



# **Quick Start Guide**

**for**

**NIR-M-T1**

**May 15, 2018**

# Specification

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

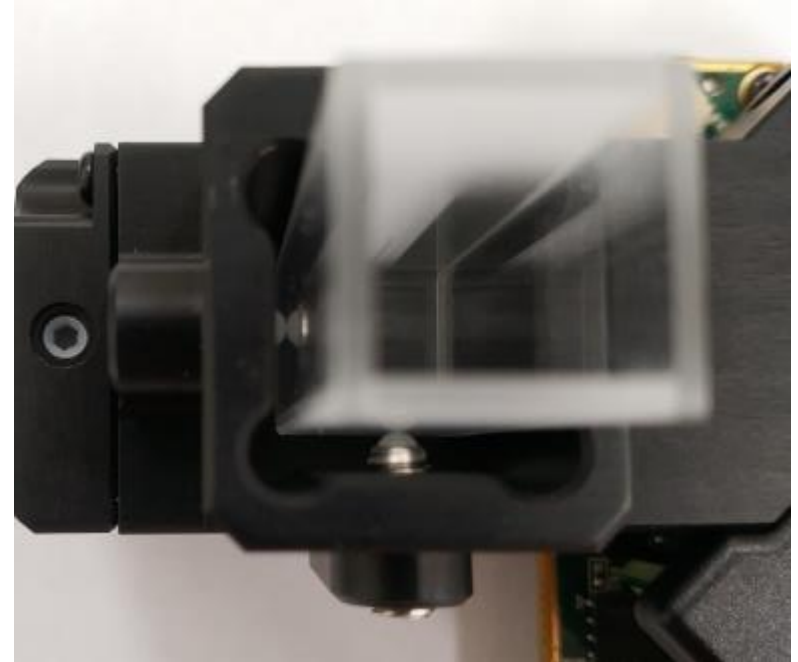
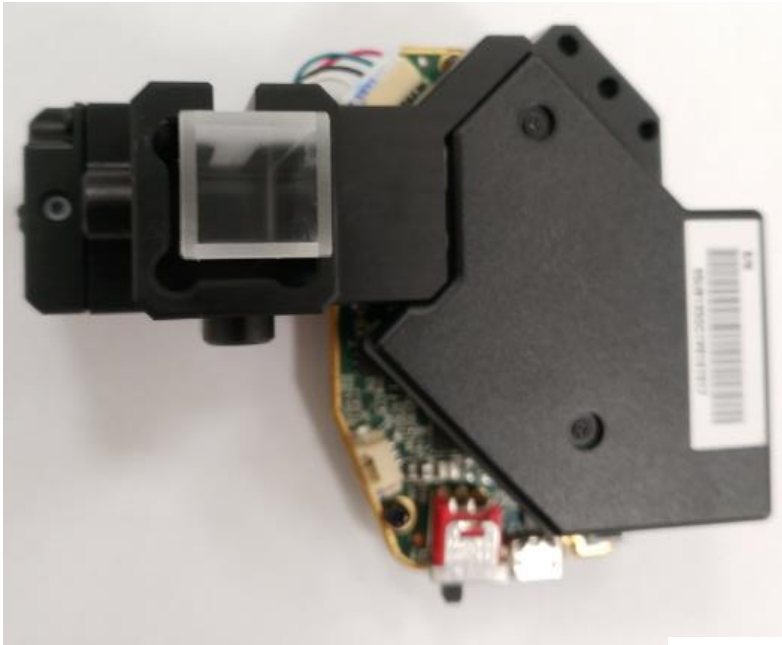
## What's inside the box

- NIR-M-T1 module (x1) with cuvette holder and light source
- Ball plungers (x3) for cuvette alignment
- Allen wrench (x1) for ball plunger adjustment



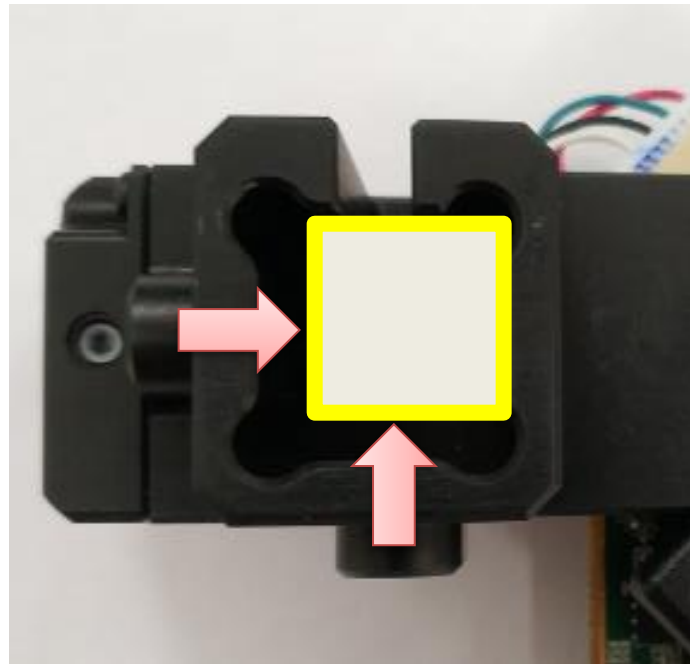
# Adjusting the fit of the cuvette

- The cuvette holder is designed to hold 10mm square cuvettes.
- First, you have to locate the two ball plungers to **make the cuvette fit snugly into the holder.**



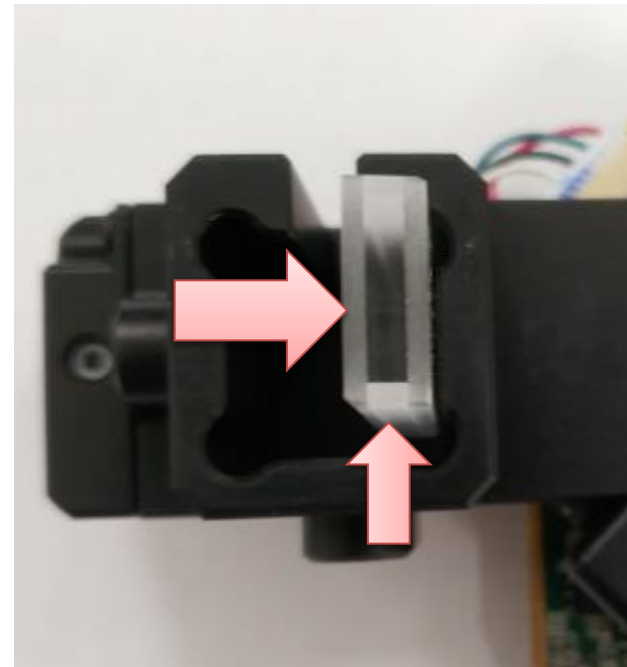
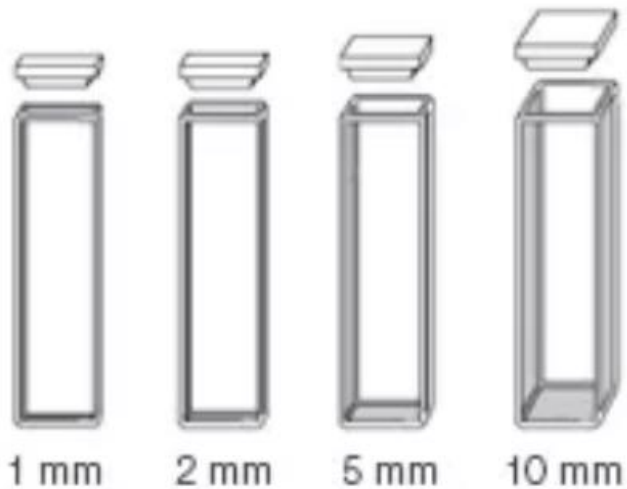
## Adjusting the fit of the cuvette

- 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.**



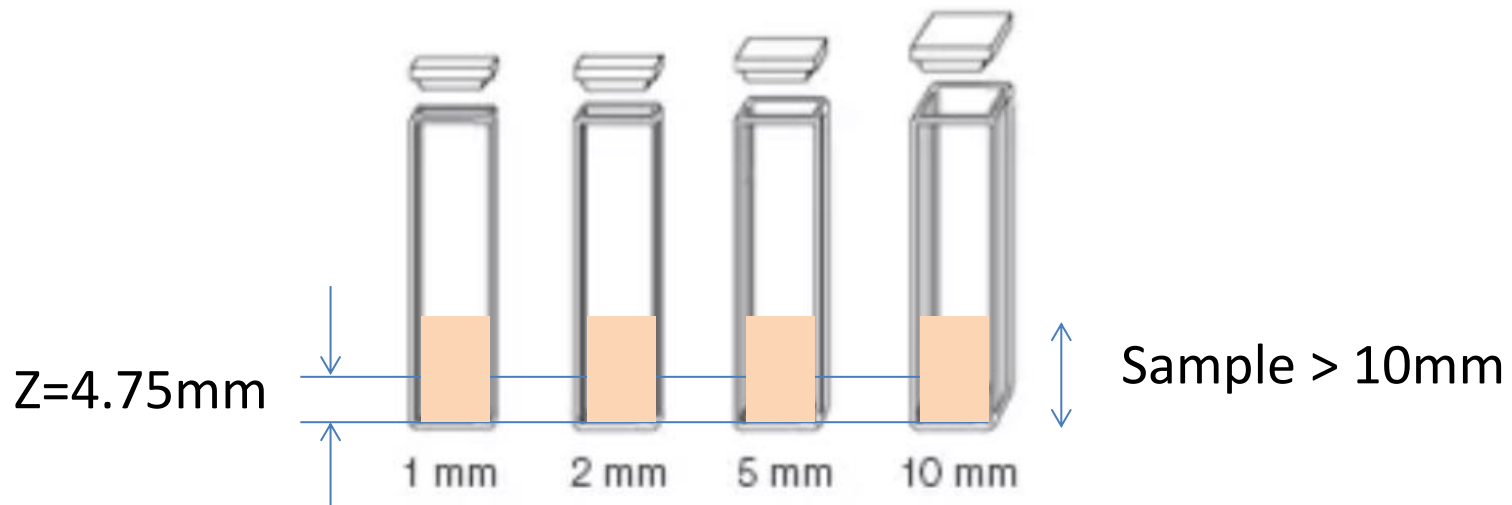
## Adjusting the fit of the cuvette

- 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.**



## Z-dimension

- The Z-dimension of cuvette holder is 4.75mm, please **fill the cuvette with enough sample to more than 10mm.**



# Perform a scan job

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

Scan Setting | **Scan Config** | Saved Scans

Local Scan Configs

Device Scan Configs

**Column 1**

Hadamard 1

*Set Device Boot-Up Config*

**Details**

Name	Column 1				Num Scans to Avg.	6
Num Sections	1	1	2	3	4	5
Scan Type	Col ▾	Col ▾	Col ▾	Col ▾	Col ▾	Col ▾
Spectral Range Start (nm)	900					
Spectral Range End (nm)	1700					
Width (nm)	7.03 ▾	8.2 ▾	8.2 ▾	8.2 ▾	8.2 ▾	8.2 ▾
Exposure Time (ms)	0.635 ▾	0.635 ▾	0.635 ▾	0.635 ▾	0.635 ▾	0.635 ▾
Dig. Resolution	228					
Total Ptn. Used: 228/624    228/352						

New
Edit
Delete
Save
Cancel



# Perform a scan job



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

The software interface shows a main plot area with a grid. The y-axis is labeled 'Absorbance (AU)' and ranges from -0.1 to 1.1. The x-axis is labeled 'Wavelength (nm)' and ranges from 1100 to 1700. The plot is currently empty. Above the plot, it says 'Device Config: Column 1' and 'Est. Device Scan Time: 2.225 secs.'. There are two buttons: 'Zoom & Pan Disabled' and 'Data Tooltip Disabled'. Below the plot, there are radio buttons for 'Reflectance', 'Absorbance', 'Intensity', and 'Reference', and a checkbox for 'Overlay'. A blue button labeled 'Scan Reference' is located at the bottom center of the plot area. To the right of the plot is a settings panel with tabs for 'Scan Setting', 'Scan Config', and 'Saved Scans'. The 'Scan Config' tab is active. It contains sections for 'Reference Select' (with 'New' selected), 'Lamp Control' (with 'Keep Lamp On' selected and 'Lamp Stable Time' set to 625), 'Scan Average' (with 'Num Scans of Average' set to 6), 'Gain Control' (with 'PGA Gain' set to 64 and 'Auto' checked), 'Continue Scan Select' (with '#Back-to-Back Scans' and 'Scan Delays (s)' both set to 0), and 'Save Scan As' (with checkboxes for \*.csv, \*.dat, \*-intensity.csv, \*-absorbance.csv, \*-reflectance.csv, \*-intensity.jdx, \*-absorbance.jdx, and \*-reflectance.jdx). The 'Directory' is set to 'D:\Spectrometer\ISC Product\Saved Scan' and the 'File Name Prefix' is '17alcohol'.



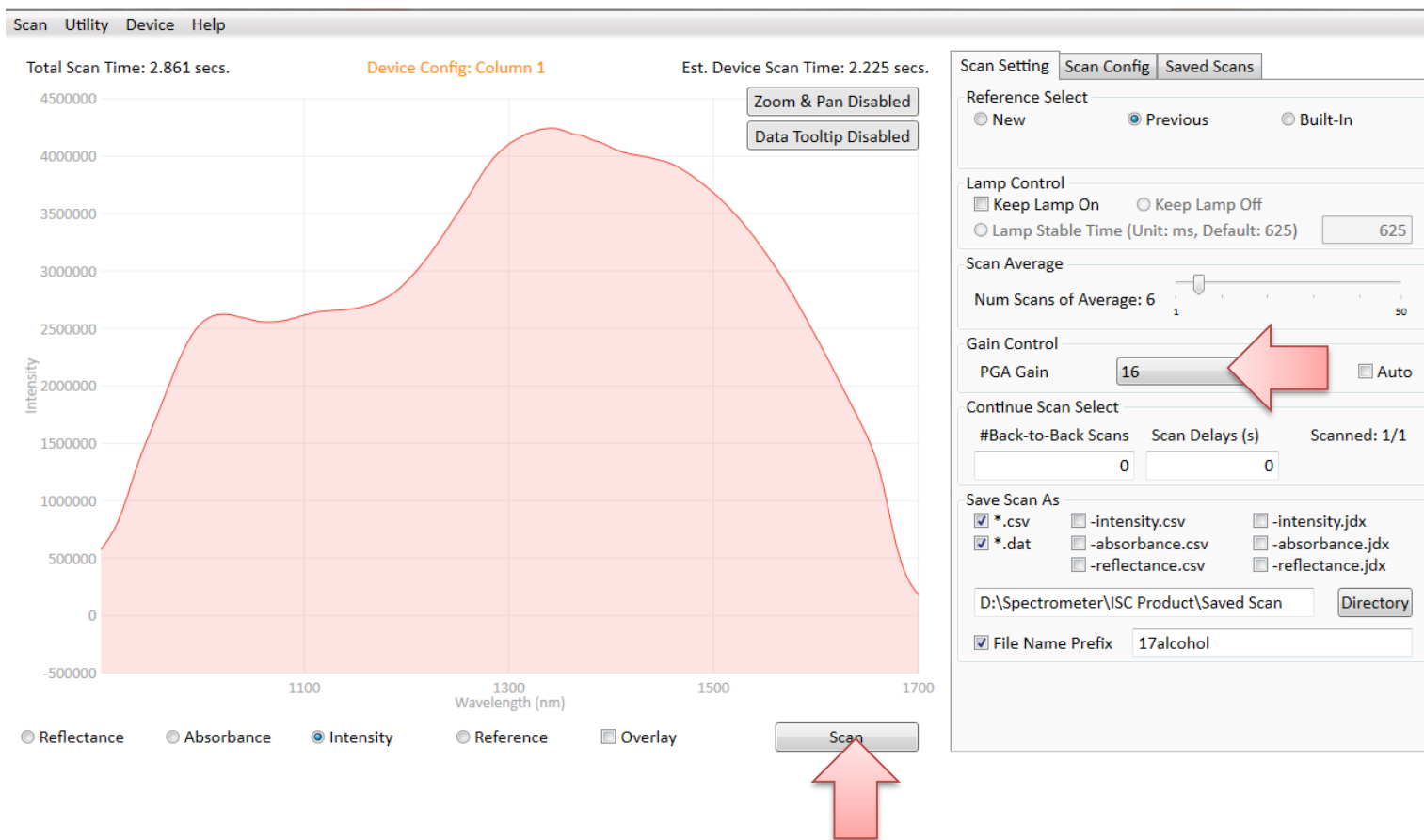
# Perform a scan job

- A reference signal is captured 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

- 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**.



The screenshot displays the software interface for performing a scan job. The main window shows a plot of Intensity versus Wavelength (nm) with a red curve and a shaded area. The plot is titled "Device Config: Column 1" and shows a total scan time of 2.861 seconds and an estimated device scan time of 2.225 seconds. The plot includes a legend at the bottom with options for Reflectance, Absorbance, Intensity (selected), Reference, and Overlay. A "Scan" button is located at the bottom center of the plot area, with a red arrow pointing to it.

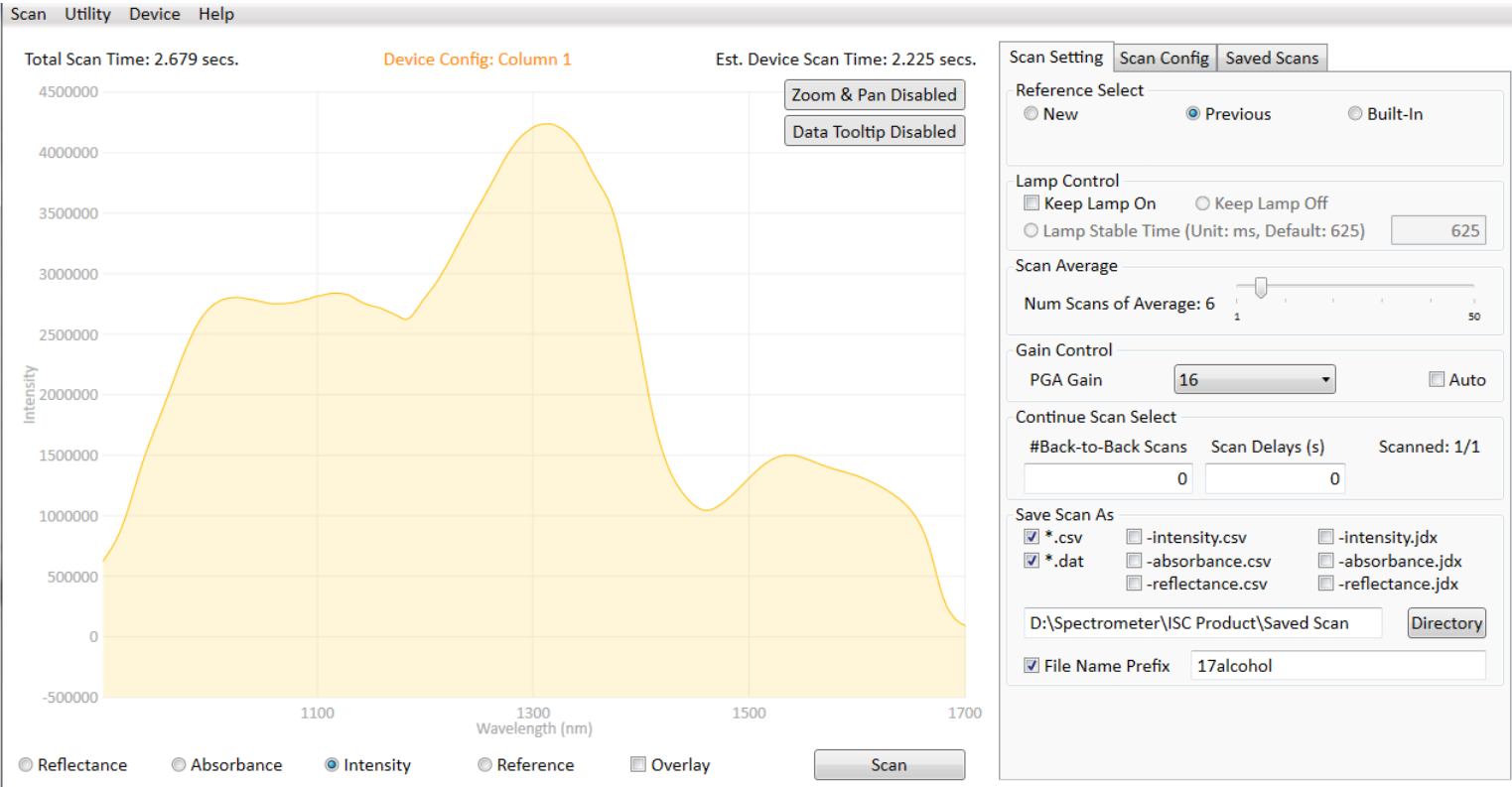
The right-hand panel contains the "Scan Setting" configuration options:

- Reference Select:** Radio buttons for New, Previous (selected), and Built-In.
- Lamp Control:** Checkboxes for Keep Lamp On and Keep Lamp Off (selected). A field for Lamp Stable Time (Unit: ms, Default: 625) is set to 625.
- Scan Average:** A slider for Num Scans of Average is set to 6.
- Gain Control:** A slider for PGA Gain is set to 16, with a red arrow pointing to it. An "Auto" checkbox is also present.
- Continue Scan Select:** Input fields for #Back-to-Back Scans (0) and Scan Delays (s) (0). Scanned: 1/1.
- Save Scan As:** Checkboxes for file formats: \*.csv, \*.dat, -intensity.csv, -absorbance.csv, -reflectance.csv, -intensity.jdx, -absorbance.jdx, and -reflectance.jdx.
- Directory:** A text field containing "D:\Spectrometer\ISC Product\Saved Scan" and a "Directory" button.
- File Name Prefix:** A text field containing "17alcohol" and a checked checkbox.

# Perform a scan job



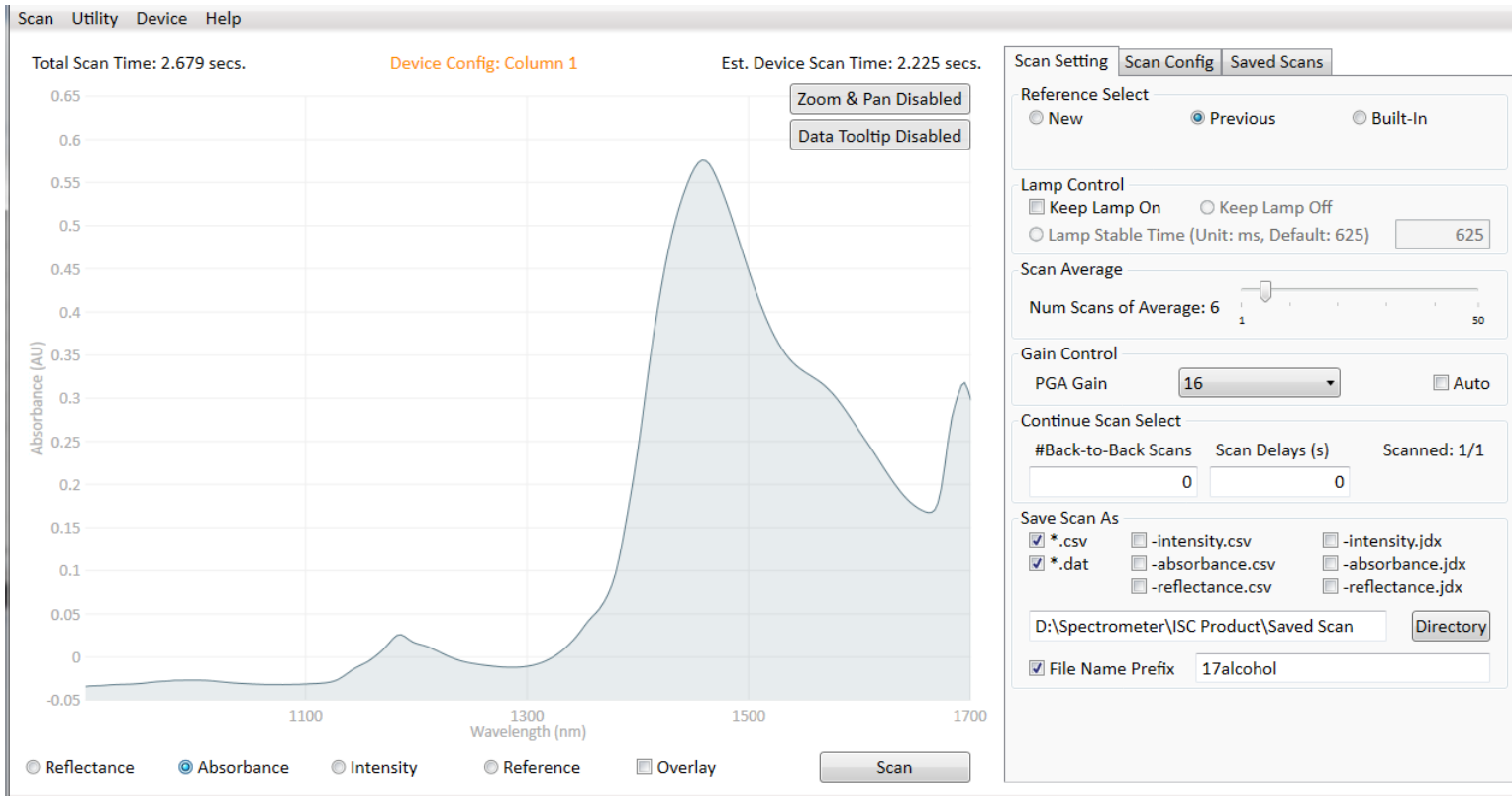
- The sample signal is captured and displayed as follows.



# Perform a scan job



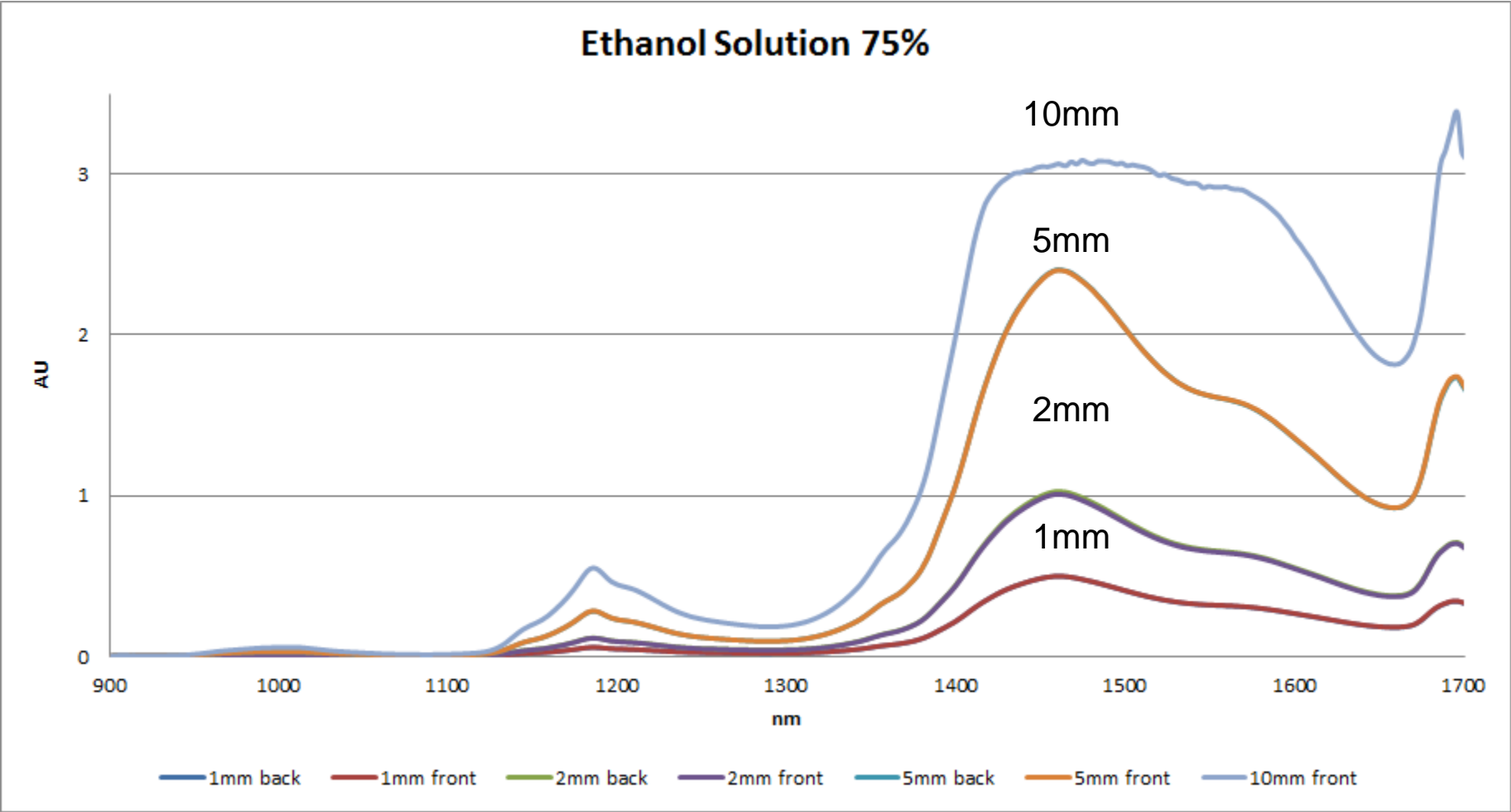
- The absorbance of this sample can be observed as below.



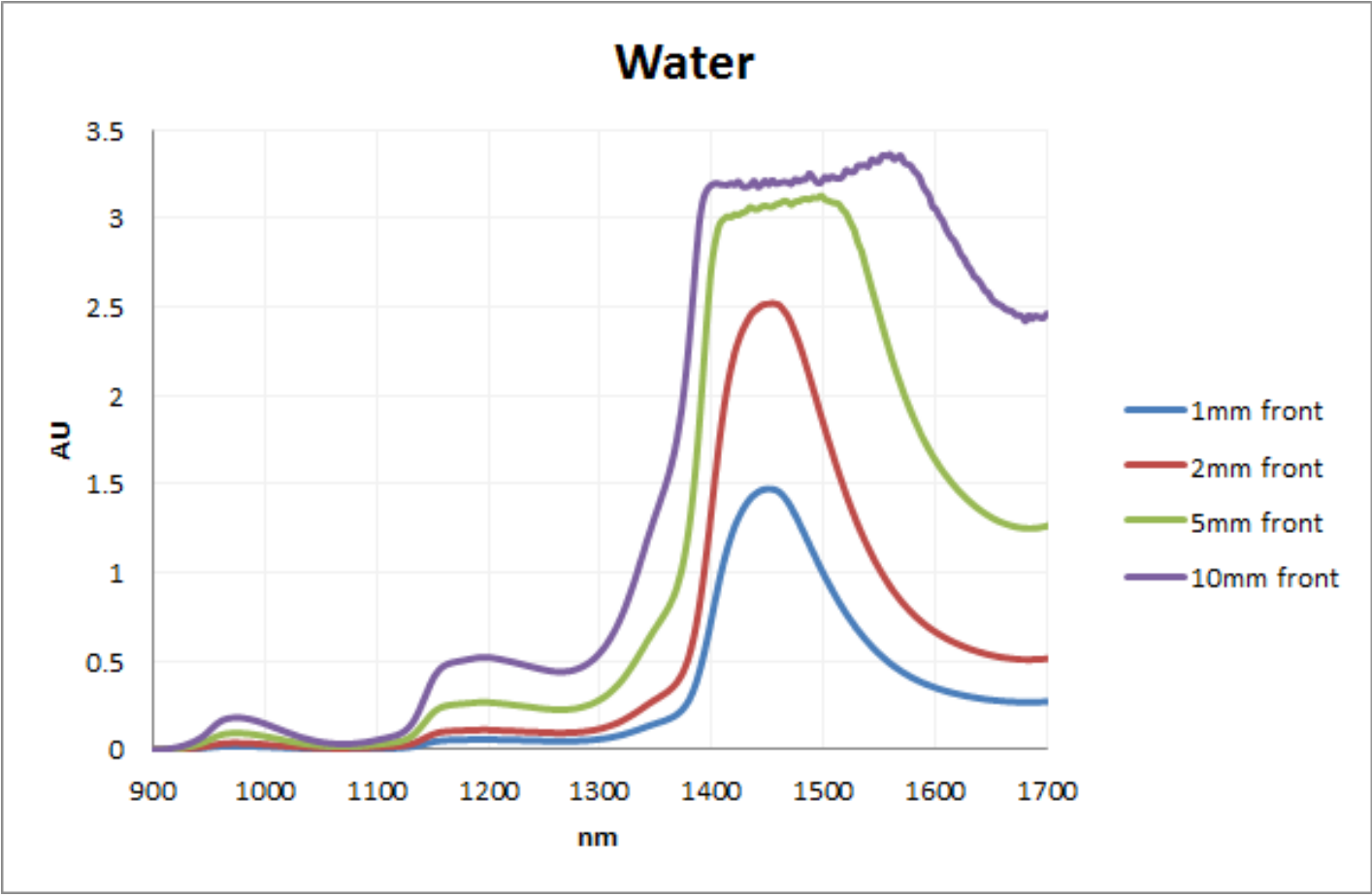
# Example: Ethanol solution (75%) scan test



- Different path lengths are scanned.

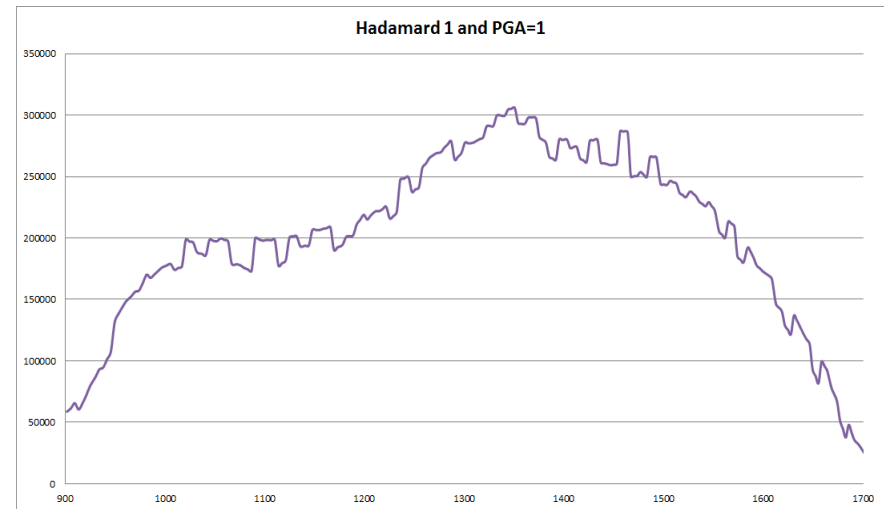
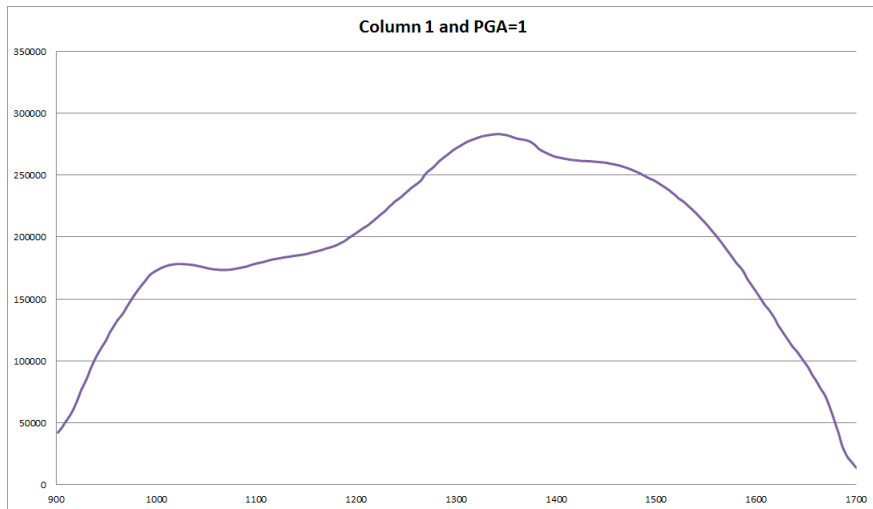


# Example: Water absorbance vs. different path length



# Column mode vs. Hadamard mode

- With NIR-M-T1, 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



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

Scan Setting | Scan Config | Saved Scans

Local Scan Configs

Device Scan Configs

Column 1  
Hadamard 1

Set Device Boot-Up Config

Details

Name	Column 1	Num Scans to Avg. 6				
Num Sections	1	1	2	3	4	5
Scan Type	Col	Col	Col	Col	Col	
Spectral Range Start (nm)	900					
Spectral Range End (nm)	1700					
Width (nm)	7.03	8.2	8.2	8.2	8.2	
Exposure Time (ms)	0.635	0.635	0.635	0.635	0.635	
Dig. Resolution	1.27					
Total Ptn. Used: 228/624	2.45					
	5.08					
	15.24					
	30.48					
	60.96					

New Edit Delete Save Cancel

# Thank You

