

# Vector Network Analyzers

## TTR500 Series Datasheet



Legendary support and quality meets ease-of-use and affordability. The Tektronix TTR500 series 2-port, 2-path VNA is our latest breakthrough - an unmatched combination of measurement performance and convenience. Get the power to make everyday measurements with the accuracy and confidence you expect from Tektronix, all without breaking your budget.

### Key performance specifications

- 100 kHz to 6 GHz frequency range
- > 122 dB dynamic range
- -50 to +7 dBm output power
- < 0.008 dB RMS trace noise

### Key features

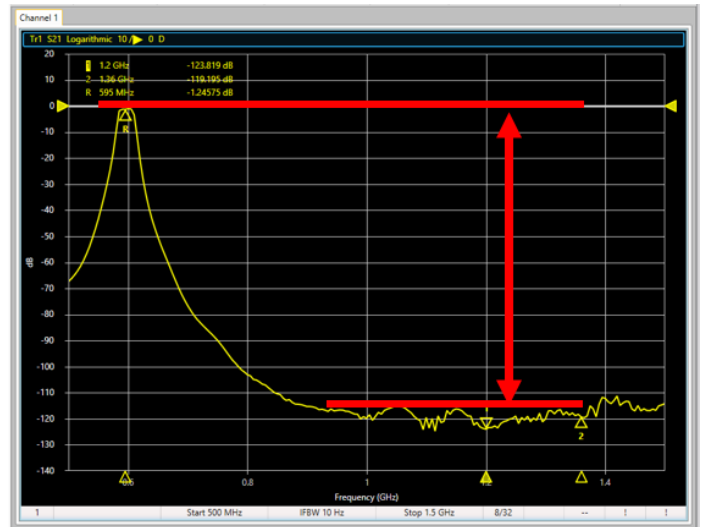
- Full 2-port 2-path S-parameter measurement ( $S_{11}$ ,  $S_{21}$ ,  $S_{12}$ ,  $S_{22}$ ) in a variety of formats.
- Complete vector network analysis capability with Tektronix VectorVu-PC™ software.
- Built-in bias tee accessible on both ports to bias active devices.
- Application programming interface (API) for Microsoft Windows environment and LabView driver.
- Robust SCPI command interface (compatible with current VNA models) to optimize code migration.
- Touchstone file support (import/export) for use with Electronic Design Automation (EDA) simulation tools.
- Offline simulation mode for analysis of S-parameter files when disconnected from the instrument.
- Industry-leading three year warranty.

### Applications

- Antenna matching and tuning
- RF component design and validation
- Education

### Benchtop performance at a fraction of the cost

The TTR500 offers industry-leading price and performance. With more than 122 dB dynamic range and less than 0.008 dB RMS trace noise, the TTR500 has performance similar to expensive, conventional benchtop VNAs.



### Compact and transportable: Take test where you need it

Gone are the days when you had to roll a cart with a heavy, shared VNA. Weighing under 3.5 lbs (1.59 kg), the TTR500 has a form factor small enough to fit in a briefcase. With a price tag to match, you can put a VNA on every engineering bench to improve efficiency and uptime. In a classroom, students can get hands-on experience with industry standard test instrumentation.



## Performance, size, reliability, affordability - choose four

The TTR500A series VNA includes an impressive array of technological and patented advances that allowed us to bend many of the traditional trade-offs between RF performance, size, reliability, and cost.

**Performance:** Inside the VNA is a tightly integrated, single-board design. At its core lies a proprietary ASIC that implements all of the transmitting and receiving functions. Along with decades of experience in RF front-end and shielding design, this integration allowed us to implement advanced DSP and patented error correction techniques that dramatically improve measurement accuracy and dynamic range.



**Convenience:** Traditional benchtop VNAs have a computer inside that typically becomes obsolete by the time the product hits the market. Our architecture enables significant improvements in size, cost, and reliability by communicating over USB to your PC, while adding additional benefits and convenience. For example, run VectorVu-PC with other applications, share data seamlessly, and save individual application setups on your PC when multiple users share the TTR500.

**Size:** A compact single-board design without heavy input and display components allows the TTR500 to pack a lot of powerful functionality in a tablet-sized frame. Store it in a drawer, pack it in your briefcase, or carry it on a plane. Take quality test and measurement technology wherever you need it.

**Reliability:** In addition to reduced part count, integration on a singleboard consumes less energy than traditional benchtop VNAs. The board generates less heat, resulting in lower component stresses and higher reliability. A fanless design provides a quieter operation. We back all of this with a three year warranty.

**Affordability:** With fewer parts and an integrated design, we created a handheld VNA that delivers traditional benchtop performance convenience at an unrivaled price. Why settle for less?

## Integrated bias tee for active devices

Use the built-in bias tee (standard in both models) to provide a DC bias to active devices without the expense and complication of external circuitry. Power the bias tee directly through BNC connectors on the rear panel.



### Complete line of affordable accessories

To simplify shopping for the complete VNA solution, Tektronix offers a range of accessories for high-accuracy measurements. Select from calibration kits, phase-stable cables, adapters, attenuators, rackmount, rugged carry case, and a training kit. See **Ordering information** for a full list of available accessories.



### Full 2-port 2-path S-parameter measurements



\*PC not included.

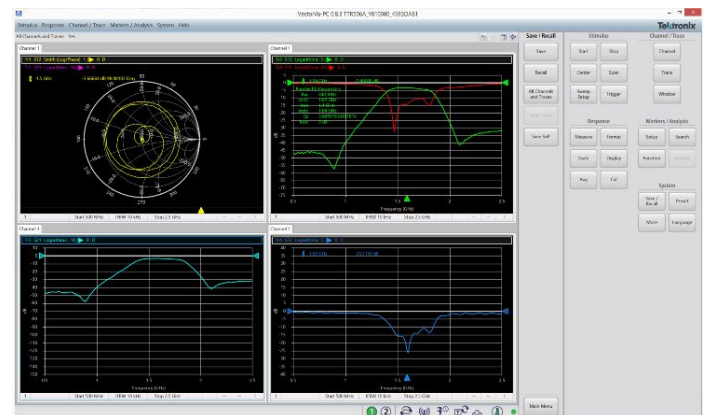
An independent RF source and three RF receivers for each port of the TTR500 enable you to take high-accuracy magnitude and phase measurements with a 1-port or 2-port device under test (DUT). Use the TTR500 to perform complete  $S_{11}$ ,  $S_{12}$ ,  $S_{21}$ , and  $S_{22}$  measurements of the DUT and display data in a variety of formats (see measurement functionality table).

### VectorVu-PC measurement functionality

| Sweep types  | Measured parameters   |
|--|---|
| Linear<br>Log  | $S_{11}$ , $S_{12}$ , $S_{21}$ , $S_{22}$<br>Absolute receiver level  |
| Data display formats   | Channel/trace functions   |
| Logarithmic magnitude<br>Linear magnitude<br>Phase<br>Expanded phase<br>Group delay<br>Smith chart<br>Polar<br>SWR<br>Real/Imaginary                               | Up to 16 channels<br>Up to 16 traces/channel<br>Up to 9 markers/trace + reference marker<br>Memory math<br>Averaging<br>Smoothing<br>Save/load state, calibration, and trace data |
| Calibration  | Trigger   |
| Response (Reflection/Transmission)<br>Enhanced response<br>Full 1-port SOL<br>Full 2-port SOLT<br>- Defined thru<br>- Unknown thru<br>User-defined calibration kit | Manual<br>Internal<br>External<br>SCPI command  |

### Rapid measurement and analysis with VectorVu-PC

VectorVu-PC (available as free download) features an industry-standard interface that minimizes the learning curve so you have more time to test your design. The software delivers a traditional look and feel to control and calibrate the instrument, while providing touchscreen compatibility for Windows PC, laptop, or tablet. For automated test systems, we include a SCPI programming interface that is compatible with common legacy VNAs. A LabView driver is also available for analysis and control. See the TTR500 programmer manual for more information.



## Offline simulation mode for convenient data analysis

VectorVu-PC features a simulation mode to analyze S-parameter data when disconnected from the TTR500. Capture measurements at the test site and analyze the data anywhere. Share it with your team or class when access to the TTR500 is limited.

## Compatibility with EDA simulation tools

VectorVu-PC supports the Touchstone (S1P, S2P) file format to import and export S-parameter data in the simulation mode. You can also share data in this format with common EDA simulation tools.

## Tektronix: A name you can trust

For over 70 years, Tektronix has delivered industry-leading solutions to the people who drive technological progress. We maintain unrivaled standards of quality, reliability, service, and support with every product, like free access to our Technical Support Centers around the world.

## Specifications

All specifications are warranted performance characteristics with guaranteed tolerance limits, unless noted otherwise. All specifications are valid between 18 °C and 28 °C ambient temperature and apply to all models unless noted otherwise.

**Nominal** refers to the features or characteristics of the design.

**Typical** indicates that 80% of units will meet the published typical performance with 80% confidence, unless otherwise noted. Typical performance is not warranted.

**Typical-Mean** indicates the mean performance measured on a sample of units immediately after performing an alignment. Typical-Mean performance is not warranted.

### General

#### Frequency range

|                |                    |
|----------------|--------------------|
| <b>TTR503A</b> | 100 kHz to 3.0 GHz |
| <b>TTR506A</b> | 100 kHz to 6.0 GHz |

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**Ports** 2-ports, Type-N female connectors

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**Measurements** Two-port, two-path S-parameters ( $S_{11}$ ,  $S_{12}$ ,  $S_{21}$ ,  $S_{22}$ ) and related measurements.

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**Connectivity** USB 2.0

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**Software** VectorVu-PC™ (requires Windows® 7/8/10, 64-bit)

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**Corrected system performance with calibration kit**

**Spinner Type-N mechanical calibration kit BN533861**

User Correction ON.

Two 60 cm Tektronix cables 012-1765-00 or 012-1768-00

| Frequency  | Directivity (dB) | Source match (dB) | Load match: Insertable devices (dB) | Load match with M-M or F-F thru (dB) | Reflection tracking (dB) | Transmission tracking: Insertable devices (dB) |
|--|------------------|-------------------|-------------------------------------|--------------------------------------|--------------------------|--|
| 300 kHz to < 1 MHz   | -38              | -34               | -37                                 | -35                                  | 0.08                     | 0.05   |
| 1 MHz to < 10 MHz  | -37              | -34               | -37                                 | -35                                  | 0.08                     | 0.02   |
| 10 MHz to < 100 MHz  | -37              | -34               | -37                                 | -35                                  | 0.08                     | 0.01   |
| 100 MHz to < 1 GHz   | -36              | -34               | -37                                 | -35                                  | 0.08                     | 0.01   |
| 1 GHz to < 3 GHz   | -36              | -34               | -37                                 | -35                                  | 0.08                     | 0.02   |
| 3 GHz to 6 GHz   | -36              | -34               | -36                                 | -35                                  | 0.09                     | 0.02   |
| 18 °C to 28 °C, within 1 °C of calibration temperature and at the same ambient humidity conditions in which calibration was performed. |                  |                   |                                     |                                      |                          |  |

**Spinner 3.5 mm mechanical calibration kit BN533854**

User Correction ON.

Two 60 cm Tektronix cables 012-1769-00 or 012-1772-00

| Frequency  | Directivity (dB) | Source match (dB) | Load match: Insertable devices (dB) | Load match with M-M or F-F thru (dB) | Reflection tracking (dB) | Transmission tracking: Insertable devices (dB) |
|--|------------------|-------------------|-------------------------------------|--------------------------------------|--------------------------|--|
| 300 kHz to < 1 MHz   | -36              | -33               | -37                                 | -35.5                                | 0.1                      | 0.06   |
| 1 MHz to < 10 MHz  | -35              | -33               | -37                                 | -35.5                                | 0.1                      | 0.02   |
| 10 MHz to < 100 MHz  | -35              | -33               | -37                                 | -35.5                                | 0.1                      | 0.01   |
| 100 MHz to < 1 GHz   | -35              | -33               | -35                                 | -35.5                                | 0.1                      | 0.01   |
| 1 GHz to < 4 GHz   | -35              | -33               | -35                                 | -35.5                                | 0.1                      | 0.02   |
| 4 GHz to 6 GHz   | -28              | -28               | -29                                 | -29                                  | 0.22                     | 0.03   |
| 18 °C to 28 °C, within 1 °C of calibration temperature and at the same ambient humidity conditions in which calibration was performed. |                  |                   |                                     |                                      |                          |  |

**Spinner Type-N calibration kit BN533844**

User Correction ON.

Two 60 cm Tektronix cables 012-1765-00

| Frequency  | Directivity (dB) | Source match (dB) | Load match: Insertable devices (dB) | Load match with M-M or F-F thru (dB) | Reflection tracking (dB) | Transmission tracking: (dB) |
|--|------------------|-------------------|-------------------------------------|--------------------------------------|--------------------------|-----------------------------|
| 300 kHz to < 1 MHz   | -32              | -31               | -32                                 | -31                                  | 0.15                     | 0.07                        |
| 1 MHz to < 10 MHz  | -32              | -31               | -32                                 | -31                                  | 0.15                     | 0.03                        |
| 10 MHz to < 100 MHz  | -31              | -31               | -32                                 | -31                                  | 0.15                     | 0.01                        |
| 100 MHz to < 1 GHz   | -31              | -31               | -32                                 | -31                                  | 0.15                     | 0.01                        |
| 1 GHz to < 4 GHz   | -31              | -31               | -32                                 | -31                                  | 0.15                     | 0.02                        |
| 4 GHz to 6 GHz   | -25              | -25               | -26                                 | -26                                  | 0.3                      | 0.04                        |
| 18 °C to 28 °C, within 1 °C of calibration temperature and at the same ambient humidity conditions in which calibration was performed. |                  |                   |                                     |                                      |                          |                             |

## Uncorrected system performance

User correction OFF. Factory correction ON.

| Frequency            | Directivity (dB) | Source match (dB) | Load match (dB) | Reflection tracking (dB) | Transmission tracking (dB) |
|----------------------|------------------|-------------------|-----------------|--------------------------|----------------------------|
| 300 kHz to < 500 kHz | -25              | -25               | -4.5            | ±1                       | ±1                         |
| 500 kHz to < 2 MHz   | -25              | -25               | -4.5            | ±1                       | ±1                         |
| 2 MHz to < 10 MHz    | -25              | -25               | -11             | ±1                       | ±1                         |
| 10 MHz to < 200 MHz  | -25              | -25               | -11             | ±1                       | ±1                         |
| 200 MHz to < 1.5 GHz | -25              | -25               | -10             | ±1                       | ±1                         |
| 1.5 GHz to < 4.5 GHz | -25              | -25               | -8              | ±1                       | ±1                         |
| 4.5 GHz to < 5 GHz   | -25              | -25               | -7              | ±1                       | ±1                         |
| 5 GHz to 6 GHz       | -25              | -25               | -7              | ±1                       | ±1                         |

## Frequency

### Range

|         |                    |
|---------|--------------------|
| TTR503A | 100 kHz to 3.0 GHz |
| TTR506A | 100 kHz to 6.0 GHz |

**Resolution** 1 Hz

**Accuracy** ± 7.0 ppm over 1 year calibration interval, 18 °C to 28 °C

### Internal reference

|                  |        |
|------------------|--------|
| Frequency        | 10 MHz |
| Initial accuracy | ±10 Hz |

**External reference input** 10 MHz ± 50 Hz

## Test port output

|   | 300 kHz to < 1 MHz          | 1 MHz to < 2 MHz    | 2 MHz to < 3 GHz    | 3 GHz to < 4.5 GHz (TTR506A) | 4.5 GHz to 6 GHz (TTR506A) |
|---|-----------------------------|---------------------|---------------------|------------------------------|----------------------------|
| Settable level  | -50 dBm to + 10 dBm         | -50 dBm to + 10 dBm | -50 dBm to + 10 dBm | -50 dBm to + 10 dBm          | -50 dBm to +10 dBm         |
| Harmonics at levels ≤ 0 dBm (typical)                           | -25 dB                      | -30 dBc             | -30 dBc             | -30 dBc                      | -30 dBc                    |
| Level accuracy -25 dBm to 3 dB below max specified output power | ±2.5 dB<br>±1.7 dB, typical |                     |                     |                              |                            |
| Max output power (typical)                                      | 2 dBm                       | 2 dBm               | 9 dBm               | 8 dBm                        | 7 dBm                      |

Test port input

Dynamic range

| Description   |               | 300 kHz to < 1 MHz                  | 1 MHz to < 2 MHz                      | 2 MHz to < 200 MHz                    | 200 MHz to < 3 GHz                    | 3 GHz to < 4.5 GHz (TTR506A only)     | 4.5 GHz to 6 GHz (TTR506A only)       |
|---------------|---------------|-------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Dynamic range | Typical       | 112 dB                              | 117 dB                                | 124 dB                                | 125 dB                                | 123 dB                                | 122 dB                                |
|               | Specification | -                                   | -                                     | -                                     | 124 dB                                | 123 dB                                | 122 dB                                |
| Noise floor   |               | -110 dBm/Hz (< -115 dBm/Hz typical) | < -120 dBm/Hz (< -125 dBm/Hz typical) | < -120 dBm/Hz (< -125 dBm/Hz typical) | < -125 dBm/Hz (< -130 dBm/Hz typical) | < -125 dBm/Hz (< -130 dBm/Hz typical) | < -125 dBm/Hz (< -130 dBm/Hz typical) |

Crosstalk with load

| Description                                | 300 kHz to < 1 MHz | 1 MHz to < 10 MHz | 10 MHz to < 200 MHz | 200 MHz to < 1 GHz | 1 GHz to < 2 GHz | 2 GHz to 6 GHz (TTR506A only above 3 GHz) |
|--|--------------------|-------------------|---------------------|--------------------|------------------|---|
| Uncorrected crosstalk with load            | -85 dB             | -110 dB           | -105 dB             | -120 dB            | -115 dB          | -120 dB                                   |
| Corrected crosstalk with load <sup>1</sup> | -90 dB             | -118 dB           | -115 dB             | -125 dB            | -125 dB          | -120 dB                                   |

<sup>1</sup> After full 2-port SOLT calibration with isolation using a Spinner BN533861 Type-N 50 Ω load.



Dynamic accuracy and compression

Dynamic accuracy

| Received level range | 105 MHz | 2 GHz   |
|----------------------|---------|---------|
| > +5 to +10 dBm      | 0.65 dB | 0.4 dB  |
| > 0 to +5 dBm        | 0.35 dB | 0.2 dB  |
| > -20 to 0 dBm       | 0.2 dB  | 0.15 dB |
| > -34 to -20 dBm     | 0.25 dB | 0.2 dB  |
| > -50 to -34 dBm     | 0.35 dB | 0.3 dB  |
| > -60 to -50 dBm     | 0.55 dB | 0.45 dB |

Dynamic accuracy, typical-mean

| Received level range | 10 MHz  | 105 MHz | 350 MHz | 783.5 MHz | 1.083 GHz | 2 GHz   | 3 GHz   | 4 GHz   | 5.25 GHz | 6 GHz   |
|----------------------|---------|---------|---------|-----------|-----------|---------|---------|---------|----------|---------|
| > +5 to +10 dBm      | 0.4 dB  | 0.3 dB  | 0.3 dB  | 0.3 dB    | 0.25 dB   | 0.2 dB  | 0.2 dB  | 0.15 dB | 0.15 dB  | 0.15 dB |
| > 0 to +5 dBm        | 0.25 dB | 0.25 dB | 0.1 dB  | 0.1 dB    | 0.1 dB    | 0.05 dB | 0.05 dB | 0.05 dB | 0.05 dB  | 0.05 dB |
| > -30 to 0 dBm       | 0.15 dB | 0.1 dB  | 0.1 dB  | 0.1 dB    | 0.1 dB    | 0.1 dB  | 0.1 dB  | 0.1 dB  | 0.1 dB   | 0.1 dB  |
| -50 to -30 dBm       | 0.2 dB  | 0.15 dB | 0.15 dB | 0.15 dB   | 0.15 dB   | 0.15 dB | 0.15 dB | 0.15 dB | 0.15 dB  | 0.15 dB |



Test port compression at maximum input level

Compression at +10 dBm input level (typical-mean) is > +5 to +10 dBm

| Frequency   | 10 MHz | 105 MHz | 350 MHz | 783.5 MHz | 1.083 MHz | 2 GHz  | 3 GHz  | 4 GHz  | 5.25 GHz | 6 GHz  |
|-------------|--------|---------|---------|-----------|-----------|--------|--------|--------|----------|--------|
| Compression | 0.4 dB | 0.4 dB  | 0.3 dB  | 0.25 dB   | 0.25 dB   | 0.2 dB | 0.2 dB | 0.2 dB | 0.2 dB   | 0.2 dB |

### Dynamic accuracy and compression

|                                    |           |                                |                         |
|------------------------------------|-----------|--------------------------------|-------------------------|
| Trace noise <sup>2</sup> , typical |           | <b>300 KHz to &lt; 200 MHz</b> | <b>200 MHz to 6 GHz</b> |
|                                    | Magnitude | 0.008 dB RMS                   | 0.006 dB RMS            |
|                                    | Phase     | 0.05 degrees RMS               | 0.04 degrees RMS        |

|  |           |                         |                            |
|--|-----------|-------------------------|----------------------------|
| Temperature stability <sup>3</sup> , typical |           | <b>300 KHz to 3 GHz</b> | <b>&gt; 3 GHz to 6 GHz</b> |
|  | Magnitude | 0.008 dB/°C             | 0.015 dB/°C                |
|  | Phase     | 0.1 degrees/°C          | 0.2 degrees/°C             |

### Maximum receiver input level

|                |           |                    |                          |
|----------------|-----------|--------------------|--------------------------|
|                | <b>DC</b> | <b>&lt; 10 MHz</b> | <b>≥ 10 MHz to 6 GHz</b> |
| Operational    | ± 24 V    | 10 dBm             | 10 dBm                   |
| Without damage | ± 30 V    | 15 dBm             | 20 dBm                   |

### Output level calibration

| Manufacturer                        | Supported power sensors                            |
|-------------------------------------|--|
| Tektronix USB power sensors         | PSM3000 series<br>PSM4000 series<br>PSM5000 series |
| Keysight USB power sensors          | U848x series<br>U2020 series<br>U2000 series       |
| Rohde and Schwarz USB power sensors | NRP-Z power sensors<br>NRP-xxS/SN power sensors    |

### Connectors

#### Front panel



| Name   | Function               | Description             |
|--------|------------------------|-------------------------|
| Port 1 | VNA measurement port 1 | Type N female conductor |
| Port 2 | VNA measurement port 2 | Type N female conductor |
| LO A   | LO A In/Out            | SMA female conductor    |
| LO B   | LO B In/Out            | SMA female conductor    |
| Power  | Power indicator        | Red/green LED           |

<sup>2</sup> Measured in a 1 KHz IF BW, 10 dBm output power, thru connection

<sup>3</sup> Measured in a 10 Hz IF BW, 0 dBm output power, thru connection

## Connectors

## Rear panel



| Name     | Function                              | Specifications                             | Connector  |
|----------|---------------------------------------|--|--|
| Bias 1   | Port 1 bias tee connection            | ± 24 VDC<br>± 200 mA maximum               | BNC Female   |
| Bias 2   | Port 2 bias tee connection            |  |  |
| Ref Out  | 10 MHz reference output               | 10 MHz ± 60 Hz<br>> 5 dBm                  |  |
| Ref In   | 10 MHz reference input                | 10 MHz ± 50 Hz<br>-5 dBm to + 10 dBm       |  |
| Trigger  | Trigger input                         | TTL<br>± Edge, ± Level<br>> 50 nS duration |  |
| Aux Sync | Auxiliary trigger                     | TTL  |  |
| DC input | Power supply                          | 4.752 to 5.25 VDC                          | 2.5 x 5.5 x 9.5 mm barrel connector<br>Center positive |
| USB 2.0  | USB connector for computer connection | USB 2.0                                    | USB 2.0 B connector                                    |

## Power supply

| Tektronix part number | Input  | Output                   |
|-----------------------|--|--------------------------|
| 119-8763-01           | 100 to 240 V AC, 50/60 Hz<br>IEC60320 C14 receptacle | + 5 V ±1%<br>4 A maximum |

## VectorVu-PC™ software

## System requirements

|   | Processor       | Memory | Drive |
|---|-----------------|--------|-------|
| Best  | Intel® Core™ i7 | 8 GB   | SSD   |
| Recommended                                     | Intel® Core™ i3 | 8 GB   | SSD   |
| Minimum   | Intel® Core™ i3 | 8 GB   | HDD   |
| Operating system: Windows® 7 or greater, 64-bit |                 |        |       |

## Physical characteristics

Length: 11.25" (28.58 cm)

Width: 8.125" (20.64 cm)

Depth: 1.75" (4.45 cm)

Weight: 3.5 lbs. (1.59 kg)

**Environmental and safety**

|                             |  |
|-----------------------------|--|
| <b>Temperature</b>          | Operating: +5 °C to +50 °C ( 41 °F to 122 °F)<br>Non-operating: -40 °C to 71 °C ( -40 °F to 159.8 °F)  |
| <b>Humidity (operating)</b> | 5% to 80% ±5%RH (relative humidity) in the temperature range of +10 °C to 30 °C (+50 °F to 86 °F)<br>5% to 75% ±5%RH above +30 °C to 40 °C (+86 °F to 104 °F)<br>5% to 45% ±5%RH above +40 °C up to 50 °C (+104 °F to +122 °F)<br>Non-condensing                       |
| <b>Altitude</b>             | Operating: 5000 m (16,404 ft)<br>Non-operating: 15,240 m (50,000 ft)   |
| <hr/>                       |  |
| <b>Dynamics</b>             |  |
| <b>Vibration</b>            | Operating: 0.31 GRMS: 5-500 Hz, 3 Axes at 10 min/axis<br>Non-operating: 2.46 GRMS: 5-500 Hz, 3 Axes at 10 min/axis   |
| <b>Shock</b>                | Operating: Half-sine mechanical shocks, 30 g peak amplitude, 11 msec duration, 3 drops in each direction of each axis, 18 total<br>Non-operating: Half-sine mechanical shocks, 40 g peak amplitude, 11 msec duration, 3 drops in each direction of each axis, 18 total |
| <hr/>                       |  |
| <b>Handling and transit</b> | Bench handling, operating: MIL-PRF-28800F Class 3<br>Transit drop, non-operating: MIL-PRF-28800F Class 2   |
| <hr/>                       |  |

## Ordering information

### Models

|         |   |
|---------|---|
| TTR503A | USB Vector Network Analyzer, 100 kHz to 3 GHz |
| TTR506A | USB Vector Network Analyzer, 100 kHz to 6 GHz |

### Power plug options

|          |  |
|----------|--|
| Opt. A0  | North America power plug (115 V, 60 Hz)  |
| Opt. A1  | Universal Euro power plug (220 V, 50 Hz) |
| Opt. A2  | United Kingdom power plug (240 V, 50 Hz) |
| Opt. A3  | Australia power plug (240 V, 50 Hz)      |
| Opt. A5  | Switzerland power plug (220 V, 50 Hz)    |
| Opt. A6  | Japan power plug (100 V, 50/60 Hz)       |
| Opt. A10 | China power plug (50 Hz)                 |
| Opt. A11 | India power plug (50 Hz)                 |
| Opt. A12 | Brazil power plug (60 Hz)                |
| Opt. A99 | No power cord                            |

### Service options

|           |   |
|-----------|---|
| Opt. C3   | Calibration Service 3 Years   |
| Opt. C5   | Calibration Service 5 Years   |
| Opt. D1   | Calibration Data Report   |
| Opt. D3   | Calibration Data Report 3 Years (with Opt. C3)  |
| Opt. D5   | Calibration Data Report 5 Years (with Opt. C5)  |
| Opt. G3   | Complete Care 3 Years (includes loaner, scheduled calibration, and more)  |
| Opt. G5   | Complete Care 5 Years (includes loaner, scheduled calibration, and more)  |
| Opt. R5   | Repair Service 5 Years (including warranty)   |
| Opt. R5DW | Repair Service Coverage 5 Years (includes product warranty period). 5-year period starts at time of instrument purchase |

### Warranty

Three year warranty

## Accessories

### Carrying case and rackmount

| Description          | Name          |
|----------------------|---------------|
| TTR500 Carrying case | TTR500TRANSIT |
| TTR500 Rackmount kit | TTR500RACK    |

### Calibration kits

| Description   | Name         |
|---|--------------|
| 7/16 SOLT mechanical calibration kit 0 to 7.5 GHz (Spinner BN 53 38 40)                     | CALMECH-716  |
| Type-N SOLT mechanical calibration kit 0 to 18 GHz (Spinner BN 53 38 61)                    | CALMECH-N    |
| 3.5mm SOLT mechanical calibration kit 0 to 32 GHz (Spinner BN 53 38 54)                     | CALMECH-35MM |
| 7/16 SOLT mechanical calibration kit MF Thru Option 0 to 7.5 GHz (Spinner BN 75 63 01 R000) | THRU-716-FM  |
| Type-N SOLT mechanical calibration kit MF Thru Option 0 to 18 GHz (Spinner BN 533918R000)   | THRU-N-FM    |
| 3.5mm SOLT mechanical calibration kit MF Thru Option 0 to 32 GHz (Spinner BN 533769R000)    | THRU-35MM-FM |
| 3.5 mm female SOLT 4-in-one kit   | CALSOLT35F   |
| 3.5 mm male SOLT 4-in-one kit   | CALSOLT35M   |
| 7/16 female SOLT 4-in-one kit   | CALSOLT716F  |
| 7/16 male SOLT 4-in-one kit   | CALSOLT716M  |
| Type N female SOLT 4-in-one kit   | CALSOLTNF    |
| Type N female SOLT 4-in-one kit 75 $\Omega$   | CALSOLTNF-75 |
| Type N male SOLT 4-in-one kit   | CALSOLTNM    |
| Type N male SOLT 4-in-one kit 75 $\Omega$   | CALSOLTNM-75 |

## Cables

| Description   | Part number |
|---|-------------|
| Cable, Rugged, Phase-stable, Type-N(m) to Type-N(m), 60 cm            | 012-1768-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to Type-N(f), 60 cm            | 012-1765-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to Type-N(m), 3.28 ft. (1 m)   | 012-1767-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to Type-N(f), 3.28 ft. (1 m)   | 012-1766-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to Type-N(m), 5 ft. (1.5 m)    | 012-1746-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to Type-N(f), 5 ft. (1.5 m)    | 012-1745-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to 7/16(f), 60 cm              | 012-1747-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to 7/16(m), 60 cm              | 012-1752-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to 7/16(m), 3.28 ft. (1 m)     | 012-1750-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to 7/16(f), 3.28 ft. (1 m)     | 012-1748-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to 7/16(m), 5 ft. (1.5 m)      | 012-1751-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to 7/16(f), 5 ft. (1.5 m)      | 012-1749-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to DIN 9.5(f), 60 cm           | 012-1753-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to DIN 9.5(m), 60 cm           | 012-1758-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to DIN 9.5(m), 3.28 ft. (1 m)  | 012-1756-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to DIN 9.5(f), 3.28 ft. (1 m)  | 012-1754-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to DIN 9.5(m), 5 ft. (1.5 m)   | 012-1757-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to DIN 9.5(f), 5 ft. (1.5 m)   | 012-1755-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to TNC(m), 60 cm               | 012-1762-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to TNC(f), 60 cm               | 012-1761-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to TNC(m), 3.28 ft. (1 m)      | 012-1763-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to TNC(f), 3.28 ft. (1 m)      | 012-1759-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to TNC(m), 5 ft. (1.5 m)       | 012-1764-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to TNC(f), 5 ft. (1.5 m)       | 012-1760-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to Type-SMA(m) 60 cm           | 012-1772-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to Type-SMA(f), 60 cm          | 012-1769-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to Type-SMA(m), 3.28 ft. (1 m) | 012-1773-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to Type-SMA(f), 3.28 ft. (1 m) | 012-1770-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to Type-SMA(m), 5 ft. (1.5 m)  | 012-1774-00 |
| Cable, Rugged, Phase-stable, Type-N(m) to Type-SMA(f), 5 ft. (1.5 m)  | 012-1771-00 |

Adapters

| Description   | Part number |
|---|-------------|
| Adapter, Coaxial, 50 Ohm Type-N(f) to Type-N(f)       | 013-0410-00 |
| Adapter, Coaxial, 50 Ohm Type-N(m) to Type-N(f)       | 013-0411-00 |
| Adapter, Coaxial, 50 Ohm, Type-N(m) to Type-N(m)      | 013-0412-00 |
| Adapter, Coaxial, 50 Ohm Type-N(m) to Type-N 7/16(m)  | 013-0402-00 |
| Adapter, Coaxial, 50 Ohm Type-N(m) to Type-7/1 (f)    | 013-0404-00 |
| Adapter, Coaxial, 50 Ohm Type-N(m) to Type DIN 9.5(m) | 013-0403-00 |
| Adapter, Coaxial, 50 Ohm Type-N(m) to Type-DIN 9.5(f) | 013-0405-00 |
| Adapter, Coaxial, 50 Ohm Type-N(m) to Type-SMA(f)     | 013-0406-00 |
| Adapter, Coaxial, 50 Ohm Type-N(m) to Type-SMA(m)     | 013-0407-00 |
| Adapter, Coaxial, 50 Ohm Type-N(m) to Type-TNC(f)     | 013-0408-00 |
| Adapter, Coaxial, 50 Ohm Type-N(m) to Type-TNC(m)     | 013-0409-00 |



Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.



Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.



Product Area Assessed: The planning, design/development and manufacture of electronic Test and Measurement instruments.

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\* European toll-free number. If not accessible, call: +41 52 675 3777

**For Further Information.** Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit [www.tek.com](http://www.tek.com).

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Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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