

Millimeter-Wave Measurement Challenges



Commercializing and Developing MM-Wave Applications

Applications are being developed and discovered across a broad range of millimeter-wave (mm-wave) frequencies ranging from 50 GHz to 1 THz. Faster data rates are driving commercial communication applications, while medical, security and other research areas are investigating ever higher test frequencies. Assuring performance and accuracy while minimizing cost are critical in the development of new mm-wave applications.

Today's Challenges

Welcome to Millimeter-wave	Testing at millimeter-wave frequencies brings new and different measurement challenges. Minimizing measurement uncertainty is critical in the development of new mm-wave applications.
Commercializing Products	In the past, mm-wave products were often both specialized and expensive. Today with the increased need for bandwidth there are many emerging commercial applications. As mm-wave applications become more mainstream, optimizing your cost-of-test becomes important to bring mm-wave products to market.
Achieving Required Performance	To better understand mm-wave product development, engineers need measurement tools with performance similar to those at microwave frequencies. Accurate measurements provide the confidence to make performance/cost tradeoffs.
Protecting Early Prototypes	Making the most out of your mm-wave prototypes can play an important role in getting to market. Unknown and unstable power levels can damage devices under test.
Size and Weight Constraints	Traditional mm-wave measurement solutions required bulky test heads which were difficult to locate near the device-under-test (DUT). Reducing that footprint not only improves performance but drives down the costs for related accessories such as wafer probe stations and antenna test facilities.



Existing and Emerging Applications

Frequency	Application
57 - 64 GHz	WiGig unlicensed band w/2.5 Gbps 802.15, 802.11ad Wireless HD
60 GHz	Wireless backhaul w/100-300 Mbps
71 - 76 GHz	Point-to-point licensed communication links w/1.25 Gbps - 10 Gbps (planned)
77 GHz	Automotive Radar
81 - 86 GHz	Point-to-point licensed communication links w/1.25 Gbps - 10 Gbps (planned)
92 - 95 GHz	Point-to-point licensed communication links w/1.25 Gbps - 10 Gbps (planned)
94 GHz	100 MHz band reserved for space-borne radios Imaging radar Airport ground control Cloud profiling radar
110 - 500 GHz	Materials imaging
120 - 124 GHz 138 - 144 GHz	Local Networking
122 GHz	Automotive Radar
180 - 210 GHz	Atmospheric satellite monitoring
180 - 300 GHz	Security & healthcare
225 - 750 GHz	Experimental radar
30 GHz - 1 THz	Radio astronomy



Millimeter-Wave Measurement Solutions

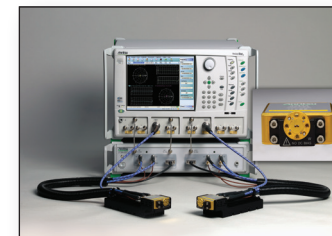


Anritsu VectorStar Enables mm-Wave Commercialization and Development

The Anritsu VectorStar® ME7838A Series has been uniquely designed to meet your millimeter wave (mm-wave) needs from 54 GHz to 750 GHz (1 THz support coming soon). For frequencies up to 110 GHz Anritsu's miniature mm-wave module design provides the best available dynamic range. Above 110 GHz, Anritsu is proud to offer solutions using VDI or OML Frequency Extenders. Across the entire 750 GHz range, only the VectorStar offers real-time power leveling for the most accurate and stable measurements.

Feature	Benefit
Easily Configurable 54 GHz to 110 GHz Test Solution	<ul style="list-style-type: none"> • Single miniature, mm-module easily configured for on-wafer, coaxial or waveguide measurements (in coaxial systems modules operate from 54 GHz to 110 GHz) • Test port biasing available during on-wafer measurements using through-line in coaxial mode • 4-port and differential mm-wave measurement capability with the inherent advantages of the VectorStar platform
Affordable Banded mm-wave Solutions	<ul style="list-style-type: none"> • Decrease test instrument expenses with banded mm-wave modules for application specific testing • Further reduce test solution costs for 54-750 GHz applications by using a 40 GHz VectorStar VNA with Anritsu's banded mm-wave modules up to 110 GHz and a 20 GHz VectorStar for frequencies above 110 GHz.
Industry Leading Performance and Stability	<ul style="list-style-type: none"> • Widest dynamic range of 106 dB at 65 GHz and 103 dB at 110 GHz (Anritsu W-band module) • Fastest measurement speed of 55 ms for 201 points at 10 kHz IFBW • Real-time power level control of up to 55 dB enables accurate linear gain and 1 dB compression measurements.
Only VNA with Real-Time mm-Wave Power Leveling from 54 GHz to 750 GHz	<ul style="list-style-type: none"> • mm-wave power control for Anritsu and VDI Frequency Extenders is more responsive than systems using software leveling. • Protect sensitive devices with power sweep control that provides the best power accuracy and stability to power levels as low as -55 dBm
Smallest/lightest mm-wave modules (54 GHz to 110 GHz)	<ul style="list-style-type: none"> • Compact, lightweight mm-wave modules for easy, precise, and economical positioning on the wafer probe station and for ease of set-up in the bench applications • More convenient to remotely mount mm-wave modules to antenna positioners

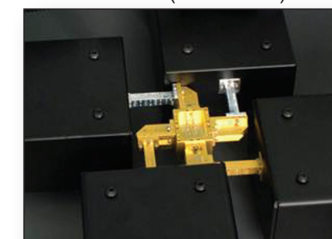
ME7838A VectorStar Banded Configurations from 54 GHz to 750 GHz



Compact Anritsu WG modules for E and W band



Compatible with VDI and OML modules for frequencies above 110 GHz (VDI shown)



4 port configurations available (VDI modules testing hybrid coupler shown)

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