



## XRF Agile RF Synthesizer + AOM Driver



The 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 +36 dBm (4 W), and 15 kHz to 400 MHz at -4 dBm. 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 16 ns step time
- High output power: up to +36 dBm per channel
- Wide frequency range: 20 – 400MHz at 4 W
- Extended range 15 kHz – 400 MHz at low power
- High modulation bandwidth 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)
- External sync clock input and 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

# XRF Agile RF Synthesizer

## Specifications XRF (2026)

### RF characteristics

|                              |                                                         |
|------------------------------|---------------------------------------------------------|
| RF output power              | -0 dBm to +36 dBm, 16dBm/-4dBm GB/LP, 14-bit resolution |
| Frequency                    | -20 MHz to 400 MHz, 32-bit resolution (0.23 Hz steps)   |
| Low-power frequency          | 15 kHz (-3 dB) to 400 MHz                               |
| Frequency stability          | ±1 ppm (0 to 50°C)                                      |
| Phase                        | -0° to 360°, 16-bit resolution                          |
| Absolute phase noise         | < -110 dBc/Hz @ 1 kHz (using internal 20 MHz reference) |
| Signal to noise              | < -100 dBc @ 30 dBm                                     |
| Intermodulation and spurious | < -55 dBc                                               |
| Crosstalk between channels   | < -57 dBc max, < -70 dBc mean                           |
| RF 'off' level               | < -100 dBm                                              |
| Extinction ratio             | < -100 dBc 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, $\phi$ , noise-eating, analogue sampling<br>8 Vpp, 10 MHz 7 <sup>th</sup> order anti-alias filter |
| Sensitivity                 | 12-bit resolution, 65 MHz sampling rate                                                                   |
| Modulation bandwidth (3 dB) | 10 MHz first parameter, 1 MHz second parameter                                                            |
| DAC                         | 2 channels, 5 Vpp, 16-bit, 1 MHz bandwidth                                                                |

### Digital input/output

|                       |                                                                           |
|-----------------------|---------------------------------------------------------------------------|
| RF on/off             | Software control, front-panel buttons, hardwired TTL, positive logic only |
| 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 input             | 2.2V/0.6V, ads max in 7.0 V, ads min -0.5 V                               |

### Table mode

|                           |                                                                   |
|---------------------------|-------------------------------------------------------------------|
| Table length              | Upt to 8k programming points per channel                          |
| Table trimming resolution | 16 ns (advanced), 1 $\mu$ s (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 |

### Front panel interface

|         |                                                                    |
|---------|--------------------------------------------------------------------|
| Display | 2.8" 320x240 pixels full colour TFT LCD                            |
| Menu    | Full control with rotary encoder and pushbutton selection features |

### Dimensions and power

|                    |                                     |
|--------------------|-------------------------------------|
| Dimensions, weight | 250 x 79 x 292 mm (W x H x D), 2 kg |
| Power input        | 98 – 264 Vac, 47 to 63 Hz, 1A       |
| Power consumption  | 60 W                                |



Photonic Solutions Ltd  
Edinburgh  
EH14 4AP  
+44 131 664 8122  
[www.photonicsolutions.co.uk](http://www.photonicsolutions.co.uk)