

M-2800 User Guide

AXEM Technology

1/22



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1 Background

Description	Date	Version	Author	Auditor
First parution	25/05/2020	V1.0	CLO	ACA

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2 Product overview



Module type	M-2800
Photo	
RF channel	Four channels
RF connector	SMA
Antenna connecton mode	Four antennas
Interface connector	Molex 53261-1571
RF connector material	Gold-plated
PCB material	Rogers FR4 gold plated
Shield material	Aluminum



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3 Configurations









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3.1 Initial Use

3.1.1 Pin connector pin assignement

T PIN 1							
PIN	Interface	Description					
1	GND	Maaputhila groupding					
2	GND	Meanwhile grounding					
3	3.7V - 5V DC	Meanwhile connect power					
4	3.7V - 5V DC						
5	GPIO 3	Output					
6	GPIO 4	Output					
7	GPIO 1	Input					
8	Beeper	Has driven with > 50mA output current					
9	UART_RXD	TTL lavel					
10	UART_TXD						
11	USB_DM	For testing					
12	USB_DP	For testing					
13	GPIO 2	Input					
14	EN	High level enable					
15	GPIO 5	RS-485 direction control					

3.1.2 Operating the reader via Demo

Put the **UHFDemo.exe**, **reader.dll**, **customControl.dll** into the same folder, and double-click **UHFDemo.exe** to run the software.

1. Open the software and it will show as below:

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rection			Firmware Ve	rsion		
	RS232	○ TCP/IP				Get
3-232			-Internal Te	mperature		
Serial Port:	CON1 -	Connect				Get
Baudrate:	115200 -	Disconnect	Read/Write	GPIO		
			-Read GPI			
Set Baudrate:	*	Set		GPI01: 🔘 High	C Low	
CP/IP				GPIO2: 🔘 High	C Low	Read
Reader IP Add:	192 168 0 178	Connect				
Port:	4001	Disconnect	-Write GP			
				GPIO3: 🔘 High	C Low	Write GPI03
RS-485 Address(HB	3X)			apro4 (0.11')	l I	
		Set		GP104: O High	U LOW	Write Gr104
Reader Identifie	r(12 Bytes)		Buzzer Beha	wior		
		Get		🔘 Quiet		
				🔘 Beep after an invent	ory round	
		Set		🔘 Beep after a tag is	identified.(For test only)	Set
	Reset Reader					Refresh
	_				Ac.	tivate Serial Port I

2. Please select **RS232** as **Connection** if the reader is connected via RS -232 port. Choose the corresponding **Serial Port** and **Baudrate** (default baudrate is 115200). As illustrated below:

Connection	RS232	© TCP/IP
RS-232 Serial Port:	COM1 -	Connect
Baudrate:	115200 ▼	Disconnect

3. Click **Connect**, if it succeeds, the **Operation History** will display as below:



If the reader is connected via TCP/IP, please follow those steps:

- Ensure that an Ethernet Card has been installed in the PC.
- Ensure that PC and reader in the same network segment.
- 1. Default settings when connected via TCP/IP as follows:



Connection	© RS232	TCP/IP
RS-232 Serial Port:	COM1 -	Connect
Baudrate:	115200 ▼	Disconnect
Set Baudrate: TCP/IP	Ŧ	Set
Reader IP Add:	192 168 0 178	Connect
Port:	4001	Disconnect

- IP addresses: 192.168.0.178
- Net mask: 255.255.255.0
- Port No.: 4001

For more TCP / IP configuration details, please defer to the document supplied:\ tcpip configuration \ IPORT-1UM.PDF

2. Click **Connect**, if it is connected successfully, the **Operation history** will display as below:



Text communication with the reader:

Click on Get in Firmware Version or in Reader Identifier, the following screen displays:

UHF RFID Reader Demo v3.62		
Reader Setup 18000-6C Tag Test ISO 18000-6B Tag T	est Serial Port Monitor	r
Basic Setup RF Setup		
Connection		Firmware Version
	CP/IP	6.9 Get
RS-232		Internal Temperature
Serial Port: COM5	Connect	Get
Baudrate: 115200 🔻	Disconnect	Read/Write GPIO Read GPIO
Set Baudrate:	Set	GPI01: O High O Low
TCP/IP Reader IP Add: 192, 168, 0, 178	Connect	GPIO2: O High O Low Read
Bent : 4001	Discourset	Write GPIO
POPT: 1001	Disconnect	GPI03: O High O Low Write GPI03
RS-485 Address(HEX) 01	Set	CPI04: OHigh OLow Write GPI04
Reader Identifier(12 Bytes) FF FF	Get	Buzzer Behavior Quiet Beep after an inventory round Beep after a tag is identified. (For test only) Set
Reset Reader		Refresh
Operation History: 📝 Auto Clear		Activate Serial Port Monitor
14-04-02 15:06:42 Reader connected CON50115200 14-04-02 15:06:45 Get firmware version 14-04-02 15:06:46 Get reader identifier		



Now the reader has been connected to PC successfully.

3.2 Setting RF Parameter

After connecting the reader with PC, we need to set some basic RF parameters: RF Output Power & RF Spectrum. Please select **RF Setup** as illustrated below:

😻 UHF RFID Reader Demo v3.62											
Reader Setup	18000-6C	Tag	Test	IS0	18000-6B	Tag	Test	Serial	Port	Monitor	
Basic Setup <mark>(</mark>	RF Setup	>									

3.2.1 Setting RF Output Power

RF Output Power is the strength of RF output signal from antenna port whose unit is dBm.

-RF Output Po	wer			
	30	dBm	Get	Set

The output power range is 0 - 33dBm. When this setting completes, it will be saved in the reader automatically even if the power is cut off. Our default output power is 30dBm (1W).

3.2.2 Setting RF Spectrum

There are two methods to set RF spectrum.

Method 1: Use the default carrier frequency of the reader.

- Please defer to Frequency parameter tablet in Communication protocol for more information about the carrier frequency.
- Frequency range the reader supports: 865MHz-868MHz(ETSI), 902MHz -928MHz(FCC).

You can set the reader in System Default Frequencies, as illustrate below:

RF Spectrum Set	μ		
	System Default Frequencies		
	◎ FCC ◎ ETSI ◎ CHN Freq Range: ▼ MHz - ▼ MHz		
	User Defined Frequencies	Get	Set
🔲 User Define	Start Frequency: KHz Freq Space: KHz Quantity:		

Notes:

- The start frequency and the end frequency must not exceed the scope of RF spectrum norm.
- Start frequency must be no more than end frequency.



- Set start frequency and end frequency to the same carrier frequency, the reader will work under fixed-frequency.
- When the parameter setting completes, RF carrier frequency of reader will be randomly hopping in the scope of limited range.
- The default RF spectrum norm is FCC (902MHz-928MHz).

Method 2: Set the RF spectrum manually.

Users can set RF spectrum via these three parameters: Start Frequency, Frequency Interval, The number of Frequency points.

3.2.3 Antenna Connection Detector

Antenna Connection Detector is for checking if the port is connected to the antenna before the reader work. Otherwise, users will be notified to connect the antenna. Please open this function before you use it, as illustrated bellow:

Antenna Connetion Detector									
Note: 1.Reader detects antenna connections by measuring the return loss of RF ports.									
2. Reader stops tag operation if return loss is above the threshold.	RL Threshold:	dB	Get	Set					
3.User can turn it off by setting the threshold to 0.									

Sensitivity of Antenna Connection Detector is set by users which is the Return Loss of antenna port, the unit of which is dB. The larger this value is, the better impedance matching requirements between antenna and port. For normal antennas, you can set the threshold to 3-6dB. Sensitivity of Ceramic Antenna and Handset could be more lower.

Notes:

- Reader detects antenna connection by measuring the Return Loss of RF ports.
- Reader stops tag operation if Return Loss is above the threshold.
- User can turn it off by setting the threshold to 0.

If antenna is not connected, Reader will stop to operate tags with the following screen display:

Operation	History:	🗹 Auto Clear 🗌 Activate Serial Port Monitor	с
2014-04-02	15:42:50	Successfully set working antenna, current working antenna : Ant 1	*
2014-04-02	15:42:50	Real time mode inventory failed, due to: Antenna is missing	
2014-04-02	15:42:50	Successfully set working antenna, current working antenna : Ant 1	
2014-04-02	15:42:50	Real time mode inventory failed, due to: Antenna is missing	
2014-04-02	15:42:50	Successfully set working antenna, current working antenna : Ant 1	
2014-04-02	15:42:50	Real time mode inventory failed, due to: Antenna is missing	
2014-04-02	15:42:50	Successfully set working antenna, current working antenna : Ant 1	Ξ
2014-04-02	15:42:50	Real time mode inventory failed, due to: Antenna is missing	-

3.2.4 Measure RF Port Return Loss

3.3 ISO-18000-6C tag inventory

Connect the Reader correctly. Tag operation could be started when RF Setup is completed.

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Tag inventory means reader identifying multiple tags' EPC number at the same time. This is the core function of UHF RFID Reader and one of the standards to judge a reader's performance.

3.3.1 Real Time Mode & Buffer Mode

The most commonly used mode for tag inventory is **Real-time** mode. Data will be uploaded meanwhile you can find the tags' EPC number instantly. **RSSI** and **Parameter of Frequency** are changed and recorded in real time. Due to its dual CPU architecture, performance of multi-tag identification under **Real-time** mode is the best.

The other is **Buffer** mode, the data will be cached and uploaded together when you need them. When there are tags with small volume, the data is uploaded filtered and with no repeat. But it will take some time to filter duplicate data when reader identifies a large number of tags. Therefore, its identification efficiency will be slightly lower than real-time mode. Note: Tags can't be operated when you extract data in the cache.

Users can choose the appropriate method based on actual situation as illustrated below:



Method NO.1: Real-time Mode

1. Click Tag Inventory (Real Time Mode). Select the connected antenna(s) port. Set the number of Repeat per command, which is the times of repeat inventory command. For example, inventory command will execute anti-collision algorithm one time when you set the value to 1. It will execute anti-collision algorithm two times when you set the value to 2...

2. Click **Inventory**, you will find that the EPC number is uploaded immediately and it is real-time updating. The reader will keep inventory unless you click **stop** as shown below:

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Caterry Caterry	teader Demo v3.62					
Tea Teach				-	٦	
lag inventory	(Real lime Mode) [lag inventory(Buffer Mode) lag in	nventory(Fast Swi	th Antenna Mode) A	Access lag	5	
(Stop Pepeat Per Command 1		Jser Define Sessi	on Se	ssion ID: SO 💌 Inve	entoried Flag 🔺 👻
Antenna Se	lection					
	Ant 1	Ant2	Ant3		Ant4	
Tag Data						
	Inventoried Quantity:		Speed:(Tag/Sec):		
			Command durati	ion (mS) :	Total Inventory D	uration (mS) :
Tag List: 3	81	Min RSS	I: -77dBm	Ma	ax RSSI: -25dBm	Refresh
70	EPC	PC 1	dentification	RSSI	Carrier Fr	*
ID						
70	E2 00 30 00 39 0C 00 79 10 30 AE 87	30 00	3	-64dBm	907.00	
70 71	E2 00 30 00 39 0C 00 79 10 30 AE 87 E2 00 30 00 39 0C 00 78 03 10 EC DF	30 00 30 00	3	-64dBm -55dBm	907.00 916.00	
70 71 72	E2 00 30 00 39 0C 00 79 10 30 AE 87 E2 00 30 00 39 0C 00 78 03 10 EC DF E2 00 30 00 39 0C 00 78 05 30 DB BD	30 00 30 00 30 00	3 4 3	-64dBm -55dBm -53dBm	907.00 916.00 907.00	
70 71 72 73	E2 00 30 00 39 0C 00 79 10 30 AE 87 E2 00 30 00 39 0C 00 78 03 10 EC DF E2 00 30 00 39 0C 00 78 05 30 DB BD E2 00 30 00 39 0C 00 78 16 70 69 5B	30 00 30 00 30 00 30 00	3 4 3 3	-64dBm -55dBm -53dBm -53dBm	907.00 916.00 907.00 907.00	
70 71 72 73 74 75	E2 00 30 00 39 0C 00 79 10 30 AE 87 E2 00 30 00 39 0C 00 78 03 10 EC DF E2 00 30 00 39 0C 00 78 05 30 DE BD E2 00 30 00 39 0C 00 78 05 30 DE BD E2 00 30 00 39 0C 00 79 1C 70 69 5E E2 00 30 00 39 0C 00 79 12 180 31 0E E2 00 30 00 39 0C 00 79 21 E0 31 0E	30 00 30 00 30 00 30 00 30 00 30 00	3 4 3 3 3	-64dBm -55dBm -53dBm -53dBm -56dBm -45dBm	907.00 916.00 907.00 907.00 907.00 907.00	
70 71 72 73 74 75 76	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	30 00 30 00 30 00 30 00 30 00 30 00 30 00	3 4 3 3 3 3 3 3 3	-64dBm -55dBm -53dBm -53dBm -56dBm -45dBm -77dBm	907.00 916.00 907.00 907.00 907.00 907.00 907.00	
1D 70 71 72 73 74 75 76 77	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	30 00 30 00 30 00 30 00 30 00 30 00 30 00 30 00	3 4 3 3 3 3 3 4	-64dBm -55dBm -53dBm -53dBm -56dBm -45dBm -77dBm -70dBm	907.00 916.00 907.00 907.00 907.00 907.00 907.00 916.00	
1D 70 71 72 73 74 75 76 77 77 78	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	30 00 30 00 30 00 30 00 30 00 30 00 30 00 30 00 30 00	3 4 3 3 3 3 3 3 4 3 4 3	-64dBm -55dBm -53dBm -53dBm -56dBm -45dBm -77dBm -70dBm -70dBm	907.00 916.00 907.00 907.00 907.00 907.00 907.00 916.00 907.00	
10 70 71 72 73 74 75 76 77 78 79	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	30 00 30 00 30 00 30 00 30 00 30 00 30 00 30 00 30 00 30 00	3 4 3 3 3 3 3 4 4 3 3 3	-64dBm -55dBm -53dBm -53dBm -56dBm -45dBm -77dBm -70dBm -70dBm -50dBm	907.00 916.00 907.00 907.00 907.00 907.00 907.00 916.00 907.00 907.00	
1D 70 71 72 73 74 75 76 76 77 77 78 80	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	30 00 30 00	3 4 3 3 3 3 3 3 4 3 3 3 3 3 3	-64dBm -55dBm -53dBm -53dBm -56dBm -45dBm -77dBm -77dBm -70dBm -50dBm -64dBm	907,00 916,00 907,00 907,00 907,00 907,00 907,00 907,00 907,00 907,00 907,00	
110 70 71 71 72 73 74 75 76 777 78 79 80 81	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	3 4 3 3 3 3 3 4 3 3 3 3 4 4 3 3 4	-64dBm -55dBm -53dBm -53dBm -53dBm -45dBm -77dBm -77dBm -70dBm -50dBm -64dBm -62dBm	907,00 915,00 907,00 907,00 907,00 907,00 907,00 907,00 907,00 907,00 907,00	
1D 70 70 71 72 73 73 74 75 76 77 78 80 81 Operation His 1014-04-02 16: 014-04-02 16: 1014-04-02 16:	E2 00 30 00 39 0C 00 79 10 30 AE 87 E2 00 30 00 39 0C 00 78 00 10 EC DF E2 00 30 00 39 0C 00 78 05 30 DB BD E2 00 30 00 39 0C 00 79 10 70 69 5B E2 00 30 00 39 0C 00 79 16 70 69 5B E2 00 30 00 39 0C 00 79 10 10 C0 65 E2 00 30 00 39 0C 00 79 10 10 C0 65 E2 00 30 00 39 0C 00 79 10 10 C0 65 E2 00 30 00 39 0C 00 78 10 20 AE 86 E2 00 30 00 39 0C 00 79 10 50 D5 07 E2 00 30 00 39 0C 00 79 10 50 AE 84 E2 00 30 00 39 0C 00 79 10 50 60 AB E2 00 30 00 39 0C 00 79 10 50 60 AB E2 00 30 00 39 0C 00 79 10 50 60 AB E2 00 30 00 39 0C 00 79 13 20 4F 94 E2 00 30 00 39 0C 00 79 13 20 4F 94 E3 00 20 00 29 0C 00 79 10 20 4F 94 E3 00 20 00 29 0C 00 79 10 20 4F 94 E3 00 20 00 29 0C 00 79 10 20 4F 94 E3 00 20 00 29 0C 00 79 10 20 4F 94 E3 00 20 00 29 0C 00 79 10 20 4F 94 E3 00 20 00 29 0C 00 79 10 20 4F 94 E3 00 20 00 29 0C 00 79 10 20 4F 94 E3 00 20 00 29 0C 00 79 10 20 4F 94 E3 00 20 00 29 0C 00 79 10 20 4F 94 E3 00 20 00 29 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 79 10 20 4F 94 E3 00 20 0C 00 70 10 0C 00 70 10 0C 00 70 10 0C 00 70 10 0C 00 70	30 00 30 00	3 4 3 3 3 4 3 3 4 4 4 3 3 4 4	-64dBm -55dBm -53dBm -53dBm -56dBm -45dBm -45dBm -77dBm -70dBm -64dBm -62dBm	907.00 916.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00	E *
1D 70 71 72 73 74 75 76 77 75 77 80 81 90 90 90 91 90 91 90 91 91 90 91 91 91 91 91 91 91 91 91 91	E2 00 30 00 39 CC 00 79 10 30 AE S7 E2 00 30 00 39 CC 00 78 10 30 AE S7 E2 00 30 00 39 CC 00 78 05 30 DB ED E2 00 30 00 39 CC 00 79 05 10 EC DF E2 00 30 00 39 CC 00 79 15 70 69 55 E2 00 30 00 39 CC 00 79 12 50 31 05 E2 00 30 00 39 CC 00 79 02 10 30 45 E2 00 30 00 39 CC 00 79 10 20 AE 86 E2 00 30 00 39 CC 00 79 10 20 AE 86 E2 00 30 00 39 CC 00 79 10 20 AE 86 E2 00 30 00 39 CC 00 79 10 20 AE 86 E2 00 30 00 39 CC 00 79 10 20 AE 86 E2 00 30 00 39 CC 00 79 10 20 AE 84 E2 00 30 00 39 CC 00 79 11 50 60 AB E2 00 30 00 39 CC 00 79 19 20 4F 94 story: ☑ Auto Clear 21:10 Real time mode inventory 21:12 Successfully set working antenna, current wor 21:12 Real time mode inventory	30 00 30 00	3 4 3 3 3 3 4 3 3 4 4 4 1 1	-64dBm -55dBm -53dBm -53dBm -66dBm -77dBm -77dBm -70dBm -70dBm -64dBm -64dBm -62dBm	907,00 916,00 907,00 907,00 907,00 907,00 907,00 907,00 907,00 907,00 907,00 907,00	E • Activate Serial Port Monitor
1D 70 70 71 72 73 73 74 75 76 77 78 79 80 80 1014-04-02 1014-04-02 16: 1014-04-02 16: 1014-04-02 16: 1014-04-02 16: 1014-04-02 16:	E2 00 30 00 39 0° 00 79 10 30 AE 87 E2 00 30 00 39 0° 00 78 05 30 DE C DF E2 00 30 00 39 0° 00 78 05 30 DB BD E2 00 30 00 39 0° 00 79 16 70 69 5B E2 00 30 00 39 0° 00 79 16 70 69 5B E2 00 30 00 39 0° 00 79 10 10 0° 69 E2 00 30 00 39 0° 00 79 10 10 0° 69 E2 00 30 00 39 0° 00 79 10 10 0° 69 E2 00 30 00 39 0° 00 79 10 30 0° E2 00 30 00 39 0° 00 78 10 20 AE 86 E2 00 30 00 39 0° 00 78 10 20 AE 86 E2 00 30 00 39 0° 00 79 10 50 60 AB E2 00 30 00 39 0° 00 79 10 50 60 AB E2 00 30 00 39 0° 00 79 10 50 60 AB E2 00 30 00 39 0° 00 79 11 50 60 AB E2 00 30 00 39 0° 00 79 13 20 4F 94 story:	30 00 30 00000000	3 4 3 3 3 3 4 4 3 3 4 4 1 1	-64dBm -55dBm -55dBm -53dBm -56dBm -77dBm -77dBm -70dBm -64dBm -64dBm	907.00 916.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00	T Activate Serial Port Monitor
1D 70 70 71 72 73 73 74 75 76 77 78 79 80 81 114-04-02 114-04-02 16: 114-04-02 16: 114-04-02 16: 114-04-02 16: 114-04-02 16: 114-04-02 16: 114-04-02 16:	E2 00 30 00 39 C ² 00 79 10 30 AE 87 E2 00 30 00 39 0C 00 78 05 30 DE C DF E2 00 30 00 39 0C 00 78 05 30 DB BD E2 00 30 00 39 0C 00 79 16 70 69 5B E2 00 30 00 39 0C 00 79 16 70 69 5B E2 00 30 00 39 0C 00 79 18 00 69 E2 00 30 00 39 0C 00 79 08 10 C0 69 E2 00 30 00 39 0C 00 79 10 20 AE 86 E2 00 30 00 39 0C 00 79 10 20 AE 86 E2 00 30 00 39 0C 00 79 17 50 60 AB E2 00 30 00 39 0C 00 79 17 50 60 AB E2 00 30 00 39 0C 00 79 17 50 60 AB E2 00 30 00 39 0C 00 79 19 20 4F 94 etory:	30 00 30 00000000	3 4 3 3 3 3 4 4 3 3 3 4 4 nt 1 nt 1	-64dBm -55dBm -55dBm -55dBm -65dBm -45dBm -77dBm -770dBm -70dBm -64dBm -64dBm -64dBm	907.00 916.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00	Activate Serial Port Monitor
1D 70 70 71 72 73 74 75 76 77 78 99 80 81 014-04-02 104-04-04 104-04-04 104-04-04 104-0	E2 00 30 00 39 0° 00 79 10 30 AE 87 E2 00 30 00 39 0° 00 78 05 30 DE C DF E2 00 30 00 39 0° 00 78 05 30 DE BD E2 00 30 00 39 0° 00 79 16 70 69 5B E2 00 30 00 39 0° 00 79 16 70 69 5B E2 00 30 00 39 0° 00 79 10 10 0° 69 E2 00 30 00 39 0° 00 79 10 10 0° 69 E2 00 30 00 39 0° 00 79 10 10 0° 69 E2 00 30 00 39 0° 00 79 10 20 AE 86 E2 00 30 00 39 0° 00 78 10 20 AE 86 E2 00 30 00 39 0° 00 79 10 50 AE 84 E2 00 30 00 39 0° 00 79 10 50 60 AB E2 00 30 00 39 0° 00 79 10 50 60 AB E2 00 30 00 39 0° 00 79 13 20 AE 84 E2 00 30 00 39 0° 00 79 13 20 4F 94 story: ✓ Auto Clear 21:10 Real time mode inventory 21:12 Real time mode inventory 21:12 Successfully set working antenna, current wor 21:13 Successfully set working antenna, current wor 21:13 Keal time mode inventory 21:13 Lime inde inventory 21:14 E Real time mode inventory 21:15 Successfully set working antenna, current wor 21:13 Real time mode inventory 21:14 Ine mode inventory 21:14 Ine mode inventory 21:15 Locessfully set working antenna, current wor 21:13 Real time mode inventory	30 00 30 00000000	3 4 3 3 3 3 4 3 3 3 4 4 nt 1 nt 1 nt 1	-64 dBm -55 dBm -53 dBm -53 dBm -45 dBm -45 dBm -77 dBm -77 dBm -70 dBm -70 dBm -64 dBm -64 dBm	907.00 916.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00 907.00	Activate Serial Port Monitor

Inventoried Quantity	Total number of inventory tags since click on Inventory Tag .
Speed	Speed of identification Tag, unit: piece / sec
Total Tag Communication	Total return EPC data of tags (Including repeated data)
Command Duration	Time of each Inventory Command takes, unit: ms
Total Inventory Duration	Total elapsed time since click on Inventory Tag , unit: ms.
ID	The serial number of data.
EPC	EPC number of tag.
PC	Protocol Control word of tag.
Identification Count	Times of tag identified.
RSSI	The signal strength when tag was identified at the last time.
Carrier Frequency	Carrier Frequency of tag which is identified at the last time.

Method NO.2: Buffer Mode

1. Click **Inventory**, the screen will display as below:

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Stop Repeat	Per Command:1	Tag Invento ✓ Ant1	ry(Fast Swit	h Antenna Mod	e) Acces	t4	Get	Buffer	Get	and Clear
Tag Data							Clear	Buffer	Query	Tag Quantity
inventoried Quar				Speed (Tag/)	ration(mS):	Total T Total I	ag Communic nventory Du	ation: ration(mS)	:
Tag List:										Refresh
ID PC CRC	EPC			Ant ID	RSSI	Identif	ication			
Operation History: ☑ Auto Clear 014-04-02 16:23:34 Successfully set 014-04-02 16:23:35 Buffer mode inve 014-04-02 16:23:35 Successfully set	working antenna, curr ntory working antenna, curr	ent working ent working	antenna : An antenna : An	t 1 t 1				E	Activate S	erial Port Moni

Note: the identified tags won't be shown in the Tag list.

2. Click **Stop** first, then click **Get Buffer**. All the data in cache will be uploaded as illustrated below:

🔪 UHF Reader	RFID Rea Setup 18	der Demo v3.6 000-6C Tag Tes	52 st ISO 18000-6B Tag Test S	erial Port Monit	or				
Tag Ir	wentory(R	eal Time Mode)) Tag Inventory(Buffer Mod) Tag Inventory	(Fast Swith	Antenna Mod	le) Acces:	s Tag	
Ι	nvent	ory Re	epeat Per Command:1	🗸 Ant1	🔲 Ant2	Ant3	🔲 An		et Buffer Cet and Clear
Tag I	Data	Inventorie	d Quantitu:			Speed (Teg/	Sec).	I	
						Command Du	ration (m	Total nS): Total	1 Tag Communication:
Tag	List: 81								Refresh
ID	PC	CRC	EPC			Ant ID	RSSI	Identification	
68	30 00	9B F1	E2 00 30 00 39 0C 0	00 78 08 70 BE BE		1	-51 dBm	90	
69	30 00	EA 13	E2 00 30 00 39 0C 0	00 79 21 80 31 OE		1	-63dBm	90	
70	30 00	6F 22	E2 00 30 00 39 0C (00 79 10 40 AE 88		1	-49dBm	90	
71	30 00	6A 76	E2 00 30 00 39 0C 0	00 79 16 80 69 50		1	-51 dBm	90	
72	30 00	3E DC	E2 00 30 00 39 00 1	JU 79 15 10 7A DE		1	-57 dBm	90	
15 74	30 00	09 38	E2 00 30 00 39 00 0	10 78 03 00 EC DE		1	-51 dBm	90	
75	30 00	23 2C	E2 00 30 00 39 00 0	0 79 10 50 A8 29		1	-58dBm	90	
76	30 00	42 42	E2 00 30 00 39 0C 0	0 79 19 10 4F 93		1	-55dBm	90	
17	30 00	95 81	E2 00 30 00 39 0C (0 78 06 30 D5 07		1	-60dBm	87	
78	30 00	D5 BE	E2 00 30 00 39 0C 0	00 78 12 70 95 OF		1	-54dBm	90	
79	30 00	3F 19	E2 00 30 00 39 0C 0	00 79 04 40 E2 CC		1	-71 dBm	90	
80	30 00	E3 ED	E2 00 30 00 39 0C (00 79 03 00 EC DA		1	-62dBm	90	
31	30 00	SF E9	E2 00 30 00 39 0C (00 79 20 40 40 FC		1	-63dBm	90	
)pera 14-04 14-04 14-04	tion Histo -02 16:26 -02 16:26 -02 16:26	ry: 🔽 Auto C 32 Reader buf 32 Reader buf 32 Reader buf	l ear ffer ffer ffer						🗌 Activate Serial Port Monit
14-04 14-04 14-04	-02 16:26 -02 16:26 -02 16:26	33 Reader buf 33 Reader buf 33 Reader buf	ffer ffer ffer						
)14-04	-02 16:26	33 Reader buf 33 Reader buf	ffer						

Functions description under Buffer Mode:

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Get and Clear: Read the data form cache and then clear the cache. It will be empty when you read the cache again.

Query tag Quantity: If you just want to know there are how many tags in cache without details, click on this button.

Clear Buffer: Clear the cache and refresh the screen.

3.3.2 Fast Switching Antenna to Inventory Tags

Under standard operation of tag inventory(Real Time Mode & Buffer Mode), the inventory period will takes at least 500-800ms. Only when inventory is completed, reader can respond to the other new command. Sometimes when 500-800ms is not accepted, we need to use Fast Switch Antenna function.

There are two methods to achieve fast switching antenna.

Method NO.1: Set the value of Repeat Per Command to 255 (0xFF), as illustrated below:

UHF RFID Reader Demo v3.62										
Reader Setup	18000-6C Tag Test	ISO 18	000-6B Tag	Test	Serial	Port	Monito	or		
Tag Inventor	Tag Inventory(Real Time Mode) Tag Inventory(Buffer Mode) Tag Inventory(Fas									
	Inventor	y	Repeat 3	Per C	onmarid	255	>			

Click **Inventory**, operating time of each round will be as short as possible; Generally speaking, if there are only 1 or 2 tags in RF region, it will takes 50ms to finish the inventory before the reader receive new command. The time-consuming will longer with the increasing tags.

Note: For specific format of command parameter, please defer to the reader's **UHF RFID Reader Serial Interface Protocol V3.1**.

Method NO.2: Use cmd_name_fast_switch_ant_inventory command (see UHF RFID Reader Serial Interface Protocol V3.1).

Difference between method NO.1 and NO.2 is: the process of sending switch antenna command is omitted in method 2, so it is faster and more efficient, which takes 25ms to read one tag from one antenna.

Select Fast switch Antenna Mode, the following screen displays:

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r									
WHF RFID Reader Demo v3.62									
Reader Setup 18000-6C Tag Test IS) 18000-6B Tag Test Serial Port Monitor								
Tag Inventory (Real Time Mode) Tag Inventory (Buffen Mode) For Inventory (Rast Swith Antenna Mode) Access Tag									
Tag Inventory (tear Time mode) Tag	inventory (burier mode) and in enterly a set	inceess rag							
Inventory	A Round B Round Ant1 1 Ant2 1	C Round D Round Ant3 I Ant4 I							

3.4 Accessing ISO-18000-6C Tag

Click Access Tag, and the screen will display as following:

_ Selected lag:			Tag List:			-	Select
ad/Write Tag							
◎ Password ◎ E	PC 💿 TID 💿 USER	Access Password(HEX)	Start Add(WORD):	Leng	th (WORD) :	Read
Data to be Writte	n (HEX)						Write
ck Tag							
Access Passwor	d 🔘 Kill Password	© EPC ◎ TID	© USER	Acors	e Password (HF	(X)	Look
🔘 Open	C Lock	🔘 Permanent Open	Permanent Lock	nece.	,5 Tubbword die		LUCK
ll Tag		Kill Password(HEX)					Kill
PC CRC	EPC	Data	Data	Ant ID	Operated		
	Auto Classe					- Aratin	and Cardel David Hard
racion mistory: 💌	nuco ofear					ACTIV	ate Serial Fort Moni

3.4.1 Read tags

You can type the parameter(zones to be read, Start Address and Data Length) as illustrated below:

Read/Write Tag				
○ Password ○ EPC ○ TID ● USER	Access Password (HEX)	Start Add(WORD):00	Length (WORD):2	Read
Data to be Written(HEX)				Write

Note: the unit of Starting Address and Data Length is WORD which is 16 bit double-byte.

Click **Inventory** when the parameter setting is completed.



Picture as below shows two tags have been identified successfully.

ID 1 2	PC 24 00 30 00	CRC 67 AB 39 BB	EPC 00 00 00 99 99 99 99 99 30 08 33 82 DD D9 01 40 00	Data 12 34 56 78 00 00 00	Data 4 4	Ant ID	Operated 2 2			
							-			
Oper	Operation History: 🖉 Auto Clear 📃 Activate Serial Port Monitor									
2014-0 2014-0	04-02 16 04-02 16	:45:28 F :45:31 0	Reader connected COM50115200 Get RF spectrum							
2014-	04-02 16	:51:24 F	Read tag							
2014-0	04-02 IO	.51.25 P	veau tag							

3.4.2 Write Tags

The area of Write Tag is the same as Read Tag, but you need to provide access password and information of write data.

Read/Write Tag										
◎ Password ◎ EPC ◎ TID ◎ USER	Access Password (HEX) 00 00 00 00	Start Add(WORD):00	Length(WORD):2	Read						
Data to be Written(HEX) aa bb cc dd				Write						

When the operation done successfully, the screen will display as follows:

TD	DC.	CPC	FDC	Dete	Data	And TD	On emotional	
10	rt Of or	CILL		Data	Data	MIC ID	operated	
1	34 00	C4 1E	30 08 33 B2 DD D9 01 40 00			1	2	
Oper	ation Hi	story:	📝 Auto Clear					🔲 Activate Serial Port Monitor
2014-	04-03 15:	18:21 R	ead tag					
2014-	04-03 15	18.76 W	rite tog					
2014	04 00 10.	10.20 8	fite tag					
1								

Note: The maximum length of one-time write is 32 Word (64 bytes, 512bits).

3.4.3 Lock Tags

Lock Tag						
C Access Password	🔘 Kill Password	© EPC	© tid	USER	A	
Open	C Lock	Permanent	Open	🔘 Permanent Lock	Access rassworu (HEA) 00 00 00 00	Lock

A password is necessary to be provided for locking tags. When the operation is completed successfully, the screen will display as follows:



ID	PC	CRC	EPC	Data	Data	Ant ID	Operated	
1	34 00	C4 1E	30 08 33 B2 DD D9 01 40 00			1	2	
Oper	ation Hi	story: [🗸 Auto Clear					Activate Serial Port Monitor
2014-0	04-03 15:	32:16 L	ock tag					

Same as Write Tags, data of identified tags will be displayed in Tag List.

3.4.4 Kill Tags

Kill Password (HEA) aa bb cc aaj	

Password is necessary which can't be 00 00 00 00 before Kill Tags. Therefore, to kill a tag please change the content of password via **Write Tag Operation** first.

When tag is killed successfully, the information will display as follows:

ID	PC	CRC	EPC	Data	Data	Ant ID	Operated	
1	24 00	67 AB	00 00 00 99 99 99 99 99			1	1	
Ope:	ation Hi	story: 🛽	🛛 Auto Clear					🔲 Activate Serial Port Monitor
2014-	04-03 15	:39:00 Ki	ll tag					

3.4.5 Tag Selection

No matter how many tags in RF region, we just want to access EPC tags which are already identified. Now, we can use the function of Tag Selection (EPC matching).

- 1. Inventory Tags in **Buffer Mode** to get all tags' EPC number.
- 2. Get tags in cache.

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3. Access tags and choose the EPC NO. which is needed , as illustrated below:

Tag Access						
Tag Selection						
Selected Tag:			Tag List:		-	Select
Read/Write Tag				E2 00 30 00 39 0C 00 81 27 10 09 77 E2 00 30 00 39 0C 00 82 26 70 09 BF F2 00 30 00 39 0C 00 81 25 30 14 19	Â	
O Password O EP	C 🔘 TID 🔘 USER	Access Password(HEX)		E2 00 30 00 00 82 20 20 40 FA E2 00 30 00 39 0C 00 82 20 20 40 FA E2 00 30 00 39 0C 00 82 24 30 1B 73 E2 00 30 00 39 0C 00 81 18 00 5A 34 E2 00 30 00 39 0C 00 81 18 00 5A 34		Read
Data to be Written	(HEX)			E2 00 30 00 39 0C 00 82 17 70 5A 35 E2 00 30 00 39 0C 00 82 21 60 37 18 E2 00 30 00 39 0C 00 82 14 40 83 94	=	Write
Lock Tag				E2 00 30 00 39 0C 00 82 21 80 31 1A E2 00 30 00 39 0C 00 81 19 50 49 37		
C Access Password	i 🔘 Kill Password	© EPC © TID	🔘 USE	E2 00 30 00 39 0C 00 81 23 00 28 02 E2 00 30 00 39 0C 00 81 23 00 28 02 E2 00 30 00 39 0C 00 81 20 40 40 F8 E2 00 30 00 39 0C 00 82 19 20 4F 88		Lock
🔘 Open	C Lock	🔘 Permanent Open	🔘 Permane	E2 00 30 00 39 0C 00 81 13 10 8E 8B E2 00 30 00 39 0C 00 82 25 00 15 02 F2 00 30 00 39 0C 00 82 24 10 18 71		LOCA
Kill Tag		Kill Password(HEX)		$\begin{array}{cccccccccccccccccccccccccccccccccccc$		Kill

After choosing the tag, please click **Select** and the screen will display as follows:

Tag Selection				
▼ Selected Tag: E2 00 30 00 39 0C 00 81 27 10 09 77	Tag List:	E2 00 30 00 39 0C 00 81 27 10 09 77	•	Select

We could see that the column on the left for **Selected Tag** has been selected. Next, all the operations are based on the tag with this EPC NO.

If you want to cancel the match of EPC, just deselect the column for Selected Tag, as below:

Tag Selection		
Selected Tag:	Tag List:	 Select

3.4.6 Error Display Might Be Returned

Errors occur if wrong operations done:

Inventory success, access failure:



There are two steps to get access to tags: firstly, tag inventory; secondly, access tags. Picture above shows the inventory is successful, but we can't access to tags.

Two reasons why:

1. Parameters incorrect: for example, zones(password/ EPC/ TID/ User) to be read do not exist.

2. Tags beyond the area that the RF could cover: distance when accessing to tags is about 60%-70% of tag inventory; in this case, please proceed the tag closer to antenna.



• Wrong password:

Operation History: 📝 Auto Clear	🗌 Activate Serial Port Monitor
2014-04-10 17:21:40 Write tag failed, due to Access failed or wrong password	

Reason why: wrong password is set.

• No tags to be operated:

Operation History: 📝 Auto Clear	🗌 Activate Serial Port Monitor
2014-04-10 17:32:52 Lock tag failed, due to There is no tag to be operated	

Reason why: Tags beyond the area that the RF could cover.

For more information about the operation history returned, please defer to the document: **UHF RFID** Reader Serial Interface Protocol V3.1.

3.5 Accessing & Inventorying ISO-18000-6B Tag

3.5.1 ISO-18000-6B Tag Inventory

Operating ISO-18000-6B Tag is similar to ISO-18000-6C but it will be easier, since **Real-time** is the only mode for ISO-18000-6B tags inventory, as illustrated below:

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Fichier	2	M2800UHF1282-UG-V1.0	
---------	---	----------------------	--

	Inve	ntory		Selected UID:		Refresh
	UID	An	Identificatio	Read/Write Tag With Unl	imited Length	
				Start Add(HEX):	Length(HEX):	Read
				Data(HEX):		
				Start Add(HEX):	Length(HEX):	
				Command Repeat: 1	Succeeded:	Write
				Data(HEX):		
				Permanent Lock Addr	ress(HEX):	Lock
				Query Lock Status Addr	ress(HEX):	Query
on	History: 🔽 A	uto Clear				Activate Serial Port Mon
11	9:26:27 Reader	connected (COM50115200			

Each time when the reader identifies a tag's UID, the buzzer will sound with a short beep. If the buzzer sounds with a long beep, it means the reader start the anti-collision function and identifies multiple tags at the same time.

3.5.2 Accessing to ISO-18000-6B Tag

There is only one tag available each time when we get access to ISO-18000-6B tag. After stopping inventory, please click the Tag UID on the left list to choose the tag you would like to do the operation, as illustrated below:

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Fichier : M2800UHF1282-UG-V1.0

Version : V1.0

UHF RF	ID Reader Demo v3.62	770 40000 60 7						
eader Set	up 18000-6C Tag Test	ISO 18000-6B T	ag Test Serial Port Monitor					
	Start			Selected UID:	E0 04 00	00 D9 2B 41 06	>	Refresh
(D	UID	Ant ID	Identification Count	Read/Write Tag Wit	th Unlimited L	ength		
EO	04 00 00 D9 2B	00	184	Start Add(HEX):		Length(HEX):		Read
				Data(HEX):				*
								Ŧ
				Start Add(HEX):		Length(HEX):		
				Command Repeat:	1	Succeeded:		Write
				Data(HEX):				
								-
				Permanent Loc	k Address(HEX):		Lock
				Query Lock Statu	s Address(HEX):		Query
eration	History: 📝 Auto Cl	ear					🔲 Activate	Serial Port Monito
-04-11	11:49:07 Tag invento	ry						
1-04-11	11:50:03 Tag invento	ry						
-04-11 -04-11	11:50:07 Inventory s 11:50:08 Tag invento	topped ry						
-04-11 -04-11	11:50:09 Inventory s 11:50:10 Tag invento	topped rv						
-04-11	11:50:16 Inventory s	topped						

Notes for access operations:

- Access operations only for the selected tag.
- It can read multi-byte data of tag at the same time, length of the data is not limited.
- Multi-byte data could be written. If error occurs, the reader will stop writing, but data which has been written will not change, thus reader will return the number of bytes which have been written successfully.
- Only one-byte data of tag can be locked each time.
- Only one-byte data state of tag is queriable each time.
- Operation to lock tag is permanent and irreversible.



4 Develop your own RFID Application

Most reader functions can be operated through the demo. But in practical applications, user might need to develop their own applications. Please defer to the document: **UHF RFID Reader Serial Interface Protocol V3.1.** The reader follows the definition both of the RS - 232 and TCP / IP interface.

Demo provides an important function of recording serial transmission, so that users can quickly grasp the content of communication protocol in practice. Please defer to the screenshot below and select **Activate Serial Port Monitor**, all uplink and downlink serial data will be recorded, as illustrated below:

UHF RFID Reader Demo v3.62	
Reader Setup 18000-6C Tag Test ISO 18000-6B Tag Test Serial Port Monitor	
2014-06-21 14:47:42 A0 03 01 70 EC 2014-06-21 14:47:43 A0 03 01 70 EC 2014-06-21 14:47:43 A0 03 01 70 EC	
2014-06-21 14:41.45 A0 05 01 72 DA 2014-06-21 14:47.45 A0 05 01 72 06 09 D9	
2014-06-21 14:41.45 A0 05 01 7B 51 2014-06-21 14:47.45 A0 05 01 7B 01 27 B7	
2014-00-21 14:47:52 A0 04 01 76 1E C7 2014-06-21 14:47:52 A0 04 01 76 10 D5	
2014-06-21 14:47:53 A0 03 01 77 E5 2014-06-21 14:47:53 A0 04 01 77 IE C6	
2014-06-21 14:47:55 A0 03 01 63 F9 2014-06-21 14:47:55 A0 04 01 63 03 F5	
2014-06-21 14:47:56 A0 03 01 79 E3 2014-06-21 14:47:56 A0 06 01 79 01 07 38 9D	
2014-06-21 14:41:55 A0 04 01 74 00 B7 2014-06-21 14:47:55 A0 04 01 74 10 D7 0014-06-21 14:47:56 A0 04 01 94 01 D7	
2014-06-21 14:47:59 A0 13 01 89 B0 30 00 00 00 00 00 00 00 00 00 00 00 BC 58 CF A0 13 01 89 B0 3 2014-06-21 14:47:59 A0 13 01 89 B0 30 00 00 00 00 00 00 00 00 00 00 00 00	30 00 30 08 33 B2 DD D9 01 40 00 00 00 00 30 9F 00 00 00 CB 2B BD A0 13 01 89 B0 30 00 30 08 33 B2
2014-06-21 14:47:59 DD D9 01 40 00 00 00 42D 9E A0 13 01 89 B0 30 00 30 08 33 B2 DD D9 01 40 00 0 2014-06-21 14:47:59 A0 13 01 89 88 30 00 30 08 33 B2 DD D9 01 40 00 00 02 31 C4	00 00 00 2F A0
2014-06-21 14:47:59 A0 13 01 89 38 30 00 30 08 33 B2 DD D9 01 40 00 00 00 00 26 21 A0 13 01 89 38 3 2014-06-21 14:47:59 A0 13 01 89 38 30 00 30 08 33 B2 DD D9 01 40 00 00 00 02 CL BA0 13 01 89 38 3	30 00 E2 00 30 00 39 05 02 27 25 30 11 D1 31 7A 30 00 30 08 33 B2 DD D9 01 40 00 00 00 03 314
2014-06-21 14:47:59 A0 13 01 89 88 30 00 30 08 33 B2 DD D9 01 40 00 00 00 00 32 C5 A0 13 01 89 88 3 30 08 33 B2 DD	30 00 00 00 00 00 00 00 00 00 00 00 00 0
2014-06-21 14:47:59 D9 01 40 00 00 00 00 32 C5 A0 13 01 89 88 30 00 30 08 33 B2 DD D9 01 40 00 00 0 31 C4	00 04 30 C3 A0 13 01 89 88 30 00 30 08 33 B2 DD D9 01 40 00 00 02
2014-06-21 14:47:59 A0 13 01 89 88 30 00 00 00 00 00 00 00 00 00 00 00 00	00 30 00 00 13 70
2014-00-21 14:41:23 A0 12 01 83 54 30 00 E2 00 30 00 33 02 02 21 25 30 11 D1 31 5E A0 0A 01 83 00 0	
Input Command:	Check Sum: Send Clear
Operation History: 🗹 Auto Clear	Z Activate Serial Port Monitor
2014-06-21 14:47:45 Get firmware version 2014-06-21 14:47:45 Get internal temperature	*
2014-06-21 14:47:52 Set RF output power 2014-06-21 14:47:53 Get RF output power	
2014-06-21 14:47:56 Get RF spectrum 2014-06-21 14:47:56 Get RF spectrum	=
2014-06-21 14:47:59 Successfully set working antenna, current working antenna : Ant I 2014-06-21 14:47:59 Real time mode inventory	

Notes:

1. Response speed of Demo will slow down after opening the **Activate Serial Port Monitor**. Please turn off this function when it is not necessary.

2. Data in violet blue is sent to the reader by PC, and data in red is the returned information to PC via reader.

3. Manual **Input Command** is used to debug serial command which could calculate the checksum automatically.

4. **UHF RFID Reader Serial Interface Protocol V3.1**, this document includes the integral source codes of the demo Based on C # of .Net