

# 9XCite-PKG-U™ USB RF Modem

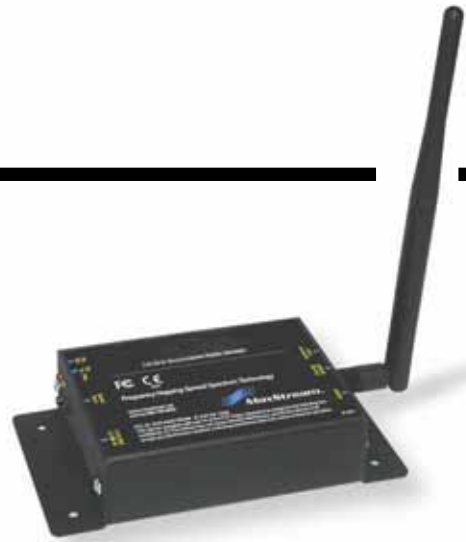
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9XCite-PKG-U™ USB RF Modem

RF Operation

Modem Configuration

Appendices



## Product Manual v1.1

XCite RF Modem Part Numbers:

XC09-009PK...-U...

XC09-038PK...-U...



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M100180  
2005.04.08

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# 9XCite-PKG-U™ RF Modem

The XCite-PKG-U USB RF Modem is a **long range, low power** and **easy-to-use** solution for the expanding RFd2d (radio frequency device-to-device) segment of the wireless market.

This manual contains information critical to fundamental XCite RF Modem operation. More advanced functionality is documented in the "XCite Advanced Programming & Configuration" manual. (Located on the MaxStream CD and on the web: [www.maxstream.net/helpdesk/](http://www.maxstream.net/helpdesk/))



## Features

### Long Range Performance

#### Range:

Indoor/Urban: **up to 300'** (90 m)

Outdoor RF line-of-sight:

up to **1000'** (300 m) w/ 2.1 dB dipole antenna

**Receiver Sensitivity:** -108 dBm (@ 9600 baud),  
-104 dBm (@ 38400 baud)

### Advanced Networking & Security

True Peer-to-Peer (no "master" required),  
Point-to-Point, Point-to-Multipoint & Multidrop

FHSS (Frequency Hopping Spread Spectrum)

7 hopping channels:  
each with over 65,000 network addresses available

Up to 9 non-overlapping simultaneous networks

### Low Power

4 mW Power Output

Power-down current as low as 1 mA

105 mA transmit / 55 mA receive current consumption

### Worldwide Acceptance

**FCC Certified (USA)** [Go to Appendix A for FCC Requirements]  
Systems that contain XCite Modems inherit MaxStream's FCC Certification

**IC (Industry Canada) Certified**

**ISM (Industrial, Scientific & Medical) license-free** 902-928 MHz frequency band

Manufactured under **ISO 9001:2000 registered standards**

### Easy-to-Use

No configuration required

Advanced configurations available  
through AT commands

5 to 12V power supply external or  
USB bus power

Continuous RF data stream of  
up to 38.4 kbps

MODBUS I/O Support (Call MaxStream  
Technical Support for additional  
supported I/O protocols)

XII™ Interference Immunity

X-CTU Software included

Plug-and-Play USB interface

Cover more ground with fewer radio  
modems due to market-leading range

**Free & Unlimited Technical Support**



## Specifications

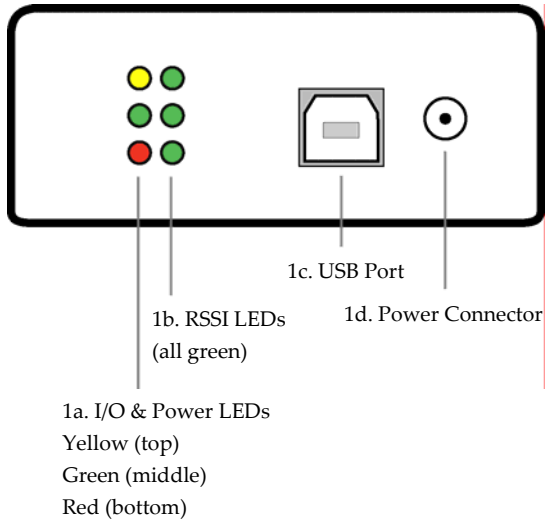
**Table 1. 9XCite-PKG-U USB RF Modem (900 MHz & 2.4 GHz) Specifications**

Specification	9XCite-PKG-U (900 MHz) USB RF Modem	
<b>Performance</b>		
Indoor/Urban Range	Up to 300' (90 m)	
Outdoor Range (RF line-of-sight)	Up to 1000' (300 m) w/ 2.1 dB dipole antenna	
Transmit Power Output	4 mW (6 dBm)	
Interface Data Rate	Software selectable 1200 - 57600 bps	
<b>Throughput Data Rate</b>	<b>9600 bps</b>	<b>38400 bps</b>
RF Data Rate	10,000 bps	41,666 bps
Receiver Sensitivity (1 x 10 <sup>-4</sup> BER)	-108 dBm	-104 dBm
<b>General</b>		
Frequency	902-928 MHz	
Spread Spectrum	Frequency Hopping, Wide band FM modulator	
Network Topology	Peer-to-Peer, Point-to-Point, Point-to-Multipoint, Multidrop	
Channel Capacity	Hopping Mode - 7 hop sequences share 25 frequencies Single Frequency Mode – 25 available frequencies	
Serial Data Interface	USB	
<b>Power Requirements</b>		
Supply Voltage	5 - 12 VDC external or USB bus power	
Transmit Current	105 mA	
Receive Current	55 mA	
Power Down Current	< 1 mA	
<b>Physical Properties</b>		
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)	
<b>Antenna</b>		
Type	½ wave dipole whip, 6.75" (17.1 cm), 2.1 dBi Gain	
Connector	Reverse-polarity SMA	
Impedance	50 ohms unbalanced	
<b>Certifications</b> (For additional certifications, go <a href="http://www.maxstream.net">www.maxstream.net</a> or call (801) 765-9885.)		
FCC Part 15.247	OUR-9XCITE	
Industry Canada (IC)	4214A-9XCITE	

# 9XCite-PKG-U Interface

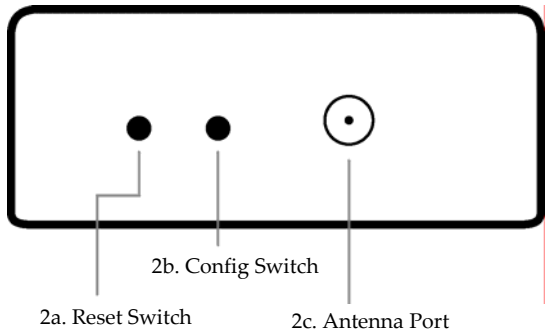
## Front and Back Views

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 through 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 LEDs are not active on the XCite version of the PKG-U RF Modem. On the XStream and XTend RF Modems, the RSSI LEDs indicate the amount of fade margin present in an active wireless link. Fade margin is the difference between the incoming signal strength and the modem's receiver sensitivity.

### 1c. USB Port

Standard Type-B USB connector – Port can be used to power the XCite-PKG-U RF Modem.

### 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. Config (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 [Mechanical Drawings](#) section.

## Pin Signals

Figure 3. Pins on the USB connector

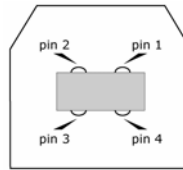


Table 2. USB Signals and their implementations on the XCite-PKG-U RF Modem

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

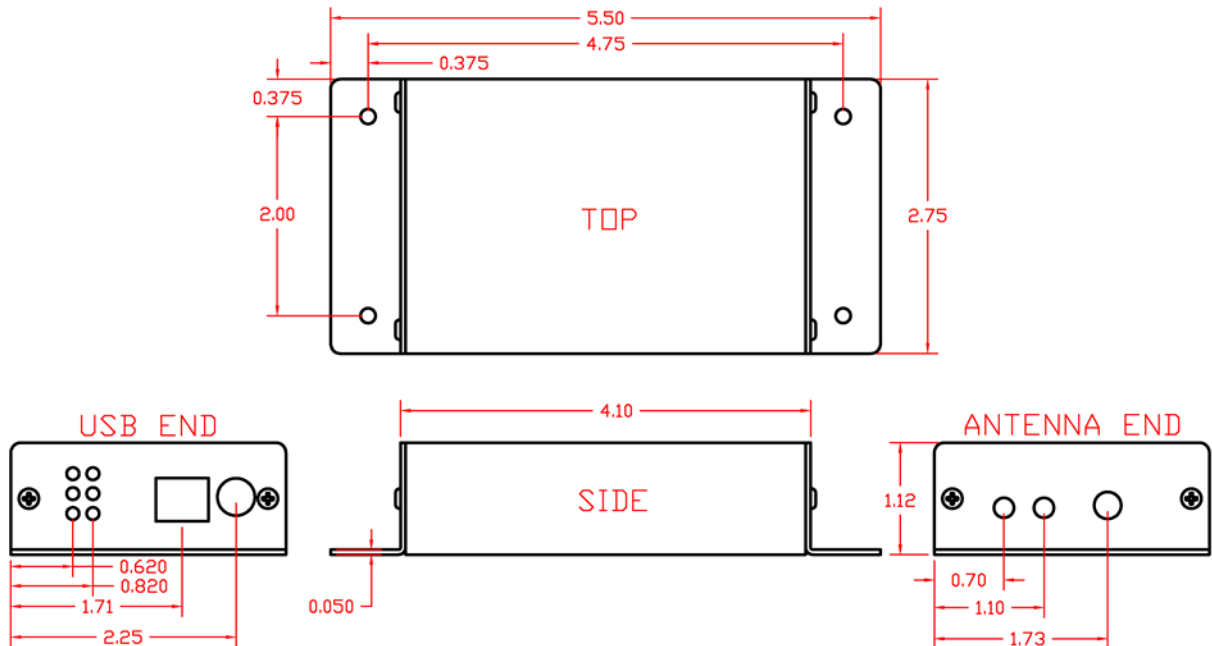
### Power Options

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.

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

## Mechanical Drawings

Figure 4. Drawings for the XCite-PKG-U (USB) RF Modem.



# RF Operation

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## Driver Installations

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### “Hardware USB Bus” & “Virtual Com Port” drivers

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Data communications between a host and an XCite USB RF Modem are enabled through the “Hardware USB Bus” and “Virtual Com Port” drivers. Once installed, the drivers allow a host (such as a PC) to communicate data to and receive data from the RF modem through a virtual serial com port. The virtual com port shows like all other serial com ports.

The XCite USB RF Modem is a “plug-and-play” device that should automatically be detected by the PC. Once the modem is detected, the PC will display an installation wizard that facilitates the required driver installations.

#### To Install Drivers:

1. Connect the XCite-PKG-U RF Modem to a PC using a USB cable. (Modem is powered through pin 1 of the USB Cable.)

#### Found New Hardware Wizard (Windows XP)

2. Verify MaxStream CD is inserted into the drive.
3. Select “Install from a specific list or location” option; then click the “Next” button.
- 4a. Select the “Search for the best driver in these locations” option.
- 4b. Check “Search removable media (CD-ROM...)” box; 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 second of the two required drivers.
8. Reboot computer if prompted to do so.

Use the Microsoft Windows “Add/Remove Software” interface to uninstall drivers.

### USB Background Information

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USB has two types of devices: Those that supply drivers (a host, such as a PC); and those that require a driver (a client, such as a MaxStream USB RF Modem). When a USB client is plugged into a host, the host prompts the device for a driver. Once a driver is located, the host loads the driver on the first use of the USB client; then supplies the installed driver on all subsequent uses.

A USB client should not be plugged into another client. If another USB client (such as a USB video camera) is plugged into a MaxStream USB RF modem (also a client), the devices will not communicate. It would be incorrect to attach a USB modem to a host on one end and attach a USB modem to a USB client at the other end. Virtually all USB peripherals (video cameras, PDA cradles, printers, etc.) are USB clients.

## System Description

The XCite-PKG-U USB RF Modem is most commonly used as an access point in a network of serial RF modems (such as MaxStream’s RS-232/485 RF Modems). The XCite RF Modems support point-to-point, peer-to-peer, point-to-multipoint and multidrop network topologies. The section below illustrates a typical point-to-multipoint network application.

### System Components

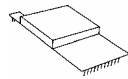
XCite Radio Modems are designed to provide long range wireless links between devices in a data system. The following devices will be used to describe a data system that includes the XCite USB RF Modem:



**XCite-PKG-U USB RF Modem (“PKG-U”):** The Ethernet RF Modem is an USB-connected serial modem used for communication with other MaxStream serial modems.

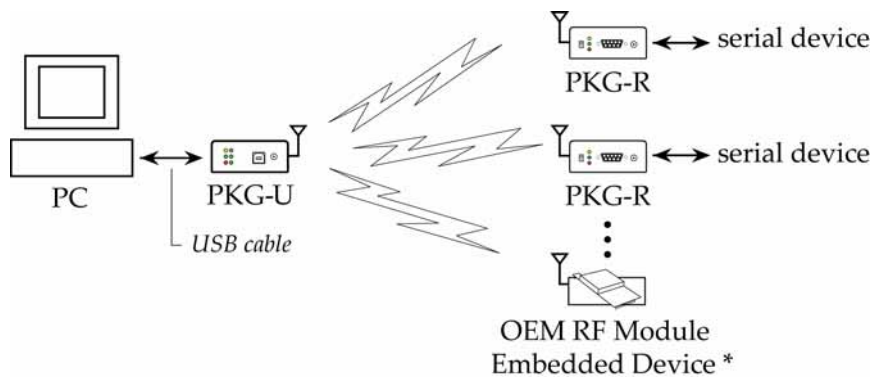


**XCite-PKG-R RS-232/485 RF Modem (“PKG-R”):** The RS-232/485 RF Modem is a serial modem that can be identified by its DB-9 serial port and 6-switch DIP Switch.



**XCite OEM RF Module (“OEM RF Module”):** The XCite OEM RF Module is mounted inside all XCite-PKG RF Modems and may be integrated into OEM-designed products to transmit and receive data over-the-air.

Figure 5. The XCite USB RF Modem in a Point-to-Multipoint Data Radio System



\* The “OEM RF Module Embedded Device” represents any device that contains in it a MaxStream OEM RF Module. This includes other MaxStream RF Modems and devices that contain in them a MaxStream OEM RF Module.

NOTE: XCite and XStream Radio Modems can seamlessly communicate data between each other. The PKG-R units shown can therefore be from either product family. The primary differences between the XCite and XStream radio modems are in range and configuration options.

# Modem Configuration

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The following versions of the XCite Module are currently available:

- 900 MHz, 9600 Baud (RF data rate), Hopping Channel Mode
- 900 MHz, 9600 Baud, Single Channel mode
- 900 MHz, 38400 Baud, Hopping Channel mode
- 900 MHz, 38400 Baud, Single Channel mode

XCite Modules can operate in both Single Channel and Hopping modes. Mode is selectable using the "Function Set" dropdown list of the "XCite Configuration" tab of the MaxStream-provided X-CTU Software.

The XCite Module is shipped with a unique parameter set in its memory. Parameters within the set are organized under the following categories: AT Commands & Non-AT Settable Parameters.

## For More Information

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Refer to the "XCite Advanced Programming & Configuration" manual for more information about modem configurations.

The advanced manual is available on the MaxStream CD or on the web: [www.maxstream.net](http://www.maxstream.net)

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## Command & Parameter Types

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### AT Commands

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AT Commands can be changed at any time by entering AT Command Mode and sending commands to the module. [AT Commands are listed in Table 5.]

AT Commands can be modified using the any of the following means:

- X-CTU Software "Modem Configuration" tab
- X-CTU Software "Terminal" tab
- Terminal software program (such as "HyperTerminal")
- Microcontroller

### Non-AT Settable Parameters (X-CTU Software configurable only)

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Non-AT Settable Parameters can only be adjusted using the MaxStream-provided X-CTU Software. To modify Non-AT Settable Parameter, connect the module to the serial com port of a PC (interface board is necessary for RS-232 connection) and modify parameter values through the X-CTU Software interface. These parameters enable features that need to be set before the module is used in the field. [Non-AT Settable Parameters are listed in Table 6.]

Non-AT Settable Parameters can only be modified using the following means:

- X-CTU Software "Modem Configuration" tab

## XCite Commands Reference

XCite AT Commands and Non-AT Settable Parameters are organized under the following command categories:

- AT Command Mode Options
- Diagnostic
- Networking
- Serial Interfacing
- Sleep Mode (Low Power)

**Table 3. XCite AT Commands**

(Settable/Readable using X-CTU Software, serial communications software or microcontroller)

AT Designator	Command Description	Parameters	Command Category	# Bytes Returned	Factory Default
CD	DI3 Configuration. Redefines the RX LED I/O line (RX LED signal).	Range: 0 – 2 0 = RX LED 1 = high 2 = low	Serial Interfacing	1	0
CN	Exit AT Command Mode. Explicitly exit radio modem from AT Command Mode and return it to Idle Mode.	-	AT Command Mode Options	-	-
CS	DO2 Configuration. Select behavior of DI2 (Digital Output 2) between <b>CTS</b> and RS-485 options.	Range: 0 – 4 0 = normal <b>CTS</b> 1 = RS-485 enable low 2 = high 3 = RS-485 enable high 4 = low	Serial Interfacing	1	0
DB	Receive Signal Strength. Returns the signal strength (in decibels) of the last received packet.	Range: 0x25 – 0x6A (Read-only)	Diagnostic	1	-
DT	Destination Address. Set the address that identifies the destination of the RF packet. Only radio modems having matching addresses can communicate with each other.	Range: 0 – 0xFFFF	Networking	2	0
HP	Channel *. Select "Hopping" or "Single Frequency" channel on which the radio modem is to communicate. Channels are not non-interfering.	Range (Hopping): 0 – 6 Range (Single Frequency): 0 – 0x18	Networking	1	0
HV	Hardware Version. Read the hardware version of the modem.	Range: 0 – 0xFFFF (Read-only)	Diagnostic	2	-
MK	Address Mask. Set address mask to configure local and global address space.	Range: 0 – 0xFFFF	Networking	2	0xFFFF (65535d)
RE	Restore Defaults. Restore AT-settable parameters to the factory default configuration.	-	(Special)	-	-
SH	Serial Number High. Read High 16 bits of unique serial number of radio modem.	0 – 0xFFFF (Read-only)	Diagnostic	2	-
SL	Serial Number Low. Read Low 16 bits of unique serial number of radio modem.	0 – 0xFFFF (Read-only)	Diagnostic	2	-
VR	Firmware Version. Read firmware version currently loaded on radio modem.	0 x 0xFFFF (Read-only)	Diagnostic	2	-
WR	Write. Write parameters to radio modem's non-volatile memory in order for changes to persist through next power-up or reset.	-	(Special)	-	-

\* To select the Channel Mode: Select mode from the 'Function Set' dropdown list on the "Modem Configuration" tab of the X-CTU Software. Then click the 'Write Parameters' button.

**Table 4. Non-AT Settable Parameters**

(Settable/Readable using the X-CTU Software’s “Modem Configuration” tab only)

AT Designator	Command Description	Parameters	Command Category	# Bytes Returned	Factory Default
AT	Guard Time After. Set required DI pin silent time after the Command Sequence Characters of the AT Command Mode Sequence (BT+ CC + AT).	Range: 0 – 0xFFFF (x 1 ms)	AT Command Mode Options	2	0x1F4 (500d)
BD	Baud Rate. Set serial data rate (baud rate at which radio modem interfaces with host).  Serial data rate is different than RF data rate which is fixed and factory-set. If the serial data rate is set higher than RF data rate, CTS may need to be observed to prevent DI buffer overrun.	Range: 0 – 6 (1200 - 57600 bps)	Serial Interfacing	1	Set to equal radio modem's fixed RF data rate.
BI	Number of Bits. (7 or 8) – Sets number of data bits per character (bits between start and stop bits).	Range: 0 – 1 0 = 7 bits 1 = 8 bits	Serial Interfacing	1	1
BT	Guard Time Before. Set required DI pin silent time before the Command Sequence Characters of the Command Mode Sequence (BT+ CC + AT).	Range: 0 – 0xFFFF (x 1 ms)	AT Command Mode Options	2	0x1F4 (500d)
CC	Command Sequence Character. Set the ASCII character to be used between Guard Times of the AT Command Mode Sequence (BT+ CC + AT). The AT Command Mode Sequence enters the radio modem to AT Command Mode (from Idle Mode).	Range: 0x20 – 0x7F	AT Command Mode Options	1	0x2B (plus sign (+) in ASCII)
CT	Time before Exit AT Command Mode. Set time period of inactivity (no valid commands received) after which radio modem automatically exits from AT Command Mode.	Range: 0x02 – 0xFFFF (x 100 ms)	AT Command Mode Options	2	0xC8 (200d)
FL	Software Flow Control. Enable serial software flow control on the radio modem. (Hardware flow control (CTS) is on by default.)	Range: 0 - 1 0 = disable 1 = enabled	Serial Interfacing	1	0
HT	Time before Wake-up Initializer. Set time period of inactivity (no serial or RF data is sent or received) before a Wake-up Initializer is sent. Base station tracks awake-status of remote radios. HT of base radio should be set shorter than ST of remote radios.	Range: 0 – 0xFFFF (x 100 ms)	Sleep (Low Power)	2	0xFFFF (no wake-up Initializer will be sent)
ID	Modem VID. Read radio modem VID (Vendor Identification Number). Only radio modems with matching VIDs can communicate with each other.	Range: 0 – 0x7FFF (above this range is Read-only)	Networking	2	0x3332
LH	Wake-up Initializer Time. Set time of the Wake-up Initializer used to wake remote radios that are in cyclic sleep mode. Time of Wake-up Initializer should be longer than that of the remote radio's cyclic sleep cycle (SM 3 - 8).	Range: 0 – 0xFF (x 100 ms)	Sleep (Low Power)	1	1
NB	Parity. Select parity format. Settings 0-4 transfer only 8 bits out the antenna port and generate the parity bit on the radio modem receiving side.	Range: 0 – 4 0 = 8-none-1, 7-any-1 1 = 8-even-1 2 = 8-odd-1 3 = 8-mark-1, 8-none-2 4 = 8-space-1	Serial Interfacing	1	0
PW	Pin Wake-up. Enable pin wake-up from Cyclic Sleep Mode.	Range: 0 – 1 0 = disabled 1 = enabled	Sleep (Low Power)	1	0
RT	DI2 Configuration. Enable $\overline{\text{RTS}}$ Mode ( $\overline{\text{RTS}}$ /CMD signal - pin 5 of OEM RF Module).	Range: 0 - 1 0 = Disabled 1 = $\overline{\text{RTS}}$ flow control	Serial Interfacing	1	0
SB	Stop Bits. Set number of stop bits.	Range: 0 – 1 0 = 1 stop bit 1 = 2 stop bits	Serial Interfacing	1	0
SM	Sleep Mode. Specify Sleep Mode settings.	Range: 0 – 8 0 = No sleep 1 = Pin Sleep 2 = Serial Port Sleep 3 to 8 = Cyclic intervals ranging from 0.5 to 16.0 seconds	Sleep (Low Power)	1	0
ST	Time before Sleep. Set time period of inactivity (no serial or RF data is sent or received) before activating Sleep Mode. Use with Cyclic Sleep and Serial Port Sleep. (see SM Command)	Range: 0x10 – 0xFFFF (x 100 ms)	Sleep (Low Power)	2	0x64 (100d)

## Configuration Software

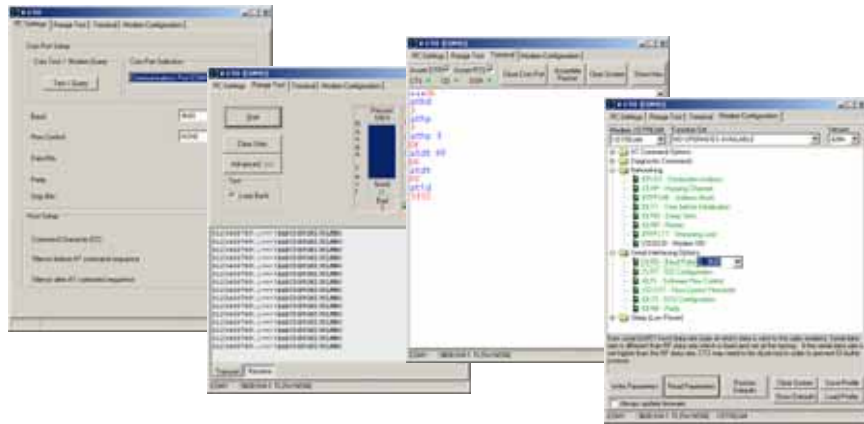
### X-CTU Software

X-CTU is MaxStream-provided software used to configure XCite Modules. It is the only means that can be used to set all three command parameter types [AT Commands and Non-AT Settable Parameters].

X-CTU Software is organized into the following four tabs:

- PC Settings tab - Setup PC serial ports to interface with an XCite Module assembly
- Range Test tab – Test XCite Module range
- Terminal tab – Configure and read XCite Module parameters using AT Commands
- Modem Configuration tab – Configure and read XCite Module parameters

Figure 6. X-CTU User Interface (PC Settings, Range Test, Terminal & Modem Configuration tabs)



#### Install X-CTU software

Double-click the "setup\_X-CTU.exe" file and follow prompts of the installation screens. This file is located in the 'software' folder of the MaxStream CD and also under the 'Downloads' section of the following web page: <http://www.maxstream.net/helpdesk/>

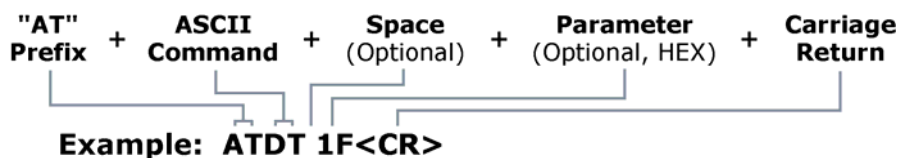
#### Using X-CTU software

In order to use the X-CTU software, a module assembly (an XCite Module mounted to a MaxStream Interface Board) must be connected to the serial port of a PC. The baud rate of the serial port ("PC Settings" tab) must match the baud rate of the module (BD (Baud Rate) Command on the "Modem Configuration" tab).

### Serial Communications Software (for AT Commands Only)

A terminal program has been built into the X-CTU software. Serial Communications Software can be used to issue AT Commands, but cannot be used to set Non-AT Settable Parameters. Use the syntax illustrated in the following example when issuing AT Commands using terminal software. (This example sets the destination address of the module to "0x1F". WR (Write) Command would also have to be used to save the new value to non-volatile memory.)

Figure 7. Syntax for sending AT Commands:



## 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.

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 X-CTU software
  3. Select 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 a range of 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.

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### Low Power Cyclic Sleep (Remote)

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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.

<b>Parameters:</b> ST = 14 SM = [3 - 7]
---

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### Low Power Modes (Pin Sleep)

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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.

<b>Parameter:</b> SM = 1
-----------------------------

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### Low Power Modes (Serial Port Sleep)

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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.

<b>Parameter:</b> SM = 2
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### 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.

<b>Parameters:</b> RR = 14 SM = 1 CT = 258 PC = 1
---

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### Modem Emulation (Remote modems)

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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.

<b>Parameters:</b> RR = 14 DT = [1 - n]
---

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### RS-485

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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.

<b>Parameter:</b> CS = 1
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# Appendix A:

# Agency Certifications


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## FCC Compliance

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For devices that contain XCite 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 7.

**Figure 8. Required FCC Label (900 MHz)**

Contains FCC ID: **OUR-9XCITE**  
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).

---

**IMPORTANT:** XCite 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.

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**9XCite-PKG-U (900 MHz) Approved Antenna List**

Table 5. XCite-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 XCite-PKG-U 900 MHz may be used only with **Approved Antennas** that have been tested with this modem. [Refer to Table 5]

**IC (Industry Canada) Certification**

Labeling requirements for Industry Canada are similar to those of the FCC. A clearly visible label on the outside of the final product enclosure must display the following text:

**Contains Model 9XStream Radio (900 MHz), IC: 4214A-9XCITE**

Integrator is responsible for its product to comply with IC ICES-003 & FCC Part 15, Sub. B - Unintentional Radiators. ICES-003 is the same as FCC Part 15 Sub. B and Industry Canada accepts FCC test report or CISPR 22 test report for compliance with ICES-003.

# Appendix B:

# Additional Information

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## 1-Year Warranty

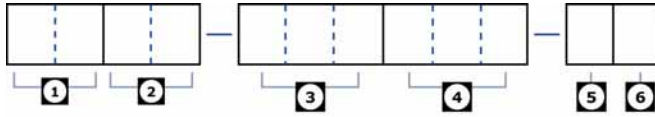
---

The XCite-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.

## MaxStream RF Modem Part Numbers

Figure 9. XCite-PKG RF Modem Part Number Key



Divisions of the MaxStream PKG RF Modem part numbers:

**1 MaxStream Product Family**

XC = XCite  
X = XStream  
XT = XTend

**2 Operating Frequency**

09 = 902-928 MHz  
24 = 2.4000 - 2.4835 GHz  
(XStream only)  
H9 = 923 MHz (XStream only)

**3 Throughput Data Rate**

001 = 1200 bps (XStream only)  
009 = 9600 bps  
019 = 19200 bps (XStream only)  
038 = 38400 bps (XCite Only)  
(blank) All XTend RF Modems support  
9600 & 115200 bps (software selectable)

**4 Operating Temperature**

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

**5 Interface**

R = RS-232, RS-485/422  
U = USB  
E = Ethernet  
T = Telephone

**6 Accessories Package**

A = Accessories Package (specific to the Interface) Included  
(blank) means the accessories package is not included

## Contact MaxStream

Free and unlimited technical support is included with every MaxStream Radio Modem sold.

Please use the following resources for additional support:

Documentation: [www.maxstream.net/helpdesk/](http://www.maxstream.net/helpdesk/)

Technical Support: Phone. (866) 765-9885 U.S. & Canada  
(801) 765-9885 Worldwide

Live Chat. [www.maxstream.net](http://www.maxstream.net)

E-Mail. [rf-xperts@maxstream.net](mailto:rf-xperts@maxstream.net)

MaxStream office hours are 8:00am – 5:00pm [U.S. Mountain Standard Time]