LeCroy

waverunner™

Powerful Capability.
User Friendly.

1GHz Great Value

WAVERUNNER-2 OSCILLOSCOPES

1 GHz - 350 MHz Bandwidth
4 GS/s - 1 GS/s Sample Rate
8 Mpts - 100 kpts Record Length

LeCroy

Catch the New Wave
Easy as 1-2-3

***Waverunner-2* oscilloscopes provide all you need to quickly capture, view and analyze your signals — accurately and reliably:**

- **1 GHz– 350 MHz bandwidth**
- **1 – 4 GS/s max, single-shot sample rate**
- **50 GS/s for repetitive signals**
- **Up to 8 million data points to view signals**

From troubleshooting to timing analysis to production testing, the *Waverunner-2* scopes are uniquely qualified to meet your requirements — all at a great value!

Simple, Fast Access to Powerful Capabilities

Waverunner-2 scopes are the second generation of the popular Waverunner series. They bring you the power of LeCroy signal acquisition, viewing and analysis capabilities with simple one-button access. Using the new Wavepilot™ feature, it's easier than ever to capture, view and analyze long time duration, high-speed signals with high resolution for accurate, precise results.

Easy to Use

Waverunner-2 scopes are designed to get you up and running quickly. Their color-coded front panels and simple menu systems are easy to understand, so your focus is on the work and not the tool. Common tasks are automatic. Navigation is streamlined and intuitive. You'll easily master their powerful operations.

The Right Price

Waverunner-2 oscilloscopes raise the bar for capability and value — you get more for your money than with any other scope in this class. And because *Waverunner-2* scopes can be upgraded, you can extend their life to meet future needs.

Increase Your Productivity

The new *Wavepilot* and *QuickZoom* buttons make it simple to magnify, view, inspect or measure signal details, to perform automatic measurements on signals, and to graph measurements in frequency spectra, histogram, or trend format. With TrackView, you can track problems to the source. Additional signal analysis capabilities let you datalog, chain math functions and more. LeCroy's signal diagnostic and troubleshooting tools provide a complete solution for characterization, debug and signal analysis.

From Circuit to Scope

A variety of accessories are offered for effectively connecting the *Waverunner-2* to your circuit. The LeCroy HFP small, lightweight probes assure you high-bandwidth, low-capacitance connections to your circuit. In addition, five interchangeable probe tips are available for probing surface mount devices, circuit vias, IC leads and other difficult spots — making the HFP probes the best choice for probing high-frequency circuits. Current probes, differential probes and amplifiers are also available.

Waverunner-2 Color Digital Oscilloscopes

Model	Bandwidth	Channels	Sample Rate/Ch	Maximum Sample Rate	Acq. Memory per Ch/Max	Option M per Ch/max	Option L per Ch/max
LT584	1 GHz	Four	2 GS/s	4 GS/s	250 k/500 kpt	1/2 Mpts	4/8 Mpts
LT374	500 MHz	Four	2 GS/s	4 GS/s	250 k/500 kpt	1/2 Mpts	4/8 Mpts
LT372	500 MHz	Two	2 GS/s	4 GS/s	250 k/500 kpt	—	—
LT354	500 MHz	Four	1 GS/s	1 GS/s	250 k	1/1 Mpts	2/2 Mpts*
LT264	350 MHz	Four	1 GS/s	1 GS/s	100 k	1/1 Mpts	—
LT262	350 MHz	Two	1 GS/s	1 GS/s	100 k	—	—

* Option ML

Wavepilot with Insight
Expand Your Vision

From beginner to expert, it is now easier than ever to apply the power of the unique analysis tools available from LeCroy. The Wavepilot function provides simple access to powerful, easy-to-use signal analysis for real insight into problems.

Cursors

Press *Wavepilot* and select *CURSORS,* then turn the knob for manual adjustment and measurement between sections of your signal.

Measure

Select *MEASURE* to simultaneously display up to 26 parameters on the signal of your choice and quickly switch from trace to trace. The Measure dashboard is context-sensitive, so when you display a histogram, you will see statistical parameters.

Graph

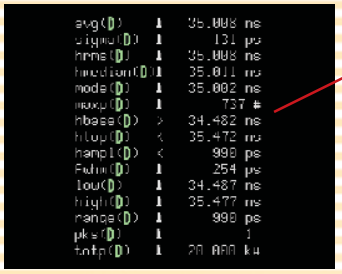
Select *GRAPH* to automatically display an FFT, histogram (optional) or TrackView (optional). Setting up signal analysis is simple with the Wavepilot menus.

Application Packages

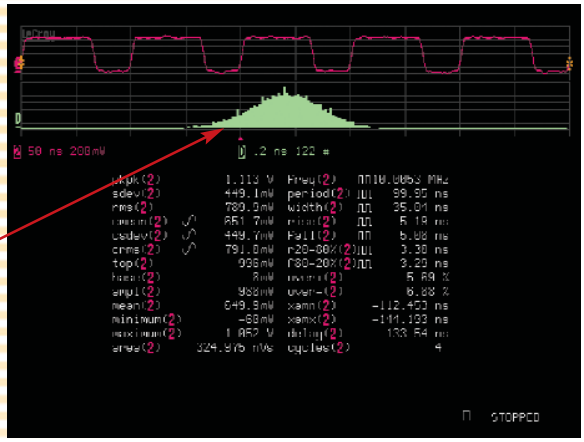
Select access to choose optional application-specific solution packages including Telecommunications Mask Test, Jitter and Timing, Power Measurements, and Data Storage solutions.

GRAPH — Histogram

Histograms and Trends (optional) are popular tools used to summarize measurement results. LeCroy has made them easier than ever with Wavepilot. Parameter selection is simple, and graphs are automatically set up, scaled and displayed.



Select Trace A: When viewing a Histogram trace, the Histogram parameters can be displayed instead of signal parameters.



Histogram with Signal Measurements

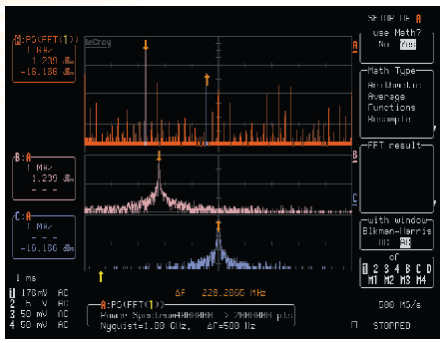
MEASURE is simple to activate from the Wavepilot toolbar. The *DASHBOARD* view displays up to 26 standard signal parameters. You can also select a set of custom parameters.

One-touch insight into any signal!

The Wavepilot function provides fast access to powerful signal analysis.

FFT Spectrum Analysis

When you need to understand the frequency content of your signal, spectrum analysis is easily accessed through the Wavepilot button.



Speed Up Debug and Analyze

UNIQUE

SMART Triggers®

The *Waverunner-2* scope's trigger bar is simple to operate. Run the scope in normal or auto trigger modes, or capture one-time events into scope memory as large as 8 Mpts with a single-shot trigger. Triggering with *Waverunner-2* is direct, easy to read and easy to understand.

SMART Trigger provides the flexibility needed to quickly trigger on the specific signal characteristic or pattern you are searching for. All *Waverunner-2* oscilloscopes include SMART Triggers. Trigger not only on what you expect but also on unusual signals. Exclusion triggers can exclude normal signals and capture only the abnormal ones, speeding up the debug of your circuits and systems. Trigger on signals down to 2 ns in width. The optional Advanced Trigger Package (ATP) extends *Waverunner-2*'s SMART Trigger capability by adding runt and slew rate trigger for the capture of intermittent events.

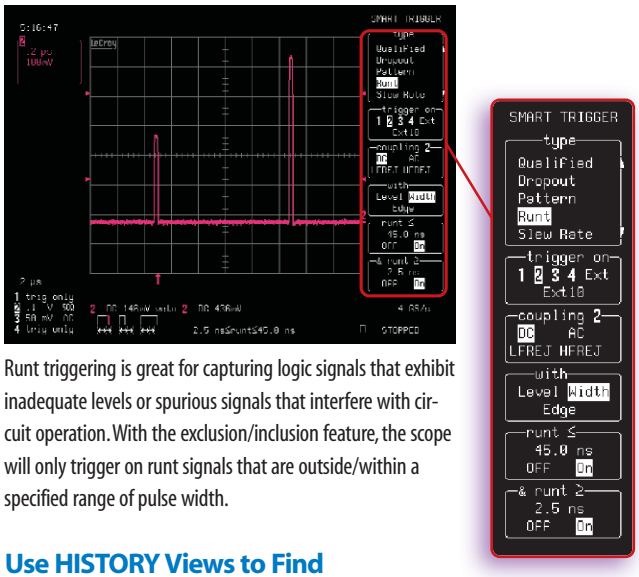
Waverunner-2 Basic Triggers

Name	Description
Edge	Select + or - slope and holdoff by time or events.
Window	Triggers when signal crosses outside the window in either direction.

Waverunner-2 SMART Triggers

Name	Triggers Conditions
Glitch	From 2 ns - 20 s and when pulse is >, <, or in or out of a range
Interval	Between edges and ranges of 10 ns - 20 s
Qualified	By edge or state on a channel or if a pattern is present or absent
Qual First	A single pulse qualifies a sequence of triggers.
Dropout	If input drops out after a time from 25 ns - 20 s
Runt*	Pulse levels, edge, widths from 2 ns - 20 s
Slew Rate*	Slope, dV, dT from 1 ns - 20 ns
Pattern (logic)	Logical combination of up to 5 inputs (3 on two-channel models). Can also be used in combination with Qualified.

* Optional Advanced Trigger Package (ATP)

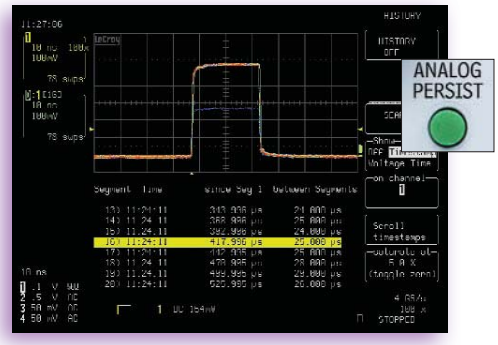


Runt triggering is great for capturing logic signals that exhibit inadequate levels or spurious signals that interfere with circuit operation. With the exclusion/inclusion feature, the scope will only trigger on runt signals that are outside/within a specified range of pulse width.

Use HISTORY Views to Find Intermittents

Pressing the green *Analog Persist* button and selecting *History* converts the scope into a fast Analog Persistence fault-finder. The lifetime of your signal is written into the History memory and mapped on screen. You can measure each signal, see its trigger time, and identify rare events. Up to 4,000 events can be acquired for playback. This is great when you have intermittent problems and want to know if they occur at a rate related to other circuit or system timing events.

Press "play" to replay the signal history and automatically scan and search from sweep to sweep. Stop when you see something of interest. The display shows the Analog Persistence view of all acquired sweeps as well as the individual sweep under inspection. Since the time of each trigger event is displayed with a resolution of 1 ns, you can easily determine the rate of occurrence.



HISTORY lets you see the intermittent Trigger on the problem, and find how often it's disrupting your design.

Probing Solutions

NEW

Active Probes

Convenient, Hands-Free Probing

To access the ever-increasing variety of test points, today's probing solutions need to be versatile, small and lightweight. The new HFP series of probes meets these needs with high bandwidth, miniature size and a variety of tip styles, making probing easier than before.

In combination with these innovative probe tips, the unique HFP *FreeHand* probe holder will hold the probe on test points to maintain signal fidelity. The end result of HFP "hands-free" probing is the enhanced ability to analyze waveforms instead of having to focus energy on keeping the probe itself in place.

AutoColor ID

When the probe is connected to a *Waverunner-2* scope, our new patent-pending AutoColor ID feature automatically senses and illuminates the probe head in that channel's trace color. You no longer need to worry about plastic rings or colored tape to identify which channel on the scope is connected to a particular test point.

HFP 1500
Leading Specifications

- 1.5 GHz Bandwidth
- 0.7 pF Input Capacitance
- 100 kΩ V DC Input Resistance
- ±8 V Dynamic Range
- 5 Interchangeable Tips available for Probing a Variety of Test Points
- Replaceable Probe Tip Socket
- Hands-Free Probing with ***FreeHand*** probe holder
- AutoColor ID Feature Matches the Probe Color to the Trace Color

Hands-free probing with *FreeHand* probe holder and HFP probe.

The new current probes, CP150 and CP015.

Current Probes

CP150 and CP015 are high-performance current probes capable of measuring 150 amp and 15 amp current signals. They incorporate Hall effect and transformer technology to measure both DC and AC currents. LeCroy also offers the best differential amplifiers available on the market, the DA1800 series.

Other useful accessories for the Waverunner-2 series are low-cost active differential probes, high voltage probes, an internal graphics printer and a choice of two scope carts.

Signal Measurements and Analysis

The new Wavepilot button and the Analysis Control Area provide quick access to a comprehensive, easy-to-use set of signal analysis tools that help you solve problems fast. Optional packages expand the *Waverunner-2* scope to a complete signal analyzer.

Standard in all models

Press *Wavepilot* and select the *Parameter Dashboard* and view up to 26 automatic measurements that update with your waveform — in real-time, on screen. Select *Graph* and view an FFT of a signal—up to 50 kpoints. Process signals with *Math Tools* including averaging to 1,000 sweeps to reduce noise or use enhanced resolution for up to 11 bits of vertical resolution. Chain up to 4 math functions and display the final waveform or any of the intermediate steps.

Extended Math and Measurements (EMM)

The *EMM* option provides basic graphical signal analysis tools including Histograms (200 events) and Trending of parameters (expanded to over 40). Additional *Math Tools* include signal integration and differentiation.

WaveAnalyzer with JTA (JTWA)

The WaveAnalyzer JTA option is the ultimate tool for characterization and troubleshooting in time, frequency, and statistical domains. It includes:

- WaveAnalyzer Signal Analysis (WAVA)
- Jitter and Timing Analysis (JTA)

WaveAnalyzer Signal Analysis (WAVA)

Waveform averaging capability increases to one million acquisitions. The FFT spectrum analysis expands to process all acquired data up to 8 Mpts and provides additional spectral views. *Histograms* (up to 2 billion events) and *Trends* let you view and measure statistical variations of signal parameters.

Jitter and Timing Analysis (JTA)

JTA has broad applications in measuring and analyzing digital electronics or mechanically related signals. Measure a wide variety of timing parameters: cycle-to-cycle, period, frequency, time interval and width. Use JitterTrack to plot the parameter variation vs. time.

Digital Filter Package (DFP)

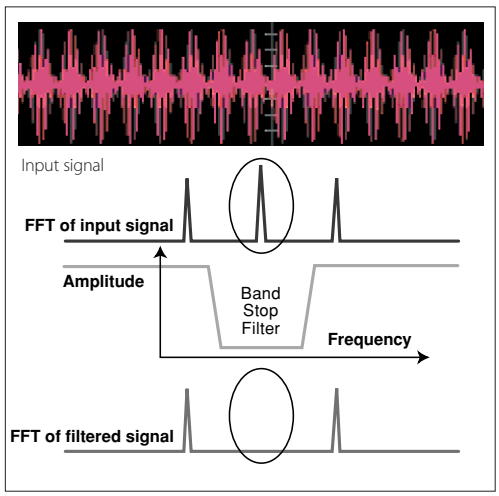
The DFP option implements a set of linear-phase Finite Impulse Response (FIR) filters. The package enhances your ability to examine important signal components by filtering out undesired spectral components such as noise.

Filters include:

Low Pass	*Raised Cosine*
High Pass	*Raised Root Cosine*
Band Pass	*Gaussian*
Band Stop	*Custom*

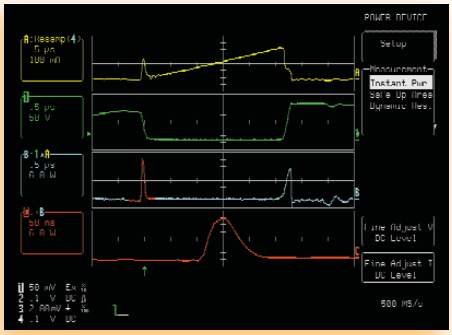
Up to 4 filters can be cascaded

Design your own filters with DFP



Powerful Applications

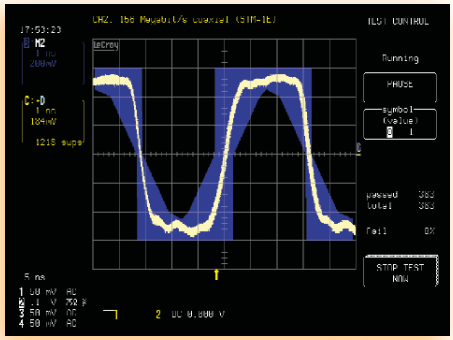
Here are four solution packages from LeCroy targeted to your specific test applications. You'll find that these packages will bring precise measurements and fast analysis to your workflow.



Current, voltage, instantaneous power and energy dissipation measurements.

World Class Power Measurement Solutions

With LeCroy PowerMeasure Systems, you can analyze power devices' performance while they are operating in circuit. The PowerMeasure System combines the required current and differential voltage measuring capability with unequalled DSO triggering, long record capture, and waveform math to make these difficult measurements as simple as the push of a very few buttons.

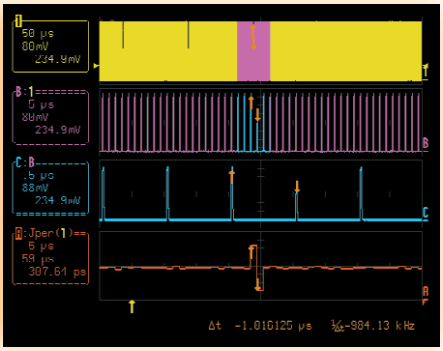


Mask Testing and extinction ratio measurements of a 156 Megabit/s coaxial (STM1-E)

Telecom Mask Test Packages

MT series Mask Testing options for electrical communications signals are available with *Waverunner-2* scopes. Mask Testing compares a trace against a mask template to check if it falls inside or outside the mask boundaries. Several actions may be initiated if the trace fails the test, including "stop", "output a pulse", and "datalog".

With the exclusive Finder Function, pulses, patterns or even random bit streams are easily isolated. MT packages take control of the Waverunner scope, displaying only relevant test menus.



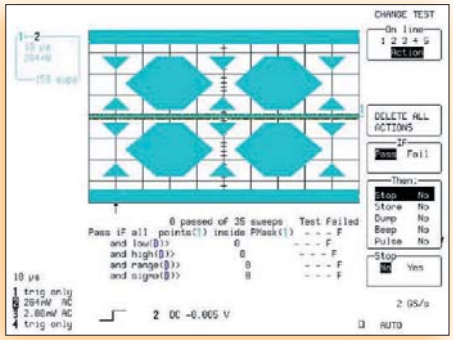
JitterTrack clearly shows timing variation as it tracks the signal cycle by cycle.

Jitter & Timing Analysis (JTA)

This analysis package provides a comprehensive set of precise timing measurements for clock, clock-to-data, and datastream analysis. TrackView shows deviations directly synchronized to the signal — patterns you would never see without this view. Press the *Wavepilot* button for easy access, and zoom in on both the "where" and the "why" of the problem; you can see it and fix it! Quickly gain insight into the source of timing and signal integrity problems.

PolyMask

PolyMask is a powerful, general-purpose testing application that lets you view and test against complex masks. PolyMask locates and clearly depicts signal failures. In pass/fail testing, failures are highlighted with colored circles. Creating masks is greatly simplified with the MaskMaker utility, a simple program that runs on any PC with Windows. Masks can be used in either normal or X-Y display mode (useful for applications such as power measurement.)



An Ethernet 100 Base-T mask created with the MaskMaker utility.

Windows Connectivity

Connect your scope to Windows-based ScopeExplorer using the Ethernet (option), GPIB or RS-232 interfaces. Click and drag files, or operate from the virtual front panel. Update your software via the web.

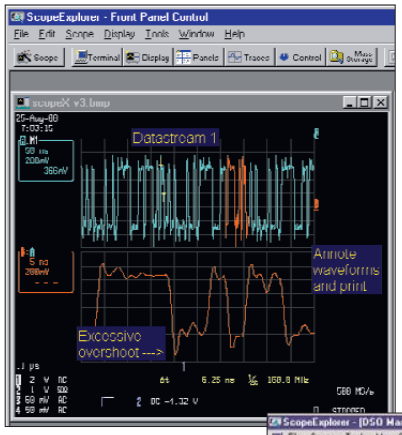
All it takes is a PC with Windows and a GPIB, RS-232-C, or the Ethernet option.

Windows Software to Enhance Your Productivity

ScopeExplorer and ActiveDSO are Windows (95, 98, 2000, or NT) PC-based connectivity tools that make it easy to interface your *Waverunner-2* scope with a PC via Ethernet, RS-232-C, or GPIB. It's easy to integrate scope data with Windows applications, as well as to control the *Waverunner-2* scope from your PC.

ScopeExplorer

Annotate and print screen shots, drag and drop files, save and load scope setup panels, and run CustomDSO applications. Click on the print icon to send the file to the printer of your choice.

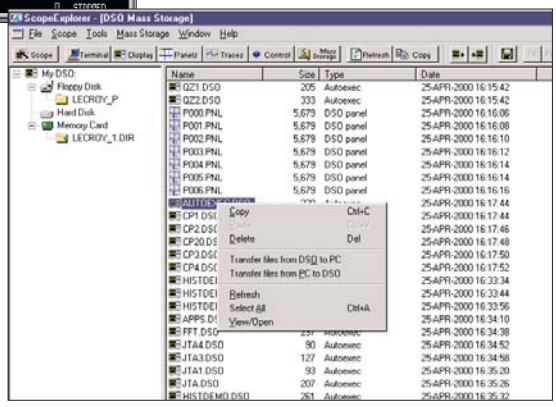


ScopeExplorer interactive front panel with familiar Windows PC operation.

Access files on storage media, including PC-Cards, hard drives, and diskettes inserted in a *Waverunner-2* scope.

ActiveDSO™

ActiveDSO is a LeCroy software utility for ActiveX control of LeCroy digital scopes.



ScopeExplorer provides access to the scope's storage media to view, edit, save, load, and run scope setup and CustomDSO applications.

Exchange *Waverunner-2* scope data with applications that support the ActiveX standard. Many applications (such as Excel, PowerPoint, Internet Explorer, Visual Basic, Visual C++ and Labview) allow users to incorporate ActiveX controls.

MaskMaker and DSO Filter

These easy-to-use Windows-based graphic utilities let you create and edit test masks and digital filters for use on *Waverunner-2* scopes. Use MaskMaker with the PolyMask tolerance mask-testing option. You can even create X-Y masks.

With the DSO-Filter PC utility and DFP (Digital Filter Package), you can specify a set of filter coefficients in an Excel spreadsheet and load them directly into the oscilloscope.

Waverunner-2 Oscilloscopes
Specifications

Vertical System	**LT584/M/L**	**LT374 / M / L**	**LT372**	**LT354/M/ML**	**LT264/M**	**LT262**
Input Channels	4	4	2	4	4	2
Analog Bandwidth @ 50 Ω (-3 dB)	1 GHz	500 MHz	500 MHz	500 MHz	350 MHz	350 MHz
Hardware Bandwidth Limits	20 MHz or 200 MHz					
Input Impedance	50 Ω ± 1%; 1 MΩ /12 pF typical (using PP006A probe)					
Input Coupling	1 MΩ: AC, DC, GND; 50 Ω: DC, GND					
Maximum Input	250 Vmax	50 Ω: 5 Vrms; 1 MΩ: 400 Vmax (peak AC ≤ 5 kHz + DC)				
Vertical Resolution	8 bits; up to 11 bits with enhanced resolution (ERES)					
Sensitivity (50 Ω or 1 MΩ)	2 mV – 5 V/div *	2 mV – 10 V/div fully variable				
DC Gain Accuracy	± (1.5% + 0.5% of full scale)					
Offset Accuracy (50 Ω or 1 MΩ)	± (1.5% + 0.5% of full scale + 1 mV)					
Offset Range	1 V – 5 V/div: ±100 V	2 mV – 99 mV/div: ±1 V 100 mV – 99 V/div: ±10 V 1 V – 10 V/div: ±100 V				
Isolation — Channel to Channel	>250:1 at <= 500MHz ; >100:1 at 1 GHz					
Timebase System						
Timebases	Main and up to four independent zoom traces simultaneously					
Ranges	← 500 ps/div – 1000 s/div → | ← 1 ns/div – 1000 s/div →					
Clock Accuracy	≤10 ppm					
Interpolator Resolution	5 ps					
External Clock Frequency	500 MHz maximum, 50 Ω, or 1 MΩ impedance					
Roll Mode – Operating Range	time/div 500 ms – 1000 s/div or sample rate <100 kS/s max					
External Timebase Clock	500 MHz maximum external sample clock input on front panel EXT BNC					
Acquisition System						
Single Shot Sample Rate						
1 Channel Max.	4 GS/s	4 GS/s	4 GS/s	—	1 GS/s	1 GS/s
2 Channels Max.	4 GS/s	4 GS/s	2 GS/s	—	1 GS/s	1 GS/s
3 – 4 Channels Max.	2 GS/s	2 GS/s	NA	1 GS/s	1 GS/s	NA
Maximum Acquisition Points/Ch						
1 Channel Max.	500k / 2M / 8M	500k / 2M / 8M	500k	—	100k / 1 M	100k
2 Channels Max.	500k / 2M / 8M	500k / 2M / 8M	250k	—	100k / 1 M	100k
3 – 4 Channels Max.	250k / 1M / 4M	250k / 1M / 4M	NA	250k / 1M / 2M	100k / 1 M	NA
Acquisition Modes						
Random Interleaved Sampling (RIS)	50 GS/s for repetitive signals: 500 ps/div – 1 µs/div					
Single Shot	For transient and repetitive signals: 1 ns/div – 1000 s/div					
Sequence						
LT262/264	2 – 400 segments					
LT354/372/374	2 – 1 000 segments					
LT584	2 – 1 000 segments					
Memory Option M, ML, or L	2 - 4 000 segments					
Intersegment Time	50 µsec max.					
Acquisition Processing						
Averaging	Summed averaging to 10^3 sweeps; continuous averaging with weighting range from 1:1 to 1:1023 (standard). Summed averaging up to 10^6 sweeps (optional with WAVA)					
Enhanced Resolution (ERES)	From 8.5 to 11 bits vertical resolution					
Envelope (Extrema)	Envelope, floor, roof for up to 10^6 sweep					

* 50 Ω: 2 mV – 1V/div ; 1 MΩ: 2 mV - 5 V/div fully variable

Triggering System

Modes	Normal, Auto, Single, and Stop
Sources	Any input channel, external, Ext/10 or line; slope, level, and coupling unique to each source (except line trigger) Inactive channels usable as trigger inputs.
Slope	Positive, Negative, Window
Coupling modes	DC, AC, HFREJ, LFREJ
AC Cutoff Frequency	7.5 Hz Typical
HFREJ, LFREJ	50 kHz typical
Pre-trigger delay	0 – 100% of horizontal time scale
Post-trigger delay	0 – 10 000 divisions
Hold off by time or events	Up to 20s or from 1 to 99 999 999 events
Internal trigger range	±5 div
Max trigger frequency	1 GHz (LT584), 500 MHz (LT354, LT374, LT372), 350 MHz (LT264, LT262)
External trigger input range	±0.5 (±5 V with Ext/10 selected)
Maximum ext. input @ 50 Ω	±5 V DC or 5 Vrms
Maximum ext. input @ 1 MΩ	400 Vmax (DC + peak AC < 5 kHz) (250 Vmax on LT584)

Automatic Setup

Auto Setup	Automatically sets timebase, trigger, and sensitivity to display a wide range of repetitive signals
Vertical Find	Automatically sets the vertical sensitivity and offset for the selected channels to display a waveform with maximum dynamic range

Probes

Model PP006A	10:1, 10 MΩ with auto-detect (one per channel)
Probe System: ProBus	Automatically detects and supports a wide variety of differential amplifiers; active, high-voltage, current, and differential probes
Scale Factors	Up to 12 automatically or manually selected

Color Waveform Display

Type	VGA color 8.4" flat-panel TFT-LCD
Resolution	VGA 640 x 480 pixels
Screen Saver	Display blanks after 10 minutes (when screen saver is "on")
Real Time Clock	Date, hours, minutes, and seconds displayed with waveform
Number of Traces	Display a maximum of eight traces. Simultaneously display channel, zoom, memory, and math traces.
Grid Styles	Single, Dual, Quad, Octal, XY, Single + XY, Dual + XY; Full Screen gives enlarged view of each style.
Intensity Controls	Separate intensity control for grids and waveforms
Waveform Styles	Sample dots joined or dots only — regular or bold sample point highlighting
Trace Overlap Display	Select opaque or transparent mode with automatic waveform overlap management.

Analog Persistence Display

Analog & Color-Graded Persistence	Variable saturation levels; stores each trace's persistence data in memory
Trace Selection	Activate Analog Persistence on a selected trace, top 2 traces, or all traces
Persistence Aging Time	Select from 500 ms to infinite
Trace Display	Opaque or transparent overlap
Sweeps Displayed	All accumulated or all accumulated with last trace highlighted

Zoom Expansion Traces

Display up to Four Zoom Traces	
Vertical Zoom	Up to 5X expansion, 50X with averaging
Horizontal Zoom	Expand to 2 pts/div, magnify to 50 000X
Auto Scroll	Automatically scan and display any zoom or math trace.

Rapid Signal Processing

Processor	Power PC
Processing Memory	Up to 128 Mbytes
Real Time Clock	Dates, hours, minutes, seconds, and time stamp trigger time to 1 ns resolution

Waverunner-2 Oscilloscopes
Specifications, Continued

Internal Waveform Memory

Waveform	M1, M2, M3, M4 (Store full-length waveforms with 16 bits/data point)
Zoom and Math	Four traces A, B, C, D with chained trace capability

Setup Storage

Front Panel and Instrument Status	Four non-volatile memories and floppy drive are standard. Hard drive and memory card are optional.

Interface

Remote Control	Full control of all front panel controls and internal functions via RS-232-C, GPIB, or Ethernet (optional)
RS-232-C	Asynchronous transfer rate of up to 115.2 kbaud
GPIB Port	Full control via IEEE – 4888.2; configurable as talker/listener for computer control and data transfer
Ethernet (optional)	10 Base-T Ethernet interface
Floppy Drive	Internal, DOS-format, 3.5" high-density
PC Card Slot (optional)	Supports memory and hard drive cards
External Monitor Port Standard	15-pin D-Type VGA-compatible
Centronics Port	Parallel printer interface
Internal Graphics Printer (optional)	Provides hard copy output in <10 seconds

Outputs

Calibrator Signal	500 Hz – 1 MHz square wave or DC level; Select from -1.0 to +1.0 into 1 MΩ, output on front panel test point and ground lug.
Control Signals	Rear Panel, TTL level, BNC output; Choice of trigger ready, trigger out, pass/fail status. (output resistance 300 Ω ± 10%)

Environmental and Safety

Operating Conditions	
Temperature	5 – 40 °C rated accuracy
	0 – 45 °C operating
	-20 – 60 °C non-operating
Humidity	80% max RH, non-condensing up to 35 °C; Derates to 50% max RH, non-condensing at 45 °C
Altitude	4 500 m (15 000 ft) max. up to 25 °C; Derates to 2 000 m (6 600 ft) at 45 °C
CE Approved	
EMC	EMC Directive 89/336/EEC; EN 61326-1 Emissions and Immunity
Safety	Low Voltage Directive 73/23/EEC; EN 61010-1 Product Safety (Installation Category II, Pollution Degree 2, Protection Class 1)
UL and cUL approved	UL Standard UL 3111-1 cUL Standard CSA C22.2 No. 1010-1

General

Auto Calibration	Ensures specified DC and timing accuracy is maintained for 1 year minimum
Auto Calibration time	< 500 ms
Power Requirements	90 – 132 VAC at 45 - 440 Hz 180 - 250 VAC at 45 - 66 Hz Automatic AC voltage selection Power Consumption: 150 – 250 VA depending on model
Battery Backup	Front panel settings retained for two years minimum
Warranty and Calibration	Three years; calibration recommended yearly

Physical Dimensions

Dimensions (HWD)	210 mm x 350 mm x 300 mm; 8.3" x 13.8" x 11.8" (height excludes feet)
Weight	18 lbs (8 kg)
Shipping Weight	27 lbs (12 kg)

Math Tools (Standard)

average (sum to 4 000 sweeps)
average (continuous weighted)
difference
enhanced resolution (to 11 bits)
envelope
FFT of 50 kpoint waveforms
floor
identity
negate
product
ratio
reciprocal (invert)
resample (deskew)
rescale (with units)
roof
sin x/x
sum

Simultaneously perform up to four math (signal) processing functions; traces can be chained together to perform math on math.

amplitude
area
base
cycle mean
cycle rms
cycles
delay
Δ delay
duty cycle
fall 90-10%
fall 80-20%
frequency
maximum
mean
minimum
+overshoot
–overshoot
peak-to-peak
period
phase
rise 10-90%
rise 20-80%
rms
sdev
top
width
xamn
xamx

Measure Tools (Standard)

Automated Measurements: Display any five parameters together with their average, high, low, and standard deviations.

Pass/Fail

Test any five parameters against selectable thresholds. Limit testing is performed using masks created on the scope or PC. Set up a pass or fail condition to initiate actions such as hard copy output, saving waveform to memory, GPIB SRQ, or pulse out.

Options

Extended Math and Measurement: Adds math and advanced measurements for all general purpose applications. Includes all standard math and measurement tools, plus the following tools:

Extended Math Tools

absolute value
differentiate
exp (base e)
exp (base 10)
log (base e)
log (base(10)
integrate
square
square root
trend (datalog)
Histogram (200 events)

Cursor Measurements

Type	Symbol	From	To
Relative time		First point on waveform	Any other point on waveform
Relative voltage		Select voltage level	Any other voltage level
Absolute time		Time and voltage relative	Ground and trigger
Absolute voltage		Voltage	Ground

Extended Measure Tools

cycle median
cycle std. deviation
Δ time @ level; % and volts
Δ time @ level from trigger
Δ time from clock to data + (setup time)
Δ time from clock to data - (hold time)
fall @ level; % and volts
first point
last point
number of points
median
rise @ level; % and volts
std. deviation
duration

WaveAnalyzer

Includes the Extended Math and Measure Tools as well as expanded capabilities for performing FFTs, averaging, histograms, and histogram parameters.

WaveAnalyzer Tools (Standard)

Histogram up to 2 billion events. Analyze with 18 histogram parameters
Summed averaging to 1 million sweeps
WaveAnalyzer FFT capability expands the basic FFT to include:
- FFT power averaging
- FFT power density, real, and imaginary
- FFT on all acquisition points

With WaveAnalyzer FFT you get maximum resolution at wide frequency spans.

Other Application Solutions

Jitter and Timing Analysis (JTA)
Digital Filter Package (DFP)
PowerMeasure Analysis (PMA1)
Communications Mask Testing (MT01/MT02)
Polymask Mask Testing (PMSK)
Advanced Optical Recording Measurements (AORM) for LT37X, 35X and 58X scopes
Disk Drive Measurements (DDM)
PRML Analysis (PRML)

Free Software Utilities

ScopeExplorer: Easy to use utility that provides a simple but powerful way to control your scope remotely over RS-232-C, GPIB, or Ethernet.
ActiveDSO: ActiveX controls for flexible windows applications programming with remote control.
MaskMaker: Create a tolerance test mask offline with this graphic tool.
DSO Filter: Specify a set of filter coefficients and load them into the scope.

Waverunner-2 Oscilloscopes
Specifications, Continued

Basic Triggers	
Edge/Slope/Window/Line	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 25 ns and 20 s.
Pattern	Logic combination of 5 inputs (3 on two-channel models); Each source can be high, low, or don't care. Trigger entering or exiting the pattern
TV-Video	Triggers selectable fields (1, 2, 4, or 8) for NTSC, PAL SECAM, or nonstandard video (up to 1500 lines)
SMART Triggers with Exclusion Technology	
Signal or Pattern Width	Triggers on glitches or on pulse widths selectable from <2.5 ns to 20 s or on intermittent faults.
Signal or Pattern Interval	Triggers on intervals selectable between 10 ns and 20 s.
Slew Rate*	Trigger on edge rates; select limits for dV, dt, and slope. Select edge limits between 2.5 ns and 20 s.
Runt*	Positive or negative runts defined by two voltage limits and two time limits. Select between 2.5 ns and 20 ns.
Hard Copy	
	Print Screen is activated by a front-panel button or remote control. Store screen image files or print to external printers including network printers and directories. Network printing and file access requires the LAN10BT Ethernet option.
Supported Printers	
B/W	LaserJet, DeskJet, Epson An optional, internal high-resolution graphics printer is also available for screen dumps; stripchart output formats capable of up to 200 cm/div.
Color	DeskJet 550C, Epson Stylus, Canon 200/600/800 series, HP7470 and HP7550
Hard copy Formats	TIFF b/w, TIFF color, BMP color, BMP compressed, and HPGL
Waveform Output	
	Store Waveforms to floppy disk or optional PC-Card Hard Drives and memory cards. Save any trace you choose and select Auto-Store to automatically store the waveform after each trigger.
Output Formats	The ASCII waveform output is compatible with spreadsheets, MATLAB, Mathcad, etc. Binary output is also available for reduced file size.
Documentation	
Included with Waverunner-2 Oscilloscopes:	Operators Manual — hard copy Remote Programming Manual — hard copy CD-ROM — PDF formatted manuals plus software utilities including ScopeExplorer, ActiveDSO, MaskMaker, DSO-Filter, and DSONet Print Gateway

* optional Advanced Trigger Package

Ordering Information

Waverunner-2 Digital Oscilloscopes	Product Code
1 GHz, 2 GS/s, 250 kpts/ch, 4 Channel Color	**LT584**
500 MHz, 2 GS/s, 250 kpts/ch, 4 Channel Color	LT374
500 MHz, 2 GS/s, 250 kpts/ch, 2 Channel Color	LT372
500 MHz, 1 GS/s, 250 kpts/ch, 4 Channel Color	LT354
350 MHz, 1 GS/s, 100 kpts/ch, 4 Channel Color	LT264
350 MHz, 1 GS/s, 100 kpts/ch, 2 Channel Color	LT262

Included with Standard Configuration	
10:1 10 MΩ Passive Probe (1 per channel)	PP006A
Operator's Manual, Quick Reference Guide, CD-ROM with OM/RCM PDF manuals, and utility software	WR2-OMCD-E
Operator's Manual	WR2-OM-E
Remote Control Manual	WR2-RCM-E
Floppy Disk Drive	
GPIB, RS-232-C, Centronics Parallel Port, VGA Video Output Port	
Protective Front Cover	
Performance Certificate	
Three-Year Warranty	

Memory Options	LT264	LT354	LT374	LT584
M: 1 Mpts/ch	•	•	•	•
ML: 2 Mpts/ch	N/A	•	N/A	N/A
L: 4 Mpts/ch	N/A	N/A	•	•

Hardware Options	
Internal Graphics Printer	GP02
10 Base-T Ethernet LAN option	LAN10BT
PC Card Slot	PCSLOT
PC Card Slot including 1 hard drive card and 1 memory card	PCMEDIA

Software Options	
Wave Analyzer Analysis Package	WAVA
Jitter Analysis and Wave Analyzer	JTWA
Extended Math and Measurement Package	EMM
ITU G.703 Fully Automated Mask Tester*	MT01
ANSI T1.102 Fully Automated Mask Tester*	MT02
Jitter and Timing Analysis Package	JTA
Digital Filter Package	DFP
Surface Map Analysis Package	SMAP
Disk Drive Measurements	DDM
Supplementary Disk Drive Measurements	PRML
Advanced Optical Recording Measurements**	AORM
Power Measure Analysis Software	PMA1
Advanced Trigger Package	ATP
PolyMask Mask Testing Software	PMSK

Selected Accessories	
1.5 GHz Active Probe	HFP 1500
1 GHz Active Probe	HFP 1000
Differential Probe	ADP300 series
Current Probe	CP and AP series
Differential Amplifiers	DA1800 series
50Ω to 75Ω Adapter	PP090
Oscilloscope Carts	OC1021, OC1024
Graphic Printer Paper/10 Rolls	GPR10

Service and Extended Warranties	
US NIST Standard Calibration	CCNIST
US Military Standard Calibration	CCMIL
Swiss OFMET Standard Calibration	CCOFMET
Five-Year Warranty at time of scope purchase	W5
Five-Year Warranty and NIST Calibration at time of scope purchase	T5

** Test Masks available are dependent upon oscilloscope bandwidth.*

*** option only for LT37X, LT35X and LT58X series*

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