Player One Apollo-M-C USB3.0 Mono Color Camera User Manual

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Player One

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Product Usage Instructions

Setting Up the Camera

1. Connect the camera to your computer using the provided data cable.
2. Install the necessary drivers and software downloaded from the Player One Astronomy website.
3. Follow the installation instructions to set up the camera on your preferred imaging software.

Capturing Solar Images

1. Mount the camera on a stable tripod or telescope for optimal stability.
2. Select the appropriate settings on your imaging software for solar photography.
3. Aim the camera at the sun, ensuring proper exposure settings for clear images.
4. Adjust focus as needed to capture detailed solar features.
5. Capture images and save them to your computer for further processing.

Using the Active Cooling System (ACS)

1. Attach the ACS to your camera for improved temperature control during imaging sessions.
2. Ensure proper ventilation around the ACS to maximize cooling efficiency.
3. Monitor the temperature of the camera body to prevent overheating during extended use.

FAQs

- **Q: Can the Apollo-M camera be used for night sky imaging?**
  - A: While designed for solar photography, the Apollo-M camera can also be used for night sky imaging with appropriate adjustments and accessories like the Active Cooling System.

- **Q: What software is compatible with the Apollo series cameras?**
  - A: The Player One Astronomy website provides drivers and software downloads that are compatible with the Apollo series cameras for seamless integration with imaging software.

Product Features

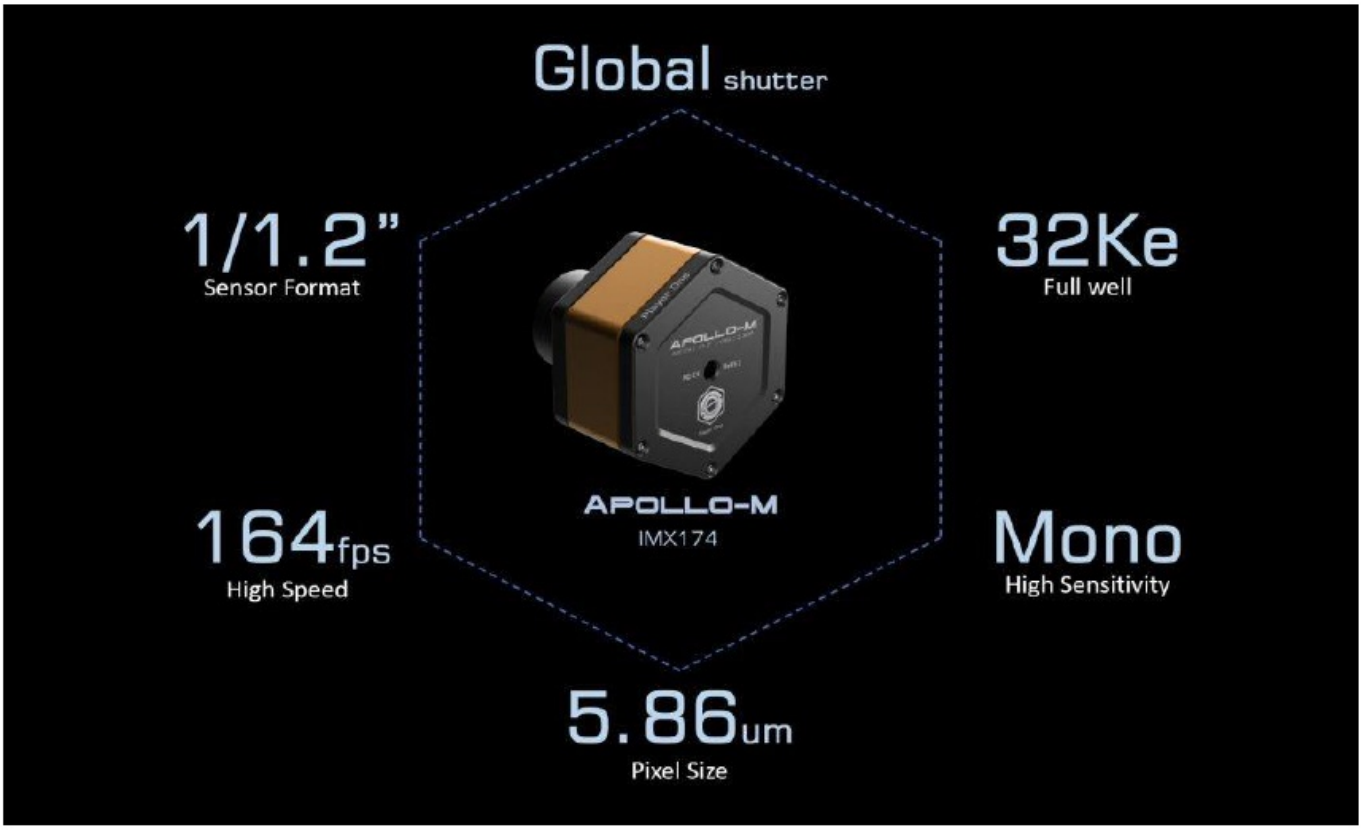
Apollo series is the world's first camera line designed specifically for solar photography, named after Apollo. The Apollo series features Sony sensors with global shutters and a focus on monochrome sensors.

Technical parameters

Sensor	SONY IMX174 1/1.2″ CMOS (mono)
Diagonal	13.3mm
Total Pixels	2.3 Mega Pixels
Max Resolution	1936×1216
Pixel Size	5.86μm
Chip Size	11.3mm×7.1mm
Frame Rate	164FPS 10bit
Shutter	Global shutter
Exposure Range	32μs-2000s
Readout Noise	6.3-3.5e
QE Peak	≈77%
Full Well	24.8k e
ADC	12 bit
Data Port	USB3.0/USB2.0
Adapter	1.25″ / M42X0.75
Back Focal Length	12.5mm
Protective Window	D32*2MM High-Quality AR Plus (Anti Reflection) Multi-Layer Coating
Diameter	66mm
Weight	160g
Resolution and FPS	Under USB3.0 mode Resolution 10bit ADC 1936×1216 164FPS More resolution options could be setup in capture software!

Product Description

Apollo-M is a solar camera developed by Player One Astronomy, which adopts the Sony IMX174 1/1.2” format monochrome sensor. The 5.86um pixel size accommodates a well depth of 32Ke with a total of 2.3MP (the resolution is 1944*1216), and the diagonal is 13.3mm.



Pregius Technology

Apollo-M (IMX174) and Xena-M (IMX249) based on Pregius 1st Gen, it was a giant leap in CMOS sensor development. IMX174 and IMX249 has same performance, the only difference is IMX174 is faster (164FPS).

Format

Apollo-M (IMX174) has 1/1.2″ format, this size is between Apollo-M MAX (IMX432) and Apollo-M MINI (IMX429).

Recommended accessories

ACS (Active Cooling System)

ACS is an external air-cooled system, designed for solar and big format planetary cameras which already has PCS (Passive Cooling System). ACS can provide much better temperature control. When camera has PCS + ACS, the temperature is only 7°C higher than ambient, the camera body is a little warm but won’t hot! ACS is not only can

be used in daylight for solar imaging, it also could be used in night for DSO lucky imaging. https://player-one-astronomy.com/product/active-cooling-system-acs-for-uncooled-cameras/ .

Features

The naming of Player One Astronomy cameras is unique. Solar camera line, named after Apollo, the god of the sun. The suffix of the name describes the camera's biggest feature.

- **Drivers and software download:**
  - http://player-one-astronomy.com/service/software/
- **Manuals download:**
  - http://player-one-astronomy.com/service/manuals/

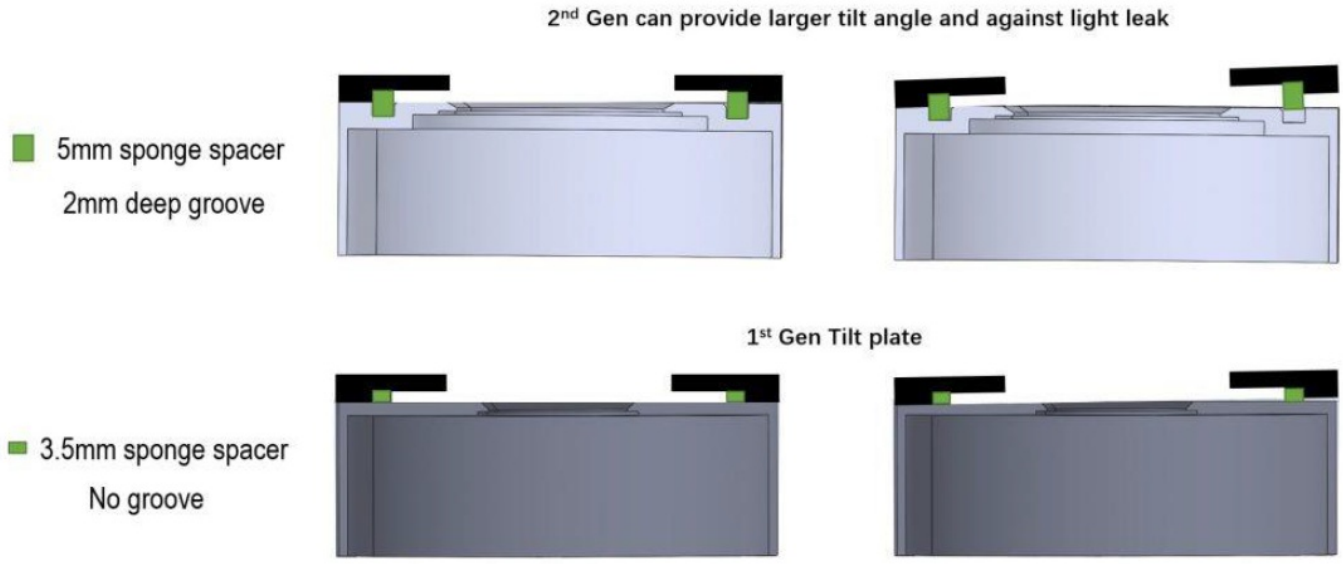
Cutting-edge Design

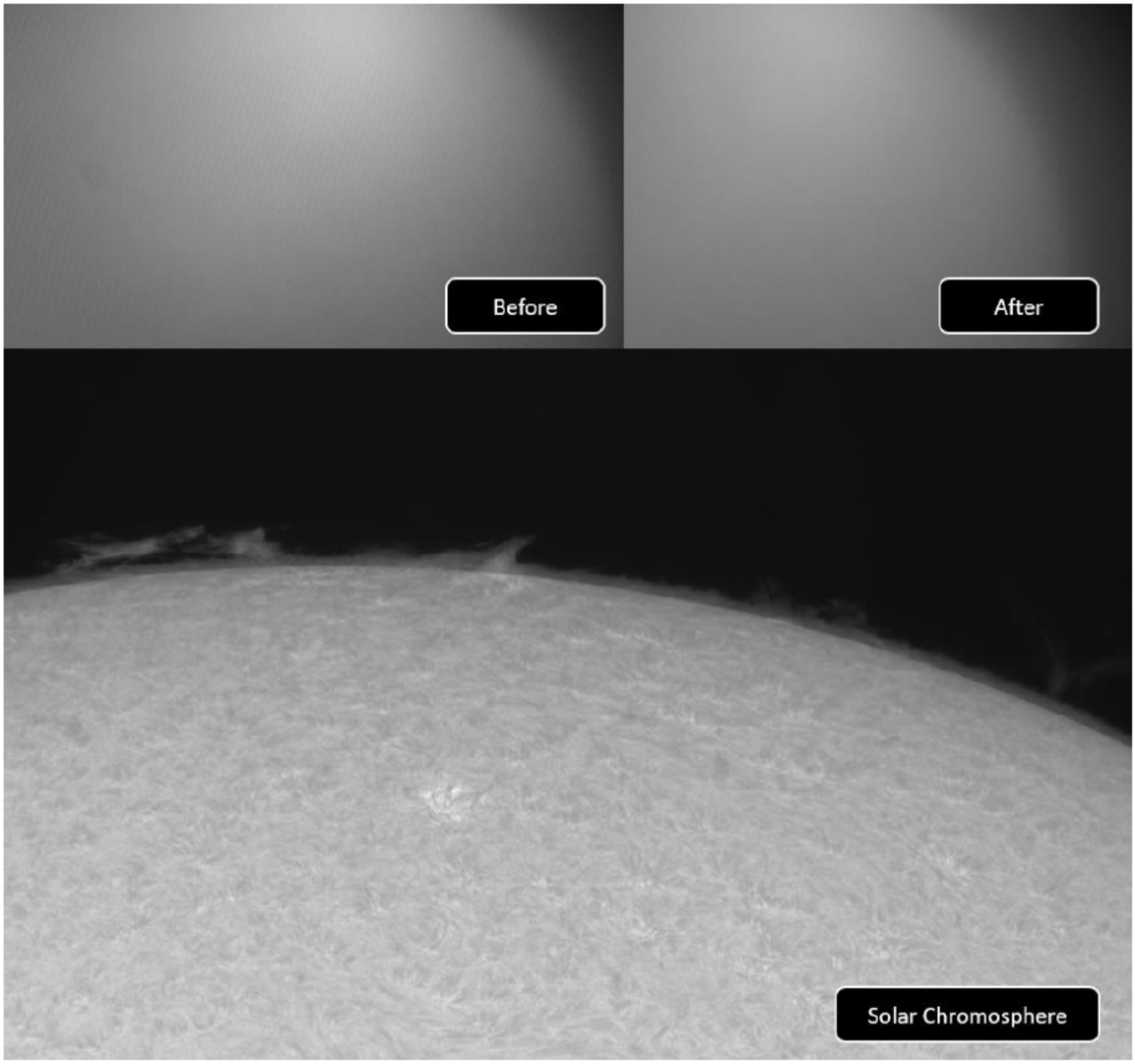
The planetary cameras developed by Player One Astronomy uses a scientific and technological regular hexagon to construct the main body line, supplemented by round chamfers to achieve both rigidity and flexibility. The positive orange, which is simply solar, is matched with the low-key and steady black, and the super-fine frosting process on the entire surface makes the camera look luxurious and cool, highlighting the style of high-end players, can't take my eyes off

2nd Gen – Sensor Tilt Plate

When taking solar photographs with a prominence telescope, the Newton ring is annoying. A smoother solar image without Newton ring could be taken by adjusting the focal plate. Get a much smaller field curvature of the telescope.

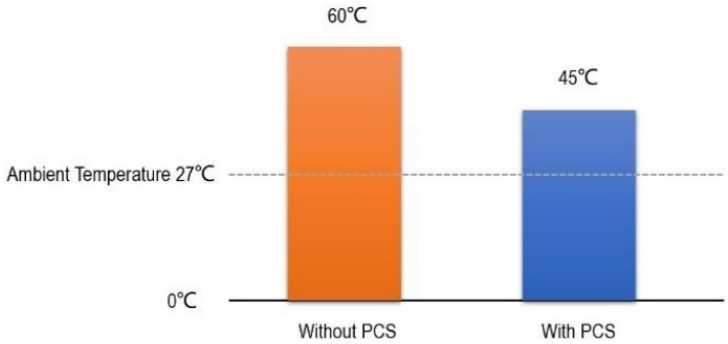
The built-in high-density sponge shading pad can block the light from the side slits without any side leakage.

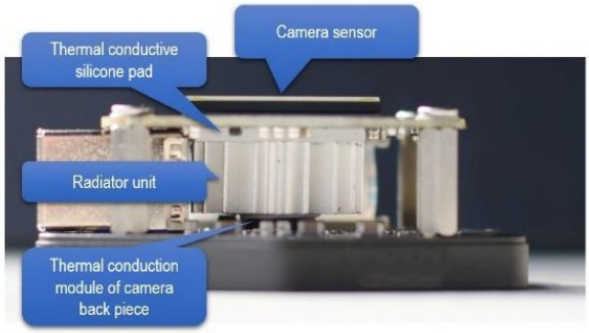




Passive Cooling System

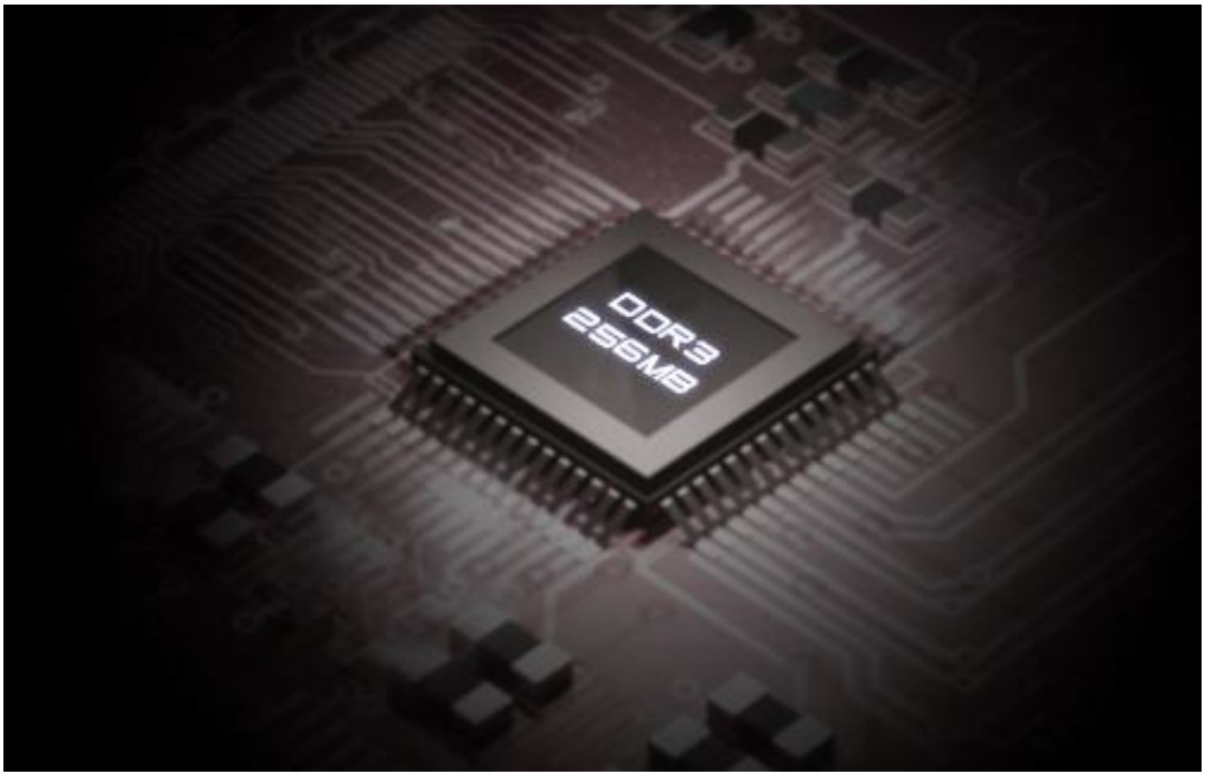
Solar cameras work in daylight, and the temperature could be much higher than at night. The heat of global shutter sensors will be a problem, especially in some big formats like IMX432. Player One add a new feature called Passive Cooling System to conduct the heat from the sensor out. Passive Cooling System (PCS for short) connects the sensor board and camera shield, it can move the heat fast to camera body. In testing, IMX432 sensor with PCS, the temperature will be 10°C-15 °C lower than without PCS.





256M DDR3 Cache

Player One Astronomy cameras are the first one who adopts the DDR3 cache in all planetary cameras in the world! It helps stabilize and secure data transmission, it effectively avoids frame dropping and greatly reduces readnoise. With the DDR3 cache, the camera does not have high demands on computing needs any longer, it will still have excellent performance even if it is connected to a USB 2.0 port.



DPS technology

The planetary cameras from Player One Astronomy have DPS (Dead Pixel Suppression) technology. The DPS is analyses many dark frames to find out that fixed abnormal pixel and records the map in camera memory. In imaging, each exposure frames, those position of dead pixels will be given a median value according to the active pixels around that abnormal pixel.

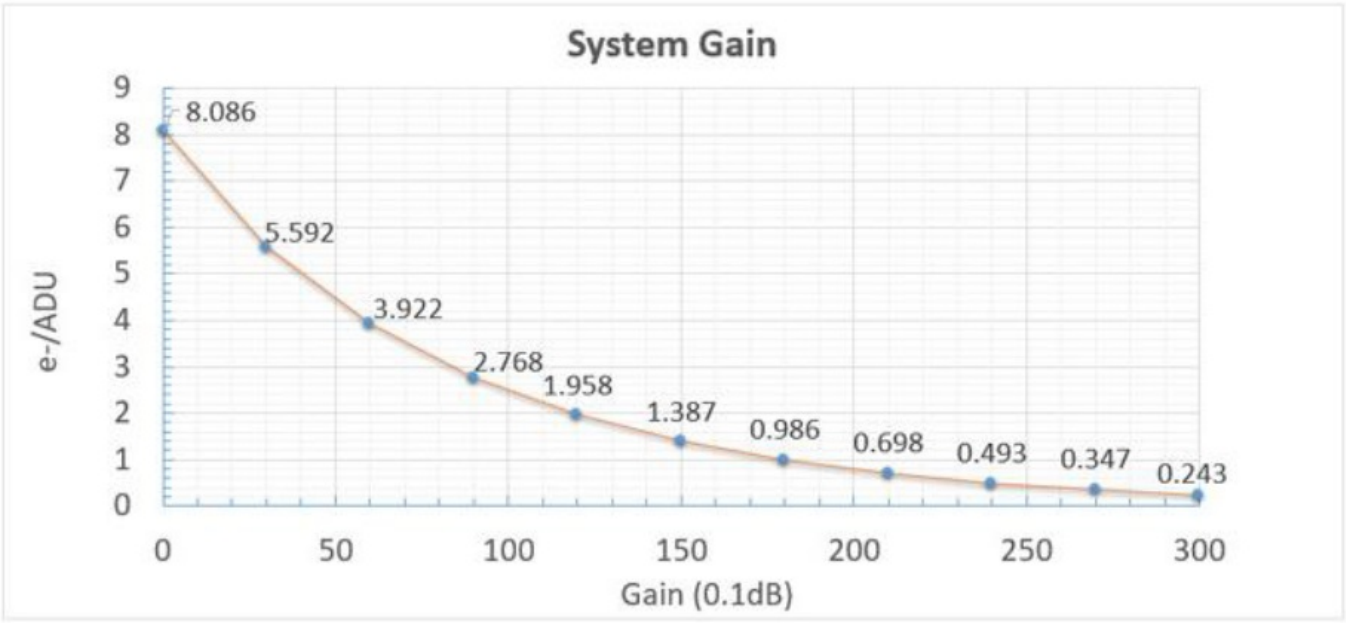
Overvoltage and overcurrent protection mechanism

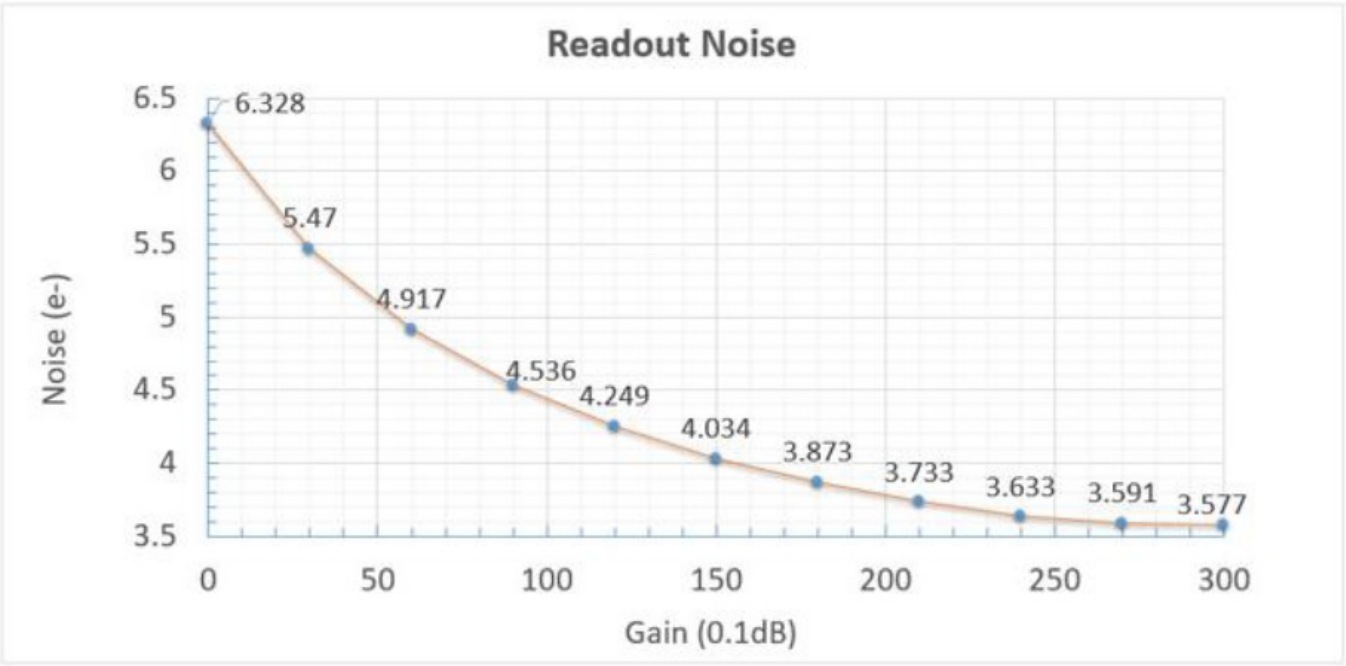
Player One cameras produced by the number one player ensures the safety of your camera and other equipment through overvoltage and overcurrent protection mechanisms.

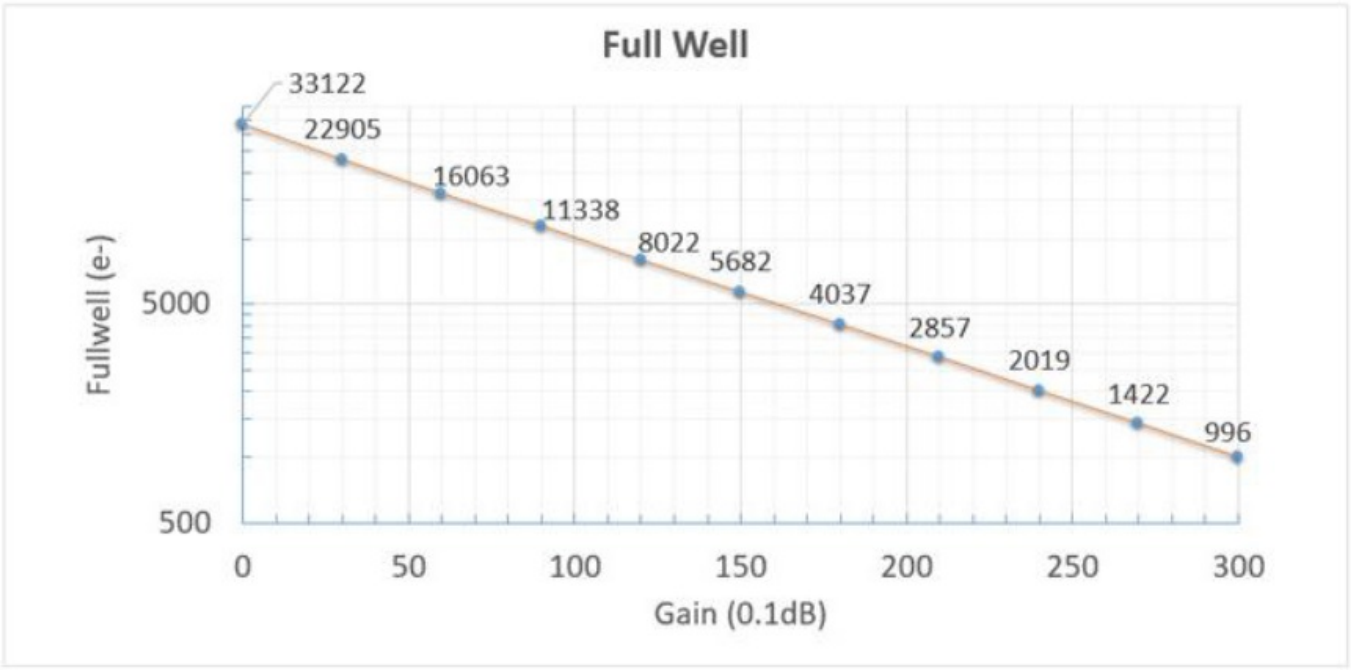
Data Port

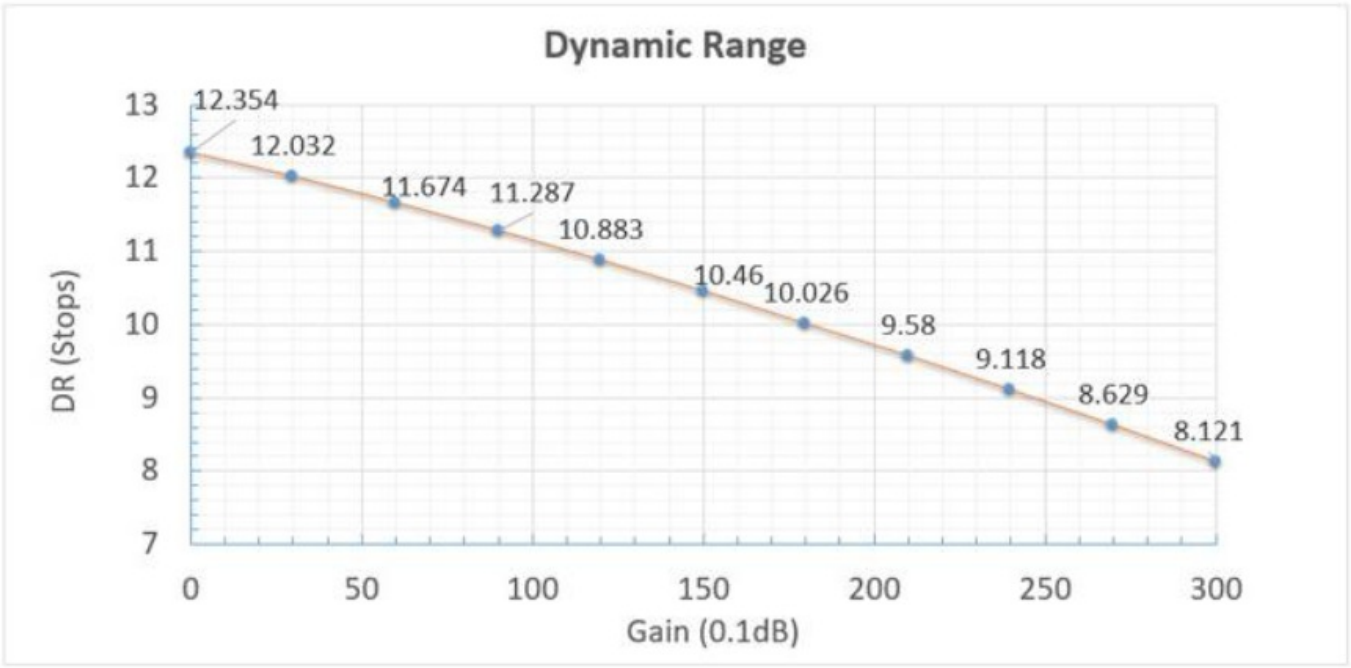
When the camera is connected to the USB3.0 interface and full-resolution preview is used, it can reach 164 FPS in RAW8 mode (10bit ADC). When recording images, since the actual writing speed will be affected by the writing speed of the hard disk itself, when the hard disk writing speed is slow, the recording may not reach the theoretical speed. It is recommended that you use a high-quality solid state drive to record data to give full play to the performance of the camera. Use the ST4 guide cable to connect the camera and the AUTO GUIDE port of the equatorial mount to do guiding.

Performance


System Gain
e-/ADU
Gain (0.1dB)
8.086
5.592
3.922
2.768
1.958
1.387
0.986
0.698
0.493
0.347
0.243


Readout Noise
Noise (e-)
Gain (0.1dB)
6.328
5.47
4.917
4.536
4.249
4.034
3.873
3.733
3.633
3.591
3.577

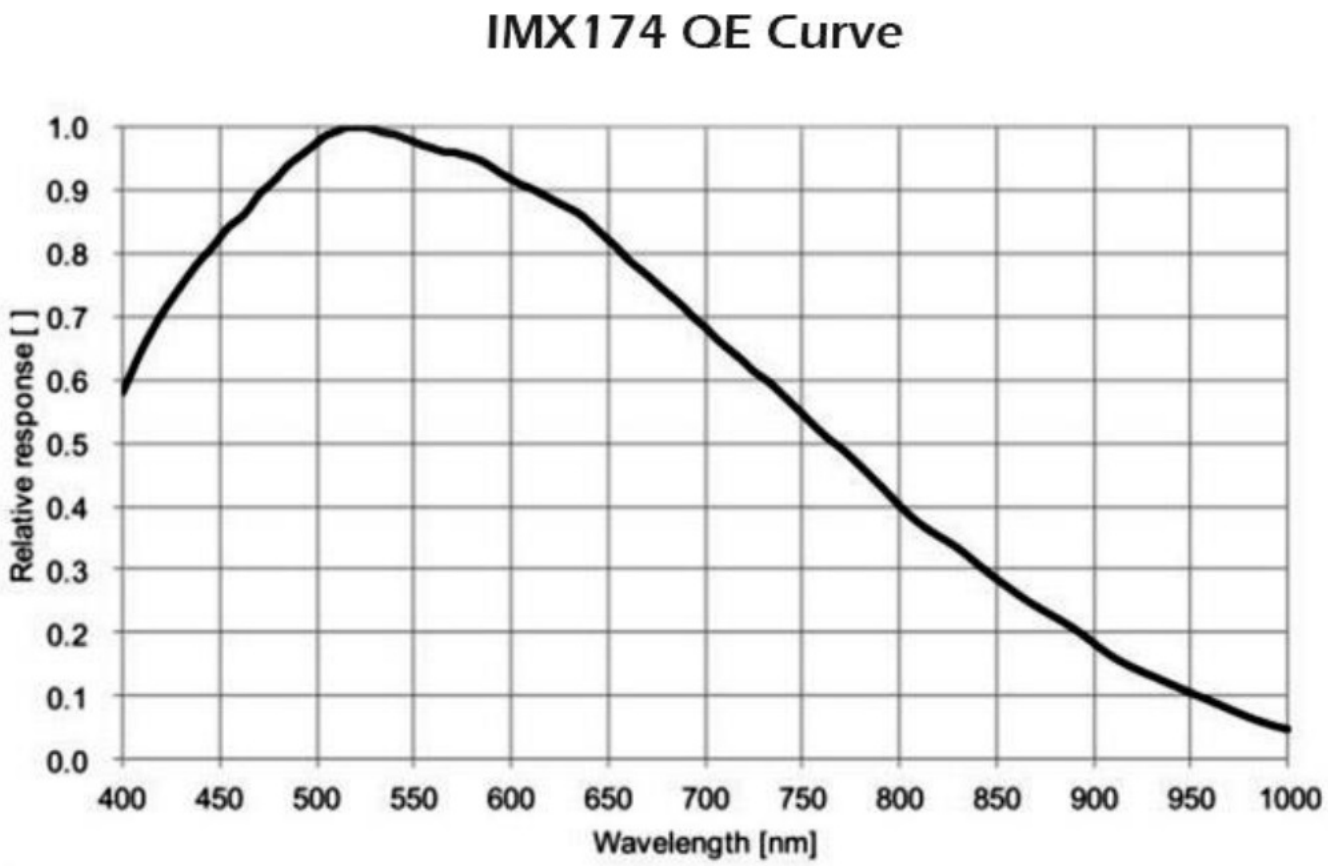




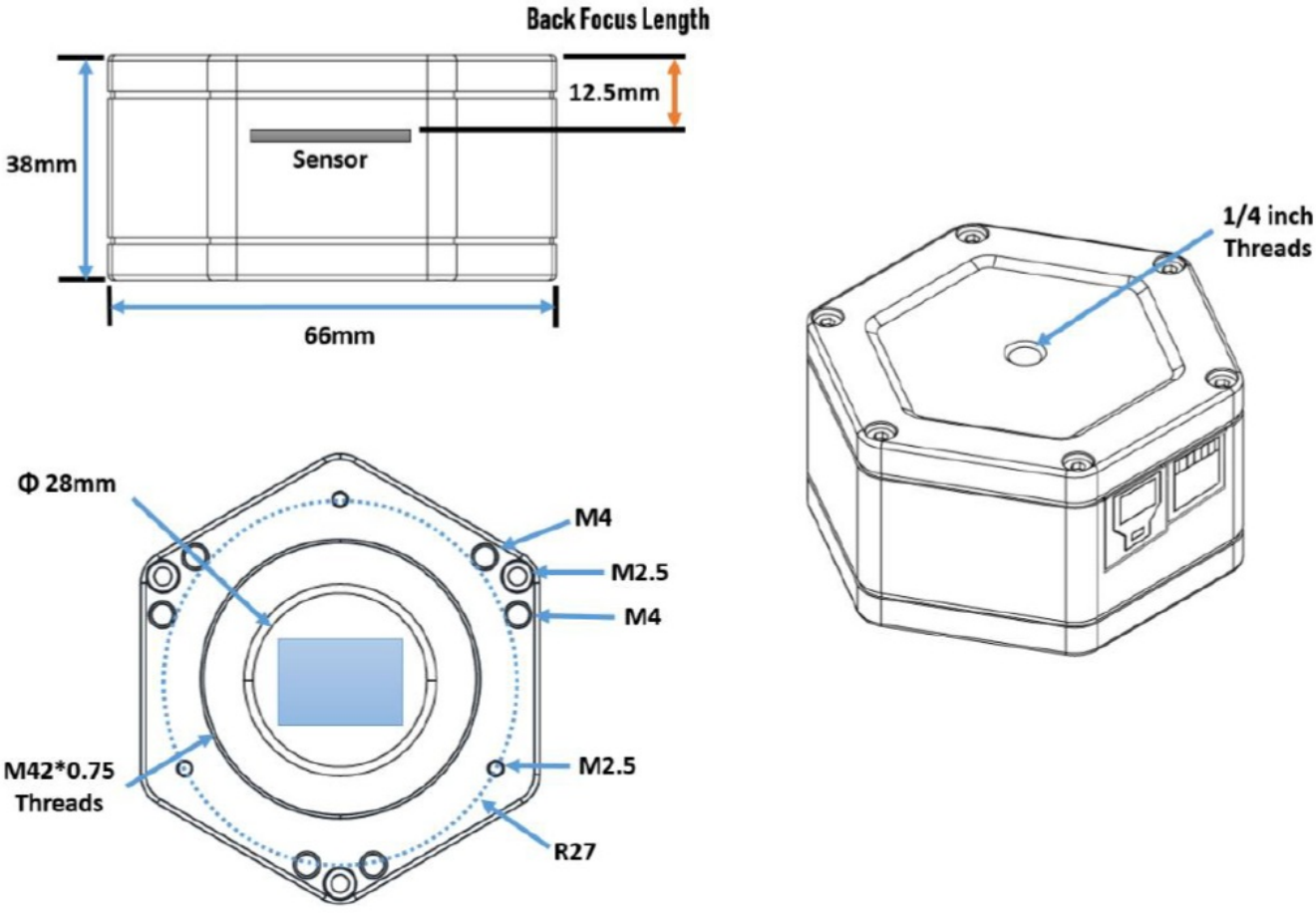
Readout Noise

Regarding readout noise, we solemnly promise that all values are obtained from actual tests. And for users, you could use Sharpcap 4 for testing. SC4 has a function called Sensor Analysis, provide a very simple way to test readout noise. We wrote a tutorial on our website: **https://player-one-astronomy.com/service/manuals/** If you are interested in readout noise testing, you may try it yourself, which is very simple.

QE Curve



Mechanical Drawing



Package List

Camera Package

Warranty & Shipping Policy

- **Payment method**
  - We provide PayPal and PayPal checkout on our website.
- **Shipping and Delivery**
  - **Shipping Fee:**
    - Amount >= 299USD: free express shipping
    - Amount < 299USD: 29.9USD for express shipping
  - **Shipping Services:**
    - We usually use DHL, UPS, FedEx, TNT for shipping.
    - Make sure your email is correct, we may contact with you through emails in case of an emergency.
- If a customer wants to designate a shipping company or has a special requirement, please send an email to support@player-one-astronomy.com and tell us your detailed requirements.
- **Shipping time:**
  - Usually 7-14 days.

    - A tracking number will be updated in 3 days after paid.
- For orders from areas where transportation is not easy, such as islands, town in mountainous regions, delivery time will be slightly longer.
- Please send an email to **support@player-one-astronomy.com** immediately, if the following occurs:
    - Shipping is delayed or has some abnormal information.
    - The packing is badly damaged on arrival, take pictures and do not sign.
- **Tax**
    - The price on our website is without tax.
    - Please note that buyers are liable to charge tax involved, such as Import tax, VAT, customs handling fee, etc.
    - Those fees possibly will be collected at the time of delivery by courier.
    - For best experience, we recommend customers to purchase our products from local dealers.

After-sales Service

Warranty Policy

- 2-year free warranty (time start from delivery) for Player One products. If the product has any issues, please send the image or video and description to **support@player-one-astronomy.com** for further check to confirmation.
- Purchase from Player One official online store, we will provide warranty service directly.
- Purchase form the dealer, we will provide warranty service through the dealer.
- Repair in warranty, the customer only pay the shipping fee of shipping back the product to us or dealer, and no other extra fees.

Replacement Policy

You can request our Replacement Service:

- Within 30 calendar days of receiving the product if the product does not match the original description of the product in one or more significant respects.
- Within 30 calendar days of receiving the product if the product suffers performance failure.

Please contact our After-Sales team by emailing **support@player-one-astronomy.com** within 30 calendar days of receiving the products. Player One shall be responsible for the two-way replacement freight for any products sent in for replacement due to performance faults.

Warranty and Replacement Policy Exceptions:

- Warranty service time or replacement service time expired.
- Legal proof-of-purchase, receipts, or invoices are not provided or are reasonably believed to have been forged or tampered with.
- A product sent to Player One for replacement does not include all original accessories, attachments and packaging, or contains items damaged by user error.
- A product is found to have no defects after all appropriate tests are conducted by Player One.

- Any fault or damage of the product is caused by unauthorized use or modification of the product, including exposure to moisture, entry of foreign bodies (water, oil, sand, etc.) or improper installation or operation.
- Product labels or serial numbers show signs of tampering or alteration.
- Damage is caused by uncontrollable external factors, including falling down, fires, floods, or lightning strikes, etc.
- Proof of damage during transit issued by the carrier cannot be provided.
- Other circumstances stated in this policy.

Documents / Resources

	Player One Apollo-M-C USB3.0 Mono Color Camera [pdf] User Manual Apollo-M-C, Apollo-M-C USB3.0 Mono Color Camera, USB3.0 Mono Color Camera, Mono Color Camera, Color Camera, Camera

References

- Astronomy Magazine: Space News, Observing, Planets, Galaxies
- Software – Player One Astronomy
- Active Cooling System (ACS) for uncooled cameras – Player One Astronomy
- Software – Player One Astronomy
- User Manual