

# D9050USBC USB 80 Gbps TX Test Application Software

The Keysight Technologies, Inc. Transmitter test application for the USB4® Version 2.0 Specification provides a fast and easy way to test, debug and characterize your USB 80 Gbps products. The tests performed by the D9050USBC software are based on the USB4 Version 2.0 Compliance Test Specification (CTS) and SigTest from the USB-IF. The test application offers a user-friendly setup wizard and a comprehensive report.

## Features

- Setup wizard for quick setup, configuration and test selection
- Covers 25.6 GBaud PAM-3 rate
- Automated test setup and execution for ease of use
- Test results report generation
- Test framework that reports multi trial results with full array of statistics for each measurement with worst case measurement result.

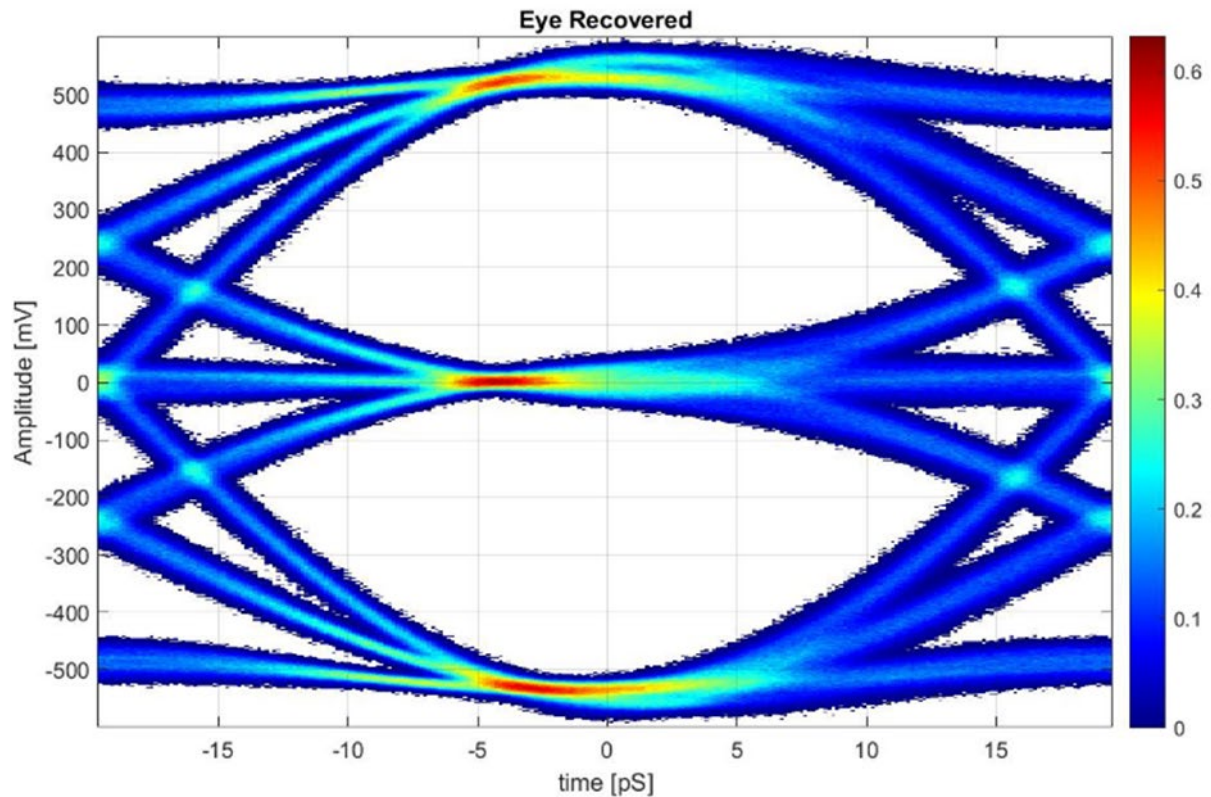


# PAM3 Specific Analysis







## Transmitter Equalization

Pass	# Failed	# Trials	Test Name (click to jump)	Actual Value	Margin	Pass Limits
✓	0	1	Transmitter Equalization (P1) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P2) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P3) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P4) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P5) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P6) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P16) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P17) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P18) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P19) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P20) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P21) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P22) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P23) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P31) (Lane 0)	Pass	100.000 %	Pass/Fail
✓	0	1	Transmitter Equalization (P32) (Lane 0)	Pass	100.000 %	Pass/Fail

## Eye Diagram



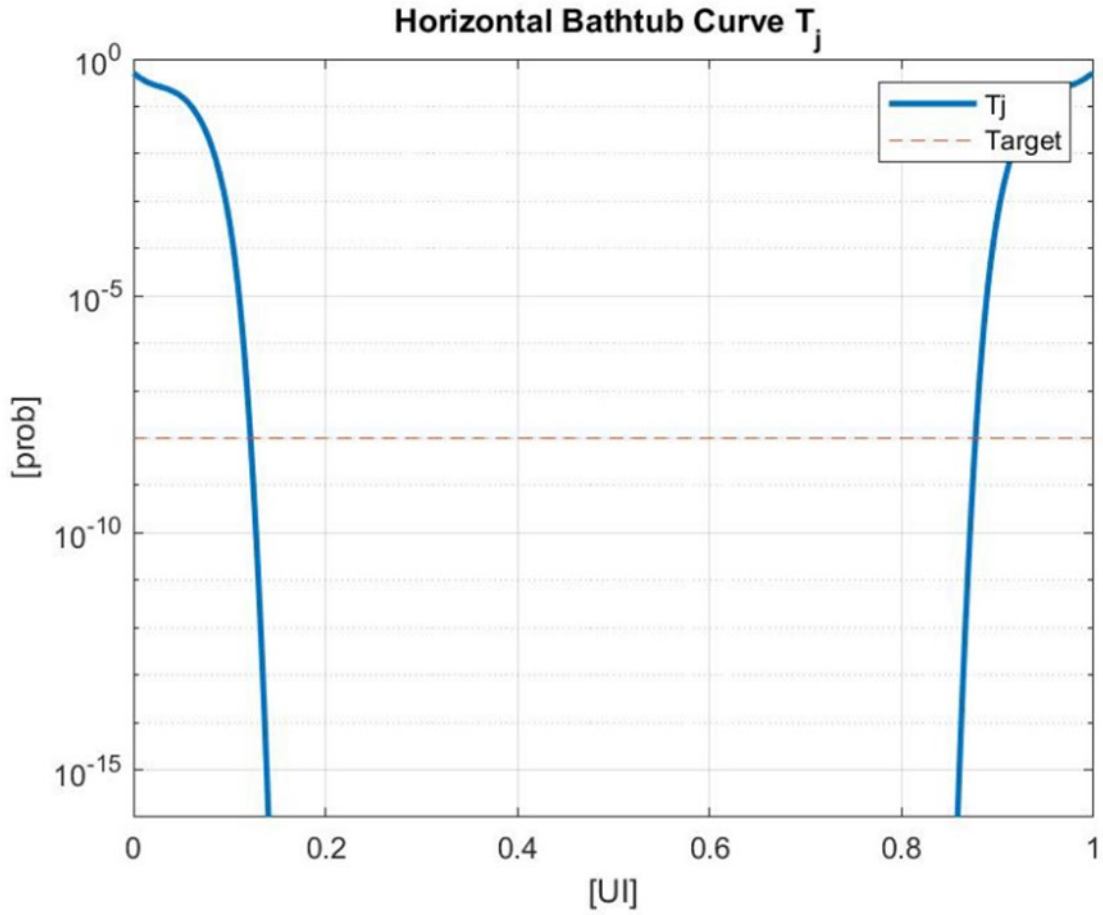
## UI, Level Mismatch, Steady State Voltage, ISI Margin, SNDR

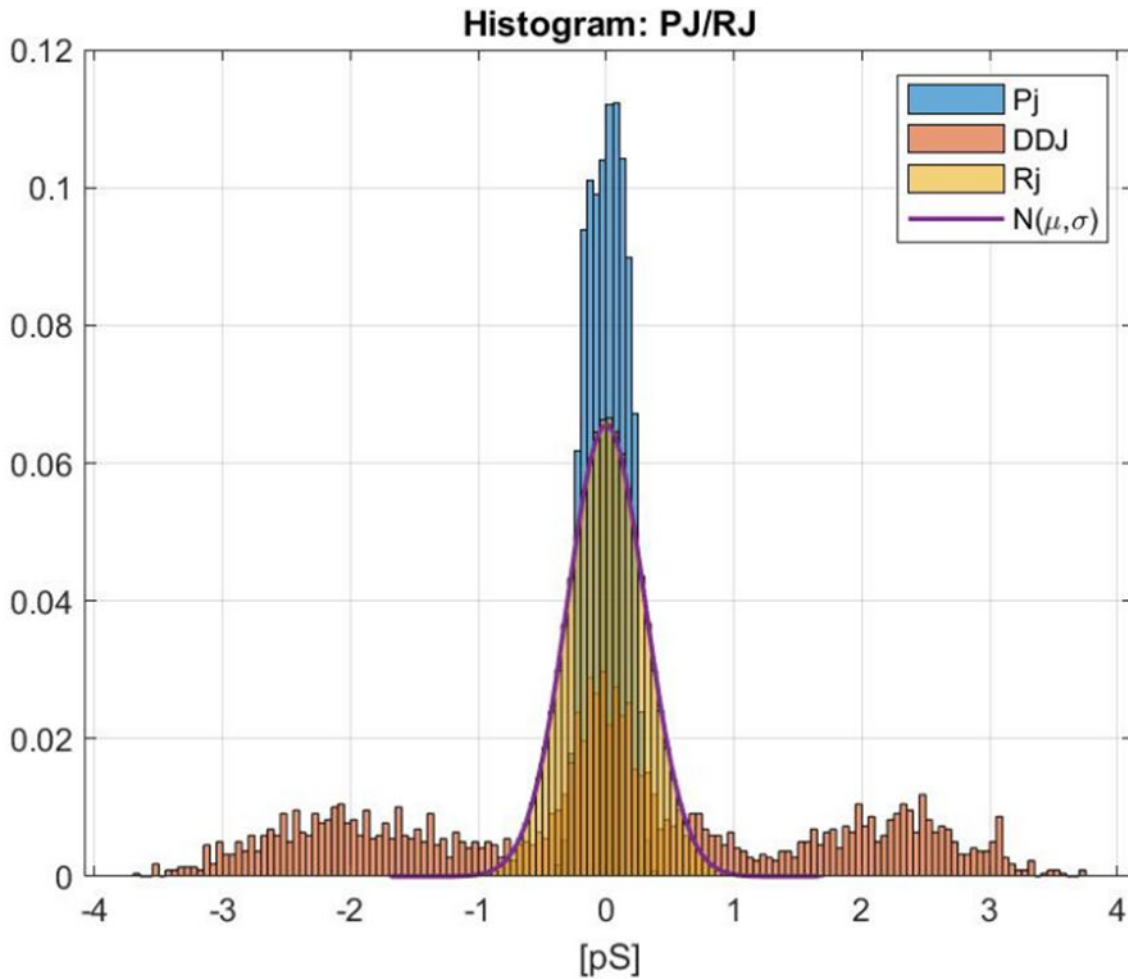
 <b>Transmitter Unit Interval (Max) (Lane 0)</b>				
To evaluate the Transmitter Unit Interval of the PAM-3 signal. Actual Value Measurement Name: Transmitter Unit Interval (Max) (Lane 0) Pass Limits: 39.0508 ps <= VALUE <= 39.0742 ps				
Actual Value	Margin	Test Pattern	Preset Number	SigTest Error Log
39.0624 ps	49.5726 %	PRT57	P4	No error
 <b>Transmitter Unit Interval (Min) (Lane 0)</b>				
To evaluate the Transmitter Unit Interval of the PAM-3 signal. Actual Value Measurement Name: Transmitter Unit Interval (Min) (Lane 0) Pass Limits: 39.0508 ps <= VALUE <= 39.0742 ps				
Actual Value	Margin	Test Pattern	Preset Number	SigTest Error Log
39.0623 ps	49.1453 %	PRT57	P4	No error
 <b>Transmitter Level Mismatch (Lane 0)</b>				
To evaluate the Transmitter Level Mismatch of the PAM-3 signal. Actual Value Measurement Name: Transmitter Level Mismatch (Lane 0) Pass Limits: VALUE >= 975.0 m				
Actual Value	Margin	Test Pattern	Preset Number	SigTest Error Log
995.3 m	2.08205 %	PRT57	P4	No error
 <b>Steady State Voltage (V_SWING) (Lane 0)</b>				
To evaluate the Steady State Voltage (V_SWING) of the PAM-3 signal. Actual Value Measurement Name: Steady State Voltage (V_SWING) (Lane 0) Pass Limits: 390.0000 mV <= VALUE <= 500.0000 mV				
Actual Value	Margin	Test Pattern	Preset Number	SigTest Error Log
456.9237 mV	39.1603 %	PRT57	P4	No error
 <b>Transmitter ISI Margin (Lane 0)</b>				
To evaluate the Transmitter ISI Margin of the PAM-3 signal. Actual Value Measurement Name: Transmitter ISI Margin (Lane 0) Pass Limits: VALUE >= 11.5000 dB				
Actual Value	Margin	Test Pattern	Preset Number	SigTest Error Log
19.8069 dB	72.2339 %	PRT57	P4	No error
 <b>Signal-to-Noise and Distortion Ratio (SNDR) (Lane 0)</b>				
To evaluate the Signal-to-Noise and Distortion (SNDR) of the PAM-3 signal. Actual Value Measurement Name: Signal-to-Noise and Distortion Ratio (SNDR) (Lane 0) Pass Limits: VALUE >= 32.5000 dB				
Actual Value	Margin	Test Pattern	Preset Number	SigTest Error Log
38.5860 dB	18.7262 %	PRT57	P4	No error

# Jitter

Actual Value	Margin	Test Pattern	Preset Number	SigTest Error Log	Bath Tub Plot	Pj Rj DDJ Histogram Plot
56.49 mUI	66.7786 %	PRT57	P4	No error	(See image)	(See image)

Bath Tub Plot





**✓ Unrelated Deterministic Jitter (UDJ) (Lane 0)** [Summary](#) [Prev](#)

To evaluate the unrelated deterministic jitter (UDJ) of the PAM-3 signal.  
 Actual Value Measurement Name: Unrelated Deterministic Jitter (UDJ) (Lane 0)  
 Pass Limits: VALUE <= 75.00 mUI

Actual Value	Margin	Test Pattern	Preset Number	SigTest Error Log
10.53 mUI	85.9600 %	PRTS7	P4	No error

**✓ Unrelated Deterministic Jitter Low Frequency(UDJ LF) (Lane 0)** [Summary](#) [Prev](#)

To evaluate the unrelated deterministic jitter low frequency (UDJ LF) of the PAM-3 signal.  
 Actual Value Measurement Name: Unrelated Deterministic Jitter Low Frequency(UDJ LF) (Lane 0)  
 Pass Limits: VALUE <= 30.00 mUI

Actual Value	Margin	Test Pattern	Preset Number	SigTest Error Log
6.45 mUI	78.5000 %	PRTS7	P4	No error

**✓ Even Odd Jitter (Lane 0)** [Summary](#) [Prev](#)

To evaluate the even odd jitter of the PAM-3 signal.  
 Actual Value Measurement Name: Even Odd Jitter (Lane 0)  
 Pass Limits: VALUE <= 20.00 mUI

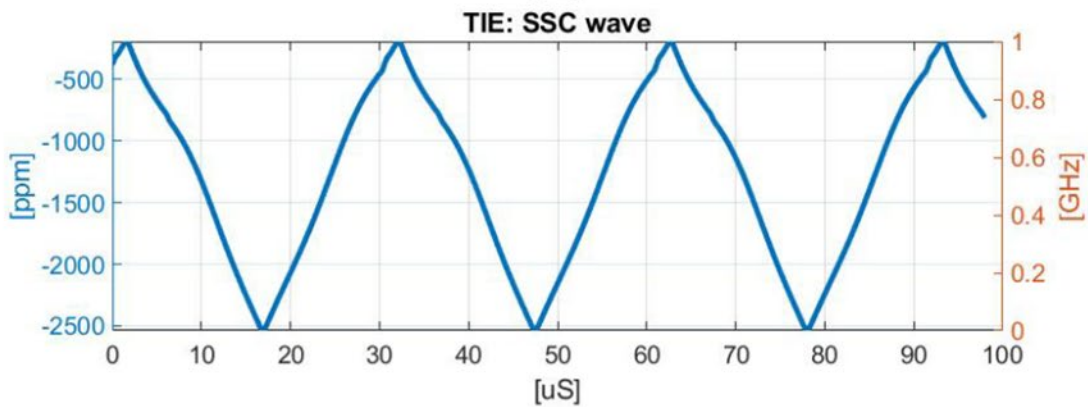
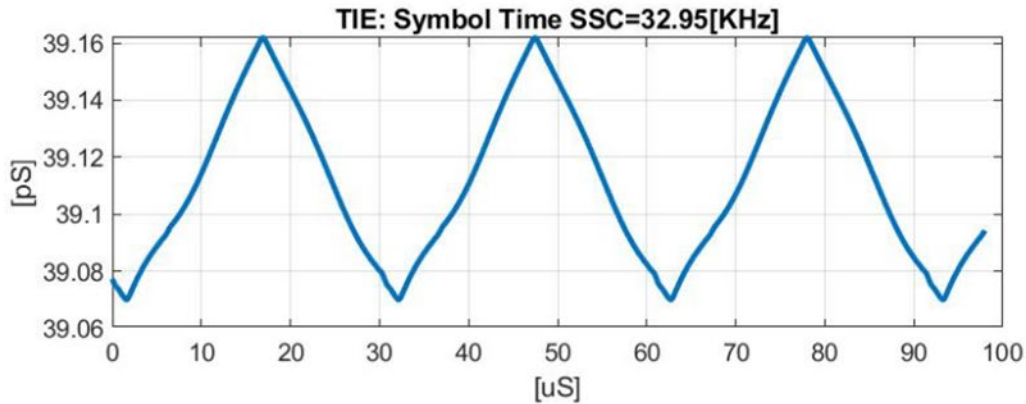
Actual Value	Margin	Test Pattern	Preset Number	SigTest Error Log
1.94 mUI	90.3000 %	PRTS7	P4	No error

**✓ SSC Down Spread Range (Max) (Lane 0)** [Summary](#) [Prev](#)

To evaluate the SSC Down Spread Range (Max) of the PAM-3 signal.  
 Actual Value Measurement Name: SSC Down Spread Range (Max) (Lane 0)  
 Pass Limits: 200.0 m% <= VALUE <= 300.0 m%

Actual Value	Margin	Test Pattern	Preset Number	SigTest Error Log	TIE Plot
251.7 m%	48.3000 %	PRTS7	P4	No error	(See image)

# SSC



Actual Value	Margin	Test Pattern	Preset Number	SigTest	Error Log
251.4 m%	48.6888 %	PRT57	P4	No error	
32.9558 kHz	1.47333 %	PRT57	P4	No error	
32.9539 kHz	1.53667 %	PRT57	P4	No error	
18.2474 ns	48.4846 %	PRT57	P4	No error	
195.9948 ppm/us	68.8812 %	PRT57	P4	No error	

## Recommended Oscilloscope

The D9050USBC Test Application Software is compatible with the Infiniium UXR series oscilloscope.

Data Rate	Minimum Bandwidth	Minimum Channels	Description
25.6 GBaud	25 GHz Higher bandwidth is required if performing Silicon characterization or Receiver calibration	2 channels minimum required for manual re-connection on 4 asymmetric lanes	UXR series oscilloscopes

## Recommended Hardware Requirement

**1-PC Mode** to connect and run USB4 SigTest analysis with an oscilloscope:

- **Processor:** Multicore CPU with at least 12 logical cores, Performance-core Frequency 4.80 GHz
- **Memory:** 64 GB RAM or higher
- **Operating System:** Windows 11 or later

Note: For 1-PC Mode setup, install the D9050USBC license on the PC. Refer to [Methods of Implementation \(MOI\)](#) for detailed setup instructions.

## VNA Configuration Requirements

Description	Test Equipment	Quantity
Network analyzer	Keysight Vector Network Analyzer: - 20 GHz is recommended as USB4 requires measurements up to 20 GHz. - Minimum 4-Port VNA to support USB4 SigTest tool requirement. • E5080B-4K0: 4-port test set, 9 kHz to 20 GHz or • P5024A-400 Streamline USB Series VNA or • M9804A-400 PXI Multiport VNA or • N522xB 4-Port PNA  Note 1: Ensure that VNA firmware revision is at least version A.15.60.xx or above (Windows 10)  Note 2: All 2-Port VNA and legacy E5071C will not be supported. Please refer to <a href="#">Return Loss Test MOI for manual setup</a> .	1 ea.
ECal Module	4-Port Electronic Calibration (ECal) Module - N4433D-010/0DC 4-Ports	1 ea.

## Ordering Information

Model Number	Description	Note
D9050USBC	USB4v2 TX Test Software	Required
D9020ASIA	Advanced Signal Integrity Software (Crosstalk)	Optional
D9020JITA	Jitter, Vertical and Phase Noise Analysis Software	Optional

# 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.

**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).

**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.

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

## Subscription Based Compliance Test Software Suites

A new ownership model of multiple Compliance Test Software Applications is now available.

With this new subscription-based model, the USB software suites bundle the Compliance Test Software Applications under a model number. Using a subscription-based ownership, you can enjoy all the test software features covered under USB across multiple generations and variants.

### Software Support and Continuity

Under the subscription plan, software support is made available with no extra support cost. Ensuring your software always stays up to date with the latest enhancements and measurement standards while having access to our team of technical experts when you need support.

On top of that all upgrades are made available to you as the USB standards progresses with no additional costs.

## Subscription Based Compliance Test Software Suites

Each suite comes with a 12, 24, or 36-month software suite subscription.

Suite License	Technology Generation and Variants Coverage (Current)
SW00USBH USB High Speed Validation License	USB 3.2 TX test (D9020USBC)
	USB4 TX test (D9040USBC)
	USB4v2 TX test (D9050USBC)
SW02USBH USB High Speed Full TX Test Suite	USB 3.2 TX test (D9020USBC)
	USB4 TX test (D9040USBC)
	USB4v2 TX test (D9050USBC)
	USB 4.0, 3.2, 2.0 Protocol Decode (D9010USBP)

## Selecting Your License:

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

**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.

### 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.

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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