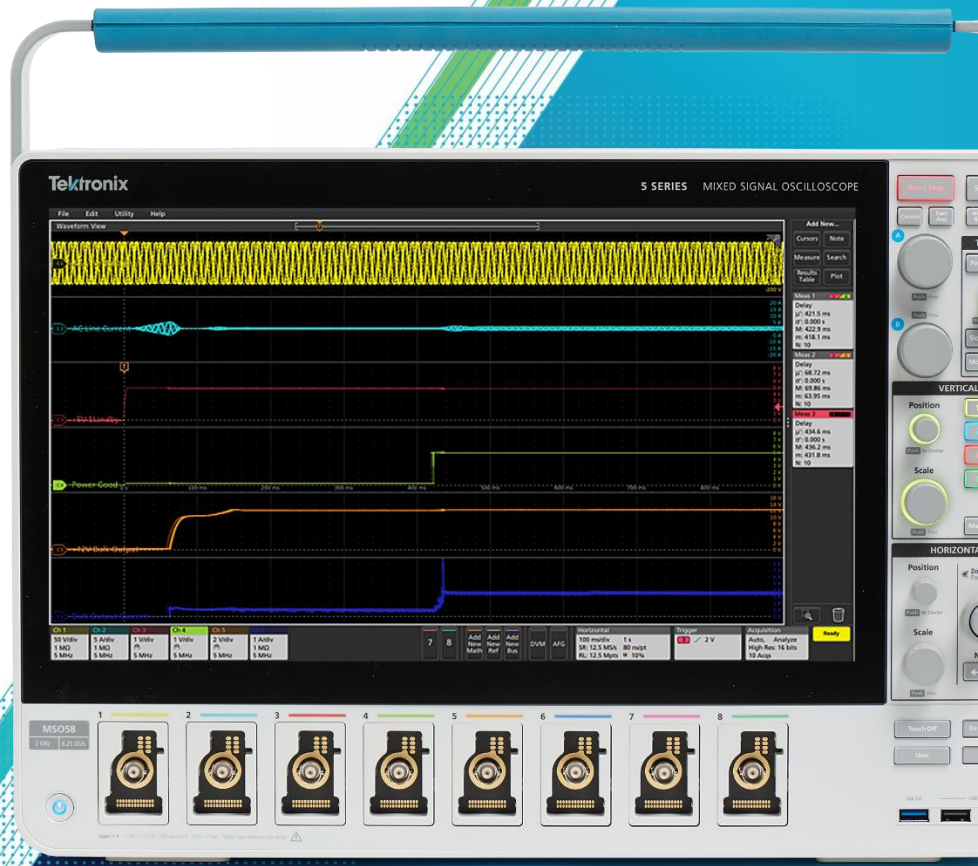
Tektronix

New measurement Trends

Analyze Anywhere Anytime

More Bandwidth. More Channels. Less Noise.



TekScope vs. e*Scope

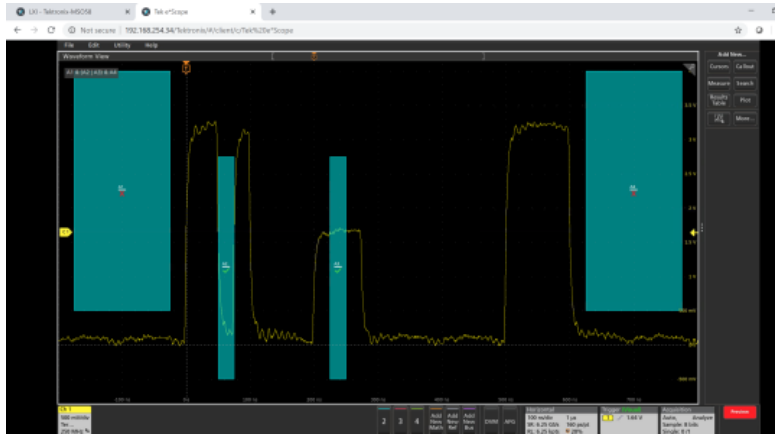
INCREASE COLLABORATION AND PRODUCTIVITY

TekScope PC Analysis Software

- Oscilloscope analysis without an oscilloscope
- Uses the 4/5/6 Series MSO user interface
- Connect to up to two scopes for live analysis on up to 16 channels

e*Scope

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



TekScope vs. e*Scope

e*Scope vs. **TekScope**

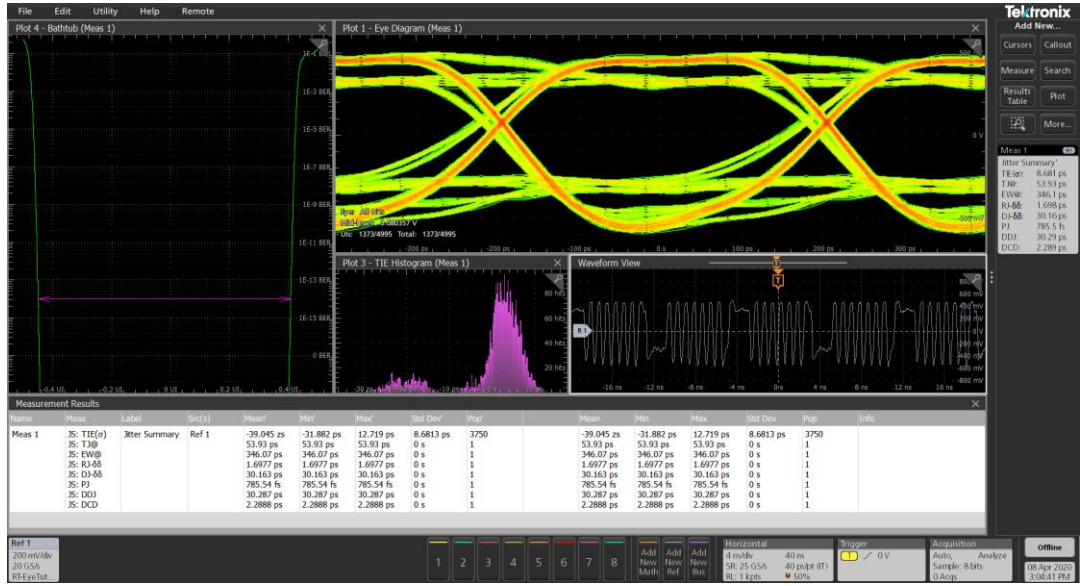
e*Scope is a **scope *viewer*** – it lets you view what is happening on the scope's screen in real time and control the scope by using a web browser.

Key Differences:

- With e*Scope, the scope is still doing all analysis work, whereas with TekScope the customer **can analyze data locally on your PC**. **The scope does not need to stop serving others while you analyze the data.**
- With e*Scope you **must be connected to the local LAN**, but with TekScope you can continue **working on your data offline**.
- Unlike e*Scope, Tekscope will also let you collectively **analyze data from multi scopes** in the same window.
- e*Scope can only show the software licenses you bought for your scope, whereas with TekScope you can actually adjust and select the **software licenses** that suit you independently **even if the scope could not offer them before**.
- **e*Scope runs only on Non-Windows Scopes**. **For Windows Scopes**, customers need to use Remote Desktop Connection and this starts to be cumbersome as it **requires admin privileges**. **TekScope does not distinguish between different Operating Systems** when pulling data from the scopes through its Multi-Scope Analysis function**.**

TekScope – Waveform Analysis from your PC

MISSION: HELPING CUSTOMERS WITH WAVEFORM ANALYSIS ANYWHERE ANYTIME



Value Proposition	Get the analysis capability of our award-winning oscilloscopes right **on your PC so you can analyze waveforms anywhere, anytime**. **The basic license is free** and provides the standard analysis included on our scopes. **Add paid licenses for advanced functions** such as multi-scope analysis, serial bus decoding, power analysis and jitter/eye analysis.

Same analysis environment

USER INTERFACE

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

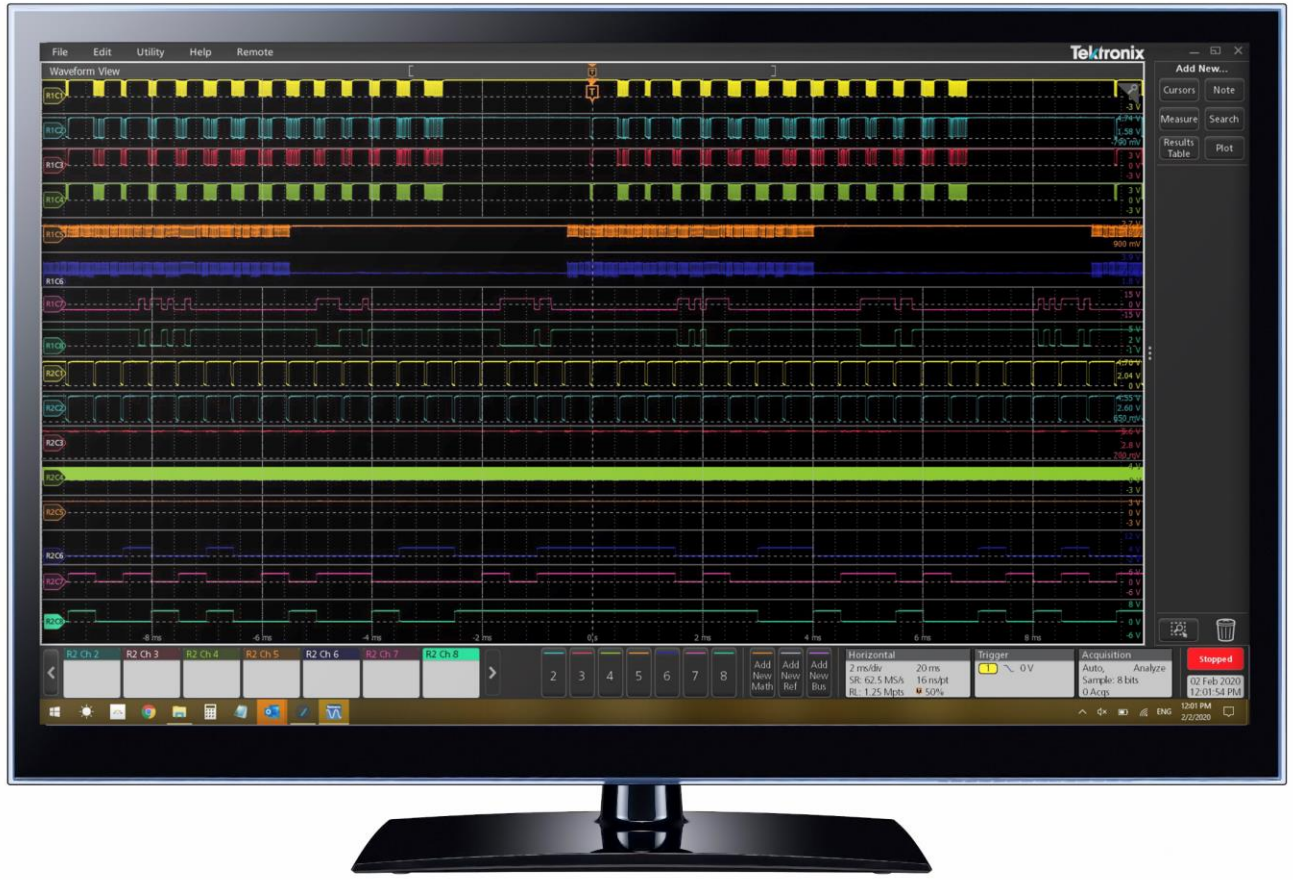
Immediate access to new Math, Reference, and Bus waveforms

All critical horizontal, trigger and acquisition parameters

Multi-Scope Analysis

WHAT IS IT?

- Modular channel system that can be **expanded up to 16 channels** and acquire real-time data from 2 scopes!
- Data triggering occurs at the same time to ensure you emulate a scope with this amount of channels.
- All channels data is shown in a centralized place on TekScope, and you can now run measurements on all of these channels at once.
- Currently works with **4/5/6 Series** MSO. Remote Connection via LAN.



Operation Modes

THREE WAYS TO GET DATA FROM REMOTE SCOPES

1. **No Triggering**, Simple Data Transfer – **Get what you see on the scope**.

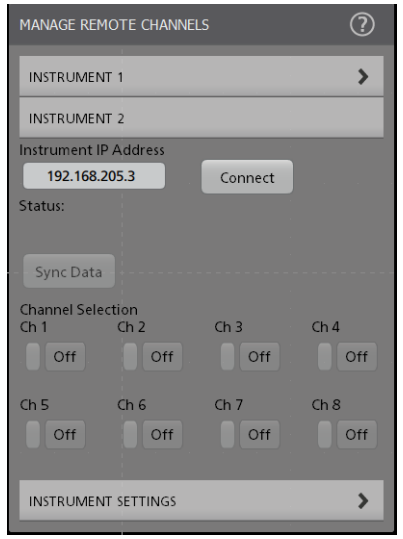
   using "Sync Data" Button

2. Data Transfer **upon triggering** on remote scopes. Trigger/Horizontal/Vertical **settings are controlled** by TekScope.

   using "Remote Instrument Control" button set to ON and using "Stopped" button to acquire data on single shots

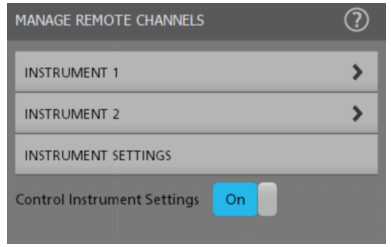
3. Data Transfer **upon triggering** on remote scopes. Trigger/Horizontal/Vertical **settings are NOT controlled** by TekScope; using the settings configured on the remote scopes.

   using "Remote Instrument Control" button set to OFF and using "Stopped" button to acquire data on single shots



Specify IP address of remote scopes

Transfer data with no triggering

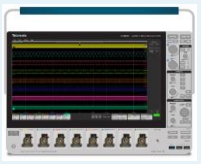


Control acquisition settings across remote scopes

Trigger remote data acquisition

Portfolio Compatibility

LOOK AND FEEL OF 4/5/6 SERIES MSO

Operation Mode	Scope Model
Offline Analysis	- Any Tektronix Oscilloscope - Most Keysight Oscilloscopes - Most Lecroy Oscilloscopes * These Oscilloscopes must support one of the “Import” file types listed for TekScope.
Multi-Scope Analysis license	- 4/5/6 Series MSO - 5 Series Low Profile - 6 Series Low Profile Digitizer   

Supported Scope Models and File Formats

Import

File Type	Source/Purpose
.wfm, .isf	Tektronix
.bin	Keysight
.trc	Lecroy
.tr0	Spice
.csv	General Purpose
.tss	4/5/6/LP Series Session files – Setup and Waveforms

Export

File Type	Purpose
.jpg, .bmp, .png	Screen Capture (Save to PC drive, not to Scope memory)
.wfm	Tektronix Waveform Data
.csv, .mat	Waveform Data to CSV or Matlab format
.set	Setup information
.tss	4/5/6/LP Series Session files – Setup and Waveforms
.pdf, .mht	Reports

PC Requirements

OS:
Microsoft Windows 10.

Web Browser:
Google Chrome or Firefox recommended.

Processor:
Intel® Core™ i5 or AMD Athlon® X4 processor (2GHz or faster).

Memory:
8 GB or higher of RAM recommended.

Disk Space:
5 GB of available disk space, 10 GB or higher recommended (exact space is dependent on the number of waveforms and their size).

Display Size:
1920x1080 or greater at 100% scaling recommended.

Prerequisites Software Required

MAKE SURE TO INSTALL ANY NEEDED SW BEFORE USING TEKSCOPE

https://scope.tekcloud.com/#/help/prerequisites

Prerequisite Software

Required for Multi-Scope Analysis package

- Install TekVISA
- Install PortMapper Service

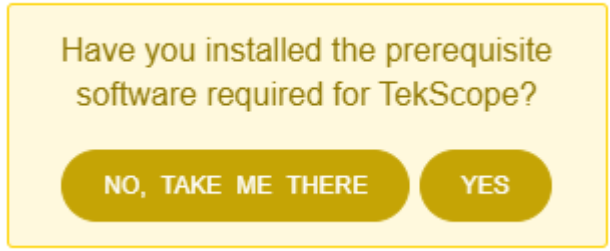
Required for PAM3 / Signal Separation / Automotive Ethernet Protocol - Analysis package

- Install TekVISA
- Install PortMapper Service
- Install MATLAB Runtime
- Install PAM3

Required for Programmable Interface functionality

- Install TekVISA

All Premium packages include Programmable Interface commands used for automated testing.



Tekcloud Installation Process

2 STEPS TO DOWNLOAD/INSTALL

Installing TekScope

1. Install TekScope

After the download has completed, launch the installer and go through the installation process.

2. Get License

Open TekScope from your PC, take note of the `host id` and enter it in the field below. Click *Get License* to download a .lic file.

host id GET LICENSE

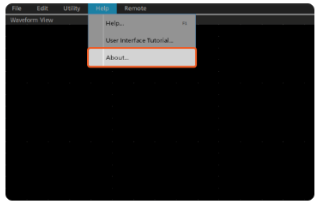
3. Install License

Open the downloaded .lic by selecting the license file and clicking *Apply* on the *Load License* window

Updating License

1. Launch About Screen

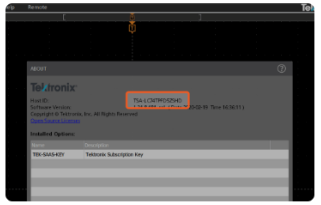
Launch TekScope and select *Help › About*.



2. Get License

Take note of the `host id`, enter it in the field below and click *Get License* to download a .lic file.

host id GET LICENSE



3. Install License

Open the downloaded .lic by the clicking the *Install License* button.

Base Package Analysis

FREE MEASUREMENT CAPABILITIES

Note:

No nomenclated item is needed – Customer just signs up on TekCloud to download TekScope

- Waveform viewing in stacked or overlay modes, including support for Pan/Zoom
- Cursors: Waveform, V Bars, H Bars, V&H Bars
- Measurements: 34 standard
- Standard Math: Basic waveform arithmetic, FFT
- Advanced Math: Equation Editor
- Standard Plots: Time Trend, Histogram and Spectrum
- Advanced Plots: XY/XYZ
- Search: Quickly find events in your data based on specified criteria
- Recall waveform files from a variety of sources and scope models
  - .tss (4/5/6 Series Session files – setups and waveforms)
  - .wfm, .isf (Tektronix)
  - .bin (Keysight)
  - .trc (Lecroy)
  - .tr0 (Spice)
  - .csv (general purpose)
- Multi-Language Support
- Protocol Decode and Search: Parallel Bus

Premium Analysis Options

UNLOCK ADVANCED MEASUREMENT CAPABILITIES

Option	Description
TEKSCOPE-MULTI	Multi-Scope Analysis: Remotely connect to multiple oscilloscopes to view and analyze data simultaneously; compatible with 4/5/6/5LP/6LPD Series MSOs
TEKSCOPE-DJA	Advanced Jitter and Eye Analysis
TEKSCOPE-PWR-ELEC	Power Electronics: Advanced Power Analysis, Magnetics Analysis, Inverter Motor Drive Analysis
TEKSCOPE-PWR-INTG	Power Integrity: Digital Power Management and Analysis, Power Management Serial Decode and Analysis (SPMI)
TEKSCOPE-DECODE	Protocol Decode: I2C, I3C, SPI, RS-232, SPMI, I2S, LJ, RJ, TDM, CAN, CAN-FD, LIN, FlexRay, SENT, 100B-T1 Automotive Ethernet, Mil-STD-1553, ARINC-429, Spacewire, USB 2.0, eUSB2, PSI5, SVID, 10 Base-T / 100 Base-TX Ethernet, MDIO, NRZ, 8b/10b
TEKSCOPE-SPECVIEW	Spectrum View: Spectrum Analysis
TEKSCOPE-PAM3-BND	PAM3 Measurements & Analysis, Automotive Ethernet Signal Separation, Automotive Ethernet 100Base-T1 Protocol Decode

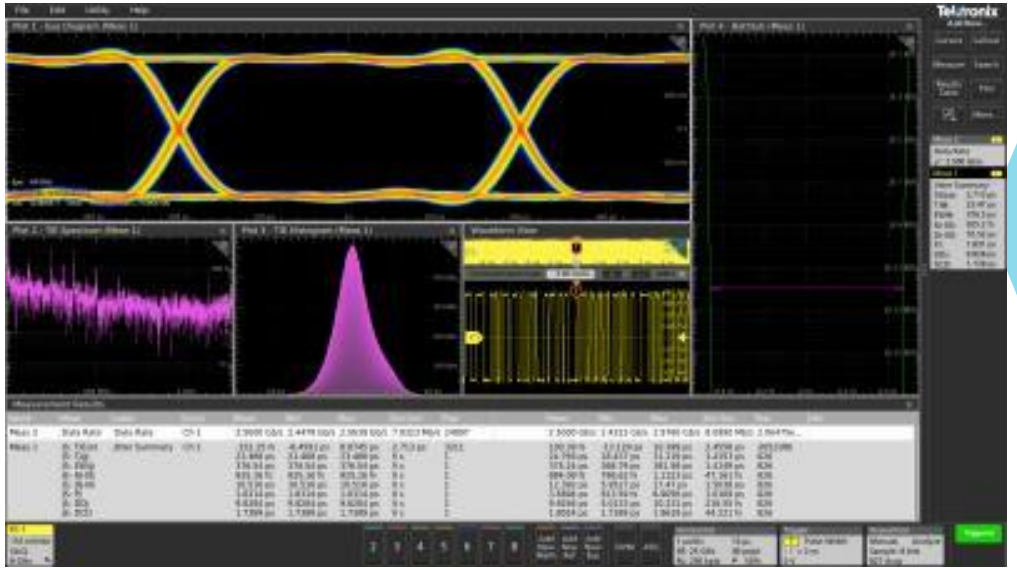
Notes:

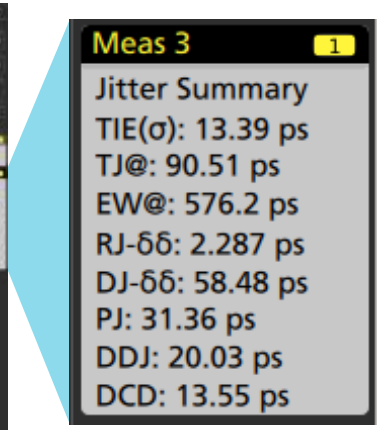
1. Software upgrades are included at no extra charge.
2. All Options are available for 1Y and 3Y licenses.

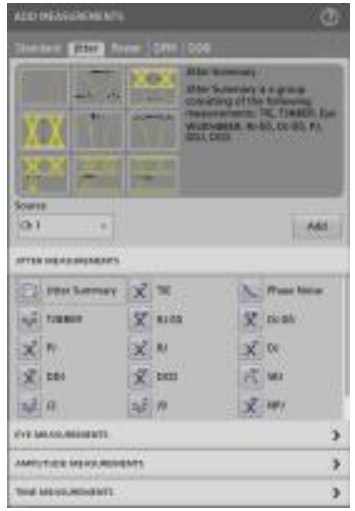
Jitter and Eye Analysis

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







Power Supply Analysis

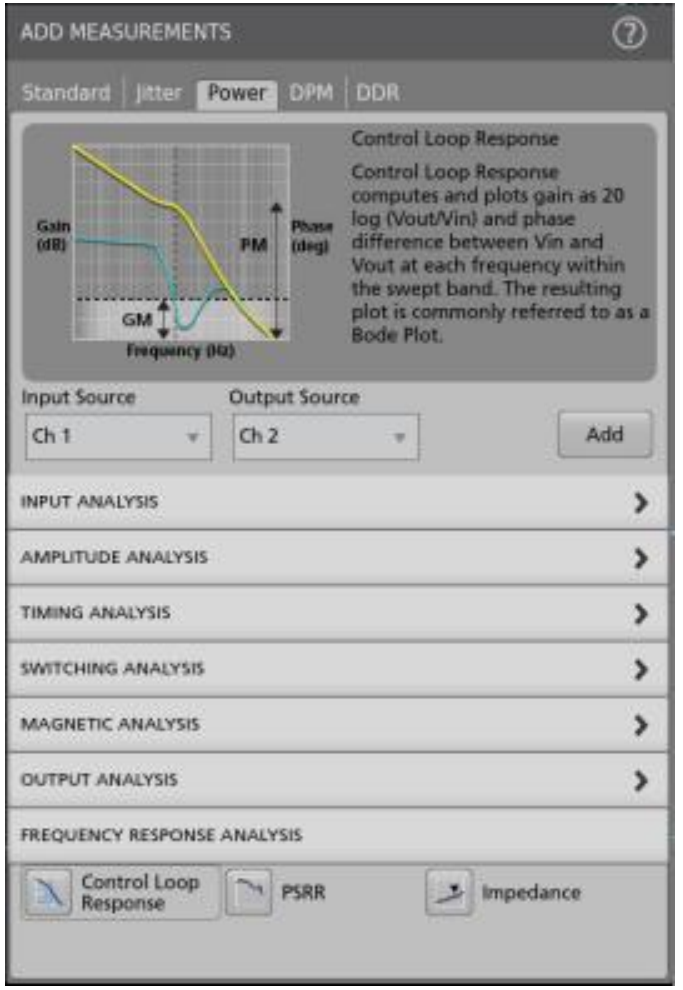
AUTOMATED POWER MEASUREMENTS

- 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

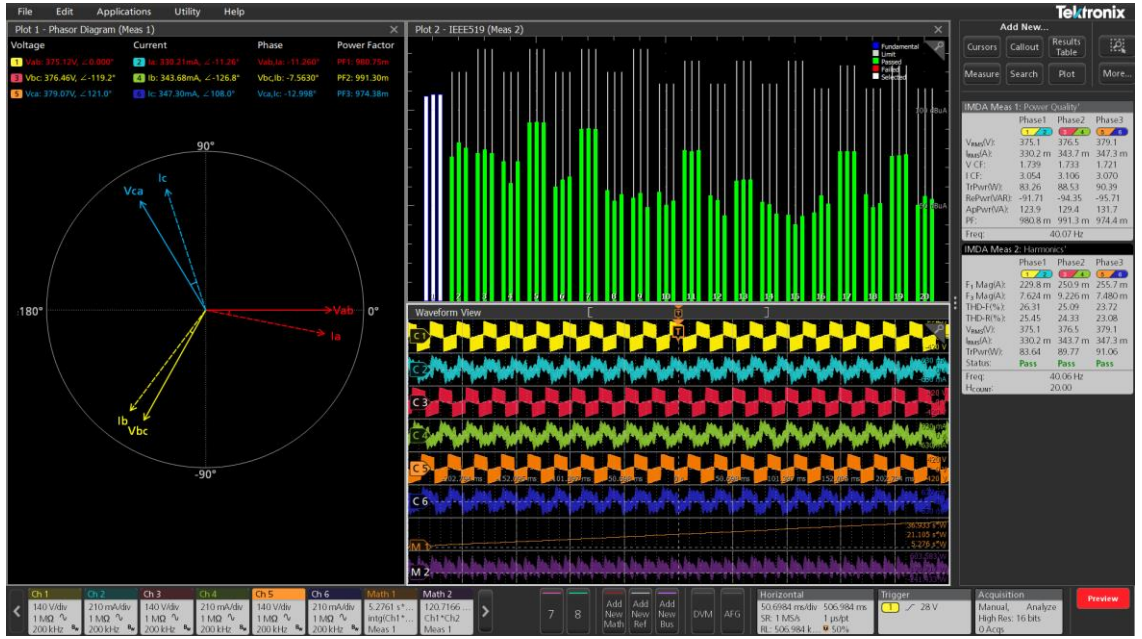
- Frequency Response
  - Control Loop Frequency Response (Bode Plot)
  - Power Supply Rejection Ratio (PSRR)
  - Impedance
- Digital Power Management
  - Ripple
  - Overshoot
  - Turn on overshoot
  - Undershoot
  - DC rail voltage
  - Turn-on/Turn-off time
  - Jitter analysis



Inverters, Motors & Drives Analysis

INPUT, OUTPUT, HARMONICS, PHASOR DIAGRAM MEASUREMENTS

- Unique phasor diagram enables analysis of load types and designs
  - Displays magnitude and angle between voltage and current
- Power Quality shows ability of electronic equipment to consume the energy being supplied to it
- Efficiency measures the ratio of output power to input power
- Perform Ripple analysis to see AC components on DC voltages
- Full Harmonics analysis can test against standard limits and provide graphical and numerical views



Extensive Serial Bus Support

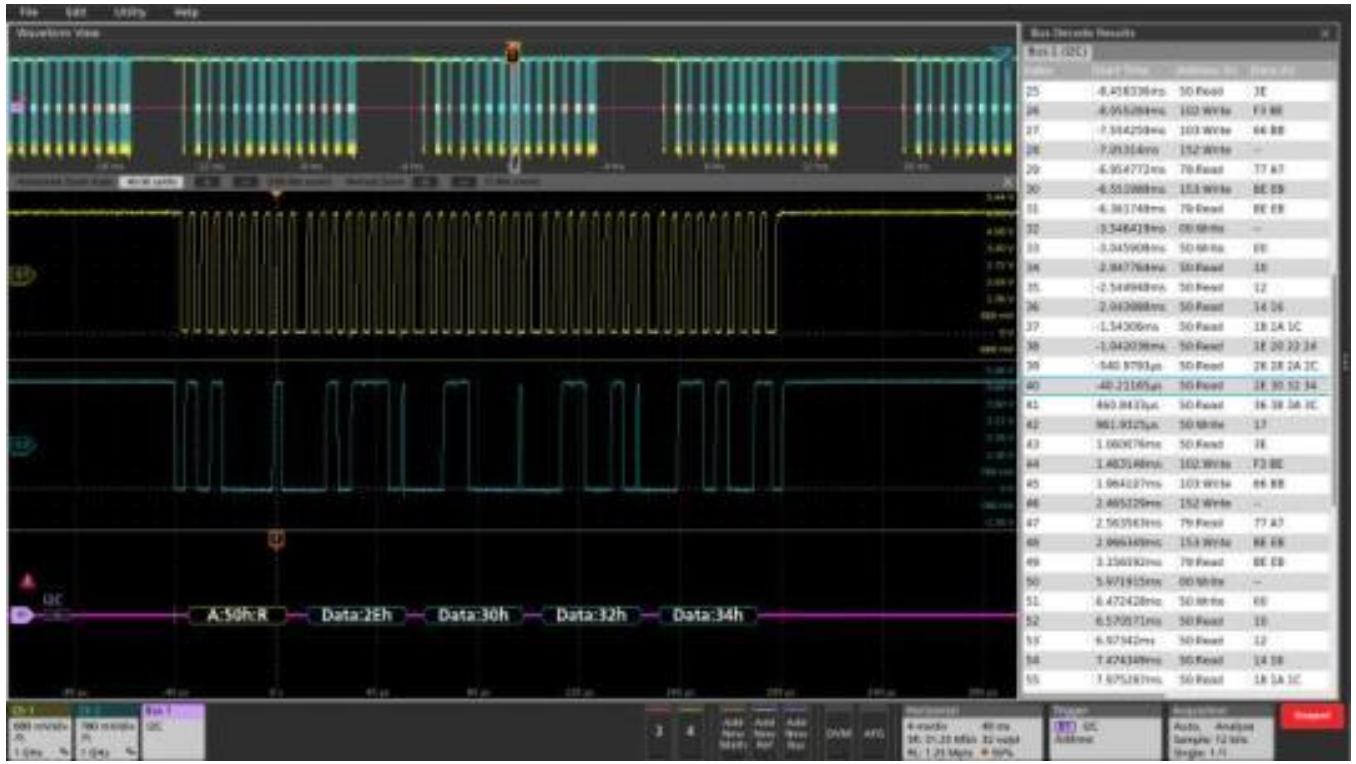
SPEED TIME TO INSIGHT AND ELIMINATE ERRORS WHEN DEBUGGING BUSES

- Decode, packet content of common serial standards
- Decoded bus presented time aligned with other inputs
- Decoded packet content also available for viewing in a tabular view

Results bar can be hidden for more viewing area

- I^2C
- SPI
- I3C
- CAN
- CAN-FD
- LIN
- FlexRay
- SENT
- Automotive Ethernet
- PSI5
- D-PHY
- RS-232
- SPMI
- USB LS/FS/HS
- eUSB2
- Ethernet 10/100BASE-T
- Audio I^2S/LJ/RJ/TDM
- MIL-STD-1553
- ARINC429
- Spacewire
- 8b/10b
- NRZ
- SVID
- MDIO
- Manchester

Coming soon: eMMC, JTAG, QSPI

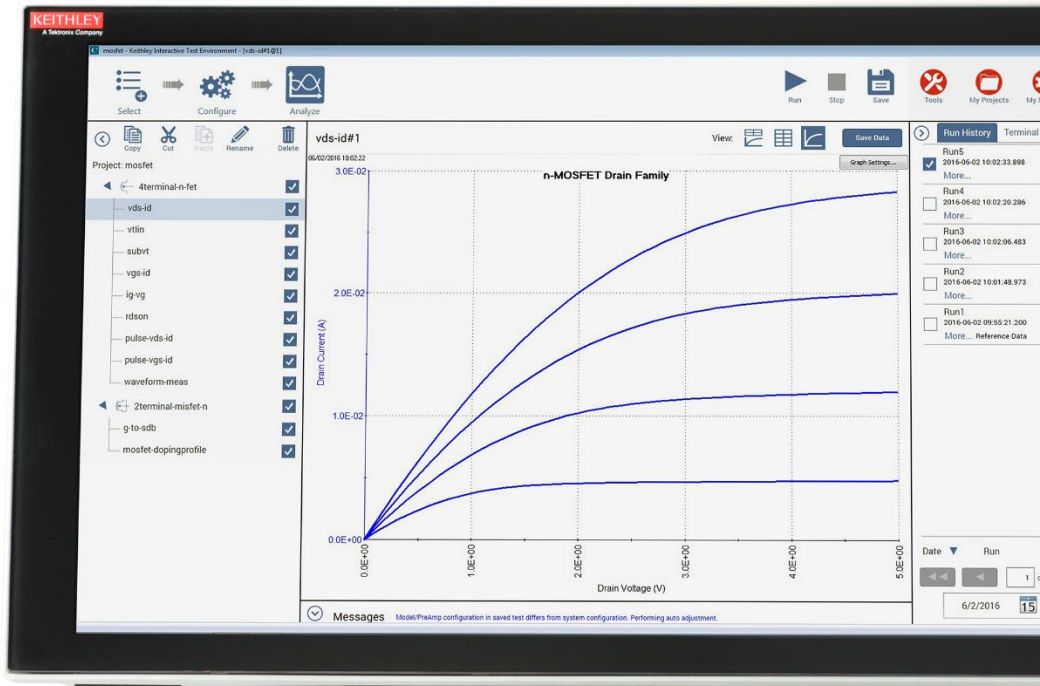


Tektronix®

Tektronix

6 Series B MSO

More Bandwidth. More Channels. Less Noise.



Current Customer and Market Trends

- Embedded designs are getting smarter and incorporating **more sensors that generate more data**
  - Video
  - Motion/position
  - 3-D sensing
- Embedded designs are using **faster clocks and higher-speed serial buses** to move and process more data
  - Need higher performance test equipment to keep pace
- Embedded systems are stressing power technologies as designers **minimize power consumption** and **ensure clean power to ASICs and FPGAs** that demand precisely-controlled DC voltages
  - Smaller signals in noisy environments
- Fewer resources and tighter project timelines mean design engineers need to **solve problems faster than ever** to stay on schedule
- Getting progressively harder to justify new capital purchases. It is expected that oscilloscopes will be:
  - **Utilized longer and across more projects** than in the past
  - **Upgradeable** as new requirements arise

6 Series B Mixed Signal Oscilloscopes

Up to 10 GHz bandwidth

Best signal fidelity with 12-bit ADCs and ultra-low noise

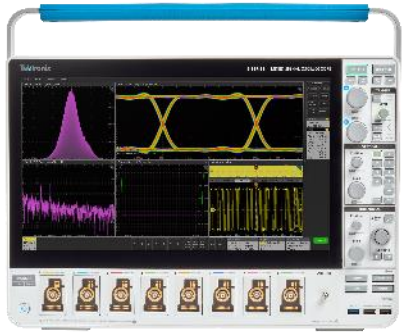
4, 6 or 8 FlexChannel inputs

Analyze and debug gigahertz+ designs with these powerful, elegant instruments

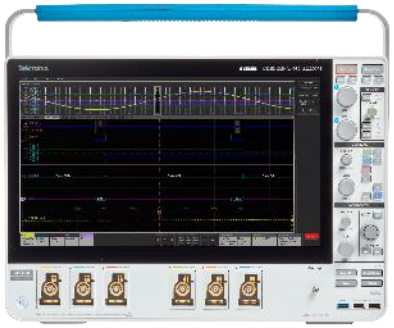
Introducing the 6 Series B MSO

6 SERIES B MSO FAMILY

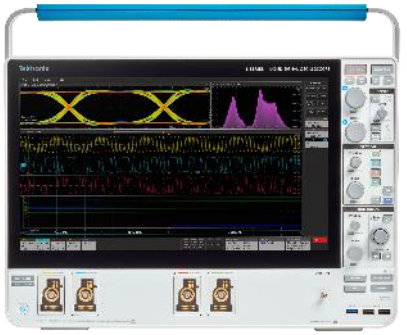
	MSO64B	MSO66B	MSO68B
Bandwidth	1 GHz, 2.5 GHz, 4 GHz, 6 GHz, 8 GHz, 10 GHz		
FlexChannel inputs	4	6	8
Analog sample rate All channels	25 GS/s (Supports up to 10 GHz, all ch)	12.5 GS/s (Supports up to 5 GHz on >4 ch)	
4 channels	25 GS/s (Supports up to 10 GHz on 4 ch)		
2 channels	50 GS/s (Supports up to 10 GHz on 2 ch)		
Maximum digital channels	32 (opt.)	48 (opt.)	64 (opt.)
Digital sample rate	25 GS/s		
Record length standard (all chans)	62.5 M		
Record length optional (all chans)	125 M, 250 M, 500 M, or 1 G		
Waveform capture rate	>500,000 wfms/s		
Arbitrary / Function Generator	50 MHz w/ 128 k Arbitrary memory (opt.)		
DVM	4-bit DCRMS, ACRMS, AC+DC (free with product registration)		
Operating system	Closed Embedded O/S (standard) on removable SSD Open Windows 10 O/S (opt.) on removable SSD		
Display	15.6 inch HD (1920 x 1080) capacitive touch		



MSO68B



MSO66B



MSO64B

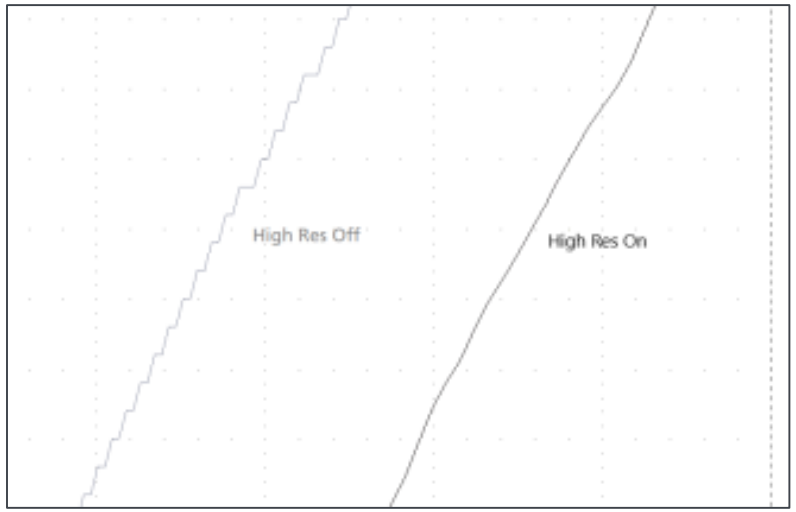
MSO64 vs. MSO6xB Differences

Specification	MSO64	MSO64B, MSO66B, MSO68B
Bandwidth Range	1 GHz – 8 GHz	1 GHz – 10 GHz
Bandwidth at 12.5 GS/s sample rate	4 GHz	5 GHz
Bandwidth at 12-bits of ADC	4 GHz	5 GHz
Number of FlexChannels	4	4, 6, or 8
Record Length	**Standard** 62.5 M **Optional** 125 M, 250 M, 500 M, 1 G	**Standard** 62.5 M **Optional** 125 M, 250 M, 500 M, 1 G
Number of Digital Channels	Up to 32 in groups of 8	Up to 64 in groups of 8
Maximum Sample Rate	25 GS/s on 4 channels	50 GS/s on 2 channels 25 GS/s on 4 channels 12.5 GS/s on >4 channels
RMS Noise	Industry leading at <20mV/div	Industry leading at every V/div setting as a % of full scale
Reduction in RMS Noise @ ≥20mV/div	N/A	Reduction of ~2dB of RMS Noise when 50 GS/s sample rate is used
Mass Storage Architecture	**Standard** Internal 250GB M.2 drive with Closed Embedded O/S **Optional** 500GB Removable Windows 10 SSD	**Standard** 250GB Removable SSD with Closed Embedded O/S **Optional** 500GB Removable SSD with Windows 10 **Optional** 500GB Removable SSD with Closed Embedded O/S
Security Option Structure	• Secure password protected BIOS • Password protected enabling/disabling of I/O ports and firmware upgrades • Calibration constants, licenses, and SPC saved on internal M.2 drive • No internal storage • No Windows 10 SSD allowed	• Secure password protected BIOS • Password protected enabling/disabling of I/O ports and firmware upgrades • Calibration constants, licenses, and SPC saved on separate, non-user-accessible memory that stays with mainframe • Storage on Removable SSD with either Closed Embedded O/S or Windows 10
Display	15.6 inch., Full HD (1920 x 1080) with capacitive touch	15.6 inch., Full HD (1920 x 1080) with capacitive touch, now even brighter

Introducing the 6 Series B MSO

HIGH RES

- The 6 Series B MSO has a 12 bit ADC
- As long as we are decimating by at least a factor of 2 (12.5 GS/s or slower sample rate), memory bandwidth allows up to 16 bit data storage
- Mathematically, each additional decimate by 2 increases vertical resolution by 1 bit
    - 12.5 GS/s: 12 bits
    - 6.25 GS/s: 13 bits
    - 3.125 GS/s: 14 bits
    - 1.25 GS/s: 15 bits
    - 625 MS/s and slower: 16 bits

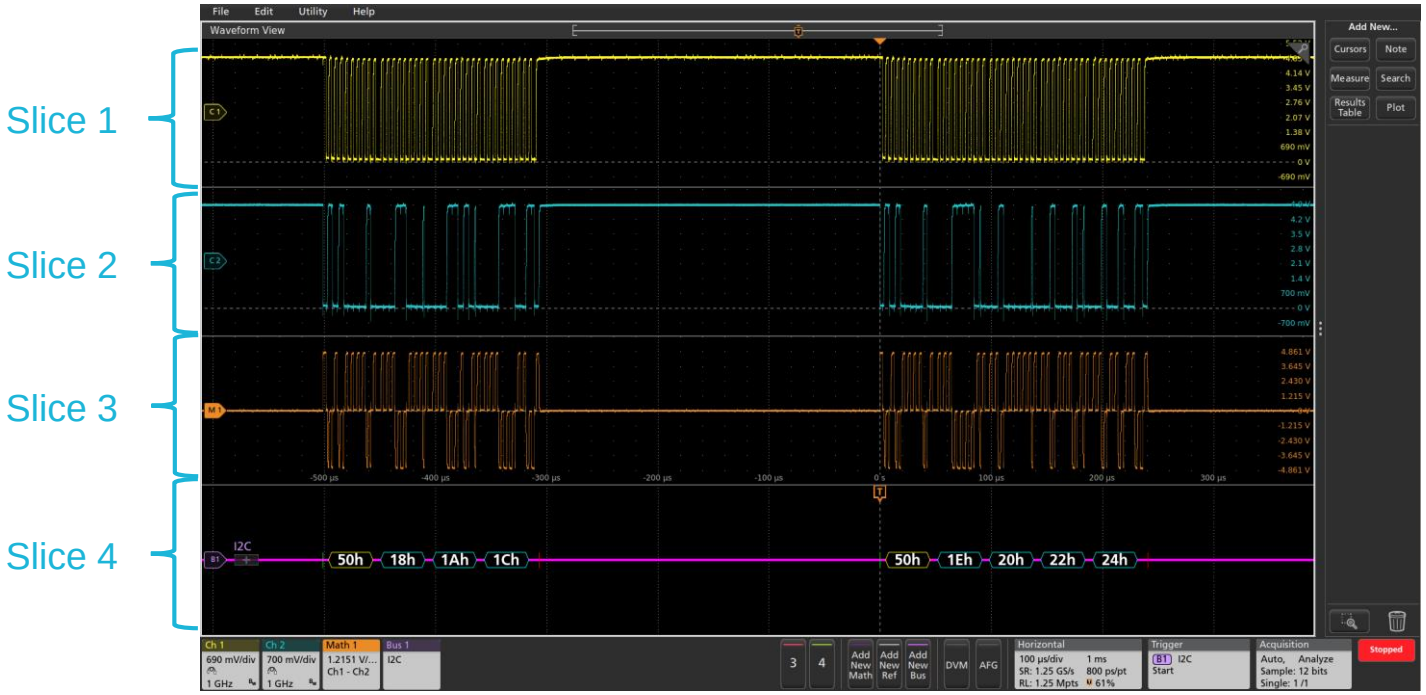


- In addition, a unique DSP filter is applied at each sample rate that limits bandwidth and thus, noise, providing a more accurate view of the signal

Stacked vs. Overlay Display Mode

MAKE THE MOST EFFICIENT USE OF YOUR 12-BIT ADC

- Stacked mode creates a ‘slice’ for each waveform
  - As waveforms are turned on/off or created/deleted, slices are automatically added or removed as needed
- Each slice uses the full range of the ADC
  - You can now have both visual separation as well as maximum accuracy



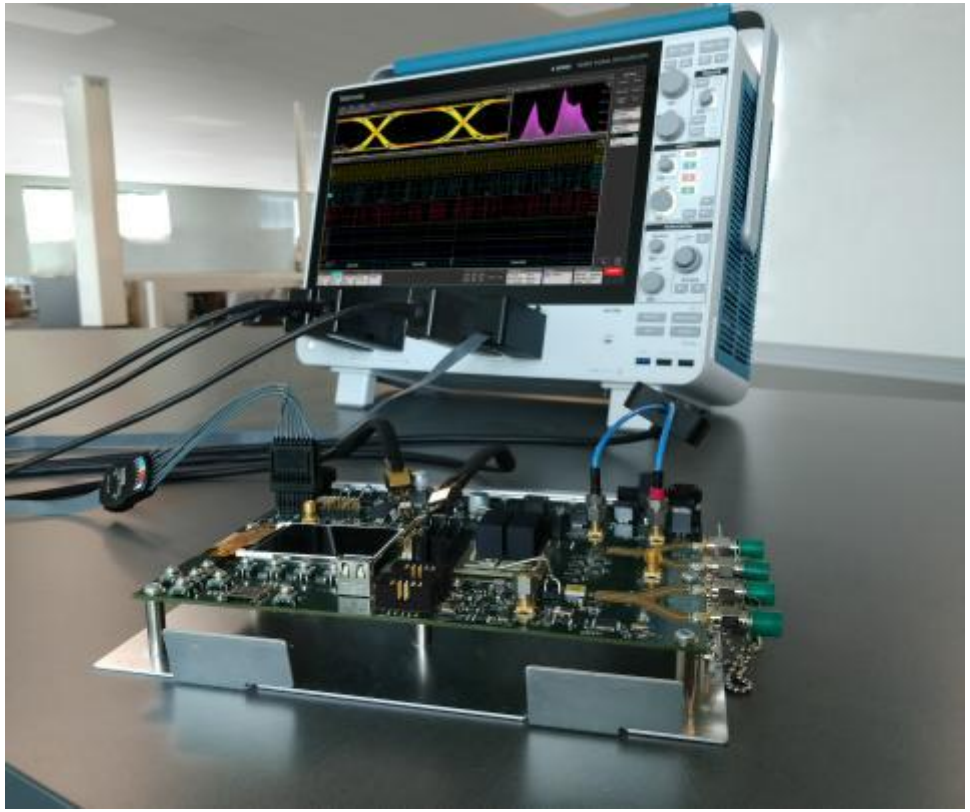
- Stacked display mode is the new default display mode
- Change the ordering of slices by rearranging badges

Highest Sample Rate

CAPTURE MORE HIGH-SPEED SIGNALS AT ONCE REDUCING DEBUG TIME

- 1 – 10 GHz bandwidths available
- 50 GS/s on two channels
- 25 GS/s on four channels
- 12.5 GS/s on >four channels
- Many instruments give up channels at high sample rates

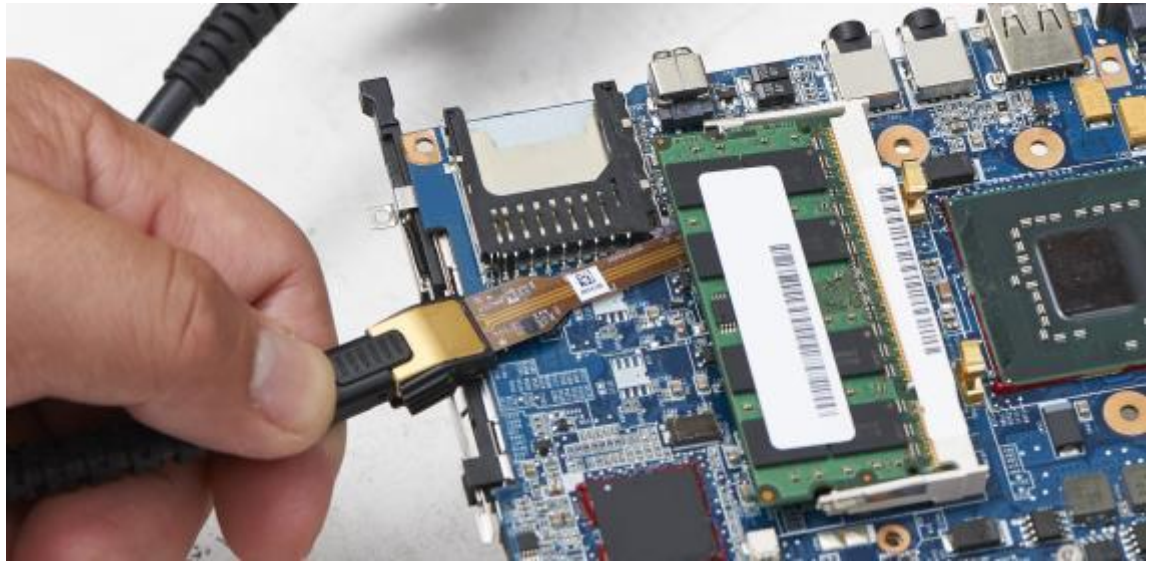
Product Series	Sample Rate 4 Channels	Bandwidth 4 Channels	Sample Rate 8 Channels	Bandwidth 8 Channels
Tektronix 6 Series B MSO	25 GS/s	10 GHz	12.5 GS/s	5 GHz
A company	20 GS/s	8 GHz	N/A	N/A
B company, a model	16 GS/s	6 GHz	16 GS/s	6 GHz
B company, b model	10 GS/s	4 GHz	N/A	N/A
C company	10 GS/s	4 GHz	N/A	N/A
D company	10 GS/s	4 GHz	N/A	N/A



Why Is This Important?

REDUCE DEBUG & CHARACTERIZATION TIME BY AS MUCH AS 3X

- DDR3 memory characterization requires acquisition of a system clock and up to 64 data channels
  - 1600MT/s systems require at least 6.7 GHz of bandwidth to measure accurately
- Interleaving, or “half-channel” sampling reduces the available channels at full bandwidth on many competitors' scopes
- The 6 Series B MSO enables viewing multiple data channels at once, accelerating the process significantly

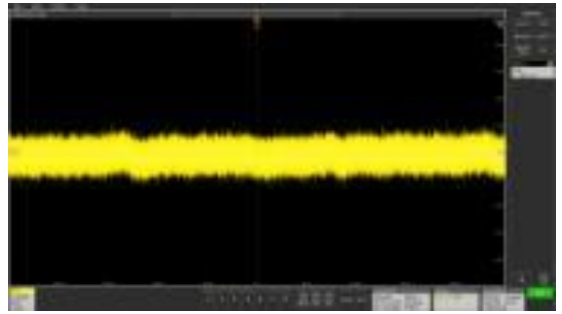


Accelerate time to insight with confidence

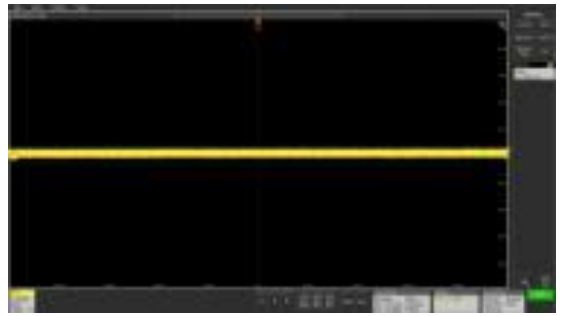
Less Noise

UP TO 20% INCREMENTAL NOISE IMPROVEMENTS

- TEK061 front-end ASIC for 50Ω, high bandwidth signal path
- >75% reduction in noise from 5 Series MSO at 1mV/div
- *NEW* 50 GS/s interleave on two channels provides ~2dB noise improvement at ≥20mV/div



5 Series MSO – 1mV/div, High Res



6 Series MSO – 1mV/div, High Res

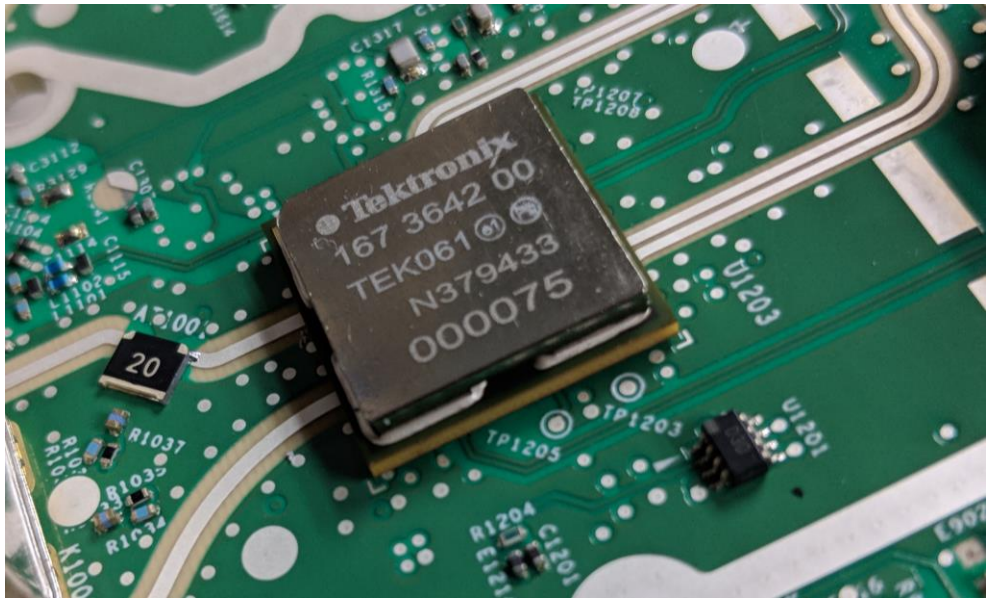
Industry leading noise performance

Why Is This Important?

SEE IT. MEASURE IT.

- Modern embedded designs demand clean, precisely-controlled DC power supplies to feed ASIC and FPGA devices
- Hunting down interfering signals is challenging when you can't see them through the noise
- The 6 Series B breakthrough noise performance lets you See It. Measure It.

Gain measurement confidence on the smallest of signals

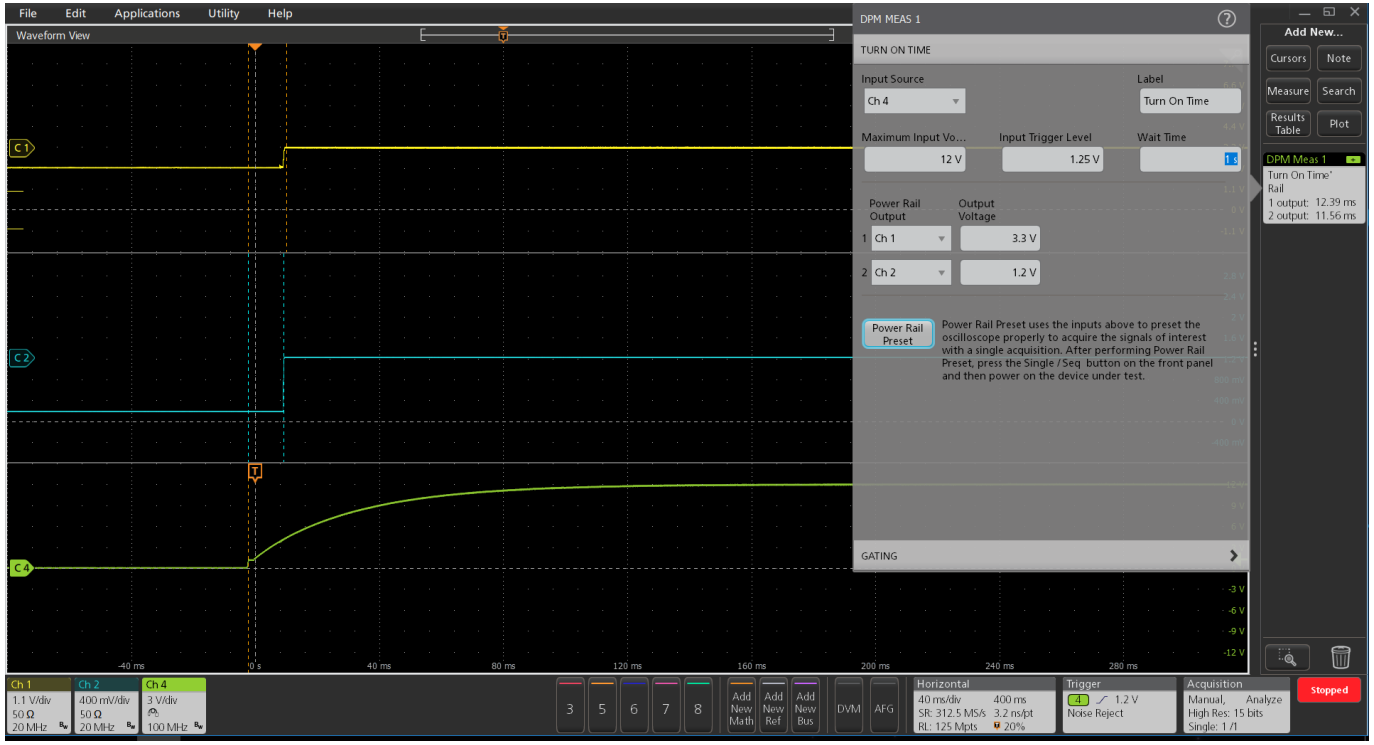


4 GHz, 50Ω, 1mV/div, typical	**RMS Noise**
Tektronix 6 Series B MSO	97 µV
A company, a model	132 uV
A company, b model	153 µV
B company	228 µV
C company, a model	240 µV
D company, b model	270 µV

Measure Power Rails on 8 channels

MEASURE MULTIPLE POWER RAILS WITH ACCURACY

- Low noise measurements to see more real signal activity
- High bandwidth to see more signal content like harmonics and ripple
- Large offsets to view and analyze small signals riding on large DC voltages
- Flexible connectivity options to cover a broad range of challenges
- Digital Power Management (Option 6-DPM) software automates power rail testing



User-centric channel configuration

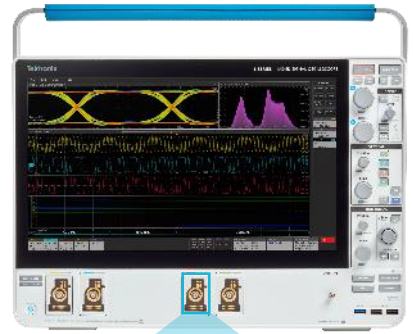
FlexChannels®

- FlexChannel® technology enables each input to be configured as either:
  - (1) analog channel
  - (8) digital channels
- Enables unprecedented flexibility and adaptability to the debug task at hand
- Possible configurations include:

MSO64B	
Analog	Digital
4	0
3	8
2	16
1	24
0	32

MSO66B	
Analog	Digital
6	0
5	8
4	16
3	24
2	32
1	40
0	48

MSO68B	
Analog	Digital
8	0
7	8
6	16
5	24
4	32
3	40
2	48
1	56
0	64



Traditional VPI connection accepts existing probes

Additional connections enable new digital probe

Each TLP058 probe accesses the 8 digital channels in the FlexChannel

Run Windows or not. You choose.

USER SELECTABLE OPERATING SYSTEM

- **Standard configuration is a removable SSD with a closed embedded operating system** installed behind an access panel on the bottom of the instrument
- **An optional SSD with a Windows 10 license** can be installed behind an access panel on the bottom of the instrument
- When a Windows 10 SSD is installed:
  - You can minimize the scope app and get to a Windows desktop
  - You can install and run other applications on the scope
  - You can attach a second monitor and extend your desktop
- Regardless of OS, the scope user interface runs exactly the same

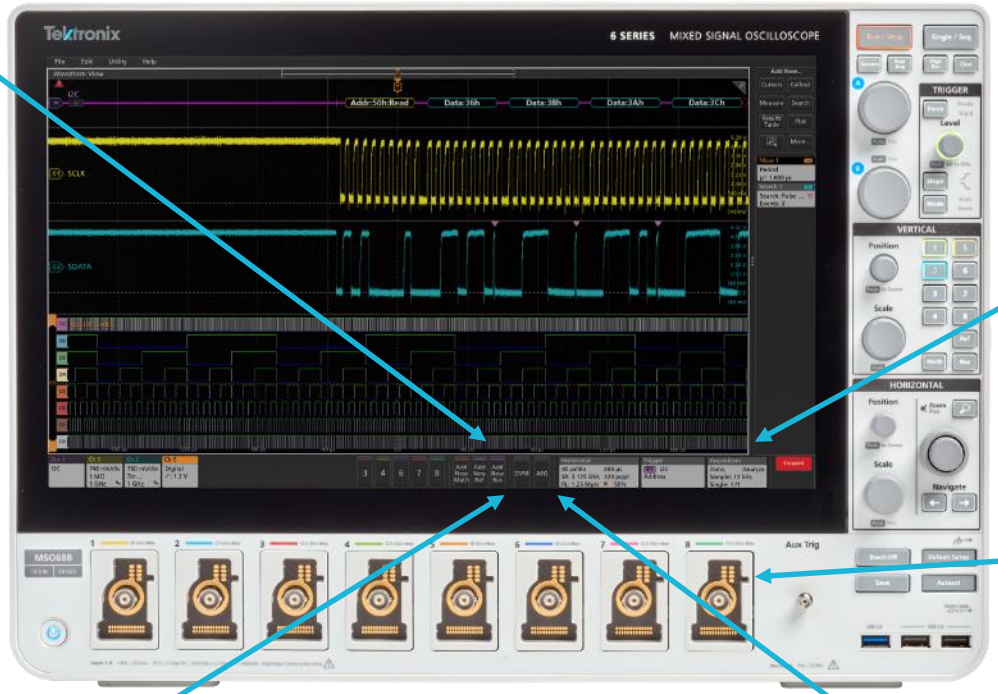
Upgrade at Any Time

CONFIDENCE FOR THE FUTURE

The scope that changes as your needs change

Protocol and Analysis Options

- Serial bus trigger and analysis
- Advanced Jitter Analysis
- Advanced Power Analysis and Digital Power Measurements
- Serial Compliance Test
- Memory Analysis
- Debug Test



Bandwidth Upgrades

- 2.5 GHz
- 4 GHz
- 6 GHz
- 8 GHz
- 10 GHz

Increase Record Length

Increase to 125 Mpts / channel
Increase to 250 Mpts / channel
Increase to 500 Mpts / channel
Increase to 1 Gpts / channel

Add TLP058 Logic Probes

Access 8 digital channels
on any FlexChannel input

Digital Voltmeter / Trigger Frequency Counter

Free with product registration

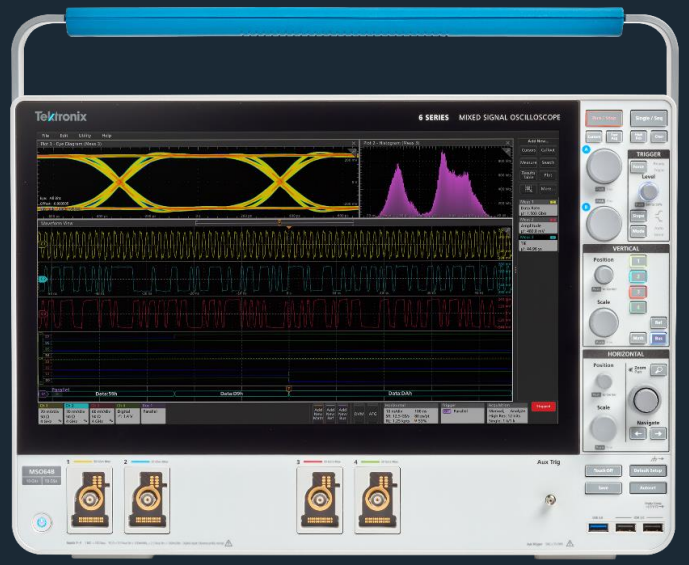
Windows 10 Upgrade

Add solid state drive with
Windows 10 license

Function Generator Upgrade

Arbitrary/ Function Generator

6 Series B MSO Mixed Signal Oscilloscopes



Up to 10 GHz bandwidth

Best signal fidelity with 12-bit ADCs and ultra-low noise

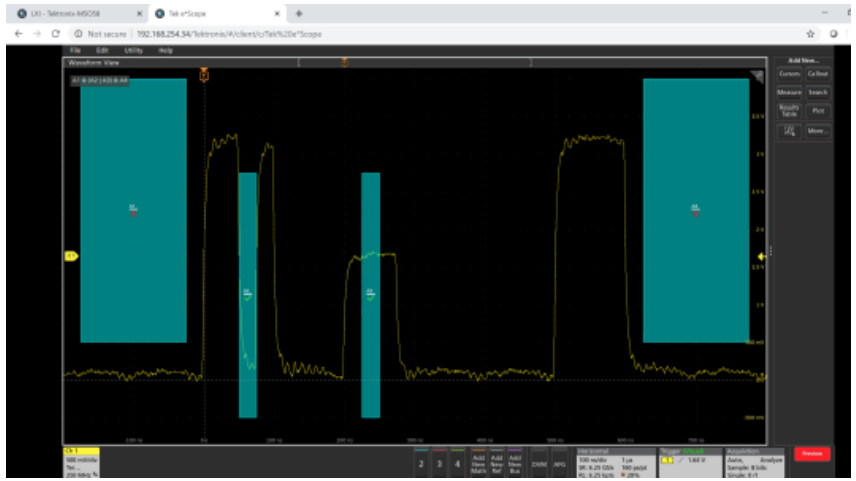
4, 6 or 8 FlexChannel™ inputs

More bandwidth. Less noise. More channels.
Same groundbreaking user experience.

DEMO

TekScope

e*Scope



Tektronix®