covesion

A Hawthorn Photonics Company

Components

ENGINEERING ON YOUR WAVELENGTH

www.covesion.com

Hawthorn PHOTONICS

covesion

A Hawthorn Photonics Company

Covesion designs and manufactures high-performance nonlinear optical materials, frequency conversion components, electro-optic modulators and photonic subsystems that enable the next generation of scientific, quantum and industrial technologies. Our solutions are trusted by researchers, engineers and system developers worldwide to deliver efficient wavelength conversion, precise optical control and reliable performance in demanding photonic applications.

Covesion is part of Hawthorn Photonics, an international photonics group dedicated to advancing innovation in nonlinear optics, quantum technologies and advanced frequency conversion. AdvR Inc, also part of Hawthorn Photonics, their non-linear optical technologies enable access to wavelengths beyond standard commercial availability, supporting advanced applications across industrial, technological, and scientific research sectors. The group includes Radiantis, a specialist in high-performance tunable laser systems incorporating ultrashort-pulse and continuous-wave lasers, optical parametric oscillators and harmonic generation platforms. Together, the companies within Hawthorn Photonics deliver complementary capabilities that support the full photonics development cycle, from fundamental research through to robust, scalable commercial systems.

At the heart of Covesion's technology are engineered MgO:LN, LN and KTP nonlinear crystals, enabling highly efficient wavelength conversion and electro-optic modulation across a broad spectral range from the ultraviolet to the mid-infrared. Through proprietary poling expertise, Covesion produces high-fidelity grating period, delivering precise phase matching for a wide range of nonlinear optical processes including Second-Harmonic-Generation (SHG), Sum- and Difference-Frequency-Generation (SFG/DFG), optical parametric processes, and photon pair generation. Our unique capabilities in electro-optic modulation has allowed for broadband phase and amplitude modulation across visible and near-IR wavelengths.

These core technologies support a wide range of photonics solutions and are used in applications spanning quantum information science, atomic and molecular sensing, spectroscopy, advanced laser systems, aerospace and environmental monitoring. By enabling efficient wavelength conversion and precise optical control, Covesion helps customers unlock new wavelengths, improve system performance and expand the capabilities of modern photonics platforms. ation while delivering the thermal stability and control required for high-performance photonic systems.

OUR VALUES

WE DELIVER

- Together
- Above and beyond
- Trust
- Innovation

Hawthorn PHOTONICS

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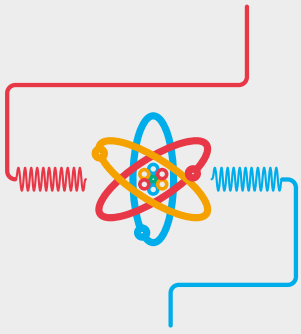

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RADIANTIS A Hawthorn Photonics Company

AdvR A Hawthorn Photonics Company

By bringing together decades of experience in advanced optical materials, precision photonic engineering and advanced laser technologies, the Hawthorn Photonics group enables researchers and technology developers to accelerate innovation and translate cutting-edge research into practical, real-world solutions.

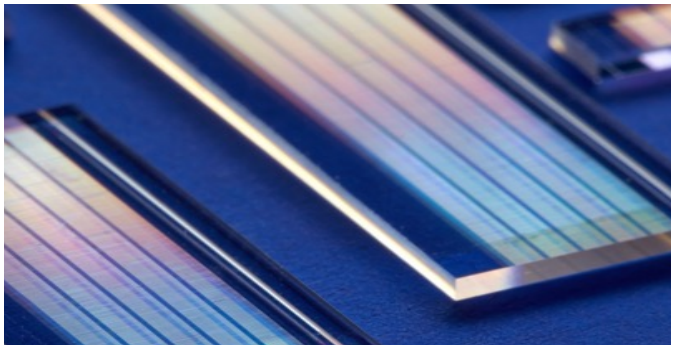
Enabling photonic solutions –
for photon generation, conversion and modulation

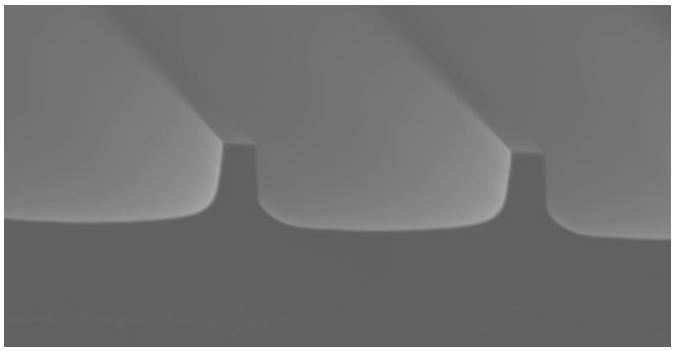
Covesion delivers advanced photonic solutions that enable wavelength conversion, photon generation, and electro-optic modulation. By uniting complementary expertise in nonlinear optical materials, engineering, integration and scalable manufacturing, we support customers from early-stage research through to high-volume commercial deployment.

We are a world-leader in the manufacture of periodically poled lithium niobate (PPLN), periodically poled potassium titanyl phosphate (PPKTP). These nonlinear optical crystals are optimized for high-efficiency wavelength conversion from 350 nm to 5000 nm, enabled by our patented poling process. Covesion provides ion-exchanged, ridge and reverse-proton-exchanged (RPE) waveguides based on periodically poled nonlinear crystals, enabling optimized device architectures for classical and quantum photonics. Devices are available for second, third, and fourth harmonic generation (SHG, THG, FHG), spontaneous parametric down-conversion (SPDC), sum and difference frequency generation (SFG, DFG), and high efficiency quantum frequency conversion, including low-loss waveguides suitable for single-photon operation in networking applications. Wavelength conversion solutions cover Type-0, Type-I and Type-II interactions, for both degenerate and non-degenerate wavelengths.

Grating periods from 1.5um to over 100µm support a wide range of nonlinear interactions and are well suited to repeatable, high-volume OEM manufacture. Off-the-shelf products are complemented by custom designs tailored to specific laser sources and system requirements. Wafer level processing and scalable manufacturing infrastructure support both one-off developmental programs and high-quantity production.

Covesion also offers a wide range of electro-optic modulators, including phase and amplitude modulators for visible and NIR wavelengths. Based on KTP, MgO: LN, and LN, our devices provide low Vπ, high optical power handling, and broadband modulation for wavelengths ranging from 380 nm to C-band, addressing applications such as atom and ion trapping, laser stabilization, communications, and remote sensing.





To simplify system integration, we design and manufacture a complete ecosystem of fully fiber-coupled devices, crystal mounts, ovens, temperature controllers and accessories, delivering thermally stable, ready-to-use optical systems.

Combined with our strengths in modeling, packaging, and characterization, we offer comprehensive technical services, from feasibility studies and prototype development to full-scale manufacturing. We also enable robust, scalable photonic solutions that transform photons, generating, converting, and modulating light to meet the most demanding requirements of todays and tomorrow's photonic technologies.

Key technology
introduction

PERIODICALLY POLED LITHIUM NIOBATE (PPLN) AND LN

Lithium Niobate (LN) is one of the most widely used nonlinear optical materials due to its high nonlinear coefficient, broad transparency window, and excellent electro-optic properties. Periodically poled lithium niobate (PPLN) provides quasi-phase matching by reversing the crystal domain orientation, enabling efficient nonlinear interactions that cover 350 nm to 5000 nm.

Adding 5% MgO to LN significantly increases the optical and photorefractive resistance of the crystal while preserving its high nonlinear coefficient. This allows more stable operation at visible wavelengths and lower temperature operation than a similar undoped crystal.

MgO:PPLN and PPLN is available in bulk crystals for free space systems, and in waveguide formats where strong optical confinement enables low-power, compact fiber-coupled conversion devices. These technologies underpin applications spanning the visible, near infrared, and mid infrared spectral regions.

MgO:LN and LN-based technologies are also central to electro-optic phase and amplitude modulators. Leveraging the strong Pockels effect in LN, these modulators provide low Vπ, high optical power handling, and broadband operation from the visible through near IR, and telecom C-band wavelengths.

PERIODICALLY POLED KTP (PPKTP) AND KTP

Potassium Titanyl Phosphate (KTP) is valued for its low green-induced infrared absorption, high damage threshold, and favorable thermal properties. When periodically poled, PPKTP becomes a powerful quasi phase matched platform widely used in both classical and quantum photonics. We offer bulk and waveguide components. PPKTP is particularly important for the generation of entangled photon pairs, squeezed light, and frequency-doubled sources due to its low optical loss and excellent stability.

Ion-exchanged KTP waveguides further enhance performance by combining the material's intrinsic robustness with efficient guided-wave nonlinear interactions. These components are commonly deployed in precision scientific instruments, remote sensing, and quantum technology experiments where stability and reproducibility are critical.

KTP phase modulators provide efficient, stable optical phase modulation across visible and near-infrared wavelengths due to the strong electro-optic effect. KTP offers a favorable combination of relatively high electro-optic coefficients, low optical absorption, high damage threshold, and excellent resistance to photorefractive effects, making it well suited for demanding applications where long-term stability is critical. In waveguide implementations, KTP phase modulators achieve low insertion loss and reduced drive voltage while maintaining good optical power handling. These characteristics make KTP phase modulators attractive for laser frequency stabilization, coherent communications, precision sensing, and quantum optics, particularly in systems operating outside standard telecom bands where alternative materials may be limited by power handling or photorefractive sensitivity.

Applications

Advanced solutions for nonlinear frequency conversion and electro-optic modulation:

Supported by low insertion loss and high-power-handling, our industry-leading components and crystals have a wide range of applications:

QUANTUM TECHNOLOGY

- Quantum Sensing
- Quantum Communication
- Quantum Computing
- Quantum Navigation & Timing

ENVIRONMENTAL, MEDICAL & LIFE SCIENCE

- Gas Sensing
- CARS Microscopy
- Flow Cytometry

AEROSPACE & DEFENSE

- Laser Countermeasures
- LIDAR
- Stand-off Sensing
- Upconversion Detection

LASERS & SCIENTIFIC INSTRUMENTATION

- Harmonic Generation
- Tuneable OPO
- Super-resolution Imaging
- Metrology

RESEARCH

- Frequency Comb Stabilization
- THzGeneration
- Nonlinear Interferometry

ATOMIC, MOLECULAR AND OPTICAL PHYSICS

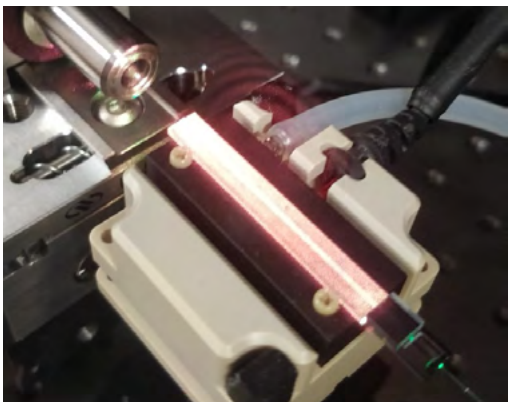
- Laser Cooling and Trapping
- Frequency Stabilization (PDH)
- High-speed Pulse Carving

Covesion's nonlinear optical crystals and components enable cutting edge optical systems. By combining efficient nonlinear frequency conversion with high-performance electro-optic modulation, these technologies extend the reach of conventional laser sources and provide precise signal modulation across visible, near-infrared and mid-infrared wavelengths.

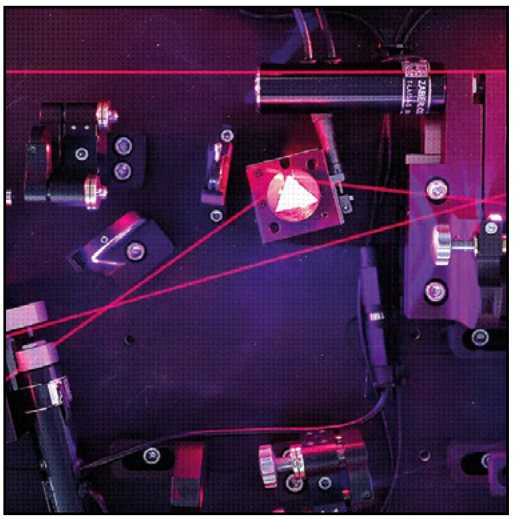
This capability is critical to enabling quantum technologies and atomic physics, where narrow-linewidth light at specific wavelengths is often required alongside stable phase or amplitude control. Examples include the harmonic generation of visible wavelengths from telecom-band lasers for applications such as atom cooling, trapping, interferometry and precision measurement. the generation of entangled photon pairs through spontaneous parametric down-conversion (SPDC)—enabling quantum computing, quantum communication and quantum key distribution (QKD).

For sensing and imaging, these materials enable tunable mid-IR generation for spectroscopy, microscopy and environmental monitoring. With pulse energies in excess of 1 mJ, these sources are also used in defense industry applications such as LIDAR and laser countermeasures.

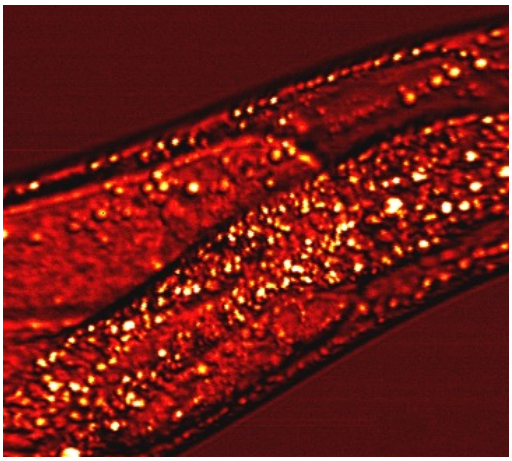
Efficient upconversion from the MIR to the NIR/visible allows systems to take advantage of lower-cost, high quantum efficiency silicon detectors in place of expensive, cooled mid-IR detectors, improving the practicality of applications such as stand-off gas detection.



High-efficiency generation of visible light via SHG using Covesion PPLN waveguide



OPO laser image of Radiantis



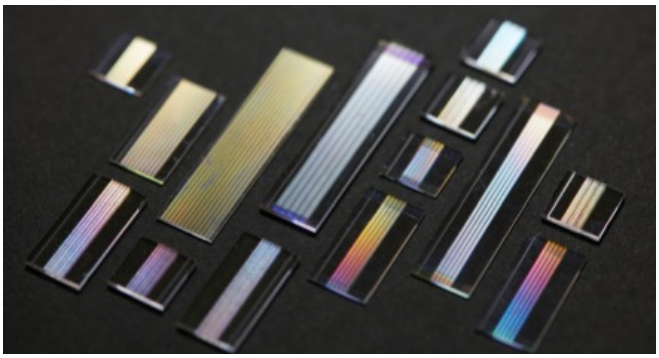
CARS microscopy image of C. elegans worm
G. Krauss et al. Opt. Lett. 34, 18, 2847 (2009)

Bulk Crystals

PPLN, PPKTP

Our MgO:PPLN and PPKTP crystals are designed to work with a wide range of common laser wavelengths.

Each device has several gratings to allow phase matching at different temperatures. The visible wavelength devices contain multiple gratings designed for phase matching of the nominal pump wavelength typically between 30-200°C. Tuning to temperatures up to 200°C allows phase matching to longer wavelengths.



All our products undergo rigorous quality inspection and are supplied clip-mounted and off-the-shelf. Custom crystal lengths, thicknesses, AR coatings, and grating designs are also available upon request.

SECOND-HARMONIC-GENERATION	APPLICATIONS
• High efficiency frequency doubling of IR lasers to visible and shorter near-IR wavelengths • Available in 0.5mm and 1.0mm apertures • Mounted and dual-band AR coated	• Green and blue generation • Scientific & medical • Frequency comb stabilization • Fluorescence microscopy
SUM FREQUENCY GENERATION	**APPLICATIONS**
• Combines fixed 1550 nm and tunable 780 nm or 810 nm pump sources to provide tunable green wavelengths • Mounted and triple-band AR coated	• Cascaded THG from 1550 nm • Quantum optics
SPONTANEOUS PARAMETRIC DOWN-CONVERSION	**APPLICATIONS**
• Generate entangled photon pairs • Available with Type-II • Mounted and dual-band AR coated	• Gravity sensing • QKD • Quantum sensing
OPTICAL PARAMETRIC OSCILLATION / GENERATION	**APPLICATIONS**
• Mounted and triple-band AR coated • Widely tunable mid-IR from a 1064 nm pump source • Available with fan-out grating	• Mid-IR spectroscopy • Environmental monitoring • LIDAR & laser counter measures
DIFFERENCE FREQUENCY GENERATION	**APPLICATIONS**
• Temperature tuning 30-200 °C • Available in 0.5mm and 1.0mm apertures • Mounted and triple-band AR coated	• Mid-IR spectroscopy • Environmental monitoring • LIDAR & laser counter measures

Waveguides

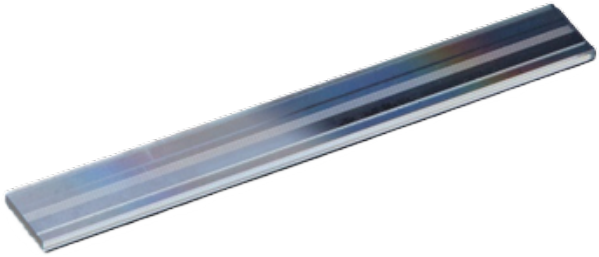
RPE, ion-exchanged, and ridge waveguides

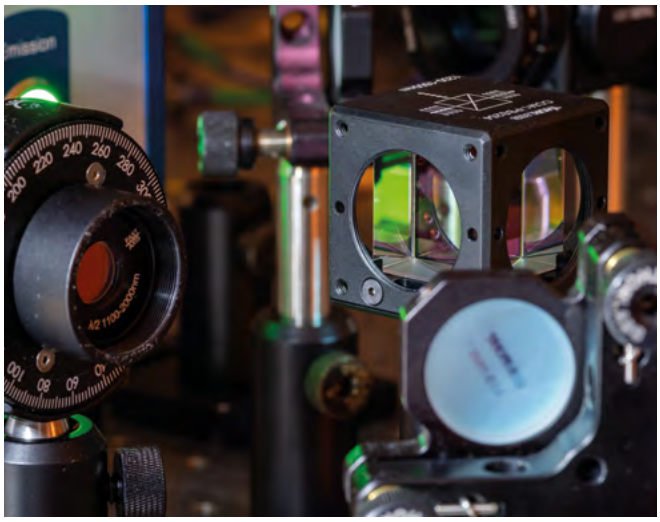
Waveguide engineering is central to modern photonics, enabling strong light-matter interaction, compact device footprints, and low-power operation.

The most important architectures for nonlinear and electro-optic devices are proton exchange ion-exchanged, and ridge waveguides, each offering distinct advantages when implemented in materials such as LN, MgO:LN, KTP and their periodically poled variants.

Reverse Proton Exchange (RPE) Waveguides are most implemented in lithium niobate, including periodically poled LN (PPLN). The process begins with proton exchange, in which lithium ions near the surface are replaced by protons, increasing the refractive index and forming a guiding region. A subsequent annealing and reverse exchange step partially restores the crystal lattice and optical properties of the LN while maintaining confinement.

The key principle of RPE waveguides is the balance between strong optical confinement and preserved nonlinear and electro optic coefficients. Compared with simple proton exchange waveguides, RPE structures exhibit lower propagation loss, improved mode symmetry, and greater resistance to photorefractive damage. These characteristics make RPE waveguides well-suited for efficient wavelength conversion and quantum frequency conversion, particularly where high nonlinear efficiency and long term stability are required.





Ion-exchanged waveguides are most closely associated with KTP technology. The principal advantage of ion-exchanged waveguides lies in their low optical loss, excellent modal quality, and minimal crystal damage. Because the process does not strongly disrupt the bulk lattice, KTP ion-exchanged waveguides preserve the material's favorable properties, including high damage threshold and low susceptibility to photorefractive effects. When combined with periodic poling, these waveguides enable highly efficient nonlinear processes such as Second-Harmonic-Generation and photon pair generation, making them widely used in precision scientific and quantum optics systems.

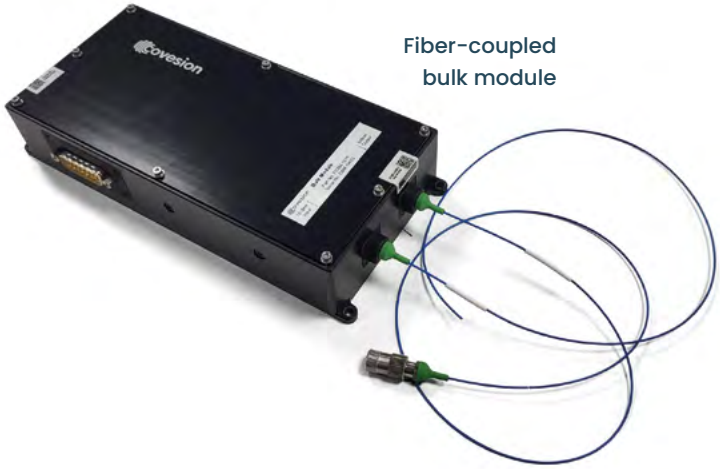
Ridge Waveguides rely on physical structuring of the material to confine light, typically formed by etching or machining ridges into bulk LN, MgO:LN, or thin-film lithium niobate (TFLN).

Optical confinement arises from the refractive index contrast between the ridge and the surrounding medium rather than from ion diffusion. The guiding principle of ridge waveguides is strong mode confinement with high design flexibility. Ridge waveguides support higher optical power levels and robust device handling.

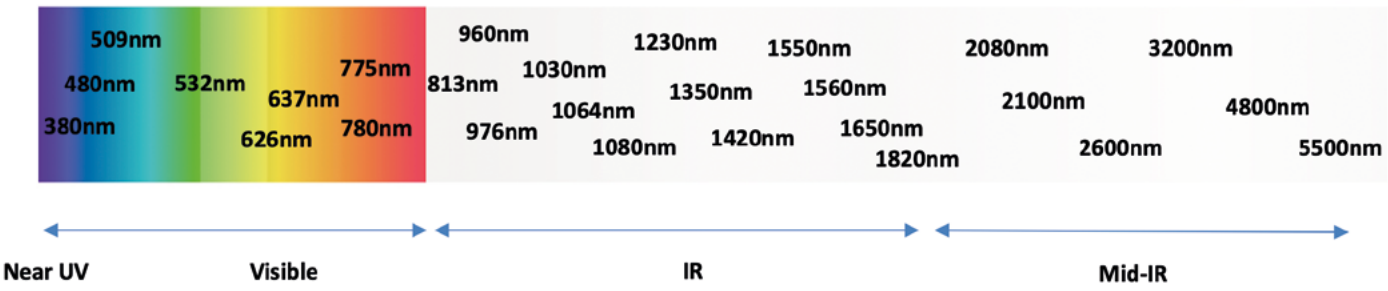
Fiber-coupled
frequency conversion

FIBER-COUPLED BULK MODULE

Utilizing our extensive range of bulk MgO:PPLN crystals we can provide customizable solutions with fiber coupling (input and output) for nonlinear wavelength conversion; designed for OEMs and researchers who need maximum ouput power with high efficiency.



Fiber-coupled bulk module



KEY FEATURES

- Fully customizable compact solution
- Simple to use
- High efficiency design
- Robust with long lifetime
- Compatible with Covesion temperature controllers
- Design for OEM integration through to R&D use
- Solution available for 1x0, 1x1, 2x1, 1x2
- Options for power monitoring, control and output filtering
- Integrated TEC and resistive heater options

FCBM example specification*	
Nonlinear interaction	Type-0 (ee-e)
Input wavelength for SHG [nm]	1064
Output wavelength [nm]	532
Phase match temperature between [ºC]	30 to 70
CW pump power [W]	2
SHG output power [mW]	125
Fiber connector	PM-FC-APC
Input/ Output fiber	PM1064/PM488
Connector keyway alignment	Slow axis

*Specifications are representative of typical product performance

CLASSICAL FREQUENCY CONVERTER

Our fiber-coupled waveguides provide a compact, high-performance solution for efficiency wavelength conversion across a wide range of interaction wavelengths. The fiber-coupled MgO:PPLN, PPLN and PPKTP waveguides allow for an ideal material to be chosen for unique wavelength, power handling, and conversion efficiency requirements.

Interactions range from UV to IR wavelengths and include Second-Harmonic-Generation (SHG), Sum Frequency Generation (SFG), Difference Frequency Generation (DFG), and Spontaneous Parametric Down Conversion (SPDC), with Type-0, Type-I and Type-II interactions available.

Our products have become synonymous with simple, reliable frequency conversion for researchers and OEMs working in many different fields. The packaged waveguide is fully compatible with our temperature controllers.

KEY FEATURES

WGCO

- Simple to use
- Robust with long lifetime
- Pump wavelength: C-band
- Flexible over a range of Input powers up to 4.5W
- Compact size to integrate into your own system

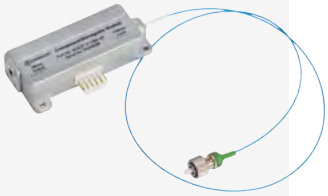
WGTC

- Simple to use
- Robust with long lifetime
- Pump wavelength: C-band
- Flexible over a range of Input powers up to 4.5W
- Compatible with TEC temperature controllers
- Compact size to integrate into your own system

TEC WAVEGUIDE COMPONENT

- Simple to use
- Robust with long lifetime
- Interaction wavelengths: 350 nm – 2000 nm
- Type-0, Type-I and Type-II interactions
- Compatible with TEC temperature controllers

FIBER INPUT/ FREE SPACE OUTPUT COMPONENT



- Simple to use
- Robust with long lifetime
- Fiber input, free space output
- Compatible with TEC and resistive temperature controllers

ROBUST PACKAGE

- Simple to use
- Robust with long lifetime
- Fiber input, fiber output
- Compatible with TEC temperature controllers

APPLICATIONS

- Atomic clocks
- Quantum sensing
- Quantum information sciences
- Atomic interferometry
- Quantum computing
- Quantum communication
- Basic research

Fiber-coupled
frequency conversion

QUANTUM FREQUENCY CONVERSION

Our reverse proton exchange (RPE) PPLN and ridge MgO:PPLN waveguides allow for highly efficient single photon frequency conversion in a low-loss fiber coupled device.

The highly efficient and low-loss RPE PPLN waveguide-based devices for quantum frequency conversion can be configured for downconversion with a DFG nonlinear interaction and for upconversion with a SFG nonlinear interaction. Downconversion converts visible/NIR photons to telecom wavelengths for low-loss fiber transmission. Upconversion converts telecom signals to visible/NIR wavelengths for interactions with quantum nodes and sensors.

On-chip features like WDMs and mode filters allow minimal loss of the signal photon in a fully fiber coupled package while highly efficient RPE PPLN waveguides allow for 100% conversion efficiency within the waveguide.

SQUEEZED LIGHT GENERATION

We offer squeezed light sources designed for quantum-enhanced sensing, continuous-variable quantum computing, and quantum networking applications.

Built around our highly efficient, low-loss fiber-coupled waveguides, these systems provide a compact, fully fiber-integrated solution for seamless deployment in both laboratory and field environments.

The C-band squeezed light source includes integrated squeezing measurement, delivering a reliable, plug-and-play platform for advanced quantum research and system integration.

APPLICATIONS	
• Quantum communication • Quantum sensing • Quantum information sciences	• Atomic interferometry • Quantum computing • Basic research

Single photon downconversion DFG

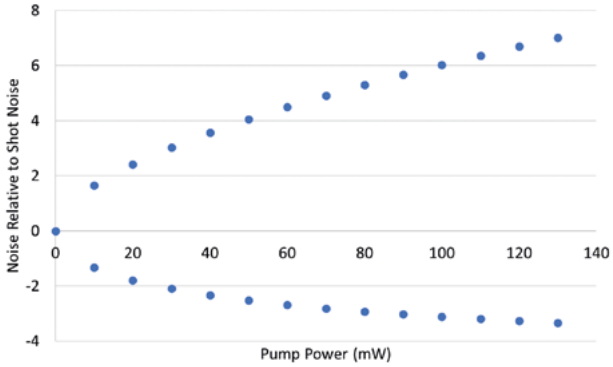
Convert a visible-NIR photon to a telecom signal for low-loss transmission over fiber.

Single photon upconversion SFG

Convert a telecom signal to visible-NIR photon to interact with distributed quantum nodes, computers, and sensors.

KEY FEATURES

- Compact fiber coupled packages for rapid integration
- Single pass configuration
- Designed for low coupling loss and propagation loss
- 3 dB single mode squeezing for 100 mW of pump power



KEY FEATURES

- 100% internal conversion with appropriate pump power
- Low coupling and propagation loss
- Advanced on-chip features including mode filters and WDMs
- All optical process preserves quantum information
- Available for upconversion and downconversion
- Custom wavelength interactions available

PHOTON PAIR GENERATION

We offer waveguide-based Spontaneous Parametric Downconversion (SPDC) devices for high-rate photon pair generation. Standard device configurations include Type-II or Type-0 405 nm → 810 nm and 775 nm → 1550 nm SPDC using KTP and MgO:PPLN ridge waveguides.

These waveguides allow for efficient pair generation (MHz/mW level for Type-II interactions, GHz/mW level for Type-0 interactions) and can be packaged as a compact and timing-compensated fiber coupled device for deployable quantum systems. Custom sources are available!

Type-0/ Type-II Configuration examples

405 nm -> 810 nm

775 nm ->1550 nm

532 nm -> 810 nm + 1550 nm

KEY FEATURES

- Compact single pass photon pair generation
- MHz/mW pair generation rates for Type-II interactions
- GHz/mW pair generation rates for Type-0 interaction
- Custom degenerate and non-degenerate interactions
- Custom poling including aperiodic and apodized gratings are available

NEAR DEGENERATE ENTANGLEMENT SOURCE

Covesion offers compact, near-degenerate polarization entanglement sources designed for high spectral purity output.

These sources are based on PPKTP waveguide crystals packaged in a compact fiber coupled device. These devices are built for C-band operation utilizing a 775nm pump to generate signal and idler wavelengths near 1540nm and 1560nm. These devices can be used in CW and pulsed configurations for applications in quantum networking, entanglement distribution, and entanglement swapping.

APPLICATIONS

- Quantum communication
- Quantum sensing
- Quantum information sciences
- Atomic interferometry
- Quantum computing
- Basic research

KEY FEATURES

- Compact fiber coupled package
- On-chip entanglement
- CW and Pulsed operation
- High purity for appropriate ps pulsed pump
- High rate PPKTP waveguides

Custom solutions
for frequency conversion

Covesion's wavelength conversion technology provides a versatile basis for the design and manufacture of unique solutions.

Our custom design and fabrication service provides application-specific technical consultation with specialized design and contract manufacture, resulting in a wavelength conversion solution tailored to your target laser system. We offer a range of custom design services including:

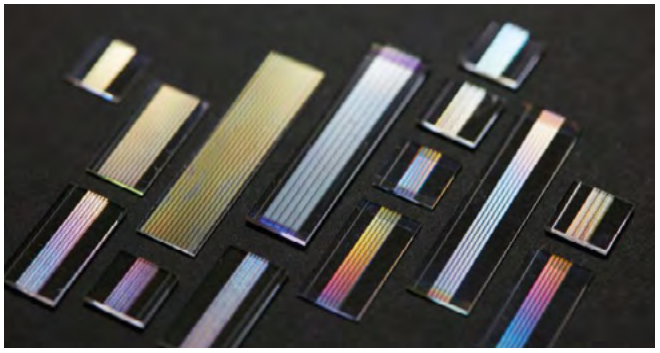
- One-off chips
- Bespoke packaging
- OEM prototyping
- Large-volume manufacture
- OEM temperature controllers

Our custom fabrication service involves consultation with the customer for design of the nonlinear optical chip through to fiber coupled packaging requirements.

Your custom nonlinear optical chip can be designed to be a bulk crystal or waveguide to provide optimal optical performance. Bespoke packaging solutions are available to provide ease of use through fiber coupled input and output.

OEM temperature control options are available to support full system integration.

We can manufacture single crystals as small as <1mm^3 for compact intra-cavity designs, or several millimeters wide aperture gratings with a long crystal length for high-power applications.



CUSTOM DESIGNS FOR NON-STANDARD INTERACTIONS

PPLN crystals and waveguides can be designed with aperiodic grating patterns to enable tailored spectral or thermal performance.

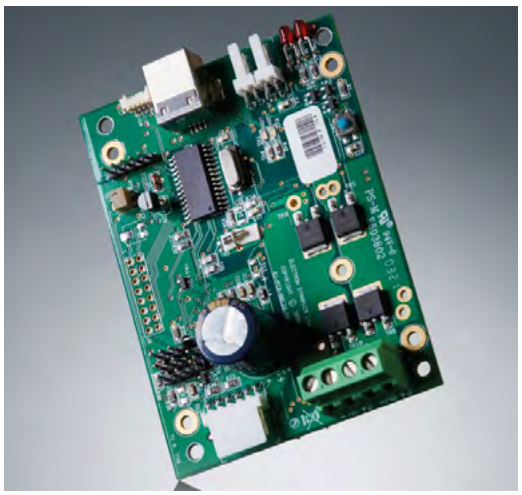
Periodic Custom designs:

- Specific poling periods with custom AR coating
- Specific poling periods with wider aperture
- Non-standard length and custom aperture angles

Aperiodic Custom designs:

- Linear period chirped gratings
- Nonlinear period chirped gratings

Please contact our technical experts to discuss your custom requirements.



Amplitude modulators
for visible wavelength

MgO:LN VISIBLE WAVELENGTH AMPLITUDE MODULATORS

Covesion's MgO:LN visible wavelength amplitude modulator is a waveguide-based Mach-Zehnder modulator that offers broadband operation with low Vπ in a low optical insertion loss and high-power -handling fiber-coupled configuration.

This device offers excellent extinction controlled by via a thermal bias port. These devices are available for customer defined wavelengths ranging from 493 nm to 850 nm. Custom development available.

These modulators provide precise and stable optical intensity control while offering high-power-handling and efficient fiber-coupling. They are well suited for applications including atomic and ion trapping, quantum optics experiments, precision spectroscopy, and optical pulse generation, as well as other laboratory and OEM systems requiring reliable visible-wavelength amplitude modulation.

KEY FEATURES

- Broad operating spectrum from the UV to Near-IR
- High extinction and stable intensity control, with typical extinction ratios around 30 dB and thermal bias control for reliable operation
- Low Vπ with broadband performance, with typical values of approximately 5–7 V at 1 GHz and 7–12 V at 10 GHz
- Low insertion loss and efficient fiber coupling in a compact fiber-coupled Mach-Zehnder configuration
- High optical power handling for visible wavelengths, supporting applications such as atomic and ion trapping, quantum optics, precision spectroscopy, and high-speed optical pulse generation

Electro-optic
phase modulators

MgO:LN PHASE MODULATORS
for UV to Near-Infrared and Frequencies up to 20 GHz

Covesion's MgO:LN Phase Modulators offer low Vπ and high-speed operation in a compact and low insertion loss fiber coupled configuration.

The polarizing waveguide used in this device offers superior PER and higher power handling than other broadband fiber-coupled devices. These phase modulators are available for customer defined wavelength ranging from approximately 370 nm to 980 nm.

These devices are ready to offer improved performance across the board for applications ranging from quantum optics and atomic physics to precision spectroscopy and advanced sensing applications.

KEY INNOVATIONS:

- Broad wavelength coverage with customer-defined operation from approximately 370–980 nm
- Low Vπ and wide bandwidth, with typical values of 3–6 V at 1 GHz and 5–9 V at 10 GHz
- Low insertion loss, typically around 4 dB
- Waveguide is engineered to provide higher PER and higher optical power handling than competing broadband fiber-coupled solutions
- Compact, fiber-coupled configuration enables efficient integration and reliable operation in laboratory and OEM systems

KTP PHASE MODULATORS

Covesion offers industry-established phase modulator performance in our line of KTP waveguide-based phase modulators.

This line offers waveguides tailored to customer-defined wavelengths ranging from near-ultraviolet to near-infrared. The KTP crystal waveguides enable high-power-handling in a fiber-coupled configuration coupled with broadband modulation and low Vπ.

The devices have been in production for over a decade of reliable performance and consumer satisfaction. Common applications include atomic interferometry and Pound-Drever-Hall stabilization.

They are available in fully freespace, freespace-out and fully fiber-coupled configurations with -3dB bandwidths of 5 GHz or 10 GHz depending on customer needs.

KEY ADVANTAGES:

- Customer-defined wavelength coverage from the near-UV to near-IR
- High optical power handling in a KTP waveguide platform, with fiber-coupled or free-space configuration options
- Broadband modulation performance for operation at frequencys up to 10 GHz
- Proven long-term reliability, with over a decade of production history in applications such as atomic interferometry and PDH laser stabilization

POCKELS CELL POLARIZATION ROTATOR

- Low-voltage polarization switching in a waveguide-based Pockels cell, with typical Vπ of ~6–12 V, significantly lower than bulk alternatives
- Broad wavelength compatibility through the visible and near-IR
- Fast polarization control, with switching bandwidth up to 2 GHz
- Flexible output polarization states (LHC/RHC or H/V)
- Compact integrated platform with low insertion loss and fiber-coupled or freespace configurations

X-CUT APE LN PHASE MODULATORS

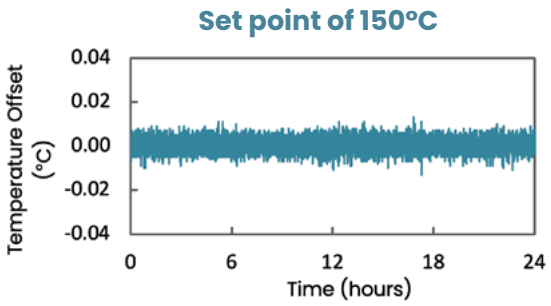
Covesion offers a line of low-loss fiber coupled phase modulators for C-band and O-band operation. Applications include laser locking fiber sensing and optical sensors.

Temperature controllers

BENCHTOP MULTI-CONTROLLER

The **Covesion Benchtop multi-controller** is a compact stand-alone benchtop unit for use with our resistive heater and TEC-based devices, including PPLN ovens, waveguide components, bulk modules and modulators.

Offering up to 4 channels of simultaneous and independent control the auto-detect feature provides hassle-free, plug-and-play functionality. The user can simply dial in the required temperature and allow the connected devices to reach optimum stability.



KEY FEATURES

- Color, touchscreen interface
- Up to 4 independently controlled channels
- Separate channels for resistive heater or TEC
- Set point stability ±0.01°C
- Set point resolution 0.01°C
- LabVIEW / Python drivers
- Maximum temperature 200°C
- Software application with a GUI
- PC control interface via USB
- Auto-detect feature for all Covesion devices
- Additional serial interface options available

* Custom solutions are available

MINI-R & MINI-T

Mini temperature controller is the package version of the PCB with USB connector. Operates via easy-to-use GUI.

KEY FEATURES

- PC control interface via USB
- Set point stability ±0.01°C
- Set point resolution 0.01°C
- Maximum temperature 200°C
- Software application with a GUI
- PCB form factor for system integration with laboratory setups
- Support resistive heater or TEC

MICRO-R & MICRO-T

Covesion's Micro PCB is specially designed for use with our crystal ovens, components and modulators. The PCB form factor is ideal for OEM system integration.

KEY FEATURES

- Set point stability ±0.01°C
- Set point resolution 0.01°C
- User-defined connector options
- Maximum temperature 200°C
- Control via serial interface
- PCB form factor for system integration with laboratory setups
- Support resistive heater or TEC

Crystal oven
and accessories

Covesion's team of optical engineers have designed a range of crystal clips, ovens, temperature controllers and mounting accessories, providing a complete bulk crystal solutions for easy integration into your optical arrangement.

CRYSTAL CLIP KITS

The Covesion clip kits provide secure mounting of our crystals.

PC1

PC5

PC40

Each clip kit contains:

- a clip body
- an ITO coated cover glass
- a number of springs and screws

Part #	Crystal length
PC1-PC5	1-5mm
PC10	10mm
PC20	20mm
PC40	40mm
PC50	50mm

KEY FEATURES

- Simple pin-aligned mounting in crystal ovens
- Uniform temperature distribution
- Spring clips secure the crystal with minimal stress
- ITO coated glass for electrostatic charge dissipation

PV OVEN SERIES

The Covesion PV Oven Series is specially designed to provide secure mounting and robust thermal stability for our crystals.

Part #	Crystal length	Oven length	Clip
PV10	1mm, 10mm	22mm	PC1, PC10
PV20	20mm	32mm	PC20
PV40	40mm	52mm	PC40
PV50	50mm	62mm	PC50

KEY FEATURES

- Auto-locating dowel pins for alignment-free insertion
- Temperature stability of ±0.01°C with Covesion temperature controller
- Various mounting options available

FREE SPACE MOUNTING SOLUTIONS

The Covesion free space mounting solutions contain post mount adaptors, flexure stage adapters and oven free mouting solutions.

Part #	Description	Optical height
PCMO01	Oven free PC01 clip mount adapter	8mm
PVP1	PV10 post mount adapter	25mm
PVP2	PV20, PV40 and PV50 post mount adapter	25mm
PVP1R	PV10 adapter mount for flexure stages	25mm
PVP2R	PV20, PV40 and PV50 adapter mount for flexure stages	25mm
RP12.5	12.5mm riser plate for flexure stage mounts	25mm

PCMO01

PVP1

PPLN mounting example using PV10 and PVP1

PVP2

PVP1R

PVP2R

RP12.5

PPLN mounting example using PV20, PVP2R and RP12.5

RADIANTIS LASERS

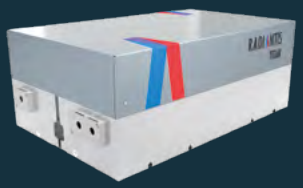
TUNE YOUR WAVELENGTH

Femtosecond OPO: Oria IR & Inspire

- Output ports: signal, idler, pump and SHG
- Pumped by a mode-locked Ti:Sapphire oscillator
- Tuning range: 345 – 4000 nm
- Average power: >1 W
- Repetition rate: 80 MHz
- Pulse duration: <200 fs

Picosecond OPO Laser System: ZENITH

- Output ports: signal, idler, pump
- Tuning range: 1387 – 4000 nm
- Average power: >4 W
- Repetition rate: 80 MHz
- Pulse duration: 5 ps



CW Broadly Tunable Laser: Titan

- Output ports: signal, idler, pump
- Tuning range: 1435 – 4138 nm
- Average power: >4 W
- Linewidth: <1 MHz

Frequency-Locked Laser

- Output wavelength: 1560 nm, 780 nm
- Output power: up to 1 W
- Linewidth: <10 kHz rms over 100 ms
- Frequency stability: <100 kHz rms over 12 h

APPLICATIONS: Advanced Photonics / Laser Spectroscopy / Microscopy
Quantum Technology / Optical communication / Biophysics

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RADIANTIS
A Hawthorn Photonics Company

Appendix I

SHG MgO:PPLN crystals

Stocked crystals
with 1 week lead time

Part #	Pump (nm)	Output (nm)	Grating periods (µm)	Temperature tuning range (°C)	Thickness* (mm)	Standard** lengths (mm)
MSHG(3.65-3.95um)-0.5	875-910	438-455	3.65, 3.75, 3.85, 3.95	30-200	0.5	1, 3, 5, 10, 20
MSHG911-0.5	902-924	451-462	4.06, 4.10, 4.14, 4.18	30 – 200	0.5	1, 3, 5, 10, 20
MSHG960-0.5	945 – 966	473-483	4.76, 4.80, 4.84	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG976-0.5	970 – 992	485 – 496	5.17, 5.20, 5.23, 5.26, 5.29	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG1020-1.0	1006-1036	503-518	5.84, 5.98, 6.08	30 – 200	1.0	1, 3, 5, 10, 20, 40
MSHG1030-0.5	1024 – 1047	512 – 524	6.16, 6.19, 6.23, 6.26, 6.29	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG1047-0.5	1040 – 1064	520 – 532	6.48, 6.52, 6.55, 6.59, 6.62	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG1064-1.0	1058 – 1080	529 – 540	6.83, 6.86, 6.90, 6.93, 6.96	30 – 200	1.0	1, 3, 5, 10, 20, 40
MSHG1080-0.5	1060-1116	530-558	6.90, 7.10, 7.30, 7.50, 7.70	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG1120-1.0	1106-1158	553-579	7.87, 7.99, 8.11, 8.23, 8.35, 8.47, 8.59	30 – 200	1.0	1, 3, 5, 10, 20, 40
MSHG1180-0.5	1166-1220	583-610	9.20, 9.40, 9.60, 9.80, 10.00	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG1230-0.5	1216-1262	608-631	10.40, 10.55, 10.70, 10.85, 11.00	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG1320-0.5	1284-1336	642-668	12.10, 12.30, 12.50, 12.70, 12.90	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG1350-0.5	1296-1422	648-711	12.40, 12.80, 13.20, 13.60, 14.00, 14.40, 14.80, 15.20	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG1420-0.5	1350-1490	675-745	13.83, 13.96,14.08, 14.55, 15.10, 15.60, 16.10, 16.60, 17.10	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG1550-0.5	1520 – 1632	760 – 816	18.50, 18.80, 19.10, 19.40, 19.70, 20.00, 20.30, 20.60, 20.90	30 – 200	0.5	0.3, 0.5, 1, 3, 5, 10, 20, 40
MSHG1550-1.0	1545 – 1610	773 – 805	19.20, 19.50, 19.80, 20.10, 20.40	30 – 200	1.0	1, 3, 5, 10, 20, 40
MSHG1650-0.5	1605 – 1720	803 – 860	20.90, 21.20, 21.50, 21.80, 22.10, 22.40, 22.70, 23.00, 23.30	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG1820-0.5	1720 – 1928	860 – 964	23.95, 24.45, 24.95, 25.45, 25.95, 26.45, 26.95, 27.45, 27.95	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG2100-0.5	1925-2250	963-1125	28.40, 29.00, 29.60, 30.20, 30.80, 31.40, 32.00, 32.60, 33.20	30 – 200	0.5	1, 3, 5, 10, 20, 40
MSHG2100-1.0	1968-2250	984-1125	29.60, 30.20, 30.80, 31.40, 32.00, 32.60, 33.20	30 – 200	1.0	1, 3, 5, 10, 20, 40
MSHG2600-1.0	2260-3300	1130-1650	34.00, 34.80, 35.50, 35.80, 35.97	30 – 200	1.0	1, 3, 5, 10, 20, 40
MSHG3100-0.5 (S)	1770-4676	885-2338	25.23, 25.86, 26.53, 27.22, 27.96, 28.74, 29.56, 30.43, 31.35, 32.33, 33.37, 34.48, 35.67, 36.95	30-200	0.5	1,3,5
MSHG3100-0.5(L)	1724-4879	862-2439	24.06, 24.63, 25.23, 25.86, 26.53, 27.22, 27.96, 28.74, 29.56, 30.43, 31.35, 32.33, 33.37, 34.48, 35.67, 36.95	30-200	0.5	10,20,40

*Custom thickness 0.5mm or 1.0mm available upon request

** Custom crystal length from 0.3mm to 50mm available upon request

Appendix II

OPO MgO:PPLN crystals

Stocked crystals
with 1 week lead time

Table 1 – OPO crystals

Part #	Pumps (nm)	Signal (nm)	Idler (nm)	Grating periods (μm)	Thickness* (mm)	Standard* lengths (mm)
MPDC449-0.5	449	608-1030	1473-1720	4.61, 4.65, 4.69	0.5	1, 3, 5, 10, 20, 40
MOPG(5.7-6.3)-1.0	405	445-460	3400 – 4500	5.7, 5.85, 6.00, 6.15, 6.30	1.0	1, 3, 5, 10, 20, 40
MOPO515-0.5	515	640 – 1030	1030 – 2530	6.00, 6.26, 6.53, 6.81, 7.10, 7.40, 7.71, 8.03, 8.36	0.5	1, 3, 5, 10, 20, 40
MOPA532-1.0	532	690 – 1064	1064 – 2310	6.85, 7.15, 7.45, 7.75, 8.05, 8.35, 8.65	1.0	1, 3, 5, 10, 20, 40
MOPO1-0.5	1064	1410 – 2128	2128 – 4340	27.91, 28.28, 28.67, 29.08, 29.52, 29.98, 30.49, 31.02, 31.59	0.5	1, 3, 5, 10, 20, 40
MOPO1-1.0	1064	1480 – 2128	2128 – 3785	29.52, 29.98, 30.49, 31.02, 31.59	1.0	1, 3, 5, 10, 20, 40
MOPO2-1.0	1064	1342 – 1460	3945 – 5135	25.5, 26.0, 26.5, 27.0, 27.5, 28.0, 28.5	1.0	1, 3, 5, 10, 20, 50
MOPO3-1.0	1064	1430 – 2085	2085 – 4185	28.5, 29.0, 29.5, 30.0, 30.5, 31.0, 31.7	1.0	1, 3, 5, 10, 20, 50

Table 2 – fan-out OPO crystals

Part #	Pumps (nm)	Signal (nm)	Idler (nm)	Grating periods (μm)	Grating aperture (mm x mm)	Thickness (mm)	Standard* lengths (mm)
MFOPO1-1.0	1064	1480-2128	2128-3785	29.52-31.59	10 x 1	1.0	1, 3, 5, 10, 20, 40, 50
MFOPO2-1.0	1064	1342-1460	3945-5135	25.50-28.50	10 x 1	1.0	1, 3, 5, 10, 20, 40, 50
MFOPO3-1.0	1064	1430-2085	2085-4185	28.50-31.70	10 x 1	1.0	1, 3, 5, 10, 20, 40, 50

*Custom thickness 0.5mm or 1.0mm available upon request

** Custom crystal length from 0.3mm to 50mm available upon request

Appendix III

DFG and SFG MgO:PPLN crystals

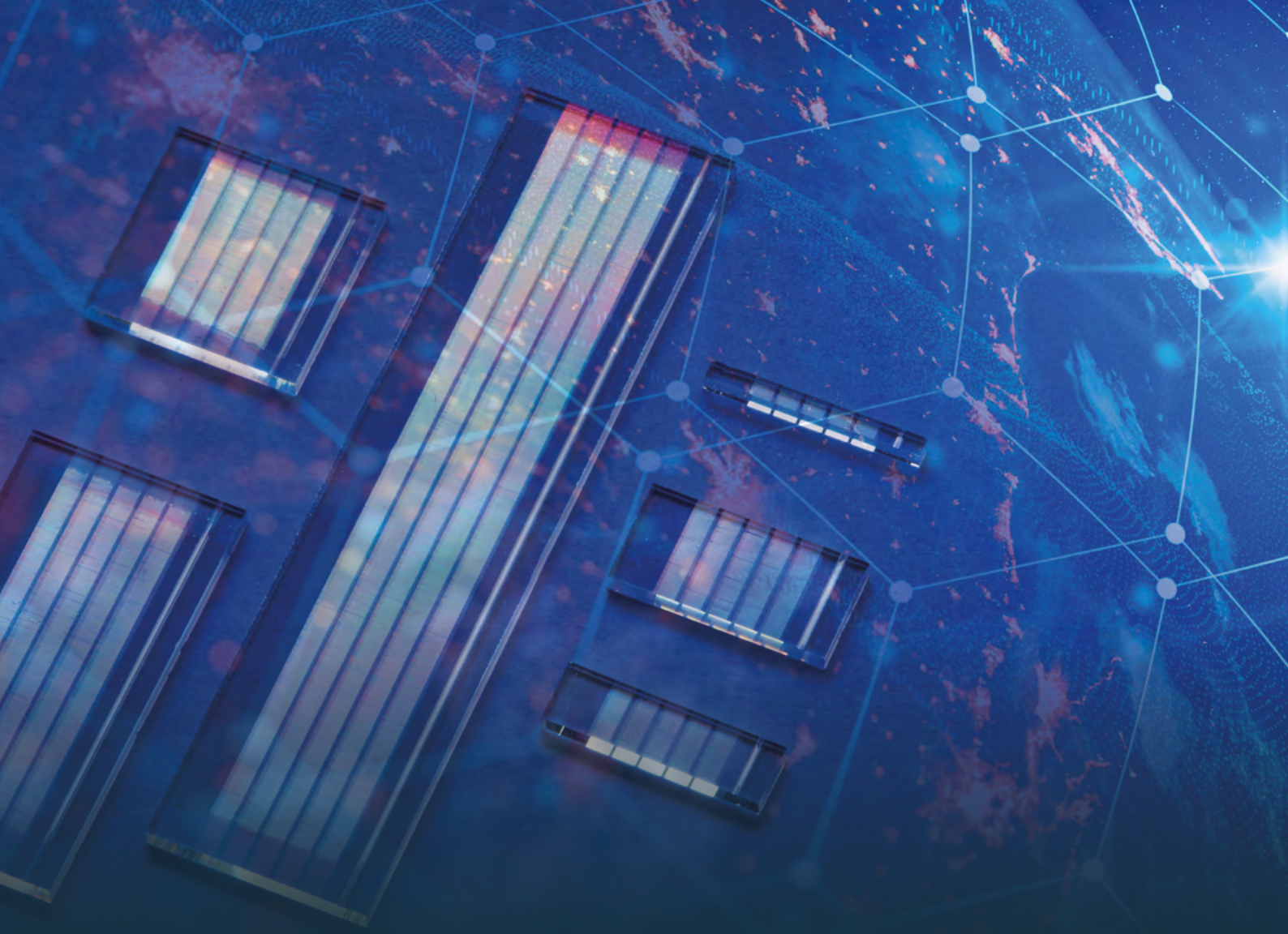
Stocked crystals
with 1 week lead time

Table 3 – DFG crystals

Part #	Pumps (nm)	Output (nm)	Grating periods (µm)	Thickness * (mm)	Standard** lengths (mm)
MDFG1-0.5	737 – 786 & 1064	2398 – 3008	18.50, 18.80, 19.10, 19.40, 19.70, 20.00, 20.30, 20.60, 20.90	0.5	1, 3, 5, 10, 20, 40
MDFG2-0.5	775 – 869 & 1064	2853 – 4741	20.90, 21.20, 21.50, 21.80, 22.10, 22.40, 22.70, 23.00, 23.30	0.5	1, 3, 5, 10, 20, 40
MDFG(25.40-30.45)-0.5	1300-1600 & 1064	3083-5159	25.40, 25.75, 26.05, 26.35, 26.65, 26.95, 27.25, 27.55, 27.85, 28.15, 28.50, 28.85, 29.20, 29.60, 30.00, 30.45	0.5	1, 3, 5, 10, 20, 40
MDFG3-1.0	1480 – 2128 & 1064	2128 – 3785	29.52, 29.98, 30.49, 31.02, 31.59	1.0	1, 3, 5, 10, 20, 40
MDFG4-0.5	885 – 1210 & 1550	2063 – 5516	24.06, 24.63, 25.23, 25.86, 26.53, 27.22, 27.96, 28.74, 29.56, 30.43, 31.35, 32.33, 33.37, 34.48, 35.67, 36.95	0.5	1, 3, 5, 10, 20, 40

Table 4 – SFG crystals

Part #	Pumps (nm)	Output (nm)	Grating periods (µm)	Thickness * (mm)	Standard** lengths (mm)
MSFG(3.81um+)-0.5	574-597 & 1536	418-430	3.81, 3.83, 3.85, 3.87, 3.89	0.5	1, 3, 5, 10, 20
MSFG(3.55 -3.75) -0.5	592-627 & 1389	415-432	3.55, 3.60, 3.65, 3.70, 3.75	0.5	1, 3, 5, 10, 20, 40
MSFG(4.85-5.06) -0.5	690 – 727 & 1389	461 – 477	4.85, 4.88, 4.91, 4.94, 4.97, 5.00, 5.03, 5.06	0.5	1, 3, 5, 10, 20, 40
MSFG1-0.5	775 – 840 & 1550	516 – 544	6.90, 7.10, 7.30, 7.50, 7.70	0.5	1, 3, 5, 10, 20, 40
MSFG578-0.5	1280 – 1365 & 1030	570 – 587	8.70, 8.80, 8.90, 9.00, 9.10	0.5	1, 3, 5, 10, 20, 40
MSFG612-0.5	1000 – 1025 & 1550	608 – 617	10.40, 10.55, 10.70, 10.85, 11.00	0.5	1, 3, 5, 10, 20, 40
MSFG626-0.5	1550 –1560 & 1051	618 – 628	11.12, 11.17, 11.22	0.5	1, 3, 5, 10, 20, 40
MSFG637-0.5	1520 – 1590 & 1070	628 – 640	11.60, 11.65, 11.70, 11.75, 11.80	0.5	1, 3, 5, 10, 20, 40
MSFG647-0.5	1085 – 1160 & 1550	638 – 663	12.10, 12.30, 12.50, 12.70, 12.90	0.5	1, 3, 5, 10, 20, 40



About Hawthorn Photonics

Hawthorn Photonics is a global photonics group dedicated to accelerating innovation in nonlinear optics, quantum photonics, and advanced frequency conversion technologies. Through its portfolio companies, including AdvR (US). Radiantis (Spain) and Covesion (UK), Hawthorn Photonics delivers integrated solutions for scientific research, commercial systems, and next-generation optical technologies.

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