High-Energy Picosecond Laser

PICOPOWER™-RG1-1064-10K

The **PICOPOWER™- RG1-1064-10K** picosecond laser delivers ultra-short pulses with high energy, high peak and average power at 1064 nm wavelength with variable repetition rates from single shot to 10 kHz. It features a unique synchronization capability with unsurpassed 3.5 ps jitter for pulses on demand. Optional wavelengths at 532 nm, 355 nm and 266 nm are available collinearly or as multiple output beams. The distinctive features of this laser are excellent power, pulse-to-pulse and beam pointing stability, diffraction-limited output beam, pulse-on-demand triggering and peak power of more than 2 MW with less than 30 W electrical power consumption. It is an ideal choice for numerous applications, including micro-machining of metal and non-metal materials, semiconductor wafer inspection, carving, nonlinear optics, ultrafast spectroscopy and many others.

Features

- *Single or multiple outputs at **1064 nm, 532 nm, 355 nm or 266 nm** wavelengths*
- *Unsurpassed **3.5 ps rms jitter** to external trigger*
- *Less than **30 ps** pulse width*
- ***50 µJ** pulse energy at 1064 nm*
- *More than **2 MW** peak power at 1064 nm*
- *Internal and external trigger*
- *Air-cooled, compact and cost effective*
- *Excellent Gaussian TEM_{00} beam profile*
- *Variable repetition rate*

Applications

- *High-speed and precision micro-machining (glass, silicon, plastics, etc.)*
- *Fluorescence lifetime measurements*
- *Multi-photon non-linear microscopy*
- *Marking, carving and 3D engraving*
- *Time-resolved spectroscopy*
- *Terahertz imaging*
- *Nonlinear optics*

LASERS, OPTICS, ELECTRONICS
MADE IN GERMANY
WWW.ALPHALAS.COM

ALPHALAS™

Technical Specifications: Typical Values

OPTICAL and ELECTRICAL CHARACTERISTICS

Parameter	Unit	Fundamental	Harmonics (optional)		
Wavelength	nm	1064	532	355	266
Pulse Energy, single shot to 5 kHz	µJ	55	33	16	12
Pulse Energy @ 10 kHz	µJ	50	29	13.5	10
Pulse Width, single shot to 10 kHz	ps	< 30	< 30	< 25	< 25
Peak Power, single shot to 5 kHz	MW	2.3	1.7	0.9	0.7
Peak Power @ 10 kHz	MW	2.1	1.4	0.8	0.6
Average Power @ 10 kHz	mW	500	290	135	100
Long Term Power Stability (8 hrs)	%, rms	< 1.0	< 2.0	< 3.0	< 4.0
Pulse-to-Pulse Energy Stability	%, rms	< 1.0	< 2.0	< 3.0	< 4.0
Beam Diameter, $1/e^2$	mm	1.4	Available on request		
Polarization (linear)	%	> 99.5	> 99.9	> 99.9	> 99.9
Beam Divergence	mrad	< 1.2	< 2.0	< 3.0	< 3.0
Beam Pointing Stability (rms)	µrad	< 30	< 30	< 30	< 30
Pre-Pulse Contrast Ratio [1)]		$> 10^3 : 1$	$> 10^5 : 1$	$> 10^7 : 1$	$> 10^9 : 1$
Post-Pulse Contrast Ratio [1)]		$> 10^2 : 1$	$> 10^3 : 1$	$> 10^5 : 1$	$> 10^7 : 1$
Spatial Mode / M^2		TEM_{00} / M^2 < 1.2		TEM_{00} / M^2 < 1.5	
Repetition Rate	kHz	Single shot to 10 kHz			
Internal Trigger Repetition Rate	kHz	0.1 ... 10			
External Trigger Repetition Rate	kHz	Single shot to 10 kHz			
External Trigger Specifications		TTL (4.5 ... 5.5 V on 50 Ω load) Rising edge: < 10 ns; Pulse width: min. 250 ns, max. 1.3 µs			
Delay of Laser Pulse to TRIG IN	ns	~ 500			
Optical SYNC OUT Pulse	ps	Optional, jitter < 1 ps, rise time < 50 ps			
Electrical SYNC OUT Pulse		+5 V on 50 Ω load			
Jitter of Laser Pulse to External Trigger	ps, rms	3.5			
Delay SYNC OUT to Laser Pulse	ns	Adjustable from -100 to +1000			
Jitter of Electrical SYNC OUT Pulse	ps	50			

MECHANICAL CHARACTERISTICS

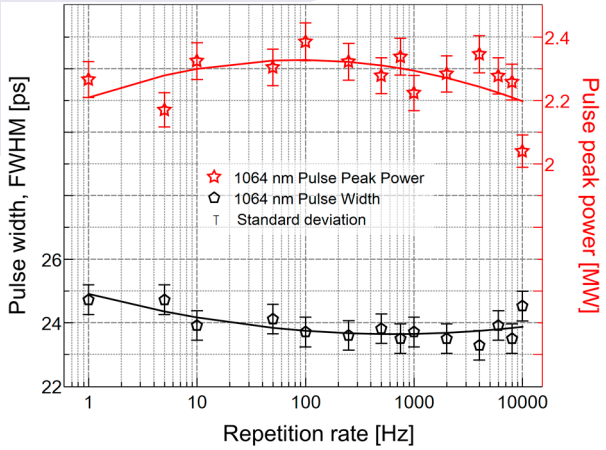
	Dimensions	Weight
Laser Head	165 x 95 x 700 mm^3	10 kg
Laser Diode Driver	130 x 65 x 105 mm^3	1 kg
Control Unit	105 x 65 x 105 mm^3	1 kg

GENERAL CHARACTERISTICS

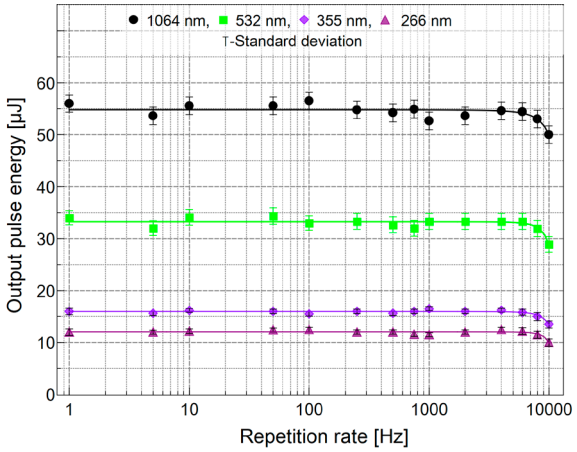
Power Requirements	+12 V DC, 5 A or 100 ... 240 VAC with AC/DC adapter
Power Consumption	< 30 W
Operating Temperature Range	15°C – 35°C
Cooling	Passive (convection)
Typical warm-up time	< 15 min
Beam height	Min. 93 mm, max. 103 mm, adjustable

Note: *[1)] Peak-to-peak with respect to residual pulses.*

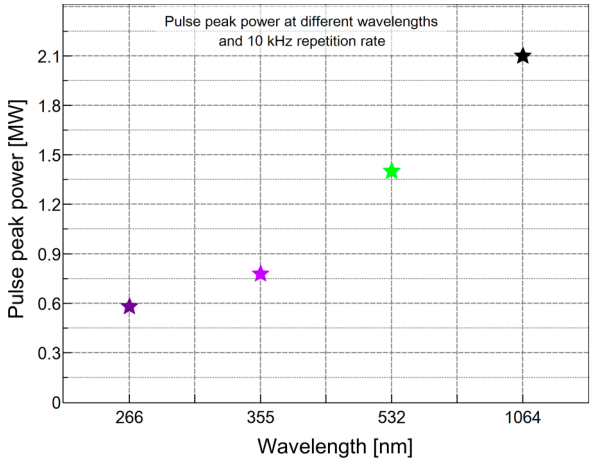
Performance of PICOPOWER™-RG1-1064-10K: Typical Values



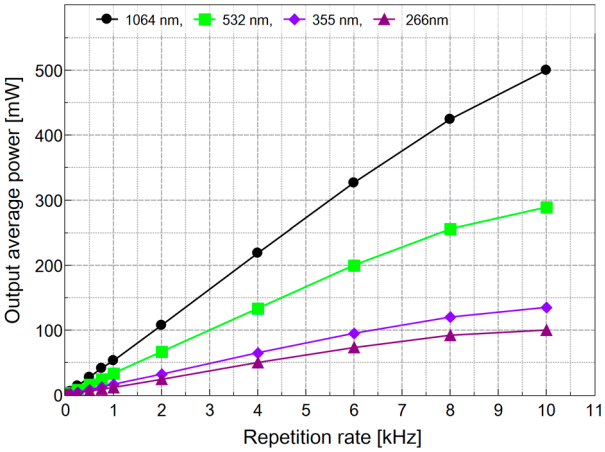
Pulse width and peak power at different repetition rates for 1064 nm wavelength.



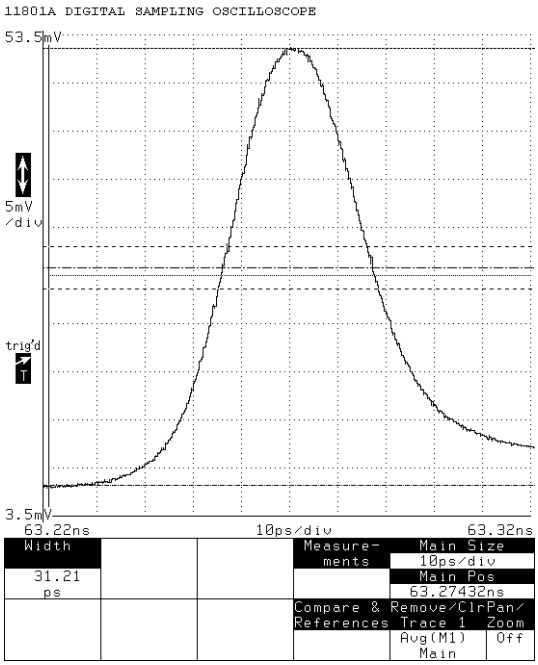
Pulse energy at different repetition rates for 1064, 532, 355 and 266 nm wavelengths.



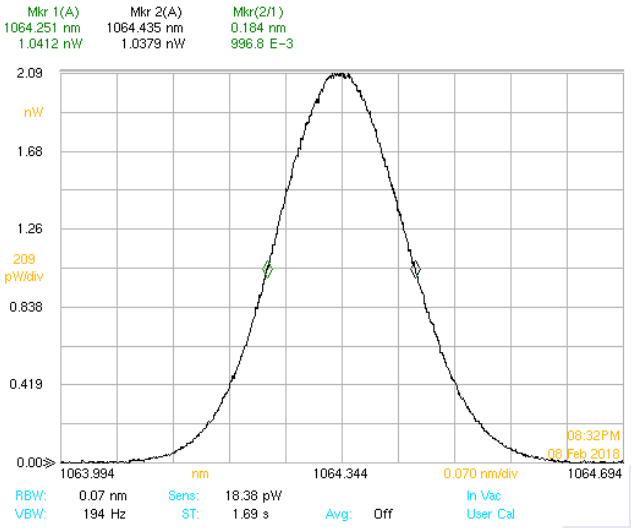
Peak power at 1064 nm and its harmonic wavelengths at 10 kHz repetition rate.



Average power at different repetition rates for 1064, 532, 355 and 266 nm wavelengths.



Pulse width at 1064 nm wavelength before deconvolution measured with 30 GHz photodetector.

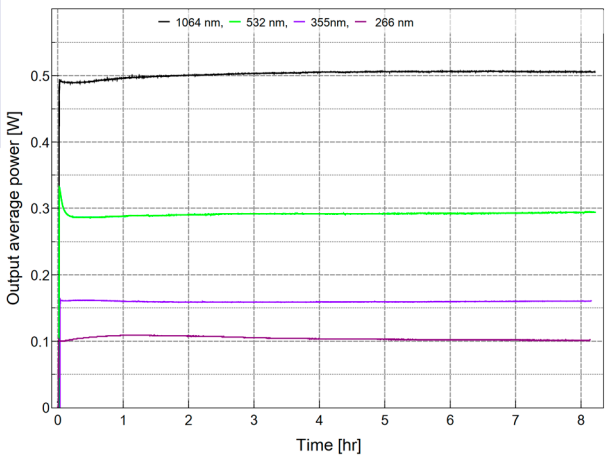


Spectral bandwidth at 1064 nm wavelength.

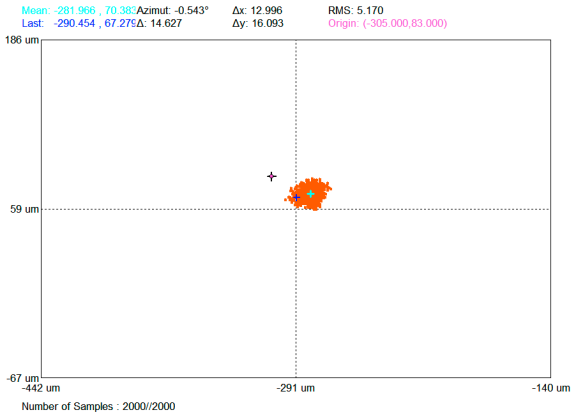
LASERS, OPTICS, ELECTRONICS
MADE IN GERMANY
WWW.ALPHALAS.COM

ALPHALAS™

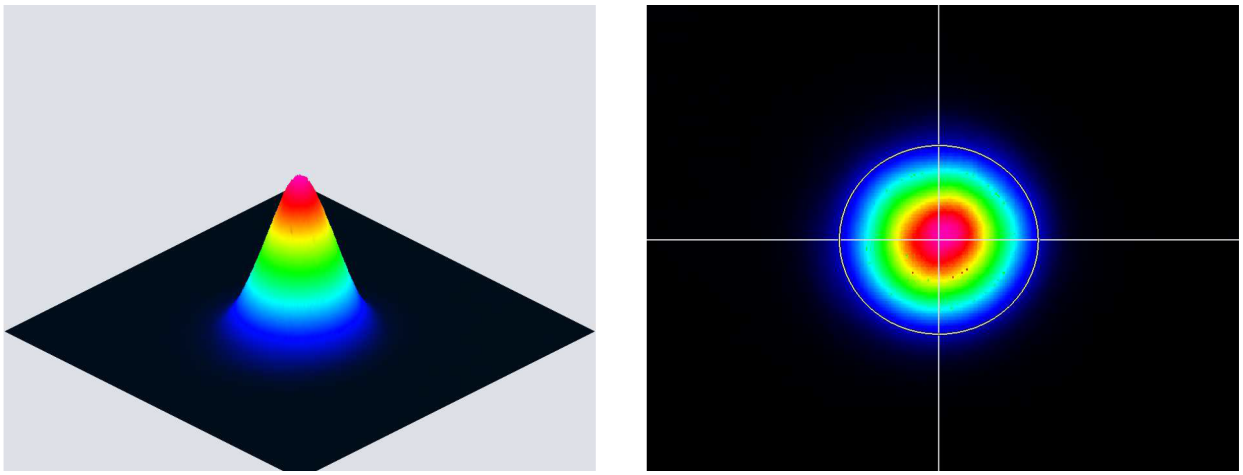
Performance of PICOPOWER™-RG1-1064-10K: Typical Values



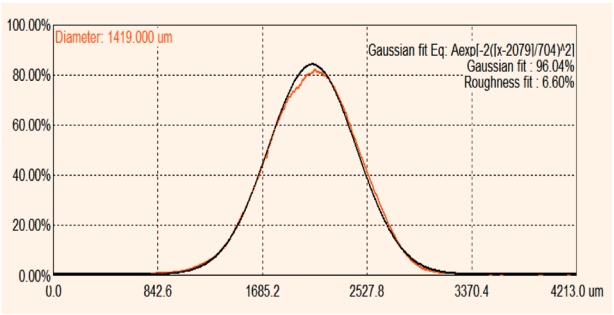
Long-term power stability at 1064 nm wavelength.

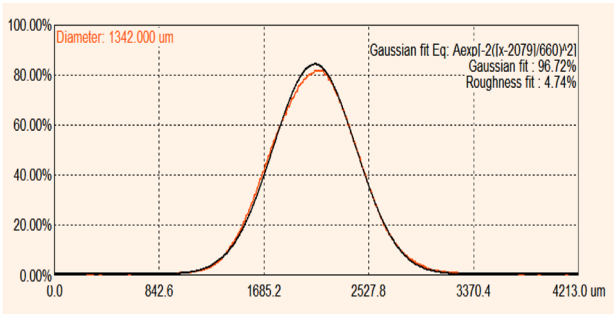


Beam pointing stability at 10 kHz repetition rate.

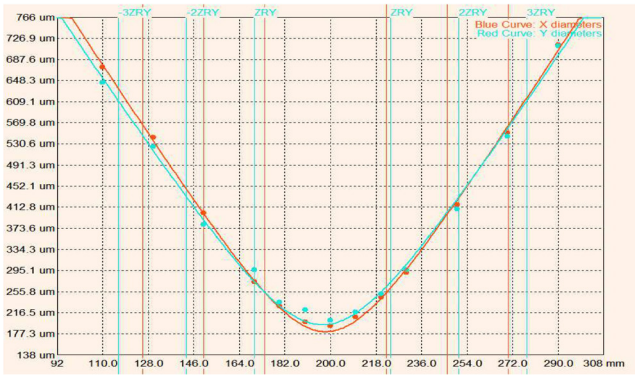


3D and 2D far-field beam profile measured at 540 mm distance from laser head for 1064 nm wavelength.





1D cross section and Gaussian fit showing nearly 95% overlap.



Beam quality measured at maximum output power according to ISO 11146 standard (± 5%).

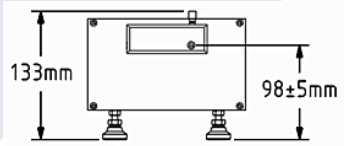
M^2_{eff} = 1.02

Div_{eff} = 0.93 mrad

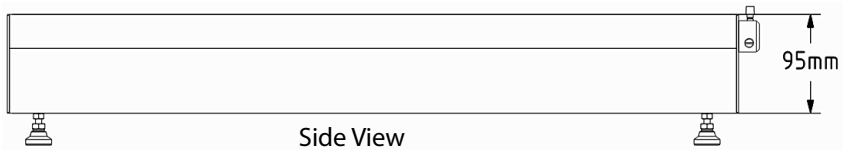
BPP_{eff} = 0.34 mrad*mm

$z0_{eff}$ = 1551 mm

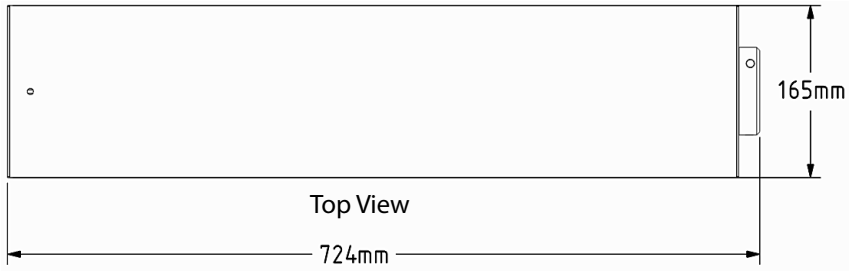
Outline Drawings of PICOPOWER™-RG1-1064-10K



Front View

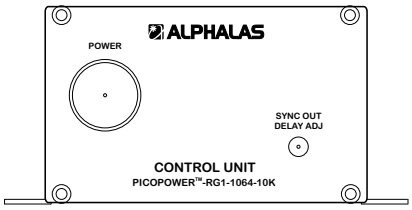


Side View

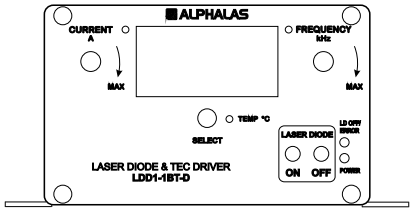


Top View

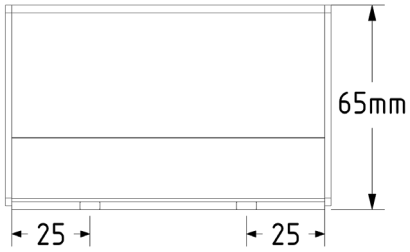
Outline Drawings of PICOPOWER™ Laser Diode Driver and Control Unit



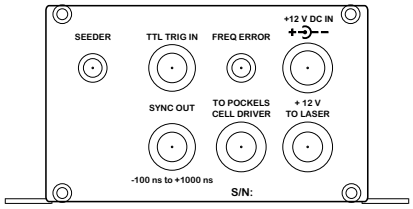
Control Unit
Front View



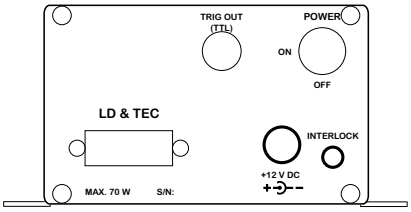
Laser Diode Driver
Front View



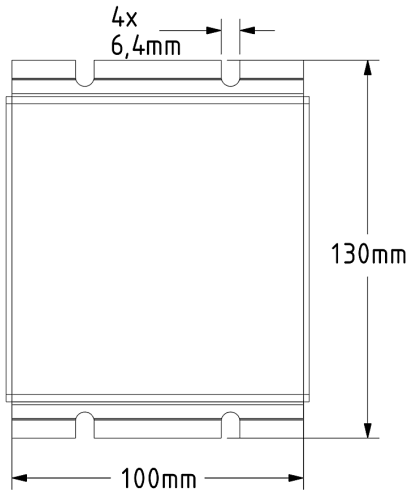
Side view



Control Unit
Back View



Laser Diode Driver
Back View



Top view

DANGER – VISIBLE AND INVISIBLE LASER RADIATION
AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION
CLASS 4 LASER PRODUCT
IEC / EN 60825-1

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