

ROHDE & SCHWARZ

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R&S® AREG800A AUTOMOTIVE RADAR ECHO GENERATOR

Specifications

Data Sheet | Version 02.00



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Definitions

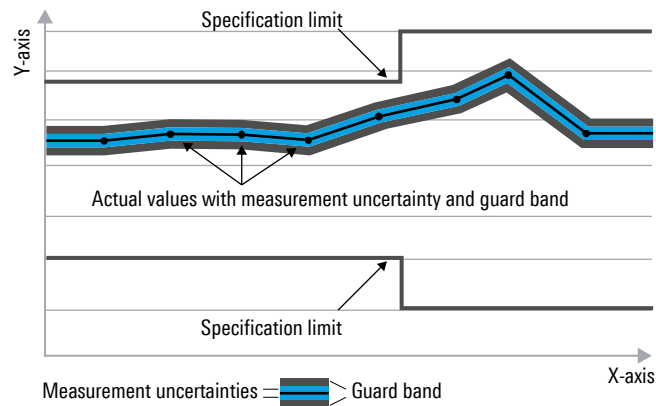
General

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as $<$, \leq , $>$, \geq , \pm , or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



Non-traceable specifications with limits (n. trc.)

Represent product performance that is specified and tested as described under “Specifications with limits” above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

Specifications without limits

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

Typical data (typ.)

Characterizes product performance by means of representative information for the given parameter. When marked with $<$, $>$ or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

Nominal values (nom.)

Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

Measured values (meas.)

Characterize expected product performance by means of measurement results gained from individual samples.

Uncertainties

Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are designated with the format “parameter: value”.

Non-traceable specifications with limits, typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP/3GPP2 standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bits per second (Gbps), million bits per second (Mbps), thousand bits per second (kbps), million symbols per second (MSPS) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, MSPS, kbps, ksps and Msample/s are not SI units.

Specifications

R&S® AREG800A

Remote frontends and echo generation concept

Echo generator type		dynamic artificial object generation
Echo generation concept		hybrid – analog stepped delay line for short object distances < 17 m; larger distances with fully digital implementation
Supported remote frontends	R&S® AREG8-24S/-24D/-77S/-77D/-81S/-81D ¹	conventional mmWave remote frontends
	R&S® QAT100	innovative R&S® QAT100 electronically controllable antenna array
Maximum number of remote frontends per R&S® AREG800A base unit	R&S® AREG8-24S/-24D/-77S/-77D/-81S/-81D ¹	up to 4 conventional mmWave frontends
	R&S® QAT100	up to 8 R&S® QAT100

Frequency range

Instantaneous IF bandwidth	R&S® AREG8-B9	1 GHz overrange: 1.2 GHz (meas.)
	R&S® AREG8-B9 with R&S® AREG8-K527	2 GHz overrange: 2.2 GHz (meas.)
	R&S® AREG8-B9 with R&S® AREG8-K527 and R&S® AREG8-K528 ¹	5 GHz (4 GHz in RF)
IF frequency range for R&S® AREG800A base unit	R&S® AREG8-B9	1.1 GHz to 2.1 GHz
	R&S® AREG8-B9 with R&S® AREG8-K527	0.7 GHz to 2.7 GHz
	R&S® AREG8-B9 with R&S® AREG8-K527 and R&S® AREG8-K528 ¹	0.7 GHz to 5.7 GHz
RF frequency bands	with R&S® AREG8-24S/-24D ¹	24 GHz to 24.25 GHz
	with R&S® AREG8-77S/-77D ¹	76 GHz to 77 GHz
	with R&S® AREG8-81S/-81D ¹	76 GHz to 81 GHz
	with R&S® QAT100	76 GHz to 81 GHz

IF paths

Maximum number of R&S® AREG8-B9 digital baseband boards		4
Maximum number of R&S® AREG8-B63 ¹ analog stepped delay lines	1 x R&S® AREG8-B9	1
	2 x R&S® AREG8-B9	2
	3 x R&S® AREG8-B9	3
	4 x R&S® AREG8-B9	4
Maximum number of individual IF paths	for 1 x R&S® AREG8-B9	1
	1 x R&S® AREG8-B9 + R&S® AREG8-K570	2
	for 4 x R&S® AREG8-B9	4
	4 x R&S® AREG8-B9 + 4 x R&S® AREG8-K570	8
	for 1 x R&S® AREG8-B9 with R&S® AREG8-K527 and R&S® AREG8-K528 ¹	1
	for 4 x R&S® AREG8-B9 with R&S® AREG8-K527 and R&S® AREG8-K528 ¹	4

¹ Will be available soon.

Artificial objects

Object type		dynamic
Minimum artificial object distance	R&S®AREG8-B9	< 17 m + air gap (meas.)
	R&S®AREG-B9 with R&S®AREG-B63 ¹	< 4 m + air gap (meas.)
Covered distance range of artificial objects	R&S®AREG8-B9	< 17 m to > 500 m (meas.)
	R&S®AREG-B9 with R&S®AREG-B63 ¹	< 4 m to > 500 m (meas.)
Maximum number of artificial objects per R&S®AREG800A	with R&S®QAT100	
	artificial object distance < 4 m to 17 m + air gap ¹	up to 4 with individual azimuth, distance, RCS, Doppler
	artificial object distance > 17 m + air gap	up to 8 with individual azimuth, distance, RCS, Doppler
	with R&S®AREG8-24S/-24D/-77S/-77D/-81S/-81D ¹	
	artificial object distance < 4 m to 17 m + air gap ¹	up to 4 (1 per frontend)
	artificial object distance > 17 m + air gap ¹	up to 32 (up to 8 per frontend)
Object distance accuracy	with R&S®AREG8-B9 option	±5 cm (meas.)
Object distance step size	with R&S®AREG8-B9 option	< 2.5 cm (nom.)
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

Level

Dynamic RCS range for all artificial objects on one IF path together	with R&S®AREG8-24S/-24D/-77S/-77D/-81S/-81D ¹	90 dB
	with R&S®QAT100	> 60 dB
Dynamic RCS range for multiple objects per IF path	with R&S®AREG8-24S/-24D/-77S/-77D/-81S/-81D ¹	60 dB
	with R&S®QAT100	–
RCS control step size		0.5 dB
Maximum input power at RX IF in connector of R&S®AREG800A base unit		10 dBm (meas.)
Recommended input power at RX IF in connector of R&S®AREG800A base unit		≤ 0 dBm (meas.)
Maximum output power at TX IF out connector of R&S®AREG800A base unit		–3 dBm (meas.)
IF attenuation accuracy of R&S®AREG800A base unit		±2 dB (meas.)

IF transfer characteristic

Amplitude flatness	measured from IF input to IF output connector at R&S®AREG800A base unit	
	measured by vector network analyzer:	
	<ul style="list-style-type: none"> • frequency step size: 2.5 MHz • measurement bandwidth: 1 kHz • span: from 1.1 GHz to 2.1 GHz for 1 GHz bandwidth from 0.6 GHz to 2.6 GHz for 2 GHz bandwidth • source power: -10 dBm 	
	R&S®AREG8-B9	
	with equalization	< ±1 dB in 1 GHz bandwidth (meas.)
	without equalization	< ±3 dB in 1 GHz bandwidth (meas.)
Group delay flatness	R&S®AREG8-B9 with R&S®AREG8-K527	
	with equalization	< ±1.5 dB in 2 GHz bandwidth (meas.)
	without equalization	< ±3.5 dB in 2 GHz bandwidth (meas.)
	R&S®AREG8-B9	
	with equalization	< ±0.5 ns in 1 GHz bandwidth (meas.)
	without equalization	< ±1 ns in 1 GHz bandwidth (meas.)
R&S®AREG8-B9 with R&S®AREG8-K527	with equalization	< ±0.5 ns in 2 GHz bandwidth (meas.)
	without equalization	< ±1 ns in 2 GHz bandwidth (meas.)

IF spectral purity

Spurious free dynamic range (spurs in frequency domain)	RX IF input to TX IF output connector at R&S®AREG800A base unit; measured at -10 dBm signal level	
	R&S®AREG8-B9	> 35 dBc (typ.)
	R&S®AREG8-B9 with R&S®AREG8-K527	> 35 dBc (typ.)
Suppression of ghost objects	measured from IF input to IF output connector at R&S®AREG800A base unit	
	measured by vector network analyzer in time domain:	
	<ul style="list-style-type: none"> • frequency step size: 125 kHz • measurement bandwidth: 100 kHz • span: from 1.1 GHz to 2.1 GHz for 1 GHz bandwidth from 0.6 GHz to 2.6 GHz for 2 GHz bandwidth • source power: -10 dBm 	
	R&S®AREG8-B9	
	with equalization	> 50 dBc
	without equalization	> 40 dBc
R&S®AREG8-B9 with R&S®AREG8-K527	with equalization	> 50 dBc
	without equalization	> 40 dBc

IF input/IF output interface

IF output port for radar signal analysis and EIRP measurements	R&S®AREG8-K740	IF output ports available on base unit
IF output frequency range	R&S®AREG8-B9	1.1 GHz to 2.1 GHz
	R&S®AREG8-B9 with R&S®AREG8-K527	0.7 GHz to 2.7 GHz
	R&S®AREG8-B9 with R&S®AREG8-K527 and R&S®AREG8-K528 ¹	0.7 GHz to 5.7 GHz
IF output measurement port max. output level	from RX IF input to AUX IF output at R&S®AREG800A base unit	0 dB
IF input port for superimposing interferers	R&S®AREG8-K741	IF input ports available on base unit
IF input max. level	R&S®AREG8-K741	10 dBm (meas.)
IF input recommended level	R&S®AREG8-K741	-3 dBm (meas.)
IF input frequency range	R&S®AREG8-B9	0.7 GHz to 5.7 GHz
	R&S®AREG8-B9 with R&S®AREG8-K527	0.7 GHz to 5.7 GHz
	R&S®AREG8-B9 with R&S®AREG8-K527 and R&S®AREG8-K528 ¹	0.7 GHz to 5.7 GHz

Hardware-in-the-loop (HiL) interface

Dedicated HiL interface	R&S®AREG8-K109	HiL coprocessor
HiL interface scenario update rate	R&S®AREG8-K109	20 ms (meas.)
Open-standard protocol support		open simulation interface (OSI)
Physical interfaces		Ethernet/LAN

User interface and remote controls

Graphical user interface with touch controls		yes
Web interface		yes
Remote control interfaces		Ethernet
	R&S®AREG8-K986 ¹	GPIB
Remote control command set		SCPI

Reference frequency**Reference frequency input**

Connector type	REF IN on rear panel	BNC female
Input frequency		10 MHz
Input level range		0 dBm to + 13 dBm
Input impedance		50 Ω (nom.), AC-coupled

Reference frequency output

Connector type	REF OUT on rear panel	BNC female
Output frequency	square wave	
	output with source mode: internal	10 MHz ± 5 ppm (nom.) derived from internal oscillator
	output with source mode: external	amplified input signal from REF IN routed to REF OUT
Output level		+10 dBm (meas.)
Source impedance		50 Ω (nom.), AC-coupled

R&S®QAT100 together with R&S®AREG800A

Frequency

R&S®AREG800A with R&S®QAT100		
RF frequency range	with R&S®QAT100	76 GHz to 77 GHz 77 GHz to 81 GHz
RF instantaneous bandwidth	with R&S®QAT100	4 GHz
Required bandwidth at R&S®AREG800A	with R&S®QAT100	R&S®AREG8-B9 with 1 GHz instantaneous bandwidth due to 4 × multiplication concept of the R&S®QAT100

Number of individual angular directions

Number of individual angular directions (Number of supported R&S®AREG800A IF paths)	with R&S®QAT100	4
	with R&S®QAT100 and R&S®QAT-B2 option	8

Number of individual artificial objects per independent angular direction

Maximum number of individual artificial objects per R&S®AREG800A IF path		1
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Number of R&S®QAT100 per R&S®AREG800A base unit

Maximum number of supported R&S®QAT100	with one individual IF path per R&S®QAT100 and one individual angular direction	8
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RF level

Maximum ratings	RX power at frontend	+60 dBm EIRP at 0.5 m distance to sensor
	TX power at frontend	+10 dBm EIRP (at 0 dBm TX input power)
	max. deviation	±3 dB between TX
Minimum input power	76.0 GHz to 77.0 GHz	+20 dBm EIRP at 0.5 m distance to sensor
	77.0 GHz to 81.0 GHz	+25 dBm EIRP at 0.5 m distance to sensor
Total RX to TX attenuation range	with R&S®AREG800A base unit and R&S®QAT100	RX antenna to TX antenna (incl. antennas) 0 dB to -80 dB (nom.)

IF level

Maximum output power at IF RX ports	R&S®QAT100	-6 dBm (nom.)
Maximum input power at IF TX ports	R&S®QAT100	0 dBm
Minimum input power at IF TX ports	R&S®QAT100	-25 dBm

RF transfer characteristic

Amplitude flatness	with R&S®QAT100 RX antenna to TX antenna	< ±5 dB (R&S®QAT100 standalone) in 4 GHz bandwidth
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Antennas

Antenna configuration	R&S®QAT100	signal distribution: one central receive antenna connected to all 4 segments; 96 transmit antennas in total 4 individual receive antennas each connected to an individual segment; up to 4 segments; each segments contains 24 transmit antennas
	with R&S®QAT-B2	same as above; additional 4 segments; up to 8 individual segments in total
Antenna type and gain	R&S®QAT100	waveguide antennas 6 dBi gain at 77 GHz center frequency (nom.)
Antenna polarization	R&S®QAT100	45° linear polarization

Angle range – field of view

Single R&S®QAT100 antenna array	air gap = 0.5 m	±19° field of view of RUT covered
	air gap = 1.0 m	±10° field of view of RUT covered
	air gap = 2.1 m	±5° field of view of RUT covered

Angular resolution

Single R&S®QAT100 antenna array	air gap = 0.5 m	0.4°
	air gap = 1.0 m	0.2°
	air gap = 2.1 m	0.1°

General data of R&S®AREG800A

Environmental conditions		
Temperature	operating temperature range	+15 °C to +45 °C
	storage temperature range	-10 °C to +60 °C
Damp heat		+40 °C, 95 % rel. humidity, steady state in line with EN 60068-2-78
Altitude	operating	4600 m
	transport	4600 m
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 55 Hz, 0.15 mm amplitude const., 55 Hz to 150 Hz, 0.5 g const., in line with EN 60068-2-6
	random	10 Hz to 300 Hz, acceleration 1.2 g RMS, in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E, method 516.4, procedure I
Power rating		
Rated voltage		100 V to 240 V AC ($\pm 10\%$)
Rated frequencies		50 Hz to 60 Hz ($\pm 5\%$)
Rated current		5.8 A to 15 A (50 Hz to 60 Hz)
Rated power	when fully equipped	< 1000 W
Power factor correction		in line with EN 61000-3-2
Product conformity		
Measurement environment	for OTA testing	a shielded environment is required
Electromagnetic compatibility	EU: in line with EMC Directive 2014/30/EU	applied harmonized standards: <ul style="list-style-type: none"> • EN 61326-1 (industrial environment) • EN 61326-2-1 • EN 55011 (class A) • EN 61000-3-2 • EN 61000-3-3
Electrical safety	EU: in line with Low Voltage Directive 2014/35/EU	applied harmonized standard: EN 61010-1
	USA	UL 61010-1
	Canada	CAN/CSA-C22.2 No. 61010-1
International safety approvals	VDE – Association for Electrical, Electronic and Information Technologies	GS mark 40046635
	CSA – Canadian Standards Association	CSA _{UL} mark 70133349
Dimensions (W x H x D)	base unit	462 mm x 240 mm x 504 mm (18.15 in x 9.44 in x 19.81 in)
	R&S®AREG8-xx frontend modules	120 mm x 115 mm x 30 mm (4.72 in x 4.53 in x 1.18 in), not including antennas and circulator
Weight	base unit (depends on options)	15 kg to 26 kg (33.07 lb to 57.32 lb)
	R&S®AREG8-xx frontend modules	1 kg (2 lb)
Display		7" TFT color display with capacitive touch functionality

Ordering information

Designation	Type	Order No.
Base unit		
Automotive radar echo generator Including power cable, quick start guide	R&S®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 ¹	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 ¹	R&S®AREG8-K528	1437.9799.02
Baseband enhancements		
Activation of second IF path for one R&S®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 ¹	R&S®AREG8-K813	1437.9901.02
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 R&S®AREG800A units ¹	R&S®AREG8-K549	1437.9876.02
Remote control GPIB ¹	R&S®AREG8-K986	1437.9818.02
Remote frontends		
mmWave remote frontends		
24 GHz to 24.25 GHz, single antenna, 250 MHz RF bandwidth ¹	R&S®AREG8-24S	1437.8611.02
24 GHz to 24.25 GHz, two antennas, 250 MHz RF bandwidth ¹	R&S®AREG8-24D	1437.8640.02
76 GHz to 77 GHz, single antenna, 1 GHz RF bandwidth ¹	R&S®AREG8-77S	1437.8670.02
76 GHz to 77 GHz, two antennas, 1 GHz RF bandwidth ¹	R&S®AREG8-77D	1437.8705.02
76 GHz to 81 GHz, single antenna, 4 GHz RF bandwidth ¹	R&S®AREG8-81S	1437.8734.02
76 GHz to 81 GHz, two antennas, 4 GHz RF bandwidth ¹	R&S®AREG8-81D	1437.8763.02
R&S®QAT100 advanced antenna array		
Advanced antenna array, from 76 GHz to 81 GHz	R&S®QAT100	1341.0004.02
Second TX/RX antenna line, for advanced antenna array	R&S®QAT-B2	1341.0162.02
Shielding system, for one R&S®QAT100	R&S®QAT-Z50	1341.0156.02

Warranty		
Base unit and all frontends (mmWave frontends and R&S®QAT100)		3 years
All other items ²		1 year
Service options		
Extended warranty, one year	R&S®WE1	Please contact your local
Extended warranty, two years	R&S®WE2	
Extended warranty with calibration coverage, one year	R&S®CW1	Rohde & Schwarz sales office.
Extended warranty with calibration coverage, two years	R&S®CW2	

Extended warranty with a term of one and two years (WE1 and WE2)

Repairs carried out during the contract term are free of charge ³. Necessary calibration and adjustments carried out during repairs are also covered.

Extended warranty with calibration coverage (CW1 and CW2)

Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs ³ and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

² For options installed, the remaining base unit warranty applies if longer than 1 year. Exception: all batteries have a 1 year warranty.

³ Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

Service that adds value

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

Rohde & Schwarz

The Rohde&Schwarz technology group is among the trail-blazers 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 more than 85 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.

www.rohde-schwarz.com

Sustainable product design

- ▶ Environmental compatibility and eco-footprint
- ▶ Energy efficiency and low emissions
- ▶ Longevity and optimized total cost of ownership

Certified Quality Management

ISO 9001

Certified Environmental Management

ISO 14001

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