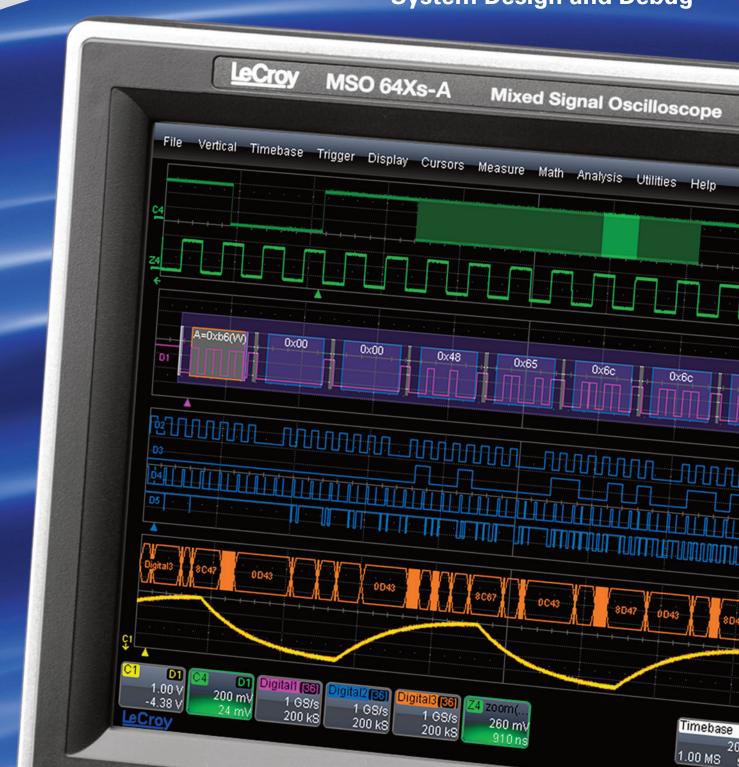
# **LeCroy**

## MSO Xs-A Mixed Signal Oscilloscopes

400 MHz - 1 GHz

**Engineered for Embedded System Design and Debug** 



## THE RIGHT TOOLS FOR EMBEDDED SYSTEM

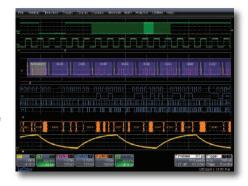
#### **Key Features**

- 400 MHz, 600 MHz and
   1 GHz bandwidths
- 4 analog and 18 digital channels
- 2.5 GS/s sample rates per channel, 5 GS/s with MSO 104Xs-A
- 10 Mpts/Ch memory on all channels, all the time
- Fast Processing of long memory and math
- Responsive User Interface
- WaveStream<sup>™</sup> Fast Viewing Mode
- WaveScan<sup>™</sup> Advanced Search and Find
- Excellent triggering including HDTV Trigger
- 10.4" touch screen display
- LXI Compliant
- SMART Triggers<sup>™</sup> capabilities for combining parallel and serial triggering

Successful design and debug of an embedded system requires monitoring a wide range of analog, digital and serial data signals. The MSO Xs-A with its long memory, fast processing, advanced measurements and touch screen is the right tool to view these signals and ensure proper bus traffic and timing between events.

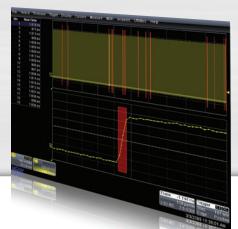
Its small form factor pack a powerful processor that can handle the long 10 Mpts of memory on each of the 4 analog and 18 digital channels faster than any competing products and without any compromise of memory length or sample rate. The touch screen interface is the ultimate in ease of use and with features like WaveStream<sup>™</sup> fast viewing mode and WaveScan<sup>™</sup> Search

and Find you can be confident that you will be able to quickly debug and solve every problem in your embedded system. Beyond the advanced measurement and triggering the MSO Xs-A offers a wide range of available serial data trigger and decode tools for I<sup>2</sup>C, SPI, UART, Audiobus (I<sup>2</sup>S, LJ, RJ, TDM), MIL-STD-1553, CAN and LIN. With analog bandwidths from 400 MHz to 1 GHz and max digital input frequencies up to 250 MHz the MSO Xs-A is the ideal mixed signal oscilloscope for everyday design and debug.



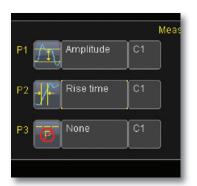
#### **Speed and Responsiveness**

The MSO Xs-A was designed to shorten debug time through faster hardware and more sophisticated software. The hardware allows for fast processing of long memory even when looking at all 22 inputs with math, measurements and serial decoders. The software is designed to respond immediately to the user's input even while processing data eliminating any lag or delay.



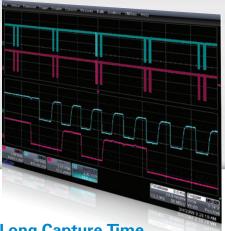
#### **WaveScan Advanced Search**

WaveScan allows searching in a single acquisition using more than 20 different modes. Or, set up a Scan condition and scan for an event over hours or days, and perform some action when it is found. Search for events on any analog or digital channel or search for a pattern across multiple digital channels.



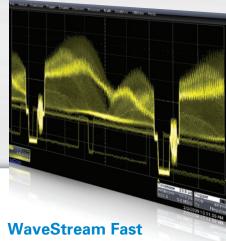
#### **Touch Screen Simplicity**

Keep your testing efficient with a thoughtfully designed user interface that provides the busy engineer with a GUI that is smooth, transparent, and easy to use. Use the touch screen to quickly access all triggers, math functions and measurement parameters or to "draw a box" around the area of interest and zoom all channels to the desired area.



#### **Long Capture Time**

With 10 Mpts/Ch of fast acquisition memory standard the MSO Xs-A provides long capture time at full sample rate, and allows for very long captures at lower sample rates letting you capture long stretches of serial bus traffic. The MSO Xs-A long memory is also thoughtfully designed to respond quickly, even when measurements, math, or serial decoders are being used.



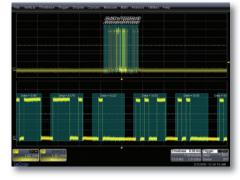
# **Viewing Mode**

WaveStream provides a vibrant, intensity graded (256 levels) display with a fast update to closely simulate the look and feel of an analog oscilloscope. Turn WaveStream ON or OFF, and adjust intensity, using the front panel knob. Use it only when you want to.



#### **Advanced Mixed Signal** Triggering

Powerful triggering allows for analog and digital cross-pattern triggering of up to 4 analog and 18 digital channels as well as Qualified AB event triggering to arm a trigger on a certain event and trigger on a parallel or serial pattern that follows.



#### **Serial Data Trigger** and Decode

Quickly and easily locate and isolate specific data on I2C, SPI, UART, Audiobus (I2S, LJ, RJ, TDM), MIL-STD-1553, CAN or LIN busses with the optional trigger and decode capabilities. Data is sown with a color-coded overlay directly on top of the physical layer waveform.

## THE INTUITIVE, POWERFUL, FLEXIBLE MSO

The MSO Xs-A mixed signal oscilloscope makes everyday embedded system testing simpler and easier. The intuitive user interface and streamlined front panel make it easy to turn on and start making measurements. The interface is designed so that all triggering, decoding, measurements and functions are just one touch away

#### 1. Digital Channel Capture

Capture 18 digital lines at 1 GS/s with 10 Mpts memory on each channel

#### 2. Digital Waveform Views

View all lines individually or group them and view as a parallel bus

#### 3. Analog Signal Capture

Capture and view analog channels width bandwidths up to 1 GHz, sample rate up to 5 GS/s and 10 Mpts on each channel

#### 4. Serial Data Decode

View decoded bus information from I<sup>2</sup>C, SPI, UART, Audiobus (I<sup>2</sup>S, LJ, RJ, TDM), MIL-STD-1553, CAN and LIN on analog or digital channels with serial data trigger and decode options

#### 5. Local Language User Interface

Select from 10 languages. Add a front panel overlay with your local language

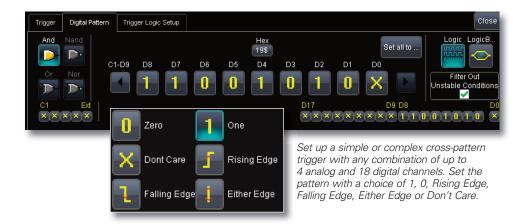


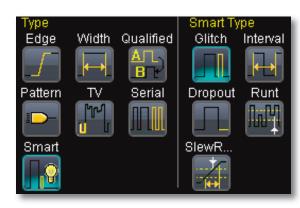


## THE COMPLETE MIXED SIGNAL TOOLSET

# Analog, Digital and Cross-pattern Triggering

The MSO Xs-A has an extensive set of triggering capabilities aimed at capturing a wide range of analog and digital signals. These triggers can be as simple as an edge trigger on an analog or digital channel or as complicated as a cross-pattern trigger which incorporates up to 4 analog and 18 digital channels. Powerful Qualified AB event triggering allows the trigger to be armed on one event and triggered on another.





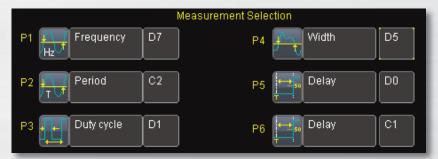
The advanced triggering of the MSO Xs-A goes well beyond the basic edge trigger and digital pattern trigger that many MSOs offer. Advanced triggers like runt and dropout and slew rate help find abnormal signals. The Qualified AB trigger can be used to connect multiple trigger events together.

#### **Easy-to-use Measurement Tools**

Cursor and measurement parameters are important for measuring and understanding both analog and digital waveforms. The MSO Xs-A cursors will read out hexadecimal bus values and analog channel voltages simultaneously. Automated measurement parameters will make measurements on both analog and digital channels with statistics to help you understand how they change over time.



Cursor measurements are displayed directly in the channel and group descriptor boxes which are always visible on screen.

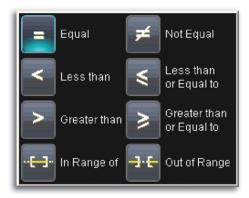


Use up to 6 measurements simultaneously and make measurements on analog, digital or a combination of both. Measurements are quickly set up using the touch screen menus.

## SERIAL DATA TRIGGER AND DECODE

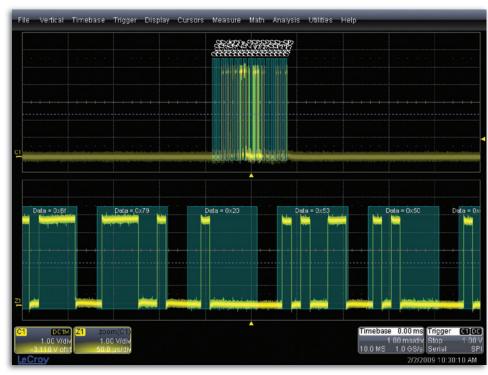
#### Complete I<sup>2</sup>C, SPI, UART, RS-232, Audiobus (I<sup>2</sup>S, LJ, RJ, TDM), MIL-STD-1553, CAN and LIN Serial Triggering

Quickly and easily isolate specific serial data events on your embedded controller for better understanding and faster debug. Set up trigger conditions in binary and hexadecimal formats. Use the digital channels to capture serial data busses keeping the analog oscilloscope channels open for other uses. Trigger on DATA in specific locations of long I<sup>2</sup>C EEPROM reads. Get complete control of your debug process and finish faster.



# Powerful Conditional Data Triggering

Completely isolate specific message events for better understanding and debug. Use a conditional trigger to select a range of values to trigger on, not just a single value. For example, oftentimes I<sup>2</sup>C utilizes DATA bytes to specify sub-addresses for accessing memory locations in EEPROMs. Conditional DATA trigger allows triggering on a range of DATA bytes that correspond to reads or writes to



specific sub-address memory blocks in the EEPROM. It can also aid in monitoring DATA outputs from sensors, such as analog-to-digital converters, and triggering when DATA is outside a safe operating range. In both cases, verifying proper operation becomes a simple task.

# Intuitive, Color-Coded Decode Overlay

Advanced software algorithms deconstruct the waveform into binary, hex, or ASCII protocol information, then overlay the decoded data on the waveform.

Various sections of the protocol are color-coded to make it easy to understand. The decode operation is fast—even with long acquisitions.

## Table Summary and Search/Zoom

Turn your oscilloscope into a protocol analyzer with the Table display of protocol information. Customize the table, or export Table data to an Excel file. Touch a message in the table and automatically zoom for detail. Search for specific address or data values in the acquisition.

ldx	Time	Addr Length	Address	R/W	Length	Data
8	240.494 ms	7	0:21	1	2	0xff 00 00
9	360.555 ms		0x21	0	1	0x08
10	360.698 ms		0x21			0x49 00 00
11	481.865 ms	7	0x21	0	1	0x0a
12	482.007 ms	7	0)(21	1	2	0x00 00 00
13	606.294 ms	7	0x20	0	3	0x01 36 00
14	721.235 ms	7	0x20	0	1	0x00
15	721.377 ms	7	0x20	1	2	0x123600
16	841.266 ms	7	0x20	0	1	0x02

## LECROY WAVESCAN ADVANCED SEARCH

WaveScan provides powerful isolation capabilities that hardware triggers can't provide. WaveScan provides the ability to locate unusual events in a single capture (i.e., capture and search), or "scan" for an event in many acquisitions over a long period of time. Select from more than 20 search modes to find events on any analog or digital channel or search for a pattern across multiple digital channels.



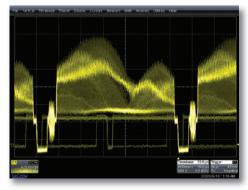
capability is much higher.

For instance, there is no "frequency" trigger in any oscilloscope, yet WaveScan allows for "frequency" to be guickly "scanned." This allows the user to accumulate a data set of unusual events that are separated by hours or days, enabling faster debugging. When used in multiple

acquisitions, WaveScan builds on the traditional LeCroy strength of fast processing of data. A LeCroy X-Stream oscilloscope will quickly scan millions of events looking for unusual occurrences, and do it much faster and more efficiently than other oscilloscopes can.

#### **WaveStream Fast Viewing Mode**

WaveStream provides a vibrant, intensity graded (256 levels) display with a fast update rate to closely simulate the look and feel of an analog oscilloscope. WaveStream is most helpful in viewing signals that have signal jitter or signal anomalies, or for applying a visual check before creating an advanced trigger or WaveScan setup to locate an unusual event.



Since the sampling rate in WaveStream mode can be as high as 5 GS/s (up to 2.5x that of other oscilloscopes), it is an excellent runt or glitch finder. Timing jitter is often visually assessed to understand approximate behavior. WaveStream makes it easy to understand jitter on edges or in eye diagrams. WaveStream also excels in allowing you to relate composite (WaveStream) to single-event (realtime sampled) behaviors. Just capture in WaveStream mode, toggle to view or zoom a single trace, then toggle back to WaveStream mode.

## PROBES, ACCESSORIES, AND OPTIONS

LeCroy offers an extensive range of probes, accessories, and options for the MSO Xs-A. Leverage your investment with these items.

#### **ZS Series High Impedance Active Probes**

#### **Leading Features:**

- 1 GHz (ZS1000) and 1.5 GHz (ZS1500) bandwidths
- High Impedance (0.9 pF, 1 M $\Omega$ )
- Extensive standard and available probe tip and ground connection accessories
- ±12 Vdc offset (ZS1500)
- LeCroy ProBus system

#### **ADP305, ADP300**

#### **Leading Features:**

- 20 MHz and 100 MHz bandwidth
- 1,000 V<sub>rms</sub> common mode voltage
- 1,400 V<sub>peak</sub> differential voltage
- EN 61010 CAT III
- 80 dB CMRR at 50/60 Hz
- LeCroy ProBus system

# PPE1.2KV, PPE2KV, PPE4KV, PPE5KV, PPE6KV, PPE20KV

#### **Leading Features:**

- Suitable for safe, accurate high-voltage measurements
- 1.2 kV to 20 kV
- Works with any 1 MΩ input oscilloscope

#### CP030, CP031

#### **Leading Features:**

- 30 A<sub>rms</sub> continuous current (50 A<sub>peak</sub>)
- 50 or 100 MHz bandwidth
- Small form factor accommodates large conductors with small jaw size
- LeCroy ProBus system



#### **AP031**

#### **Leading Features:**

- Lowest priced differential probe
- 15 MHz bandwidth
- 700 V maximum input voltage
- Works with any 1 MΩ input oscilloscope



#### AP033, AP034

#### **Leading Features:**

- 500 MHz and 1 GHz bandwidth
- 10,000:1 CMRR
- Wide dynamic range, low noise
- LeCroy ProBus system



#### **Extended Math Option**

Adds 12 additional math functions, chaining of two math functions, rescaling with unit selection, and 1 Mpt FFTs.

# I<sup>2</sup>C, SPI, UART, RS-232, Audiobus (I<sup>2</sup>S, LJ, RJ, TDM), MIL-STD-1553, CAN and LIN Trigger and Decode Options

Powerful serial triggering, including conditional data triggering, intuitive, color-coded decode overlay, search, and table display.



## **MSO Xs-A SPECIFICATIONS**

Analog Channels	MSO 44Xs-A	MSO 64Xs-A	MSO 104Xs-A			
Bandwidth (@ 50 Ω)	400 MHz	600 MHz	1 GHz			
Rise Time	875 ps	500 ps	300 ps			
Input Channels	4					
Display	10.4" Color flat-panel TFT-LCD, 800 x 600 SVGA, touch screen					
Sample Rate (single-shot)	2.5 (	2.5 GS/s 5 GS				
Sample Rate (RIS mode)	50 GS/s					
Standard Record Length	10 Mpts/Ch (all channels)					
Standard Capture Time	Up to 2 ms at full sample rate on all four channels					
Vertical Resolution	8-bits					
Vertical Sensitivity (V/div)	2 mV/div–10 V/div (1 MΩ); 2 mV/	/div-1 V/div (50 Ω)				
Vertical (DC Gain) Accuracy	±1.0% of full scale (typical); ±1.5% of full scale ≥ 10 mV/div (warranted)					
BW Limit	20 MHz, 200 MHz					
Maximum Input Voltage	50 Ω: 5 V <sub>rms</sub> , 1	MΩ: 400 V max.	50 Ω: 5 V <sub>rms</sub>			
	(DC + Peak	AC ≤ 5 kHz)	1 MΩ: 250 V max. (DC + Peak AC ≤ 10 kHz)			
Input Coupling	AC, DC, GND (DC and GND for 50 $\Omega$ )					
Input Impedance	1 MΩ    16	1 MΩ    20 pF, or 50 Ω				
Probing System	BNC or ProBus					
Probes	One PP009 (5 mm) per channel (standard)		One PP011 (5 mm) per channel (standard)			
Digital Channels						
Number of Channels	18					
Maximimum Input Frequency	250 MHz					
Sample Rate (per Ch)						
Record Length (per Ch)	10 Mpts					
Threshold Groupings	D0–D8, D9–D17					
Threshold Levels	TTL, ECL, CMOS (2.5 V, 3.3 V, 5 V), PECL, LVDS or User Defined					
Input Impedance	100 kΩ    5.0 pF					
Maximum Input Voltage	± 30 V non-destruct					
Horizontal and Trigger						
Timebase Range	200 ps/div_1000 s/div Irall made fro	om 500 ms/div_1000 s/div/				
Timebase Accuracy	200 ps/div–1000 s/div (roll mode from 500 ms/div–1000 s/div) ≤ 5 ppm @ 25 °C (typical) (≤ 10 ppm @ 5–40 °C)					
Trigger Modes	Normal, Auto, Single, and Stop					
Trigger Sources	Any input channel, External, Ext/10, or line; slope and level unique to each source (except for line trigger)					
Trigger Coupling						
Pre-trigger Delay	DC, AC, HFRej, LFRej 0–100% of full scale					
Post-trigger Delay	0–10.000 divisions					
Trigger Hold-off	1 ns to 20 s or 1 to 1,000,000,000	ovente				
Internal Trigger Level Range	±4.1 div from center	event9				
External Trigger Range	EXT/10 ±4V; EXT ±400 mV					

# **MSO Xs-A SPECIFICATIONS**

<b>Trigger Types</b>	MSO 44Xs-A	MSO 64Xs-A	MSO 104Xs-A		
Standard	Edge, Glitch, Width, Logic (Pattern), TV (NTSC, PAL, SECAM, HDTV – 720p, 1080i, 1080p), Runt, Slew Rate Interval (Signal or Pattern), Dropout, Qualified (State or Edge)				
Measure, Zoom, and Math Tools					
Standard Parameter Measurements	Up to 6 of the following parameters can be calculated at one time on any waveform: Amplitude, Area, Base (Low), Delay, Duty, Fall Time (90%-10%), Fall Time (80%-20%), Frequency, Maximum, Mean, Minimum, Overshoot+, Overshoot-, Period, Peak-Peak, Phase, Rise Time (10%-90%), Rise Time (20%-80%), RMS, Skew, Standard Deviation, Top (High), Width+, Width Measurements can be gated.				
Zooming	Use front panel QuickZoom butto	on, or use touch screen or mouse to dra	aw a box around the zoom area.		
Standard Math		nce, Product, Ratio, and FFT (up to 25 k n, and FlatTop windows). 1 math functi			
Physical (MS-250)					
Dimensions (HWD)	1.5" x 4.25" x 8.375" (3.8 x 10.8 x	21.2 cm)			
Weight	1.7 lbs. (.775 kg)				
Leadset Length	16" (40.65 cm)				
Physical (Base Oscilloscope)					
Dimensions (HWD)	10.25" x 13.4" x 6" (26 cm x 34 cr	n x 15 cm) Excluding accessories and p	rojections		
Net Weight	16.0 lbs. (7.26 kg.)				
Option					
Extended Math (WSXs-MATHSURF Option)	Derivative, Envelope, Enhanced	ath functions: Absolute Value, Averagir Resolution (to 11- bits), Floor, Integral, Square, and Square Root. Also adds ch	Invert, Reciprocal, Rescale		

## ORDERING INFORMATION

#### **Product Description Product Code Product Description MSO Xs-A Mixed Signal Oscilloscopes Local Language Overlays** MSO 104Xs-A WSXs-A-FP-CHNES-TR 1 GHz, 5 GS/s, 4 + 18 Ch, 10 Mpts/Ch MSO Chinese (Tr) Front Panel Overlay with 10.4" Color Touch Screen Display Chinese (Simp) Front Panel Overlay WSXs-A-FP-CHNES-SI MSO 64Xs-A 600 MHz, 2.5 GS/s, 4 + 18 Ch, 10 Mpts/Ch MSO Russian Front Panel Overlay WSXs-A-FP-RUSSIAN with 10.4" Color Touch Screen Display MSO 44Xs-A 400 MHz, 2.5 GS/s, 4 + 18 Ch, 10 Mpts/Ch MSO **Software Options** with 10.4" Color Touch Screen Display Extended Math Software Package Electrical Telecom Mask Test Software Package **Included with Standard Configuration** Windows Lockout Software Option MS-250 Mixed Signal Oscilloscope Option Advanced Triggering with LeCroy SMART Triggers **Serial Data Options** $\div$ 10, 500 MHz, 10 M $\Omega$ Passive Probe (Total of 1 Per Channel) I<sup>2</sup>C Trigger and Decode Option Getting Started Manual and Quick Reference Guide UART and RS-232 Trigger and Decode Option WSXs-UART-RS232bus TD Standard Ports: 10/100Base-T Ethernet, USB 2.0 (5), SPI Trigger and Decode Option SVGA Video out, Audio in/out, RS-232 LIN Trigger and Decode Option Protective Front Cover CAN Trigger and Decode Option Anti-virus Software (Trial Version) Audiobus Trigger and Decode Option Standard Commercial Calibration and Performance Certificate for I2S, LJ, RJ and TDM 3-year Warranty MIL-STD-1553 Trigger and Decode Option **Mixed Signal Accessories Probes and Amplifiers\*** Large Gripper Probe Set for 0.10" (2.54 mm) Pin Pitch. PK400-1 Set of 4 ZS1500, 1.5 GHz, 0.9 pF, 1 MΩ Includes 10 Color-coded Probes High Impedance Active Probe Medium Gripper Probe Set for 0.04" (1.0 mm) Pin Pitch, PK400-2 Set of 4 ZS1000, 1 GHz, 0.9 pF, 1 M $\Omega$ Includes 10 Color-coded Probes High Impedance Active Probe Small Gripper Probe Set for 0.008" (0.2 mm) Pin Pitch, PK400-3 1 GHz Active Differential Probe (÷1, ÷10, ÷20) Includes 10 Color-coded Probes 500 MHz Active Differential Probe (x10, $\div$ 1, $\div$ 10, $\div$ 100) 18-pin 3M Interface Cable MSO-3M 30 A; 100 MHz Current Probe - AC/DC; 30 Arms; 50 Apeak Pulse (Mates with 3M Part Number 2520-6002) 30 A; 50 MHz Current Probe - AC/DC; 30 Arms; 50 Apeak Pulse 30 A; 50 MHz Current Probe – AC/DC; 30 Arms; 50 Apeak Pulse **General Accessories** 150 A; 10 MHz Current Probe – AC/DC; 150 A<sub>rms</sub>; 500 A<sub>peak</sub> Pulse WSXs-KYBD Keyboard Accessory 500 A; 2 MHz Current Probe - AC/DC; 500 Arms; 700 Apeak Pulse Optical Mouse Accessory WSXs-MOUSE 1,400 V, 100 MHz High-Voltage Differential Probe External GPIB Accessory WS-GPIB 1,400 V, 20 MHz High-Voltage Differential Probe Hard Carrying Case WSXs-HARDCASE 1 Ch. 100 MHz Differential Amplifier Soft Carrying Case WSXs-SOFTCASE with Precision Voltage Source Rack Mount Accessory WSXs-RACK \*A wide variety of other passive, active, and differential probes are also available. Accessory Pouch WSXs-POUCH

**Mounting Accessory** 

Clamp Mounting Stand WSXs-MS-CLAMP

**Local Language Overlays** 

WSXs-A-FP-GERMAN
WSXs-A-FP-FRENCH
WSXs-A-FP-ITALIAN
WSXs-A-FP-SPANISH
WSXs-A-FP-JAPANESE
WSXs-A-FP-KOREAN

#### **Customer Service**

LeCroy oscilloscopes and probes are designed, built, and tested to ensure high reliability. In the unlikely event you experience difficulties, our digital oscilloscopes are fully warranted for three years, and our probes are warranted for one year.

This warranty includes:

• No charge for return shipping

Consult LeCroy for more information.

- Long-term 7-year support
- Upgrade to latest software at no charge



Local sales offices are located throughout the world. www.lecroy.com Visit our website to find the most convenient location. **Product Code** 

WSXs-MATHSURF

WSXs-ET-PMT

WSXs-LOCKOUT

WSXs-I2Cbus TD

WSXs-SPIbus TD

WSXs-LINbus TD

WSXs-CANbus TD

WSXs-Audiobus TD

ZS1500-QUADPAK

ZS1000-QUADPAK

AP034

AP033

CP031

CP030

AP015

CP150

CP500

ADP305

ADP300

DA1855A

WSXs-1553 TD

# AMEYA360 Components Supply Platform

### **Authorized Distribution Brand:**

























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