

**ROHDE & SCHWARZ**

Make ideas real



# AREG800A

## R&S® AREG-P FIXED PRODUCT CONFIGURATION VERSIONS

Specifications | Version 01.00



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# Definitions

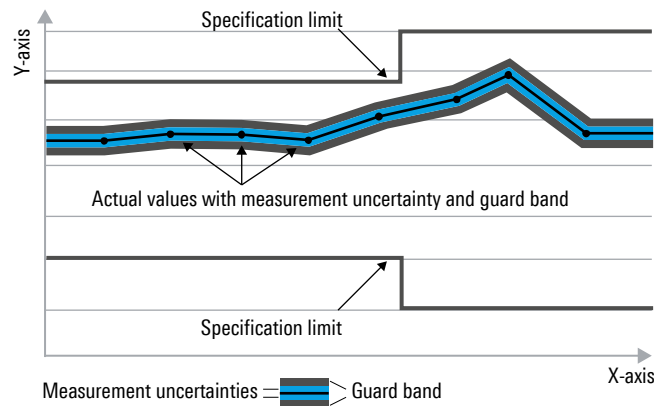
## General

Product data applies under the following conditions:

- Three hours of storage at ambient temperature followed by 30 minutes of 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 standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bit per second (Gbps), million bit per second (Mbps), thousand bit 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® AREG-P fixed product configuration versions of the AREG800A for automotive radar production

#### R&S® AREG-DBP1/-DBP2/-DBP3 together with R&S® AREG-MFP/-BFP

Configuration	Options	Components
R&S® AREG-P1 radar mini configuration	R&S® AREG-DBP1 production base unit option	one digital channel one object per channel 5 GHz instantaneous bandwidth near object range possibility analog IF output interfaces remote control interfaces
	R&S® AREG-MFP/-BFP production frontend option; one frontend per channel required	monostatic or bistatic
R&S® AREG-P2 radar golden configuration	R&S® AREG-DBP2 production base unit option	two digital channels one object per channel 5 GHz instantaneous bandwidth near object range possibility analog IF output interfaces remote control interfaces
	R&S® AREG-MFP/-BFP production frontend option; one frontend per channel required	monostatic or bistatic
R&S® AREG-P3 radar pro configuration	R&S® AREG-DBP3 production base unit option	three digital channels one object per channel 5 GHz instantaneous bandwidth near object range possibility analog IF output interfaces remote control interfaces
	R&S® AREG-MFP/-BFP production frontend option, one frontend per channel required	monostatic or bistatic

### R&S® AREG-DBP1/-DBP2/-DBP3 production base unit options

#### Remote frontends and echo generation concept

Echo generation type		settable artificial object generation
Echo generation concept		digital artificial object generation
Supported remote frontends	R&S® AREG-MFP/-BFP production frontend option; R&S® AREG-DBP1/-DBP2/-DBP3 production base unit option required	monostatic or bistatic
Maximum number of remote frontends per R&S® AREG-DBP1/-DBP2/-DBP3 production base unit options	R&S® AREG-MFP/-BFP production frontend option	one for R&S® AREG-DBP1
		two for R&S® AREG-DBP2
		three for R&S® AREG-DBP3

#### Frequency range

Instantaneous IF bandwidth	3 modes	1 GHz, overrange: 1.2 GHz (meas.)
		2 GHz, overrange: 2.2 GHz (meas.)
		5 GHz, overrange: 5.2 GHz (meas.)
IF frequency range for R&S® AREG-DBP1/-DBP2/-DBP3 production base unit options	for 1 GHz mode	1.1 GHz to 2.1 GHz
	for 2 GHz mode	0.7 GHz to 2.7 GHz
	for 5 GHz mode	0.7 GHz to 5.7 GHz
RF frequency bands	R&S® AREG-MFP/-BFP production frontend option	76 GHz to 81 GHz

#### IF paths

Maximum number of channels	R&S® AREG-DBP1	1
	R&S® AREG-DBP2	2
	R&S® AREG-DBP3	3

## Artificial objects

Object type		adjustable
Covered distance range of artificial objects	for non-FMCW mode	< 17 m to 350 m (meas.)
	for FMCW mode	≥ air gap to 350 m (meas.)
Maximum number of artificial objects per R&S®AREG-DBP1/-DBP2/-DBP3 production base unit options	with R&S®AREG-MFP/-BFP	
	R&S®AREG-DBP1	1 (one per channel)
	R&S®AREG-DBP2	2 (one per channel)
	R&S®AREG-DBP3	3 (one per channel)
Object distance accuracy		±5 cm (meas.)
Object distance step size		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		±500 km/h
Velocity step size		0.05 km/h
Doppler frequency offset accuracy	measured with a spectrum analyzer in IF domain as frequency offset between base unit IF input and IF output signal, without frontend	< 1 Hz
Velocity accuracy	The Doppler shift velocity error is determined from the measured Doppler shift frequency error by using the equation: $f_{\text{error}} = 3.6 \times (f_{\text{error}}/f_{\text{center}}) \times \frac{1}{2} \times 299\,700\,000 \text{ m/s}$ , with $f_{\text{center}}$ being 78 GHz or 79 GHz (for R&S®AREG-MFP/-BFP).	< 0.05 km/h

## Level

Dynamic RCS range for one artificial object on one IF path	with R&S®AREG-MFP/-BFP	90 dB
RCS control step size		0.1 dB
Maximum input power at "RX IF in" connector of R&S®AREG-DBP1/-DBP2/-DBP3 production base unit options		10 dBm (meas.)
Recommended input power at "RX IF in" connector of R&S®AREG-DBP1/-DBP2/-DBP3 production base unit options		≤ 0 dBm (meas.)
Maximum output power at "TX IF out" connector of R&S®AREG-DBP1/-DBP2/-DBP3 production base unit options		-3 dBm (meas.)
IF attenuation accuracy of R&S®AREG-DBP1/-DBP2/-DBP3 production base unit options		±2 dB (meas.)

**IF transfer characteristics**

Amplitude flatness	measured from IF input to IF output connector at R&S®AREG-DBP1/-DBP2/-DBP3 production base unit options	
	measured by vector network analyzer:	
	<ul style="list-style-type: none"> <li>• frequency step size: 2.5 MHz</li> <li>• measurement bandwidth: 1 kHz</li> <li>• span <ul style="list-style-type: none"> <li>– from 1.1 GHz to 2.1 GHz, for 1 GHz bandwidth</li> <li>– from 0.7 GHz to 2.7 GHz, for 2 GHz bandwidth</li> <li>– from 0.7 GHz to 5.7 GHz, for 5 GHz bandwidth</li> </ul> </li> <li>• source power: –10 dBm</li> </ul>	
	without equalization	
	for 1 GHz mode	< ±3 dB in 1 GHz bandwidth (meas.)
	for 2 GHz mode	< ±3.5 dB in 2 GHz bandwidth (meas.)
	for 5 GHz mode	< ±5 dB in 5 GHz bandwidth (meas.)
Group delay flatness	without equalization	
	for 1 GHz mode	< ±1 ns in 1 GHz bandwidth (meas.)
	for 2 GHz mode	< ±1 ns in 2 GHz bandwidth (meas.)
	for 5 GHz mode	< ±2 ns in 5 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®AREG-DBP1/-DBP2/-DBP3 production base unit options; measured at –10 dBm signal level	
	for 1 GHz mode	> 35 dBc (typ.)
	for 2 GHz mode	> 35 dBc (typ.)
	for 5 GHz mode	> 30 dBc (typ.)
Suppression of ghost objects	measured from IF input to IF output connector at R&S®AREG-DBP1/-DBP2/-DBP3 production base unit options	
	measured by vector network analyzer in time domain:	
	<ul style="list-style-type: none"> <li>• frequency step size: 125 kHz</li> <li>• measurement bandwidth: 100 kHz span <ul style="list-style-type: none"> <li>– from 1.1 GHz to 2.1 GHz, for 1 GHz bandwidth</li> <li>– from 0.7 GHz to 2.7 GHz, for 2 GHz bandwidth</li> <li>– from 0.7 GHz to 5.7 GHz, for 5 GHz bandwidth</li> </ul> </li> <li>• source power: –10 dBm</li> <li>• distance to wanted artificial object: 2 m</li> </ul>	
	for 1 GHz mode	> 40 dBc (meas.)
	for 2 GHz mode	> 40 dBc (meas.)
for 5 GHz mode	> 40 dBc (meas.)	

**AUX IF output interface**

AUX IF output port for radar bandwidth and EIRP measurements		IF output ports available on R&S®AREG-DBP1/-DBP2/-DBP3 production base unit options and R&S®AREG-MFP/-BFP production frontend options
AUX IF output frequency range	for 1 GHz mode	1.1 GHz to 2.1 GHz
	for 2 GHz mode	0.7 GHz to 2.7 GHz
	for 5 GHz mode	0.7 GHz to 5.7 GHz
AUX IF output measurement port output gain	from RX IF input to AUX IF output at R&S®AREG-DBP1/-DBP2/-DBP3 production base unit options	0 dB (nom.); max. 0 dBm

**User interface and remote controls**

Graphical user interface with touch controls		yes
Web interface		yes
Remote control interfaces		Ethernet
		GPIO
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 $\Omega$ (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 $\pm$ 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 $\Omega$ (nom.), AC coupled

## R&S® AREG-MFP/-BFP production frontend option together with R&S® AREG-DBP1/-DBP2/-DBP3 production base unit options

### Frequency

RF frequency range	R&S® AREG-MFP/-BFP	76.0 GHz to 81.0 GHz
RF instantaneous bandwidth	R&S® AREG-MFP/-BFP with R&S® AREG-DBP1/-DBP2/-DBP3 in 1 GHz mode	1 GHz
	R&S® AREG-MFP/-BFP with R&S® AREG-DBP1/-DBP2/-DBP3 in 2 GHz mode	2 GHz
	R&S® AREG-MFP/-BFP with R&S® AREG-DBP1/-DBP2/-DBP3 in 5 GHz mode	5 GHz
RF center frequency step size	R&S® AREG-MFP/-BFP	100 MHz
IF center frequency	R&S® AREG-MFP/-BFP	
	for 1 GHz bandwidth	1.6 GHz
	for 2 GHz bandwidth	1.7 GHz
	for 5 GHz bandwidth	3.2 GHz

### Number of R&S® AREG-MFP/-BFP production frontend options per R&S® AREG-DBP1/-DBP2/-DBP3 production base unit options

Maximum number of supported R&S® AREG-MFP/-BFP production frontend options	for R&S® AREG-DBP1	1
	for R&S® AREG-DBP2	2
	for R&S® AREG-DBP3	3

### RF level

Absolut maximum RX power at frontend RX waveguide port	R&S® AREG-MFP/-BFP	-7 dBm
Maximum TX power at frontend TX waveguide port	R&S® AREG-MFP/-BFP	≥ 15 dBm (meas.)

### RF transfer characteristics

Amplitude flatness	<b>RF amplitude flatness</b>	
	measured by vector network analyzer:	
	<ul style="list-style-type: none"> <li>with diplexer between RX and TX</li> <li>frequency step size: 2.5 MHz</li> <li>measurement bandwidth: 1 kHz</li> <li>window function: normal gate (Hann)</li> <li>type: bandpass filter</li> </ul>	
	<b>R&amp;S® AREG-MFP/-BFP production frontend options together with R&amp;S® AREG-DBP1/-DBP2/-DBP3 production base unit options</b>	
Group delay flatness	measured from RX waveguide input to waveguide TX output connector at R&S® AREG-MFP/-BFP and:	
	for 1 GHz mode	< ±1 dB (meas.)
	for 2 GHz mode	< ±2 dB (meas.)
	for 5 GHz mode	< ±5 dB (meas.)
Group delay flatness	<b>R&amp;S® AREG-MFP/-BFP production frontend options together with R&amp;S® AREG-DBP1/-DBP2/-DBP3 production base unit options</b>	
	measured from RX waveguide input to waveguide TX output connector at R&S® AREG-MFP/-BFP and:	
	for 1 GHz mode	< ±0.5 ns (meas.)
	for 2 GHz mode	< ±1 ns (meas.)
	for 5 GHz mode	< ±1 ns (meas.)



## Antennas

Antenna configuration	with R&S®AREG-MFP	1 combined TX/RX antenna (circulator integrated into frontend module)
	with R&S®AREG-BFP	1 TX and 1 RX antenna, lateral antenna spacing (center to center): 32 mm
Antenna type and gain	with R&S®AREG-MFP/-BFP	WR12 rectangular horn antenna, 10 dBi (nom.)
Antenna gain extension	with R&S®AREG-MFP/-BFP and R&S®SGH90G25	WR12 rectangular horn antenna, 25 dBi (nom.)
Antenna polarization		linear, vertical polarization, horizontal polarization possible by rotating the frontend module

## Auxiliary IF output interface

Received signal IF output at AREG-DBP1/-DBP2/-DBP3 production base unit options for radar bandwidth measurements: connect to a spectrum analyzer or oscilloscope

AUX IF output measurement port maximum output level	R&S®AREG-MFP/-BFP	max. 0 dBm
AUX IF output gain	from RX waveguide input (at RF frequency) to auxiliary RX IF out port (at IF frequency)	
	R&S®AREG-MFP/-BFP	12 dB (nom.)
AUX IF output frequency range	R&S®AREG-MFP/-BFP	0.7 GHz to 5.7 GHz

## Power measurement output

RX power connector at AREG-MFP/-BFP production frontend options for radar EIRP measurements: connect to a power sensor

RX power output measurement port maximum output level	R&S®AREG-MFP/-BFP	max. 0 dBm
RX power output gain	from RX waveguide input (at RF frequency) to RX power port (at IF frequency)	
	R&S®AREG-MFP/-BFP	10 dB (nom.)
RX power output frequency range	R&S®AREG-MFP/-BFP	0.7 GHz to 5.7 GHz

## Connectors R&S®AREG-MFP/-BFP options

RX IF OUT	receiver IF signal output to base unit	SMA female
TX IF IN	transmitter IF signal and reference input from base unit	SMA female
Control	power and control connection to frontend module	26-pin ODU Mini-Snap series L, coding A, push-pull connector
RX power	receiver IF signal output for power measurements, connect an R&S®NRPxx power sensor	SMA female

## General data of R&S®AREG-DBP1/-DBP2/-DBP3 production base unit options

<b>Environmental conditions</b>		
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
<b>Mechanical resistance</b>		
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
<b>Power rating</b>		
Rated voltage		100 V to 240 V AC (± 10 %)
Rated frequencies		50 Hz to 60 Hz (± 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
<b>Product conformity</b>		
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"> <li>• EN 61326-1 (industrial environment)</li> <li>• EN 61326-2-1</li> <li>• EN 55011 (class A)</li> <li>• EN 61000-3-2</li> <li>• EN 61000-3-3</li> </ul>
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 <sub>UL</sub> mark 70133349
<b>Dimensions (W × H × D)</b>	R&S®AREG-DBP1/-DBP2/-DBP3 production base unit options	462 mm × 240 mm × 504 mm (18.15 in × 9.44 in × 19.81 in)
	R&S®AREG-MFP/-BFP production frontend options	120 mm × 115 mm × 30 mm (4.72 in × 4.53 in × 1.18 in), not including antennas and circulator
<b>Weight</b>	R&S®AREG-DBP1/-DBP2/-DBP3 production base unit options (depends on version)	15 kg to <26 kg (33.07 lb to <57.32 lb)
	R&S®AREG-MFP/-BFP production frontend options	1 kg (2 lb)
<b>Display</b>		7" TFT color display with capacitive touch functionality

## Ordering information

Designation	Type	Order No.
<b>Production base units</b>		
Radar mini	R&S®AREG-DBP1	1437.9676P02
Radar golden	R&S®AREG-DBP2	1437.9682P02
Radar pro	R&S®AREG-DBP3	1437.9699P02
<b>Rackmount kit</b>		
Rackmount kit backend	R&S®ZZA-KNP51	1177.8855.00
<b>High gain antenna</b>		
Standard 25 dBi gain horn	R&S®SGH90G25	1538.5817.03
<b>Production frontends</b>		
Monostatic	R&S®AREG-MFP	1437.9701P02
Bistatic	R&S®AREG-BFP	1437.9718P02

## Warranty and service

<b>Warranty</b>		
Base unit		1 year
All other items		1 year
<b>Service options</b>		
	<b>Service plans</b>	<b>On demand</b>
Calibration	up to five years <sup>1</sup>	pay per calibration
Warranty and repair	up to five years <sup>1</sup>	standard price repair
Contact your Rohde & Schwarz sales office for further details.		

<sup>1</sup> For extended periods, contact your Rohde & Schwarz sales office.

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- ▶ Environmental compatibility and eco-footprint
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- ▶ Longevity and optimized total cost of ownership

Certified Quality Management

**ISO 9001**

Certified Environmental Management

**ISO 14001**

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