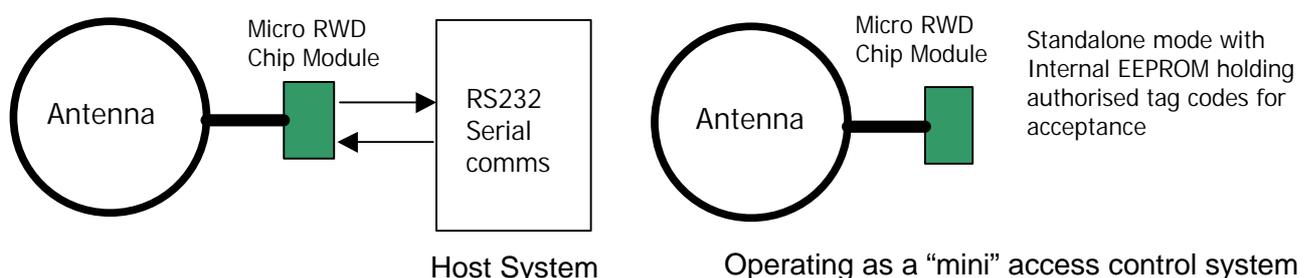# ib technology

Data Sheet

Operation of MicroRWD

The MicroRWD Evaluation board supplied in the development kit has a MicroRWD module fitted to a Universal RFID base board. This PCB has been designed with an on-board voltage regulator, power supply filtering and 13.56MHz track antenna (125kHz antenna coil is connected externally) as an example of a well developed application board. A MAX 202 level converter provides the RS232 signals or an optionally fitted USB interface allows communication to a host computer (please refer to UNI_RS232_USB.PDF data sheet for information on link settings and schematic diagram). Because all MicroRWD modules are pin compatible and share the same host command protocol, the same Evaluation board is used for all development systems, the only differences being the selection of 700uH or 1uH antenna and the Windows application software used.

When power is first applied to the board the red and green LEDs flash once to indicate successful power-up. The MicroRWD performs tests for internal faults and broken or shorted antenna, and can even detect badly tuned antennas, these problems are indicated by the red LED flashing continuously until the fault has been rectified.

The MicroRWD will normally have the red LED lit until a valid card or tag is brought into the RF field. If the tag is accepted as valid (these checks depend on the type of tag/card and the corresponding version of MicroRWD) then the green LED is lit and the output drivers are switched on. These outputs can be connected together to give up to 100ma of drive current for operating a relay etc. In addition, a switch input is provided for overriding the tag reading operation or selecting higher baud rates (depending on MicroRWD version).

Note that these features apply to the standard MicroRWD products supplied with the development kit, other versions may operate in different ways and use the OP0-OP3 output pins for additional communication protocols such as Weigand and Clock/Data etc.

The MicroRWD can be operated in a standalone mode or connected to a host computer.

Micro RWD Chip Module

Antenna — RS232 Serial comms

Host System

Micro RWD Chip Module

Antenna

Standalone mode with Internal EEPROM holding authorised tag codes for acceptance

Operating as a "mini" access control system

In both cases the red and green LEDs indicate if a valid card or tag is in the RF field. The MicroRWD can also check the serial number of the tag against an internally stored list of authorised serial numbers. If the tag's serial number is not in the list then the green LED will not light and no operation is allowed. Standalone mode is where this internal list has been pre-programmed with valid serial numbers. The MicroRWD can authorise these tags and operate the output drives etc without being connected to any external system, like a mini access control system.

The MicroRWD can also be connected to a host computer via it's serial communication port. The host computer can then use a simple set of commands to read/write data to the tags and to program configuration parameters into the MicroRWD itself.

The MicroRWD module Evaluation board has been provided with a 9-way RS232 connector and optional USB interface for connection to a PC system. The Windows application software provided allows all of the features of the MicroRWD and the tag/card type concerned to be explored and evaluated.

Windows Application Software

Using the supplied CDROM, the appropriate software for the MicroRWD version and tag/card type (located in \Win32 directory) should be selected and installed, by running the SETUP program and following the on-screen instructions. The programs have been written using Borland C++Builder 4 which is regarded as one of the best "Windows Visual C++ compiler" available, example source code for the applications is included on the CDROM.

All current Win32 platforms are supported and the software has been designed to be as simple and intuitive as possible. The first action must be to click on the COM PORT drop-down menu and to select the COM PORT being used. The communication protocol for the MicroRWD will be set up automatically and the status indicators on the main screen respond when a card/tag is placed in the RF field.

Two main windows can be selected on the Win32 application (three on Mifare version). The main TAG/CARD window shows the tag/card memory contents which can be read from or written to by selecting the READ or WRITE buttons.

The Mifare application has an additional window that allows the authentication key codes to be entered and stored on the RWD.

The final window allows the MicroRWD EEPROM memory to be programmed with configuration parameters and a list of authorised serial numbers (if used). In addition, the ABOUT drop-down displays the Win32 application version and the message response from the MicroRWD showing the type of reader, software build date and disclaimer text.

Examples of main TAG/CARD window for Hitag, EM400X and Mifare applications

The STATUS field shows the acknowledge byte (and the individual flags and their descriptions) sent from the MicroRWD in response to the commands. The TAG/CARD window shows the tag memory and has buttons allowing specific Pages or Blocks of data to be read and stored.
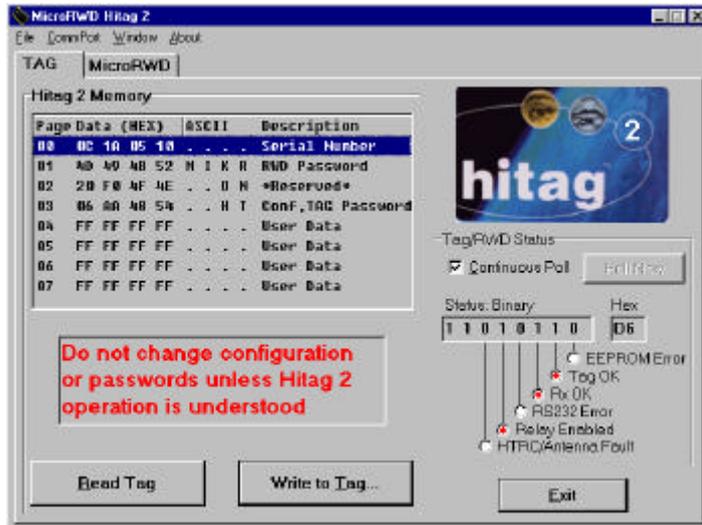
Main TAG window for Read/Write MicroRWD Hitag 2 version.
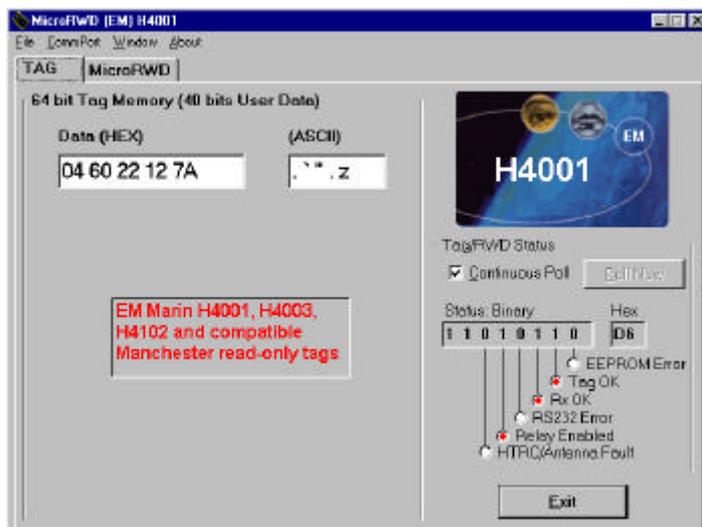
Main TAG window for read-only MicroRWD EM400X version.
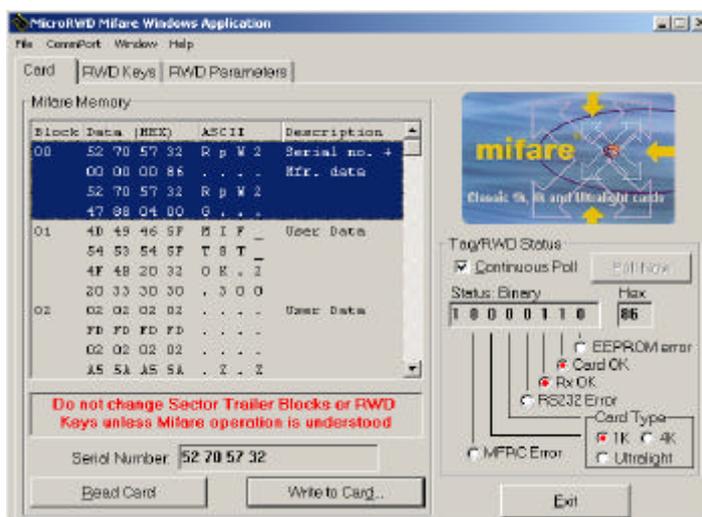
Main TAG/CARD window for Read/Write MicroRWD Mifare version.

## Examples of RWD KEY window for Mifare Win32 application

The MicroRWD Mifare application has an additional window labelled "RWD_Keys" that allows the Mifare authentication key codes to be entered and stored in RWD non-volatile memory.
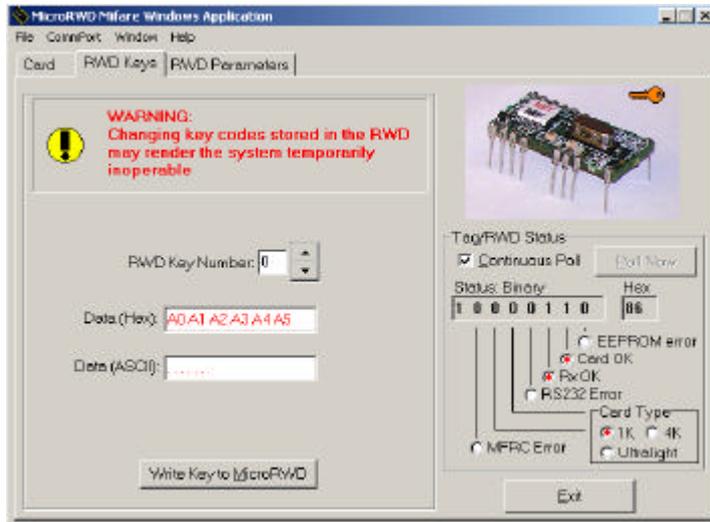
RWD Keys window for MicroRWD Mifare version.

## Example of RWD PARAMETERS window for Hitag, EM400X and Mifare applications

All the Windows applications have a window labelled "MicroRWD" or "RWD Parameters" that allows the configuration bytes, password parameters and serial number authorisation lists (if used) to be entered and stored in the RWD EEPROM non-volatile memory.
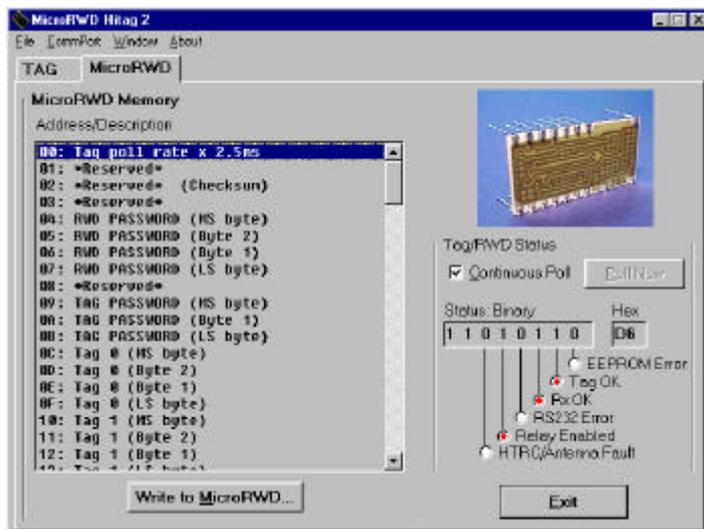
MicroRWD Parameter window showing internal memory map and various parameters that can be configured.

## Example of ABOUT window for Hitag, EM400X and Mifare applications

All the Windows applications have a drop-down ABOUT window that displays the Win32 software version and copyright information together with the "Message" command response from the MicroRWD. This string contains information on the Reader type, software build history and the IB Technology disclaimer text.
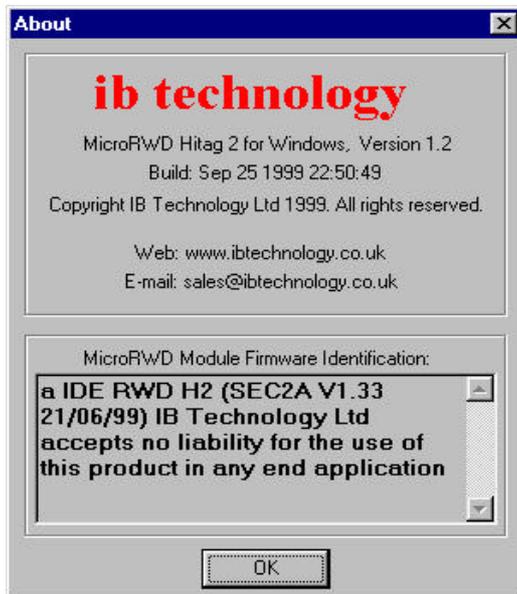

The ABOUT drop-down menu shows the firmware identification message sent from the MicroRWD.

Developing Host Communication Software

The MicroRWD modules can be interfaced to any PC or microcontroller using the serial communication interface (Tx, Rx and CTS pins). The MicroRWD responds to simple command codes and replies with an acknowledge byte (Status flags) and data as appropriate. The host commands and data structures for all the MicroRWD modules are based on the same protocol and command types and this information is detailed in the H1_PROT, H2_PROT, EM_PROT, MC_PROT, RWD_QT and MF_PROT.PDF data sheets (available on CDROM or downloadable from www.ibtechnology.co.uk website).
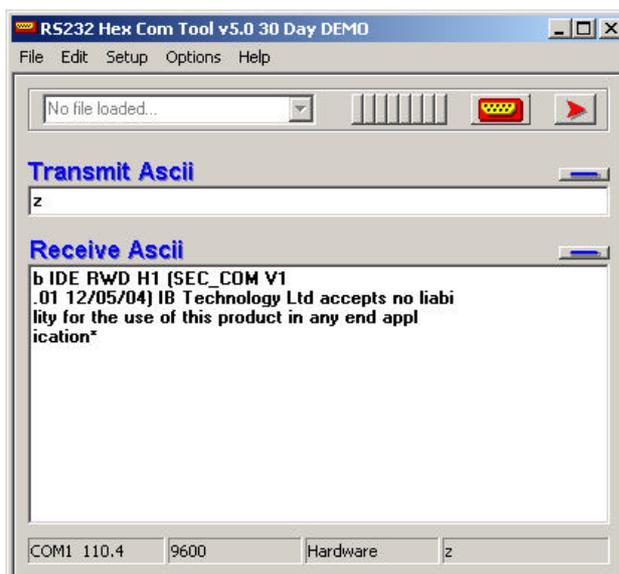
Third-party RS232 HEX COM TOOL from Virtual Integrated Design, downloadable from: www.rs232pro.com
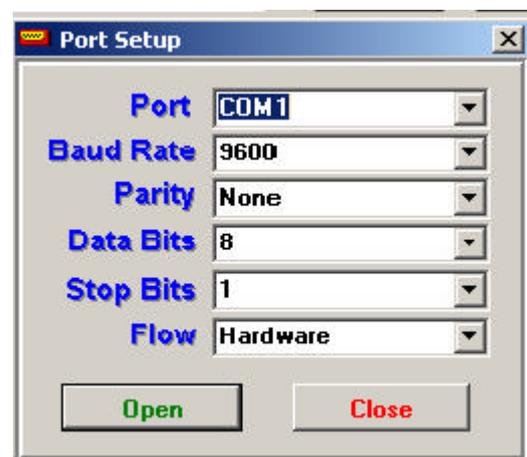
To fully understand the commands and the data structures a Windows based "RS232 Terminal" programme can be used to manually transmit the command codes and view the raw HEX/ASCII data received. We recommend the use of the third-party "RS232 HEX COM TOOL" from Virtual Integrated Design. A 30-day fully operational demo version can be downloaded from website: www.rs232pro.com and the full registered version can also be downloaded for a small fee (also available on CDROM and website: http://www.ibtechnology.co.uk/).

This third-party application is easy to use and can send and receive ASCII or HEX data as shown in the pictures above. Install the RS232 HEX COM TOOL software by running SETUP in the usual manner.

Select "SETUP" and "PORT SETUP"

Select COM port, 9600 baud, No Parity, 8 bits, 1 stop and "Hardware" flow control.

Select "OPTIONS and TX" and ensure nothing is "ticked" (i.e.. "On key press", CR, LF, Echo are NOT selected). Transmit will then occur when TX icon (Red arrow) is clicked or by pressing RETURN key.

Select "OPTIONS and RX" and ensure SPACES is "ticked". Received bytes will then have spaces between them.

Transmit and Receive Windows can be changed from Hex to ASCII display by clicking the "TRANSMIT ASCII" and "RECEIVE ASCII" text respectively.

Clicking the "Blue line" icons clears the Windows.

Note that "RS232 HEX COM TOOL Version.5.01 or later should be downloaded (www.rs232pro.com) because this version correctly supports hardware handshaking. We support the ethical use of demonstration software and request that you purchase the unlimited registered version as soon as evaluation is complete.

Note also that "RS232 Terminal" programmes such as "HyperTerminal" bundled with Windows are NOT suitable because they can only send and receive 7-bit Hex data (ASCII characters) and not 8-bit Hex data.

"RS232 Hex Com Tool Vx.x" is a trademark of Virtual Integrated Design (www.viddata.com)

No responsibility is taken for the method of integration or final use of MicroRWD

More information on the Micro RWD and other products can be found at the Internet web site:

http://www.ibtechnology.co.uk

Or alternatively contact IB Technology by email at:

sales@ibtechnology.co.uk