

Anritsu
Advancing beyond

Millimeter Wave Measurement Solutions



Millimeter Wave Applications

Millimeter waves are, strictly speaking, electromagnetic waves with frequencies of 30 – 300 GHz (wavelengths of 1 – 10 mm). However, in mobile communications, the 26 – 29 GHz band is also classified as a millimeter wave. Millimeter waves have the following characteristics:

- The wide frequency bandwidth enables high-speed communication.
- The short wavelength allows the detection of small objects with high spatial resolution. In addition, by using a highly directional antenna (such as a parabolic antenna), the radio beam can be narrowed, which reduces the effects of noise and interference waves.
- Millimeter waves have a greater directionality and are less prone to diffraction than microwaves.
- Compared to light waves such as lasers, millimeter waves are less susceptible to the attenuation and scattering caused by fog or rain.

Millimeter waves are used for the following communication services and sensing:

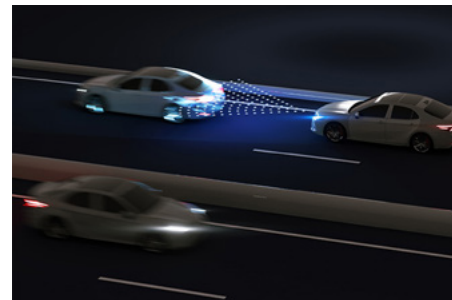
Terrestrial and non-terrestrial networks



Satellite communications and astronomical observations



Collision-prevention radar



Vital sensors



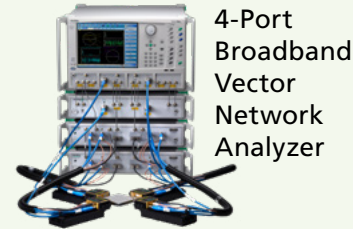
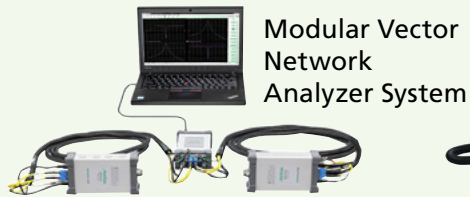
To guarantee the quality of these services, developers must evaluate the frequency characteristics of millimeter wave devices at each of the design, development, and manufacturing stages.

In addition, the cables and other components used for measurement also must themselves support sufficiently wide frequency bandwidth.

Millimeter Wave Measurement Solutions Lineup

R&D

Transmission Characteristics, Group Delay, Return Loss of Devices and Materials



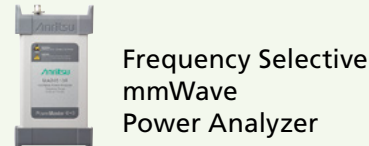
Spectrum Measurement



5G protocol Test/RF Measurement



Power Measurement



Interference Wave Generation, Pulse Signal Source



Manufacturing

Transmission Characteristics, Group Delay, Return Loss of Devices and Materials

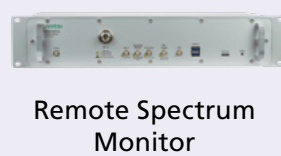
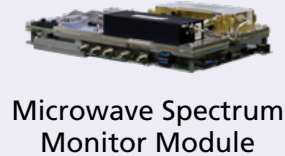


Power Measurement



Radio Wave Environment Measurement

Spectrum Measurement



Components



R&D: Communications

The development of devices that use millimeter waves requires the evaluation of multiple items, from material properties to compliance with the relevant wireless communication standards.



Distributed Modular 2-port Vector Network Analyzer

ME7869A

The ME7869A can evaluate amplitude and phase transmission characteristics even when the two measurement ends are far apart by connecting/synchronizing two independent VNA ports via a dedicated optical cable.

- Phase-synchronized measurement up to 43.5 GHz for distant distance
- Radiation pattern evaluation for large antenna arrays



Broadband Vector Network Analyzer

4-Port Broadband Vector Network Analyzer

ME7838 Series

ME7838x4 Series

Frequency response from 2 - 4 GHz (S-band) to 140 - 220 GHz (G-band) can be measured in a single sweep.

A four-port vector network analyzer can measure crosstalk.

- Frequency characteristics of substrates and devices up to 220 GHz
- On-wafer measurement



Spectrum Analyzer/Signal Analyzer + External Mixer MS2830A/MS2840A/MS2850A

In addition to spectrum measurements, Signal Analyzer can also evaluate modulated signals for in digital wireless systems.

By combining the unit with an external mixer, spectrum measurements up to 325 GHz are possible.



Ultraportable Spectrum Analyzer

MS2760A/MS2762A

It covers a range of 9 kHz - 170 GHz while its small size allows direct connection to most devices under test, eliminating the need for expensive, lossy cables.

Spectrum Master can be powered by USB and controlled from a Windows® PC, laptop, or tablet.



Radio Communication Test Station

RF Converter

MT8000A

MA80001A/MA80002A/MA80003A

The MT8000A functions as a 5G pseudo base station and uses a frequency converter to support all the millimeter wave frequency bands (28/39/43.5 GHz) used by 5G.



R&D: Radar, Sensors

The development of devices that use millimeter waves requires the evaluation of multiple items, from material properties to compliance with the relevant legal regulations.



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ME7869A

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Spectrum Analyzer/Signal Analyzer + External Mixer

MS2830A/MS2840A/MS2850A

The external mixing function using Eravant or VDI mixers enables the evaluation of wideband millimeter wave transmitters, such as millimeter wave radar and automotive radar. It covers a range of 40 - 325 GHz, depending on the mixer being used.



RF/Microwave Signal Generator

MG362x1A

For evaluation of the signal quality evaluation of radars, transmitters, devices, antennas, AD converters, DA converters, components, etc.

For generating jamming signals and pulse signals up to 70 GHz.



Frequency Selectable mmWave Power Analyzer

MA24507A/MA24510A

The receiver structure of Power Master is similar to that of a spectrum analyzer, which not only shortens the measurement time but also enables frequency selectivity.

This results in more accurate power measurements in the frequency band of interest.



Manufacturing

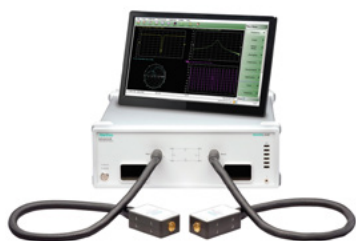
The manufacturing of millimeter wave devices requires space-saving measurement equipment that can be controlled from a PC.



Compact USB Vector Network Analyzer

MS46122B

A PC-controlled compact USB vector network analyzer with three frequency ranges from 1 MHz to 8/20/43.5 GHz. This model is ideal for passive device testing applications where there is a need for both performance and space saving.



ShockLine™ 2-Port Performance VNA

MS46522B

When combined with the ShockLine software, this VNA provides a cost-effective solution for testing passive devices. Millimeter wave options available from 55 to 92 GHz.



ShockLine™ 4-Port Performance VNA

MS46524B

A four-port vector network analyzer is ideal for evaluating the frequency characteristics of differential signals. Wide dynamic range enables measurement of very low reflection artifacts.



USB Peak Power Sensor

MA24440A/MA24441A

Can measure pulse powers of less than 10 μ s. The provided software lets you to observe variations in power over time.



Microwave CW USB Power Sensor

MA24330A/MA24340A/MA24350A

By connecting the USB sensor to a PC, you can measure the output power of millimeter wave devices. The control software is available for downloading from the Anritsu website.



Radio Wave Environment Measurement/Monitoring

Measuring and monitoring radio wave characteristics such as electric field strength and interfering signals is necessary to understand millimeter-wave communication environments. Anritsu offers a portable spectrum analyzer is suitable for investigating the radio wave environment in the field.



Field Master Pro

MS2090A

The MS2090A can perform real-time measurement from 2 - 4 GHz (S-band) to 26 - 40 GHz (Ka-band), up to a 150-MHz bandwidth and can also measure instantaneous pulsed signals.

- Can identify interference being experienced by ground stations using directional antennas
- When combined with a directional antenna, can measure the operational and interference waves being received by a ground station



Microwave Spectrum Monitor Module

MS27200A

Anritsu has designed this spectrum analyzer for integration into systems with a wide range of applications. Anritsu provides the using SCPI commands to control the module, so that you can easily integration it into your system.

Real-time measurements up to a bandwidth of 150 MHz are possible.

- Interference hunting
- Signals Intelligence (SIGINT) , Technical Surveillance Countermeasures (TSCM)



Remote Spectrum Monitor

MS27201A

Users can operate the Remote Spectrum Monitor and measure the spectrum via the network. For example, long-term radio wave monitoring can be useful for analyzing the causes of communication problems such as jamming/interference.

Real-time measurements up to a bandwidth of 150 MHz are possible.

- Interference monitoring
- PC application software suitable for remote control



Components and Accessories

When measuring millimeter waves, the components used, such as cables and connectors, must also have acceptable frequency characteristics and return loss.



Coaxial Cable Connectors

K Connector: Can be used up to 40 GHz and is compatible with SMA connectors.

V Connector: Coaxial coverage up to 65 GHz and fits commercially available 2.4-mm connectors.

W1 Connector: Mode-free performance up to 110 GHz.



Adapters, Attenuators, and Terminators

For precision measurements, adapters are available to mate one connector type to another.

Precision attenuators and terminators suppress high-frequency signal reflections.



Calibration Kits, Measurement Components and Accessories

Anritsu offers kits that allows you to calibrate the performance of vector network analyzers.

A bias tee can add or block a DC signal, and a directional coupler or power divider can branch/combine signals.



Calibration Kit



Bias Tee



Directional Coupler



Power Divider



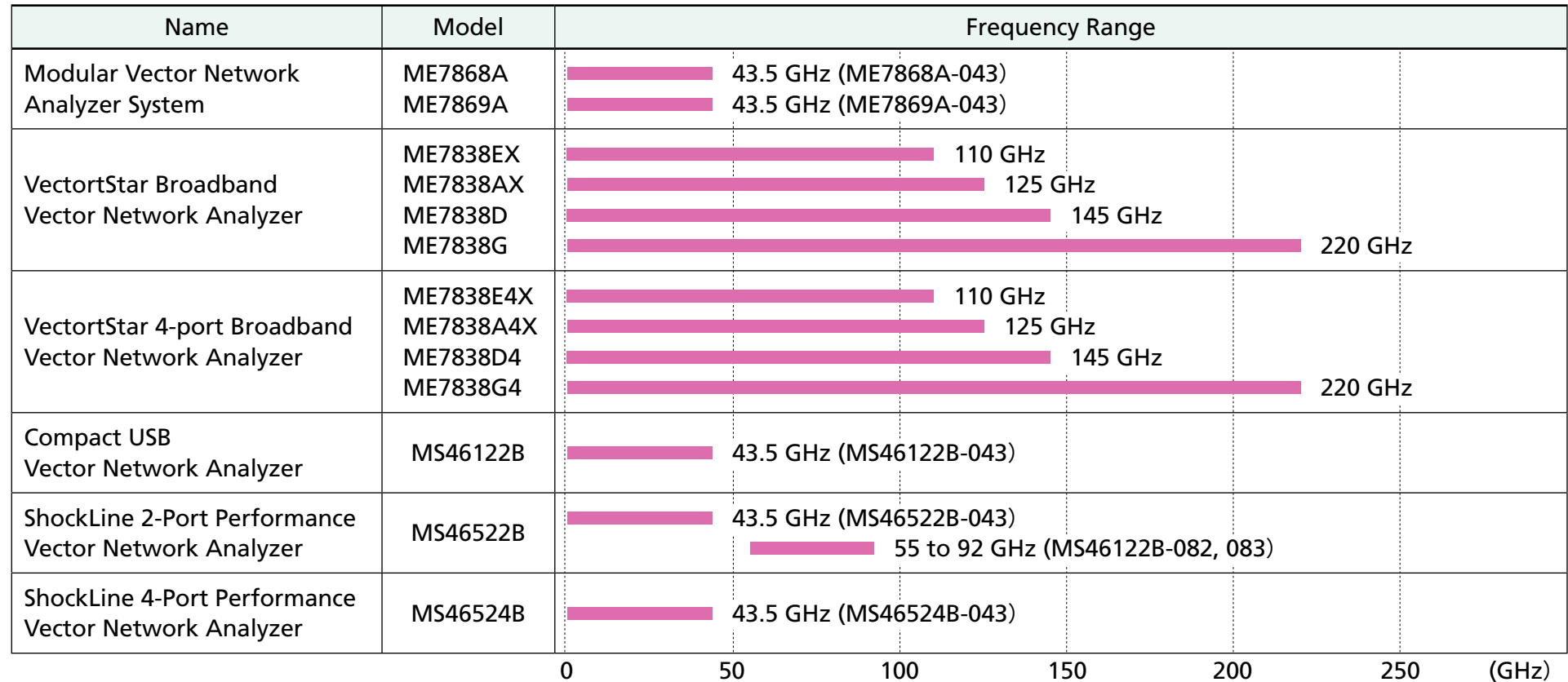
Power Splitter



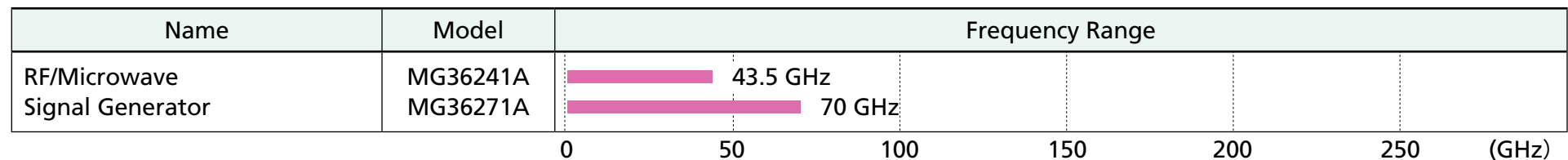
Test Fixture

Frequency Range

Vector Network Analyzer



Signal Generator



Frequency Range

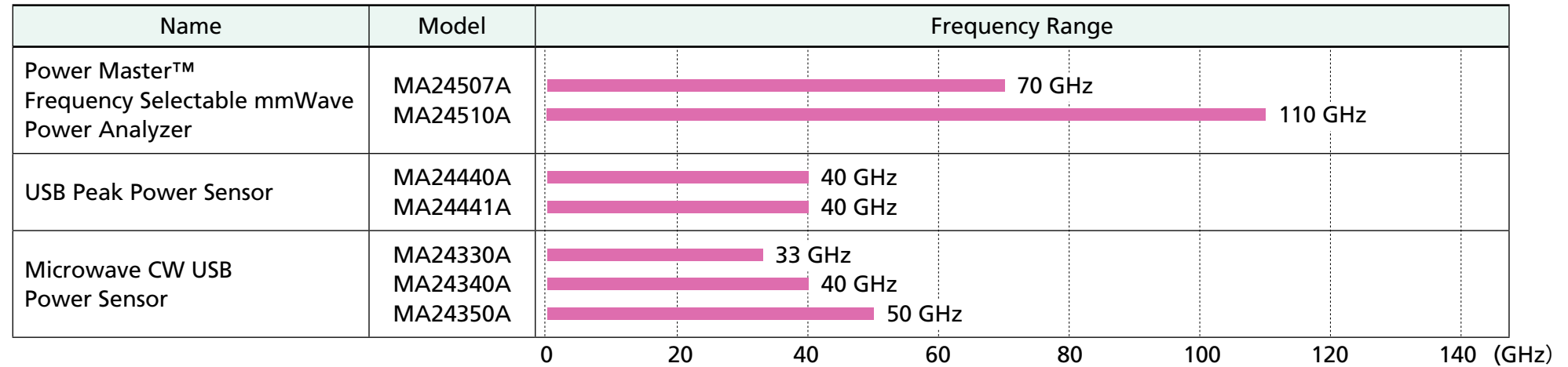
Spectrum Analyzer

Name	Model	Frequency Range
Spectrum Analyzer/ Signal Analyzer + External Mixer	MS2830A MS2840A MS2850A	 43 GHz (MS2830A-045)  44.5 GHz (MS2840A-046)  44.5 GHz (MS2830A-046)  40 to 325 GHz Range varies depending on external mixer used
Spectrum Master	MS2760A MS2762A	 32 GHz (MS2760A-0032, MS2762A-0032)  44 GHz (MS2760A-0044, MS2762A-0044)  50 GHz (MS2760A-0050, MS2762A-0050)  70 GHz (MS2760A-0070, MS2762A-0070)  110 GHz (MS2760A-0110, MS2762A-0110)  145 GHz (MS2760A-0145, MS2762A-0145)  170 GHz (MS2760A-0170, MS2762A-0170)
Field Master Pro	MS2090A	 32 GHz (MS2090A-0732)  43.5 GHz (MS2090A-0743)  54 GHz (MS2090A-0754)
Microwave Spectrum Monitor Module	MS27200A	 32 GHz (MS27200A-0732)  43.5 GHz (MS27200A-0743)  54 GHz (MS27200A-0754)
Remote Spectrum Monitor	MS27201A	 32 GHz (MS27201A-0732)  43.5 GHz (MS27201A-0743)  54 GHz (MS27201A-0754)

0 50 100 150 200 250 300 350 (GHz)

Frequency Range

Power Sensor



Base Station Simulator

