

R&S® BBA150

Broadband Amplifier

Excellent microwave amplifiers with high power density



R&S®BBA150

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At a glance

The R&S®BBA150 is a new family of broadband amplifiers for the microwave range. The instruments, which are optimized for high frequencies, offer high power, yet are compact and lightweight. In combination with the field-tested R&S®BBA100 broadband amplifier family, amplifier systems from 9 kHz to 6 GHz including various RF switching options can be set up.

The new R&S®BBA150 broadband amplifiers featuring two frequency ranges from 0.8 GHz to 3.0 GHz and 2.5 GHz to 6.0 GHz open up applications in the microwave range. Together with the well-established R&S®BBA100 broadband amplifier family, all-in-one amplifier systems with multiple frequency ranges from 9 kHz to 6 GHz and different power classes can be implemented.

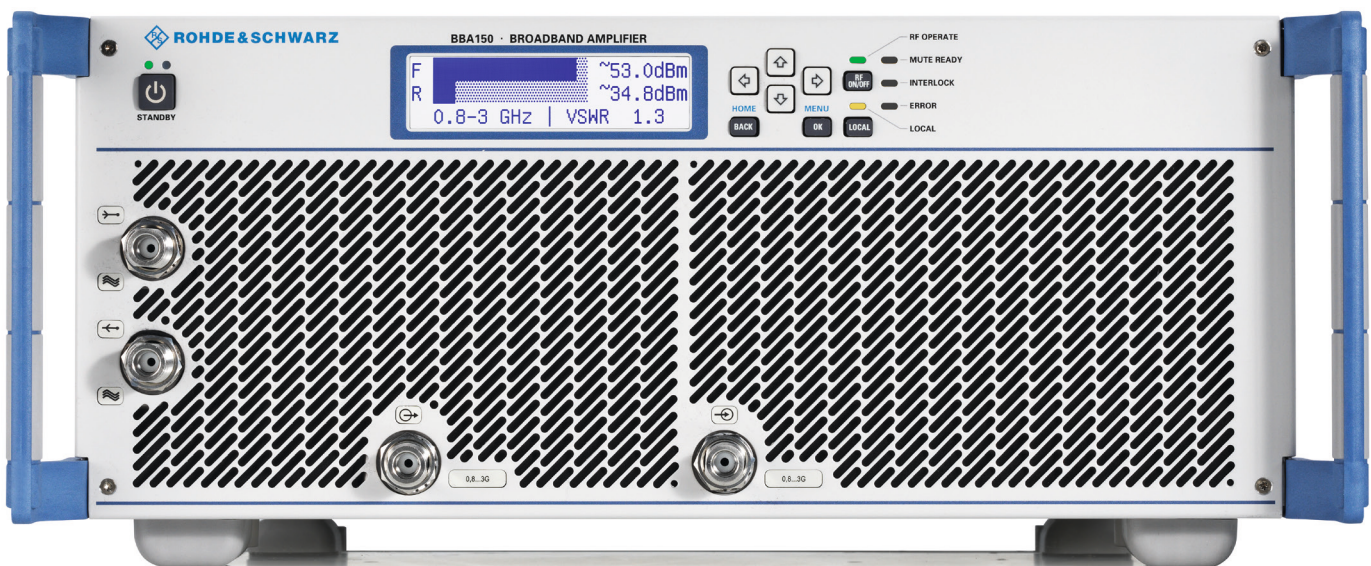
As a result, the different standards for EMS measurements can be covered up to 6 GHz. The amplifiers are also suitable for applications besides EMC testing, such as component production and quality assurance in the industrial environment, as well as for research, physical engineering and communications.

The R&S®BBA150 broadband amplifier is configured as a 19", 4 HU rackmount and is suitable for desktop use and for rack installation. Its modular, lightweight design is optimized for high frequencies. The amplifier is operated either using display and buttons, automatically via remote control interface or over a web browser.

The modular concept is a prerequisite for upgrading power and frequency range later on. The worldwide service concept and the global availability of spare parts promote the trust and confidence of customers.

Key facts

- Two frequency ranges from 0.8 GHz to 3.0 GHz and 2.5 GHz to 6.0 GHz
- Output power from 15 W to 400 W
- Ideal for system configuration together with the R&S®BBA100 broadband amplifier family
- 100% mismatch tolerance
- Suitable for amplitude, frequency, phase and pulse modulation
- Three-year warranty and worldwide spare parts availability



R&S®BBA150

Broadband Amplifier

Benefits and key features

The most advanced broadband amplifier on the market

- Sophisticated RF design
- Compact and lightweight
- Series production

▷ [page 4](#)

Reliable with high availability

- Outstanding expertise in amplifier development
- Cost benefit due to little downtime

▷ [page 5](#)

Flexible control and operation

- Manual operation
- Local and remote operation via web browser and PC
- Integration into the R&S®EMC32 measurement software
- Remote control via Ethernet
- Safety thanks to two different interlocks

▷ [page 6](#)

Two families – one amplifier system

- Perfect integration
- RF switching options

▷ [page 8](#)

Excellent service and quick maintenance

- Outstanding service concept
- Extended warranty for maximum protection of investment
- From pre-sale to service – at your doorstep

▷ [page 10](#)

Model overview	
Frequency range	Power levels
0.8 GHz to 3.0 GHz	30 W, 60 W, 110 W, 200 W, 400 W
2.5 GHz to 6.0 GHz	15 W, 30 W, 60 W, 100 W, 200 W

The most advanced broadband amplifier on the market

Outstanding RF design in combination with high-quality series production in one of Europe's most progressive plants

Sophisticated RF design

State-of-the-art design and simulation programs used during development, the use of power semiconductors from internationally leading manufacturers and our engineers' decades of experience in developing amplifiers produce the most advanced amplifier design currently available. The use of semiconductor dice directly bonded onto printed boards makes it possible to achieve high output powers, even at 6 GHz. Especially parasitic effects caused by housed transistors can be effectively avoided. Efficiency coupled with ruggedness ensures smooth operation; lean firmware with effective monitoring and protection mechanisms provides operational safety. Generous dimensioning of the RF amplifier stages provides sufficient margin and ensures compliance with warranted data sheet parameters.

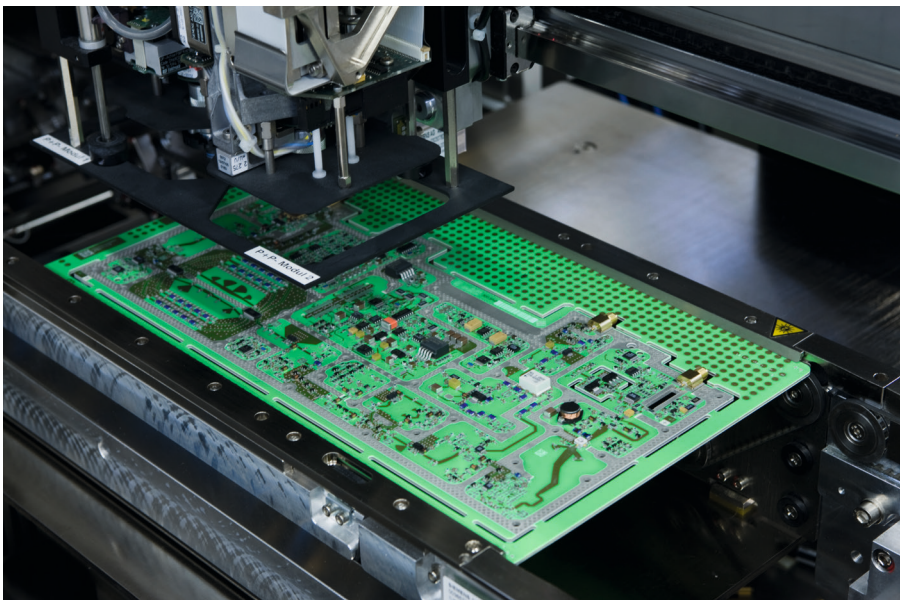
Compact and lightweight

The R&S®BBA150 also sets new standards in terms of mechanical design. Due to its lightweight design and special aluminum-copper heat sink, the R&S®BBA150 weighs only half as much as conventional amplifiers in the same power class. If desired, it is possible to combine both frequency ranges in a single instrument. An RF output power of up to 200 W in just four height units means excellent power density.

Series production

The R&S®BBA150 broadband amplifiers are series-produced in one of Europe's most advanced plants. The award-winning Rohde&Schwarz plant in the town of Teisnach (Germany) offers superior manufacturing depth: From precision mechanical engineering and metalworking to printed board production and final assembly, all manufacturing steps are united under the same roof. Automated final test rigs ensure that only products that comply with specifications leave the "Factory of the Year"¹⁾.

¹⁾ The Rohde&Schwarz plant in Teisnach received the "Factory of the Year" award in 2010 from the business magazine "Produktion" in cooperation with the consulting firm A. T. Kearney.



Automated insertion of components into printed boards at Rohde&Schwarz.

Reliable with high availability

Broadband amplifiers as reliable as the sound and TV broadcast transmitters from Rohde & Schwarz

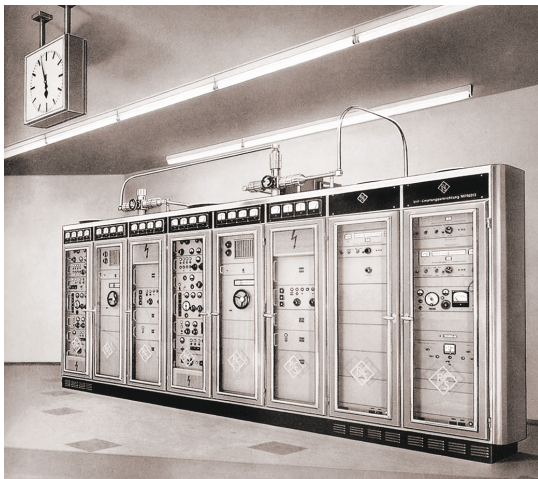
Outstanding expertise in amplifier development

The R&S®BBA150 broadband amplifiers are highly tolerant to mismatch and rugged enough to handle short-circuiting at the RF end or an open RF output. The expertise gained over many years in the development of power amplifiers is based on the R&D work for Rohde & Schwarz sound and TV broadcast transmitters. Their reliability is well-known and a major reason for the company's global market leadership in digital terrestrial transmitter technology.

Cost benefit due to little downtime

The market launch of the R&S®BBA100 broadband amplifier family in 2010 underscores the Rohde & Schwarz claim to offer stable, reliable amplifiers for maximum customer benefit. Short downtimes are an important economic factor. The new R&S®BBA150 broadband amplifiers for the microwave range are the next logical step down this path.

Transfer of know-how



1963:
VHF sound broadcast transmitter with 2×5 kW

All the Rohde & Schwarz expertise in manufacturing sound and TV broadcast transmitters has gone into the development of the R&S®BBA100 and R&S®BBA150 broadband amplifiers.



2007:
TV transmitter with 6.5 kW



2010:
R&S®BBA100 broadband amplifier



2013:
R&S®BBA150 broadband amplifier

Flexible control and operation

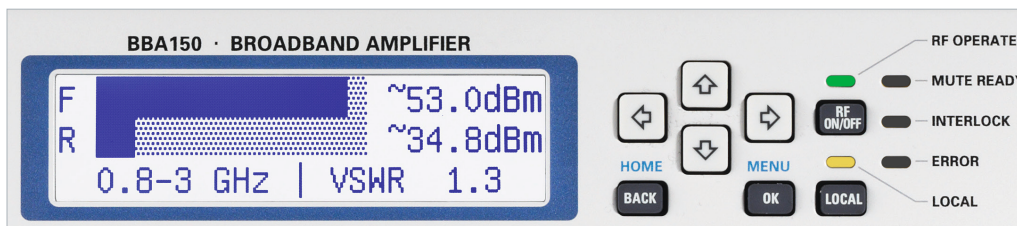
Operation of the R&S®BBA150 is always efficient, including local and remote control and operation via web GUI.

Manual operation

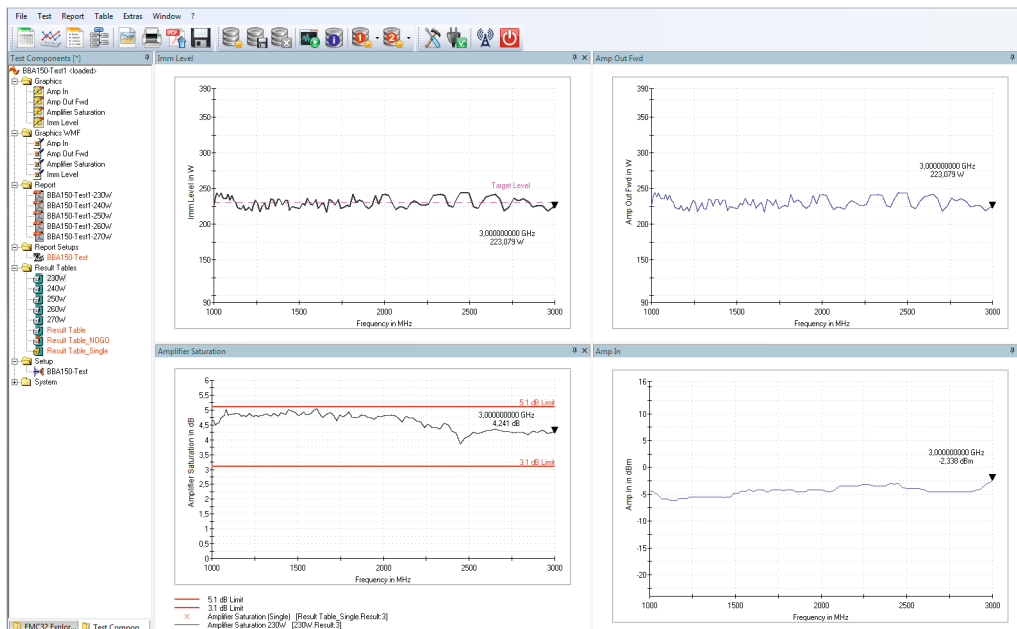
The R&S®BBA150 is operated via the display and the buttons directly on the instrument. This is ideal for use in labs and makes it easy to change settings. A clever menu structure provides straightforward access to all essential information and possible settings; during operation, RF output power, reflected power and VSWR are displayed.

Local and remote operation via web browser and PC

The web GUI integrated into the R&S®BBA150 is called up via LAN and web browser. The R&S®BBA150 can be conveniently operated via its graphical user interface using a laptop near the instrument or a control workstation PC. A common web browser (e.g. Google Chrome, Mozilla Firefox, Microsoft Internet Explorer) is all that is needed.



Display and buttons on the R&S®BBA150 front panel.



R&S®EMC32 measurement software.

Integration into the R&S®EMC32 measurement software

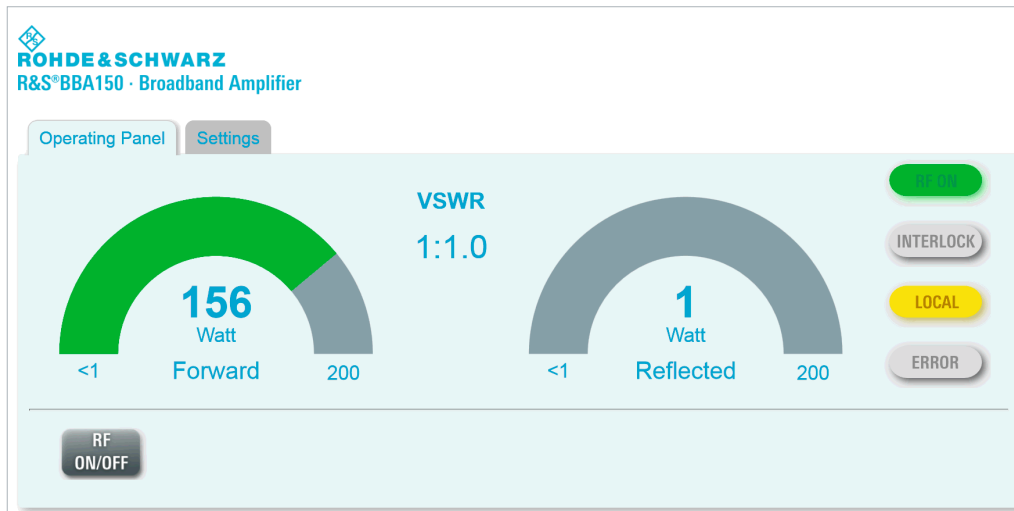
Complex measurement scenarios almost always require the use of a higher-level measurement and control software, for example R&S®EMC32. The complete integration of the R&S®BBA150 into the EMC measurement software offers many different options for setting and controlling the amplifier for immunity measurements in line with common standards such as CISPR, IEC, ISO, EN, ETSI, VDE, FCC and ANSI.

Remote control via Ethernet

The standard Ethernet interface makes it possible to automate test sequences by remote control commands in line with the SCPI nomenclature. TCP/IP networks are now standard for networking and controlling equipment; a separate infrastructure is no longer needed. To make integration especially easy, the R&S®BBA150 allows an IP network address to be set manually or assigned automatically via DHCP.

Safety thanks to two different interlocks

The obligatory device interlock is complemented by another, configurable interlock. The device interlock restarts the instrument without user interaction as soon as the circuit is closed. The configurable interlock requires a confirmation, either locally on the R&S®BBA150 or via remote control command, before RF power can be output again. This function ensures maximum possible safety and convenient operation.



Operating panel on the web GUI of the R&S®BBA150.

Settings panel on the web GUI of the R&S®BBA150.

Two families – one amplifier system

The R&S®BBA150 ideally complements the R&S®BBA100, making it possible to implement amplifier systems from 9 kHz to 6 GHz.

Perfect integration

The two R&S®BBA150 frequency ranges from 0.8 GHz to 3.0 GHz and 2.5 GHz to 6.0 GHz are an upward extension of the R&S®BBA100 frequency range from 9 kHz to 1.0 GHz. The R&S®BBA150 can, of course, also be used as a standalone product. However, its strengths are brought to bear together with the R&S®BBA100: The R&S®BBA150 can be seamlessly integrated into a combined amplifier system.

RF switching options

The R&S®BBA150 features RF switching options for its two frequency ranges. In larger amplifier systems, the R&S®BBA150 benefits from the extensive R&S®BBA100 RF switching options. Various application-specific configurations can be implemented using the R&S®BBA100 RF input switches, RF output switches and RF sample port switches. On request the R&S®BBA100 as the master controls the R&S®BBA150 and integrates it like an additional RF path. The overall system then functions as a multiband amplifier that optionally has a common RF input and common sample ports and RF switches. It is centrally remote controlled via a single interface.

Example: switching options of a combined amplifier system

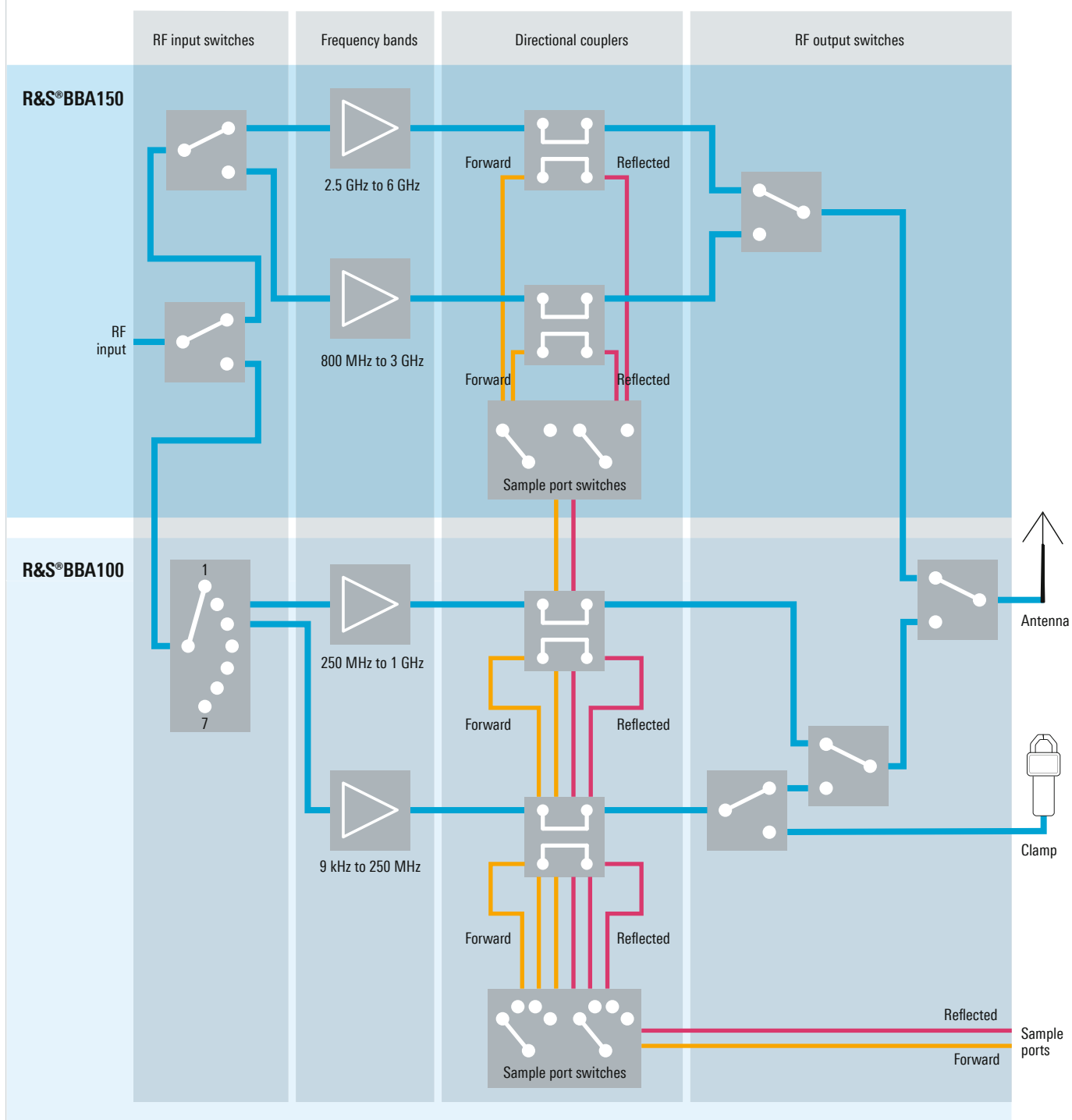
The amplifier system shown below consists of an R&S®BBA150 and an R&S®BBA100 with frequency ranges from 9 kHz to 250 MHz (band A), 250 MHz to 1.0 GHz (band C), 800 MHz to 3.0 GHz (band D) and 2.5 GHz to 6.0 GHz (band E). The RF input switches (R&S®BBA-110 option) make it possible to connect a shared signal source and feed the RF input signal to the selected frequency range when the corresponding RF path is chosen.

The RF sample ports (R&S®BBA-B140 option) provide the forward and reflected power via the sample port switch (R&S®BBA-B142 option), while the RF output switches (R&S®BBA-B120 and R&S®BBA-B121 options) allow the RF output signal to be applied to different loads. The setup shown here can be used, for example, to perform BCI measurements from 9 kHz to 250 MHz on the clamp or radiated measurements from 80 MHz to 6 GHz via the antenna. All switch positions are correctly set by the system automatically when the RF path is selected.

Combined amplifier system consisting of the R&S®BBA150 and R&S®BBA100.



Combined amplifier system with switching options



Excellent service and quick maintenance

Minimal downtime due to modular design and worldwide service

Outstanding service concept

The modular structure of the R&S®BBA150 allows problems to be remedied quickly and keeps downtime to a minimum. All of the amplifier's components are designed as modules and can usually be replaced at the local Rohde&Schwarz office or the nearest service center. Spare parts are available worldwide.

If the problem cannot be eliminated at the local service center, the instrument will be repaired at the plant within a maximum of ten working days (plus shipping time).

Extended warranty for maximum protection of investment

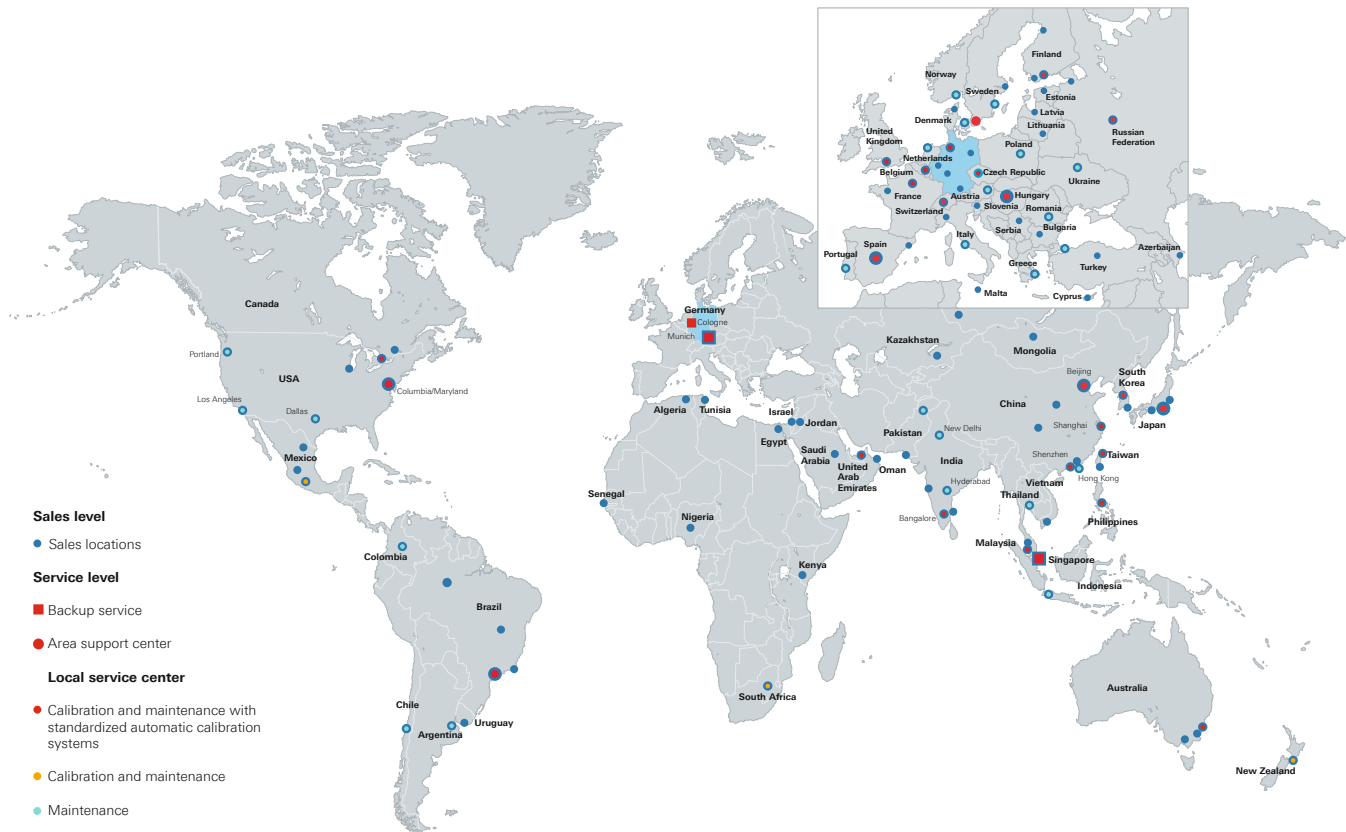
The extended warranty offers optimal performance and availability of an R&S®BBA150 broadband amplifier at low, calculable operating cost. The terms of one to four years (WE1 to WE4) – in addition to the three-year warranty – provide long-term investment protection.

From pre-sale to service – at your doorstep

Rohde&Schwarz is a technology group of companies with a global presence. More than 9000 employees maintain direct customer contact in over 70 countries. The Rohde&Schwarz network in over 70 countries ensures optimum on-site support by highly qualified experts. The user risks are reduced to a minimum at all stages of the project:

- Solution finding/purchase
- Technical start-up/application development/integration
- Training
- Operation/calibration/repair

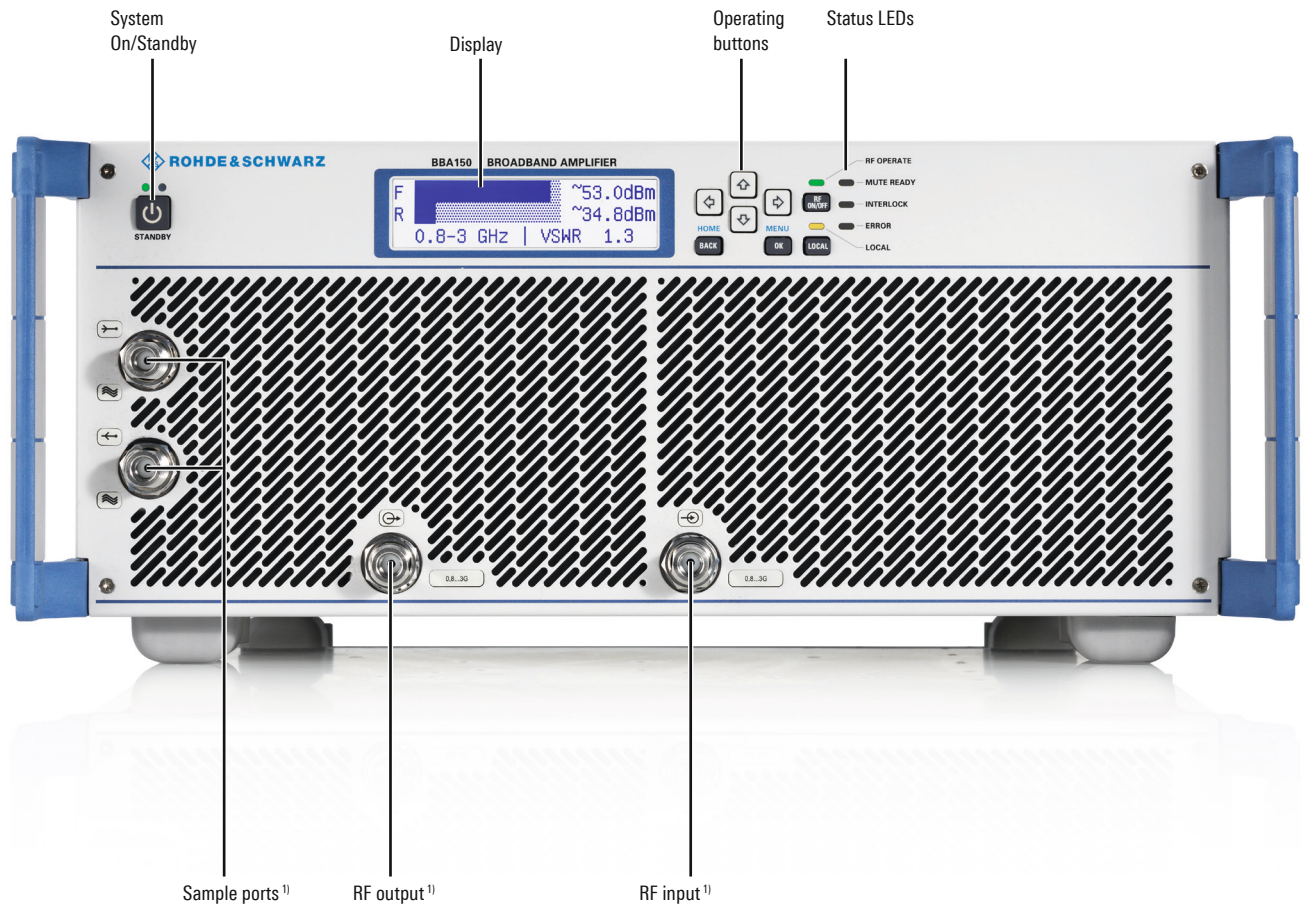
Rohde&Schwarz has the experience needed to offer all customers a customized solution tailored to their requirements.



Front view

Desktop model

Functional elements

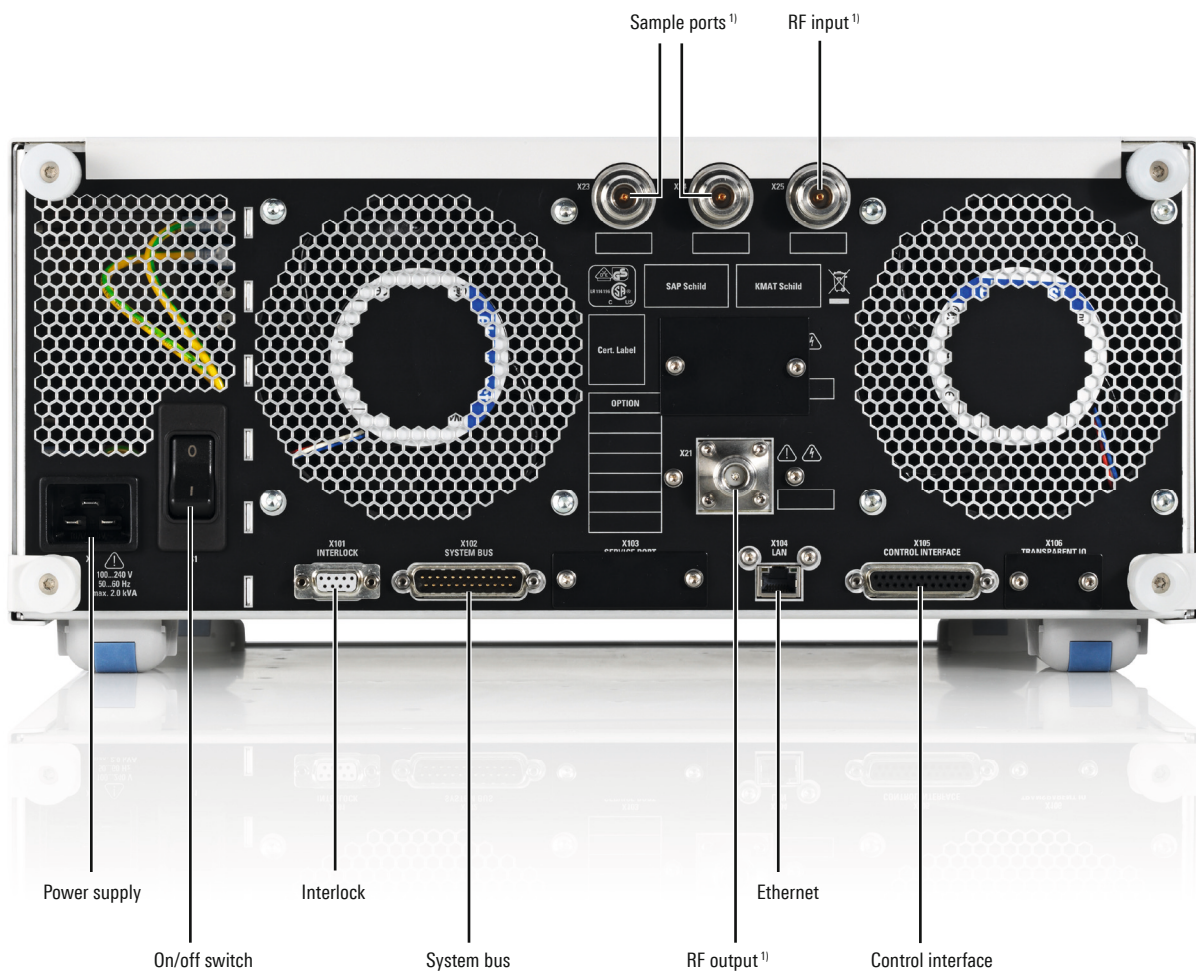


¹⁾ Optional or configuration-dependent.

Rear view

Desktop model

Functional elements



¹⁾ Optional or configuration-dependent.

Specifications in brief

Specifications in brief		
RF specifications		
Frequency range		0.8 GHz to 3.0 GHz, instantaneously; 2.5 GHz to 6.0 GHz, instantaneously
Nominal power classes	0.8 GHz to 3.0 GHz	30 W (44.8 dBm), 60 W (47.8 dBm), 110 W (50.4 dBm), 200 W (53.0 dBm), 400 W (56.0 dBm)
	2.5 GHz to 6.0 GHz	15 W (41.8 dBm), 30 W (44.8 dBm), 60 W (47.8 dBm), 100 W (50.0 dBm), 200 W (53.0 dBm)
Nominal output load		50 Ω
Gain flatness		± 3.0 dB (or better, see data sheet)
Gain adjustment range		> 15 dB
Spurious		-80 dBc (nom.), max. -70 dBc
Modulation capability		AM, FM, ϕ M, PM
Nominal input impedance		50 Ω
Input level for nominal output power		-3.4 dBm
Nominal output impedance		50 Ω
Output mismatch protection		100%
RF sample and detected sample signals		
RF sample signal coupling factor	RF forward and reflected sample ports, optional	approx. 46 dB (see test report for details)
Detected sample signal level	detected forward and reflected sample ports, optional	0.8 V to 2.6 V DC
RF and sample connectors		
RF input port	either front panel	N female
	or rear panel	N female
RF output port	either front panel	N female or 7/16 DIN female
	or rear panel	N female or 7/16 DIN female
RF sample ports	forward output power, optional	N female
	reflected output power, optional	N female
Detected sample ports	forward output power, optional	N female
	reflected output power, optional	N female
Graphical user interface		
Local graphical display		200 × 48 pixel, monochrome
Web GUI	via Ethernet	RJ-45, 10/100 Mbit/s, autonegotiation, half/full duplex
Remote control		
Ethernet		RJ-45, 10/100 Mbit/s, autonegotiation, half/full duplex
General data		
Operating voltage range		100 V to 240 V AC $\pm 10\%$, single phase, 50 Hz to 60 Hz $\pm 6\%$
Power consumption	depending on power class	max. 3.6 kVA
Air cooling		forced air, built-in fans, air entry at front, air exit at rear
Dimensions		
Desktop model	W × H × D, incl. fans, handles and feet	430 mm × 196 mm × 580 mm (16.93 in × 7.72 in × 22.83 in)
	for rackmounting	19" 1/1, 4 HU
Rack model	W × H × D	19" × 12 HU × 800 mm (31.5 in)

Specifications in brief		
Environmental conditions		
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
Protection		
Input overdrive	without damage	max. +15 dBm
Load VSWR		infinite
Interlock		1 device interlock, 1 configurable interlock
Input protection against bias voltage	optional	DC block level ≤ 50 V DC
Transient voltage compatibility		category II, in line with IEC 60364-4-443
Short-circuit breaking capacity		automatic all-pole 20 A circuit breaker
Thermal overload		shutdown at +50°C ambient temperature

All specified parameters are valid for an ambient temperature of +25°C, input impedance of 50 Ω and output impedance of 50 Ω.

For data sheet, see 3606.7247.22 and www.rohde-schwarz.com.

Ordering information

Designation	Type	Configuration No.
R&S®BBA150 single-band power amplifiers		
Frequency band from 0.8 GHz to 3.0 GHz		
30 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-D30
60 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-D60
110 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-D110
200 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-D200
400 W, air-cooled, 12 HU rack model	R&S®BBA150	BBA150-D400
Frequency band from 2.5 GHz to 6.0 GHz		
15 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-E15
30 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-E30
60 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-E60
100 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-E100
200 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-E200
Accessories supplied: power cord, user manual on CD.		
R&S®BBA150 dual-band power amplifiers		
Frequency bands from 0.8 GHz to 3.0 GHz and 2.5 GHz to 6.0 GHz		
30 W/15 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-D30E15
30 W/30 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-D30E30
60 W/15 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-D60E15
60 W/30 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-D60E30
60 W/60 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-D60E60
110 W/30 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-D110E30
110 W/60 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-D110E60
110 W/100 W, air-cooled, 4 HU desktop model	R&S®BBA150	BBA150-D110E100
Accessories supplied: power cord, user manual on CD.		

Designation	Type	Order No.
Options		
GPIO Remote Control (external add-on)	R&S®BBA-B101	5355.8189.00
RF Input Switch (N)	R&S®BBA-B110	5355.8866.02
RF Output Switch (N, max. 200 W)	R&S®BBA-B120	5355.8795.02
Fast Amplifier Mute	R&S®BBA-B130	5355.8114.02
DC Block Input Protection (N)	R&S®BBA-B132	5353.9236.03
RF Forward/RF Reflected Sample Ports (N front)	R&S®BBA-B140	5355.8837.02
RF Forward/RF Reflected Sample Ports (N rear)	R&S®BBA-B140	5355.8837.03
Detected Forward/Detected Reflected Sample Ports (N front)	R&S®BBA-B141	5355.8850.02
Detected Forward/Detected Reflected Sample Ports (N rear)	R&S®BBA-B141	5355.8850.03
Sample Port Switch (dual port, N front)	R&S®BBA-B142	5355.8872.02
Sample Port Switch (dual port, N rear)	R&S®BBA-B142	5355.8872.03
Transparent I/O	R&S®BBA-B160	5355.8889.02

Service options		
Frequency Range/Output Power Upgrade	R&S®BBA-UPGR	on request
Extended Warranty, one year	R&S®WE1	Please contact your local Rohde & Schwarz sales office.
Extended Warranty, two years	R&S®WE2	
Extended Warranty, three years	R&S®WE3	
Extended Warranty, four years	R&S®WE4	

The frequency ranges between 9 kHz and 1 GHz are covered by the R&S®BBA100 broadband amplifier family (product brochure PD 5214.0753.12, data sheet PD 5214.0753.22). The two broadband amplifier families can be integrated into a combined amplifier system mechanically and in terms of RF switching and system control.

Your local Rohde & Schwarz expert will help you determine the optimum solution for your requirements.

To find your nearest Rohde & Schwarz representative, visit

www.sales.rohde-schwarz.com

Service that adds value

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

About Rohde & Schwarz

Rohde & Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 80 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

Quality management and environmental management

Rohde & Schwarz is certified in line with the ISO 9001 and ISO 14001 management systems.

Certified Quality System
ISO 9001

Certified Quality System
ISO 14001

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R&S®BBA150 Broadband Amplifier

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