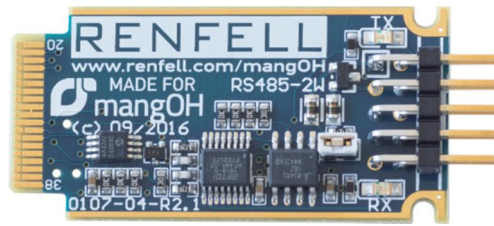**MADE FOR mangOH™**

Renfell Engineering Pty Ltd

RS485 2 Wire

mangOH™ Internet of Things card

Introduction

The Renfell Engineering RS485 2 Wire IoT card enables the mangOH™ development board to connect to devices and networks that use the half duplex RS485 serial bus protocol to communicate. Based around a highly integrated FTDI chipset, standard and non-standard baud rates from 183 baud up to 3Mbaud are available. Separate TX and RX LEDs provide a visual indication of transmit and receive data as an aide to debugging data communications.

For ease of use, the driver direction switching is managed in hardware, and the USB device simply maps to a standard `/dev/ttyUSBx` device in the operating system.

The 120R network termination resistor can be enabled or disabled by inserting or removing an on-board Jumper – thus allowing the card to be placed either at the end or in the middle of a RS485 network.

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Important Notice

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Board Overview
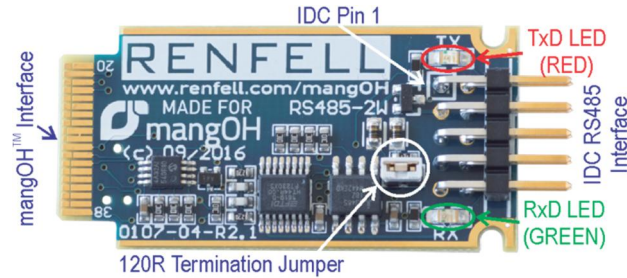
Block Diagram
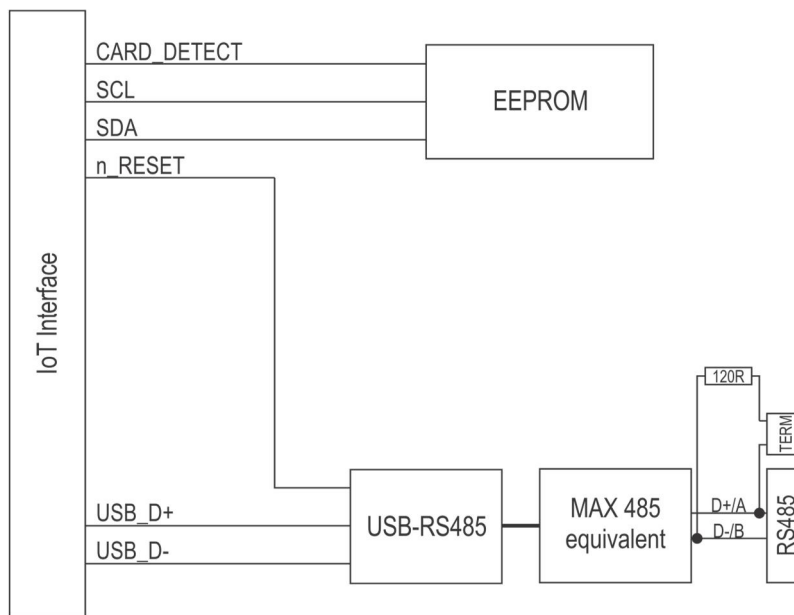
Connection Details

Connection to the IoT card is via an IDC-10 connector. It is recommended that the Renfell IDC-10 to DB9 Transition Cable (P/N 34-00012) be used to convert the IDC connector to a standard DB9M DTE interface.
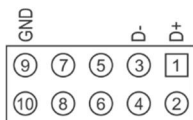
IDC-10 connection

looking INTO IoT card

Signal Name	Direction into IoT card	IDC-10 Pin No	DB9M Pin No
D+/Rx+	I/O	1	1
D-/Rx-	I/O	3	2
GND		9	5

Usage Example

> Note: The IoT card MUST be 'enabled' by de-asserting the *n_RESET* pin on the IoT connector before it will respond to commands

Test that the IoT card is recognised by the mangOH^{TM} board

1. Open a SSH windows to the mangOH^{TM} board and log in as root.
2. In the SSH window, type the following at the shell prompt:

```
logread –f | grep –i "usb"
```

3. Insert the IoT card into one of the slots on the mangOH^{TM} board. Something similar to the following should be displayed in the first SSH window:

```
Jan  6 00:05:08 mangoh-57 user.info kernel: [  301.936181] usb 1-1.3.3: new full-
speed USB device number 9 using msm_hsic_host
Jan  6 00:05:08 mangoh-57 user.info kernel: [  302.030367] ftdi_sio 1-1.3.3:1.0:
FTDI USB Serial Device converter detected
Jan  6 00:05:08 mangoh-57 user.info kernel: [  302.050144] usb 1-1.3.3: Detected FT-
X
Jan  6 00:05:08 mangoh-57 user.info kernel: [  302.052891] usb 1-1.3.3: Number of
endpoints 2
Jan  6 00:05:08 mangoh-57 user.info kernel: [  302.057317] usb 1-1.3.3: Endpoint 1
MaxPacketSize 64
Jan  6 00:05:08 mangoh-57 user.info kernel: [  302.089546] usb 1-1.3.3: Endpoint 2
MaxPacketSize 64
Jan  6 00:05:08 mangoh-57 user.info kernel: [  302.093514] usb 1-1.3.3: Setting
MaxPacketSize 64
Jan  6 00:05:08 mangoh-57 user.info kernel: [  302.101327] usb 1-1.3.3: FTDI USB
Serial Device converter now attached to ttyUSB0
```

Note that the formatting may be different depending on the width of the SSH window.
4. Now remove the IoT card from the mangOH^{TM} board.

```
Jan  6 00:23:40 mangoh-57 user.info kernel: [ 1413.509934] usb 1-1.3.3: USB
disconnect, device number 9
Jan  6 00:23:40 mangoh-57 user.info kernel: [ 1413.518876] ftdi_sio ttyUSB0: FTDI
USB Serial Device converter now disconnected from ttyUSB0
```

To cancel the logread, click in the SSH window and press <CTRL-C> to return to the shell prompt:

```
^C
root@mangoh-57:~#
```

Test the RS485 serial connection

> Note: A RS485 to RS232 adapter or RS485-USB adapter will be needed to test the RS485 serial connection.

1. Open a SSH windows to the mangOH^{TM} board and log in as root.
2. Ensure that the 120R termination jumper is fitted on the IoT card.
3. Ensure the IoT card is inserted into the mangOH^{TM} board.
4. Connect the IDC-10 to DB9 Transition Cable (Renfell P/N 34-00012) to the IDC-10 connector on the IoT card.
5. Connect the DB9 to a PC using a RS485 adapter as noted above.

6. Open a terminal program (such as TeraTerm Pro - http://ttssh2.osdn.jp/index.html.en or PuTTY - http://www.chiark.greenend.org.uk/~sgtatham/putty/) on the PC.
7. In the terminal program, set the appropriate Port and the following serial parameters:
   Baud: 9600
   Data: 8 bit
   Parity: None
   Stop: 1 bit
   Flow control: None
8. In the SSH window to the mangOH^{TM} board, type the following:

```
echo "Hello, world" > /dev/ttyUSB0
```

The red TX LED should flash briefly on the IoT card, and the text "Hello, world" appear in the terminal program on the PC.

9. In the SSH window to the mangOH^{TM} board, type the following:

```
cat /dev/ttyUSB0
```

10. In the PC terminal program, type the following:

```
Hello right back
```

and press enter. The green RX LED should flash briefly on the IoT card, and the text "Hello right back" should appear in the SSH window to the mangOH^{TM} board.

11. Exit the cat command on the mangOH^{TM} board by pressing <CTRL>-C

```
root@mangoh-57:~# cat /dev/ttyUSB0
Hello right back
^C
root@mangoh-57:~#
```

Errata

1. FTDI Kernel module drivers are only available in Legato Release 16.01 for mangOH^{TM} or later

References

· Latest product information: http://www.renfell.com/mangOH/index.html
· mangOH^{TM} and Legato Tips, Articles and Tutorials: https://www.littlesliceofmangoh.com
· USB-Serial converter IC: http://www.ftdichip.com/Products/ICs/FT230X.html
· Legato information: http://legato.io
· mangOH^{TM} information: http://mangoh.io