

## Data Sheet

### OEM-MIFARE-ICODE.PDF

7 Pages  
Last Revised 03/08/11

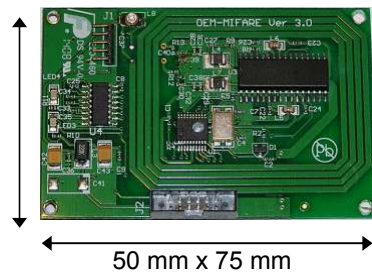
### OEM-MIFARE-ICODE Reader Board

The OEM-MIFARE-ICODE Reader Board is a complete Read/Write system for ISO14443A Mifare 1k, 4k, Ultralight and ISO15693 ICODE / TAG-IT cards and tags. DESFire and Mifare PLUS cards are supported for serial number acquisition only. It has an integrated PCB track antenna, LEDs, TTL serial and I/O interface and is available in two versions; with RS232 connector or USB (RS232 interface version requires 5 volt supply, USB version uses USB bus for power supply).

The OEM boards are based on the proven RWD-MIFARE-ICODE (MICODE) module design with components laid out inside a PCB track antenna and they function in exactly the same way as the module with an antenna fitted. The design incorporates power supply filtering to ensure optimum performance, antenna-trimming capacitor to adjust tuning for different environments and LEDs for visual indication of card acceptance. The J2 connector also allows the OEM-MIFARE-ICODE board to be reprogrammed with custom firmware.

- **Complete “plug-and-go” RFID Read / Write system based on proven design.**
- **Integrated PCB antenna, LEDs, RS232 or USB interface.**
- **Supports Mifare 1k, 4k, Ultralight and ICODE / Tag-it (including contactless read/write to Mifare ProX, SmartMX / JCOP cards).**
- **Average current consumption down to 100 $\mu$ A (micro Amps) even when fully active.**
- **Auxiliary output options for automatic data output as serial or Wiegand protocol.**
- **“Reference Design Pack” available for ultra low-cost higher volume applications.**

OEM-MIFARE-ICODE-RS232



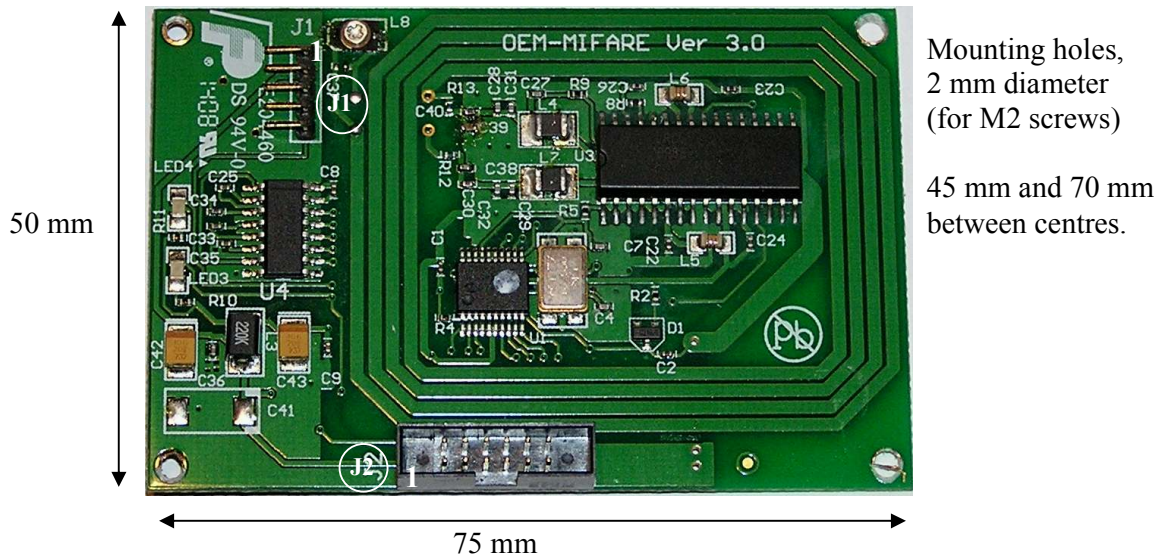
OEM-MIFARE-ICODE-USB



This document should be read in conjunction with the **MFPROT** and **MF\_ICPROT** data sheets that detail the operation and command protocol for the RWD-MIFARE-ICODE modules (and therefore OEM boards also). Because they use the same design and firmware as the RWD module (and the Universal RFID base board) the Mifare Windows applications and RS232 HEX COM utility can be used in the usual manner.

A “Reference Design Pack” is also available for customers who want to copy the board layout on their own PCB and then just purchase the pre-programmed microcontroller from IB Technology. For higher volume applications this “Reference Design” chipset solution will achieve a proven, quick time-to-market embedded Reader product at the **lowest possible cost and with minimum effort**.

## OEM-MIFARE-ICODE-RS232



**OEM-MIFARE-ICODE-RS232 connectors** (note Pin 1 positions on diagram), note same J2 connector and pin out as USB version.

**J2 connector:** 2 x 6 way, TOBY boxed IDC header, 2mm pitch ([www.toby.co.uk](http://www.toby.co.uk), C05-12-AG1-G), mates with TOBY A05-12 socket or equivalent.

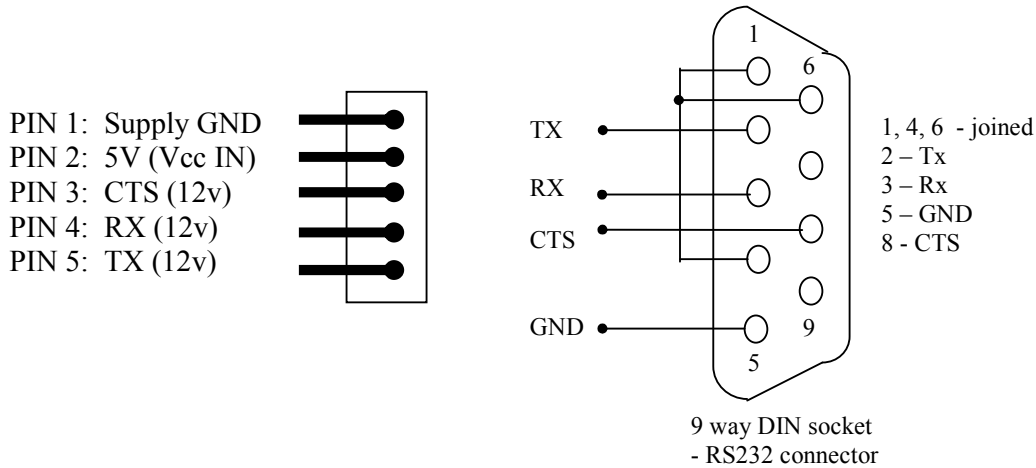
Connector J2 provides all the power, communication and control signals of the RWD-MIFARE-ICODE module on a single connector.

PIN 1: GND	■ ●	PIN 2: OP0
PIN 3: 5v (Vcc IN)	● ●	PIN 4: Red LED
PIN 5: CTS (5v)	● ●	PIN 6: OP1
PIN 7: GND	● ●	PIN 8: Green LED
PIN 9: RX (5v)	● ●	PIN 10 SW1
PIN 11: Reset (MCLR)	● ●	PIN 12: TX (5v)

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**J1 connector:** 5 way, 2 mm pitch header.

Connector J1 is used to connect the OEM-MIFARE-ICODE board to an RS232 serial port (as on a PC). Note that if J1 is connected to a standard 9-way D-type serial connector then pins 1, 4 and 6 must be joined on the D-type connector. 5-volt supply must be connected to J1 pin 2 as shown.

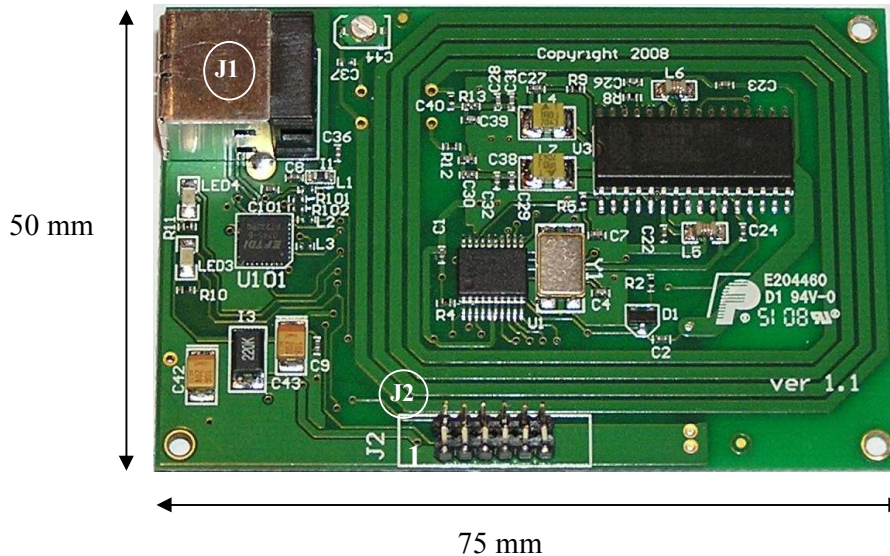


## Specifications:

Power Supply: 5 volts, **average** current consumption typically less than 50 mA. Power supply capable of providing 200mA is recommended.

Communication: 9600 baud, 8 bits, 1 stop, no parity.

## OEM-MIFARE-ICODE-USB



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**OEM-MIFARE-ICODE-USB connectors** (note Pin 1 positions on diagram), note same J2 connector and pin out as RS232 version.

**J2 connector:** 2 x 6 way, TOBY boxed IDC header, 2mm pitch ([www.toby.co.uk](http://www.toby.co.uk), C05-12-AG1-G), mates with TOBY A05-12 socket or equivalent.

Connector J2 provides all the power, communication and control signals of the RWD-MIFARE-ICODE module on a single connector.

**J2 CONNECTOR TYPE AND PIN OUT IDENTICAL TO RS232 OEM BOARD.**

**J1 connector:** USB (type B) connector.

USB connector J1 is used to connect the OEM-MIFARE-ICODE board to a standard USB host port on a PC, which also provides the 5-volt power supply via the USB bus. The FTDI VCP (Virtual COM Port) driver must be installed on the PC. This can be downloaded from IB Technology website or from FTDI website (preferred location for latest version):

(<http://www.ftdichip.com/Drivers/CDM/CDM%202.04.06.exe>).

This provides the CDC (Communication Device Class) interface on the PC and allows Windows applications to communicate with the OEM board as if it was connected to a standard COM port.

PIN 1: 5-volts  
PIN 2: DATA-  
PIN 3: DATA+  
PIN 4: Ground



## **Specifications:**

Power Supply (supplied by USB interface): **average** current consumption typically less than 50 mA. Communication via CDC (Communication Device Class) VCP (Virtual COM Port) provided by FTDI Windows driver (OEM board communication: 9600 baud, 8 bits, 1 stop, no parity).

## Configuration parameter list

The OEM-MIFARE-ICODE Reader has internal (non-volatile) configuration parameters. These are byte values that define all the Reader operational features such as the polling rate and Auxiliary output options etc.. They can be changed using the PROGRAM command (see MFPROT data sheet for command protocol).

Byte 0: Tag Polling Rate (default 0x60 = 262 milliseconds)

- 0x00 = 0mS (SLEEP and power-down is skipped)
- 0x10 = 8mS
- 0x20 = 16mS
- 0x30 = 32mS
- 0x40 = 65mS
- 0x50 = 131mS
- 0x60 = 262mS (default)
- 0x70 = 524mS
- 0x80 = 1 second
- 0x90 = 2 seconds
- 0xA0 = 4 seconds
- 0xB0 = 8 seconds

Byte 1: Auxiliary data output

- 0x00 = OFF (no output from OP0 / OP1)
- 0x01 = 24 (26) bit Wiegand OP0 / OP1
- 0x02 = 32( 34) bit Wiegand OP0 / OP1
- 0x03 = 9600 baud serial from OP0 (default)

Byte 2: Checksum Value (Reserved – do not change)

Byte 3: Mifare/ICODE option byte

- 0x00 = MIFARE mode (default)
- 0x01 = ICODE mode

Byte 4: Wiegand parity option

- 0x00 = No parity (default)
- 0x01 = Even/Odd parity added

Byte 5: Auxiliary Block Read address on card

Mifare card block address 0 - 255), default = 0x01

Byte 6: Key number / type to access Auxiliary data

- (TxxKKKKK), (T = Key type, 0 = KeyA, 1 = KeyB)
- (K = Key code number, 0 - 31)
- default = 0x00, key 0, TypeA

Byte 7: "Beep" delay parameter (default 0x00 = OFF)

Beep delay = value x 40mS, 0x18 (24 decimal) = 1 second.

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Byte 8: Auxiliary output base data selection.  
0x00 = use UID/serial number (default)  
0x01 = Perform Block Read)

Byte 9: Auxiliary output switch (redirects serial o/p)  
0x00 = Aux output from OP0 pin (default)  
0x01 = Aux output from Tx pin

Byte 10: Auxiliary output serial format, Hex or ASCII  
0x00 = HEX format (default)  
0x01 = ASCII character format

Byte 11: Auxiliary byte order option  
0x00 = Plain data as read from card (default)  
0x01 = Byte order Reversed

Byte 12 – Byte 255 forms the UID/serial number authorisation list. Groups of 4-byte serial number can be stored here for authorisation. Default condition is Byte 12 – Byte 15 = 0xFF 0xFF 0xFF 0xFF indicating the list is empty (not used).

Byte 12: 0xFF      Empty list code  
         0xFF  
         0xFF  
         0xFF      (LSB)

Byte 16: 0xFF      Empty list code  
         0xFF  
         0xFF  
         0xFF      (LSB)



Byte 252: 0xFF      Empty list code  
         0xFF  
         0xFF  
Byte 255: 0xFF      (LSB)

## **Mifare KEYCODE list**

The OEM-MIFARE-ICODE Reader has additional internal (non-volatile) memory for storing up to 32 Mifare KEYCODES. These are 6-byte “passwords” used for accessing the read/write memory on Mifare cards. They can be changed using the **STORE KEY** command (see MFPROT data sheet for command protocol). Default values are the Philips/NXP defined default values (Transport keys) for new Mifare cards.

Location 0 (0x00): Key code 0 (Default 0xFF FF FF FF FF FF)  
Location 1 (0x01): Key code 1 (Default 0xFF FF FF FF FF FF)

Location 2 (0x02): Key code 2 (Default 0xA0 A1 A2 A3 A4 A5)  
Location 3 (0x03): Key code 3 (Default 0xB0 B1 B2 B3 B4 B5)  
-  
-  
-  
Location 28 (0x1C): Key code 28 (Default 0xFF FF FF FF FF FF)  
Location 29 (0x1D): Key code 29 (Default 0xFF FF FF FF FF FF)

Location 30 (0x1E): Key code 30 (Default 0xA0 A1 A2 A3 A4 A5)  
Location 31 (0x1F): Key code 31 (Default 0xB0 B1 B2 B3 B4 B5)

Please note that if different OEM board sizes or custom features are required then the “Reference Design Pack” can be used and IB Technology can provide modified firmware to the customers specification. Please contact [support@ibtechnology.co.uk](mailto:support@ibtechnology.co.uk) for further details.

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](mailto:sales@ibtechnology.co.uk)**