R&S® ATS1500C
ANTENNA TEST CHAMBER FOR AUTOMOTIVE RADAR SENSORS

Antenna characterization, validation and calibration in a small footprint

ROHDE & SCHWARZ
Make ideas real
The R&S®ATS1500C together with the R&S®AREG100A automotive radar echo generator is the most complete system available on the market, tailored and designed for automotive radar module development, validation and calibration. With next generation advanced driver assistance systems (ADAS) and the upcoming autonomous driving right around the corner, automotive radar sensors will play a much bigger role to improve driving safety. Hence, the compatibility, functionality and accuracy have to be validated with a reliable and accurate system.

The fully shielded chamber is a compact antenna test range (CATR) consisting of a gold-plated parabolic reflector, a two-axis positioner allowing for 3D movements and the R&S®AREG100A frontend as the feed antenna.

The R&S®ATS1500C antenna test chamber is a CATR based compact, movable antenna test chamber for calibration and validation of 77 GHz/79 GHz automotive radar sensors. It is carefully designed to eliminate ghost targets within the chamber during target simulation tests and provides a highly accurate positioner for angular measurements.

The unique, patented parabolic reflector with optimized rolled edges promises well-distributed power of the collimated beams after reflection. Moreover, the reflector manufactured by Rohde & Schwarz has an extremely high-precision surface that minimizes quiet zone ripple, especially at high frequencies. The CATR setup works bidirectionally for transmit and receive signals.

Although the R&S®ATS1500C has a remarkably compact size of 0.90 m × 1.99 m × 1.70 m (W × H × D), the CATR system allows measurements in far-field conditions even for premium MIMO sensors. The maximum aperture size of a sensor can be 30 cm × 30 cm. The high-precision 3D tilt-tilt positioner was carefully designed to mimic the radar sensors in actual operation. In reality, both azimuth and elevation move simultaneously, and this can also be achieved by the R&S®ATS1500C positioner. When choosing the optional hardware trigger, measurements can be performed while continuously moving the positioner axes. This significantly reduces measuring times.

The positioner axes swing in a circular motion so that the DUT always keeps the polarization and distance aligned to the feed antenna. For measuring the orthogonal polarization, the DUT holder can be manually rotated in 22.5° steps.

Applications
In terms of applications, the R&S®ATS1500C can be further complemented by other Rohde & Schwarz state-of-the-art test and measuring instruments for a variety of applications, including ETSI RED and FCC in-band precompliance tests, interference tests, angular calibration and antenna characterization, making it a must-have chamber for every automotive radar manufacturer.
**Key facts**

- Very compact and portable far-field over-the-air (OTA) test system based on CATR technology
- State-of-the-art CATR reflector with optimized edges for uniform power distribution and high-precision surface finishing for minimal deviations in quiet zone
- Large quiet zone to accommodate large MIMO radars
- Very high frequency range for automotive radar sensors
- High-precision high-speed 3D tilt-tilt positioner for significantly shorter test time
- High shielding effectiveness of typically > 90 dB and extremely low reflections to eliminate ghost targets
- Multiple standardized interfaces for control and data transmission
- RF shielded ventilation system to maintain a stable temperature during measurements
- Suitable for ETSI and FCC validation, including interference tests, angular calibration and antenna characterization

**SPECIFICATIONS IN BRIEF**

<table>
<thead>
<tr>
<th>Specifications in brief</th>
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<tbody>
<tr>
<td>In-band frequency range</td>
<td>with R&amp;S®AREG100A-B177S 76.0 GHz to 77.0 GHz</td>
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<tr>
<td></td>
<td>with R&amp;S®AREG100A-B181S 76.0 GHz to 81.0 GHz</td>
</tr>
<tr>
<td>Out-of-band frequency range</td>
<td>chamber 6 GHz to 110 GHz</td>
</tr>
<tr>
<td>Shielding effectiveness</td>
<td>chamber &gt; 90 dB (typ.)</td>
</tr>
<tr>
<td>Polarization</td>
<td>feed antenna linear, vertical polarization, horizontal polarization possible by rotating frontend module</td>
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<tr>
<td>Quiet zone quality</td>
<td>reflector Ø 30 cm (for 76 GHz to 81 GHz)</td>
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<tr>
<td></td>
<td>average amplitude taper &lt; 1.3 dB (preliminary)</td>
</tr>
<tr>
<td></td>
<td>average amplitude ripple &lt; 0.5 dB (preliminary)</td>
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<tr>
<td>Angular resolution</td>
<td>resolution of feedback 0.03° (inner and outer axis) (preliminary)</td>
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<tr>
<td>Accumulated positioner error</td>
<td>of the whole system at DUT reference &lt; 0.5° (inner and outer axis) (preliminary)</td>
</tr>
<tr>
<td>Tilt angle</td>
<td>outer axis ±180°</td>
</tr>
<tr>
<td></td>
<td>inner axis ±45°</td>
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<tr>
<td>DUT load capability</td>
<td>positioner 2.0 kg, centered (preliminary)</td>
</tr>
<tr>
<td>Hardware triggering</td>
<td>positioner optional (requires BNC feedthrough)</td>
</tr>
<tr>
<td>Positioner API</td>
<td>positioner yes (C / C++ / C# / VB.NET / Python / MATLAB®, …)</td>
</tr>
<tr>
<td>Power supply</td>
<td>chamber 100 V to 230 V (AC) (–5%/+10%), max. 13 A</td>
</tr>
<tr>
<td>Weight</td>
<td>chamber approx. 500 kg (1102.31 lb)</td>
</tr>
<tr>
<td>Dimensions (W × H × D)</td>
<td>chamber 0.90 m × 1.99 m × 1.70 m (2.95 ft × 6.5 ft × 5.58 ft)</td>
</tr>
<tr>
<td>Temperature range</td>
<td>operating temperature range +20°C to +30°C</td>
</tr>
</tbody>
</table>

For more information, see data sheet (PD 3608.2065.22)

1) Limited by feeding structure.
2) DUT weight used for testing: 2.0 kg.
3) Measured worst-case scenario.

**ORDERING INFORMATION**

For ordering information, see data sheet (PD 3608.2065.22) and www.rohde-schwarz.com
Rohde & Schwarz
The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

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Rohde & Schwarz training
www.training.rohde-schwarz.com

Regional contact
- Europe, Africa, Middle East | +49 89 4129 12345
customersupport@rohde-schwarz.com
- North America | 1 888 TEST RSA (1 888 837 87 72)
customer.support@rsa.rohde-schwarz.com
- Latin America | +1 410 910 79 88
customersupport.la@rohde-schwarz.com
- Asia Pacific | +65 65 13 04 88
customersupport.asia@rohde-schwarz.com
- China | +86 800 810 82 28 | +86 400 650 58 96
customersupport.china@rohde-schwarz.com

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