QRF Quad RF Synthesizer + AOM Driver

The MOGLabs QRF is a quad-channel RF synthesizer that offers the flexibility of computer-controlled DDS generation at an economical per-channel price. It offers a range of functionality for common AOM tasks such as adjustable frequency shifting, low bandwidth modulation, intensity stabilisation, and pulse generation. Optional integrated power amplifiers enable most AOMs to be driven directly without the need for external amplification.

The channels are inherently phase synchronous, simplifying phase mod-demod experiments such as IQ-measurement. Each channel as a separate modulation input and can be configured independently. Furthermore, hardware TTL switching permits rapid pulse generation with extremely low jitter.

An integrated display interface simplifies operating the device, and it can be fully computer-controlled over Ethernet or USB using a human-readable control language. Full software suite, including examples in Python, MATLAB and LabVIEW provided.

Features

- Four RF channels
- High output power: up to +33dBm per channel
- Wide frequency range: 10 - 200MHz
- Analog modulation (AM, FM, PM, PID)
- External TTL inputs for fast pulse generation
- Autonomous execution of complicated frequency/power/phase sequences
- Robust open- and short-circuit protection
- Ethernet and USB interfaces

Applications

- AOM driver
- Intensity stabilisation
- Diamond NV quantum control
- Laser cooling, trapping, spectroscopy
- Bose-Einstein condensation
- Quantum optics: squeezed light
- Electromagnetic transparency, slow light
- Time and frequency standards

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Specifications QRF (2025)

RF characteristics		
RF output power	QRF241: 0 to +33 dBm QRF041: 0 to +12 dBm	10-bit amplitude resolution
Frequency range	10 to 200 MHz, 0.12Hz steps	
Frequency stability	±25 ppm (0 to 50°C)	
Phase	0 to 360°, 14-bit resolution	
Absolute phase noise	< –110 dBc/Hz @ 1 kHz	
Signal to noise	< –95 dBc @ 30 dBm	
Intermodulation and spurious	< –50 dBc	
Crosstalk between channels	< –50dBc	
RF 'off' level	< –70dBm	
External clock	25 MHz or 500 MHz	
Analogue input/output		
Number	1 input per RF channel (4 total)	
Function	FM, AM, PM, PID, independently configurable per channel	
Sensitivity	± 1V, anti-alias filter at 100kHz, 12-bit resolution	
Modulation bandwidth (3 dB)	100 kHz with 2nd order anti-alias	
Input latency	< 5 µs	
Digital input/output		
RF on/off	Software control, front-panel buttons, hardwired TTL	
RF on/off response time	< 40ns	
TTL input	1 per channel, for on/off control or table trigger	
Computer interface		
Ethernet	10/100 TP, RJ45	
USB	USB2, plug type USB-A	
Table mode	Up to 4 channels simultaneously (independently or synchronised)	
Table memory (non-volatile)	8k entries per channel (frequency, amplitude, phase and duration)	
Table timing resolution	5 µs	
Dimensions and power		
Dimensions, weight	250 x 79 x 292 mm (W x H x D), 2 kg	
Power	30 W (041); 55 W (241)	

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