R4M vector network analyzers

Features

- Measurement of S-parameters between 10 MHz and 20 GHz
- Dynamic range over 100 dB
- Pulse mode measurements: point-in-pulse, pulse-profile[1]
- Measurement of frequency converter parameters with vector calibration.
- Measurement of harmonics and intermodulation products levels
- Noise figure measurements
- Frequency and/or power sweep of probing signal
- Analysis and filtration in time domain, mathematical network integration and removal
- Vector calibration of coaxial, waveguide and microstrip paths, support of electronic calibrator

Description

The R4M vector network analyzer (VNA) is used to measure S-parameters of linear one-port and two-port devices, and various characteristics of electric circuits. The R4M series VNAs are used for analyzing, tuning, testing, monitoring and manufacture of high-frequency and microwave devices used in radio electronics, communications, radars, and measurement equipment. Analyzer's operating principle is based on separate measurements of incident wave, reflected wave and wave transmitted through DUT, using directional couplers. The R4M includes a synthesized source of probing signal and receivers of reflected signals and signals passed through DUT. Micran's VNA is computer-controlled with Graphit R4M software installed. Data interchange between VNA and PC is run via Ethernet. Multi-channel synchronization system provides joint operation of R4M and other devices. The control of R4M is run via SCPI commands making it possible to integrate the VNA into automated measurement and control systems. Due to modular architecture, which provides high integrability and configurability, R4M is a perfect solution to implement challenges. Depending on used hardware options, the analyzers are subdivided into several versions. You may add any software, hardware and combined software/hardware options to your selected version.

Features and options

Number of ports and output connector types (20A option)

The 20A is a hardware option that determines the output connector type. A ywo-port measurment unit with 3.5 mm NMD connectors (male).

Noise figure measurement (IKSH option)

The IKSH is a software/hardware option. The option provides noise figure measurement with vector correction of limited matching between DUT and R4M receiver input.

[1] Measurement errors of R4M analyzers are not standardized for additional operation modes.

The option requires a noise generator (not supplied). For detailed information on the generator and filters, refer to our website www.micran.ru, or contact us (contact details are at the end of this catalogue).

Measurement is performed by default receiver of R4M additionally equipped with low-noise preamplifier and set of switches. Such a combination allows to configure measurement circuit bypassing the directional coupler and increase the receive path sensitivity. For noise figure measurement a cold-source method is used with vector correction of DUT / R4M input mismatch, so that no noise generator in the measurment circuit are needed. The noise generator is required for the receiver calibration only. The GSHM2 noise generators are recommended, see Test & Measurement Equipment section of this catalogue. The device is calibrated using calibration kit (NKMM).

ilt is recommended to install additional matching attenuator (e.g. D2M attenuator) at the DUT input to avoid input impedance effects on noise figure.

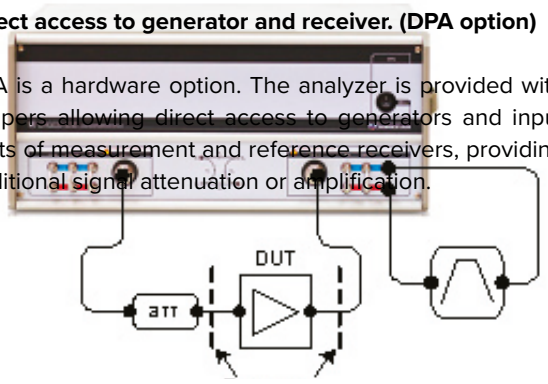
When switching the circuit comprising low-noise amplifier, R4M-18 is sequentially measuring S-parameters and noise figure.

Built-in switch of reference receiver (SPA option)

SPA is a hardware option. The analyzer has a switch installed that enables the control by distribution of first reference channel signal. The option provides high precision measurements in frequency conversion devices.

Direct access to generator and receiver. (DPA option)

DPA is a hardware option. The analyzer is provided with jumpers allowing direct access to generators and input ports of measurement and reference receivers, providing additional signal attenuation or amplification.



Calibration plane

Extended dynamic range (DMA option)

DMA is a hardware option. Four electromechanical attenuators are installed additionally to the DPA option, extending the output power range and optimizing the receivers' operation.

Pulse measurements (IIP option)

IIP is a software option. The parameter measurement synchronization of the DUT and the control signal of external pulse modulator or DUT power switching provide parameter measurements of various microwave devices operating in pulse mode. The minimum time required for measuring S-parameters (and minimum pulse duration, accordingly) is 40 ns. Pulse shape is measured by shifting measurement window (with step ≥ 10 ns).

Time domain analysis and filtration (VOP option)

VOP is a software option. The option allows to analyze DUT in time domain, and displays responses passed through / reflected from DUT vs. time or distance. Time domain filtration provides suppression of parasite responses, e.g. caused by re-reflections in attachments.

Mixer parameters measurement with vector calibration (SPA option is required)

Independent frequency control of probing signal and receiver heterodyne provides measurements of frequency conversion devices, using external oscillator. Built-in

Specifications

Operating frequency range	
In 7.0/3.04 mm coaxial path	10 MHz ... 18 GHz
In 3.5/1.52 mm coaxial path	10 MHz ... 20 GHz
Maximum allowable relative frequency setting error for operation with internal reference oscillator for one year	$\pm 2 \times 10^{-6}$
Output power setting range	
Without DMA option	−20 ... 0 dBm
With DMA option	−90 ... 0 dBm
Maximum allowable output power setting error within −20 to 0 dBm range	± 2 dB
Signal source attenuation range for DMA option	0 ... 70 dB with 10 dB step
Signal receiver attenuation range for DMA option	0 ... 30 dB with 10 dB step
Reflection coefficient (RC) modulus measurement range	0 ... 1
Transmission coefficient (TC) modulus measurement range within 125 to 18000 (20000) MHz range	
Without DMA option	−90 ... +20 dB
With DMA option	−90 ... +50 dB
Receiver inherent noise level for 10 Hz intermediate-frequency filter within 125 to 18000 (20000) MHz range	≤ −100 dBm
Maximum allowable absolute transmission coefficient modulus measurement error	± (0.5 ... 2.5) dB, depending on frequency and transmission coefficient modulus
Maximum allowable absolute transmission coefficient phase measurement error	1.5° to 12°, depending on frequency and transmission coefficient modulus
Maximum allowable absolute reflection coefficient modulus measurement error	± (0.01 ... 0.055) depending on frequency and reflection coefficient modulus
Maximum allowable absolute reflection coefficient phase measurement error	from 1.5° depending on frequency and reflection coefficient modulus