Dream Chip CHIP

Dream Chip Technologies

ATOM one 4K mini

7 / 11 / 16 mm sensor

Dual SDI 4K POV Camera

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1   Introduction

Dear Customer,

Thank you very much for buying **ATOM one 4K mini**.

This manual gives you an overview of your new camera. More technical details about the camera functions can be found in the **ATOM one 4K mini** reference manual.

The **ATOM one 4K mini** is the smallest POV SDI 4K camera with inbuilt broadcast grade image processing in the market.

The **ATOM one 4K mini** camera family consists of 3 versions with different sensors and lens types:

Camera model	Sensor type	Lens type
ATOM one 4K mini 7	7mm rolling shutter	C-mount / S-mount
ATOM one 4K mini 11	11mm rolling shutter	C-Mount
ATOM one 4K mini 16	16mm global shutter	C-Mount

The compact size and simple operation will enable you to place a camera at any location.

You have full control to all the settings for best quality and reliable operation at any of your wanted locations.

High quality 12G SDI und 32 phase multimatrix support will easily color match the **ATOM one 4K mini** to any existing 4K production environment.

1.1 Quality Policy

Dream Chip Technologies GmbH is committed to the delivery of safe, effective and reliable products to their consumers, a fundamental element of our Company's Targets.

Our mission is to bridge the gap between demand and offer by supporting our customers with sophisticated technology, thus enabling them to launch new products without having to neglect their core business. This strategy ensures business stability and steady growth through product innovations at the same time.

We have both outstanding engineering knowledge and many years of experience in the field of consumer and industrial focused semiconductor development.
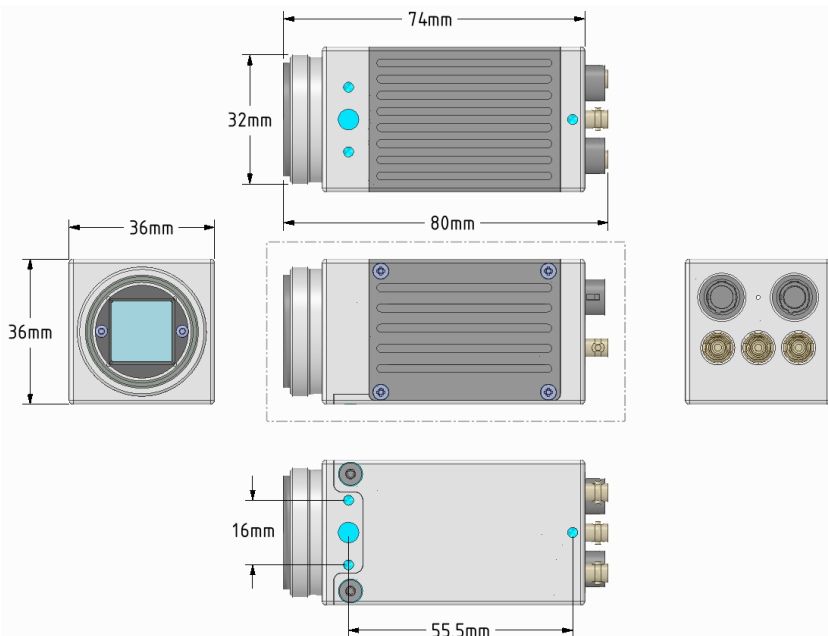
Peter Schaper, CEO

2   Technical Data

2.1   Dimensions

For simple mounting the camera has a 1/4" x 5mm tripod thread at the top and bottom.

Any custom specific mounting can be done with 6 additional M3x5mm mount holes on top and bottom.

Please refer to the drawing below for details.

2.2 Overview

- Dimensions: 36mm x 36mm x 79mm (Width x Height x Length)
- Weight: 123g
- Power supply 9V-36V
  - 6.5W ATOM one 4K mini 7
  - 7.6W ATOM one 4K mini 11
  - 8.3W ATOM one 4K mini 16
- C-Mount, for the ATOM one mini 7 model a S-Mount (M12) adapter is included
- Operation conditions: -30…+65 degree Celsius
- Active cooling with a 30mm fan

2.3 Image Sensor

The following table lists the image sensor attributes of the three different camera models:

Camera	4K mini 7	4K mini 11	4K mini 16
Pixel Size	1.62µm	2.4µm	3.45µm
Sensor Size	1/2.5"	2/3"	1"
Sensor Diagonal	7.2mm	11mm	16.1mm
Filter	IR cut	IR cut	IR cut
Shutter Type	Rolling	Rolling	Global
Dynamic	10 Bit / 57dB	10 Bit / 57dB	12 Bit / 72 dB
Sensitivity (native)	ISO 30-675	ISO 45-1010	ISO 115-1840
Sensitivity (digital gain)	ISO 3200	ISO 6400	ISO 12800
Sensitivity (2000 Lux 50 Hz)	F2.4	F8	F6.7
Maximum Field of View	125° (2.7mm lens)	76° (6mm lens)	98° (6mm lens)
Resolution	UHD	UHD + 4K	UHD + 4K

2.4   Image Processing Features

- Defect Pixel Correction
- Black level, White Level, Master Black
- Lens shade correction
- White balance / Auto white balance
- Auto exposure with adjustable weight grid
- Flare compensation
- High quality color interpolation (Debayer)
- Color Matrix / Color correction
- Color temperature settings / presets
- Multimatix Color Correction (12/24/32 angles)
- Denoise filter
- Detail filter
- Color post processing (luminance, contrast, saturation, hue)
- SDI range adjustable (black / white)
- 4K to 2K downscaler

2.5   Video Output

- Dual SDI 12G Output (with separate LUTs and RAW support)
- 10 BIT YUV422 3840x2160 UHD
- 10 BIT YUV422 4096x2160 4K (only mini 11 and mini 16)
- Built-in scaler allows output of progressive or interlaced Full HD or 2K content on both outputs
- Framerates: 23.98, 24, 25, 29.97, 30, 47.96, 48, 50,59.94, 60
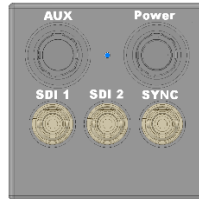
2.6   System Functions

- Autostart with last settings
- Embedded time code
- Tri-level genlock input and output
- Remote control via RS485 and RS232 (3.3V)

3 Connectors

The **ATOM one 4K mini** has 5 connectors at the back side.

3.1 Power / RS485 connector

The power connector is a Hirose male HR10 6 pin connector. The following table shows required plugs. Dream Chip offers a mini XLR adapter.

Female HR10A-7P-6S(73)	Signal	Dream Chip 4-wire Power Cable	Power ITT Male M-XL-3-12L	RS485 ITT Female M-XL-3-11L
6	Power in	red	1	
5	GND	brown	3	3
4	RS485_A	N/A		
3	RS485_B	N/A		
2	RS485_B	black		2
1	RS485_A	orange		1

Note: There is a solder option to use the pins 1 to 4 as a full duplex RS422 connection. Please contact Dream Chip for more details.

3.2 Aux connector

The AUX connector is a Hirose female HR10 6 pin connector and is reserved for future functions.

Currently the connector can be used for serial control and as power source bypassed from the power connector. The following table shows the required plug.

Male Pin HR10A-7P-6P(73)	Signal
1	Power pass through
2	GND
3	Uart TX 3.3V
4	Uart RX 3.3V
5	RESERVED
6	RESERVED

3.3 Dual SDI output

The HD-BNC output are SMPTE 2081 / 2082 complaint. The two outputs can deliver the same signal (mirror mode) or can be used with two individual output lookup tables. Alternatively the SDI 2 output can be configured as a RAW output.

3.4 Genlock

The HD-BNC genlock connector can be used as a tri level sync input or output. With this feature the camera can work synchronal to your production environment.

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4   Optical System

4.1   Back-Focus Adjustment

The back-focus of the **ATOM one 4K mini** is adjustable. This helps to adapt to any lens to have a perfect focus.

The following diagram is showing the components of the lens mount, from left to right those are:

- Sensor mount
- Lens mount
- Lock ring
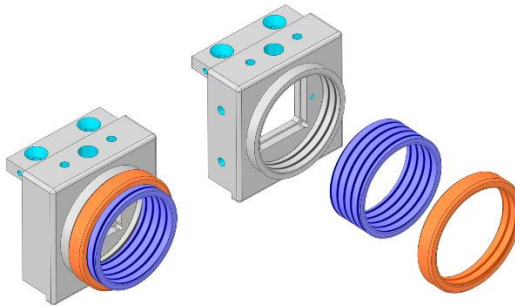
For adjustment do the following procedure:

1. Attach your target lens to the **ATOM one 4K mini**. Try to tighten it a little
2. Loosen the lock ring to release the lens mount
3. Turn the lens mount with your lens for back-focus adjustment
4. Check your focus on a monitor. Focus assistant is helpful
5. Carefully tighten the lock ring, since this will change back focus a little
6. Check focus again. You may repeat steps 3-6 until you are satisfied
7. Finally firmly tighten the lock ring with your hand (do not use tools!)

Be carefully and sensitive with the locking threads. In rough environments you may secure the lock ring with lock-tight.

4.2 Lens Recommendations

4.2.1 Corner Shading / Lens Shading

Depending on the sensor size, different lens types are required to avoid corner shading. The following chapters show the guide line for the best experience.

To some degree shaded corners (not black) can be corrected with the camera in-build lens shading correction functions.

4.2.2 Resolution

Depending of the lens quality many 5M pixel or 10M pixel optics are giving the maximum resolution. On wide angle application high grade lenses are recommended to have less color fringe and focus issues in the corners.

Tests are recommended.

4.2.3 4K mini 7

The 4K mini7 is shipped with a C-mount to M12 adapter. Due to the large 1 / 2.5 " sensor standard **1/3 inch** M12 optics *will not work* on **ATOM one 4K mini**. This can be seen as shading in the corners.

Tests have shown that the technical data (sensor size, focal length) which the manufactures supply for M12 type of lenses is not reliable. Testing is required.

The used lenses should be 4K or 12Mpix grade. Dream Chip is offering a range of tested high quality M12 lenses for the best user experience.

4.2.4 4K mini 11

This camera has a standard 2/3" sensor size. Any C-mount lens for 2/3" sensors will work.

4.2.5 4K mini 16

The 1" sensor requires larger lenses to avoid corner shading. Some 2/3" C-mount lenses (with long focal length) may work. The larger sensor will give more field of view compared to a 2/3" sensor with the same lense.

5 Camera Operation

5.1 Setting up the Camera

For the operation, only power and one SDI output must be connected. The remote control via RS485 is optional.

The camera will automatically start with its last configuration (auto_save must be enabled, or the user must save the settings manually after making changes). The starting time of the camera is ~3 seconds.

The status of the camera can be seen with the status LED on the back side.

- Purple blinking: Boot
- Blue blinking: Ready
- Yellow blinking: Busy
- Red (slow): Firmware update
- Red (fast): Genlock Error
- Red / Yellow toggle: Over Temperature (see next chapter)

5.2 Cooling

The camera must transfer the operational heat to the environment (6.5 – 8.3 W, depending on the camera model). Since the camera is very small, it has an in-build fan for optimal cooling.

The airflow is from the left to right off the camera, when viewed from the front. **Make sure, that the sides of the camera are not covered.**

The main heat source is at the bottom of the camera. Mounting the camera on a metal surface will support cooling. In normal environment (<30 °C) the camera can be operated save without any additional mounting for cooling.

The camera does have an over temperature protection mechanism. As soon as the internal temperature goes above 80 °C the device will enter a safe mode to cool down. It will signal the safe mode by toggling the status LED between red and yellow.

The camera will resume operation when the temperature drops below 50 °C. Alternatively you can power-cycle the device, but keep in mind that without cooling down the camera will probably enter the safe mode again after a very short time.

5.3   Remote Control
The serial RS485 port can be used to control the camera.

All commands are text based. Details can be found in the "ATOM one 4K mini - Reference Manual".

By using a RS485 to USB converter the Windows ProVideo software can be used to configure the camera with an easy to use GUI.

6   ProVideo Control Software

The **ATOM one 4K mini** comes with a free Windows control software. The ProVideo camera control software gives an easy access to most of the camera functions.

To use the software you need a serial connection from **ATOM one 4K mini** to a Windows PC. This can be done with a USB – RS485 adapter. You can build your own adapter with a serial FTDI cable or purchase a cable from Dream Chip.
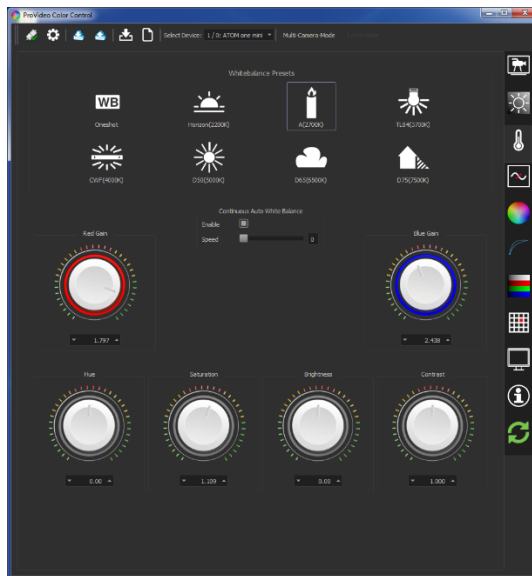
The ProVideo GUI is an open source software which is hosted on GitLab. The latest release of the Windows version of the software can be downloaded here:
https://gitlab.com/dreamchip/provideo-downloads

If you wish to use the GUI as the starting point of your own control software feel free to download the source code. Details can be found here:
https://gitlab.com/dreamchip/provideo-gui

7 FAQ

7.1 Q: The camera does not respond to serial commands

Make sure, your cables are connected correctly. Check you baud rate, the default is 115200 8N1.

7.2 Q: Is there a hardware camera controller available

Currently, Dream Chip does not provide a hardware camera controller, but 3rd party controllers are available in the market.

A free Windows software and a full API documentation comes with the camera. With this documentation you may adapt the camera to your existing controller.

7.3 Q: Where can I find firmware updates for my camera?

You can download the latest firmware and control software from our GitLab repository:

https://gitlab.com/dreamchip/provideo-downloads

8   Warranty

Dream Chip Technologies GmbH warrants that this product will be free from defects in materials and workmanship for a period of **6 months** from the date of purchase. If a product proves to be defective during this warranty period, Dream Chip Technologies GmbH, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, you the Customer, must notify Dream Chip Technologies GmbH of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. The Customer shall be responsible for packaging and shipping the defective product to a designated service center nominated by Dream Chip Technologies GmbH, with shipping charges pre-paid. Customer shall be responsible for paying all shipping changes, insurance, duties, taxes, and any other charges for products returned to us for any reason.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Dream Chip Technologies GmbH shall not be obligated to furnish service under this warranty: a) to repair damage resulting from attempts by personal other than Dream Chip Technologies GmbH representatives to install, repair or service the product, b) to repair damage resulting from improper use or connection to incompatible equipment, c) to repair any damage or malfunction caused by the use of non Dream Chip Technologies GmbH parts or supplies, or d) to service a product that has been modified or integrated with other products when the effect of such a modification or integration increases the time or difficulty of servicing the product.

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9 Certifications

9.1 CE Compliance

ATOM one 4K mini has been shown to comply with the listed technical standards below. The tests has been done accordingly with the measurement procedures specified in European Council Directive- EMC Directive 2014/30/EU.

The **ATOM one 4K mini** passed the tests performed according to:

- EN 55022:2011-12 Class B / CISPR 22:2013-09-03
- EN 55024:2016-05 Class B / CISPR 24:2014-10-08
- EN 61000-3-2: 2015-03
- EN 61000-3-3: 2014-03

9.2 For Customers in the U.S.A.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Reorient or relocate the receiving antenna. Increase the separation between the equipment and receiver. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. Consult the dealer or an experienced radio/TV technician for help.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment. The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a computing device pursuant to Subpart J of Part 15 of FCC Rules.