

From Here to Infinity

A user guide to OASI'S new CCD Camera



- Earlier this year the Society purchased a new Atik Infinity Camera.
- This uses the latest technology to enable real-time stacking and aligning of images.
- This opens up the exciting prospect of having deep sky objects displayed live in colour at outreach events.
- The camera is also a good entry point for any member wishing to dip their toes into deep sky CCD imaging.
- It can also act as a guide camera in a autoguiding set-up.

About Atik Cameras

- Atik Cameras were founded in 2006 by Steve Chambers and Rui Tripa.
- From small beginnings, the company has grown rapidly. Atik cameras are now sold across Europe, USA, Canada, Australia, Japan and Malaysia.
- Atik is based in Norwich, where the cameras are designed and developed.
- Most of the equipment is manufactured in a dedicated factory in Lisbon, Portugal.

A Selection of Atik Cameras
Atik 1100 and Atik One 9.0



Atik 4120 EX



Atik 460 EX



Atik 314 L



Atik Titan



Atik Camera Specification Table One

Atik Cameras Specification Tables

	420	Infinity	414EX	428EX	460EX	490EX	4120EX
Image sensor	Sony ICX274	Sony ICX825	Sony ICX825	Sony ICX674	Sony ICX694	Sony ICX814/5	Sony ICX834AQG
Resolution	1620x1220	1392x1040	1392x1040	1932x1452	2750x2200	3380x2704	4242x2830
Pixel size (um)	4,4x4,4	6,45x6,45	6,45x6,45	4,54x4,54	4,54x4,54	3,69x3,69	3,1x3,1
ADC	16 bit	16bit	16bit	16 bit	16 bit	16bit	16bit
Readout noise (Typ.)	3e-	6e-	4e-	5e-	5e-	5e-	5e-
Cooling Delta	-30	Passive	-30	-25	-25	-25	-25
Regulated cooler	Yes	No	Yes	Yes	Yes	Yes	Yes
Water assist	No	No	No	No	No	No	No
Maximum exposure	Unlimited	120s	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Minimum exposure	0,001s	0,001s	0,001s	0,001s	0,001s	0,001s	0,001s
Maximum Frame Rate	n/a	3fps	n/a	n/a	n/a	n/a	n/a
Gain Factor	0.13e-/ADU	0.37e-/ADU	0.28e-/ADU	0.27e-/ADU	0.27e-/ADU	0.19e-/ADU	0.14e-/ADU
Full Well Capacity	~9,000e-	~24,000e-	~18,000e-	~17,500e-	~18,000 e-	~12,500e-	~9,000 e-
Dark Current	~0.0001 e-/s at -10°	n/a	~0.001 e-/s at -10°	~0.0002 e-/s at -10°	~0.0004 e-/s at -10°	~0.0003 e-/s at -10°	~0.0003 e-/s at -10°
PC interface	USB2	USB2	USB2	USB2	USB2	USB2	USB2
Power requirements	12VDC, 0.9A	12VDC, 1A	12VDC, 1A	12VDC, 0.9A	12VDC, 0.9A	12VDC, 0.9A	12VDC, 1A
Backfocus distance	13mm ±0.5	13mm ±0.5	13mm ±0.5	13mm ±0.5	13mm ±0.5	13mm ±0.5	13mm ±0.5
Thread on front	M42x0,75	M42x0,75	M42x0,75	M42x0,75	M42x0,75	M42x0,75	M42x0,75
Weight	400g	340g	400g	400g	400g	400g	400g
Mono or OSC	Either	Either	Either	Either	Either	Either	OSC

Atik Camera Specification Table Two

Atik Cameras Specification Tables

	GP	Titan	Atik 314L+	One 6.0	One 9.0	383L+	4000	11000
Image sensor	Sony ICX445	Sony ICX424	Sony ICX285	Sony ICX694/5	Sony ICX814/5	Kodak KAF-8300	Kodak KAI4022	Kodak KAI11002
Resolution	1296x964	659x494	1392x1040	2750x2200	3380x2704	3362x2504	2048x2048	4008x2672
Pixel size (um)	3,75x3,75	7,4x7,4	6,45x6,45	4,54x4,54	3,69x3,69	5,4x5,4	7,4x7,4	9x9
ADC	12bit	16 bit	16 bit	16bit	16bit	16 bit	16 bit	16 bit
Readout noise (Typ.)	7e-	7e-	4e-	4e-	4e-	7e-	11e-	13e-
Cooling Delta	Passive	-20	-27	-38	-38	-40	-40	-38
Regulated cooler	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Water assist	No	No	No	No	No	No	Yes	Yes
Maximum exposure	5s	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Minimum exposure	0,001s	0,001s	0,001s	0,001s	0,001s	0,2s	0,001s	0,001s
Maximum Frame Rate	30 fps	15 fps	n/a	n/a	n/a	n/a	n/a	n/a
Gain Factor	n/a	0.34e-/ADU	0.3e-/ADU	0.27e-/ADU	0.19e-/ADU	0.41e-/ADU	0.61e-/ADU	0.92e-/ADU
Full Well Capacity	n/a	~22,500 e-	~19,500 e-	~18,000e-	~12,000e-	~26,000 e-	~40,000 e-	~60,000 e-
Dark Current	n/a	n/a	~0.0002 e-/s at -10°	~0.0005 e-/s at -10°	~0.0002 e-/s at -10°	~0.1000 e-/s at -10°	~0.0100 e-/s at -20°	~0.0300 e-/s at -20°
PC Interface	USB2	USB2	USB2	USB2	USB2	USB2	USB2	USB2
Power requirements	USB powered	12VDC, 0.55A	12VDC 0.8A	12VDC, 2A				
Backfocus distance	7mm ±0.5	12mm ±0.5	13mm ±0.5	27mm ±0.5	27mm ±0.5	17mm ±0.5	16mm ±0.5	15mm ±0.5
Thread on front	M42x0,75	M42x0,75	M54x0,75	M42x0,75	M42x0,75	M42x0,75	M42x0,75	M54x0,75
Weight	80g	350g	400g	900g	900g	700g	990g	990g
Mono or OSC	Either	Either	Either	Mono	Mono	Mono	Either	Either

Getting to know the Camera



3. Getting to know your camera

3.1 Camera Parts



1. USB port
2. ST4 compatible guide port
3. Guide port LED
4. 2.1mm centre-positive 12V DC input

3.2 Sensor

The sensors available in the Atik infinity cameras are listed below:

	Monochrome	Colour
Atik infinity	SONY ICX825ALA	SONY ICX825AQA

Due to the very clean nature of these CCDs, dark frames are unnecessary in most cases. This is due to the low noise which stands at an amazing 6 electrons RMS typical.

What's in the Box?



2. Pack Contents

This pack includes:

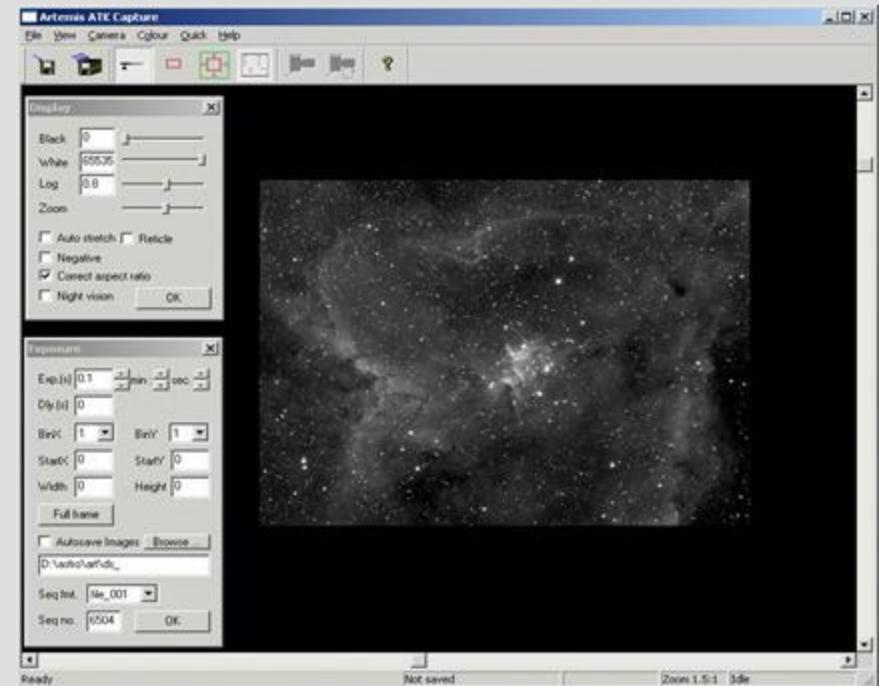
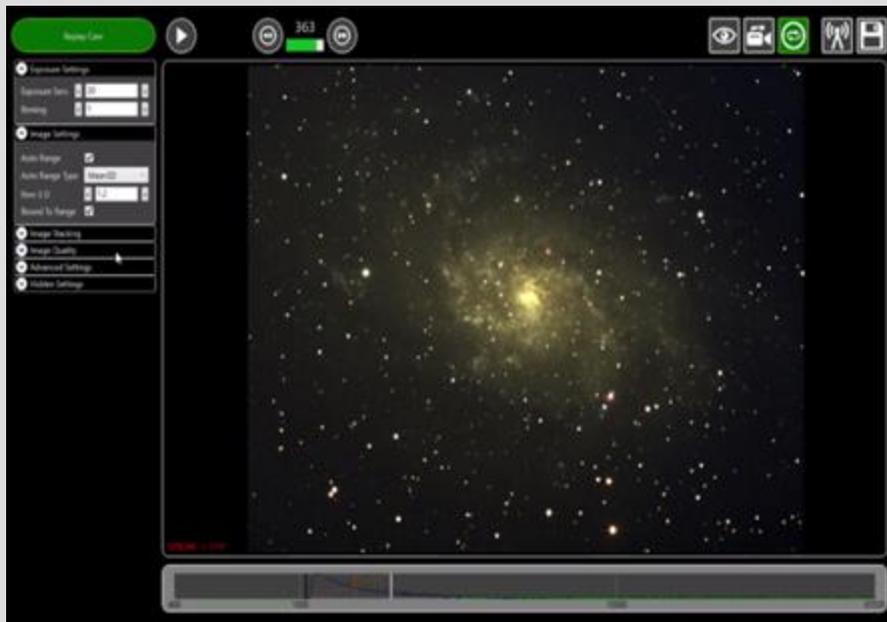


1. Atik infinity camera
2. USB cable
3. Car lighter type power cable
4. CD with software and manuals
5. Quickstart Guide

Core Software

Atik Infinity Software

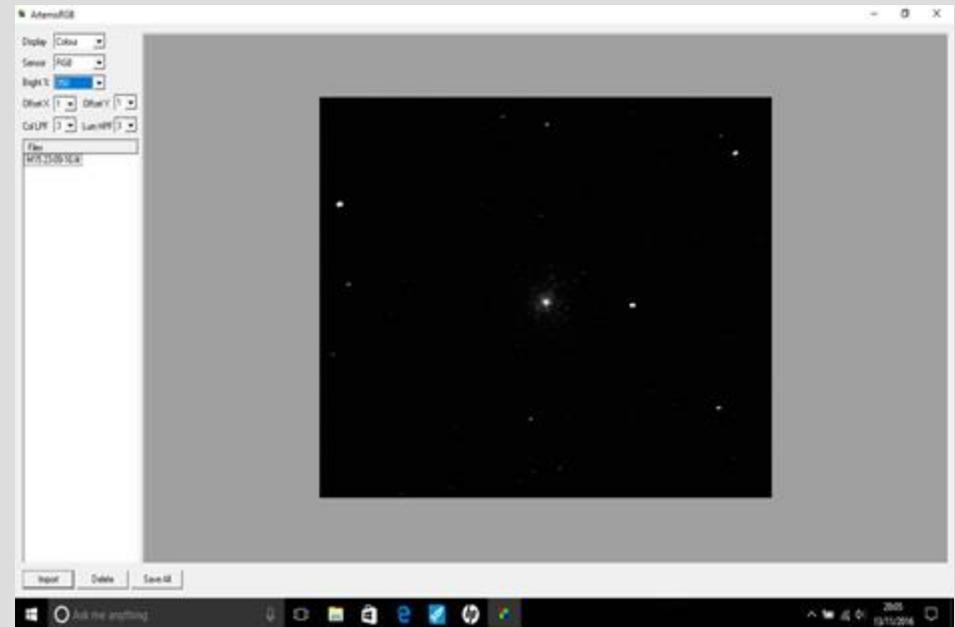
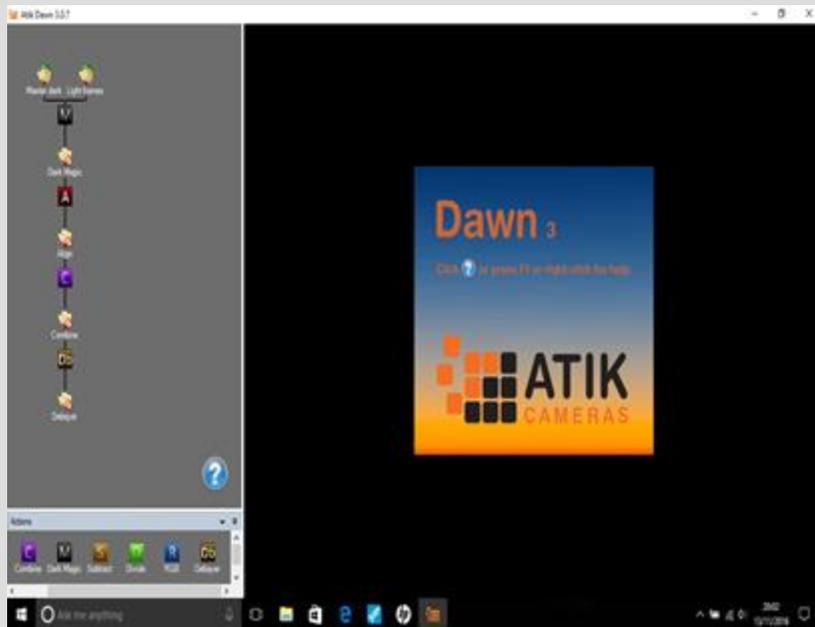
Artemis Capture



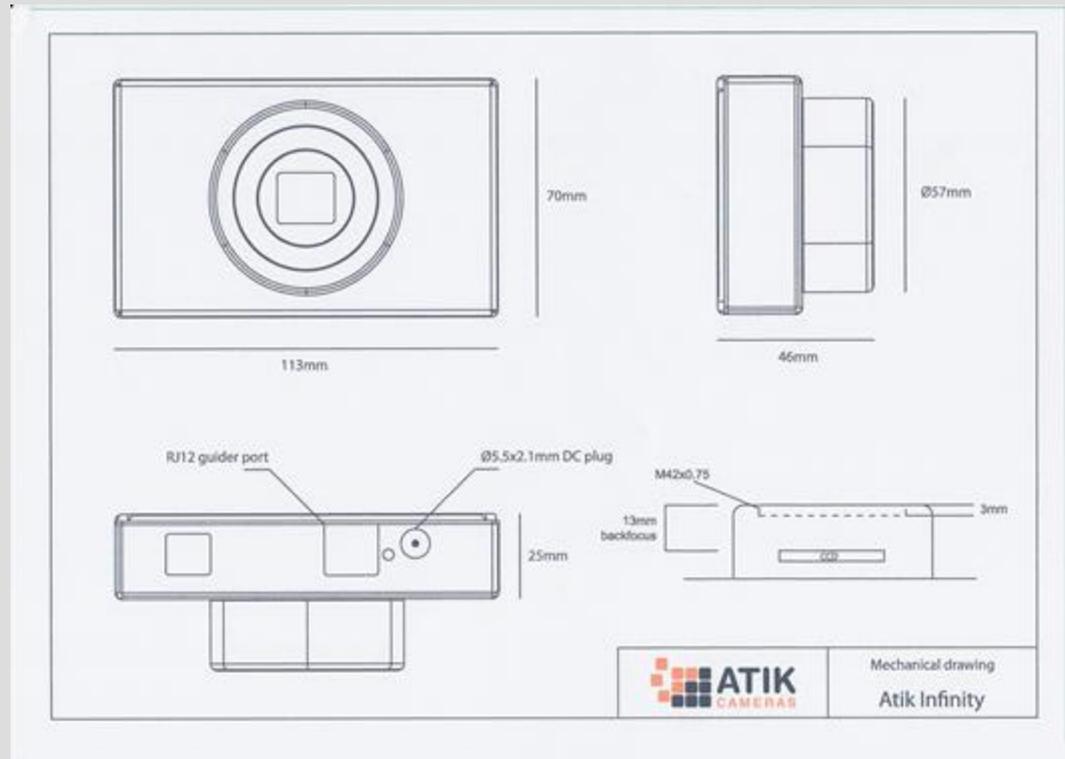
Core Software

Atik Dawn

Artemis RGB



Mechanical Drawing



Technical Information



4. Technical Information Summary

	Infinity
Image sensor	Sony ICX825
Resolution	1392x1040
Pixel size (µm)	6,45x6,45
ADC	16bit
Readout noise (Typ.)	6e
Cooling	Passive
Regulated cooler	No
Water assist	No
Maximum exposure	120s
Minimum exposure	0,001s
PC Interface	USB2
Power requirements	12VDC, 1A
Backfocus	13mm ±0.5
Thread	M42x0,75
Weight	340g
Mount or OSC	Either

The following table gives the angular resolution per pixel with certain focal distances. The formula to calculate any other focal length is:

$$(\text{Pixel Size } (\mu\text{m}) / \text{Focal Distance } (\text{mm})) * 206.3 = \text{angular resolution } (\text{arcseconds/pixel})$$

Focal Length	Atik Infinity
250	5,32
300	4,44
350	3,80
400	3,32
450	2,99
500	2,66
550	2,42
600	2,22
650	2,05
700	1,90
750	1,77
800	1,66
850	1,57
900	1,48

More Information

- The Atik Infinity is the first Atik camera dedicated to Video Astronomy.
- It bridges the gap between visual observing and traditional astrophotography by capturing high quality images at live-view frame rates.
- The Sony ICX825 sensor with Exciew HAD CCD II can capture details on faint deep sky objects while maintaining an “at telescope” feeling.
- This technology has its roots in highly sensitive security cameras. Although the Infinity also uses technology from microscopy cameras.

Video Astronomy

- Video Astronomy, also known as Electronically Assisted Astronomy fills the gap in the area between visual observing and astrophotography.
- It can help the observer to view deep sky objects in real time and in colour in light polluted areas.
- It can also help observers who may have visual or physical disabilities to view objects.
- It also has benefits for outreach astronomy, more “wow” factor and less queues for the eyepiece.
- It is not a substitute for astrophotography, only modest equipment needed.

Video Astronomy in the 1960's

- Gil Miles of Sydney Amateur Astronomers in 1961.



Mallincam

- Since 1985 the Canadian company Mallincam have been producing video cameras for astronomy
- These were, at first, analogue cameras which outputted to a monitor with a composite video cable or S video cable. Images could be saved to a computer using a video capture device.
- Founded by Rock Mallin
- Mallincam now also produce digital CCD and CMOS cameras of high quality at a range of prices.
- In case anybody needs an explanation.....
- CCD stands for Charged Coupled Device
- CMOS stands for Complimentary Metal-Oxide Semiconductor
- Each has its own merits.....but that is a subject for another
- Workshop!
- These cameras produced images using a stacking routine called Integration.
- In the following years, dedicated Video Astronomy cameras have also been produced by companies such as Astro Video Systems, Watec, Stella Cam and Mintron.

Mallincam Junior Pro



Mallincam Star Vision



Camera Connections



Camera Connections

BASIC VIDEO ASTRONOMY WITH A COMPUTER

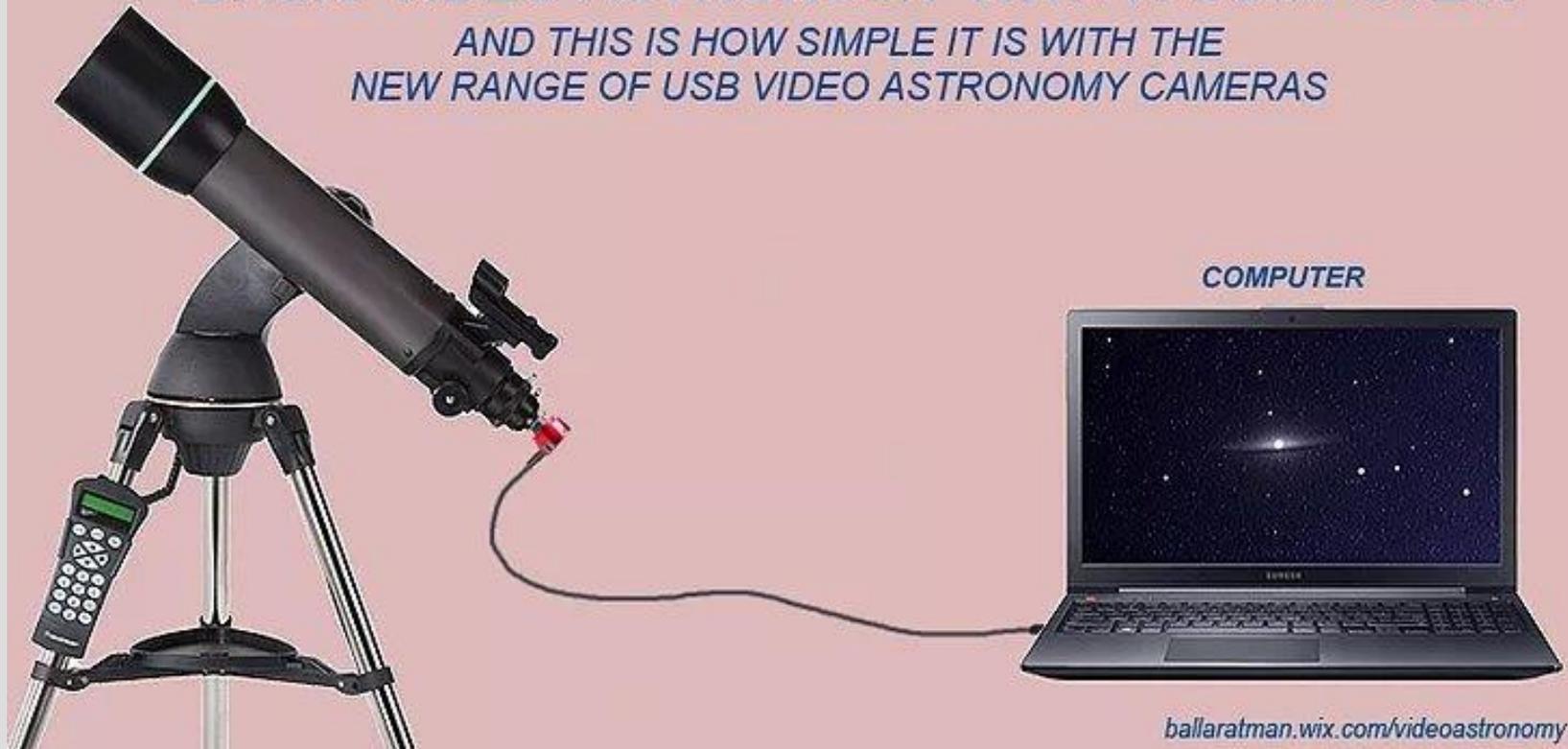
**VIEWING ON A COMPUTER IS AS SIMPLE AS
USING AN A.V. LEAD & VIDEO GRABBER**



Camera Connections

BASIC VIDEO ASTRONOMY WITH A COMPUTER

*AND THIS IS HOW SIMPLE IT IS WITH THE
NEW RANGE OF USB VIDEO ASTRONOMY CAMERAS*



Back to the Infinity

- In 2015 Atik Cameras launched the Infinity.
- As well as being sensitive enough for real time viewing of Deep Sky objects it can also be used for basic deep sky astrophotography and as a guide camera.
- Sessions can be recorded for playback and editing later.
- Single frames can be saved in PNG or FITS format for stacking and editing. FITS frames can be edited in Atik's Dawn Software or the free FITS Liberator.
- The Infinity can be used with reasonably modest equipment. A driven mount is required, it doesn't have to be equatorial, the software will sort out any field rotation on alt/az mounts.
- Due to sensor and pixel size, the Infinity works best on telescopes in the 300mm to 1000mm focal length range.
- The Infinity is available as a colour or monochrome camera. The monochrome being more sensitive.

Hardware Requirements

- The Infinity has modest minimum hardware requirements.
- Pentium III PC
- 128 MB Ram
- Windows Vista or above
- CD Rom Drive
- USB 2 Port
- 12 Volt DC 1Amp power required, a Power Tank would supply this.

Things that the Infinity Isn't

- The Infinity has a minimum exposure length of 0.001 second.
- This makes it suitable for viewing the bright Planets, Sun and Moon only in “Live View”, (the images will not be stacking.)
- However, the Beta 3 version of the software has a fix for this.
- The Infinity has a maximum exposure time of 120 seconds. Even though you can bring out colour and detail from deep sky objects in a few seconds, it is no match for a dedicated, cooled, CCD camera, which can take exposures of many minutes.

Competitors

Starlight Express Lodestar x2

UltraStar

Running Starlight Live Software



Live Broadcasting

- Another exciting feature of the camera is the ability to produce live broadcasts for viewing on the internet.
- All that is required is a Google account and associated YouTube channel. These are free and readily available.
- You can broadcast live and can record and process the video to keep as a record.
- This is a feature which I have yet to try out, it is something the Society could explore to do if the interest is there.
- A recent development is the Video Astronomy Live website, users can broadcast live to their own channel.

Video Astronomy Live

The screenshot shows a web browser window displaying the Video Astronomy Live website. The browser's address bar shows the URL www.videoastronomyfive.co.uk/broadcasts. The website header includes the logo "Video Astronomy Live" with the tagline "Live Space Broadcasting" and a navigation menu with buttons for Home, Broadcasts, Forum, Visitor FAQs, Weather, GPCAM, Contact, and More. The "ALTAIR ASTRO" logo is also present, with the text "Proud Sponsors of VAL" below it.

The main content area features a large video player on the left showing a handheld device against a space background. Below the player is a text instruction: "Click through the channels to see who's live. If someone is, then simply click their channel name from the list below to visit their page and chat live. For previous broadcasts, please select the iPlayer from the menu right or below".

To the right of the video player is a "FIND VIDEO" search bar and a "CHOOSE PLAYLIST" dropdown menu set to "Channels". Below this is a grid of video thumbnails with titles and durations:

Thumbnail	Title	Date	Duration
	Spaceout	27 Sep 2014	00:42:49
	Spaceout - Broadcast 5th May 2016 Abk Infinity look at M51 & M27	13 May 2016	00:46:12
	Carlscope - Broadcast 17th March 2016 - Abk Infinity	17 May 2016	03:29:09
	AstroExeter Solar Broadcast 2	25 May 2016	00:39:47
	AstroExeter Solar Broadcast 1	25 May 2016	03:00:04
	Spaceout - Broadcast 5th May 2016 Abk Infinity look at M51 & M27	13 May 2016	00:55:09

At the bottom of the page, there are buttons for "Channels", "iPlayer", and "Video Astronomy Tutorials". A taskbar at the very bottom shows the Windows Start button, search bar, and several application icons, with the system clock displaying 12:16 on 26/10/2016.

That's the end of the Slideshow

Now I will try to demonstrate the software!

