TELEDYNE LECROY
Everywhere**you**look™

WaveSurfer 3000
Getting Started Guide

TELEDYNE LECROY
Everywhere**you**look™

700 Chestnut Ridge Road
Chestnut Ridge, NY 10977

1.800.5.LECROY • teledynelecroy.com

WaveSurfer 3000
Getting Started Guide

Welcome

Thank you for buying a Teledyne LeCroy product. We're certain you'll be pleased with the detailed features so unique to our instruments.
This Getting Started Guide is designed to cover important safety and installation information for your oscilloscope, along with some basic operating procedures so you're quickly working with waveforms.

Contents

INTRODUCTION

WaveSurfer 3000

INTRODUCTION

About the WaveSurfer 3000 Oscillosocopes

WaveSurfer 3000 oscilloscopes feature an advanced user interface with touch screen simplicity to shorten debug time. Quickly identify and isolate anomalies with WaveScan, Fast Display, and History mode for faster troubleshooting; LabNotebook enables easy documentation and convenient collaboration. The advanced probe interface, upgradable bandwidth and multi-instrument capabilities provide maximum versatility and investment protection.

Mixed Signal Option

With embedded systems growing increasingly more complex, powerful mixed signal debug capabilities are an essential part of modern oscilloscopes. The 16 integrated digital channels and set of tools designed to view, measure and analyze analog and digital signals enable fast debugging of mixed signal designs. Flexible analog and digital cross-pattern triggering across all 20 channels provides the ability to quickly identify and isolate problems in an embedded system.

WaveSource Waveform Generator

The integrated WaveSource waveform generator provides a complete system testing solution with stimulus output of Sine, Square, Ramp, Pulse, and DC. High sample rate and resolution combined with low jitter and harmonic distortion mean versatile waveform generation. Create accurate and stable waveforms with high performance hardware.

WaveScan Search and Find

WaveScan® Search and Find allows you to search a single acquisition using more than 20 different criteria. Or, set up a scan condition and scan for an event over hours or even days.

History Mode

Never miss a waveform. History mode lets you scroll back in time to view previous waveforms and isolate anomalies. Use cursors and measurement parameters to quickly find the source of problems. History mode is always available with a single button press, no need for elaborate setup to enable this mode.

LabNotebook

With one press of a button, LabNotebook saves or restores displayed waveforms and instrument settings. Make additional measurements on restored waveforms days, months, or even years later using LabNotebook's Flashback Recall feature.

Specifications

Detailed specifications are maintained in the Datasheet on the product page at teledynelecroy.com.

Key Specifications	
Bandwidth	200 MHz – 500 MHz
Channels	2 or 4
Sample Rate (all channels)	2 GS/s
Memory (per channel)	10 Mpts/ch
Digital Channels	16
Digital Sample Rate	500 MS/s
Minimum Detectable Pulse Width	4 ns
Maximum Input Frequency	125 MHz

Materials List

Check that you have all the parts listed here. Contact Teledyne LeCroy immediately if any part is missing.

- 1 oscilloscope
- 2 or 4 passive probes (one for each channel)
- 1 Micro SD Card (installed)
- 1 AC power cord (rated for country)
- 1 protective front cover
- 1 Getting Started Guide
- 1 Oscilloscope Security Certificate
- 1 Oscilloscope Registration Card
- 1 Calibration Document
- 1 CE Certificate

General Safety Information

This section contains instructions that must be observed to keep the instrument operating in a correct and safe condition. You are required to follow generally accepted safety procedures in addition to the precautions specified in this section. **The overall safety of any system incorporating this instrument is the responsibility of the assembler of the system.**

Symbols
These symbols appear on the instrument's front or rear panels and in its documentation to alert you to important safety considerations.

⚠ **CAUTION** of damage to instrument, or **WARNING** of hazard to health. Attend to the accompanying information to protect against personal injury or damage. Do not proceed until conditions are fully understood and met.

⚡ **WARNING.** Risk of electric shock.

⏚ Measurement ground connection.

∿ Alternating Current.

⏻ On/Standby power.

Precautions

- **Use proper power cord.** Use only the power cord shipped with this instrument and certified for the country of use.

- **Maintain ground.** This product is grounded through the power cord grounding conductor. To avoid electric shock, connect only to a grounded mating outlet.

- **Connect and disconnect properly.** Do not connect/disconnect probes or test leads while they are connected to a voltage source.

- **Observe all terminal ratings.** Do not apply a voltage to any input (C1, C2, C3, C4, EXT or Dig) that exceeds the maximum rating of that input. Refer to the front of the oscilloscope for maximum input ratings.

- **Use only within operational environment listed.** Do not use in wet or explosive atmospheres.

- **Use indoors only.**

- **Keep product surfaces clean and dry.**

- **Do not block the cooling vents.** Leave a minimum six-inch gap between the instrument and the nearest object.

- **Do not remove the covers or inside parts.** Refer all maintenance to qualified service personnel.

- **Do not operate with suspected failures.** Inspect all parts regularly and do not use the product if any part is damaged. Cease operation immediately and sequester the instrument from inadvertent use.

Operational Environment

Temperature: 0° to 50° C
Humidity: Maximum relative humidity 90% for temperatures up to 31° C decreasing linearly to 50% relative humidity at 50° C
Altitudes: up to 3,048 m (at < 30° C)

Power and Ground Connections

The instrument operates from a single-phase, 100 to 240 Vrms (± 10%) AC power source at 50/60 Hz (± 5%), or a 100 to 120 Vrms (± 10%) AC power source at 400 Hz (± 5%). The instrument automatically adapts to the line voltage. Manual voltage selection is not required.

The AC inlet ground is connected directly to the frame of the instrument. For adequate protection again electric shock, connect to a mating outlet with a safety ground contact.

⚠ **WARNING.** Interrupting the protective conductor inside or outside the oscilloscope, or disconnecting the safety ground terminal, creates a hazardous situation. Intentional interruption is prohibited.

Maximum power consumption with all accessories installed (e.g., active probes, USB peripherals, digital leadsets) is 150 W (150 VA) for four-channel models and 100 W (100 VA) for two-channel models. Power consumption in standby mode is 4 W.

Cleaning

Clean only the exterior of the oscilloscope using a damp, soft cloth. Do not use harsh chemicals or abrasive elements. Under no circumstances submerge the instrument or allow moisture to penetrate it. Avoid electric shock by unplugging the power cord from the AC outlet before cleaning.

⚠ **CAUTION.** Do not attempt to clean internal parts.

Fuse Replacement

Disconnect the power cord before inspecting or replacing the fuse. Open the fuse holder (located at the rear of the instrument below the AC power inlet) using a small, flat-bladed screwdriver. Replace the old fuse with a new 5 x 20 mm T-rated 3.15 A/250 V fuse. Close the fuse holder before powering on.

⚠ **WARNING.** For continued fire protection at all line voltages, replace the fuse with one of the specified type and rating only. Always disconnect the power cord before replacing the fuse.

Support

Online Documentation

Teledyne LeCroy publishes a free Technical Library on its website. Manuals, tutorials, application notes, white papers, and videos are available to help you get the most out of your Teledyne LeCroy products.

The *WaveSurfer 3000 Oscillosocopes Operator's Manual* can be downloaded from **teledynelecroy.com/wavesurfer3000**. This .PDF document contains more extensive procedures for operating your oscilloscope than are found here.

The Datasheet published on the product page contains the detailed product specifications.

Technical Support

Registered users can contact their local Teledyne LeCroy service center at the number listed in this guide to make Technical Support requests by phone or email. You can also submit Technical Support requests via the website at **teledynelecroy.com/support/techhelp.**

SET UP

WaveSurfer 3000

The Front of Your Oscilloscope

A Touch Screen Display

B Front Panel

C WaveSource Waveform Generator Button

D Ground and Calibration Outut Terminals

E USB Ports

F Mixed Signal Interface

G Channel Inputs

H Power Button

I Rotating / Tilting Feet

The **touch screen display** is the principal viewing and control center of the oscilloscope. See "Touch Screen Display" for an overview of its components.

The **front panel** houses buttons and knobs that control different oscilloscope settings. Operate the instrument using front panel hard controls, display soft controls, or a mix of both that is convenient for you.

All front panel knobs have multiple modes of operation: pressing them invokes one action and turning them another. The labels below the knob tell you what happens when you "Push" instead of turn.

Front mounted host USB ports can be used for transferring data or connecting peripherals such as a mouse or keyboard.

The **mixed signal intereface** connects the digital leadset to input up-to-16 digital lines (with MSO option).

Ground and calibration output terminals are used to compensate passive probes.

Channel inputs 1–4 (or 1–2 depending on model) are signal inputs to the oscilloscope.

The **Power button** turns on/off the oscilloscope. See "Powering On/Off" for more information.

The **rotating, tilting feet** enable four different viewing positions.

The Back of Your Oscilloscope

A Built-in Carrying Handle

B **WaveSource** Waveform Generator output connector

C Kensington Lock

D Micro SD Card Slot

E **EXT TRIG** connector to input an external trigger signal

F **AUX OUT** connector to send device trigger enabled or trigger out signal to another device

G **VGA Video Output** for connecting to external monitors

H **Ethernet Port** for connecting to networks

I **USBTMC Port** for remote control

J **USB Ports** (2) for connecting external USB devices

K **AC Power Inlet** for the AC line cord

L Fuse Holder

Carrying

The oscilloscope's case contains a **built-in carrying handle**. Always unplug the instrument from the power source before lifting and carrying it.

Powering On/Off

Connect the line cord rated for your country to the AC power inlet on the back of the instrument, then plug it into a grounded AC power outlet. (see Power and Ground Connections in "General Safety Information").

The **Power button** controls the operational state of the oscilloscope. Press the button to switch on the instrument; the LED on the button lights to show the oscilloscope is on. Press it again to switch "off" (Standby power).

⚠ **CAUTION.** Do not power on or calibrate the oscilloscope with a signal attached.

Always use the Power button or the **File > Shutdown** menu option to execute a proper shut down process and preserve settings.

The Power button does not disconnect the oscilloscope from the AC power supply; some "housekeeping" circuitry continues to draw power. The only way to fully power down the instrument is unplug the AC line cord from the outlet.

⚠ **CAUTION**. Do not place the instrument so that it is difficult to reach the power cord in case you need to disconnect from power.

We recommend unplugging the instrument if it will remain unused for a long period of time.

Connecting

After start up, configure the connection on the oscilloscope using the menu options listed below. See the *WaveSurfer 3000 Oscilloscopes Operator's Manual* for more detailed instructions.

USB Peripherals
Connect the device to a USB port on the front or back of the instrument. Go to **Utilities > Utilities Setup > Hardcopy** to configure printer settings.

External Controller
Connect a USB-A/B cable from the USBTMC port on the back of the instrument to the controller. Go to **Utilities > Preference Setup > Remote** to configure remote control.

WaveSource Waveform Generator (to other device)
Connect a BNC cable from the WaveSource connector on the back of the instrument to the other device. Go to **Utilities > WaveSource** or touch the front panel WaveSource button to configure the output signal.

Other Auxiliary Device
Connect a BNC cable from Aux Out on the back of the instrument to the other device. Go to **Utilities > Utilities Setup > Aux Output** to configure the connection.

SET UP

LAN

WaveSurfer 3000 accepts DHCP network addressing. Connect a cable from either Ethernet port on the back panel to a network access device. Go to **Utilities > Utilities Setup > Remote** and select TCPIP to obtain a network connection and IP address. Go to **Utilities > Preference Setup > Email** to configure email settings.

External Monitor

WaveSurfer 3000 supports external monitors with 1028 x 600 resolution. Connect the monitor cable to the VGA video output on the back of the instrument. The connection is "plug-and-play" and does not require any further configuration on the oscilloscope. If necessary, configure the monitor to receive output.

Printer

WaveSurfer 3000 supports PictBridge-compliant printers. Connect the printer to any host USB port. The connection is "plug-and-play."

Micro SD Card

The Micro SD Card acts as the oscilloscope's removable hard drive. Use it to store and easily share setup files, waveform trace files, LabNotebook notebooks, and related data.

When using the oscilloscope Disk Utilities, the Micro SD Card appears as Storage Card, while a connected USB drive appears as USB Disk.

Probes

WaveSurfer 3000 oscilloscopes are compatible with the included passive probes and all Teledyne LeCroy ProBus active probes that are rated for the oscilloscope's bandwidth. Probe specifications and documentation are available at **teledynelecroy.com/wavesurfer3000**.

Digital Leadset

Available with the purchase of an MS probe, the digital leadset enables input of up-to-16 lines of digital data. Lines can be organized into two logical groups and can be named appropriately.

The digital leadset features two digital banks with separate threshold controls, making it possible to simultaneously view data from different logic families.

Each flying lead has a signal and a ground connection. A variety of ground extenders and flying ground leads are available for different probing needs. To achieve optimal signal integrity, connect the ground at the tip of the flying lead for each channel used in measurements. Use either the provided ground extenders or ground flying leads to make the ground connection.

To connect the leadset to the oscilloscope, push the connector into the mixed signal interface below the front panel until you hear a click.

To remove the leadset, press in and hold the buttons on each side of the connector, then pull out to release it.

Software Activation

The oscilloscope operating software (firmware and standard applications) is active upon delivery.

Demonstration Software
The oscilloscope is delivered with a 30-day trial license of the available option packages.

To try an option, go to Utilities > Utilities Setup > Options, choose the option from the list, and touch Activate Demo Key.

Purchasing Software Options
To purchase an option, contact your Teledyne LeCroy sales representative at the number listed in this guide. You will receive a license key via email that activates the optional features on the oscilloscope. To install the key:

1. Go to Utilities > Utilities Setup > Options.
2. Touch Add Key.
3. Enter the new license key and click OK.
4. Reboot the oscilloscope.

Firmware Updates

Free firmware updates are available periodically from the Teledyne LeCroy website at **teledynelecroy.com/support/softwaredownload.** Registered users will receive email notification when a new update is released. To download and install the update:

1. From a remote PC, visit our download page and click the link to Oscilloscope Downloads > Firmware Upgrades.
2. Select your oscilloscope series and model number.
3. Enter your registration login information, or create a new account.
4. Click the download link, and choose to Save the installer to a USB storage device.
5. Insert the USB device into one of the ports on the front of the oscilloscope.
6. Go to Utilities > Utilities Setup.
7. On the Utilities dialog, choose Update Firmware.
8. Browse to the installer file in the USB Disk folder, then select Upgrade.
9. When installation is complete, power cycle the instrument.

⚠ **CAUTION.** The installation may take several minutes, depending on the length of time since your last upgrade. Do not power down the oscilloscope at any point during the installation process.

USER INTERFACE

WaveSurfer 3000

Touch Screen Display

The entire display is a touch screen. Use your finger to touch, double-touch, touch-and-drag, or draw a selection box. Many controls that display information also work as "buttons" to access other functions. If you have a mouse installed, you can click anywhere you can touch to activate a control; in fact, you can alternate between clicking and touching, whichever is convenient.
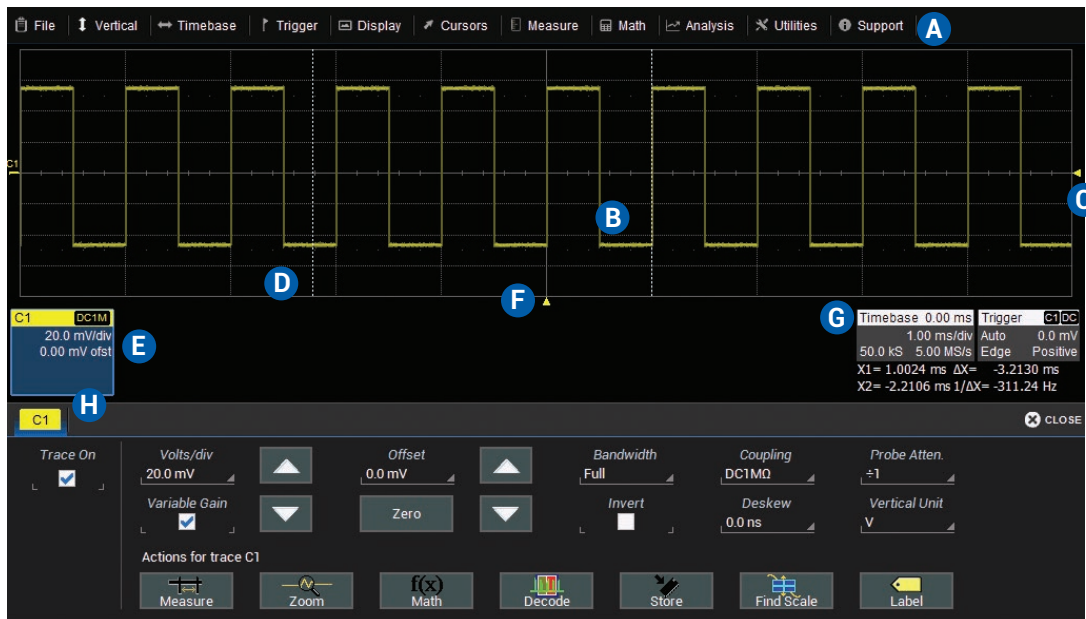
A Menu Bar

B Grid Area

C Trigger Level Indicator

D Cursor

E Channel Descriptor Box

F Trigger Position Indicator

G Timebase and Trigger Descriptor Boxes

H Dialog Tabs

A **menu bar** of drop-down menus lets you access set up dialogs and other functions. All functionality can be accessed through either the menu bar or other shortcuts.

The **grid area** displays the waveform traces. You can adjust the brightness of the grid lines to make other objects more visible.

Trigger level (vertical axis) and **trigger position** (horizontal axis) indicators appear on the grid when a trigger is set, color-coded to match the input.

Cursors show where measurement points have been set. Touch-and-drag cursor indicators to quickly reposition the measurement point.

Channel (C1-C4), Zoom (Z1-Z4), Math (F1-F2), Memory (M1-M2), and Digital (Digital1-Digital2, with MSO option) **descriptor boxes** appear immediately below the grid and summarize current settings for each open trace. Touch the descriptor box to open the corresponding set up dialog.

Timebase and Trigger descriptor boxes appear at the right of the display. Timebase and Trigger settings only apply to channel traces. Touch the descriptor box to open the corresponding set up dialog.

Dialogs appear at the bottom of the display for entering set up data. The top dialog will be the main entry point for the selected function.

For convenience, related dialogs appear as a series of tabs behind the main dialog. Touch the tab to open the dialog
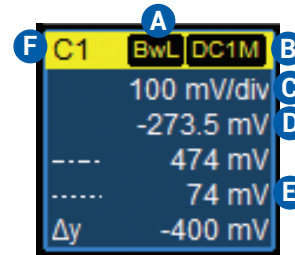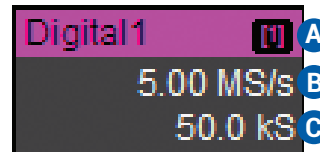
Timebase Descriptor Box
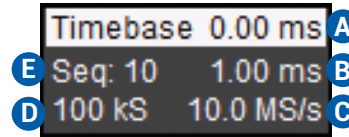
A Trigger Delay (Position)
B Time/div
C Sample Rate
D # Samples
E Sampling Mode
   (blank when in real-time mode)

Channel Descriptor Box

A Pre-Processing Summary Listing (summarizes changes from default states)
B Coupling
C Gain Setting
D Offset Setting
E Cursor Positions
F Channel Abbreviation

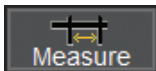**Digital Descriptor Box**
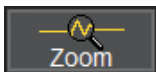
A # Digital Lines in Group
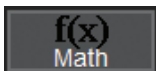B Digital Sample Rate
C Digital Memory

Shortcut Toolbar

These buttons on the main Channel, Math, and Memory dialogs offer shortcuts to useful functions so that you don't have to leave the underlying dialog. They always apply to the active (highlighted) trace.
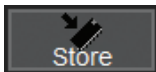
Measure	Apply up-to-six measurement parameters.
Zoom	Display a zoom of the trace.
f(x) Math	Apply up-to-two math functions.
Decode	Open decoder software (installed option required, else disabled)
Store	Copy the active trace to a memory trace (e.g., copy C2 to M2).
Find Scale	Scale the waveform to fit the grid.
Label	Apply a custom label to a waveform.

Context Menu

Touching a trace opens a context menu of actions that can be applied to that trace, such as create math function, apply measurements or label.
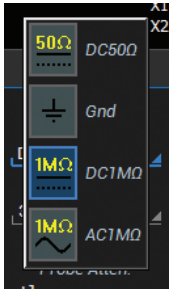

Language Selection

To change the language that appears on the display, go to **Utilities > Preference Setup > Preferences** and make your **Language** selection. The oscilloscope software must be restarted after the language is selected.
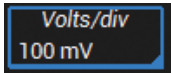
Entering/Selecting Data

Touch & Type

Touching once activates a control. In some cases, you'll immediately see a pop-up menu of options. Touch one to select it.

On some pop-up menus, options can be displayed as a **list** or as **icons**. Touch the respective button to change the appearance.

In other cases, data entry fields appear highlighted on the display. When a data entry field is highlighted (as shown here), it is active and can be modified by using the front panel Adjust knob.

If you have a keyboard installed, you can type your entry in the active field. Or, you can touch again, then select your entry from the pop-up menu or keypad.

You'll see a pop-up keypad when you double-touch a numerical data entry field. Touch the soft keys to use it exactly as you would a calculator. When you touch OK, the value is entered in the field.

Touch & Drag

Touch-and-drag waveforms, cursors and trigger indicators to reposition them on the grid; this is the same as setting the values on the dialog. Quickly zoom areas of the grid by touching and dragging to draw a selection box around a portion of the trace.

USER INTERFACE

Front Panel

Most of the front panel controls duplicate functionality available through the touch screen display. They are covered in more detail in the Basics section and in the *WaveSurfer 3000 Oscilloscopes Operator's Manual*. Below are a few useful front panel controls.

Shortcut buttons arranged across the top of the front panel give quick access to commonly used functions.

The **Print button** captures the entire screen and handles it according to your Hardcopy settings (e.g., print, email, or save to file), or creates a Notebook Entry in LabNotebook if configured for it.

The **Touch Screen button** enables or disables touch screen functionality.

Other shortcut buttons arranged across the bottom open special applications.

All of the knobs on the front panel function one way if turned and another if pushed like a button. The top label describes the knob's principal "turn" action, and the bottom label describes its "push" action.

Front panel buttons light up to indicate which functions and traces are active.

The **Adjust knob** changes the value in any highlighted data entry field when turned. Pushing the Adjust knob toggles between coarse (large increment) or fine (small increment) adjustments when the knob is turned.

The **Intensity button** sets the Adjust knob to control the waveform trace intensity. When more data is available than can actually be displayed, the Intensity button helps to visualize significant events by applying an algorithm that dims less frequently occurring samples.

With Intensity 100%
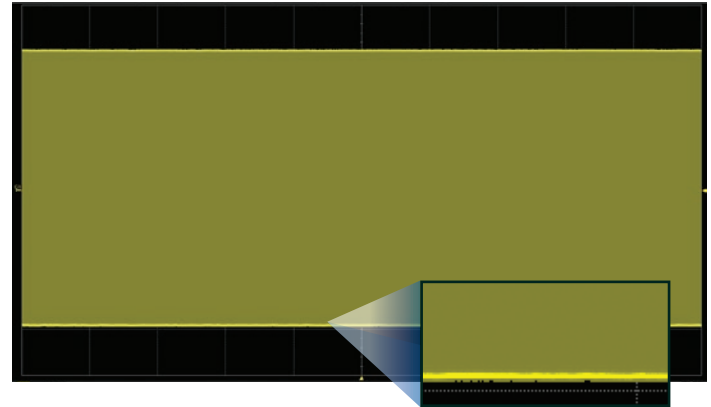
With Intensity 40%

BASICS

WaveSurfer 3000

Turning On/Off Traces

From the Front Panel
Press the corresponding **Channel button (1–4)** to turn on a trace and make it active. To turn off an active trace, press the button again.

A trace (waveform pattern) appears on the grid with a color-coded Channel descriptor box below it. This box always displays the current settings for the trace and is labeled C1–C4.

To open digital traces (MSO option only), press the **Dig button**. Digital trace descriptors are labeled Digital1-Digital2.

From the Display
Choose **Vertical > Channel<#> Setup** to turn on the trace and make it active. To turn off the trace, touch the descriptor box, then clear the Trace On checkbox on the Channel dialog.

For digital traces, choose **Vertical > Digital<#> Setup**. Turn off the trace by clearing the Group checkbox.

Zoom, Math, and Memory Traces
In addition to the channel and digital traces, you can view a zoom (close-up portion) of a trace (Z1-Z4), a trace previously stored to the oscilloscope's memory (M1-M2), or a trace that displays the result of a math function applied to one or more source traces (F1-F2). The quickest way to turn on these traces is to use the front panel **Zoom**, **Math**, and **Memory buttons**, which open the corresponding trace setup dialogs. Adjust a trace individually by touching its descriptor box and changing dialog settings.

If multiple channel traces are open and you press Zoom, zoom traces are created for each channel.

Active vs. Inactive Trace
A highlighted descriptor box indicates the "active" trace, and all display and front panel actions will apply to that trace until another is selected. This is true for all traces, regardless of the type. Although several traces may be open and appear on the grid, only one at a time is active.
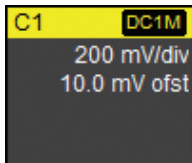
Inactive. *Controls will not work for this trace.*
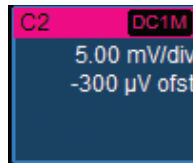
Active. *Controls will work for this trace.*

Also, the front panel Channel buttons (1-4) and the Dig, Mem, Zoom, and Math buttons will light to indicate the active trace.

Viewing Multiple Traces
By default, the oscilloscope has **Auto Grid** enabled. This divides the screen into a maximum of three grids, one each for channels/memories, math functions, and zooms. All traces of the same type appear on a single grid.

Two special grid layouts are available: **XY Grid**, which puts the oscilloscope in XY mode, and **XY Single Grid**, which creates one XY grid and one single grid for the rest of your traces.

Vertical

These controls adjust the channel trace along the Y axis.

From the Front Panel

A Press to activate analog trace.

B Turn to raise or lower Offset (analog) or Vertical Position (digital). Push to return to zero.

C Turn to raise or lower Vertical Scale (analog) or Group Height (digital). Push to adjust with more precision.

D Press to activate digital trace (MSO option only).

Analog Traces From the Display

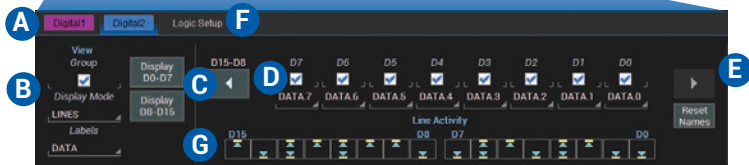Touch to activate the trace and again to open the Channel dialog.
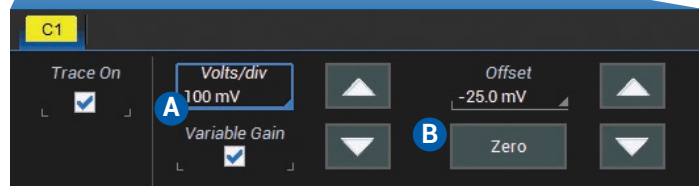
A Touch any control to change the value.

**B** Use the Up/Down buttons to change Vertical Scale or Offset.

Digital Traces From the Display

Touch to activate the digital trace and again to open the Digital dialog.

A Touch tab to choose digital group (1-2).

B Choose to display individual digital lines, bus trace or both.

C Touch arrows to switch between banks 0-7 and 8-15.

D Touch checkbox to select the lines in the group.

E Enter Vertical Position (top of lowest bit relative to center) and Group Height (vertical space occupied by group) in divisions.

F Touch to open Logic Setup dialog.

G Watch Line Activity Indicators instead of line traces to quickly see the state of each digital line.
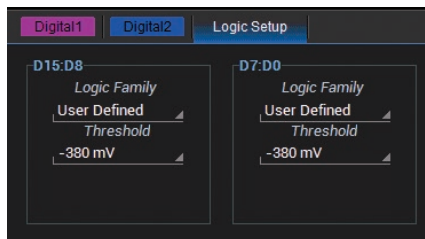
Choose a standard Logic Family, or enter custom values for Threshold. Separate controls allow you to set different values for each bank.
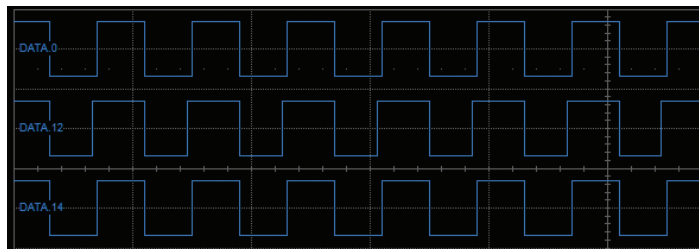
Line trace shows high, low and transition points for each line.
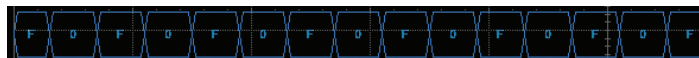
Bus trace collapses lines into hex values.

Line Activity Indicators

High   Low   Transitioning

Horizontal (Timebase)

These controls adjust the trace along the X axis.

From the Front Panel
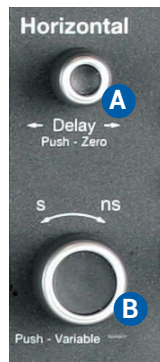
A Turn to raise or lower trigger Delay. Push to return Delay to zero.

B Turn to raise or lower Horizontal Scale (Time/div). Push to adjust scale with more precision on math, memory, or zoom traces.

From the Display
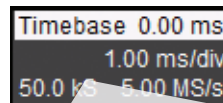
Touch to open the Timebase dialog.

A Touch to select a Sampling Mode.

B Use the Up/Down buttons to change Time/Division.

C Enter a Delay or use the button to Set To Zero.

Triggers

Triggers tell the oscilloscope when to perform an acquisition. Available trigger types are described at more length in the *WaveSurfer 3000 Oscilloscopes Operator's Manual.*

From the Front Panel

A Opens the Trigger dialog.

B Stops the oscilloscope from acquiring data.
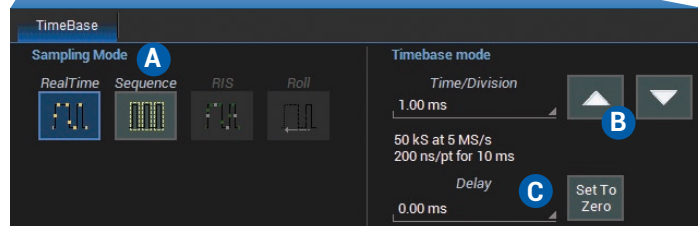
C Triggers once (single-shot acquisition) when all conditions are met.

D Triggers repeatedly whenever all conditions are met.

E Same as Normal when there is a valid trigger; triggers after a preset period when there is no valid trigger.

F Turn to change Trigger Level (V). Push to automatically find the level.

G Lights up when a trigger is armed.

H Lights up when a trigger has fired.

From the Display

Touch to open Trigger dialog.
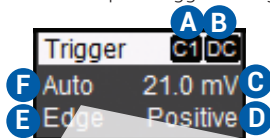
A Trigger Source

B Trigger Coupling

C Trigger Level

D Trigger Slope

E Trigger Type

F Trigger Status
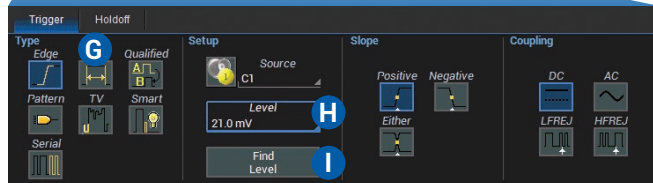
G Touch to choose trigger Type.

H Touch to set Trigger Level (V).

I Touch to let the software automatically find trigger level based on the input signal.

Trigger Indicators

Level Indicator

Position Indicator

Pre/Post-Trigger Indicator appears at the edge of the grid when trigger point is no-longer visible.

Cursors

Cursors set measurement points on a trace. There are five preset cursor types, each with a unique appearance on the display. These are described in more detail in the *WaveSurfer 3000 Oscilloscopes Operator's Manual*.

From the Front Panel
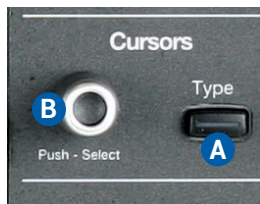
A Press to apply cursor. Continue pressing to cycle through all cursor types.

B Turn to adjust cursor position. Push to select different cursor lines to adjust.

From the Display
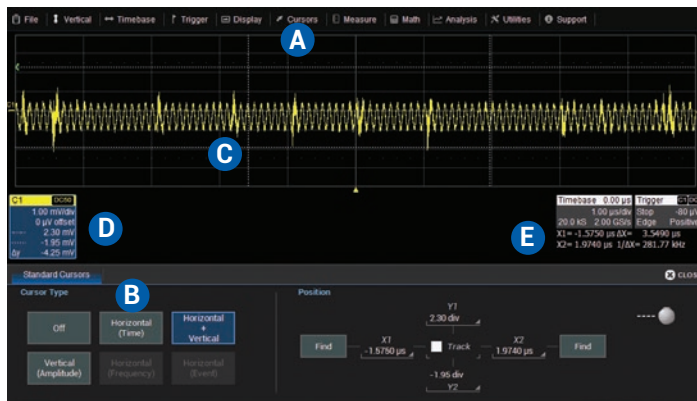
A Choose Cursor > Cursor Setup to open the Cursor dialog.

B Touch to choose Cursor Type.

C Touch-and-drag cursor line to reposition cursor.

D Vertical Cursor readout appears on descriptor boxes.

E Horizontal Cursor readout appears below Timebase.

Zoom

Zoom traces display a close-up portion of a channel trace.

From the Front Panel

Press the Zoom button.

Zoom trace opens for every channel trace. The un-zoomed portion of the original trace is shaded (grey), so that the zoomed portion is more visible.
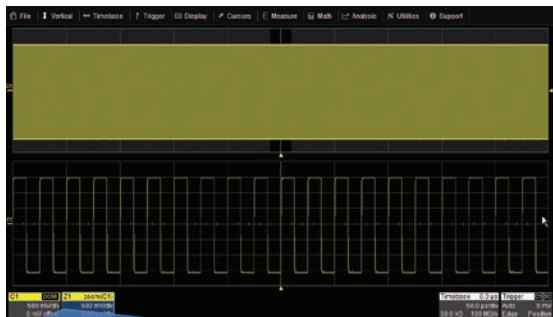
Use Horizontal knobs to adjust Time/div.

From the Display
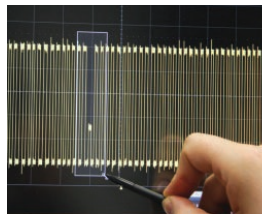
Draw a zoom box on a portion of a Channel trace.

Repeat on another section to reposition the zoom trace.

OR
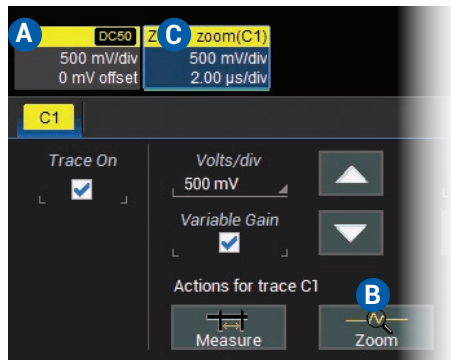
A Touch Channel descriptor box to activate the trace.

B Touch the Zoom shortcut button.

C Touch Zoom descriptor to open the Zoom dialog and adjust scale.

Math

Math traces display the result of applying a mathematical function (e.g., FFT) to one or more channel traces. One important distinction between math functions and measurement parameters is that the result of math is always another waveform, whereas the result of measurement is a number.

A Choose Math > Math Setup or press front panel Math button to open Math dialog.

B Select an existing function (F1-F2) to turn it on. Math trace opens in separate grid.

C Touch F<#> tab to set up or change a function. (Deselect Trace On to close trace.)

D Choose Source channel and math Operator (function).

E Math descriptor box shows math scaling. Touch to re-open F<#> tab if closed.

Measurements & Statistics

Measurements are waveform parameters that can be expressed as numerical values, such as amplitude or frequency. You can set up-to-six simultaneous measurements on one or more channel traces and view the active readout in a table. Statistical measurements can be added to the table of parameter values. You can also view measurements as a histicon, a miniature histogram, or open a second grid showing the trend, a plot of the values showing how the measurement has changed over time. Measurements gates can be used to only perform measurements on a specific portion of the waveform.

A Choose Measure > Measure Setup to open the Measure dialog.

B Touch Measure cell to re-open Measure dialog if closed.

C Readout of parameter values.

D Touch to show/hide table of parameter values.

E Touch to choose parameter.

F Touch to choose source channel.

G Touch to set measurement gates.

H Select to display histicons.

I Select to add statistics to the table.

Memories (Reference Waveforms)

Memories are traces stored for reference. They can be recalled to the display for comparison with other traces. A memory can be zoomed or measured for better analysis of historical data. You can store up-to-two internal memories (M1-M2). After that, new memories will overwrite previously stored data.

Internal memories only persist until the oscilloscope is rebooted. To store memories indefinitely, save them to an external file by choosing File > Save Waveform. The file can then be recalled into one of the two internal memories for viewing by choosing File > Recall Waveform. Only memory files saved with the extension .trc can be recalled.

Press the front panel Mem(ory) button to open the Memory dialog.
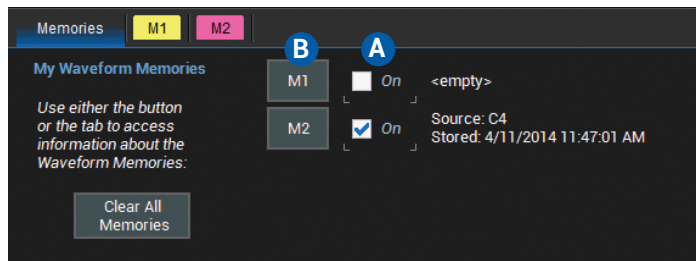
A   To turn on stored memory, check On next to M1-M2.

B   To store new memory, touch M1-M2 button or tab.
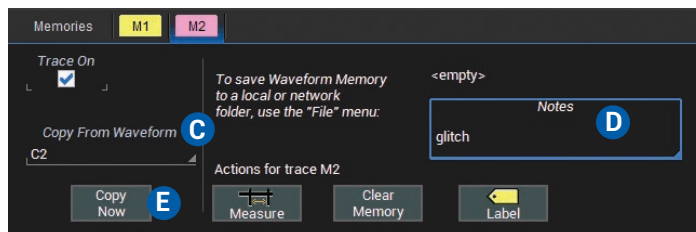
C   Select source trace in Copy From Waveform.

D   Add notes describing contents of memory.

E   Touch to copy to internal memory.

WaveSource

The WaveSource Waveform Generator allows you to output sine, square, triangle, pulse, DC and noise waveforms from the WaveSurfer 3000.

Connect a BNC cable from the WaveSource output on the back of the oscilloscope to the input device.

From the Front Panel
Press the WaveSource button.

From the Display
Choose Utilities > WaveSource.

A   Select a waveform type.

B   Choose setup group (e.g., Frequency *or* Period, Amplitude *or* Level).

C   To adjust a parameter, select it and turn the Front Panel Adjust knob or type a new value.

Serial Trigger and Decode Options

Serial trigger and decode options provide added insight when debugging serial data standards. For the most up to date list, go to: **teledynelecroy.com/serialdata.**
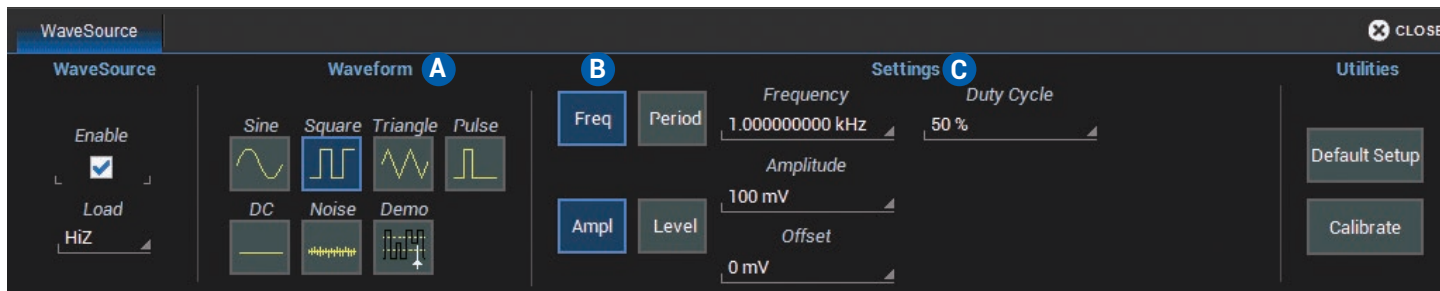
Activate your license key (see p.14) to add decoder and trigger functionality to the oscilloscope.

From the Front Panel
Press the Decode button.

From the Display
Choose Analysis > Serial Decode, or touch the Decode shortcut button on the Channel dialog.

Serial trigger and decoder setup differs depending on the protocol, the number of input channels used, and different pattern or error filters available. For detailed instructions, see the *Trigger and Decode Instruction Manual* linked to each serial data standard on our website.

Documenting

Printing
Pressing the front panel Print button captures an image of the display, which is then be handled according to your chosen Harcopy method: send to printer, save to file, or email to preconfigured address. Go to Utilities > Utilities Preferences > Hardcopy Setup to configure how the oscilloscope handles the Print command. To make the Print button create a new Notebook Entry, go to File > LabNotebook > Preferences and select Create Entry when Hardcopy Pressed.

Sharing Data
The oscilloscope can be added to a LAN via TCP/IP or directly connected to a PC via USBTMC. If you have email set up on the oscilloscope, saved files can be sent directly from the instrument. They can also be transferred to a USB drive through any of the host USB ports on the instrument.

LabNotebook
The integrated LabNotebook tool lets you record waveform images and waveform files right on the oscilloscope. You create individual Notebook Entries as you work, which are saved to Micro SD Card. When you choose File > LabNotebook, the LabNotebook dialog opens showing all your Notebook entries. You can also use the LabNotebook Flashback feature to put the oscilloscope back to the exact state it was in when the Notebook Entry was saved. See the *WaveSurfer 3000 Oscilloscopes Operator's Manual* for more information on using LabNotebook.

.

Temperature Dependent Calibration

The WaveSurfer 3000 is calibrated at the factory prior to being shipped. This calibration is run at 23° C (± 2° C) and is valid for temperatures ± 5° C of the original calibration temperature. Within this temperature range the WaveSurfer 3000 will meet all of the specifications. When the oscilloscope is used outside of this temperature range a temperature dependent calibration is recommended. There are two options for this calibration: Calibrate All or Calibrate Current Setting.

Calibrate All - All possible combinations of vertical and horizontal settings are calibrated at the current temperature. This calibration is valid for the current temperature ± 5° C. This calibration takes about 120 minutes.

Calibrate Current Setting - The oscilloscope is calibrated at the current vertical and horizontal setting. This calibration is valid for this setting for the current temperature ± 5° C. This calibration takes under 30 seconds.

It is recommended that the WaveSurfer 3000 be calibrated when the temperature range is outside of the ± 5° C of the original calibration temperature or when it has been more than 1 month since the previous calibration.

It is recommended that the WaveSurfer 3000 be warmed up for at least 20 minutes prior to use. During the WaveSurfer 3000 warm-up period, the specifications are not guaranteed.

It is required that all inputs be removed from the oscilloscope prior to performing calibration.

REFERENCE

WaveSurfer 3000

Service

Contact your local Teledyne LeCroy service center for calibration or other service.

Returning a Product

If the product cannot be serviced on location, the service center will give you a **Return Material Authorization (RMA)** code and instruct you where to ship the product. All products returned to the factory must have an RMA.

Return shipments must be prepaid. Teledyne LeCroy cannot accept COD or Collect shipments. We recommend air-freighting. Insure the item you're returning for at least the replacement cost.

Follow these steps for a smooth product return.

1. Remove all accessories from the device. Do not include the manual.

2. Pack the product in its case, surrounded by the original packing material (or equivalent).

3. Label the case with a tag containing:
   • The RMA
   • Name and address of the owner
   • Product model and serial number
   • Description of failure or requisite service

4. Pack the product case in a cardboard shipping box with adequate padding to avoid damage in transit.

5. Mark the outside of the box with the shipping address given to you by Teledyne LeCroy; be sure to add the following:
   • ATTN: <RMA code assigned by Teledyne LeCroy>
   • FRAGILE

6. **If returning a product to a different country:**
   • Mark the shipment as a **Return of US manufactured goods for warranty repair/recalibration.**
   • If there is a cost for the service, list the cost in the Value column and the original purchase price **For insurance purposes** only.
   • Be very specific about the reason for shipment. Duties may have to be paid on the value of the service.

Service Plans

Extended warranty, calibration, and upgrade plans are available for purchase. Contact your Teledyne LeCroy sales representative or customersupport@teledynelecroy.com to purchase a service plan.

Teledyne LeCroy Service Centers

United States and Canada World Wide Corporate Office	US Protocol Solutions Group	Europe	Singapore
Teledyne LeCroy 700 Chestnut Ridge Road Chestnut Ridge, NY, 10977-6499 Ph: 800-553-2769 / 845-425-2000 Fax: 845-578-5985 teledynelecroy.com **Support:** contact.corp@teledynelecroy.com **Sales:** customersupport@teledynelecroy.com	Teledyne LeCroy 3385 Scott Boulevard Santa Clara, CA, 95054 teledynelecroy.com **Sales and Service:** Ph: 800-909-7211 / 408-727-6600 Fax: 408-727-0800 contact.corp@teledynelecroy.com **Support:** Ph: 800-909-7112/408-653-1260 psgsupport@teledynelecroy.com	Teledyne LeCroy SA 4, Rue Moïse Marcinhes Case postale 341 1217 Meyrin 1 Geneva, Switzerland Ph: +41 22 719 2228 / 2323 / 2277 Fax: +41 22 719 2233 contact.sales@teledynelecroy.com applications.indirect@teledynelecroy.com teledynelecroy.com/europe **Protocol Analyzers:** Ph: +44 12 765 0397 1	**Oscilloscopes:** Teledyne LeCroy Singapore Pte Ltd. Blk 750C Chai Chee Road #02-08 Singapore 469003 Ph: ++ 65 64424880 Fax: ++ 65 64427811 **Protocol Analyzers:** Genetron Singapore Pte Ltd. 37 Kallang Pudding Road, #08-08 Tong Lee Building Block B Singapore 349315 Ph: ++ 65 9760-4682
Taiwan LeColn Technology Co Ltd. Far East Century Park, C3, 9F No. 2, Chien-8th Road Chung-Ho Dist., New Taipei City, Taiwan Ph: ++ 886 2 8226 1366 Fax: ++ 886 2 8226 1368 sales_twn@teledynelecroy.com	**Korea** Teledyne LeCroy Korea 10th fl. Ildong Bldg. 968-5 Daechi-dong, Gangnam-gu Seoul 135-280, Korea Ph: ++82 2 3452 0400 Fax: ++82 2 3452 0490	**China** Teledyne LeCroy Beijing Rm. 2001 Unit A, Horizon Plaza No. 6 Zhichun Rd., Haidian Dist. Beijing 100088, China Ph: ++86 10 8280 0318 / 0319 / 0320 Fax: ++86 10 8280 0316 **Service:** Rm. 2002 Ph: ++86 10 8280 0245	**Japan** Teledyne LeCroy Japan Hobunsya Funchu Bldg, 3F 3-11-5, Midori-cho, Fuchu-Shi Tokyo, 183-0006 Japan Ph: ++ 81 4 2402 9400 Fax: ++ 81 4 2402 9586 teledynelecroy.com/japan

Certifications

This section certifies the instrument's Electromagnetic Compatibility (EMC), Safety and Environmental compliance.

EMC Compliance

EC DECLARATION OF CONFORMITY - EMC
The oscilloscope meets intent of EC Directive 2004/108/EC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications listed in the Official Journal of the European Communities:

EN 61326-1:2013, EN 61326-2-1:2013 EMC requirements for electrical equipment for measurement, control, and laboratory use. [1]

Electromagnetic Emissions:
EN 55011:2010, Radiated and Conducted Emissions Group 1, Class A [2,3]

EN 61000-3-2/A2:2009 Harmonic Current Emissions, Class A

EN 61000-3-3:2008 Voltage Fluctuations and Flickers, Pst = 1

Electromagnetic Immunity:
EN 61000-4-2:2009 Electrostatic Discharge, 4 kV contact, 8 kV air, 4 kV vertical/horizontal coupling planes [4]

EN 61000-4-3/A2:2010 RF Radiated Electromagnetic Field, 3 V/m, 80-1000 MHz; 3 V/m, 1400 MHz - 2 GHz; 1 V/m, 2 GHz - 2.7 GHz

EN 61000-4-4/A1:2010 Electrical Fast Transient/Burst, 1 kV on power supply lines, 0.5 kV on I/O signal data and control lines [4]

EN 61000-4-5:2006 Power line Surge, 1 kV AC Mains, L-N, L-PE, N-PE [4]

EN 61000-4-6:2009 RF Conducted Electromagnetic Field, 3 Vrms, 0.15 MHz - 80 MHz

EN 61000-4-11:2004 Mains Dips and Interruptions, 0%/1 cycle, 70%/25 cycles, 0%/250 cycles [4,5]

[1] To ensure compliance with all applicable EMC standards, high quality shielded interface cables should be used.

[2] Emissions which exceed the levels required by this standard may occur when the oscilloscope is connected to a test object.

[3] This product is intended for use in nonresidential areas only. Use in residential areas may cause electromagnetic interference.

[4] Meets Performance Criteria "B" limits of the respective standard: during the disturbance, product undergoes a temporary degradation or loss of function or performance which is self-recoverable.

[5] Performance Criteria "C" applied for 70%/25 cycle voltage dips and for 0%/250 cycle voltage interruption test levels per EN61000-4-11.

European Contact:
Teledyne LeCroy Europe GmbH
Waldhofer Str 104
D-69123 Heidelberg
Germany
Tel: (49) 6221 82700

AUSTRALIA & NEW ZEALAND DECLARATION OF CONFORMITY – EMC
Oscilloscope complies with the EMC provision of the Radio Communications Act per the following standards, in accordance with requirements imposed by Australian Communication and Media Authority (ACMA):

EN 55011:2010 Radiated and Conducted Emissions, Group 1, Class A, in accordance with EN61326-1:2013 and EN61326-2-1:2013.

Australia / New Zealand Contacts:

Vicom Australia Ltd.	Vicom New Zealand Ltd.
1064 Centre Road	60 Grafton Road
Oakleigh, South Victoria 3167	Auckland
Australia	New Zealand

Safety Compliance

EC DECLARATION OF CONFORMITY – LOW VOLTAGE
The oscilloscope meets intent of EC Directive 2006/95/EC for Product Safety. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements

EN 61010-2:030:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-030: Particular requirements for testing and measuring circuits

The design of the instrument has been verified to conform to the following limits put forth by these standards:
• Mains Supply Connector: CAT II local distribution level, equipment connected to the mains supply (AC power source).

• Measuring Terminals: CAT 0 signal level, equipment measuring terminals connected to source circuits where measures are taken to limit transient voltages to an appropriately low level.

• Unit: Pollution Degree 2, operating environment where normally only dry, non-conductive pollution occurs. Conductivity caused by temporary condensation should be expected.

• Unit: Protection Class I, grounded equipment in which protection against electric shock is achieved by Basic Insulation and a connection to the protective ground conductor in the building wiring.

U.S. NATIONALLY RECOGNIZED AGENCY CERTIFICATION
The oscilloscope has been certified by Underwriters Laboratories (UL) to conform to the following safety standard and bears UL Listing Mark:

UL 61010-1 Third Edition – Safety standard for electrical measuring and test equipment.

CANADIAN CERTIFICATION
The oscilloscope has been certified by Underwriters Laboratories (UL) to conform to the following safety standard and bears cUL Listing Mark:

CAN/CSA-C22.2 No. 61010-1-12. Safety requirements for electrical equipment for measurement, control and laboratory use.

Environmental Compliance

END-OF-LIFE HANDLING
The instrument is marked with this symbol to indicate that it complies with the applicable European Union requirements to Directives 2002/96/EC and 2006/66/EC on Waste Electrical and Electronic Equipment (WEEE) and Batteries.

The instrument is subject to disposal and recycling regulations that vary by country and region. Many countries prohibit the disposal of waste electronic equipment in standard waste receptacles. For more information about proper disposal and recycling of your Teledyne LeCroy product, please visit teledynelecroy.com/recycle.

RESTRICTION OF HAZARDOUS SUBSTANCES (RoHS)
This instrument and its accessories conform to the 2011/65/EU RoHS2 Directive, as it has been classified as Industrial Monitoring and Control Equipment (per Article 3, Paragraph 24) and is exempt from RoHS compliance until 22 July 2017 (per Article 4, Paragraph 3).

ISO Certification
Manufactured under an ISO 9000 Registered Quality Management System. Visit **teledynelecroy.com** to view the certificate.

Warranty

THE WARRANTY BELOW REPLACES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS, OR ADEQUACY FOR ANY PARTICULAR PURPOSE OR USE. TELEDYNE LECROY SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTRACT OR OTHERWISE. THE CUSTOMER IS RESPONSIBLE FOR THE TRANSPORTATION AND INSURANCE CHARGES FOR THE RETURN OF PRODUCTS TO THE SERVICE FACILITY. TELEDYNE LECROY WILL RETURN ALL PRODUCTS UNDER WARRANTY WITH TRANSPORT PREPAID.

The oscilloscope is warranted for normal use and operation, within specifications, for a period of three years from shipment. Teledyne LeCroy will either repair or, at our option, replace any product returned to one of our authorized service centers within this period. However, in order to do this we must first examine the product and find that it is defective due to workmanship or materials and not due to misuse, neglect, accident, or abnormal conditions or operation.

Teledyne LeCroy shall not be responsible for any defect, damage, or failure caused by any of the following: a) attempted repairs or installations by personnel other than Teledyne LeCroy representatives or b) improper connection to incompatible equipment, or c) for any damage or malfunction caused by the use of non-Teledyne LeCroy supplies. Furthermore, Teledyne LeCroy shall not be obligated to service a product that has been modified or integrated where the modification or integration increases the task duration or difficulty of servicing the oscilloscope. Spare and replacement parts, and repairs, all have a 90-day warranty.

The oscilloscope's firmware has been thoroughly tested and is presumed to be functional. Nevertheless, it is supplied without warranty of any kind covering detailed performance. Products not made by Teledyne LeCroy are covered solely by the warranty of the original equipment manufacturer.

TELEDYNE LECROY
Everywhere**you**look™