

# RF amplifiers from Rohde & Schwarz in accelerator physics

Particle acceleration requires cavity resonators that are driven with high RF powers at defined frequencies. Rohde & Schwarz offers RF solid-state amplifiers for frequencies ranging from 9 kHz to 6 GHz, delivering CW power up to 80 kW.



## Your requirement

Whether in a linear accelerator (LINAC), circular accelerator, storage ring or feedback loop for beam stabilization – it takes robust, reliable RF amplifiers with high phase stability and low phase noise to apply the necessary kinetic energy to electrons, protons and ions.

## Technical solution

Rohde & Schwarz has more than 70 years of experience in building air-cooled and liquid-cooled high-power amplifiers for broadcasting, EMC, physics and engineering applications. The company offers a broad range of products, including narrowband and broadband solid-state amplifiers for the frequency range from 9 kHz to 6 GHz, delivering CW power up to 80 kW.

The amplifiers are available as class A, class AB and class C amplifiers to cover diverse applications. They feature excellent RF characteristics, including very short phase delay, high phase stability, low phase noise and constant gain. The amplifiers offer an impressively high power density while maintaining high efficiency, along with high availability and robustness against mismatch.

In addition to CW signals, the amplifiers support all common modulation modes as well as fast, pulsed CW signals. The fast amplifier mute option, which is available for certain amplifier models, permits blanking of the RF output signal down to a level that is very close to the thermal noise floor of  $-174$  dBm (1 Hz).

The amplifiers can easily be integrated into control systems via LAN, GPIB or, depending on the model, parallel I/O interfaces. Control commands and alarm messages are made available via Simple Network Management Protocol (SNMP) or Standard Commands for Programmable Instruments (SCPI).

## Applications

### RF amplifier system for LINACs or circular accelerators

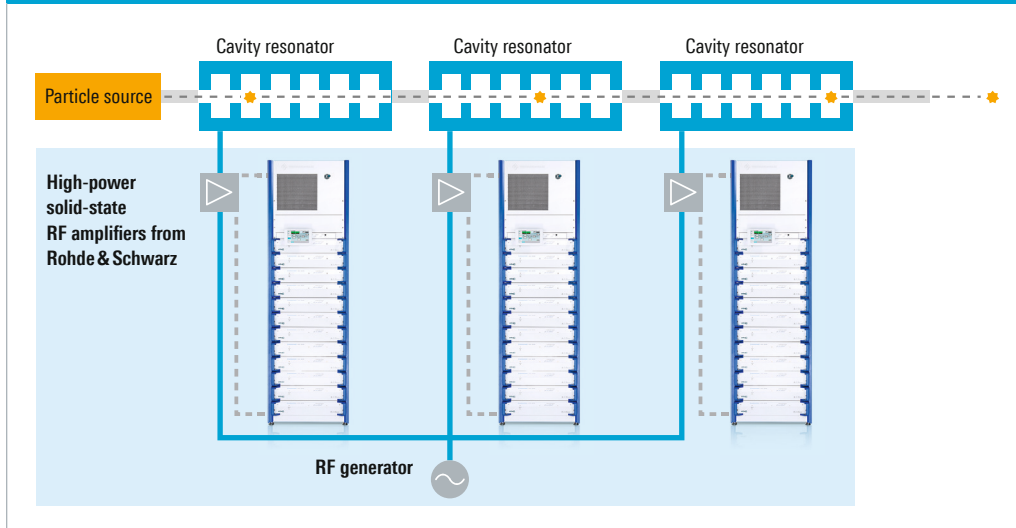
Solid-state amplifiers from Rohde&Schwarz are the ideal driver amplifiers for klystrons or inductive output tube (IOT) amplifiers or main amplifier in an accelerator chain. Rohde&Schwarz also offers broadband amplifiers for use in feedback loops, for example to reduce the size and energy dispersion of a particle beam within a storage ring.

### Rapid RF output signal suppression using fast amplifier mute option

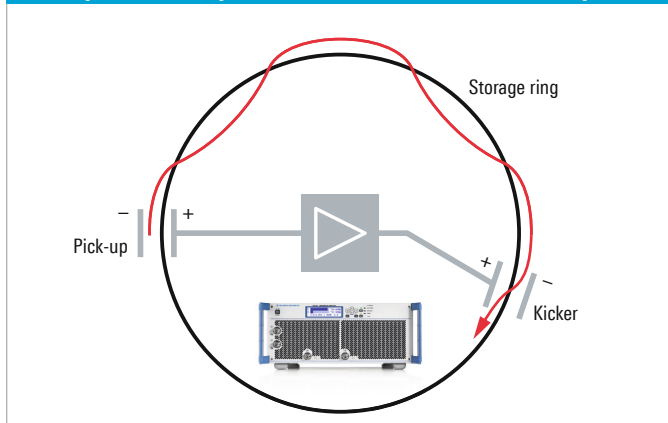
The fast amplifier mute option available for certain amplifier models reduces the noise power of the RF output signal in just a few microseconds to a level very close to the thermal noise floor of  $-174$  dBm (1 Hz). The RF signal will return to the nominal output power just as quickly. The mute function is controlled via a TTL input.

RF amplifier family	Frequency range	Max. CW output power	Order no. for product brochure
R&S®BBA150	9 kHz to 6 GHz	2.5 kW/200 W	3606.7247.12
R&S®BBL200	9 kHz to 250 MHz	10 kW	3606.9456.12
R&S®TxR9	87.5 MHz to 108 MHz	80 kW	3606.8595.12
R&S®TxV9	170 MHz to 254 MHz	32 kW	5214.5990.12
R&S®TxU9	470 MHz to 862 MHz	80 kW	5214.5990.12

### Example: RF amplifier system used in a LINAC



### Example: RF amplifier used in a feedback loop



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