

WUSB MAC-PHY Interface Connector Specification

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1 Preface

1.1 Scope of this Revision

Version 0.95 of the WUSB MAC-PHY Interface Connector Specification has connector, pin-out and placement and component height restrictions.

1.2 Revision History

Revision Number	Date	Description
0.92	3/10/05	Release Draft
0.95	12/1/2005	Added component height restrictions for MAC and PHY Updated cable description

2 Introduction

This document describes a WUSB MAC-PHY mechanical interface for prototyping, integration and early testing of WUSB MAC and PHY implementations, location shown in Figure 1. Both MAC and PHY designs benefit from a standardized connector and form factor interface. It eases integration efforts by eliminating the need for adaptor boards which can degrade signal integrity.

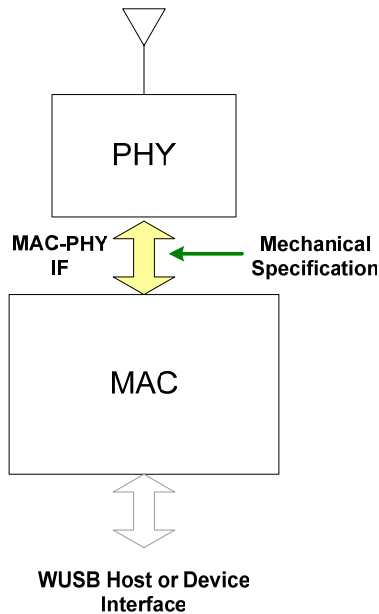


Figure 1 WUSB MAC-PHY Interface Block Diagram

This document describes a connector scheme that allows two types of connections:

- Direct board to board connection – best electrical connection and most compact size
- Cabled connection – provides for greater flexibility in MAC and/or PHY size and form factor.

The connector should meet the following criteria:

- Availability of connector and cables across multiple geographies.
- Sufficient number of contacts for MAC-PHY signals.
- Sufficient number of contacts for power and ground pins.
- Easy to probe with test equipment like Oscilloscopes, Logic Analyzers and Protocol Analyzers.

This document specifies a 2x20 0.1 inch pin spacing IDE style header for the PHY interface connector and 2x20 0.1 inch pin receptacle for the MAC connector.

The intent of the this connector specification is to reduce development costs and time for MAC and PHY implementations by defining a standard connector interface for prototyping and interoperability testing. This document defines a connector interface to which MAC and PHY vendors can develop.

The authors of the specification do not make claims of suitability of this connector for production boards as it remains outside the scope of this effort. It will remain up to the individual companies to determine the applicability of this specification for their specific product design.

3 Connector

The specified connectors are a 2x20 Vertical, T/H Type 2.54mm pitch [0.1”x 0.1”] dual row shrouded header (IDE style) for the PHY board and a 2x20 Vertical, T/H Type 2.54mm pitch [0.1”x 0.1”] dual row receptacle. See the following two figures for example footprints included for reference.

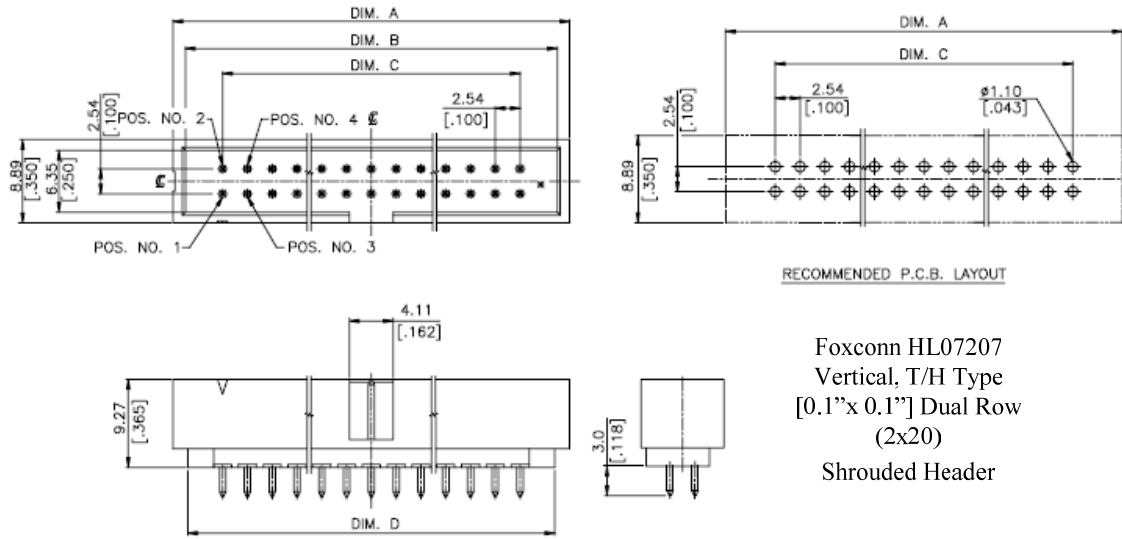


Figure 2 PHY Board 2x20 Shrouded Header

Figure 1 displays the footprint data for a Foxconn HL07207 Vertical, T/H Type [0.1”x 0.1”] dual row (2x20) shrouded header. For proper keying, pin 20 of the header should be removed.

The specific part shown for the 2x20 header is an example for illustration purposes. Many manufacturers make equivalent connectors.

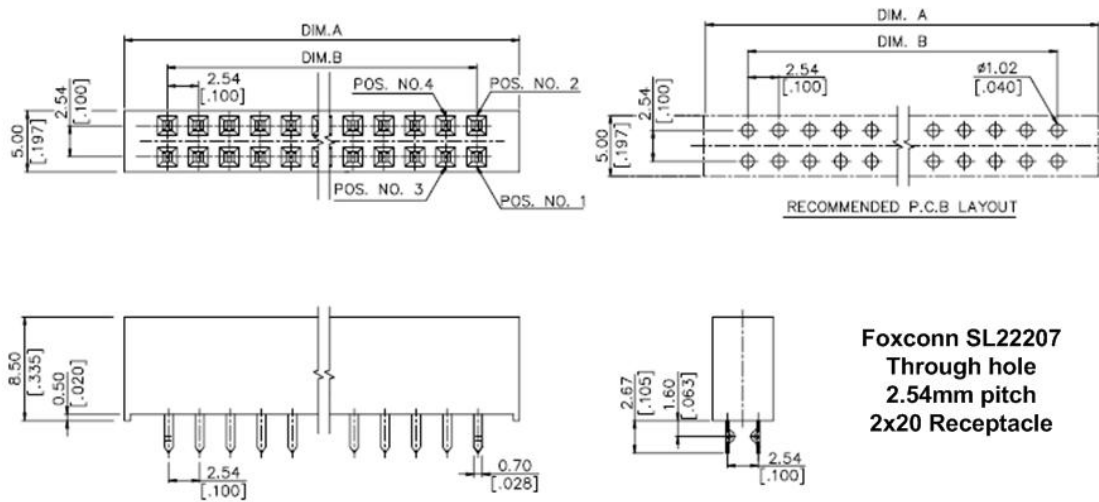


Figure 3 MAC Board 2x20 Receptacle

Figure 2 shows the footprint data for a Foxconn SL22207 Vertical, T/H Type [0.1”x 0.1”] dual row receptacle. For proper keying, pin 20 of the receptacle should be plugged.

The specific part shown for the 2x20 receptacle is an example for illustration purposes. Many manufacturers make equivalent connectors.

4 MAC – PHY Mechanical Considerations

For mechanical dimensions and connector placement considerations the following conventions are used:

MAC

- Primary (component) side is the PCB side that faces the PHY card when connected.
- Secondary (solder) side is the PCB side opposite the MAC-PHY interface connector.

PHY

- Primary (component) side is the PCB side that faces away from the MAC board when plugged into the MAC-PHY connector.
- Secondary (solder) side is the PCB side that faces the MAC board when plugged into the MAC-PHY connector.

4.1 Retention mechanism/mounting Holes

The following figure shows the position of the MAC-PHY mounting hole positions referenced to the connector pin 1 location. While they are optional, it is highly recommended to include at least one for mechanical support. The upper left mounting hole (marked UL in the figure) is the minimum recommended mounting hole location.

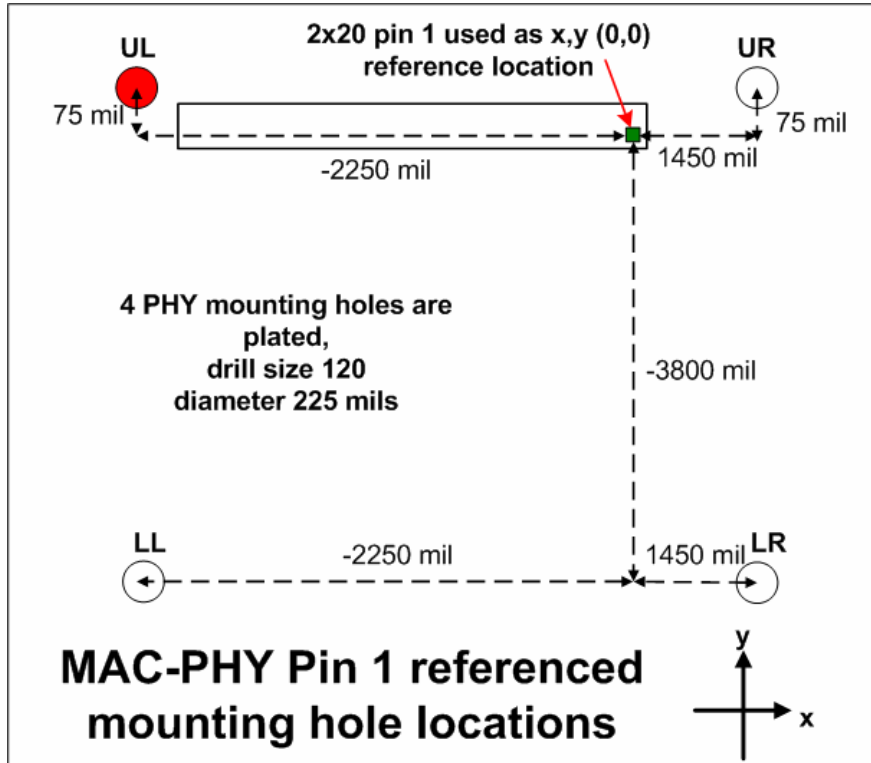


Figure 4 Mounting hole locations

The four mounting holes shown in Figure 5 should be plated with recommended hole size diameter of 225 mils.

4.2 MAC-PHY Mechanical Considerations

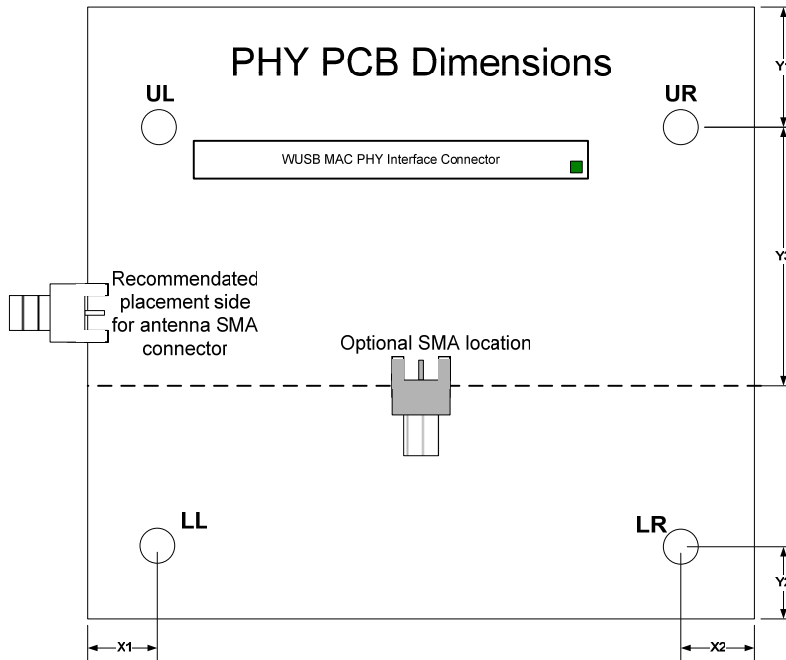


Figure 5 PHY Mechanicals

Dimensions X1, X2, Y1, Y2 and Y3 are relative to the mounting hole locations shown. The following are maximum spacing recommendations:

- X1, X2 \leq 200 mils
- Y2 \leq 200 mils
- Y1 \leq 1000 mils
- If the optional SMA connection edge is used Y3 \leq 250 mils

The recommended placement for the antenna SMA connector is the middle of the left board edge.

The PHY board connector mounts to the secondary side of the PHY board.

The MAC board should provide adequate clearance to accommodate the maximum PHY dimensions consistent with the PHY mechanical example shown above.

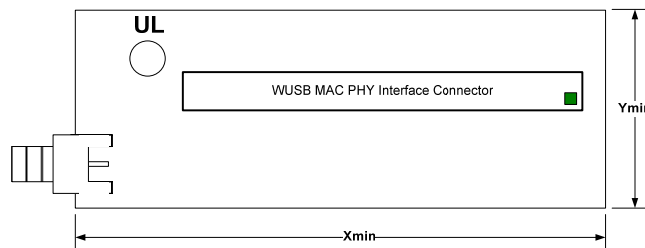


Figure 6 PHY Minimum recommended dimensions

To ensure adequate mechanical stability it is recommended to include at least 1 mounting hole on the PHY board. Figure 6 above shows the recommended minimum size PHY board with dimensions $Y_{min} = 200$ mils and $X_{min} = 260$ mils.

4.3 Component Height Restrictions

4.3.1 PHY restrictions

No components on secondary side (side facing MAC board) over 125 mils (0.125 inch).

4.3.2 MAC restrictions

No components on primary side within region A should exceed 375 mils (0.375 inch) in height to provide clearance for mated PHY board components.

4.4 PHY secondary side restrictions

5 Power

Power pins are defined for the MAC-PHY connector to allow use of a common power supply for “compact” demo units. Use of a common supply can also help avoid power supply isolation problems that can occur when boards with separate power supplies are connected together.

Optional power pins are defined to provide power to the PHY:

- This allows use of a common power supply for “compact” demo units.
- 6 pins on the 2x20 interface are for power (+3.3VDC)
- Max current = 350mA per pin
- Max total current = 2.1A

If additional power or tighter power regulation is required then the PHY must implement an external supply. The PHY must provide proper power supply isolation if an external supply is also used. Otherwise damage to one or both power supplies could result.

It is highly recommended that the MAC include a quality regulator for the +3.3V provided to the MAC-PHY power pins to ensure proper PHY operation. Both the MAC and PHY should implement decoupling caps adjacent to the power pins on the connector.

- Filter caps - Several 0.1uF caps near power and signal lines of the connector to filter out high frequency noise.
- Bulk caps – 4.7uF or larger caps adjacent to the power pins.

Ensure the PCB power traces are thick enough to carry rated current without excessive voltage drop across the trace and/or connector(s). Ideally the power pins should connect directly to the associated +3.3V power plane on both the MAC and PHY boards. It is recommended that the MAC implement over current protection on the +3.3V rail to ensure large current transients or shorts won't damage sensitive board components.

6 Connector Pin-out

Table 1: Connector pin-out

40 Pin MAC-PHY Connector Pin-Out			
Pin	Function	Pin	Function
1	Reset	2	Ground
3	Data 0	4	NC
5	Data 1	6	PWR
7	Data 2	8	PWR
9	Data 3	10	PWR
11	Data 4	12	PWR
13	Data 5	14	PWR
15	Data 6	16	PWR
17	Data 7	18	NC
19	Ground	20	Key
21	PCLK	22	Ground
23	TXEN	24	Ground
25	RXEN	26	Ground
27	PHYACT	28	NC
29	DATAEN	30	Ground
31	CCA ST	32	Ground
33	SER DAT	34	Ground
35	STOPC	36	Ground
37	RSVD1	38	Ground
39	RSVD2	40	Ground