Mifare™/DESFire™ Reader

User's Manual

(For DF7XX Series)

REV.E

May 26, 2016

Table of Contents

1. Introduction

1. 1 General

DF7XX series are available with metal keypad and without metal keypad options for customer end applications. The communication interfaces between the reader and tags are with RS232, ABA TK2, Wiegand or RS485 to match the integration requirement.

Features:

1. Supports MAD1/MAD2/MAD3 standard, and supports customer MAD-AID setting.
2. Supports Non-MAD format with user-defined sector number.
3. Supports used card with data offset and length.
4. Supports multi sectors.
5. Reads Mifare™ Classic 1K/4K, Mifare™ Pro, or DESFire™ 2K/4K/8K card.
6. Sets each reader with reader ID for multi-link application.
7. Output interface: Wiegand (Default), ABA-TK2 and RS232/RS485.
8. Wiegand output selectable from 1 bit to 128 bits.
9. RS232 output packet can be set with header, reader ID and trailer.
10. Serves as a versatile configurable reader bundled with a utility developed by Promag™ engineering teams which is easy to set up for buzz or LED color indication.
11. Has the IP 66 certificate to secure the critical installation environment. Also passed the R&TTE, FCC approval.
12. Protected by mutual three passes authentication, DES & 3 DES MACing/Encipherment.
13. Classic housing and various models offer customers wide coverage to select for their application demand. The inside buzzer and LED are able to be configured by the bundled utility.

Application:

1. Access Control.
2. Time Attendance.
3. Guest Registration System.
4. Academic Services.
5. Info Services.
6. Identity authentication.

1. 2 Product Description

1.2.1 Reader Description

DF7XX series are available for user's end configuration by applying Mifare sector and Mifare DESFire technology. They can be configured to read Mifare or Mifare DESFire card with MAD1/MAD2 or MAD3 standard in a Mifare application open system, or can be configured to read the user-defined sector data (Non-MAD) in a user defined closed system.

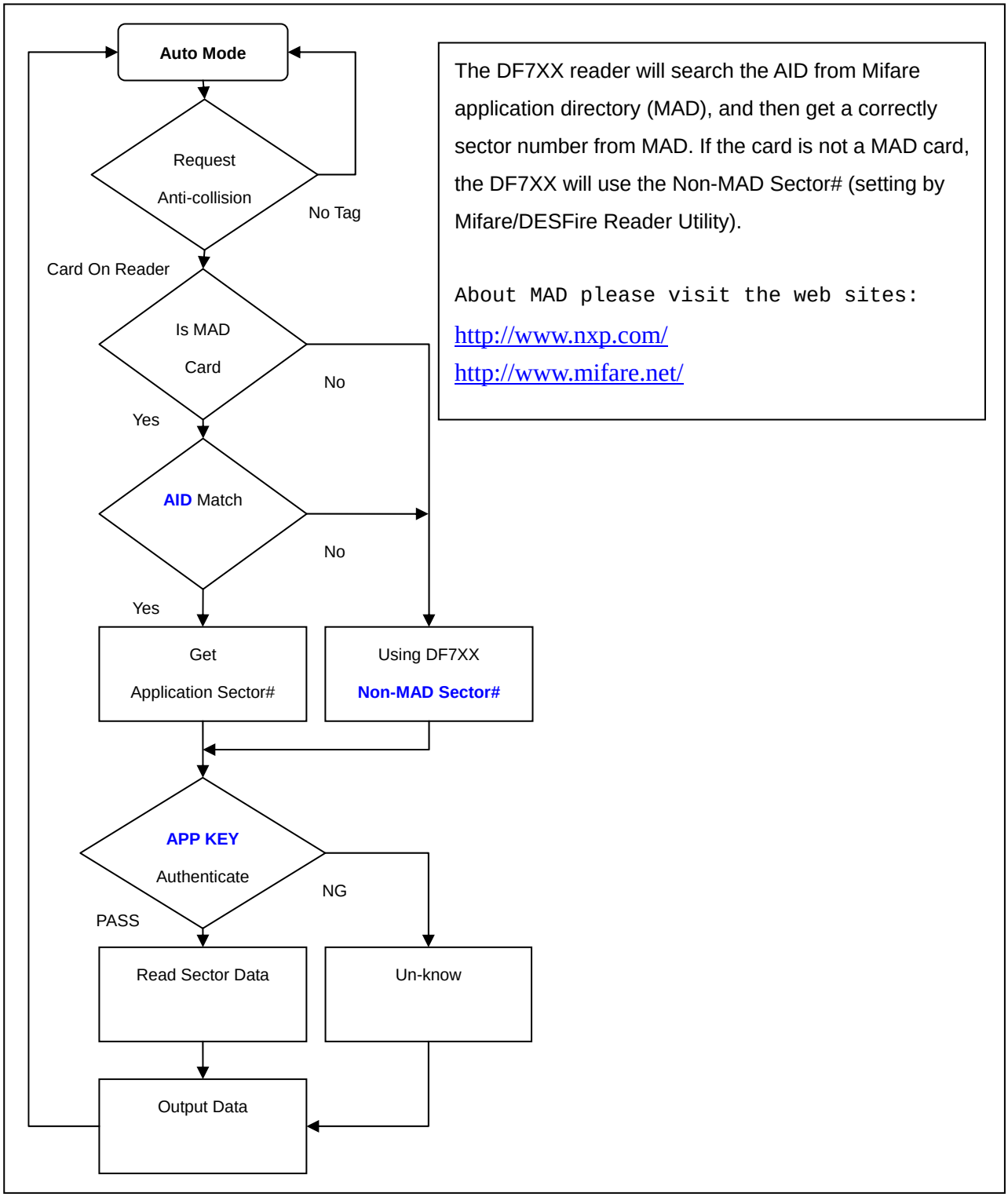
1.2.2 Reader Appearance

<DF700/DF710 series>

<DF750/DF760 series>

1. 3 Mifare™ Application Directory (MAD) Support

DF7XX reader supports the MAD format card, the MAD (Mifare application directory) standard proposes the introduction of common data structures for card application directory entries. DF7XX reader should take advantage of this feature using those sector pointers instead of physical sector number.



1. 4 User-Data Format

DF7XX reader will send out the data following the format as below, the user data length defined by the data-info. At Wiegand output format, the data output length is fixed (defined by number of bits), so the user data would be cut if longer than number of bits, or the user data would be appended with zero “0” if shorter than number of bits.

		Byte 0	Byte 15
Application Sector #	Block 0	**Data-Info**	**USER DATA (Max 240 Bytes)**
	Block 1		
	Block 2		
	Block 3		

Data-Info	
bit7 bit6	bit5 bit0
Data Type (11b)	Data Length

Data type is fixed with 11b which means “any other data” type of “Card Holder information” as MAD standard. And data length is including the data with ending zero “0”, so the number of data byte sent by DF7XX reader is equal to data length with one less for RS232 output.

Example: Data length is 16, the DF7XX reader only sends out 15 bytes for RS232 output.

2. Specification

2.1 Hardware Specification

	DF7XX reader
Major Feature	Mifare™ /DESFire™ Application Directory Reader Access Control & Security
Card Type	ISO14443A, Mifare™ Classic 1K/4K for MAD1/MAD2, Mifare™ Pro, Mifare DESFire™ 2k/4K/8K
RF Frequency	13.56MHz
DC Power	DC 7.5~24V /125mA@12V
Interface	Wiegand 1~128 bits (Standard / Reverse) RS232 2400~57600 (baud rate) ABA-TK2 40IPS

2.2 Order Information

Part Number	Include	Description
DF700-00	DF700-00	DF700 Mifare™ /DESFire™ Configurable Reader
MF700KIT-10	Reader-Kit WAS-T0029 DISK5238 Power Adaptor	Reader-Kit Reader Configure Cable Install CD(Document, Driver, Software) DC Power Adaptor 9VDC for Reader-Kit
MFA01	MFA01	Mifare™ Classic 1K Card
MFA04	MFA04	Mifare™ Classic 4K Card

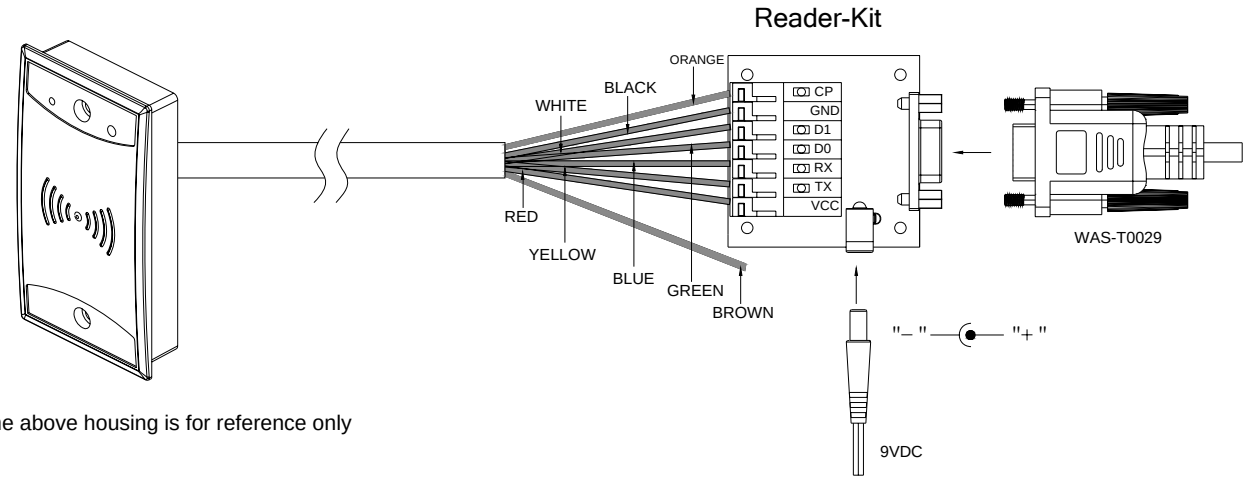
3. Preparation

3.1 Wires Assignment

Color	Symbol	I/O	Description
Red	VCC	IN	Power Input : DC 7.5V~24V
Black	GND	IN	Power Ground
White	DATA 1	OUT	Wiegand Data 1 Signal / ABA TK2 Clock (Strobe)
Green	DATA 0	OUT	Wiegand Data 0 Signal / ABA TK2 Data
Yellow	TXD	OUT	RS232 TXD (To Host RXD)/ RS485+(for DF710/DF760)
Blue	RXD	IN	RS232 RXD (To Host TXD)/ RS485-(for DF710/DF760)
Orange	CP	OUT	ABA TK2 Card Present
Brown	LED/BUZEER	IN	External LED/BUZZER Control

To configure the DF7XX reader you need connect the reader to the reader-kit first as below:

DF700/DF750(K)

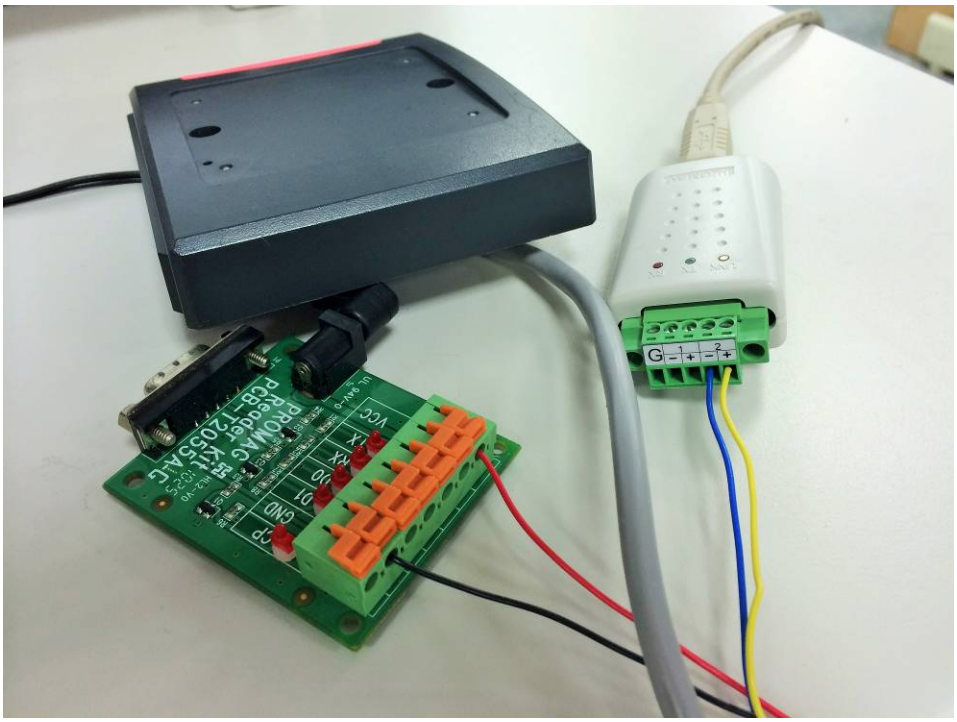


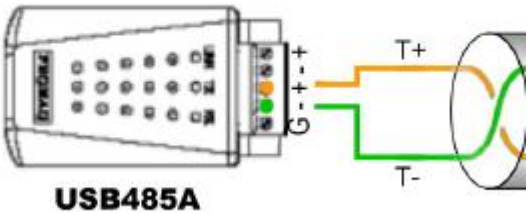
The above housing is for reference only

DF710/DF760(K)

Connect Yellow (T+) and Blue (T-) to RS485 Converter to PC. (Recommend using Promag™ USB485A-00.)

An example for DF710/DF760(K)use USB485A-00 as below picture.





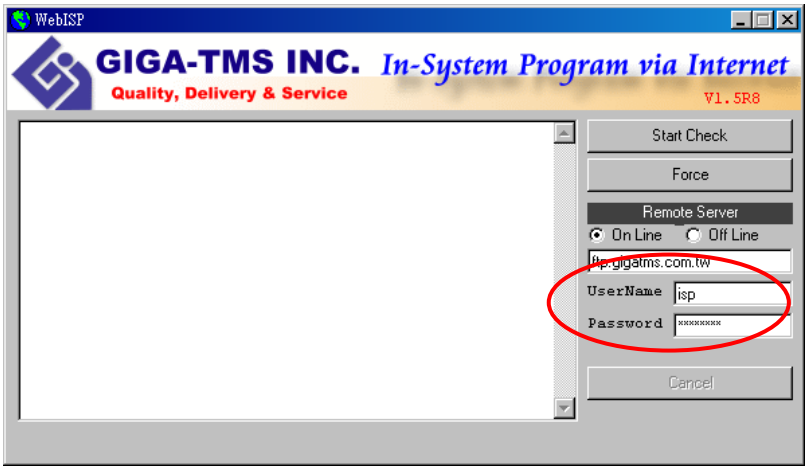
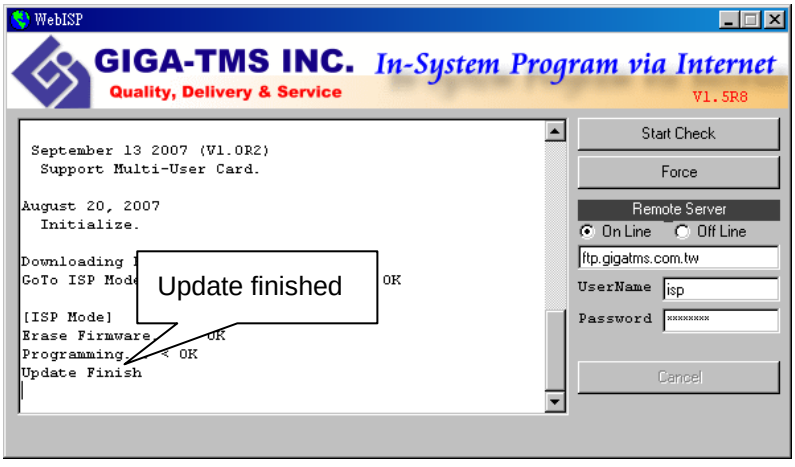
Note:

Reader-kit and USB485A-00 are connection kit. They are optional items for purchasing.

3.2 WebISP - Firmware Update Utility

DF7XX reader also supports the ISP (In-System Program) function to upgrade the reader's firmware.

Install the WebISP (included in CD-ROM) in your Windows System first (It may need to reboot your system) and follow the steps as below: (First of all, you need to connect the reader or programmer to PC, and make sure they were power-on.)

Step 1: Input your account (UserName and Password) Note: Contact us to get your account when needed. **Step 2**: Click [Start Check] to automatically check the firmware version from our FTP server.	 Note: 1. The WebISP will auto scan all COM ports to search the reader or programmer. 2. The WebISP will show the [Update Information] and list the update history. 3. If the firmware version is out of date, the WebISP will prompt you to update the firmware. Click [Update] to begin updating the firmware.
Step 3: Wait for the updating to finish. And repeat step 2 to update other readers or programmers.	

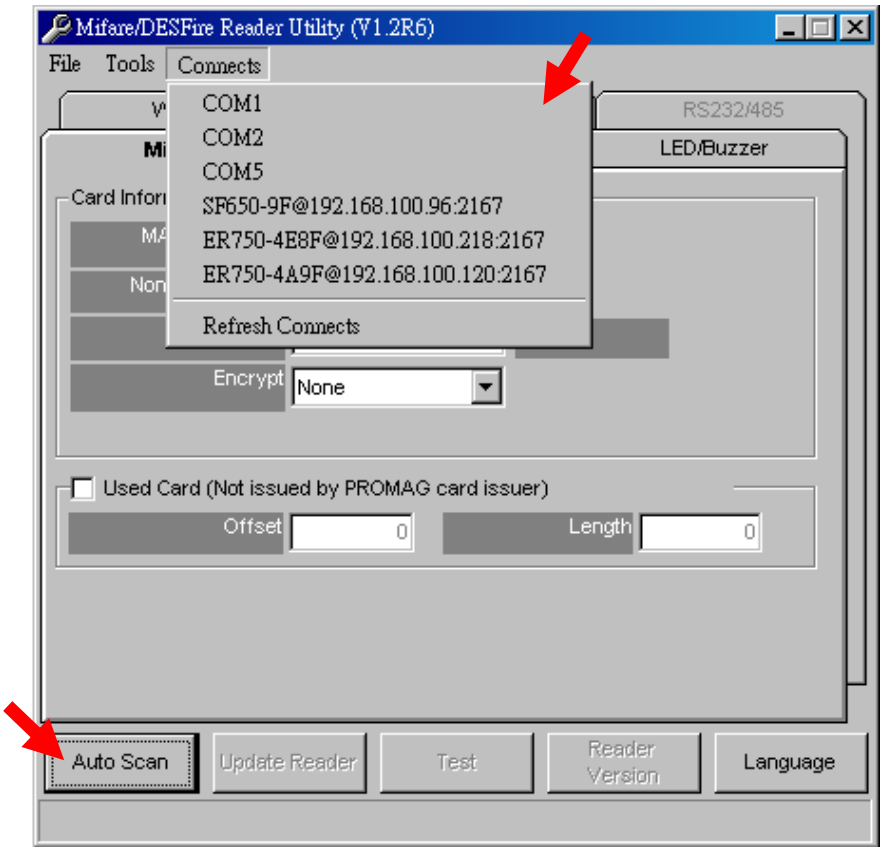
3.3 Setting Reader

Mifare/DesFire Reader Utility:

Install Mifare/DesFire Reader Utility software (included in CD-ROM) in your PC, and connect the reader to PC.

*Remark: Please check the connection of PC-to-reader is correctly.

1. Connection



Method 1:

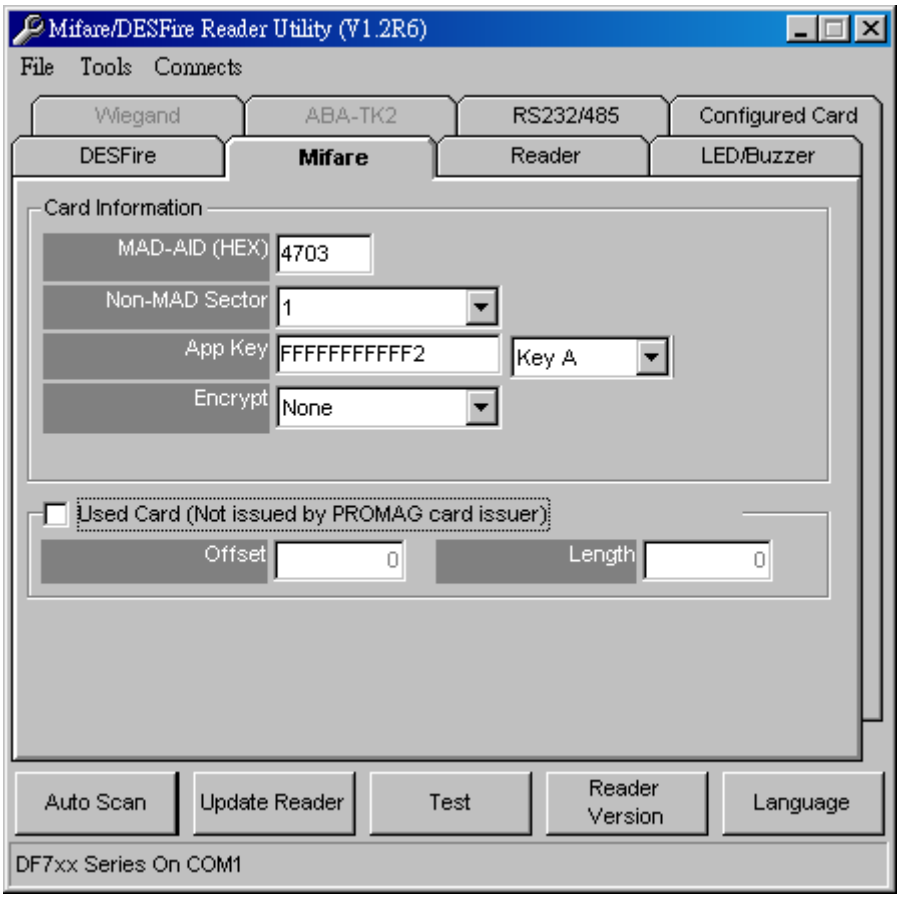
Click [Auto Scan] to search all COM ports and to find the available device.

Method 2:

Click [Connects] and choose the COM port to detect available device.

2. Instruction

- **Mifare Settings**



MAD-AID: (default=4703)

MAD Application Identifier number is authorized and assigned by Mifare.net™ upon the customer's request for registered Application Identifier in a Mifare application open system (AID:0000h~FFFFh).Or it is also possible for the user to define the AID himself for the application in user defined closed system without registering into MAD group. According to the AID, DF7XX can find and read the corresponding sector on the MAD card.

App Key (KEY_A): (default=FFFFFFFFFFFF)

App Key must be the same as the KEY_A of the card issued. This means DF7XX only can read the sector data on the card with the same KEY_A.

Encrypt: (default=None)

Fraud prevention, Select Encrypt Mode (None, Encrypt 1, Encrypt 2, Encrypt 3, Encrypt 4, Encrypt 5) to protect your card data. (Remark: Encrypt mode must work together with the same encrypt mode of "Mifare Card Issuer" software.)

Used Card (Not issued by "Mifare Card Issuer")

You have to indicate the data position in the card, when the card is not issued by "Mifare Card Issuer" software. And you must set the "Offset" (Max 255, and base from zero) from the beginning of sector and set your data "Length" (Max **240**).

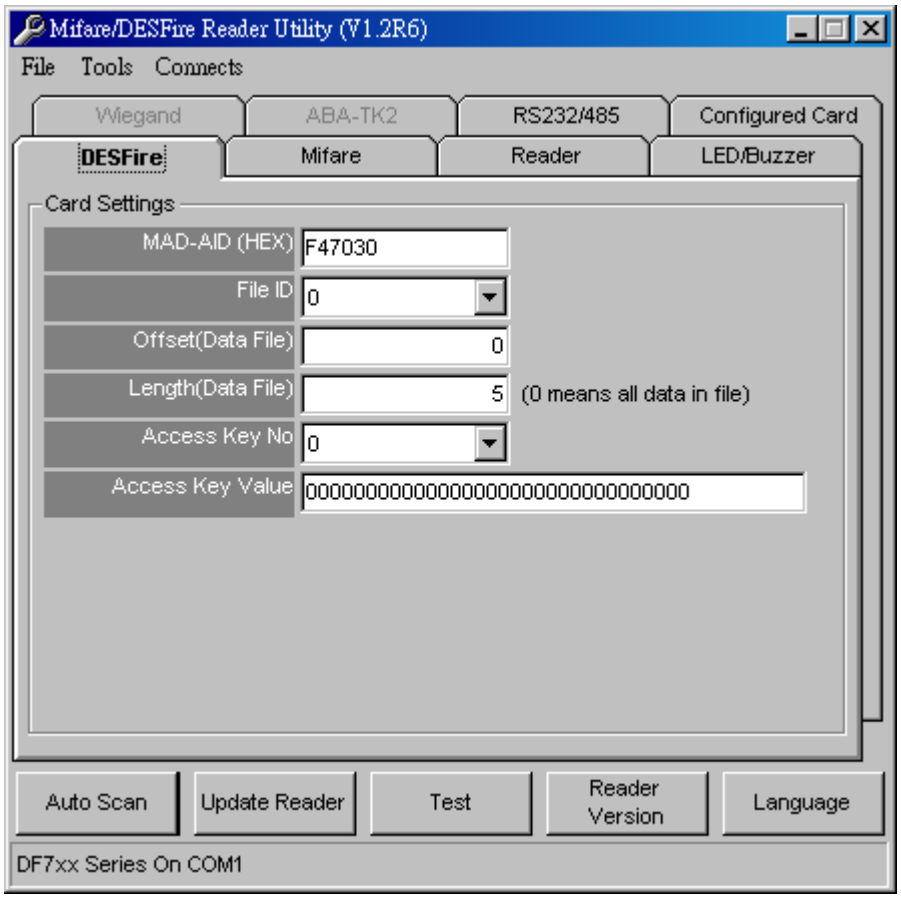
Example:

If your card data is in the grey grid of sector, you have to set the "Offset" = 17,

and set the "Length"= 20.

	AID Sector (or Non-MAD Sector)															
Block 0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Block 1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Block 2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47

➢ **DESFire Settings**



MAD-AID: (default=F47030)

MAD Application Identifier number is authorized and assigned by Mifare.net™ upon the customer's request for registered Application Identifier in a Mifare application open system (AID:000000h~FFFFFFh).Or it is also possible for the user to define the AID himself for the application in user defined closed system without registering into MAD group. According to the AID, DF7XX reader can find and read the corresponding application on the card.

File ID: (default=0)

File ID is 0~15. There are three file types. Data file, Value file and Record file. DF7XX reader will auto detect the type and output the data.

Offset/Length: (default=0 / 5)

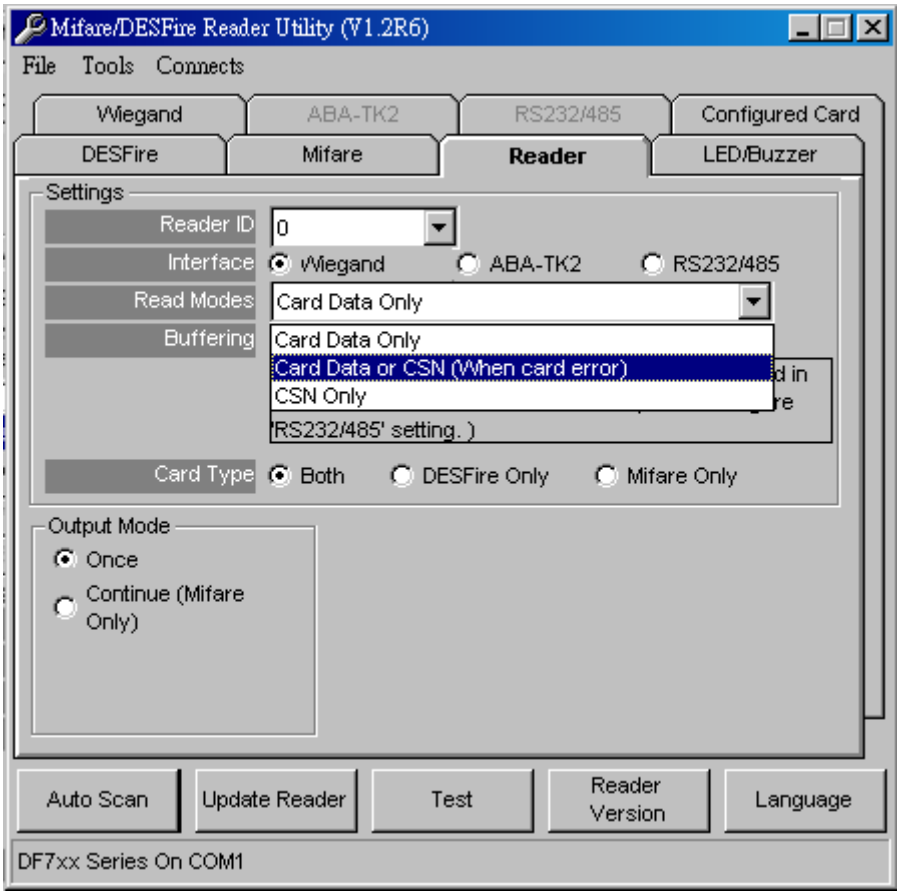
The Data file will depend on the value to output data. The Value file will be sent the value out. The Record file will be sent the latest record data.

Access Key No/Value: (default=0 / 00000000000000000000000000000000)

Key must be the same as the Read or Read/Write KEY of the card issued. This means DF7XX reader only can read the data on the card with the same key.

⇨ **DF App Admin Key (KeyNo = 0)**

➢ **Reader Settings**



Reader ID: (default=0)

DF7XX reader ID for multi link application. (ID: 0~63)

Interface: (default=Wiegand)

DF7XX reader can be set as Wiegand, RS232 or ABA-TK2 output.

Read Modes: (default=Card Data Only)

1. Card Data Only

   Read card sector data only. If any error occurs (ex: App. key incorrect.), the reader will represent "Card Invalid" status.

2. Card Data or CSN

   Read card sector data. When any error occurs (ex: App. key incorrect.), the reader will output "CSN".

3. CSN Only

   Read card CSN (card ID) only.

Output Modes: (default= Once)

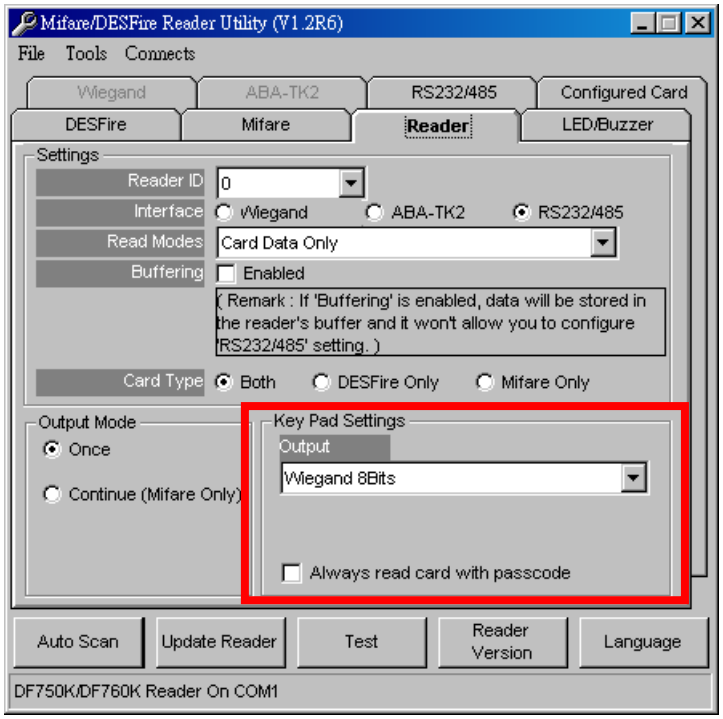
1. Once

   Read card sector data only. If any error occurs (ex: App. key incorrect.), the reader will represent "Card Invalid" status.

2. Continue

   Keeping sending data (or CSN) to host till card remove. Only for the Mifare card.

➢ **Keypad Settings**



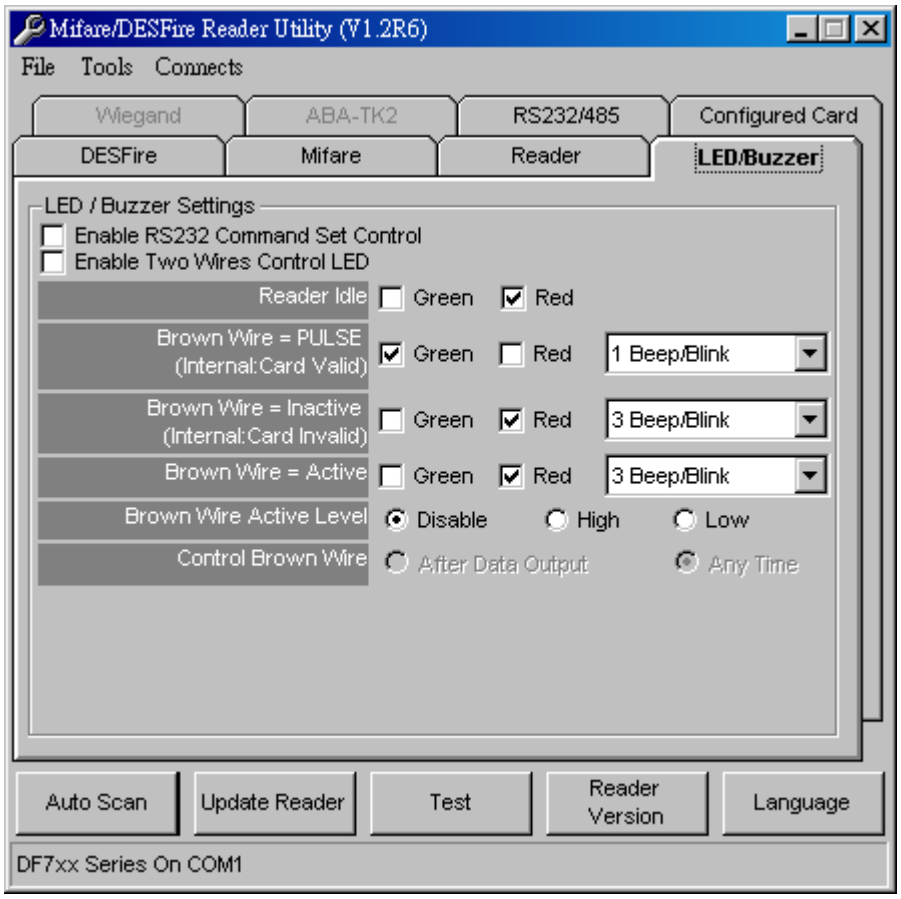
Output: (default= Wiegand 8Bits)

- **Wiegand 4, 6, 8**：Send Wiegand signal pre key pressing.
- **ASCII Hex Code**：Send ASCII code pre key pressing.
- **Buffering(Decimal)**： Press 0~65535 numbers and press "#" to send decimal numbers.("*" to cancel)
- **Buffering (BCD)**：Press 0~ 99999999 numbers and press "#" to send BCD numbers. ("*" to cancel).

	Wiegand 4 bits	Wiegand 6 bits	Wiegand 8 bits	ASCII Hex Code	Buffering (Decimal)	Buffering (BCD)
1	0001	000010	11100001	31 00 00	0~65535	00000000~ 99999999
2	0010	000100	11010010	32 00 00		
3	0011	000111	11000011	33 00 00		
4	0100	101001	10110100	34 00 00		
5	0101	101010	10100101	35 00 00		
6	0110	101100	10010110	36 00 00		
7	0111	101111	10000111	37 00 00		
8	1000	110001	01111000	38 00 00		
9	1001	110010	01101001	39 00 00		
0	0000	000001	11110000	30 00 00		
*	1010	110100	01011010	2A 00 00	Cancel	Cancel
#	1011	110111	01001011	23 00 00	Send	Send

Remark: *Please reference ANNEX J. for simply output examples.*

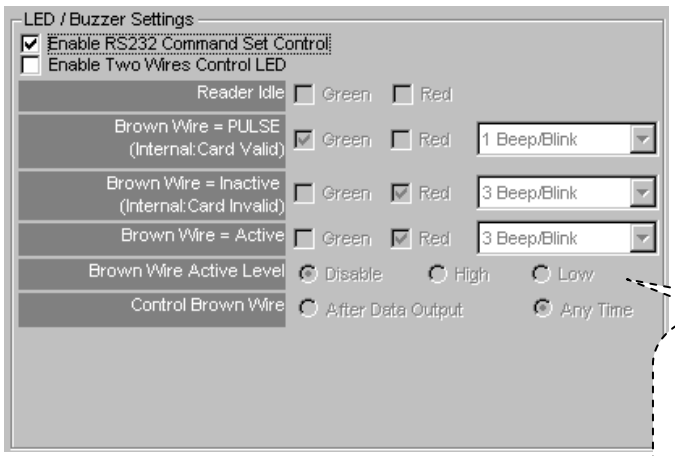
➢ **LED / Buzzer Settings**



DF7XX supports LED/Alarm configure. Set the LED/Buzzer to indicate the system status for end-user.

Enable RS232 Command Set Control:

Enable this setting if you need to control LED/Buzzer by software command set.



Remark:
If "Enable RS232 Command Set Control (for LED/Buzzer)" is checked, the external LED/Buzzer with high/low level control will be disabled.

Enable RS232 Command Set Control:

RS232 LED/Buzzer command set frame as below:

STX	J	NUMBER (0~9)	CR
02h	4Ah	30h~39h	0Dh

Command Table:

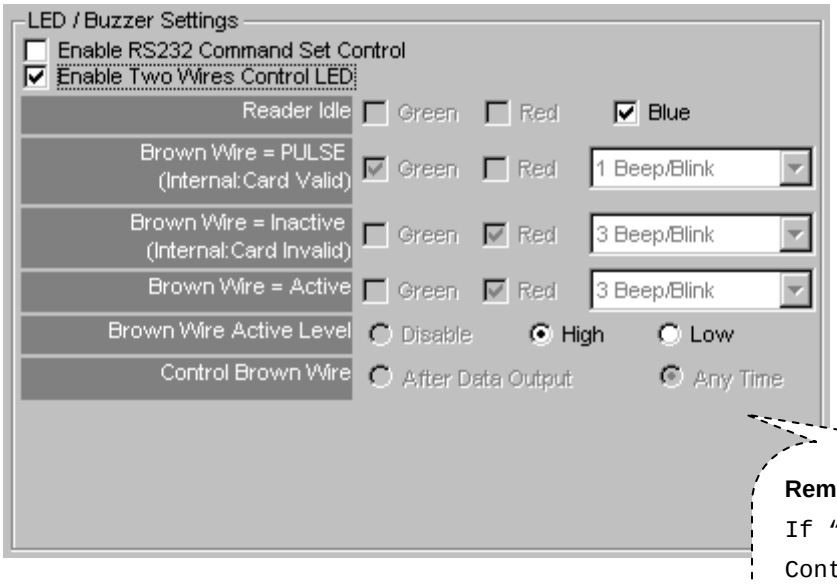
NUMBER	Descriptions
0 (30h)	All LED Off, Buzzer Off
1 (31h)	Green LED ON
2 (32h)	Green LED OFF
3 (33h)	Red LED ON
4 (34h)	Red LED OFF
5 (35h)	Buzzer Beep once
6 (36h)	Buzzer Beep 3 Times
7 (37h)	Green LED ON with Beep once
8 (38h)	Red LED ON with Beep 3 Times
9 (39h)	All LED ON (Orange)

Enable Two Wires Control LED:

(Only for Promag™ reader of baud rate=19200, n, 8, 1)

Set up the "Brown Wire Active Level", and Brown wire and Orange wire will follow the setting.

Example: "Brown Wire Active Level"=High; Green light on when brown wire level was high. The red LED light on when orange wire level high. When both wire change level high at the same time, it will both light on without beep.



Remark:
If "Enable Two Wires Control LED" checkbox is checked, the external LED/Buzzer control with high/low level control will be disabled.

Read Idle:

Show LED color after power on or idle state.

Brown Wire = PULSE (Internal: Card is Valid):

Show LED color and beeps to indicate the end-user when brown wire inputted pulse signal, or card was passed by reader.

Remark: This setting is enabled when “Brown Wire Active Level” is “Disable”.

Brown Wire = Inactive (Internal: Card is Invalid):

Show LED color and beeps to indicate the end-user when brown wire inputted GND signal, or card was failed by reader.

Brown Wire = Active:

Show LED color and beeps to indicate the end-user that brown wire inputted the active level signal from host.

Remark: This setting is enabled when “Brown Wire Active Level” is not “Disable”.

Brown Wire Active Level: (default=Disable)

Sets brown wire active level condition with host status.

- Disable: Disable the brown wire. The LED/buzzer is controlled by settings.
- High: Brown wire active state is in high logic, normal state is in low logic (normal open).
- Low: Brown wire active state is in low logic, normal state is in high logic (normal closed).

Remark:
If setting Active Low, you may have to connect brown wire to a pull-up resistor (1K~10K) with 5VDC.

Control Brown wire:

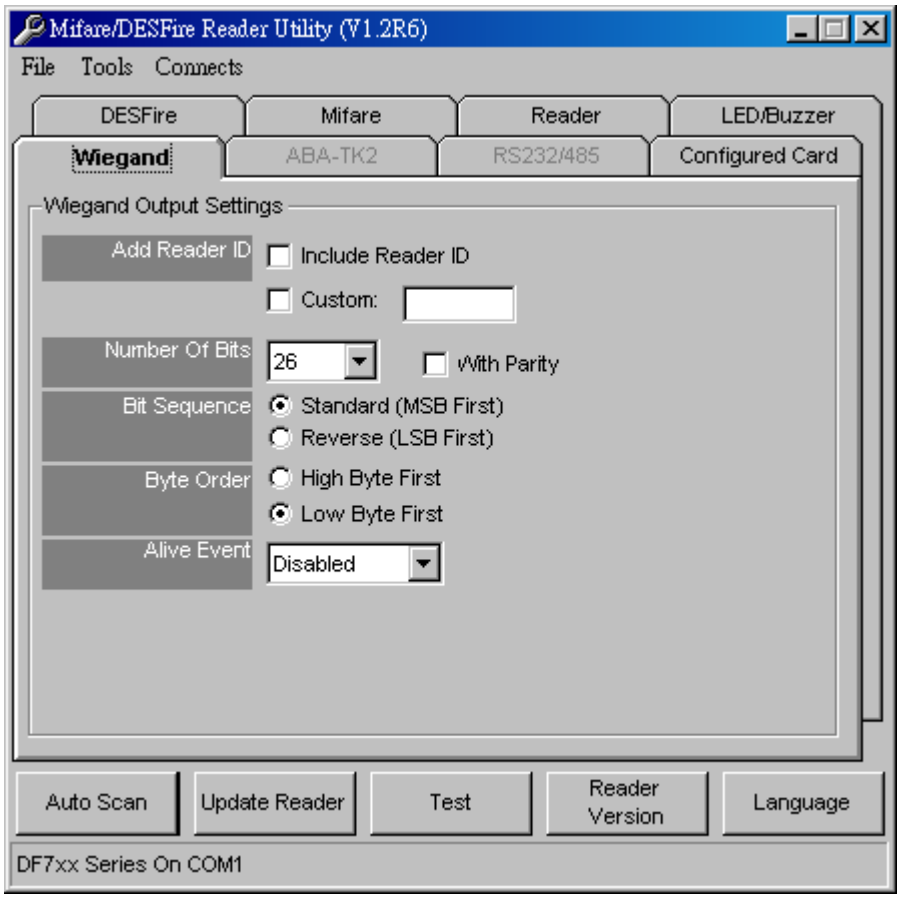
- After Data Output: The brown wire will be enabling after finished output the card data or CSN.
- Any Time: The brown wire enabled in any time.

Note: See Annex E, the LED/Buzzer can be controlled by the externally high/low level controller also.

Brightness:

Change value to brighten or darken LED. More high and more brighten.

➢ **Wiegand Setting**



Add Reader ID: (default=Disable)

Set Wiegand output data to include the Reader ID when it is checked.

Custom Premable: (default=Disable)

Set the Wiegand output data to include premable code when it is enabled.

This code only combines with CSN output.

Number of Bits: (default=26)

Set the Wiegand output type you want to meet your host (or terminal). It can be 1 to 128.

With parity: (default=Enable)

Set data with or without parity bit. If this is enabled, it will automatically add parity bit when sending output data.

Bit Sequence: (default=Standard)

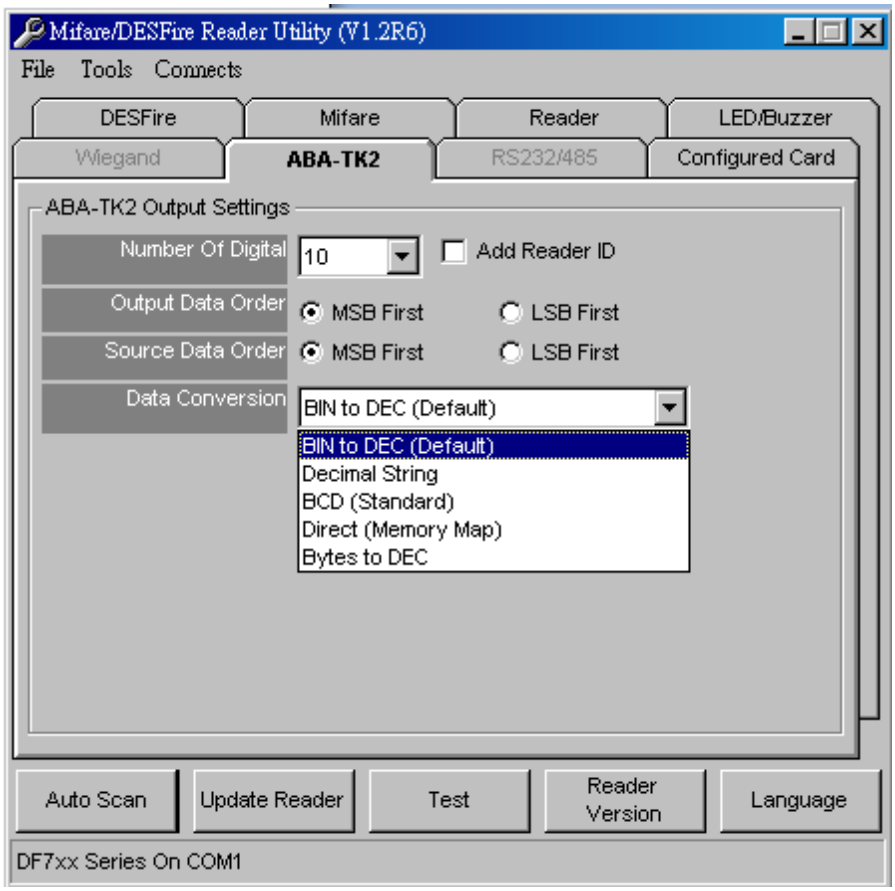
Set the Wiegand output data sequence, and it can be a standard data sequence (MSB first) or a reverse data sequence (LSB first).

Byte Order: (default=High Byte First)

Set the Wiegand output data byte order, and it can be high byte first or low byte first.

Alive Event is reserved.

➢ **ABA-TK2 Settings**



Number of Digital: (default=10)

Set the number of digital codes for TK2 output.

Add Reader ID: (default=Disable)

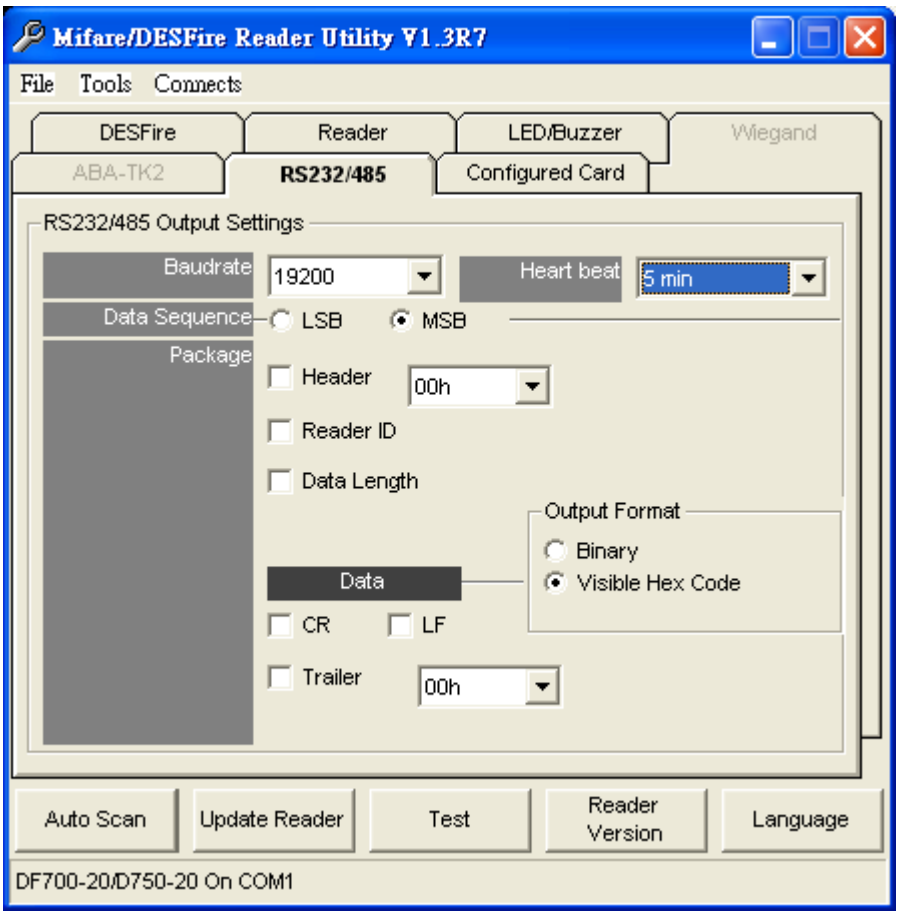
Add Reader ID into TK2 data.

Output Data Order (default=MSB First): Set the TK2 data sequence order.

Data Conversion (default= BIN to DEC): Select card data format to convert.

- BIN to DEC (the card is issued by Mifare Card Issuer.)
- Decimal String (ex. "123456")
- BCD
- Direct (Memory Map)
- Byte to DEC

➢ **RS232/485 Output Setting**



Baud rate: (default=9600)

The working range can be set from 2400 to 57600 (depends on the device).

Heart beat: (default = disabled)

Click to select the interval time of periodically sending the heart beat data to host.

Data Sequence: (default= “MSB” first)

The output data sequence order can be set to "LSB" first or "MSB" first.

Package: (default = Header (02h) + CR + LF + Trailer (03h))

To set a packet which includes the “Header”, “Reader ID”, “Data Length”, “CR”, “LF” and “Trailer”. (Header: 00h~FFh, Trailer: 00h~FFh).

Output Format: (default="Hex String")

The output format can be "Binary" or "Hex String”.

Note:

(1).Wiegand output data packet with Reader ID:

Standard	Parity(**Even**)	Reader ID	(MSB)	Data Bits	(LSB)	Parity(**Odd**)
Reverse	Parity(**Odd**)	Reader ID	(LSB)	Data Bits	(MSB)	Parity(**Even**)

(2).RS232/RS485 output data packet with Header, Reader ID and Trailer:

Header	Reader ID	(LSB)	Data Bytes	(MSB)	Trailer

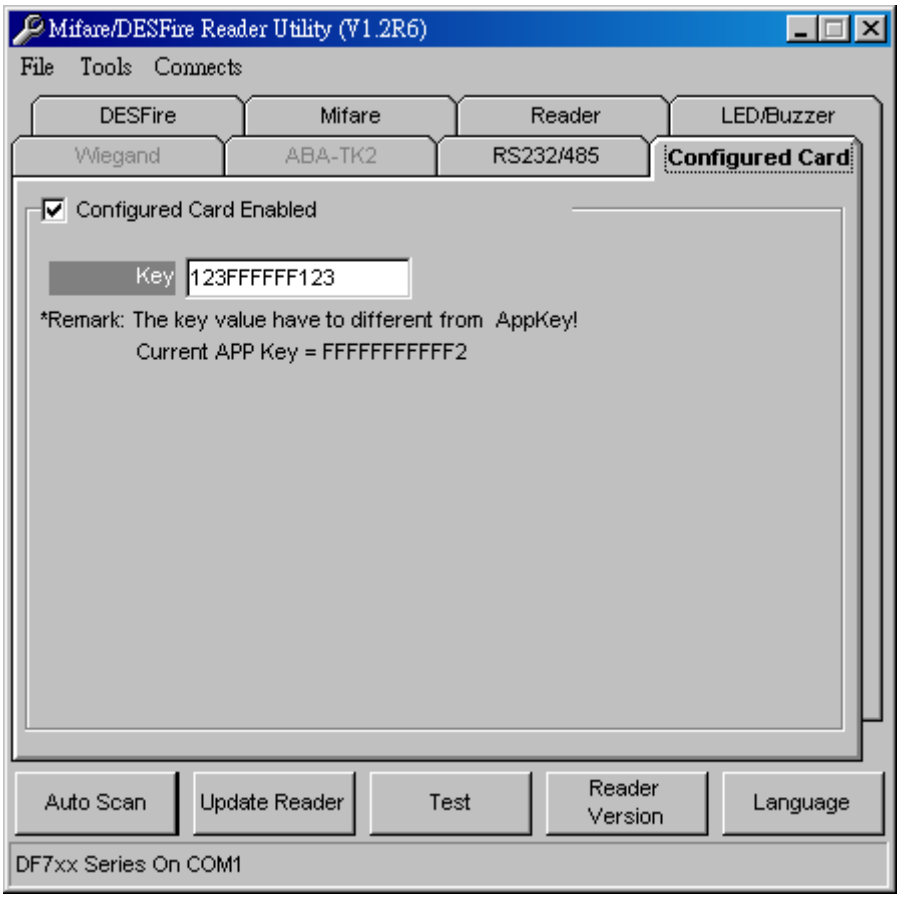
(3).ABA-TK2 with Reader ID:

MSB First	SS	Reader ID	(MSB)	Digital Code	(LSB)	ES	LRC
LSB First	SS	Reader ID	(LSB)	Digital Code	(MSB)	ES	LRC

Remark:

Reader's all configuration items are write only, so any user cannot read the configuration items from the reader to get the App Key, this is very important to protect your App Key and all configuration items.

- **Configured Card**



Configured Card Enabled: (default=Enable)

Can allow your reader change configuration by Mifare Card.

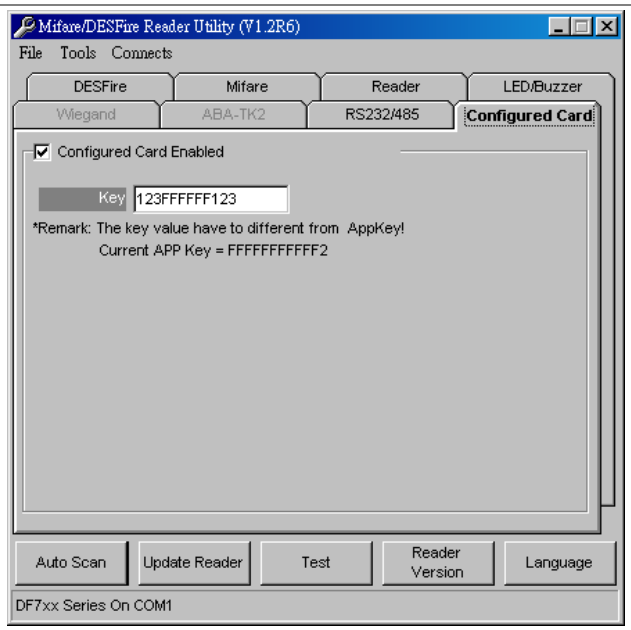
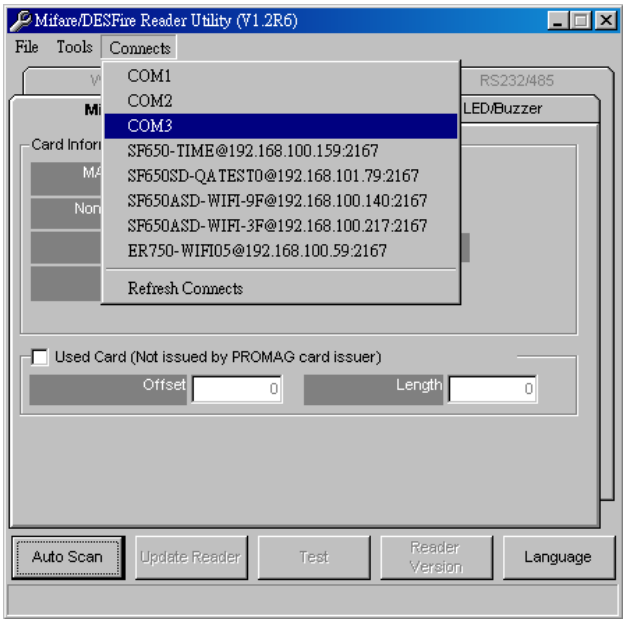
Key: (default=000000000000)

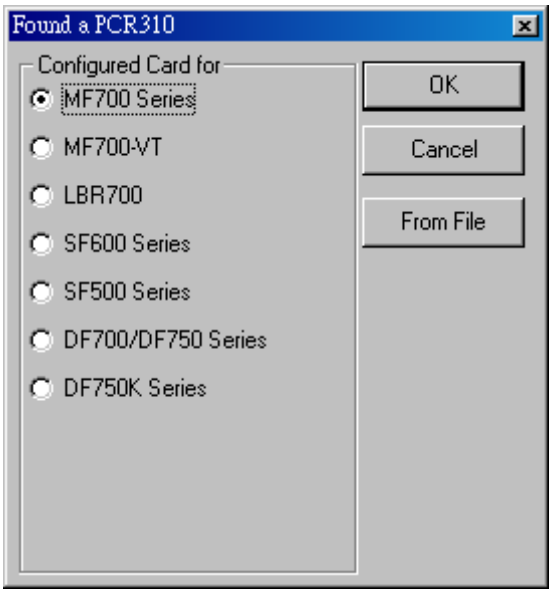
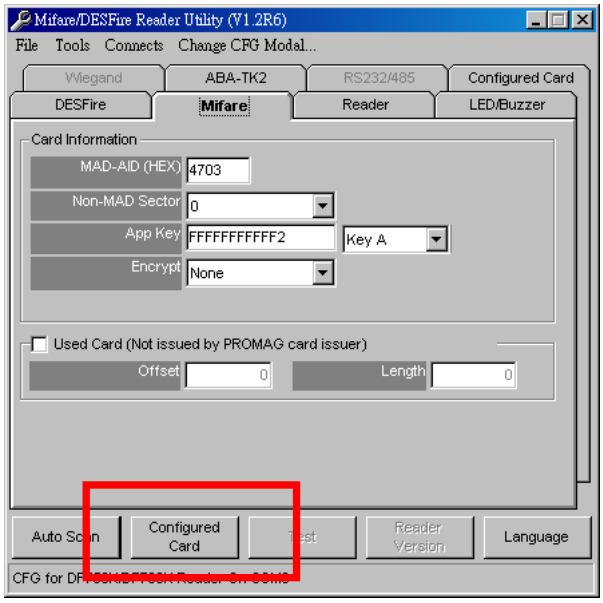
Is the Mifare Key A for allowed the configured card.

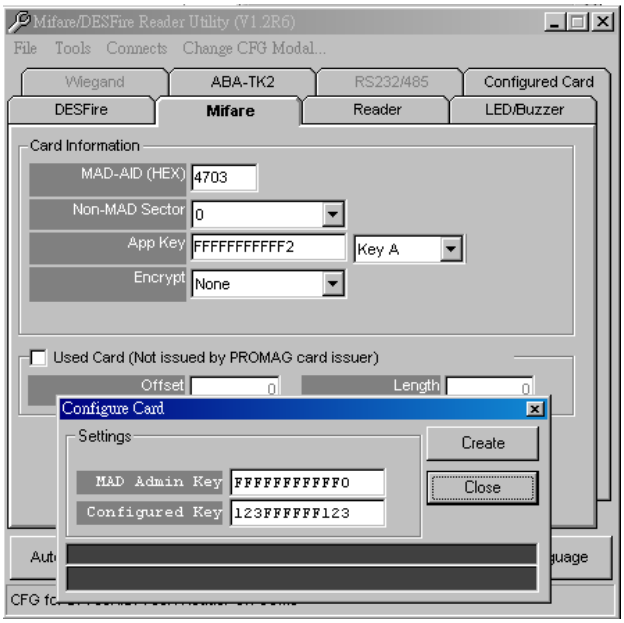
3.4 Create Configured Card

DF7XX reader supports updating the reader by reading Configured Card. This function is specially using when stand alone system.

The following steps indicate you to create a configure card:

Step 1: Configure the reader. Enable the “Configured Card Enabled” item, and then press [Update Reader].	
Step 2: Connect the PCR310 to PC for issuing card. ↓ Select the series corresponding, or load the configuration file. ↓ Select the reader’s model name. ↓ Click "OK"	

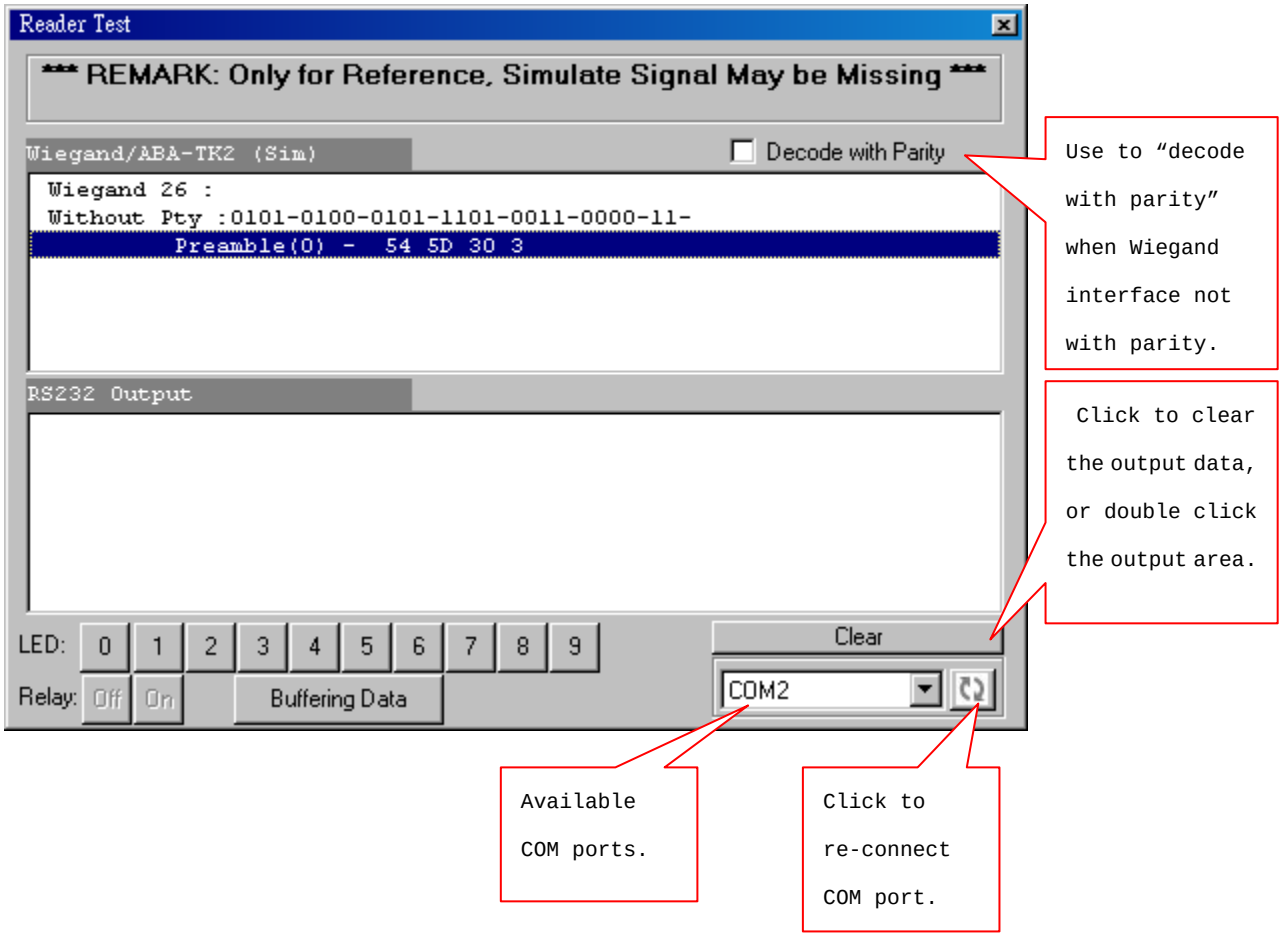
Remark: *The corresponding series are "DF700/DF750 Series" and "DF750K Series".*	
Step 3: Configure all settings as normal. ↓ Click [Configure Card]	

Step 4: Put a Mifare card in the PCR310 cassette. ↓ Type in: “MAD Admin Key” and “Configured Key” (which has been updated to the corresponding reader.) ↓ Click [Create].	
Step 5: Take this card to approach the reader for configured settings.	***Remark:*** *If the reader you use is the one with the keypad, you need to press *00# to enter the configuration mode (within 10-seconds beeps) and press * to exit the configuration mode. In short, to make the configured card work, please press *00# on the reader (the reader will start to sound the beeps) and then present the configured card to the reader.*

4. Data Output

4.1 Reader Test

After reader's configurations have been updated success, you can use [Test] function to check reader's configurations have been correctly stored.



LED [0]~[9]: (default=Disable)

Manually to control LED/buzzer by commands [0]~[9]. Enable this by "Enable RS232 Command Set Control".

Buffering: (default=Disable)

Manually to control data output timing by the command [Buffering Data].

Enable this by "Buffering" Enabled.

Relay: (default=Disable)

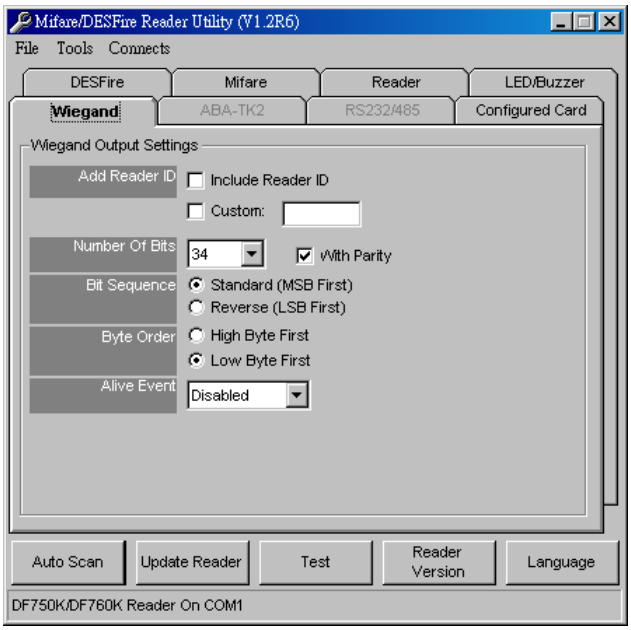
Not available for DF7XX readers.

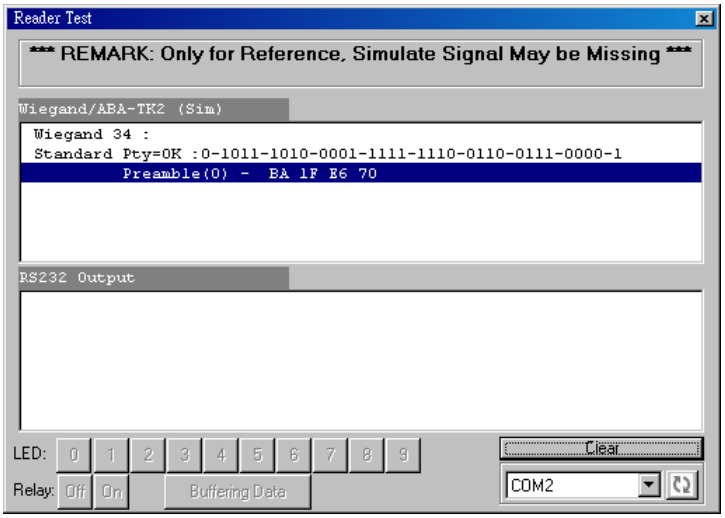
4.2 Test Read Card After Update

The following steps indicate you to test read card:

1. After set configurations in the Reader Utility software, you can click [Update Reader] to update the currently configurations to the reader.
2. Or, click [Test] to update configurations and verify output data.
3. Got an issued Mifare card and approach the reader, you can see the output data on “Reader Test” window.

Wiegand 34 bits output data with standard bit sequence, example as below:





Remark:

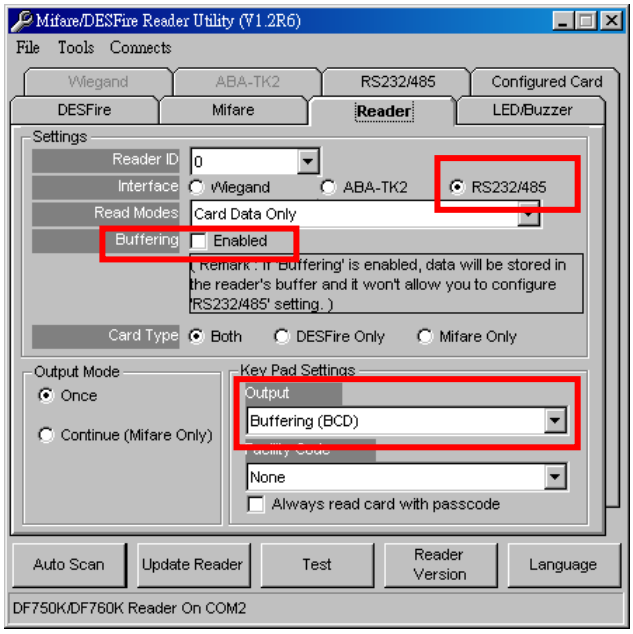
1. When using reader-kit to test Wiegand (or TK2) signal, this test may be failed if the processor of computer is too slow.

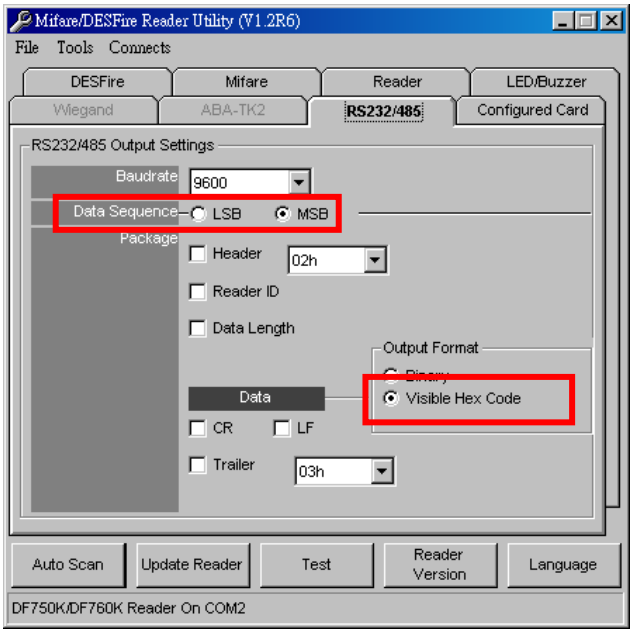
2. When using reader-kit to test Wiegand (or TK2) signal, you need to connect to the physical COM port.

4.3 Test Key Pad After Update

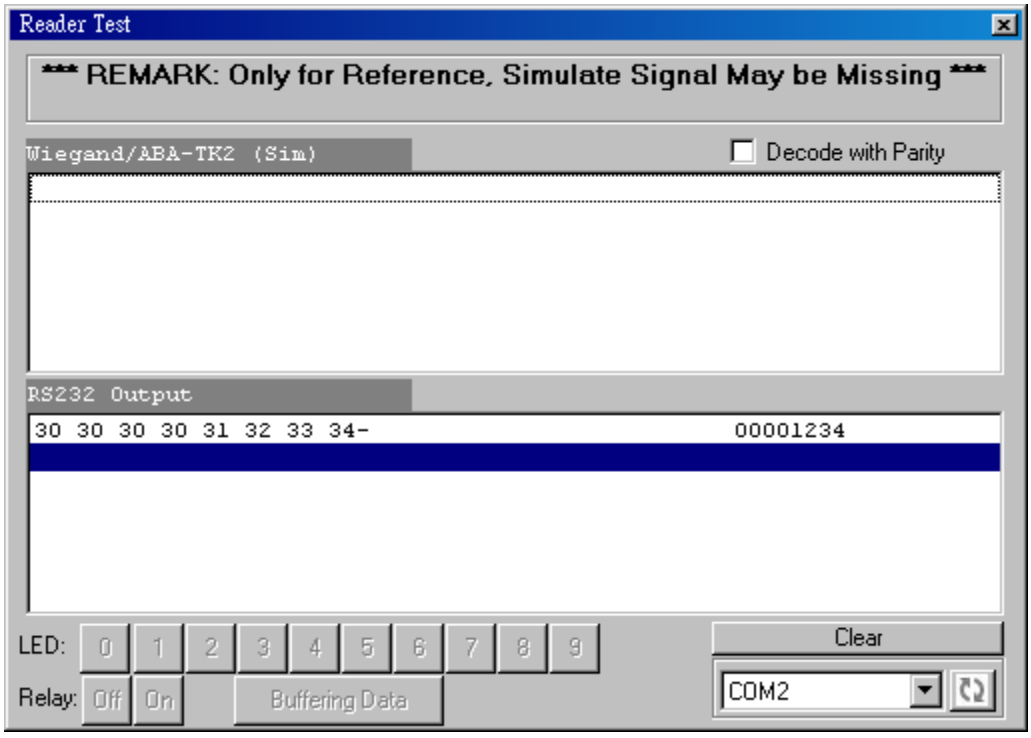
4.3.1 Simply Output “1234” – RS232 Interface

RS232 interface – Settings:





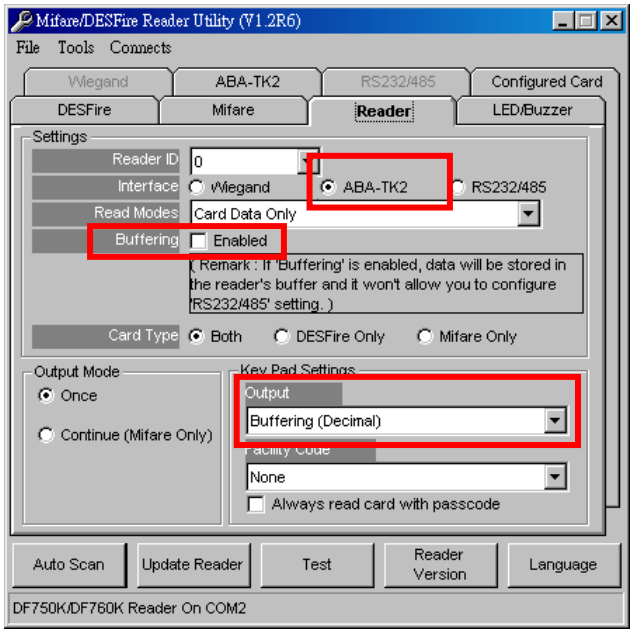
RS232 interface – Output: Press “1234” + “#”

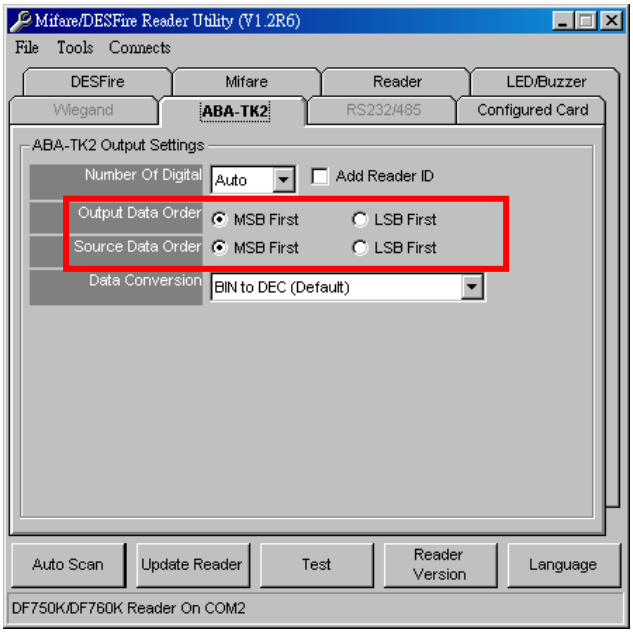


Result=1234

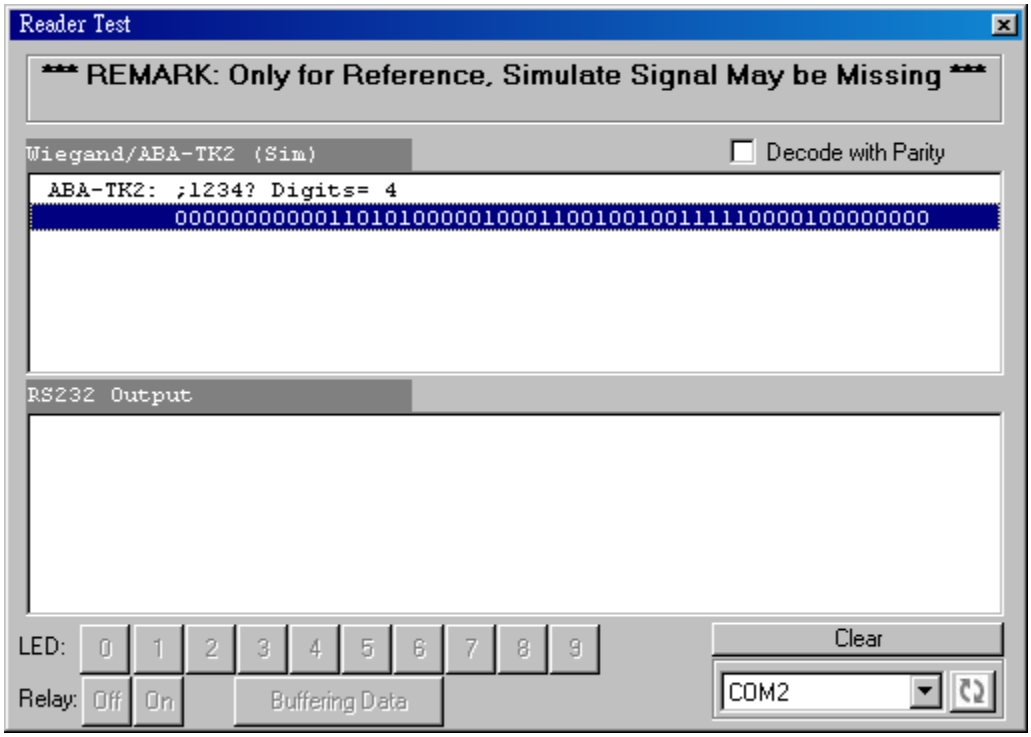
4.3.2 Simply Output “1234” – ABA-TK2 Interface

ABA-TK2 interface – Settings:





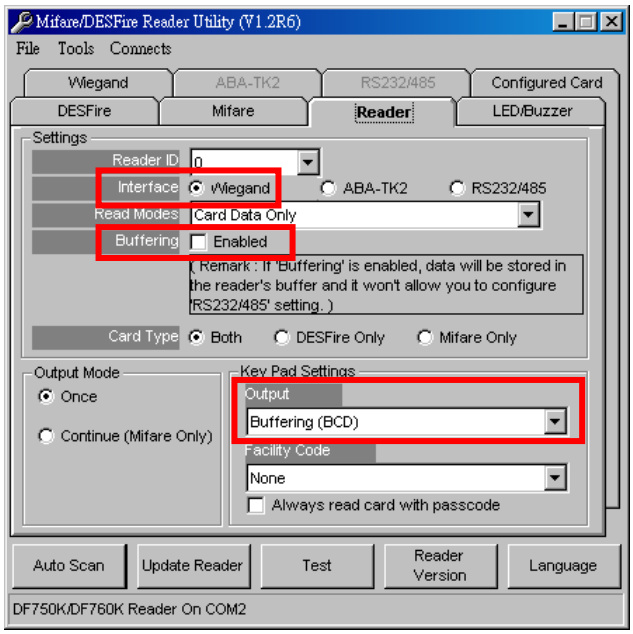
ABA-TK2 interface – Output: Press “1234” + “#”

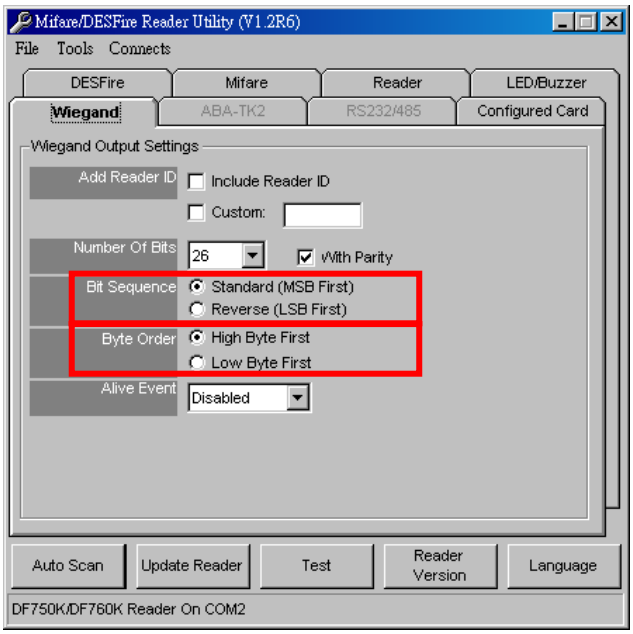


Result=1234

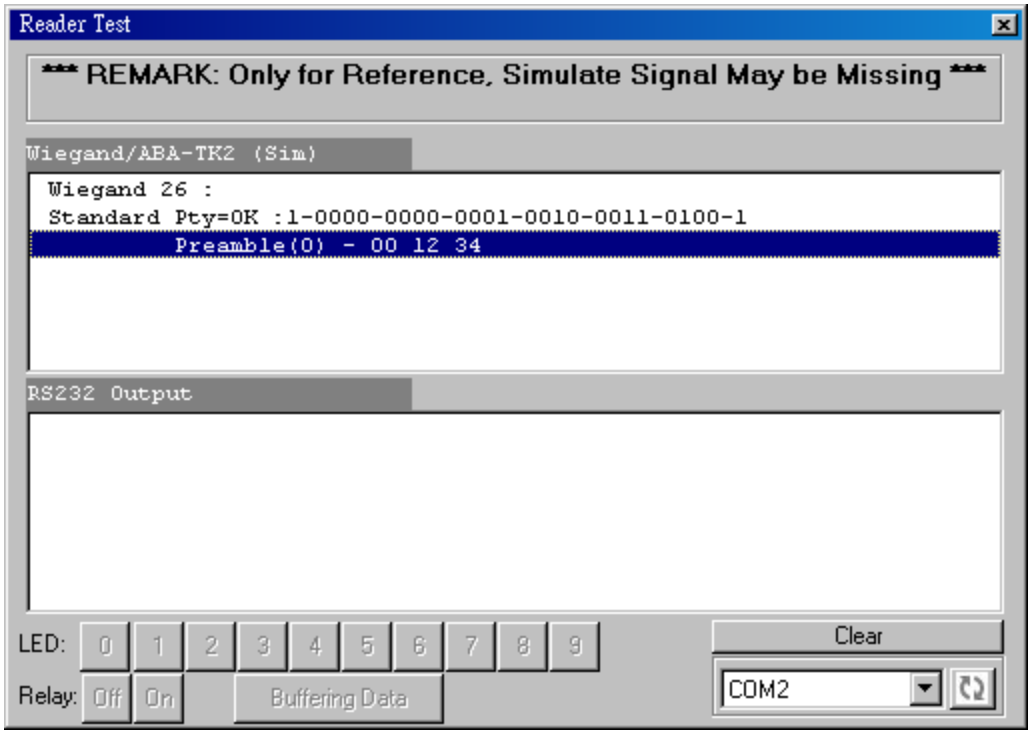
4.3.2 Simply Output “1234” –Wiegand Interface

Wiegand interface – Settings:





Wiegand interface – Output: Press “1234” + “#”

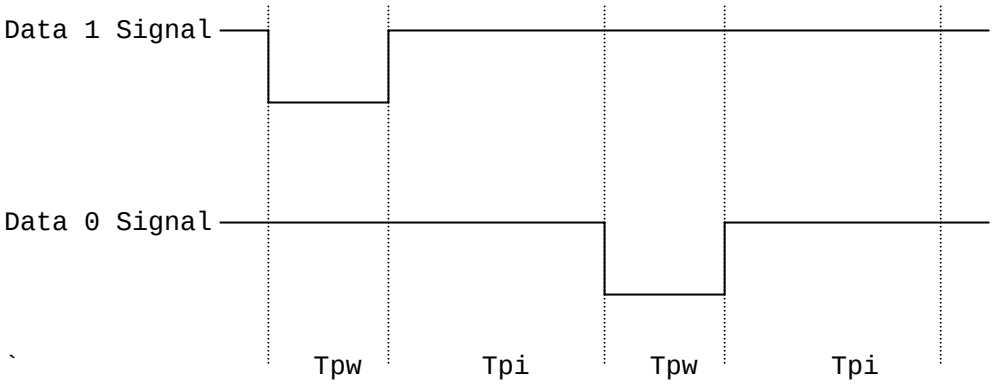


Result=1234

Appendix

ANNEX A. Wiegand Interface

The Data 1 and Data 0 signals are held at a logic high level unit, the reader is ready to send a data stream. The reader places data as asynchronous low-going pulses on the Data 1 or Data 0 lines to transmit the data stream to Host. The Data 1 and Data 0 pulses will allowable pulse width times and pulse interval times for the reader.



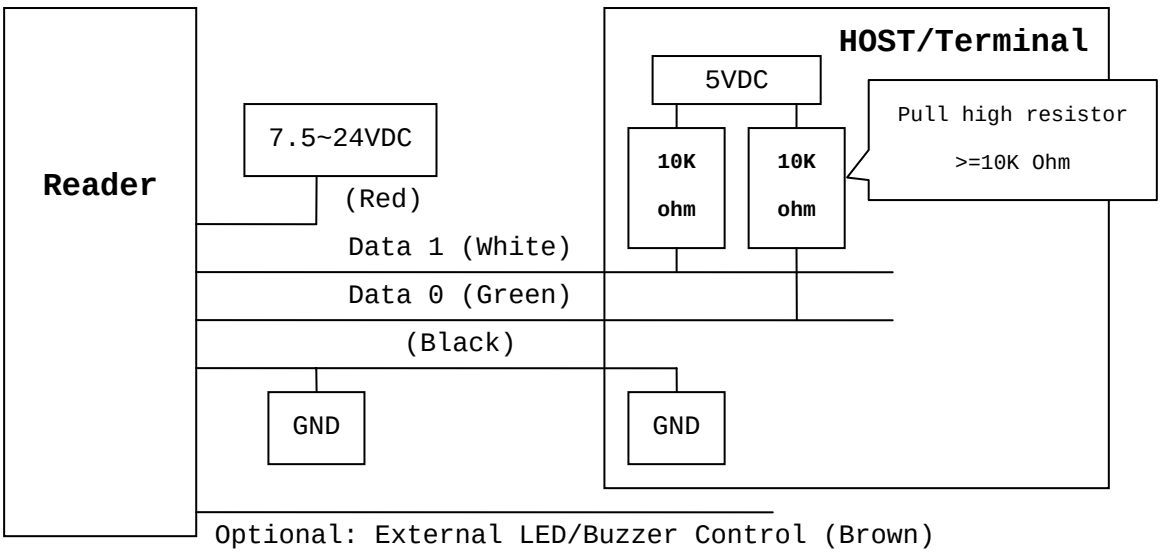
Pulse Times

Symbol	Description	Typical Time
Tpw	Pulse Width Time	100us +/- 3%
Tpi	Pulse Interval Time	1.9ms +/- 3%

Wiegand Packet (Without Reader ID)

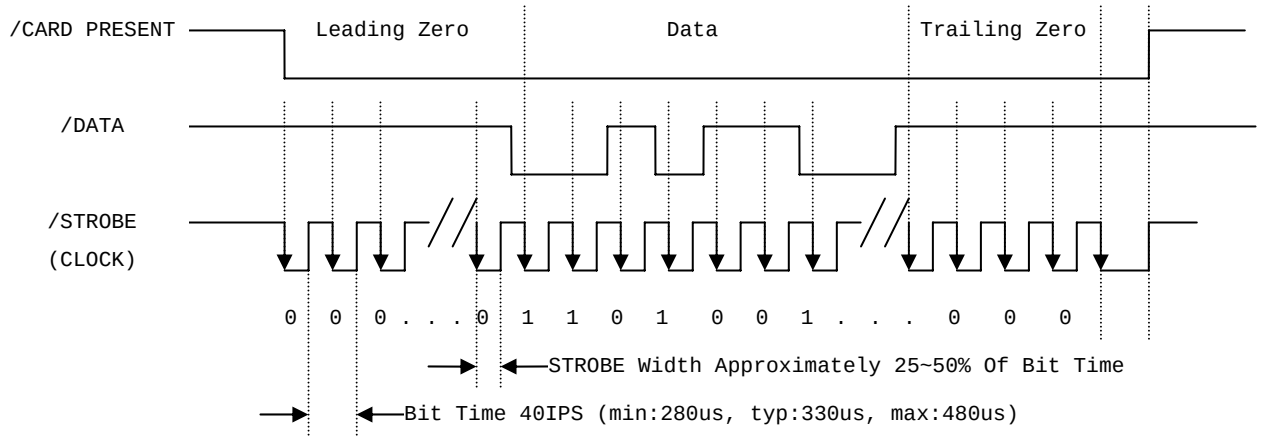
Standard (Default)	Parity(Even)	(MSB)	Data Bits	(LSB)	Parity(Odd)
Reverse (Option)	Parity(Odd)	(LSB)	Data Bits	(MSB)	Parity(Even)

Connect the Wiegand wires, example as below: (The pull high resister must >= 10K Ohm)



ANNEX B. ABA-TK2 Interface

The timing for card present, clock (strobe) and data, example as below:



DATA

The data signal is valid while the clock is low. If the Data signal is high, the bit is a zero. If the Data signal is low, the bit is a one.

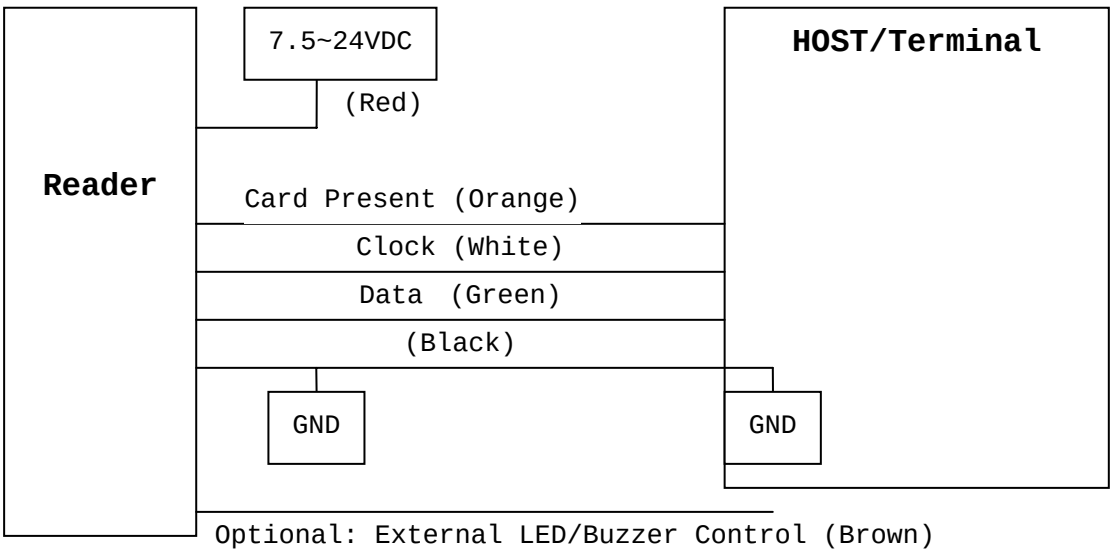
CLOCK (STROBE)

The Clock signal indicates when Data is valid. It is recommended that Data be loaded by the user with the leading edge (negative) of the Strobe.

CARD PRESENT

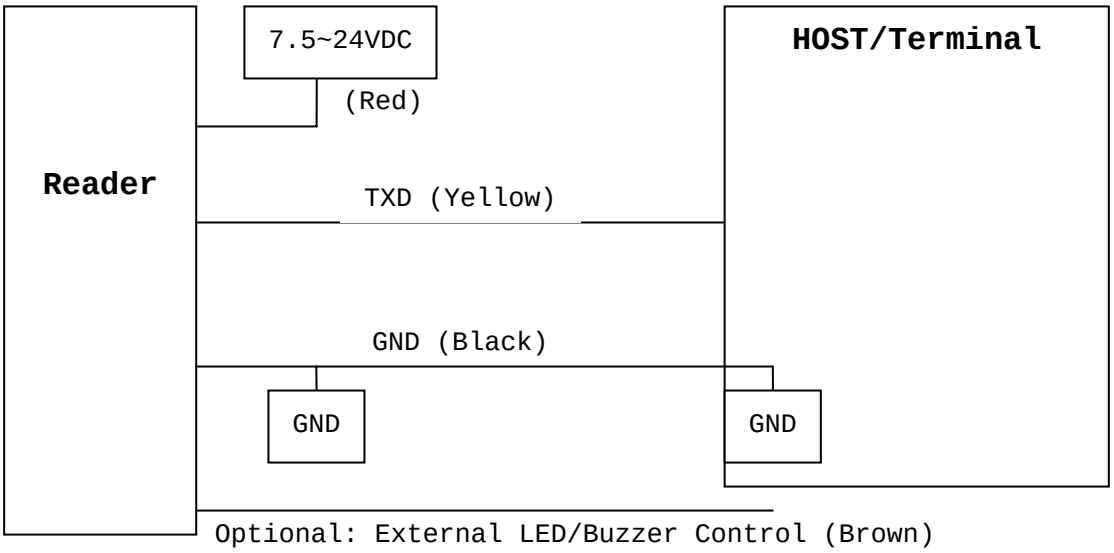
Card Present will go low after flux reversals from the Reader. Card Present will return high after the last flux reversal.

Connect the ABA TK2 wires, example as below:



ANNEX C. RS232 Interface

Connect the RS232 wires, example as below:

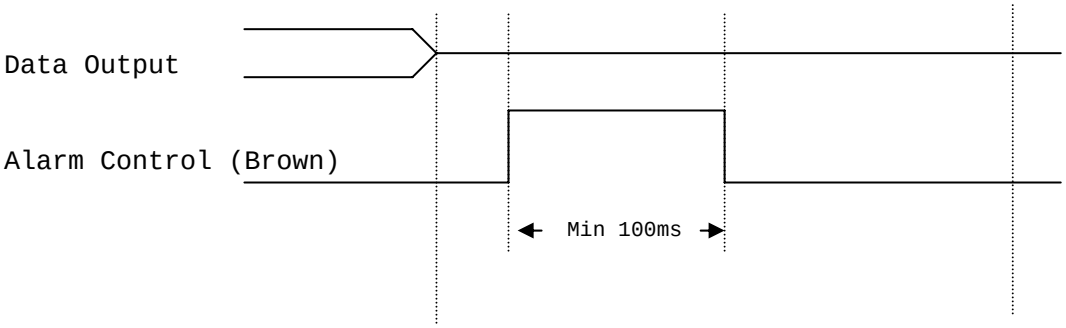


ANNEX D. External LED/Buzzer Control

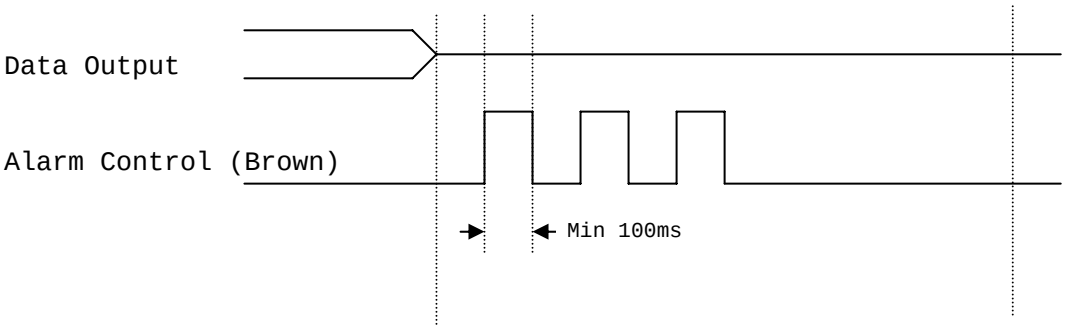
DF7XX reader supports the external LED/Buzzer control for Terminal (or Host) to prompt end-user the card data is invalid or valid. Use Brown wire to control the LED/Buzzer of DF7XX reader.

Examples as below: (Active High)

(1) Show External Invalid Status



(2) Show Card Valid Status



Note:

1. Send one pulse to show the “Extern Invalid” LED/buzzer status.
2. Send three or more pulse to show the “Card Valid” LED/buzzer status.
3. You can configure the LED/buzzer status by reader utility software.

ANNEX E. History

Rev A: February 12, 2009
Issue DF7XX Reader.

Rev B: October 29, 2009
Fix power supply 7.5V~24VDC

Rev C: November 30, 2011 (Kylie)
Update Mifare Reader Utility Pics.
Modify Reader ID to 0~63.
Add “Source Data Order”. (P.14)
Modify “Sequence Order” to “Output Data Order”.(P.14)
Modify “Remark”. (P.11)
January 12, 2012 (Kylie)
Modify “DataLength” limit to 64 bytes. (p.8)
Add how to “Read the Configure Card”. (p.29)
August 15, 2012(Kylie)
Add examples for keypad output. (p.31~33)
September 13, 2013 (Kylie)
Delete e. (P. 29)
Modify remark. (P.28)
September 16, 2013 (Kylie)
Update utility S/W & Web ISP S/W pictures.
November 20, 2013 (Kylie)
Add “Hardware Compare table” and “Software requirement table” (p.9)(p.11)
September 12, 2014 (Kylie)
Add a note about DF710/DF760 wire assignment by using USB485A. (p. 12)
September 26, 2014 (Kylie)
Fix “Two Wire Control” descriptions. (p. 22)

Rev D: August 12, 2015 (Kylie)
Add notice for Access key, the utility DESfire configure. (P. 17)

Rev E: May 26, 2016
Added Heart beat setting (P. 26)

NOTE!!!

Hereby, GIGA-TMS INC., declares that the radio equipment type DF700 is in compliance with Directive 2014/53/EU.

GIGA-TMS INC., Address: 8F, NO.31, LANE 169, KANG-NING ST., HIS-CHIH, NEW TAIPEI CITY, 22180 TAIWAN R.O.C.

The operating frequency bands and the maximum RF power (target power) transmitted in each band of DF700 is following:

DF700: 13.56MHz band -2.20 dBuA.

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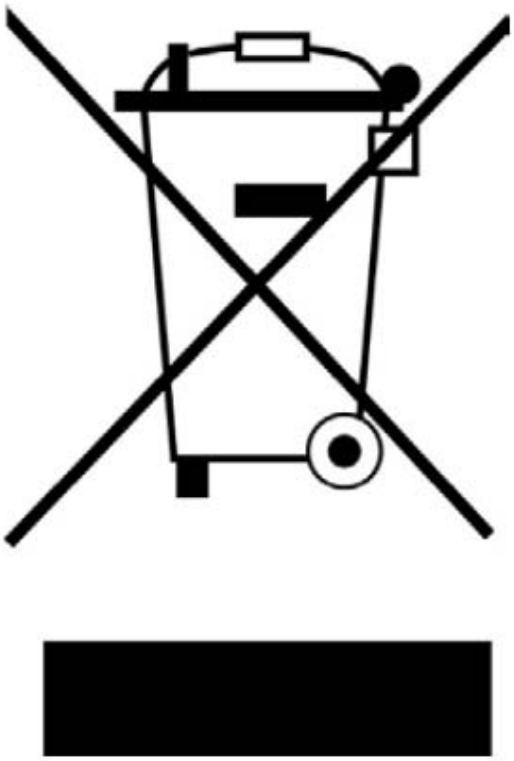
Office: 8F, No. 31,Lane 169, Kang-Ning St.,Hsi-Chih, Taipei, Taiwan



Waste Electrical and Electronic Equipment (WEEE)

This symbol means that according to local laws and regulations your product and/or its battery shall be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. Proper recycling of your product will protect human health and the environment.

TM951128B