

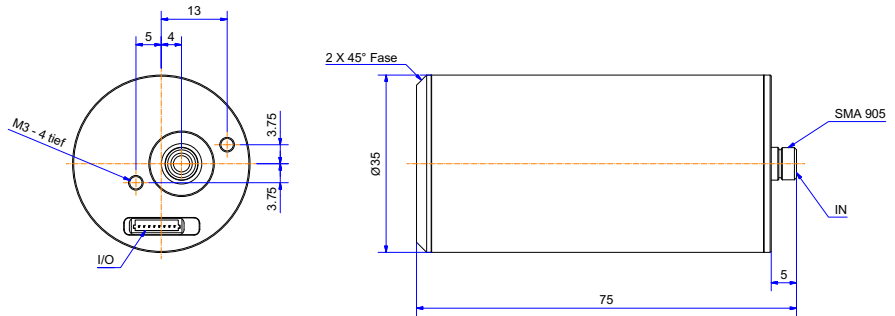
QtubeSpectrometer AFBR-S20T1WU

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



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

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

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 μ m							
Wavelengths Accuracy	1/3 of the spectral resolution							
Dynamic Range *	850:1							
Numerical Aperture	0.1							
SNR †	min. 200:1							
Stray Light ‡	\leq 0.2%							
Exposure Time Range	100 μ s 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: SMO8B-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 \times 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 μ m 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

