

PG500

SERIES

Picosecond Tunable Optical Parametric Generators

FEATURES

- Unprecedented tuning range **0.68–16 μm**
- Up to **15%** conversion efficiency (signal + idler)
- Narrow linewidth
- Motorized “hands free” tuning in **680 nm – 10 μm** range
- **Remote** control via keypad
- PC control using RS232 and **LabView** drivers

APPLICATIONS

- Nonlinear optics
- Nonlinear spectroscopy: SFG, SH, CARS
- Pump-probe experiments
- Vibrational spectroscopy
- Laser-induced fluorescence
- Other laser spectroscopy applications
- Your application is welcome...



PG500 series optical parametric generators (OPG) are an excellent choice for researchers who need picosecond tunable source from UV to mid IR. Due to the unique broad tunability range these devices are a very attractive and cost-efficient alternative to other tunable laser radiation sources.

computerized control unit rotate nonlinear crystals and diffraction grating. Precise nonlinear crystal temperature stabilization ensures long-term stability of output radiation. In order to protect nonlinear crystals from damage the pump pulse energy is monitored by built-in photodetectors and alerting sound signal.



Microprocessor based control system provides precise automatic positioning of relevant components allowing hands-free operation. To ensure exceptional reproducibility, accurate step motors driven by

For customer convenience system is controlled through its RS232 type PC interface with LabView drivers (included) or a user-friendly remote control pad. Both options allow easy control of the system settings.

PG501 – UP TO 1 mJ PULSE ENERGY IN NEAR-IR RANGE

PG501 is the compact basic model of PG500 series. The unit includes:

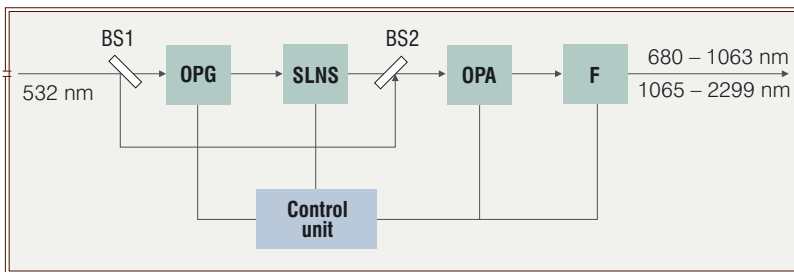
- optical parametric generator (OPG);
- diffraction grating based spectral linewidth narrowing system (SLNS);
- optical parametric amplifier (OPA);
- electronic control unit.

Two BBO crystals are used for OPG and OPA stages. The diffraction grating narrows the OPG output linewidth down to 6 cm^{-1} . Narrowed and spatially filtered pulse seeds the OPA. The signal and idler waves are separated by polarizer and are directed to separate output ports. Such advanced OPG and OPA's set-up ensures high conversion efficiency and good output beam spatial profile.

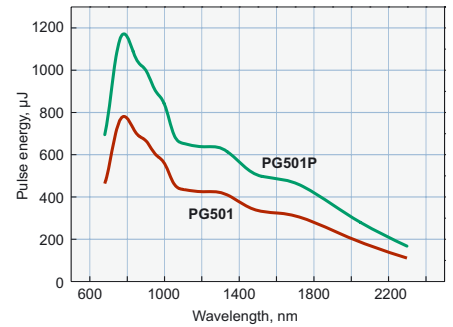
A microprocessor-based control unit provides hands-free OPG operation and exceptional output wavelength reproducibility. Precise temperature stabilization of the nonlinear crystals assures a long-term stability of the output parameters.

A built-in pump pulse energy monitor alerts the user if the pump intensity approaches the preset value.

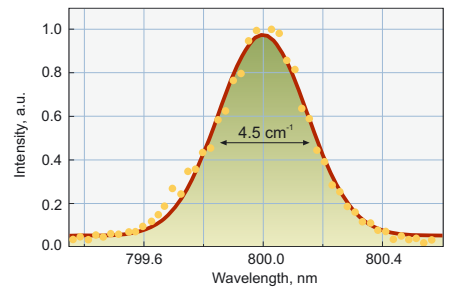
For budget customers model without SLNS is available (PG502).



PG501 model functional layout



Typical PG501 model tuning curve (pump energy: 10 mJ @ 532 nm)



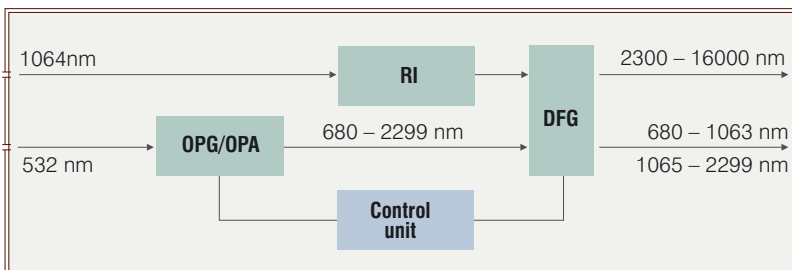
Typical PG501 model output linewidth at 800 nm

PG501-DFG – UNPRECEDENTED TUNING RANGE UP TO 16 µm

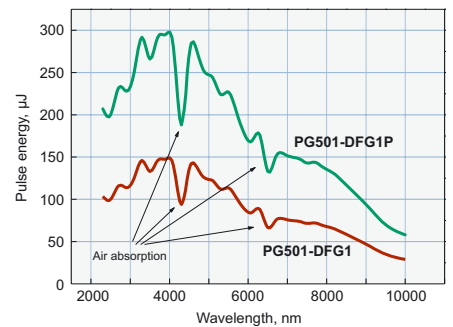
PG501-DFG1 model combines an OPG and difference frequency generator (DFG) into a single unit and features extremely wide wavelength coverage. Tuning range up to $10 \mu\text{m}$ is achieved by mixing the OPG idler wave at $1.19\text{--}1.98 \mu\text{m}$ with the 1064 nm beam of a picosecond Nd:YAG laser in AgGaS_2 crystal. Good OPG output beam spatial profile and relay imaging (RI) of 1064 nm beam ensure high DFG conversion efficiency, providing up to $>300 \mu\text{J}$ per pulse in the $3\text{--}4 \mu\text{m}$ range. The whole tuning range is covered without any optics changes.

Two models with different output energy specifications are available: PG501-DFG1 and PG501-DFG1P.

With GaSe crystal the DFG tuning range can be extended up to $16 \mu\text{m}$ (up to $18 \mu\text{m}$ upon request).

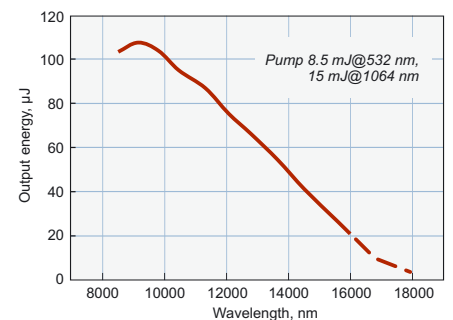


PG501-DFG model functional layout



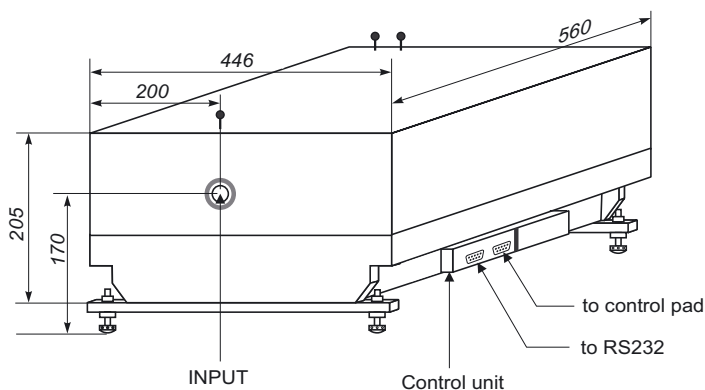
Typical tuning curve of PG501-DFG1 and PG501-DFG1P.

Note, output energy is affected by air absorption (depends on air humidity, temperature etc.)

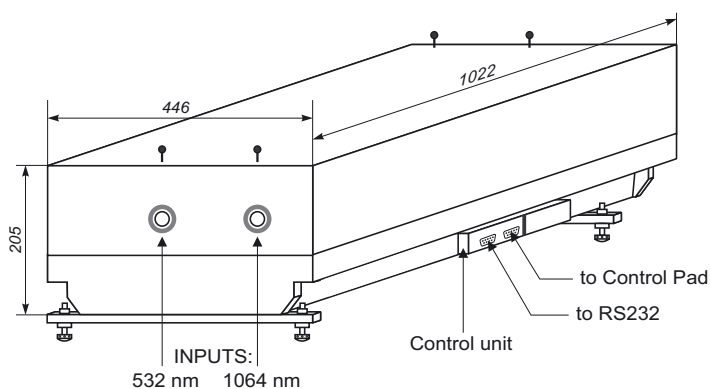


Typical PG501-DFG2 model tuning curve with GaSe crystal

PG500 SERIES LASERS DRAWINGS



PG501 and PG502 drawing



PG501-DFG drawing

PUMP LASER

Unique rugged and compact design establishes **PL2241** series picosecond lasers as versatile tool for research applications.

The heart of the system is diode pumped solid state (**DPSS**) master oscillator placed in hermetically sealed monolithic block. Combined, the **DPSS** master oscillator and flash lamp pumped regenerative amplifier offer reliable performance and hands free operation.

Up to **250 Hz** repetition rate speeds up data acquisition and processing in spectroscopic systems.

- Up to **100 mJ** per pulse at **1064 nm**
- **< 30 ps** pulse duration (<25 ps optional)
- Excellent pulse duration stability
- Up to **250 Hz** repetition rate
- Streak camera triggering option with **< 0.1 ns** optical jitter
- Hermetically sealed **DPSS** master oscillator
- Excellent beam pointing **stability**
- Thermo stabilized **second, third or fourth** harmonic options
- **PC control** by RS232 and LabView drivers
- Remote control via keypad



RELATED PRODUCTS

PG411/PG511 – PICOSECOND OPG WITH NEAR TRANSFORM-LIMITED BANDWIDTH

A tunable wavelength laser systems for research requiring narrow bandwidth picosecond pulses.

- **<2 cm⁻¹** bandwidth
- **<7 %** (StDev) output energy stability
- High energy conversion efficiency

Innovative synchronously pumped picosecond optical parametric oscillator (SPOPO) and travelling wave optical parametric amplifier (OPA) configuration, featuring the efficient narrowing of the output linewidth in the OPO cavity and amplification of a single pulse in the OPA.



PG400

For applications, requiring tunability from UV to far-IR, PG400 series OPG/OPA are excellent and cost-efficient choice.

- **0.21–16 μm** tuning range
- Up to **15%** conversion efficiency
- Pumped by **355 nm**
- **<6 cm⁻¹** linewidth in all tuning range
- **Solid-state** convenience



PG602

PG602 series optical parametric generators are good choice for applications requiring hands free wavelength tuning form UV to IR.

- From **300 nm to 2300 nm** tuning range
- Up to **15%** conversion efficiency
- Up to **1 mJ** output energy in UV-blue range
- Pumped by 266 nm

SPECIFICATIONS ¹⁾

Model	PG501	PG502	PG501P	PG502P	PG501-DFG1	PG501-DFG1P	PG501-DFG2
OPG SPECIFICATIONS							
Output wavelength tuning range, nm							
Signal	680–1063				680–1063		
Idler	1065–2300				1065–2299		
DFG	–				2.3–10	2.3–10	2.3–16 ²⁾
Output pulse energy, μJ	>700 ³⁾	>700 ³⁾	>1000 ³⁾	>1000 ³⁾	>700 ³⁾		
Output pulse energy @3700 nm, μJ	–				>125 ³⁾	>250 ³⁾	>250 ³⁾
Linewidth, cm^{-1}	<6	<30	<9	<30	<6		
Scanning step, nm							
Signal	0.1				0.1		
Idler	1				1		
DFG	–				1		
Typical beam size, mm ⁴⁾	~ 4	~ 4	~ 5	~ 5	~4		
Typical beam size for DFG, mm ⁵⁾	–				~ 6	~ 9	~ 9
Beam divergence, mrad ⁶⁾	<2				<2		
Beam polarization ⁷⁾							
Signal	vertical				vertical		
Idler	horizontal				horizontal		
DFG	–				horizontal		
PUMP LASER REQUIREMENTS							
Energy, mJ							
At 1064 nm	–				5	10	15
at 532 nm	10	10	15	15	10		
Pulse duration, ps ⁸⁾	20–40				20–40		
Beam polarization @532 nm	horizontal				horizontal		
Beam polarization @1064 nm	–				vertical		
Beam size, mm ⁹⁾	6–10				6–10		
Beam divergence, mrad	<0.5				<0.5		
Beam profile	Homogeneous, without hot spots				Homogeneous, without hot spots		
Recommended pump source	PL2241-SH PL2143-SH	PL2241-SH PL2143-SH	PL2241A-SH PL2143A-SH	PL2241A-SH PL2143A-SH	PL2241 PL2143	PL2241A PL2143A	PL2241B PL2143B
Recommended harmonics generator module	–				HP1		
PHYSICAL CHARACTERISTICS							
Size (W×H×L), mm	446×260×582				446×260×1022		
OPERATING REQUIREMENTS							
Room temperature, °C	18–30						
Voltage	100–240 V, single phase, 47–63 Hz						
Powering, W	<60						

¹⁾ All specifications subject to change without notice. The parameters marked typical are not specifications. They are indications of typical performance and will vary with each unit we manufacture. Unless stated otherwise all specifications are measured at 800 nm.

²⁾ Two crystals that are exchanged manually are used to cover 2.3–16 μm range.
³⁾ Unless stated otherwise output is measured at 800 nm. See tuning curves for typical outputs at other wavelengths.

⁴⁾ Beam diameter is measured @ 800 nm at the $1/e^2$ point and can vary depending on the pump pulse energy.

⁵⁾ Beam diameter is measured @ 3700 nm at the $1/e^2$ point and can vary depending on the pump pulse energy.

⁶⁾ Full angle measured at the $1/e^2$ point @ 800 nm.

⁷⁾ Separate output ports for signal, idler and DFG.

⁸⁾ Should be specified while ordering.

Requests
for custom made products
are welcome !



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