



NOTE

All numerical values are in metric units. Dimensions are in millimeters. Unless otherwise specified, dimensions have a tolerance of $\pm 0.13\text{mm}$ and angles have a tolerance of $\pm 2^\circ$. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

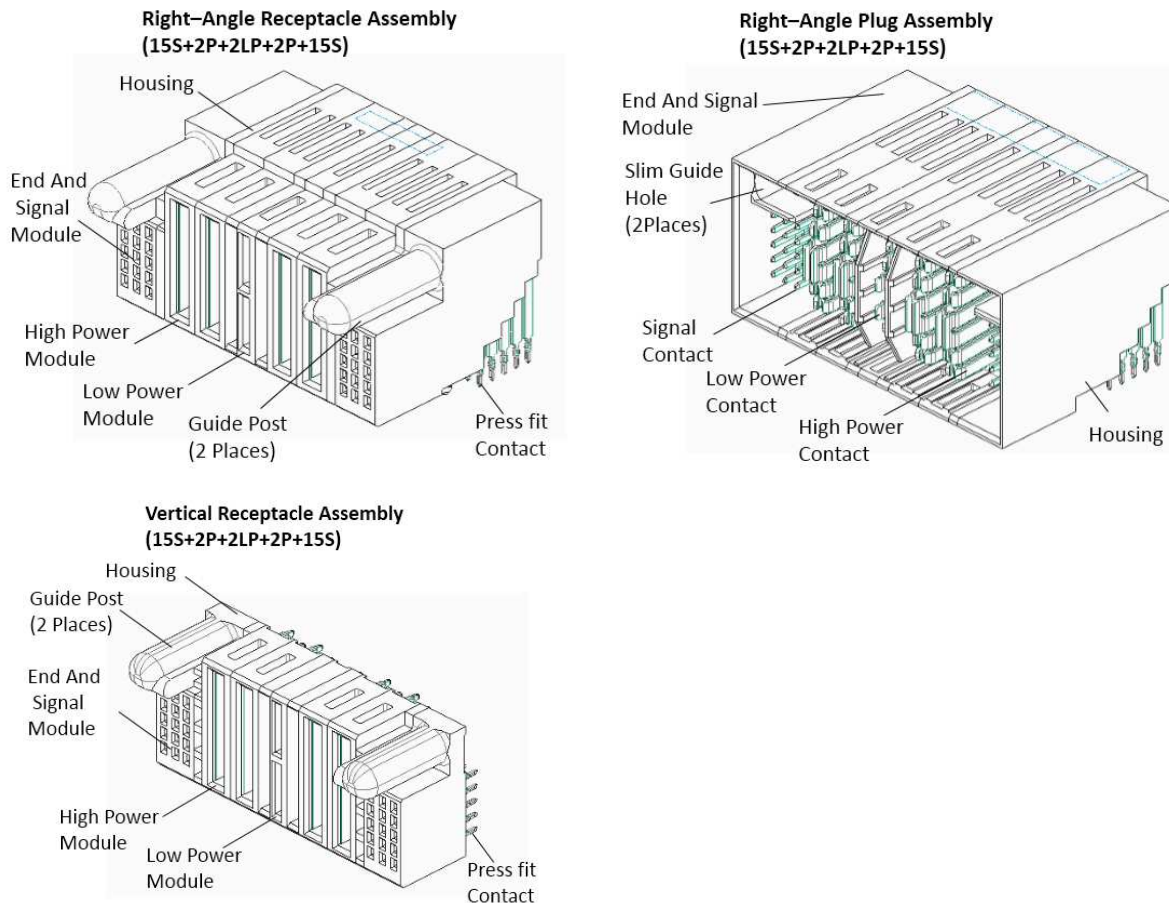
This specification covers the requirements for application of MULTI-BEAM HD connectors onto printed circuit (pc) boards for use in power supplies. These connectors consist of vertical and right-angle receptacle assemblies, and right-angle plug assembly. The connectors are available with either precision formed press-fit (compliant pin) contacts or solder type contacts. Each connector consists of a housing with power modules containing high power or low power contact and signal modules containing 5 rows of signal contacts, either pin or socket. The signal pin contacts (only in plugs) are available in two contact mating lengths: standard and mate-last break-first (MFBL) (post mate), and the power contacts (only in receptacles) are available in two contact mating lengths: standard and mate-first break-last (MFBL) (pre-mate) for sequencing applications.



NOTE

The amount of power and signal contacts in a connector is customer specified. Any connector configuration can be designed to meet customer requirements – provided it is within the limitations stated in the document.

When corresponding with TE Connectivity personnel, use the terminology provided in this specification to facilitate your inquiries for information. Basic terms and features of this product are provided in Figure 1.



'LP' stands for low power module, 'S' stands for signal contacts, and 'P' stands for high power module

Figure 1

Modules are available with centerline spacing and related voltage listed in the following table:

MODULE TYPE	CONFIGURATION INDICATOR	CONTACT	
		CENTERLINE SPACING	VOLTAGE RATING(V)
Signal	S	2.00 mm	60 (secondary circuits, B/S)
Low Power	LP	3.00 mm	60
	HLP	5.00 mm	300
High Power	P	5.00 mm	60
	HP	6.00 mm	200
	HBP	7.00 mm	300

Figure 2

End modules and center modules are available with features that provide blind mating, misalignment, and polarization. End modules contain a guide post, guide hole, latch receiver with plastic leg and signal modules, So signal modules only lie the connector two sides and only have 30 pin max.. End module without guides and signal module are also available. It call guideless end module. Guides (posts on receptacles and holes in plugs) have rounded edges for ease of mating and are offset to prevent improper mating of connectors. The plastic leg help to align the connector to the pc board for installation then secure the connector for soldering. The connectors are supplied in tray form for manual placement.

The connectors feature standoffs (one located at each contact) to facilitate pc board cleaning after soldering. Convection windows and cored lances located on the housing provide air flow for power modules.

2. REFERENCE MATERIAL

2.1. Revision Summary

Initial release of application specification include:

Corrected connector types and power module types in Figure 1

2.2. Customer Assistance

Reference Product Base Part Number 2204401 and Product Code EE15 are representative of MULTI-BEAM HD connectors. Use of these numbers will identify the product line and help you to obtain product and tooling information. Such information can be obtained through a local TE Representative, by visiting our website at www.te.com, or by calling PRODUCT INFORMATION at the numbers at the bottom of page 1.

2.3. Drawings

Customer Drawings for product part numbers are available from the service network. If there is a conflict between the information contained in the Customer Drawings and this specification or with any other technical documentation supplied, the information contained in the Customer Drawings takes priority.

2.4. Manuals

Manual 402-40 can be used as a guide to soldering. This manual provides information on various flux types and characteristics with the commercial designation and flux removal procedures. A checklist is included in the manual as a guide for information on soldering problems.

2.5. Specifications

Product specification 108-128007 provides expected product performance and test information.

Test specification 109-11 provides solder ability requirements and evaluation methods. Workmanship specification 101-21 provides solder fillet requirements.

2.6. Standards

These connectors comply with Electronic Industries Alliance (EIA) – 364, “Electrical Connector Test Procedures Including Environmental Classifications.”

3. REQUIREMENTS

3.1. Safety

Do not stack product shipping containers so high that the containers buckle or deform.

3.2. Limitations

The connectors are designed to operate in a temperature range of – 40° to 125° C.

Voltage rating for these connectors are based upon a circuit pad diameter of 1.60±0.05 and UL Material Group IIIb. This material group has a comparative tracking index (CTI) 4. Voltage rating according to contact centerline spacing and circuit pad travel are given in Figure 2.

3.3. Material

The housing is made of glass filled LCP, UL 94 – V-0, The contacts are made of high – conductivity copper alloy under-plated with nickel and plated with gold or palladium nickel; solder tines are plated with tin over nickel. Retention clips are made of plated copper alloy.

3.4. Storage

A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the product material.

B. Shelf Life

The product should remain in the shipping containers until ready for use to prevent deformation to components. The product should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.

C. Chemical Exposure

Do not store product near any chemical listed below as they may cause stress corrosion cracking in the material.

Alkalis	Ammonia	Citrates	Phosphates	Citrates	Sulfur Compounds
Amines	Carbonates	Nitrites	Sulfur	Nitrites	Tartrates

3.5. PC Board

A. Material and Thickness

The pc board material shall be glass epoxy (FR-4 or G-10). The pc board thickness shall be as stated in Figure.

PC BOARD THICKNESS	
CONNECTOR WITH PRESS-FIT CONTACTS	CONNECTOR WITH SOLDER TYPE CONTACTS
1.50mm Min	Tail length – 0.4mm MAX.

Figure 3

B. Hole Dimensions and Durability

The contact holes must be drilled and plated through to specific dimensions to prevent stubbing during placement of the connector on the pc board and to ensure optimum continuity for circuits after soldering. If applicable, holes for the retention plastic legs may be used with or without plated through holes. The drilled holes size, plating types, plating thickness, and finished holes size must be as stated to provide unrestricted insertion. See Figure 4.

For connectors with press-fit contacts, the pc board holes cannot withstand connector removal more than three times. The radius of any board hole must not increase more than 0.038mm or decrease less than 0.0508mm.

C. Pads

The pc board circuit pads must be solder able in accordance with Test specification 109-11.

D. Layout

The holes in the pc board must be precisely located to ensure proper placement and optimum performance of the connector. The pc board layout must be designed using the dimensions provided on the customer drawing for the specific connector. A sample of the recommended pc board layout is shown

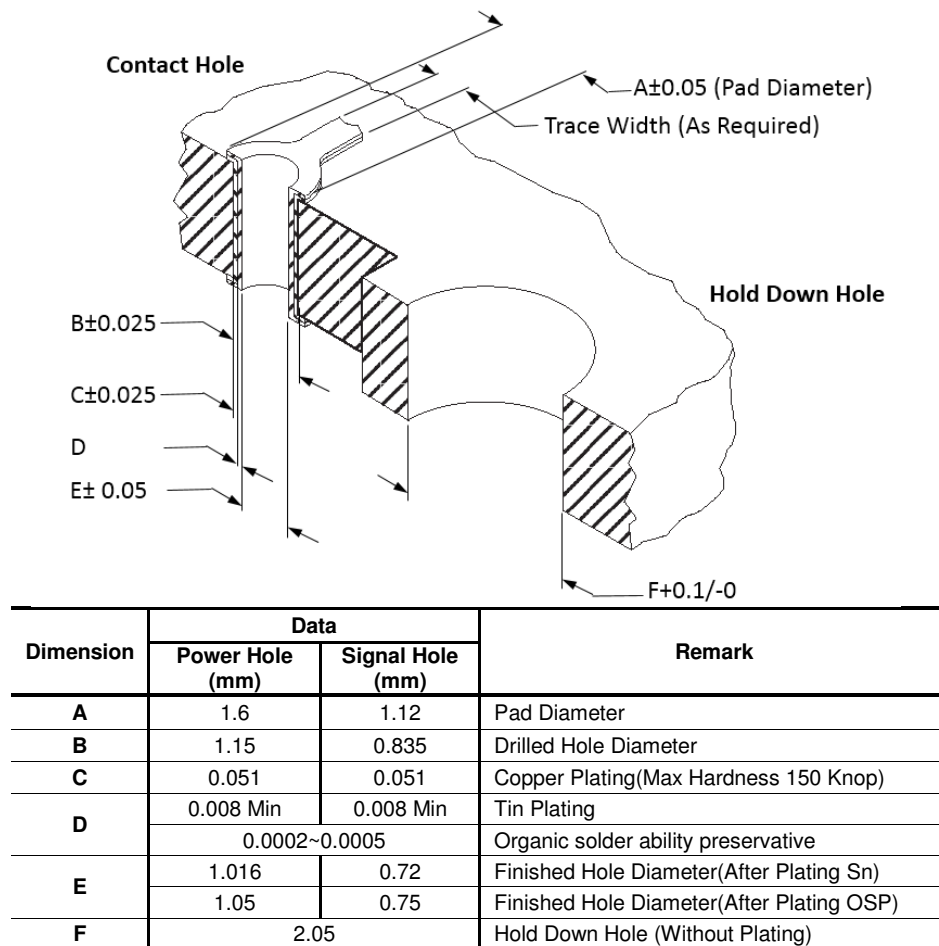
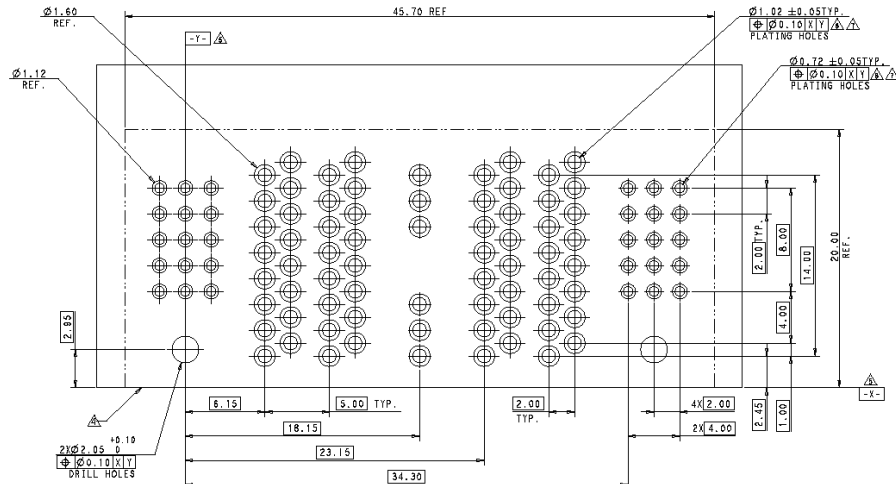


Figure 4

Sample Recommended PC Board Layout Right-Angle Plug (With Hold Down)

PART NUMBER	ROWS	SIGNAL			POWER				SIGNAL			
		1	2	3	P1	P2	LP	P3	P4	4	5	6
2204441-1	E	SH	SH	SH	PH	PH	LH1	PH	PH	SH	SH	SH
	D	SH	SH	SH						SH	SH	SH
	C	SH	SH	SH			LH2			SH	SH	SH
	B	SH	SH	SH						SH	SH	SH
	A	SH	SH	SH						SH	SH	SH
		1 5S+2P+2LP+2P+1 5S										



Vertical Receptacle (With Hold Down)

PART NUMBER	ROWS	SIGNAL			POWER				SIGNAL			
		6	5	4	P4	P3	LP	P2	P1	3	2	1
2204421-1	E	SM	SM	SM	PM	PM	LM1	PM	PM	SM	SM	SM
	D	SM	SM	SM						SM	SM	SM
	C	SM	SM	SM			LM2			SM	SM	SM
	B	SM	SM	SM						SM	SM	SM
	A	SM	SM	SM						SM	SM	SM
		1 5S+2P+2LP+2P+1 5S										

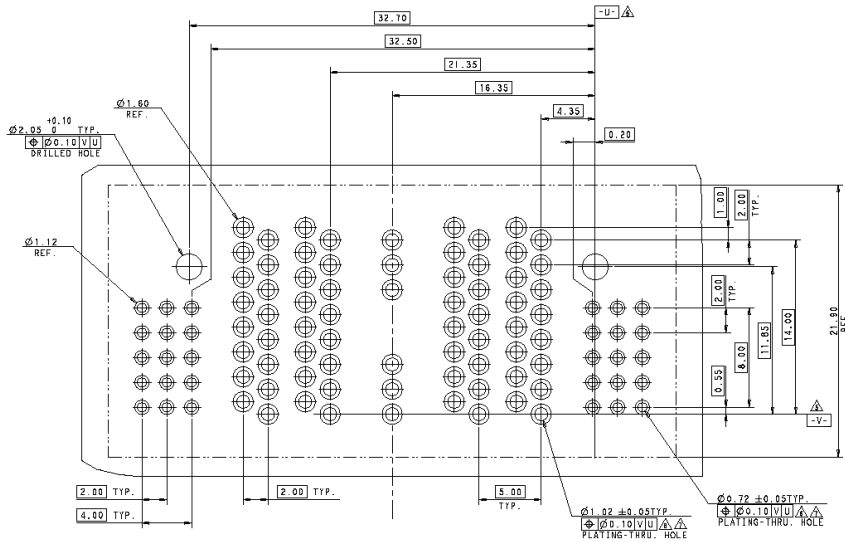
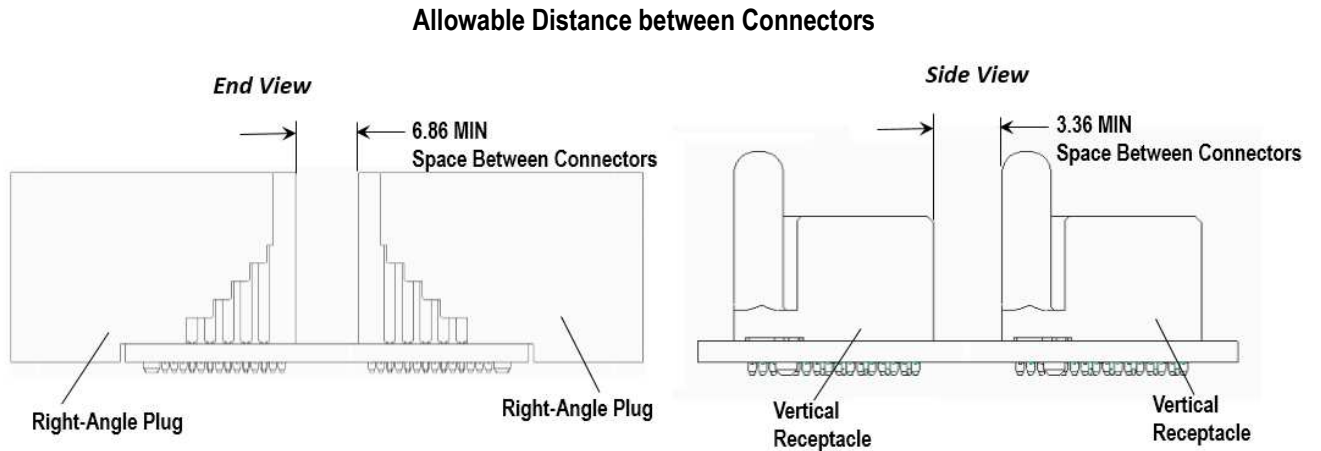


Figure 5

E. Spacing

Care must be used to avoid interference between adjacent connectors and other components. In addition, space allowed between pc boards for mating of connectors must be considered when determining distance between pc boards. The minimum allowable distance needed between connectors to ensure full mating of connectors and the allowable distance between pc boards with connectors fully mated is provided in Figure 6.



Allowable Distance between Connectors

Note: Connectors must be fully mated

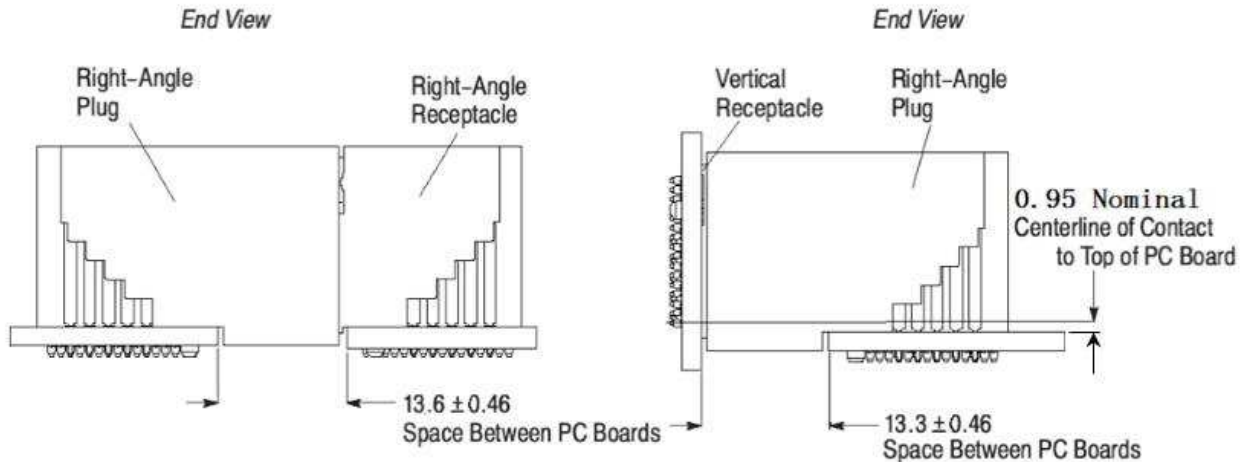


Figure 6

3.6. Connector placement



NOTE

Connectors should be handled only by the housing to avoid deformation, contamination, or damage to the contacts.

A. Registration

When placing connectors on the pc board, contacts and, if applicable, retention plastic legs or mounting holes must be aligned and started into the matching holes before seating the connector onto the board.

B. Insertion force

The force required to seat the connector with press-fit contacts or retention plastic legs onto the pc board can be calculated by:

Number of connector press-fit contacts x maximum insertion force per contact = insertion force N.

The maximum amount of insertion force per press- fit contact is given in Figure 7.

MAXIMUM INSERTION FORCE (N)		
PRE PRESS-FIT POWER CONTACT	PRE PRESS-FIT SIGNAL CONTACT	PRE PRESS-FIT LOW POWER CONTACT
800	50	150

Figure 7

3.7. Soldering

Observe guidelines and procedures when soldering contacts. Contact solder tines must be soldered, cleaned, and dried according to the following:

A. Flux selection

Contact solder tines must be fluxed prior to soldering with a mildly active, rosin base flux. Selection of the flux will depend on the type of pc board and other components mounted on the board. Additionally, the flux must be compatible with the wave solder line, manufacturing, health, and safety requirements. Flux that is compatible with these connectors are provided in Figure 8.

FLUX TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			KESTER	ALPHA
RMA	Mild	Noncorrosive	186	611

Figure 8

B. Process

The connectors can be soldered using wave soldering or equivalent soldering techniques. It is recommended using tin or tin-lead solder for these connectors. Refer to Manual 402-40 for soldering guidelines. The temperatures and exposure time shall be as specified in Figure 9.

SOLDERING PROCESS	WAVE TEMPERATURE	TIME (At Maximum Temperature)
Wave	265° C [509° F]	10 Seconds

Figure 9

C. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Consult with the supplier of the solder and flux for recommended cleaning solvents. Cleaners must be free of dissolved flux and other contaminants. Common cleaning solvents that will not the affect connectors for the time and temperature specified are listed in Figure 10

CLEANER		TIME (Minutes)	TEMPERATURE (Maximum)
NAME	TYPE		
ALPHA 2110	Aqueous	1	132° C [270°F]
BLOACT EC-7	Solvent	5	100° C [212°F]
Butyl CARBITOL	Solvent	1	Ambient Room
Isopropyl Alcohol	Solvent	5	100° C [212°F]
KESTER 5778	Aqueous	5	100° C [212°F]
KESTER 5779	Aqueous	5	100° C [212°F]
LONCOTERGE 520	Aqueous	5	100° C [212°F]
LONCOTERGE 530	Aqueous	5	100° C [212°F]
Terpene Solvent	Solvent	5	100° C [212°F]

Figure 10

i **NOTE**
 If a particular solvent that is not listed, contact *PRODUCT INFORMATION* at the number at the bottom of page 1.

D. Drying

When dry cleaned connectors and pc boards, make certain that temperature limitations are not exceeded: -40° to 125° C. Excessive temperatures may cause housing degradation.

3.8. Checking Installed Connector

A. With press-fit contacts

The top of the “eye” of each press-fit contact must be below the top surface of the PCB. All standoffs must be seated On the pc board within the dimension provided in Figure 11.

B. With Solder Type Contacts

All solder joints should conform to those specified in workmanship specification 101-21 and all other requirements specified in this document. Solder fillets must be evenly formed around each contact solder tine. There must be no visible skips or voids. All standoffs must be seated on the pc board within the dimension provided in Figure 11.

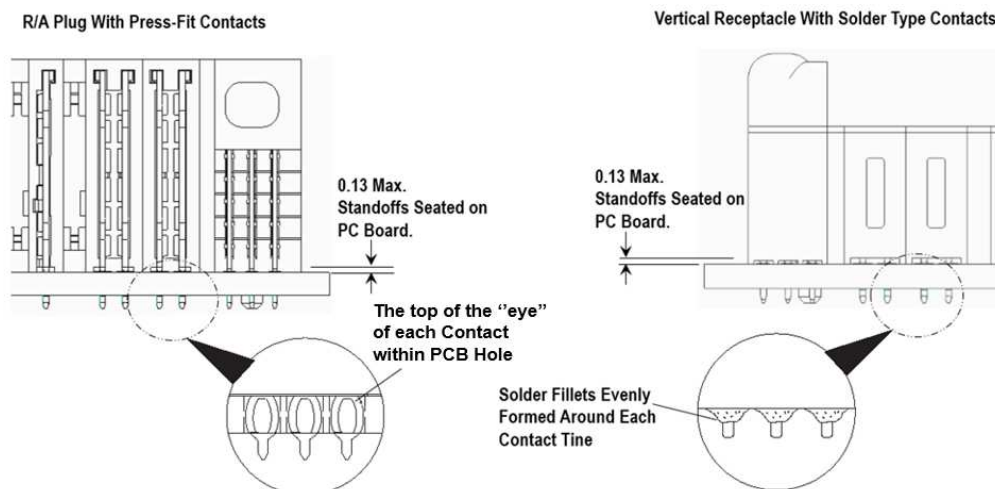


Figure 11

3.9. Connector Mating

i CAUTION
Connectors should be handled only by the housing to avoid deformation, contamination, or damage to the contacts.

A. Polarization

For connectors with guides, polarization is provided by matching the guides of mating connectors. For connectors with guideless, polarization is provided by matching the chamfer of housing.

B. Mating Force

The maximum amount of mating force per contact is given in Figure 12.

CONTACT	MAXIMUM MATING FORCE PER CONTACT (N)
High Power	3.5
Low Power	1.5
Signal	1.0

Figure 12

C. Mating Sequencing

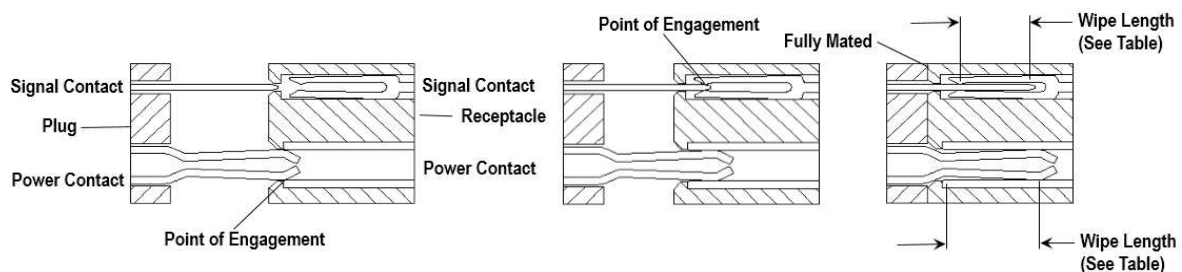
Contact mating sequence available for the connectors are listed in Figure 13.

CONNECTOR	CONTACT MATING LENGTH		
	High Power Contact	Low Power Contact	Signal Contact
Receptacle	Standard and MFBL(Pre-Mate)	Standard and MFBL	Standard
Plug	Standard	Standard	Standard and MFBL

Figure 13

D. Wipe Length

Wipe length for these connectors is defined as that portion (length) of the mating contacts that touches (wipes) from the point of engagement to the point of being fully mated. The wipe length depends on the contact (power or signal) and mating length (standard, MFBL) of each individual contact. The minimum wipe length at the level of mating for power and signal contacts is listed in Figure 14.

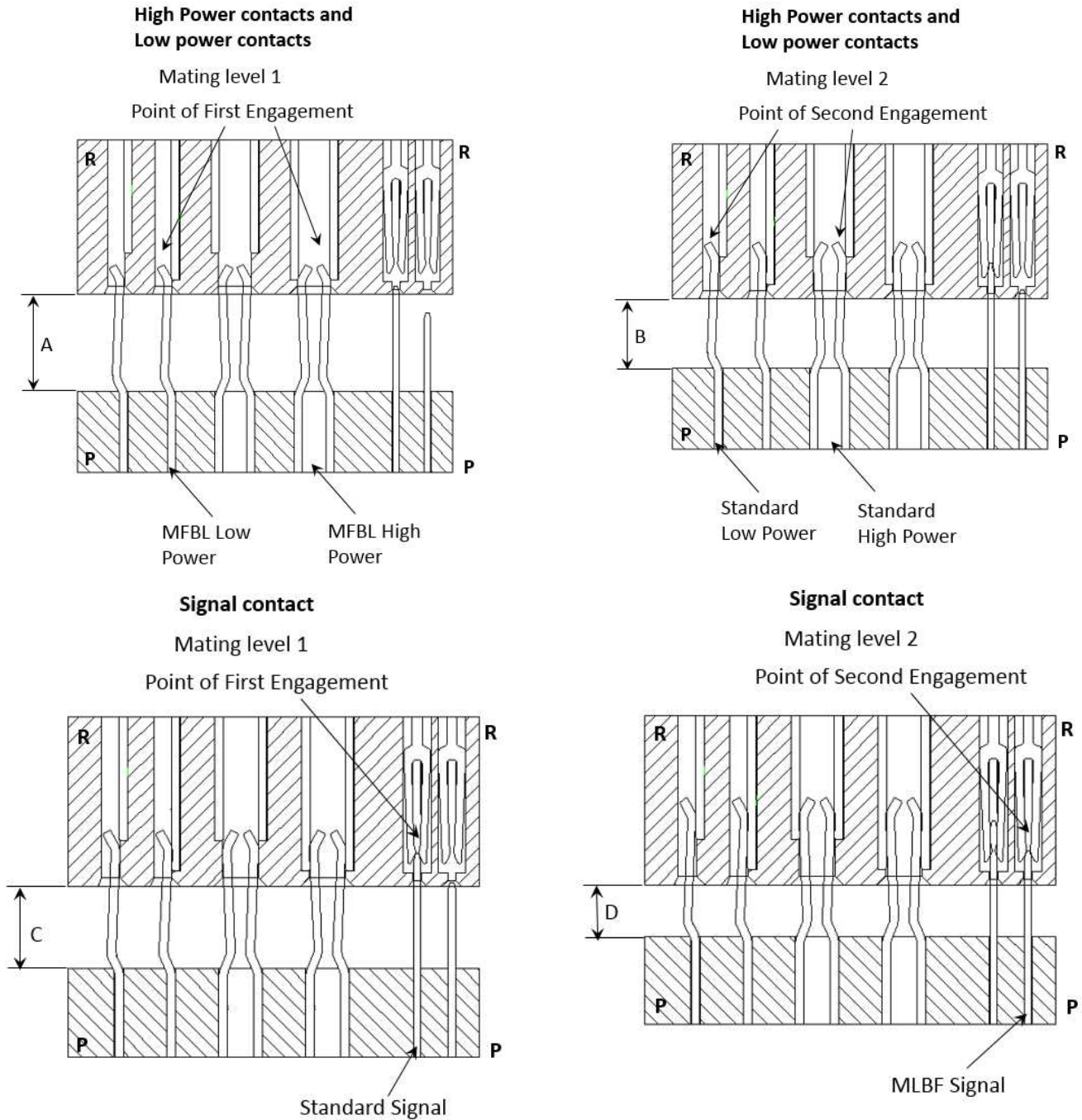


CONTACT	MATING LENGTH	MATING LEVEL	WIPE LENGTH (mm Min)
High Power	MFBL	1	5.8
	Standard	3	4.1
Low Power	MFBL	1	5.8
	Standard	3	4.1
Signal	Standard	2	4.2
	MLBF	4	2.5

Figure 14

E. Offset Distance

The connectors provide sequencing among contacts with 3 mating levels. The power contact have 2 mating levels and signal contact have 2 mating levels. The offset distance, measured from the receptacle mating face to the plug mating force at the point of electrical engagement, depends on the contact (power or signal) and mating length(Standard, MFBL) of the mating connectors. The offset distance at the level of mating for power and signal contacts is listed in Figure 15.



“R” Means Receptacle connector. “P” Means Plug connector.

CONTACT	MATING LENGTH	MATING LEVEL	OFFSET DISTANCE	
			Dimension	Nominal(mm)
High Power & Low Power	MFBL	1	A	6.10
	Standard	2	B	4.40
Signal	Standard	1	C	4.70
	MLBF	2	D	3.00

Figure 15

F. Misalignment

When mating connectors, side-to-side and up- and- down misalignment is allowed to the dimensions given in Figure 16. There is no misalignment for connectors with latch receivers.



NOTE

Connectors with guides should be used in applications requiring blind mating. Connectors with latch receivers and connectors without guides should not be used in applications requiring blind mating.

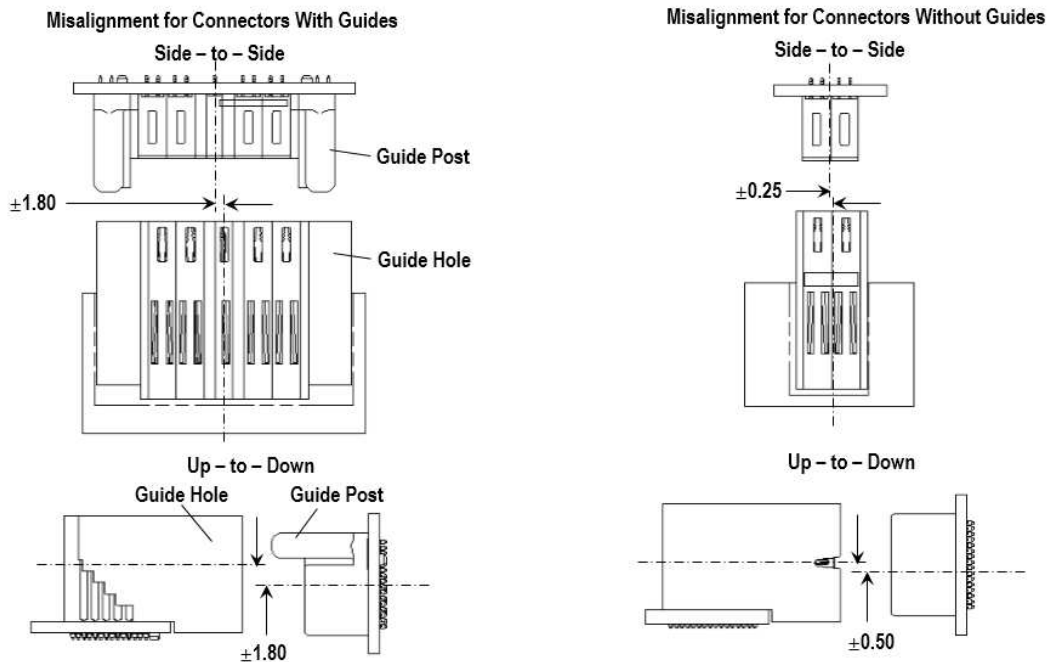


Figure 16

3.10. Connector Un-mating

The minimum amount of un-mating force per contact is given in Figure 17.

CONTACT	MINIMUM UNMATING FORCE PER CONTACT (N)
High Power	2.2
Low Power	0.5
Signal	0.2

Figure 17

3.11. Connector Removal

A. Solder Type Contacts

Connectors with solder type contacts must be removed from the pc board by standard de-soldering methods. After removal from the board, the connector MUST NOT be re-used.

B. Press-Fit Contacts

Connectors with press-fit contacts must be removed from the pc board using a push bar (or flat rock) and pc board support.

C. Retention Force

The force retaining the connector with press-fit contacts or retention plastic leg on the pc board can be calculated by:

Number of connector press-fit contacts X minimum retention force per contact = retention force N.

The minimum amount of retention force per press-fit contact is given in Figure 18.

MINIMUM RETENTION FORCE(N)		
PER PRESS-FIT HIGH POWER CONTACT	PER PRESS-FIT LOW POWER CONTACT	PER PRESS-FIT SIGNAL CONTACT
107.2	20.1	6.7

Figure 18

3.12. Repair

These connectors are not repairable. Damaged or defective connectors must not be used.

4. QUALIFICATION

No qualifying support for Multi-Beam HD connectors was defined at the time of publication of this document.

5. TOOLING

5.1. Connectors with Solder Type Contacts

No tooling is required for placement of the connectors with solder type contacts onto the pc board.

5.2. Connectors with Press Fit Contacts

A. Application Tooling

The application tooling (such as an arbor press) used to seat these connectors must provide sufficient amount of downward force to insert the contacts into the pc board holes.

B. PC Board Support

A pc board support must be used to prevent bowing of the pc board during the placement of these connectors on the board. The board support must have a flat surface with holes or a channel large enough and deep enough to receive any protruding components. The pc board must be secured to the board support to prevent movement of the board during seating. Refer to Figure 19.

The board support must also be used when removing these connectors from the pc board.

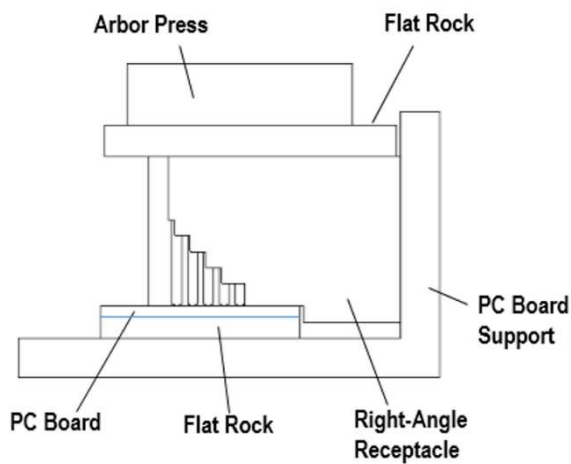
C. Flat Rock Tooling

Commercially available bar stock (flat rock tooling) with a flat surface large enough to cover all contacts must be used with the application tooling to seat these connectors. For vertical receptacles with guides, the flat rock tooling must be sized to cover all contacts and avoid the guides.

For removing these connectors from the pc board, it is suggested that the pc board be supported from the connector side and that the connector be removed using flat rock tooling.

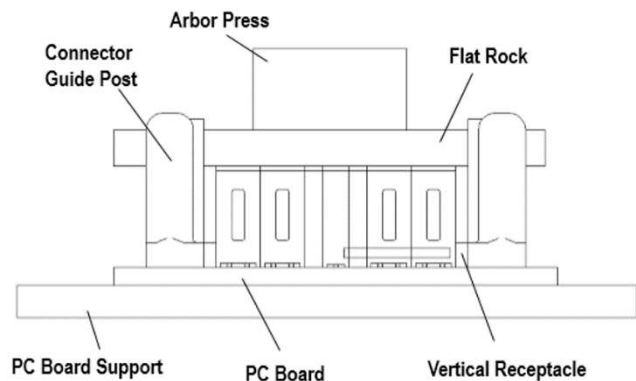
Seating Right -Angle Plug and Receptacle

With Press-Fit contacts



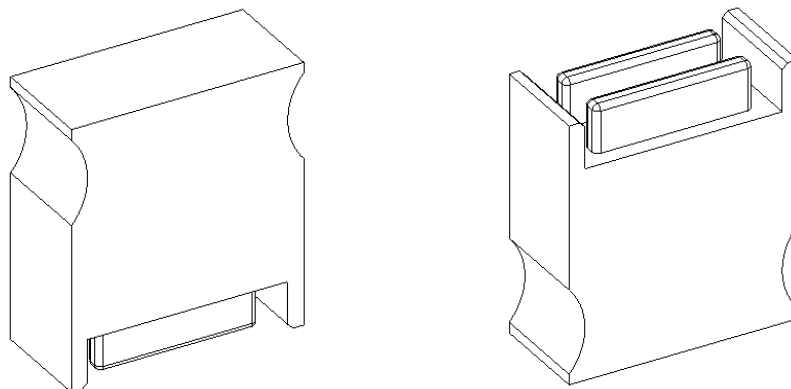
Seating Vertical Receptacle

With Press-Fit contacts



Seating Vertical Receptacle

Having Only Press-Fit Power Contacts



Seating Tool Assemblies

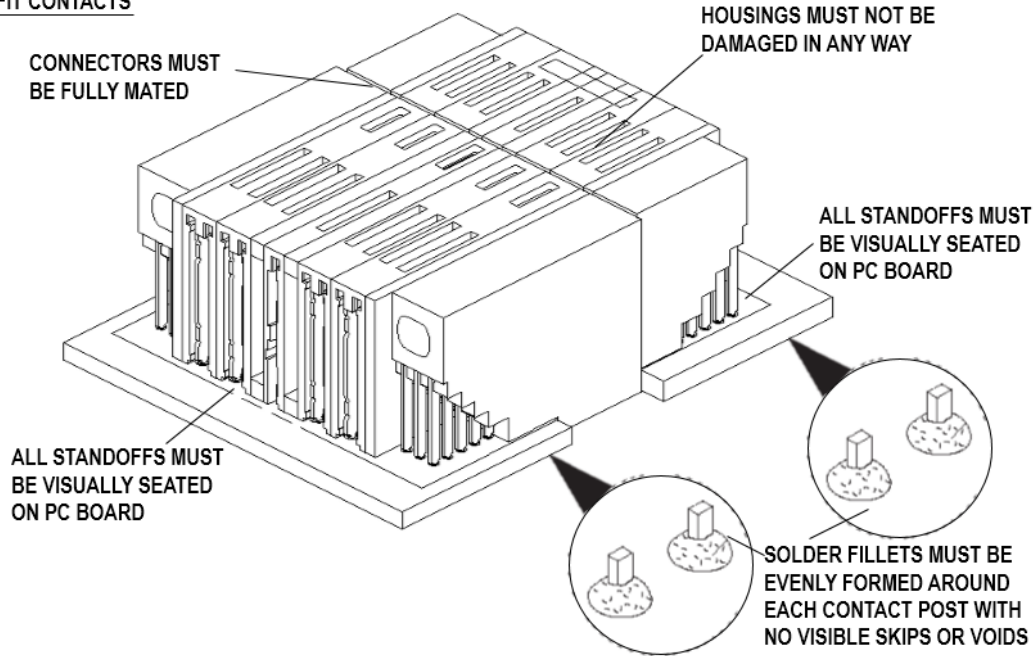
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Figure 19

6. VISUAL AID

The illustration below shows a typical application of MULTI-BEAM HD connector. This illustration should be used by production personnel to ensure a correctly applied product. Applications which DO NOT appear correct should be inspected using the information in the preceding pages of this specification and in the instructional material shipped with the product or tooling.

CONNECTORS WITH PRESS-FIT CONTACTS



CONNECTORS WITH PRESS-FIT CONTACTS

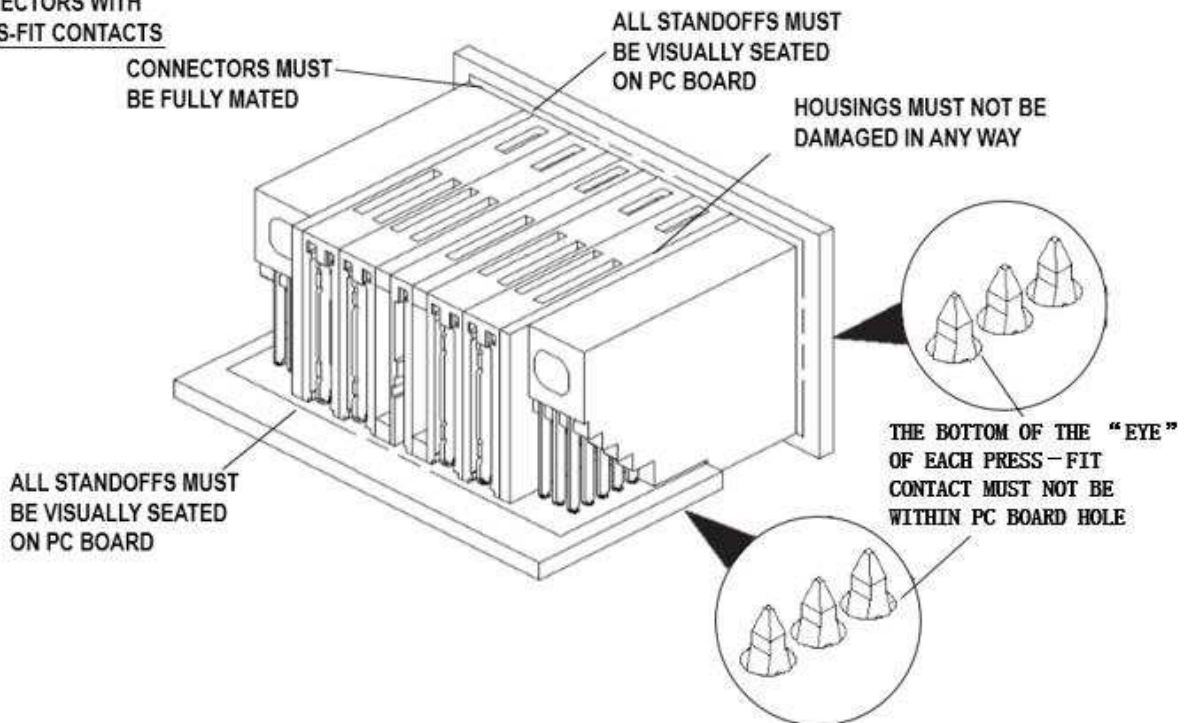


FIGURE 20 VISUAL AID