THE VALUE OF PERFORMANCE.

NORTHROP GRUMMAN

Gigashot™ FT
High Energy DPSS Laser

Northrop Grumman – Cutting Edge Optronics

(636) 916-4900 / Email: st-ceolaser-info@ngc.com

Gigashot™ FT Key Specifications

- Wavelength: 1064 nm (532 nm and 355 nm optional)
- Single Longitudinal Mode (optional)
- Pulse Energy: >320 mJ at 1064 nm
  >160 mJ at 532 nm
  >120 mJ at 355 nm
- Repetition Rate: 100 Hz
- Pulse Energy Stability: <1.0% rms
- Long Term Energy Drift: <2% rms
- Smooth Flat-top Beam Profile
- Beam Pointing Stability: <50 μrad

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Technical Approach:
All Diode Pumped Nd:YAG Laser

- MOPA (Master Oscillator Power Amplifier) structure
  - Energy and repetition rate scalable design
- EO-QS stable cavity oscillator
  - Injection seeding (optional) for single wavelength operation
  - TEM_{00} Gaussian beam profile
- Beam shaping
  - Smooth flat-top
- Relay-imaging amplification
  - Preserve smooth flat-top beam quality

- PowerPULSE™ diode pumped amplifiers (COTS)
  - Ultra-long life quasi-continuous-wave (QCW) diode bars (> 10 Billion shots)
  - Wide selection of pump energy and rod diameters

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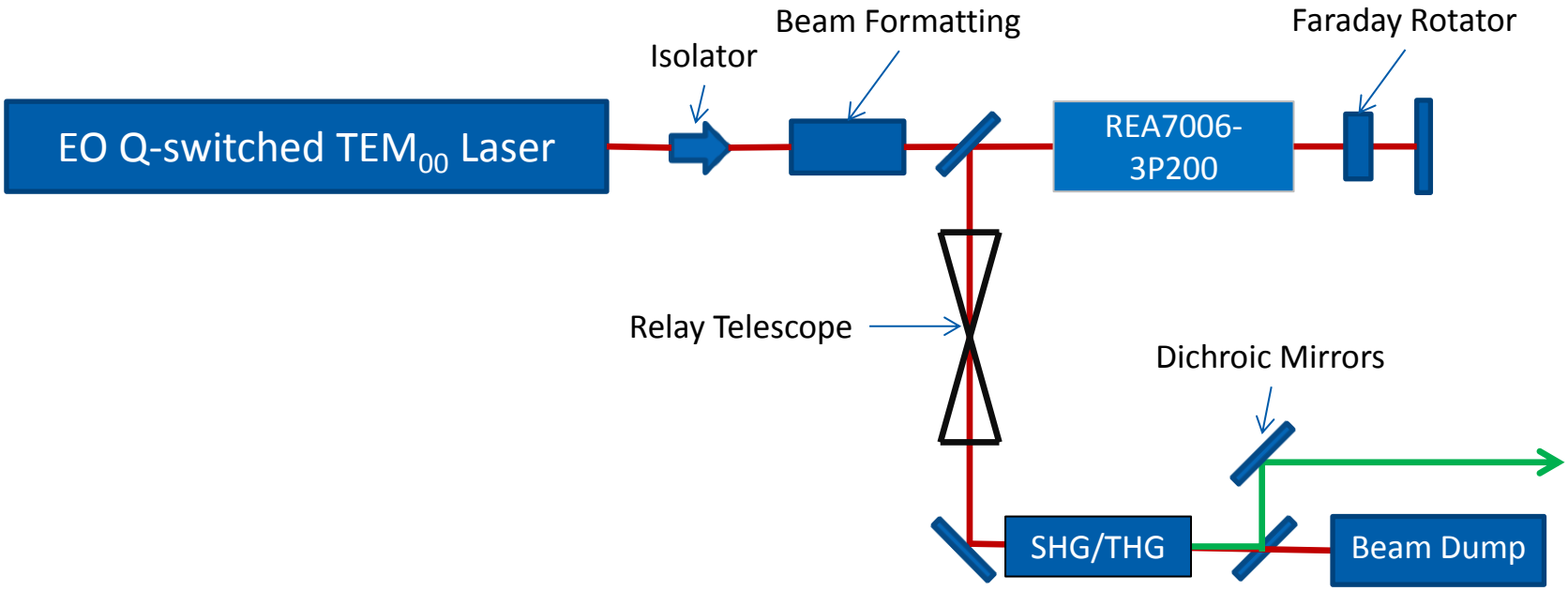
Layout of Laser



*SHG and THG are optional

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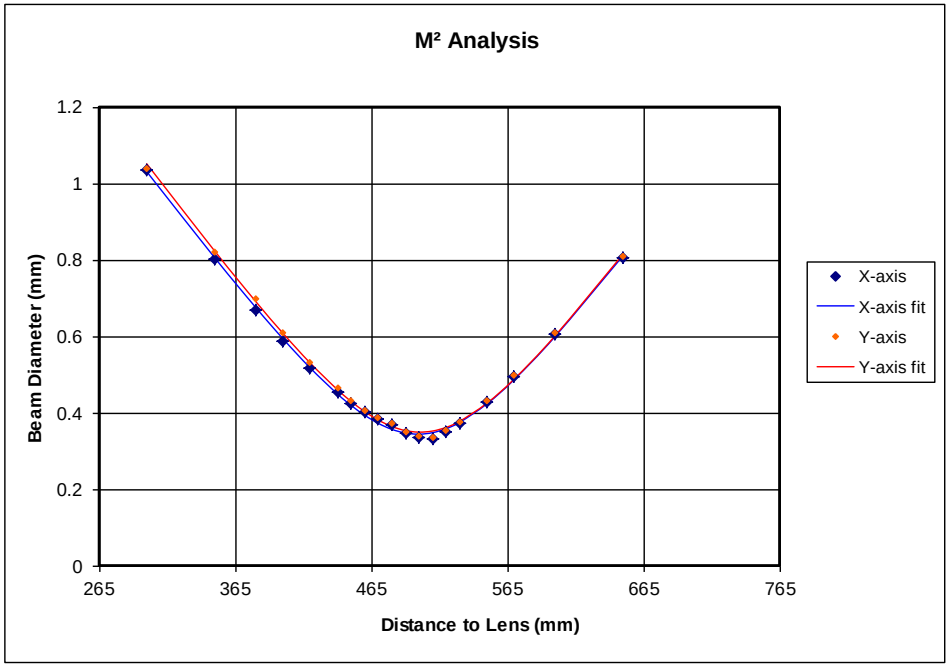
TEM_{00}, Injection Seeded Oscillator

- Single transverse mode operation: M^2 of < 1.3
- Stable center frequency
- Linewidth narrowed
- Smooth temporal profile
- < 10ns pulse width

Output Data			
	X-Axis	Y-Axis	Average
M^2	1.24	1.27	1.25
$2w_o$	0.344	0.349	0.347
z_o	499.35	500.88	500.11

		x	y	
Beam diameter at OW:	2ω	1.241711	1.246506	mm
Full angle divergence (1/e):	2θ	1.47131	1.506822	mrad
Full angle divergence (FWHM):	$2\theta_{FWHM}$	0.86513	0.886012	mrad
Rayleigh Length:	z_R	70.54	70.73	mm



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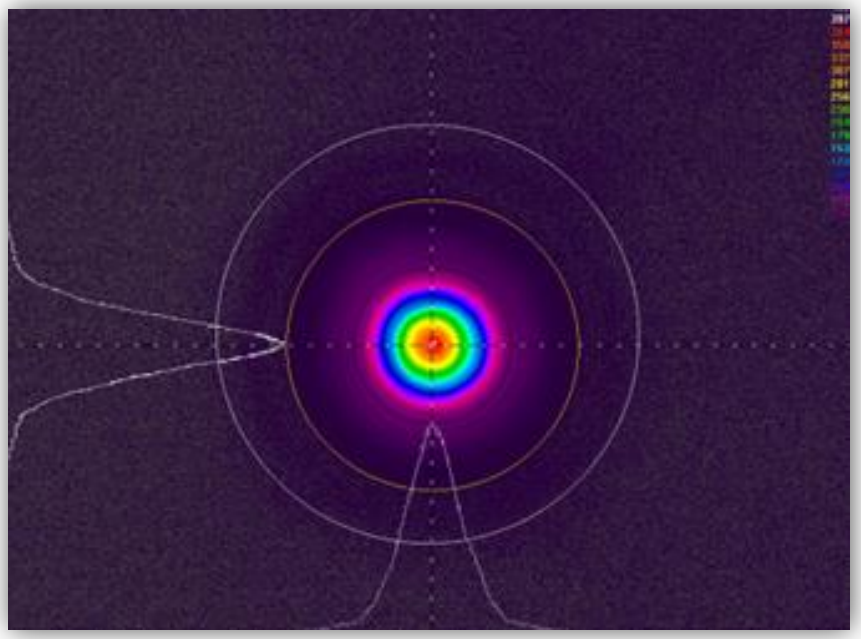
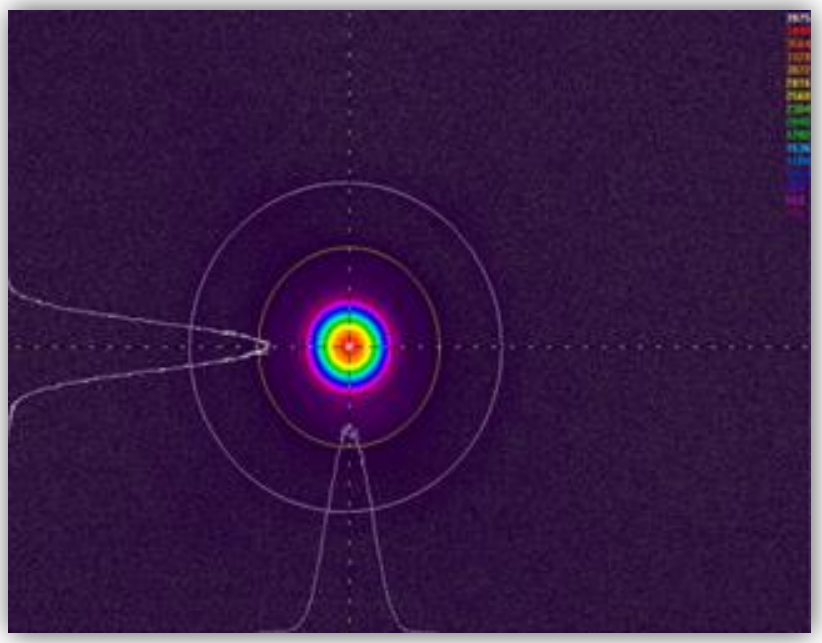
Oscillator Beam Profile

- Gaussian beam profile, near and far field.



Near Field Beam Profile



Far Field Beam Profile

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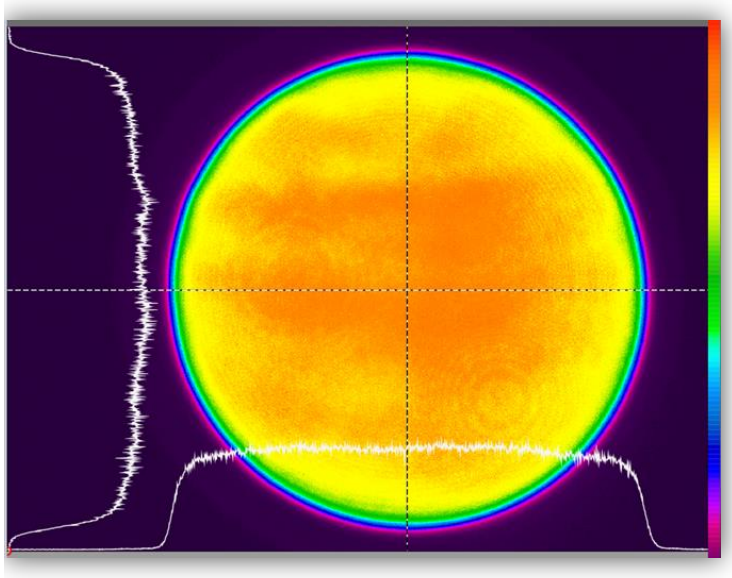
Beam Shaping - Flat-top Beam Profile

- After creation of a flat top beam profile, it must be maintained through the amplifier system.
- Relay telescopes are used to place the image of the beam near field at each amplifier.
- Amplification takes place on the flat top profile.



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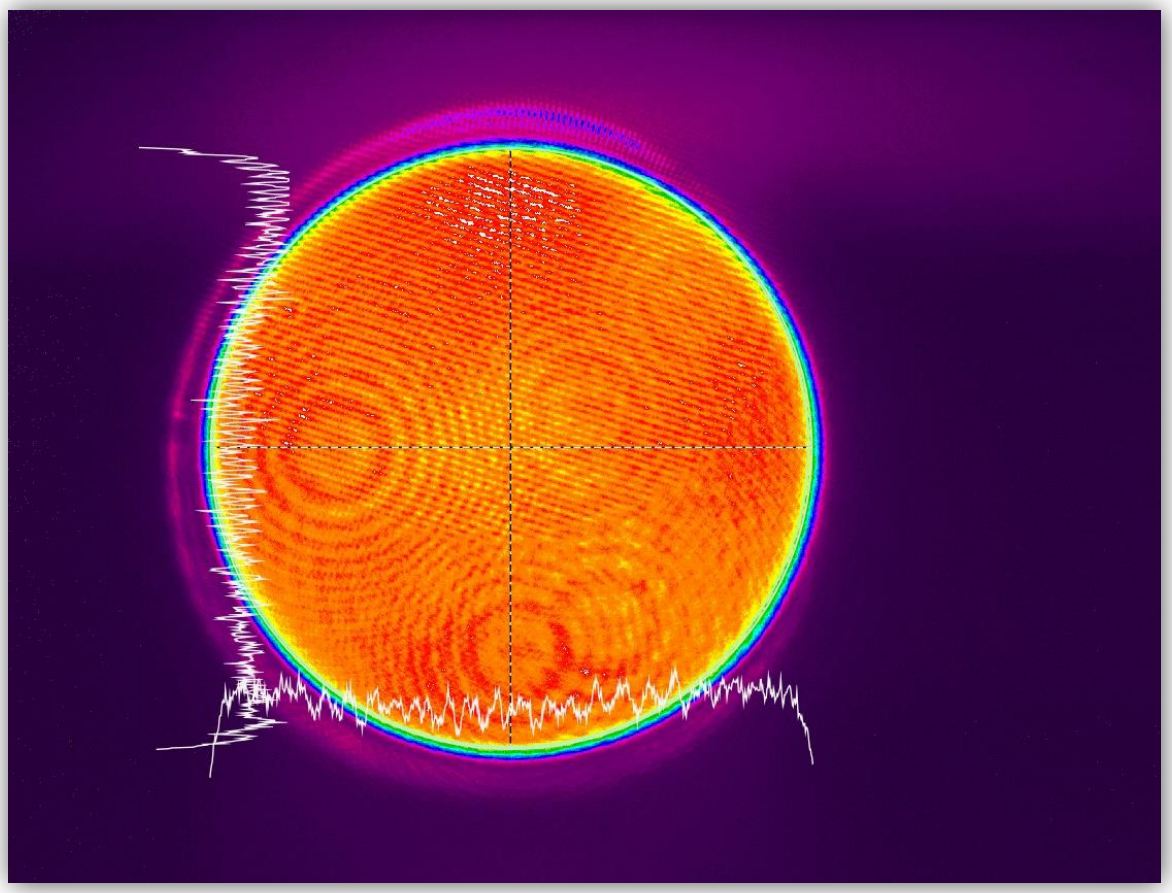
Beam Profile at 1064 nm, 350 mJ



Near Field Beam Profile

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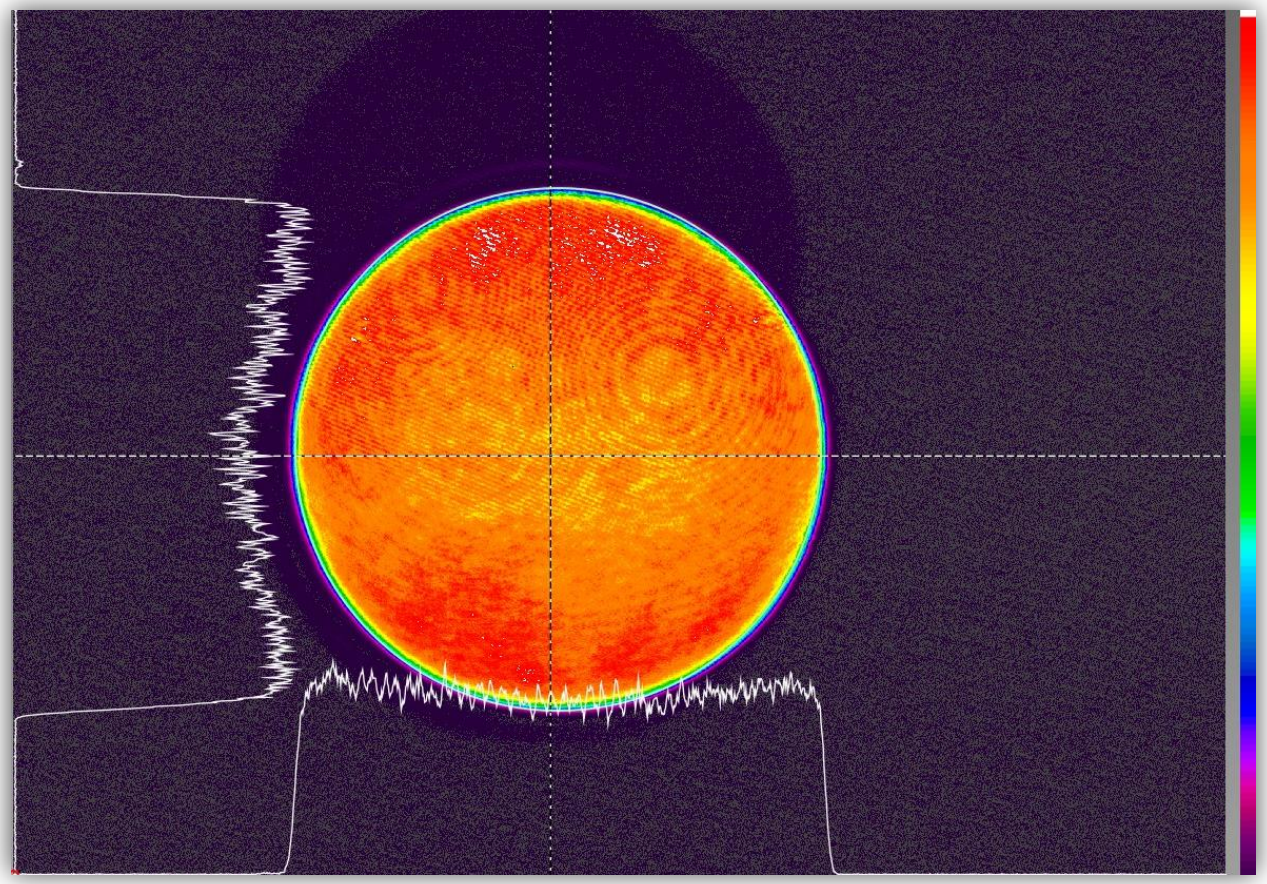
Beam Profile at 532 nm, 180 mJ



Near Field Beam Profile

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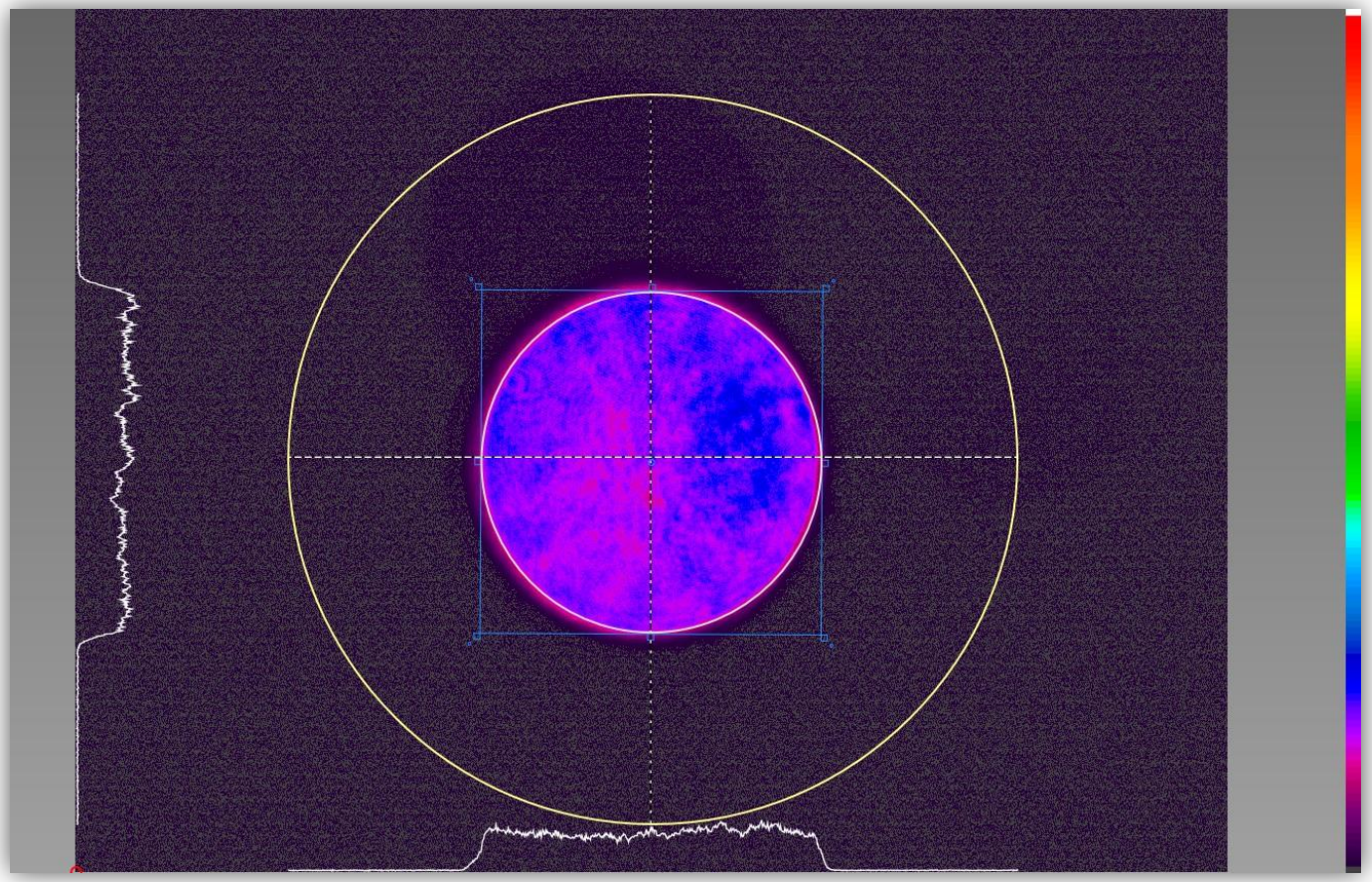
Beam Profile at 355 nm, 140 mJ



Near Field Beam Profile

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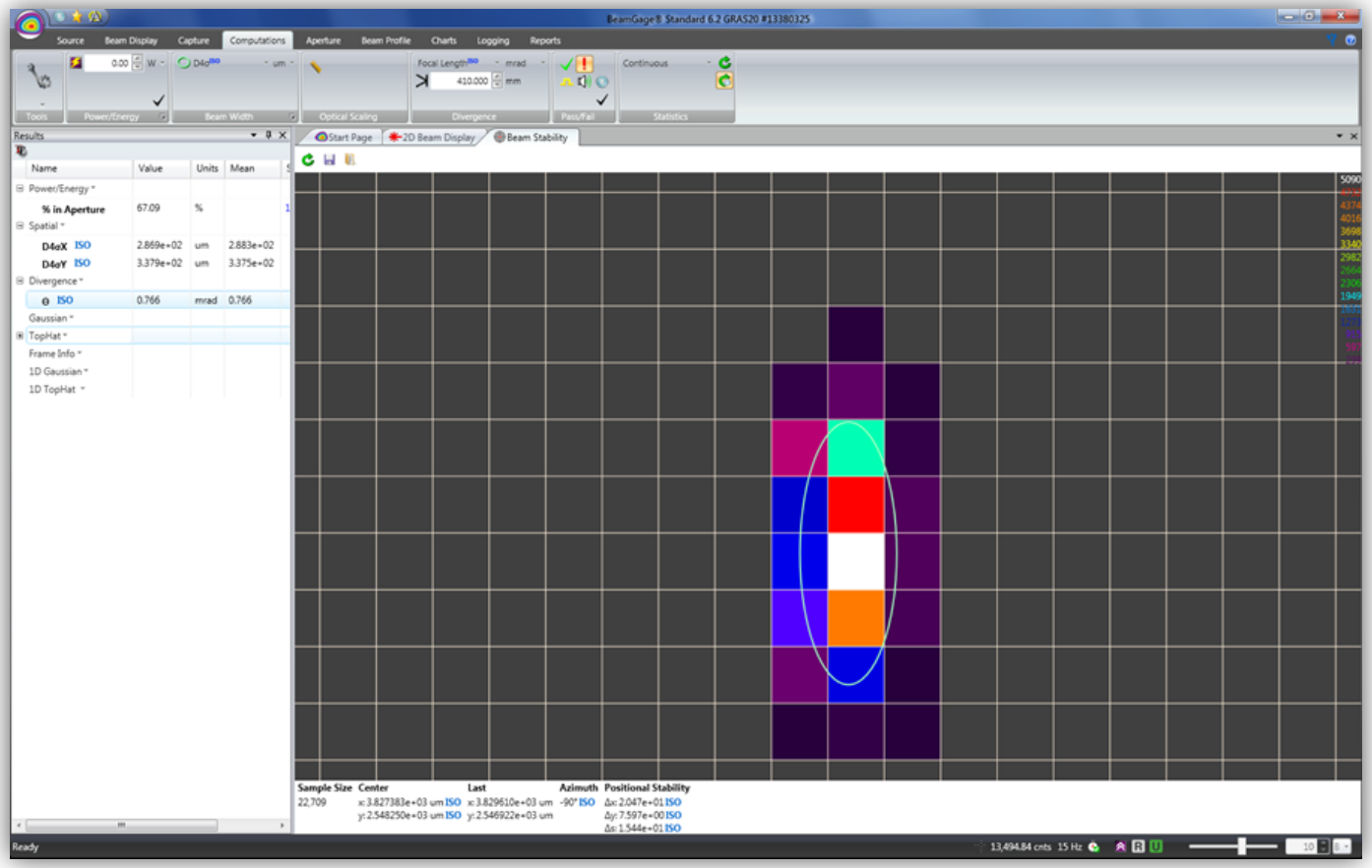
Beam Pointing Stability at 355nm

- Beam pointing stability of the laser is < 40 µrad over one hour.



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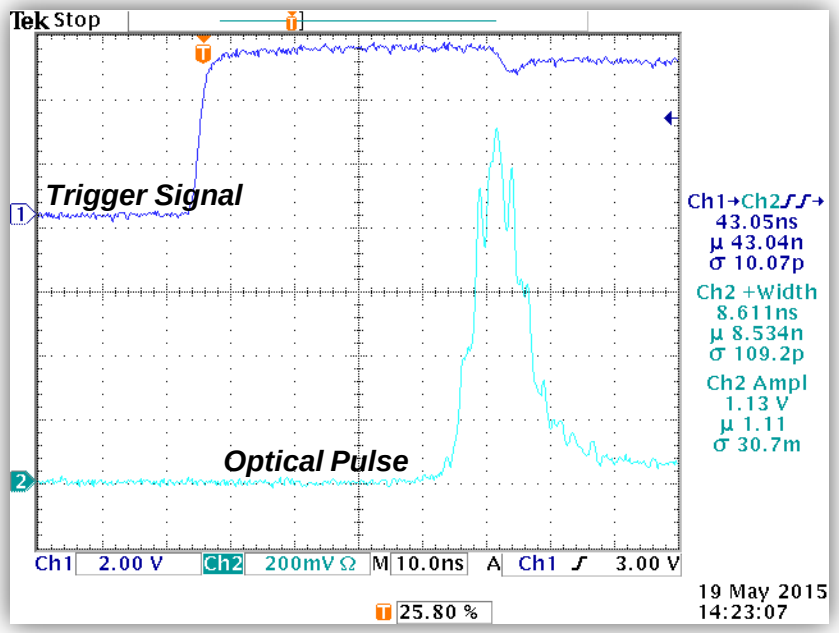
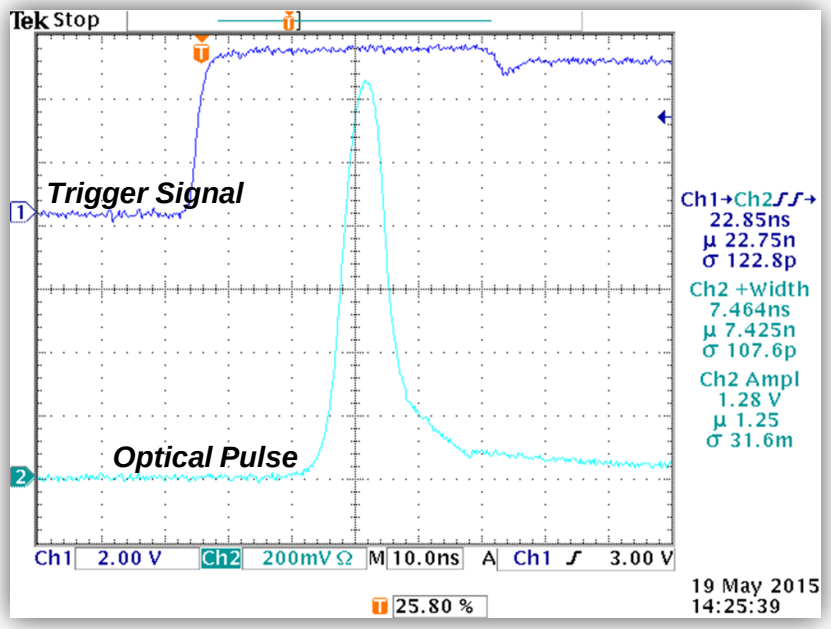
Temporal Profile

- Smooth temporal profile, < 10ns pulse width.





Unseeded

Seeded

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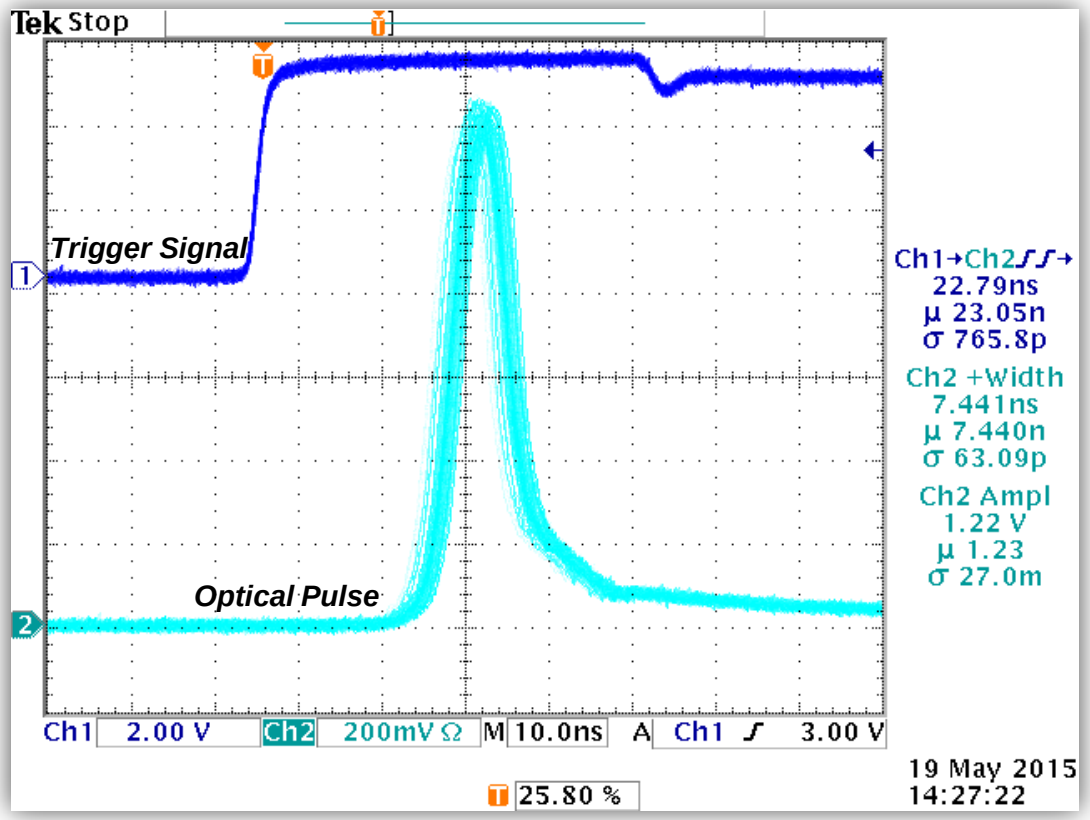
Pulse Width and Jitter

- Pulse width is 7.4 ns, smooth, and with a jitter < 0.5 ns measured from external trigger to light output.



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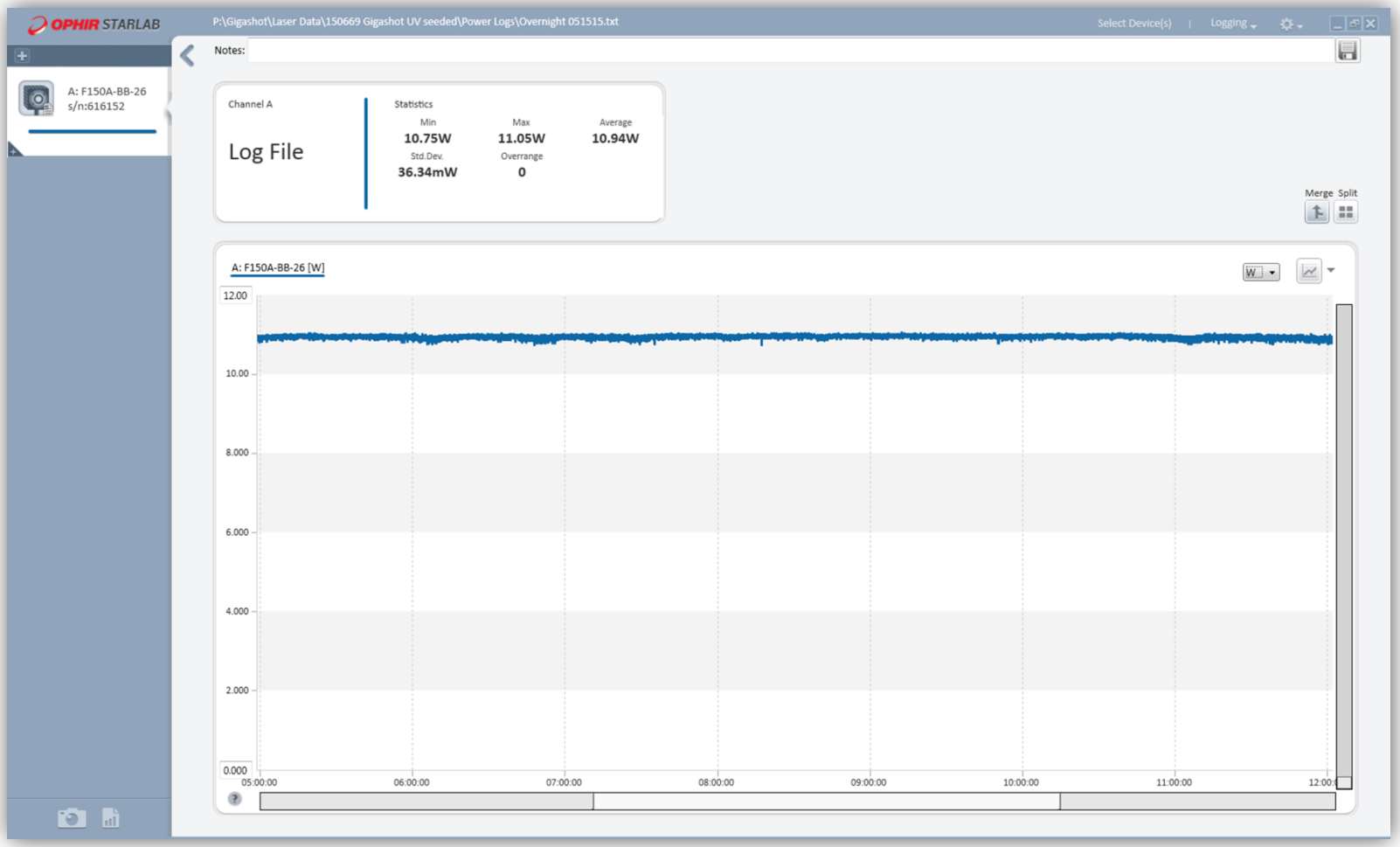
Long Term Energy Stability

- Energy stability at 355 nm is better than 0.5% rms over a 7 hour period.



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Gigashot™FT High Energy DPSS Laser

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- DPSS high energy commercial laser with operation at 1064 nm, 532 nm, and 355 nm @ 100 Hz with injection seeding has been demonstrated.
- Smooth flat-top beam profile is ideal for scientific applications such as pumping Ti:Sapphire and OPOs where gain uniformity is key.
- High pulse-to-pulse energy stability.
- Superior long-term pulse energy stability.
- Low maintenance, ‘hands-off’ operation.
- Long life, energy efficient diode pumping.
  - (2 yr/10,000 hr diode warranty)
- Customized versions available.

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