## Autocorrelators Model Overview

# pulseCheck NX

High-Resolution Multitalent

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# pulseCheck SM 2000

Long-Range Autocorrelator

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# Mini

Compact Autocorrelator

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## Carpe

 First choice for microscopy and lithography page 19





## ... Benefits & Technology

Optics and Detector Technology	A wide variety of professional applications can be covered with various detector types and optics sets. Photomultiplier (PMT) detectors are highly sensitive and are ideal for pulse measurements at low pulse energies. Photodiode detectors, on the other hand, are perfect for measuring lasers with high peak power. In combination with highly efficient optics, our detectors pave the way for measurements over an wide wavelength spectrum from 200 nm to 12 µm.
Collinear and Non-Collinear Measurements	Our autocorrelators support fast switching between collinear and non- collinear measurement modes. The collinear mode - often referred to as interferometric or fringe-resolved mode - provides additional qualitative information about the chirp and the central wavelength of the pulse. In contrast, the non-collinear mode - also referred to as intensity autocorrelation - provides background-free, high dynamic range autocorrelation. Although not background-free, switching between these two modes is even realized with the Mini TPA and TPA optics sets for pulseCheck.
Automatic Phase Matching	Autocorrelators take advantage of phase-sensitive and nonlinear processes and require what is called phase matching. APE's pulseCheck achieves this software aided for each wavelength range, resulting in precise and fast operation without the need for manual adjustment. Measurements are made even easier by using our TPA detectors, which combine detector and nonlinear optics in a single element. Here, phase matching adjustment is no longer necessary at all.

Plug & Play and Easy Integration with Network Interface

The pulseCheck offers easy-to-use plug & play capability via USB. In addition, the pulseCheck can be easily integrated into automated test and measurement environments with an Ethernet connection (SCPI over TCP/IP). And all this is possible without the need for an additional PC. The pulseCheck can also be controlled directly from any location via a network connection.



### pulseCheck NX The Modular Autocorrelator

Pulse Measurement Perfection with the Multitalent from APE

The pulseCheck platform grows with your tasks. Suitable for characterizing virtually all ultrafast pulse lasers, APE's pulseCheck autocorrelator covers a wide range of wavelengths and pulse widths. This flexibility is achieved by using interchangeable optics sets, typically consisting of a nonlinear crystal and a dedicated detector module.



- Exchangeable Optics Sets for wavelength coverage from 200 nm to 12 μm
- Wide range of sensitivity levels covered with PMT, PD, and TPA
- High temporal resolution with a sampling resolution down to 50 attoseconds
- Toggle between interferometric and intensity autocorrelation
- Integrated Controller for data acquisition, data fitting, and fast FPGA data processing
- Software aided wavelength tuning of crystal (phase matching)
- Fully compliant with DIN 58175-2:2021-04 (pulse measurement)
- NX-Software and USB as well as Ethernet connection
- TCP/IP remote control with standardized command set for easy programming
- Option: FROG for complete pulse characterization



### pulseCheck NX Overview

### Overview

Specifications	pulseCheck NX 50	pulseCheck NX 150	pulseCheck SM 2000
Pulse Width	5 fs - 15 ps	10 fs - 40 ps	20fs - 500 ps
Wavelengths	200 nm - 12 µm, depending on optics set	200 nm - 12 μm, depending on optics set	200 nm - 12 $\mu m,$ depending on optics set
Delay Resolution	50 attoseconds	200 attoseconds	1 femtosecond
Refresh Rate	10 Hz	7.5 Hz	Depending on scan range, 120 ps/sec
Intensity Resolution	18 bit	18 bit	18 bit
Detector Types	PMT, TPA, PD	PMT, TPA, PD	PMT, TPA, PD
Electronics	Integrated	Integrated	Integrated
Software	NX Software	NX Software	V 2019 Software
Connectivity	USB, Ethernet	USB, Ethernet	USB, Ethernet
			see page 14 pulsecheck SM 2000 for details

### High Resolution & Strong Processing Performance

The advanced system-on-chip based architecture enables measurements with low latency, a high time resolution down to 50 attoseconds and an intensity dynamic range of 18 bit. This allows full access to even the tiniest autocorrelation features.



Software GUI for pulseCheck NX



# ... Flexibility for your Experiments

Maximum Functionality through Modular Design	APE meets the growing need for maximum functionality and flexibility with the modular concept on which the pulseCheck autocorrelator series is based. Thus, Optics sets to upgrade the wavelength range or FROG capability can be added any time.		
From Ultrashort to Longer Pulses	Various pulseCheck configurations can be adapted to the individua needs of pulse duration measurement. The measurement of extra pulse durations up to 500 ps is possible with pulseCheck SM.		
	Pulse Width Measurement Rang	e	
<ul> <li>pulseCheck NX 50</li> <li>pulseCheck NX 150</li> <li>pulseCheck SM 2000</li> </ul>	t 5 fs 100 fs 1 ps 10 ps 100 ps 500 p	s 5 fs 15 ps 10 fs 40 ps 20 fs 500 ps	
High Sensitivity and Low Noise with Three Types of Detectors	Photodiode Detector (PD)     Standard sensit     Photomultiplier (PMT)     Highest sensitiv	ivity up to 1 W <sup>2</sup> ⁄ity up to 10 <sup>.6</sup> W <sup>2</sup>	

- Two-Photon Absorption (TPA)
- Highest sensitivity ( High sensitivity up to  $10^{-2}$  W<sup>2</sup>



### pulseCheck NX

**Optics Sets** 

A variety of different and exchangeable optics sets cover a wide wavelength range: from UV at 200 nm to mid IR at 12  $\mu m.$ 

Photodiode (PD)



Photomultiplier (PMT)

• Typ. Sensitivity: up to  $10^{-6} W^2$  • Rep. Rate: > 250 kHz • Measurement Mode: Collinear and Non-collinear  $\lambda$ [nm]



### Two Photon Absorption (TPA)

• Typ. Sensitivity: < 0.1 W<sup>2</sup> (NIR/IR) • < 1 W<sup>2</sup> (VIS) • < 100 W<sup>2</sup> (UV) • Rep. Rate: > 10 Hz • Measurement Mode: Collinear Intensity λ[nm]



<sup>\*</sup> For cross-correlation: wavelength range depends on pump wavelength

<sup>\*\*</sup> For the wavelength range 1500 - 2200 nm we recommend to use the highly sensitive IR detector "Extended IR PD SELECTED"



## pulseCheck NX Specifications

Specifications	
Measurable Pulse Width Range*	5 fs - 15 ps with pulseCheck NX 50; 10 fs - 40 ps with pulseCheck NX 150
Wavelength Range	200 nm - 12 µm, depending on Optics Set
Exchangeable Detector (Optics Sets)	PMT, PD, or TPA
Dealy Sampling Resolution	Down to 50 attoseconds (NX 50), 200 attoseconds (NX 150)
Refresh Rate	10 Hz (NX 50); 7.5 Hz (NX 150)
Sensitivity	Typically 1 10 <sup>-6</sup> W <sup>2</sup> depending on Optics Set**
Intensity Resolution	18 Bit
Pulse Repetition Rate	PD, TPA: 10 Hz and above; PMT: 250 kHz and above
Type of Measurement Mode	PMT, PD : non-collinear intensity, collinear interferometric; TPA: hybrid non-collinear intensity, collinear interferometric;
SHG Tuning for Phase Matching	PMT/PD: automatic; TPA: not applicable
Trigger Mode	TTL for f < 50 kHz
Input Polarization	Linear horizontal, vertical available as option
Input Beam Coupling	Free-space (6 mm aperture); Option: fiber coupling FC/PC, FC/APC, SMA
Max Input Power	1 W (e.g. oscillator with a rep. rate of approx. 70 MHz) or 10 $\mu J$ (e.g. amplified system with rep. rates in the kHz range), whichever results in lower value
Connectivity	USB and Ethernet
Remote Control	Possible via TCP/IP (SCPI command set)
Calibration	NIST traceable calibration certificate included
Calibration	NIST traceable calibration certificate included

### NX Software & Electronics

Electronics	<ul> <li>Integrated controller for data acquisition, processing and data fitting</li> <li>Fast FPGA data post-processing</li> <li>&gt; 10k datapoints per scan</li> <li>Connectivity: USB and Ethernet</li> <li>In-field software and firmware updates</li> </ul>
Software	<ul> <li>Intuitive and easy-to-navigate</li> <li>Plug &amp; play installation</li> <li>Real-time display of the pulse width (measured ACF and fitted pulse width)</li> <li>Fitting Routines: Gaussian, Sech<sup>2</sup>, Lorentz</li> <li>Measurement of central wavelength</li> </ul>
NX Software Enhancements	<ul> <li>The metadata dashboard displays all measurement results and device status</li> <li>The new help section displays hints and explanation for all software buttons and functions</li> <li>The new monochromatic Contrast Screen Mode helps to enhance the readability of the screen while wearing laser safety glasses</li> </ul>
Remote	<ul> <li>Direct remote control via TCP/IP (no PC software required)</li> <li>Users can create their own measurement remote routines using the standardized SCPI command set and data aquisition</li> </ul>

\* 13 fs<sup>2</sup> internal dispersion at 800 nm for short-pulse option to be considered

\*\* Sensitivity is defined as measured sensitivity including Optics Set, defined as average power times peak power of the incident pulses PAV \* P<sub>peak</sub>



### Options

Various Optics Sets

Fiber coupling

Polarization rotator

FROG

### Compliance

CE certified

• NIST tracable calibration with HeNe laser

• Fully compliant with DIN 58175-2:2021-04 (Autocorrelation measurement methods)

Dimensions and Power		
Dimensions	244 x 201 x 309 mm (pulseCheck NX 50) 244 x 201 x 395 mm (pulseCheck NX 150) See appendix for technical drawings	
Power	95 240 V, 50 60 Hz, 60 W	

## FROG

Complete Pulse Characterization with pulseCheck NX and FROG Option Second Harmonic Generation FROG is the most popular spectrometerless Frequency Resolved Optical Gating method. The pulseCheck autocorrelators by APE optionally integrate FROG, giving access to complete pulse characterization. This option opens the door to complete spectral and temporal pulse characterization.



Different crystal modules for various wavelength ranges.

- Complete spectral and temporal pulse characterization
- Different crystal modules available to cover wavelengths from 420 2200 nm
- FROG trace data processing and visualization with included software
- Pulse width ranges from as low as 20 fs up to 6 ps
- High spectral resolution up to 0.1 nm
- Available for the pulseCheck NX autocorrelator\*

\* Required laser rep. rate >10 kHz



## ... FROG Pulse Characterization Software

FROG Trace	The software provides laser pulse intensity as a function of time and frequency (wavelength). Results are visualized in the form of a FROG trace diagram as well as pulse shape and spectrum.
	It is a matter of seconds to automatically find the required phase matching tuning angle - thanks to the automated phase matching routine by pulseCheck.
Wavelength and Pulse Width Coverage	Various crystals guarantee coverage of wavelengths from 420 nm up to 2200 nm and pulse widths from 20 fs to 6 ps (numbers given for fourier transform limited pulses). The spectral resolution starts as high as 0.1 nm.
	The FROG option is designed for laser repetition rates above 10 kHz and is available for the pulseCheck NX autocorrelator series (except

for pulseCheck SM 2000).

🚓 FROG × \_ File Settings Retrieve 832 -830 --971.31 Choose crystal IR I 150 🗸 825-880 - 1220 nm Res.: 0.2 nm Settings 820-Start / nm 815-772 • Amplitude Stop / nm 810--832 Samples E 805-100 -Lambda / 800-RUN 795 -Ref frog retrieval - 0  $\times$ 790-File Options Tools Spectral Retrieval 785--2.8 Retrieve -2.0 0.8 -900 (a.u.) -1.0 물 780--0.0 (rad) 775---1.0 0.2 772 05 -2.2 0.4162 0-0.3890 **A**·P·E 0.3950 0.4000 0.4050 0.4100 Frequency (1/fs) Temporal 1.6 0.02 FROG error 0.8-1.0 Software GUI FROG for -9.0 (a.u.) 0.5 Phase ( pulseCheck NX 0 321 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 ó -0.5 🗟 Iteration 0.2 -1.0 
 Grid Size
 Temporal Resulution
 Spectral Resolution

 512 x 512
 10.2
 \$f\_5
 0.000191
 \$f\_5^-1
 run
 6 -1.6 600.0 748.3 -751.2 -600.0 -400.0

12

-200.0 0.0 200.0 Time (fs)

400.0

## **FROG Crystals**

FROG crystal is suitable if "Pulse Width Range" matches or if pulses are longer the "Spectral Bandwidth" matches.

FROG Crystal	Wavelength Range	Spectral Resolution	Pulse Width Range	Spectral Bandwidth
VIS-I-200	420 550 nm	0.1 nm	200 6000 fs	> 1 nm
VIS-I-50	420 550 nm	0.3 nm	50 200 fs	> 3 nm
VIS-I-20	420 550 nm	1 nm	20 70 fs	> 10 nm
VIS-II-150	550 700 nm	0.1 nm	150 2000 fs	> 1 nm
VIS-II-50	550 700 nm	0.3 nm	50 200 fs	> 3 nm
VIS-II-20	550 700 nm	2 nm	20 60 fs	> 20 nm
NIR-200	700 900 nm	0.1 nm	200 5000 fs	> 1 nm
NIR-50	700 900 nm	0.2 nm	50 500 fs	> 2 nm
NIR-20	700 900 nm	3 nm	20 50 fs	> 30 nm
IR-I-150	900 1200 nm	0.2 nm	150 900 fs	> 2 nm
IR-I-60	900 1200 nm	1 nm	60 200 fs	> 10 nm
IR-I-30	900 1200 nm	5 nm	30 60 fs	> 50 nm
IR-II-100	1200 1600 nm	0.5 nm	100 700 fs	> 5 nm
IR-II-50	1200 1600 nm	2 nm	50 100 fs	> 20 nm
IR-II-30	1200 1600 nm	9 nm	30 50 fs	> 90 nm
Ext. IR-I-50	1800 2200 nm	19 nm	50 200 fs	> 190 nm



### pulseCheck SM 2000 Long-Range Autocorrelator

Pulse Width Measurement up to 500 ps

With the revised version of the long-range delay technology in pulseCheck SM, the new autocorrelator offers a scanning range up to three times larger and a measuring speed up to five times faster than the previous long-range models. The pulseCheck SM includes a high performance controller that is integrated into the device.

The pulseCheck SM is suitable for particularly long pulse durations of up to 500 ps. At the other end, short pulses down to 20 fs can be measured. A resolution of 1 fs and a sampling rate of 1 MHz is available over the entire measurement range.



- Pulse widths from 20 fs up to 500 ps
- Optics Sets from 200 nm to 12 µm
- Measurement speed of 120 ps/sec
- Automatic phase matching
- Integrated high performance controller
- Toggle between interferometric and intensity autocorrelation
- Wide range of sensitivity levels covered with PMT, PD, and TPA
- USB & Ethernet connectivity and TCP/IP remote control
- Gaussian, Sech<sup>2</sup>, and Lorentzian fitting routines
- NIST traceable calibration



## pulseCheck SM 2000 Specifications

Specifications	
Measurable Pulse Width*	20 fs 500 ps (20 fs - 150 ps directly measured, 150 ps - 500ps half ACF measured)
Wavelength Range	200 nm - 12 µm, depends on Optics Set
Optics Sets	Exchangeable; Detector-Types: PMT, PD, or TPA
Delay Resolution	1 fs
Delay Linearity	< 1 %
Scan Speed	120 ps/s
Sampling Rate	1 MHz
Sensitivity**	Typically 1 10 <sup>-6</sup> W <sup>2</sup> depending on Optics Set
Recommended Repetition Rate	PD, TPA: 1 Hz GHz; PMT: 250 kHz GHz
Type of Measurement Mode	PMT, PD : non-collinear intensity, collinear interferometric; TPA: hybrid collinear intensity
Trigger Mode	TTL, repetition rate 1 Hz - 10 kHz
Input Polarization	Linear horizontal, vertical available as option
Input Beam Coupling	Free-space (6 mm aperture); Option: fiber coupling FC/PC, FC/APC, SMA
Max Input Power	1 W (e.g. oscillator with a rep. rate of approx. 70 MHz) or 10 $\mu J$ (e.g. amplified system with rep. rates in the kHz range), whichever results in lower value
Software	Included; Real-time display of data and pulse parameters
Fitting Routines	Gaussian, Sech <sup>2</sup> , Lorentz
Connection	USB, Ethernet
Remote Control	Possible via TCP/IP (SCPI command set)
Calibration	NIST traceable calibration certificate included

Dimensions and Power		
Dimensions	253 x 190 x 572 mm (W/H/L) See appendix for technical drawings	
Power	95 240 V, 50 60 Hz, Power 60 W	

\* 13 fs<sup>2</sup> internal dispersion at 800 nm for short-pulse option to be considered
 \*\* Measured sensitivity including Optics Set, defined as average power times peak power of the incident pulses P<sub>AV</sub> \* P<sub>peak</sub>

## Mini Compact Autocorrelator

Compact Autocorrelator

Mini is the perfect pulse duration measurement tool in a compact size and with high sensitivity.



- Wavelength coverage from 250 nm to 3200 nm depending on Optics set
- Compact design for minimum space requirements and easy portability
- UV measurements without cross-correlation
- Ultra-precise delay resolution
- Interferometric and intensity autocorrelation (Mini PD) or interferometric and hybrid intensity autocorrelation (Mini TPA)
- Gaussian, Sech<sup>2</sup>, and Lorentzian fitting routines
- Including software and USB interface
- TCP/IP remote control with standardized command set for easy programming
- NIST traceable calibration
- Stable protective carrying case



## ... Compact Autocorrelator for Routine Tasks

Two models available

#### Mini TPA - Exchangable Detectors

The APE Mini TPA benefits from the two-photon absorption principle. This eliminates the need of SHG crystal angle tuning and makes the wavelength tuning process unnecessary. Various exchangeable Optics Sets to cover a wide wavelength range are available for the Mini TPA.



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#### Mini PD - Detector not exchangable

The Mini PD is available with for different wavelength ranges (pre-installed, not exchangeable). It is ideal for lasers with a fix wavelength or where the wavelength range is within one of the ranges below. Thus, the Mini PD is the most cost-effective autocorrelator.

VIS 1	VIS 2	NIR	IR
420-550	540-750	700-1200	1100-1800

UV Range without Cross-Correlation Together with an UV Optics Set, the Mini TPA provides pulse width measurements in the UV range, from 250 nm to 400 nm — without the need for cross-correlation. Elimination of the cross-correlation approach makes the data evaluation easier, by reducing the conventional two-step measurement process to a single-step approach.

## **Mini Specifications**

Specifications	Mini TPA	Mini PD
Measurable Pulse Width Range	50 fs 3.5 ps; Optional: down to 35 fs	50 fs 3.5 ps; Optional: down to 10 fs
Available Optics Sets	Exchangeable Optics sets of TPA-type	Fixed Optics set of PD-type - not exchangeable
Wavelength Range	UV 250 400 nm; VIS 400 700 nm; NIR 700 1250 nm; IR 1250 2100 nm; Ext. IR 2000 3200 nm	VIS 1 420 550 nm; VIS 2 540 750 nm; NIR 700 1200 nm; IR 1100 1800 nm (Fixed range to be specified on order)
Type of Measurement Mode	Collinear intensity	Non-collinear intensity, collinear interferometric
Measurement Mode Switching	No	Yes
Sensitivity*	Depending on Optics set, typically 0.1 W <sup>2</sup> ; UV range < 500 W <sup>2</sup>	Depending on Optics set, typically 1 $W^2$
SHG Tuning for Phase Matching	Not required	Software aided
Max Input Power	300 mW or 5 $\mu J$ (whichever results in lower value)	1 W (e.g. oscillator with a rep. rate of approx. 70 MHz) or 10 $\mu J$ (e.g. amplified systems)
Recommended Repetition Rate	> 300 Hz; For UV only: upper limit 2 MHz	> 300 Hz

Further Specifications	
Input Polarization	Linear horizontal, vertical available as option
Input Aperture	6 mm (free-space)
Input Beam Coupling	Free-space; Optional: fiber coupling FC/PC, FC/APC, SMA
Beam Input Height	86 150 mm; Optional 50 mm
Software	Included; Real-time display of pulse width and different fitting routines
Fitting Routine	Gaussian, Sech <sup>2</sup> , Lorentz
Connection	USB
Remote Control	Possible via TCP/IP (SCPI command set)
Calibration	NIST traceable calibration certificate included

### Options

- Various Optics Sets
- Short pulse option
- Fiber coupling

Input polarization rotator

Dimensions and Power	
Dimensions	160 x 220 (or 140**) x 155 mm (W/H/L) See appendix for technical drawings
Power	95 240 V, 50 60 Hz, 60 W

\* Measured sensitivity including Optics Set is defined as average power times peak power of the incident pulses  $P_{AV}$  \*  $P_{peak}$  \*\* Optional for 50 mm input beam height

## Carpe Autocorrelator for Microscopy & Lithography

### Microscopy & Lithography Autocorrelator

APE's Carpe autocorrelator is designed to measure the pulse duration of laser pulses directly at the sample location in a focus. It is therefore ideally suited for use in microcopy or lithography.

The Carpe autocorrelator measures the pulse width both at the sample location (e.g. behind the microscope optics) and at any other location between laser and sample. A comparison of the pulse widths obtained at these two locations allows the pulse broadening to be calculated and / or the the pulse width to be optimized with a pre-chirper.

An additional power measurement (optional) at the sample location also supports systematic and quantitative studies on the laser power of ultrashort pulses.



- Measure pulse widths at the sample position and before microscope input
- Measure average power at sample position (optional)
- Estimate the peak power in conjunction with the pulse width
- Option: Short working distance, e.g. for immersion objective lenses
- Option: pre-chirper femtoControl for pulse compression & dispersion compensation



## **Carpe** Specifications

### **Specifications**

Measurable Pulse Width	50 fs 3.5 ps; Optional: 30 fs 3.5 ps
Wavelength Range (for pulse width measurement)	700 1100 nm or 1250 2000 nm
Wavelength Range (for power detection)	700 1000 nm
Power Measurement (optional)	0 30 mW; 0 300 mW
Recommended Repetition Rate	> 100 kHz
Working Distance	> 0.5 mm; Optional < 0.5 mm
Input Polarization	Linear horizontal

### Options

Short working distance < 0.5 mm (e.g. immersion lenses)</p>

APE pulse compressor femtoControl (Dispersion management)

#### Dimensions and Power

Dimensions	295 x 173 x 180 mm (W/H/L) See appendix for technical drawings
Power	95 240 V, 50 60 Hz, 60 W

### Example Setup





### peakDetect - Pulse Monitoring Multi-Tool

Innovative Pulse Monitoring

peakDetect is an innovative measurement tool for the precise monitoring of ultra-short lasers. It is a key tool for quality management and predictive maintenance, potentially saving downtime costs and helping to plan necessary service in advance.

peakDetect is a single device without moving parts. It measures at the same time the average power, beam pointing, nonlinear efficiency and temperature. These measurements also yield pulse quality as a new unique monitoring parameter as well as the peak power as additional values.

The compact and robust design makes peakDetect ideal for incorporation into laser systems or production lines and as a portable service tool.

Solide State Laser Monitored over a 48 Hour Period

The comparison of measurement results obtained with the peakDetect and various standard measurement tools over 48 hours shows excellent agreement of trends and small variations of the derived laser parameters.







### peakDetect Specifications

#### **Applications**

- Laser pulse performance monitoring, e.g. for laser production, micro-machining
- Laser-medical diagnostics and calibration, e.g. for ophthalmology
- Predictive maintenance (Industry 4.0), Laser quality management

#### **Specifications**

Wavelength Range	700 1100 nm; Optimized for 1000 1100 nm (e.g. fiber laser); 500 550 nm (e.g. SHG of fiber laser); Other wavelengths to be discussed
Pulse Width Range	Femtoseconds, picoseconds; typically 50 fs 10 ps
Repetition Rate	1 kHz 2 MHz (with automatic repetition rate measurement) > 2 MHz with manual entry of laser repetition rate Other specifications to be discussed
Input Polarization	Linear / any orientation
Response Time / Latency time	< 5 ms
Beam Pointing Sensitivity	Accuracy < 5 µm, Resolution < 1 µm
Aperture	2.2 mm or customized
Computer Interface	USB, Serial, Fieldbus, Custom
Power Supply	via USB or custom
Dimensions	Small footprint for machine integration, customization possible
Directly Measured Values	Repetition rate (measured up to 2 MHz or manual entry) Average power Beam position (Pointing) Non-linear efficiency
Derived Values	Peak power Pulse quality Pulse duration

#### **OEM** Integration

APE helps you to customize your individual peakDetect monitoring system. Starting with your specific laser parameters and objectives, we support you each step of the way, towards implementing a peakDetect solution for your application. Demo units are available on request.

#### Pulse Quality Monitoring with APE's Autocorrelators

Pulse quality monitoring is also possible using APE's autocorrelator technology. Depending on your requirements, either peakDetect technology or autocorrelation technology may be advantageous. For a more detailed technical discussion do not hesitate to contact us.



## **Appendix** Technical Drawings

All Dimensions in mm

# pulseCheck NX

 Multitalent for any task

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### pulseCheck SM 2000 Beam distance Long-range Beam input autocorrelator . (turnable mirror) ß page 14 220 252. Focus alignment 571.5 189.5 76 o

## Appendix Technical Drawings

All Dimensions in mm

## Mini

Compact autocorrelator

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Standard Version

Optional Reduced Beam Input Height Version



# Carpe

 First choice for multiphoton microscopy

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## Appendix Technical Drawings

All Dimensions in mm



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