

pulseSelect

Repetition Rate Reduction for Mode-locked Lasers with a Pulse Picker

Pulse Picking with pulseSelect

- pulseSelect is an acousto-optical pulse picker, developed for the special demands of femtosecond laser technology. Pulse distortion is minimized by a low dispersive design and the use of reflective optics. High repetition rates and high contrast rates are achieved by using acousto-optical elements.
- The pulse repetition rate can be reduced by an adjustable internal frequency divider or by external triggering. Low division ratios down to $f_{\text{REP}}/2$ are possible. pulseSelect has an integrated RF power limitation and protection circuit to prevent modulator damage. For highest stability the phase of the RF carrier frequency is locked to the repetition rate of the laser in use.



At a Glance

- Low dispersion design suitable for ultra-short pulses (fs/ps) down to < 20 fs
- Division ratio continuously variable between $f_{\text{REP}}/2 \dots f_{\text{REP}}/260,000$
- Synchronized to laser seed with internal trigger
- Single-shot up to 3 MHz with external TTL trigger
- External trigger-gate mode

pulseSelect Single & Dual

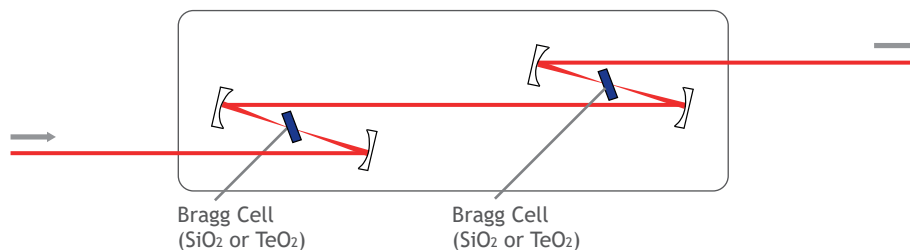
Single pulseSelect

- The Single pulseSelect consists of an optical module and control electronics. A Bragg cell represents the most important part of the optics, which selects individual pulses from the laser beam due to the acousto-optical effect. Focusing mirror, collimator mirror and a beam stop for the zero-order beam complete the setup. The driver electronics supplies the modulated RF signal for the Bragg cell with a carrier frequency that corresponds to the multiple of the laser repetition rate.

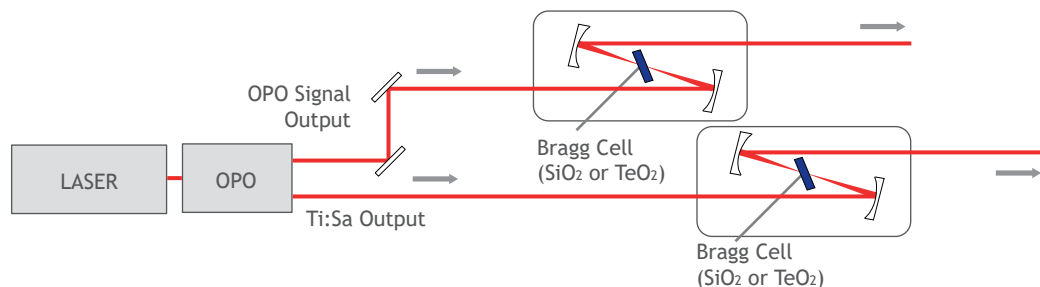
Dual pulseSelect

- Dual pulseSelect is available in two variants, Serial and Parallel. The Serial variant offers an improved contrast ratio of over 6000:1. The Parallel version allows the simultaneous picking of pulses from two synchronized laser sources.

Dual pulseSelect Serial: This version is designed to allow for highest contrast ratio of above 6000:1 by placing two Bragg cells. Both are synchronized to one common clock (in serial configuration; i.e. one beam through two Bragg cells).



Dual pulseSelect Parallel: This variant is designed for simultaneous picking of pulses from two synchronized laser sources. The system is equipped with two synchronized Bragg cells. Independent picking settings are possible for both Bragg cells.



* Sample input configuration (laser, OPO, and beam routing not included)

pulseSelect

Specifications

pulseSelect Single

Versions	Broadband	High-Power Dualband
Wavelength Ranges (Other ranges on request)	500 ... 1600 nm	340 ... 540 nm + 680 ... 1080 nm
Max. Laser Input Power (P_{AV})	5 W (at 800 nm)	
Input Frequency (f_{REP})	72 ... 81 MHz, to be specified with 0.5 MHz accuracy at time of order	
Input Polarization	Horizontal, Polarization rotator available as option	
Output Repetition Rate (based on 80 MHz input frequency)	Single-shot ... 40 MHz External Trigger based: Single-shot ... 3 MHz Internal Trigger based: ~ 308 Hz ... ~ 40 MHz (only integer values of input repetition rate are available)	
Division Ratio (internal trigger)	$f_{REP}/2 \dots f_{REP}/260,000$	
Contrast Ratio (at 800 nm, $f_{REP}/20$)	> 75 : 1 for adjacent pulses > 500 : 1 for non-adjacent pulses	
Diffraction Efficiency*	> 50% (at 800 nm, $f_{REP}/20$)	

pulseSelect Dual - Serial

Application	High-contrast performance
Contrast Ratio (at 800 nm, $f_{REP}/20$)	> 5000 : 1 for adjacent pulses > 200.000 : 1 for non-adjacent pulses
Diffraction Efficiency*	> 25% (at 800 nm, $f_{REP}/20$)

pulseSelect Dual - Parallel

Application	Simultaneous picking of pulses from two synchronized laser sources
Contrast Ratio (at 800 nm, $f_{REP}/20$)	> 75 : 1 for adjacent pulses > 500 : 1 for non-adjacent pulses
Diffraction Efficiency*	> 50% (at 800 nm, $f_{REP}/20$)

Options

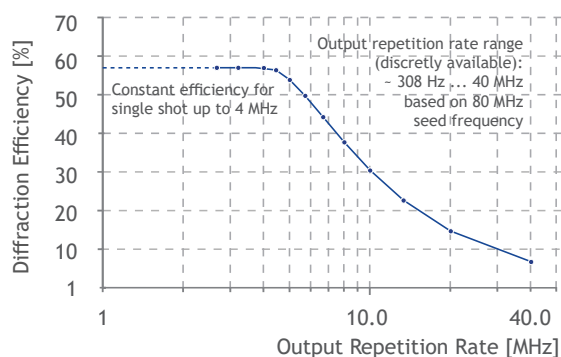
Input Frequency	35 ... 90 MHz (to be specified with 0.5 MHz accuracy at time of order)
High Diffraction Efficiency	> 60% (36% for pulseSelect Dual - Serial), only available for max average input power of 0.5 W
Polarization Rotator	Changing input polarization to horizontal

* Ratio of the diffracted pulse energy to the pulse energy incident into Bragg cell

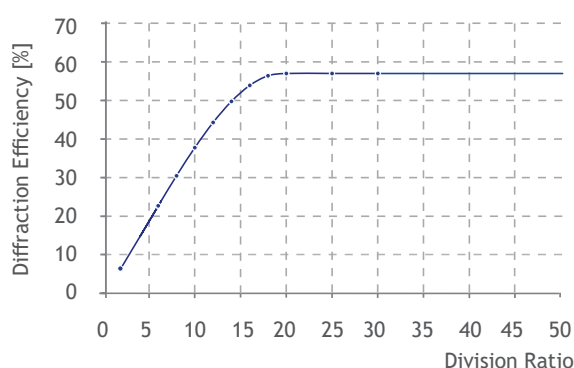
pulseSelect Specifications

Diagrams

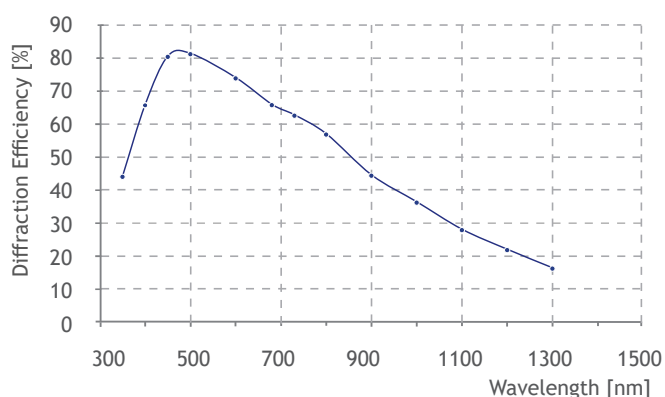
Typical Diffraction Efficiency over Repetition Rate



Typical Diffraction Efficiency over Division Ratio measured with 80 MHz fs-laser at 800 nm

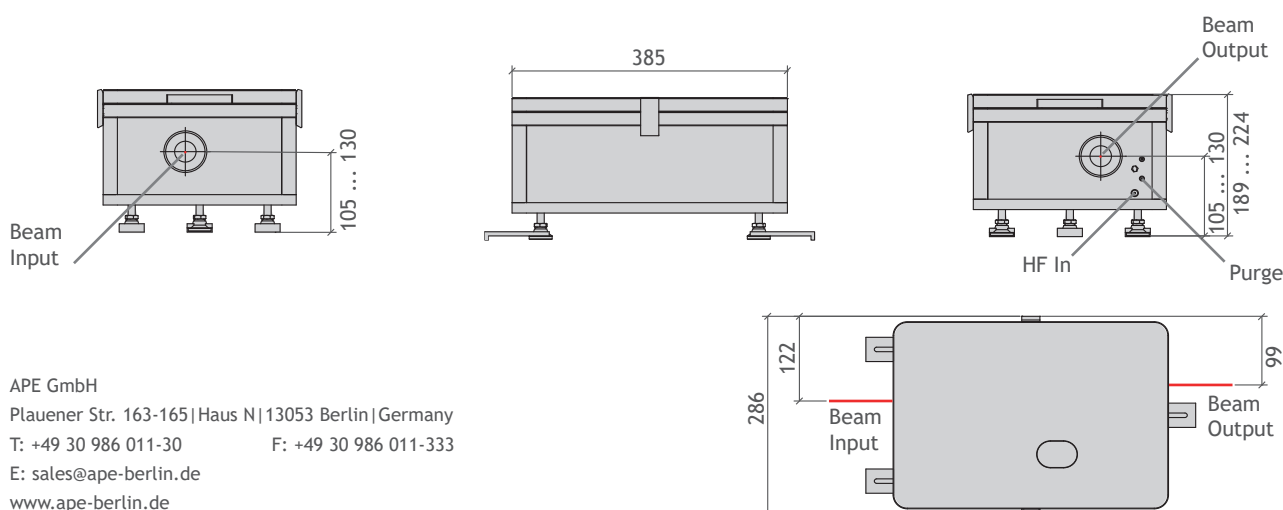


Typical Diffraction Efficiency over Wavelength for Repetition Rates up to 4 MHz



Dimensions

Control Box	267 mm x 180 mm x 312 mm (W x H x D)
Optical Head Single	286 mm x 189 ... 224 mm x 385 mm (W x H x D)
Optical Head Dual - Serial	390 mm x 189 mm ... 224 mm x 580 mm (W x H x D)
Optical Head Dual - Parallel	Two units, each: 286 mm x 189 mm ... 224 mm x 385 mm (W x H x D)



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