# moglabs
## a santec company

# XRF Agile RF Synthesizer + AOM Driver



The MOGLabs XRF agile RF synthesizer provides two channels of agile RF frequency synthesis with high-power output drivers. Each channel spans a frequency range of 20 to 400 MHz with output power up to +36dBm (4 W), and 15 kHz to 400 MHz at –4dBm. The two channels can be controlled via front panel knobs to adjust frequency and power, or via computer interface. Two external analogue inputs are provided for each channel, to allow FM/AM/PM with 10 MHz bandwidth, and PID servo feedback is built-in for laser noise-eating or frequency locking.

The computer interface (10/100 Ethernet and USB) allows full control of all parameters, advanced table sequence control, and monitoring. Ultrafast digital outputs can be individually controlled in synchronisation with the table sequences.

## Features

- Two RF channels, independent or synchronised
- Table mode with 16ns step time
- High output power: up to +36dBm per channel
- Wide frequency range: 20 – 400MHz at 4W
- Extended range 15kHz – 400MHz at low power
- High modulation bandwidth 10 MHz (AM, FM, φ)
- RF power output monitoring and protection
- External digital inputs for fast on/off, trigger
- 16 high-speed digital IO (table sequence control)
- Autonomous execution of complicated frequency/power/phase sequences
- External sync clock input
- Two analogue outputs
- Robust open- and short-circuit protection
- Ethernet and USB interfaces
- Powerful API using simple text commands

## Applications

- AOM driver
- Noise eater or laser frequency lock
- Precise qubit quantum control
- Laser cooling, trapping, spectroscopy
- Bose-Einstein condensation
- Quantum optics: squeezed light
- Electromagnetic transparency, slow light
- Time and frequency standard

# Agile Frequency Synthesizer/AOM Driver

## Specifications 2025

### RF characteristics

| | |
|---|---|
| RF output power | 0 to +36 dBm, 16dBm/-4dBm GB/LP        14-bit resolution |
| Frequency | 20 to 400 MHz, 32-bit resolution (0.23Hz steps) |
| Low-power frequency | 15 kHz (– 3dB) to 400 MHz |
| Frequency stability | ±1 ppm (0 to 50°C) |
| Phase | 0 to 360°, 16-bit resolution |
| Absolute phase noise | < – 110dBc/Hz @ 1kHz (using internal 20 MHz reference) |
| Signal to noise | < – 100dBc @ 30dBm |
| Intermodulation and spurious | < – 55dBc |
| Crosstalk between channels | < – 57dBc max, < – 70dBc mean |
| RF 'off' level | < – 100dBm |
| Extinction ratio | < – 100dBc signal on/off (PA on), 10 kHz RBW |
| External clock | 5 MHz to 1 GHz |

### Analogue input/output

| | |
|---|---|
| Number | 2 inputs and 2 outputs per RF channel |
| Function | FM, AM, φ, noise-eating, analogue sampling |
| Sensitivity | 8 Vpp, 10 MHz 7$^{th}$ order anti-alias filter<br>12-bit resolution, 65MHz sampling rate |
| Modulation bandwidth | 10 MHz first parameter, 1 MHz second parameter |
| DAC | 2 channels, 5 Vpp, 16-bit, 1MHz bandwidth |

### Digital input/output

| | |
|---|---|
| RF on/off | Software control, front-panel buttons, hardwired TTL, positive logic |
| Trigger input | Per channel, start/retrigger by edge or level |
| Shutter output | Per channel TTL output |
| High speed digital IO | 16 TTL input/output, user-controllable and via table mode |
| TTL high/low | 2.2 V/0.6V, abs max in 7.0 V, abs min -0.5 V |

### Table mode

| | |
|---|---|
| Table length | Up to 8k programming points per channel |
| Table timing resolution | 16 ns (advanced), 1 μs (simple) |
| FLASH storage | Four tables |
| Channel sync | Independent, shared trigger, or fully synchronised (software set) |

### Computer interface

| | |
|---|---|
| Ethernet | 10/100 TP, RJ45 |
| USB | USB2, plug type USB-A |

### Dimensions and power

| | |
|---|---|
| Dimensions | 250 x 79 x 292mm (WxHxD), 2kg |
| Power input | 95 – 264 Vac, 47 to 63Hz, 1A |
| Power consumption | 60W |