Amphenol® High Density HDB³ and HSB³ Connector Series

SL-402-1

HDB³
High Density

Amphenol Aerospace

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BRISTLE BRUSH ADVANTAGES

The superior choice for board level interconnects

The Bristle Brush contact has been proven in military avionics packages and meets the requirements of MIL-DTL-55302. It provides high density in tighter spacing which is a main concern for integrated electronics in aircraft systems.

Brush vs. Conventional Contacts

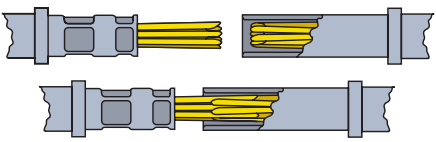
Brush Contact Innovation

- Multiple contact interfaces: Strands of high tensile strength wire are bundled together to form brush-like contacts. By intermeshing two multi-strand wire bundles, an electrical connection is made.
- Provides redundant current paths, 14-70 (point of contact) per mated contact with a gas tight junction.
- Very smooth (low friction) interface

Conventional Pin/Socket

- Machined surface finish on both parts
- Higher friction and wear
- Limited number of contact sites

BRUSH CONTACTS



CONVENTIONAL PIN AND SOCKET CRIMP CONTACTS

Amphenol Brush Contact Provides:

- Low mating forces (70% to 90% lower than conventional pin and socket contacts
- Easy mating/unmating makes high circuit counts practical (25 lbs. typical for 400 contacts)
- Multiple points of contact = superior electrical capability
  - Stable, low resistance-20milliohms max.
  - Redundant current paths
  - Proven electrical and gas tight contact sites
- Severe environment protection
- High current rating
- Long contact life (100,000 cycles of mating and unmating with out performance degradation)
- Documented intermittency-free performance - no 10 nanosecond discontinuities during 50,000,000 cycles of 0.010 displacement
- Overall cost effectiveness (life cycle cost)
- Protection against micro-arcing
- No degradation in a fretting/micro-motion environment

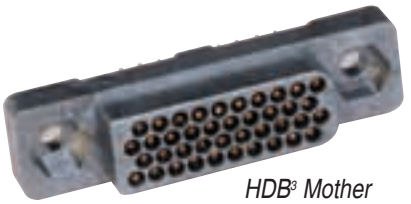
Amphenol operates a Quality System that is third party certified to ISO-9001-2008 and AS9100.

HIGH DENSITY BRUSH (HDB³) SERIES

HDB³ High Density Brush Series with tighter (.070 inch X .060 inch) staggered grid spacing

This new connector series of brush connectors incorporates a higher density contact pattern and lower mated height than Amphenol's standard low mating force rectangular connectors. HDB³ connectors utilize the same durable and reliable B³ brush contact in a tighter .070" X .060" staggered grid pattern. They offer the advantage of higher density in a compact-height connector utilizing less board space. Styles include mother board, daughter board, input/output and stacker.

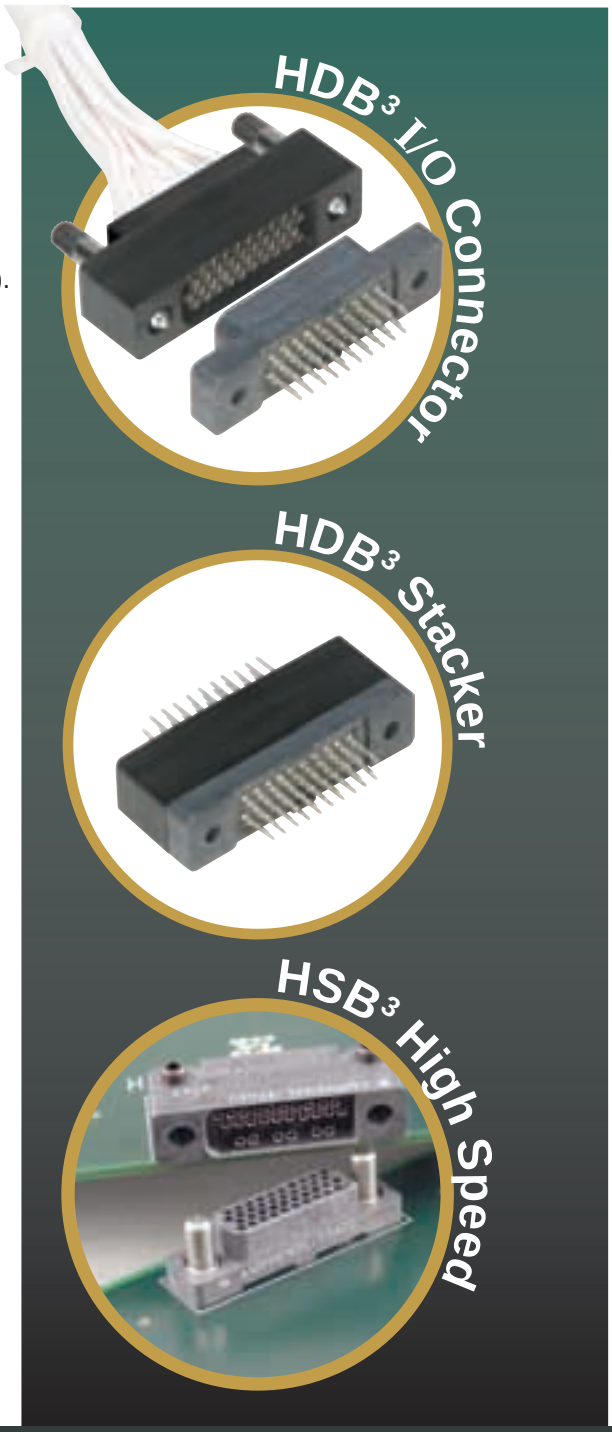
HDB³ Daughter Board Connector



HDB³ Mother Board Connector

HDB³ MATERIALS

Insulator:	Liquid crystal polymer, 30% glass filled	
Contact:	Wire:	Beryllium copper per ASTM B197; finish is gold per ASTM B488 over nickel per AMS-QQ-N-290.
	Holder:	Brass similar to UNS C33500; available finishes include gold per MIL-G-45204, tin-lead per MIL-P-81728 or tin per MIL-T-10727 (RoHS Compliant).
	Sleeve:	Stainless Steel per AMS-5514, passivated IAW QQ-P-35 (Daughter Board, I/O and Stacker connector)
Keys/Guide Pins:	Stainless Steel	



COMPARISON

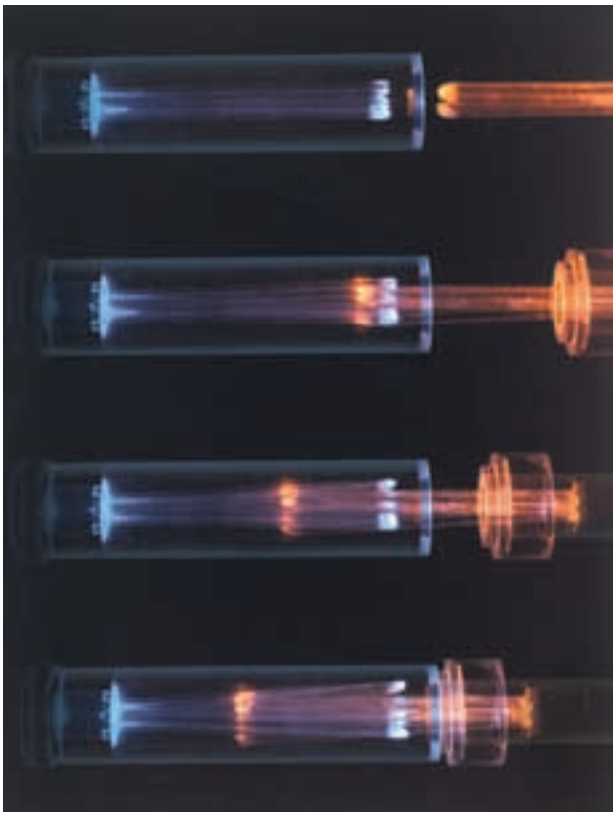
COMPARISON

The Amphenol HDB³ Connector offers advantages over competitive connectors:

- Higher density contact pattern
- Uses less board space
- Allows for shorter mated height
- Provides the durability and performance of the Brush contact
- Low cost

	Amphenol HDB³	Hypertronics HPH	Airborn RM4
Contact System	Brush	Hyperboloid	Pin & Socket
Durability, Mating Cycles	100,000	2,000	500
Contact Mating Forces, Ounces	1.5	1.5	2.5
Mother Board	.070 X .060	.075 X .075	.075 X .070
Daughter Board	.070 X .060	.075 X .100	.075 X .100
Connector Width	.350	.443	.400
Mated Height, MB to 4th row of DB	.680	.986	.915

PERFORMANCE



CONNECTOR PERFORMANCE

Durability:	100,000 mating cycles
Insertion/Extraction Force:	1.5 ounce typical per contact
Operating Temperature:	-65° to 125°C
Current Rating: maximum (load dependent)	2 amperes Hot swap 1 ampere
Insulation Resistance:	5 gigaohms minimum Dielectric Withstanding
Voltage:	750 volts, 60 hertz, rms @ Sea Level 250 volts, 60 hertz, rms @ 70,000 feet Elevation
Solderability:	MIL-STD-202, Method 208
Salt Fog:	48 Hours IAW MIL-STD-1344, method 1001, test condition B
Humidity:	IAW MIL-STD-1344, method 1002, type II
Vibration:	4 hours in each of 3 mutually perpendicular axes IAW MIL-ST 1344, method 2005, test condition V, letter H
Shock:	1 shock along each of three mutually perpendicular axes IAW MIL-STD-1344, method 2004,test condition G
Data Rate (HSB³):	Capable of 3.125 Gbps (consult Amphenol for arrangement)

FEATURES

FEATURES

Polarization:	“D” shaped design
Keying:	Optional keys offer 36 unique keying combinations
Guide Pins	Optional guide pins provide additional alignment
Radial Misalignment:	Capable of correcting up to a .020” initial radial misalignment
Angular Misalignment:	Capable of mating with up to a 2° initial angular misalignment

HDB³ & HSB³

HDB³ MOTHER BOARD – HOW TO ORDER

Mates with:
- Daughter Board
- I/O
- Stacker

1.	2.	3.	4.	5.	6.
	Number of Contacts	Brush Wire Plating	Termination	Contact Termination Finish	Less Hardware (Purchased separately see pg 10 for hardware options)
HDB-M4	**–040**	**M**	**24**	**2**	**X**

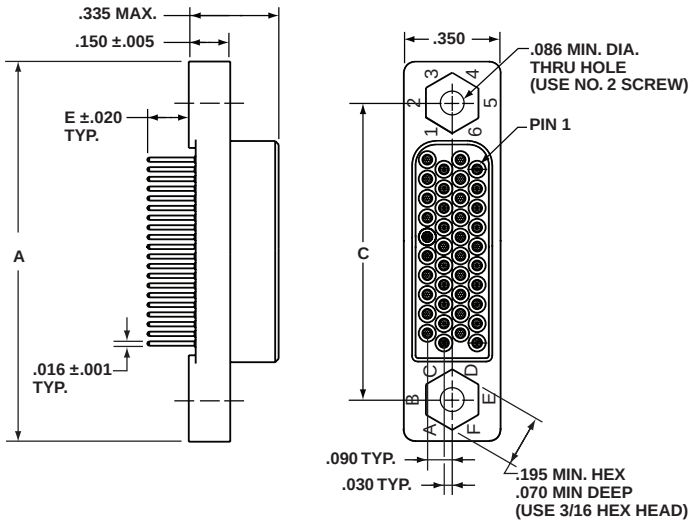
1. Connector Type

HDB-M4

Designates HDB³ Mother Board

2. Number of Contacts

	Number of Contacts	Dimension A	Dimension C
040	40	1.375	1.075
060	60	1.725	1.425
080	80	2.075	1.775
120	120	2.775	2.475
160	160	3.475	3.175



3. Brush Wire Plating

M	0.000050 Au Min. thick over Nickel
C	0.000020 Au Min. thick over Nickel

4. Termination

	Type	Stickout (Dim. E)
22	PCB, Straight, .016 Dia	0.120
23	PCB, Straight, .016 Dia	0.150
24	PCB, Straight, .016 Dia	0.180
26	PCB, Straight, .016 Dia	0.240
28	PCB, Straight, .016 Dia	0.300

5. Contact Termination Finish

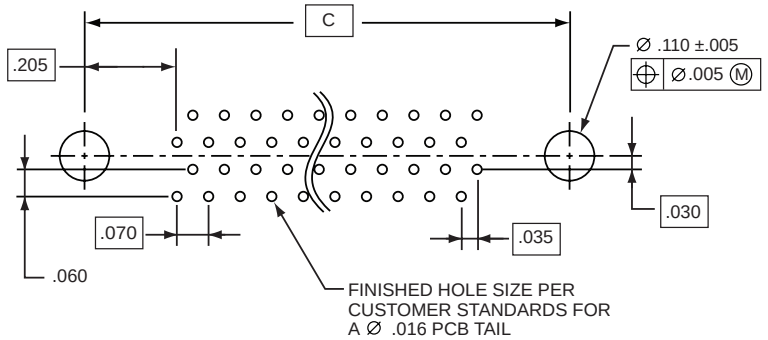
2	Gold plated in accordance with MIL-G-45204, Type II, .00030 Min. thick Gold over .000050 Min. thick Nickel
5	Tin plated in accordance with ASTM B545, .00010 Min. thick Matte Tin over .00010 Min. thick Nickel
6	Tin-Lead plated in accordance with SAE-AMS-P-81728, .00010 Min. thick Tin-Lead over .00010 Min. thick Copper

6. Hardware

X	Less Hardware

Hardware is purchased separately (see page 11 for hardware options).

MOTHER BOARD LAYOUT



HDB³ DAUGHTER BOARD – HOW TO ORDER

Mates with:
• Mother Board

1.	2.	3.	4.	5.	6.
	Number of Contacts	Brush Wire Plating	Termination	Contact Termination Finish	Less Hardware (Purchased separately see pg 10 for hardware options)
HDB-D4	–040	M	01	2	X

1. Connector Type
HDB-D4

Designates HDB³ Daughter Board

2. Number of Contacts

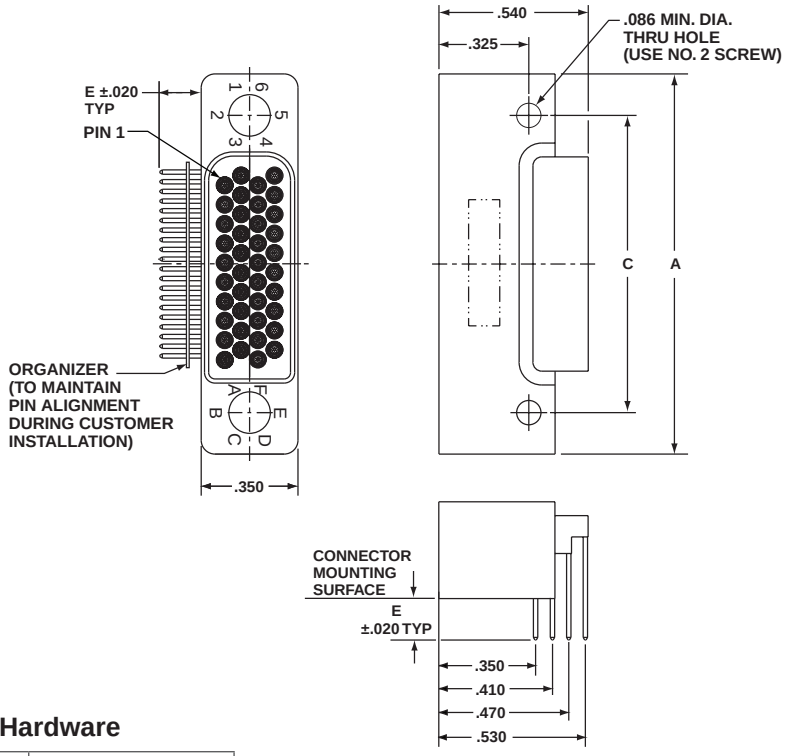
	Number of Contacts	Dimension A	Dimension C
040	40	1.375	1.075
060	60	1.725	1.425
080	80	2.075	1.775
120	120	2.775	2.475
160	160	3.475	3.175

3. Brush Wire Plating

M	0.000050 Au Min. thick over Nickel
C	0.000020 Au Min. thick over Nickel

4. Termination

	Type	Stickout (Dim. E)
01	PCB, Right Angle, .016 Dia.	0.090
02	PCB, Right Angle, .016 Dia.	0.120
03	PCB, Right Angle, .016 Dia.	0.150
04	PCB, Right Angle, .016 Dia.	0.180
06	PCB, Right Angle, .016 Dia.	0.300



5. Contact Termination Finish

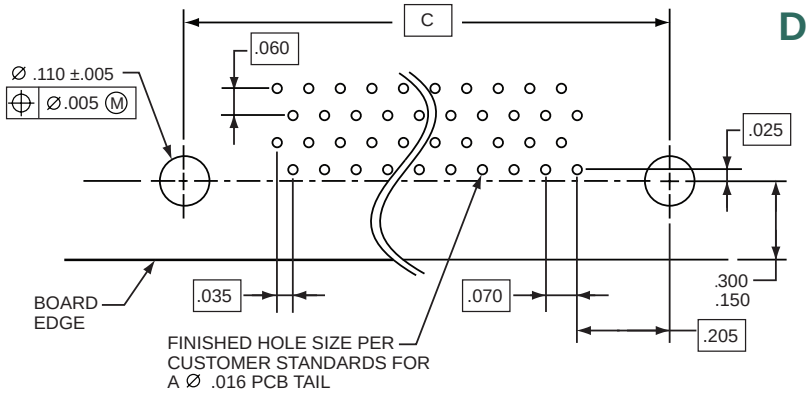
2	Gold plated in accordance with MIL-G-45204, Type II, .00030 Min. thick Gold over .000050 Min. thick Nickel
5	Tin plated in accordance with ASTM B545, .00010 Min. thick Matte Tin over .00010 Min. thick Nickel
6	Tin-Lead plated in accordance with SAE-AMS-P-81728, .00010 Min. thick Tin-Lead over .00010 Min. thick Copper

6. Hardware

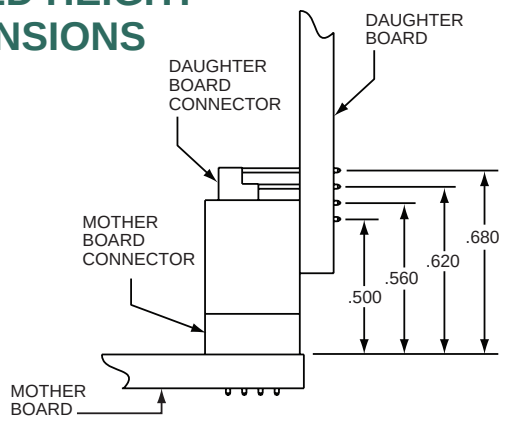
X	Less Hardware

Hardware is purchased separately (see page 11 for hardware options).

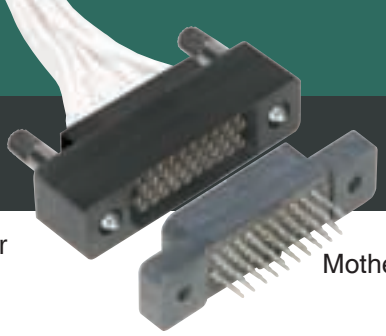
DAUGHTER BOARD LAYOUT



MATED HEIGHT DIMENSIONS



HDB³ I/O CONNECTOR



FEATURES/BENEFITS

- Cable to board applications
- Crimp termination
- Uses wire well size 22D

HDB³ I/O – HOW TO ORDER

Mates with:
- Standard Mother Board

1.	2.	3.	4.
	Number of Contacts	Brush Wire Plating	Contact Termination Finish
HDB-D4C	**–120**	**C**	**2**

1. Connector Type

HDB-D4C

Designates HDB³ I/0 Connector

2. Number of Contacts

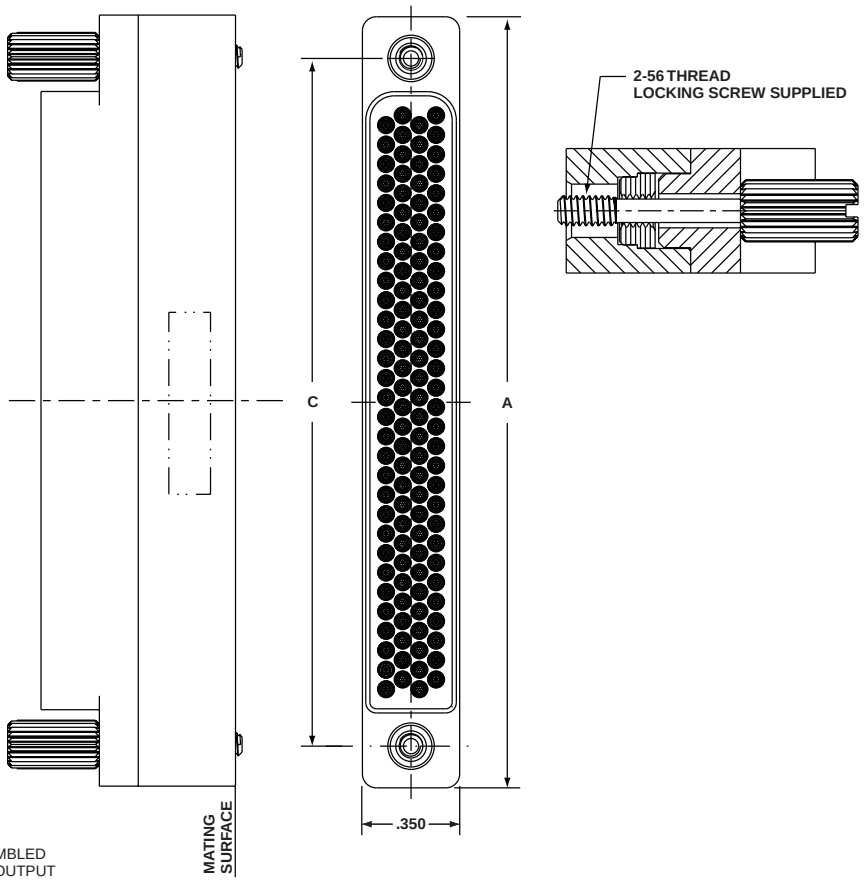
Number of Contacts	Dimension A	Dimension C
040	1.375	1.075
060	1.725	1.425
080	2.075	1.775
120	2.775	2.475
160	3.475	3.175

3. Brush Wire Plating

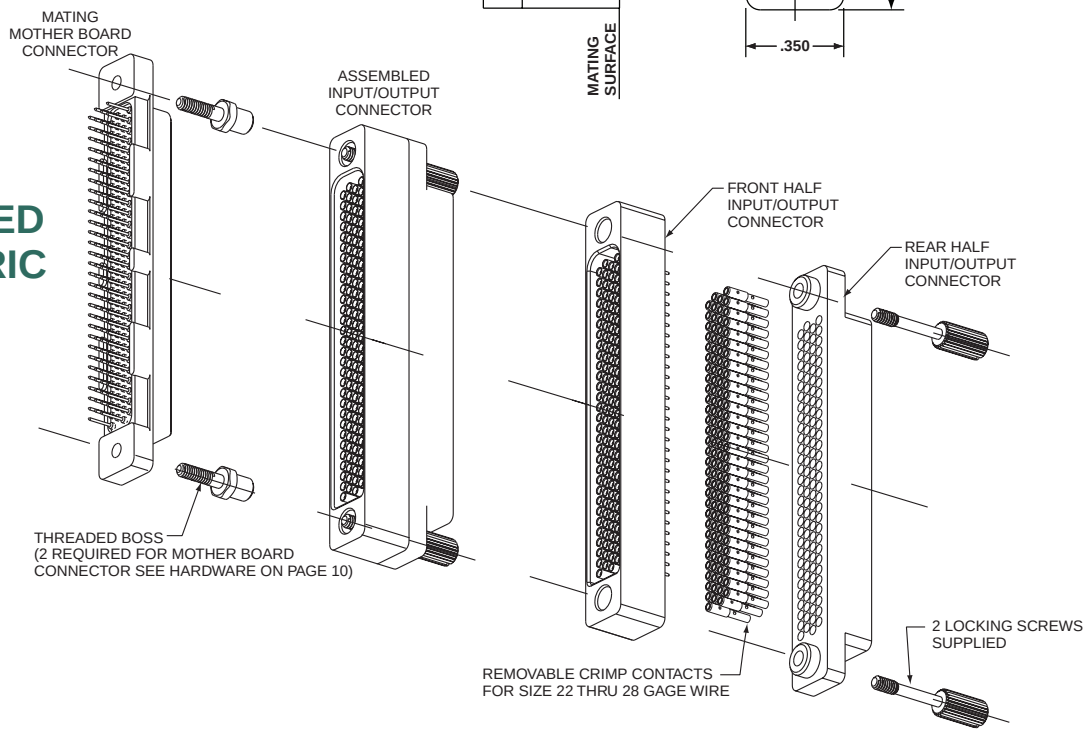
M	0.000050 Au Min. thick over Nickel
C	0.000020 Au Min. thick over Nickel

4. Contact Termination Finish

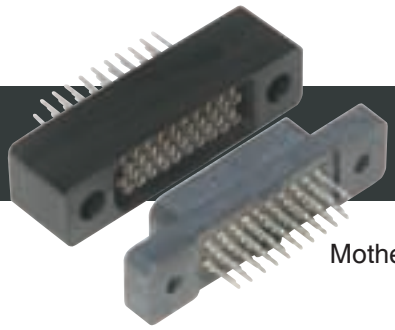
2	Gold plated in accordance with MIL-G-45204, Type II, .00030 Min. thick Gold over .000050 Min. thick Nickel



EXPLODED ISOMETRIC VIEW



HDB³ STACKER CONNECTOR



FEATURES/BENEFITS

• For applications that need or demand parallel boards

STACKER CONNECTOR – HOW TO ORDER

Mates with:
• Standard Mother Board

1.	2.	3.	4.	5.	6.
	Number of Contacts	Brush Wire Plating	Termination	Contact Termination Finish	Less Hardware (Purchased separately see pg 10 for hardware options)
HDB-D4S	**–120**	**C**	**22**	**2**	**X**

1. Connector Type

HDB-D4S
Designates HDB³ Stacker Connector

2. Number of Contacts

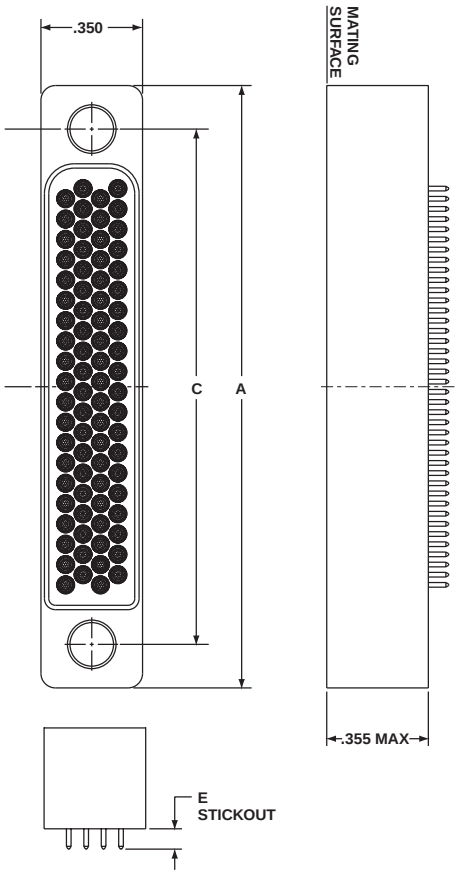
Number Diff Signals	Number of Contacts	Dimension A	Dimension C
040	40	1.375	1.075
060	60	1.725	1.425
080	80	2.075	1.775
120	120	2.775	2.475
160	160	3.475	3.175

3. Brush Wire Plating

M	0.000050 Au Min. thick over Nickel
C	0.000020 Au Min. thick over Nickel

4. Termination

	Type	Stickout (Dim. E)
22	PCB, Straight, .016 Dia	0.100
23	PCB, Straight, .016 Dia	0.130
24	PCB, Straight, .016 Dia	0.160
28	PCB, Straight, .016 Dia	0.280



5. Contact Termination Finish

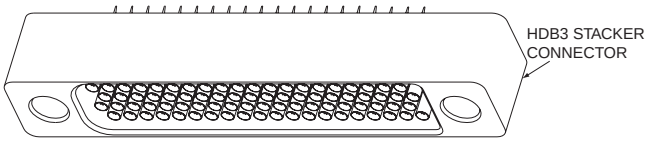
2	Gold plated in accordance with MIL-G-45204, Type II, .00030 Min. thick Gold over .000050 Min. thick Nickel

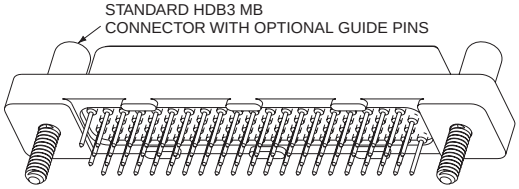
6. Hardware

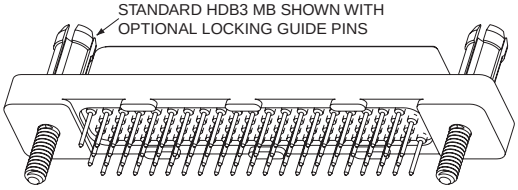
X	Less Hardware

Hardware is purchased separately (see page 11 for hardware options).

EXPLODED ISOMETRIC VIEW







HIGH SPEED BRUSH (HSB³) SERIES 3.125 Gb/s

BENEFITS.

- High speed configuration available that allows data rates up to 3.125 Gb/s via 100 ohm matched impedance differential pairs
  - — Partially populated standard HDB³ mother board & daughter board bodies
- Contact a Sales Engineer for validation results

MOTHER BOARD – HOW TO ORDER

Mates with:
• High Speed Daughter Board

1.	2.	3.	4.	5.	6.	7.
	Number of Differential Pairs	Differential Signal	Brush Wire Plating	Termination	Contact Termination Finish	Less Hardware (Purchased separately see pg 10 for hardware options)
HSB-M4	**–03**	**D**	**M**	**24**	**2**	**X**

1. Connector Type

HSB-M4
Designates High Speed HSB³ Mother Board

2. Number of Contacts

Number Differential Pairs	No. Low Speed Signals	Dimension A	Dimension C
03	20	1.375	1.075
05	30	1.725	1.425
07	40	2.075	1.775
10	60	2.775	2.475
13	80	3.475	3.175

3. Differential Signal

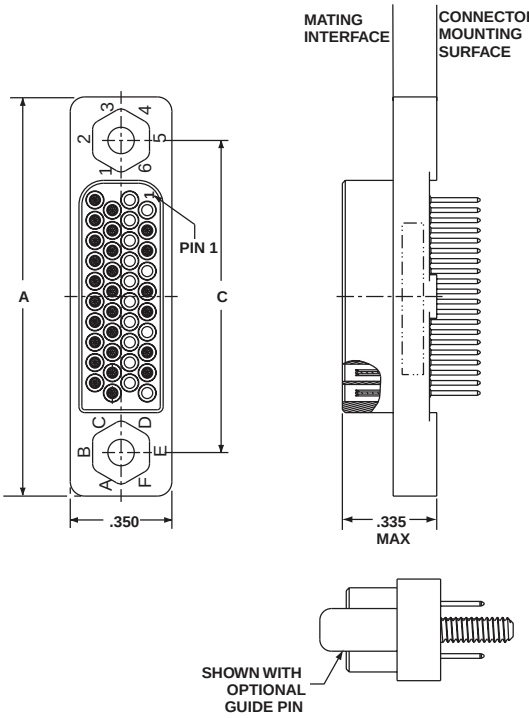
D	Standard

4. Brush Wire Plating

M	0.000050 Au Min. thick over Nickel
C	0.000020 Au Min. thick over Nickel

5. Termination

	Type	Stickout (Dim. E)
22	PCB, Straight, .016 Dia	0.120
23	PCB, Straight, .016 Dia	0.150
24	PCB, Straight, .016 Dia	0.180
26	PCB, Straight, .016 Dia	0.240
28	PCB, Straight, .016 Dia	0.300



6. Contact Termination Finish

2	Gold plated in accordance with MIL-G-45204, Type II, .00030 Min. thick Gold over .000050 Min. thick Nickel
5	Tin plated in accordance with ASTM B545, .00010 Min. thick Matte Tin over .00010 Min. thick Nickel
6	Tin-Lead plated in accordance with SAE-AMS-P-81728, .00010 Min. thick Tin-Lead over .00010 Min. thick Copper

7. Hardware

X	Less Hardware

Hardware is purchased separately (see page 11 for hardware options).

DAUGHTER BOARD – HOW TO ORDER

Mates with:
• High Speed Mother Board

1.	2.	3.	4.	5.	6.	7.
	Number of Differential Pairs	Differential Signals	Brush Wire Plating	Termination	Contact Termination Finish	Less Hardware (Purchased separately see pg 10 for hardware options)
HSB-D4	–03	**D**	**M**	**02**	**2**	**X**

1. Connector Type

HSB-D4

Designates High Speed HSB³ Daughter Board

2. Number of Contacts

Number Diff Pairs	No. Low Speed Signals	Dimension A	Dimension D
03	20	1.375	1.075
05	30	1.725	1.425
07	40	2.075	1.775
10	60	2.775	2.475
13	80	3.475	3.175

3. Differential Signals

D	Standard

4. Brush Wire Plating

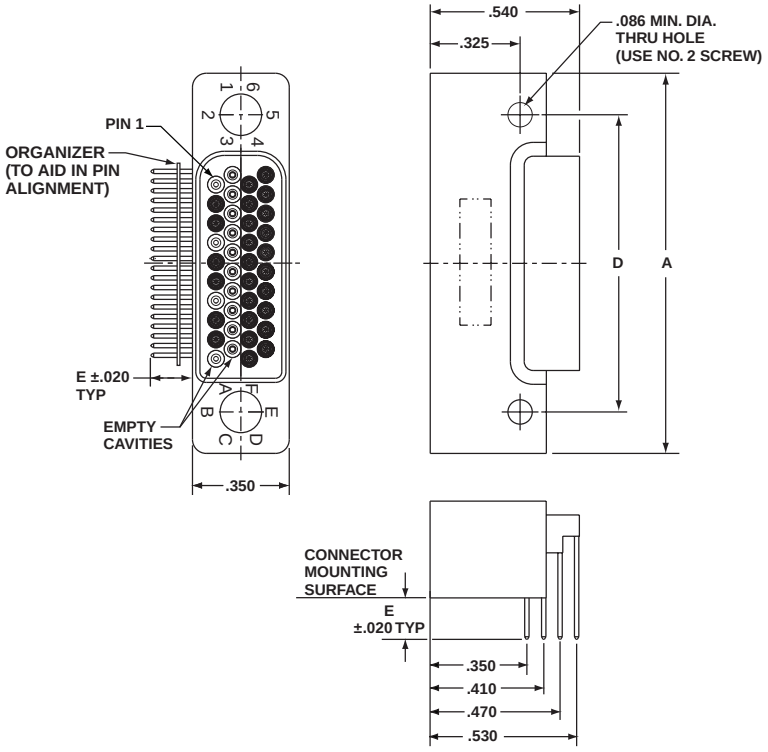
M	0.000050 Au Min. thick over Nickel
C	0.000020 Au Min. thick over Nickel

5. Termination

	Type	Stickout (Dim. E)
01	PCB, Right Angle, .016 Dia	0.090
02	PCB, Right Angle, .016 Dia	0.120
03	PCB, Right Angle, .016 Dia	0.150
04	PCB, Right Angle, .016 Dia	0.180
06	PCB, Right Angle, .016 Dia	0.300

6. Contact Termination Finish

2	Gold plated in accordance with MIL-G-45204, Type II, .00030 Min. thick Gold over .000050 Min. thick Nickel
5	Tin plated in accordance with ASTM B545, .00010 Min. thick Matte Tin over .00010 Min. thick Nickel
6	Tin-Lead plated in accordance with SAE-AMS-P-81728, .00010 Min. thick Tin-Lead over .00010 Min. thick Copper



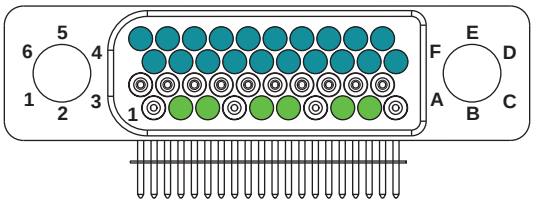
7. Hardware

X	Less Hardware

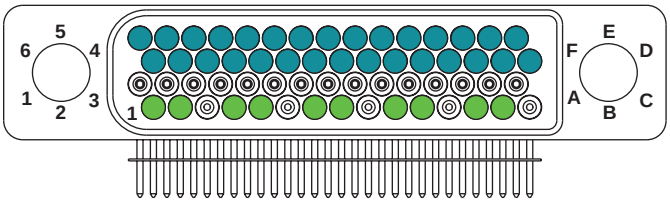
Hardware is purchased separately (see page 11 for hardware options).

HSB³ LAYOUT

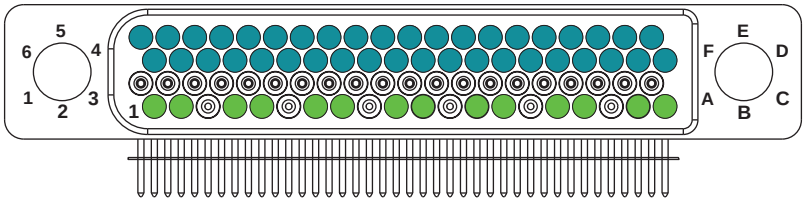
HSB³ ARRANGEMENTS



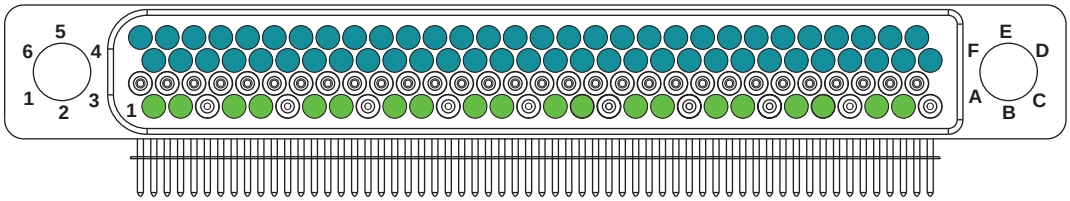
40 Pin Body with 3 Differential Pair, 20 Signal Contacts



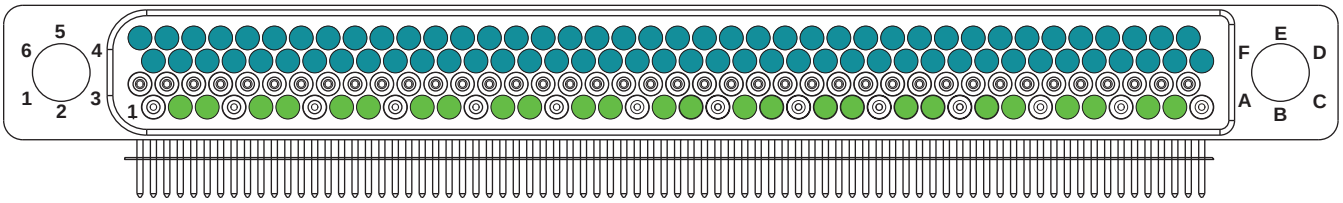
60 Pin Body with 5 Differential Pair, 30 Signal Contacts



80 Pin Body with 7 Differential Pair, 40 Signal Contacts



120 Pin Body with 10 Differential Pair, 60 Signal Contacts



160 Pin Body with 13 Differential Pair, 80 Signal Contacts

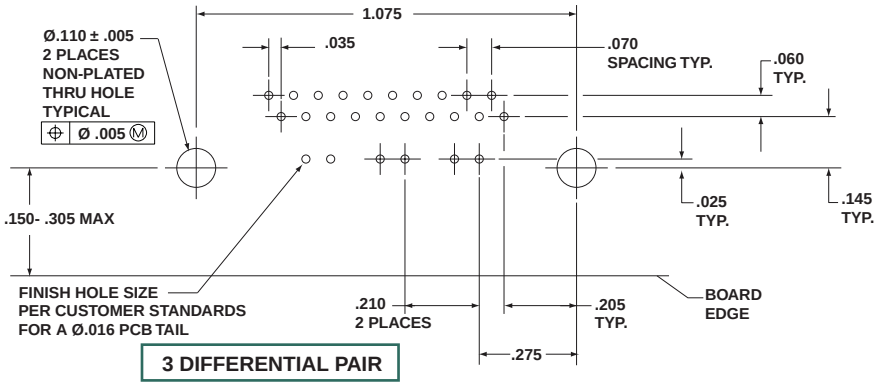
As viewed from front of daughter board connector

KEY

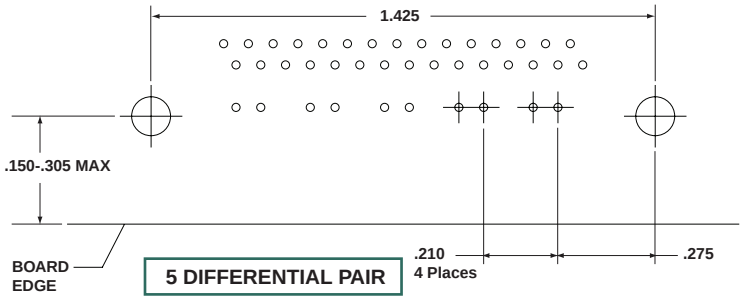
- 100 Ohm Differential Pair Contacts
  (100 Ohm Differential contact pairs capable of 3.125 Gb/s data rates)
- Empty Contact Cavity
- Standard Digital, Low Speed Signal Contacts

HSB³ RECOMMENDED BOARD LAYOUT

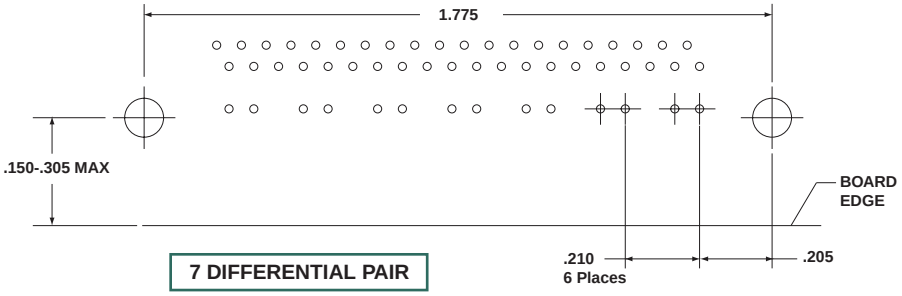
DAUGHTER BOARD



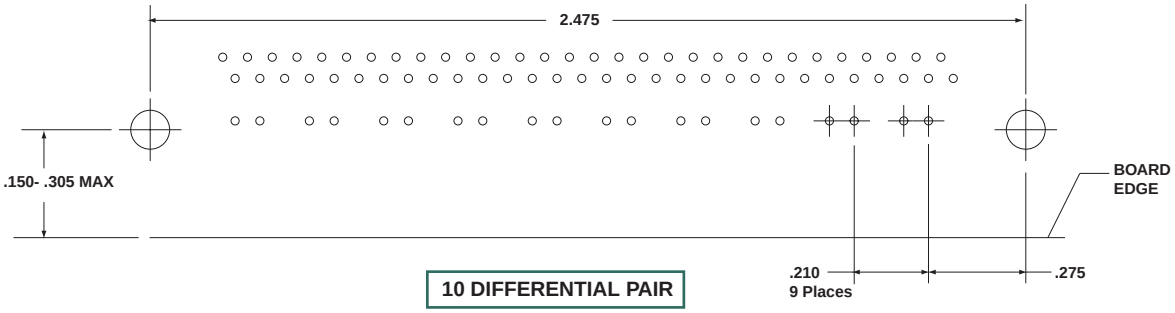
3 DIFFERENTIAL PAIR



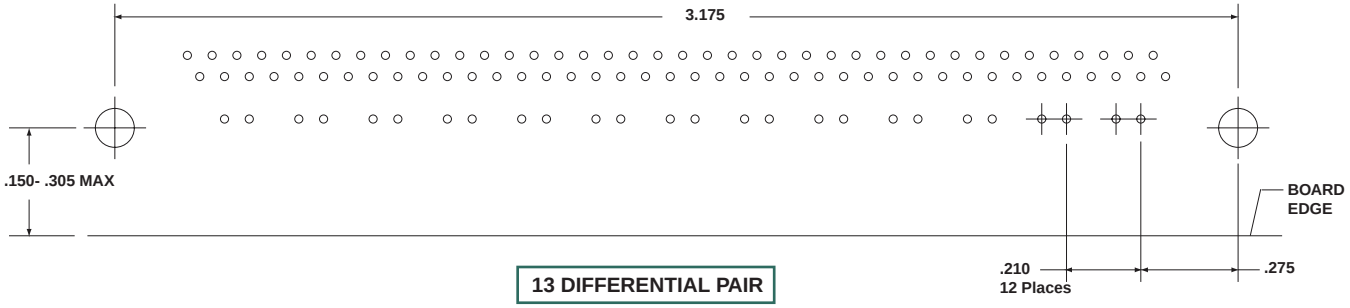
5 DIFFERENTIAL PAIR



7 DIFFERENTIAL PAIR



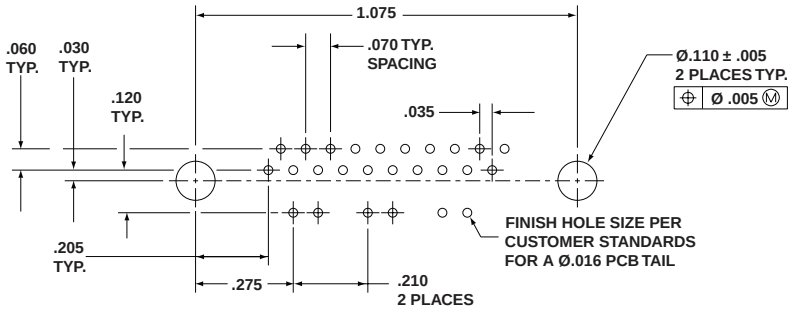
10 DIFFERENTIAL PAIR



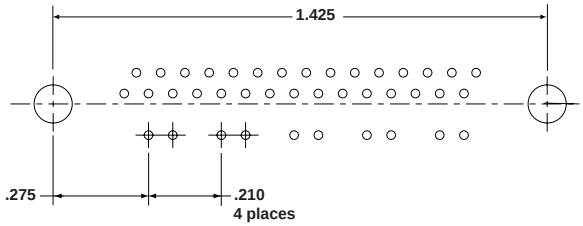
13 DIFFERENTIAL PAIR

HSB³ RECOMMENDED BOARD LAYOUT

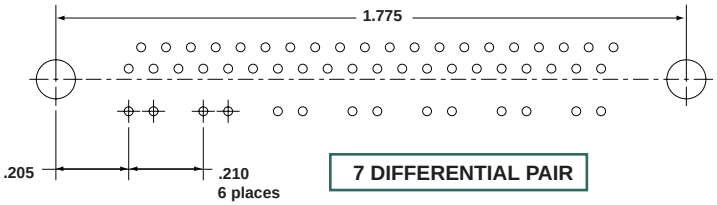
MOTHER BOARD



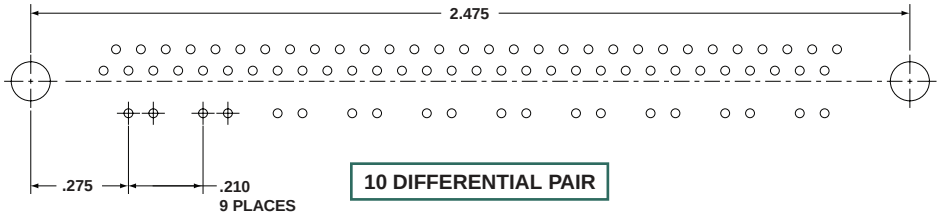
3 DIFFERENTIAL PAIR



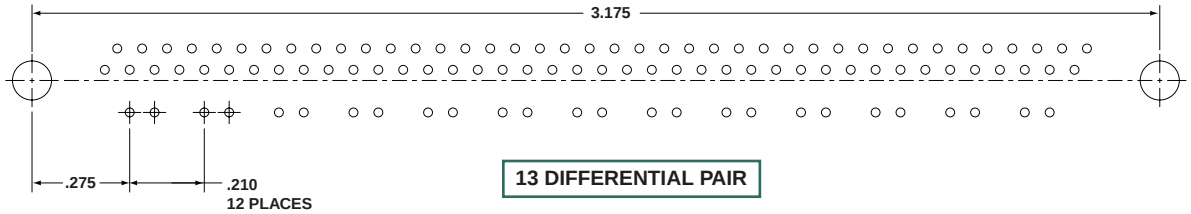
5 DIFFERENTIAL PAIR



7 DIFFERENTIAL PAIR



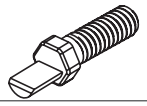
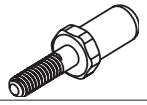
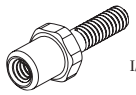
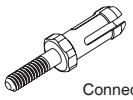
10 DIFFERENTIAL PAIR



13 DIFFERENTIAL PAIR

HARDWARE FOR HDB³ AND HSB³ CONNECTORS

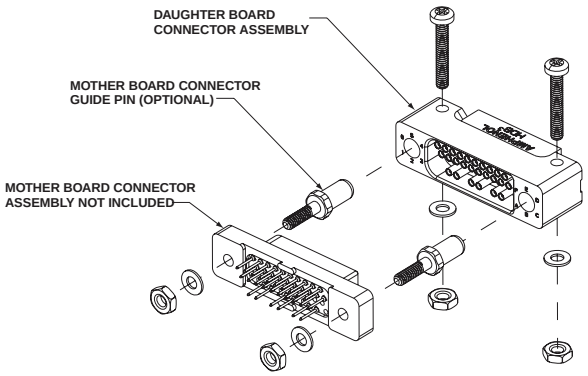
HARDWARE FOR ALL CONFIGURATIONS (Sold Separately)

MOTHER BOARD			
PART NUMBER	TYPE	STICKOUT	
HDB-508803-001	POLARIZATION KEY (QTY 2)	0.250	
HDB-508803-002	POLARIZATION KEY (QTY 2)	0.500	
HDB-508803-003	POLARIZATION KEY (QTY 2)	0.750	
HDB-508802-001	GUIDE PIN (QTY 2)	0.250	
HDB-508802-002	GUIDE PIN (QTY 2)	0.500	
HDB-508802-003	GUIDE PIN (QTY 2)	0.750	
HDB-508808-000	THREADED BOSS (QTY 2)*	0.250	 Accepts I/O Connector Jack Screw
HDB-508808-001	THREADED BOSS (QTY 2)*	0.500	
HDB-508808-002	THREADED BOSS (QTY 2)*	0.750	
HDB-508808-020	LOCKING GUIDE PIN (QTY 2)	0.250	 Shown with Mother Board Connector on page 5
HDB-508808-021	LOCKING GUIDE PIN (QTY 2)	0.500	
HDB-508808-022	LOCKING GUIDE PIN (QTY 2)	0.750	

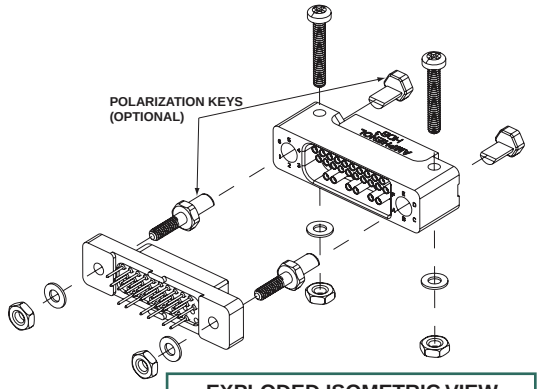
* Required with Mother Board only when mating to I/O Connector

DAUGHTER BOARD		
PART NUMBER	TYPE	
HDB-508804-000	POLARIZATION KEY (QTY 2)	
HDB-508804-001	LOW PROFILE MOUNTING NUT (QTY 2)	

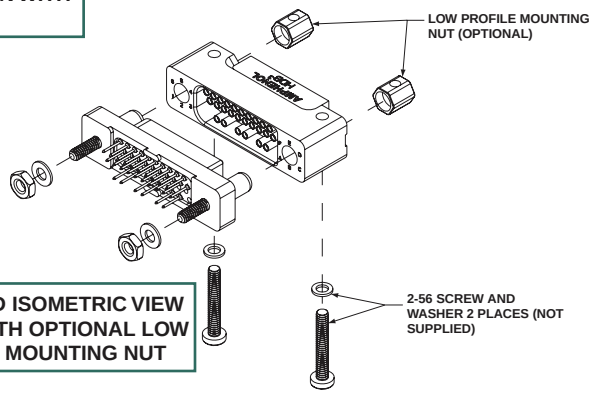
EXPLODED ISOMETRIC VIEW



EXPLODED ISOMETRIC VIEW SHOWN WITH OPTIONAL GUIDE PIN



EXPLODED ISOMETRIC VIEW SHOWN WITH OPTIONAL KEYING



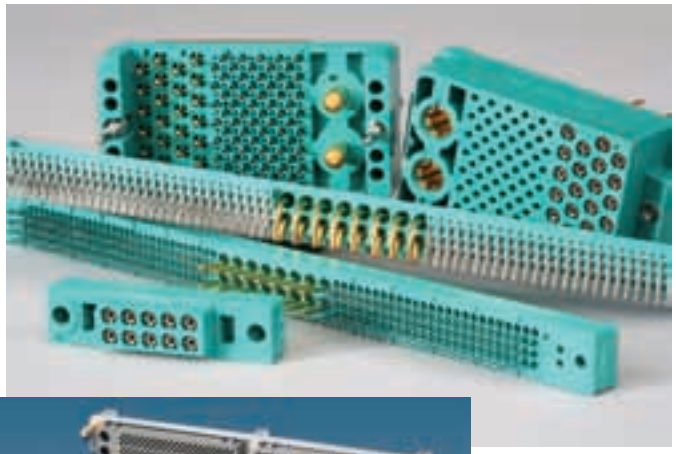
EXPLODED ISOMETRIC VIEW SHOWN WITH OPTIONAL LOW PROFILE MOUNTING NUT

OTHER AMPHENOL RECTANGULAR PRODUCTS

MIL-DTL-55302 BRUSH CONTACT TECHNOLOGY

Amphenol Bristle Brush Contact:
Multiple Strands of High Tensile Strength Wires Bundled Together, Providing Superior Electrical Connection with Low Mating Force

See Amphenol Catalog, 12-035, Low Mating Force Rectangular Connectors, currently on-line at www.amphenol-aerospace.com.*



HIGH PERFORMANCE LINE REPLACEABLE MODULE (LRM)

Amphenol LRM Surface Mount Connectors meet the high density needs of today's integrated electronic modules. Design versatility and product reliability makes Amphenol the premier choice for the system designer in solving board interconnect requirements.

See Amphenol Catalog, 12-037, LRM Interconnect Products, currently on-line at www.amphenol-aerospace.com.*

GIGASTAK & DIGASTAK HIGH SPEED RECTANGULARS

New family of high speed LRM connectors that are capable of achieving data rates in excess of 6.25 Gpbs via 100 ohm matched impedance differential pairs. Each insert arrangement has been optimized through strategic placement of signal and gorund contacts for the perfect balance of impedance control and cross talk mitigation for a given data rate. This series also offers a unique solderless termination to module cards via Amphenol Intercon's cStack technology.

Consult Amphenol Aerospace for futher information.

MEDICAL CABLE CONNECTORS

- Utilize high performance B^3 brush contact
- 10 contacts per connector
- Plug – crimp removable contacts
- Receptacle – printed circuit board contacts
- Currently available in 12 colors, each with a unique key-ing combination (plug only, user is to provide key hole for receptacle)
- Also offered as partially populated
- Notches in plug connector to assist with over molding

For more information see Amphenol Catalog, 12-035, Low Mating Force Rectangular Connectors, currently on-line at www.amphenol-aerospace.com.*

* Amphenol Aerospace will be providing a Combined Rectangular Products catalog, 12-R1, which will combine the products covered in 12-035, 12-037, the HDB3 and HSB3 product covered in this catalog, along with other Amphenol Rectangular interconnect products. Ask for the new combined Amphenol Rectangular Interconnect Products catalog; available Jan. 2011.