InnoSpectra Corporation

# Quick Start Guide

# for

# NIR-M-T1 / NIR-M-T11

**Feb. 8, 2022**

RISE

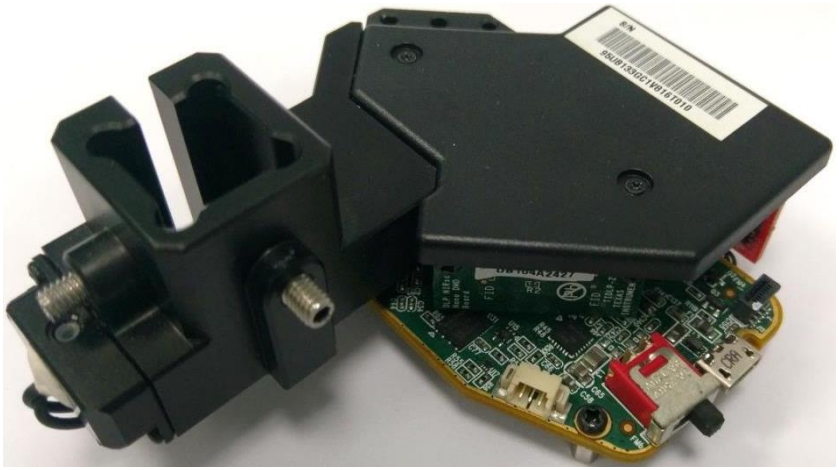
Responsibility Innovation Superiority Entrepreneurship

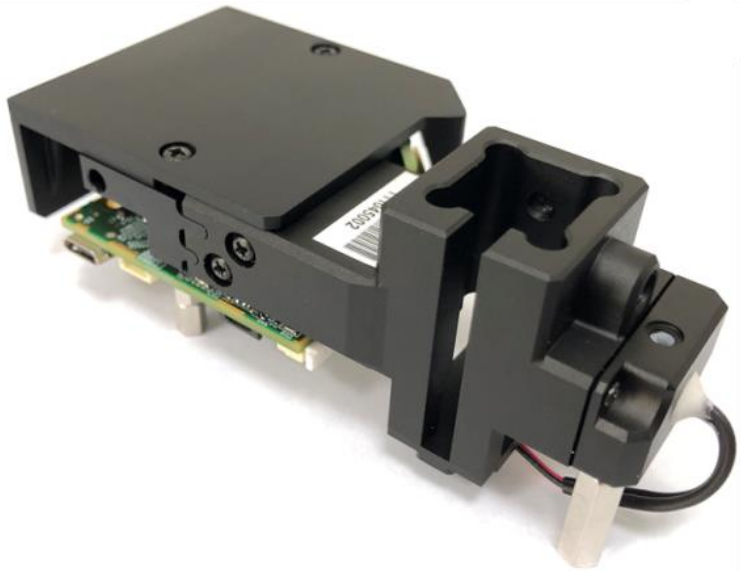
# Specification

| Model | NIR-M-T1 | NIR-M-T11 |
|---|---|---|
| Size | **91.8mm * 76mm * 41.2mm** | **96mm * 48mm * 38.2mm** |
| Weight | **<106g** | **<100g** |
| Sampling method | Transmission | |
| Cuvette holder | **Path length=10mm, Z-dimension=4.75mm** | **Path length=10mm, Z-dimension=15mm** |
| Wavelength range | **900-1700nm** | **1350-2150nm** |
| Wavelength accuracy | < +/- 1nm typical (verified with RM-NIR) | |
| Resolution (FWHM) | **Typical 10nm, Maximum 12nm** | **12nm @ 1530nm LD** |
| SNR | > 5000:1 in 1s scan | |
| Slit width | 25um | |
| Dispersing element | Plane grating | |
| Wavelength selector | TI DMD DLP2010NIR, 854x480 pixels | |
| Pixel to wavelength | 1.17nm/pixel in average | |
| Scan capability | Linear/Hadamard/Slew scan | |
| Scan pattern | Programmable, up to 624 patterns | |
| Detector | Single element 1mm InGaAs detector<br>Equivalent to 128 pixels (scan pattern=6px, no overlapping)<br>Equivalent to 256 pixels (scan pattern=6px, with overlapping) | |
| Exposure time | 0.635ms~60.960ms | |
| ADC | 24-bit | |
| Measurement time | Depends on scan configuration | |
| Connectivity | USB, UART, BLE (optional) | |
| Wireless scan | via BLE (optional) | |
| APP | iOS, Android | |
| Data format | CSV/ DAT/ JDX | |
| Illumination source | One integrated halogen tungsten lamp, 0,7W *1 | |
| Power | USB (500mA@5V) | |

# What's inside the box

- NIR-M-T module (x1) with cuvette holder and light source
- Ball plungers (x3) for cuvette alignment
- Allen wrench (x1) for ball plunger adjustment

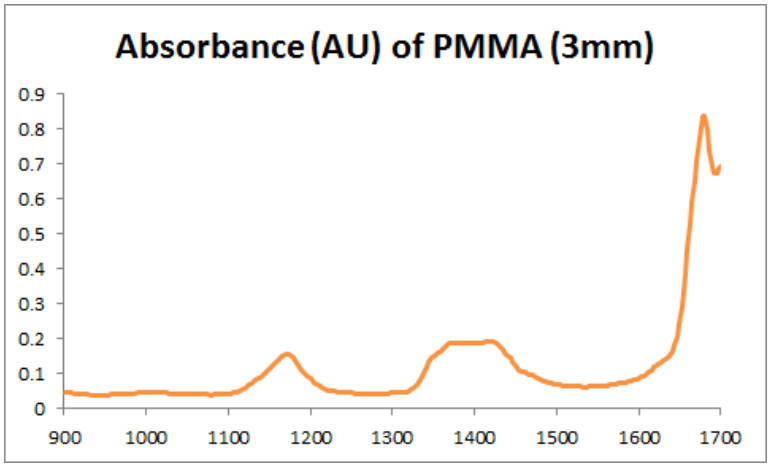




# Cuvette Types

Cuvette Types

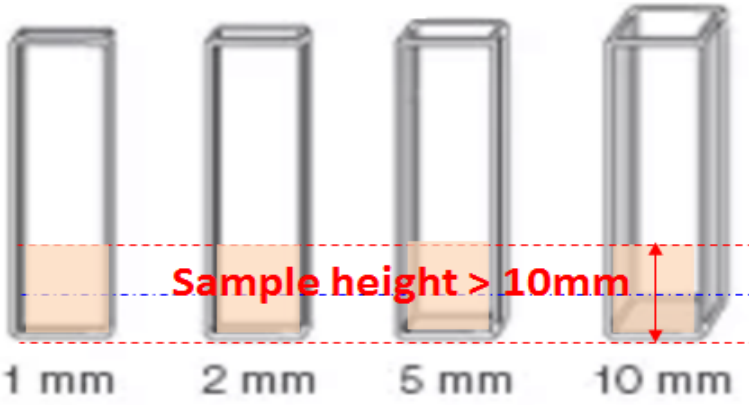
- Quartz ○
- Glass ○
- Plastic (Not recommended for NIR) ✕

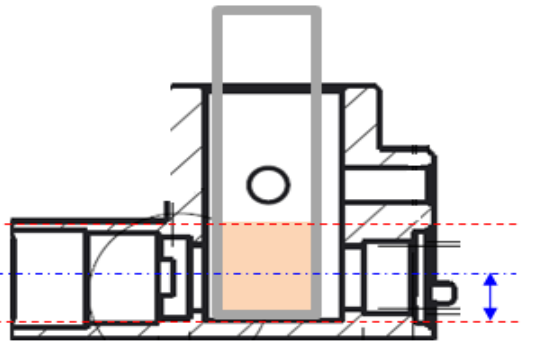


# Z-dimension & Sample Height

- Please load **enough samples** in the cuvette for measurement.

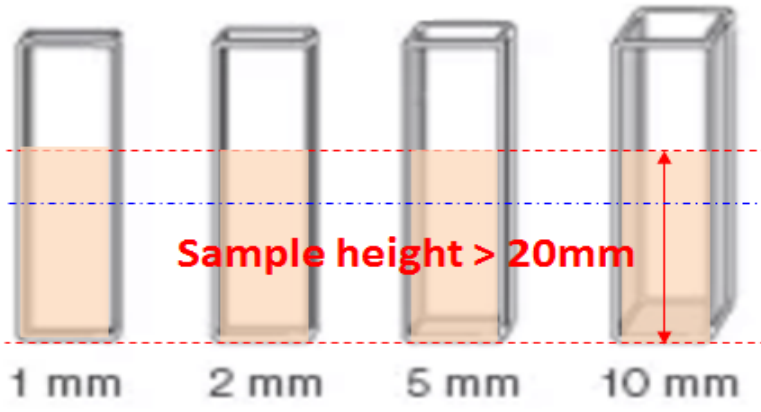
NIR-M-T1

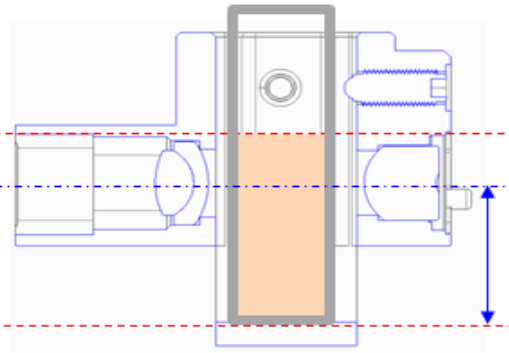


Z-dimension=4.75mm

NIR-M-T11

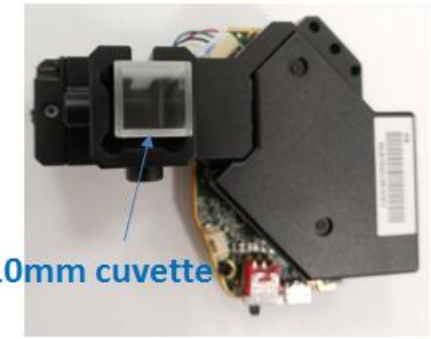


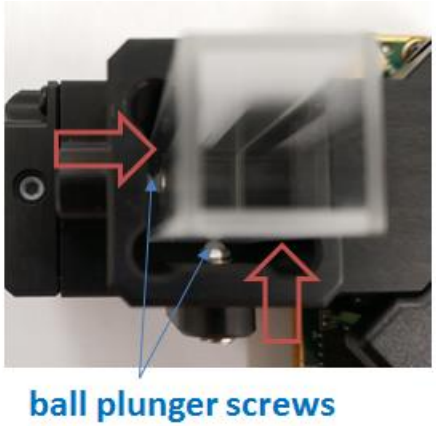



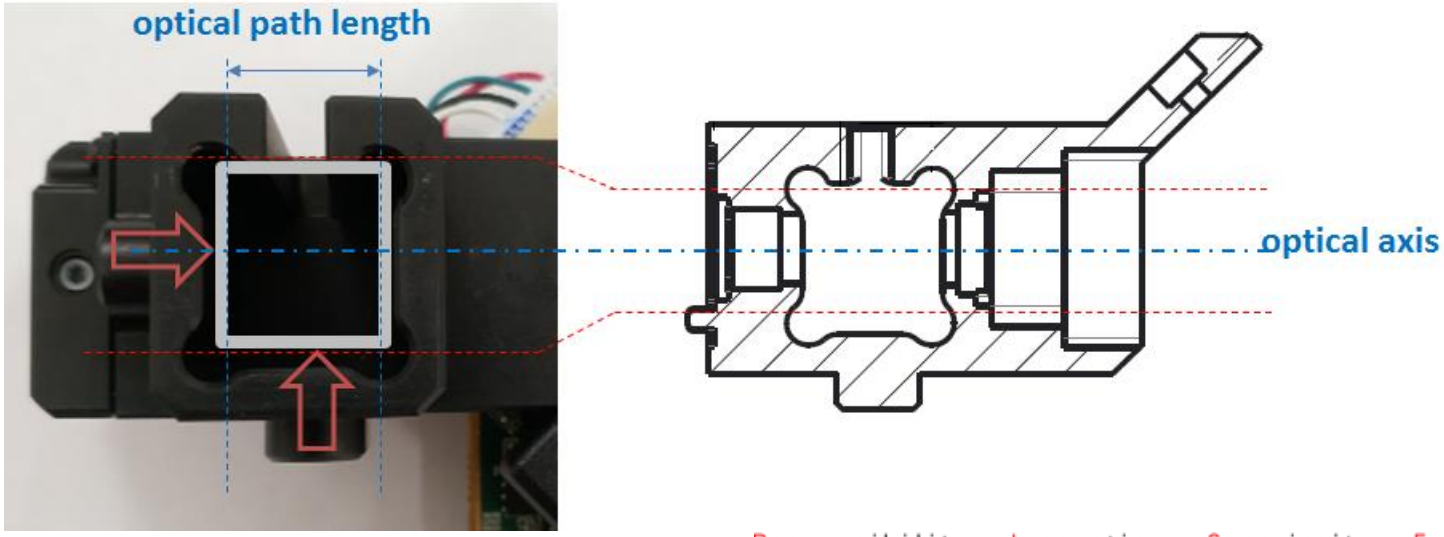
Z-dimension=15mm

# Alignment of Standard Cuvette

- Please use the Allen wrench to adjust the ball plunger screws until the ball end contacts the cuvette and starts to compress, **do not over tighten the ball plunger screws**.

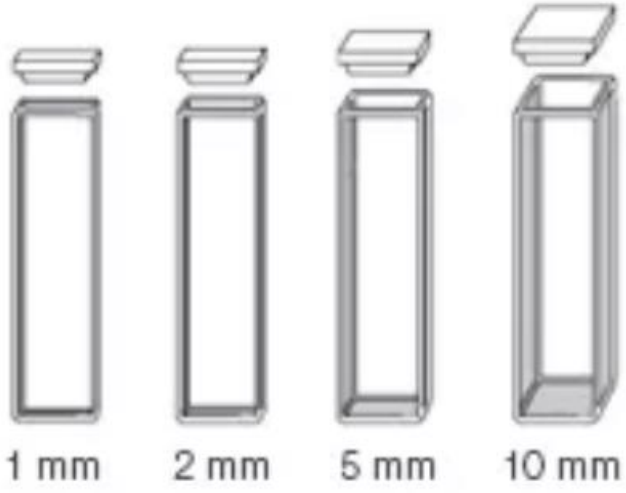


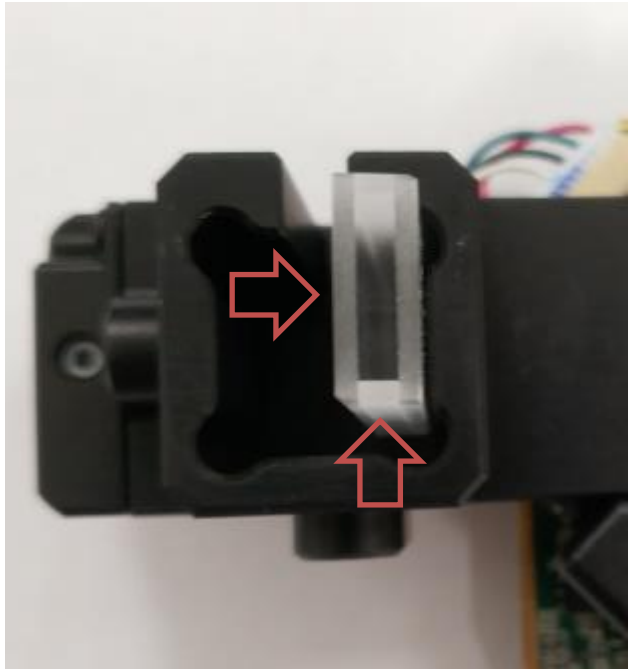



# Alignment of Short Path Length Cuvette

- You may consider using different cuvette with shorter path length, for example, 1mm, 2mm or 5mm. Please **use a proper spacer to adjust the fit of the cuvette**.

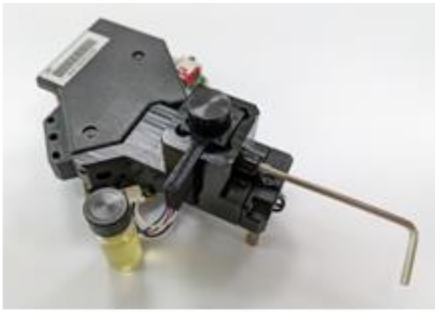


# Adapter of Vial & Short Path Length Cuvette

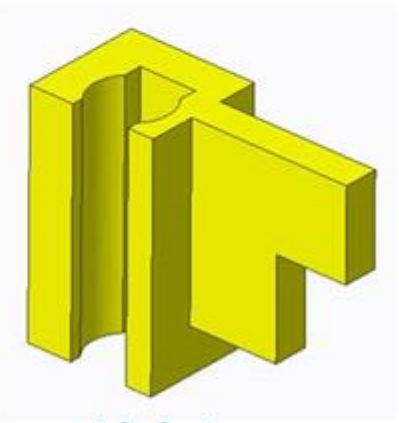
- Please contact ISC for **CAD file of adapter**


1mm cuvette with adapter



vial with adapter

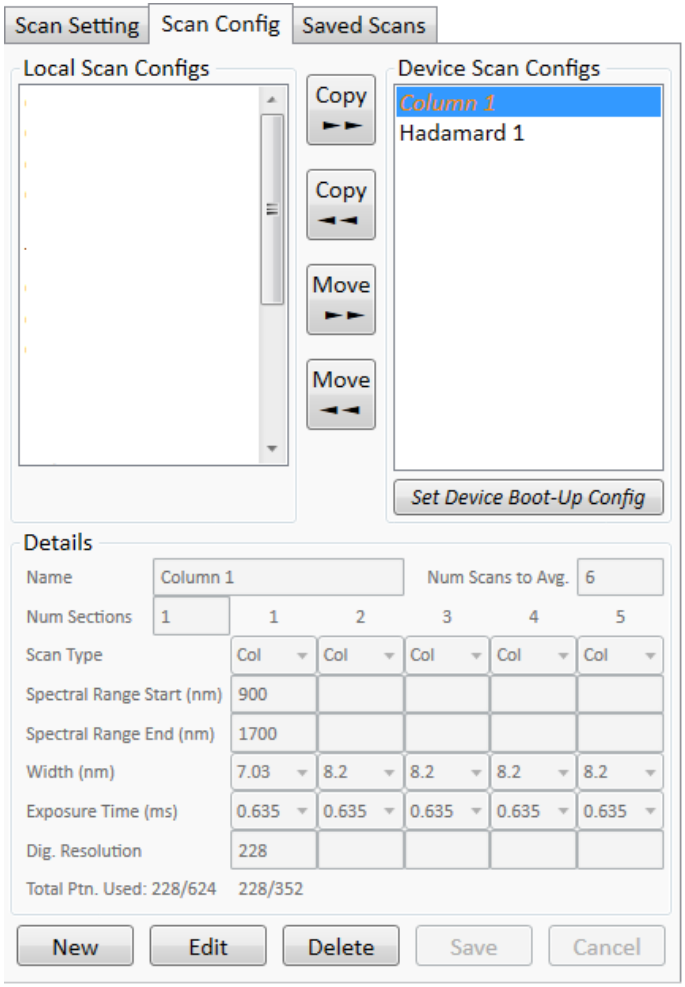
cuvette adapter



vial adapter

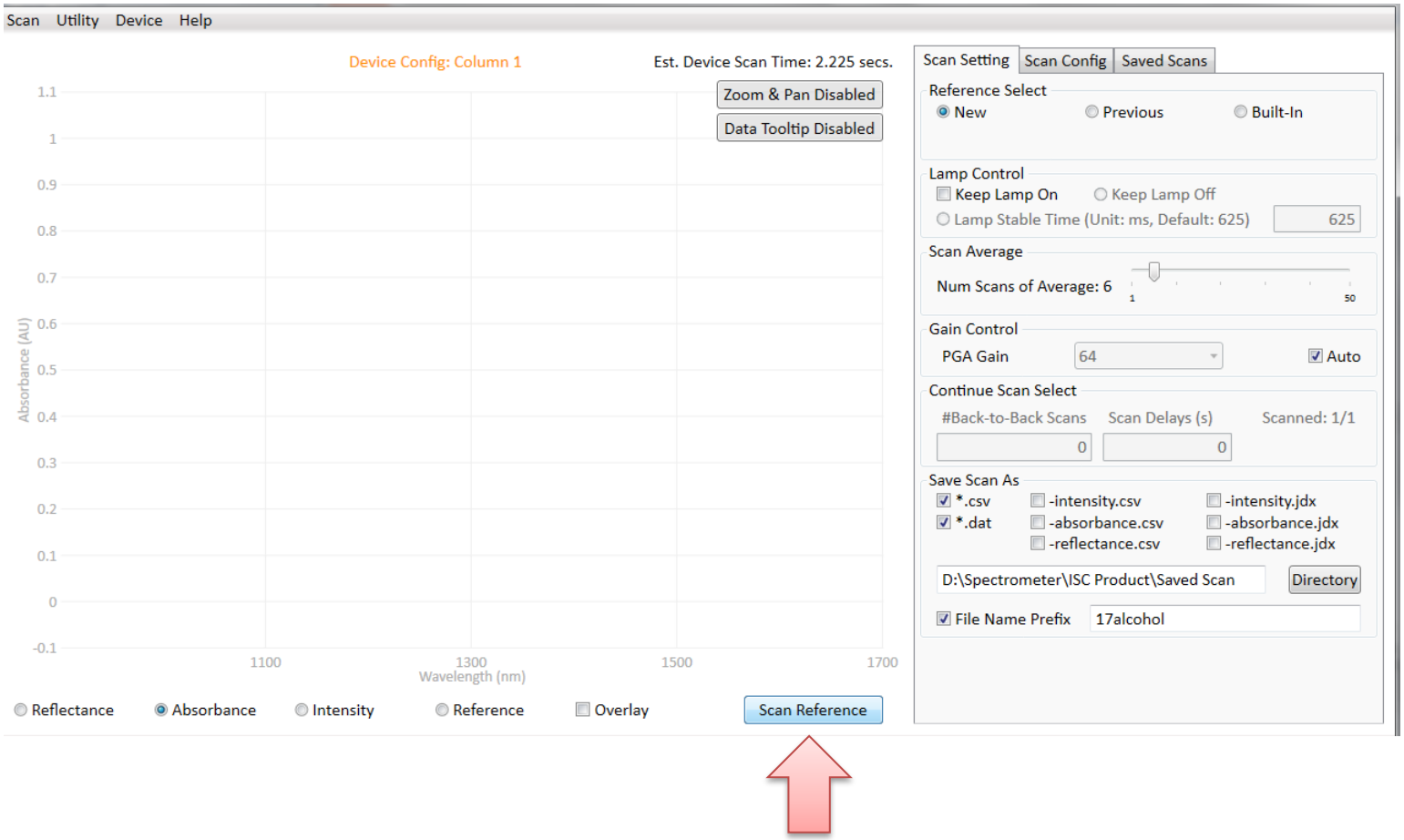
# Perform a Scan Job (Take T1 as an Example)

- Please **set up scan configuration**, for example, **Column 1 (default)**.



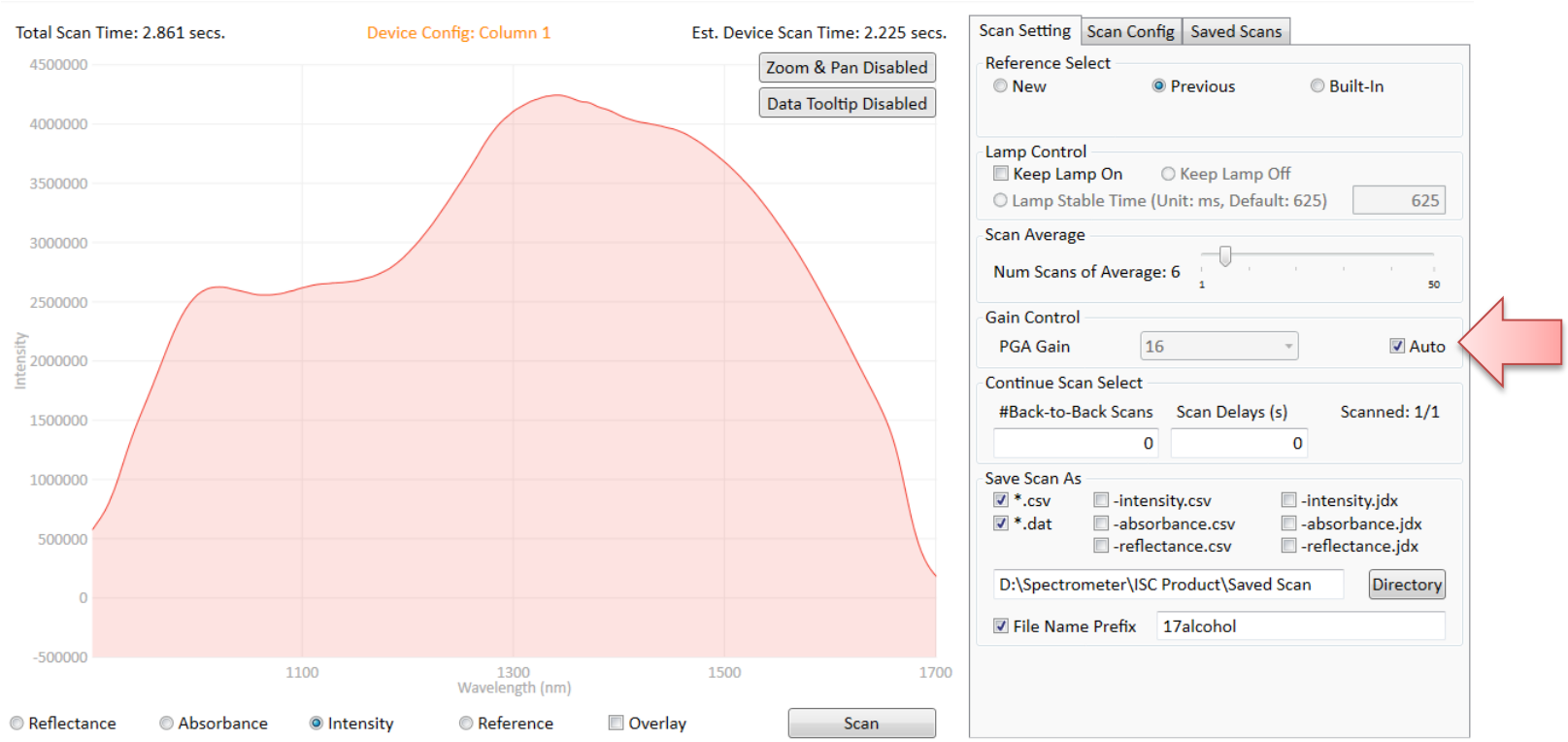
# Perform a Scan Job (Take T1 as an Example)

- Please scan an **empty cuvette** to obtain a **reference** signal.



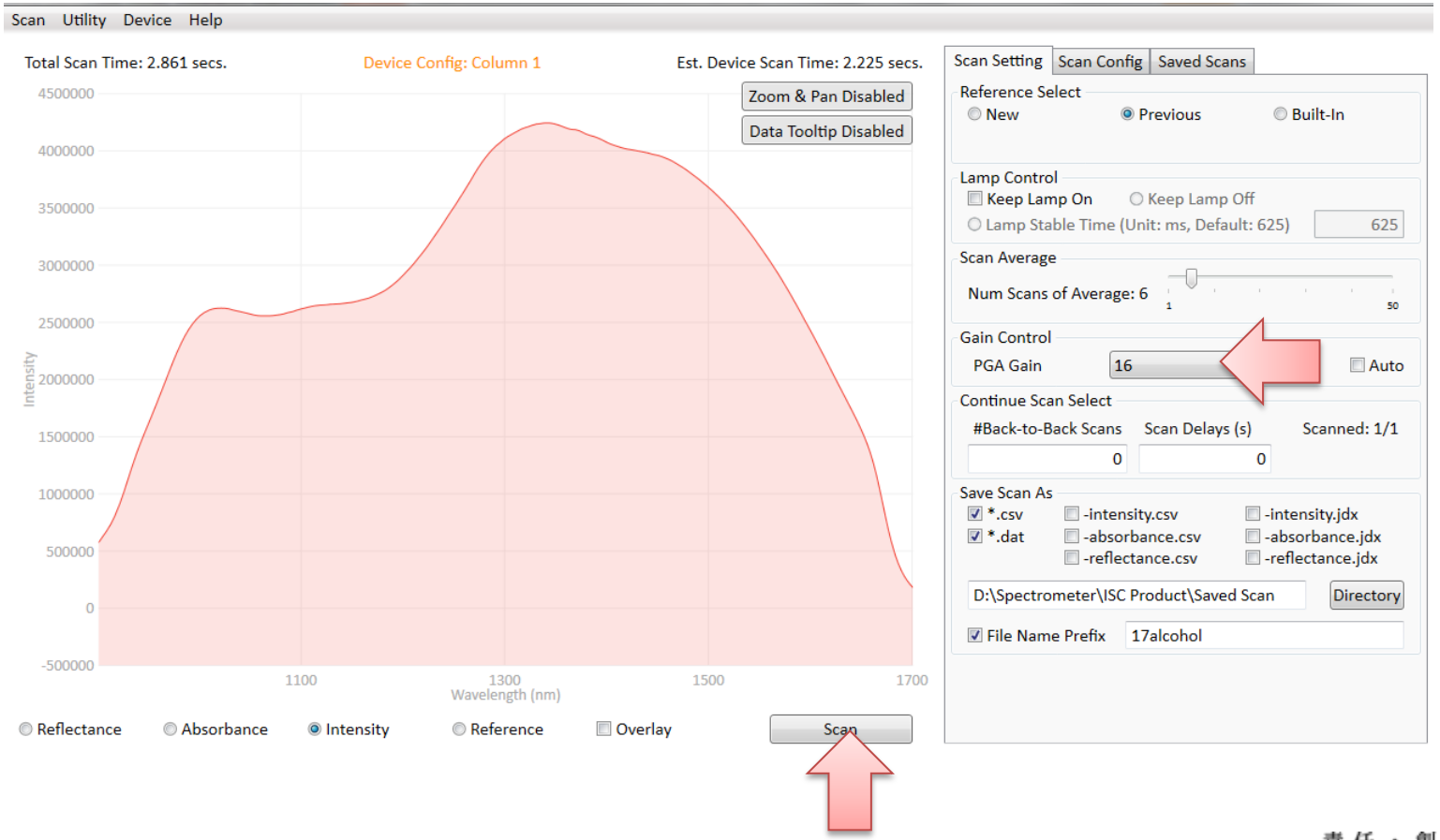
# Perform a Scan Job (Take T1 as an Example)

- A reference signal is scanned and displayed as below. In this case, we select **Auto PGA**, the software determines PGA=16 for this empty cuvette in “Column 1” configuration.



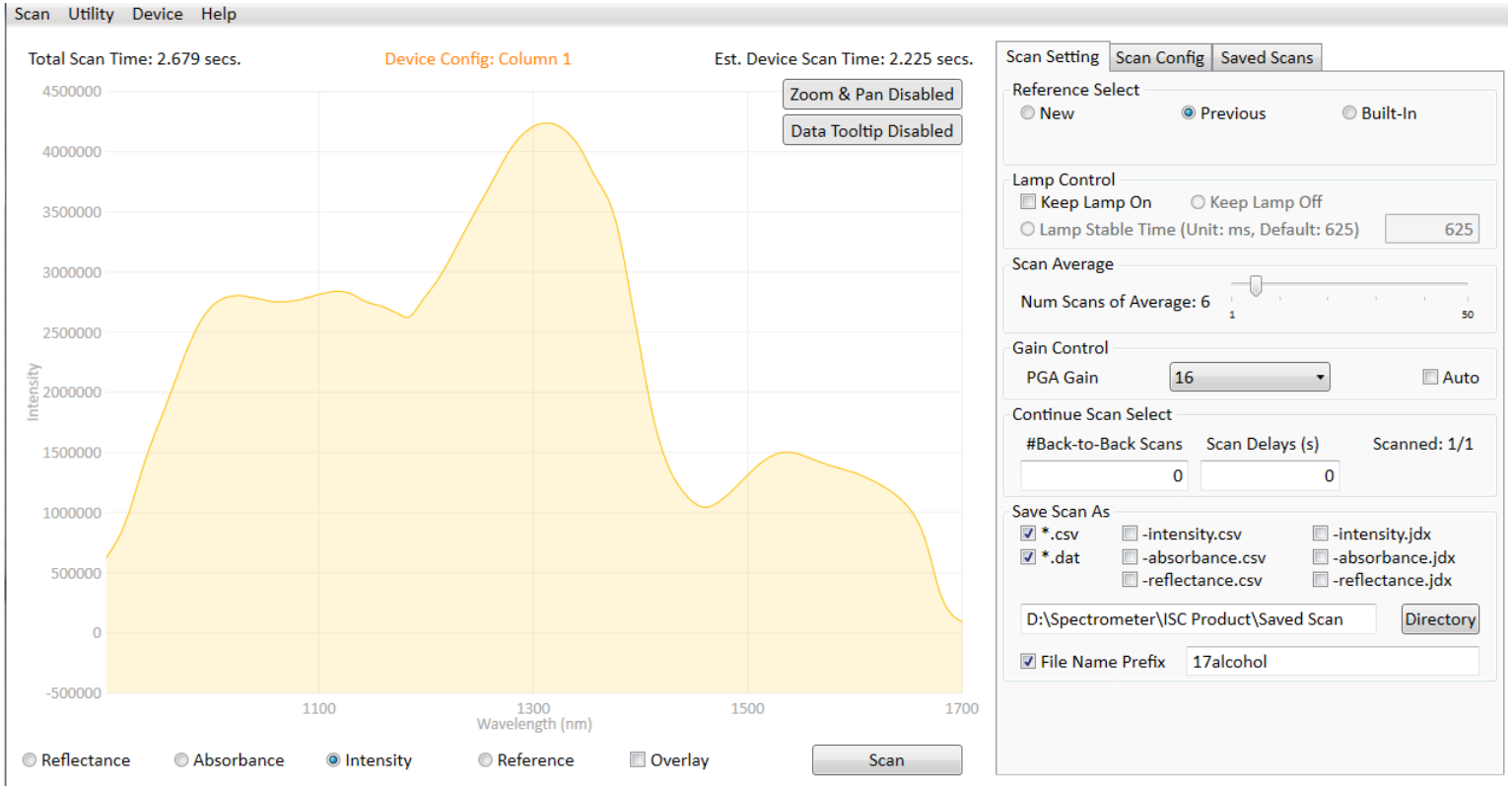
# Perform a Scan Job (Take T1 as an Example)

- To perform a sample signal scan, you can disable “Auto PGA” and **fix the PGA to 16**. This will ensure both sample and reference signals with **same PGA gain**.



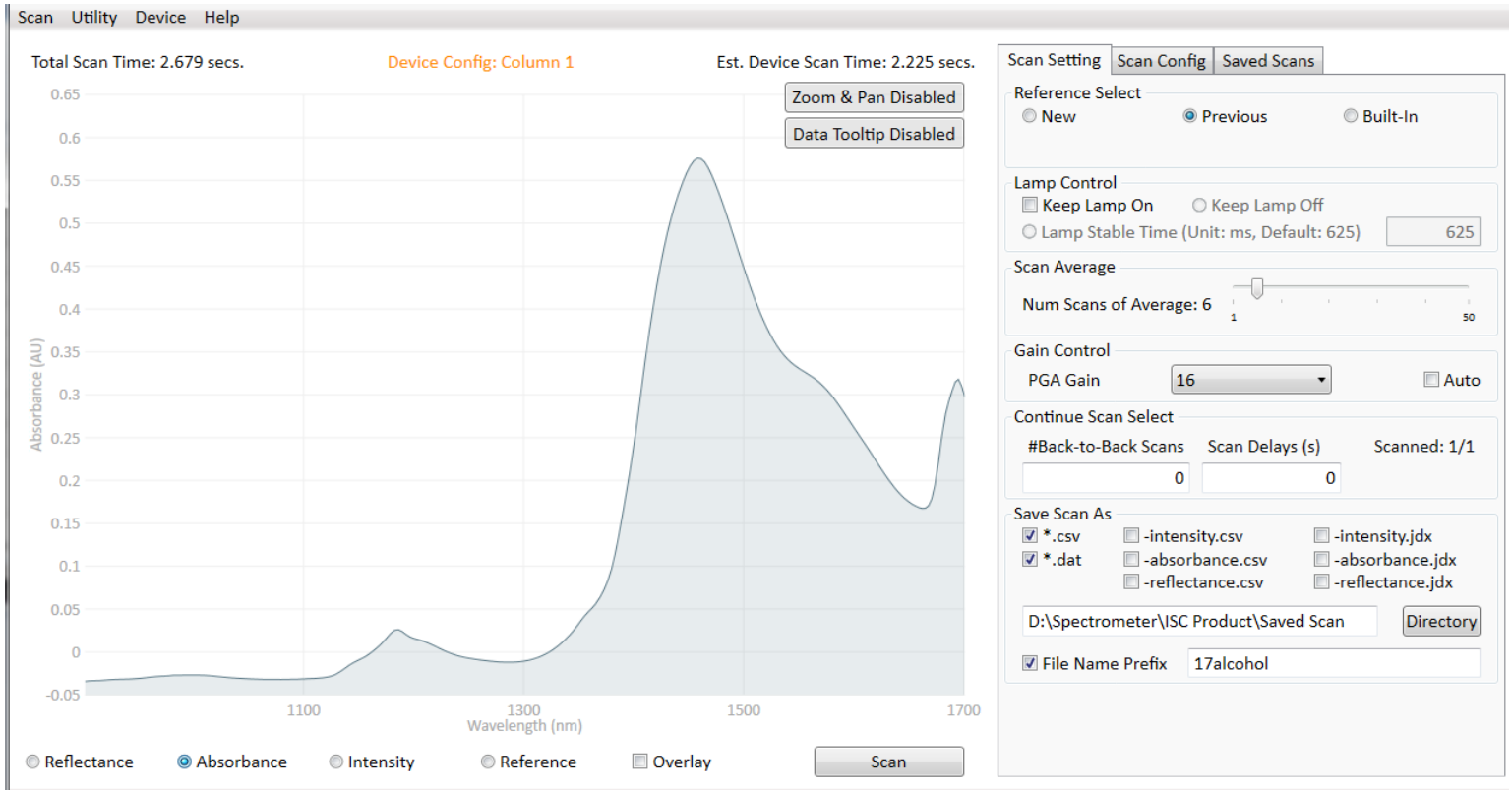
# Perform a Scan Job (Take T1 as an Example)

- The sample signal is captured and displayed as below.



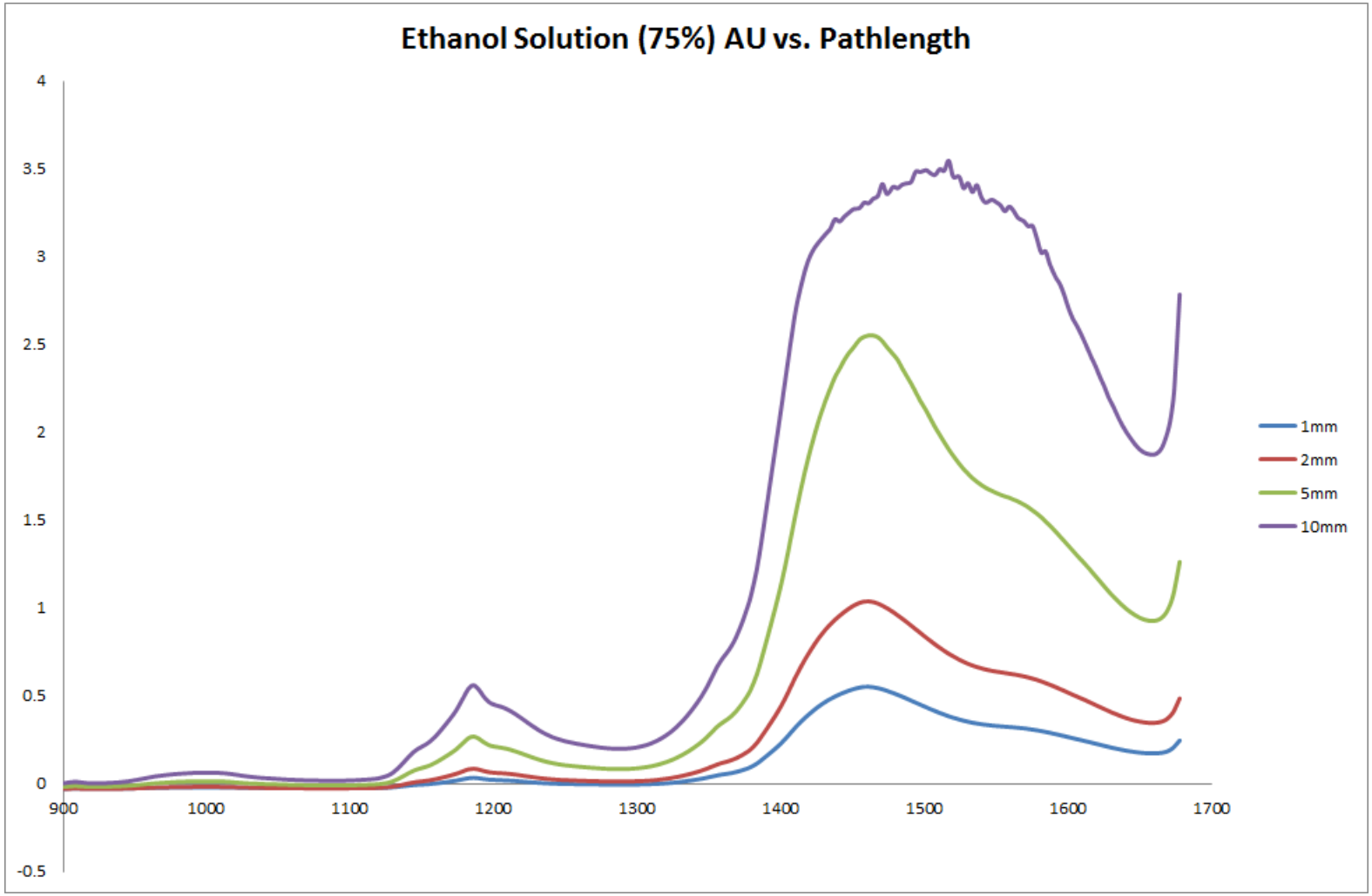
# Perform a Scan Job (Take T1 as an Example)

- The absorbance of this sample is calculated and displayed as below.



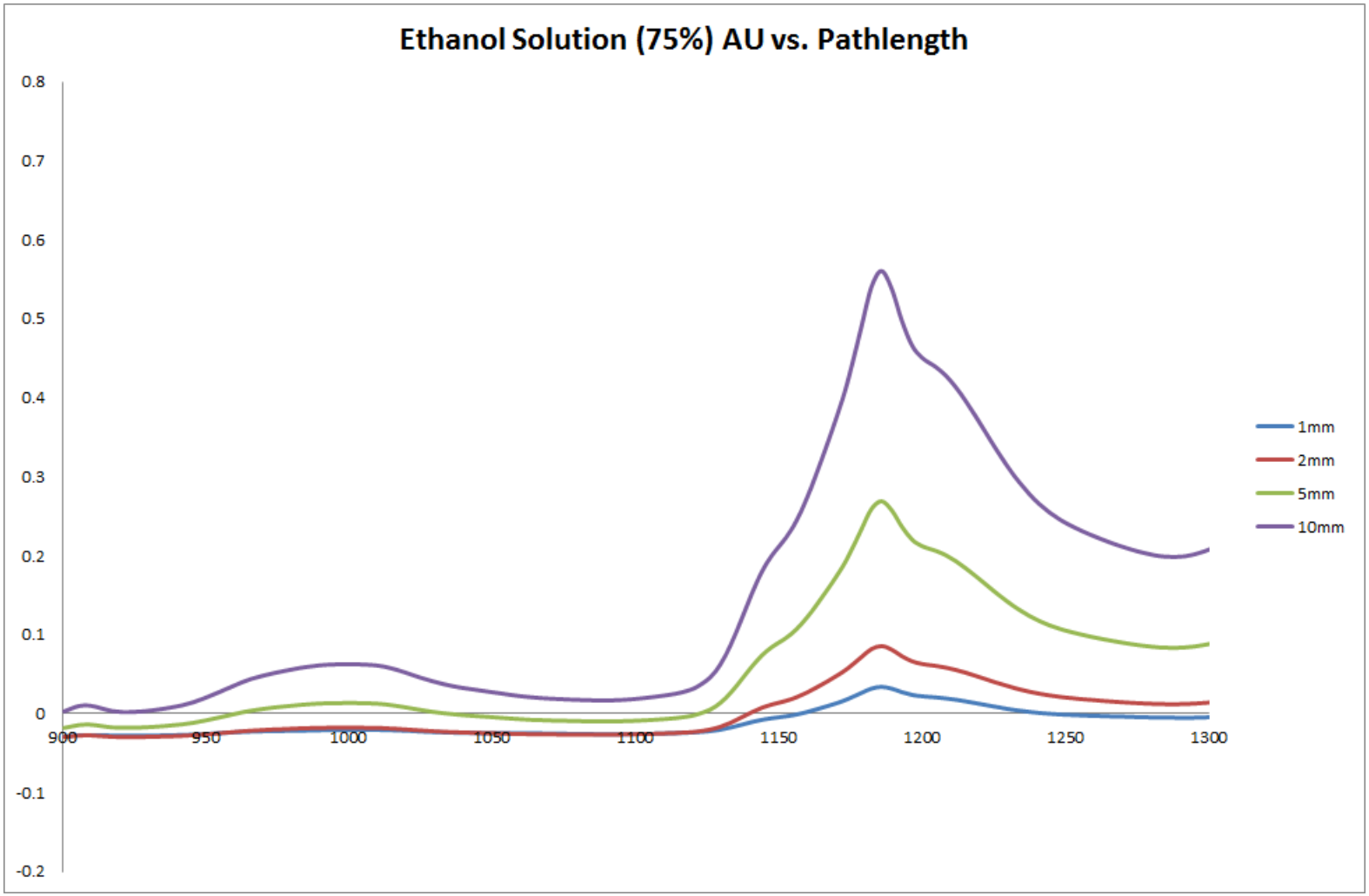
# Example: Scan Ethanol Solution (75%) with T1

- The absorbance of ethanol solution in different path length is displayed as below.



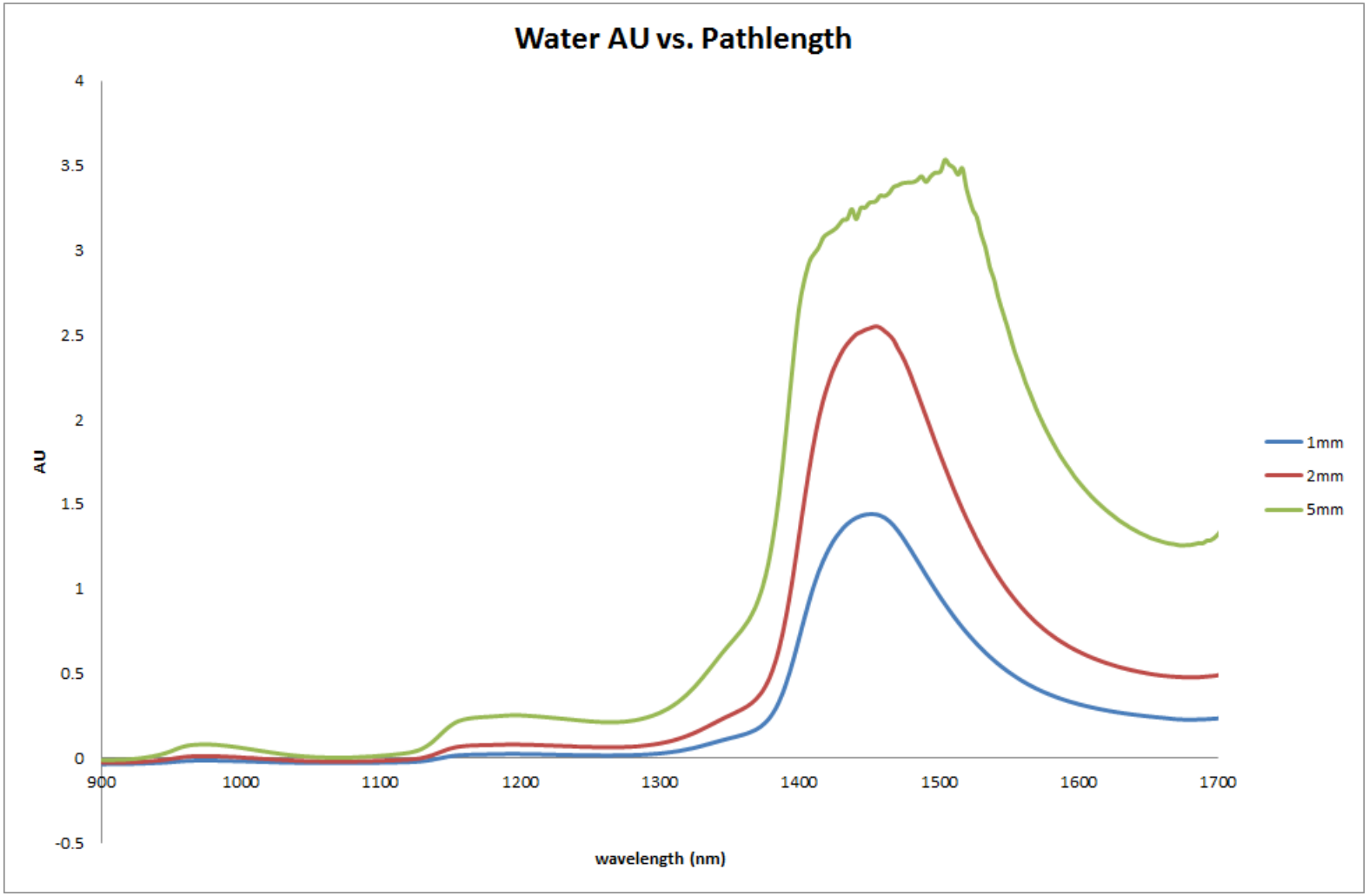
# Example: Scan Ethanol Solution (75%) with T1

- The absorbance of ethanol solution in different path length is displayed as below.



# Example: Scan Water with T1

- The absorbance of water in different path length is displayed as below.



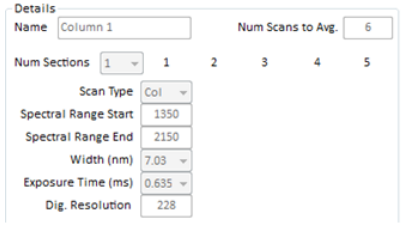
# Example: Scan Soy Milk with T11

- Soy milk and dairy milk are generally opaque, white or off-white in color, and are strong scattering materials. If you plan to measure milk in transmissive mode, you need to apply a very short path length. Here is an example of the absorbance of soy milk measured using 100um path length.

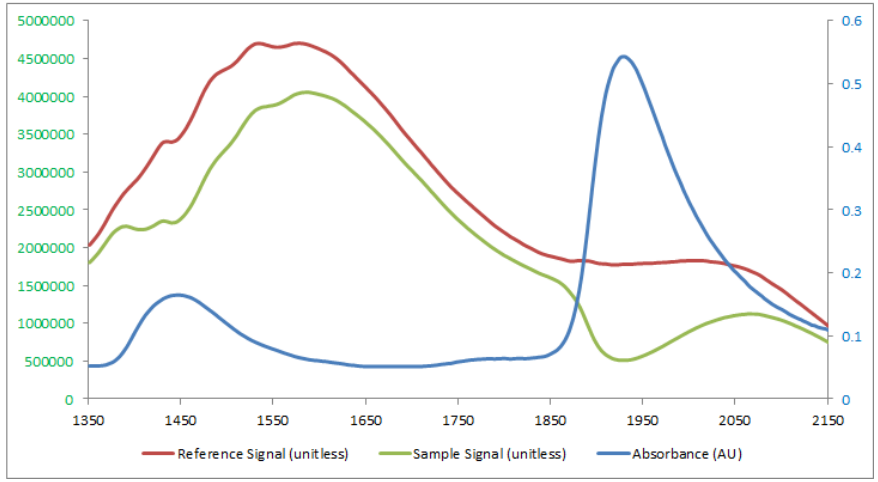

Soy milk (per 100ml)
Protein: 6g
Fat: 3.2g
Carbohydrates: 7.8g

NIR-M-T11

Demountable cuvette:
Light Path=100um

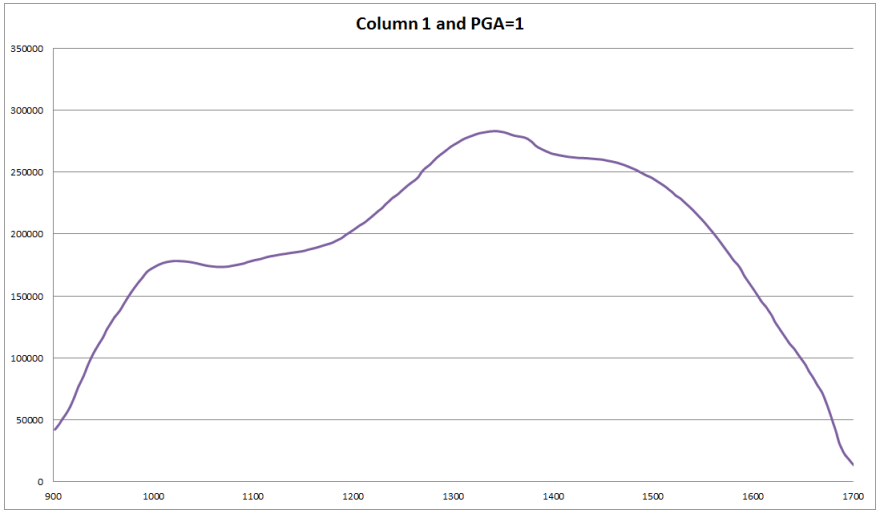


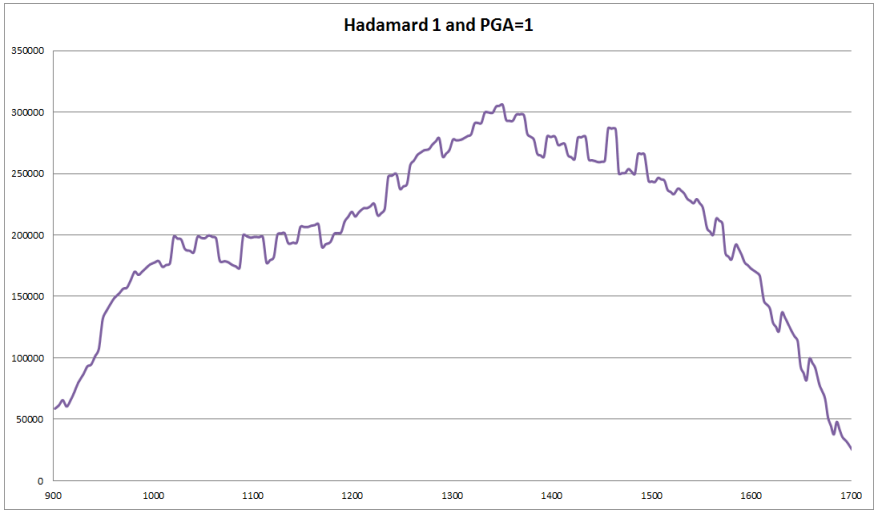

- Scan Config: Column 1 has been good enough to maintain spectral quality.
- Reference Signal: Empty cuvette (air).



# Column Mode vs. Hadamard Mode

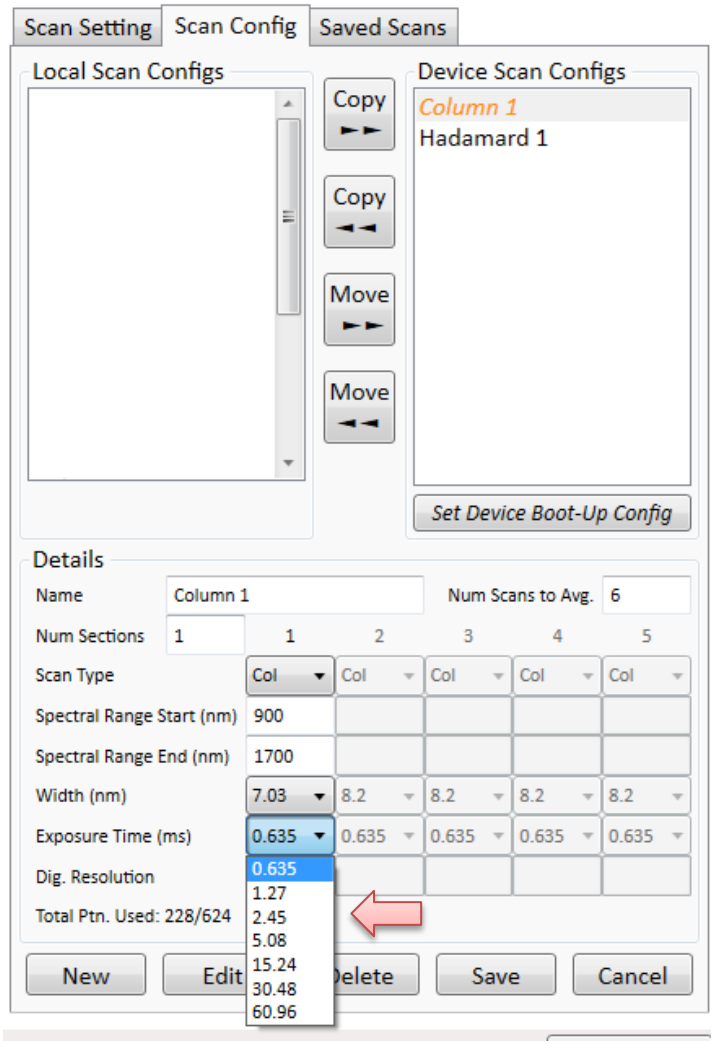
- With NIR-M-T, we **do not suggest using the Hadamard mode** because it is very possible to cause reference signal saturation even when PGA=1. **Once signal is saturated, the absorbance calculation will never be correct.**



# SNR Enhancement (Take T1 as an Example)

- In **Column mode**, you can also **increase the exposure time to improve SNR**.



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# Thank You

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