ROHDE&SCHWARZ

Make ideas real

# AREG800A
# AUTOMOTIVE RADAR ECHO GENERATOR

## Accelerate your radar testing with the most advanced solution

Product Brochure | Version 05.00

# YOUR CHALLENGE

Developers of new automotive radar sensors, radar based advanced driver assistance systems (ADAS) and autonomous driving (AD) features face demanding challenges during each step of the development process.

Individual test scenarios or even the entire test philosophy can change during development when new unpredictable test cases emerge. Moreover, there is an increasing variety of radar sensors, growing modularity and a higher number of ADAS functions. These issues, as well as shorter sensor development cycles for upcoming vehicles, are making test procedures more complex. These conditions require a test concept and a test environment that are dynamic, flexible and scalable.

Currently available test equipment can only simulate a very limited set of test cases and scenarios. The lack of RF stimulation solutions for radar sensors is a huge challenge today. As a result, radar sensors and ADAS functions cannot be consistently and reproducibly tested/verified in either the sensor and ADAS feature development phases or during the vehicle homologation phase on the test rig.

## A new level of possibilities

The AREG800A meets current and future test requirements and can easily be tailored to individual needs thanks to its flexible, software defined configuration concept.

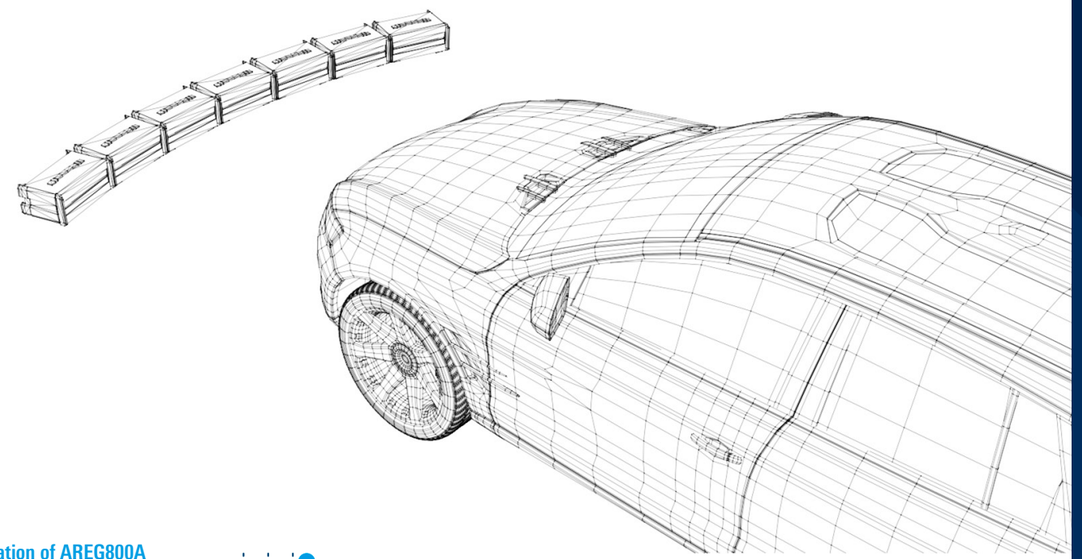
The AREG800A generates multiple complex artificial objects with variable distance, radial velocity and RCS. It supports up to 5 GHz of instantaneous bandwidth. The AREG800A is a smart instrument suitable for dynamic and complex object generation in all automotive radar bands. The frequency ranges offered by the AREG800A are 0.7 GHz to 5.7 GHz, 24 GHz to 24.25 GHz, 24 GHz to 44 GHz and 76 GHz to 81 GHz, ensuring compatibility with future ISAC sensors and all automotive radars, including future short-range radar sensors and their applications, e.g. for collision avoidance systems.

**Generation of dynamic objects**

## Tailored to your needs

The flexible AREG800A design covers all applications fulfilling all the requirements along the whole automotive radar testing life cycle, from early radar sensor R&D to advanced HiL/ViL ADAS/AD test cases and radar mass production testing. Thanks to its field-upgradeable concept, extra features can be added easily by installing software keycodes on site. There is no need for service appointments, and service turnaround time is avoided.

**Scalable solution**



**Seamless integration of AREG800A thanks to an open and standardized control interface**

## Open standard control interface

The AREG800A is controlled in open-loop and closed-loop test environments through a robust, open, real-time interface in line with the open simulation interface (OSI) specification.

**Multiple independent objects**

## Realistic ADAS/AD scenario generation

A single AREG800A connected to an R&S®QAT100 advanced antenna array can generate echoes from up to eight different angular directions. Individual objects can be generated from all eight directions simultaneously (one per direction). Objects can have variable dynamic distance, velocity or object size (RCS). It is now possible for the first time to simulate realistic driving scenarios for automotive radar sensors during ADAS/AD tests.

**Worldwide service and support**

## Worldwide service and support

The Rohde&Schwarz service network in over 70 countries ensures optimum on-site support with minimal turnaround times.

# OUR SOLUTIONS

The AREG800A automotive radar echo generator is an innovative and versatile solution for testing automotive radar sensors. It supports test cases requiring single/dual antenna frontends such as the R&S®AREG8-81S 81S/D (with 4 GHz instantaneous RF bandwidth), R&S®AREG8-81WS/WD (with 5 GHz instantaneous RF bandwidth), or multiple integrated antennas such as the R&S®QAT100 advanced antenna array with 4 GHz instantaneous RF bandwidth.

Thanks to the full harmonization of the AREG800A with the R&S®QAT100 advanced antenna array, all test requirements for the most advanced radar scenario simulations are covered.

### Discover the ultimate automotive radar testing solution

The AREG800A is the key enabler for testing automotive radar sensors and ADAS/AD features. Complex artificial objects can be generated with variable distance, radial velocity, size (RCS), azimuth or elevation angles. An instantaneous bandwidth of 5 GHz covers the typical frequency range of current and future automotive radar sensors. The capability to simultaneously generate a large number of dynamic artificial objects makes it possible for the first time to run realistic and reproducible tests in lab environments.

### Flexibility at its best

The AREG800A meets all requirements for demanding automotive radar echo generation applications:

- Simulate objects with dynamic distance variation during early R&D, chipset development and radar sensor validation
- Use hardware-in-the-loop (HiL) test cases during ADAS/AD feature and algorithm development
- Use vehicle-in-the-loop (ViL) test cases with realistic driving sce-narios on the roller dyno for vehicle certification and homologation
- Produce state-of-the-art 4D imaging radar sensors with high demands on the radar test equipment
- Simulate angular echo distribution or multiple echoes from a single direction
- Usage even in comprehensive and dynamic EMC environments
- Complies with the Radio Equipment Directive and to exploit the maximum EiRP
- Automotive radar interference mitigation algorithm performance testing using the AREG800A brings safe ADAS/AD on the road
- High sensitivity radar signal analysis measurements allowed

### Bring road reality to your lab

The AREG800A combined with the R&S®QAT100 advanced antenna array and R&S®AREG8-xx mmWave remote frontends lets users tackle major autonomous driving challenges. Road tests for ADAS/AD feature development and validation can be transferred from the road to the test rig in a realistic manner. This streamlines R&D, testing and validation times, optimizes time to market for new radar sensors and ADAS/AD functions and reduces costs for R&D and testing.

# DISCOVER THE ULTIMATE AUTOMOTIVE RADAR TESTING SOLUTION

### Generate dynamic artificial objects

- Generate multiple complex artificial objects with individually variable distance, radial velocity and object size (RCS) for advanced automotive radar test cases
- Combine with the R&S®QAT100 advanced antenna array to generate artificial objects with individual angular directions for ADAS/AD scenario based testing
- Standard artificial object distances ranging from < 17 m to 3000 m
- Minimum object distance can be reduced to < 4 m with an optional internal analog stepped delay line, e.g. for autonomous emergency braking (AEB) tests
- For FMCW radars, the minimum object distance can be digitally reduced down to the air gap value of the radar under test using a patented and unique software feature suitable for extremely short object distance generation
- Designed for scenario generation: simulate up to eight artificial objects with individual distance, object size, radial velocity and direction expressed in azimuth/elevation angle when used in combination with the R&S®QAT100
- Simulate up to 32 objects with individual distance, object size and radial velocity using four AREG800A mmWave remote frontends

### Easy and intuitive operation

- Intuitive graphical user interface with touchscreen controls for manual operation and monitoring the entire test setup
- Easy, straightforward test setup configuration directly on the AREG800A itself; no need for a PC
- Built-in SCPI macro recorder with code generator for easy integration into existing test software
- Linux based operating system provides maximum software stability for 24/7 test operation
- Scenario preview for fast debugging and overview

### Frontends for every test case

The AREG800A perfectly addresses the industry's need for a versatile radar echo generator. With its RF frontend portfolio, the AREG800A can be tailored exactly to your application-specific testing needs:

- The innovative R&S®QAT100 advanced antenna array for generating artificial objects from varying angular directions enables ADAS/AD feature and scenario based test cases in the 76 GHz to 81 GHz frequency band
- Conventional millimeterwave (mmWave) remote frontends in all automotive radar bands for benchtop sensor validation. All mmWave remote frontends are available in a single antenna configuration for optimized MIMO testing or in a two antenna configuration with high RX/TX isolation to minimize ringaround
- All supported RF frontends are connected by cable to the base unit and fully controlled by the AREG800A, enabling easy, user-friendly operation; the test setup works as a one-box solution
- Frontend switching supports hot swapping between different radar bands for maximum flexibility in the test setup


### Real-time interface

- Built-in real-time interface for hardware-in-the-loop and vehicle-in-the-loop test setups
- Open simulation interface (OSI) supported as an open, generic interface for environmental perception of ADAS/AD features with scenario update rates of < 0.15 ms
- Synchronization of multiple R&S®QAT100 advanced antenna arrays and AREG800A automotive radar echo generators to generate dense scenarios with a large number of individual artificial objects
- Synchronous parallel over-the-air simulation of multiple automotive radar sensors to test advanced ADAS/AD features involving multiple radar sensors, and sensor data fusion

### Scalability and flexibility

- Offers flexible, easy and sustainable test-setup adaption to new requirements and test cases, thanks to a configuration concept based mainly on keycode-activated software options
- Incorporates simultaneous control for up to four conventional mmWave remote frontends or up to eight R&S®QAT100 advanced antenna arrays for simple extension of test capabilities
- Calibrated IF input and output interfaces to connect additional test and measurement equipment for automotive radar measurement tasks (for example, testing for robustness against interfering signals using a connected signal generator, or signal monitoring using a connected signal and spectrum analyzer)

# FLEXIBILITY AT ITS BEST FOR SENSOR VALIDATION IN R&D

### Highest test case flexibility thanks to remote frontends

Performance-optimized T&M equipment is required for validating and optimizing future automotive radar sensors. Test cases typically include a wide range of RF parameters that need to be checked for final acceptance tests. As the core of radar test and validation setups, the AREG800A provides R&D engineers with a versatile, future-proof radar tester for evaluating all relevant sensor parameters. Its modular concept and support for conventional mmWave remote frontends (R&S®AREG8-81S/D, R&S®AREG8-24S/D, R&S®AREG8-81WS/WD, etc.) make it easily adaptable to the testing requirements of different sensor products and OEMs. Separate frontends for 24 GHz to 24.25 GHz and 76 GHz to 81 GHz permit hot swapping between different radar bands. If a radar sensor specification requires more advanced test cases – angular artificial object separability performance tests for a radar sensor under test (RUT), for example – the AREG800A combined with the R&S®QAT100 is the right solution for the challenge.

### Validation of cutting-edge 4D imaging radar sensors

The AREG800A combined with the R&S®ATS1500C antenna measurement chamber forms a harmonized solution for accurate automotive radar validation and calibration under far-field conditions as a reliable basis for ADAS/AD features. The AREG800A easily integrates with the chamber. With conventional mmWave remote frontends in single antenna configuration, DUTs can be tested under far-field conditions.

The R&S®ATS1500C was specially developed for testing the latest automotive radar sensors. Based on the compact antenna test range (CATR) principle, it provides measurements under far-field conditions in a compact footprint, even for premium MIMO sensors. The AREG800A and conventional R&S®AREG mmWave remote frontends are perfect for this use case.

AREG800A and R&S®ATS1500C: A perfect team for the development of 4D imaging radars.

AREG800A: The right instrument for every test challenge.

## Generation of dynamic artificial objects for every application

The AREG800A automotive radar echo generator can be operated with the R&S®QAT100 advanced antenna array or conventional mmWave remote frontends.

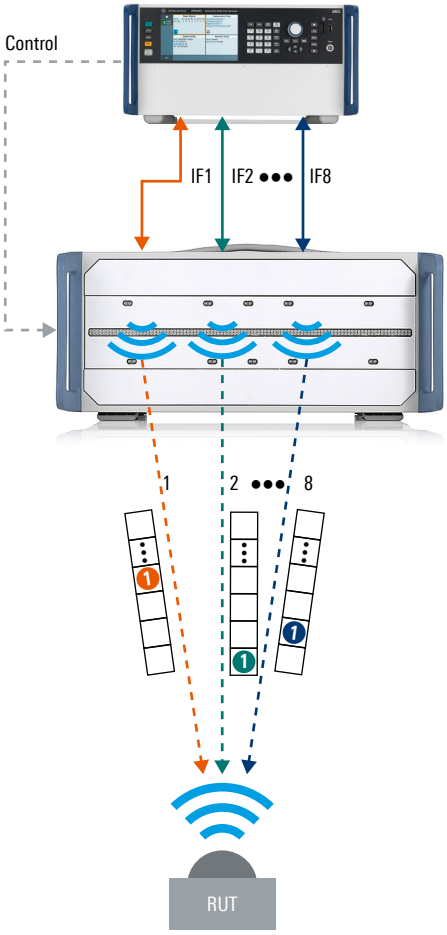
A single AREG800A connected to an R&S®QAT100 antenna can generate echoes from up to eight different angular directions. Individual objects can be generated from all eight directions simultaneously (one per direction) or from one direction after the other; an ideal solution for advanced scenario generation, like the test cases defined by Euro NCAP.

When the AREG800A is used in combination with the mmWave remote frontends, up to four mmWave remote frontends can be connected to a single base unit with up to eight individual artificial objects per mmWave remote frontend.

Individual artificial objects can have variable, dynamic distance, velocity and object size (RCS).

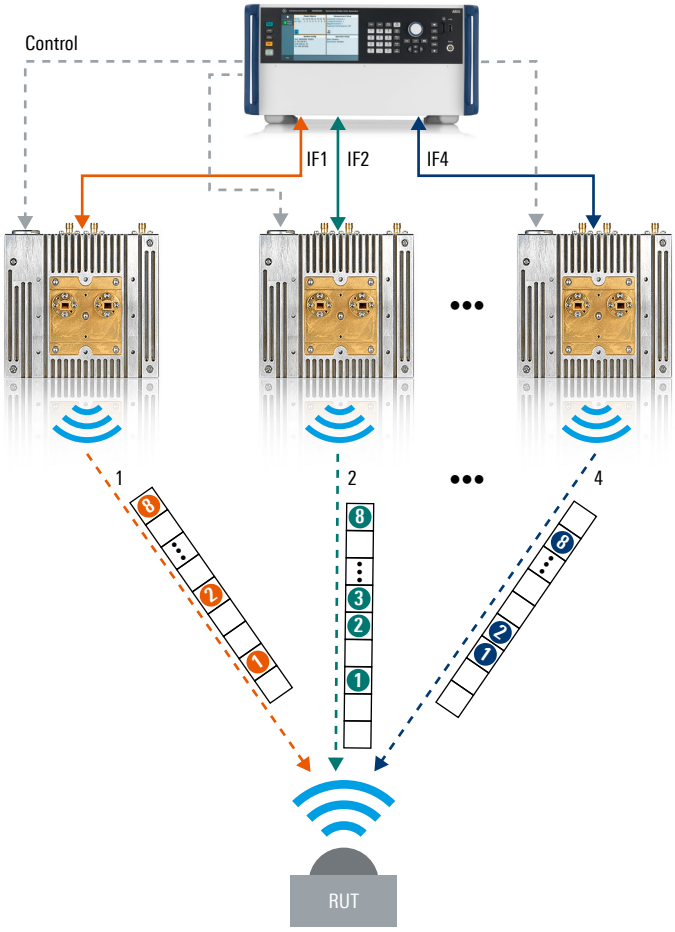
### AREG800A combined with R&S®QAT100

Up to eight independent angular directions with a maximum of one individual artificial object per direction.




### AREG800A combined with mmWave remote frontends

Up to four mmWave remote frontends can be connected to a single base unit, with up to eight individual artificial objects generated per frontend.



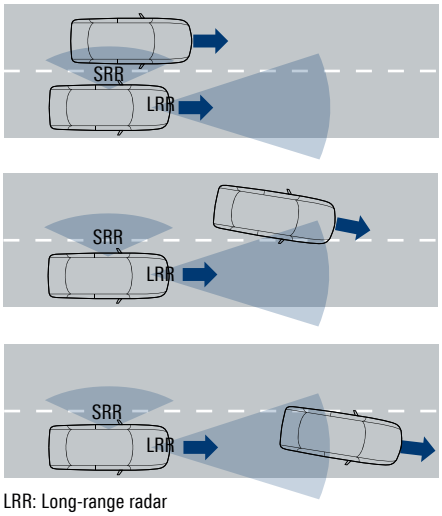
# BRING ROAD REALITY TO YOUR LAB WITH REALISTIC HiL TESTING

When testing new ADAS/AD features, the first steps are performed in hardware-in-the-loop/closed-loop setups where the radar sensor and associated ADAS electronic control unit (ECU) are stimulated based on simulated driving scenarios.

Reliable closed-loop sensor tests require driving scenario parameters calculated by the scenario simulator to be correctly synchronized for the test subsystems. As the core element of a closed-loop test system, the AREG800A has a built-in real-time control interface that can process artificial object data provided by the driving scenario simulator. With scenario update rates faster than 0.15 ms and OSI support, the AREG800A perfectly addresses the requirements of closed-loop test systems for realistic and reproducible scenario generation.

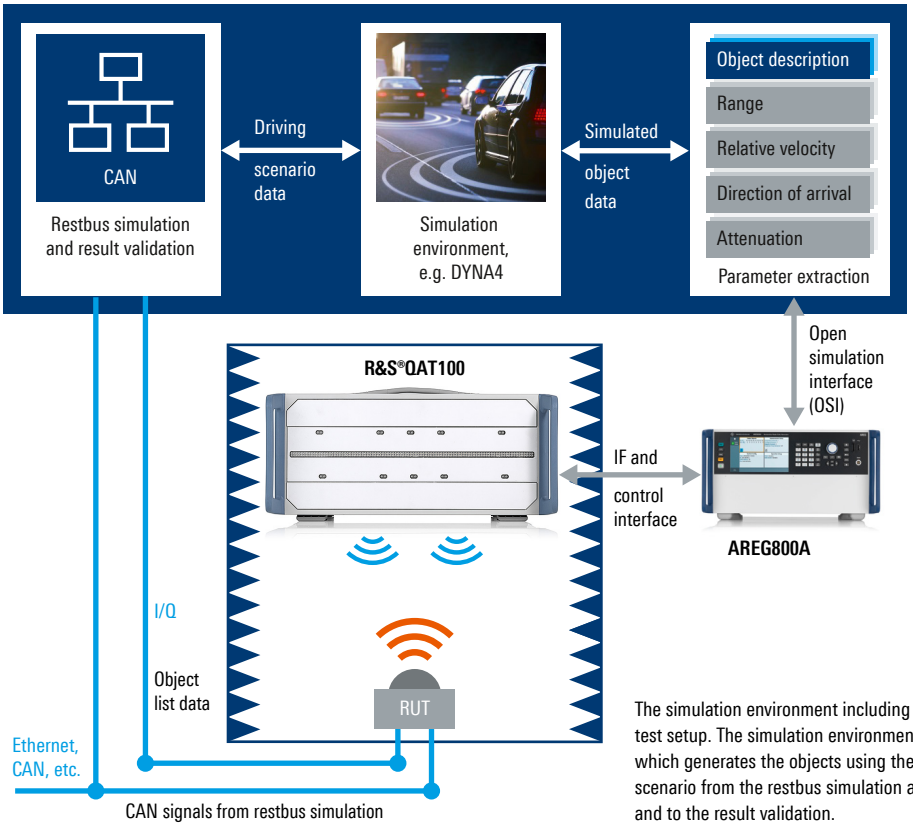
ADAS/AD functions such as recognizing when a vehicle cuts in rely on fusing data from several radar sensors covering the front, side and back of the vehicle. The AREG800A in combination with the R&S®QAT100 is ideal for testing such highly complex scenarios. The AREG800A enables synchronous parallel stimulation of multiple automotive radar sensors for testing challenging ADAS/AD functions.

### Scenario based ADAS/AD function test with parallel sensor stimulation using AREG800A and R&S®QAT100




LRR: Long-range radar
SRR: Short-range radar

### Example of a closed-loop test setup based on the AREG800A, with angular artificial object directions generated by the R&S®QAT100




The simulation environment including restbus simulation closes the loop between the RUT and the test setup. The simulation environment streams the simulated artificial object data to the AREG800A, which generates the objects using the R&S®QAT100. The RUT gets the data necessary for the scenario from the restbus simulation and transmits its object list back to the simulation environment and to the result validation.

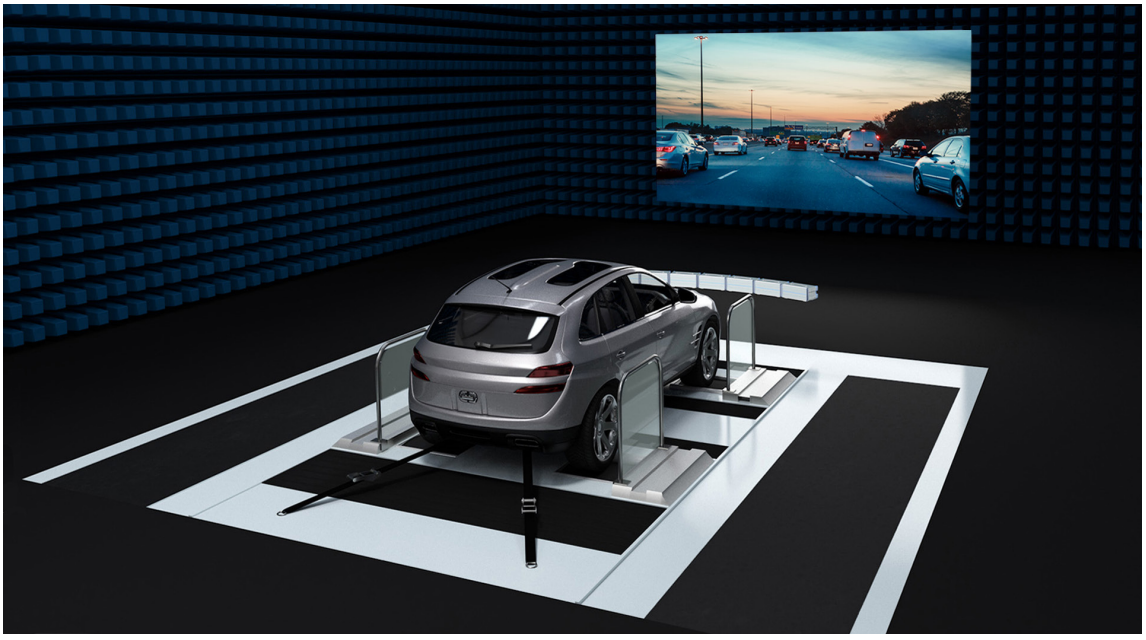
# TEST LIKE IT IS REAL – FROM ROAD TO RIG FOR ViL TESTING

The AREG800A combined with the R&S®QAT100 as part of the AVL DRIVINGCUBE™ opens a completely new range of possibilities for testing radar based ADAS and AD features to ensure correct operation in vehicle-in-the-loop (ViL) test beds. Using a ready-to-drive vehicle mounted on a test bed increases efficiency and safety in scenario based testing during validation and certification of ADAS/AD features.

Reducing the number of accidents and severe injuries is one of the major goals of autonomous driving. Advanced driver assistance functions are just an intermediate step on the journey towards fully autonomous self-driving cars.

Some functions, like adaptive cruise control (ACC), increase driver comfort or compensate for driver inattention. Other functions, like autonomous emergency braking (AEB), are relevant for Euro NCAP testing and are therefore extensively tested.

When the AREG800A and the R&S®QAT100 are integrated into the DRIVINGCUBE™ solution from AVL, defined Euro NCAP test cases can be executed with maximum reproducibility, thanks to the complete absence of mechanical moving components. The test setup is unaffected by the strong vibration that typically occurs on ViL test beds. No matter what your ViL testing challenge is, the flexible, scalable AREG800A and R&S®QAT100 concept always provides a suitable solution. Multiple R&S®QAT100 arrays can be combined to cover larger fields of view.



Rohde&Schwarz combined with AVL: A successful partnership provides a game changing ViL solution

## Scenario testing for ADAS and AD in line with Euro NCAP

| Scenario | Covered by Rohde&Schwarz solution |
|---|---|
| Autonomous emergency braking (AEB) – city | yes |
| Autonomous emergency braking (AEB) – pedestrian | yes |
| Autonomous emergency braking (AEB) – cyclist | yes |
| Autonomous emergency braking (AEB) – interurban | yes |
| Lane support | yes |
| Adaptive cruise control (ACC) | yes |

# ROAD SAFETY – PRODUCE HIGH QUALITY 4D IMAGING RADAR SENSORS

### Testing state-of-the-art automotive radar sensors in tier 1 production

The AREG800A combined with its conventional mmWave remote frontends is a versatile tester for automotive radar sensors. It can be tailored to all manufacturing processes, including initial sensor calibration, with test cases such as antenna pattern measurement and functional testing. It ensures continuous product quality control and reliable identification of faulty sensors.

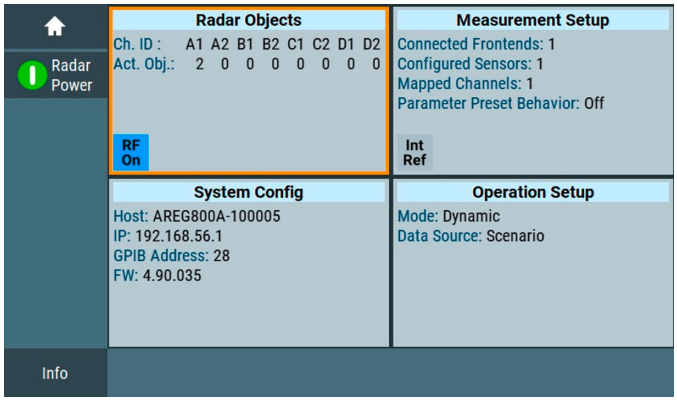
The ability to generate multiple artificial objects with dynamic distance, radial velocity and object size (RCS) ensures maximum test case flexibility. Production test engineers benefit from a robust, flexible and future-proof solution.

Connecting a signal and spectrum analyzer to the IF output interface of the AREG800A makes it possible to measure the relevant indicators for radar sensor quality, such as occupied bandwidth and equivalent isotropically radiated power (EIRP), for the radar sensor under test.

### Radar sensor validation in OEM automotive assembly lines

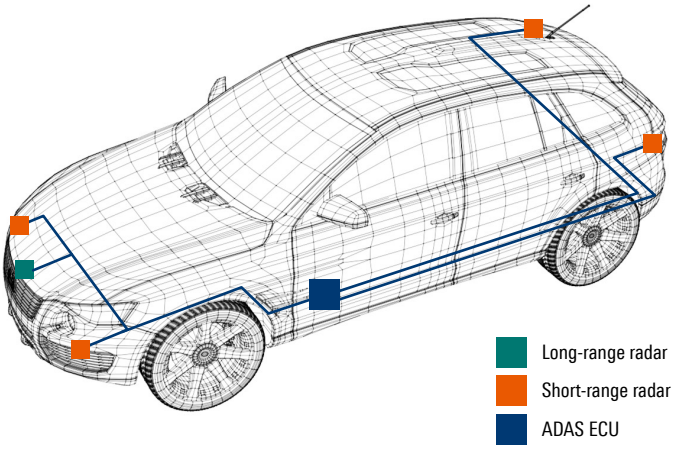
To ensure customer satisfaction and reduce aftersales service expense for the OEM, radar based ADAS sensors need to work as intended when a vehicle leaves the production line. After final integration of the automotive radar sensors into the car bumpers, conducting a function test and initializing the ADAS sensors are extremely important steps during final in-depth testing at the end of the vehicle assembly line.

Cars typically have one long-range radar (LRR) sensor for adaptive cruise control and multiple short-range radar (SRR) sensors for collision avoidance systems. All long-range radar sensors and short-range radar sensors installed in a car need to be examined. OEMs crosscheck correct sensor installation and overall functionality. With the AREG800A, these tests can be optimized because multiple synchronized frontends can be used with a single base unit. Synchronous sensor testing saves test time, reduces overall costs and minimizes the footprint in production.




The simple, intuitive graphical user interface and built-in AREG800A touchscreen make it easy to monitor the status of the production test system.

**The AREG800A enables testing optimized for time, cost and footprint for all SRRs and LRRs installed on a single vehicle in OEM assembly lines.**



# PERFECTLY TAILORED TO YOUR TEST APPLICATIONS ALONG THE AUTOMOTIVE RADAR ECO CHAIN

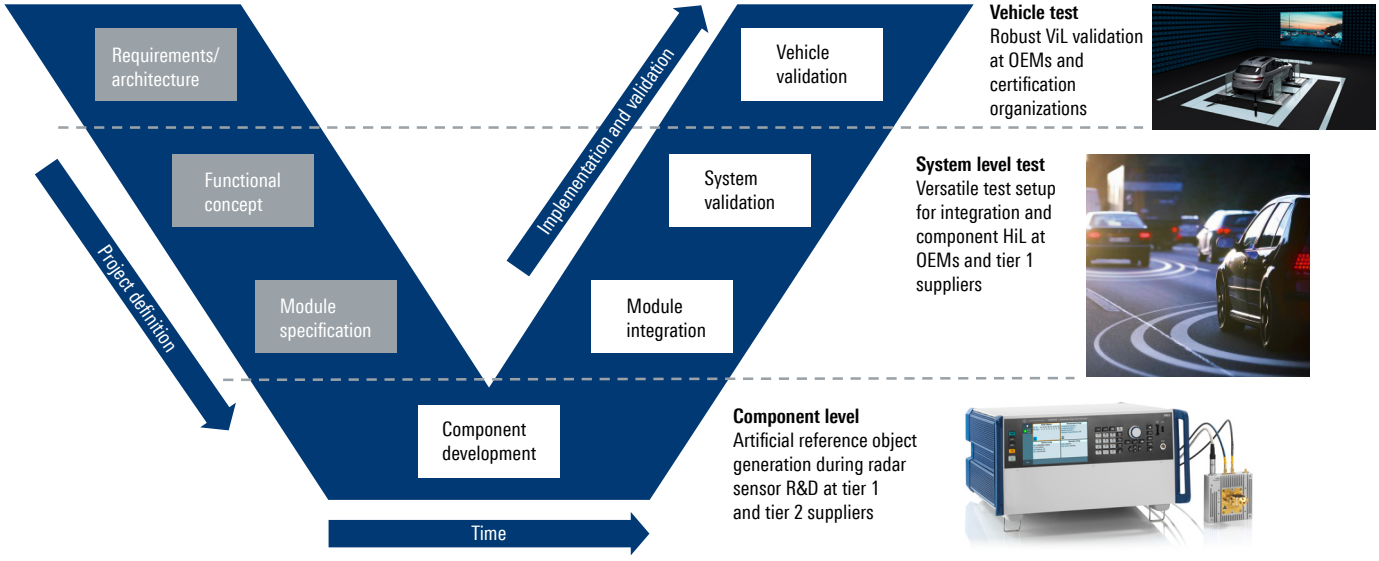
### Seamless radar sensor validation in line with the V model

V models are often used in the automotive industry to optimize development project scheduling. Thanks to the flexibility of the AREG800A and the variety of applications that can be addressed with it, tailored reference solutions. They range from component development to vehicle validation:

- **Component level:**
  Artificial object generation with dynamic distance, object size and radial velocity during chipset development for tier 2 suppliers and radar sensor R&D for tier 1 suppliers
- **System level test:**
  Hardware-in-the-loop (HiL) test cases; during radar sensor module integration and full system validation of ADAS/AD features at tier 1 suppliers and OEMs
- **Vehicle test:**
  Vehicle-in-the-loop (ViL) test cases with realistic driving scenarios on the roller dyno for vehicle certification and homologation at both the OEM and certification organizations

### The V model for automotive radar and ADAS/AD development

The AREG800A addresses all radar sensor tests during component R&D and ADAS/AD implementation and validation.



# SPECIFICATIONS IN BRIEF

| Specifications in brief | | |
|---|---|---|
| **Remote frontends and general concept** | | |
| Echo generator type | | dynamic artificial object generation |
| Echo generation concept | | ► hybrid: analog stepped delay line for short object distances < 17 m; longer distances up to 3000 m with fully digital implementation<br>► digital: for FMCW radars, the minimum generated distance is equal to the air gap value of the radar under test, and the maximum generated distance is 3000 m |
| Supported remote frontends | R&S®AREG8-24S/-24D/-81S/-81D/-81WS/-81WD | conventional mmWave remote frontends |
| | R&S®AREG-MFP/-BFP | monostatic or bistatic production frontend options; R&S®AREG-DBP1/-DBP2/-DBP3 production base unit option required |
| | R&S®QAT100 | innovative R&S®QAT100 electrically controllable antenna array |
| | R&S®FE44S | external frontends |
| Maximum number of remote frontends per AREG800A base unit | R&S®AREG8-24S/-24D/-81S/-81D/-81WS/-81WD | up to 4 conventional mmWave remote frontends |
| | R&S®QAT100 | up to 8 R&S®QAT100 |
| | R&S®FE44S | up to 8 external frontends, 4 for TX and 4 for RX (4 pairs) |
| **Frequency range** | | |
| Instantaneous RF bandwidth | R&S®AREG8-B9 | 1 GHz |
| | R&S®AREG8-B9 with R&S®AREG8-K527 | 2 GHz |
| | R&S®AREG8-B9 with R&S®AREG8-K527 and R&S®AREG8-K528 | 5 GHz |
| RF frequency bands | with R&S®AREG8-24S/-24D | 24 GHz to 24.25 GHz |
| | with R&S®AREG8-81S/-81D/-81WS/-81WD | 76 GHz to 81 GHz |
| | with R&S®QAT100 | 76 GHz to 81 GHz |
| | R&S®FE44S | 24 GHz to 44 GHz |
| **Artificial objects** | | |
| Minimum artificial object distance | R&S®AREG8-B9 | < 17 m + air gap (meas.) |
| | R&S®AREG8-B9 with R&S®AREG8-B63 | < 4 m + air gap (meas.) |
| | R&S®AREG8-B9 with R&S®AREG8-B63 and R&S®AREG8-K814 | ≥ air gap (meas.) |
| | R&S®AREG8-B9 with R&S®AREG8-K814 | ≥ air gap (meas.) |
| Covered distance range of artificial objects | R&S®AREG8-B9 | < 17 m to 3000 m (meas.) |
| | R&S®AREG8-B9 with R&S®AREG8-B63 | < 4 m to 3000 m (meas.) |
| | R&S®AREG8-B9 with R&S®AREG8-B63 and R&S®AREG8-K814 | ≥ air gap to 3000 m (meas.) |
| | R&S®AREG8-B9 with R&S®AREG8-K814 | ≥ air gap to 3000 m (meas.) |
| | R&S®AREG-DBP1/-DBP2/-DBP3 with R&S®AREG-MFP/-BFP | ≥ air gap to 350 m (meas.) for FMCW,<br>< 17 m to 350 m (meas.) for non FMCW |
| Maximum number of artificial objects per AREG800A | with R&S®QAT100 | |
| | artificial object distance < 4 m to 3000 m + air gap | up to 8 with individual azimuth/elevation, distance, RCS, Doppler<br>(up to 4 objects between 4 m and 17 m and up to 4 objects between 17 m and 3000 m) |
| | artificial object distance > 17 m to 3000 m + air gap | up to 8 with individual azimuth/elevation, distance, RCS, Doppler |
| | artificial object distance ≥ air gap to 3000 m | up to 8 with individual azimuth/elevation, distance, RCS, Doppler |
| | with R&S®AREG8-24S/-24D/-81S/-81D/-81WS/-81WD or with R&S®FE44S | |
| | artificial object distance < 4 m to 3000 m + air gap | up to 32 (up to 8 per frontend<br>(up to 4 objects between 4 m and 17 m and up to 28 objects between 17 m and 3000 m)) |
| | artificial object distance > 17 m to 3000 m + air gap | up to 32 (up to 8 per frontend) |
| | artificial object distance ≥ air gap to 3000 m | up to 32 (up to 8 per frontend) |

| Specifications in brief | | |
|---|---|---|
| Object distance accuracy | with R&S®AREG8-B9 option | ±5 cm (meas.) |
| Object distance step size | with R&S®AREG8-B9 option | 1 cm |
| Air gap | object distances and resulting object radar cross sections will change according to the distance between frontend reference plane and DUT | recommendation: air gap should be large enough to match far-field condition of radar under test |
| **Radial velocity** | | |
| Individual Doppler frequency shift for each artificial object | | yes |
| Velocity setting range | R&S®AREG8-B9 | ±500 km/h |
| Velocity step size | R&S®AREG8-B9 | 0.001 km/h |
| | R&S®AREG-DBP1/-DBP2/-DBP3 with R&S®AREG-MFP/-BFP | 0.05 km/h |
| **Level** | | |
| Dynamic RCS range for all artificial objects on a single IF path | with R&S®AREG8-24S/-24D/-81S/-81D/-81WS/-81WD | 90 dB |
| | with R&S®QAT100 | > 60 dB |
| Dynamic RCS range for multiple objects per IF path | with R&S®AREG8-24S/-24D/-81S/-81D/-81WS/-81WD | 60 dB |
| | with R&S®QAT100 | – |
| RCS control step size | | 0.1 dB |
| Amplitude flatness | R&S®QAT100 standalone | < ±5 dB in 4 GHz bandwidth (meas.) |
| **IF input/IF output interface** | | |
| IF output port for radar signal analysis and EIRP measurements | R&S®AREG8-K740 | IF outputs available on base unit |
| IF input port for superimposing interferers | R&S®AREG8-K741 | IF inputs available on base unit |
| **Hardware-in-the-loop (HiL) interface** | | |
| Dedicated HiL interface | R&S®AREG8-K109 | HiL co-processor |
| Open standard protocol support | | open simulation interface (OSI) |
| **User interface and remote controls** | | |
| Graphical user interface with touch controls | | yes |
| Remote control interfaces | | Ethernet |
| | R&S®AREG8-K986 | GPIB |
| Remote control command set | | SCPI |
| **General data** | | |
| Dimensions (W × H × D) | base unit | 462 mm × 240 mm × 504 mm<br>(18.15 in × 9.44 in × 19.81 in)<br>5 HU, 19" width |
| Weight | base unit (depends on options) | 15 kg to 26 kg (33.07 lb to 57.32 lb) |

# ORDERING INFORMATION

**R&S®AREG8-Bxxx = hardware option; R&S®AREG-Kxxx = software/keycode option**

| Designation | Type | Order No. |
|---|---|---|
| **Base unit** | | |
| Automotive radar echo generator, including power cable, quick start guide | AREG800A | 1437.4400.02 |
| **Hardware options** | | |
| **Baseband** | | |
| Digital baseband with 1 GHz IF bandwidth, 1 IF path and 1 individual artificial object | R&S®AREG8-B9 | 1437.8011.02 |
| Analog stepped delay line, for short object generation with 1 IF path and 1 individual artificial object | R&S®AREG8-B63 | 1437.8205.02 |
| **Software options** | | |
| **Bandwidth upgrade** | | |
| Baseband extension from 1 GHz to 2 GHz IF bandwidth, for 1 IF path | R&S®AREG8-K527 | 1437.9882.02 |
| Baseband extension from 2 GHz to 5 GHz IF bandwidth, for 1 IF path | R&S®AREG8-K528 | 1437.9799.02 |
| **Baseband enhancements** | | |
| Activation of second IF path for one AREG8-B9 baseband with 1 GHz bandwidth and 1 individual object | R&S®AREG8-K570 | 1437.9899.02 |
| One additional artificial object, for all IF paths | R&S®AREG8-K812 | 1437.9853.02 |
| Extended Doppler frequency shift up to 10 MHz | R&S®AREG8-K813 | 1437.9901.02 |
| Near object range for FMCW | R&S®AREG8-K814 | 1437.9776.02 |
| **Intermediate frequency ports and control interfaces** | | |
| Analog IF output interfaces | R&S®AREG8-K740 | 1437.9830.02 |
| Analog IF input interface | R&S®AREG8-K741 | 1437.9847.02 |
| Hardware-in-the-loop control interface | R&S®AREG8-K109 | 1437.9860.02 |
| Synchronization interface, for multiple AREG800A generators | R&S®AREG8-K549 | 1437.9876.02 |
| Remote control GPIB | R&S®AREG8-K986 | 1437.9818.02 |
| **System alignment backend** | | |
| System alignment | R&S®AREG8-B97 | 1437.9001.02 |
| **Production base units** | | |
| R&S®AREG-P1 radar mini | R&S®AREG-DBP1 | 1437.9676P02 |
| R&S®AREG-P2 radar golden | R&S®AREG-DBP2 | 1437.9682P02 |
| R&S®AREG-P3 radar pro | R&S®AREG-DBP3 | 1437.9699P02 |
| **Rackmount kit backend** | | |
| Rackmount kit backend | R&S®ZZA-KNP51 | 1177.8855.00 |
| **Remote frontends** | | |
| **mmWave remote frontends** | | |
| 24 GHz to 24.25 GHz, single antenna, 250 MHz RF bandwidth | R&S®AREG8-24S | 1437.8611K02 |
| 24 GHz to 24.25 GHz, two antennas, 250 MHz RF bandwidth | R&S®AREG8-24D | 1437.8640K02 |
| 76 GHz to 81 GHz, single antenna, 4 GHz RF bandwidth | R&S®AREG8-81S | 1437.8734K02 |
| System alignment, for R&S®AREG8-81S | R&S®AR81S-B97 | 1437.9053.02 |
| 76 GHz to 81 GHz, two antennas, 4 GHz RF bandwidth | R&S®AREG8-81D | 1437.8763K02 |
| System alignment, for R&S®AREG8-81D | R&S®AR81D-B97 | 1437.9060.02 |
| 76 GHz to 81 GHz, single antenna, 5 GHz RF bandwidth | R&S®AREG8-81WS | 1437.9153K02 |
| System alignment, for R&S®AREG8-81WS | R&S®AR81WS-B97 | 1437.9247.02 |
| 76 GHz to 81 GHz, two antennas, 5 GHz RF bandwidth | R&S®AREG8-81WD | 1437.9160K02 |
| System alignment, for R&S®AREG8-81WD | R&S®AR81WD-B97 | 1437.9230.02 |
| 24 GHz to 44 GHz, single antenna, 1 GHz RF bandwidth | R&S®FE44S | 1338.7001K02 |
| Frontend control, for R&S®FE44S | R&S®AREG8-K553 | 1437.9782.02 |
| **R&S®QAT100 advanced antenna array** | | |
| Advanced antenna array, from 76 GHz to 81 GHz | R&S®QAT100 | 1341.0004.02 |
| Second line of 96 transmit antennas, for the R&S®QAT100 | R&S®QAT-B2 | 1341.0162.02 |
| Shielding system, for one R&S®QAT100, length: 50 cm | R&S®QAT-Z50 | 1341.0156.02 |
| **Production frontends** | | |
| Monostatic frontend production | R&S®AREG-MFP | 1437.9701P02 |
| Bistatic frontend production | R&S®AREG-BFP | 1437.9718P02 |

| Warranty | | |
|---|---|---|
| Base unit and all frontends (mmWave remote frontends and R&S®QAT100) | | 3 years |
| All other items [1] | | 1 year |
| **Service options** | | |
| Extended warranty, one year | R&S®WE1 | Contact your local Rohde&Schwarz sales office. |
| Extended warranty, two years | R&S®WE2 | |
| Extended warranty with calibration coverage, one year | R&S®CW1 | |
| Extended warranty with calibration coverage, two years | R&S®CW2 | |
| Extended warranty with accredited calibration coverage, one year | R&S®AW1 | |
| Extended warranty with accredited calibration coverage, two years | R&S®AW2 | |

[1] For options installed, the remaining base unit warranty applies if longer than 1 year. Exception: all batteries have a 1 year warranty.

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- Worldwide
- Local and personalized
- Customized and flexible
- Uncompromising quality
- Long-term dependability

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The Rohde&Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test&measurement, technology systems and networks&cybersecurity. Founded 90 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

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- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
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ISO 9001

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ISO 14001

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PD 3609.8015.12 | Version 05.00 | July 2024 (st)
AREG800A Automotive Radar Echo Generator
Data without tolerance limits is not binding | Subject to change