

**INTERPOSER AND FLEX  
DESIGN GUIDELINES**

MIPI Remote Sampling  
Head (RSH) for  
High-Speed D-PHY and  
C-PHY Interfaces

**MK-G014E-E-22315**

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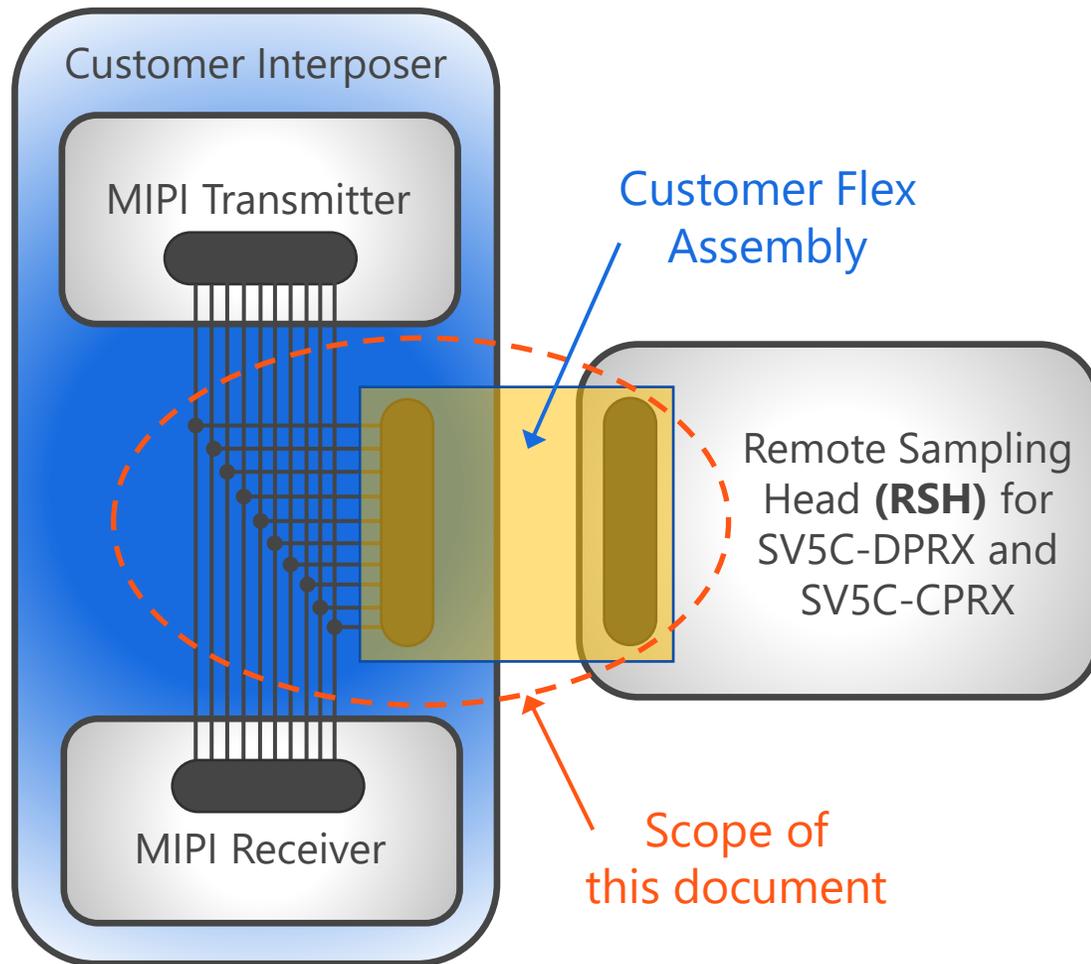
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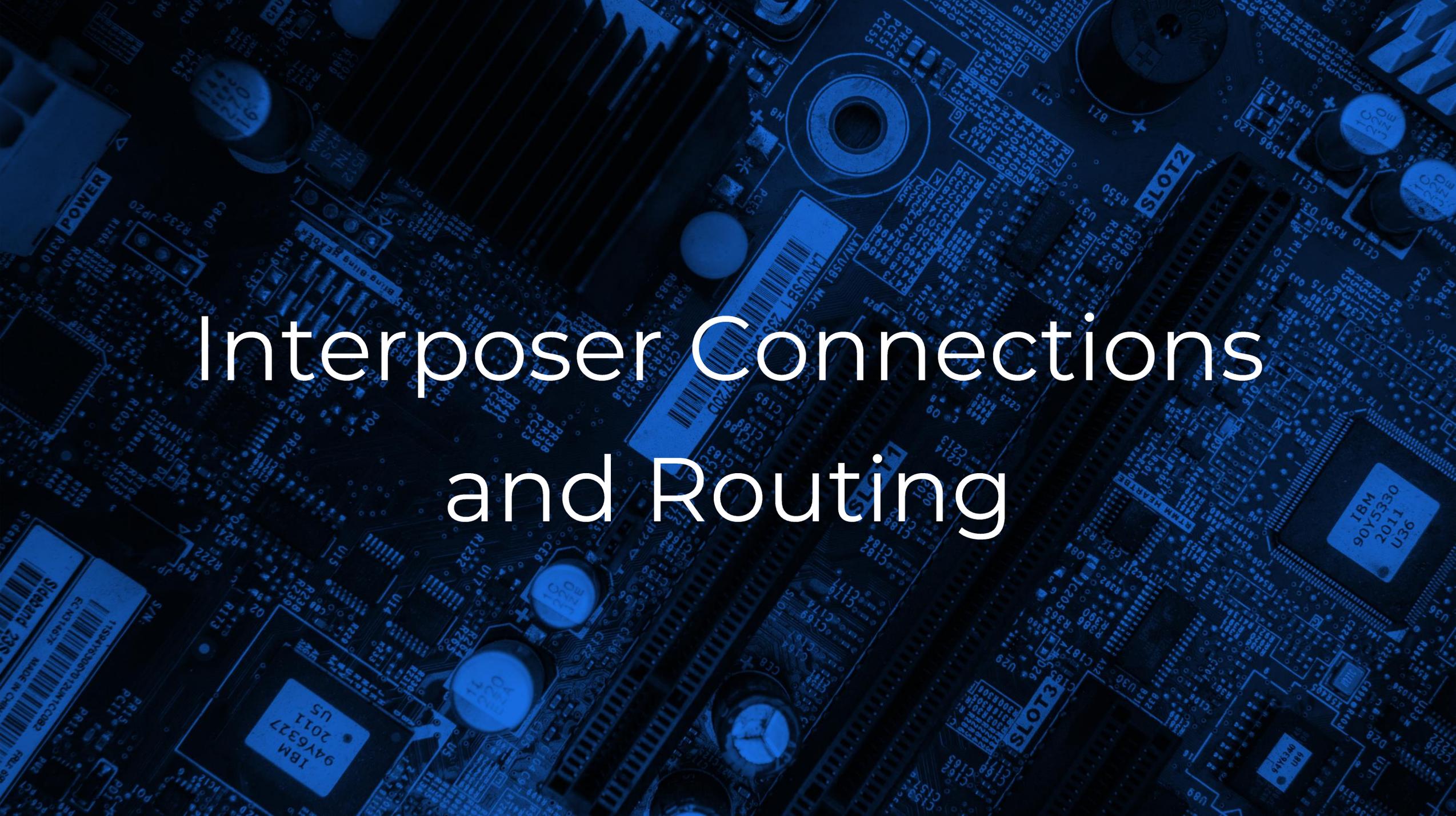
# Scope

This document provides recommendations for schematic, layout, and connector selection for **interposers** and **customer flex assemblies** used to measure live MIPI® Alliance systems with Introspect Technology probing solutions at 3 Gbps (D-PHY) / 3 Gbps (C-PHY) and above.

The document focuses on the highlighted areas in the diagram on the left. The customer flex assembly connects MIPI signals to a probing solution such as the **Introspect Remote Sampling Head** as shown in the diagram.

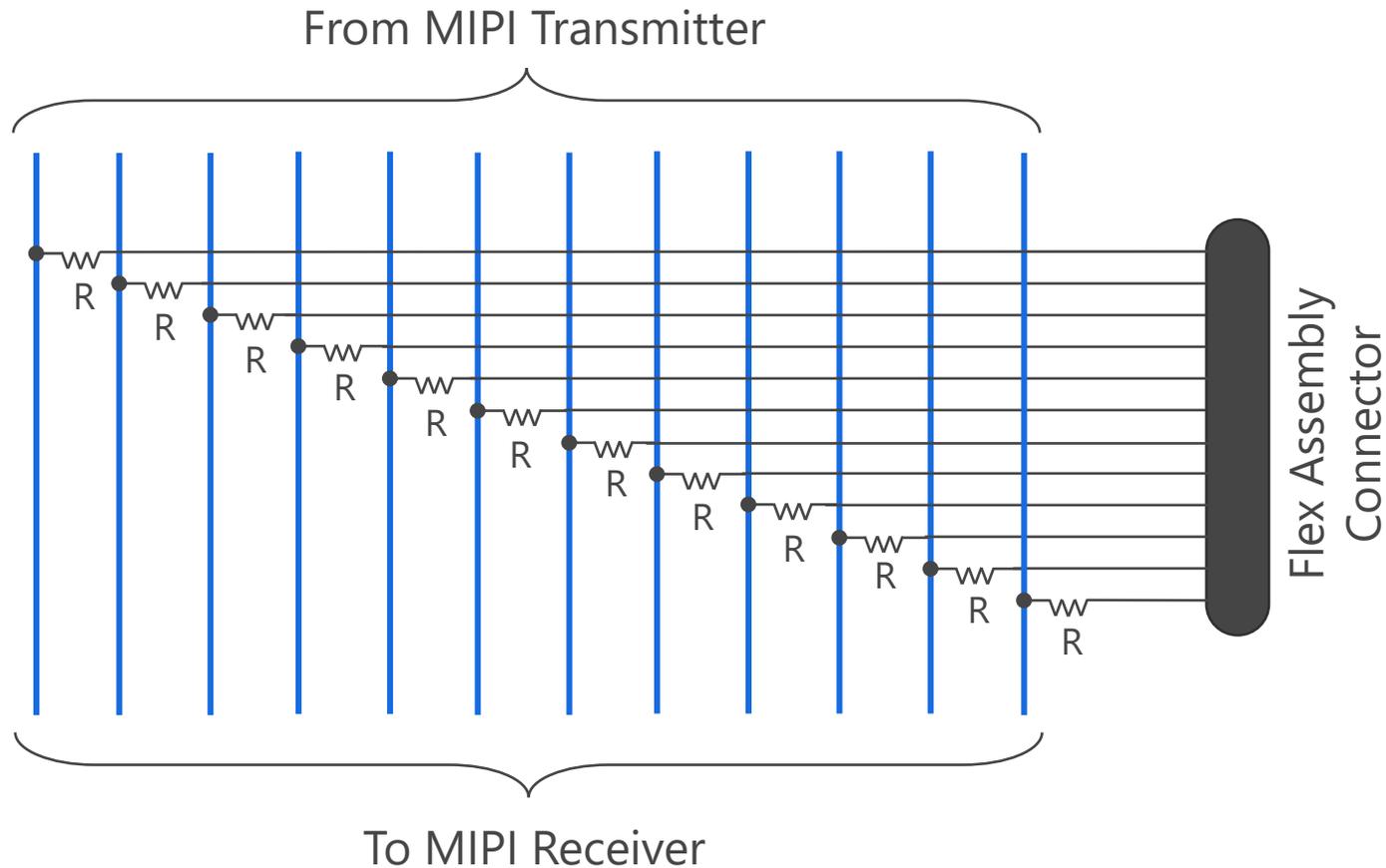
The interposer's connections to the MIPI transmitter and receiver sub-assemblies are not relevant to this topic, other than requiring reasonable controlled-impedance characteristics.





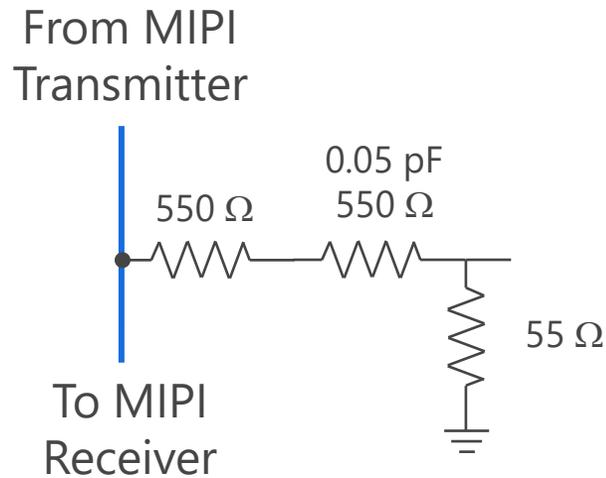
# Interposer Connections and Routing

# Signal Connections on the Interposer

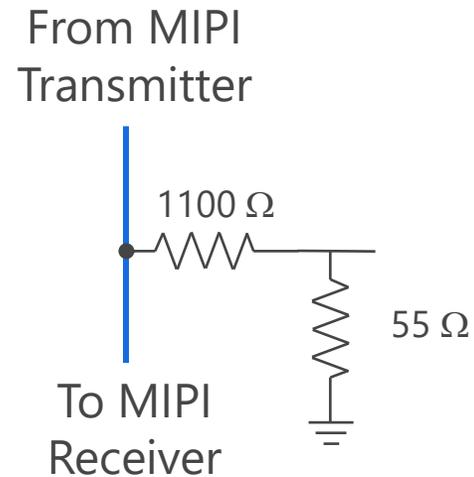


- For D-PHY: up to 10 lines (4 Data + CLK)
- For C-PHY: up to 12 lines (4 trios)
- Place tap resistors on each of the conductors in the interposer
- The tap resistor shown on this slide is conceptual. **See the next slide for detail.**

# Tap Resistor Layout on the Interposer



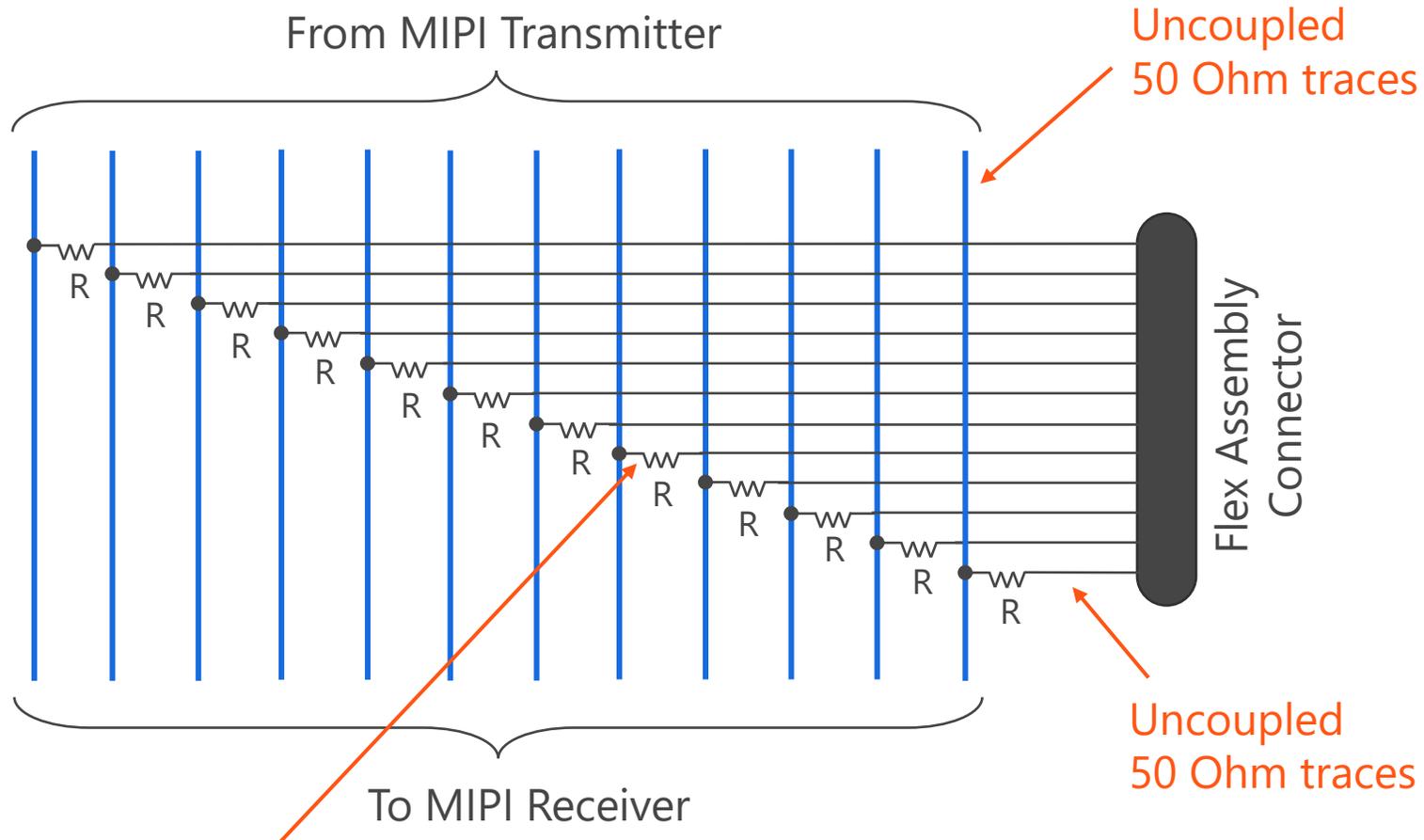
(a)



(b)

- For best signal integrity, it is strongly recommended that the tap resistor be laid out with three components, as shown in (a) on the left side of the diagram. A small capacitor may be stacked on the second 550 ohm resistor as shown in (a) on the left side of the diagram.
- Only if interposer space constraints preclude the three-footprint layout on the right, then a two footprint layout may be used, as shown in (b) on the right side of the diagram. This is suitable for lower data rate applications (< 3 Gbps / 3 Gsps).

# Signal Routing on Interposer

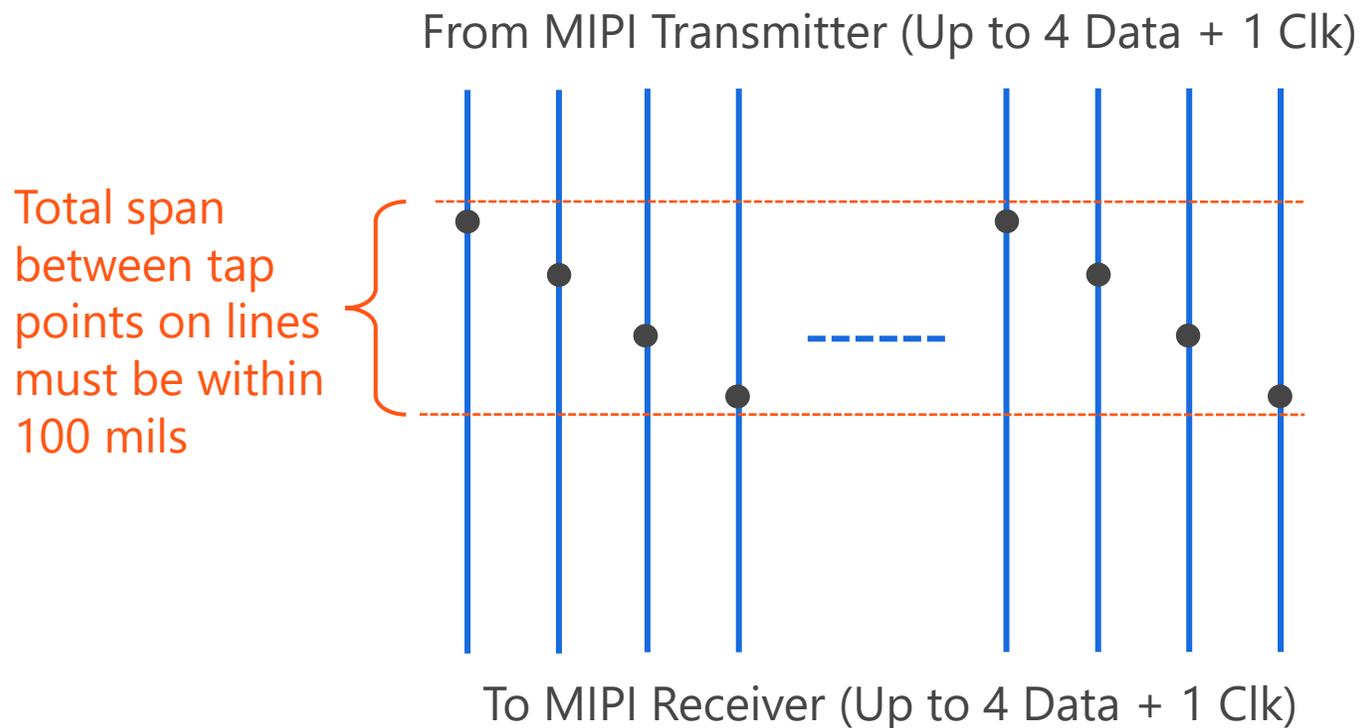


- Route as uncoupled controlled impedance transmission lines
- Since vias have to be used, place them close to the main pass-through traces
- Use typical signal integrity guidelines for vias like removing non-functional pads

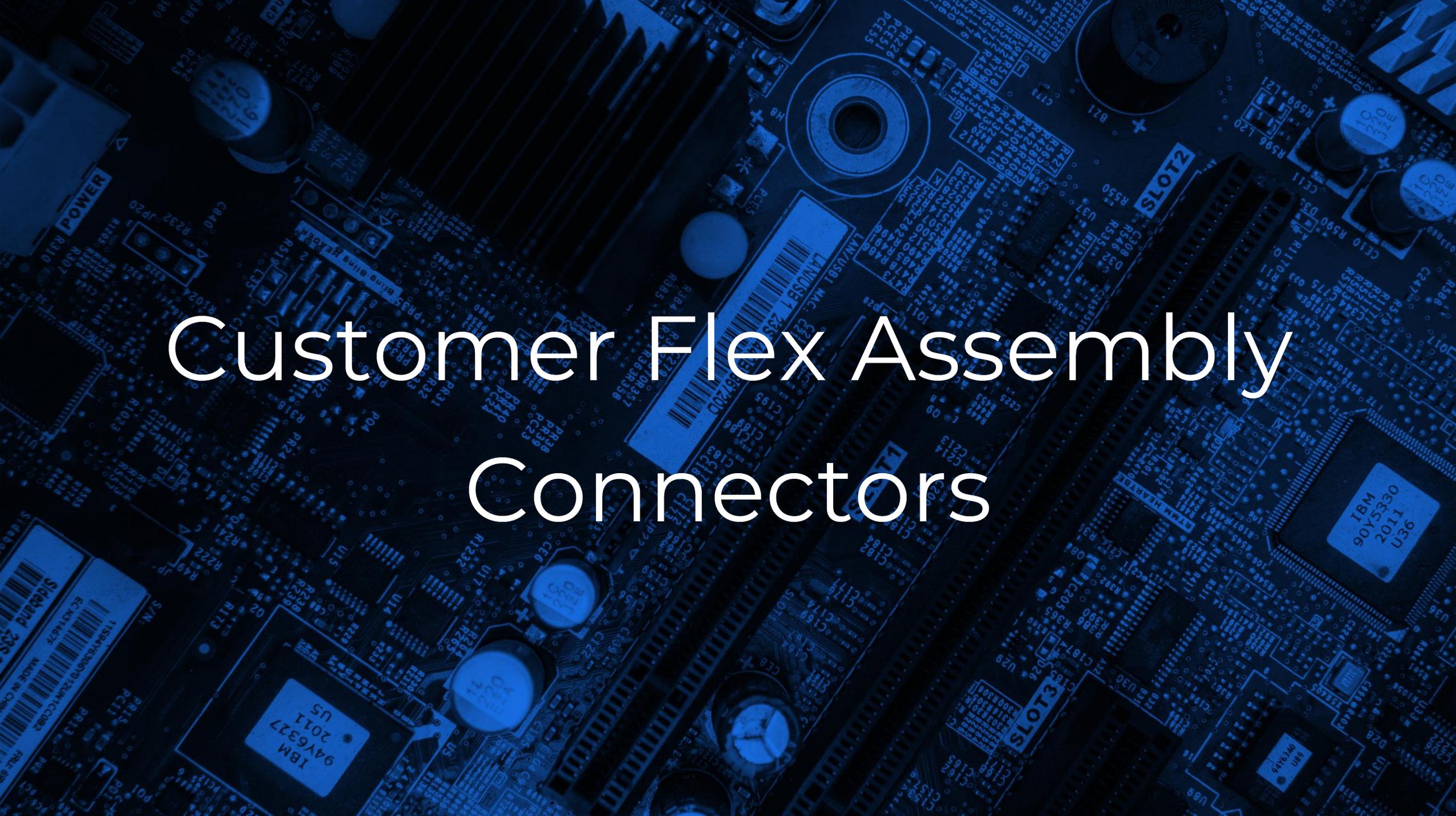
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- Place resistors as close as possible to trace
- Can use via to cross field of vertical traces

# Signal Routing on Interposer: Total Span Between Tap Points

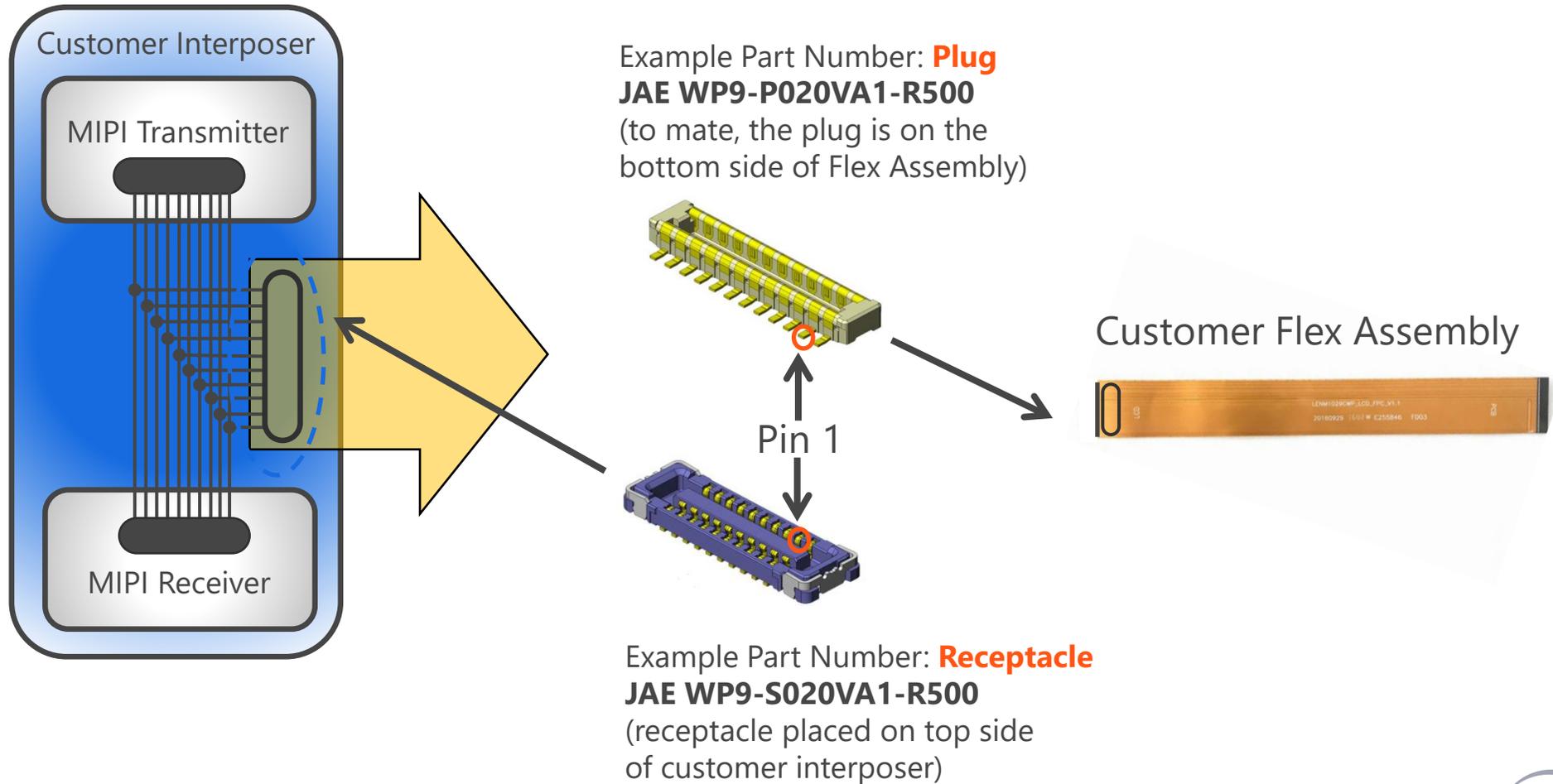


- Total span between tapping points on transmission lines must be within 100 mils
- Tap trace lengths themselves must be tightly matched (within 3 mils)



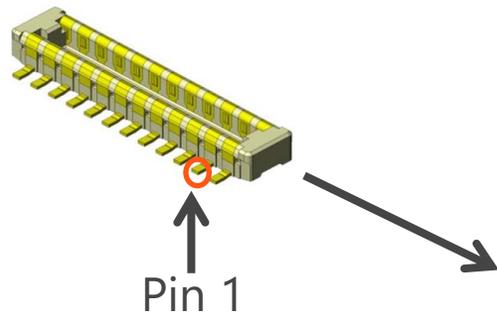
# Customer Flex Assembly Connectors

# Customer Flex Assembly: Example Connectors with Small Interposer Footprint



# Customer Flex Assembly: Required Connector for Remote Sampling Head

Example Part Number: **Plug**  
**JAE WP9-P020VA1-R500**  
(plug on bottom side  
of Flex Assembly)

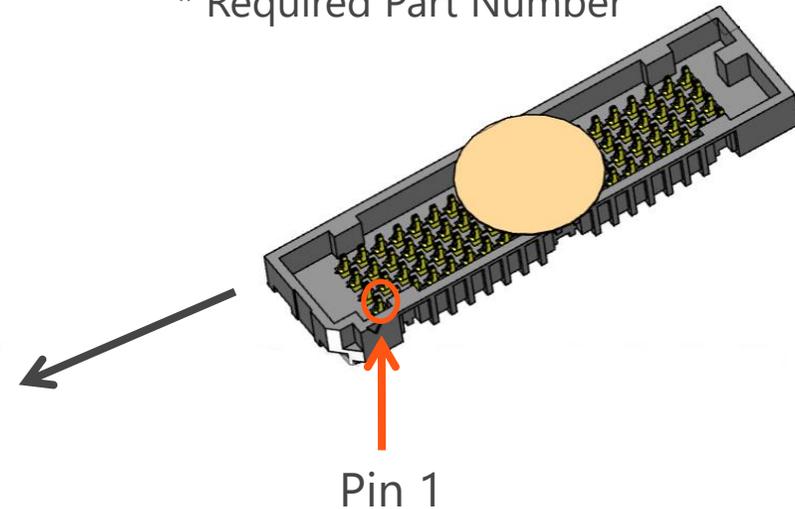


Customer Flex Assembly



Required Part Number: **Plug**  
**Samtec LPAM-20-01.5-L-04-2\***  
(**20 x 4** plug on bottom side  
of Flex Assembly)

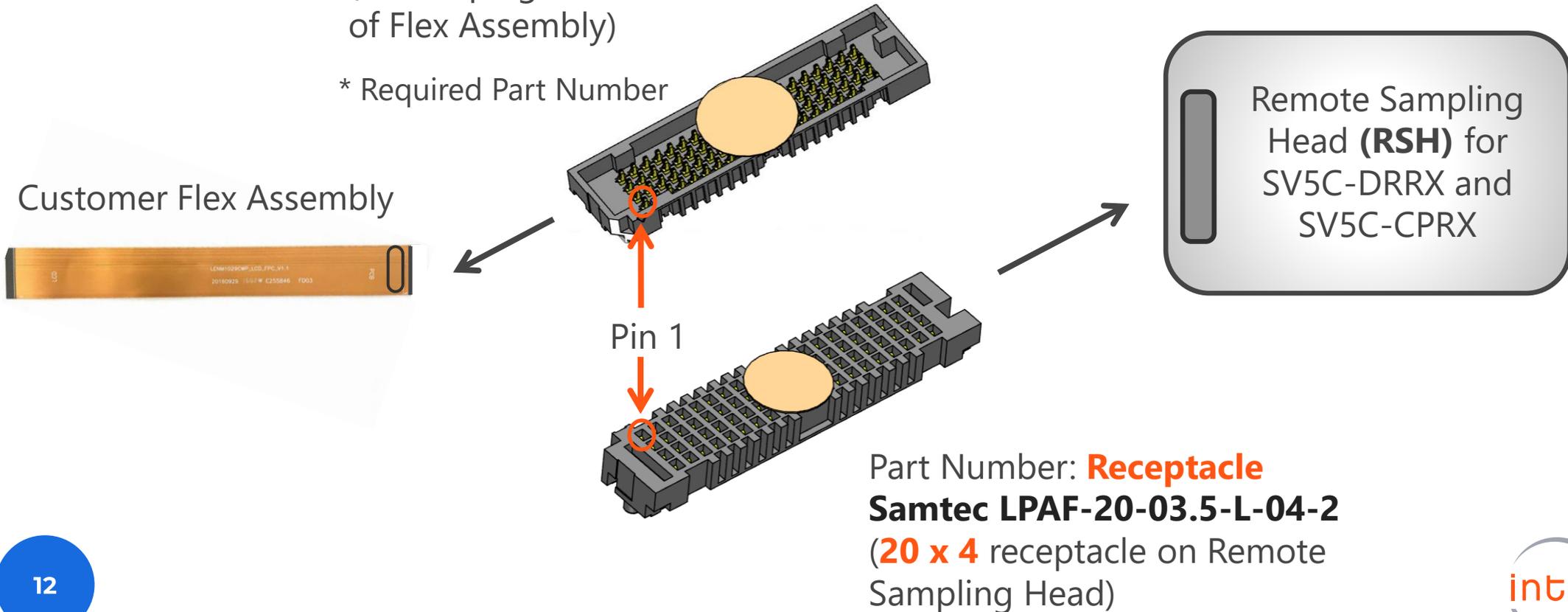
\* Required Part Number



# Customer Flex Assembly: Required Connector for Remote Sampling Head

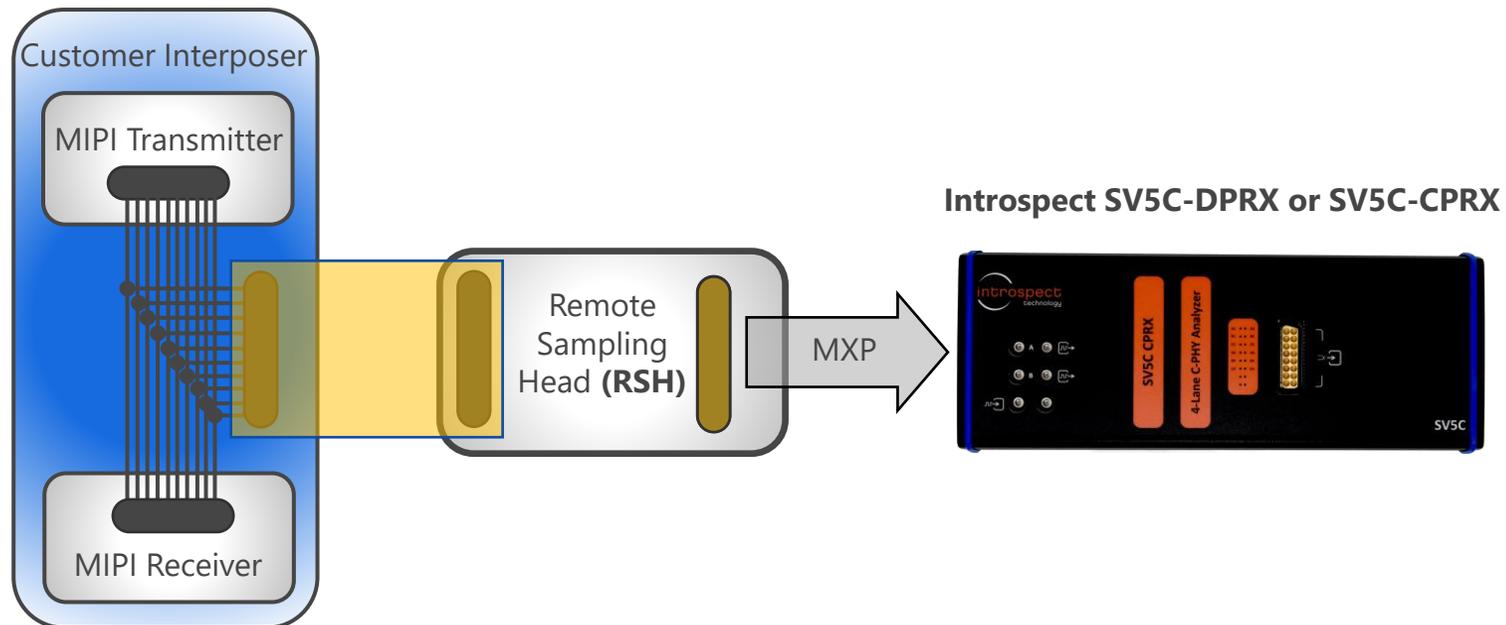
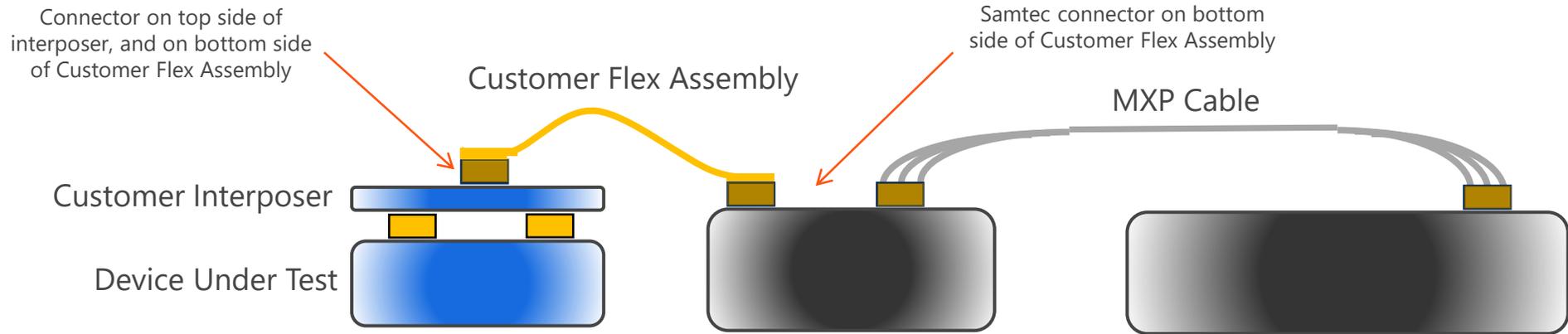
Required Part Number: **Plug**  
**Samtec LPAM-20-01.5-L-04-2\***  
(**20 x 4** plug on bottom side  
of Flex Assembly)

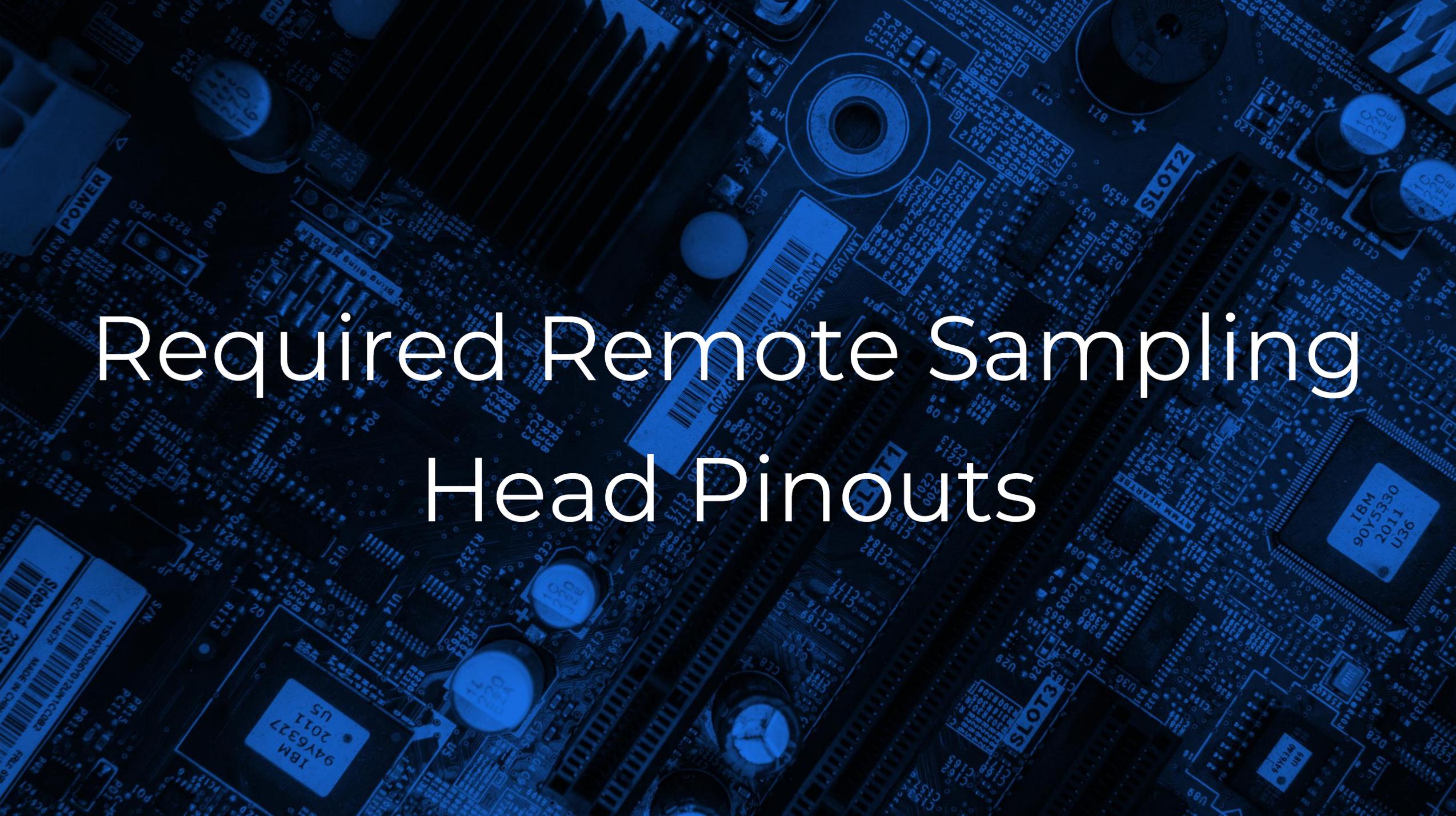
\* Required Part Number



Part Number: **Receptacle**  
**Samtec LPAF-20-03.5-L-04-2**  
(**20 x 4** receptacle on Remote  
Sampling Head)

# Customer Flex Assembly: Complete System Diagram





# Required Remote Sampling Head Pinouts

# MIPI D-PHY: required Remote Sampling Head Pinout (Receptacle and Plug)

Pin 77

GND	GND	GND	GND
GND	Lane 1P	GND	GND
GND	GND	Lane 1N	GND
GND	Lane 2P	GND	GND
GND	GND	GND	GND
GND	GND	Lane 2N	GND
GND	Lane 3P	GND	GND
GND	GND	Lane 3N	GND
GND	GND	GND	GND
GND	GND	GND	GND
GND	GND	GND	GND
GND	GND	GND	GND
GND	Clock N	GND	GND
GND	GND	Clock P	GND
GND	GND	GND	GND
GND	GND	GND	GND
GND	GND	GND	GND
GND	Lane 4N	GND	GND
GND	GND	Lane 4P	GND
GND	GND	GND	GND

Pin 1

Pin 80

- Plug (male, part number **LPAM-20-01.5-L-04-2**) is on the Customer Flex Adapter, bottom side. Refer to pin 1 orientation shown on slide 11.
- Receptacle (female, part number **LPAF-20-03.5-L-04-2**) is on the Introspect Remote Sampling Head. Refer to pin 1 orientation shown on slide 11.

Pin 4

# MIPI C-PHY: Required Remote Sampling Head Pinout (Receptacle and Plug)

Pin 77

GND	GND	GND	GND
GND	1A	GND	GND
GND	GND	1B	GND
GND	1C	GND	GND
GND	GND	GND	GND
GND	GND	3A	GND
GND	3B	GND	GND
GND	GND	3C	GND
GND	GND	GND	GND
GND	GND	GND	GND
GND	GND	GND	GND
GND	GND	GND	GND
GND	4C	GND	GND
GND	GND	4B	GND
GND	4A	GND	GND
GND	GND	GND	GND
GND	GND	2C	GND
GND	2B	GND	GND
GND	GND	2A	GND
GND	GND	GND	GND

Pin 1

Pin 80

- Plug (male, part number **LPAM-20-01.5-L-04-2**) is on the Customer Flex Adapter, bottom side. Refer to pin 1 orientation shown on slide 11.
- Receptacle (female, part number **LPAF-20-03.5-L-04-2**) is on the Introspect Remote Sampling Head. Refer to pin 1 orientation shown on slide 11.
- Pin numbers and letters in the pinout table on the left are listed by Trio and Wire respectively (1A = Trio 1, Wire A).

Pin 4

# Summary

- Introspect's multi-conductor MIPI probe solution provides a simple connectorized interface for easy attachment to 4-lane MIPI D-PHY buses and 4-trio MIPI C-PHY busses.
- This document described the guidelines for the interposer design and layout.
- An example connector (JAE WP9 series) between the interposer and the customer flex connector has been shown. The plug has a compact footprint and can be placed on an interposer card.
- The required connector (Samtec LP Array series, LPAM and LPAF) between the customer flex connector and the Remote Sampling Head has also been shown, with the required pinouts provided.



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