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# ChipConnect Cable Assemblies

## INTRODUCTION

### Description

TE Connectivity's (TE) ChipConnect passive copper cable assembly is a robust and flexible cable assembly based on the Intel® Omni-Path Internal Faceplate-to-Processor (IFP) cable assembly with support of up to 2 ports, at 100Gbps per port. The IFP cable assembly is composed of discrete twinax pairs with a 54-position Linear Edge Connector (LEC) that mates with CPU substrate, and paddle card connectors that mate internally with Intel® Omni-Path Internal Faceplate Transition (IFT) connector and cage. Due to the lower loss characteristics of copper cable, ChipConnect internal cabling extends the reach for high data rate signals. TE's cabling solution helps lower overall costs by eliminating re-timers required to compensate for lossy PCB traces as well as costlier, lower loss PCB laminates.

ChipConnect assemblies are offered with 85 ohm impedance 30AWG twinax pairs. The cable design is available in a broad range of standard configurations. Standard cabling options include:

- IFPA - mates with 1.587mm thick microprocessor substrate
- IFPB - mates with 1.102mm thick microprocessor substrate
- Straight, right and left turn exit configurations
- 1-port (8 diff pair) and 2-port (16 diff pair) I/O paddle card connector configurations
- Inverted and non-inverted I/O paddle card connectors
- Various standard cable lengths through 439mm

In addition to these standard IFP cable configurations, TE can develop customized versions based on individual customer requirements.

### Features and Benefits

- Internal copper cable solution for use with Intel® Xeon® Phi™ Processor 7200F Series with integrated Intel® Omni-Path Architecture
- Supports 25Gbps channel speeds utilizing Intel Omni-Path Architecture
- Enables less expensive PCB material and electronics, with higher channel performance
- Optimized construction to minimize insertion loss and cross talk
- High density 0.7 mm LEC contact pitch
- 30AWG 85 Ohm low loss 25GHz primary pairs
- Toolless connector insertion and extraction
- Molded plastic strain-relief isolates solder joints from external stresses
- Straight, left-turn or right-turn exit LEC termination support different system designs
- Active press to release stainless steel IFT latching
- Torsional spring latch LEC termination connects to retention features on socket bolster plate
- RoHS compliant

### Product Applications

- High performance computing
- Servers and routers
- Data Center and Enterprise networks

### Industry Protocols

- Intel Omni-Path Architecture (100Gbps)

### Technical Documents

*Product Specification*
108-130015

## PART NUMBERS

**Table 1. Part Number Selection Guide**

| IFP Style | Number of Ports | LEC Configuration | IFP Configuration | Assembly Length (mm) | Breakout Length (mm) | Part Number | Remark |
|---|---|---|---|---|---|---|---|
| A | 2 | Straight | Flat | 142 | 75 | 2821719-3 | |
| | | | | 208 | 104.5 | 2821719-1 | |
| | | | | 405 | 104.5 | 2821719-2 | |
| | | | | 460 | 104.5 | 2821719-4 | * |
| | | | Inverted | 208 | 104.5 | 2821720-1 | |
| | | | | 405 | 104.5 | 2821720-2 | |
| B | 1 | Straight | Flat | 150 | N/A | 2821721-1 | |
| | | | Inverted | 160 | N/A | 2821722-1 | |
| | | | | 205 | N/A | 2821722-2 | |
| | | | | 242 | N/A | 2821722-3 | |
| | | | | 465 | N/A | 2821722-4 | * |
| | | Left Angle | Flat | 142 | N/A | 2821723-4 | |
| | | | | 335 | N/A | 2821723-1 | |
| | | | | 371 | N/A | 2821723-2 | |
| | | | | 460 | N/A | 2821723-5 | * |
| | | | | 515 | N/A | 2821723-3 | * |
| | | | Inverted | 178 | N/A | 2821724-1 | |
| | | | | 235 | N/A | 2821724-2 | |
| | | | | 318 | N/A | 2821724-3 | |
| | | | | 419 | N/A | 2821724-4 | |
| | | | | 439 | N/A | 2821724-5 | |
| | | | | 500 | N/A | 2821724-6 | * |
| | | Right Angle | Flat | 142 | N/A | 2821778-1 | |
| | | | | 460 | N/A | 2821778-2 | * |
| | | | Inverted | 235 | N/A | 2821725-1 | |
| | | | | 370 | N/A | 2821725-2 | |
| | | | | 500 | N/A | 2821725-3 | * |

*Cable lengths exceeding 439 mm are not standard offer and have not been qualified by Intel

## PRODUCT SPECIFICATIONS

### Table 2. Material Specifications

| | |
|---|---|
| **PCB** | Halogen Free low loss laminate |
| | IPC Class 3 |
| **Contact** | Gold plated contact pads |
| **Connector housing** | PBT thermoplastic |
| **Active latches** | Stainless steel wire bail lock (LEC) |
| | Stamped Stainless steel (I/O) |
| **Discrete cable** | Silver plated copper conductor |
| | Fluoropolymer dielectric |
| | Metallic tape pair shield |
| | Polyester tape jacket |

### Table 3. Electrical/Mechanical Specifications

| | |
|---|---|
| **Impedance** | 85Ω ±5 ohm (avg), ±10% (instantaneous) |
| **Data Rate** | 25Gbps per channel |
| **Within Pair Skew** | 5 ps max |
| **Rated Voltage** | 30V |
| **Connector Insertion** | 1.13 kgf |
| **Connector Detraction** | 1.22 kgf |
| **Latch Engagement** | 1.59 kgf |
| **Connector Extraction** | 1.22 kgf |
| **28-Pin Plug Insertion** | 4.1 kgf |
| **28-Pin Plug Extraction** | 3.1 kgf |
| **28-Pin Plug Retention** | 9.2 kgf |
| **Durability** | 30 mating cycles |
| **Residual Load Limit** | 0 kgf |
| **Static Cable Strain Relief** | 5.0 kgf |
| **Dynamic Cable Strain Relief** | TBD |
| **LEC54 from housing to back-shell retention** | 5.0 kgf |
| **Minimum Cable Bend Radius** | 2-Port, 7.5 mm dia bundle: R=37.5 mm<br>1-Port, 5.5 mm dia bundle: R=25 mm |

### Table 4. Environmental Specifications

| | |
|---|---|
| **Non-Operating Condition** | 24°C |
| **Operating Condition** | -40C to 70C, 6%RH |
| **Flammability Rating** | VW-1 |
| **Safety Certificates** | RoHS II compliant |

## ChipConnect Cable Assemblies

**Table 5. Discrete Primary Pair Cable Specifications**

| | |
|---|---|
| **Bend Radius** | 7x minor diameter |
| **Cable Dimensions** | Minor Diameter = 0.89 mm |
| | Major Diameter = 1.55 mm |
| **Attenuation** | 5 GHz = 3.8 dB/m |
| | 12.89 GHz = 6.0 dB/m |
| | 20 GHz = 8.0 dB/m |
| | 25 GHz = 10.0 dB/m |

## ChipConnect Cable Assemblies

# PIN CONFIGURATIONS

### IFPA 2-Port Configuration

| CABLE PINOUT | | | | |
|---|---|---|---|---|
| PAIR | PIN NAME | P1 | P2 | P3 |
| GROUND BUS | - | 1 | - | 1 |
| 1 | HFI0_RX_DN(1) | 2 | - | 2 |
| | HFI0_RX_DP(1) | 3 | - | 3 |
| GROUND BUS | - | 4 | - | 4 |
| 2 | HFI0_RX_DN(3) | 5 | - | 5 |
| | HFI0_RX_DP(3) | 6 | - | 6 |
| GROUND BUS | - | 7 | 1 | 7 |
| 3 | HFI1_RX_DN(1) | - | 2 | 8 |
| | HFI1_RX_DP(1) | - | 3 | 9 |
| GROUND BUS | - | - | 4 | 10 |
| 4 | HFI1_RX_DN(3) | - | 5 | 11 |
| | HFI1_RX_DP(3) | - | 6 | 12 |
| GROUND BUS | - | - | 7 | 13 |
| GROUND BUS | - | - | - | 14 |
| GROUND BUS | - | 8 | - | 15 |
| 5 | HFI0_TX_DP(4) | 9 | - | 16 |
| | HFI0_TX_DN(4) | 10 | - | 17 |
| GROUND BUS | - | 11 | - | 18 |
| 6 | HFI0_TX_DP(2) | 12 | - | 19 |
| | HFI0_TX_DN(2) | 13 | - | 20 |
| GROUND BUS | - | 14 | 8 | 21 |
| 7 | HFI1_TX_DP(4) | - | 9 | 22 |
| | HFI1_TX_DN(4) | - | 10 | 23 |
| GROUND BUS | - | - | 11 | 24 |
| 8 | HFI1_TX_DP(2) | - | 12 | 25 |
| | HFI1_TX_DN(2) | - | 13 | 26 |
| GROUND BUS | - | - | 14 | 27 |
| GROUND BUS | - | - | 15 | 28 |
| 9 | HFI1_TX_DN(1) | - | 16 | 29 |
| | HFI1_TX_DP(1) | - | 17 | 30 |
| GROUND BUS | - | - | 18 | 31 |
| 10 | HFI1_TX_DN(3) | - | 19 | 32 |
| | HFI1_TX_DP(3) | - | 20 | 33 |
| GROUND BUS | - | 15 | 21 | 34 |
| 11 | HFI0_TX_DN(1) | 16 | - | 35 |
| | HFI0_TX_DP(1) | 17 | - | 36 |
| GROUND BUS | - | 18 | - | 37 |
| 12 | HFI0_TX_DN(3) | 19 | - | 38 |
| | HFI0_TX_DP(3) | 20 | - | 39 |
| GROUND BUS | - | 21 | - | 40 |
| GROUND BUS | - | - | - | 41 |
| GROUND BUS | - | - | 22 | 42 |
| 13 | HFI1_RX_DP(4) | - | 23 | 43 |
| | HFI1_RX_DN(4) | - | 24 | 44 |
| GROUND BUS | - | - | 25 | 45 |
| 14 | HFI1_RX_DP(2) | - | 26 | 46 |
| | HFI1_RX_DN(2) | - | 27 | 47 |
| GROUND BUS | - | 22 | 28 | 48 |
| 15 | HFI0_RX_DP(4) | 23 | - | 49 |
| | HFI0_RX_DN(4) | 24 | - | 50 |
| GROUND BUS | - | 25 | - | 51 |
| 16 | HFI0_RX_DP(2) | 26 | - | 52 |
| | HFI0_RX_DN(2) | 27 | - | 53 |
| GROUND BUS | - | 28 | - | 54 |

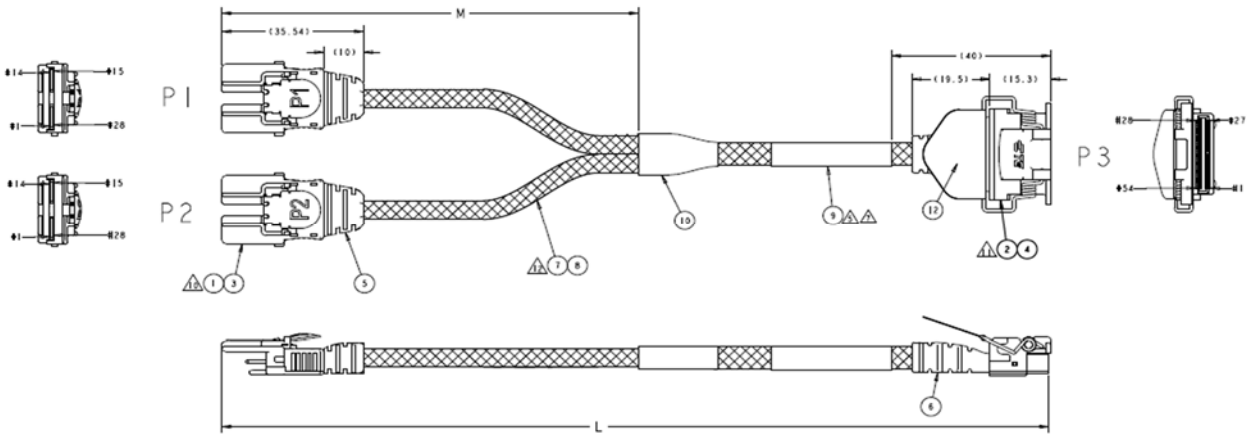
## ChipConnect Cable Assemblies

### IFPB 1-Port Configuration

| CABLE PINOUT | | | |
|---|---|---|---|
| PAIR | PIN NAME | P1 | P2 |
| GROUND BUS | - | 1 | 1 |
| 1 | HF10_RX_DN(1) | 2 | 2 |
| | HF10_RX_DP(1) | 3 | 3 |
| GROUND BUS | - | 4 | 4 |
| GROUND BUS | - | 28 | 4 |
| 2 | HF10_RX_DN(2) | 27 | 5 |
| | HF10_RX_DP(2) | 26 | 6 |
| GROUND BUS | - | 25 | 7 |
| 3 | HF10_RX_DN(3) | 5 | 8 |
| | HF10_RX_DP(3) | 6 | 9 |
| GROUND BUS | - | 25 | 10 |
| 4 | HF10_RX_DN(4) | 24 | 11 |
| | HF10_RX_DP(4) | 23 | 12 |
| GROUND BUS | - | 22 | 13 |
| GROUND BUS | - | 7 | 14 |
| GROUND BUS | - | 8 | 15 |
| 5 | HF10_TX_DP(4) | 9 | 16 |
| | HF10_TX_DN(4) | 10 | 17 |
| GROUND BUS | - | 21 | 18 |
| 6 | HF10_TX_DP(3) | 20 | 19 |
| | HF10_TX_DN(3) | 19 | 20 |
| GROUND BUS | - | 11 | 21 |
| 7 | HF10_TX_DP(2) | 12 | 22 |
| | HF10_TX_DN(2) | 13 | 23 |
| GROUND BUS | - | 14 | 24 |
| GROUND BUS | - | 18 | 24 |
| 8 | HF10_TX_DP(1) | 17 | 25 |
| | HF10_TX_DN(1) | 16 | 26 |
| GROUND BUS | - | 15 | 27 |

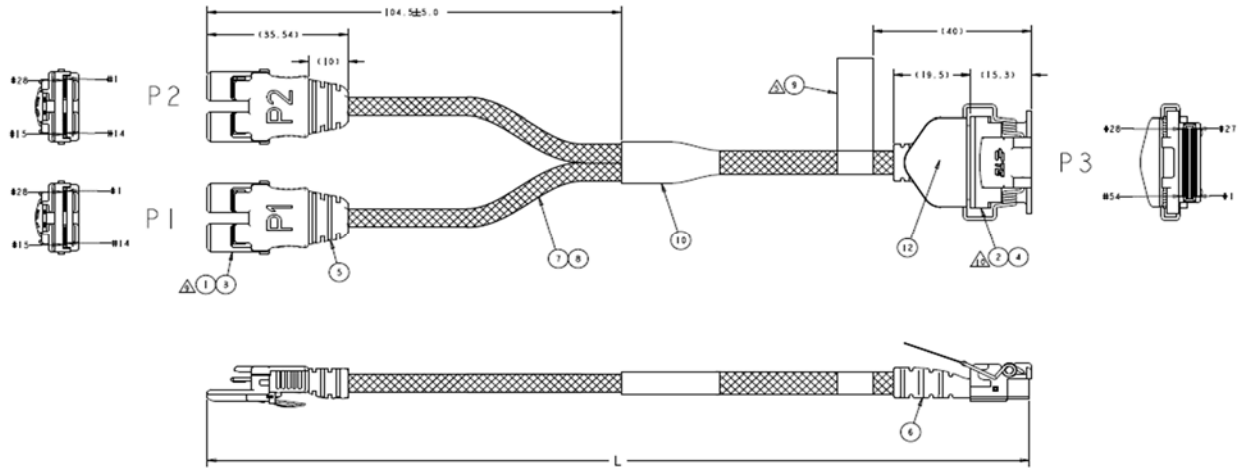
## CHIPCONNECT CABLE ASSEMBLY MECHANICAL SCHEMATICS

### IFPA 2-Port Flat Straight

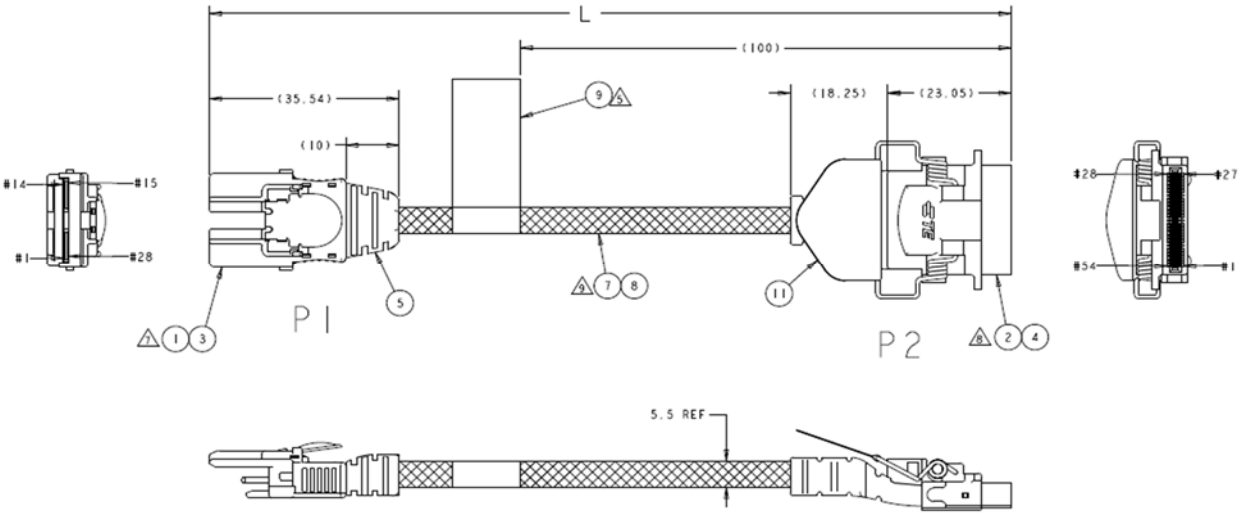


## ChipConnect Cable Assemblies

### IFPA 2-Port Inverted Straight

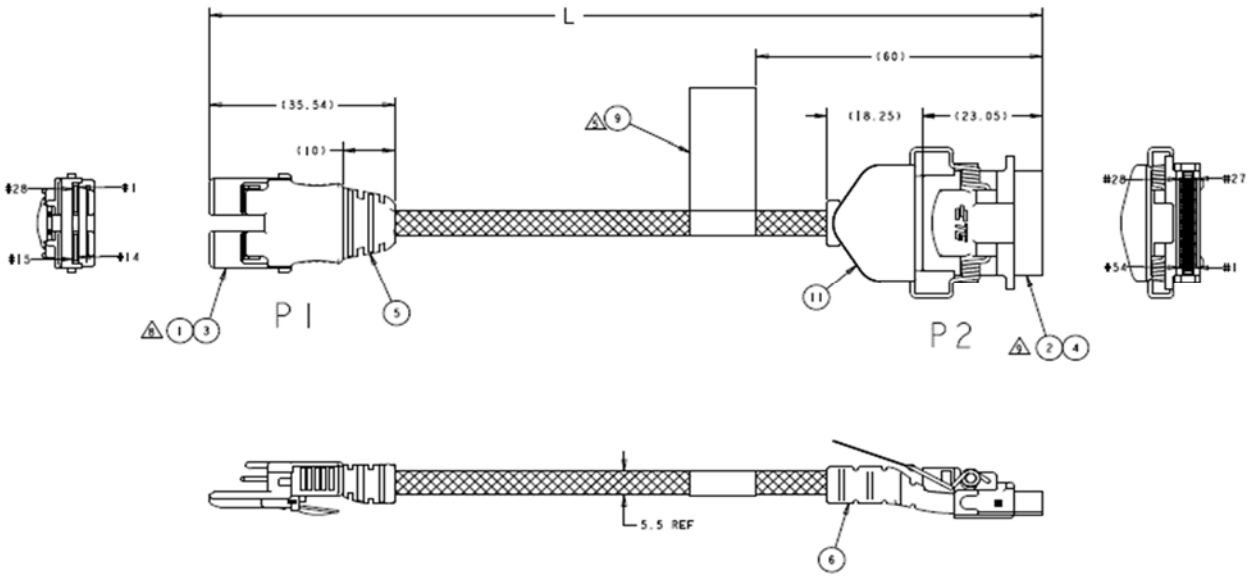



### IFPB 1-Port Flat Straight

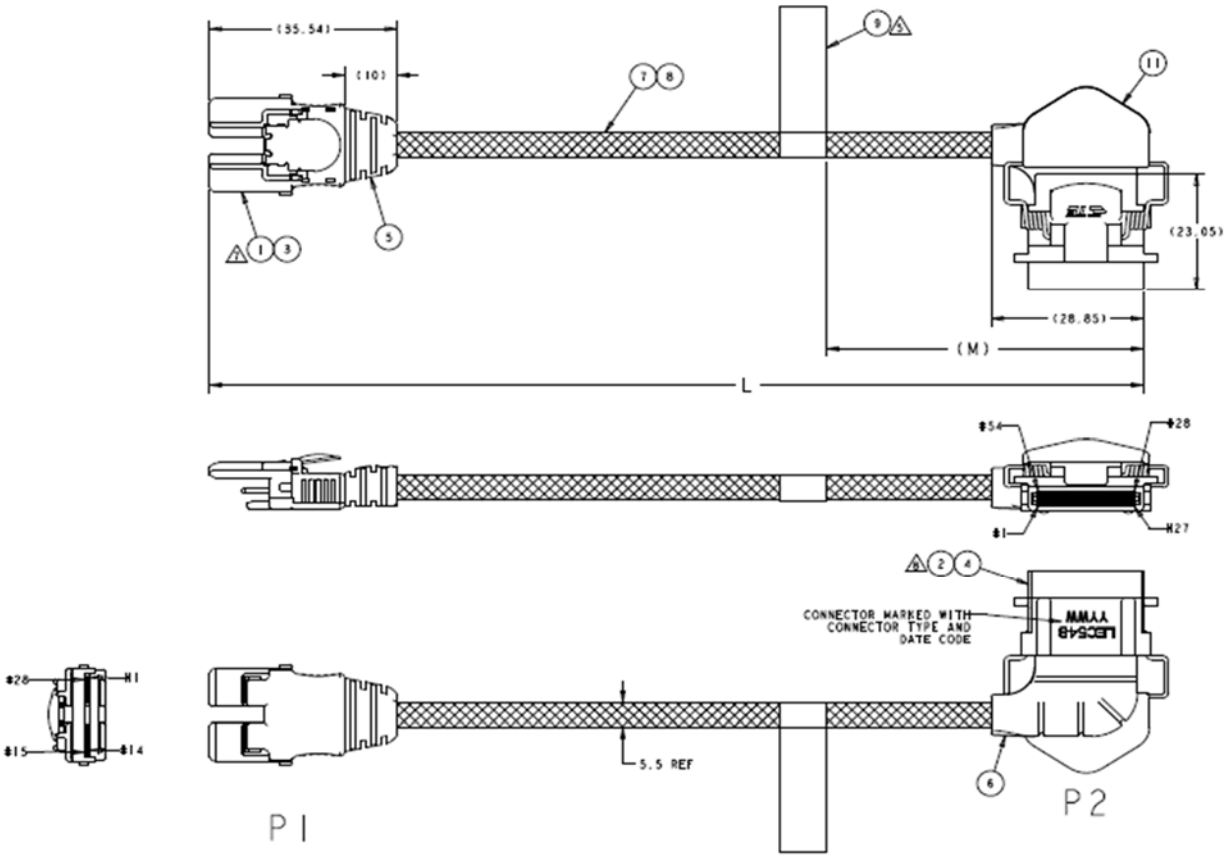


## ChipConnect Cable Assemblies

### IFPB 1-Port Inverted Straight

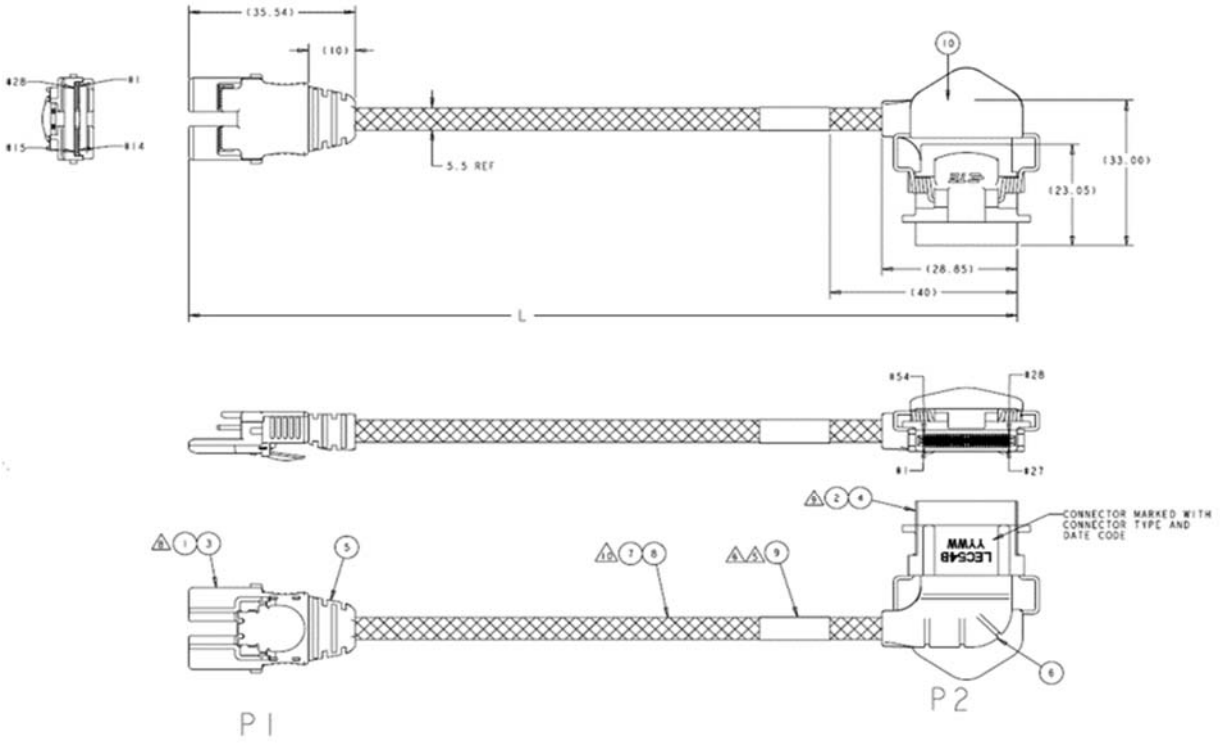



### IFPB 1-Port Flat Right Exit

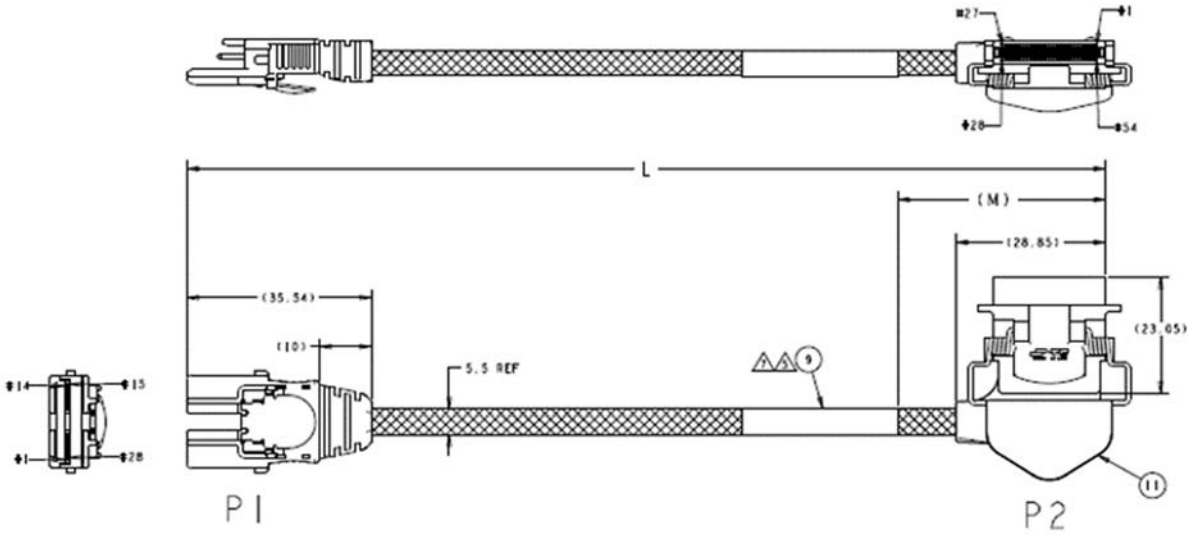


## ChipConnect Cable Assemblies

### IFPB 1-Port Inverted Right Exit

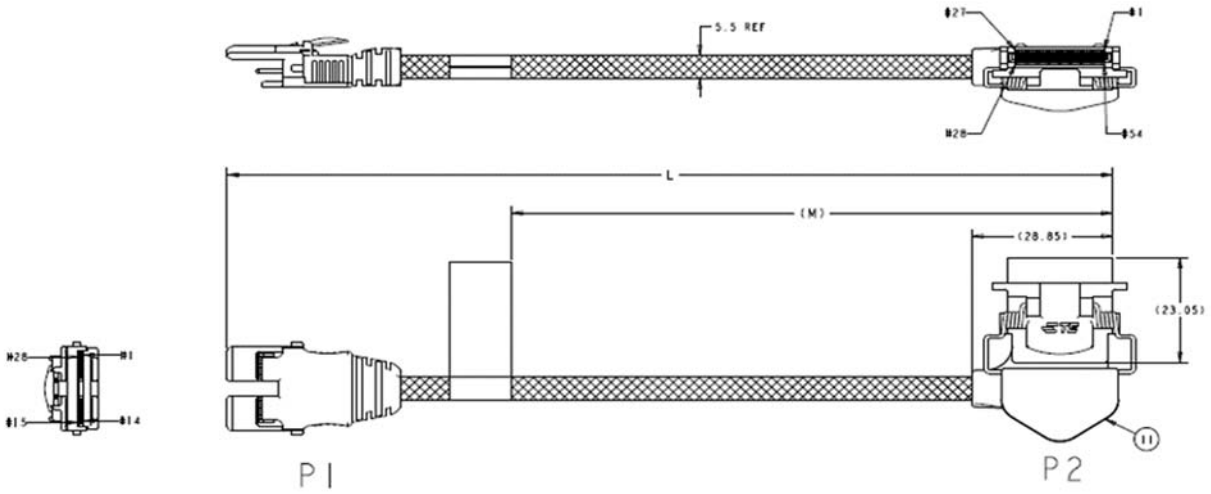



### IFPB 1-Port Flat Left Exit



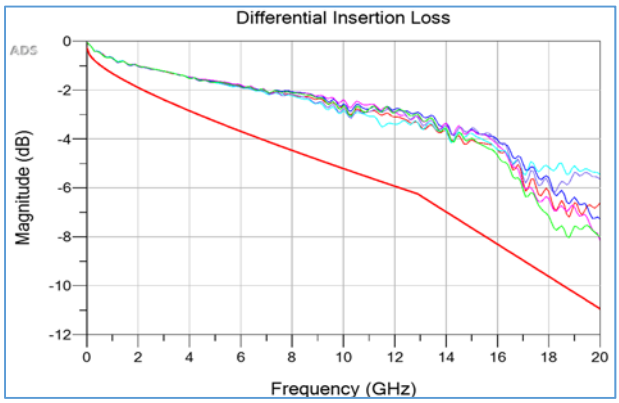
## ChipConnect Cable Assemblies

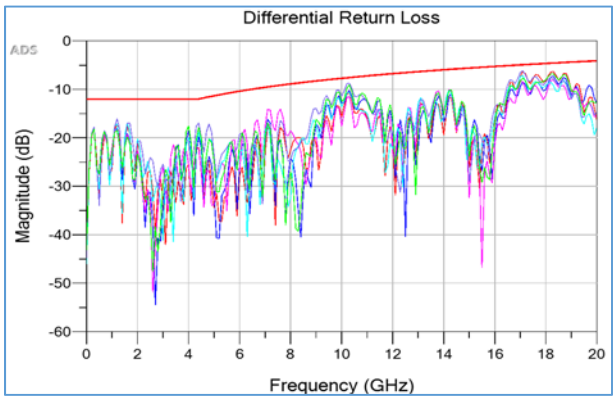
### IFPB 1-Port Inverted Left Exit



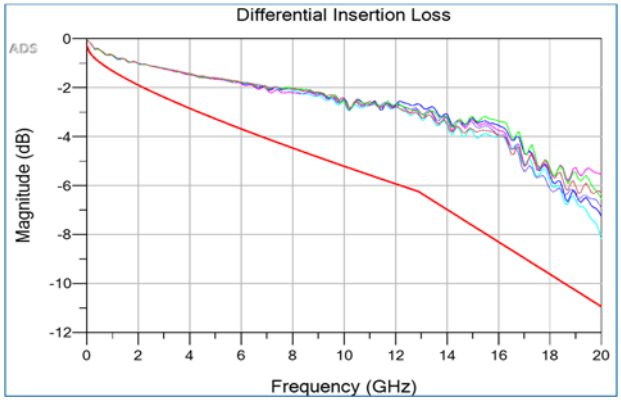
## SIGNAL INTEGRITY PERFORMANCE

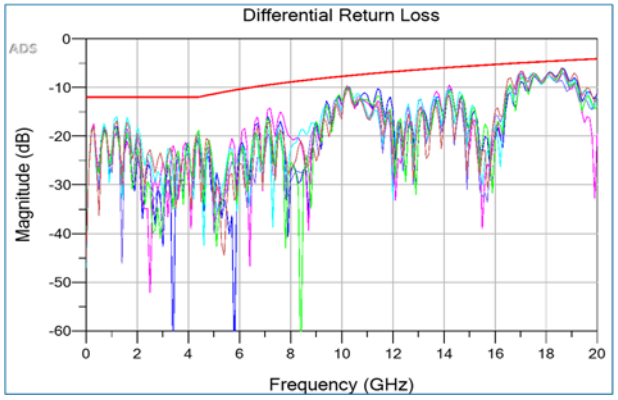
### TEPN 2821719-1



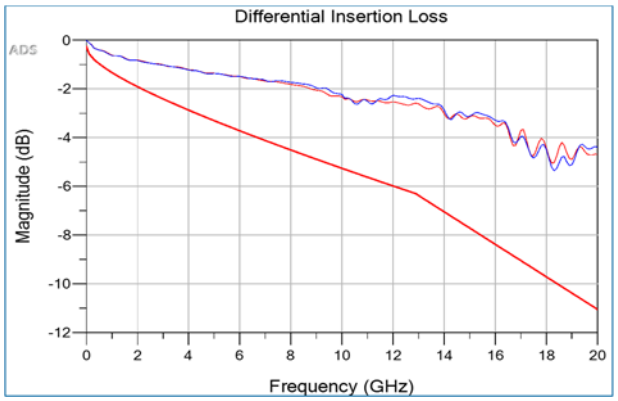



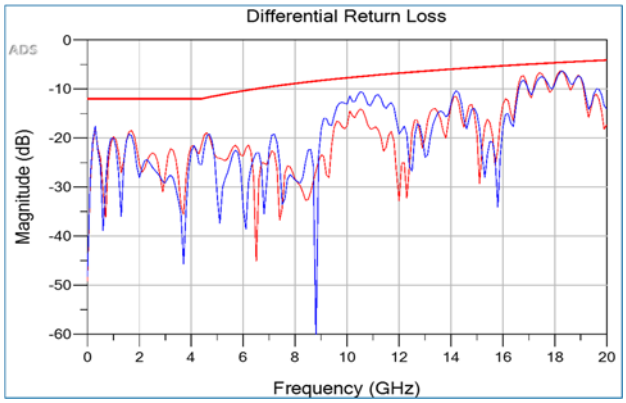

### TEPN 2821720-1



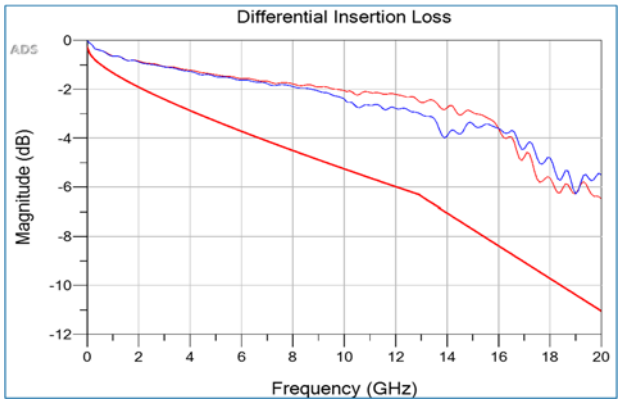

### TEPN 2821721-1

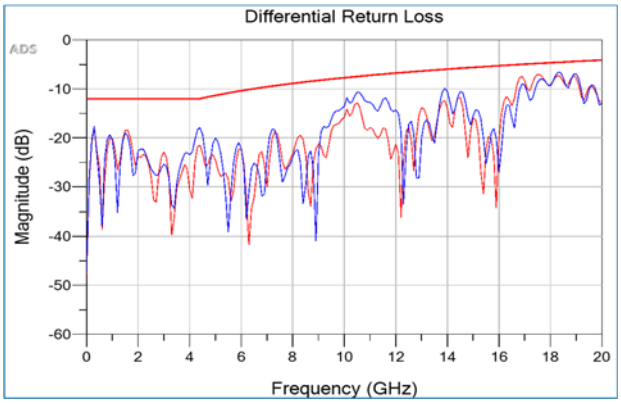


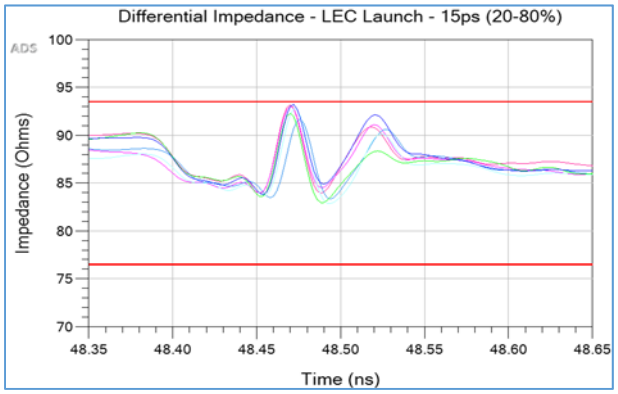
## ChipConnect Cable Assemblies

### TEPN 2821722-1

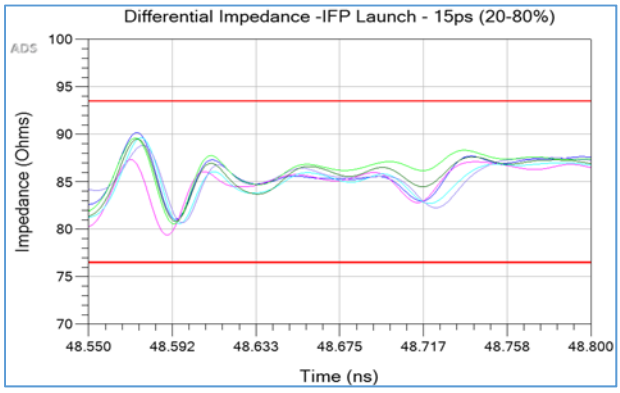



### LEC A – Differential Impedance

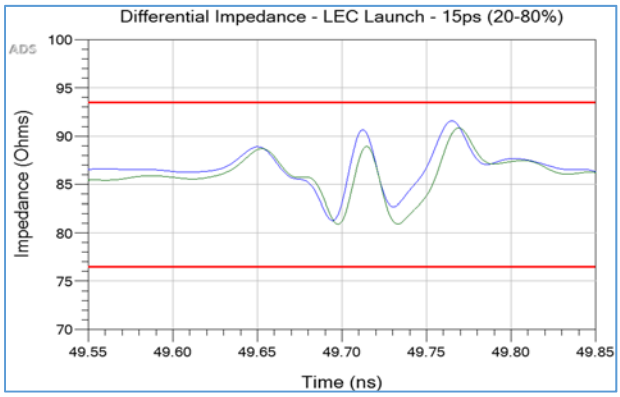



### IFP A – Differential Impedance



## ChipConnect Cable Assemblies

### LEC B – Differential Impedance




### IFP B – Differential Impedance