产品手册

仪器型号：R&S罗德与施瓦茨宽频放大器BBL200

西安安泰测试科技有限公司

仪器维修|租赁|销售|测试

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网址: www.agitekservice.com　　座机：029-88827159

R&S®BBL200
BROADBAND AMPLIFIER

Specifications

9 kHz to 225 MHz

Specifications
Version 05.00

ROHDE&SCHWARZ
Make ideas real

CONTENTS

Rohde & Schwarz equipment is designed for reliable operation up to an altitude of 2000 m above sea level, and for transport up to an altitude of 4600 m above sea level.

All specified parameters are valid for an ambient temperature of +25 °C, input impedance of 50 Ω and output impedance of 50 Ω. Data without tolerance limits is not binding.

RoHS Europe, Directive 2011/65/EU: equipment category 9, fulfilled without any exceptions.

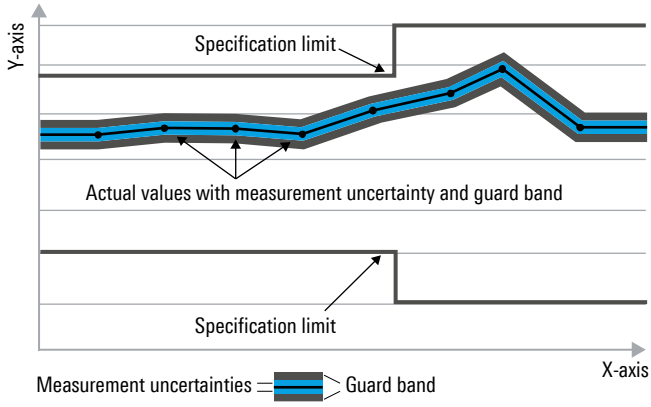
WEEE Europe, Directive 2002/96/EC:
No disposing with unsorted municipal waste; no return with collection of waste electrical and electronic equipment from private households. Separate collection necessary. Ask Rohde & Schwarz representatives about recovery.

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 <, ≤, >, ≥, ±, 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.



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.

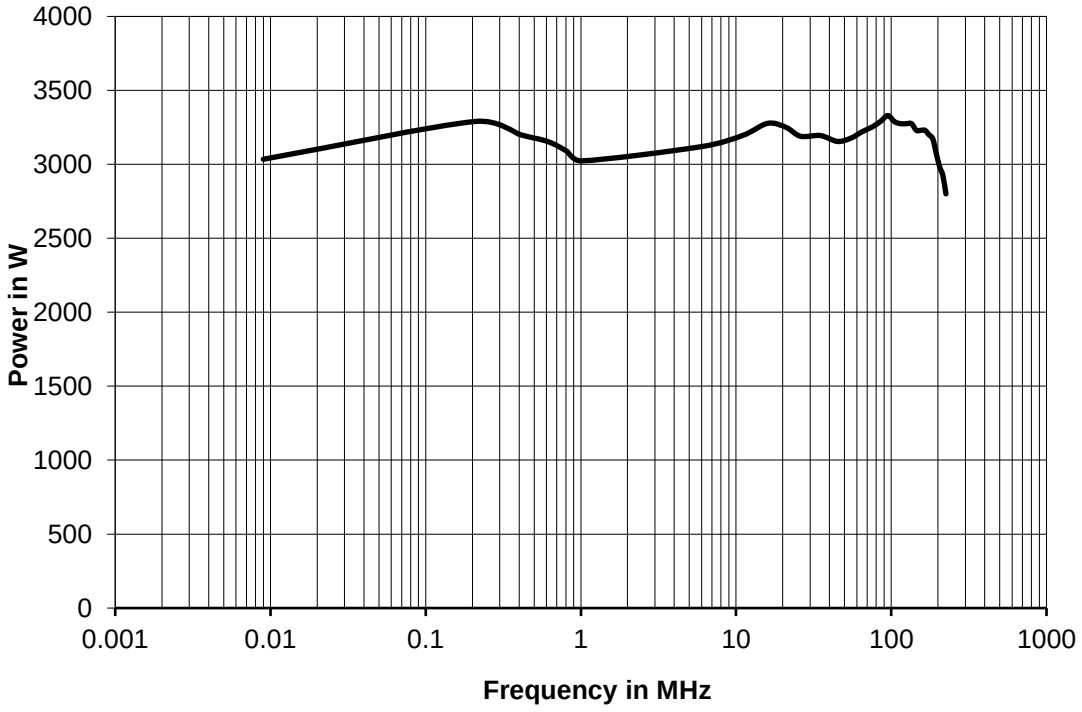
Device settings and GUI parameters are indicated as follows: “parameter: value”.

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

Frequency band from 9 kHz to 225 MHz

Power class: 3000 W

Frequency response at 1 dB compression



RF specifications

Main parameters		
Frequency range		9 kHz to 225 MHz instantaneously
Nominal output load		50 Ω
Nominal output power		3000 W (64.8 dBm)
Output power	9 kHz to 20 MHz	min. 3000 W (64.8 dBm)
	20 MHz to 110 MHz	min. 3400 W (65.3 dBm)
	110 MHz to 225 MHz	gradual reduction to min. 2800 W (64.5 dBm) at 225 MHz
Power output at 1 dB compression	9 kHz to 110 MHz	min. 3000 W (64.8 dBm)
	110 MHz to 225 MHz	gradual reduction to min. 2800 W (64.5 dBm) at 225 MHz
Nominal power gain		68.2 dB
Gain flatness		±3.0 dB
Gain adjustment range		> 15 dB
Harmonics	9 kHz to 110 MHz at 3000 W	< –20 dBc
	110 MHz to 225 MHz at 2800 W	< –20 dBc
Third-order intermodulation (IM3)	2-tone at 58.5 dBm/tone, above 1 MHz, test frequencies 100 kHz apart	nom. < –20 dBc
Spurious	carrier offset > 100 kHz, from 1 MHz	nom. –80 dBc, max. –70 dBc
Noise figure	at maximum gain	
	5 MHz to 50 MHz	< 16.0 dB (nom.)
	50 MHz to 225 MHz	< 9.0 dB (nom.)

Input		
Nominal input impedance		50 Ω
Input level for nominal output power		nom. –3.4 dBm
Input VSWR	at 50 Ω	max. 2:1
Maximum input level	RF	+5 dBm
	DC	0 V

Output		
Nominal output impedance		50 Ω
Output mismatch tolerance	VSWR < 6:1	without foldback
	VSWR > 6:1	with gradual foldback to approx. 50 % of nominal output power, depending on load impedance
Output mismatch protection, VSWR		100 %, without damage

RF sample and detected RF sample signals		
RF sample signal coupling factor	sample ports for forward and reflected RF	approx. 70 dB, see test report for details
Detected RF sample signal level	sample ports for detected forward and reflected RF (alternatively)	up to 3.0 V DC, see test report for details

Mechanical specifications

Amplifier system		
Dimensions	rack setup, W × H × D, incl. handles, stands and crane lugs	600 mm × 1570 mm × 1100 mm (23.62 in × 61.81 in × 43.31 in)
Weight		approx. 280 kg (617 lb)

Heat exchanger		
Dimensions	W × H × D, incl. handles and stands	1241 mm × 558 mm × 400 mm (48.86 in × 21.97 in × 15.75 in)
Dry weight		approx. 29 kg (64 lb)

Connectors		
Connecting plate at rack top cover, or alternatively connecting plate at rear panel, bottom	RF input port	N female
	sample ports for RF or detected RF	N female
	Ethernet	RJ-45
	interlock	WAGO X-COM®, 7-pin, female
	amplifier state	WAGO X-COM®, 7-pin, female
	transparent I/O, optional	2 × WAGO X-COM®, 7-pin, female
RF output port	rear panel, bottom	1 5/8" EIA female
Mains power	rear panel, bottom	5 × 4 mm^2 power supply cable
	cable diameter at 380 V to 415 V AC	8 mm to 15 mm
	cable diameter at 208 V to 240 V AC	13 mm to 26 mm
Coolant supply	rack top cover, rear panel or bottom	2 × 40 mm cooling hose

Electrical specifications

Amplifier system		
Rated operating voltage		380 V to 415 V AC ± 10 %, three-phase with N, 47 Hz to 63 Hz
		208 V to 240 V AC ± 10 %, three-phase, 47 Hz to 63 Hz
Rated current	at 230 V per phase	20.5 A
Rated power	RF_{cw} = 3000 W (RMS), VSWR = 1	14.2 kVA
Maximum electrical fuse protection		3 × 63 A

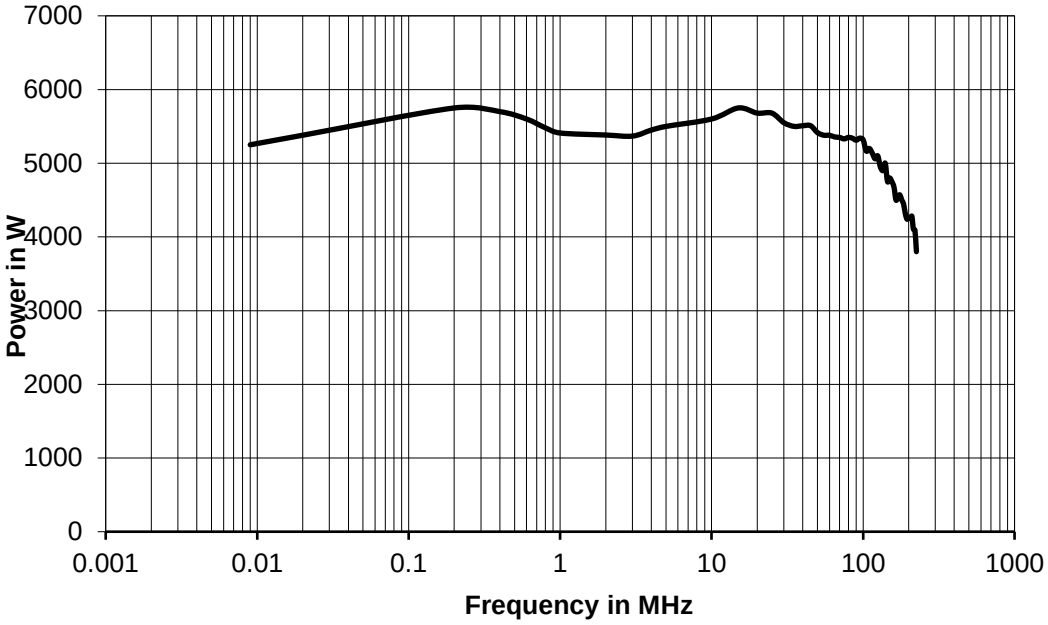
Heat exchanger		
Nominal operating voltage range		230 V AC ± 10 %, single-phase, 47 Hz to 63 Hz
Current	at 230 V	< 1.5 A
Power consumption		< 350 VA

Cooling specifications

Liquid cooling		
Cooling circuit		closed cooling system, automated pressure balancing
Coolant		39 % v/v Antifrogen® N (based on monoethylene glycol, water and anticorrosion additives)
Heat exchanger	capacity	max. 9.5 kW
	air volume flow	6200 m^3/h
	mounting type	indoor or outdoor, floor installation
Recommended distance between amplifier system and heat exchanger	pipe length	max. 2 × 20 m
	difference in altitude	max. 20 m
Cooling hose	outside diameter	2 × 40 mm
	bending radius	280 mm

Power class: 5000 W

Frequency response at 1 dB compression



RF specifications

Main parameters		
Frequency range		9 kHz to 225 MHz instantaneously
Nominal output load		50 Ω
Nominal output power		5000 W (67.0 dBm)
Output power	9 kHz to 20 MHz	min. 5000 W (67.0 dBm)
	20 MHz to 110 MHz	min. 5500 W (67.4 dBm)
	110 MHz to 225 MHz	gradual reduction to min. 3500 W (65.4 dBm) at 225 MHz
Power output at 1 dB compression	9 kHz to 110 MHz	min. 5000 W (67.0 dBm)
	110 MHz to 225 MHz	gradual reduction to min. 3500 W (65.4 dBm) at 225 MHz
Nominal power gain		70.4 dB
Gain flatness		±3.0 dB
Gain adjustment range		> 15 dB
Harmonics	9 kHz to 110 MHz at 5000 W	< –20 dBc
	110 MHz to 225 MHz at 3500 W	< –20 dBc
Third-order intermodulation (IM3)	2-tone at 59.4 dBm/tone, above 1 MHz, test frequencies 100 kHz apart	nom. < –20 dBc
Spurious	carrier offset > 100 kHz, from 1 MHz	nom. –80 dBc, max. –70 dBc
Noise figure	at maximum gain	
	5 MHz to 50 MHz	< 16.0 dB (nom.)
	50 MHz to 225 MHz	< 9.0 dB (nom.)

Input		
Nominal input impedance		50 Ω
Input level for nominal output power		nom. –3.4 dBm
Input VSWR	at 50 Ω	max. 2:1
Maximum input level	RF	+5 dBm
	DC	0 V

Output		
Nominal output impedance		50 Ω
Output mismatch tolerance	VSWR < 6:1	without foldback
	VSWR > 6:1	with gradual foldback to approx. 50 % of nominal output power, depending on load impedance
Output mismatch protection, VSWR		100 %, without damage

RF sample and detected RF sample signals		
RF sample signal coupling factor	sample ports for forward and reflected RF	approx. 70 dB, see test report for details
Detected RF sample signal level	sample ports for detected forward and reflected RF (alternatively)	up to 3.0 V DC, see test report for details

Mechanical specifications

Amplifier system		
Dimensions	rack setup, W × H × D, incl. handles, stands and crane lugs	600 mm × 2050 mm × 1100 mm (23.62 in × 80.71 in × 43.31 in)
Weight		approx. 460 kg (1014 lb)

Heat exchanger		
Dimensions	W × H × D, incl. handles and stands	1125 mm × 925 mm × 600 mm (44.29 in × 36.42 in × 23.62 in)
Dry weight		56 kg (123 lb)

Connectors		
Connecting plate at rack top cover, or alternatively connecting plate at rear panel, bottom	RF input port	N female
	sample ports for RF or detected RF	N female
	Ethernet	RJ-45
	interlock	WAGO X-COM®, 7-pin, female
	amplifier state	WAGO X-COM®, 7-pin, female
	transparent I/O, optional	2 × WAGO X-COM®, 7-pin, female
RF output port	rear panel, bottom	1 5/8" EIA female
Mains power	rear panel, bottom	5 × 10 mm^2 power cable supply
	cable diameter at 380 V to 415 V AC	13 mm to 26 mm
	cable diameter at 208 V to 240 V AC	18 mm to 32 mm
Coolant supply	rack top cover, rear panel or bottom	2 × 40 mm cooling hose

Electrical specifications

Amplifier system		
Rated operating voltage		380 V to 415 V AC ± 10 % three-phase with N, 47 Hz to 63 Hz
		208 V to 240 V AC ± 10 % three-phase, 47 Hz to 63 Hz
Rated current	at 230 V per phase	35.0 A
Rated power	RF_{cw} = 5000 W (RMS), VSWR = 1	24.0 kVA
Recommended electrical fuse protection		3 × 63 A

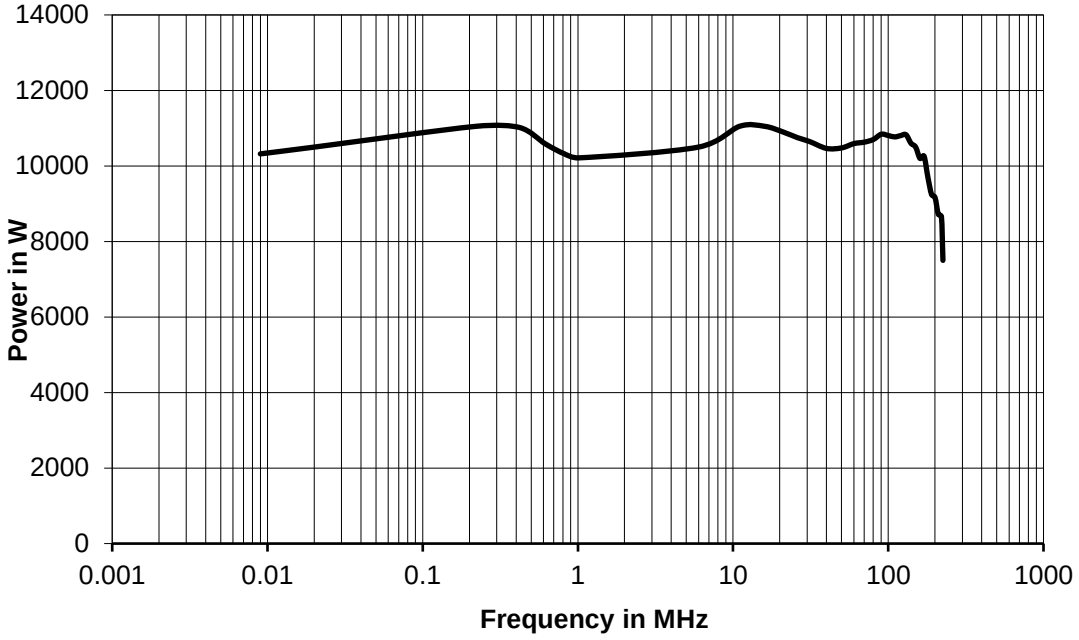
Heat exchanger		
Nominal operating voltage range		230 V AC ± 10 %, single-phase, 47 Hz to 63 Hz
Current	at 230 V	< 3.5 A
Power consumption		< 810 VA

Cooling specifications

Liquid cooling		
Cooling circuit		closed cooling system, automated pressure balancing
Coolant		39 % v/v Antifrogen® N (based on monoethylene glycol, water and anticorrosion additives)
Heat exchanger	capacity	max. 15.7 kW
	air volume flow	5145 m³/h
	mounting type	indoor or outdoor, floor installation
Recommended distance between amplifier system and heat exchanger	pipe length	max. 2 × 20 m
	difference in altitude	max. 20 m
Cooling hose	outside diameter	2 × 40 mm
	bending radius	280 mm

Power class: 10000 W

Frequency response at 1 dB compression



RF specifications

Main parameters		
Frequency range		9 kHz to 225 MHz instantaneously
Nominal output load		50 Ω
Nominal output power		10000 W (70.0 dBm)
Output power	9 kHz to 20 MHz	min. 10000 W (70.0 dBm)
	20 MHz to 110 MHz	min. 10300 W (70.1 dBm)
	110 MHz to 225 MHz	gradual reduction to min. 8000 W (69.0 dBm) at 225 MHz
Power output at 1 dB compression	9 kHz to 110 MHz	min. 10000 W (70.0 dBm)
	110 MHz to 225 MHz	gradual reduction to min. 7000 W (68.5 dBm) at 225 MHz
Nominal power gain		73.4 dB
Gain flatness		±3.0 dB
Gain adjustment range		> 15 dB
Harmonics	9 kHz to 110 MHz at 10000 W	< –20 dBc
	110 MHz to 225 MHz at 8000 W	< –20 dBc
Third-order intermodulation (IM3)	2-tone at 62.5 dBm/tone, above 1 MHz, test frequencies 100 kHz apart	nom. < –20 dBc
Spurious	carrier offset > 100 kHz, from 1 MHz	nom. –80 dBc, max. –70 dBc
Noise figure	at maximum gain	
	5 MHz to 50 MHz	< 16.0 dB (nom.)
	50 MHz to 225 MHz	< 9.0 dB (nom.)

Input		
Nominal input impedance		50 Ω
Input level for nominal output power		nom. –3.4 dBm
Input VSWR	at 50 Ω	max. 2:1
Maximum input level	RF	+5 dBm
	DC	0 V

Output		
Nominal output impedance		50 Ω
Output mismatch tolerance	VSWR < 6:1	without foldback
	VSWR > 6:1	with gradual foldback to approx. 50 % of nominal output power, depending on load impedance
Output mismatch protection, VSWR		100 %, without damage

RF sample and detected RF sample signals		
RF sample signal coupling factor	sample ports for forward and reflected RF	approx. 70 dB, see test report for details
Detected RF sample signal level	sample ports for detected forward and reflected RF(alternatively)	up to 3.0 V DC, see test report for details

Mechanical specifications

Amplifier system		
Dimensions	rack setup, W × H × D, incl. handles, stands and crane lugs	1200 mm × 2050 mm × 1100 mm (47.24 in × 80.71 in × 43.31 in)
Weight		approx.870 kg (1915 lb)

Heat exchanger		
Dimensions	W × H × D, incl. handles and stands	2400 mm × 1150 mm × 600 mm (9445.88 in × 452.76 in × 236.22 in)
Dry weight		approx. 238 kg (525 lb)

Connectors		
Connecting plate at rack top cover, or alternatively connecting plate at rear panel, bottom	RF input port	N female
	sample ports for RF or detected RF	N female
	Ethernet	RJ-45
	interlock	WAGO X-COM®, 7-pin, female
	amplifier state	WAGO X-COM®, 7-pin, female
	transparent I/O, optional	2 × WAGO X-COM®, 7-pin, female
RF output port	rear panel, bottom	1 5/8" EIA female
Mains power	rear panel, bottom	5 × 16 mm^2 power supply cable
	cable diameter	32 mm
Coolant supply	rack top cover, rear panel or bottom	2 × 51 mm cooling hose

Electrical specifications

Amplifier system		
Rated operating voltage		380 V to 415 V AC ± 10 %, three-phase with N, 47 Hz to 63 Hz
Rated current	at 230 V per phase	72 A
Rated power	RF_{cw} = 10000 W (RMS), VSWR = 1	50 kVA
Recommended electrical fuse protection		3 × 80 A

Heat exchanger		
Nominal operating voltage range		230 V AC ± 10 %, single-phase, 47 Hz to 63 Hz
Current	at 230 V	< 13 A
Power consumption		< 3000 VA

Cooling specifications

Liquid cooling		
Cooling circuit		closed cooling system, automated pressure balancing
Coolant		39 % v/v Antifrogen® N (based on monoethylene glycol, water and anticorrosion additives)
Heat exchanger	capacity	max. 41 kW
	air volume flow	20100 m^3/h
	mounting type	indoor or outdoor, floor installation
Recommended distance between amplifier system and heat exchanger	pipe length	max. 2 × 20 m
	difference in altitude	max. 20 m
Cooling hose	outside diameter	2 × 51 mm
	bending radius	280 mm

General data

Modulation specifications

Modulation capability		AM, FM, φM or PM

Control specifications

Remote control		
Ethernet		RJ-45, 10/100 Mbit/s, autonegotiation, half/full duplex

Local HM		
Local display		200 × 48 pixel, monochrome
Manual controls	resting pushbutton	mains switch
	operation pushbuttons	• system standby/on • RF standby/operate • local/remote
	menu pushbuttons	• arrow up, down, left, right • ok • back
LED status information		• system standby/on • RF standby/operate • mute ready • interlock • error • local/remote

Web GUI		
Remote web GUI	via Ethernet	RJ-45, 10/100 Mbit/s, autonegotiation, half/full duplex

Environmental specifications

Temperature loading	operating temperature range	0 °C to +40 °C
	storage temperature range	–20 °C to +70 °C
Damp heat		max. +40 °C at 95 % rel. humidity, without condensation
Altitude	operating altitude	up to 2000 m
	storage altitude	up to 4600 m
Calibration interval		no calibration needed
Electromagnetic compatibility	immunity	in line with EN 61326-1, public and industrial areas
	electromagnetic fields	≤ 10 V/m, in line with IEC 61000-4-3
	surge test: line to ground	≤ 2 kV, in line with IEC 61000-4-5
	surge test: Ethernet to ground	≤ 2 kV, in line with IEC 61000-4-5
	surge test: line to line	≤ 1 kV, in line with IEC 61000-4-5
	bursts	≤ 2 kV, in line with IEC 61000-4-4
Electromagnetic emissions	overall	in line with EN 55011 (CISPR 11), industrial area, ISM group 1 or 2 and FCC 047 CFR part 18, nonconsumer equipment
	conducted emissions	in line with EN 55011, class A
	radiated emissions	equipment for use in shielded areas only, normative limits of EN 55011 group 1/2 class A or FCC 047 CFR part 18 exceeded up to 60 dB
Electromagnetic field strength	all-around the enclosure	in line with the limits of rec 1999/519/EC, 26. BImSchV, BGV B11 exposure limit 2 (protection of health and safety of workers, consumers and the general public)
Electrical safety		in line with EN 61010-1:2010, IEC 61010-1:2011 + Corr. 2011 (third ed.)

Protection

RF		
Load VSWR		unlimited
Interlock		1 device interlock, 1 configurable interlock
Input protection against bias voltage	optional	DC block level ≤ 50 V DC

Power supply		
Transient voltage compatibility		category II, in line with IEC 60364-4-443
Switching capacity of internal fuses		< 10 kA

Miscellaneous		
Thermal overload		shutdown at thermal overload

Liquid cooling		
Pressure overload		pressure relief valve, 5 bar
Module exchange		self-shutting valves

Ordering information

We recommend that you ask your local Rohde & Schwarz expert to find the solution that is optimally suited to your needs.

R&S®BBL200 single-band power amplifiers

Frequency band from 9 kHz to 225 MHz

Designation	Type	Configuration No.
3000 W, liquid-cooled, 31 HU rack model	R&S®BBL200	BBL200-A3000
5000 W, liquid-cooled, 42 HU rack model	R&S®BBL200	BBL200-A5000
10000 W, liquid-cooled, 2 × 42 HU rack model	R&S®BBL200	BBL200-A10000

Accessories supplied: rack power cord, user manual (printed and on CD), test report, indoor heat exchanger, 2 × 20 m cooling hose and filling pump.

Options

Designation	Type	Order No.
GPIB remote control	R&S®BBA-B101	5355.8250.05
Fast amplifier mute for applications above 3 MHz	R&S®BBL-B130	5356.9914.02
DC block input protection (N)	R&S®BBA-B132	5353.9236.03
Sample ports for forward and reflected RF (N), interface rear bottom for 3000 W and 5000 W model	R&S®BBL-B140	5356.9937.02
Sample ports for forward and reflected RF (N), interface rear bottom for 10000 W model, interface rack top cover for all models	R&S®BBL-B140	5356.9937.03
Sample ports for detected forward and reflected RF (N)	R&S®BBL-B141	5356.9908.02
Transparent I/O	R&S®BBL-B160	5356.9920.02
Rack wheels	R&S®ZR1-RW01	5354.4309.02

Service

Service level agreements

Rohde & Schwarz offers maintenance and support services to maximize and protect the investment of customers' Rohde & Schwarz products. Details are given in the "Service Levels Description for Rohde & Schwarz Broadband Amplifiers" document (PD 3607.6467.92).

Calibration information

An optional calibration can be ordered for the R&S®BBL200. Note that the simple acceptance rule is selected for the declaration of conformity (cf. ILAC-G8:09/2019, section 4.2.1).

System upgrades

Upgrades in frequency band and/or RF output power are available on request.

Service at Rohde&Schwarz
You're in great hands

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

Rohde&Schwarz

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.

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

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

Rohde&Schwarz customer support
www.rohde-schwarz.com/support

PD 3606.9456.22 | Version 05.00 | August 2024 (ch)
R&S®BBL200 Broadband Amplifier