

QCM-RF II / 2-18.5 GHz

Qubit Control Module | Cluster Series 19" Rack Mounted

Release November 2025_V1.9

Description

The QCM-RF II is the ideal RF signal generator specifically designed for the control of quantum devices. The unleveled noise performance and high spurious-free-dynamic range makes it ideal for high-fidelity single- and two-qubit gates. The QCM-RF II supersedes the first version and excels to provide even flatter and cleaner spectrum;

70 dBc SFDR can be reached in its full range from 2 to 18.5 GHz.

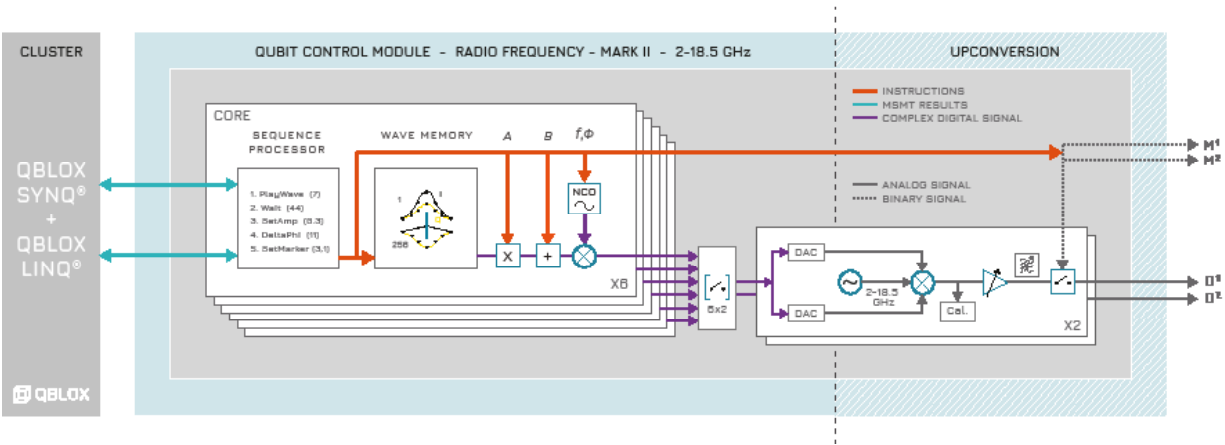
The QCM-RF II has 2 RF output channels with two independent internal upconversion stages to directly output signals over a wide frequency range from 2 GHz to 18.5 GHz. The module incorporates 6 sequence processors for flexible multiplexed driving and tracking of up to 6 qubits that can span a 700 MHz bandwidth.

Both output channels have their own local oscillator to allow for fully independent operation of each channel.



Features

- Advanced distributed sequence processing.
- Multiplexed control of up to 6 qubits per module.
- Synchronized to all other modules via SYNQ protocol.
- Real-time control of amplitude, offset and modulation phase (virtual Z-gates).
- LINQ allows for low-latency interaction with all other modules within < 400 ns.
- Sequencer instructions allow constructing arbitrarily long (modulated) signals.
- External instrument triggering via 2 marker outputs.



Specifications QCM-RF

Frequency range	2 - 18.5 GHz
Analog output channels	2
Analog bandwidth	(-3 dB) 500 MHz (-6 dB) 650 MHz (-9 dB) 720 MHz
Pulse Processing Units	6 Q1 sequence processors
DAC sample rate	1 GS/s (for I and Q)
DAC resolution (vertical)	16 bit (for I and Q)
Binary output markers	2 (3.3 V LVTTTL)
Max. output power (into 50 Ohm)	+10 dBm (< 8 GHz) +5 dBm (> 8 GHz)
Attenuation range	30 dB
Output harmonic levels	> 35 dBc

SFDR within 2 - 18.5 GHz full range (including LO leakage, spurious sidebands, excluding output harmonics.)	> 54 dBc at 100% IF amplitude > 64 dBc at 50% IF amplitude > 70 dBc at 25% IF amplitude
Phase noise (@3 GHz, 10 kHz offset)	-115 dBc/Hz
Frequency resolution	0.25 Hz (IF), 1 Hz (LO)
Output switch signal suppression	> 60 dB
Ethernet data rate	1 Gbit/s
Driver/API	SCPI / Python / QCoDeS
Max. power consumption (via Cluster)	39 W
Input/Output connector type	SMA
Marker connector type	SMP
Dimensions single module	269 x 130 x 20 mm ³
Weight	0.438 kg