5 Series B MSO

Mixed Signal Oscilloscope Datasheet



Key performance specifications

With a remarkably innovative pinch-swipe-zoom touchscreen user interface, the industry's largest high-definition display, and 4, 6, or 8 FlexChannel® inputs that let you measure one analog or eight digital signals per channel, the 5 Series MSO is ready for today's toughest challenges, and tomorrow's too. It sets a new standard for performance, analysis, and overall user experience

Input channels

- 4, 6, or 8 FlexChannel® inputs
- Each FlexChannel provides:
  - One analog signal that can be displayed as a waveform view, a spectral view, or both simultaneously
  - Eight digital logic inputs with TLP058 logic probe

Bandwidth (all analog channels)

- 350 MHz, 500 MHz, 1 GHz, 2 GHz (upgradable)

Sample rate (all analog / digital channels)

- Real-time: 6.25 GS/s
- Interpolated: 500 GS/s

Record length (all analog / digital channels)

- 62.5 Mpoints standard
- 125, 250, 500 Mpoints(optional and upgradable)

Waveform capture rate

- >500,000 waveforms/s

Vertical resolution

- 12-bit ADC
- Up to 16 bits in High Res mode

Standard trigger types

- Edge, Pulse Width, Runt, Timeout, Window, Logic, Setup & Hold, Rise/Fall Time, Parallel Bus, Sequence, Visual Trigger, Video (optional)
- Auxiliary Trigger ≤5 VRMS, 50Ω, 250 MHz (>200 mV_{pp}) (Edge Trigger only)

Standard analysis

- Cursors: Waveform, V Bars, H Bars, V&H Bars
- Measurements: 36
- Spectrum View: Frequency-domain analysis with independent controls for frequency and time domains
- FastFrame™: Segmented memory acquisition mode with maximum trigger rate >5,000,000 waveforms per second
- Plots: Time Trend, Histogram, Spectrum
- Math: Basic waveform arithmetic, FFT, and advanced equation editor
- Search: Search on any trigger criteria
- Jitter: TIE and Phase Noise

Optional analysis

- RF vs. Time traces, triggers, Spectrograms, and IQ capture
- Advanced Jitter and Eye Diagram Analysis
- Signal Integrity Modeling (SIM)
- User-defined filtering
- Advanced Spectrum View
- RF vs. Time traces, triggers, Spectrograms, and IQ capture
- Digital Power Management
- Power Distribution Network Analysis
- Time Domain Reflectometry (TDR)
- Mask/Limit Testing
- Inverters, Motors, and Drives
- LVDS Debug and Analysis
- PAM3 Analysis
- Advanced Power Measurements and Analysis
- Advanced Vector Signal Analysis (SignalVu-PC)

Optional protocol trigger, decode, and analysis

I2C, SPI, eSPI, I3C, RS-232/422/485/UART, SPMI, SMBus, CAN, CAN FD, CAN XL, LIN, FlexRay, SENT, PSI5, CXPI, Automotive Ethernet, MIPI C-PHY, MIPI D-PHY, USB 2.0, eUSB 2.0, USB 3.0, PCIe Gen1/Gen2, Ethernet, EtherCAT, Audio, MIL-STD-1553, ARINC 429, SpaceWire, 8B/10B, NRZ, Manchester, SVID, 1-Wire, MDIO, and NFC

Optional serial compliance test (optional and upgradeable)

- Ethernet, USB 2.0, Automotive Ethernet, Industrial Ethernet, Multi-gigabit Automotive Ethernet, MIPI D-PHY 1.2, MIPI D-PHY 2.1, MIPI C-PHY 2.0

Arbitrary/Function Generator (optional and upgradable)

- 100 MHz waveform generation
- Waveform Types: Arbitrary, Sine, Square, Pulse, Ramp, Triangle, DC Level, Gaussian, Lorentz, Exponential Rise/Fall, Sin(x)/x, Random Noise, Haversine, Cardiac

Digital voltmeter (free with product registration)

- 4-digit AC RMS, DC, and DC+AC RMS voltage measurements

Trigger frequency counter (free with product registration)

- 8-digit

Display

- 15.6 inch (396 mm) TFT color
- High Definition (1,920 x 1,080) resolution
- Capacitive (multi-touch) touchscreen

Connectivity

- USB Host (7 ports), USB 3.0 Device (1 port), LAN (10/100/1000 Base-T Ethernet; LXI Compliant), DisplayPort, DVI-D, VGA

e*Scope®

- Remotely view and control the oscilloscope over a network connection through a standard web browser

Standard probes

- One 10 MΩ passive voltage probe with less than 4 pF capacitive loading per channel

Warranty

- 1 year

Dimensions

- 12.2 in (309 mm) H x 17.9 in (454 mm) W x 8.0 in (204 mm) D
- Weight: < 25 lbs. (11.4 kg)

Never let a lack of channels slow down your verification and debug process again!

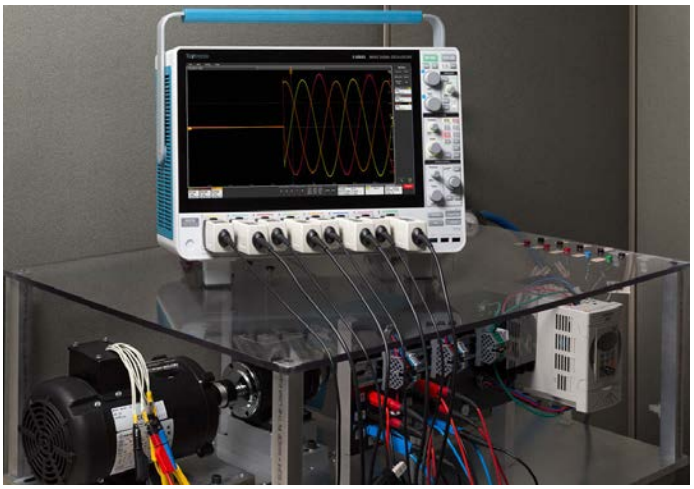
The 5 Series MSO offers better visibility into complex systems by offering four, six and eight channel models with a large 15.6-inch high-definition (1,920 x 1,080) display. Many applications, such as embedded systems, three-phase power electronics, automotive electronics, power supply design, and DC-to-DC power converters, require the observation of more than four analog signals to verify and characterize device performance, and to debug challenging system issues.

Most engineers can recall situations in which they were debugging a particularly difficult problem and wanted greater system visibility and context, but the scope they were using was limited to two or four analog channels. Using a second scope involves significant effort to align trigger points, difficulty in determining timing relationships across the two displays, and documentation challenges.

And while you might assume that a six and eight channel oscilloscope would cost 50% or 100% more than a four-channel scope, you'll be pleasantly surprised to find that six channel models are only ~25% more than four channel models and eight channel models are only ~67% more than four channel models. The additional analog channels can pay for themselves quickly by enabling you to keep current and future projects on schedule.



Voltage measurements on a switch-mode power supply showing the ripple voltage on one of the power rails.



Voltage measurements on a three-phase motor showing the three-phase input voltages after startup.

FlexChannel® technology enables maximum flexibility and broader system visibility

The 5 Series MSO redefines what a Mixed Signal Oscilloscope (MSO) should be. FlexChannel technology enables each channel input to be used as a single analog channel, eight digital logic inputs (with the TLP058 logic probe), or simultaneous analog and spectrum views with independent acquisition controls for each domain. Imagine the flexibility and configurability this provides.

With an eight FlexChannel model, you can configure the instrument to look at eight analog and zero digital signals. Or seven analog and eight digital. Or six analog and 16 digital, five analog and 24 digital and so on. You can change the configuration at any time by simply adding or removing TLP058 logic probes, so you always have the right number of digital channels.

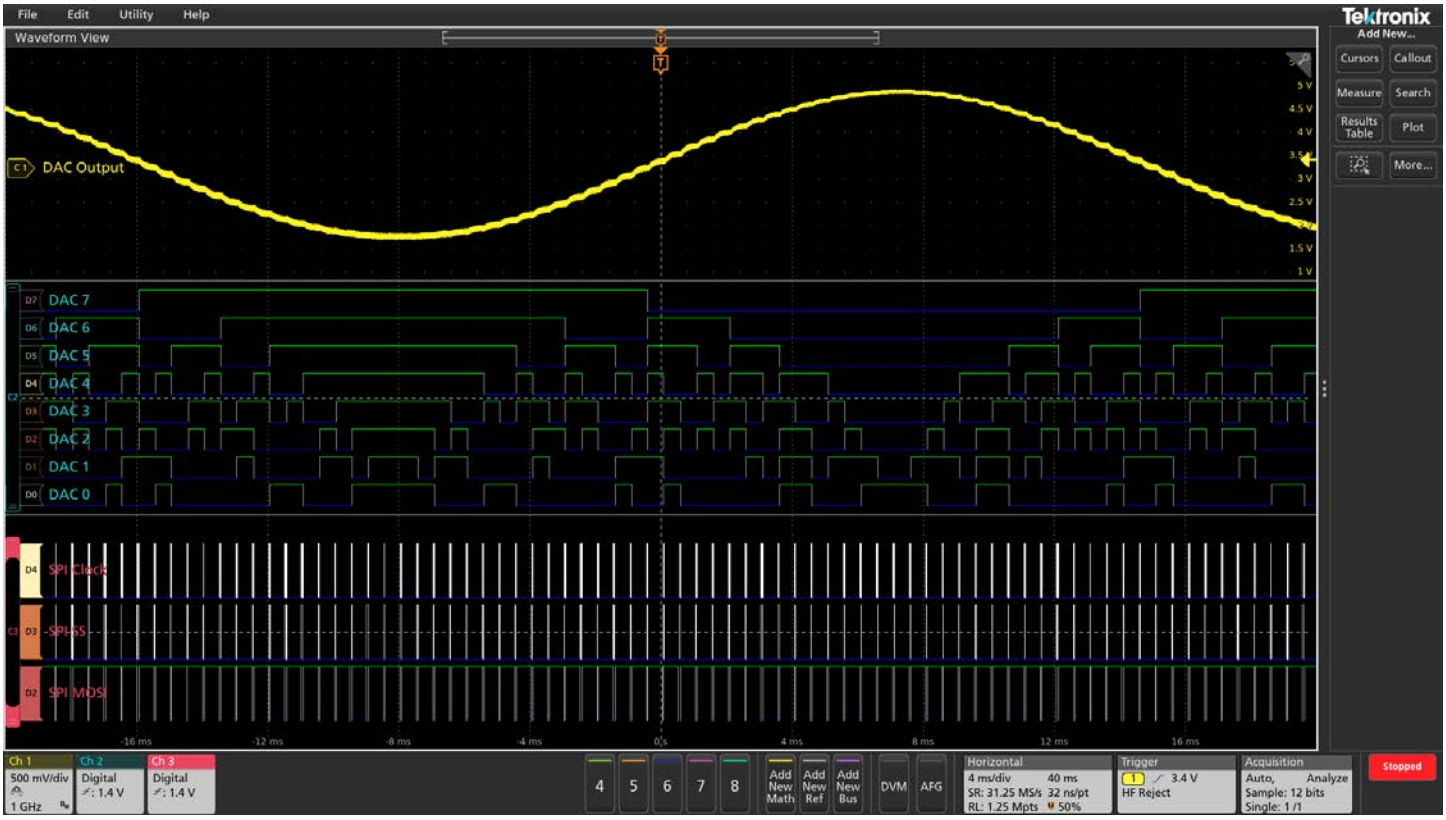


FlexChannel technology enables the ultimate in flexibility. Each input can be configured as a single analog or eight digital channels based on the type of probe you attach.

Previous-generation MSOs required tradeoffs, with digital channels having lower sample rates or shorter record lengths than analog channels. The 5 Series MSO offers a new level of integration of digital channels. Digital channels share the same high sample rate (up to 6.25 GS/s), and long record length (up to 500 Mpoints) as analog channels.

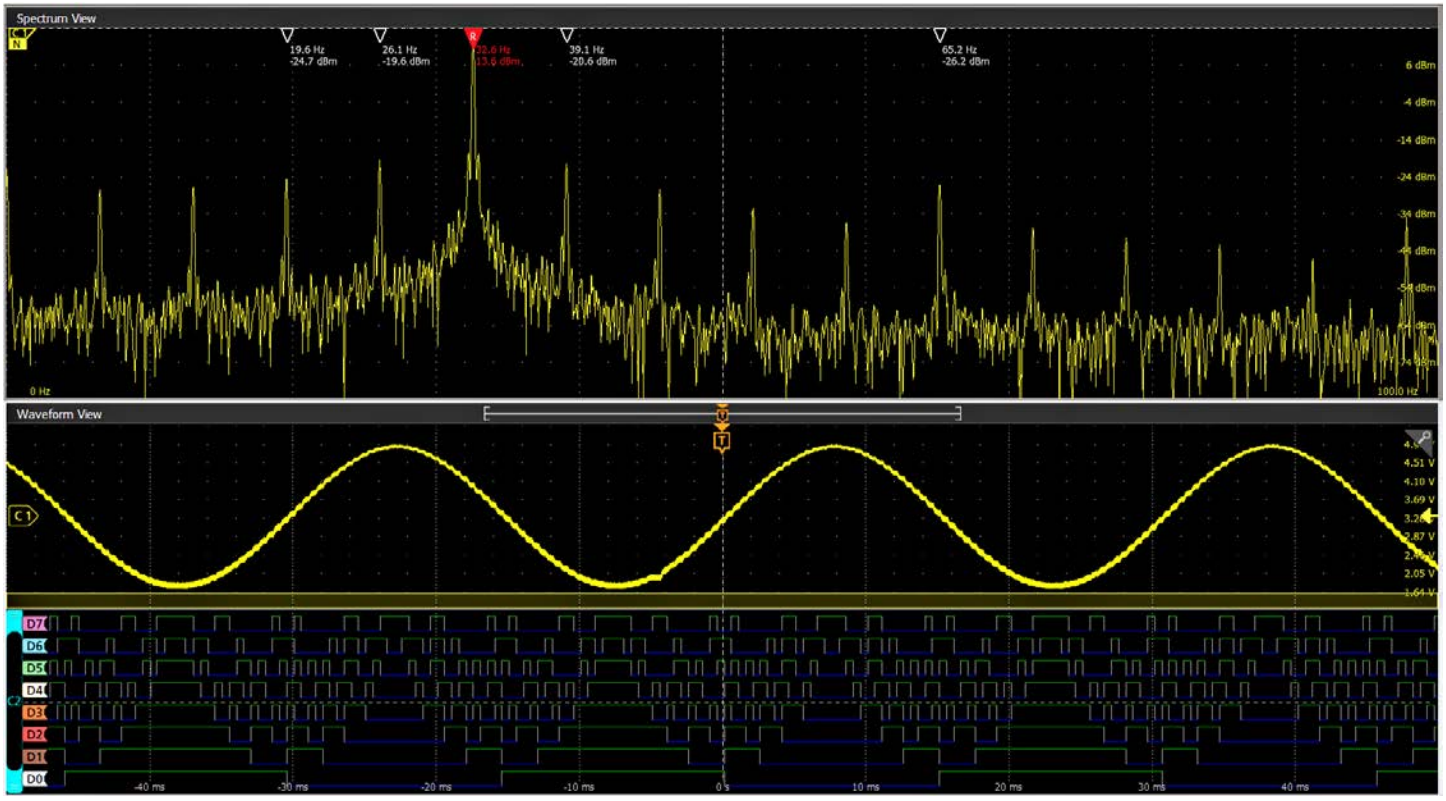


The TLP058 provides eight high performance digital inputs. Connect as many TLP058 probes as you like, enabling up to a maximum of 64 digital channels.



Channel 2 has a TLP058 Logic Probe connected to the eight inputs of a DAC. Notice the green and blue color coding, where ones are green and zeros are blue.

Another TLP058 Logic Probe on Channel 3 is probing the SPI bus driving the DAC. The white edges indicate higher frequency information is available by either zooming in or moving to a faster sweep speed on the next acquisition.



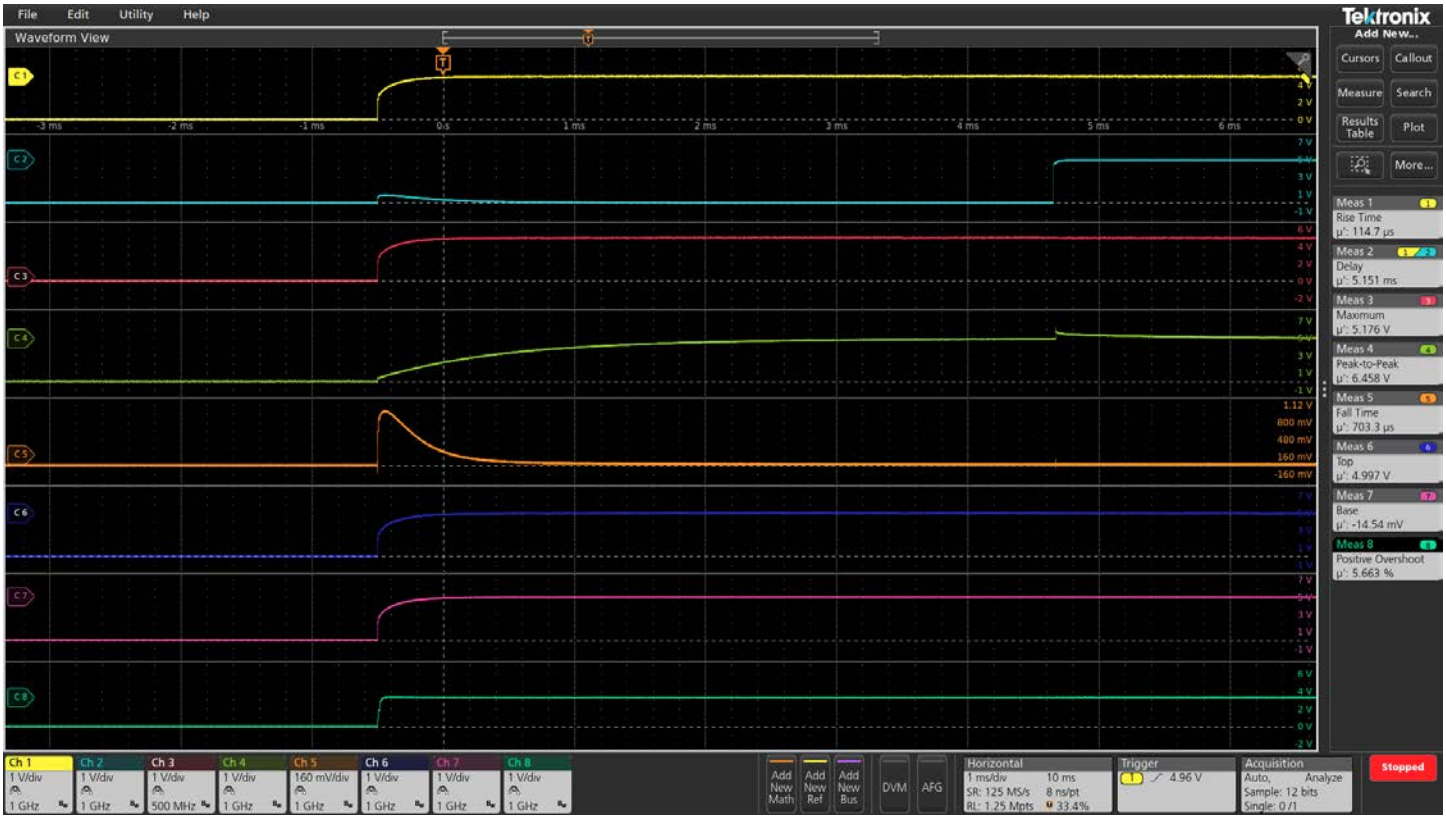
Beyond just analog and digital, FlexChannel inputs include Spectrum View.

This Tektronix-patented technology enables you to simultaneously view both analog and spectral views of all your analog signals, with independent controls in each domain.

Unprecedented signal viewing capability

The stunning 15.6 inch (396 mm) display is the largest display in the industry, providing 100% more display area than a scope with a 10.4" (264 mm) display..It is also the highest resolution display, with full HD resolution (1,920 x 1,080), enabling you to see many signals at once with ample room for critical readouts and analysis.

The viewing area is optimized to ensure that the maximum vertical space is available for waveforms. The Results Bar on the right can be hidden, enabling the waveform view to use the full width of the display.



Stacked display mode enables easy visibility of all waveforms while maintaining maximum ADC resolution on each input for the most accurate measurements

The 5 Series MSO offers a revolutionary new Stacked display mode. Historically, scopes have overlaid all waveforms in the same graticule, forcing difficult tradeoffs:

- To make each waveform visible, you vertically scale and position each waveform so that they don't overlap. Each waveform uses a small percentage of the available ADC range, leading to less accurate measurements.
- For measurement accuracy, you vertically scale and position each waveform to cover the entire display. The waveforms overlap each other, making it hard to distinguish signal details on individual waveforms

The new Stacked display eliminates this tradeoff. It automatically adds and removes additional horizontal waveform 'slices' (additional graticules) as waveforms are created and removed. Each slice represents the full ADC range for the waveform. All waveforms are visually separated from each other while still using the full ADC range, enabling maximum visibility and accuracy. And it's all done automatically as waveforms are added or removed! Channels can easily be reordered in stacked display mode by dragging and dropping the channel and waveform badges in the Settings bar at the bottom of the display. Groups of channels can also be overlaid within a slice to simplify visual comparison of signals.

The display also provides plenty of viewing area not only for signals, but also for plots, measurement results tables, bus decode tables and more. You can easily resize and relocate the various views to suit your application.



Viewing four analog channels, a decoded serial bus waveform, decoded serial packet results table, seven measurements, a measurement histogram, measurements results table with statistics, and a DVM - simultaneously!

Exceptionally easy-to-use user interface lets you focus on the task at hand

The Settings Bar – key parameters and waveform management

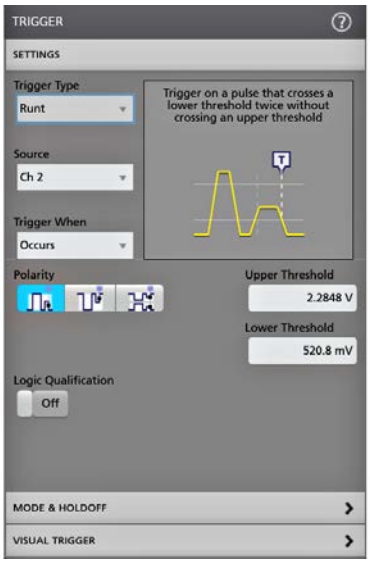
Waveform and scope operating parameters are displayed in a series of “badges” in the Settings Bar that runs along the bottom of the display. The Settings Bar provides immediate access for the most common waveform management tasks. With a single tap, you can:

- Turn on channels
- Add math waveforms
- Add reference waveforms
- Add bus waveforms
- Enable the optional integrated Arbitrary/Function generator (AFG)
- Enable the optional integrated digital voltmeter (DVM)

The Results Bar – analysis and measurements

The Results Bar on the right side of the display includes immediate, one-tap access to the most common analytical tools such as cursors, measurements, searches, measurement and bus decode results tables, plots, and notes.

DVM, measurement and search results badges are displayed in the Results Bar without sacrificing any waveform viewing area. For additional waveform viewing area, the Results Bar can be dismissed and brought back at any time.



Configuration menus are accessed by simply double-tapping on the item of interest on the display. In this case, the Trigger badge was double-tapped to open the Trigger configuration menu.

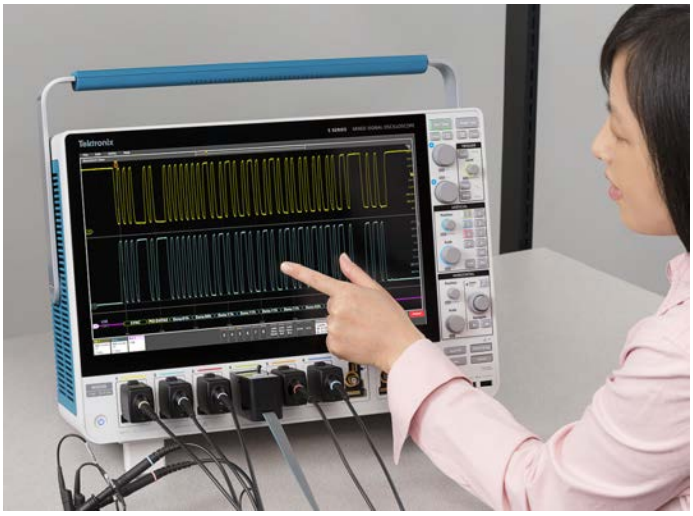
Touch interaction finally done right

Oscilloscopes have included touch screens for years, but the touch interface has been an afterthought. The 5 Series MSO 15.6" display includes a capacitive touchscreen and provides the industry's first oscilloscope user interface truly designed for touch.

The touch interactions that you use with phones and tablets, and expect in a touch-enabled device, are supported.

- Drag waveforms left/right or up/down to adjust horizontal and vertical position or to pan a zoomed view
- Pinch and expand to change scale or zoom in/out in either horizontal or vertical directions
- Drag items off the edge of the screen to delete them
- Swipe in from the right to reveal the Results Bar or down from the top to access the menus in the upper left corner of the display

Smooth, responsive front panel controls allow you to make adjustments with familiar knobs and buttons, and you can add a mouse or keyboard as a third interaction method.



Interact with the capacitive touch display in the same way you do on your phones and tablets.

Variable font size

Historically, oscilloscope user interfaces have been designed with fixed font sizes to optimize viewing of waveforms and readouts. This implementation is fine if all users have the same viewing preferences, but they don't. Users spend a significant amount of time staring at screens, and Tektronix recognizes this. The 5 Series MSO offers a user preference for variable font sizes; scaling down to 12 points or up to 20 points. As you adjust the font size, the user interface dynamically scales so you can easily choose the best size for your application.



Comparison showing how the user interface scales as font size changes.

Attention to detail in the front-panel controls

Traditionally, the front face of a scope has been roughly 50% display and 50% controls. The 5 Series B MSO display fills about 85% of the face of the instrument. To achieve this, it has a streamlined front panel that retains critical controls for simple intuitive operation, but with a reduced number of menu buttons for functions directly accessed via objects on the display.

Color-coded LED light rings indicate trigger source and vertical scale/position knob assignments. Large, dedicated Run/Stop and Single Sequence buttons are placed prominently in the upper right, and other functions like Force Trigger, Trigger Slope, Trigger Mode, Default Setup, Autoset and Quick-save functions are all available using dedicated front panel buttons.



Efficient and intuitive front panel provides critical controls while still leaving room for the massive 15.6" high definition display.

Windows or not – you choose

The 5 Series MSO offers you the choice of whether to include a Microsoft Windows™ operating system.

The 5 Series MSO comes with a standard removable SSD that contains a closed embedded operating system that will boot as a dedicated scope with no ability to run or install other programs. An optional SSD with Windows 10 operating system is available that will boot to an open Windows 10 configuration, so you can minimize the oscilloscope application and access a Windows desktop where you can install and run additional applications on the oscilloscope or you can connect additional monitors and extend your desktop. Simply swap the drives as needed through an access panel on the bottom of the instrument.

Whether you run Windows or not, the oscilloscope operates in exactly the same way with the same look and feel and UI interaction.

Need higher channel density?

The 5 Series MSO is also available in a low-profile form factor - the MSO58LP. With eight 1 GHz input channels plus an auxiliary trigger input, in a 2U high package and 12-bit ADCs, the 5 Series MSO Low Profile sets a new standard for performance in applications where extreme channel density is required.

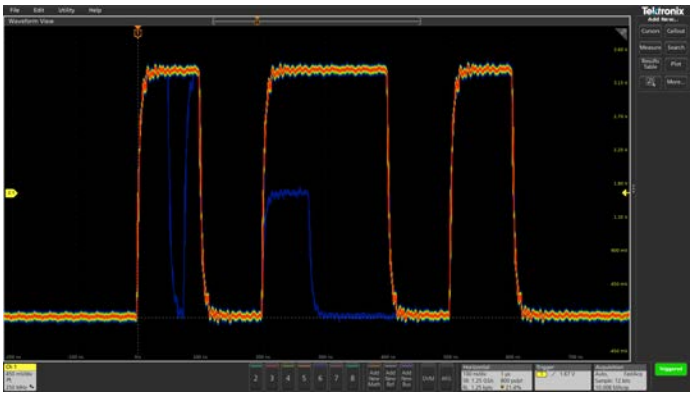


Experience the performance difference

With up to 2 GHz analog bandwidth, 6.25 GS/s sample rates, standard 62.5 Mpts record length and a 12-bit analog to digital converter (ADC), the 5 Series MSO has the performance you need to capture waveforms with the best possible signal fidelity and resolution for seeing small waveform details.

Digital Phosphor technology with FastAcq™ high-speed waveform capture

To debug a design problem, first you must know it exists. Digital phosphor technology with FastAcq provides you with fast insight into the real operation of your device. Its fast waveform capture rate - greater than 500,000 waveforms per second - gives you a high probability of seeing the infrequent problems common in digital systems: runt pulses, glitches, timing issues, and more. To further enhance the visibility of rarely occurring events, intensity grading indicates how often rare transients are occurring relative to normal signal characteristics.



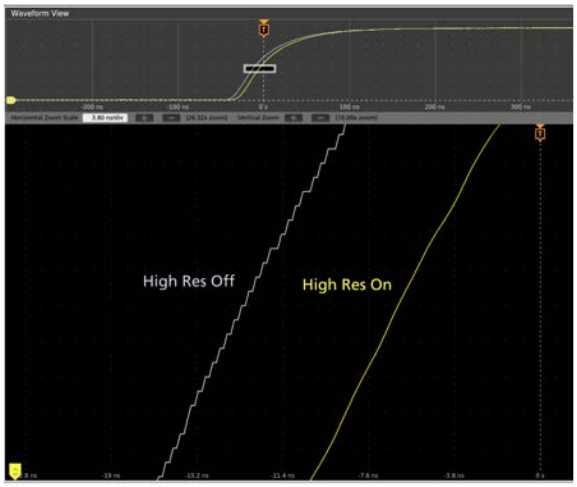
FastAcq's high waveform capture rate enables you to discover infrequent problems common in digital design.

Industry leading vertical resolution

The 5 Series MSO provides the performance to capture the signals of interest while minimizing the effects of unwanted noise when you need to capture high-amplitude signals while seeing smaller signal details. At the heart of the instrument are 12-bit analog-to-digital converters (ADCs) that provide 16 times the vertical resolution of traditional 8-bit ADCs.

A new High Res mode applies a hardware-based unique Finite Impulse Response (FIR) filter based on the selected sample rate. The FIR filter maintains the maximum bandwidth possible for that sample rate while preventing aliasing and removing noise from the oscilloscope amplifiers and ADC above the usable bandwidth for the selected sample rate. High Res mode always provides at least 12 bits of vertical resolution and extends all the way to 16 bits of vertical resolution at ≤125 MS/s sample rates.

New lower-noise front end amplifiers further improve your ability to resolve fine signal detail.



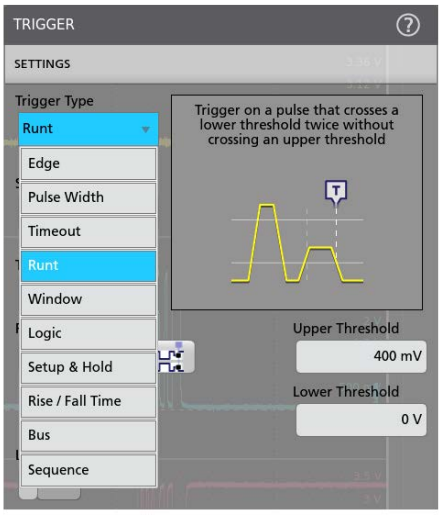
12-bit ADC, along with the new High Res mode, enable industry leading vertical resolution.

Triggering

Discovering a device fault is only the first step. Next, you must capture the event of interest to identify root cause. The 5 Series MSO provides a complete set of advanced triggers, including:

- Runt
- Logic
- Pulse width
- Window
- Timeout
- Rise/Fall time
- Setup and Hold violation
- Serial packet
- Parallel data
- Sequence
- Video
- Visual Trigger
- RF Frequency vs. Time
- RF Magnitude vs. Time

With up to a 500 Mpoint record length, you can capture many events of interest, even thousands of serial packets in a single acquisition, providing high-resolution to zoom in on fine signal details and record reliable measurements.

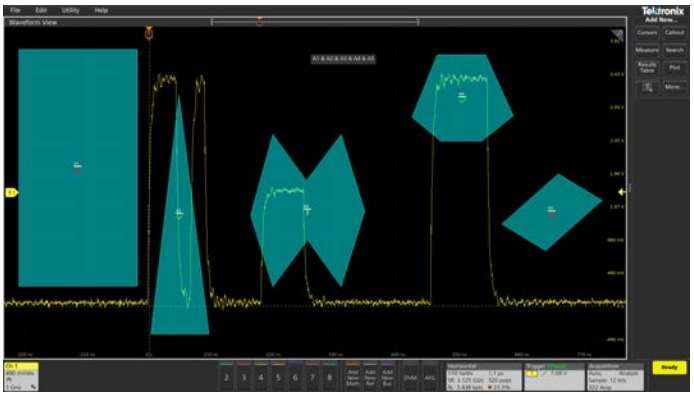


The wide variety of trigger types and context-sensitive help in the trigger menu make it easier than ever to isolate the event of interest.

Visual Trigger – finding the signal of interest quickly

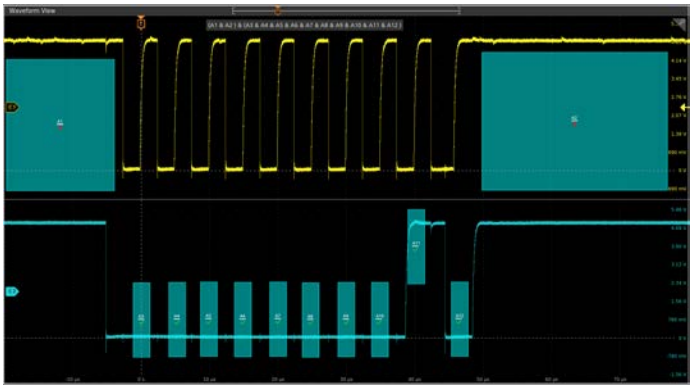
Finding the right cycle of a complex bus can require hours of collecting and sorting through thousands of acquisitions for an event of interest. Defining a trigger that isolates the desired event speeds up debug and analysis efforts.

Visual Trigger extends the instrument's triggering capabilities by scanning through all waveform acquisitions and comparing them to on-screen areas (geometric shapes). You can create an unlimited number of areas using the mouse or touchscreen, and a variety of shapes (triangles, rectangles, hexagons, or trapezoids) can be used to specify the desired trigger behavior. Once shapes are created, they can be edited interactively to create custom shapes and ideal trigger conditions. Once multiple areas are defined, a Boolean logic equation can be used to set complex trigger conditions using on-screen editing features.



Visual Trigger areas isolate an event of interest, saving time by only capturing the events you want to see.

By triggering only on the most important signal events, Visual Trigger can save hours of capturing and manually searching through acquisitions. In seconds or minutes, you can find the critical events and complete your debug and analysis efforts. Visual Trigger even works across multiple channels, extending its usefulness to complex system troubleshooting and debug tasks.



Multiple channel triggering. Visual Trigger areas can be associated with events spanning multiple channels, such as triggering on a specific burst-width on channel 1 and a specified bit pattern on channel 2.

High-Speed Probing

The TPP Series passive voltage probes offer all the benefits of general-purpose probes - high dynamic range, flexible connection options, and robust mechanical design - while providing the performance of active probes. Up to 1 GHz analog bandwidth enables you to see high frequency components in your signals, and extremely low 3.9 pF capacitive loading minimizes adverse effects on your circuits and is more forgiving of longer ground leads.

An optional, low-attenuation (2X) version of the TPP probe is available for measuring low voltages. Unlike other low-attenuation passive probes, the TPP0502 has high bandwidth (500 MHz) as well as low capacitive loading (12.7 pF).



The instrument comes standard with one TPP0500B (350 MHz, 500 MHz models) or TPP1000 (1 GHz, 2 GHz models) probe per channel.

TekVPI Probe Interface

The TekVPI® probe interface sets the standard for ease of use in probing. In addition to the secure, reliable connection that the interface provides, many TekVPI probes feature status indicators and controls, as well as a probe menu button right on the comp box itself. This button brings up a probe menu on the oscilloscope display with all relevant settings and controls for the probe. The TekVPI interface enables direct attachment of current probes without requiring a separate power supply. TekVPI probes can be controlled remotely through USB or LAN, enabling more versatile solutions in ATE environments. The 5 Series MSO provides up to 80 W of power to the front panel connectors, sufficient to power all connected TekVPI probes without the need for an additional probe power supply.

IsoVu™ Isolated Measurement System

Whether designing an inverter, optimizing a power supply, testing communication links, measuring across a current shunt resistor, debugging EMI or ESD issues, or trying to eliminate ground loops in your test setup, common mode interference has caused engineers to design, debug, evaluate, and optimize "blind" until now.

The revolutionary Tektronix IsoVu technology uses optical communications and power-over-fiber for complete galvanic isolation. When combined with the 5 Series MSO equipped with the TekVPI interface, it is the first, and only, measurement system capable of accurately resolving high bandwidth, differential signals, in the presence of large common mode voltage with:

- Complete galvanic isolation
- Up to 1 GHz bandwidth
- 1 Million to 1 (120 dB) common mode rejection at 100 MHz

- 10,000 to 1 (80 dB) of common mode rejection at full bandwidth
- Up to 2,500 V differential dynamic range
- 60 kV common mode voltage range

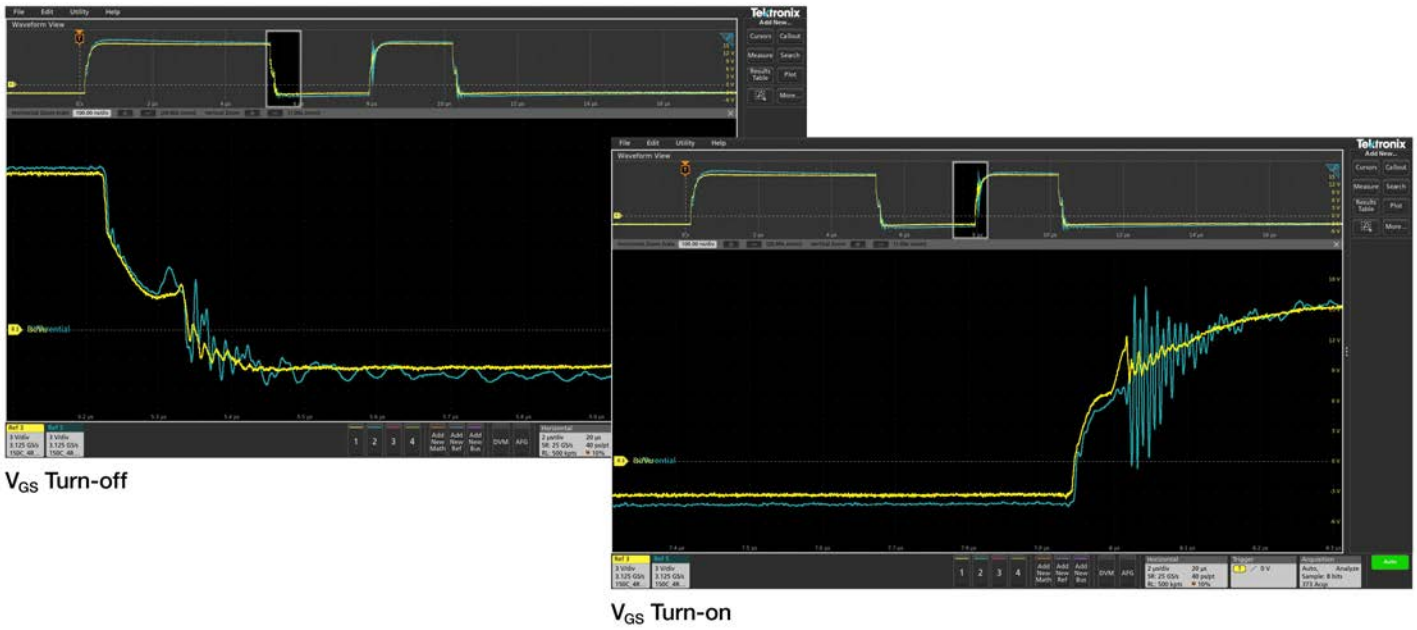


The Tektronix TIVP Series IsoVu™ Measurement System

The Tektronix TIVP Series IsoVu™ Measurement System offers a galvanically isolated measurement solution to accurately resolve high bandwidth, differential signals up to 2,500 Vpk in the presence of large common mode voltages, with the best-in-class common mode rejection performance across its bandwidth.

High-side gate voltage measurement with IsoVu

The following image shows a comparison of the high-side gate voltage for a standard differential probe versus an optically isolated probe. For both at turn-off and turn-on, high-frequency ringing can be seen on the gate after the device's gate passes through the threshold region. Due to coupling between the gate and power loop, some ringing is expected. However, in the case of the differential probe, the ringing has a significantly higher amplitude than is measured by the optically isolated probe. This is likely due to the changing reference voltage inducing common mode currents within the probe and an artifact of a standard differential probe. While the waveform measured by the differential probe appears to pass the maximum gate voltage of the device, the more accurate measurement of the optically isolated probe makes it clear that the device is within specification. Application designers using standard differential probes for gate voltage measurements should use caution as it may not be possible to differentiate between the probing and measurement system artifact shown here and an actual violation of the device ratings. This measurement artifact may cause the designer to increase the gate resistance to slow down the switching transient and reduce the ringing. However, this would unnecessarily increase losses in the SiC device. For this reason, it is essential to have a measurement system that accurately reflects the actual dynamics of the device, in order to appropriately design the system and optimize performance.



Differential Probe (blue trace) vs. IsoVu Optically Isolated Probe (yellow trace).

Comprehensive analysis for fast insight

Basic waveform analysis

Verifying that your prototype's performance matches simulations and meets the project's design goals requires careful analysis, ranging from simple checks of rise times and pulse widths to sophisticated power loss analysis, characterization of system clocks, and investigation of noise sources.

The 5 Series MSO offers a comprehensive set of standard analysis tools including:

- Waveform- and screen-based cursors
- 36 automated measurements. Measurement results include all instances in the record, the ability to navigate from one occurrence to the next, and immediate viewing of the minimum or maximum result found in the record
- Basic waveform math
- Basic FFT analysis
- Advanced waveform math including arbitrary equation editing with filters and variables
- Spectrum View frequency domain analysis with independent controls for time and frequency domains
- FastFrame™ Segmented Memory enables you to make efficient use of the oscilloscope's acquisition memory by capturing many trigger events in a single record while eliminating the large time gaps between events of interest. View and measure the segments individually or as an overlay.

Standard amplitude and time measurements annotate the waveform display with visual bars and markers to indicate relative information. Measurement results tables provide comprehensive statistical views of measurement results with statistics across both the current acquisition and all acquisitions.

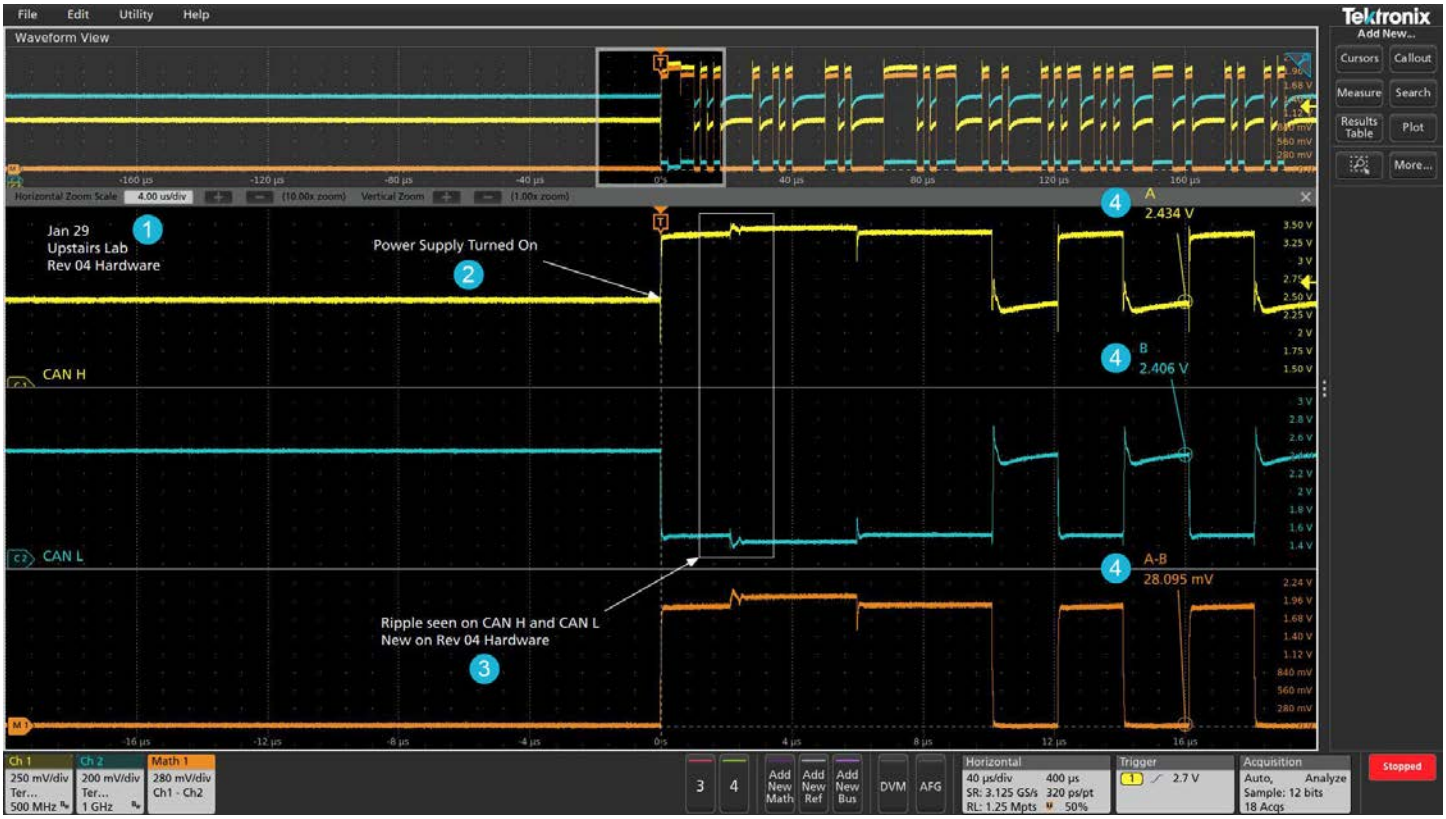


Using automated measurements to characterize power supply bring up.

Callouts

1. **Note**: Write and position a text box on the screen.
2. **Arrow**: Write and position a text box, then add an arrow to a specific location on the screen.
3. **Rectangle**: Write text and outline a specific region on the screen indicated by a resizable box.
4. **Bookmark**: Create a dynamic readout at a specific time relevant to a trigger point. This readout includes text, magnitude of the signal, signal units, as well as a line and target indicating the bookmark reference point.

Documenting test results and methods is critical when sharing data across a team, recreating a measurement at a later date, or delivering a customer report. With a few taps on the screen, you can create as many custom callouts as needed; enabling you to document the specific details of your test results. With each callout, you can customize the text, location, color, font size, and font.



Easy to use callouts (Note, Arrow, Rectangle, Bookmark) that are detailing the specifics of this test setup and corresponding results.

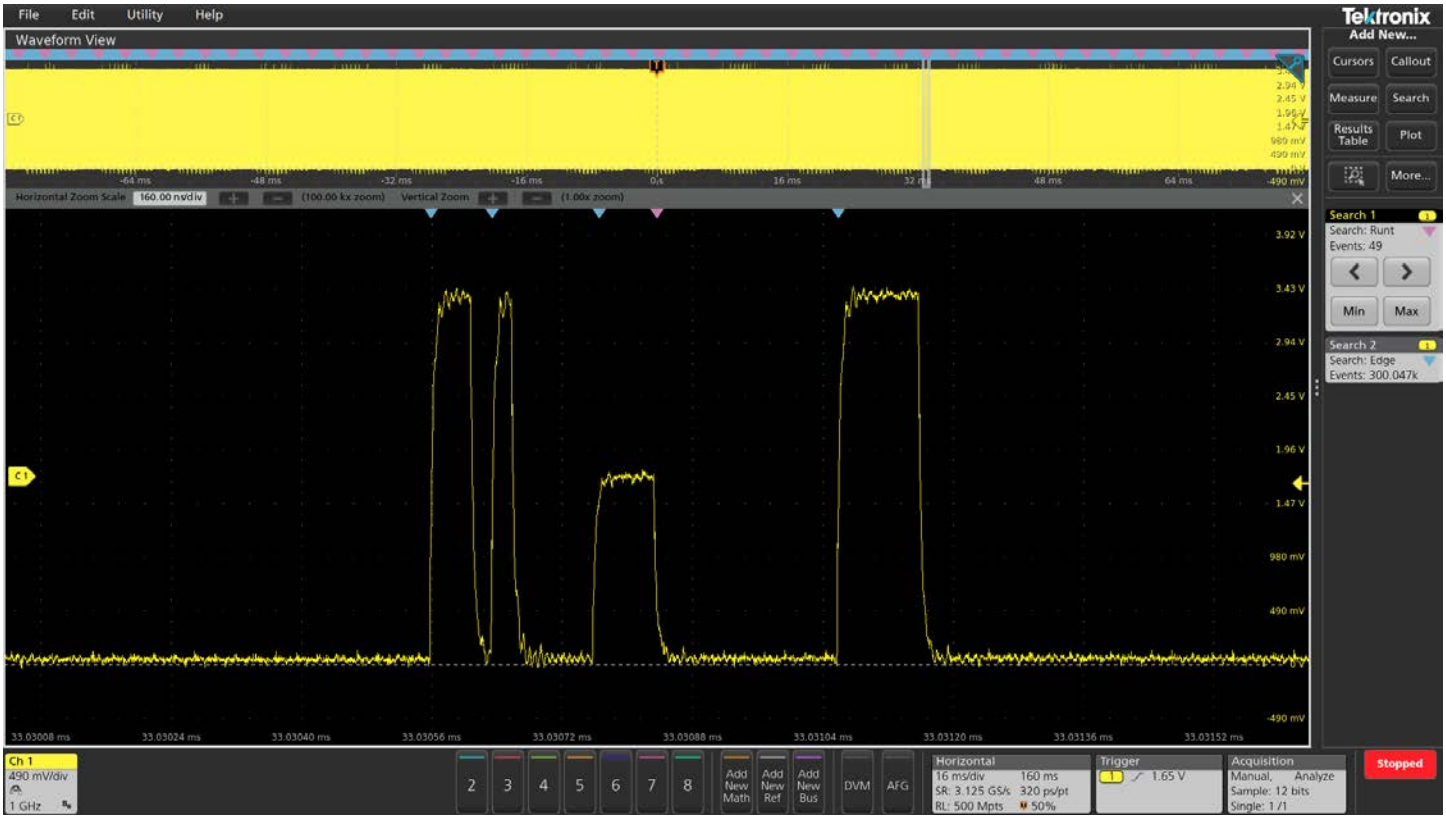
Navigation and search

Finding your event of interest in a long waveform record can be time-consuming without the right search tools. With today's record lengths of many millions of data points, locating your event can mean scrolling through literally thousands of screens of signal activity.

The 5 Series MSO offers the industry's most comprehensive search and waveform navigation with its innovative Wave Inspector® controls. These controls speed panning and zooming through your record. With a unique force-feedback system, you can move from one end of your record to the other in just seconds. Or, use intuitive drag and pinch/expand gestures on the display itself to investigate areas of interest in a long record.

The Search feature allows you to automatically search through your long acquisition looking for user-defined events. All occurrences of the event are highlighted with search marks and are easily navigated to, using the Previous (←) and Next (→) buttons found on the front panel or on the Search badge on the display. Search types include edge, pulse width, timeout, runt, window, logic, setup and hold, rise/fall time and parallel/serial bus packet content. You can define as many unique searches as you like.

You can also quickly jump to the minimum and maximum value of search results by using the Min and Max buttons on the Search badge.



Earlier, FastAcq revealed the presence of a runt pulse in a digital data stream prompting further investigation.

In this long 20 ms acquisition, Search 1 reveals that there are approximately 37,500 rising edges in the acquisition. Search 2 (run simultaneously) reveals that there are six runt pulses in the acquisition.

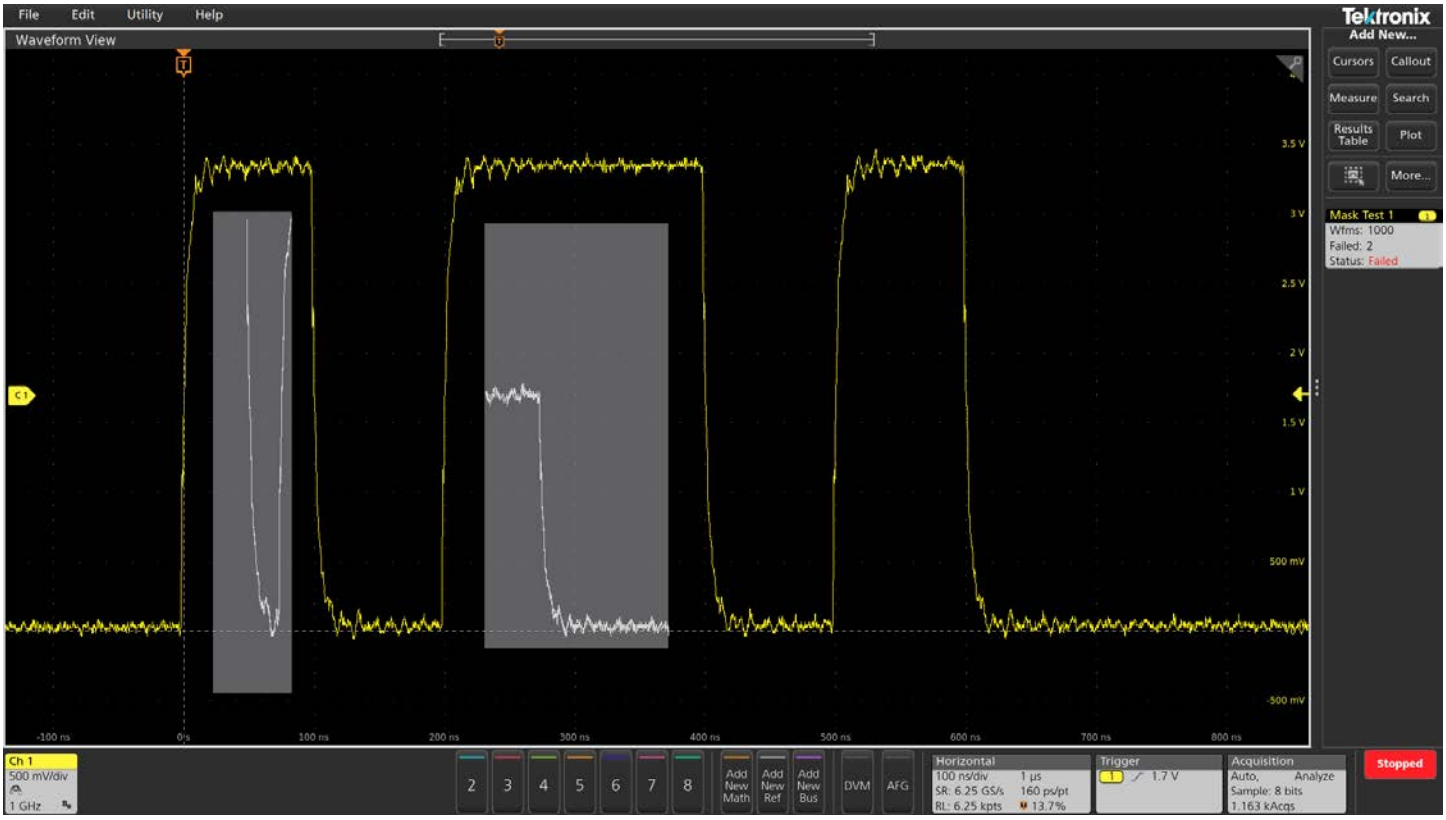
Mask and limit testing (optional)

Whether you are focused on signal integrity or setting up pass/fail conditions for production, mask testing is an efficient tool to characterize the behavior of certain signals in a system. Quickly create custom masks by drawing mask segments on the screen. Tailor a test to your specific requirements and set actions to take when a mask hit is registered, or when a complete test passes or fails.

Limit testing is an insightful way to monitor the long-term behavior of signals, helping you characterize a new design or confirm hardware performance during production line testing. Limit tests compare your live signal to an ideal, or golden version of the same signal with user-defined vertical and horizontal tolerances.

You can easily tailor a mask or limit test to your specific requirements by:

- Defining test duration in number of waveforms
- Setting a violation threshold that must be met before considering a test a failure
- Counting violations/failures and reporting statistical information
- Setting actions upon violations, test failure, and test complete



Custom, multiple segment mask capturing the presence of a signal glitch and runt pulse in a waveform.

Signal Integrity Modeling (Base) (optional)

Modern high-speed designs all face the same challenge: measurement and interconnect impairments that obscure the true performance of the device under test (DUT). Cables, probes, fixtures, and channel elements introduce reflections, loss, and delay that can dominate the DUT's actual behavior. These issues can lead to two common validation pitfalls:

- **False failures:** where the device appears to malfunction even though the root cause is the measurement path
- **False confidence:** where the device performs well in the lab but fails in the actual system

Addressing these impairments is essential for accurate measurement, reliable simulation, and meaningful system-level validation.

Signal Integrity Modeling (SIM) addresses these challenges by enabling precise de-embedding of the measurement circuit—including probes, fixtures, and cables—while accurately accounting for source and load impedances at both the transmitter and receiver. SIM allows users to define a variety of models such as S-parameters, transmission-line models, and RLC elements to remove loss, delay, and other artifacts from the measurement setup. This level of correction significantly improves measurement fidelity and can be the difference between passing and failing compliance tests.

Once the measurement path is de-embedded, engineers can explore "what-if" scenarios by embedding a simulation circuit. This may range from a simple 50 Ω termination for transmitter characterization, to a worst-case cable inserted at the end of a signal path, to a complete backplane or interconnect modeled using S-parameters. These simulations provide valuable insight into system behavior under real-world conditions, helping teams validate design robustness and avoid costly hardware iterations.



The new SIM tool provides an intuitive, interactive modeling environment for on-scope de-embedding and embedding of signals.

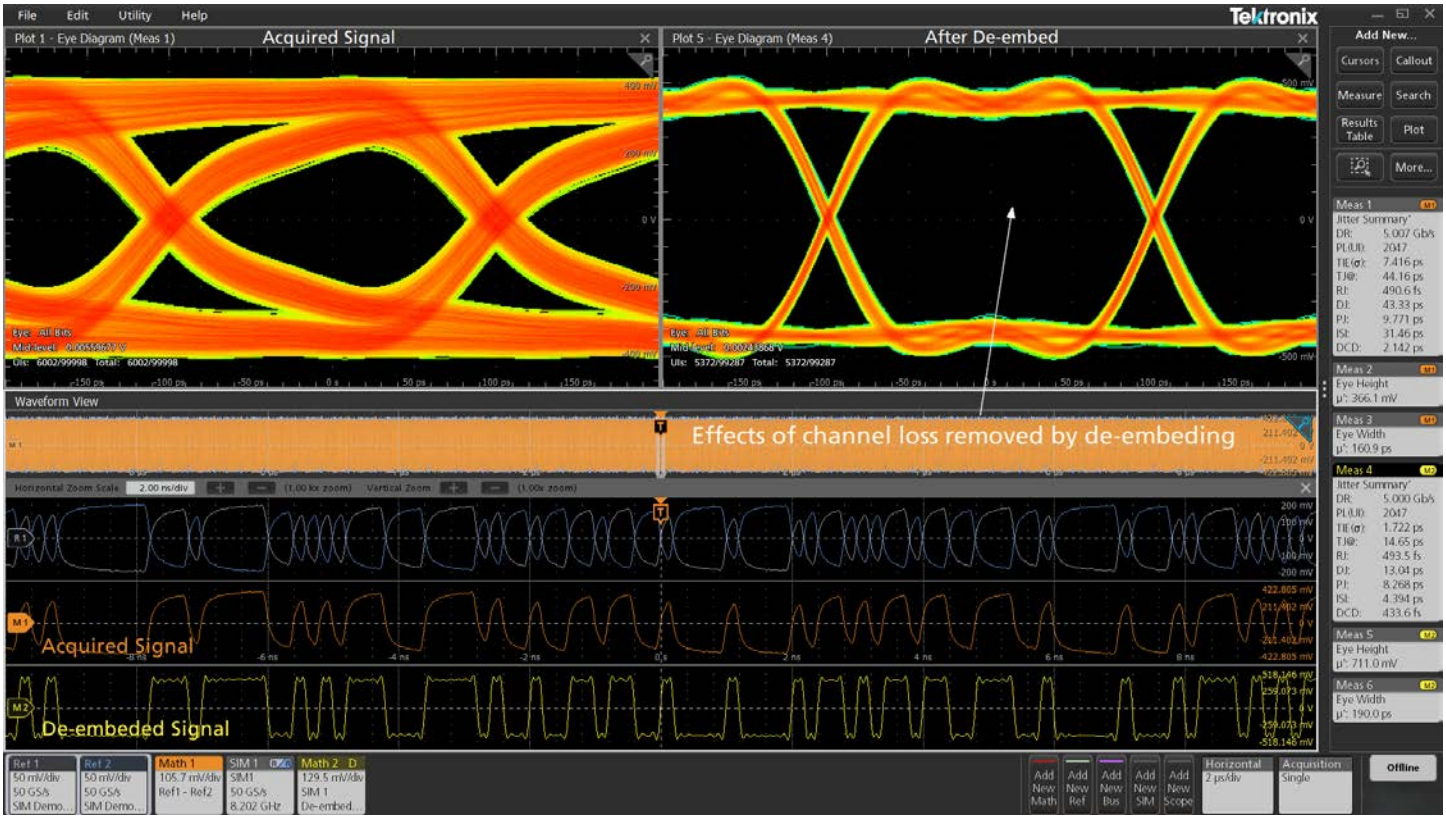
Signal Integrity Modeling (Advanced) (optional)

Designers increasingly rely on advanced equalization techniques at the receiver to compensate for loss and distortion in high-speed channels. In many cases, channel loss can cause eye diagrams to close, masking the true performance of the system.

SIM Advanced (SIMA) helps overcome this by providing receiver equalization tools— including CTLE, FFE, and DFE—that reduce inter-symbol interference (ISI), open closed eyes, and deliver a more accurate view of receiver performance under realistic operating conditions.

Finally, as transmitter waveforms evolve beyond simple NRZ signaling—toward higher-order schemes and tighter margins—evaluating the impact of transmitter equalization becomes critical. SIMA enables users to apply pre-emphasis or de-emphasis to simulate real-world behavior and optimize system performance across challenging channels.

SIMA builds on SIM capabilities, providing a complete signal integrity modeling environment that supports de-embedding, embedding, and advanced equalization for high-speed serial links. Whether validating digital interfaces like DDR, PCIe, or Ethernet, or modeling RF, analog, or fast-switching power systems, SIM and SIMA help ensure robust performance and reduce costly hardware iterations.



Compare signals before and after de-embedding, or across multiple modeling scenarios, in a single view.

User-defined filtering (optional)

In the broad sense, any system that processes a signal can be thought of as a filter. For example, an oscilloscope channel operates as a low pass filter where its 3 dB down point is referred to as its bandwidth. Given a waveform of any shape, a filter can be designed that can transform it into a defined shape within the context of some basic rules, assumptions, and limitations.

Digital filters have some significant advantages over analog filters. For example, the tolerance values of analog filter circuit components are high enough that high order filters are difficult or even impossible to implement. High order filters are easily implemented as digital filters. Digital filters can be implemented as Infinite Impulse Response (IIR) or Finite Impulse Response (FIR). The choice of IIR or FIR filters are based upon design requirements and application.

The 5 Series MSO has the ability to apply designated filters to math waveforms through a MATH arbitrary function. Option 5-UDFLT takes this functionality a level deeper, providing more than MATH arbitrary basic functions and adds flexibility to support standard filters and can be used for application centric filter designs.



Filters can be created through the Math dialog. Once a filter is edited, it can be easily applied, saved, and recalled for use or modification later

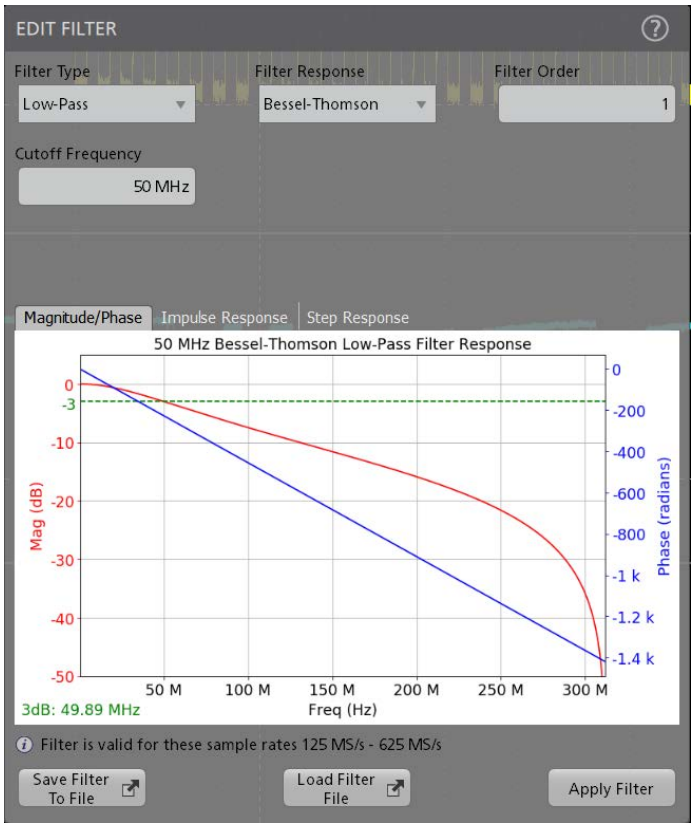
Filter types supported on the 5 Series MSO include:

- Low pass
- High pass
- Band pass
- Band stop
- All pass
- Hilbert
- Differentiator
- Custom

Filter response types supported on the 5 Series MSOinclude:

- Butterworth
- Chebyshev I
- Chebyshev II
- Elliptical
- Gaussian
- Bessel-Thomson

The Filter Response control is available for all Filter Types except All-pass, Hilbert, or Differentiator.



Filter creation dialog showing selection for Filter Type, Filter Response, Cutoff Frequency, Filter Order, and a graphical representation of Magnitude/Phase, Impulse Response, and Step Response

Filter designs can be saved, recalled, and applied once any editing has been completed.

Time Domain Reflectometry (optional)

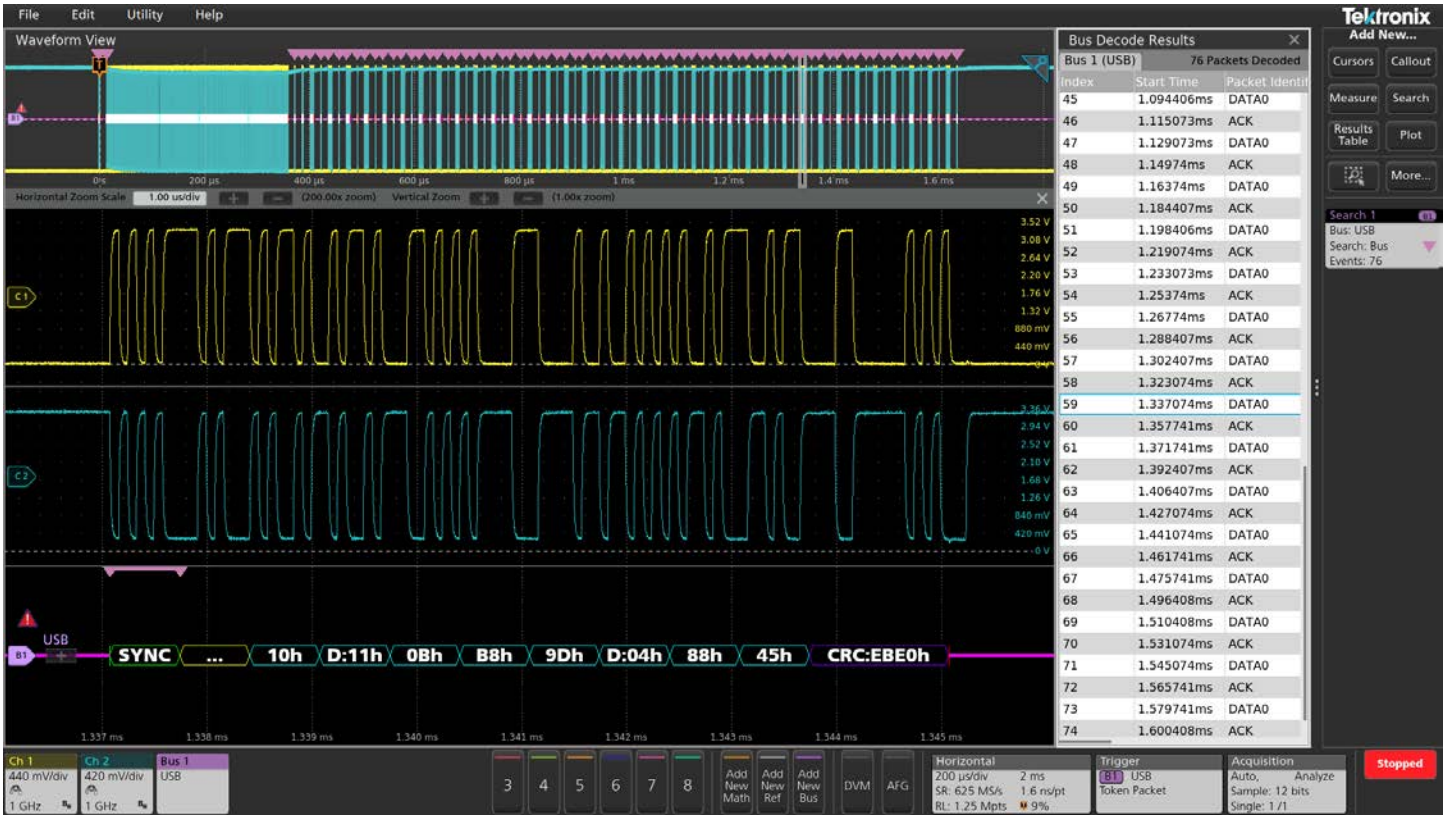
TDR offers a wide range of features to debug and characterize the impedance of power integrity circuits, PCBs, high-speed applications, cables, and interconnects. One can perform TDR measurements with a simple setup including the MSO5B, TDR module, and either SMA cables or TDR probe.



Protocol decode and analysis (optional)

During debugging, it can be invaluable to trace the flow of activity through a system by observing the traffic on one or more serial buses. It could take many minutes to manually decode a single serial packet, much less the thousands of packets that may be present in a long acquisition.

And if you know the event of interest that you are attempting to capture occurs when a particular command is sent across a serial bus, wouldn't it be nice if you could trigger on that event? Unfortunately, it's not as easy as simply specifying an edge or a pulse width trigger.



Triggering on a USB full-speed serial bus.

A bus waveform provides time-correlated decoded packet content including Start, Sync, PID, Address, End Point, CRC, Data values, and Stop, while the bus decode table presents all packet content from the entire acquisition.

The 5 Series MSO offers a robust set of tools for working with the most common serial buses found in embedded design including I2C, SPI, eSPI, I3C, RS-232/422/485/UART, SPMI, SMBus, CAN, CAN FD, CAN XL, LIN, FlexRay, SENT, PSI5, CXPI, Automotive Ethernet, MIPI C-PHY, MIPI D-PHY, USB 1.0 (1.5 Mbps), USB 1.1 (12 Mbps), USB 2.0 (480 Mbps), eUSB2.0, Ethernet 10/100, EtherCAT, Audio (I2S/LJ/RJ/TDM), MIL-STD-1553, ARINC 429, SpaceWire, NRZ, Manchester, SVID, SDLC, 1-Wire, MDIO, and NFC.

Protocol search enables you to search through a long acquisition of serial packets and find the ones that contain the specific packet content you specify. Each occurrence is highlighted by a search mark. Rapid navigation between marks is as simple as pressing the Previous (←) and Next (→) buttons on the front panel or in the Search badge that appears in the Results Bar.

The tools described for serial buses also work on parallel buses. Support for parallel buses is standard in the instrument. Parallel buses can be up to 64 bits wide and can include a combination of analog and digital channels.

- Serial protocol triggering lets you trigger on specific packet content including start of packet, specific addresses, specific data content, unique identifiers, and errors.
- Bus waveforms provide a higher-level, combined view of the individual signals (clock, data, chip enable, and so on) that make up your bus, making it easy to identify where packets begin and end, and identifying sub-packet components such as address, data, identifier, CRC, and so on.
- The bus waveform is time aligned with all other displayed signals, making it easy to measure timing relationships across various parts of the system under test.
- Bus decode tables provide a tabular view of all decoded packets in an acquisition much like you would see in a software listing. Packets are time stamped and listed consecutively with columns for each component (Address, Data, and so on).

NFC decode and analysis (optional)

Evaluating the performance margins of NFC designs is often difficult due to an inability to trace the protocol-level result down to the parametric signal level. This means marginal passes may result in failures later in the test flow, especially when designs are susceptible to interference and signal integrity issues caused by design trade-offs or nearby electronics, requiring time-consuming debug across multiple instruments like a protocol analyzer and RF signal analyzer.

The NFC Protocol Decode and Search option on the 5 Series MSO offers users the ability to view the transaction of the NFC link and trace the result through every step of signal manipulation in the standard, from the protocol-level down to the fundamental signal level to gain insight into exactly how your NFC chip, tag, reader, or mobile device is performing.

NFC transactions can be long. The software option uniquely uses the data coming from the hardware DDC used for Spectrum View, which allows for sample rate compression, saving transfer time and memory, allowing for 100s of milliseconds or even seconds of signal data to be captured and analyzed.

Additionally, because I/O signals are not always available to probe and trigger on from the device under test, triggering on the RF envelope itself is also a challenge considering NFC's small modulation index. With Spectrum View, you can trigger on the 13.56 MHz envelope using RF vs. Time traces and triggers, which is also unique amongst instruments.

This capability simplifies up-front design validation and also provides a powerful debugging tool in a single instrument when failures do occur.



NFC software option allows you to decode and search through their digital NFC bit stream for performing NFC analog/RF and digital pre-conformance, debug, and troubleshooting in a single instrument.

Compliance applications (optional)

A key focus area for embedded designers is testing various embedded and interface technologies for compliance. This ensures the device passes the logo certification at plugfests and achieves successful interoperability when working with other compliant devices.

The compliance test specifications for high speed serial standards like USB, Ethernet, Memory, Display and MIPI are developed by the respective consortiums or governing bodies. Working closely with these consortiums, Tektronix has developed oscilloscope-based compliance applications that not only focus on providing pass/fail results but also provide deeper insight into any failures by providing relevant measurement tools such as jitter and timing analysis to debug failing designs.

These automated compliance applications are built on a framework that provides:

- Complete test coverage per the specification.
- Fast test times with optimized acquisitions and test sequencing based on customized settings.
- Analysis based on previously-acquired signals, allowing the device under test (DUT) to be disconnected from the setup once all acquisitions are completed. This also allows analysis of waveforms acquired on a different oscilloscope or captured at a remote lab, facilitating a very collaborative test environment.
- Optional signal validation during acquisition to ensure the right signals are being captured.
- Additional parametric measurements for design debug.
- Custom eye diagram mask testing for insight into design margin.
- Detailed reports in multiple formats with setup information, results, margins, waveform screenshots and plot images.



The TekExpress USB 2.0 automated compliance testing configuration menu

Spectrum View

It is often easier to debug an issue by viewing one or more signals in the frequency domain. Oscilloscopes have included math-based FFTs for decades in an attempt to address this need. However, FFTs are notoriously difficult to use for two primary reasons.

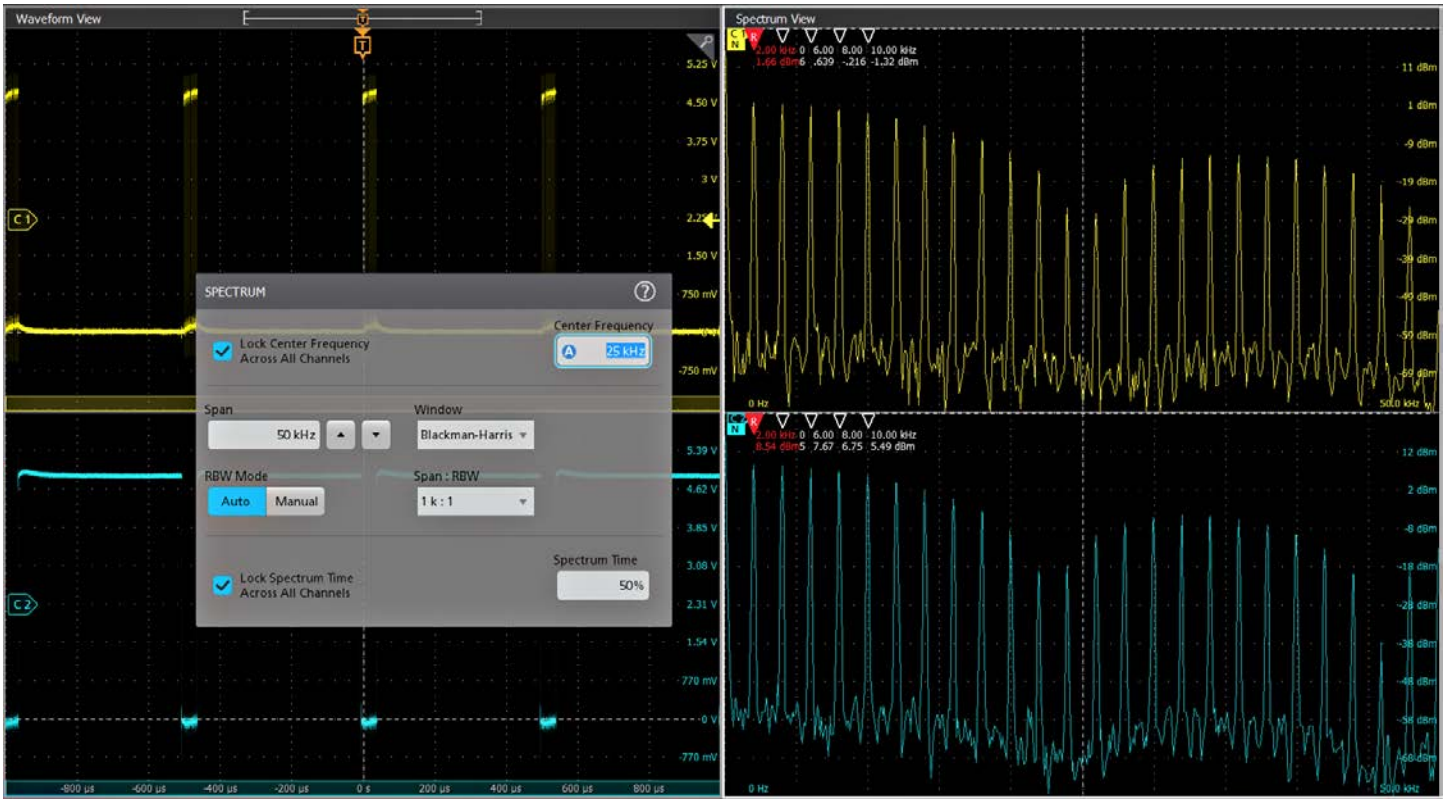
First, when performing frequency-domain analysis, you think about controls like Center Frequency, Span, and Resolution Bandwidth (RBW), as you would typically find on a spectrum analyzer. But then you use an FFT, where you are stuck with traditional scope controls like sample rate, record length and time/div and have to perform all the mental translations to try to get the view you're looking for in the frequency-domain.

Second, FFTs are driven by the same acquisition system that's delivering the analog time-domain view. When you optimize acquisition settings for the analog view, your frequency-domain view isn't what you want. When you get the frequency-domain view you want, your analog view is not what you want. With math-based FFTs, it is virtually impossible to get optimized views in both domains.

Spectrum View changes all of this. Tektronix' patented technology provides both a decimator for the time-domain and a digital downconverter (DDC) for the frequency-domain behind each FlexChannel. The two different acquisition paths let you simultaneously observe both time- and frequency-domain views of the input signal with independent acquisition settings for each domain. Other manufacturers offer various 'spectral analysis' packages that claim ease-of-use, but they all exhibit the limitations described above. Only Spectrum View provides both exceptional ease-of-use and the ability to achieve optimal views in both domains simultaneously.

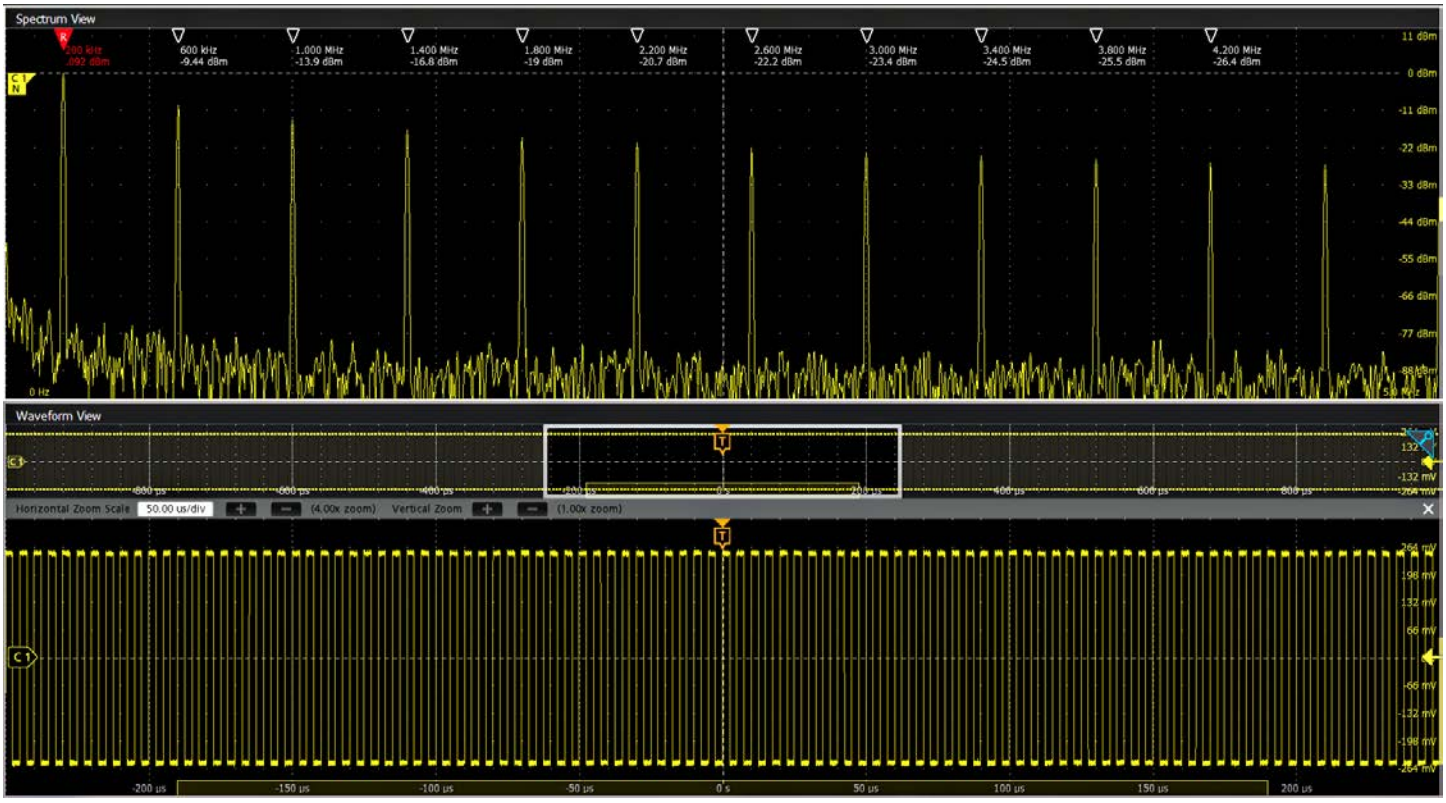
Traditionally, performing RF measurements, such as RF Channel Power (CHP), Adjacent Channel Power Ratio (ACPR), and Occupied Bandwidth (OBW), required a dedicated spectrum or signal analyzer or spectrum analyzer software. This additional hardware or software leads to more complexity and higher costs. Available standard with Spectrum View, integrated RF Measurements on each channel saves users time, bench space, and costs with the ability to validate RF transmitter CHP, ACPR, and OBW directly on the oscilloscope.

Additionally, the DDC significantly reduces the required sample rate to resolve a signal compared to a conventional FFT since it becomes a function of span rather than center frequency. This allows for reduced file sizes, improved frequency resolution, and faster spectrum update rates, leading to a more responsive and accurate solution capable of capturing tens of seconds of spectrum data.



Intuitive spectrum analyzer

Intuitive spectrum analyzer controls like center frequency, span and resolution bandwidth (RBW), independent from time domain controls, provide easy setup for frequency domain analysis.



Up to 11 automated peak markers provide frequency and magnitude values of each peak. The Reference marker is always the highest peak shown and is indicated in red.

Spectrum Time gates the range of time where the FFT is being calculated. Represented by a small graphical rectangle in the time domain view, it can be positioned to provide time correlation with the time domain waveform. Perfect for conducting Mixed Domain Analysis.

Visualizing changes in the RF signal (optional)

RF time domain traces make it easy to understand what's happening with a time-varying RF signal. There are three RF time domain traces that are derived from the underlying I and Q data of Spectrum View:

- Magnitude – The instantaneous amplitude of the spectrum vs. time.
- Frequency – The instantaneous frequency of the spectrum relative to the center frequency vs. time.
- Phase – The instantaneous phase of the spectrum relative to the center frequency vs. time.

Each of these traces can be turned on and off independently, and all three can be displayed simultaneously.

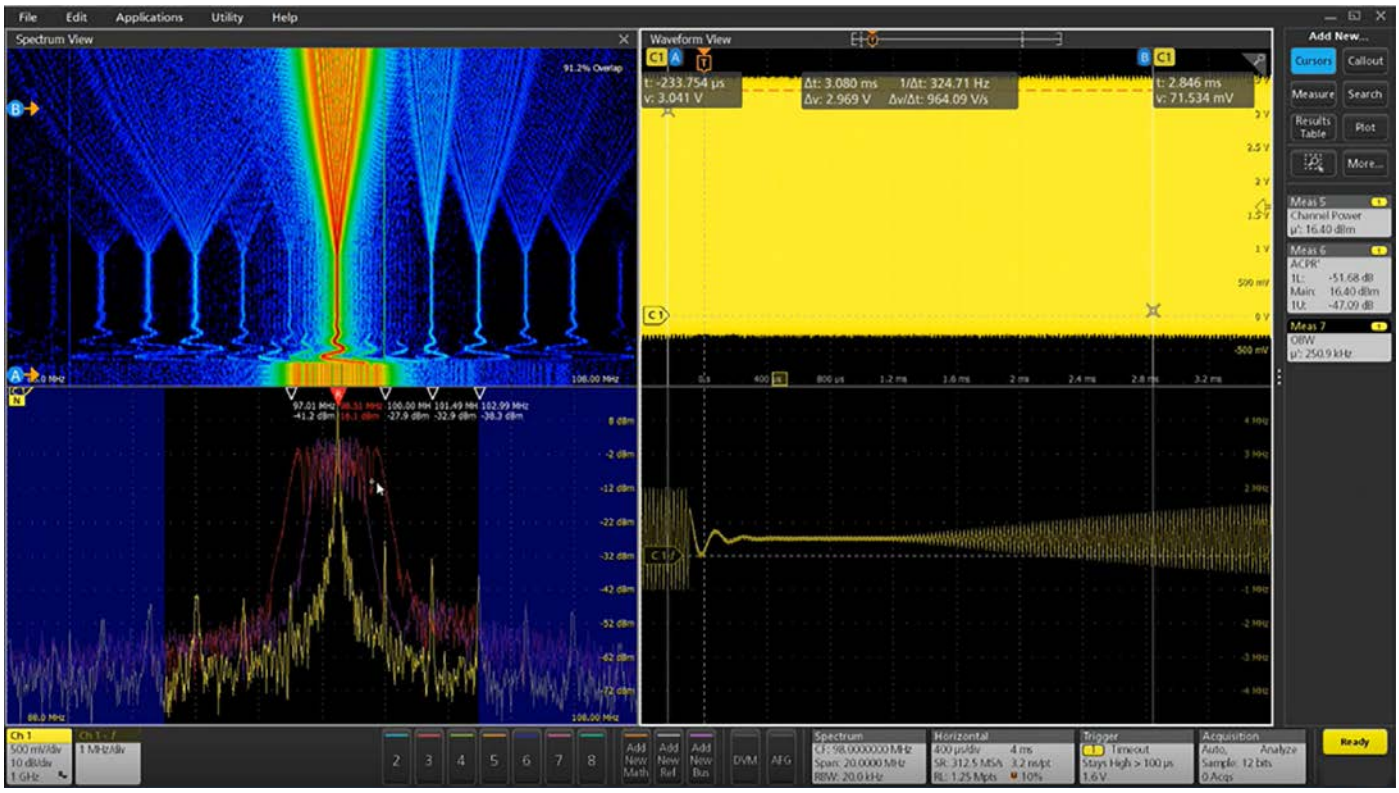
The data is stored as in-phase and quadrature (I&Q) samples and precise synchronization is maintained between the time domain data and the I&Q data.

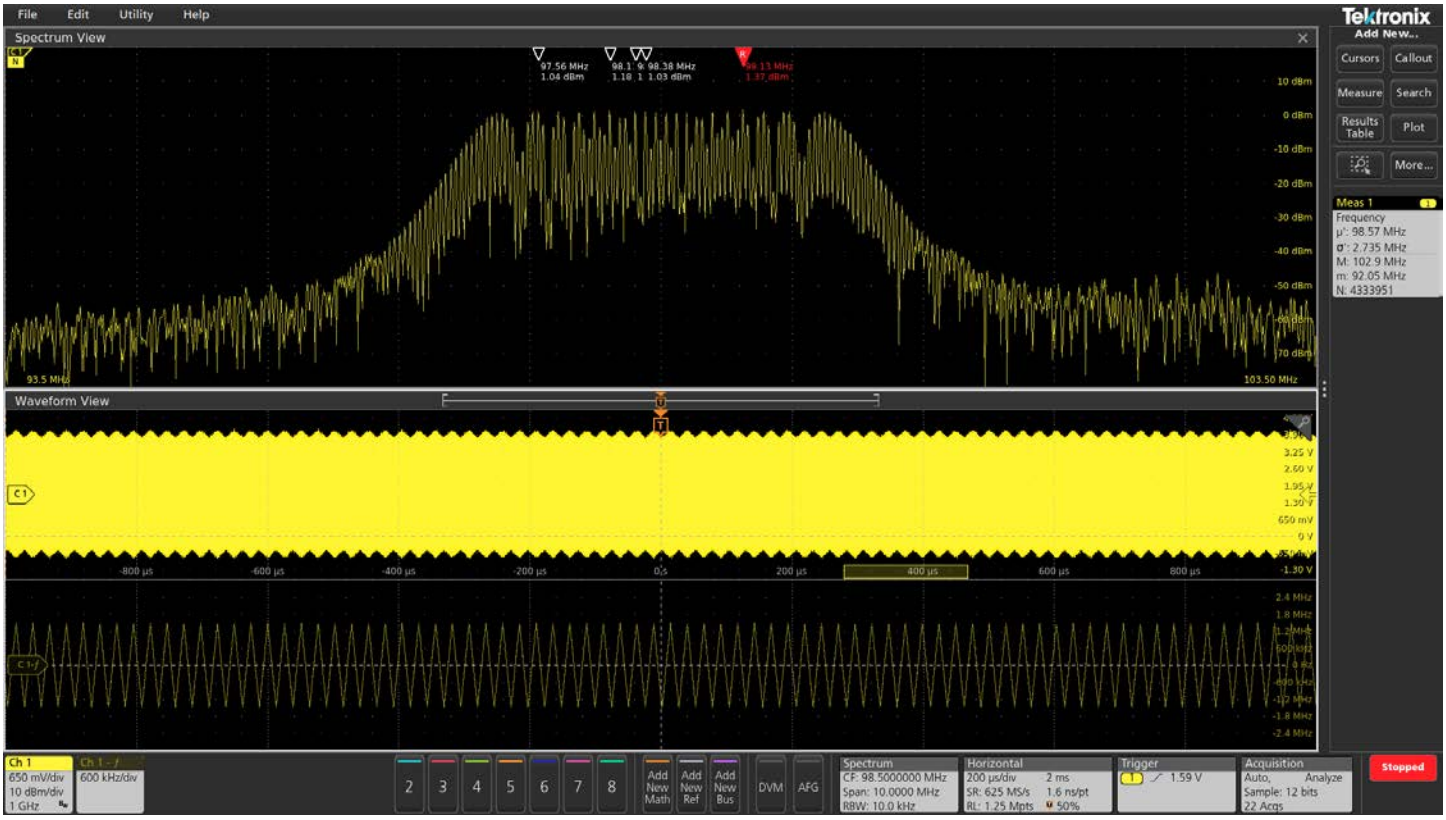
When RF vs. Time traces are activated, IQ data can be captured and exported to file for more advanced analysis within third-party applications.

With frequency on the x-axis, time on the y-axis, and power level indicated by variations in color, the Spectrogram display (included with option RFVT) offers enhanced insight into changes in signal amplitude and frequency content over time, allowing you to see where and when changes in spectral activity occur. This makes it ideal for displaying trends in spectral data such as when diagnosing complex spurious, frequency hopping, multi-channel, and dynamic signals.

Spectrogram benefits include:

- Ability to view all spectrum activity in a given span and acquisition immediately, without having to specify FFT overlap or Spectrum Time
- Quickly compare spectrum at different moments in time using time-correlated cursors and up to three overlaid spectrum traces
- Pinch and zoom in on spectral activity of interest with display resolution and FFT overlap automatically optimized
- Adjust center frequency, span, RBW, and amplitude color-scaling as needed to view all signals of interest
- Simultaneously view trends in multi-channel or non-contiguous spectrum by activating spectrograms on each available oscilloscope channel and independently setting center frequency and amplitude scaling


File
Edit
Applications
Utility
Help
Spectrum View
Waveform View
Add New...
Cursors
Callout
Measure
Search
Results Table
Plot
More...
Meas 5
Channel Power
Meas 6
ACPR
Meas 7
OBW
Ready



The lower trace is the frequency vs. time trace derived from the input signal.

Notice that the Spectrum Time is positioned during a transition from the lowest frequency to the middlefrequency, so the energy is spread across a number of frequencies. With the frequency vs. time trace, you can easily see the different frequency hops, simplifying characterization of how the device switches between frequencies.

Triggering on changes in the RF signal (optional)

Whether you need to find the source of electromagnetic interference or understand the behavior of a VCO, hardware triggers for RF versus time make it easy to isolate, capture, and understand the RF signal behavior. Trigger on edges, pulse widths, and timeout behavior of RF magnitude vs. time and RF frequency vs. time.

Comprehensive vector signal analysis with SignalVu-PC (optional)

When analysis needs go beyond the basic spectrum, amplitude, frequency, and phase vs. time you can employ the SignalVu-PC vector signal analysis application. This enables in-depth transient RF signal analysis, detailed RF pulse characterization, and comprehensive analog and digital RF modulation analysis.

To enable the SignalVu-PC application on your 5 Series MSO Oscilloscope, three options are required.

1. To run the application on the instrument, the Windows SSD (5B-WIN) needs to be installed in the oscilloscope.
2. The Spectrum View RF versus time traces option (5-SV-RFVT) needs to be installed in the oscilloscope to enable I/Q data transfer.
3. The Connect (CONxx-SVPC) license needs to be installed on the SignalVu-PC to enable base features of application, which includes 16+ RF measurements and displays.

The RF digital down converters and integrated measurement engines behind each channel have your complex mixed-signal and mixed-domain analysis needs covered in one instrument.

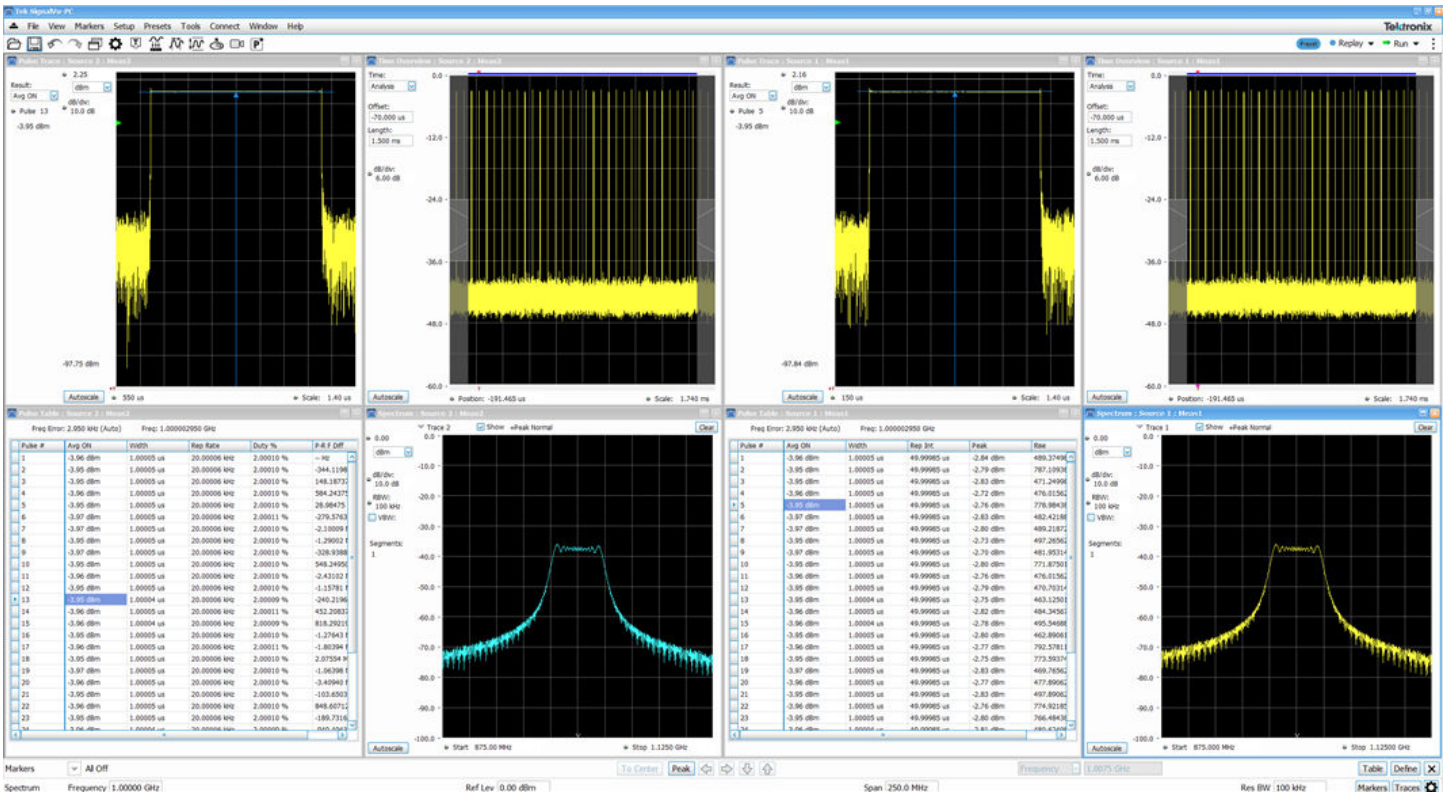


Pulse analysis on SignalVu-PC running on a 5 Series B MSO

Advanced pulse analysis (optional)

The per-channel DDC available on the 5 Series MSO offers the ability to analyze RF signals independently on all channels, including configuration of separate timing, triggering and measurements. This capability extends to evaluation of time, frequency and modulation domains simultaneously when using the SignalVu-PC VSA software.

The Advanced Pulse Analysis Option (SVPNL-SVPC) allows you to analyze multiple radar signals across measurement channels on a common timebase with independent or coordinated controls and measurements.



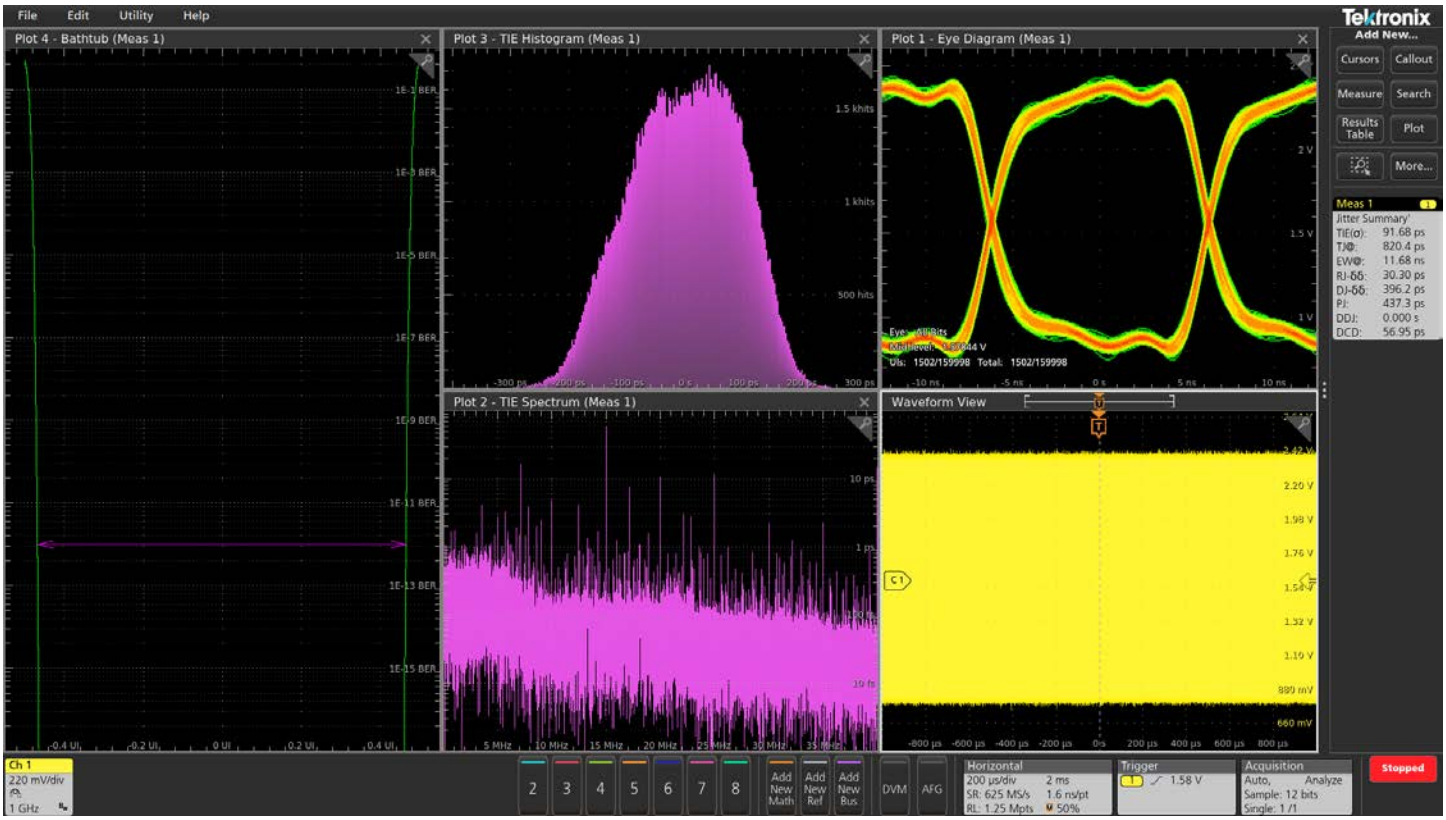
The advanced pulse analysis application in SignalVu-PC offers up to 31 automated pulse parameter measurements, statistics, and displays for analysis on up to 8 signal sources simultaneously, streamlining workflows and boosting efficiency.

Jitter analysis (optional)

The 5 Series MSO has seamlessly integrated the DPOJET Essentials jitter and eye pattern analysis software package, extending the oscilloscope's capabilities to take measurements over contiguous clock and data cycles in a single-shot real-time acquisition. This enables measurement of key jitter and timing analysis parameters such as Time Interval Error and Phase Noise to help characterize possible system timing issues.

Analysis tools, such as plots for time trends and histograms, quickly show how timing parameters change over time, and spectrum analysis quickly shows the precise frequency and amplitude of jitter and modulation sources.

Option 5-DJA adds additional jitter analysis capability to better characterize your device's performance. The 31 additional measurements provide comprehensive jitter and eye-diagram analysis and jitter decomposition algorithms, enabling the discovery of signal integrity issues and their related sources in today's high-speed serial, digital, and communication system designs. Option 5-DJA also provides eye diagram mask testing for automated pass/fail testing.



The unique Jitter Summary provides a comprehensive view of your device's performance in a matter of seconds.

Power analysis (optional)

The 5 Series MSO has also integrated the optional power analysis package into the oscilloscope automatic measurement system to enable quick and repeatable analysis of power quality, input capacitance, inrush current, harmonics, switching loss, safe operating area (SOA), modulation, ripple, Magnetic measurements, efficiency, amplitude and timing measurements, slew rate (dv/dt and di/dt), Control Loop Response (Bode Plot), Power Supply Rejection Ratio (PSRR), and inverter ride-through (LVRT, HVRT) measurements.

Measurement automation optimizes the measurement quality and repeatability at the touch of a button, without the need for an external PC or complex software setup.



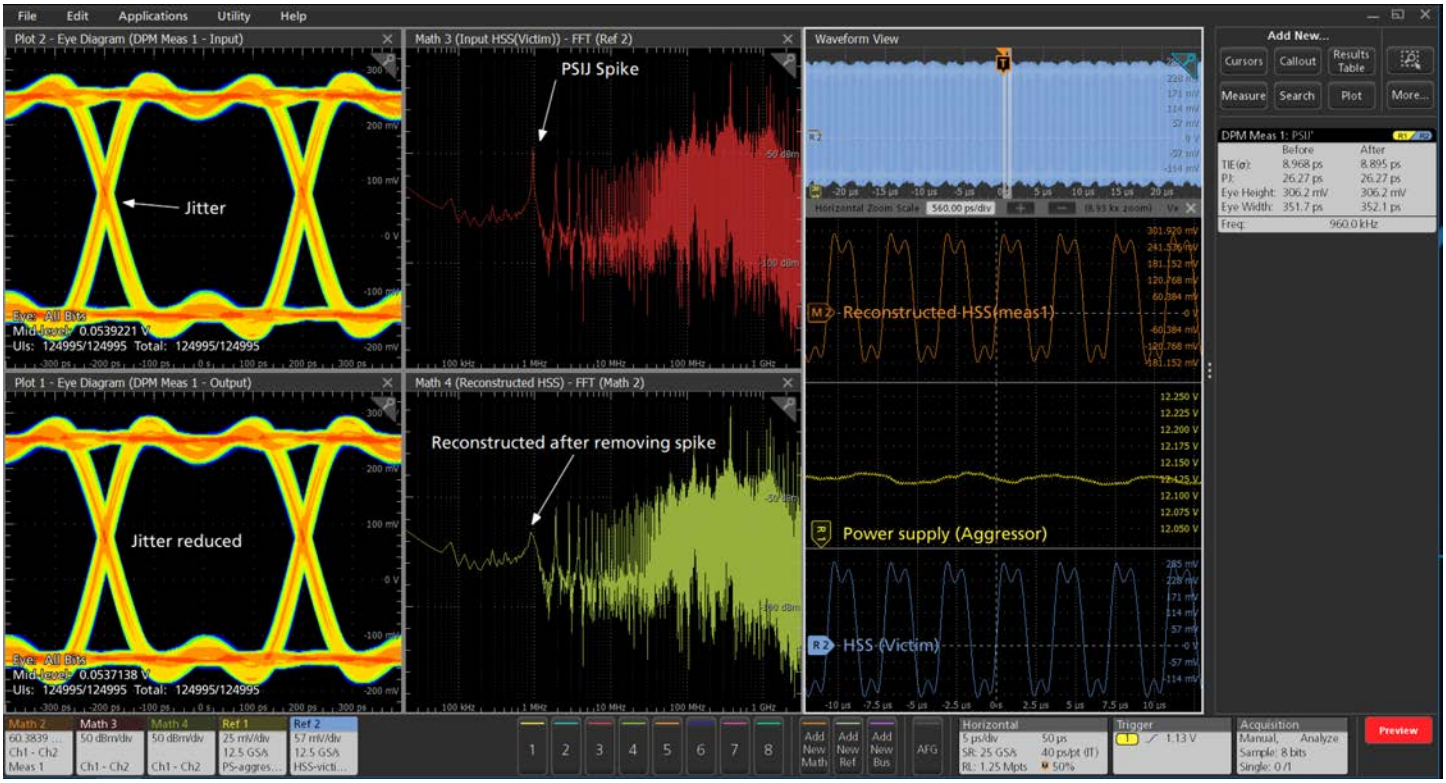
The Power Analysis measurements display a variety of waveforms and plots.

Digital power management (optional)

The Digital Power Management and analysis (DPM) software option provides automated power rail measurements for Power Integrity Analysis on the 5 Series MSO oscilloscopes. The solution enables both simultaneous analysis of multiple power rails (using power rail probes) and sequencing of measurements (using passive probes). The solution is designed with the user workflow in mind to help design engineers meet their time-to-market needs. It also generates an automated report that includes measurements, test results, and plot images.

Key measurements include ripple, ripple-on-ripple, power sequencing, jitter analysis, transient analysis, power integrity and signal integrity analysis.

The Power Supply Induced Jitter (PSIJ) measurement acts as a tool that gives insights and confidence to signal integrity engineers to model the effects of hardware changes, to test their effectiveness before actually making them. The measurement provides essential results such as eye height, eye width, PJ, and TIE before and after filtering.

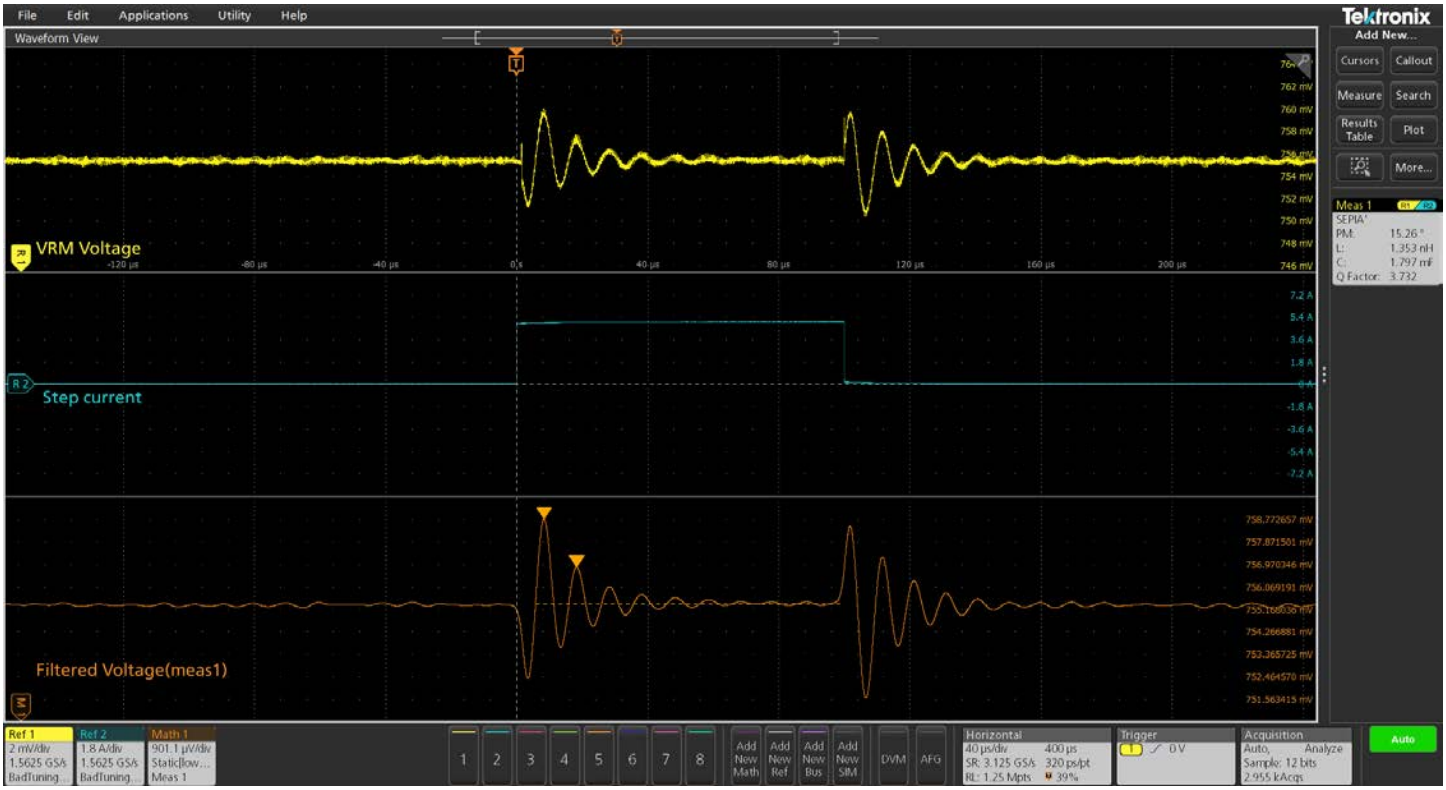


Power Distribution Network (optional)

The 5 Series MSO has also integrated the optional power distribution package into the oscilloscope automatic measurement system to enable quick and repeatable analysis of Control Loop Response (Bode Plot), Power Supply Rejection Ratio (PSRR), two-Port Impedance, Stability Evaluation for Power Integrity Analysis (SEPIA by Picotest), and Power Supply Induced Jitter (PSIJ).

It provides performance using multi-channel and multi-domain signal views, helping power integrity engineers identify resonances, evaluate transient response, and ensure stable regulator operation under real-world conditions.

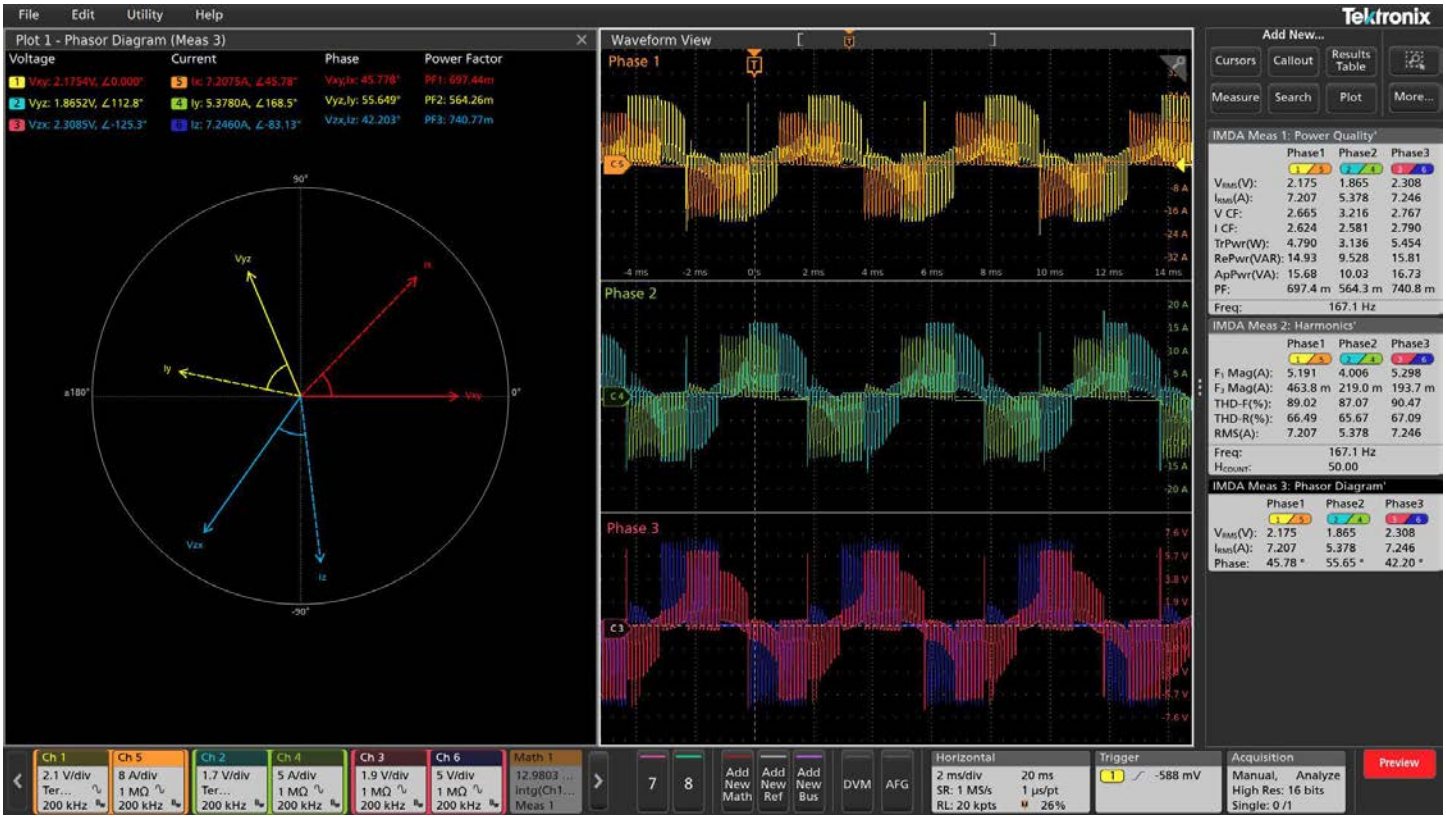
PDN characterization ensures stable, low-impedance power delivery for high-performance electronic systems. It is increasingly important in AI/data centers, computing platforms, automotive, and industrial applications where power integrity directly impacts system performance and reliability.



Integrated SEPIA analysis captures the power rail's response (yellow) to a dynamic step load (cyan). A filtered voltage response (orange) is analyzed to yield phase margin. In this example the phase margin is low, indicating an unstable voltage regulator.

Inverter Motor Drive Analysis (optional)

On the left is a Phasor Diagram displaying the phase and magnitude of current and voltage measurements for all three phases of power. In the results badge on the right, are the results from the automated measurements of power quality, power harmonics and the phasor diagram.



Phasor diagram

During the design and validation of systems that utilize three-Phase power, it can be difficult to correlate control systems and power electronics with the performance of the overall system. The IMDA can be used on six and eight channel versions of the 5 Series MSO (MSO56B and MSO58B) to analyze digital control and power electronics sub-systems.

This will give you deeper insights enabling you to debug the design, efficiency and reliability of:

- Three-Phase Power inverters, converters, power supplies and Automotive three-Phase designs for DC-AC topology
- Motors (brushless AC, brushless DC, induction, permanent magnet, universal, stepper, rotor)
- Drives (AC, DC, variable frequency, servo)

The automated measurements that are included with 5-IMDA are:

- Input analysis
  - Power Quality with Phasor Diagram
  - Harmonics
  - Input Voltage
  - Input Current
  - Input Power
- Ripple analysis
  - Line Ripple
  - Switching Ripple
- Output analysis
  - Phasor Diagram
  - Efficiency
  - Mechanical Power
  - System Efficiency
- Wiring configurations
  - 1 Volt/1 Current - 1P2W
  - 2 Volt/2 Current - 1P3W
  - 2 Volt/2 Current – 3P3W
  - 3 Volt/3 Current – 3P3W
  - 3 Volt/3 Current – 3P4W

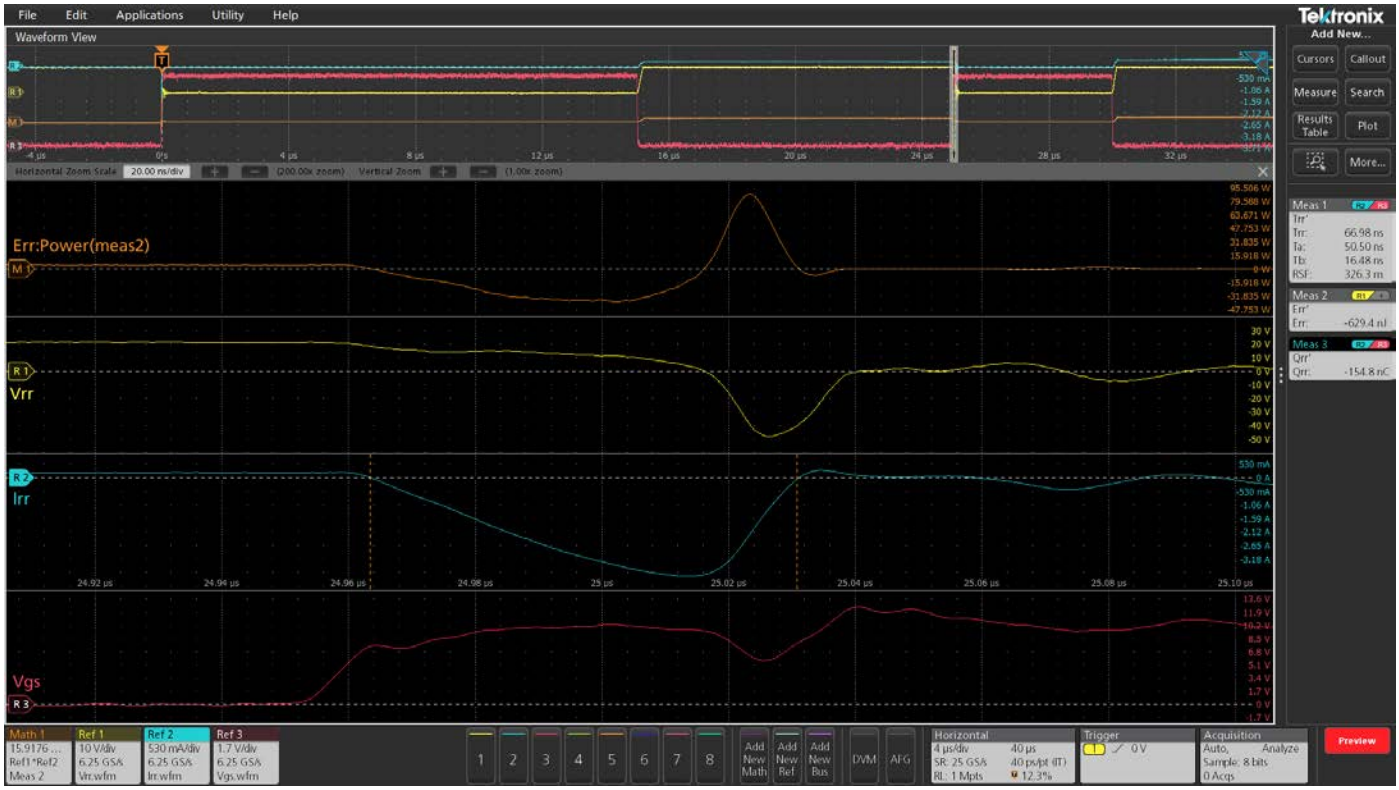
With option 5-IMDA-DQ0 gain the ability to transform the three-phase AC time domain waveforms into DC signals that are graphically represented as rotating coordinates on a phasor plot.

Wide Bandgap Double Pulse Test (optional)

The Wide Bandgap Double Pulse Test application offers precise Wide Bandgap measurements that make device and the system validation easier. It has an ability to test SiC or GaN devices and also Si MOSFET and IGBTs. The application is compatible with all the Tektronix VPI probes and when used with the Tektronix IsoVu™ probes, it helps uncover all the hidden artifacts of SiC or GaN devices at the circuit level. The application offers automated measurements as per the JEDEC and IEC standards. It offers unique features such as per-cycle analysis with annotation, flexibility with custom reference level settings, configurable integration points, and power preset that can be set based on the DUT designs.

Following measurements are performed:

- Low side switching parameters and High side diode reverse recovery measurements
- Low side and High-side switching parameters
- RDS(on) Dynamic Resistance
- Parallel topology analysis



The image shows diode reverse recovery measurements with reverse recovery current and voltage captured on the high-side

Designed with your needs in mind

Connectivity

The 5 Series MSO contains a number of ports which you can use to connect the instrument to a network, directly to a PC, or to other test equipment.

Two USB 2.0 and one USB 3.0 host ports on the front and four more USB host ports (two 2.0, two 3.0) on the rear panel enable easy transfer of screenshots, instrument settings, and waveform data to a USB mass storage device. A USB mouse and keyboard can also be attached to USB host ports for instrument control and data entry.

- The rear panel USB Device port is useful for controlling the oscilloscope remotely from a PC.
- The standard 10/100/1000BASE-T Ethernet port on the rear of the instrument enables easy connection to networks and provides LXI Core 2011 compatibility.
- The DVI-D, DisplayPort and VGA ports on the rear of the instrument let you duplicate the instrument display on an external monitor or projector.



The I/O you need to connect the 5 Series MSO to the rest of your design environment.

Upgrade Automated Test Equipment (ATE) systems quickly and smoothly

Anyone working closely with automated test systems knows that moving to a new model or platform can be painful. Modifying an existing codebase for a new product can be prohibitively expensive and complicated. Now there's a solution.

All 5 Series MSOs include a Programmatic Interface (PI) Translator. When enabled, the PI Translator acts as an intermediate layer between your test application and the oscilloscope. It recognizes a subset of legacy commands from the popular DPO/MSO5000B and DPO7000C platforms and translates them on the fly into supported commands for the 5 Series MSO. The Translator interface is designed to be human-readable and easily extensible, which means that you can customize its behavior to minimize the amount of effort required when transitioning to your new oscilloscope.

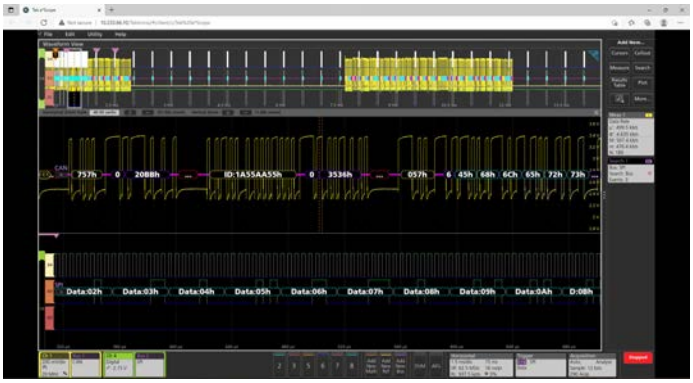
Remote operation to improve collaboration

Want to collaborate with a design team on the other side of the world?

The included e*Scope® capability enables fast control of an oscilloscope running the Embedded Operating System over a network connection. This can be viewed from any PC or device through a standard web browser.

Simply enter the IP address or network name of the oscilloscope and a web page will be served to the browser. Control the oscilloscope remotely in the exact same way that you do in-person using the built-in touchscreen. Alternatively for oscilloscopes with the Microsoft Windows 10 Operating System, you can use Windows Remote Desktop™ to connect directly to the instrument and control it remotely.

The industry-standard TekVISA™ protocol interface is included for using and enhancing Windows applications for data analysis and documentation. IVI-COM instrument drivers are included to enable easy communication with the oscilloscope using LAN or USBTMC connections from an external PC.



e*Scope provides simple remote viewing and control using common web browsers.

PC-based analysis and remote connection to your oscilloscope

Get the analysis capability of an award-winning oscilloscope on your PC. Analyze waveforms anywhere, anytime. The basic license lets you view and analyze waveforms, perform many types of measurements and decode the most common serial buses - all while remotely accessing your oscilloscope. Advanced license options add capabilities such as multi-scope analysis, more serial bus decoding options, jitter analysis, and power measurements.



TekScope PC analysis software runs on a Windows computer with the same award-winning user experience as the 4, 5, and 6 Series MSOs.

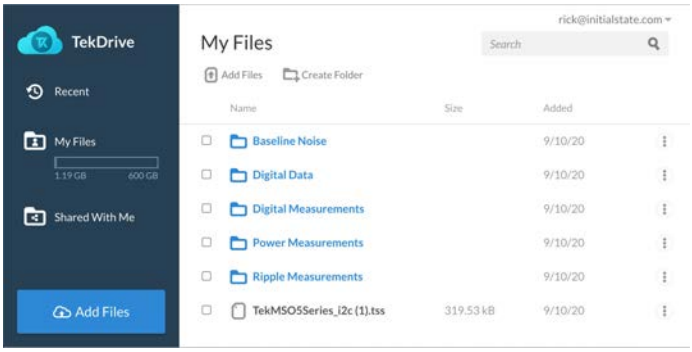
Key features of the TekScope PC analysis software include:

- Connect to the instrument remotely and enable low-latency waveform updates using high-speed TekHSI data transfers.
- Share the data remotely with your colleagues so that they can perform analysis and make measurements as if they were sitting in front of the oscilloscope
- Synchronize waveforms from the multiple oscilloscopes in real-time

- Perform advanced analysis even if your oscilloscope is not equipped with TekScope PC analysis software
- Recall Tektronix oscilloscope sessions and waveform files from the equipment made by Tektronix and other vendors.
- Waveform file formats supported include .wfm, .isf, .csv, .h5, .tr0, .trc, and .bin

TekDrive collaborative test and measurement workspace

Using TekDrive, you can upload, store, organize, search, download, and share any file type from any connected device. TekDrive is natively integrated into the instrument for seamless sharing and recalling of files - no USB stick is required. Analyze and explore standard files like .wfm, .isf, .tss, and .csv, directly in a browser with smooth interactive waveform viewers. TekDrive is purpose built for integration, automation, and security.



TekDrive collaborative workspace - save files directly from your instrument and share across your team.

Arbitrary Function Generator (AFG)

The instrument contains an optional integrated arbitrary/function generator, perfect for simulating sensor signals within a design or adding noise to signals to perform margin testing. The integrated function generator provides output of predefined waveforms up to 100 MHz for sine, square, pulse, ramp/triangle, DC, noise, sin(x)/x (Sinc), Gaussian, Lorentz, exponential rise/fall, Haversine, and cardiac. The AFG can load waveform records up to 128 k points in size from an internal file location or a USB mass storage device.

The AFG feature is compatible with Tektronix's ArbExpress PC-based waveform creation and editing software, making creation of complex waveforms fast and easy.

Digital Voltmeter (DVM) and Trigger Frequency Counter

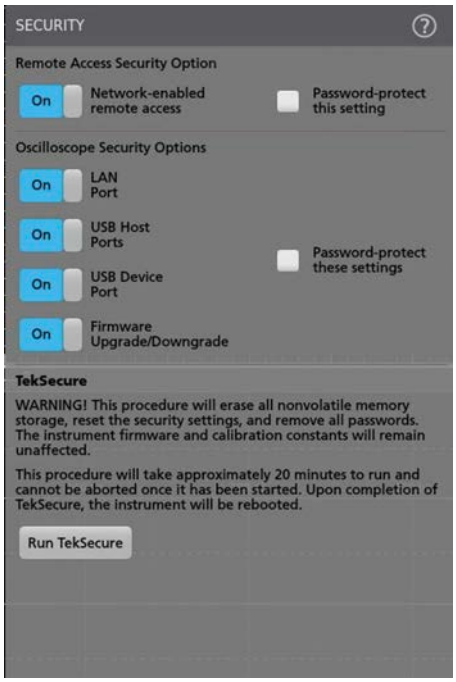
The instrument contains an integrated 4-digit digital voltmeter (DVM) and 8-digit Trigger Frequency Counter. Any of the analog inputs can be a source for the voltmeter, using the same probes that are already attached for general oscilloscope usage. The Trigger Frequency Counter provides a very precise readout of the frequency of the trigger event on which you're triggering.

Both the DVM and Trigger Frequency Counter are available for free and are activated when you register your product.

Enhanced security

The 5 Series B MSO provides you with the option to protect company data through the Security menu. This includes the option to restrict access to the instrument by password-protecting remote network access, I/O ports, and firmware updates to ensure the security of the data. By default, the oscilloscope disables remote access on initial use and gives you the option to enable remote access with or without a password.

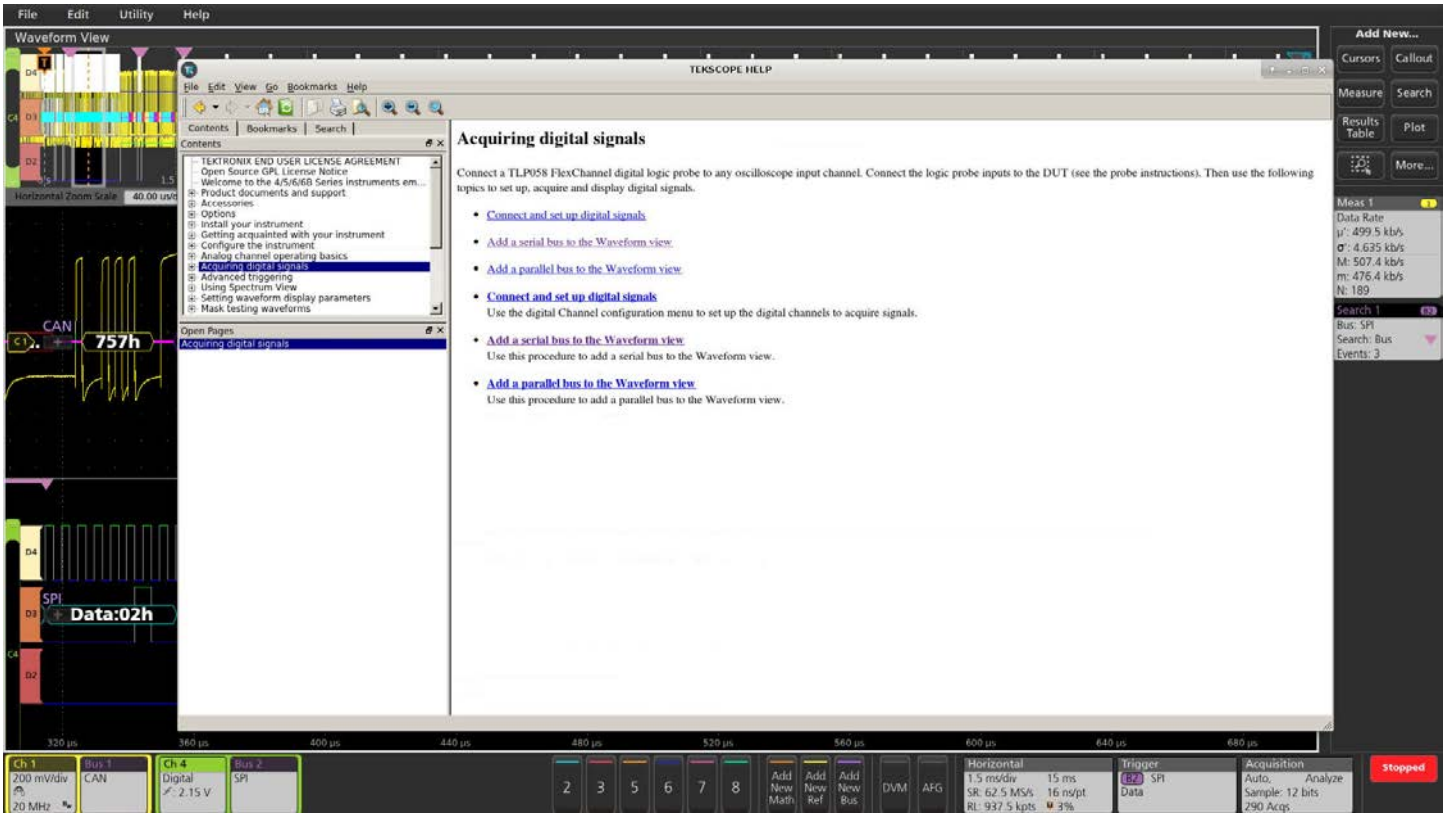
To clear user data, run TekSecure from the menu. Sanitize the oscilloscope by removing the SSD from the bottom of the instrument.



Help when you need it

Several helpful resources are included so you can get your questions answered rapidly without having to find a manual or go to a website:

- Graphical images and explanatory text are used in numerous menus to provide quick feature overviews.
- All menus include a question mark icon in the upper right that takes you directly to the portion of the integrated help system that applies to that menu.
- A short user interface tutorial is included in the Help menu for new users to come up to speed on the instrument in a matter of a few minutes.



Integrated help answers your questions rapidly without having to find a manual or go to the internet.

Specifications

All specifications are guaranteed and apply to all models unless noted otherwise.

Model overview

	MSO54B	MSO56B	MSO58B
FlexChannel inputs	4	6	8
Maximum analog channels	4	6	8
Maximum digital channels (with optional logic probes)	32	48	64
Bandwidth (calculated rise time)	350 MHz (1.15 ns), 500 MHz (800 ps), 1 GHz (400 ps), 2 GHz (225 ps)		
DC Gain Accuracy	**< 2 GHz models:**	50 Ω: ±1.2%, (±2.5% at ≤ 1 mV/div) 1 MΩ: ±1.0%, (±2.0% at ≤ 1 mV/div)	
	2 GHz models:	50 Ω: ±1.2%, (±2.5% at ≤ 1 mV/div) 1 MΩ: ±1.0%, (±2.0% at ≤ 1 mV/div)	
ADC Resolution	12 bits		
Vertical Resolution	8 bits @ 6.25 GS/s 12 bits @ 3.125 GS/s 13 bits @ 1.25 GS/s (High Res) 14 bits @ 625 MS/s (High Res) 15 bits @ 312.5 MS/s (High Res) 16 bits @ ≤125 MS/s (High Res)		
Sample Rate	6.25 GS/s on all analog / digital channels (160 ps resolution)		
Record Length (std.)	62.5 Mpoints on all analog / digital channels		
Record Length (opt.)	125, 250, or 500 Mpoints on all analog / digital channels		
Waveform Capture Rate	>500,000 wfms/s		
Arbitrary/Function Generator (opt.)	13 predefined waveform types with up to 100 MHz output		
DVM	4-digit DVM (free with product registration)		
Trigger Frequency Counter	8-digit frequency counter (free with product registration)		

NOTE: Warranted specification, immediately after SPC, add 2% for every 5 °C change in ambient temperature.

NOTE: Warranted specification, immediately after SPC, add 1% for every 5 °C change in ambient temperature. At full scale is sometimes used to compare to other manufacturers.

Vertical system

Bandwidth selections

50 Ω: 20 MHz, 250 MHz, and the full bandwidth value of your model

1 MΩ: 20 MHz, 250 MHz, 500 MHz

Input coupling

DC, AC

Input impedance

50 Ω ± 1%

1 MΩ ± 1% with 13.0 pF ± 1.5 pF (< 2 GHz models)

1 MΩ ± 1% with 14.5 pF ± 1.5 pF (2 GHz models)

Input sensitivity range

1 MΩ

500 µV/div to 10 V/div in a 1-2-5 sequence

50 Ω

500 µV/div to 1 V/div in a 1-2-5 sequence

500 µV/div is a 2X digital zoom of 1 mV/div

Maximum input voltage

50 Ω: 5 VRMS, with peaks ≤ ±20 V (DF ≤ 6.25%)

1 MΩ: 300 VRMS , CAT II

Derate at 20 dB/decade between 4.5 MHz and 45 MHz; derate 14 dB/decade between 45 MHz and 450 MHz. Above 450 MHz, 5.5 VRMS

Effective bits (ENOB), typical

< 2 GHz models, High Res mode, 50 Ω, 10 MHz input with 90% full screen

Bandwidth	ENOB
1 GHz	7.6
500 MHz	7.9
350 MHz	8.2
250 MHz	8.1
20 MHz	8.9

2 GHz models, High Res mode, 50 Ω, 10 MHz input with 90% full screen

Bandwidth	ENOB
1 GHz	7.0
250 MHz	7.8
20 MHz	8.7

Random noise, RMS, typical

2 GHz models, High Res mode (RMS)

2 GHz models	50 Ω			1 MΩ		
V/div	**1 GHz**	**250 MHz**	**20 MHz**	**500 MHz**	**250 MHz**	**20 MHz**
≤1 mV/div	66.8 µV	66.8 µV	27.2 µV	208 µV	117 µV	64.6 µV
2 mV/div	96.9 µV	77.5 µV	28.5 µV	224 µV	117 µV	66.7 µV
5 mV/div	202 µV	108 µV	37.4 µV	238 µV	133 µV	68.7 µV
10 mV/div	275 µV	147 µV	56.1 µV	277 µV	173 µV	83.6 µV
20 mV/div	469 µV	251 µV	106 µV	416 µV	278 µV	125 µV
50 mV/div	1.10 mV	589 µV	253 µV	916 µV	620 µV	271 µV
100 mV/div	2.75 mV	1.47 mV	602 µV	1.90 mV	1.36 mV	603 µV
1 V/div	18.4 mV	10.8 mV	4.68 mV	20.3 mV	14.6 mV	6.54 mV

NOTE: Bandwidth in 50 Ω is limited to 175 MHz at ≤ 1 mV/div, 350 MHz at 2 mV/div, and 1.5 GHz at 5 mV/div.

1 GHz, 500 MHz, 350 MHz models, High Res mode (RMS), typical

< 2 GHz models	50 Ω					1 MΩ			
V/div	**1 GHz**	**500 MHz**	**350 MHz**	**250 MHz**	**20 MHz**	**500 MHz**	**350 MHz**	**250 MHz**	**20 MHz**
≤1 mV/div	254 µV	198 µV	141 µV	118 µV	70.0 µV	189 µV	143 µV	118 µV	64.8 µV
2 mV/div	255 µV	198 µV	143 µV	121 µV	70.4 µV	194 µV	145 µV	121 µV	66.0 µV
5 mV/div	262 µV	202 µV	150 µV	133 µV	72.8 µV	196 µV	152 µV	130 µV	69.6 µV
10 mV/div	283 µV	218 µV	169 µV	158 µV	79.8 µV	212 µV	167 µV	154 µV	78.2 µV
20 mV/div	357 µV	273 µV	222 µV	223 µV	102 µV	269 µV	214 µV	223 µV	104 µV
50 mV/div	677 µV	516 µV	436 µV	460 µV	196 µV	490 µV	410 µV	480 µV	207 µV

< 2 GHz models	50 Ω					1 MΩ			
100 mV/div	1.61 mV	1.23 mV	1.02 mV	1.04 mV	464 µV	1.16 mV	964 µV	1.05 mV	475 µV
1 V/div	13.0 mV	9.88 mV	8.41 mV	8.94 mV	3.77 mV	13.6 mV	10.6 mV	11.1 mV	5.47 mV

NOTE: Bandwidth at 500 µV/div is limited to 250 MHz in 50 Ω.

Position range

±5 divisions

Offset ranges, maximum

Input signal cannot exceed maximum input voltage for the 50 Ω input path.

Volts/div Setting	Maximum offset range, 50 Ω Input
500 µV/div - 99 mV/div	±1 V
100 mV/div - 1 V/div	±10 V

2 GHz models

Volts/div Setting	Maximum offset range, 50 Ω Input
500 µV/div - 50 mV/div	±1 V
100 mV/div - 1 V/div	± (-10 * (Volts/div Setting) + 1.5 V)
51 mV/div - 99 mV/div	±10 V
501 mV/div - 1 V/div	± (-10 * (Volts/div Setting) + 15 V)

Volts/div Setting	Maximum offset range, 50 Ω Input
500 µV/div - 63 mV/div	±1 V
64 mV/div - 999 mV/div	±10 V
1 V/div - 10 V/div	±100 V

≤ 1 GHz models

Volts/div Setting	Maximum offset range	
	50 Ω Input	1 MΩ Input
500 µV/div - 63 mV/div	±1 V	±1 V
64 mV/div - 999 mV/div	±10 V	±10 V
1 V/div - 10 V/div	±10 V	±100 V

Offset accuracy

±(0.005 X | offset - position | + DC balance)

Crosstalk (channel isolation), typical

≥ 200:1 up to the rated bandwidth for any two channels having equal Volts/div settings

DC balance

0.1 div with DC-50 Ω oscilloscope input impedance (50 Ω BNC terminated)

0.2 div at 1 mV/div with DC-50 Ω oscilloscope input impedance (50 Ω BNC terminated)

0.4 div at 500 µV/div with DC-50 Ω oscilloscope input impedance (50 Ω BNC terminated)

0.2 div with DC-1 MΩ oscilloscope input impedance (50 Ω BNC terminated)

0.4 div at 500 µV/div with DC-1 MΩ scope input impedance (50 Ω BNC terminated)

Vertical system – digital channels

Number of channels

8 digital inputs (D7-D0) per installed TLP058 (traded off for one analog channel)

Vertical resolution

1 bit

Maximum input toggle rate

500 MHz

Minimum detectable pulse width, typical

300 ps

Thresholds

One threshold per digital channel

Threshold range

±40 V

Threshold resolution

10 mV

Threshold accuracy

± [100 mV + 3% of threshold setting after calibration]

Input hysteresis, typical

100 mV at the probe tip

Input dynamic range, typical

30 V_{pp} for F_{in} ≤ 200 MHz, 10 V_{pp} for F_{in} > 200 MHz

Absolute maximum input voltage, typical

±42 V peak

Minimum voltage swing, typical

400 mV peak-to-peak

Input impedance, typical

100 kΩ

Probe loading, typical

2 pF

Horizontal system

Time base range

200 ps/div to 1,000 s/div

Sample rate range

1.5625 S/s to 6.25 GS/s (real time)

12.5 GS/s to 500 GS/s (interpolated)

Record length range

Standard

1 kpoints to 31.25 Mpoints in single sample increments

Optional 5-RL-125M

125 Mpoints

Optional 5-RL-250M

250 Mpoints

Optional 5-RL-500M

500 Mpoints

Aperture uncertainty

≤ 0.450 ps + (1 * 10-11 * Measurement Duration)RMS, for measurements having duration ≤ 100 ms

Timebase accuracy

±2.5 x 10-6 over any ≥1 ms time interval

Description	Specification
Factory Tolerance	±12 ppb; at calibration, 25 °C ambient, over any ≥1 ms interval
Temperature stability	±20 ppb across the full operating range of 0 °C to 50 °C, after a sufficient soak time at the temperature; tested at operating temperatures
Crystal aging	±300 ppb; frequency tolerance change at 25 °C over a period of 1 year

Delta-time measurement accuracy, nominal

$$DTA_{pp}(typical) = 10 \times \sqrt{\left(\frac{N}{SR_1}\right)^2 + \left(\frac{N}{SR_2}\right)^2 + \left(0.450\ ps + \left(1 \times 10^{-11} \times t_p\right)\right)^2} + TBA \times t_p$$

$$DTA_{RMS} = \sqrt{\left(\frac{N}{SR_1}\right)^2 + \left(\frac{N}{SR_2}\right)^2 + \left(0.450ps + \left(1 \times 10^{-11} \times t_p\right)\right)^2} + TBA \times t_p$$

(assume edge shape that results from Gaussian filter response)

The formula to calculate delta-time measurement accuracy (DTA) for a given instrument setting and input signal assumes insignificant signal content above Nyquist frequency, where:

SR_1 = Slew Rate (1st Edge) around 1st point in measurement

SR_2 = Slew Rate (2nd Edge) around 2nd point in measurement

N = input-referred guaranteed noise limit (V_{RMS})

TBA = time-base accuracy or reference frequency error

t_p = delta-time measurement duration (sec)

Maximum duration at highest sample rate

10 ms (standard record length) or 80 ms (maximum optional record length)

Time base delay time range

-10 divisions to 5,000 s

Deskew range

-125 ns to +125 ns with a resolution of 40 ps

Delay between analog channels, full bandwidth, typical

≤ 100 ps for any two channels with input impedance set to 50 Ω, DC coupling with equal Volts/div or above 10 mV/div

Delay between analog and digital FlexChannels, typical

< 1 ns when using a TLP058 and a passive probe matching the bandwidth of the scope, with no bandwidth limits applied

Delay between any two digital FlexChannels, typical

320 ps

Delay between any two bits of a digital FlexChannel, typical

200 ps

Trigger system

Trigger modes

Auto, Normal, and Single

Trigger coupling

DC, HF Reject (attenuates > 50 kHz), LF Reject (attenuates < 50 kHz), noise reject (reduces sensitivity)

Trigger holdoff range

0 ns to 10 seconds

Edge-type trigger sensitivity, DC coupled, typical

Path	Range	Specification
1 MΩ path (all models)	0.5 mV/div to 0.99 mV/div	5 mV from DC to instrument bandwidth
	≥ 1 mV/div	The greater of 5 mV or 0.7 div from DC to lesser of 500 MHz or instrument BW, and 6 mV or 0.8 div from > 500 MHz to instrument bandwidth
50 Ω path, 1 GHz, 500 MHz, 350 MHz models		The greater of 5.6 mV or 0.7 div from DC to the lesser of 500 MHz or instrument BW, and 7 mV or 0.8 div from > 500 MHz to instrument bandwidth
50 Ω path, 2 GHz models	0.5 mV/div to 0.99 mV/div	3.0 div from DC to instrument bandwidth
	1 mV/div to 9.98 mV/div	1.5 divisions from DC to instrument bandwidth
	≥ 10 mV/div	< 1.0 division from DC to instrument bandwidth
Line		Fixed

Trigger jitter, typical

≤ 5 psRMS for sample mode and edge-type trigger

≤ 7 psRMS for edge-type trigger and FastAcq mode

≤ 40 psRMS for non edge-type trigger modes

Trigger level ranges

This specification applies to logic and pulse thresholds.

Source	Range
Any Channel	±5 divs from center of screen
Aux In Trigger	±5 V
Line	Fixed at about 50% of line voltage

Trigger types

Trigger Type	Description
Edge	Positive, negative, or either slope on any channel. Coupling includes DC, AC, noise reject, HF reject, and LF reject.

Trigger Type	Description
Pulse Width	Trigger on width of positive or negative pulses. Event can be time- or logic-qualified.
Timeout	Trigger on an event which remains high, low, or either, for a specified time period. Event can be logic-qualified.
Runt	Trigger on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again. Event can be time- or logic-qualified.
Window	Trigger on an event that enters, exits, stays inside or stays outside of a window defined by two user-adjustable thresholds. Event can be time- or logic-qualified.
Logic	Trigger when logic pattern goes true, goes false, or occurs coincident with a clock edge. Pattern (AND, OR, NAND, NOR) specified for all input channels defined as high, low, or don't care. Logic pattern going true can be time-qualified.
Setup and Hold	Trigger on violations of both setup time and hold time between clock and data present on any input channels.
Rise/Fall Time	Trigger on pulse edge rates that are faster or slower than specified. Slope may be positive, negative, or either. Event can be logic-qualified.
Video (option 5-VID):	Trigger on all lines, odd, even, or all fields of NTSC, PAL, and SECAM video signals.
Sequence	Trigger on B event X time or N events after A trigger with a reset on C event. In general, A and B trigger events can be set to any trigger type with a few exceptions: logic qualification is not supported, if A event or B event is set to Setup and Hold, then the other must be set to Edge, and Ethernet and High Speed USB (480 Mbps) are not supported.
Visual trigger	Qualifies standard triggers by scanning all waveform acquisitions and comparing them to on-screen areas (geometric shapes). An unlimited number of areas can be defined with In, Out, or Don't Care as the qualifier for each area. A boolean expression can be defined using any combination of visual trigger areas to further qualify the events that get stored into acquisition memory. Shapes include rectangle, triangle, trapezoid, hexagon and user-defined.
Parallel Bus	Trigger on a parallel bus data value. Parallel bus can be from 1 to 32 bits (from the digital and analog channels) in size. Supports Binary and Hex radices.
I2C Bus (option 5-SREMBD)	Trigger on Start, Repeated Start, Stop, Address (7 or 10 bit), Data, or Address and Data on I2C buses up to 10 Mb/s.
I3C Bus (option 5-SRI3C)	Trigger on Start, Repeated Start, Stop, Address, Data, I3C SDR Direct, I3C SDR Broadcast, Missing ACK, T-Bit Error, Broadcast Address Error, Hot-Join, HDR Restart, HDR Exit on I3C buses up to 10 Mb/s.
SPI Bus (option 5-SREMBD)	Trigger on Slave Select, Idle Time, or Data (1-16 words) on SPI buses up to 20 Mb/s.
RS-232/422/485/UART Bus (option 5-SRCOMP)	Trigger on Start Bit, End of Packet, Data, and Parity Error up to 15 Mb/s.
CAN Bus (option 5-SRAUTO)	Trigger on Start of Frame, Type of Frame (Data, Remote, Error, or Overload), Identifier, Data, Identifier and Data, End Of Frame, Missing Ack, and Bit Stuff Error on CAN buses up to 1 Mb/s.
CAN FD Bus (option 5-SRAUTO)	Trigger on Start of Frame, Type of Frame (Data, Remote, Error, or Overload), Identifier (Standard or Extended), Data (1-8 bytes), Identifier and Data, End Of Frame, Error (Missing Ack, Bit Stuffing Error, FD Form Error, Any Error) on CAN FD buses up to 16 Mb/s.
LIN Bus (option 5-SRAUTO)	Trigger on Sync, Identifier, Data, Identifier and Data, Wakeup Frame, Sleep Frame, and Error on LIN buses up to 1 Mb/s.
FlexRay Bus (option 5-SRAUTO)	Trigger on Start of Frame, Indicator Bits (Normal, Payload, Null, Sync, Startup), Frame ID, Cycle Count, Header Fields (Indicator Bits, Identifier, Payload Length, Header CRC, and Cycle Count), Identifier, Data, Identifier and Data, End Of Frame, and Errors on FlexRay buses up to 10 Mb/s.
SENT Bus (option 5-SRAUTOSEN)	Trigger on Start of Packet, Fast Channel Status and Data, Slow Channel Message ID and Data, and CRC Errors.

Trigger Type	Description
SPMI Bus (option 5-SRPM)	Trigger on Sequence Start Condition, Reset, Sleep, Shutdown, Wakeup, Authenticate, Master Read, Master Write, Register Read, Register Write, Extended Register Read, Extended Register Write, Extended Register Read Long, Extended Register Write Long, Device Descriptor Block Master Read, Device Descriptor Block Slave Read, Register 0 Write, Transfer Bus Ownership, and Parity Error.
USB 2.0 LS/FS/HS Bus (option 5-SRUSB2)	Trigger on Sync, Reset, Suspend, Resume, End of Packet, Token (Address) Packet, Data Packet, Handshake Packet, Special Packet, Error on USB buses up to 480 Mb/s.
Ethernet Bus (option 5-SRENET)	Trigger on Start of Frame, MAC Addresses, MAC Q-tag, MAC Length/Type, MAC Data, IP Header, TCP Header, TCP/IPV4 Data, End of Packet, and FCS (CRC) Error on 10BASE-T and 100BASE-TX buses.
Audio (I2S, LJ, RJ, TDM) Bus (option 5-SRAUDIO)	Trigger on Word Select, Frame Sync, or Data. Maximum data rate for I2S/LJ/RJ is 12.5 Mb/s. Maximum data rate for TDM is 25 Mb/s.
MIL-STD-1553 Bus (option 5-SRAERO)	Trigger on Sync, Command (Transmit/Receive Bit, Parity, Subaddress / Mode, Word Count / Mode Count, RT Address), Status (Parity, Message Error, Instrumentation, Service Request, Broadcast Command Received, Busy, Subsystem Flag, Dynamic Bus Control Acceptance, Terminal Flag), Data, Time (RT/IMG), and Error (Parity Error, Sync Error, Manchester Error, Non-contiguous Data) on MIL-STD-1553 buses.
ARINC 429 Bus (option 5-SRAERO)	Trigger on Word Start, Label, Data, Label and Data, Word End, and Error (Any Error, Parity Error, Word Error, Gap Error) on ARINC 429 buses up to 1 Mb/s.
RF Magnitude vs. Time and RF Frequency vs. Time (option 5-SV-RFVT)	Trigger on edge, pulse width and timeout events.

Acquisition system

Sample

Acquires sampled values

Peak Detect

Captures glitches as narrow as 640ps at all sweep speeds

Averaging

From 2 to 10,240 waveforms

Maximum averaging speed = 180 waveforms/s

Fast Hardware Averaging

An acquisition mode for acquiring a large number of averages in a short amount of time. Fast hardware averaging optimizes the acquisition path, reducing storage truncation error and smoothing out fine scale non-linearity imperfections via an optional offset dithering technique. This feature is available through programmatic interface commands.

From 2 to 1,000,000 waveforms

Maximum averaging speed = 32,000 waveforms/s

Envelope

Min-max envelope reflecting Peak Detect data over multiple acquisitions

High Res

Applies a unique Finite Impulse Response (FIR) filter for each sample rate that maintains the maximum bandwidth possible for that sample rate while preventing aliasing and removing noise from the oscilloscope amplifiers and ADC above the usable bandwidth for the selected sample rate.

High Res mode always provides at least 12 bits of vertical resolution and extends all the way to 16 bits of vertical resolution at ≤ 125 MS/s sample rates.

FastAcq®

FastAcq optimizes the instrument for analysis of dynamic signals and capture of infrequent events by capturing >500,000wfms/s (one channel active; >100K wfms/s with all channels active).

Roll mode

Scrolls sequential waveform points across the display in a right-to-left rolling motion, at timebase speeds of 40 ms/div and slower, when in Auto trigger mode.

History mode

Makes use of the maximum record length, allowing you to capture many triggered acquisitions, stop when you see something of interest, and quickly review all stored triggered acquisitions.

The number of available acquisitions stored in history is (Maximum record length) / (Current record length setting).

FastFrame™

Acquisition memory divided into segments.

Maximum trigger rate >5,000,000 waveforms per second

Minimum frame size = 50 points

Maximum Number of Frames: For frame size ≥ 1,000 points, maximum number of frames = record length / frame size.

For 50 point frames, maximum number of frames = 1,000,000

Waveform measurements

Cursor types

Waveform, V Bars, H Bars, V&H Bars, and Polar (XY/XYZ plots only)

DC voltage measurement accuracy, Average acquisition mode

Measurement Type	DC Accuracy (In Volts)
Average of ≥ 16 waveforms	±((DC Gain Accuracy) * |reading - (offset - position)| +Offset Accuracy + 0.1 * V/div setting)
Delta volts between any two averages of ≥ 16 waveforms acquired with the same oscilloscope setup and ambient conditions	±(DC Gain Accuracy * |reading| + 0.05 div)

Automatic measurements

36, of which an unlimited number can be displayed as either individual measurement badges or collectively in a measurement results table

Amplitude measurements

Amplitude, Maximum, Minimum, Peak-to-Peak, Positive Overshoot, Negative Overshoot, Mean, RMS, AC RMS, Top, Base, and Area

Timing measurements

Period, Frequency, Unit Interval, Data Rate, Positive Pulse Width, Negative Pulse Width, Skew, Delay, Rise Time, Fall Time, Phase, Rising Slew Rate, Falling Slew Rate, Burst Width, Positive Duty Cycle, Negative Duty Cycle, Time Outside Level, Setup Time, Hold Time, Duration N-Periods, High Time, Low Time, Time to Minimum, and Time to Maximum

Jitter measurements (standard)

TIE and Phase Noise

Measurement statistics

Mean, Standard Deviation, Maximum, Minimum, and Population. Statistics are available on both the current acquisition and all acquisitions

Reference levels

User-definable reference levels for automatic measurements can be specified in either percent or units. Reference levels can be set to global for all measurements, per source channel or signal, or unique for each measurement

Gating

Screen, Cursors, Logic, Search, or Time. Specifies the region of an acquisition in which to take measurements. Gating can be set to Global (affects all measurements set to Global) or Local (all measurements can have a unique Time gate setting; only one Local gate is available for Screen, Cursors, Logic, and Search actions).

Measurement plots

Histogram, Time Trend, Spectrum, Eye Diagram (TIE measurement only), Phase Noise (Phase Noise measurement only)

Measurement limits

Pass/fail testing for user-definable limits on measurement values. Actions for measurement value failures include Save Screen Capture, Save Waveform, System Request (SRQ), and Stop Acquisitions

Jitter analysis (option 5-DJA) adds the following:

Measurements

Jitter Summary, TJ@BER, SJ@Freq, RJ- δδ, DJ- δδ, PJ, RJ, DJ, DDJ, DCD, SRJ, J2, J9, NPJ, F/2, F/4, F/8, Eye Height, Eye Height@BER, Eye Width, Eye Width@BER, Eye High, Eye Low, Q-Factor, Bit High, Bit Low, Bit Amplitude, DC Common Mode, AC Common Mode (Pk-Pk), Differential Crossover, T/nT Ratio, SSC Freq Dev, SSC Modulation Rate, SSC Slew Rate, Pattern Length, and Inter-Symbol Interference (ISI)

Measurement plots

Eye Diagram and Jitter Bathtub

Fast eye rendering: Shows the Unit Intervals (UIs) that define the boundaries of the eye along with a user specified number of surrounding UIs for added visual context

Complete eye rendering: Shows all valid Unit Intervals (UIs)

Measurement limits

Pass/fail testing for user-definable limits on measurement values. Actions for measurement value failures include Save Screen Capture, Save Waveform, System Request (SRQ), and Stop Acquisitions

Eye diagram mask testing

Automated mask pass/fail testing with mask autofit

Power analysis (option 5-PWR) adds the following:

Measurements

Input Analysis (Frequency, V_{RMS}, I_{RMS}, voltage and current Crest Factors, True Power, Apparent Power, Reactive Power, Power Factor, Phase Angle, Harmonics, Inrush Current, Input Capacitance)

Amplitude Analysis (Cycle Amplitude, Cycle Top, Cycle Base, Cycle Maximum, Cycle Minimum, Cycle Peak-to-Peak)

Timing Analysis (Period, Frequency, Negative Duty Cycle, Positive Duty Cycle, Negative Pulse Width, Positive Pulse Width)

Switching Analysis (Switching Loss, dv/dt, di/dt, Safe Operating Area, R_{DSon})

Output Analysis (Line Ripple, Switching Ripple, Efficiency, Turn-on Time, Turn-off Time)

Magnetic Analysis (Inductance, I vs. Intg(V), Magnetic Loss, Magnetic Property)

Frequency Response Analysis (Control Loop Response Bode Plot, Power Supply Rejection Ratio, Impedance)

Green Power Analysis (LVRT, HVRT)

Measurement Plots

Harmonics Bar Graph, Switching Loss Trajectory Plot, and Safe Operating Area

Measurement limits

Pass/fail testing for user-definable limits on measurement values. Actions for measurement value failures include Save Screen Capture, Save Waveform, System Request (SRQ), and Stop Acquisitions

Inverter Motor Drive Analysis (option 5-IMDA) adds the following:

Measurements

Input Analysis (Power Quality, Harmonics, Input Voltage, Input Current, and Input Power)

Ripple analysis (Line Ripple and Switching Ripple)

Output analysis (Phasor Diagram and Efficiency)

DQ0 analysis (DQ0) Requires option 5-IMDA-DQ0

Measurement plots

Harmonics Bar Graph and Phasor Diagram

Inverter Motor Drive Analysis Mechanical Measurements (option 5-IMDA-MECH: requires option 5-IMDA) adds the following:

Sensors supported

Hall sensors, QEI (Quadrature Encoder Interface, Resolver, and Sin-Cos encoder)

Measurements

Electrical Analysis (Power Quality, Harmonics, Ripple, DQ0, and Efficiency)

Mechanical Analysis (Speed, Acceleration, Angle (QEI method), Direction, and Torque)

Measurement plots

Time Trend, Acquisition Trend, Phasor Diagram, Harmonics Bar Graph, DQ0, and Histogram (speed distribution)

Digital power management (option 5-DPM) adds the following:

Measurements

Ripple Analysis (Ripple)

Transient Analysis (Overshoot, Undershoot, Turn On Overshoot, DC Rail Voltage)

Power Sequence Analysis (Turn-on, Turn-off)

Jitter Analysis (TIE, PJ, RJ, DJ, Eye Height, Eye Width, Eye High, Eye Low)

PI/SI Analysis (PSIJ)

Power Distribution Network (5-PDN) adds the following:

Measurements

Power Integrity Analysis (Control Loop Response, Power Supply Rejection Ratio (PSRR), Impedance, Stability Evaluation for Power Integrity Analysis (SEPIA))

Power Integrity - Signal Integrity Analysis (Power Supply Induced Jitter (PSIJ))

Digital Power Management Basic (option 5-DPMBAS) adds the following:

Measurements

Ripple Analysis (Ripple)

Transient Analysis (Overshoot, Undershoot)

Power Sequence Analysis (Turn-on, Turn-off)

LVDS debug and analysis option (option 5-DBLVDS) adds the following:

Data Lane Measurements

- Generic Test (Unit Interval, Rise Time, Fall Time, Data Width, Data Intra Skew (PN), Data Inter Skew (Lane-to-Lane), Data Peak-to-Peak)
- Jitter Test (AC Timing, Clock Data Setup Time, Clock Data Hold Time, Eye Diagram (TIE), TJ@BER, DJ Delta, RJ Delta, DDJ, De-Emphasis Level)

Clock Lane Measurements

- Generic Test (Frequency, Period, Duty Cycle, Rise Time, Fall Time, Clock Intra Skew (PN), Clock Peak-to-Peak)
- Jitter Test (TIE, DJ, RJ)
- SSC On (Mod Rate, Frequency Deviation Mean)

Waveform math

Number of math waveforms

Unlimited

Arithmetic

Add, subtract, multiply, and divide waveforms and scalars

Algebraic expressions

Define extensive algebraic expressions including waveforms, scalars, user-adjustable variables, and results of parametric measurements. Perform math on math using complex equations. For example (Integral (CH1 - Mean(CH1)) X 1.414 X VAR1)

Math functions

Invert, Integrate, Differentiate, Square Root, Exponential, Log 10, Log e, Abs, Ceiling, Floor, Min, Max, Degrees, Radians, Sin, Cos, Tan, ASin, ACos, and ATan

Relational

Boolean result of comparison >, <, ≥, ≤, =, and ≠

Logic

AND, OR, NAND, NOR, XOR, and EQV

Filtering function (standard)

Loading of user-definable filters. Users specify a file containing the coefficients of the filter.

Filtering function (option 5-UDFLT)

Filter types

Low pass, High pass, Band pass, Band stop, All pass, Hilbert, Differentiator, and Custom

Filter response types

Butterworth, Chebyshev I, Chebyshev II, Elliptical, Gaussian, and Bessel-Thomson

FFT functions

Spectral Magnitude and Phase, and Real and Imaginary Spectra

FFT vertical units

Magnitude: Linear and Log (dBm)

Phase: Degrees, Radians, and Group Delay

FFT window functions

Hanning, Rectangular, Hamming, Blackman-Harris, Flattop2, Gaussian, Kaiser-Bessel, and TekExp

Spectrum View

Center Frequency

Limited by instrument analog bandwidth

Span

18.6 Hz to 312.5 MHz

18.6 Hz to 500 MHz (with option 5-SV-BW-1)

Coarse adjustment in a 1-2-5 sequence

RF Measurements

Channel Power (CHP), Adjacent Channel Power Ratio (ACPR), and Occupied Bandwidth (OBW) measurements on Spectrum View trace data and display

RF vs. Time Traces

Magnitude vs. time, Frequency vs. time, Phase vs. time (with option 5-SV-RFVT)

RF vs. Time Trigger

Edge, pulse width, and timeout trigger on RF Magnitude vs. Time and RF Frequency vs. Time (with option 5-SV-RFVT)

Spectrograms

RF Frequency vs. Time vs. Amplitude display with frequency on x-axis, time on y-axis, and power level indicated by variations in color (with option 5-SV-RFVT)

Resolution Bandwidth (RBW)

93 µHz to 62.5 MHz

93 µHz to 100 MHz (with option 5-SV-BW-1)

IQ capture

The data is stored as in-phase and quadrature (I&Q) samples and precise synchronization is maintained between the time domain data and the I&Q data.

When RF vs. Time traces are activated (with option 5-SV-RFVT), IQ data can be captured and exported to file for more analysis within third-party applications.

The maximum acquisition time varies with span and sample rate. At 25 GS/s and 2 GHz span, the maximum acquisition time is 0.086 seconds. For 1 GHz span, the maximum acquisition time is 0.172 seconds. For 40 MHz span, the maximum acquisition time is 2.749 seconds. For 1 MHz span, the maximum acquisition time is 87.961 seconds.

The max acquisition time varies with span and sample rate. At 6.25 GS/s and 500 MHz span, the max acquisition time is 0.086 seconds. For 312.5 MHz span, the max acquisition time is 0.172 seconds. For 40 MHz span, the max acquisition time is 0.687 seconds. For 1 MHz span, the max acquisition time is 43.980 seconds.

Window types and factors

Window type	Factor
Blackman-Harris	1.90
Flat-Top 2	3.77
Hamming	1.30
Hanning	1.44
Kaiser-Bessel	2.23
Rectangular	0.89

Spectrum Time

FFT Window Factor / RBW

Reference level

Reference level is automatically set by the analog channel Volts/div setting

Setting range: -42 dBm to +44 dBm

Vertical Position

-100 divs to +100 divs

Vertical units

dBm, dBµW, dBmV, dBµV, dBmA, dBµA

Vertical scalings

Linear, Log

Horizontal scaling

Linear, Log

Multi-channel spectrum analysis

Each FlexChannel input can be configured with Spectrum View, RF vs. Time traces (with option RFVT), and Spectrogram (with option RFVT).

Multiple RF measurements can be performed simultaneously across channels.

Spectrum Time and Center Frequency settings can be unlocked and moved independently from each other across channels. All Spectrum View channels must share the same Span, Resolution Bandwidth and Window Type.

Search

Number of searches

Unlimited

Search types

Search through long records to find all occurrences of user specified criteria including edges, pulse widths, timeouts, runt pulses, window violations, logic patterns, setup and hold violations, rise/fall times, and bus protocol events. Search results can be viewed in the Waveform View or in the Results table.

Number of searches

Unlimited

Search types

Search through long records to find all occurrences of user specified criteria including edges, pulse widths, timeouts, runt pulses, window violations, logic patterns, setup and hold violations, rise/fall times, and bus protocol events. Search results can be viewed in the Waveform View or in the Results table.

Save

Save

Save files directly to the oscilloscope or USB media, to a remote network drive, or to your TekDrive collaboration workspace.

Waveform type

Tektronix Waveform Data (.wfm), Comma Separated Values (.csv), MATLAB (.mat)

Waveform gating

Cursors, Screen, Resample (save every nth sample)

Screen capture type

Portable Network Graphic (*.png), 24-bit Bitmap (*.bmp), JPEG (*.jpg)

Setup type

Tektronix Setup (.set)

Report type

Adobe Portable Documents (.pdf), Single File web Pages (.mht)

Session type

Tektronix Session Setup (.tss)

Display

Display type

15.6 in. (395 mm) liquid-crystal TFT color display

Display resolution

1,920 horizontal × 1,080 vertical pixels (High Definition)

Display modes

Overlay: traditional oscilloscope display where traces overlay each other

Stacked: display mode where each waveform is placed in its own slice and can take advantage of the full ADC range while still being visually separated from other waveforms. Groups of channels can also be overlaid within a slice to simplify visual comparison of signals.

Zoom

Horizontal and vertical zooming is supported in all waveform and plot views.

Interpolation

Sin(x)/x and Linear

Waveform styles

Vectors, dots, variable persistence, and infinite persistence

Graticules

Movable and fixed graticules, selectable between Grid, Time, Full, and None

Color palettes

Normal and inverted for screen captures

Individual waveform colors are user-selectable

Format

YT, XY, and XYZ

Local Language User Interface

English, Japanese, Simplified Chinese, Traditional Chinese, French, German, Italian, Spanish, Portuguese, Russian, Korean

Local Language Help

English, Japanese, Simplified Chinese

Arbitrary function generator (optional)

Modes of operation

Off, Continuous, Burst

Function types

Arbitrary, sine, square, pulse, ramp, triangle, DC level, Gaussian, Lorentz, exponential rise/fall, sin(x)/x, random noise, Haversine, Cardiac

Sine waveform

Frequency range

0.1 Hz to 100 MHz

Frequency setting resolution

0.1 Hz

Frequency accuracy

130 ppm (frequency ≤ 10 kHz), 50 ppm (frequency > 10 kHz)

This is for Sine, Ramp, Square and Pulse waveforms only.

Amplitude range

20 mV_{pp} to 5 V_{pp} into Hi-Z; 10 mV_{pp} to 2.5 V_{pp} into 50 Ω

Amplitude flatness, typical

±0.5 dB at 1 kHz

±1.5 dB at 1 kHz for < 20 mV_{pp} amplitudes

Total harmonic distortion, typical

1% for amplitude ≥ 200 mV_{pp} into 50 Ω load

2.5% for amplitude > 50 mV AND < 200 mV_{pp} into 50 Ω load

Spurious free dynamic range, typical

40 dB (V_{pp} ≥ 0.1 V); 30 dB (V_{pp} ≥ 0.02 V), 50 Ω load

Square and pulse waveform

Frequency range

0.1 Hz to 50 MHz

Frequency setting resolution

0.1 Hz

Frequency accuracy

130 ppm (frequency ≤ 10 kHz), 50 ppm (frequency > 10 kHz)

Amplitude range

20 mV_{pp} to 5 V_{pp} into Hi-Z; 10 mV_{pp} to 2.5 V_{pp} into 50 Ω

Duty cycle range

10% - 90% or 10 ns minimum pulse, whichever is larger

Minimum pulse time applies to both on and off time, so maximum duty cycle will reduce at higher frequencies to maintain 10 ns off time

Duty cycle resolution

0.1%

Minimum pulse width, typical

10 ns. This is the minimum time for either on or off duration.

Rise/Fall time, typical

5 ns, 10% - 90%

Pulse width resolution

100 ps

This applies to overshoot of the positive-going transition (+overshoot) and of the negative-going (-overshoot) transition

Asymmetry, typical

±1% ±5 ns, at 50% duty cycle

Jitter, typical

< 60 ps TIE_{RMS}, ≥ 100 mV_{pp} amplitude, 40%-60% duty cycle

Ramp and triangle waveform

Frequency range

0.1 Hz to 500 kHz

Frequency setting resolution

0.1 Hz

Frequency accuracy

130 ppm (frequency ≤ 10 kHz), 50 ppm (frequency > 10 kHz)

Amplitude range

20 mV_{pp} to 5 V_{pp} into Hi-Z; 10 mV_{pp} to 2.5 V_{pp} into 50 Ω

Variable symmetry

0% - 100%

Symmetry resolution

0.1%

DC level range

±2.5 V into Hi-Z

±1.25 V into 50 Ω

Random noise amplitude range

20 mV_{pp} to 5 V_{pp} into Hi-Z

10 mV_{pp} to 2.5 V_{pp} into 50 Ω

Sin(x)/x

Maximum frequency

4 MHz

Gaussian pulse, Haversine, and Lorentz pulse

Maximum frequency

10 MHz

Lorentz pulse

Frequency range

0.1 Hz to 5 MHz

Amplitude range

20 mV_{pp} to 2.4 V_{pp} into Hi-Z

10 mV_{pp} to 1.2 V_{pp} into 50 Ω

Cardiac

Frequency range

0.1 Hz to 1 MHz

Amplitude range

20 mV_{pp} to 5 V_{pp} into Hi-Z

10 mV_{pp} to 2.5 V_{pp} into 50 Ω

Arbitrary

Memory depth

1 to 128 k

Amplitude range

20 mV_{pp} to 5 V_{pp} into Hi-Z

10 mV_{pp} to 2.5 V_{pp} into 50 Ω

Repetition rate

0.1 Hz to 50 MHz

Sample rate

250 MS/s

Signal amplitude accuracy

±[(1.5% of peak-to-peak amplitude setting) + (1.5% of absolute DC offset setting) + 1 mV] (frequency = 1 kHz)

Signal amplitude resolution

1 mV (Hi-Z)

500 µV (50 Ω)

Sine and ramp frequency accuracy

1.3 x 10-4 (frequency ≤10 kHz)

5.0 x 10-5 (frequency >10 kHz)

DC offset range

±2.5 V into Hi-Z

±1.25 V into 50 Ω

DC offset resolution

1 mV (Hi-Z)

500 µV (50 Ω)

DC offset accuracy

±[(1.5% of absolute offset voltage setting) + 1 mV]

Add 3 mV of uncertainty per 10 °C change from 25 °C ambient

Digital voltmeter (DVM)

Measurement types

DC, AC_{RMS}+DC, AC_{RMS}, Trigger Frequency count

Voltage resolution

4 digits

Voltage accuracy

DC:

±((1.5% * |reading - offset - position|) + (0.5% * |(offset - position)|) + (0.1 * Volts/div))

De-rated at 0.100%/°C of |reading - offset - position| above 30 °C

Signal ± 5 divisions from screen center

AC:

± 2%(40 Hz to 1 kHz) with no harmonic content outside 40 Hz to 1 kHz range

AC, typical: ± 2% (20 Hz to 10 kHz)

For AC measurements, the input channel vertical settings must allow the V_{PP} input signal to cover between 4 and 10 divisions and must be fully visible on the screen

Trigger frequency counter

Resolution

8 digits

Accuracy

±(1 count + time base accuracy * input frequency)

The signal must be at least 8 mV_{pp} or 2 div, whichever is greater.

Maximum Input frequency

10 Hz to maximum bandwidth of the analog channel

The signal must be at least 8 mV_{pp} or 2 div, whichever is greater.

Processor system

Host processor

Intel i5-8400H (2.5 GHz, 64-bit, quad core processor)

Operating system

Default instrument: Closed Linux

Instrument with option 5B-WIN installed: Microsoft Windows 10. Option 5-WIN is not available for MSO58LP instrument.

Standard SSD with Embedded OS

≥ 250 GB removable solid state drive

Solid State Drive (SSD) with Microsoft Windows 10 OS (option 5-WIN or SUP5B-WIN)

≥ 500 GB SSD. Form factor is a 2.5-inch SSD with a SATA-3 interface. This drive is customer installable and includes the

Microsoft Windows 10 Enterprise IoT 2021 LTSB (64-bit) operating system

Input-Output ports

DisplayPort connector

A 20-pin DisplayPort connector; connect to show the oscilloscope display on an external monitor or projector

DVI connector

A 29-pin DVI-D connector; connect to show the oscilloscope display on an external monitor or projector

VGA

DB-15 female connector; connect to show the oscilloscope display on an external monitor or projector

Probe compensator signal, typical

Connection:

Connectors are located on the lower front right of the instrument

Amplitude:

0 to 2.5 V

Frequency:

1 kHz

Source impedance:

1 kΩ

External reference input

The time-base system can phase-lock to an external 10 MHz reference signal.

USB interface (Host, Device ports)

Front panel USB Host ports: Two USB 2.0 Hi-Speed ports, one USB 3.0 SuperSpeed port

Rear panel USB Host ports: Two USB 2.0 Hi-Speed ports, two USB 3.0 SuperSpeed ports

Rear panel USB Device port: One USB 3.0 SuperSpeed Device port providing USBTMC support

Ethernet interface

10/100/1000 Mb/s

Auxiliary output

Rear-panel BNC connector. Output can be configured to provide a positive or negative pulse out when the oscilloscope triggers, the internal oscilloscope reference clock out, or an AFG sync pulse

Characteristic	Limits
Vout (HI)	≥ 2.5 V open circuit; ≥ 1.0 V into a 50 Ω load to ground
Vout (LO)	≤ 0.7 V into a load of ≤ 4 mA; ≤0.25 V into a 50 Ω load to ground

Kensington-style lock

Rear-panel security slot connects to standard Kensington-style lock

LXI

Class: LXI Core 2011

Version: 1.4

Power source

Power

Power consumption

400 Watts maximum

Source voltage

100 - 240 V ±10% at 50 Hz to 60 Hz

115 V ±10% at 400 Hz ±10%

Physical characteristics

Dimensions

Height: 12.2 in (309 mm), feet folded in, handle to back

Height: 14.6 in (371 mm) feet folded in, handle up

Width: 17.9 in (454 mm) from handle hub to handle hub

Depth: 8.0 in (205 mm) from back of feet to front of knobs, handle up

Depth: 11.7 in (297.2 mm) feet folded in, handle to the back

Weight

< 28 lbs (12.5 kg)

Cooling

The clearance requirement for adequate cooling is 2.0 in (50.8 mm) on the right side of the instrument (when viewed from the front) and on the rear of the instrument

Rackmount configuration

7U (with optional RM5 Rackmount Kit)

Environmental specifications

Specification	Operating	Non-operating
Temperature	+0 °C to +50 °C (32 °F to 122 °F)	-20 °C to +60 °C (-4 °F to 140 °F)
Humidity	5% to 90% RH up to +40 °C; 5% to 50% RH up to +50 °C, noncondensing; max WB +39 °C	5% to 90% RH up to +40 °C; 5% to 50% RH up to +50 °C, noncondensing; max WB +39 °C
Altitude	Up to 3,000 m (9,843 ft)	Up to 12,000 m (39,370 ft)

EMC, environmental, and safety

Safety certification

US NRTL Listed - UL61010-1 and UL61010-2-030

Canadian Certification - CAN/CSA-C22.2 No. 61010.1 and CAN/CSA-C22.2 No 61010.2.030

EU Compliance - Low Voltage Directive 2014-35-EU and EN61010-1.

International Compliance - IEC 61010-1 and IEC61010-2-030

Regulatory

CE marked for the European Union and UL approved for the USA and Canada

RoHS compliant

Software

IVI driver

Provides a standard instrument programming interface for common applications such as LabVIEW, LabWindows/CVI, Microsoft .NET, and MATLAB. Compatible with Python, C/C++/C# and many other languages through VISA.

TekDrive

Upload, store, organize, search, download, and share any file type from any connected device. TekDrive is natively integrated into the instrument for seamless sharing and recalling of files - no USB stick is required. Analyze and explore standard files like .wfm, .isf, .tss, and .csv, directly in a browser. Visit http://www.tek.com/software/tekdrive to learn more.

e*Scope®

Enables control of the oscilloscope over a network connection through a standard web browser. Simply enter the IP address or network name of the oscilloscope and a web page will be served to the browser. Transfer and save settings, waveforms, measurements, and screen images or make live control changes to settings on the oscilloscope directly from the web browser. Optionally configure e*Scope authentication to password protect access to control and view the oscilloscope.

LXI Web interface

Connect to the oscilloscope through a standard web browser by simply entering the oscilloscope's IP address or network name in the address bar of the browser. The Web interface enables viewing of instrument status and configuration, status and modification of network settings, and instrument control through the e*Scope web-based remote control.

Programming Examples

Programming with the 4/5/6 Series platforms has never been easier. With a programmer's manual and a GitHub site you have many commands and examples to help you get started remotely automating your instrument. See https://github.com/tektronix/programmatic-control-examples.

Ordering information

Use the following steps to select the appropriate instrument and options for your measurement needs.

Select a model

Start by selecting a 5 Series B MSO model based on the number of FlexChannel inputs you need. Each FlexChannel input supports 1 analog or 8 digital input signals, interchangeably.

Model	TAA Compliant Models	Number of FlexChannels
MSO54B	MSO54B-TAA	4
MSO56B	MSO56B-TAA	6
MSO58B	MSO58B-TAA	8

Each model includes

One passive analog probe per FlexChannel:

350 MHz or 500 MHz bandwidth models: TPP0500B 500 MHz probes

1 GHz or 2 GHz bandwidth models: TPP1000 1 GHz probes

Installation and safety manual

Embedded Help

Power cord

Calibration certificate documenting traceability to National Metrology Institute(s) and ISO9001/ISO17025 quality system registration

One-year warranty covering all parts and labor on the instrument.

One-year warranty covering all parts and labor on included probes

Add instrument functionality by adding an option bundle

Three classes of option bundles are offered (Starter, Pro, Ultimate), providing a range of options depending on your budget and application needs. For detailed information on the current contents of each bundle, please visit our website and view the software bundle brochure at https://www.tek.com/document/brochure/software-bundles-for-the-4-5-and-6-series-mso-oscilloscopes.

1. Starter bundle offers the most common serial bus decoding, protocol analysis, power measurements and analysis, and hardware enhancing options bundled together.
2. Pro bundles are application-specific (Serial trigger and decode, Power Integrity, Signal Integrity, Automotive, Automated Compliance Test, Military Government Aerospace), and include all options from the Starter bundle.
3. Ultimate bundle includes all options from the Starter bundle in addition to the all options from all Pro bundles.

Permanent	Bundle description
5-STARTER-FL	Includes I2C, SPI, RS-232/422/UART serial trigger and analysis, AFG (Arbitrary/Function Generator), and power measurements and analysis

Permanent	Bundle description
5-PRO-SERIAL-FL	Includes 5-STARTER plus 125 MS/ch record length, additional select serial analysis options
5-PRO-POWER-FL	Includes 5-STARTER plus 125 MS/ch record length, select power analysis options
5-PRO-SIGNAL-FL	Includes 5-STARTER plus 125 MS/ch record length, advanced Jitter and select analysis options
5-PRO-COMPL-FL	Includes 5-STARTER plus 125 MS/ch record length, advanced select automated compliance test options
5-PRO-AUTO-FL	Includes 5-STARTER plus 125 MS/ch record length, advanced Jitter and select automotive analysis options
5-PRO-AERODEF-FL	Includes 5-STARTER plus 125 MS/ch record length, advanced Jitter, mask test, and select serial analysis options
5-ULTIMATE-FL	Includes 5-STARTER, all 5-PRO bundle options plus 500 MS/ch record length, RF vs. Time traces, triggers, Spectrograms, and IQ capture, extended Spectrum View capture bandwidth, and video trigger options

Each purchased bundle includes: A permanent license enables all features to the purchased bundle permanently. A permanent license includes updates and bug fixes to the bundle.

Configure your instrument

Select the analog channel bandwidth you need

Choose the bandwidth you need today by choosing one of these bandwidth options. You can upgrade it later by purchasing an upgrade option.

Bandwidth Option	Bandwidth
5-BW-350	350 MHz
5-BW-500	500 MHz
5-BW-1000	1 GHz
5-BW-2000	2 GHz

Add instrument functionality

Instrument functionality can be ordered with the instrument or later as an upgrade kit.

Instrument option	Built-in functionality
5-RL-125M	Extend record length from 62.5 Mpoints/channel to 125 Mpoints/channel
5-RL-250M	Extend record length from 62.5 Mpoints/channel to 250 Mpoints/channel
5-RL-500M	Extend record length from 62.5 Mpoints/channel to 500 Mpoints/channel
5B-WIN	Add removable SSD with Microsoft Windows 10 operating system license
5-AFG	Add Arbitrary/Function Generator

5B-WIN : This option is not compatible with option 5-SEC.

Add optional protocol triggering, decode, and search capabilities

Choose the protocol support you need today by choosing from these analysis options. You can upgrade later by purchasing an upgrade kit.

Instrument option	Protocols supported
5-RFNFC	ISO/IEC 15693, 14443A, 14443B, and FeliCa (decode and search only)
5-SRAERO	Aerospace (MIL-STD-1553, ARINC 429)
5-SRAUDIO	Audio (I^2S, LJ, RJ, TDM)
5-SRAUTO	Automotive (CAN, CAN FD, CAN XL, LIN, FlexRay, and CAN symbolic decoding)
5-SRAUTOEN1	100Base-T1 and 10BASE-T1S Automotive Ethernet serial analysis
5-SRAUTOSEN	Automotive sensor (SENT)
5-SRCOMP	Computer (RS-232/422/485/UART)
5-SRCPHY	MIPI C-PHY Vx.x (DSI-2, CSI-2 decode and search only)
5-SRCXPI	CXPI (decode and search only)
5-SRDPHY	MIPI D-PHY (DSI-1, CSI-2 decode and search only)
5-SREMBD	Embedded (I^2C, SPI)
5-SRENET	Ethernet (10BASE-T, 100BASE-TX)
5-SRESPI	eSPI (decode and search only)
5-SRETHERCAT	EtherCAT (decode and search only)
5-SR8B10B	8B/10B (decode and search only)
5-SRI3C	MIPI I3C
5-SRMANCH	Manchester (decode and search only)
5-SRMDIO	MDIO (decode and search only)
5-SRNRZ	NRZ (decode and search only)
5-SRONEWIRE	One wire (1-Wire decode and search only)
5-SRPCIE321	PCIe Gen1, Gen2, Gen3 (decode and search only)
5-SRPM	Power Management (SPMI)
5-SRPSI5	PSI5 (decode and search only)
5-SRSDLC	Synchronous Data Link Control Protocol Decode & Search
5-SRSMBUS	SMBus (decode and search only)
5-SRSPACEWIRE	Spacewire (decode and search only)

Instrument option	Protocols supported
5-SRSVID	SVID
5-SRUSB2	USB (USB2.0 LS, FS, HS)
5-SREUSB2	eUSB2.0 (decode and search only)
5-SRUSB3	USB 3.0, USB 3.1 Gen1, USB 3.2 Gen1 (decode and search only)

NOTE: Differential serial bus? Be sure to check Add analog probes and adapters for differential probes.

Add third party serial bus decode and analysis capabilities

Third-party applications are available that provide serial bus decode and analysis capabilities to use on the Series MSO. Use of the third-party software applications require a Windows 10 SSD (option -WIN).

Please see additional information at https://prodigytechno.com/oscilloscope-based-protocol-decode-software/

Add optional serial bus compliance testing

Choose the serial compliance testing packages you need today by choosing from these options. You can upgrade later by purchasing an upgrade kit. All options in the table below require option 5B-WIN (SSD with Microsoft Windows 10 operating system).

Instrument Option	Serial Buses Supported
5-CMAUTOEN	Automotive Ethernet (100Base-T1, 1000Base-T1) automated compliance test solution. ≥2 GHz bandwidth required for 1000BASE-T1
5-CMAUTOEN10	Automotive Ethernet (10BASE-T1S Short Reach) automated compliance test solution.
5-AUTOEN-BND	Automotive Ethernet Compliance, Signal Separation, PAM3 Analysis, 100Base-T1 Decode software (requires options 5--DJA)
5-AUTOEN-SS	Automotive Ethernet Signal Separation
5-CMINDUEN10	Industrial Ethernet (10Base-T1L Long Reach) automated compliance test solution
5-CMENET	Ethernet automated compliance test solution (10BASE-T/100BASE-T/1000BASE-T). ≥1 GHz bandwidth required for 1000BASE-T
5-CMENETML	Multilane Ethernet (10Base-T, 100Base-T, 1000Base-T) automated compliance test solution
5-CMUSB2	USB2.0 automated compliance test solution. Requires TDSUSBF USB test fixture ≥2 GHz bandwidth required for high-speed USB

Add optional analysis capabilities

Instrument option	Advanced analysis
5-DBLVDS	TekExpress automated LVDS test solution (requires options 5-DJA and 5-WIN)
5-DJA	Advanced Jitter and Eye Analysis

Instrument option	Advanced analysis
5-SIM	Signal Integrity Modeling embedding and de-embedding
5-SIMA	Advanced Signal Integrity Modeling embedding, de-embedding, equalization and CDR
5-DPM	Digital Power Management
5-IMDA	Inverter Motor Drive Analysis
5-IMDA-DQ0	DQ0 feature for Inverter Motor Drive Analysis (requires option 5-IMDA)
5-IMDA-MEC	Mechanical measurements for Inverter Motor Drive Analysis (requires option 5-IMDA)
5-MTM	Mask and Limit testing
5-PAM3	PAM3 analysis (requires options 5-DJA and 5-WIN)
5-PS2	Power solution bundle (5-PWR, THDP0200, TCP0030A, 067-1686-XX deskew fixture)
5-PWR	Power Measurement and Analysis
5-PDN	Power Distribution Network measurement and analysis
5-SV-BW-1	Increase Spectrum View Capture Bandwidth to 2 GHz
5-SV-RFVT	Spectrum View RF vs. Time traces, triggers, Spectrograms, and IQ capture
5-TDR	Time Domain Reflectometry
5-UDFLT	User Defined Filter Creation Tool
5-VID	NTSC, PAL, and SECAM video triggering
5-WBG-DPT	Wide Bandgap SiC/GaN Double Pulse Test Measurements and Analysis

NOTE: 5-PS2, 5-PS2FRA : These are not compatible with option 5-PWR and must be purchased at the same time as the instrument. Not available as an upgrade.

NOTE: 5-PWR : This option is not compatible with option 5-PS2 or 5-PS2FRA and it is not compatible with option 5-PS2.

NOTE: 5-IMDA-DQ0, 5-IMDA-MEC : These are not compatible with MSO54B.

Add Vector Signal Analysis

SignalVu-PC is a stand-alone application that can be run on a 5 Series MSO or on a separate Windows PC to provide advanced vector signal analysis. In order to run SignalVu-PC on your 5 Series MSO, three options are required.

1. To run the application on the instrument, the Windows SSD (5B-WIN) needs to be installed in the oscilloscope.
2. The Spectrum View RF versus time traces option (5-SV-RFVT) needs to be installed in the oscilloscope to enable I/Q data transfer.
3. The Connect (CONxx-SVPC) license needs to be installed in SignalVu-PC to enable base features of the application, which includes 16+ RF measurements and displays.

Add digital probes

Each FlexChannel input can be configured as eight digital channels simply by connecting a TLP058 logic probe to a FlexChannel input.

For this instrument	Order	To add
MSO54B	1 to 4 TLP058 Probes	8 to 32 digital channels
MSO56B	1 to 6 TLP058 Probes	8 to 48 digital channels
MSO58B	1 to 8 TLP058 Probes	8 to 64 digital channels

Add analog probes and adapters

Add additional recommended probes and adapters

Recommended Probe / Adapter	Description
TAP1500	1.5 GHz TekVPI® active single-ended voltage probe, ±8 V input voltage
TAP2500	2.5 GHz TekVPI® active single-ended voltage probe, ±4 V input voltage
TAP3500	3.5 GHz TekVPI® active single-ended voltage probe, ±4 V input voltage
TAP4000	4 GHz TekVPI® active single-ended voltage probe, ±4 V input voltage
TCP0030A	30 A AC/DC TekVPI® current probe, 120 MHz BW
TCP0020	20 A AC/DC TekVPI® current probe, 50 MHz BW
TCP0030A	30 A AC/DC TekVPI current probe, 120 MHz BW
TCP0150	150 A AC/DC TekVPI® current probe, 20 MHz BW
TRCP0300	30 MHz AC current probe, 250 mA to 300 A
TRCP0600	30 MHz AC current probe, 500 mA to 600 A
TRCP3000	16 MHz AC current probe, 500 mA to 3000 A
TDP0500	500 MHz TekVPI® differential voltage probe, ±42 V differential input voltage
TDP1000	1 GHz TekVPI® differential voltage probe, ±42 V differential input voltage
TDP1500	1.5 GHz TekVPI® differential voltage probe, ±8.5 V differential input voltage
TDP3500	3.5 GHz TekVPI® differential voltage probe, ±2 V differential input voltage
TDP4000	4 GHz TekVPI® differential voltage probe, ±2 V differential input voltage
THDP0100	±6 kV, 100 MHz TekVPI® high-voltage differential probe
THDP0200	±1.5 kV, 200 MHz TekVPI® high-voltage differential probe
TMDP0200	±750 V, 200 MHz TekVPI® high-voltage differential probe
TPR1000	1 GHz, Single-Ended TekVPI® Power-Rail Probe; includes one TPR4KIT accessory kit
TPR4000	4 GHz, Single-Ended TekVPI® Power-Rail Probe; includes one TPR4KIT accessory kit
TIVP02	Isolated Probe; 200 MHz, ±5 V to ±2500 V depending on tip; 2 meter cable

Recommended Probe / Adapter	Description
TIVP02L	Isolated Probe; 200 MHz, ±5 V to ±2500 V depending on tip; 10 meter cable
TIVP05	Isolated Probe; 500 MHz, ±5 V to ±2500 V depending on tip; 2 meter cable
TIVP05L	Isolated Probe; 500 MHz, ±5 V to ±2500 V depending on tip; 10 meter cable
TIVP1	Isolated Probe; 1 GHz, ±5 V to ±2500 V depending on tip; 2 meter cable
TIVP1L	Isolated Probe; 1 GHz, ±5 V to ±2500 V depending on tip; 10 meter cable
TPP0502	500 MHz, 2X TekVPI® passive voltage probe, 12.7 pF input capacitance
TPP0850	2.5 kV, 800 MHz, 50X TekVPI® passive high-voltage probe
P6015A	20 kV, 75 MHz high-voltage passive probe
TPA-BNC	TekVPI® to TekProbe™ BNC adapter (recommended for connecting your existing TekProbe probes to this instrument)
TEK-DPG	TekVPI deskew pulse generator signal source
067-1686-xx	Power measurement deskew and calibration fixture
TPA-20MHz	TekVPI 20MHz low-pass hardware filter

Looking for other probes? Check out the probe selector tool at www.tek.com/probes.

Add accessories

Add traveling or mounting accessories

Optional Accessory	Description
HC5	Hard carrying case
RM5	Rackmount kit
GPIB to Ethernet adapter	Order model 4865B (GPIB to Ethernet to Instrument Interface) directly from ICS Electronics www.icselect.com/gpib_instrument_intfc.html

Select power cord option

Select power cord option	Description
A0	North America power plug (115 V, 60 Hz)
A1	Universal Euro power plug (220 V, 50 Hz)
A2	United Kingdom power plug (240 V, 50 Hz)
A3	Australia power plug (240 V, 50 Hz)
A5	Switzerland power plug (220 V, 50 Hz)

Select power cord option	Description
A6	Japan power plug (100 V, 50/60 Hz)
A10	China power plug (50 Hz)
A11	India power plug (50 Hz)
A12	Brazil power plug (60 Hz)
A99	No power cord

Add extended service and calibration options

Protect your investment and your uptime with a service package for your instrument.

Optimize the lifetime value of your purchase and lower your total cost of ownership with a calibration and extended warranty plan for your instrument. Plans range from standard warranty extensions covering parts, labor, and 2-day shipping to Total Product Protection with repair or replacement coverage from wear and tear, accidental damage, ESD or EOS. See the table below for specific service options available on the 5 Series B MSO family of products. Compare factory service plans https://www.tek.com/en/services/factory-service-plans.

Additionally, Tektronix is a leading accredited calibration services provider for all brands of electronic test and measurement equipment, servicing more than 140,000 models from 9,000 manufacturers. With 100+ labs worldwide, Tektronix serves as a global partner, delivering tailored whole-site calibration programs with OEM quality at a market price. View whole site calibration service capabilities https://www.tek.com/en/services/calibration-services.

Service Option	Description
T3	Three-year Total Product Protection, includes repair or replacement coverage from wear and tear, accidental damage, ESD or Electrical Over-stress plus standard warranty extended to 3 years. All repairs include calibration, firmware updates and 2-day shipping within country. Guarantees faster turnaround time than without coverage.
R3	Standard warranty extended to 3 years. All repairs include calibration, firmware updates and 2-day shipping within country. Guarantees faster turnaround time than without coverage.
C3	Calibration service for 3 years. Includes traceable calibration or functional verification where applicable, for recommended calibrations. Coverage includes the initial calibration plus 2 years of calibration coverage.
T5	Five-year Total Product Protection, includes repair or replacement coverage from wear and tear, accidental damage, ESD or Electrical Overstress plus standard warranty extended to 5 years. All repairs include calibration, firmware updates and 2-day shipping within country. Guarantees faster turnaround time than without coverage.
R5	Standard warranty extended to 5 years. All repairs include calibration, firmware updates and 2-day shipping within country. Guarantees faster turnaround time than without coverage.
C5	Calibration service for 5 years. Includes traceable calibration or functional verification where applicable, for recommended calibrations. Coverage includes the initial calibration plus 4 years of calibration coverage.

Feature upgrades after purchase

Add feature upgrades in the future

You can easily add functionality after the initial purchase. Node-locked licenses permanently enable optional features on a single product. Floating licenses allow license-enabled options to be easily moved between compatible instruments. Compatible instruments for the floating licenses are 5 Series MSO and 5 Series B MSO models.

Upgrade feature	Node-locked license upgrade	Floating license upgrade	Description
Add instrument functions	SUP5-AFG	SUP5-AFG-FL	Add arbitrary function generator
	SUP5-RL-125M	SUP5-RL-125M-FL	Extend record length from 62.5 Mpts to 125 Mpts / channel
	SUP5-RL-250M	SUP5-RL-250M-FL	Extend record length from 62.5 Mpts to 250 Mpts / channel
	SUP5-RL-500M	SUP5-RL-500M-FL	Extend record length from 62.5 Mpts to 500 Mpts / channel
	SUP5-RL-125MT250M	SUP5-RL-125MT250M-FL	Extend record length from 125 Mpts to 250 Mpts / channel
	SUP5-RL-250MT500M	SUP5-RL-250MT500M-FL	Extend record length from 250 Mpts to 500 Mpts / channel
	SUP5-RL-125MT500M	SUP5-RL-125MT500M-FL	Extend record length from 125 Mpts to 500 Mpts / channel
Add protocol analysis	SUP5-RFNFC	SUP5-RFNFC-FL	ISO/IEC 15693 and ISO/IEC14443A (decode and search only)
	SUP5-SR8B10B	SUP5-SR8B10B-FL	8b/10b serial decoding and analysis
	SUP5-SRAERO	SUP5-SRAERO-FL	Aerospace serial triggering and analysis (MIL-STD-1553, ARINC 429)
	SUP5-SRAUDIO	SUP5-SRAUDIO-FL	Audio serial triggering and analysis (I^2S, LJ, RJ, TDM)
	SUP5-SRAUTO	SUP5-SRAUTO-FL	Automotive serial triggering and analysis (CAN, CAN FD, LIN, FlexRay, and CAN symbolic decoding)
	SUP5-SRAUTOEN1	SUP5-SRAUTOEN1-FL	100BASE-T1 and 10BASE-T1S Automotive Ethernet serial analysis
	SUP5-SRAUTOSEN	SUP5-SRAUTOSEN-FL	Automotive sensor serial triggering and analysis (SENT)
	SUP5-SRCOMP	SUP5-SRCOMP-FL	Computer serial triggering and analysis (RS-232/422/485/UART)
	SUP5-SRCPHY	SUP5-SRCPHY-FL	MIPI C-PHY serial analysis (DSI-2, CSI-2)
	SUP5-SRCXPI	SUP5-SRCXPI-FL	CXPI serial decoding and analysis
	SUP5-SRDPHY	SUP5-SRDPHY-FL	MIPI D-PHY (DSI-1, CSI-2 decode and search only)
	SUP5-SREMBD	SUP5-SREMBD-FL	Embedded serial triggering and analysis (I^2C, SPI)

Upgrade feature	Node-locked license upgrade	Floating license upgrade	Description
Add protocol analysis	SUP5-SRENET	SUP5-SRENET-FL	Ethernet serial triggering and analysis (10Base-T, 100Base-TX)
	SUP5-SRESPI	SUP5-SRESPI-FL	eSPI serial decoding and analysis
	SUP5-SRETHERCAT	SUP5-SRETHERCAT-FL	EtherCAT serial decoding and analysis
	SUP5-SRI3C	SUP5-SRI3C-FL	MIPI I3C serial triggering and analysis
	SUP5-SRMANCH	SUP5-SRMANCH-FL	Manchester (decode and search only)
	SUP5-SRMDIO	SUP5-SRMDIO-FL	Management Data Input/Output serial decoding and analysis
	SUP5-SRNRZ	SUP5-SRNRZ-FL	NRZ serial decoding and analysis
	SUP5-SRONEWIRE	SUP5-SRONEWIRE-FL	One wire (1-Wire) serial decoding and analysis
	SUP5-SRPM	SUP5-SRPM-FL	Power Management serial triggering and analysis (SPMI)
	SUP5-SRPSI5	SUP5-SRPSI5-FL	PSI5 serial decoding and analysis
	SUP5-SRSDLC	SUP5-SRSDLC-FL	Synchronous Data Link Control Protocol Decode & Search
	SUP5-SRSMBUS	SUP5-SRSMBUS-FL	SMBus serial decoding and analysis
	SUP5-SRSPACEWIRE	SUP5-SRSPACEWIRE-FL	Spacewire serial decoding and analysis
	SUP5-SRSVID	SUP5-SRSVID-FL	Serial Voltage Identification (SVID) serial triggering and analysis
	SUP5-SRUSB2	SUP5-SRUSB2-FL	USB 2.0 serial bus triggering and analysis (LS, FS, and HS)
	SUP5-SREUSB2	SUP5-SREUSB2-FL	Embedded USB2 (eUSB2) serial decoding and analysis

Upgrade feature	Node-locked license upgrade	Floating license upgrade	Description
Add serial compliance testing All serial compliance products require option 5B-WIN (SSD with Microsoft Windows 10 operating system)	SUP5-AUTOEN-BND	N/A	Automotive Ethernet compliance, signal separation, PAM3 analysis (requires option 5-DJA), 100BASE-T1 serial decode
	SUP5-AUTOEN-SS	SUP5-AUTOEN-SS-FL	Automotive Ethernet signal separation
	SUP5-CMAUTOEN	SUP5-CMAUTOEN-FL	Automotive Ethernet automated compliance test solution (100BASE-T1 and 1000BASE-T1) Requires ≥2 GHz bandwidth for 1000BASE-T1 testing
	SUP5-CMAUTOEN10	SUP5-CMAUTOEN10-FL	Automotive Ethernet (10BASE-T1S Short Reach) automated compliance test solution
	SUP5-CMENET	SUP5-CMENET-FL	Ethernet automated compliance test solution (10BASE-T/100BASE-T/ 1000BASE-T). Requires ≥1 GHz bandwidth for 1000BASE-T1 testing
	SUP5-CMENETML	SUP5-CMENETML-FL	Multilane Ethernet automated compliance test solution (10Base-T, 100Base-T, 1000Base-T) (requires option 5- CMENET)
	SUP5-CMINDUEN10	SUP5-CMINDUEN10-FL	Industrial Ethernet (10Base-T1L Long Reach) automated compliance test solution
	SUP5-CMUSB2	SUP5-CMUSB2-FL	USB2.0 automated compliance test solution. Requires TDSUSBF USB test fixture Requires ≥2 GHz bandwidth for high-speed USB testing

Upgrade feature	Node-locked license upgrade	Floating license upgrade	Description
Add advanced analysis	SUP5-DBLVDS	SUP5-DBLVDS-FL	LVDS debug and analysis (requires option 5-DJA and 5B-WIN)
	SUP5-DJA	SUP5-DJA-FL	Advanced jitter and eye analysis
	SUP5-SIM	SUP5-SIM-FL	Signal Integrity Modeling
	SUP5-SIMA	SUP5-SIMA-FL	Advanced Signal Integrity Modeling
	SUP5-DPM	SUP5-DPM-FL	Digital Power Management
	SUP5-IMDA	SUP5-IMDA-FL	Inverter Motor Drive Analysis
	SUP5-IMDA-DQ0	SUP5-IMDA-DQ0-FL	DQ0 feature for Inverter Motor Drive Analysis (requires option 5-IMDA)
	SUP5-IMDA-MECH	SUP5-IMDA-MECH-FL	Mechanical measurements for Inverter Motor Drive Analysis (requires option 5-IMDA)
	SUP5-MTM	SUP5-MTM-FL	Mask and Limit Testing
	SUP5-PAM3	SUP5-PAM3-FL	PAM3 analysis (requires option 5-DJA)
	SUP5-PWR	SUP5-PWR-FL	Advanced power measurements and analysis
	SUP5-PDN	SUP5-PDN-FL	Power Distribution Network analysis
	SUP5-PS2	N/A	Power solution bundle (5-PWR, THDP0200, TCP0030A, 067-1686-XX deskew fixture)
	SUP5-DPMBAS	SUP5-DPMBAS-FL	Basic Digital Power Management
	SUP5-SV-BW-1	SUP5-SV-BW-1-FL	Increase Spectrum View Capture Bandwidth to 500 MHz
	SUP5-SV-RFVT	SUP5-SV-RFVT-FL	Spectrum View RF vs. Time traces, triggers, Spectrograms, and IQ capture
	SUP5-UDFLT	SUP5-UDFLT-FL	User Defined Filter Creation Tool
	SUP5-VID	SUP5-VID-FL	NTSC, PAL, and SECAM video triggering
	SUP5-WBG-DPT	SUP5-WBG-DPT-FL	Wide Bandgap SiC/GaN Double Pulse Test Measurements and Analysis
Add digital voltmeter	N/A	N/A	Add digital voltmeter / trigger frequency counter (Free with product registration at www.tek.com/register5mso)

NOTE: The SUP5-IMDA, SUP5-IMDA-FL, SUP5-IMDA-DQ0, SUP5-IMDA-DQ0-FL, SUP5-IMDA-MECH, and SUP5-IMDA-MECHFL floating license option upgrades are not compatible with the MSO54B.

Upgrade feature	Upgrade	Description
Add expansion embedded Windows operating system SSD	SUP5B-WIN	Add removable SSD with Windows 10 operating system

Upgrade feature	Upgrade	Description
Add expansion embedded operating system SSD	SUP5B-LNX	Add removable SSD with embedded operating system

Bandwidth upgrades after purchase

Add bandwidth upgrades in the future

You can easily upgrade the analog bandwidth of products after initial purchase. Bandwidth upgrades are purchased based on the number of FlexChannel inputs, the current bandwidth, and the desired bandwidth.

Oscilloscope model owned	Bandwidth upgrade product	Upgrade option	Upgrade option description
MSO54B	SUP5B-BW4	5B-BW3T5-4	License; Bandwidth Upgrade for 5 Series B MSO; Upgrade from 350 MHz to 500 MHz bandwidth on a (4) FlexChannel model; Node Locked
	SUP5B-BW4	5B-BW3T10-4	License; Bandwidth Upgrade for 5 Series B MSO; Upgrade from 350 MHz to 1 GHz bandwidth on a (4) FlexChannel model; Node Locked
	SUP5B-BW4	5B-BW5T10-4	License; Bandwidth Upgrade for 5 Series B MSO; Upgrade from 500 MHz to 1 GHz bandwidth on a (4) FlexChannel model; Node Locked
	SUP5B-BW10T204		Bandwidth upgrade; from 1 GHz to 2 GHz on (4) FlexChannel models of 5 Series B oscilloscopes
	SUP5B-BW3T204		Bandwidth upgrade; from 350 MHz to 2 GHz on (4) FlexChannel models of 5 Series B oscilloscopes
	SUP5B-BW5T204		Bandwidth upgrade; from 500 MHz to 2 GHz on (4) FlexChannel models of 5 Series B oscilloscopes

Oscilloscope model owned	Bandwidth upgrade product	Upgrade option	Upgrade option description
MSO56B	SUP5B-BW6	5B-BW3T5-6	License; Bandwidth Upgrade for 5 Series B MSO; Upgrade from 350 MHz to 500 MHz bandwidth on a (6) FlexChannel model; Node Locked
	SUP5B-BW6	5B-BW3T10-6	License; Bandwidth Upgrade for 5 Series B MSO; Upgrade from 350 MHz to 1 GHz bandwidth on a (6) FlexChannel model; Node Locked
	SUP5B-BW6	5B-BW5T10-6	License; Bandwidth Upgrade for 5 Series B MSO; Upgrade from 500 MHz to 1 GHz bandwidth on a (6) FlexChannel model; Node Locked
	SUP5B-BW10T206		Bandwidth upgrade; from 1 GHz to 2 GHz on (6) FlexChannel models of 5 Series B oscilloscopes
	SUP5B-BW3T206		Bandwidth upgrade; from 350 MHz to 2 GHz on (6) FlexChannel models of 5 Series B oscilloscopes
	SUP5B-BW5T206		Bandwidth upgrade; from 500 MHz to 2 GHz on (6) FlexChannel models of 5 Series B oscilloscopes
MSO58B	SUP5B-BW8	5B-BW3T5-8	License; Bandwidth Upgrade for 5 Series B MSO; Upgrade from 350 MHz to 500 MHz bandwidth on a (8) FlexChannel model; Node Locked
	SUP5B-BW8	5B-BW3T10-8	License; Bandwidth Upgrade for 5 Series B MSO; Upgrade from 350 MHz to 1 GHz bandwidth on a (8) FlexChannel model; Node Locked
	SUP5B-BW8	5B-BW5T10-8	License; Bandwidth Upgrade for 5 Series B MSO; Upgrade from 500 MHz to 1 GHz bandwidth on a (8) FlexChannel model; Node Locked
	SUP5B-BW10T208		Bandwidth upgrade; from 1 GHz to 2 GHz on (8) FlexChannel models of 5 Series B oscilloscopes
	SUP5B-BW3T208		Bandwidth upgrade; from 350 MHz to 2 GHz on (8) FlexChannel models of 5 Series B oscilloscopes
	SUP5B-BW5T208		Bandwidth upgrade; from 500 MHz to 2 GHz on (8) FlexChannel models of 5 Series B oscilloscopes

Certification

Tektronix is registered to ISO 9001:2015 and ISO 14001:2015.

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