SeeSense
Specialist Camera Solutions

MAPIR SURVEY 3

MAPIR

Multispectral imaging camera sensors fitted on to drones enable agriculturalists to effectively manage crops, soil, fertilizing, irrigation, etc.

The MAPIR Survey3 is a compact affordable aerial multispectral imaging camera system offering a range of 6 filter and 2 lens angle options. They are widely used for checking a wide range of **vegetation, mineral & burn indices** including:

- Normalised Difference Vegetation Index (NDVI)
- Enhanced Vegetation Index (EVI)
- Chlorophyll Vegetation Index (CVI)
- Modified Sample Ratio (MSR)
- Iron Oxide Ratio (IOR)
- Burn Area Index (BAI)

AND MANY MORE!

The MAPIR Survey 3 range includes an external GPS receiver to provide instant geo-tagging with every captured image which can be processed on Mapir, Pix4D, Metashape, DroneDeploy, One Button, C3D, MapsMadeEasy, and other software

The MAPIR Calibration Ground Target provides highly accurate calibrated reflectance values for captured media.

MAPIR - MAPPING THE INVISIBLE

Please contact SeeSense for further details of MAPIR cameras and their application:

www.seesense.eu sales@seesense.eu

CAMERAS FOR MULTI SPECTRAL IMAGING

Features:

- 12 MegaPixel Image Resolution
- Up to 2160p Video Resolution
- 1/2.3-inch CMOS Sensor
- 6 spectrum options and two angles of view
- GPS Receiver provides instant Geo-tagging
- Comprehensive camera menu
- Compact, Lightweight and Affordable
- Range of Camera Clips & Mounts available

Applications:

- Aerial Multispectral Imaging
- Crop Inspection
- Checking vegetation Indices
- Crop Consulting
- Irrigation Management
- Crop Spraying

Camera Options:

19mm wide angle lens (87º HFOV)

Resolving 5.5 cm/pixel @ 120m (400') Above Ground Level

- S3W-RGB Visible Light (RGB) camera
- S3W-OCN Orange, Cyan & NIR (OCN, NDVI) camera
- S3W-RGN Red, Green & NIR (RGN, NDVI) camera
- S3W-NGB NIR, Green & Blue (NGB, ENDVI) camera
- S3W-RE Red-Edge (RE) camera
- S3W-NIR Near Infrared (NIR) camera

47mm narrow angle lens (41º HFOV)

Resolving 2.3 cm/pixel @ 120m (400') Above Ground Level

- S3N-RGB Visible Light RGB camera
- S3N-OCN Orange, Cyan & NIR (OCN, NDVI) camera
- S3N-RGN Red, Green+NIR (RGN, NDVI) camera
- S3N-NGB NIR+Green+Blue (NGB, ENDVI) camera
- S3N-RE Red-Edge (RE) camera
- S3N-NIR Near Infrared (NIR) camera

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CAMERA OPTIONS AND APPLICATIONS

OCN Orange, Cyan & NIR (OCN, NDVI) camera
- Red Image Channel = **Orange Light**
- Green Image Channel = **Cyan (Blue/Green) Light**
- Blue Image Channel = **NIR (Near Infrared) Light**

The OCN filter is an improvement to the RGN (Below) since it provides increased contrast within vegetation and reduces soil noise. It is better to use the OCN if there is soil amongst the vegetation, and the RGN if the crop has more of a solid canopy (low number of soil pixels). It can be used with the NDVI index just like the RGN filter. **If you are looking for the best camera to buy to measure general plant health then OCN camera are your best option**.

RGN Red, Green & NIR (RGN, NDVI) camera
- Red Image Channel = **Red Light**
- Green Image Channel = **Green Light**
- Blue Image Channel = **NIR (Near Infrared) Light**

The RGN filter is has been the most commonly purchased model mainly due to its ability to capture the Red and NIR wavelengths necessary for the popular NDVI index. NDVI is typically used as a general plant health and vigor index, basically it will show you what regions are healthiest compared to those areas that are not as healthy. Mapir's new OCN filter typically provides better results which you can read about HERE in more details.

NGB NIR, Green & Blue (NGB, ENDVI) camera
- Red Image Channel = **NIR (Near Infrared) Light**
- Green Image Channel = **Green Light**
- Blue Image Channel = **Blue Light**

The NGB filter is often times used for the ENDVI index, basically Enhanced NDVI. It takes the plant's green reflectance into account when determining plant health instead of just using the reflected near infrared (NIR) light as the NDVI index uses. Some applications (like DroneDeploy for instance) don't allow you to compute ENDVI, so please check which indices are supported. You can also compute the NDVI index using Blue vs NIR light, which may reveal different results compared to using the RGN camera. The best way to think about the difference between the RGN and NGB models is that **most of the time the RGN model is the better choice**, but the NGB model may show you something that the RGN cannot, so if your budget allows, using both cameras and comparing the results is recommended.

RE Red-Edge (RE) camera
- Red Image Channel = **RedEdge (725nm) Light**
- Green Image Channel = **Not Used**
- Blue Image Channel = **Not Used**

The RedEdge filter is used to capture a single band of reflected light in the region known as the rededge. This region from about 700-800nm is where plants have varying reflectance which closely relates to their health. A plant reflecting more rededge light will typically be more healthy than a plant that is not. When processed with Mapir's MCC application the output images will be a single image band, i.e. black and white. A white pixel will be high rededge reflectance, and a black pixel low rededge reflectance. You can disregard the green and blue image channels as they will not contain useful data compared to the red channel.

NIR Near Infrared (NIR) camera
- Red Image Channel = **Near Infrared (850nm) Light**
- Green Image Channel = **Not Used**
- Blue Image Channel = **Not Used**

The near infrared filter is used to capture a single band of reflected near infrared light. When processed with Mapir's MCC application, the output images will be a single image band, meaning black and white. A white pixel will be high NIR reflectance, and a black pixel low NIR reflectance. You can disregard the green and blue image channels as they will not contain useful data compared to the red channel.

RGB Camera
- Red Image Channel = **Red Light**
- Green Image Channel = **Green Light**
- Blue Image Channel = **Blue Light**

Simply speaking an RGB camera captures light in the spectrum range we see as we see it and is typical to that installed on most cameras! An RGB / visible light camera is commonly used for surveying a scene along with multispectral cameras to capture a reference colour image. This can then be used to compare to a NDVI graded one or to relate what our eyes see to what a camera capable of capturing near infrared (NIR) light sees. It can also be used for orthophotography where many photos are combined to generate a 3D model.

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Specification:

Image Sensor	1/2.3-inch CMOS 12 MP Sony Exmor R IMX117 (Bayer RGB))
Chipset	Novatek NTK96663
Pixel Size	1.4µm x 1.4µm
Pixels	Horizontal: 4000, Vertical: 3000
Image Resolution	12 MegaPixel (4000 x 3000 px), 8MP
Image Format	RAW + JPG, JPG (RAW - 12bit, JPG - 8bit per channel)
Video Format	MP4 (H.264 Codec)
Video Resolution	2160p24, 1440p30, 1080p60, 720p60
Ground Sample Distance (GSD)	5.5 cm/px (2.17"/px) @ 120m (400') AGL 2.3 cm/px (20.9"/px) @ 120m (400') AGL
GPS/GNSS (External)	ublox UBX-G7020-KT
Output Mode	2160p*, 1440p*, 1269p, 1080p*, 720p, All 16:9 format * = 4/3 format WVGA, VGA.
Low Distortion Glass Lens	19mm 87º HFOV, F2.8 Fixed Aperture 47mm 41º HFOV, F3.0 Fixed Aperture
ISO	50* / 100 / 200 / 400 / AUTO
Shutter Speeds	AUTO, 1/2000, 1/1000*, 1/500, 1/250, 1/125, 1/90, 1/30, 1/15, 1/8, 1, 2, 5, 10, 15, 20, 30, 60
Frequency	60Hz* / 50 Hz
Exposure	+2.0, +1.67, +1.33, +1.0, +0.67, +0.33 +0.0*, -0.33, -0.67, -1.0, -1.33, -1.67, -2.0
White Balance	Auto, Daylight, Cloudy, Tungsten, Flourescent, Blue, Light Blue, Red, Light Red, Custom*
Capture Mode	Single*, 3 sequence, 10 sequence
Capture Interval	0.5*, 1,2, 5, 10, 30 seconds, 1, 5, 10, 30 minutes, 1, 2, 6, 12 24 hours
Capture Speed	RAW+JPG: 2.75 Seconds / Photo JPG: 1.5 Seconds / Photo
Remote Trigger	PWM via HDMI Port
Video Output Level	HD 1080p (HDMI Micro), SD 480p (Optional USB FPV Cable)
Memory Storage	Micro SD (Up To 128GB) 64GB Card ≈ 15K JPG, 2.2K RAW+JPG
TV Mode	NTSC*, PAL
Output Format	2160p 24 fps / 1440p & 1269p 30fps / 1080p 60, 30fps (30 4:3) / 720p 120, 60, 30 fps / WVGA 30fps / VGA 240 fps

Specification Continued:

LCD	2.0" Ultra bright colour touch screen
Metering	Average, Centre*, Spot
Colour	Normal*, B&W, Sepia, Vivid
Sharpness	Strong, Medium*, Soft
Auto Power On	ON* / OFF
On Screen Display (OSD)	ON* / OFF
Date Stamp	ON / OFF*
Sound	ON* / OFF
Quick Capture	ON / OFF*
Auto Power ON / OFF	OFF* / 1, 3, 5, 10, 15, 30 minutes, 1 hour
Auto Sleep LCD	1min* / 3min / 5min / OFF
Vertical Rotate	ON / OFF*
OSD Languages	English*, French, Spanish, Dutch, Czech, Polish, German,Italian, Portuguese Brazil, Chinese, Russian, Japanese, Korean
Power Consumption	5.2V 0.4A With Battery, (0.2A without)
Battery	Removable Li-ion (1200mAh) Battery (Not required when USB Powered)
Power Input	Battery, USB (Micro-A Cable Included or Optional Micro USB FPV Cable)
Weight	76 grammes with battery (54g without)
Dimensions	59 x 41.5 x 36mm (LxHxD)
	*** = Default Setting**

Included Accessories

USB GPS Receiver, Battery, Lens Cap, USB Charge Cable, Manual

Optional Accessories

MAP-TARG	**Mapir Reflectance Calibration Target Kit V2**
MOUNTS	STANDARD & TILTING MOUNT SYSTEMS ARE AVAILABLE FOR DJI, 3DR DRONES & A GENERIC DRONE MOUNTING SYSTEM - **SEE SEPARATE DATASHEET FOR DETAILS**
MAP-S3-CC	Mapir Survey 3 Camera Clip
MAP-S3-GPSA	Advanced GPS Receiver
S3/2-HDMITR	PWM & Intervalometer Shutter Cable
S3/2-HDMITR	USB FPV Cable
S3/2-LP	Mapir Camera Lens Protector
MICRO SD	Micro SD Cards

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