



Ultrafast Photodetectors

UPD Series

**NEW MODELS:
Faster Rise Times & Wider
Wavelength Ranges**



The UPD series of ultrafast photodetectors are best suited for measurement of optical waveforms from DC to 25 GHz. Various models feature rise times as short as **15 ps** and cover the spectral range from **170 to 2600 nm**.

All photodetectors are enclosed in compact and solid aluminum housings and can be biased with a battery or an external power supply.

The UV-extended versions of the silicon type photodetectors are the only commercial products that cover the spectral range from 170 to 1100 nm.

Another type of unique UV-sensitive InGaAs photodetectors can be used for detecting laser pulses in the range from 350 to 1700 nm, thus having the widest spectral range and the highest speed commercially available.

Perfect impedance matching and state-of-the-art microwave technology assure pulse form measurements without any ringing or artefacts. The customer is free to use a 50 Ω terminating resistor for highest speed operation, or a high impedance load for obtaining large signals. This guarantees maximum flexibility for diverse applications.

In combination with our BBA series of wideband high-gain amplifiers, the high-speed photodetectors are an advantageous alternative to the expensive and cumbersome avalanche photodiodes.

The UPD series high-speed photodetectors are indispensable tools for laser and photonics research.

Features

- Ultra High-Speed Operation
- Rise Times: **starting from 15 ps**
- Bandwidths: **up to 25 GHz**
- Spectral Ranges: **170 - 2600 nm**
- Compact Design
- Battery or External Power Supply
- Models for Free-Space Beam, or with FC/PC Receptacle or Pigtailed with SM Fiber

Applications

- Pulse Form Measurements
- Pulse Duration Measurements
- Precise Synchronization
- Mode Beating Monitoring
- Heterodyne Measurements

New Models Available: Faster Rise Times & Wider Wavelength Ranges

- **UPD-15-IR2-FC**: Ultrafast InGaAs PIN photodetector, rise time < 15 ps, bandwidth > 25 GHz, spectral range 800 - 1700 nm, fiber-coupled input with FC/APC connector
- **UPD-35-IR2-P**, **UPD-35-IR2-D**: Ultrafast InGaAs PIN photodetectors, rise time < 35 ps, bandwidth > 10 GHz, spectral range 800 - 1700 nm, with polished or diffuse window
- **UPD-35-UVIR-P**, **UPD-35-UVIR-D**: Ultrafast InGaAs PIN photodetectors, rise time < 35 ps, bandwidth > 10 GHz, spectral range 350 - 1700 nm, with polished or diffuse window
- **UPD-50-SP**, **UPD-50-SD**, **UPD-50-UD**, **UPD-50-UP**: Ultrafast Si PIN photodetectors, rise time 50 ps, fall time 50 ps, bandwidth > 7 GHz, spectral range 170 - 1100 nm or 320 - 1100 nm, with polished or diffuse window
- **UPD-100-IR1-P**: Ultrafast Ge photodetector, rise time < 100 ps, pulsewidth (FWHM) 300 ps, spectral range 400 - 2000 nm
- **UPD-3N-IR2-P**: Fast InGaAs photodetector, extended infrared range up to 2.1 μm , rise time 150 ps
- **UPD-5N-IR2-P**: Fast InGaAs photodetector, extended infrared range up to 2.6 μm , rise time 200 ps

UPD Series • Available Models

Model	Rise Time (ps)	Bandwidth (GHz)	Spectral Range (nm)	Quantum Efficiency @ Peak	Sensitive Area (Dia. μm / mm^2)	Noise Equiv. Power ($\text{W}/\sqrt{\text{Hz}}$)	Dark Current (nA)	Material	Optical Input / Window Type ¹⁾	RF Output Connector Type
UPD-15-IR2-FC	< 15	> 25	800 - 1700	75%	Fiber, 9 μm	1.0×10^{-15}	0.1	InGaAs	Fiber w. FC/APC ⁵⁾	SMA
UPD-30-VSG-P	< 30	> 10	320 - 900	40%	200x200 / 0.04	3.0×10^{-15}	0.1	GaAs	Polished, glass	SMA
UPD-35-IR2-P	< 35	> 10	800 - 1700	80%	55 / 0.0024	1.0×10^{-15}	0.3	InGaAs	Polished, glass	SMA
UPD-35-IR2-D	< 35	> 10	800 - 1700	80%	55 / 0.0024	1.0×10^{-15}	0.3	InGaAs	Diffuse, quartz	SMA
UPD-35-IR2-FR	< 35	> 10	800 - 1700	80%	55 / 0.0024	1.0×10^{-15}	0.3	InGaAs	FC/PC receptacle ⁵⁾	SMA
UPD-35-IR2-FC	< 35	> 10	800 - 1700	80%	Fiber, 9 μm	1.0×10^{-15}	0.3	InGaAs	Fiber w. FC/APC ⁵⁾	SMA
UPD-35-UVIR-P	< 35	> 10	350 - 1700	80%	55 / 0.0024	1.0×10^{-15}	0.3	InGaAs ⁴⁾	Polished, MgF_2	SMA
UPD-35-UVIR-D	< 35	> 10	350 - 1700	80%	55 / 0.0024	1.0×10^{-15}	0.3	InGaAs ⁴⁾	Diffuse, quartz	SMA
UPD-40-VSI-P	< 40	> 8.5	500 - 1690	40%	200x200 / 0.04	3.0×10^{-10}	5000	InGaAs	Polished, glass	SMA
UPD-40-IR2-P	< 40	> 8.5	800 - 1700	80%	60 / 0.0028	1.1×10^{-15}	0.5	InGaAs	Polished, glass	SMA
UPD-40-IR2-D	< 40	> 8.5	800 - 1700	80%	60 / 0.0028	1.1×10^{-15}	0.5	InGaAs	Diffuse, quartz	SMA
UPD-40-IR2-FR	< 40	> 8.5	800 - 1700	80%	60 / 0.0028	1.1×10^{-15}	0.5	InGaAs	FC/PC receptacle ⁵⁾	SMA
UPD-40-IR2-FC	< 40	> 8.5	800 - 1700	80%	Fiber, 9 μm	1.1×10^{-15}	0.5	InGaAs	Fiber w. FC/APC ⁵⁾	SMA
UPD-40-UVIR-P	< 40	> 8.5	350 - 1700	80%	60 / 0.0028	1.1×10^{-15}	0.5	InGaAs ⁴⁾	Polished, MgF_2	SMA
UPD-40-UVIR-D	< 40	> 8.5	350 - 1700	80%	60 / 0.0028	1.1×10^{-15}	0.5	InGaAs ⁴⁾	Diffuse, quartz	SMA
UPD-50-SP	< 50	> 7.0	320 - 1100	45%	100 / 0.0079	1.2×10^{-15}	0.001	Si	Polished, glass	SMA
UPD-50-SD	< 50	> 7.0	320 - 1100	45%	100 / 0.0079	1.2×10^{-15}	0.001	Si	Diffuse, quartz	SMA
UPD-50-UP	< 50	> 7.0	170 - 1100	45%	100 / 0.0079	1.2×10^{-15}	0.001	Si ⁴⁾	Polished, MgF_2	SMA
UPD-50-UD	< 50	> 7.0	170 - 1100	45%	100 / 0.0079	1.2×10^{-15}	0.001	Si ⁴⁾	Diffuse, quartz	SMA
UPD-70-IR2-P	< 70	> 5.0	800 - 1700	80%	80 / 0.005	2.0×10^{-15}	0.8	InGaAs	Polished, glass	SMA
UPD-70-IR2-D	< 70	> 5.0	800 - 1700	80%	80 / 0.005	2.0×10^{-15}	0.8	InGaAs	Diffuse, quartz	SMA
UPD-70-IR2-FR	< 70	> 5.0	800 - 1700	80%	80 / 0.005	2.0×10^{-15}	0.8	InGaAs	FC/PC receptacle ⁵⁾	SMA
UPD-70-IR2-FC	< 70	> 5.0	800 - 1700	80%	Fiber, 9 μm	2.0×10^{-15}	0.8	InGaAs	Fiber w. FC/APC ⁵⁾	SMA
UPD-70-UVIR-P	< 70	> 5.0	350 - 1700	80%	80 / 0.005	2.0×10^{-15}	0.8	InGaAs ⁴⁾	Polished, MgF_2	SMA
UPD-70-UVIR-D	< 70	> 5.0	350 - 1700	80%	80 / 0.005	2.0×10^{-15}	0.8	InGaAs ⁴⁾	Diffuse, quartz	SMA
UPD-100-IR1-P ²⁾	< 100	> 3.0	400 - 2000	80%	80 / 0.005	3.0×10^{-13}	700	Ge	Polished, glass	SMA
UPD-200-SP	< 175	> 2.0	320 - 1100	85%	400 / 0.126	1.5×10^{-15}	0.001	Si	Polished, glass	BNC
UPD-200-SD	< 175	> 2.0	320 - 1100	85%	400 / 0.126	1.5×10^{-15}	0.001	Si	Diffuse, quartz	BNC
UPD-200-UP	< 175	> 2.0	170 - 1100	85%	400 / 0.126	1.5×10^{-15}	0.001	Si ⁴⁾	Polished, MgF_2	BNC
UPD-200-UD	< 175	> 2.0	170 - 1100	85%	400 / 0.126	1.5×10^{-15}	0.001	Si ⁴⁾	Diffuse, quartz	BNC
UPD-300-SP	< 300	> 1.0	320 - 1100	90%	600 / 0.283	3.0×10^{-15}	0.01	Si	Polished, glass	BNC
UPD-300-SD	< 300	> 1.0	320 - 1100	90%	600 / 0.283	3.0×10^{-15}	0.01	Si	Diffuse, quartz	BNC
UPD-300-UP	< 300	> 1.0	170 - 1100	90%	600 / 0.283	3.0×10^{-15}	0.01	Si ⁴⁾	Polished, MgF_2	BNC
UPD-300-UD	< 300	> 1.0	170 - 1100	90%	600 / 0.283	3.0×10^{-15}	0.01	Si ⁴⁾	Diffuse, quartz	BNC
UPD-500-SP	< 500	> 0.6	320 - 1100	90%	800 / 0.5	3.5×10^{-15}	0.01	Si	Polished, glass	BNC
UPD-500-SD	< 500	> 0.6	320 - 1100	90%	800 / 0.5	3.5×10^{-15}	0.01	Si	Diffuse, quartz	BNC
UPD-500-UP	< 500	> 0.6	170 - 1100	90%	800 / 0.5	3.5×10^{-15}	0.01	Si ⁴⁾	Polished, MgF_2	BNC
UPD-500-UD	< 500	> 0.6	170 - 1100	90%	800 / 0.5	3.5×10^{-15}	0.01	Si ⁴⁾	Diffuse, quartz	BNC
UPD-3N-IR2-P	< 150 ⁶⁾	> 0.4 ⁶⁾	800 - 2100	75%	300 / 0.07	1.5×10^{-13}	90	InGaAs	Polished, glass	BNC
UPD-5N-IR2-P	< 200 ⁶⁾	> 0.3 ⁶⁾	800 - 2600	70%	300 / 0.07	7.0×10^{-13}	2000	InGaAs	Polished, glass	BNC
UPD-2M-IR2-P	< 75000	> 0.004	900 - 1700	80%	2000 / 3.14	4.0×10^{-14}	5	InGaAs	Polished, glass	BNC
UPD-2M-IR2-P-1TEC ³⁾	< 75000	> 0.004	900 - 1700	75%	2000 / 3.14	1.0×10^{-14}	0.3	InGaAs	Polished, glass	BNC

Notes: ¹⁾ The diffuse window reduces the positioning accuracy requirements and increases the damage threshold at the cost of a reduced sensitivity by a factor of approx. three to five. **Recommended for high peak power lasers only.**

²⁾ This model has negative output. All other models have positive output by default but may be ordered with negative output if required.

³⁾ With TEC cooling module, non-standard housing.

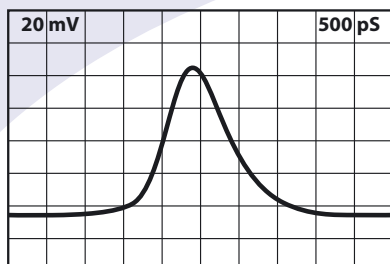
⁴⁾ Modified material with increased blue / UV sensitivity.

⁵⁾ Not compatible with the optional filter holder.

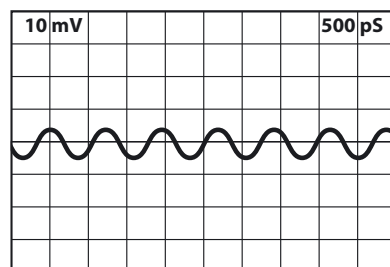
⁶⁾ Greatly improved performance.



Ultrafast Photodetectors



High fidelity pulse form measurement with UPD-200-SP and 1 GHz oscilloscope. The light source is our PULSELAS®-P-1064-100 subnanosecond Q-switched laser.



Longitudinal mode beating of a He-Ne laser (633 nm) recorded with UPD-200-SP photodetector and 1 GHz oscilloscope. The modulation depth of the 1.5 GHz beating signal is limited to 25% by the oscilloscope bandwidth.

Power Sources for UPD Series (depend on the photodetector model)

Low-Noise Power Supply
European Standard
Input: 230 V AC
Output: 12 V DC
Model: **PS-UPD-12-EU**

Low-Noise Power Supplies
Worldwide Usage
Input: 100 - 240 V AC

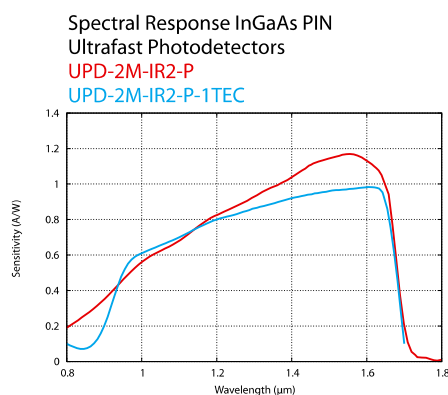
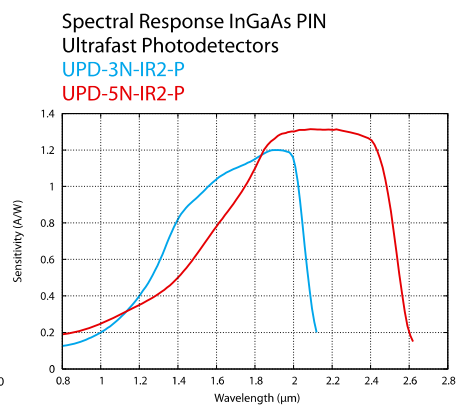
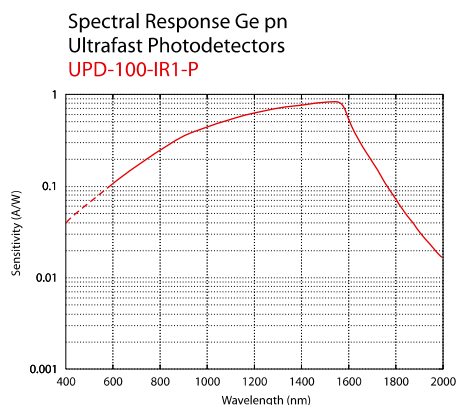
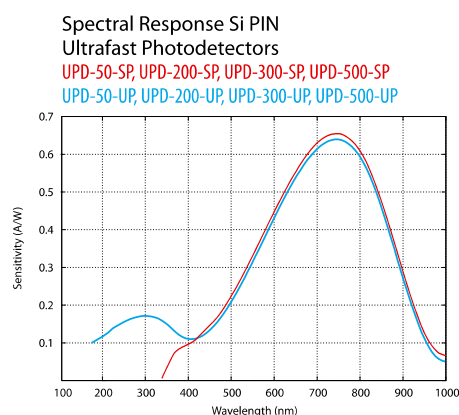
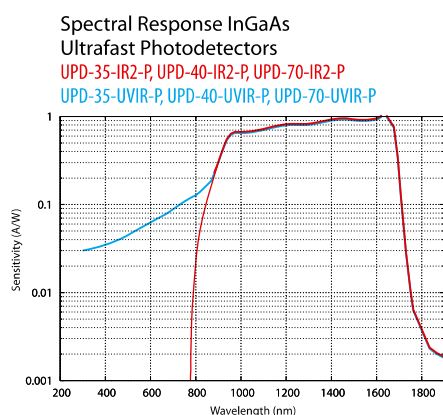
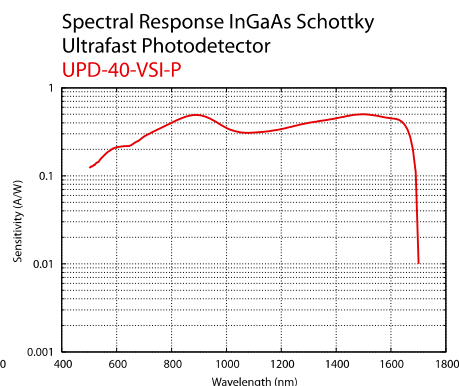
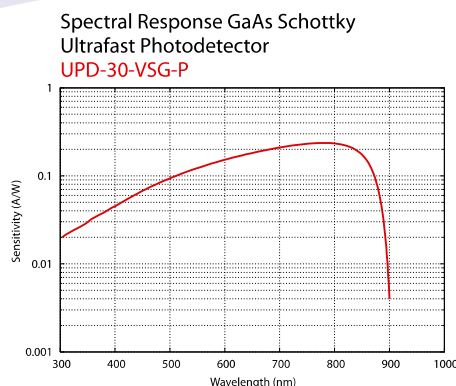
Output: 6 V DC
Model: **PS-UPD-6-WW**

Output: 9 V DC
Model: **PS-UPD-9-WW**

Output: 12 V DC
Model: **PS-UPD-12-WW**

Bias Battery

6 V
Model: **BAT-UPD-6V**



Related Products

- Broadband Amplifiers BBA Series (amplitude gain: ×10, ×100 or variable ×1÷100)
- BNC 50 Ω Terminating Load
- SMA (male) to BNC (female) Adapter
- SMA to SMA Adapter
- Attenuator Filter Adapter

Important notice: The sensitivity curves are for reference only and are not recommended to be used for calibration or amplitude measurement purposes.

ALPHALAS GMBH
Bertha-von-Suttner-Str. 5
D-37085 Goettingen
Germany

TEL +49 - 551 - 77 06 147
FAX +49 - 551 - 77 06 146
E-MAIL sales@alphalas.com
WEB www.alphalas.com

Lasers, Optics, Electronics.
MADE IN GERMANY.
www.alphalas.com



Options and further specifications are available upon request. Specifications in this data sheet are subject to change without notice. No responsibility for typing or printing errors. ALPHALAS GmbH reserves the right to make changes without further notice to any products herein. ALPHALAS GmbH makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ALPHALAS GmbH assume any liability arising out of the application or use of any product, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters that may be provided in ALPHALAS GmbH data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals", must be validated for each customer application by customer's technical experts. ALPHALAS GmbH products are intended for expert users only. ALPHALAS GmbH products are not designed, intended, or authorized for use in medical, surgical or any other human in vivo applications, or for any other application in which the failure of the ALPHALAS GmbH product could create a situation where personal injury or death may occur. Therefore, ALPHALAS GmbH products must not be used in such applications. Furthermore, ALPHALAS GmbH products must not be used in critical applications (e.g. in life support systems, in aviation, in nuclear facilities, in weapon systems, in safety or security systems, etc.). ALPHALAS GmbH products must not be used where damage to property may occur.