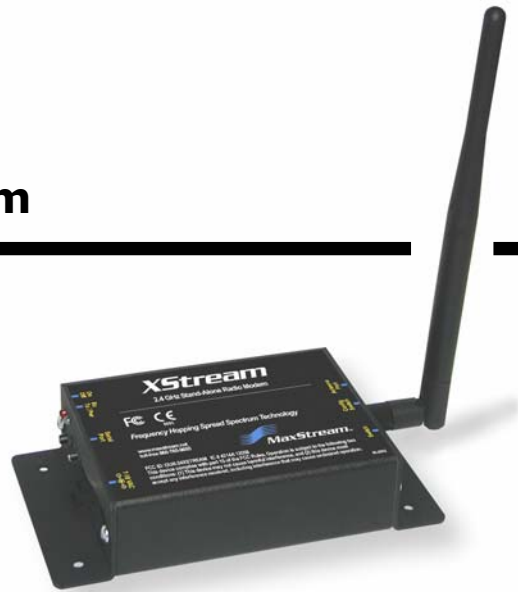


XStream-PKG-U™ USB RF Modem



Product Manual v4.2A

XStream RF Modem Part Numbers:

X09-001PK...-U...

X09-009PK...-U...

X09-019PK...-U...

X24-009PK...-U...

X24-019PK...-U...

XH9-001PK...-U...

XH9-009PK...-U...

XH9-019PK...-U...



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www.maxstream.net (live chat support)

M100074

08.04.2004

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XStream-PKG-U RF Modem

Introduction

MaxStream, Inc. developed the XStream-PKG-U USB RF Modem as a **long range, low power** and **easy-to-use** solution for the expanding RFd2d (radio frequency device-to-device) segment of the wireless market. The XStream-PKG-U RF Modem is compatible with all other MaxStream RF Modem radio modems meaning that users can transparently communicate data to RS-232/485 RF Modems, XStream OEM RF Modules and XCite OEM RF Modules.

Included Items

XStream-PKG-U USB RF Modem

XStream-PKG-U RF Modems now support a USB connection and Firmware Version 4.2A [See next page for list of features].

When compared to competing RF Modems, MaxStream solutions stand out in terms of money and time saved during project development. MaxStream RF Modems handle all the complexities associated with wireless communication (including modulation, demodulation, frequency synthesizers, amplifiers, filters, FCC approvals, etc.), so system integrators can focus on their own product development.



MaxStream RF Modems have been successfully designed into thousands of projects because of the strengths of MaxStream products and the strength of MaxStream’s support of its products.

Accessories Package

The accessories listed below are included with XStream-PKG-U USB RF Modems that carry the “-UA” suffix on the product number. For example: Part number “X09-019PKC-UA” includes the listed accessories and part number “X09-019PKC-U” does not. If RS-232/422/485 adapters and cables are needed for use with the XStream-PKG-R (RS-232/485) RF Modem, a separate accessories kit is available.

Table 1. Accessories Package (Items included with XStream-PKG-U RF Modems having the “-UA” suffix)

Item Name	Qty.	Description	MaxStream part number
Quick Start Guide	1	Familiarizes users with some of the RF Modem's most important functions. The guide provides step-by-step instructions including how to perform a range test.	M100075
CD: Configuration Software and Documentation	1	Helps developers to build & manage reliable wireless connections using XStream-PKG RF Modems. CD includes manuals, X-CTU Software & development tools.	MD0006
Antenna	1	RPSMA half-wave dipole antenna connects to the antenna port of the XStream-PKG-U RF Modem.	A09-HASM-675 (900 MHz) A24-HASM-525 (2.4 GHz)
USB Cable	1	Used to connect XStream-PKG-U RF Modems to a host USB port.	JU1U2-CSB-6F

Features

Long Range Communications at Low Cost

900 MHz Range

- Indoor/Urban: **up to** 1500' (450 m)
- Outdoor line-of-sight: **up to** 7 miles (11 km) w/ dipole antenna
- Outdoor line-of-sight: **up to** 20 miles (32 km) w/ high gain antenna

2.4 GHz Range

- Indoor/Urban: **up to** 600' (180 m)
- Outdoor line-of-sight: **up to** 3 miles (5 km) w/ dipole antenna
- Outdoor line-of-sight: **up to** 10 miles (16 km) w/ high gain antenna

Receiver sensitivity: **-110 dBm** (900 MHz), **-105 dBm** (2.4GHz)

- Compare with -93 dBm industry average



Easy-to-Use

Plug-and-Play RF experience (no configuration required)

Easy Integration of advanced functionality

Transparent Operation

Portable (small form factor and low power)

Support for multiple data formats

Reliable Transmission

Frequency-Hopping Spread Spectrum (FHSS) technology

Built-in **Interference Immunity** feature attenuates pager and cellular interference by 600 db

Low Power

Several Low-Power modes

Advanced Networking & Security

True Peer-to-Peer networking ("Master" radio not required)

Source & Destination addressing for point-to-multipoint networks

Supports Point-to-Point, Point-to-Multipoint & Multidrop applications

Simple AT and Binary command interface

Packet retries and acknowledgements

Over 65,000 unique addresses available

Three layers of networking filtration (VID, Hopping Channel & Address)

Specifications [\[Appendix B\]](#)

1-year Warranty [\[Appendix C\]](#)

Free & Unlimited Technical Support [\[Appendix D\]](#)

Worldwide Acceptance

FCC Certified (USA) [Go to [Appendix A](#) for FCC Requirements]

Devices that contain MaxStream RF Modems can inherit MaxStream's FCC Certification

IC (Industry Canada) **Certified**

ISM (Industrial, Scientific & Medical) frequency band

Manufactured under ISO 9001:2000 registered standards since 2000

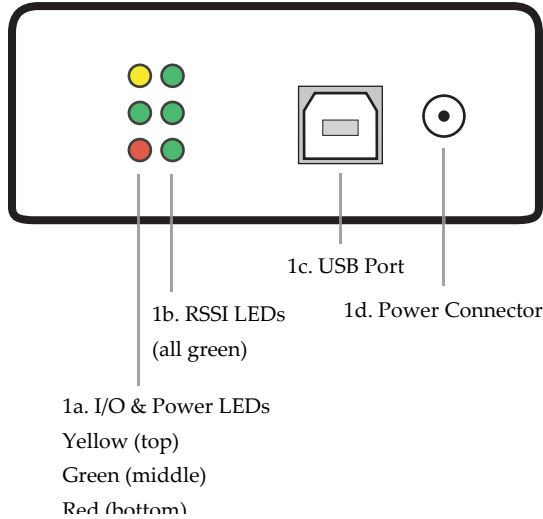
9XStream-PKG-U (900 MHz) RF Modems are approved for use in **US, Canada, Australia, Israel** and more. 24XStream-PKG-U (2.4 GHz) adds EU and other approvals.



XStream-PKG-U Interface

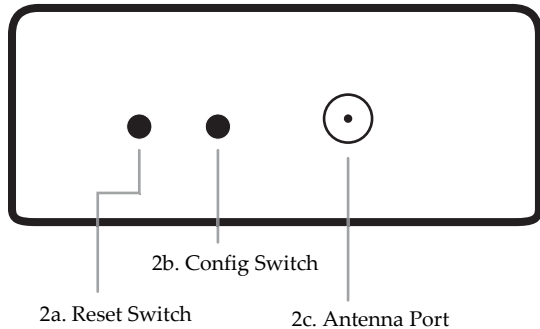
Front and Back Views

Figure 1. Front View



NOTE: Disconnect the USB cable before connecting or removing power from the Power Connector [1d]. This port does not require power unless insufficient power is available from the USB Port (< 500 mA).

Figure 2. Back View



1a. I/O & Power LEDs

I/O & Power LED indicators visualize diagnostic status information. The RF Modem’s status is represented as follows:

- Yellow** (top LED) = Serial Data Out (to host)
- Green** (middle) = Serial Data In (from host)
- Red** (bottom) = Power/TX Indicator (Red light is on when powered, off briefly during RF transmission)

1b. RSSI LEDs

RSSI (Receive Signal Strength Indicator) LEDs help assess the signal strength of received data.

- 3 LEDs on** = Very Strong Signal (> 30 dB fade margin)
- 2 LEDs on** = Strong (> 20 dB fade margin)
- 1 LED on** = Moderate (> 10 dB fade margin)
- 0 LED on** = Weak (< 10 dB fade margin)

Fade Margin = Amount by which a received signal level may be reduced without causing system performance to fall below a specified threshold value.

1c. USB Port

Standard Type-B USB connector – This port can also be used to power the XStream-PKG-U unit.

1d. Power Connector

5-12 VDC Power Connector – Power can also be supplied through the VBUS pin of the USB port.

2a. Reset Switch

Pressing the Reset Switch forces the modem into reset (or re-boot). It can be used in conjunction with the Configuration Switch [2b] to enter the RF Modem into AT Command Mode by doing the following: Simultaneously press the “Reset” and “Configuration” switches down, then release the “Reset” button, then after 1 second release the “Configuration” button.

After these steps are taken, the RF Modem enters into AT Command Mode at the RF Modem’s default baud rate.

2b. Configuration Switch

The Configuration Switch provides an alternate way to enter AT Command Mode. To enter AT Command Mode at the RF Modem’s default baud rate, read the Reset Switch entry on this page [2a].

2c. Antenna Port

This port is a 50Ω RF signal connector for connecting to an RPSMA (Reverse Polarity SMA) type antenna.

For CAD drawings and exact measurements, go to “[CAD Drawings](#)” section of Appendix B.

Operation

The XStream-PKG-U RF Modem is a stand-alone unit that can interface through a host device USB port. In order to interface through the USB port of a PC, OS-specific drivers must be installed.

This chapter covers basic operation of the XStream-PKG-U USB RF Modem and is organized as follows:

- Driver Installations
- Signal Pinouts
- Modem Configuration
- Modem Profiles

Driver Installations

"Hardware USB Bus" & "Virtual Com Port" drivers)

The XStream-PKG-U USB RF Modem is a "plug-and-play" device that should be detected by the PC. Once the modem is detected, the PC will display an installation wizard that facilitates driver installations.

To Install/Uninstall Drivers:

1. Connect the XStream-PKG-U RF Modem to a PC using a USB cable.

Found New Hardware Wizard windows

2. Verify MaxStream CD is inserted into the drive.
3. Select "Install from a specific list or location" option (Windows XP) then click the "Next" button.
- 4a. Select the "Search for the best driver in these locations" option (Windows XP).
- 4b. Check "Search removable media (CD-ROM...)" box (Windows XP), then click the "Next" button.
5. ["Windows Logo Testing" alert box] Click the "Continue Anyway" button.
6. Click the "Finish" button.
7. Repeat steps 2 through 5 to install the next driver.
8. Reboot computer if prompted to do so.

(Use the Microsoft Windows "Add/Remove Software" interface to uninstall.)

Signal Pinouts

Figure 3. Pins on the USB connector

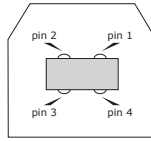


Table 2. USB Signals and their implementations on the XStream-PKG-U RF Modem

USB Pin	USB Name	Description	Implementation
1	VBUS	Power	Power RF Modem
2	D-	Transmitted & Received Data	Transmit data to and from the RF Modem
3	D+	Transmitted & Received Data	Transmit data to and from the RF Modem
4	GND	Ground Signal	Ground

Power Options

The RF Modem can power itself directly from the USB host through the USB cable (“bus-powered mode”). The modems can also be powered using an external power supply (“self-powered mode”). The external power must supply a DC voltage between 5 and 12 V. The power supply currently shipped with MaxStream Development Kits is a suitable power supply for this option.

XStream-PKG-U RF Modem automatically selects “self-powered mode” if power is available on the power connector when the RF is connected to USB. Do not disconnect the external power source without first disconnecting the XStream-PKG-U RF Modem from the USB connector.

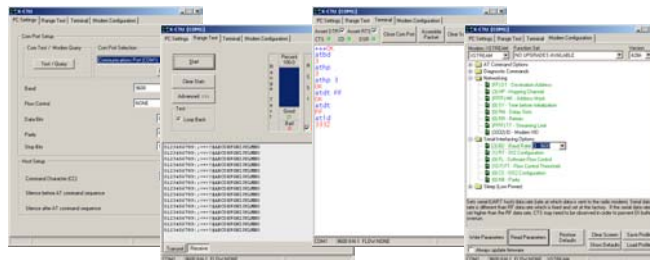
Modem Configuration

X-CTU Software

The X-CTU software can be used to setup and monitor communications using an XStream-PKG-U RF Modem and a PC. The software provides an easy-to-use interface that is divided into tabs that help users to setup a PC Serial Com Port, configure XStream-PKG-U RF Modem Parameters and perform range tests.

- **PC Settings** tab - Setup PC serial com ports to interface with RF modems
- **Range Test** tab - Test XStream RF Modem range
- **Terminal** tab - Configure and read XStream RF Modem parameters
- **Modem Configuration** tab - Configure and read XStream RF Modem parameters

Figure 4. Tabs of the X-CTU Software



To install the X-CTU software:

1. Double-click the “setup_X-CTU.exe” file then follow prompts of the installation screens. This file is located in the “software” folder of the MaxStream CD and under the ‘Downloads’ section of the following web page: www.maxstream.net/helpdesk/

Modem Profiles

Modem Profiles provide a method of saving radio parameters to a computer for later use. When configuring a RF Modem, use the "Save Profile" button to store custom settings to a user-defined folder. This section presents modem profiles that cite parameter values that are recommended for several different purposes.

For More Information

Consult "XStream Advanced Programming & Configuration" manual for more information about modem configurations.

To save and load modem profiles, follow these steps:

How to Use Modem Profiles

1. Connect the RF Modem to the USB port of a PC using a USB cable
 2. Launch MaxStream's proprietary X-CTU software
 3. Go to the "Modem Configuration" tab
 4. Adjust parameters according to data radio system's criteria. (Several modem profiles are listed below and contain recommended parameter values that accommodate certain functions.)
 5. Click the "Write Parameters" button (Parameters are saved to the connected RF Modem)
 6. To save the modem profile for later use, click the "Save Profile" button and save the profile to a specified folder in the Windows directory.
- To load previously saved profiles, click the "Load Profiles" button then navigate to the file.

Full-Duplex

USE: This profile can be used to simulate Full-Duplex communication between 2 MaxStream RF Modems. Use this profile if communication may be initiated from either RF Modem simultaneously.

Parameters:
RT = 2
RR = 20
RN = 4

DESCRIPTION: When streaming data, this profile inserts delays (RN) after it has transmitted the number of bytes determined by TT command. This allows the other radio to transmit its data and simulates a full-Duplex mode. Flow control should be observed.

Low Latency

USE: In query/response type systems, the SY parameter can be used to dramatically reduce the latency of a response (turn-around time) by having the modems stay synchronized as they shift from transmit to receive.

Parameter:
SY = 14

DESCRIPTION: As long as communication is constant with no gaps larger than SY (in tenths of seconds), the modems will not have to spend time initializing the channel except for on the first transmission. Without SY, the channel will be re-initialized before every transmission.

HINT: Keep SY as small as is possible.

Low Power Cyclic Sleep (Base Station)

USE: To wake a remote modem in cyclic sleep mode.

DESCRIPTION: Set a RF Modem to send a .6 second to 16.1 second channel initialization header that will wake a modem in the .5 second to 16 second cyclic sleep mode. Notice that Time-to-Sleep (ST) on the remote must be a tenth of a second shorter than the time-to-Long-Header (HT) on the base modem.

Parameters:
SM = 0
HT = 13
LH = [0x6 - 0x51]

SPECIAL: This profile should be programmed into the base modem that is to initiate communication. Use "Lower Power Cyclic Sleep Remote" profile for remote.

Low Power Cyclic Sleep (Remote)

USE: To have a radio go to low power mode.

DESCRIPTION: Use this profile to set a modem to a low power mode where it will wake up every (.5 to 16) seconds to check for a transmission. If there is a transmission the radio will wake up and receive the incoming data, returning to sleep after 2 seconds (ST) of no transmitting or receiving data.

SPECIAL: This profile should be programmed into the low power remote modem. Use "Low Power Cyclic Sleep Base Station" profile for base.

Parameter: SM = 1

Low Power Modes (Pin Sleep)

USE: Pin sleep mode can be used to control the sleep and wake states of the radio.

DESCRIPTION: This profile tells the radio to monitor the DTR pin to control the sleep and wake states.

Parameters: ST = 14 SM = [3 - 7]

Low Power Modes (Serial Port Sleep)

USE: Radio is in low power mode until a serial character is received.

DESCRIPTION: If this state is enabled, the modem goes into Sleep Mode after a user-defined period of inactivity (no transmitting or receiving of data). In this mode, the PWR LED is off. The modem will return to Idle Mode after the (ST) inactivity time.

Parameter: SM = 2

Modem Emulation (Base Station)

USE: This allows a PC to initiate point-to-point connections between a "base modem" and multiple "remote modems" - one at a time.

DESCRIPTION: This profile configures a "base modem" to "dial" uniquely addressed remote modems using an ATDT dialing string. The modem will default to command mode when turned on - use DTR to control power. After 60 seconds, the modem will automatically revert to data mode (CT) using the previously saved modem address (DT). Retries (RR) are enabled to ensure a reliable connection.

SPECIAL: Use in conjunction with the Modem Emulation (Remote modem) profile.

Parameters: RR = 14 SM = 1 CT = 258 PC = 1

Modem Emulation (Remote modems)

USE: Allow a PC to initiate point-to-point connections between a "base modem" and multiple "remote modems" - one at a time.

DESCRIPTION: This profile configures a "remote modem" to respond when the base modem "dials" the address "1 to n" using an ATDT dialing string. Retries (RR) are enabled to ensure a reliable connection.

SPECIAL: To contact this modem, send the dialing string "ATDT4,CN"<cr> to the base modem to initiate the communication. Use in conjunction with the Modem Emulation (Base Station) profile.

Parameters: RR = 14 DT = [1 - 4]

RS-485

USE: This profile is for half-duplex RS-485 operation.

DESCRIPTION: This profile programs the radio to use the CTS (J1 - pin 1) as an RS-485 Transmit Enable.

Parameter: CS = 1

Appendix A: Agency Certifications

FCC Compliance

For devices that contain XStream Radio Modems to inherit MaxStream’s FCC certifications, the following labeling and antenna conditions must be met:

LABELING REQUIREMENTS


 **WARNING:** The Original Equipment Manufacturer (OEM) must ensure that FCC labeling requirements are met. This includes a clearly visible label on the outside of the final product enclosure that displays the contents as is shown in Figures 5 & 6.

Figure 5. Required FCC Label (900 MHz)

Contains FCC ID: **OUR9XSTREAM**
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.

ANTENNA WARNING


 **WARNING:** This device has been tested with Reverse Polarity SMA connectors with the antennas listed in Tables 3 & 4 of Appendix A. When integrated in OEM products, fixed antennas require installation preventing end-users from replacing them with non-approved antennas. Antennas not listed in the tables must be tested to comply with FCC Section 15.203 (unique antenna connectors) and Section 15.247 (emissions).

Figure 6. Required FCC Label (2.4 GHz)

Contains FCC ID: **OUR-24XSTREAM**
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.

IMPORTANT: XStream 900 MHz & 2.4 GHz OEM Modems have been certified by the FCC for use with other products without any further certification (as per FCC section 2.1091). Changes or modifications not expressly approved by MaxStream could void the user’s authority to operate the equipment.

9XStream-PKG-U (900 MHz) Approved Antenna List

Table 3. XStream-PKG-U 900 MHz Approved Antennas with Separation Distances compliant with FCC Exposure Requirements


Manufacturer	900 MHz Part Number	Type	Gain	Application	Minimum Separation Distance
*	*	Yagi	6.2dBi	Fixed/Mobile **	20cm
*	*	Yagi	7.2dBi	Fixed/Mobile **	20cm
MaxStream	A09-Y8	Yagi	8.2dBi	Fixed/Mobile **	20cm
*	*	Yagi	9.2dBi	Fixed/Mobile **	20cm
*	*	Yagi	10.2dBi	Fixed/Mobile **	20cm
MaxStream	A09-Y11	Yagi	11.2dBi	Fixed/Mobile **	20cm
MaxStream	A09-F2	Omni Direct.	2.2dBi	Fixed	20cm
MaxStream	A09-F5	Omni Direct.	5.2dBi	Fixed	20cm
MaxStream	A09-F8	Omni Direct.	8.2dBi	Fixed	20cm
*	*	Omni Direct.	9.2dBi	Fixed	20cm
*	*	Omni Direct.	7.2dBi	Fixed	20cm
MaxStream	A09-M7	Omni Direct.	7.2dBi	Fixed	20cm
MaxStream	A09-H	1/2 wave antenna	2.1dBi	Fixed/Mobile **	20cm
MaxStream	A09-HBMM-P5I	1/2 wave antenna	2.1dBi	Fixed/Mobile **	1cm
MaxStream	A09-QBMM-P5I	1/4 wave antenna	1.9 dBi	Fixed/Mobile **	1cm
*	*	1/4 wave integrated wire antenna	1.9 dBi	Fixed/Mobile **	1cm

* FCC-approved antennas not inventoried by MaxStream – Contact MaxStream (801-765-9885) for information.

** Can be approved for portable applications if integrator gains approval through SAR testing

MaxStream radio modems are pre-FCC approved for use in fixed base station and mobile applications. As long as the antenna is mounted at least 20 cm (8 in) from nearby persons, the application is considered a mobile application. If the antenna will be mounted closer than 20 cm to nearby persons, then the application is considered “portable” and requires an additional test performed on the final product. This test is called the Specific Absorption Rate (SAR) testing and measures the emissions from the radio modem and how they affect the person.

RF EXPOSURE



WARNING: This equipment is approved only for mobile and base station transmitting devices, separation distances of (i) 20 centimeters or more for antennas with gains < 6 dBi or (ii) 2 meters or more for antennas with gains ≥ 6 dBi should be maintained between the antenna of this device and nearby persons during operation. To ensure compliance, operation at distances closer than this is not recommended.

The preceding statement must be included as a CAUTION statement in manuals for OEM products to alert users on FCC RF Exposure compliance.

In order to fulfill the certification requirements, the OEM must comply with FCC regulations:

1. The system integrator must ensure that the text on the external label provided with this device is placed on the outside of the final product.
2. The XStream-PKG-U 900 MHz may be used only with **Approved Antennas** that have been tested with this modem. [See Table 3 above]

24XStream-PKG-U (2.4 GHz) Approved Antenna List


Table 4. XStream-PKG-U 2.4 GHz Approved Antennas with Separation Distances compliant with FCC Exposure Requirements

Manufacturer	2.4 GHz Part Number	Type	Gain	Application	Minimum Separation Distance
*	*	Yagi	6dBi	Fixed **	2m
*	*	Yagi	8.8dBi	Fixed **	2m
*	*	Yagi	9dBi	Fixed **	2m
*	*	Yagi	10dBi	Fixed **	2m
*	*	Yagi	11dBi	Fixed **	2m
*	*	Yagi	12dBi	Fixed **	2m
*	*	Yagi	12.5dBi	Fixed **	2m
*	*	Yagi	13.5dBi	Fixed **	2m
*	*	Yagi	15dBi	Fixed **	2m
*	*	Omni Direct.	2.1dBi	Fixed/Mobile **	20cm
*	*	Omni Direct.	3dBi	Fixed/Mobile **	20cm
*	*	Omni Direct.	5dBi	Fixed/Mobile **	20cm
*	*	Omni Direct.	7.2dBi	Fixed **	2m
*	*	Omni Direct.	8dBi	Fixed **	2m
*	*	Omni Direct.	9.5dBi	Fixed **	2m
*	*	Omni Direct.	10dBi	Fixed **	2m
*	*	Omni Direct.	12dBi	Fixed **	2m
*	*	Omni Direct.	15dBi	Fixed **	2m
MaxStream	A24-P8	Panel	8.5dBi	Fixed **	2m
MaxStream	A24-P13	Panel	13dBi	Fixed **	2m
*	*	Panel	14dBi	Fixed **	2m
*	*	Panel	15dBi	Fixed **	2m
*	*	Panel	16dBi	Fixed **	2m
MaxStream	A24-P19	Panel	19dBi	Fixed **	2m
MaxStream	A24-HABMM-P6I	Dipole	2.1dBi	Fixed/Mobile **	20cm
MaxStream	A24-HBMM-P6I	Dipole	2.1dBi	Fixed/Mobile **	20cm
MaxStream	A24-HABSM	Dipole	2.1 dBi	Fixed/Mobile **	20cm
MaxStream	A24-QABMM-P6I	Monopole	1.9 dBi	Fixed/Mobile **	20cm
*	A24-Q1	Monopole	1.9 dBi	Fixed/Mobile **	20cm
*	*	Monopole	1.9 dBi	Fixed/Mobile **	20cm

* FCC-approved antennas not inventoried by MaxStream – Contact MaxStream (801-765-9885) for information.

** Can be approved for portable applications if integrator gains approval through SAR testing

RF EXPOSURE



WARNING: This equipment is approved only for mobile and base station transmitting devices, separation distances of (i) 20 centimeters or more for antennas with gains < 6 dBi or (ii) 2 meters or more for antennas with gains ≥ 6 dBi should be maintained between the antenna of this device and nearby persons during operation. To ensure compliance, operation at distances closer than this is not recommended.

The preceding statement must be included as a CAUTION statement in manuals for OEM products to alert users on FCC RF Exposure compliance.

European Compliance (2.4 GHz only)

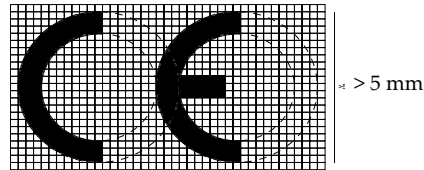
The 24XStream has been certified for several European countries. For a complete list, see www.maxstream.net.

If the 24XStream modems are incorporated into a product, the manufacturer must ensure compliance of the final product to the European harmonized EMC and low-voltage/safety standards. A Declaration of Conformity must be issued for each of these standards and kept on file as described in Annex II of the R&TTE Directive. Furthermore, the manufacturer must maintain a copy of the XStream user manual documentation and ensure the final product does not exceed the specified power ratings, antenna specifications, and/or installation requirements as specified in the user manual. If any of these specifications are exceeded in the final product, a submission must be made to a notified body for compliance testing to all required standards.

OEM Labeling Requirements

The 'CE' marking must be affixed to a visible location on the OEM product.

Figure 7. CE Label Requirements



The CE mark shall consist of the initials "CE" taking the following form:

- If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected.
- The CE marking must have a height of at least 5mm except where this is not possible on account of the nature of the apparatus.
- The CE marking must be affixed visibly, legibly, and indelibly.

Furthermore, since the usage of the 2400 – 2483.5 MHz band is not harmonized throughout Europe, the Restriction sign must be placed to the right of the 'CE' marking as shown below. See the R&TTE Directive, Article 12 and Annex VII for more information

Figure 8. CE Label Required on OEM Equipment



Restrictions

France – France imposes restrictions on the 2.4 GHz band. Go to www.art-telecom.fr or contact MaxStream for more information.

Norway – Norway prohibits operation near Ny-Alesund in Svalbard. More information can be found at the Norway Posts and Telecommunications site (www.npt.no).

24XStream Declarations of Conformity

MaxStream has issued Declarations of Conformity for the 24XStream modules concerning emissions, EMC and safety. These files are located in the 'documentation' folder of the MaxStream CD.

Important Note

MaxStream does not list the entire set of standards that must be met for each country. MaxStream customers assume full responsibility for learning and meeting the required guidelines for each country in their distribution market. For more information relating to European compliance of an OEM product incorporating the 24XStream module, contact MaxStream, or refer to the following web sites:

CEPT ERC 70-03E – Technical Requirements, European restrictions and general requirements: Available at www.ero.dk/

R&TTE Directive – Equipment requirements, placement on market: Available at www.ero.dk/

Notifications and Required Information

Since the 2.4 GHz band is not harmonized throughout Europe, a notification must be sent to each country prior to shipping product according to Article 6.4 of the R&TTE Directive. A list of national contacts for most European countries may be found at www.ero.dk/.

The following technical data (relating to the 24XStream) is often required in filling out an notification form.

- Frequency Band: 2400 – 2483.5 MHz
- Modulation: Frequency Shift Keying
- Channel Spacing: 400 kHz
- ITU Classification: 400KF1D
- Output Power: 100 mW EIRP
- Notified Body Number: 0891

Contact MaxStream (801) 765-9885 if additional information is required.

Table 5. Antennas approved for use with 24XStream (2.4 GHz) RF Modems in Europe

Manufacturer	Part Number	Type	Gain	Application	Minimum Separation Distance
MaxStream	A24-HABMM-P6I	Dipole	2.1 dBi	Fixed/Mobile *	20cm
MaxStream	A24-HBMM-P6I	Dipole	2.1 dBi	Fixed/Mobile *	20cm
MaxStream	A24-HABSM	Dipole	2.1 dBi	Fixed/Mobile *	20cm
MaxStream	A24-QABMM-P6I	Monopole	1.9 dBi	Fixed/Mobile *	20cm
MaxStream	A24-QBMM-P6I	Monopole	1.9 dBi	Fixed/Mobile *	20cm
MaxStream	A24-Q1	Monopole	1.9 dBi	Fixed/Mobile *	20cm

* Can be approved for portable applications if integrator gains approval through SAR testing

Appendix B: Specifications

XStream PKG-U USB RF Modem Specifications

Table 6. XStream-PKG-U USB RF Modem (900 MHz & 2.4 GHz) Specifications

Specification	9XStream-PKG-U (900 MHz)		24XStream-PKG-U (2.4 GHz)	
Performance				
Indoor/Urban Range	Up to 1500' (450 m)		Up to 600' (180 m)	
Outdoor LOS Range	Up to 7 miles (11 km) w/ dipole antenna Up to 20 miles (32 km) w/ high-gain antenna		Up to 3 miles (5 km) w/ dipole antenna Up to 10 miles (16 km) w/ high-gain antenna	
Serial Data Throughput	9600 bps	19.2 kbps	9600 bps	19.2 kbps
RF Baud Rate	10,000 bps	20,000 bps	10,000 bps	20,000 bps
Transmit Power Output	100 mW	100 mW	50 mW	50 mW
Receiver Sensitivity	-110 dBm	-107 dBm	-105 dBm	-102 dBm
General				
Frequency	902-928 MHz		2.4000-2.4835 GHz	
Spread Spectrum	Frequency Hopping, Wide band FM modulator			
Network Topology	Peer-to-Peer, Point-to-multipoint, Point-to-Point, Multi-drop			
Channel Capacity	7 hop sequences share 25 frequencies			
Serial Data Interface	USB			
I/O Serial Data Rate	Software selectable 1200 - 57600 bps			
Power Requirements				
Supply Voltage	5-12 VDC			
Transmit Current	215 mA		250 mA	
Receive Current	85 mA		110 mA	
Power Down Current	TBD			
Physical Properties				
Enclosure	7.1 oz. (200 g), Extruded aluminum, black anodized			
Enclosure Size	2.75" x 5.50" x 1.124" (7.90 cm x 13.90 cm x 3.80 cm)			
Operating Temperature	0 to 70° C (commercial), -40 to 85° C (industrial)			
Antenna				
Type	½ wave dipole whip, 6.75" (17.1 cm), 2.1 dBi Gain			
Connector	Reverse-polarity SMA (RPSMA)			
Impedance	50 ohms unbalanced			
Certifications				
FCC Part 15.247	OUR9XSTREAM		OUR-24XSTREAM	
Industry Canada (IC)	4214A-9XSTREAM		4214A 12008	
Europe	N/A		ETSI, CE	

Appendix C:

Additional Information

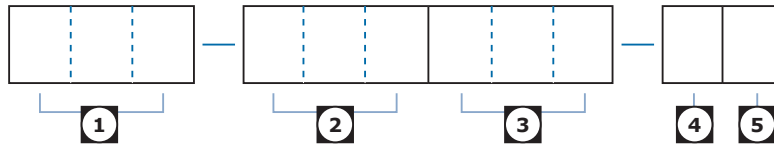
1-Year Warranty

The XStream-PKG-U USB RF Modem from MaxStream, Inc. (the "Product") is warranted against defects in materials and workmanship under normal use, for a period of 1-year from the date of purchase. In the event of a product failure due to materials or workmanship, MaxStream will repair or replace the defective product. For warranty service, return the defective product to MaxStream, shipping prepaid, for prompt repair or replacement.

The foregoing sets forth the full extent of MaxStream's warranties regarding the Product. Repair or replacement at MaxStream's option is the exclusive remedy. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND MAXSTREAM SPECIFICALLY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL MAXSTREAM, ITS SUPPLIERS OR LICENSORS BE LIABLE FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT, FOR ANY LOSS OF USE, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, LOST PROFITS OR SAVINGS, OR OTHER INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT, TO THE FULL EXTENT SUCH MAY BE DISCLAIMED BY LAW. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES. THEREFOR, THE FOREGOING EXCLUSIONS MAY NOT APPLY IN ALL CASES. This warranty provides specific legal rights. Other rights which vary from state to state may also apply.

XStream-PKG-U RF Modem Part Numbers

Figure 10. XStream-PKG RF Modem Part Number Key



Divisions of the XStream-PKG RF Modem part number:

- 1 Operating Frequency**
 X09 = 915 MHz
 X24 = 2.4 GHz
 XH9 = 923 MHz frequencies (Australia and Israel)
- 2 RF Data Rate (Baud)**
 001 = 1200 baud
 009 = 9600 baud
 019 = 19200 baud
- 3 PKG Temperature Ratings**
 PKC = Commercial: 0 to 70° C
 PKI = Industrial: -40 to 85° C. Embedded RF Module is Conformal Coated
 PKT = Tested Industrial: -40 to 85° C. Embedded RF Module is Conformal Coated & 100 % tested
- 4 Interfacing Mode**
 R = RS-232, RS-485/422
 U = USB
- 5 Accessories Package**
 A = Accessories Package (specific to the Interfacing Mode) Included
 (blank) means that the accessories package is not included

For example: X09-009PKC-UA
 (XStream-PKG-U 900 MHz RF Modem, 9600 baud, Commercially Tested, USB Interface, w/ accessories)

Wireless Industry Perspective

Table 7. Comparisons of Wireless Technologies

	IrDA	Bluetooth	Wireless LAN	Cellular	MaxStream 900 MHz
Transmit Speed	Up to 4 Mbps	Up to 1 Mbps	Up to 11 Mbps	Up to 38.4 kbps	Up to 19.2 kbps
Range	10 meters	10-50 meters	50 meters indoor 150 meters outdoor	Cellular network	180 meters indoor 5-16 Kilometers outdoor
Interface	Custom	USB, PCI	USB, PCI	Serial, USB	Serial, USB
Advantage	Low price, High speed	Multiple vendors, Plug and Play	Multiple vendors, High speed	Dial-in access to remote device, National coverage	Long range, Low price, Low power, Advanced networking
Disadvantage	Line-of-sight only, No multipoint	Short range, Complex software	Power Consumption, Complex software	Re-occurring monthly costs	Limited simultaneous network support

