D9050LDDC LPDDR5 Tx Compliance Test Software

Keysight's D9050LDDC LPDDR5 compliance test application software provides a fast and easy way to test, debug and characterize your LPDDR5 designs. LPDDR5 technology offers high data rate of up to 6.4GT/s which enables higher bandwidth for data transfer with lower power. The D9050LDDC offers full test coverage to enable testing of transmitter physical layer of the LPDDR5 DRAM.

Features

The LPDDR5 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 electrical, timing, eye diagram and jitter tests.
- Offline testing capability with waveform files for completeness of simulation to validation workflow.
- Easy interface to export the test result to the KS6800A series Data Analytics repository for quick analysis with the web-based visualization tool.

Comprehensive Test Coverage

The LPDDR5 compliance test application allows you to use the oscilloscope to perform automated testing and margin analysis on your LPDDR5 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 LPDDR5 compliance test automates the measurement as specified in the specification, which helps save test time and design cost.

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Easy Test Definition

The test application enhances the usability of Keysight Infiniium oscilloscopes for testing LPDDR5 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.
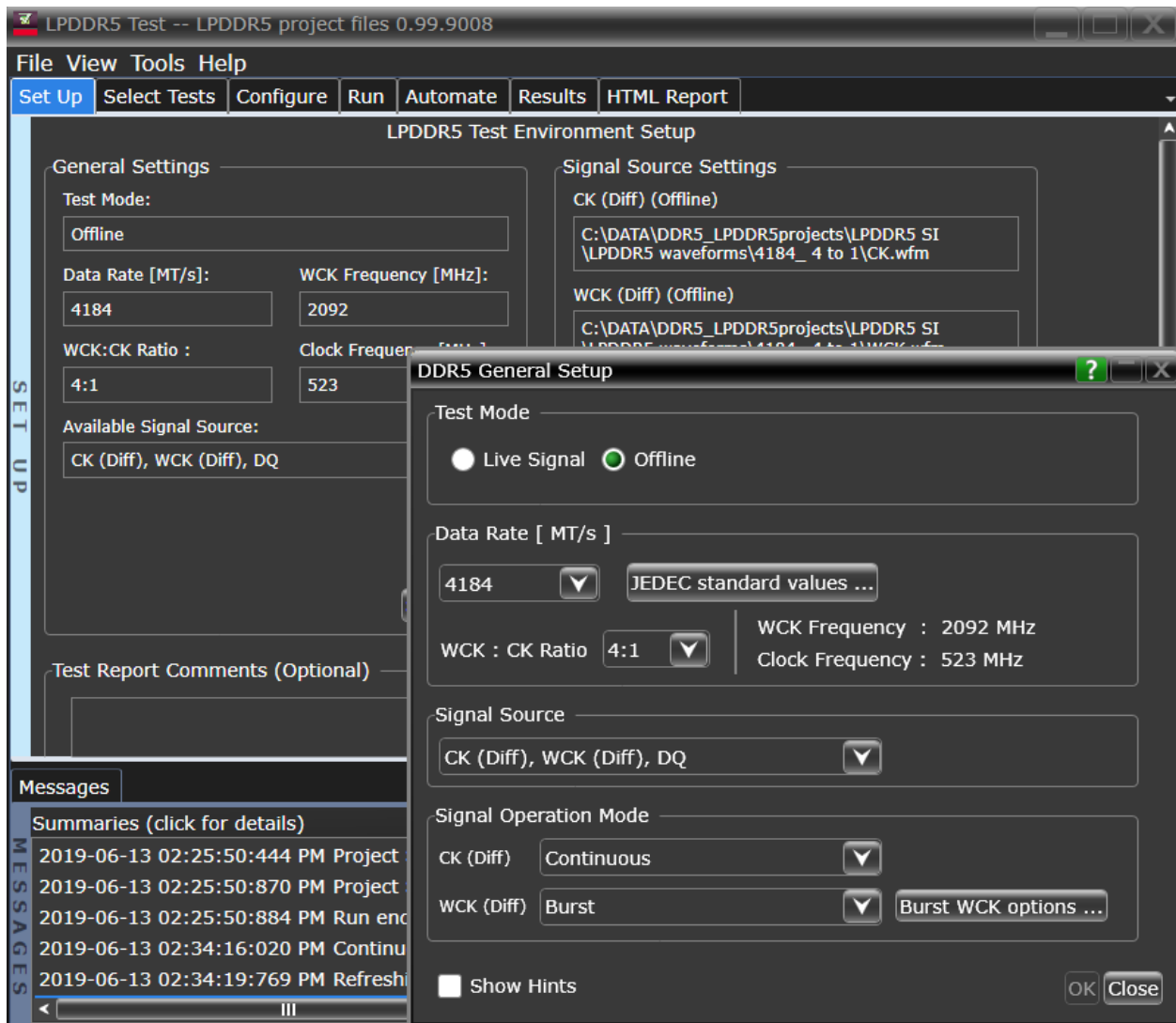

Figure 1: LPDDR5 application test setup screen. Select the speed grade of your device, Live Signal or Off-line, and signal sources.

Configurability and Guided Connection

The LPDDR5 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.
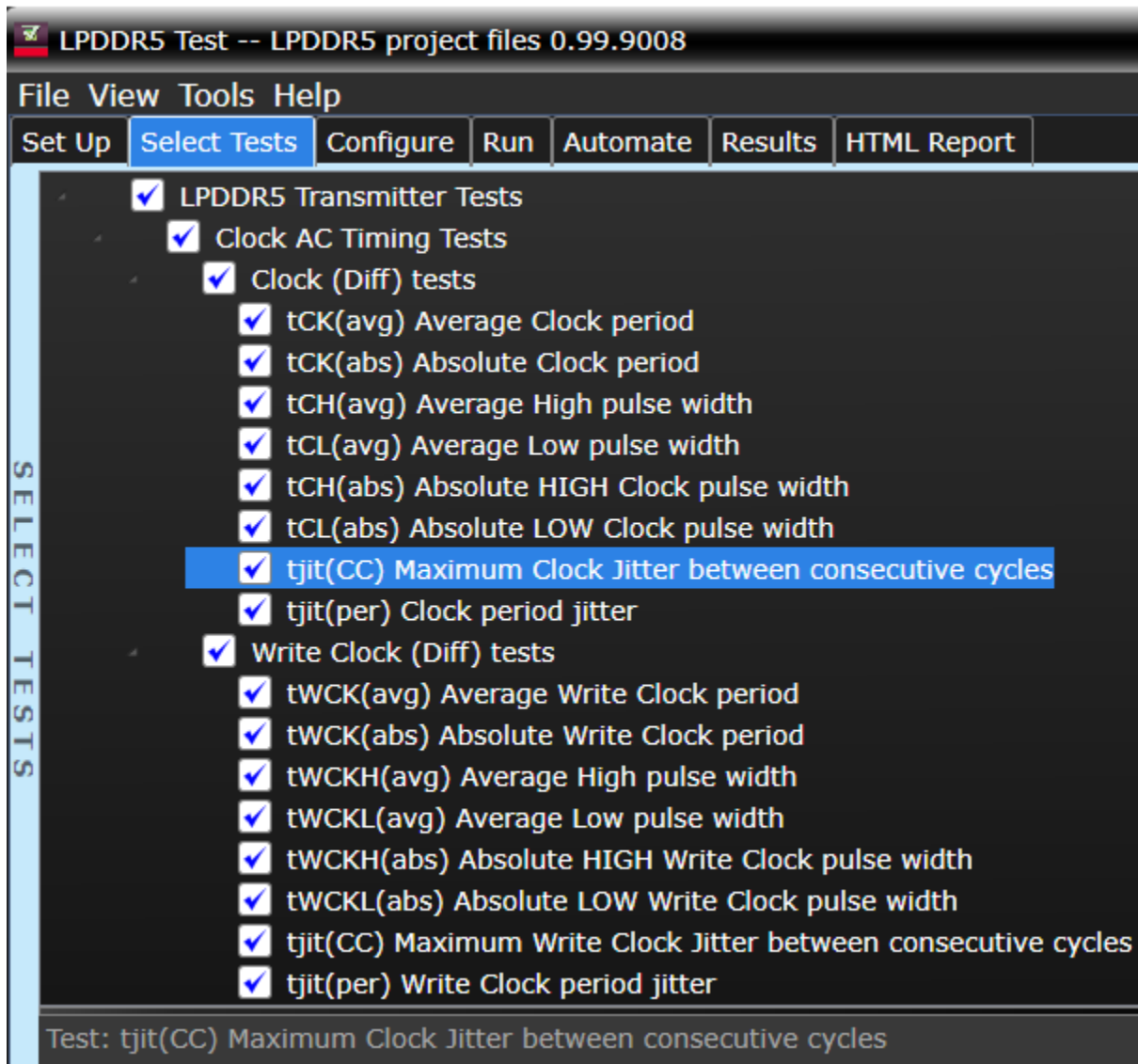

Figure 2: The Select Tab lists all the tests available in your setup. You can easily setup the individual test or groups of tests.

Comprehensive Result Analysis

In addition to providing you with measurement results, the LPDDR5 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	SRIdiffR_CK	4.814 V/ns	23.5 %	SR_Limit_Min V/ns <= VALUE <= SR_Limit_Max V/ns
✓	0	1	SRIdiffF_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
ⓘ		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 LPDDR5 test application documents your test parameters, pass or fail status, test limits, measured values and margin.

Data Analytics

The KS6810A data analytics web service software provides an interface that allows the user to export the test result directly to the data repository server via a URL. The user can retrieve the aggregated measurement to be viewed using the visualization tool included in the KS6810A software. The visualization tool provides graphical plots in histogram or line mode that describes the measurement in different test conditions or properties.

Thorough Performance Reporting

The LPDDR5 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.

Test Report

Overall Result: FAIL

Test Configuration Details	
Application	
Name	D9050LDDC LPDDR5 Test
Version	0.99.9035.0
Device Description	
Test Mode	Live Signal
Data Rate [MT/s]	1500
WCK:CK ratio	2:1
Test Session Details	
Infiniium SW Version	64.00.00805
Infiniium Model Number	DSO91304A
Infiniium Serial Number	No Serial
Debug Mode Used	No
Compliance Limits	LPDDR5-800MHz Test Limit (official)
Last Test Date	2019-07-17 16:17:02 UTC +08:00

Summary of Results

Test Statistics	
Failed	2
Passed	30
Total	32

Margin Thresholds	
Warning	< 5 %
Critical	< 0 %

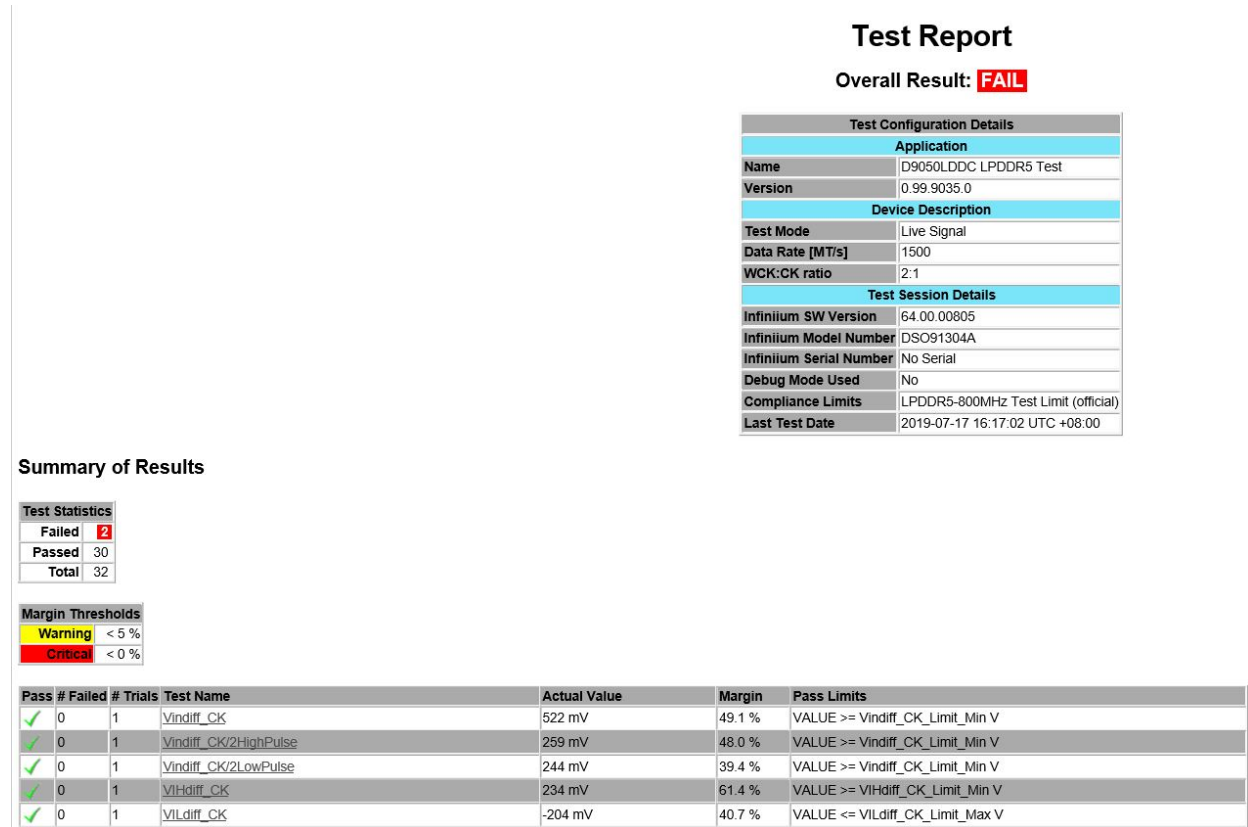| Pass	# Failed	# Trials	Test Name	Actual Value	Margin	Pass Limits
✓	0	1	Vindiff_CK	522 mV	49.1 %	VALUE >= Vindiff_CK_Limit_Min V
✓	0	1	Vindiff_CK/2HighPulse	259 mV	48.0 %	VALUE >= Vindiff_CK_Limit_Min V
✓	0	1	Vindiff_CK/2LowPulse	244 mV	39.4 %	VALUE >= Vindiff_CK_Limit_Min V
✓	0	1	VIHdiff_CK	234 mV	61.4 %	VALUE >= VIHdiff_CK_Limit_Min V
✓	0	1	VILdiff_CK	-204 mV	40.7 %	VALUE <= VILdiff_CK_Limit_Max V

Figure 4: The LPDDR5 test application generates a summary report for quick results viewing. The report includes details such as test limits, test description and test results.
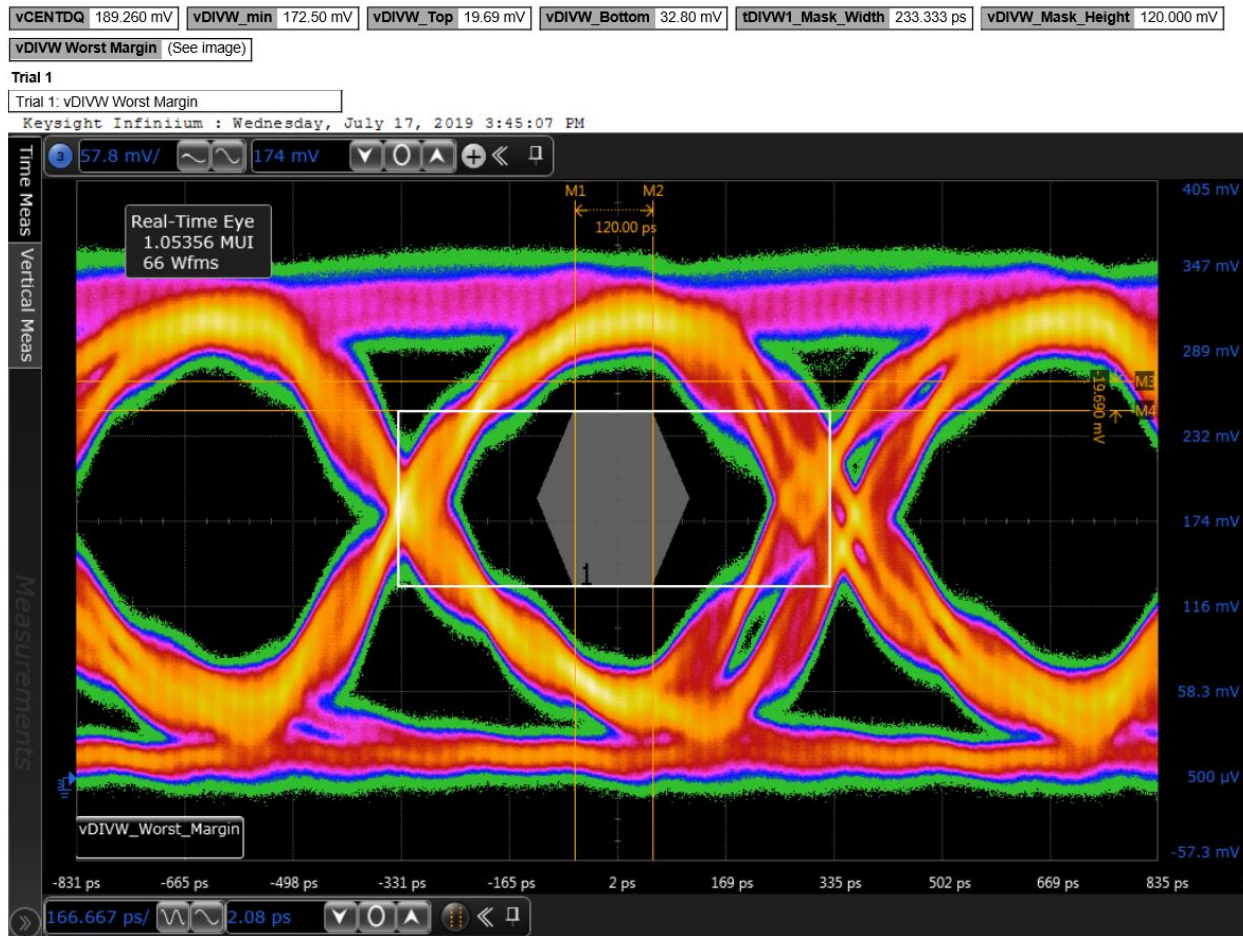
Figure 5: Images of worst-case failures are included in the LPDDR5 summary report for appropriate tests.

Recommended Oscilloscope

The D9050LDDC LPDDR5 software is compatible with the Infiniium series oscilloscopes with operating software revision of 6.40 or higher.

Data rate	Minimum bandwidth	Channels	Description
Up to 6.4 GT/s	16 GHz	3 Channels	Infiniium V-Series, Z series, UXR oscilloscopes

Ordering Information

Software

Model number	Description	Note
D9050LDDC	LPDDR5 Compliance Test Software	Required
D9020JITA	Jitter, Vertical and Phase Noise Analysis Software	Required
D9020ASIA	Advanced Signal Integrity Software (EQ, InfiniiSim Advanced)	Optional
KS6810A	Data Analytics software (1 license)	Optional
D9010LSPO	Infiniium Offline Analysis Software	Optional

Example of Hardware Configuration

Model number	Description	Quantity
UXR0164A	16 GHz Infiniium oscilloscope	1
1169B	12GHz InfiniiMax II probe amplifiers	3
N5442A	Precision BNC adapter	3
MX0100A	Micro probe head	1 (includes 5 probe heads, 1 bullet adapter)
MX0103A	Bullet adapter	2

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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

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Time-based – Time-based 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).

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>
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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.

Time-based licenses include a software support subscription through the term of the license.

Selecting your license:

Step 1. Choose your software product (eg. D9050LDDC).
Step 2. Choose your license term: perpetual or time-based.
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.

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