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# Data Sheet

Universal RFID Socket board with RS232 / USB interface

The Universal RFID Socket board is the baseboard for the MicroRWD RFID reader modules from IB Technology.
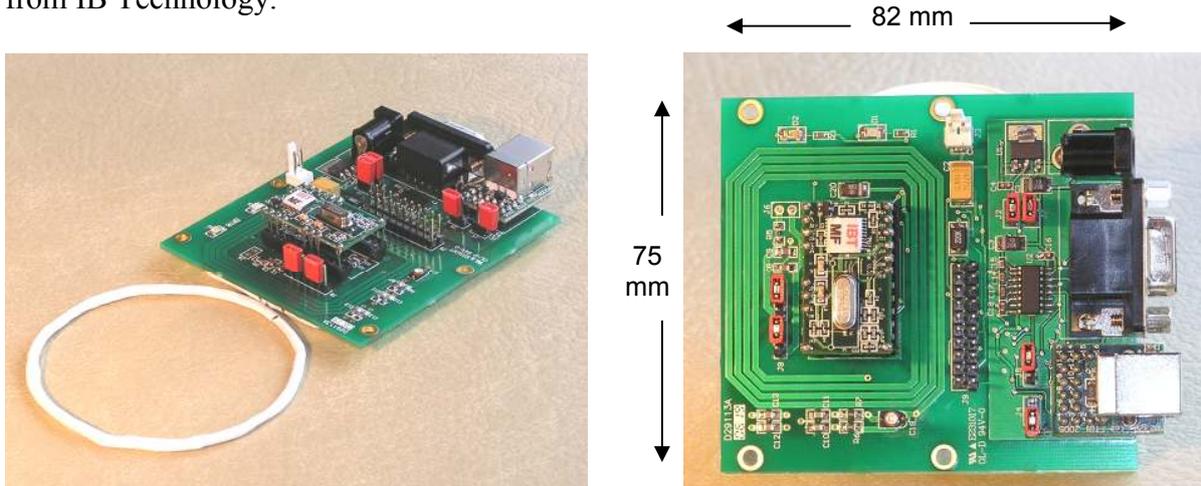
MicroRWD modules are low-cost, pin compatible and host command compatible Proximity reader modules for Hitag 1, Hitag S256/2048, Hitag 2, Mifare 1k/4k/Ultralight, ICODE SLI and EM400X/4102 RFID tags and contactless smart cards. The module solutions only require a 5v supply and an antenna coil to be fully featured read/write systems with optimised easy to use host commands. All modules use the same universal 24 pin DIP package so customers can migrate between different transponder technology with the minimum of design change.
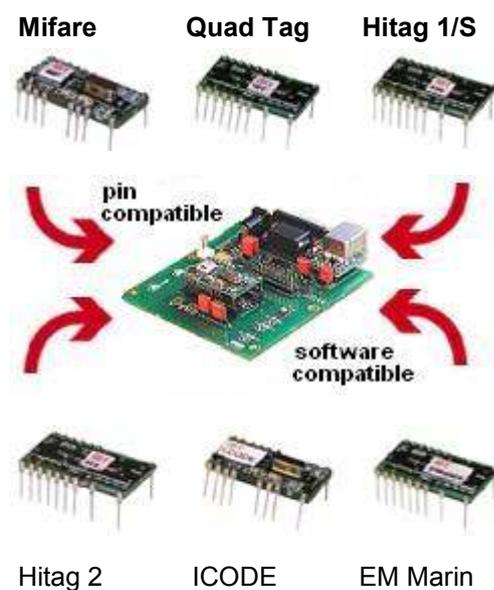
The Universal Socket board provides the antenna, power supply regulation and RS232 / USB interfaces to the MicroRWD module itself. Specifically the board has a 24 pin DIP socket for the appropriate MicroRWD module to be plugged into, LEDS for visual status indication, selectable PCB and coil based antenna for 13.56MHz and 125kHz operation and voltage regulation allowing 9-12v DC power supplies to be used.

The Universal Socket board with the appropriate MicroRWD module fitted is a complete "ready-to-use" RFID reader system and is used in the SDK/Evaluation kit together with sample tags/cards and CDROM containing all the data sheets and Windows applications (executable and C source).
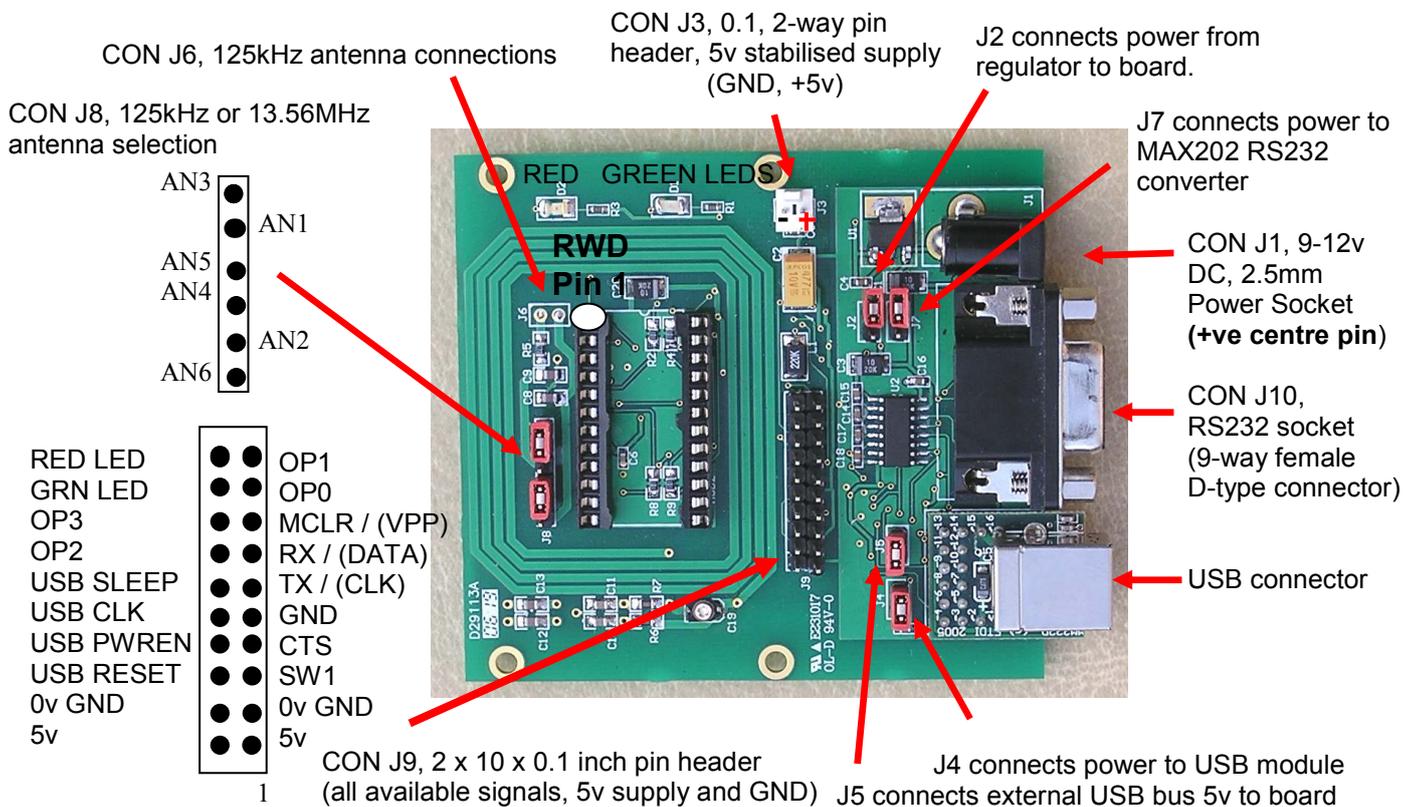
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Universal socket board (with 125kHz coil antenna mounted on the underside) was designed to fit in the Evatron EVA73 plastic case giving the option of a fully enclosed product.

The Universal socket board can be powered directly from a stabilised 5 volt supply, from the 9-12 volt DC connector or from the USB bus. The MicroRWD module itself has a low average current (approximately 15-20ma) but consumes up to 200ma in a short burst every polling cycle when the RF is turned on for the brief communication period. The Universal socket board uses a 470uF capacitor across the supply rails to smooth these current pulses and so the entire board consumes around 60 ma and can operate directly from a USB bus with no external power supply.

Universal socket board link options

The board has link options to select the on-board 13.56MHz PCB antenna or the external 125kHz antenna coil and various options for supplying power to the board and interfaces.

CON J6, 125kHz antenna connections

CON J3, 0.1, 2-way pin header, 5v stabilised supply (GND, +5v)

J2 connects power from regulator to board.

CON J8, 125kHz or 13.56MHz antenna selection

J7 connects power to MAX202 RS232 converter

AN3
AN1
AN5
AN4
AN2
AN6

RED   GREEN LEDS

RWD Pin 1

CON J1, 9-12v DC, 2.5mm Power Socket (+ve centre pin)

CON J10, RS232 socket (9-way female D-type connector)

RED LED   OP1
GRN LED   OP0
OP3   MCLR / (VPP)
OP2   RX / (DATA)
USB SLEEP   TX / (CLK)
USB CLK   GND
USB PWREN   CTS
USB RESET   SW1
0v GND   0v GND
5v   5v

USB connector

1

CON J9, 2 x 10 x 0.1 inch pin header (all available signals, 5v supply and GND)

J4 connects power to USB module
J5 connects external USB bus 5v to board

2

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Connector and link descriptions
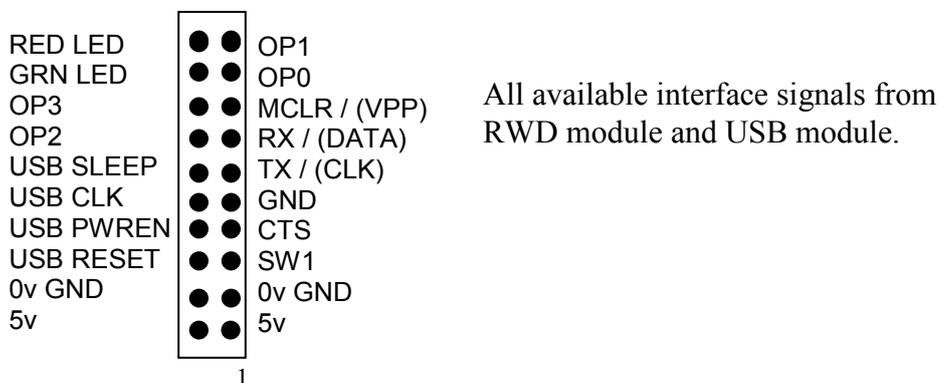
a) CON J1 (2.5mm Power Socket (+ve centre pin):
   Connector for external 9-12v DC supply.

b) Link J2 (2 pin, 0.1 inch header):
   Connects 5 volt output from on-board voltage regulator to the rest of the board.

c) CON J3 (2 pin , 0.1 inch polarised connector):
   Connector for external 5v stabilised power supply to board.

d) Link J4 (2 pin, 0.1 inch header):
   Connects 5 volt supply on board to USB module.

e) Link J5 (2 pin, 0.1 inch header):
   Connects external USB bus 5 volt supply to the rest of the board.

f) CON J6 (2 pin, 0.1 inch header):
   Connection for external 125kHz, 700 uH antenna coil.

g) Link J7 (2 pin, 0.1 inch header):
   Connects 5 volt supply on board to MAX202 RS232 level converter.

h) Links J8 (6 pin, 0.1 inch header):
   Selects on-board 13.56MHz PCB antenna or external 125kHz antenna coil.

For 125 kHz antenna
link AN1-AN5
   AN2-AN6

AN3 AN1 AN5 AN4 AN2 AN6

AN3 AN1 AN5 AN4 AN2 AN6

For 13.56 MHz antenna
link AN1-AN3
   AN2-AN4
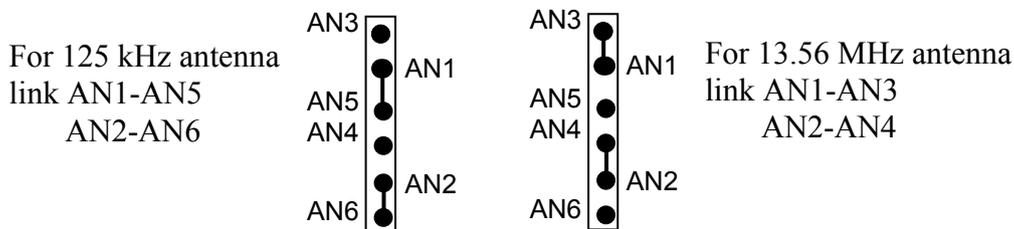
i) CON J9 (2 x 10 way, 0.1 inch header):

RED LED   OP1
GRN LED   OP0
OP3   MCLR / (VPP)
OP2   RX / (DATA)
USB SLEEP   TX / (CLK)
USB CLK   GND
USB PWREN   CTS
USB RESET   SW1
0v GND   0v GND
5v   5v

1

All available interface signals from
RWD module and USB module.

j) CON J10 (9 pin female, D-type):
   RS232 connector (1, 4, 6 joined, 2 – Tx, 3 – Rx, 5 – GND, 8 – CTS)

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Operation of MicroRWD module only with 5 volt external supply

With a MicroRWD module fitted and the 13.56MHz or 125kHz antenna selected, the module can be powered from an external 5 volt stabilised supply connected to CON J3 or CON J9. The interface and communication pins can also be accessed directly from CON J9. For this case the links J2, J4, J5, J7 can be removed to ensure that only the MicroRWD module is powered and the MAX202 and the USB module (if fitted) are OFF.

Operation of MicroRWD module using RS232 interface

The MicroRWD module can be powered from an external 5 volt stabilised or 9-12 volt un-regulated supply (Link J2 set accordingly). For RS232 communication, link J7 should be closed to power the MAX202 device. A standard RS232 extension cable (straight-through, pin-to-pin) is used to connect CON J10 to a PC COM port or other host RS232 interface.

Operation of MicroRWD module using USB interface (if fitted)

The MicroRWD module can be connected to and powered from an external USB bus.
To ensure the board consumes minimum power, links J2 and J7 should be removed to disconnect the MAX202 power and regulator supply. Links J4 and J5 should then be closed to connect the external USB bus 5 volt supply to the USB module and the MicroRWD itself.

The Universal RFID socket board uses the low-cost FTDI (Future Technology Devices International Ltd) MM232R "serial to USB converter" module. If not already fitted, the module can be purchased on-line from http://www.ftdichip.com/
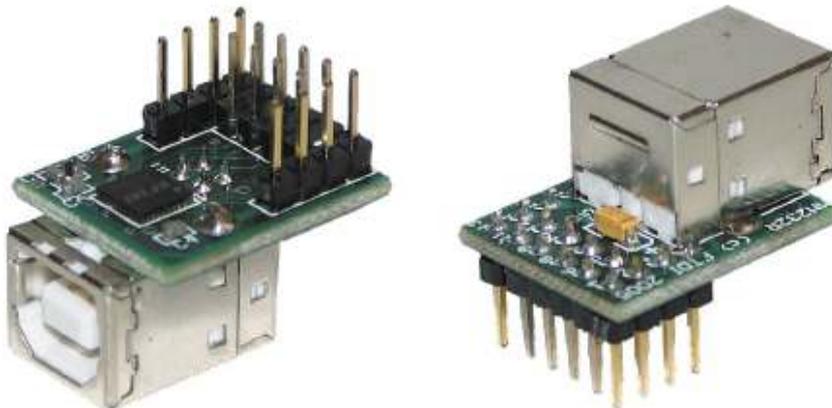
FTDI USB – serial interface module MM232R

The USB module should be connected to the PC USB port using a standard USB connecting cable. All the Windows applications for the MicroRWD module currently communicate with the serial COM ports and assume RS232 connection. FTDI provide a VCP (Virtual COM Port) driver for the MM232R module that allows standard RS232 communication programs to operate over the USB bus. The VCP drivers for various Operating Systems can be downloaded from http://www.ftdichip.com/Drivers/VCP.htm and installed according to the supplied instructions (VCP driver file: CDM 2.00.00 or later). With the Universal RFID board connected to the USB bus, the Windows applications can be run in the usual manner with a COM port selected higher than the maximum COM port number on the PC being used.

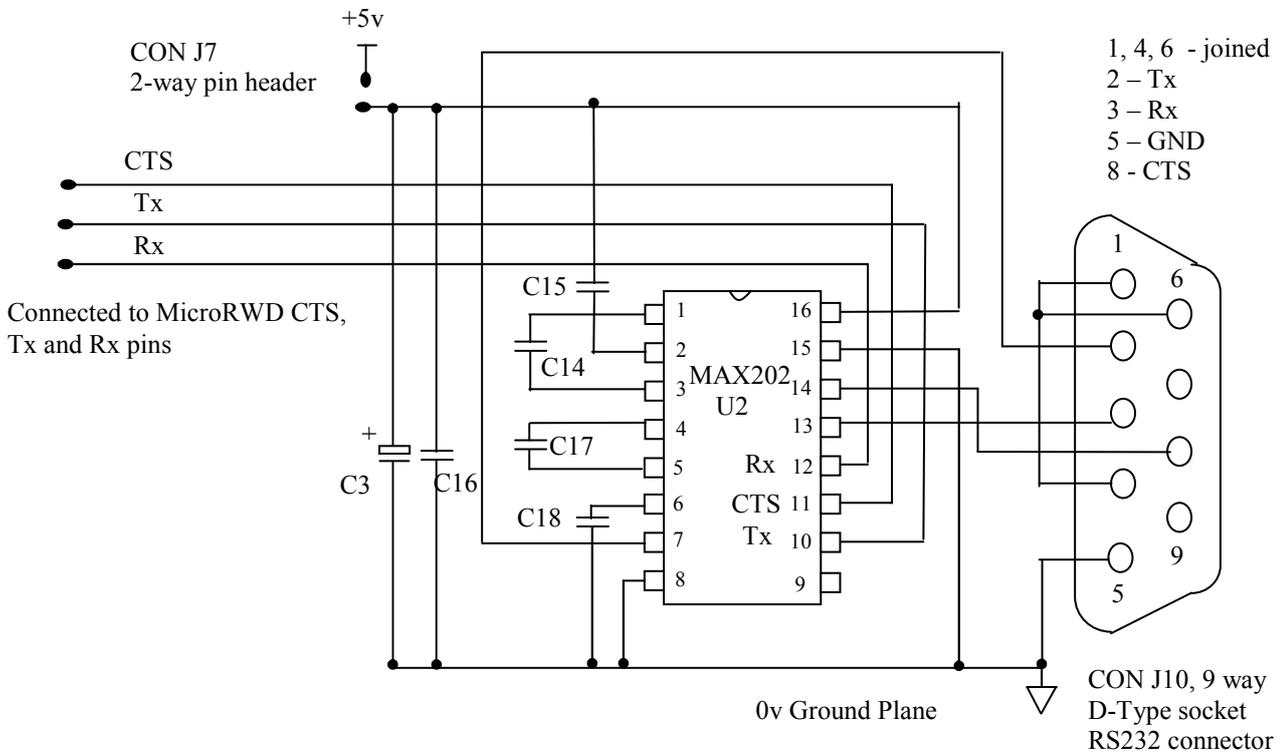# ib technology

FTDI MM232R USB Module pin out and PCB pad layout

FTDI MM232R
USB/RS232 module, MOD1

Connected to MicroRWD CTS,
Tx and Rx pins
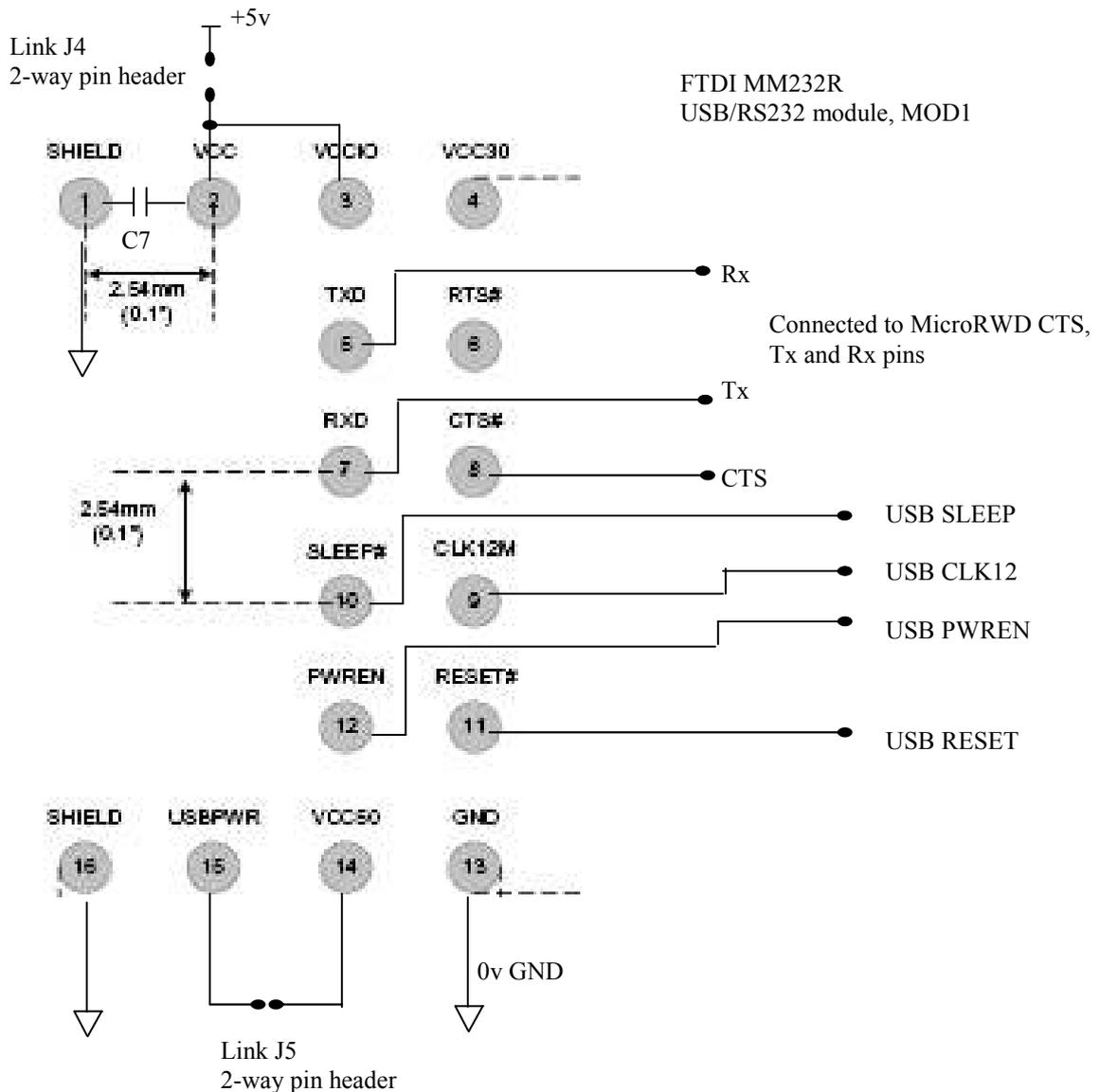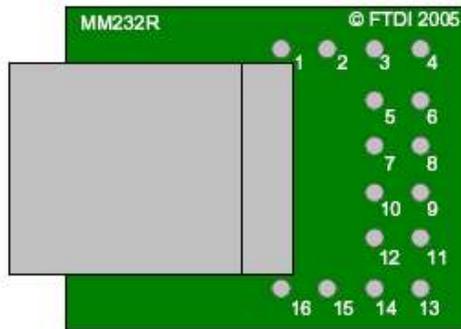
For USB powered RFID board, short links J4 and J5
For external 5v supply, short link J4, open link J5

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RS232 interface circuit and connector pin out

(DCD, DTR, DSR joined)
MicroRWD CTS (BUSY) connected to CTS

CON J7
2-way pin header

+5v

1, 4, 6 - joined
2 – Tx
3 – Rx
5 – GND
8 - CTS

CTS

Tx

Rx

Connected to MicroRWD CTS,
Tx and Rx pins

C15

C14

MAX202
U2

C17

Rx

C3   C16   C18   CTS

Tx

1   16
2   15
3   14
4   13
5   12
6   11
7   10
8   9

1   6

5   9

CON J10, 9 way
D-Type socket
RS232 connector

0v Ground Plane

SINGLE SUPPLY TTL TO RS-232

+5V

.1uF

1 c1+   16 Vcc

.1uF   3 c1-   **MAXIM**   v+ 2
                202E

.1uF   4 c2+   v- 6

5 c2-

.1uF

.1uF

.1uF

TTL   11 T1IN   T1OUT 14   RS-232

100K   TTL   10 T2IN   T2OUT 7   .01uF   RS-232

100K   TTL   12 R1OUT   R1IN 13   .01uF   RS-232

TTL   9 R2OUT   R2IN 8   RS-232

15 GND
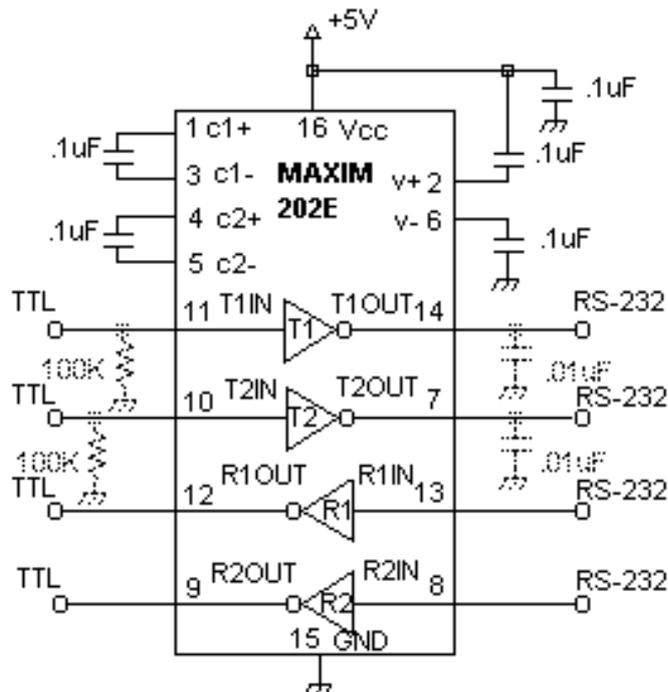
Shaded components used as needed
to prevent jitter and noise

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MicroRWD module interface circuit and pin out

RWD +5v

R1, R3 1k

D2
Red LED

D1, Green LED

MCLR/Vpp

SW1

OP3

R2, R8

OP2

0v GND

AN3
AN1

AN5
AN4

AN6

AN2

CON J8
For 125kHz antenna link AN1-AN5, AN2-AN6
For 13.56MHz ant' link AN1-AN3, AN2, AN4

RWD +5v

AN1

AN2

Micro
RWD
(MOD2)

1   24

12   13

0v GND

CTS

Tx

Rx

RWD +5v

OP0

OP1

R4, R9

CON J9, 2 x 10 x 0.1 inch
pin header

Red LED   OP1
Grn LED   OP0
OP3   MCLR/Vpp
OP2   Rx(Data)
USB SLEEP   Tx(Clk)
USB CLK   GND
USB PWREN   CTS
USB RESET   SW1
0v GND   0v GND
5v   5v

1

1 uH PCB antenna (L2)

C12 = 22pF

C19, 5-50pF
trimming
capacitor

R6, 0R

C10 = 180pF

AN3

C11 = 220pF

R7, 0R

AN4

C13 = 22pF

R5
C8, C9

ANT1, L3
700uH Antenna

27R   47pF   AN5

AN6

47pF

Through hole solder pads for wire coil connection.

CON J3, 0.1, 2-way pin
header, 5v stabilised supply

RWD+5v

L1, 22uH

C2, 470uF
low ESR

47nF

+5v

C20

C6   C5

47nF

C1

0v GND

C4

Link J2
0.1, 2-way pin header

CON J1, 9-12v DC, 2.5mm Power Jack
Socket (+ve centre pin)

LM1117 REG (U1)

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MicroRWD pin out

Pin Name	DIP No.	I/O Type	Buffer Type	Description
LED1	1	O	TTL	Red LED connection. 25ma max sink current
LED2	2	O	TTL	Green LED connection. 25ma max sink current
RESET	3	I	ST	Reset pin internally pulled high. Active low. Normally not connected
SW1	4	I	ST	Switch input to override output drives or select baud rate. Internally pulled high. Active low
OP3	5	O	TTL	Aux output drive. 25ma max sink current.
OP2	6	O	TTL	Aux output drive. 25ma max sink current.
GND	7	P	-	Ground reference for logic and analogue pins
VCC	8	P	-	+5v Positive supply
AN1	9	P	AN	Antenna connection. Up to 200ma peak current. +/- 100v peak voltage. 125kHz or 13.56Mhz drive into 700 uH or 1 uH antenna.
-	10	-	-	Not connected
-	11	-	-	Not connected
AN2	12	P	AN	Antenna connection.
GND	13	P	-	Ground reference for logic and analogue pins. Normally used for antenna screen connection
-	14	-	-	Not connected
-	15	-	-	Not connected
-	16	-	-	Not connected
-	17	-	-	Not connected
-	18	-	-	Not connected
OP1	19	O	TTL	Aux output drive. 25ma max sink current.
OP0	20	O	TTL	Aux output drive. 25ma max sink current.
VCC	21	P	-	+5v Positive supply
RX	22	I	TTL	Serial communication Receive line. 9600 baud, 8 bit, 1 stop, no parity
TX	23	O	TTL	Serial communication Transmit line
CTS	24	O	TTL	Serial communication CTS handshake. RX enabled when CTS low and disabled when high.

(I/O = Input/Output, AN = Antenna output, P = Power, ST = Schmitt Trigger input, TTL = TTL logic I/O)

Standard 0.1 inch / 2.54 mm pitch. "wide" 24 pin DIL layout.

30.5 mm

1   24

Micro RWD

Pins mounted to hybrid flush with substrate.

PCB Row Spacing 17.5 mm

12   13

17.5mm

Unconnected pin pads

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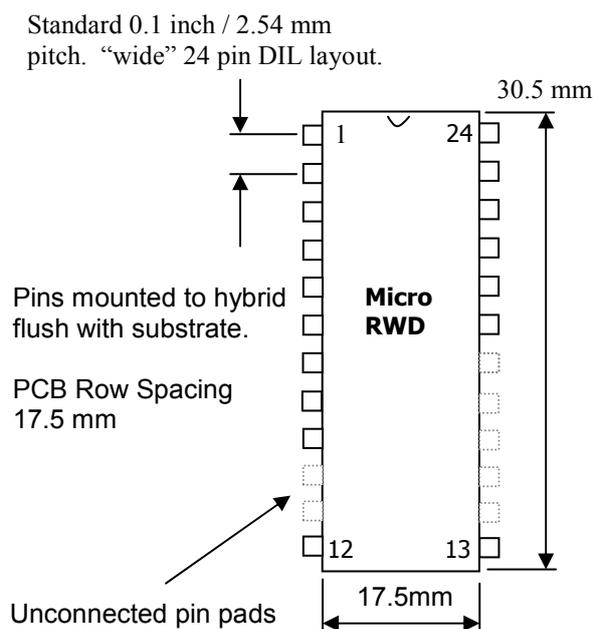
Universal RFID socket board specifications

Basic preliminary electrical specifications.

Parameter	Typical Value
Supply Voltage	5v DC regulated or 9-12v DC unregulated.
Operating temperature	-25 deg C to + 70 deg C
Average current consumption: MicroRWD + LEDs ONLY (default 100ms RF-OFF polling delay)	Approx 20ma
Average current consumption: MicroRWD + LEDs + RS232 interface.	Approx 25ma
Average current consumption: MicroRWD + LEDs + USB interface.	Approx 25ma
Maximum board current (MicroRWD + all interfaces active)	Approx 60ma
Peak antenna voltage (optimum antenna tuning)	Up to +/- 100v (200v peak-to-peak)
Peak antenna current (optimum tuning)	Up to 200ma
Communication time for Tag authentication	20ms (Hitag)
Communication time for 32 bit WRITE operation	30ms (Hitag)
Maximum data rate (between Tag and RWD)	4k baud or 53 / 106k baud
Range (dependent on antenna dimensions and tuning)	Up to 20cm (125kHz) or 10cm (13.56MHz)
Auxiliary output drive current	Up to 25ma sink
Switch input (pulled up)	Active low
Serial Interface	TTL level RS232 or +/- 12v RS232
Communication Parameters (depending on MicroRWD type)	9600/38400 baud, 8 data bits, no parity, 1 stop bit protocol with CTS handshake

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