# Fibre I2C2PC

## ADDING FIBRE OPTIC INTERFACE TO THE I2C2PC ADAPTOR

### Summary

The use of a fibre optic connection offers some unique advantages in certain circumstances.

- Almost infinite isolation voltage as cables are completely non-metallic
- Absolute confidence in the isolation barrier
- Complete Radio Frequency isolation is possible with complete confidence.

The I2C2PC adaptor has auxiliary serial socket.

A new interface board connects to this and provides a plastic optic fibre (POF) interface using the commonly available TOSLINK system. TOSLINK cables are the most readily available fibre optic cables, stocked by most electronics and audio stores. Range is specified for up to 15m of 1mm POF cable. Toslink uses red light, so you can debug connectrions by eye!

To software the interface remains the same as RS232 and USB: It is still a comport interface.



**Figure 1: Toslink Adaptor**

# 1  Advantages of Fibre

## 1.1  Galvanic Isolation: Safety and Complete Confidence

We offer a standard galvanically isolated adaptor. However if the voltage is very high, this is not suitable. The isolation is ultimately dependent on the integrity of a tiny microcircuit, a few millimetres of plastic, and faith that it will all work like the manufacturer said. If the cost of failure is very high, then it takes a lot less faith to believe that several metres of plastic fibre cannot go wrong.

## 1.2  RF Isolation: Total and Predictable Isolation of data lines.

Similarly in RF test equipment, transmitters, and scientifc research, it can be very difficult to achieve >160dB of RF isolation on a high speed data line, and equally difficult to have confidence that it has been achieved and will stay that way. Optic fibre can easily, repeatedly, stably and predictably achieve it.

## 1.2.1 Special Advantage of I2C

In RF equipment the I2C bus has a special advantage over other interfaces such as async serial (RS232). The I2C bus does not require a running clock. When the bus stops, the chips will generate no noise. Even where a microprocessor is used as a slave, it can be put into clock shutdown, and will wake on I2C.

The multi-drop addressable nature of the bus reduces the number of lines that need to cross RF isolation barriers, reducing filtering problems and easing design.This makes I2C chips excellent for RF test equipment control.

## 2    4 Fibre vs 2 Fibre connections

The TOSLINK adaptor PCB has 2 transmitters and 2 receivers. You can use the whole board as a 4 fibre, hardware handshaking, adaptor. Or you can cut the board into two adaptors and only have RX and TX fibres, by fitting a second TTL serial connector. *Do not use the right hand half for the I2C2PC connection*

## 3    5V operation

The I2C2PC uses a 5 V supply, and the TOSLINK modules use 3.3V. The left hand end has a regulator for 5V operation. For 3.3V applications fit the jumper. *Do not use the right hand half for the I2C2PC connection*



## 4    Fibre-PC Adaptor

The adaptor can be interfaced to the PC with a MAX232 type convertor. We can supply a USB to Fibre adaptor for this job if required.

## 5    Pre-Assembled Adaptors

As this is a very specialised requirement it is not ex-stock. However we have a certain number of fibre adaptors and can build to order for you. Contact sales@i2cchip.com for price and more information.

If you have purchased a preassembled adaptor then:
- The adaptor is set for Fibre. To use RS232 or USB, you will need to remove the jumpers inside the case.

## 6    You will need:
- Fibre adaptor pcb
- 2pin and 3 pin 0.1'' headers and 3 shunts.
- Micromatch 6 female, same as used for I2C.

- Micromatch male-male cable.
- An RS232 or USB to TTL serial interface for the PC end

## 7  How

- Add micromatch CN9 to the I2C2PC adaptor.
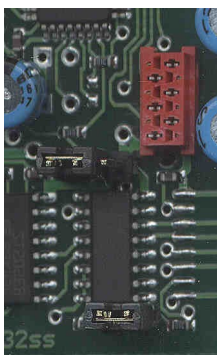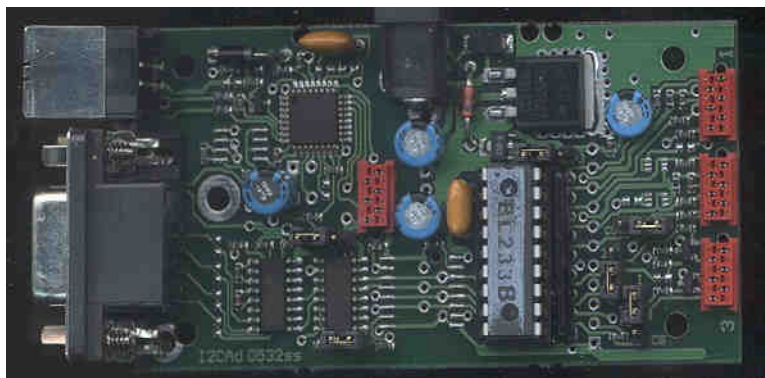- Add pin headers J1 and J2 to the I2C2PC, and jumper as shown.



**Figure 7.2.:**



**Figure 7.1.:**

- Use a double ended micromatch cable. (Note that pin 1 of the AUX connector is on the bottom, unlike the I2C ports)

| # | I2C2PC CN9 | # | |
|---|------------|---|---|
| 1 | VCC (+5) | | |
| 2 | CTS (out) | | |
| 3 | RXD (out) | | |
| 4 | TXD (in) | | |
| 5 | RTS (in) | | |
| 6 | GND | | |

- Power up the I2C2PC adaptor with the Fibre module plugged in. The TX (out) module will glow red. If using a 4 fibre connection the TX/RTS will not glow. (it glows to stop data flow)
- Power up your RS232-Fibre adaptor at the PC end. The TX should glow. With a 4 fibre interface, you will be able to turn on the TX/RTS from the "pins" tab in Realterm
- Remove the clear dust protection plugs, and connect the fibres. You can see the light coming out the end of the fibre before you plug it into the reciever.
- Now it should be working! Type *"?"* and the adaptor should reply eg with "18"

- If it not talking to the I2C2PC adaptor: First make sure the jumpers J1, J2 on the I2C2PC are correct.
- Stick the module outside the I2C2PC case with double sided foam tape, or 3M Dual Lock velcro tape, and reassemble once it is all working. Alternatively it will fit in another matching box with the mounting holes on the pcb.

***Warning: Do not accidentally plug the module into an I2C port.*** The AUX interface CN9 has totally different pinout. If someone else might do this unintentionally, glue the connector down or attach a note in the unit.

## 8   Software

No software changes are needed as the Fibre adaptor is still another comport as far as software is concerned.

## 9   Selecting Interfaces in I2C2PC

*Make sure the jumper by the DB9 is not fitted*
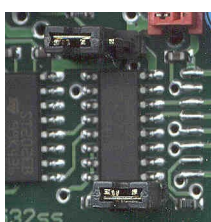


**Figure 9.1.:**

With the jumper fitted as shown in the picture the AUX Fibre interface is selected. The jumper only selects the source of signals *from* the PC. Data returning *from* the adaptor always comes out all three ports (RS232,USB,Bluetooth). This is useful for debugging.

| *J1* | *J2,J3* | *Mode* |
|------|---------|--------|
| none | none | Autoselect USB/RS232<br>Selects USB when it is enumerated |
| none | USB (left) | USB only |
| none | RS232 (right) | RS232 only |
| fitted | none | invalid |
| fitted | USB (left) | AUX (Fibre) Only |
| fitted | RS232 | invalid |