

NeoSpectra Micro – Development Kit

Evaluation Brief Guide

V2.0



neospectra
Si-WARE
SYSTEMS

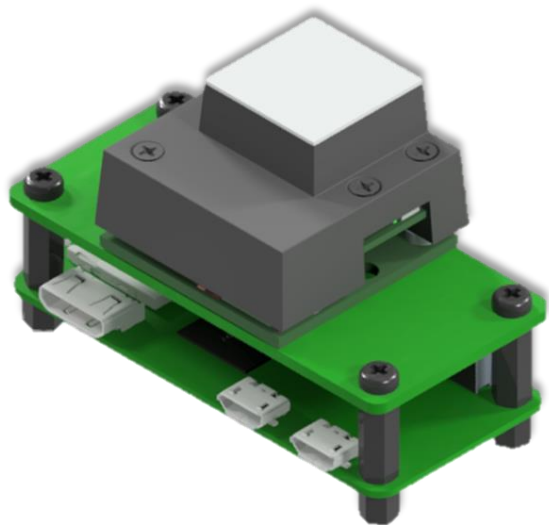
About this document

Si-Ware Systems offers NeoSpectra Micro Development Kits (NM-DVK) as a tool to facilitate the evaluation of NeoSpectra Micro's performance, and to enable customers to start developing prototypes with minimum effort.

This document is a brief description on how you can use the NM-DVK to evaluate the performance of NeoSpectra Micro.

For more detailed information about the evaluation and/or development using the NM-DVK, please contact Si-Ware Systems on neospectra.support@si-ware.com

About NeoSpectra Micro DVK



NeoSpectra Micro (SWS62231) is a chip-sized, OEM Near InfraRed (NIR) spectral sensor that delivers the spectral response of the light absorbed by materials for quantification, qualification or identification. It is designed to be used in different systems as an OEM module for applications that can be enabled by the spectral range 1,350 nm– 2,500 nm.

The NeoSpectra Micro Development Kit (DVK) is a set of components that connects the core product with an optical coupling system for sample interfacing, as well as a Raspberry Pi board that acts as a host for easy interfacing. The DVKs enable developers to evaluate the performance of the NeoSpectra Micro, and to start developing prototypes for their applications

Implementation Features

- Compact size
- Ready optical interface for diffuse reflectance
- Various options for data interfaces
- Easy migration from DVK to product

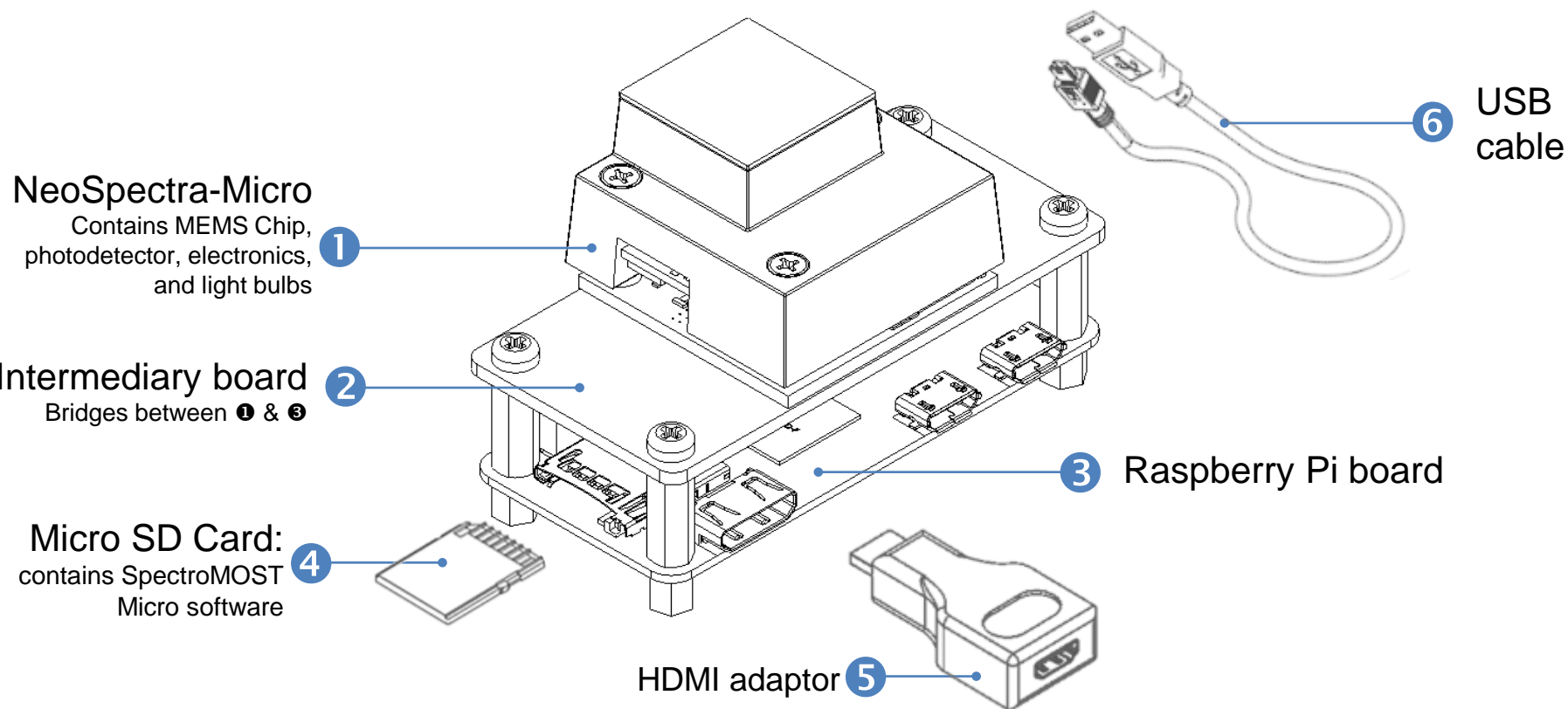
Economic Benefits

- Low cost
- Economies of scale – semiconductor technology
- Easy installation and service free

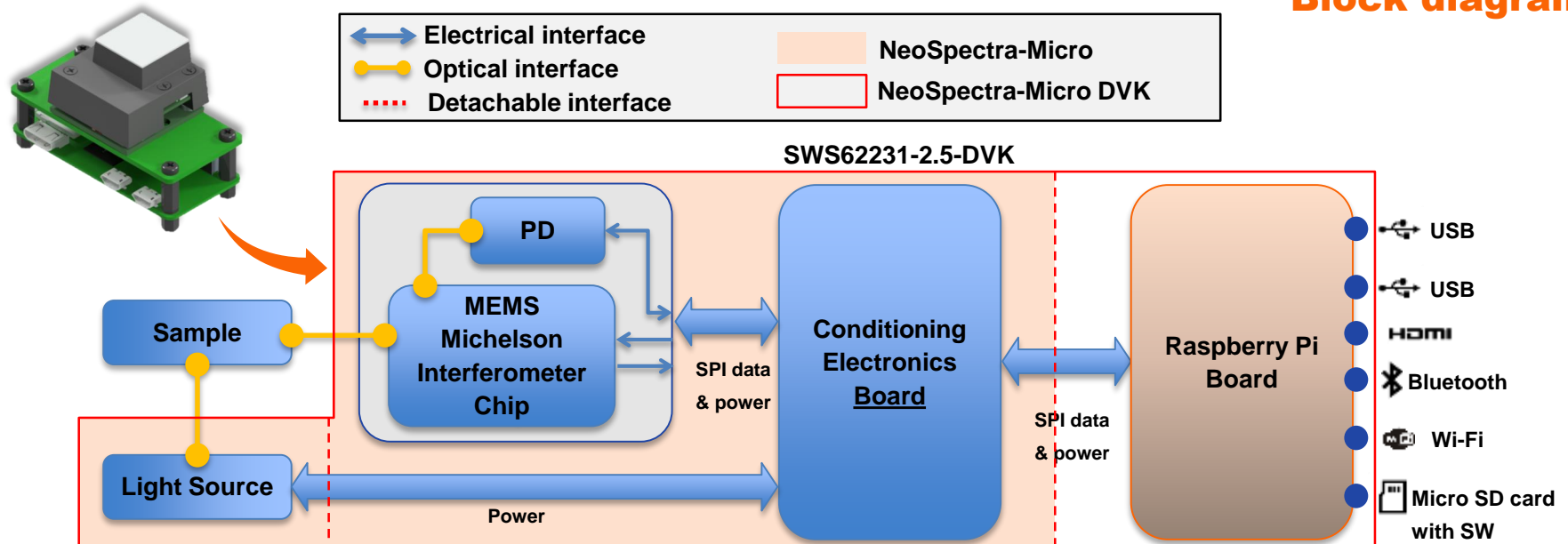
Performance Advantages

- Wide spectral ranges
- Adjustable parameters for performance optimization
- Low power consumption
- Single photodetector that doesn't require cooling

Kit Components



Block diagram



- NeoSpectra Micro consists of a monolithic MEMS Michelson interferometer, a single element photo-detector, and an electronic driver board.
- You can interface with NM-DVK directly via SPI interface. In order to facilitate the evaluation process, we have attached the NeoSpectra Micro to a Raspberry Pi board. This board can act as a bridge to your host system e.g. your PC, or it can work as a host on its own.
- The micro SD card attached in the Raspberry Pi board, contains SpectroMOST Micro software that enables performing measurements using NeoSpectra Micro.
- Caution : Wi-Fi in the Raspberry Pi board is originally turned OFF. It can be turned ON via the OS of the Raspberry Pi board. To guarantee stable operation please keep Wi-Fi off during spectral measurements.

Optical head for sample interface

Free-space coupling from sample to MEMS (No fibers included)

Interface with sample

- Designed for diffuse reflectance measurements
- Window surface to contact sample
- Collection Spot size ~ 2.5 mm

Light sources

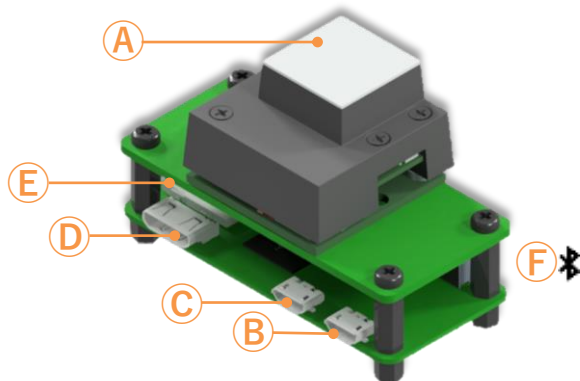
- Three Tungsten Halogen Lamps
 - (see details [here](#))
 - Number of bulbs to be used during the scan can be controlled by the software
- Operating temperature: 2,400 K
- Reflectors surrounding the bulbs to optimize power coupling

Warm up time

- Initial warm up time is required to stabilize the light source.
- To warm up optical head, take measurements in continuous mode* for :
 - Minimum: 1 min
 - Preferred :10 minutes

*read about continuous mode [here](#)

Interfaces and evaluation modes



- A** Optical free-space coupling
- B** Micro USB port (power only)
- C** Micro USB port (data & power)
- D** Mini HDMI port
- E** Memory card slot
- F** Bluetooth

Mode 1 | Operation using PC

- Connect NeoSpectra Micro to your PC via Raspberry Pi's USB port and install SpectroMOST Micro Software for speedy measurements of spectra.
- Connections:
 - A** Spectralon for background, and sample to measure for scan
 - B** Case 2 light bulbs: Nothing to connect
Case 3 light bulbs: Electrical power source (Voltage: 5 V; Current: 2A)
 - C** USB 3.0 port of a PC with SpectroMOST Micro installed
 - D** Nothing to connect
 - E** Micro SD card with SpectroMOST Micro installer
 - F** Nothing to connect

Mode 2 | Operation using Raspberry Pi

- Let the Raspberry Pi board be a mini-computer host and use its resources, and interfaces to communicate with NeoSpectra Micro.
- Connections
 - A** Spectralon for background, and sample to measure for scan
 - B** Electrical power source (Voltage: 5V; Current: 2A)
 - C** USB hub to connect peripherals e.g. control systems
 - D** HDMI adaptor – HDMI Cable - Screen
 - E** Micro SD card with SpectroMOST Micro
 - F** Nothing to connect

About SpectroMOST Micro

SpectroMOST Micro is the software tool that enables plotting, saving, and loading spectra data measured by NeoSpectra Micro Development Kits.

SpectroMOST Micro does not feature spectral analysis functions. Users are not expected to be able to build analysis models using this edition.

SpectroMOST Micro saves spectra and PSD data in “.spectrum” and “.PSD” file formats respectively. These formats can be converted to .txt to export data to any file format

SpectroMOST Micro can be operated on your own PC or on the Raspberry Pi board.

Mode 1 | Operation using PC

- Installation Steps
 - Connect NM-DVK to your PC via the USB cable
 - The Raspberry Pi board will show on your PC as an external drive.
 - Open the drive, and click on the setup file. The installation wizard will take you through all the installation steps
- Save and load measurements
 - Measured spectra and PSD data can be saved on your PC.

Mode 2 | Operation using Raspberry Pi

- Installation steps
 - Connect NM-DVK to a screen, keyboard, and mouse as shown in the interfaces description [here](#)
 - Wait until the Operating System of the Raspberry Pi board is initialized.
 - You'll find a shortcut to SpectroMOST Micro on the desktop. Click on it, and start using SpectroMOST Micro
- Save and load measurements
 - Measured spectra and PSD data can be saved on the Micro SD Memory card installed in the Raspberry Pi board

Spectra measured and saved with Raspberry Pi can not be loaded in PC with Windows using the SD Card. To extract data from the Raspberry Pi board, connect it with a USB flash memory drive via a USB hub, and copy the files in it.

SpectroMOST GUI - Main Interface

❶ Connect kit and wait until the status bar turns to green

❷ Select the tab:

- Spectrum: Ratio of spectral responses from a sample and a reference material
- PSD: Power Spectral Density

❸ Set measurement parameters:

- Scan time (t_s)*
- Select Optical gain settings
- Run mode:
 - Single: Display one measurement
 - Continuous: Keep taking and displaying measurements

❹ Take measurements:

- Background (in Spectrum tab only): With reference material at sample interface e.g. Spectralon
- Scan: With your sample material at sample interface
- Stop: Stop an ongoing measurement

❺ Wait until data are displayed in the display



❻ Controls on Plots

- Save: Save data of all measurements plotted in the displayed area.
- Load: Load previously measured data at anytime
- Clear: Delete all displayed measurements
- Capture (In “Continuous” run mode only): Keep the last measured data displayed after a new scan is operated.

❼ Data display

- Enable/disable linear interpolation of data
- In case interpolation is enabled, select the number of data points to be displayed

$$*SNR \propto \sqrt{t_s}$$

Performance highlights

Parameter	Unit	Condition	Value
Wavelength Range	nm	SNR > 200:1	1,350 – 2,550
Wavelength Resolution	nm	@ λ = 1.55 μ m, FWHM criterion	16
SNR	-	2s scan time, @ λ =2,350 nm, 3 light bulbs ON	2,000 : 1
Wavelength Accuracy	nm	@ λ = 1,400 nm	± 1.5
Wavelength Repeatability	nm	@ λ = 1,400 nm, absorbance level: 0.5 A.U	± 0.15
Temperature	°C	Operation	-5 – 40

Si-Ware Systems offers NeoSpectra-Micro Development kits to customers as a tool to evaluate the performance of NeoSpectra-Micro, and to assess the form, fit, function for end-use applications.

NeoSpectra-Micro is soldered on intermediary board to enable electrical and mechanical connection with Raspberry Pi board. Detaching NeoSpectra-Micro from the intermediary board should not be attempted.

These kits are not intended for qualification or use in production. The kit components are provided “as is” without any warranty whatsoever from Si-Ware Systems. Si-Ware Systems takes no responsibility for any damages that may occur to the development kit or any other external item if development kits are misused or if precautions listed in documentation are not followed.

For inquiries and support please contact neospectra.support@si-ware.com

Contact

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