RRHFOEM04

ETHERNET

Table of Contents

Abbreviation

- ISO – International Organization of Standardization
- RFID – Radio Frequency Identification
- AIDC – Auto Identification and Data Collection
- RF – Radio Frequency
- ID – Identifier
- CPU – Central Processing Unit
- TCP/IP – Transmission Control Protocol/Internet Protocol
- UID – Unique Identity
- PICC – Proximity Integrated Circuit Cards
- ATQA – Answer to Request A
- EAS – Electronic Article Surveillance
- DSFID – Data Structure Format Identifier
- AFI – Application Family Identifier
- API – Application Programming interface
- HF – High Frequency
- NFC – Near Field Communication

Chapter 1: Overview

1.1 General description of the product

RRHFOEM04 ETHERNET is a ready to use RFID Reader with inbuilt Antenna. This reader is used in applications such as programming tags, payments, desktop use etc. It is a high performance multiprotocol OEM HF reader. Based on proprietary anti-collision algorithm it support fast ISO15693 and ISO14443A tag detection and read/write operation. It operates at 13.56MHz.

1.2 Introduction to Technology

Radio Frequency Identification (RFID) is a next generation of Auto Identification and Data Collection (AIDC) technology which helps you automate business processes. This automation can provide accurate and timely information without any human intervention. Access to such information where you can individually identify each one of the tagged item uniquely, it helps in improving your processes and also to make informed decision.

RFID is an auto identification technology which is used for tracking items with a tag on it which sends data to readers through radio waves. These tags makes the item to speak about its identity, activity, location and data stored inside through readers and finally to the application software to make the information useful.

Chapter 2: Specification & Features

2.1 Technical Specs

Parameter	RRHFOEM04 ETHERNET
Operating Frequency	13.56MHz
Antenna	Inbuilt
Protocol	ISO 15693, ISO 14443A
Tag Supported	ICODE SLI, TAG IT, Mifare
Supply Voltage	5 VDC
Read Range	Upto 100 mm
Interface	ETHERNET
Weight	110 g (Approx.)
Storing Temperature	-30° C to +80° C
Operating Temperature	-10° C to +65° C
Dimension	122 x 79 x 32

2.2 Features list

- Inbuilt Antenna
- Easy to Integrate
- Ready to use
- Near field communication(NFC)

Chapter 3: Unpacking

3.1 List of Items

1. RRHFOEM04 ETHERNET Reader
2. ETHERNET Cable
3. API's CD
4. Adapter

3.2 Description & Identification of Items

1. RRHFOEM04 ETHERNET

   It is HF reader as shown in fig.

Fig.1 shows the reader RRHFOEM04 ETH

2. ETHERNET Cable

   It is LAN cable which is used for connect reader to the PC for communication purpose.

Fig.2 shows the Ethernet Cable

3. API's CD

It contains application for testing ISO 14443A and ISO 15693 commands.

Fig.3 shows the API's CD

4. Adapter

It is 5VDC Adaptor to power up the reader.

Fig.4 shows the Power Adapter

Chapter 4: Installation

4.1 Hardware Installation

Steps:

1. Take a HF reader and LAN Cable.
2. Connect one side of LAN cable to the reader which shown in fig.5.
3. Connect other side of LAN cable to the PC.
4. Connect Power Adapter to power up the reader which is shown in fig.5.

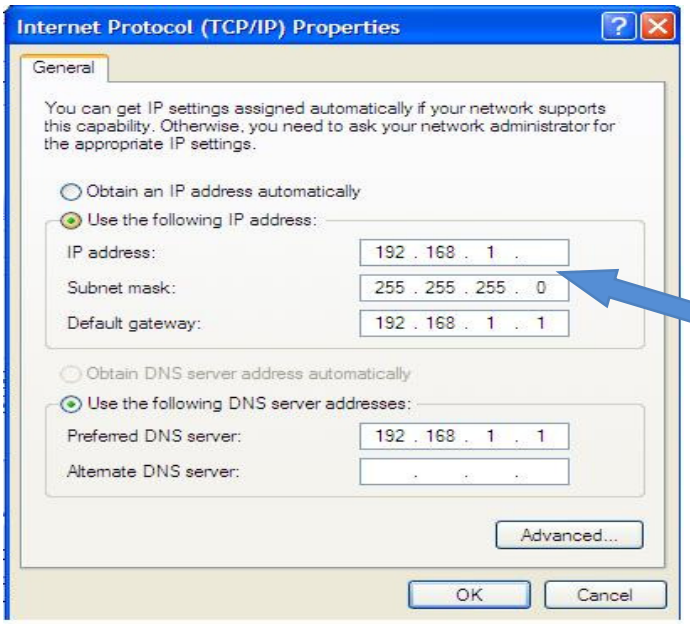
Fig.5 shows the connection of reader, ETH cable and power adapter

4.2 Software Installation

Steps:

1. Set the network configuration as following:

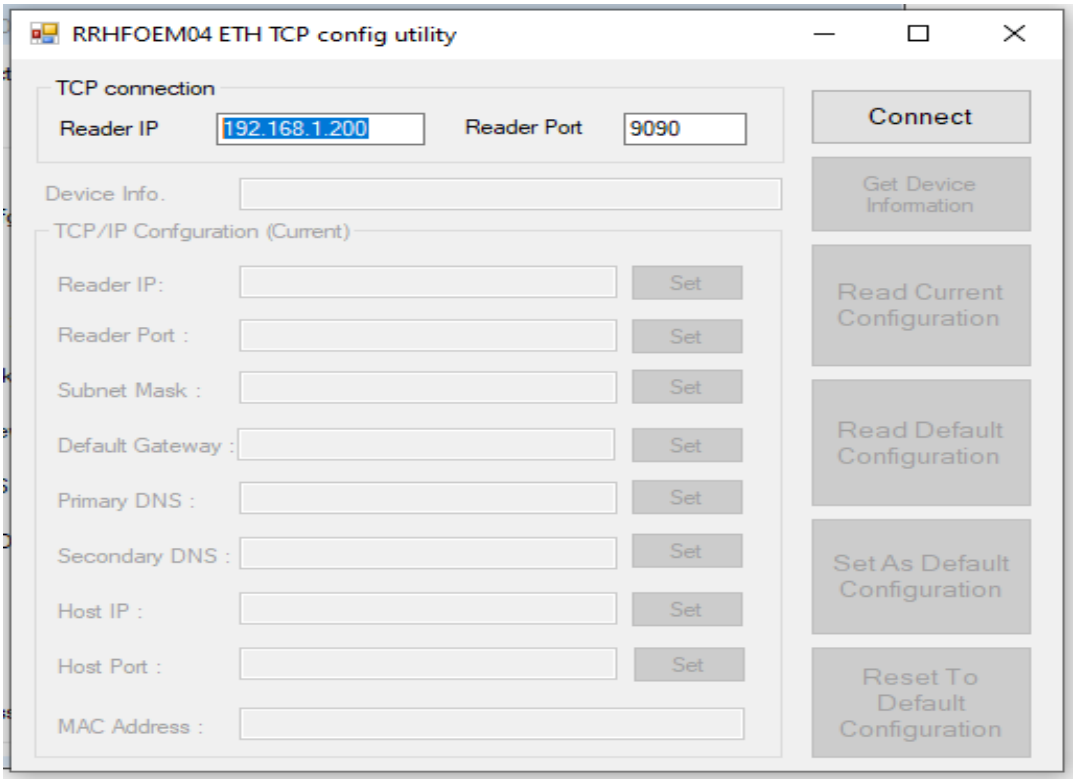
   Go to start-> Control Panel-> Network & Internet connections->Network Connections-> Local Area Connection-> Properties-> Internet Protocol(TCP/IPv4)-> Properties-> Use the Following IP address

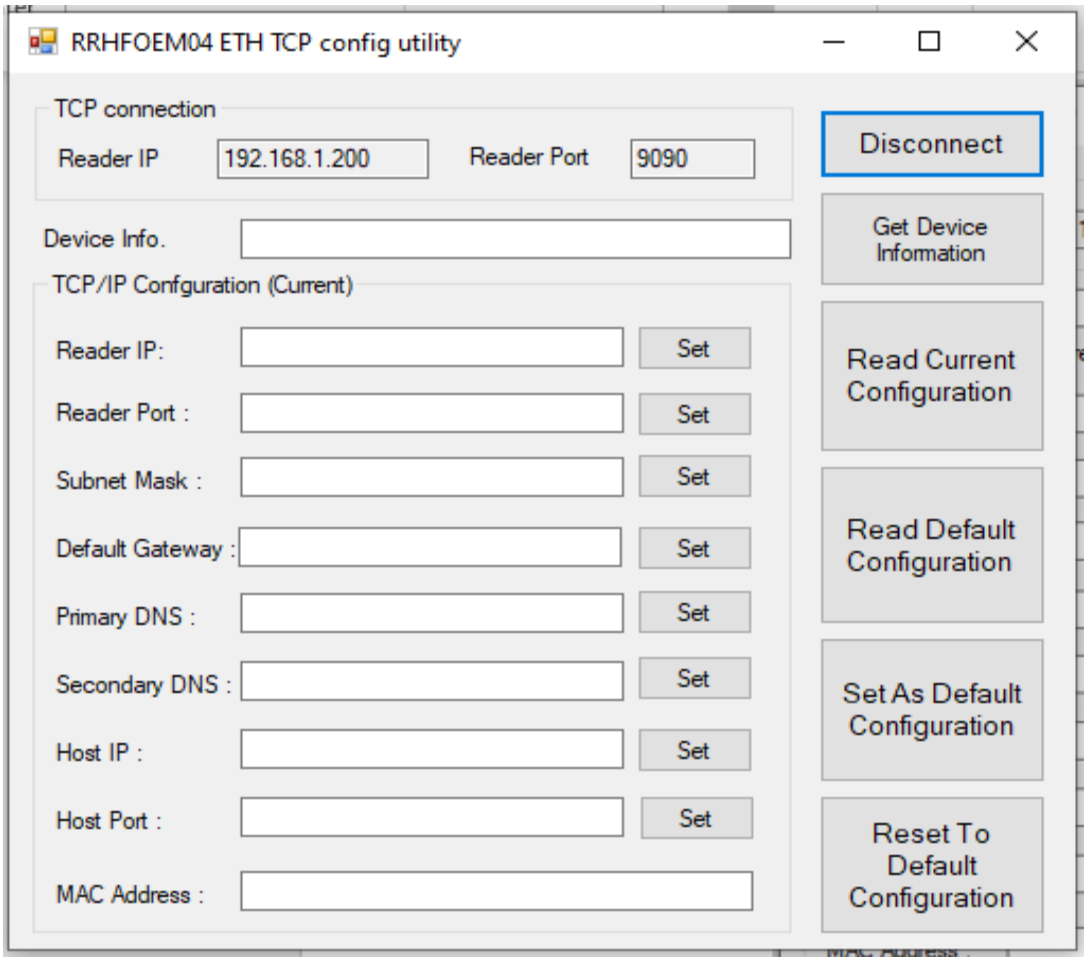


Here, Use any number (2-255)

2. Start-> Run-> arp -d*
3. You can change configuration according to your network using following **Steps**:

I. Open X:\\RRHFOEM04_ETH TCP config utility\RRHFOEM04_ETH TCP config utility\bin\Debug\RRHFOEM04_ETH TCP config utility.exe





II. Click on get device info, Click on Read Current Configuration.

III. Set IP address, Subnet mask, default gateway, Host server IP (IP of system), Primary DNS, Secondary DNS, And Restart reader .

Following are the details of each command set of TCP config utility.

Note: After set up this all TCP/IP configuration from this application, user must restart the reader.

1. Get Device Information

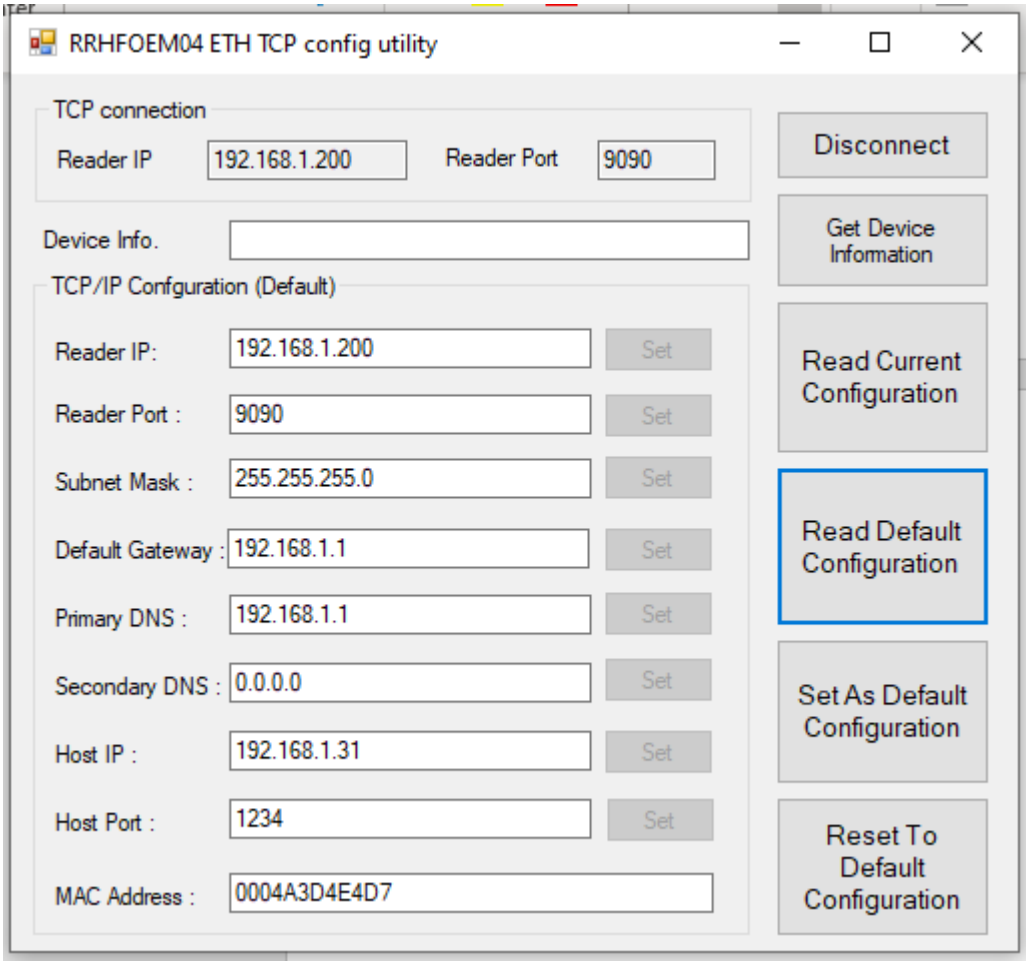
This command is used to Read device name and Serial number.

2. Read Current Configuration

This command is used to Read Current TCP/IP configuration on Which the reader currently runs.

3. Read Default Configuration

This command is used to Read Client's default TCP/IP configuration,which set as current configuration when Reset switch press for one time. If Reset switch press for 3 second, its factory Reset (shipping time Configuration)the Reader.



4. Set As Default Configuration

This command is used to Set Client's default Server IP, Server port, Subnet mask, default gateway, Host IP (IP of system),Host port, Primary DNS, Secondary DNS.

5. Reset To Default Configuration

This command is used to set Client's default TCP/IP configurations, as current configuration on Which the reader currently runs.

IV. Now check the ping according to your IP address.

4. If the ping is still not coming, press the reset switch of the reader (reader should be powered up) and repeat from step 1.
5. Open API's CD in the PC and Copy contains of it.
6. Paste at any place.
7. Now open X:\RRHFOEM04\RRHFOEM04\bin\Debug\RRHFOEM04.exe.

Chapter 5: Testing and Operations

5.1 Testing

- Connect the reader using Ethernet cable with System and also power adapter to power up the reader.
- If the buzzer beeps one time than the reader is ON.
- Check the ping of reader according to your IP address as changed above. If the ping is coming than the communication is established between reader and system.
- Now open the application and follow the below steps.

5.2 How to use

5.2.1 How to connect

User may use this application to connect the reader and to perform the operations.

Following are the steps for Connection:

a) Open the application of RRHFOEM04.
b) Select TCP/IP from connection type which shown in fig.6.
c) Also set the IP address according to your IP address on API which is shown in fig.6.
d) Now click on connect button and reader is connected which is shown in fig.7.

Below are the snaps showing the connection of reader.

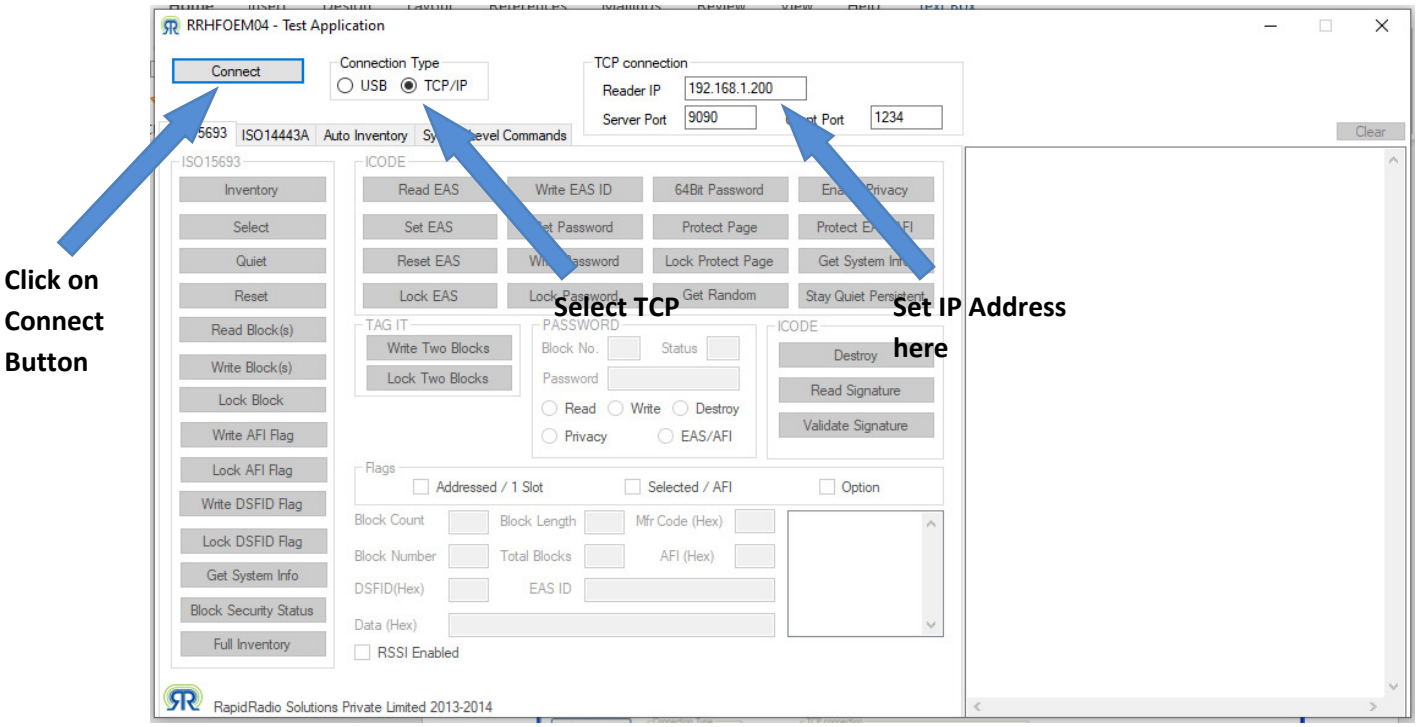


Fig.7 select the TCP/IP from conn.type

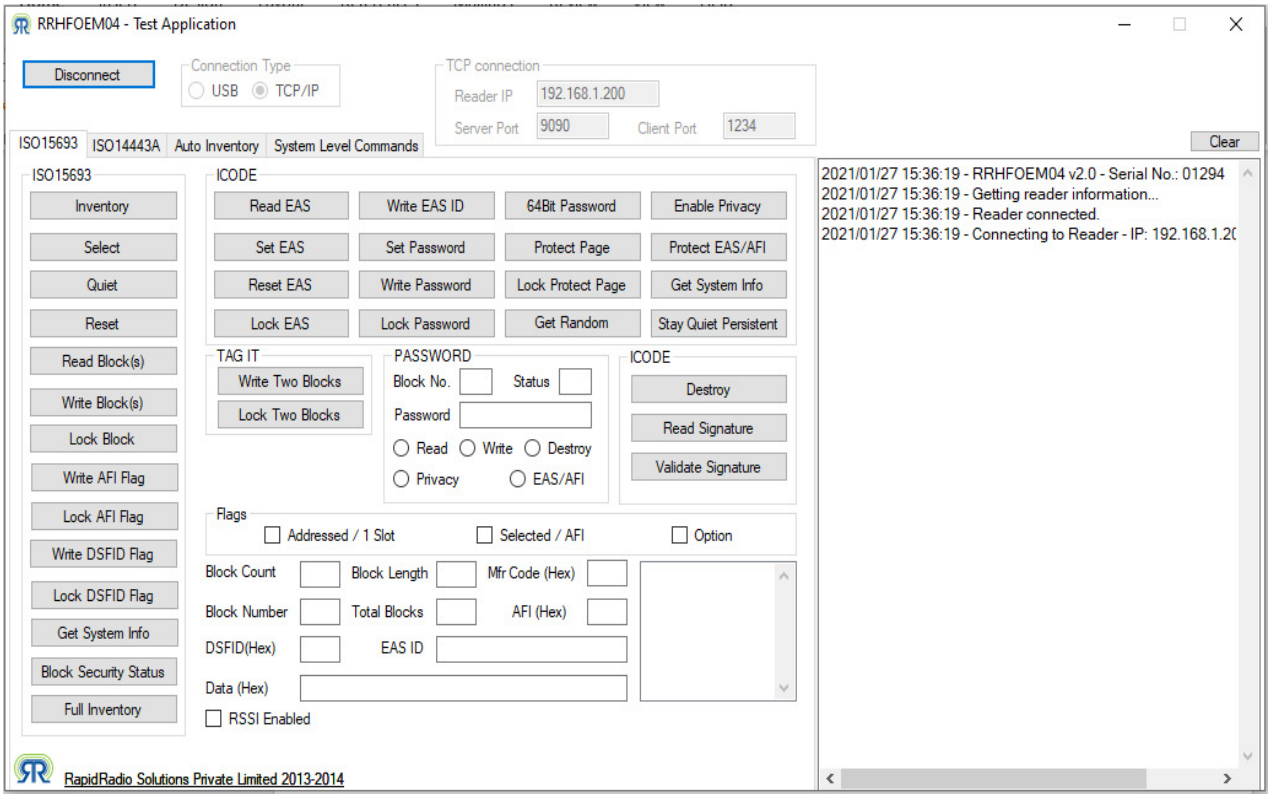


Fig.8 shows that the reader is connected

5.2.2 ISO 15693 Command set

User may use this ISO 15693 command set to perform the operations of ISO 15693 standard.

Following are the steps for Connection:

a) Follow the above step to connect the reader.
b) Select ISO 15693 tab which is shown in fig.8.
c) Now perform the various operation of ISO 15693.

Below are the snaps showing the tab of ISO 15693.

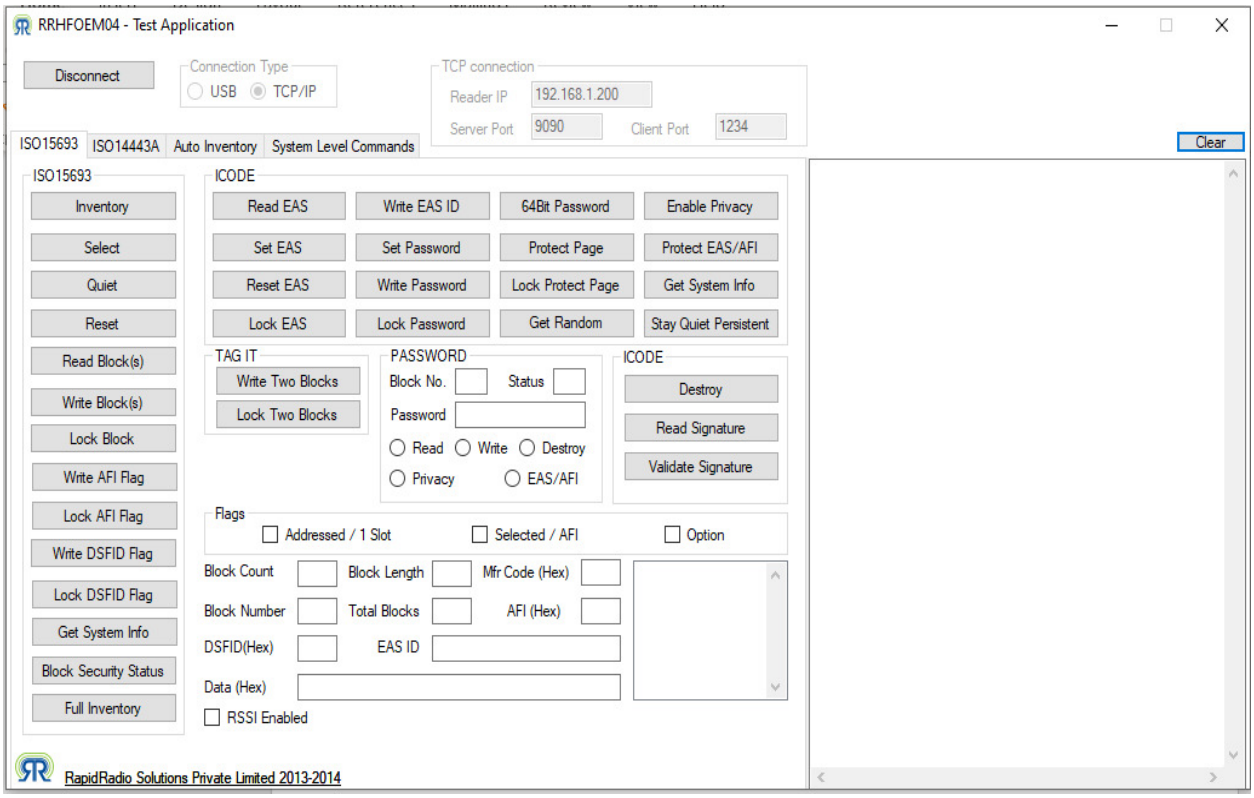


Fig.8 selects the ISO 15693 tab.

Following are the details of each command set of ISO 15693

Note:

1. If address flag is selected, you need to select the UID from the list box. (Inventory should be performed).
2. If select flag is selected, you need to perform the select command on the appointed tag.

1. 16 slot/ one slot Inventory

If 1 slot flag is selected than it is performed 1 slot inventory, it returns only single UID (If multiple tags are present then it will return error).

If 1slot flag is not selected, then it performs 16 slot inventory. It will return UID's of Tag's present (only if they are not colliding).

2. Select

Select command is used to select particular tag.

3. **Quiet**

   The reader sends this command to turn the corresponding tag into Quiet state. When a tag is in Quite state, it will not reply any inventory command. But it will still reply any command in addressed mode with matching UID.

4. **Reset**

   Turn the present tag from Quiet state into Ready state.

5. **Read Block(s)**

   The reader sends this command to read out the corresponding tag's block(s) and its security status byte. The block number and the size of a block may differ from tag to tag with different manufacturer.

   The number of blocks to be read should be set by user.

   Note: Before sending read command, you need to execute the get system information command.

6. **Write Block(s)**

   The reader sends this command to write the corresponding tag's block(s). The block number and the size of a block may differ from tag to tag with different manufacturer.

   The number of blocks to be written should be set by user.

   Note:

   1. Before sending write command you need to execute the get system information command.
   2. If the block to be written has been locked, the operation will fail, and the reader will return error.

7. **Lock Block**

   The reader sends this command to let the reader lock the stated block. When the block is locked it contents can never be changed again.

8. **Write AFI Flag**

   This command writes a one-byte AFI code to the selected tag.

9. Lock AFI Flag

This command locks the AFI byte. Locked AFI value can never be changed again.

10. Write DSFID Flag

This command writes a one byte DSFID code to the selected tag.

11. Lock DSFID Flag

This command locks the DSFID byte. Locked DSFID value can never be changed again.

12. Get system info

The reader sends this command to get the detailed information of the selected tag. The information includes 1byte DSFID, 1byte AFI, 1byte block length, 1byte total blocks available and 1 byte IC reference.

13. Block security status

It returns the security status of block(s).

Note: the number of blocks can be changed by entering value in total block textbox.

14. Full Inventory

This command returns UID of tag and it also shows the number of tags available on the reader.

15. Read DSFID (ICODE)

This command looks for a tag with the EAS bit enabled and reports the results.

EAS commands manipulate a tag's Electronic Article Surveillance (EAS) label or scan for the presence of EAS-enabled tags.

16. Read EAS (ICODE)

This command Returns EAS flag status (00Hex or 01Hex).

17. Set EAS (ICODE)

This command sets a tag's EAS bit so that readers scanning for the bit report the presence of the tag.

18. Reset EAS(ICODE)

This command clears a tag's EAS bit so that readers scanning for the bit do not report the presence of the tag.

19. Lock EAS(ICODE)

This command locks the tag's EAS bit so that the EAS state can be never changed again.

20. Write EAS ID(ICODE)

The command WRITE EAS ID enables a new EAS Identifier to be stored in the corresponding configuration memory. If EAS is password protected (for Set and Reset EAS) the EAS password must be first transmitted with the SET PASSWORD command.

21. Set Password(ICODE)

This command Internally sent Get Random Number commands by reader itself. So, no need to send get Random Number commands. This Commands will accept only Addressed and selected mode flags. If Enable privacy is Set, then only send Tag password with Without address flag.

This Password set different passwords.

22. Write Password(ICODE)

The WRITE PASSWORD command enables a new password to be written into the related memory if the related old password has already been transmitted with a SET PASSWORD command and the addressed password is not locked.

23. Lock Password(ICODE)

The LOCK PASSWORD command enables the addressed password to be locked if the related password has already been transmitted with a SET PASSWORD command. A locked password cannot be changed.

24. 64Bit Password(ICODE)

The 64-bit PASSWORD PROTECTION command enables Read and Write passwords are required to get access to password protected blocks (pages).

This mode can be enabled if the Read and Write passwords have been transmitted first with a SET PASSWORD command.

If the 64-bit password protection is enabled, both passwords are required for read & write access to protected blocks (pages). Once the 64-bit password protection is enabled, a change back to 32-bit password protection (read and write password) is not possible.

25. Protect Page(ICODE)

Page protect command defines the access conditions for the pages. The related passwords (Read and Write password) have been transmitted first with the SET PASSWORD command.

26. Lock Protect Page(ICODE)

The LOCK PAGE PROTECTION CONDITION command locks the protection pointer address and the status of the page protection conditions if the Read and Write passwords have been transmitted first with the SET PASSWORD command.

27. Get Random(ICODE)

It gives two bytes number. It can be any between 0000 to FFFF Hex.

28. Enable Privacy(ICODE)

The ENABLE PRIVACY command enables tag to be set to Privacy mode if the Privacy password is correct. The Tag will not respond to any command except GET RANDOM NUMBER and SET PASSWORD. To get out of the Privacy status, the valid Privacy password must be transmitted to the tag with the SET PASSWORD command in None Address mode.

29. Protect EAS/AFI(ICODE)

The PASSWORD PROTECT EAS/AFI command enables the password protection for EAS and/or AFI if the EAS/AFI password is first transmitted with the SET PASSWORD command.

Option flag set to logic 0: EAS will be password protected.
Option flag set to logic 1: AFI will be password protected.

Once the EAS/AFI password protection is enabled, it is not possible to change back to unprotected EAS and/or AFI.

30. Get System Info(ICODE)

The command GET SYSTEM INFORMATION command provides information about the IC access conditions and supported features.

31. Stay Quite Persistent (ICODE)

When receiving the STAY QUIET PERSISTENT command, the tag enters the persistent quiet state and will not send back a response. Remark: The STAY QUIET PERSISTENT command provides the same behavior as the mandatory STAY QUIET command with the only difference at a reset (power off).

The label IC will turn to the ready state if the power off time is exceeding the persistent time.

32. Destroy

The DESTROY command enables the Tag Label IC to be destroyed if the Destroy password is correct. This command is irreversible, and the Tag will never respond to any command again. The DESTROY command can only be executed in addressed or selected mode.

33. Read Signature

The READ SIGNATURE command returns an IC specific, 32-byte ECC signature, to verify NXP Semiconductors as the silicon vendor. The signature is programmed at chip production and cannot be changed afterwards.

34. validate Signature

It is foreseen to offer an online and offline way to verify originality of ICODE SLIX2.

35. Write Two Blocks (TAG IT)

This command writes two consecutive block of TAG IT series tag.

36. Lock Two Blocks (TAG IT)

This command locks two consecutive block of TAG IT series tag.

5.2.3 ISO 14443A Command Set

User may use this ISO 14443A command set to perform the operations of ISO 14443A standard.

Following are the steps for Connection:

a) Follow the above step to connect the reader.
b) Select ISO 14443A tab which is shown in fig.9.
c) Now perform the various operation of ISO 14443A.

Below are the snaps showing the tab of ISO 14443A.

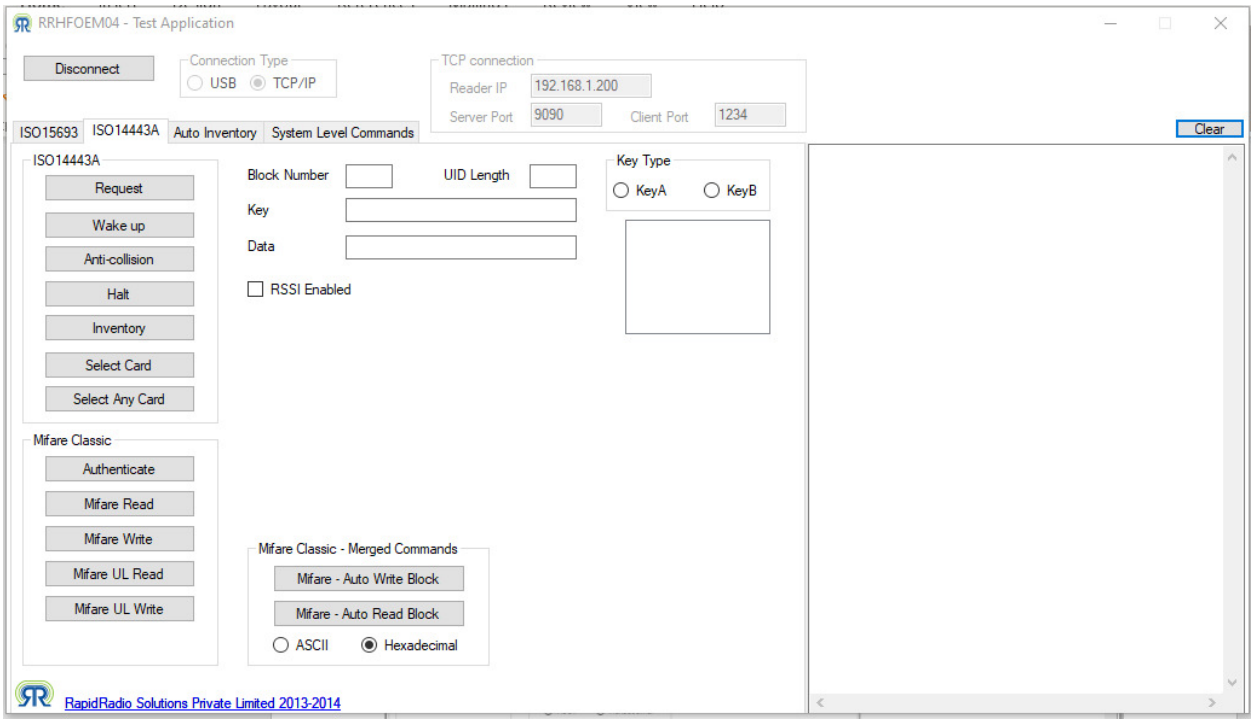


Fig.9 selects ISO 14443A tab.

Following are the details of each command set of ISO 14443A.

1. **Request**

   This Command requests all the PICC in IDLE state they respond synchronously with ATQA.

   For Mifare 1K it returns 0400 and 0200 for Mifare 4K.

2. **Wake up**

   This Command requests all the PICC in HALT state they respond synchronously with ATQA.

   For Mifare 1K it returns 0400 and 0200 for Mifare 4K.

3. **Anti-collision**

   This command returns UID of Mifare Card. The UID may be of 4, 7 or 10 Bytes.

4. **Halt**

   This command forces the PICC to return in halt state.

5. **Inventory**

   This command returns only the first 4 bytes of UID.

6. **Select Card**

   This command used to select a specific card. Enter the UID length and select the card from list box.

   Note: Perform inventory first

7. **Select Any Card**

   This command selects any card present in RF Field.

8. **Authenticate**

   This command authenticates a Particular block of PICC to perform read and write operations.

   To Authenticate you need to mention the key type i.e., KeyA (60Hex) or KeyB (61Hex), Block number on which read and write operations are to be performed i.e., 0,4,8,0B.

   For Block 0,1,2,3 authenticate block number 3. Similarly, for block 4, 5, 6 and 7 authenticate block number 7 and so on.

   Select the UID from the list box and enter the 6-byte Key. Make Sure ALL Auto Inventory Are disable When user Authenticate Tag.

9. **Mifare Read**

   This command reads the particular block of PICC. Block contains 16 Bytes of Data.

   Note: First authenticate the block.

10. Mifare Write

This Command writes 16 bytes of data into a particular Block of PICC.

Note: First authenticate the block.

11. Mifare Ultra-Light Read

This command is used to read a particular block of Mifare Ultra-light series card.

Note: No authentication required.

12. Mifare Ultra-Light Write

This command is used to write a particular block of Mifare Ultra-light series card.

Note: No authentication required.

13. Mifare Classic-Merged Commands

1. **Mifare - Auto Write Block**

This command is used to write a Block No. 1 of Mifare card.

Note: No authentication required.

2. **Mifare - Auto Read Block**

This command is used to Read a Block No. 1 of Mifare card.

Note: No authentication required.

5.2.4 Auto Inventory Command set

User may use this Auto Inventory Command set to perform the operations of Auto Inventory.

Following are the steps for Connection:

a) Follow the above step to connect the reader.
b) Select Auto Inventory tab which is shown in fig.10.
c) Now perform the various operation of Auto inventory.

Below are the snaps showing the tab of Auto inventory.

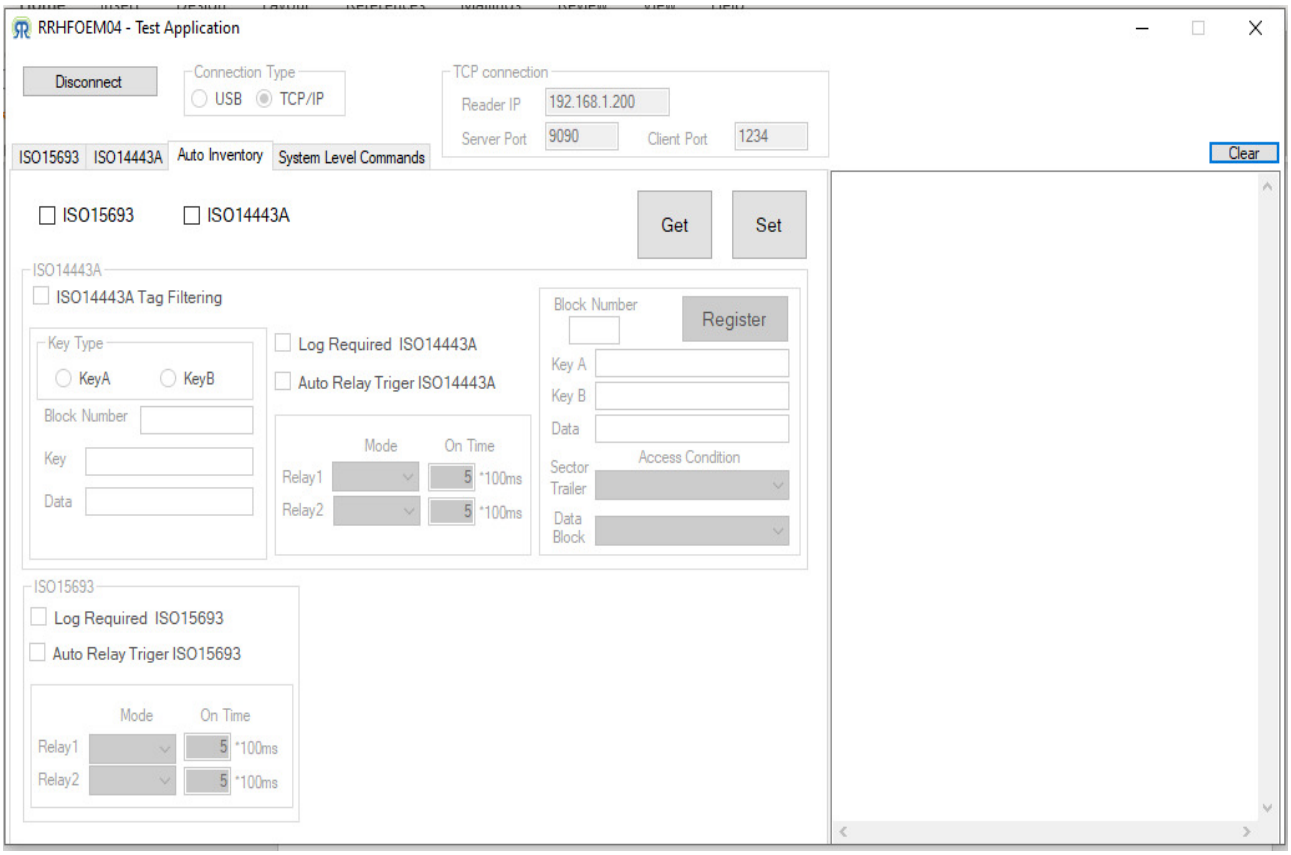


Fig.10 Auto Inventory command tab

Following are the details of each command set of Auto inventory.

1. **Get**

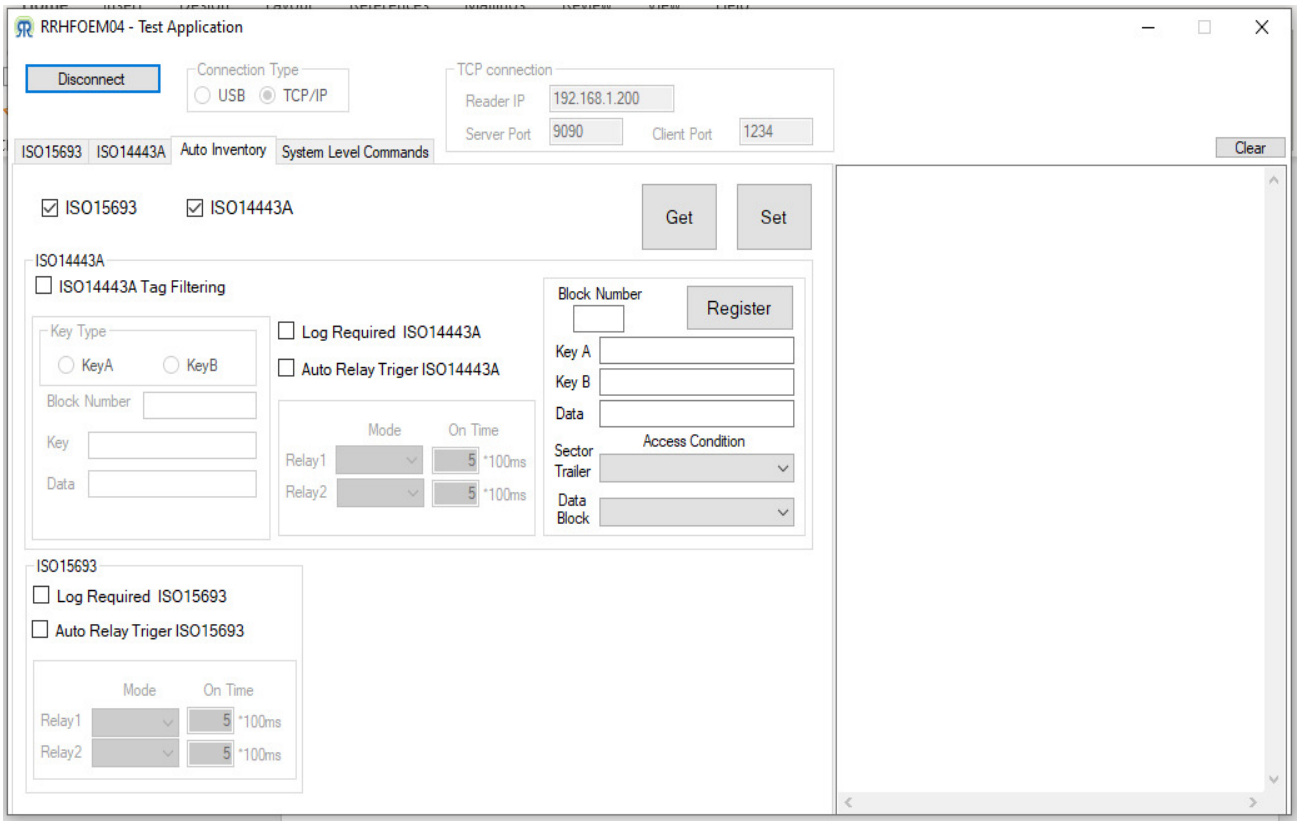
   This command is used to Read Auto Inventory Status and settings.

   Auto Inventory

   This command continuously scans for any Card appearing in RF field and returns its UID.

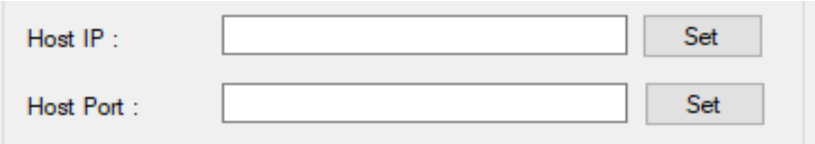
2. **Set**

   This command is used to Set Auto Inventory of ISO 14443A and ISO 15693 Enable or disable and settings. Click on checkbox of desired ISO standard(s) and set it.



3. Log Required

This Configuration is used to Get Log of Detected Tag. Whenever Log Required is set. Reader must connect to systems server, with host IP and host port which is set from below TCP/IP configuration.



otherwise, other card will not be released until the data of first tag is collected in server .when this condition occurs Remove all tag from reader range, restart the reader and connect with server.

4. Auto Relay Triger

This Configuration is used to Set Relay Mode.

Mode:

1. Single

Relay On when Tag detects and off after Set Time.

2. **Continuous**

   Relay on Until Tag detects and off after Set Time when tag is out of reader range.

3. **No Change**

   No change in Relay last status.

5. **ISO 14443A Tag Filtering**

   This Configuration used to set Tag filtering. when Particular Block Data is available only then Tag detects in Auto Inventory, Otherwise Tag not detect.

   For Tag Filtering you need to mention the key type i.e., KeyA (60Hex) or KeyB (61Hex), Block number on which read operations are to be performed i.e. 1,2,4,5,6. User can only enter data blocks here not Sector Trailer. Enter 6 Bytes Keys and 16 Bytes of Data.

   Block contains 16 Bytes of Data.

   For Block 0,1,2 data blocks 3 is Sector Trailer. Similarly, for block 5, 6, 7 Sector Trailer is Block no 8 and so on.

6. **ISO 14443A Register**

   This Configuration used to Register Tag or Write data and Specific PICC Block number. Disable Both auto Inventory First when you Register PICC.

   For Register you need to mention the key type i.e., KeyA (60Hex) or KeyB (61Hex), Block number on which read operations are to be performed i.e., 1,2,4,5. User can only enter data blocks here not Sector Trailer. Enter 6 Bytes Keys and 16 Bytes of Data. And select Access condition for Sector Trailer and Data Blocks. And then Click on Register Button. It Only Register if card is Fresh.

5.2.5 RR System Level Command set

User may use this RR System Level command set to perform the operations of System Level Command.

Following are the steps for Connection:

a) Follow the above step to connect the reader.

b) Select System Level Command tab which is shown in fig.12.
c) Now perform the various operation of System level command.

Below are the snaps showing the tab of System Level Command.

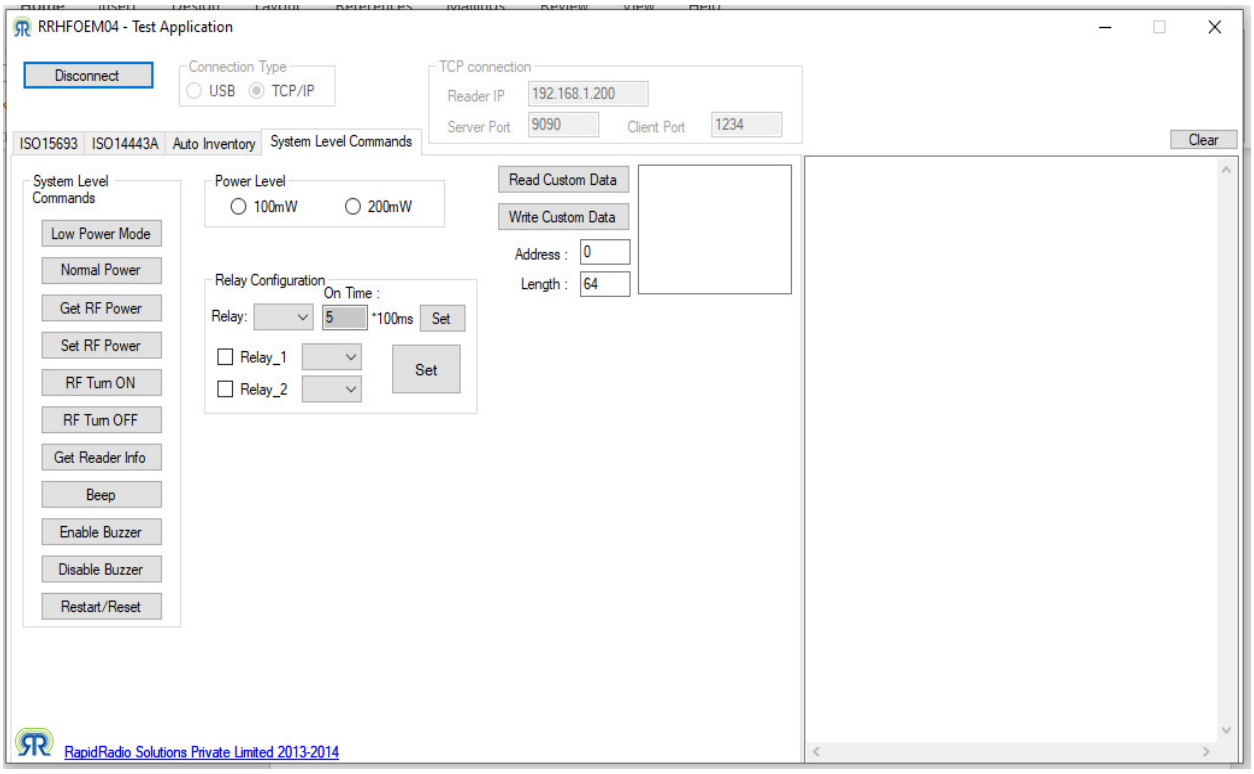


Fig.12 selects system level command tab

Following are the details of each command set of System Level Command.

1. **Low Power Mode**

   This command is used to decrease the RF power of reader.

2. **Normal Power**

   Normal Power command restores the default power level.

3. **Get RF Power**

   This command is used to Get the RF power of reader which is Last user set.

4. **Set RF Power**

   This command is used to set the RF power of reader by selecting the power level from 100mW or 200mW.

5. **RF Turn ON**

   This command is used to turn ON the RF Field.

6. **RF Turn OFF**

   This command is used to turn OFF the RF Field.

7. **Get Reader Information**

   Get reader information command returns product ID and serial number of readers.

8. **Beep**

   This command beeps the buzzer.

9. **Enable Buzzer**

   Enable buzzer is used to turn ON the buzzer.

10. **Disable Buzzer**

    Disable buzzer is used to turn OFF the buzzer.

11. **Restart/Reset**

    This command is used to restart the reader.

Chapter 6: Trouble Shooting

6.1 Do’s and Don’ts:

1. Check the connection of reader with system.
2. Make sure that the tag is in RF Field.
3. Connect the ETH Cable in CPU or in LAN Hub.
4. Use the ETH cable provided along with the reader.
5. Read the command set document for detailed information of command.
6. Make sure that the LED of adapter is ON not blinking.
7. Don’t put on metal thing.
8. Make sure that there are no unwanted cards or tags in RF field.
9. Try to avoid accidental damage to the reader.
10. Try to avoid water damage to the reader.
11. Execute Disconnect button before removing the reader.
12. Make sure that IP address is not conflicting in the network.