Qneo AFBR-S20N1N256
Neat NIR spectrometer designed for industrial integration.

Overview
Start your optical analysis right away with the Qneo. Equipped with an uncooled InGaAs sensor array, the Qneo enables professional measurement between 950 nm and 1700 nm.

On a footprint smaller than a credit card, the Qneo features a rugged setup that combines high resistance in industrial environments and high optical performance.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Product Configuration</th>
<th>Wavelength Range</th>
<th>Spectral Resolution typ. (FWHM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFBR-S20N1N256</td>
<td>Qneo with 256-pixel sensor</td>
<td>950 nm to 1700 nm</td>
<td>8 nm</td>
</tr>
</tbody>
</table>

Specifications
- Focal length: 40 mm
- Entrance slit: 30 μm: 256-pixel sensor version
- Dynamic range\(^1\): 12000:1
- SNR\(^2\): Max. > 10,000
- Numerical aperture: 0.18
- Stray light\(^3\): <0.1 %
- Integration time: 4 μs to 5 minutes
- Detector: Uncooled 256-pixel InGaAs 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
- Optical interface: SMA connector
- Digital interfaces: USB 2.0 with Type-C connector, SPI, UART
- Dimensions (without SMA connector): 60.0 mm × 50.0 mm × 19.0 mm
- Weight: 70g
- Power consumption: 5V DC, 30 mA
- PC operating system: Windows 7 and above

All values in the table are typical values if not marked with "min., max., <, >".
Test conditions: Vcc = 5.0V, ambient temperature = 25°C.

\(^1\) Dynamic range: Dynamic range is calculated as (average sensor saturation value) / (average read out noise at smallest exposure time), only the offset is adjusted for the used spectra.
\(^2\) SNR: measured with a tungsten light source and a selected exposure time to achieve a max signal of 90% to 100% of the sensor saturation value. Max. SNR = max[(average value / standard deviation) per pixel]. The spectra are averaged over 1 single spectra and only offset is adjusted.
\(^3\) Stray light: Measured with a tungsten light source and a long pass filter of 1400 nm; the spectrum is averaged over 500 single spectra and only offset is adjusted.
### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature (non-condensing)</td>
<td>$T_s$</td>
<td>$-25$</td>
<td></td>
<td>$+70$</td>
<td>°C</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>$V_{CC}$</td>
<td>$-0.5$</td>
<td></td>
<td>$5.5$</td>
<td>V</td>
</tr>
<tr>
<td>Data Input Voltage (trigger IO 0–3)</td>
<td>$V_i$</td>
<td>$0.0$</td>
<td></td>
<td>$V_{CC}$</td>
<td>V</td>
</tr>
<tr>
<td>Data Input Voltage (all other pins)</td>
<td>$V_{AI}$</td>
<td>$0.0$</td>
<td></td>
<td>$3.6$</td>
<td>V</td>
</tr>
<tr>
<td>Data Output Voltage</td>
<td>$V_o$</td>
<td>$0.0$</td>
<td></td>
<td>$3.3$</td>
<td>V</td>
</tr>
</tbody>
</table>

The device might get damaged if the maximum ratings are exceeded.

### Recommended Operating Conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient Operating Temperature</td>
<td>$T_c$</td>
<td>$-15$</td>
<td></td>
<td>$+55$</td>
<td>°C</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>$V_{CC}$</td>
<td>$4.5$</td>
<td>$5.0$</td>
<td>$5.5$</td>
<td>V</td>
</tr>
<tr>
<td>Trigger IO Input Voltage</td>
<td>$V_{AI}$</td>
<td>$0.0$</td>
<td></td>
<td>$3.3$</td>
<td>V</td>
</tr>
<tr>
<td>Data Input Voltage (all other pins)</td>
<td>$V_{O}$</td>
<td>$0.0$</td>
<td></td>
<td>$3.3$</td>
<td>V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Output Voltage</td>
<td>$V_o$</td>
<td>$0.0$</td>
<td></td>
<td>$3.3$</td>
<td>V</td>
</tr>
</tbody>
</table>

The device might get damaged if the maximum ratings are exceeded.

---

**Figure 1.** Typical Sensitivity Curve of IR Sensor Arrays (Source: www.hamamatsu.com)

![Typical Sensitivity Curve of IR Sensor Arrays](image_url)

**Notes:**
1. Reference data from Hamamatsu
2. Data from Broadcom measurement
Application Software
Every Qneo spectrometer includes Waves user software developed for general-purpose spectroscopy applications. Waves includes sophisticated algorithms for data acquisition and evaluation.
Various spectrum evaluation options are available with only a few mouse clicks.
• 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

Software Library
A complementary 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 supports various programming languages that can use .NET DLLs, including C#, Visual Basic .NET, C++, Delphi, LabVIEW, Matlab, and Mathematica.

Communication Protocol
The spectrometer can 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.

I/O Port
The Qneo includes an auxiliary connector for analog and digital I/O, communication interfaces, and power supply (if USB is not used). The four digital channels can be configured as trigger input, shutter or flash lamp control, process control, or general-purpose I/O pins.
The Qneo supports three trigger modes: software trigger, interval trigger, and external trigger.

Figure 2. Included User Software
Figure 3. Qneo Package Outline Drawing
Figure 4. Qneo Package Drawing – Back

For more product information: Broadcom.com
Copyright © 2021 Broadcom. All Rights Reserved. Broadcom, the pulse logo, and Connecting everything are among the trademarks of Broadcom. The term “Broadcom” refers to Broadcom Inc. and/or its subsidiaries.
AFBR-520NIN00X-DS102 June 17, 2021