

Connex Mini Integration Guide

Hardware, Software, and Protocol Reference
Target Architecture: Medical Link / Connex Mini
Version: 1.1

1. System Overview

The Connex Mini / Medical Link is a highly integrated wireless video solution designed for reliable, low-latency transmission. It supports both standard commercial applications and specialized medical environments (such as MRI suites).

- Range: Operational range of up to 30 meters.
- Multicast: A single transmitter can pair with a maximum of 4 receivers (sinks).
- Supported Resolutions: Supports up to 1080p60 at 40MHz bandwidth and up to 1080p30 at 20MHz bandwidth. Custom configurations support 720p50/60 at 20MHz.
- Environment: The boards are designed to withstand ambient temperatures ranging from 0°C to 50°C.
- Audio: Audio transmission is not supported.
- DFS/AFS: The system supports Dynamic Frequency Selection (DFS) and Automatic Frequency Selection (AFS) protocols to avoid radar interference.

2. Hardware Interfaces

2.1 Transmitter (Tx) Specifications

The Transmitter module (Petit Tx + Balcony) includes interfaces for power, video, and communication. Custom part numbers (e.g., MLEM50H-B1-TX-INV-01) may feature a metal enclosure without plastic housing.

- Antennas: 2 x U.FL connectors linked to SMA antennas.
- Video Input: Micro HDMI.
- Operating Voltage: 6-34V standard range. Custom applications may specify a nominal 12V input.

Tx Power Connector (J1)

Pin #	Pin Name	Description
2, 3	(+)	Power input (+)
1, 4	GND	Power ground

Tx OEM Connector (J2)

Pin #	Pin Name	Description
1	UART5 RX	3.3V TTL
2	UART5 TX	3.3V TTL
9, 10	GND	Ground

2.2 Receiver (Rx) Specifications

The Receiver module (Petit Rx) handles downlink reception and interfaces with display units and OEM microcontrollers.

- Antennas: 3 x SMA and 2 x U.FL connectors linked to SMA antennas.
- Operating Voltage: 4.75V – 5.25V. Standard nominal is 5V.
- Custom MRI Notes: For high magnetic field environments (up to 3T), certain magnetic inductors on the Rx board may be depopulated and replaced with non-magnetic equivalents.

Rx Power Connector (J1)

Pin #	Pin Name	Description
1, 2	(+)	Power input (+)
3, 4, 5, 6	GND	Power ground

Rx OEM Connector (J6)

Pin #	Pin Name	Description
1	DC	3.3V TTL
2	UART3 TX	3.3V TTL
3	UART3 RX	3.3V TTL
6	GND	Ground

2.3 Mating Connectors

The system is supplied without power cables by default. Mating connectors must be sourced according to the following specifications:

Side	Connector	Type	Crimp Pin	Housing Connector
TX	J1	Power	JST SSHL-002T-P0.2	JST GHR-04V-S
TX	J2	OEM	JST SSHL-002T-P0.2	JST GHR-08V-S
RX	J1	Power	Hirose DF14-4S-1.25C	Hirose DF14-2628SCF
RX	J6	OEM	Hirose DF13-6S-1.25C	Hirose DF13-2628SCF

3. Application Protocol and API Integration

The Connex Mini modules can be controlled via API commands over UART from an OEM microcontroller using the designated OEM connector.

3.1 Physical Layer (UART)

The serial connection between the host (customer device) and the device (Amimon module) utilizes the following configuration:

- Baud Rate: 115.2 Kbps
- Data Length: 8 bits
- Stop Bit: 1
- Parity: None

3.2 Link Layer Protocol Frame Formats

The data link layer supports two revisions. Checksum calculations are required for both frame headers and payloads based on XOR operations.

Revision 1 Format: Header (4 bytes) | Payload (0-255 bytes) | Frame Checksum (1 byte).
The header starts with 0xAA and 0xBB.

Revision 2 Format: Header (5 bytes) | Payload (0-255 bytes) | Payload Checksum (1 byte).
The header starts with 0xAA and 0x55 and includes an internal Header Checksum.

3.3 Key API Commands

- System Restart (ID 255): Restarts the TX or RX system. No parameters required.
- Allow Registration (ID 42): Initiates the pairing/registration process with a remote device.
- Get Extended Network State (ID 233): Returns the current network state and sub-state (e.g., disconnected, connecting, in range).
- Set RF Region (ID 88): Sets the required RF region, such as US, Europe, Japan, etc. A reset is required for the change to take effect.
- Set Downlink Bandwidth (ID 103): Sets the operating bandwidth to either 40MHz or 20MHz.

4. System Registration (Pairing)

Up to 4 receivers can be paired to a single transmitter. Pairing can be executed physically or via API.

Hardware Method

1. Push the registration button (SW2) on the receiver for more than 5 seconds until the registration message appears on screen.
2. Push the registration button (SW1) on the transmitter for more than 5 seconds until the "registration in process" message and progress bar appear.
3. Wait for the progress bar to complete. The units will restart automatically once registration is finished.

API Method

1. Send CMD_ALLOW_REGISTRATION (ID 42) to the Receiver. Network State (command 233) will change to 1,0.
2. Send CMD_ALLOW_REGISTRATION (ID 42) to the Transmitter.
3. Wait for pairing confirmation. When the link is established, Network State changes to 4,0 (Network Connected).

5. Technician Tool Configuration

Amimon provides a PC-based Technician Tool for advanced diagnostics, regulation compliance, and firmware management.

- **Capabilities:** The tool allows users to perform firmware upgrades, un-register units, manually change between 20/40 MHz bandwidths (Tx only), and set sub-regions or fixed frequencies.
- **Connection:** The tool connects to the Tx or Rx via the onboard micro USB port. Proper USB drivers (e.g., Amimon USB driver setupUSBDrivers) must be installed.
- **Device Monitoring:** The tool monitors operating frequencies and Channel Availability Checks (CAC). It displays radar detections during In-Service Monitoring (ISM) to comply with DFS regulations.
- **Reception Parameters:** Detailed RF statistics, such as Uplink Antenna power (PIN), Error Packets (PER), Downlink Antenna SNR, and DFS frequencies, can be logged for troubleshooting.
- **Regulation Scripts:** The tool can execute scripts to set the device to specific frequencies and transmit powers (Pout) for certification and testing purposes. Devices must be unregistered to run these scripts.

Important: It is recommended to keep the Transmitter and Receiver USB ports physically accessible in the final integrated product design to allow for future FW upgrades and diagnostic tool connections.

6. Regulatory Compliance Statements

This section outlines the mandatory regulatory statements (FCC and ISSED/Industry Canada) based on the equipment certifications for the Amimon Wireless HD Video Transmitter (AMNPCTX01) and Receiver (AMNPTRX01) modules.

6.1 FCC Compliance Statements

Part 15 Compliance

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.

Modifications Warning

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

RF Exposure Compliance

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

5 GHz Band Restrictions

Operations in the 5.15 - 5.25 GHz band are restricted to indoor usage only.

6.2 ISED Canada (Industry Canada) Statements

The suppliers of radio equipment shall provide the notices and/or statements in both English and French in a conspicuous location in the user manual or on the device.

RSS-Gen Compliance / Conformité CNR-Gen

This device complies with Industry Canada licence-exempt RSS standard(s). 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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

ICES-003 / NMB-003

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

RF Exposure / Exposition aux Radiofréquences

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

5 GHz LE-LAN Band Restrictions / Restrictions de Bande 5 GHz

The user manual for local area network devices shall contain instructions related to the following restrictions:

- (i) the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
- (ii) the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall comply with the e.i.r.p. limit; and
- (iii) the maximum antenna gain permitted for devices in the band 5725-5825 MHz shall comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate.

Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

Note: This device does not operate in the 5600-5650 MHz band as required by Canada.

(i) les dispositifs fonctionnant dans la bande 5 150-5 250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;

(ii) le gain maximal d'antenne permis pour les dispositifs utilisant les bandes 5 250-5 350 MHz et 5 470-5 725 MHz doit se conformer à la limite de p.i.r.e.;

(iii) le gain maximal d'antenne permis (pour les dispositifs utilisant la bande 5 725-5 825 MHz) doit se conformer à la limite de p.i.r.e. spécifiée pour l'exploitation point à point et non point à point, selon le cas.

De plus, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5

250-5 350 MHz et 5 650-5 850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

Detachable Antenna Usage / Utilisation d'Antennes Amovibles

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

6.3 Host Product Labeling Requirements

As these are modular approvals, the final end-product (host) must display the following labels on the exterior to comply with ISED regulations:

For the Receiver module:

Contains IC: 7680A-AMNPTRX01

For the Transmitter module:

Contains IC: 7680A-AMNPCTX01

And equivalently for the FCC IDs (e.g., Contains FCC ID: [Insert FCC ID]).