RAPTER
Radar Production Tester

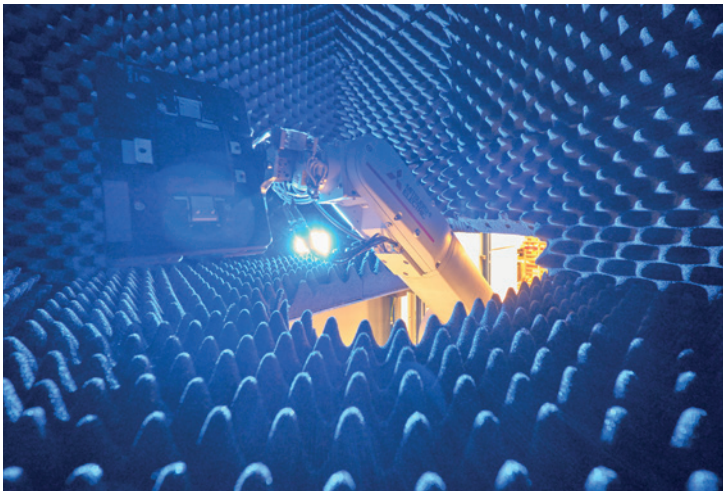
konrad technologies

EXPERTISE IN **TEST AND AUTOMATION**

ADAS Test Solutions

RAPTER
Radar Production Tester

for Automotive Radar Sensors



Your Key Benefits

- Rapid DUT variant change capability (cost efficient plug and play design)
- Instant DUT booting upon loading
- On-demand customization and configuration
- A modular, scalable system for object simulation and RF measurements
- Compact footprint aprox. 1.30 m width x 1.80 m depth (without monitor)
- Uninterrupted communication from DUT load to DUT unload

Overview

The Konrad Technologies Radar Production Test System (**KT-RAP**TER) is a versatile, stand-alone radar test system that complies with safety regulations and offers customizable instrumentation and mechatronic controls. It is specifically designed to address the evolving requirements of autonomous driving regulations, catering to the complex testing needs for both radar sensor production and design verification. The **KT-RAP**TER is production-ready and adheres to more than 12 manufacturing safety standards, allowing manufacturers to tailor radar sensor test plans to their needs, ultimately enhancing test yield and quality.

Customization / Flexibility

The **KT-RAP**TER offers extensive customization options to meet specific test and measurement requirements. It supports various frequency ranges and both bistatic and monostatic configurations with different front ends. The system features an automation interface for controlling and executing test sequences, accommodating both manual and automated loading and unloading procedures. This modular and scalable system can be mounted either vertically or horizontally, with adjustable height and length options, including the distance between the horn antenna and the Device Under Test (DUT). It can be used as a stand-alone test cell or integrated into a production line.

Konrad Technologies' comprehensive solution is designed with flexibility in mind, making it compatible with different Radar Test System (RTS) solutions and platforms, including the NI VRTS among others. The **KT-RAP**TER offers features for obstacle simulation and RF measurement. Additionally, there is a range of available plug-ins that empower users to conduct physical layer measurements of sensor outputs.

Users can define and configure a diverse array of test scenarios, encompassing both moving and stationary objects. These tests can be integrated with antenna pattern measurements, facilitating sensor calibration and performance verification in a simultaneous manner.

Cost / Time Efficiency

By making direct contact with the DUT immediately after loading and maintaining continuous power and contact until unloading, customers can conduct pre-tests before the main tests in an anechoic chamber thus saving cycle time. This setup allows for the concurrent testing of two DUTs — one in the loading area and one in the test area. Moreover, the system's straightforward exchange mechanism enables the swift replacement of different DUT variants within minutes without requiring any adjustments to the system itself.

The wide range of customization options significantly reduces the time and costs associated with non-recurring engineering (NRE) development, contributing to more efficient manufacturing processes.

Typical RF Measurements

- EIRP
- Occupied Bandwidth (OBW) Phase Noise
- Antenna Pattern
- Emission

General Measurements

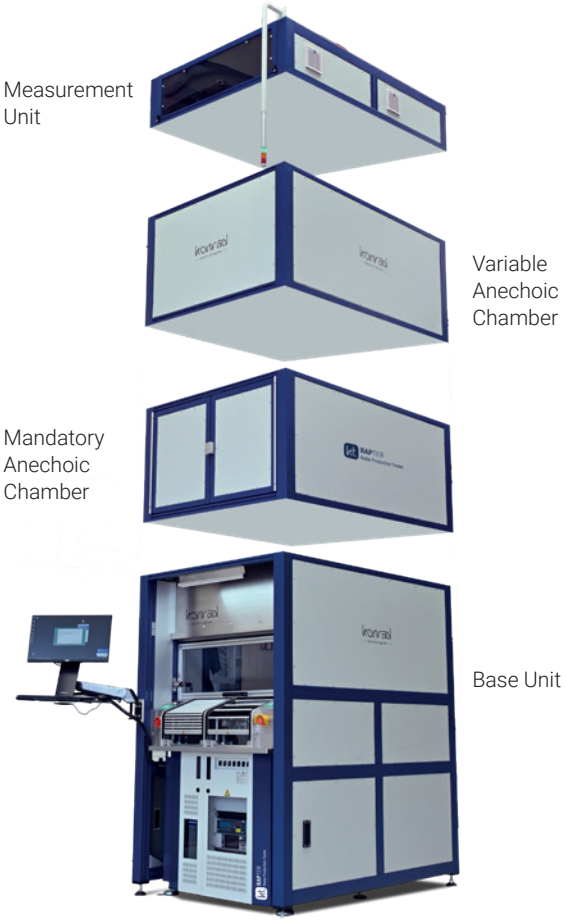
- Functional test
- Sleep current
- Fault injection

Hardware Features

- Azimuth and Elevation control via a robot
- Options for both manual and automated loading/unloading of the Device Under Test (DUT)
- A self-contained enclosure integrating anechoic chamber, instrumentation, and sensor fixture, available in both vertical and horizontal orientations with a compact footprint
- Adjustable height options (starting at 1 meter) to meet far-field test requirements as specified by sensor specifications
- Maintenance accessibility through rear and front access doors.
- Precise DUT carrier pick-up facilitated by robot interfaces
- Simultaneous loading/unloading of multiple DUTs, where DUT#1 can be removed/inserted in parallel with the testing of DUT#2 to maximize Units per Hour (UPH)

Compliance with the following 12 safety regulations:

Directive 2006/42/EG	EN ISO 13849-1:2016-06
EN ISO 12100:2011-03	EN ISO 14119:2014-03
EN 60204 -1:2019-06	EN ISO 14118:2018-07
EN ISO 13857:2020-06	EN 10218-1:2012
EN ISO 13850:2016-05	EN 10218-2:2012
EN ISO 14120:2016-05	EN ISO 4414:2010



*Modular Separation of **KT-RAP**TER*
(also available as horizontal system)

Specifications

Parameter	Specs for NI platform	Specs for R&S AREG800A platform
Frequency Range	60 GHz or 76-81GHz	24 to 24.25 GHz and 76 to 81 GHz
Instantaneous Bandwidth	4 GHz	up to 5 GHz (2024)
Transmit/Receive Isolation	80 dB for bistatic / 20 dB monostatic	70 dB for bistatic / 18 dB monostatic (meas.)
Tx Maximum Output Power	7 dBm	≥ 15 dBm (meas.)
Phase Noise, 77 GHz at 100 kHz Offset	-85 dBc/Hz typical	-90 dBc/Hz (meas.)
Number of Simulated Objects	1-2 (full range)	up to 8 objects per channel and up to 4 channels per device
Range	4 to 300+ m	Air Gap - 3000m
Range Resolution	5 cm (near obstacles)	1 cm (nom.)
Range Distance Accuracy	± 4 cm (<100 m), ± 7 cm (>100 m)	±5 cm (meas.)
Object Velocity (Doppler Frequency Shift)	±500 km/hr (75 kHz)	±500 km/h. Extended Doppler frequency shift up to 10 MHz is possible using a software feature
Doppler Resolution	0.1 km/hr (15 Hz)	0.001 km/h
Doppler Accuarcy	± 0.05 km/hr (7.5 Hz)	≤ 0.05km/h
Radar Cross Section Range (RCS)	50 dB minimum	90 dB
RCS Resolution	≤ 1 dB	0.1 dB
Distance between VRTS and Radar Sensor (DUT)	0.8 m minimum - vertical system up to 2 m - horizontal system up to 10 m	0.8 m minimum - vertical system up to 2 m - horizontal system up to 10 m
Sweep speed of azimuth and elevation	max. 40°/sec.	max. 40°/sec.
Azimuth Movement	+-90°	+-90°
Elevation Movement	+-25°	+-25°
Cycle Time (from load to unload without measurement)	9,5 sec. for each loading area	9,5 sec. for each loading area

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