BROADCOM®

Data Sheet

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.

Key Features

- High sensitivity
- Low temperature dependency
- Stable long-term performance
- Ultra-compact design
- Powerful onboard electronics

Applications

- Agricultural analysis
- Food safety
- Chemical analysis
- Quality control
- Petro-chemical analysis
- Environmental analysis
- Biomedical applications
- Pharmaceutical analysis
- Process control and monitoring

Part Number	Product Configuration	Wavelength Range	Spectral Resolution Typ. (FWHM)
AFBR-S20N1N256	Qneo with 256-pixel sensor	950 nm to 1700 nm	8 nm

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 readout noise at the 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 100 single spectra and only the 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 the offset is adjusted.

Pin Descriptions

Pin	Name	Description	Function	Voltage Min.	Voltage Typ.	Voltage Max.	Conditions
1	+5V	Power Supply	PWR	4.5	5	5.5	—
2	USB D-	Negative USB Data Signal	I/O	0	—	3.3	—
3	GND	Ground	PWR	—	—	—	1
4	USB D+	Positive USB Data Signal	I/O	0	—	3.3	—
5	EN_USB	Enable USB on Aux	I	0	—	5.5	3
6	TRG-I/O 0	Trigger I/O 0	I/O	0	—	5	—
7	TRG-I/O 1	Trigger I/O 1	I/O	0	—	5	—
8	TRG-I/O 2	Trigger I/O 2	I/O	0	—	5	—
9	TRG-I/O 3	Trigger I/O 3	I/O	0	—	5	—
10	GND	Ground	PWR	—	—	—	1
11	UART_RX	UART Receive Input	I	0	—	3.3	2
12	UART_TX	UART Transmit Output	O	0	—	3.3	—
13	Reserved	Do Not Connect	—	—	—	—	—
14	Reserved	Do Not Connect	—	—	—	—	—
15	GND	Ground	PWR	—	—	—	1
16	SPI_POCI	SPI Peripheral Out/Controller In	O	0	—	3.3	—
17	SPI_PICO	SPI Peripheral In/Controller Out	I	0	—	3.3	3
18	SPI_SCK	SPI Clock	I	0	—	3.3	3
19	SPI_CS	SPI Chip Select (active low)	I	0	—	3.3	2
20	nRESET	Device Reset (active low)	I	0	—	3.3	2

1. All GND pins are internally connected.
2. Internally pulled up.
3. Internally pulled down.

Figure 1: Qneo Connector

pin 19   pin 1

USB

pin 20   pin 2

Auxiliary Port
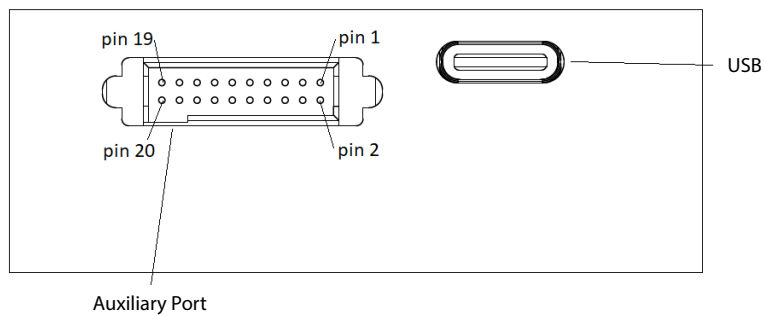
Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Units
Storage Temperature (non-condensing)	T_S	–25	—	+70	°C
Supply Voltage	V_{CC}	–0.5	—	5.5	V
Data Input Voltage (trigger IO 0–3)	$V_{I\,trig}$	0.0	—	V_{CC}	V
Data Input Voltage (all other pins)	V_I	0.0	—	3.6	V
Data Output Voltage	V_O	0.0	—	3.3	V

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

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units
Ambient Operating Temperature	T_C	–15	—	+55	°C
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
Trigger IO Input Voltage	$V_{I\,trig}$	0.0	—	3.3	V
Data Input Voltage	V_I	0.0	—	3.3	V

Figure 2: Typical Sensitivity Curve of IR Sensor Arrays
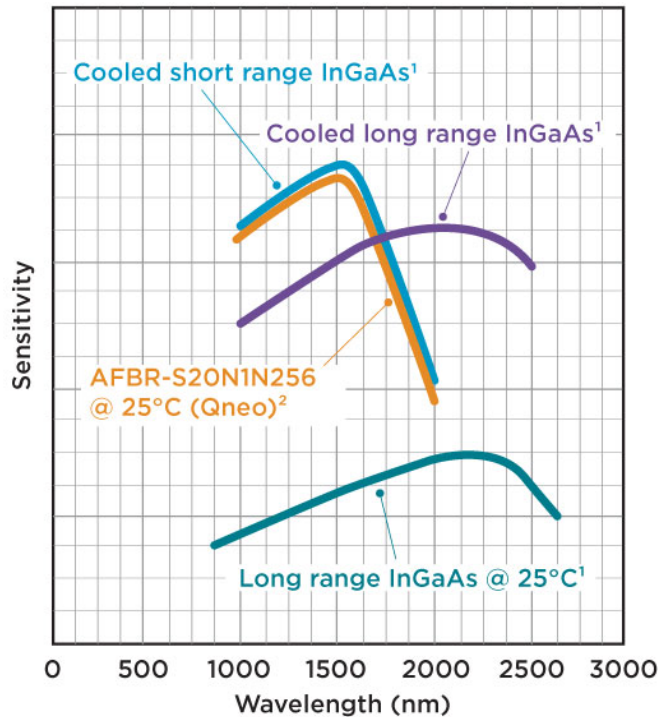
1. Typical measurement curves of cooled short-range InGaAs and cooled & uncooled long-range InGaAs from commercial off-the-shelf devices
2. Typical measurement curve of Broadcom's uncooled short-range InGaAs (Qneo)