

3. Specifications

3.1 Vertical

| | WS424 | WS422 | WS434 | WS432 | WS454 | WS452 |
|----------------------------------|--|-------|---------|-------|---------|-------|
| Bandwidth (at probe tip) | 200 MHz | | 350 MHz | | 500 MHz | |
| Rise Time (typical) | 1.75 ns | | 1 ns | | 750 ps | |
| Input Channels | 4 | 2 | 4 | 2 | 4 | 2 |
| Display | 10.4" Color flat-panel TFT-LCD, 800x600 SVGA, touch screen | | | | | |
| Sample Rate (single-shot) | 2 GS/s max (interleaved mode), 1 GS/s (all channels) | | | | | |
| Sample Rate (RIS mode) | 50 GS/s | | | | | |
| Standard Record Length | 500 kpts/Ch (interleaved mode), 250 kpts/Ch (all channels) | | | | | |
| Maximum Record Length (Optional) | 2 Mpts/Ch (interleaved mode), 1 Mpts/Ch (all channels) | | | | | |
| Standard Capture Time | up to 250 μ s at full sample rate | | | | | |
| Maximum Capture Time (Optional) | up to 1 ms at full sample rate | | | | | |
| Vertical Resolution | 8 bits | | | | | |
| Vertical Sensitivity | 1 mV/div - 10 V/div (1 M Ω); 1 mV/div - 2 V/div (50 Ω) | | | | | |
| Vertical (DC Gain) Accuracy | \pm (1.5% + 0.5% of full scale) | | | | | |
| BW Limit | 20 MHz 20 MHz, 200 MHz | | | | | |
| Maximum Input Voltage | \pm 400 Vpk (CAT I), \pm 300 Vpk (CAT II) | | | | | |
| Input Coupling | AC, DC, GND (AC for 1 M Ω only) | | | | | |
| Input Impedance | 1 M Ω /16 pF, or 50 Ω \pm 1%, | | | | | |
| Probing System | BNC or ProBus [®] | | | | | |
| Probes | One PP007 per channel (standard) | | | | | |
| Time/div Range | 1 ns - 1000 s/div 500 ps - 1000 s/div 200 ps - 1000 s/div | | | | | |
| Roll mode | from 200 ms/div - 1000 s/div | | | | | |
| Timebase Accuracy | 10 ppm | | | | | |

3.2 Triggering System

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| Trigger Modes | Normal, Auto, Single, and Stop |
| Sources | Any input channel, External, Ext/10, or line; slope and level unique to each source (except for line trigger) |
| Trigger Coupling | AC, DC, HF, HFRej, LFRej |
| Pre-trigger Delay | 0 – 100% of full scale |
| Post-trigger Delay | 0 – 10,000 divisions |
| Hold-off | 2 ns to 20 s or 1 to 99,999,999 events |
| Internal Trigger Level Range | \pm 5 div from center |
| External Trigger Range | EXT/10 \pm 5 V; EXT \pm 500 mV |
| External Trigger | Input Impedance 50 Ω , 1M Ω |

3.3 Standard Triggers

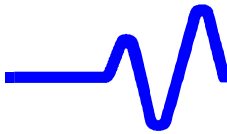
| | |
|--------------------|---|
| Edge | Triggers when signal meets slope (positive, negative, or Window) and level condition |
| Glitch | Triggers on positive or negative glitches with widths selectable from 2 ns to 20 s or on intermittent faults. Includes exclusion mode (trigger on intermittent faults by specifying the normal width period). |
| Width | Triggers on positive or negative glitches with widths selectable from 2 ns to 20 s or on intermittent faults. Includes exclusion mode (trigger on intermittent faults by specifying the normal width period). |
| Logic (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. |
| TV-Composite Video | Triggers selectable fields (1, 2, 4, or 8), Positive or Negative slope, for NTSC, PAL, SECAM, or non-standard video (up to 1500 lines) |

3.4 Optional SMART Triggers®

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| Runt | Trigger on positive or negative runts defined by two voltage limits and two time limits. Select between 2 ns and 20 ns. Includes exclusion mode (trigger on intermittent faults by specifying the normal width period). |
| Slew Rate | Trigger on edge rates. Select limits for dV, dt, and slope. Select edge limits between 2 ns and 20 ns. Includes exclusion mode (trigger on intermittent faults by specifying the normal width period). |
| Interval (Signal or Pattern) | Triggers on a source if a given state (or transition edge) has occurred on another source. Delay between sources is 2 ns to 20 s, or 1 to 99,999,999 events. Includes exclusion mode (trigger on intermittent faults by specifying the normal width period). |
| Dropout | Triggers if signal drops out for longer than selected time between 2 ns and 20 s. Includes exclusion mode (trigger on intermittent faults by specifying the normal width period). |
| Qualified (State or Edge) | Triggers on any input source only if a defined state or edge occurred on another input source. Delay between sources is 2 ns to 20 s, or 1 to 99,999,999 events. Includes exclusion mode (trigger on intermittent faults by specifying the normal width period). |

3.5 Documentation and Connectivity

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| Printing | Connect to any WindowsXP-compatible printer. Load any standard WindowsXP printer driver onto the unit as future needs require. |
| Email | Configure the unit to send an email of a screen image in a variety of formats using MAPI (i.e. through a default email program) or SMTP (no additional program needed). |
| Waveform Memories | Save waveform data as a reference trace to be compared to channels, zooms, or math functions. |
| Waveform File Data | Save waveform data in the following formats: Binary, ASCII, Excel, Mathcad, MATLAB. |
| Screen Image | Save a screen image to the internal hard drive, a user-supplied USB memory stick, or any other peripheral connected to one of the three USB 2.0 ports. Image can be saved in a variety of formats, and with white or black background. |
| Waveform Labeling (Annotation) | Attach up to 10 labels to any combination of waveforms. Labels appear on screen images. |
| Hardcopy Front Panel Button | Configure the front panel Hardcopy button to send an email, save a screen image, save waveform file data, and save to the clipboard. |
| Networking | Standard 10/100Base-T Ethernet interface (RJ-45 connector). Connect to any network using DHCP with automatically assigned IP address. |
| Remote Control | Via LeCroy Remote Command Set (via Ethernet) |
| USB Ports | 3 USB ports (one on front of instrument) support Windows compatible devices |
| External Monitor Port | Standard 15-pin D-Type female SVGA-compatible connector for external color |
| Parallel Port | 25-pin D-type female (Centronics) |
| Serial Port | 9-pin D-type male (not for remote oscilloscope control) |
| Audio Port | Mic Input, Line Input, Line Output |



3.6 Measure, Zoom, and Math Tools

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| Standard Parameter Measurement | 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, Rise Time (10%-90%), Rise Time (20%-80%), RMS, Skew, Standard Deviation, Top (High), Width. Measurements may be gated. |
| Zooming | Use front panel QuickZoom button, or use touch screen or mouse to draw a box around the zoom area. |
| Standard Math | Operators include Sum, Difference, Product, Ratio, and FFT (up to 25 kpts with power spectrum output and rectangular, VonHann, and FlatTop windows). 1 math function may be defined at a time. |
| Extended Math (MathSurfer Options) | Adds the following additional math functions: Absolute Value, Averaging (summed and continuous), Derivative, Envelope, Enhanced Resolution (to 11 bits), Floor, Integral, Invert, Reciprocal, Roof, Square, and Square Root. Also adds chaining of two math functions, and rescaling to different units. |

3.7 Automatic Setup

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| Auto Setup | Automatically sets timebase, trigger, and sensitivity to display a wide range of repetitive signals. |
| Vertical Find | Scale automatically sets the vertical sensitivity and offset for the selected channel. |
| Analog Persistence | When ON, persistence applied to all waveforms. Select analog or color-graded. Variable saturation level, with aging time selectable from 500 ms to infinity. |

3.8 Setup and Waveform Storage

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| Front Panel and Instrument Status | Save to the internal hard drive, over the network, or to a USB connected peripheral device. |
| Waveform Traces | Save to one of four internal memories with 16 bit resolution for recall/comparison. |
| Waveform Data | Save to the internal hard drive, over the network, or to a USB connected peripheral device. |

3.9 Outputs

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| Calibrator | 1 KHz square wave or DC level; Select from -1.0 to +1.0 into 1 M Ω , 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 \pm 10%) |

3.10 Environmental and Safety

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| Temperature (Operating) | +5 °C to +40 °C |
| Temperature (Non-Operating) | –20 °C to +60 °C |
| Humidity (Operating) | 5% to 80% relative humidity (non-condensing) at ≤ 30 °C. Upper limit derates to 55% 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 3048 m (10,000 ft) at up to 25 °C |
| Altitude (Non-Operating) | up to 12,190 m (40,000 ft) |
| Vibration (Operating) | Random vibration, 0.31 grms 5 Hz to 500 Hz, 15 minutes in each of three orthogonal axes |
| 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 |
| Certification | CE Approved, UL (Std. UL 3111-1) and cUL (Std. CSA C22.2 No. 1010-1) listed. EMC Directive 89/336/EEC; EN61326-1:1997+A1:1998+A2:2001. Low Voltage Directive 73/23/EEC; EN 61010-1:2001 Product Safety (Installation Category II, Pollution Degree 2, Protection Class 1) |

3.11 Physical Dimensions

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| Dimensions (HxWxD) | 260 mm x 340 mm x 152mm (10.25" x 13.4" x 6"). Excluding accessories and projections. |
| Net Weight | 6.8 kg (15 lbs). Excluding accessories. |

3.12 General

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| Power | (AC) 100–120 Vrms at 50/60/400 Hz; 200–240 Vrms at 50/60 Hz; Max. Power Consumption: 170 VA |
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3.13 Warranty & Calibration

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| Warranty | Three year warranty. |
| Calibration | Calibration recommended yearly. |