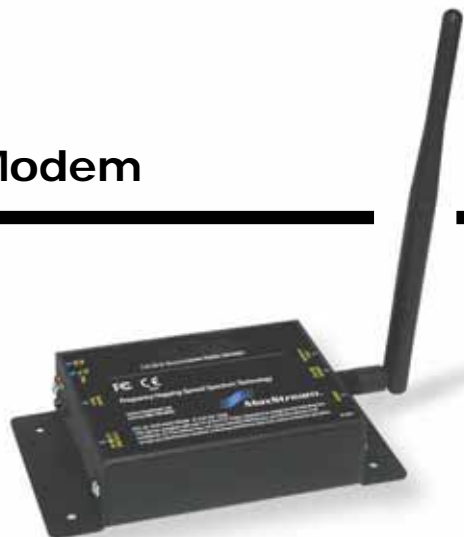


# 9XCite-PKG-R™ RS-232/485 RF Modem

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9XCite-PKG-R RF Modems  
Using the XCite RS-232/485 RF Modem  
Modem Configuration



## Product Manual v1.1

XCite RF Modem Part Numbers:

XC09-009PKC-R  
XC09-009PKC-RA

XC09-038PKC-R  
XC09-038PKC-RA



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M100103  
2005.04.08

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# 9XCite-PKG-R RF Modems

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The XCite RS-232/485 RF Modem is a drop-in wireless solution that is used to provide wireless links for any data system. It transfers a standard asynchronous serial data stream and features the following:

- Continuous data stream of up to 38400 bps (factory-set, RF baud rate)
- Serial Interfacing from 1200 to 57600 bps
- Software selectable between Hopping (FHSS) and Single Frequency Channel Modes
- Approved by the FCC under Part 15 of the FCC Rules and Regulations
- Variable input supply voltage (7 - 18 VDC)

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

## Additional Features

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### Long Range

- Indoor/Urban Range: **Up to 300'** (90 m)
- Outdoor/RF Line-of-sight Range: **Up to 1000'** (300 m)
- Receiver Sensitivity: **-108 dBm** (@9600 Baud),  
**-104 dBm** (@38400 Baud)



### Low Power

- Transmit Power Output: **4 mW** [40 mW effective considering excellent receiver sensitivity]
- **105 mA** transmit / **55 mA** receive current consumption
- Power-down current as low as **6 mA**

**Advanced Networking & Security** (True Peer-to-Peer (no "master" required), Point-to-Point, Point-to-Multipoint, Multidrop)

**Specifications** [see next page]

**1-Year Warranty** [[Appendix B](#)]

**Free & Unlimited Technical Support** [[Appendix C](#)]

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### Worldwide Acceptance

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

Devices that embed XCite Radio Modems inherit MaxStream's FCC certification

**IC (Industry Canada) Certified**

**ISM (Industrial, Scientific & Medical) frequency band**

MaxStream products manufactured under **ISO 9001:2000 registered standards**



## XCite-PKG-R RS-232/485 RF Modem Specifications

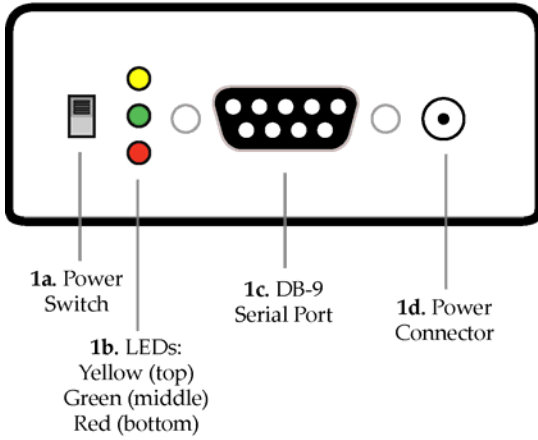
Table 1. XCite-PKG-R RS-232/485 RF Modem (900 MHz) Specifications

Specification	9XCite-PKG-R (900 MHz) RS-232/485 RF Modem	
<b>Performance</b>		
Indoor/Urban Range	Up to 300' (90 m)	
Outdoor LOS Range	Up to 1000' (300 m) w/ 2.1 dB dipole antenna	
Transmit Power Output	4 mW (6 dBm)	4 mW (6 dBm)
Interface Data Rate	Software selectable 1200 - 57600 bps	
<b>Throughput Data Rate</b>	<b>9,600 bps</b>	<b>38,400 bps</b>
RF Data Rate	10,000 bps	41,666 bps
Receiver Sensitivity	-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	RS-232/485/422	
<b>Power Requirements</b>		
Supply Voltage	7-18 VDC	
Transmit Current	105 mA	
Receive Current	55 mA	
Power Down Current	6 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	Commercial (0 to 70° C) or Industrial (-40 to 85° C)	
<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	

# XCite-PKG-R Interface

## Front and Back Views

Figure 1. Front View



### 1a. Power Switch

Move Power Switch to the ON (up) position to power the XCite-PKG-E RS-232/485 RF Modem.

### 1b. LEDs

LED indicators visualize diagnostic status information. RF Modem's status is represented as follows:

- Yellow** (top) = Serial data out (to host)
- Green** (middle) = Serial data in (from host)
- Red** (bottom) = Power/TX Indicator (Red light is on when modem is powered, pulses off and on briefly during RF transmission)



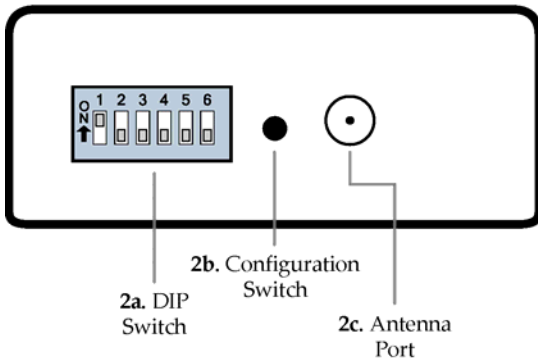
### 1c. Serial Port

Standard female RS-232 (DB-9) DCE connector – Port is also used for RS-485 and RS-422 connections.

### 1d. Power Connector

7-18 VDC Power Connector (Center positive, 5.5/2.1 mm) – Power can also be supplied through Pin 9 of the serial port [1c].

Figure 2. Back View



### 2a. DIP Switch

DIP Switch automatically configures the XCite Module to operate in different modes. Each time the module assembly (interface board + XCite Module) is powered-on, intelligence on the XIB-R interface board programs the attached module according to the positions of the DIP Switch. [See Figure 3 below for DIP Switch settings.]

In cases where AT Commands should not be sent each time the RF Modem is powered on, the processor must be disabled by populating J7 on the interface board. [See "DIP Switch Configurations" section [page 17] for more information].

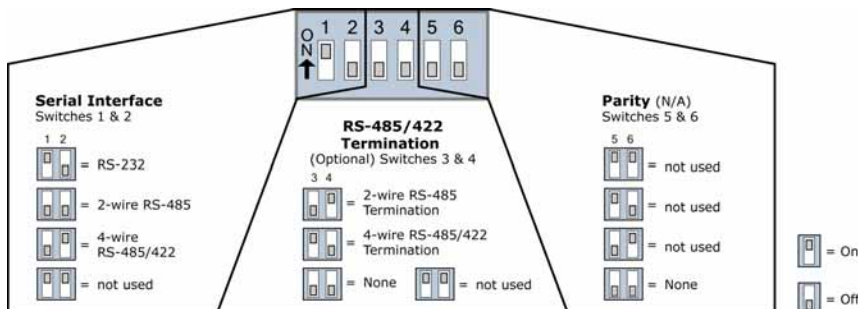
### 2b. Config (Configuration) Switch

Configuration Switch provides an alternate way to enter "AT Command Mode". To enter "AT Command Mode" at the RF modem's default baud rate, hold the Configuration Switch down while powering on the module using the Power Switch [1a].

### 2c. Antenna Port

Antenna Port is a 50 Ω RF signal connector for connecting to an external antenna. Connector type is Reverse Polarity (RPSMA) female. The RPSMA has threads on the outside of a barrel and a male center conductor.

Figure 3. DIP Switch Settings



## Adapters

The XCite-PKG-RA RS-232/485 RF Modems come with several adapters. The adapters facilitate basic functions, such as the following:

- Performing Range Tests
- Testing Cables
- Connecting to other RS-232 DCE and DTE devices
- Connecting to terminal blocks or RJ-45 (for RS-485/422 devices)

### NULL Modem Adapter (male-to-male)

**Part Number: JD2D2-CDN-A** (Black, DB9 M-M) The male-to-male NULL modem adapter can be used to connect two DCE devices. A DCE device is one that connects with a straight-through cable to the male serial port of a computer (DTE).

Figure 4. Male NULL modem adapter and pinouts

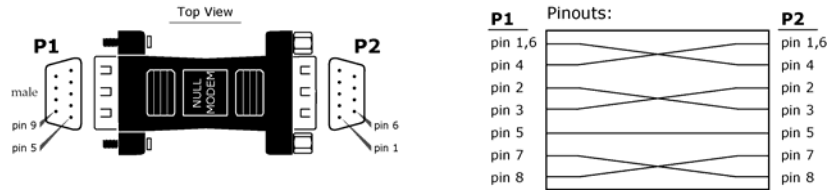


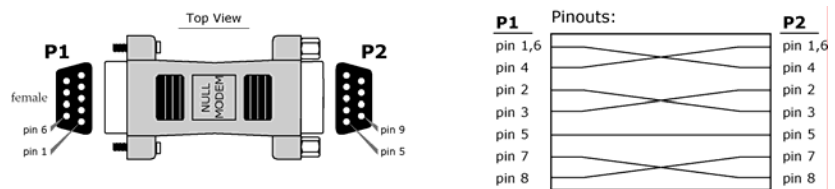
Figure 5. Example of a MaxStream RF Modem (DCE Device) connecting to another DCE device)



### NULL Modem Adapter (female-to-female)

**Part Number: JD3D3-CDN-A** (Gray, DB9 F-F) The female-to-female NULL modem adapter can be used to verify serial cabling is functioning properly. To test cables, insert the female-to-female NULL modem adapter in place of a pair of RF Modems and test the connection without any RF Modems in the connection.

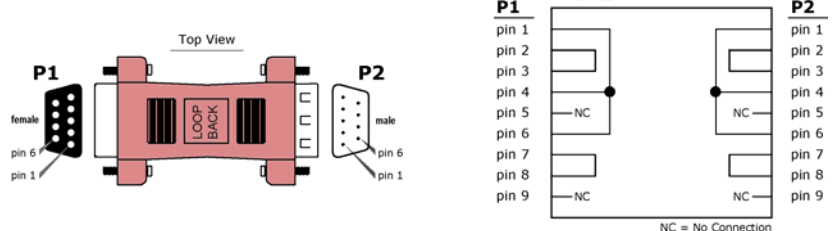
Figure 6. Female NULL modem adapter and pinouts



### Serial Loopback Adapter

**Part Number: JD2D3-CDL-A** (Red, DB9 M-F) The serial loopback adapter is used for range testing. During a range test, the serial loopback adapter configures the RF Modem to function as a repeater by looping serial data back into the radio for retransmission.

Figure 7. Serial loopback adapter and pinouts



# Using the XCite RS-232/485 RF Modem

## RS-232 Operation

### DIP Switch Settings and Serial Port Connections

Figure 8.  
RS-232 DIP Switch Settings



DIP Switch settings are read and applied only while powering-on.

Figure 9.  
Pins used on the female RS-232 (DB-9) Serial Connector

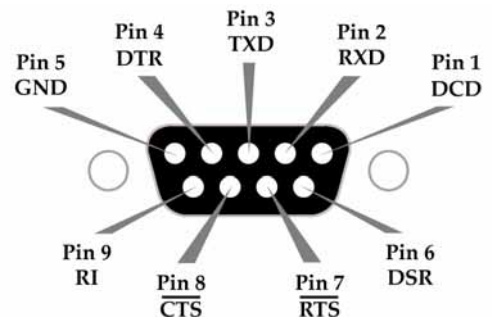
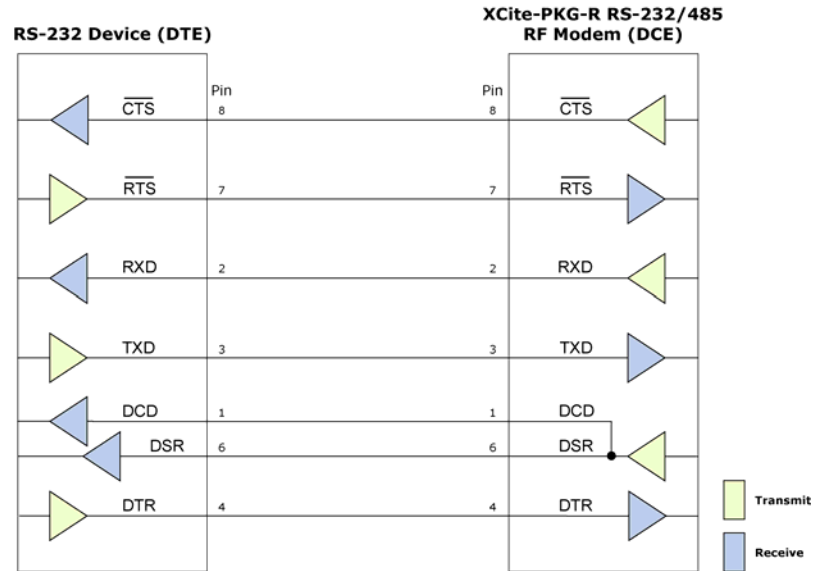


Table 2. RS-232 Signals and their implementations on the XCite-PKG-R RF Modem  
(Low-asserted signals are distinguished by horizontal line over pin name.)

DB-9 Pin	RS-232 Name	Description	Implementation
1	DCD	Data-Carrier-Detect	Connected to DSR (pin 6)
2	RXD	Received Data	Serial data OUT (over-the-air) of RF Modem
3	TXD	Transmitted Data	Serial data IN to RF Modem
4	DTR	Data-Terminal-Ready	Can enable POWER-DOWN on the RF Modem
5	GND	Ground Signal	Ground
6	DSR	Data-Set-Ready	Connected to DCD (pin 1)
7	$\overline{\text{RTS}}$	Request-to-Send	Enables "Command Mode" on the RF Modem or provides RTS flow control
8	CTS	Clear-to-Send	Provides Clear-to-Send flow control
9	RI	Ring Indicator	Optional power input that is connected internally to the front power connector

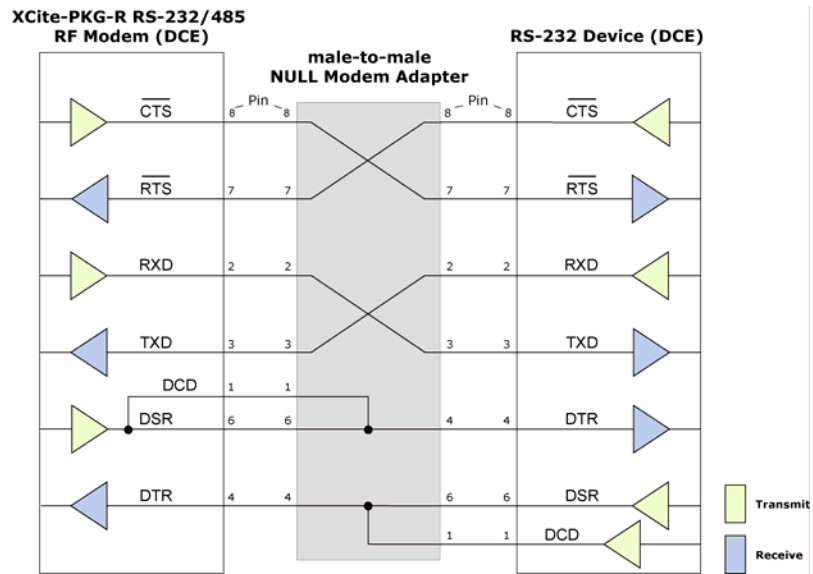
## Wiring Diagram: RS-232 DTE Device to an RF Modem

Figure 10. XCite RF Modem wired to an RS-232 DTE (male connector) device



## Wiring Diagram: RF Modem to an RS-232 DCE Device

Figure 11. XCite RF Modem wired to an RS-232 DCE (female connector) device



## Sample Wireless Connection: DTE ⇄ DCE ⚡ DCE ⇄ DCE

Figure 12. Typical wireless connection between DTE and DCE devices



## RS-485 (2-wire) Half-Duplex Operation

### DIP Switch Settings and Serial Port Connections

Figure 13.  
RS-485 (2-wire) Half-Duplex  
DIP Switch Settings

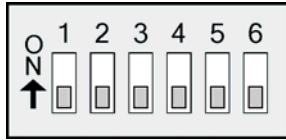


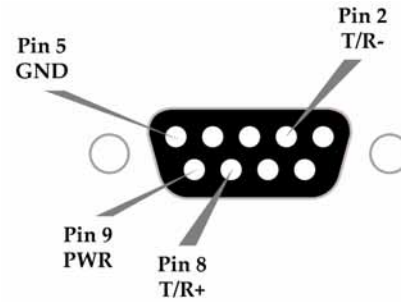
Figure 15.  
RS-485 (2-wire) with Termination (Optional)



Termination is the 120Ω resistor between T+ and T-.

DIP Switch Settings are read and applied only while powering-on.

Figure 14  
Pins used on the female DB-9  
Serial Connector



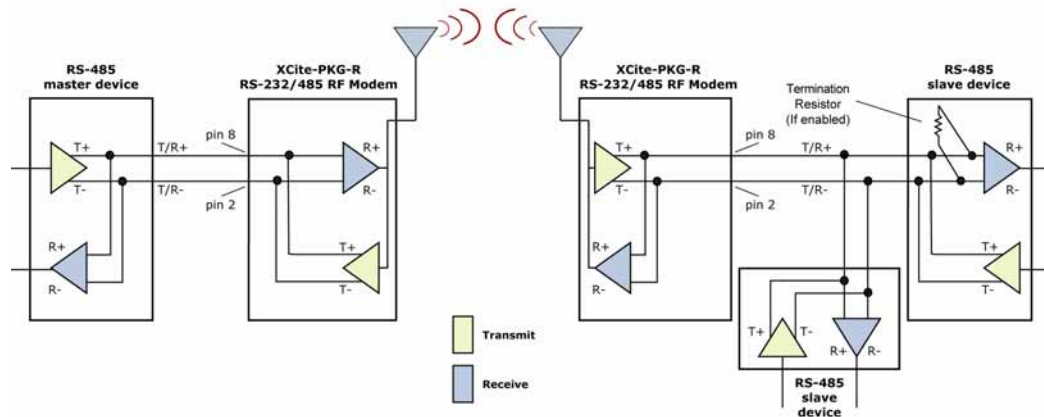
Note: Refer to Figures 24 and 25 [page 10] for RJ-45 connector pin designations used in RS-485/422 environments.

Table 3. RS-485 (2-wire Half-duplex) Signals and their implementations on the XCite-PKG-R RF Modem

DB-9 Pin	RS-485 Name	Description	Implementation
2	T/R- (TRA)	Negative Data Line	Transmit serial data to and from the XCite-PKG-R RF Modem
5	GND	Ground Signal	Ground
8	T/R+ (TRB)	Positive Data Line	Transmit serial data to and from the XCite-PKG-R RF Modem
9	PWR	Power	Optional power input that is connected internally to the front power connector
1, 3, 4, 6, 7	Not used		

### Wiring Diagram: RS-485 (2-wire) Half-Duplex

Figure 16. XCite-PKG-R RF Modem in a 2-wire (half-duplex) RS-485 environment



## RS-485 (4-wire) and RS-422 Operation

### DIP Switch Settings and Serial Port Connections

Figure 17.  
RS-485 (4-wire) and RS-422  
DIP Switch Settings

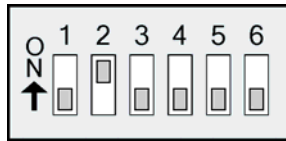


Figure 19.  
RS-485/422 (4-wire) with Termination (Optional)



Termination is the 120Ω resistor between T+ and T-.  
DIP Switch Settings are read and applied only while powering-on.

Figure 18.  
Pins used on the female DB-9  
Serial Connector

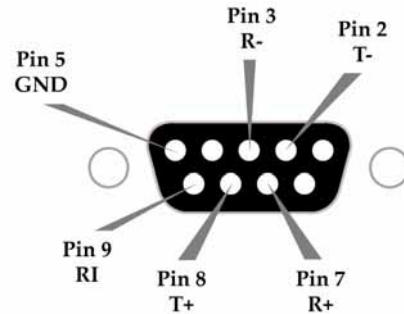
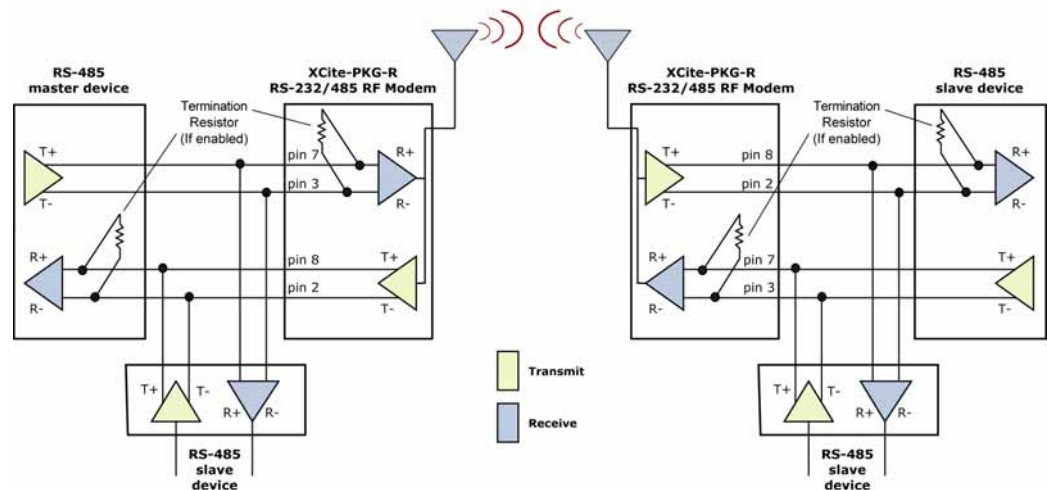


Table 4. RS-485/422 (4-wire) Signals and their implementations with the XCite-PKG-R RF Modem

DB-9 Pin	RS-485/422	Description	Implementation
2	T- (TA)	Transmit Negative Data Line	Serial data Sent from the XCite-PKG-R RF Modem
3	R- (RA)	Receive Negative Data Line	Serial data Received by the XCite-PKG-R RF Modem
5	GND	Signal Ground	Ground
7	R+ (RB)	Receive Positive Data Line	Serial data Received by the XCite-PKG-R RF Modem
8	T+ (TB)	Transmit Positive Data Line	Serial data Sent from the XCite-PKG-R RF Modem
9	PWR	POWER	Optional power input that is connected internally to the front power connector
1, 4, 6	Not Used		

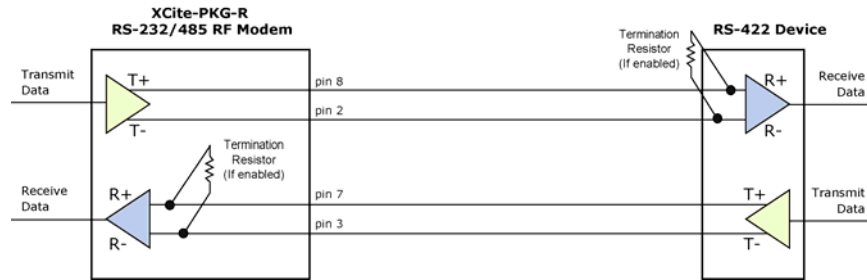
### Wiring Diagram: RS-485 (4 wire)

Figure 20. XCite-PKG-R RF Modem in an RS-485 (4-wire) environment



## Wiring Diagram: RS-422

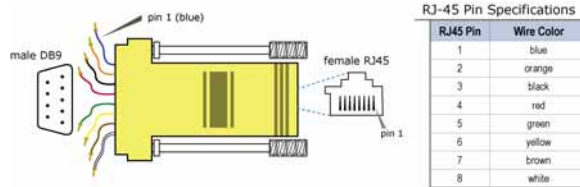
Figure 21. XCite-PKG-R RF Modem in an RS-422 environment



### Male DB-9 to RJ-45 Adapter

**Part Number: JE1D2-CDA-A** (Yellow, RJ45 female to DB-9 male) This adapter facilitates adapting a DB-9 connector to a CAT5 cable.

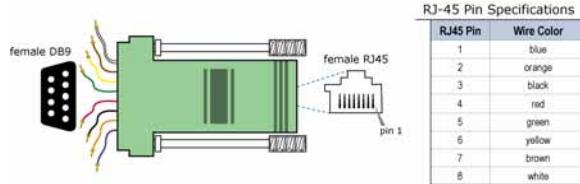
Figure 22. Male RS-485/422 Adapter and pin specifications



### Female DB-9 to RJ-45 Adapter

**Part Number: JE1D3-CDA-A** (Green, RJ45 female to DB9 female) This adapter facilitates adapting a DB-9 connector to a CAT5 cable.

Figure 23. Female RS-485/422 Adapter and pin specifications



### RS-485/422 Connection Guidelines

The RS-485/422 protocol provides a solution for wired communications that can tolerate high noise and push signals over long distances. RS-485/422 signals can communicate as far as 4000 feet (1200 meters). (RS-232 signals are only suitable for distances up to 100 feet (30.5 meters)) RS-485 offers multidrop capability in which up to 32 nodes can be connected. The RS-422 protocol is used for point-to-point communications.

Interface voltages are interdependent of data protocol. Therefore, different RS-232/485/422 settings can be used in different nodes of one data radio system. In such a scenario, the RF Modem can function as a RS-485 to RS-232 converter.

### Suggestions for integrating the XCite-PKG-R RS-232/485 RF Modem with the RS-485/422 protocol:

1. When using Ethernet twisted pair cabling: Select wires so that T+ and T- are connected to each wire in a twisted pair. Likewise, select wires so that R+ and R- are connected to a twisted pair. (For example, tie the green and white/green wires to T+ and T-.)
2. For straight-through Ethernet cable (not cross-over cable) – The following wiring pattern works well: Pin 3 to T+, Pin 4 to R+, Pin 5 to R-, Pin 6 to T-
3. Note that the connecting cable only requires 4 wires (even though there are 8 wires).
4. When using phone cabling (RJ-11) – Pin 2 in the cable maps to Pin 3 on opposite end of cable and Pin 1 maps to Pin 4 respectively.

# Modem Configuration

## X-CTU Software Configurations

The following versions of the XCite Modem 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

Go to the "XCite Advanced Programming & Configuration" Manual for more detailed information about module configurations.

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

## Command & Parameter Types

### AT Commands

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)

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

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 7. 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)	-	-

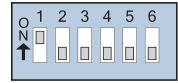
\* To select the Channel Mode: Select mode from the 'Function Set' dropdown list on the "Modem Configuration" tab of the X-CTU Software. Then click the 'Write Parameters' button.

**Table 8. 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 = 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)

## DIP Switch Configurations

Each time the RF Modem is powered-on, intelligence on the MaxStream Interface Board (located inside the RF Modem) sends AT Commands that program the RF Modem based on positions of the DIP Switch. Automatic configurations that take place during the power-on sequence affect RF Modem parameter values as shown below [Table 6].



To avoid overwriting previously stored custom configurations (due to the automatic configurations that take place each time the RF Modem is powered-on), it is necessary to disable a processor located on the XIB-R interface board. To disable the processor, populate J7 of the XIB-R Interface Board. (By default, J7 jumper is not populated.)

**Table 7. RF Modem Power-up Options (J7 jumper and Config Switch)**

Condition	Behavior
If J7 is populated	Processor is disabled and AT Commands are not sent to the RF Modem
If Config Switch is pressed	Processor is disabled and RF Modem enters into AT Command Mode
If J7 is NOT populated and Config Switch is NOT pressed	Execute logic as shown in Table 6.

**Table 8. AT Commands Sent as result of DIP Switch Settings (SW = DIP Switch)**

Condition	Behavior
Serial Interfacing Options	
If SW1 is ON (up)	AT Commands sent: ATCS 0 (RS-232 Operation: $\overline{\text{CTS}}$ function for $\overline{\text{CTS}}$ line, DB-9 pin 8, OEM RF Module pin 1) ATCD 2 (DO3 - RX LED = low)
If SW1 is OFF (down)	AT Commands sent: ATCS 3 (RS-485 or RS-422 Operation) ATCD 2 (DO3 - RX LED = low)
Exit AT Command Mode	
Always	AT Commands sent: ATCN (Exit AT Command Mode)

## 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.

### How to Use Modem Profiles

1. Connect the RF Modem to the serial port of a PC (Using an RS-232 cable)
  2. Launch the X-CTU software
  3. Click the "Modem Configuration" tab
  4. Set modem parameters according to data radio system criteria.
  5. Click the "Save Profile" button to any folder located on the PC.
- To view previously saves profiles, click the "Load Profile" button and navigate to the saved file.

### Full-Duplex

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

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

**Parameters:**  
 RT = 2  
 RR = 20  
 RN = 4

### Low Power Cyclic Sleep (Base)

**USE:** To wake a remote radio 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.

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

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

### Low Power Cyclic Sleep (Remote)

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

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

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

**Low Power Mode (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.

**Parameter:**  
SM = 1

**Low Power Mode (Serial Port Sleep)**

USE: Radio is in low power mode until an RS-232 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)**

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)**

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.

SPECIAL: This mode is configured automatically through proper DIP Switch settings. This mode will be overwritten if the RF Modem is configured through the DIP Switch for RS-232 operation.

**Parameter:**  
CS = 1

# Appendix A:

## FCC Certifications

### FCC Compliance

The MaxStream XCite OEM RF Module complies with Part 15 of the FCC Rules. Compliance requires the following be stated:

Contains FCC ID: OUR-9XCITE

The enclosed 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.

### Labeling Requirements

#### Label Warning

**▲ 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 shown in the figure below.

**Figure A1. Required FCC Label for OEM products containing XCite OEM RF Module**

Contains FCC ID: OUR-9XCITE  
The enclosed 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.

### FCC Notices

Adherence to the following is required:

**IMPORTANT:** The XCite (900 MHz) OEM Module has 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.

**IMPORTANT:** OEMs must test their final product to comply with unintentional radiators (FCC section 15.107 and 15.109) before declaring compliance of their final product to Part 15 of the FCC Rules.

**IMPORTANT:** The XCite OEM RF Module has been certified for remote and base radio applications. If the XCite will be used for portable applications, the device must undergo SAR testing.

**NOTE:**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or television reception, try to correct the interference by following one or more of the following suggestions:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a different circuit.
- Consult the dealer or an experienced radio/TV technician for help.

**9XCite (900 MHz) Approved Antennas**

**Antenna Warning**

**▲ WARNING** This device has been tested with RPSMA connectors with the antennas listed in the table below. When integrated into the OEM product, these fixed antennas require installation preventing end-users from replacing them with non-approved antennas. Any antenna not already tested with the XCite module must be tested to comply with FCC Section 15.203 for unique antenna connectors and 15.247 for emissions.

**Table A1. Antennas approved for use with the 9XCite (900 MHz) OEM RF Module**

Part Number	Type	Gain	Application
*	Yagi	6.2dBi	Fixed/Mobile
*	Yagi	7.2dBi	Fixed/Mobile
A09-Y8	Yagi	8.2dBi	Fixed/Mobile
*	Yagi	9.2dBi	Fixed/Mobile
*	Yagi	10.2dBi	Fixed/Mobile
A09-Y11	Yagi	11.2dBi	Fixed/Mobile
*	Yagi	12.2dBi	Fixed/Mobile
*	Yagi	13.2dBi	Fixed/Mobile
*	Yagi	14.2dBi	Fixed/Mobile
A09-Y15	Yagi	15.2dBi	Fixed/Mobile
A09-F2	Omni Direct.	2.2dBi	Fixed
A09-F5	Omni Direct.	5.2dBi	Fixed
A09-F8	Omni Direct.	8.2dBi	Fixed
*	Omni Direct.	9.2dBi	Fixed
*	Omni Direct.	7.2dBi	Fixed
A09-M7	Omni Direct.	7.2dBi	Fixed
A09-H	1/2 wave antenna	2.1dBi	Fixed/Mobile
A09-HBMM-P5I	1/2 wave antenna	2.1dBi	Fixed/Mobile
A09-QBMM-P5I	1/4 wave antenna	1.9 dBi	Fixed/Mobile
*	1/4 wave integrated wire antenna	1.9 dBi	Fixed/Mobile

\* FCC-approved antennas not inventoried by MaxStream – Contact MaxStream for more information.

Over 100 additional antennas have been tested and approved for use with the XCite Modem. Contact MaxStream toll-free (866) 765-9885 for a complete list that includes “Mag Mount”, “Dome”, “Multi-path” and “Panel” antennas.

**RF Exposure**

**▲ WARNING** The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter for satisfying RF exposure compliance.

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

# Appendix B:

## Additional Information

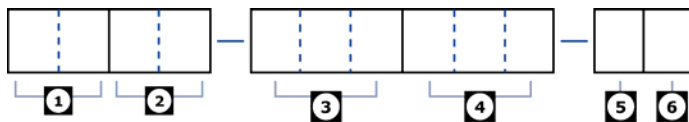
### 1-Year Warranty

The XCite-PKG-R RS-232/485 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 C1. XCite-PKG-R RS-232/485 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 RF Data Rate (baud)**

009 = 9600 bps  
038 = 38400 bps (XCite Only)  
(blank) All XTend RF Modems support 1200 to 115200 bps.

**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 Mode**

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

**6 Accessories Package**

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

# Appendix C:

## Troubleshooting and FAQs

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### Contact MaxStream

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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/download.php](http://www.maxstream.net/helpdesk/download.php)

**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 8:00 am – 5:00 pm [U.S. Mountain Standard Time]