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ZIF connector with open end for FPC pass-through

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ABSTRACT

A zero insertion force (ZIF) connector is a commonly used electrical connector that makes a connection between a flexible printed circuit (FPC), which is a type of flexible cable, and a printed circuit board (PCB). Due to part and assembly tolerances, the FPC is typically oversized (made longer) to ensure its electrical connectivity to the ZIF connector. As a result of the oversizing of the FPC, and due to the ZIF connector not being able to pass through the FPC, the FPC bends or buckles, forming a loop. The loop causes a loss of space within a device that uses the ZIF connector and a loss in reliability. This disclosure describes a ZIF connector that eliminates the FPC loop, resulting in optimized space within the PCB as well as increased reliability.

KEYWORDS

- ZIF connector
- Zero insertion force
- Flexible printed circuit (FPC)
- Printed circuit board (PCB)
- FPC loop
- PCB design

BACKGROUND

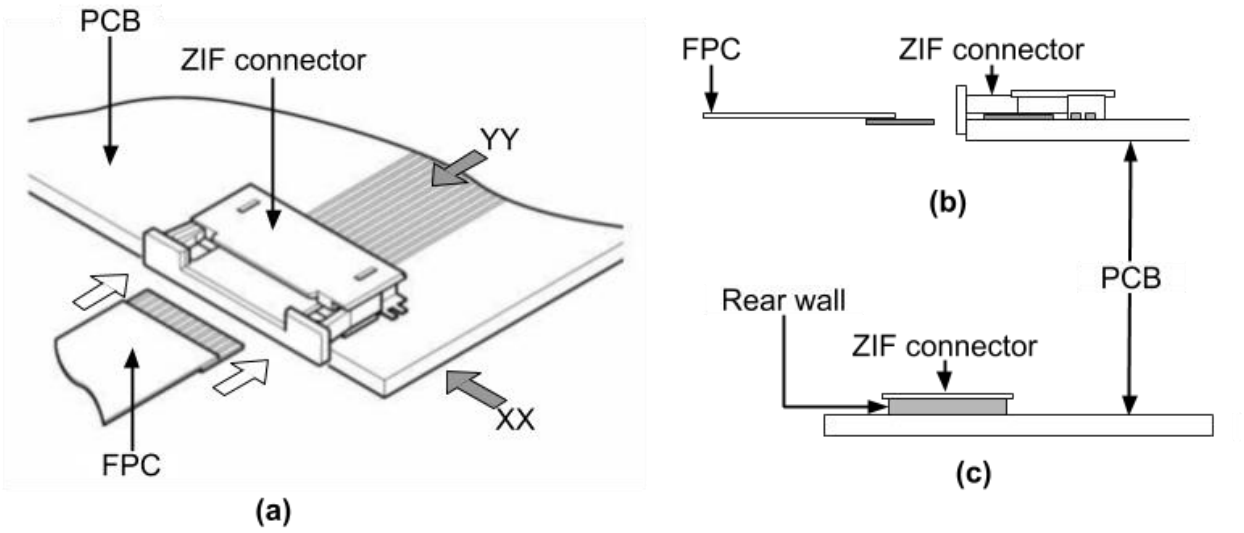

Fig. 1: ZIF connector: (a) Perspective view; (b) Side view (from XX); (c) Rear view (from YY)

A zero insertion force (ZIF) connector (Fig. 1) is a commonly used electrical connector that makes a connection between a flexible printed circuit (FPC), which is a type of flexible cable, and a printed circuit board (PCB). Fig. 1(a) illustrates a perspective view of ZIF connector hosted on a PCB, while Fig. 1(b) illustrates a side view. Fig 1(c) illustrates a rear view of the ZIF connector, in which a rear wall of the ZIF connector is visible.

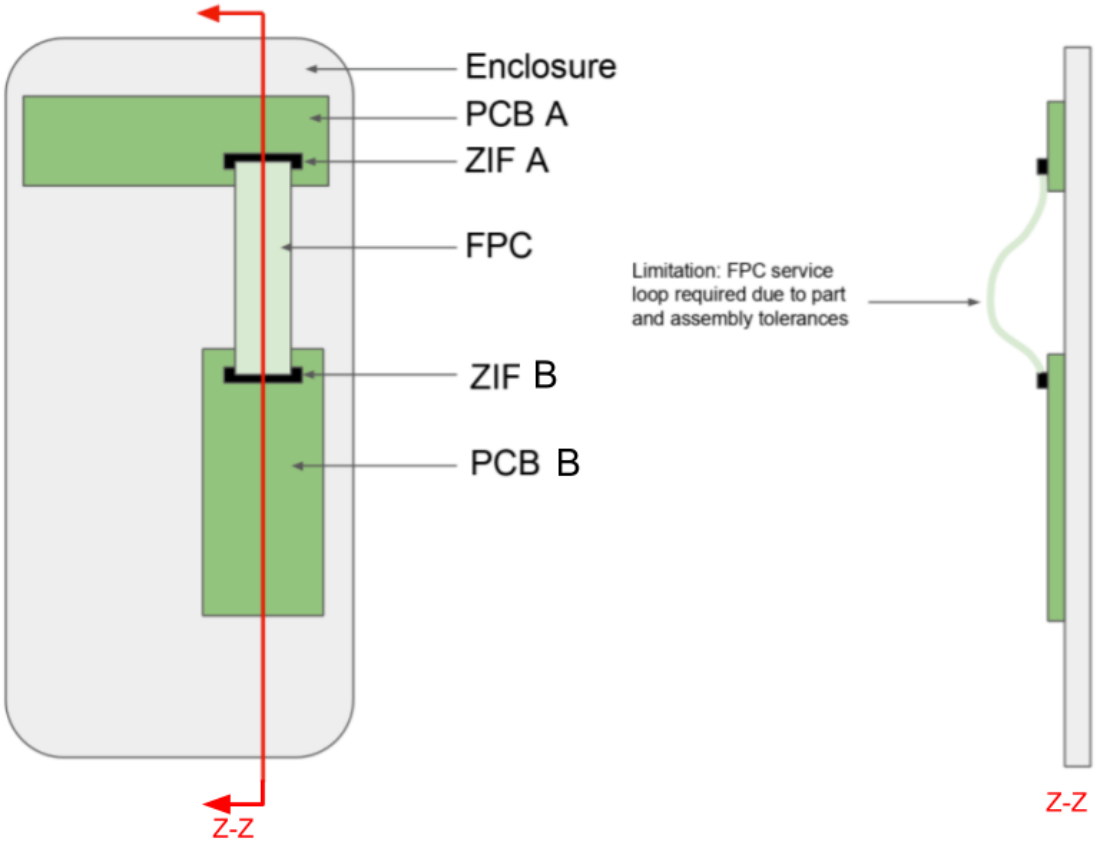

Fig. 2: An FPC connecting two PCBs: (a) Top view; (b) Cross-section at ZZ. Due to part and assembly tolerances, a service loop forms in the FPC

In a typical application, illustrated in top view in Fig. 2(a), an FPC is constrained at end A, e.g., inserted into ZIF connector A to connect with PCB A. The FPC is connected using ZIF connector B to PCB B. Due to part and assembly tolerances, the FPC is oversized, e.g., made longer, to ensure connection at end B. The rear wall of the ZIF connector B acts as a hard stop to the FPC, preventing the FPC from passing completely through ZIF connector B. As a result of the oversizing and the hard stop, the FPC bends or buckles, e.g., slacks, forming a loop referred to as a service loop, as illustrated in Fig. 2(b). The loop is not desirable for the following reasons:

- It causes a loss of space within the device, resulting in a larger-than-desired product or a product with fewer features.

- Loss of reliability: The service loop places the FPC under elastic strain, which in turn stresses the board-to-board connection. This can cause failures. In addition, the service loop can impart undesired pressure onto neighboring components, or onto the FPC itself.

DESCRIPTION

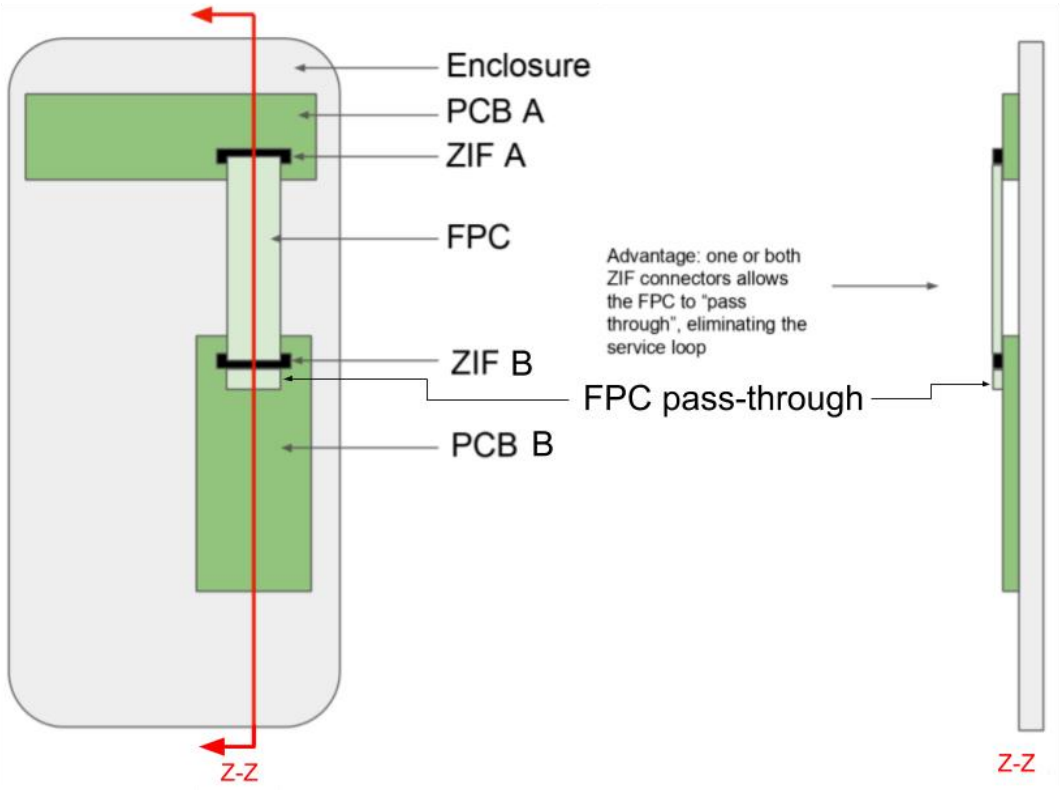

Fig. 3: Eliminating the service loop of an FPC: (a) Top view; (b) Sectional view at ZZ, illustrating the passing through of the FPC at ZIF connector B

The disclosure describes a ZIF connector that enables a pass-through of the FPC, thereby eliminating, or flattening, the service loop. This is shown in Fig. 3, which illustrates the passing through of the FPC at ZIF connector B (Fig. 3a), thereby eliminating the service loop (Fig. 3b). A ZIF connector can be prepared for FPC pass-through by removing its rear wall. The pass-

through ZIF connector can be at one or both ends of the FPC. The variability in tolerance is attributed to the amount of pass-through.

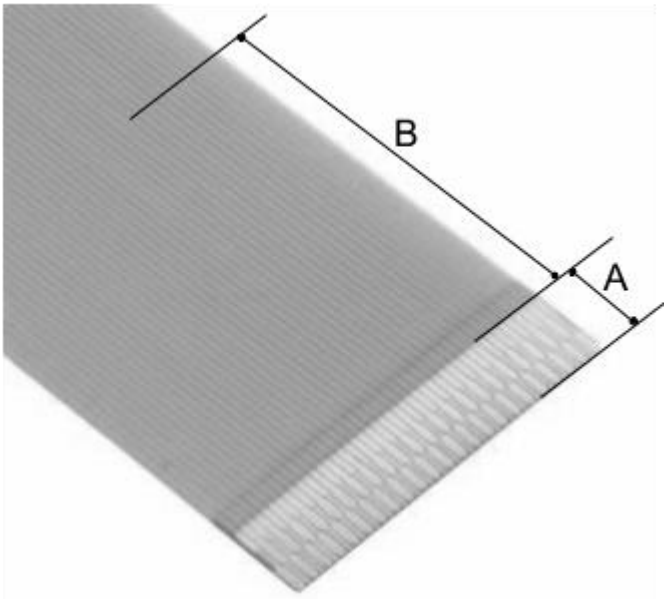

Fig. 4: Parts of an FPC

As illustrated in Fig. 4, an FPC has at least two parts, e.g., a section B where the conductive traces are covered with insulating material, and a section A where the conductive traces are exposed. Section A, where the conductive traces are exposed, is the section that makes electrical connection with the ZIF connector. Per the techniques of this disclosure, the FPC is designed such that the section of the FPC with exposed conductive traces are oversized, e.g., made longer, ensuring a solid electrical connection.

CONCLUSION

This disclosure describes a ZIF electrical connector that eliminates a loop in connected flexible printed circuits, resulting in optimized space within a PCB as well as increased reliability.