

# *intelleflex*<sup>®</sup>

## **XC3 Technology**<sup>™</sup>

CMR-6100 User Manual



Doc ID: TS-34-0512  
Published May 29, 2012

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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.

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This device complies with Industry Canada License-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

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 radiofrequency 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 the receiver, Connect the equipment into an outlet on a circuit different from that to which the receiver is connected, Consult the dealer or an experienced radio/TV technician for help.

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#### Caution

This device should be operated with a minimum distance of at least 32 cm between its antennas and a person's body in keeping with RF exposure limits in Council Recommendation 1999/519/EU

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## 1. Introduction

The Intellex XC3 Technology based Cellular Multi-Protocol Reader, CMR-6100, is a new age RFID reader that provides extended RFID capabilities with industry-leading range as well as the ability to connect remotely through a GSM. Along with the GSM network, the CMR-6100 is capable of decoding GPS data. The CMR-6100 advanced design ensures easy field upgradeability, in addition to support for ISO 18000-6:2010 and EPC-global C1G2 industry standards.



Figure 1.1-1 the CMR-6100

This user manual describes the operation and installation of the CMR-6100. This manual is intended for, but not limited to, Intellex RFID software and integration partners responsible for incorporating Intellex XC3 Technology into new or existing RFID solutions.

## 2. The Intellex CMR-6100

### 2.1 Description

The CMR-6100 has unique functionality which supports connections through Ethernet and a GPRS cellular modem. The cellular modem also provides access to GPS location and time synchronization. In order to take full advantage of the remote capabilities of a cellular modem, the CMR-6100 offers autonomous functionality. The autonomous functionality of the CMR-6100 is provided by the hosting and remote management of internal application programs (agents) capable of communicating to the CMR-6100 and other local devices. The CMR-6100 also offers two optically isolated general purpose inputs and two open-drain outputs. There are two pairs of bi-static antenna connectors: 2 transmit (Tx) and 2 receive (Rx) ports. The CMR-6100 also has a USB Type-A receptacle with high levels of USB driver support.

### 2.2 Power and External Connections

To power the Intellex CMR-6100 use the provided +24VDC 2.5A power supply and use the DC power input on the back panel of the reader, ensuring the connector has been completely inserted into the receptacle and the locking screw is secured to finger tightness. There is an additional battery DC input on the CMR-6100 which powers the unit completely but notifies the hosted application agent that the main power source has been turned off and it is now running on battery backup. This is useful to limit cellular network and RF transmitting to make sure the battery backup isn't depleted quickly.

Additionally on the back panel is a USB Type-A receptacle, RJ45 LAN, USB Type-B receptacle, and the GPIO screw pin adapter receptacle. The USB Type-A receptacle is designed to take almost all USB based devices, additional internal application support may be needed to run complex devices such as modems, but USB memory sticks, USB to Serial adapters and printers are supported. The USB Type-B receptacle is a serial port connection which provides direct access to the CMR-6100 network settings. For more information about the GPIO connector see Chapter 2.4.5.



Figure 2.1-1 CMR-6100 Back Connector Panel

When using the CMR-6100, be sure to always have antennas connected to at least one pair of antenna ports – This is imperative to ensure proper behavior of the unit.



Figure 2.2-2 CMR-6100 Front Panel

## 2.3 Hardware Specifications

### SPECIFICATIONS

<b>Physical Characteristics</b> Dimensions Weight	12.27 x 6.85 x 1.36 inches (311.62 x 174 x 34.5 mm) 2.9 lbs. (1.32 kg)
<b>Connectivity</b> External Interfaces RF Connector Type Antenna Ports Power Supply	RJ45, USB type-A, serial over USB type B, GPIO Reverse Polarity TNC (RP-TNC) 2 transmit, 2 reverse (2 bi-static pairs) 24V (single) range (10.5-28)V; Backup power range (10.5-28)V
<b>Protocol</b> Standards C1G2 PIE forward link Tari C3 Manchester forward link rates Miller backscatter link frequencies, M ratio Reverse link data rates (BLF/M)	EPC C1G2 passive, ISO 18000-6C revision 1 Manchester BAP 25 - 6.25 μsec 8 - 128 Kbps BLF: 80 - 320 KHz, M: 2 – 128 2.5 – 160 Kbps
<b>Performance</b> Transmitter RF Output Power Receiver Sensitivity Frequency Range Number of Channels	0 to +30 dBm, 1 dB steps, +/- 1 dB accuracy (Max 1 Watt) -120 dBm at 2.5 Kbps EU 865-867 MHz, FCC 902-928 MHz; Regulatory dependent 4 – 50; Regulatory dependent
<b>Environmental</b> Temperature Operating Storage Humidity Standard Vibration Standard	0° to +55°C -20° to +70°C IEC 60068-30/78, 5-95% non-condensing IEC 60068-2-6
<b>Compliance/Certifications</b> EMC Agency Listings RoHS	FCC Part 15 Class B, EN55022 Class B UL 60950, cUL C22.2 No. 60950-00 Restriction of Hazardous Materials Compliance
<b>Hardware and Firmware Management</b> Firmware Upgrade Host Interface Protocols	Host based firmware upgrade capabilities Serial port, HDLC formatting
<b>Software Support</b> Windows DLL (Ethernet only) XML API (Ethernet only) Ruby based agents	Compatible with Microsoft® .NET Compact Framework Platform independent API command set Ruby applications hosted on the reader executing autonomously and collecting RFID tag data

## 2.4 Detailed System Specifications

### 2.4.1 Antennas

There are four Reverse Polarity (RP) Threaded Neill-Concelman (TNC) connectors on the CMR-6100. These connectors are separated into pairs, two are dedicated for transmit and two are dedicated for receive. At a minimum one pair of antennas needs to be connected: a “pair” consisting of one transmit antenna and one receive antenna.

Mounting hardware is provided with the antennas to easily attach antennas either to a pole or wall. A mounting instruction sheet is provided with the mounting hardware. Mount one antenna pair such that antennas are at least six feet above the ground. To maximize read range, space the Transmit (Tx) and Receive (Rx) antennas at least a foot apart. You can also mount the antennas side-by-side (horizontally) so long as a minimum separation of one foot is maintained. Be sure to verify the antennas are connected to the correct ports; the antenna’s function is labeled on the back of the antenna.

Connect the Tx antenna to the Tx port on the reader, and Rx antenna to the Rx port on the reader. Use the supplied RF cables with reverse TNC connectors.

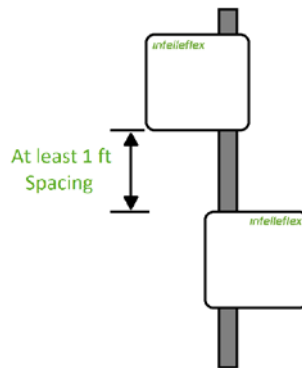


Figure 2.3-1 Tx and Rx antenna spacing

Two pairs of antenna pairs may be connected to the reader at any given time. When several Rx and Tx antennas are connected, the reader can be set up to transmit on any Tx port and receive on any Rx port.

### 2.4.2 Serial Connection

```

*****
Prod: FMR-6000
Name: Intellex Reader
S/N: IA210430011
Ver: 3.0.2.0.707
Rel Date: 2010-10-27 12:24:37 -0700
IP: 10.1.6.139
netmask: 255.255.255.0
gateway: 10.1.6.1
broadcast: 10.1.6.255
mac: 64:7B:D4:08:10:AD
using DHCP: no
*****
** Intellex Reader @ 10.1.6.139 **
** 3.0.2.0.707 - IA210430011 **
*****
**
** 1 - Set static IP **
** 2 - Set to DHCP networking **
** 3 - Restore factory defaults **
** 4 - Display network settings **
** 5 - Reboot reader **
**
*****
    
```

Figure 2.3-2 Serial Port Boot Output

There is a direct serial connection port on the CMR-6100 that allows for a PC to establish a connection with the reader through a standard USB cable. This creates a Virtual Communication Port (VCP) that allows PCs without serial ports to connect directly to the reader without buying a Serial to USB adapter. Drivers to support this feature can be found on the Intellex support website: [Intellex Download Support](#).

Once the driver is installed and the USB cable is connected to both the reader and the PC, opening up a serial connection can be done easily on both Windows or OS X for Mac based systems. To connect over serial on a specific system please see [Appendix A](#) for details. Use a Baud Rate of 115200, data 8 bit, Parity none, and Stop of 1 bit with no flow control. Once a serial connection is established to the reader connect the Ethernet cable using the power injector (see next section for details). Allow the unit to boot. When the unit has booted all the way, you will see the print out on the screen as in Figure 2.3-2.

### 2.4.3 Status and Activity LEDs

There are five active LEDs on the front right corner of the CMR-6100. They are used to see the status or activity level of the reader. When a reader is first plugged in, the *Power* LED will illuminate and stay illuminated until power is removed from the unit.

The next two lights to turn on will be *Boot* and *Network*. *Boot* will light up when the host application is ready to accept connections. *Network* will light up when the DHCP client has started and is ready to accept a network connection from a DHCP server, or when the reader has assigned itself a static IP address.



Figure 2.3-3 (Cutaway) LED Activity and Status Lights

*Transmit* is a dynamic light that will flicker whenever the CMR-6100 is transmitting RF signals out of either of the antenna ports. This light does not necessarily indicate it is finding tags, only that RF is successfully being broadcasted from the reader. The light will flicker (or pulse) at a rate that is dependent on the length and duty cycle of the transmission. If the reader is assigned to read the full content of user memory, the light will be illuminated until the transmission has ended.

*Network* is a dual purpose LED, configured to flash while cellular data is being transferred or to be solid while LAN connection is provided.

*Fault* is an error triggered LED that will stay illuminated if there is a system error. If the *Fault* light is illuminated on your CMR-6100 please contact Intellex Technical Support (information found at the beginning and end of this document) to get the reader serviced at your earliest convenience. *Note: The Fault light will be illuminated for a few seconds during boot and will then go out when the boot sequence has successfully completed.*

### 2.4.4 General Purpose I/O

There are four digital General Purpose Input and Output (GPIO) ports on the CMR-6100 that are accessed through the provided 8 pin screw head connector. There are two opto-isolated inputs, two open drain outputs, Ground pin, and +5v pin.

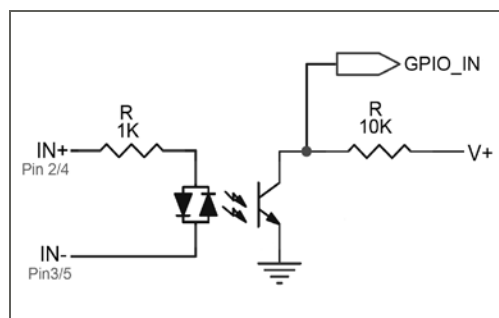


Figure 2.3-4 Optically Isolated Input Schematic



The inputs are differential optically isolated inputs. A differential input provided on the positive and negative side of each input will drive either a positive (logic 1) or negative (logic 0) voltage through the isolator. There is a 1k resistor in series with the positive input pin on each input.

The outputs are open-drain, driven by a MOSFET, and will either drive the pin to a ground, closing the MOSFET, by providing a digital 1 logic level or become a high impedance output, opening the MOSFET, by providing a digital 0 logic level.

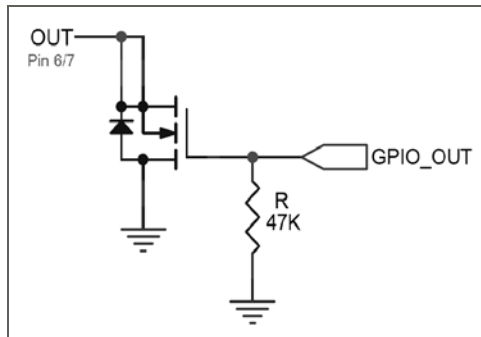


Figure 2.3-5 Open-Drain Digital Output

On the readers back panel, located just left of middle, is the green GPIO socket that the provided screw terminal fits into. The screw header fits securely into the socket and is tightened down with the two attached screws. Looking at the reader, the pins are numbered left to right from eight (8) to one (1). See Figure 2.3-6 for details and Table 2.3-1 for the pin out.

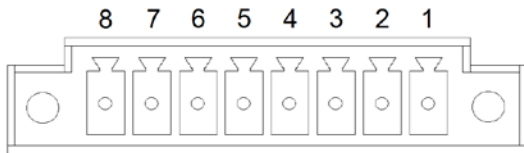


Figure 2.3-6 8 Pin GPIO Header (Looking at the Reader)

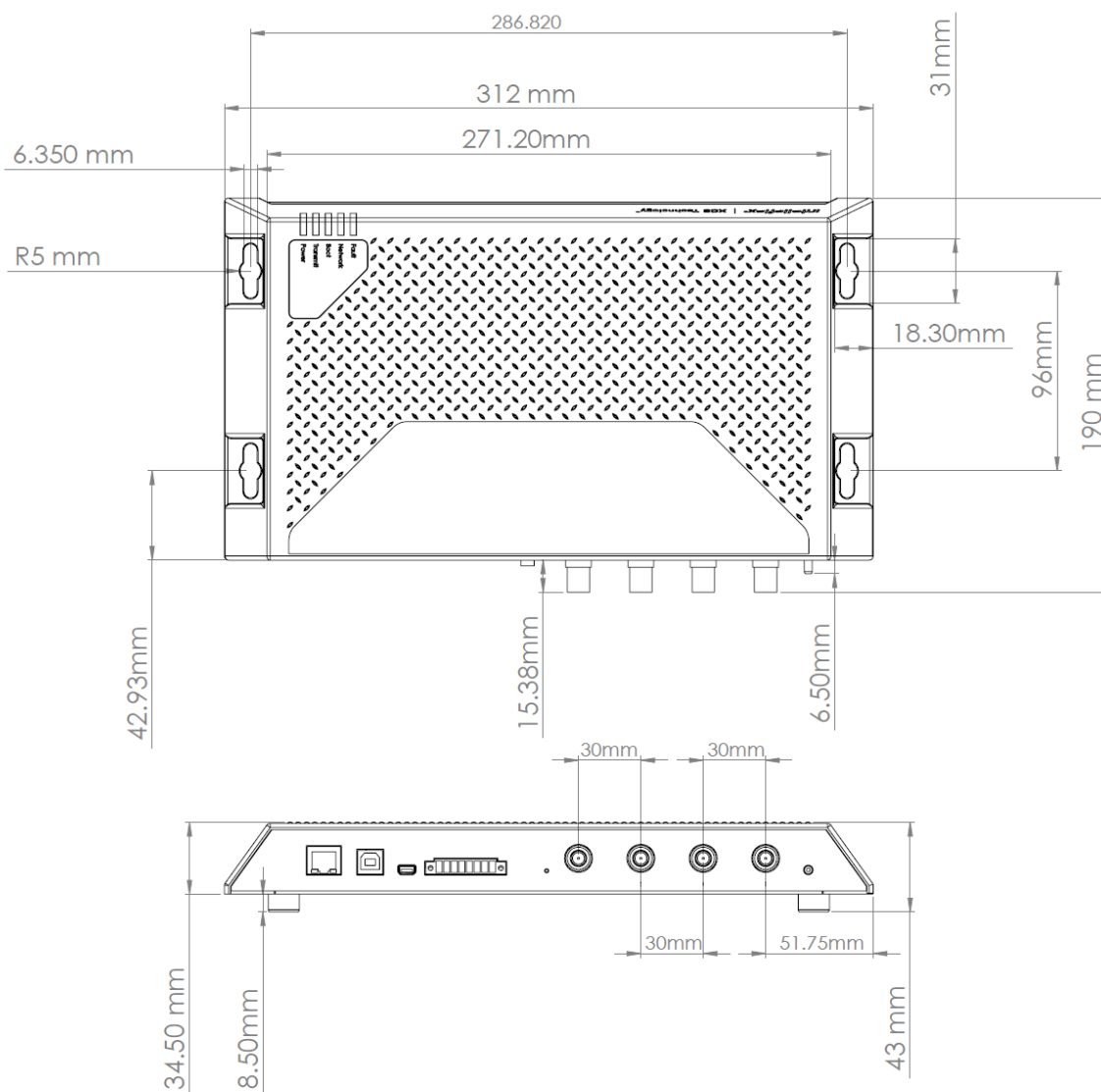
Table 2.3-1 Pin Description and Characteristics

Pin	Description	Characteristics
1	Vdd	5v @ 50mA
2	IN 1+	Max Current 10mA
3	IN 1-	
4	IN 2+	Max Current 10mA
5	IN 2-	
6	OUT 1	62v@100mA Max
7	OUT 2	62v@100mA Max
8	GND	Ground

### 2.4.5 Reader Mounting

The case of the CMR-6100 has been designed with included mounting holes located on either side of the case. When mounting the reader, keep in mind the antenna cables and where they are going to route. If mounting the unit outside or in an industrial area, consider using a NEMA enclosure to protect the unit.





### 3. Web Based Reader Interface

The test interface to the CMR-6100 is a web browser enabled GUI through which the user may interact with the reader. This interface is based on a web server that resides on the reader. Through this interface, the user can set the reader's name, upgrade the reader with new firmware, choose a static IP address or enable DHCP, check status and version numbers, set cellular connection parameters and manage agents. The user can then inventory C3 or C1G2 tag IDs and interact with tag memory.

#### 3.1 Establishing a Connection

The CMR-6100 reader supports Internet Explorer and Mozilla Firefox.

For More information about obtaining the IP address of the reader please see [Section 2.3.2](#). Once the reader's IP address is known, type in the IP address of the reader (e.g., <http://10.1.7.90>) into the browser address bar, the reader interface will appear and the status screen will be displayed by default.

#### 3.2 Checking Versions and Status

Upon successfully connecting to the reader, the browser defaults to the status page. From this page the Firmware Version of the reader can be determined ("Software Version"), as well as the Serial Number and MAC Address.



Figure 3.2-1 Status and System Page

### 3.3 Manually Setting to Static or DHCP

From the Admin/Management tags, the Reader Name, Network Setup, and NTP server can be dynamically configured. Be sure to talk to your network administrator before assigning a static IP address to the reader as this can create IP conflicts on your network and will cause the CMR-6100 to not properly respond to commands.

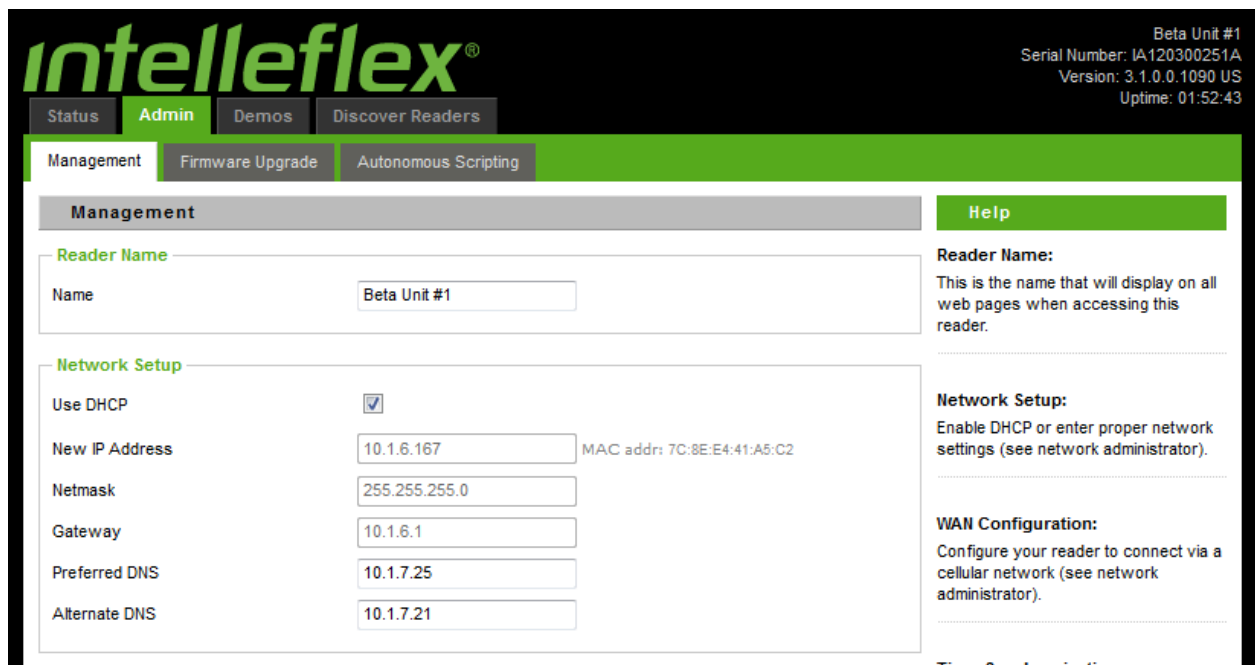


Figure 3.3-1 Admin Management Page

### 3.4 Upgrading Reader Firmware

Upgrading the Firmware on the CMR-6100 is done through the “Firmware Upgrade” tab under “Admin”. Obtain the latest version of the FW through the Intellex website or contact the Intellex Support department if you believe that your firmware version is out of date or if you are experiencing any problems using the web based interface.

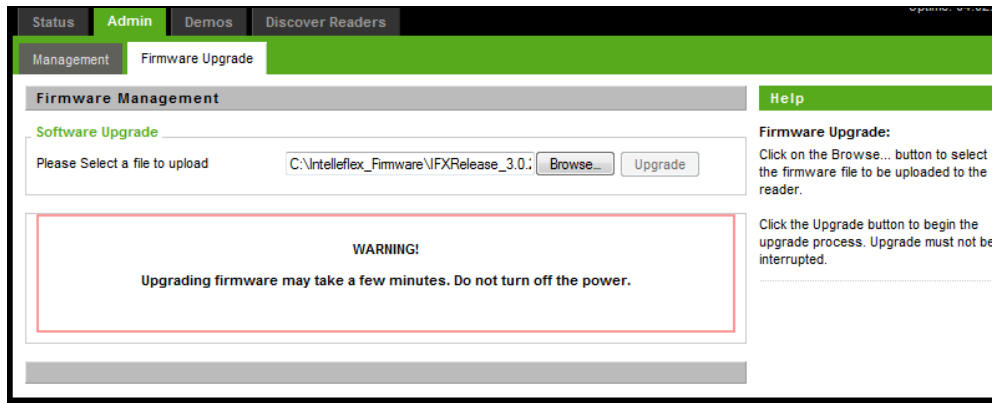


Figure 3.4-1 Reader Firmware Upgrade Page

### 3.5 Basic Inventory Demo

The Demo’s tag Inventory page is the main page used to interface with tags. From this page the user has the ability to inventory tags with different RF and reader parameters, read and write to tag user memory, and verify functionality of the system.

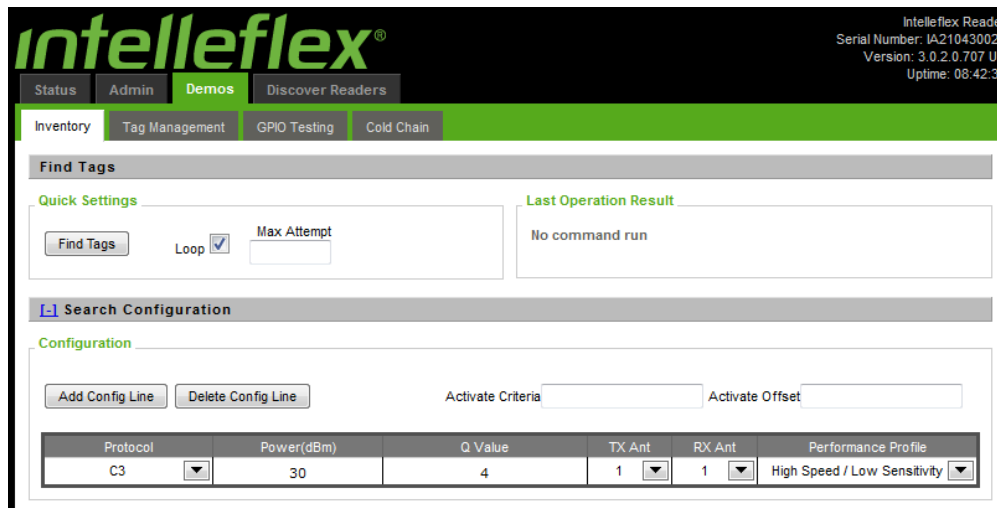


Figure 3.5-1 Inventory and Search Configuration Page

Reader parameters are controlled via “config” lines. A single config line or multiple config lines may be used. A config line is a command sent to the reader telling it what parameters and settings to use during an inventory action. Within each config line, the following reader parameters can be set:

- Protocol – C3 or C1G2
- Power level in dBm, between 0 and +30 dBm
- Q value, between 0 and 13
- Tx and Rx antenna
- Performance Profile

**Protocol:** Select C3 or C1G2 operation from the Protocol dropdown menu. Two config lines can be used to have the reader read a mixed tag population simultaneously.

**Power:** Set between 0 and full power of +30 dBm. Use full power to read C3 tags at long range.

**Q value:** This value defines the number of time slots that are included in a Query. Total time slots =  $2^Q$ . On average having more slots than tags in the field is better than having too few. On a general rule of thumb using twice as many slots as tags works well, with the exception of very large populations of tags.

**Tx ant:** Select transmit antenna

**Rx ant:** Select receive antenna

**Performance Profile:** Changing this value will change the performance of the system; by selecting “High Speed/Low Sensitivity” the system will perform inventories as fast as possible at the expense of read distance. “Medium Speed & Sensitivity” is a middle balance between speed and read distance. “Low Speed / High Sensitivity” is going to perform very slowly relative to the other two, but will maximize read distance and performance in challenging RF environments.

**Loop:** Check this box for the reader to repeatedly execute the defined set of config lines. Leave it unchecked to execute each defined config line once and only once, before stopping reads.

### Search Results

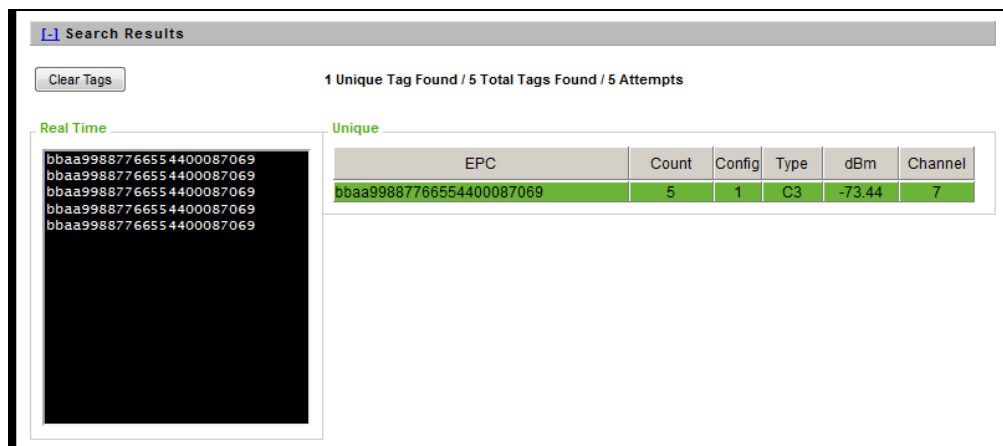


Figure 3.5-2 Search Results with a tag Found

The black window on the left shows the tag ID of each tag, as it is read. Text from this window may be copied into a document, if needed. The window holds the last 100 tag IDs read.

The summary window on the right displays the unique tag IDs of identified tags, number of times that tag was read, the config line that most recently found the tag, the tag type (C3 or C1G2), and the dBm value of the Received Signal Strength Indicator (RSSI). Each field may be sorted by clicking on the corresponding gray header (i.e. to sort by protocol, click “Type”).

A summary of reads is also displayed above the unique tag reads window. At the top right corner of the Find Tags window, the Last Operation Result section displays the status of the most current command, giving the user some real time feedback on reader operation.

## 3.6 Basic Memory Reader and Write Demo

The web based demonstration page includes a simple tag memory management page that allows you to read and write hexadecimal data in and out of the tag memory. Access to the memory is given by “Block” address and an offset. In all Intellex XC3 tags there is 60 kilobits of user memory that is broken up into 60 1kbit “Blocks”. To access the “Manage Tag Memory” section on the Demo page, find a tag and double click on the tag in the search results viewing area. The window in Figure 3.6-1 will show after double clicking on the tag.

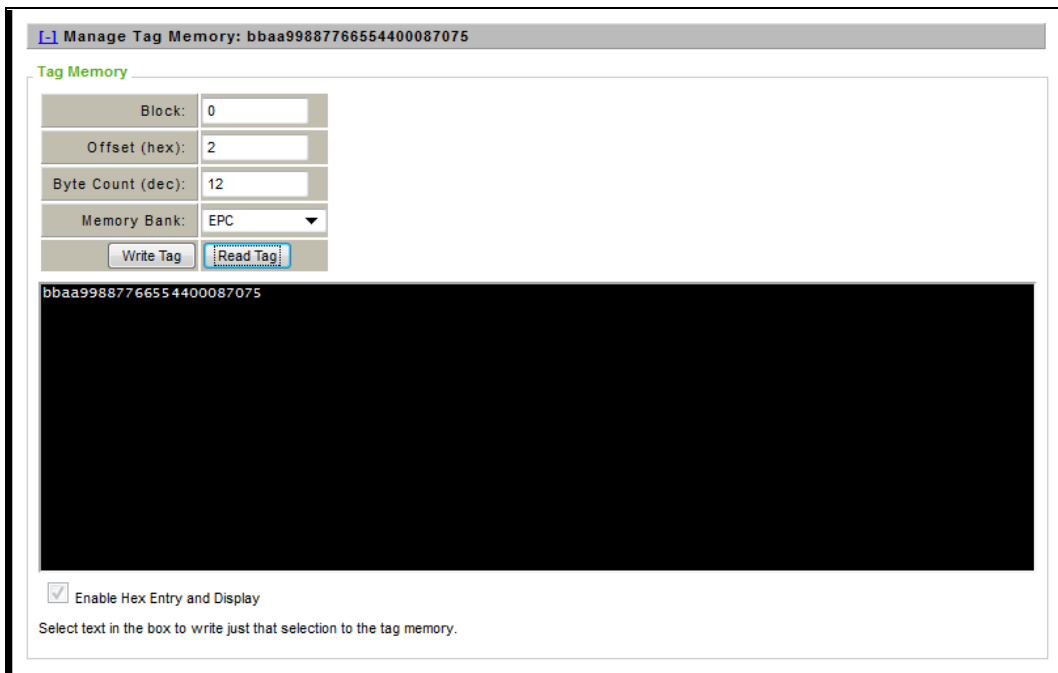


Figure 3.6-1 Tag EPC Read from Tag Memory Management Page

By Selecting the EPC Memory Bank and an Offset of 2 with a length of 12 bytes, the CMR-6100 will read the EPC data that is stored in the tag. All of user memory can also be read and written to in the same way that the EPC memory was accessed here.

### 3.7 GPIO Testing and Verification Page

The GPIO Testing page enables the CMR-6100 to either set or detect the logic levels of the general purpose inputs or outputs. See Section 2.5 for more information about the [General Purpose I/O](#).

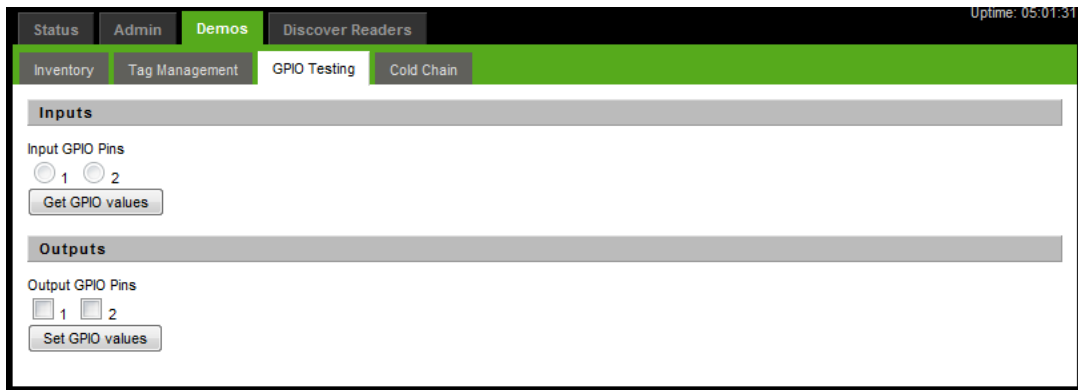


Figure 3.7-1 GPIO Test and Verification Webpage

### 3.8 WAN Setup

Depending on the SIM card installed, different APN information will be required. Please consult Intellex Support for addition information or support.

WAN Configuration	
APN Server	<input type="text"/>
APN Username	<input type="text"/>
APN Password	<input type="text"/>
WAN Connection Status:	undefined <span style="float: right;"><input type="button" value="Refresh Status"/></span>

Web Service Configuration	
Web Service IP	<input type="text" value="dsbeta.intelleflex.com"/>
Web Service Port	<input type="text" value="80"/>

### 3.9 Data Collection Agents

CMR-6100 Reader Software provides set of Data Collection Agents (Ruby based applications which execute autonomously on CMR-6100). Data Collections agents consist of couple of main components:

- Connection Setup – connection can be TCP or cellular
- Data collection logic – This component defines what type of data id being collected by the agent. Base agent install package contains three types of agents:
  - Agent for collecting tag inventory: Inventory
  - Agent for reading TMT tag status with ability to send SMS message to the reader and commanding to read full tag memory data: Status
  - Agent for finding tags and reading full content of a tag on scheduled interval (note that this operation is very data intensive and it can result in big data set being sent over WAN connection: ReadLog)
- Data Formatting – Currently agent infrastructure provides support for XML and JSON message format. Plug and play architecture allows for easy addition of new message formats (see Intellex Data Services documentation for more details about message formats.)
- Data Buffering – If there is no connectivity at the time, data will be buffered and prepared to send at later time.
- Remote server address defines where collected data will be sent. By default, agents are configured to send data to Intellex Data Collection Services which provides infrastructure for reliable data collection, data storage and cleansing. Stored data is the made available through Intellex Data Services (see Intellex Data Services documentation for more details about how to access the data.)

### 3.10 Agent Setup

In the Script Configuration select the desired agent and the desired settings. Looping Interval dictates how often the agent is going to execute the script in minutes. Server Push Interval dictates how often that stored data in the buffer should get pushed to the server. And the buffer entry tells the agent how big of a ring buffer to create. Select the desired RF settings and click Save. To run the script click run and the Script Status window will update.

intelleflex®

Beta Unit #1  
 Serial Number: IA120300251A  
 Version: 3.1.0.0.1090 US  
 Uptime: 01:53:07

Status
Admin
Demos
Discover Readers

Management
Firmware Upgrade
Autonomous Scripting

Script Management

**Script Status**

Status	Scripts are not running.
Script	N/A
Memory Usage in bytes	N/A
Percentage of CPU Usage	N/A

**Script Configuration**

Script	<input type="text" value="inventory"/>
Looping Interval	<input type="text" value="1"/> min
Server Push Interval	<input type="text" value="1"/> min
Max Number of Buffer Entries	<input type="text" value="100"/>
Outgoing Network	<input checked="" type="radio"/> Ethernet <input type="radio"/> Cellular
RF Power	<input type="text" value="30"/> dBm
Transmit Antenna	<input type="text" value="1"/>
Receive Antenna	<input type="text" value="1"/>
RF Profile	<input type="text" value="High Speed / Low Sensitivity"/>

**Script Controls**

Help

**Status:**  
Displays status related to the script manager.

---

**Script Configuration:**  
Displays and allows you to change the parameters a script uses when running.

---

**Script Controls:**  
Click the start button to activate the script on the reader.



## 4. Troubleshooting tips

### 4.1 Reader is unresponsive

- Verify that the reader is powered, the power adapter LED is on, and the three recessed lights on the back of the reader above the serial connector are on.
- Power cycle the reader. After all three lights come on, connect to the reader.
- Verify network connectivity. Check reader and host IP address and ping the reader.

### 4.2 Reader is not reading tags

- Verify that at least one pair of antennas (one Tx and one Rx) are connected and attached to the appropriate ports on the reader.
- From the Demo/test page, verify that that the config line specifies the correct Tx and Rx pair.
- Ensure that the correct config line parameters have been set; to test the reader set the following parameters: protocol (C3 or C1G2), power (set full power at +30 dBm), Q value (set between 4 and 6), select the right Tx and Rx antennas.
- Make sure that the appropriate type of tags are being used for the application. For example, use a mount-on-metal tag for a metal mount application.
- Make sure that you are using the appropriate Performance Profile for your application, if it is not reading the tag in a difficult RF environment, try selecting a slower, yet more RF robust, sensitive profile.

### 4.3 Reader response is slow or sluggish

- Multiple configuration lines will slow the reader down, Use one configuration line if you want the fastest response.
- Check Q value. For larger tag populations, higher Q should be used. In general, avoid Q values greater than 9.
- Make sure that you are using the appropriate Performance Profile for your application. If it is reading too slowly for your needs, try selecting a less sensitive profile.

## Technical Support

For technical assistance, reader service, or repair, please contact Technical Support by filing a support case through our web submittal form

<http://www.intelleflex.com/Support.sfdcform.asp>

-or-

E-mail [support@intelleflex.com](mailto:support@intelleflex.com)

If the reader needs to be returned for service, please fill out the warranty card included with developer's kit and call in to receive a Return Materials Authorization (RMA) number and instructions on how to return the reader or visit [Intelleflex.com](http://Intelleflex.com) for more detail.

## Appendix A Establishing a Serial Connection

### 4.4 A-1 For Windows:

What you will need:

- 1) Download the appropriate USB drivers located on the Intellex website (<http://intelleflex.com/Support.Downloads.asp>).
- 2) Use a A-Male to B-Male USB Cable

Once the drivers are installed plug the USB cable into the reader and computer. The drivers should auto install. Open up “Device Manager” in windows.

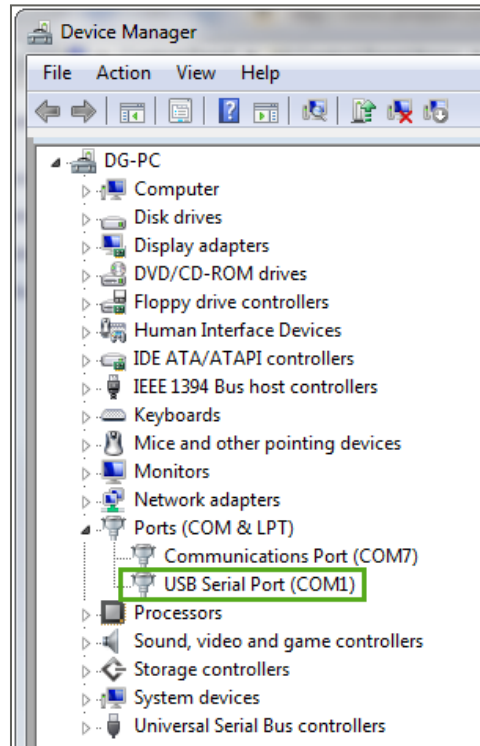
For XP:

- 1) Click on **Start** and then **Control Panel**.
- 2) Click on the Performance and Maintenance link.  
**Note:** If you're viewing the *Classic View* of Control Panel, you won't see this link. Simple double-click on the **System** icon and proceed to Step 4.
- 3) In the *Performance and Maintenance* window, click on the **System** icon near the bottom of the window.
- 4) In the *System Properties* window, click on the **Hardware** tab.
- 5) With the *Hardware* tab selected, click on the **Device Manager** Button.

For Windows 7:

- 1) Click on **Start** and then type **Device Manager** in the search bar at the bottom.

Once device manager window is open click on **Ports (COM & LPT)** and look for the **USB Serial Port** device as shown in the green box to the right.



Open up Tera-Term or HyperTerminal.

For XP:

- 1) Click on **Start** and then **All Program**
- 2) Go to Accessories->Communications->HyperTerminal

Windows 7 does not have HyperTerminal Installed, so you can install Tera-Term or any other serial port manager software. Tera-Term can be installed from the Internet.

Once your Serial Device Manager software is open use the following settings to configure the software to talk to the CMR-6100. You have now connected to the CMR-6100 over serial, you can now get system information, set network configurations, or set the reader back to defaults.

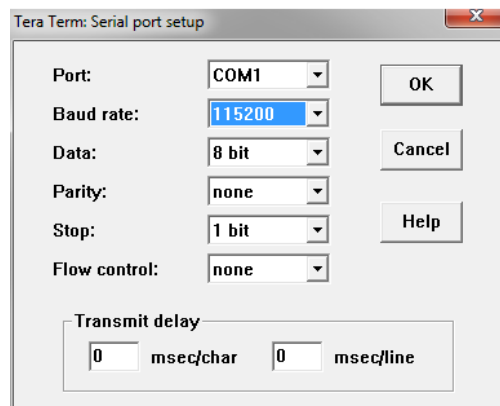


Figure 0-1 Serial Port Baud Rate and other settings

#### 4.5 A-2 For OS X ( Linux):

Systems for Mac and Linux are very similar, but may not work on every Linux build. The outline below describes using a program called **screen**. If this program is not installed on your system search on the Internet for your specific Linux system and use the appropriate packet manager , “apt-get” for example, and obtain the **screen** program.

Open up a Terminal Window. On OS X this can be found under “Applications” -> “Utilities” -> Terminal. Or hit “Command-Space” and type in “Terminal”.

Once you have a terminal window open, type the following Linux commands. Note that they might be slightly different based upon which version of Linux that is running.

```
user-iMac ~ $ ls /dev/tty.*
/dev/tty.Bluetooth-Modem      /dev/tty.MacPro-Bluetooth-PDA-Sy /dev/tty.usbserial-A5004bmH
/dev/tty.Bluetooth-PDA-Sync   /dev/tty.SteveReedsiPhone-Wirele
user-iMac ~ $ screen /dev/tty.usbserial-A5004bmH 115200
```

Figure 0-1 Terminal Commands

The first command in black italic font will show all the “tty.” Devices attached to the machine. Look for the device that is label “usbserial-A500...”, it is in green font in Figure 5.2-1. Once the name of the serial device has been identified, look for the second line in black font “screen /dev/tty.usbserial-A500....” with a baud rate setting of 115200.

The CMR-6100 has now been connected over serial providing system information, enabling network configurations, or restoring system defaults.