introspect technology

# INTERPOSER AND FLEX DESIGN GUIDELINES

## RSH2 (AC Coupled) Remote Sampling Head for Embedded DisplayPort Interfaces

**MK-G016E-E-24127**



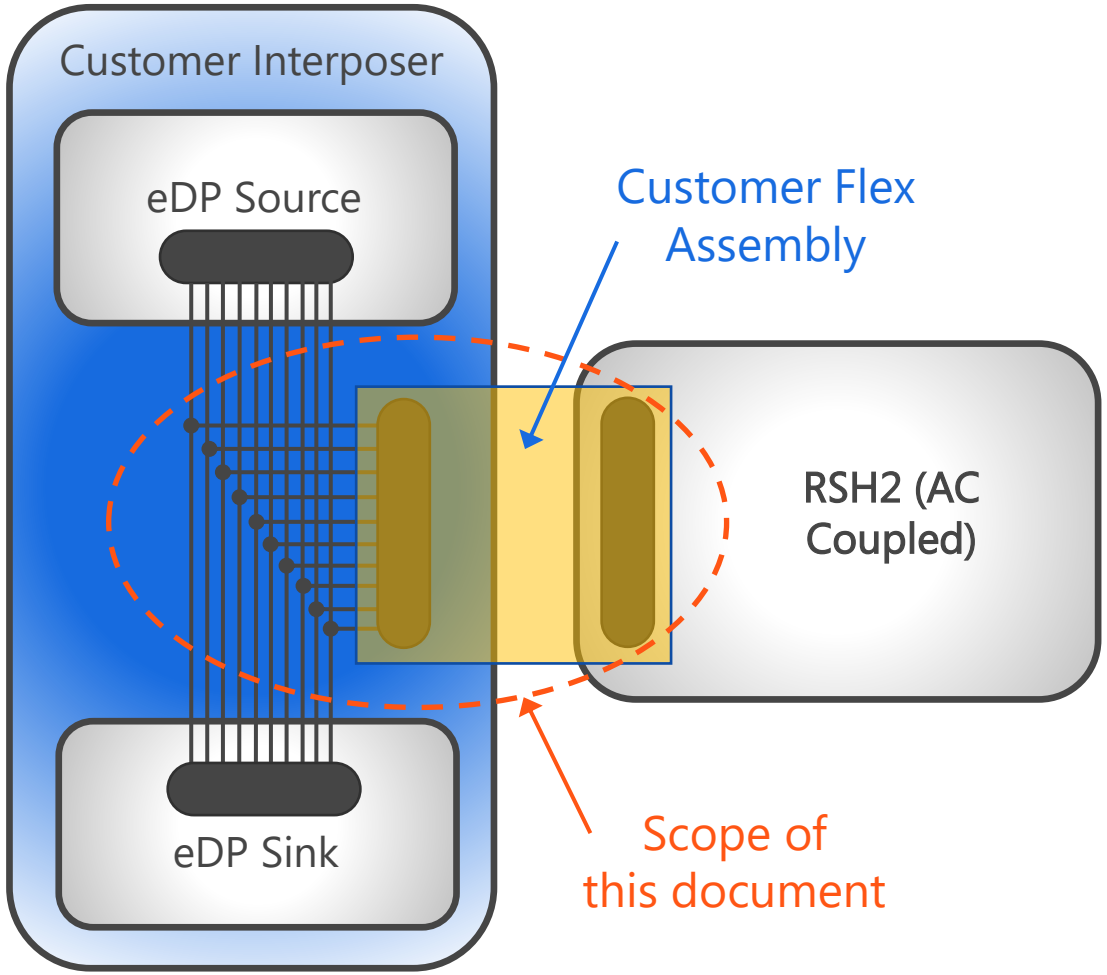
Published in Canada on May 6, 2024


# Table of Contents





introspect technology

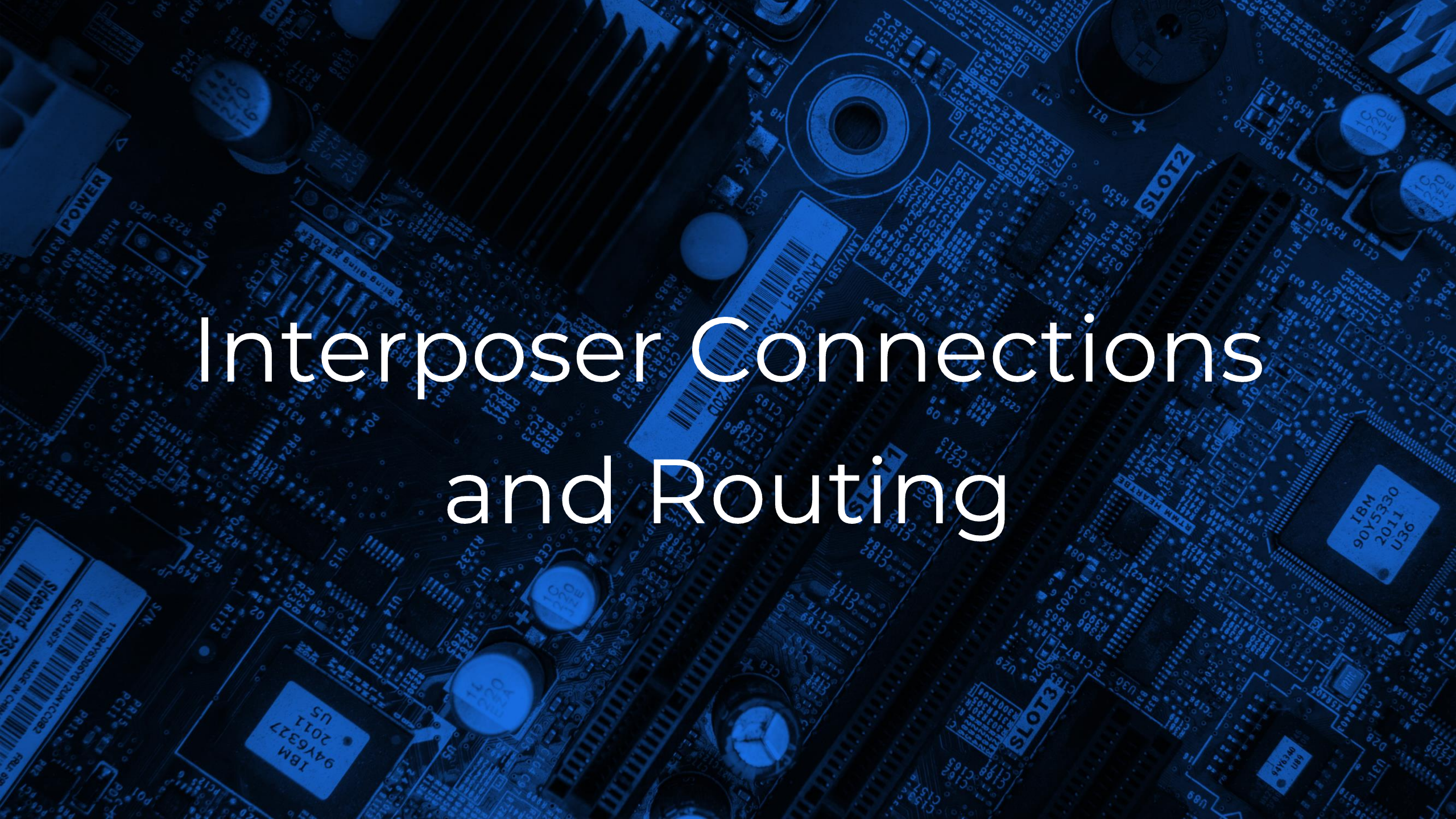



# Scope

This document provides recommendations for schematic, layout, and connector selection for **interposers** and **customer flex assemblies** used to measure live eDP systems at up to 8.1 Gbps.

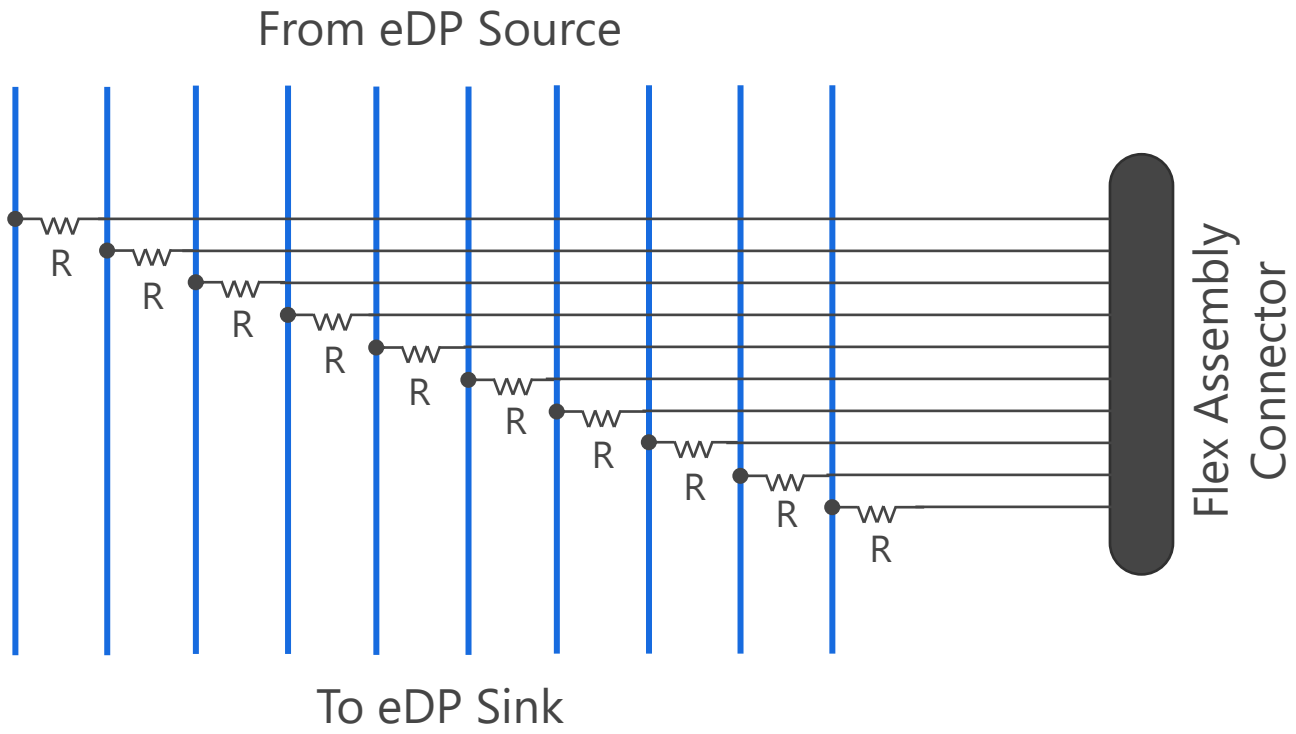
The document focuses on the highlighted areas in the diagram on the left. The customer flex assembly connects eDP signals to a probing solution such as the **RSH2 (AC Coupled)** as shown in the diagram.

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



# Interposer Connections and Routing

# Signal Connections on the Interposer

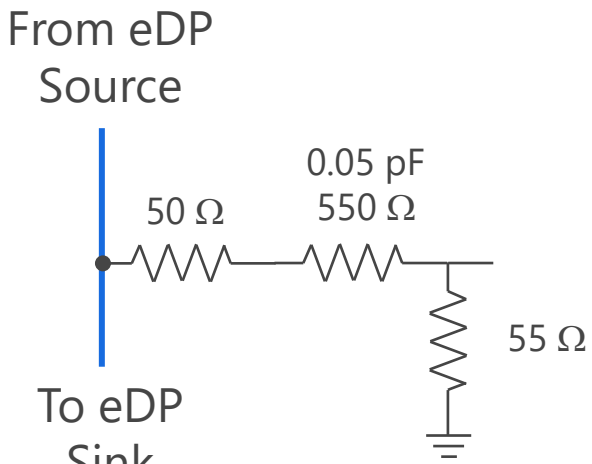



- Up to 10 lines (4 Main Link + Auxiliary Channel)
- Place tap resistors on each of the conductors in the interposer
- The tap resistor shown on this slide is conceptual. **See the next slide for detail**.

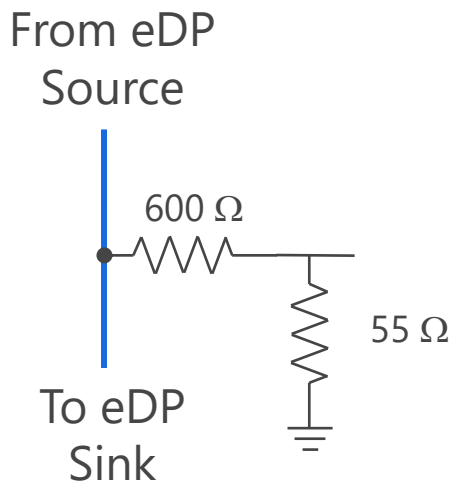


introspect technology

# Tap Resistor Layout on the Interposer




(a)



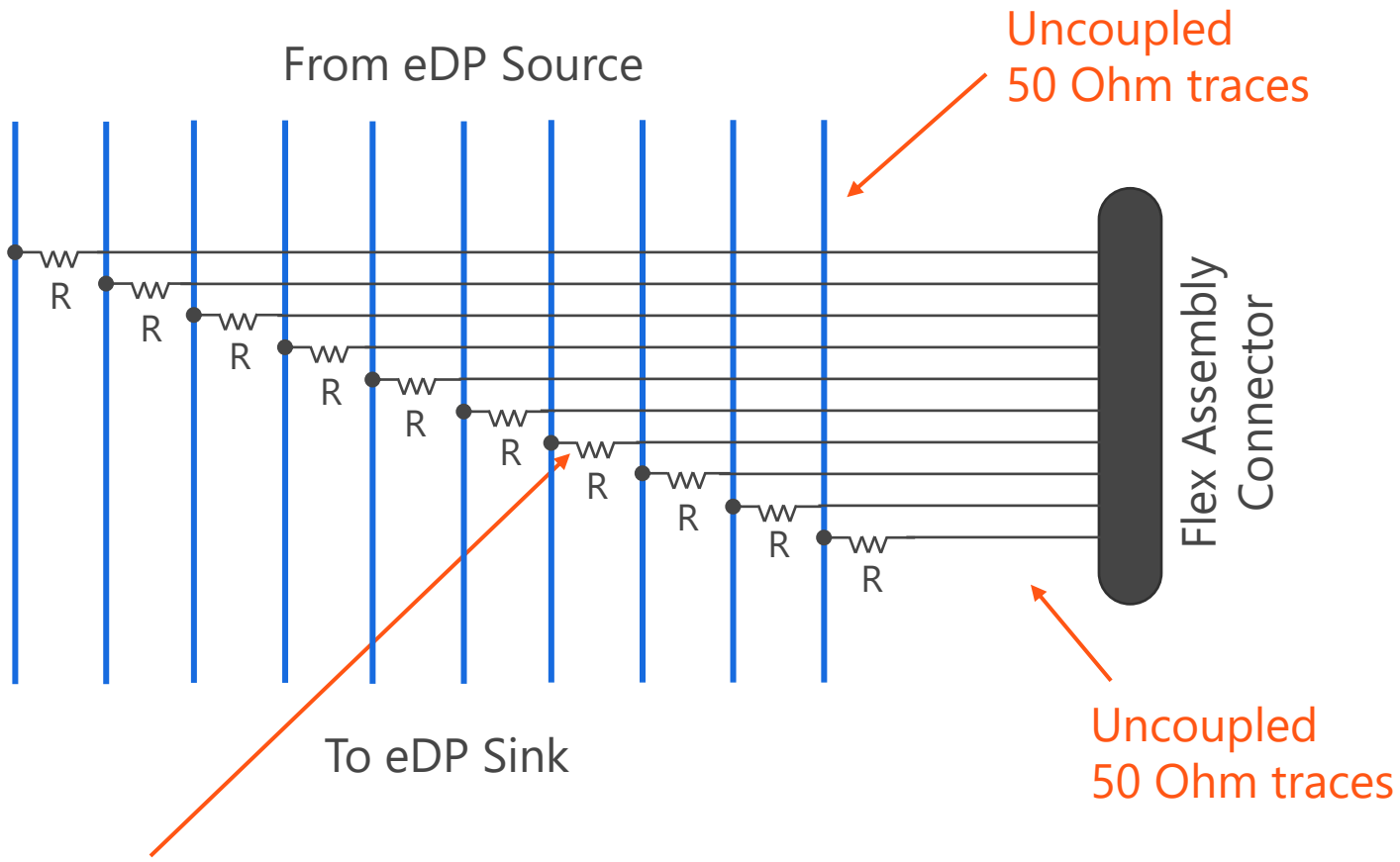

(b)

- 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 (less than or equal to 2.7 Gbps).



introspect technology

# Signal Routing on Interposer



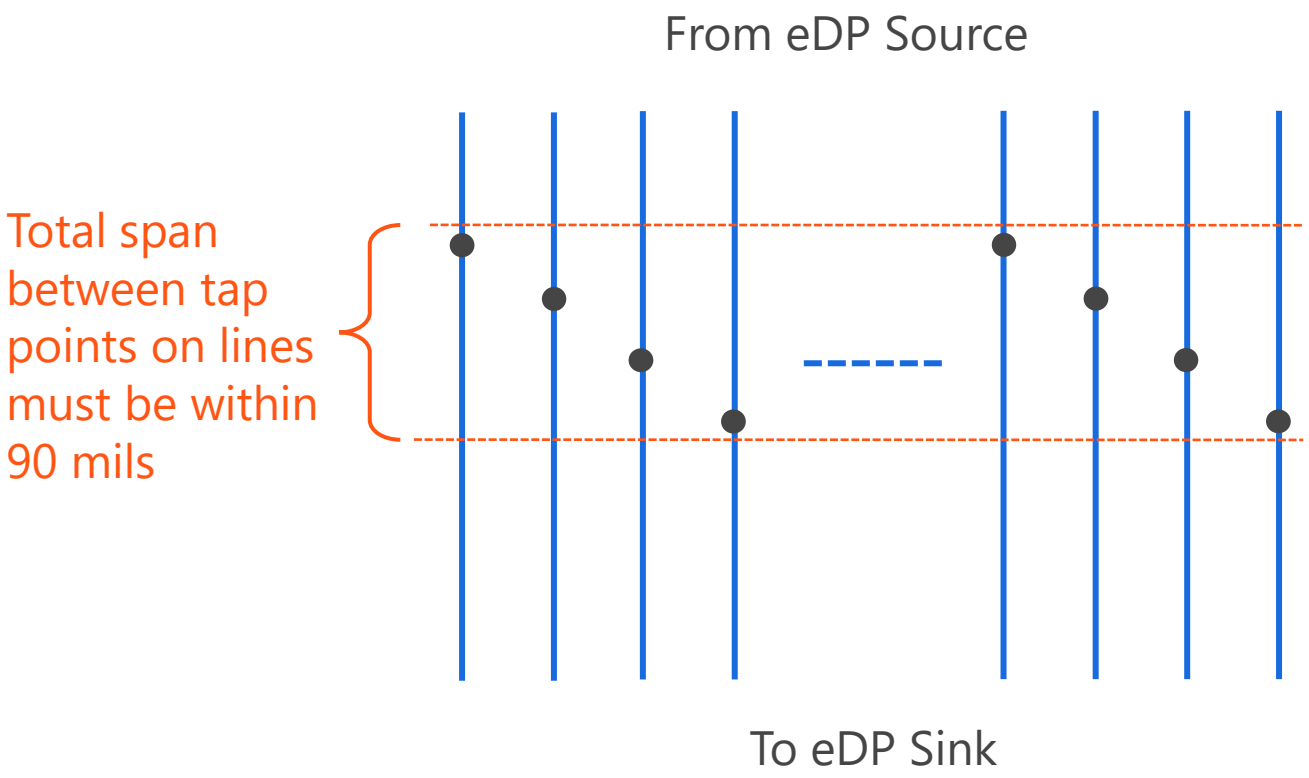

- Route as uncoupled controlled impedance transmission lines
- Since vias must be used, place them close to the main pass-through traces
- Use typical signal integrity guidelines for vias like removing non-functional pads

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



introspect technology

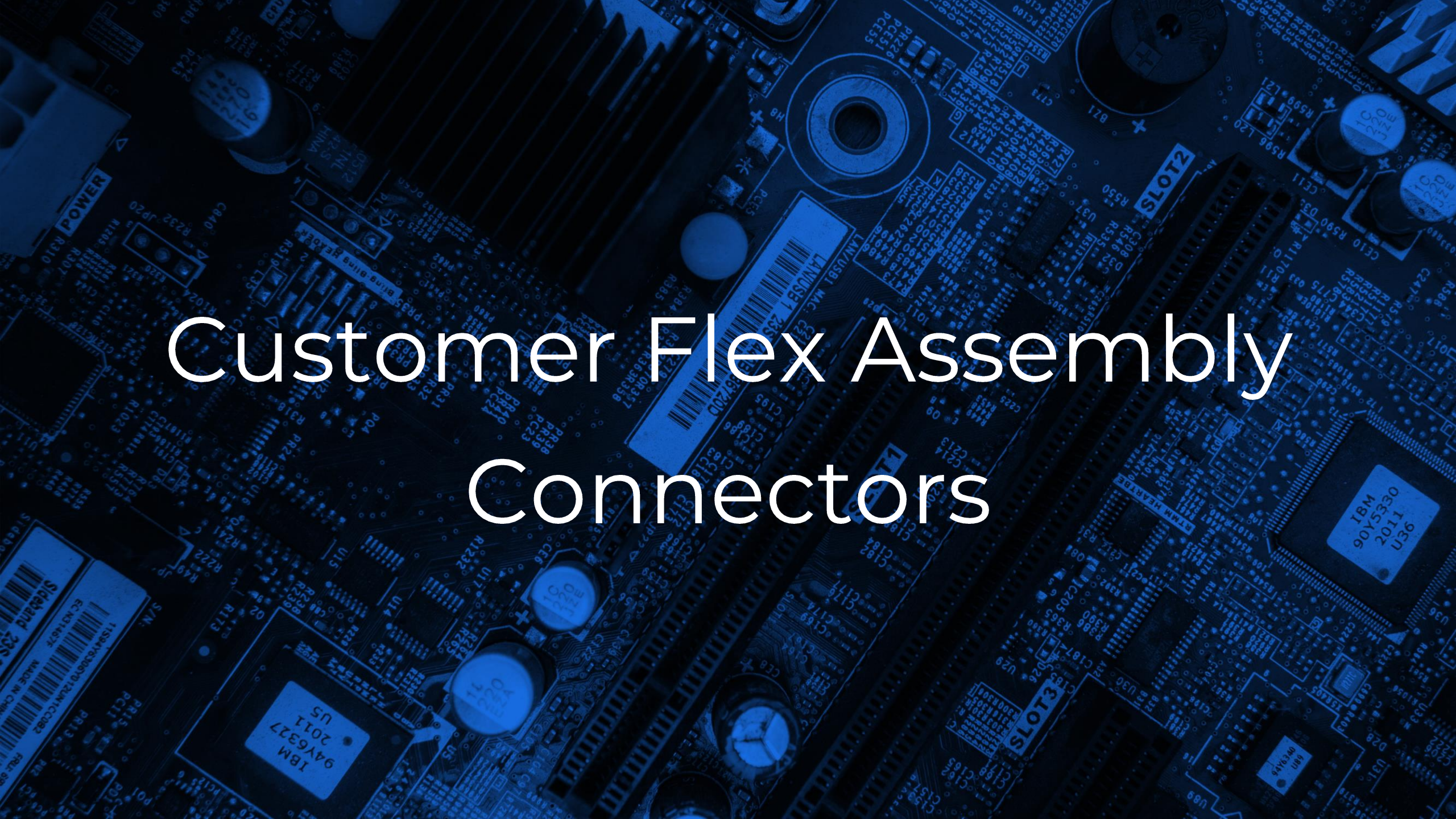
# Signal Routing on Interposer: Total Span Between Tap Points




- Total span between tapping points on transmission lines must be within 90 mils
- Tap trace lengths themselves must be tightly matched (within 3 mils)

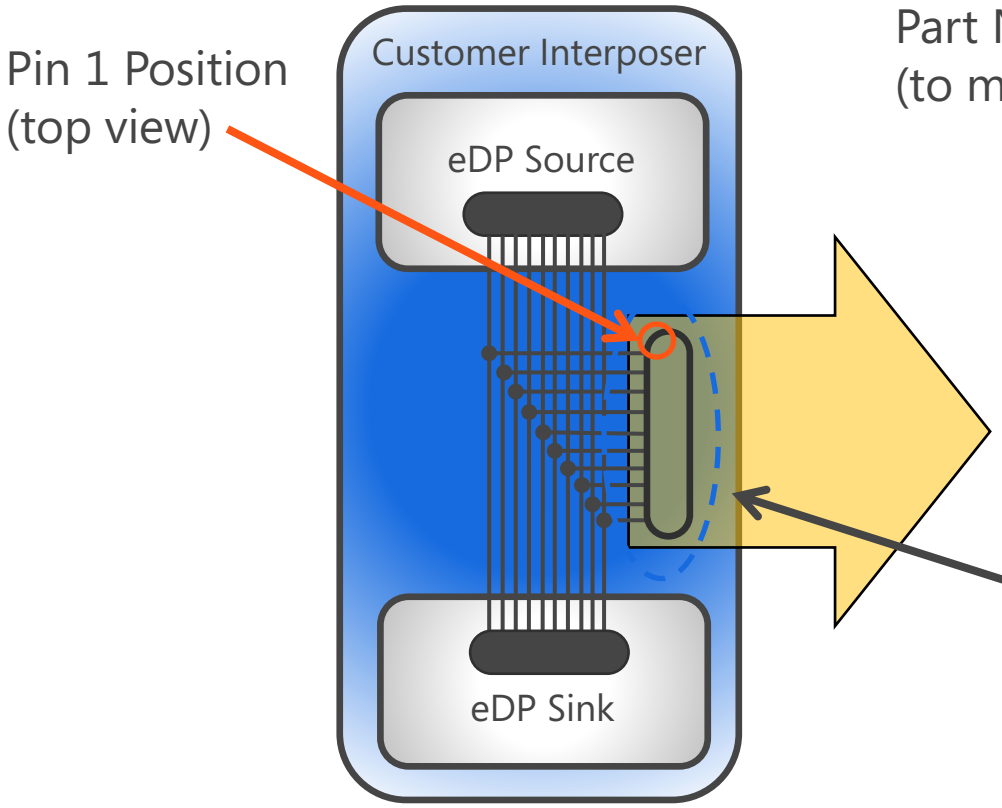


introspect technology



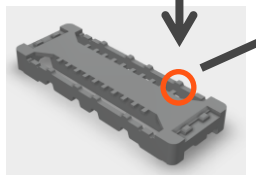

# Customer Flex Assembly Connectors

# Interposer Side of Customer Flex



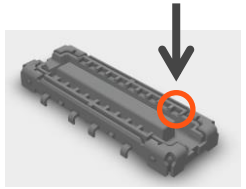

**Plug:** I-PEX NOVASTACK 35-HDN 20P
Part Number: 20864-020E-01
(to mate, the plug is on the bottom side of Flex Assembly)

Pin 1, plug bottom view
(solder side) shown



Customer Flex Assembly

Pin 1, receptacle top view shown



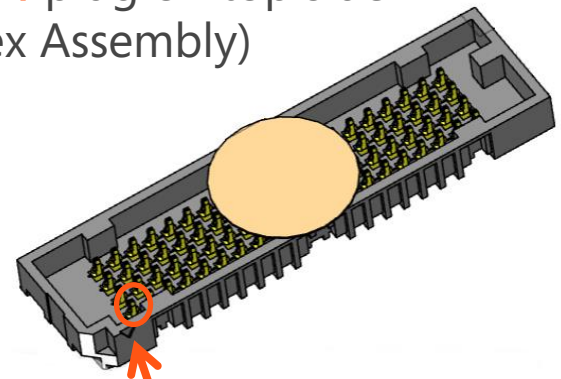
**Receptacle:** I-PEX NOVASTACK 35-HDN 20P
Part Number: 20865-020E-03
(receptacle placed on top side of customer interposer)



introspect technology

# Remote Sampling Head Side of Customer Flex

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



Customer Flex Assembly

Pin A01

Pin 1

**Plug:** I-PEX NOVASTACK 35-HDN 20P
Part Number: 20864-020E-01
(plug top view shown, plug is on
the bottom side of Flex Assembly)



introspect technology

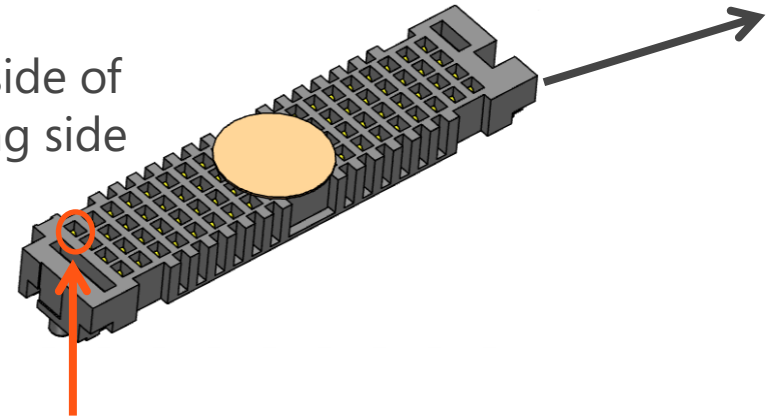
# Putting It All Together – Side View




introspect technology

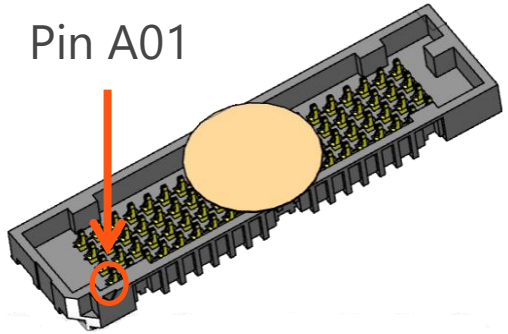
# Remote Sampling Head Connection

Part Number: Receptacle
**Samtec LPAF-20-03.5-L-04-2**
(20 x 4 receptacle on bottom side of Remote Sampling Head, mating side shown)



RSH2 (AC Coupled)

Pin A01



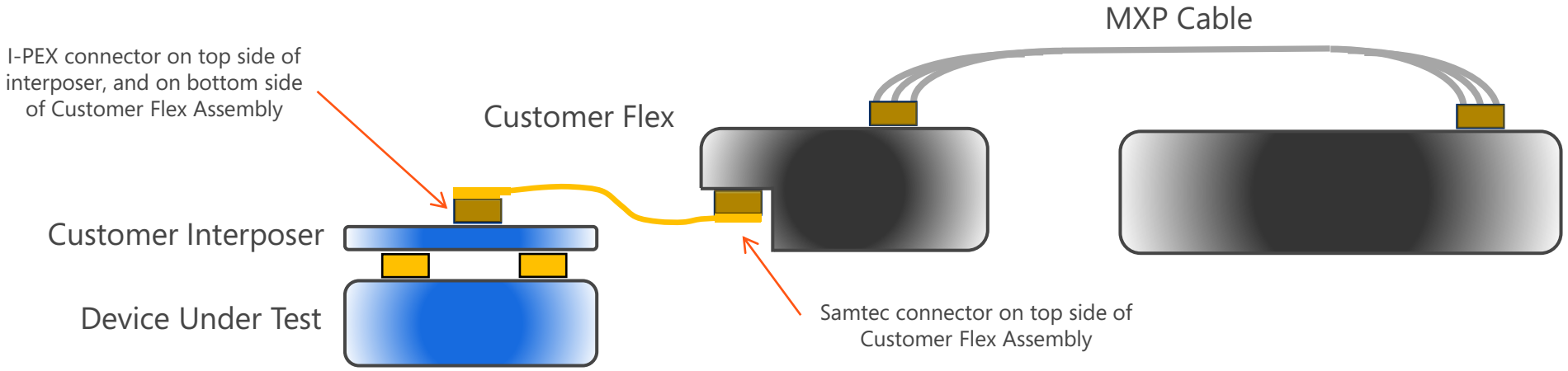
Customer Flex Assembly

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

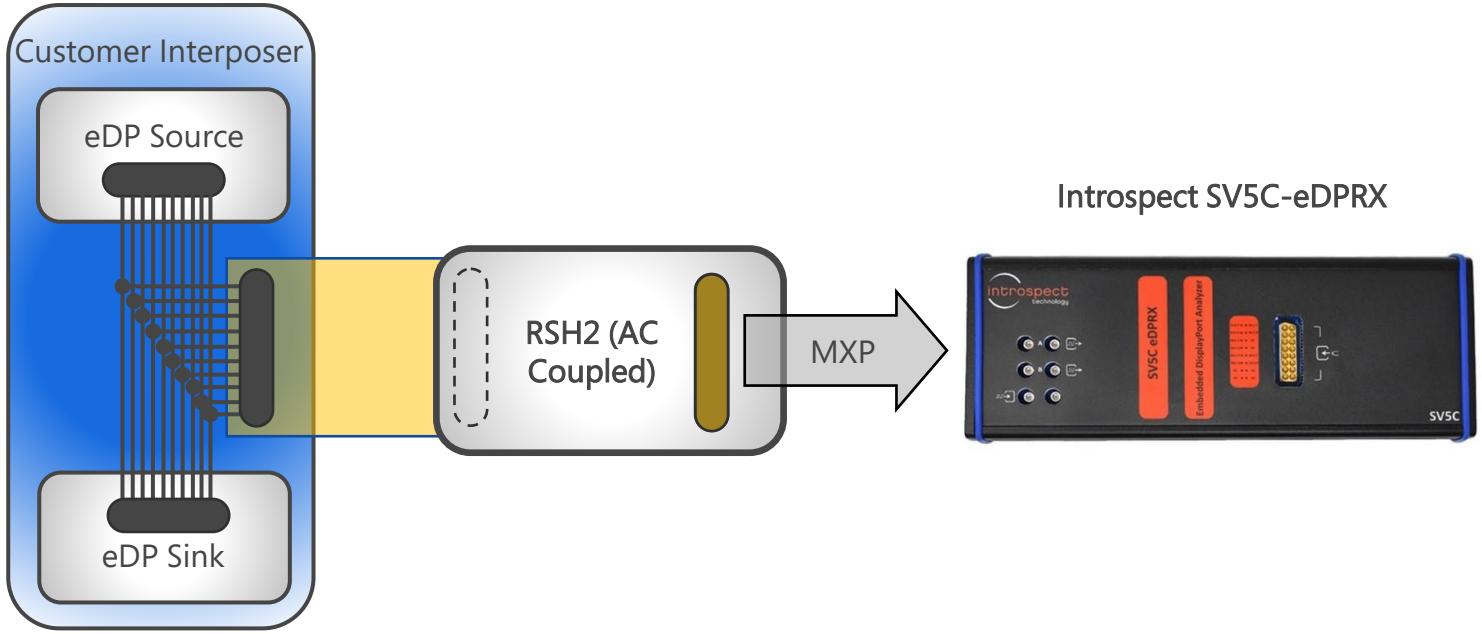


introspect technology

# Complete System Diagram



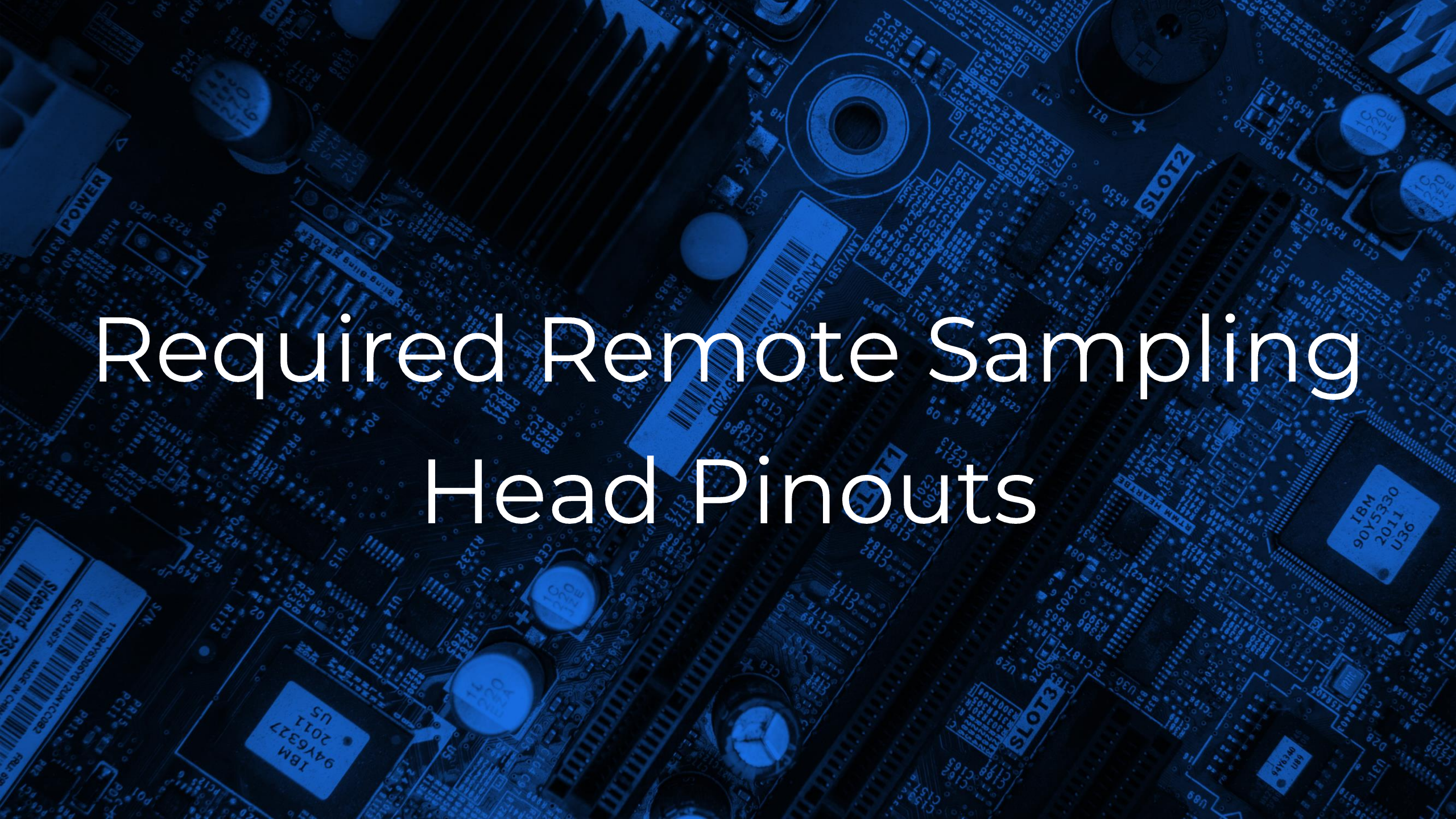

**SIDE VIEW**




**TOP VIEW**



introspect technology



# Required Remote Sampling Head Pinouts

# Interposer Receptacle Pinout

| | | | | |
|---|---|---|---|---|
| 1 | GND | | GND | 2 |
| 3 | ML 3P | | AUX P | 4 |
| 5 | ML 3N | | AUX N | 6 |
| 7 | GND | | GND | 8 |
| 9 | NC | | ML 2P | 10 |
| 11 | NC | | ML 2N | 12 |
| 13 | GND | | GND | 14 |
| 15 | ML 4P | | ML 1P | 16 |
| 17 | ML4N | | ML 1N | 18 |
| 19 | GND | | GND | 20 |

- Receptacle (part number I-PEX 20865-020E-03) is on customer interposer. The pinout shown on the left is oriented for the **receptacle, top view**. See slide 10.
- Note that when connected, the receptacle on the "top side" of the interposer will connect to the plug on the flex adapter "bottom side". See the pin 1 orientations shown on slide 10, 11, 12, and 13.
- Additional shield pins must be grounded as well, please see I-PEX footprint documentation.
- Plug pinout is shown on the following slide for complete clarity.



introspect technology

# Flex Plug Pinout

| | | | | |
|---|---|---|---|---|
| 2 | GND | | GND | 1 |
| 4 | AUX P | | ML 3P | 3 |
| 6 | AUX N | | ML 3N | 5 |
| 8 | GND | | GND | 7 |
| 10 | ML 2P | | NC | 9 |
| 12 | ML 2N | | NC | 11 |
| 14 | GND | | GND | 13 |
| 16 | ML 1P | | ML 4P | 15 |
| 18 | ML 1N | | ML4N | 17 |
| 20 | GND | | GND | 19 |

- Plug (part number I-PEX 20864-020E-01) is on the customer flex assembly. The pinout shown on the left is oriented for the **plug, top view**.
- Note that when connected, the plug on the "bottom side" of the flex adapter would connect to the receptacle on the customer interposer "top side". See the pin 1 orientations shown on slide 10, 11, 12 and 13.



introspect technology

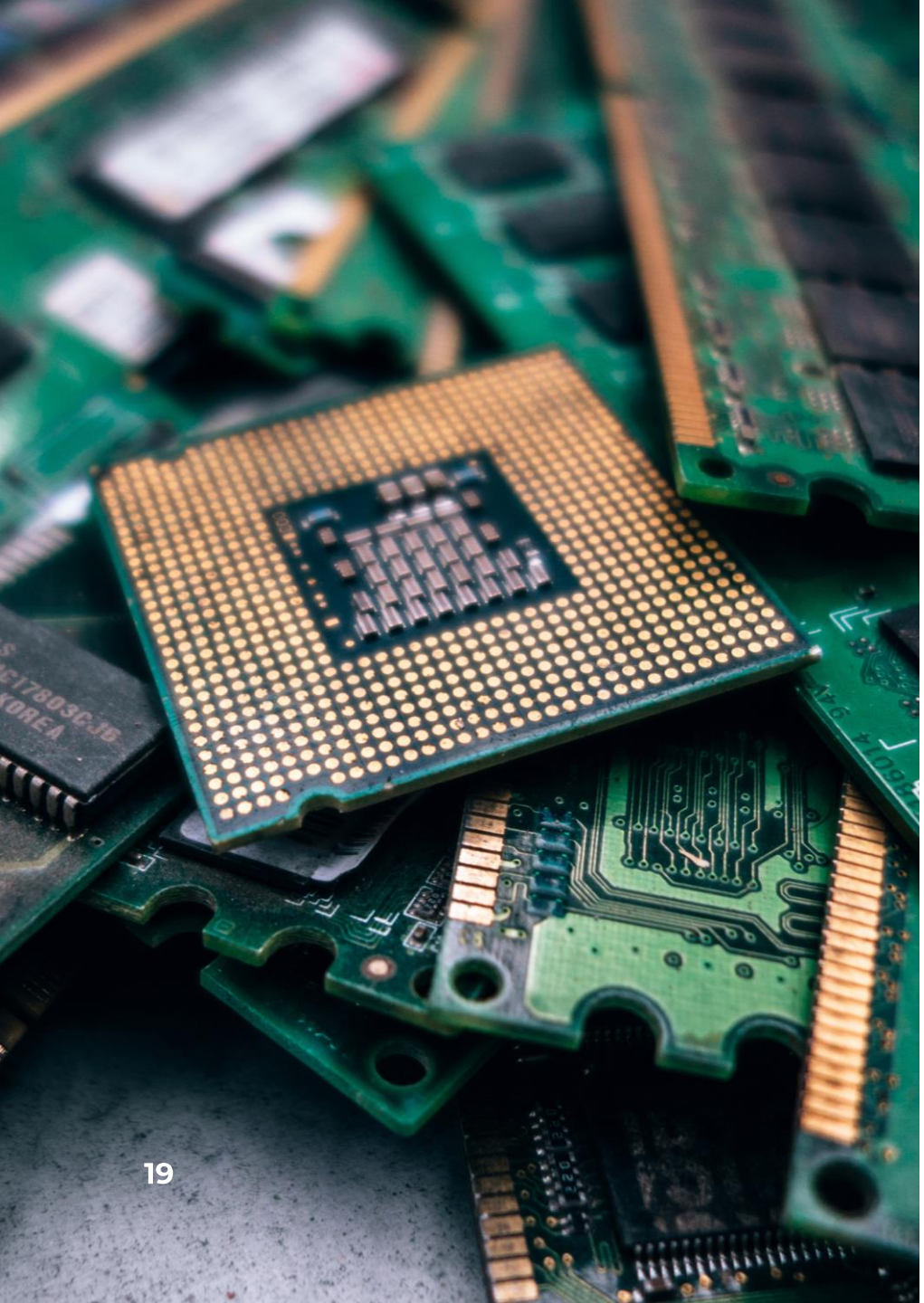
# **eDP:** Required Remote Sampling Head Pinout (Receptacle and Plug)

| | | | | | |
|---|---|---|---|---|---|
| Pin A01 | GND | GND | GND | GND | Pin D01 |
| | GND | Aux P | GND | GND | |
| | GND | GND | Aux N | GND | |
| | GND | ML 1P | GND | GND | |
| | GND | GND | GND | GND | |
| | GND | GND | ML 1N | GND | |
| | GND | ML 2P | GND | GND | |
| | GND | GND | ML 2N | GND | |
| | GND | GND | GND | GND | |
| | GND | GND | GND | GND | |
| | GND | GND | GND | GND | |
| | GND | GND | GND | GND | |
| | GND | ML 4N | GND | GND | |
| | GND | GND | ML 4P | GND | |
| | GND | GND | GND | GND | |
| | GND | GND | GND | GND | |
| | GND | GND | GND | GND | |
| | GND | ML 3N | GND | GND | |
| | GND | GND | ML 3P | GND | |
| Pin A20 | GND | GND | GND | GND | Pin D20 |

- Plug (male, part number **LPAM-20-01.5-L-04-2)** is on the Customer Flex Adapter, bottom side. Refer to pin A01 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 A01 orientation shown on slide 13.



introspect technology



# Summary

- Introspect's RSH2 (AC Coupled) Remote Sampling Head provides a simple connectorized interface for easy attachment to Main Link and Aux Channel busses.
- This document described the guidelines for the interposer design and layout.
- The required connector (I-PEX NOVASTACK 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 RSH2 Remote Sampling Head has also been shown, with the required pinouts provided.



introspect technology


introspect
technology
To Learn More Visit:
INTROSPECT.CA