OPTOSKY Spectroscopy Solutions

Datasheet

Scientific-grade Cooled UV Camera | ATD2700

Features

- Scientific-grade professional camera based on GSENSE series full-frame or large-pixel image sensors
- Two-stage high-performance TE cooling structure
- Rolling shutter
- Broad spectral range from 200 nm to 1100 nm
- Up to 16 megapixels (4096 × 4096)
- Controllable temperature reduction up to 40 °C
- Compact anti-fogging design ensures no condensation on the sensor surface even under extremely low temperatures
- High-speed USB 3.0 / Camera Link interface with data transfer rates up to 5 Gbps
- Built-in ISP module supporting up to 16-bit processing
- Supports video and image capture in both software-triggered and hardware-triggered modes

Applications

- Scientific Research: Spectral Analysis
- Automated Optical Inspection (AOI)
- Fluorescence Imaging
- Gene Sequencing
- Semiconductor Manufacturing and Inspection
- Surface Defect Detection of Materials
- High-Voltage Equipment Monitoring
- Security and Anti-Counterfeiting Detection, as well as Forensic Investigation
- Astronomical Observation

Description

The ATD2700 series scientific/high-sensitivity cameras are equipped with GSENSE series high-performance large-pixel or full-frame image sensors. To address the inherent thermal noise of the sensors, a dual-stage high-efficiency cooling module has been specially designed, enabling the camera sensor to operate at temperatures more than 40°C below ambient. To combat the common issue of surface fogging at low temperatures, the ATD2700 series incorporates an anti-fogging structure that ensures the sensor surface remains fog-free under such conditions. This proprietary technology significantly reduces image noise and guarantees the acquisition of high-quality images.

Sensor temperature is software-controllable to balance low noise and optimal quantum efficiency (QE) of GSENSE sensors (QE drops at very low temperatures).

Supports free-run or triggered operation (single/multi-image capture per trigger). Integrated industrial-grade I/O module enables synchronization with external devices or multi-camera setups. Includes advanced image processing software for camera control and image processing.

Model	Descrip
ATD2700-420-UB	4.2MP, GSENSE back-illuminated sensor, USB interface
ATD2700-420-CLB	4.2MP, GSENSE back-illuminated sensor, CameraLink interface
ATD2700-1600-CL	16MP, front-illuminated sensor, USB+CameraLink interface
ATD2700-1600-CLB	6MP, GSENSE back-illuminated sensor, USB+CameraLink interface

Figure 1: ATD2700 Scientific-grade Cooled UV Camera

1. Selection Guide

Model	Features
ATD2700-420-UB	4.2MP, 200–1100nm, GSENSE back-illuminated sensor, monochrome thermoelectrically cooled camera, USB interface
ATD2700-420-CLB	4.2MP, 200–1100nm, GSENSE back-illuminated sensor, monochrome thermoelectrically cooled camera, CameraLink interface
ATD2700-1600-CL	16MP, 300–1000nm, front-illuminated sensor, monochrome thermoelectrically cooled camera, USB+CameraLink interface
ATD2700-1600-CLB	16MP, 200–1100nm, GSENSE back-illuminated sensor, monochrome thermoelectrically cooled camera, USB+CameraLink interface

2. Parameter

Parameters		ATD2700-420-UB	ATD2700-420-CLB	ATD2700-1600-CL	ATD2700-1600-CLB
Camera Parameters	Sensor	GSENSE back-illuminated CMOS sensor		GSENSE front-illuminated CMOS sensor	GSENSE back-illuminated CMOS sensor
	Spectral Range	200nm-1100nm		300nm-1000nm	200nm-1100nm
	Pixel Size	6.5μm × 6.5 μm		9μm × 9μm	
	Target Area Size	1.2”		3.2”	
	Resolution	2048 × 2048		4096 × 4096	
	Frame Rate	72.5fps@2048×2048 72.5fps@1024×1024	108fps@2048×2048 108fps@1024×1024	23fps@4096×4096, 90fps@2048×2048	23fps@4096×4096
	Memory	512MB (4Gb)		1024MB (8Gb)	
	Conversion	11bit：1.03		12bit：	12bit：

	Gain	12bit：0.42(HCG) 13.33(LCG) 12bit CMS：0.43 12bit Global reset：0.44(HCG) 1.92(LCG) HDR 11HL：0.58 HDR 12HL：0.54	0.86e-/DN(HCG 16.5×) 20.94e-/DN (LCG 2.8×) 12bit Global reset：TBD HDR16：0.94e-/DN	0.35e-/DN(HCG 12×) 10.42e-/DN(LCG 3×) 12bit Global reset：TBD HDR16：TBD
Camera Parameters	Dynamic Range	11bit：61.38dB 12bit：59.73dB(HCG) 67.17dB(LCG) 12bit CMS：64.12dB 12bit Global reset：58.63dB(HCG) 61.27dB(LCG) HDR 11HL：91.83dB HDR 12HL：86.02dB	12bit：58.5dB(HCG 16.5×) 67.5dB(LCG 2.8×) 12bit Global reset：TBD HDR16：82.5dB	12bit：55.0dB(HCG 12×) 62.4dB(LCG 3×) 12bit Global reset：TBD HDR16：TBD
	Readout Noise	11bit：1.69e- 12bit：1.72e-(HCG) 23.25e-(LCG) 12bit CMS：1.07e- 12bit Global reset：2.08e-(HCG) 6.62e-(LCG) HDR 11HL：0.97e- HDR 12HL：1.78e-	12bit：4.06e-(HCG 16.5×) 35.61e-(LCG 2.8×) 12bit Global reset：TBD HDR16：4.59e-	12bit：4.06e-(HCG 12×) 35.61e-(LCG 3×) 12bit Global reset：TBD HDR16：TBD
	Full-Well Capacity	11bit：1.98ke- 12bit：1.67ke-(HCG)； 53.07ke-(LCG) 12bit CMS：1.71ke- 12bit Global reset：1.78ke-(HCG)； 7.66ke-(LCG) HDR 11HL：37.85ke- HDR 12HL：35.56ke-	12bit：3.45ke-(HCG 16.5×) 84.33ke-(LCG 2.8×) 12bit Global reset：TBD HDR16：61.49ke-	12bit：1.30ke-(HCG 12×) 39.2ke-(LCG 3×) 12bit Global reset：TBD HDR16：TBD
	Signal-to-Noise Ratio	11bit：32.97dB 12bit：32.22dB(HCG) 47.25dB(LCG) 12bit CMS：32.34dB 12bit Global reset：32.49dB(HCG) 38.85dB(LCG) HDR 11HL：45.78dB HDR 12HL：45.51dB	12bit：35.4dB(HCG 16.5×) 49.3dB(LCG 2.8×) 12bit Global reset：TBD HDR16：47.9dB	12bit：30.7dB(HCG 12×) 45.9dB(LCG 3×) 12bit Global reset：TBD HDR16：TBD
	Sensitivity	1.1×108e-/((W/m2).s)@550nm	23.82 V/(lux-s)@600nm	26.58 V/(lux-s)@550n

	Dark Current	Typical: 0.45e-/s/pix@ -30℃ die temp		0.15e-/pixel/s	
	Quantum Efficiency	95%@560nm		74% @ 600nm	74% @ 600nm
	Exposure Time Range	12us-300s	12us-10s	12us-3600s	12us-3600s
	Gain Range	1× – 21×		1× – 16.5×	1× – 12×
	Shutter Mode	Rolling Shutter / Global Reset			
	Binning Mode	Software 2×2, 3×3, 4×4; Hardware FPGA 2×2		Software 2×2, 3×3, 4×4	
	Data Interface	USB3.0	CameraLink	USB3 / CameraLink	USB3 / CameraLink
	Digital I/O	1 opto-isolated input, 1 opto-isolated output, 2 non-isolated I/O ports			
	Data Format	Mono 11 / Mono 12 / Mono 16		RAW8 / RAW12 / HDR16	
	Cooling Temperature Difference	Up to 40°C below ambient temperature			
General Specifications	Power Supply Mode	Powered by 12V power adapter		Powered by 19V 4.74A power adapter	
	Power Consumption	<25W		TEC ON：58.7W；TEC OFF：16.2W；TEC OFF + CameraLink Only：8.2W	
	Temperature	Operating temperature: -30~60℃; Storage temperature: -40~85℃		Operating temperature: -30~45℃; Storage temperature: -40~60℃	
	Humidity	20%-80%, non-condensing		0-95%	
	Dimensions	80*80*101.5		100*100*127.7	
	Weight	860g		1317g	
	Lens Mount	C-mount		M54 × 0.75	
	Software	SDK development kit and supporting software provided.			

3. Main Performance Tests

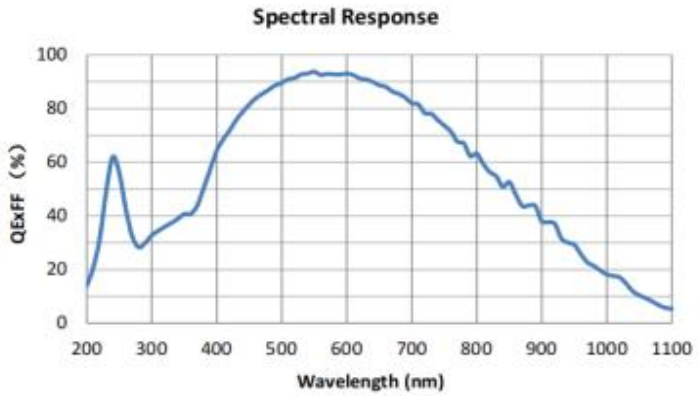

Figure 3: ATD2700-420 Camera Spectral Response Curve

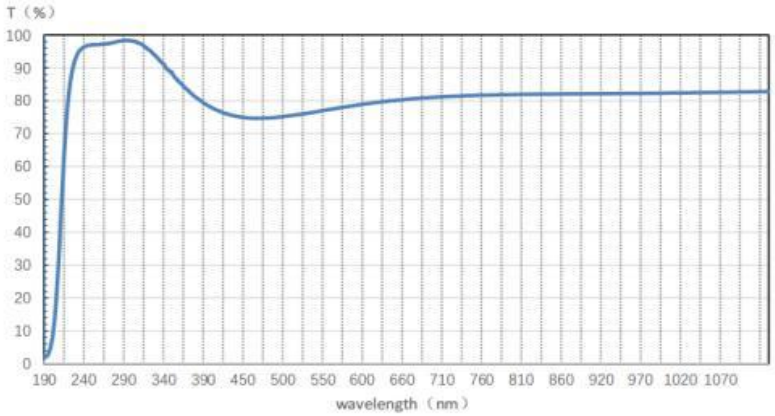

Figure 4: ATD2700-420 Camera Filter Transmittance Curve

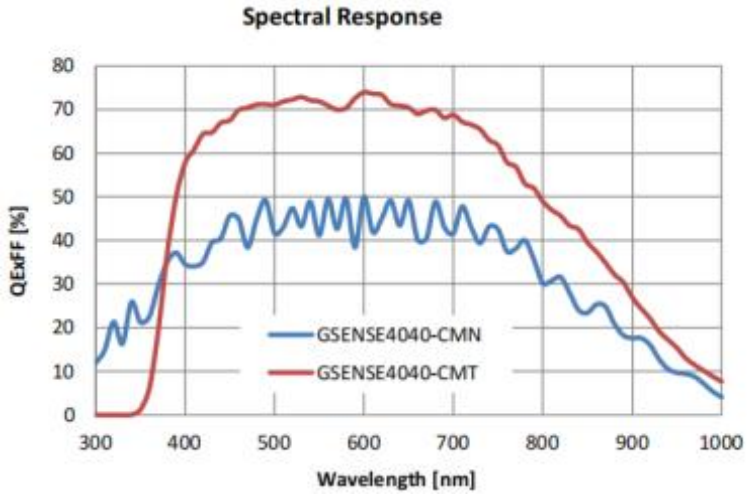

Figure 5: ATD2700-1600-CL Camera Spectral Response Curve

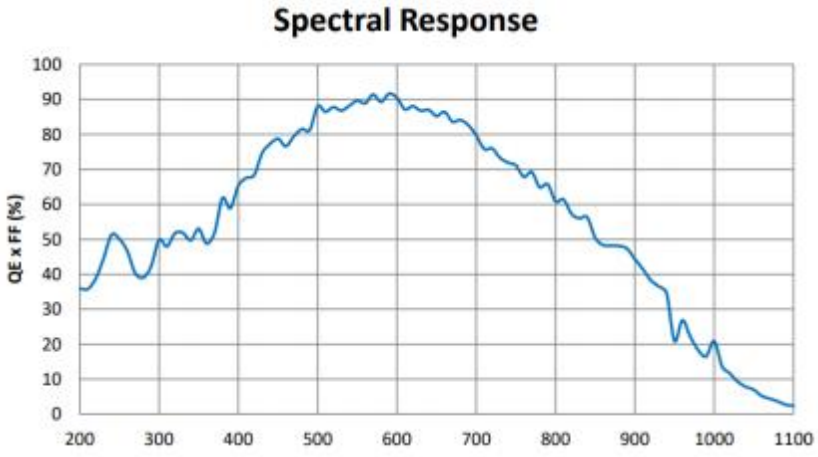

Figure 6: ATD2700-1600-CLB Camera Spectral Response Curve

4. Effect Diagram

Figure 7: ATD2700-420-CLB UV Camera Physical Photo and Dimensions Diagram

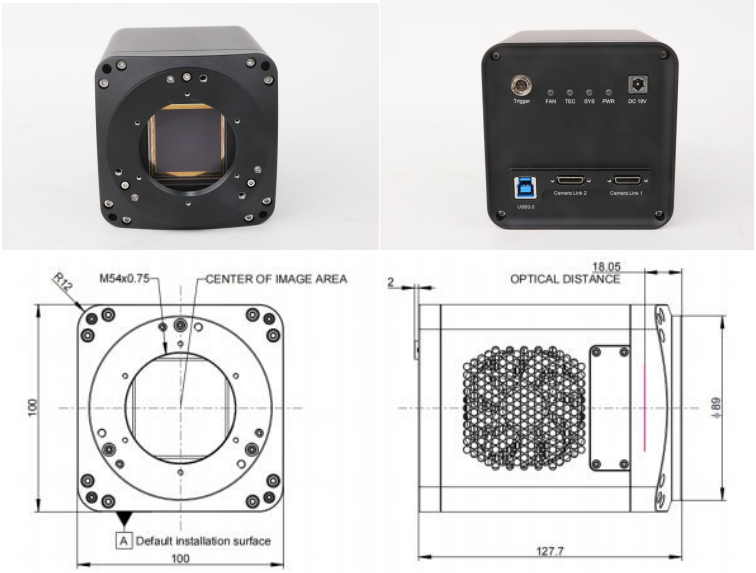

Figure 8: ATD2700-1600 UV Camera Physical Photo and Dimensions Diagram

5. Packing List

ATD2700 Standard Packaging List	
A	3A Instrument Safety Case (1 piece, 2.8 kg/box)
B	ATD2700 Camera
C	Power Cable (standards optional: CN, US, EU, UK)
D	Power Adapter
E	USB 3.0 Data Cable
F	External Trigger Control Cable
G	CameraLink Cable x2 (Optional)
H	Acquisition Card (Optional)

6. External I/O Interface Definitions

Table 6-1: ATD2700 Series Pin Signal Definitions

Color	Pin	Signal	Signal Description
White	1	GDN	Non-isolated signal and power ground
Red	2	12V	12VDC Power Input
Blue	3	OPTO_GND	Optocoupler-isolated signal ground
Yellow	4	DIR_GPIO1	Non-isolated signal (software-configurable as input/output) (line2)
Black	5	DIR_GPIO2	Non-isolated signal (software-configurable as input/output) (line3)
Green	6	OPTO_IN	Optocoupler-isolated input signal (line0)
Pink	7	OPTO_OUT	Optocoupler-isolated output signal (line1)