Vector Network Analyzer (4 Ports)  8GHz

Protek A338 vector network analyzer is one of a Protek network analyzer family line covering a wider frequency range up to 8.0GHz than 3.2GHz Protek A333 has. The convenience and reliability of Protek A338 is inherited from Protek A333 and by the wider frequency range, the more applications can be used with Protek A338 in many industries.
### Key Features

- **Frequency Range**: 300kHz ~ 8GHz, 16 Parameters support (S11 ~ S44)
- **Measurement time per point**: 100us per point
- **Wide Output Power Range**: -60dBm to +10dBm
- **Dynamic Range**: >150dB (1Hz IF bandwidth)
- **Time domain and gating conversion included**
- **Two Independent Signal Sources**
- **Frequency offset mode, including vector mixer calibration measurements**
- **Up to 16 logical channels with 16 traces each**
- **Multiple precision calibration methods and automatic calibration**
- **Up to 500,001 measurement points**
- **Fixture simulation**
- **COM/DCOM compatible for LabView and automation programming**

### Measurement Capabilities

<table>
<thead>
<tr>
<th>Measured Parameters</th>
<th>S11, S22, S33, S44, S12, S13, S14, S21, S24, S31, S32, S34, S41, S42, S43 and absolute power of the reference and received signals at the port.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Measurement Channels</td>
<td>Up to 16 independent logical channels: each logical channel is represented on the screen as an individual channel window. A logical channel is defined by such stimulus signal settings as frequency range, number of test points, or power level.</td>
</tr>
<tr>
<td>Data Traces</td>
<td>Up to 16 data traces can be displayed in each channel window. A data trace represents one of such parameters of the DUT as S-parameters, response in time domain, input power response.</td>
</tr>
<tr>
<td>Memory Traces</td>
<td>Each of the 16 data traces can be saved into memory for further comparison with the current values.</td>
</tr>
<tr>
<td>Data Display Formats</td>
<td>Logarithmic magnitude, linear magnitude, phase, expanded phase, group delay, SWR, real part, imaginary part, Smith chart diagram and polar diagram display formats are available.</td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>Typical dynamic range of 150dB is achieved through the entire frequency range (at 1Hz IF bandwidth)</td>
</tr>
<tr>
<td>Low Measurement Errors</td>
<td>This device has a low variation between a large pool of manufactured instruments. Low trace noise allows for particularly high-precision measurements.</td>
</tr>
</tbody>
</table>
Key Features

**Sweep Features**

- **Sweep Type**
  - Linear frequency sweep, logarithmic frequency sweep, and segment frequency sweep occur when the stimulus power is a fixed value. Linear power sweep occurs when frequency is a fixed value.

- **Measured Points Per Sweep**
  - Set by the user from 2 to 500,000.

- **Segment Sweep Features**
  - A frequency sweep within several independent user-defined segments. Frequency range, number of sweep points, source power, and IF Bandwidth should be set for each segment.

- **Power**
  - Source power from -60dBm to +10dBm with resolution of 0.05dB. In frequency sweep mode, the power slope can be set to up to 2dB/GHz for compensation of high frequency attenuation in connection wires.

- **Sweep Trigger**
  - Trigger Modes: continuous, single, or hold.
  - Trigger Sources: internal, manual, external, bus.

**Trace Functions**

- **Trace Display**
  - Data trace, memory trace, or simultaneous indication of data and memory traces.

- **Trace Math**
  - Data trace modification by math operations: addition, subtraction, multiplication or division of measured complex values and memory data.

- **Autoscaling**
  - Automatic selection of scale division and reference level value allow the most effective display of the trace.

- **Electrical Delay**
  - Calibration plane moving to compensate for the delay in the test setup. Compensation for electrical delay in a device under test (DUT) during measurements of deviation from linear phase.

- **Phase Offset**
  - Phase offset is defined in degrees.

- **Frequency Scan Segmentation**
  - This VNA has a large frequency range with the option of frequency scan segmentation. This allows optimal use of the device, for example, to realize the maximum dynamic range while maintaining high measurement speed.

- **Power Scanning and Compression Point Recognition**
  - The power sweep feature turns compression point recognition, one of the most fundamental and complex amplifier measurements, into a simple and accurate operation.

- **Balanced Measurements**
  - This function enables evaluation of devices with balanced ports, for instance, differential amplifiers or transformers, as pictured here.

**Trace Math**

- **Addition**
  - Math operations of measured complex values and memory data.

**Trace Math**

- **Subtraction**
  - Math operations of measured complex values and memory data.

**Trace Math**

- **Multiplication**
  - Math operations of measured complex values and memory data.

**Trace Math**

- **Division**
  - Math operations of measured complex values and memory data.

**Scalar Mixer/Converter Measurements**

- **Scalar Mixer/Converter Measurements**
  - The scalar method allows the user to measure only the magnitude of the transmission coefficient of the mixer and other frequency translating devices. No external mixers or other devices are required. The scalar method employs port frequency offset when there is a difference between the source port frequency and the receiver port frequency.

- **Scalar Mixer/Converter Calibration**
  - This is the most accurate method of calibration applied for measurements of mixers in frequency offset mode.

**Vector Mixer/Converter Measurements**

- **Vector Mixer/Converter Measurements**
  - The vector method allows the measurement of both the magnitude and phase of the mixer transmission coefficient.

- **Vector Mixer/Converter Calibration**
  - This method of calibration is applied for vector mixer measurements.

**Automatic Frequency Offset Adjustment**

- **Automatic Frequency Offset Adjustment**
  - The function performs automatic frequency offset adjustment when the scalar mixer/ converter measurements are performed to compensate for internal LO setting inaccuracy in the DUT.

**Sweep Trigger**

- **Sweep Trigger**
  - Trigger Modes: continuous, single, or hold.
  - Trigger Sources: internal, manual, external, bus.

**Time Domain Measurements**

- **Time Domain Measurements**
  - The function performs data transformation from frequency domain into response of the DUT to various stimulus types in time domain. Modeled stimulus types: bandpass, lowpass impulse, and lowpass step. Time domain span is set by the user arbitrarily from zero to maximum, which is determined by the frequency step.

**Time Domain Gating**

- **Time Domain Gating**
  - This function mathematically removes unwanted responses in the time domain, which allows the user to obtain frequency response without influence from fixture elements.

**Limit Testing**

- **Limit Testing**
  - Limit testing is a function of automatic pass/fail judgment for the trace of the measurement results. The judgment is based on the comparison of the trace to the limit line set by the user and can consist of one or several segments.

**Port Impedance Conversion**

- **Port Impedance Conversion**
  - The function of conversion of the S-parameters measured at 50 port into the values, which could be determined if measured at a test port with arbitrary impedance.

**S-Parameter Conversion**

- **S-Parameter Conversion**
  - The function allows conversion of the measured S-parameters to the following parameters: reflection impedance and admittance, transmission impedance and admittance, and inverse S-parameters.
TFT Color LCD (10.4-inch)
Daylight viewable high resolution LCD display

Power & LED
Power On/Off
Green LED: Power On Status
Red LED: External Power

USB
Instrument states, Calibration data and Trace data can be stored on an external USB drive.

Screen Menu
Display selectable menu in connection with function keys or soft keys

Soft Key
Select menu displayed on the screen

Enter
Input numeric values

Knob / Arrow
Move marker positions or items on the table list
### Measurement Range
- Impedance: 50Ω
- Test Port Connector: N-type, Female
- Number of Test Ports: 4
- Frequency Range:
  - 300 KHz to 8.0 GHz
- Full CW Frequency Accuracy: ±5x10⁻⁶
- Frequency Setting Resolution: 1 Hz
- Number of Measurement Points: 1 Hz to 500,001
- Measurement Bandwidths:
  - 1 Hz to 30 kHz (with 1/1.5/2/3/5/7 steps)
- Dynamic Range (IF Bandwidth 10 Hz):
  - From 100 KHz to 300 KHz: -90 dBm
    - From 300 KHz to 8.0 GHz: -125 dBm

### Test Port Output
- Match (without system error correction):
  - Power Range:
    - 100 KHz to 6.0 GHz: +18 dB
    - 6.0 GHz to 8.0 GHz: +18 dB
  - Power Accuracy: ±0.5 dB
  - Power Resolution: 0.05 dB
  - Harmonics Distortion:
    - From 300 KHz to 8.0 GHz: -18 dB
    - Non-harmonic Spurious: -25 dBc
  - Trace Noise Magnitude:
    - (IF Bandwidth 3 KHz):
      - From 100 KHz to 300 KHz: 5 mdB rms
      - From 300 KHz to 8.0 GHz: 1 mdB rms

### Measurement Accuracy
- Accuracy of Transmission Measurements (Magnitude / Phase):
  - +15 dB to +15 dB: 0.2 dB / 2°
  - +50 dB to +50 dB: 0.2 dB / 1°
  - -70 dB to -50 dB: 0.2 dB / 1°
- Trace Stability:
  - Trace Noise Magnitude (IF Bandwidth 3 KHz):
    - From 100 KHz to 300 KHz: 5 mdB rms
    - From 300 KHz to 8.0 GHz: 1 mdB rms
  - Temperature dependence (Per One Degree of Temperature Variation):
    0.02 dB / °C

### Test Port
- Directivity:
  - (without system error correction):
    - 100 KHz to 300 KHz: 15 dB
    - 300 KHz to 8.0 GHz: 18 dB
- Test Port Input:
  - Match (without system error correction):
    - Damage Level: 18 dB
    - Damage DC Voltage: 35 V
    - Noise Level (defined as the rms value of the specified noise floor, IF bandwidth 10 Hz):
      - From 100 KHz to 300 KHz: -105 dBm
      - From 300 KHz to 8.0 GHz: -125 dBm

### Measurement Speed
- Measurement time per point:
  - 100,000 points
- Source to receiver port switchover time:
  - 10 ms

### Typical Cycle Time Versus Number of Measurement Points

<table>
<thead>
<tr>
<th>Points</th>
<th>Start 100 KHz, stop 10 MHz, IF bandwidth 30 KHz</th>
<th>Start 10 MHz, stop 8.0 GHz, IF bandwidth 30 KHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>13.1 ms</td>
<td>45.5 ms</td>
</tr>
<tr>
<td>201</td>
<td>45.5 ms</td>
<td>102.3 ms</td>
</tr>
<tr>
<td>401</td>
<td>1601 ms</td>
<td>408.3 ms</td>
</tr>
<tr>
<td>408</td>
<td>Unconnected</td>
<td>Full Two-port Calibration</td>
</tr>
<tr>
<td>10</td>
<td>Unconnected</td>
<td>Full Two-port Calibration</td>
</tr>
</tbody>
</table>

### General Data
- External Reference Frequency:
  - 10 MHz
  - Input Level: 2 dBm ± 3 dB
  - Input Impedance: 50Ω
- Operating Temperature Range:
  - +40 °C to +129 °C
- Storage Temperature Range:
  - -40 °C to +129 °C
- Humidity:
  - 90% at 41 °C
- Atmospheric Pressure:
  - 84 to 106.7 kPa

### Calibrations
- Calibration Frequency:
  - 3 years
- Calibration Interval:
  - 3 years
- External PC System Requirements:
  - Windows XP
  - CPU Frequency: 1 GHz
  - RAM: 512 MB
- Power Supply:
  - 110-240 V, 50/60 Hz
  - Power Consumption:
    - 80 W
  - Dimensions (L x W x H):
    - 320 x 439 x 238 mm
  - Weight:
    - 11.7 kg