

9XCite™ Wireless OEM Module

9XCite Wireless OEM Module

RF System Components

Module Configuration

Appendices



Product Manual v1.0

For 9XCite Module Part Numbers: XC09-009...
 XC09-038...



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9XCite Wireless OEM Module

Powerfully Simple

The 9XCite Module is a drop-in wireless solution that adds connectivity to any UART or serial device. It transfers a standard asynchronous serial data stream and features the following:

- Continuous data stream of up to 38400 bps (factory-set, over-the-air baud rate)
- Serial Interfacing from 1200 to 57600 bps
- Software selectable between Hopping (FHSS) and Single Channel modes
- Approved by the FCC under Part 15 of the FCC Rules and Regulations
- Variable input supply voltage (2.85 – 5.50 VDC)

This manual contains information critical to basic 9XCite Module operation. More detailed information is available in the “XCite Advanced Programming & Configuration” Manual. (Located on the MaxStream CD or on the web: www.maxstream.net/support_documentation.html)

Features:

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

Devices that embed 9XCite Modules inherit MaxStream’s FCC certification.

IC (Industry Canada) **Certified**

ISM (Industrial, Scientific & Medical) frequency band

MaxStream products manufactured under **ISO 9002 registered standards** since 2000.

Indoor/Urban Range: **Up to 300’** (90 m)

Outdoor/LOS Range: **Up to 1000’** (300 m) w/dipole antenna

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

Transmit Power Output: **1 mW** [50 mW effective considering excellent receiver sensitivity]

Advanced Networking capabilities (True **Peer-to-Peer** (no “master” required), **Point-to-Point**, **Point-to-Multipoint**, **Multi-Drop**)

Specifications [[Appendix B](#)]

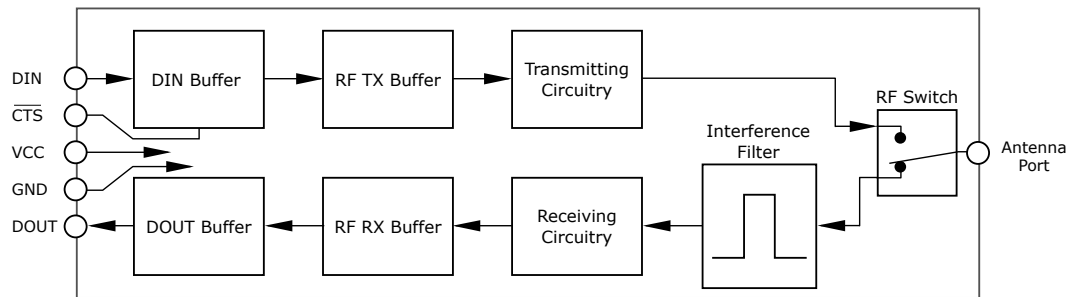
1-Year Warranty [[Appendix C](#)]

Free Technical Support [[Appendix D](#)]



Block Diagram

Figure 1. 9XCite Module Block Diagram



'Interference Filter' reduces interference from pagers and cellular.

Module Pinout Signals

9XCite Module pin signals and their functions:

Table 1. J1 Pin Descriptions

(Low-asserted signals distinguished with a horizontal line over signal name.)

Module Pin	Signal Name	I/O	When Active	Description
1	$\overline{\text{CTS}}$	O*	low	Clear-to-Send Flow Control
2	SLEEP (PWRDN)	I*	high	Can be used to enter Sleep Mode
3	DO (Data Out)	O*	n/a	Serial Data leaving the 9XCite Module (to the processor host)
4	DI (Data In)	I	n/a	Serial Data entering the 9XCite Module (from the processor host)
5	$\overline{\text{RTS}}$	I**	low	Request-to-Send
6	$\overline{\text{RESET}}$	I*	low	Reset module
7	RX LED	O	high	Receive LED
8	$\overline{\text{TX}}$ / PWR	O	low	$\overline{\text{TX}}$ - Asserted during transmission
			high	PWR - Indicates power is on
9	$\overline{\text{CONFIG}}$	I***	low	Backup method for entering Command Mode. Primary method is with "+++" [See CC Parameter]
10	VCC	I	-	2.85 – 5.50 VDC variable
11	GND	-	-	Ground

* Pin utilizes 10K Ω Pull-Up resistor (Already installed in the module)

** Pin utilizes 10K Ω Pull-Down resistor (Already installed in the module)

*** Pin utilizes 100K Ω Pull-Up resistor (Already installed in the module)

Note When integrating the 9XCite Module onto a Host PC Board, all lines that are not used should be left disconnected (floating).

Table 2. J2 Pin Descriptions

Module Pin	Pin Name
1	reserved
2	GND
3	GND
4	GND

J2 Pins are used primarily for mechanical stability and may be left disconnected.

For More Information

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

The advanced manual is available on the MaxStream CD or on the web: www.MaxStream.net

Pinout Signal Overview

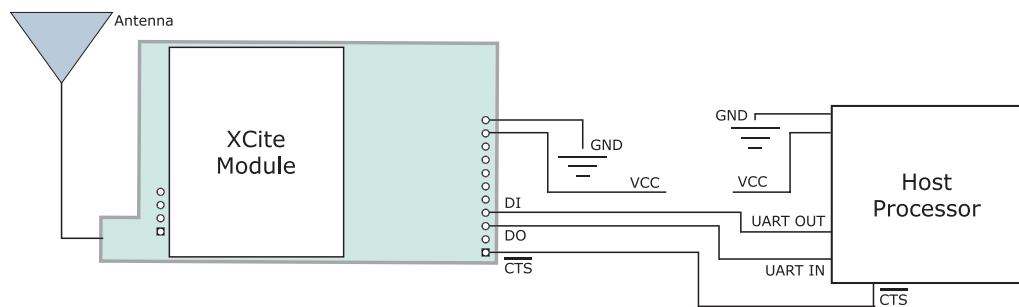
The interface signals are available through the 11-pin header. All pins operate on VCC CMOS levels. Five signals that are commonly used in applications are:

- DI (pin 4 – Data In)
- DO (pin 3 – Data Out)
- VCC (pin 10 – Power)
- GND (pin 11 – Ground)
- $\overline{\text{CTS}}$ (pin 1 – Clear-to-Send)

The remaining 6 pins (SLEEP (PWRDN), $\overline{\text{RTS}}$, $\overline{\text{RESET}}$, RX LED, $\overline{\text{TX/PWR}}$, $\overline{\text{CONFIG}}$) may be used for additional functionality. Go to the “XCite Advanced Programming & Configuration Manual” for more detailed information about module pinouts.

Application Circuit

Figure 2. Application Circuit – connection to host processor

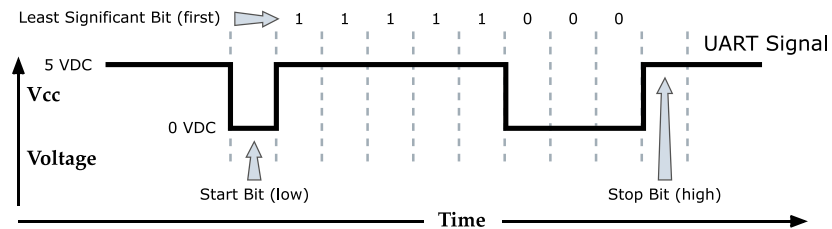


Serial Data

Data enters the 9XCite Module through the DI Pin as an asynchronous serial signal. The signal should idle high when no data is being transmitted.

Each data packet consists of a start bit (low), 8 data bits (least significant bit first) and a stop bit (high). The following figure illustrates the serial bit pattern of data passing through the module.

Figure 3. UART data packet 0x1F (decimal number “31”) as transmitted through the 9XCite Module



The 9XCite Modules transfer 7 or 8 bits over-the-air [Selectable using BI Parameter]. The start and stop bits from the UART signal are not transmitted, but are regenerated on the receiving module.

DI (Data In) Buffer

Once serial data has entered the 9XCite Module through the Data In (DI) Pin, the data is stored in the DI Buffer until it can be transmitted.

Once the first byte of data enters the DI Buffer, the module begins to initialize the RF channel (unless RF data is being received). In the case where the module is receiving RF data, the serial data is stored in the DI Buffer. When the DI Buffer has only 17 bytes of memory left, the 9XCite Module de-asserts (high) $\overline{\text{CTS}}$ to signal to the host device to stop sending data. $\overline{\text{CTS}}$ re-asserts once the DI Buffer has at least 35 bytes available in memory. Once in the DI Buffer, the data is packetized for transmission. [The packet structure is broken down on the next page.]

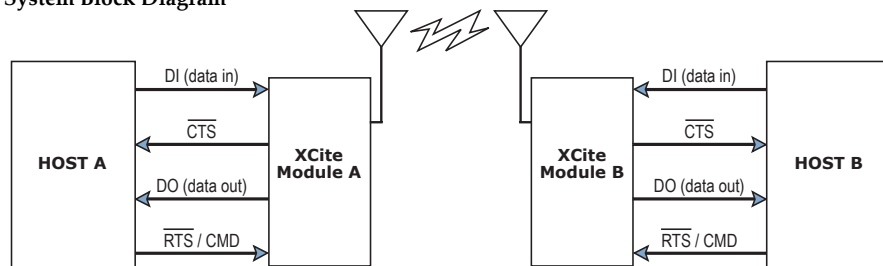
<VID><ATHP><ATDT><PSN><Pay Load><CRC>

<VID>	Factory assigned Vendor ID number
<ATHP>	Channel (or Network) number
<ATDT>	Module Address
<PSN>	Packet Serial Number (8-bit number that uniquely identifies each packet)
<Pay Load>	Data shifted into module for transmission
<CRC>	16-bit CRC (like a checksum) for error detection

Timing Specifications

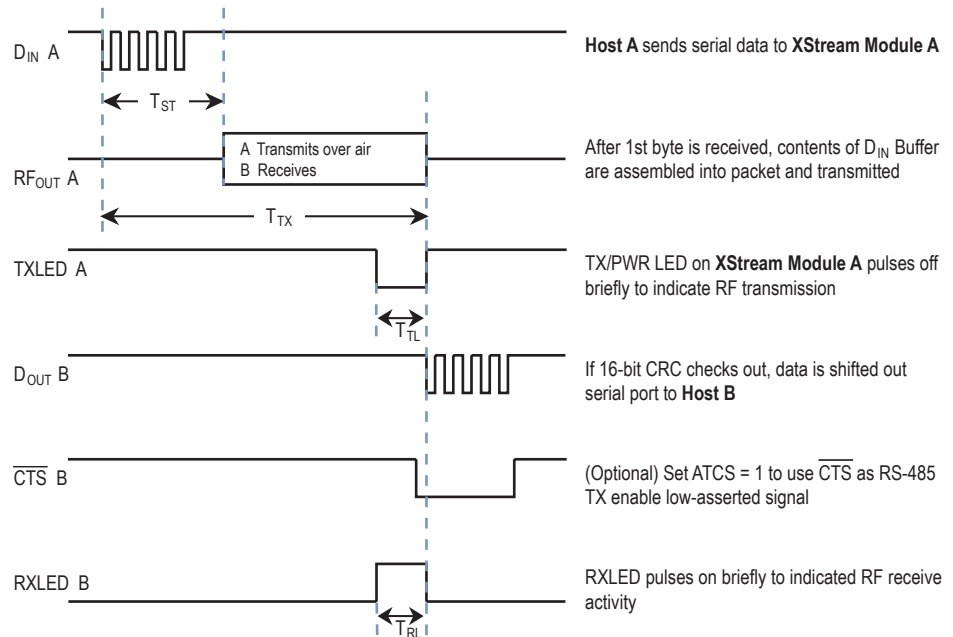
The diagram below [Figure 4] shows 9XCite Modules providing an RF Link between hosts.

Figure 4. System Block Diagram



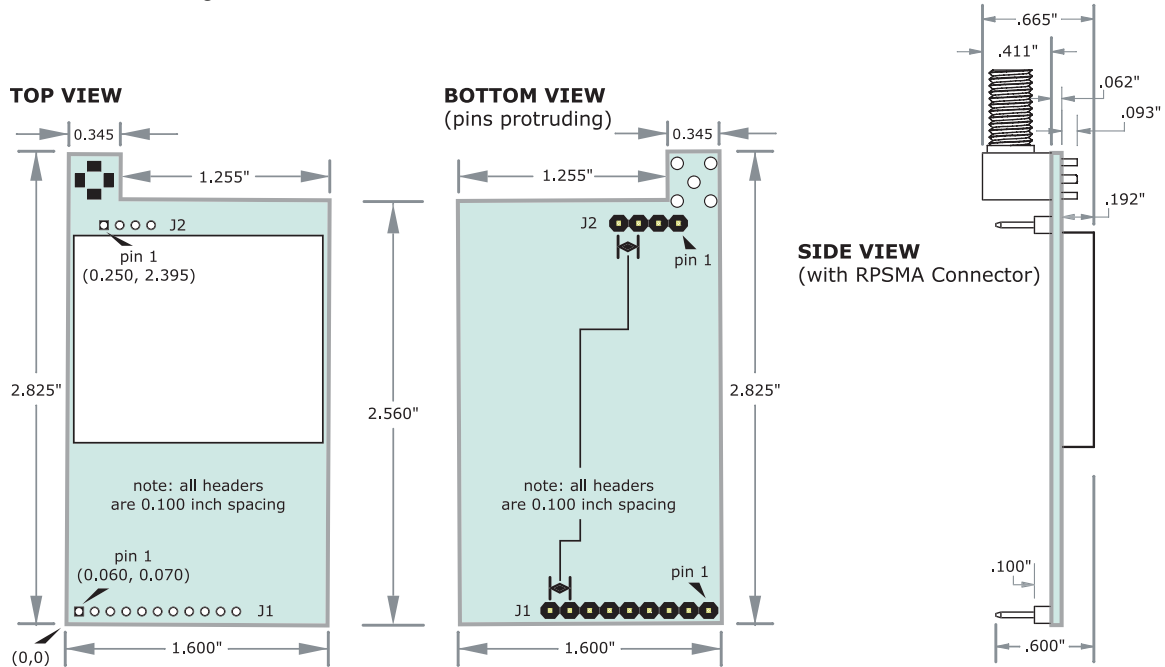
The RF data flow sequence is initiated when the first byte of data is received by the transmitting 9XCite Module. As long as 9XCite Module A is not already receiving data, the serial data goes into the DI Buffer, is packetized and then transmitted to 9XCite Module B.

Figure 5. Timing Specifications (“A” and “B” are associated with figure 4)



Mechanical Drawings

Figure 6. Mechanical Drawings (Measures are in inches)



Electrical Characteristics

Table 3. DC Characteristics ($V_{CC} = 2.85$ to $5.50V$)

Symbol	Parameter	Condition	Min	Typical	Max	Units
V_{IL}	Input Low Voltage	All Input Signals	-0.5		$0.3 * V_{CC}$	V
V_{IH}	Input High Voltage	All Except \overline{RESET} Pin	$0.6 * V_{CC}$		$V_{CC} + 0.5$	V
V_{IH2}	Input High Voltage	\overline{RESET} Pin *	$0.9 * V_{CC}$		$V_{CC} + 0.5$	V
V_{OL}	Output Low Voltage	$I_{OL} = 20$ mA, $V_{CC} = 5V$			0.7	V
V_{OH}	Output High Voltage	$I_{OH} = -20$ mA, $V_{CC} = 5V$	4.0			V
I_{IL}	Input Leakage Current I/O Pin	$V_{CC} = 5.5V$, pin low (absolute value)			3	μA
I_{IH}	Input Leakage Current I/O Pin	$V_{CC} = 5.5V$, pin high (absolute value)			3	μA
I_{IL2}		\overline{CTS} , \overline{DO} , \overline{RESET}		$(V_{CC} - V_I)/10$ **		mA
I_{IL3}		\overline{CONFIG}		$(V_{CC} - V_I)/47$ **		mA
I_{IH2}		\overline{RTS}		$(V_{CC} - V_I)/10$ **		mA

* Reset pulse must last at least 250 nanoseconds

** V_I = the input voltage on the pin

RF System Components

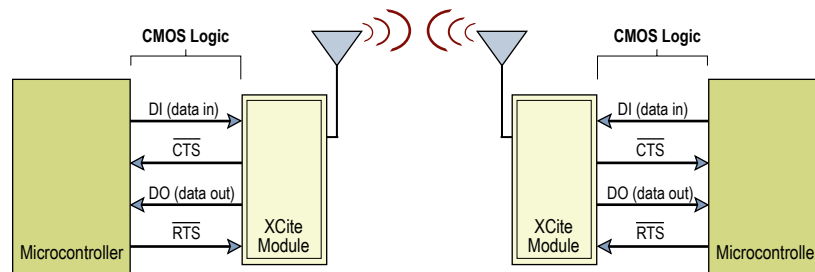
Serial Communications

The 9XCite Wireless OEM Module interfaces to a host device through a CMOS-level asynchronous serial port. Through its serial port, the 9XCite Module can communicate directly with any UART-interfaced or RS-232/485/422 device. [Timing specifications illustrated on page 4]

UART-Interfaced Data Flow

Devices that have a UART interface can connect directly through the pins of the 9XCite Wireless OEM Module as is shown in the figure below.

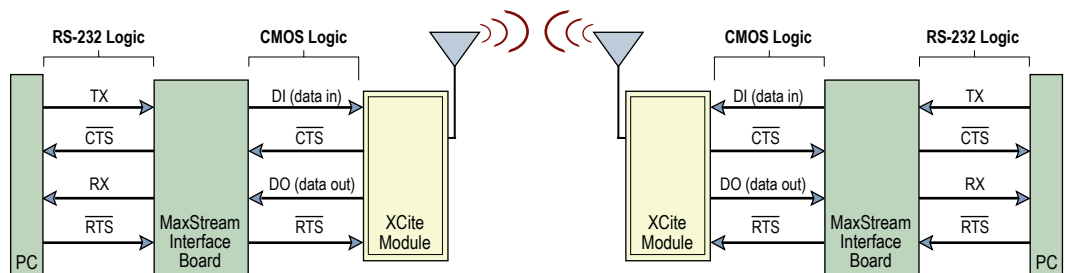
Figure 7. Data Flow in a UART-interfaced environment
(Low-asserted signals distinguished with horizontal line over signal name.)



RS-232 and RS-485/422 Data Flow

Wiring the 9XCite Module to a host device serial port enables the host device to communicate wirelessly. To transmit, the host device simply sends serial data to the 9XCite Module pins. The 9XCite Module then converts the data to Frequency Hopping Spread Spectrum (FHSS) or Single Channel FCC-approved wireless data. Once transmitted, the over-the-air data can be detected by receiving 9XCite Modules, checked for integrity and then sent to a receiving device [Figure below].

Figure 8. Data Flow in RS-232 and RS-485/422 environments.
(Low-asserted signals distinguished with a horizontal line over signal name.)



Interfacing Hardware

MaxStream, Inc. developed a proprietary interface board (MaxStream Product number: XIB-R) to facilitate the connection between 9XCite Wireless OEM Modules and serial devices. Many integrators develop their own interfacing circuitry; others use MaxStream's XIB-R Interface Board. In either case, the following sections illustrate how to interface with 9XCite Wireless OEM Modules by illustrating properties of the MaxStream XIB-R Interface Board.

9XCite Development Kit

The MaxStream Interface board is included with the 9XCite Development Kit. The kit includes all the hardware and software needed for basic wireless connections.

Table 4. 9XCite Development Kit contents

Item	Qty.	Description	Part Number
9XCite Module (w/ RPSMA connector)	1	Module comes with fixed over the air baud rates up to 38400 bps	XC09-...-NSC
9XCite Module (w/ wire antenna)	1	Modules comes with fixed over the air baud rates up to 38400 bps	XC09-...-WNC
MaxStream Interface Board	2	Enables interfacing to RS-232/485/422 devices	XIB-R
Antenna	1	RPSMA half-wave dipole antenna.	A09-HASM-675
Quick Start Guide	1	Quickly familiarize users with some of the 9XCite Module's most important functions. The guide provides step-by-step instructions on how to make a wireless connection and test its ability to transport data over varying ranges and conditions.	MD0009
CD	1	CD includes documentation and configuration software	MD0010
Serial Loopback Adapter	1	Connects to the female RS-232 (DB-9) serial connector of the 9XCite Module and can be used to configure the radio modem to function as a repeater (for range testing)	JD2D3-CDL-A
NULL Modem Adapter (male-to-male)	1	Connects to the female RS-232 (DB-9) serial connector of the 9XCite Module and can be used to connect the radio modem to another DCE (female DB9) device	JD2D2-CDN-A
NULL Modem Adapter (female-to-female)	1	Used to bypass radios to verify serial cabling is functioning properly	JD3D3-CDN-A
Male DB-9 to RJ-45 Adapter	1	Facilitates adapting the DB-9 Connector to a CAT5 cable (female RJ45 to male DB9)	JE1D2-CDA-A
Female DB-9 to RJ-45 Adapter	1	Facilitates adapting the DB-9 Connector to a CAT5 cable (female RJ45 to female DB9)	JE1D3-CDA-A
9V DC Power Adapter	2	Allows Interface Board to be powered by a 110 Volt AC power supply	JP4P2-9V4-6F
9V Battery Clip	1	Allows Interface Board to be remotely powered by a 9V battery	JP2P3-C2C-4I
RS-232 Cable (6')	2	Connects interface board to devices having an RS-232 serial port	JD2D3-CDS-6F

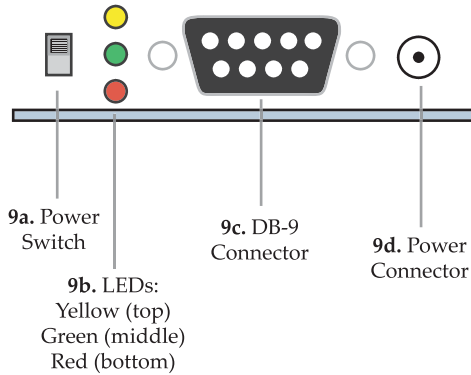
MaxStream Interface Board (Part Number: XIB-R)

The MaxStream Interface board was developed to provide a means of connecting the 9XCite Module to any system having an RS-232 or RS-485/422 connection. Since the 9XCite Module requires signals to enter at CMOS voltages, one of the main functions of the interface board is to convert interface signals between CMOS levels (2.85 – 5.50V) and RS-232 levels (-12 - +12V). The MaxStream Interface Board includes the following built-in features:

- DIP Switch
- Configuration Switch
- Power Switch
- LEDs
- DB-9 Connector
- Power Connector

MaxStream Interface Board Components & Features

Figure 9. Front View



9a. Power Switch

Move the Power Switch to the on (up) position to power the Interface Board. DIP Switch [10a] settings are only read during a power-up sequence.

9b. LEDs

The **LED** indicators visualize diagnostic status information. The radio modem's status is represented as follows:

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

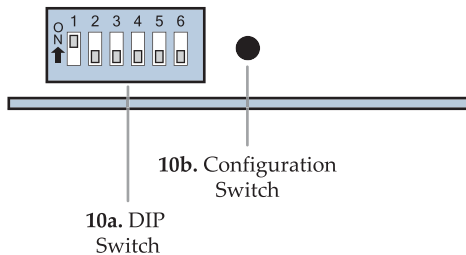
9c. DB-9 Connector

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

9d. Power Connector

7-18 VDC Power Connector (Center positive, 5.5/2.1mm) – Power can also be supplied through Pin 9 of the DB-9 Connector.

Figure 10. Back View



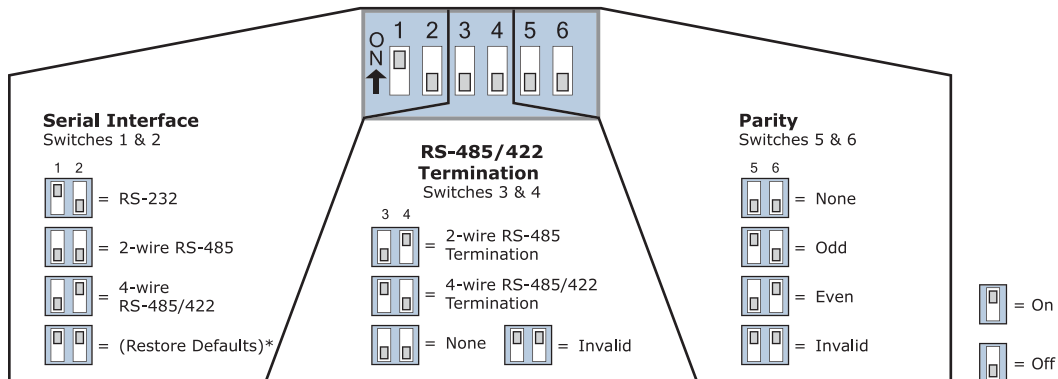
10a. DIP Switch

The DIP Switch configures the 9XCite OEM Module to operate in different modes. **DIP Switch settings are only read and applied during a powering-on sequence.** [See Figure 11 below for DIP Switch settings]

10b. Configuration Switch

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

Figure 11. MaxStream Interface Board DIP Switch Settings



* The "Restore Defaults" setting, for switches 1 & 2, can be used to restore AT Settable parameters to their default states. Once switches are in position, reset occurs during next power-up

Module Configuration

The following versions of the 9XCite Module are currently available:

- 900 MHz, 9600 (over-the-air) Baud, Hopping Channel Mode
- 900 MHz, 9600 Baud, Single Channel mode
- 900 MHz, 38400 Baud, Hopping Channel mode
- 900 MHz, 38400 Baud, Single Channel mode

9XCite 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 XCite-CTU Software.

The 9XCite Module is shipped with a unique parameter set in its memory. Parameters within the set are organized under the following three categories: AT Commands, Non-AT Settable Parameters and Read-Only AT Commands.

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

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 can be modified using the any of the following means:

- XCite-CTU Software
- Serial Communications Software ("HyperTerminal", "Pro Comm", etc.)
- Microcontroller

Non-AT Settable Parameters (XCite-CTU Software configurable only)

Non-AT Settable Parameters can only be adjusted using the MaxStream-provided XCite-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 XCite-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 7.]

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

- XCite-CTU Software (MaxStream-provided)

XCite Commands & Parameter Reference

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

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

Table 5. AT Commands
(Settable/Readable using XCite-CTU Software, Serial Communications Software or Microcontroller)

Command Category	AT Command	Command Description	Parameters	# Bytes Returned	Factory Default
(Special)	WR	Write – Writes all configurable parameters to non-volatile memory. All AT Command Settable Parameters are stored.	None	n/a	none
AT Command Mode Options	HV	Hardware Version – Reads and returns the hardware version of the 9XCite Module.	Read-Only	2	none
	SH	Serial High – Reads and returns the module serial number high word.	Read-Only	2	none
	SL	Serial Low – Reads and returns the module serial number low word.	Read-Only	2	none
	VR	Firmware Version – Reads and returns the firmware version of the 9XCite Module.	Read-Only	2	none
Diagnostic	DB	Receive Signal Strength (Decibels) – Returns the signal strength (in decibels) of the last received packet.	Read-Only	1	none
	RE	Default Configuration – Restores module's default configuration (Only AT Command Settable Parameter defaults)	None	n/a	none
Networking	DT	Module Address – Sets local module address. Only modules with the same address can communicate with each other.	Range: 0x00 - 0xFFFF	1	0
	HP	Channel - Adjusts the module's channel number to allow the module to hop on a specific hopping sequence. This allows independent networks of modules to operate in the same vicinity.	Hopping Channel Mode Range: 0 – 6 Single Channel Mode Range: 0x00 - 0x18 (Decimal: 0 – 24)	2	0
	MK	Address Mask – Sets global address mask. A global address is one that has the same bits set as the Address Mask. This can be used to allow a base module to receive data from a range of addresses. It may also be used to configure "subnets" of modules that communicate in a group.	Range: 0x00 - 0xFFFF	2	0xFFFF
Serial Interfacing Options	CD	RX LED I/O – Redefines the RX LED I/O line.	Range: 0 – 5 0 = RX LED 1 = high 2 = low 3 = input 4 = output 5 = carrier detect	1	0
	CS	RS-485 Transmit Enable – Modifies behavior of the $\overline{\text{CTS}}$ signal.	Range: 0 – 4 0 = Normal 1 = RS-485 enable low 2 = $\overline{\text{CTS}}$ high 3 = RS-485 enable high 4 = $\overline{\text{CTS}}$ low	1	0

Table 6. Non-AT Settable Parameters
(Settable using XCite-CTU Software only)

Command Category	AT Command Equivalent	Command Description	Parameter Range	# Bytes Returned	Factory Default
AT Command Options	AT	Silence AFTER Sequence - Sets time period of silence after a command sequence.	Range: 0x00 - 0xFFFF (milliseconds)	2	0x1F4
	BT	Silence BEFORE Sequence – Sets period of silence time before a command sequence.	Range: 0x00 - 0xFFFF (milliseconds)	2	0x1F4
	CC	Commands Sequence Character –Parameter determines ASCII command sequence character used to enter AT Command Mode.	Range: 0x20 – 0x7F	1	0x2B (plus sign "+" in ASCII.)
	CT	Time Out from Command Mode – If no valid commands have been received within this time period, module returns to Idle Mode from AT Command Mode.	Range: 0x02 – 0xFFFF (tenths of a second)	2	0xC8
Networking	ID	Assign Module VID – Sets Module VID for creating separate networks.	Range: 0x00 - 0x3332	1	0x3332
Serial Interfacing Options	BD	Baud Rate – Sets serial com port's baud rate (bps) and thus sets the rate at which serial data enters into the module. If Com Port Baud rate is set higher than the fixed over-the-air baud of the module, CTS may need to be implemented.	Range: 0 – 6 (1200 – 57600 BPS)	1	Set to equal module's over-the-air Baud 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	1	1
	FL	Software Flow Control – Enables serial software flow control on the module. (Hardware flow control (CTS) is always on.) XON = 0x11, XOFF = 0x13	Range: 0 -1 0 = No software flow control 1 = Use software flow control	1	0
	NB	Parity – Sets error-checking parameters for parity systems. Setting 7 bits (using BI Parameter) and Mark or Space parity will result in a setting of 7 bits and no parity.	Range: 0 – 4 0 = 8-bit (no parity) or 7-bit (with parity) 1 = 8-bit even parity 2 = 8-bit odd parity 3 = 8-bit mark parity 4 = 8-bit space parity	1	0
	RT	RTS Mode – Enables $\overline{\text{RTS}}$ Mode.	Range: 0 – 1 0 = None 1 = $\overline{\text{RTS}}$ Handshaking	1	0
	SB	Stop Bits – Sets number of stop bits.	Range: 0 – 1 0 = 1 stop bit 1 = 2 stop bits	1	0
Sleep (Low Power)	HT	Time-to-Beacon – Sets time of inactivity (no serial or RF data sent or received) before a wake-up beacon is transmitted. Value should be shorter than time set with ST Command.	Range: 0x00 - 0xFFFF (tenths of a second)	2	0xFFFF (no wake-up beacon sent)
	LH	Beacon Transmit Time – Specifies the length of the wake-up beacon. The length of the beacon should be longer than the interval if time set using SM Command.	Range: 0x00 - 0xFF (tenths of a second)	1	1
	PW	Pin Wake Up – Allow s pin wake up from Cyclic Sleep Mode.	Range: 0 – 1 0 = Disable 1 = Enable	1	0
	SM	Sleep Mode – Specifies 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	1	0
	ST	Time-to-Sleep – Sets the time of inactivity before entering Sleep Mode. (This number is only valid with SM Command Cyclic and Serial Port Sleep settings.)	Range: 0x10x00 - 0xFFFF (tenths of a second)	2	0x64

Configuration Software

XCite-CTU Software

XCite-CTU is MaxStream-provided software used to configure 9XCite Modules. It is the only means that can be used to set all three command parameter types [AT Commands, Non-AT Settable Parameters & Read-Only AT Commands].

XCite-CTU Software is organized into 3 tabs:

- **PC Settings** tab - Setup PC serial ports to interface with an XCite Module assembly
- **Range Test** tab – Test an 9XCite Module's range and monitor packets sent and received
- **XCite Configuration** tab – Configure and read parameters of 9XCite Modules

For More Information

Go to the Interfacing Software section of the "XCite Advanced Programming & Configuration" manual for step-by-step instruction on how to accomplish XCite-CTU functions.

The advanced manual is available on the MaxStream CD or on the web:
www.MaxStream.net

Figure 12. XCite-CTU User Interface (PC Settings, Range Test & XCite Configuration tabs)



Install XCite-CTU software

Double-click the "setup_XCite-CTU.exe" file and follow prompts of the installation screens. (The "setup_XCite-CTU.exe" file is located in the MaxStream CD "Software" folder and also on the web: http://www.maxstream.net/products_software.html)

Using XCite-CTU software

In order to use the XCite-CTU software, a module assembly (a 9XCite Module mounted to a MaxStream Interface Board) must be connected to the serial port of a PC. The baud rate of the serial port ("Setup" tab) must match the baud rate of the module (BD (Baud Rate) Command on the "Configuration" tab).

Serial Communications Software (for AT Commands Only)

Serial Communications Software can be used to issue AT and Read-Only AT Commands, but cannot be used to set Non-AT Settable Parameters.

"HyperTerminal" and "Pro Comm" are examples of commonly used serial communications software. "HyperTerminal" comes installed with Windows XP, 2000 and NT.

All AT Commands are sent as follows:

AT + [2 Character ASCII Command] + [Optional Space] + [Parameter (HEX)] + [CR]

(CR = Carriage return)

Appendix A: FCC Certification

9XCite (900 MHz) Module - FCC Compliance

The MaxStream 9XCite Wireless OEM Module complies with Part 15 of the FCC Rules. Compliance requires the following be stated:

Figure A1. Required FCC Label for 9XCite Module

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.

OEM 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 shown in Figure A2.

Figure A2. Required FCC Label for OEM products containing 9XCite 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 Notice

Compliance to the following is also required:

IMPORTANT: The 9XCite (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 9XCite wireless OEM module has been certified for mobile and base station applications. If the 9XCite 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experience radio/TV technician for help.

9XCite (900 MHz) Approved Antenna List

ANTENNA WARNING



WARNING This device has been tested with Reverse Polarity SMA connectors with the antennas listed in Table A1 [next page]. 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 9XCite module must be tested to comply with FCC Section 15.203 for unique antenna connectors and Section 15.247 for emissions.

Table A1. Antennas approved for use with the 9XCite Wireless OEM 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.

In addition to the antennas listed in Table A1, over 100 additional antennas have been tested and approved for use with the 9XCite module. Contact MaxStream toll-free (1-866-765-9885) 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: Specifications

9XCite Wireless OEM Module Specifications

Table B1. 9XCite OEM Module Specifications

Specification	9XCite (900 MHz)	
General		
Frequency	902-928 MHz	
Spread Spectrum Type	Frequency Hopping, Direct FM modulator	
Single Channel (Optional)	Fixed or User Selectable (up to 12 channels)	
Network Topology	Peer-to-Peer, Point-to-Multipoint, Point-to-Point, Multi-Drop Transparent	
Unique Hop Sequences	7 hop sequences share 25 channels OR 12 selectable channels (Single Channel Mode)	
Serial Data Interface	CMOS	
I/O Data Rate	Software selectable 1200-57600 bps	
Power Requirements		
Supply Voltage	2.85 to 5.50 VDC	
Transmit Current (2.85V)	55 mA	
Receive Current (2.85V)	35 mA	
Power Down Current	20 μ A	
Physical Properties		
Module Board Size	1.6" x 2.825" x 0.35" (4.06 cm x 7.17 cm x 0.89 cm)	
Weight	0.8 oz. (24 g)	
Connector	11-Pin & 4-Pin 0.1" spaced Male Berg-type Headers	
Operating Temperature	0 to 70° C (Commercial)	
Antennas		
Type	$\frac{1}{4}$ Wave Monopole, 3" (7.62 cm) integrated wire, 1.9 dBi	
Connector (Optional)	Reverse-polarity SMA (RPSMA)	
Impedance	50 ohms unbalanced	
Certifications		
FCC Part 15.247	Pending	
Industry Canada (IC)	Pending	
Performance		
Indoor/Urban Range	approximately 300' (90 m)	
Outdoor LOS Range	approximately 1000' (300 m) w/ dipole	
Transmit Power Output	1 mW (10 mW effective considering excellent RX sensitivity)	
Serial Data Throughput	9600 bps	38400 bps
RF Baud Rate	10000 bps	41666 bps
Receiver Sensitivity	-108 dBm (1x10 ⁻⁴ BER)	-104 dBm (1x10 ⁻⁴ BER)

Appendix C:

Additional Information

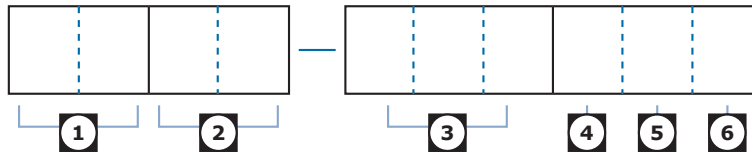
1-Year Warranty

The 9XCite Wireless OEM Module 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.

9XCite Wireless OEM Module Part Numbers

Figure C1. Part Numbers Key



Divisions of the XCite Wireless OEM Module part number:

- 1 MaxStream Product Family**
XC = XCite
- 2 Operating Frequency**
09 = 902-928 MHz
- 3 Over-the-air Baud Rate**
009 = 9600 Baud
038 = 38400 Baud
- 4 Wire Antenna**
W = Wire Antenna
N = No Wire Antenna
- 5 Connector**
S = RPSMA Connector
N = No Connector
- 6 Module Temperature Rating**
C = Commercial: 0 to 70° C

For example: XC09-038NSC

(9XCite Module, 900 MHz, 38400 Baud, No Wire Antenna, RPSMA Connector, Commercial Temperature Rating)

Appendix D: Troubleshooting & FAQs

Contact MaxStream

MaxStream technical support prides itself on timely and thorough solution-delivery.

MaxStream technical support engineers are versed in RF and EE technologies and are readily accessible via the means listed below. By contacting MaxStream technical support, you benefit from many years of combined field experience.

Several on-line support features are available. Please use the following resources for additional support:

FAQs	http://www.maxstream.net/support_faq.html
Documentation	http://www.maxstream.net/support_documentation.html
Technical Support	Live Chat: www.MaxStream.net
	Phone: (801) 765-9885
	eMail: support@MaxStream.net

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