XMA-11K

Argos Beacon

User Manual

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1 General Description

The XMA-11K is an independently powered, self-contained Argos beacon that is fully submersible to 7,500m (24,606 ft). This beacon is designed to protect your valuable assets and make their recovery even easier. The use of Argos makes your assets trackable from anywhere in the world and is packaged in an all titanium enclosure with a solid state surface sensor and optional remote head. The XMA-11K is designed to meet or exceed you operational requirements for an ultra deepwater submersible beacon.

Inside the XMA-11K titanium chassis, is a fully functional Argos PTT (Stand-alone transmitter) that can be quickly integrated into mission specific packages, or used alone to gather Doppler based position information. The circuit board benefits from an incredibly small package and advanced power management, making it an ideal choice for long range, long term monitoring projects. Advanced firmware provides multiple options for data acquisition.

The XMA-11K is intended for subsurface and surface deployments. Xeos Technologies Inc. (Xeos) manufactures other specific products for subsurface and surface applications. See www.xeostech.com for details or call (902) 444-7650.

2 Theory of Operation

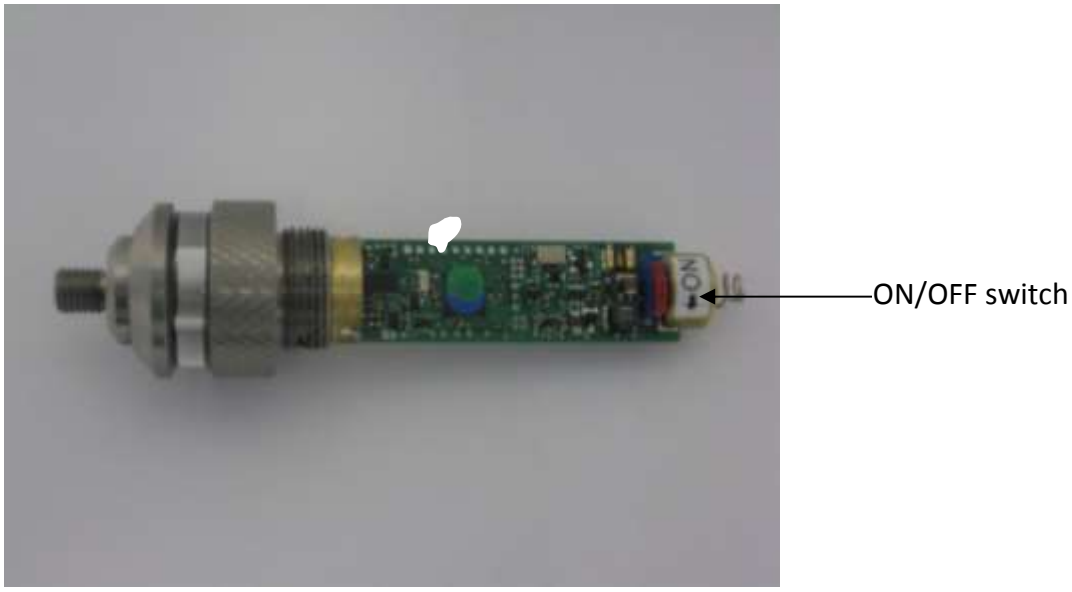
The XMA-11K is intended for instantly locating and recovering high value, free drifting assets at sea with Argos Doppler accuracy. After being activated, the XMA-11K is submerged (to a maximum depth of 11K meters), where it enters Underwater Mode. Here, it monitors water conductivity between the top disk and the bulkhead for up to 2 years.

Once it reaches the surface, XMA-11K will transmit its Doppler position and will continue to send is Doppler position until it is manually turned off, the battery pack drops below the minimum voltage requirement of 7v, or the XMA-11K is re-submerged.

3 Operating Instructions

3.1 On/Off Modes and Testing

The XMA-11K beacon is turned ON and OFF through the use of an internal switch. To turn XMA-11K ON, open the tube and remove the circuit board. Switch the switch to the 'ON' position. Screw the circuit board and antenna back into the tube. Once turned on, the device will transmit a pre-programmed frequency. Every time the device sends out a transmission, a green LED will flash in the translucent antenna spacer. To turn the device off, repeat the above step but put the switch in the 'OFF' position. Once turned off, the device will no longer transmit the pre-programmed frequency.



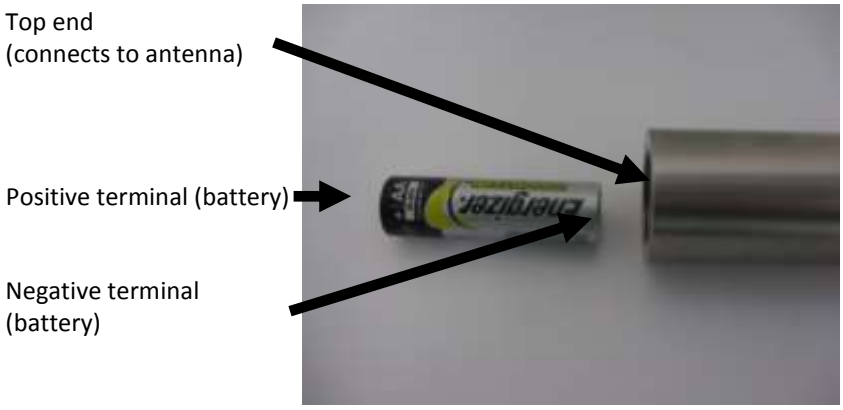
<u>Note</u>: It is important that the beacon has a good view of the sky during any test, so it is necessary to test the beacon outside of a building.

<u>Note</u>: Cycling power for any reason, for example by using the switch to turn OFF/ON or by removing battery power will start the above-water Alarm Mode.

3.2 Changing the Batteries

The chassis can easily be taken apart by unscrewing the top antenna end off of the unit. This must be done carefully as the circuit board is attached to the antenna, and will come out of the unit when then top is taken off the chassis. The batteries are inserted into the chassis with the positive end facing the circuit board, and the negative end facing the bottom of the chassis. When changing the batteries, ensure that the plastic protecting sleeve is still within the chassis.

The XMA-11K accepts 6x 1.5V AA batteries in the standard chassis. A short chassis that accepts 7 CR123A 3V lithium batteries is also available.



Note: **Ensure that all batteries are inserted into the chassis with the correct polarity. The negative terminal of the battery should be facing the bottom of the chassis. The positive terminal of the battery should be facing the antenna and the circuit board.**

Note: **The batteries inside the chassis are protected by a plastic tube. When replacing batteries, ensure that the plastic tube is still intact inside the chassis.**

3.3 Working with Argos

3.3.1 Overview of Argos

Argos is a globally used location and data collection system. It can be used to find any mobile object, anywhere around the world, as long as it is fitted with a compatible Argos transmitter. Satellites orbiting close to the Earth receive messages transmitted from Argos compatible transmitters located on a deployed unit. These messages are then re-transmitted from the satellites to receiver stations located on the Earth. The receiver stations then re-transmit the messages to an Argos Processing Centre. The Argos Processing Centre measures the Doppler Effect (i.e. the change in frequency of a wave relative to wave origin and observer) on the transmitted frequency. Using this measurement, position or original transmission can be calculated. The Argos Processing Centre will process any data collected and then send both the

collected data and the unit position to the user. For more information related to Argos, see the Argos website at http://www.argos-system.org or an Argos manual can be found at http://www.argos-system.org/manual/ .

3.3.2 Account Setup

If the user does not already have an Argos account set up, or the unit to be deployed does not have an Argos ID number, an SUA (System Use Agreement) Form and/or an ID Number Request Form must be filled out and given to User Services. Both of these forms can be downloaded from https://www.argos-system.org/html/userarea/forms_en.html . Once the appropriate form and been processed, a Service Contract/Order Form and a Prices List will be sent back to the user. These forms will also need to be filled out and returned to User Services. Once the signed order form has been received, User Services will send a Program Overview to the user, and the device will be authorized for deployment using Argos.

3.3.3 Data Acquisition

There are many different ways of accessing positioning data from Argos. ArgosWeb is a secure website that displays location of the unit using Google Maps and has an option to download all collected data. ArgosServer provides the user with remote access to Argos data with TELNET. ArgosDirect allows data to be sent to the user through E-mail, FTP (File Transfer Protocol), or CD-ROM. ArgosShare allows users to share any collected data with other personnel. ArgosMonitor monitors the position of unit, unit state, and any sensor data for changes in state. Any change in state will create an alert that is sent to the user by E-mail, SMS (Short Message Service) or Fax. For more information on Data Acquisition, view the Argos Manual (Ch 6 – How to access Argo data) at
http://www.argos-system.org/manual/ .

4 Programming

Your XMA 11K should be programmed with a hex ID and a repetition rate. However, if you need to change the ID or repetition rate, this section will explain how to do that

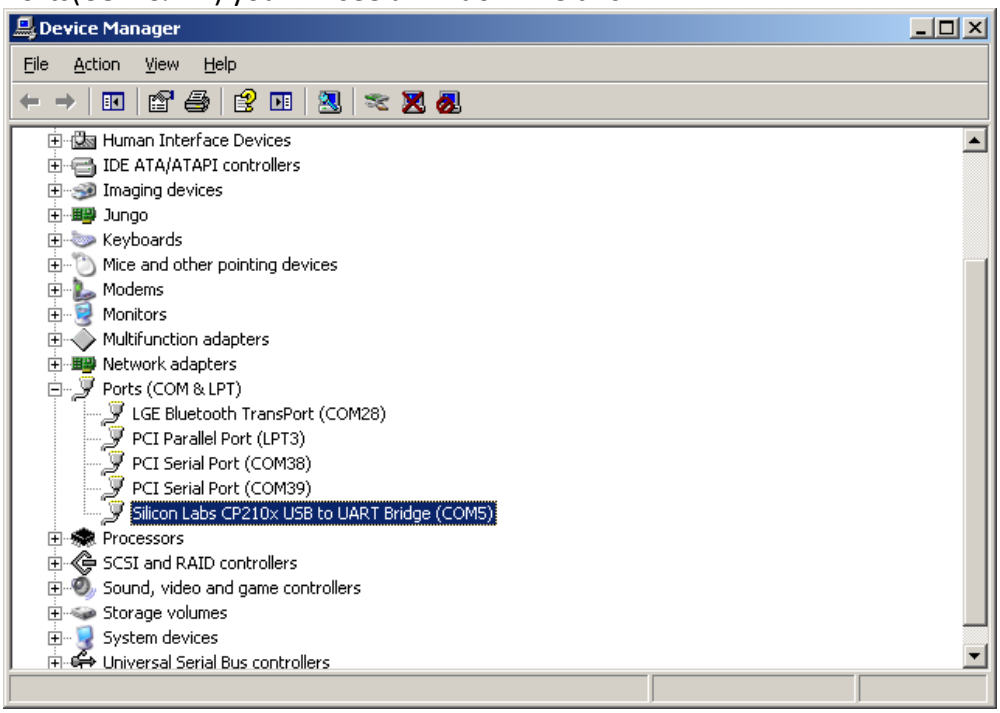
4.1 Connecting the XMA-11K to your computer

1. Make sure that the antenna is attached to the XMA-11K. (*To prevent damage to the transmitter)*

2. Plug the USB connector into a computer. You may have to install a driver for the Silicon Labs CP2102 chip in the adapter. If necessary download the “VCP Driver Kit” for the computer operating system from the following web site:

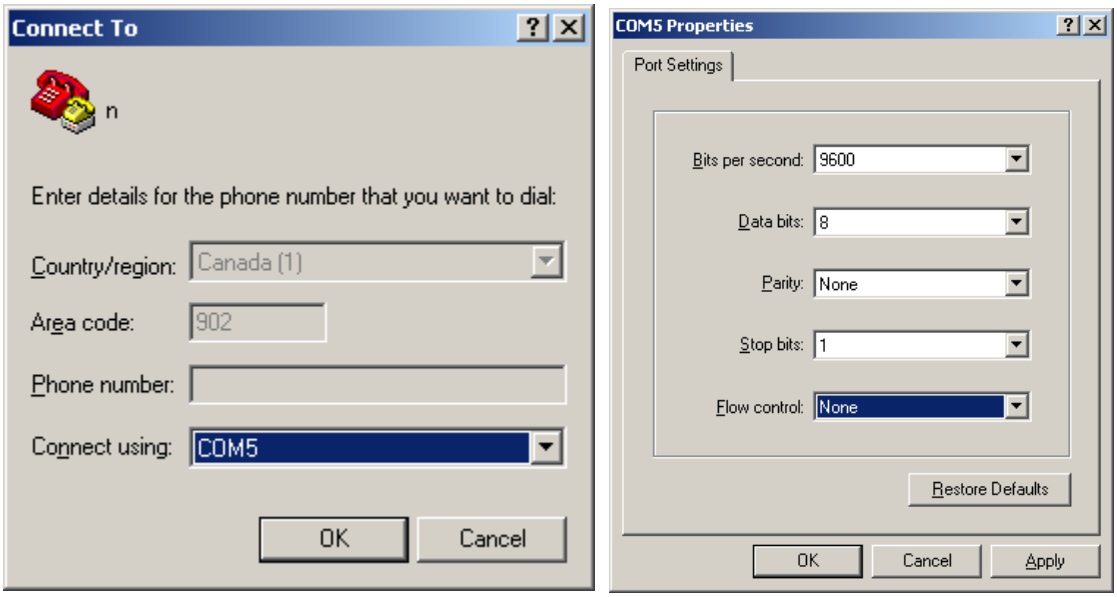
http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx

3. Find out which COM port your computer has selected for the USB adapter by clicking on Control Panel, System, Hardware, and Device manager. Click the "+" sign next to Ports(COM&LPT) you will see a window like this



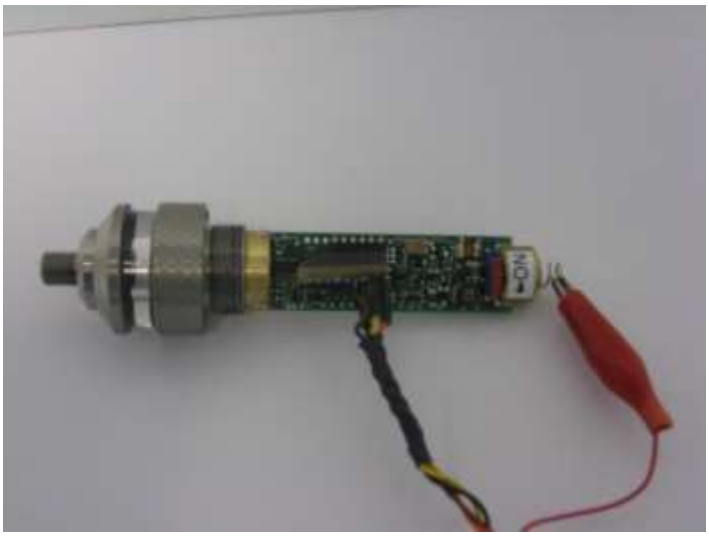
Next to the device labelled "Silicon Labs CP210x USB to UART Bridge" you will see a COM port number. This one Says COM5. Take note of what yours says.

4. On the computer, run HyperTerminal. Configure it to the COM port that Microsoft Windows selected for your CP2102 USB adapter above and set the following parameters:

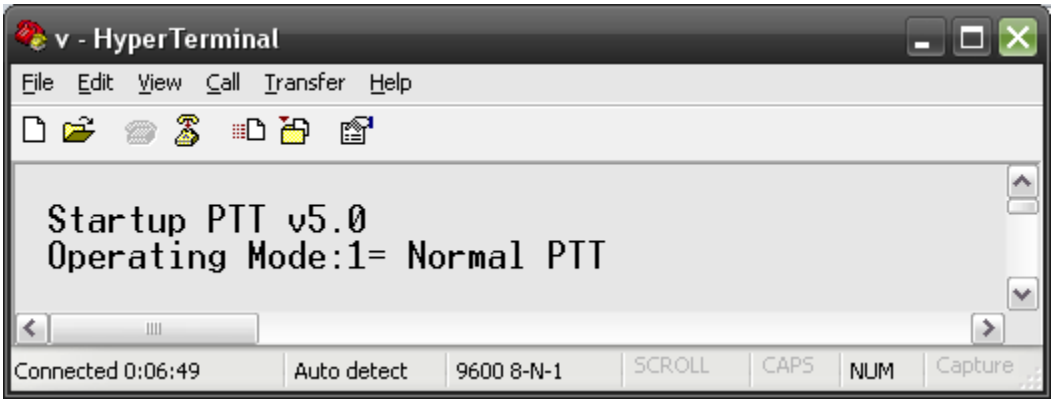


Baud rate:	9600 baud
Data bits:	8 bits
Parity:	None
Stop bits:	1
Flow Control:	None

5. Switch the blue and red switch to the OFF position and plug the 9 pin connector and alligator clip on the USB adapter as shown into the XMA-11K connector (watch the polarity). then switch the blue and red switch to the ON position



6. You should then see a message on the HyperTerminal window like this:



4.2 XMA-11K settable parameters

Once the XMA-11K is connected to the computer you can begin configuring the parameters to your desired values. The rest of this chapter describes each parameter and how to configure it.

NOTE: The XMA-11K will not accept any commands until it is in the "ASCII Terminal Mode." To enter "ASCII Terminal Mode" simply type "$et" in the HyperTerminal window. You will then see a ">" symbol appear in the HyperTerminal window. To exit "ASCII Terminal Mode" type "$en" the XMA will then go back to its regular operating mode.

4.2.1 Repetition Period (Rep Rate)

The Rep Rate is the amount of time between each transmission of the XMA-11K.

To change the Rep Rate: Type "$SRxxx" and hit "enter" where xxx is the number of seconds that you want between each transmission.

Example: to change the Rep Rate to 90 seconds. Type "$SR090" and hit "enter"

4.2.2 HEX ID

The HEX ID is the unique identifier that the XMA-11K uses to transmit position data to the satellites.

To Change the HEX ID: Type "$SIxxxxxxx" and Hit "enter" where xxxxxxx is the 7 digit HEX ID.

Example: to change the HEX ID to 1A2B3C4.
Type "$SI1A2B3C4" and hit "enter"

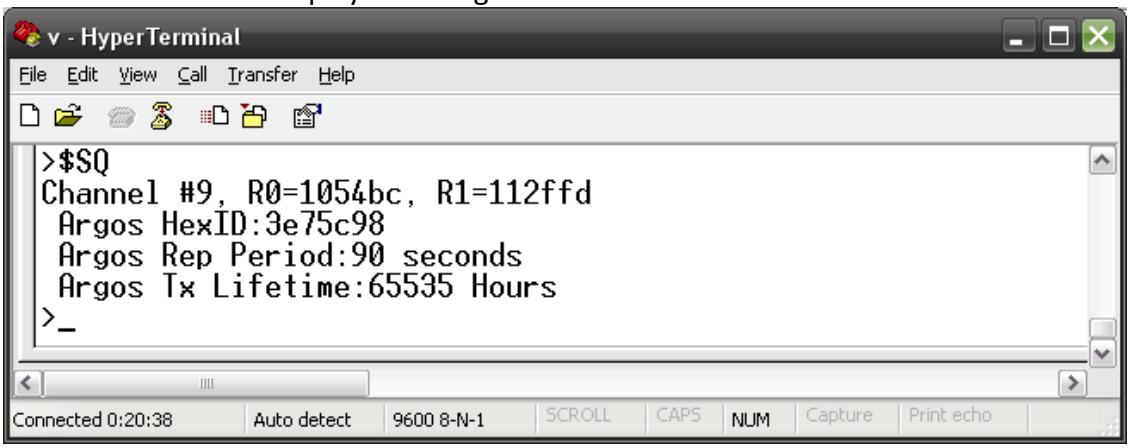
NOTE: If you have an old 20 bit ID that only contains 5 digits, you must enter two zeros "00" at the end of the 5 digits to make it 7 digits. Otherwise the XMA will not accept the changes.

4.2.3 Settings Query

A settings query will display the Alpha related settings of the XMA-11K such as the HEX ID the Rep period, the Channel, and the transmit lifetime of the unit.

To display a settings Query: Type "$SQ"

The screen will then display a message like this

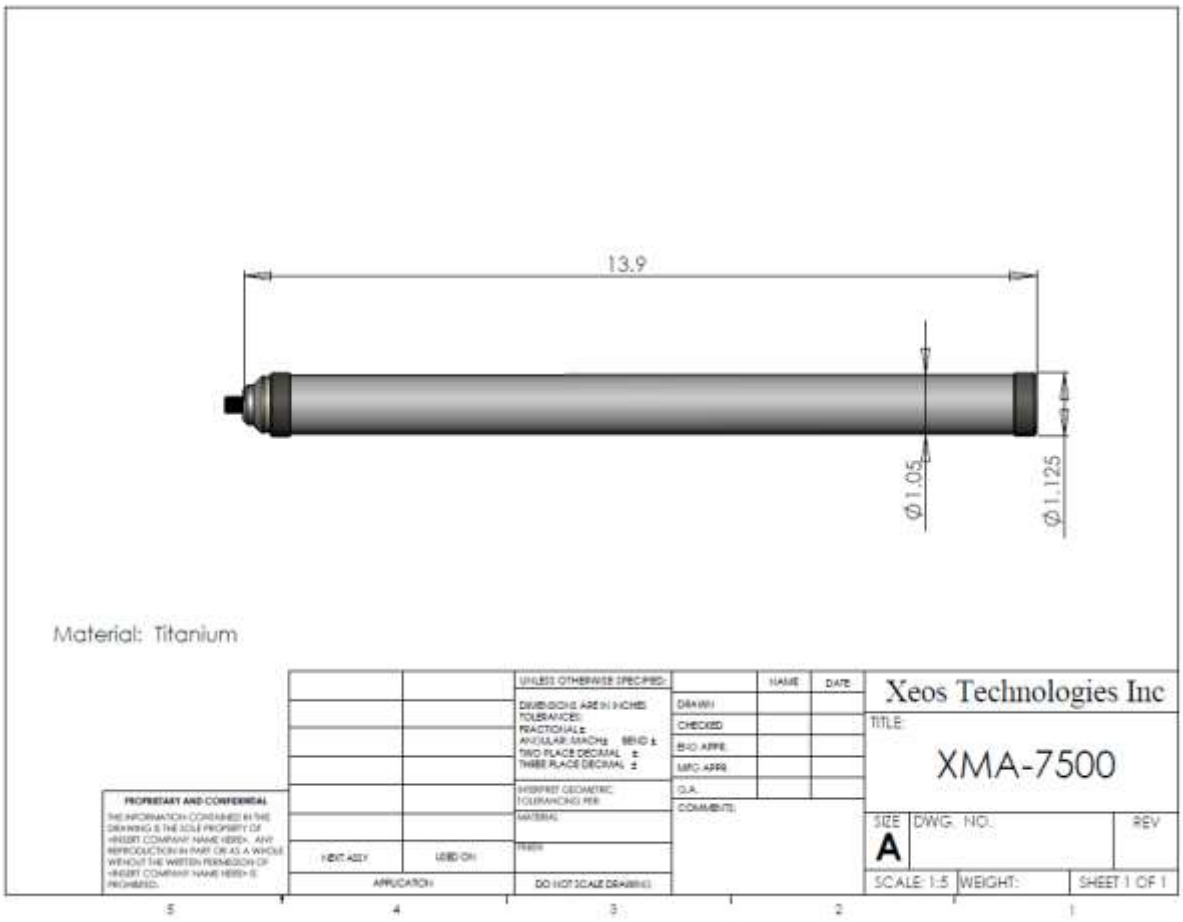


NOTE: use this command to verify the parameters you have changed

Appendix A - Technical Specification – Standard

Mechanical:

Material:	Tube: Grade 9 Titanium Antenna: Stainless Steel Spacer: Glass
Dimensions:	Length 13.9”L x 1.125” diam. Diameter of tube: 1.05’’ Antenna: 7” length
Weight:	Out of water: 644g In water: 431g
O-rings:	568-019 70A DURO BUNA
O-Ring Lube:	Dow Corning compound



Appendix B - Technical Specification – Short

Mechanical:

Material:	Tube: Grade 9 Titanium Antenna: Stainless Steel Spacer: Glass
Dimensions:	Length 16.23”L x 1.125” diam. Diameter of tube: 1.05’’ Antenna: 7” length
Weight:	Out of water: 820g In water: 620g
O-rings:	568-019 70A DURO BUNA
O-Ring Lube:	Dow Corning compound

Appendix C - Electrical

Power Supply

CR123A

Internal Battery Supply:	7x CR123A 3 volt lithium batteries
Voltage:	21 volts nominal
Capacity:	1.4 Amp-hours
Life expectancy:	22 Months (12 months subsurface 10 months at surface) Based on 90 second repetition rate.
Power Dissipation:	1W

AA

Internal Battery Supply:	6x AA 1.5 volt batteries
Voltage:	9 volts nominal
Capacity:	Varies by chemistry (1.8 Ah – 3.4 Ah)
Life expectancy:	18 Months (12 months subsurface 6 months at surface). Based on 90 second repetition rate.
Power Dissipation:	1W

Electronics

Digital Controller:	Xeos Hammerhead
Antenna Output Impedance:	50 ohms
Sleep Current:	<30µA
Transmit Current:	325mA @ 800mW Output
Channels:	User selectable, 401.630 MHz to 401.656 MHz
Serial Interface:	TTL level 9,600 baud (Firmware bootloader standard)

Environmental

Operating Temperature:	-30° C to +70° C (-22° F to +158° F) – chassis -40° C to +60° C (-40° F to +140° F) – circuit board
Storage Temperature:	-50° C to +80° C (-58° F to +176° F)
Depth Rating:	Submersible to 7,500m (24,606ft)

Appendix D Warranty, Support and Limited Liability

Xeos Technologies Inc. warranties the XMA-11K to be free of defects in material or manufacturing for a period of one year following delivery. Liability is limited to repair or replacement of the defective part and will be done free of charge.

LIMITED WARRANTY: Xeos Technologies Inc. warrants that the product will perform substantially in accordance with the accompanying written materials for a period of one year from the date of receipt.

CUSTOMER REMEDIES: Xeos Technologies Inc. entire liability and your exclusive remedy shall be at Xeos Technologies Inc. option, either (a) return of the price paid or (b) repair or replacement of the product that does not meet Xeos Technologies Inc. Limited Warranty and that is returned to Xeos Technologies Inc. with a copy of your receipt. This Limited Warranty is void if failure of the product has resulted from accident, abuse, or misapplication. Any replacement product will be warranted for the remainder of the original warranty period or ninety (90) days, whichever is longer.

NO OTHER WARRANTIES: Xeos Technologies Inc. disclaims all other warranties, either express or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the product or the accompanying written materials. This limited warranty gives you specific legal rights. You may have others, which vary from state to state.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES: In no event shall Xeos Technologies Inc. or its suppliers be liable for any damages whatsoever (including, without limitation, damages for loss of equipment, for loss of business profits, business interruption, loss of business information, or other pecuniary loss) arising out of the use of or inability to use this Xeos Technologies Inc. product, even if Xeos Technologies Inc. has been advised of the possibility of such damages.