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**tyco**

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## AMP Z-PACK 2mm HM Hard Metric Interconnection System

**AMP**

**Tyco Electronics — Committed to Customer Service**

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**Comments on using this catalog**

Dimensions are in millimeters and inches. Values in brackets are inch equivalents. Dimensions used in this catalog are for reference purposes only. Customer drawings are available on request. Metric symbols used are:

- m = meter
- cm = centimeter
- mm = millimeter
- µm = micrometer
- N = Newton
- kg = kilogram
- g = gram
- C = Celsius

**Electrical Performance Reports**

- 65721 5 row Connector
- 65722 5+2 row Connector
- 889065 8 row Connector
- 889066 8+2 row Connector

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- Technical support
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- Authorized Distributor Locations

**Technical documents**

**Product Specifications**

- 108-19082 5 row board-to-board Connections
- 108-1622 8 row board-to-board Connections
- 108-19107 LF Cable Connectors
- 108-19108 HF Cable Connectors
- 108-1651 Universal Power Module

**Application Specifications**

- 114-19029 Standard board-to-board
- 114-19036 Ground Return Shields
- 114-19039 LF Cable Connector
- 114-1103 Universal Power Module

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**See inside back cover for Global Contacts and phone numbers.**

Product Outline and Table of Contents

Product Facts

- High Density System with Small Real Estate on Backplane and Daughtercard
- Extensive Range of Signal, Power, Coaxial, and Fiber Board-to-Board and Cable-to-Board Connections.
- Hard Metric 2mm Pitch in Accordance with IEC 917 and IEC 61076-4-101
- Modular Units give Flexible Configuration
- Special Versions for VME64 Extensions and CompactPCI
- Signal Contact Rating 1.5a Fully Energized
- Universal Power Module rated at 7.8A / line, 23.4A fully energized
- All Lines Impedance Controlled to 50ohm (Single Ended) and 100ohm (Differential) nominal
- Safe Design, complies with IEC950 in Mated Condition; Universal Power Module is Safe in Unmated Condition
- Several Performance Levels for Board and Cable Connectors with Unshielded and Shielded Versions
- Corruption-proof sequencing- Signal Contact Levels exceed Maximum Tolerance of Backplane Distortion and Warpage (ref. Hard Metric Equipment Practice)
- Mismatching Keys Block Mating before any Contact Touch
- Backplane thickness range 1.4 - 5.6 [.055 - .220]
- Daughtercard Thickness Range of 1.4 - 4.3 [.055 - .169] (3.5 [.138] max. with Lower Shields)
- Small Press Fit Board Hole allows Maximum Track Width and Minimum Signal Corruption
- Versions comply with Bellcore Central Office Environment and Uncontrolled Environment
- Single- and Multi-line Models Available or Tyco Electronics Circuits & Design can build a System to your Specification

Product Outline

The AMP Z-PACK 2mm HM Hard Metric connector system is designed to meet the current and future needs of telecommunication, computer and instrumentation applications giving excellent electrical and mechanical characteristics at an economical price. It is a high performance, high density system with flexible configuration which offers upgradeability. The connector system is fully supported by Tyco Electronics splice models to guarantee choosing the right product to match the application.

Z-PACK 2mm HM connectors comply with the requirements of IEC 917 and IEC 61076-4-101 and valuable product extensions provide great flexibility in the range of applications. The system can provide the following options:

- Backplane and daughtercard connections in standard and reverse sex.
  - Parallel daughtercard connection.
  - Midplane connections in both planar and cross connect configuration.
  - Cable connections for backplane rear and front of daughtercards.
  - Extender card connections.
- These variations can be arranged for signal contacts, and for backplanes, power, coax and fiber optic cable and board connections.

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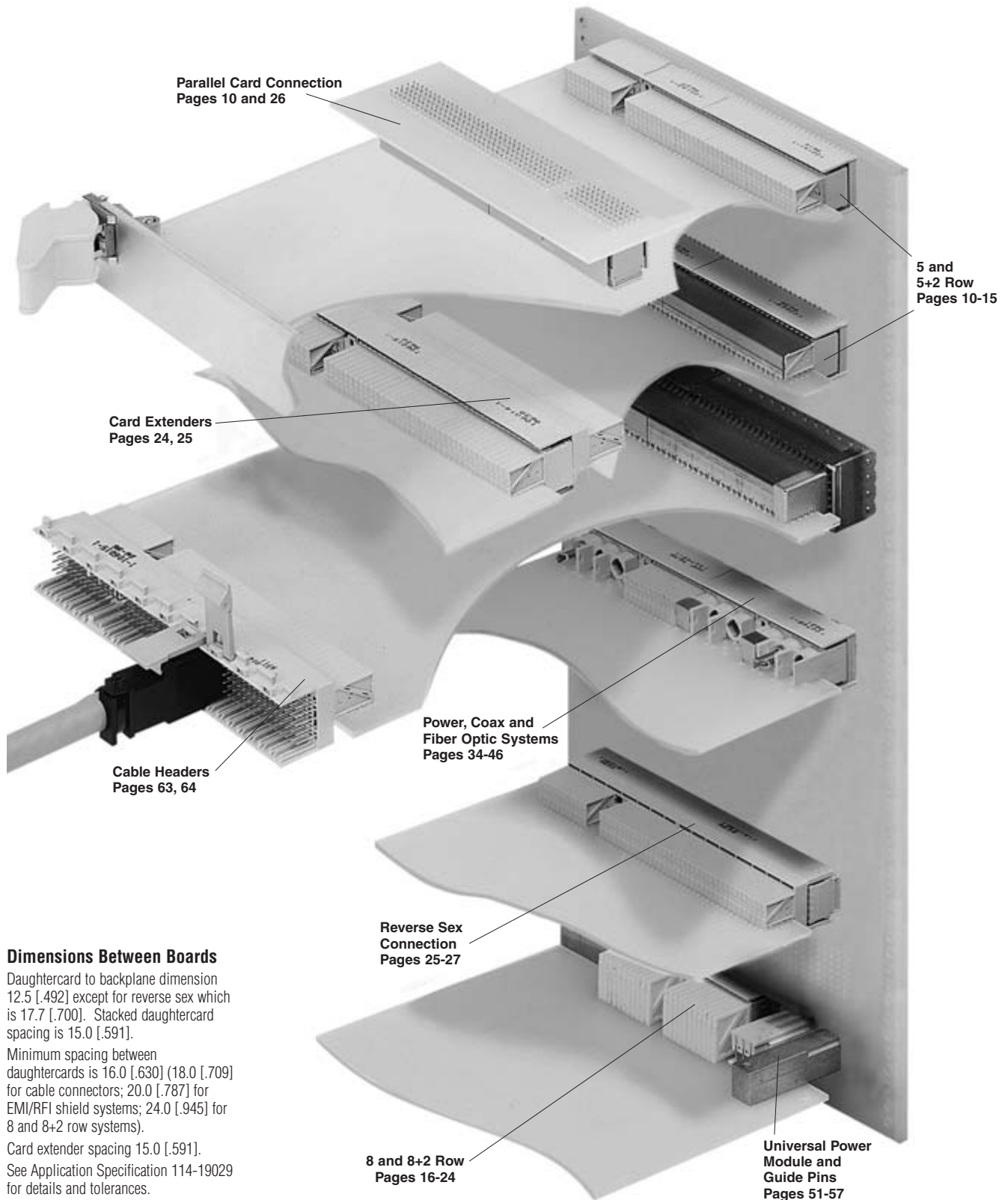
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**System Options — Front**



**Dimensions Between Boards**

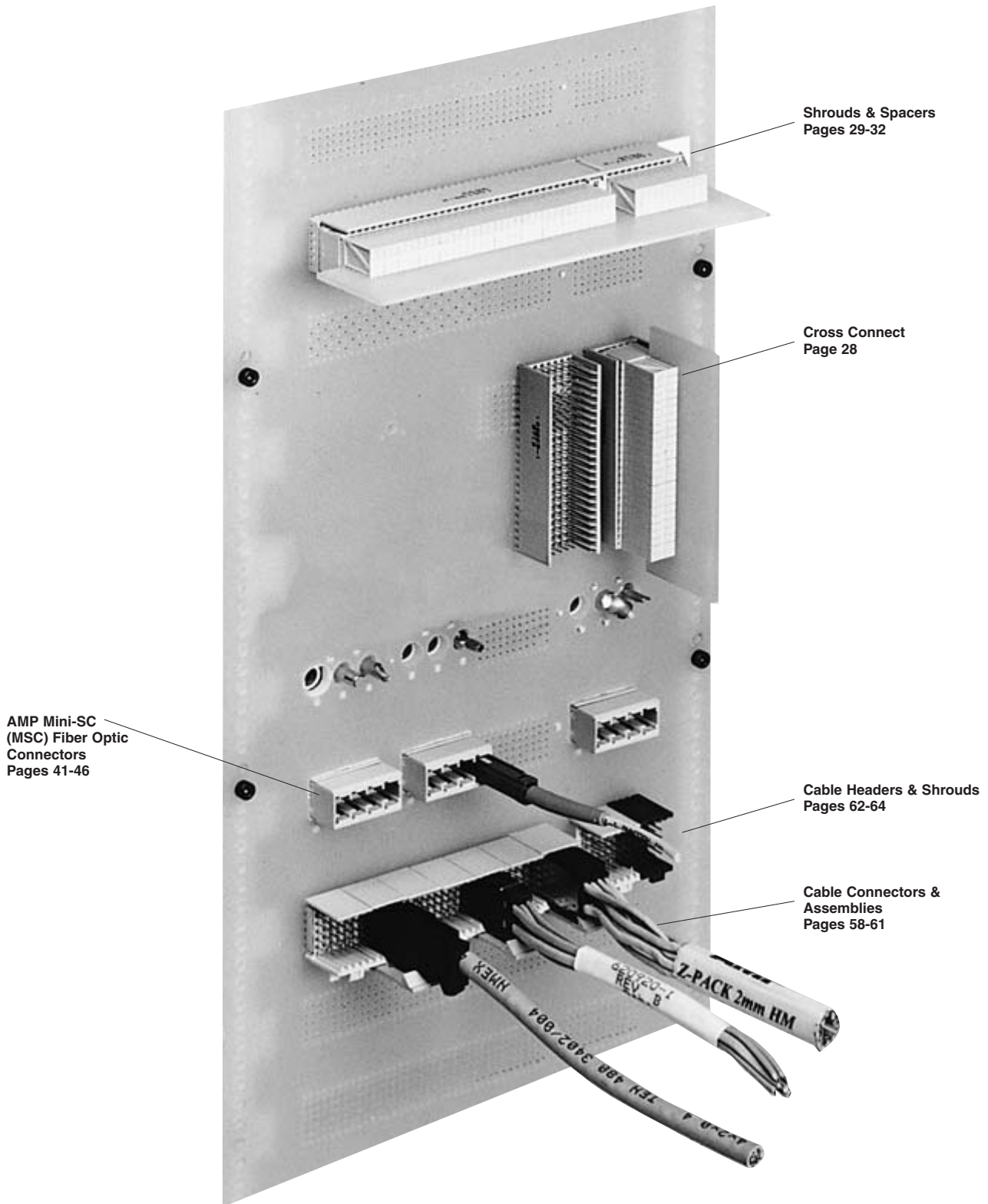
Daughtercard to backplane dimension 12.5 [.492] except for reverse sex which is 17.7 [.700]. Stacked daughtercard spacing is 15.0 [.591].

Minimum spacing between daughtercards is 16.0 [.630] (18.0 [.709] for cable connectors; 20.0 [.787] for EMI/RFI shield systems; 24.0 [.945] for 8 and 8+2 row systems).

Card extender spacing 15.0 [.591].

See Application Specification 114-19029 for details and tolerances.

**System Options — Rear**



### Product Characteristics

Electronic developments are increasing the demands on system performance, and connectors can no longer be considered as discrete components but as part of a total electrical/electronic design. These aspects can include the following:

#### Higher pin count within tight space constraints.

With 25 and 40 signal pins per cm of 5 row and 8 row connectors respectively, high densities can be achieved, or low signal to ground ratios specified within tight space constraints.

#### Minimum reflections

Matched impedance between cables, connectors and systems give low reflections at interfaces. This is achieved with overmolded receptacle contacts which give impedances close to the values of printed circuit boards, maximizing effective signal strength.

#### Reduced crosstalk

Crosstalk can be minimized by selective use of ground pins between signals, which can be augmented by the use of ground return shields. Reduced cross talk versions of the receptacle connector provide partial shielding between columns.

#### Shielding

Upper and/or lower ground return shields are used with 5+2 and 8+2 row headers to improve signal integrity. EMI / RFI shields are available to totally enclose 5 row connectors to give maximum immunity from, and minimum emission of, radiated noise.

#### Reduced Skew

The design of right angle connectors achieves very low skew between longest and shortest contact and board paths, corrected for board effects. The actual value varies between 5 row and 8 row types.

#### Fiber Optic Connections

As well as the normal power and coaxial DIN contacts, either DIN fiber optic or AMP MSC fiber optic connectors can be included in backplane systems for high speed data transfer without risk of corruption.

#### Upgradeability

The system is upgradeable to give enhanced performance as system demands increase. This allows economical selection of components initially with enhanced version selectable as performance levels increase without a major change in connector design or board layout. Tyco Electronics recommends that board layouts include ground return shield holes for future-proofing.

### System Features

#### Termination

All versions use AMP ACTION PIN press fit contacts, giving high retention force termination conforming to IEC 352-5.

#### Pin Headers

Contact pins are available to give three mating levels on the front face with standard 3.7 [.146] tail, suitable for boards from 1.4 to 4.3 [.055 - .169] thick. Feedthrough vertical headers offer three levels of mating to rear of backplane for midplane and cable connection with special twisted pins used for cross connect applications. A wide variety of standard product exists which offer economy and short lead times, but any variation of selective load can be offered.

#### Receptacle Assemblies

Receptacle assemblies employ a 'chiclet' assembly principle allowing a variety of selective loading and providing the ability to fit reduced cross talk shields. Enhanced versions are pre-fitted with upper shields, with lower shields applied separately as required.

#### Power Connection

Universal Power Module Connectors are press fit three position connectors with the option of three levels of sequencing and 23A rating.

Alternatively, DIN contacts can be used in type L, M and N housings with contact rating up to 40A and first make/last break option. Variations of cable-to-board, board-to-board and cable-to-cable are offered.

#### Coaxial Connection

DIN coax contacts can be fitted to type L, M and N housings in cable and board mount versions.

#### Fiber Optic Connections

DIN style contacts can be fitted to housings as above or higher density AMP MSC contacts to MSC housings.

#### Spice Models

To achieve optimum performance and cost, it is essential to accurately match connector and system parameters. Where customers wish to carry out their own analysis, Tyco Electronics offers single and multi-line models for many connector styles. Please ask for details of the packages available.

#### Modelling Support

Tyco Electronics offers a structured approach to the design and evaluation of packaging and interconnection systems, including a full range of electrical and mechanical support functions.

Using accurate device models, our capabilities include high speed signal propagation analysis using SPICE modelling, and simulation of interconnections and backplane designs. Complete power distribution and thermal analysis can also be included.

#### System Manufacture

Tyco Electronics Circuits and Packaging Division specializes in the design and manufacture of high performance backplanes and subsidiary boards. They will design backplanes and boards to meet your performance criteria, bringing their experience and tools to enhance your design. Ask Tyco Electronics for further details.

**Electrical Characteristics**

**Electrical Characteristics, Typical**

AMP Z-PACK 2mm HM Connector System offers considerable benefits in performance over other 2.00 [.079] systems. Tests have shown values for inductance, capacitive loading and propagation delay to be 18%, 13% and 18% lower respectively than other 5 row systems.

**Electrical characteristics, Typical.**

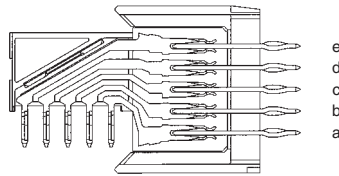
Signal Pin rating, all contacts loaded	1.5a @ 70°C [158°F]		
Nominal resistance	<13.5mOhm		
Creepage/clearance	</=0.8mm		
Propagation delay, corrected for board effects (5 row)	104ps		
Signal/ground ratio	4:1	1:1	Differential Pair
Impedance	50-58	49-55	86-89
Backward x-talk, row to row	4-10		2-3
" " column to column	<3	<1	<1
" " diagonal	<2	<<1	<<1

These values apply at 333ps rise time (10%-90%). These values have been obtained with 5 row connectors; similar improvements are obtained with 8 row versions. See page 41 for Z-PACK 2mm HM Connector Optical Performance.

**Shield Types and Selection**

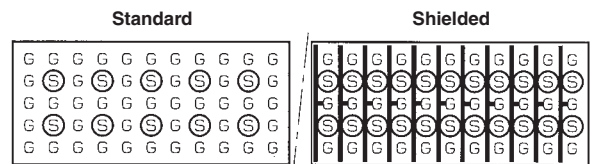
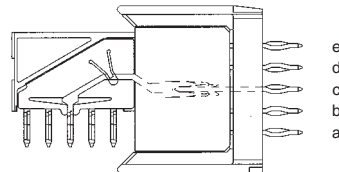
**Standard Version**

5 row version gives 250 contacts/100 [3.937], suitable for rise times down to 100ps with cross talk <5% using a 4:1 signal/ground ratio (50 signal/100mm)



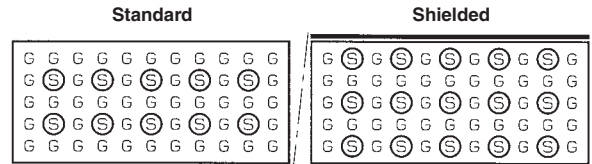
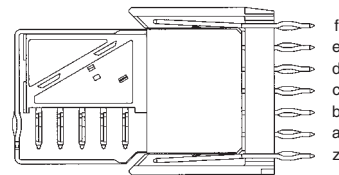
**Reduced Cross Talk Version**

Metal shield grounded to row c and to the board (optional) reduces cross talk in the d and e contacts by 25% to the level of a and b. Allows increase in density to 100 signals/100 [3.937].



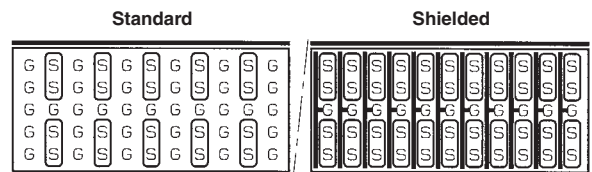
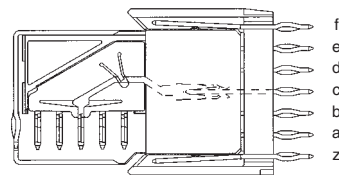
**Ground Return Shields**

Performance is enhanced suitable for rise times down to 250ps by using extra pin rows mating to shields on the receptacle. Allows an increase in density to 75 signal/100 [3.937], reduces cross talk by 30% and reduces single ended impedance peaks in rows a and e.



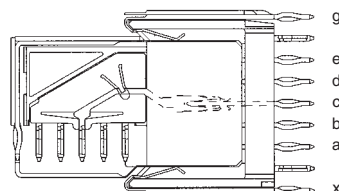
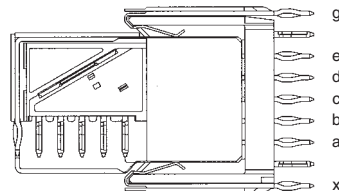
**Ground Return and Reduced X-talk Shields**

Increase performance to sub-nanosecond rise times. When used with differential pairs, improves cross talk by 30%, lowers impedance peaks and reduces propagation delay by 10%



**EMI/RFI Shields**

These shields, used with end caps, totally enclose the connector and reduce radiation by 20-30dB over the 100MHz-1GHz range. These shields can be used with reduced cross talk shields as shown in the lower view.





**Contact Make and Break Sequence**

**Make and Break Sequence**

The diagram shows the sequence of make and break for the range of 2mm HM signal contacts, shields, Universal Power Module contacts and DIN 41626 contacts. In relation to the key blocking position, the housings must close by the dimension shown to give first contact point for the respective contact type, with housings fully mated 9.1 [.358] closer than the key blocking point. All dimensions are nominals and assume connectors are assembled flush with the backplane.

**POWER CONTACT F.M.L.B.**

**UNI.PWR. LEVEL 3**

**UNI.PWR. LEVEL 2**

**SIGNAL CONTACT LEVEL 3**

**UNI.PWR. LEVEL 1**

**POWER CONTACT STD.**

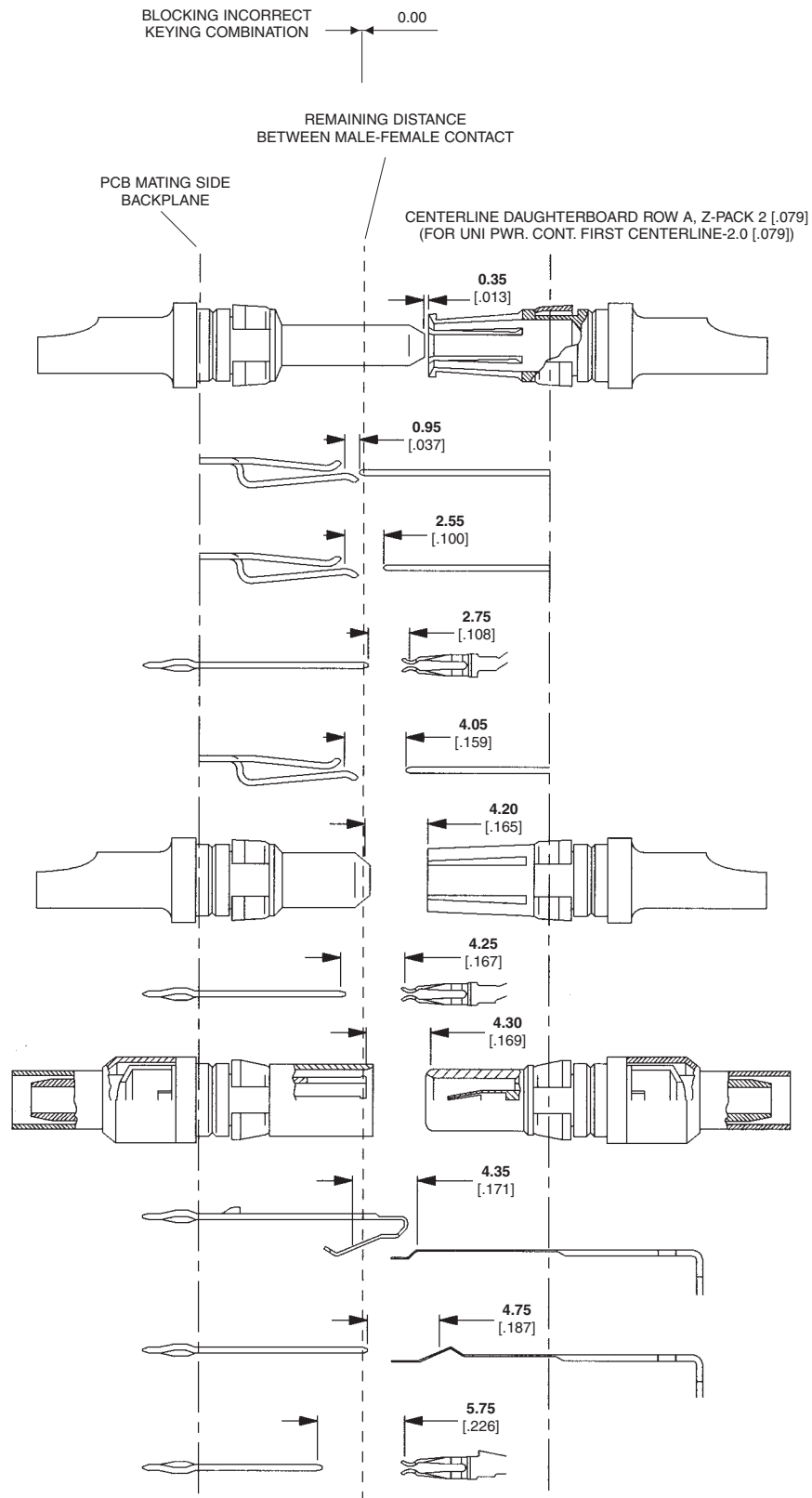
**SIGNAL CONTACT LEVEL 2**

**COAX CONTACT**

**EMI-RFI SHIELDING**

**ENHANCED SHIELDING**

**SIGNAL CONTACT LEVEL 1**



*Electronics*

**Connector Configurations**

**Connector Stacking**

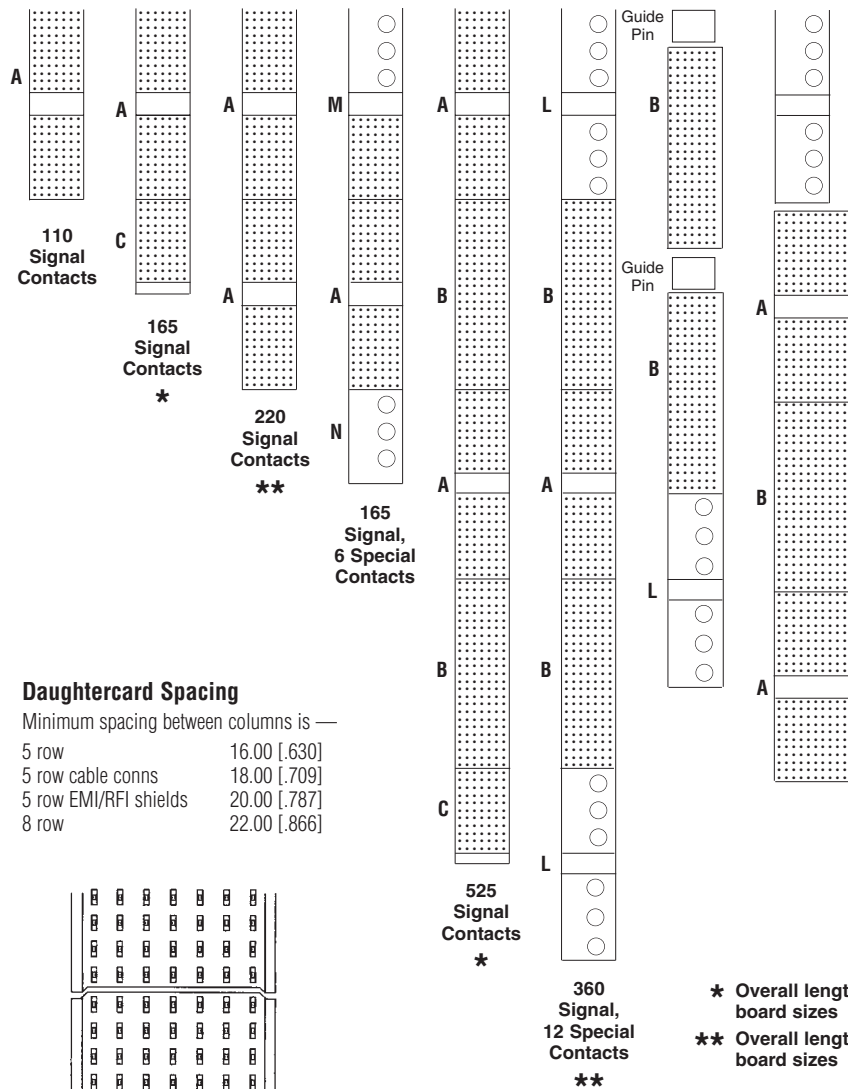
Connectors can be stacked together without change of contact pitch ensuring that the end features below nest together.

Guiding features are provided to align connector pairs and avoid contact damage. IEC 61076-4-101 dictates that connectors are end stacked as shown in the adjacent first five columns, with B modules located between modules with location/guiding features. An alternative guiding device can be used instead, such as the guide pin (page 55).

Types C and N are intended for use at a column end.

Universal Power Module connectors can be located at any position. Special arrangements must be made when stacking 8 row to 5 row.

The diagrams show typical arrangements but others are possible.

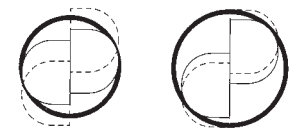
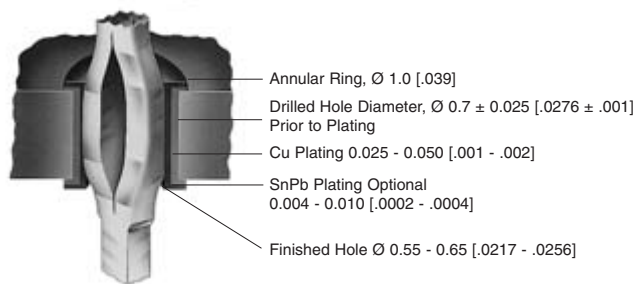


**ACTION PIN Contacts**

Details of the pcb hole size and finish apply to all ACTION PIN contacts. IEC 61076-4-101 specifies true position of holes to within 0.1 [.004]. For feedthrough posts, true position within 0.05 [.002] to minimize out-of-position post tips could be used.

A new contact can be inserted into the same hole three times without damage should repair or replacement be necessary.

**AMP ACTION PIN Press-fit Contact Interconnection**



**Min. Hole  $\varnothing$  0.55 [.0217]**  
**Max. Hole  $\varnothing$  0.65 [.0256]**

**Two spring members compress to different degrees to accommodate hole tolerances max. diagonal 0.84 [.033] dia.**

**Vertical Male Connector, 5 Row, Types A, B and C**

**Vertical Male Connectors**

Types A,B and C male connectors will mate with right angle female and vertical female connectors shown on pages 13 and 27 respectively.

**5 Row Versions**

Type A has 110 signal pins with center guiding and keying facility. Type B has 125 signal pins and Type C has 55 signal pins and guiding features. All are end stackable without change in contact pitch according to the chart on page 9.

**5+2 Row Versions**

For use with females with ground return shields and contacts in rows z and f in addition to those above.

**Short Tail Versions**

Standard versions have contact option A in rows a-e with option C in rows z and f on 5+2 row versions.

**Feedthrough Versions**

For midplane and rear cable connection. 5 row versions mate with unshielded female connectors and 5 row cable connectors. 5+2 row versions mate with female connectors having ground return shields or 5+2 row shielded cable connectors. Standard versions use contact options K and T instead of A and C.

Mylar tail guides can be fitted to feedthrough posts to aid assembly to the board.

For versions other than those shown, refer to page 47 which gives access to other sizes and loading patterns.

End caps are available for use with special versions of types A and B connectors. Consult Tyco Electronics.

**Performance Data pages 6-7.**

**Materials and Finish**

Glass filled polyester housing, gray, UL94 V-0 rated

Phosphor-bronze signal contacts

Contact area 0.8µm [.000030] Au over 1.3µm [.000050] Ni

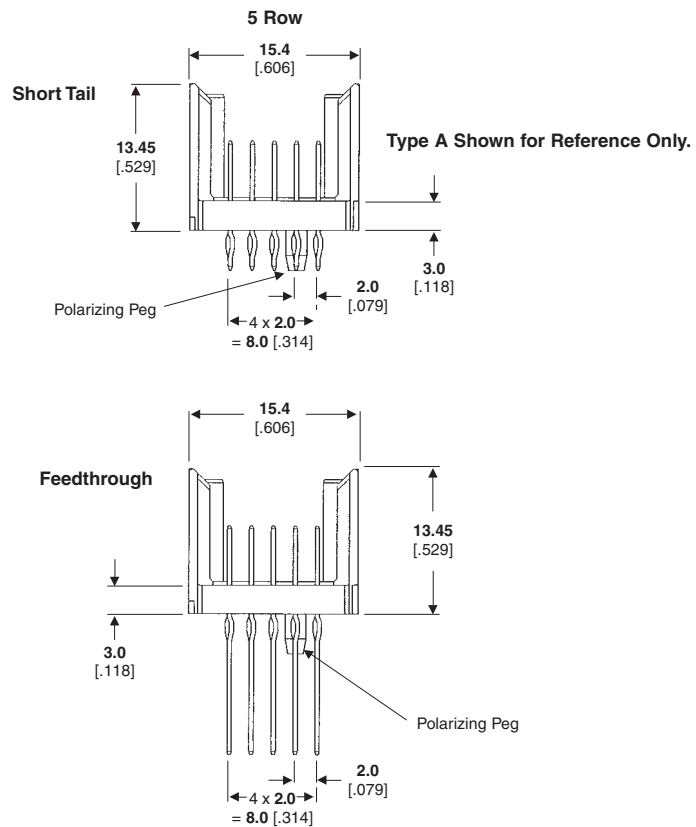
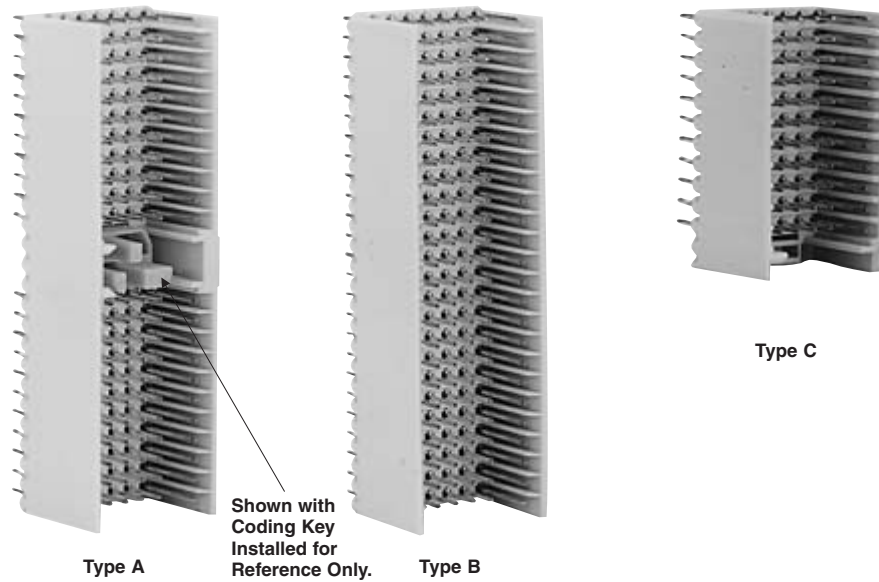
ACTION PIN Contact 0.5µm [.000020]

Sn/Pb over 1.3µm [.000050] Ni

**Coding keys for type A page 47.**

**Board layout page 69 for guidance only.**

**Protection covers available see page 33.**



Description	Part Numbers			
	Short Tail		Feedthrough	
	5 Row	5+2 Row	5 Row	5+2 Row
Type A (with locating peg)	100143-1	100668-1	106164-1	106509-1
Type B (25)	100141-1	100669-1	106165-1	106510-1
Type B (19)	1392175-1	352869-1	—	—
Type B (22)	352639-1	352638-1	—	—
Type C	100159-1	106081-1	106303-1	188637-1

For VME64 and C-PCI versions, see page 48.

**Vertical Male Connector, 5 Row, Type A/B**

**Type A/B Vertical Male Connector**

Type A/B male connectors will mate with Type A/B right angle female connectors shown on page 15.

**5 Row Version**

Type A/B connector offers the guidance ability similar to the Type A connector but also utilizes the center three columns for additional signal pin capability which are not found in the Type A connector.

Available in the Type A/B connector are 95 signal pins, 110 signal pins and 125 signal pins. All are end stackable without change of contact pitch according to the chart on page 9.

**5+2 Row Versions**

For use with females with ground return shields and contacts in rows z and f in addition to those above.

**Short Tail Versions**

Standard versions have contact option A in rows a-e with option C in rows z and f on 5+2 row versions.

**Feedthrough Versions**

For midplane connection, 5 row versions mate with standard 5 row Type A/B female connectors and 5+2 row versions mate with Type A/B female connectors having ground return shields. Standard versions use contact options K and T instead of A and C.

Mylar tail guides can be fitted to feedthrough posts to aid assembly to the board.

**Materials and Finish**

Glass filled polyester housing, gray UL94 V-0 rated

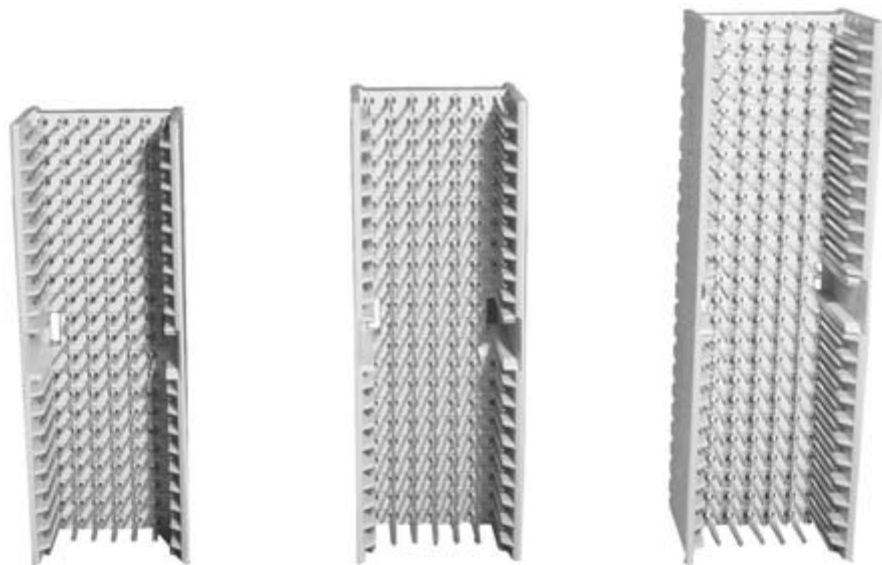
Phosphor-bronze signal contacts

Contact area 0.8µm [.000030] Au over 1.3µm [.000050] Ni

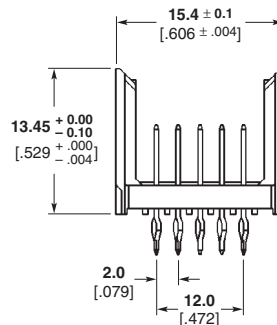
ACTION PIN Contact 0.5µm [.000020]

Sn/Pb over 1.3µm [.000050] Ni

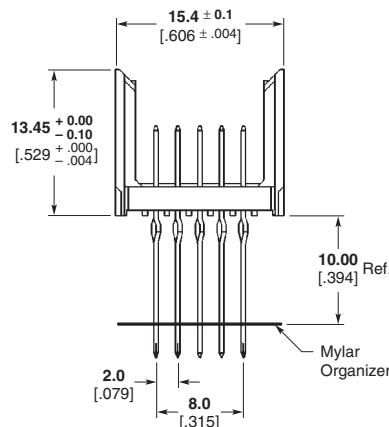
**Board layout (see Customer Print).**



Type A/B Short Tail



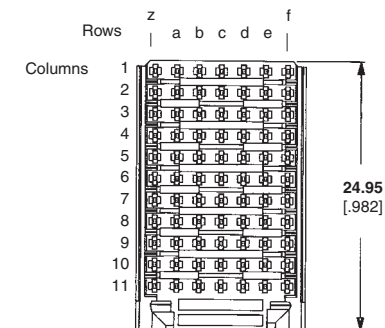
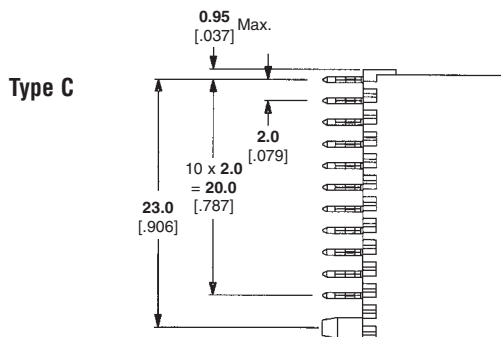
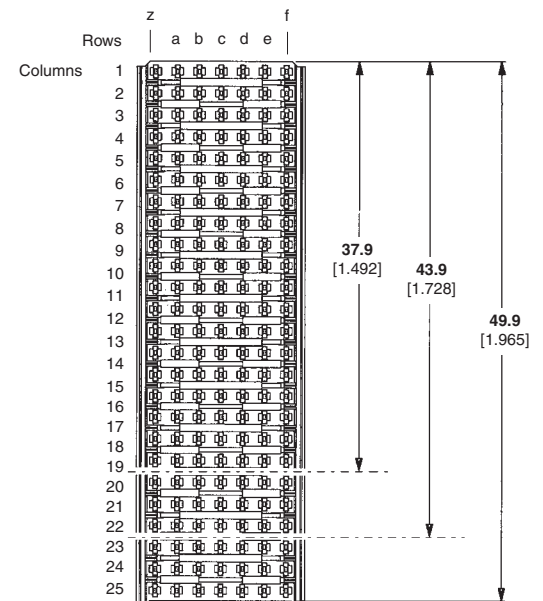
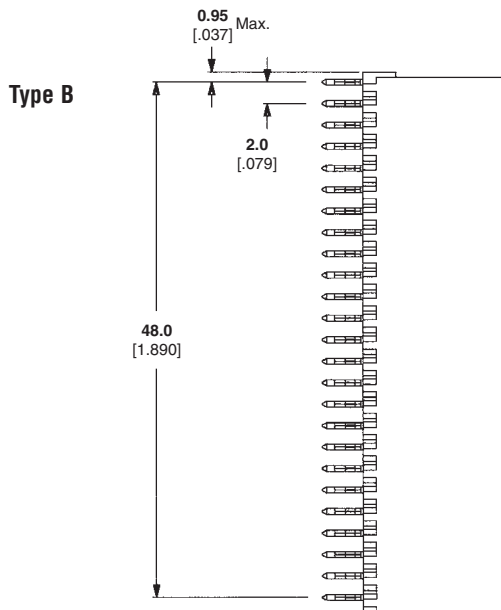
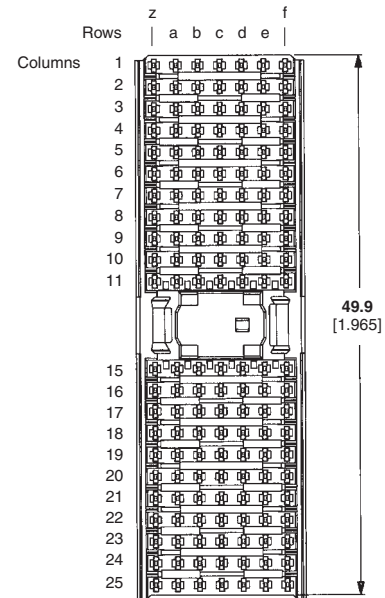
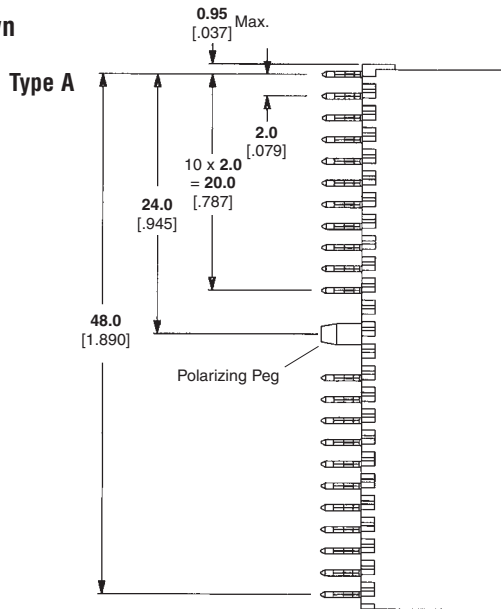
Type A/B Feedthrough



Description	Part Numbers			
	Short Tail		Feedthrough	
	5 Row	5+2 Row	5 Row	5+2 Row
Type A/B (25)	646731-1	646529-1	646938-1	646535-1
Type A/B (22)	646737-1	646533-1	646949-1	646735-1
Type A/B (19)	646948-1	646530-1	646950-1	646732-1

**Vertical Male Connector, 5 Row, Types A, B and C (Continued)**

Short Tail Version Shown



**Right Angle Female Connectors, 5 Row, Types A, B and C**

**Right Angle Female Connectors**

Types A, B and C female connectors will mate with respective vertical and right angle male connectors and with shrouds shown on pages 10 and 29.

Type A has 110 contacts with center guiding and keying facility, type B has 125 contacts and type C has 55 contacts with end guiding feature. All are end stackable without change of contact pitch according to the chart on page 9.

Four levels of performance are offered; standard, reduced crosstalk, ground return shield and reduced crosstalk + ground return shields. Upper ground return shields are pre-fitted to receptacles; lower shields are supplied and fitted separately as required. 5+2 male connectors are used with ground return shield versions.

For versions other than those shown, refer to page 47 which gives access to other sizes and loading patterns.

Performance Data pages 6-7.

**Materials and Finish**

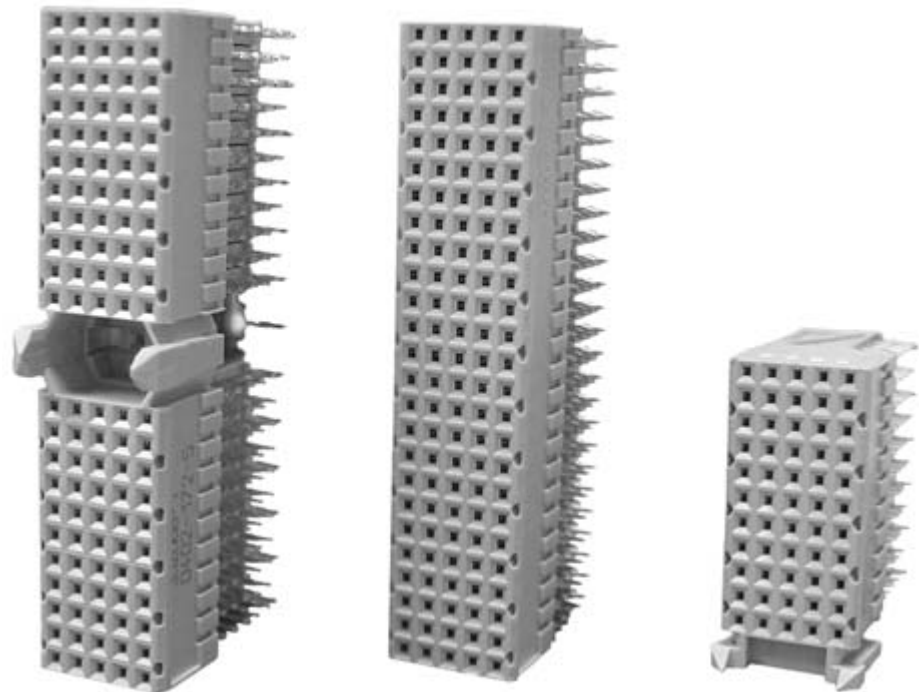
Glass filled polyester housing, gray, UL94 V-0 rated

Phosphor-bronze signal contacts

Contact area 0.8µm [.000030] Au over 1.3µm [.000050] Ni

ACTION PIN Contact 0.5µm [.000020]

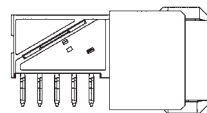
Sn/Pb over 1.3µm [.000050] Ni



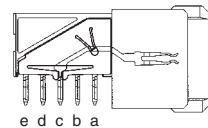
Standard Version

Reduced Crosstalk Version

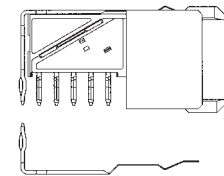
With Upper Shield Attached



Lower Shields



Row C to Ground

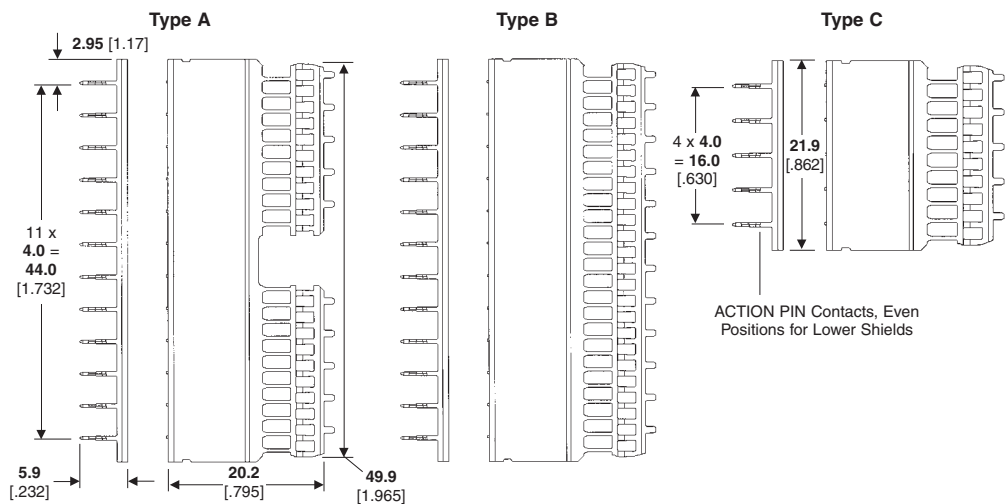


Separate Lower shield

Coding keys for type A page 47.

Board layout page 69 for guidance only.

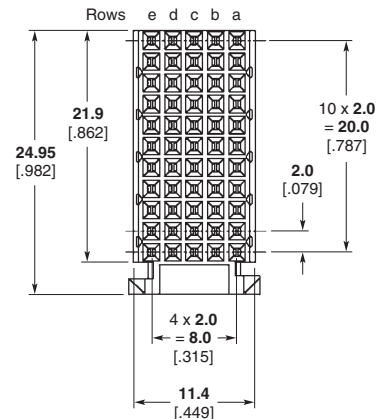
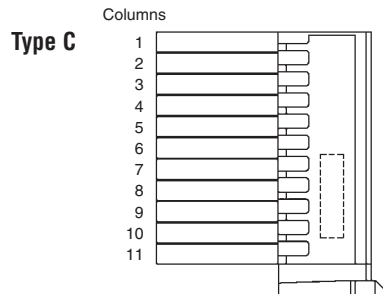
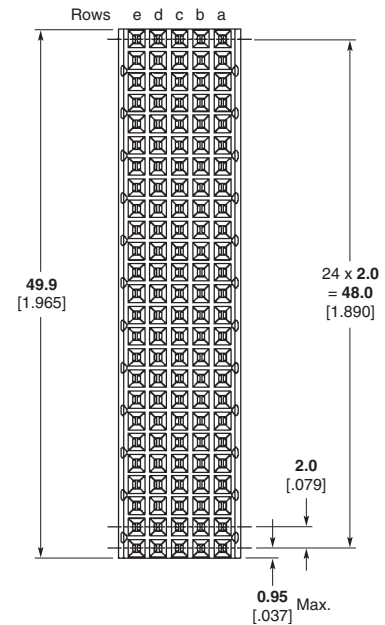
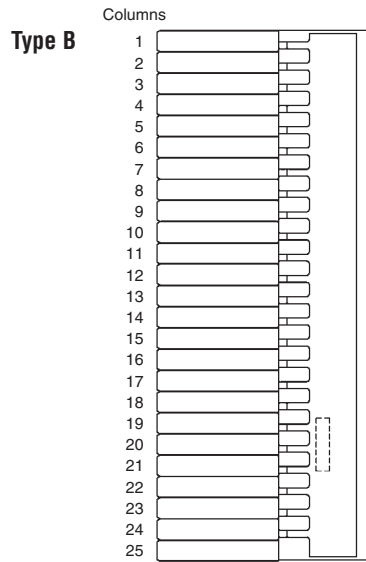
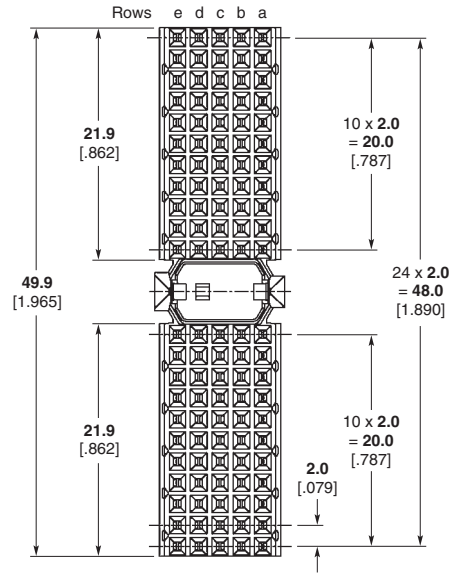
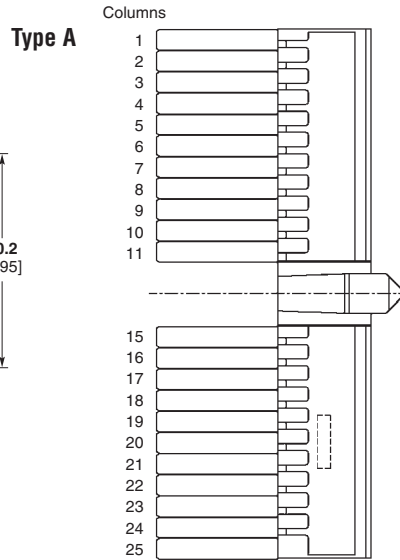
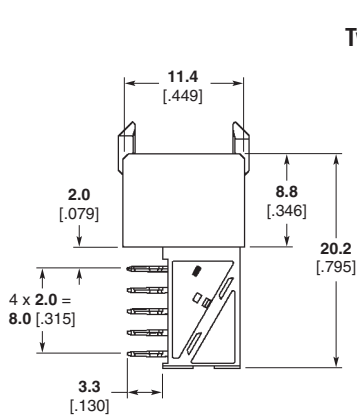
Daughtercard thickness range of 1.4 - 4.3 [.055 - .169] (3.5 [.138] max with lower shield).



Description	Part Numbers				
	Standard	Standard with Upper Shield	Reduced Cross Talk	Reduced Cross Talk with Upper Shield	Lower Shield
Type A	100147-1	352068-1	100623-1	352344-1	338108-2
Type B	100145-1	352069-1	100624-1	352345-1	338110-2
Type B (22)	188836-1	352152-1	—	1345007-1	352468-2
Type B (19)	352009-1	352171-1	—	1345008-1	352029-2
Type C	100161-1	352115-1	188224-1	352346-1	352112-2

For VME64 and C-PCI versions, see page 48.

**Right Angle Female Connectors, 5 Row, Types A, B and C (Continued)**



**Right Angle Female Connectors, 5 Row, Type A/B**

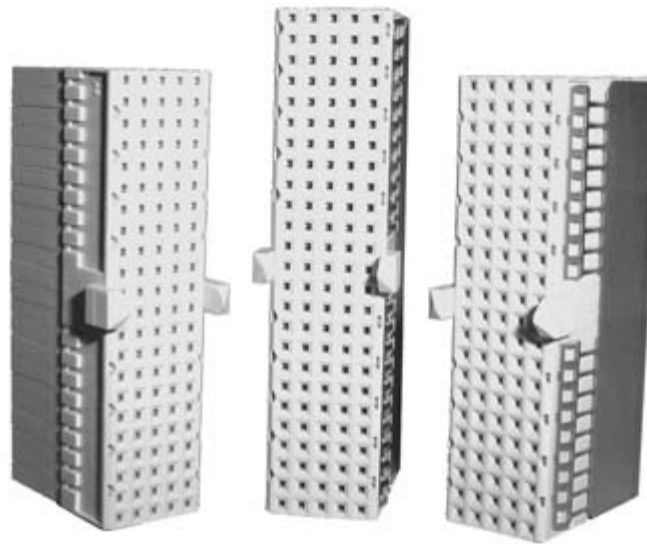
**Type A/B Female Connectors**

Type A/B female connector will mate with respective vertical male connector as shown on page 11.

Type A/B connector offers the guidance ability similar to the Type A connector but also utilizes the center three columns for additional signal pin capability which are not found in the Type A connector.

Available in the Type A/B connector are 95 contacts, 110 contacts and 125 contacts. All are end stackable without change of contact pitch according to the chart on page 9.

Two levels of performance are offered; standard and with upper ground return shields. Upper ground shields are pre-fitted to receptacles. 5+2 male connectors are used with ground return shield versions.



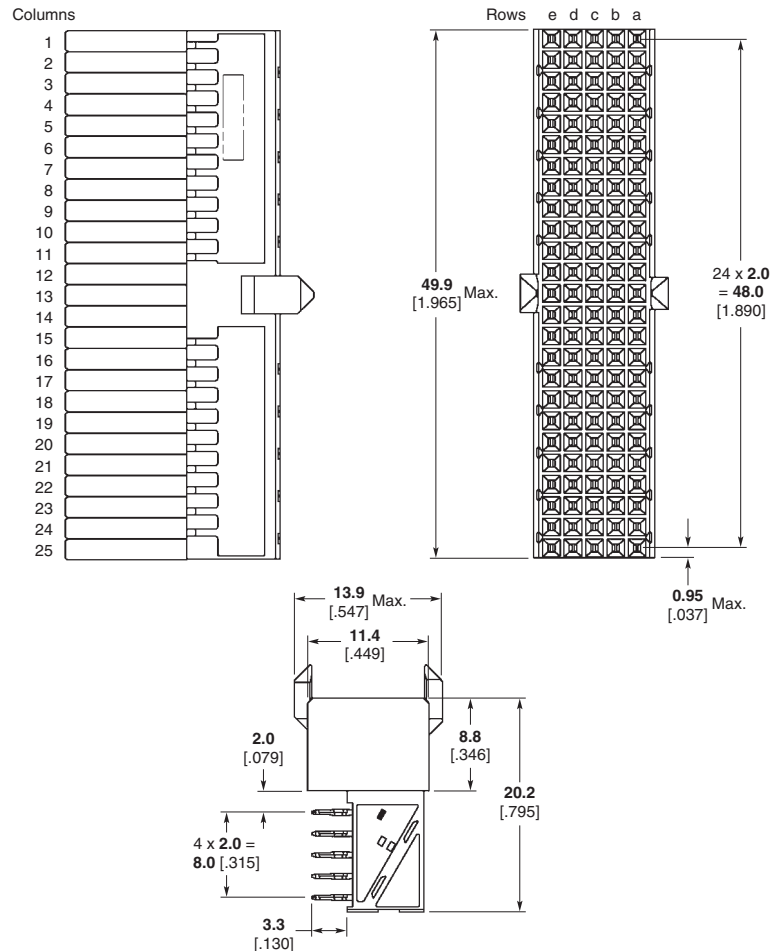
**Performance Data pages 6-7.**

**Material and Finish**

- Glass filled polyester housing, gray, UL94 V-0 rated
- Phosphor-bronze signal contacts
- Contact area 0.8µm [.000030] Au over 1.3µm [.000050] Ni
- ACTION PIN Contact 0.5µm [.000020] Sn/Pb over 1.3µm [.000050] Ni

**Board layout (see Customer Print).**

**Daughtercard thickness range of 1.4 - 4.3 [.055 - .169].**



Description	Part Numbers	
	Standard	Standard with Upper Shield
Type A/B (25)	646574-1	646547-1
Type A/B (22)	646573-1	646489-1
Type A/B (19)	646572-1	646488-1



**Vertical Male Connectors, 8 Row, Types D, E and F**

**Vertical Male Connectors**

Types D, E and F mate with respective right angle receptacle connectors shown on page 19.

**8 row Versions**

For use with unshielded female connectors. Type D has 176 signal pins with center guiding and keying facility, and type E has 200 signal pins and type F has 88 signal pins. They are stackable without change of contact pitch according to the chart on page 71.

**8+2 Row Versions**

For use with females with ground return shields and have contacts in rows z and i in addition to those above.

**Short Tail Versions**

Standard versions have contact option A in rows a-h with option C in rows z and i on 8+2 row versions.

**Feedthrough Versions**

For midplane connection, 8 row versions mate with standard 8 row female connectors and 8+2 row versions mate with female connectors having ground return shields. Standard versions use contact options K and T instead of A and C.

For versions other than those shown, refer to page 47 which gives access to other sizes and loading patterns.

Guide pin Part No. 532808-1 may be used with type D male connectors to give early alignment.

**Performance Data pages 6-7.**

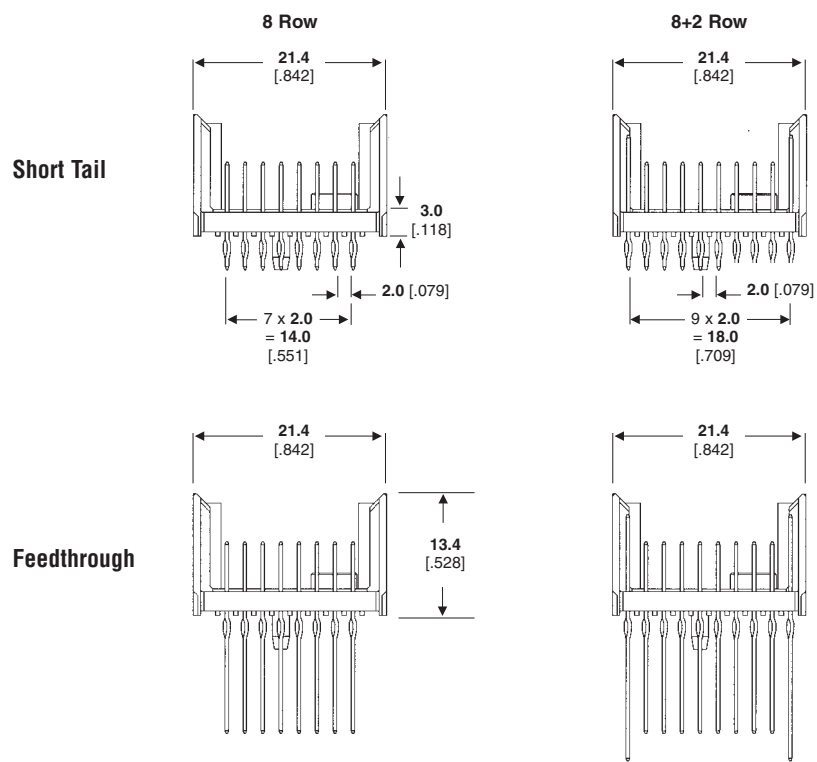
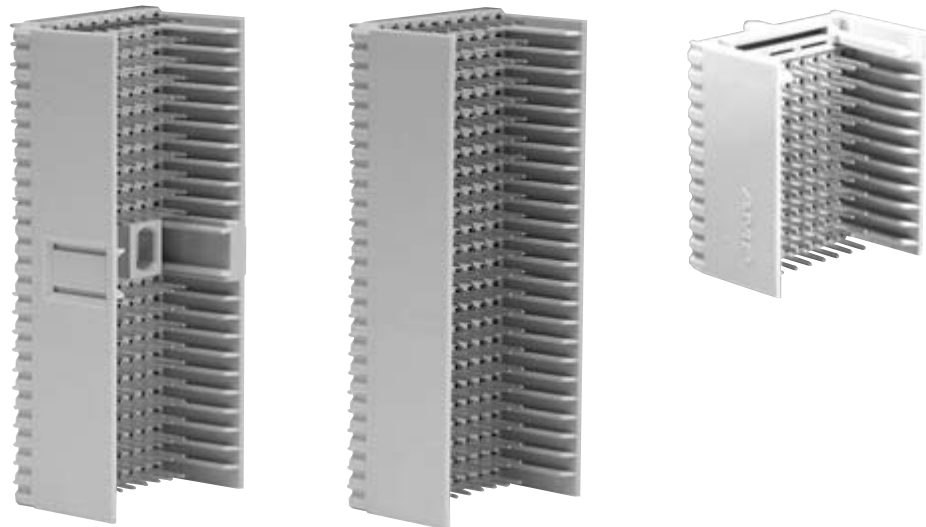
**Materials and Finish**

Glass filled polyester housing, gray, UL94 V-0 rated  
 Phosphor-bronze signal contacts  
 Contact area 0.8µm [.000030] Au over 1.3µm [.000050] Ni  
 ACTION PIN Contact 0.5µm [.000020] Sn/Pb over 1.3µm [.000050] Ni

**Coding keys for type D page 47.**

**Board layout page 71 for guidance only.**

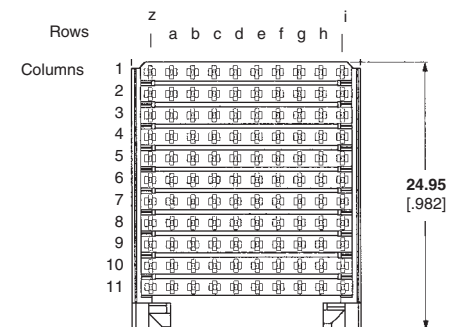
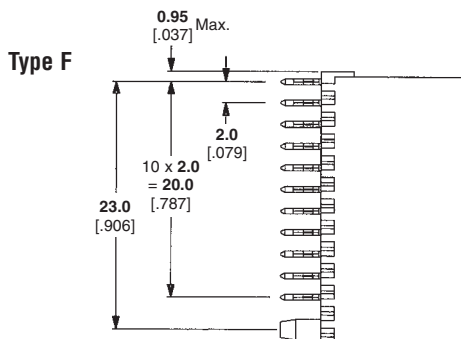
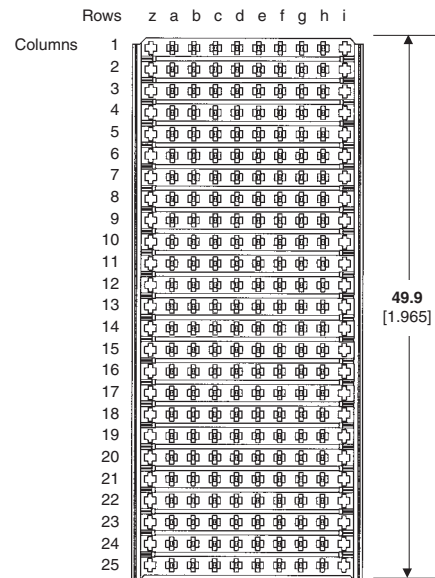
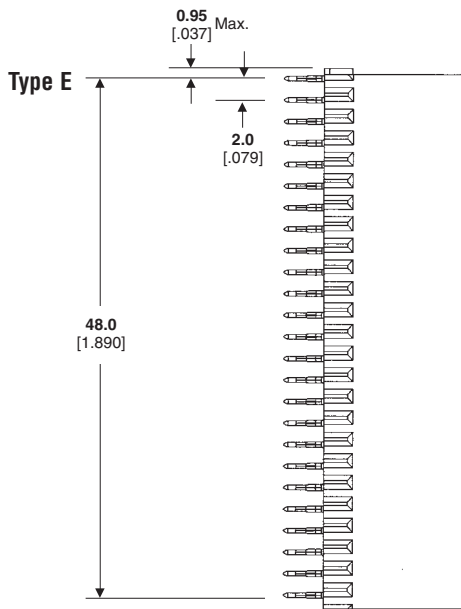
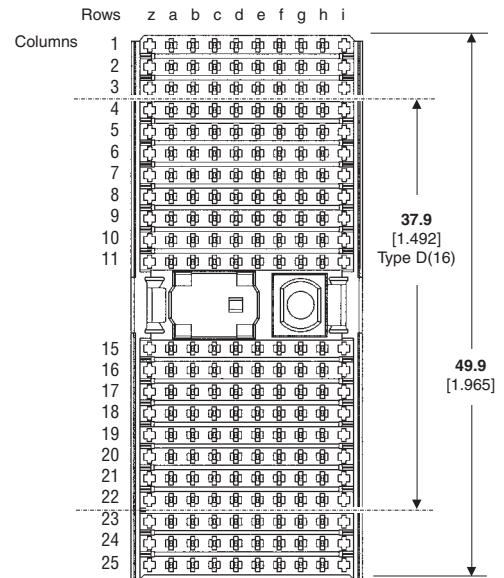
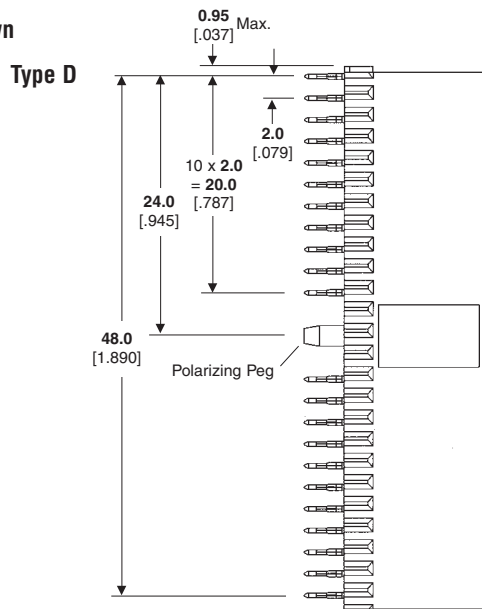
**Protection Covers available, see page 33.**



Description	Part Numbers			
	Short Tail		Feedthrough	
	8 Row	8+2 Row	8 Row	8+2 Row
Type D	646346-1	646356-1	646372-1	646375-1
Type D (16 column, 128 position)	646362-1	—	—	—
Type E	646347-1	646357-1	646373-1	646376-1
Type F	646457-1	646513-1	646514-1	646515-1

**Vertical Male Connectors, 8 Row, Types D, E and F**

Short Tail Versions Shown



**Vertical Male Connectors, 8 Row, Type D/E**

**Type D/E Vertical Male Connector**

Type D/E male connectors will mate with Type D/E right angle female connectors shown on page 21.

**8 row Version**

Type D/E connector offers the guidance ability similar to the Type D connector but also utilizes the center three columns for additional signal pin capability which are not found in the Type D connector.

Available in the Type D/E connector are 200 signal pins which are end stackable without change of contact pitch according to the chart on page 9.

**8+2 Row Versions**

For use with females with ground return shields and contacts in rows z and i in addition to those above.

**Short Tail Versions**

Standard versions have contact option A in rows a-h with option C in rows z and i on 8+2 row versions.

**Feedthrough Versions**

For midplane connection, 8 row versions mate with standard 8 row Type D/E female connectors and 8+2 row versions mate with Type D/E female connectors having ground return shields. Standard versions use contact options K and T instead of A and C.

Mylar tail guides can be fitted to feedthrough posts to aid assembly to the board.

**Materials and Finish**

Glass filled polyester housing, gray, UL94 V-0 rated

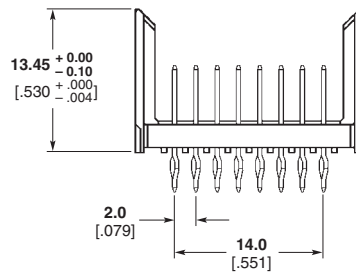
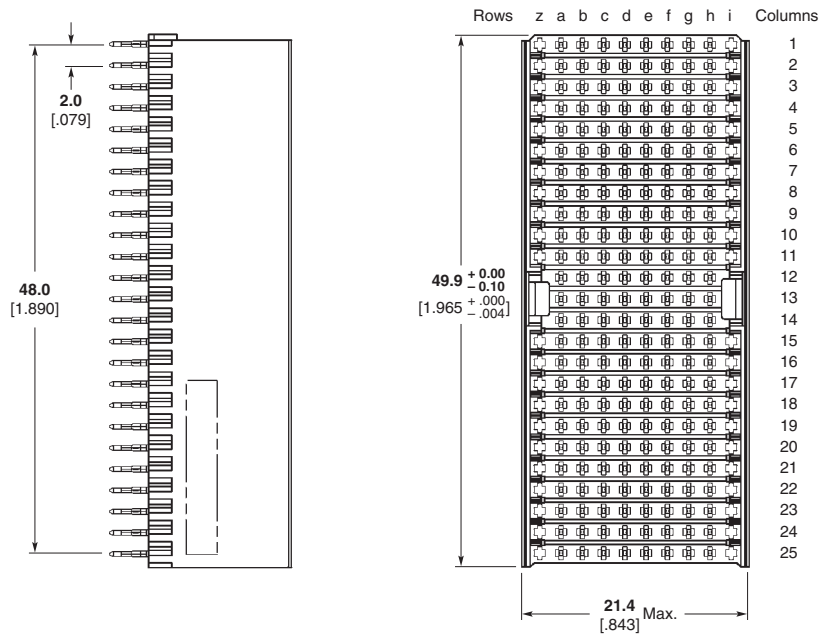
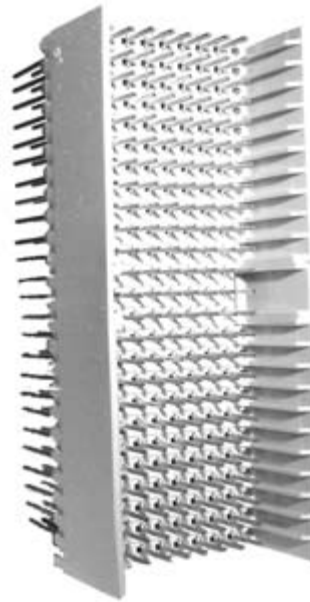
Phosphor-bronze signal contacts

Contact area 0.8µm [.000030] Au over 1.3µm [.000050] Ni

ACTION PIN Contact 0.5µm [.000020]

Sn/Pb over 1.3µm [.000050] Ni

**Board layout (see Customer Print).**



Description	Part Numbers			
	Short Tail		Feedthrough	
	8 Row	8+2 Row	8 Row	8+2 Row
Type D/E	646729-1	646951-1	646952-1	646953-1

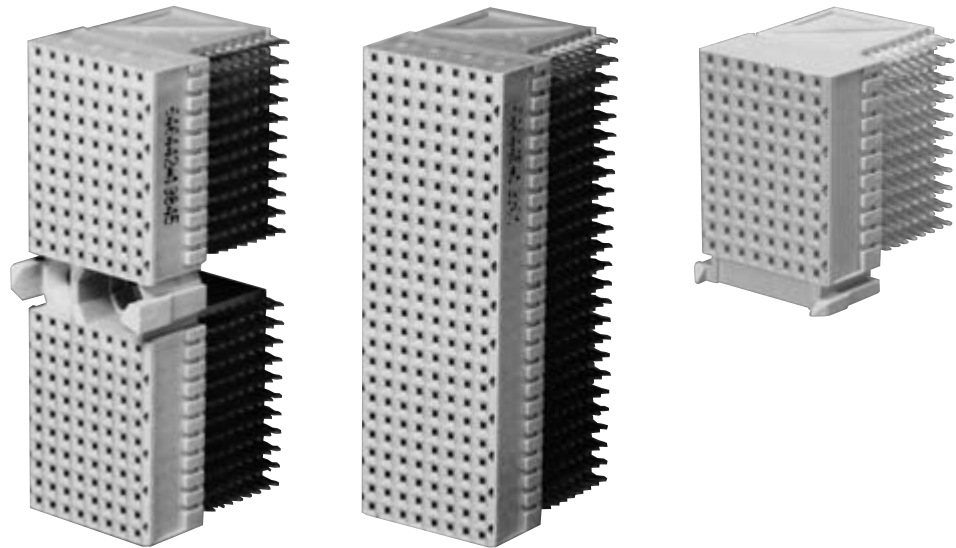
**Right Angle Female Connectors, 8 Row, Types D, E and F**

**Right Angle Female Connectors**

Types D, E and F female connectors will mate with respective vertical male connectors shown on page 16.

Type D has 176 contacts with center guiding and keying facility and type E has 200 contacts and Type F has 88 contacts. Connectors are end stackable without change of contact pitch according to the chart on page 9. Two levels of performance are offered; standard and ground return shield versions. Upper ground return shields are pre-fitted to receptacles; lower shields are supplied and fitted separately as required. 8+2 male connectors are used with ground return shield versions.

For versions other than those shown, which gives access to other sizes and loading patterns, consult Tyco Electronics.



**Performance Data pages 6-7.**

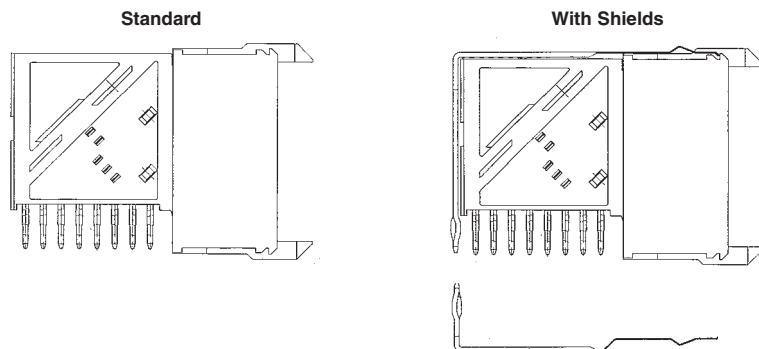
**Materials and Finish**

Glass filled polyester + LCP housing, gray, UL94 V-0 rated  
 Phosphor-bronze signal contacts  
 Contact area 0.8µm [.000030] Au over 1.3µm [.000050] Ni  
 ACTION PIN Contact 0.5µm [.000020] Sn/Pb over 1.3µm [.000050] Ni

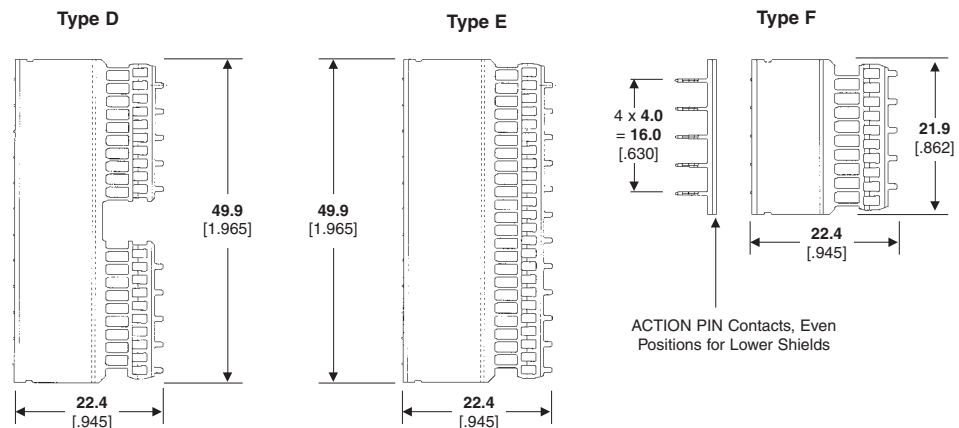
**Coding Keys for Type A page 47.**

**Board layout page 71, for guidance only.**

**Daughtercard thickness range of 1.4 - 4.3 [.055 - .169] (3.5 [.138] max. with lower shield)**

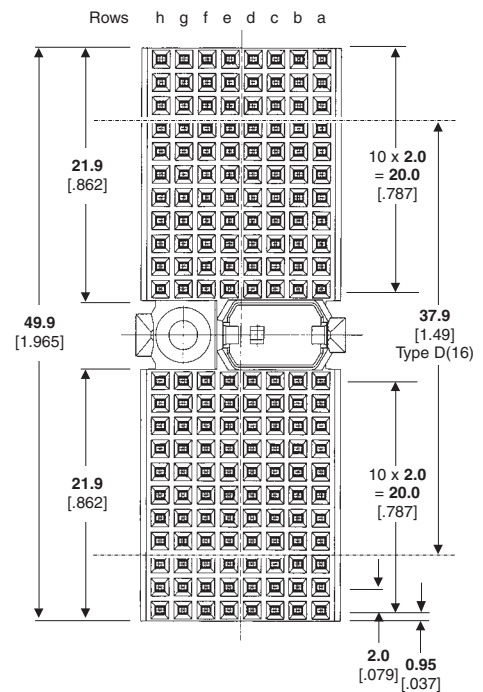
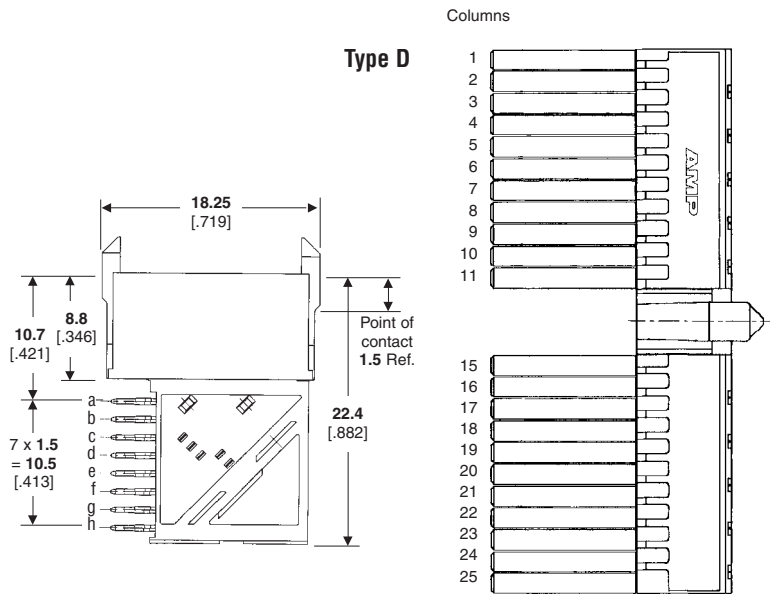


**Shields**



Description	Part Numbers		
	Standard	Standard with Upper Shield	Lower Shield
Type D	646442-1	646486-1	646428-1
Type D (16)	646447-1	—	—
Type E	646445-1	646487-1	646430-1
Type F	646446-1	646492-1	646493-1

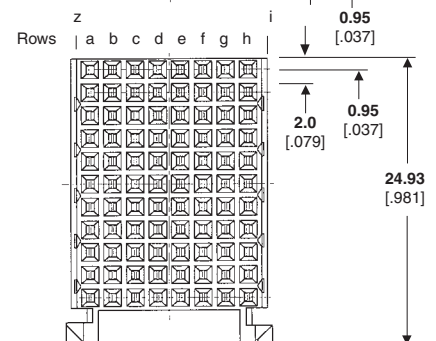
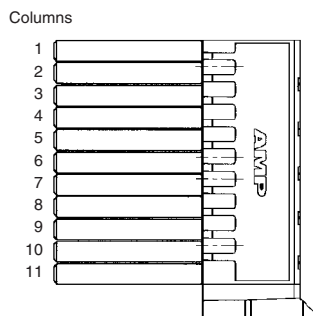
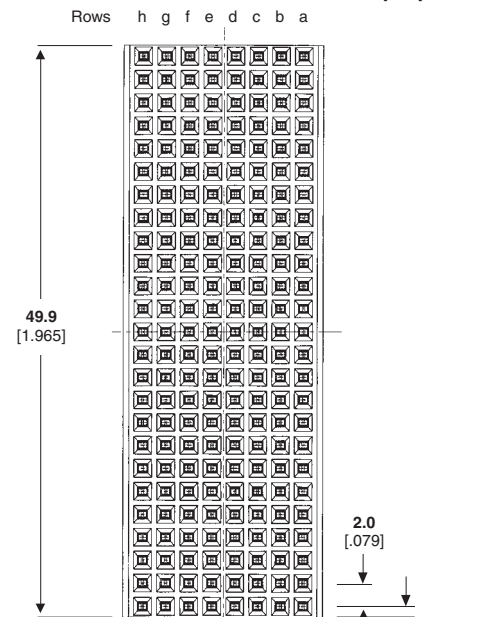
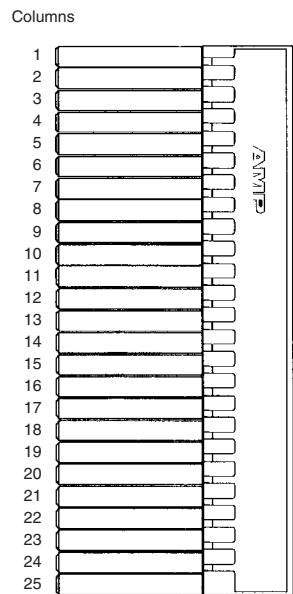
**Right Angle Female Connectors, 8 Row, Types D, E and F (Continued)**



**Materials and Finish**

Glass filled polyester housing, gray, UL94 V-0 rated  
 Phosphor-bronze signal contacts  
 Contact area 0.8µm [.000030] Au over 1.3µm [.000050] Ni  
 ACTION PIN Contact 0.5µm [.000020] Sn/Pb over 1.3µm [.000050] Ni

**Daughtercard thickness range of 1.4 - 4.3 [.055 - .169].**



**Right Angle Female Connectors, 8 Row, Type D/E**

**Type D/E Female Connectors**

Type D/E female connector will mate with respective vertical male connector as shown on page 18.

Type D/E connector offers the guidance ability similar to the Type D connector but also utilizes the center three columns for additional signal pin capability which are not found in the Type D connector.

Available in the Type D/E connector are 200 contacts. All are end stackable without change of contact pitch according to the chart on page 9.

Two levels of performance are offered; standard and with upper ground return shields. Upper ground shields are pre-fitted to receptacles. 8+2 male connectors are used with ground return shield versions.

**Performance Data pages 6-7.**

**Materials and Finish**

Glass filled polyester housing, gray, UL94 V-0 rated

Phosphor-bronze signal contacts

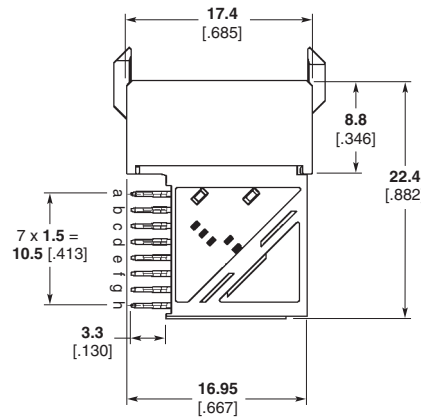
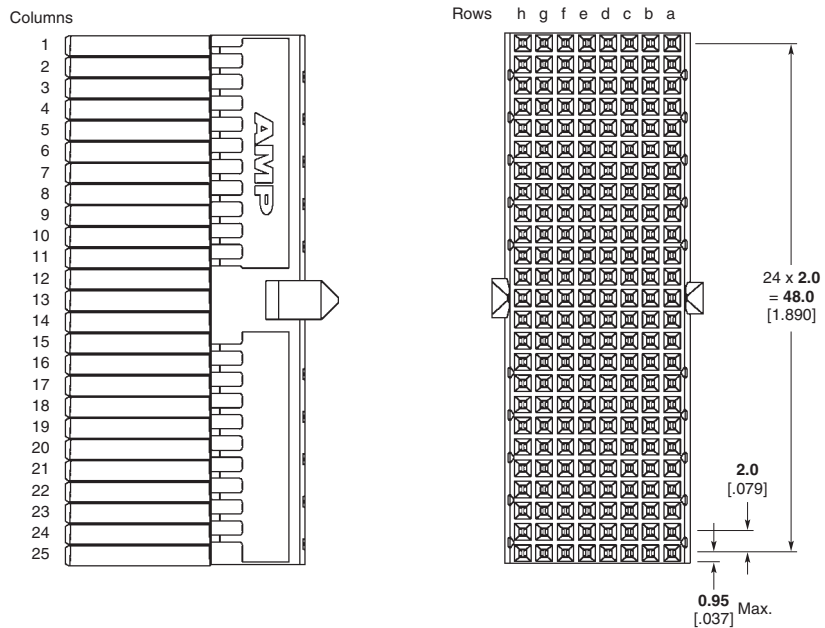
Contact area 0.8µm [.000030] Au over 1.3µm [.000050] Ni

ACTION PIN Contact 0.5µm [.000020] Sn/Pb

over 1.3µm [.000050] Ni

**Board layout (see Customer Print)**

**Daughtercard thickness range of 1.4 - 4.3 [.055 - .169]**



Description	Part Numbers	
	Standard	Standard with Upper Shield
Type D/E	646728-1	646759-1

**4 & 4+1 Row Slim Connectors**

**4 & 4+1 Row Slim Connectors**

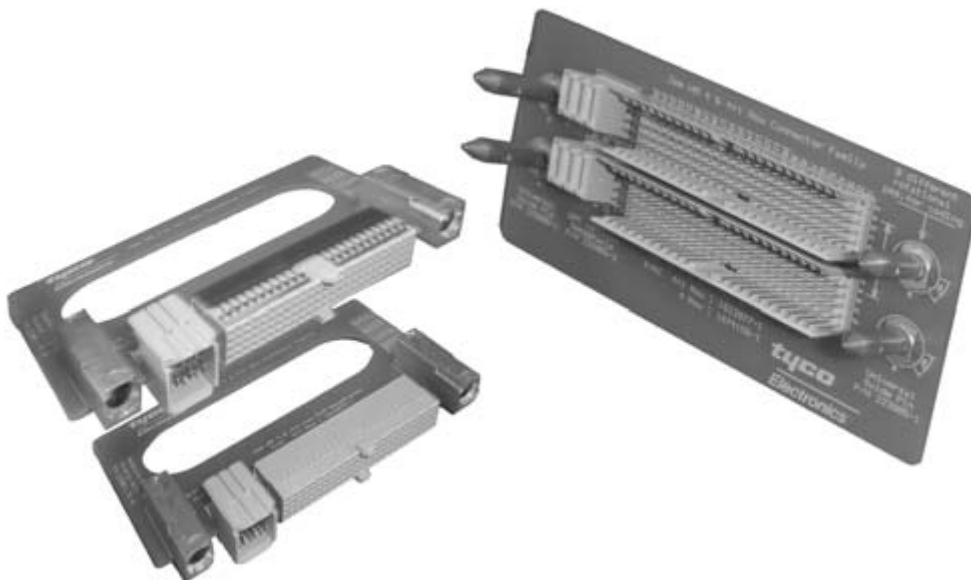
A newly designed Z-PACK 2mm HM 4 row & 4+1 row slim version of the Z-PACK Hard Metric (HM) 5 row standard backplane connector.

**Application**

This Z-PACK 2mm HM 4 row & 4+1 row slim connector is specifically designed to extend the Z-PACK 2mm Hard Metric standard connector product line. The connector enables the usage of Hard Metric practice in Telecommunications and Computer systems, as well as instrumentation applications with slot spacing as narrow as 15mm, giving excellent performance and mechanical characteristics at an economical price.

**Product Facts**

- Z-PACK 2mm HM 4 & 4+1 row slim version of HM 5 row standard connector
- Designed specifically to fit into a 15mm slot spacing and wider
- Designed in accordance with IEC 917-2-2 and IEC 61076-4-101 specifications
- Modular connector with basic module size of 50mm built in 2mm square grid
- Safe Design, complies with IEC950 in mated condition
- 1.4mm (55 mil) minimum backplane thickness
- 1.4 to 2mm (55 – 80 mil) daughtercard thickness range
- Supports applications at data rates up to 2.5 Gb/s (differential signaling) with edge rates of 100 psec., and 1:1 signal to ground ratio (10 pair/20mm), and up to 1.5 Gb/s (differential signaling) under same conditions but with 3:1 signal to ground ratio (15 pair/20mm)



Description	Part Number
Right Angle Receptacle 4 row Type A/B with upper shield	1612872-1
Vertical Header 4+1 row Type A/B (122 pos.)	1612877-1
Right Angle Receptacle 4 row Type A/B	1612913-1
Vertical Header 4 row Type A/B (100 pos.)	1674156-1
<b>Insertion Tools</b>	
Vertical Header	1-715836-1
Right Angle Receptacle	1596463-1

**4 & 4+1 Row Slim Connectors (Continued)**

**Product Dimensions**

**Typical Electrical Properties**

**Flexible Pin Assignment for Differential Pair**

—Max. Noise at 100ps Edge Rate  
 (AA)S — G = 1:1 Across the Column  
 Suitable for Data Rate — 2.5 Gb/s and up  
 Near End Noise — 3.4%  
 Far End Noise — 1.4%  
 (BB)S — G = 1:1 in Column  
 Suitable for Data Rate — 2.5 Gb/s and up  
 Near End Noise — 1.8%  
 Far End Noise — < 1%  
 (CC)S — G = 3:1  
 Suitable for Data Rate — 1.5 Gb/s  
 Near End Noise — 6.4%  
 Far End Noise — < 1%

**Flexible Pin Assignment for Single Ended**

—Max. Noise at 500ps Edge Rate  
 S — G = 1:1  
 Frequency — 200MHz (Max 400 Mb/s)  
 Near End Noise — 4.0%  
 Far End Noise — 1.2%

**Technical Documents**

**Focus on Global Standards Consortium**

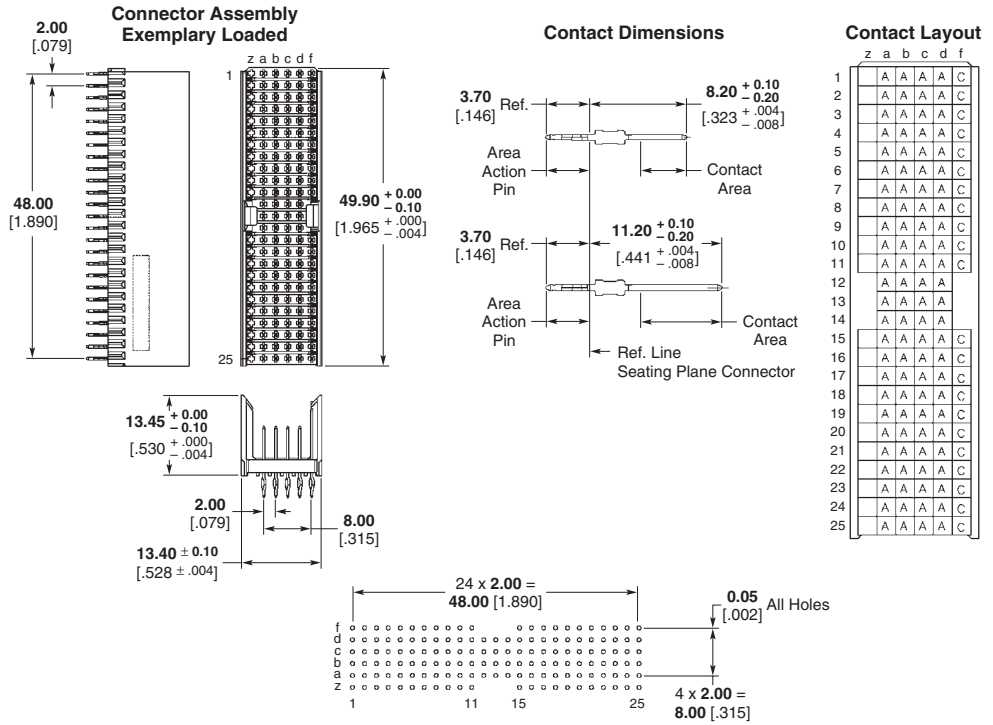
**Base Station**

OBSAI (Open Base Station Architecture Initiative) Established in Oct/02: <http://www.obsai.org/index.asp> Nokia/Samsung/LG/Hyundai/Syscom/ZTE

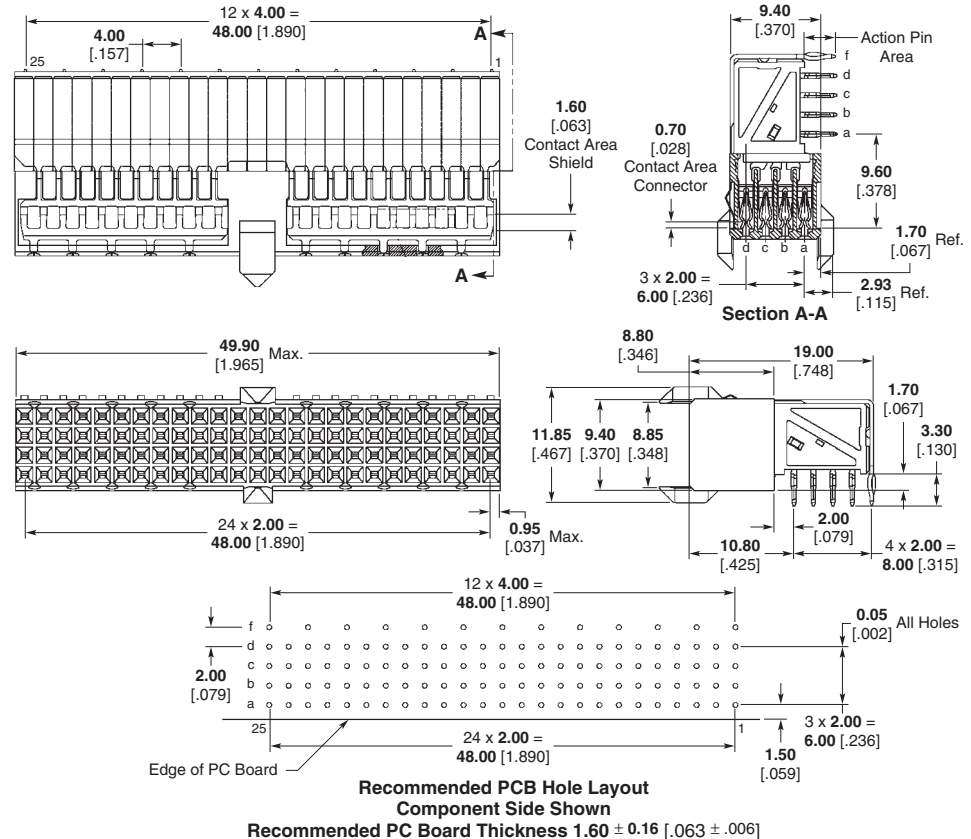
**E-PON (Ethernet Passive Optical Network)**

Not Standards yet but some Ad-hoc level working group in IEEE802.3 <http://www.ieee802.org/3/efm/baseline/index.html>

**Vertical Header**

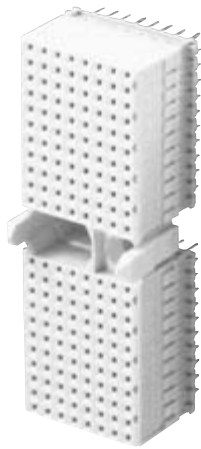


**Right Angle Receptacle**





**Vertical Female Connectors, 8 Row, Types D, E, and F**



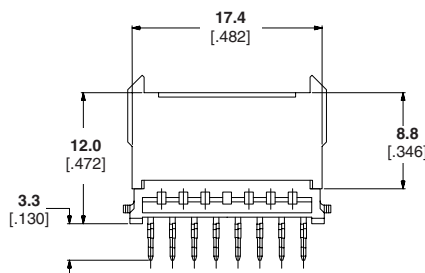
Type D Shown

**Vertical Female Connector**

Type D, E, and F mate with respective vertical male connectors shown on page 18. They are used in stacking applications offering high density in a limited space.

**Materials and Finish**

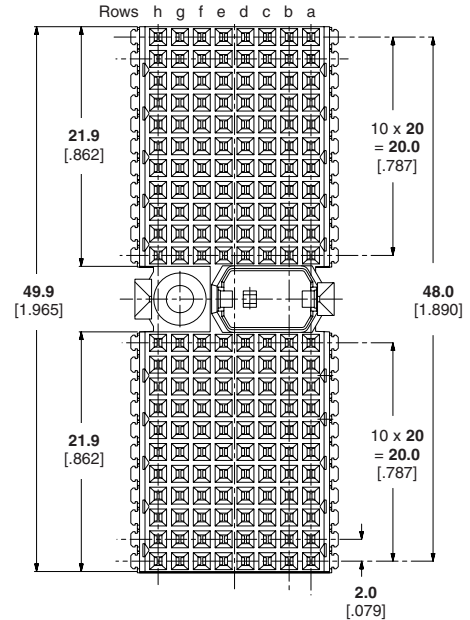
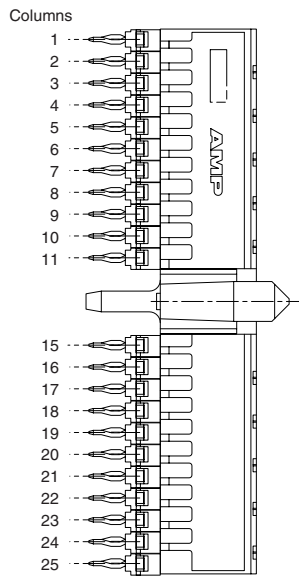
- Glass filled polyester housing, gray, UL94 V-O rated
- Phosphor-bronze signal contacts
- Contact area 0.8µm [.000030] Au over 1.3µm [.000050] Ni
- ACTION PIN Contact 0.5µm [.000020] Sn/Pb over 1.3µm [.000050] Ni



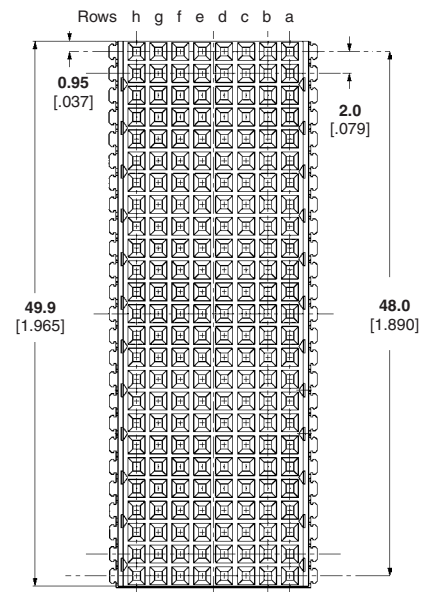
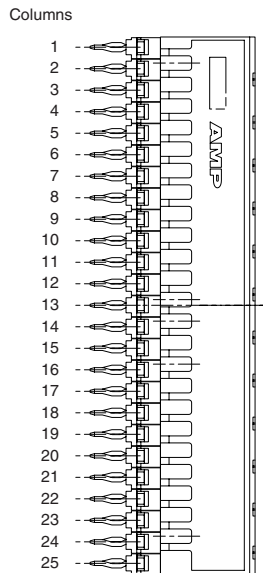
Type F Shown

Description	Part Numbers
Type D	646538-1
Type E	646539-1
Type F	646540-1
Type D/E	646773-1

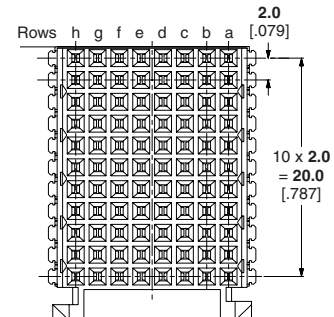
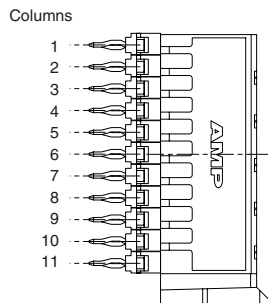
**Type D**



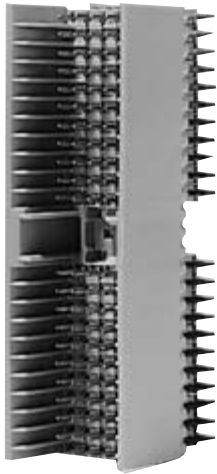
**Type E**



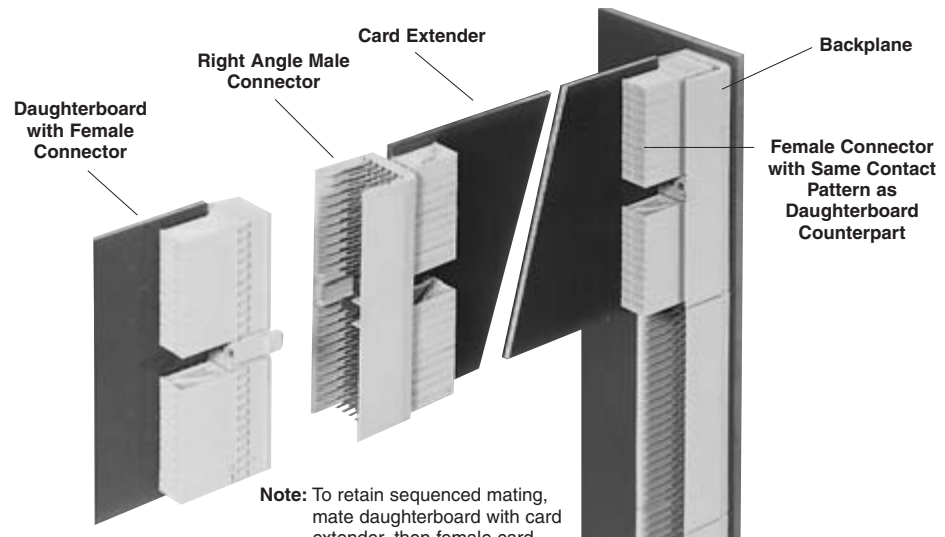
**Type F**



**Right Angle Male Connectors, Type A, B, C**



**Arrangement**



**Note:** To retain sequenced mating, mate daughterboard with card extender, then female card extender connector with male on backplane.

**Right Angle Male Connector**

Used for card extender and reverse sex daughter-to-backplane application

Types A, B and C connectors mate with respective right angle female connectors for card extenders and with vertical female connectors for reverse sex connection. Refer to pages 13 and 27.

Type A has 110 contacts with center guiding and keying facility; Type B has 125 contacts and Type C has 55 contacts with guiding feature. Standard versions have pins with mating level 1; see page 47 for other options.

Two performance levels are available; standard and reduced crosstalk

**Performance Data pages 6-7.**

**Materials and Finish**

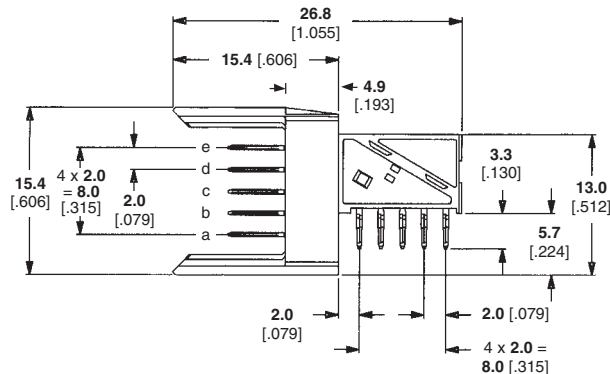
Glass filled polyester housing, gray, UL94 V-0 rated  
 Contact area 0.8µm [.000030] Au over 1.3µm [.000050] Ni  
 ACTION PIN Contact 0.5µm [.000020] Sn/Pb over 1.3µm [.000050] Ni

**Coding keys for type A page 47.**

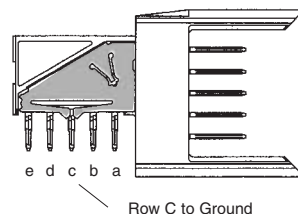
**Board layout page 69 for guidance only.**

**Side Elevation**

**Standard Version**



**Reduced crosstalk version.**  
 Same dimensions as standard version. Consult Tyco Electronics.



Description	Part Numbers	
	Standard	Reduced Crosstalk
Type A	106015-1	352271-1
Type B	106014-1	352272-1
Type B 22col	352131-1	—
Type B 19col	352406-1	—
Type C	106012-1	352273-1