RFID TRANSPONDER **TECHNOLOGY**

NTAG203 13.56MHz ISO14443A READER/WRITER
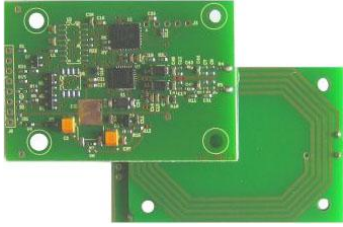
FRW-PCB	FRW-ONDA	FRW-SHELL	FRW-BOX

1.0 FEATURES AND SPECIFICATIONS

The FRW is a Front Side Serial Tag Reader/Writer with **built-in Antenna**, with five interface options.

TRANSPONDERS SUPPORTED:
CLASSIC 1K   Protected against duplication by Crypto Authentication using KEYA.
             Is structured in **16 SECTORS** any with 4 BLOCK of 16 bytes each.
             The 4th BLOCK of each SECTOR is reserved for CRYPTO KEYS and is not usable for DATA.
             BLOCK0 of SECTOR0 is the MANUFACTURE DATA containing UID.
- No anticollision.
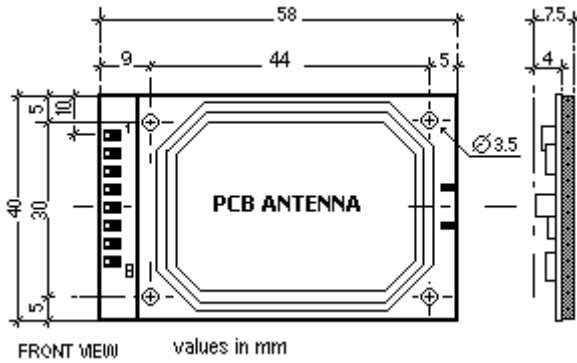- Automatic detect of the Transponder type.

2.0 VERSIONS
NTAG203-TTL-MH-5-(Case)   TTL interface. Spontaneous.

Glossary: **FR/FRW=**Model   Interface: **TTL   232   485   USB   LAN**
            M= TAG MIFARE
            S= Polling   **H**= Spontaneous
            5/12=5V(standard)/12V power supply
            Case= PCB**/**SHELL/ONDA/BOX/ POCKET

2.0 MOUNTING

DIMENSION FRW-TTL/232/485 (see also Par.6.0)

FRONT VIEW   values in mm

CONNECTION FRW-TTL

The on-board connector is an 8 pin .1" soldering type.

Pin Number	Description	
1	+3.3 to 5VDC	
2	GND	
3	RX	TTL input
4	TX	TTL output
5	No Connect	
6	No Connect	
7	Out1	Open Collector output.
8	LED-OUT	TTL output trough internal 1kΩ

CONNECTION FRW-232

The on-board connector is an 8 pin .1" soldering type.

Pin Number	Description	
1	+5VDC	
2	GND	
3	RX	RS232 input
4	TX	RS232 output
5	No Connect	
6	No Connect	
7	Out1	Open Collector output.
8	LED-OUT	TTL output trough internal 1kΩ

INSTALL

Due to the Radio Frequency emissions of the Reader Antenna is important to avoid the usage of metal panels in front, rear and lateral sides of the Reader.

Although the FRW provides an high resistance to EMC corruption, avoid to install it in high RF emission environments, the reading distance may result reduced.

FRONT PANEL
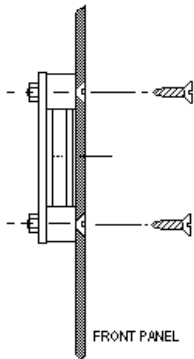
3.0 PROTOCOL

The standard protocols for the TRW are:

MH Spontaneous   Suitable for application point to point. The FRW transmits data only when a TAG is really present.

The protocol FORMAT is described below.

STX   Start of string synchronization code.
DEVICE.. Is the Device Number **(for RS485 only). For the FRW-TTL/RS232 is always 00H.**
LENGTH..   Is the number of bytes following the LENGTH.
                Example: STX-DEVICE-LENGTH-FUNCTION-DATA0....DATA11-BCC
                The length is 14 DEC = 0D HEX.
FUNCTION /STATUS....................................... Is the FUNCTION to be executed or the STATUS of an operation executed.
SPARE0 to SPARE3....................................... Is an area reserved for future use.
DATA0 to DATAn.. Are the data exchanged.
BCC.......................................…..........................   Is calculated as the XOR of all bytes from STX to last DATA included.
                Example: STX-DEVICE-LENGTH-STATUS-BCC → 02H-00H-02H-01H-BCC
                where BCC= 01H.

3.2 PROTOCOL FRW-MH

The FRW-MH operates in spontaneous mode.
The POLL SCN interrogation is internally generated by the FRW module waiting for a TAG in the RF field.
THe RF Field is always turned on.

3.2.1 STRINGS from FRW to HOST

REPLY#0 :   READ

DESCRIPTION	STX	DEVICE	LENGTH	STATUS	FRB	DATAn (n=4-7-16)	BCC
HEX VALUE	02H	00H-7CH	07H or 13H	See below	00H-3FH	HEX	HEX

FUNCTION   VALUE   DESCRIPTION
MIFARE CLASSIC:
READ SCN   04H   **LENGHT=07H DATAn=4 bytes** contains the **Serial Code Number**.
READ BLOCK   04H   **LENGHT=13H DATAn=16bytes** from block (FRB) are complete.
MIFARE ULTRALIGHT:
READ SCN   44H   **LENGHT=0AH DATAn=7 bytes** contains the **Serial Code Number**.
READ BLOCK   44H   **LENGHT=13H DATAn=(4 BLOCKs of 4 BYTES each) 16 Bytes** from block (FRB) are complete.
MIFARE DESFIRE D40:
READ SCN   43H   **LENGHT=0AH DATAn=7 bytes** contains the **Serial Code Number**.
MIFARE DESFIRE EV1:
READ SCN   45H   **LENGHT=0AH DATAn=7 bytes** contains the **Serial Code Number**.
MIFARE DESFIRE EV2:
READ SCN   46H   **LENGHT=0AH DATAn=7 bytes** contains the **Serial Code Number**1.

MIFARE PLUS:
READ SCN   **42H**   **LENGHT=0AH DATAn=7 bytes** contains the **Serial Code Number**.

REPLY#1 :   STATUS

DESCRIPTION	STX	DEVICE	LENGTH	STATUS	BCC
HEX VALUE	02H	00H-7CH	02H	See below	HEX

FUNCTION	VALUE	DESCRIPTION
READ DATA ERR	01H	The data detected on the TAG are corrupted or incomplete. RF noise environment detected.
NO TAG	02H	The FRW has detected a no valid tag present during a COMMAND or POLLING sequence.
AUTH ERR	10H	The command was not executed because a bad parameter in the Authentication Keys was detected.
COMMAND ERR	20H	The command was not executed because a parameter out of limit on the command string or a data error was dectected.
COMMAND OK	04H	The command has been correctly executed.

3.2.3 DATA FLOW FRW-MH

The FRW continously send a POLL SCN command , waiting for a valid READ SCN-SCNU.
When fully received, the HOST can send a COMMAND in a **time window** of 250 ms.
Over this time, if no command has been sent, the FRW automatically repeat a POLL SCN sequence till TAG extraction or a COMMAND receive, except for COMMAND#4 ACK.
If receive COMMAND#4 ACK the FRW close the sequence and wait for a TAG extraction.
The **time window** on FRW is **reloaded** at any reply during a COMMAND sequence, except for critical errors.
A tipycal data flow, in spontaneous mode, is described below.

```
HOST                                                          FRW
                       READ DATA sequence
Internal POLL SCN is generated and a TAG is correctly read    <===   READ SCN
                   Open time window……250ms……

                   COMMAND sequence in time window
NO COMMAND    ===>                                            Repeat READ DATA sequence
POLL  BLOCK   ===>        (max response time 200ms)           <===   if OK READ BLOCK
                              New time window…..

WRITE BLOCK   ===>        (max response time 300ms)           <===   if OK READ BLOCK
                                                             <===   if ERROR STATUS
                              New time window…..
TURN-ON/OFF   ===>        (max response time 150ms)           <===   if OK  STATUS
                              New time window…..
ACK           ===>                                            Wait  for TAG extraction….
```

4.0 OUT1 AND LED

OUT1

The Out1 is an Open Collector output driving a max. load of 80 ma at 12VDC.
It will goes ON/OFF using the COMMAND#5.

LED-OUT

The LED-OUT is a TTL output, active high, with a 1 kΩ internal series resistor suitable to drive an external LED connected to GND.
It will turn ON when a KEY/CARD is moved in the RF-Field and is correctly read.
It will turn OFF when the KEY/CARD is removed by the RF-Field.

6.0 FRW-MS/MH-12-ONDA or SHELL

Dimension SHELL	H 77 x L 112 x D 30 mm
Dimension ONDA	H 51 x L 115 x D 24 mm

ONDA

CABLE PIN FUNCTION

COLOUR	232	485
WHITE	+12VDC	+12VDC
BROWN	GND	GND
YELLOW	RX 232	RS485-A
GREEN	TX 232	RS485-B
GREY	GND	GND

EXAMPLE: HOW TO CONNECT TO A   9 PIN D-TYPE S (Female)

SHELL

TR 232-S cable	D-TYPE S connector
YELLOW(RX)	PIN 3
GREEN(TX)	PIN 2
GREY(GND)	PIN 5

IMPORTANT:
DURING A WRITE COMMAND THE TAG MUST BE MANTAINED IN THE PROPER RF FIELD TILL A REPLAY#1 OR
STATUS ERROR STRING HAS BEEN RECEIVED.

7.0 FRW-232-MS-12-BOX

The module FRW is inserted into a BOX plastic enclosure.
Has the same electrical functions of the standard FRW-232.
A Cannon 9S connect all the signals. Connection with PC through a STRAIGHT CABLE.
The 12VDC power supply is connected by a standard 2,1mm plug-in:
Internal PIN   +12V
External PIN   GND
The TRW is protected against polarity inversion.

FRW-232-12-BOX

MECHANICAL

Length	11.2cm
Width	6.8cm
Height	2.8cm
Weight	Typ 100g

OPERATING

Power Requirements	9 to 12 VDC not stabilized max. current 50mA
Serial interface **Data=8 Parity=N Stop=1**	Polling Mode
Speed	9600 baud
Read Distance (TAG in center of RF field)	CARD typ 60 mm

PIN	DESCRIPTION
1	
2	TX 232
3	RX 232
4	
5	GND
6	NOT CONNECTED
7	NOT CONNECTED
8	NOT CONNECTED
9	NOT CONNECTED

Cannon 9S Connector