C A S I A G

Ensuring no two aircraft collide mid-air.

C O N T E N T S

CASIA G

The world's **most advanced electro-optical** aircraft detection solution to protect your UAV operations.

Features

DETECT & ALERT

Sense non-cooperative aircraft using a patented computer vision and AI system.

INTEGRATED ADS-B

Integrated ADS-B for increased coverage with cooperative aircraft.

ELECTRO-OPTICAL & ADS-B CORRELATION

Electro-optical (non-cooperative aircraft) and ADS-B (cooperative aircraft) detections are correlated to provide a single intruder detection, and the most accurate data possible.

360 DEGREE FIELD OF REGARD

Our six camera Casia G systems provide a 360 degree field of regard around your drone operation.

ALWAYS ON

Casia G is constantly focused on surveiling the airspace, allowing you to fly at a moments notice. It is ready and waiting and doesn't require breaks.
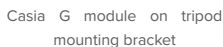
UNLIMITED COVERAGE

Each Casia G node is small and easy to install. To cover a greater area, or give your operations more time to react to intruder aircraft, additional systems can be deployed that work together in a mesh network.
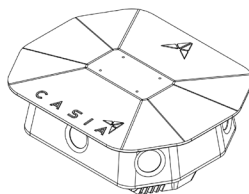
SUPPORTS 24/7 OPERATION

The system will be able to discern if a sunset or sunris has occured, to optimize operations and switch to appropriate mode (Day Mode or Night Mode).

Casia G Module

The Casia G Module houses six cameras, a graphical processing unit, and uAvionix's proprietory software. The software is the brains of the Casia G ground based Detect and Alert system.

Casia G module on tripod mounting bracket

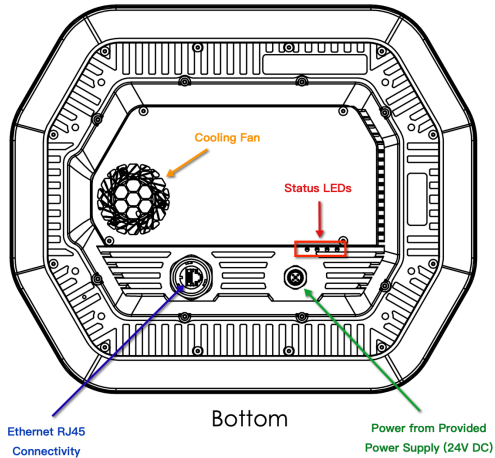|	
Input Voltage	**110V AC must be provided to 24 DC power supply**
Power	**65W Nominal, 70W Peak**
Mass	**4 kg**

Power and Data Connections

As shown below, Casia G has two connections:

1. Ethernet RJ45 bayonet connection

2. Power from the provided 24VDC power supply - 4 pin type A M12

Casia G underside drawing

Performance Specifications

Casia uses different algorithms for day mode, in comparison to night mode. Performance data for each mode will differ. Performance will reduce below that specificied when visibility decreases.

The following performance numbers were obtained by flying fixed wing and rotary GA aircraft at each of the 6 Casia G cameras at multiple altitudes, angles, and velocities. Declaration range varies based on the size of the intruder aircraft.
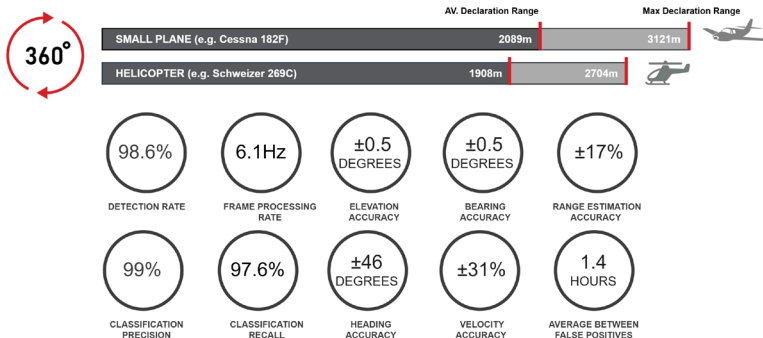
Performance improves as new software is released. uAvionix reserves the right to alter the above table without notice. Detection was determined based on real encounters of general aviation aircraft with Casia G. Detailed performance reports are available for regulatory approval purposes.

Declaration range is the distance at which an aircraft is detected and classified. Once an intruder is detected, the time taken to react, the time taken for your UAS to move to a safe zone, and the speed of your UAS and the typical speed of intruder traffic must be considered in determining your operational area.

Day Mode

The following data is a reflection of the results of performance testing of the night detection capability of the Casia G system.

	AV. Declaration Range	Max Declaration Range
SMALL PLANE (e.g. Cessna 182F)	2089m	3121m
HELICOPTER (e.g. Schweizer 269C)	1908m	2704m

360°

98.6%	6.1Hz	±0.5 DEGREES	±0.5 DEGREES	±17%
DETECTION RATE	FRAME PROCESSING RATE	ELEVATION ACCURACY	BEARING ACCURACY	RANGE ESTIMATION ACCURACY
99%	97.6%	±46 DEGREES	±31%	1.4 HOURS
CLASSIFICATION PRECISION	CLASSIFICATION RECALL	HEADING ACCURACY	VELOCITY ACCURACY	AVERAGE BETWEEN FALSE POSITIVES

Casia G has been trained and tuned to identify and classify small GA aircraft. The above results are specific to the detection of small GA aircraft. Casia G will classify intruders as one of the following:

Detected Intruder Types	Small single engine aircraft, single disk rotorcraft, birds, multirotors

Casia G will not perform to the above specified level when the intruders are small drones or birds. This is the case even when scale is considered, as there are many factors involved in Casia G detections.
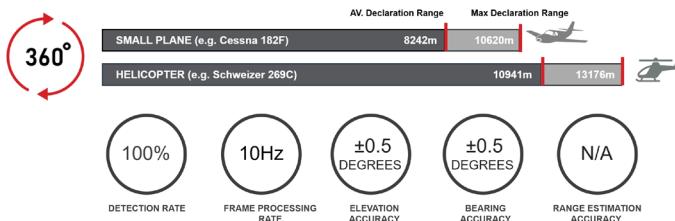
Night Mode

The following data is a reflection of the results of performance testing of the night detection capability of the Casia G system. The evaluation focused on the system's ability to detect and track small planes and helicopters during night operations.
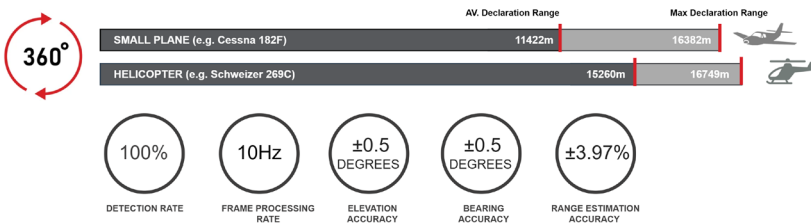
Single-System Performance

At night, the system detects navigation and anti-collision lights. With a single system it is not possible to triangulate the position of detected aircraft. As such, it should be assumed that the detected aircraft, is detected in the worst case scenario (i.e. head on geometry). This results in shorter detection range for single versus multiple systems.

360°

	AV. Declaration Range	Max Declaration Range
SMALL PLANE (e.g. Cessna 182F)	8242m	10620m
HELICOPTER (e.g. Schweizer 269C)	10941m	13176m

100%	10Hz	±0.5 DEGREES	±0.5 DEGREES	N/A
DETECTION RATE	FRAME PROCESSING RATE	ELEVATION ACCURACY	BEARING ACCURACY	RANGE ESTIMATION ACCURACY

Multi-System Performance

With multi-sensor configurations, at least one system will see the side of the intruder aircraft, as opposed to head-on. This provides a longer detection range than single sensor deployments.

360°

	AV. Declaration Range	Max Declaration Range
SMALL PLANE (e.g. Cessna 182F)	11422m	16382m
HELICOPTER (e.g. Schweizer 269C)	15260m	16749m

100%	10Hz	±0.5 DEGREES	±0.5 DEGREES	±3.97%
DETECTION RATE	FRAME PROCESSING RATE	ELEVATION ACCURACY	BEARING ACCURACY	RANGE ESTIMATION ACCURACY

Operational Limitations

Casia G must only be operated within the following limitations. In addition, pre-flight checks must be performed before flight, as specified in the Casia G User Guide.

Note when transition occurs at sunset and sunrise there may be increased false positives (and potentially decreased range) until the environment is sufficiently dark or illuminated.

*Ambient Termperature	**-10℃ to 50℃**
*Ambient Humidity	**85℃ / 85% RH, 168 hours**
Precipitation	**Nil**
Cloud Coverage	**Okta 0-8**

Day Mode

Performance will reduce below that specificied above when visibility decreases, as shown in the table below:

	Small Plane		Helicopter	
Visibility	**Average Declaration Range**	**Detection Rate**	**Average Declaration Range**	**Detection Rate**
>= 10miles	2089m	98.6%	1908m	98.9%
5 miles	2030m	98.6%	1854m	98.9%
3 miles	1978m	98.6%	1807m	98.9%
1 mile	1693m	98.6%	1547m	98.9%

Quality & Compliance

Designed, manufactured and hand assembled in the USA.

Tested by uAvionix for environmental and electrical ruggedness with over 3,000 hours with no operational issues.

FC IC 🗑

Mounting Options

Tripod Mount Assembly

Casia G Module on tripod mount.

The Casia G shown opposite is on a tripod mount, which is typically used for temporary installations.

The mount fastens onto the bottom of the Casia G using M6x8 Button Head bolts.

The mount then screws onto a 5/8"-11 bold of a tripod or telescopic mount.

The mount is shown in detail in the diagram below.
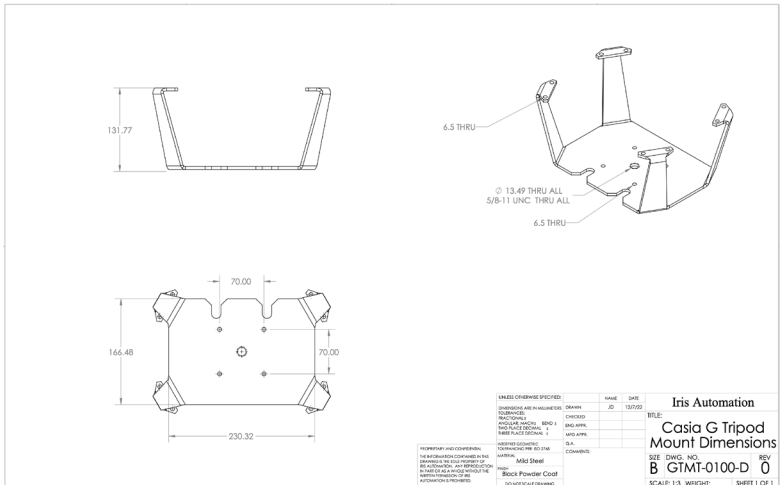
Casia G Tripod Mount

Mast Top Mount Assembly

This mount is for permanently mounting Casia on top of a riser pole. It leverages the tripod mount with an additional bracket. In this setup, hardware provided by uAvionix can be used to fix the Casia hardware and power supply to the pole with premade mounting brackets.

A 2-4" diameter mast is required to accommodate the mounting bracket. For most applications, it is recommended that a galvanized steel pipe be used to ensure rigidity and corrosion resistance. The mast should be securely anchored at its base and as far up the length of that mast as possible.
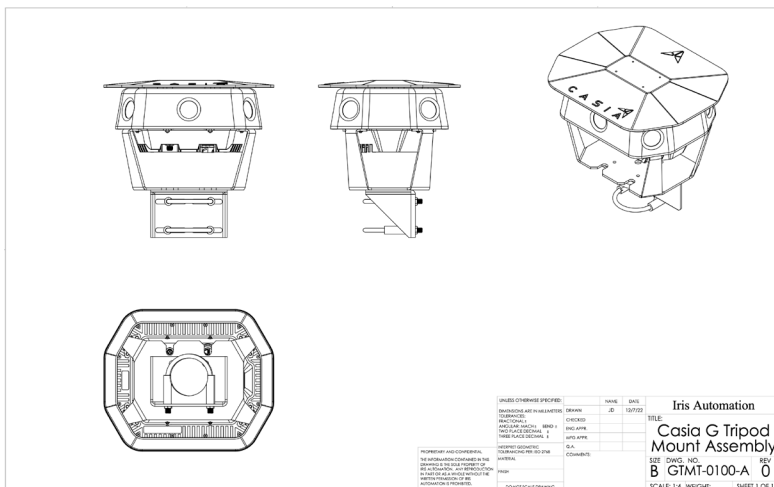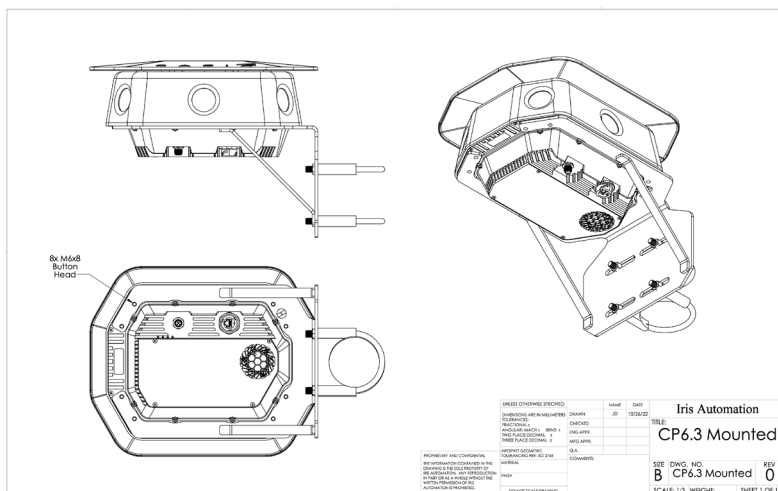

Casia G Module on Mast Top Mount

Mast Side Mount Assembly

This mount is for permanently mounting Casia at an elevated point, part way up a riser pole. In this setup, hardware provided by uAvionix can be used to fix the Casia hardware and power supply to the pole with premade mounting brackets.

A 2-4" diameter mast is required (must be less than 5" or field of view of system will be occluded) to accommodate the mounting bracket provided with the Casia G system. For most applications, it is recommended that a galvanized steel pipe be used to ensure rigidity and corrosion resistance. The mast should be securely anchored at its base and as far up the length of that mast as possible.

Casia G Module on Mast Side Mount

Limitations and Disclaimers

Setup and maintenance of Casia G must be performed as per the Casia user guide to ensure that Casia performs optimally. Contact support@uavionix.com for assistance.

Incorrect installation can affect Casia performance:

- If the field of view of the camera is partially obscured - for example - by a building, pole, tree, or any other object including bugs and water droplets, Casia will not detect as specified.

uAvionix leverages artificial intelligence and machine learning to ensure Casia 'learns' to correctly interpret its environment. Casia has been trained to identify small piloted aircraft and helicopters, and is designed for use in low risk airspace, some distance away from airports. The performance and limitations of the Casia system should be understood by the pilot in command before using Casia G as part of a layered air risk mitigation approach.

- If Casia has not been 'trained' in an environment similar to yours, performance - including the frequency of false positives - may vary from that specified.

- Casia has been optimized for low risk airspace, away from airports. If Casia 'sees' larger aircraft (e.g. Boeing 747) several miles away, it may report a smaller aircraft at a closer range.

- Casia was not trained to detect powered parachutes, balloons, large planes/jets, other aircraft or other objects. This should be considered by the operator when evaluating air risk.

- Casia may not detect every aircraft in all environments under all circumstances, and may not detect all intruders early enough for an avoidance maneuver to be successfully performed. This must be considered during air risk assessment.

- The time taken for Casia to detect uncooperative piloted aircraft can vary due to environmental conditions, distance, aircraft size, clutter, smoke, and other factors.

- Depending on the performance (turn radius, cruising speed, ascent/descent rates, acceleration/ deceleration rate) of your UAS, the time taken to avoid a detected intruder aircraft will vary. This must be considered during air risk assessment.

- Casia G does not detect static objects.

The specified Casia performance was based on actual encounters with piloted aircraft intruding from above the skyline. Performance below the skyline is still being assessed and should therefore be presumed to be significantly lower.

Reliability / average uptime of the Casia System is under evaluation.

Your Casia system should be replaced following a heavy impact, or should be returned to uAvionix for evaluation and repair.

If you believe Casia may not be performing correctly, it should NOT be used and support@uavionix.com should be contacted for guidance.

For regulatory guidance, please contact sales@uavionix.com.

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