TELEDYNE TEST TOOLS
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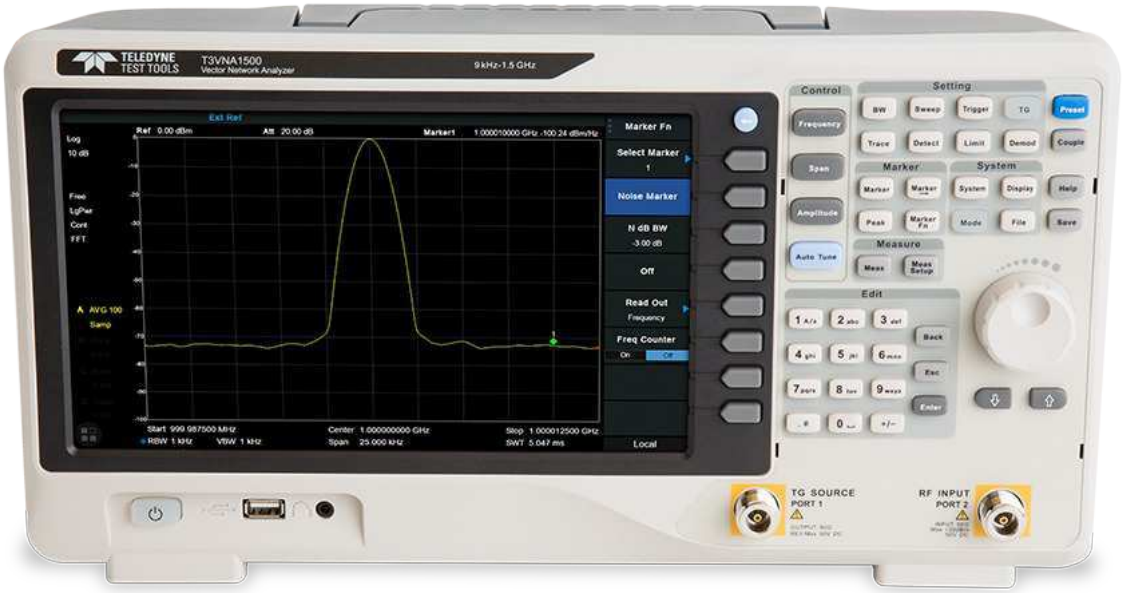
T3VNA Vector Network Analyzer
Quick Start Guide



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Contents

General Safety Summary

Read the following precautions carefully to avoid any personal injuries, or damage to the instrument or products connected to it. Use the instrument only as specified.

Use only the power cord supplied for the instrument.

Ground the instrument. The instrument is grounded through the ground conductor of the power cord. To avoid electric shock, always connect to grounded outlets. Make sure the instrument is grounded correctly before connecting its input or output terminals.

Connect the signal wire correctly. To avoid damage, observe input polarity and maximum voltage/current ratings at all times.

Observe all terminal ratings and signs on the instrument to avoid fire or electric shock. Before connecting to the instrument, read the manual to understand the input/output ratings.

Do not operate with suspected failures. If you suspect that the instrument is damaged, contact the Teledyne LeCroy service department immediately.

Do not operate in wet/damp conditions.

Do not operate in an explosive atmosphere.

Keep the surface of the instrument clean and dry.

Avoid touching exposed circuits or wires. Do not touch exposed contacts or components when the power is on.

Do not operate without covers. Do not operate the instrument with covers or panels removed.

Use only the fuse specified for the instrument.

Use proper over voltage protection.

Use anti-static protection. Operate in an anti-static protected area. Ground measurement cable conductors before connecting to the instrument to discharge any static electricity before connecting the cables to the instrument.

Observe ventilation requirements. Ensure good ventilation. Check the vent and fan regularly to prevent overheating.

Safety Terms and Symbols

The following terms may appear on the instrument:
DANGER: Direct injury or hazard may occur.
WARNING: Potential injury or hazard may occur.
CAUTION: Potential damage to instrument/property may occur .

The following symbols may appear on the instrument:

CAUTION Risk of injury or damage. Refer to manual.

WARNING Risk of electric shock or burn

Earth Ground Terminal

Protective Conductor Terminal

Frame or Chassis Terminal

ON/ Standby Power

Alternating Current

Measuring Terminal Ratings

RF Input: 50 Ω, Max +30 dBm, ±50 VDC

No rated measurement category per IEC/EN 61010-031:2015. Measuring terminals on this product are not intended to be connected directly to mains.

Operating Environment

Temperature: 0 °C to 50 °C

Relative Humidity: 90% RH up to 30 °C; derates to 50% at 50°C.

Altitude: ≤ 3000 m

Use indoors only.

Pollution Degree 2. Use in an operating environment where normally only dry, non-conductive pollution occurs. Temporary conductivity caused by condensation should be expected.

AC Power

Input Voltage & Frequency: 100-240 V at 50/60/400 Hz

Automatic AC selection.

Power Consumption: 35 W maximum

Mains Supply Connector: CAT II per IEC/EN 61010-1:2015, instrument intended to be supplied from the building wiring at utilization points (socket outlets and similar).

Fuse Type

100 V / 110 V : 1.25A / 250 V (’T’ rated)
220 V / 230 V : 1.25A / 250 V (’T’ rated)

1 General Inspection

Please check the instrument according to the following steps.

1. Inspect the shipping container.

Keep the shipping container and packaging material until the contents of the shipment have been completely checked and the instrument has passed both electrical and mechanical tests. It is always good practice to save the shipping container and packaging for use when returning the power supply to Teledyne LeCroy for service or calibration.

The consigner or carrier will be responsible for damage to the instrument resulting from shipping. Teledyne LeCroy will not provide free maintenance or replacement in this instance.

2. Inspect the instrument.

If the instrument is found to be damaged, defective or fails in electrical or mechanical tests, please contact the Teledyne LeCroy service department immediately.

3. Check the accessories.

Please check that you have received the accessories: Calibration Kit, Utility Kit, Power Cord, USB cable. If the accessories are incomplete or damaged, please contact Teledyne LeCroy immediately.

Care

Do not store or leave the instrument in direct sunshine for extended periods of time.

Note: To avoid damage to the instrument, please do not leave it in a corrosive atmosphere.

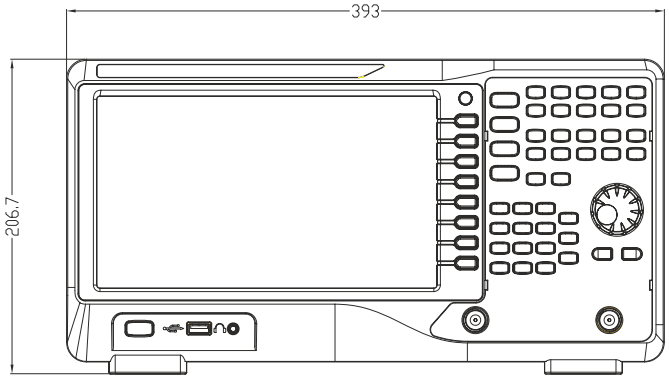
Cleaning

Regularly perform the following steps to clean the instrument.

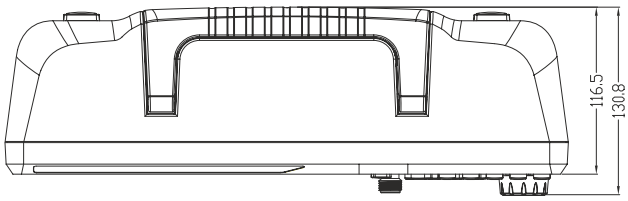
1. Disconnect the instrument from all power sources, then clean it with a soft, damp cloth.
2. Remove loose dust on the outside of the instrument with a soft cloth. When cleaning the LCD, take care to avoid scratching it.

Note: To avoid damage to the surface of the instrument, please do not use any corrosive liquid or chemical cleanser. Make sure that the instrument is completely dry before restarting it to avoid short circuit or personal injury.

Appearance and Dimensions



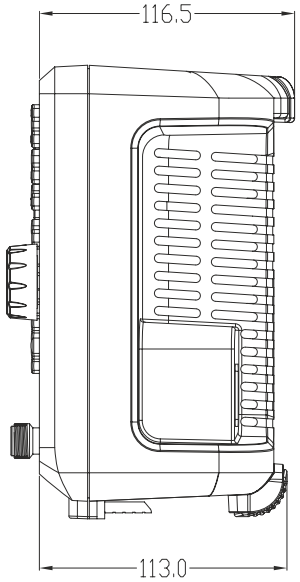
Front View



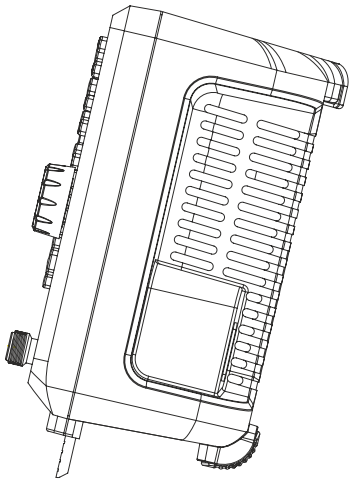
Top View

Adjust the Supporting Legs

Adjust the supporting legs to tilt the Vector Network Analyzer upwards for stable placement, and easier operation and observation of the instrument.



Before Adjusting

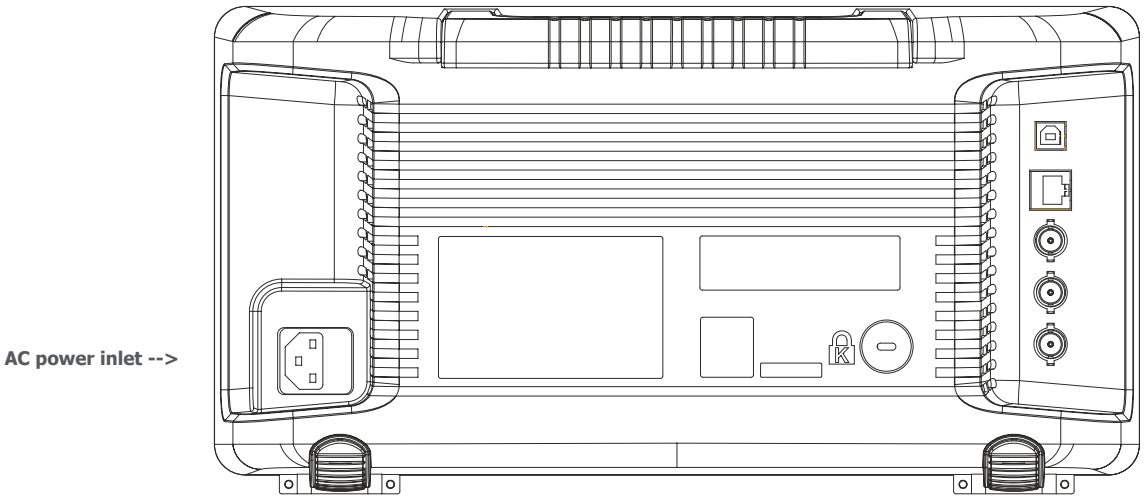


After Adjusting

Connecting to the AC Power Supply

The Vector Network Analyzer accepts 100-240V, 50/60/400Hz AC power supply. Please use only the power cord provided to connect the instrument to the power source.

Connect the power cord to the AC inlet as shown in the figure below.



2. General Description

The T3VNA1500 vector network analyzer has a frequency range from 9 kHz up to 1.5 GHz, and the T3VNA3200 has a frequency range from 9 kHz to 3.2 GHz. They are lightweight and small in size, with a user-friendly interface, concise display style, reliable measurement precision, and plenty of RF measurement functions. Applicable to research and development, education, production, maintenance and other related fields, it meets a wide range of user requirements.

The Front Panel

1. Graphical User Interface
2. Menu Control Keys
3. Function Keys
4. Numeric Keyboard
5. Adjust Knob
6. Arrow Keys
7. RF Input, VNA port 2
8. Tracking Generator Output, VNA port 1
9. Earphone jack for AM and FM demodulation and audio output
10. USB Host
11. Power Switch

The analyzer provides a numeric keyboard at the front panel (as shown in the figure above, item 4). The numeric keyboard which supports English uppercase / lowercase characters, numbers and common symbols (including decimal point, #, space and +/-) are mainly used to edit file or folder names and set parameters. USB Host (item 10) allows reading and storing the instrument state or trace in the USB storage device or store the contents currently displayed on the screen in .png or .jpg or .bmp format.

Function Details:

Frequency: Set the parameters of frequency, and Peak → CF, CF → Step

Span: Set the parameters of span, and X-scale(Log-Linear) setup

Amplitude: Set the parameters of amplitude, including Ref Level, Attenuator, Preamp, etc; and Correction setup

Auto Tune: Scan the full span rapidly and move the biggest signal to center freq, and automatically sets the optimal parameters according to the signal

BW: Set the parameters of RBW and VBW, Average Type (Log power, Power, Voltage), and Filter Type(-3 dB Gauss/ -6 dB EMI)

Trace: Selects Trace / Trace Setup / Trace Math

Sweep: Set the parameters of sweep ,and EMI QPD Dwell Time

Detect: Select the Detector type for each trace independently

Trigger: Selects the Free Trigger / Video Trigger / External Trigger

Limit: Sets the Pass / Fail Limit

TG: Set the parameters of tracking generator. Including TG Level, TG Level offset, Normalization setup. The backlight LED is on when TG source is on.

Demod: Sets AM and FM Parameters

Meas: In spectrum analyzer mode, selects the Advanced Measurement function. In non spectrum analyzer mode, select corresponding settings.

Meas Setup: Set the measurement parameters.

Marker: Selects the Marker Trace and Marker Math

Marker→: Set other system parameters on the basis of the current marker value.

Marker Fn: Selects the Noise Marker / N dB BW / Freq Counter / Read Out of Freq

Peak: Searches for the Peak Signal, peak search configuration and peak table.

System: Sets the system parameters.

Function Details Continued:

Mode: Selects the Vector Network Analyzer, Spectrum Analyzer / EMI / Reflection Measurements, etc

Display: Used to adjust the Grid Brightness / Display Line and other display parameters

File: Selects the File System

Preset: Resets the system to default status

Couple: Selects the RBW / VBW / Attenuator / Freq Step /Sweep Time Mode and other parameters

Help: Opens Help Information

Save: Save Shortcut Key

Rear Panel

1. Handle
2. USB Device
3. LAN Interface
4. 10MHz Reference In
5. 10MHz Reference Out
6. External Trigger In
7. Kensington Lock Point
8. AC Power Socket

1. Handle

Pull up the handle vertically for easy carrying of the instrument. When you do not need the handle, press it down.

2. USB Device Interface

The analyzer can serve as a “slave” device to connect external USB devices. Through this interface, a PC can be connected to control the analyzer remotely through programming or PC software.

3. LAN Interface

Through this interface, the analyzer can be connected to your local network for remote control.

4. REF IN 10 MHz

The analyzer can use internal or external reference source.

• When a 10 MHz external clock signal is received through the [10 MHz IN] connector, this signal is used as the external reference source and “Ext Ref” is displayed in the status bar of the user interface. When the external reference is lost, transfinite or not connected, the instrument switches to its internal reference source automatically and “Ext Ref” on the screen disappears.

• The [10 MHz IN] and [10 MHz OUT] connectors are usually used to build synchronization among multiple instruments.

5. REF OUT 10 MHz

The analyzer can use internal or external reference source.

• When internal reference source is used, the [10 MHz OUT] connector can output a 10 MHz clock signal generated by the analyzer. This signal can be used to synchronize other instruments.

• The [10 MHz OUT] and [10 MHz IN] connectors are usually used to build synchronization among multiple instruments.

6. Trigger in

In external trigger mode, the connector receives an external trigger signal through a BNC cable.

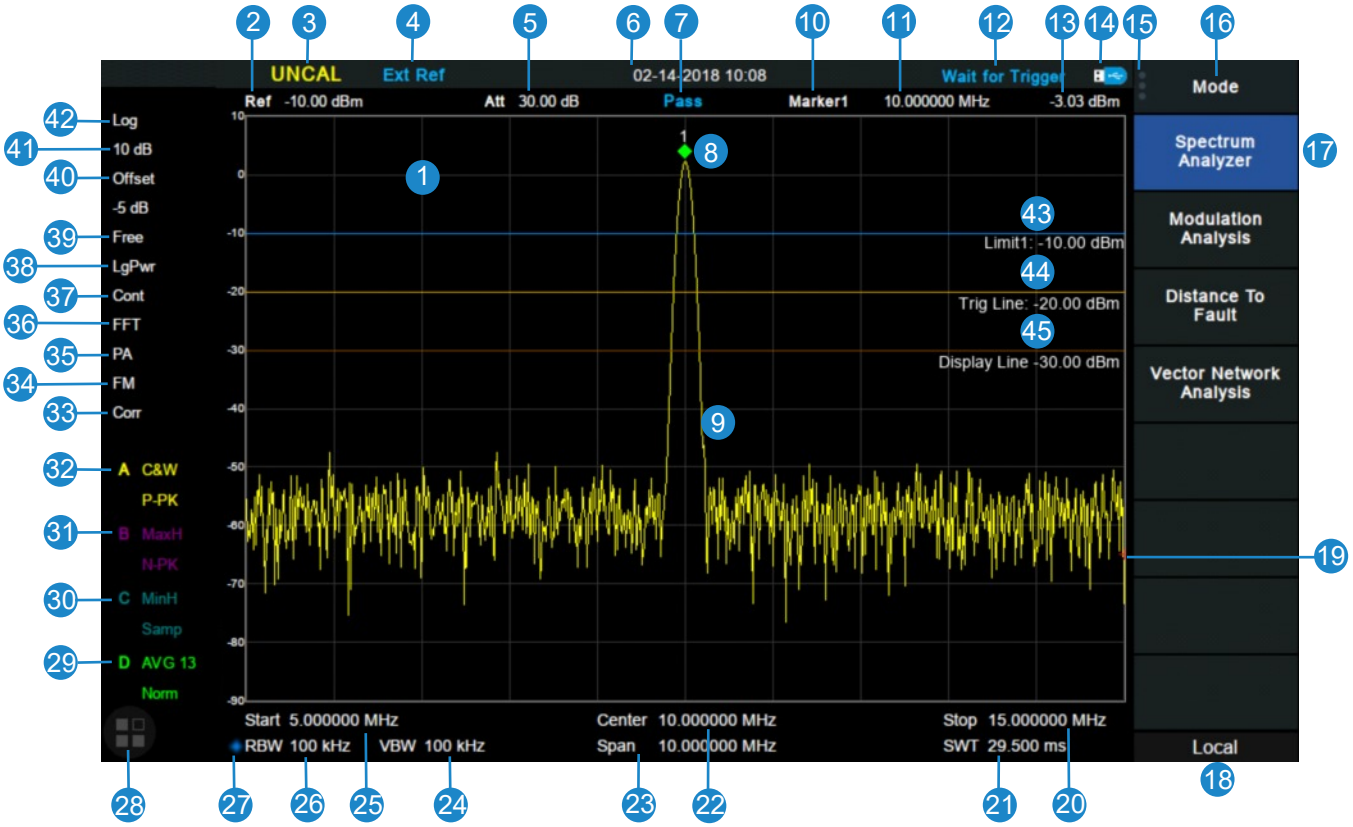
7. Security Lock Hole

If needed, you can use a security lock (sold separately) to lock the analyzer to a desired location.

8. AC Power Supply and Fuse

The analyzer accepts 100-240V, 50/60/400Hz AC power supply. Please use the power cord provided to connect the instrument. Before power on, make sure the analyzer is protected by fuse.

Graphical User Interface



Number	Name	Description
1	Display Area	Waveform display area
2	Ref	Reference level
3	UNCAL	When the sweep time less than the auto couple time, the measure result may be inaccuracy, appear “UNCAL”
4	EXT REF	Ext 10 MHz reference clock detected indicator
5	Att	Attenuator Value
6	Day and time	System time
7	Pass/Fail status	Limit Pass / Fail status
8	Marker	Current active marker
9	Trace	Active trace
10	Marker	Current marker, select to open a new marker
11	Marker X value	Frequency, frequency delta or time
12	Operation status	Waiting for trigger or acquiring
13	Marker Y value	Amplitude value or amplitude delta value
14	USB Storage	USB storage device identification is displayed when a USB flash drive is inserted
15	Main menu touch icon	Selecting this button will bring up the main menu
16	Menu title	Function of the current menu
17	Menu selection	Menu items of the current function
18	Local / remote status	Local is local mode, Remote is remote mode, Upgrade means the instrument is upgrading
19	Sweep progress indicator	Indicates the currently scanned frequency position
20	Stop frequency	Sweep stop frequency value
21	Sweep time	The time a sweep will take
22	Center frequency	Center frequency value
23	Span	Frequency span value
24	VBW	Video bandwidth value
25	Start frequency	Sweep start frequency value
26	RBW	Resolution bandwidth value

Number	Name	Description
27	Blue icon	When displayed indicates that VBW and RBW are not automatically coupled but in manual configuration mode
28	Touch assistant	Click to open the commonly used functions for measurement, such as peak search. Touch Assist can be moved to any position on the screen and it can be turned off
29, 30, 31, 32	Trace Status	Set the trace parameters of A/B/C/D. Trace mode: C&W: Clear Write, MaxH: Maximum Hold, MinH: Minimum Hold, View: View, AVG: Video average and times. Detect Type: P-PK: Positive peak, N-PK: Negative peak, Samp: Sample, Norm: Normal, AVG: Average, Q-PK: Quasi-peak
33	Correction	Indicates that there is a user configured amplitude correction when present.
34	AM or FM	AM or FM identification
35	PA	Enable or disable the Preamplifier
36	FFT	Sweep mode is FFT
37	Single or Continue	Sweep mode is Single or Continuous
38	Average type	Log power / Power / Voltage power
39	Trigger type	Free / Video / External trigger
40	Ref offset	Reference Offset identification and value
41	Scale / Div	Vertical scale value
42	Scale type	Log or linear
43	Limit line	Limit Pass / Fail level
44	Trigger level	Video trigger level
45	Display line	Reference display line

Mode

The vector network analyzer offers a variety of operating modes, some only available via user purchased options. Selecting via the **Mode** key enables:

• Vector Network Analyzer

• Modulation Analysis (AMA/DMA)

• Spectrum Analyzer

• Distance To Fault (DTF)

Front panel key operations vary functionality in different modes.

User Notices and Warnings

RF Input

Ensure that the input signal to the RF input port does not contain more than 50 Volts DC, otherwise damage will occur to the instrument. The AC (radio frequency) input signal component should not exceed a maximum continuous power level of +30dBm.

The RF INPUT can be connected to the device under test through a cable with a N male connector.

In VNA mode this port is used as the input port S21.

Tracking Generator Output

To avoid damage to the tracking generator, The reverse DC voltage must not exceed 50V DC.

The TG SOURCE can be connected to the device under test through a cable with a N male connector.

In VNA mode this port is used as the single port of S11 and the VNA output port of S21.

More Information

You can view your instrument model, serial number, hardware and software version by selecting **System → System Info.**

For more information about this product, please refer to the following documents:

Vector Network Analyzer User Manual: provides detailed information about the functions of this product.

Vector Network Analyzer Datasheet: provides the main characteristics and specifications of this product.

Firmware Operation

Check System Information: Users can get the system information by pressing **System→ System Info**, including

• Product Model, Serial Number and Host ID.

• Software Version and Hardware Version.

• Option Information.

Firmware Upgrade: Follow this procedure to finish the firmware update:

1. Download the firmware package from the Teledyne LeCroy website (http://teledynelecroy.com).

2. Extract and copy the .ADS file into the root directory of a USB stick.

3. Plug the USB stick into the USB Host connector. Press **System→ System Info → Firmware Update**, find the .ADS file in USB stick.

4. Press the **Load**, the analyzer will perform the update process automatically.

The upgrade procedure will take several minutes. Once the upgrade is completed, please follow the instruction to reboot.

Any interruption during the update process will result in update failure and system data lost. Do not remove the USB storage device until the update is finished.

Loading Options: Refer to the procedures below to activate the options you have purchased.

1. Press **System** → Load Option

2. Enter the license key in the onscreen window. Press **Enter** to confirm your input and terminate the license key input.

The option will be enabled after rebooting.

Touch Screen Operation

The Vector Network Analyzer has a 10.1 inch touch screen and supports various gesture operations. Including:

• Click on the upper right corner of the screen to enter the main menu

• Swipe up and down or left and right in the waveform area to change the X-axis center coordinate or Y-axis reference level

• Perform two-points scaling in the waveform area to change the X-axis span

• Click on a screen parameter or menu for parameter selection or editing

• Open and drag the marker

• Use auxiliary shortcuts to perform common operations

You can turn the touch screen function on and off via **Display** → **Touch Settings**

Remote Control

The vector network analyzer supports communication with computers via USB and LAN. By using these interfaces, in combination with programming languages and/or NI-VISA software, users can remotely control the analyzer based on SCPI (Standard Commands for Programmable Instruments) command set, Labview and IVI (Interchangeable Virtual Instrument), to inter-operate with other programmable instruments. You can also remote monitor and control the analyzer in a Web Browser.

For more details, refer to the T3VNA Programming Guide.

Using Built-in Help

The built-in help system provides information about every function key at the front panel and every menu soft key.

• Press **Help** and a prompt about how to obtain help information will be shown at the center of the screen. Then, press the key for which you need help and the relevant help information will be shown at the center of the screen.

• To close the help information window, press **Help** again.

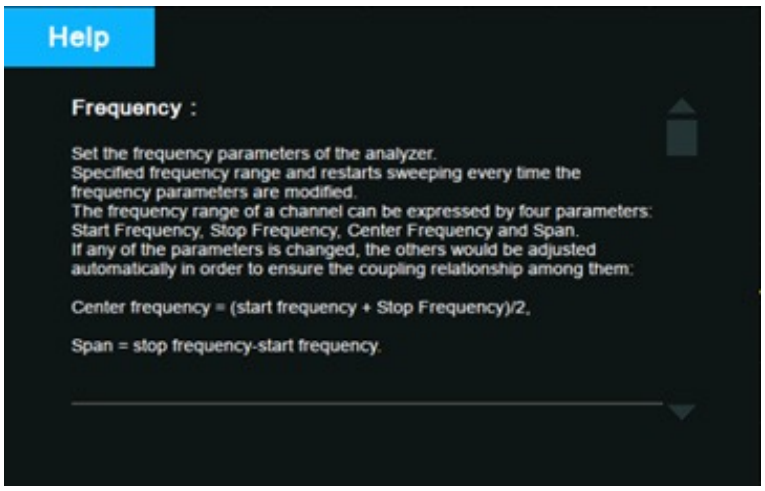


Figure 11 Help Information.

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ABOUT TELEDYNE TEST TOOLS

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 expands on the Teledyne LeCroy product portfolio by adding a comprehensive range of test equipment solutions for its customers. The new range of product solutions deliver engineers with a broad range of quality test solutions that enables speed to market product validation and design. More and more designers, engineers and lecturers are relying on Teledyne Test Tools to meet their testing, education and electronics validation needs with confidence and within budget.

Location and Facilities

Headquartered in Chestnut Ridge, New York, Teledyne Test Tools and Teledyne LeCroy have 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.

Teledyne LeCroy (US Headquarters)

700 Chestnut Ridge Road
Chestnut Ridge, NY. USA
10977-6499
Phone: 800-553-2769 or 845-425-2000
Fax Sales: 845-578-5985
Email Sales: contact.corp@teledynelecroy.com
Email Support: support@teledynelecroy.com
(Oscilloscopes, Waveform Generators, Signal Integrity)
Web Site: http://teledynelecroy.com/
Phone Support: 1-800-553-2769

Teledyne LeCroy (European Headquarters)

Teledyne LeCroy GmbH
Im Breitspiel 11c
D-69126 Heidelberg, Germany
Phone: + 49 6221 82700
Fax: +49 6221 834655
Fax Sales: +49 6221 834655
Fax Service: +41 22 719 22 99
Email Sales: contact.gmbh@teledynelecroy.com
Email Service: service.gmbh@teledynelecroy.com
Email Support: applications.de@teledynelecroy.com
Web Site: http://teledynelecroy.com/germany
Phone Service: +49 6221 8270 85
Phone Support: +49 6221 8270 28