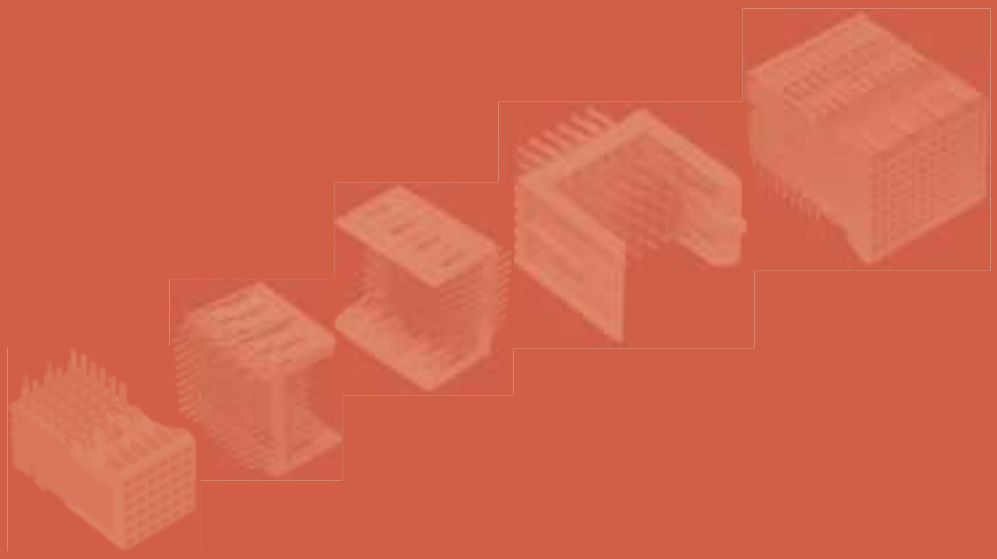
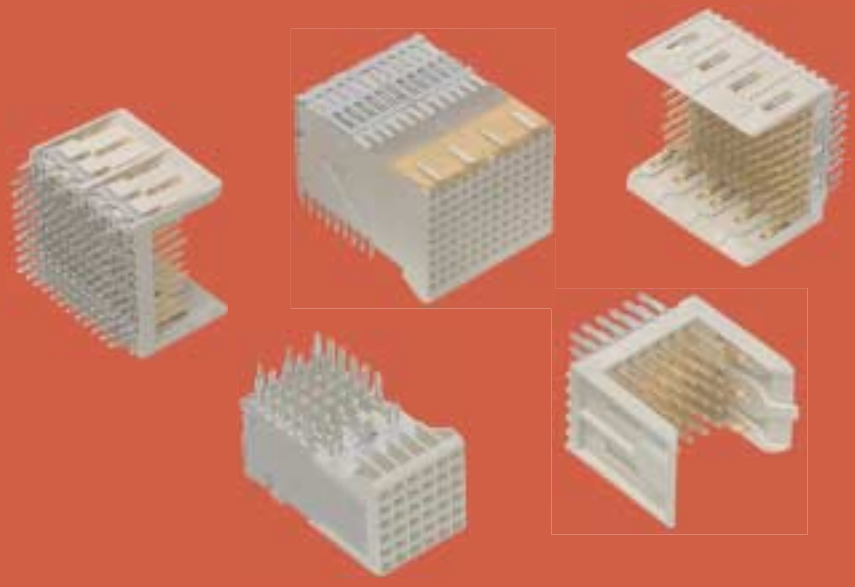


2003

Tempus HS Connector Series



Cannon

ITT Industries

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Contents

Introduction

PRODUCT OVERVIEW:

ITT Industries, Cannon's TEMPUS CBC-20-HS series is a 2 mm backpanel connector system consisting of receptacles and headers. Headers are available with outside ground shields (Series 1000) or with an outer shield in addition to column-wise stripline shields (Series 2000). Both headers mate to the Series 2000 receptacle, which has outer shielding top and bottom with unique column-wise stripline shielding.

Apart from these features, the HS series is similar to the Cannon TEMPUS CBC-20 Connectors in profile, footprint and mating interface. The stripline structure and shields allow the Tempus HS Series to have improved signal performance when routed in either a single-ended or a differential pair configuration.

The Tempus HS product line is designed to conform to the same equipment practice as all other CBC-20 products. This gives the customer access to the largest variety of complementary products and sources within the backplane connector market.

Standards

The Cannon Tempus HS product is designed to meet the identical product standards as FCI to assure our products are form, fit and function compatible. The HS product standard is also drafted to be compatible with the existing equipment practice defined in IEC 61076-4-104.

Product standard:
·CAS-21031 (5-row)
·CAS-21032 (8-row)

Environmental:
·Telcordia GR-1217-CORE (pending)

Flammability:
·UL 94V-0

Testing and Qualification

Full test reports are available upon request:
Signal Integrity Validation Report: 02072K

General Data

GENERAL:
ITT Industries, Cannon TEMPUS CBC-20-HS 1000 and 2000 Series are consistent with standard TEMPUS. The system is a typical right-angle female socket on the removable daughtercards and vertical male header on the backplane. Both mating halves are offered with press-fit termination.

Contact Pitch
2.00 x 2.00 (.079 x .079)

Standard Contact Mating Lengths
5.00, 5.75, 6.50, 7.25. and 8.00.
Rear plug-up lengths of 13.6 and 17.0 are also standard.

Standard module arrangements

Number of Contacts	Layout	Module Length
30	5 X 6	12.0
96	8 X 12	24.0

Contact Arrangements
Refer to relevant connector design notes, all arrangements are standardized in accordance with IEC, EIA, and IEEE specifications.

Insulator Material
High-Temperature Thermoplastic

Flammability Rating
UL 94V-0

Contact Materials
Cu Alloy

Plating Options
Press-fit Area: Tin-Lead over Nickel base.
Contact Area: Gold over Nickel base or Gold over Palladium Nickel over a Nickel base.

Electrical

Current Rating
1.0 A at 30°C T-rise above ambient, all pins powered.
2.0 A at 30°C T-rise above ambient, one contact powered.

Contact Resistance
Maximum initial contact resistance on signal contacts and on grounds 25 mΩ.

Insulation Resistance
>1000 MΩ at 500 VDC.

Voltage Proof
500 VDC or 500 VAC peak RMS or AC, 60 Hz.

Capacitance
<3.0 pF at 1MHz, 1V.

Inductance
<15 nH at 1 MHz

Propagation Delay
Prop delay <300 ps
Skew between rows < 40 ps

Measured at 500 ps risetime, 50 Ω reference impedance.

Characteristic Impedance
55±5 Ω single ended except where last column is unbounded by another connector, then 61±5 Ω single ended. Measured at 500 ps (10-90%).

Cross Talk
Please refer to the Signal Integrity Performance Report.

MECHANICAL:

Compliant Pin Terminal

	Backplane Male/Header	Daughtercard Female/Socket
Press-in	< 100 N	< 32 N
Push-out	> 20 N	> 7 N

Forces measured per pin average at 5.1mm/min.

Total 8x12 header insertion force shall not exceed 11,400 N.
Total 8x12 receptacle insertion force shall not exceed 3,776 N.

Repairability
3 repair cycles.

Radial hole distortion
<50 mm max, <37.5 mm average over 10.

PCB Hole Wall Damage
>7.5 mm min copper between pin and laminate. No cracks permitted.

PCB Thickness Recommendations
1.30 mm min BP & DC
2.50 mm max DC (5-row std)
3.40 mm max DC
(5-row wide-body & 8-row)

Mating/Unmating Force
Insertion < 0.55 N
Withdrawal >0.15 N
Per contact force measured at 25.4 mm/min.

	Max Mating
5 X 6	16.5 N [3.67 lbs]
8 X 12	52.8 N [11.75 lbs]

	Min Unmating
5 X 6	4.5 N [1.00 lbs]
8 X 12	14.4 N [3.20 lbs]

Connector Selection

Single-Ended Selection Table

Size	Connector	Density	Ground Configuration	Backward Crosstalk @ Signal Risetime 2 ns	1 ns	500 ps	200 ps
5 row	1000 Series	32 contacts/in.	Staggered (S/G=1/1)	0.9%	1.9%	3.6%	8.9%
	1000 Series	51 contacts/in.	Row C grounded	4.6%	8.8%	-	-
	2000 Series	51 contacts/in.	Row C grounded	4.4%	8.3%	-	-
	1000 Series	63 contacts/in.	None	9.4%	-	-	-
8 row	1000 Series	50 contacts/in.	Staggered (S/G=1/1)	1.1%	2.5%	4.6%	8.7%
	1000 Series	76 contacts/in.	Rows C and F grounded	4.8%	9.6%	-	-
	2000 Series	76 contacts/in.	Rows C and F grounded	4.7%	9.2%	-	-
	2000 Series	101 contacts/in.	None	9%	-	-	-

The single-ended selection table gives an estimate of the worst-case noise to be expected for a given HS connector in a particular grounding pattern. Starting with a particular signal edge rate, the table will tell what the theoretic worst-case noise is for the listed configurations. This can be weighed against the signal density requirement to select the 5 or 8 row version required.

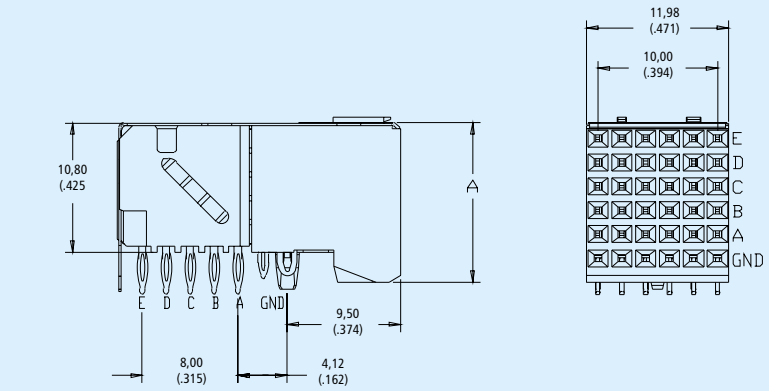
Differential Pair Selection Table

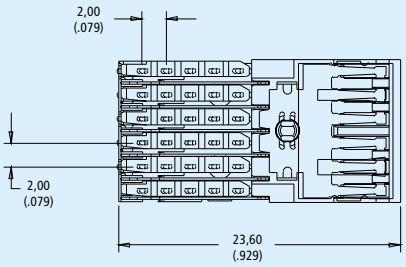
PCB Material	Size	Density	Connector	Maximum Trace Length @ Bit Rate 1.25 Gb/s	2.5 Gb/s	3.2 Gb/s
FR-4	5 row	25 pairs/in.	1000 Series	1.25 m	0.42 m	-
			2000 Series	1.40 m	0.52 m	0.32 m
	8 row	38 pairs/in.	1000 Series	1.25 m	0.42 m	-
			2000 Series	1.40 m	0.52 m	0.32 m
Rogers 4350	5 row	25 pairs/in.	1000 Series	>1.50 m	0.66 m	0.50 m
			2000 Series	>1.50 m	0.80 m	0.65 m
	8 row	38 pairs/in.	1000 Series	>1.50 m	0.66 m	0.45 m
			2000 Series	>1.50 m	0.80 m	0.65 m

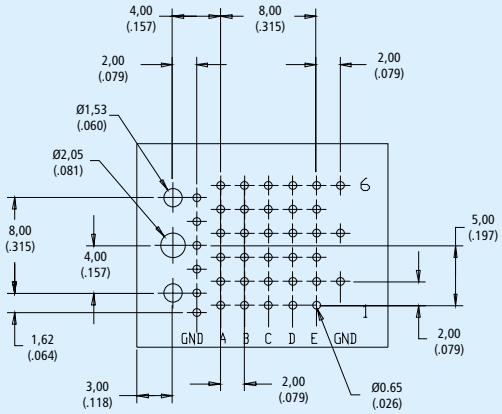
The differential pair selection table compares the connector versions based on simulated system link. For each connector and two popular PCB materials, the table lists the length of the backplane trace where the signal losses become unacceptable.

The data in these tables was compiled from simulations using standard PCB manufacturing rules and edge-coupled traces for differential pairs. Other board materials and advanced design rules can improve the signal performance from that shown.

5-ROW - FEMALE SIGNAL MODULES







Recommended P.C.B. Hole Pattern
Component Side

Refer to Design Notes on page 14 for circuit board drill and hole plating details.

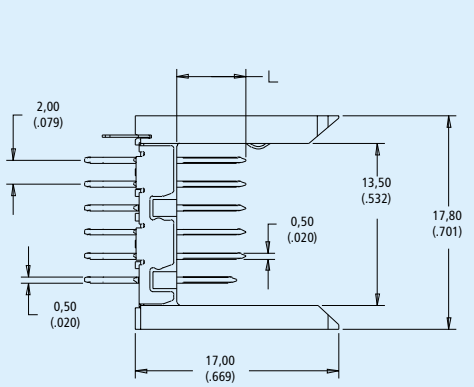
(1) (Refer to Customer Drawing Number K026717Y2011.)

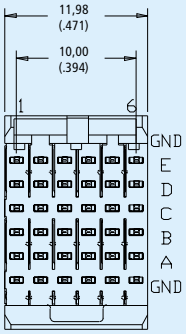
(2) (Refer to Customer Drawing Number K026717Y2020.)

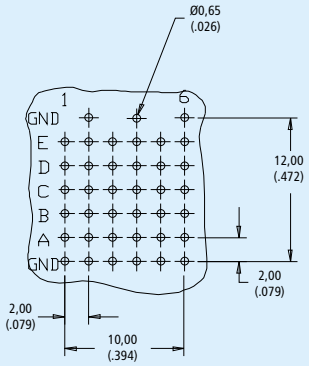
No. of Signal Positions	Part Number	Version	PCB Thickness	Dim 'A'
30	CBC20HS2000-030FDP1-500- y -VR	Standard(1)	1,3 - 2,5 (.05-.10)	13,3 (.52)
30	CBC20HS2000-030FXP1-500- y -VR	Wide-Body(2)	1,3 - 3,4 (.05-.13)	14,3 (.56)

y : **Plating Selection:** 1 : 0.7 µm PdNi (Palladium Nickel)
2 : 1.27µm Au (Gold)
3 : 0.8 µm Au (Gold)

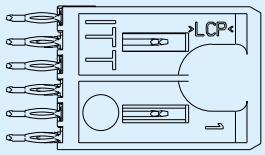
5-ROW - MALE SIGNAL MODULES

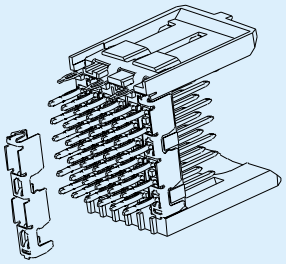






Recommended P.C.B. Hole Pattern
Component Side





Refer to Design Notes on page 14 for circuit board drill and hole plating details.

* (Refer to Customer Drawing Number K026717Y2010.)

* * (Refer to Customer Drawing Number K026717Y2018.)

Part Number Nomenclature: CBC20HSwwww-030WDP3-zzz-y-VR

***wwww* : Series Number:**

1000 = without stripline shield *

2000 = with stripline shield * *

***y* : Plating Selection:**

1 : 0.7 µm PdNi (Palladium Nickel)

2 : 1.27µm Au (Gold)

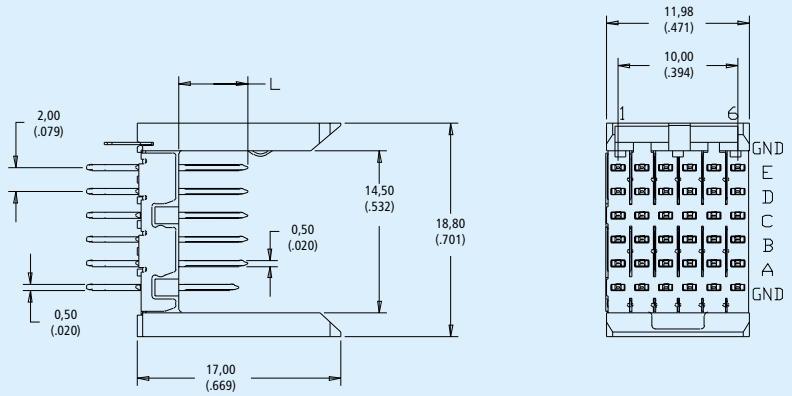
3 : 0.8 µm Au (Gold)

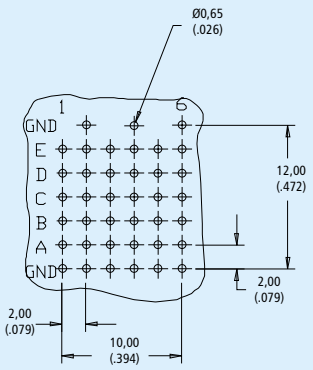
zzz : Sequencing/Pin Length, dim 'L':

Pattern No.*	GND-Row	Row-A	Row-B	Row-C	Row-D	Row-E
501	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)
502	5.00 (.196)	6.50 (.255)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)
503	5.00 (.196)	6.50 (.255)	5.75 (.226)	5.75 (.226)	6.50 (.255)	5.75 (.226)
505	5.00 (.196)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)
509	5.00 (.196)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)

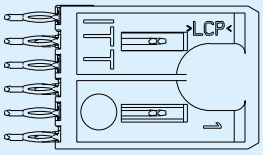
*Other loading patterns possible upon request.

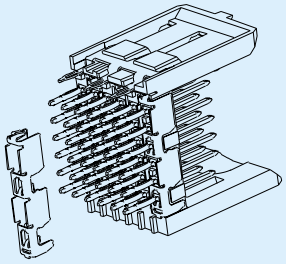
5-ROW - MALE SIGNAL MODULES - WIDE BODY





Recommended P.C.B. Hole Pattern
Component Side





Refer to Design Notes on page 14 for circuit board drill and hole plating details.

* (Refer to Customer Drawing Number K026717Y2016.)

* * (Refer to Customer Drawing Number K026717Y2025.)

Part Number Nomenclature: CBC20HSwwww-030WXP3-zzz-y-VR

wwww : Series Number: 1000 = without stripline shield *
2000 = with stripline shield * *

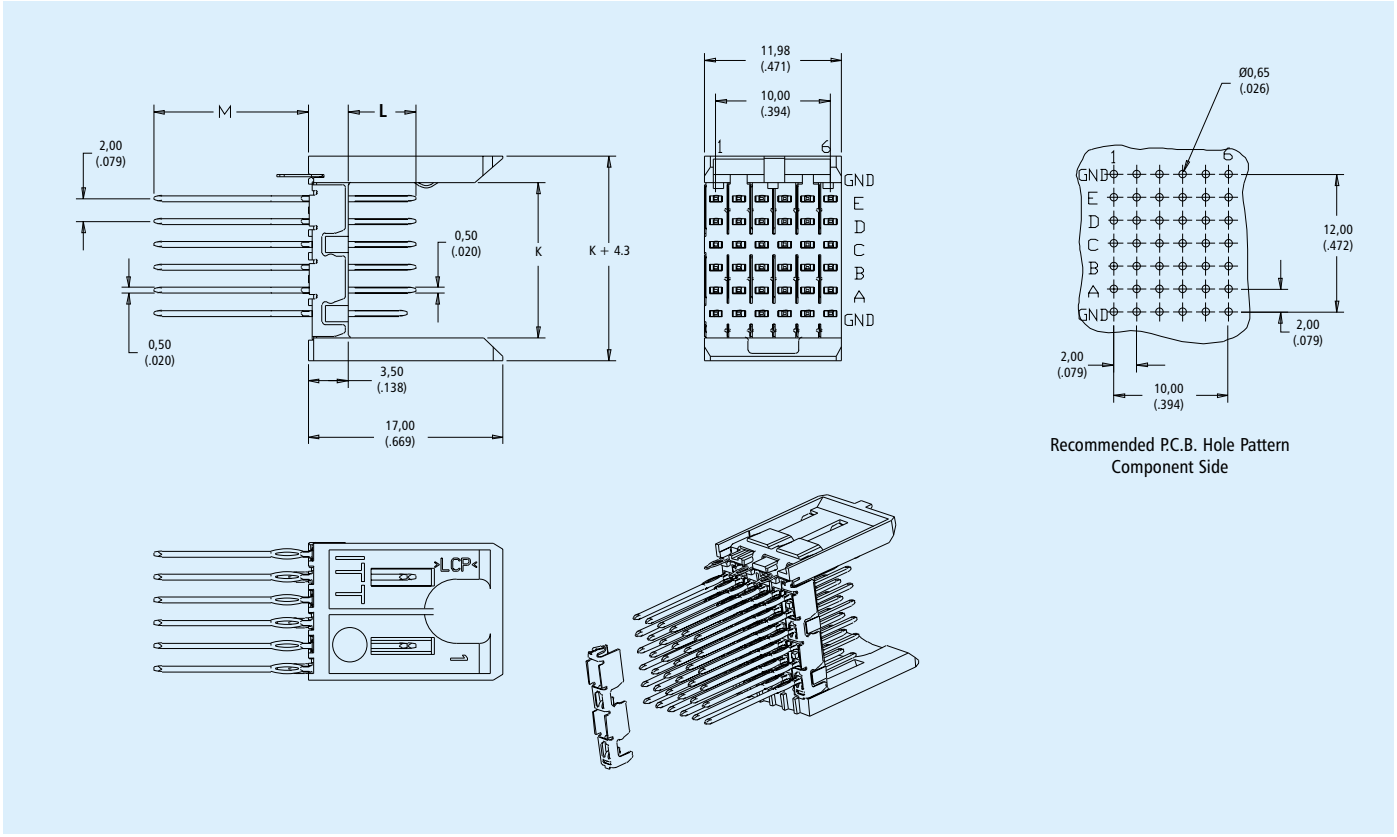
***y* : Plating Selection:** 1 : 0.7 µm PdNi (Palladium Nickel)
2 : 1.27µm Au (Gold)
3 : 0.8 µm Au (Gold)

zzz : Sequencing/Pin Length, dim 'L':

Pattern No.*	GND-Row	Row-A	Row-B	Row-C	Row-D	Row-E
501	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)
502	5.00 (.196)	6.50 (.255)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)
503	5.00 (.196)	6.50 (.255)	5.75 (.226)	5.75 (.226)	6.50 (.255)	5.75 (.226)
505	5.00 (.196)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)
509	5.00 (.196)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)

*Other loading patterns possible upon request.

5-ROW - MALE SIGNAL MODULES - FEED-THROUGH



Refer to Design Notes on page 14 for circuit board drill and hole plating details.

(1)* (Refer to Customer Drawing Number K026717Y2021.)
(2)* (Refer to Customer Drawing Number K026717Y2022.)
(1)* * (Refer to Customer Drawing Number K026717Y2027.)
(2)* * (Refer to Customer Drawing Number K026717Y2028.)

Part Number Nomenclature : CBC20HSwwww-030Wuvv-zzz-y-VR

***wwww* : Series Number:**

1000 = without stripline shield *
2000 = with stripline shield * *

***u* : Housing Version:**		**Dim 'K'**	**PCB Thickness**
u = D	Standard (1)	13.50 (.532)	1.20 - 2.50 (.047 - .098)
u = X	Wide-Body (2)	14.50 (.571)	1.20 - 3.40 (.047 - .134)

***y* : Plating Selection:**

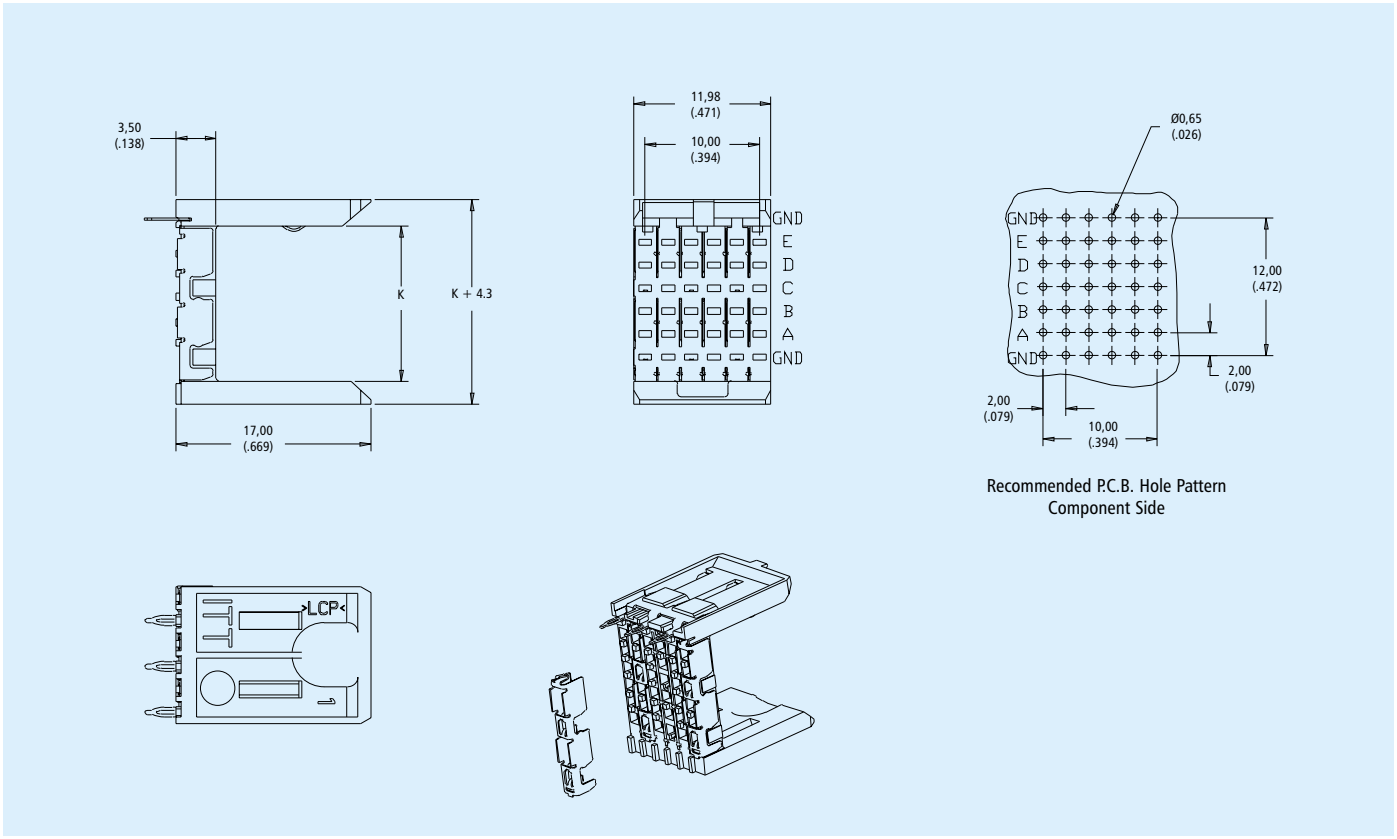
1 : 0.7 µm PdNi (Palladium Nickel)
2 : 1.27 µm Au (Gold)
3 : 0.8 µm Au (Gold)

vv-zzz : Sequencing/Pin Length:

Pattern No.*	Dim 'L'		Dim 'M'
vv-zzz	GND -Row	Signals A-F	All
U1-501	5.00 (.196)	5.00 (.196)	13.60 (.535)
U1-503	5.00 (.196)	6.50 (.255)	13.60 (.535)
U1-509	5.00 (.196)	5.75 (.226)	13.60 (.535)
V2-501	5.00 (.196)	5.00 (.196)	17.00 (.669)
V2-503	5.00 (.196)	6.50 (.255)	17.00 (.669)
V2-509	5.00 (.196)	5.75 (.226)	17.00 (.669)

*Other loading patterns possible upon request.

5-ROW - MALE SIGNAL MODULES - SHROUDS



Refer to Design Notes on page 14 for circuit board drill and hole plating details.

(1)* (Refer to Customer Drawing Number K026717Y2023.)

(2)** (Refer to Customer Drawing Number K026717Y2029.)

Part Number Nomenclature : CBC20HSwwww-030R5u-y-VR

***wwww* : Series Number:**

1000 = without stripline shield*

2000 = with stripline shield **

***u* : Housing Version:**	**Dim 'K'**	**PCB Thickness**
u = D Standard (1)	13.50 (.531)	1.20 - 2.50 (.047 - .098)
u = X Wide-Body (2)	14.50 (.571)	1.20 - 3.40 (.047 - .134)

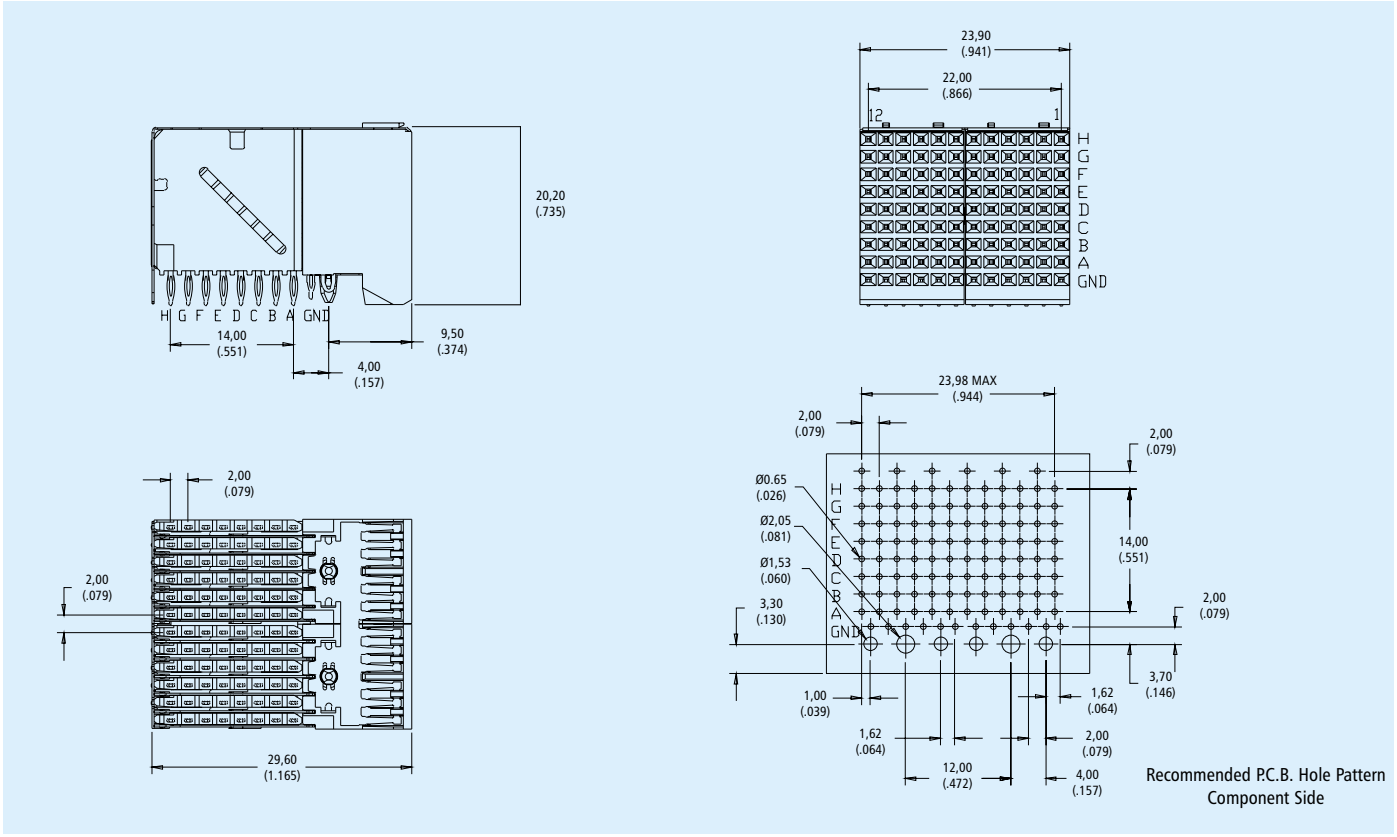
***y* : Plating Selection:**

1 : 0.7 µm PdNi (Palladium Nickel)

2 : 1.27 µm Au (Gold)

3 : 0.8 µm Au (Gold)

8-ROW - FEMALE SIGNAL MODULES

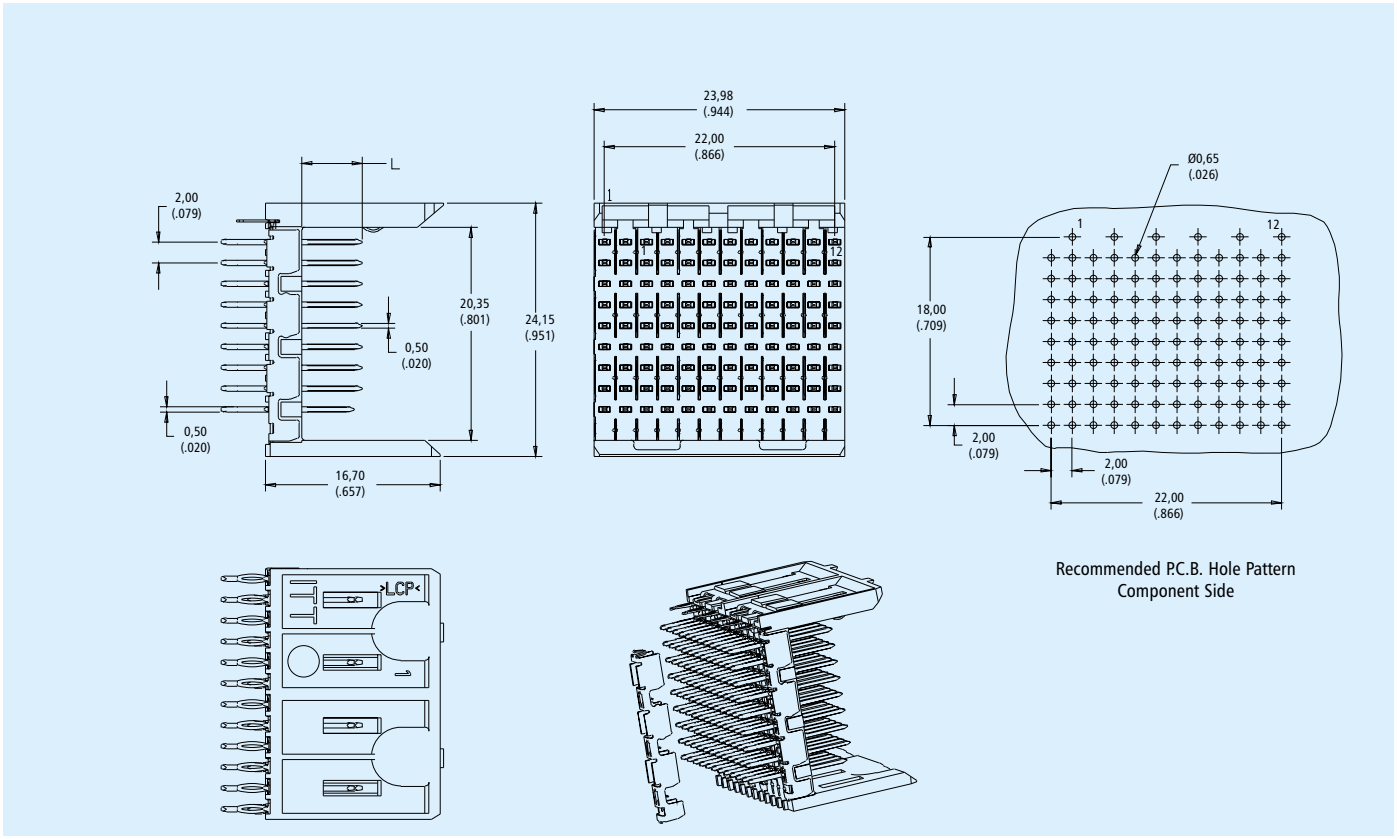


Refer to Design Notes on page 14 for circuit board drill and hole plating details.
(Refer to Customer Drawing Number K026717Y2015.)

No. of Signal Positions	Part Number	Version	PCB Thickness
96	CBC20HS2000-096FDP1-800-y-VR	Wide-Body	1,3 - 3,4 (.05 - .13)

y : **Plating Selection:** 1 : 0.7 µm PdNi (Palladium Nickel)
2 : 1.27µm Au (Gold)
3 : 0.8 µm Au (Gold)

8-ROW - MALE SIGNAL MODULES



Refer to Design Notes on page 14 for circuit board drill and hole plating details.

* (Refer to Customer Drawing Number K026717Y2013.)

* * (Refer to Customer Drawing Number K026717Y2019.)

Part Number Nomenclature: CBC20HSwwww-096WDP3-zzz-y-VR

***wwww* : Series Number:**
1000 = without stripline shield *
2000 = with stripline shield * *

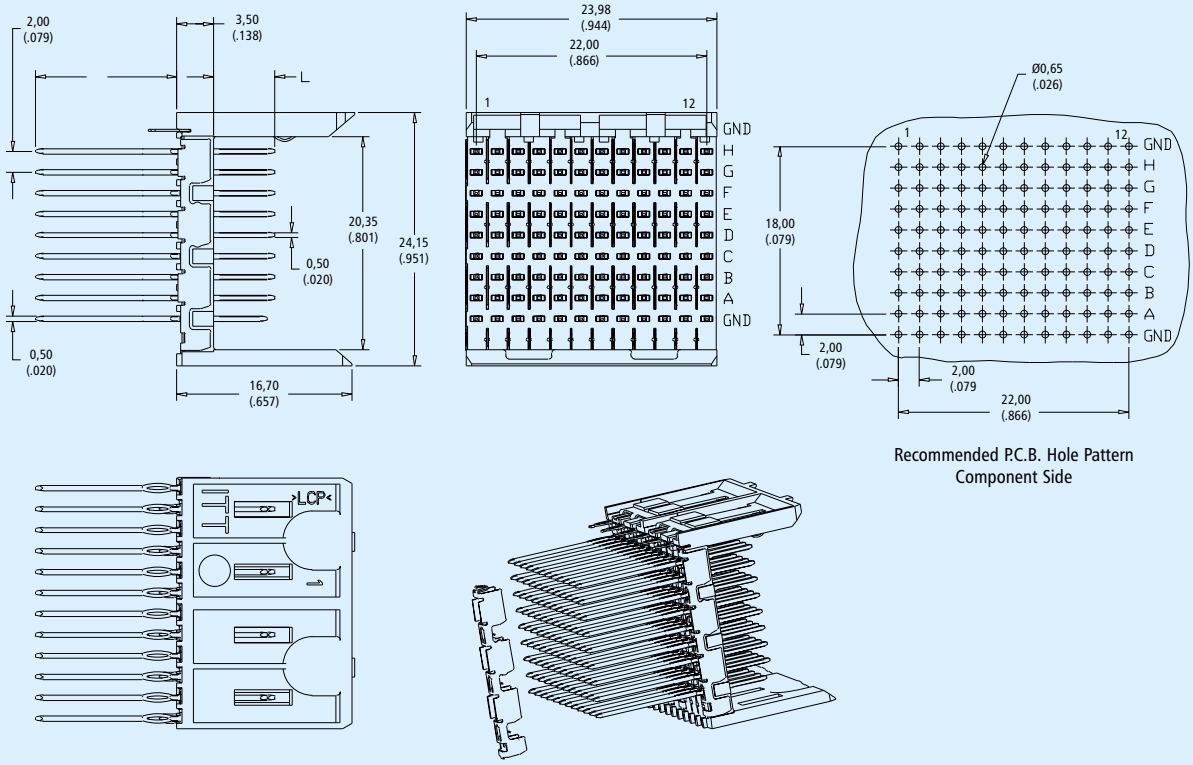
y : Plating Selection:
1 : 0.7 µm PdNi (Palladium Nickel)
2 : 1.27 µm Au (Gold)
3 : 0.8 µm Au (Gold)

zzz : Sequencing/Pin Length, dim 'L':

Pattern No.*	GND-Row	Row-A	Row-B	Row-C	Row-D	Row-E	Row-F	Row-G	Row-H
801	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)
805	5.00 (.196)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)
809	5.00 (.196)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)

*Other loading patterns possible upon request.

8-ROW - MALE SIGNAL MODULES - FEED-THROUGH



Recommended P.C.B. Hole Pattern
Component Side

Refer to Design Notes on page 14 for circuit board drill and hole plating details.

* (Refer to Customer Drawing Number K026717Y2024.)

* * (Refer to Customer Drawing Number K026717Y2030.)

Part Number Nomenclature : CBC20HSwwww-096WDvv-zzz-y-VR

wwww : Series Number:

1000 = without stripline shield *
2000 = with stripline shield * *

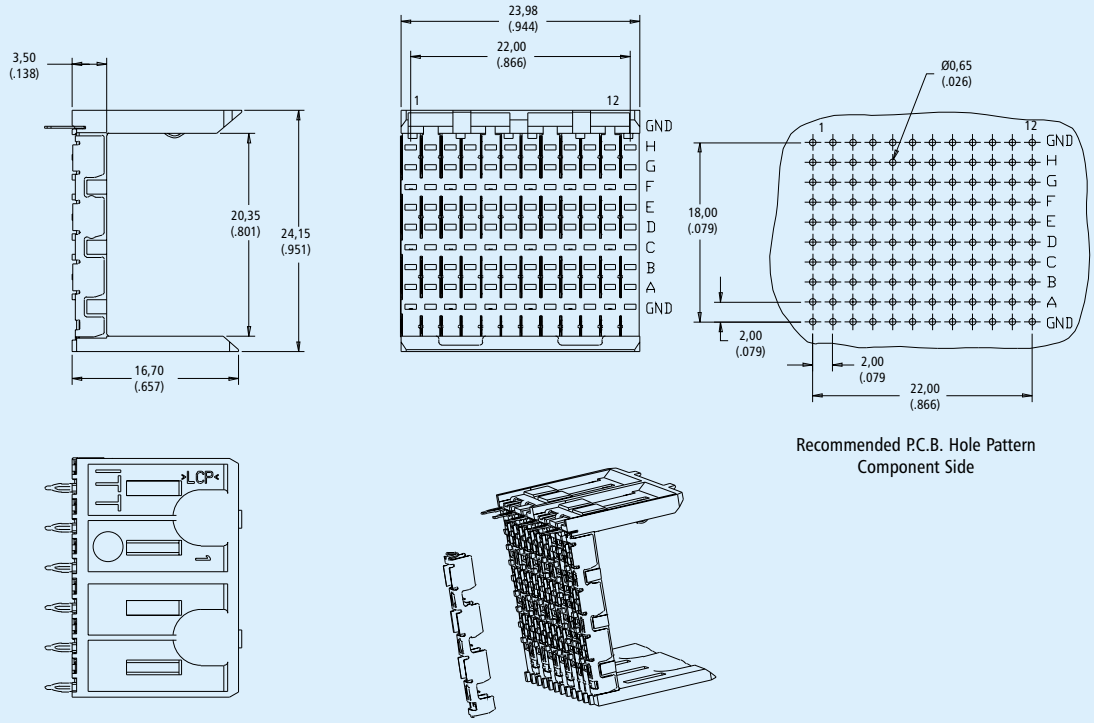
y : Plating Selection: 1 : 0.7 µm PdNi (Palladium Nickel)
2 : 1.27 µm Au (Gold)
3 : 0.8 µm Au (Gold)

zzz : Sequencing/Pin Length, dim 'L':

Pattern No.*	GND-Row	Row-A	Row-B	Row-C	Row-D	Row-E	Row-F	Row-G	Row-H
801	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)	5.00 (.196)
805	5.00 (.196)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)	6.50 (.255)
809	5.00 (.196)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)	5.75 (.226)

*Other loading patterns possible upon request.

8-ROW - MALE SIGNAL MODULES - SHROUDS



Refer to Design Notes on page 14 for circuit board drill and hole plating details.

* (Refer to Customer Drawing Number K026717Y2026.)

* * (Refer to Customer Drawing Number K026717Y2031.)

Part Number Nomenclature : CBC20HSwwww-096R8D-y-VR

wwww : Series Number:

1000 = without stripline shield *

2000 = with stripline shield * *

y : Plating Selection: 1 : 0.7 µm PdNi (Palladium Nickel)

2 : 1.27 µm Au (Gold)

3 : 0.8 µm Au (Gold)

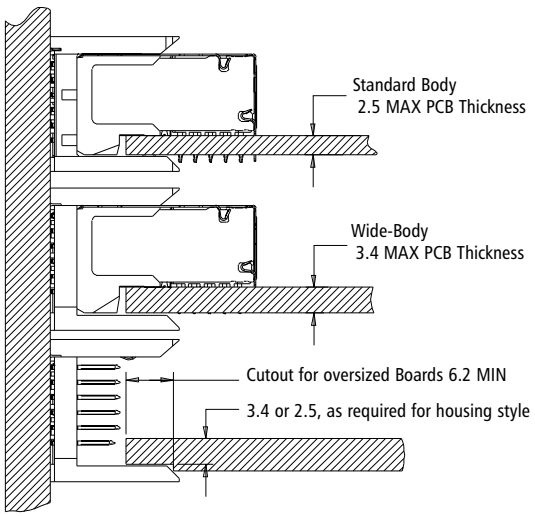
PLATING CROSS REFERENCE

Mating Area:	We Recommend: Tempus Plating : "Y"	Durability	Environment	If You Use: Metral * Plating: "X" Header	Receptacle
0.7 μm PdNi	1	1000 Cycles	TBA (Please contact product manager at ITT Industries, Cannon for detailed information)	5	9S
				9	9
1.27 μm Au	2	500 Cycles		3	3
				2	-
0.8 μm Au	3	250 Cycles		1	1

ASSEMBLY DRAWING REFERENCE

	1000 - Series		2000 - Series	
	Standard	Wide-Body	Standard	Wide-Body
5-Row Female	*(See 2000 Series)*		K026717Y2011	K026717Y2020
5-Row Male	K026717Y2010	K026717Y2016	K026717Y2018	K026717Y2025
5-Row Male Feed-Thru	K026717Y2021	K026717Y2022	K026717Y2027	K026717Y2028
5-Row Shroud	K026717Y2023		K026717Y2029	
8-Row Female	*(See 2000 Series)*		K026717Y2015	
8-Row Male	K026717Y2013		K026717Y2019	
8-Row Male Feed-Thru	K026717Y2024		K026717Y2030	
8-Row Shroud	K026717Y2026		K026717Y2031	

Wide-Body vs. Standard

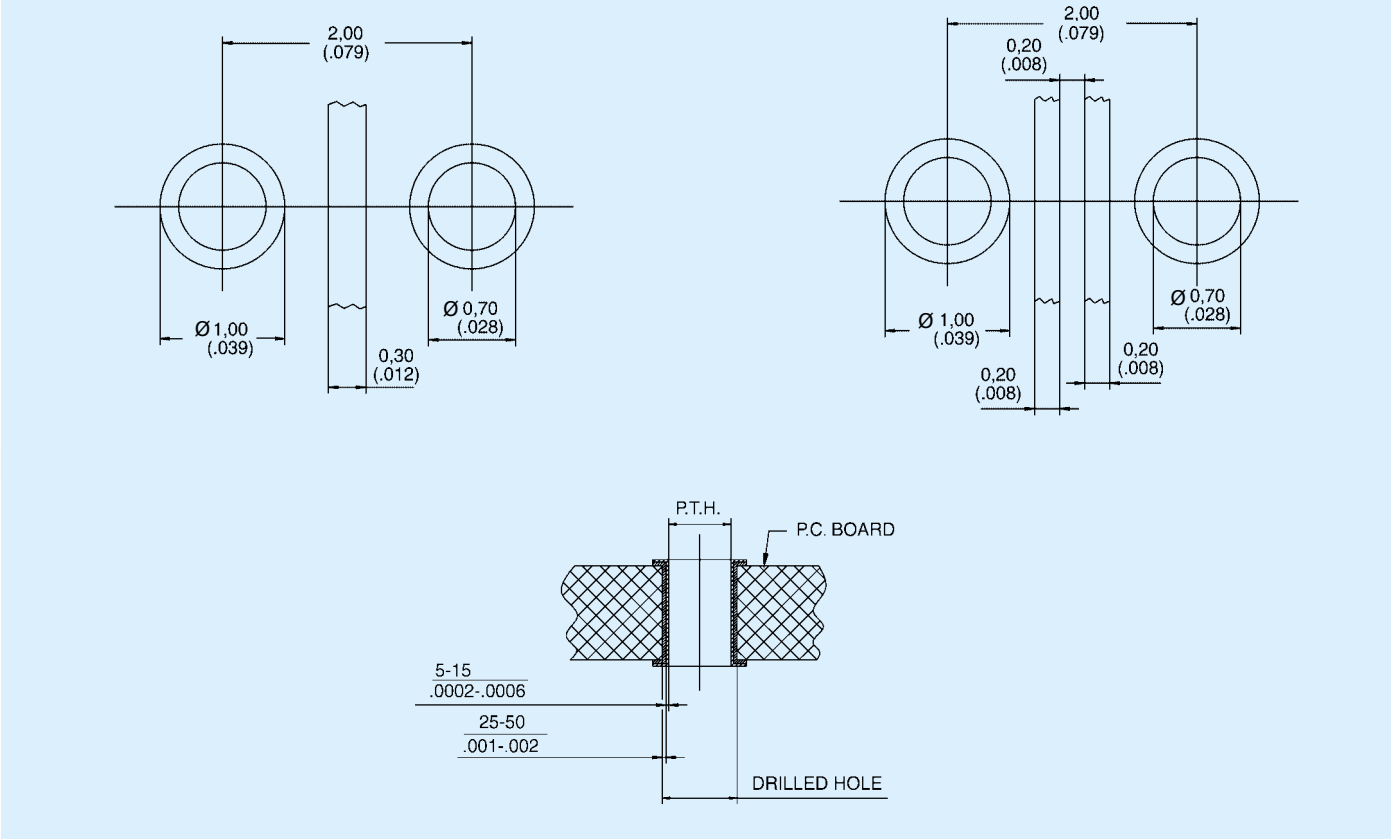


The "standard' housing style follows the rest of the Tempus product line in equipment practice. The standard only allows for up to 2.5 mm thick PCB's. With increased row count and increased signal speeds, it is likely that the daughtercard PCB will exceed 2.5 mm thick. For this reason, the "wide-body" version has been developed for the 5-row which allows up to 3.4 mm PCB thickness. This allowance is standard on 8-row.

If the PBC is larger than 3.4 mm, it is allowable to remove PCB material from the under side of the daughtercard at least 6.2 mm back from the edge as shown in the figure to the left. Care must be taken in this approach, since the first row of ground pins are 5 mm and the first signals are 7 mm from the card edge.

* Trademark of the FCI Corporation

HOLE GEOMETRY NOTES



The recommended plated through hole configuration is a tin-lead finish over copper. The Tempus products have been tested for repairability and environmental conformance with this design. It is acknowledged that for many reasons alternate hole finishes may be considered. Please note that although these treatments (such as OSP, immersion gold or immersion silver over copper) have been used successfully, they have not been verified to conform to Telcordia GR-1217-CORE.

APPLICATION AND REPAIR

The TEMPUS CBC-20-HS product line is designed to be compatible with standard CBC-20 press-fit assembly and repair methods. The system is supported by a full range of application tooling for prototype to mass-production volumes. For a complete overview of products available and instructions please refer to Cannon document CAS 25012E.

THIS NOTE MUST BE READ IN CONJUNCTION WITH THE PRODUCT DATA SHEET/ CATALOGUE.
Failure to observe the advice in this information sheet and the operating conditions specified in the Product Data Sheet /Catalogue could result in hazardous situations.

MATERIAL CONTENT AND PHYSICAL FORM
Electrical connectors do not usually contain hazardous materials. They contain conducting and non-conducting materials and can be divided into two groups.
a) Printed circuit types and low cost audio types which employ all plastic insulators and casings.
b) Rugged, fire barrier and high reliability types with metal casings and either natural rubber, synthetic rubber, plastic or glass insulating materials. Contact materials vary with type of connector and also application and are usually manufactured from either: Copper, copper alloys, nickel, alumel, chromel or steel. In special applications, other alloys may be specified.

FIRE CHARACTERISTICS AND ELECTRIC SHOCK HAZARD
There is no fire hazard when the connector is correctly wired and used within the specified parameters. Incorrect wiring or assembly of the connector or careless use of metal tools or conductive fluids, or transit damage to any of the component parts may cause electric shock or burns. Live circuits must not be broken by separating mated connectors as this may cause arcing, ionisation and burning.
Heat dissipation is greater at maximum resistance in a circuit. Hot spots may occur when resistance is raised locally by damage, e.g. cracked or deformed contacts, broken strands of wire. Local overheating may also result from the use of the incorrect application tools or from poor quality soldering or slack screw terminals. Overheating may occur if the ratings in the product Data Sheet/Catalogue are exceeded and can cause breakdown of insulation and hence electric shock.
If heating is allowed to continue it intensifies by further increasing the local resistance through loss of temper of spring contacts, formation of oxide film on contacts and wires and leakage currents through carbonisation of insulation and tracking paths. Fire can then result in the presence of combustible materials and this may release noxious fumes. Overheating may not be visually apparent. Burns may result from touching overheated components.

HANDLING
Care must be taken to avoid damage to any component parts of electrical connectors during installation and use. Although there are normally no sharp edges, care must be taken when handling certain components to avoid injury to fingers.
Electrical connectors may be damaged in transit to the customers, and damage may result in creation of hazards. Products should therefore be examined prior to installation/use and rejected if found to be damaged.

DISPOSAL
Incineration of certain materials may release noxious or even toxic fumes.

APPLICATION
Connectors with exposed contacts should not be selected for use on the current supply side of an electrical circuit, because an electric shock could result from touching exposed contacts on an unmated connector. Voltages in excess of 30 V ac. or 42.5 V dc are potentially hazardous and care should be taken to ensure that such voltages cannot be transmitted in any way to exposed metal parts of the connector body. The connector and wiring should be checked, before making live, to have no damage to metal parts or insulators, no solder blobs, loose strands, conducting lubricants, swarf, or any other undesired conducting particles.
Insulation resistance should be checked to make certain that no low resistance joints or spurious conducting paths are existing between contacts and exposed metal parts of the connector body. Further, the contact resistance of the connectors should be measured within the electrical circuit in order to identify high resistances, which result in excessive connector heating.

Always use the correct application tools as specified in the Data Sheet/Catalogue.

Do not permit untrained personnel to wire, assemble or tamper with connectors.

For operation voltage please see appropriate national regulations.

IMPORTANT GENERAL INFORMATION

(i) Air and creepage paths/Operating voltage
The admissible operating voltages depend on the individual applications and the valid national and other applicable safety regulations.
For this reason the air and creepage path data are only reference values. Observe reduction of air and creepage paths due to PC board and/or harnessing.

(ii) Temperature
All information given are temperature limits. The operation temperature depends on the individual application.

(iii) Other important information
Cannon continuously endeavours to improve their products. Therefore, Cannon products may deviate from the description, technical data and shape as shown in this catalog and data sheets.

(iv) Harnessing and Assembly Instructions
If applicable, our special harnessing and/or assembly instruction has to be adhered to. This is provided on request.

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