QBLOX

# QCM - RF

## Qubit Control Module RF

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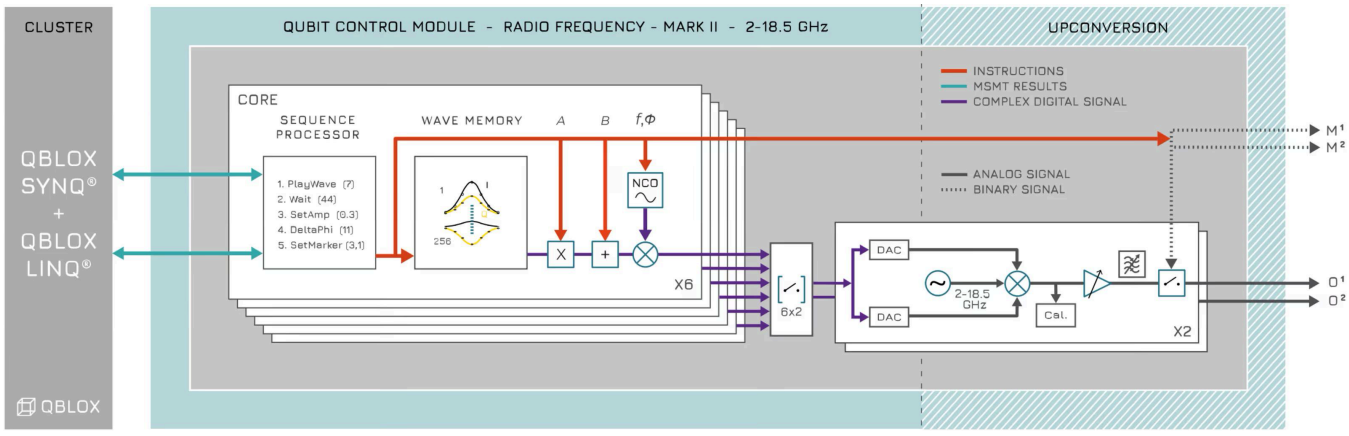
## DESCRIPTION

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

Sequencer instructions allow constructing arbitrarily long (modulated) signals.

External instrument triggering via 2 marker outputs.

## SPECIFICATIONS

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|---|---|
| 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 LVTTL)** |
| Max. output power (into 50 Ohm): | **+10 dBm (< 8 GHz) / +5 dBm (> 8 GHz)** |
| Attenuation range: | **30 dB** |
| Output harmonic levels: | **> 35 dBc** |

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|---|---|
| SFDR within 2 - 18.5 GHz full range<br>(incl. LO leakage, spurious sidebands,<br>excl. output harmonics): | **> 54 dBc at 100% IF amplitude**<br>**> 64 dBc at 50% IF amplitude**<br>**> 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 mm³** |
| Weight: | **0.438 kg** |