# moglabs

### ARF/XRF Agile RF Synthesizer + AOM Driver



The MOGLabs ARF/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). 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 at up to 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
- High output power: up to +36dBm per channel
- Wide frequency range: 20-400MHz
- High modulation bandwidth up to 10 MHz (AM, FM,  $\phi$ )
- 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
- Three analogue outputs
- Robust open- and short-circuit protection
- Ethernet and USB interfaces

#### *Applications*

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

## Agile Frequency Synthesizer/AOM Driver Specifications ARF/XRF

| RF characteristics                      |   |
|---|---|
| RF output power                         | ARF421, XRF421: 0 to +36 dBm<br>ARF021, XRF021: 0 to +16 dBm                            |
| Frequency                               | 20 to 400 MHz, 32-bit resolution (0.23Hz steps)   |
| Frequency stability                     | ±1 ppm (0 to 50°C)  |
| Phase                                   | 0 to 360°, 16-bit resolution  |
| Absolute phase noise                    | – 115dBc/Hz @ 10kHz, – 113dBc/Hz @ 1kHz, – 105dBc/Hz @ 100Hz                            |
| Signal to noise                         | > 80dBc @ 30dBm   |
| Intermodulation and spurious            | < – 80dBc   |
| Crosstalk between channels              | < – 70dBc (off), < – 50dBc (on)   |
| RF 'off' level                          | < – 70dBm   |
| External clock                          | 5 MHz to 1 GHz  |
| Analogue input/output                   |   |
| Number                                  | 2 inputs and 2 outputs per RF channel   |
| Function                                | FM, AM, $\phi$ or analogue sampling for DSP applications                                |
| Sensitivity                             | ± 1V, 7 <sup>th</sup> order anti-alias filter<br>12-bit resolution, 65MHz sampling rate |
| Modulation bandwidth                    | 10 MHz first parameter, 1 MHz second parameter  |
| DAC                                     | 3 channels, ± 2.5 V, 14-bit, 1MHz bandwidth   |
| Digital input/output                    |   |
| RF on/off                               | Software control, front-panel buttons, hardwired TTL                                    |
| 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 (advanced)                    |
| Computer interface                      |   |
| Ethernet                                | 10/100 TP. RJ45   |
| USB                                     | USB2. plug type USB-A   |
| Table mode                              | Up to 8k programming points per channel   |
| Table timing resolution                 | ARF: 1 μs, XRF: 16 ns   |
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| Dimensions and power                    |   |
| Dimensions                              | 250x79x292mm (WxHxD), 2kg   |
| Power                                   | 95 – 264 Vac, 47 to 63Hz, 1A  |



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