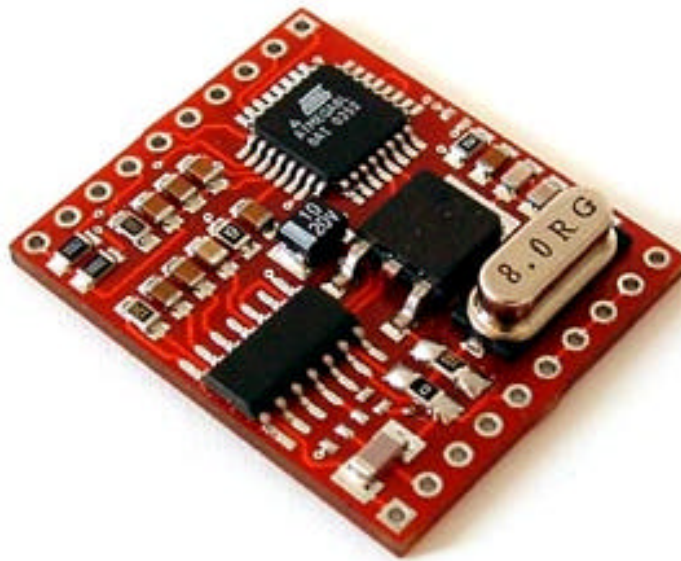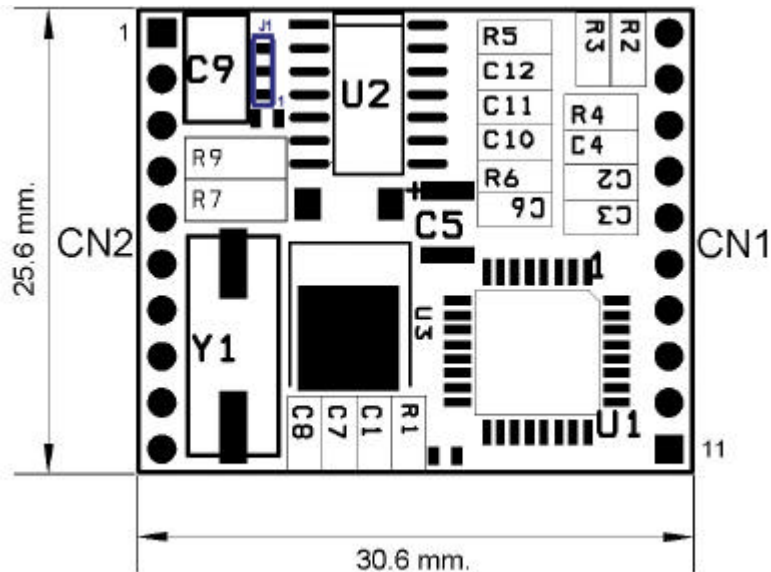# OEM r/w Module-125 kHz

Preface

The controller module OEM allows the reading and writing of the main types of tags based on 125kHz technology. It supports Hitag 1 and 2, EM4x02, EM 4x50. Using an external antenna and a serial interface it can easily be connected to a host or a PC.

IDzone

HARDWARE

CN2

Name	PIN	Description
ARX	1	Antenna RX
ATX	2	Antenna TX1
VDD	3	+5 V DC
GND	4	Ground
ATX2	5	Antenna TX2
GND	6	(Ground)
RSV	7	Reserved for future developments
RSV	8	Reserved for future developments
RSV	9	Reserved for future developments
RSV	10	Reserved for future developments

CN1

Name	PIN	Description
RX	11	RX of PC
TX	12	TX towards the PC
RSV	13	Reserved for future developments
RSV	14	Reserved for future developments
RSV	15	Reserved for future developments
EN	16	Default Open or 5V=Enable reader, 0V= disable reader
LEDr	17	LED red
LEDg	18	LED green (reading received)
GND	19	Ground
VDD	20	+5 V DC

J1

Name	PIN	Description
DrvSel	1-2	driver antenna double (Default)
DrvSel	2-3	driver antenna single

Electrical characteristics of the PIN

Name	PIN	Electric parameters	Current (max)	Description
RX TX	11 12	USART (note1)	-	Transmission of data receipt to RS232 or RS485 device driver
EN	16	ST (note2)	25 mA	Default: Open or 5V= Enable controller 0V disable controller
LEDr	17	GND (note3) Cathode Led green/ Anode Led red	25 mA	Activation leds Red/green
LEDg	18	LED (note 3) anode led green/ cathode led red	25 mA	Activation leds Red/green, Internally connected with 330 ohm
ARX ATX1	1 2	(depends on calibration of the antenna	200 mApp	Antenna Input Antenna Output An inductance equal 470uH has to be connected between these pins 27 Ohm (Max).
ATS2	5	ATX2	-	Antenna driver 2 (does not need external connection)
RSV	5,6,7,8 9,10,13 14,15	-	-	does not need external connection
GND	4,19	GND	-	Supply 0Vdc
VDD	3,20	+5 V DC	150 mA	Supply 5Vdc

note1:   Universal Synchronous Asynchronous Receiver Transmitter
note2:   Schmitt trigger buffer output
note3:   The controller is disposed to activate two leds (red/green) in anti parallel connection what permits to activate one at a time.
          Besides, the green led is activated automatically whensoever a noted badge is identified.

SOFTWARE

Description of the communications protocol

Preface
The baud rate of the serial is fixed and equal 9600; the number of bits per character is always 8, there is no parity and 1 bit of stop is designated. The commands can also be issued using a terminal program. The data is transmitted as ASCII characters that can be displayed on any terminal program (for ex. Hyperterminal).

Syntaxes
In this document all control characters are written in bold-style (ex. **CR** corresponds on booting in serial to the value 13dec or rather 0Dhex). The constant alphanumerical strings are indicated between quotation marks (ex. "3"). The variable parameters are concluded between the characters < e >, the signification of the parameters will be specified after the description of each command

Structure of the commands
This protocol has been developed for a very simple administration of the communication. Generally the commands and the answers are forwarded as single ACSII characters and the controller adds **CR** + **LF** (Carriage Return + Line Feed) to each answer.

Ex. "X" <DATI>	
CR character ascii 13dec (0D hex) for Carriage Return.	
LF character ascii 10dec (0D hex) for Line Feed.	

Commands

In the following table are specified all the commands that are accepted from the controler. On each command the controller responds to the host apart from explicit indicated cases. The activation of the green led indicates the correct execution of a reading or writing command.

Recapitulation

Command	Description
'x' . 'z'	Reset
'v'	Version request
'c'	Reading continues
'l'	Login
'r'	Read page
'w'	Write page
'd'	Denomination of led
'p'	Antenna power off

Error codes
The following table shows all error messages returned from the controller.

Code	Description
'?'	Command not valid
'N'	Command not executed
'S'	Continuous read stopped

Description of the commands

Reset

"x" or "z"

This command executes a reset software. The forwarding of this command causes a reset of the controller and of possible transponders in the reading-zone.

If the command has been received correctly, the controller answers as following:

"MULTITAg-125   a.01" **CR LF** and enters into the continuous read mode.

Get Version

"v"

This command requests the currently implemented firmware from the controller.

If the command has been received correctly, the controller answers as following:

"MULTITAG-125   a.01" **CR LF**

Continuous read (default function mode after power on)

"c"

Following this command, the controller reads and forwards continuously the serial number of the transponder that remains in the reading zone. This command can be interrupted by forwarding any character to the controller. The reader supports different types of tags even if only one type of tag at a can be identified.

In this reading mode the controller effects a fast scanning of all the designated tags and forwards the serial number of the identified tag via serial-line

If the command has been received correctly, the controller answers as following:

<IdTipo> <SerialNumber>

<IdTipo>   one-digit character string identifies the single type of the tag. Can be used in order to determine the type of the tag presented to the reader and control tag specific commands.

The different types of supported transponders have UID in different lengths, for example the tags EM4x02 use an UID of 5 bytes whereas Hitag 1 and Hitag 2 use only 4 bytes.

The following table shows a list of specified IdTipo of all the supported tags

IdTipo	Description	Length UID
"U"	EM 4x02	5 bytes
"T"	EM 4x50	4 bytes
"Z"	ISO FDXB	8 bytes
"h"	HITAG 1	4 bytes
"H"	HITAG 2	4 bytes

<SerialNumber> n-digit alphanumerical string.

Login

"l" <Password>

This command is necessary for the authentication for tags of the type EM 4x50 and HITAG 2.

For the transponder EM 4x50 the command signification of the Login is the same as described on the datasheet of this transponder: it is necessary to forward the Login-command followed by the Password in order to have access to the protected memory area. For example it is necessary to forward this command in order to execute the scripture of the password onto the transponder of the type EM4X50. Keep in mind that, as described in the respective datasheet, the Password on EM4X50 is the Longword n°00 and that it can not be read but only written if it (the current) is known.

For the transponder HITAG2 it is necessary to know the password before any access in reading or writing is possible.

In both cases the login is effected automatically with the default values based on the ultimate identified type of tag.

<Password>   4-bytes alphanumerical string represents the code used for the login

If the command has been received correctly, the controller answers as following:

"L" **CR LF**   In case of successfully effected login

       or

"N" **CR LF**   In case of Error. Password wrong or tag removed from the reading zone

Read page

"r" <PageAddr>

This command allows the reading of a block of data of a tag. The dimension of the data returned by an answer depends on the type of tag used. The valid values of the number of the requested page depend also on the type of tag in use. The reading command of page 00 in case of tags of the type EM 4x02 and ISO FDXB returns the serial number of the tag.

<PageAddr>   1-byte numerical string represents the number of the page to read

If the command has been received correctly, the controller answers as following:

<IdTipo><SerialNumber> **CR LF**   In case of correctly received reading

          or

"N" **CR LF**   In case of Error or tag removed from the reading zone

Write page

"w" <PageAddr> <Dati>

This command allows the writing of a block of data of a tag. After typing in the data, they will be automatically rereaded in order to verify the correct writing. Not all types of tags support the writting.

<PageAddr>   1-byte numerical string represents the number of the page to write
<Dati>   n-byte alphanumerical string represents the data to write

Type of tag	Byte	Description
Hitag 1	4	48 pages of 4 byte each
Hitag 2	4	8 pages of 4 byte each
EM 4x05	4	32 pages of 4 byte each
EM 4x02	-	Not supported
ISO FDXB	-	Not supported

If the command has been received correctly, the controller answers as following:

"w" <Dati> **CR LF**   in case of successfully effected writing

          or

"N" **CR LF**   in case of error. Writing failed due to bad transmission conditions or false dimensions of <Dati> relating to the characteristics of the tag.

Example:

w0412345678 **CR LF**   writes the data 12345678 on page 04 of the tag

Set LED

"d" <StatoLed>

This command allows the administration of the led. The user is able to set the state of the led manually.

<StatoLed>   1-byte alphanumerical string represents the parameter of the activation of the led

Command	Description
"dg"	Activates the green led and deactivates the red led
"dr"	Activates the red led and deactivates the green led
"dn"	Deactivates both leds

If the command has been received correctly, the controller answers as following:

"DG" **CR LF**   on the command "dg"
"DR" **CR LF**   on the command "dr"
"DN" **CR LF**   on the command "dn"

Example:

dr   Answer "DR **CR LF**" and activation of the red led

ID zone

ANTENNA power off

"p"

This command switches off the antenna power. The controller enters the stand-by mode, the consumption of the controller is reduced down to ca 40mA. All the tags presented in the area of the antenna are shut off and reset.
If the pin 16 (Enable) is set to logic low (OV) the entire controller is in Stand-by.
In this function mode the antenna is switched off and all serial commandos are ignored.
In order to exit this mode one has to change the pin 16 (Enable) from logic low or set it to logic high (which means: Enable=Open or +5V => Enable controller).
After carrying out this operation the controller starts to work in function mode "Continuous read".

If the command has been received correctly, the controller answers as following:
"P" **CR LF**   confirms the acceptance of the command

Power on is only performed sending a reset command ("x" or "z")

Example:
p   Answer "P" **CR LF** and the controller passes into stand-by mode

Attention
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