BROADCOM®

Data Sheet

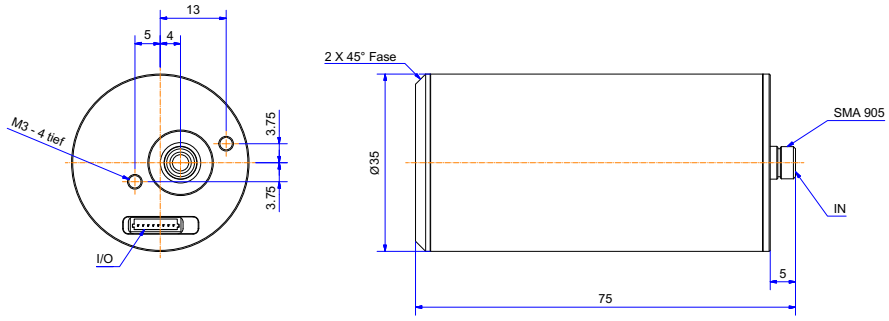
QtubeSpectrometer AFBR-S20T1WU

UV Sensitive Miniature Spectrometer for Flexible Industrial Integration

Overview

Within an amazingly small design, the Broadcom® QtubeSpectrometer is the perfect spectral sensor for the integration directly into your process pipe. This spectrometer module delivers technical specifications that are unprecedented at this size. The QtubeSpectrometer module covers a wide spectral range from 190 nm to 1000 nm within one single device. Easy communication and signal acquisition is guaranteed through a UART interface. The optical performance is optimized for the UV range.

Figure 1. AFBR-S20T1WU Outline Drawing



Part Number	Product Configuration	Wavelength Range
AFBR-S20T1WU	QtubeSpectrometer	190 nm to 1000 nm

Key Features

- Robust design
- High spectral resolution
- Sensitivity optimized for UV
- Low temperature dependency
- Cost effective

Applications

- Water quality analysis
- Agricultural measurements
- Biomedical applications
- Chemical research
- Color measurements
- Counterfeit detection
- Environmental analysis
- Health and life science
- Light measurements
- Process control and monitoring

Specifications

Parameter	Specification			
Spectral Resolution (FWHM) Referring to Wavelengths Range	200 to 350 nm	350 to 600 nm	600 to 730 nm	730 to 1000 nm
	<3.5 nm	<2 nm	<3 nm	<5.5 nm
Focal Length	50 mm			
Optical Components	Grating: 295 lines, blaze 270 nm			
Entrance Slit	20 µm			
Wavelengths Accuracy	1/3 of the spectral resolution			
Dynamic Range *	850:1			
Numerical Aperture	0.1			
SNR †	min. 200:1			
Stray Light ‡	≤0.2%			
Exposure Time Range	100 µs to 2000s			
Detector	TCD1254 with 2500 pixels			
A/D Converter	16-bit			
Calibration	Wavelength, spectral sensitivity, nonlinearity, and multiple dark spectra			
Optical Interface	SMA 905 fiber connector, the use of a fiber is not necessary			
Digital Interfaces	Connector manufacturer: JST Device connector p/n: SM08B-SRSS-TB Mating connector p/n: SHR-08V-S-B UART communication for software interface			

Pin Assignment	1	2	3	4	5	6	7	8
Pin Function	VCC (+5V)	Ground	UART_TX (output)	UART_RX (input)	I/O 0	I/O 1	Bootloader_EN	Power_EN

Dimensions	35.0 mm × 70.0 mm
Weight	80g
Temperature	Operating: –15°C to 60°C (noncondensing) Storage: –25°C to 70°C (noncondensing)
Thermal Drift	<0.1 nm/K
Mechanical Stability	MIL-STD-883 Method 2002A, MIL-STD-883 Method 2007A
Standards	RoHS Compliance 2011/65/EU (RoHS 2)
Power Consumption	5V DC, max. 130 mA
Baud Rate	57600, 8N1, no handshake
Communication	Short link communication protocol included in the SDK. Download via webpage: https://www.broadcom.com/products/optical-sensors/spectrometers

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

** Dynamic range = saturation limit/read out noise measured at 200 ms integration time + averaging 100.*
† SNR = exposure time of 200 ms, and averaging of 100 samples is used for this measurement. The SNR is calculated for each pixel (SNR(pixel) = (bright signal/bright noise). The maximum of these values must meet the specification.
‡ Measured with a halogen light source + 640 nm long pass filter + optical fiber with 200 µm core diameter and a NA of 0.22. Stray light is the max. Measured signal below 500 nm in comparison to the max of the complete spectra.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Storage Temperature	T_S	-25	—	+70	°C
Supply Voltage	V_{CC}	-0.5	—	5.5	V
Data Input Voltage	V_I	0	—	V_{CC}	V
Data Output Voltage	V_O	0	—	3.3	V

NOTE: Device might get damaged if the maximum ratings are exceeded.

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Ambient Operating Temperature	T_C	-15	—	+60	°C
Supply Voltage	V_{CC}	4.5	5	5.5	V
Signaling Rate	B	0.3	57.6	3000	kBd
Trigger IO Input Voltage	V_{IO}	0.0	—	3.3	V

Pin Orientation