SkyLine Airborne Radio System (ARS) User and Installation Manual

Revision D

UAV-1006972-001
Revision D

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5 Warranty

Uncertified uAvionix products are warranted to be free from defects in material and workmanship for two years from purchase.

Certified uAvionix products are warranted to be free from defects in material and workmanship for two years from purchase.

For the duration of the warranty period, uAvionix, at its sole option, will repair or replace any product which fails under normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost.

This warranty does not apply to cosmetic damage, consumable parts, damage caused by accident, abuse, misuse, improper installation, water, fire or flood, damage caused by unauthorized servicing, or product that has been modified or altered.

IN NO EVENT, SHALL UAVIONIX BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE OF, MISUSE OF, OR INABILITY TO USE THE PRODUCT OR FROM DEFECTS IN THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

Warranty repair service shall be provided directly by uAvionix.

6 Revision History

Revision	Date	Comments
A		Initial Release
B	05/15/2025	Updated product images. Added muLTElink wiring in appendix.
C	09/18/2025	On page 17 and 19 fixed error to change “non-CPNC” to “CPNC.”
D	09/30/2025	Added link switching logic.

7 Regulatory Statements Regarding Frequency Authorization

Please see uAvionix CNPC Frequency Authorization ISM and C-Band Considerations (UAV-1006986-001) for a full explanation of the frequency authorizations required for Industrial, Scientific, and Medical (ISM) frequency bands, LTE frequency bands, and aviation protected C-Band frequency bands.

7.1 Industrial, Scientific, & Medical (ISM) Frequencies

This section is applicable to products using the 902-928 MHz frequency range, including SkyLink915, SkyLink915micro and muLTElink915.

7.1.1 Federal Communications Commission (FCC) Statement

FCC ID: 2AFFTC2XISM

This device meets the FCC requirements for RF exposure in public or uncontrolled environments.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

7.1.2 Industry Canada (IC) Statement

IC ID: 25261-C2XISM

In order to comply with FCC / ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

Afin de se conformer aux exigences d'exposition RF FCC / ISED, cet appareil doit être installé pour fournir au moins 20 cm de séparation du corps humain en tout temps.

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1) l'appareil ne doit pas produire de brouillage;

2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement."

7.2 Aviation Protected C-Band (5030-5090MHz)

This section is applicable to products using the 5030-5090 MHz frequency range, including SkyLink5060, SkyLink5060micro, and muLTElink5060.

7.2.1 Federal Communications Commission (FCC) Statement

The following required statement from the Federal Communications Commission (FCC) statement is applicable to ARS and GRS products using aviation protected C-Band frequencies only, and applies to United States based entities with the exception of direct sales to the U.S. Government and units directly exported by uAvionix:

This device has not been authorized as required by the rules of the Federal Communications Commission. This device is not offered for sale or lease until authorization is obtained, with the exception of organizations that are developing software to use it or evaluating it with the intention of incorporating it in a product. Before powering the device, an experimental FCC license (with prior FAA concurrence) is required. Once integration or evaluation is completed, the device should be returned to uAvionix or rendered unusable.

7.3 LTE

This section is applicable to products using LTE frequency range, including muLTEink5060 and muLTElink915.

The cellular service that is part of muLTElink is provided by an international MVNO (Mobile Virtual Network Operator) that has global coverage and is already pre-activated before shipping. All bandwidth costs associated with cellular data usage are included with the SkyLine service; there is no additional payment necessary regardless of the number of flight hours performed. In most countries the cellular service will use LTE Cat 1 for increased reliability and when not available in some parts of the world it will

fall back to 3G/2G/EDGE as necessary. When multiple mobile carriers are detected as available, the one with the strongest signal strength and number of towers visible will be selected. In the US all major and most smaller carriers are supported with the exception of Verizon. While cellular service is widely available at and below 400ft AGL, it often becomes significantly less reliable at altitudes above that due to cellular towers optimizing their antennas for ground-based usage.

8 Introduction to CNPC

Control and Non-Payload Communications (CNPC) link systems are unique to Uncrewed Aircraft Systems (UAS). CNPC links provide Command and Control (C2) functionality for a UAS and specifically exclude payload data that does not serve the CNPC function. CNPC solutions sometimes use aviation protected frequencies which are protected by international and national law and require frequency authorizations to be obtained from local regulatory authorities. The words "Non-Payload Communications" includes the CNPC Link System supporting remote pilot-to/from-ATC (Air Traffic Control) voice communications, also referred to as ATC relay.

Payload communications specifically include communications associated with the Uncrewed Aircraft (UA) mission payloads, which do not contain safety-of-flight information.[1] Therefore, payload communications do not require the use of aviation safety protected spectrum and are thus prohibited from using the CNPC link system. Some uAvionix products require specific regulatory frequency authorization. If your product requires this authorization, this will be identified in the specific product sections.

The performance of CNPC links is standardized and governed by RTCA and Federal Aviation Administration (FAA) Technical Standard Order (TSO) documentation. RTCA DO-362A provides the Minimum Operational Performance Specifications (MOPS) for terrestrial CNPC systems and defines much of the functionality for which uAvionix products have been designed. DO-362A compliant systems support UAS information exchanges that allow the remote pilot to safely control, monitor, and manage the UA while utilizing the C-Band spectrum allocation.

8.1 CNPC Link System Components

A CNPC link system consists of the following:

1. CNPC link Airborne Radio System (ARS) consisting of:
    a. CNPC link system airborne radio(s)
    b. One or more CNPC link system airborne antennas
    c. Associated cabling connecting the radio(s) and antenna(s)
2. CNPC link Ground Radio System (GRS) – to include fixed or mobile installations of

[1] Safety-of-flight information is any information/data sent to or received from the UA that is necessary to ensure the UAS is operated/operating in a manner that protects people and/or property from harm due to unintentional events.

a. CNPC link system ground radio(s)
b. One or more CNPC link system ground-based antenna(s)
c. Associated cabling connecting the radio(s) and antenna(s)

NOTE: This document describes the installation and implementation of the uAvionix ARS systems. The GRS installation and implementation is covered in the uAvionix GRS Installation Manual (UAV-1006973-001).

Figure 1 illustrates the RTCA DO-362A representation of a CNPC link system.

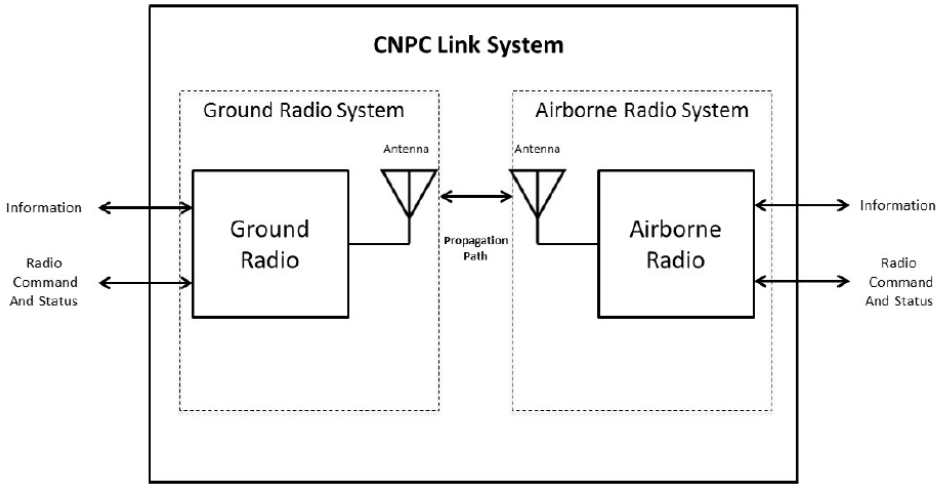


Figure 1: RTCA DO-362A illustration of CNPC link system components

Note: For the remainder of this document, CNPC and "Command and Control" (C2) may be used interchangeably.

9 Introduction to uAvionix SkyLine and SkyLink ARS Solutions

IMPORTANT: SkyLine leverages uAvionix radios and software for seamless mission operation and monitoring. To accompany this ARS User and Installation manual, reference the SkyLine User and Installation Gude (UAV-1005905-001) and the SkyLine GRS Installation Manual (UAV-1006973001).

uAvionix CNPC solutions are managed through a software/services solution called SkyLine™. SkyLine is what is known by RTCA DO-377A[2] as a C2 link Communications Service Provider (C2CSP) platform.

SkyLine is a cloud-based solution which communicates in real-time to all components of the CNPC link system (including all ARS and GRS) and provides real-time telemetry, health and status, and radio performance statistics to a remote pilot in command (RPIC), flight crew, or other operations personnel. SkyLine has many additional features including data storage, detect and avoid (DAA), and frequency allocation management (FAM) which are covered elsewhere in SkyLine specific documentation (UAV-1005905-001). Features of SkyLine in this document cover only the interaction associated with ARS installation and configuration. SkyLine is available as an application/service from uAvionix or as an API for integration into Uncrewed Traffic Management (UTM) or Ground Control Station (GCS) platforms.

When SkyLine is used with multiple GRS, SkyLine manages make-before-break (MBB) functionality to allow roaming of a single ARS from one GRS to another in a safety-case compliant manner. Learn about link switching and roaming (ground) logic in the SkyLine Ground Radio System (GRS) User and Installation Manual.

Below, a typical system with a SkyLink Ground Radio System (GRS) and a SkyLink Airborne Radio System (ARS) managed by uAvionix SkyLine infrastructure is shown.

[2] Minimum Aviation System Performance Standards (MASPS) for C2 Link Systems Supporting Operations of Unmanned Aircraft Systems in U.S. Airspace

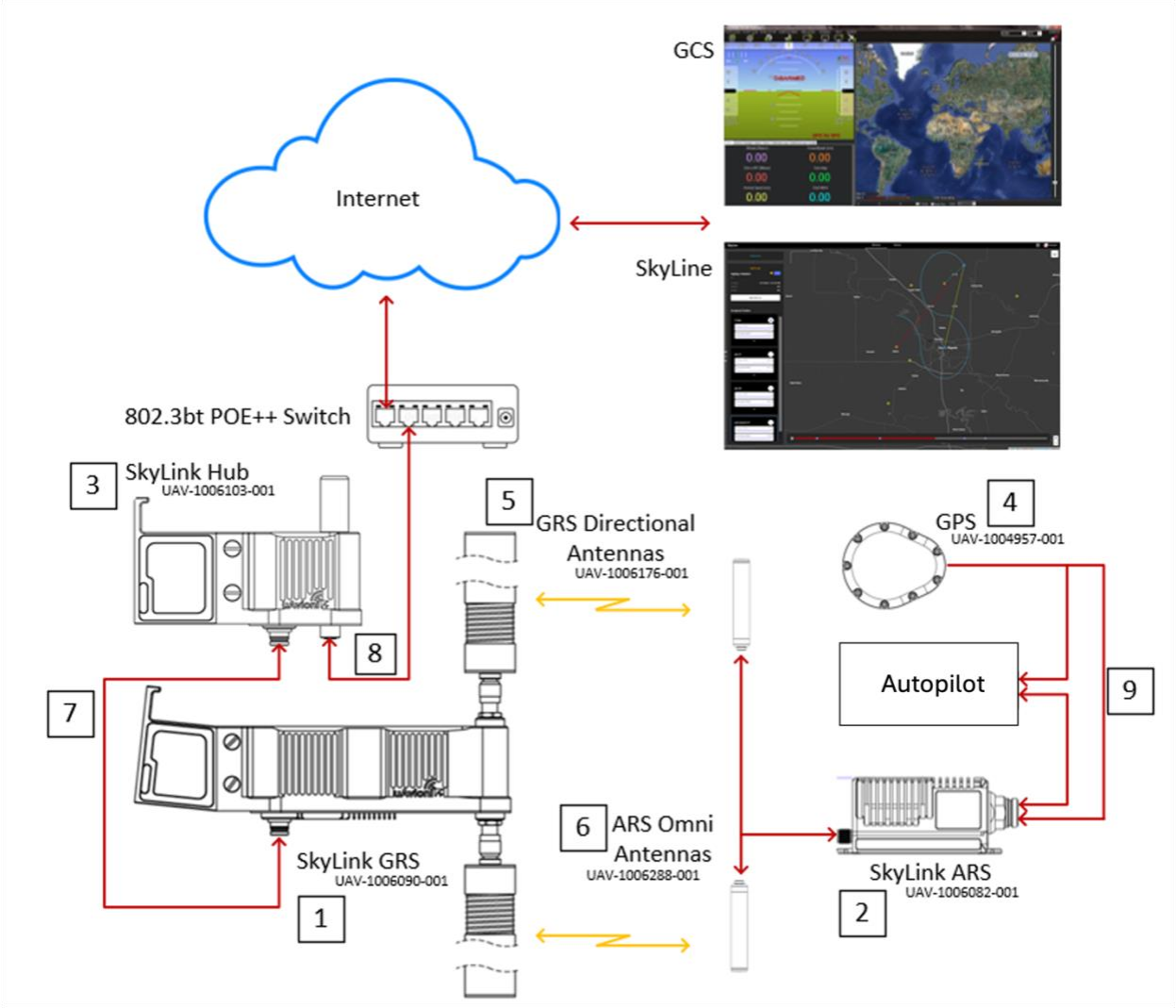


Figure 2: SkyLink Radios with SkyLine Infrastructure

The use of SkyLine is required for configuration and setup of uAvionix ARS and GRS.

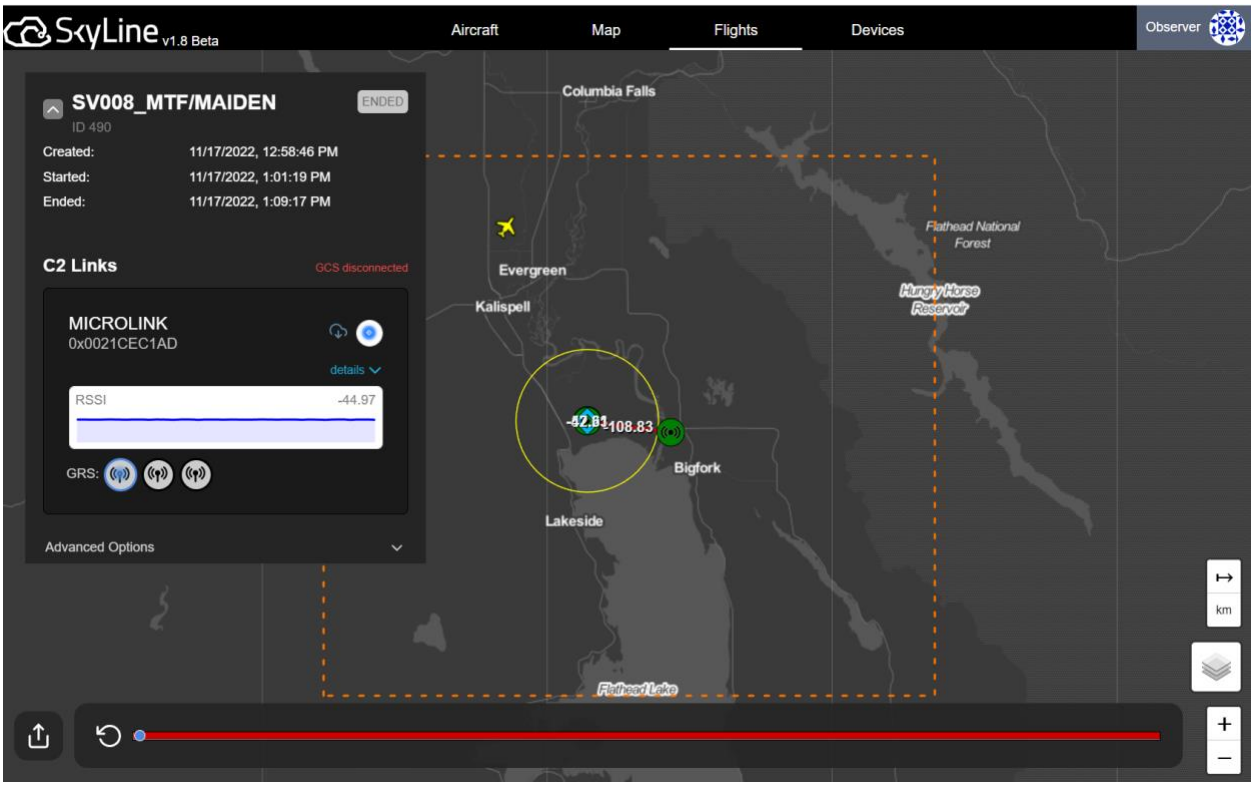


Figure 3: SkyLine User Interface

9.1 ARS Solutions

uAvionix offers multiple ARS options depending on customer needs. Some factors for determining which ARS is selected include frequencies used, frequency authorizations required, size, weight, and power consumption (SWaP) required by the UA, autopilot integration/compatibility, altitude or locations flown, and desired range.

Table 1 provides a comparison matrix between ARS models to aid in product selection.Figure 1

ARS	ISM	C Band	LTE	Size (mm)	Weight (g)	DC Power	Transmit Power
SkyLink915	X			55x46x23	73	1W	1W
SkyLink915micro	X			31x20x10	9	1W	1W
SkyLink5060		X		77x64x51	134	20W	10W
SkyLink5060micro		X		57x43x36	40	1W	0.1W
muLTELink915	X		X	71x51x13	60	2W	1W

mulTELink5060		X	X	71x51x18	70	2W	0.1W

Table 1: ARS Comparison Matrix

The following paragraphs provide a high-level overview of each ARS option. Further ARS specs are available in the appendices.

9.1.1 ISM and ISM+LTE ARS

9.1.1.1 SkyLink915micro (ISM)

Previously known as “microLink”, SkyLink915micro is an FCC and IC approved, aviation grade, Beyond Visual Line of Sight (BVLOS) C2 datalink radio designed for long-range mission-critical UAS operations. SkyLink915micro is the lowest-SWaP option of all ARS. SkyLink915micro is a bi-directional, Multiple Input Single Output (MISO) architecture.

Figure 4: SkyLink9125micro

9.1.1.2 SkyLink915 (ISM)

Previously known as “microLink Pro”, SkyLink915 is an FCC and IC approved, aviation grade, Beyond Visual Line of Sight (BVLOS) C2 datalink radio designed for long-range mission-critical UAS operations. SkyLink915 is a bi-directional, Multiple Input Single Output (MISO) architecture.

Figure 5: SkyLink915

9.1.1.3 muLTElink915 (ISM+LTE)

muLTElink915 integrates the functionality of SkyLink915micro and LTE C2 into a single device. It is possible to integrate an additional external SkyLink5060 for 10W C-Band to obtain a 3-frequency capability or SkyLink915micro/SkyLink915 to obtain additional redundancy.

A 4-frequency capability can be achieved by adding an additional radio – such as SATCOM or 5G SA hotspot. Assuming low latency and high bandwidth, this radio – in addition to CPNC – can provide data and control for a camera or other payload.

Figure 6: multeLink915

9.1.2 C Band and C Band+LTE ARS

9.1.2.1 SkyLink5060micro

SkyLink5060micro is a 100 mW bi-directional, Multiple Input Single Output (MISO) dual CNPC ARS, operating on aviation-protected C-Band. C-Band operations require a license from the frequency regulator. SkyLink5060micro is the lowest-SWaP C-Band ARS option.

Figure 7: SkyLink5060micro

9.1.2.2 SkyLink5060

SkyLink5060 is a 10 W bi-directional, Multiple Input Single Output (MISO) dual CNPC ARS, operating on aviation-protected C-Band. C-Band operations require a license from the frequency regulator. SkyLink5060 is the best C-Band ARS selection for Group 4-5 UAS.

Figure 8: SkyLink5060

9.1.2.3 muLTElink5060

muLTElink5060 integrates the functionality of SkyLink5060micro and LTE C2 into a single device. It is possible to integrate an additional external SkyLink915micro or SkyLink915 to obtain a 3-frequency capability.

A 4-frequency capability can be achieved by adding an additional radio – such as SATCOM or 5G SA hotspot. Assuming low latency and high bandwidth, this radio – in addition to CNPC– can provide data and control for a camera or other payload. See the appendix for further information.

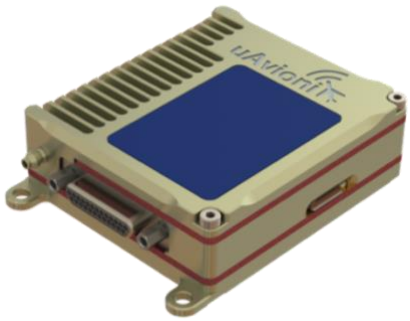


Figure 9: muLTElink5060

10 Installation

SkyLink ARS radios connect to an autopilot via a transparent TTL/RS232 serial interface. They are plug and play with any autopilot system and GCS. A GPS input is required for proper timing of frequency hopping and transmission of messages. General information is provided in this section, follow the installation specifications later in this document for specific power, antenna and wiring information.

10.1 ARS Physical Installation

Install the ARS in the airframe in a location that allows easy access to the autopilot and minimal RF coax length for antenna installation. Longer coax lengths result in greater signal loss and translates to loss in range.

10.2 Antenna installation

Each ARS includes up to two omnidirectional antennas for each frequency. Each muLTElink model includes up to three antennas, one omnidirectional antenna for LTE, and one or two omnidirectional antennas for the base frequency.

Install the antennas on the airframe in a location that reduces shadowing and interference between the ARS antenna and the GRS. For systems with two antennas for each frequency, install each antenna on opposite sides of the airframe. Refrain from installing the antennas near other antennas or other electronic equipment already on the airframe to reduce electromagnetic emissions interference (EMI). Antennas should be mounted in a vertical orientation.

10.3 GPS installation

The truFYX GPS needs to be installed on top of the airframe in a location that reduces shadowing and allows a clear view of the sky.

10.4 Configuration

Configuration requires registering the ARS and GRS with SkyLine and configuring your autopilot and GRS to communicate to the ARS and GRS respectively.

10.5 ARS Skyline Registration

MuLTElink devices automatically register, so no registration steps need be followed.

Non-muLTElink ARS devices will be registered by uAvionix prior to shipment. If assistance is needed in this regard, please log a ticket for assistance at uAvionix.com/support.

10.6 SkyLine ARS Registration Steps

STEP	ACTION	DATA SOURCE
1	Type the URL into your browser	QuickStart Card
2	Select the Devices tab	
3	Click +	
4	Enter a Name for your SkyLine ARS	
5	Enter the ARS RadioID	ARS Label
6	SkyLink5060 and muLTElink5060 only	Authorized C-Band Frequency in Hz
7	Click SAVE	

Table 2: ARS Registration Steps

10.7 Autopilot Configuration

10.7.1 Mission Planner / Ardupilot

The following parameters need to be configured for Ardupilot aircraft when using the uAvionix Airborne Radio System, ARS. The desired serial port will need configured with the values shown below. The examples below show the configuration for an ARS connected to TELEM1 or TELEM2.

NOTE: A Power Cycle / Reboot is required after changing any of the parameters.

Function	Parameter	Value	Description
TELEM1	SERIAL1_BAUD	57	Baud rate = 57600
	SERIAL1_PROTOCOL	2	Protocol type MAVLink 2
	SR1_PARAMS	5	Stream rate in Hz for parameter exchange
	SERIAL1_OPTIONS	1024	Disable MAVLink message forwarding

Table 3: Ardupilot Autopilot Configuration Parameters for TELEM1

Function	Parameter	Value	Description
TELEM2	SERIAL2_BAUD	57	Baud rate = 57600
	SERIAL2_PROTOCOL	2	Protocol type MAVLink 2
	SR2_PARAMS	5	Stream rate in Hz for parameter exchange
	SERIAL2_OPTIONS	1024	Disable MAVLink message forwarding

Table 4: Ardupilot Autopilot Configuration Parameters for TELEM2

NOTE: For serial options, when you click on the value, it opens a separate window. Select “Don’t forward MAVLink to/from” and it will place 1024 in the Value field.

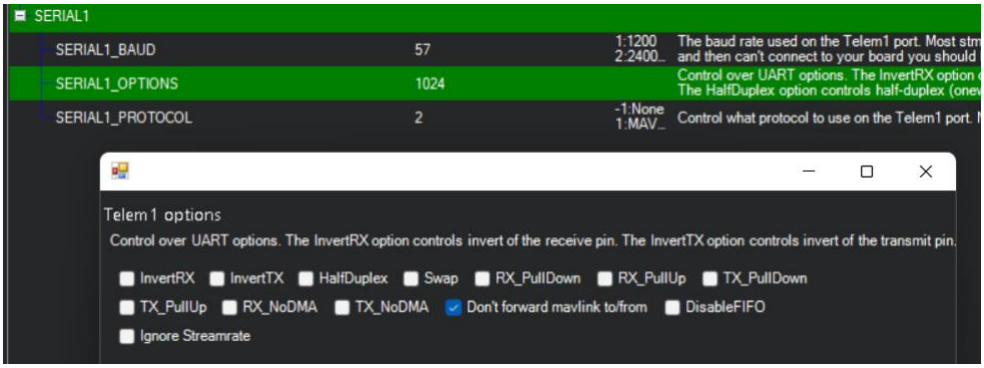


Figure 100: Autopilot Configuration for ARS

The following parameters need to be configured in mission planner when using truFYX as the primary GPS on GPS 2 (Serial 4)

Function	Parameter	Value	Description
GPS	GPS_AUTO_CONFIG	2	Enable GPS Auto Config
	GPS_SAVE_CONFIG	2	Enable GPS Save Config
	GPS_TYPE	5	GPS = NMEA
	SERIAL4_BAUD	115	Baud Rate = 115200
	SERIAL4_PROTOCOL	5	Serial 4 = GPS

Table 5: Mission Planner Parameters When Using truFYX GPS

10.7.2 Auterion / PX4

The following parameters are required for PX4 based aircraft when using the uAvionix ARS. The desired MAVLink stream instance should be directed to the desired serial port. The examples below show the configuration for configuring TELEM1 to utilize the MAVLink 1 instance protocol.

NOTE: A Power Cycle / Reboot is required after changing any of the parameters.

Function	Parameter	Value	Description
TELEM1	SER_TEL1_BAUD	57	TELEM 1 Baud rate 57600
	MAV_1_CONFIG	101	MAVLink Instance 1 destination TELEM1
	MAV_1_FORWARD	0	Disable MAVLink Instance 1 message forwarding
	MAV_1_MODE	0	MAVLink Instance 1 Mode to Normal.
	MAV_1_RATE	0	MAVLink Instance 1 rate 0

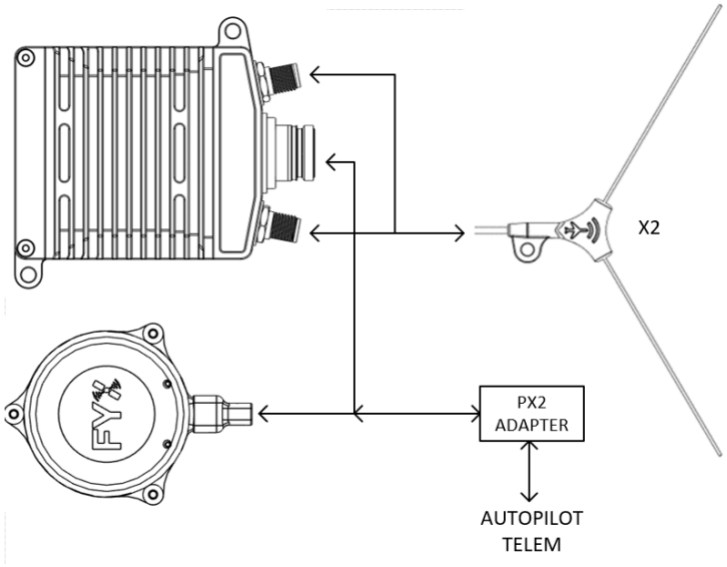
Table 6: PX4 Parameters When Using uAvionix ARS

10.8 SkyLink915 UAV-1005876-001

10.8.1 Kit Contents

Qty	Description	Part Number
2	Antenna SMA 915	UAV-1004675-008
1	Harness Cable SkyLink LEMO8	UAV-1006648-001
1	AdapterPro	UAV-1002875-001

- ISM band
- 1T2R Diversity
- 1W
- LEMO 8
- 9-31V



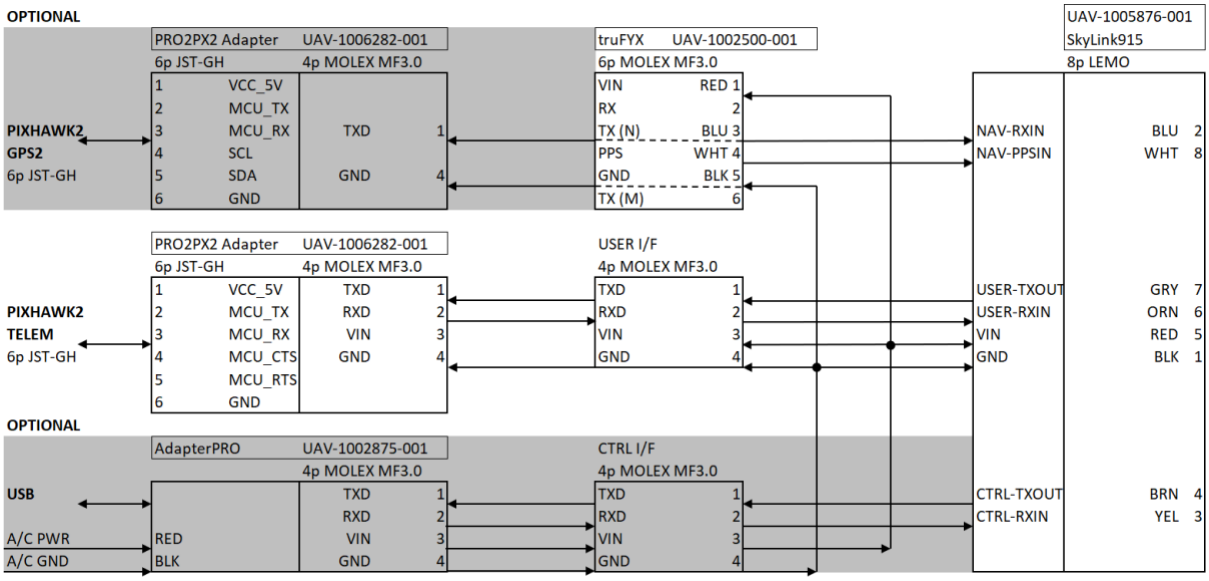


Figure 11: SkyLink915 Wiring Diagram

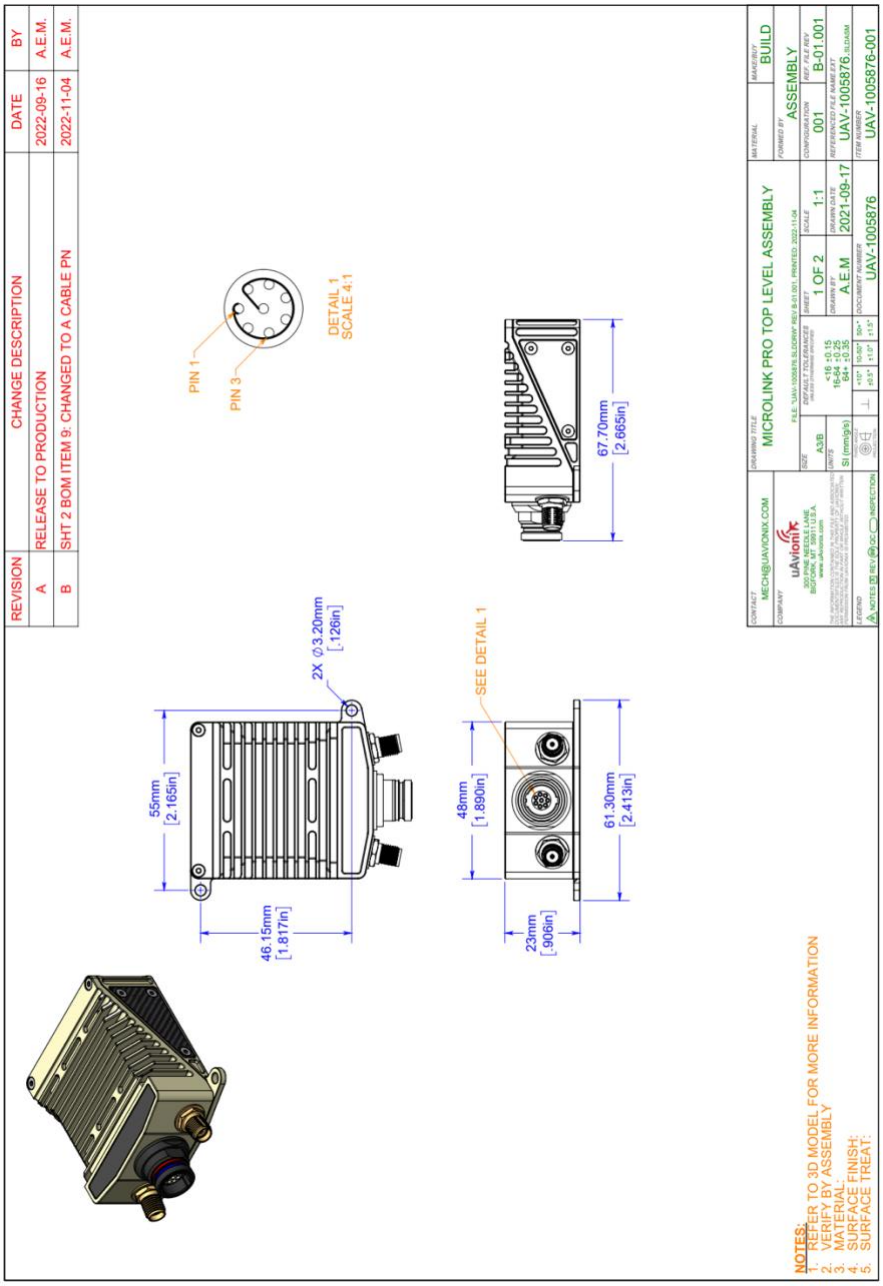


Figure 12: SkyLink915 Top Level Assembly

10.9 SkyLink915micro UAV-1002868-001

10.9.1 Kit Contents

Qty	Description	Part Number
2	Antenna 915 MMCX	UAV-1004675-008

- ISM band
- 1T2R Diversity
- 1W
- JST-GH
- 5V

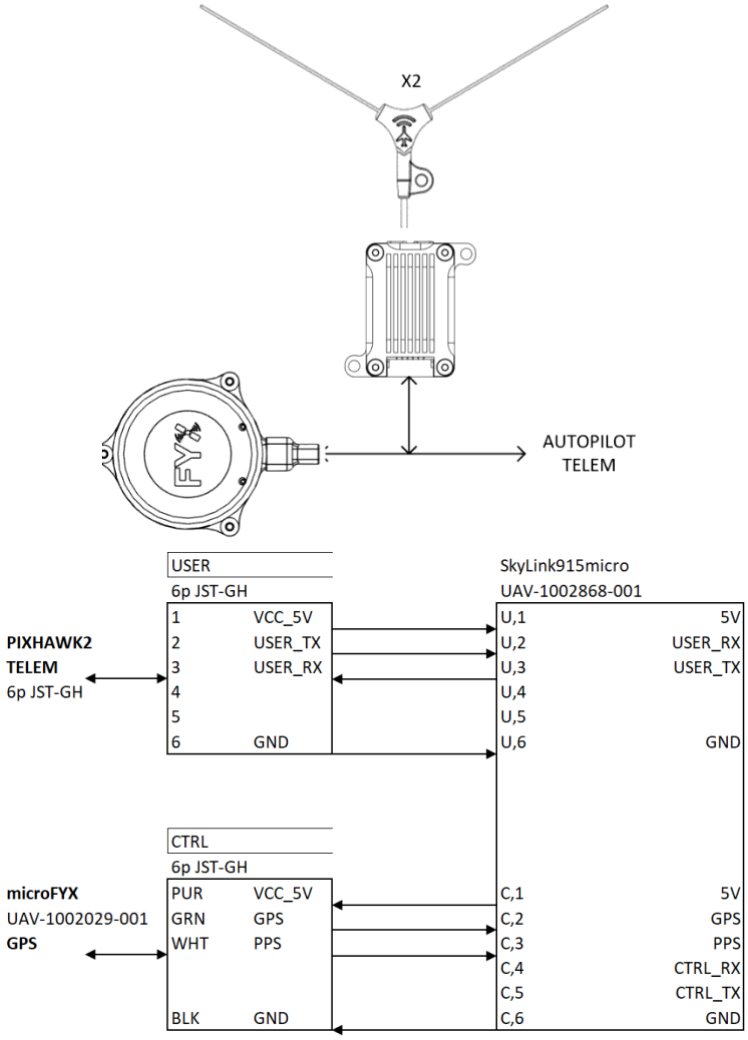


Figure 13: SkyLink915micro Wiring Diagram

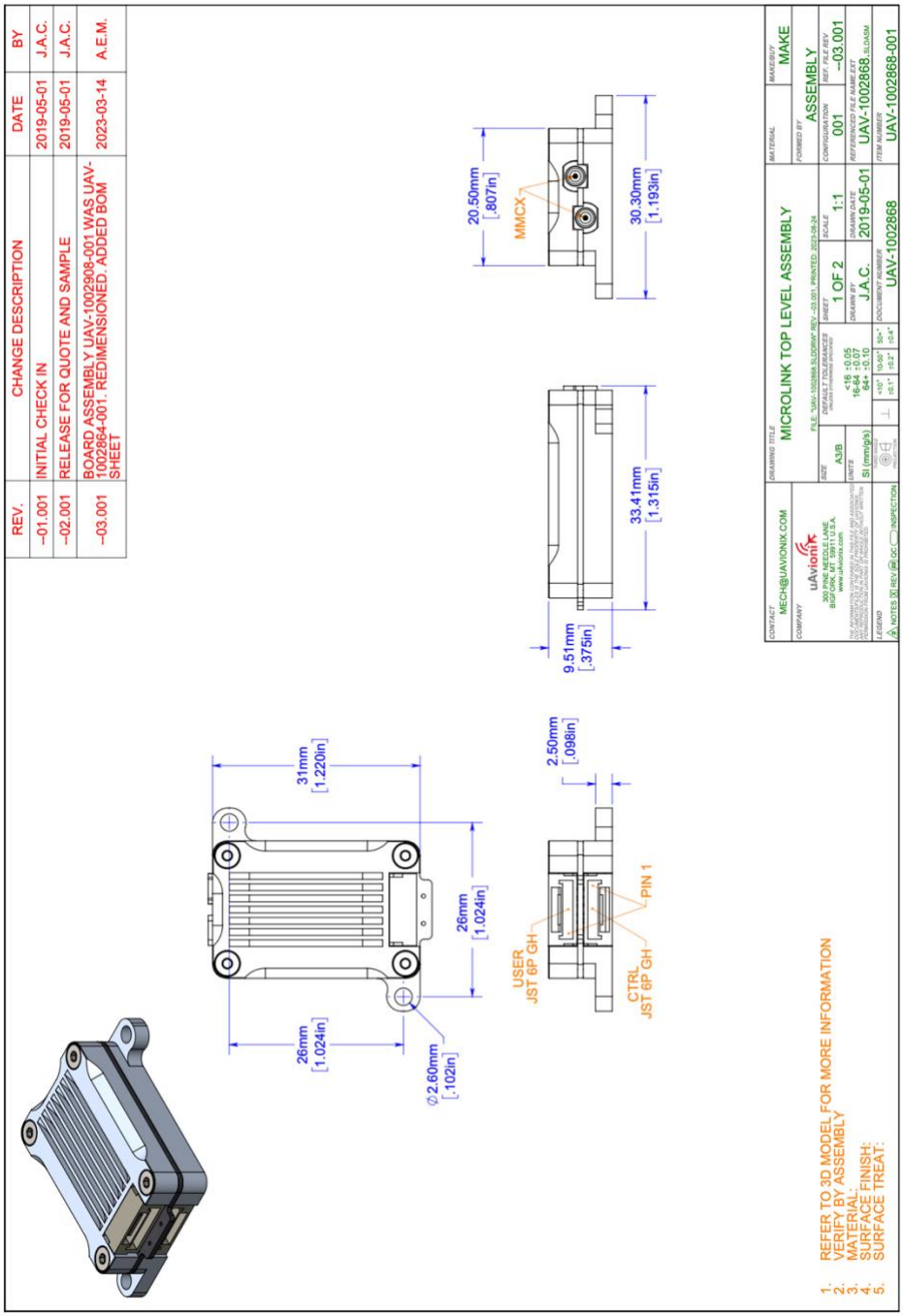


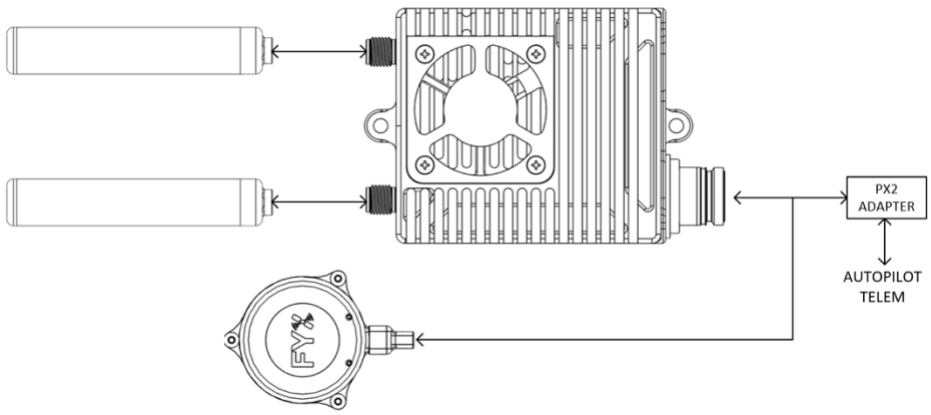
Figure 14: SkyLink915micro Top Level Assembly

10.10 SkyLink5060 UAV-1006082-001

10.10.1 Kit Contents

Qty	Description	Part Number
1	Cable RF SMA-SMA Long	UAV-1006858-002
1	Cable RF SMA-SMA Short	UAV-1006858-001
2	Antenna 5060 OMNI	UAV-1006288-001
1	Harness Cable SkyLink LEMO8	UAV-1006648-001
1	AdapterPro	UAV-1002875-001
1	Pro2PX2 Adapter	UAV-1006282-001

- C-Band band
- 1T2R Diversity
- 10W
- LEMO 8
- 24V



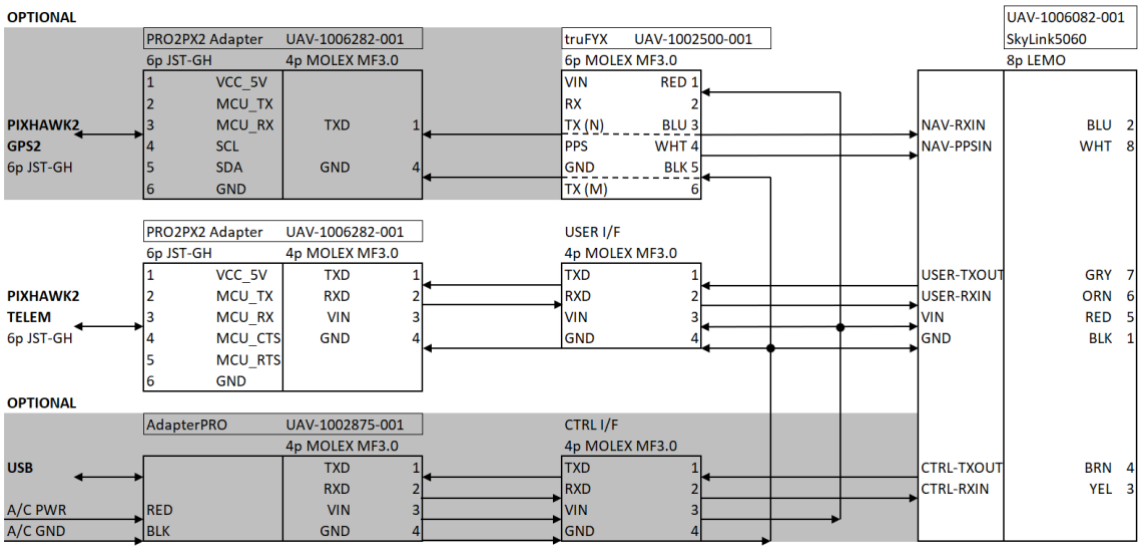


Figure 15: SkyLink5060 Wiring Diagram

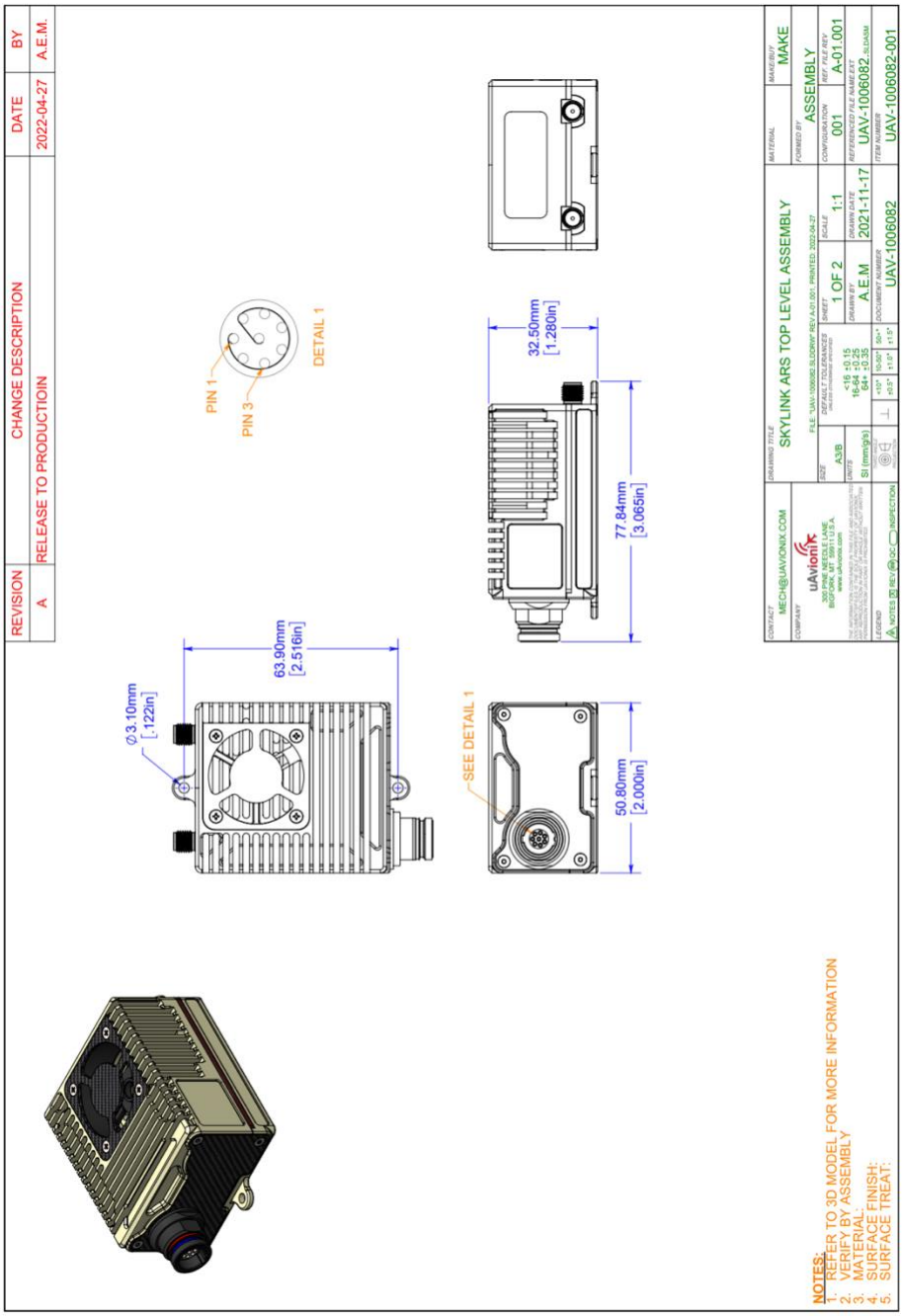


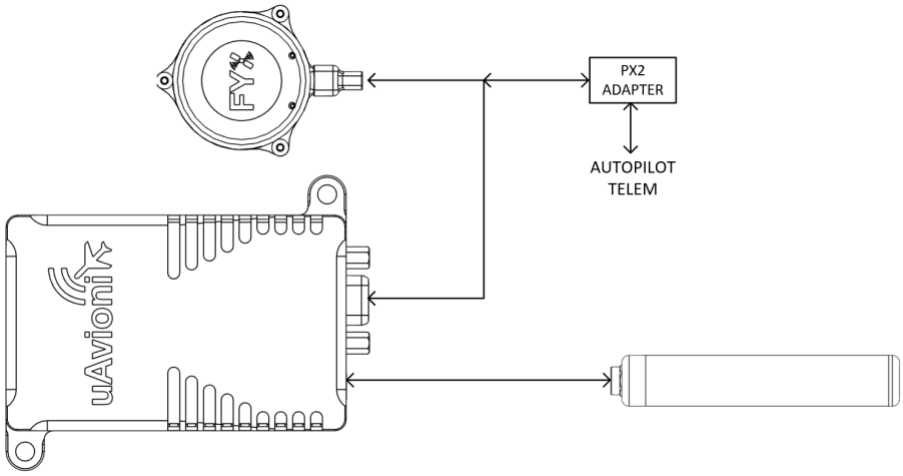
Figure 16: SkyLink5060 Top Level Assembly

10.11 SkyLink5060micro UAV-1006308-001

10.11.1 Kit Contents

Qty	Description	Part Number
1	Cable RF SMA-MMCX	UAV-1006932-001
1	Antenna 5060 OMNI SMA	UAV-1006288-001
1	Harness Cable SkyLink microDB9	UAV-1006985-001
1	AdapterPro	UAV-1002875-001

- C-Band band
- 1T1R
- 0.1W
- MicroDB9
- 9-31V



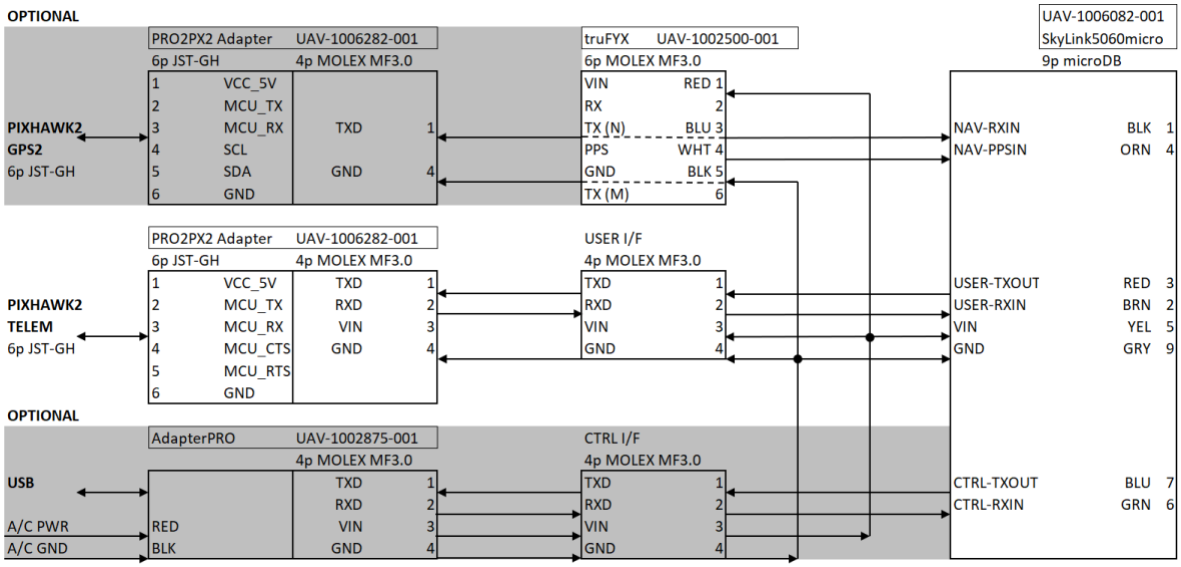


Figure 17: SkyLink5060micro Wiring Diagram

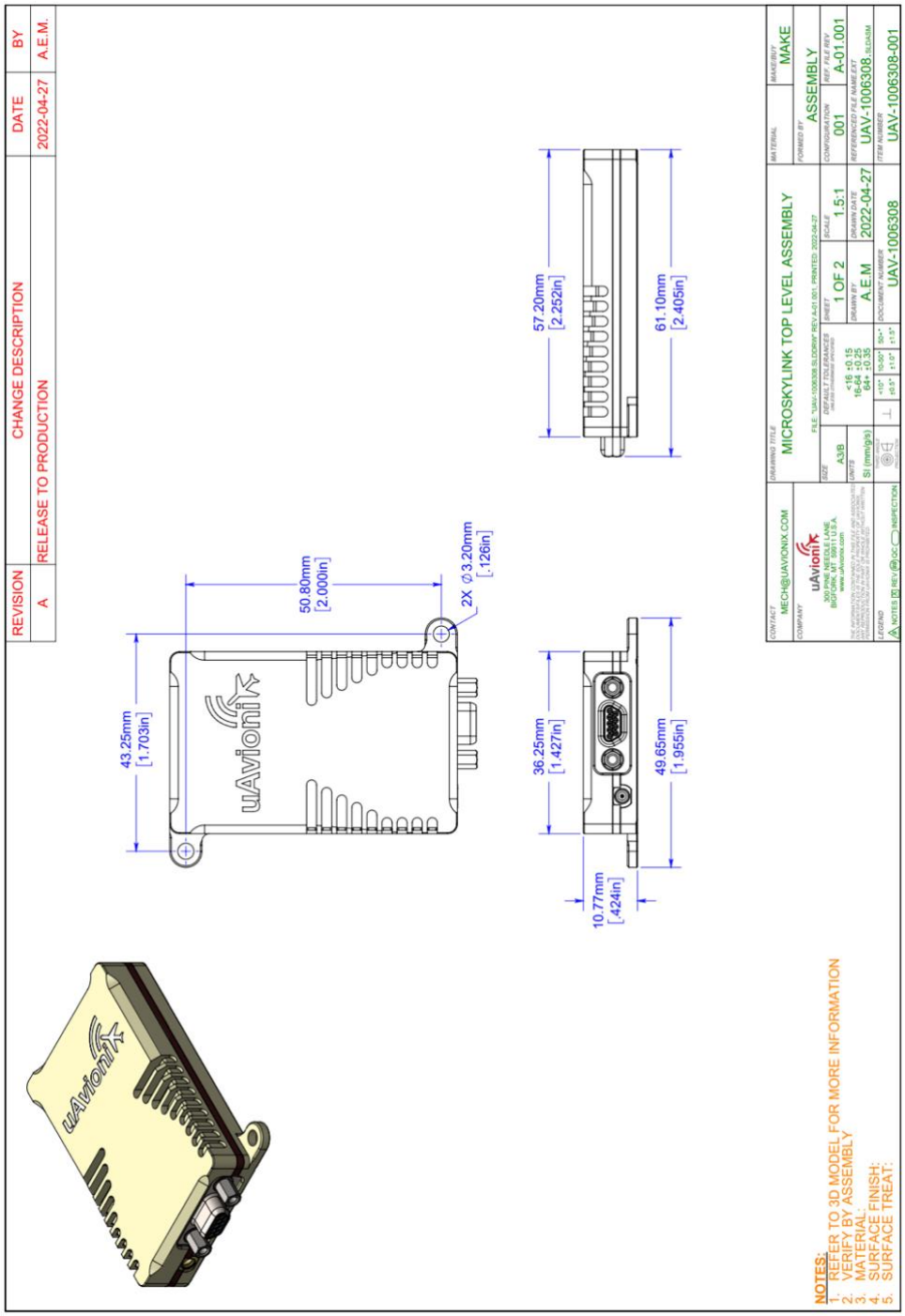


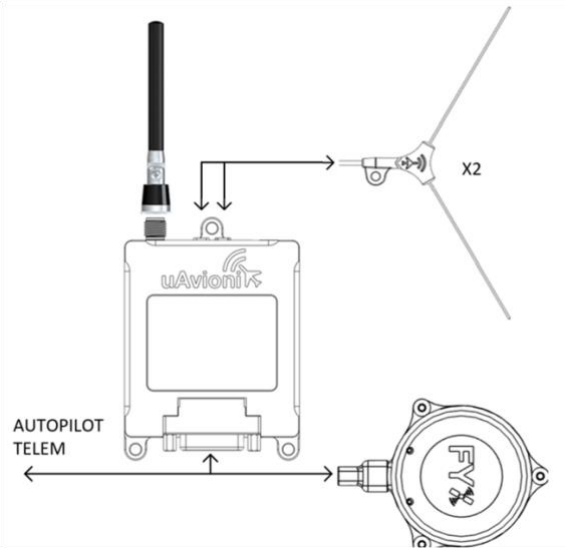
Figure 18: SkyLink5060micro Top Level Assembly

10.12 muLTElink915 UAV-1006657-001

10.12.1 Kit Contents

Qty	Description	Part Number
2	Antenna 915 MMCX	UAV-1005866-001
1	Antenna LTE SMA	UAV-1005802-001
1	Harness Cable muLTElink microDB25	UAV-1006984-001
1	Blue Robotics RJ45 Adapter Board	UAV-1006931-001

- LTE and ISM band
- 2X1T2R Diversity
- 1W
- MicroDB25
- 9-31V



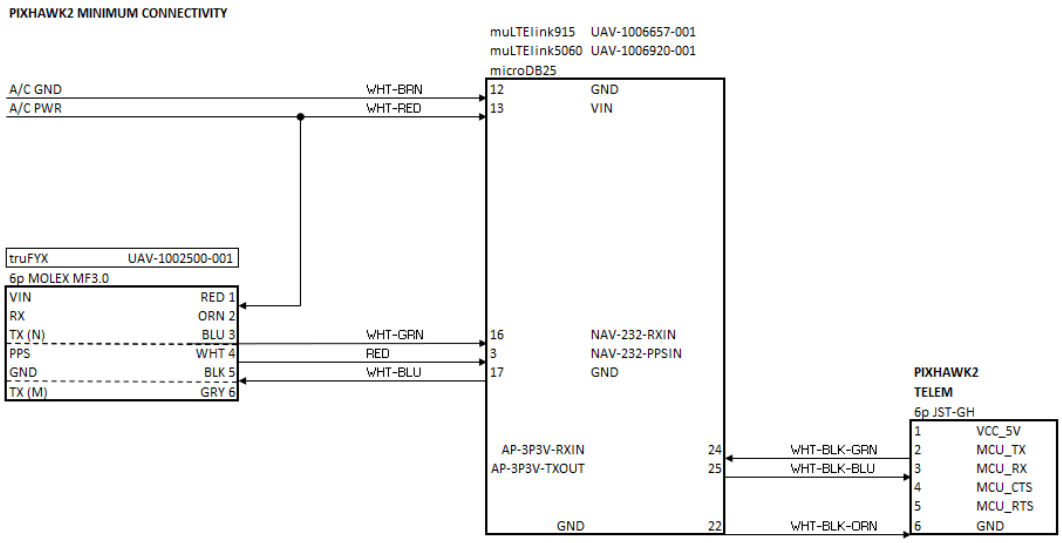


Figure 19: muLTElink915 Wiring Diagram

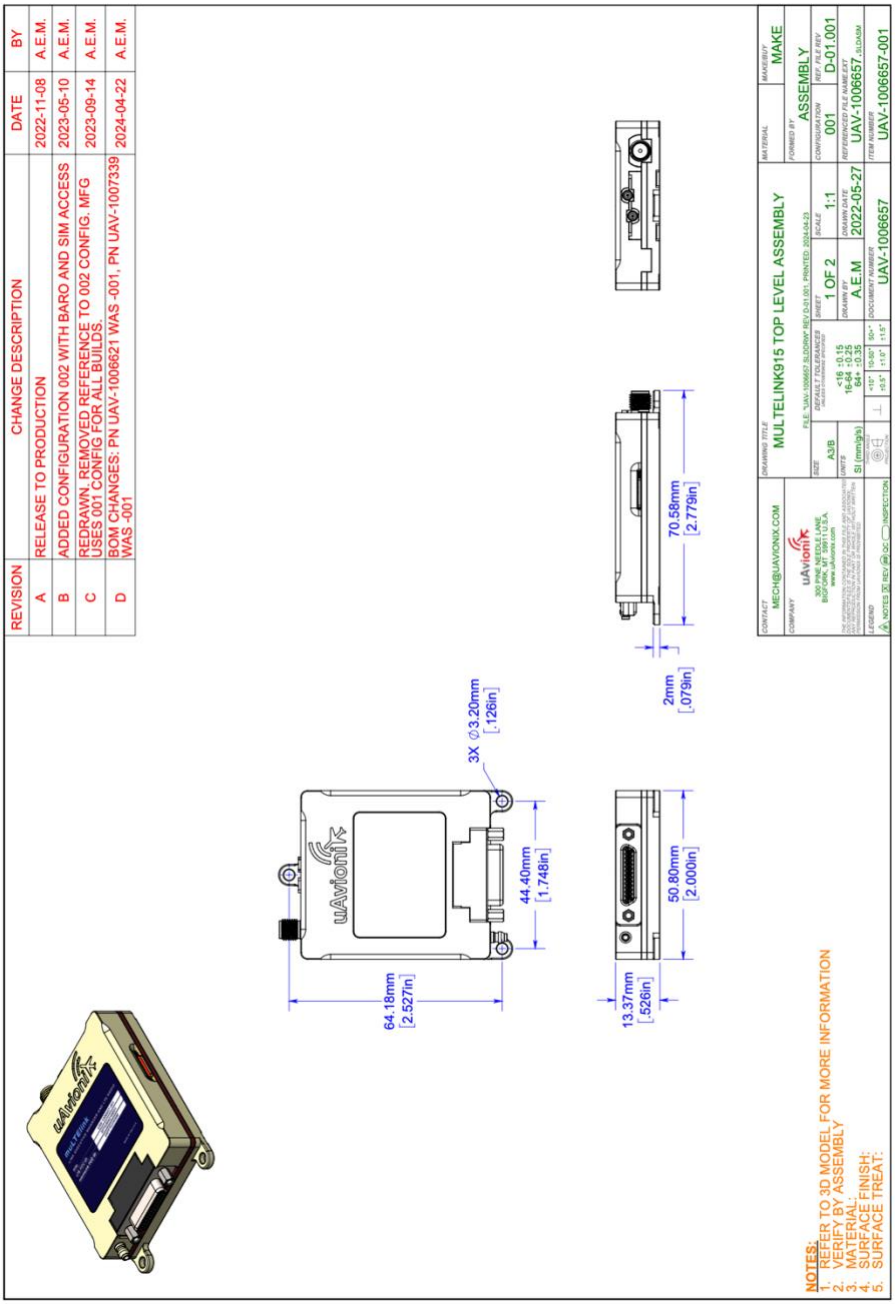


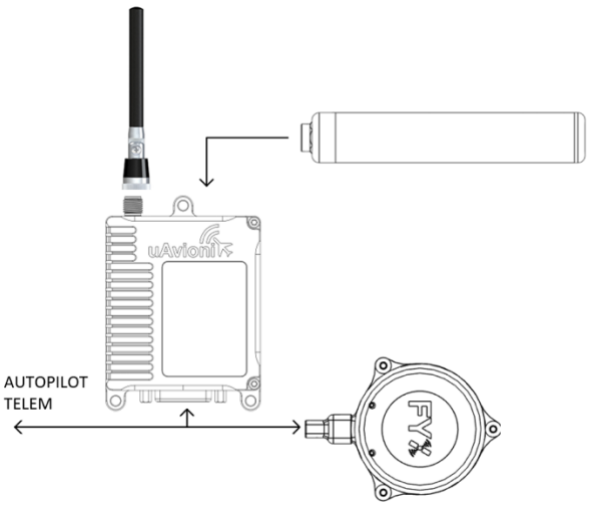
Figure 20: muLTElink915 Top Level Assembly

10.13 muLTElink5060 UAV-1006920-001

10.13.1 Kit Contents

Qty	Description	Part Number
1	Cable RF SMA-MMCX	UAV-1006932-001
1	Antenna 5060 SMA	UAV-1006288-001
1	Antenna LTE SMA	UAV-1005802-001
1	Harness Cable muLTElink microDB25	UAV-1006984-001
1	Blue Robotics RJ45 Adapter Board	UAV-1006931-001

- LTE and ISM band
- 2X1T2R Diversity
- 1W
- MicroDB25
- 9-31V



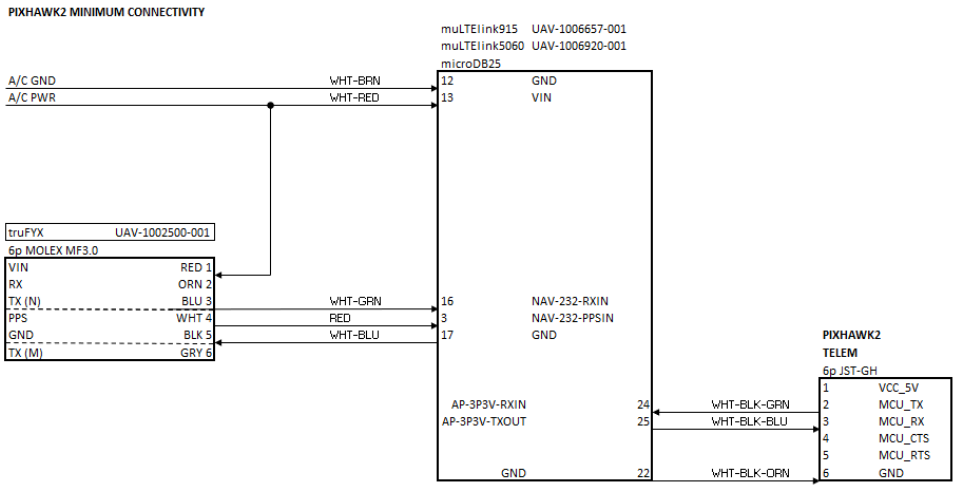


Figure 21: muLTElink5060 Wiring Diagram

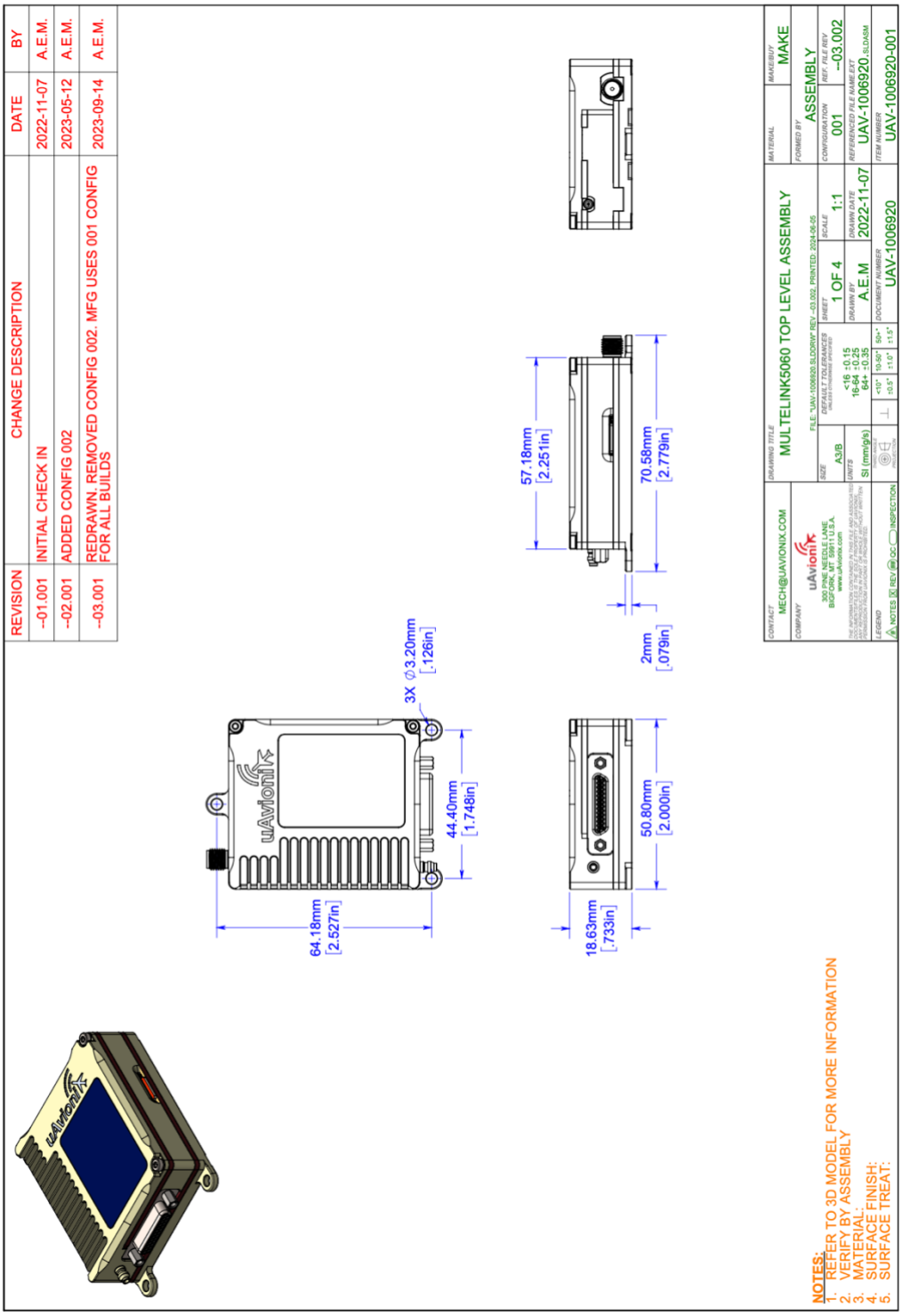


Figure 22: muLTElink5060 TOP Level Assembly

11 ARS Link Switching Logic

This section will be useful for UAS operators and engineers.

The ARS (Airborne Radio System) uses muLTElink Link Executive Manager (LEM) to manage which communication path the aircraft uses as its **primary receive link**.

11.1 How it Works

- **Primary signal**: 1-second rolling average of incoming user data rate to judge link health.
- **Evaluation cadence**: Runs every 1 second.
- **Confirmation cycles**: Switch decisions require confirmation across multiple 1-second cycles (~2–3s effective delay).
- **Disqualification threshold**: About 1.5s for a radio link to be disqualified.
- **Hysteresis**: Built-in safeguards against flapping; includes “double-hysteresis” in worst-case transitions.
- **Active link criteria**: A link is considered active if rxBytesPerSec > 0 on the user data channel.
- **Prioritization**: When the current active link becomes inactive, chooses an active link with the highest rolling average (if multiple).

11.2 Decision & Timing Behavior

- **Observed switch latency**: ~4s max in momentary dropouts.
- **Worst-case behavior**: Practical timeout guidance of ~10s used by operators, even though disqualification + hysteresis nominally ~2–4s.

11.3 Operational Notes

- **Failsafe sensitivity**: A GCS failsafe set to <5s may trigger before muLTElink can switch; ~10s recommended.
- **Manual link disabling**: Not supported in SkyLine software; customers disable radios/antennas physically for tests.

12 Support

For support visit uavionix.com/support

13 Appendix

13.1 MuLTElink Radio Wiring Diagram

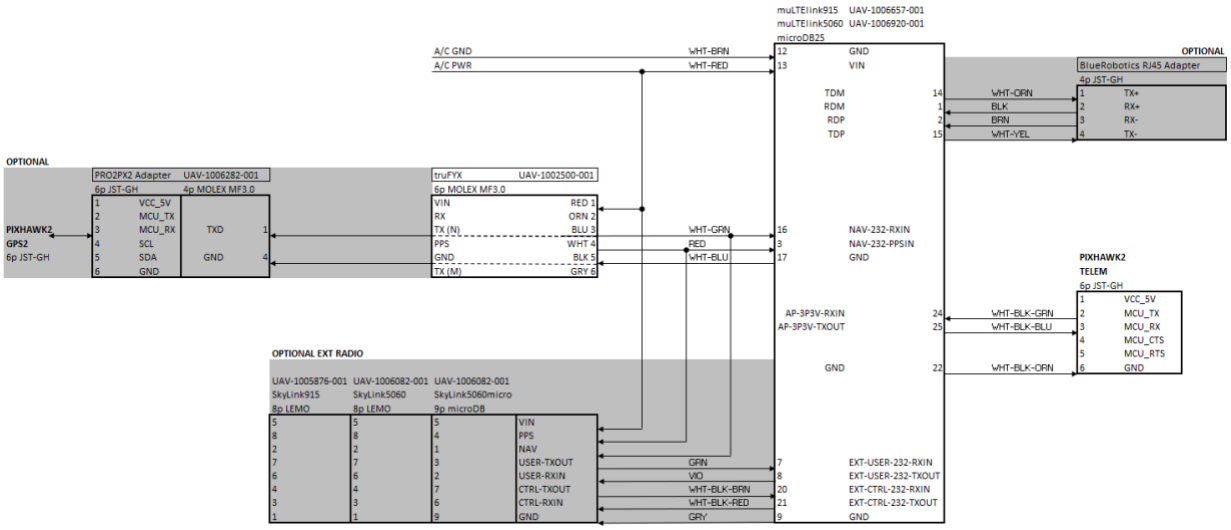


Figure 23: muLTElink Radio Wiring Diagram

13.2 muLTElink – Pixhawk Minimum Connectivity

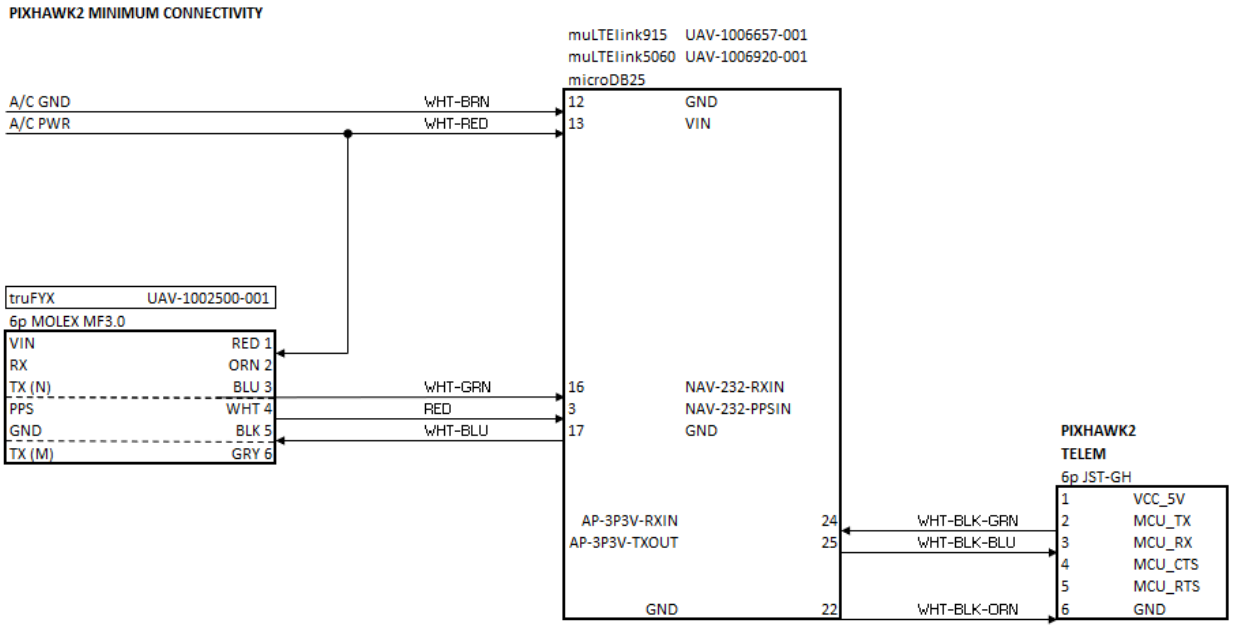


Figure 24: muLTElink – Pixhawk Wiring Diagram

13.3 muLTElink – Piccolo SL Minimum Connectivity

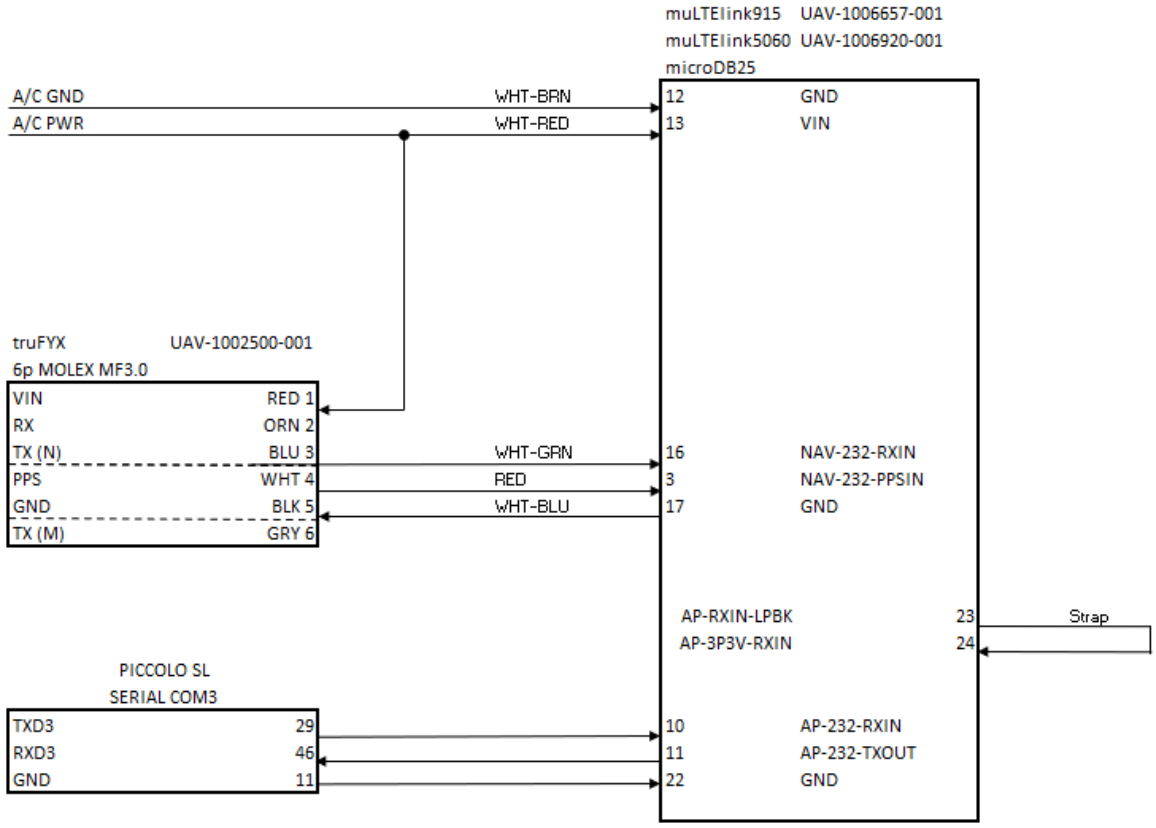


Figure 25: muLTElink – Piccolo Wiring Diagram

13.4 muLTElink –With Two External Radios

13.4.1 muLTElink5060 with External SkyLink915, 5G SA Hotspot Incorporating Payload Solution

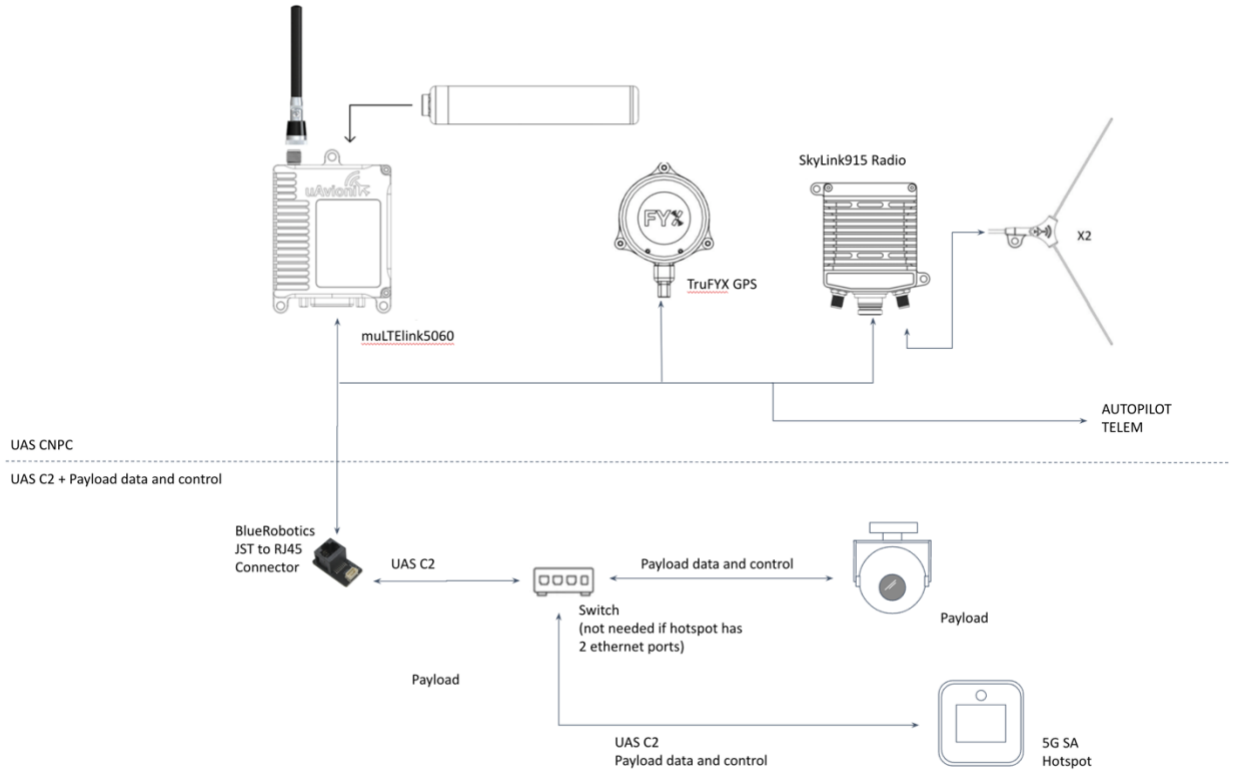


Figure 26: muLTElink Wiring Diagram with Two External Radios

13.4.2 External SkyLink5060, SATCOM Incorporating Payload Solution

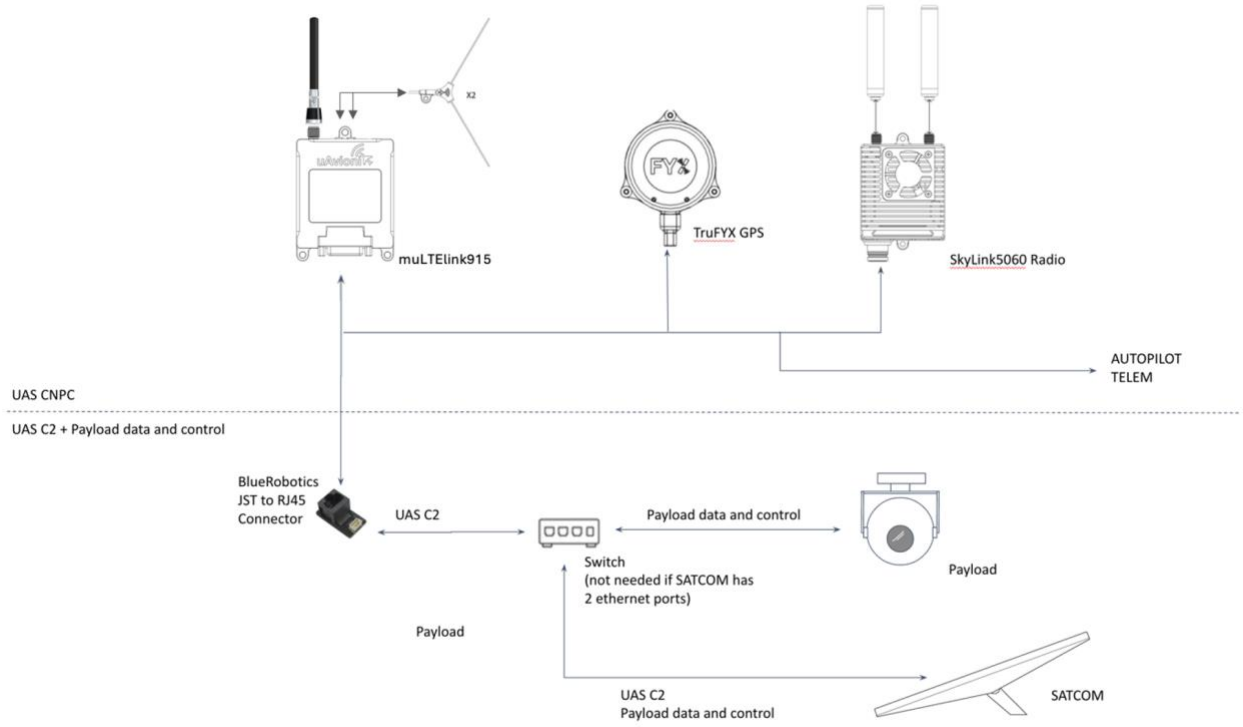


Figure 277: muLTElink Diagram with SATCOM Incorporating Payload Solution

13.4.3 Wiring Diagram

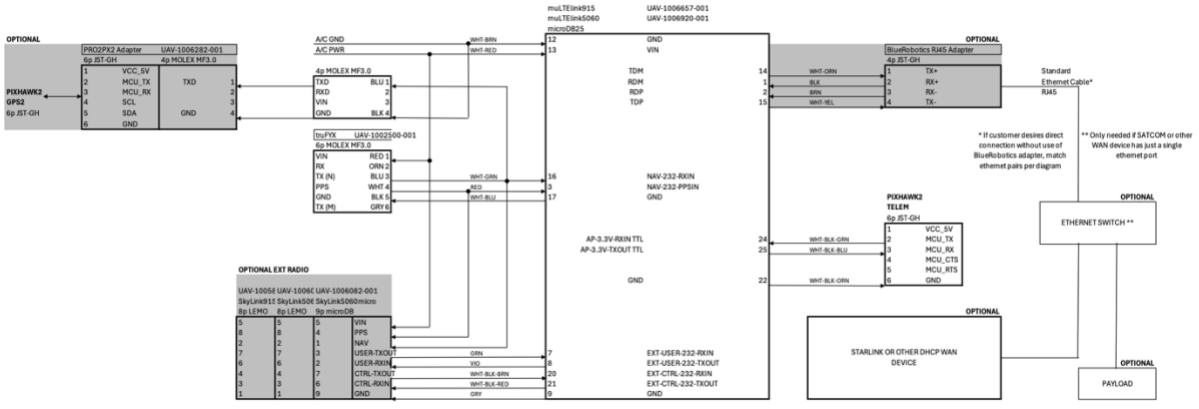


Figure 28: muLTElink Wiring Diagram with SATCOM Incorporating Payload Solution