

Advanced Tunable Diode Laser



Future of Spectroscopy and Imaging System

We provide high-performance tunable diode lasers,
which open up new era of spectroscopy and imaging.



Spectra Quest Lab. Inc

Spectra Quest Lab, Inc.

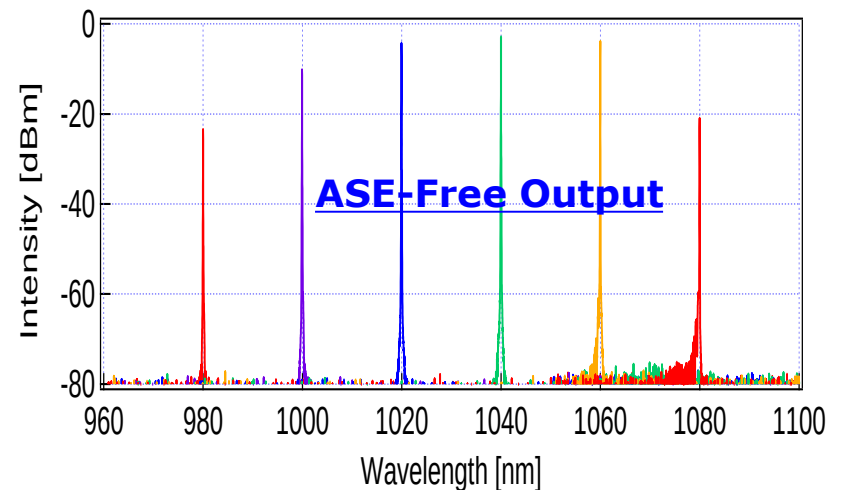
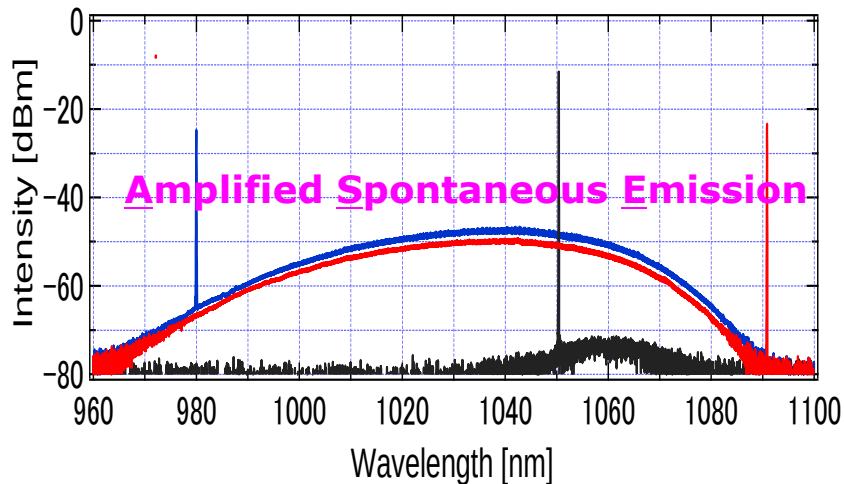
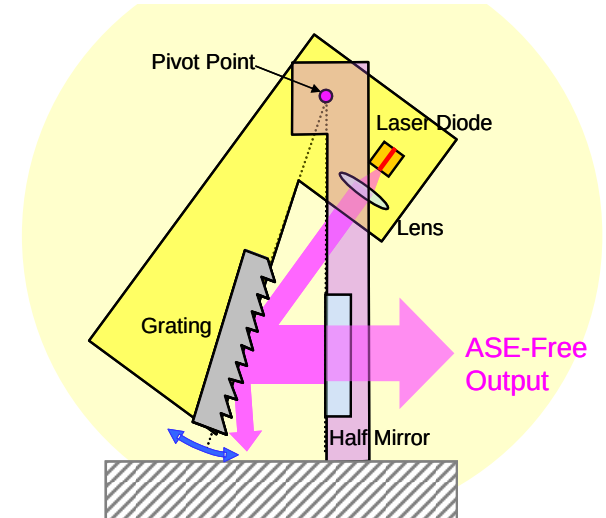
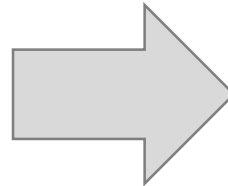
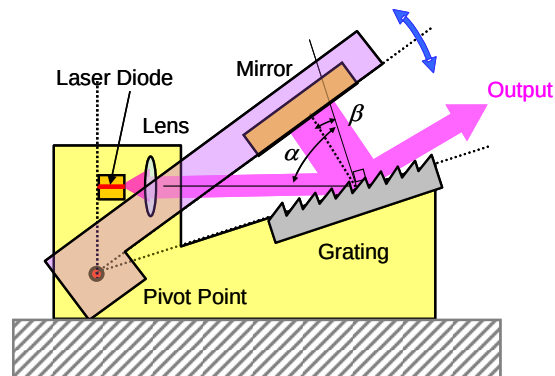
***Spectra Quest Lab was founded in 2013,
Chiba-University Inohana Innovation Plaza,
based on the heritage of JST Sentan Project
“High Power and Widely Tunable Diode laser”.
Our products are based on “patented design
of laser cavity” and “high-power gain chips”,
which were specially developed for tunable
diode laser by OPTOENERGY, Inc.***

Transposed Littman Configuration

United States Patent
Muro et al.

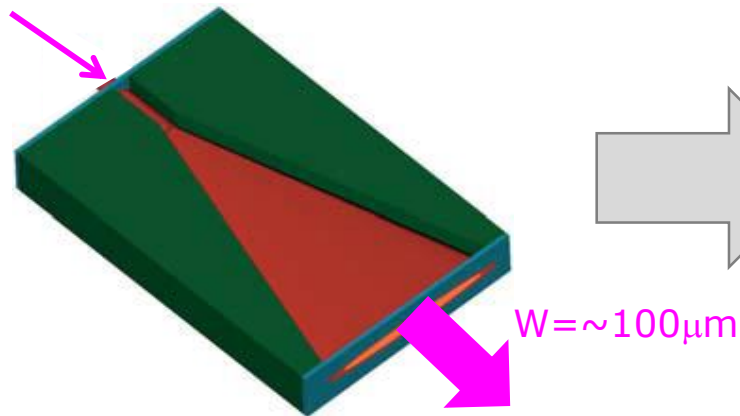
(10) Patent No.: US 9,042,422 B2
(45) Date of Patent: May 26, 2015

Littman Configuration

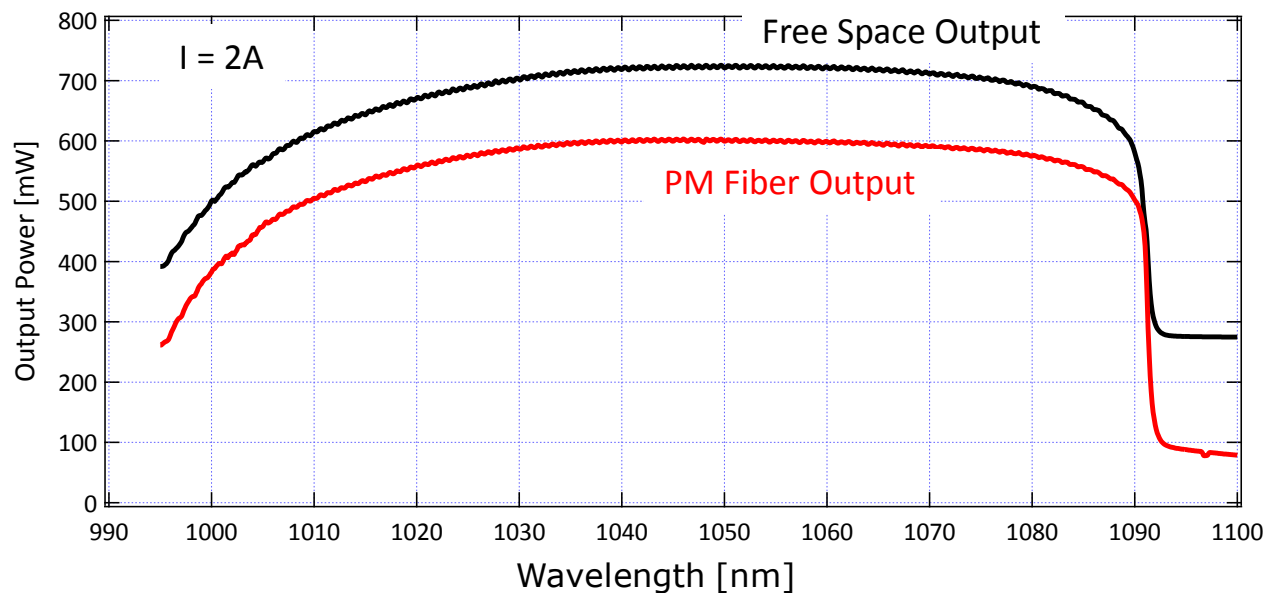
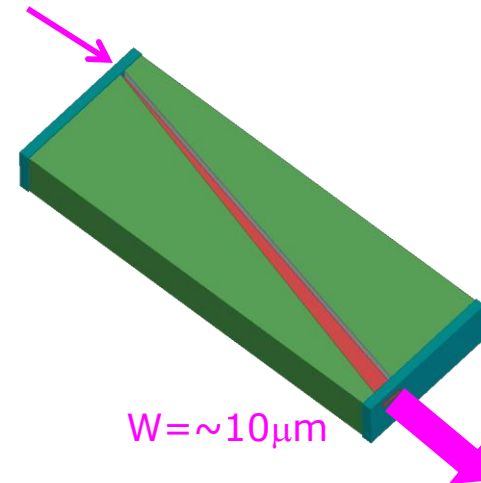


High-Power & Wide-Band SOA Chip

Flared Taper Amplifier



Angled Narrow Taper Amplifier



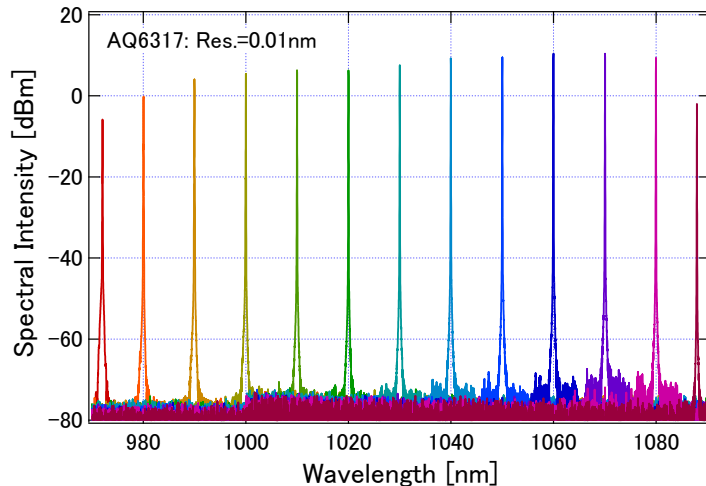
1 μm Band, ASE-Free Tunable Diode Laser

 **Lambda-Master 1040**

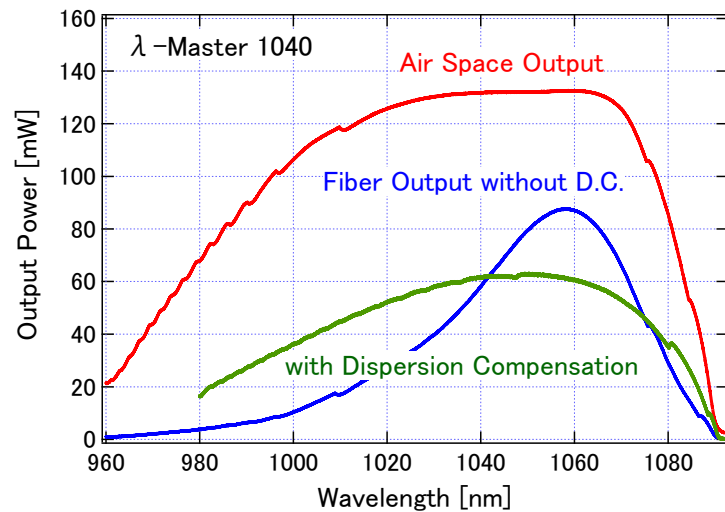


- ☐ High Spectral Purity : 80dB@ 0.01nm
- ☐ High Output Power : 100 mW (Free Space)
50 mW (PM Fiber)
- ☐ Wide Band Tuning : > 100 nm
980~1090nm, 920~1000nm
- ☐ Mode-Hop-Free Tuning : > 50 nm
- ☐ Narrow Linewidth : < 100 kHz (10 μs)
- ☐ High Res. Digital Control : 0.1 pm
- ☐ High Speed Tuning : 30 nm / s
- ☐ Built-in Data Acquisition : 16bit- 2ch.

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Wavelength Stabilized Diode Laser

*Compact & low-cost tunable diode laser with PZT & Manual Tuning.
ASE-Free and Mode-Hop-Free Operation are realized at any wavelength.*

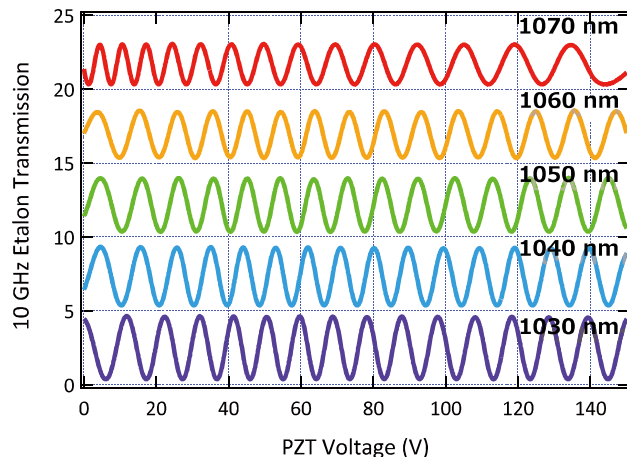
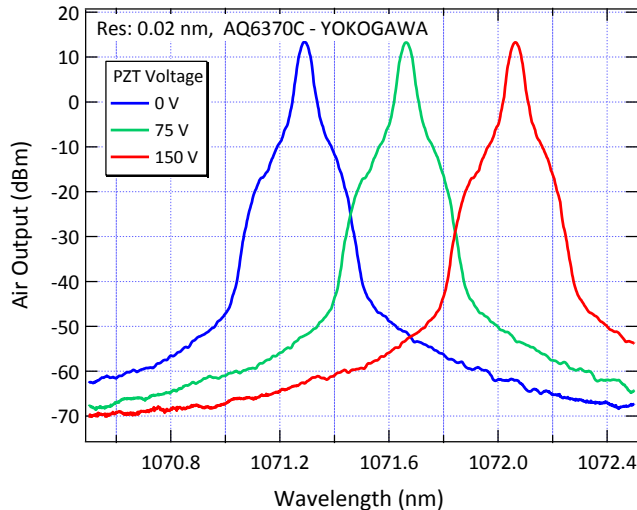
 **Λ-Lock 1040**



- ❑ ASE-Free Output : Free Space : 100 mW,
Fiber Output : 50 mW
- ❑ Manual Tuning Range : 980 ~ 1080 nm,
920 ~ 990 nm
- ❑ Mode Hop Free Tuning by PZT : 0.5 nm
- ❑ Laser Linewidth : < 100 kHz (10 μ s)
- ❑ Build-in Isolator and Fiber Port (Optional)
- ❑ Frequency Lock by Invar Etalon (Optional)

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1 W-100 nm High-Power & Wide-Band SOA

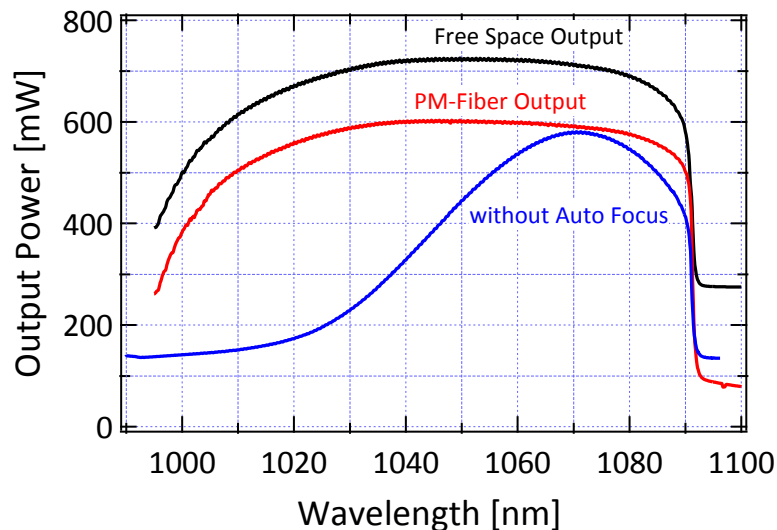
Combined with λ -Master Series

 λ -Amp 1040



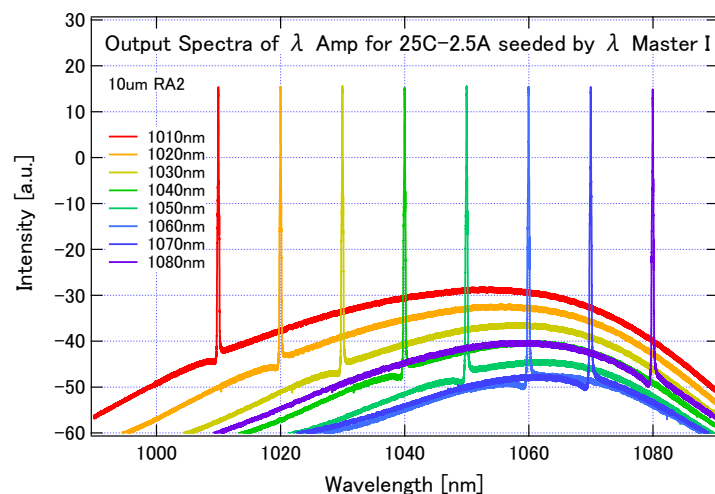
- ❑ Wide Gain Band : 980~1085nm,
920~1010nm
- ❑ High Power : 1 W (Free Space)
600 mW (Fiber Output)
- ❑ Polarization Ratio : >100 / 1
- ❑ Excellent Beam Quality : $M^2 \sim 1.1$
- ❑ Fiber Coupling : >50% over Gain Band
- ❑ APC Control : against Time & λ -Sweep
- ❑ External Modulation : 0 ~ 20 kHz

1 W-100 nm High-Power & Wide-Band SOA



Combined with λ -Master Series

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- ❑ **High Power : 1 W (Free Space) 600 mW (Fiber Output)**
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1 ns-Pulse Semiconductor Optical Amplifier

-Impulse 1040 -Impulse 950

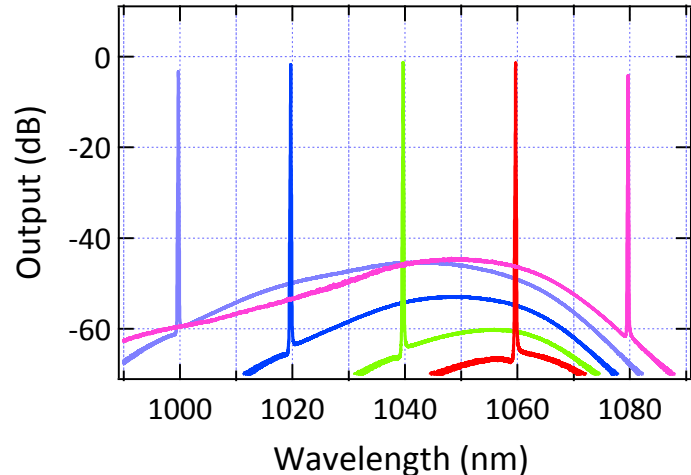
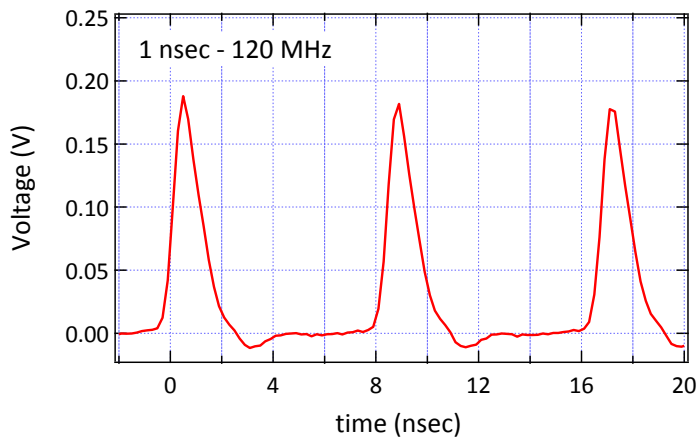


Combined with λ -Master or λ -Lock

- ☐ 1ns Fourier Limit Pulse : SW: 250MHz
 - 50ps Pulse Sharper : Option
- ☐ Pulse on demand : up to 250MHz
 - Int./Ext. Trigger
 - Build-in Delay Unit : 10ns with 10ps res.
- ☐ High Peak Power : Max. 1.5 W (Fiber Out)
 - PM Fiber-In, PM Fiber Out
- ☐ High Polarization Ratio : >30dB
- ☐ Wide Gain Band : 980~1085nm,
920~1010nm
- ☐ Very High Extinction Ratio : >70dB@1MHz
 - Suitable for Fiber Amp Seeding

1 ns-Pulse Semiconductor Optical Amplifier

 -Impulse 1040  -Impulse 950



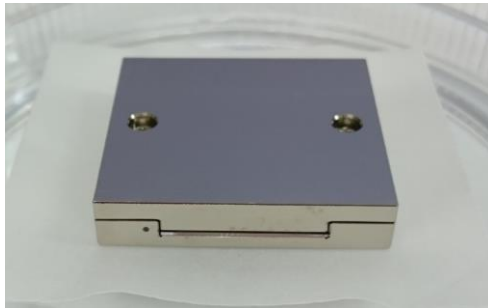
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Second Harmonic Conversion Unit

λ -Master Visible

24 Elements PPMgSLT Device



SHG Unit



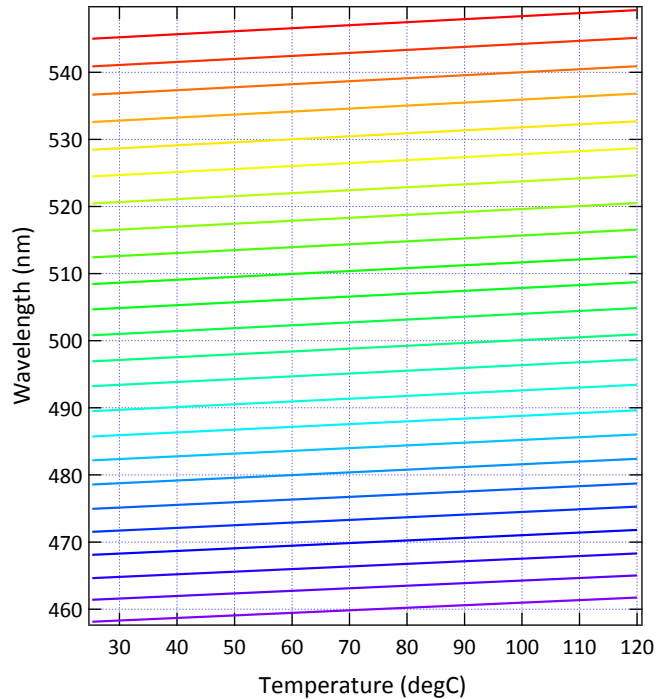
- ❑ Wide Tuning Range : 455 ~ 550nm
 - 24 Elements PPMgSLT Device
 - Automatic Selection of Device
- ❑ Mode Hop Free Tuning Range : 4nm
 - Synchronized Scan of T and λ
 - User Friendly Computer Control

When used with λ -Master and λ -Amp

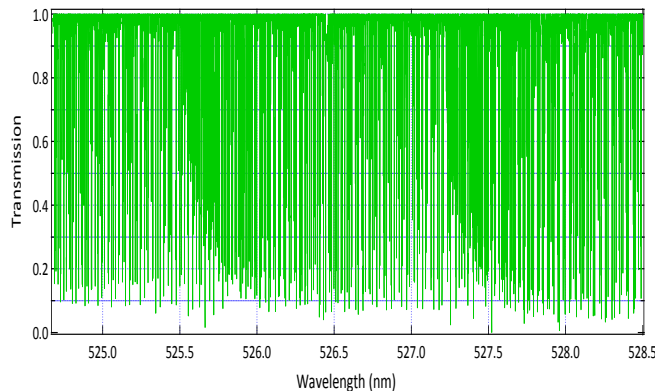
- ❑ SHG Power : ~ 5mW
- ❑ High Spectral Purity : >80dB
- ❑ Narrow Linewidth : <200kHz (10 μ s)
- ❑ High Res. Digital Control : 0.1pm

Second Harmonic Conversion Unit

Phase Matching of Devices



Absorption lines of iodine gas



- ☐ **Wide Tuning Range : 455 ~ 550nm**
 - **24 Periods PPMgSLT Device**
 - **Automatic Selection of Device**
- ☐ **Mode Hop Free Tuning Range : 4nm**
 - **Synchronized Scan of T and λ**
 - **User Friendly Computer Control**

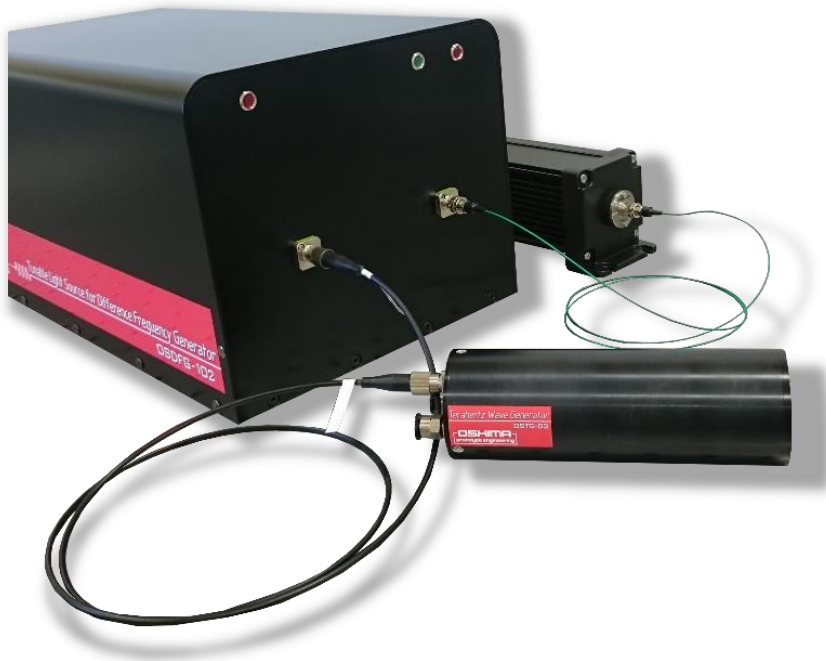
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Tunable Coherent Terahertz Light Source

This system utilizes UTC-PD (NTT-EL) as a Terahertz mixer.

λ -Master 1040 and λ -Lock 1040 are used as mixing light sources.



□ High-Power by UTC-PD

- Max. 1 μ W

□ Wide Band Freq. Tuning

- 0.3 ~ 4.5 THz

□ Rapid, High Res. Tuning

- Max 4 THz/sec Sweep
- Digital Res. : 3 MHz

□ High Spectral Purity

- Dynamic Range: > 50dB

□ Narrow Linewidth

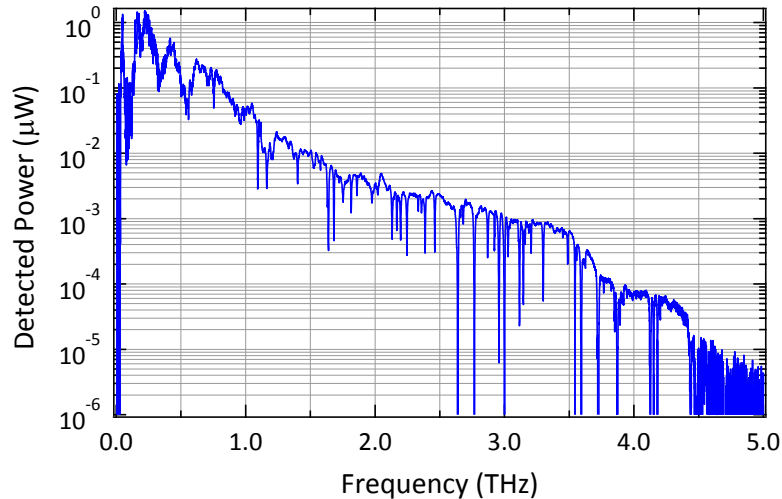
- 100 kHz (10 μ sec)

□ Zero Freq. Calibration

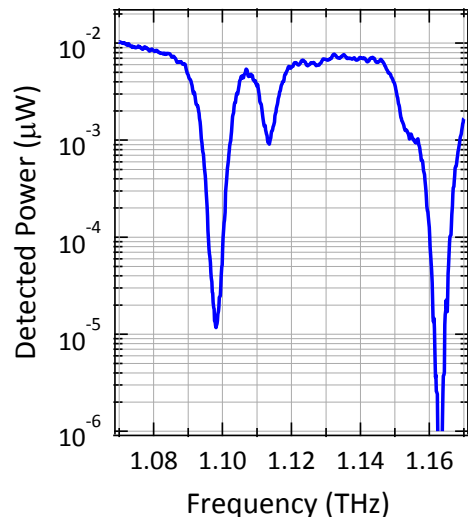
□ Freq. Calib. by Etalon

Tunable Coherent Terahertz Light Source

Frequency Dependence of Emitted Terahertz Power



Expanded Chart of Water-Vapor Lines



❑ High-Power by UTC-PD

- Max. 1 μW

❑ Wide Band Freq. Tuning

- 0.3 ~ 4.5 THz

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- Max 4 THz/sec Sweep
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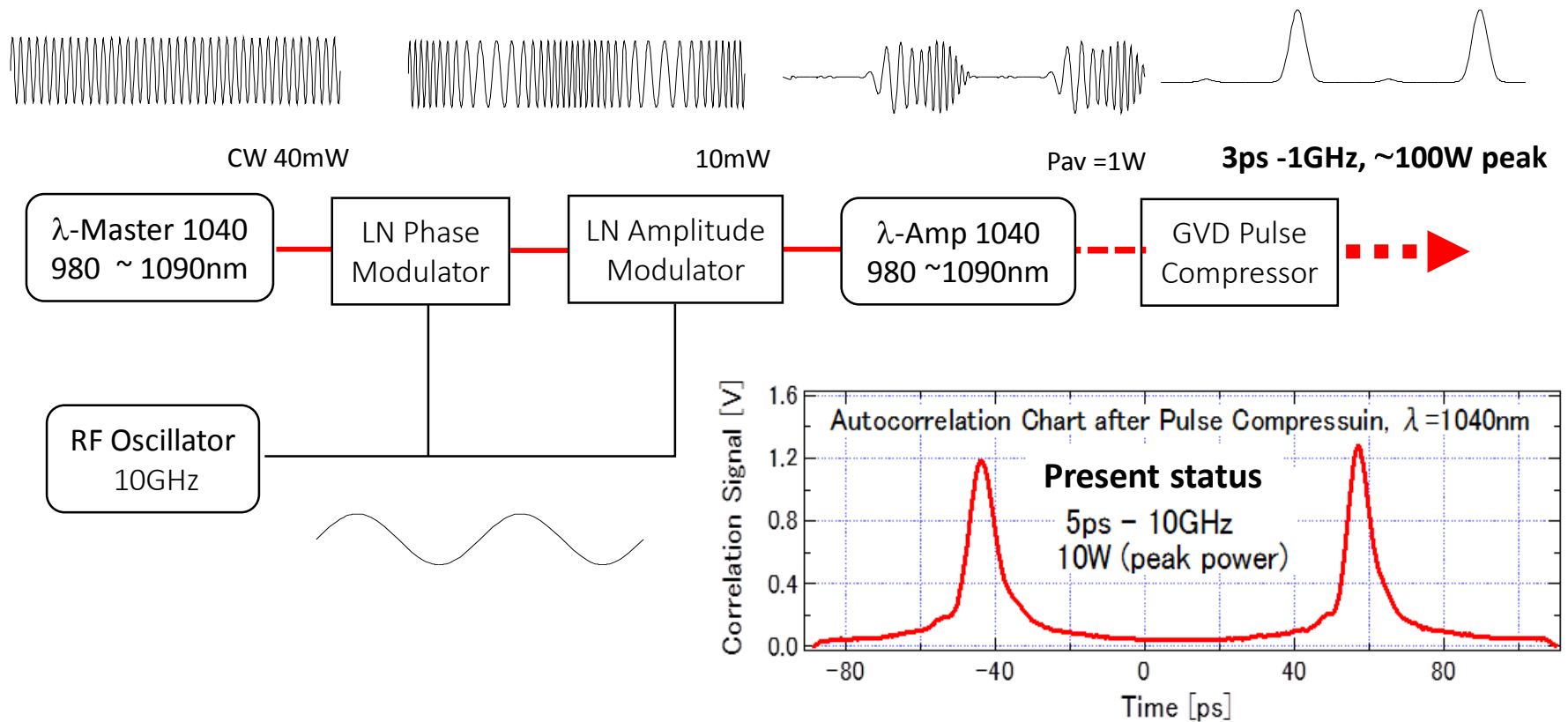
- 100 kHz (10 μsec)

❑ Zero Freq. Calibration

❑ Freq. Calib. by Etalon

Tunable Pico-Second Pulse Synthesizer

Now we are developing tunable pico-second laser by pulse carving technology, based on our semiconductor based laser technologies.



Thank you for your attention !

We are challenging toward the innovation of spectroscopy.

*If you have any possible co-operative item with us,
please contact us through our website.*

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info@spectraquestlab.com



Spectra Quest Lab. Inc