QK-A021 AIS Receiver Dongle

Designed in UK

Features

- Receiving on dual channels (161.975 MHzand162.025 MHz) alternately
- Auto-hop channel algorithm improves 4% of captured message rate
- Manually adjustable hopping interval rates (0.25 sec, 1 sec, 30 sec and auto-hopping)
- Sensitivity up to -105 dBm@30% PER
- Up to 45 nautical miles receiving range
- USB 2.0 powered (<26mA@5.0V)
- Serial output: 38400 bps baud rate over USB
- Message output in NMEA-0183 format
- SMA connector for 50 Ohm VHF antenna
- SMA to BNC coaxial adaptor included
- Compatible with Windows, Mac and Linux (optional Configuration must be completed using Windows software.)
- This device does not come pre-loaded with map data. We advise using OpenCPN for map data. Some iOS apps may charge for map use.

V1.0

Contents

1. Setup overview

Consider if you have CD reader/ Internet access onsite: ensure you can load the driver and configuration software through the CD or through Internet access (Download any software to your Windows laptop before traveling to your boat if needed)

- **Drivers:** Will automatically install to your device if it is running Windows 10. If not, it is included on the FREE CD or to download from our website.

- **Configuration Software:** is optional. It is needed to configure hopping intervals. These can be changed to give a better performance when compared with other AIS hopping algorithms.

- Ensure you have the correct length of cables needed, like USB or for linking VHF.

- **Location:** Select where your QK-A021 is to be sited, it will need to be close to a device to plug into but it should also not be used close to generators or compressors (e.g. refrigerators) as they can generate substantial RF noise. It is designed to be used in a protected indoor environment and is NOT waterproof. Generally, a suitable placement of QK-A021 is together with other types of navigation equipment and the PC that will be used to display the output data. QK-A021 is designed to be ultra-portable and convenient but should only be used where it is well protected from humidity and water.

- **Antenna:** QK-A021 is not supplied with a VHF antenna as the type of antenna and cable requirements differ from vessel to vessel. A suitable VHF antenna will need to be connected before the receiver will operate fully. AIS communication system frequencies are close to the duplex VHF channels used for marine communication, so the antenna should be separated as much as possible (ideally at least 3 meters) from the voice communication VHF antenna to avoid unnecessary adjacent channel interference. Best separation is achieved by installing the antennas over each other or on separate sides of the mast. If an existing VHF transmitting antenna is used to receive AIS signals, proper separation equipment (e.g., an active VHF antenna splitter) should be applied.

(This is an overview only; familiarize yourself with the manual before installation.)

2. Setup

In the box you should have:

1 x QK-A021 V2.0

1 x SMA-BNC coaxial adapter

1 x USB extension cable

1 x CD with manuals and drivers

The QK-A021 is an entry level single channel AIS receive-only unit, which allows you to receive AIS messages direct to your laptop or other devices via USB. Entry level, pocket sized and pocket friendly.

1. To start setting up QK-A021, please ensure there are valid AIS signals present. Without receiving valid AIS signals, the device will output "no valid AIS messages" every 2 minutes. The AIS system works on the marine VHF band, which is considered to be 'line of sight' radio. What this means is that if the QK-A021 antenna cannot see the antenna of the vessels, the AIS signals from vessels will not reach the QK-A021. Practically, this is not strictly a requirement, few buildings and trees between them will still be fine. Larger obstacles such as hills and mountains, on the other hand, will significantly degrade the AIS signals.

2. Connect the module to a suitable VHF antenna. BNC or N type adaptors can be used to connect QK-A021 with different types of external VHF antennae:
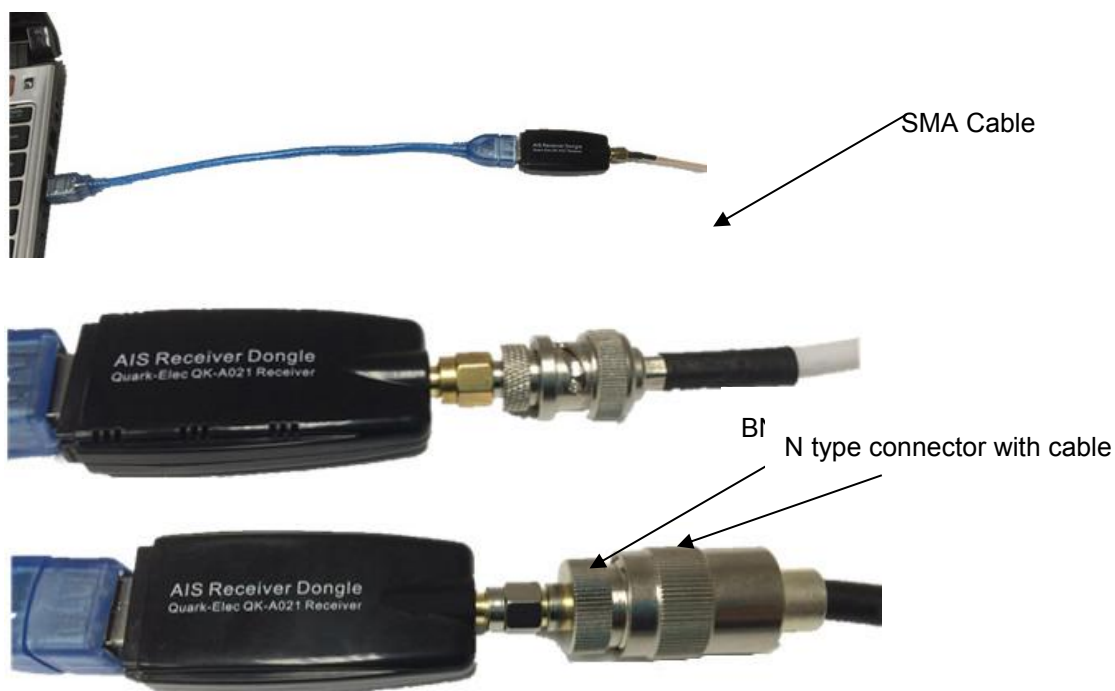
3. To enable the USB data connection of QK-A021 to other devices, related hardware drivers may be needed dependent on system requirements.

Windows 10 will automatically install the drivers from a Windows Update. As long as there is an active Internet connection the first time the QK-A032 is plugged in.

If the Windows PC is not connected to the Internet or if the USB driver does not install automatically on the first installation of the QK-A032; please use the following link to install the USB drivers manually.

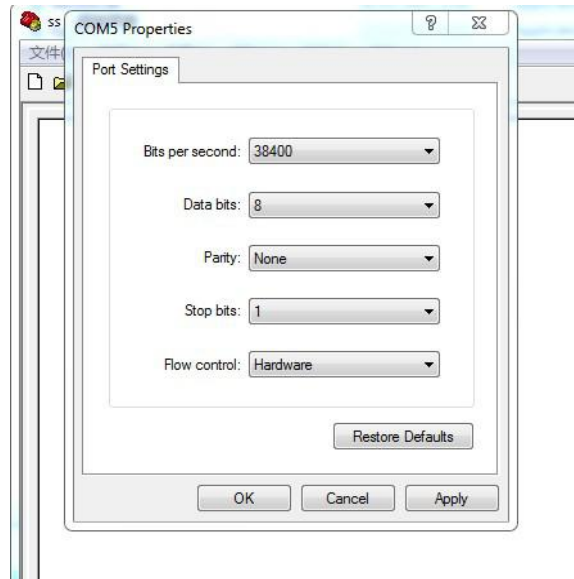https://www.quark-Elec.com/downloads/drivers/

For Mac OS X the QK-A021 will be recognized and shown as a USB modem. The ID can be checked with the following steps:-

- After plugging QK-A021 into a USB port, launch Terminal.app.

- Type ls /dev/*usb*.

- Mac system will return a list of USB devices. QK-A021 will display as - "/dev/tty.usbmodemXYZ" where XYZ is a number. Nothing further needs to be done if it is listed.

- If it is not listed then a restart may be required.

- No driver is required for Linux. When plugged into the computer, QK-A021 will show up as a USB CDC device on /dev/ttyACM0.

4. The USB connection status can always be checked after the driver has been successfully installed. Take Windows system as an example, the COM interface number and status can be checked on Device Manager as seen below:-
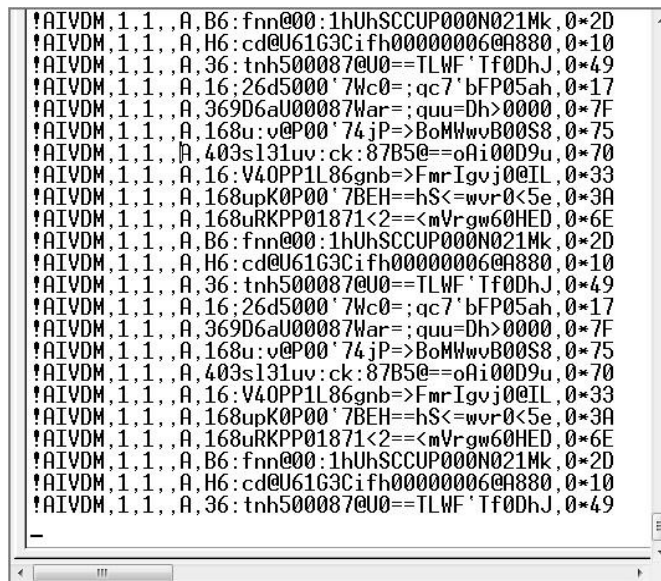
V1.0
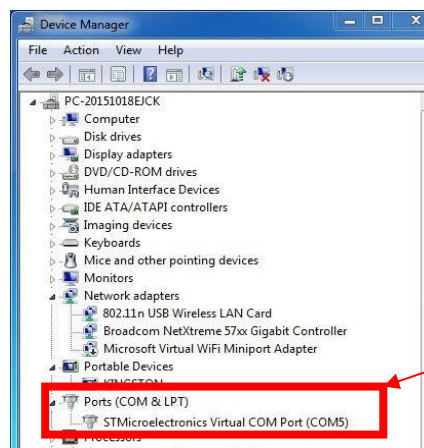
5. You can Run a terminal monitor application like Putty, HyperTerminal or any other similar tool to check the connection status. Ensure that the COM port is set at 38400bps, 8, N and 1).

If all the above is set up correctly, users will see the following information:

```
!AIVDM,1,1,,A,B6:fnn@00:1hUhSCCUP000N021Mk,0*2D
!AIVDM,1,1,,A,H6:cd@U61G3Cifh00000006@A880,0*10
!AIVDM,1,1,,A,36:tnh500087@U0==TLWF'Tf0DhJ,0*49
!AIVDM,1,1,,A,16;26d5000'7Wc0=;qc7'bFP05ah,0*17
!AIVDM,1,1,,A,369D6aU00087War=;quu=Dh>0000,0*7F
!AIVDM,1,1,,A,168u:v@P00'74jP=>BoMWwvB00S8,0*75
!AIVDM,1,1,,A,403s131uv:ck:87B5@==oAi00D9u,0*70
!AIVDM,1,1,,A,16:V4OPP1L86gnb=>FmrIgvj0@IL,0*33
!AIVDM,1,1,,A,168upK0P00'7BEH==hS<=wvr0<5e,0*3A
!AIVDM,1,1,,A,168uRKPP01871<2==<mVrgw60HED,0*6E
!AIVDM,1,1,,A,B6:fnn@00:1hUhSCCUP000N021Mk,0*2D
!AIVDM,1,1,,A,H6:cd@U61G3Cifh00000006@A880,0*10
!AIVDM,1,1,,A,36:tnh500087@U0==TLWF'Tf0DhJ,0*49
!AIVDM,1,1,,A,16;26d5000'7Wc0=;qc7'bFP05ah,0*17
!AIVDM,1,1,,A,369D6aU00087War=;quu=Dh>0000,0*7F
!AIVDM,1,1,,A,168u:v@P00'74jP=>BoMWwvB00S8,0*75
!AIVDM,1,1,,A,403s131uv:ck:87B5@==oAi00D9u,0*70
!AIVDM,1,1,,A,16:V4OPP1L86gnb=>FmrIgvj0@IL,0*33
!AIVDM,1,1,,A,168upK0P00'7BEH==hS<=wvr0<5e,0*3A
!AIVDM,1,1,,A,168uRKPP01871<2==<mVrgw60HED,0*6E
!AIVDM,1,1,,A,B6:fnn@00:1hUhSCCUP000N021Mk,0*2D
!AIVDM,1,1,,A,H6:cd@U61G3Cifh00000006@A880,0*10
!AIVDM,1,1,,A,36:tnh500087@U0==TLWF'Tf0DhJ,0*49
```

The red LED light turns on once QK-A021 powered up, and the yellow/green LED flashes to indicate valid AIS messages received.

6. Run any AIS NMEA-0183 compatible chart software (such as OpenCPN or SeaClear) and then start to view the displayed AIS information.

3. <u>Connecting</u>

QK-A021 has the following electrical connections/indicators:

● **AIS antenna connector**. Standard SMA female 50 Ohm connector. An active VHF antenna splitter is required if one VHF antenna is shared by QK-A021 and VHF voice radio. (We recommend separate antennas ideally.)

● **USB connector**. A   USB connector outputs the AIS messages directly to the connected device. It can also be used for adjusting hopping parameters using the GUI Configuration software.

4. <u>Using QK-A021 with OpenCPN</u>

OpenCPN is free software that can be used to view concise chart plotter and navigation information. It is available for use on both PCs ,MAC and Linux systems. The following is a sample setting for the OpenCPN plotter.   Go to the options tab at the top of OpenCPN and click on the connections tab. Fill in the data below as instructed. Set the COM port and the baud rate of your device. Then click add connection. We set COM2 as the QK-A021 input and COM1 is used for a standard serial port GPS input from an external device.
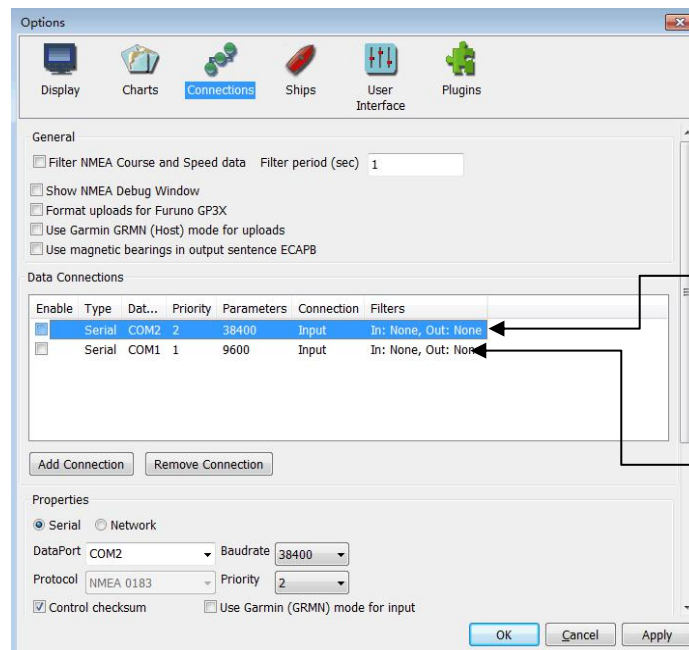
5. <u>Hopping interval</u>

The module can be configured using the Quark-elec **GUI Configuration Application** (See below download link) which is free to download and very straightforward. This enables the operator to specify hopping intervals of 1s, 30s and 25s according to preference and need. Our patented algorithm is likely to pick up more messages, faster than the manual settings but there are certain environments and locations where manual setting may be desirable. An article is available explaining this is on our blog:

https://www.quark-elec.com/latest-field-test-of-patented-autohopping-algorithm/
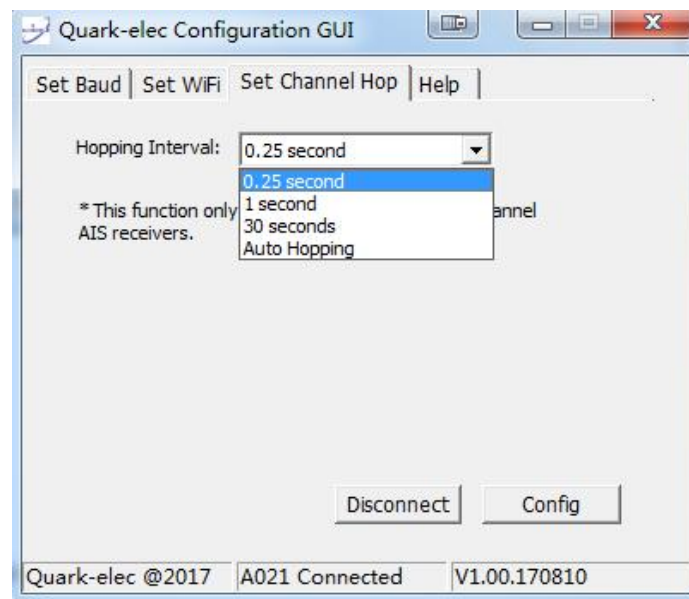
You can download the software here:

https://quark-elec.com/doc/QE_MUX_configTool.zip

Detailed instructions on how to use the Configuration software are available here:

https://www.quark-elec.com/doc/QK-A0xx_GUI_application_note.pdf

Please check that no other APPs or programs are open when using the Configuration GUI.

6. <u>Status LED'S</u>

A021 features two LEDs which indicate power and valid AIS input. These LEDs flash as below:

Power: red flashes at 3 second intervals.

Valid AIS received： green LED flashes for each valid message received.

- NB: The green LED on QK-A021 will flash if a valid AIS package received. This means please don't expect QK-A021 to have any AIS messages coming out if the green LED light is not flashing.

7. <u>Specification</u>

Item	Specification
Frequency bands	161.975MHz &162.025MHz
Operating temperature	-25°C to +80°C
Storage temperature	-25°C to +85°C
Average supply current (typical quiescent)	<26mA@5.0V
AIS receiver sensitivity	-105dBm@30%PER

8. <u>Warranty and legal notes</u>

Quark-Elec warrants this product to be free from defects in materials and manufacture for one year from the date of purchase. Quark-Elec will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts and labour. The customer is, however, responsible for any transportation costs incurred in returning the unit to Quark-Elec. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs. A returns number must be given before any unit is sent back for repair.

The above does not affect the statutory rights of the consumer.

Disclaimer

This product is designed to aid navigation and should be used to augment normal navigational procedures and practices. It is the user's responsibility to use this product prudently. Neither Quark-Elec, nor their distributors or dealers accept responsibility or liability either to the products user or their estate for any accident, loss, injury or damage whatsoever arising out of the use or of liability to use this product.

Accuracy of this manual

Quark-Elec products may be upgraded from time to time and future versions may therefore not correspond exactly with this manual. The manufacturer of this product disclaims any liability for consequences arising from omissions or inaccuracies in this manual and any other documentation provided with this product.

9. <u>Additional information and support</u>

For additional technical information and other enquiries, please go to the Quark-elec forum at: https://quark-elec.com/forum/ it's often the quickest way to receive and answer as many questions have already been answered there.

For sales and purchasing information, please email us: info@quark-elec.com

Document history

Issue	Date	Changes / Comments
1.0	27-02-2015	Initial release
2.0	13-07-2017	Release V2.0 hardware

Quark-Elec (UK)
Unit 7, The
Quadrant
Newark Close
Royston, UK
SG8 5HL