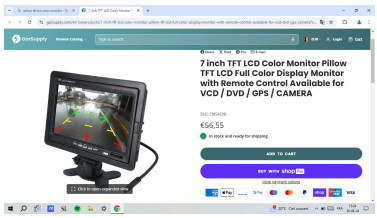
https://www.fichier-pdf.fr/2025/01/15/sv205-camera-on-delta-optical-titanium-ed-ii-spotting-scope/

Portable YUKON Video ATC Video Attachment Video Image Sensor 0.6K
From : http://www.atn-optics.com/capteur-d-images-portatif-de-video-atc-video-attachment-de-video-yukon-c2x28641011

The Yukon 0.3 Megapixel image sensor (lens: 8mm) with eyepiece adapters (ATN-Optics) transmits a PAL/NTSC video signal in 500x582 pixels directly displayed on a 7'' TFT LCD Color Monitor, all powered by USB - Power Bank 5-12V

Pictures with Konuspot 20-60 x 80 spotting scope displayed on a TFT LCD Color Monitor 7''

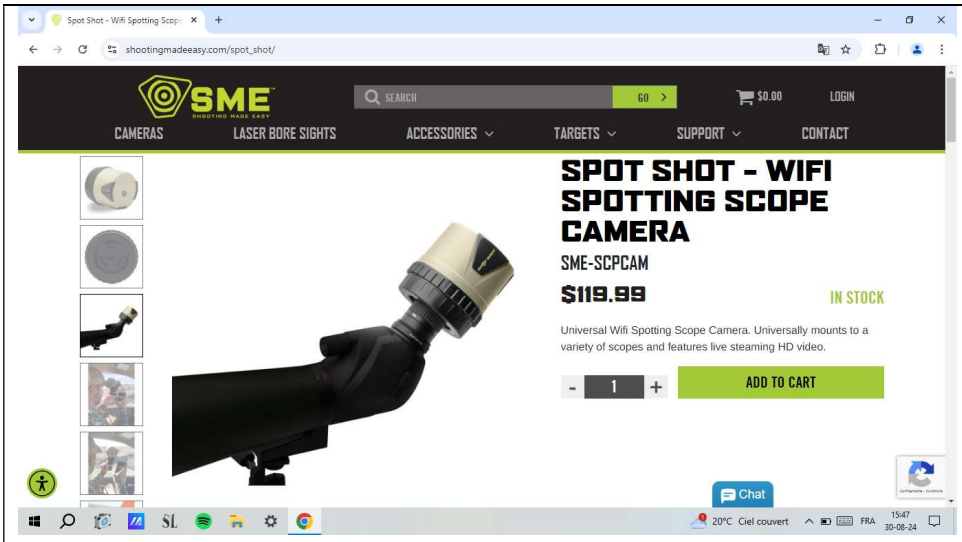
Konus spot 80 Eyepiece Base male thread M42*0.75
Exit pupil at 20x : 2.9mm at 60x : 1.2mm
Aperture (Objective) diameter : 80mm
Telescope Focal Length : ?
Eyepiece Focal Length : ?







SPOT SHOT SCOPE CAMERA - Universal wireless Wi-Fi spotting scope camera by SME
From : https://www.amazon.com/dp/B07MC572D3?ref=emc_s_m_5_i_atc





Pictures with a Konuspot 20-60 x 80 spotting scope displayed via SME Spot Shot Wi-Fi Scope Cam software on a Wi-Fi linked IPad mini 1 tablet.

The SME Spot Shot – Wi-Fi spotting scope camera without or with mini screen adapts directly to the eyepiece of the spotting scope and transmits a decoded HD video via Wi-Fi with the free SpotShot application which is available on Google Play or Apple iOS App Store

My experience in february 2020 with a : Excellent material, very clear pictures with Konuspot 20-60 x 80 spotting scope to visualize impacts of .30 bullets holes impacts at 100m at 30x magnification on ISSF C50 classic target with LED lighting. I recommend a very stable tripod to facilitate the fine focus adjustment on the spotting scope especially because pictures are only transmitted every 5 sec.. Very simple implementation of SME Spot Shot Wi-Fi Scope Cam software on IPad mini 1 tablet, reliable Wi Fi link. **BUT Battery out of use after 1 month and impossible to compensate with a power bank or battery replacement. Waste of money - shame after such a good experience ! Single-use material with quick expiration**

Longshot Hawk Spotting Scope Camera : 2K Resolution: 1920 X 1080 px



From : https://www.btactical.eu/longshot-hawk-smart-scope.html :
The Hawk Spotting Scope camera with a resolution of 1920x1080 pixels fits directly on the eyepiece of the spotting scope and transmits via Wi-Fi an HD video decoded with the App-Based software application (iOS 8.0 or higher recent and compatible version Android 5.1 to 11) which allows efficient management of shooting results.
Another Longshot Marksman option allows you to observe your impacts at a long distance without having a long observation sight: you can install detection at the foot of the target with Wi-Fi transmission of the signal but with the risk of impacts on the camera. LONGSHOT's wireless, portable, battery-powered target camera systems are installed next to your target and 10 to 15 feet behind; the camera can be moved within this range to adjust the field of view. The LONGSHOT Marksman being positioned downstream of the target, the visualization is not subject to mirages to review its shots.

From : https://www.amazon.ca/LongShot-Hawk-Spotting-Scope-Camera/product-reviews/B07VKCQH2W/ref=cm_cr_unknown?ie=UTF8&reviewerType=all_reviews&returnFromLogin=1&filterByStar=three_star&pageNumber=1
And From : https://www.youtube.com/watch?v=EN8UayXPTxg

Customers review : *Battery life 1 hour, size and weight - wish to see something less bulky, excessive weight destabilizes the alignment of the scope, difficulty aligning the camera with the eyepiece and on the target, wifi failure blocking without solution, requires a faster WiFi (there is a delay of about 3 seconds when trying to set up). It doesn't charge off a USB, it uses a 12 volt Pigtail Barrel Plug Connector – lame. Only 1080P and the camera doesn't center behind the scope.*
These remarks are very similar to my previous observations on the SME Spot shot WiFi camera.
Some customers demand higher resolution and sometimes report wasting money !

Accufire Omnis : **2.7 K Resolution : 1440 x 1880 px**
From : **https://www.accufirescope.com/the-omnis-digital-spotting-scope/index.html**

If you want to avoid the risks of destroying the camera at the foot of the target and the hazards of Wi-Fi transmission, you can opt for a high-magnification digital observation scope with integrated screen as offered by Accufire Omnis) which has a digital zoom range of 30x to 120x that is displayed on a 2.96-inch OLED screen. With the Accufire app, the user can connect to the Omnis' onboard Wi-Fi network and stream video content (1440x1880 pixels) to any compatible Apple or Android device. The Omnis can record audio and video to a 32GB microSD card accessible through its port (port type, USB-C). The Omnis is currently used in the wild for long-range shooting instruction and scouting, hunting, law enforcement, and other surveillance and reconnaissance activities. Powered by 4 rechargeable batteries ensuring a battery life of 4 hours, a USB-C port allows connection to an external Power-Bank.



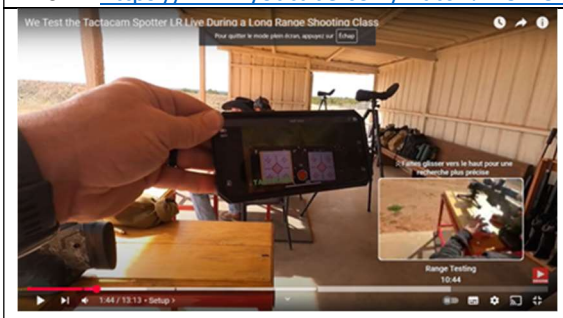
https://www.tacticalstore.se/en/sights-optics/night-vision/accufire-omnis-30-120x-digital-day-night-spotting-scope/

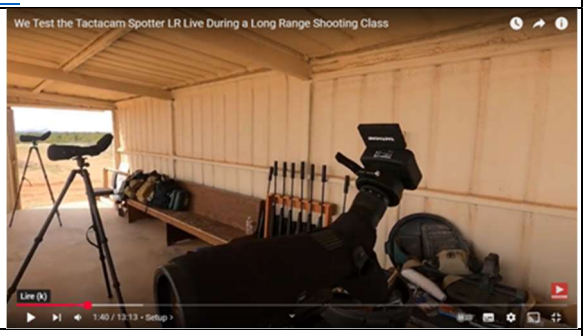
Tactacam Spotter Long Range 4K Spotting Scope Camera on Vortex Diamondback 20-60x80
From : https://www.alpineoptics.at/e/tactacam-spotter-long-range-4k-spotting-scope-camera.html?srsltid=AfmBOoqsvKqenhLROfWC6POygENCQM1WSmQAbUgy5usfIL5vK9zn7OPp





From : https://www.youtube.com/watch?v=9M3YPf93glE









The camera is perfectly and firmly attached to the telescope eyepiece in the optical axis of the eyepiece. The alignment of the telescope is easy on the center of the target to be viewed at 100m through the HD screen.
Despite a request, no photo showing a view of a C50 target at 100m with .22LR caliber shots at the black center of the target with the Tactacam lr spotter used in the video :

From : **https://www.youtube.com/watch?v=GCuzzuvTIXw**
It is possible to take photos or videos and the WiFi app allows your spotter and others to see the images live on their smartphone.
The Tactacam Spotter 4K long range camera is advertised 4K and so to have the same resolution (4K) as the Sony IMX415 and IMX485 4K resolution CMOS image sensors.
4K resolution, at 3840 x 2160 pixels, is 4 times higher than 1080p, which is (2K) 1920 x 1080 pixels.

On 01.01.2025 from Alpine Optics Austria : We can confirm that Tactacam stopped the Production of all cameras except for the Reveal cameras. Tactacam has discontinued this product.

My past experience in transferring impact visualization to a screen:

In recent years, I have had the opportunity to experiment with 3 devices on a Konuspot 20-60 x 80 telescope which adapt to the eyepiece and allow impacts to be viewed on screen via cable or Wi-Fi at 100m:

- Digiscoping via an iPad tablet,
- The Yukon ATC Video Attachment,
- The SME Spot Shot – Wi-Fi spotting scope camera.

These three devices are heavy, bulky and attach to the eyepiece without effectively maintaining alignment with the optical axis of the eyepiece. This point is essential because it affects centering and sharpness, which are impossible to be perfect during a shooting session. This essential and elementary problem is neglected by manufacturers in favor of the versatility of the fixing device.

Three other devices were considered with comments :

- Longshot Hawk Spotting Scope Camera
- Accufire Omnis
- Tactacam Spotter Long Range 4K Spotting Scope Camera on Vortex Diamondback 20-60x80

From my experience, it appears that Telescope with optics HD are essential and that digiscoping device whose optics are limited to 2 Megapixels (1080p which is 1920 x 1080 pixels) are too weak to visualize the impacts of .22LR at 100m, although they are clearly visible to the naked eye in the eyepiece of the spotting scope.
4K resolution, at 3840 x 2160 pixels, is 4 times higher than 1080p, which is 1920 x 1080 pixels.
4K is a digital image format with a screen definition whose longest edge is approximately 4,000 pixels.

Adapt the 4K camera in the optical axis of the eyepiece, align the telescope with optics HD on the center of the target to be viewed at 100m and maintain these settings stable throughout the duration of the shooting session: these are the basic constraints for simplify. Avoid the hazards linked to Wi-Fi, Battery failures and the use of software that is certainly very efficient but of little use with unsuitable hardware. Image transmission via a high-speed USB 3.0 interface in real time to a tablet, a driver-free plug-and-play cam powered directly on the tablet preferable, because who drags a PC into the shooting field with them...?

The solution at this stage is not to invest in a high-performance telescope if it is to adapt a camera which does not allow us to approximately reproduce what we see with the naked eye in the eyepiece.

Preliminaries:

The targets imposed in competition are made of ordinary cardboard with a uniform black center and are non-reactive to impacts like the Birchwood Casey Shoot-N-C Bullseye Targets for example.
.223 caliber is very common as a military caliber (5.56 nato). It is therefore appropriate to be able to detect .22 impacts at least 100m away in a black cardboard center under the ordinary lighting of the shooting ranges offered for competitions.

On the shooting field, a target rifle shooter in a prone position wants before the start of the session a spotting scope firmly pre-adjusted installed next to him to analyze shooting groups in real time to optimize his shooting performance. Until now to observe exactly what the scope "sees" down-range, you had to position your head close to the eye-piece and look directly through the lens. During a match, this isn't a big deal ! Ideally, a sporting shooter in a shooting position attempts to maintain his position during the match as soon as it is confirmed as good after analyzing the impacts in real time on the target while keeping his cheek glued to the buttstock.
So, he can evaluate for each shot fired its impact on the target according to its position corrections and its alignment with respect to the aimed point that he has applied.
However, it is illusory for the shooter not to modify his position each time he observes the target, especially when he has to look for hits that are difficult to find or are superimposed or have little contrast. Alternating your aiming position from the target to the eyepiece of the spotting scope harms the shooter's performance and impact groupings. Any shooter has already observed better groupings when he fires several shots following without scrutinizing each impact but at the risk that the grouping moves away from the targeted center.
The ideal observation system must therefore allow the shooter to be able to observe the impact of his shot by always keeping his cheek pressed against the rifle and simply looking away to view the impact onto a screen.
Since 2010, the Digiscoping technique via a iPhone applied via an adapter to the eyepiece has made it possible to record the video of shots.
It's better to add a camera to the eyepiece of the spotting scope, ensuring proper alignment of the optical axes, and transmit the video signal by cable or Wi-Fi to a screen or tablet. The desired viewing distance and the diameter of the impacts to be observed will determine the degree of resolution required for the telescope, camera and display screen. This option of deporting the visualization of impacts on a screen observed from a distance can pose a problem for shooters who aim with corrective glasses adapted to open aiming. The nearsighted shooter will see the display screen better without his shooting glasses. If the shooting glasses are of the knobloch type with the small diameter corrective lens, it will be very easy to observe the screen from the corner of the eye outside the lens without changing the position. With normal size corrective lenses, you can stick a half-moon lens on the lower part of the lens to cancel the optical correction in this area (e.g. normal correction of -1.75 cyl neutralized by a lens of + 1.75 cyl).

 Canon IXUS Target image at 1m with rear holes .22LR illumination	Our goal is to be operational with the official ISSF C50 target paper used for national competitions to observe .22LR bullet holes in the black center of the target at 100m through a spotting scope with digiscoping camera on tablet.

It is easy to make sure the light is shining more horizontally across the target or a light shining at the back of the target to light up the holes to see better your bullets impacts and cheaper.
But during a competition, a competitive shooter must be adapted to the light conditions of the targets in the stand. Capture images with a mini USB Camera Module 1.25'' UVC driver-free plug-and-play connectivity without WIFI would be the easiest option to implement quickly on eyepiece spotting scope next to the shooter in a prone position.

What does it take to reliably spot small-caliber impacts in a digiscopic screenshot image using a spotting scope?

https://www.baader-planetarium.com/en/blog/the-camera-at-the-eyepiece/
https://www.digiscopie.info/Digiscopie-bases/Digiscopie-adaptateur.htm

- Are strongly suggested Spotting scope with optics HD », « ED », « fluorite » ou « APO », according to the names of the various manufacturers to reduce chromatic aberration. What allows to discern your impact is the contrast, and this is obtained with ED quality lenses (extremely low dispersion).

- Large diameter optics to gain brightness but to be negotiated depending on the weight and size knowing that high quality optical glass increases light transmission, decreases light dispersion, and so cuts down on chromatic aberration, or "color fringing", which is due to the splitting of the light spectrum.

- A big misconception is that you need a 20-60 zoom eyepiece. The variable focal length eyepieces called “zooms” of spotting scopes offer adjustable magnification but have a significantly narrower field of view, at the same magnification, than fixed eyepieces. Their image is narrower and they transmit less light. Digiscoping experts often prefer a fixed 30x eyepiece. The large 30x field from Swarovski or the 32x from Leica have long remained the absolute weapon of “serious” digiscopers. A good compromise is the choice of the US Army : the M151 Sniper Spotting is a light and compact scope with powerful and bright optics 12-40x magnification with a 60mm objective lens diameter.

- Whether the optical design is a straight line of sight or off set in an angled position, there is no change in resolution, FOV or eye relief. The main reason is because this is all done in the eyepiece not the body of the scope.

- Choose a Spotting scope with eyepiece allowing an optional photographic adapter for the spotting scope, for any SLR camera to be attached to your telescope using a T-Ring that locks onto the camera body like a lens and an adapter that threads (usually T2 M42*0.75) onto the T-Ring. The T-Ring must match the lens mount design of your camera so that it can properly lock onto it. Then, a threaded adapter can be fastened to your camera and T-Ring with either a 1.25” or 2” barrel (nose-piece).

1. **The Delta Titanium ED II 15-45x65 Spotting Scope**
   From **:** https://teleskopy.pl/product_info.php?products_id=2643&language=en

The Titanium 65ED II spotting scope from Delta Optical is just 24cm long and weighs only 1350 grams. Image on the scope are subjected to chromatic aberrations due to refractive lens limitation. Using ED fluorite glass for extra low dispersion, Distortion free 4 lens system, Chromatic aberration correction and a new improved anti-reflective coating to ensure better performance in difficult lighting conditions and better, more faithful color reproduction enabled the use of a lens with a very short focal length and, as a result, observation equipment with a length of only 24 cm explains that the Delta Optical Titanium 65ED II achieves extremely sharp, high contrast and true color images. In addition, ED glass allows for a very short focal length of just 370 mm, making it possible to keep this high-quality spotting scope extremely lightweight and compact. The use of four lenses allow excellent correction of chromatic aberration as well as any abaxial errors. The Delta Optical Spotting Scope Titanium comes with a large, comfortable wide-angle eyepiece, with which magnifications of 15x to 45x can be achieved. Thanks to an eye relief of 15 to 18 mm, the spotting scope can be easily used even by people wearing glasses.The telescope is equipped with an optional photo adapter (T2 - adapter for Delta Optical Titanium 65ED MK2 spotting scope) that allows you to connect any SLR with the T-Ring.

Specifications of Delta Optical Titanium 65ED II spotting scope

Magnification	15-45x	Interpupillary distance	15 mm (15x) 18 mm (45x)
Lens diameter	65 mm	Eyecups	Highly rotatable
Focal length	375 mm	Waterproof	Yes
Prism system	-	Anti-fog	Yes
Prismatic glass	-	Nitrogen-filled	Yes
Lens coating	Full Multiple	Tripod device	Yes, 1/4" and 3/8
Field of view (at 1000 m)	57 m (15x) 27 m (45x)	ED fluorite glass	Yes
Close focus	4 m	Color	Black/Green
Exit pupil	4.3 mm (15x) 1.4 mm (45x)	Dimensions	245 x 100 x 80 mm
Interpupillary distance (eye relief)	15 mm (15x) 18 mm (45x)	Weight	1350 g

2. Digital camera specifications

Choose a spotting scope camera that did not require inconvenient mounting hardware and difficult adjustments to get up and running quickly. Keeping the camera aligned on the eyepiece can be a challenge. The camera should not be placed directly behind the eyepiece, but at a certain distance. This is because a telescope eyepiece is calculated to project a sharp image onto our curved retina interacting with our pupil, and is not calculated for the flat camera sensor. Therefore, if the camera is too close to the eyepiece, the image will be heavily distorted at the edges. The larger the sensor, the farther it should be from the eyepiece. This additionally enlarges the image - even an eyepiece with a medium focal length thus quickly brings you into the maximum magnification range. At some point, the resolving power of the telescope, as well as the pixel size of the camera, will set limits to the magnification that can be obtained.

As a guide, a full frame DSLR (864mm^2) needs a distance of around 95mm, an APS-C camera (370mm^2) 85mm and for an MFT (225mm^2) 70mm, it gives good results. On a DSLR with a standard T-ring, the sensor sits 55mm deep in the body (the "flange focal length"), so you're already on the safe side with a T-2 extension of 40mm.
General rules : Hold the camera lens close to the eyepiece (about the same distance as the eye relief of the eyepiece : 15 to 18 mm for Delta Titanium HD II) without the lenses touching and scratching each other, align the optical axes (i.e., hold the camera centered and straight on the eyepiece).

With a sensor surface of 18 mm^2 for the SV205 camera, bring the eyepiece as close as possible to the camera of the Delta Titanium eyepiece to capture the maximum surface of the optical image by the photocell.

The ideal position will be determined based on the quality of the image and the optical magnification to be applied with the telescope zoom. To increase the magnification, it is better to use the zoom of your spotting scope, in principle more efficient than that obtained by increasing the eyepiece-digital sensor gap because beyond a magnification factor of 1.5-2 x , this in fact sees its performance drop and the sharpness of the image deteriorates.
We thus reduce the magnification factor by the photocell by compensating the magnification by the optics of the telescope. Extension tubes can always be inserted to move the camera further away if necessary.

3. <u>Resolution and sensor size optimal for digiscoping</u>

We know that "fine grain" films of low sensitivity (type 64 or 100 ISO) produced a more beautiful, finer image than "coarse grain" emulsions of high sensitivity (type 400 ISO), and we so let's conclude <u>that the more pixels there are, the more beautiful the image will be... It's all wrong.</u>

A small sensor and too many pixels have a very negative influence on image quality.

Increasing the number of pixels therefore means that more and more photosensitive elements are aligned on a sensor surface which is not increasing. Logically, each pixel therefore becomes smaller and smaller: a device displaying 12 Megapixels has pixels 4 times smaller than the old model which displayed 3 Megapixels. The intensity of light arriving at the sensor has not changed. Each pixel therefore receives 4 times less light.

It therefore becomes necessary to amplify more and more the electronic signal emitted by each pixel, which makes the image “electronically noisy” and the stronger the amplification, the greater the noise. Modern “small pixels” are logically much more subject to noise than the “large pixels” of the early days of digital photography. The new digital sensors offer the possibility of photographing with increasingly high sensitivities: the equivalent of old films of 400, 800, 1600 or 3200 ISO. In reality, the technical operation consists of constantly increasing the signal amplification factor, and therefore the electronic noise which becomes truly cacophonous. To counter this noise, “smoothing” programs look for altered pixels and copy the least affected neighboring pixel. This smoothing reduces the definition of the image which becomes more and more blurred by coupling tens of thousands of pixels to one of their neighbors.

Ten years ago, the criteria were not to exceed 10 Mpixels for a 1/1.7" sensor, or approximately 30 Mpix per square inch of sensor or 10/43.3 = 0.23 Mpixels/mm^2 of sensor

For digiscoping, the best choice will be to acquire an USB eyepiece camera for telescope whose **<u>sensor is as large as possible and set an absolute limit of 10 Megapixels maximum.</u>**

USB Eyepiece camera SVBONY 105 sensor : CMOS OV2710
Size 1/2.7" image area : 5.86 x 3.28 mm = 19.2 mm^2
2,0 Megapixels Pixel Size 3.0 x 3.0 µm / 1920 x 1080 px Mpix/mm^2 : 2/19.2 = 0.104
<u>Our current tests with the SV105 camera have confirmed that the 2K resolution is too low to observe .22LR bullet holes in the black center of the target at 100m through a spotting scope with digiscoping camera on tablet.</u>

USB Eyepiece camera SVBONY 205 F9159D sensor old version: CMOS Sensor: Sony IMX179
Size : 1/3.2’’ Image Area: 6.18mm*5.85mm = 36.2 mm^2
8,4 Megapixels Pixel Size: 1.4µm / 3864 x 2192 px Mpix/mm^2 : 8.4/36.2 = 0.232

USB Eyepiece camera SVBONY 205C F9159C sensor new version: CMOS rolling shutter Sony IMX415
Size : 1/2.8’’ image area : 5.60 x 3.18 mm = 17.8 mm^2
7,05 Megapixels Pixel size 1.45 x 1.45 µm / 3264 x 2160 px Mpix/mm^2 : 7.05/17.8 = 0.396

Equipped with the newly developed IMX415 Sony CMOS sensor, this camera module SV205C delivers exceptional image quality with a resolution 3840x 2160 under ideal conditions (8.29 Mega Pixels).
In order to fixing the Pixel Vignetting color issue on the original version SV205C camera, Sony cut the new one out of some pixels, the parameter will be 7.05MP with 3264 x 2160, pixel size is adjusted to 1.45 x 1.45 µm. This uses Sony's unique high-sensitivity, low-noise technology to reduce the pixel size to 1.45 square microns, approximately 80% smaller than the previous generation IMX274, creating a record-breaking 1/2.8-inch stacked 4K CMOS image sensor and with excellent low-light performance. Additionally, by using a stacked structure with low-noise circuitry, Sony has made it possible to capture clear images even in dark scenes.

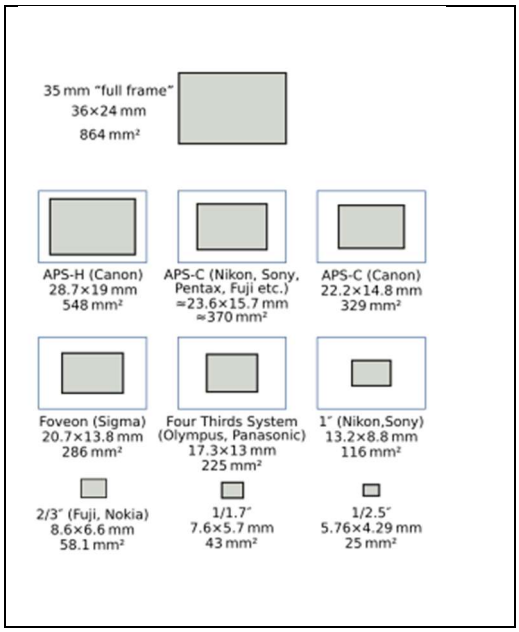
USB Eyepiece camera SVBONY 305 sensor CMOS rolling shutter Sony IMX290
Size 1/2.8’’ image area : 5.60 x 3.18 mm = 17.8 mm^2
2,1 Megapixels Pixel Size 2.9 x 2.9 µm Mpix/mm^2 : 2.1/17.8 = 0.117

From : https://www.svbony.com/sv705c-color-planetary-camera-imx585/?srsltid=AfmBOop7v6f_RyuajoTzSD92BT4uSQ62T4GXiHWlFiybWJPen5jWrPQX&pageIndex=2#F9198J
The IMX415 sensor in the SVBONY 205 telescope camera is a great product but a better is available :

USB Eyepiece camera SVBONY SV 705C sensor CMOS Exmor Sony IMX585 ; Air cooling against sensor heating included ; Size 1/1.2'' image area : 11.14 x 6.26 mm = 69.7 mm^2 ; diagonal 12.8 mm ;
3840 x 2160 pixels (4K UHD) ; 8,3 Megapixels Pixel size 2.9 x 2.9 µm Mpix/mm^2 : 8.3/69.7 = 0.119

The models SV105 and SV205 both are driver-free plug-and-play because they use the UVC protocol. Please notice the currently supported connection system for SV105 and SV205 camera is windows,Linux, Android system. From App Store, "USB Camera" can let your iOS device connect to USB WebCam or video capture card. You can record video or capture snapshot. Compatibility with iPad Requires iPadOS 17.0 or later, Mac Requires macOS 14.0 or later and a Mac with Apple M1 chip or later.

For the models SV305 and above (such as SV305C, SV505C, etc.), a driver is to be installed (ASCOM driver or SVBONY Camera) and after that, you can use the imaging software Sharpcap, AstroDMx Capture or NINA, etc. But who drags a PC into the shooting field with them...?
So the best choice currently is the SV205 with IMX415 sensor connected via USB3.0 via the "USB Cameras for Android" app on an Android tablet, for example SamsungGalaxy. Hoping to see the SVBONY SV705C marketed driver-free plug-and-play.



For information, Samsung Galaxy Camera comes with a 1/2.3" (~ 6.16 x 4.62 mm) CMOS sensor, which has a diagonal of 7.70 mm (0.3") and a surface area of 28.46 mm^2 for 8 Megapixels.
Common sensor sizes for some digital cameras:

Standard	Diagonal	Sensor size	
1/2,5"	7,18 mm	4,29x5,76 mm	Panasonic TZ6
1/2,3"	7,7 mm	4,62x6,16 mm	Nikon P90, Canon 110 IS
1/2"	8 mm	4,8x6,4 mm	Fuji F70EXR
1/1,7"	9,5 mm	5,7x7,6 mm	Canon G10
1/1,6"	10 mm	6 x 8 mm	Fuji S200EXR
1/1,2"	12.8 mm	11,14x6,26 mm	Sony IMX585
4/3"	21,6 mm	13x17,3 mm	reflex 4/3 et hybrides Micro 4/3
APS	24,8 mm à 28,4 mm	13,8x20,7 mm (Sigma) à 15,8x23,6 mm (Nikon, Sony)	reflex amateurs
24x36	43,3 mm	24x36 mm	Nikon D700, Sony Alpha 900

4. <u>Spotting scope 4K Camera driver-free plug-and-play well suited to the 100m shooting field</u>

SVBONY cameras are intended for planetary imaging where the full chip area is not required. Common T2 DLSR adapters are designed to separate the camera from the eyepiece by 60mm or more to allow a Barlow lens and contrast filter to be inserted into the end of the camera if necessary. This results in a very reduced effective field of view giving the impression of an exaggerated zoom effect with the magnification of the telescope at minimum when in reality it is a field of view dictated by the size of the sensor camera. . We can increase the field of vision and therefore reduce the exaggerated zoom effect by using an optical focal reducer (or Barlow lens) until the desired field of vision is obtained with a reduction of 0.8 to 0.6. . . The best option will be with 18mm^2 sensor area IMX415 SV205 camera to bring the eyepiece as close as possible to the Delta Titanium eyepiece camera to capture the maximum optical image area by the photocell and reduce the exaggerated zoom effect and useless. We thus reduce the magnification factor by the photocell by compensating the magnification by the optics of the telescope.

<u>To increase the magnification, it is better to use the zoom of your spotting scope, in principle more efficient than that obtained by increasing the eyepiece-digital sensor gap because beyond a magnification factor of 1.5-2 x, this in fact sees its performance drop and the sharpness of the image deteriorates.</u>

The ideal position will be determined based on the quality of the image and the optical magnification to be applied with the telescope zoom. With these adapters<u>, the sensor-eyepiece distance is 30 mm maximum</u>. If necessary, an extension tube (SVBONY F9160A) of appropriate size (5 mm) can be inserted between the two adapters A and B for good magnification-sharpness optimization of the image.



https://teleskopy.pl/product_info.php?products_id=2643&language=en
Delta Optical Titanium 65ED MK2 spotting scope (520€)
https://teleskopy.pl/product_info.php?products_id=3297
T2 - adapter for Delta Optical Titanium 65ED MK2 spotting scope (33€)



Delta Optical Titanium 65ED MK2 spotting scope (520€) with the T2 - adapter for Delta Optical Titanium 65ED MK2 spotting scope (33€)



T2 - adapter for Delta Optical Titanium 65ED MK2 spotting scope **(A) (33€)**



Extension tube kit M42*0.75 SVBONY F9160A (30€)



M42*0.75 to 1.25" eyepiece convertor for telescopes **(B) (20€)**



M42*0.75 to 1.25" Coaxial Locking Interface Adapter SVBONY F9164A **(C)**



Complete assembly from left to right: eyepiece, T2 adapter **A** + extension tube 5mm, eyepiece convertor **B**, sv205



M42*0.75 to 1.25" eyepiece convertor for telescopes Height : 19mm from : https://fr.aliexpress.com/item/846750965.html?
M42*0.75 to 1.25" Coaxial Locking Interface Adapter SVBONY F9164A from : https://fr.aliexpress.com/item/1005007252679767.html?

The nose of the SV205 camera is mounted on the anodized aluminum telescope adapter M42*0.75 to 1.25" eyepiece converter for telescopes **(B)** Height: 19mm itself screwed onto the T2 - adapter **(A)** for spotting scope Delta Optical Titanium 65ED MK2.

After removing the eyepiece rubber seal, the eyepiece - sensor camera distance is 30mm maximum. The choice of the anodized aluminum M42 to 1.25 inch/1.25 inch telescope adapter is decisive in bringing the eyepiece as close as possible to the camera sensor and to be preferred over the F9164A telescope eyepiece adapter SVBONY M42*0.75 to 1.25'' with Coaxial locking (**C)** which does not allow optimal eyepiece-camera sensor distance.

The USB 3.0 cable connection is made directly to the tablet using the free “USB Camera” application from the Play Store (Android). Focusing is done via the telescope, the eyepiece of which remains functional. Image optimization via the “USB Cam” application. No external power supply by Power Bank required, the SV205 camera is powered directly by the tablet.

We can combine an M28.5*0.6 SVBONY F9127A UV IR Cut filter to improve contrast by blocking infrared ultraviolet and if necessary an M28.5*0.6 SVBONY F9154A Barlow lens as a 0.5x focal reducer to increase the field of vision. <u>These options (Cut filter and Barlow lens) have proven to be unfavorable for image quality</u> and require moving the camera away from the telescope eyepiece by another choice of adapter or by inserting spacers.

Specifications of Delta Optical Titanium 65ED II spotting scope

Magnification	15-45x	Interpupillary distance	15 mm (15x) 18 mm (45x)
Lens diameter	65 mm	Eyecups	Highly rotatable
Focal length	375 mm	Waterproof	Yes
Prism system	-	Anti-fog	Yes
Prismatic glass	-	Nitrogen-filled	Yes
Lens coating	Full Multiple	Tripod device	Yes, 1/4" and 3/8
Field of view (at 1000 m)	57 m (15x) 27 m (45x)	ED fluorite glass	Yes
Close focus	4 m	Color	Black/Green
Exit pupil	**4.3 mm (15x)** **1.4 mm (45x)**	Dimensions	245 x 100 x 80 mm
Interpupillary distance (eye relief)	15 mm (15x) 18 mm (45x)	Weight	1350 g

A Wi-Fi alternative is possible with the option SVBONY SC001 Spectative Wi-Fi Camera 2MP 1080P Camera which is 1920 x 1080 pixels. Wireless with 32GB TF card, electronic eyepiece camera with 1.25 inch mount allows transmission via Wi-Fi but is installed as a replacement for the spotting scope eyepiece, eliminating focus and choice of magnification via the telescope. Only suitable for telescopes with a 1.25" detachable eyepiece and <u>insufficient resolution (2K).</u>

5. .22LR impact holes@100m / ISSF C50 Black Circle Target / Samsung Galaxy 11'' Tab A9+ Screenshot image from SV205 camera on Delta Optical Titanium ED II spotting scope

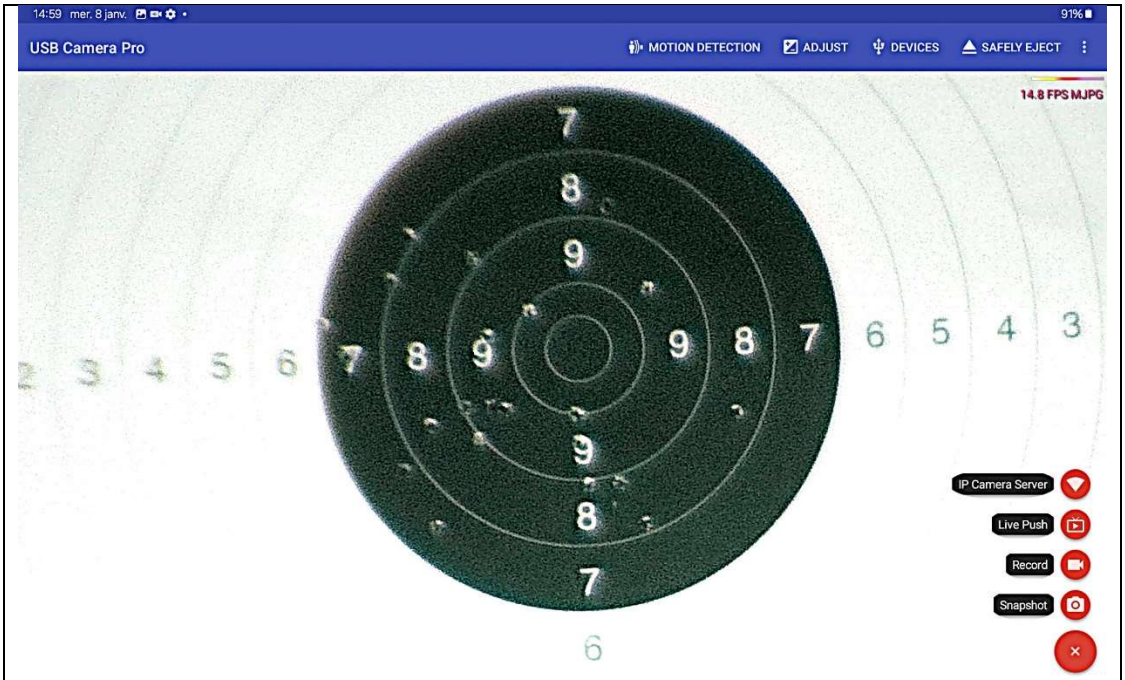
The targets imposed in competition are made of ordinary cardboard with a uniform black center and are non-reactive to impacts like the Birchwood Casey Shoot-N-C Bullseye Targets for example.
The size of the impacts on target are at least .22LR and the .223 caliber is very common as a military caliber (5.56 nato). It is therefore appropriate to be operational to observe .22LR bullet holes in the black cardboard center of the official C50 target paper used for national competitions under the ordinary lighting of the shooting ranges offered for competitions at 100m through a spotting scope with digiscoping camera on tablet. Of course, it is easy to make sure the light is shining more horizontally across the target or a light shining at the back of the target to light up the holes to see better your bullets impacts and cheaper.
But during a competition, a competitive shooter must be adapted to the light conditions of the targets in the stand. Capture images with a mini USB Camera Module 1.25'' UVC driver-free plug-and-play connectivity without WIFI would be the easiest option to implement quickly on eyepiece spotting scope next to the shooter in a prone position. A driver-free plug-and-play cam is preferred because who drags a PC into the shooting field with them...?
To get the best quality of the image taken by the USB Camera Pro software :

- Set the Pro USB Camera to 15FPS to gain sensitivity in low light
- Do not use USB Cam Snapshot (always in JPEG) and prefer Screenshot (in PNG)
- Configure the tablet in PNG format, Refresh rate 50HZ or less, Screen zoom to zero,
- Screenshot image from tablet

Although the camera provides 8K images, the Screenshot will never exceed the tablet screen resolution : 2K (1920 x 1200 pixels).
At 30 Hz e.g., the monitor will refresh half as often at 60Hz, which means it will display each frame for a longer time, potentially reducing the perception of stuttering or tearing since the camera is at 15fps to gain sensitivity in low light.
The captured PNG image format is uncompressed, which provides the best quality. Use the screenshot from the tablet to capture PNG image.
In all cases, the view of the target on the tablet screen will always be of better quality (PNG) than the image obtained in Snapshot (JPEG).



Snapshot 22LR impact holes 100m
Delta Titanium SV205 adaptor new + 5mm USB Cam Pro AOC 100m cal .22lr
Snapshot 2025-01-04.16.12.26.7240~2



Two-finger adjusted zoom screen – .22LR Holes views
Delta Titanium SV205 adaptor new + 5mm USB Cam Pro AOC 100m cal .22lr
Zoom Screenshot_20250108_145923_USB Camera Pro 2



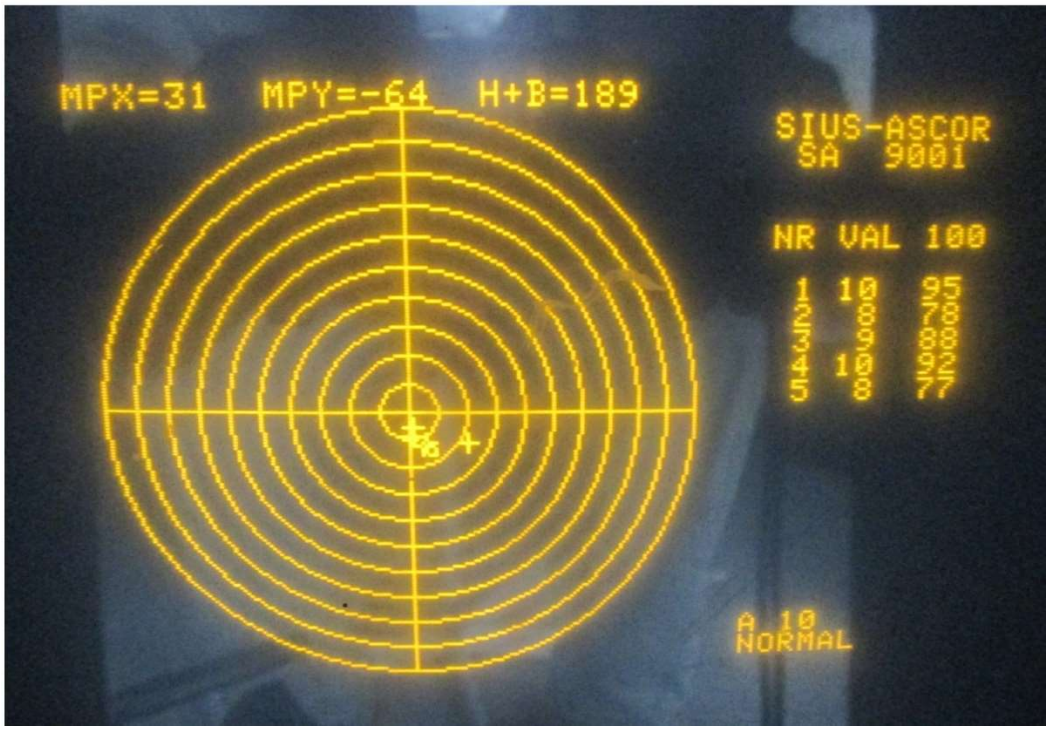
Screenshot capture - .22LR & .357 holes views (.357 holes n=6 in the black center) 100m
Delta Titanium SV205 adaptor new + 5mm USB Cam Pro AOC 100m cal .22lr Zoom
Screenshot_20250108_151839_USB Camera Pro 2

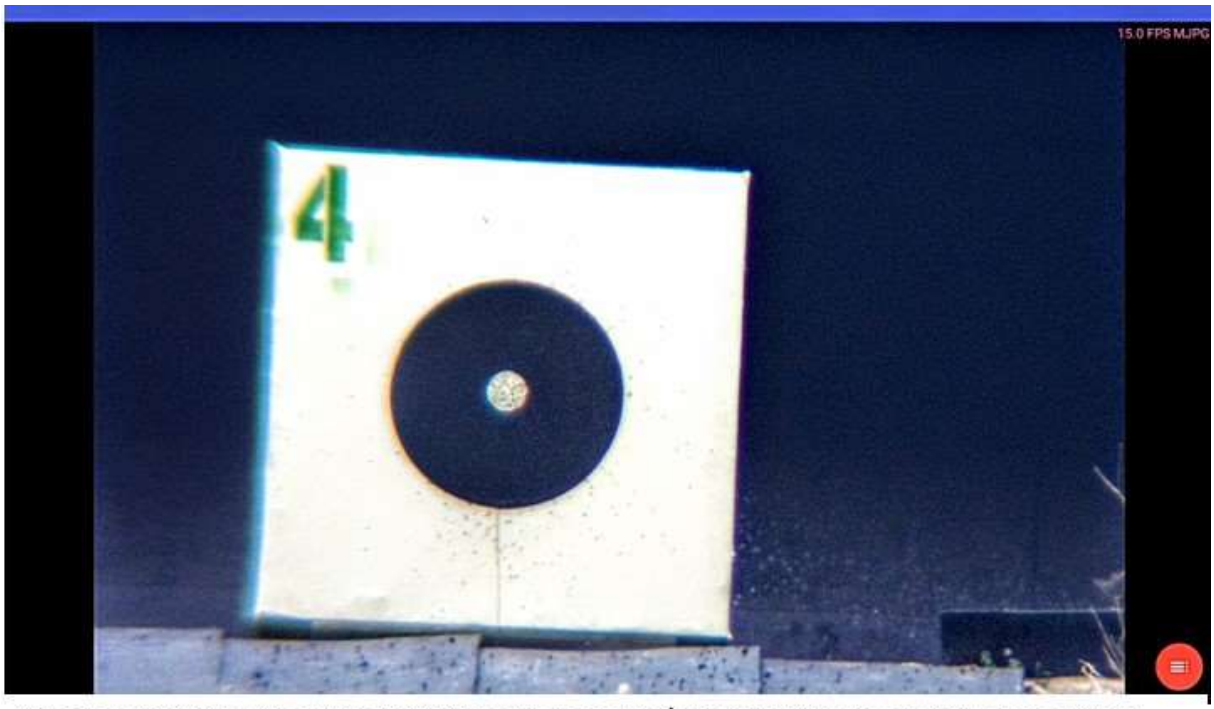
6. Max .308'' various caliber impact holes @300m / Official ISSF 300m Rifle Target / Samsung Galaxy 11'' Tab A9+ Screenshot image from SV205 camera on Delta Optical Titanium ED II spotting scope

The ISSF 300 metre target, which is used worldwide : EDITION 2017 | Second Print V1.1 01/2018 Copyright: ISSF 6.3.4 Official ISSF Targets / 6.3.4.1 300m Rifle Target
10 Ring 100 mm (±0.5 mm) 5 Ring 600 mm (±3.0 mm)
9 Ring 200 mm (±1.0 mm) 4 Ring 700 mm (±3.0 mm)
8 Ring 300 mm (±1.0 mm) 3 Ring 800 mm (±3.0 mm)
7 Ring 400 mm (±3.0 mm) 2 Ring 900 mm (±3.0 mm)
6 Ring 500 mm (±3.0 mm) 1 Ring 1000 mm (±3.0 mm)
Inner Ten = 50 mm (±0.5 mm). Black from 5 to 10 rings = 600 mm (±3.0 mm).
Ring Thickness: 0.5 mm to 1.0 mm.
Visible size of target card: 1020 mm x 1020 mm providing the background on which the target is mounted is the same colour as the target).

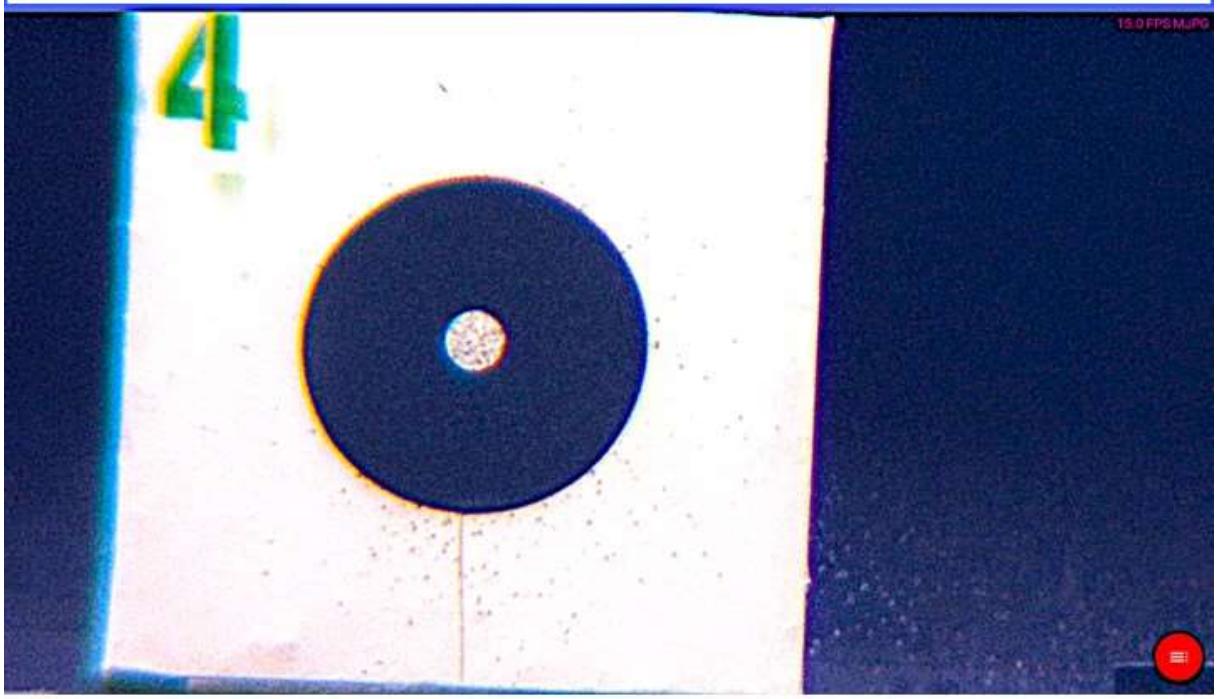


Shooting field CTF Official ISSF 300m Rifle Target
Screenshot_20250126_121506_Camera





Screenshot various caliber Max .308" impact holes views /Delta Titanium EDII spotting scope SV205 adapter new + 5mm USB Cam Pro CTF 300m Official ISSF 300m Rifle Target / Samsung Galaxy 11'' Tab A9+/ Screenshot _20250126_131725_USB Camera Pro~2



Screenshot various caliber Max .308" impact holes views /Delta Titanium EDII spotting scope SV205 adapter new + 5mm USB Cam Pro CTF 300m Official ISSF 300m Rifle Target / Samsung Galaxy 11'' Tab A9+/ Zoom Screenshot_20250126_131740_USB Camera Pro~2

7. Image Capture : Snapshot or Screenshot

USB Camera is a tool that lets you connect a webcam to your smartphone or tablet and use it as an alternative to the device's own camera. Although it's true that the interface could be more intuitive and the quality and resolution offered by the connected camera could be better, USB Camera is a free option worth considering for anyone who wants to replace the camera on their smartphone or tablet for whatever reason.

In order to use USB Camera correctly, you'll need an Android device, a webcam that can be connected via USB, and an adapter compatible with the port of your smartphone or tablet. Once everything is connected, you can start configuring aspects of the transmission, although you must bear in mind that the quality offered will never the screen resolution, regardless of the resolution at which your camera is capable of broadcasting (4K). Galaxy Tab a9+ screen resolution : 1920 X 1200 pixels

A screenshot is not a photo, it was never taken with a camera/lens and is not high resolution. It is not intended for high quality printing, only to copy your screen and use as a visual reference!
Screenshots are always a far lower resolution "copy" of the original photo.
It isn't your phone's fault. Try emailing the screenshot, you will see it doesn't get compressed (blur).
Try sending any 'Screenshot' as a document rather than picking from the gallery. This way image compression will not be done.
The file format used when saving screenshots can also affect the image quality. Two of the most popular formats are JPG (lossy format) or JPEG, and PNG (lossless format). **Your screenshots will look better if you save them with PNG, but the file size will be considerably larger compared to saving them with JPEG.**
The USB Camera Pro when saving a snapshot use exclusively JPEG . So, it is better to use the screenshot from the tablet to save with PNG.
FPS means photographic images (frames) displayed each second in a movie, and is not the same as an electronic monitor refresh rate. The lowest FPS that humans find acceptable in movies is about 24 frames per second.
The Hz refresh rate applies to video monitors and refers to how many times per second your monitor can display a new image, which is measured in hertz (Hz). One hertz equates to one new image per second.
The big difference here is that the refresh rate of the monitor (Hz) has to be adjusted to match the frames per second in the video recording. Monitors rated at 60Hz can handle up to 60 frames per second.
However, lowering the refresh rate may make the gameplay appear smoother if the game is consistently outputting around or below the new refresh rate (in this case, 30 fps). At 30 Hz, the monitor will refresh half as often, which means it will display each frame for a longer time, potentially reducing the perception of stuttering or tearing

7. To get the best quality of the image taken by the USB Camera Pro software :

- Set the Pro USB Camera to 15FPS,
- Do not use USB Cam Snapshot (always in JPEG)
- Configure the tablet in PNG format, Refresh rate 60HZ or less, Screen zoom to zero,
- Capture image using Screenshot via Tablet

Although the camera provides 8K images, the Snapshot will never exceed the tablet screen resolution, which is 2K (1920 x 1200 pixels). The captured PNG image format is uncompressed, which provides the best quality. Use the screenshot from the tablet to capture PNG image.
In all cases, the view of the target on the tablet screen will always be of better quality (PNG) than the image obtained in Snapshot (JPEG).
At 30 Hz e.g., the monitor will refresh half as often at 60Hz, which means it will display each frame for a longer time, potentially reducing the perception of stuttering or tearing since the camera is at 15fps to gain sensitivity in low light.

8. <u>A game-changing upgrade for a spotting scope target camera would be SV205 driver-free plug-and-play camera with IMX485 sensor</u> !

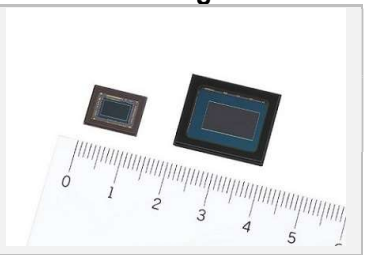
From : https://www.sony.com/en/SonyInfo/News/Press/201906/19-058E/

- **<u>What about the Sony IMX415 CMOS image sensor 4K type 1/2.8</u>**

26 juin 2019 Tokyo, Japan — Sony Corporation today announced the upcoming release of two new models of CMOS image sensors: the IMX415 type 1/2.8 4K-resolution stacked CMOS image sensor, which is the smallest of its kind in the world※1; and the IMX485 type 1/1.2 4K-resolution back-illuminated CMOS image sensor, which delivers outstanding low-light performance approximately 3.3 times that of conventional and have a higher level of image recognition and detection performance. Addressing this need, Sony offers a lineup of compact 4K-resolution CMOS image sensors that deliver superior image recognition and detection performance and excellent low-light performance at the same time—which had been difficult to achieve with conventional technologies. The expanded sensor lineup makes it possible to obtain high-quality images for various scenes, thereby expanding the range of applications for security cameras.

※1: Among 4K-resolution CMOS image sensors for security camera applications

Capteurs d'images CMOS de résolution 4K : Left: IMX415 Right: IMX485

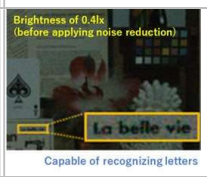
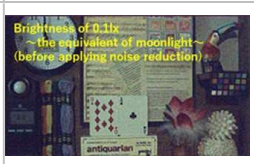
Model name	Sample price (excluding tax)	
IMX415 type 1/2.8 (diagonal 6.43mm) 8.46M effective pixels※3	2 500 JPY	
IMX485 type 1/1.2 (diagonal 12.86mm) 8.42M effective pixels※3 back-illuminated CMOS image sensor	10 000 JPY	

※3: Based on image sensor effective pixel specification method

In general, as pixel miniaturization progresses (IMX415 : 1,45 µm) , the light collection efficiency per pixel deteriorates and sensitivity decreases but improved with IMX485 : 2.9 µm.

- **<u>What about the Sony IMX485 CMOS image sensor 4K type 1/1.2</u>**

A back-illuminated sensor with even better low-light performance with its ample 2.9 square µm pixel size, 2.1 times larger than conventional, coupled with the latest pixel technology for low-noise capabilities, the new sensor dramatically improves the **<u>low-light performance to 3.3 times that of conventional CMOS image for a 4K – resolution sensor.</u>**

Model name	IMX415	IMX485
		
Number of effective pixels	3864(H) × 2192(V), approx. 8.46 megapixels	3864(H) × 2176(V), approx. 8.42 megapixels
Image size	Diagonal: 6.43mm (type 1/2.8)	Diagonal 12.86mm (type 1/1.2)
Unit cell size	1,45 µm (H) × 1,45 µm (V)	2,9 µm (H) × 2,9 µm (V)
Frame rate Full pixel	10bit 90fps, 12bit 60fps	10bit 90fps, 12bit 60fps
Sensitivity (F5.6 standard value)	2048 digits	9530 digits
Sensor saturation signal level (minimum value))	3895 digits	3895 digits
Main function	Digital overlap HDR	Digital overlap HDR
Output	MIPI D-PHY 2/4 lanes	MIPI D-PHY 2/4/4×2/8 lanes

9. Additional Data

From : http://www.stargazing.net/naa/scopemath.htm

Telescope Formulas

Magnification =	**Objective focal length / Eyepiece focal length**
=	**Objective diameter / Exit pupil**
f/# =	**Objective focal length / objective diameter**
Field Size (°) =	**eyepiece field stop diameter / telescope focal length) x 57.3°**
Exit pupil =	**Objective diameter / Magnification**
=	**Eyepiece focal length / (Objective f/#)**
Dawes limit =	**4.56 arc seconds / Objective diameter in inches**
Aperture gain =	**(Objective diameter / Eye pupil diameter)^2**

Modern high-index Barlows actually improve eyepiece performance by reducing astigmatism at the edge of the field. Additionally, using a Barlow increases the effective f/number of the lens and allows longer focal length eyepieces (with their longer eye relief) to be used for high magnification viewing.

In short, magnification is equal to the “focal length” of the telescope divided by the focal length of your eyepiece. So a 500mm FL telescope with a 10mm eyepiece = 50x magnification/zoom. The SV105 is roughly equivalent to a 4mm eyepiece, so for a 500mm FL telescope and a 4mm eyepiece, that's a magnification of x125. If you have a 1000mm FL telescope, that's x250! Great for planets, but not for wide field shots of open star clusters etc.

Delta Titanium Optical dealers :

USA
https://www.edgunwest.com/
https://annexdefense.com/
http://darnfineshot.com/

Canada
https://www.hirschprecision.com/