TELEDYNE TEST TOOLS
Everywhereyoulook™

Quick Start Guide

T3PS13206P, T3PS23203P, T3PS33203P and T3PS43203P DC Power Supply Quick Start Guide

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SAFETY INSTRUCTIONS

This chapter contains important safety instructions that you must follow during operation and storage. Read the following before any operation to insure your safety and to keep the instrument in the best possible condition.

Safety Symbols

These symbols may appear in the manual or on the instrument.

 WARNING	Warning: Identifies conditions or practices that could result in injury or loss of life.
 CAUTION	Caution: Identifies conditions or practices that could result in damage to the T3PSX3200P series or to other properties.
	DANGER High Voltage
	Attention Refer to the Manual
	Protective Conductor Terminal
	Earth (ground) Terminal
	Do not dispose electronic equipment as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased.

Safety Guidelines

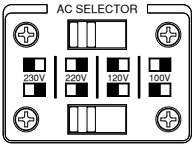
General Guideline ⚠ CAUTION	• Do not place any heavy object on the unit. • Avoid severe impact or rough handling that leads to damaging the unit. • Do not discharge static electricity to the unit. • Do not block the cooling fan opening. • Do not perform measurements on circuits that are directly connected to mains power. • Do not disassemble the T3PSX3200P series unless you are qualified. • Do not connect the measuring terminals of the unit directly to supply mains. Note: Measuring terminals of the T3PSX3200P series have no rated measurement category (CAT) per IEC/EN 61010-1:2010.
Power Supply ⚠ WARNING	• AC Input voltage range: 100V/120V/220V/230V ±10% • Frequency: 50Hz/60Hz • To avoid electrical shock connect the protective grounding conductor of the AC power cord to an earth ground.
Fuse ⚠ WARNING	• Fuse type: 100V/120V：T6.3A/250V， 220V/230V：T3.15A/250V • To prevent fire, replace the fuse only with the specified type and rating. • Disconnect the power cord before replacing the fuse. • Make sure the cause of fuse blowout is fixed before replacing the fuse.

Cleaning the power supply	• Disconnect the power cord before cleaning the power supply. • Use a soft cloth dampened in a solution of mild detergent and water. Do not spray any liquid into the power supply. • Do not use chemicals containing harsh products such as benzene, toluene, xylene, and acetone.
Operation Environment	• Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (Note below) • Relative Humidity: < 80% • Altitude: < 2000m • Temperature: 0°C to 40°C
	(Pollution Degree) EN 61010-1:2010 specifies pollution degrees and their requirements as follows. The T3PSX3200P series falls under degree 2. Pollution refers to "addition of foreign matter, solid, liquid, or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity". • Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence. • Pollution degree 2: Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected. • Pollution degree 3: Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation which is expected. In such conditions, equipment is normally protected against exposure to direct sunlight, precipitation, and full wind pressure, but neither temperature nor humidity is controlled.
Storage environment	• Location: Indoor • Relative Humidity: < 70% • Temperature: -10°C to 70°C

Checking the AC Voltage

⚠ CAUTION

Before the power is turned on, confirm that the input power supply meets the following conditions:
100V/120V/220V/230V ±10% ，50/60Hz



Power cord for the United Kingdom

When using the power supply in the United Kingdom, make sure the power cord meets the following safety instructions.

NOTE: This lead/appliance must only be wired by competent persons

⚠WARNING: THIS APPLIANCE MUST BE EARTHED

IMPORTANT: The wires in this lead are coloured in accordance with the following code:

Green/ Yellow:	Earth
Blue:	Neutral
Brown:	Live (Phase)

As the colours of the wires in main leads may not correspond with the coloured marking identified in your plug/appliance, proceed as follows:

The wire which is coloured Green & Yellow must be connected to the Earth terminal marked with either the letter E, the earth symbol ⏚ or coloured Green/Green & Yellow.

The wire which is coloured Blue must be connected to the terminal which is marked with the letter N or coloured Blue or Black.

The wire which is coloured Brown must be connected to the terminal marked with the letter L or P or coloured Brown or Red.

If in doubt, consult the instructions provided with the equipment or contact the supplier.

This cable/appliance should be protected by a suitably rated and approved HBC mains fuse: refer to the rating information on the equipment and/or user instructions for details. As a guide, a cable of 0.75mm² should be protected by a 3A or 5A fuse. Larger conductors would normally require 13A types, depending on the connection method used.

Any exposed wiring from a cable, plug or connection that is engaged in a live socket is extremely hazardous. If a cable or plug is deemed hazardous, turn off the mains power and remove the cable, any fuses and fuse assemblies. All hazardous wiring must be immediately destroyed and replaced in accordance to the above standard.

OVERVIEW

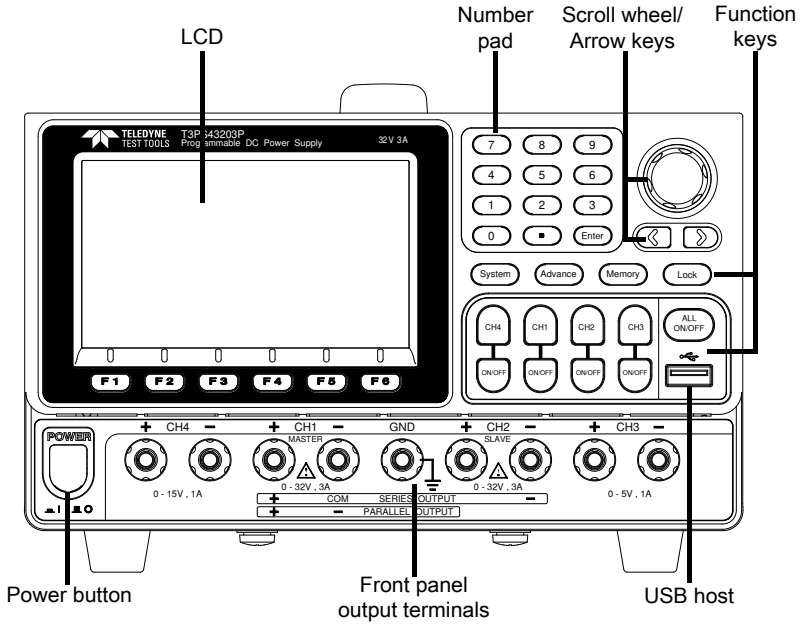
This chapter contains a brief introduction to T3PSX3200P series including the main features and an overview of the front and rear panel.

Key Features

Features	• Multiple Outputs: T3PS13206P: 32V/6A x 1 T3PS23203P: 32V/3A x 2 (CH1/CH2) T3PS33203P: 32V/3A x 2 (CH1/CH2) 1.8V/2.5V/3.3V/5V/5A x 1(CH3) USB Port Output: 3A T3PS43203P: 32V/3A x 2 (CH1/CH2) 5V/1A x 1(CH3), 15V/1A x 1 (CH4) • Constant voltage and constant current operation (CV/CC). • Low noise, thermostatically controlled fan. • 4.3 inch TFT display.
Operation	• Digital panel control. • Output on/off control (ON/OFF), and each channel can be controlled separately. • Digital voltage and current settings. (Key & Encode) • 10 groups of save/recall settings and 2 groups of power-on settings. 10 groups of save/recall Sequence. 10 groups of save/recall Delay. 10 groups of save/recall Record. • CH1/CH2 workable in Load Mode • 7 types display modes available with 5 contents and 2 waveforms respectively • Input/Output terminal (Control I/O) • Alarm buzzer (BEEP). • Key lock function (LOCK). • Multiple remote control interfaces (standard: RS232, USB, LAN)

Protection Features	• Overvoltage and overcurrent protection (OVP/ OCP) • Overtemperature protection (OTP). • Polarity Reverse Protection • Overload Protection (OPP in Load mode)
Interface	• Remote Control RS-232 • USB remote control. • Control I/O • LAN remote control

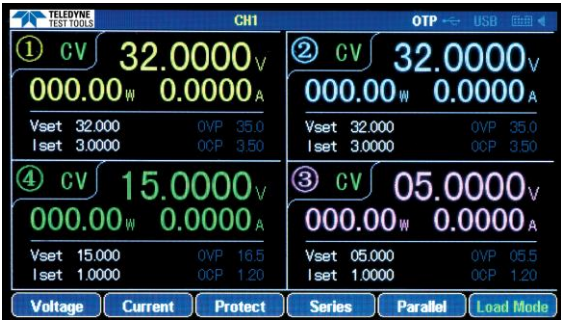
Front Panel



*The panel above is the example of T3PS43203P.

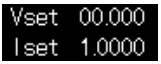
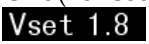
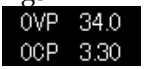
Display

Display Interface



T3PS43203P model

Channel distribution	Channel number and distribution vary by models with different colors identifications: CH1: Yellow CH2: Blue CH3: Pink CH4 : Green CH1 is master and CH2 becomes yellow under tracking series and tracking parallel modes.
Single channel display	
Channel no.	Color of channel remains the original ① when not being set. Color of channel blinks between the original and orange ① ⟷ ① when being set.
Channel status	Display active channel state Power supply: CH1/CH2/CH3/CH4: green CV or red CC Load Mode: CH1/CH2: orange CV CC CR
Voltmeter Indicators	Displays the output voltage with up to 6 digits of resolution. The default units are Volts (V). CH1: 00.0000 V CH2: 00.0000 V CH3: 00.0000 V (T3PS43203P) 1.8 V (T3PS33203P) CH4: 00.0000 V

Ammeter Indicator	Displays the output current with up to 5 digits of resolution. The default units are ampere (A). CH1:  CH2:  CH3:  (T3PS43203P) CH4: 
Setting Display	Displays the voltage and current settings. CH1/CH2/CH3/CH4:  CH3(T3PS33203P) displays setting of voltage only  Display OVP/OCP settings CH1/CH2/CH3/CH4:  The CH3 OVP of T3PS33203P is a fixed value (approx. 5.5V), non-configurable and with only on or off switch available for user. OCP is available only for USB output port (approx. 3.1A) 

Status Indicator

Display the set function/remote control interface

CH1: The active channel under setting status

OTP: The status of OTP protection mode

: The status of USB flash drive connected

USB: USB remotely disconnected

USB: USB remotely connected

: The status of control I/O connected

Others: when operating in the series/parallel tracking mode, the corresponding SER/PAR icons appear on the display.

when Sequence/Delay/Monitor/Recorder is activated, the corresponding SEQ/DLY/MON/ REC icons appear on the display.

Function Keys

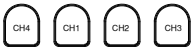
Power Button

Turns the power on or off.

On:

Off:

Channel select buttons



Each channel has its own button and promptly switchable among CH1-CH4 setting.

Output buttons

Individual output

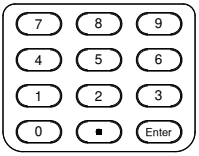
The ON/OFF button is operational individually by each channel. The Output key will light up when the output is on.

ON:

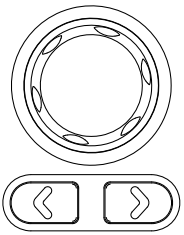
Output all

All ON:

Number pad

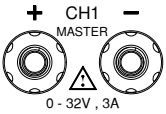


For parameter value setting

Scroll wheel & Arrow keys		Scroll wheel is used to set each parameter value, whilst arrow keys are used for parameter, menu selection and voltage/current fine adjustment. It is used to switch or operate the displayed waveforms under diagram display mode.
Function keys	F1 F6	The 6 function keys (F1-F6) display varied functions per different opertations.
System key	System	It is used to set functions including Interface, Beep, Backlight, etc.
Advance key	Advance	It is used for certain advanced functions like Sequence, Delay, Monitor, Recorder, etc.
Memory key	Memory	It is used to operate several functions including save and recall, etc., for set parameters.
Lock key	Lock	It is used to disable all the panel keys except for the Output key.
	Unlock	Press the F6 button to unlock, which can disable remote control and return to panel operation.

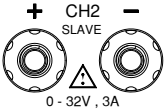
Terminals

CH1 terminal



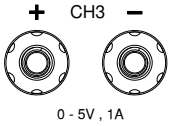
Power output terminal or load input terminal

CH2 terminal

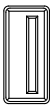


Power output terminal or load input terminal

CH3 terminal



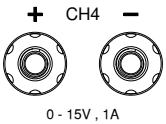
Power output terminal



Power output terminal (T3PS33203P only)

⚠ Warning: The output current from the 2 terminals should Not exceed 5A for T3PS33203P.

CH4 terminal

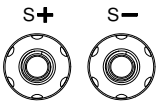


Power output terminal

GND terminal

Ground terminal

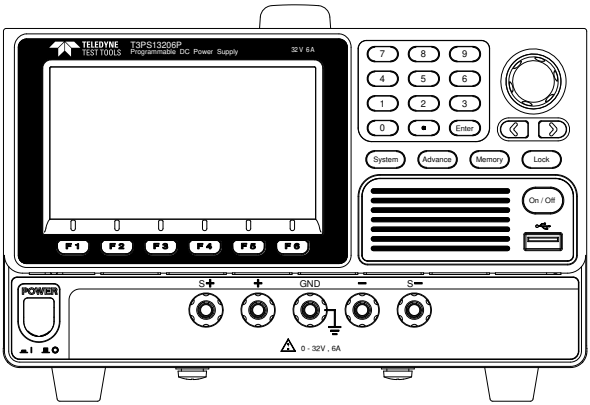
Voltage feedback terminal (SENSE)



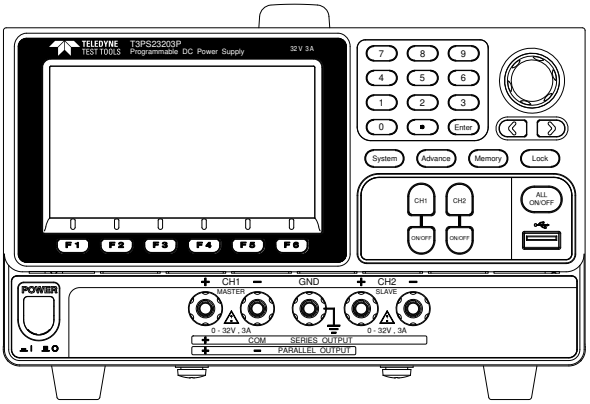
Sense terminal of power output (for T3PS13206P only)

Panels of other models:

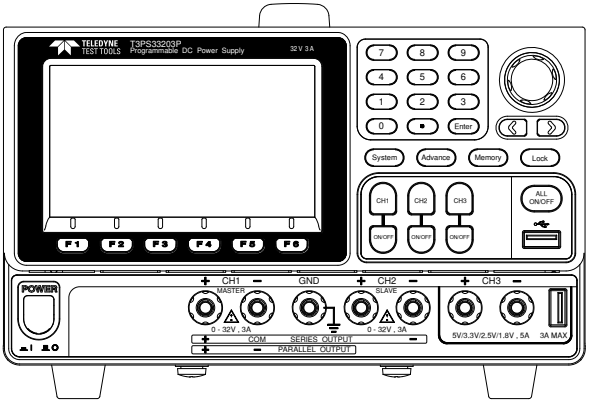
T3PS13206P



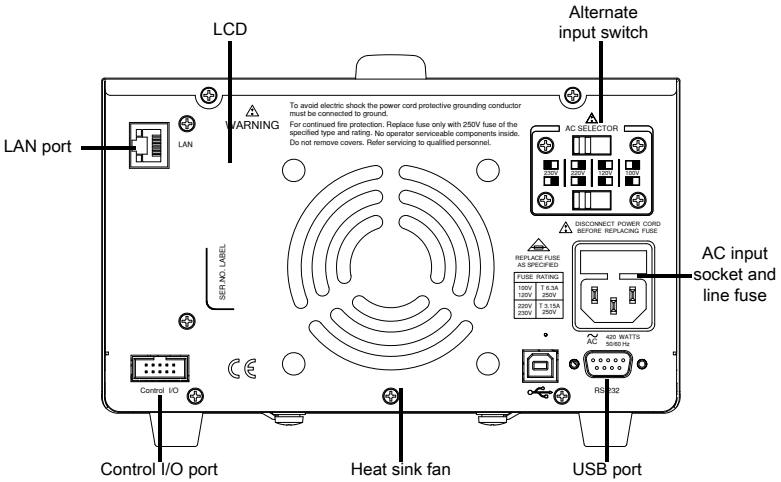
T3PS23203P

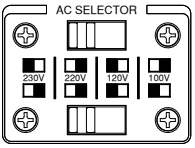
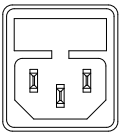


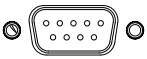
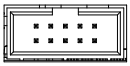
T3PS33203P



Rear Panel



Items		Description
Alternate input switch		AC voltage selection: 100V/120V/220V/230V ±10%, frequency 50/60Hz
AC input socket and line fuse		The AC input accepts 100V/120V/220V/230V AC. The frequency is 50Hz/60Hz. Fuse: 100V/120V: T6.3A/250V, 220V/230V: T3.15A/250V, slow-blow type
USB port		USB device port for remote control.
LAN port		LAN port for remote control.

RS 232 port	 RS-232	RS232 port for remote control.
Control I/O port	 Control I/O	5 ports in all for input/output control.

GETTING STARTED

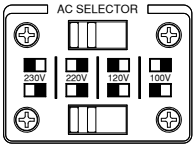
This chapter describes the start up procedures and the preparation that is necessary before operating the power supply.

Start Up

Checking the AC Voltage

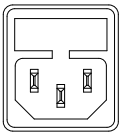
CAUTION

Before the power is turned on, confirm that the input power supply meets the following conditions:
100V/120V/220V/230V ±10% , 50/60Hz



Connecting the AC power cord

The fuse is a slow-blow fuse.
3.15A (220V/230V)
6.30A (100V/120V), Confirm that the fuse is of the correct type and rating before connecting the power cord.



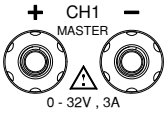
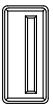
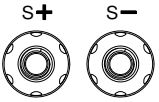
Turning the power on

Press the power button. The LCD will display the line frequency of the AC power supply.

Turning the power off

To turn the power off, press the power button again.

Load Connection

Recommended Cables	Model	Specification	Usage
	GTL-104A	10A	Front panel terminal
	GTL-105A	3A	Sense (T3PS13206P only)
Front panel wiring	Use the GTL-104A cables for the front panel source connections. 		
	USB Type A only (Greater than 4A) 		
	Use the GTL-105A cables for the sense connections. 		

Wire Gauge

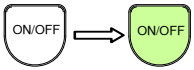
Load wires must have enough current capacity to minimize cable loss and load line impedance. Voltage drop across a wire should not excess 0.5V. The following list is the wire current rating at 450A/cm2.

Wire Size(AWG)	Maximum Current (A)
20	2.5
18	4
16	6
14	10
12	16

Turning the Output On/Off

Panel Operation

Press the *Output* key of each channel individually to turn the output on. The Output key will light-up when the output is on.



When the output is turned on, pressing the *Output* key again will turn the output off.

Press ALL ON/OFF key when it needs to output or turn off all channels simultaneously.

Automatic Output Shut Down

Any of the following actions will cause the output to be automatically shut down:

- Toggle between power output and load mode
- Independent/Tracking Series/Tracking Parallel operation
- Recall the saved setting
- OVP/ OCP/OPP/OTP protection is tripped.
- When Sequence/Delay/Monitor/Control IO fits the set conditions.

APPENDIX

Specifications

The specifications apply under the following conditions: The T3PSX3200P series is powered on for at least 30 minutes, within +20°C-+30°C.

Power Mode

Output Rating	CH1/CH2 Independent	0 - 32.000V, 0 - 3.0000A (T3PS13206: 0 - 6.0000A)
	CH1, CH2 Series	0 - 64.000V, 0 - 3.0000A
	CH1, CH2 Parallel	0 - 32.000V, 0 - 6.0000A
	CH3	0 - 5.000V, 0 - 1.0000A (for T3PS43203P)
	CH4	0 - 15.000V, 0 - 1.0000A(for T3PS43203P)
Voltage	Line regulation	≤ 0.01% + 3mV
	Load regulation	≤ 0.01% + 3mV (rating current ≤ 3A) ≤ 0.02% + 5mV (rating current > 3A)
	Ripple & noise (5Hz-1MHz)	≤ 0.35mVrms, ≤ 0.5mVrms(T3PS13206) ≤ 1mVrms(T3PS43203P: CH3/CH4)
	Transient recovery time	≤ 50μs, (T3PS13206: ≤ 100μs) (50% load change，minimum load 0.5A)
	Temperature coefficient	≤ 300ppm/°C

Current	Line Regulation	≤ 0.2% + 3mA
	Load Regulation	≤ 0.2% + 3mA
	Ripple & noise	≤ 2mArms; ≤ 4mArms (T3PS13206)
Tracking Operation	Tracking error	≤ 0.1% +10mV of Master (0 - 32V) (No Load, with load add load regulation ≤ 100mV)
	Parallel regulation	Line: ≤ 0.01% + 3mV Load: ≤ 0.01% +3mV(rating current≤ 3A) ≤ 0.02% +5mV(rating current > 3A)
	Series regulation	Line: ≤ 0.01% + 5mV Load: ≤ 100mV
	Ripple & noise	≤ 1mVrms(5Hz-1MHz)
Resolution	Voltage	Voltage: programming 1mV ,readback 0.1mV
	Current	Current: 0.1mA (T3PS13206: 0.2mA)
Accuracy	Ammeter	3.2A full scale (T3PS13206: 6.2A), programming 5 digits, readback 5 digits
	Voltmeter	33V full scale, programming 5 digits, readback 6 digits
	Setting accuracy	Voltage: ± (0.03% of reading + 10mV) Current: ± (0.3% of reading + 10mA)
	Readback accuracy	Voltage: ± (0.03% of reading + 10mV) Current: ± (0.3% of reading + 10mA)
Bindpost	Output voltage	1.8V/2.5V/3.3V/5.0V, ±5%
	Output current	5A
CH3 (T3PS33203P)	Line regulation	≤ 3mV
	Load regulation	≤ 5mV
	Ripple & noise	≤ 2mVrms (5Hz - 1MHz)
	Transient recovery time	≤ 100μs (50% load change, minimum load 0.5A)
USB Port	Output	1.8V/2.5V/3.3V/5.0V, ±0.35V, 3A

Warning The output current from the 2 terminals should Not exceed 5A.

Load Mode

Display	Voltage	1-33.00V
	Current	0-3.200A(T3PS13206:0-6.200A)
	Power	0-50.00(T3PS13206:0-100.00W)
CV Mode	CH1/CH2	1.500V - 33.00V
	Setting/ Readback accuracy	≤ 0.1% + 30mV
	Resolution	10mV
CC Mode	CH1/CH2	0 ~ 3.200A 0 ~ 6.200A(T3PS13206)
	Setting/Readback accuracy	≤ ±0.3% + 10mA
	Resolution	1mA
CR Mode	CH1/CH2	1Ω ~1kΩ
	Setting/ Readback accuracy	≤ ±(3% + 1 Ω) (voltage ≥ 0.1V, and current ≥ 0.1A)
	Resolution	1Ω

Other Mode

OVP	Power mode	OFF, ON(0.5V- 35.0V)(CH1/CH2) OFF, ON(0.5V- 5.5V)(T3PS43203P: CH3) OFF, ON(0.5V- 16.5V)(T3PS43203P: CH4) Fixed 5.5V (T3PS33203P:CH3)
	Load mode	OFF,ON(1.5V - 35.0V) (CH1/CH2)
	Setting accuray	±100mV
	Resolution	100mV

OCP	Power/Load mode	OFF, ON(0.05A-7.00A) (T3PS13206) OFF, ON(0.05A-3.50A) (CH1/CH2) OFF, ON(0.05A-1.20A) (T3PS43203P:CH3/CH4) 3.1A (USB port) (T3PS33203P:CH3)
	Setting accuracy	±20mA
	Resolution	10mA
Insulation resistance	Between chassis and terminal	20MΩ or above (DC 500V)
	Between chassis and DC power cord	30MΩ or above (DC 500V)

ABOUT TELEDYNE TEST TOOLS

TELEDYNE TEST TOOLS
Everywhereyoulook™

Company Profile

Teledyne LeCroy is a leading provider of oscilloscopes, protocol analyzers and related test and measurement solutions that enable companies across a wide range of industries to design and test electronic devices of all types. Since our founding in 1964, we have focused on creating products that improve productivity by helping engineers resolve design issues faster and more effectively. Oscilloscopes are tools used by designers and engineers to measure and analyze complex electronic signals in order to develop high-performance systems and to validate electronic designs in order to improve time to market.

The Teledyne Test Tools brand extends the Teledyne LeCroy product portfolio with a comprehensive range of test equipment solutions. This new range of products delivers a broad range of quality test solutions that enable engineers to rapidly validate product and design and reduce time-to-market. Designers, engineers and educators rely on Teledyne Test Tools solutions to meet their most challenging needs for testing, education and electronics validation.

Location and Facilities

Headquartered in Chestnut Ridge, New York, Teledyne Test Tools and Teledyne LeCroy has sales, service and development subsidiaries in the US and throughout Europe and Asia. Teledyne Test Tools and Teledyne LeCroy products are employed across a wide variety of industries, including semiconductor, computer, consumer electronics, education, military/aerospace, automotive/industrial, and telecommunications.

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