

# APL2200 SERIES



APL2200 series amplifiers are designed to produce up to 130 mJ picosecond pulses at kilohertz pulse repetition rate. Short pulse duration, excellent pulse-to-pulse stability, superior beam quality makes APL2200 series diode pumped picosecond amplifiers well suited for applications like OPCPA pumping, non-linear optics and others.

### Regenerative amplifier / Power amplifier design

APL2200 series amplifiers consist of regenerative amplifier and power amplifiers. System could be seeded by built-in picosecond oscillator or other ultrafast laser system. Pulses from regenerative amplifier are spatially shaped and amplified in double-pass amplifiers with thermally induced birefringence compensation. Advanced optical design ensures smooth, without hot spots beam spatial profile at the laser output. Low light depolarization level allows high efficiency generation of up to 4<sup>th</sup> harmonic with build-in harmonic generators. Repetition rate and timing of the pulses can be locked to the external RF source (with –PLL option) or other ultrafast laser system (with –FS option).

### Build-in harmonic generators

Angle-tuned LBO and/or BBO crystals mounted in temperature stabilized heaters are used for second, third and fourth harmonic generation. Harmonic separation system is designed to ensure high spectral purity of radiation and direct it to the output ports.

### Simple and convenient laser control

For customer convenience the amplifier can be controlled through remote control pad or USB interface. Alternatively, the amplifier can be controlled from personal computer with supplied software for Windows™ operating system. LabVIEW™ drivers are supplied as well.

### APL2200 series available models

Model	Features
APL2201	Delivers 10 mJ, 90 ps pulses at up to 1 kHz repetition rate
APL2203	Delivers 30 mJ, 90 ps pulses at up to 1 kHz repetition rate
APL2205	Delivers 60 mJ, 90 ps pulses at up to 1 kHz repetition rate
APL2206	Delivers 130 mJ, 90 ps pulses at up to 1 kHz repetition rate

## High Energy kHz Repetition Rate Picosecond Amplifiers

### FEATURES

- ▶ High pulse energy at kHz rate
- ▶ Diode pumped **solid state design**
- ▶ Cooled by supplied chiller – tap water is not required (optional)
- ▶ **Low maintenance costs**
- ▶ Remote control pad
- ▶ PC control via USB with supplied LabVIEW™ drivers
- ▶ Optional temperature stabilized second, third and fourth harmonic generators

### APPLICATIONS

- ▶ OPG/OPA pumping
- ▶ OPCPA pumping
- ▶ Other spectroscopic and nonlinear optics applications...

**SPECIFICATIONS** <sup>1)</sup>

Model	APL2201	APL2203	APL2205	APL2206
<b>Output energy</b>				
at 1064 nm	10 mJ	30 mJ	60 mJ	130 mJ
at 532 nm <sup>2)</sup>	5 mJ	15 mJ	30 mJ	70 mJ
at 355 nm <sup>3)</sup>	3 mJ	10 mJ	20 mJ	inquire
at 266 nm <sup>4)</sup>	1 mJ	2.5 mJ	4 mJ	inquire
<b>Pulse energy stability (StdDev) <sup>5)</sup></b>				
at 1064 nm	1 %			
at 532 nm	1.5 %			
at 355 nm	2 %			
at 266 nm	4 %			
Pulse duration (FWHM) <sup>6)</sup>	90±10 ps			
Pulse repetition rate <sup>7)</sup>	1000 Hz			
Triggering mode	external			
Spatial mode <sup>8)</sup>	super-Gaussian			
Beam divergence <sup>9)</sup>	< 1 mrad	< 0.7 mrad		
Typical beam diameter <sup>10)</sup>	~ 3 mm	~ 5 mm	~ 6 mm	~ 7 mm
Beam pointing stability <sup>5)</sup>	< 100 µrad			
Pre-pulse contrast	> 100 : 1			
Polarization	linear, > 95 %			

**INPUT**

Wavelength	1064 nm
Pulse duration range (FWHM)	20 fs – 90 ps
Pulse repetition rate	50 – 95 MHz
Average power	>20 mW

**PHYSICAL CHARACTERISTICS**

Laser head size (W×L×H)	455 × 1035 × 242 mm	900 × 1500 × 350 mm	1200 × 2200 × 350 mm	TBA
Power supply size (W×L×H)	550 × 600 × 680 mm	550 × 600 × 1100 mm	550 × 600 × 1030 mm	TBA
Chiller size (W×L×H)	400 × 430 × 790 mm	400 × 430 × 790 mm	500 × 500 × 850 mm	600 × 600 × 600 mm

**OPERATING REQUIREMENTS**

Water service	not required, air-cooled	water-cooled		
Relative humidity	20–80 % (non condensing)			
Operating ambient temperature	22 ± 2 °C			
Mains voltage	208 or 230 V AC, single phase, 50/60 Hz	208 or 230 V AC, three phases, 50/60 Hz		
Power rating <sup>11)</sup>	< 1 kVA	< 2.5 kVA	< 5 kVA	< 14 kVA

<sup>1)</sup> Due to continuous improvement, all specifications are subject to change. Parameters marked typical are illustrative; they are indications of typical performance and will vary with each unit we manufacture. Unless stated otherwise, all specifications are measured at 1064 nm and for basic system without options.

<sup>2)</sup> For APL210x-SH and APL210x-SH/FH options. Outputs are not simultaneous.

<sup>3)</sup> For APL210x-TH option. Outputs are not simultaneous.

<sup>4)</sup> For APL210x-SH/FH option. Outputs are not simultaneous.

<sup>5)</sup> Rms, measured over 30 s.

<sup>6)</sup> Optional 30 ps duration. Inquire for pulse energies.

<sup>7)</sup> Should be specified when ordering. Inquire for custom pulse repetition rates.

<sup>8)</sup> Gaussian fit >80%.

<sup>9)</sup> Full angle measured at the 1/e<sup>2</sup> level at 1064 nm.

<sup>10)</sup> Beam diameter is measured at 1064 nm at the 1/e<sup>2</sup> level.

<sup>11)</sup> Required current rating can be calculated by dividing power rating by mains voltage.



**OPTIONS**

- ▶ **Option P30.** Provides 30±3 ps output pulse duration. Contact EKSPLA for pulse energy specifications.
- ▶ **Option FS.** External seeder input via motorized spectral broadening stage for APL2100 series.
- ▶ **Option PLL.** Precise trigger to external RF signal with jitter < 1 ps.
- ▶ **AW Water-air cooling option.** Water-air cooling unit or chiller for APL2100 series.
- ▶ **Multiple channel option.** Multiple outputs of same or different wavelength/energy are available.

**BEAM PROFILE**

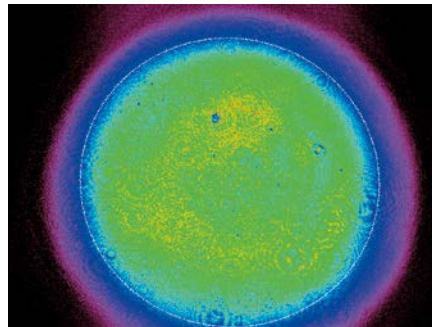


Fig 1. Typical beam profile at APL2200 amplifier output

**OPTICAL LAYOUT**

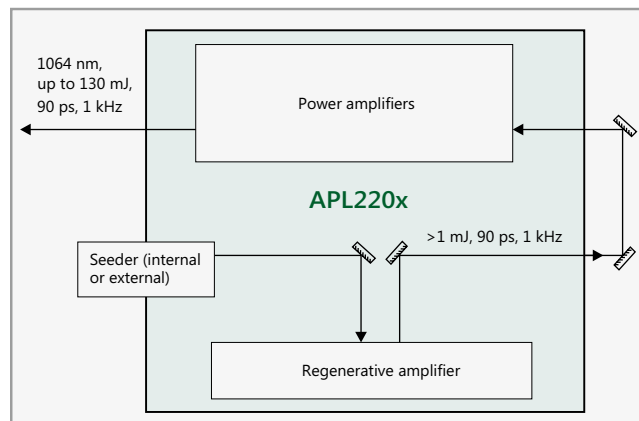


Fig 2. Block optical layout of APL2200 series amplifier

**ORDERING INFORMATION**

Recommended seed laser for 90 ps is PL2210B. For 30 ps pulse duration use PL2210A as seed laser.

**Note:** Laser must be connected to the mains electricity all the time. If there will be no mains electricity for longer than 1 hour then laser (system) needs warm up for a few hours before switching on.

**APL2201-P90-1K-SH/TH/FH**

Model	Harmonic generator options:
Pulse duration: P90 → 90 ps P30 → 30 ps	SH → second harmonic TH → third harmonic FH → fourth harmonic
Pulse repetition rate in Hz, 1K = 1000 Hz	