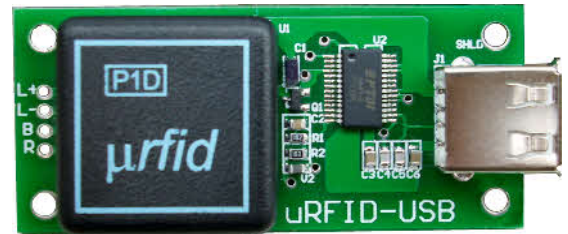


RFIDREAD- μ RW-USB (125khz and 134kHz models). RFID reader writer module with USB interface.

Designed for embedding into products manufactured by third-parties, the RFIDREAD- μ RW-USB unit is our standard RFIDREAD- μ RW module on a USB interface adapter board. This unit allows users to quickly connect a RFID reader/writer to a PC with a standard USB serial port.

- **Direct connection to a PC's USB port.**
- **Reads EM4100 compatible transponders.**
64bit Read Only, Manchester Encoded at 64cyc/bit.
Reads and Writes T5557 compatible transponders.
Manchester Encoding 32 cyc/bit.
Read and Write FDX-B Protocol ISO11784/11785 for animal identification.
- **Read Distance: 3.5cm for cards, and keytags.**
- **Ultra small unit size: 66mm x 29mm**
- **Output control for a dual color LED for Pass indication.**
- **Buzzer Output Control for Pass indication.**
- **Integrated RFID Coil Antenna.**



Description.

The RFIDREAD- μ RW-USB is designed to read and write the popular range of EM4100 and T5557 compatible proximity cards and transponders available on the general market. EM4100 compatible transponders contain 64 bits of Read Only memory, while T5557 transponders carry 224 bits of Read/Write memory.

In addition it can perform read functions on transponders programmed using FDX-B protocol for animal identification as described in ISO11784/11785 standards. It is also capable of programming T5557 transponders in FDX-B protocol standard.

In operation the reader will continually scan for either EM4100, T5557, or FDX-B transponders depending on which type has been selected. The transponder type can be selected by way of pre-defined commands via the Uart Receive line. When the selected transponder is in range it is read and its associated data is transmitted on the Uart Tx line in serial ASCII format.

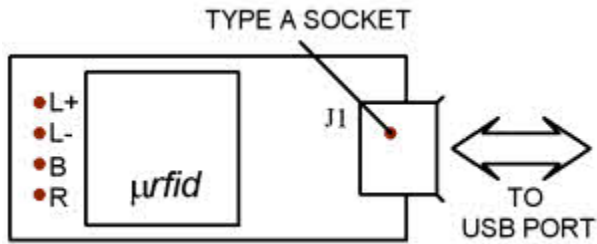
The command set for the RFIDREAD- μ RW describe such functions as:

- Set LED color and function.
 - Set Buzzer Function.
 - Set Default Transponder type.
 - Locate Tag.
 - Read Block.
 - Read Password Protected Block.
 - Write Block.
 - Write Password Protected Block.
 - Enable/Disable password Protection.
 - Set Maximum Block.
 - Setup Transponder Configuration.
 - Emulate EM4100 with T5557 tag.
 - Read FDX-B transponders and Write T5557 in FDX-B protocol.
-

Connector Pin Description:

The RFIDREAD- μ RW-USB derives its power from the USB port supply via connector J1. Command and data information is transferred on this connector in standard ASCII serial protocol.

Additionally the peripheral control outputs allow a dual color led, and buzzer to be used to give audio and visual PASS indications when a transponder comes within reading range. The peripheral control outputs are available as a terminal pad area marked L+, L-, and B. The LED and buzzer outputs can be controlled by setting various options described further.



Top View

V+ to GND	-0.3V to 5Vdc
Operating Current	40mA (2)
Operating Temperature Range	0° C to 85°C
Storage Temperature Range	0° C to 85°C

ABSOLUTE MAXIMUM RATINGS (1)

NOTE: (1) Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. Exposure to absolute maximum conditions for extended periods may affect unit reliability.

NOTE: (2) May vary due to component variations.

Peripheral control lines are described in Table 1

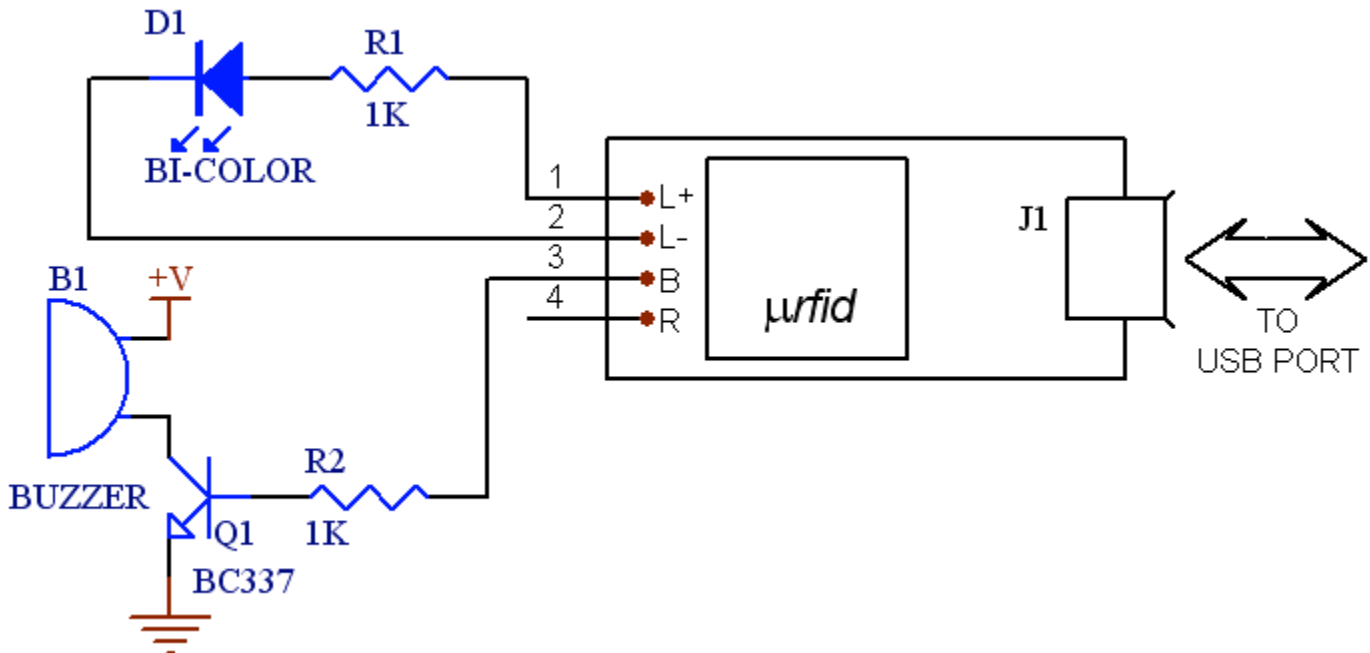
Label.	Description.
L+	Positive polarity of led output when dual color led is used.
L-	Negative polarity of LED output when dual color led is used. (1)
B	Buzzer output control line. This line will go high when the buzzer is active.
R	Unit Reset line. Leave this line unconnected during normal operation.

Table 1. Peripheral Control lines

Note: (1) When using a single color led you may leave pin 2 unconnected, and connect the cathode of the LED to ground.

Example circuit connections:

A simple circuit connection is shown here including a dual color LED and a Buzzer. Dual color LED's can display 2 colors by driving them with alternating polarity. The RFIDREAD- μ RW-USB is designed for dual color LED's but an ordinary single color led may be substituted. The alternate color then simply becomes an OFF LED state. When selecting a Buzzer, one that has a self drive circuit is required.



USB driver installation:

The RFIDREAD- μ RW-USB uses a USB to Serial device made by FTDI which enables the USB port to become accessible as a virtual serial port. Once installed the reader will appear in the PC's device driver list as shown below.



In the case above the serial port is allocated to serial port COM3 however may vary depending on pre-existing com port hardware and virtual drivers loaded for other applications. The device manager list can be located by selecting the Start>Control Panel>System Menu and then selecting the Hardware>Device tabs.

The USB drivers can be downloaded from www.apdanglia.org.uk Once downloaded simply save the file to any location on your PC and run the executable file. The drivers will automatically be installed on your system. When the RFIDREAD- μ RW-USB is next plugged into a USB port on your PC it will be allocated a COM port number as shown above and will be accessible as a serial port by a suitable application program that is able to send and receive ASCII characters to a serial port. Alternatively a free RFID reader writer application program can also be downloaded from www.apdanglia.org.uk

Frequency of operation:

The RFIDREAD- μ RW-USB is available in two models. The RFIDREAD- μ RW-USB-125, and RFIDREAD- μ RW-USB-134 which differ only in the frequency of the field generated to read and write transponders. These operate at 125kHz, and 134kHz respectively.

When reading and writing FDX-B transponders the RFIDREAD- μ RW-USB-134 should be used as this protocol specifies that transponders operate at 134kHz; however in practice the 125kHz readers will also operate with 134kHz transponders with only a slight reduction in read and write range, and vice-versa.

Principle of Operation:

The RFIDREAD- μ RW rfid module at the core of this reader generates a magnetic field through its integrated antenna at 125kHz, or 134kHz. Passive RFID transponders also have an integrated antenna that are tuned to the same frequency. When they are within range of the reader unit they are able to draw sufficient power from the electromagnetic field to power their own internal electronics. Once powered they are able to modulate the incident magnetic field which is detected by the reader. In this way the Transponders are able to transmit their data to the reader.

There are many different types of transponders designed to operate at various frequencies, and their functions and the amount of information they carry can also vary. The RFIDREAD-μRW is able to read Transponders optimized for either 125kHz, or 134kHz. It will read EM4100 compatible transponders carrying 64 bits of read only data, as well as read and write T5557 compatible transponders carrying 224 bits of Read/Write memory using Manchester Encoding. It is also capable of reading FDX-B compatible transponders, and programming the T5557 using FDX-B animal identification protocol.

As the protocols for transponders differ from each other, the transponder required to be scanned is first selected, or made the default tag. (See further for RFIDREAD-μRW command descriptions). Once selected the reader will continually scan for this transponder type. When the reader detects the selected RFID tag its data is read for processing and the decoded data sent via ASCII coded serial Output.

Serial Output Format description:

When a successful read of a transponder takes place the unit will transmit a string of information. This string of information will vary in length depending on the type of transponder being scanned, and the configuration of the transponder.

EM4100 transponder Output

The output format for a read of an EM4100 transponder is a simple string of 10 ASCII coded Hexidecimal characters followed by the ASCII code \$0D (carriage return) as a string end marker.

For example, when reading a EM4100 compatible card with the Version Number of \$06, and a card data of \$001259E3 the following string is transmitted:

06001259E3<crn> where <crn> is serial ASCII code \$0D

The card information is transmitted once and a new string will not be sent until the transponder moves outside of the scanning range, and it, or another transponder enters scanning range again.

NOTE: Although EM4100 compatible transponders contain 64bits of information not all the bits are defined for user data. Some data bits are allocated as parity check bits and for other functions.

T5557 transponder Output.

The output format for a read of a T5557 transponder is slightly more complicated than an EM4100 as it has more data and various options that alter its behavior. The memory structure of the T5557 rfid tags is as shown in Fig 1. T5557 memory structure.

Block memory description.	Example data
Page 0,Block 0, 32 bit Configuration data.	Manchester, max block = 4
Page 0,Block 1, 32 bit R/W Data	12665577
Page 0,Block 2, 32 bit R/W Data	99A0FF56
Page 0,Block 3, 32 bit R/W Data	226390AA
Page 0,Block 4, 32 bit R/W Data	56129800
Page 0,Block 5, 32 bit R/W Data	FFFF0000
Page 0,Block 6, 32 bit R/W Data	99880011
Page 0,Block 7, 32 bit R/W Data, or Password	12345678
Page 1, Block 1, 32bit Trace data	-
Page 1, Block 2, 32bit Trace data	-

Fig 1. T5557 memory structure.

When the tag enters the RF field and powers up it loads the information stored in the configuration block. This tells it what bit rate and encoding scheme to transmit in. It then enters into Regular Read Mode. In Regular Read Mode the tag will start to transmit its data starting from Block 1, and ending in the block number selected by a parameter known as the Max Block value stored in the configuration data (block 0).

The RFIDREAD-μRW will decode the information coming from the tag and output the data in an ASCII coded string. This is of the form of 8 ASCII hex characters per 32bit block, with each block separated by an ASCII space character \$20. The full string is terminated with a carriage return character \$0D.

For example, when reading a T5557 compatible card with the example data shown above and a Max Block set to 4 the following string is transmitted:

12665577 99A0FF56 226390AA 56129800<crn> ,where <crn> is serial ASCII code \$0D

The card information is transmitted once and a new string will not be sent until the transponder moves outside of the scanning range, and it, or another transponder enters scanning range again. However various block access read and write commands are available for the T5557 as described further.

FDX-B animal identification transponder Output

The output format for a read of an FDX-B protocol transponder is a simple string of decimal characters indicating the 3 digit country code, and 12 digit National ID followed by the ASCII code \$0D (carriage return) as a string end marker.

When a FDX-B programmed transponder enters the field of the reader it will be scanned and a string as shown in the example below is transmitted:

999_000000001008<crn> ,where <crn> is serial ASCII code \$0D, and “_” is a data separator

In this example 999 is the country code defined inside the transponder, while 000000001008 is the unique 12 digit decimal code used to identify an animal.

FDX-B protocol transponders may contain additional data which can be accessed using specific commands. See RAT and WAT commands as shown in Table 3. Active Tag Commands Summary further on.

RFIDREAD-μRW command description.

Various commands and parameter data are sent to the RFIDREAD-μRW via the Uart Rx line on the interface connector (pin 5. RX). Commands sent to the reader consist of simple ASCII strings terminated with a carriage return. The reader will then process the command and respond by transmitting data or status information on the Uart Tx line (pin6. TX)

The reader has various selectable power up options. These options are written to non-volatile memory within the unit and will be retained even after the unit is turned off. These options are:

- Set LED color and function.
- Set Buzzer Function.
- Set Default Transponder type.

LED and Buzzer functions activate for a short period after a successive read of a transponder. The behavior of which can be controlled by the appropriate command. Setting the default transponder controls which transponder type the reader first starts to look for once it is turned on. See Table 2. Setting power up options.

LED Color While Scanning.	LED color Transponder Read.	Serial Command Code.
RED (default)	GREEN (default)	SL0 <crn>
GREEN	RED	SL1 <crn>
LED OFF	GREEN	SL2 <crn>
LED OFF	RED	SL3 <crn>
LED OFF	LED OFF	SL4 <crn>
RED	RED	SL5 <crn>
GREEN	GREEN	SL6 <crn>

* For purposes of illustration a RED/GREEN dual color led is assumed connected.

BUZZER FUNCTION.	Serial Command Code.
BEEP ON READ(default)	SB0<crn>
BUZZER DISABLED	SB1<crn>

DEFAULT TRANSPONDER.	Serial Command Code.
EM4100Read Only	SD0<crn>
T5557(default) Read/Write Tag	SD1<crn>
FDX-B Read/Write Tag	SD2<crn>

Table 2. Setting power up options.

<crn>= ASCII carriage return code \$0D

When a command is processed successfully the reader will respond with the standard response of :

OK<crn>

If the command is misunderstood, a status code is sent back. See **Error Codes and Status Description**.

Additionally the RFIDREAD- μ RW features the following commands as summarized in Table 3. Active Tag Commands summary.

Command Description	Serial Command Code.
LOCATE TRANSPONDER	LTG<crn>
SELECT TAG TYPE	STx<crn>
READ BLOCK (T5557)	RBx<crn>
WRITE BLOCK (T5557)	WBx<32bit Data><crn>
READ PASSEWERDED BLOCK (T5557)	RPx<32bit Password><crn>
WRITE PASSEWERDED BLOCK (T5557)	WPx<32bit Password><32bit Data><crn>
SET MAXIMUM BLOCK (T5557)	SMx<crn>
ENABLE PASSWORD PROTECTION (T5557)	PWE<crn>
DISABLE PASSWORD PROTECTION (T5557)	PWD<32bit Password><crn>
READ CONFIGURATION BLOCK (T5557)	RCB<crn>
SETUP CONFIGURATION BLOCK (T5557)	SCB<crn>
WRITE EM4100 PROTOCOL (T5557)	WEP<40bit Data>
READ TRACE DATA (T5557)	RTD<crn>
READ STANDARD DATA	RSD<crn>
READ ANIMAL TAG (FDX-B)	RAT<crn>
WRITE ANIMAL TAG (FDX-B)	WAT<CRN>

Table 3. Active Tag Commands Summary.

x denotes block address : 0-7

(T5557) denotes T5557 tag commands only

(FDX-B) denotes FDX-B protocol tag commands.

Locate Transponder Command.

When a transponder enters the scanning field of the reader its data is decoded and transmitted on the Uart Tx line; however once data is sent there is no indication that the tag is still within scanning range. At some point it may have been removed. The Locate Transponder commander is useful in determining if a tag is still present. The command protocol for which is shown here, along with the available responses.

Protocol: **LTG<crn>** ,where <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
LTG<crn>	?1<crn>	Tag not present
	OK<crn>	Tag present

Select Tag Type Command.

This command is almost identical to the Set Default Transponder command, except that the parameters are not stored to non volatile memory. On power up the selected tag will always revert back to that set using the Set Default Transponder command.

This command is used for alternating between scanning for one type of transponder and another. A user may elect to scan for an EM4100 tag during, for example, a 1 second period and a T5557 tag the next, in alternating fashion.

Special Note: The Select Tag command also introduces a 5 second lockout of the reader's normal Pass indication and serial output. If a tag enters the field within 5 seconds of issuing this command it will not transmit the card data, or issue LED and buzzer indications. This is to prevent contradictory data being sent to any scanning program accessing the reader while a tag enters the scanning field.

Protocol: **STx<crn>** ,where x = tag type code 0 to 1, <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
ST0<crn>	?1<crn>	Tag not present
	OK<crn>	EM4100 Tag selected
ST1<crn>	?1<crn>	Tag not present
	OK<crn>	T5557 Tag selected
ST2<crn>	?1<crn>	Tag not present
	OK<crn>	FDX-B Tag selected

Read Block Command.

This command is only valid if the T5557 transponder is selected, and the tag is not in password mode. T5557 Transponders have 7 blocks of 32bits of read/write memory. The blocks are addressed in the range of block 1 to block 7. It is used to read the 32bits of data of a selected block.

Protocol: **RBx<crn>** ,where x is the block address 1 to 7, <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
RB1<crn>	?1<crn>	Tag not present
.	aabbccdd<crn>	8 ASCII hex bytes representing
.		1 block of 32bit data is returned
RB7<crn>		

If this command is sent while the tag is in password mode, the command will be ignored by the transponder and it will revert to standard read mode. In this case the returned information will be one or more blocks of 32bit data depending on the Max Block setting stored within the transponder configuration block. If an EM4100 tag is selected then Read block command is invalid.

Standard read response for an EM4100 transponder.

Command Protocol Example	Response.	Description.
RB1<crn>	?1<crn>	Tag not present
.	?2<crn>	Invalid read or Write for EM4100 data.
RB7<crn>		

Write Block Command.

This command is only valid if the T5557 transponder is selected, and the tag is not in password mode. T5557 Transponders have 7 blocks of 32bits of read/write memory. The blocks are addressed in the range of block 1 to block 7. It is used to write 32bits of data to a selected block.

Protocol: **WBx<32bit Data><crn>** ,where x is the block address 1 to 7, <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
WB1aabbccdd<crn>	?1<crn>	Tag not present
.	?2<crn>	Tag failed to Write
WB7aabbccdd<crn>	OK<crn>	Data written. (aabbccdd)

If this command is sent while the tag is in password mode, the command will be ignored by the transponder

Read Passworded Block Command.

This command is only valid if the T5557 transponder is selected, and the tag is in password mode. T5557 Transponders have 7 blocks of 32bits of read/write memory. The blocks are addressed in the range of block 1 to block 7. It is used to read the 32bits of data of a selected block with password protection.

Protocol: **RPx<32bit Password><crn>** ,where x is the block address 1 to 7, <crn> is \$0D carriage return and 32bit password is expressed as 8 ASCII hex bytes.

Command Protocol Example	Response.	Description.
RP1FFAACCC00<crn>	?1<crn>	Tag not present
.	aabbccdd<crn>	8 ASCII hex bytes representing 1 block of 32bit data is returned
RP7FFAACCC00<crn>		

If this command is sent while the tag is not in password mode, the command will be ignored by the transponder and it will revert to standard read mode. In this case the returned information will be one or more blocks of 32bit data depending on the Max Block setting stored within the transponder configuration block.

Write Passworded Block Command.

This command is only valid if the T5557 transponder is selected, and the tag is in password mode. T5557 Transponders have 7 blocks of 32bits of read/write memory. The blocks are addressed in the range of block 1 to block 7. It is used to write 32bits of data to a selected block with password protection.

Protocol: **WPx<32bit Password><32bit Data><crn>** ,where x is the block address 1 to 7, <crn> is \$0D carriage return, and 32bit password is expressed as 8 ASCII hex bytes.

CAUTION. Only issue this command if the Tag is in Password protection mode otherwise data corruption may occur. A transponder that is not in password mode will misinterpret the password for data and an incorrect write will occur.

Command Protocol Example	Response.	Description.
WP112345678aabbccdd<crn>	?1<crn>	Tag not present
.	?2<crn>	Tag failed to Write
.	OK<crn>	Data written. (aabbccdd)
WP712345678aabbccdd<crn>		

In this example the password is \$12345678 stored in block 7

Set Maximum Block Command.

This command is only valid if the T5557 transponder is selected, and the tag is not in password mode. As discussed earlier in this document the T5557 transponders enter Standard Read mode when they first enter the RF field of the reader. In this mode they will start transmitting data from block 1 to a block address defined in the configuration block. This value is the Max Block value and can be any value from 0 to 7. If the password mode is to be used for the tag then the maximum block should not be set to 7 as this will cause the password that is stored in block 7 to be transmitted. Note also that if the maximum block is set to 0 this will cause the configuration block to be transmitted only. This command is useful when an application requires that part of the data stored on the tag be automatically transmitted, in other words “public data”, while the upper blocks remain private, readable only though a direct block read command.

Protocol: **SMx<crn>** ,where x is the Max Block value required (0 to 7), <crn> is \$0D carriage return.

Command Protocol	Response.	Description.
SM0<crn>	?1<crn>	Tag not present
.	?2<crn>	Tag failed to Write
.	OK<crn>	Max value Set ok.
SM7<crn>		

Enable Password Protection.

This command is only valid if the T5557 transponder is selected, and the tag is not in password mode. This command does a write to the configuration block (block 0) of the tag and sets the Password control bit. Following this command all direct block access commands require a password to be sent. Note that when a tag first enters scanning range it will start transmitting from block 1 to the value set by the Max Block parameter. If there are locations that are required to be kept private a Max Block value below that required to be private should be set.

Protocol: **PWE<crn>** ,where <crn> is \$0D carriage return.

Command Protocol	Response.	Description.
PWE<crn>	?1<crn>	Tag not present
	?2<crn>	Tag failed to Write
	OK<crn>	Password mode enabled.

Disable Password Protection.

This command is only valid if the T5557 transponder is selected, and the tag is in password mode. This command does a write to the configuration block (block 0) of the tag and clears the Password control bit. Following this command all direct block access commands do not require a password to be sent.

Protocol: **PWD<32bit Password><crn>** ,where <crn> is \$0D carriage return.

Command Protocol	Response.	Description.
PWD<12345678><crn>	?1<crn>	Tag not present
	?2<crn>	Tag failed to Write
	OK<crn>	Password mode disabled.

In this example the password is \$12345678 stored in block 7

CAUTION. Only issue this command if the Tag is in Password protection mode otherwise data corruption may occur. A transponder that is not in password mode will misinterpret the password for data and an incorrect write will occur. As this command accesses the configuration block writing incorrect data to this block may render the tag unreadable. This can occur if the tag is set to operate with encoding other than Manchester, or at rates that the RFIDREAD-μRW is not designed to operate with.

Read Configuration Block Command.

This command is only valid if the T5557 transponder is selected, and the tag is not in password mode. This command is used to read the configuration block (block 0).

Protocol: **RCB<crn>** ,where <crn> is \$0D carriage return.

Command Protocol	Response.	Description.
RCB<crn>	?1<crn>	Tag not present
	aabbccdd<crn>	8 ASCII hex bytes representing the 32bit configuration block.

Setup Configuration Block Command.

This command is only valid if the T5557 transponder is selected, and the tag is not in password mode. The RFIDREAD-μRW currently only reads T5557 tags setup for Manchester Encoding, 32cyc/bit, with Sequence terminator active. T5557 transponders sold by Priority 1 Design are all setup as such by default however the user may encounter transponders setup otherwise. If the configuration block has not been locked, or password protected the use of this command will set the transponder to the appropriate mode.

Protocol: **SCB<crn>** ,where <crn> is \$0D carriage return.

Command Protocol	Response.	Description.
SCB<crn>	?2<crn> OK<crn>	Tag failed to Read/Write Tag setup successfully.

Note: The Tag type selected will be set to T5557 after using this command.

Write EM4100 Protocol Command.

This command is only valid if the T5557 transponder is selected, and the tag is not in password mode. EM4100 protocol tags are Read Only and their data is factory set. This presents a problem when a duplicate tag, or a tag with predefined data is required. This command solves this problem by writing the data and configuration block of a T5557 Read/Write tag so that it appears to function as a EM4100 tag to a standard reader.

Protocol: **WEP<40 bit data><crn>** ,where <crn> is \$0D carriage return.

Command Protocol	Response.	Description.
WEP1200071239<crn>	?1<crn> OK<crn>	Tag not present T5557 Tag will now function as a EM4100 tag.

In this example the T5557 Tag will now behave as an EM4100 protocol Tag with a Version Number of \$12, and a data of \$00071239. The RFIDREAD-μRW will still be selected for T5557 tags after this command. To read the Tag with the new protocol a Set Tag Type command (STx), or Set Default Tag (SDx) will need to be sent in order to read EM4100 protocol tags. In order to return the T5557 tag to its normal function a Setup Configuration Block (SCB) command can be used.

Read Trace Data Command.

This command is only valid if the T5557 transponder is selected, and the tag is not in password mode. This command is used to read the two blocks of Trace information stored in page 1 of the T5557 transponders. These are Read Only blocks and carry manufacturer codes, lot numbers, and other such data for tracing the source of the transponder.

Protocol: **RTD<crn>** ,where <crn> is \$0D carriage return.

Command Protocol	Response.	Description.
RTD<crn>	?1<crn> E0150156 1411081C<crn>	Tag not present 2 x 8 ASCII hex bytes representing 2 blocks of Trace data.

Read Standard Data.

This command is valid for all transponder types. It is used to tell the reader to output the tag's standard data that it normally transmits when it first enters the RF field of the reader. This command is generally used in conjunction with the Set Tag command for continuous polling purposes. The Set Tag command is first issued, which creates a 5 second lockout of the normal serial communications. During this 5 second window the Read Standard Data command is issued to read the data of any tag currently within scanning range.

Protocol: **RSD<crn>** ,where <crn> is \$0D carriage return.

Command Protocol	Response.	Description.
RSD<crn>	?1<crn> E0150156 1411081C<crn>	Tag not present Standard data for Tag.

Read Animal Tag Data .

This command is only valid if a FDX-B transponder is selected. This command is used to read information on a transponder encoded using FDX-B animal identification protocol as defined in ISO11784/11785.

Protocol: **RAT<crn>** ,where <crn> is \$0D carriage return.

Response:

country code _ national identity code _ animal bit status _ data block status _ checkbits _ data block <crn>
,where <crn> is \$0D carriage return.
, “ _ “ is a separator between data fields

Country code is a 3 decimal digit value used to refer to individual manufacturers. A code of 999 is used to indicate that the transponder is a test transponder and need not contain a unique identification number.

National identity code is an unique 12 digit decimal number within a country.

Animal bit status is a single digit indicating whether the transponder is used for animal identification or not. This value is set to 1 to indicate an animal identification application, and 0 otherwise.

Data block status is an indicator flag to indicate whether an additional data block exists. A value of 1 indicates that the transponder contains an additional 24 bit data block. Otherwise it is 0.

Checkbits are a 16 bit cyclic redundancy value used to check the data within a transponder.

Data Block is the information contained in the extra data block if the Data block status is 1. When the Data block status flag is 0 this value will be transmitted as 000000.

Eg.

Command Protocol	Response.	Description.
RAT<crn>	?1<crn> 999_000000001007_1_0_AEC4_000000<crn>	Tag not present String data response

Write Animal Tag Data .

This command is only valid if a FDX-B transponder is selected. This command is used to write information onto a T5557 transponder encoded according to FDX-B animal identification protocol as defined in ISO11784/11785.

Protocol: **WAT**<country code>_<national identity code>_<animal bit status>_<data block>_<transponder type> <crn>
, where <crn> is \$0D carriage return.
, data block field may be omitted if not required.
, Transponder type is "0" for T5557 transponders.

Country code is a 3 decimal digit value used to refer to individual manufacturers. A code of 999 is used to indicate that the transponder is a test transponder and need not contain a unique identification number.

National identity code is a unique 12 digit decimal number within a country.

Animal bit status is a single digit indicating whether the transponder is used for animal identification or not. This value is set to 1 to indicate an animal identification application, and 0 otherwise.

Data Block is a 6 Hexidecimal string denoting the 24 bits of data to be written into the extra data block of the transponder. If the transponder does not require an extra data block this field may be omitted.

Eg.

Command Protocol	Response.	Description.
WAT999_000000001007_1_0<crn>	?1<crn> OK<crn>	Tag not present Write performed.

Country code is 999, National identity code is 000000001007, and Animal status bit set to animal application. In this form there is no extra data block appended. Transponder type is T5557. Data block status bit is automatically set to 0 as the extra data block information has not been included in the command string. In this case the extra data block is set to \$000000.

Eg.

Command Protocol	Response.	Description.
WAT999_000000001007_1_123456_0<crn>	?1<crn> OK<crn>	Tag not present Write performed.

Country code is 999, National identity code is 000000001007, and Animal status bit set to animal application. Extra data block contains \$123456. The Data Block status bit is automatically set to 1 to indicate the presence of the data block. Transponder type is T5557.

Error Codes and Status Description.

The RFIDREAD- μ RW unit will respond to every command with either the requested data, or one of these status strings summarized here.

ERROR AND STATUS CODES.	DESCRIPTION.
?0<crn>	Command not understood.
?1<crn>	Tag not present.
?2<crn>	Tag failure to Read/Write.
?3<crn>	Access to Block 0 not allowed
OK<crn>	Function Performed Successfully.

Table 4. Error Codes and Status Description summary.

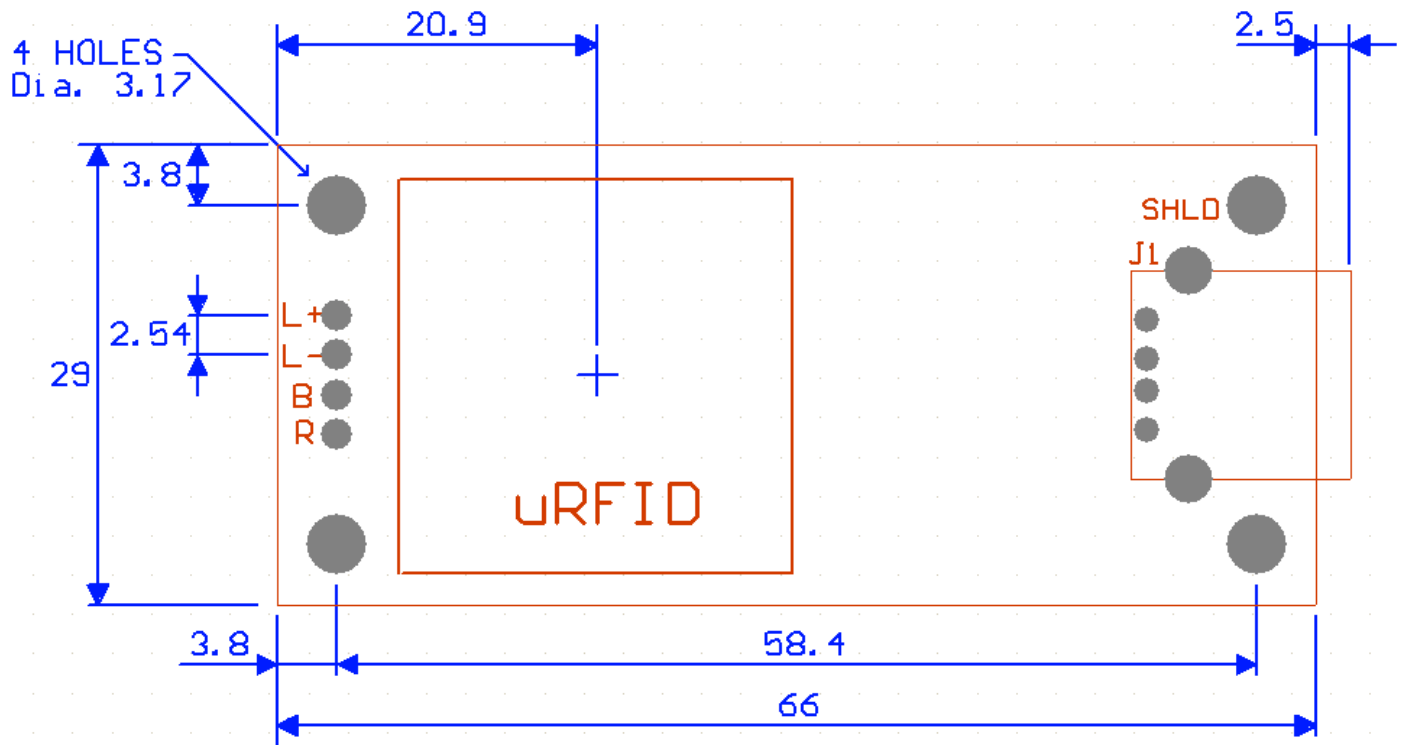
Serial protocol description:

The protocol for the Serial Input and Output lines is 9600 Baud, 8 data bits, 1 stop bit, no parity.

Limitations of the RFIDREAD- μ RW.

The T5557 transponders are capable of being set up with various encoding schemes and bit rates. However the RFIDREAD- μ RW currently only reads transponders using Manchester Encoding schemes at a bit rate of 32 cycles per bit, with the Sequence terminator pattern active. For this reason limitations have been placed on Write executions to the configuration block in order to prevent accidentally placing the transponders into an unreadable mode of operation.

Dimensions:



All dimensions in Millimeters.