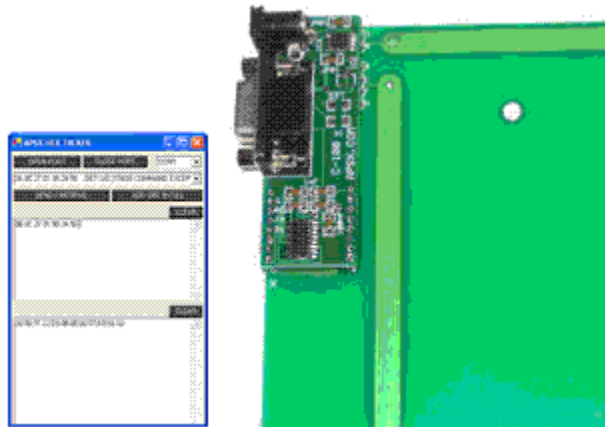


APSX

RFID Reader/Writer Data Sheet V 1.7



APSX

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Warranty: APSX Reader/Writer is warranted from defects in workmanship and materials for a period of 90 days. Liability for defects is limited to the purchase price of the product. This warranty will not apply to defects resulting from improper modifications or use outside published specifications.

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FEATURES

APSX RFID readers include the following components:

1. APSX RFID Reader/Writer (RW110, RW210 or RW310)
2. C100 TTL to RS232 level converter
3. 6-9V power supply
4. Downloads available at www.apsx.com/support.aspx
 - a. APSX RFID Setup File (with .NET Framework)
Installs APSX RFID TEST Application and .NET Framework if you do not have .NET Installed in your PC. Test application allows you to communicate tag info with your PC.
 - b. APSX RFID Setup File (w/o .NET Framework)
Installs only APSX RFID TEST Application. It allows you to communicate tag info with your PC.
 - c. Help File (CHM)
Provides useful information on key features of our readers, 13.56MHz memory organization, installation guide of Test Application, connection to PC, commands and source code.
 - d. APSX Test Application Source Codes
It includes the whole package of codes, Visual Basic project files and DLL components.
 - e. RFID Direct Talk Application
Includes two things: First, PDF data sheet which provides field descriptions, ISO15693 and APSX specific commands. Second, APSX serial talk software (serhex.exe)
 - f. Sample Project for VB6

APPLICATIONS

APSX RFID Test Application and Serial Talk Software (serhex.exe)

ISO15693 uses CRC-16 (Cyclic Redundancy Check) as shown below (Checksum Visual Basic version):

Important: First two bytes in the command string should not be included in this calculation while sending data.

```
Private Sub CalculateCRC(ByVal DataBytes As Byte(),ByRef CRCLSB as  
Byte,ByRef CRCMSB as Byte)
```

```
    Const PresetValue = &HFFFF
```

```
    Const Polynomial = &H8408
```

```
    Dim CRCValue As Integer
```

```
    Dim i As Integer, j As Integer
```

```
    CRCValue = PresetValue
```

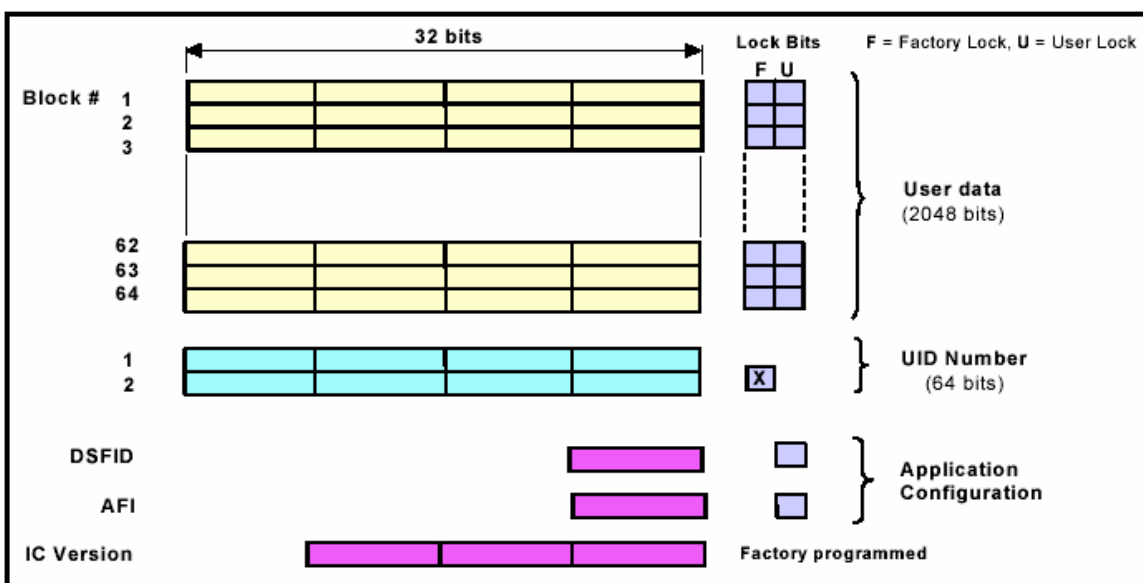
```
    For i = 0 To DataBytes.Length - 1
```

```
        CRCValue = CRCValue Xor DataBytes(i)
```

```

For j = 0 To 7
  If CRCValue And &H1 Then
    CRCValue = (CRCValue >> 1) Xor Polynomial
  Else
    CRCValue >>= 1
  End If
Next j
Next i
CRCValue = Not CRCValue - 65536
CRCLSB = CRCValue Mod 256
CRCMSB = (CRCValue - CRCLSB) / 256
End Sub
  
```

Memory Organization of 13.56MHz Vicinity Card Transponder



FUNCTIONAL DESCRIPTION

Hardware

- APSX RFID reader/Writers operate at 19200 baud rate.
- Built-in TTL. Need to use level converter to connect directly to PC (max232) or use APSX C-100 level converter.
- Read Range for RW310: up to 11" for credit card size tags, 5" for CD/DVD size labels, 4" for 24mm circular labels, and 6" for mini tags.
- Three different board dimensions: RW-310 (9" x 6" x 0.25") - RW-210 (4.5" x 2.7" x 0.25") – RW-110 (1 1/8" x 1 7/8" x 0.25')
- On-board antenna
- Power consumption 20mA at stand by, 80mA in fast mode (20 reads per sec.) under 5V
- Read and write any type of 13.56 MHz RFID tag (ISO15693)
- Allows user to program own cards
- Shorter transaction time than 125 kHz systems
- Programmable LEDs are available for visual feedback
- Mountable to any surfaces
- Operates on regulated 5VDC or 6 -9 VDC when using with C-100

Software

You can build your own .NET application with available DLL.

If you are not using VB.Net or do not want to use the DLL, you can use serial commands to directly talk to our devices.

Contents of the applications available at www.apsx.com/support.aspx page:

APSX RFID Setup File (with .NET Framework)

Installs APSX RFID TEST Application and .NET Framework if you do not have .NET Installed in your PC. Test application allows you experiment with all the features of the ISO15693 tag. It may take up to 5 minutes.

APSX RFID Setup File (w/o .NET Framework)

Installs only APSX RFID TEST Application. Test application allows you experiment with all the features of the ISO15693 tag.

Help File (CHM)

Provides useful information on key features of our readers, 13.56MHz memory organization, installation guide of Test Application, connection to PC, commands and source code.

APSX Test Application Source Code

It includes the whole package of codes, Visual Basic project files and DLL components.

RFID Direct Talk Application

Includes two things: First, PDF data sheet which provides pin connection info, field descriptions, ISO15693 and APSX specific commands. Second, APSX serial talk software (serhex.exe)

Sample Project for VB6

Software Installation (more detail available in Help File on support pages)

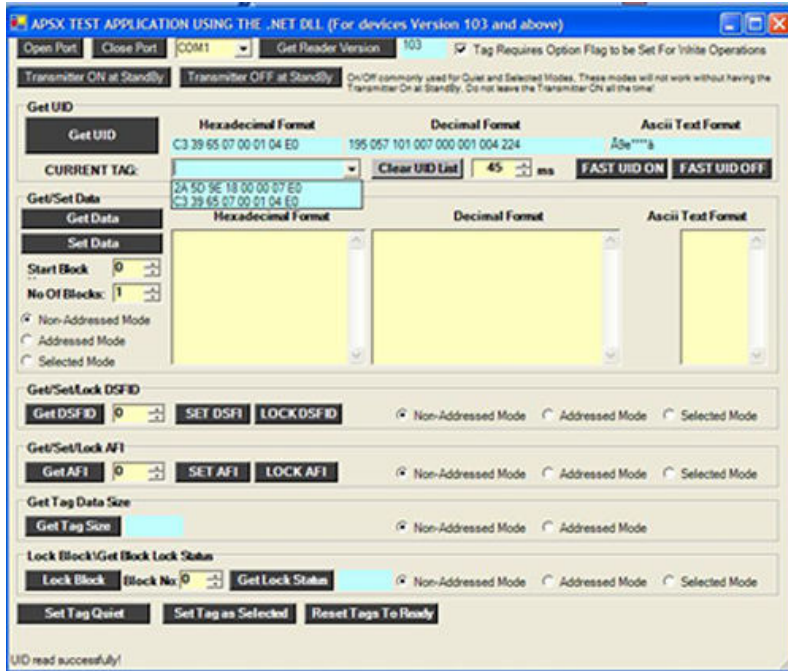
1. Go to www.apsx.com support page
2. Download APSX TEST application to your PC
3. If you have .NET installed on your PC, you can download only APSX TEST application. Otherwise, you need to install the extended version with .NET Framework (dotnetfx.exe) in it. The extended version takes 5 minutes to install
4. When its installed click to APSX RFID TEST Application setup icon to start install. Dialog screen will appear. Click Next
5. Select you folder and user spec then click Next
6. Then click to confirm. Then system starts installing.
7. Click Close when you are done.

Connection to PC

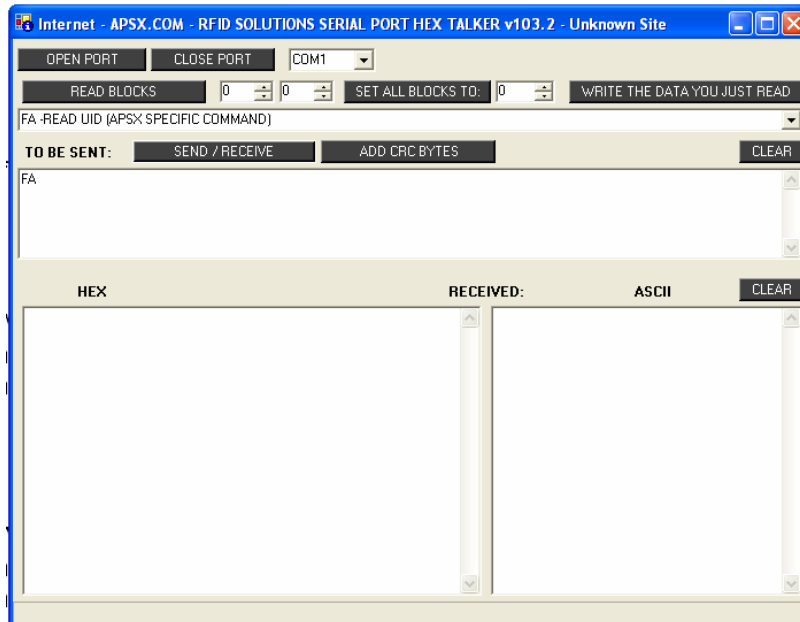
1. APSX RFID Readers come as TTL. However, if you use a TTL to RS232 converter (C-100 sold separately), you can connect directly to your PC. You will need a serial cable, standard 6V power adapter, APSX RFID reader, APSX TEST APPLICATION, 13.56MHz RFID tag to start testing
2. Connect the reader and PC with the serial cable
3. Connect the reader to the power adapter
4. Run the APSX TEST application
5. The main screen will appear

SOFTWARE DESCRIPTION

APSX RFID TEST Application Main Screen



APSX Hex Talker Main Screen (serhex.exe)



Field Descriptions

Fields				
# of Bytes Sent	# of Bytes Expected	Flag	Command	CRC
8 bits	8 bits	8 bits		16 bits

Example1:

Read Command: 06 0C 27 01 00 2A 50

06: 6 bytes sent (not including this byte '06')

0C: 12 bytes expected or needed

27: Flag (00100111 bin)

01: Inventory command (ISO 15693 standard)

00: Block number

2A 50: CRC16 (Cyclic Redundancy Check - Low Byte & High Byte)

Example2:

Write Command: 0A 00 43 21 00 06 07 08 09 CD F6

0A: 10 bytes sent (not including this byte '0A')

00: No bytes expected

43: Flag

21: Write command

00: Block number

06 07 08 09: Four Bytes Data

CD F6: CRC16 (Low Byte & High Byte)

Serial Talker Commands

APSX Specific Commands

FF – Green Led On

It turns the green led on. Whenever you need to use this function of the green led, you can simply use this command.

FE –Green Led off

It turns the green led off. Whenever you need to use this function of the green led, you can simply use this command.

FD – Red Led On

It turns the red led on. Whenever you need to use this function of the red led, you can simply use this command.

FC – Red Led off

It turns the red led off. Whenever you need to use this function of the red led, you can simply use this command.

FB – Switch to Fast Mode

Fast mode is the special mode that the reader tracks the proximity area continuously. When you need to read tags whenever they enter into that proximity area you can use this mode.

FA – Read UID

This allows you to read the unique ID of each tag. It gives you back UID of a specific tag.

F7 – Transmitter Off

F8 – Transmitter On

F9 – Get Version Number

ISO 15693 Standard Commands

Get UID

It's the same command as FA. For this command you need to put the variables by yourself. The number of bytes you sent and the number of bytes you need to read are up to you.

Example:

- Open port
 - Select Get UID command from the dropdown menu
- Command looks like this:
06 0C 27 01 00 2A 50
- 06: 6 bytes sent (not including this byte '06')
0C: 12 bytes expected
27: Flag (00100111 bin)
01: Inventory command (ISO 15693 standard)
00: Block number
2A 50: CRC16 (Low & High)
- Place RFID Tag close enough to the reader
 - Press Send/Receive button
 - On the bottom screen you will see the UID of that specific tag

Response would be like this (12 Bytes):
00:00:C3:27:D5:06:00:00:07:E0:FA:23:

Write Block

This command writes on the desired block. Blocks have the range of “0-64”. Each block has four bytes. Therefore four bytes are needed for each block.

Example:

- Open port
- Select Write Block command from the dropdown menu

Command looks like this:

0A 00 43 21 00 06 07 08 09 CD F6

0A: 10 bytes sent (not including this byte '0A')

00: No bytes expected

43: Flag

21: Write single block command

00: Block number

06 07 08 09: Four Bytes Data (one block)

CD F6: CRC

- Put RFID Tag close enough to the reader
- Press Send/Receive button

Read Block

This command reads the desired block from the tag. Blocks have the range of 64. Each block has four bytes.

Example:

- Open port
- Select Get UID command from the dropdown menu
Command looks like this: 06 07 03 20 00 9B 0A

06: 6 bytes sent (Not including this byte '06')

07: Seven bytes expected

03: Flag

20: Read single block command (ISO 15693 standard)

00: Block number

9B 0A: CRC (Low & High)

- Place RFID Tag close enough to the reader
- Press Send/Receive button
- On the bottom screen you will see the data of that specific tag

Response would be like this (7 Bytes):

00:06:07:08:09:E9:5B:

00: Flag

06 07 08 09: Four bytes data

E9 5B: CRC

APSX RFID TEST Application Commands (more available at www.apsx.com/support.aspx)

When APSX RFID TEST application is running, hit OPEN PORT button by selecting your port such as COM1

VERSION

If you want to see the version number, click to GET READER VERSION.

UID (Unique identifier)

The UID shall be set permanently by the IC manufacturer. It consists of 8 bytes which have 1 byte of MSB (most significant bit 'E0'), 1 byte of IS manufacturer code and 6 bytes of unique serial number. You can click to GetUID button to get UID number of a tag. You can see in three format including hexadecimal, decimal, Ascii. When you start reading different tags, they are stored in the combo box right under the hexadecimal UID box. You can also decide which tag to work on by selecting the tag as current from the combo box.

FAST UID

The other important feature is reading UIDs in fast mode. You can read UID non-stop by clicking FAST UID ON button once. The close this feature just click FAST UID OFF button.

TAG DATA

Non-Address Mode

Non-Addressed mode indicates that the tag in the range will be read or written without considering selected or addressed modes.

In order to get the data on the tag, just click the GET DATA button. There are hexadecimal, decimal and Ascii formats available. If you want to get some part of the data, you can select START BLOCK and NO OF BLOCKS indicators to specify the starting block and how many blocks you want to read. Maximum number of blocks to read is 12.

The same logic applies for data writing purposes. You need to type your data in the hexadecimal format box by leaving a space between each data. Then you click SET DATA button to write on the tag.

Addressed Mode

Addressed mode indicates that the tag addressed will be read or written no matter which tag is in the range or selected. Addressed tag can be selected by using the ADDRESSED TAG combo box next to GET UID button.

Selected Mode

Selected mode indicates that the tag selected will be read or written no matter which tag is in the range or addressed. A tag can be selected by using the SET TAG AS SELECTED button at the very bottom of the screen.

DSFID (Data storage format identifier)

It is coded on one byte. It allows for instant knowledge on the logical organization of the data. DSFID can be read or written by using GET DSFID or SET DSFID buttons. The ID you want to set can be entered into the box before you hit the SET DSFID button. The other feature is to lock DSFID. When you lock it, it can not be changed again. The modes (Non-Addressed, Addressed, Selected) are applied by the same logic UID has.

AFI (Application family identifier)

AFI provides application family categorization such as '10' as transportation, '30' as access control, 'C0' as airline bags etc... AFI is coded on one byte, which constitutes 2 nibbles of 4 bits each. AFI can be read or written by using GET AFI or SET AFI buttons. The ID you want to set can be entered into the box before you hit the SET AFI button. The other feature is to lock AFI. When you lock it, it can not be changed again. The modes (Non-Addressed, Addressed, Selected) are applied by the same logic UID has.

TAG SIZE

Tag size can be read by using GET TAG SIZE button. The modes (Non-Addressed, Addressed, Selected) are applied by the same logic UID has.

LOCK BLOCK

You can lock and get the lock status of any block. **But when you lock it, there is no way to unlock it.** Select the block you want to lock then hit LOCK BLOCK button. If you want to know the status of any block you want, you can select the block and then hit GET LOCK STATUS button.

TRANSMITTER ON/OFF

You need to leave the transmitter on for tags to stay in any mode they need to be powered and be in the range. Otherwise they will lose power and reset. You can

use the buttons on the top part of the RFID Test Application. You can use F8(HEX) to turn on and F7(HEX) to turn off.

Pin Definitions

In order to connect the reader to your system, you need to follow these guidelines for the wire connections:

Pin 1: Ground

Pin 2 & 3: Not Used

Pin 4: 5V (Regulated)

Pin 5: TX (Serial Transmit)

Pin 6: RC (Serial Receive)

Pin 7: Ground

Pin 8: Not Used

Appendix

Serial Talker Command Summary

FF – Green LED on
FE – Green LED off
FD – Red LED on
FC – RED LED off
FB – Switch to Fast Mode
FA – Read UID
Get UID
Read Block
Write Block
TRANSMITTER ON F8(HEX) / OFF F7(HEX)
F9 – Get the Version Number
And any other ISO 15693 command

APSX RFID TEST Application Command Summary

VERSION
UID
FAST UID
TAG DATA
 Non-Address Mode
 Addressed Mode
 Selected Mode
DSFID
AFI
TAG SIZE
LOCK BLOCK

Product dimensions

APSX RW-110 13.56MHz RFID Reader Module Board

Dimensions (W X L): 1 1/8" X 1 7/8"

APSX RW-210 13.56MHz RFID Reader Module Board

Dimensions (W X L): 2.70" X 4.50"

APSX RW-310 13.56MHz RFID Reader Module Board

Dimensions (W X L): 6.00" X 9.00"

APSX – One Goal in Mind: Productivity

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