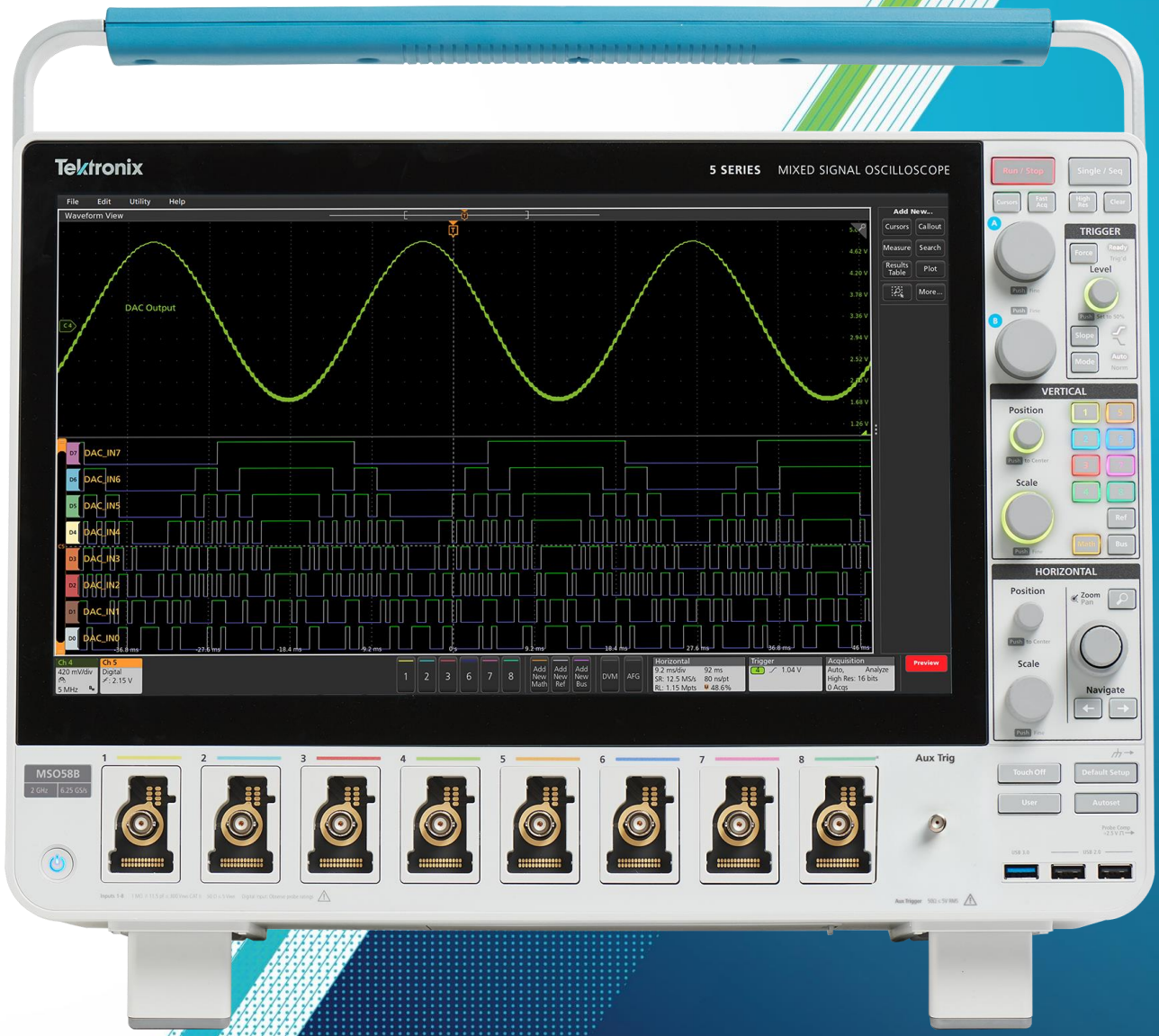
Tektronix

# 5 Series B MSO를 통해 최신 오실로스코프의 기술 동향 알아보기



# Agenda

- Product Overview
- General Useability
- Upgrade Options
- Compliance Options
- Working Remotely
- Probing Solutions
- Summary

# Product Overview

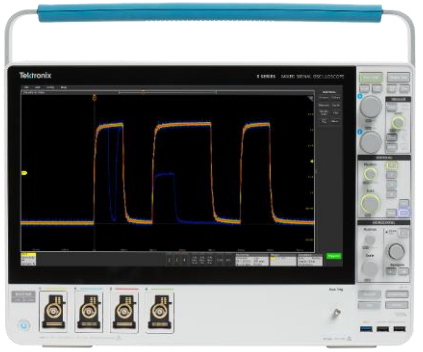
# 5 Series B MSO Mixed Signal Oscilloscope

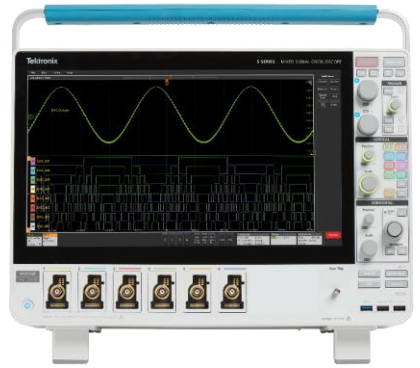
- **Intuitive operation**
  - Award-winning user interface is designed for touch
  - 15.6” HD pinch, drag and swipe touch display
- **Insightful measurements and analysis**
  - 12-bit resolution @ 1.25 GHz; 16-bit resolution @ 50 MHz
  - Built-in DDCs enable multi-channel, synchronized spectrum analysis
  - Fast insights with measurement statistics, tables and trends
  - Optional Windows operating system enables advanced analysis
- **Meets application challenges**
  - Advanced single-phase and three-phase power analysis
  - Powerful tools for signal integrity and power integrity
  - Support for over 25 serial protocols covering the most common interfaces
- **Versatile signal access**
  - Up to 8 FlexChannel® inputs plus Aux In – for up to 8 analog or 64 digital signals plus a trigger/synch signal
  - 1 GHz, low-loading passive probes included with instruments of 1 GHz bandwidth or greater
  - TekVPI interface supports a wide range of active, differential, IsoVu & current probes
- **Work and collaborate almost anywhere**
  - Using just a web browser, connect and control the scope within your own network
  - Analyze data on or off the scope thanks to PC analysis software that works just like the scope
  - Optional one-button cloud storage for convenient storage and collaboration

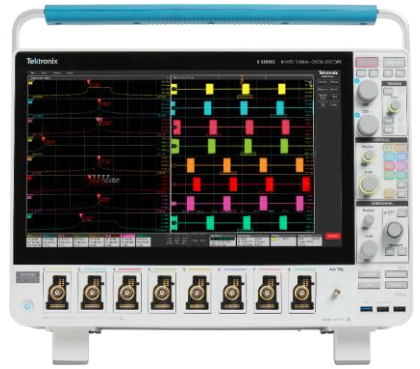
# Key Specifications

## MSO5B

| 5 Series B MSO | MSO54B | MSO56B | MSO58B |
|---|---|---|---|
| Bandwidth | 350 MHz, 500 MHz, 1 GHz, 2 GHz | | |
| FlexChannels | 4 | 6 | 8 |
| Sample Rate (all channels) | 6.25 GS/s | | |
| Digital Channels | 32 (opt.) | 48 (opt.) | 64 (opt.) |
| Sample Rate | 6.25 GS/s | | |
| Record length standard (all ch) | 62.5 M | | |
| Record length optional (all ch) | 125 M, 250 M or 500 M | | |
| ADC Resolution | 12 bits, Up to 16 bits w/ High Res | | |
| Waveform Capture Rate | >500,000 wfms/s | | |
| Arbitrary / Function Generator | 100 MHz (opt.) | | |
| Operating System | Closed Linux (standard)<br>Open Windows (optional) | | |
| Display | 15.6-inch HD (1920 x 1080) capacitive touch | | |
| Aux Trigger In | Standard | | |





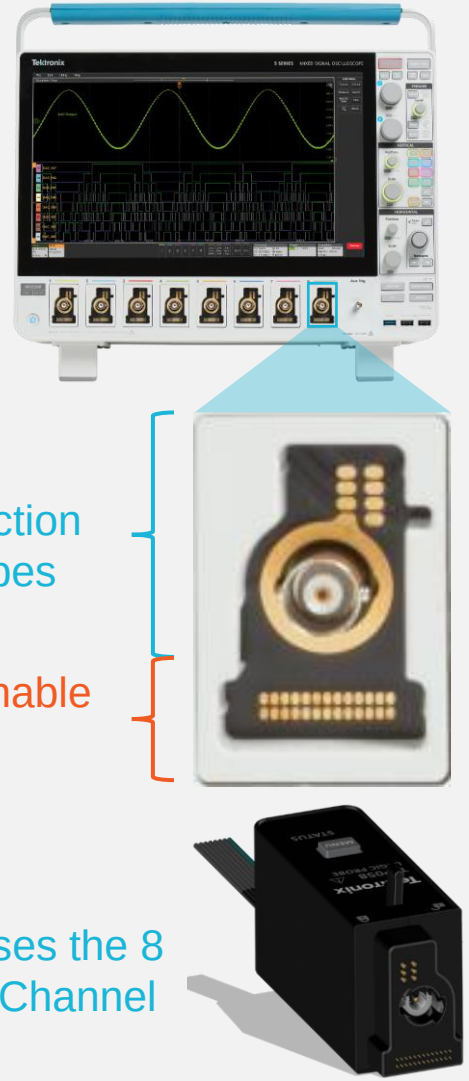


# User-centric channel configuration

## FlexChannels®

- Enables unprecedented flexibility and adaptability to the debug task at hand
- By plugging in an analog or digital probe, each input can be configured as either:
  - (1) analog channel (time domain, frequency domain, or both)
  - (8) digital channels
- Possible configurations include:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| MSO54B | Analog | 4 | 3 | 2 | 1 | 0 | | | | |
| | Digital | 0 | 8 | 16 | 24 | 32 | | | | |
| MSO56B | Analog | 6 | 5 | 4 | 3 | 2 | 1 | 0 | | |
| | Digital | 0 | 8 | 16 | 24 | 32 | 40 | 48 | | |
| MSO58B | Analog | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | Digital | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 |



# Industry Leading Vertical Resolution

## 12-BIT ADC AND NEW HIGH RES MODE PROVIDE A MORE ACCURATE VIEW

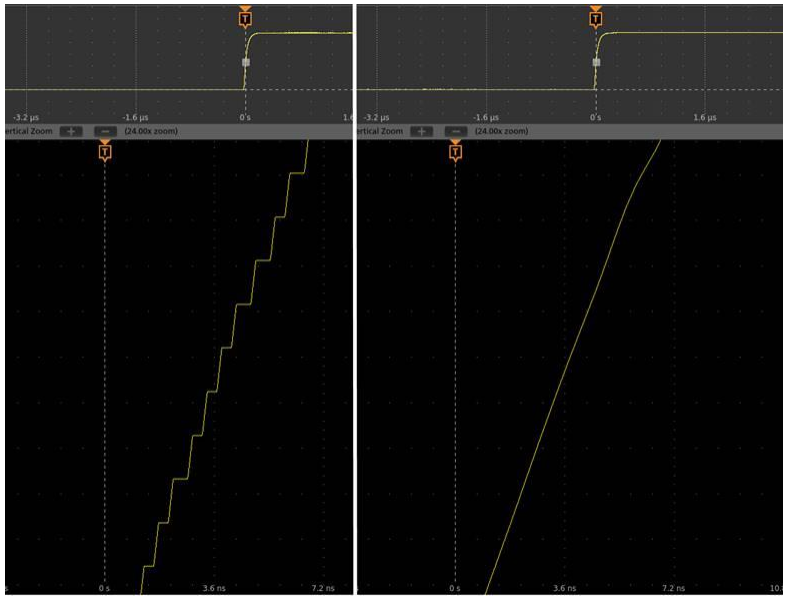
- 12-bit analog-digital converter (ADC) delivers 16 times the resolution of conventional 8-bit ADC

- New High Res mode delivers up to 16 bits of vertical resolution for finer view of lower frequency signals
  - A unique DSP filter is applied at each sample rate. It limits bandwidth and thus, noise, providing a more accurate view of the signal

- Next generation front end amplifier reduces noise to help resolve small signal details
  - ~4.5 dB lower noise from previous generation oscilloscopes

Effective Number of Bits (ENOB)

| Bandwidth | 2 GHz Models | <2 GHz Models |
|---|---|---|
| 1 GHz | 7.0 | 7.6 |
| 500 MHz | N/A | 7.9 |
| 350 MHz | N/A | 8.2 |
| 250 MHz | 7.8 | 8.1 |
| 20 MHz | 8.7 | 8.9 |



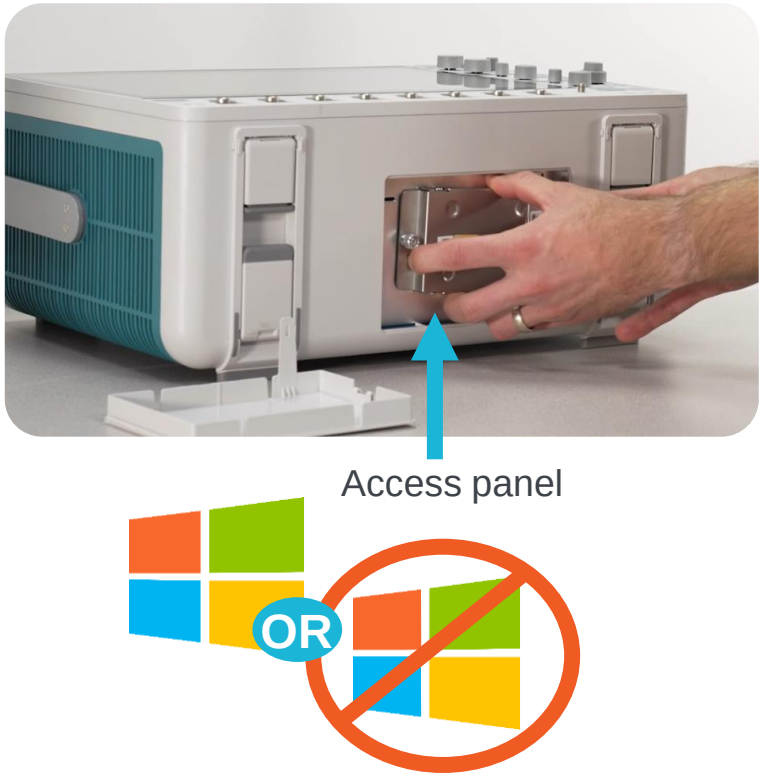
See 16x more digitizing levels on a 12-bit scope

# Configurable Operating System

## WINDOWS OR NOT. YOU CHOOSE.

One of the only oscilloscopes that operates as **either**

A **dedicated scope** OR **open Windows**

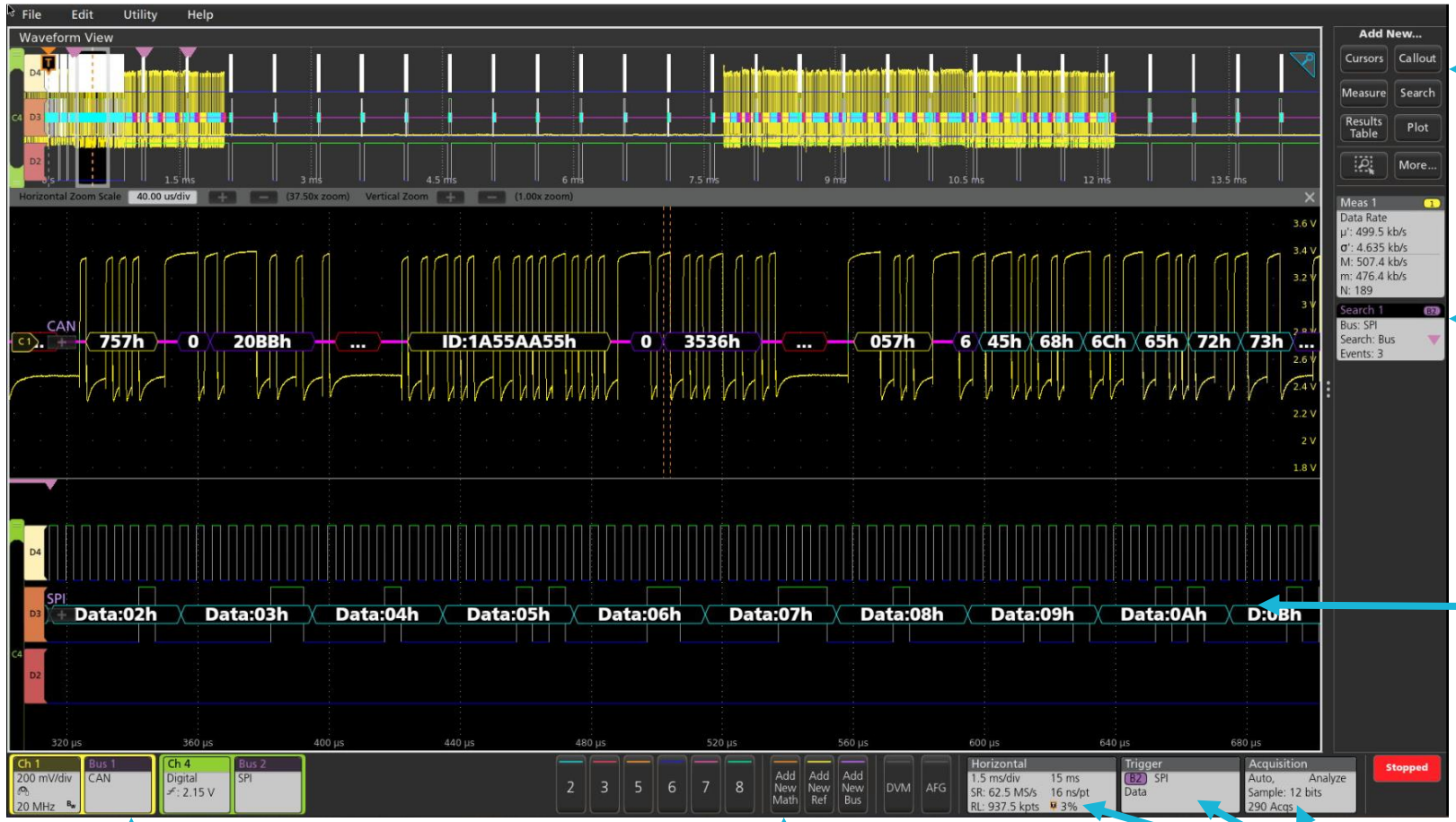



- Configure according to your preference
  - Some prefer a dedicated scope without Windows (e.g. simple, secure)
  - Others prefer running applications on the scope (e.g. using extended monitors, compliance test)
- User interface and experience is identical in either configuration
- Windows SSD can be removed at any point in the future, extending the life of the scope as a dedicated instrument
  - If, for example, Windows goes out of support

# General Useability

# Drag. Pinch. Double Tap.

## USER INTERFACE DESIGNED FOR TOUCH




Immediate access to cursors, notes, measurements, searches, results tables or plots

Measurement and Search results badges are displayed in Results Bar

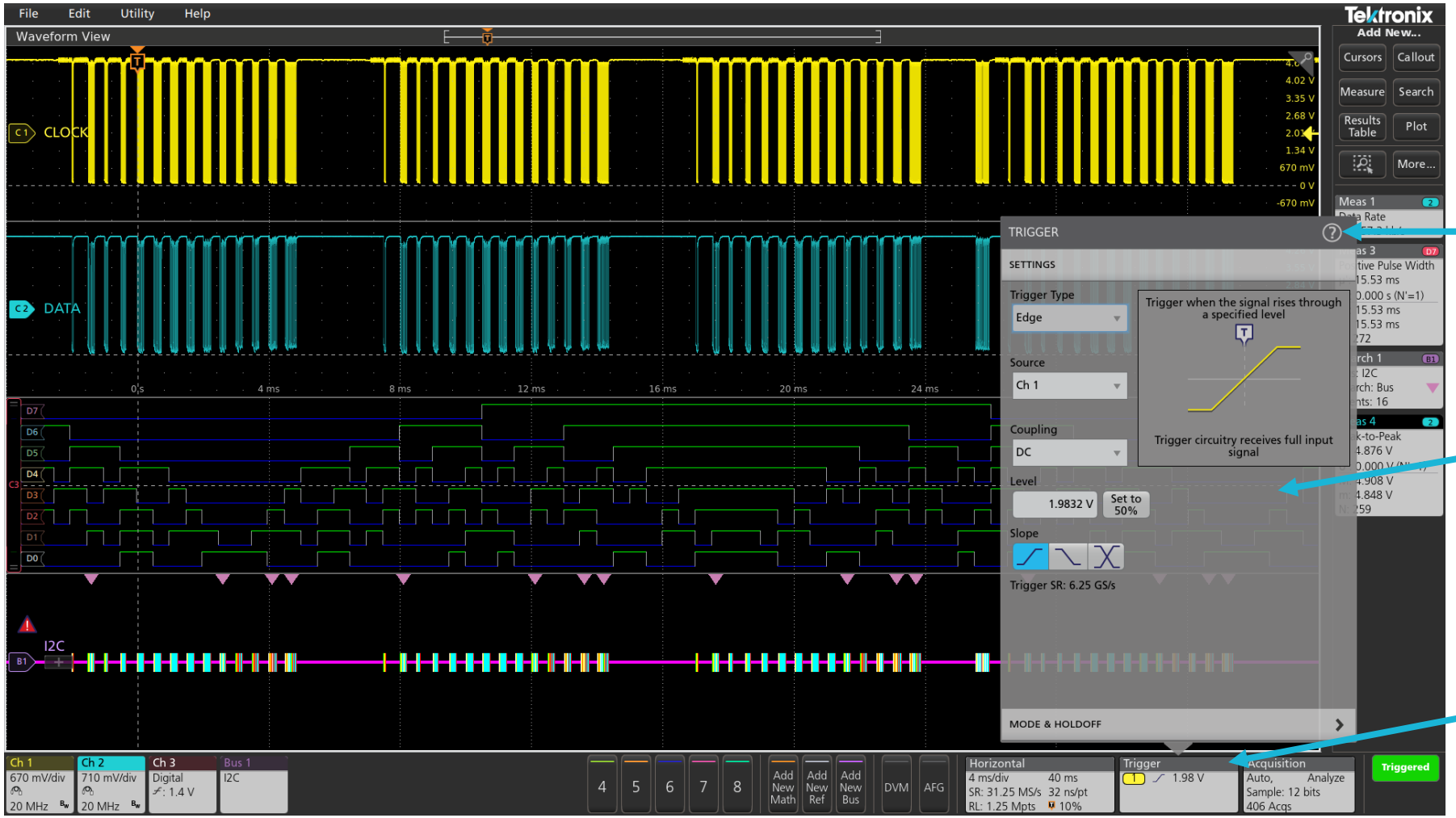
Massive waveform viewing area!

Waveform badges show relevant info for all displayed waveforms

Immediate access to new Math, Reference, Bus, DVM and AFG

All critical horizontal, trigger and acquisition parameters

# Direct Access to Configuration Menus

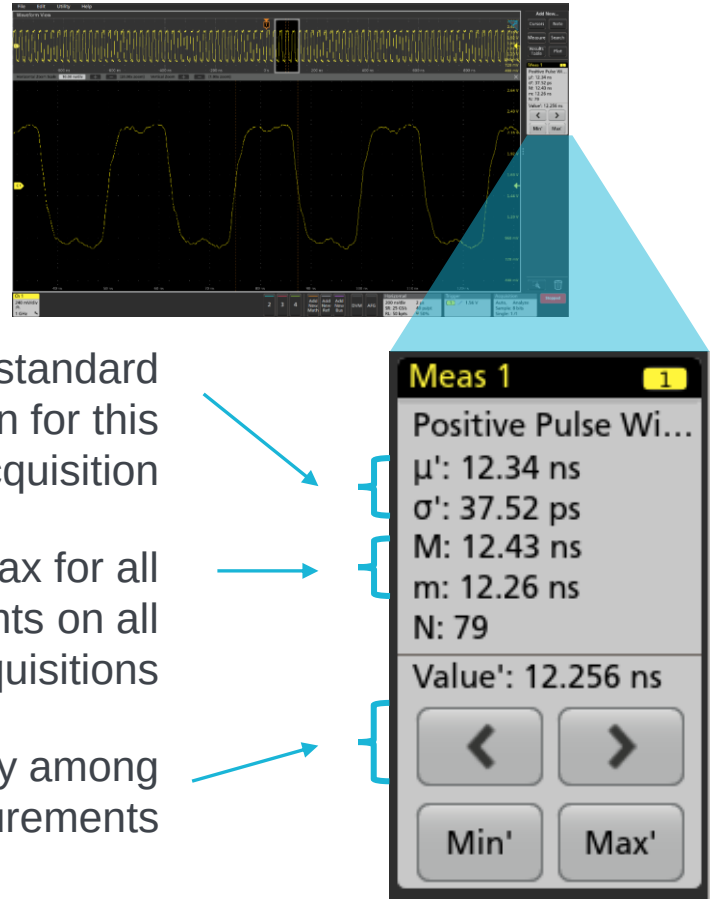



- Access configuration menus by double-tapping relevant items
- Context sensitive help available from all menus
- Configuration menus take up little screen real estate, and are transparent and movable
- Access controls through objects on the display, rather than navigating menus to get to more menus

# A Measurement is More than One Number

## INTEGRATED STATISTICS, EASY MIN/MAX NAVIGATION SPEEDS INSIGHT INTO SIGNAL BEHAVIOR

- Each measurement has a badge in the Results Bar
- Turn on statistics to quantify signal characteristics over millions of acquisitions
- Quickly navigate through measurements
  - Arrow buttons move to the previous or next occurrence of the measurement and move the zoom window accordingly
  - Min’ and Max’ buttons go to Min and Max values in record
- Locally gate measurements by screen, cursors, logic, search or by time



# Stacked vs. Overlay Display Modes

## NEW STACKED MODE SAVES TIME AND PROVIDES MOST ACCURATE VIEW

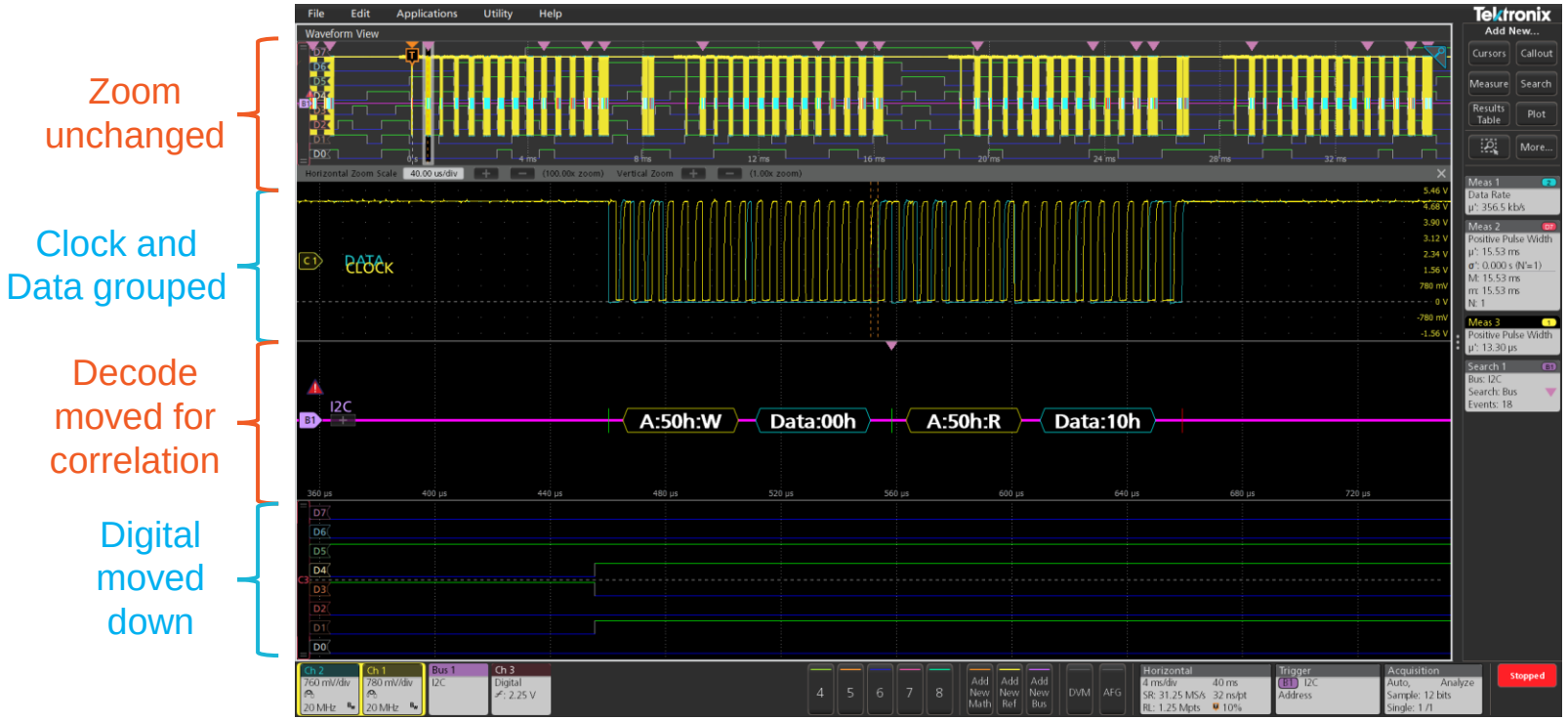
- Stacked mode creates a ‘slice’ for each waveform
  - As waveforms are turned on, slices are automatically added
  - As waveforms are turned off, slices are automatically removed
  - Can reorder slices as desired
- Each slice uses the full range of the ADC
  - You can now have both visual separation as well as maximum resolution


- Stacked display mode is the default, but you can also specify overlay mode as your default

# Stacked / Overlay Display Mode

## NEW STACKED / OVERLAY MODE PROVIDES THE BEST OF BOTH WORLDS!

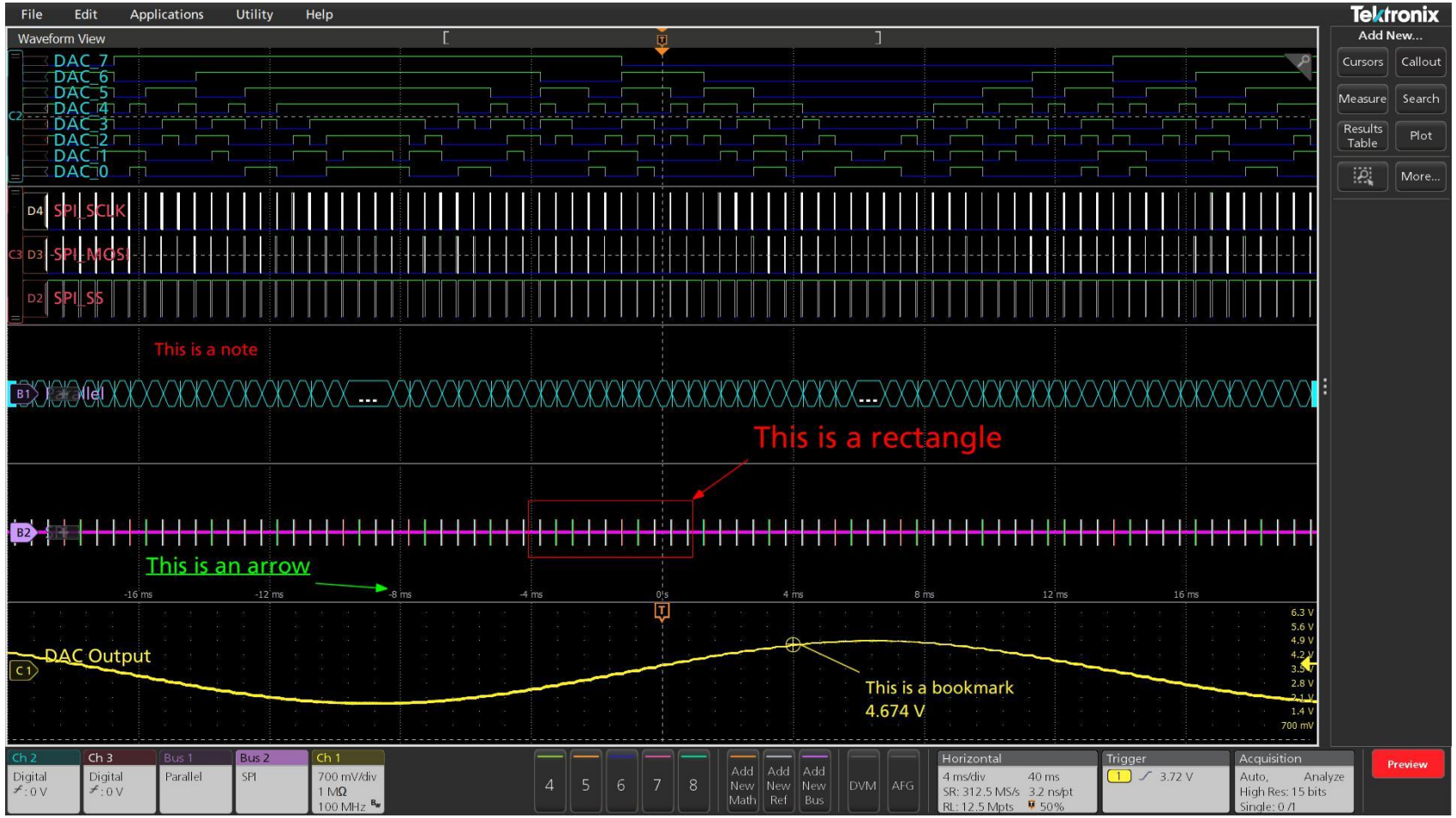
- Stacked mode
  - Optimizes vertical resolution and easy viewing of many signals
  - Signals can be reordered
- Overlay mode
  - Optimizes comparison of signal amplitudes and timing
- Stacked/Overlay mode
  - Easy comparison of some of the signals, without compromising vertical resolution or ease of viewing multiple signals



# Callouts to Ease Documentation

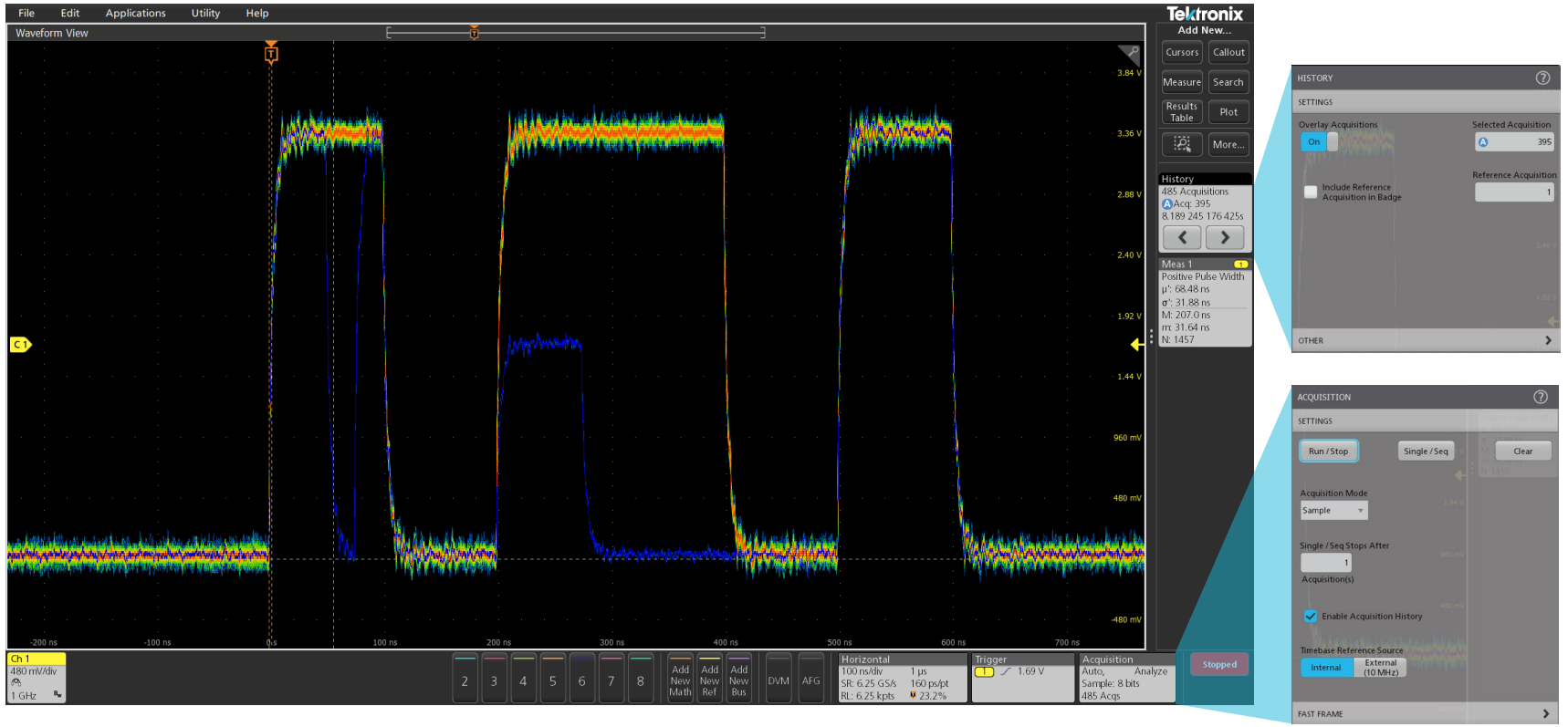
## EASILY DOCUMENT YOUR SETUP AND RESULTS

- “Notes” have been replaced with “Callouts”
- Four types of Callouts
  - Note
  - Arrow
  - Rectangle
  - Bookmarks
- Usual formatting options available
  - Font, size, color, bold, italics, underline, etc.



# History Mode

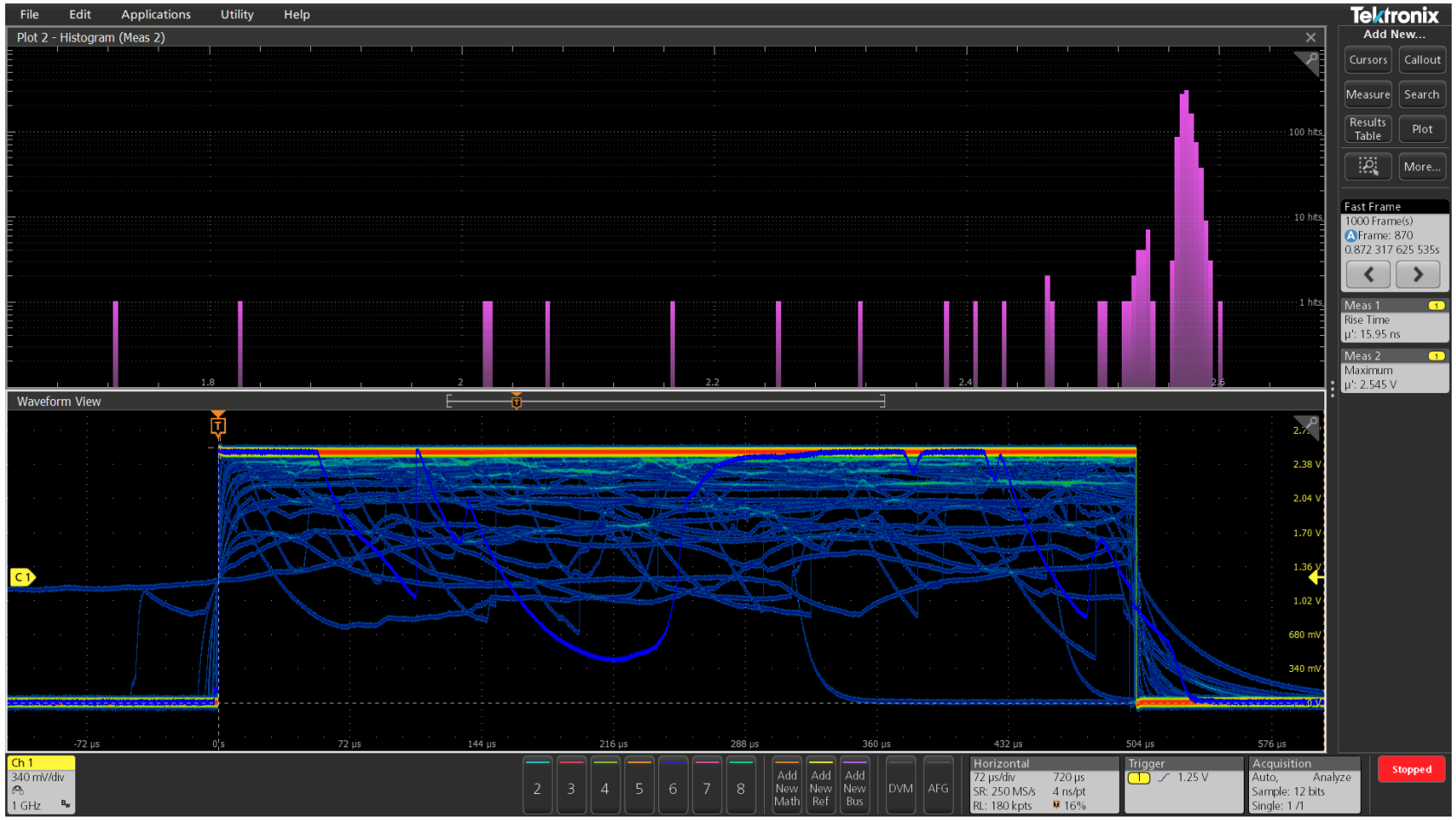
## VIEW EVENTS THAT WERE CAPTURED WHEN YOU WEREN'T LOOKING




- 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 acquisitions.
- Compatible with standard waveforms, spectrum view, math waveforms, measurements, visual trigger, cursors, statistics, plots, searches, bus decodes, and more.

# Fast Frame Segmented Memory

- Acquisition mode that allows you to divide your record length into many frames that can each store a trigger event
- Enables capture of many events of interest at high resolution without all of the dead time between them
- Easily navigate through frames or overlay all frames for quick visual comparison
- Analysis tools like math, measurements, search, bus decode, etc. work across all acquired frames




*Fast Frame capture with all 1000 frames overlaid.*
*Easily navigate through frames using the Fast Frame badge on the right.*

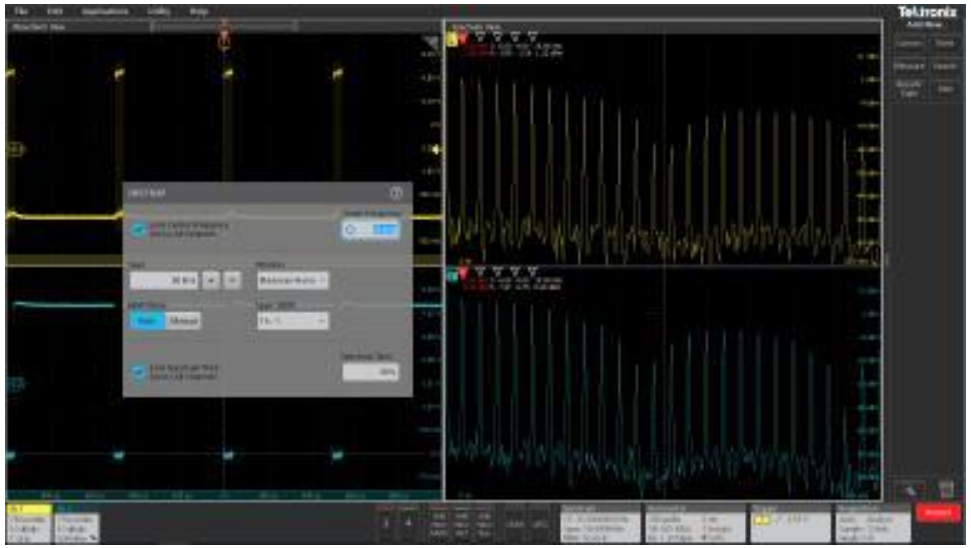
# History Mode demo

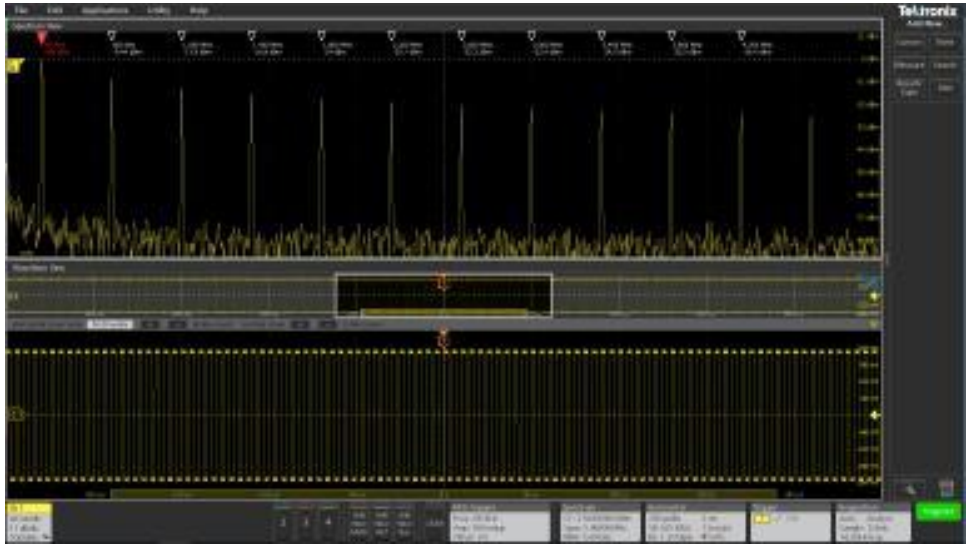
# Fast Frame demo

# Spectrum Analysis on Any or All Channels

## SPECTRUM VIEW - MIXED-DOMAIN ANALYSIS CAPABILITY (STANDARD FEATURES)

- Spectrum View provides simultaneous time- and frequency-domain views of each analog input signal with independent acquisition settings in each domain
  - Center Frequency
  - Span
  - Resolution Bandwidth
- Time-correlated time- and frequency-domain displays
- Normal, Max Hold, Min Hold, and Average traces
- Stacked and overlay frequency-domain displays
- Automated peak markers and manual markers

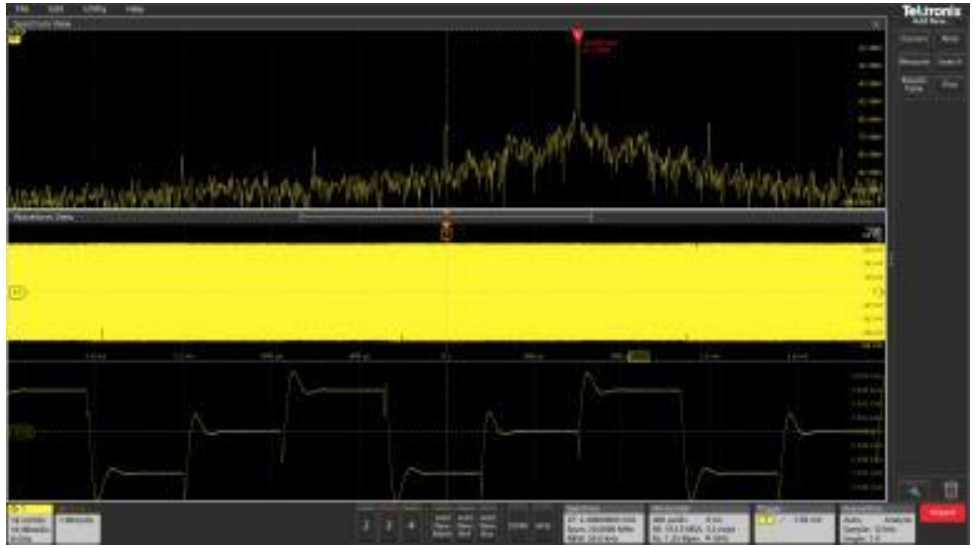


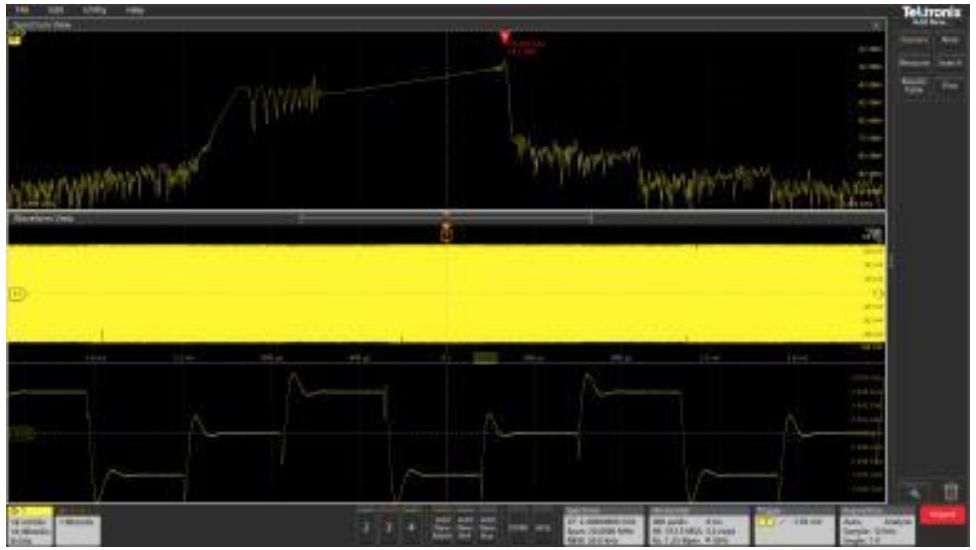


# Spectrum Analysis on Any or All Channels

## SPECTRUM VIEW - RF TIME DOMAIN TRACES (OPTION 5-SV-RFVT)

- Spectrum View Time Domain Traces make is easy to understand what's happening with a time-varying RF signal.
- Three RF time domain traces derived from the underlying I & Q data of Spectrum View
  - **Magnitude** – The instantaneous amplitude of the spectrum vs. time
  - **Frequency** – The instantaneous frequency of the spectrum relative to center frequency vs. time
  - **Phase** – The instantaneous phase of the spectrum relative to the center frequency vs. time
- Trigger on Magnitude vs. Time or Frequency vs. Time waveforms

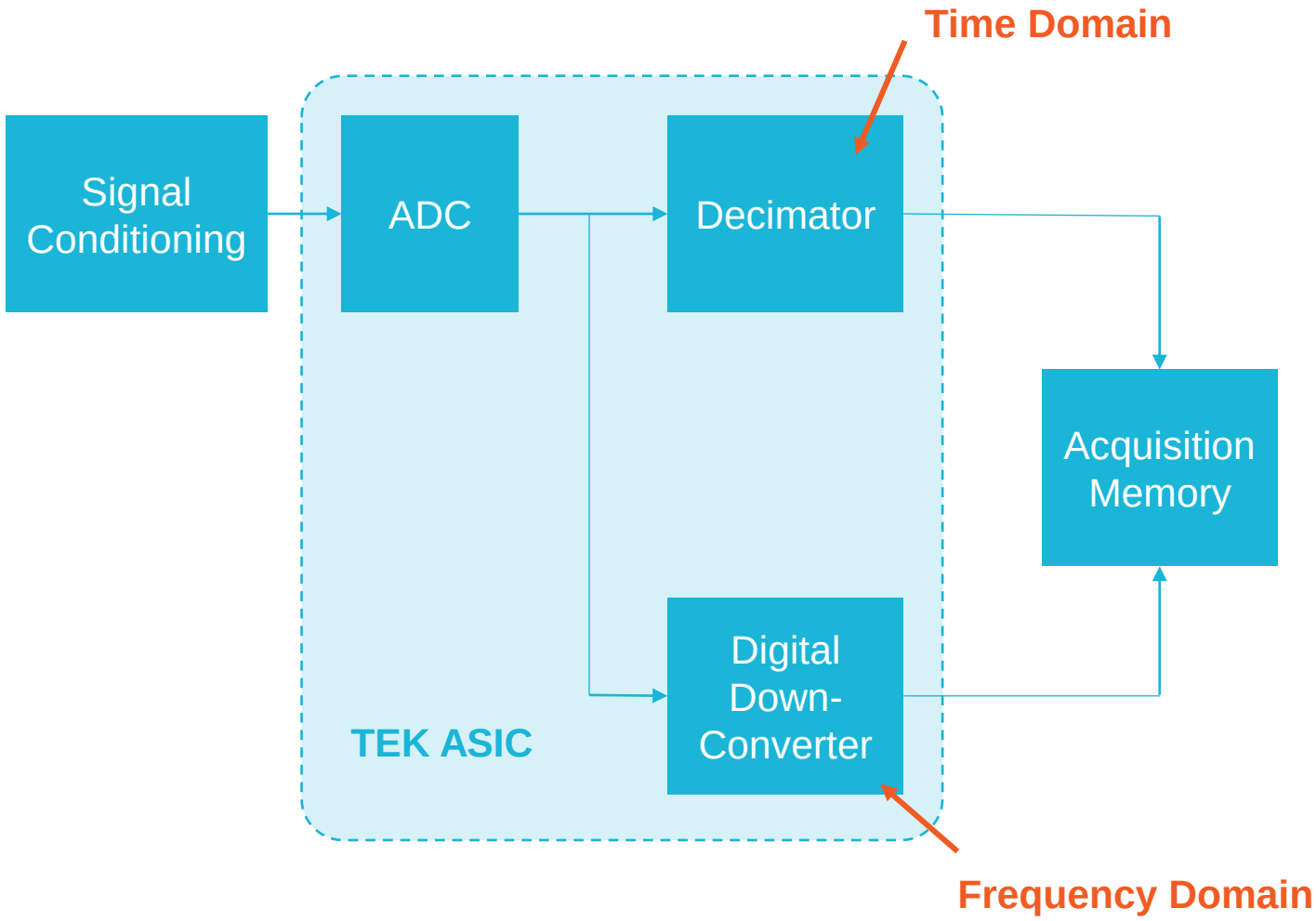




# Technology Behind Spectrum View

PATENT PROTECTED

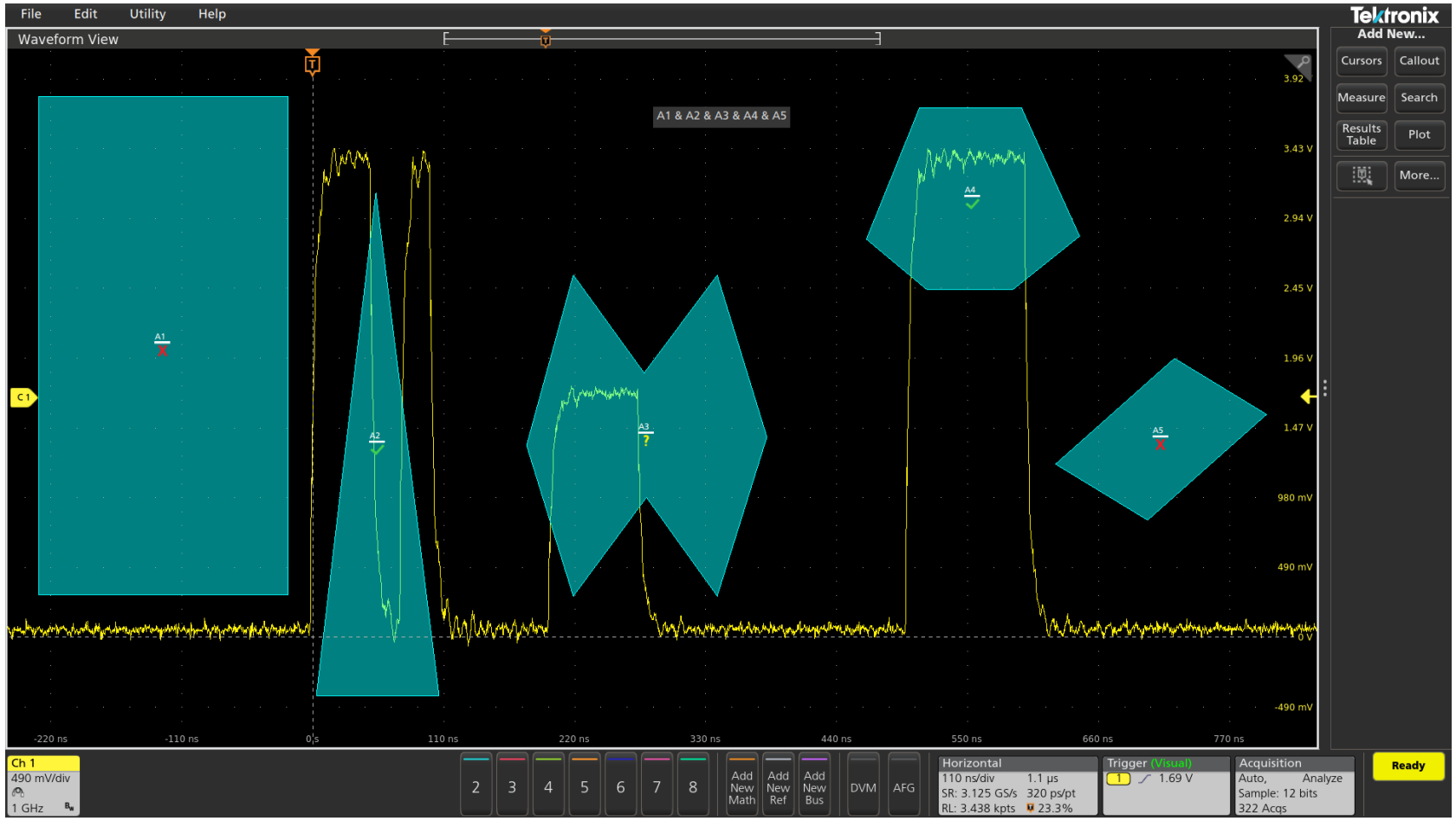
- TEK ASIC includes both of the following for each FlexChannel:
  - A decimator for time domain waveform viewing
  - A digital downconverter for frequency domain waveform viewing
- Having both pieces of dedicated hardware provides independent acquisition controls in each domain



# Spectrum View demo

# Visual Trigger

- Visual Trigger makes the identification of the desired waveform events quick and easy by scanning through all waveform acquisitions and comparing them to on-screen areas (geometric shapes).
- An essentially-unlimited number of areas can be created using a variety of shapes including triangles, rectangles, hexagons, trapezoids, and user-specified shapes.
- Boolean combinatorial logic combines the areas to define the desired trigger behavior.




*Visual Trigger qualifies hardware trigger to capture complex events.*
*This example shows capture of a specified digital data pattern during a burst of clock pulses.*

# Even more user experience enhancements

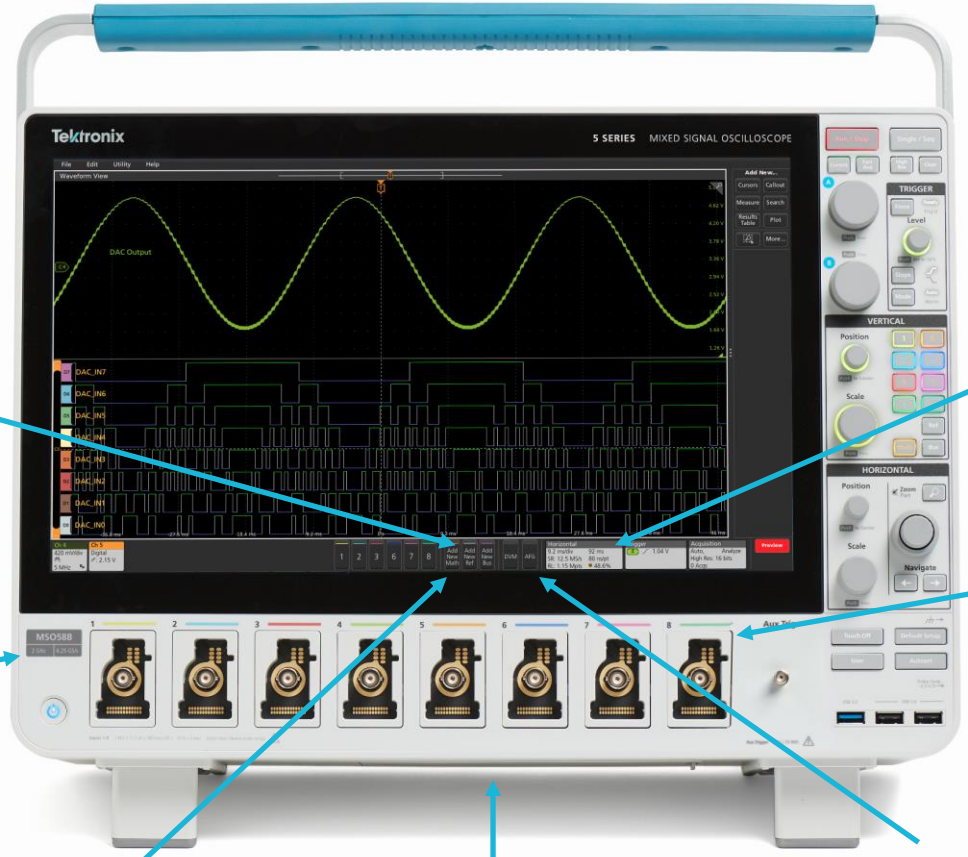
- Unlimited plots, measurement results tables, bus decode tables with ability to reorganize views as desired
- Cursor readouts in graticule
- Easy documentation of things on screen via notes
- Vertical scale and position knob LEDs map to selected waveform color
- Trigger level knob LED maps to trigger source color
- In graticule horizontal and vertical division labels
- Movable / fixed graticule
- Custom waveform colors
- Global vs local reference levels, clock recovery, etc.
- Undo / Redo
- Context sensitive help
- e*Scope lets you drive scope remotely via browser exactly the same as in-person
- Badges show effective bandwidth of each channel
- Inverted display mode, adjustable font sizes
- Quick save via the Save button on the front panel
- Flick to remove channels, buses, math waveforms, reference waveforms & measurements
- Identical user interface available on TekScope offline analysis software
- Upload, share, store, search, download, and store any file to the cloud using TekDrive
- And more…

# Upgrade Options

# Upgrade at Any Time

## CONFIDENCE FOR THE FUTURE

## The scope that changes as your needs change




### Protocol and Analysis Options

- Serial bus trigger and analysis
- Automated Jitter Analysis
- Automated Power Analysis
- Digital Power Management
- Automotive Ethernet Compliance
- Ethernet Compliance
- USB 2.0 Compliance
- Inverter Motor Drive Analysis

### Bandwidth Upgrades

- 500 MHz
- 1 GHz
- 2 GHz *

* Must be performed by authorized Tektronix service center

### Increase Record Length

Upgrade to 125 Mpts / channel
Upgrade to 250 Mpts / channel
Upgrade to 500 Mpts / channel

### Add TLP058 Logic Probes

Access 8 digital channels
on any/every FlexChannel input

### Digital Voltmeter / Trigger Frequency Counter

Free with product registration

### Windows 10 Upgrade

Add solid state drive with
Windows 10 license

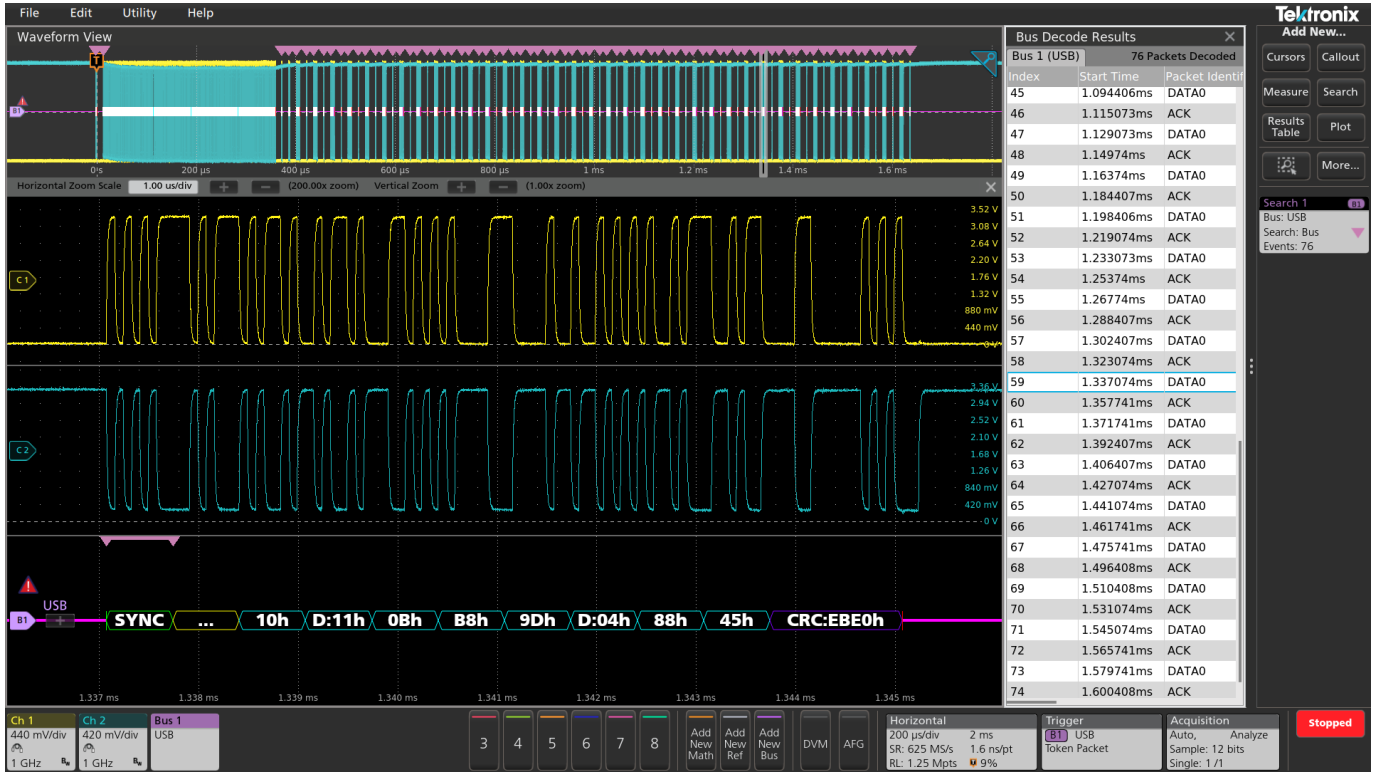
### Function Generator Upgrade

100 MHz Arbitrary/ Function Generator

# Simplified Serial Decoding and Triggering

## OPTIONAL PACKAGES

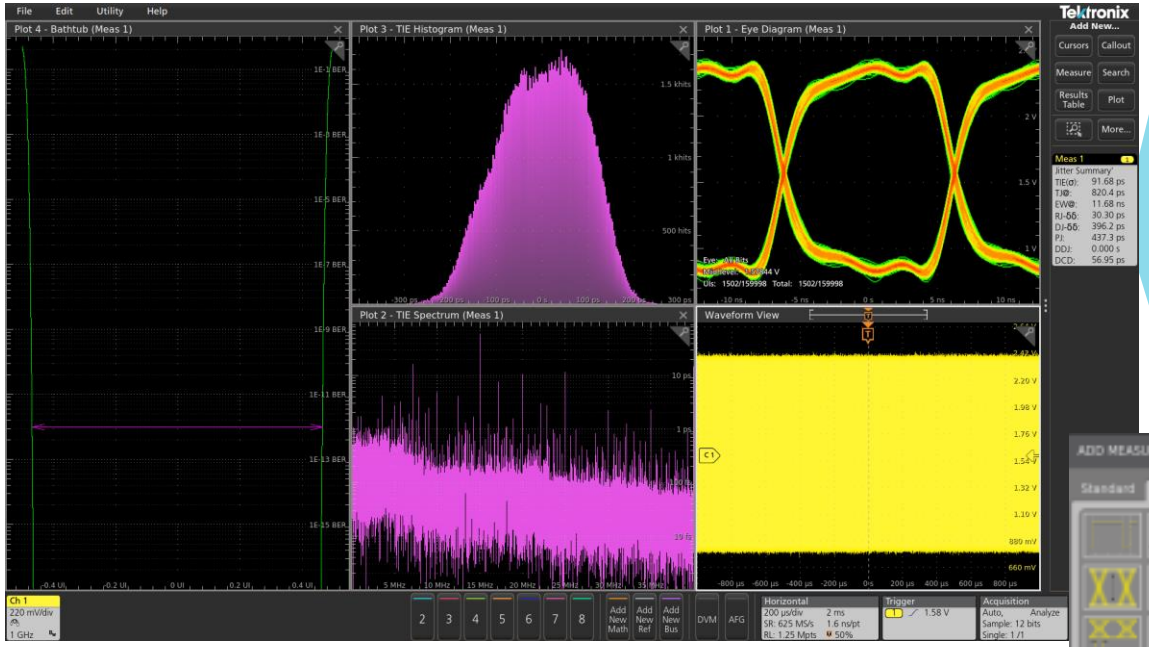
- Trigger on, decode, and search for packet content of common serial standards
- Decoded bus presented time aligned with other inputs and chips
- Decoded packet content also available for viewing and exporting in a tabular form
  - I2C
  - SPI
  - eSPI
  - I3C
  - RS-232/422/485/UART
  - SPMI
  - SMBus
  - CAN
  - CAN FD
  - LIN
  - FlexRay
  - SENT
  - PSI5
  - CXPI
  - Automotive Ethernet
  - MIPI C-PHY
  - MIPI D-PHY
  - USB 2.0
  - eUSB2
  - Ethernet
  - EtherCAT
  - Audio
  - MIL-STD-1553
  - ARINC 429
  - Spacewire
  - 8B/10B
  - NRZ
  - Manchester
  - SVID
  - SDLC
  - 1-Wire
  - MDIO

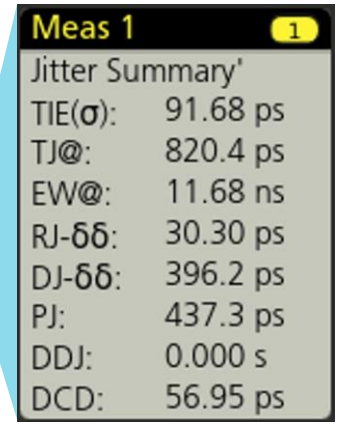


# Jitter and Eye Analysis

## CHARACTERIZE KEY SYSTEM TIMING WITH JITTER & EYE ANALYSIS

- DPOJET functionality is integrated into the scope application for faster and more intuitive operation
- Jitter measurements are accessed in the same manner as basic measurements
- Jitter Summary simplifies set up of the most common jitter measurements and plots

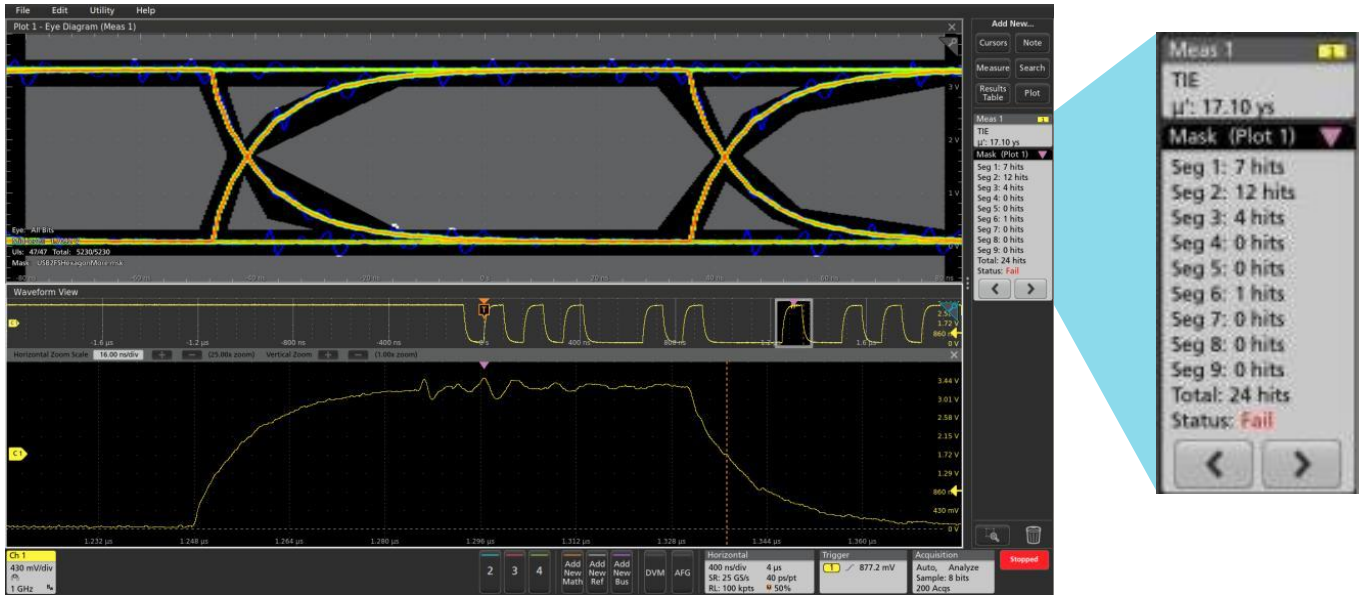



# Automated Eye Diagram Pass/Fail Testing

## AUTOMATED PASS/FAIL TESTING FOR SERIAL SIGNALS

- Automated pass/fail mask testing on eye diagrams:
  - Included in 5-DJA jitter option
  - Verifies signal amplitudes and noise, timing jitter, and rise- and fall-times, with a single test
  - Masks specified by simple text file
  - Unlimited number of mask segments
  - User-specified pass/fail threshold and number of acquisitions to test
  - Manual navigation between violations

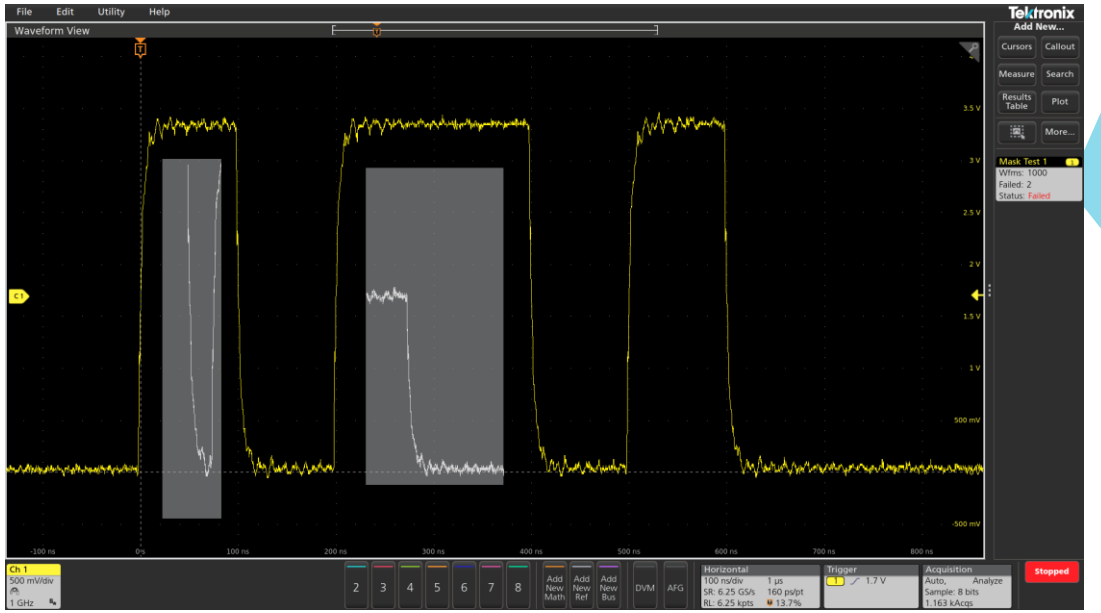



*Eye diagram mask test, with user-specified pass-fail threshold of 10 mask violations (hits). This example shows navigation between hits and correlation to time-domain waveform.*

# Automated Pass/Fail Testing

## AUTOMATED PASS/FAIL TESTING

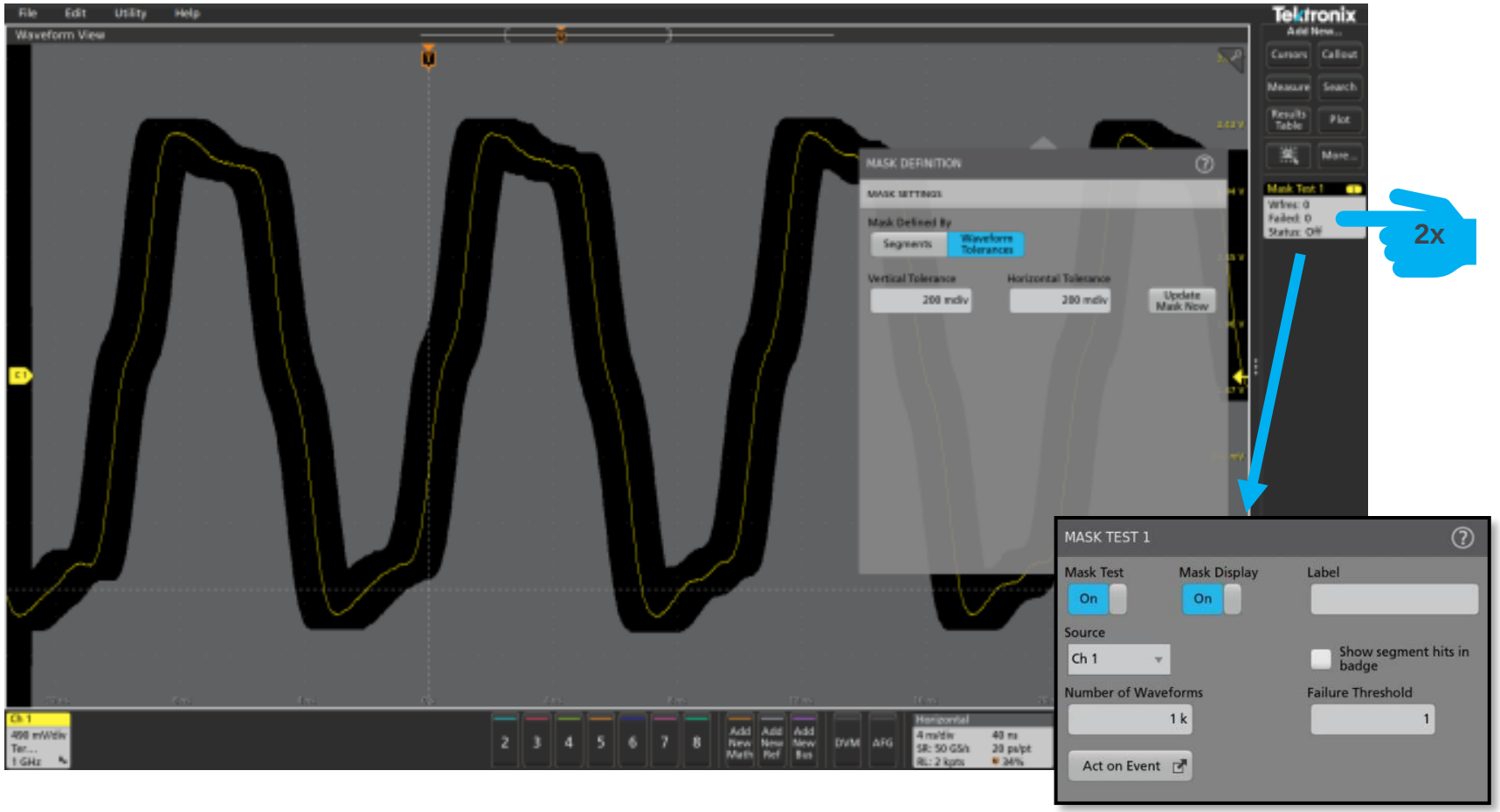
- Automated Pass/Fail testing
  - Option 5-MTM
  - Custom mask definitions created by drawing segments on the display
    - Unlimited number of mask segments
    - Triangle, Rectangle, Trapezoid, or Hexagon starting shapes
  - User-specified pass/fail threshold and number of waveforms to test
  - Action on hit, failure or pass include Save screen capture, Save waveform, Stop Acquisitions



# Automated Pass/Fail Mask Testing

## ADDED TO OPTION 5-MTM

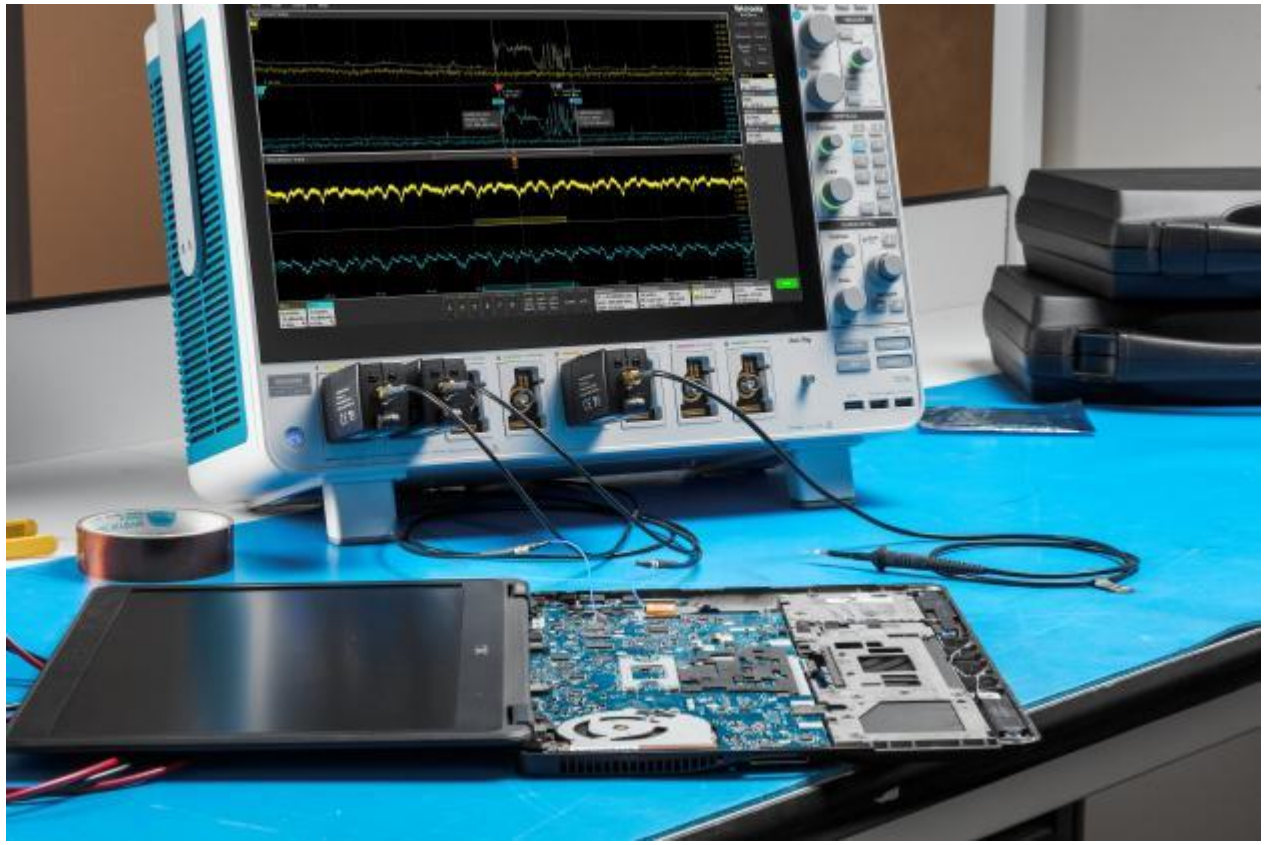
- Can now define mask via Waveform Tolerances
- Tolerance based masks do not move/scale with the waveform
- Can perform limit testing on multiple waveforms simultaneously
- User-specified pass/fail threshold and number of waveforms to test
- Action on hit, failure or pass include Save screen capture, Save waveform, Stop Acquisitions, SRQ



# Measure Power Rails on Eight Channels

## MEASURE MULTIPLE POWER RAILS WITH ACCURACY

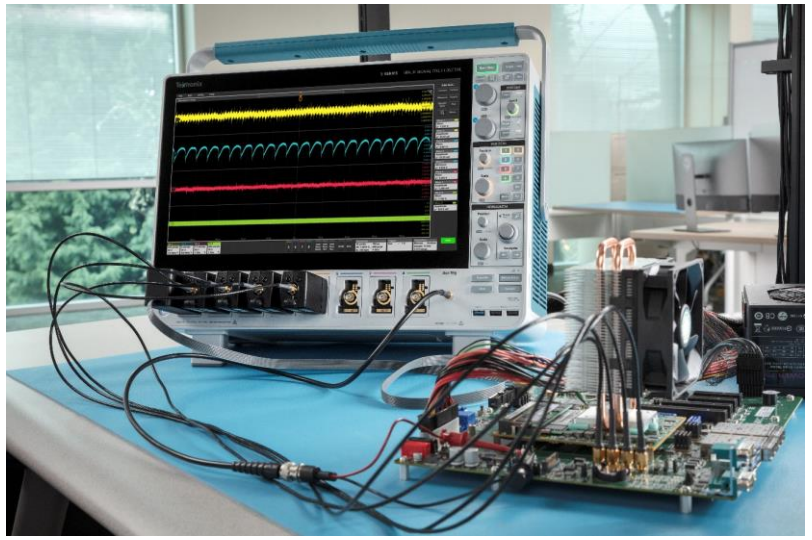
- Large offsets to view and analyze small signals riding on large DC voltages
- Flexible connectivity options to cover a broad range of challenges
- Low noise measurements to see more real signal activity
- High bandwidth to see more signal content like harmonics and ripple
- Digital Power Management (Option 5-DPM) software automates power rail testing

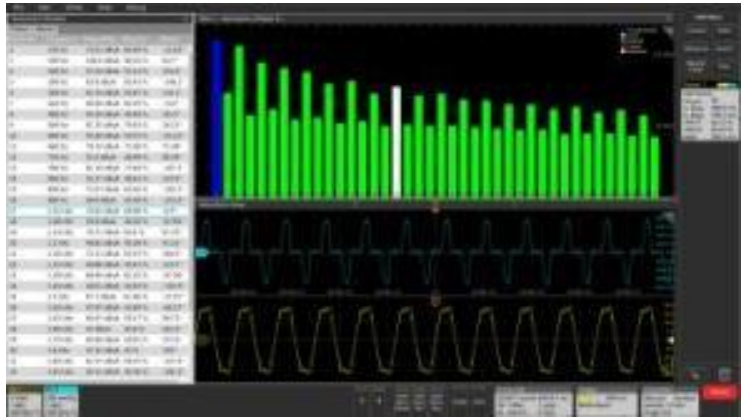


# Power Supply Analysis

## AUTOMATED POWER MEASUREMENTS MADE RELIABLE AND REPEATABLE

- Provides the user with application expertise
  - Algorithms and measurement techniques
  - Test limits for relevant industry standards
- Automates setup for measurements
- Ensures consistent and reliable measurements
- Enables efficient documentation of measurement results





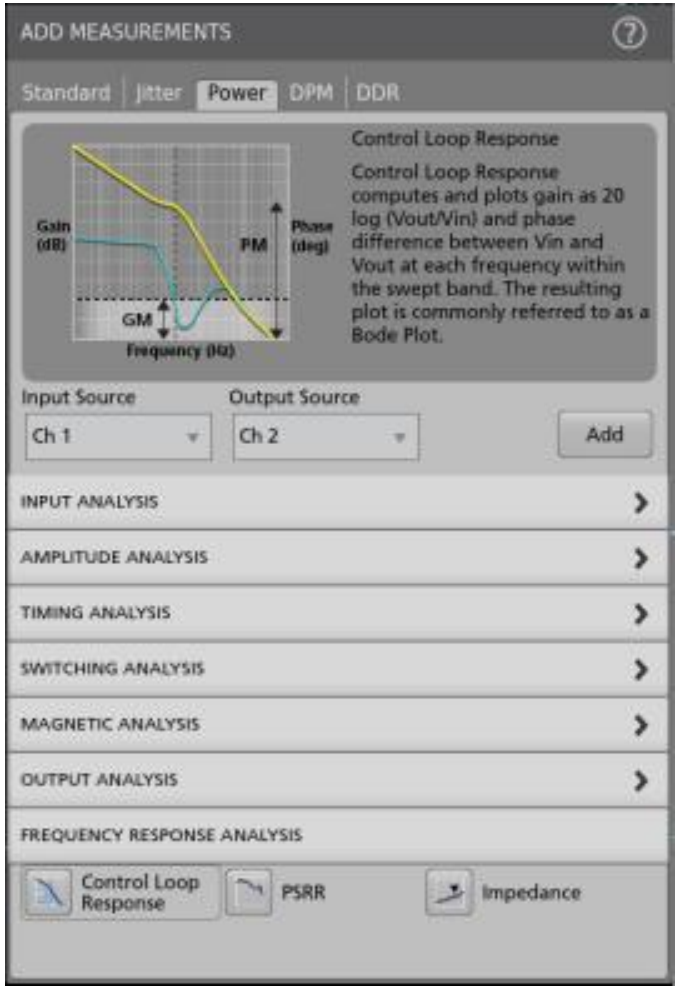
Power Current Harmonics

# Power Supply Analysis

## AUTOMATED POWER MEASUREMENTS

- Option 5-PWR and upgrades SUP5-PWR and SUP5-PWR-FL
- Power tab in Add Measurements menu

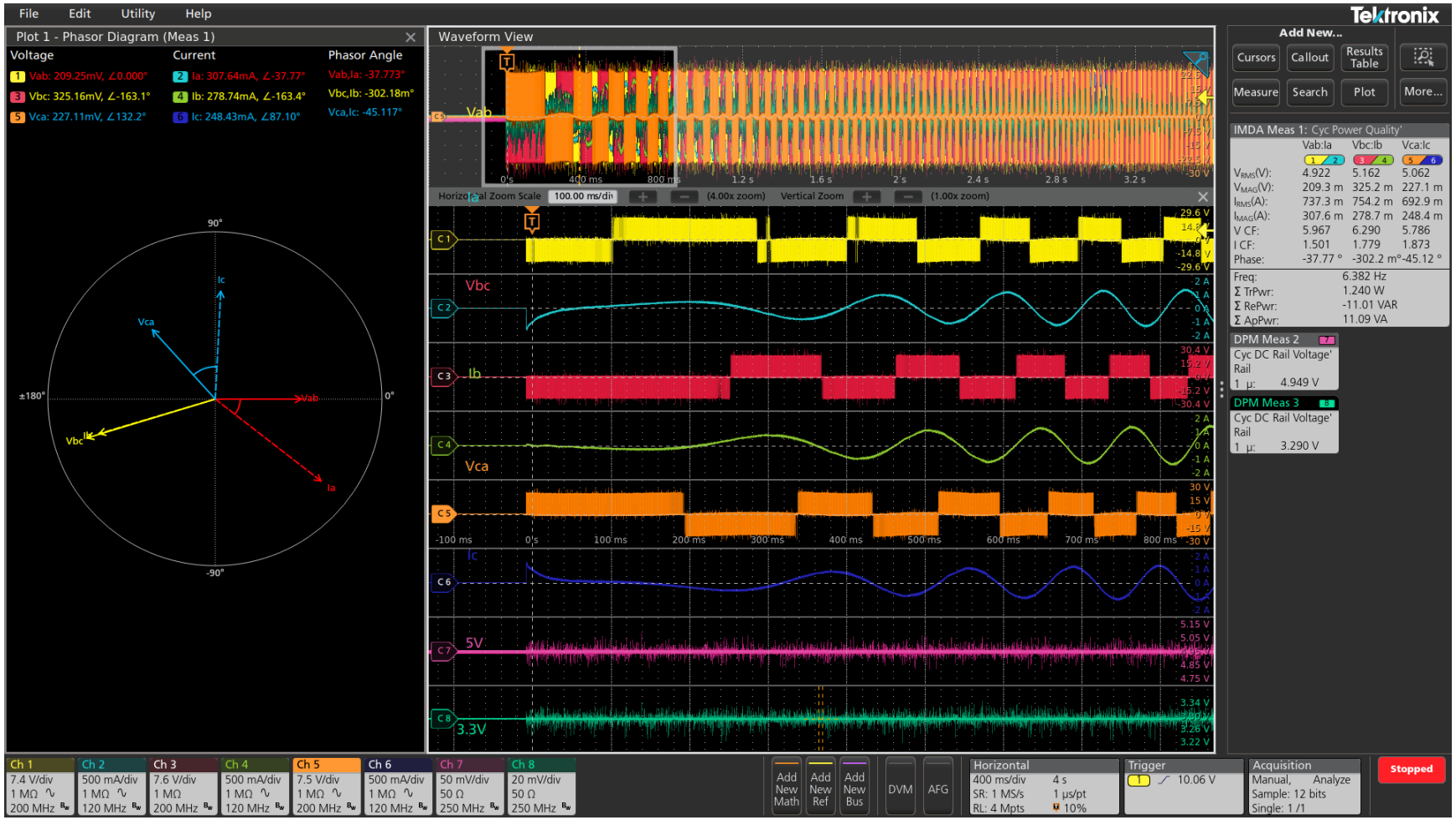
- Input Analysis
  - Power Quality
  - Harmonics
  - Input Capacitance
  - Inrush Current
- Amplitude Analysis
  - Cycle Amplitude, Cycle Top, Cycle Base, Cycle Peak-to-Peak, Cycle Maximum, Cycle Minimum
- New Magnetic Analysis
  - Magnetic Loss
  - Magnetic Property
  - Inductance
  - I vs. ∫V
- Timing Analysis
  - Period, Frequency, Positive Duty Cycle, Negative Duty Cycle, Positive Pulse Width, Negative Pulse Width
- Switching Analysis
  - Switching Loss
  - SOA
  - dv/dt
  - di/dt
  - RDSon
- Output Analysis
  - Line Ripple
  - Switching Ripple
  - Efficiency
  - Turn-on Time / Turn-off Time
- Frequency Response
  - Control Loop Frequency Response (Bode Plot)
  - Power Supply Rejection Ratio (PSRR)
  - Impedance
- Digital Power Management
  - Ripple
  - Overshoot
  - Turn on overshoot
  - Undershoot
  - DC rail voltage
  - Turn-on/Turn-off time
  - Jitter analysis



# Inverter Motor Drive Analysis (IMDA)

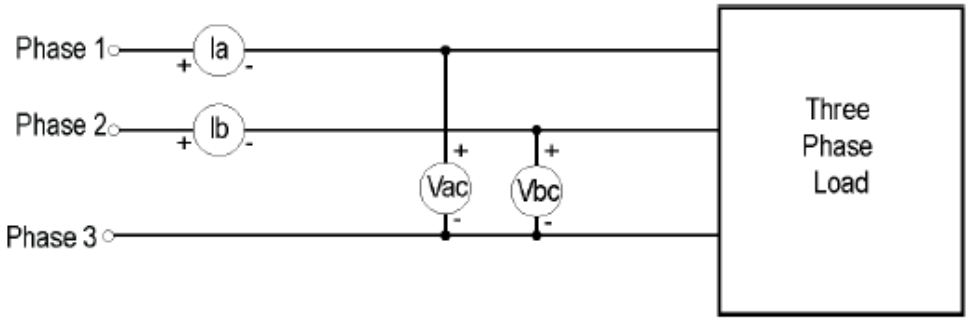
## OPTIONAL SOFTWARE PACKAGES

- **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
- **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
- **DQ0 analysis**
- **Mechanical Measurements**

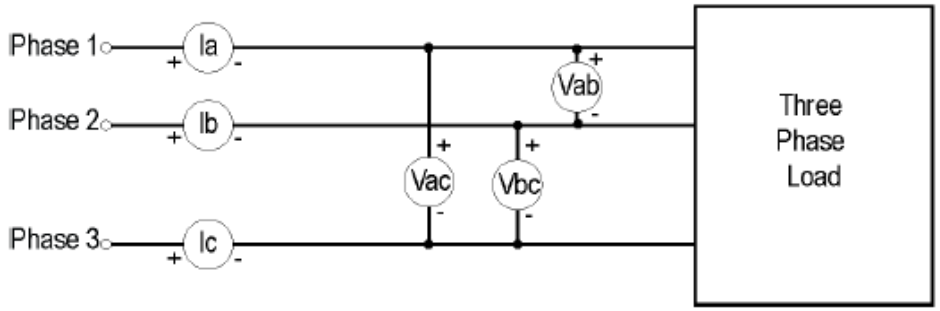


# Configurations

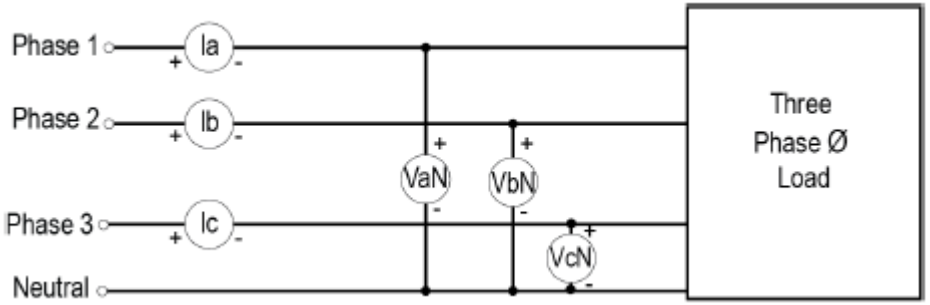
## 2V/2I, 3-Phase, 3-Wire



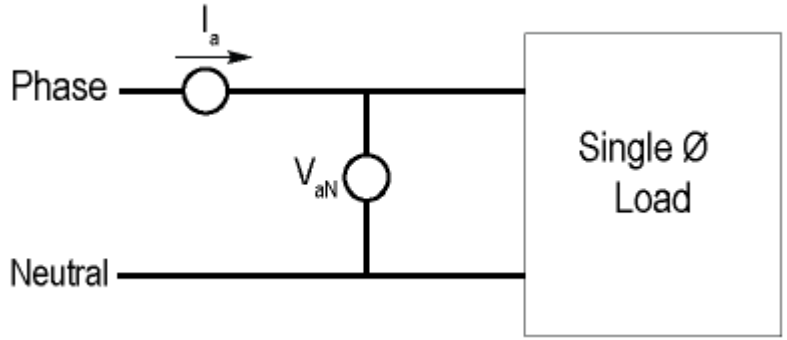

## 3V/3I, 3-Phase, 3-Wire (Delta)




## 3V/3I, 3-Phase, 4-Wire (Star, Wye)




## 1V/1I, 1-Phase, 2-Wire

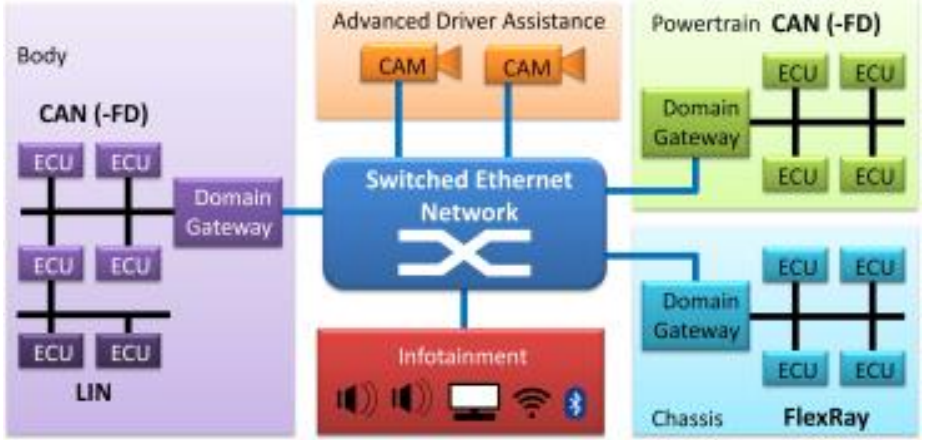


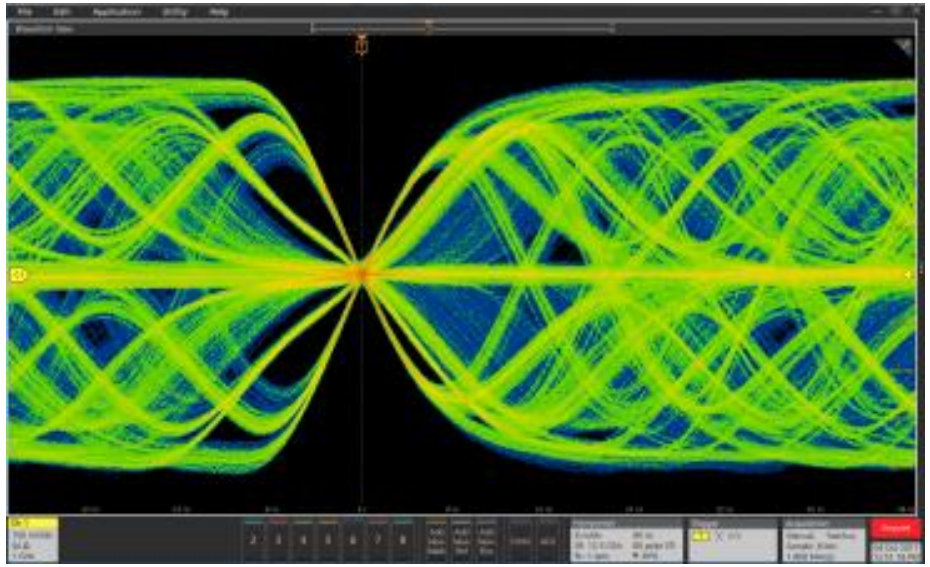
# Compliance Options

# Automotive Ethernet Compliance

## OPTIONAL TEKEXPRESS SOFTWARE PACKAGE

- Though similar to Ethernet, Automotive Ethernet has unique requirements driven by automotive concerns including weight, reliability and cost.
  - Enables support for high data rate applications (ADAS, IVI)
- Covers both standards: 100BASE-T1 and 1000BASE-T1
- Includes the following tests required by the standards:
  - Maximum Output Droop
  - Distortion
  - Timing Jitter (master/slave)
  - Power Spectral Density
  - Clock Frequency
  - MDI Return Loss
  - Peak Differential Output

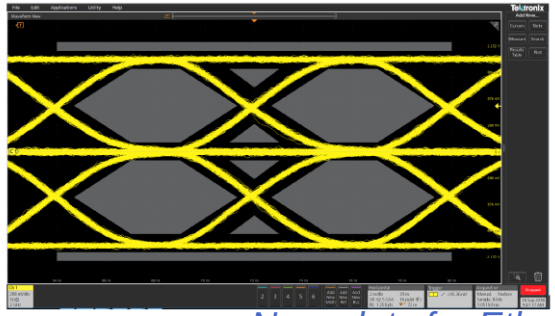


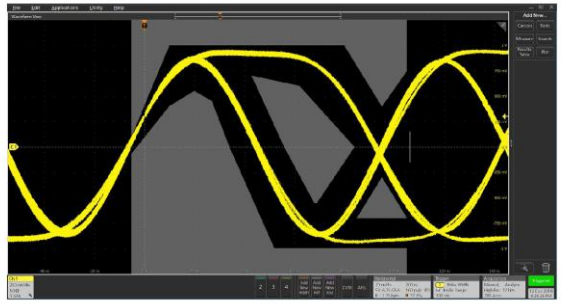



# Ethernet Compliance

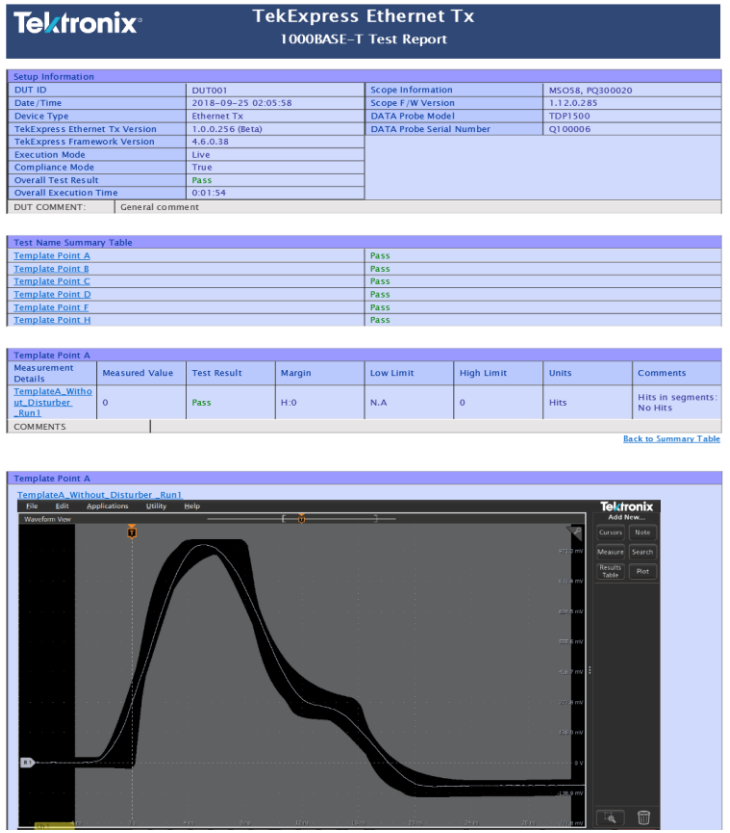
## OPTIONAL TEKEXPRESS SOFTWARE PACKAGE

- 1000BASE-T (IEEE 802.3) compliance tests:
  - Template, Peak, Droop, Distortion, Jitter, Common Mode
- 100BASE-TX (ANSI X3.263) compliance tests:
  - AOI Template, Rise/Fall time, Rise/Fall and Amplitude symmetry, Overshoot, Output voltage
- 10BASE-T (IEEE 802.3) compliance tests:
  - Link Pulse, MAU Template, Harmonics, Common Mode and Differential Voltage
- Supports TDP1500/3500 and P6247/P6248 probes
- Supports existing Ethernet fixture : TF-GBE-BTP

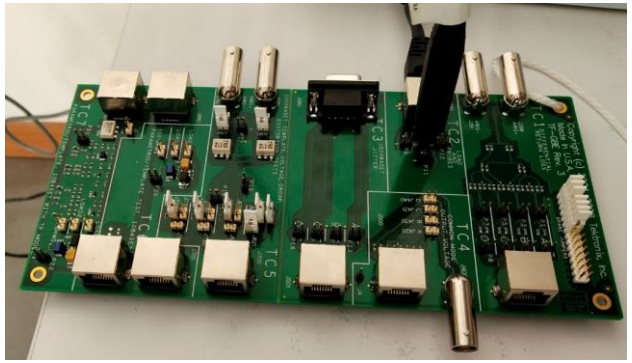




*New plots for Ethernet Template tests*



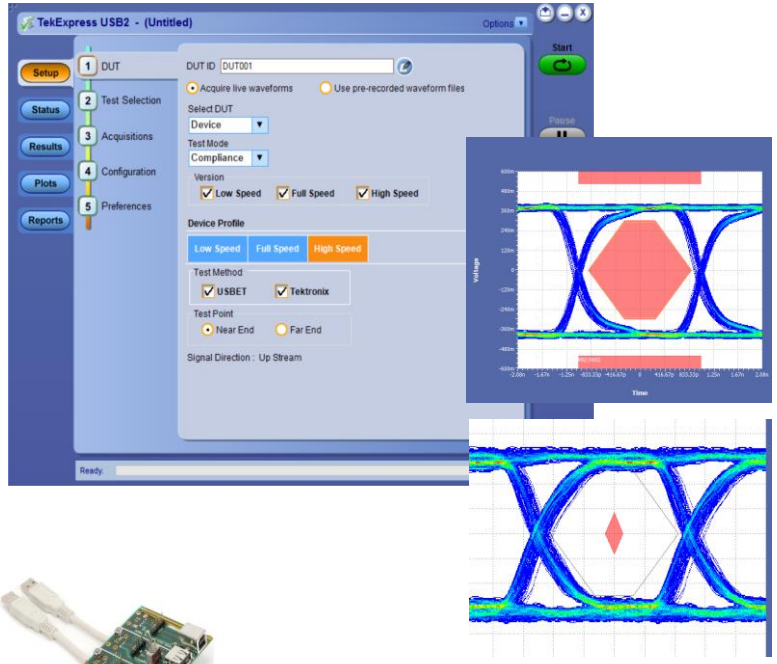

*Compliance test report with Pass/Fail, Margin, and Plots*

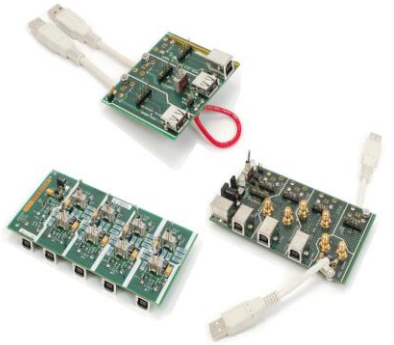


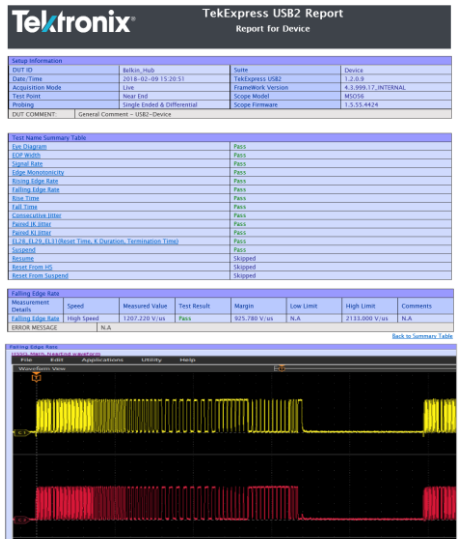
# USB2 Compliance

## OPTIONAL TEKEXPRESS SOFTWARE PACKAGE

- 100% Test Coverage as per USB 2.0 Specifications
  - Supports Signal Quality, High-speed, Inrush Current and Droop Tests
- Supports Three different speeds
  - Low-speed (LS), Full-speed (FS) and High-speed (HS)
- Choose test method from USBET tool or from Tektronix
  - Solution automates USB-IF test tool as well
- Custom mask support for Eye diagram test
- Support for TDP1500/3500, TAP1500 and TCP0030 probes
- Detailed reports with test specific waveform screenshots
- Fixtures available from Tektronix – p/n TDSUSBF





# New Option Bundles for 5 Series B MSO

## 1-YEAR / PERPETUAL LICENSES AVAILABLE

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | **Starter Bundle**<br>1-Year / Perpetual | Serial trigger, decode, search and event table analysis on I2C, SPI, RS-232/422/485/UART buses<br>Integrated Arbitrary Function Generator with 13 predefined waveform types as well as arbitrary waveforms up to 100 MHz | | | | |
| 2 | **Pro Bundles**<br>• Pick one of the bundles<br>• Includes Starter Bundle<br>• Adds 125Mpoint record length<br><br>1-Year / Perpetual | **Serial Decode**<br>I2C, SPI, eSPI, I3C, RS-232/422/485, UART, SPMI, SMBus, CAN, CAN FD, LIN, FlexRay, SENT, PSI5, CXPI, Automotive Ethernet, MIPI C-PHY, MIPI D-PHY, USB 2.0, eUSB2, Ethernet, EtherCAT, Audio, MIL-STD-1553, ARINC`429, Spacewire, 8B/10B, NRZ, Manchester, SVID, SDLC, 1-Wire, MDIO | **Power**<br>• Digital Power Management Analysis<br>• Inverter & Motor Drive Analysis<br>• IMDA DQ0<br>• IMDA Mech<br>• Advanced Power Analysis<br>• Serial Decode<br>  • SPMI<br>  • SVID | **Signal Integrity**<br>• LVDS Debug*<br>• Jitter Analysis<br>• Mask/Limit Testing<br>• PAM3 Analysis*<br>• User-defined Filters | **Compliance**<br>• 10/100/1000* BaseT Ethernet<br>• Multi Lane capability for 10/100/1000 BaseT<br>• Industrial Ethernet (10BaseT1L)*<br>• USB2.0* | **Automotive**<br>• Signal separation<br>• Automotive Ethernet compliance*<br>• Jitter analysis<br>• 3-phase inverters, motors and drives analysis with DQ0 and Mechanical measurements<br>• PAM3 analysis*<br>• Serial decode for CAN, LIN, FlexRay, 100BASE-T1, SENT, CXPI, I3C, NRZ, PSI5 | **Mil/Gov**<br>• Jitter Analysis<br>• Mask/Limit Testing<br>• Serial Decode<br>  • Mil-Std-1553<br>  • ARINC429<br>  • Manchester<br>  • NRZ<br>  • Spacewire |
| 3 | **Ultimate Bundle**<br>1-Year / Perpetual | • Includes Starter bundle and ***all*** Pro bundles<br>• **PLUS:** 500 Mpoint record length, Spectrum View RF vs. Time waveforms, Extended Spectrum View capture bandwidth, Video Trigger | | | | | |

Note *: Requires SSD with Windows 10 license (MSO5x = 5-WIN and MSO5xB = 5B-WIN

# Working Remotely

# Remote Operation

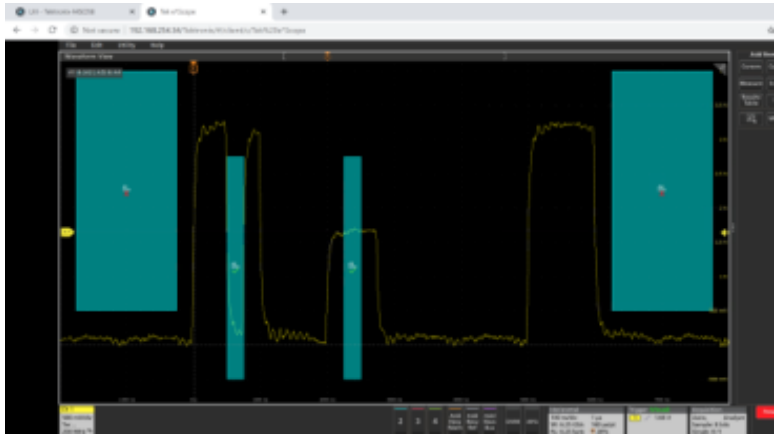
## INCREASE COLLABORATION AND PRODUCTIVITY

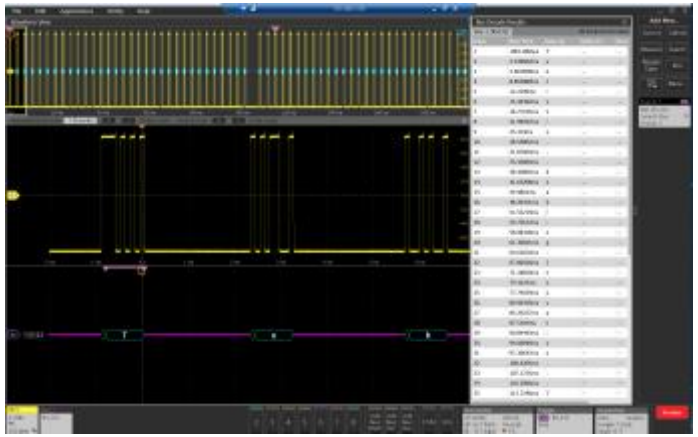
### e*Scope

- Control your oscilloscope through any browser
- See live updates of waveforms, analysis results and measurements
- Change acquisition settings, measurements and display configuration

### Remote Desktop on Windows 10

- Control your oscilloscope through a RDT viewer
- See live updates of waveforms, analysis results and measurements
- Change acquisition settings, measurements and display configuration





# TekScope™ – Waveform Analysis from your PC

## WAVEFORM ANALYSIS ANYWHERE ANYTIME

Get the **analysis capability** of our award-winning oscilloscopes right on your PC so you can **analyze waveforms anywhere, anytime**.

**Starter License** includes:

- Base application
- Serial decode for the most common embedded standards(I2C/SPI/RS-232C)
- Remote access to a single instrument(USB, Ethernet)
- Spectrum View basic

**Pro Licenses** for:

- Serial Decode
- Power
- Automotive
- Mil/Gov

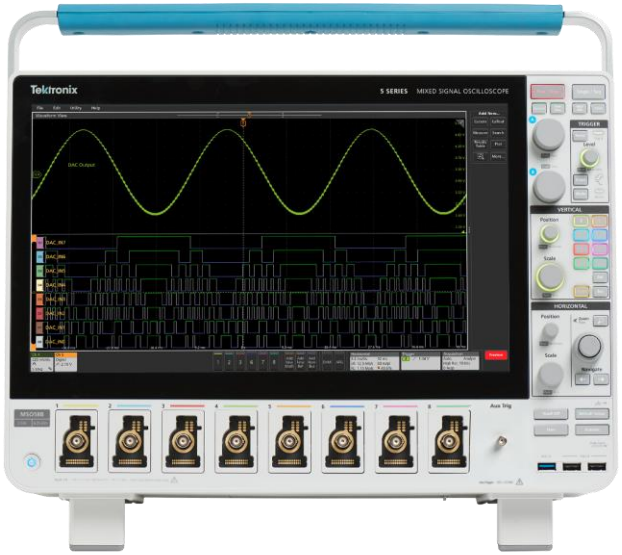
**Ultimate License** includes Starter license, all Pro licenses plus:

- Multi-scope analysis(Up to 4 scope, 32ch)
- Full Spectrum View
- User-defined filters

# TekDrive

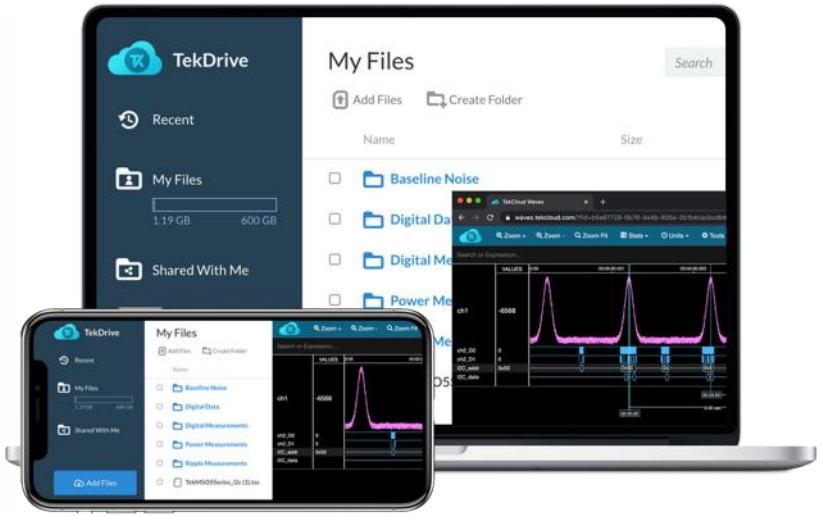
Collaborative Data Workspace

Securely Collaborate and Share with Your Team



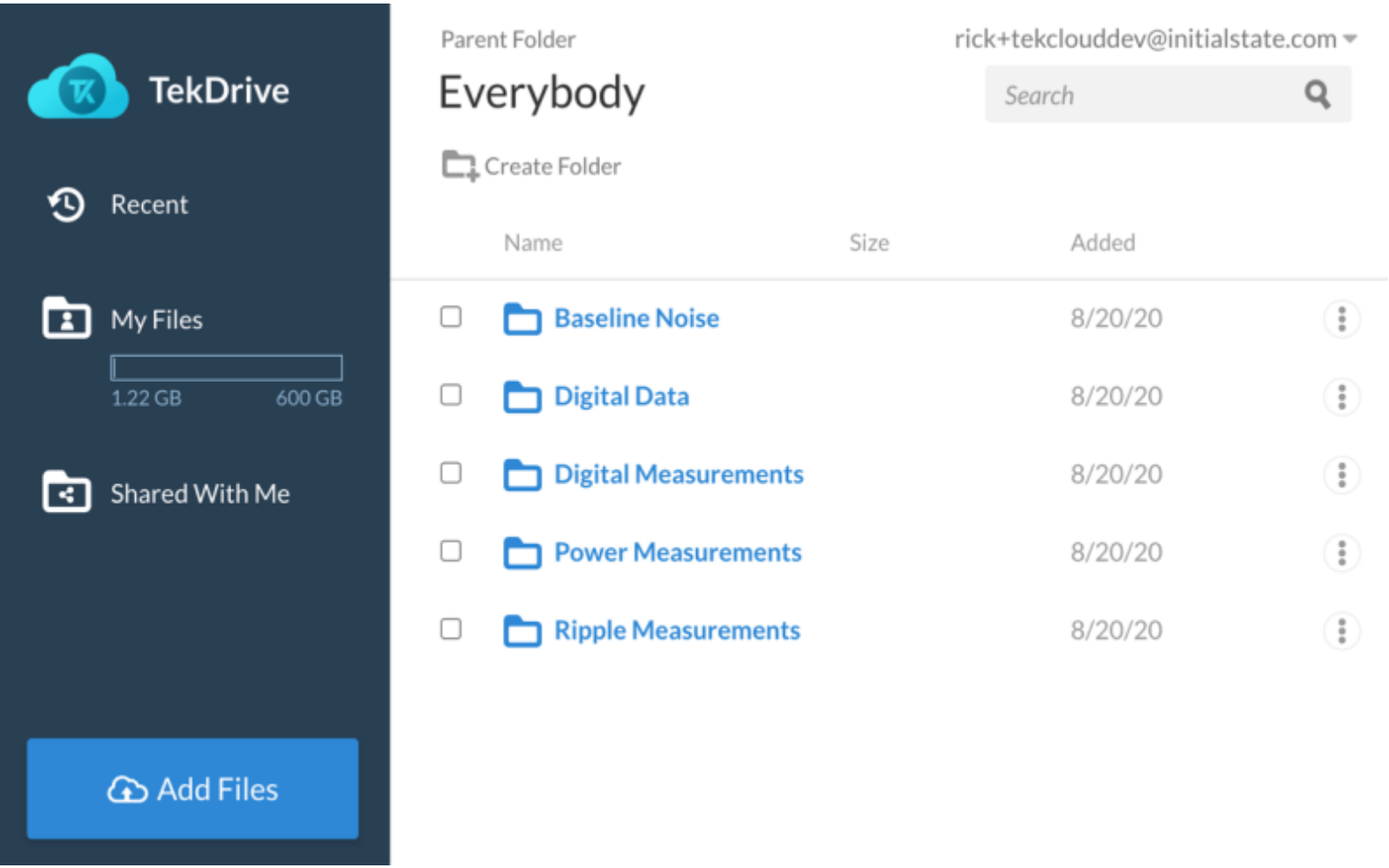

Save/Recall Data and Sessions Directly from an Instrument

Inspect and Analyze Data Directly in Off-scope Software




Manage and Analyze on any Device with No Extra Software

# UPLOAD, DOWNLOAD, SEARCH AND ORGANIZE
drive.tekcloud.com




# OPEN DIRECTLY IN BROWSER OR IN TEKSCOPE


# Probing Solutions

# Versatile Probing Solutions

## FROM ROBUST, FLEXIBLE CONFIGURATIONS TO APPLICATION SPECIFIC REQUIREMENTS

### Passive Probes

Highest bandwidth, lowest probe loading.

### Low Voltage Single Ended

Accurate high-frequency, low voltage measurements.

### Low Voltage Differential Oscilloscope Probes

Signal fidelity for serial bus PHY measurements.

### Current Probes

Best-in-class bandwidth and sensitivity. Safety Certified.

### Power Rail Probes

Power rail probes offer low noise, low loading, high bandwidth, and high DC offset specifically for power integrity measurements.

### High Voltage Single Ended

Low capacitance and best in class bandwidth. Safety Certified.

### High Voltage Differential Probes

Industry leading performance up to 6000V. Safety Certified.

### IsoVu Isolated Probes

Probing systems make high-resolution measurements in the presence of common mode signals or noise.

# Introducing The Power-Rail Probes

## TPP1000

- Provides a high bandwidth range of up to 1GHz
  - Other vendors typically offer only 500MHz
  - 1GHz means that the customer may not specifically need to invest in active probes
  - Provides a high dynamic range of up to 300V
  - Provides ultra-low input capacitance of 3.9pF and high input resistance of 10MOhm
  - Now have MMCX cartridge tip available!

# Power-Rail Probes

## LARGER OFFSET VOLTAGE, WIDER DYNAMIC RANGE

| Specifications | TPR1000 | TPR4000 |
|---|---|---|
| **Bandwidth** | 1 GHz | 4 GHz |
| **Offset Voltage Range** | ±60V | |
| **Dynamic Range** | ±1V | |
| **Input Resistance** | 50KΩ DC, 50Ω AC | |
| **Input Coupling** | DC, LF Reject | |
| **Accuracy** | 1mV | |
| **System Noise (With 6 Series Scopes)** | <300µV$_{Peak\text{-}To\text{-}Peak}$ (With 20MHz Bandwidth Limit)<br><1.3mV$_{Peak\text{-}To\text{-}Peak}$ (At Full Bandwidth of Scope)<br><br>Note:<br>*With grounded input, set to maximum sensitivity of 1.3mV/Div* | |
| **Attenuation** | 1.25x | |
| **Connectivity & Accessories** | New Browser, Solder-In & Snap-On | |

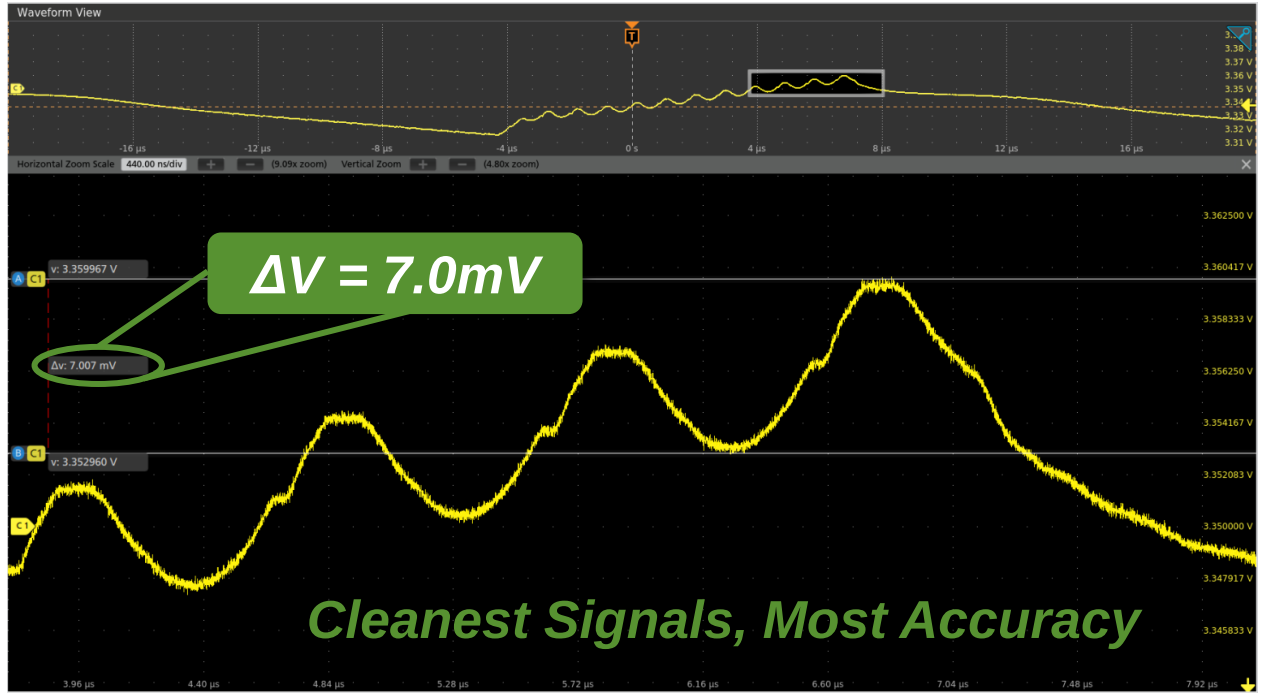

*Note: Specifications are estimated and may change without notice*

# Power-Rail Probe vs. Passive Probes

## WHAT POWER-RAIL PROBES SHOW THAT CAN'T BE SEEN WITH PASSIVE PROBES

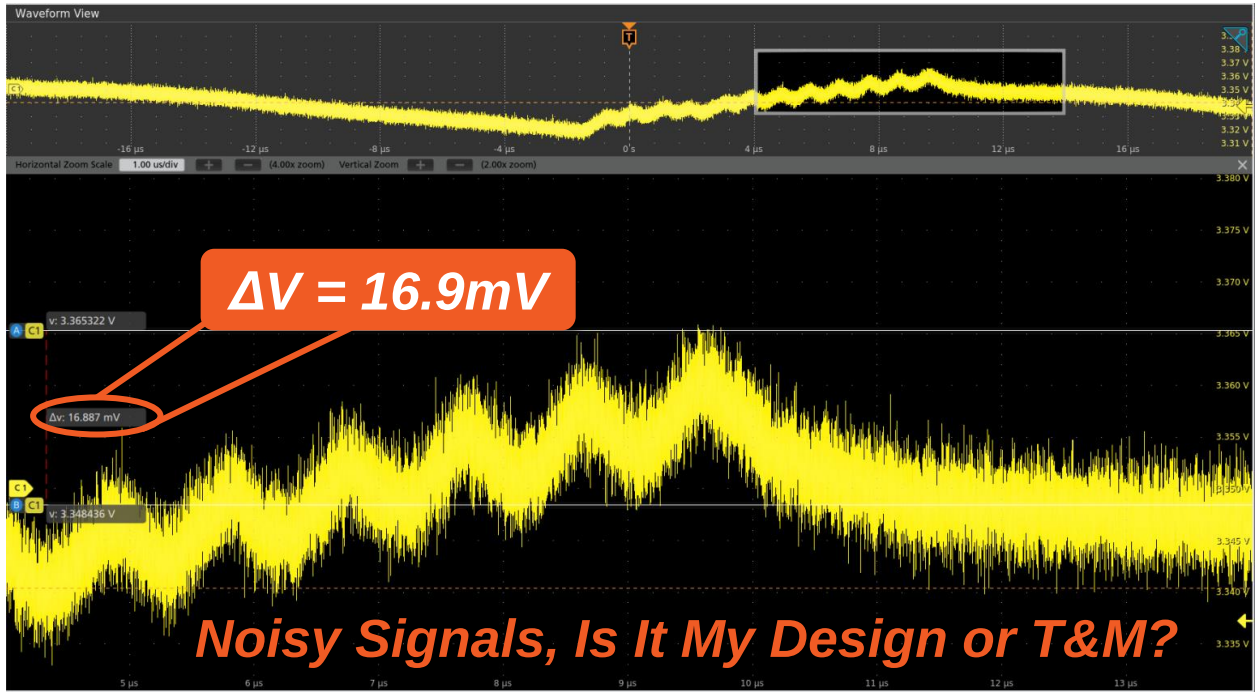
### Ripple on 3.3V Rail with Power-Rail Probe

*(Using **1GHz** Bandwidth Limit & **6 Series** Oscilloscope)*




### Ripple on 3.3V Rail with TPP1000 Passive Probe

*(Using **1GHz** Bandwidth Limit & **6 Series** Oscilloscope)*

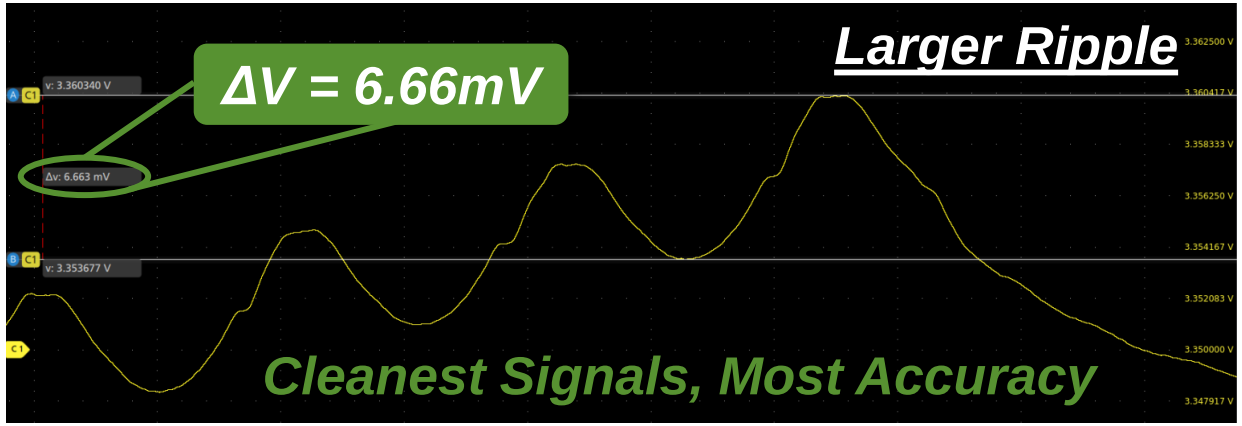


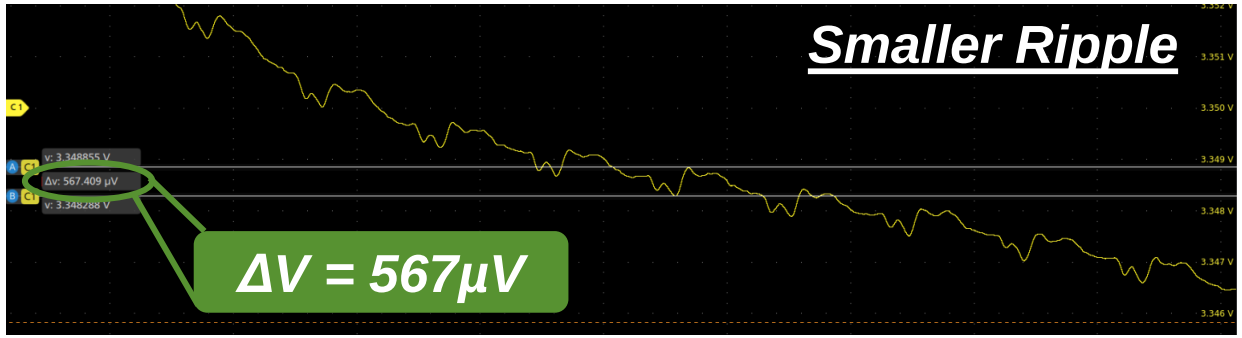
# Power-Rail Probe vs. Passive Probes

## WHAT POWER-RAIL PROBES SHOW THAT CAN'T BE SEEN WITH PASSIVE PROBES

### Ripple on 3.3V Rail with Power-Rail Probe

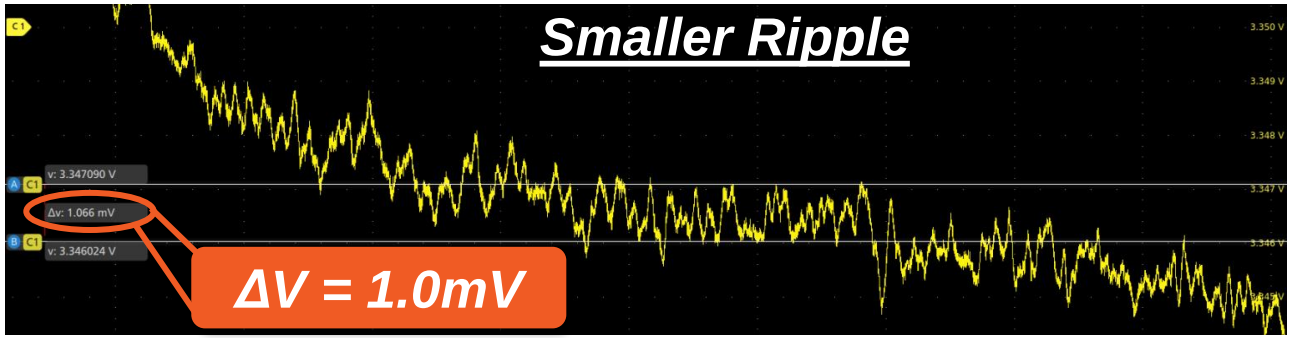
*(Using **20MHz** Bandwidth Limit & **6 Series** Oscilloscope)*




### Ripple on 3.3V Rail with TPP1000 Passive Probe

*(Using **20MHz** Bandwidth Limit & **6 Series** Oscilloscope)*

# TIVP series IsoVu Probe

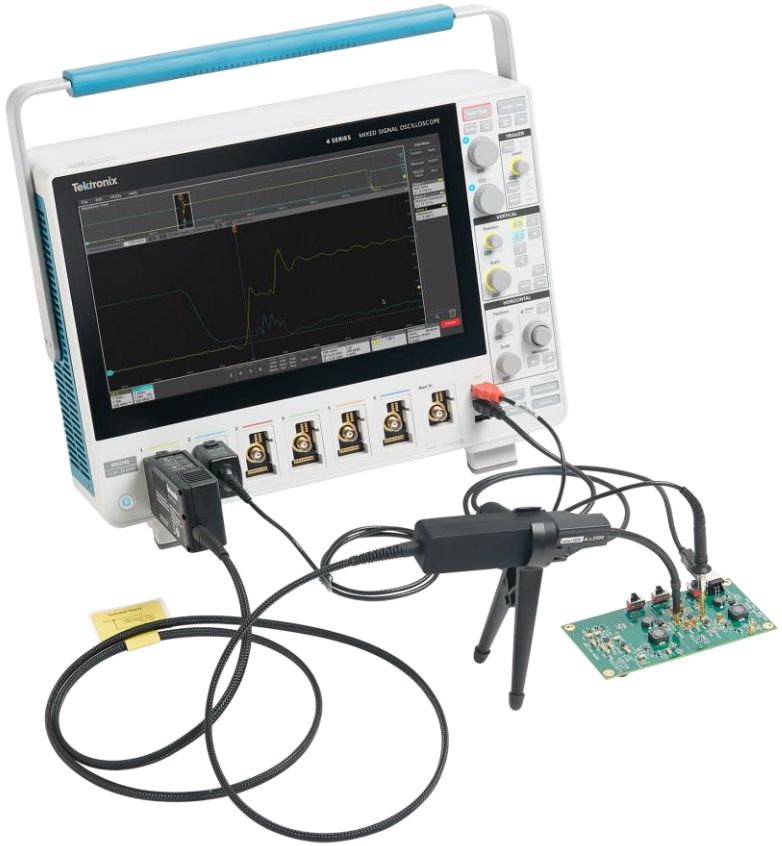
## ISOLATED - DIFFERENTIAL MEASUREMENT SYSTEM

**IsoVu™ technology is the ONLY differential probing system for Wide Bandgap (WBG) testing!**

Enables differential measurements on floating, fast (~1ns) signals

- New Differential Probes characteristics:
  - High Common Mode Rejection (CMRR)
  - High Bandwidth
  - Wide Input range
  - Max Flexibility

  - Up **to ±2500V** input range
  - Up to **60kV CM**
  - Up to **1GHz (<350ps rise time)**
  - Up to **100dB CMRR @100MHz**

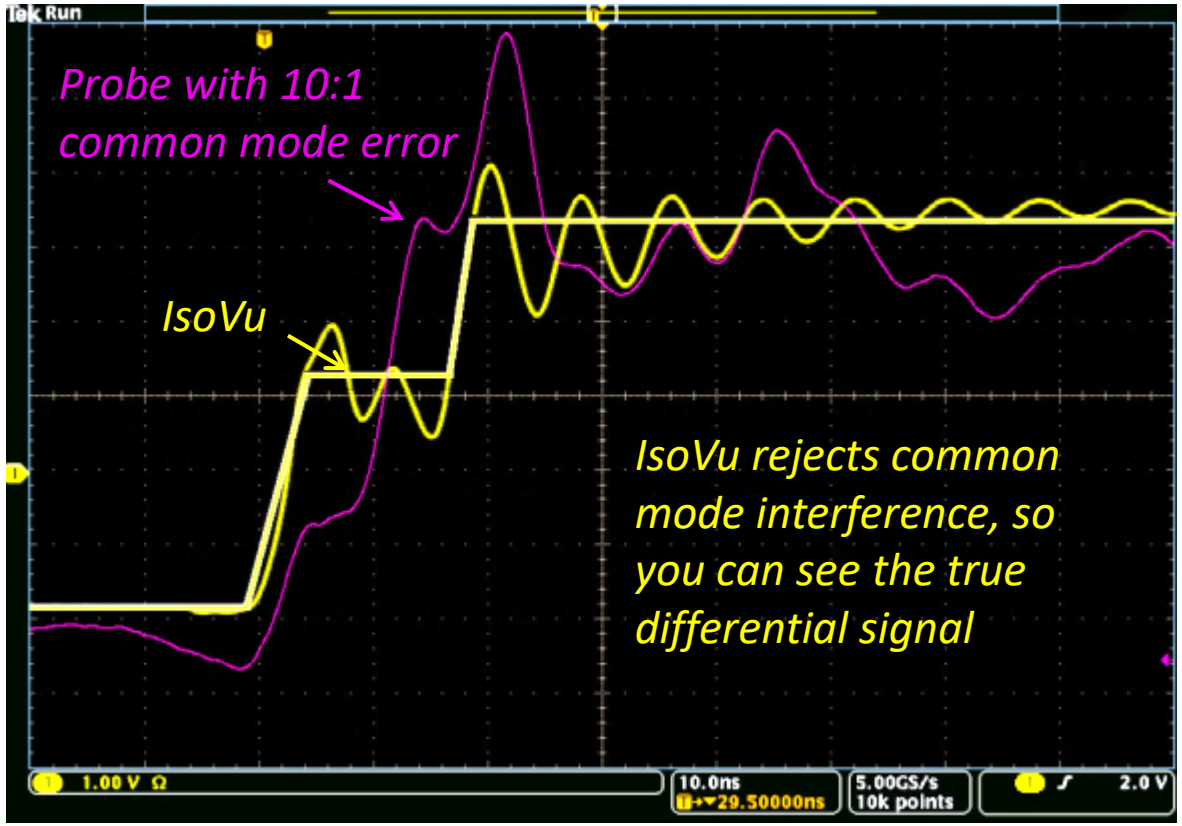


# TIVP series IsoVu Probe

## High-side GaN

- IsoVu gives you an accurate, repeatable measurement providing meaningful correlation with expected performance

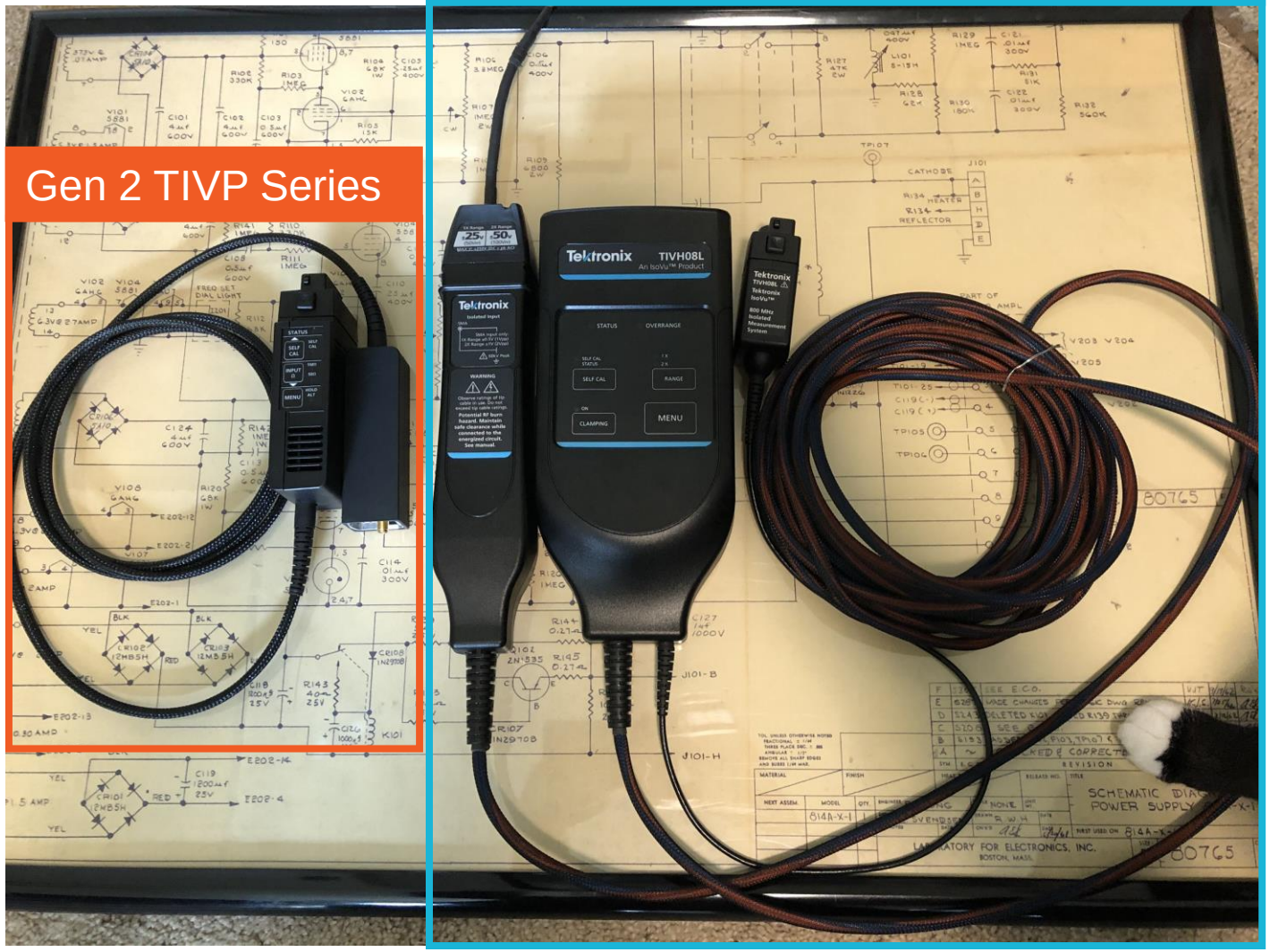
Expected Simulation Results



# TIVP series IsoVu Probe

Gen 1 TIVH Series

Gen 2 TIVP Series



# 5 Series B MSO Recommended Probes

| Type | Probe | Description |
|---|---|---|
| Passive Voltage | TPP0502 | 2X, 500 MHz, 300 V CAT II |
| | TPP0850 | 50X, 800 MHz, 2500Vpeak |
| Isolated Measurement System | TIVP02 / L | 200 MHz, ±5 V to ±2500 V (depending on tip) 2/10m cable |
| | TIVP05 / L | 500 MHz, ±5 V to ±2500 V (depending on tip) 2/10m cable |
| | TIVP1 / L | 1 GHz, ±5 V to ±2500 V (depending on tip) 2/10m cable |
| High-Voltage Differential | THDP0100 | 100X / 1000X, 100 MHz, 6 kV |
| | THDP0200 | 50X / 500X, 200 MHz, 1.5 kV |
| | TMDP0200 | 25X / 250X, 200 MHz, 750 V |
| | TDP0500 / 1000 | 5X / 50X, 500 MHz / 1 GHz, ±42 V |
| Low-Voltage Differential | TDP1500 | 10X, 1.5 GHz, ±8.5 V |
| | TDP3500 / 4000 | 5X, 3.5 GHz / 4 GHz, ±2 V |
| Active Voltage | TAP1500 | 10X, 1.5 GHz, ±8 V |
| | TAP2500 / 3500 / 4000 | 10X, 2.5 GHz / 3.5 GHz / 4 GHz, ±4 V |
| TriMode™ | TDP7704 | 4 GHz TriMode probe with TekFlex connector technology |
| | TDP7706 | 6 GHz TriMode probe with TekFlex connector technology |
| | TDP7708 | 8 GHz TriMode probe with TekFlex connector technology |

| Type | Probe | Description |
|---|---|---|
| Power Rail | TPR1000 | 1 GHz, Single-Ended TekVPI Power-Rail Probe with TPR4KIT Standard Accessory Kit |
| | TPR4000 | 4 GHz, Single-Ended TekVPI Power-Rail Probe with TPR4KIT Standard Accessory Kit |
| AC/DC Current | TCP0030A | DC – 120 MHz, 30 ADC, 30 ARMS, 50 Apeak |
| | TCP0020 | DC – 50 MHz, 20 ADC, 20 ARMS, 100 Apeak |
| | TCP0150 | DC – 20 MHz, 150 ADC, 150 ARMS, 500 Apeak |
| AC-only Current | TRCP0300 | 9 Hz – 30 MHz, 300 A |
| | TRCP0600 | 12 Hz – 30 MHz, 600 A |
| | TRCP3000 | 1 Hz – 16 MHz, 3000 A |
| Digital Probe | TLP058 | 8 channel general purpose logic probe for 4/5/6 Series Oscilloscope. Includes accessory kit |

# Summary

# 5 Series B MSO Mixed Signal Oscilloscope


Get a panoramic view of your design with high-fidelity waveforms, unique spectrum analysis, and versatile probing. It’s easy thanks to an award-winning user interface and innovative support for engineering outside the lab.

Tektronix®