LeCroy

WaveMaster® 8000A Series

The Ultimate Analysis Capability for Next-Generation Research

It's All About Performance

The LeCroy WaveMaster 8000A Series oscilloscope offers a unique combination of high bandwidth, fast sampling speeds, and long memory capture, ideal for digital and communications systems. Equipped with our patented X-Stream technology, its fast data transfer and processing system deliver unprecedented measurement capabilities, at speeds 10–100 times faster than conventional oscilloscopes. Providing true WaveShape Analysis, its high-performance capabilities are changing the way engineers think about design and testing.

Features:

- **High bandwidth from 4 GHz to 6 GHz**
- **Fast sampling speeds—to 20 GS/s on 4 channels**
- **Full sampling speed maintained over entire memory length**
- **Standard memory 2 Mpts/Ch**
- **High signal integrity with an SiGe amplifier, ADC, and trigger circuit**
- **Intuitive GUI for easier WaveShape Analysis**
- **10–100 times faster processing speeds**
- **A wide array of standard math tools**
- **Optional math and measurement packages**

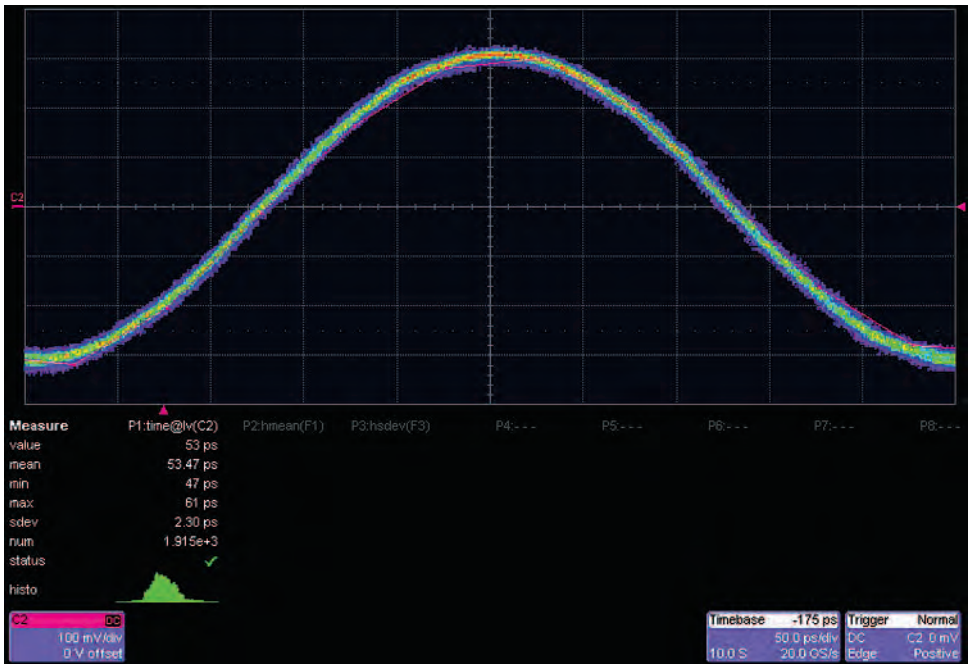
Measurement Accuracy

Superior timebase performance and very low jitter noise floor make WaveMaster a truly remarkable instrument. Delivering extremely stable and precise measurements, its high level of accuracy includes:

- 1 ps rms jitter noise floor
- Timebase stability of ±1 ppm clock accuracy
- Low trigger jitter < 2.5 ps
- Rise time as fast as 75 ps captures fast signal edges

Exceptional Trigger Performance

WaveMaster offers a comprehensive array of triggers for maximum performance. The SiGe trigger circuit offers a 5 GHz edge trigger bandwidth for capturing fast signals with superior sensitivity. The versatile SMART Trigger™ captures a variety of signals, including glitches and pulse widths down to 600 ps. The logic trigger makes it easy to capture a pattern of up to 5 inputs, or to qualify on 4 signal inputs and trigger on the 5th.



A 2 GHz sine wave input with persistence "on" demonstrates the exceptionally low trigger jitter on WaveMaster oscilloscopes.

Deep Memory Calculations with Unprecedented Speed

LeCroy's proprietary X-Stream technology offers users the ability to see deep memory calculations updated quickly on the screen. With waveform processing at speeds 10–100 times faster than conventional oscilloscope technology, users can now easily:

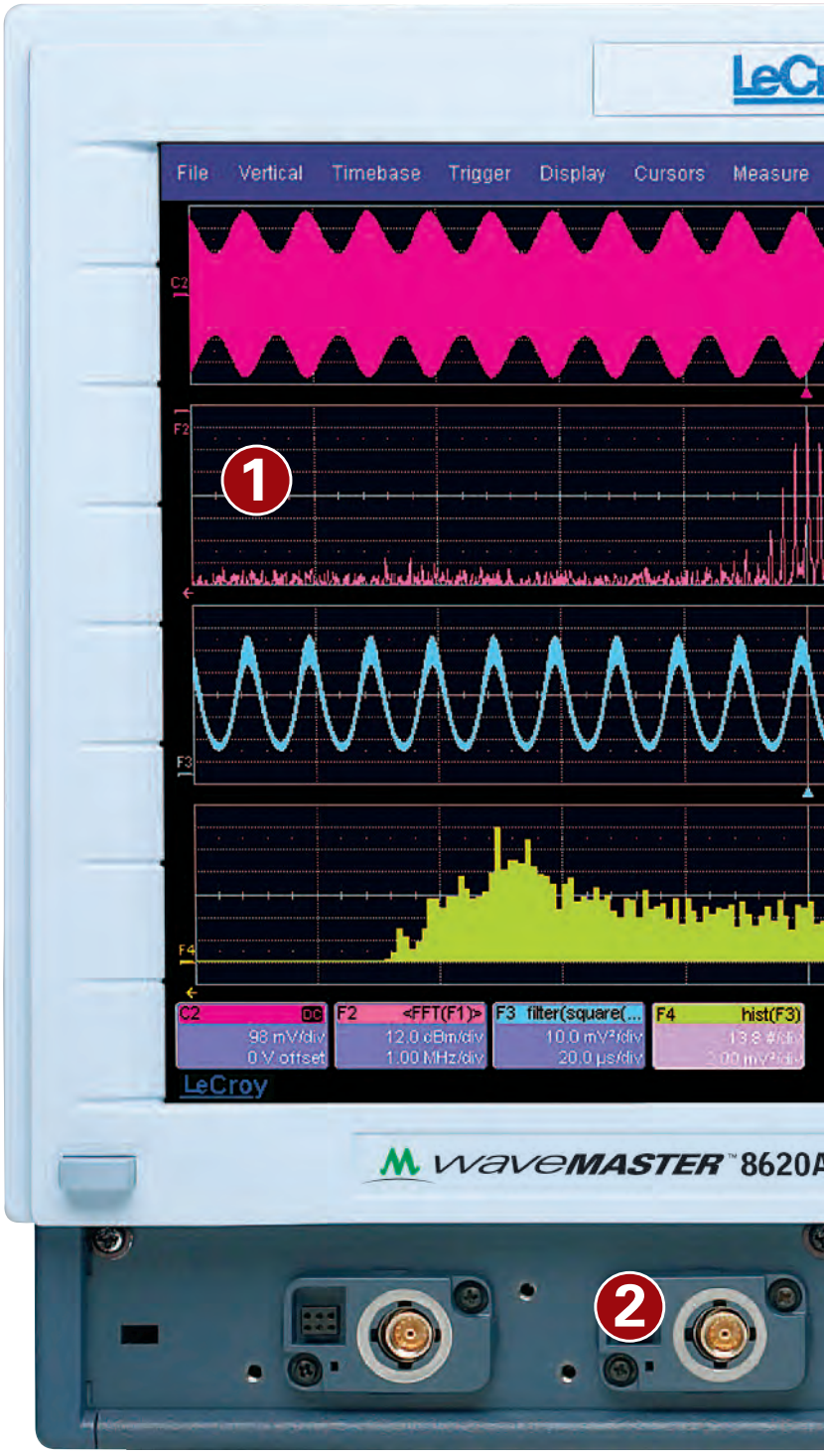
- Capture and analyze long records quickly
- Use advanced tools such as XMATH Advanced Math and XDEV Advanced Customization software packages with long records
- Display unique analysis views, such as 3-dimensional displays, and histicons

True Customization

LeCroy offers the ability to modify parameter measurements or math functions in the oscilloscope's interface for true customization. Users simply add proprietary functionality like MATLAB, Mathcad or Excel, just as in a LeCroy-installed function. The results are displayed on the screen. Since the resulting waveform is inserted back into the processing flow, the oscilloscope's cursors, measurements, and math can be performed on it. This feature adds a robust dimension to WaveMaster's capabilities, creating much more flexibility than a simple export of data to a third-party program.

Familiar Controls for Ease of Use

The WaveMaster 8000A Series oscilloscope's user interface is designed to be familiar, intuitive, and efficient. The easily recognizable oscilloscopes controls on the front panel combine with a natural, context-sensitive graphical user interface that react quickly to user commands. A flexible selection of cursors can be positioned by knobs dedicated to specific functions that can be accessed from the front panel or the touch screen.



1. 10.4" Touch Screen Display

800 x 600 SVGA resolution with large screen keeps pop-up control menus from covering the waveform.

2. ProLink Input Connections

High integrity, full bandwidth signal connector with probe power and control in one simple-to-connect interface.

3. One-touch User Interface

Need to quickly change a control parameter? Simply touch the parameter on the screen and the dialog pops up. No need to use several mouse clicks from a pull-down tree.

4. Dedicated Cursor Controls

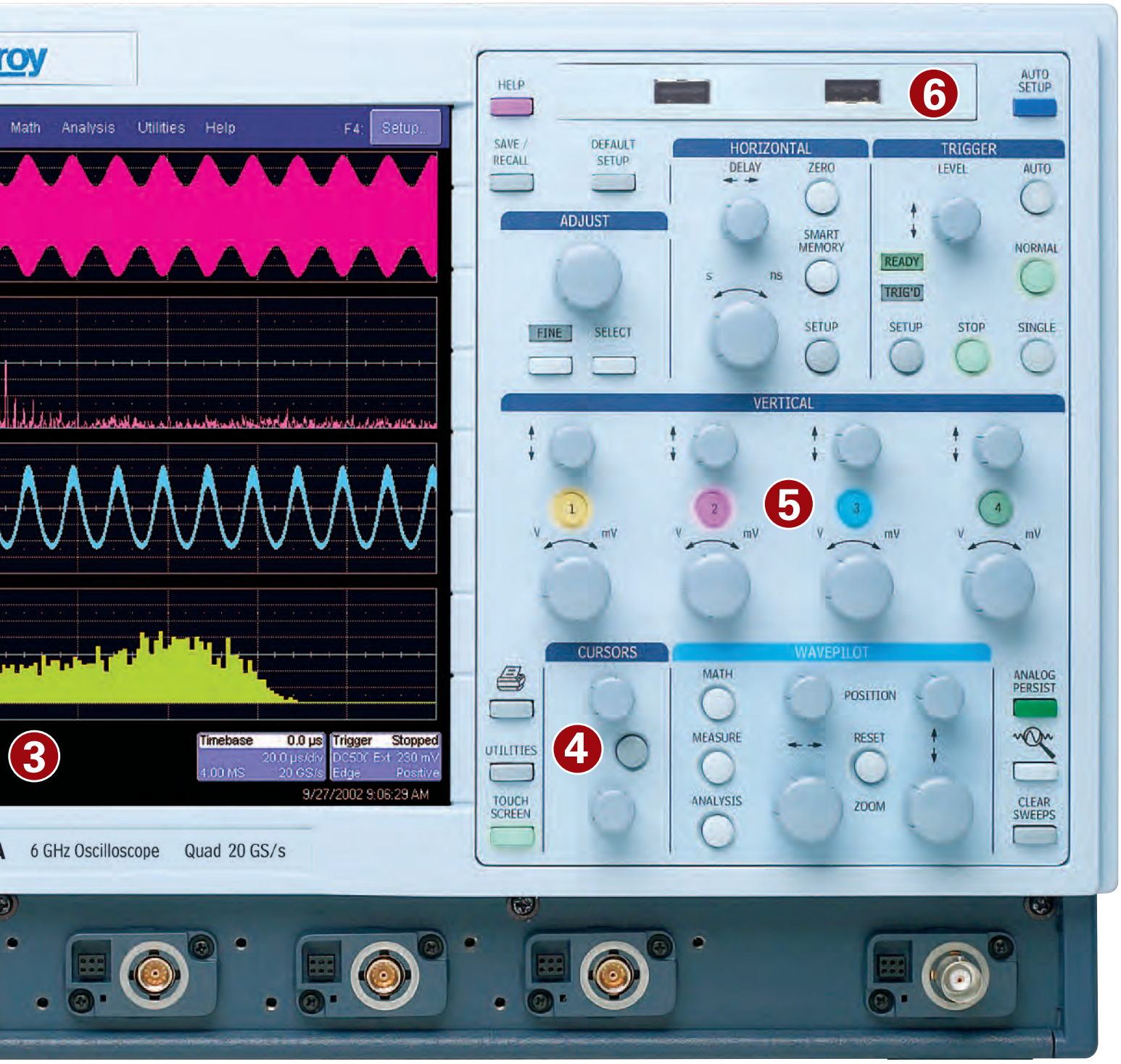
No need to recall the cursor menu to change cursor position.

5. Dedicated Vertical Controls

Separate knobs set the vertical scale factor and offset for each active channel. The user can concentrate on the circuit — not on controlling the oscilloscope.

6. Front Access USB 2.0

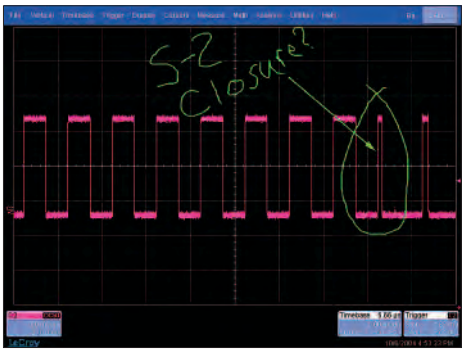
Provides convenient access for transferring waveform or setup data to flash memory keys, without the need to reach behind the oscilloscope.


Math
Analysis
Utilities
Help
F4:
Setup...
Timebase 0.0 µs
20.0 µs/div
4.00 MS 20 GS/s
Trigger Stopped
DC50(Ext 230 mV
Edge Positive
9/27/2002 9:06:29 AM
6 GHz Oscilloscope
Quad 20 GS/s
HELP
AUTO SETUP
SAVE / RECALL
DEFAULT SETUP
HORIZONTAL
DELAY
ZERO
TRIGGER
LEVEL
AUTO
ADJUST
SMART MEMORY
READY
TRIG'D
NORMAL
FINE
SELECT
SETUP
STOP
SINGLE
VERTICAL
CURSORS
WAVEPILOT
MATH
POSITION
ANALOG PERSIST
UTILITIES
MEASURE
RESET
TOUCH SCREEN
ANALYSIS
ZOOM
CLEAR SWEEPS
3
4
5
6

LabNotebook™
An In-Scope Solution for Documenting Results

LeCroy Introduces a Complete In-scope Solution—Standard on most LeCroy Oscilloscopes

Now you can efficiently create complete and detailed waveform reports directly in the oscilloscope. An all-in-one solution for annotating and sharing information, LabNotebook™ simplifies results recording and report generation by eliminating the multi-step processes that often involve several pieces of equipment.

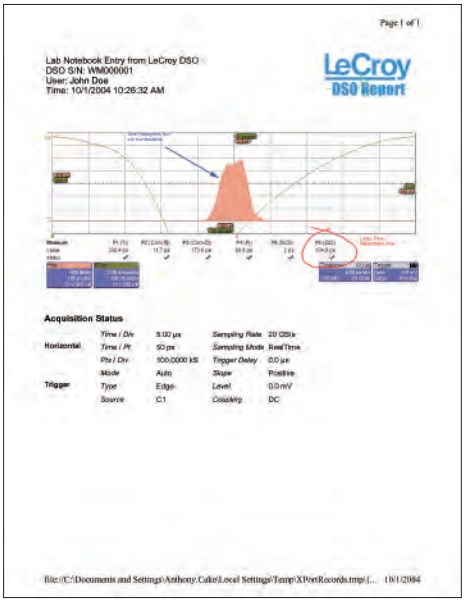


LabNotebook enables users to focus on results rather than the process, as they can now:

- Save all displayed waveforms
- Save the relevant setups with the saved waveform
- Add freehand notes with a stylus, or as text
- Convert the complete report to pdf, rtf, or html
- Print or e-mail reports

Create Notes with the Screen Capture

By pressing Hard Copy, you can annotate waveforms as you capture them. Once the notes are finished, they can be readily saved as a report and e-mailed directly from the oscilloscope.



Flashback Function

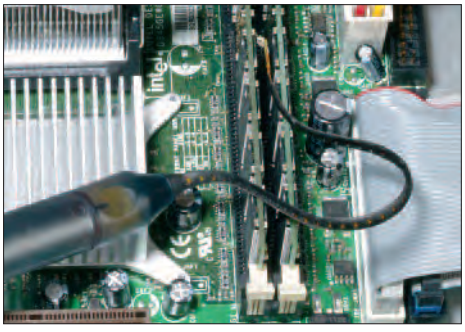
Users can employ the Flashback Function to recall the state of the oscilloscope, including saved waveforms and setup. Additional measurements are easily made, using the keyword filter to find the correct notebook entry for recall.

WaveLink Probes

WaveLink probes provide industry-leading performance for wideband signal connection to test instruments. The first differential probes to employ SiGe technology, they deliver full system bandwidth at the probe inputs when used with WaveMaster 6 GHz, 5 GHz, and 4 GHz oscilloscopes.

All WaveLink probes offer:

- Excellent low loading characteristics
- Superb flat frequency response
- Outstanding fidelity for high-speed signals



Enhanced Math Functions and Optional Packages

WaveMaster's robust capabilities include all standard math tools, as well as a pass/fail testing feature. Optional packages can boost these abilities even further, with advanced math, measure and timing tools, customization packages, jitter and timing analysis, and more. Please consult the LeCroy Web site for additional information.

Specifications

Vertical System	WaveMaster 8620A	WaveMaster 8600A	WaveMaster 8500A	WaveMaster 8420A	WaveMaster 8400A
Analog Bandwidth @ 50 Ω (-3 dB)	6 GHz	6 GHz	5 GHz	4 GHz	4 GHz
Rise Time (typical)	75 ps	75 ps	90 ps	105 ps	105 ps
Input Channels	4				
Bandwidth Limiters				20 MHz, 200 MHz, 1 GHz, 3 GHz	
Input Impedance	50 Ω ±2.0%				
Input Coupling	DC, GND				
Maximum Input Voltage	±4 V_{peak}				
Channel-Channel Isolation	≥ 100:1 at 2 GHz; ≥ 40:1 at 3 GHz; ≥ 20:1 at 4 GHz				
Vertical Resolution	8 bits; up to 11 bits with enhanced resolution (ERES)				
Sensitivity	2 mV–1 V/div (fully variable, < 10 mV/div through zoom)				
DC Gain Accuracy	±1.5% of full scale				
Offset Range	±750 mV @ 2 mV–194 mV/div ±4 V @ 196 mV–1 V/div				
Offset Accuracy	±(1.5% of full scale +1.5% of offset value +2 mV)				

Horizontal System

Timebases	Internal timebase common to 4 input channels; an external clock may be applied at the auxiliary input
Time/Division Range	Real Time: 20 ps/div – 10 s/div Random Interleave Sampling: to 20 ps/div, Upper time / div limit function of sample rate and memory length settings
Sample Rate and Delay Time Accuracy	±1 ppm ≤ 10 sec interval
Time Interval Accuracy	≤ 0.06 / SR + (1 ppm * Reading) (rms)
Jitter Noise Floor	1 ps rms (typical)
Trigger and Interpolator Jitter	< 2 ps rms (typical)
Channel-Channel Deskew Range	±9 x time/div. setting, or 25 ns, whichever is larger
External Timebase Reference	100 MHz; 50 Ω impedance, applied at the rear input
External Clock	30 MHz–2 GHz, 50 Ω impedance, applied at the auxiliary input

Acquisition System

	WM8620A	WM8600A	WM8500A	WM8420A	WM8400A
Single-Shot Sample Rate/Ch	20 GS/s of 4 Ch	20 GS/s on 2 Ch; 10 GS/s on 4 Ch		20 GS/s of 4 Ch	20 GS/s on 2 Ch; 10 GS/s on 4 Ch
Random Interleaved Sampling (RIS)	200 GS/s for repetitive signals, to 20 ps /div. Upper time/div limit function of sample rate and memory length settings				
Maximum Trigger Rate	150,000 waveforms/second				
Intersegment Time	6 µs				
Maximum Acquisition Memory Points/Ch	4 Ch	(2 Ch) / (4 Ch)	(2 Ch) / (4 Ch)	4 Ch	(2 Ch) / (4 Ch)
Standard Memory	4M	8M / 4M	8M /4M	4M	8M / 4M
L – Memory Option	8M	16M / 8M	16M / 8M	8M	16M / 8M
VL – Memory Option	16M	32M / 16M	32M / 16M	16M	32M / 16M
XL – Memory Option	24M	48M / 24M	48M / 24M	24M	48M / 24M
XXL – Models	N/A	100M / 50M	100 M / 50 M	N/A	100M / 50M

Acquisition Processing

Averaging	Summed averaging to 1 million sweeps; continuous averaging to 1 million sweeps
Enhanced Resolution (ERES)	From 8.5 to 11 bits vertical resolution
Envelope (Extrema)	Envelope, floor, or roof for up to 1 million sweeps

Triggering System

Modes	Normal, Auto, Single, and Stop
Sources	Any input channel, External, Ext X 10, Ext ÷10, or line; slope and level unique to each source (except line trigger)
Coupling Mode	DC
Pre-trigger Delay	0–100% of memory size (adjustable in 1% increments)
Post-trigger Delay	the smaller of 0–10,000 divisions or 86400 seconds
Hold-off by Time or Events	From 2 ns up to 20 s or from 1 to 99,999,999 events
Internal Trigger Range	±5 div from center

Specifications

Triggering System (cont.)	WM8620A/WM8600A/WM8500A	WM8420A/WM8400A
Trigger Sensitivity with Edge Trigger (Ch 1–4)	3 div @ ≤ 5 GHz 2 div @ < 4 GHz 1.2 div @ < 3 GHz (typical)	2 div @ ≤ 4 GHz 1.2 div @ < 3 GHz (typical)
External Trigger Sensitivity, (Edge Trigger)	1.2 V @ ≤ 5 GHz, 800 mV < 4 GHz 480 mV < 3 GHz (typical)	800 mV @ < 4 GHz, 480 mV @ < 3 GHz
Max. Trigger Frequency, SMART Trigger	750 MHz @ ≥ 10 mV	
External Trigger Input Range	Aux (±0.4 V); Aux X10 (±0.04 V); Aux/10 (±4 V)	

Basic Triggers

Edge	Triggers when signal meets slope and level condition.

SMART Triggers

State or Edge Qualified	Triggers on any input source only if a defined state or edge occurred on another input source. Delay between sources is selectable by time or events.
Dropout	Triggers if signal drops out for longer than selected time between 2 ns and 20 s.
Pattern	Logic combination (AND, NAND, OR, NOR) of 5 inputs – 4 channels (2 channels in 11 GHz mode) and external trigger input. Each source can be high, low, or don't care. The High and Low level can be selected independently. Triggers at start or end of the pattern.

SMART Triggers with Exclusion Technology

Glitch	Triggers on positive or negative glitches with widths selectable from 600 ps to 20 s, or on intermittent faults.
Signal or Pattern Width	Triggers on positive or negative pulse widths selectable from 600 ps to 20 s, or on intermittent faults.
Signal or Pattern Interval	Triggers on intervals selectable between 2 ns and 20 s.

Color Waveform Display

Type	Color 10.4" flat panel TFT-LCD with high resolution touch screen
Resolution	SVGA; 800 x 600 pixels
Number of traces	Display a maximum of 8 traces. Simultaneously display channel, zoom, memory and math traces.
Grid Styles	Auto, Single, Dual, Quad, Octal, X-Y, Single+X-Y, Dual+X-Y
Waveform Representation	Sample dots joined, or sample dots only

Analog Persistence Display

Analog and Color-Graded Persistence	Variable saturation levels; stores each trace's persistence data in memory
Persistence Types	Select analog, color graded, or three-dimensional
Trace Selection	Select persistence on all or any combination of traces
Persistence Aging Timing	Select from 500 ms to infinity
Sweep Display Modes	All accumulated, or all accumulated with last trace highlighted

Processor

Type	Intel® Pentium® 4, 2.54 GHz or better
Processor Memory	Up to 2 Gbytes
Operating System	Microsoft Windows® XP Professional
Oscilloscope Operating Software (X-Stream)	Entire instrument including any installed optional applications packages operates within a single Windows application
Real Time Clock	Date and time displayed with waveform an in hardcopy files. SNTP support to synchronize to precision internal clocks.

Internal Waveform Memory

	4 active waveform memory traces (M1-M4) store 16 bit/point full length waveforms. Waveforms can be stored to any number of files limited only by the data storage media capacity.

Setup Storage

Front Panel and Instrument Status	Store to the internal hard drive or to a USB-connected peripheral device.

Specifications

Interface

Remote Control	Via Windows Automation, or via LeCroy Remote Command Set
GPIB Port (optional)	Supports IEEE – 488.2
Ethernet Port	Supports 10/100BaseT Ethernet interface
USB Ports	USB 2.0 ports on front and rear panels support Windows® XP compatible devices
External Monitor Port	15 pin D-Type SVGA compatible, duplicates instrument display. Optional dual monitor support for split Windows® applications
Parallel Port	1 standard

Auxiliary Input

Signal Types	Select External Trigger or External Clock Input on the front panel

Auxiliary Output

Signal Types	Select Calibrator, Trigger Enabled, Trigger Out, Pass/Fail, or Off
Calibrator Signal	5 Hz–5 MHz square wave or DC Level, 0–500 mV into 50 Ω, 0–1.0 V into 1 MΩ, or TTL logic voltages

General

Auto Setup	Automatically sets timebase, trigger, and sensitivity to display a wide range of repetitive signals
Find Vertical Scale	Automatically sets the vertical sensitivity and offset for the selected channel to display a waveform with the maximum dynamic range
Auto Calibration	Ensures specified DC and timing accuracy is maintained for 1 year minimum.

Power Requirements

Voltage	100–240 VAC ±10% at 50/60/400 Hz; 200–240 VAC ±10% at 50/60 Hz; Automatic AC Voltage Selection

	WM8620A	WM8600A/WM8500A	WM8420A	WM8400A
Max. Power Consumption	800 VA (800 W)	650 W/650 VA	800 VA (800 W)	650 W/650 VA

Environmental

Temperature (Operating)	+5 °C to +40 °C including CD-ROM drives
Temperature (Non-Operating)	–20 °C to +60 °C
Humidity (Operating)	5% to 80% relative humidity (non-condensing) up to +30 °C. Upper limit derates to 25% relative humidity (non-condensing) at +40 °C.
Humidity (Non-Operating)	5% to 95% relative humidity (non-condensing) as tested per MIL-PRF-28800F
Altitude (Operating)	Up to 10,000 ft. (3048 m) at or below +25 °C
Altitude (Non-Operating)	Up to 40,000 ft. (12,192 m)

Physical Dimensions

Dimensions (HWD)	264 mm x 397 mm x 491 mm; 10.4" x 15.6" x 19.3" (height excludes feet)			
Weight	23 kg; 50 lbs.	18 kg; 39 lbs.	23 kg; 50 lbs.	18 kg; 39 lbs.
Shipping Weight	29 kg; 63 lbs.	24 kg; 53 lbs.	29 kg; 63 lbs.	24 kg; 53 lbs.

Certifications

CE Compliant; UL and cUL listed; Conforms to EN 61326 (for EMC); EN 61010, UL 61010B-1 and CSA C22.2 No. 1010.1 (for safety)

Warranty and Service

3-year warranty; calibration recommended annually.
Optional service programs include extended warranty, upgrades, and calibration services.

Ordering Information

WaveMaster Digital Oscilloscopes	Product Code
4 Ch; 6 GHz; 20 GS/s; 4 Mpts/Ch	WaveMaster 8620A
4 Ch; 4 GHz; 20 GS/s; 4 Mpts/Ch	WaveMaster 8420A
4 Ch; 6 GHz; 10 GS/s; 4 Mpts/Ch; 8 Mpts 20 GS/s using 2 or 1 Ch	WaveMaster 8600A
4 Ch; 5 GHz; 10 GS/s; 4 Mpts/Ch; 8 Mpts 20 GS/s using 2 or 1 Ch	WaveMaster 8500A
4 Ch; 4 GHz; 10 GS/s; 4 Mpts/Ch; 8 Mpts 20 GS/s using 2 or 1 Ch	WaveMaster 8400A
4 Ch; 3 GHz; 10 GS/s; 4 Mpts/Ch; 8 Mpts 20 GS/s using 2 or 1 Ch	WaveMaster 8300A

Memory Options	8620A/8420A		8600A/8500A/8400A/8300A	
WM-XL	24M	(4 Ch)	48M/24M	(2 Ch/4 Ch)
WM-VL	16M	(4 Ch)	32M/16M	(2 Ch/4 Ch)
WM-M	8M	(4 Ch)	16M/8M	(2 Ch/4 Ch)

Long Memory Models	
4 Ch; 6 GHz; 10 GS/s; 50 Mpts/Ch; 20 GS/s and 100 Mpts/Ch max. using 2 or 1 Ch	WaveMaster 8600A XXL
4 Ch; 5 GHz; 10 GS/s; 50 Mpts/Ch; 20 GS/s and 100 Mpts/Ch max. using 2 or 1 Ch	WaveMaster 8500A XXL
4 Ch; 3 GHz; 10 GS/s; 50 Mpts/Ch; 20 GS/s and 100 Mpts/Ch max. using 2 or 1 Ch	WaveMaster 8300A XXL

Included with Standard 8620A, 8420A, 8600A, 8500A, 8400A, and 8300A Configurations

- ProLink Adapter SMA; 4 each **(8620A, 8420A, 8600A, 8500A, 8400A)**
- ProLink Adapter BNC; 2 each **(8620A, 8420A, 8600A, 8500A, 8400A)**
- ProLink Adapter BNC; 5 each **(8300A)**
- Optical 3-button Wheel Mouse-USB
- Protective Front Cover
- Printed Operator's Manual
- Printed Getting Started Manual
- Printed Remote Control Manual
- Product Manual Set on CD-ROM
- Software Option Manual on CD-ROM
- Norton AntiVirus Software (1 year subscription)
- Microsoft Windows License Agreement
- Standard Commercial Calibration with Performance Certificate
- Power cable for the destination country
- 3-Year Warranty

Software Options

Advanced Math and WaveShape Analysis Software Packages	
Advanced Math Software Package	XMATH
Advanced Customization Software Package	XDEV
Processing Web Editor Software Package for Functions and Parameters	XWEB
Master Analysis Package (Includes JTA2, XMATH, XDEV)	XMAP
Digital Filter Software Package	DFP2
Jitter and Timing Analysis Software Package	JTA2
Advanced M1 Software Package for Jitter and Timing Measurements (1 seat)	LECROYM1/ADV-1
Advanced M1 Software Package for Jitter and Timing Measurements (4 seats)	LECROYM1/ADV-4
Basic M1 Software Package for Jitter and Timing Measurements (1 seat)	LECROYM1/BASIC

Software Options (continued)	Product Code
Communications Testing Software Packages	
Serial Data Mask Software Package	SDM
Ethernet Test Software Package	ENET
USB 2.0 Compliance Test Software Package	USB2
SAS I/II Solution Analysis Software Package	SDA-SAS
HDMI Compliance Test Software Package (Available Summer 2006)	SDA-HDMI
Application Specific Test and Analysis Packages	
PowerMeasure Analysis Software Package	PMA2
EMC Pulse Parameter Software Package	WM-EMC
8B/10B Decoding and Analysis Software Package	SDA-8B10B
Advanced Optical Recording Measurement Software Package	AORM
Disk Drive Measurement Software Package	DDM2

Hardware and Software Option

32 Digital Channel Oscilloscope Mixed Signal Option	MS-32-DSA

Probes Options and Accessories

2.5 GHz, 0.7 pF Active Probe (÷10), Small Form Factor	HFP2500
WaveLink 7.5 GHz Differential Probe with Adjustable Tip Module	D600A-AT*
WaveLink 7 GHz Differential Probe with Small Tip Module	D600ST*
WaveLink 4 GHz, 5 V Differential Probe with Small Tip Module	D350ST*
WaveLink 6 GHz, Differential Positioner with Mounted Tip Module	D500PT*
WaveLink ProLink Probe Body	WL600
7.5 GHz Low Capacitance Passive Probe 500/1000 Ω	PP066
1 GHz Active Differential Probe (÷1, ÷10, ÷20)	AP034
Optical-to-Electrical Converter, 500–870 nm ProLink BMA Connector	OE525
Optical-to-Electrical Converter, 950–1630 nm ProLink BMA Connector	OE555
1 MΩ Adapter includes PP005A Passive Probe	AP-1M

*For a complete probe, order a WL600 Probe Body with the Probe Tip Module

Hardware Options and Accessories

IEEE-488 GPIB Control Interface	GPIB-1
Dual Monitor Display	DMD-1
Keyboard, USB	KYBD-1
ProLink-to-BNC Adapter; 1 each	LPA-BNC
Kit of 4 ProLink BNC Adapters with Case	LPA-BNC-KIT
ProLink-to-SMA Adapter	LPA-SMA
Kit of 4 SMA ProLink Adapters with Case	LPA-SMA-KIT
Oscilloscope Cart with Additional Shelf and Drawer	OC1024
Oscilloscope Cart	OC1021
Rackmount Adapter with 25" (64 cm) Slides	RMA-25
Rackmount Adapter with 30" (76 cm) Slides	RMA-30
Video Trigger Module	VT75
Internal Graphics Printer	WM-GP02
Removable Hard Drive Package (includes USB, CD-ROM, Removable Hard Drive, and Spare Hard Drive)	WM-RHD
Additional Removable Hard Drive	WM-RHD-02
CD-ROM Read/Write Upgrade	WM-CDRW
Soft Carrying Case	WM-SCC
Hard Transit Case	WM-TC1
USB 2.0 Testing Compliance Test Fixture	TF-USB
Probe Deskew and Calibration Test Fixture	TF-DSQ

Customer Service

LeCroy oscilloscopes 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.

This warranty includes:

- No charge for return shipping • Long-term 7-year support
- Upgrade to latest software at no charge

LeCroy 1-800-5-LeCroy www.lecroy.com

Local sales offices are located throughout the world.
To find the most convenient one visit www.lecroy.com