MICRAN

ACCURACY – SPEED – QUALITY

THE NEW GENERATION OF HIGH PERFORMANCE
VECTOR NETWORK ANALYZERS
PANORAMA R4213/R4226

- R4213 : 300 kHz to 13.5 GHz
- R4226 : 10 MHz to 26.5 GHz

Micran R4213/R4226 Vector Network Analyzers

- Frequency range 0.3/10 MHz to 13.5/26.5 GHz
- High dynamic range 145 dB
  at 1 Hz IF bandwidth
- Wide source power range -90 dB
  to +12/+15 dB
- Low trace noise of 0.002 dB RMS
  at 1 kHz IF bandwidth
- High temperature stability of 0.01 dB/°C

Description

The new generation of high performance vector network analyzers R4213/4226 is designed on the principle of flexible architecture. This makes the analyzers ideal for testing of passive and active devices as well as solutions for complex tasks. Up-to-date Micran patented software and hardware solutions allow combine the huge set of the microwave (MW) measurements in only one device, reduce instrument cost, and enhances accuracy and measurement repeatability.

Micran VNA simplifies measurement cases for development, serial manufacture and verification of RF and MW products. It is an ideal solution for wireless communications, aerospace and defense, computer, medical, automotive, etc.

Features and Applications

Time domain analysis and gating

- Time domain analysis is useful for measuring impedance values along a transmission line and for evaluating a device problem (discontinuity) in time or distance
- Allows to display responses, passed through the DUT and reflected from it, in time or distance, for example caused by reflections in a test fixture. Gating provides the flexibility to selectively remove reflection or transmission responses. This can be useful when designing and troubleshooting cable assemblies
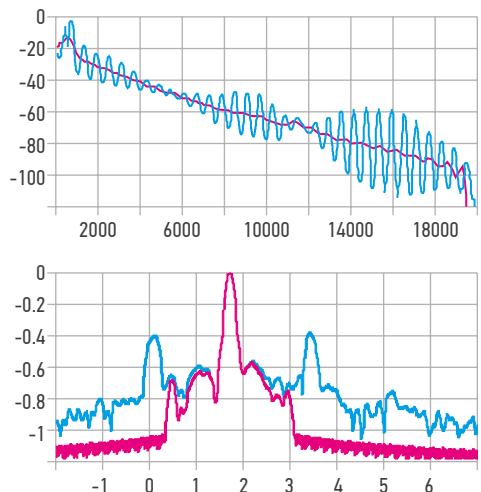
Limit testing

- Give the operator visual guides when tuning devices
- Provide standard criteria for meeting device specification
- Show the comparison of data versus specifications
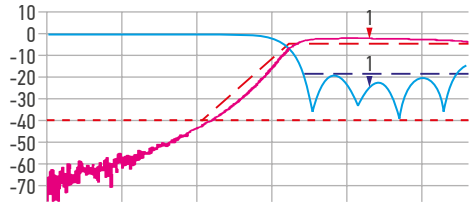
Limit testing compares the measured data with defined limits, and provides optional Pass or Fail information for each measured data point.
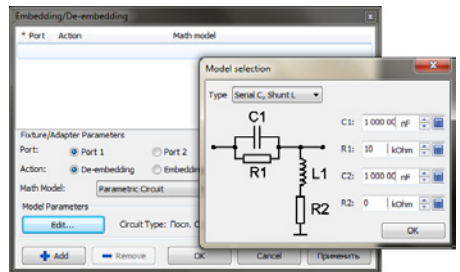
Frequency and Power sweep
- Linear, list sweep
- AM-AM and AM-PM compression measurements
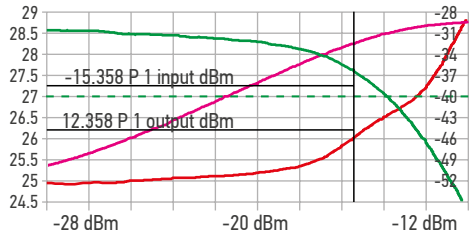
Embedding/De-Embedding

- This function allows the user to mathematically exclude or integrate the circuit connected between the calibration plane and the DUT from the measurement results
- This circuit should be described by s2p file, or parametric circuit

Calibration capabilities

- TRL/LRL/TRM/LRM calibration
- Adapter removal/insertion
- Source and receivers calibration with an external power meter
- SOLT calibration (with known, or unknown thru)
- Automatic calibration using the ECal module
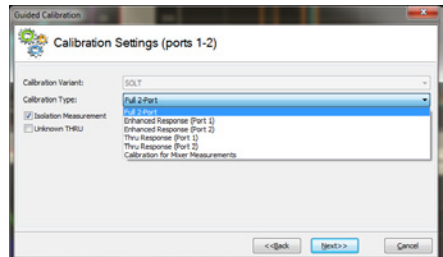
Mixer measurement

- Conversion loss/gain, magnitude and phase
- Input match, output match Isolation
- Scalar mixer calibration
- Vector mixer calibration
- LO source control and LO power calibration
- Calibration wizard

Noise Figure measurement

- Built-in noise receiver
- The cold-source technique
- The ability to perform multiple measurements such as noise figure and S-parameters with a single set of connections
- Noise source is used only for calibration

Second internal source

- Frequency range 0.3/10 MHz to 13.5/26.5 GHz
- For IMD, hot-S22, and swept-LO measurements. Can be used as a local oscillator (LO) signal for testing conversion loss of mixers and frequency converters

High output power and wide power sweep range

- Power sweep range with internal attenuator from -90 dBm to +15 dBm

Port configuration

- Impedance conversion allows to mathematically transform the measurement results to what are in referenced in new Z impedance using VNA software
- Power Offset provides a method of compensating port power for added attenuation or amplification in the source path

High compression point

- For improved dynamic accuracy

Pulse measurement

- Point-in-pulse, average pulse, pulse profile capability
- Pulse I/O connector on rear panel for synchronization with external equipment and DUT
- The minimum measurement of S-parameters and the minimum pulse widths is 40 ns. Shifting the measuring window (in increments of ≥ 10 ns), measured pulse profile

Automatic calibration

- Automatic detection of the module electronic calibration
- Wide range of Micran ECal modules with different connector types are available

Front panel jumpers

- For direct access to test port couplers and receiver

Source and receiver attenuators for better measurement optimization

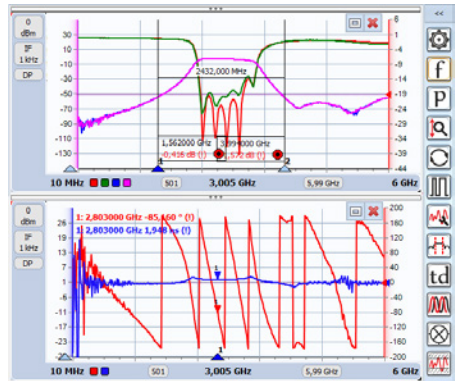- For better measurement optimization

Software

- User-friendly interface
- Versatile report generating system
- Custom profiles save/load for different measurement setups
- Formulae editor for complex mathematical calculations
- Unlimited memory traces
- Adjustable markers system
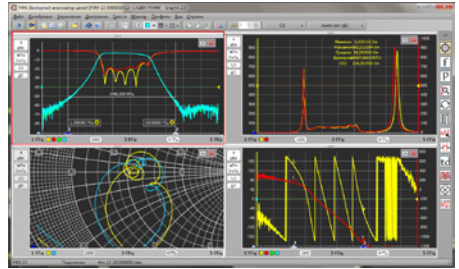
The VNA R4213/4226 analyzers are built on the architecture of virtual instrumentation. It is easy to use and allows to improve the performance of VNA functionality by affordable price.

Micran VNAs support SCPI command programming and software drivers for the most common programming environments. It also uses industry standard LAN communications for remote control and provides a powerful user-friendly interface for devices manual testing.

Multiple Measurements with a Single Instrument

Front R4213/4226

Configurable test set is available

Internal second source out

Test Port 1

Switching ports indication

Test Port 2

Back R4213/4226

10 MHz In/Out

Ethernet 10/100

Noise source +28 Vdc out

Trigger out

Trigger in

Configurator
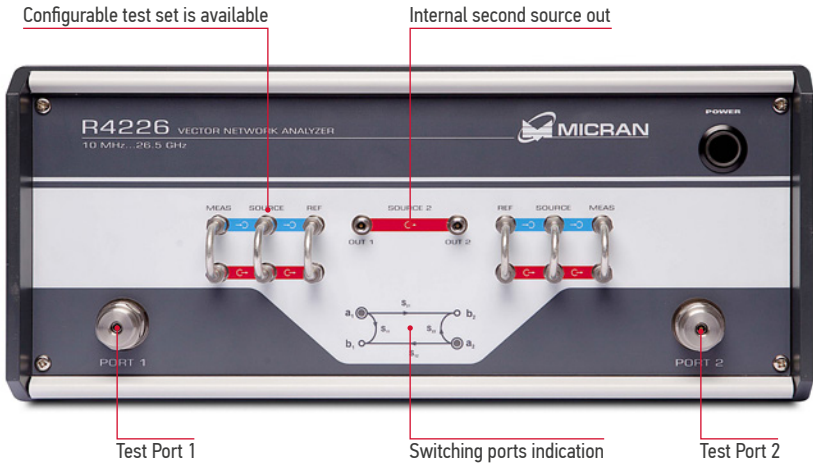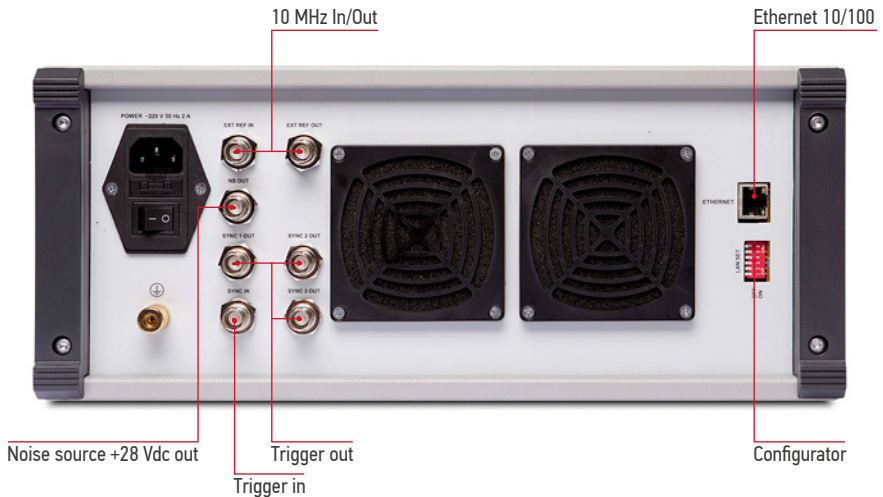
Specification

Dynamic range at 10 Hz IF Bandwidth, max output power

S11 trace noise at open load, 1 kHz IF Bandwidth, 0 dB output power

Specification

Key measurement functions and characteristics

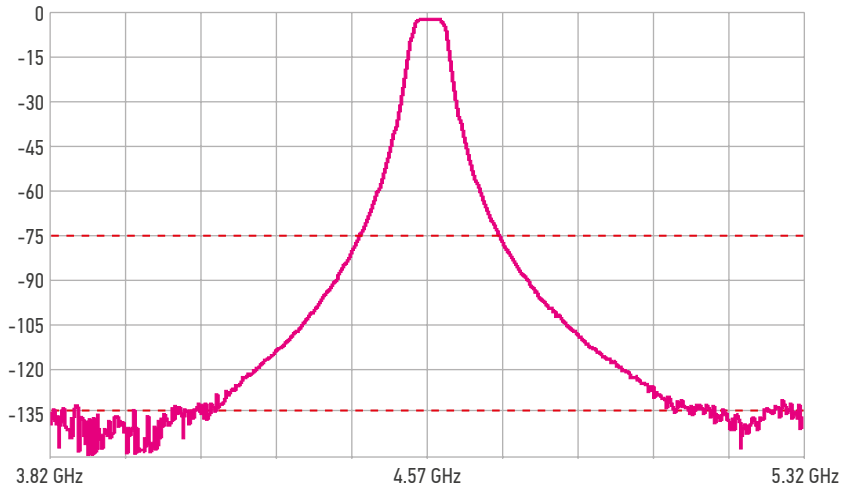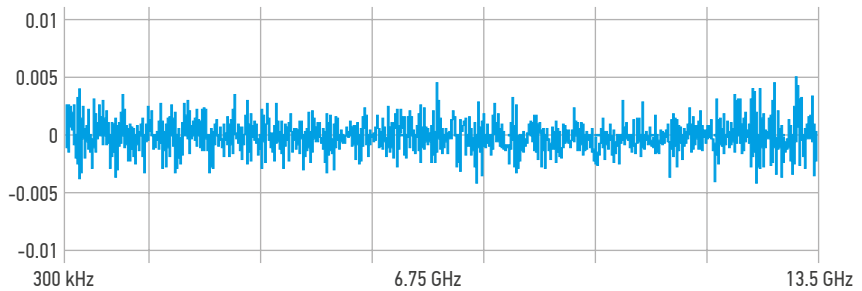|	R4213	R4226
Frequency range	300 kHz – 13.5 GHz	10 MHz – 26.5 GHz
Test port	2, 50 Ohm	
Type connector	Type N	3.5 mm NMD
Dynamic range (10 Hz IFBW)	135 dB	
0.1 dB compression	+15 dBm input	+12 dBm input
Maximum output power	+12 dBm	+15 dBm
Source power range	-90 to +12 dBm	-90 to +15 dBm
IFBW max	30 kHz	100 kHz
Frequency accuracy	±1 ppm	
Frequency resolution	1 Hz	
Power level accuracy	±0.8 dB	±1.0 dB
Power resolution	0.05 dB	0.05 dB
Harmonics distortion	-25 dBc	-25 dBc
Non-Harmonic spurious	-30 dBc	-30 dBc
Trace noise (1 kHz IFBW)	0.002 dB rms	
Stability	0.01 dB/^{0}C	
Calibration	SOLT, Adapter removal/insertion, ECal, TRL, Unknown thru, Power cal, Receiver cal, SMC	SOLT, Adapter removal/insertion, ECal, TRL, Unknown thru, Waveguide, Power cal, Receiver cal, SMC, VMC
Capability		
Time domain and Gating	+	+
Source/receive attenuators	+	+
Noise figure measurement with noise receiver	-	+
Scalar-mixer measurement	+	+
Vector-mixer measurement	-	+
Pulse measurement	+	+
AM-AM and AM-PM compression measurements	+	+
Front panel jumpers	+	+
Internal second source	+	+
Frequency offset	+	+
Power consumption	42 W	90 W
Dimensions (LxWxH)	380x350x160 mm	
Weight	5 kg	8.5 kg

Uncorrected System Performance, dB

	R4213	R4226
Directivity	20	20
Source match	20	18
Load match	20	18

Corrected system performance with Micran Calibration Kit NKMM, dB

R4213	300 kHz – 9 GHz	9 GHz – 13.5 GHz
Directivity	48	46
Source match	44	42
Load match	46	44

R4226	10 MHz – 9 GHz	9 GHz – 18 GHz	18 GHz – 26.5 GHz
Directivity	48	46	42
Source match	44	42	38
Load match	46	44	40

Calibration parameters R4213/R4226 with Micran EC4226 automatic calibration module, dB

	10 MHz – 8 GHz	8 GHz – 18 GHz	18 GHz – 24 GHz	24 GHz – 26.5 GHz
Directivity	48	45	42	42
Source match	45	48	47	44
Load match	44	45	42	41
Transmission tracking	±0.03	±0.03	±0.03	±0.035
Reflection tracking	±0.02	±0.02	±0.02	±0.02

Vector Network Analyzers Accessories

NKMM Calibration kits

Micran's NKMM calibration kits are used to calibrate vector network analyzers with different types of coaxial connectors (Type N, III, IX var.3, 3.5 mm, 2.4 mm). Each kit contains all necessary loads and coaxial adapters. S-parameters measurement VNA accuracy depends on a particular set of calibration kit. The total measurement error will be determined by inaccurate characterization of the measures and the constancy of their parameters during the operation, calibration method, and the instability of VNA. *Full information about the calibration kits you can find on our website* **www.micran.com**

EC4226 Automatic calibration modules

New generation of EC4226 electronic calibrators designed by Micran are proposed to automate the VNA calibration process. The key feature of electronic calibrator is own design and production MMIC with electronically switchable loads.
The electronic calibration module is equipped with additional adapters with NMD connectors on one side and standard connectors 3.5/1.52 mm in-series or 7.0/3.04 mm – on the other side for convenient and durable connection to the VNA ports.
In comparison to the calibration kit, electronic calibrator has the following advantages:
- Auto-definition to the VNA ports connection
- Reducing the complexity and duration of the calibration process
- Reducing the operator error
- Specialized GaAs MMIC, with constant phase difference between the measures in full frequency range
- Analyzer ports and cable assemblies wear reducing
- This device is available with different connectors type
- USB controlled

Phase-stable cable assembly

Micran's VNA have high metrological characteristics – low error and large dynamic range of S-parameters measurement. Using calibration kits in combination with a variety of calibration methods is useless if the cables, connecting the DUT and the analyzer, have poor shielding, which is sensitive to bending and movements. The low-quality connectors installed on the cable may damage both standard loads precision connectors and DUTs connectors.

To ensure the VNA accuracy characteristics it is recommended to use the phase-stable cable assemblies designed by Micran, that are made with special protection and heavy-duty NMD connectors.

Cable assembly is an extension of the measuring port, displacing the calibration plane directly to the measuring device. High flexibility and low sensitivity to bends allow you to conveniently place the DUT in the workplace. At bending of the cable to the minimum allowable radius of 6 cm phase transfer coefficient of the cable varies no more than 3 degrees, and the module - maximum 0.1 dB. Special cable protection limits the minimum bending radius of the cable, defends the cable from the mechanical compression, the longitudinal cross-twisting impacts.

MICRAN

There is no reason to refuse...

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Micran T&M Equipment Technical Support

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