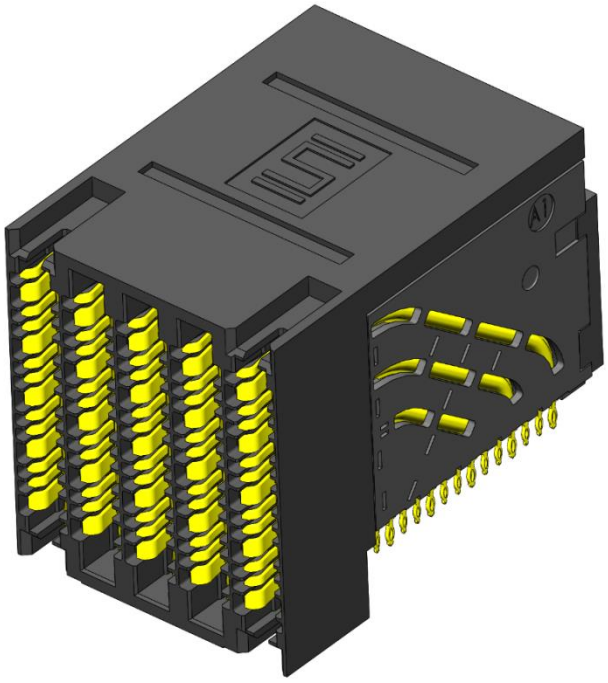
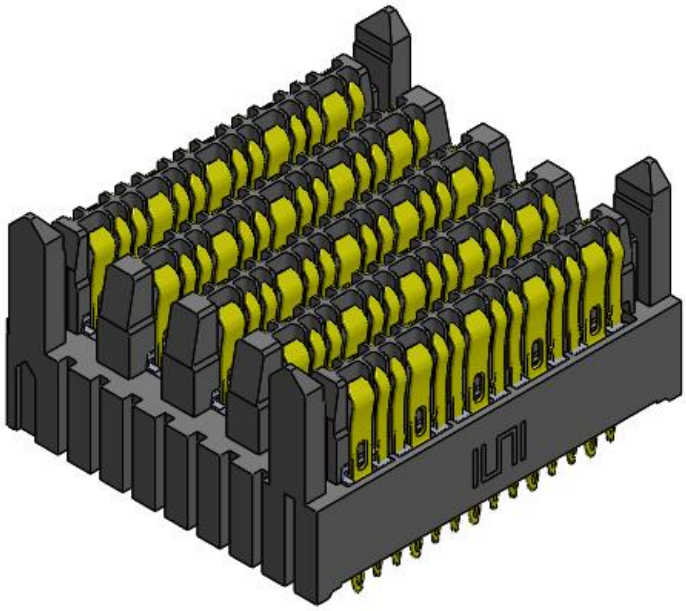
Series: EBTM / EBTF 2,00mm (.0787") ExaMAX® High Speed Backplane

EBTF – Right Angle Receptacle



EBTM - Vertical Header



See www.samtec.com for more

Series: EBTM / EBTF 2,00mm (.0787") ExaMAX® High Speed Backplane

1.0 Objective

1.1 This specification provides information and requirements regarding customer application of the ExaMAX connector system with press-fit termination. This specification is intended to provide general guidance for application process development. It is recognized that no single application process will work under all customer scenarios and that customers will develop their own application processes to meet their needs. However, if these application processes differ greatly from the one recommended, SAMTEC cannot guarantee acceptable results.

2.0 Scope

2.1 This specification provides information and requirements regarding customer application of the ExaMAX connector system with press-fit termination.

3.0 General

This document is meant to be an application guide. If there is a conflict between the product drawings and specifications, the drawings take precedence

3.1 Product Description and Features

ExaMAX is a high speed electrical connector system for backplane, coplanar, and orthogonal applications. The system utilizes a Right Angle Receptacle (EBTF-RA) and a Vertical Header (EBTM-VT) for backplane applications and a Right Angle Header (EBTM-RA) and Right Angle Receptacle (EBTF-RA) for coplanar and orthogonal applications. ExaMAX connectors use compliant press-fit tails to provide a reliable electrical connection between the connector and the plated through holes (PTH) of the PCB. For signal terminals, the ExaMAX product has a small press-fit section that uses Ø0.36mm finished through holes while the ground terminals use the standard press-fit section with Ø0.50mm finished through holes. In addition to the signal pairs and grounds, there is a single low speed signal on the end of each column that may be utilized for miscellaneous low speed signals and/or low power requirements. These locations also have the small press-fit section and use Ø0.36mm finished through holes.

3.2 Product Configurations

3.2.1 Backplane

For backplane applications, ExaMAX Right Angle Receptacle (EBTF-RA) and Vertical Header (EBTM-VT) connectors will be offered in the size configurations shown in Table 1. When spacing allows, we recommend that connectors which have thick wall housings should be used in order to maximize robustness. Not all sizes are currently tooled, check with SAMTEC sales or the SAMTEC website for availability.

Table 1: ExaMAX Backplane Connector Configuration Offerings

Signal pairs per column	Number of Columns	Column Spacing	Number of Positions (Including Grounds)
4 pair	6, 8 and 10	2.0mm	84, 112 and 140
6 pair	6, 8, 10, and 12	2.0mm	120, 160, 200, and 240

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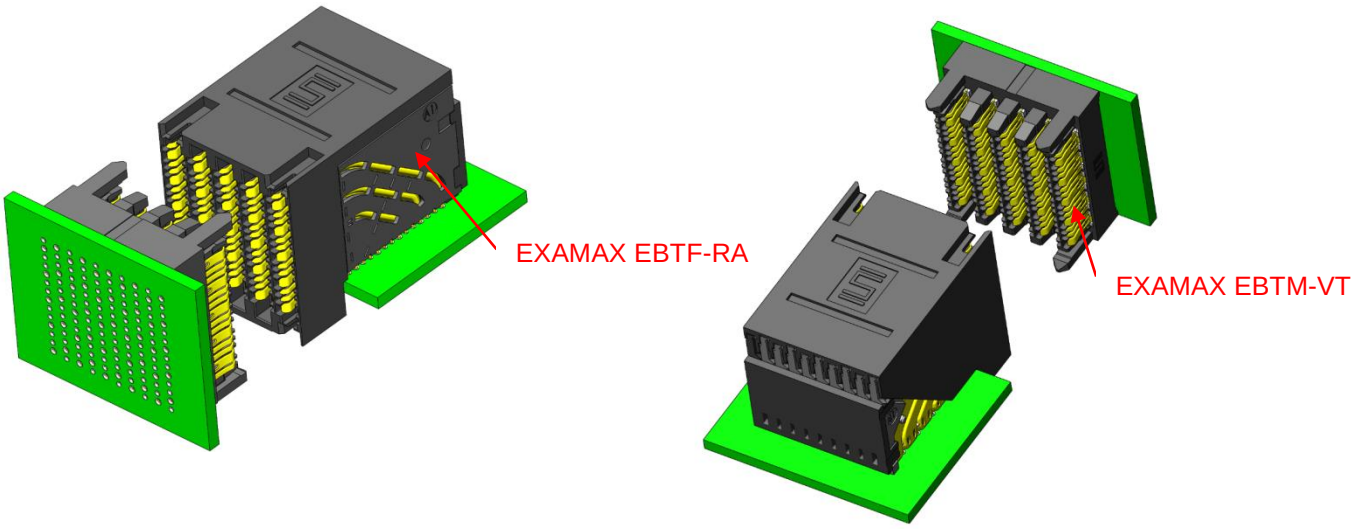

Figure 1: ExaMAX EBTF-RA and EBTM-VT Backplane Application

(4 Pair, 2mm Pitch, 10-Column Configuration Shown)

3.2.2 Coplanar

For coplanar applications, ExaMAX Right Angle Header (EBTM-RA) connectors will be offered in the size configuration shown in Table 2. Not all sizes are currently tooled, check with SAMTEC sales or the SAMTEC website for availability.

Table 2: ExaMAX EBTM-RA Connector Configuration Offerings			
Signal pairs per column	**Number of Columns**	**Column Spacing**	**Number of Positions (Including Grounds)**
4 pair	6, 8 and 10	2.0mm	84, 112 and 140
6 pair	6, 8, 10, and 12	2.0mm	120, 160, 200, and 240

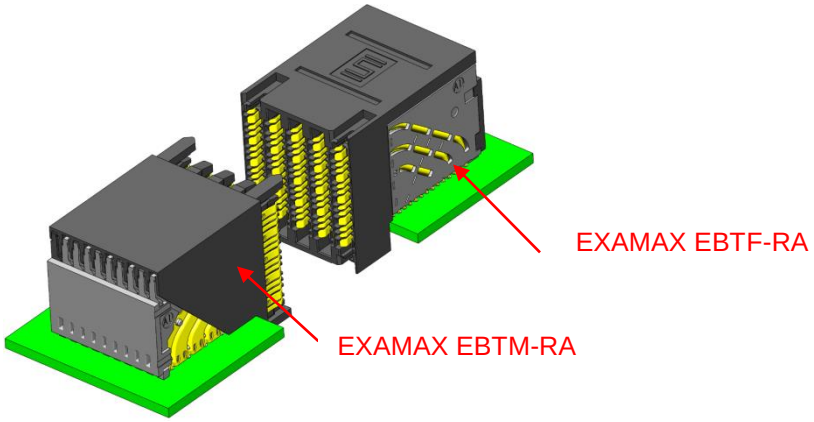

Figure 2: ExaMAX EBTF-RA and EBTM-RA Coplanar Application
(4 Pair, 2mm Pitch, 10-Column Configuration Shown)

3.2.3 Direct Mate Orthogonal

For direct mate orthogonal applications, ExaMAX connectors will be offered in the size configuration shown in Table 3. Not all sizes are currently tooled, check with SAMTEC sales or the SAMTEC website for availability.

Table 3: ExaMAX Direct Mate Orthogonal Connector Configuration Offerings

Signal pairs per column	Number of Columns	Column Spacing	Number of Positions (Including Grounds)
6 pair	10, 12 and 16	Varies	200, 240 and 320

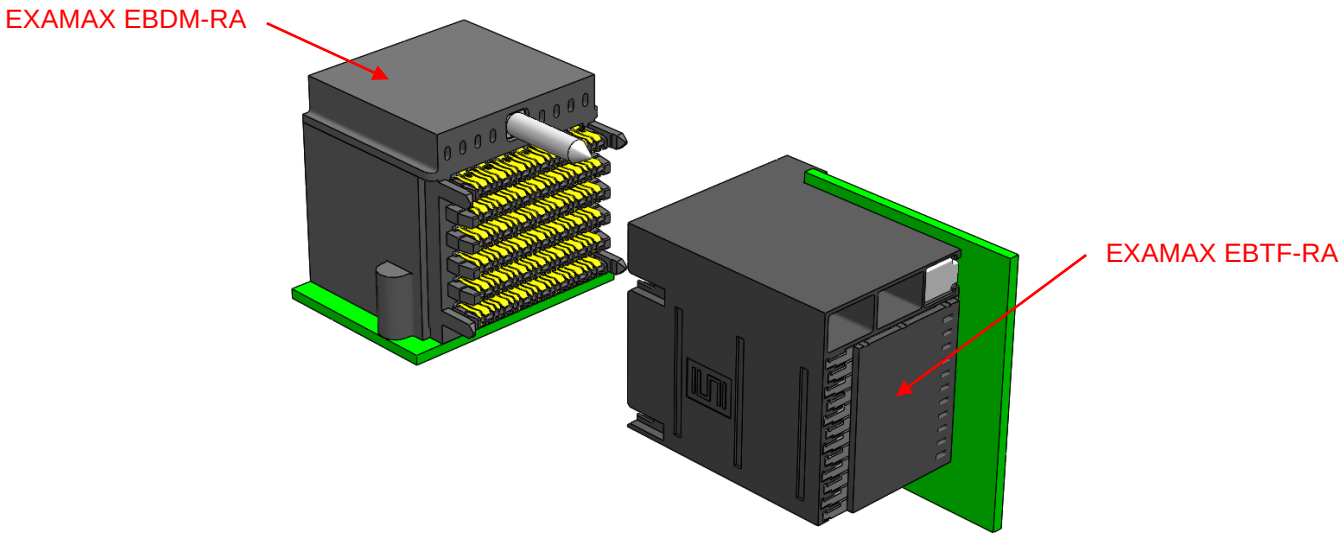

Figure 3: ExaMAX EBDM-RA and EBTF-RA Direct Mate Orthogonal Application (6 Pair, 12-Column Configuration with guides Shown)

3.3 Compatibility with Hard Metric Products

3.3.1 The ExaMAX product is compatible with hard metric standards in that the distance between the backplane and front edge of the daughter card is 12.5mm for back panel applications. This distance includes a 0.05 mm nominal gap between the top face of the EBTM-VT and the front face of the EBTF-RA. See Figure 4 and Table 4 for dimensions relative to the daughter card for back panel applications.

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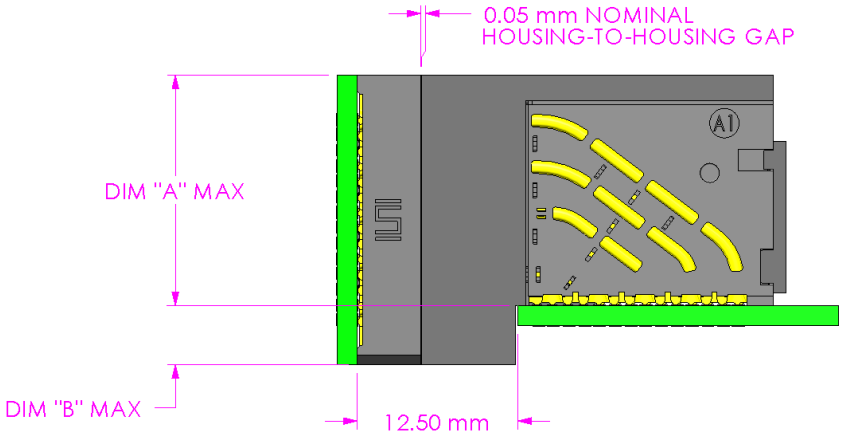


Figure 4: View of Back Panel Applications

Table 4: Connector Dimensions for Back Panel Applications (Relative to Daughter Card)		
Connector type	**DIM A (mm)**	**DIM B (mm)**
4 pair	17.90	4.60
6 pair	25.10	4.60

3.4 Thick Wall Assemblies, 2mm Column-to-Column Pitch

For applications where connectors do not need to be stacked side-by-side and on pitch, we recommend that thick walled assemblies be used. The thick wall assemblies are 1.00 mm wider in the column-to-column direction when compared to a thin wall assembly. An additional 0.50 mm of material is added to each side of a non-guided housing. For assemblies that have guide modules, the additional 0.50 mm of material is only added to the non-guide module side of the housing. Thick wall assemblies are available for 4-pair, and 6-pair Right Angle Receptacles (EBTF-RA), and some Vertical Headers (EBTM-VT).

3.5 Connector Guidance

3.5.1 Housing Guide Features

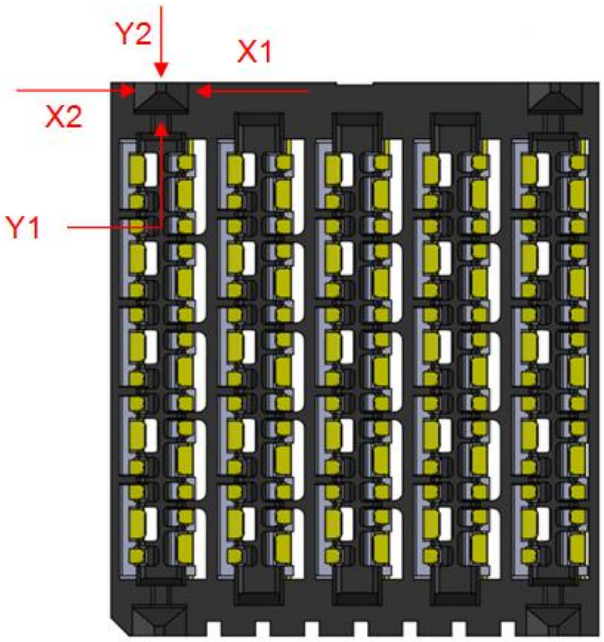
Table 5 below shows the amount of misalignment in each direction that can be tolerated by the guiding features on the connector housings as they are mated. It is important to note that this misalignment is not rigid misalignment. The chassis design must permit the card modules to move freely so these housing guide features can perform final alignment within clearances of separate guide modules and integrated guide pins.

Table 5: Connector Guidance Features		
Connector type	**Nominal misalignment correction in direction parallel to connector columns**	**Nominal misalignment correction in direction perpendicular to connector columns**
ExaMAX 4 & 6 pair	± 1.1 mm	± 1.2 mm

For backplane and orthogonal applications the maximum acceptable angular misalignment of the daughter card relative to the backplane is ± 2°.

3.5.2 Housing Guide Post Strength

Individually, each Vertical Header housing guide post can withstand 17 N in the X1, X2 and Y1 directions and 25 N in the Y2 direction.



3.5.3 Optional Integrated Guide Features

If additional guidance is needed, an optional integrated guide system can be added to any product configuration. The system consists of a round metal guide pin placed on the male connector and a corresponding round hole with a generous lead in on the receptacle connector. This system provides a nominal diametrical misalignment of ø6.0 mm, or ± 3.0 mm in any direction and a wipe length of 15.35 mm after the guide pin is fully engaged into the guide hole.

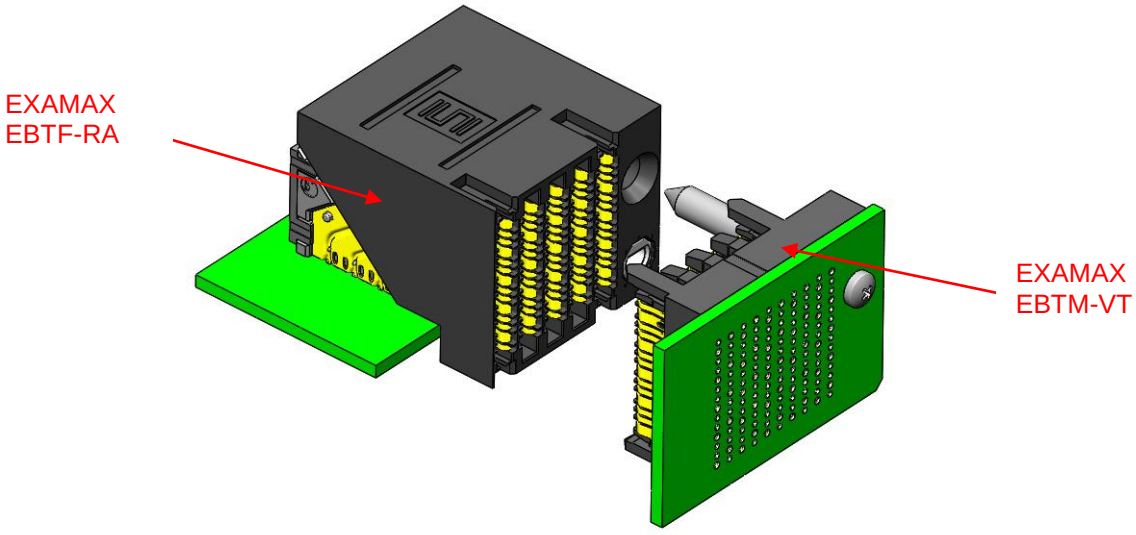


Figure 5: View of Backplane Connectors with Guides (4 Pair, 2mm Pitch, 10-Column Configuration Shown)

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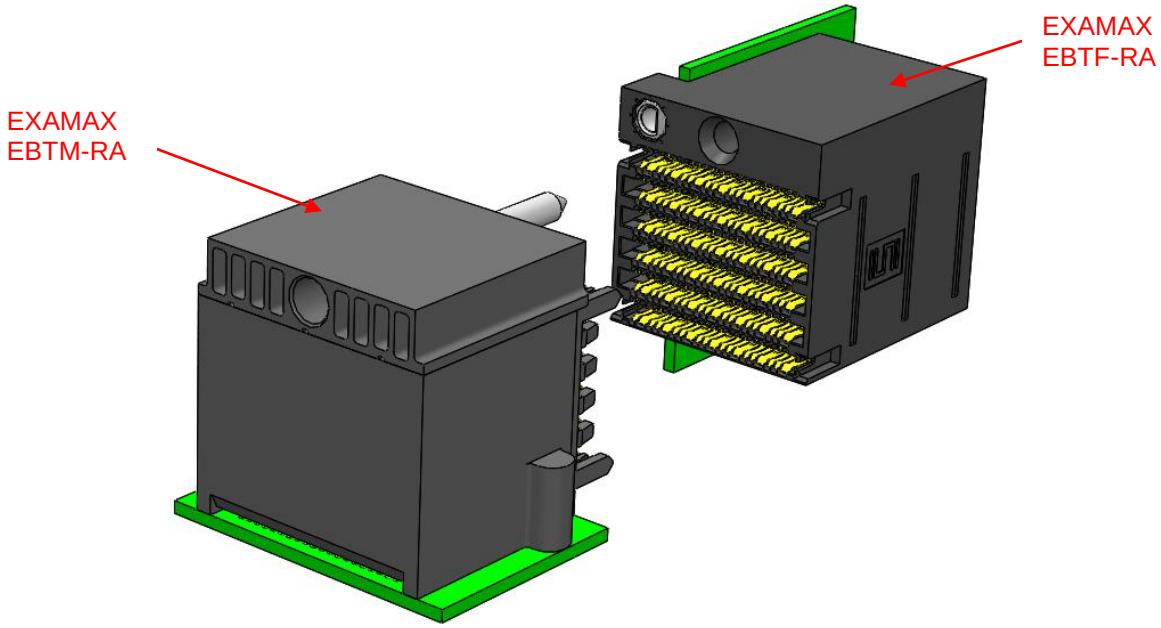
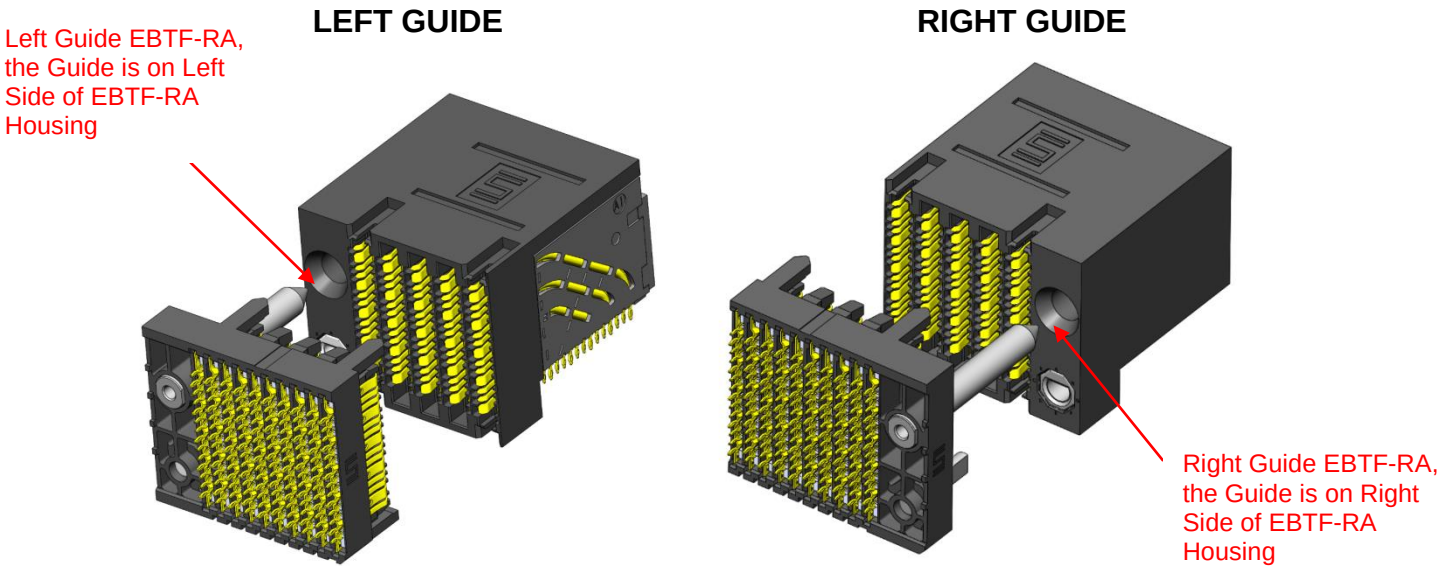


Figure 6: View of Orthogonal Connectors with Guides
(6 Pair, 12-Column Configuration Shown)

3.5.4 Integrated Guide Orientation: SAMTEC Terminology

Left/Right integrated guide orientation is determined by the location of the guide features when looking at the mating face of the right angle receptacle. The L/R designation of the mating header is defined by the right angle receptacle that it mates with (i.e. A Right Guide EBTM-VT mates with a Right Guide EBTF-RA). See Figure 7.



Vertical Header mated to Right Angle Receptacle

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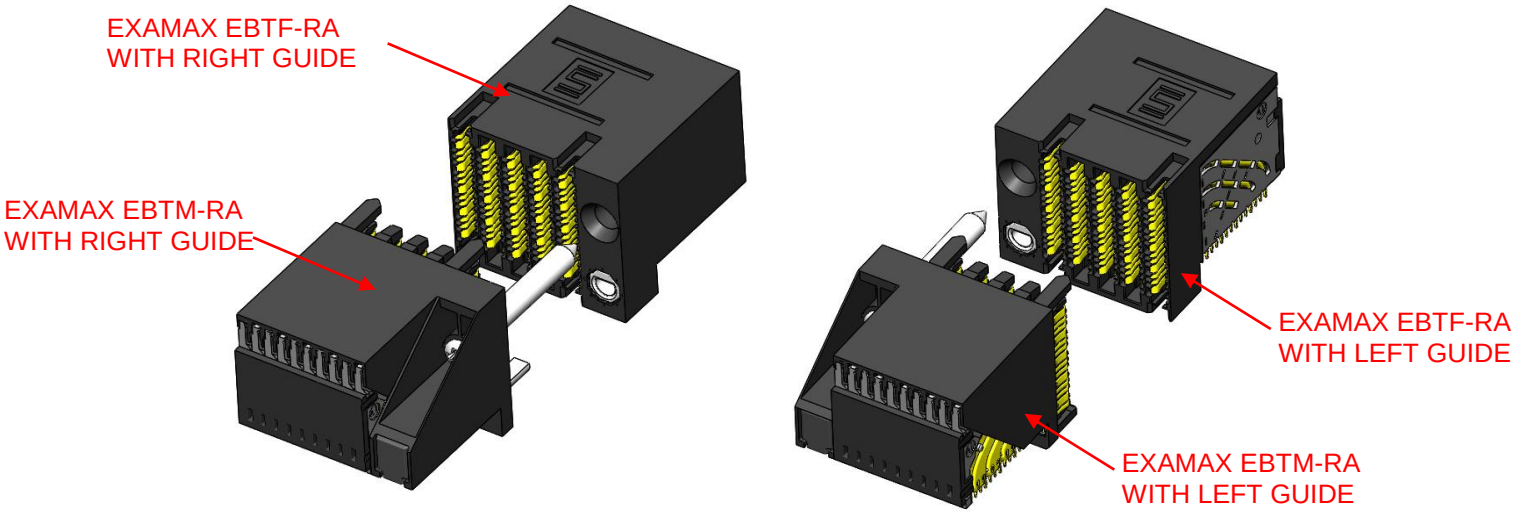

Right Angle Header mated to Right Angle Receptacle

Figure 7: Designation of ExaMAX Left/Right Guide Orientation

3.5.5 Integrated Guide Strength (Backplane)

The Vertical Header and Right Angle Header integrated guide pins will be deflected 0.2 mm or less with 13 N of force applied just past the guide-pin lead-in chamfer.

3.5.6 Separate Guide Modules

Separate metal guide modules should be used to maximize a system's mechanical robustness. Separate guide modules will allow for additional misalignment in each direction as shown in table 6 below.

Table 6: Separate Guide Module Guidance Features

PART NUMBER	Guide Width	Nominal misalignment correction in direction parallel to connector columns	Nominal misalignment correction in direction perpendicular to connector columns	Wipe length after guide pin is fully engaged in guide receptacle
EGBF-RA-20 MATED TO EGBM-VT-X-XX.X-20	7.2 mm	2.9 mm	2.9 mm	17.9 mm

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3.5.7 Quantity and Location of Guides Relative to Signal Modules

Whether using integrated or separate guide modules, one guide module should be placed at each end of a group of signal modules. If the amount of bow in a daughter card exceeds the amount of signal connector guidance, then an additional guide module, separate or integrated, should be placed near the center of a group of signal modules. The guide pin strength rating versus the card weight must be taken into consideration.

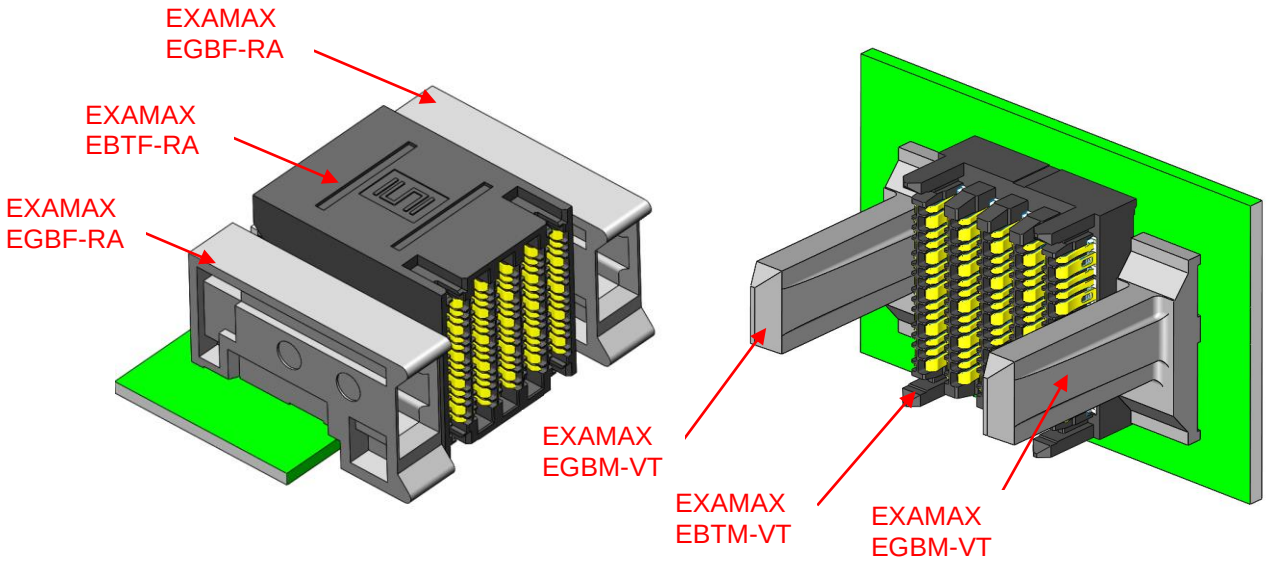

Figure 8 : ExaMAX EBTF-RA With EGBF-RA and EBTM-VT With EGBM-VT Backplane Application

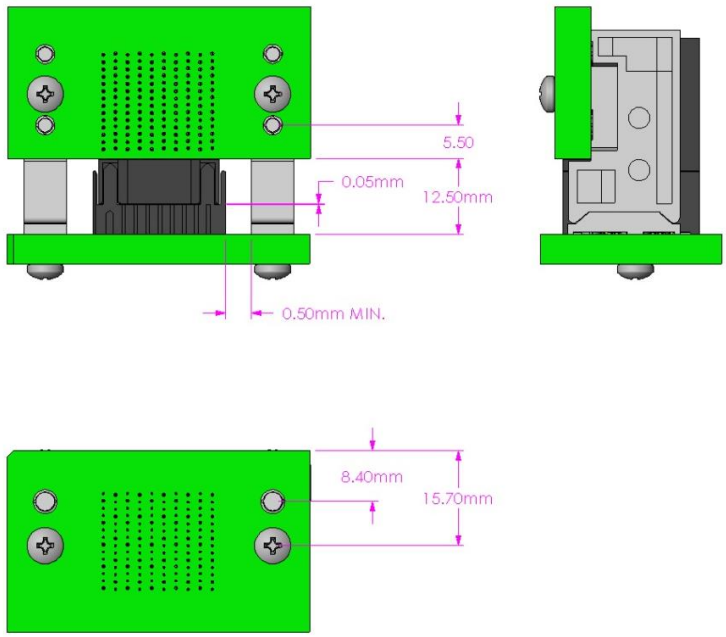

Figure 9: ExaMAX (EBTF-RA to EBTM-VT) With Signal Modules Nominal Mated Connector-to-Connector Hole Locations

3.5.8 Requirements for Direct-Mate Orthogonal (DMO) chassis layout

There must be some type of center structure located between horizontally-oriented card modules and vertically-oriented card modules in any Direct-Mate Orthogonal chassis design. This center structure should be mounted to a chassis datum feature in the connector mating direction. The center structure could be a "picture-frame" printed circuit board, two L-shaped printed circuit boards, a die cast piece of metal with holes, or some similar structure that permits airflow from front to back while providing features to properly locate metal guide pins to provide rough alignment and to support card weight on both sides. Each card module in the DMO chassis should have a minimum of 2 metal guide modules. As with coplanar and backplane applications the guide in strength rating versus card module weight must be taken into consideration. All card modules must have the ability to move freely so there is no deformation of any chassis component due to misalignment between metal guide pins and guide receptacles.

3.5.9 Guide Keying Options

The purpose of keying is to prevent connectors with improperly matched keys from mating beyond the point of initial contact. Keying can be provided by using either integrated guide modules or by using separate 10.8mm keyed guide modules. Both approaches offer eight different keying options (plus an option without keying). See product customer drawing, link provided below:

http://suddendocs.samtec.com/prints/ebtf-6-xx-2.0-x-ra-x-x-x-x-mkt.pdf

For the integrated guide modules, refer to the product customer drawing for proper keying dash number designation and for PCB layout information.

3.6 Orthogonal Board-to-Board Spacing

Because the right angle orthogonal header (EBDM-RA) sits flush on top of the PCB, the connector location relative to the board's edge can be adjusted to provide different board-to-board spacing. For example, when mated to a EBTF-RA for a direct mate orthogonal (DMO) application, the board-to-board spacing would be 10.0 mm when the EBDM-RA A1 via is 1.50 mm from the front edge of the board.

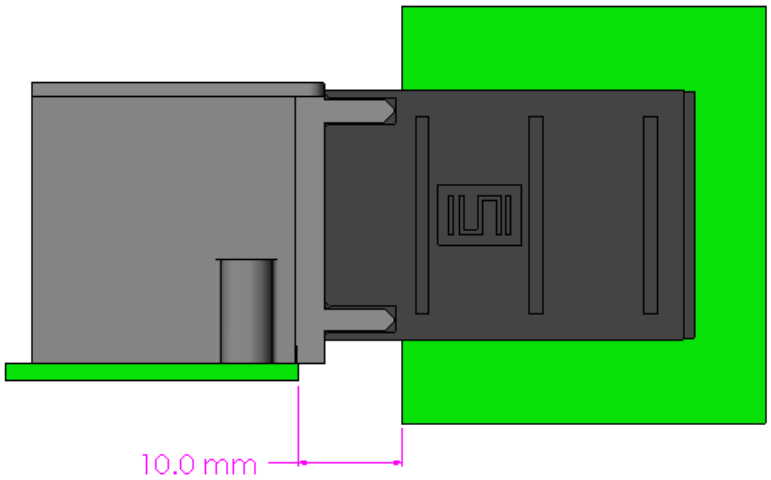

Figure 10: Example Board-to-Board Distance for Direct Mate Orthogonal Application

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3.7 Direct-Mate Orthogonal Mating Orientation

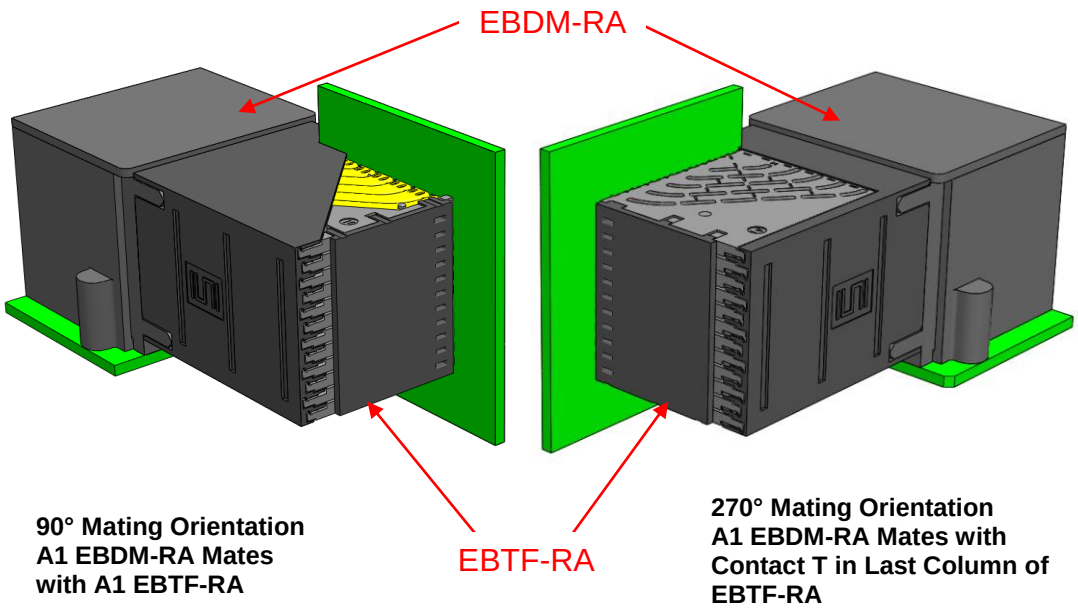

Figure 11: ExaMAX DMO Mating Orientation Designation

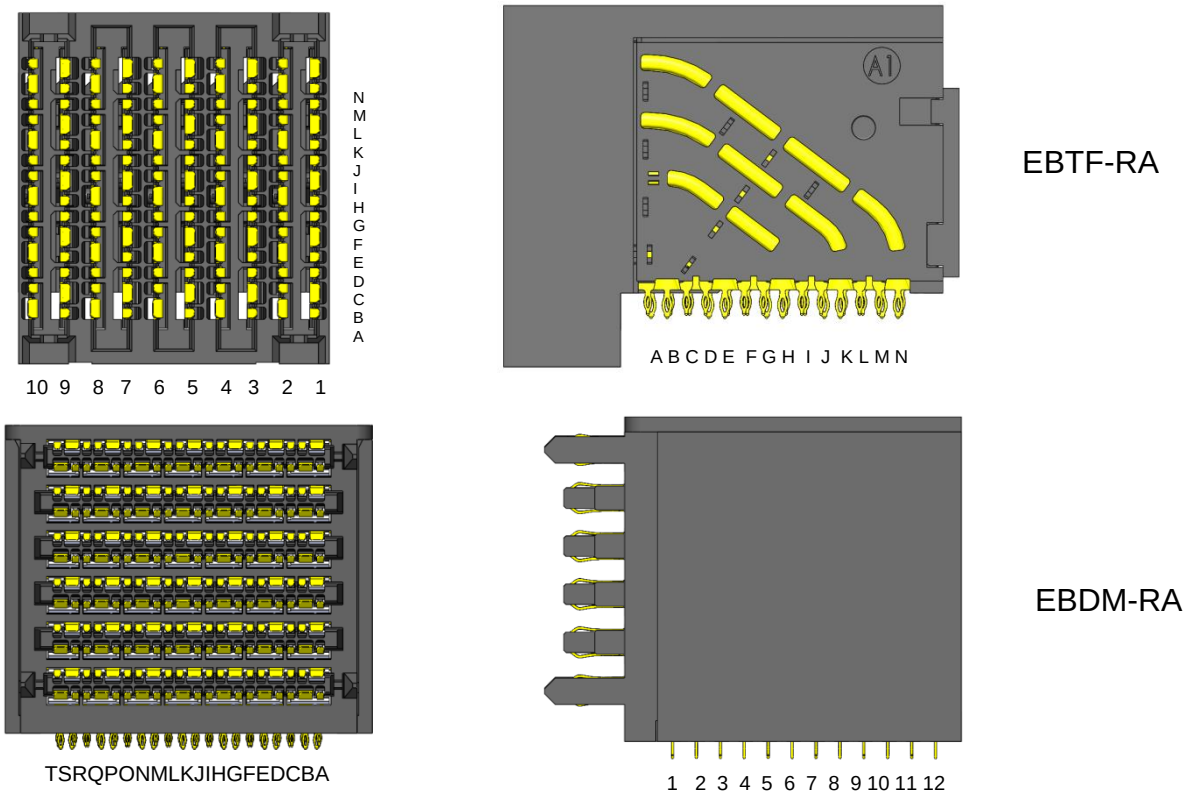

Figure 12: ExaMAX EBTF-RA and EBDM-RA Connector Position Identification

3.8 Direct Mate Orthogonal Pin Mapping

Along with the flexibility of being able to mate the ExaMAX EBTF-RA with the ExaMAX EBDM-RA in either the 90° mating orientation or the 270° mating orientation, comes the possible confusion of how the PCB Vias are related from one board to the other. To assist in PCB layout, SAMTEC Form E-4511 provides visual maps and tables relating the Via IDs of the EBDM-RA PCB to the Via IDs of the EBTF-RA PCB. Tables are provided for both orientations shown in Figure 11.

3.9 Contact Mating and Connector Mating Sequence

The ExaMAX connector system is capable of providing three different mating wipe lengths. When specifying the advanced mate configuration, both the header and the receptacle need to have advanced mate contacts. When specifying the short detect configuration, only the header or the receptacle can have a short detect contact. See tables 7 and 8 as well as customer drawings for additional details.

Table 7: Contact Mating Details

Item	Standard Mate Only	Advanced Mate	Short Detect	Advance Mate & Short Detect
Connector Suffix	-1	-2	-3	-4
Wipe Length (mm) Nominal	2.5 mm	3.7 mm	2.2 mm	Varies by Type
Contact Location	All	A-Contact 1ST Column and 2ND to Last Column	Last Contact 2ND Column	Location by Type

Table 8: Connector Mating Sequence

Un-Mate Nominal Distance (mm) (See Figure 13-16)	Description of Event
17.90	ExaMax EGBX Series die cast guide pin is fully engaged past lead-in features
15.35	ExaMAX integrated guide pin is fully engaged past lead-in features
6.70	ExaMAX housing guide post and guide slot start to align connectors
5.15	ExaMAX housing guide post and guide slot are fully engaged
4.40	ExaMAX advance mate contacts first touch
3.70	ExaMAX advance mate contacts - wipe begins
3.60	ExaMAX standard mate contacts first touch
2.60	ExaMAX short detect contact first touches
2.50	ExaMAX standard mate contact - wipe begins
2.20	ExaMAX short detect contact - wipe begins
2.00	ExaMAX standard mate contacts begin 2 points of contact
0.05	ExaMAX remaining gap when BP to card spacing is 12.5mm

3.10 Mated Connector-to-Connector Via and Housing Locations

The relative location of the header to the receptacle vias and the outside walls is dependent upon the inter-mating connector types. While the housing and PCB real estate varies by connector size (number of differential pairs), the locations between mated connectors remain constant for each of the six configurations shown in figures 13 thru 16.

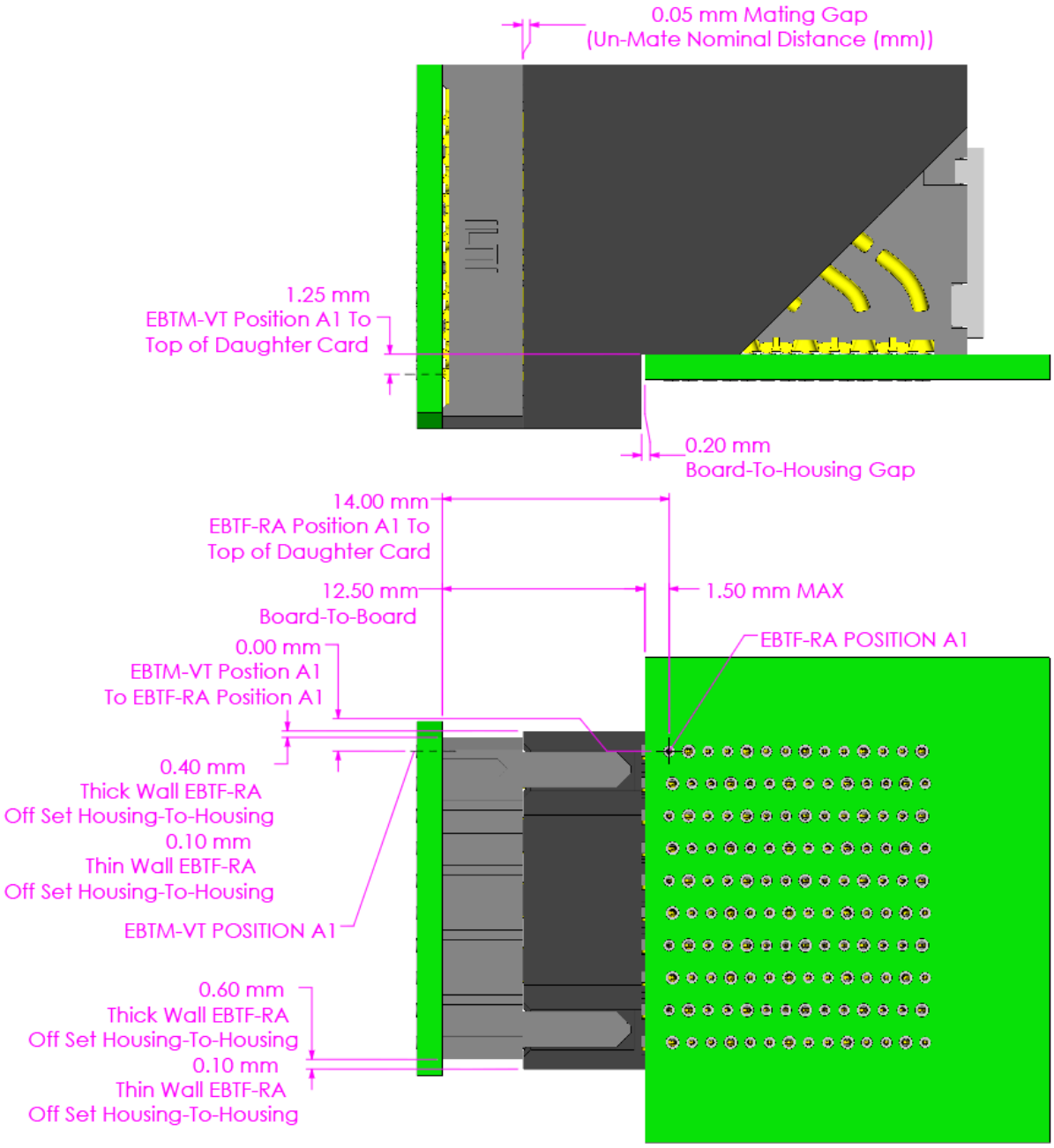

Figure 13: ExaMAX Backplane (Standard EBTF-RA to EBTM-VT) Nominal Mated Connector-to-Connector Locations

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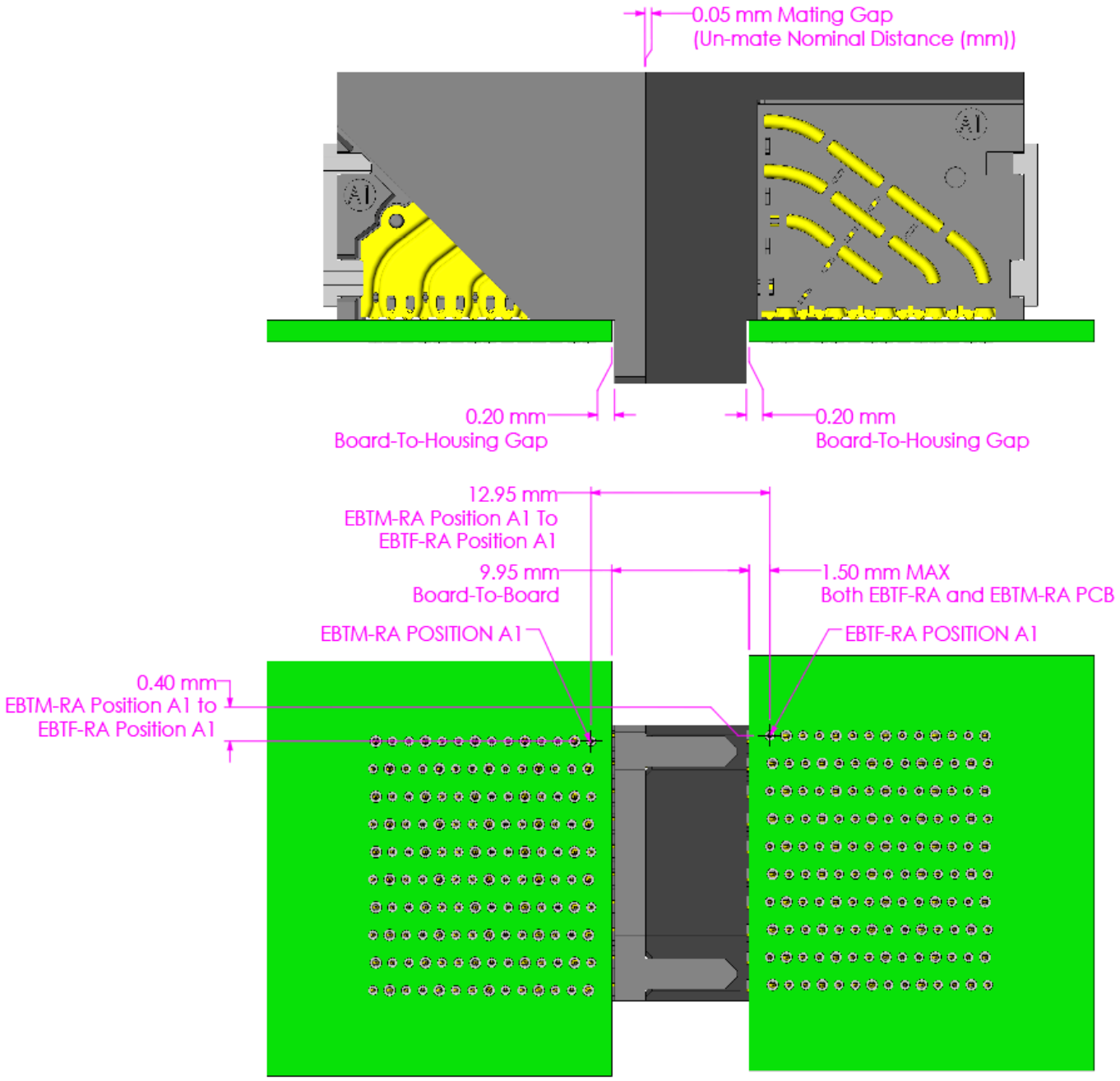

Figure 14: ExaMAX Co-Planar (EBTF-RA to EBTM-RA) Nominal Mated Connector-to-Connector Location

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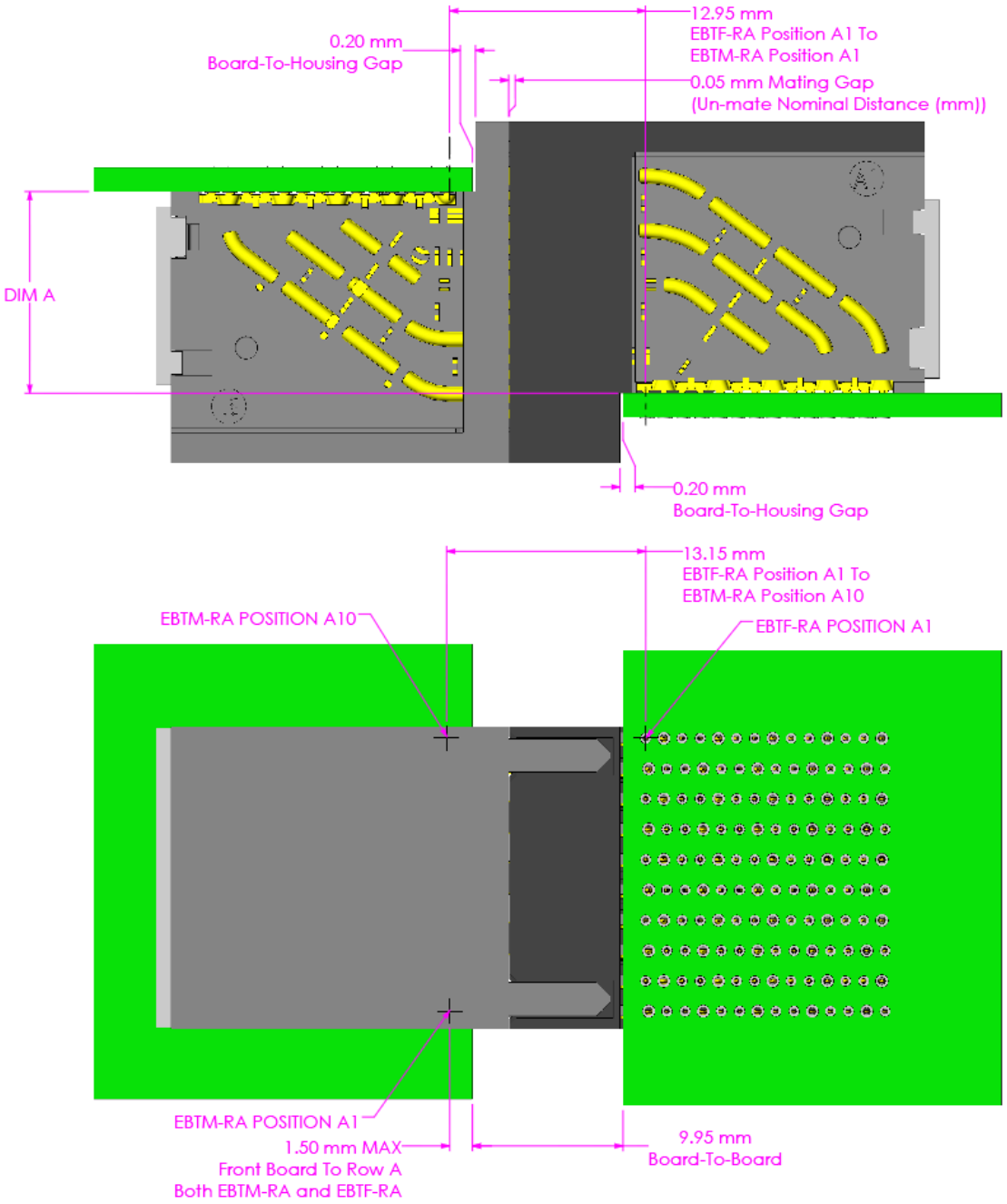

Figure 15: ExaMAX Inverse Co-Planar (EBTF-RA to EBTM-RA) Nominal Mated Connector-to-Connector Locations

Table 9: Inverse Co-Planar Separation Distance between Component-Side Surfaces	
Connector Type	**Dim A (mm)**
4-Pair	13.3
6-Pair	20.5

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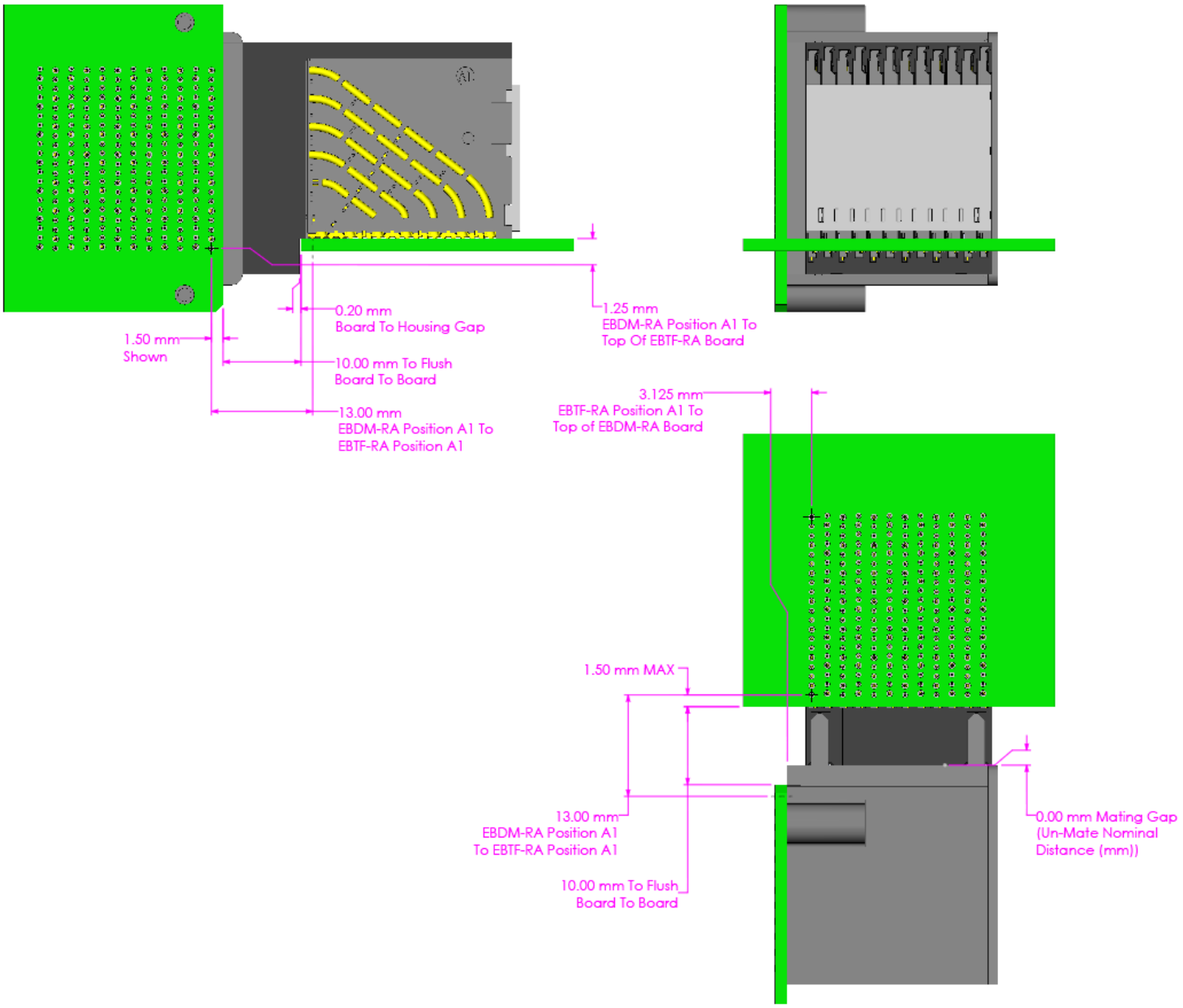

Figure 16: ExaMAX Orthogonal (EBDM-RA to EBTF-RA) Nominal Mated Connector-to-Connector Locations

3.11 Power Options

The ExaMAX connector system can be configured to provide both high speed signal and power within the same connector. While any contacts within the ExaMAX connector can be used for power, we do not recommend using short detect contacts. If ground contacts are used for power, all the ground contacts within a column must be used for power because they are common.

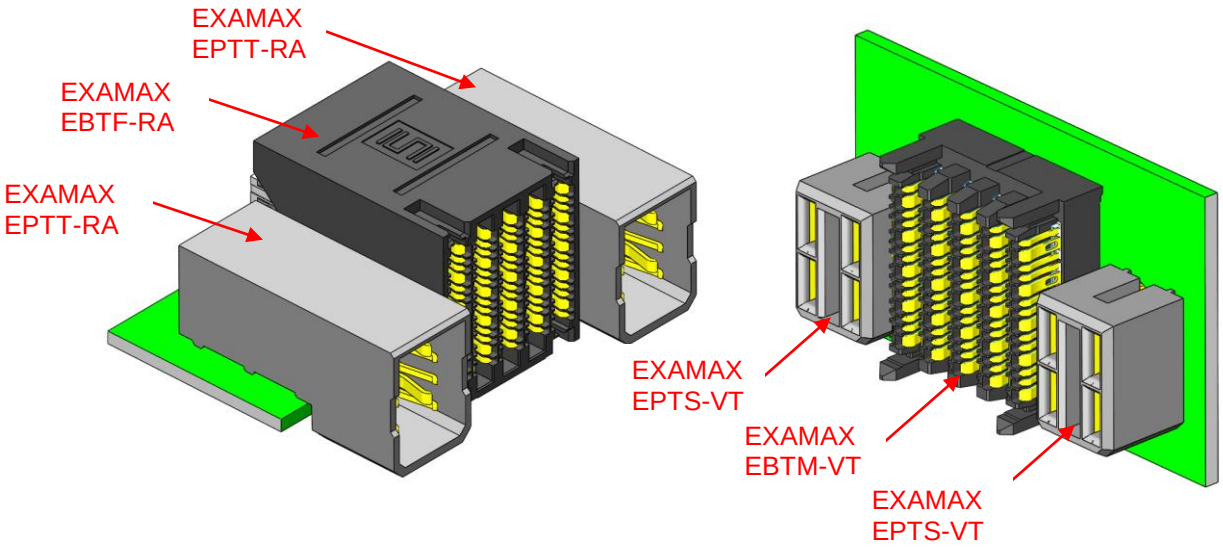

Figure 17 : ExaMAX EBTF-RA With EPTT-RA and EBTM-VT With EPTS-VT Backplane Application

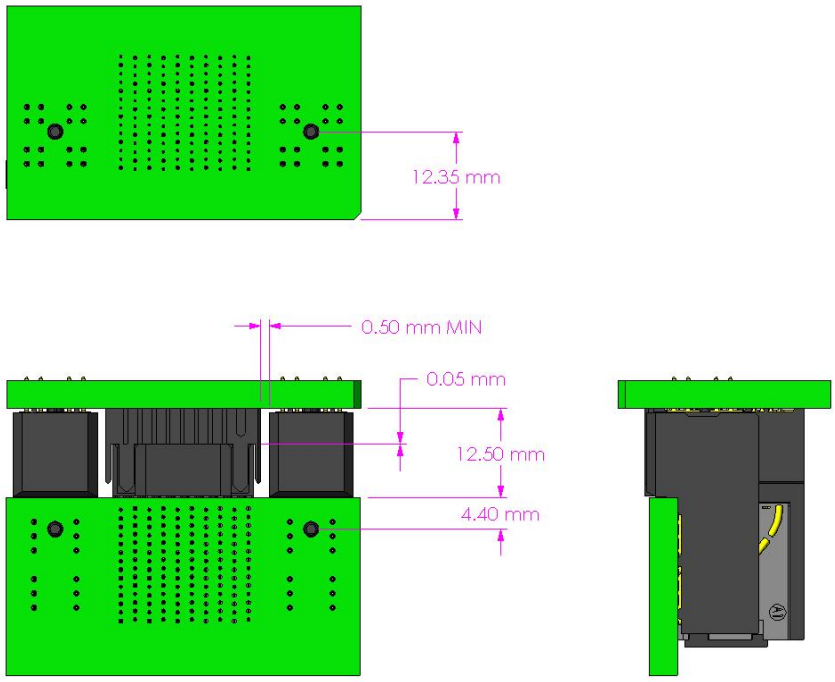

Figure 18: ExaMAX (EBTF-RA to EBTM-VT) With Power Modules Nominal Mated Connector-to-Connector Hole Locations

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4.0 PRINTED CIRCUIT BOARD LAYOUT INFORMATION

4.1 Board Thickness

The minimum PCB thickness that does not require PCB back-up tooling for EON tip clearance is 1.75mm. If back-up tooling with EON tip clearance will be used, the minimum PCB thickness can be reduced to 1.30mm. For mid-plane applications where connectors share the same via holes from opposite sides of the board the minimum PCB thickness should be 3.60mm. There are no maximum thickness requirements.

4.2 Connector to Connector Spacing

The connector-to-connector centerline spacing for ExaMAX products will depend on the number of columns, the column-to-column pitch, whether internal guides are used and the position of the connectors relative to each other. When using a recommended thick wall EBTF-RA, the column-to-column spacing of the vias between connectors is 1.0 mm larger than the spacing within the connector. In table 10 are listed the contact EON overall spacing (E), the distance from mating centerline to the A1 EON (C), adjacent EON Via to Via spacing (G) and mating centerline to mating centerline spacing (S) for three different configurations with 2mm and 3mm column-to-column pitch.

No Guide EBTF-RA No Guide EBTF-RA

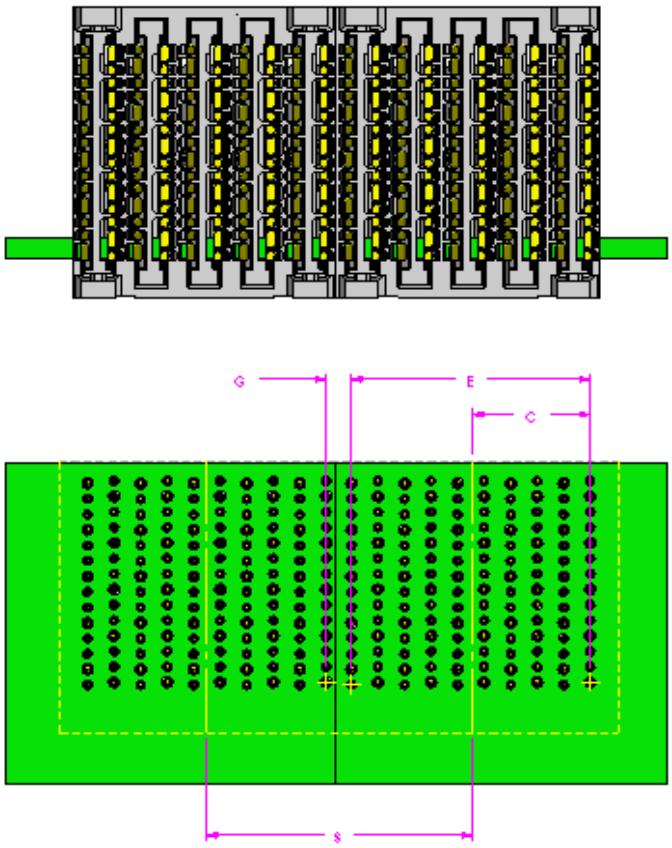

Figure 19: Connector to Connector Spacing With No Guides Option I

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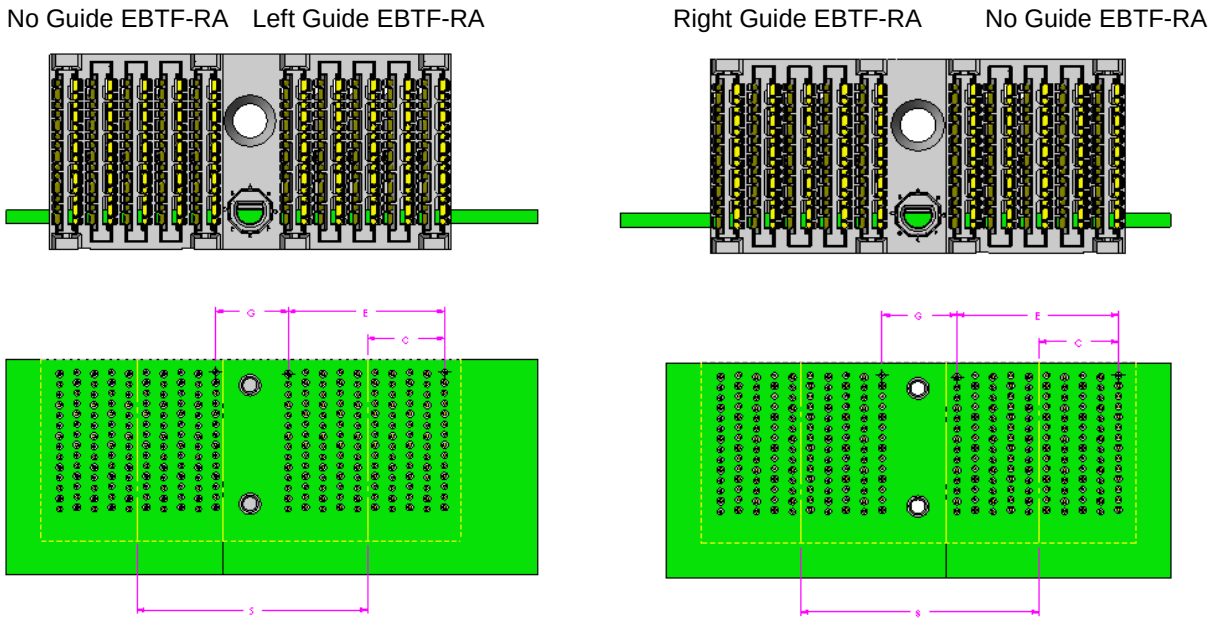

Figure 20: Connector to Connector Spacing with Left and Right Guides Options II and III

Table 10: PCB Connector to Connector Spacing

	No. Columns	2 mm EON pitch						3mm EON Pitch			
		Thick and Thin Wall		Thick Wall		Thin wall					
		C	E	G	S	G	S	C	E	G	S
Option I: Both No Guides	6	5.2	10.0	3.0	13.0	2.0	12.0	7.7	15.0	3.0	18.0
	8	7.2	14.0	3.0	17.0	2.0	16.0	10.7	21.0	3.0	24.0
	10	9.2	18.0	3.0	21.0	2.0	20.0	13.7	27.0	3.0	30.0
	12	11.2	22.0	3.0	25.0	2.0	24.0	16.7	33.0	3.0	36.0
Option II: With Left Guide	6	5.2	10.0	8.95	18.95	8.45	18.45	7.7	15.0	8.45	23.45
	8	7.2	14.0	8.95	22.95	8.45	22.45	10.7	21.0	8.45	29.45
	10	9.2	18.0	8.95	26.95	8.45	26.45	13.7	27.0	8.45	35.45
	12	11.2	22.0	8.95	30.95	8.45	30.45	16.7	33.0	8.45	41.45
Option III: With Right Guide	6	5.2	10.0	8.95	18.95	8.45	18.45	7.7	15.0	8.45	23.45
	8	7.2	14.0	8.95	22.95	8.45	22.45	10.7	21.0	8.45	29.45
	10	9.2	18.0	8.95	26.95	8.45	26.45	13.7	27.0	8.45	35.45
	12	11.2	22.0	8.95	30.95	8.45	30.45	16.7	33.0	8.45	41.45

4.3 Printed Circuit Board Screen Printing Recommendations

It is recommended to print the outline of the connector housing onto the PCB to insure proper placement of the connector. Detailed information of the recommended outline is provided on the customer drawing.

4.4 Keep-Out Zones for Application and Removal Tooling

There are no keep-out zones necessary for application tooling because these tools fit within the outside envelope of the connector assemblies.

In order to minimize any strain on the board and other components near the connector, it is recommend that for PCB / connector rework, allowances on the connector side of the board should be made for 2mm keep-out zones adjacent to the connector on a minimum of two opposing sides. These zones will be needed for support tooling during the removal process. Refer to section 5.10 for additional details.

4.5 Position A1 Identification

Because Right Angle connectors can only be applied to the PCB in one orientation, no specific visual features have been added to the right angle connector housings. See the associated customer drawing for proper PCB layout and identification of the A1 contact position.
Vertical connectors can be placed onto the PCB in two different orientations. In order to clearly identify the A1 contact position, vertical header connector housings have serrations along the A side of the housing and a corner chamfer and flag at the A1 position (See figure 21).

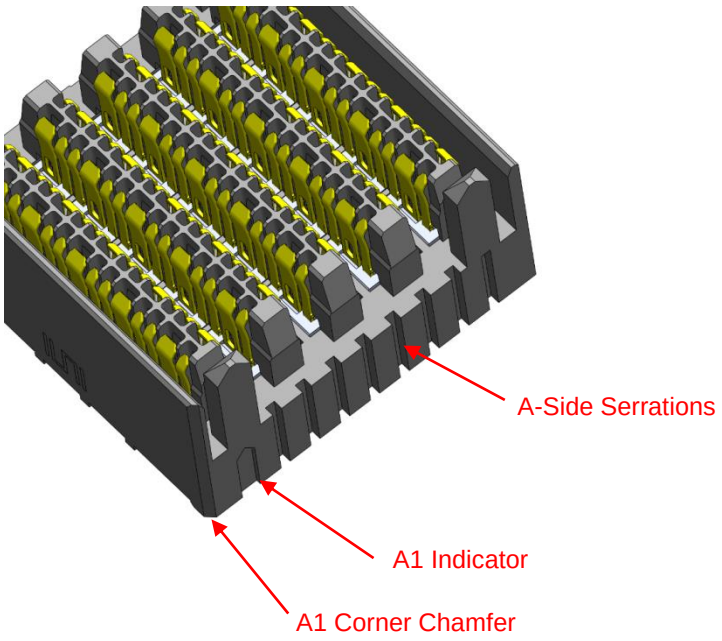

Figure 21: Vertical Connector A1 Identification

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5.0 APPLICATION PROCEDURE

5.1 Connector Insertion Tooling

The ExaMAX Right Angle Receptacle (EBTF-RA), Coplanar Right Angle Header (EBTM-RA), and Right Angle Orthogonal Header (EBDM-RA) connectors are designed for "flat rock" insertion and thus do not require any special insertion tooling.

The ExaMAX Vertical Header and Vertical Receptacle connectors are intended to be applied utilizing a "flat rock" along with one of the special insert tools listed in table 11.

If a connector's ground tails are longer than the thickness of the printed circuit board that the connector is being applied to (ground tail length specification is 1.60 ± 0.15mm) a special bottom support tool will be necessary. This tool could be a PCB with oversized holes or a custom tool designed by the user.

Table 11: EBTM-VT 2mm Insertion Tool Part Numbers

Pair	Column	Number Positions	2mm Insertion Tool PN
			EBTM-VT
4	6	84	CAT-PT-EBTM-4-06-2.0-VT
	8	112	CAT-PT-EBTM-4-08-2.0-VT
	10	140	CAT-PT-EBTM-4-10-2.0-VT
6	6	120	CAT-PT-EBTM-6-06-2.0-VT
	8	160	CAT-PT-EBTM-6-08-2.0-VT
	10	200	CAT-PT-EBTM-6-10-2.0-VT
	12	240	CAT-PT-EBTM-6-12-2.0-VT

5.2 Insertion Press

Several important items to consider when selecting an insertion press include:

- The press must have sufficient force capabilities
- The press must be capable of controlling the insertion rate.
- The press must be capable of pressing per a force gradient curve.
- The press ram must be large enough to cover the insertion tooling
- The press table must be large enough to properly accommodate the PCB size.

SAMTEC recommends using a servo driven electronic press from the Tyco Electronics (ASG) MEP family of presses. See section 5.3 for programming details.

5.3 Recommended Insertion Press Settings

ExaMAX connectors, with the exception of the Right Angle Orthogonal Header, have a maximum insertion force of 12 Newton per press-fit terminal. The Right Angle Orthogonal Header requires a maximum insertion force of 18 Newton per press-fit terminal.

For all connector types except for the EBDM-RA, SAMTEC recommends using a 75 degree force gradient press profile to ensure that the connectors are fully seated, while at the same time are not damaged by over pressing the connectors onto the board. A typical 75 degree press profile would look like figure 22 below. The recommended insertion rate is 0.050"/sec for the entire time the ram is in contact with the connector press tool.

Note: SAMTEC RECOMMENDS THAT ONLY ONE CONNECTOR ASSEMBLY BE INSERTED AT A TIME. If more than one connector is inserted at the same time then extra care must be taken to ensure that the push surface of the tool is parallel to the component surface of the board.

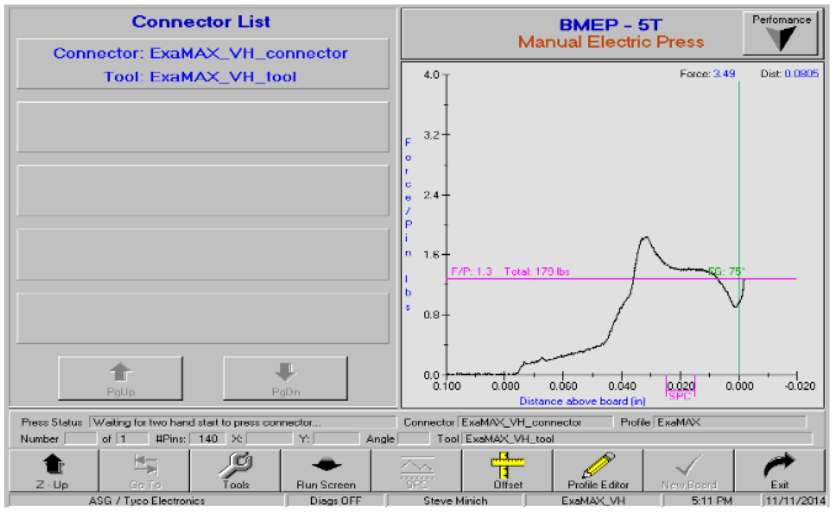

Figure 22: Example of 75 Degree Force Gradient Press Profile

Table 12: Summary of Insertion Force Recommendations		
	EBDM-RA Configuration	**All Other Configurations**
Recommended Press-Fit Force	**18 N Max. Per Pin**	**75 Degree Force Gradient (12 N Max. Per Pin)**

5.4 Board Insertion Procedure for Right Angle Receptacle or Coplanar Right Angle Header Connectors

- Begin by holding the connector at a slight angle so that the tips of the outside column press fit tails, left or right, can be inserted into either the first or last column of via holes on the PCB. See figure 23.

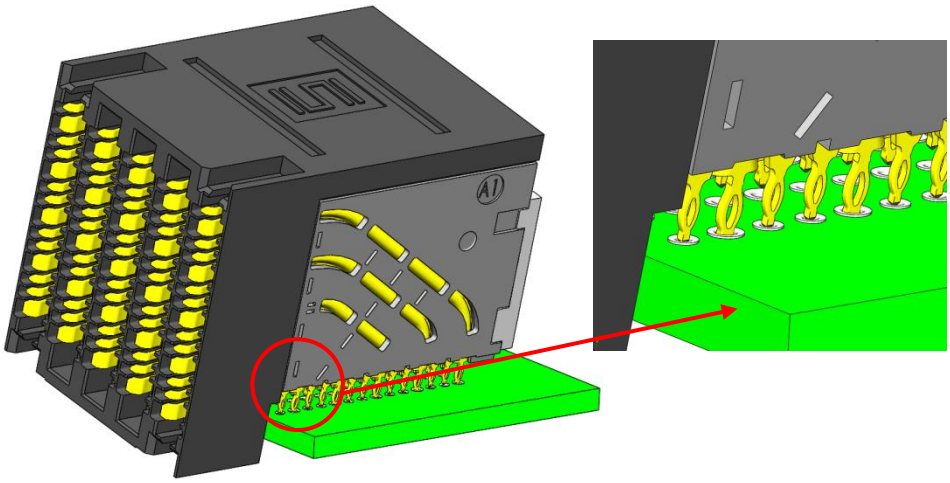

Figure 23: Right Column EONs Being Aligned With PCB Vias

- Once the end column EON tips have been inserted, rotate the connector towards the board to insert the rest of the EON tips into their corresponding vias. The top surface of the connector should be parallel with the top surface of PCB after all of the tips have been properly inserted. Refer to figure 24.

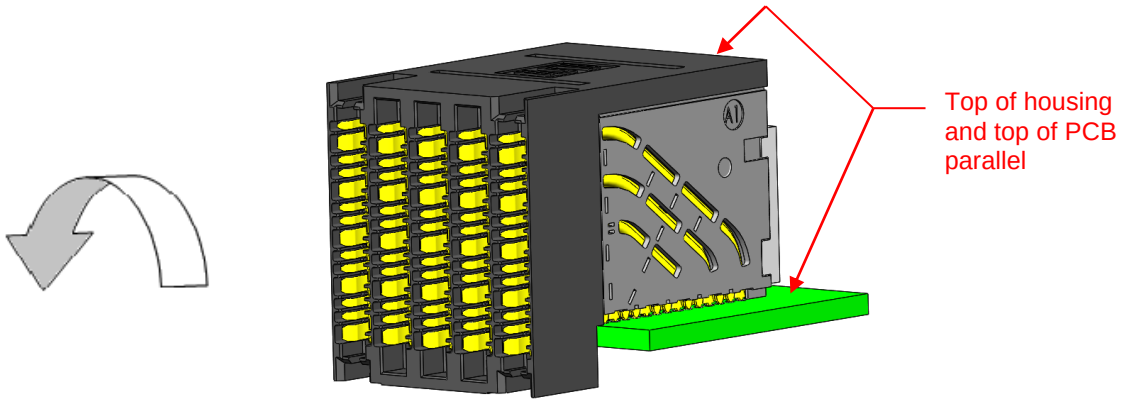

Figure 24: Connector Rotated Parallel to Top of PCB and EONs Aligned

- Using a flat rock surface and an insertion press, apply force to the flat area of the connector as shown in figure 25.

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75 degree Force Gradient (12 N MAX per pin)

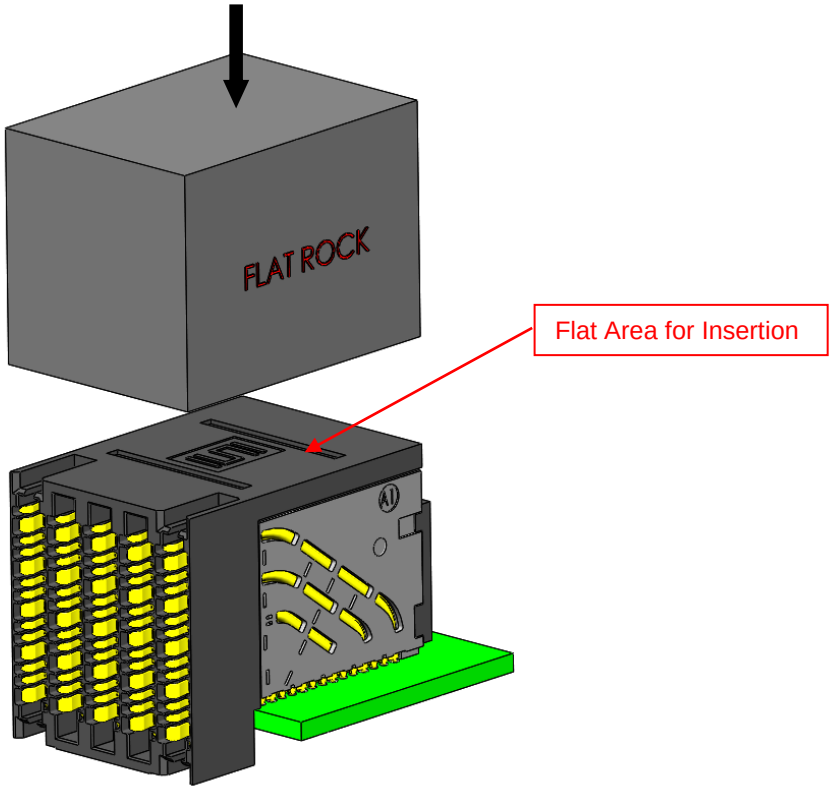
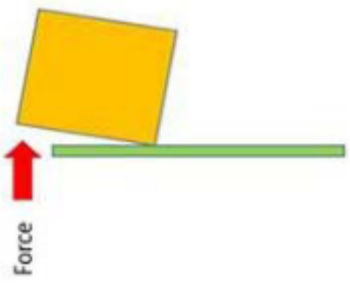


Figure 25: Flat Rock Tool Application to Seat Right Angle Connector

- Inspect for proper application (refer to section 5.7).
- When a force is applied to the front underside surface of the housing, the typical peel strength per IMLA, without hold down screws, is shown in table 13. (i.e. 2-pair x 8 IMLA = 8 x 11.6 N = 92.8 N peel strength)
- For connectors with either a right or left guide module, two Phillips Pan Head M2 x 0.4 hold-down screws must be used to secure the connector more rigidly to the PCB. The length of the screws shall be as shown in table 13. Screws are not provided with the connectors.
- For a connector assembly with hold down screws you will typically obtain an additional 70 N peel strength. (i.e. 2-pair 8 IMLA w / screws = 92.8 N + 70 N = 162.8 N peel strength)

Table 13: Guide Module Hold-Down Screw Length

Connector Size	Screw Length (mm)	Peel Strength w/o Screws (N / IMLA)
4-Pair	2.0 – 6.0 + PCB Thickness	20.0
6-Pair	2.0 – 6.0 + PCB Thickness	29.0



5.5 Board Insertion Procedure for Vertical Connectors

- Place insertion tool into the connector assembly and carefully locate onto the printed circuit board, taking care to assure that all press-fit tails are aligned with the proper PCB hole (i.e. A1 to A1) and each cavity slot of the connector has a blade from the insert tool located in it.

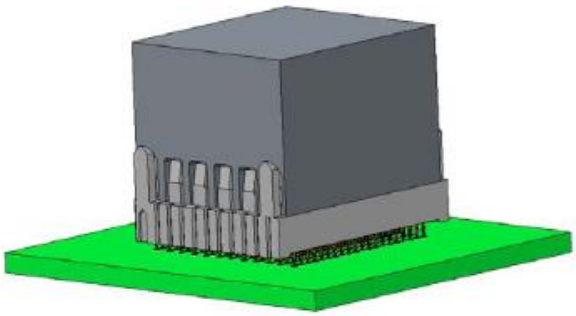


Figure 26: Vertical Connector and Insertion Tool Placed Onto PCB

- Using a flat rock surface and an insertion press, apply force to the top of the insert tool as shown in figure 27.

75 degree Force Gradient (12 N MAX per pin)

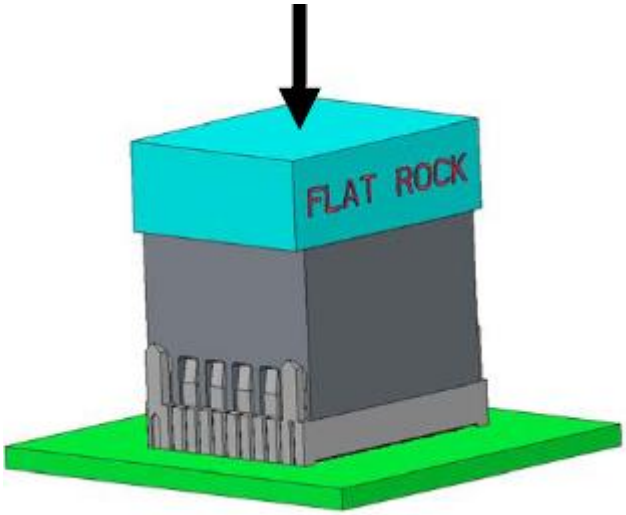


Figure 27: Flat Rock Tool Used to Seat Vertical Connector

- Inspect for proper application (refer to section 5.7).

- For connectors with either a right or left guide module, one Phillips Pan Head M2 x 0.4 hold-down screw must be used to secure the connector and guide pin to the PCB. The length of the screw shall be 2.0 - 6.0 mm plus the thickness of the PCB. Screws are not provided with the connectors.

5.6 Board Insertion Procedure for Right Angle Orthogonal Headers

- Begin by holding the connector at a slight angle so that the tips of the last row of press fit tails can be inserted into the last row of via holes on the PCB. Refer to figure 28.

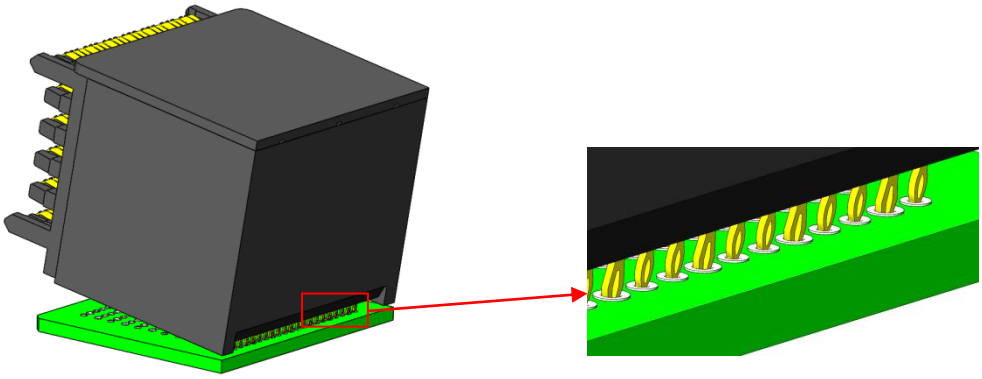


Figure 28: Last Row of EON tips Inserted Into Last Row of PCB Vias

- Once the last row of EON tips have been inserted, rotate the connector towards the front of board to insert the rest of the EON tips into their corresponding vias. The top surface of the connector should be parallel with the top surface of PCB after all of the tips have been properly inserted. Refer to figure 29.

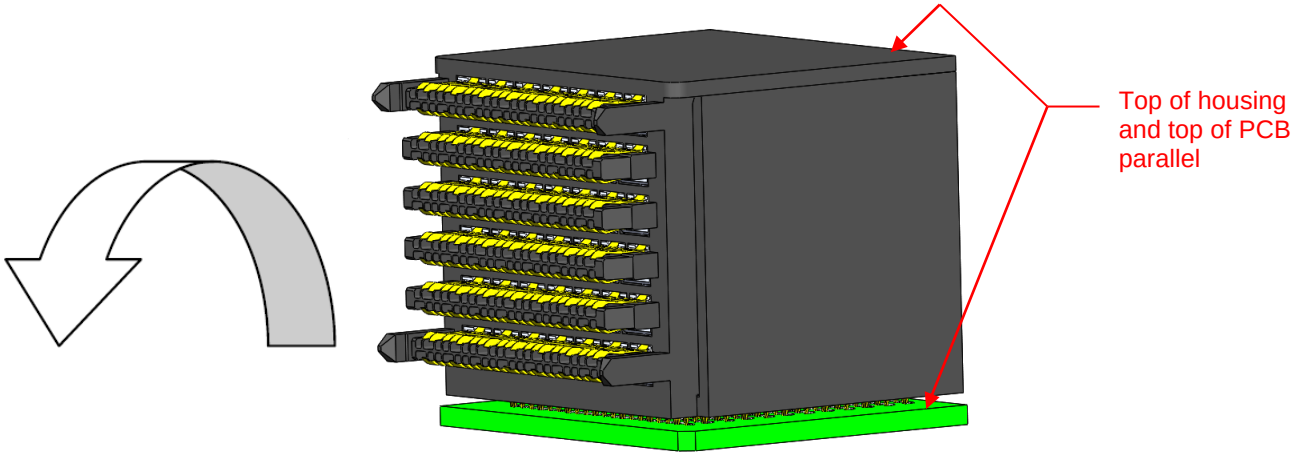


Figure 29: Connector Rotated Parallel to the Top of PCB and EONs Aligned

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- Using a flat rock surface and an insertion press, apply force to the flat area of the connector as shown in figure 31.

FORCE = 18 N MAX per pin

Note: The EBDM-RA connector should be pressed to 18N max and not 75 degree Force Gradient. A 75 degree Force Gradient (12 N max force per pin) profile is recommended for all other connector configurations.

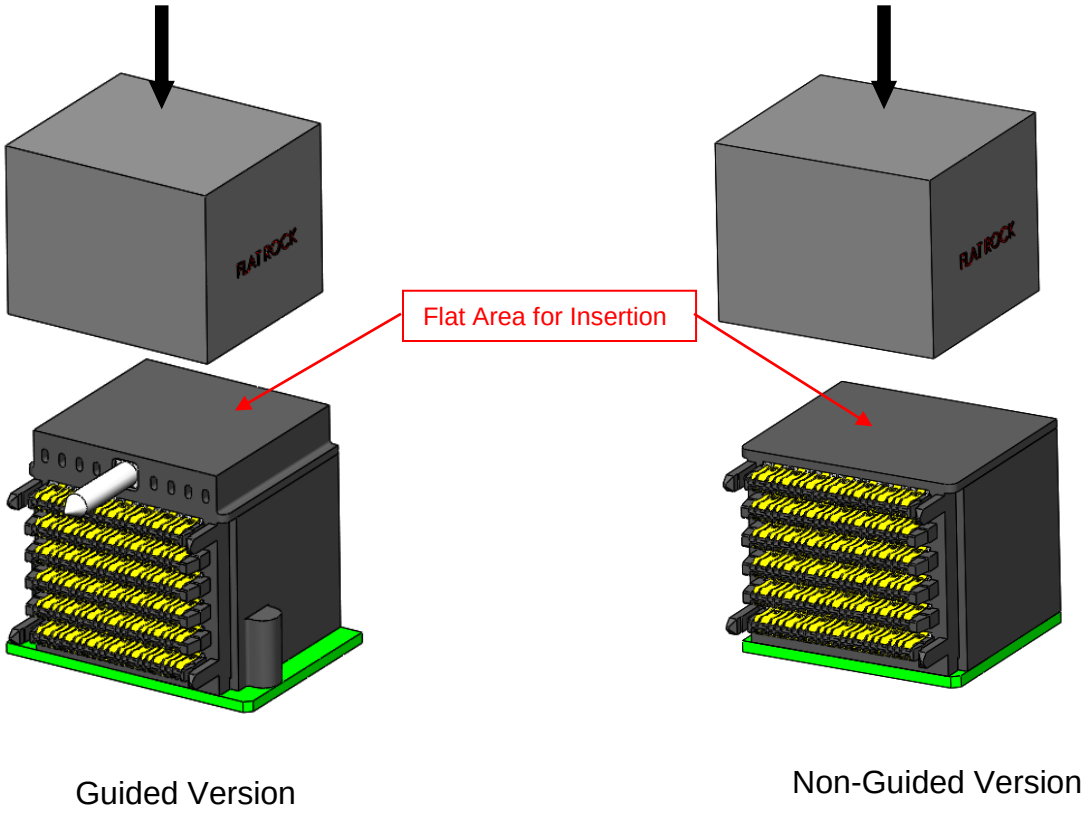

Figure 30: Flat Rock Tool Application to Seat RA Orthogonal Connector

- Inspect for proper application (refer to section 5.7).
- For connectors with the optional screw mounting features, apply two M2 X 0.91 thread forming tri-round-ular shaped screws, designed specifically for plastic material, into the mounting holes in order to more rigidly secure the connector to the PCB. Screw length should range from 4 to 8 millimeters long plus the board thickness. Screws are not provided with the connectors.

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5.7 The post-application inspection should consist of several simple checks to assure that the connector is applied properly and is not damaged.

- Visually assure that all press-fit tails are seated in the proper PCB holes and that none have been crushed during application.
- Visually check that the standoffs on the bottom of each assembly are seated flush and parallel with the PCB surface (see Figure 31). Once fully seated, there may be some minor gaps (<0.1 mm) due to component tolerances.
- For right angle products, not being fully seated can cause misalignment when the daughter card is mated to the backplane.

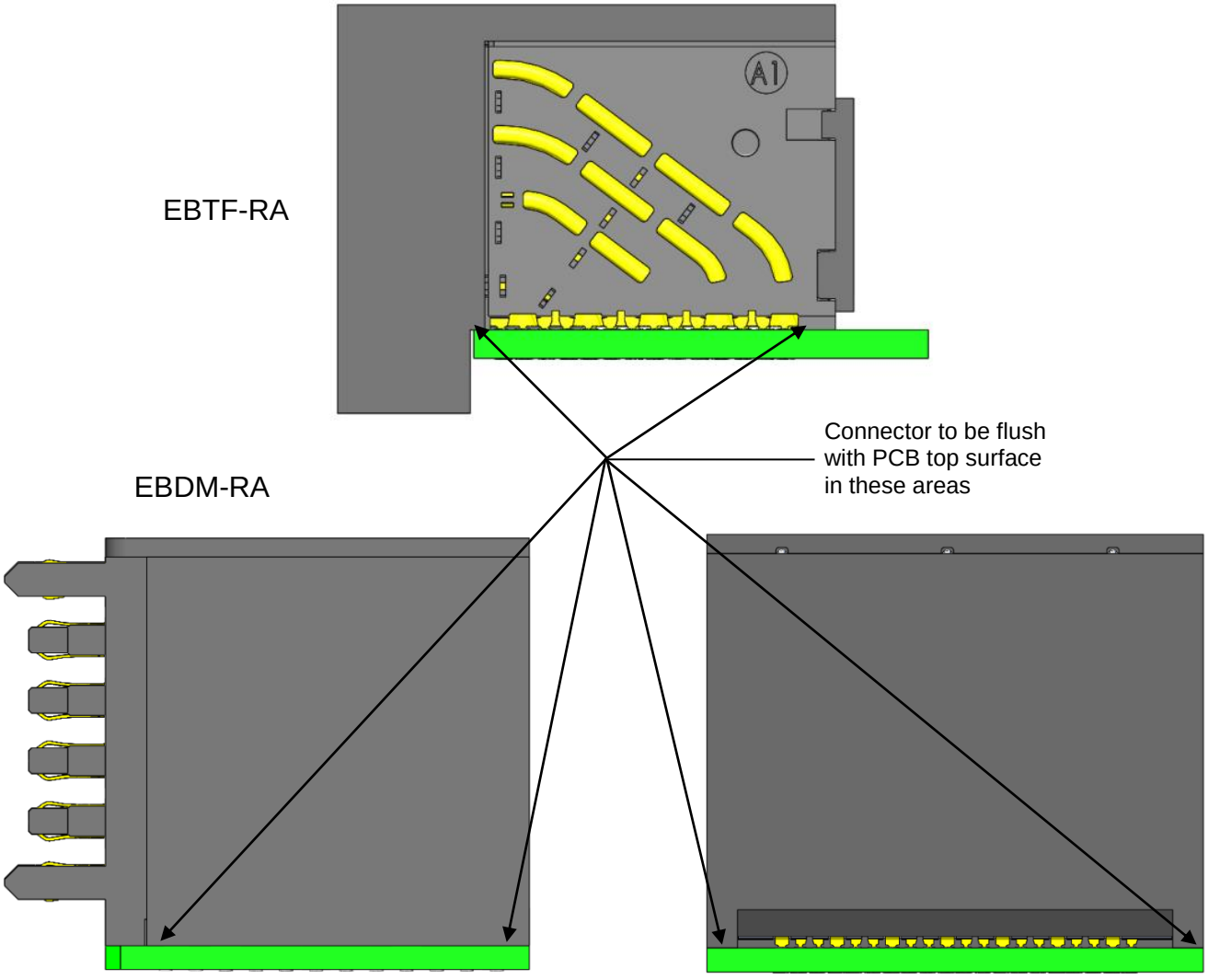

Figure 31: Proper Seating after Board Application

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5.8 Connector Removal Tooling

The following are SAMTEC removal tool part numbers for ExaMAX connectors. Due to size restrictions, the removal tool only presses on the ground press-fit tails.
EBDM-RA connectors use the same EBTM-RA tool that is listed below, but the tool must be rotated 90° so that the front face of the tool is perpendicular to the front edge of the PCB.

Table 14: ExaMAX Removal Tools

Differential Pairs	No. Columns	2mm Removal Tool PN *	
		EBTM-VT & EBTM-RA	EBTF-RA & VR
4	6	TBD	TBD
	8	TBD	TBD
	10	TBD	TBD
6	6	TBD	TBD
	8	TBD	TBD
	10	TBD	TBD
	12	TBD	TBD

*** To minimize cost, the largest removal tool for a given column pitch may be used to remove any connector with the same column pitch. To use a larger tool, disassemble the tool and remove any excess pins. Pins only go into the ground holes.**

5.9 Removal Tool Description

The connector removal tool is a hand tool used to remove ExaMAX connectors from the back side of the circuit board by pressing on the ground EONs. A hand operated arbor press and bottom support tool (not included with removal tool) are required to actuate the tool and provide support around the connector during the removal process.
It is important to note that the header removal tool is red in color and the receptacle tool is blue in color. If the wrong tool is used for rework, damage to the plated through holes and/or the tool may occur.

5.10 Connector Removal Procedure

- A manual arbor press is adequate to perform connector removal.
- With the connector to be removed facing downward, place the board assembly over a bottom support tool (not included) that is appropriate for the board layout (see figure 32).
- Make sure that the support tool extends along the entire length of at least two opposing sides of the connector. Also make sure that no small components (chip resistors, chip capacitors, etc.) are between the board and the support tool. The size and shape of the support tooling will vary due to the connector size, number of EONs, whether there are adjacent connectors, and any other surrounding components.
- From the back side of the board, roughly align the A1 side of the tool with the A1 via location on the PCB.
- Final align the tool so that all the pins protruding from the face of the tool are inserted into the ground vias (larger 0.50mm diameter vias) belonging to the connector that you wish to remove. If the pins and vias do not align, rotate the tool 180° and try again. The pins and vias will only align one way. DO NOT TRY TO PUSH PINS INTO SIGNAL VIAS (smaller 0.36mm diameter vias) OR WHERE THERE ARE NO VIAS. THE PINS WILL BUCKLE AND BREAK.

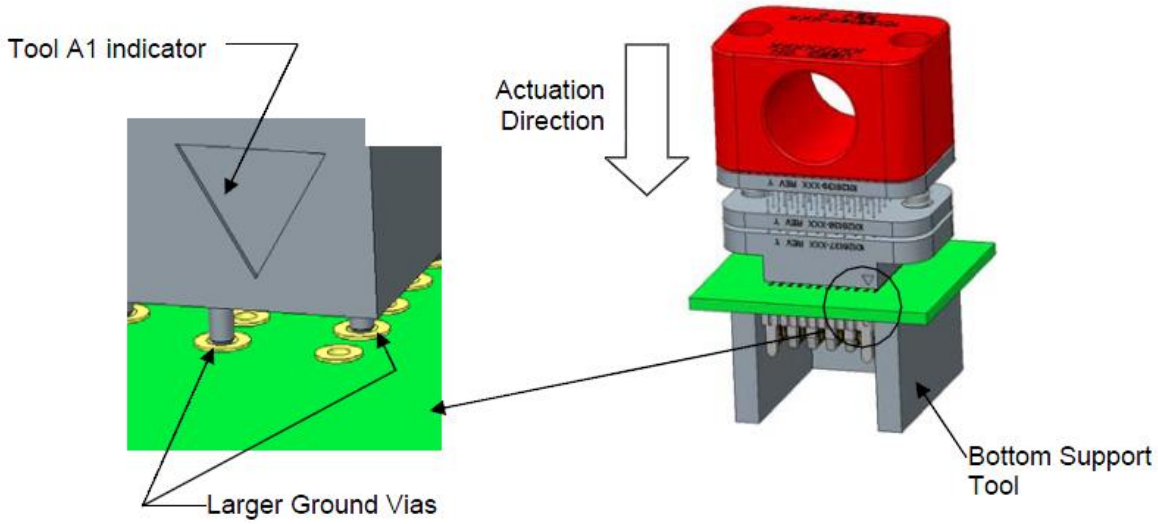

Figure 32: Removal Tool Procedure

- Actuate the press so that the tool is compressed. Apply pressure evenly and slowly, not with a quick motion. Stop applying pressure when the force drops or the press handle becomes easy to move. This will indicate that the EONs have released from the printed circuit board. The connector should be lying on the bench or can be easily removed by hand.