Test More. Test Faster. Test for Less.

AEM

# Mixed Mode Multi-Port Vector Network Analyzer

(MMVNA-200)

## Optimized for Manufacturing Testing

A Multi-Port Vector Network Analyzer Capable of Simultaneously Measuring All Ports and Their Interdependency.

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# Multi-Port Component Testing

The MMVNA-200 is a multi-port vector network analyzer capable of simultaneously measuring all ports and their interdependency.

The small, portable 8-port form-factor makes MMVNA-200 easy to integrate in the manufacturing environment. Measuring all possible combinations of RF S-parameters on all ports within a sweep lasting less than 10 seconds, MMVNA-200 greatly reduces test time over other RF test systems. Additionally, multiple test ports eliminate the need of connecting and disconnecting different test fixtures repeatedly. No external RF switch matrix is required, further simplifying the test setup.

MMVNA-200 is uniquely capable of performing dual-ended testing using two independent MMVNA-200 instruments synchronized over the communication-channel under test. This feature makes it ideal for far-field measurements and cable measurements.

In addition to RF measurements, MMVNA-200 also performs DC measurements, ensuring proper end-to-end connectivity of the DUT and measuring DC resistance when required. This is an important feature for DUTs where many failures happen due to improper connectivity rather than RF performance.

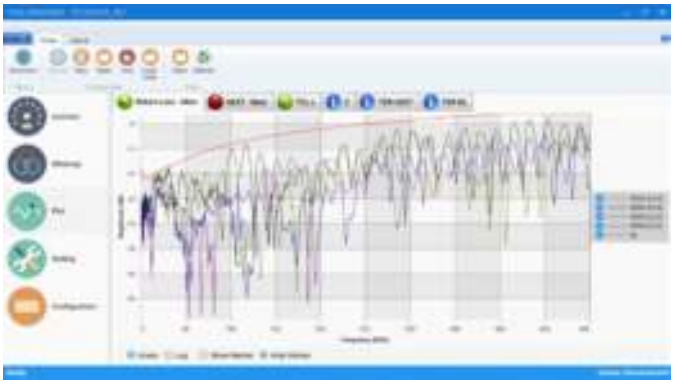
VNA Manager is a required companion software utility that facilitates control of the analyzer including customization of the Autotest through S-parameter based settings.

The system is IP addressable enabling remote view of test data across geographical locations.

While MMVNA-200 measures hundreds of different S-parameters in every sweep within seconds, yet it enables focusing on critical parameters by allowing flexible configuration, and easy-to-understand PASS/FAIL results. Results for mixed-mode and single-ended results are displayed and tools for zooming and filtering of results are available for in-depth analysis.

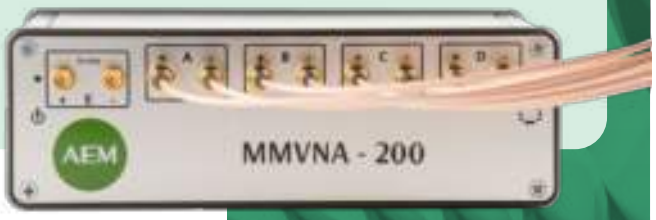
These features make MMVNA-200 one of the most versatile RF analyzer for the engineers interested in deep-dive, and at the same time fast and easy for the operators.

A large number of test applications can be supported by user configurable parameters and test limits. These are several built-in configurations for widely used test applications such as automotive single-pair Ethernet test.



# KEY CAPABILITIES

- Measurements of multi-port devices under test (up to 8 ports)
- End-to-end synchronized testing with two independent analyzers
- DC measurements and RF measurements in the same instrument
- All S-parameter combinations automatically measured during every autotest within seconds, with ability to choose parameters of interest
- Adheres to Open Alliance, BroadR-Reach, 802.3bw, 802.3bp and 802.3ch (draft) for the following s-parameter tests:
  - Link segments and components; cables, connectors, and wire harnesses
- Open Alliance VNA Reference Measurements
- Equipment connector interfaces (ECU, MDI)
- Transmitter's and Receiver's




# SPECIFICATIONS

| Parameter | Specification |
|---|---|
| **Frequency Range** | ▪ 0.1 – 3,000 MHZ |
| **Frequency Resolution** | ▪ 0.1 MHz |
| **Frequency Accuracy** | ▪ ± 2 ppm |
| **Test Ports (single ended)** | ▪ 4 (differential)/ 4 (single ended) |
| **Test Ports (dual ended)** | ▪ 8 (differential) |
| **IF bandwidth** | ▪ 100 Hz (range setting = 7) |
| **Test Interface** | ▪ SMA (female) |
| **Impedance of Test Port** | ▪ 50 Ω (single ended)<br>▪ 100 Ω (differential) |
| **Test Port power output** | ▪ -1.0 dBm |
| **Max DC voltage at Test Port (damage level)** | ▪ 60 V |
| **Sweep Speed** | ▪ -1.0 dBm |
| **Max DC voltage at Test Port (damage level)** | ▪ 0.3 msec/step (80 db noise floor)<br>▪ 3.4 msec/step (110 db noise floor) |
| **RF Measurement Parameters** | ▪ Differential-to-single ended return loss (SSD,x+/-,x)<br>▪ Differential-to-single ended cross-talk (SSD,y+/-,x)<br>▪ Differential-to-differential return loss (SDD,xx)<br>▪ Differential-to-differential cross-talk (SDD,yx).<br>▪ Differential to common mode return loss (TCL) (SCD,xx)<br>▪ Differential to common mode transmission (TCTL) (SCD,xx)<br>▪ Differential to common mode cross-talk (SCD,yx) |
| **RF Measurement Parameters – Double Ended** | ▪ Differential-to-single ended return loss and cross-talk. Differential-to-differential return loss and cross-talk. (near-end and far-end). Differential Insertion loss, differential to common-mode insertion loss |

## SPECIFICATIONS CONTINUED

| Parameter | Specification |
|---|---|
| **Measurement Floor - Cross-Talk (regular sweep mode)** | ▪ 100 dB @ 0.1MHz<br>▪ 105 dB @ 1MHz<br>▪ 105 dB @ 100MHz<br>▪ 95 dB @ 600MHz<br>▪ 85 dB @ 1000MHz<br>▪ 50 dB @ 3000MHz |
| **Measurement Floor- Return Loss (regular sweep mode)** | ▪ 60 dB @ 0.1MHz<br>▪ 60 dB @ 1MHz<br>▪ 60 dB @ 100MHz<br>▪ 50 dB @ 600MHz<br>▪ 40 dB @ 1000MHz<br>▪ 15 dB @ 3000MHz |
| **Dynamic Range transmission measurements (regular sweep mode)** | ▪ 90 dB @ 0.1MHz<br>▪ 100 dB @ 1MHz<br>▪ 100 dB @ 100MHz<br>▪ 95 dB @ 600MHz<br>▪ 85 dB @ 1000MHz<br>▪ 50 dB @ 3000MHz |
| **Accuracy - Transmission measurements (regular sweep mode) mid dynamic range measurements** | ▪ ± 0.2 dB @ 0.1MHz<br>▪ ± 0.1 dB @ 1MHz<br>▪ ± 0.1 dB @ 100MHz<br>▪ ± 0.1 dB @ 600MHz<br>▪ ± 0.3 dB @ 1000MHz<br>▪ ± 0.5 dB @ 3000MHz |
| **Accuracy - Reflection measurements mid dynamic range measurements** | ▪ ± 0.4 dB |
| **Directivity** | ▪ 40 dB @ 0.1MHz<br>▪ 60 dB @ 1MHz<br>▪ 60 dB @ 100MHz<br>▪ 45 dB @ 600MHz<br>▪ 30 dB @ 1000MHz<br>▪ 25 dB @ 3000MHz |
| **Tracking Error** | ▪ 0.05 dB (0.1 to 1000MHz) |
| **Source Return Loss** | ▪ 50 dB @ 1MHz<br>▪ 40 dB @ 100MHz<br>▪ 20 dB @ 1000 MHz |
| **Insertion Loss Measurement range-dual ended** | ▪ 80 dB @ 0.1MHz<br>▪ 80 dB @ 1MHz<br>▪ 70 dB@ 100 MHz<br>▪ 65 dB @ 1000 MHz<br>▪ 40 dB @ 3000 MHz |
| **DC Measurement Parameters - Double Ended** | ▪ 0 - 100 Ω (± 0.5 Ω) |
| **DC Resistance Measurement Range** | ▪ 0 - 100 Ω (± 0.5 Ω) |
| **DC Resistance Measurement Resolution** | ▪ 0.1 Ω |
| **File Format for S-parameter Results** | ▪ CSV and Touchstone (s8p, s16p) |
| **Plots** | ▪ frequency domain S-parameter (magnitude)<br>▪ time-domain impulse response (linear or dB)<br>▪ time-domain step response (impedance or dB)<br>▪ phase v/s frequency, real part v/s frequency, imaginary part v/s frequency<br>▪ ACRF, PSACRF for dual ended tests<br>▪ power sum measurements of selected combinations of S-parameters |

## SPECIFICATIONS CONTINUED

| Parameter | Specification |
|---|---|
| **Size** | ▪ 17.5cm (Depth) x 16.5cm (Width) x 5.5cm (Height) |
| **File Format for S-parameter results** | ▪ CSV and Touchstone (s8p, s16p) |
| **Weight** | ▪ 1.0 kg |
| **Power Supply** | ▪ 5V DC adapter |
| **Power Consumption** | ▪ 8 W |
| **Battery Operation** | ▪ 8 hours with full charge and 1 test/min |
| **Connectivity** | ▪ USB, 10/100/1000 Ethernet |
| **Operating System** | ▪ Linux |
| **Operating Temperature** | ▪ 0 °C to 45 °C |
| **Storage Temperature** | ▪ -50 °C to +70 °C |
| **Humidity** | ▪ 90 % at 25 °C |
| **Atmospheric pressure** | ▪ 70.0 kPa to 106.7 kPa |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