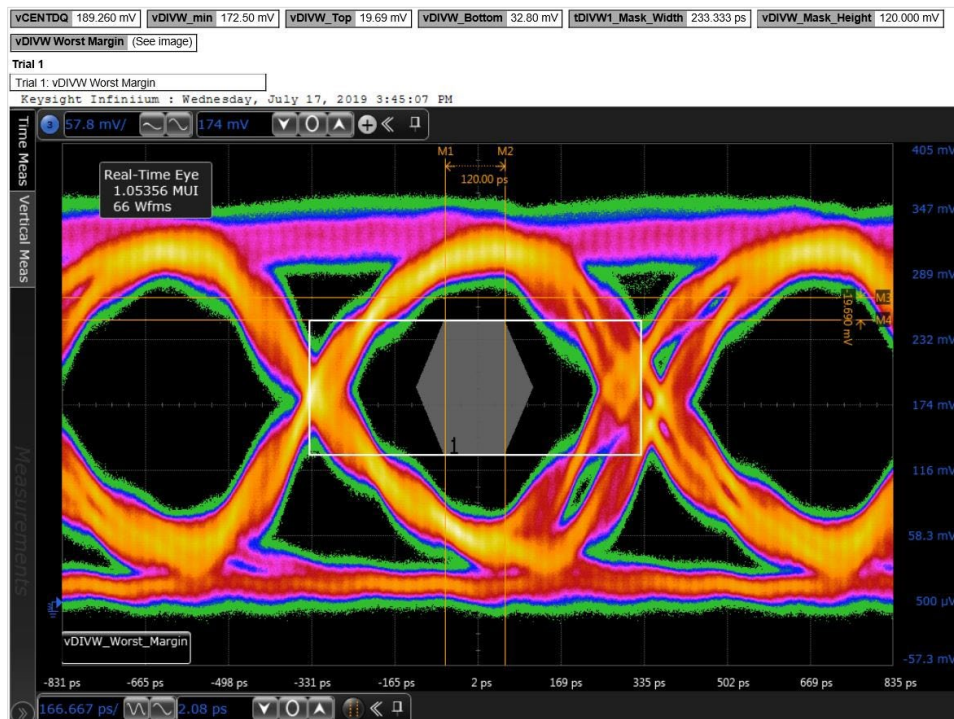
The D9350LDDC compliance test application software is compatible with the D9310AGGC Compliance Test Software Measurement Server, which provides the capability to offload measurements to one or multiple virtual machines or measurement servers, enabling concurrent data acquisition and computation of test results, drastically reducing the overall test time. Please contact us in case you would like more information about this powerful feature.

## Thorough Performance Reporting

The D9350LDDC compliance test application generates HTML reports that captures the performance, status and margins of your device under test. It also captures screenshots of critical measurements of your reference and documentation. This report is suitable for printing and sharing with your test vendors, customers, and suppliers.



**Figure 4.** The D9350LDDC test application generates a summary report for quick results viewing. The report includes details such as test limits, test description and test results.



**Figure 5.** Images of worst-case failures are included in the LPDDR5 summary report for appropriate tests.

## Recommended Oscilloscope

The D9350LDDC LPDDR5 software is compatible with various series of oscilloscopes. Please refer to the release notes for the recommended oscilloscope software version.

Memory Type	Data Rate	Minimum Bandwidth	Channels	Description
LPDDR5	Up to 6.4 GT/s	16 GHz	4 Channels	Infiniium XR8, UXR series oscilloscope
LPDDR5X	8.5 GT/s	25 GHz		

## Ordering Information

### Software

Model Number	Description	Note
D9350LDDC	LPDDR5 Tx Compliance Test Software	Required
D9320JITA	Jitter, vertical and phase noise analysis software	Required
D9320ASIA	Advanced Signal Integrity Software (EQ, InfiniiSim Advanced)	Optional

### LPDDR5 Compliance Test with D9310AGGC Compliance Test Measurement Server

Model Number	Description	Quantity
D9350LDDC	LPDDR5 Tx Compliance Test Software. To be installed and licensed on the Infiniium Manager PC. Recommended hardware: 8G RAM, 100G storage.	1
D9320JITA	Jitter, vertical and phase noise analysis software	1
D9320ASIA	Advanced Signal Integrity Software (EQ, InfiniiSim Advanced)	1
D9310AGGC	Measurement server license. To be installed on each measurement server: PC or virtual machine. The quantity depends on the desired speed improvement.	N
KS8108A	Resource Arbiter Server. To be installed and licensed on any host of the network.	1

## Example of LPDDR5 Hardware Configuration

Model Number	Description	Quantity
XR804KA-164	16 GHz Infiniium XR8 oscilloscope	1
MX0022A	16 GHz InfiniiMax Ultra probe amplifiers	4
MX0100A	Micro probe head	1 (includes 5 probe heads, 1 bullet adapter)
MX0103A	Bullet adapter	3

## Example of LPDDR5X Hardware Configuration

Model Number	Description	Quantity
XR804KA-254	25 GHz Infiniium XR8 oscilloscope	1
MX0025A	25 GHz InfiniiMax Ultra probe amplifiers	4
MX0100A	Micro probe head	1 (includes 5 probe heads, 1 bullet adapter)
MX0103A	Bullet adapter	3

## Keysightcare Software Support Subscription

Provides Peace of Mind Amid Evolving Technologies

- Ensure your software is always current with the latest enhancements and measurement standards.
- Gain additional insight into your problems with live access to our team of technical experts.
- Stay on schedule with fast turnaround times and priority escalations when you need support.

# Flexible Software Licensing and KeysightCare Software Support Subscriptions

Keysight offers a variety of flexible licensing options to fit your needs and budget. Choose your license term, license type, and KeysightCare software support subscription.

## License terms

**Perpetual** – Perpetual licenses can be used indefinitely.

**Subscription** – Subscription licenses can be used through the term of the license only (6, 12, 24, or 36 months).

## License types

**Node-locked** – License can be used on one specified instrument/computer.

**Transportable** – License can be used on one instrument/computer at a time but may be transferred to another using Keysight Software Manager (internet connection required).

**USB portable** – License can be used on one instrument/computer at a time but may be transferred to another using a certified USB dongle (available for additional purchase with Keysight part number E8900-D10).

**Floating (single site)** – Networked instruments/computers can access a license from a server one at a time. Multiple licenses can be purchased for concurrent usage.

## KeysightCare Software Support Subscriptions

Perpetual licenses are sold with a 12 (default), 24, 36, or 60-month software support subscription. Support subscriptions can be renewed for a fee after that.

Subscription licenses include a software support subscription through the term of the license.

## Selecting Your License

**Step 1.** Choose your software product (eg. S1234567A).

**Step 2.** Choose your license term: perpetual or subscription.

**Step 3.** Choose your license type: node-locked, transportable, USB portable, or floating.

**Step 4.** Depending on the license term, choose your support subscription duration.

Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at [www.keysight.com](http://www.keysight.com).



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