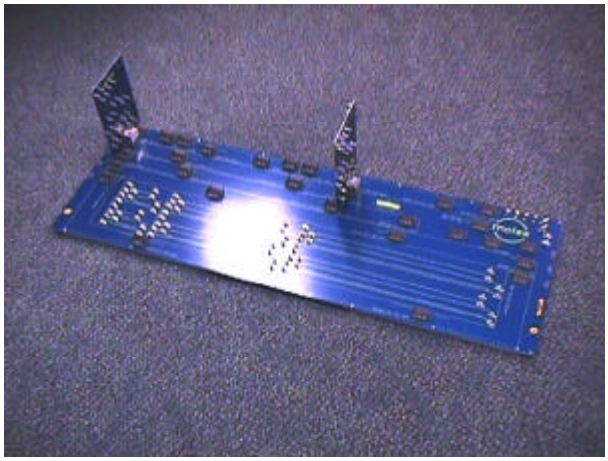
GBX FR408 Reference Backplane



Layout and Design Overview

Date: November 30, 2004
Revision: 1.2

By Gourgen Oganessyan
Sr Electrical Project Engineer
goganessyan@molex.com
phone: (630) 527-4287
fax: (630) 512-8620

TABLE OF CONTENTS

MOLEX INCORPORATED
2222 WELLINGTON COURT, LISLE, IL 60532-1682
TEL 630-969-4550
FAX 630-969-4550 TLX 254069

1) GENERAL OVERVIEW

The Molex GBX reference backplane is an OIF-compliant 6 GB/s test vehicle for a 5-pair GBX connector. It is built to allow a complete system-level characterization of connector performance for 8-inch, 15-inch, 20-inch, 25-inch, 30-inch, 1-meter and 1.25-meter differential channel lengths (where each length is a sum of the daughter-card and backplane channel lengths). Each length group features distal lanes with 4 TX and 4 RX channels and four clock-lines, as well as intermediate traffic pass-thru lanes to provide additional insight into coupled noise when routing through the connector pin field. An additional 8-inch single-connector feature, as well as a bridge feature, is also included. The distal channels are loosely coupled differential lines with various patent- pending antipad configurations, as well as standard rectangular construction. The intermediate channels are either tightly coupled lines or two styles of differential triad construction, - a top-routed and a bottom routed one.

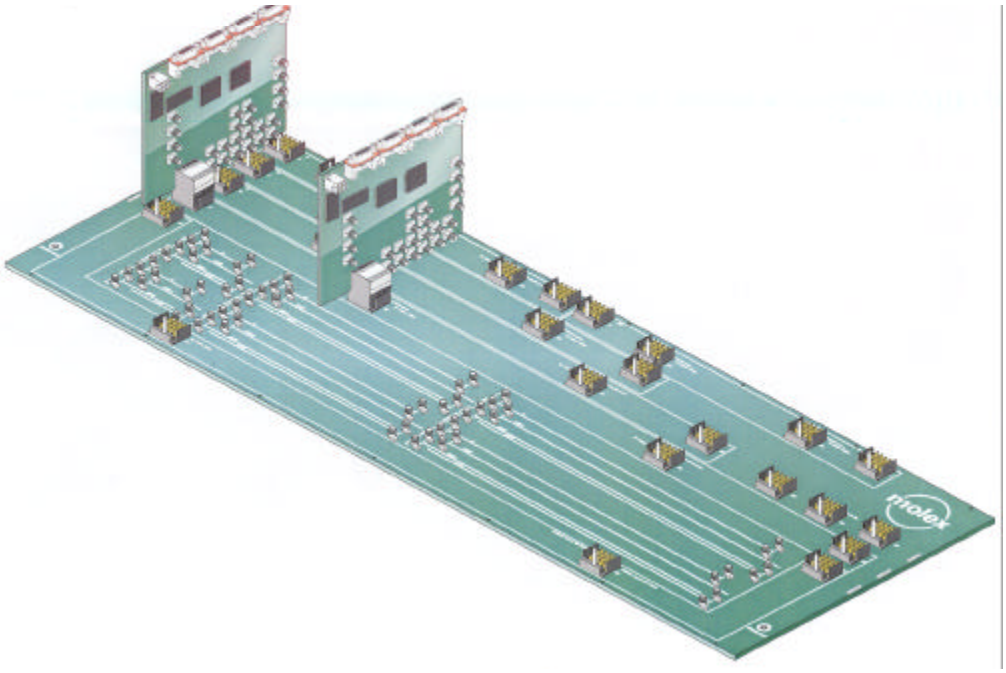
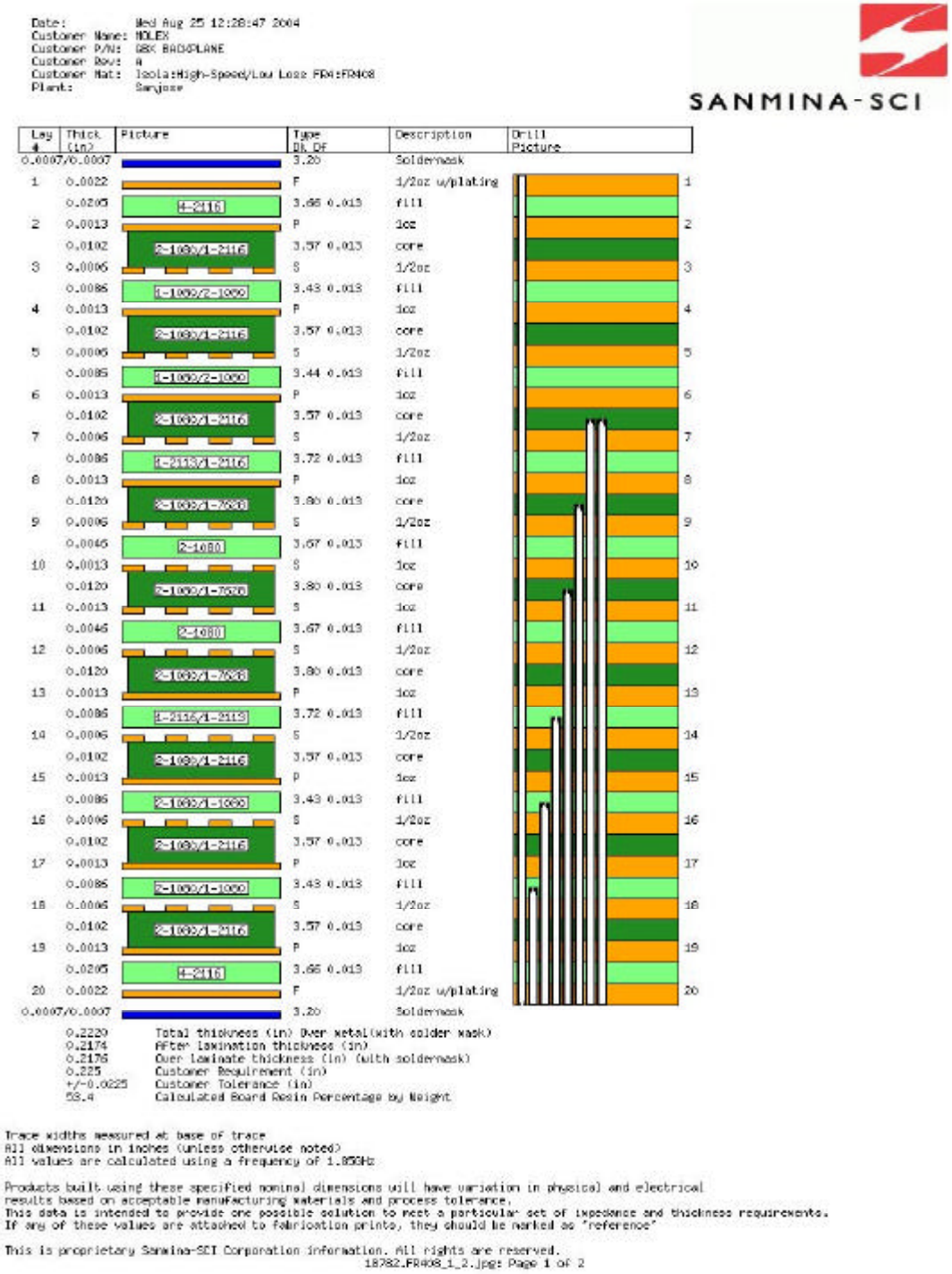


Fig. 1. GBX reference backplane schematic

MOLEX INCORPORATED
2222 WELLINGTON COURT, LISLE, IL 60532-1682
TEL 630-969-4550
FAX 630-969-4550 TLX 254069

Table 1 (a). GBX Backplane Stack - finished.



Date: Wed Aug 25 12:28:47 2004
Customer Name: MOLEX
Customer P/N: GBX BACKPLANE
Customer Rev: A
Customer Mat: Isola:High-Speed/Low Loss FR4:FR408
Plant: Sanjose

SANMINA-SCI

Lay #	Thick (in)	Picture	Type	Dk Df	Description	Drill Picture
0.0007/0.0007			3.20		Soldermask	
1	0.0022		P		1/2oz w/plating	1
	0.0205	1-2116	3.66	0.013	fill	
2	0.0013		P		1oz	2
	0.0102	2-1080/1-2116	3.57	0.013	core	
3	0.0006		S		1/2oz	3
	0.0086	1-1080/2-1080	3.43	0.013	fill	
4	0.0013		P		1oz	4
	0.0102	2-1080/1-2116	3.57	0.013	core	
5	0.0006		S		1/2oz	5
	0.0085	1-1080/2-1080	3.44	0.013	fill	
6	0.0013		P		1oz	6
	0.0102	2-1080/1-2116	3.57	0.013	core	
7	0.0006		S		1/2oz	7
	0.0086	1-2113/1-2116	3.72	0.013	fill	
8	0.0013		P		1oz	8
	0.0120	2-1080/1-7628	3.80	0.013	core	
9	0.0006		S		1/2oz	9
	0.0046	2-1080	3.67	0.013	fill	
10	0.0013		S		1oz	10
	0.0120	2-1080/1-7628	3.80	0.013	core	
11	0.0013		S		1oz	11
	0.0046	2-1080	3.67	0.013	fill	
12	0.0006		S		1/2oz	12
	0.0120	2-1080/1-7628	3.80	0.013	core	
13	0.0013		P		1oz	13
	0.0086	1-2116/1-2113	3.72	0.013	fill	
14	0.0006		S		1/2oz	14
	0.0102	2-1080/1-2116	3.57	0.013	core	
15	0.0013		P		1oz	15
	0.0086	2-1080/1-1080	3.43	0.013	fill	
16	0.0006		S		1/2oz	16
	0.0102	2-1080/1-2116	3.57	0.013	core	
17	0.0013		P		1oz	17
	0.0086	2-1080/1-1080	3.43	0.013	fill	
18	0.0006		S		1/2oz	18
	0.0102	2-1080/1-2116	3.57	0.013	core	
19	0.0013		P		1oz	19
	0.0205	1-2116	3.66	0.013	fill	
20	0.0022		P		1/2oz w/plating	20
0.0007/0.0007			3.20		Soldermask	

0.2229 Total thickness (in) Over metal(with solder mask)
0.2174 After lamination thickness (in)
0.2175 Over laminate thickness (in) (with soldermask)
0.225 Customer Requirement (in)
+/-0.0225 Customer Tolerance (in)
58.4 Calculated Board Resin Percentage by Weight

Trace widths measured at base of trace
All dimensions in inches (unless otherwise noted)
All values are calculated using a frequency of 1.850Hz

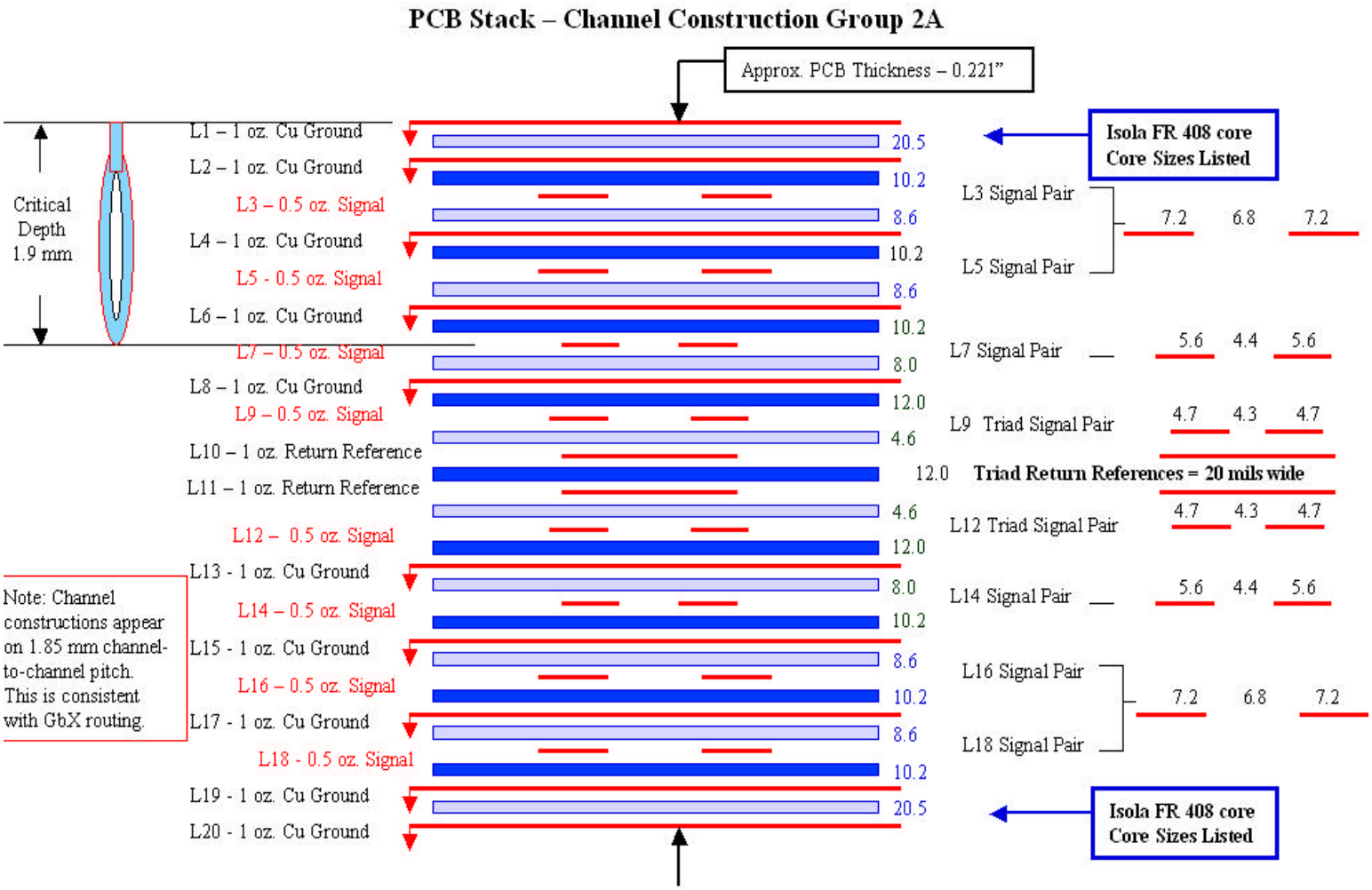
Products built using these specified nominal dimensions will have variation in physical and electrical results based on acceptable manufacturing materials and process tolerance.
This data is intended to provide one possible solution to meet a particular set of impedance and thickness requirements.
If any of these values are attached to fabrication prints, they should be marked as "reference"

18782.FR408_1_2.jpg: Page 1 of 2

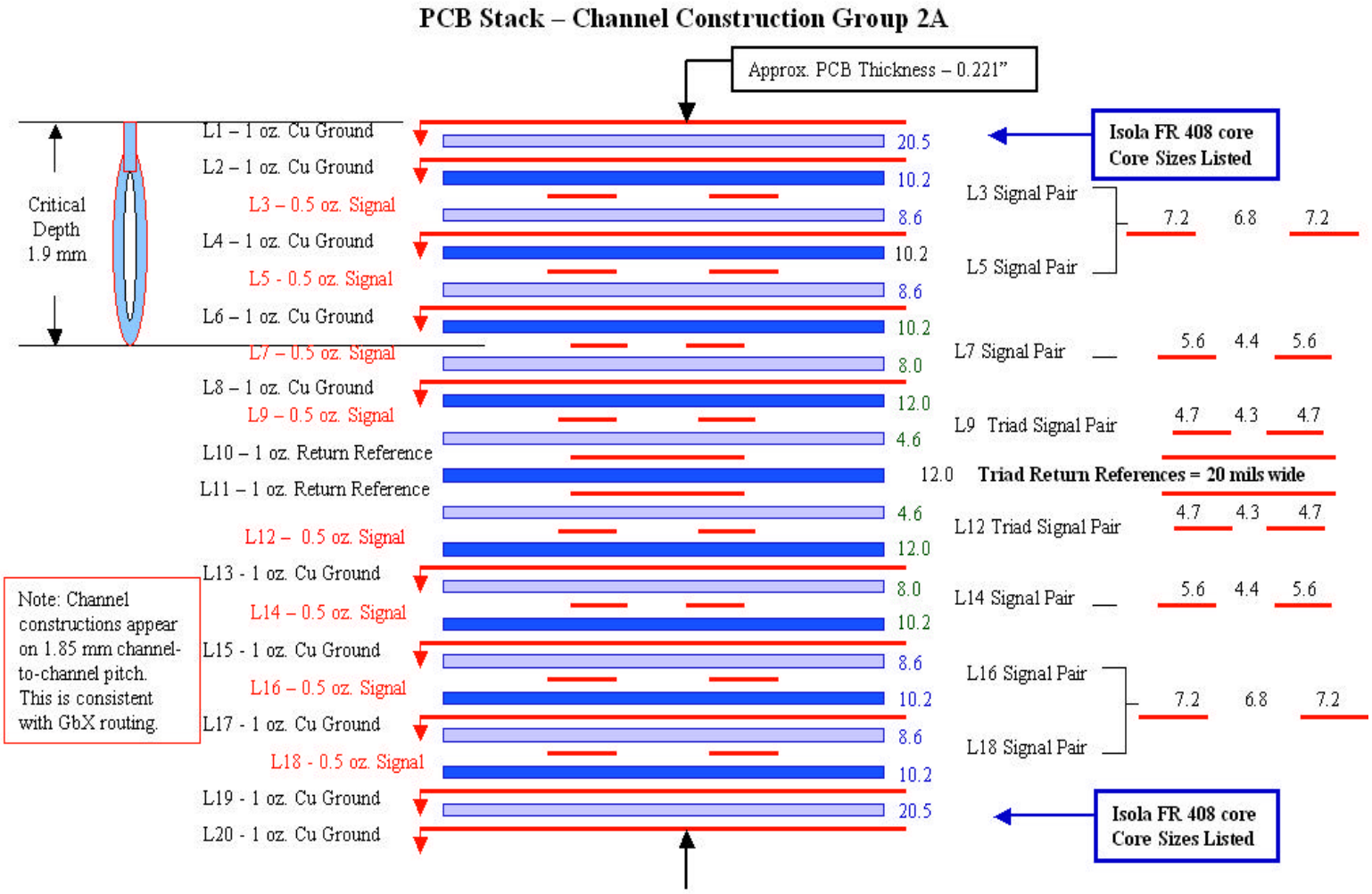
The finished backplane board stack and construction is as follows:

The backplane board and channel construction as designed is as follows:

Table 1 (b). GBX Backplane and Channel Construction - Designed



MOLEX INCORPORATED
2222 WELLINGTON COURT, LISLE, IL 60532-1682
TEL 630-969-4550
FAX 630-969-4550 TLX 254069



Notes:

1) **Relative dielectric constant values are referenced at 2.5 GHz per Isola typical construction design guide.**
2) **Soldermask thickness is included in column 2 total thickness.**

The following figures illustrate the construction of various channels:

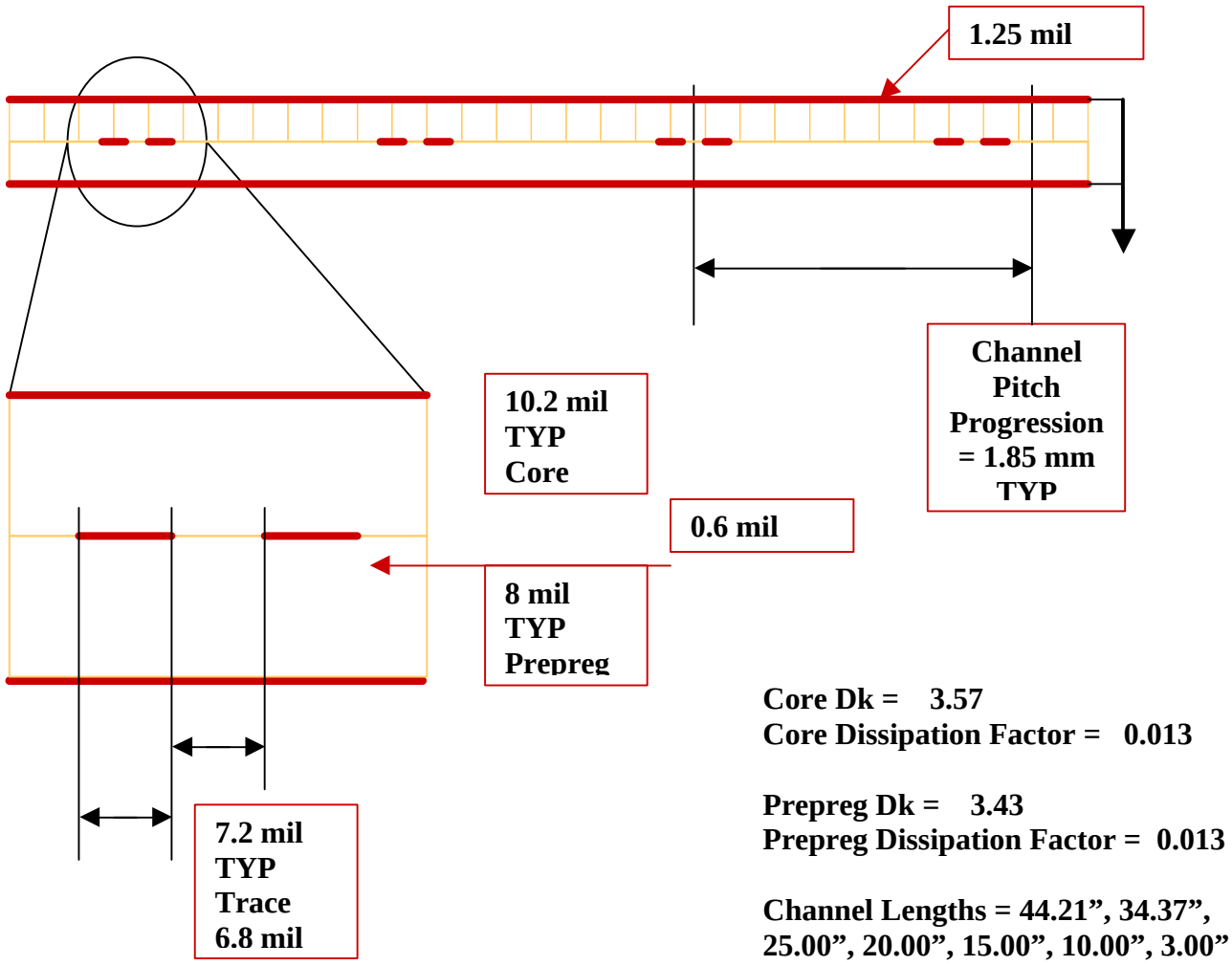


Fig 2. Distal Channel Construction, Style A (7.2/6.8/7.2) – loosely coupled.

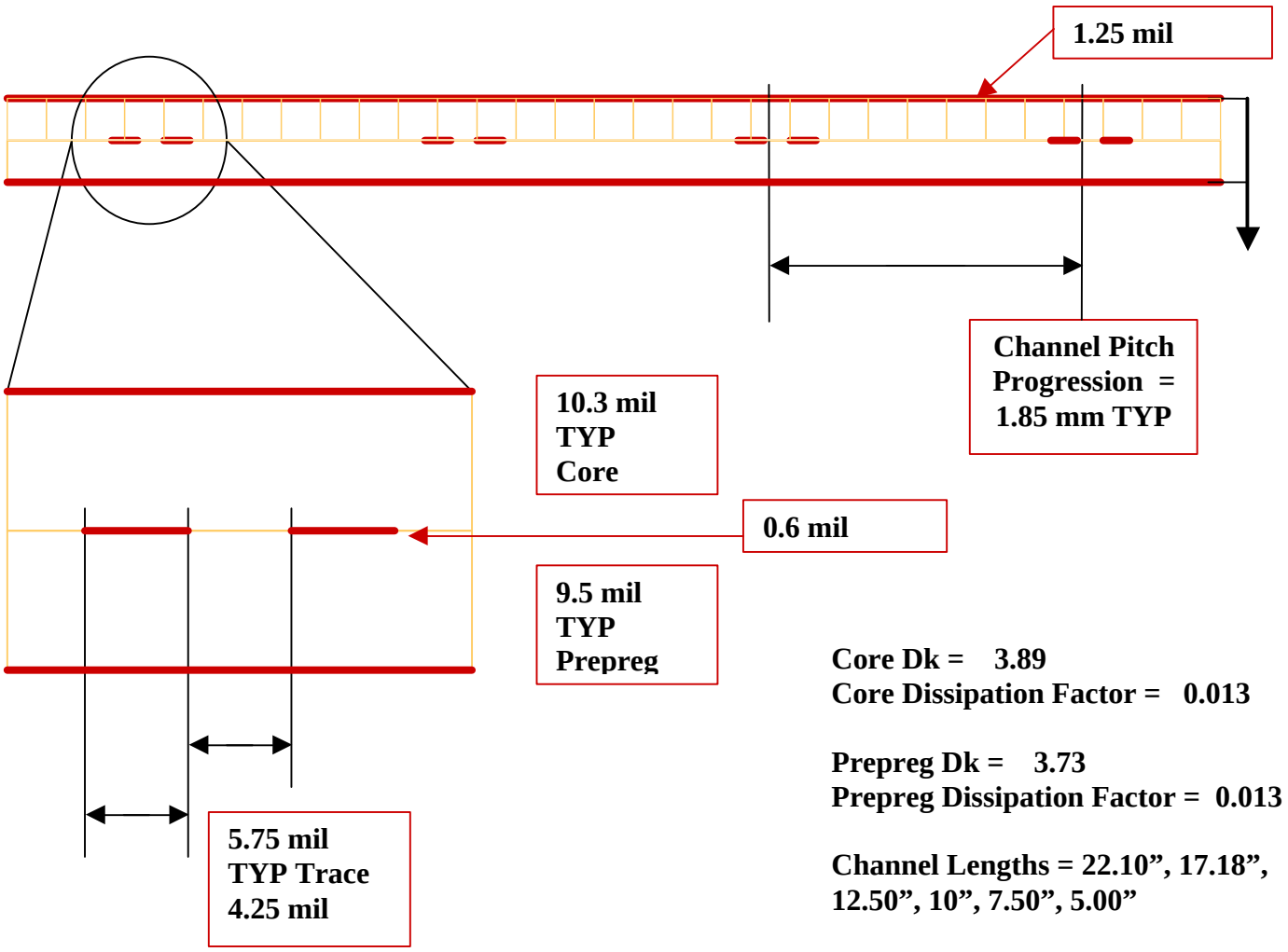


Fig. 3. Intermediate Channel Construction, Style B (5.6/4.4/5.6) – tightly coupled; with: Breakout A (5/6.5/5) – layer S3 and layer S6

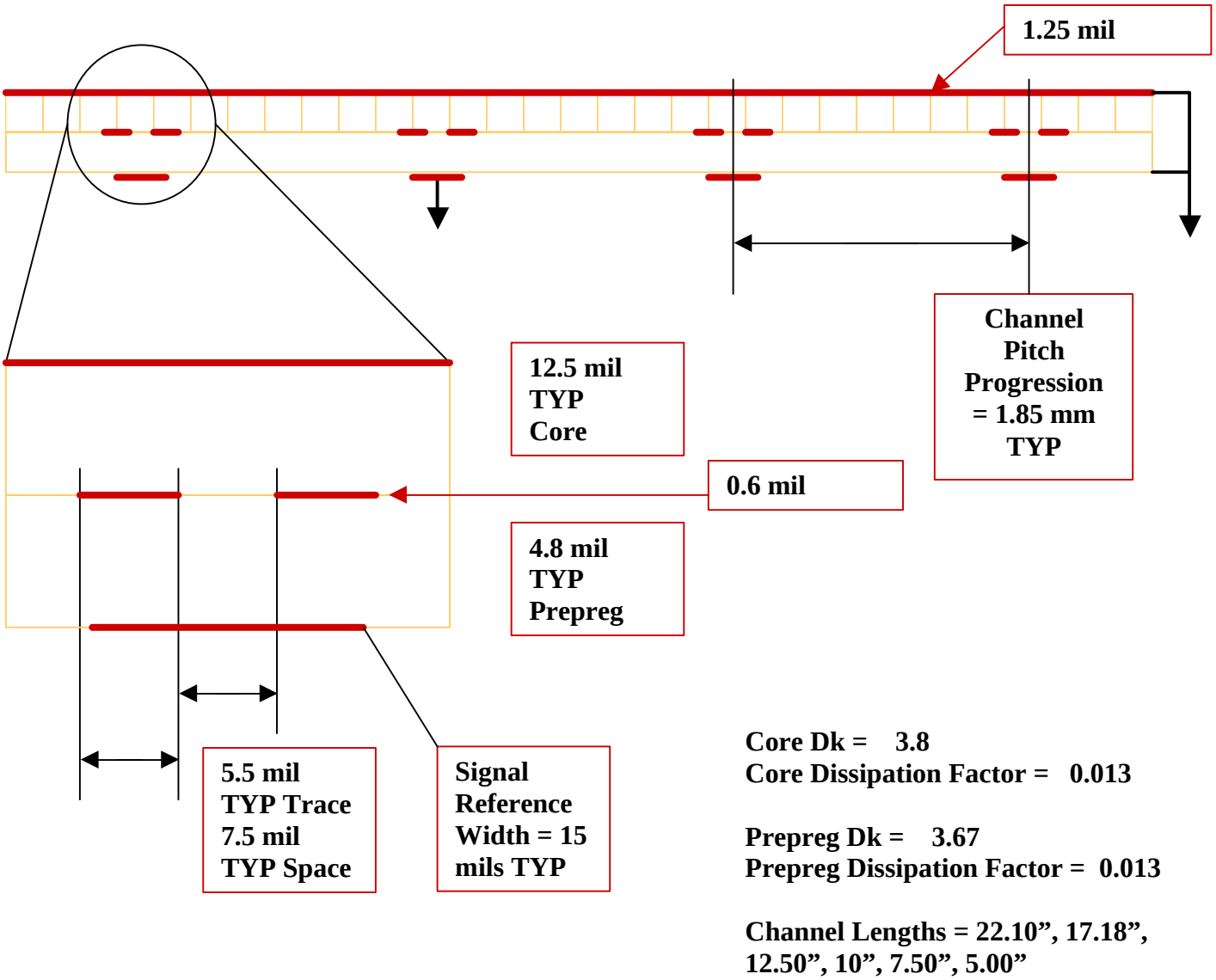


Fig. 4. Intermediate Channel Construction, Style C (4.7/4.3/4.7) – triad, loosely coupled; layers S4 & S5

Trace rout-outs and antipad constructions are depicted below:

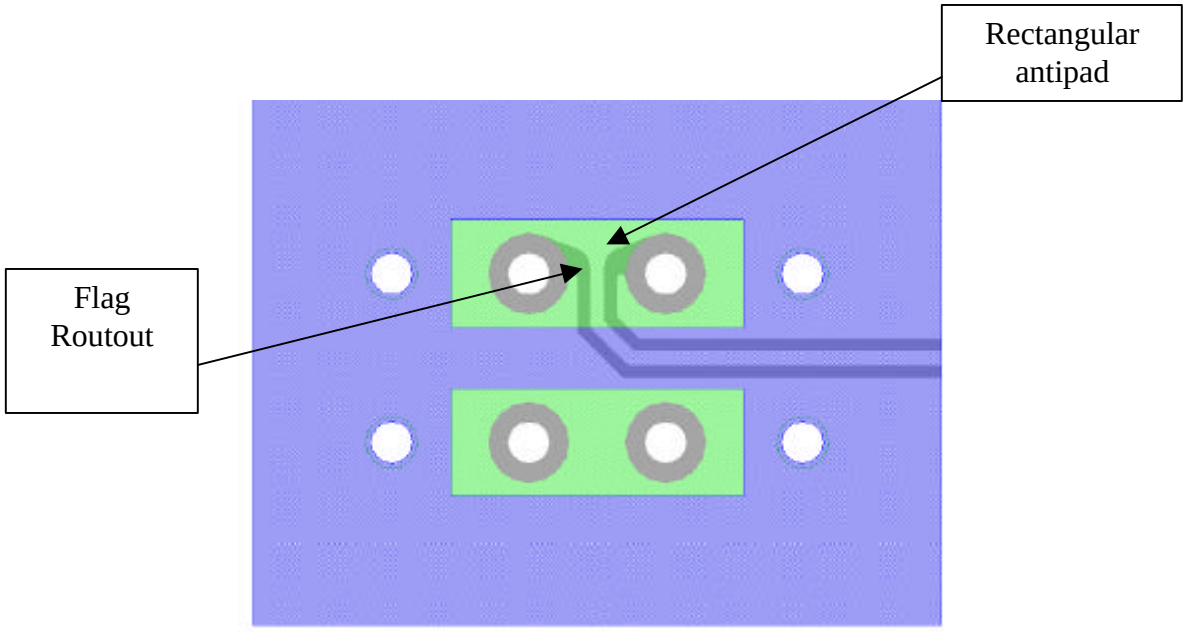


Fig. 5. Standard data lines: flag routout, rectangular antipad,– layers S1, S2, S7, S8

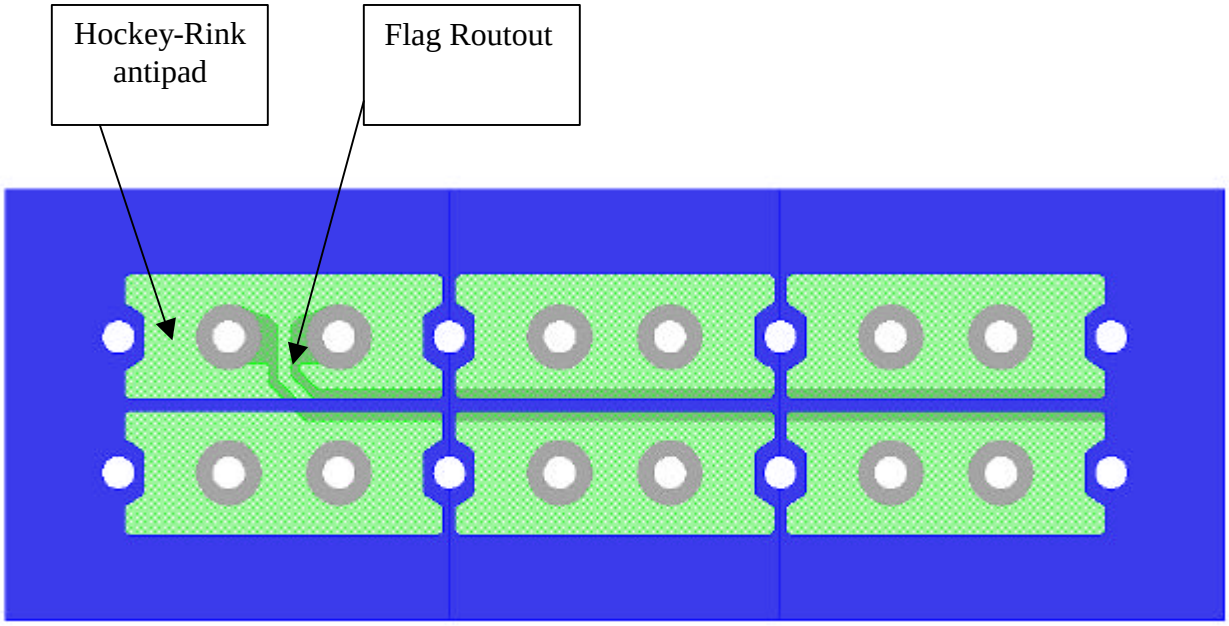


Fig. 6. Clock line construction:
Breakout A (5/6.5/5) – layer S3 and Layer S6

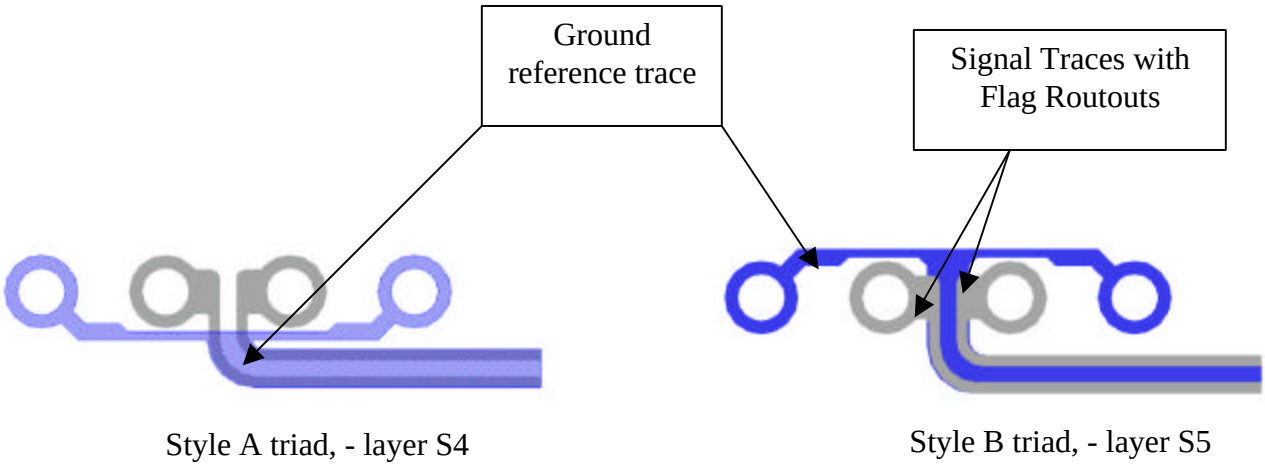


Fig 7. Differential triad channel structure: blue is ground return, grey are differential lines.

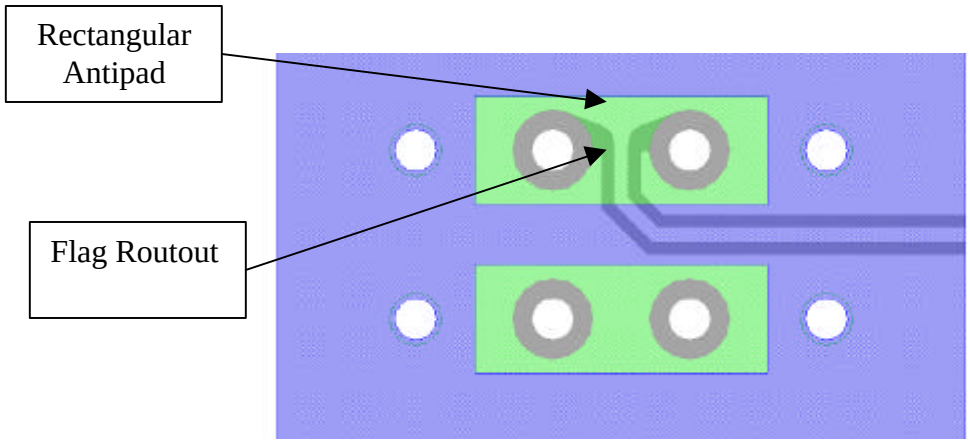
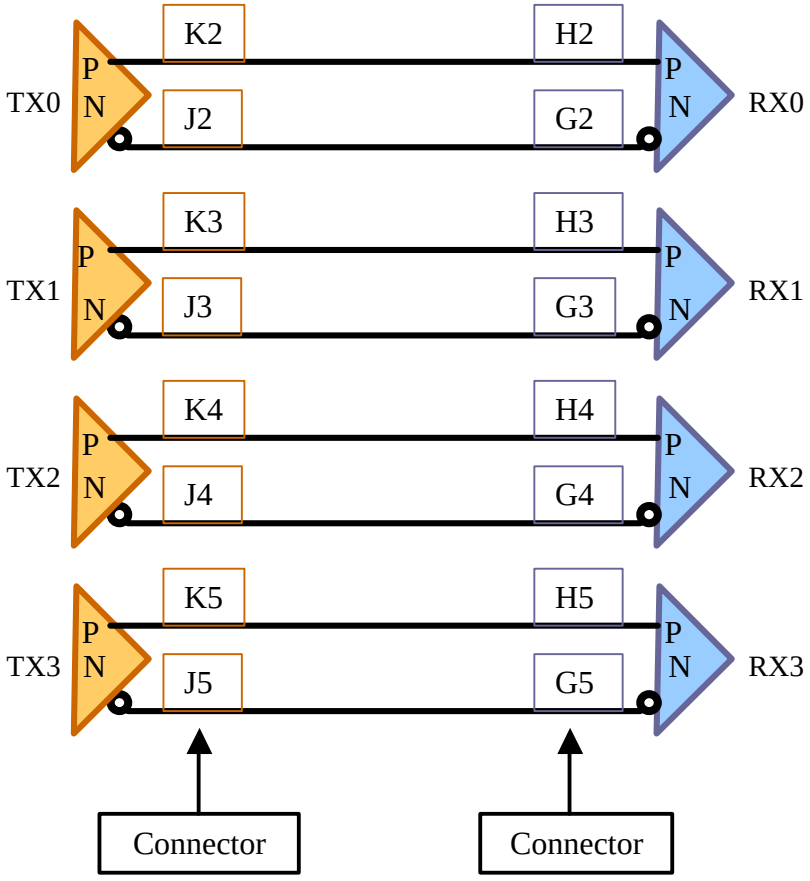


Fig 9. Tightly coupled intermediate channel route-out, layers S3 & S6

Clock line channel construction is discussed in detail in Section 9.

The design guide for active daughter-cards for using with the GBX reference Backplane is given below. Following this universal layout schedule will allow different silicon vendors perform interoperability testing across the backplane.

GbX™ Terminal Positions Designated By Flags For Each Backplane Connector



Notes:

- Both Outbound And Inbound Signal Sets Follow The Same Hook-up Schedule.
- Transmitter And Receiver Polarity Is Indicated (P: positive, N: negative).

MOLEX INCORPORATED
2222 WELLINGTON COURT, LISLE, IL 60532-1682
TEL 630-969-4550
FAX 630-969-4550 TLX 254069

2) 8-Inch Channel

The connectors labeled J1 and J2 represent the 8-inch channel group. The outbound (TX) channels (as in Fig. 5) are on layer 3 (S1), where the thru-hole is optimized with **backdrill of 15 mil below layer 6**. The inbound (RX) channels are on layer 18 (S8). The TX and RX pin map is as follows:

Transmit –to-Receive Pin Map

TX	RX
J2/K2	G2/H2
J3K3	G3/H3
J4/K4	G4/H4
J5/K5	G5/H5

The typical channel schematic on the backplane is shown on Fig. 9. Outbound traffic is defined at TX channels traveling from left to right, while inbound traffic is TX channels traveling from right to left.

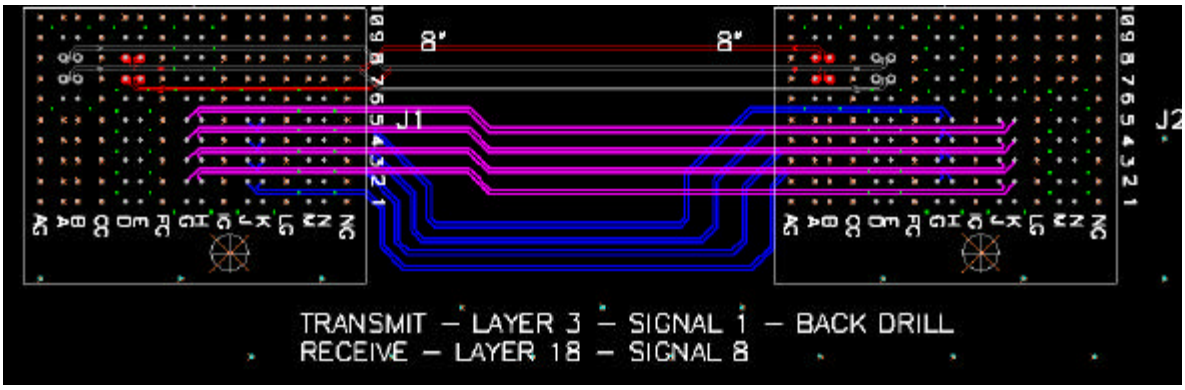


Fig 9. Typical channel schematic: left-to right – outbound traffic;
right-to-left – inbound traffic

MOLEX INCORPORATED
2222 WELLINGTON COURT, LISLE, IL 60532-1682
TEL 630-969-4550
FAX 630-969-4550 TLX 254069

Channel mapping and construction
(length - 8” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	3 (S1)	Channel A	35.3 (BD) (0.9 mm)
J3/K3	3(S1)	Channel A	35.3 (BD) (0.9 mm)
J4/K4	3(S1)	Channel A	35.3 (BD) (0.9 mm)
J5/K5	3(S1)	Channel A	35.3 (BD) (0.9 mm)
G2/H2	3 (S1)	Channel A	35.3 (BD) (0.9 mm)
G3/H3	3(S1)	Channel A	35.3 (BD) (0.9 mm)
G4/H4	3(S1)	Channel A	35.3 (BD) (0.9 mm)
G5/H5	3(S1)	Channel A	35.3 (BD) (0.9 mm)

*** BD – backdrill 29 mil diameter**

Inbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	18(S8)	Channel A	34 (0.863 mm)
J3/K3	18(S8)	Channel A	34 (0.863 mm)
J4/K4	18(S8)	Channel A	34 (0.863 mm)
J5/K5	18(S8)	Channel A	34 (0.863 mm)
G2/H2	18(S8)	Channel A	34 (0.863 mm)
G3/H3	18(S8)	Channel A	34 (0.863 mm)
G4/H4	18(S8)	Channel A	34 (0.863 mm)
G5/H5	18(S8)	Channel A	34 (0.863 mm)

Clock Lines are designed as in Fig. 6 and Table 2, and are described in detail in Section 9.

3) 15-Inch Channel

The connectors labeled J3, J4, J73 and J74 represent the 15-inch channel group. The connectors J3 and J4 are the outer distal lanes, while J73 and J74 are the pass-thru traffic lanes. On the distal lane, outbound (TX) channels (as in Fig. 5) are on layer 3 (S1), with worst-case stub. The inbound (RX) channels are on layer 18 (S8). The TX and RX pin map is as follows:

Transmit –to-Receive Pin Map

Outbound/Inbound

TX	RX
J2/K2	G2/H2
J3K3	G3/H3
J4/K4	G4/H4
J5/K5	G5/H5

3 a) Distal Channels

Channel mapping and construction
(length – 15” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	3 (S1)	Channel A	185.3 (4.7 mm)
J3/K3	3(S1)	Channel A	185.3 (4.7 mm)
J4/K4	3(S1)	Channel A	185.3 (4.7 mm)
J5/K5	3(S1)	Channel A	185.3 (4.7 mm)
G2/H2	3 (S1)	Channel A	185.3 (4.7 mm)
G3/H3	3(S1)	Channel A	185.3 (4.7 mm)
G4/H4	3(S1)	Channel A	185.3 (4.7 mm)
G5/H5	3(S1)	Channel A	185.3 (4.7 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	18(S8)	Channel A	34 (0.863 mm)
J3/K3	18(S8)	Channel A	34 (0.863 mm)
J4/K4	18(S8)	Channel A	34 (0.863 mm)
J5/K5	18(S8)	Channel A	34 (0.863 mm)
G2/H2	18(S8)	Channel A	34 (0.863 mm)
G3/H3	18(S8)	Channel A	34 (0.863 mm)
G4/H4	18(S8)	Channel A	34 (0.863 mm)
G5/H5	18(S8)	Channel A	34 (0.863 mm)

Clock Lines are designed as in Fig. 6 and Table 2, and are described in detail in Section 9.

3 b) 10-Inch Intermediate Channels

On the pass-thru traffic lane, the channel design is a differential triad as in Fig. 7. The left-hand pattern (J73) has TX channels on layer 12 (S5) with worst-case via stub and triad construction of Style A (Fig. 7). The right-hand pattern has TX channels on layer 9 (S4) with via optimized by **backdrill of 15 mil below layer 9**, and triad construction of style B (Fig. 7). There are no clock lines on pass-thru lanes.

Channel mapping and construction
(length – 10" nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	12(S5)	Triad A	96.4 (2.45 mm)
J3/K3	12(S5)	Triad A	96.4 (2.45 mm)
J4/K4	12(S5)	Triad A	96.4 (2.45 mm)
J5/K5	12(S5)	Triad A	96.4 (2.45 mm)
G2/H2	12(S5)	Triad A	96.4 (2.45 mm)
G3/H3	12(S5)	Triad A	96.4 (2.45 mm)
G4/H4	12(S5)	Triad A	96.4 (2.45 mm)
G5/H5	12(S5)	Triad A	96.4 (2.45 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
J3/K3	9(S4)	Triad B	11.9 (BD) (0.3 mm)
J4/K4	9(S4)	Triad B	11.9 (BD) (0.3 mm)
J5/K5	9(S4)	Triad B	11.9 (BD) (0.3 mm)
G2/H2	9(S4)	Triad B	11.9 (BD) (0.3 mm)
G3/H3	9(S4)	Triad B	11.9 (BD) (0.3 mm)
G4/H4	9(S4)	Triad B	11.9 (BD) (0.3 mm)
G5/H5	9(S4)	Triad B	11.9 (BD) (0.3 mm)

4) 20-Inch Channel

The connectors labeled J5, J6, J75 and J76 represent the 20-inch channel group. The connectors J6 and J5 are the outer distal lanes, while J75 and J76 are the intermediate pass-thru traffic lanes. On the distal lane, outbound (TX) channels (as in Fig. 5) are on layer 5 (S2), where the thru-hole is optimized with **backdrill of 15 mil below layer 6**. The inbound (RX) channels are on layer 16 (S7), where the thru-hole is optimized with **backdrill of 15 mil below layer 16**. The TX and RX pin map is as follows:

Transmit –to-Receive Pin Map

Outbound/Inbound

TX	RX
J2/K2	G2/H2
J3K3	G3/H3
J4/K4	G4/H4
J5/K5	G5/H5

4 a) Distal Channels

Channel mapping and construction
(length – 20” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	5(S2)	Channel A	14.8 (BD) (0.38 mm)
J3/K3	5(S2)	Channel A	14.8 (BD) (0.38 mm)
J4/K4	5(S2)	Channel A	14.8 (BD) (0.38 mm)
J5/K5	5(S2)	Channel A	14.8 (BD) (0.38 mm)
G2/H2	5(S2)	Channel A	14.8 (BD) (0.38 mm)
G3/H3	5(S2)	Channel A	14.8 (BD) (0.38 mm)
G4/H4	5(S2)	Channel A	14.8 (BD) (0.38 mm)
G5/H5	5(S2)	Channel A	14.8 (BD) (0.38 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	16(S7)	Channel A	15.6 (BD) (0.40 mm)
J3/K3	16(S7)	Channel A	15.6 (BD) (0.40 mm)
J4/K4	16(S7)	Channel A	15.6 (BD) (0.40 mm)
J5/K5	16(S7)	Channel A	15.6 (BD) (0.40 mm)
G2/H2	16(S7)	Channel A	15.6 (BD) (0.40 mm)
G3/H3	16(S7)	Channel A	15.6 (BD) (0.40 mm)
G4/H4	16(S7)	Channel A	15.6 (BD) (0.40 mm)
G5/H5	16(S7)	Channel A	15.6 (BD) (0.40 mm)

Clock Lines are designed as in Fig. 6 and Table 2, and are described in detail in Section 9.

4 b) 13-Inch Intermediate Channels

On the pass-thru traffic lane, the channel design is a differential triad as in Fig. 7. The right-hand pattern (J76) has TX channels on layer 14 (S6) with a standard-design lower 5.75/4.25/5.75 pair and with via optimized by **backdrill of 15 mil below layer 14.**
The left-hand pattern (J76)has TX channels on layer 9 (S4) with via optimized by **backdrill of 15 mil below layer 9**, and triad construction of style B (Fig. 7). There are no clock lines on pass-thru lanes.

Channel mapping and construction
(length – 13" nom)

Outbound Traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
J3/K3	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
J4/K4	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
J5/K5	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
G2/H2	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
G3/H3	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
G4/H4	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
G5/H5	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)

Inbound Traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
J3/K3	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
J4/K4	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
J5/K5	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
G2/H2	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
G3/H3	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
G4/H4	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
G5/H5	9 (S4)	Triad B	11.9 (BD) (0.3 mm)

5) 25-Inch Channel

The connectors labeled J7, J8, J19 and J20 represent the 25-inch channel group. The connectors J7 and J8 are the outer distal lanes, while J19 and J20 are the intermediate pass-thru traffic lanes. On the distal lane, outbound (TX) channels (as in Fig. 5) are on layer 3 (S1), where the thru-hole is optimized with **backdrill of 15 mil below layer 6**. The inbound (RX) channels are on layer 5 (S2), with worst-case via stub. The TX and RX pin map is as follows:

Transmit –to-Receive Pin Map

Outbound/Inbound

TX	RX
J2/K2	G2/H2
J3K3	G3/H3
J4/K4	G4/H4
J5/K5	G5/H5

5 a) Distal Channels

Channel mapping and construction
(length – 25” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	3(S1)	Channel A	35.3 (BD) (0.9 mm)
J3/K3	3(S1)	Channel A	35.3 (BD) (0.9 mm)
J4/K4	3(S1)	Channel A	35.3 (BD) (0.9 mm)
J5/K5	3(S1)	Channel A	35.3 (BD) (0.9 mm)
G2/H2	3(S1)	Channel A	35.3 (BD) (0.9 mm)
G3/H3	3(S1)	Channel A	35.3 (BD) (0.9 mm)
G4/H4	3(S1)	Channel A	35.3 (BD) (0.9 mm)
G5/H5	3(S1)	Channel A	35.3 (BD) (0.9 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	5(S2)	Channel A	164.8 (4.19 mm)
J3/K3	5(S2)	Channel A	164.8 (4.19 mm)
J4/K4	5(S2)	Channel A	164.8 (4.19 mm)
J5/K5	5(S2)	Channel A	164.8 (4.19 mm)
G2/H2	5(S2)	Channel A	164.8 (4.19 mm)
G3/H3	5(S2)	Channel A	164.8 (4.19 mm)
G4/H4	5(S2)	Channel A	164.8 (4.19 mm)
G5/H5	5(S2)	Channel A	164.8 (4.19 mm)

Clock Lines are designed as in Fig. 6 and Table 2, and are described in detail in Section 9.

5 b) 15.5-Inch Intermediate Channels

On the pass-thru traffic lane, the channel design is a differential triad as in Fig. 7. The left-hand pattern (J19) has TX channels on layer 7 (S3) with a standard-design lower 5.75/4.25/5.75 pair and with via optimized by **backdrill of 15 mil below layer 7.** The right-hand pattern (J76) has TX channels on layer 9 (S4) with worst-case via stub, and triad construction of style B (Fig. 7). There are no clock lines on pass-thru lanes.

Channel mapping and construction
(length – 15.5" nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	7(S3)	Channel B, breakout A	17 (BD) (0.43 mm)
J3/K3	7(S3)	Channel B, breakout A	17 (BD) (0.43 mm)
J4/K4	7(S3)	Channel B, breakout A	17 (BD) (0.43 mm)
J5/K5	7(S3)	Channel B, breakout A	17 (BD) (0.43 mm)
G2/H2	7(S3)	Channel B, breakout A	17 (BD) (0.43 mm)
G3/H3	7(S3)	Channel B, breakout A	17 (BD) (0.43 mm)
G4/H4	7(S3)	Channel B, breakout A	17 (BD) (0.43 mm)
G5/H5	7(S3)	Channel B, breakout A	17 (BD) (0.43 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	9 (S4)	Triad B	120.8 (3.06 mm)
J3/K3	9 (S4)	Triad B	120.8 (3.06 mm)
J4/K4	9 (S4)	Triad B	120.8 (3.06 mm)
J5/K5	9 (S4)	Triad B	120.8 (3.06 mm)
G2/H2	9 (S4)	Triad B	120.8 (3.06 mm)
G3/H3	9 (S4)	Triad B	120.8 (3.06 mm)
G4/H4	9 (S4)	Triad B	120.8 (3.06 mm)
G5/H5	9 (S4)	Triad B	120.8 (3.06 mm)

MOLEX INCORPORATED
2222 WELLINGTON COURT, LISLE, IL 60532-1682
TEL 630-969-4550
FAX 630-969-4550 TLX 254069

6) 30-Inch Channel

The connectors labeled J9, J10, J17 and J18 represent the 20-inch channel group. The connectors J9 and J10 are the outer distal lanes, while J17 and J18 are the pass-thru traffic lanes. On the distal lane, outbound (TX) channels (as in Fig. 5) are on layer 5 (S2), where the thru-hole is optimized with **backdrill of 15 mil below layer 6**. The inbound (RX) channels are on layer 16 (S7), where the thru-hole is optimized with **backdrill of 15 mil below layer 16**. The TX and RX pin map is as follows:

Transmit –to-Receive Pin Map

Outbound/Inbound

TX	RX
J2/K2	G2/H2
J3K3	G3/H3
J4/K4	G4/H4
J5/K5	G5/H5

6 a) Distal Channels

Channel mapping and construction
(length – 30” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	5(S2)	Channel A	14.8 (BD) (0.38 mm)
J3/K3	5(S2)	Channel A	14.8 (BD) (0.38 mm)
J4/K4	5(S2)	Channel A	14.8 (BD) (0.38 mm)
J5/K5	5(S2)	Channel A	14.8 (BD) (0.38 mm)
G2/H2	5(S2)	Channel A	14.8 (BD) (0.38 mm)
G3/H3	5(S2)	Channel A	14.8 (BD) (0.38 mm)
G4/H4	5(S2)	Channel A	14.8 (BD) (0.38 mm)
G5/H5	5(S2)	Channel A	14.8 (BD) (0.38 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	16(S7)	Channel A	15.6 (BD) (0.40 mm)
J3/K3	16(S7)	Channel A	15.6 (BD) (0.40 mm)
J4/K4	16(S7)	Channel A	15.6 (BD) (0.40 mm)
J5/K5	16(S7)	Channel A	15.6 (BD) (0.40 mm)
G2/H2	16(S7)	Channel A	15.6 (BD) (0.40 mm)
G3/H3	16(S7)	Channel A	15.6 (BD) (0.40 mm)
G4/H4	16(S7)	Channel A	15.6 (BD) (0.40 mm)
G5/H5	16(S7)	Channel A	15.6 (BD) (0.40 mm)

Clock Lines are designed as in Fig. 6 and Table 2, and are described in detail in Section 9.

6 b) 18-Inch Intermediate Channels

On the pass-thru traffic lane, the channel design is a differential triad as in Fig. 7. The right-hand pattern (J18) has TX channels on layer 14 (S6) with a standard-design lower 5.75/4.25/5.75 pair and with via optimized by **backdrill of 15 mil below layer 14.**
The left-hand pattern (J17)has TX channels on layer 9 (S4) with via optimized by **backdrill of 15 mil below layer 9**, and triad construction of style B (Fig. 7). There are no clock lines on pass-thru lanes.

Channel mapping and construction
(length – 18" nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
J3/K3	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
J4/K4	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
J5/K5	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
G2/H2	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
G3/H3	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
G4/H4	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
G5/H5	9 (S4)	Triad B	11.9 (BD) (0.3 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
J3/K3	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
J4/K4	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
J5/K5	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
G2/H2	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
G3/H3	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
G4/H4	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)
G5/H5	14(S6)	Channel B, breakout A	15.6 (BD) (0.40 mm)

MOLEX INCORPORATED
2222 WELLINGTON COURT, LISLE, IL 60532-1682
TEL 630-969-4550
FAX 630-969-4550 TLX 254069

7) 1-Meter Channel

The connectors labeled J11, J12, J15 and J16 represent the 1-meter channel group. The connectors J11 and J12 are the outer distal lanes, while J15 and J16 are the pass-thru traffic lanes. On the distal lanes, outbound (TX) channels (as in Fig. 5) are on layer 18 (S8), where the thru-hole is not optimized with backdrill. The inbound (RX) channels are on layer 3 (S1), with backdrill of 15 mil below layer 6. The TX and RX pin map is as follows:

Transmit –to-Receive Pin Map

Outbound/Inbound

TX	RX
J2/K2	G2/H2
J3K3	G3/H3
J4/K4	G4/H4
J5/K5	G5/H5

7 a) Distal Channels

Channel mapping and construction
(length – 39.37” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	3 (S1)	Channel A	35.3 (BD) (0.9 mm)
J3/K3	3 (S1)	Channel A	35.3 (BD) (0.9 mm)
J4/K4	3 (S1)	Channel A	35.3 (BD) (0.9 mm)
J5/K5	3 (S1)	Channel A	35.3 (BD) (0.9 mm)
G2/H2	3 (S1)	Channel A	35.3 (BD) (0.9 mm)
G3/H3	3 (S1)	Channel A	35.3 (BD) (0.9 mm)
G4/H4	3 (S1)	Channel A	35.3 (BD) (0.9 mm)
G5/H5	3 (S1)	Channel A	35.3 (BD) (0.9 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	18(S8)	Channel A	34 (0.863 mm)
J3/K3	18(S8)	Channel A	34 (0.863 mm)
J4/K4	18(S8)	Channel A	34 (0.863 mm)
J5/K5	18(S8)	Channel A	34 (0.863 mm)
G2/H2	18(S8)	Channel A	34 (0.863 mm)
G3/H3	18(S8)	Channel A	34 (0.863 mm)
G4/H4	18(S8)	Channel A	34 (0.863 mm)
G5/H5	18(S8)	Channel A	34 (0.863 mm)

Clock Lines are designed as in Fig. 6, and are mapped as in Table 2.

7 b) 20-Inch Intermediate Channels

On the pass-thru traffic lane, the channel design is a differential triad as in Fig. 7. The right-hand pattern (J16) has TX channels on layer 7 (S3) with a standard-design lower 5.75/4.25/5.75 pair and worst-case via stub. The left-hand pattern (J15) has TX channels on layer 12 (S5) with worst-case via stub, and triad construction of style B (Fig. 7). There are no clock lines on pass-thru lanes.

Channel mapping and construction
(length – 20" nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	12(S5)	Triad B	96.4 (2.45 mm)
J3/K3	12(S5)	Triad B	96.4 (2.45 mm)
J4/K4	12(S5)	Triad B	96.4 (2.45 mm)
J5/K5	12(S5)	Triad B	96.4 (2.45 mm)
G2/H2	12(S5)	Triad B	96.4 (2.45 mm)
G3/H3	12(S5)	Triad B	96.4 (2.45 mm)
G4/H4	12(S5)	Triad B	96.4 (2.45 mm)
G5/H5	12(S5)	Triad B	96.4 (2.45 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	7(S3)	Channel B, breakout A	144.4 (3.67 mm)
J3/K3	7(S3)	Channel B, breakout A	144.4 (3.67 mm)
J4/K4	7(S3)	Channel B, breakout A	144.4 (3.67 mm)
J5/K5	7(S3)	Channel B, breakout A	144.4 (3.67 mm)
G2/H2	7(S3)	Channel B, breakout A	144.4 (3.67 mm)
G3/H3	7(S3)	Channel B, breakout A	144.4 (3.67 mm)
G4/H4	7(S3)	Channel B, breakout A	144.4 (3.67 mm)
G5/H5	7(S3)	Channel B, breakout A	144.4 (3.67 mm)

8) 1.25-Meter Channel

The connectors labeled J13, J14, J77 and J78 represent the 1.25-meter channel group. The connectors J13 and J14 are the outer distal lanes, while J77 and J78 are the pass-thru traffic lanes. On the distal lane, outbound (TX) channels (as in Fig. 5) are on layer 5 (S2), where the thru-hole is optimized with **backdrill of 15 mil below layer 6**. The inbound (RX) channels are on layer 16 (S7), where the thru-hole is optimized with **backdrill of 15 mil below layer 16.** The TX and RX pin map is as follows:

Transmit –to-Receive Pin Map

Outbound/Inbound

TX	RX
J2/K2	G2/H2
J3K3	G3/H3
J4/K4	G4/H4
J5/K5	G5/H5

8 a) Distal Channels

Channel mapping and construction
(length – 49.21” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	5(S2)	Channel A	14.8 (BD) (0.38 mm)
J3/K3	5(S2)	Channel A	14.8 (BD) (0.38 mm)
J4/K4	5(S2)	Channel A	14.8 (BD) (0.38 mm)
J5/K5	5(S2)	Channel A	14.8 (BD) (0.38 mm)
G2/H2	5(S2)	Channel A	14.8 (BD) (0.38 mm)
G3/H3	5(S2)	Channel A	14.8 (BD) (0.38 mm)
G4/H4	5(S2)	Channel A	14.8 (BD) (0.38 mm)
G5/H5	5(S2)	Channel A	14.8 (BD) (0.38 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	16(S7)	Channel A	15.6 (BD) (0.40 mm)
J3/K3	16(S7)	Channel A	15.6 (BD) (0.40 mm)
J4/K4	16(S7)	Channel A	15.6 (BD) (0.40 mm)
J5/K5	16(S7)	Channel A	15.6 (BD) (0.40 mm)
G2/H2	16(S7)	Channel A	15.6 (BD) (0.40 mm)
G3/H3	16(S7)	Channel A	15.6 (BD) (0.40 mm)
G4/H4	16(S7)	Channel A	15.6 (BD) (0.40 mm)
G5/H5	16(S7)	Channel A	15.6 (BD) (0.40 mm)

Clock Lines are designed as in Fig. 6, and are mapped as in Table 2.

8 b) 27-Inch Intermediate Channels

On the pass-thru traffic lane, the channel design is a differential triad as in Fig. 7. The left-hand pattern (J77) has TX channels on layer 12 (S5) with via optimized by **backdrill of 15 mil below layer 12** and triad construction of Style A (Fig. 7).
The right-hand pattern has TX channels on layer 9 (S4) with via optimized by **backdrill of 15 mil below layer 9**, and triad construction of style B (Fig. 7). There are no clock lines on pass-thru lanes.

Channel mapping and construction
(length – 27.1" nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	12(S5)	Triad A	18.1 (BD) (0.46 mm)
J3/K3	12(S5)	Triad A	18.1 (BD) (0.46 mm)
J4/K4	12(S5)	Triad A	18.1 (BD) (0.46 mm)
J5/K5	12(S5)	Triad A	18.1 (BD) (0.46 mm)
G2/H2	12(S5)	Triad A	18.1 (BD) (0.46 mm)
G3/H3	12(S5)	Triad A	18.1 (BD) (0.46 mm)
G4/H4	12(S5)	Triad A	18.1 (BD) (0.46 mm)
G5/H5	12(S5)	Triad A	18.1 (BD) (0.46 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub Length (mils)
J2/K2	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
J3/K3	9(S4)	Triad B	11.9 (BD) (0.3 mm)
J4/K4	9(S4)	Triad B	11.9 (BD) (0.3 mm)
J5/K5	9(S4)	Triad B	11.9 (BD) (0.3 mm)
G2/H2	9 (S4)	Triad B	11.9 (BD) (0.3 mm)
G3/H3	9(S4)	Triad B	11.9 (BD) (0.3 mm)
G4/H4	9(S4)	Triad B	11.9 (BD) (0.3 mm)
G5/H5	9(S4)	Triad B	11.9 (BD) (0.3 mm)

9) Clock Lines

In addition to standard data channels, all distal lanes also include clock lines designed with a large "hockey rink" antipad and a tapered breakout. (Fig 6).
The outbound and inbound traffic channels are defined in the same way as above, left-to-right and right-to-left, respectively.
The transmit and receive pin mapping is

Transmit –to-Receive Pin Map

Outbound/Inbound

TX	RX
A7/B7	D7/E7
A8/B8	D8/E8

All (DE) clock lines are on signal layer S6 and the (AB) lines are on layer S3, as per Table 2. However, clock lines in different channel groups have different via stubs, some being optimized with a 29 mil-wide backdrill 15 mil below the respective layer. This is described in detail in the following subsections.

9 a) 8-Inch Channel

Channel mapping and construction
(length - 8" nom)

Outbound traffic

Pair	**Layer**	**Channel Construction**	**Stub length (mils)**
A8/B8	7(S3)	Breakout A	17 (BD) (0.43 mm)
A7/B7	7(S3)	Breakout A	17 (BD) (0.43 mm)
D8/E8	7(S3)	Breakout A	17 (BD) (0.43 mm)
D7/E7	7(S3)	Breakout A	17 (BD) (0.43 mm)

Inbound traffic

Pair	**Layer**	**Channel Construction**	**Stub length (mils)**
A8/B8	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
A7/B7	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
D8/E8	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
D7/E7	14(S6)	Breakout A	15.6 (BD) (0.40 mm)

MOLEX INCORPORATED
2222 WELLINGTON COURT, LISLE, IL 60532-1682
TEL 630-969-4550
FAX 630-969-4550 TLX 254069

9 b) 15-Inch Channel

Channel mapping and construction
(length - 15” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub length (mils)
A8/B8	7(S3)	Breakout A	144.4 (3.67 mm)
A7/B7	7(S3)	Breakout A	144.4 (3.67 mm)
D8/E8	7(S3)	Breakout A	144.4 (3.67 mm)
D7/E7	7(S3)	Breakout A	144.4 (3.67 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub length (mils)
A8/B8	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
A7/B7	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
D8/E8	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
D7/E7	14(S6)	Breakout A	15.6 (BD) (0.40 mm)

9 c) 20-Inch Channel

Channel mapping and construction
(length - 20” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub length (mils)
A8/B8	7(S3)	Breakout A	17 (BD) (0.43 mm)
A7/B7	7(S3)	Breakout A	17 (BD) (0.43 mm)
D8/E8	7(S3)	Breakout A	17 (BD) (0.43 mm)
D7/E7	7(S3)	Breakout A	17 (BD) (0.43 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub length (mils)
A8/B8	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
A7/B7	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
D8/E8	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
D7/E7	14(S6)	Breakout A	15.6 (BD) (0.40 mm)

MOLEX INCORPORATED
2222 WELLINGTON COURT, LISLE, IL 60532-1682
TEL 630-969-4550
FAX 630-969-4550 TLX 254069

9 d) 25-Inch Channel

Channel mapping and construction
(length - 25” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub length (mils)
A8/B8	7(S3)	Breakout A	17 (BD) (0.43 mm)
A7/B7	7(S3)	Breakout A	17 (BD) (0.43 mm)
D8/E8	7(S3)	Breakout A	17 (BD) (0.43 mm)
D7/E7	7(S3)	Breakout A	17 (BD) (0.43 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub length (mils)
A8/B8	14(S6)	Breakout A	72.8 (1.85 mm)
A7/B7	14(S6)	Breakout A	72.8 (1.85 mm)
D8/E8	14(S6)	Breakout A	72.8 (1.85 mm)
D7/E7	14(S6)	Breakout A	72.8 (1.85 mm)

9 e) 30-Inch Channel

Channel mapping and construction
(length - 30” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub length (mils)
A8/B8	7(S3)	Breakout A	17 (BD) (0.43 mm)
A7/B7	7(S3)	Breakout A	17 (BD) (0.43 mm)
D8/E8	7(S3)	Breakout A	17 (BD) (0.43 mm)
D7/E7	7(S3)	Breakout A	17 (BD) (0.43 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub length (mils)
A8/B8	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
A7/B7	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
D8/E8	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
D7/E7	14(S6)	Breakout A	15.6 (BD) (0.40 mm)

9 f) 1-Meter Channel

Channel mapping and construction
(length - 39.37” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub length (mils)
A8/B8	7(S3)	Breakout A	144.4 (3.67 mm)
A7/B7	7(S3)	Breakout A	144.4 (3.67 mm)
D8/E8	7(S3)	Breakout A	144.4 (3.67 mm)
D7/E7	7(S3)	Breakout A	144.4 (3.67 mm)

Inbound traffic

Pair	Layer	Breakout	Stub length (mils)
A8/B8	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
A7/B7	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
D8/E8	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
D7/E7	14(S6)	Breakout A	15.6 (BD) (0.40 mm)

9 g) 1.25-Meter Channel

Channel mapping and construction
(length - 49.21” nom)

Outbound traffic

Pair	Layer	Channel Construction	Stub length (mils)
A8/B8	7(S3)	Breakout A	17 (BD) (0.43 mm)
A7/B7	7(S3)	Breakout A	17 (BD) (0.43 mm)
D8/E8	7(S3)	Breakout A	17 (BD) (0.43 mm)
D7/E7	7(S3)	Breakout A	17 (BD) (0.43 mm)

Inbound traffic

Pair	Layer	Channel Construction	Stub length (mils)
A8/B8	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
A7/B7	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
D8/E8	14(S6)	Breakout A	15.6 (BD) (0.40 mm)
D7/E7	14(S6)	Breakout A	15.6 (BD) (0.40 mm)

Appendix: Channel Grouping by Length

8” – 10” length

Layer	Channel Construction	Stub Length (mils)	Location on PCB	Length (inches)
3 (S1)	Channel A	35.3 (BD) (0.9 mm)	8 inch distal, outbound; J2/K2, J3/K3, J4/K4, J5/K5	8
18(S8)	Channel A	34 (0.863 mm)	8 inch distal, inbound; J2/K2, J3/K3, J4/K4, J5/K5	8
7(S3)	Breakout A	17 (BD) (0.47 mm)	8 inch distal, clock lines, inbound, outbound, A7/B7,A8/B8	8
14(S6)	Breakout A	15.6 (BD) (1.40 mm)	18 inch distal, clock lines, inbound, outbound; D7/E7, D8/E8	8
12(S5)	Triad A	96.4 (2.45 mm)	15” pass-thru, outbound; J2/K2, J3/K3, J4/K4, J5/K5	10
9 (S4)	Triad B	11.9 (BD) (0.3 mm)	15” pass-thru, inbound; J2/K2, J3/K3, J4/K4, J5/K5	10

13” – 15.5” length

Layer	Channel Construction	Stub Length (mils)	Location on PCB	Length (inches)
3 (S1)	Channel A	185.3 (4.7 mm)	15 inch distal, outbound; J2/K2, J3/K3, J4/K4, J5/K5	15
18(S8)	Channel A	34 (0.863 mm)	15 inch distal, inbound; J2/K2, J3/K3, J4/K4, J5/K5	15
7(S3)	Breakout A	144.4 (3.67 mm)	15 inch distal, clock lines, outbound, A7/B7,A8/B8	15
14(S6)	Breakout A	17 (BD) (0.47 mm)	15 inch distal, clock lines, outbound, D7/E7, D8/E8	15
7(S3)	Breakout A	17 (BD) (0.47 mm)	15 inch distal, clock lines, inbound, A7/B7,A8/B8	15
14(S6)	Breakout A	72.8 (1.85 mm)	15 inch distal, clock lines, inbound, D7/E7, D8/E8	15
14(S6)	Channel B, breakout A	15.6 (BD) (1.40 mm)	20” pass-thru, outbound, J2/K2, J3/K3, J4/K4, J5/K5	13
9 (S4)	Triad B	11.9 (BD) (0.3 mm)	20” pass-thru, inbound, J2/K2, J3/K3, J4/K4, J5/K5	13
7(S3)	Channel B, breakout A	17 (BD) (0.47 mm)	25” pass-thru, outbound, J2/K2, J3/K3, J4/K4, J5/K5	15.5
9 (S4)	Triad B	120.8 (3.06 mm)	25” pass-thru, inbound, J2/K2, J3/K3, J4/K4, J5/K5	15.5

MOLEX INCORPORATED
2222 WELLINGTON COURT, LISLE, IL 60532-1682
TEL 630-969-4550
FAX 630-969-4550 TLX 254069

18” – 20” length

Layer	Channel Construction	Stub Length (mils)	Location on PCB	Length (inches)
5(S2)	Channel A	14.8 (BD) (1.38 mm)	20 inch distal, outbound; J2/K2, J3/K3, J4/K4, J5/K5	20
16(S7)	Channel A	15.6 (BD) (1.40 mm)	20 inch distal, inbound; J2/K2, J3/K3, J4/K4, J5/K5	20
7(S3)	Breakout A	17.3 (BD) (0.44 mm))	20 inch distal, clock lines, outbound, outbound; A7/B7,A8/B8	20
14(S6)	Breakout A	15.6 (BD) (1.40 mm)	20 inch distal, clock lines, outbound, outbound; D7/E7, D8/E8	20
7(S3)	Breakout A	15.6 (BD) (1.40 mm)	20 inch distal, clock lines, inbound, outbound; A7/B7,A8/B8	20
14(S6)	Breakout A	17 (BD) (0.47 mm)	20 inch distal, clock lines, inbound, outbound; D7/E7, D8/E8	20
9 (S4)	Triad B	11.9 (BD) (0.3 mm)	30” pass-thru, outbound, J2/K2, J3/K3, J4/K4, J5/K5	18
14(S6)	Channel B Breakout A	15.6 (BD) (1.40 mm)	30” pass-thru, inbound, J2/K2, J3/K3, J4/K4, J5/K5	18

25” – 27” length

Layer	Channel Construction	Stub Length (mils)	Location on PCB	Length (inches)
3(S1)	Channel A	35.3 (BD) (0.9 mm)	25 inch distal, outbound; J2/K2, J3/K3, J4/K4, J5/K5	25
5(S2)	Channel A	164.8 (4.19 mm)	25 inch distal, inbound; J2/K2, J3/K3, J4/K4, J5/K5	25
7(S3)	Breakout A	17 (BD) (0.47 mm)	25 inch distal, clock lines, outbound, A7/B7,A8/B8	25
14(S6)	Breakout A	72.8 (1.85 mm)	25 inch distal, clock lines, outbound, D7/E7, D8/E8	25
7(S3)	Breakout A	144.4 (3.7 mm)	25 inch distal, clock lines, inbound, A7/B7,A8/B8	25
14(S6)	Breakout A	17 (BD) (0.47 mm)	25 inch distal, clock lines, inbound, D7/E7, D8/E8	25
12(S5)	Triad A	18.1 (BD) (0.46 mm)	1.25 m pass-thru, outbound, J2/K2, J3/K3, J4/K4, J5/K5	27.1
9 (S4)	Triad B	11.9 (BD) (0.3 mm)	1.25 m pass-thru, inbound, J2/K2, J3/K3, J4/K4, J5/K5	27.1

30” length

Layer	Channel Construction	Stub Length (mils)	Location on PCB	Length (inches)
5(S2)	Channel A	14.8 (BD) (1.38 mm)	30 inch distal, outbound; J2/K2, J3/K3, J4/K4, J5/K5	30
16(S7)	Channel A	15.6 (BD) (1.40 mm)	30 inch distal, inbound; J2/K2, J3/K3, J4/K4, J5/K5	30
7(S3)	Breakout A	17 (BD) (0.47 mm)	30 inch distal, clock lines, outbound, inbound; A7/B7,A8/B8	30
14(S6)	Breakout A	15.6 (BD) (1.40 mm)	30 inch distal, clock lines, outbound, inbound; D7/E7, D8/E8	30

39.37” length

Layer	Channel Construction	Stub Length (mils)	Location on PCB	Length (inches)
3 (S1)	Channel A	35.3 (BD) (0.9 mm)	1 m distal, outbound; J2/K2, J3/K3, J4/K4, J5/K5	39.37
18(S8)	Channel A	34 (0.863 mm)	1 m distal, inbound; J2/K2, J3/K3, J4/K4, J5/K5	39.37
7(S3)	Breakout A	144.4 (3.67 mm)	1 m distal, clock lines, outbound; A7/B7,A8/B8	39.37
14(S6)	Breakout A	15.6 (BD) (1.40 mm)	1 m distal, clock lines, outbound; D7/E7, D8/E8	39.37
7(S3)	Breakout A	15.6 (BD) (1.40 mm)	1 m distal, clock lines, inbound; A7/B7,A8/B8	39.37
14(S6)	Breakout A	72.8 (1.85 mm)	1 m distal, clock lines, inbound; D7/E7, D8/E8	39.37

49.21” length

Layer	Channel Construction	Stub Length (mils)	Location on PCB	Length (inches)
5(S2)	Channel A	14.8 (BD) (1.38 mm)	1.25 m distal, outbound; J2/K2, J3/K3, J4/K4, J5/K5	49.21
16(S7)	Channel A	15.6 (BD) (1.40 mm)	1.25 m distal, inbound; J2/K2, J3/K3, J4/K4, J5/K5	49.21
7(S3)	Breakout A	17 (BD) (0.47 mm)	1.25 m distal, clock lines, outbound, inbound; A7/B7,A8/B8	49.21
14(S6)	Breakout A	15.6 (BD) (1.40 mm)	1.25 m distal, clock lines, outbound, inbound; D7/E7, D8/E8	49.21

RESOURCES

For GBX products and information contact:

Gary A. Humbert
Molex Inc.,
2222 Wellington Court
Lisle IL 60532
Phone: 630-718-5830
Fax: 630-512-8620
e-mail: ghumbert@molex.com

For PMC – Sierra products and information contact:

Owen Williams
PMC-Sierra Inc.
8555 Baxter Place
Burnaby, BC V5A 4V7
Canada
Phone: 604-415-6000
Fax: 604-415-6205
e-mail: Owen_Williams@pmc-sierra.com

Please note that patents have been applied for by Molex for: the Triad PCB routing scheme, the specific pinfield trace routing designs, and the anti-pad configurations described in this document.