

# Product Specification: X-Beam<sup>™</sup> FPC Jumper Product Series (XFPC)

## **OVERVIEW**

The semi-custom X-Beam<sup>™</sup> FPC Jumper solution provides a flexible electromechanical link between two circuit boards, utilizing an advanced flexible printed circuit (FPC) which mates to an ultra-low profile connector on each end. The board connections are made with a surface mounted, ultra-low profile X-Beam<sup>™</sup> Connector, which occupies minimal board space and offers outstanding reliability. A high-performance flex circuit maintains excellent signal integrity with the capability to carry up to 10A of current.

The XFPC products leverage Neoconix standard X-Beam connectors and mating hardware, but with an FPC that is customized based on each applications signal, power, and length requirements. The XFPC product series is part of the Neoconix FPConnected family of FPC-connector assemblies.



## **FEATURES**

- High Power FPC + Low Profile X-Beam Connector
- High Current: to >10A
- High Speed: to >10Gbps
- Standard Pin Counts of 28 (power), 48 (power or signal), and 68 (power or signal)
- Flexibility in custom FPC length (typically 20mm 150mm)
- Highly Reliable, Screw-Down Connection to Mainboard
- Low Profile Mainboard Connection: 1.1-1.3mm
- Small Footprint to Mainboard: 28pos = 10.80x 6.65mm
  48 pos = 11.35 x 7.68mm, 68pos = 13.60 x 10.68mm

## **REFERENCE DRAWINGS**

- 904-000028 (28 position Power Connector)
- 904-000027 (48 Position)
- 904-000026 (68 Position)



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### PART NUMBER INFORMATION

An XFPC assembly consists of the following items.

- Qty 1 Custom FPC
- Qty 2 X-Beam Connectors
- Qty 2 M2 SMT Nuts
- Qty 2 M2 Screws

Each part should be ordered separately. Specific part numbers are included below, and a separate product drawing is available which details each of these.

<u>FPC (x1)<sup>1</sup></u>	Custom P/N
<u>X-Beam (x2)</u>	XBM-G028A (28-pos, short post <sup>2</sup> , power only <sup>3</sup> )
	XBM-D048A (48-pos, short post)
	XBM-D048C (48-pos, tall post)
	XBM-D068C (68-pos, short post)
	XBM-D068A (68-pos, tall post)
<u>SMT Nuts<sup>4</sup> (x2)</u>	B01-000633 (P=0.25, if PCB < 1mm thick)
	B01-000654 (P=0.40, if PCB >=1mm thick)
M2 Screws <sup>5</sup> (x2)	B01-000662 (L=3, P=0.25, if PCB <1mm thick)
	B01-000661 (L=3, P=0.40, if PCB 1.0 - 1.6mm)
	B01-000660 (L=4, P=0.40, if PCB 1.6 - 2.6mm)

B01-000659 (L=5, P=0.40, if PCB 2.6 - 4.0mm)

<sup>1</sup>The FPC should have a 0.50mm thick SS301 stainless steel stiffener behind the LGA mating area. See drawings for details.

<sup>2</sup>The "post" refers to the plastic alignment features on the X-Beam connectors. A taller post offers easier seating of the FPC prior to screw-down, but has the tradeoff of larger overall height.

<sup>3</sup>The 28-position X-Beam connector (XBM-G028A) is configured only as a power connector, with 12 positions electrically joined in parallel for the V+ connection, 12 positions electrically joined in parallel for the V- connection, and 4 discrete positions for signals.

<sup>4</sup>In the table, P refers to thread pitch. For thin PCBs (<1mm), a 0.25mm thread pitch is required to ensure adequate threads of engagement



<sup>5</sup>In the table, L refers to screw length.

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### TECHNOLOGY BACKGROUND:

The **X-Beam Connector** integrates the historically proven Neoconix micro-spring design into an over-molded thermoplastic carrier allowing superior electrical performance coupled with ease of assembly in a 1.1-1.3mm total mated height. The ultra low profile design provides excellent signal integrity, with use at datarates of up to 28Gbps in production. The current capacity is scalable, with flexibility to allocate as many positions to power and ground as desired in the 48 position and 68 position configurations.





Ref 48 Position Connector

## **X-BEAM CONNECTOR FEATURES**

- Ultra-low profile, 0.44mm connector base height after reflow
- One-step, high reliability screw assembly
- High speed signal contacts to 10Gbps
- Pick & place compatible (SMT nut and connector)
- Additional customization options offered
- Compliant with ROHS 2011/65/EU and IPC-4101B (halogen-free)
- Please see individual Neoconix drawings for more details



Ref 48 Position Connector

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## **XFPC PRODUCT SPECIFICATIONS**

### **MECHANICAL:**

ITEM	DESCRIPTION	REQUIREMENT	COMMENT
M1	Contact Pitch	0.6 mm	
M2	X-Beam Normal Force	30 +/-10g normal force /	
		contact	
M3	Recommended Screw Torque	0.5~0.8 kg-cm, (based on final hardware)	M2.0 screw
M4	Durability Cycles	50	Functional OK
M5	FPC pull force	2.5 kgf	Along FPC direction

## **ELECTRICAL:**

ITEM	DESCRIPTION	REQUIREMENT	COMMENT
E1	Resistance Per Position, X-Beam Connector (LLCR)	< 30 mΩ	
E2	Resistance variance (Delta R after test)	< 10 mΩ	
	Resistance for Power Contacts	28Pos: < 2.5m-Ohms	12 pos ganged together
E3	X-Beam Current Capacity (Power Pin)	28Pos: 8.5A Power + 8.5A GND (less than 30C temp rise)	Based on loop-through configuration with 12 PWR and 12 GND connections
E3	X-Beam Current Capacity (Signal Pin)	1.5A/Contact (less than 30C temp rise)	Per EIA364-70, Use the following formula for more than 2 contacts ganged together: Max current rating = 1A x (contacts /2) + 0.75 A Ex: 2P for 1.75A, 3P for 2.25A, 10P for 5.75A, etc.
E4	Insulation Resistance	>100 MΩ	
E5	Dielectric Withstanding Voltage	100 V	
E6	Diff. insertion loss (S21)	48 and 68Pos X-Beam: > -1 dB (~ 20 GHz)	(Simulation with 85 ohm impedance)
E7	Diff return loss (S11)	48 and 68 Pos X-Beam: < -15 dB (~ 3 GHz) <-10 dB (~20 GHz)	

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## ENVIRONMENTAL

ITEM	DESCRIPTION	REQUIREMENT	COMMENT
EN1	<b>Operating Temperature</b>	-40C to 85C	
EN2	Storage Temperature	-40C to 85C	
EN3	Temperature life	105C x 96 hours	Per EIA364-1000, table 8 condition
EN4	Cyclic Temperature & Humidity	Cycling the connector between 25°C +/-3 °C at 80% RH and 65 +/-3°C at 50% RH, Ramp times should be 0.5 hour and dwell times be 1 hour. Perform 24 cycles.	EIA 364-31 Specimens shall be mated during test,
EN5	Salt Spray	48hrs, 5% mist,	<10 mΩ Δ,
EN6	Vibration	<10 mΩ Δ No signal discontinuities of more than 1 µsec during the test.	Duration: 10 minutes per axis for all 3 axes. Frequency Range: 5 ~ 500 Hz. 5 to 20Hz (slope): (0.01g <sup>2</sup> /Hz)@5Hz, (0.02g <sup>2</sup> /Hz)@20Hz; 20 to 500Hz (flat): Input acceleration is 3.13 g RMS;

### MATERIALS

ITEM	DESCRIPTION	REQUIREMENT	COMMENT
MA1	Plastic housing	LCP, UL94 v-0	
MA2	Contact Elements	Hi performance Copper Alloy	
MA3	Contact Plating	Min 5 μ" hard Au over Ni	
MA4	Plastic Cap	LCP, UL94 v-0	
MA5	RoHS	ROHS Compliant per 2011/65/EU	
MA6	Package	Tape & Reel (Connector) Tape & Reel (Nut) Tray (FPC)	

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### **APPLICATION NOTES:**

### A1, FPC Footprint (X-Beam Interface)

(Example 48-position XFPC Jumper)



## **Recommend FPC footprint**

Note:

- 2.
- The stiffener is to align with connector housing when final assembly. The alignment tolerance for FPC & stiffener is  $\pm 0.075$ mm. Based on left notch (1.250+1.250)&right protrustion (2.050+2.050) feature. Solder mask opening min: 0.50 × 0.80 mm min.
- 3.

This information is for reference only. Please review the latest product drawing for the most up-to-date FPC Footprint information.

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## A2, PCB Mainboard Footprint

(Example 48-position XFPC Jumper)





This information is for reference only. Please review the latest product drawing for the most up-to-date PCB Footprint information.

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### A3: Pin Map vs. Connector, FPC & PCB Footprint:

(Example 48-position XFPC Jumper)



This information is for reference only. Please review the latest product drawing for the most up-to-date Pin Map information.

### A4, Solder Stencil

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Recommend minimum stencil thickness 0.10mm for X-Beam connection.

### A5, Recommended Reflow Profile:



Preheat	125 °C to 220 °C 150 s to 210 s	
Time at T>185 °C	60 s to 90 s	
Peak temperature	260 °C -5/+0 °C	
Peaktime	10 s to 30 s (≥ 250 °C)	
Cooling rate	≤ 6 K/s	
Time from 25 °C to peak	240 s to 360 s	

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### A6, X-Beam connector assembly process:

### Nut: Bottom side of board





 Tape & reel or tray package for auto-SMT process on board.

### X-Beam: Top side of board



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### A7, Recommended Assembly Guideline:





### A8, Handling Guidelines

- The use of latex gloves is recommended when handling connectors. As with any normal force connector, avoid touching contact tips and handle the product only by its edges.
- Mating surfaces should be clean prior to assembly. Foreign contaminants can result in opens or shorts after assembly.
- Connector cleaning is not needed if the product is kept in original packaging. When necessary, cleaning can be employed with the use of compressed air. Cleaning can also be performed with an ultrasonic bath of isopropyl alcohol (IPA). A 5 minute soak should be followed by a 10 minute bake at 65°C.
- When not in use, please keep product stored in original packaging.

### **ORDERING INFO**

To obtain a quotation, please contact the Neoconix sales office at <u>sales@neoconix.com</u> or 408-530-9393. Please include the part number(s) of interest.

Custom interposers and hardware are also available from Neoconix. Please contact the factory for more information.

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### **REVISION HISTORY**

Rev A	10/06/2016	Rev A Release
Rev B	03/15/2017	Added 28 and 68 position interposers, updated format of part numbering system, updated
		product specs.
Rev C	07/31/2018	Added nut SMT procedure, updated recommended FPC layout
Rev D	06/07/2019	Updated part numbers

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