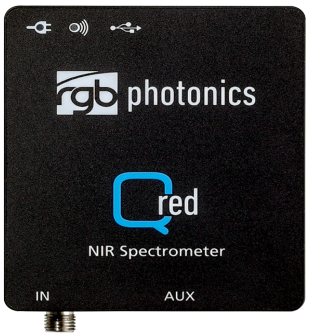
rgb photonics

# THE NEW Qred

ULTRA-COMPACT NIR SPECTROMETER
WITH COOLED HIGH-PERFORMANCE IMAGE SENSOR




**KEY FEATURES:**

- Cooled InGaAs detector
- Ultra-compact design
- Customizable wavelength ranges up to 2.5 µm
- Powerful electronics for on-board processing and evaluation

The Qred is the world's first truly portable high performance near-infrared (NIR) spectrometer. On a footprint smaller than a credit card, it includes a high-throughput Czerny-Turner optics with a TEC-cooled InGaAs image sensor. The Qred spectrometer breaks the size and cost barriers that prevented widespread applications of NIR spectroscopy in many fields including food safety, quality control, medical diagnostics and pharmaceutical analysis.

The advanced thermal design provides high thermal stability and excellent heat transfer without a fan. The rugged design with no moving parts ensures reliable operation in rough environments.

The Qred includes a powerful microcontroller that enables:

- Full processing of spectra in the device (offset, nonlinearity, dark spectrum, spectral sensitivity)
- Averaging and smoothing
- Binning and buffering of spectra
- Complex application-specific evaluation algorithms
- A large choice of available communication interfaces
- An I/O connector for analog and digital signals

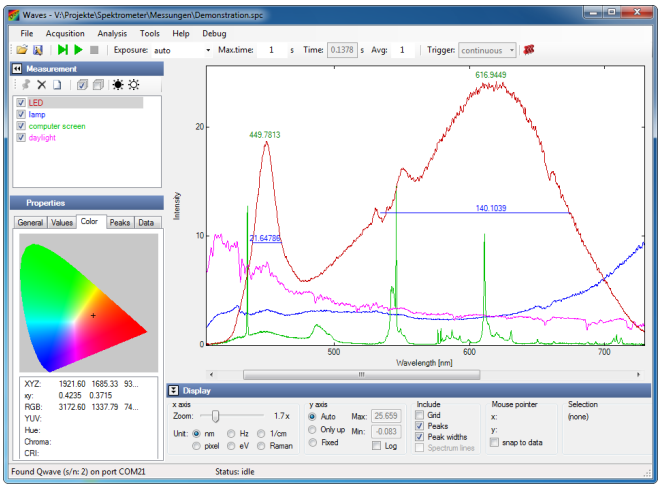
## Options

- Custom wavelength ranges between 900 and 2500 nm
- Custom entrance slits (determine resolution and sensitivity)
- Uncooled image sensor
- Custom optical connectors
- Custom optical filters

| | Specifications |
|---|---|
| Focal length | 50 mm |
| Wavelength range | 900 to 1700 nm<br>900 to 2500 nm |
| Entrance slit (changeable) | 50 µm by 256 pixel sensor<br>30 µm by 512 pixel sensor |
| Spectral resolution FWHM | 900 - 1700 nm:<br>8 nm with 256 pixel sensor<br>4 nm with 512 pixel sensor<br>900 - 2500 nm:<br>16 nm with 256 pixel sensor<br>8 nm with 512 pixel sensor |
| Dynamic range | 15000 : 1 |
| Numerical aperture | 0.14 |
| Stray light | < 0.1 % |
| Detector | Cooled Hamamatsu 256/512 pixel InGaAs line image sensor |
| A/D converter | 16 bit |
| Calibration | Wavelength, sensitivity, nonlinearity and multiple dark spectra stored in device |
| Transfer speed to PC | USB 2.0 High-Speed / 480 Mbps |
| Optical interface | SMA connector |
| Digital Interfaces | USB 2.0 with Type-C connector, SPI, UART |
| Dimensions | 67.0 × 58.0 × 22.5 mm (technical drawing available on our website) |
| Weight | 160 g |
| Operating temperature | -15 °C to 60 °C (non-condensing) |
| Storage temperature | -25 °C to 70 °C |
| Power consumption | 5 V DC<br>Without cooling: 200 mA<br>With cooling: up to 3 A |
| PC operating system | Windows 10, 8, 7, Vista, XP |

## PC Software

Every Qred spectrometer includes Waves, the smartest general-purpose spectroscopy software on the planet. Waves not only includes unique sophisticated algorithms for data aquisition and evaluation, it also provides these features through a clear and straightforward user interface that's designed to make things easy.




Software features include:

- Take and display series of spectra
- Automatic exposure control with dark spectrum interpolation
- Import most ASCII-based file formats
- Export as ASCII table to almost any numerical analysis software
- Comprehensive tools for displaying and analyzing spectra
- "Strip charts" for comparing characteristic values between multiple spectra including peak follower in real time
- Graph printing and export to PDF
- Dynamic peak finder (no need to set a threshold level)
- Dark spectrum interpolation
- Transmission, absorption and reflection measurements

All spectrum evaluation options are available with as little mouse clicks as possible. To zoom in, just move the zoom slider. To move around, just move the scrollbar. To change the x axis unit, just click the corresponding button. There is no step two. For some features, there is not even a step one: values such as peaks or colorimetry are instantly calculated as soon as you take a spectrum.

Waves is available as a free download from our website.

## Software library

A software development kit (SDK) is also included to control the spectrometer and take spectra from your own software. It consists of a Windows DLL library for the .NET framework, documentation and sample code. The SDK can be used with any programming languange that can use .NET DLLs, including C#, Visual Basic .NET, C++, Delphi, LabVIEW, Matlab and Mathematica.

## Communication protocol

The spectrometer can also be directly controlled from an embedded microcontroller or other operating systems using the device communication protocol. Just like our application software, the protocol is designed to be both powerful and easy to use for software developers.

## I/O Port


The Qred includes a new auxiliary connector for analog and digital I/O, communication interfaces and power supply (if USB is not used). The 8 digital channels can be configured as trigger input, shutter or flash lamp control, process control or general purpose I/O pins.

The Qred supports three trigger modes: software trigger, interval trigger and external trigger. It can be set to trigger on the start or the end of the exposure period.

## Optional accessories

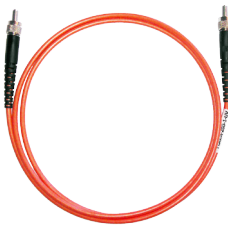
**Cosine Correcting Probe**

The cosine corrector COCOS-SMA-F collects light over an angle of 180 degrees and can be used to measure irradiance or illuminance as optical power per area. It can be attached to an optical fiber or directly to the spectrometer.

**SMA Collimator**

The collimator can be used to couple collimated light into a multi-mode optical fiber or to collimate the divergent light emitted from a fiber.

**Optical Fiber with SMA Connectors**



Optical fiber patch cables are fabricated to customer's requirements regarding:

- Length
- Core diameter
- Tubing (PVC or stainless steel)
- Spectral range
- Optical connectors

More specialized accessories are available on request.

## Applications

NIR spectroscopy is an invaluable analysis tool in life sciences and organic chemistry. But its application in the field has been limited by the size and cost of current NIR spectrometers, which are still much bigger and heavier than today's compact UV/VIS spectrometers. For integration in portable hand-held devices, a new smaller and more affordable NIR spectrometer is a crucial requirement. The new Qred is ideally suited to replace these older bulkier spectrometers and at the same time enables numerous new applications in compact portable devices. It allows the widespread use of portable NIR analysis devices to be taken directly to the point of measurement in applications such as:

- Food quality scanning
- Medical tissue analysis
- Fertilizer control
- Chemical analysis

Please contact us if your requirements are not matched by these specifications. Custom modifications are available for any quantities. All specifications are subject to change without notice. The latest versions can be found on our website.

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RGB Photonics GmbH
Donaupark 13
93309 Kelheim
Germany

Tel.: +49 9441 17 50 33 - 0
Fax: +49 9441 17 50 33 - 92
sales@rgb-photonics.com
www.rgb-photonics.com