W waveRunner ®

WaveRunner® *6000 Series*

6030
6050/6051
6100
6200

LEADING FEATURES

- **350 MHz, 500 MHz, 1 GHz and 2 GHz Bandwidths**
- **5 GS/s on All Channels (10 GS/s on 2 Ch for 6100 and 6200)**
- **1 Mpts on All Channels, Expandable to 12/24 Mpts**
- **Compact and Lightweight**
- **Easy User Interface**
- **New 2.5 mm Passive Probe**
- **Touch Screen Interface**
- **Vertical Controls for Each Channel**
- **USB 2.0 and 802.3xx LAN Ports**
- **Open Windows 2000**

Excellent Performance, Great Price, Easy to Use

LeCroy's WaveRunner 6000 Series is built to be the world's best everyday bench oscilloscope. It offers the best acquisition specifications, a user interface that makes it easy to perform the most common oscilloscope functions, industry-leading long term support and a "feel" that makes the oscilloscope a pleasure to drive.

For the first time, LeCroy has combined the type of high performance front amplifier, ADC, memory and triggering used in more expensive oscilloscopes and designed it all into a very affordable package. The WaveRunner 6000 Series also introduces a user interface that makes viewing and measuring signals simple and fast.

With the WaveRunner 6000 Series, all viewing controls and basic oscilloscope functions are easily at hand using front panel knobs. You get fast views and can zoom in to see details on the bright touch panel color screen. Or use the simple and intuitive controls to call up exactly the measurements you need.

The WaveRunner 6000 Series includes an industry-leading signal acquisition path, which provides a 5 GS/s ADC on every

channel (Model 6050 and above) and 1 Mbyte of standard memory. No need to worry about the undersampling or aliasing caused by slower ADCs or shorter memories on other oscilloscopes.

The WaveRunner 6000 Series comes standard with the new PP007 500 MHz passive probe (one per channel). This 2.5 mm high impedance probe offers excellent characteristics for probing everyday signals. LeCroy also offers a wide range of optional single-ended and differential active probes, current probes, optical to electrical (O/E) converters and differential amplifiers.

Lastly, we decided to architect the oscilloscope so that users could add just the functionality they want. There are options for testing power devices, serial data mask testing, jitter and timing analysis, and for a wide variety of probes, O/E converters and other application specific devices.

Altogether, the WaveRunner 6000 Series sets a new industry standard for high performance at low price in everyday bench oscilloscopes.

LeCroy

Vertical System

	WaveRunner 6030	WaveRunner 6050	WaveRunner 6051	WaveRunner 6100	WaveRunner 6200
Nominal Analog Bandwidth @ 50 Ω (-3 dB)	350 MHz	500 MHz	500 MHz	1 GHz	2 GHz
Rise Time (Typical)	1 ns	750 ps	750 ps	200 ps	225 ps
Input Channels	4	4	2	4	4
Bandwidth Limiters	25 MHz; 200 MHz				
Input Impedance	1MΩ//<20pF (10 MΩ // 9.5pF using PP007 probe)				
Input Coupling	50 Ω: DC, 1MΩ: AC, DC, GND				
Maximum Input Voltage, 50 Ohm	50 Ω: 5 Vrms, 1 MΩ: 250 V max (Peak AC: ≤ 10 kHz + DC)				
Channel to Channel Isolation	>40dB @ <100MHz (>30dB @ full bandwidth)				
Vertical Resolution	8 bits; up to 11 with enhanced resolution (ERES)				
Sensitivity	50 Ω: 2 mV/div – 1 V/div fully variable; 1 MΩ: 2 mV – 10 V/div fully variable				
DC Gain Accuracy	±1.0% of full scale (typical); ±1.5% full scale (warranted)				
Offset Range	50 Ω: ± 400 mV @ 2–4.99 mV/div ± 1.0 V @ 5–99 mV/div ± 10 V @ 100 V/div - 1V/div 1 MΩ: ± 500 mV @ 2–4.99 mV/div ± 1.0 V @ 5–99 mV/div ± 10 V @ 100 mV/div - 1V/div ± 100 V @ 1 - 10V/div				
Offset Accuracy	±(1.5% + 0.5% of offset value + 1 mV)				
Probing System	BNC or Probus				

Timebase System

Timebases	Internal timebase common to all input channels; an external clock may be applied at the auxiliary input				
Time/Division Range	20 ps/div – 10 s/div				
Math & Zoom Traces	4 independent zoom and 4 math/zoom traces standard; 8 math/zoom traces available with XMATH (Advanced Math package)				
Clock Accuracy	± 5 ppm @ 25° C (± 10ppm @ 5–40° C)				
Jitter Noise Floor	2 ps rms (typical, 5ps warranted) @ 100 mV/div				
Time Interval Accuracy	Clock Accuracy + Jitter Noise Floor				
Sample Rate & Delay Time Accuracy	Equal to Clock Accuracy				
Trigger & Interpolator Jitter (RMS)	≤ 3 ps rms (typical)				
Channel to Channel Deskew Range	±4.5 ns				
External Sample Clock	DC to 1 GHz; 50 Ω BNC input				
Roll Mode	Switches Automatically at t/div > .5 S/div or sample rate <20 ks/sec				

Acquisition System

Single-Shot Sample Rate/Ch	2.5 GS/s	5 GS/s			
Interleaved Sample Rate (2 Ch)	N/A			10 GS/s	
Random Interleaved Sampling (RIS)	200 GS/s				
Trigger Rate	125,000 waveforms/second				
Sequence Mode Acquisition	10,000 segments max. Trigger time recorded with each event.				
Sequence Time Stamp Resolution	1 ns				
Minimum time Between Sequential Segments	8 µs				
Acquisition Memory – Standard	1M (4Ch) / 2M (2Ch)		1M (2Ch) / 2M (1Ch)	1M (4Ch) / 2M (2Ch)	
Acquisition Memory – Option S	2M / 4M				
Acquisition Memory – Option M	4M / 8M				
Acquisition Memory – Option L	8M/16M				
Acquisition Memory – Option VL	12M/24M				

Acquisition Processing

Time Resolution (min, Single-shot)	200 ps (5 GS/s) [100 ps (10 GS/s)]				
Averaging	Summed and continuous averaging to 1 million sweeps				
ERES	From 8.5 to 11 bits vertical resolution				
Envelope (Extrema)	Envelope, floor, and roof for up to 1 million sweeps				
Interpolation	Linear, Sinx/x				

Trigger System

Trigger Modes	Normal, Auto, Single, Stop				
Sources	Any input channel, External, Ext/10, or Line; slope and level unique to each source				
Trigger Coupling	DC50 Ω, GND, DC1MΩ, AC1MΩ				
Pre-trigger delay	0–100% of memory size (adjustable in 1% increments, or 100 ns)				
Post-trigger delay	The smaller of 0 to 10,000 divisions or 86,400 seconds				
Hold-off	2 ns or 20 s or 1 to 99,999,999 events				
Internal trigger level range	±5 div from center				
Max trigger frequency	2 divisions at >750 MHz with Edge Trigger; 1 div at 750 MHz 750 MHz max with SMART Trigger @ ≥10 mV (subject to bandwidth limit of oscilloscope)				
Trigger Level DC Accuracy	±3% full scale ±2mV (typical)				
External trigger range	EXT/10 ±4V; EXT ±400mV				

Basic Triggers

Edge/Slope/Line	Triggers when signal meets slope (positive or negative) 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 25 ns and 20 s.				
Pattern	Logic combination (AND, NAND, OR, NOR) of 5 inputs (4 channels 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.				

waveRunner®   Specifications

SMART Triggers® with Exclusion Technology	WaveRunner 6030	WaveRunner 6050	WaveRunner 6051	WaveRunner 6100	WaveRunner 6200
Glitch & Pulse Width	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.				
Timeout (State/Edge Qualified)	Triggers on any source if a given state (or transition edge) has occurred on another source. Delay between sources is 10ns to 20 s, or 1 to 99,999,999 events.				
Exclusion Triggering	Trigger on intermittent faults by specifying the normal width or period.				

Automatic Setup

Auto Setup	Automatically sets timebase, trigger, and sensitivity to display a wide range
Vertical Find Scale	Automatically sets the vertical sensitivity and offset for the selected channels to display

Probes

Probes	One PP007 per channel standard; Optional passive and active probes available
Probe System; Probus	Automatically detects and supports a variety of compatible probes
Scale Factors	Automatically or manually selected, depending on probe used

Color Waveform Display

Type	Color 8.4" flat-panel TFT-LCD with high resolution touch screen
Resolution	SVGA; 800 x 600 pixels
Real Time Clock	Dates, hours, minutes, seconds displayed with waveform. Accurate to ±50ppm. SNTP support to synchronize to precision internet clocks.
Number of Traces	Display a maximum of 8 traces. Simultaneously display channel, zoom, memory, and math traces.
Grid Styles	Auto, Single, Dual, Quad, Octal, XY, Single + XY, Dual + XY
Waveform Styles	Sample dots joined or dots only

Analog Persistence Display

Analog & Color-Graded Persistence	Variable saturation levels; stores each trace's persistence data in memory.
Persistence Selections	Select analog, color, or three-dimensional.
Trace Selection	Activate persistence on all or any combination of traces.
Persistence	Aging Time Select from 500 ms to infinity.
Sweeps Displayed	All accumulated, or all accumulated with last trace highlighted.

Zoom Expansion Traces

	Display up to 4 Zoom and 4 Math/Zoom traces; 8 Math/Zoom traces available with XMAP (Master Analysis package) or XMATH (Advanced Math package).

CPU

Processor	Intel 2 GHz or better with MS Windows 2000 Platform.
Processing Memory	256 MB on Std & M option; 512 MB with L option & VL option

Internal Waveform Memory

	M1, M2, M3, M4 Internal Waveform Memory (store full-length waveform with 16 bits/data point) or store to any number of files limited only by data storage media

Setup Storage

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

Interface

Remote Control	Via Windows Automation, or via LeCroy Remote Command Set
GPIB Port (Optional)	Supports IEEE – 488.2
Ethernet Port	10/100Base-T Ethernet interface (RJ-45 connector)
USB Ports	5 USB ports (one on front of instrument) support Windows compatible devices
Extenal Monitor Port	Standard 15-pin D-Type SVGA-compatible DB-15; connect a second monitor to use dual-monitor display mode.
Parallel Port	1 standard
Serial Port	DB-9 COM1 port (not for remote oscilloscope control)

Auxiliary Input

Signal Types	Selected from External Trigger or External Clock input on front panel

General

Auto Calibration	Ensures specified DC and timing accuracy is maintained for 1 year minimum
Power	100-120 Vrms at 50/60/400 Hz; 200-240 Vrms at 50/60 Hz (Max voltage and frequency tolerance: ±10%); Installation Category: 300V CAT II; Max. Power Consumption: 400VA/400W

Environmental

Temperature: Operating	+5℃ to 40℃
Temperature: Non-Operating	-20℃ to +60℃
Humidity: Operating	5% to 80% RH (non-condensing) up to ±30℃, Upper limit derates to 50% RH (non-condensing) at 40℃
Humidity: Non-Operating	5% to 95% RH (non-condensing) as tested per MIL-PRF-28800F
Altitude: Operating	3,048m (10,000 ft) max at up to 25℃, derates to 610m (2,000 ft) at 40℃
Altitude: Non-Operating	12,190m (40,000 ft)
Vibration: Operating	Random vibration, 0.31 grms, 5 Hz, 15 minutes in each of three orthogonal axes

Environmental

Vibration: Non-Operating	Random vibration, 2.4 grms, 5 Hz to 500 Hz, 15 minutes in each of three orthogonal axes
Functional Shock	20 g peak, half sine, 11 ms pulse, 3 shocks (positive and negative) in each of three orthogonal axes, 18 shocks total

Physical

Dimensions (HWD)	211mm x 355mm x 363mm (excluding feet) 8.3" x 13.8" x 14.3"
Net Weight	10 kg (22 lb), excluding printer
Shipping Weight	less than 13.6 kg (30 lb)

Certifications

	CE Approved, UL and cUL listed; conforms to EN 61326-1, EN 61010-1, UL 3111-1, and CSA C22.2 No. 1010.1

Warranty and Service

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

WaveRunner 4-Channel Digital Oscilloscopes

2 GHz 5/10 GS/s 1/2 Mpts Standard, 4-Channel Color	WaveRunner 6200
1 GHz 5/10 GS/s 1/2 Mpts Standard, 4-Channel Color	WaveRunner 6100
500 MHz 5 GS/s 1/2 Mpts Standard, 4-Channel Color	WaveRunner 6050
500 MHz 5 GS/s 1/2 Mpts Standard, 2-Channel Color	WaveRunner 6051
350 MHz 2.5 GS/s 1/2 Mpts Standard, 4-Channel Color	WaveRunner 6030

Included with Standard Configuration

10:1 10 MΩ, 500 MHz BW Passive Probes – Qty 4 (2 with Waverunner 6051)	PP007
Operators Manual; Quick Reference Guide; CD-ROM with OM/RCM and Utility software and Recovery software	
Remote Control Manual	
Optical 3 button Wheel Mouse- USB	
Standard Ports; 10/100Base-T Ethernet, USB (5), Parallel, RS-232, SVGA Video out, Audio in/out	
Protective Front Cover	
Standard Commercial Calibration and Performance Certificate	
3 Year Warranty	

Memory Options

2 Mpts/Ch, 4 Mpts/Ch	S
4 Mpts/Ch, 8 Mpts/Ch	M
8 Mpts/Ch, 16 Mpts/Ch	L
12 Mpts/Ch, 24 Mpts/Ch	VL

Hardware Options

Internal Thermal Printer	WR6-GP
Removable HDD	WR6-RHD
CD-RW Upgrade	WR6-CDRW

WaveShape Analysis Packages

Jitter and Timing Analysis	WR6-JTA2
PowerMeasure Analysis	WR6-PMA2
Digital Filter Package	WR6-DFP2
Serial Mask Package	WR6-SDM
Ethernet Test Package (WaveRunner 6200 Only)	WR6-ENET
USB 2.0 Compliance Software (WaveRunner 6200 Only)	WR6-USB
Advanced Math Package	WR6-XMATH
Developers Customization Kit	WR6-XDEV
Norton Antivirus	WR6-NA
Master Analysis Package (XMATH + XDEV + JTA2)	WR6-XMAP

Selected Accessories

Passive Probe, 500 MHz	PP007-1
2.5 GHz Active Voltage Probe	HFP2500
1.5 GHz Active Voltage Probe	HFP1500
1 GHz Active Voltage Probe	HFP1000
500 MHz Differential Probe	AP033
1 GHz Differential Probe	AP034
1GHz Active FET Probe	AP020
500A, 2 MHz Current Probe	CP500
150A, 10 MHz Current Probe	CP150
15A, 50 MHz Current Probe	CP005
30A, 50 MHz Current Probe	AP015
100 MHz Differential Amp	DA1855A
Floppy Drive (External USB)	WR6-FLPY
Rackmount	WR6-RACK
Mini Keyboard	WR6-KBD
Soft Carrying Case	WR6-SOFT
Hard Transit Case	WR6-HARD
Accessory Pouch	WR6-POUCH
GPIB (External USB)	GPIB-USB
256 MB USB Memory Key	MEM-USB
Stylus Holder	STYLUS
Replacement Stylus	STY-RPL
Scope Cart	OC1021
Scope Cart	OC1024

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