R&S®QAT100
ADVANCED ANTENNA ARRAY

Specifications

Data Sheet
Version 05.00

ROHDE&SCHWARZ
Make ideas real

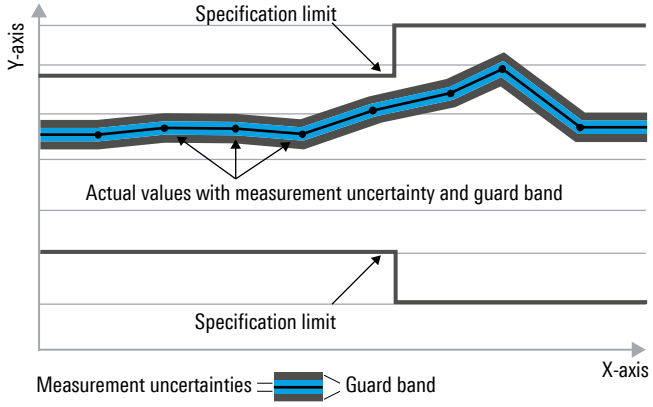
CONTENTS

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 <, ≤, >, ≥, ±, 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

Frequency

RF frequency range	R&S®QAT100	76.0 GHz to 77.0 GHz
		77.0 GHz to 81.0 GHz
RF instantaneous bandwidth		4 GHz (typ.)
IF frequency range		1.1 GHz to 2.1 GHz (typ.)

Level

Maximum ratings	RX power at frontend	+60 dBm EIRP at 0.5 m distance to sensor
	TX power at frontend	+10 dBm EIRP [1]
Minimum input power	76.0 GHz to 77.0 GHz	> +25 dBm EIRP at 0.5 m distance to sensor
	77.0 GHz to 81.0 GHz	> +35 dBm EIRP at 0.5 m distance to sensor
IF power rating	RX output power	0 dBm (nom.)
	TX input power	–30 dBm to +6 dBm

Artificial objects

Object type		dynamic and static
Maximum number of objects	with R&S®QAT100 (base unit)	up to 4 with individual azimuth, distance, RCS, Doppler [2]
	with R&S®QAT-B2 option (second TX/RX unit)	up to 8 with individual azimuth, distance, RCS, Doppler [2]

Transfer characteristics

Amplitude flatness	76 GHz to 77 GHz	< ± 3 dB (typ.)
	76 GHz to 80 GHz	< ± 8 dB (typ.)
	77 GHz to 81 GHz	< ± 8 dB (typ.)
Group delay flatness		< 1.5 ns in 4 GHz bandwidth

Antennas

Antenna configuration	with R&S®QAT-B11 standard frontend	96 TX channels (spacing 3.7 mm)
		5 RX channels
	with R&S®QAT-B2 second line of 96 transmit antennas	192 TX channels (spacing 3.7 mm)
		additional 5 RX channels
	with R&S®QAT-B21 single line MIMO frontend	96 TX channels (spacing 3.7 mm)
		96 RX channels (spacing 3.7 mm)
Antenna EIRP variation R&S®QAT-B11/ R&S®QAT-B21	76 GHz to 77 GHz	< ± 3 dB [2] (typ.)
		< ± 8 dB (typ.)
	76 GHz to 80 GHz	< ± 5 dB [2] (typ.)
		< ± 10 dB (typ.)
	77 GHz to 81 GHz	< ± 5 dB [2] (typ.)
		< ± 10 dB (typ.)
Antenna polarization		linear, 45°

Operating modes

Mode a	Rohde & Schwarz radar test system	R&S®QAT 100 controlled by R&S®AREG800A
Mode b	standalone operation	R&S®QAT 100 requires R&S®QAT-B5 analog stepped delay line

[1] 6 dBm TX input power.

[2] In combination with R&S®AREG800A and R&S®QAT-B1 option.

Reference frequency

Reference frequency input

Connector type	sync on rear panel	SMA female
Input frequency 10 MHz	sine wave	
	input mode: Ext 10 MHz	10 MHz (nom.) ± 5 ppm
Input level		–13 dBm to +13 dBm
Source impedance		50 Ω (nom.)
Input frequency 100 MHz	sine wave	
	input mode: Ext 100 MHz	100 MHz (nom.)
Input level		–6 dBm to +13 dBm
Source impedance		50 Ω (nom.)
Input frequency 3.2 GHz	sine wave	
	input mode: Ext 3.2 GHz	3.2 GHz (nom.)
Input level		–6 dBm to +13 dBm
Source impedance		50 Ω (nom.)

Reference frequency output

Connector type	Ref. Out on rear panel	BNC female
Output frequency 10 MHz	sine wave	
	output mode: 10 MHz	10 MHz (nom.) ± 50 ppm, derived from internal oscillator
Output level		+10 dBm ± 2 dB
Source impedance		50 Ω (nom.)
Output frequency 100 MHz	sine wave	
	output mode: 100 MHz	100 MHz (nom.) ± 50 ppm, derived from internal oscillator
Output level		+6 dBm ± 2 dB
Source impedance		50 Ω (nom.)

Remote control

Interfaces	Ethernet/LAN	10/100/BASE-T
Command set		SCPI 1999.5 or compatible command sets
Ethernet/LAN protocols and services		• VISA VXI-11 (remote control) • Telnet/RawEthernet (remote control)
Ethernet/LAN addressing		DHCP, static; support of Zeroconf and M-DNS to facilitate the direct connection to a system controller

Connectors

Base unit

Rear panel connectors

Frontend RX IF OUT	5-receiver IF signal output from frontend module and 1 selectable IF output	SMA female
	additional 5-receiver IF signal output from frontend module and 1 selectable IF output, with R&S®QAT-B2 option	SMA female
Frontend TX IF IN	4 TX IF input from target simulator and 1 input for all TX channel	SMA female
	additional 4 TX IF input from target simulator and 1 input for all TX channel, with R&S®QAT-B2 option	SMA female
Trigger IN	TTL compatible	BNC female
Trigger OUT	TTL compatible	BNC female
REF OUT	10 MHz reference frequency output	BNC female
Sync	10 MHz reference frequency input	SMA female
LAN	provides remote control functionality and other services, see Remote control	RJ-45
USB	USB 2.0 high speed	USB type B

General data

Environmental conditions		
Temperature	operating temperature range	+5 °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	8 Hz to 500 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 (± 10 %)
Rated frequencies		50 Hz to 60 Hz (± 5 %), 400 Hz (± 5 %)
Rated current		2.5 A (max.) (50 Hz to 60 Hz)
Rated power	when fully equipped	200 W (max.)
Power factor correction		in line with EN 61000-3-2
Product conformity		
Electromagnetic compatibility	EU: in line with EMC Directive 2014/30/EU	applied harmonized standards: • EN 61326-1 (industrial environment) • EN 61326-2-1 • EN 55011 (class A) • EN 61000-3-2 • EN 61000-3-3
Operating environment	for OTA testing	To comply with regulatory requirements, use the R&S®QAT100 only in a shielded environment, like an anechoic chamber or a faraday cage, or in conjunction with the R&S®QAT-Z50 shielding device. However, you must stop operating the R&S®QAT-100 if you receive any reports of interference.
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	VDE mark
	CSA – Canadian Standards Association	CSA mark
Dimensions (W × H × D)	base unit	375 mm × 170 mm × 250 mm (17.52 in × 5.98 in × 14.65 in) (19", 4 HU)
Weight	base unit	8 kg (20 lb)
	frontend module	1 kg (2 lb)
Display		1.4" OLED display

Option

R&S®QAT-B5 analog stepped delay line

With R&S®QAT-B2 second line of 96 transmit antennas option, a second R&S®QAT-B5 can be used.

Total number of generated echoes		1 (adjustable)
Distance	minimum	< 1.8 m
	maximum	14.7. m [3]
	resolution	0.10 m (nom.)
Attenuation (RCS)	range	60 dB (typ.)
	resolution	1 dB

Ordering information

Designation	Type	Order No.
Advanced antenna array, base unit, including power cable and quick start guide	R&S®QAT100	1341.0004.02
Standard frontend	R&S®QAT-B11	1341.0240.11
Single line MIMO frontend	R&S®QAT-B21	1341.0240.21
Enhanced flatness	R&S®QAT-B1	1341.0279.02
Second line of 96 transmit antennas	R&S®QAT-B2	1341.0162.02
Analog stepped delay line	R&S®QAT-B5	1341.0179.02
Shielding system, length: 50 cm	R&S®QAT-Z50	1341.0156.02
Shielding extension	R&S®QAT-Z51	1341.0185.02
Shielding trio	R&S®QAT-Z53	1341.0191.02
Hinge set	R&S®QAT-Z6	1341.0210.02
Pair of RF cables, length: 1 m	R&S®QAT-Z10	1341.0227.10
Pair of RF cables, length: 1.5 m	R&S®QAT-Z10	1341.0227.15
Pair of RF cables, length: 2 m	R&S®QAT-Z10	1341.0227.20

Warranty		
Base unit		1 year
All other items [4]		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 a term of one and two years (WE1 and WE2)
Repairs carried out during the contract term are free of charge [5]. Necessary calibration and adjustments carried out during repairs are also covered.

[3] Without air gap.

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

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

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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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