

# ME7220A

Radar Test System (RTS)  
76 to 77 GHz

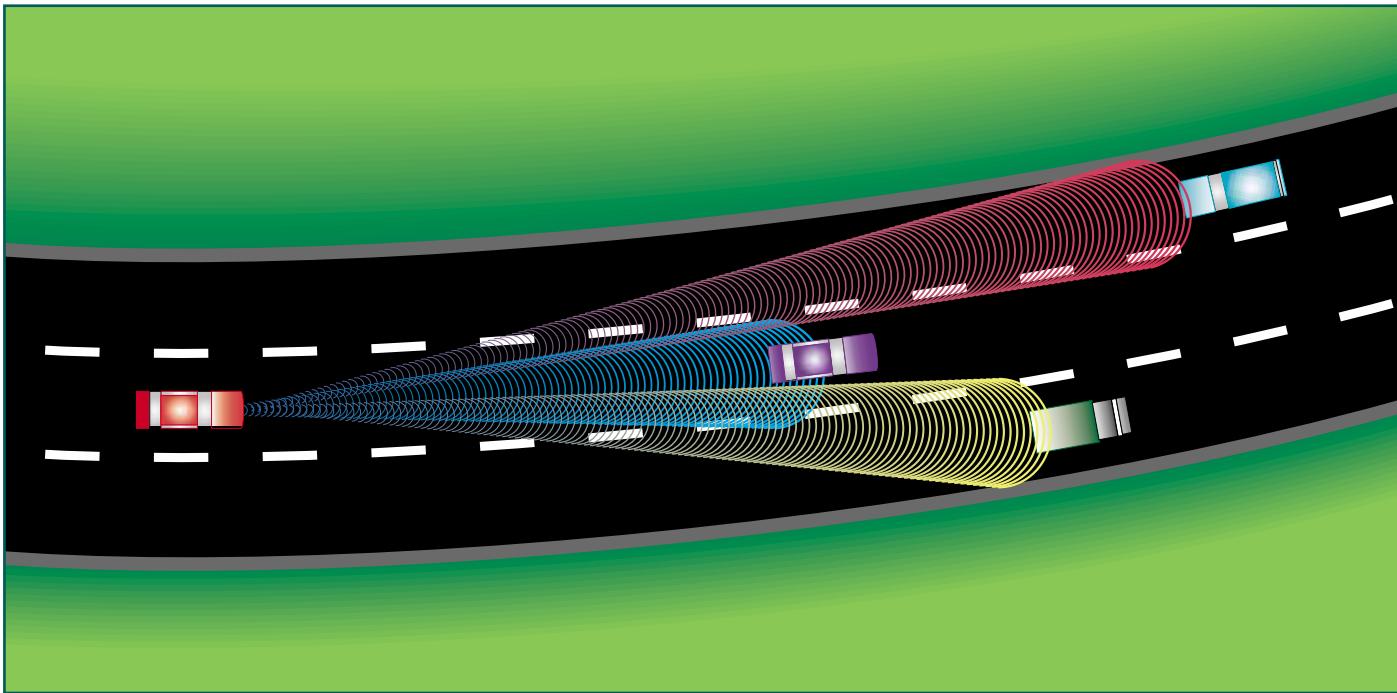


*Target Simulation & Signal Analysis for Automotive Radar  
Exceptional Performance at an Affordable Price*

# The Challenge

The installation of collision warning and Adaptive Cruise Control (ACC) systems on passenger automobiles and long-haul trucks challenges manufacturers of vehicles and radar modules alike. Integrating a sensitive radar module and its associated antenna into a vehicle platform is not an easily predictable task. The introduction of new technologies like millimeter-wave radar testing into your production facility, coupled with the requirement to drive costs as low as possible, puts heavy demands on your design engineers, test department and your entire production team.

Developing test procedures that are comprehensive in terms of functionality and accuracy but are fast and easy to initiate requires care and forethought. Guaranteeing performance and reliability in high volume manufacturing is always difficult. Finally, drive-by testing after installation is time-consuming and lacks accuracy and repeatability. These factors make it essential to test to a known set of parameters using a quality instrument of verifiable accuracy and repeatability.



# The Solution

Whether you are a designer of radar systems or a manufacturer of passenger automobiles, long-haul trucks, radar transponders or antennas, you need to maintain your reputation for quality and safety. As ACC technologies mature, as customers realize the benefits of using these systems and as production volume soars, new testing technologies will be required to keep your manufacturing competitive and to maximize profitability.

At Anritsu we understand that testing millimeter-wave radar within the confines of a high-volume vehicle production line will be a new experience for many automotive engineers. We also understand the importance of performance verification testing to ensure quality. By bringing our experience in radio frequency, microwave and optical testing to bear on your requirements, Anritsu can deliver test capability that keeps you ahead of the competition. The ME7220A Radar Test System accurately and repeatedly characterizes ACC radar modules to ensure quality and optimum functionality.

# Anritsu, Your Test Partner...

Working with emerging technologies involves some significant learning experiences. With Anritsu as your testing partner you can be certain you have the expertise, products and support of the leader in automotive radar testing available whenever you need them. Anritsu has more than a century of experience innovating solutions to test the newest wired or wireless technologies including millimeter wave and optics. As a pioneer in the development of simulators and test systems for ACC applications, Anritsu radar test systems have been used extensively in the development of automotive radar and related components. Anritsu is well positioned to lead the way in developing test systems that meet the immediate and future needs of radar and automobile developers and manufacturers as well as after-market service centers. With manufacturing facilities on three continents and our renowned support available in over 100 countries worldwide, you are assured of the highest performance test solution backed up with outstanding product and application support.

# ME7220A Radar Test System (RTS)



## The Ideal Solution for Your Testing Environment ...

### Research and Development:

- Verifies operation under realistic conditions by simulating moving targets (other vehicles or roadside objects) at multiple target distances
- Fully characterizes the radar module by quantifying transmitter, receiver and antenna performance
- Integrated functionality allows radar signal power and frequency measurements without external equipment
- Suited for stand-alone bench-top testing, but easily integrates with other instruments into a test bench or rack
- Built-in laser allows accurate alignment of the radar-under-test to the RTS antennas without additional mechanical fixtures

### Radar Module Manufacturing:

- Integrates into standard production lines or automated radar test stations for complete testing of the radar modules
- Allows full or sample testing of all critical radar parameters accurately and repeatedly in a confined and controlled environment
- Ideal for anechoic chamber testing of radar components and modules
- Interfaces with external test accessories including spectrum analyzers and power meters for complete test flexibility
- Easily controlled from an external computer (via RS-232) or by using the included handheld manual controller

### Vehicle Manufacturing:

- Speeds production by simplifying alignment of the ACC sensor (antenna) when installed on the vehicle
- Verifies operation under realistic conditions by simulating moving targets (other vehicles or roadside objects) at multiple target distances
- Characterizes both radar transmitter and receiver performance

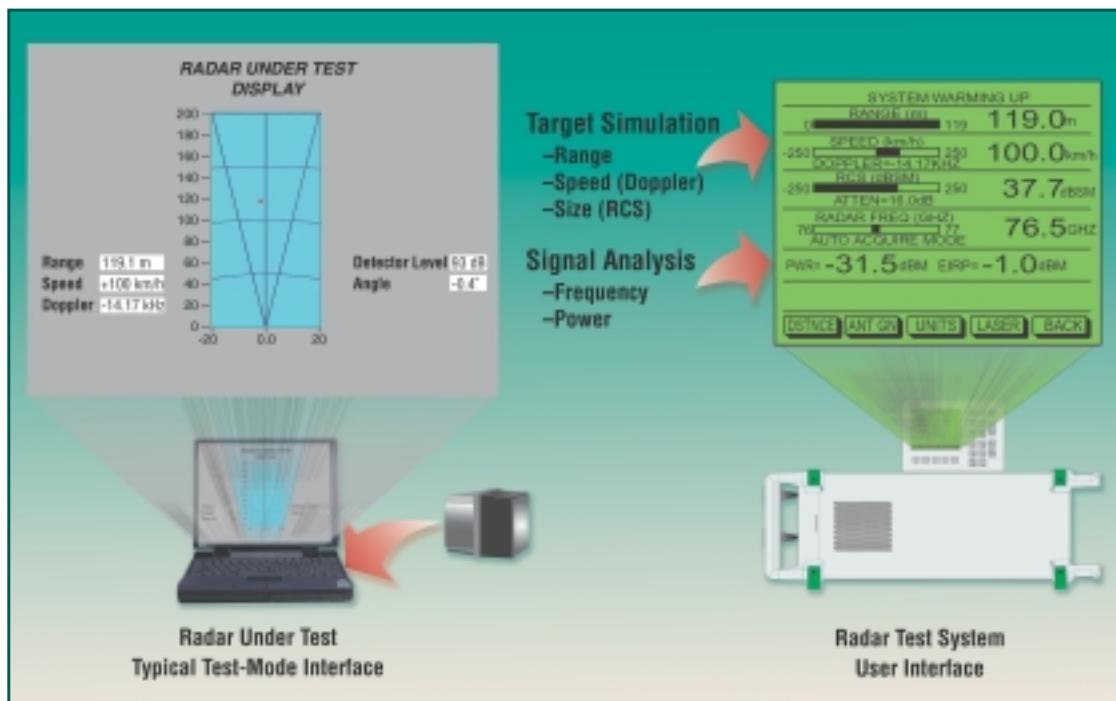
# Application: ACC Module Testing



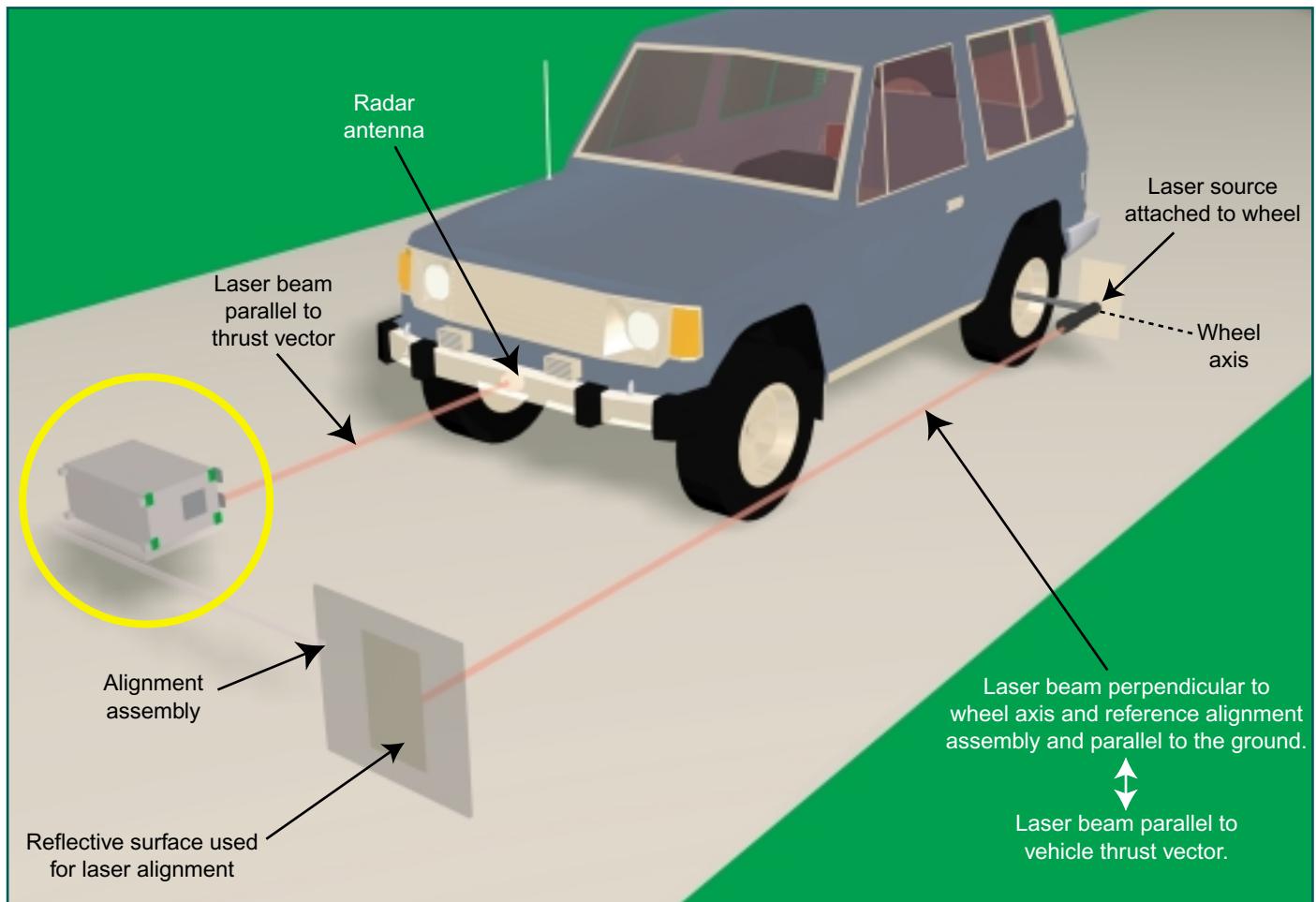
*Anechoic Chamber Measurement Setup*

Anritsu understands the requirements of ACC radar module developers and manufacturers. Test times must be minimized yet performance must be assured. The ME7220A can quickly and completely characterize all three major elements of the ACC system, the transmitter, receiver and antenna.

Accurate testing of the ACC module requires accurate alignment of the RTS antenna with that of the module. The ME7220A RTS includes a built-in laser to facilitate that alignment. Quantify module performance at two ranges with targets that are completely programmable in size (RCS) and speed. Full data downloading and archiving is provided via the RS-232 interface to your external computer. The built-in RF detector in the ME7220A delivers pinpoint accuracy when measuring antenna patterns and radiated power. The ME7220A also has built in capability to measure the center frequency of the modulated radar signal.



# Application: On-Vehicle Verification and Alignment



Operating statistics from long-haul truck companies have shown that collision warning and ACC systems can reduce accidents by as much as 70%. Until now installation and alignment of these systems during vehicle manufacture has been a costly, manual, time-consuming process even on the lowest-volume vehicle production lines.

When used with your existing vehicle alignment setup, the Anritsu ME7220A Radar Test System facilitates alignment of the ACC module to the vehicle thrust axis, and verifies correct radar operation and antenna alignment. Even within the tight confines of your vehicle production line, simulated targets quickly verify radar operation at both close-in and long ranges. You can adjust the size and relative speed of either target to accurately verify functionality and alignment without time-consuming drive-by testing. The instrument-grade quality and calibration of the ME7220A means that your results will be repeatable as well as accurate.

# ME7220A Radar Test System Specifications

## General

Frequency Range*1	76 GHz to 77 GHz
Antenna E-Field Polarization	Horizontal standard (other polarization options available)
Alignment Laser	Class II laser, 600-700nm, Output Power <1 mW NOTE: Alignment laser shuts off above 40°C

## Radar Signal Analysis

Received Radar Power (at RTS waveguide input flange)		-10 dBm, specifications below apply
Measured Radar Power	Internal Meter	Range 30 dB, minimum
		Accuracy $\pm 2$ dB
	External Meter	Range 35 dB, minimum (50 dB, typical, with option 5)
		Accuracy $\pm 1$ dB, including IF measurement and EIRP Cal Factor
Maximum Radar Occupied Frequency		Full band 76 to 77 GHz (translated to IF of 4.7 to 5.7 GHz)
Radar Transmit Frequency Spectrum	External Spectrum Analyzer	Accuracy of 76-77 GHz frequency measurement is limited by spectrum analyzer external reference and specifications.
	External Spectrum Analyzer with RTS Internal Reference	Internal reference frequency accuracy 50 ppm
	Internal Frequency Measurement	Accuracy of displayed frequency is $\pm 50$ MHz, maximum
Spurious Signals, In-Band		38 dBc maximum, referenced to output signal

## Target Simulation

Received Radar Power (at RTS waveguide input flange)		-15 dBm, specifications below apply
Radar Signal Occupied Bandwidth		300 MHz, maximum, in the 76-77 GHz range
Number of Simultaneous Targets		1 (either Near Target or Far Target)
Target Distance*2	Near Target	3.5 meters nominal (+ distance from RTS to radar)
	Far Target	116.5 meters nominal (+ distance from RTS to radar)
	Distance Accuracy	Near Target: $\pm 0.5$ m, maximum Far Target: $\pm 2.0$ m, maximum
	Distance from RTS to DUT Radar	1.5 meter, minimum
	Maximum RCS	-4 dBsm, minimum (Near Target) 50 dBsm, minimum (Far Target)
Radar Cross Section (RCS)	RCS Adjustment Range	50 dB, 1 dB steps
	RCS Accuracy	$\pm 0.75$ dB $\pm 5\%$ of attenuation, maximum (measured at a single frequency of 76.5 GHz) $\pm 2.5$ dB, maximum, (measured over 76-77 GHz)
	Speed Range	0 to $\pm 250$ km/h, minimum (0 to $\pm 35$ kHz, minimum)
Target Speed Simulation (Doppler Frequency)	Speed Step Size	0.1 km/h, minimum (15 Hz, minimum)
	Speed Error	0.2 km/h, maximum (30 Hz, minimum)
	Doppler Carrier & Sideband Suppression	40 dBc, minimum
	In-Band	40 dBc, maximum
Signal Characteristics	Spurious Signals (measured at waveguide output)	Local Oscillator: -5 dBm, maximum (at 70.8 to 71.8 GHz)
		Image Response: -3 dBc, maximum (65.6 to 66.6 GHz)
RF Noise Density (CW)	Local Oscillator Phase Noise	-80 dBc/Hz @ 100 kHz offset, maximum
	AM Noise for Target Simulation	-130 dBm/Hz @ 2 MHz offset, maximum

\*1: 24 GHz or other frequency range options available – contact factory

\*2: Other target distance options available – contact factory

## Display Module

Display Screen	160 x 128 Dot Matrix monochrome LCD, with backlight
Cable from main module	1 meter

## Power Requirements

Primary Power	85 - 240 Volts AC, 50-60 Hz, 200VA maximum
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## Environmental

Operating Temperature Range	+15°C to +35°C (0°C to +50°C, with reduced performance)
Operating Humidity	5% to 95% at 40°C
Warm-Up Time	30 minutes, maximum, for ambient +15 to +35°C
Storage Temperature	-15°C to 75°C
EMC & Safety	Meets European Community requirements for CE marking

## Size and Weight

Dimensions	197.6h x 485.6w x 553.6d mm, main module 178.8h x 228w x 76.5d mm, display module
Weight	10 kg, main module 1 kg, display module

## Front Panel Connectors

Antenna Input/Output	WR12 Waveguide, 0 dBm maximum, no damage
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## Rear Panel Connectors

Power Meter Port	N (F), 50W, 10 dBm maximum output
Spectrum Analyzer Port	N (F), 50W, 10 dBm maximum output
10 MHz Reference Input	BNC (F), 50W, +15 dBm to -5 dBm, 25 VDC, max
RS-232 Serial Port	D-Sub 9-pin (M)
IF External Loop	2 SMA (F), 0 dBm maximum input/output

## Recommended accessories to increase the measurement capabilities of the ME7220A:

MS2663C	Spectrum Analyzer, 9 kHz to 8.1 GHz
ML2437A	Power Meter, Single Channel
MA2472A	Power Sensor, 10 MHz to 18 GHz



**Anritsu Power Meters and Sensors**



**Anritsu Spectrum Analyzer**

## Optional Accessories:

15NN50-1.5C	50 Ohm Cable, N(M)-N(M), 1.5m, 6 GHz
15NN50-3.0C	50 Ohm Cable, N(M)-N(M), 3.0m, 6 GHz
15NN50-5.0C	50 Ohm Cable, N(M)-N(M), 5.0m, 6 GHz

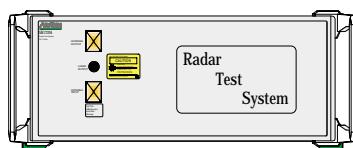
## Ordering Information

The ME7220A Radar Test System includes, in addition to the Main and Display modules, the following accessories:

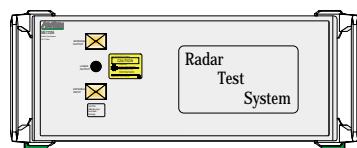
- WR12 Horn Antennas, Quantity 2
- Operation and Programming Manual
- N-Type, 50 Ohm Termination
- Serial Interface Cable
- Power Cord

### Options available include:

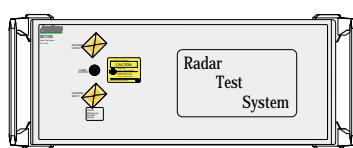
- 1A Rack Mount Kit with handles
- 2A Antenna Polarization – Vertical
- 2B Antenna Polarization – 45° slant left
- 2C Antenna Polarization – 45° slant right
- 3A Input/Output port waveguide extensions, 5.08 cm (2.0 in.)
- 5 Wider dynamic range at power meter port using external bandpass filter



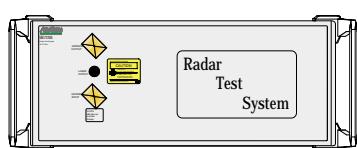
**Antenna Polarization – Horizontal (Standard)**



**Antenna Polarization – Vertical**



**Antenna Polarization – 45° left**



**Antenna Polarization – 45° right**

# Product Support

## Reliability and Serviceability:

The Anritsu Radar Test System has been designed with performance, long term reliability, ease-of use and serviceability in mind. Extensive environmental, safety, and EMC testing has been performed to ensure compliance with industry standards. This extensive testing and resulting system refinements help guarantee that user productivity is optimized via maximum system up-time.

## Warranty:

The Anritsu Radar Test System is covered by a one-year, return-to-local service center warranty. Complete warranty details are provided in the RTS Operation Manual.

## On Site Support:

On-site Support Agreements are available in most locations. Contact your local Anritsu Service Center for availability.

### Option ES37 On-site Calibration

Option ES37 three-year on-site RTS Calibration Agreement includes two calibrations, scheduled annually, performed by an Anritsu service engineer. Provides verification that the model meets or exceeds all of its published specifications, execution of necessary adjustments, test data for out of tolerance parameters recorded before any necessary adjustments, a Certificate of Calibration, a list of test equipment used in the verification and the environmental conditions at the time of the verification, and a calibration sticker indicating date of calibration and due date.

### Option ES11 On-site Repair

When ordered at the same time as a new RTS, Option ES11 converts the standard 12-month return-to-service center warranty into 3 months of On-Site Repair service. It also provides 12 additional months of On-Site Repair service for a total of 15 months. Labor and material needed for repair are included. Customers benefit from having a total of 15 months of On-site repair coverage.

Annual on-site service contracts are also available after the Option ES11 expires.

## Return-to-Local Service Center Support:

Calibration and Repair services are also available on a per-incident basis at your local Anritsu Service Center.

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#### Sales Centers:

US (800) ANRITSU  
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ME7220A Radar Test System Data Sheet