



OPERATION MANUAL

13.56 MHz RFID Desk Top Reader

FOR A9230-C (ISO 15693)

and

A9231-B (ISO-14443A)

Desk Top Readers

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AMICWare RFID Expert Software

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AMICWare RFID Expert Software

1. Introduction

AMICWare RFID Expert Software provides a graphical window based on user interface for the AMIC A9230-C and AMIC A9231-B desk top RFID readers. The software is built upon the AMICTek Protocol(-S) and can be used to demonstrate the features, functions and benefits of RFID technology



AMICWare RFID Expert Software

2. Installation and Startup

2.1 Product Contents

Check the package for the AMICWare RFID Expert Software, it contains one CD-ROM setup disk.



2.2 Installation Requirements

The AMICWare RFID Expert Software requires the following minimum environment:

(1) System requirement:

Minimum: Pentium 133MHz
 32MB RAM
 UART 16550A (or compatible)
 10MB free disk space
Resolution: 1024 x 768 with small fonts
Color depth: 16 Bit (65536)

(2) Operating systems :

Windows 98/2000
Windows XP



AMICWare RFID Expert Software

2.3 Setup

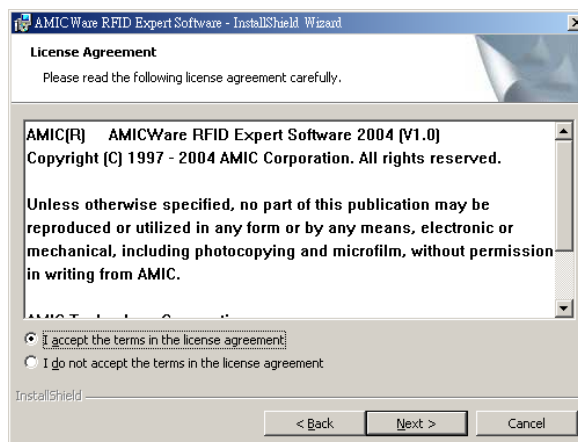
2.3.1 Installation

1. Insert the enclosed CD-ROM into computer's CD-ROM drive. After a short while the Welcome Screen shall be displayed.
Click the **Next** Button.



Note If the Welcome Screen is not displayed when the CD-ROM is inserted, go to My Computer, open the Setup Disk (CD-ROM) icon, and double-click the Setup.exe file.

2. The Software License Agreement screen will be displayed.
Click the **Yes** Button.





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3. The Customer Information Screen will be displayed. Enter the required information, and
Click the **Next** Button.

The screenshot shows the 'Customer Information' window of the 'AMICWare RFID Expert Software - InstallShield Wizard'. The window has a title bar with the text 'AMICWare RFID Expert Software - InstallShield Wizard'. Below the title bar, the text 'Customer Information' is displayed, followed by 'Please enter your information.' There are two text input fields: 'User Name:' with the value '111' and 'Organization:' with the value '111'. Below these fields, the text 'Install this application for:' is followed by two radio button options: 'Anyone who uses this computer (all users)' (which is selected) and 'Only for me (111)'. At the bottom of the window, there are three buttons: '< Back', 'Next >', and 'Cancel'. The 'Next >' button is highlighted.

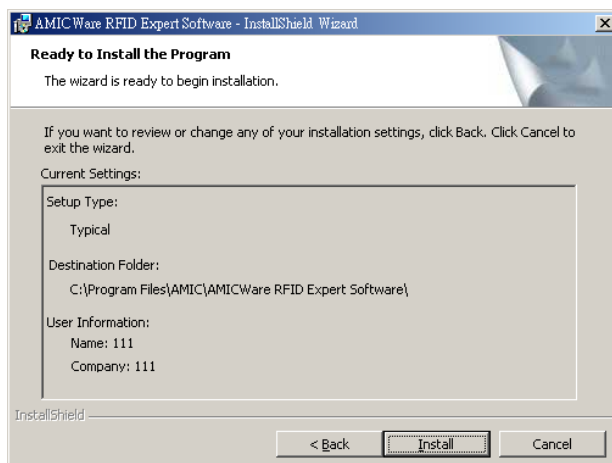
4. The Choose Destination Location Screen will be displayed. Using Browse Button to choose.
Click the **Next** Button.

The screenshot shows the 'Destination Folder' window of the 'AMICWare RFID Expert Software - InstallShield Wizard'. The window has a title bar with the text 'AMICWare RFID Expert Software - InstallShield Wizard'. Below the title bar, the text 'Destination Folder' is displayed, followed by 'Click Next to install to this folder, or click Change to install to a different folder.' There is a folder icon and the text 'Install AMICWare RFID Expert Software to:' followed by the path 'C:\Program Files\AMIC\AMICWare RFID Expert Software\'. To the right of the path is a 'Change...' button. At the bottom of the window, there are three buttons: '< Back', 'Next >', and 'Cancel'. The 'Next >' button is highlighted.

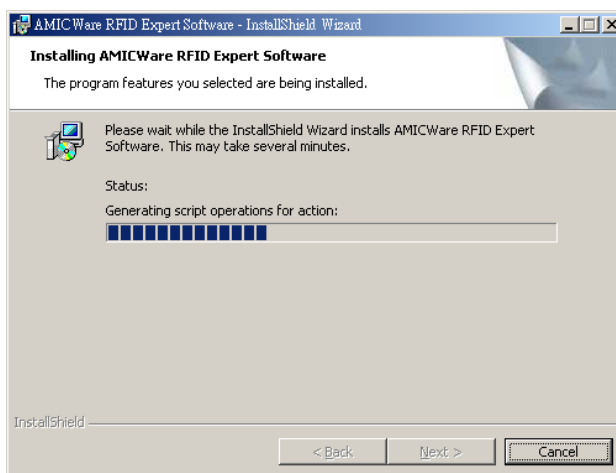


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5. The Ready to Install the Program Screen will be displayed. Click the **Install** Button.



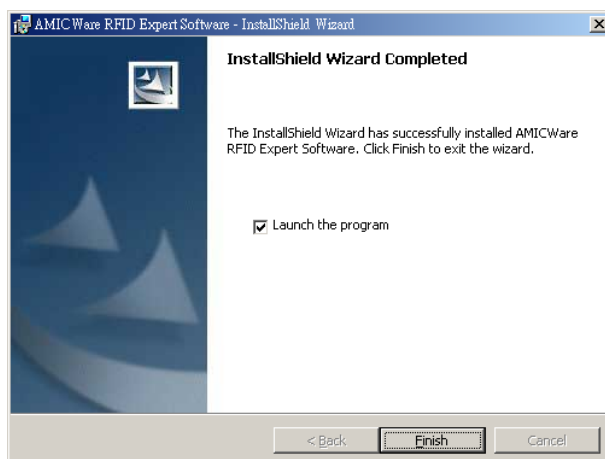
6. The Start Copying file Screen will be displayed.





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7. When the setup operation is completed, the following screen will be displayed, Click the **Finish** Button.



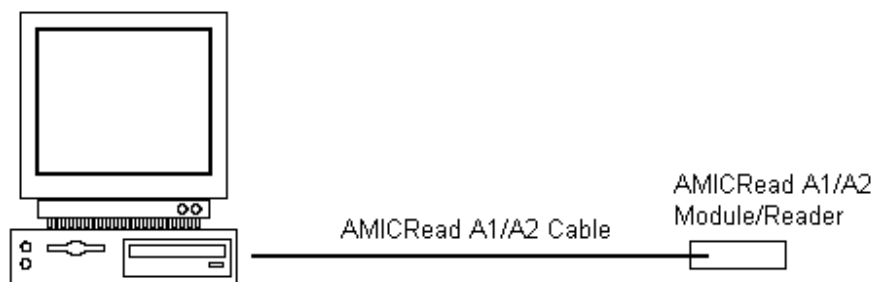
2.3.2 Uninstalling the AMICWare RFID Expert Software

Follow the procedure below to uninstall the AMICWare RFID Expert Software from your computer.

1. Select **Program/AMICWare RFID Expert Software** from the Windows Start Menu.
2. Select **Uninstall AMICRFID**.

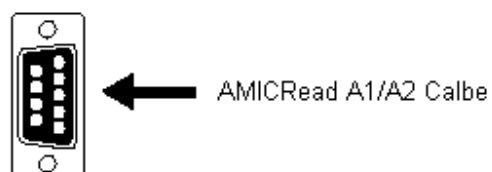
3. Connection

3.1 Connecting the AMICRead A1/A2 module/Reader

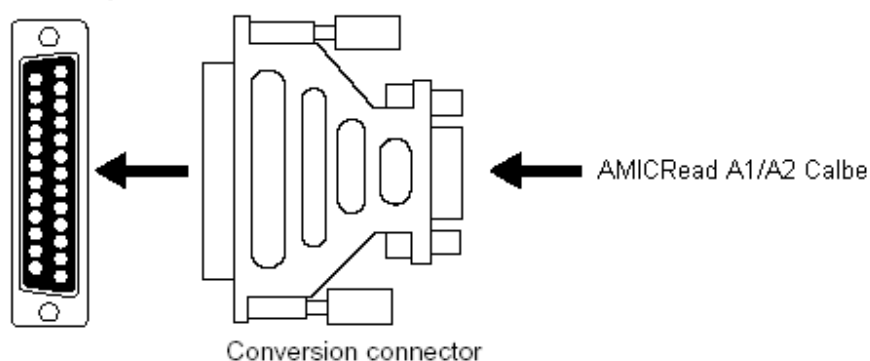


Note The connector on the computer side of the AMICRead A1/A2 Cable is a 9-pin D-sub connector. If the computer has a 25-pin D-sub connector, use a commercially available conversion connector or conversion cable.

For 9-pin D-sub Serial Port Connectors



For 25-pin D-sub Serial Port Connectors





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3.2 Starting and Quitting

1. Select **Program/AMICWare RFID Expert Software/AMICRFID** from the Windows Start Menu.
2. The AMICWare RFID Expert Software will start.



3. Select **Exit** button to close the AMICWare RFID Expert Software.

Default Setting :

The following is default setting on computer side.

COM Port:

COM1

Baud Rate:

9600 bits/sec, N, 8, 1

No Parity Bit, 8 Data Bits, 1 Stop Bit.



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- The software will automatically detect desk top reader hardware type and respectively bring up the corresponding operation software as follows.

AMICRead A1 software screen for A9230-C

The screenshot shows the AMICWare RFID Expert Software V1.0 interface. The 'Tag Type' section has 'Tag-It HF' selected. The 'Tag Mode' section has 'Non-Addressed' selected. The 'ISO Command' section has 'Read Block' selected. The 'Condition' section has 'AFI Field Is Present' and 'Get Block Security Status' checked. The 'Inventory Condition (HEX data)' section has 'Mask Length' set to 08 and 'Mask Value' set to 00. The 'Request/Response List' and 'Tag UID List (HEX data)' sections are empty. The status bar at the bottom shows 'Tag-It HF: 2K bits, Total: 64 blocks, Per block: 4 bytes, UID = E0 07 xx xx xx xx xx xx'.

AMICRead A2 software screen for a A9231-B

The screenshot shows the AMICWare RFID Expert Software V1.0 interface. The 'ISO-14443A Command' section has 'REQUEST(REQA)' selected. The 'Card Type' is set to 'Mifare_1K (DEC: 00 ~ 15)'. The 'Card Serial No. (HEX)' is set to 'FF078069'. The 'Key Operation (Sector Trailer)' section has 'Key A' selected. The 'Current Key' is set to 'FFFFFFFF'. The 'Mifare S50/S70 - Data Blocks Operation (HEX Data excluding Sector)' section has 'Sector' set to 00. The 'Mifare S50/S70 - Value Blocks Operation (Range: 0.00 ~ 99999.99)' section has 'Sector' set to 00. The 'Ultralight Data Page Operation (HEX Data excluding Page)' section has 'Page0 ~ 3' selected. The status bar at the bottom shows 'Caps Num Ins 上午 10:44 2004/8/2'.



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3.3 Screen Configuration for A9230-C desk top reader

The following describes the screen configuration of the AMICWare RFID Expert Software for A9230-C desk top reader (ISO-15693).

Menu bar — Operate Port Set Help Exit

Tool bar — [Back] [Stop] [Play]

Operation Window —

Tag Type

- ☐ AMIC Tag
- ☐ I.Code SLI
- ☒ Tag-It HF-I

Tag Mode

- ☒ Non-Addressed
- ☐ Addressed
- ☐ Inventory

Select Mode State

ISO Command

- ☐ Get System Info.
- ☐ Read Block
- ☐ Read Multiple Blocks
- ☐ Write Block
- ☐ Write AFI
- ☐ Lock AFI
- ☐ Get Multiple Blocks Security Status
- ☐ Write DSFID
- ☐ Lock DSFID
- ☐ Lock Block
- ☐ Select
- ☐ Stay Quiet
- ☐ Reset to Ready

Condition

- ☐ AFI Field Is Present
- ☐ Get Block Security Status

Default : Low Data Rate

Inventory Condition (HEX data)

Mask Length: 08 *Range : 00 ~ 08 (Initial 08)

Mask Value: 00 *Range : 00 ~ FF (Initial 00)

Default : Number of slots = 1 slot

Input First Block Number (HEX)

Input End Block Number (HEX)

Input Block Data (HEX)

Input Tag UID (MSB -> LSB : HEX)

Input Tag AFI (HEX)

Input Tag DSFID (HEX)

Execute

Request/Response List

Clear

Tag UID List (HEX data)

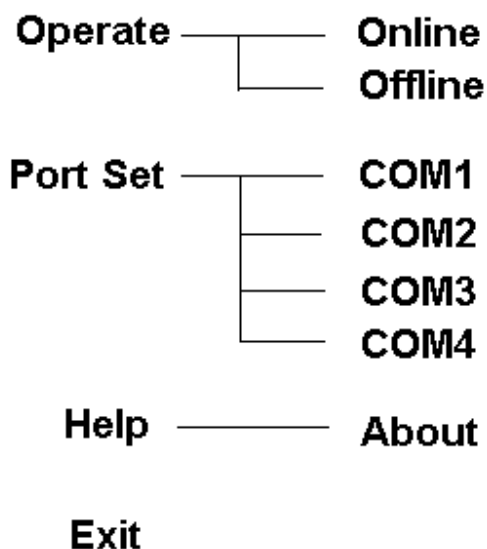
Clear

Status bar — Tag-It HF-I : 2K bits, Total : 64 blocks, Per block : 4 bytes, UID = E0 07 xx xx xx xx xx xx Caps Num Ins 上午 10:32 2004/8/2



Menu Bar

The Menu Bar functions are listed in the following menu tree.



Tool bar

The following shortcut keys can be used from the Toolbars.

-  Online
-  Offline
-  About
-  Execute

Status Bar

The Status Bar displays tag contents and others auxiliary information.



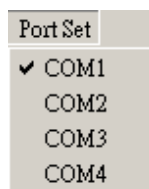


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3.3.1 COM Port Setting

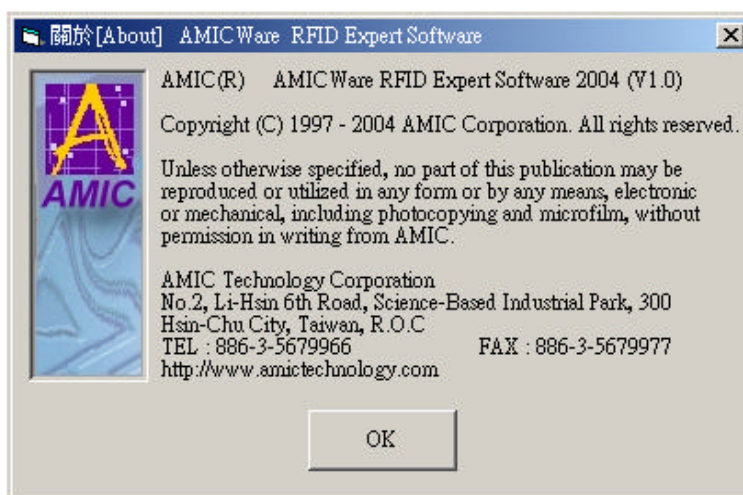
Select **Port Set** from the Menu Bar.

You can choose COM1, COM2, COM3 or COM4.



3.3.2 Toolbars Description

1.  Online : The COM Port is opened.
Note : The circle indicator will change to red on the right of the screen.
2.  Offline : The COM Port is closed.
Note : The circle indicator will change to black on the right of the screen.
3.  About : About the AMICWare RFID Expert Software related information as following.



4.  Execute : Send command to AMICRead A1 module/reader.



3.3.3 Operation Description

1. Select Tag Type:

Tag Type

☐ AMIC Tag

☐ I.Code SLI

☒ Tag-It HF-I

The AMICWare RFID Expert Software fully supports two IC manufacturers (TI, PHILIPS at present) that offer ISO/IEC 15693 compatible tags.

2. Select Tag Mode:

Tag Mode

☒ Non-Addressed

☐ Addressed

☐ Inventory

When you make the setting, the AMICWare RFID Expert Software will automatic disable (gray-out) some functions as shown below:

Non-Addressed Mode

ISO Command

<input type="radio"/> Get System Info.	<input type="radio"/> Write DSFID
<input type="radio"/> Read Block	<input type="radio"/> Lock DSFID
<input type="radio"/> Read Multiple Blocks	<input type="radio"/> Lock Block
<input type="radio"/> Write Block	<input type="radio"/> Select
<input type="radio"/> Write AFI	<input type="radio"/> Stay Quiet
<input type="radio"/> Lock AFI	<input type="radio"/> Reset to Ready
<input type="radio"/> Get Multiple Blocks Security Status	

Addressed Mode

ISO Command

<input type="radio"/> Get System Info.	<input type="radio"/> Write DSFID
<input type="radio"/> Read Block	<input type="radio"/> Lock DSFID
<input type="radio"/> Read Multiple Blocks	<input type="radio"/> Lock Block
<input type="radio"/> Write Block	<input type="radio"/> Select
<input type="radio"/> Write AFI	<input type="radio"/> Stay Quiet
<input type="radio"/> Lock AFI	<input type="radio"/> Reset to Ready
<input type="radio"/> Get Multiple Blocks Security Status	

Inventory Mode

ISO Command

<input type="radio"/> Get System Info.	<input type="radio"/> Write DSFID
<input type="radio"/> Read Block	<input type="radio"/> Lock DSFID
<input type="radio"/> Read Multiple Blocks	<input type="radio"/> Lock Block
<input type="radio"/> Write Block	<input type="radio"/> Select
<input type="radio"/> Write AFI	<input type="radio"/> Stay Quiet
<input type="radio"/> Lock AFI	<input type="radio"/> Reset to Ready
<input type="radio"/> Get Multiple Blocks Security Status	



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3. Select Function:

ISO Command

<input type="radio"/> Get System Info.	<input type="radio"/> Write DSFID
<input type="radio"/> Read Block	<input type="radio"/> Lock DSFID
<input type="radio"/> Read Multiple Blocks	<input type="radio"/> Lock Block
<input type="radio"/> Write Block	<input type="radio"/> Select
<input type="radio"/> Write AFI	<input type="radio"/> Stay Quiet
<input type="radio"/> Lock AFI	<input type="radio"/> Reset to Ready
<input type="radio"/> Get Multiple Blocks Security Status	

Choose the tag function that you want to perform.

4. Select Condition:

Condition

☐ AFI Field Is Present

☐ Get Block Security Status

Default : Low Data Rate

Tag Mode and Function selected will determine the usable function of the Condition items.

5. Select Inventory Condition:

Inventory Condition

Mask Length	<input type="text" value="08"/>	*Range : 00 ~ 08 (Initial 08)
Mask Value	<input type="text" value="00"/>	*Range : 00 ~ FF (Initial 00)
<input checked="" type="checkbox"/> Number of slots		Default : Number of slots = 1 slot

This inventory condition frame is enabled for Inventory Mode only.



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6. Data Key in Parts:

A software interface for entering data key information. It consists of several input fields and a button. The fields are labeled: 'Input First Block Number (HEX)', 'Input End Block Number (HEX)', 'Input Block Data (HEX)', 'Input Tag UID (MSB -> LSB :HEX)', 'Input Tag AFI (HEX)', and 'Input Tag DSFID (HEX)'. The 'Input Block Data' field has four sub-input boxes. The 'Input Tag UID' field has eight sub-input boxes. There is a red circular indicator in the top right corner and an 'Execute' button.

The operation of data key in parts, depend on the Function selected.

7. Request/Response List:

A window titled 'Request/Response List' with a 'Clear' button in the top right corner. The main area of the window is a large, empty rectangular box with a vertical scrollbar on the right side, intended for displaying a list of request and response messages.

The Request/Response List window will record request and response related messages. The request and response related messages will be cleared, whenever the Clear Button is pressed.



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8. Tag UID List:



This Tag UID List frame will record Tag UID messages.

The tag UID related messages will be cleared, whenever the Clear Button is pressed.

Note :

For other operation information, refer to the ISO/IEC 15693-3 specification.



3.4 Screen Configuration for A9231-B desk top reader

The following describes the screen configuration for AMICWare RFID Expert Software accompanying the AMIC A9231-B (ISO-14443A) desk top reader.

AMICWare RFID Expert Software supports PHILIPS that offer Mifare S50/S70/Ultraligh IC for ISO/IEC 14443A compatible tags.



3.4.1 Operation Description

1. ISO-14443A Command:

The dialog box titled "ISO-14443A Command" contains four rows of controls. Each row has a button on the left and a text input field on the right. The first row has a "REQUEST(REQA)" button and a "Card Type" field. The second row has a "REQUEST(WUPA)" button and a "Card Serial No. (HEX)" field. The third row has an "ANTICOLLISION" button and a "Card Serial No. (DEC)" field. The fourth row has "SELECT" and "HALT" buttons, a "Response Flag (HEX)" field, and a "(00 : OK)" label.

- ※ The AMICWare RFID Expert Software fully supports ISO/IEC 14443A command.
- ※ Choose the command of ISO/IEC 14443A that you want to perform.
- ※ If any tag is within the field of antenna, the software will automatically identify related information and show it on the right side.

2. Record Card:

The dialog box titled "Record Card (HEX data)" contains a label "Card Serial No" above a large text area. At the bottom, there are two buttons: "Multi-Card Search" and "Clear".

- ※ Record card of Card window will record unique card serial number messages.
- ※ If two or more cards are within the field of antenna, press Multi-Card Search Button to get multi-card's serial number.
- ※ The unique card serial number messages will be clear, whenever the Clear Button is pressed.



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3. Request/Response List:

A screenshot of the 'Request/Response List' window. It features a title bar with 'Clear' and 'Exit' buttons. Below the title bar is a large, empty rectangular area for displaying request and response messages.

- ※ Request/Response List window will record request and response related messages.
- ※ Request and response related messages will be cleared, whenever the Clear Button is pressed.
- ※ AMICWare RFID Expert Software will be closed, whenever the Exit Button is pressed.

4. Operation Frame:

AMICWare RFID Expert Software will automatic enable related operation window according to “Card Type” as shown below:

Note : Mifare S50/S70 can be used for data block or value block (e-Purse function).

Mifare S50/S70 Data Blocks Operation

A screenshot of the 'Mifare S50/S70 - Data Blocks Operation (HEX Data excluding Sector)' window. The window has a title bar and contains the following elements:

- Sector:** A text box containing '00'. To its right, red text indicates 'Mifare_1K (DEC : 00 ~ 15)' and 'Mifare_4K (DEC : 00 ~ 39)'.
- Key Operation (Sector Trailer):** A sub-section containing:
 - Key A:** A radio button that is selected.
 - Access Condition:** A label.
 - Key B:** A radio button.
 - Current Key:** Three text boxes containing 'FFFFFFFFFFFF', 'FF078069', and 'FFFFFFFFFFFF'.
 - Buttons:** 'Save Key to Backup File', 'Verify Key', and 'Change Key'.
- Read/Write:** Two buttons labeled 'Read' and 'Write'.
- Data Blocks:** Four radio buttons labeled 'Block0', 'Block1', 'Block2', and 'Block3', each followed by a large empty text box for data entry.



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- ※ Setting sector number that you want to operate, then press Verify Key to authentication.
- ※ If authentication is passed, the grayed-out buttons will be enable.
- ※ Secret keys A and B will be save to PC file whenever the Save Key to Backup File Button is pressed.
- ※ The secret keys A and (or) B will be changed to Mifare S50/S70 IC whenever the Change Key Button is pressed

Note : Mifare S50/S70 secret keys A and B has 48 bits and default value of 0xFFFFFFFFFFFF.

Note : Mifare S50/S70 access condition has 32 bits and default value of 0xFF078069.

Mifare S50/S70 Value Blocks Operation

- ※ If authentication is passed (shown above), the Read button will be enable and the reading of e-Purse value will be allowed. After Read is finished, the other grayed-out buttons will be enabled. Select the function to be performed next

Ultralight Data Page Operation

- ※ Select the page that you want to read. Press the Read button. Page data will be



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displayed at the corresponding place.

- ※ Select the page that you want to write. Key in Data0 ~ Data3.(hex values). Press Write button and the data will be write to the selected page.

Note :

For other operation information, refer to the ISO/IEC 14443A-3 specification and Mifare S50/S70/Ultralight IC related specification.



Annex 1.Tag Descriptions

Annex 1.1 Tag-It HF-I ISO-15693 (Texas Instruments)

The complete Tag-It HF-I specification can be found in the Texas Instruments publication titled “ Tag-It HF-I Transponder Inlays Reference Guide”.

Figure 43 - Memory Structure of the Tag-It HF-I

Block #	32 bits (4 bytes per block)			
0 (0x00)				
1 (0x01)				
2 (0x02)				
.
.
.
62 (0x3E)				
63 (0x3F)				

- ※ 2K bits (256bytes) of user memory is available for read/write.
- ※ The user can permanently lock any block.
- ※ Once a block is locked it can not be unlocked again.
- ※ A 64-bit ID (factory programmed) uniquely identifies each Tag-It HF-I chip.

0xE0	0x07	Unique Tag ID – 48 bits (6 bytes)
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Annex 1.2 I • Code SLI ISO-15693 (Philips)

The complete I • Code SLI specification in the Philips publication titled "I • Code SLI Smart Label IC SL2 ICS20 Functional Specification".

Figure 44 - Memory Structure of the I • Code SLI (version SL2 ICS20)

Block #	32 bits (4 bytes per block)			
0 (0x00)				
1 (0x01)				
2 (0x02)				
•	•	•	•	•
•	•	•	•	•
•	•	•	•	•
26 (0x1A)				
27 (0x1B)				

- ※ 896 bits (112bytes) of user memory is available for read/write.
- ※ The user can permanently lock any block.
- ※ Once a block is locked it can not be unlocked again.
- ※ A 64-bit ID (factory programmed) uniquely identifies each I • Code SLI chip (SL2 ICS20).

0xE0	0x04	0x01	Unique Tag ID – 40 bits (5 bytes)
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Annex 1.3 Mifare S50 (Philips)

Complete Mifare S50 specification can be found in the Philips publication titled “Mifare Standard Card IC MF1 IC S50 Functional Specification”.

Figure 28 - Memory Structure of the Mifare S50

Sector	Block	16 bytes per block	Description
15	3		Sector Trailer 15
	2		Data
	1		Data
	0		Data
14	3		Sector Trailer 14
	2		Data
	1		Data
	0		Data
	•	•	•
	•	•	•
	•	•	•
0	3		Sector Trailer 0
	2		Data
	1		Data
	0		Manufacturer Data

- ※ 1K byte EEPROM memory is organized in 16 sectors with 4 blocks of 16 bytes each.
- ※ User can set passwords (Key A, Key B) for each sector.
- ※ Each sector has a sector trailer containing the secret keys A and B(optional) and access condition for four blocks of that sector.
- ※ A 32-bit ID (factory programmed) uniquely identifies each Mifare S50 chip.

Unique Tag ID – 32 bits (4 bytes)



Annex 1.4 Mifare S70 (Philips)

Complete Mifare S70 specification can be found in the Philips publication titled "Mifare Standard 4k byte Card IC MF1 IC S70 Functional Specification".

Figure 29 - Memory Structure of the Mifare S70

Sector	Block	16 bytes per block	Description
39 to 32	15		Sector Trailer 39
	14		Data
	.	.	.
	.	.	.
	.	.	.
	0		Data
31	3		Sector Trailer 31
	2		Data
	1		Data
	0		Data
	.	.	.
	.	.	.
	.	.	.
0	3		Sector Trailer 0
	2		Data
	1		Data
	0		Manufacturer Data

- ※ 4K byte EEPROM memory is organized in 32 sectors with 4 blocks and in 8 sectors with 16 blocks. One block consists of 16 bytes.
- ※ User can set passwords (Key A, Key B) for each sector.
- ※ Each sector has a sector trailer containing the secret keys A and B(optional) and access condition for four blocks of that sector.
- ※ A 32-bit ID (factory programmed) uniquely identifies each Mifare S70 chip.

Unique Tag ID – 32 bits (4 bytes)



Annex 1.5 Mifare Ultralight (Philips)

Complete Mifare Ultralight specification can be found in the Philips publication titled “Mifare Ultralight Contactless Single-trip Ticket IC MF0 IC U1 Functional Specification”.

Figure 30 - Memory Structure of the Mifare Ultralight

Page	Byte Number				Description
0	SN0	SN1	SN2	BCC0	Serial Number
1	SN3	SN4	SN5	SN6	Serial Number
2	BCC1	Internal	Lock0	Lock1	Internal / Lock
3	OTP1	OTP2	OTP3	OTP4	OTP
4	Data0	Data1	Data2	Data3	Data read/write
5	Data4	Data5	Data6	Data7	Data read/write
6	Data8	Data9	Data10	Data11	Data read/write
7	Data12	Data13	Data14	Data15	Data read/write
8	Data16	Data17	Data18	Data19	Data read/write
9	Data20	Data21	Data22	Data23	Data read/write
10	Data24	Data25	Data26	Data27	Data read/write
11	Data28	Data29	Data30	Data31	Data read/write
12	Data32	Data33	Data34	Data35	Data read/write
13	Data36	Data37	Data38	Data39	Data read/write
14	Data40	Data41	Data42	Data43	Data read/write
15	Data44	Data45	Data46	Data47	Data read/write

- ※ 512 bit EEPROM memory is organized in 16 pages with 4 bytes each.
- ※ The chip offer read-only locking mechanism, after locking the page becomes read-only memory.
- ※ Page 3 is the OTP page. It is pre-set to all “0” after production. These bytes may be bit-wise modified by a write command, If a bit is set to “1”, it cannot be changed back to “0” again.
- ※ A 56-bit ID (factory programmed) uniquely identifies each Mifare Ultralight chip.

Unique Tag ID – 56 bits (7 bytes)



AMICWare RFID Expert Software

Revision History

Revision	Date	Description	By
1.0C	06/01/2004	Initial creation	D.L.
1.0D	06/08/2004	Modify Contents	R.L.
1.0E	08/02/2004	Modify Contents	D. L.
1.0F	03/01/2006	Reader modification	R.L.



AMICWare RFID Expert Software

NOTE: The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To comply with the FCC RF exposure compliance requirements, this device and its antenna must not be co-located or operating to conjunction with any other antenna or transmitter.

FCC INFORMATION

The Federal Communication Commission Radio Frequency Interference Statement includes the following paragraph:

The equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communication. However, there is no grantee that interference will not occur in a particular installation. If this equipment dose cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on , the user is encouraged to try to correct the interference by one or more of the following measures:

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

The user should not modify or change this equipment without written approval
Form **AMIC Technology Corporation**. Modification could void authority to use this equipment.



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